



THE CITY OF WINNIPEG

BID OPPORTUNITY

BID OPPORTUNITY NO. 941-2016

**SUPPLY, INSTALLATION, CONFIGURATION AND COMMISSIONING OF TRAFFIC
MANAGEMENT CENTRE AUDIO VISUAL SYSTEM AND ASSOCIATED
EQUIPMENT – PHASE 1**

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PART B - BIDDING PROCEDURES

B1. CONTRACT TITLE

- B1.1 SUPPLY, INSTALLATION, CONFIGURATION AND COMMISSIONING OF TRAFFIC MANAGEMENT CENTRE AUDIO VISUAL SYSTEM AND ASSOCIATED EQUIPMENT – PHASE 1

B2. SUBMISSION DEADLINE

- B2.1 The Submission Deadline is 4:00 p.m. Winnipeg time, November 8, 2016.
- B2.2 Bids determined by the Manager of Materials to have been received later than the Submission Deadline will not be accepted and will be returned upon request.
- B2.3 The Contract Administrator or the Manager of Materials may extend the Submission Deadline by issuing an addendum at any time prior to the time and date specified in B2.1.

B3. ENQUIRIES

- B3.1 All enquiries shall be directed to the Contract Administrator identified in D4.1.
- B3.2 If the Bidder finds errors, discrepancies or omissions in the Bid Opportunity, or is unsure of the meaning or intent of any provision therein, the Bidder shall promptly notify the Contract Administrator of the error, discrepancy or omission at least five (5) Business Days prior to the Submission Deadline.
- B3.3 If the Bidder is unsure of the meaning or intent of any provision therein, the Bidder should request clarification as to the meaning or intent prior to the Submission Deadline.
- B3.4 Responses to enquiries which, in the sole judgment of the Contract Administrator, require a correction to or a clarification of the Bid Opportunity will be provided by the Contract Administrator to all Bidders by issuing an addendum.
- B3.5 Responses to enquiries which, in the sole judgment of the Contract Administrator, do not require a correction to or a clarification of the Bid Opportunity will be provided by the Contract Administrator only to the Bidder who made the enquiry.
- B3.6 The Bidder shall not be entitled to rely on any response or interpretation received pursuant to B3 unless that response or interpretation is provided by the Contract Administrator in writing.

B4. CONFIDENTIALITY

- B4.1 Information provided to a Bidder by the City or acquired by a Bidder by way of further enquiries or through investigation is confidential. Such information shall not be used or disclosed in any way without the prior written authorization of the Contract Administrator. The use and disclosure of the confidential information shall not apply to information which:
- (a) was known to the Bidder before receipt hereof; or
 - (b) becomes publicly known other than through the Bidder; or
 - (c) is disclosed pursuant to the requirements of a governmental authority or judicial order.
- B4.2 The Bidder shall not make any statement of fact or opinion regarding any aspect of the Bid Opportunity to the media or any member of the public without the prior written authorization of the Contract Administrator.

B5. ADDENDA

- B5.1 The Contract Administrator may, at any time prior to the Submission deadline, issue addenda correcting errors, discrepancies or omissions in the Bid Opportunity, or clarifying the meaning or intent of any provision therein.
- B5.2 The Contract Administrator will issue each addendum at least two (2) Business Days prior to the Submission Deadline, or provide at least two (2) Business Days by extending the Submission Deadline.
- B5.2.1 Addenda will be available on the Bid Opportunities page at The City of Winnipeg, Corporate Finance, Materials Management Division website at <http://www.winnipeg.ca/matmgt/bidopp.asp>
- B5.2.2 The Bidder is responsible for ensuring that he/she has received all addenda and is advised to check the Materials Management Division website for addenda regularly and shortly before the Submission Deadline, as may be amended by addendum.
- B5.3 The Bidder shall acknowledge receipt of each addendum in Paragraph 8 of Form A: Bid. Failure to acknowledge receipt of an addendum may render a Bid non-responsive.

B6. SUBSTITUTES

- B6.1 The Work is based on the materials, equipment, methods and products specified in the Bid Opportunity.
- B6.2 Substitutions shall not be allowed unless application has been made to and prior approval has been granted by the Contract Administrator in writing.
- B6.3 Requests for approval of a substitute will not be considered unless received in writing by the Contract Administrator at least seven (7) Business Days prior to the Submission Deadline.
- B6.4 The Bidder shall ensure that any and all requests for approval of a substitute:
- (a) provide sufficient information and details to enable the Contract Administrator to determine the acceptability of the material, equipment, method or product as either an approved equal or alternative;
 - (b) identify any and all changes required in the applicable Work, and all changes to any other Work, which would become necessary to accommodate the substitute;
 - (c) identify any anticipated cost or time savings that may be associated with the substitute;
 - (d) certify that, in the case of a request for approval as an approved equal, the substitute will fully perform the functions called for by the general design, be of equal or superior substance to that specified, is suited to the same use and capable of performing the same function as that specified and can be incorporated into the Work, strictly in accordance with the Contract;
 - (i) Demonstration of the performance and function shall be provided upon request.
 - (e) certify that, in the case of a request for approval as an approved alternative, the substitute will adequately perform the functions called for by the general design, be similar in substance to that specified, is suited to the same use and capable of performing the same function as that specified and can be incorporated into the Work, strictly in accordance with the Contract.
 - (i) Demonstration of the performance and function shall be provided upon request.
- B6.5 The Contract Administrator, after assessing the request for approval of a substitute, may in his/her sole discretion grant approval for the use of a substitute as an “approved equal” or as an “approved alternative”, or may refuse to grant approval of the substitute.
- B6.6 The Contract Administrator will provide a response in writing, at least two (2) Business Days prior to the Submission Deadline, to the Bidder who requested approval of the substitute.

- B6.6.1 The Contract Administrator will issue an Addendum, disclosing the approved materials, equipment, methods and products to all potential Bidders. The Bidder requesting and obtaining the approval of a substitute shall be responsible for disseminating information regarding the approval to any person or persons he/she wishes to inform.
- B6.7 If the Contract Administrator approves a substitute as an “approved equal”, any Bidder may use the approved equal in place of the specified item.
- B6.8 If the Contract Administrator approves a substitute as an “approved alternative”, any Bidder bidding that approved alternative may base his/her Total Bid Price upon the specified item but may also indicate an alternative price based upon the approved alternative. Such alternatives will be evaluated in accordance with B15.
- B6.9 No later claim by the Contractor for an addition to the price(s) because of any other changes in the Work necessitated by the use of an approved equal or an approved alternative will be considered.

B7. BID SUBMISSION

- B7.1 The Bid shall consist of the following components:
- (a) Form A: Bid; and
 - (b) Form B: Prices.
 - (i) If the Contract Administrator has approved substitute hardware and software according to B6, then a document listing all software, equipment, model specifics, and quantities, unit pricing per Form B: section, and description of each item shall be provided along with a plan view line diagram of all interconnected devices.
- B7.2 Further to B7.1, the Bidder should include the written correspondence from the Contract Administrator approving a substitute in accordance with B6.
- B7.3 All components of the Bid shall be fully completed or provided, and submitted by the Bidder no later than the Submission Deadline, with all required entries made clearly and completely in ink, to constitute a responsive Bid.
- B7.4 The Bid Submission may be submitted by mail, courier or personal delivery, or by facsimile transmission.
- B7.5 If the Bid Submission is submitted by mail, courier or personal delivery, it shall be enclosed and sealed in an envelope clearly marked with the Bid Opportunity number and the Bidder's name and address, and shall be submitted to:
- The City of Winnipeg
Corporate Finance Department
Materials Management Division
185 King Street, Main Floor
Winnipeg MB R3B 1J1
- B7.5.1 Samples or other components of the Bid Submission which cannot reasonably be enclosed in the envelope may be packaged separately, but shall be clearly marked with the Bid Opportunity number, the Bidder's name and address, and an indication that the contents are part of the Bidder's Bid Submission.
- B7.6 Bidders are advised not to include any information/literature except as requested in accordance with B7.1.
- B7.7 Bidders are advised that inclusion of terms and conditions inconsistent with the Bid Opportunity document, including the General Conditions, will be evaluated in accordance with B15.1(a).
- B7.8 If the Bid Submission is submitted by facsimile transmission, it shall be submitted to 204- 949-1178.

B7.8.1 The Bidder is advised that the City cannot take responsibility for the availability of the facsimile machine at any time.

B7.9 Bids submitted by internet electronic mail (e-mail) will not be accepted.

B8. BID

B8.1 The Bidder shall complete Form A: Bid, making all required entries.

B8.2 Paragraph 2 of Form A: Bid shall be completed in accordance with the following requirements:

- (a) if the Bidder is a sole proprietor carrying on business in his/her own name, his/her name shall be inserted;
- (b) if the Bidder is a partnership, the full name of the partnership shall be inserted;
- (c) if the Bidder is a corporation, the full name of the corporation shall be inserted;
- (d) if the Bidder is carrying on business under a name other than his/her own, the business name and the name of every partner or corporation who is the owner of such business name shall be inserted.

B8.2.1 If a Bid is submitted jointly by two or more persons, each and all such persons shall identify themselves in accordance with B8.2.

B8.3 In Paragraph 3 of Form A: Bid, the Bidder shall identify a contact person who is authorized to represent the Bidder for purposes of the Bid.

B8.4 Paragraph 10 of Form A: Bid shall be signed in accordance with the following requirements:

- (a) if the Bidder is a sole proprietor carrying on business in his/her own name, it shall be signed by the Bidder;
- (b) if the Bidder is a partnership, it shall be signed by the partner or partners who have authority to sign for the partnership;
- (c) if the Bidder is a corporation, it shall be signed by its duly authorized officer or officers;
- (d) if the Bidder is carrying on business under a name other than his/her own, it shall be signed by the registered owner of the business name, or by the registered owner's authorized officials if the owner is a partnership or a corporation.

B8.4.1 The name and official capacity of all individuals signing Form A: Bid should be printed below such signatures.

B8.4.2 All signatures shall be original.

B8.5 If a Bid is submitted jointly by two or more persons, the word "Bidder" shall mean each and all such persons, and the undertakings, covenants and obligations of such joint Bidders in the Bid and the Contract, when awarded, shall be both joint and several.

B9. PRICES

B9.1 The Bidder shall state a price in Canadian funds for each item of the Work identified on Form B: Prices.

B9.1.1 Prices on Form B: Prices shall include:

- (a) duty;
- (b) freight and cartage;
- (c) Provincial and Federal taxes [except the Goods and Services Tax (GST) and Manitoba Retail Sales Tax (MRST, also known as PST), which shall be extra where applicable] and all charges governmental or otherwise paid;
- (d) profit and all compensation which shall be due to the Contractor for the Work and all risks and contingencies connected therewith.

B9.1.2 Prices on Form B: Prices shall not include Environmental Handling Charges (EHC) or fees, which shall be extra where applicable.

B9.2 The quantities listed on Form B: Prices are to be considered approximate only. The City will use said quantities for the purpose of comparing Bids.

B9.3 The quantities for which payment will be made to the Contractor are to be determined by the Work actually performed and completed by the Contractor, to be measured as specified in the applicable Specifications.

B10. DISCLOSURE

B10.1 Various Persons provided information or services with respect to this Work. In the City's opinion, this relationship or association does not create a conflict of interest because of this full disclosure. Where applicable, additional material available as a result of contact with these Persons is listed below.

B10.2 The Persons are:

- (a) Dominic Chevrier (Stantec Consulting Ltd.)
- (b) Mark Cossement (Barco Visual Solutions, Inc.)
- (c) Dennis Nuutinen (Activu Corporation)
- (d) Brian Pratschler (Inland AV)

B11. QUALIFICATION

B11.1 The Bidder shall:

- (a) undertake to be in good standing under The Corporations Act (Manitoba), or properly registered under The Business Names Registration Act (Manitoba), or otherwise properly registered, licensed or permitted by law to carry on business in Manitoba, or if the Bidder does not carry on business in Manitoba, in the jurisdiction where the Bidder does carry on business; and
- (b) be financially capable of carrying out the terms of the Contract; and
- (c) have all the necessary experience, capital, organization, and equipment to perform the Work in strict accordance with the terms and provisions of the Contract.

B11.2 The Bidder and any proposed Subcontractor (for the portion of the Work proposed to be subcontracted to them) shall:

- (a) be responsible and not be suspended, debarred or in default of any obligations to the City. A list of suspended or debarred individuals and companies is available on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Division website at <http://www.winnipeg.ca/matmgt/debar.stm>

B11.3 The Bidder and/or any proposed Subcontractor (for the portion of the Work proposed to be subcontracted to them) shall:

- (a) have successfully carried out work similar in nature, scope and value to the Work; and
- (b) be fully capable of performing the Work required to be in strict accordance with the terms and provisions of the Contract; and
- (c) have a written workplace safety and health program, if required, pursuant to The Workplace Safety and Health Act (Manitoba);
- (d) be certified and experienced, at the time of commencing Work, in the supply, installation, configuration, and commissioning of the proposed AV system hardware and software by the AV software developer and AV hardware manufacturer. The Contractor shall provide at minimum one (1) certified person on site to oversee and/or conduct Work and shall note the name of this person(s) on Form: B.

- (e) be authorized to supply, install and maintain the equipment proposed.
- (f) have direct experience within the past two (2) years with a minimum of three (3) previous projects using proposed software and hardware integration in similar implementations as specified herein.
- (g) propose an AV system hardware manufacturer and software developer with at minimum five (5) reference projects over the past year where proposed hardware and software has been similarly fully integrated and implement as specified herein.

B11.4 The Bidder shall submit, within three (3) Business Days of a request by the Contract Administrator, proof satisfactory to the Contract Administrator of the qualifications of the Bidder and of any proposed Subcontractor.

B11.5 The Bidder shall provide, on the request of the Contract Administrator, full access to any of the Bidder's equipment and facilities to confirm, to the Contract Administrator's satisfaction, that the Bidder's equipment and facilities are adequate to perform the Work.

B12. OPENING OF BIDS AND RELEASE OF INFORMATION

B12.1 Bids will not be opened publicly.

B12.2 Following the Submission Deadline, the names of the Bidders and their Total Bid Prices (unevaluated, and pending review and verification of conformance with requirements or evaluated prices) will be available on the Closed Bid Opportunities (or Public/Posted Opening & Award Results) page at The City of Winnipeg, Corporate Finance, Materials Management Division website at <http://www.winnipeg.ca/matmgt>

B12.3 After award of Contract, the name(s) of the successful Bidder(s) and the Contract amount(s) will be available on the Closed Bid Opportunities (or Public/Posted Opening & Award Results) page at The City of Winnipeg, Corporate Finance, Materials Management Division website at <http://www.winnipeg.ca/matmgt>

B12.4 The Bidder is advised that any information contained in any Bid may be released if required by City policy or procedures, by The Freedom of Information and Protection of Privacy Act (Manitoba), by other authorities having jurisdiction, or by law.

B13. IRREVOCABLE BID

B13.1 The Bid(s) submitted by the Bidder shall be irrevocable for the time period specified in Paragraph 9 of Form A: Bid.

B13.2 The acceptance by the City of any Bid shall not release the Bids of the next two lowest evaluated responsive Bidders and these Bidders shall be bound by their Bids on such Work for the time period specified in Paragraph 9 of Form A: Bid.

B14. WITHDRAWAL OF BIDS

B14.1 A Bidder may withdraw his/her Bid without penalty by giving written notice to the Manager of Materials at any time prior to the Submission Deadline.

B14.1.1 Notwithstanding C21, the time and date of receipt of any notice withdrawing a Bid shall be the time and date of receipt as determined by the Manager of Materials.

B14.1.2 The City will assume that any one of the contact persons named in Paragraph 3 of Form A: Bid or the Bidder's authorized representatives named in Paragraph 10 of Form A: Bid, and only such person, has authority to give notice of withdrawal.

B14.1.3 If a Bidder gives notice of withdrawal prior to the Submission Deadline, the Manager of Materials will:

- (a) retain the Bid until after the Submission Deadline has elapsed;

- (b) open the Bid to identify the contact person named in Paragraph 3 of Form A: Bid and the Bidder's authorized representatives named in Paragraph 10 of Form A: Bid; and
- (c) if the notice has been given by any one of the persons specified in B14.1.3(b), declare the Bid withdrawn.

B14.2 A Bidder who withdraws his/her Bid after the Submission Deadline but before his/her Bid has been released or has lapsed as provided for in B13.2 shall be liable for such damages as are imposed upon the Bidder by law and subject to such sanctions as the Chief Administrative Officer considers appropriate in the circumstances. The City, in such event, shall be entitled to all rights and remedies available to it at law.

B15. EVALUATION OF BIDS

B15.1 Award of the Contract shall be based on the following bid evaluation criteria:

- (a) compliance by the Bidder with the requirements of the Bid Opportunity, or acceptable deviation therefrom (pass/fail);
- (b) qualifications of the Bidder and the Subcontractors, if any, pursuant to B11 (pass/fail);
- (c) Total Bid Price;
- (d) economic analysis of any approved alternative pursuant to B6;

B15.2 Further to B15.1(a), the Award Authority may reject a Bid as being non-responsive if the Bid Submission is incomplete, obscure or conditional, or contains additions, deletions, alterations or other irregularities. The Award Authority may reject all or any part of any Bid, or waive technical requirements or minor informalities or irregularities if the interests of the City so require.

B15.3 Further to B15.1(b), the Award Authority shall reject any Bid submitted by a Bidder who does not demonstrate, in his/her Bid or in other information required to be submitted, that he/she is responsible and qualified.

B15.4 Further to B15.1(c), the Total Bid Price shall be the sum of the quantities multiplied by the unit prices for each item shown on Form B: Prices.

B15.5 This Contract will be awarded as a whole.

B16. AWARD OF CONTRACT

B16.1 The City will give notice of the award of the Contract or will give notice that no award will be made.

B16.2 The City will have no obligation to award a Contract to a Bidder, even though one or all of the Bidders are determined to be responsible and qualified, and the Bids are determined to be responsive.

B16.2.1 Without limiting the generality of B16.2, the City will have no obligation to award a Contract where:

- (a) the prices exceed the available City funds for the Work;
- (b) the prices are materially in excess of the prices received for similar work in the past;
- (c) the prices are materially in excess of the City's cost to perform the Work, or a significant portion thereof, with its own forces;
- (d) only one Bid is received; or
- (e) in the judgment of the Award Authority, the interests of the City would best be served by not awarding a Contract.

B16.3 Where an award of Contract is made by the City, the award shall be made to the responsible and qualified Bidder submitting the lowest evaluated responsive Bid, in accordance with B15.

- B16.3.1 Following the award of Contract, a Bidder will be provided with information related to the evaluation of his/her Bid upon written request to the Contract Administrator.
- B16.4 Notwithstanding C4 and Paragraph 6 of Form A:Bid, the City may issue a Purchase Order to the successful Bidder in lieu of the execution of a Contract.
- B16.5 The Contract Documents, as defined in C1.1(n)(ii) in their entirety shall be deemed to be incorporated in and to form a part of the Purchase Order notwithstanding that they are not necessarily attached to or accompany said Purchase Order.

PART C - GENERAL CONDITIONS

C0. GENERAL CONDITIONS

- C0.1 The *General Conditions for the Supply of Goods* (Revision 2008 05 26) are applicable to the Work of the Contract.
- C0.1.1 The *General Conditions for the Supply of Goods* are available on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Division website at http://www.winnipeg.ca/matmgt/gen_cond.stm
- C0.2 A reference in the Bid Opportunity to a section, clause or subclause with the prefix “**C**” designates a section, clause or subclause in the *General Conditions for Supply of Goods*.

PART D - SUPPLEMENTAL CONDITIONS

GENERAL

D1. GENERAL CONDITIONS

D1.1 In addition to the *General Conditions for the Supply of Goods*, these Supplemental Conditions are applicable to the Work of the Contract.

D2. SCOPE OF WORK

D2.1 The Work to be done under the Contract shall consist of the supply, installation, configuration, testing, and commissioning of a Phase 1 networked audio visual system including hardware and demo software at 821 Elgin Avenue, Winnipeg, Manitoba. Basic training of users and system administrators on the use, setup and maintenance shall also be provided by the AV software developer/hardware manufacturer.

D2.2 The major components of the Work are as follows:

- (a) TMC Control Room - R04 - Video Wall Display, Cabling, Mounts, Room Interconnect and Other Accessories (Sect. 1)
 - (i) Supply, install, and configure all video wall displays, cabling (including display interconnect cables to R03A), mounts, and other required accessories to meet specified quality and function within global AV system.
- (b) TMC Control Room - R04 - Discrete Hardware Encoders, Cabling, Mounts, and Other Accessories (Sect. 2)
 - (i) Supply, install, and configure all discrete hardware encoders, cabling (including interconnection to room R03A), mounts, and other required accessories to meet specified quality and function within global AV system.
- (c) TMC Supervisor Room - R06 - Hardware Encoder, and Other Accessories (Sect. 3)
 - (i) Supply, install, and configure the discrete hardware encoder, cabling (including interconnection to room R03A), mounts, and other required accessories to meet specified quality and function within global AV system.
- (d) TMC AV Data Room - R03A - Rack, Decoders, Encoders, Mounts, and Other Accessories (Sect 4)
 - (i) Supply, install, terminated, and configure the equipment rack, display output node decoders, mounts and other specified or required accessories to meet specified quality and function within global AV system.
- (e) TMC AV Software Installation, Configuration, Commissioning of Global AV system (Sect. 4)
 - (i) Supply, install, configure, and commission demo software and network settings to provide specified quality and function of the within the global AV system.

D3. DEFINITIONS

D3.1 When used in this Bid Opportunity:

- (a) "**1080p**" means High Definition video mode characterized by 1080 lines of vertical resolution and progressive scan;
- (b) "**24/7**" means 24 hours a day, 7 days a week;
- (c) "**4k**" means Display resolution on the order of 4,000 pixels horizontal, and 2,000 pixels vertical;
- (d) "**API**" means Application Programmers Interface;
- (e) "**AV**" means Audio/Visual;

- (f) "**AV Integrator**" means Audio/Visual Integrator is a legal business that is authorized and certified where necessary to provide, install, configure, and or commission Audio Visual hardware and software;
- (g) "**AV System**" means Audio Visual Situational Awareness and Collaboration System that provides integrated AV hardware and software for networked audio and visual device control throughout the TMC, and enables the combination of IP streamed sources for understanding within and outside of the TMC, and real-time event handling and collaboration between internal stakeholders;
- (h) "**CA6a, Cat6, Cat5**" means common IP network cabling;
- (i) "**CATV**" means Community Access Television;
- (j) "**cd/m2**" means Candela per square meter;
- (k) "**City IT**" means Information Technology representatives from the City of Winnipeg;
- (l) "**CoW**" means City of Winnipeg;
- (m) "**DHCP**" means Dynamic Host Configuration Protocol;
- (n) "**DP**" means Display Port;
- (o) "**DSP**" means Digital Signal Processing;
- (p) "**DVI**" means Digital Visual Interface;
- (q) "**EDID**" means Extended Display Information Data;
- (r) "**fps**" means Frames per second;
- (s) "**Gbps**" means Gigabits per second;
- (t) "**Global AV System**" means AV system supporting networked components and users on the City LAN;
- (u) "**H.264 / H.265**" means Advanced Video Coding Format of video content;
- (v) "**HD**" means High Definition;
- (w) "**HDMI**" means High-Definition Multimedia Interface;
- (x) "**HID**" means Human Interface Device;
- (y) "**i7**" means Intel i7 processor;
- (z) "**IGMP**" means Internet Group Management Protocol;
- (aa) "**IP**" means Internet Protocol;
- (bb) "**IPS**" means Inter Panel Switching;
- (cc) "**IR**" means Infrared;
- (dd) "**KVM**" means Keyboard Video Mouse;
- (ee) "**LAN**" means Local Area Network;
- (ff) "**LCD**" means Liquid Crystal Display;
- (gg) "**LED**" means Light Emitting Diode;
- (hh) "**Mbps**" means Megabits per second;
- (ii) "**ms**" means millisecond;
- (jj) "**MTBF**" means Mean Time Between Failure;
- (kk) "**OS**" means Operating System;
- (ll) "**PC**" means Personal Computer;
- (mm) "**PDF**" means Portable Document Format;
- (nn) "**PTZ**" means Pan-Tilt-Zoom;
- (oo) "**PVR**" means Personal Video Recorder;
- (pp) "**REST**" means Representational State Transfer;

- (qq) "**RIS**" means Roadway Information System;
- (rr) "**RJ-45**" means Connector for common network cables;
- (ss) "**RMA**" means Return Material Authorization;
- (tt) "**RS-232(c)**" means Serial cable connection for control;
- (uu) "**RTP**" means Real-time Transport Protocol;
- (vv) "**RTSP**" means Real Time Streaming Protocol;
- (ww) "**SOAP**" means Simple Object Access Protocols;
- (xx) "**SSH**" means Secure Shell;
- (yy) "**TCP/IP**" means Transmission Protocol over IP;
- (zz) "**TMC**" means City of Winnipeg Traffic Management Centre;
- (aaa) "**TSMS**" means Traffic Signal Management System;
- (bbb) "**UDP**" means User Datagram Protocol;
- (ccc) "**UPS**" means Uninterruptible power supply;
- (ddd) "**USB**" means Universal Serial Bus;
- (eee) "**VDC**" means Voltage Direct Current;
- (fff) "**VGA**" means Video Graphics Array ;
- (ggg) "**VMS**" means Video Management Software;
- (hhh) "**VOIP**" means Voice Over Internet Protocol;
- (iii) "**VTC**" means Video Teleconferencing;

D4. CONTRACT ADMINISTRATOR

- D4.1 The Contract Administrator is:
Jonathan Foord, EIT
Signals Asset Engineer
Telephone No.: 204- 986-6619
Email Address: jfoord@winnipeg.ca

D5. OWNERSHIP OF INFORMATION, CONFIDENTIALITY AND NON DISCLOSURE

- D5.1 The Contract, all deliverables produced or developed, and information provided to or acquired by the Contractor are the property of the City and shall not be appropriated for the Contractors own use, or for the use of any third party.
- D5.2 The Contractor shall not make any public announcements or press releases regarding the Contract, without the prior written authorization of the Contract Administrator.
- D5.3 The following shall be confidential and shall not be disclosed by the Contractor to the media or any member of the public without the prior written authorization of the Contract Administrator;
- (a) information provided to the Contractor by the City or acquired by the Contractor during the course of the Work;
 - (b) the Contract, all deliverables produced or developed; and
 - (c) any statement of fact or opinion regarding any aspect of the Contract.
- D5.4 A Contractor who violates any provision of D5 may be determined to be in breach of Contract.

D6. CONTRACTOR'S SUPERVISOR

D6.1 At the pre-construction meeting, the Contractor shall identify his/her designated supervisor and any additional personnel representing the Contractor and their respective roles and responsibilities for the Work.

D7. RETURNED GOODS

D7.1 Further to C.7 and C.11, The Contract Administrator or his/her designate shall inform the Contractor of the item(s) being returned and the reason for the return. The Contractor shall provide the Contract Administrator with Return Material Authorization (RMA) including shipping instructions, within five (5) Calendar Days of the request.

D7.1.1 The Contractor shall be responsible for all transportation charges on returned goods and further to C.8 the goods will be held at the Contractor's risk pending instruction.

D7.2 Further to D7.1, the RMA shall include the following information, as a minimum:

- (a) Company name, if different than Contractor, and ship to addresses;
- (b) Written authorization for the return and for a collect shipment;
- (c) Preference of carrier / shipping method, a contact person with either a local Winnipeg telephone number or a toll-free telephone number;
- (d) A contact person, responsible for the returned goods, with a toll-free telephone number.

D7.3 The Contract Administrator shall provide, as a minimum:

- (a) The City department returning the goods, including an address and contact information for pick up;
- (b) The City account number; if applicable;
- (c) The City of Winnipeg's Department and address;
- (d) Two (2) copies of the written authorization / RMA, one (1) copy on the outside and (1) one within the package;
- (e) Total number of packages, weight and dimensions.

D8. NOTICES

D8.1 Notwithstanding C21.3, all notices of appeal to the Chief Administrative Officer shall be sent to the attention of the Chief Financial Officer at the following facsimile number:

The City of Winnipeg
Chief Financial Officer

Facsimile No.: 204- 949-1174

D8.2 **Bid Submissions must not be submitted to this facsimile number. Bids must be submitted in accordance with B7.**

SUBMISSIONS

D9. AUTHORITY TO CARRY ON BUSINESS

D9.1 The Contractor shall be in good standing under The Corporations Act (Manitoba), or properly registered under The Business Names Registration Act (Manitoba), or otherwise properly registered, licensed or permitted by law to carry on business in Manitoba, or if the Contractor does not carry on business in Manitoba, in the jurisdiction where the Contractor does carry on business, throughout the term of the Contract, and shall provide the Contract Administrator with evidence thereof upon request.

D10. INSURANCE

D10.1 The Contractor shall provide and maintain the following insurance coverage:

- (a) commercial general liability insurance, in the amount of at least two million dollars (\$2,000,000.00) inclusive, with The City of Winnipeg added as an additional insured; such liability policy to also contain a cross-liability clause, non-owned automobile liability and products and completed operations cover, to remain in place at all times during the performance of the Work;
- (b) if applicable, Automobile Liability Insurance covering all motor vehicles, owned and operated and used or to be used by the Contractor directly or indirectly in the performance of the Work. The Limit of Liability shall not be less than \$2,000,000 inclusive for loss or damage including personal injuries and death resulting from any one accident or occurrence.
- (c) all risks installation floater carrying adequate limits to cover all machinery, equipment, supplies and/or materials intended to enter into and form part of any installation. Deductibles shall be borne by the Contractor.

D10.2 The Contractor shall provide the Contract Administrator with a certificate(s) of insurance, in a form satisfactory to the City Solicitor, at least two (2) Business Days prior to the commencement of any Work but in no event later than the date specified in C4 for the return of the executed Contract.

D10.3 The Contractor shall not cancel, materially alter, or cause the policy to lapse without providing at least thirty (30) Calendar Days prior written notice to the Contract Administrator.

D11. SUBCONTRACTOR LIST

D11.1 The Contractor shall provide the Contract Administrator with a complete list of the Subcontractors whom the Contractor proposes to engage at least two (2) Business Days prior to the commencement of any Work on the Site but in no event later than seven (7) Calendar Days from notification of the award of Contract.

D11.1.1 Subcontractor information shall include

- (a) legal name, address, and contact info.
- (b) Name of personnel working on-site for subcontractor.

SCHEDULE OF WORK

D12. COMMENCEMENT

D12.1 The Contractor shall not commence any Work until he/she is in receipt of a notice of award from the City authorizing the commencement of the Work.

D12.2 The Contractor shall not commence any Work until:

- (a) the Contract Administrator has confirmed receipt and approval of:
 - (i) evidence of authority to carry on business specified in D9;
 - (ii) evidence of the workers compensation coverage specified in C6.16;
 - (iii) evidence of the insurance specified in D10;
- (b) the Contractor has attended a meeting with the Contract Administrator, or the Contract Administrator has waived the requirement for a meeting.
- (c) the Contractor has supplied an AV system concept book for Work that has been approved by the Contract Administrator.
 - (i) the conception book shall include but not be limited to the following:
 - (i) A detailed component block diagram

- (ii) A detailed component listing with quantities, with brief description of use within the AV system (if not clear by component name).
 - (iii) A schematic diagram showing cabling runs and connections of all equipment constituting the AV System. (AutoCAD Bid Document Drawings will be provided upon request)
 - (iv) Individual room and building wiring diagrams showing power connections, Ethernet connectivity, analog video transmission (if required), and control system wiring.
 - (v) R03A Room Configuration and Rack Layout, ,
 - (vi) Ethernet switching (hardware and configuration) requirements to support local building AV system usage, and transmission/reception of City LAN input/output.
- (d) The Contractor has provided a critical path method (C.P.M) schedule for the Work including a Gantt chart for the Work based on this schedule with the following (but not limited to) info:
- (i) Material Delivery
 - (ii) Hardware Installation
 - (iii) Software Installation
 - (iv) Commissioning, inspection and turnover to client.
 - (v) List and dates for all deliverables required from Contract Administrator and City such as approvals, City IT coordination activities, and City supplied equipment installations.
- (e) The Contractor has provided a list of subcontractors if applicable.

D12.3 The City intends to award this Contract by November 15, 2016.

D12.3.1 If the actual date of award is later than the intended date, the dates specified for delivery, and Total Performance will be adjusted by the difference between the aforementioned intended and actual dates.

D13. DELIVERY

D13.1 Goods shall be delivered within 21 Calendar Day(s) of the award of Contract, unless otherwise approved in writing by Contract Administrator, f.o.b. destination, freight prepaid to:

821 Elgin Avenue
Winnipeg, Manitoba, Canada
R3E 3R1

D13.2 The Contractor shall confirm each delivery with the Contract Administrator or his/her designate, at least two (2) Business Days before delivery.

D13.3 Goods shall be delivered between 8:30 a.m. and 3:30 p.m. on Business Days.

D13.4 The Contractor shall off-load the Goods as directed at the delivery location.

D13.5 The Contractor shall provide deliveries with power-lift trucks where necessary as there is no access to a forklift, or truck offloading bay.

D14. INSTALLATION, CONFIGURATION, COMISSIONING, AND TOTAL PERFORMANCE

D14.1 The goods supplied shall be installed, and configured by December 19, 2016.

D14.2 The inspection, commissioning, and resolving of any deficiencies constituting Total Performance and turnover to City shall be completed by December 22, 2016.

MEASUREMENT AND PAYMENT

D15. INVOICES

D15.1 Further to C10, the Contractor shall submit an invoice for each order delivered to:

The City of Winnipeg
Corporate Finance - Accounts Payable
4th Floor, Administration Building, 510 Main Street
Winnipeg MB R3B 1B9

Facsimile No.: 204- 949-0864

Email: CityWpgAP@winnipeg.ca

D15.2 Invoices must clearly indicate, as a minimum:

- (a) the City's purchase order number;
- (b) date of delivery;
- (c) delivery address;
- (d) type and quantity of goods delivered, installed, commissioned and turned over to City;
- (e) the amount payable with GST, MRST, and any applicable environmental handling charges/fees identified and shown as separate amounts; and
- (f) the Contractor's GST registration number.

D15.3 The City will bear no responsibility for delays in approval of invoices which are improperly submitted.

D15.4 **Bid Submissions must not be submitted to the above facsimile number. Bids must be submitted in accordance with B7.**

D16. PAYMENT

D16.1 Further to C10, the City may at its option pay the Contractor by direct deposit to the Contractor's banking institution.

D17. PAYMENT SCHEDULE

D17.1 Further to C10, payment shall be in Canadian funds net thirty (30) Calendar Days after receipt and approval of the Contractor's invoice.

D18. WARRANTY

D18.1 Notwithstanding C11, the warranty period shall begin on the date of Total Performance and shall expire one (1) year thereafter unless extended pursuant to C11.3, in which case it shall expire when provided for thereunder.

D18.1.1 The one (1) year warranty shall include materials, and labour and all shipping costs to and from manufacturer or repair depots provided by the Contractor.

D18.1.2 Where extended hardware warranties are available from equipment manufacturer, the AV contractor shall compile a list of extended warranties to include in the operations and maintenance manual at completion of Work.

- (a) The display panels for the video wall shall have at minimum three (3) year manufacturer warranty.
- (b) Encoders, decoder output nodes from the AV manufacturer shall have at minimum two (2) year manufacturer warranty.

D18.2 Further to C11, if a defect or deficiency prevents the full and normal use or operation of the Work or any portion thereof, for purposes of calculating the warranty period, time shall be deemed to cease to elapse for the defective or deficient portion, and for any portion of the Work whose use or operation is prevented by such defect or deficiency, as of the date on which the defect or deficiency is observed or the use or operation is prevented and shall begin to run again when the defect or deficiency has been corrected or the Work may be used or operated to the satisfaction of the Contract Administrator.

PART E - SPECIFICATIONS

GENERAL

E1. APPLICABLE SPECIFICATIONS AND DRAWINGS

E1.1 These Specifications shall apply to the Work.

E1.2 The following are applicable to the Work:

<u>Drawing No.</u>	<u>Drawing Name/Title</u>
	941-2016_Drawing_Cover_R0
	941-2016_Drawing_General Arrangement_R0
	941-2016_Drawing_R03A AV Data Details_R0
	941-2016_Drawing_R03 Foyer Details_R0
	941-2016_Drawing_R04 Main Boardroom_R0
	941-2016_Drawing_R05 Control Room_R0
	941-2016_Drawing_R06 Supervisor Details_R0
	941-2016_Drawing_Second Boardroom Details_R0
	941-2016_Video_TMC Room and Conduit Walk Through_R0

E1.3 Due to the sensitivity of the information pertained in the drawings, and, or videos or photos, these items shall only be provided to bona fide AV Integrators for the purpose of bidding on the specified Work upon:

- (a) Request to Contract Administrator via email with information on legal business name, business address, contact information, and website if available.
- (b) Contract Administrator validation of AV Integrator, and supply of AV Integrator with confidentiality disclosure agreement.
- (c) AV Integrator return of signed confidentiality disclosure agreement to Contract Administrator.

E1.4 Bidders are reminded that requests for approval of substitutes as an approved equal or an approved alternative shall be made in accordance with B6.

E2. GENERAL

E2.1 The City of Winnipeg (CoW) is implementing its first traffic management centre (TMC). The TMC design is based on a decentralized/distributed model where communication networks, technology, and information systems are utilized to send relevant information to geographically separated stakeholders throughout the City to enable data driven and informed action.

E2.2 There are four key systems that support the functioning of the TMC. These systems are the:

E2.2.1 Traffic Signal Management System (TSMS) – centralized and real-time control of the 650 signalized intersections throughout the city. Provides two way communication, control, and reporting. 100% connected Machine to Machine (M2M) cellular connections.

E2.2.2 Roadway Information System (RIS) – Geographic repository of information on roadway incidents, activities, and traffic flow, integrated with stakeholder activity to provide relevant information sharing to internal and external users.

E2.2.3 Video Management System (VMS) - Manages and supports the control/functionality of a city wide network of Pan-Tilt-Zoom cameras monitoring the road network. The system

facilitates the use of these cameras, and the sharing of this visual information/control to stakeholders as authorized and as required.

- E2.2.4 Audio Visual (AV) Situational Awareness and Collaboration System – Provides networked audio and visual device control throughout the TMC, and enables the combination of sources from the other three systems to provide situational awareness, and understanding within and outside of the TMC, and real-time event handling and collaboration between internal stakeholders. The following specifies the Phase 1 implementation of this AV Situational Awareness and Collaboration System or shortened to “AV system” in this document.

E3. PHASED SYSTEM IMPLEMENTATION

- E3.1 The implementation of the AV system is broken down into two (2) phases. The Work to be completed in Phase 1 (this bid opportunity) shall complement the full system rollout of Phase 2. Phase 2 shall consist of increased inputs (encoded sources) and outputs (decoding), and the supply, installation, configuration, and commissioning with integration of 3rd party software and hardware for additional sources, outputs, and controls within the Phase 1 rooms and the building’s two (2) boardrooms. Items to come in Phase 2 include items such as interactive projectors, VTC with PTZ cameras, speakers, and microphones, with DSP and VOIP, and touch control panels.

E4. GENERAL AV SYSTEM REQUIREMENTS

- E4.1 The AV system shall be a complete IP-based end-to-end system implementing control room workflows, AV collaboration, and the development of situational awareness views in the fastest, most efficient and effective way.
- E4.2 It shall support following functions:
- (a) Provide situational awareness: by ensuring the capture, transport and visualization of various types of information sources (video, data and/or audio)
 - (b) Multi-person and multi-location use and collaboration: enabling the sharing of situational information between multiple users or outputs, across multiple locations spanning the network.
 - (c) Interaction with control room applications: allow TMC operators to (remotely) control applications from their desk
 - (d) 3rd Party Integration: allowing control of control and meeting room equipment through touch and web interfaces.
 - (e) 14 hour business day year round commercial/industrial usage up to 24/7 for special events.
 - (f) Scalable to add additional users, groups, inputs, and outputs as required.
- E4.3 The complete AV system shall consist of the following components:
- (a) Input AV sources
 - (b) Display outputs
 - (c) IP-based distribution network
 - (d) Collaboration software
 - (e) Interface with external systems
 - (f) Additional network services
 - (g) System level performance and capabilities
 - (h) Network security and information assurance
- E4.4 Source Capture

- E4.4.1 The AV System shall be capable of simultaneously displaying multiple types of video signals, IP based streaming video formats, remote desktops, video graphics, web pages, graphic files, video files, encoded audio visual streams, and application for simultaneous viewing on any system display.
- E4.4.2 The AV System shall allow the definition of an unlimited amount of sources
- E4.4.3 Sources shall be defined within the system and available to any authorized user.
- E4.4.4 The AV system shall utilize software and hardware capture of audio, video, and data sources and shall convert them to IP streams that can be efficiently transported on standard IP based networks.
- E4.4.5 The supplied AV system shall provide the capability to integrate the following source captures for use and control within the global AV system:
- (a) High resolution video and audio signals capture: encoding of video and audio baseband signals using industry standard codecs. Unless otherwise agreed to by the Contract Administrator, all encoded video shall be h.264.
 - (i) High resolution video and graphics encoders shall provide the:
 - ◆ Capture of audio, video, and graphics for use on IP networks.
 - ◆ Up to 4K encoding and loop through options. Loop through encoders shall provide industry standard monitor connections such as DVI/HDMI/DP
 - ◆ Optimized image quality and streaming by allocated/available bandwidth to each endpoint.
 - ◆ Availability to define the maximum output bitrate limit and ensure the optimized streams do not exceed stated limits while maintaining the image and stream quality.
 - ◆ Provide full frame rates up to 60 fps, and
 - ◆ Typical end to end latencies of 100 milliseconds or less
 - ◆ Unicast and multicast streaming
 - ◆ Provide accurate colour, and visually lossless video and graphic content to multiple output endpoints.
 - ◆ End to end frame-synchronized replication of content shown across multiple display outputs.
 - ◆ Encoders shall be capable for use as decoders.
 - ◆ External/discrete video and graphic encoder options shall enable the connection of PC keyboard and mouse input for remote operation. The keyboard and mouse signals shall be transported on the IP network. Latency between the remote keyboard and mouse via the encoder connection to the controlling PC shall be less than 100 milliseconds. Remote mouse movement shall be smooth and accurate providing remote users with no/minimal noticeable delay. (Less than 100 milliseconds)
 - (ii) Encoder AV System Integration
 - ◆ The encoder shall automatically register itself to the AV central management system
 - ◆ A web interface shall provide an overview of all encoding decoding devices on the network.
 - ◆ Setup wizards shall allow mass configuration of multiple system encoders.
 - ◆ Encoders shall provide automatic EDID management and scaling when utilized as a decoder.
 - (iii) Encoder Connectivity and Flexibility

- ◆ Shall provide connectivity using standard computer cables and connections.
 - ◆ Shall provide input encoding of standard computer display output resolutions.
 - ◆ Encoders shall permit the choice of two types of digital video inputs for computer video signal output connection.
 - ◆ Shall provide the availability to define encoded output resolution, compression, and frame rate up to 60 fps.
 - ◆ Availability to define the maximum output bitrate limit and ensure the optimized streams do not exceed stated limits while maintaining the image and stream quality.
 - ◆ Unless otherwise agreed to by the Contract Administrator, all encoded sources shall provide 12 Mbps streams or less for encoded outputs of 1920x1200 pixels 60 fps or less.
 - ◆ Source Encoding shall use non-proprietary industry standard formats and resolutions enabling decoding by general user computer hardware on the city network while minimizing the need for additional decoding hardware.
- (b) Encoded IP network stream capture: shall directly accept and integrate already encoded network IP video into the AV system, and shall process these streams where necessary to ensure compatibility with the entire AV system and ensure low latency processing. (AV system shall support this functionality, but shall not be utilized in Phase 1)
- (i) The AV system shall support the easy integration of IP network camera feeds managed on an accessible IP network of a Video Management System (VMS) server as video sources for use on the global AV system.
 - ◆ VMS managed IP camera video feeds shall be pulled from the VMS servers and not directly from the IP camera as to avoid the requirement for an additional unicast feed.
 - ◆ Shall support major VMS vendors such as Avigilon, Genetec, and Milestone Systems.
 - (ii) The AV system shall support the integration of video sources from major IP camera manufacturers, such as Axis, Bosch, HikVision, Panasonic, etc, including the support for high frame rate and megapixel cameras.
 - (iii) Shall provide watchdog functionality ensuring high availability of streaming video as required.
 - (iv) Shall report on loading for high level resource management
 - (v) The AV system should integrate the basic PTZ controls of the integrated IP camera feeds, if available.
- (c) Remote Desktop software capture: shall enable the capture of the graphical output generated by OS's and applications to serve as sources for the use within the global AV system. The AV system remote desktop software capture shall:
- (i) Allow access and control of the remote desktop server from an AV connected client via keyboard and mouse.
 - (ii) Support Windows 7, 8, and 10.
 - (iii) The following modes of remote desktop software capture shall be provided:
 - ◆ Full remote desktop: capturing the complete remote desktop including multi-screens.
 - ◆ Single remote desktop display: capturing one of potentially multiple displays from a remote desktop
 - ◆ Desktop cropping of a rectangular section of the display by X and Y coordinates

- ◆ Application Window: capturing a particular application window by application name.
 - ◆ Content of the application window shall be displayed
 - ◆ Application name shall be indicated at output
- (iv) Software screen-capture shall be installed on all operator computers, supervisor computer, VMS client computers with the support from the Contractor to create up to four (4) AV sources per computer or pooled amongst the computers twenty (20) such AV sources with KVM capability as requested by the Contract Administrator.
- (v) The use of virtual desktops for screen-scraping of sources shall be permitted.

E4.5 Remote Desktop Control and Software Keyboard Video Mouse (KVM)

- E4.5.1 The AV system shall enable an operator to use software KVM to instantly connect and control remote desktop(s) from keyboard and mouse connected encoders or through remote desktop software capture.
- (a) The AV system client's local keyboard and mouse shall operate as the input and control devices of the remote desktop as if the keyboard and mouse were connected directly to the remote desktop.
 - (b) The local keyboard and mouse shall operate in a periodic update mode in addition to a real-time update mode for smooth cursor update.
 - (i) The keyboard and mouse signals shall be transported on the IP network.
 - (ii) Latency between the remote keyboard and mouse via the encoder connection to the controlling PC shall be less than 100 milliseconds.
 - (iii) Remote mouse movement shall be smooth and accurate providing remote users with no/minimal noticeable delay.
 - (c) The AV system shall enable a client to move to the top/bottom/left/right edges of a local desktop to up to four pre-defined remote desktops as defined by client user.
 - (d) The AV system shall permit system administrators to manage IP addresses or range of IP addresses that can access target remote desktops.
 - (e) The AV system shall restrict the view and/or interaction to only specific display(s) of the target remote desktop. It shall permit system administrators to restrict a client user from accessing a remote system with multiple displays, to interact only with the application shown on any particular display.
- E4.5.2 The application shall have the capability to provide notification to the host machine user (operator) when the desktop transport is active and connected to the core system.
- E4.5.3 The application shall allow the host machine operator (if authorized) to set control parameters for communication with the core system; disabling keyboard and mouse or desktop transport when desired.
- E4.5.4 Ease of Install
- (a) The remote desktop software client shall be easily installed on a user's workstation through the AV system, and be automatically detected by the AV system.
- E4.6 Display Output
- E4.6.1 The AV system shall be able to drive multiple displays of various resolutions in multiple locations connected by standard IP networks.
- E4.6.2 The AV system shall be capable of displaying any available system source on any common commercially available display(s) utilizing common standard video signal types
- E4.6.3 Displays, scalable in quantity and locations shall be defined within the system and available to any authorized user

- E4.6.4 The AV system shall be able to arrange and layout multiple AV system sources for decoding and presentation as composite streams on a display output or across a multiple display video wall.
- E4.6.5 Layouts of arranged multiple sources shall be viewable and shareable across displays or clients across the network.
- (a) The AV System Display Output devices shall operate as group where required to create one seamless synchronous and unlimited size display wall.
 - (b) display output devices shall be frame-locked and vertical-synch–locked for synchronized output as required.
 - (c) Client Workstations
 - (i) Shall be able to create, share, collaborate, or view decoded AV system layouts with multiple AV system sources.
 - (ii) Shall use software and hardware acceleration where available to decode AV sources, and minimize cpu/gpu utilization where applicable.
- E4.7 IP Distribution Network
- E4.7.1 The AV system shall be capable of transporting any captured signal to any location using a standard IP network.
- E4.7.2 The AV system shall support multicast of captured signals to minimize network bandwidth requirements.
- E4.7.3 The AV system shall support:
- (a) network operation with layer 2 or layer 3 switches or routers and have IGMP query and snooping capabilities to avoid network flooding due to multicasting.
 - (b) high bandwidth 1 Gb/s network connections without oversubscription
 - (c) standard network cabling such as but not limited to Cat6a, Cat 6, and Cat5e
- E4.7.4 The Contractor shall work in conjunction with City IT to ensure appropriate switch equipment selection and setup of the City supplied switch(s). The Contractor shall coordinate and work with the Contract Administrator and City IT to ensure security and network requirements are adhered to in configuration of the switch(s).
- E4.8 AV System User Collaboration
- E4.8.1 The AV system shall support full redundancy from a network level up to fully redundant servers and displays. The AV system shall support the monitoring of the state of the network, servers, and displays and initiate fail-over switching on any of the devices or the network itself.
- E4.8.2 The AV system shall utilize current and future off-the-shelf PC components through the transparent use of industry standard hardware acceleration of modern graphic cards. The AV system software shall support the easy and open integration possibilities with 3rd party systems.
- E4.9 Architecture and API
- E4.9.1 The AV system software shall support client server architecture.
- E4.9.2 The server(s) running the AV system software shall be fully redundant in Phase 2, however for Phase 1, the demo software shall run solely on either a supplied sixth generation i7 linux computer/linux virtual machine, or from the a centrally managed City server.
- (a) The Contractor shall work in conjunction with City IT to ensure appropriate and compatible hardware and software is provided to accommodate the AV system demo management software.
- E4.9.3 The AV system software shall be able to share or push complete and/or partial desktop content between workstations and between unmanned displays or workstations.

- E4.9.4 The AV system software shall provide capabilities to provide highly customizable system actions in response to third-party application real-time events.
- E4.9.5 The AV system software shall provide an application programmer's interface (API) to facilitate third-party software to control and access the AV system software features including the ability to:
- (a) Query the available composed views
 - (b) Launch sources in windows
 - (c) Switch views
 - (d) Switch current window contents to available inputs for both networked or non-networked sources (on the input cards)
 - (e) Query the overall system status, and
 - (f) Launch applications
- E4.9.6 The AV System software shall provide an API that provides the capability for third-party control systems and applications to send commands to the system via standard TCP/IP or RS-232 protocols.
- E4.9.7 The AV system software shall support Simple Object Access Protocols (SOAP) , REST, and Telnet API for touch panel controls and 3rd party AV integration.
- E4.10 Source Management
- E4.10.1 The AV system software shall manage the multiple input sources connected to the global AV system network.
- E4.10.2 The AV system software shall be able to auto-detect sources available on the network
- E4.10.3 The AV system software shall be able to display a complete and organized list of available sources.
- (a) The AV system shall support the following types of sources:
 - (i) Networked Desktops
 - ◆ Software screen-scraping of user workstations connected to the AV network.
 - ◆ Software screen-scraping up to 120Mb
 - ◆ Full desktop, partial desktop, multi-head, or active application window
 - ◆ Operator workstations connected to DVI/HDMI/DP IP encoders up to 1920x1200 resolution per source
 - ◆ Operator workstations connected to DVI/HDMI/DP IP encoders up to 4k resolution per source
 - ◆ Allows screen-scraping of source PCs where software cannot be installed, where source PC is on separate secured network, or where dynamic video may be shared and needs to be disseminated on the global AV network with high quality streaming, and low end to end latency for view and control.
 - (ii) Intranet and Internet (For Phase 1 this will be accomplished through software screen-scraping)
 - ◆ Unlimited quantity of web sources
 - ◆ Renders any web page within the system and makes available as a video source on the global AV system.
 - (iii) Streaming Video (This functionality will not be utilized in Phase 1, as VMS client computers in Phase 1 will have a hardware encoder with KVM on a graphic card output to create sources of VMS client camera setups to the global AV system.)
 - ◆ Streaming video sources from interoperable encoders
 - ◆ Streaming sources from encoded IP network stream capture

E4.11 Displayed Sources

E4.11.1 The AV system shall provide users the availability to display additional meta data, input user definable content and labels, and change appearance of individual AV system sources such as:

- (a) Source name as label
- (b) Status of Source
- (c) Audio Presence Indicators
- (d) Date-time Indicators
- (e) Text
- (f) Border Colours
- (g) Logos insertion (image files)
- (h) User definable message ticker that can be configured for position (top, bottom, left, and right), language, scroll speed, and direction of scroll

E4.12 Application Management

E4.12.1 The AV system software shall permit the operator to manage applications installed on unmanned application computers. (i.e. Room R03A or R05 software and encoded screen scrapping installations on various room computers or virtual desktops)

E4.12.2 The AV system shall include complete software keyboard video management (KVM) using the remote desktop capture software to permit users to take mouse and keyboard control of the following:

- (a) Manned Displays (operators workstation)
- (b) Unmanned displays
- (c) Any screen scraped application
- (d) Any IP Encoded Source

E4.12.3 The AV system through 3rd party integration shall support the capability to control CATV PVR receivers, PTZ video conferencing controls, VOIP controls, and room audio visual.

- (a) The AV system shall support the use of touchscreens and web interfaces to enable user control of these devices and specified functionality.

E4.13 Display Output Management

E4.13.1 The AV System GUI shall provide an intuitive means for dynamically arranging content on any of the system displays. It shall provide a graphical representation with option for local rendering of all system displays and indicate all content available and currently displayed in the system.

E4.13.2 The AV system GUI shall display all defined system resources authorized for access by the current user profile. System resources shall be viewable as a list, resource tree, or searchable by typing the designation of the desired resource.

E4.13.3 The AV system GUI shall allow multiple users to log in and control the system concurrently; each in accordance with their own user rights.

E4.13.4 The AV system software shall permit sources to be rendered on manned or unmanned displays with a given users intervention.

E4.13.5 The AV system software shall provide the capability to create layouts consisting of arranged multiple AV system global sources to create situational awareness views.

E4.13.6 The AV system software shall provide a GUI client interface to allow users to create, preview, drag and drop sources into multisource layouts.

- (a) The AV system software shall allow the creation of virtual layouts with arranged AV sources and shall enable

- (i) rendering of sources on a local users computer
 - (ii) sharing of virtual layouts with other network AV system users (also rendered for networked user)
 - (iii) collaboration with other networked AV system users through software KVM capabilities.
- E4.13.7 The AV system client GUI shall allow users to push layouts with arranged multiple AV sources to manned or unmanned displays, passed on permissions.
- E4.13.8 The client GUI shall be non-intrusive and require minimal amount of user desktop space.
- E4.13.9 The client GUI shall allow the user to organize single or multiple layouts of arranged AV sources into larger composite layouts for dissemination to the global AV system.
- E4.13.10 The AV client software shall permit a user to create, name, store, and launch layouts of arranged sources and locally share to other AV clients on the AV network.
- E4.13.11 The AV client shall permit the user to turn on or off local rendering of a multi AV source layout
- E4.13.12 The AV client GUI shall provide user feedback of CPU loading.
- E4.13.13 The AV system shall provide the capabilities for user friendly and fast layout switching, to load layouts on a particular display, or on multiple displays simultaneously.
- E4.13.14 The AV system shall support turning displays on or off, or input selection, and hotkey executable macros.
 - (a) The AV system GUI shall provide the capability to create, store and recall multiple scripted actions. These scripts shall be assignable to user-defined push button-like graphical controls, allowing the scripts to execute upon clicking.
- E4.13.15 The AV system shall support the option for scheduling and dwell time of sources, multisource layout arrangements, and overall layouts including defined start and end times. The inclusion of this functionality shall not be part of Phase 1.
- E4.14 AV Content Management and Arrangement
 - E4.14.1 The AV system GUI shall provide the following content management functions:
 - (a) Resource view: A list of all available resources available to the system.
 - (b) Resource search: The capability to search system resources by typing the name of the resource.
 - (c) Video wall representation: the capability to see and manipulate a graphical representation of the video wall and/or displays along with the current content being displayed in real-time.
 - (d) Content templates: The capability to store and recall image locations on the video wall display independently of actual content. New content added to the video wall is immediately aligned to content template boundaries.
 - (e) Presets: The capability to store and recall content along with their relative positions on the video wall.
 - (f) Crop: The capability to remove unwanted peripheral content from displayed content
 - (g) Zoom: The capability to magnify areas of a displayed source on the video wall.
 - (h) Size: The capability to re-size content as it appears on the video wall; either preserving or modifying the original aspect ratio of the source.
 - (i) Layering: The capability to place content on top of (or underneath) other content on the video wall.
 - (j) Snap: The capability to force displayed content to align with the boundaries of a display.
 - (k) Source default parameters: The capability to define default size and aspect ratio settings for a source.

- (l) Event scheduling: The capability to automatically call up predetermined content on the video wall by time-driven schedule.
- (m) Multi-views: The capability to create multiple alternate versions of displayed video wall content and toggle rapidly between them.

E4.14.2 The following capabilities shall be provided if available:

- (a) Zoom: The capability to magnify areas of a displayed source on the video wall.
- (b) Image Blending: The capability to make a displayed image partially transparent thereby making layered content underneath the primary image visible.
- (c) Color Keying: The capability to make certain colors of a displayed image transparent thereby making layered content underneath the color visible.

E4.15 Audio Management

E4.15.1 The AV system software shall support integrated audio systems to allow full user control of all audio sources defined in the system.

E4.15.2 The AV system GUI shall support multi-zone audio control providing the capability to select audio source and control volume for all audio-capable sources and all audio zones defined within a system.

E4.16 System Maintenance and Monitoring

E4.16.1 The AV system shall support software updates that push through the AV central server to avoid updating an AV client per client.

E4.16.2 The AV system shall provide an administration control panel for Administrators logged into the AV client.

E4.16.3 The AV system software shall permit the logging of the following:

- (a) Client Logging
- (b) Central Server Logging

E4.16.4 Where logs shall not be automatically overwritten

E4.16.5 The AV system software shall produce logs that shall contain the minimum information:

- (a) Individual User ID that has control of the video wall at any given time
- (b) Name of PC that has control of video wall at any given time
- (c) Time control was taken
- (d) Time control was released
- (e) Source(s) rendered – start and end time

E4.16.6 Time stamps in log shall be in intervals of one (1) second or less.

E4.16.7 The AV System shall support the option for a monitoring application that provides the system with the capability to independently monitor and report on the health of all major system components.

E4.17 User Management

E4.17.1 The AV system software shall support user management capabilities as follows:

- (a) Authentication and Permission System
 - (i) User accounts are validated against Active Directory
 - (ii) Permissions for functionality
 - (iii) Roles
- (b) Active Directory, LDAP
 - (i) No storage of passwords in the AV system
- (c) Internal Accounts

- (i) Storage of passwords on the AV system server only
- (ii) Password database is encrypted
- (d) Role Based
 - (i) Roles define access to resources
- (e) Security for APIs
 - (i) Special API accounts shall be available to define permission and roles.

E4.18 System Level Performance and Capabilities

E4.18.1 The AV system shall be fully scalable, and shall be extendable at any time in terms of:

- (a) Number of sources
- (b) Number of displays
- (c) Number of screens per display
- (d) Number of concurrent clients

E4.18.2 Increases of the above shall be realized with incremental cost and shall not require a major system overhaul.

E4.19 Security and Information Assurance

E4.19.1 The manufacturer shall disclose its information assurance general policy with respect to product release cycles

E4.19.2 Information Assurance Certification Required (CON)

E4.20 Fault Tolerance and Robustness

E4.20.1 The AV system hardware and software shall provide capabilities for redundant techniques:

E4.20.2 AV system source capture units and display outputs shall support redundant network connections to the IP Network

E4.20.3 The AV system software shall support running on redundant server hardware with automatic switching from one server to another in case of first server failure.

E4.20.4 The AV system shall support virtualized server support

E4.20.5 Network display outputs shall support N+1 redundant configurations where in the case of a failure of a single output unit, the redundant output unit is activated and takes over the task of the failed unit.

E4.20.6 The switch from the failed unit to the redundant unit will happen without requiring any physical re-cabling between display output units and screens.

E5. INPUT AV SOURCES

E5.1 Unless otherwise noted, or previously agreed to by the Contract Administrator, all sources shall be available in h.264 encoded format to facilitate networked AV system situational awareness sharing and collaboration across the City LAN. H.264 encoders and/or the AV system shall support multicast streaming and encoding configurability for scaling and bandwidth conservation when transmitting AV sources/multi source layouts over the internal building or external City LAN. The City shall have the ability to modify scaling and encoding configuration for transmission over the network.

E5.2 Discrete hardware encoder quality and latency shall fulfill the following requirements:

- (a) Audio and video encoded source transmissions with an end to end latency of 100 ms or less.
- (b) Audio shall be accurately synchronized with video when broadcast together
- (c) When distributing graphics, the encoder shall preserve even the smallest details, making it suitable to encode images like spreadsheets or single pixel line diagrams. The

encoder shall provide smooth high quality source streaming free of horizontal lines, frame freezes or choppy audio/video quality, with minimal to no visual artifacts.

- (d) KVM interaction with manned and unmanned encoded computer displays shall have an input latency and display of 100 ms or less. Mouse and keyboard input shall provide performance similar to a local keyboard and mouse. Mouse pointer shall move and display smoothly.
- E5.3 H.264 encoded CATV receivers totaling one (1) live or recorded playback television channel sources. For Phase 1, CATV-PVR shall have remote control capabilities provided to users from within the TMC Control Room.
- E5.4 Discrete hardware H.264 graphic card encoding sources with audio capture, and shall include support of networked KVM.
- E5.4.1 If the H.264 encoding is unable to provide (Low latency, high quality, low artifact, and synchronized audio visual output and control (regardless of video dynamics – static, semi static, motion video) at specified bandwidth maximums (12 Mbps) within the local AV system at 821 Elgin Avenue at.) than analog video and audio dissemination shall also be provided and integrated into the AV system configuration. This shall apply specifically to encoded rooms where local users interact directly with local encoded sources and display outputs.
- E5.5 Software screen-capture of entire display(s) output, section of display(s) and OS windows and shall include support for networked KVM.
- E5.5.1 Software screen-capture is to be used to source and control computer applications and webpages with primarily static/semi-static content.

E6. AV USER AND USER GROUP PERMISSIONS

- E6.1 For Phase 1, the control of the AV system operation shall be enabled solely through AV control software/clients installed on city computers, and the CATV-PVR remote control. Touchscreens and boardrooms are not part of the specified Work and will be provided in Phase 2.
- E6.2 The AV system shall have two distinct user scenarios, not including administration users:
 - (a) Basic User
 - (i) The basic user shall permit basic local meeting room input and output access only. At request of the Contract Administrator the account can be setup without a password requirement, or with a password. If password is required, the following minimum complexity levels may be defined and enabled:
 - (i) Minimum number characters in length
 - (ii) Contains a ratio or number of uppercase letters, lowercase letters, numbers, and symbols
 - (ii) Typically, this user type will be utilized for table top touch screen control.
 - (b) Active Directory User
 - (i) The Active Directory user shall login using a City Active Directory login and shall have availability to access global AV system inputs and outputs based on user level permissions.
 - (i) Permissions to use specific AV inputs and outputs shall be managed through the AV system with integration of the City Active Directory System. Permissions shall allow setting by User and User Group permissions with multiple levels and complexity provided by the City Active Directory (AD) system.
 - (ii) Permissions shall be managed by City IT administrators.
 - (iii) The Contractor shall support the integration and setup of the AV system with the City Active Directory in coordination and collaboration with City IT.
 - (ii) This user type will utilize both the computer installed AV system client control software, and the table top touch screen control.

E7. AV SYSTEM USERS

E7.1 The following is a proposed list of users of the Phase 1 AV System.

E7.2 Local Users

E7.2.1 TMC System Administrator – Setup, configuration modification, control and operation of AV System components and related city supplied hardware.

- (i) view/create virtualized multisource layouts with local rendering.
- (ii) share layouts or sections of layouts with other authorized users.
- (iii) view layouts sent from other AV System Users, and/or collaborate across the network.

E7.2.2 TMC Supervisor – Oversees the System Administrator and TMC Operators. Is able to control and operate AV System inputs and outputs.

- (i) view/create virtualized multisource layouts with local rendering.
- (ii) share layouts or sections of layouts with other authorized users.
- (iii) view layouts sent from other AV System Users, and/or collaborate across the network.

E7.2.3 TMC Operators – Control and operation of AV System inputs and outputs.

- (i) view/create virtualized multisource layouts with local rendering.
- (ii) share layouts or sections of layouts with other authorized users.
- (iii) view layouts sent from other AV System Users, and/or collaborate across the network.

E7.2.4 Traffic Signal Timing Engineers – Control and operation of authorized AV system inputs and ability to (client software only):

- (i) view/create virtualized multisource layouts with local rendering.
- (ii) share layouts or sections of created multisource layouts with other authorized users.
- (iii) view layouts sent from other AV System Users, and/or collaborate across the network.

E8. WORK SUMMARY

E8.1 For Phase 1, the Work of the Contractor shall consist of the supply, installation, configuration, testing, and commissioning of a networked audio visual hardware and software system at 821 Elgin Avenue, Winnipeg, Manitoba, meeting performance and functionality of the bid specifications.

- (a) The Contractor shall supply, install configure, and commission a three month duration demo of the full AV system software provided with the following:
 - (i) Server license for up to sixteen (16) concurrent clients
 - (ii) Availability to view thirty-six (36) concurrent AV sources
 - (iii) Display license for the video wall
 - (iv) Fifteen (15) client licenses for controlling AV system software and enabling local rendering, AV system source KVM, and AV system multi-user collaboration.
 - (v) Availability to define unlimited screen-scraped (software encoded desktop sources).
 - (vi) All functionality as defined by the bid specifications.
- (b) For Phase 1, the demo software shall be installed in coordination with City IT on a City supplied 6th gen i7 workstation at 821 Elgin Avenue, or on a centralized virtual server with the following hardware specifications:
- (c) The networked AV system software, clients, software encoders, and all other specified equipment shall be configured by the Contractor in coordination with the City IT.
 - (i) The Contractor shall be certified by the software developer/hardware manufacturer and have experience in scope (size, functionality) with the equipment and software.

- (i) The Contractor shall provide on site, at minimum, one individual with previous experience and certification from the AV software developer/hardware manufacturer to oversee/install all specified equipment, and to configure, test, and commission the specified system.
- E8.2 Training of users and system administrators on the use, setup and maintenance shall be provided through live and recorded web trainings directly from the AV software developer/hardware manufacturer.
 - (a) Allow for two (2) four (4) hour web training sessions with TMC staff.
 - (i) Training sessions shall take place during regular business hours.
 - (ii) Each training session shall include a review of the operation and maintenance manual, review of system configuration and review of controls.
 - (iii) Training shall cover basic troubleshooting techniques such as best practices for rebooting various components of the system.
 - (b) Training shall be sufficient to enable users to:
 - (i) view/create virtualized multisource layouts with local rendering.
 - (ii) share layouts or sections of layouts with other authorized users.
 - (iii) view layouts sent from other AV System Users, and/or collaborate across the network.
 - (iv) general maintain and troubleshoot basic system issues.
 - (v) software screen-scraped source creation or modification.
 - (c) The Operations and Training Manual shall be completed and accepted by the Contract Administrator or his/her designate unless requested earlier by Contract Administrator, prior to the training session taking place.
- E8.3 The Contractor shall supply all equipment as noted, or required to meet the bid specifications.
- E8.4 The City shall supply all computers, computer monitors, LAN switches, firewalls, routers, and computer accessories such as computer mice, keyboards, and individual computer speakers for this project. The City shall be responsible for the installation and licensing of the city supplied computer operating systems (OS) and any software not required under the scope of this work. The City shall be responsible for configuring all the computer hardware on the City's internal network.
- E8.5 The Contractor shall be responsible for the overall configuration and for the connection of each source input and output for proper operation within the global environment defined in the specifications documents and drawings. The Contractor is responsible to supply and install (with the exception of already installed LAN cables) all the required cables, all raceways and supports within ceiling spaces and all mounts for video output devices. The Contractor is responsible to provide installation support for this AV System in an integrated system and in conjunction with the City's IT infrastructure.
- E8.6 All installed cables are to be marked and coded at termination ends to facilitate ease of understanding purpose and hardware input/output connection. All ceiling run cables shall not rest on suspending ceilings but be support by wall or ceiling mounted J-hooks.
 - (a) The Contractor shall allow for the supply and installation of continuous Ethernet cables to be run and terminated from all Phase 1 encoded City supplied computers and Contractor supplied encoders to R03A rack without using existing wall jacks.
 - (i) This is to accommodate potential ease of accommodating network switching of the AV system with the City LAN.
- E8.7 The supply, install and configuration of the following AV components outside of the local building of 821 Elgin Ave are beyond the scope of this specification.
- E8.8 Any deviations in system design, performance issues, or inability of the proposed AV system configuration to meet specific requirements shall be noted by the Contractor on the bid submission.

E8.9 City IT Access, Coordination, and Scheduling.

E8.9.1 Shall have access through the network and to City supplied hardware, not limited to the following, for overall management of:

- (i) Active Directory,
- (ii) Security,
- (iii) Permissions and Permission Hierarchy,
- (iv) Network, switch configuration and loading.

E8.9.2 The City IT personnel shall provide input and requirements for network configuration, security, and integration with City supplied hardware and accessories. The Contractor shall coordinate work with City IT to implement the overall AV System for use across the City LAN. The Contractor shall provide a detailed plan and scope of work in advance of the actual work being performed. The detailed schedule shall note timelines and deliverables required by City IT to meet project deadlines, as well as sufficient details for City IT to understand requirements and scope.

E9. QUALITY ASSURANCE

E9.1 Quality of Installation

E9.1.1 The workmanship with reference to this project is to be of the highest industry standards applicable. This applies to work including electrical installations, and AV System equipment, installation and configuration. All equipment shall be of commercial/enterprise quality, and Work to be of professional quality.

E9.1.2 The Contractor shall provide properly trained, qualified, professional installation technicians and trades people throughout the duration of this project. Observe and obey building codes applicable, safety rules & regulations, and the general rules of the facility as directed.

E9.1.3 All installation, configuration and setup of software as well as related work hereto shall be carried out by qualified technicians thoroughly trained by the video wall system provider in the installation and service of the provided software.

E10. TMC CONTROL ROOM (R05)

E10.1 The TMC Control Room (R05) shall consist of a room with a video wall consisting of eight (8) fifty-five (55) inch IPS LED Ultra Narrow Bezel professional grade displays in a two (2) high by four (4) wide display configuration. Each display panel shall have a minimum resolution of 1080p.

E10.2 Sources to be displayed on the video wall shall consist primarily of IP network cameras, webpages, computer software applications, local and networked video sources, and CATV-PVR. The AV system hardware shall be able to decode up to the equivalent of sixteen (16) concurrent 1080p 30 fps (or eight (8) 1080p 60 fps sources for display on the video wall).

E10.3 Within the room are four (4) installed operator stations each with their own City supplied computer, mouse, keyboard, computer speaker and four (4) - twenty-three (23) inch 1080p monitors with DVI, VGA, and DP connections.

E10.4 The four (4) operators shall be able to control and operate the video wall through installed AV system software clients installed on their individual computers, and shall be able to pass audio and video from their computer or from a global AV system source to the video wall or to external building users/outputs over the City LAN. One display output from each operator computer graphic card shall be configured for loop-through hardware video encoding for local and/or City LAN sharing. Audio and HID USB for keyboard and mouse input from the computer shall also be captured.

E10.5 Each operator shall have the capability to create virtual AV multisource layouts on their local computer with rendering for situational awareness and day-to-day operation. Operators shall be

able to quickly and easily share a virtual AV multisource layout with other network users, and manned or unmanned networked outputs in a view only or collaborative multi-user scenario.

- E10.6 The operators shall be provided with KVM control of unmanned computer hardware and software encoded sources, or KVM collaboration with manned hardware or software encoded sources through multisource layouts locally or on a display output. User/User-group permissions to the granularity of each source or control shall be developed in consultation with Contract Administrator and City IT.
- E10.7 The scope of Work in the TMC Control Room R05 shall consist of, but not be limited to:
- E10.7.1 Coordinate the installation of AV System control software, and screen-capture software with City IT on the four (4) operator computers.
- E10.7.2 Supply, install, and configure all required cables, supports and modules for each operator including loop-through video signal hardware encoders of one DVI/DP monitor (one (1) per operator) and audio capture, and any HID (keyboard, mouse) connections for each operator computer as required to ensure integration as global AV source. Selectable audio playback of AV system audio sources shall be provided through each operator's computer as a line-in input.
- (a) Note hardware encoded quality and latency requirements E5.4.1
- E10.7.3 For Phase 1, audio sources, such as the audio provided from the CATV-PVR shall be provided in room through operator workstation computer speakers.
- (a) Each input and output device shall be defined for separate or combined use in the AV System, and shall be selectable and usable within the room, within the building, or across the City LAN.
- E10.7.4 Supply and install the video wall composed of eight (8) video wall displays (monitors) for this room, including all the required cables, mounts, supports and modules for the installation and connection to the AV system.
- E10.8 One of the four operator stations may be delegated for use by a System Administrator for administration of the global AV system and VMS system. The System Administrator shall have the same setup and capabilities as an operator, however this user shall be provided with increased permissions for control, management, setup and modification of the AV system.

E11. SUPERVISOR ROOM (R06)

- E11.1 The TMC Supervisor shall oversee the entire operation of the TMC, including all available input sources, and outputs such as the video wall, regardless of location within the local building. Access and control of the video wall shall be available to the supervisor, including the capability to provide audio and video input to the AV system utilizing the supervisor's local computer. The supervisor shall have the capability to create and share virtual AV multisource layouts from the supervisor's local computer for other's situational awareness and day-to-day operation.
- E11.2 At the supervisor's desk is a city supplied computer complete with mouse, keyboard, speakers, and two (2) twenty-three (23) inch 1080p monitors with DVI, VGA, and DP connections.
- E11.3 The scope of work in the Supervisor Room (R06) shall consist of, but not be limited to:
- E11.3.1 Coordinate installation of AV System control software, and screen-capture software with City IT as required on the supervisor's computer.
- E11.3.2 Supply, install, and configure all required cables, supports and modules for the supervisor's AV use including loop-through video signal encoders of one DVI/DP monitor, audio capture, and any HID (keyboard, mouse) connections as required to integrate as source a global AV source. Selectable audio playback of AV system audio sources shall be provided through the supervisor's computer as a line in input.
- (a) Note hardware encoded quality and latency requirements E5.4.1

E12. AV DATA ROOM (R03A)

- E12.1 The AV Data Room (R03A) shall house the AV system hardware components utilized to interface, use, and control local building AV inputs, local AV outputs, and City LAN AV inputs and AV outputs. All AV system components shall be located within this room where possible, and as to not impact AV system performance, unless otherwise noted.
- (a) AV system input and output nodes shall be located within this room where possible.
- E12.2 All Ethernet switches, and any required computers for screen-scraping of computer applications, webpages or other static/semi-static sources shall be supplied by the City.
- E12.3 The Contractor shall provide requirements for switching to fulfill the bid specifications and intended Phase 1 use in consultation with the Contract Administrator.
- E12.4 The Contractor shall be responsible for all cable terminations.
- E12.5 Patch panel(s) shall be provided and installed for clear demarcation and colour coding of wiring coming from the AV equipment. The Contractor shall propose a colour coding scheme for approval by the Contract Administrator.
- E12.6 The AV Data Room shall provide the AV system with City LAN network connection via Cat6a connections already terminated in the room.
- E12.7 In Phase 1, the i7 workstation shall be housed in this room and shall be utilized for the initial demo software installation, or a centralized server provided.
- E12.8 The scope of work in the Technical Room R03A shall consist of, but not be limited to:
- (a) Supply and install a 2 post 48U rack complete with all the required accessories to provide support, power and vertical cable management for the AV system.
 - (b) One (1) city supplied CATV-PVR receiver shall provide one (1) television channel AV inputs for use in the global AV system.
 - (i) Supply, install, and configure all required cables, supports and modules for video encoding and audio capture. For Phase 1, CATV-PVR control and channel selection shall be provided through the use of the receiver's remote control.
 - (i) It is proposed that the final location of the CATV-PVR receiver shall be installed in R03A room, however for Phase 1, this item may be provided in R05, however the Contractor shall provide all cabling, mounts, supports as required to include this as hardware encoded AV source. At minimum the CATV-PVR will be provided with connectivity to R03A and R05 from the CATV provider.
 - (c) Supply, install and configure all mounts, supports cabling, etc to facilitate AV system integration and specified operation of the following (but not limited to):
 - (i) AV system decoder(s) and all mounts, supports, cabling, etc, to facilitate AV system integration, dissemination to and control of video wall.
 - (ii) IR/RS-232 controller and receiver (if required for CATV-PVR control),
 - (iii) Required patch panels in order to provide a clear demarcation for all wiring coming from AV equipment outside of Technical room (R03A)
 - (iv) Discrete hardware encoder(s) complete with audio capture, and HID connections (mouse, keyboard) for AV system KVM control and collaboration for City supplied computers running VMS client(s).
 - (i) The discrete hardware encoder shall encode one (1) DVI monitor output from each supplied VMS client computer (two in total)
 - (d) Install and configure AV system software in coordination with City IT on City supplied hardware to operate as sources of the global AV system with KVM control/collaboration as noted.
 - (i) AV system management software on a City supplied i7 workstation, or centralized server.
 - (ii) AV system software KVM of VMS client computer(s),

- (iii) Screen-scraping of desktop monitor(s) output, section(s) of monitor, or applications on local computers or virtualized desktops and KVM software control.
- (iv) One (1) CATV-PVR receivers.

E13. HARDWARE

E13.1 Alternative hardware and software submissions other than the components listed in Form: B shall be processed as per the request for substitutes as per B6.

E13.1.1 Sufficient documentation shall be required, and demonstration upon request Contract Administrator to the show that the proposed substitution is equivalent or better in terms of function and performance of the overall integration and combination of AV hardware and software specified herein.

E13.2 Video Wall Display

E13.2.1 The Video Wall Display shall meet the following requirements:

- (a) Display panels size of fifty-five (55) inches diagonal.
- (b) Direct LED IPS panels with minimum 60 Hz refresh
- (c) Minimum typical luminance of 700 cd/m²
- (d) Minimum resolution of 1920x1080 pixels
- (e) 16:9 format
- (f) 178 degree horizontal and vertical viewing angles or greater.
- (g) Minimum Contrast Ratio of 1,400:1
- (h) Minimum Dynamic Contrast Ratio of 500,000:1
- (i) Minimum Screen Haze of 44%
- (j) Ultra narrow bezel to bezel distance of 3.5 mm or less (3.8 mm pixel to pixel or less)
- (k) Commercially rated for 24/7 service
- (l) RS-232c control and/or RJ-45 control.
- (m) 10 bit colour
- (n) Energy Star Version 6
- (o) Power supply shall be modular and replaceable on site.
- (p) Backlight typical lifetime of greater than 60,000 hrs
- (q) Mean Time Between Failure of 100,000 hrs (half brightness)
- (r) Equipped with temperature sensors and ultra-low noise fans for heat management.
- (s) The display panels shall have digital input connectivity options, including, but not limited to, OPS, Digital DVI, HDMI, full DisplayPort and IP inputs.
- (t) Each display panel shall have the ability to "loop-through" any selected digital input signal via a full Display Port connection supporting v1.1a or higher
- (u) Each display panel shall have signal "cropping" capabilities allowing a single image to be displayed across the entire video wall array (bezel compensation)
- (v) The control of the wall shall be possible via a network. Each panel shall have their own IP address, and the control software can access all of them at the same time. The available features shall be: On/Off, brightness and colour, input control
- (w) Provide automatic and dynamic brightness and color calibration with uniformity between all associated video wall panels through built in light and colour sensors without manual intervention. Brightness levels shall be modifiable across all video wall panels through control management software without the need for individual physical interaction.

- (x) The control of the display wall shall be possible via a network. All display panels shall have their own IP address, and the control software can access all of them at the same time. The available features shall be: On/Off, brightness and colour, input control
- (y) Shall provide minimum three (3) year manufacturer warranty and serviceability for at minimum three (3) years after end of life.
- (z) Display mounts: Shall permit micro-adjustment for high quality clean, gapless, professional installation, and shall provide ease of access and quick serviceability. Maximum mount offset distance from wall shall be less than 100 mm unless otherwise agreed to by the Contract Administrator.

E13.2.2 Execution

- (a) Contractor shall provide professional input to the mounting height and angle of the four (4) wide by two (2) high, eight (8) display panel video wall based on the TMC Control Room (R05) ergonomic and functional use, and viewing by the TMC Meeting Room (R04) operators. The Contractor shall provide final position recommendations with a visual mock up to be approved by the Contract Administrator before installing the Video Wall Displays.
- (b) Provide, install and configure the eight display panels at the location identified with all required modules, and accessories to provide required functionality. An extra panel may be added on contract award, and if so, shall be delivered to 821 Elgin Ave for storage with notification to Contract Administrator on arrival.
 - (i) All displays from the same manufacturer, and of the same model year and version. An additional display panel of the same manufacture shall be provided to mitigate impacts from an unexpected panel failure and issues stemming from finding the same panel at a later date.
- (c) Provide and install all required cables, mounting hardware and fixtures including power, display, and control cables and devices, including interconnection with room R03A. Wood backing has been installed as illustrated in specification drawings to facilitate mounting.
 - (i) Supply, and install four (4) fiber video interconnect cables to connect four of the display panels to room R03A. The remaining four displays shall be connected with loop through cable connections.
- (d) Configure the displays panels as a video wall for optimal room usage.
- (e) Provide, install and configure the display wall for integration into the global AV system for control and use.

E13.2.3 The Video Wall Displays shall be the model IVD5521 by Barco Visual Solutions Inc. along with corresponding items as noted in B7.1(b) or equivalent approved by the Contract Administrator. Green BCM / wall net components and Energy Star, and internal power supply without redundancy shall also be provided.

E13.3 Equipment Rack

E13.3.1 The Equipment Rack shall meet the following requirements:

- (a) EIA compliant 19" 48RU 2-post equipment rack;
- (b) Minimum 11-gauge steel frame complete with heavy duty kit.
- (c) Complete with tapped 10-32 mounting holes in universal EIA spacing (front and back), black e-coat finish and numbered rack spaces;
- (d) Fully welded steel construction;
- (e) UL listed with up to a 2,000 lb. weight capacity;
- (f) Integrated ground stud;
- (g) Provide four (4) horizontal current monitoring 5-20P 20A straight blade power bars complete with ten (10) outlets, 15A receptacles, on/off switch.

- (h) Provide 8" wide horizontal Cable Trough complete with joiner plates and end caps.
- (i) Provide horizontal cable managers:
 - (i) Horizontal cable managers shall be finger style, 1RU, 5.5" deep, complete with hinged cover.
 - (ii) Supply 1 horizontal cable manager for every 6RUs of rack mounted equipment.
- (j) Provide high density 8" wide, 5.43" deep, 44RU high vertical cable manager complete with hinged door and 2RU finger spacing.
- (k) Provide equipment shelves:
 - (i) Equipment shelves shall be fixed, vented, double-sided 28" deep.
 - (ii) Minimum load capacity shall be 200lbs.
 - (iii) Supply shelves as necessary to complete installation of equipment included in the contract.
- (l) Contractor shall be responsible for all rack accessories required to complete installation of all equipment included in the contract.

E13.3.2 The Equipment rack and accessories shall be R.F. Mote or equivalent approved by the Contract Administrator or his/her designate.

E13.3.3 Execution:

- (a) Supply and install the rack (and all required accessories) with sufficient rack unit space to allow for the installation of all rack mounted control devices required for the complete solution in consultation with City IT.
- (b) Ensure equipment is operating at specified normal operating temperatures. Coordinate AC unit settings with the City.
- (c) Configure the rack in order to install a UPS supplied by the City at the bottom of the rack. The Contractor shall assume that a space of 12RU will be required.

E13.4 Patch Panel(s)

E13.4.1 The Patch Panel(s) shall meet the following requirements:

- (a) Sized to accommodate all incoming AV related network cables and optimal performance cable (recommended by AV equipment manufacturers) from AV equipment outside the technical room (R03A);
- (b) Shall allow to mount keystone footprint Shielded RJ-45 Modular Jacks compatible with optimal performance cable (recommended by AV equipment manufacturers);
- (c) Shall include all required patch cords to make the connections between the Patch Panel(s) and AV equipment;
- (d) Shall include all required keystone footprint Shielded RJ-45 Modular Jacks to maintain optimal performance when optimal performance cable (recommended by AV equipment manufacturers) is required;

E13.4.2 Execution:

- (a) Provide and install required mounting cables, adapters, hardware and fixtures.
- (b) Insert network AV cables into IDC slots of keystone modular jacks in accordance with manufacturers' recommendations. Using the appropriate tools
- (c) Ensure that network AV cable foil is properly grounded to jacks.
- (d) Connect patch panel ground wire to equipment rack's ground stud.
- (e) Daisy-chain connection of patch panels' ground wire is prohibited.

E13.4.3 Professionally label every patch panel and every port as approved by the Contract Administrator.

E13.5 The patch panel shall be the Key Connect Shielded model manufactured by Belden or equivalent approved by the Contract Administrator.

- E13.5.1 Contractor shall provide 24 port and 48 port patch panels in order to minimize the total number of patch panels required (i.e. use one 48 port panel instead of two 24 port panels when more than 24 cables are required).
- E13.6 Discrete Hardware H.264 Encoder with Audio and HID for integrated KVM functionality.
- E13.6.1 A combined video, audio, USB HID (Keyboard and Mouse) H.264 encoder shall meet the following requirements:
- (a) Video input/output support for DP 1.1a/1.2, and DVI.
 - (i) Shall provide loop-through capabilities for encoding video signals between a computer video output and a monitor
 - (b) Support only one AV HID combined input. Dual video stream encoders shall be permitted if dual HID and Audio in/out is also captured.
 - (c) 3.5mm stereo line audio in and line out, 3.5 mm audio mono mic in, and stereo headphones out.
 - (d) Shall support video streams for resolution selections between 640x480 - 2560x1600 24-60Hz, and from 640x480 - 4096x2160 24-30hz
 - (e) Shall support 60 fps on resolutions below 1920x1200, and shall support 30 fps for resolutions greater than and up to 4096x2160.
 - (f) Shall be encoded with H.264 Codec and shall have High/Main/Base Profiles up to level 5.0
 - (g) Audio may be uncompressed and shall be synced with encoded video
 - (h) The encoder shall provide ultra-low end to end latency <100 ms while providing a high quality video stream for loop-through sources of 1080p or less.
 - (i) The encoder shall provide low end to end latency between 80 and 200 ms (typical 100ms) at resolutions greater than 1080p up to 4k.
 - (j) The encoder shall utilize no greater than 12 Mbps bandwidth for video.
 - (k) Shall support DHCP, Link Local, and fixed IP
 - (l) When distributing graphics, the encoder shall preserve even the smallest details, making it suitable to encode images like spreadsheets or single pixel line diagrams.
 - (m) Shall be of a small form factor, and provide silent operation (32 dBA or less at 20C)
 - (n) Provide automatic EDID management and scaling.
 - (o) Provide https web interface, SSH , and Rest API to facilitate configuration and system integration.
 - (p) Shall provide 1 Gbps full duplex Ethernet connectivity.
 - (q) Unicast, Multicast (IGMP v3), RTP, RTSP
 - (r) Multicast: maximum 12 simultaneous RTSP session per channel
 - (s) Unicast : maximum 2 simultaneous RTSP session per channel
 - (t) Provide the capabilities to update firmware.
 - (u) Shall provide remote native keymap keyboard and mouse control.
 - (i) In cases where the encoder is used to connect to a computer, the encoder connects to the keyboard and mouse inputs of the computer for remote operations. The remote keyboard and mouse signals are transported through the IP network and are decoded by the High resolution Video/Graphics encoder.
 - (v) Shall provide automatic downscaling by profile
 - (w) Image processing shall provide color space conversion, scaling and frame rate reduction
 - (x) Integrates for full functionality in specified AV system software.

- (y) Encoder shall be no greater than 256 cubic inches, utilizing no greater than 100W.
- (z) Shall be mountable.

E13.6.2 Execution:

- (a) The Contractor shall supply, install, and configure all encoders, mounts, cables, and accessories to support the professional and tidy integration of these computers as sources in the global AV system.
 - (i) Loop through encoding for Operator Computer 1 (R05), and Monitor 1 (DVI or DP), includes keyboard, mouse, and audio in and out.
 - (ii) Loop through encoding for Operator Computer 2 (R05), and Monitor 1 (DVI or DP), includes keyboard, mouse, and audio in and out.
 - (iii) Loop through encoding for Supervisor Computer (R06), and Monitor 1 (DVI or DP), includes keyboard, mouse, and audio in and out.
 - (iv) Unmanned encoding for VMS Client Computer 1(R03A), and Monitor 1 (DVI or DP), includes keyboard, mouse and audio in. 19" Equipment Rack Mounted
 - (v) Unmanned encoding of VMS Client Computer 2 (R03A), and Monitor 1 (DVI or DP), includes keyboard, mouse, and audio In. 19" Equipment Rack Mounted
- (b) All cables shall be labelled, and neatly bundled and secured under the station desks, or on equipment racks.
- (c) Rack mounted encoders shall be confined to 1U per 2 encoders and final location shall be approved by the Contract Administrator.
- (d) R05 and R06 encoders shall be mounted to the underside of desk unless otherwise approved by the Contract administrator.
- (e) The Contractor shall install and configure the encoders on the network in coordination with City IT, and with final device settings (resolution, frame rate, quality, etc) requiring review and approval by the Contract Administrator.

E13.6.3 The Hardware H.264 Encoder with Audio and HID for integrated KVM functionality and accessories shall be the NGS-D220 Lite by Barco Visual Solutions Inc. or equivalent approved by the Contract Administrator.

E13.7 Discrete Hardware H.264 Encoder with Audio

E13.7.1 The Discrete Hardware H.264 Encoder with Audio shall meet the following requirements:

- (a) Full 24 bits processing, YUV4:2:0 color sampling
- (b) Full HD real-time RTSP/RTP/UDP based streaming
- (c) Low latency H.264 Baseline Profile 4.2 encoding up to 12 Mbps with high quality encoding of multimedia sources.
- (d) Supports resolutions up to 1920x1080
- (e) Provides minimum 100 Mbps Ethernet interface
- (f) Integrates for full functionality in specified AV system software.
- (g) Provides synchronized video and audio source inputs through HDMI
- (h) Supports streams up to 1080p 60 fps.
- (i) Standalone with external power supply.
- (j) Shall be mountable.
- (k) Shall support multicast streaming to multiple receivers.
- (l) Shall ensure HDCP inputs are available for dissemination to global AV system.
- (m) Shall support DHCP, Link Local, and fixed IP
- (n) Shall be of a small form factor, and provide silent operation
 - (i) No greater than 256 cubic inches, utilizing no greater than 100W.
 - (ii) Low Power, natural convection cooled for high MTBF

- (o) Provide https web interface, SSH, and Rest API to facilitate configuration and system integration.

E13.7.2 Execution:

- (a) The Contractor shall supply, install, and configure the encoder, mounts, cables, and accessories to support the professional and tidy integration of City supplied CATV-PVR source in the global AV system.
- (b) The Discrete Hardware H.264 Encoder with Audio shall be installed with the CATV-PVR.
 - (i) The CATV-PVR device will be supplied by the City through a local television provider. Television Provider installed connection endpoints and device may be located in either of the two locations as noted in the drawing. The Contractor shall determine location of encoder device and supply, install, and configure all required accessories to facilitate control of the CATV-PVR from within the TMC Control Room R05.
- (c) All cables shall be labelled, and neatly bundled and secured in rack or under desk.
- (d) This encoder shall be mounted on top of the CATV-PVR (if in R05), or in an Equipment Rack (if in R03A) unless otherwise approved by the Contract administrator.
- (e) The Contractor shall install and configure the encoders on the network in coordination with City IT, and with final device settings (resolution, frame rate, quality, etc) requiring review and approval by the Contract Administrator.

E13.7.3 The Discrete Hardware H.264 Encoder with Audio shall be the NGS-D101 (TFN 1CH DVI Input Node) by Barco Visual Solutions Inc. or equivalent approved by the Contract Administrator.

E13.8 Video Wall Decoder Display Nodes

E13.8.1 The Video Wall Decoder Display Nodes shall meet the following requirements:

- (a) Fully integrate with supplied AV system software
- (b) Provide Dual 1Gbps LAN connectivity
- (c) Support four (4) DP 1.2 outputs for up to four (4) 4k-UHD displays or four (4) DVI SL for up to four (4) HD displays.
- (d) Universal IP decoding
 - (i) Support codecs and formats of H.264, MPEG-2/4, MxPEG, MJPEG, VNC, and software screen scraped AV sources utilizing Pro-Server.
- (e) 19" rack mountable, two display nodes shall use a maximum of 4U
- (f) Up to 150W typical, and max 300 W power draw per node
- (g) Shall be daisy-chainable for increased decoding capabilities, and composing synchronized video on display walls of user definable size. Daisy-chained display nodes shall provide accurate and synchronized AV outputs across multiple daisy-chained display nodes providing the AV sources to a synchronized display consisting of multiple video wall panels.
- (h) Provides Frame Lock
- (i) Shall provide combined decoding capabilities of a combined minimum four (4) 1080p 60 fps sources per display output node.

E13.8.2 Execution:

- (a) The Contractor shall supply, install, and configure the display nodes, mounts, cables, and accessories to support the professional and tidy integration of display nodes in the global AV system.
 - (i) The Contractor shall supply, install, and configure all cables, and interface devices to connect video wall panels from R05 TMC Control Room.

- (ii) Each display node shall provide fiber video connection to four panels, four (4) directly, and four others through loop through connectivity at the video wall.
- (b) The Contractor shall install two display nodes in the 19" Equipment Rack with mounting of max 4U nodes in layout approved by the Contract Administrator.
- (c) All cables shall be labelled, and neatly bundled and secured in the rack.
- (d) The Contractor shall install and configure the display nodes on the network in coordination with City IT, and with final device settings requiring review and approval by the Contract Administrator.

E14. INSPECTION AND COMMISSIONING FOR ACCEPTANCE

- E14.1 On completion the Contractor will accompany the Contract Administrator for an on-site inspection for the purpose of commissioning the products for Acceptance.
- E14.2 If during the inspection the Contract Administrator identifies deficiencies related to the Work, the Contractor must correct these deficiencies to the satisfaction of the Contract Administrator within three (3) business days of the inspection. Should the Contractor be unable to rectify the problem, then the Contract Administrator at his/her election, may:
- E14.2.1 Accept the AV Equipment at its level of exhibited condition or performance;
 - E14.2.2 Extend the rectification period for a further three (3) business days, or;
 - E14.2.3 Mandate that the Contractor, at no additional cost to the City arrange to expeditiously replace the AV Equipment or the defective component(s) thereof such that the replacement(s) be of a condition or offer a level of performance deemed to be acceptable to the Contract Administrator and in accordance with the specifications of the Contract
- E14.3 Failure or inability to rectify any deficiencies identified by the Contract Administrator during the acceptance period could result in the cancellation of the contract for reasons of default.

E15. ADMINISTRATIVE REQUIREMENTS

- E15.1 Permits, Codes and Regulations
- E15.1.1 Obtain permits, registrations, licenses and necessary insurance to execute the Work in compliance with applicable regulations.
 - E15.1.2 Perform the Work in compliance with relevant codes and regulations.
- E15.2 Submittals
- E15.2.1 Shop Drawings/AV Concept Book
 - (a) Within five days of contract award, submit CPM and Gantt chart schedule and AV Concept book drawing package to Contract Administrator or his/her designate for review.
 - (b) Submission shall be noted by the Contractor as "Reviewed", including the date and the name of the reviewer, prior to being submitted to the Contract Administrator or his/her designate.
 - (c) Submissions shall not jeopardize the project schedule.
 - (d) AV Concept Book drawings, diagrams and listings will be reviewed for conformance with the design intent. As a part of the review process, only compliance with information given in the contract documents will be reviewed. Corrections or comments made by the Contract Administrator or his/her designate during this process do not waive requirement for a compliance with Contract Documents. Furthermore, the value of the work shall not be altered by review comments where equipment has not been added, deleted or where the additional equipment is required to meet the design intent outlined in Contract Documents.

- (e) The returned submittal shall have annotations, amendments and/or comments. Correct where noted, and if modifications are needed or if additional equipment is required for system to function as intended, there shall be no changes to contract value. Make corrections in a timely manner. Corrections or comments noted by the Contract Administrator or his/her designate during this process do not waive compliance with the requirements as demonstrated in the drawings and specification documents.
- (f) AV Concept Book submissions shall be submitted in Adobe PDF format. Poor quality scans will be rejected. Submissions shall be complete unless approved by Contract Administrator or his/her designate before the submission. Partial submissions will not be accepted for review.
- (g) Drawings shall be neat and organized to show information including cable numbering scheme and a cable pull list. Submit drawings in PDF. Minimum size of drawings is 11x17. Drawings/diagrams shall include:
 - (i) Functional block (flow) diagram showing the interconnection of equipment. For each wire or wire group, show wire numbers and wire type. Identify device connection at each termination. For each device or device group, identify type, model and location. For multi-pin connections, provide pin/conductor/function schedule;
 - (ii) Riser diagrams/cable diagrams showing system conduit, back boxes, connector, cable and cable numbering for systems, including existing rough-ins;
 - (iii) Schematic diagrams showing detailed wiring interconnections of custom assemblies, terminal strips, terminal blocks and multi-pin connectors and harness details;
 - (iv) Location plan showing floor, wall, ceiling and on furniture equipment locations;
 - (v) Testing checklists and documentation;

E15.2.2 Operation and Maintenance Manual

- (a) Prior to Total Completion, the Contractor shall complete and submit to the Contract Administrator or his/her designate an Operations and Maintenance Manual.
- (b) The manual shall be submitted in electronic as well as hardcopy versions.
 - (i) Electronic version shall be delivered on a USB key. Information in the electronic manual shall be sorted out by folders to follow the Table of Content of the hardcopy manual.
 - (ii) Hardcopy version shall consist of a three D-Ring binder with hard cover. Electronic copy shall be secured in the pocket on the inside of the binder hardcover and clearly labelled.
 - (iii) Hardcopy manual shall be complete with Table of Content and corresponding hard tabs, separating sections within the manual.
- (c) Content of both hardcopy and electronic manuals shall include, but not be limited to the following:
 - (i) Maintenance manuals for every piece of equipment supplied by the Contractor as a part of the project.
 - (ii) List of cables, complete with associated cable tags.
 - (iii) Updated equipment rack layout, indicating location of the Contractor's and City's equipment.
 - (iv) Updated functional block diagram.
 - (v) Updated schematic diagram.
 - (vi) Updated system riser diagram.
 - (vii) Completed testing check lists.
- (d) In addition, the electronic manual shall be complete with a copy of all programs which were uploaded on the equipment included in the project. Programs shall be organized in folders, with every folder being dedicated to a specific piece of equipment and

labelled as such. Folder name shall include a date corresponding to the latest software update.

E15.3 Contractor Performance

- E15.3.1 Submit shop drawings and AV concept book.
- E15.3.2 Provide a complete and working system to comply with the operational capabilities, design and standards of quality specified.
- E15.3.3 Provide equipment, labour and material required for the specified systems.
- E15.3.4 If the systems do not fulfill all aspects of this Specification, make adjustments required to bring installation into conformance with the Specification at no additional cost to the City.
- E15.3.5 Work in accordance with the best trade practices, fabricate and install items in accordance with manufacturers' recommendations and the specifications.
- E15.3.6 Coordinate and consult with the Contract Administrator or his/her designate, to provide an installation to industry best practices.
- E15.3.7 Fully test and align the systems as outlined in this Specification and according to accepted trade practices to satisfaction of the Contract Administrator or his/her designate.
- E15.3.8 Correct deficiencies at no cost to the City. Should there be violations or non-compliance to the Codes, correct these at no cost to the City. Correct violations within ten days of receiving notice.

E15.4 Conduct of Work

- E15.4.1 Ensure replacement and/or restoration to original condition of any damage or alteration to the building and its contents, e.g. floor, ceiling, walls, furniture, caused by the installation process. Damage or disfigurement shall be remedied at Contractor's expense.
- E15.4.2 Confirm dimensions, distances and placement, and report any discrepancies to the Contract Administrator or his/her designate, before installation.

E15.5 Errors and Omissions

- E15.5.1 Omissions and/or errors in the proposal documents not reported at the time of response do not relieve the Contractor from the responsibility for supplying properly functioning systems as specified.
- E15.5.2 Provide the equipment, installation material and labour required to fulfill the requirements and intent of the specification whether or not enumerated explicitly.
- E15.5.3 Provide wiring, terminations, adapter assemblies and power supplies related to equipment functions.
- E15.5.4 Prior to the award of contract, review reference drawings and site conditions and report discrepancies, including conduit routing and sizing, to the Contract Administrator or his/her designate.

E15.6 Delivery, Storage, and Handling

- E15.6.1 Delivery and Acceptance Requirements.
 - (a) Pay shipping charges associated with equipment and documentation to and from the required location.
- E15.6.2 Storage and Handling Requirements
 - (a) The City will provide a lockable room for parts and tools, however the City is not responsible for loss of specified system components until Work completion.
- E15.6.3 Packaging Waste Management

- (a) Remove and properly dispose of waste products. Make every effort possible to recycle waste items like cardboard, metal, and plastic. The Contractor shall entirely dispose of waste products from the site.
- (b) Garbage disposal and associated fees; if applicable, fees are at the Contractor's expense.

E15.6.4 Materials Control

- (a) All equipment supplied under this Contract shall be new.
- (b) Deliver the equipment to the site and provide necessary handling equipment and tools to store and later on install the equipment.
- (c) Visually inspect equipment for damage or defects and report damaged or defective materials to the Contract Administrator or his/her designate, before installation.
- (d) Inform the Contract Administrator or his/her designate, of any correspondence from suppliers and manufacturers concerning defects or delays.

E15.6.5 Site Access

- (a) Comply with ongoing project rules concerning:
 - (i) Acceptable hours to perform work to minimize disruptions of daily operations;
 - ◆ Card access will provided to authorized Contractor personnel through coordination with and approval by Contract Administrator
 - ◆ Hours shall be between 7:30 am and 4:30 pm on regular business days.
 - ◆ Site access before, after, or on weekends shall be upon approval by the Contract Administrator.
 - (ii) Site procedures for example: sign in (if applicable);
 - (iii) Security procedures;
 - (iv) Parking location; fees shall be Contractor's responsibility;
 - (v) Material Storage; the Contractor shall remain solely responsible for material's security;
 - (vi) Upon acknowledgement of substantial performance of the Work, access to the site shall be granted only at the discretion of the City.

E16. PERFORMANCE RELIABILITY

E16.1 The responsibility for the warranty and performance reliability shall rest upon the Contractor.

E16.2 The term "*repeat failures*" as used herein is defined to mean that the same component, subassembly, or assembly develops repeated defects, breakdowns and/or malfunctions rendering the item inoperative, or required repeated shop correction, service and/or replacement during the warranty period as noted in D18, Minor items or ordinary service adjustments are not included, or considered out of the scope of "repeated failures", as well as other factors, such as operational damage due to accidents, misuse or lack of proper maintenance and service attention by not following the manufacturer's preventative maintenance schedules.

E16.3 Where a supplied component, subassembly, or assembly develops "repeated failures" in service, the Contractor shall make any necessary changes (including repairs, alterations or modifications) in order to guarantee reliability of performance at the Contractor's cost.