ENVIRONMENTAL AND TECHNOLOGY PLATFORM

UNDERFLOOR AIR PROJECT
SUPPLY & INSTALLATION SCOPE OF WORK

ETP (Environmental and Technology Platform) Contractor (Camino)	By Division 15 Mechanical Contractor	By Division 16 Electrical Contractor	By Division 9 Mechanical Contractor
Access Floor System. Interior zone diffusers w/manual damper control. Perimeter zone diffusers w/automatic motorized damper control, and low voltage power supply module. 120 volt power control module for Diffusers w/auto damper. Access floor electrical boxes c/w duplex receptacles and mounting plate for voice/data connectors. 120 volt plug and play power distribution zone boxes. 120 volt plug and play cable sets to workstation boxes/private office boxes/meeting room boxes. Cutouts for diffusers and electrical boxes. Installation of diffusers and floor boxes. Sheet metal plenum dividers for zoning of HVAC. Perimeter steel enclosure and continuous aluminum grill flush mounted into access floor to accommodate hot water fin tube. Factory applied hard surface coverings such as granite, hardwood, p.lam, vinyl, stone, exposed concrete on access floor areas.	Air handling, chiller, boiler equipment, low voltage control wiring, sensors, and thermostats. Central Computerized Control and Management Systems. Perimeter fin tube and piping to accommodate perimeter hot water heating system (flush mounted in steel enclosure provided by ETP supplier). Exhaust equipment. Return air equipment. Supply and return air duct work. All other Division 15 requirements not specifically included by the ETP contractor **.**	Home run feeds to power distribution zone boxes. IT cabling and connectors. Miscellaneous power/receptacles in walls/millwork. Power feeds and cabling for general base building lighting. Power feeds to HVAC equipment with exception of motorize modular diffusers mounted in access floor system. Connection of home run cables to circuit breaker panels. All other Division 16 requirements not specifically included by the ETP contractor **.**	Modular Carpet Tile. Wall Base. All hard and soft finishes on built up concrete slab (non-access floor) areas. All other Division 9 requirements not specifically included by the ETP contractor.

The intention of the scope of work is to ensure that the ETP Contractor provides all the Electrical Components (modular wiring and floor boxes) and Mechanical components (diffusers) that are cut into and mounted in the Access Floor Panel System.

PART 1 - GENERAL

1.1 Section Includes

A. Work of this section includes, but is not limited to the following:
   i) High performance cementitious core access floor system.
   ii) Thermostatically controlled diffusers including power control modules
   iii) Manually operated diffusers.
   iv) Modular plug and play wiring for 120 volt power distribution system..
   v) Factory applied static dissipative high pressure laminate finish.
   vi) Factory applied stone finishes and vinyl finishes.
   vii) Factory cutouts for diffusers and electrical boxes.
   viii) Sheet metal plenum dividers.
   ix) Ramps and steps if applicable.
   x) Perimeter fin tube enclosure and linear grill.

1.2 Related Sections

A. Concrete sealer (by Division 3) shall be compatible with pedestal adhesive.

B. Electrical contractor (Division 16) shall provide necessary material and labor to electrically connect the access floor to the building ground.

C. Carpet (by Division 9)

D. Air handling units, ductwork, thermostats and control wiring (by Division 15)

E. Home run feeds from electrical rooms to power distribution zone boxes (by Division 16)

1.3 Environmental Conditions for Storage and Installation

A. Area to receive the access floor shall be enclosed and maintained at ambient temperature between 55° to 85° F, and at humidity level between 20% to 70% relative, and shall remain within these environmental limits throughout installation and occupancy. All floor panels shall be stored and maintained within these limits upon delivery to storage sites.

1.4 References

A. CISCA (Ceilings & Interior Systems Construction Association) - “Recommended Test Procedures for Access Floors” shall be used when presenting load performance product information.

1.5 Performance Certification

A. Product tests shall be witnessed and certified by independent engineering and testing laboratory with a minimum of five years experience testing access floor components in accordance with CISCA "Recommended Test Procedures for Access Floors". Access floor supplier shall carry a cash allowance of $1200.00 for Concentrated Load testing (1.9.A) and Ultimate Rolling Load testing (1.8.2E) to be carried out by Intertek Testing Services Ltd. Panels shall be randomly selected from job site.

B. Provide access flooring capable of withstanding lateral seismic forces to requirements of latest edition and amendments of National Building Code and Local Building By- Laws. Submit data on earthquake resistance in the form of structural computations that have been signed and sealed by an independent professional engineer. Include structural computations, material properties and other information required for structural analysis and verifications that access flooring system will withstand loads indicated.

1.6 Quality Assurance

A. 2.2.1 Install access floor system using manufacturer's own forces or an accredited franchiser installer under the control and responsibility of the system manufacturer. Have a senior, qualified field representative on Site to direct the Work at all working times.

B. 2.2.2 Access floor panels, and understructure shall be stamped and fabricated by a manufacturing facility that has demonstrated a successful 10-year track record of local installations of similar size and complexity.

1.7 Mock Up

A. 2.3.1 Before installation of entire access floor system, provide a 2.4 m x 2.4 m (8' x 8') mock up of the floor system determined by Architect/Construction Manager which serves as the minimum standard for the remaining access floor system delivered to, and installed at the Site. Build such mock up where directed by Architect/Construction Manager. The mock up will be installed prior to issuing a contract to enable the owner and consultants to conduct a comparative review of products.

1.8 Performance Requirements

1.8.1 Pedestals:

A. **Axial Load**: Pedestal assembly shall provide a minimum 2272 kg (5000 lb.) axial load without permanent deformation.

B. **Overturning Moment**: Pedestal assembly shall provide an average overturning moment of 112.98 Nm (1000 in-lbs.) when glued to a clean, sound, uncoated concrete surface. Structural calculations shall be required attesting to the lateral stability of the system under seismic conditions. Provide independent seismic certification from a Professional Engineer registered in the State or Province where the project is located.

1.8.2 Floor Panels:

A. **Concentrated Load**: Panel shall be capable of supporting a minimum concentrated load of 5.5 KN (1250 lbs./sq.in.) (using a round or square indentor) at any location on the panel (weakest point) with a maximum deflection of 2.5 mm (0.100 inches.) Panel shall not exceed a permanent set of .25 mm (0.010 inches), after the load is removed.

B. **Uniform Load**: Panel shall be capable of supporting a minimum uniform load of 14.3 kPa (300 lbs./sq.ft.) at any location on the panel with a maximum top surface deflection of 1.5 mm (0.060 inches). Panel shall not exceed a permanent set of .25 mm (0.010 inches), after the load is removed.

C. **Ultimate Load**: Panel shall be capable of withstanding a minimum concentrated load of 11 KN (2500 lbs./sq.in.) (using a round or square indentor) at any location on the panel without failure. Failure is defined as the point at which the panel will no longer accept the load.

D. **Rolling Load**: Panel and supporting understructure shall be able to withstand the following rolling loads at any location on the panel without developing a local and overall surface deformation greater than 0.040 inches. Note: wheel 1 and wheel 2 tests shall be performed on two separate panels.

Wheel 1:	Size: 3” dia x 1 13/16” wide	Load: 543 kg (1200 lbs.)	Passes: 10
Wheel 2:	Size: 6” dia x 1 1/2” wide	Load: 364 kg (800 lbs.)	Passes: 10,000

E. **Ultimate Rolling Load**: Panel and supporting understructure shall be capable of withstanding the following rolling load at any location on the panel without incurring damage. Damage is defined as significant dishing or surface deformation that would require panel warranty replacement in an actual installation.

Wheel 1:	Size: 3” dia x 1 13/16” wide	Load: 727 kg (1600 lbs.)	Passes: 10

F. **Impact Load:** Panel and supporting understructure shall be capable of supporting an impact load of 57 kg (125 lbs.) dropped from a height of 1 meter (36 inches) onto a 25mm x 25mm area (1 sq. inch) at any location on the panel.

G. **Flammability**: System (not including floor covering) shall meet the following flammability requirements when tested in accordance with ULC S102.1. Provide independent test reports as part of submittal.

Flame Spread: 0	Smoke Development: Less than 5	Fuel Contribution: 0

H. **Moisture Resistance**: Panel shall be constructed with moisture resistant cementitious core. Integrity of the panels and core shall not be affected by water resulting from sprinkler activation. Particleboard panels are unacceptable.

I. **Environmental/LEED Certification**: Floor panels shall be certified, by an independent testing lab using LEED test procedures, to qualify for the LEED credit for Low VOC emitting materials. Only non-toxic "green" adhesives shall be used for fabrication and installation.

1.9 Design Requirements:

A. Access floor system, where indicated on the design documents, shall consist of modular and removable steel clad panels with cementitious core supported by adjustable height pedestal assemblies.

B. Panel shall be easily removed by one person with a lifting device and shall be interchangeable except where cut for special conditions.

C. Quantities, finished floor heights (FFH) and location of accessories shall be as specified on the contract drawings.

1.9.1 Submittals for Review

A. Detail sheets, for each proposed product type, which provide the necessary information to describe the product and its performance.

B. Test reports, certified by an independent testing laboratory with a minimum of five years experience testing access floor components in accordance CISCA Recommended Test Procedures, certifying that component parts perform as specified.

1.9.2 Submittals for Information

A. Manufacturer's installation instructions and guidelines.

B. Manufacturer's Owner Manual outlining recommended care and maintenance procedures.

PART 2 - PRODUCTS

2.1 Support Components

Pedestals:

A. Pedestal assemblies shall be corrosive resistant, all steel welded construction, and shall provide an adjustment range of +/- 1" for finished floor heights 6" or greater.

B. Pedestal assemblies shall provide a means of leveling and locking the assembly at a selected height, which requires deliberate action to change height setting and prevents vibration displacement.

C. Pedestal head shall be designed with locating tabs and integral shape to interface with the panel for positive lateral retention and positioning without fasteners. Pedestal head shall be fabricated with integral sound deadening gasket.

D. Hot dip galvanized steel pedestal head shall be welded to a threaded rod which includes a specially designed adjusting nut. The nut shall provide location lugs to engage the pedestal base assembly, such that deliberate action is required to change the height setting.

E. Threaded rod shall provide a specially designed anti-rotation device, such that when the head assembly is engaged in the base assembly, the head cannot freely rotate (for FFH of 6" or greater).

F. Hot dip galvanized pedestal base assembly shall consist of a formed steel plate with no less than 16 square inches of bearing area, welded to a 7/8" square steel tube and shall be designed to engage the head assembly.

2.2 Panel Components

Floor Panels:

A. Panels shall consist of a top steel sheet and formed steel bottom pan encasing a lightweight cementitious core material to meet load performance and fire rating performance criteria outlined in 1.8.2

B. Panel shall have a durable non-corrosive finish treatment to steel surfaces.

C. Corner of panel shall have a locating tab and integral shape design to interface with the pedestal head for positive lateral retention and positioning with or without fasteners.

D. Fastening of panels to pedestal heads shall be accomplished by the use of 4 machine screws per panel.

2.3 Acceptable Manufacturers:

Camino Modular Systems Inc**.** 416-675-2400

2.4 Accessories

2.4.1 Modular Wiring:

A. **Flush Mount Access Floor Boxes:**

CSA approved Power, Voice & Data (PVD) Service centers shall be provided in locations as detailed on the contract drawings. High capacity 8 inch square Service centers shall be capable of accommodating 2 duplex receptacles, knockouts for standard voice/data faceplates and integral modular plug and play connectors. The service outlet box shall be a drop-in design having a hinged steel lid with optional carpet insert. Box housing shall be constructed with 18 ga. steel. Lid to be 16 ga. steel re-inforced to accept foot traffic. Powder coat finish from manufacturer's standard range.

B. **Power Distribution Zone Box:**

CSA approved Power Distribution Zone Box (PDZB) with 9 or 12 modular connector power out ports to provide general purpose and/or isolated ground, 120 volt power, as detailed on the contract drawings. The PDZB shall be constructed of cold rolled steel with painted powder coat finish and bolt on steel lid. Each PDZB shall have a label indicating the circuit number and electrical panel at each power out connector. Home run feeds from electrical panel to PDZB shall be by Division 16.

C. **Plug and Play Cable Sets:**

CSA approved modular cable sets shall be provided to connect flush mount PVD Servicenters to Power Distribution Zone Boxes. Metallic flex cable set to be manufactured with modular multi-pin connectors on each end and be CSA approved for plenum applications. Length to be 8 meters (25 ft) unless otherwise shown on drawings.

D. **Acceptable Modular Wiring Manufacturers:**
Camino Modular Systems Inc. 416-675-2400

2.4.2 Diffusers and Linear Grills:

A. **Manual round diffusers (Type A):** Circular diffusers shall be constructed of high impact poly carbonate plastic which complies with U.L. 94-5V. Diffuser shall be designed for VAV supply into the space with maximum air flow of 72 CFM at a plenum pressure of 0.05" W.G. Diffuser shall be 200 mm (8") diameter and be complete with dirt collection basket and manual adjusted flow regulator damper to allow user to control air flow. Refer to contract drawings for quantities.

B. **Thermostatically controlled diffusers with motorized damper (Type B):** Circular diffusers shall be constructed of high impact polycarbonate plastic which complies with U.L. 94-5V. Diffuser shall be designed for VAV supply into the space with maximum air flow of 72 CFM at a plenum pressure of 0.05" W.G. Diffuser shall be 200 mm (8") diameter and be complete with dirt collection basket and 24 VAC direct drive proportional actuator to control VAV damper. Actuator shall be designed with two RJ12 ports to allow daisy chain connection of multiple diffusers using standard 12 foot or 20 foot modular plenum rated cables. A 120 VAC/24 VAC power supply modular (PSM) and 120 VAC modular plug-in power connector to the PSM is required for each zone thermostat. The diffuser, PSM and interconnect daisy chain cables are supplied and installed by this section. The zone thermostat and thermostat cable to the PSM, and interconnect daisy chain cables are supplied and installed by Division 15.

C. **Thermostatically controlled diffusers with motorized damper (Type C):** VAV diffusers housing shall be constructed of 18 ga. galvanized steel with an 18 ga. galvanized steel volume damper. Provide with removable aluminum top grille with openings no wider than 0.30” for shoe heel penetration protection. Units shall be designed for thermostatic VAV supply into the space with maximum air flow of 150 CFM at a plenum pressure of 0.05" W.G. Provide with 24 VAV actuator. Actuator shall be designed to allow daisy chain connection of multiple diffusers using standard low voltage plenum rated modular plug-in cables. A 120 VAC/24 VAC power supply modular (PSM) and 120 VAC modular plug-in power connector to the PCM is required for each zone thermostat. The

diffuser, PSM and interconnect daisy chain cables are supplied and installed by this section. The zone thermostat, thermostat cable to the PSM are interconnect daisy chain cables are supplied and installed by Division 15.

D. **Acceptable Diffuser Manufacturers:**

Camino Modular Systems Inc. 416-675-2400

E. **Linear Grill/Fin Tube Enclosure:**

Provide flush mount steel enclosure box for perimeter hot water fin tube system as detailed on drawings. Steel enclosure to be manufactured from 16 ga. galvanized steel and be supported by an adjustable steel pedestal and stringer system. Provide 9" wide continuous linear grill fabricated from anodized aluminum, with pencil and heel proof spacing, to be supported by fin tube box and installed flush with adjacent access floor finish. Fin tube enclosure to be sealed at junction of access floor and curtain wall with caulking and neoprene tape to ensure zero air leakage from pressurized plenum. Provide stiffening brackets and stack effect air divider plate as per detail on drawings.
Acceptable manufacturer: Camino Modular Systems Inc. 416-675-2400

F. **Plenum Divider:**

A. Provide factory cutouts in access floor panels for all PVD Service centres and all diffusers.
B. Provide manufacturer's standard steps, ramps fascia plate, perimeter support, and grommets where indicated on the contract drawings.
C. Provide_____ spare floor panels, _____spare pedestals and _____spare screws used in the project for maintenance stock. Deliver to project in manufacture's standard packaging clearly marked with the contents.
D. Provide_____ panel lifting devices.

2.5 Factory Applied Finishes

A. Finish the surface of floor panels with factory applied floor covering material as indicated on the contract drawings. The type, color and pattern shall be selected from manufacturer's standard. Provide bolted stringer understructure for any factory applied stone, vinyl or static dissipative laminate finishes.

2.6 Fabrication Tolerances

A. Floor panel flatness measured on a diagonal: +/- 0.030"
B. Floor panel flatness measured along edges: +/- 0.025"

C. Floor panel width or length of required size: +/- 0.010”
D. Floor panel squareness tolerance: +/- 0.015”

PART 3 - EXECUTION

3.1 Preparation

A. Examine structural subfloor for unevenness, irregularities and dampness that would affect the quality and execution of the work. Do not proceed with installation until structural floor surfaces are level, clean, and dry as completed by others.

B. Concrete sealers, if used, shall be identified and proven to be compatible with pedestal adhesive. Verify that adhesive achieves bond to slab before commencing work.

C. Verify dimensions on contract drawings, including level of interfaces including abutting floor, ledges and doorsills.

D. The General Contractor/Construction Manager shall provide clear access, dry clean subfloor area free of construction debris and other trades throughout installation of access floor system. Area to receive access floor shall be enclosed and be maintained at a temperature range of 55° to 85° F and a humidity range of 20% to 70% relative. Access floor panels must be stored in this environment at least 24 hours before installation begins.

E. General Contractor/Construction Manager shall ensure subtrade responsibility for meeting following air tightness requirements:

1. Before start of access floor system installation, all slab to slab walls in areas to receive access floors shall be sufficiently sealed at the junction of walls and slabs to maintain air tightness.

2. All ductwork, conduit, cabling and piping penetrations through walls,. plenum dividers, and slabs shall be sufficiently sealed.

3. All utility penetrations cut into access floor cavity by other trades during and after completion of installation of access floor system shall be sufficiently sealed by trade responsible for cutting the penetration.

2. Access floor system contractor shall sufficiently seal the access floor system as required at following locations to maintain air tightness:

1. Access floor perimeter at wall junctions.

2. Columns and fire-rated wall assemblies.

3. Fascia edge constructions.

4. Access Floor to curb connections.

5. Penetrations for utilities cut into access floor panels by access floor contractor shall be sufficiently sealed by access floor contractor.

6. All cable and wire openings shall be sealed with manufacture's standard removable cable cutout

or grommets.

3.2 Installation

A. Pedestal locations shall be established from approved shop drawings so that mechanical and electrical work can be installed without interfering with pedestal installation.

B. Installation of access floor shall be coordinated with other trades to maintain the integrity of the installed system. All traffic on access floor shall be controlled by access floor installer. No traffic but that of access floor installers shall be permitted on any floor area for 24 hours to allow the pedestal adhesive to set.

C. Floor system and accessories shall be installed under the supervision of the manufacturer's authorized representative and according to manufacturer's recommendations

D. No dust or debris producing operations by other trades shall be allowed in areas where access floor is being installed to ensure proper bonding of pedestals to subfloor.

E. A clean subfloor shall be turned over to the access floor installer prior to commencement of the access floor installation. Access floor installer shall keep the subfloor clean as the installation progresses.

F. Partially complete floors shall be braced against shifting to maintain the integrity of the installed system where required.

G. Additional pedestals as needed shall support panels where floor is disrupted by columns, walls, and cutouts.

H. Understructure shall be aligned such that all uncut panels are interchangeable and fit snugly but do not bind when placed in alternate positions.

I. Finished floor shall be level, not varying more than 0.062" in 10 feet or 0.125" overall.

J. Acceptance: General Contractor/Construction Manager shall accept floor in whole or in part prior to allowing use by other trades.