

**TOWN OF BLIND RIVER  
REQUEST FOR TENDER  
NEW BLIND RIVER WATER TREATMENT PLANT INTAKE AND LOW LIFT PUMPING STATION  
CONTRACT NO. PS-2026-01**

**ADDENDUM #3  
February 13<sup>th</sup>, 2026**

This addendum shall form part of the Contract Documents. The Addendum issued shall be indicated in FT.05 ADDENDA of the FORM OF TENDER.

**QUESTIONS & ANSWERS**

**Q1: Is a plan takers list available?**

A1: All Bidders and Suppliers are encouraged to register on MERX at <https://www.merx.com/solicitations/open-bids/Blind-River-Water-Treatment-Plant-Intake-and-Low-Lift-Pumping-Station/0000313363> so updated plan takers lists can be issued from time to time. The Town is exploring options with MERX to allow public viewing of current plan takers.

The Town has published an updated plan takers list to the MERX platform which shall be considered as Addendum No. 2 for addendum tracking purposes. No other information was included under Addendum No. 2..

**Q2: Will you include specific valve supplier to the tender documents?**

A2: "No ruling on proposed alternate equipment as acceptable will be made prior to acceptance of a Bidder Submission. For further information Bidders shall refer to Specification Section 01200 – Alternatives."

**Q3: Can you provide the budget or engineers estimate is for this project?**

A3: No, budget and estimates will not be provided.

**Q4: Why are bonding and mobilization/demobilization items listed in the Miscellaneous Table, which identifies them as those that the owner may NOT pay?**

A4: Bonding, as well as Mobilization and Demobilization Items will be paid for by the Town. The other items are provisional and subject to the Owner's acceptance.

**ADDITIONS & DELETIONS TO THE TENDER**

Please note the following changes to Section 9. SPECIFICATIONS, of the tender:

- 1.1 ADD: Section 08310 Access Hatches, as attached.
- 1.2 DELETE: Section 15810 Ductwork and Accessories, in its entirety,  
and REPLACE WITH: Section 15810 Ductwork and Accessories, as attached.

Please note the following changes to Section 10. FORM OF TENDER of the tender, FT.10 DETAILED CONTRACT PRICE BREAKDOWN

- 2.1 DELETE: Table for DIVISION 8 – DOORS AND WINDOWS, in its entirety, and REPLACE with,

Section	Title	Total*
8110	Steel Doors and Frames	
8200	FRP Doors and Frames	
8310	Access Hatches	
8710	Door Hardware	
8800	Fire-Rated and Safety Glass	
Total Price for Division 8:		

2.2 DELETE: MISCELLANEOUS ALLOWANCE TABLE, in its entirety, and REPLACE with,

The Bidder agrees that they are not entitled to payment of Miscellaneous Allowance items, except for additional work carried in accordance with the Contract as directed by the Owner and/or Consultant and only to the extent of such additional work as directed by the Owner and/or Consultant.

Item No.	Specification Number	Description	Unit of Measure	Estimated Quantity	Unit Price	Total*
2	Section 01025-1.7.8.1	Redline Drawings as per Section 01780	Lump sum	1	\$ 75,000.00	\$ 75,000.00
3	Section 01025-1.7.8.2	O&M Manual as per Section 01780	Lump sum	1	\$ 25,000.00	\$ 25,000.00
4	NA	Allowance for Utilities Coordination	Lump sum	1	\$ 50,000.00	\$ 50,000.00
5	NA	Contingency Allowance	Lump sum	1	\$ 900,000.00	\$ 900,000.00
					Subtotal:	\$ 1,050,000.00

**End of Addendum 3**

Encls.

**Sec15810 Ductwork & Accessories (13 Pages)**

**Sec08310 Access Hatches (6 Pages)**

## **1 GENERAL**

### **1.1 Scope of Work**

1.1.1 Work included: Furnishing and installing factory fabricated floor access hatches.

### **1.2 Related Work**

1.2.1 Section 03300 – Cast-in-Place Concrete

1.2.2 Section 05500 – Metal Fabrications

### **1.3 References**

1.3.1 All products shall conform to the following standards and regulations:

.1 American Society for Testing and Materials (ASTM):

- .1 ASTM A53/A53M-18 - Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless
- .2 ASTM A123/A123M-17 – Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
- .3 ASTM A276/A276M-24a – Specification for Stainless Steel Bars and Shapes

.2 Canadian Standards Association (CSA):

- .1 CSA G40.20-13/G40.21-13 (R2023) - Structural Quality Steels
- .2 CAN/CSA-G164-18 (R2023) - Hot-Dipped Galvanizing of Irregularly Shaped Articles
- .3 CSA S16-19 - Design of Steel Structures
- .4 CSA W59-24 - Welded Steel Construction

.3 Master Painters Institute (MPI):

- .1 MPI #18 – Primer, Zinc Rich, Organic
- .2 MPI #79 – Primer, Alkyd, Anti-Corrosive for Metal
- .3 MPI #35 – Bituminous Coating

### **1.4 Submittals**

1.4.1 Product Data: Provide manufacturer's product data for all materials in this specification.

1.4.2 Samples: Manufacturer to provide upon request; sized to represent material adequately.

1.4.3 Shop Drawings: Show profiles, accessories, location and dimensions. Stamped by a Professional Engineer licensed to practice in the Province of Ontario.

1.4.4 Contract Closeout: Access door manufacturer shall provide the manufacturer's warranty, prior to the contract closeout.

## **1.5 Product Handling**

1.5.1 All materials shall be delivered in manufacturer's original packaging.

1.5.2 Store materials in a dry, protected, well-vented area. The Contractor shall thoroughly inspect product upon receipt and report damaged material immediately to delivering carrier and note such damage on the carrier's freight bill of lading.

1.5.3 Remove protective wrapping immediately after installation (if applicable).

## **1.6 Substitutions**

1.6.1 Proposals for substitution products may be submitted for review following the award of the Contract, as per specification Section 01200 Alternatives. Contractor guarantees that proposed substitution shall meet the performance and quality standards of this specification.

## **1.7 Job Conditions**

1.7.1 Verify that other trades with related work are complete before installing access hatch(s).

1.7.2 Mounting surfaces shall be straight and secure; substrates shall be of proper width.

1.7.3 Refer to the construction documents, shop drawings and manufacturer's installation instructions.

## **1.8 Warranty/Guarantee**

1.8.1 Manufacturer's standard warranty: Materials shall be free of defects in material and workmanship for a period of 10 years from the date of purchase. Should a part fail to function in normal use within this period, manufacturer shall furnish a new part at no charge.

# **2 PRODUCTS**

## **2.1 General**

2.1.1 Hatches shall be pre-assembled from the manufacturer and delivered to site ready to be installed.

2.1.2 Furnish and install hatches to the size and type indicated on plans.

## **2.2 Approved Manufacturers**

2.2.1 BILCO, P.O. Box 1203, New Haven, CT 06505, Phone: (800)366-6530.

- 2.2.2 MSU Mississauga Ltd., 2222 South Sheridan Way, Mississauga, Ontario, L5J 2M4, Phone: (905) 823-4340.
- 2.2.3 Maxam Metal Products Limited Unit 5 - 7978 North Fraser Way Burnaby, B.C. Canada V5J 0C7, Phone (604) 433-4243
- 2.2.4 Acudor Products Ltd., 1125 Squires Beach Rd Pickering, ON L1W 3T9, 844-228-3671 / 905-683-6121, Email: INFO@ACUDOR.CA , URL: www.acudor.com

### **2.3 Floor Drainage Access Hatch**

#### 2.3.1 Acceptable Products:

- .1 Bilco Type 'J-AL'
- .2 MSU Type 'M'
- .3 MSU Type 'MG'
- .4 Acudor FC-H20

#### 2.3.2 Performance characteristics:

- .1 Cover: Shall be reinforced to support a minimum live load of 1464 kg/m<sup>2</sup> with a maximum deflection of 1/150<sup>th</sup> of the span
- .3 Operation of the cover shall be smooth and easy with controlled operation throughout the entire arc of opening and closing.
- .4 Operation of the cover shall not be affected by temperature.
- .5 Entire door, including all hardware components, shall be highly corrosion resistant.
- .6 Mullion in the middle of the hatch (if required) to support cover shall be removable.
- .7 Manufacturer to provide structural calculations, stamped by a Professional Engineer registered in the Province of Ontario, upon request.
- .8 Hatch shall be watertight.
- .9 Hatch shall include retrofit-type safety grating.

#### 2.3.3 Cover:

- .1 Shall be 6.3 mm aluminum diamond pattern
- .2 Cover shall be equipped with a hold open arm that automatically locks the cover in the open position.
- .3 Cover shall be fitted with the required number and size of compression spring operators. Springs shall have an electrocoated acrylic finish. Spring tubes shall be constructed of a reinforced nylon 6/6 based engineered composite material.

- .4 A Type 316 stainless steel snap lock with fixed handle shall be mounted on the underside of the cover.
- 2.3.4 Frame: Channel frame shall be 6.3 mm extruded aluminum with bend down anchor tabs around the perimeter. A continuous EPDM gasket shall be mechanically attached to the aluminum frame to create a barrier around the entire perimeter of the cover and significantly reduce the amount of dirt and debris that may enter the channel frame.
- 2.3.5 Single Safety Gate:
- .1 Operation of the safety gate shall be smooth, opening to 90° upright position, with hold-open rod that locks grate in open position.
  - .2 Designed for a minimum live load of fall protection to satisfy OSHA 29 CFR 1926.502(c)..
  - .3 Grate to be aluminum with a safety-yellow powder coat paint finish for visibility.
  - .4 Hardware components to be made of Type 316 stainless steel.
  - .5 Grate openings to be 100mm x 150mm.
  - .6 Hinges: Shall be heavy forged aluminum hinges, each having a minimum 6.3 mm diameter Type 316 stainless steel pin and shall pivot so the cover does not protrude into the channel frame. They shall be specifically designed for horizontal installation and shall be through bolted to the:
    - .7 cover with tamperproof Type 316 stainless steel lock bolts; and
    - .8 frame with Type 316 stainless steel bolts and locknuts.
- 2.3.6 Drain Coupling: Provide a 38 mm drain coupling located in the right front corner of the channel frame, unless noted otherwise.
- 2.3.7 Lifting Mechanisms: Manufacturer shall provide the required number and size of compression spring operators enclosed in telescopic tubes to provide, smooth, easy and controlled cover operation throughout the entire arc of opening and to act as a check in retarding downward motion of the cover when closing. The upper tube shall be the outer tube to prevent accumulation of moisture, grit and debris inside the lower tube assembly. The lower tube shall interlock with flanged support shoe fastened to a formed 6.3 mm gusset support plate.
- 2.3.8 A removable exterior turn/lift handle with a spring loaded ball detent shall be provided to open the cover and the latch release shall be protected by a flush, gasketed, removable screw plug.
- 2.3.9 Hardware: Type 316 stainless steel.
- 2.3.10 Finishes: Factory finish shall be mill finished aluminum with bituminous coating applied to the exterior of the frame.

### **3 EXECUTION**

#### **3.1 General**

3.1.1 Contractor shall coordinate cast-in hatches with concrete pours. Ensure all embedded items are installed prior to placing concrete.

#### **3.2 Examination**

3.2.1 Verify that site conditions are ready to receive work, substrate is dry, clean and free of foreign matter.

3.2.2 Verify that the access hatch installation will not disrupt other trades.

3.2.3 Verify that the access door accessories such as hold-open arms are in an accessible location that does not put the Operator in adverse risk.

3.2.4 Examine openings to receive access hatch unit. Verify opening size, location, and that opening is square and plumb, and ready to receive work of this Section.

.1 Inform Engineer of unacceptable conditions immediately upon discovery.

.2 Proceed with installation after unacceptable conditions have been remedied and after receipt of written approval from Engineer.

3.2.5 Beginning of installation means acceptance of site conditions.

#### **3.3 Installation**

3.3.1 The installer shall check as-built conditions and verify the manufacturer's access hatch details for accuracy to fit the application prior to fabrication. The installer shall comply with the access door manufacturer's installation instructions.

3.3.2 The installer shall furnish mechanical fasteners consistent with the access door manufacturer's instructions.

#### **3.4 Cleaning**

3.4.1 Clean in accordance with Section 01740- Cleaning.

3.4.2 Progress Cleaning:

.1 Perform cleanup as work progresses.

.2 Leave work area clean at end of each day.

3.4.3 Final cleaning: Upon completion, remove surplus materials, rubbish, tools, and equipment

3.4.4 Waste Management:

.1 Collect recyclable waste and dispose of or recycle field generated construction waste created during construction or final cleaning related to work of this Section.

- .2 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

**END OF SECTION**

## **1 GENERAL**

### **1.1 Scope**

1.1.1 Provide and install ductwork, fittings and all accessories as required.

### **1.2 Reference Standards**

1.2.1 Provide work in accordance with requirements of Regulatory Agencies and conform to:

- .1 SMACNA HVAC Duct Construction Standards
- .2 ASHRAE Standards
- .3 AMCA Standards
- .4 ULC
- .5 ANSI
- .6 NFPA Standards

### **1.3 Related Sections**

- 1.3.1 Section 15010 - Mechanical General Requirements
- 1.3.2 Section 15100 - Basic Materials and Methods
- 1.3.3 Section 15900 – HVAC Controls
- 1.3.4 Division 16 - Electrical

### **1.4 Submittals**

1.4.1 Submit shop drawings in accordance with Section 15010 – Mechanical General Requirements.

## **2 PRODUCTS**

### **2.1 Noise and Vibration Control**

- 2.1.1 All Ductwork: to be constructed to withstand 1-½ times working static pressure and designed for 500 Pa (2") operating pressure minimum.
- 2.1.2 All ducting on fan suction shall be rated to withstand negative pressure of 1-½ fan pressure static, dead head rating.
- 2.1.3 Ductwork: Use the type of isolators on equipment to obtain optimum results, consult with the isolator manufacturer to provide installation instructions for each product.

## **2.2 Ductwork**

- 2.2.1 All Ductwork: to be constructed to withstand 1-½ times working static pressure and designed for 500 Pa (2") operating pressure minimum.
- 2.2.2 Sheetmetal Ducts : Lock forming quality steel with minimum G90 designation zinc coating to A526/A526M-85. Gauge of ducts shall be in accordance with recommendations of ASHRAE and SMACNA.
- 2.2.3 Fabrication: ducts and fittings configuration in accordance with recommendations of SMACNA and ASHRAE.
- 2.2.4 Joints:
- .1 to SMACNA and ASHRAE.
  - .2 May be made with the Ductmate System. System components shall be made of standard catalogue manufacture as supplied by Ductmate Industries, Inc.

## **2.3 Fiber Glass Reinforced Plastic (FRP) Duct**

- 2.3.1 Provide fibre glass reinforced plastic (FRP) ductwork for supply and exhaust ductwork as shown on the drawings in the chemical room.
- 2.3.2 Fibreglass reinforced plastic ductwork shall be in accordance with:
- .1 National Standard of Canada, Specification CAN/CGSB-41.22-93 Design Level 1.
  - .2 Society of the Plastics Industry (SPI) "Recommended Product Standard for Custom Contact Moulded Reinforced Polyester Chemical Resistant Process Equipment (TS-122C).
- 2.3.3 Material:
- .1 Resin
    - .1 Commercial grade halogenated polyester resin.
    - .2 Contains no other fillers except as required for viscosity control for fire retardance.
    - .3 Up to 5% weight of thixotropic agent may be added for viscosity control.
    - .4 Antimony compounds or other fire retardant agents added for flame resistance. Flame spreading rating shall be less than 25, I.D. 'Class 1' of ASTM E84 "Standard Method of Test for Surface Burning Characteristics of Building Material".
    - .5 Chemical resistant to the following concentrations in air:
      - .1 H2S - 3.4 ppm
      - .2 Methyl mercaptan - 55 ppb
      - .3 Dimethyl Sulfide - 19 ppb

.4 Ethyl mercaptan - 19 ppb

.5 Ethyl Methyl Sulfide - 17 ppb

.6 Suitable for the following outdoor conditions:

.1 100% RH

.2 -26°C min. winter

.3 +35°C max. summer

.2 Glass Fibre

.1 Commercial grade having a coupling agent that will provide a suitable bend between the glass reinforcement and the resin.

.3 Fabricated plastic or approved equal.

2.3.4 Laminate

.1 Primary chemical - resistant surface: As a corrosion barrier, provides a resin rich inner surface layer 10-20 mil minimum, not exceed 10% ± 5% "C" glass by weight. Use Nexus as an alternate. The surface finish shall be smooth and continuous.

.2 Internal Anti-Wicking Barrier: Provide a 100 mil inner layer composed of resin reinforced non-continuous glass fibre strands applied in two (2) plies of chopped strand mat equivalent to 916g/m<sup>2</sup> (3 oz/ft<sup>2</sup>). As an alternative method, provide two (2) passes of chopped roving, minimum length 13 to 50mm (1/2 to 2") applied uniformly by spray up process to an equivalent weight. Glass content of the 100 mil corrosion barrier shall be 27% ± 5% glass by weight.

.3 Additional structural reinforcing layer: Provide layer laminates to give the additional strength necessary to meet the tensile and flexural requirements of the CGSB standard.

2.3.5 Cut Edges

.1 All cut edges shall be coated with resin so that no glass fibres are exposed, and all voids filled. Structural elements having edges exposed to the chemical environment shall be made with chopped strand glass reinforcement only.

2.3.6 Butt Joints

.1 Provide butt joints for straight connections. The strength of the butt joint shall be at least equal to that of the duct itself. Total minimum width of the joint shall be 75mm for 3.2mm thickness, 100mm for 4.8mm thickness and 150mm for 6.4mm thickness.

.2 Finished joints shall be built up in successive layers and be as strong as practicable. The width of the first layer shall be not less than 50mm. Successive layers shall increase uniformly to provide the specified minimum total width of overlay, which shall be centred on the joint. Crevices between jointed pieces shall be filled with resin or thixotropic resin paste, leaving a smooth inner surface. The interior of joints may also be reinforced resin-rich surface.

### 2.3.7 Flanges

- .1 Dimensions of reinforced plastic flanges for round ducts shall be in accordance with the following table. Flange thicknesses and width  $[(O.D. - I.D.)/2]$  of flange faces for rectangular ducts shall correspond to those for round ducts having the same diameter as the longer side of rectangular ducts.
- .2 Flange Attachment
  - .1 Duct wall at hub of flange shall be at least 1.5 times normal thickness and taper to normal thickness over a distance of at least one (1) flange width. Fillet radius shall be at least 9.5mm at point where the hub meets the back of the flange.
- .3 Drilling
  - .1 Standard flanges shall be supplied drilled, in accordance with the table, unless otherwise specified.
- .4 Flange Bolting
  - .1 The bolt holes shall straddle centreline unless otherwise specified. Number of bolt holes and diameters of bolt holes and bolt circles shall be in accordance with the table unless otherwise specified. Rectangular flange width and bolt spacing shall be the same as that for diameters corresponding to the longer sides.
- .5 Face of Flange
  - .1 Face of flange shall have neither projections nor depressions greater than 0.8mm and shall be perpendicular to centreline of duct with  $1/2"$ . A camber of 3.2mm with respect to the centreline, measured at the O.D. of the flange, shall be allowable. The face of the flange shall have a suitable chemically resistant surface.
- .6 Bolts on flanged connections shall be tightened using the manufacturer's recommendation on torque. Washers are recommended under bolt heads and nuts. Field joint kits with instructions shall be provided by the manufacturer, unless otherwise agreed. In making butt joints in the field, all grease, moisture and other contamination shall be removed from the ends of the duct being joined before it is sanded. Bolts, nuts, and washers shall be SS316.

### 2.3.8 Duct Dimensions

- .1 The minimum wall thickness of round ducts shall be in accordance with the following table. For rectangular ducts, the minimum thickness shall be as in the table, substituting the longer side for the diameter. Fabricate ducts to a minimum allowable vacuum of 124 Pa with 5 to 1 design factor of safety based on the tensile and flexural requirements of the CGSB standard and 3 meter lengths between stiffener rings for vacuum service.

#### REINFORCED-POLYESTER ROUND DUCT DIMENSIONS

I.D.	Wall Thickness (min.)	Nominal Flange Diameter (O.D.)	Flange Thickness	Bolt Circle Diameter	Bolt Hole Diameter	No. of Bolt Holes
mm	mm	mm				
50	3.2	162	6.4	127	11.1	4
75	3.2	187	6.4	152	11.1	4
100	3.2	213	6.4	178	11.1	4
150	3.2	264	6.4	229	11.1	8
200	3.2	314	6.4	279	11.1	8
250	3.2	365	9.5	330	11.1	12
300	3.2	416	9.5	381	11.1	12
350	3.2	467	9.5	432	11.1	12
400	3.2	518	13	229	11.1	16
450	3.2	568	13	533	11.1	16
500	3.2	619	13	584	11.1	20
600	4.8	721	13	686	11.1	20
750	4.8	873	13	838	11.1	28
900	4.8	1026	13	991	11.1	32
1050	6.4	1178	16	1143	11.1	36
1200	6.4	1381	16	1321	14.3	44
1350	6.4	1534	16	1473	14.3	44
1500	6.4	1686	16	1626	14.3	52

**2.4 Sheet Metal Ductwork**

2.4.1 Provide sheet metal ductwork and accessories for supply and exhaust ductwork serving the unclassified areas.

2.4.2 Ductwork Systems - Reference Standards:

.1 Provide ducts, fittings, accessories and supports conforming to the construction details as described in the latest editions of the following publications, except as modified hereinafter:

.1 Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA) - "HVAC Duct Construction Standards - Metal and Flexible"

.2 SMACNA - "Guidelines for Welding Sheet Metal"

- .3 SMACNA - "Testing Balancing and Adjusting of Environmental Systems"
- .4 NFPA - "Standard for Installation of Air Conditioning and Ventilation Systems" - NFPA 90A
- .2 Provide a minimum SMACNA Class 'C' seal for all ductwork.
- .3 Install sheet metal deflector vanes the full height of duct in square elbows and in elbows where radius is less than 1.5 times width of duct, security riveted in place. Provide double thickness vanes of the same gauge as the duct in which they are installed.
- .4 All exterior ductwork to be stainless steel to match existing.
- .5 Maintain all ductwork free of dust and debris during construction. Clean interior of ductwork prior to operating any equipment.
- .6 Reinforce ductwork at all penetrations for thermometers, manometers, thermostats, gauges, etc. and provide extended collars for instruments installed in insulated ductwork.
- .7 Provide rubber grommets where copper tubing passes through ductwork or casings.
- .8 Where obstructions pass through ducts, provide tear-drop shaped deflectors around obstructions to avoid air flow interference. Increase ductwork size around deflectors to maintain equivalent free area. Caulk holes up in ductwork and provide cover-plates to close spaces left between duct and obstruction.
- .9 Make all necessary provisions and allowances when installing ductwork for the structural building framing and transform or divide ducts as required. Maintain free area.
- .10 Protect open ends of ducts during installation with suitable closures to preclude dirt and debris from entering.
- .11 Ductwork leakage shall be less than 5% of fan air flow capacity.

2.4.3 Rectangular Ductwork:

- .1 Fabricate ductwork of the following minimum thickeners with joints and bracing:

<b>Nominal Thickness Millimetres</b>	<b>Millimetres</b>	<b>Type of Transverse Joint Connections</b>	<b>Bracing</b>
0.55	0-300	S Cleat or Drive Cleat on 2440mm centres	None
0.70	330-450	S Cleat or Drive Cleat on 2440mm centres	None
0.85	790-1070 1100-1370	25mm T Cleat or 25mm Angle S Cleat on 910mm staggered centres	None 38 x 38 x 3mm intermediate side angles of

Nominal Thickness Millimetres	Millimetres	Type of Transverse Joint Connections	Bracing
		38mm T Cleat or 38mm Angle S Cleat on 910mm staggered centres	1220mm from joint
1.00	1400-2140	Reinforced Angle Cleats bolted to the duct at 610mm intervals	38 x 38 x 3mm intermediate side angles of 610mm from joint
1.31	2160mm and over	38mm reinforced Angle A Cleat 38mm reinforced S-T Cleats 50 x 50 x 5mm Angle flanges on 910mm staggered centres	38 x 38 x 3mm intermediate side angles of 38 x 38 x 3mm angle joint, 610mm from joint

- .2 Cross-break all flat un-installed sheet metal ductwork having any side are 300mm, except immediately upstream and downstream of splitter dampers.
- .3 Provide longitudinal duct seams as follows:
  - .1 Corners
    - .1 Pittsburgh or double corner seams
    - .2 Mid-section
      - .1 Grooved seam or inside standing seam up to 500 Pa
  - .4 Construct tees, bends or elbows with a centreline radius of not less than 1.5 times the width of the duct. Where space does not permit the specified radius, use square throat fitting with double thickeners turning vanes.

## 2.5 Hangers and Supports

- 2.5.1 Fabricate strap hangers to same material as duct. Hanger configuration to SMACNA details. 500 mm (20") is maximum duct size to be supported by strap hanger.
- 2.5.2 Rod and angle hangers: galvanized steel to SMACNA details.
- 2.5.3 Hanger attachments: manufactured concrete inserts, expansion shields and bolted steel clamps. Do not weld rods to steel decks or use powder actuated fasteners.

## 2.6 Duct Sealant

- 2.6.1 General: water-based sealant, non-toxic, non-combustible, non-flammable, and tested in accordance with CAN4-S102. Flame spread shall not exceed 25 and smoke developed shall not exceed 50.

- 2.6.2 Acceptable Product: Multi-Purpose Duct Sealant as manufactured by Trans Continental Equipment, Duro Dyne SWB Duct Sealer, Iron Grip 601 as supplied by Alpha Sheet Metal Co., Uni-Grip Duct Sealer from United McGill Corporation or Agency Approved Equal.

## **2.7 Flexible Connections**

- 2.7.1 Outdoors: 814 g/m<sup>2</sup> (24 oz per sq. yd.) tensile strength of not less than 450 x 400 lbs (2000x1780 N) with metal to 75 mm (3") fabric to metal "Grip-Lok" duct connections. Durolon indicated. Dyn-Air.
- 2.7.2 Indoors: 750 g/m<sup>2</sup> (22 oz. per sq. yd.) tensile strength of not less than 290 x 290 lbs (1290x1290 N) with metal to 75 mm (3") fabric to metal "Grip-Lok" duct connections. Canflex indicated. Dyn-Air.

## **2.8 Volume Dampers**

- 2.8.1 Single Leaf Dampers: fabricated from minimum 1.0 mm (20 gauge) galvanized steel, suitably reinforced to prevent vibration and fitted with indicating regulator. Duro-Dyne, Lawson & Taylor, Dyn-Air.
- 2.8.2 Multi-Blade Opposed Action Dampers: fabricated from 1.6 mm (16 gauge) galvanized steel, mounted in separate channel frames, reinforced to prevent vibration, and fitted with opposed action linkage hardware. Duro-Dyne "Opax" blade kit, Lawson & Taylor, Dyn-Air.

## **2.9 Balancing Dampers**

- 2.9.1 Provide balancing dampers in branch duct locations as indicated on the drawings. Balancing damper are to be compatible with the respective duct type
- 2.9.2 Provide adjustable locking mechanisms to hold the damper in a fixed position after balancing is completed.

## **2.10 Motorized Dampers**

- 2.10.1 Refer to HVAC control section 15900.

## **2.11 Outside Air Louvres**

- 2.11.1 Stormproof Louvres:
- .1 All exterior louvers shall be constructed of aluminum, except for louvers installed on chemical room exterior walls, which shall be constructed of stainless steel."
  - .2 Fixed exterior architectural louvre. Aerodynamic performance in accordance with ANSI/AMCA 500-L Certified Ratings Seal, minimum 38.5% free area. Maximum pressure drop through louvre 50Pa (0.20" W.C.). Overall size as indicated on Contract Drawings.
- 2.11.2 Acceptable Manufacturers: Greenheck, Nailor, EH Price or Agency Approved Equal.

**2.12 Test Ports**

- 2.12.1 General: provide test ports to suit intended application, (ie. insulated/uninsulated duct, round/rectangular duct).
- 2.12.2 Acceptable Product: Air Power Co. Dial 1000, Dial 2000 or Duro-Dyne IP-1, IP-2, IPG-3, IP-4, Dyn-Air.

**3 EXECUTION**

**3.1 Ductwork - Installation**

- 3.1.1 Install ductwork parallel to building lines and in accordance with SMACNA standards.
- 3.1.2 Do not break continuity of insulation vapour barrier by hangers or rods.
- 3.1.3 Ground across flexible connector with No. 2/0 braided copper strap.
- 3.1.4 Anchor all risers as indicated.
- 3.1.5 Install fire dampers to NFPA90A-1985.
- 3.1.6 Make fresh air intake ducts watertight up to end of transition. Fit drain connection on bottom with 20mm (3/4") pipe to drain.
- 3.1.7 Support all ductwork from structural members. Where structural bearings do not exist, suspend strapping or hangers from steel channels or angles. Provide supplementary structural members. Do not suspend from metal deck.
- 3.1.8 Hangers shall be steel angles with supporting rods, locking nuts and washers to following table:

Duct Sizes	Angle Size	Rod Size	Spacing
up to 30"	1" x 1" x 1/8"	1/4"	10 feet
31" to 42"	1-1/2"x1-1/2"x1/8"	1/4"	10 feet
43" to 60"	1-1/2"x1-1/2"x1/8"	3/8"	10 feet
61" to 84"	2" x 2" x 1/8"	3/8"	8 feet
Up to 750mm	25 x 25 x 3mm	6mm	3 metres
775 to 1050mm	40 x 40 x 3mm	6mm	3 metres
1075 to 1500mm	40 x 40 x 3mm	10mm	3 metres
1525 to 2100mm	50 x 50 x 3mm	10mm	2.5 metres

- 3.1.9 Seal all joints and penetrations in ductwork.

- 3.1.10 Paint all visible internal portions of duct outlets to grilles dull black. Internal painting of ductwork behind grilles shall be by Sheet Metal Contractor.
- 3.1.11 Install flexible ductwork only where specifically indicated on drawing.
- 3.1.12 Seal and protect all openings to ductwork, existing and new, within the construction areas to ensure that no dirt or contaminants enter the ductwork. On completion of the work inspect ductwork and remove any dirt or contaminants resulting from the work.

**3.2 Duct Sealing**

- 3.2.1 Ductwork and plenums shall be sealed as follows in accordance with seal classifications A, B and C described in SMACNA and ASHRAE literature.

DUCT DESCRIPTION	DUCT LOCATION			
	SUPPLY		RETURN	EXHAUST
	<2"wc	> 2"wc		
Outdoors and Unconditioned Spaces	A	A	C	A
Conditioned Spaces	C	B	B	C

**3.3 Duct Cleaning**

- 3.3.1 All ductwork shall be thoroughly vacuumed on completion of all construction work which generates or disturbs dust and other particulate matter. Ductwork shall be cleaned immediately prior to occupancy in accordance with CAN/CSA-Z317.2.
- 3.3.2 The duct cleaning shall be performed by an established firm currently engaged in such work and approved by the Consultant for this project.
- 3.3.3 Provide duct access doors where required in the ductwork to facilitate cleaning.

**3.4 Flexible Connections**

- 3.4.1 Provide flexible duct connections between ductwork and all air handling equipment.

**3.5 Volume Dampers**

- 3.5.1 Provide volume dampers in all supply, return and exhaust duct mains at the junctions of branch ducts, and where required to properly balance system.
- 3.5.2 Provide single leaf dampers in branch ducts less than 300mm (12") in height where indicated, or where branch duct connection to main is made with a Tee connection.
- 3.5.3 Provide multi-blade opposed action dampers in branch ducts 300mm (12") or greater in height and where specifically indicated on drawings.

3.5.4 Provide additional volume dampers where required by Air Balancing agency for effective balancing of system.

**3.6 Motorized Dampers**

3.6.1 Install dampers supplied under Section 15900 in ducts or plenum as indicated.

**3.7 Outside Air Louvres**

3.7.1 Coordinate framing and anchorage for louvres with other parts of the Work.

3.7.2 Install bird screen to inside face of louvres.

3.7.3 Install louvres in accordance with manufacturer's instructions and reviewed Shop Drawings. Securely anchor into opening.

3.7.4 Install duct collars as required and extended sills as indicated.

**3.8 Test Ports**

3.8.1 Provide test ports as required by Balancing Agency to completely test and balance the system. No temporary holes will be permitted in ductwork or flexible connections.

**3.9 Duct Leakage Tests**

3.9.1 Ductwork shall be leak tested in accordance with the SMACNA AHVAC Air Duct Leakage Test Manual@. The maximum permitted duct leakage shall be:

<b>Duct Pressure More Than</b>	<b>Less than or equal to</b>	<b>Rectangular Cfm/100ft<sup>2</sup> duct surface area</b>	<b>Round/Flat Oval Cfm/100ft<sup>2</sup> duct surface area</b>
-2"wc	0"wc	-9.4	-4.7
0"wc	2"wc	9.4	4.7
2"wc	3"wc	12.3	6.1
3"wc	4"wc	14.8	7.4
4"wc	6"wc	9.6	19.2
6"wc	8"wc	11.6	23.2

3.9.2 Ductwork that exceeds the maximum permitted leakage shall be re-sealed and re-tested.

3.9.3 Duct leakage test shall be witnessed and certified by the Systems Verification Agency of section 15020.

3.9.4 Record and submit three (3) copies of test results to the Consultant for review prior to application of duct insulation or concealment of ductwork.

**3.10 Adjusting and Balancing**

- 3.10.1 Refer to Section 15020 – System Verification (Testing, Adjusting and Balancing (TAB)).
- 3.10.2 Do not begin air balance until system has been completed and is in full working order. Put all heating, ventilating, and air conditioning system and equipment into full operation and continue the operation of same during each working day of balancing procedures.
- 3.10.3 Air handling systems which include air filters shall be balanced to provide design airflows with air filters loaded so that the air pressure drop through each filter is equal to the average of the manufacturers listed initial resistance and recommended final (change-out) resistance.
- 3.10.4 Test and adjust each blower rpm to design requirements.
- 3.10.5 Test and record motor full load amperes.
- 3.10.6 Make Pitot tube traverse of main supply and obtain design air quantities at fans.
- 3.10.7 Test and record system static pressures, suction and discharge.
- 3.10.8 Test and adjust system for design air quantities of recirculated air.
- 3.10.9 Test and adjust system for design air quantities of outside air.
- 3.10.10 Test and record entering air temperatures (db heating and cooling).
- 3.10.11 Test and record entering air temperature (wb cooling).
- 3.10.12 Test and record leaving air temperatures (db heating and cooling).
- 3.10.13 Test and record leaving air temperature (wb cooling).
- 3.10.14 Adjust all main supply and return air ducts to proper design air quantities.
- 3.10.15 Adjust all zones to proper design air quantities, supply and return.
- 3.10.16 Test and adjust each diffuser, grille, and register to within 5% of design requirements.
- 3.10.17 Identify each diffuser, grille, and register as to location and area.
- 3.10.18 Identify and list size, type, and manufacturer of diffusers, grilles, registers, and all testing equipment. Use manufacturer's rating on all equipment to make required calculations.
- 3.10.19 In readings and tests of diffusers, grilles, and registers, include required velocities and tested velocities, and required air quantities and tested air quantities after adjustments.
- 3.10.20 In cooperation with the control manufacturer's representative, set adjustment of automatically operated dampers to operate as specified, indicated, and/or noted.
- 3.10.21 Adjust all diffusers, grilles, and registers to minimize drafts in all areas.
- 3.10.22 Adjust and set to proper order, all smoke control systems prior to testing under Section 15020. Make any adjustments requested by Section 15020.

- 3.10.23 Tabulate and certify test results on suitable forms and submit to Consultant and Systems Verification Agency for approval and record.
- 3.10.24 As part of this Contract, this Division shall make any changes in the pulleys, belts, and dampers, or add any dampers, as required for correct balance as recommended by the Systems Verification Agency, at no additional cost to the Owner.
- 3.10.25 After completion of tests and submittal of balancing reports, this Contractor shall provide, if requested to, a spot check of the systems with the Systems Verification Agency. If actual air quantities do not agree with the test reports, this Agency shall rebalance the system to the satisfaction of the System Verification Agency.

**END OF SECTION**