Addendum 4

Project Title: Roof Replacement
Building 20
Central Experimental Farm (CEF), Ottawa (Ontario)

Solicitation No: 14-1109 August 27, 2014

The following changes in the tender documents are effective immediately. This addendum will form part of the contract documents

---

Q & A

Q10. Does the concrete deck have a slope? Will the project require tapered insulation acres the entire area included in the specifications?

A10. Bidders are to assume that the concrete deck has a slope, therefore tapered insulation will not be required.

DRAWINGS AND SPECIFICATIONS

1. At Division 07 "Thermal and Moisture Protection":

Delete Section 07 55 20 – SBS Roof Concrete **in its entirety**
Replace with: Section 07 55 20 – Revised SBS Roof Concrete

2. At Division 07 "Thermal and Moisture Protection", Section 07 62 00 "Metal Flashing and Trim", Article 2.2.1:

Delete: Standard of Acceptance shall be Tremco Dymonic, Sikaflex 1a by Sika, or Sternson RC-1.

3. At Division 07 "Thermal and Moisture Protection", Section 07 92 00 "Joint Sealing":

Delete article 2.2.1.1 in its entirety

ALL OTHER TERMS AND CONDITIONS REMAIN THE SAME

1 General

1.1 This specification section applies to the SBS roof replacement of the south west roof section of Building #20 located at 960 Carling Avenue Ottawa.

1.2 Summary of Work.

.1 Remove and discard from site existing roof system (metal flashings, insulation and membranes) down to the existing vapour barrier. Remove and discard membranes from ductwork. The existing ballast can be disposed of on site for future use by the client.

.2 Inspect vapour barrier for visible signs of mould. Test sample if mould suspected, remediate if required, at additional cost to owner.

.3 Remove and discard from site any loose or deteriorated vapour barrier.

.4 Inspect concrete deck for any signs of significant cracking, spalling, exposed reinforcement, or surface deterioration. Repair deck as directed by Consultant.

.5 Install new plywood and blocking to up stands, parapets, and wall junction substrates as per detail and approved shop drawings. Ensure minimum membrane flashing height of 200 mm.

.6 Install new self-adhesive vapour barrier continuity strips as vapour barrier wrap / flame stop membrane at all up stands, parapets, and wall junctions. Ensure 75 mm extension above insulation overlay board finish height.

.7 Prime and install new torch applied modified bitumen vapour barrier.

.8 Replace existing drains with new retrofit drains. Review drainage before proceeding with insulation installation.

.9 Adhere Polyisocyanurate insulation.

.10 Adhere bituminous insulation overlay.

.11 Install torch applied base sheet.

.12 Install self-adhesive base sheet flashings

.13 Install torch applied cap sheet and cap sheet flashings.

.14 Install waterproofing for the duct work. Duct work might be required to be lifted during the base and cap sheet membrane installation depending on the site conditions after the removal of existing system.

1.3 REFERENCE STANDARD(S)

.1 Wind Uplift resistance

.1 Submit a report, issued by a certified materials testing laboratory, attesting that the specified roofing system was tested in accordance with CSA A123.21-10, *Standard test method for the dynamic wind uplift resistance of membrane-roofing systems*. Test results shall demonstrate that the roofing system provides a Dynamic Uplift Resistance (DUR) of 75 psf or;

.2 Submit a report showing that the specified roofing system has been tested for Wind Uplift Resistance in accordance with FM 4470 Standard. The test results shall demonstrate that the roofing system provides a resistance of 90 psf for

the field surface of the roof. Edges and corners must be installed according to the requirements listed in FM PLPDS 1-29.]

.2 Membranes must meet or exceed requirements of CGSB 37.56–M (9th Draft), *Membrane, Modified, Bituminous, Prefabricated, and Reinforced for Roofing*.]

.3 Membranes must meet or exceed requirements of ASTM D 6162, Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fibre Reinforcements.]

.4 Membranes must meet or exceed requirements of ASTM D 6163, Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Glass Fibre Reinforcements.

.5 Polyisocyanurate thermal insulation boards must meet or exceed requirements of CAN/ULC S704-011, *Thermal Insulation, Polyurethane and Polyisocyanurate, Boards Faced*].

.6 Roofing system must meet or exceed requirements of CAN/ULC-S107-10, Methods of Fire Tests of Roof Coverings, Class C.

1.4 COMPATIBILITY

.1 All waterproofing materials will be single sourced from the same manufacturer, or approved for use in their total system warranty, and included in their wind uplift and fire resistance approvals.

1.5 TECHNICAL DATA

.1 Submit two (2) copies of the most current technical data sheets. These documents must describe the materials' physical properties.

1.6 CONTRACTOR QUALIFICATION

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

.2 Roofing contractors must also be registered with manufacturer’s certification program and provide the Consultant with a manufacturer certificate to this effect before beginning any roofing work.

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

.4 The contractor must submit 3 projects successfully completed within the last 3 years for which the work was, minimum, of same quantity and quality as those included in the presents. Every submitted project must be accompanied with a reference including its name and phone number.

1.7 MANUFACTURER'S REPRESENTATIVE

.1 The roofing product manufacturer must delegate a representative to visit the work site at the start of roofing installation, upon completion, and at all other times as required to enable them to warrant the completed work. It is incumbent upon the Roof Contractor to ensure this takes place.

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

1.8 INSPECTION

.1 Roof installation inspections will be performed by the Consultant.

.2 All inspection fees will be paid by the owner, unless deficient workmanship results in additional and unforeseen inspection requirements. Additional inspections due to poor workmanship or planning may be invoiced to the contractor

1.9 PRE-INSTALLATION MEETING

.1 Attend an on-site pre-roof meeting [prior to commencement] with the roofing contractor's representative, roofing foreman, and the Consultant present. The purpose of this meeting is to review site conditions, scope of work, installation procedures and others particular to the project.

1.10 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, elevated 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 $+10^0$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 $+5^0$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; metal flashings will be secured and stored to avoid creasing, buckling, scratches or any other possible damage.

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

1.11 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 CRCA 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 on location at least one hour after torch application completion to perform the "fire watch inspection".

.4 Never apply the torch directly to any combustibles.

.5 Throughout roofing installation, maintain a clean site and have one approved ABC fire extinguisher within 6 metres of each operable roof 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. Heating of propane bottles is strictly prohibited.

1.12 WARRANTIES

.1 The membrane manufacturer will issue a written document in the owner's name, valid for a 10 year period, saying that it will repair any leaks in the roofing membrane to restore the roofing system to a dry and watertight condition, to the extent that defects in roofing material or installation methods caused water infiltration. The warranty must cover for the entire cost of the repair(s), excluding removal of overburden, during the entire warranty period. The warranty must be transferable, at no extra cost, to subsequent building owners.

.2 The contractor will provide a written and signed document to the owner certifying that the work executed will remain in place and free of waterproofing defect for a period of 2 years from the date of acceptance.

2 Products

2.1 DESIGN REQUIREMENTS

.1 The roof engineering design has been completed using an assembly of materials as required to produce a complete roofing system with the necessary wind uplift resistance, fire resistance, total system warranty, and other requirement s of the specifications and provincial building code. All proposed systems must meet the individual product specifications below, as well as required system performance:

2.2 MODIFIED BITUMEN VAPOUR BARRIER:

.1 Description: The SBS modified bitumen membrane shall be reinforced with a fibreglass mat in conformance with Prefabricated membrane, complying with CAN/CGSB 37.56-M (9th draft). The upper surface is sanded; the under face is covered with a thermo fusible plastic film.

.2 In conformance with: CAN/CGSB 37.56-M (9th Draft).

.3 Properties:

		MD	XD
.1	Strain energy (kN/m)	1.3	1.3
.2	Breaking strength (kN/m)	11	8.5
.3	Ultimate elongation (%)	4	4
.4	Tear resistance (N)	30	
.5	Static puncture resistance (N)	160	
.6	Dimensional stability (%)	0	0
.7	Plastic flow (°C)	≥110	
.8	Cold bending at -30 °C	No cracking	
.9	Thickness (mm)	2.2m	
.10	Roll Dimension	15m x 1m	

2.3 VAPOUR RETARDER CONTINUITY STRIP

.1 Description: Self-adhesive flame stop membrane composed of glass fleece reinforcement and SBS modified bitumen.

2.4 INSULATION

.1 Description: Closed-cell, Polyisocyanurate foam core integrally laminated to heavy, black (non-asphaltic), fibre-reinforced organic felt facers.

.2 LTTR (long-term thermal resistance) values determined in accordance with CAN/ULC-S770 and ASTM C 1289.

.3 Recycled Content: Between 16% and 43% by weight, depending on thickness (57% post-consumer, 43% pre-consumer).

.4 1.2 m. x 1.2 m (4'x 4'). Thickness 84 mm (3.3"), R20.

.5 Pre-fabricated drain sumps, 2.4m x 2.4m (8' x 8'), reducing thickness of insulation by a minimum of 25 mm (1") at all drains

2.5 INSULATION OVERLAY

.1 Description: Multi-ply, semi-rigid asphaltic roofing substrate board composed of a mineral fortified asphaltic core formed between two asphaltic saturated fibreglass liners. Length 1.2 m. x width 1.5 m x thickness 3.2 mm.

2.6 ROOF MEMBRANES

.1 Base Sheet Membrane for Field Surface

.1 Description: Roofing membrane composed of SBS modified bitumen and a composite reinforcement. The surface is covered with a thermofusible plastic film, the underside is sanded. The surface must be marked with three (3) chalk lines to ensure proper roll alignment.

.2 In conformance with: CGSB 37.56-M (9th Draft).

.3 Properties:

		MD	XD
.1	Strain energy (kN/m)	7.8	7.2
	Breaking strength (kN/m)	15	13.5
.2	Ultimate elongation (%)	60	65
.3	Tear resistance (N)	125	
.4	Static puncture resistance (N)	560	
.5	Dimensional stability (%)	0.2	0
.6	Plastic flow (°C)	≥ 110	
.7	Cold bending at -30 °C	No cracking	
.8	Lap joint strength (kN/m)	Pass > 4 kN/m	

.2 Base Sheet Membrane for Flashings and Parapets

.1 Description: Membrane composed of SBS modified bitumen and composite] reinforcement. The surface is covered with a thermofusible plastic film and the underface is covered with a release protection film. The surface shall be marked with three (3) chalk lines to ensure proper roll alignment.

.2 In conformance with: CGSB 37.56-M (9th Draft).

.3 Roofing Cap Sheet Membrane for Field And Parapet Surfaces

.1 Description: Roofing membrane composed of SBS modified bitumen with a composite reinforcement and elastomeric bitumen [with flame-retarding agent]. The surface is protected by coloured granules. The underface is covered with a thermofusible plastic film.

.2 In conformance with: CGSB 37.56-M (9th Draft).

.3 Properties:

		MD	XD
.1	Strain energy (kN/m)	7.8	7.2
.2	Breaking strength (kN/m)	15	13.5
.3	Ultimate elongation (%)	60	65
.4	Tear resistance (N)	125	
.5	Static puncture resistance (N)	560	
.6	Dimensional stability (%)	0.2	0
.7	Plastic flow (°C)	≥ 110	
.8	Cold bending at -30 °C	No cracking	
.9	Lap joint strength (kN/m)	Pass > 4 kN/m	

2.7 ACCESSORY MEMBRANES

.1 Reinforcement membrane:

.1 Description: Roofing membrane with composite heavy duty reinforced and SBS modified bitumen. Both sides are covered with a thermofusible plastic film. The top face must be marked with three (3) distinctive blue chalk lines to ensure proper roll alignment.

.2 Prefabricated membrane, complies with CAN/CGSB 37-GP-56M (9th draft)

2.8 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 Primer for self-adhesive membranes

.1 Description: Polymeric emulsion finish designed to improve adherence of self-adhesive waterproofing membranes when solvent-based primer is not recommended.

2.9 ADHESIVES

.1 Insulation adhesive:

.1 Description: A highly elastomeric, two components, one step, all purpose, foamable adhesive that contains no solvents and sets in minutes.

2.10 PLUMBING STACKS

.1 Plumbing stacks to be one piece, spun aluminum vents with cap to match.

2.11 RETROFIT ROOF DRAINS

.1 Description Aluminum retrofit drain insert using U-Flow connectors, complete with cast aluminum domes and copper flange.

.2 Outlet pipe and U-FLOW connector size to match existing drain line diameter.

2.12 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 Sealing product

.1 Description: Composed of a bitumen/polyurethane waterproofing mono-component and polyester reinforcements. Designed to finish up stands and details.

2.13 Gas Line Supports.

.1 Description: Pipe support manufactured of recycled rubber base.

2.14 Aluminized Waterproofing Membrane for Ductwork.

.1 Description: Self-adhesive membrane composed of SBS modified bitumen, self-protected by an aluminum sheet.

2.15 Roof Details for Electrical Penetrations

.1 Post Flashing shall consist of a 300 mm high 0.080 seamless spun aluminum base riveted to a rigid PVC electrical socket or switch cover.

.2 Post Flashing shall be installed by the Contractor in accordance with manufacturer's installation instructions.

.3 All electrical work shall be completed and tested by certified electrician.

3 Execution

3.1 SURFACE EXAMINATION AND PREPARATION

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

.2 Before roofing work begins, the Consultant and Contractors representatives will inspect and approve deck conditions (including slopes and wood blocking) as well as up stands, parapets, construction joints, roof drains, plumbing vents, ventilation outlets and others. The start of roofing work will certify that roofing conditions are acceptable for work to commence.

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

.4 Make sure plumbing, carpentry, mechanical, electrical and all other project related items have been duly completed as required.

.5 No materials to be installed during rain, snowfall and or inclement weather.

3.2 SET-UP

.1 Advise consultant of set-up schedule with dates, times and expected durations for all activities.

.2 Review with Consultant and Owner to a agree upon staging area or areas required to complete the project in a safe and timely manner with as minimum inconvenience to the occupants as possible. This must take into account all activities for the duration of the project such as, locations for tar kettles, disposal bins, propane storage, transports, toilets, cranes, and the various staging areas for hoisting and removals etc.

3.3 CLEANING

.1 The entire work site must be routinely [minimum daily] organized and or cleared of rubbish, materials, tools and equipment which may hinder roof installation, performance, fire hazards and to eliminate dangerous conditions to the occupants and public.

3.4 EQUIPMENT FOR WORK EXECUTION

.1 Maintain all equipment and tools used during the project in a respectable working order.

3.5 CURB AND PARAPET MODIFICATIONS.

.1 Calculate height of finished roofing system at all up stands, parapets, roof openings and wall junctions. Submit shop drawings locating and identifying proposed modifications to parapet and curb heights.

.2 Add new plywood and wood blocking as per approved shop drawings to ensure minimum membrane flashing height of 200mm.

3.6 REMOVALS

.1 Remove all existing roofing membrane and metal flashings down to existing vapour barrier.

.2 Prepare existing substrates to receive new roofing system.

3.7 APPLICATION OF TORCH-APPLIED VAPOUR RETARDER

.1 Primer must be dry prior to the installation of the vapour barrier membrane.

.2 Starting at the lowest point of the roof slope, the vapour barrier membrane must be heat-welded onto the substrate in conformance with manufacturer’s written recommendations.

.3 Overlap adjacent rolls of 75 mm (3 in) and 100 mm (4 in). End laps must be 150 mm (6 in). Space end laps by at least 300 mm (12 in).

.4 The roof vapour barrier must meet and overlap the air/vapour barrier on adjoining walls to ensure total continuity.

.5 Turn up vapour barrier at insulation perimeters and around each element penetrating it to ensure sealed connections with flashing base sheet.

3.8 INSULATION INSTALLATION

.1 Apply insulation to vapour retarder or to adjoining board with specified adhesive applied in 2 cm. wide bands every 33 cm. using the manufacturer’s approved applicator. Apply at a rate of 2 kg to 3 kg. per square metre with additional as specified at perimeters and corners to prevent wind uplift.

.2 Install boards in a staggered formation, butting all edges closely and score cut to eliminate all cupping and warping.

.3 Score cut boards as required at all undulations in the substrate to allow for full contact and walk in place to ensure full adhesion. Particular attention required at all slopes in the concrete slab.

.4 Cut insulation boards to fit snugly at all perimeters, roof opening etc. but not oversized to damage the vapour barrier during installation.

.5 Install only as much insulation as can be covered and completed in a water tight fashion by days end.

.6 All gaps in the insulation around roof penetrations etc are to be packed with fibregalss batt insulation.

3.9 INSTALLATION OF INSULATION OVERLAY

.1 Apply boards with the specified adhesive; applied in 2 cm. wide bands every 33 cm. using the manufacturer's approved applicator. Apply at a rate of 2 kg to 3 kg. per square metre.

.2 All vertical joints between boards and insulation will be staggered.

.3 All the panels will be installed in a tight fitting, level manner with adherence as per the manufactures instructions.

.4 Apply only as many boards as can be covered and made in a water tight condition by the days end.

3.10 INSTALLATION OF TORCH APPLIED BASE SHEET

.1 Loose lay the base sheet membrane on the substrate, taking care to align the starting edge of the roll with the drain.

.2 After alignment back roll the membrane and commence the torch application while obtaining a continuous bead of bitumen at the side laps as the membrane is unrolled and assuring the complete adherence throughout.

.3 Each strip should overlap the preceding strip by 75 mm. along the side joint (use the blue line to facilitate alignment) and by 150 mm. at the ends. Stagger the end joints by at least 300 mm.

.4 At end laps, angle-cut the corners that will be covered by the following roll.

.5 Special care must be taken to avoid creating wrinkles, blisters, and fish mouths in the base sheet membrane.

3.11 BASE SHEET FLASHING INSTALLATION (SELF ADHERED)

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

.2 Before applying membranes, always burn the plastic film from the section to be covered if there is an overlap (inside and outside corners and field surface). For sanded base sheet membranes, apply primer for self-adhesive membrane on the area to be covered at the foot of the parapets.

.3 Cut off corners at end laps of areas to be covered by the next roll.

.4 Each selvedge will overlap the previous one along lines provided for this purpose, and by 150 mm (6 in) at the ends.

.5 Position the pre-cut membrane. Remove 150 mm (6 in) of the silicone release film to hold the membrane in place at the top of the parapet.

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

.7 Install a reinforcing gusset at all inside and outside corners.

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

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

3.12 INSTALLATION OF TORCH-APPLIED CAP SHEET

.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 At end laps, cut at 45° the area to be covered with an additional cap sheet sidelap.

.5 Overlap cap sheet side laps by 75 mm. and end laps by 150 mm. All overlap surfaces must be degranulated. End laps should be staggered by a minimum of 300mm

.6 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.

.7 Avoid overheating.

.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.) During installation, take care to avoid excessive bitumen bleed-out at joints.

.9 Avoid walking on recently installd and still hot membranes

.10 Once cap sheet is installed, carefully check all overlapped joints with a trowel to ensure a full weld at all seams where bleed-out is not visible.

3.13 INSTALLATION OF THERMOFUSIBLE CAP SHEET ON FLASHINGS AND PARAPETS

.1 This cap sheet must be installed in one-metre-wide strips (3.25 ft).

.2 Each selvedge will overlap the previous one laterally along lines provided for this purpose, and will overlap by 150 mm (6 in) the field surface. Membranes for flashings must be spaced at least 100 mm (4 in) with respect to the cap sheet membranes on the field surface, to avoid areas of excessive membrane thickness.

.3 Cut off corners at end laps on areas to be covered by the next roll.

.4 Use a chalk line to draw a straight line on the field surface, 150 mm (6 in) from flashings and parapets.

.5 Use a 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 flashing or parapet, as well as on the granulated vertical surfaces to be overlapped.

.6 This cap sheet will be heat-welded directly to the base sheet membrane, proceeding from bottom to top.

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

.8 During installation, be careful not to overheat the membrane and its reinforcements.

3.14 ROOFING FOR VARIOUS DETAILS

.1 All existing rain water leaders to be toughly prepared within to allow for a complete and uninterrupted seal with the new u-flow connector.

.2 Install waterproofing membranes in conformance with various roofing details illustrated in the Manufactures manual.

.3 ENSURE ALL MECHANICAL AND ELECTRICAL PENETRATIONS ARE WATERPROOFED WITH A SUITABLE PRE-FABRICATED ROOF ACCESSORY, AN INSULATED BOX, OR TWO-PART POLYURETHANE INTERCLIP SYSTEM BY SOPREMA.

- END OF SECTION -