

Region of Waterloo  
Stage 1 Light Rail Transit Project

Performance Output Specifications  
Article 3  
Cited References

## Table of Contents

3.1	Cited References .....	3-1
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**ARTICLE 3 CITED REFERENCES**

3.1 Cited References

- (a) The design, installation, construction, and testing of the Project shall conform to the applicable requirements of the codes and standards or portions thereof listed herein, as well as all local codes and ordinances, unless specified otherwise. Where the requirements stipulated or referenced conflict, the more stringent shall apply. The governing version of the listed documents shall be the latest version adopted at the time of bid.

1993 AASHTO Guide for the Design of Pavement Structures for Rigid and Flexible Pavements
Accessibility for Ontarians with Disabilities Act (AODA)
Accessibility for Ontarians with Disabilities Act (AODA)
ACI 358.1R-92: Analysis and Design of Reinforced Concrete Guideway Structures, American Concrete Institute;
American Electric Railway Association
American Institute of Steel Construction (AISC)
American National Standards Institute (ANSI).
American Public Transportation Association (APTA): Recommended Practices for Security Infrastructure
American Railway Engineering and Maintenance of Way Association (AREMA) <ul style="list-style-type: none"> <li>• Communications and Signals Manual of Recommended Practices</li> </ul>
American Society for Testing and Materials (ASTM)
American Society of Mechanical Engineers (ASME)
American Water Works Association
American Public Transportation Association (APTA) <ul style="list-style-type: none"> <li>• APTA Technical Recommended Practice for The Selection of Cameras, Digital Recording Systems, Digital High-Speed Networks and Train-lines for Use in New Transit-Related CCTV Systems (APTA IT-RP-001-08)</li> <li>• APTA Manual of Standards and Recommended Practices for Rail Transit Systems</li> </ul>
Association of American Railways (AAR)
Building Industry Consulting Services International (BICSI)

<p>Canada Standards Association (CSA)</p> <ul style="list-style-type: none"> <li>• CAN/CSA-A23.3-04 (R2010) - Design of Concrete Structures</li> <li>• CAN/CSA-S16-09 - Design of Steel Structures</li> <li>• CAN-CSA B651-12 Accessibility</li> </ul>
<p>Canadian Electrical Manufacturers Association (CEMA)</p>
<p>Canadian Environmental Protection Act</p>
<p>Canadian National Railway Design and Construction Standard (CN).</p>
<p>Canadian Portland Cement Association “Thickness Design for Concrete Highways and Street Pavements”</p>
<p>Canadian Rail Operating Rules (CROR)</p>
<p>Canadian Standards Association</p>
<p>City of Kitchener Urban Design Manual</p>
<p>City of Waterloo Urban Design Manual</p>
<p>Department of Fisheries and Oceans Fisheries Act</p>
<p>Department of Transportation</p>
<p>Electric Utility Service Equipment Requirements Committee (EUSERC)</p>
<p>Electrical and Electronic Manufacturers’ Association of Canada</p>
<p>Electrical Engineering Manual, MTO</p>
<p>Electronic Industries Association (EIA)</p> <ul style="list-style-type: none"> <li>• EIA 603 – Radio Transmitters</li> <li>• EIA 204-D – Radio Receivers</li> <li>• EIA 329-A, 1 – Radio Antennas</li> <li>• EIA RS-316 – Radio Electrical Performance</li> <li>• EIA-310-D - Cabinets, Racks, Panels, and Associated Equipment</li> </ul>
<p>Environmental Guide for Fish and Fish Habitat, MTO</p>
<p>Environmental Guide for Noise, MTO</p>

Environmental Protection Act, R.S.O. 1990, c. E.19
<p>European Committee for Electro technical Standardization (CENELEC):</p> <ul style="list-style-type: none"> <li>• EN 50121: Railway Applications – Electromagnetic compatibility</li> <li>• EN 50124: Railway Applications – Insulation coordination</li> <li>• EN 50126: Railway Applications – The specification and demonstration of Reliability, Availability, Maintainability and Safety (RAMS)</li> <li>• EN 50128: Railway Applications – Communication, signaling, and processing systems – Software for railway control and protection systems</li> <li>• EN 50129: Railway Applications – Communication, signaling and processing systems – Safety related electronic for signaling</li> <li>• EN 50155: Railway Applications – Electronic equipment used on rolling stock</li> <li>• EN 50159: Railway Applications – Communication, signaling and processing systems – Safety-related communication in transmission systems</li> <li>• EN 50238: Railway Applications – Compatibility between rolling stock and train detection systems</li> <li>• EN 60571: Electronic Equipment used on rail vehicles</li> </ul>
Genesee & Wyoming (Goderich-Exeter Railway) (GEXR) Railroad Design and Construction Standards
Grand River Conservation Authority (GRCA) Policies for the Administration of the Development, Interference with wetland and alterations to shorelines and watercourse regulation (O.Reg. 150/06)
Grand River Conservation Authority Erosion and Sediment Control Guidelines
IEC 60529 (consolidated edition 2.1 –February 2001) – Degree of Protection provided by enclosures (IP codes)
IEC 61373:- Revision 1999-01, Railway application –Rolling Stock equipment – ‘Shock and Vibration Test’
Illuminating Engineering Society of North America (IESNA) Standards
Industry Canada
<p>Institute of Electrical and Electronics Engineers (IEEE)</p> <ul style="list-style-type: none"> <li>• IEEE 802.1b - LAN Management</li> <li>• IEEE 802.1d – MAC</li> <li>• IEEE 802.1g –Remote MAC Bridging</li> <li>• IEEE 802.1q –Virtual Bridged LAN</li> </ul>

- IEEE 802.1p – Quality of Service for Traffic Prioritization
- IEEE 802.3 – CSMA/CD Access Method and Physical Layer Specification
- IEEE 802.3ae – 10 Gigabit Ethernet
- IEEE 802.3 – LAN/MAN CSMA/CD (Ethernet) Access Method
- IEEE 802.3u – Fast Ethernet
- IEEE 802.11 – Standard for Information Technology – Part II: Wireless LAN MAN & PHY Spec
- IEEE 802.11a/b/g/n – Wireless Local Area Networks
- IEEE Std. 1474.1 – IEEE Standard for Communications-Based Train Control (CBTC) Performance and Functional Requirements
- IEEE Std. 1474.2 – IEEE Standard for User Interface Requirements in Communications-Based Train Control (CBTC) Systems
- IEEE Std. 1474.3 – IEEE Recommended Practice for Communications-Based Train Control (CBTC) System Design and Functional Allocations
- IEEE Std. 1474.4 – IEEE Recommended Practice for Functional Testing of a Communications-Based Train Control (CBTC) System
- IEEE Std. 1475 – IEEE Standard for the Functioning of Interfaces Among Propulsion, Friction Brake, and Train-borne Master Control on Rail Rapid Transit Vehicles
- IEEE Std. 1478 – IEEE Standard for Environmental Conditions for Transit Rail Car Electronic Equipment
- IEEE Std. 1483 – IEEE Standard for Verification of Vital Functions in Processor-Based Systems Used in Rail Transit Control
- IEEE Std. 1698 – IEEE Guide for the Calculation of Braking Distances for Rail Transit Vehicles

Insulated Cable Engineers Association (ICEA)

<p>International Electrotechnical Commission (IEC)</p> <ul style="list-style-type: none"> <li>• IEC 60529 Degrees of protection provided by enclosures (IP Codes)</li> <li>• IEC 60812: Analysis technique for system reliability – Procedure for Failure Mode and Effect Analysis (FMEA)</li> <li>• IEC 61000: Electromagnetic Compatibility (EMC), Testing and measurement techniques – Electrostatic discharge immunity test</li> <li>• IEC 61000-5-2, Electromagnetic Compatibility (EMC) – Part 5 Installation and mitigation guidelines – Section 2 Earthing and cabling</li> <li>• IEC 61373 - Railway applications – Rolling stock equipment – Shock and vibration tests</li> <li>• IEC 61508: Functional safety of electrical/electronic /programmable electronic safety-related systems</li> </ul>
<p>International Organization for Standardization (ISO)</p> <ul style="list-style-type: none"> <li>• ISO 9001, Model for quality assurance in design, development, production, installing and servicing</li> </ul>
<p>Internet Engineering Task Force (IETF)</p>
<p>Low Impact Development Stormwater Management Planning and Design Guide Version 1, 2010 – Credit Valley Conservation Authority</p>
<p>Metro Ethernet Forum (MEF)</p> <ul style="list-style-type: none"> <li>• MEF 2 Requirements and Framework for Ethernet Service Protection</li> <li>• MEF 3 Circuit Emulation Service Definitions, Framework and Requirements in Metro Ethernet Networks</li> <li>• MEF 4 Metro Ethernet Network Architecture Framework Part 1: Generic Framework</li> <li>• MEF 6.1 Metro Ethernet Services Definitions Phase 2</li> <li>• MEF 7 EMS-NMS Information Model</li> <li>• MEF 8 Implementation Agreement for the Emulation of PDH Circuits over Metro Ethernet Networks</li> <li>• MEF 9 Abstract Test Suite for Ethernet Services at the UNI</li> <li>• MEF 10.1 Ethernet Services Attributes Phase 2</li> <li>• MEF 11 User Network Interface (UNI) Requirements and Framework</li> <li>• MEF 12 Metro Ethernet Network Architecture Framework Part 2: Ethernet Services Layer</li> <li>• MEF 13 User Network Interface (UNI) Type 1 Implementation Agreement</li> <li>• MEF 14 Abstract Test Suite for Traffic Management Phase 1</li> </ul>

<ul style="list-style-type: none"> <li>• MEF 15 Requirements for Management of Metro Ethernet Phase 1 Network Elements</li> <li>• MEF 16 Ethernet Local Management Interface</li> <li>• MEF 17 Service OAM Framework and Requirements</li> <li>• MEF 18 Abstract Test Suite for Circuit Emulation Services</li> <li>• MEF 19 Abstract Test Suite for UNI Type 1</li> <li>• MEF 20 UNI Type 2 Implementation Agreement</li> <li>• MEF 21 Abstract Test Suite for UNI Type 2 Part 1 Link OAM</li> </ul>
Metrolinx Design and Engineering Standards
Military Specifications
<p>Ministry of Transportation, Ontario, Bridge Design Manuals, latest edition:</p> <ul style="list-style-type: none"> <li>• Structural Manual, MTO;</li> <li>• Ontario Structure Inspection Manual, MTO;</li> <li>• Concrete Culvert Design and Detailing Manual, MTO;</li> <li>• Structural Rehabilitation Manual, MTO;</li> <li>• Structural Planning Guidelines 2005;</li> <li>• Structural Financial Analysis Manual, MTO;</li> <li>• Structural Steel Coating Manual, MTO;</li> <li>• Aesthetic Guidelines for Bridges, MTO;</li> <li>• Guidelines for prefabricated Bridges, MTO;</li> <li>• Drainage Management Manual, MTO;</li> <li>• Sign Support Manual, MTO.</li> <li>• All other applicable Bridge Standards and Manuals, MTO</li> </ul>
Mix Design Method for Recycled Hot Mix, MTO
MTO Contract Design, Estimating and Documentation Manual
National Electrical Manufacturers Association (NEMA)
<p>National Fire Protection Association (NFPA)</p> <ul style="list-style-type: none"> <li>• NFPA 130 –Standard for Fixed Guideway Transit and Passenger Rail System</li> <li>• National Fire Protection Association (NFPA) 731: Standard for the Installation of Electronic Premises Security Systems</li> </ul>



Occupational Health and Safety Act (OHSA) <ul style="list-style-type: none"> <li>Occupational Health and Safety Act, Ontario Regulation 278/05 as amended (last amendment O.Reg. 479/10) – Designated Substance – Asbestos on Construction Projects and in Buildings Repair Operations</li> <li>Occupational Health and Safety Act, Ontario Regulation 490/09 as amended (last amendment O.Reg. 148/12) – Designated Substances</li> </ul>
Ontario Building Code (OBC)
Ontario Electrical Safety Code (OESC)
Ontario Engineering Manual, MTO
Ontario Fire Code
Ontario Ministry of the Environment Stormwater Management Planning and Design Manual 2003
Ontario Provincial Specifications for Roads and Public Works, OPS Municipal and Provincial Common;
Ontario Provincial Standards
Ontario Provincial Standards and Specifications (OPSS) User's Guide
Ontario Regulation 153/04 as amended (last amendment O.Reg. 269/11) – Record of Site Condition
Ontario Regulation 255/11 as amended Applications for Environmental Compliance Approvals
Ontario Regulation 419/05 as amended Air Pollution — Local Air Quality
Ontario Structure Inspection Manual, MTO
Ontario Traffic Manual (OTM)
Ontario Traffic Signal Control Equipment Specifications
Ontario Water Resources Act, R.S.O. 1990, c. O.40
OPS Specifications for Roads and Municipal Services, Vol 1, General Conditions of Project Agreement and Specifications for Construction (Div 1 to 9), as revised
OPS Specifications for Roads and Municipal Services, Vol 2, Specifications for Material, as revised
OPS Specifications for Roads and Municipal Services, Vol 3, Drawings for roads, barriers, drainage, sanitary sewers, watermains and structures, as revised
OPS Specifications for Roads and Municipal Services, Vol 4, Drawings for Electrical Work, as revised

Other structures: Ontario Building Code (OBC) 2006 & National Building Code (NBC) 2005.
R.R.O. 1990 Regulation 347 as amended (last amendment O.Reg. 283/12) - General Waste Management
R.R.O. 1990 Regulation 903 as amended (last amendment O.Reg 468/10) – Wells
Region of Waterloo and Area Municipalities Design Guidelines and Supplemental Specifications for Municipal Services (DGSSMS)
Region of Waterloo Construction Activity Vibration Specifications
Region of Waterloo Grand River Transit Fare Collection Strategy and Policy (tentative 2012)
Region of Waterloo Illumination Policy
Region of Waterloo ITS Strategic Plan (2013 – in progress)
Region of Waterloo Regional Transportation Corridor Design Guidelines
Region of Waterloo Request for Waste Disposal Approval – Standard Operating Procedure – as amended (latest revision February 27, 2013)
Region of Waterloo Sewer Use By-law (1990) By-law 1-90, Amended by By-law 92-050
Region of Waterloo Standard Special Provisions (RWSSP), 2013 and as revised
Region of Waterloo Standard Specifications (RWSS), 2013 and as revised
Retained Soil System (RSS) Guidelines (2007)
Roadside Safety Manual, MTO
Seeding and Cover Quality Assurance Visual Inspection Field Guide
Steel Structures Painting Council
Structures subjected to LRT loading: Canadian Highway Bridge Design Code CAN/CSA-S6-06(R11).
Structures subjected to railway loading: CN – Engineering Specifications for Industrial Tracks & AREMA – American Railway Engineering of Maintenance-of Way Association, Manual for Railway Engineering 2012.
TCRT Report 57 – Track Design Handbook for Light Rail Transit, Transportation Research Board;
The National Association of Corrosion Engineers International
Transport Canada Rules and Regulations

Transportation Association of Canada <ul style="list-style-type: none"><li>• Transportation Association of Canada Geometric Design Guide for Canadian Roads</li><li>• Transportation Association of Canada Guide for the Design of Roadway Lighting</li><li>• Transportation Association of Canada Manual of Uniform Traffic Control Devices for Canada (1998)</li></ul>
Transportation of Dangerous Goods, Transport Canada
Underwriters Laboratories (UL)
US Department of Transportation: Transit Security Design Considerations
VIA Rail Design and Construction Standards