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SECTION 3 - GENERAL REQUIREMENTS
STANDARD SPECIFICATIONS

3.01 SPECIFICATIONS, STANDARDS, OR METHODS

.1 When references to the following capitalized abbreviations are made, they refer to Specifications, Standards, or Methods of the respective Association. Abbreviations listed herein but not mentioned in the specifications shall be disregarded.

.2 The numbers and letters following the abbreviations denote the Association's serial designation for the Specification or Standard to which reference is made. All references to these Specifications, Standards or Methods shall, in each instance, be understood to refer to the latest adopted revision, including all amendments

AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
AGA	American Gas Association
AIEEE	American Institute of Electrical and Electronics Engineers
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
ANSI	American National Standards Institute
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWWA	American Water Works Association
AWPA	American Wood Preservers' Association
AWS	American Welding Society
BCLNA	British Columbia Landscaping and Nursery Trades Association
BCNTA	British Columbia Nursery Trades Association
BCSLA	British Columbia Society of Landscape Architects
CEC	Canadian Electrical Code
CEMA	Canadian Electrical Manufacturers Association
CGA	Canadian Gas Association
CGSB	Canadian General Standards Board
CISC/ICCA	Canadian Institute of Steel Construction
CMHC	Canada Mortgage and Housing Corporation
CPCI	Canadian Prestressed Concrete Institute
CRCA	Canadian Roofing Contractors Association
CSA	Canadian Standards Association
CIU	Canadian Institute of Underwriters Association
CWB	Canadian Welding Bureau
CSPI	Corrugated Steel Pipe Institute
EEI	Edison Electric Institute
IEC	International Electrotechnical Commission
IET	Institute of Engineers and Technology
IEEE	Institute of Electrical and Electronics Engineers, I (formerly IRE and IEE)
IES	Illuminating Engineering Society
ICEA	Insulated Cable Engineers Association
ISA	Instrument Society of America
IOS	International Organization for Standardization
NEMA	National Electrical Manufacturers Association
MOTI	Ministry of Transportation and Infrastructure
NBC	National Building Code of Canada
NEC	National Electrical Code

NEMA	National Electrical Manufacturers Association
NESC	National Electrical Safety Code
NLGA	National Lumber Grades Authority
TAC	Transportation Association of Canada
SAE	Society of Automotive Engineers
UL	Underwriters' Laboratories, Inc.
WORKSAFEBC	Workers' Compensation Board
WCLIB	West Coast Lumber Inspection Bureau

(REVISED NOVEMBER 2016)

.3 All static and dynamic units on drawings and specifications are S.I. units, conforming to Can-3-Z234.2-73, the International System of Units (S.I.) and Can/CSAZ234.1, Metric Practice Guide.

.4 The S.I. Units accepted for the purpose of these standards, together with conversion factors relating them to equivalent imperial units are tabulated as follows:

ITEM	BASIC SI UNIT	(SIU) ABBREVIATION	EQUIVALENT IMPERIAL UNIT (EIU)	CONVERSION FACTOR (CF) (CF X EIU=SIU)
Length	metre	m	foot	0.3048
Length	millimetre	mm	inch	25.4
Area	square metre	m2	square foot	0.0929
Area	square metre	m2	square yard	0.836
Volume	cubic metre	m3	cubic foot	0.0283
Volume	cubic metre	m3	cubic yard	0.765
Volume	litre	L	imperial gallon	4.546
Mass	kilogram	kg	pound	0.454
Mass	tonne	t	ton (short)	0.907
Density	kilogram per cubic metre	kg/m3	pound per cubic inch	27,680.0
Temperature	degree Celsius	C	degree Fahrenheit	(F-32) x 5/9 = C

ITEM	BASIC SI UNIT	(SIU) ABBREVIATION	EQUIVALENT IMPERIAL UNIT (EIU)	CONVERSION FACTOR (CF) (CF X EIU=SIU)
Force	newton	N	pound force	4.448
Pressure*	kilopascal	kPa	pound per sq. inch	6.8948
Pressure*	kilopascal	kPa	inch water column	0.2491
Pressure, stress (concrete)	megapascal	MPa	pound per sq. in.	0.0069
Volume flow	litre per second	l/s	imperial gallon per minute	0.07758
Volume flow	cubic metre per second	m3/s	cubic feet per second	0.0283
Volume flow	litre per second	l/s	cubic feet per second	28.316
Power	kilowatt	kW	horsepower (electric)	0.746
Energy	joule	J	British Thermal Unit	1055.06
Illuminance	lux	lux	footcandles	10.76391
Frequency	hertz	Hz	Cycles per second	1.0

*As used in these standards, pressure shall mean gauge pressure unless otherwise noted.

Standard Sieve Sizes

EIU	SI	EIU	SI	EIU	SI
4"	100 mm	1-1/2"	37.5 mm	3/8"	9.5 mm
3"	75 mm	1"	25 mm	1/4"	6.3 mm
2-1/2"	63 mm	3/4"	19 mm		
2"	50 mm	1/2"	12.5 mm		
#4	4.75 mm	#20	0.85 mm	#60	0.25 mm
#8	2.36 mm	#30	0.6 mm	#80	0.18 mm
#10	2 mm	#40	0.425 mm	#100	0.15 mm
#16	1.18 mm	#50	0.3 mm	#200	0.075 mm

Standard Pipe Sizes

EIU	SI	EIU	SI	EIU	SI
1/2"	12.5 mm	4"	100 mm	15"	375 mm
3/4"	19.0 mm	6"	150 mm	18"	450 mm
1"	25.0 mm	8"	200 mm	21"	525 mm
1-1/2"	37.5 mm	10"	250 mm	24"	600 mm
2"	50.0 mm	12"	300 mm	42"	1050 mm
2-1/2"	65.0 mm				

Concrete Strengths

EIU	SI
2200 psi	15 MPa
2500 psi	18 MPa
2900 psi	20 MPa
3700 psi	25 MPa
4500 psi	30 MPa
5000 psi	36 MPa

Reinforcing Steel

Comparison of Imperial and Metric Sizes
(Note: % difference based on area of bars in in^2)

IMPERIAL BAR			METRIC BAR			
SIZE	AREA in2	AREA mm2	SIZE	AREA in2	AREA mm2	METRIC BAR IS
#3	.11	71	10M	.16	100	45% L
#4	.20	129	10M	.16	100	20% S
#4	.20	129	15M	.31	200	55% L
#5	.31	200	15M	.31	200	SAME
#6	.44	284	20M	.47	300	6.8% L
#7	.60	387	20M	.47	300	22% S
#7	.60	387	25M	.78	500	30% L
#8	.79	510	25M	.78	500	1.3% S
#9	1.00	645	30M	1.09	700	9% L
#10	1.27	819	30M	1.09	700	14% S
#10	1.27	819	35M	1.55	1000	22% L
#11	1.56	1006	35M	1.55	1000	0.6% S
#14	2.25	1452	45M	2.33	1500	3.5% L
#18	4.00	2581	55M	3.88	2500	3.0% S

L = LARGER
S = SMALLER

3.01A REFERENCE

.1 The Manual of Engineering Standards and Specifications contains references to standard specifications for testing, materials, manufacturing installation and design procedures. This section provides the full descriptive title of referenced specifications.

.2 All references listed shall be understood to refer to the latest adopted revision, including all amendments.

.3 All references listed and referred to by the Manual of Engineering Standards and Specifications shall be part of the Manual as far as they are applicable to and not in consistent with the Manual.

SPEC NUMBER	TITLE
ANSI A 300	Standard Tree Care Operations
ANSI B 16.1	Cast Iron Pipe Flanges and Flanged Fittings
ANSI B 16.5	Standard Specification for Pipe Flanges and Flanged Fittings
ANSI/IES RP-8	Roadway Lighting
ANSI/NSF 61	NSF/ANSI 61 Drinking Water System Components – Health Effects
ASTM 3261	Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastaic Fittings for Polyetheylene (PE) Plastic Pipe and Tubing
ASTM A 48	Standard Specification for Gray Iron Castings
ASTM A 123/A 123M	Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 153	Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A 354	Standard Specification for Quenched and Tempered Alloy Steel Bolts, Studs, and Other Externally Threaded Fasteners
ASTM A 536	Standard Specification for Ductile Iron Castings
ASTM A 563	Standard Specification for Carbon and Alloy Steel Nuts
ASTM A 653/A 653M	Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanized) by the Hot-Dip Process
ASTM A 746	Standard Specifications for Ductile Iron Gravity Sewer Pipe
ASTM A 775	Standard Specification for Epoxy-Coated Reinforcing Steel Bars
ASTM A 775M	Standard Specification for Epoxy-Coated Reinforcing Steel Bars
ASTM B 42	Standard Specification for Seamless Copper Pipe, Standard Sizes
ASTM B 62	Standard Specifications for Composition Bronze or Ounce Metal Castings
ASTM B 88	Standard Specification for Seamless Copper Water Tube
ASTM B 633	Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel
ASTM B 766	Standard Specification for Electrodeposited Coatings of Cadmium

ASTM C 14M	Standard Specification for Nonreinforced Concrete Sewer, Storm Drain, and Culvert Pipe (Metric)
ASTM C 33	Standard Specification for Concrete Aggregates
ASTM C 55	Standard Specification for Concrete Building Brick
ASTM C 67	Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile
ASTM C 76	Specification for Reinforced Concrete Culvert, Storm Drain and Sewer Pipe
ASTM C 76M	Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe (Metric)
ASTM C 88	Standard Test Method for Soundness of Aggregates by Use of Sodium Sulphate or Magnesium Sulphate
ASTM C 117	Standard Test Method for Material Finer Than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C 127	Standard Test Method for Relative Density (Specific Gravity) and Absorption of Coarse Aggregate
ASTM C 131	Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C 136	Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM C 140	Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units
ASTM C 144	Standard Specification for Aggregate for Masonry Mortar
ASTM C 295	Standard Guide for Petrographic Examination of Aggregates for Concrete
ASTM C 309	Standard Specification for Liquid Membrane - Forming Compounds for Curing Concrete
ASTM C 443	Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets
ASTM C 443M	Standard Specifications for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets (Metric)
ASTM C 478	Standard Specification for Circular Precast Reinforced Concrete Manhole Sections
ASTM C 579	Standard Test Methods for Compressive Strength of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings and Polymer Concretes
ASTM D 429	Standard Test Methods for Rubber Property - Adhesion to Rigid Substrates
ASTM D 638	Standard Test Method for Tensile Properties of Plastics
ASTM D 751	Standard Test Methods for Coated Fabrics
ASTM D 977	Standard Specification for Emulsified Asphalt
ASTM D 1248	Standard Specification for Polyethylene Plastics Extrusion Materials for Wire and Cable
ASTM D 1557	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN-m/m3))

ASTM D 1751	Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
ASTM D 2241	Standard Specification for Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series)
ASTM D 2412	Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading
ASTM D 2419	Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate
ASTM D 2466	Standard Specification for Poly (Vinlyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40
ASTM D 2467	Standard Specification for Poly (Vinlyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80
ASTM D 2564	Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Pipe Systems
ASTM D 2657	Standard Practice for Heat Fusion Joining of Polyolefin Pipe and Fittings
ASTM D 2726	Standard Test Method for Bulks Specific Gravity and Density of Non-Absorptive Compacted Birtuminous Mixtures
ASTM D 3034	Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings
ASTM D 3139	Standard Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals
ASTM D 3549	Standard Test Method for Thickness or Height of Compacted Bituminous Paving Mixture Speciments
ASTM D 4318	Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM D 6928	Standard Test Method for Resistance of Coarse Aggregate to Degradation by Abrasion in the Micro-Deval Apparatus
ASTM D 6938	Standard Text Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Neclear Methods (Shallow Depth)
ASTM F 436	Standard Specification for Hardened Steel Washers
ASTM F 477	Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe
ASTM F 593	Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs
ASTM F 594	Standard Specification for Stainless Steel Nuts
ASTM F 679	Standard Specification for Poly(Vinyl Chloride) (PVC) Large Diameter Plastic Gravity Sewer Pipe and Fittings
AWWA C 104	Cement-Mortar Lining for Ductile-Iron Pipe and Fittings
AWWA C 110	Ductile-Iron and Grey-Iron Fittings
AWWA C 111	Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
AWWA C 150	Thickness Design of Ductile-Iron Pipe
AWWA C 151	Ductile-Iron Pipe, Centrifugally Cast
AWWA C 153	Ductile-Iron Compact Fittings

AWWA C 200	Steel Water Pipe, 6in (150mm) and Larger
AWWA C 203	Coal-Tar Protective Coatings and Linings for Steel Water
AWWA C 206	Field Welding of Steel Water Pipe
AWWA C 208	Dimensions for Fabricated Steel Water Pipe Fittings
AWWA C 209	Cold-Applied Tape Coatings for Steel Water Pipe, Special Sections, Connections and Fittings
AWWA C 210	Standard Specification for Liquid – Epoxy Coatings and Linings for Steel Water Pipe and Fittings
AWWA C 213	Standard Specification for Fusion – Bonded Epoxy Coatings and Linings for Steel Water Pipe and Fittings
AWWA C 219	Standard Specification for Bolted, Sleeve – Type Couplings for Plain – End Pipe
AWWA C 500	Metal Seated Gate Valves for Water and Sewerage Systems
AWWA C 502	Dry-Barrel Fire Hydrants
AWWA C 504	Rubber-Seated Butterfly Valves
AWWA C 509	Resilient-Seated Gate Valves for Water Supply Service
AWWA C 600	Installation of Ductile Iron Water Mains and Their Appurtenances
AWWA C 651	Disinfecting Water Mains
AWWA C 800	Underground Service Line Valves and Fittings
AWWA C 900	Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 Inch Through 12 Inch (100mm through and 300mm), for Water Transmission Distribution
AWWA C 905	Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 14 in. through 48 in. (350mm through 1200mm) for Water Transmission and Distribution
AWWA C 906	Standard Specification for Polyethylene (PE) Pressure Pipe and Fittings, 4 in. (100 mm) through 63 in. (1,600 mm), for Water Distribution and Transmission
AWWA M 11	Steel Pipe: A Guide for Design and Installation
AWWA M 17	Installation, Field Testing, and Maintenance of Fire Hydrants
CAN/CSA A 23.1	Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete
CAN/CSA A 23.2	Methods of Test for Concrete
CAN/CSA A 23.5	Supplementary Cementing Materials
CAN/CSA A 3000	Cementitous Materials Compendium
CAN/CSA 3 A 266.2	Chemical Admixtures for Concrete
CAN/CSA G 40.21	General Requirements for Rolled or Welded Structural Quality Steel / Structural Quality Steel
CAN/CSA Z 234.1	Canadian Metric Practice Guide
CGSB 41 GP 25M	Pipe, Polyethylene, for the Transport of Liquids
CSA 22.2 No. 85	Standard Specifications for Rigid PVC Boxes and Fittings
CSA 6164	Standard Specification for Concrete Masonry Units
CSA B 137.3	Rigid Polyvinyl Chloride (PVC) Pipe for Pressure Applications
CSA B 182.1	Plastic Drain and Sewer Pipe and Pipe Fittings
CSA B 182.2	PSM Type PVC Sewer Pipe and Fittings
CSA B 182.4	Profile PVC Sewer Pipe and Fittings

CSA B 1800	Standard Specification for Thermoplastic Non-Pressure Piping Compendium
CSA C 22.2 No. 45.1	Canadian Electrical Code, Electrical Rigid Metal Conduit - Steel
CSA C 22.2 No. 211.2	Canadian Electrical Code, Rigid PVC (Unplasticized) Conduit
CSA A 231.1/A 231.2	Standard Specification for Precast Concrete Paving Slabs/Precast Concrete Pavers
CSA G 30.3	Cold Drawn Steel Wire for Concrete Reinforcement
CSA G 30.5	Welded Steel Wire Fabric for Concrete Reinforcement
CSA G 30.15	Welded Deformed Steel Wire Fabric for Concrete Reinforcement
CSA G 30.18	Carbon-Steel Bars for Concrete Reinforcement
CSA G 164	Hot Dip Galvanizing of Irregularly Shaped Objects
CSA S 16	Design of Steel Structures
CSA S 157	Strength Design in Aluminum
CSA S 269.3	Concrete Formwork
CSA W 48	Standard Specifications for Filler Metals and Allied Materials for Metal Arc Welding
CSA W 59	Welded Steel Construction (Metal Arc Welding)
CSA W 186	Welding of Reinforcing Bars in Reinforced Concrete Construction
IMSA 19-1	Standard Specifications for Polyethylene Insulated, Polyvinyl Chloride Jacketed Signal Cable
IMSA 50-2	Standard Specifications for Polyethylene Insulated, Polyethylene Jacketed, Loop Detector Lead-In Cable
MOTI SS 952	Contractor Supply Asphalt and Paving Materials for Highway Use

(REVISED NOVEMBER 2016)

3.01B SUPPLEMENTARY DOCUMENTS

.1 The Manual of Engineering Standards and Specifications contains references to guidelines, governances, standards and strategies and reports. The intent of the supplemental documents is to provide additional information. Information provided in the supplemental documents does not replace or supersede the MoESS requirements.

(a) CNIB Position for Accessible Pedestrian Signals In Canada
www.cnib.ca/en/about/who/believe/documents/cnib APS position.doc

(b) City of Nanaimo, Steep Slope Development Permit Area Guidelines
http://www.nanaimo.ca/assets/Departments/Community~Planning/Publications~and~Forms/SSguidelines.pdf

(c) City of Nanaimo, Traffic and Highway Installation Guidelines
http://www.nanaimo.ca/EN/main/departments/Engineering-Public-Works/4490/traffic-highway-guidelines.html

(d) FHWA, Manual of Uniform Control Devices
http://mutcd.fhwa.dot.gov/pdfs/2003/pdf-index.htm

(e) NCHRP, Report 672 - Roundabouts an Informational Guide
http://www.trb.org/Main/Blurbs/164470.aspx

(f) Ministry of Transportation and Infrastructure, Manual of Standard Traffic Signs & Pavement Markings
http://www.th.gov.bc.ca/publications/eng_publications/electrical/MoST_PM.pdf

(g) Motor Vehicle Act Regulations - Division 23 – Traffic Control Devices
www.bclaws.ca/EPLibraries/bclaws_new/document/LOC/freeside/--%20M%20--/Motor%20Vehicle%20Act%20RSBC%201996%20c.%20318/05_Regulations/28_26_58%20Motor%20Vehicle%20Act%20Regulations/26_58_06.xml#part_division23

(h) BC Hydro, Street Light Information Management System (SLIM)
https://www.bchydro.com/ex/streetlight/

(i) City of Nanaimo, Urban Forest Management Strategy
http://www.nanaimo.ca/assets/Departments/Parks~Rec~Culture/Publications~and~Forms/UFMS2010.pdf

(j) BCLNA, British Columbia Landscape Standards
http://bclna.com/bc-landscape-standards/

(k) City of Nanaimo, Invasive Plant Management Strategy
http://www.nanaimo.ca/EN/main/departments/Community-Planning/Environmental-Planning/invasive-plants/invasive-plant-management-strategy.html ***(REVISED NOVEMBER 2016)***

(l) Nanaimo Transportation Master Plan
http://www.nanaimo.ca/assets/Departments/Engineering~Public~Works/Transportation~Master~Plan/2014-07-10%20Nanaimo%20Transportation%20Master%20Plan%20Final%20High%20Res.pdf ***(REVISED NOVEMBER 2016)***

(m) City of Nanaimo, Erosion and Sediment Control Guideline
https://www.nanaimo.ca/assets/Departments/Building~Inspection/Publications~and~Forms/erosion.pdf ***(REVISED NOVEMBER 2016)***

(n) Department of Fisheries and Oceans and the Ministry of Environment, Land Development Guidelines for the Protection of Aquatic Habitat http://www.dfo-mpo.gc.ca/Library/165353.pdf ***(REVISED NOVEMBER 2016)***

(o) City of Nanaimo, Urban Forestry Management Strategy https://www.nanaimo.ca/assets/Departments/Parks~Rec~Culture/Publications~and~Forms/UFMS2010.pdf ***(REVISED NOVEMBER 2016)***

3.01C CITY BYLAWS ***(REVISED NOVEMBER 2016)***

.1 The Manual of Engineering Standards and Specifications shall be used in conjunction with the most current City bylaws that impact construction.

(a) Building Bylaw No. 5693
http://www.nanaimo.ca/ByLaws/ViewBylaw/7224.pdf

(b) Crossing Control Bylaw No. 5174
http://www.nanaimo.ca/UploadedFilesPath/Bylaws/B5174cons.pdf

(c) Development Parking Regulations Bylaw No. 7013
http://www.nanaimo.ca/UploadedFilesPath/Bylaws/7013.pdf

(d) Elimination of Dust Emissions Bylaw No. 4896
http://www.nanaimo.ca/ByLaws/ViewBylaw/4896.pdf

(e) Flood Prevention Bylaw No. 5105
http://www.nanaimo.ca/ByLaws/ViewBylaw/5105.pdf

(f) Management and Protection of Trees Bylaw No. 7126
http://www.nanaimo.ca/UploadedFilesPath/Bylaws/B7126.pdf

(g) Noise Control Bylaw No. 4750
http://www.nanaimo.ca/UploadedFilesPath/Bylaws/4750.pdf

(h) Official Community Plan Bylaw No. 6500
http://www.nanaimo.ca/assets/Departments/Community~Planning/Offical~Community~Plan~-~10~Year~Review/OfficialCommunityPlan2008.pdf

(i) Soil Removal and Depositing Regulation Bylaw No. 1747
http://www.nanaimo.ca/UploadedFilesPath/Bylaws/1747.pdf

(j) Sewer Regulation and Charge Bylaw No. 2496
http://www.nanaimo.ca/ByLaws/ViewBylaw/2496.pdf

(k) Storm Sewer Regulation and Charge Bylaw No. 3808
http://www.nanaimo.ca/UploadedFilesPath/Bylaws/3808.pdf

(l) Traffic and Highways Regulation Bylaw No. 5000
http://www.nanaimo.ca/UploadedFilesPath/Bylaws/3808.pdf

(m) Tree Protection Bylaw No. 7126
http://www.nanaimo.ca/UploadedFilesPath/Bylaws/B7126.pdf

(n) Waterworks Rate and Regulation Bylaw No. 7004
http://www.nanaimo.ca/UploadedFilesPath/Bylaws/B7004cons.pdf

(o) Zoning Bylaw No. 4500
http://www.nanaimo.ca/EN/main/departments/Current-Planning/Zoning.html

(REVISED NOVEMBER 2016)

3.02 CONSTRUCTION PROGRAM

.1 Prior to commencement of work specified herein, the Contractor shall submit to the Engineer for approval, a written construction program summarizing his proposed construction methods and sequences.

.2 This program shall contain sufficient information on the following points for the Engineer assess the practicability of the proposed methods:

(a) Sources of aggregate
(b) Stripping methods
(c) Excavation and hauling methods
(d) Compaction equipment and methods for each type of fill and aggregate
(e) Watering and dewatering methods
(f) Waste material disposal locations
(g) Traffic control, if required
(h) Provision for access to adjacent properties, if required
(i) Hours of work

3.03 TEMPORARY CONSTRUCTION FACILITIES

.1 Access Road:

(a) Temporary roads shall be constructed as required for access to the working areas. Access to temporary roads from public roads shall require prior written approval from the City of Nanaimo. Adequate drainage facilities in the form of ditches, culverts, or other conduits shall be installed as found necessary to maintain these roads. In the construction of access roads, existing drainage facilities, natural or otherwise, shall not be disturbed to the detriment of properties outside the working area and such facilities shall, unless otherwise provided elsewhere in the specifications, be restored to their original condition as far as is practical to do so on completion of the work.

.2 Sanitary Facilities:

(a) Clean, sanitary, latrine accommodations shall be provided by the Contractor, and shall be located and maintained such that they are not offensive to any property owner or member of the public. The use of these facilities by persons engaged in the work shall be strictly enforced.
(b) These facilities shall be removed by the Contractor at the conclusion of the work or when instructed to do so by the Owner.

3.04 SPECIAL TOOLS, OPERATING MANUALS, AND SHOP DRAWINGS

.1 For installations which include mechanical and electrical equipment or machinery having wearing parts and requiring periodical repair and adjustment, all special tools, wrenches, and accessories required for removing worn parts, making adjustments, and carrying out maintenance shall be supplied. All gauges, indicators, and lubricating devices necessary for the proper operation of the equipment shall be furnished.

.2 With each piece of equipment, 4 sets of operating manuals and as-constructed shop drawings shall be supplied. The manuals should give the manufacturer's recommended maintenance schedules with the grades of lubricants required and instructions as to how the equipment may be taken apart for periodic inspection and replacement.

.3 The Contractor shall furnish all lubricating oils, greases, fuels, water, and power necessary to operate all equipment furnished under this Contract for a period of time sufficient to indicate its full acceptance to the Engineer.

3.05 EXPLOSIVES

.1 The General method of storage, handling, use and character of all explosives shall be subject to the Accident Prevention Regulations covering explosives, pursuant to the Workers' Compensation Act of British Columbia and must conform to local police requirements.

.2 Explosives in excess of sixty-eight (68) kg shall be kept only in registered premises, which have been licensed under the Explosives Act (Canada).

3.06 BLASTING

.1 Blasting will be permitted only after securing the approval of the Owner. Damage caused by blasting shall be repaired by the Contractor at his expense. The method and procedure employed for blasting shall be in accordance with Provincial and Municipal ordinances. The Contractor shall not do any blasting without first verifying that his insurance covers any loss of life or damage that may result from this work and includes a waiver of subrogation in favour of the Owner. The Owner, in granting approval for blasting, does not in any way assume responsibility for injury, loss of life, or damage that may result therefrom, and such approval shall not be construed as approval of the methods employed by the Contractor in blasting, the sole responsibility therefore being that of the Contractor.

3.07 SITE MAINTENANCE AND CLEANUP

.1 The working areas shall be maintained in an orderly manner and shall not be encumbered with equipment, materials, or debris.

.2 Cleanup shall be a continuing process from the start of the work to final acceptance of the project. The Contractor shall at all times, and without further order, keep property on which work is in progress free from accumulations of waste materials or rubbish caused by employees or by the work. Accumulations of waste materials which might constitute a fire hazard will not be permitted. Spillage from the Contractor's hauling vehicles on travelled public or private roads shall be promptly cleaned up. On completion of construction, the Contractor shall remove all temporary structures, rubbish, and waste materials resulting from his operations.

3.08 TIMING OF INSTALLATION

.1 The Contractor shall schedule the work in a manner such that disruption of normal traffic and inconvenience to residents in the working area is kept to a minimum. Resurfacing of roads, testing of pipe, and cleanup of the site shall be completed no later than 30 days following commencement of construction on any street block.

.2 Departure from scheduling as specified above will be permitted only with the written consent of the Owner to a request made by the Contractor.

3.09 WORK WITHIN ROAD RIGHTS-OF-WAY

.1 All work within road rights-of-way shall be in strict conformance with, but shall not be limited to, the following requirements:

(a) Where one-way traffic cannot be avoided, adequate traffic control in the form of signs, lights, barricades and/or flagmen or pilot cars must be provided.
(b) Where detours are available, they must be adequately designated with proper signs.
(c) Traffic must be restored to as near normal as possible when work is not in progress.
(d) Surface runoff is to be prevented from seeping into trenches.
(e) Excavation across entrances, whether private or commercial, shall be backfilled and thoroughly compacted, within two hours unless otherwise approved in writing by the tenant or property owner.
(f) Open cut excavation shall not be left open overnight or on weekends unless there are workmen on duty and there is authorization by letter from the City of Nanaimo.
(g) Adequate signs, barriers, flares, etc., to ensure the safety of the public and traffic are to be provided at all times. Lights and flares are to be in good working order at all times and are to be checked daily. Lights that are not operational shall be removed from the worksite.
(h) Existing drainage courses and culverts are to be preserved and maintained as required.
(i) If the City of Nanaimo, at any time, deems it necessary, a workman from the Operations Division, City of Nanaimo, will be stationed at the work site to ensure that no damage is done to existing services.

.2 The Contractor shall make allowance in his tendered prices for all additional costs likely to be incurred in conforming with the Ministry of Transportation and Infrastructure regulations when working on or near a highway or right-of-way under the jurisdiction of the Ministry of Transportation and Infrastructure.

3.10 WORKSAFEBC

.1 The Contractor shall comply, at all times, with the current Workers Compensation Act and the WorkSafeBC Occupational Health and Safety Regulation.

.2 The Contractor shall have a current Occupational, Health & Safety Program and provide a copy of this program to the Owner.

.3 Prior to commencing work, the Contractor shall forward a copy of their WorkSafeBC Notice of Project, Clearance Letter and Safety Program to the Owner.

.4 If the Contractor is designated as the Prime Contractor, they shall fulfill the Prime Contractor responsibilities as defined in: ***(REVISED NOVEMBER 2016)***

(a) WorkSafeBC Occupational Health and Safety Regulation, Notice of project, Section 20.2, and Coordination of multiple employer workplaces, Section 20.3. ***(REVISED NOVEMBER 2016)***

(b) Workers Compensation Act (BC), Coordination at multiple-employer workplaces, Section 118, Subsections (1) & (2) and, ***(REVISED NOVEMBER 2016)***
(c) General Requirements, Section 3.10 WorkSafeBC. ***(REVISED NOVEMBER 2016)***

.5 If the Contractor is designated as the Prime Contractor, they shall follow current WorkSafeBC regulations.

.6 The workplace may have the following known operations and/or site conditions that could present a potential hazard to workers and other persons at the workplace. Other hazards may exist:

Example:

Asbestos Pipe	Energized Equipment
Confined Space	Traffic >30km/h
Underground Utilities	Tree Removal
Excavations	Hazardous Materials
Overhead Power Lines	Mobile Equipment

.7 The City of Nanaimo has developed Safework Procedures for the guidance of Municipal Employees in addressing the aforementioned potential hazards. These procedures can be made available to the Contractor as reference in developing their own site specific safework procedures that will be utilized to protect the health and safety of all workers and persons on this project.

SECTION 3 - GENERAL REQUIREMENTS
EXISTING STRUCTURES AND UTILITY WORKS

3.20 SCOPE

.1 This specification refers to the location, protection, removal, and replacement of existing structures and utility works.

.2 Existing structures shall mean all existing pipes, ducts, ditches, or other works forming a part of sewerage, drainage, water, telephone, electrical, gas or other utility systems as well as sidewalks, curbs, poles, fences, buildings, and other man-made things that may be encountered during construction.

3.21 SUPPLY OF MATERIALS

.1 The Contractor shall supply all materials required for the specified location, protection, removal, and replacement of existing structures.

.2 Unless specified otherwise, materials supplied for replacement of existing structures shall be at least equal to those being replaced.

3.22 LOCATION OF STRUCTURES

.1 Prior to commencing any excavation the Contractor shall be responsible for locating existing surface and underground structures that may affect the work or may be damaged during construction.

.2 Drawings or descriptions, verbal or otherwise, of existing structures or their location that are given to the Contractor are intended only as an aid to his location of these structures. Measurements and location of the existing underground structures shown on the drawings are not guaranteed to be accurate, and must be verified by the Contractor prior to proceeding with construction.

.3 On request from the Engineer, the Contractor shall excavate and uncover underground structures for the purpose of establishing line or grade for proposed installation of piping or other works.

3.23 PROTECTION, ADJUSTMENT, AND SALVAGE OF STRUCTURES

.1 Unless authorization from the Engineer is received for their removal, underground and surface structures encountered during construction shall be protected from damage. In the event of damage resulting from the construction operation, they shall be repaired or replaced at the contractor's sole expense to a condition which is at least the equivalent of that which existed prior to construction. On instructions from the Engineer certain works shall be salvaged and delivered to the City of Nanaimo Works Yard on Labieux Road.

.2 All asbestos cement pipe damaged or disturbed during construction shall be removed and disposed of in accordance with WorkSafeBC regulations using proper safework practices. ***(REVISED NOVEMBER 2016)***

3.24 EMERGENCY SITUATIONS

.1 In emergency situations resulting from the construction operation, where life or property are endangered, the Contractor shall immediately take whatever action is required to eliminate the danger and shall also notify the appropriate authorities of the situation.

.2 In the specific case of a water or sewer break, the contractor shall immediately notify the Public Works Department at 250-758-5222.

.3 During periods when the Contractor's personnel are not on the job (after hours and weekends) at least one of the three Contractor's representatives in Nanaimo shall be available by phone contact. The names, addresses and phone numbers of the three Contractor's representatives shall be filed with the Engineer prior to commencement of construction and this list shall be updated by the Contractor as is necessary.

.4 If the Contractor cannot be contacted to remedy the situation the Owner will take whatever action deemed necessary to eliminate the danger and all costs incurred shall be borne by the Contractor.

3.25 ACCESS MAINTAINED

.1 Existing hydrants, valve or manhole covers, valve boxes, curb stop boxes, fire or police call boxes, and all other utility controls, warning systems, and appurtenances thereof shall not be obstructed or made inaccessible at any time by the construction work. Bridges, walks, or other temporary facilities shall be provided as may be necessary to ensure that these controls or warning systems are free for use in their normal manner at all times during construction.

3.26 CURTAILMENT OF UTILITY SERVICE

.1 Where existing utilities such as water, sanitary sewer, storm sewer, electricity, telephone, and gas are serving the public, work shall be planned and executed such that there is no curtailment of service provided by these utilities without prior receipt of approval of the authorities responsible for provision and maintenance of these utilities. The Contractor shall obtain the above approvals from the recognized authorities controlling these utilities. If approval for such disruption of utility service is not granted, the Contractor may be able to establish temporary facilities to provide continuous utility service during the course of construction. Such temporary facilities shall only be implemented after receiving the approval of the utility authority and all costs relating to the establishment of temporary services shall be borne by the Contractor.

.2 If the Contractor, after receiving approval of the responsible authorities, is to temporarily close off an existing utility, he shall, unless otherwise authorized by the Engineer, notify individual users of the utility at least twenty-four (24) hours prior to the time of shut-off.

3.27 SUPPORT OF STRUCTURES

.1 Existing structures other than pipes shall be protected against damage from settlement by means of support or compaction of backfill as required. Support shall remain in place following backfill of excavations.

.2 Backfill which is placed under or adjacent to existing structures which have been undermined during excavation shall be compacted in a manner which will prevent damage of the structure from settlement. Such backfill shall be of approved granular material suitable for compaction.

.3 For support of existing piping, other than asbestos cement or cast iron piping, refer to Standard Drawing T-11 in Section 4 – Trench Excavation, Bedding and Backfill.

.4 Where excavations for works cross underneath existing asbestos cement or cast iron piping the existing pipe shall be replaced by the Contractor with PVC pipe approved by the Engineer or supported with a concrete grade beam refer to Standard Drawing No. T-11, Section 4 – Trench Excavation, Bedding and Backfill as determined by the Engineer.

3.28 DRAINAGE FACILITIES

.1 Existing culverts, enclosed drains, flumes and ditches, and other drainage structures affected by the work but left in place, shall be kept clear of excavated material at all times during construction. When it is necessary to temporarily remove an existing drainage structure, the Contractor shall provide suitable temporary ditches or other approved means of handling the drainage during construction.

.2 Culverts and drain pipes shall be replaced on line and grade at the time of trench backfilling, in accordance with City of Nanaimo Standards and Specifications.

.3 No chlorinated water shall be discharged into storm drainage facilities without prior approval from the City Engineer.

.4 Prior to, and during construction, the Contractor shall take full responsibility for controlling erosion and sediment transfer by utilizing the guidelines contained in the handbook entitled, “Land Development Guidelines for the Protection of Aquatic Habitat”, by the Department of Fisheries and Oceans and the Ministry of Environment, to prevent discharge of sediment into City stormwater management systems and environmentally sensitive areas. It is incumbent for the contractor to acquire and be familiar with these guidelines.

3.29 WORK WITHIN RAIL RIGHTS-OF-WAY

.1 Where construction occurs within Railway rights-of-way the Owner will obtain the necessary permit for installation. The Contractor shall provide written notice to the local Superintendent of the Railway company at least 48 hours prior to commencement of work, with copies to the Engineer.

.2 The Contractor shall coordinate timing of installation, rail removal and replacement with the Railway District Superintendent.

3.30 HIGHWAY CROSSING

.1 Where construction occurs on Provincial Highway rights-of-way the Owner will obtain the permit for Permission to Construct Works within Crown Lands. The Contractor shall be responsible for obtaining any other necessary construction permits and shall determine the complete requirements of the Ministry of Transportation and Infrastructure (MOTI). Installation within the right-of-way shall be strictly in conformance with MOTI requirements and regulations. If there is any conflict between MOTI requirements and these specifications, the MOTI requirements shall govern within the highway rights-of-way. The Contractor shall provide written notice to the MOTI at least 7 days prior to commencement of work with copies to the Engineer.

3.31 ELECTRICAL POWER, TELEPHONE, TELEVISION, CITY AND PRIVATE OWNED FIBRE OPTICS, CABLES AND CONDUITS

.1 Electrical power, telephone, television, city and private owned fibre optics, cables and conduits may exist throughout the work area. B. C. Utility Companies shall be notified by the Contractor prior to excavation in the vicinity of any buried cables or ducts.

3.32 GAS PIPELINES

.1 High pressure gas pipelines may exist throughout the area. The Contractor shall familiarize themselves with the requirements and regulations of the Standard Practice Instruction of the Gas Utility Company, the Gas Act, and the Pipe-Line Act of the Province of British Columbia with regard to work carried out in the vicinity of these pipelines, and shall comply with such requirements and regulations.

.2 The local gas company shall be notified prior to excavation in the vicinity of buried gas mains.

3.33 POWER LINE CROSSING

.1 Where construction crosses British Columbia Hydro and Power Authority (BCH&PA) rights-of-way, the Owner will obtain necessary permission beforehand. Construction within the right-of-way shall be strictly in conformance with BCH&PA requirements and regulations.

3.34 WORK IN VICINITY OF OVERHEAD POWER LINES

.1 Equipment shall not be operated where it is possible to bring such equipment or any part of the equipment within 3 metres of any energized electrical conductor unless the following safety precautions are taken by the Contractor:

(a) The utility company is notified, the line de-energized, or effectively guarded against contact, or displaced or re-routed from the work area.
(b) The Workers' Compensation Board prior to commencement of construction is notified in accordance with their required procedure.
(c) For high-voltage transmission lines, a greater clearance is provided, as determined by the utility company.

3.35 RELOCATION OF EXISTING PIPING

.1 Where existing underground piping parallels the centreline of the trench, or crosses the trench centreline and intersects the pipe to be installed and must, in either case, be relocated, the Contractor shall make arrangements for the relocation of existing piping or shall, having received the approval of the authority responsible for maintenance of the existing pipe, remove and relocate existing piping with his own forces. Where existing pipes cross the centreline of the trench but do not intersect the pipe to be installed, the Contractor will not disturb the existing pipes.

3.36 WATERCOURSE CROSSING

.1 Where a watercourse crossing is required as part of the construction, the crossing construction shall be in accordance with the Ministry of Environment, Provincial Fish and Wildlife regulations and Federal Fisheries regulations where applicable.

.2 The Owner will obtain the necessary initial permission from the authority having jurisdiction to construct works where a water course crossing is required. The Contractor shall provide written notice to the authority having jurisdiction at least seven (7) days prior to commencement of work, with copies to the Engineer.

3.37 DETOURS

.1 All road closures and detours require approval from the City of Nanaimo. Applications for detours shall be made by the Contractor to the City of Nanaimo in writing at least seven (7) days in advance of the detour going into effect. Where detours are permitted the City of Nanaimo will notify the fire, police and ambulance departments as well as the bus service prior to the detour going into effect**.**

.2 The Contractor shall notify the City of Nanaimo immediately following the resumption of normal traffic flow.

SECTION 3 - GENERAL REQUIREMENTS
CLEARING AND GRUBBING

3.50 SCOPE

.1 This specification refers to clearing and grubbing of the site for construction in the areas delineated on the drawings or described in the specifications.

3.51 SUPPLY OF MATERIALS

.1 The Contractor shall supply all materials required for clearing and grubbing.

3.52 CLEARING AND GRUBBING

.1 The area shall be cleared and grubbed within the limits designated by the Engineer on the site.

.2 All trees and brush except those selected for preservation shall be cut, and along with all stumps, logs, roots, rotten wood, and other organic materials shall be removed from the site.

.3 The above material shall be removed from the ground surface and to a minimum depth of 0.30 metres below.

.4 All other rubbish and debris existing on the site shall be removed and disposed of. No burning will be allowed.

.5 Where selective clearing is required, trees or groups of trees as designated on the drawings or marked by the Engineer in the field shall be preserved.

.6 Trees shall be felled within the designated clearing area and those falling outside this area shall be cut up and returned to the clearing area for disposal.

.7 Individual leaning or dangerous trees or snags adjacent to, but outside the designated clearing area, shall be cut and disposed of. Written permission shall be obtained from the Owner by the City of Nanaimo for this work.

.8 Excavations resulting from removal of tree trunks, roots, or other material shall be filled and leveled by the Contractor as a part of the clearing and grubbing operation.

3.53 BURNING

.1 No burning of wood waste, rubbish or debris is allowed in the City of Nanaimo.

3.54 MERCHANTABLE TIMBER

.1 Merchantable timber cut during the clearing operation shall be trimmed of all branches and stockpiled on the site at a location designated by the Engineer. Such timber will remain the property of the Owner unless otherwise noted in the contract documents.

.2 Removal of timber from dedicated road rights-of-way will be subject to permission from the Ministry of Forests, Lands and Natural Resource Operations.***(REVISED NOVEMBER 2016)***

SECTION 3 - GENERAL REQUIREMENTS
CONTROL OF PUBLIC TRAFFIC

3.60 SCOPE

.1 This specification refers to the control of public traffic in construction areas.

3.61 CONTROL OF PUBLIC TRAFFIC - GENERAL

.1 The following general principles shall be maintained when performing construction or maintenance work upon Municipal streets and thereby affecting traffic through movement, access to properties and/or parking.

.2 All control of public traffic will be carried out in accordance with the Ministry of Transportation and Infrastructure Traffic Control Manual for Work on Roadways and WorkSafeBC regulations.

.3 Work on streets shall be completed as quickly as possible so as to only disrupt normal street operation for the shortest possible time.

.4 Proposed projects shall be planned in such a way as to keep work areas and interference with traffic to a minimum.

.5 Initial inspection of the site shall include observations of traffic intensity, property use and extent of no parking.

.6 All job equipment not in use shall be sorted in such a manner as not to create view obstructions or unnecessary obstructions to vehicular or pedestrian traffic.

.7 In certain instances, it may be required to perform construction jobs between traffic peaks, which will be noted as a condition on the permit to construct works on the Public Road Allowance, i.e. 9:00 a.m. to 4:00 p.m.

.8 Emergency works shall have priority over traffic inconvenience insofar as is necessary to correct the problem. Nevertheless, every effort must be made to provide protection for the public and workers.

.9 Partial or complete closure of major and collector roads requiring traffic detouring in at least one direction must be approved by the City of Nanaimo at least seven days prior to the start of construction.

.10 No loose material like dirt, mud and debris should be allowed to accumulate or remain upon any sidewalk, street or driveway.

.11 At any time, a Police Officer can override these provisions.

3.62 USE OF FLAG PERSONS

.1 Although the need for flag persons will be determined by the Engineer, it is generally expected that they will be required in the following situations:

(a) When public traffic is required to pass working vehicles or equipment which may block all or part of the travelled roadway.
(b) When it is necessary to institute a one-way traffic system through a construction area or other blockage where traffic volumes are heavy, approach speeds are high, and a traffic signal system is not in use.
(c) Where workers and/or equipment are employed on the travelled way over the brow of a hill, around a sharp curve or at any other location where oncoming traffic would not otherwise have adequate warning of their presence.
(d) In high speed, high volume areas where temporary protection is required while other traffic control devices (barricades, cones, signs, etc.) are being erected or taken down.
(e) For emergency protection when other traffic control devices are not readily available.
(f) In all situations where complete protection for workers, working equipment and public traffic is not provided by other traffic control devices.
(g) At the entrance to road closures and along detour routes where required.

.2 Courtesy is of prime importance as many motorists tend to become irritable when held up by road work for any length of time. Each flagperson shall be fully conversant with all aspects of the situation requiring the delay and shall be ready to explain the hold-up, and its approximate duration, if required.

.3 All flag persons must be trained and certified in a Traffic Control course acceptable to WorkSafeBC**.**

.4 Flag persons and their equipment shall conform to WorkSafeBC regulations.

3.63 USE OF TRAFFIC CONTROL DEVICES

.1 Traffic control devices shall be placed immediately before the work commences, except "parking restriction" signs which will be installed a minimum of 12 hours in advance.

.2 Traffic control devices shall remain in place only as long as they are needed, and shall be removed immediately thereafter.

.3 Any traffic control device not required at any time during the work shall be removed from view.

.4 Traffic control devices used outside work hours (overnight, holidays and weekends) shall be maintained to produce a safe effect and be minimal obstructions to traffic, parking or access. Flashing beacons will be used to completely and properly identify all sites at night.

.5 Traffic control devices shall at all times be in good repair.

.6 Misapplication and excessive use of traffic control devices shall be avoided. This may cause confusion and result in disrespect for the instruction.

.7 Detoured traffic shall be afforded maximum practical protection, convenience and guidance by the proper use of traffic control devices.

.8 Signs shall be mounted on weighted bases or folding frames, ensuring that they are held rigidly and maintained in a proper position.