APPENDICES

CONTENTS

(REVISED NOVEMBER 2016)

Revision Request Summary Sheet **APPENDIX A**

for the Manual of Engineering Standards and Specifications

Revision Request No.: _____
(filed by Engineering Services Technologist)

Date _____

To: Engineering Services Technologist – City of Nanaimo

From: _____ Department: (or company name) _____

Phone No.: _____

Section Number / Drawing Reference: _____

Change Requested: _____

_____

_____

_____

_____

Reason for Change: _____

_____

_____

_____

_____

Signature: _____ **Date:** _____

Action:
(Eng Ser Tech) _____ **Date:** _____

APPENDIX B

SECTIONAL CROSS REFERENCE

TO BE INCLUDED

IN

FUTURE

REVISION

APPENDIX C

CONDITION SHEET

REFERENCE: _____ DATE:_____

NAME:_____

ADDRESS:_____

The undersigned agrees to grant access to the property as mentioned herein for the purpose of a _____, subject to the following conditions for restoration.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

CITY OF NANAIMO
455 Wallace Street, Nanaimo, B.C., V9R 5J6

EASEMENT RELEASE AND INSPECTION FOLLOWING INSTALLATION OF UTILITY

Contractor:_____ Contract No.:_____

Owner's Name:_____ Easement Reference No.:_____

Mailing Address:_____

_____

Location:_____

_____

Legal Description:_____

_____

Manhole No.:_____ to Manhole No.:_____

Clean-up of easement is satisfactory and meets the requirements as set out in the easement condition form.

Date:_____Property Owner:_____

Clean-up of easement is NOT satisfactory until the following work has been carried out:_____

_____

_____

_____

_____

Date:_____Property Owner:_____

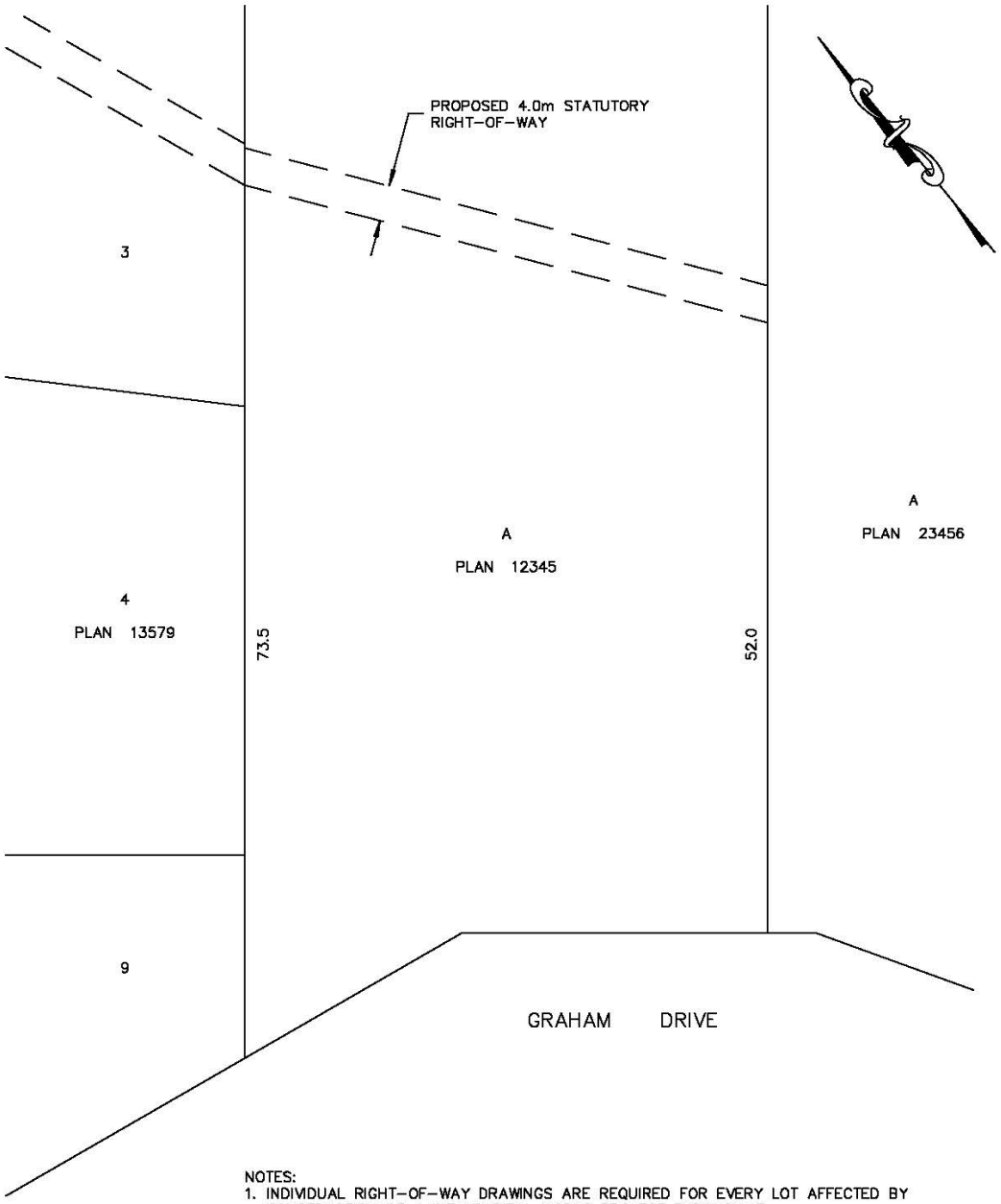
Contractor's Agent:_____

==========

Consulting Engineers' Approval and Recommendation:_____

_____

_____
Consulting Engineer



NOTES:
1. INDIVIDUAL RIGHT-OF-WAY DRAWINGS ARE REQUIRED FOR EVERY LOT AFFECTED BY CONSTRUCTION OF A CITY CAPITAL WORKS PROJECT THROUGH IT.
2. THE SKETCH IS AN ATTACHMENT REQUIRED WITH EVERY PERMISSION TO ENTER FORM. AND CONDITION SHEET SIGNED BY THE PROPERTY OWNER.
3. FOR BLANKET WORKING ACCESS AGREEMENTS, REFER TO APPENDIX D, CLAUSE 4.

SAMPLE SKETCH

\\TENT\E&PW\INFRASTRUCTURE PLANNING\STANDARDS & PRODUCTS\MOESS\EDITION NO11\FINAL DRAFT\FINAL DRAFT STANDARD CAD DRAWINGS\APPENDIX\RW-2

6.20.2016

CITY OF NANAIMO
THE HARBOUR CITY

PROPOSED RIGHT OF WAY

Scale: N.T.S.
Created: MAY 2013
Rev DateNOV 2016
Dwg No: RW-2

APPENDIX D

MINIMUM REQUIRED STATUTORY RIGHT-OF-WAY AND TEMPORARY WORKING EASEMENT WIDTHS FOR UNDERGROUND SERVICES THROUGH PRIVATE PROPERTY

1. Where location of a municipal utility in a statutory right-of-way is permitted by the *City Engineer*, the right-of-way widths shall be as follows:

(a)	Single utility.	R.O.W. width =	Twice the depth from surface to the crown of the pipe rounded up to nearest half meter [4.0 m minimum width]
(b)	Two utilities within the same trench.	R.O.W. width =	Twice the depth from surface to the crown of the deeper pipe rounded up to the nearest half meter [5.0 m minimum width]
(c)	Two or more utilities adjacent to one another but in separate trenches.	R.O.W. width =	Cumulative widths for single services PLUS any difference to provide the required separation rounded up to nearest half meter [6 m minimum width]
(d)	The maximum depth shall be used to determine the R.O.W. width and the width shall be consistent throughout the length of the R.O.W.		
(e)	For pipes 900 mm or larger, add an additional 2.0 m to R.O.W. width.		
(f)	When the utility is within a Road allowance and the distance from the property line to the centre of the utility is less than half of the width indicated above for a single utility, the difference shall be provided as right-of-way on the adjacent property.		
(g)	Modified right-of-ways will be considered where supported by design and/or supplemental report(s).		

(REVISED NOVEMBER 2016)

2. Rear and side yard utility right-of-ways are acceptable if appropriate access is provided to the utilities for maintenance and replacement by conventional open cut method.

3. In all cases, the width of rights-of-way shall be sufficient to permit an open excavation with side slopes and access for construction equipment in accordance with the WorkSafe BC regulations, without impacting on or endangering adjacent structures. The *Consultant* shall provide cross sections indicating the minimum safe distances to adjacent building footings based on a safe angle of repose from the limits of the excavation.

4. Blanket access agreements are required on private property for the purpose of moving construction equipment and materials onto the utility right-of-way.

5. Right-of-way locations shall be selected to avoid environmentally sensitive areas such as watercourses and wetlands.

SUBSTANTIAL COMPLETION STATISTICS RECORD
UTILITIES & WORKS FOR DEVELOPMENT

DATE OF SUBMISSION: _____

FILE NO: _____

ASBUILT NO.: _____

ENG. CO: _____

LOCATION: _____

DATE OF CERTIFICATION: _____
(Same date as G2 Certification of Installed Works)

WATERWORKS

ITEM	TYPE	DR	UNIT	QUANTITY	COST PER UNIT ($)	VALUE ($)
PIPE			L.M.			
FIRE HYDRANT			EACH			
FLUSHOUT			EACH			
PRESSURE REDUCING VALVE			EACH			
METER			EACH			
FITTINGS			EACH			
					WATERWORKS TOTAL	

SANITARY SEWER WORKS

ITEM	TYPE	DR	UNIT	QUANTITY	COST PER UNIT ($)	VALUE ($)
PIPE			L.M.			
MANHOLE			EACH			
TEMPORARY CLEANOUT			EACH			
DROP MANHOLE			EACH			
					SANITARY SEWER TOTAL	

(REVISED NOVEMBER 2016)

STORM SEWER WORKS

ITEM	TYPE	DR	UNIT	QUANTITY	COST PER UNIT ($)	VALUE ($)
PIPE			L.M.			
MANHOLE			EACH			
TEMPORARY CLEANOUT			EACH			
CATCHBASIN			EACH			
STORM DETENTION			EACH			
					STORM SEWER WORKS TOTAL	

(REVISED NOVEMBER 2016)

STREETS, SIDEWALKS, CURBS, STREETLIGHTS

ITEM	UNIT	QUANTITY	COST PER UNIT ($)	VALUE ($)
50 mm Asphalt Road/Lane	L.M.			
75mm Asphalt Road	L.M.			
Asphalt Widening & Patching	S.M.			
Mountable curb and gutter	L.M.			
Non-mountable curb or curb and gutter	L.M.			
Concrete Sidewalk	L.M.			
Asphalt Sidewalk	L.M.			
1.8m wide asphalt sidewalk	L.M.			
Asphalt Walkway	L.M.			
Trail*	L.M.			
Trail*	L.M.			
Streetlights**	EACH			
Traffic Signal	EACH			
STREETS, SIDEWALKS, CURBS, STREETLIGHTS TOTAL				

***Note the width of the trail and the material type.**
****The cost per unit for streetlights or traffic signal includes supply of all materials and installation of electrical service equipment, concrete pole base, conduit, wiring, pole and lamp for each streetlight or traffic signal.***

(REVISED NOVEMBER 2016)

LANDSCAPING & IRRIGATION

ITEM	UNIT	QUANTITY	COST PER UNIT ($)	VALUE ($)
Street Trees	EACH			
∅Irrigation Piping	L.M.			
Irrigation Controller	EACH			
Top Soil	S.M.			
Sod/Seeding	S.M.			
Rock/Block Wall	L.M.			
Bio Swale	L.M.			
			LANDSCAPING AND IRRIGATION TOTAL	

(REVISED NOVEMBER 2016)

STATISTIC SUMMARY

DATE OF SUBMISSION: _____

FILE NO: _____

ASBUILT NO.: _____

ENG. CO: _____

LOCATION: _____

DATE OF CERTIFICATION: _____
(Same date as G2 Certification of Installed Works)

ITEM	UNITS	QUANTITY	TOTAL VALUE ($)
WATERMAINS	L.M.		
SANITARY SEWERS	L.M.		
STORM SEWERS	L.M.		
STORM DETENTION	EACH		
ROADS/LANES	L.M.		
SIDEWALKS	L.M.		
WALKWAYS/TRAILWAYS	L.M.		
CURB AND GUTTER	L.M.		
FIRE HYDRANTS	EACH		
STREETLIGHTS	EACH		
LANDSCAPING/IRRIGATION	L.S.		
		GRAND TOTAL VALUE OF ALL WORKS	

(REVISED NOVEMBER 2016)

CITY OF NANAIMO SERVICE SHEET
SINGLE FAMILY RESIDENTIAL LOT

HOUSE NO:	STREET NAME:	
PLAN NO:	LOT NO:	FILE NO:

SHOW: 1) LOT. 2) STREET R/W NAME. 3) RIGHT OF WAYS IF ANY. 4) NORTH ARROW. 5) LOCATION OF ALL UTILITIES – IDENTIFIED & DIMENSIONED.

NOTE: "FROM LPL" = FROM LEFT PROPERTY LINE & "FROM RPL" = FROM RIGHT PROPERTY LINE

VACANT LOT		DEVELOPED LOT		CAPITAL PROJECT		L.I.P.		D.C.C.	

LOCATION	CONNECTED YES	CONNECTED NO	SIZE / MATERIAL
WATER:			
FIRE LINE:			
SANITARY SEWER:			INVERT EL.
STORM SEWER:			INVERT EL.

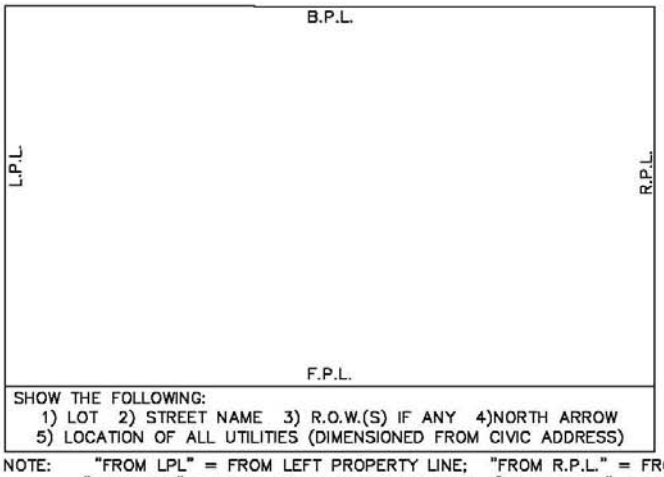
MINIMUM BASEMENT ELEVATION:
CERTIFIED ACCURATE BY:

COMMENTS:

SEAL / ENGINEER'S STAMP

CITY OF NANAIMO SERVICE SHEET
FOR ALL LOTS EXCLUDING SINGLE FAMILY

HOUSE NO:	STREET:		CARD NO:
PLAN NO:	LOT NO:	PERMIT NO:	FILE NO:



SHOW THE FOLLOWING:
1) LOT 2) STREET NAME 3) R.O.W.(S) IF ANY 4)NORTH ARROW
5) LOCATION OF ALL UTILITIES (DIMENSIONED FROM CIVIC ADDRESS)

- ☐ NEW INSTALL
- ☐ CHANGE/UPDATE
- ☐ METER REMOVAL
- ☐ SERVICE CONNECTION
- ☐ SERVICE DISCONNECT
- ☐ METER REPLACEMENT

COMMENTS: _____

NOTE: "FROM LPL" = FROM LEFT PROPERTY LINE; "FROM R.P.L." = FROM RIGHT PROPERTY LINE;
"FROM FPL" = FROM FRONT PROPERTY LINE; "FROM B.P.L." = FROM BACK PROPERTY LINE;

☐VACANT LOT ☐DEVELOPED LOT ☐CAPITAL PROJECT ☐LOCAL IMPROVEMENT PROJECT ☐D.C.C.

SERVICE		LOCATION	NEW	EXIST	CONNECTED YES	CONNECTED NO	SIZE (mm)	MATERIAL
WATER	DOMESTIC		☐	☐	☐	☐		
	FIRE LINE		☐	☐	☐	☐		
	COMBINATION		☐	☐	☐	☐		
SANITARY			☐	☐	☐	☐		
		M.B.F.E.:	INVERT ELEVATION:					
STORM			☐	☐	☐	☐		
		M.B.F.E.:	INVERT ELEVATION:					

M.B.F.E. = Minimum Basement Floor Elevation NOTE: Inverts to Geodedic Datum

METERS		
NEW	REGISTER NO.	
	READING	
OLD	REGISTER NO.	
	READING	

COMPLETED BY: _____

DATE: _____

PLACE METER STICKER/STAMP IN BOX

SEAL / ENGINEER'S STAMP

TO: Finance Department
City of Nanaimo
411 Dunsmuir Street
Nanaimo, BC V9R 5E4

Building Permit or File #_____

Civic Address_____

BUILDING DEVELOPMENT WATER METER INFORMATION SHEET

TO BE USED ON BUILDING DEVELOPMENTS WHERE THE DETECTOR CHECK/METER CHAMBER IS DEVELOPER INSTALLED.

TO BE SUBMITTED UPON INSTALLATION OF WATER METER/DETECTOR CHECK.

1. Type of Water Meter: ❑ Domestic Meter ❑ Fireline Meter ❑ Combination Meter

2.(a) Date of Installation of Water Meter: _____

(b) Date of Installation of Fireline Meter: _____

(c) Date of Installation of Combination Meter: _____

3. Make and Model of meter installed:

Domestic _____ Serial No. _____ Head No. _____

Detector Check _____ Serial No. _____ Head No. _____

Combination _____ Serial No. _____ Head No. _____

4. Size of meter installed: Domestic: _____

Detector Check: _____

Combination: _____

5. Meter reading at date of installation: Domestic: _____

Detector Check: _____

Combination: _____

6. Reading type: Metric _____

7. Does reading contain decimal places: Yes _____ No _____

8. If reading contains decimal places, how many decimal places are there? _____

9. Location of meter/service: _____

(must be stated on this sheet)

_____ P.Eng.

_____
(Please Print Name)

_____
(Company Name

_____
(Address)

cc: Manager, Utilities, Public Works
Manager, Revenue Services, Finance

(REVISED NOVEMBER 2016)

APPENDIX G1

CERTIFICATION OF DESIGN

I, _____, a Professional Engineer registered in the Province of British Columbia, hereby certify that the works, as herein set out on the attached drawings entitled

_____
_____
_____

have been designed in accordance with the City of Nanaimo's Engineering Standards and Specifications, and in accordance with good engineering practice where such design is not covered by the City's Engineering Standards and Specifications.

_____

I have been retained to provide design, supervision, inspection, as-built drawings, and final certification for this project by:_____
(Name of Client)

Phone:_____ Fax:_____

Address:_____

_____

I am satisfied that in the contractual mandate which exists between myself and my client, the terms of reference will permit me to render a level of supervision of the construction work which will allow me to put my name and seal to the "Certification of Works" required by the City of Nanaimo, a sample copy of which is attached to this document and initialed by me.

In the event that my client releases me from this project, or in the event that I find the terms of reference do not permit me to render a level of supervision of the construction work which will allow me to put my name and seal to the form of certification required by the City of Nanaimo, I will notify the City of Nanaimo within twenty-four (24) hours verbally and follow it up with written confirmation and clarification.

Signed this _____ day of _____ 20 _____.

_____ P. Eng.
(Signature)

I understand that the "CERTIFICATION OF WORKS" is to be completed in this format and submitted with the "AS-BUILT" drawings. _____

Engineer

SEAL / ENGINEER'S STAMP

_____
Engineer (Signature)

_____
Engineering Firm

Effective January 1995
(REVISED NOVEMBER 2016)

CERTIFICATION OF INSTALLED WORKS

NOTE: To be completed in this format and submitted with the "As-Built" drawings

Location of the Construction Site and Works: (Legal Description)

_____

_____

all within the City of Nanaimo, British Columbia.

I, _____, a Registered Professional Engineer (Reg. No. _____) in the Province of British Columbia, hereby certify:

1. THAT the following construction tests were carried out to confirm that construction met the specifications required:

   (a). _____

   (b). _____

   etc.

2. THAT I was able to monitor the construction and provide a level of supervision of the construction work sufficient to be able to confirm that: specifications in force and effect by the City of Nanaimo and in the applicable design drawings for the said Works were generally met during the Construction Period and that all materials incorporated into the Works that are regulated by the City's Approved Product List are materials noted at the time of installation, and

3. THAT the accompanying plans labeled:

   (i). _____

   (ii). _____

   (iii). _____

   accurately record the materials, grades, inverts, offsets and dimensions of the constructed work.

   DATED this _____ day of _____. 20 _____.
   (DATE OF CERTIFICATION)

SEAL / ENGINEER'S STAMP

_____
Engineer (Signature)

_____
Engineering Firm

Effective January 1995
(REVISED NOVEMBER 2016)

CERTIFICATION OF STREET LIGHT INSTALLATION

Location of the Construction site and Works (Legal Description)

_____

_____

all within the City of Nanaimo, British Columbia.

I, _____, a Registered Professional Engineer (Reg. No. _____), in the Province of British Columbia, hereby certify that:

1. I have received the final electrical inspection request and declaration for the street lighting installation from the electrical Field Safety Representative (copy attached).

2. All of the street lighting system is installed in accordance with all the specifications in force and effect by the Provincial Government and the City of Nanaimo as shown on the drawings and specifications authorized by me and submitted to the City of Nanaimo, Engineering Division. The system has been energized and tested. The system is in working order and will be ready for use once it is connected to the B.C. Hydro and Power Authority's system.

3. The accompanying plans labeled:

_____

_____

_____

_____

are certified "as-builts" and truly record the construction of all the street lighting required for the subject project.

DATED this _____ day of _____, 20 _____.

SEAL / ENGINEER'S STAMP

_____
Engineer (Signature)

_____
Engineering Firm

(REVISED NOVEMBER 2016)

CERTIFICATION OF LANDSCAPE INSTALLATION
NOTE: To be completed in this format and submitted with the "As-Built" drawings

Location of the Construction Site and Works: (Legal Description)

_____

_____

_____

_____

all within the City of Nanaimo, British Columbia.

I, _____, a Landscape Architect, and member in good standing of British Columbia Society of Landscape Architects, hereby certify

1. THAT the following construction tests were carried out to confirm that construction met the specifications required:

1. THAT I was able to monitor the construction and provide a level of supervision of the construction work sufficient to be able to confirm that the specifications in force and effect by the City of Nanaimo and in the applicable design drawings for the said Works were generally met during the Construction Period and

2. THAT the accompanying plans labeled:

(i). _____
(ii). _____
(iii). _____

accurately record the materials, species, as-built locations, offsets and dimensions of the constructed work.

DATED this _____ day of _____ 20_____.

SEAL / LANDSCAPE ARCHITECT STAMP

_____
Landscape Architect (Signature)

_____
Landscape Architecture Firm

Effective May 1998
(REVISED NOVEMBER 2016)

CITY OF NANAIMO SANITARY SEWER FLOW ANALYSIS – CALCULATION SHEET

Project _____

ENGINEERING COMPANY _____

ADDRESS _____

ENGINEER _____

Seal/ Engineer's Stamp

Date: _____

Design By: _____

Sheet _____ **of** _____

Harmon Peaking Factor:
PF = 1 + 14/(4+P^1/2)

Mannings Formula:
V = (R^2/3 * S^½)/n
Q = V*A n = 0.013

										Sewage Flow		**Infiltration & Inflow**		**Total Flow**		**Pipe Data**			
Area No.	MH No. To MH No.	Location	Area (Hectares) A	Units or Lots	Density pp Ha	Equiv. Pop. (ca)	Cum. Equiv. Pop. (ca)	Average Flow (L/day)	Peaking Factor	Peak Flow (L/day)	Peak Flow (ML/day)	Infilt. (ML/day)	Cum. Infilt (ML/day)	Total Flow (ML/day)	Flow (L/s) Q	Pipe Size (mm) D	Pipe Slope (m/m) S	Pipe Capacity (L/s)	Velocity (m/s) V

(REVISED NOVEMBER 2016)

CITY OF NANAIMO STORMWATER MANAGEMENT FLOW ANALYSIS – CALCULATION SHEET

PROJECT: _____

ENGINEERING COMPANY: _____
ADDRESS: _____
ENGINEER: _____

Rational Formula: Q = C x I x A x 2.78

SEAL / ENGINEER'S STAMP

Return Period: _____ Years

Date: _____

Design By: _____

Sheet _____ of _____

Mannings Formula

$V = \frac{(R)2/3 \times (S)1/2}{n}$

$Q = V \times A \quad n = 0.013$

MH To MH	Area (Ha) (A)	Coeff. (C)	Area x Coeff. (AC)	Accum. A x C	Time Of Concent (Mins)	Rainfall Intensity (mm/hr) (I)	Q (l/s)	Diam. (mm) (D)	Design Slope (%) (S)	Installed Slope (%)	Cap. (l/s)	Velocity (m/s) (V)	Length M.H. to M.H. (m)	Time of Flow-MH to MH (Mins)

(REVISED NOVEMBER 2016)

CITY OF NANAIMO
FIRE FLOW CALCULATION SHEET
(Calculations based on "Guide for Determination of Fireflow"
prepared by Fire Underwriter's Survey)

1. Type (s) of Construction: _____

   Co-efficient (c) based on type of construction = _____

   Ground Floor Area: _____ ft^2 No. of Stories: _____

   Total Floor Area: _____ ft^2

   Fire Flow From Formula ($F = 14.8\ C\sqrt{A}$): _____ IGPM (a)

2. Type of Occupancy: _____ Hazard: Low _____ High _____ Other _____

   Hazard Allowance: Add or subtract: _____ % x (a) = _____ IGPM

   Sub Total: _____ IGPM (b)

3. Automatic Sprinklers: _____ (yes/no)

   Sprinkler Allowance: Subtract (max. 50%): _____ % X (b) = _____ IGPM (c)

   Sub Total: _____ IGPM (d)

4. Exposures: Distance/Hazard
   1. Front _____Add _____%
   2. Left _____Add _____%
   3. Rear _____ Add _____%
   4. Right_____ Add _____%

   Exposure Allowance: Add: _____ (e) % X (b) = _____ IGPM (f)

TOTAL FIRE FLOW REQUIRED: _____ IGPM (g)
REQUIRED PRESSURE: _____ P.S.I.

SPRINKLER SYSTEM INFORMATION

(a) If building has automatic sprinklers:
Distance from sprinkler fire connections at building to nearest available fire hydrant on an unobstructed route _____m

Will sprinkler systems be wet or dry: Wet _____ Dry _____

If wet, will system contain anti-freeze or any other chemical additive? Yes _____ No _____

Backflow protection: (describe) _____
_____

(b) If building has no automatic sprinklers:
Distance from main building entrance to nearest available fire hydrant on an unobstructed route _____m

SEAL / ENGINEER'S STAMP

Calculations by: _____ P. Eng.

Signature: _____

Date:_____

CITY OF NANAIMO
THE HARBOUR CITY

Water Meter Sizing Calculation Sheet

For Non-Fire Service Meters

AWWA M22 Fixture Value Methodology

Page 1 of 2

General Information

Customer Name: _____ File No. _____

Address / Legal Description: _____ Building Permit No. _____

_____

Occupancy Type: Industrial ☐ Commercial ☐ Institutional ☐

Multifamily ☐ Agricultural ☐ Other ☐ _____

Is this a phased development? Yes ☐ No ☐

Calculations pertain to: Buildout ☐ Phase ☐ Phase No. _____

Step 1: Calculate Total Domestic Fixture Value

Fixture	Fixture Value (GPM @ 60 psi)		No. of Fixtures		Fixture Value
Bathtub	8	x		=	
Bedpan Washers	10	x		=	
Bidet	2	x		=	
Dental Unit	2	x		=	
Dishwasher	2	x		=	
Drinking Fountain - Public	2	x		=	
Hose Bibs (c/w 50 ft wash down):					
- 1/2 inch	5	x		=	
- 5/8 inch	9	x		=	
- 3/4 inch	12	x		=	
Kitchen Sink	2.2	x		=	
Lavatory	1.5	x		=	
Showerhead (Shower Only)	2.5	x		=	
Service Sink	4	x		=	
Toilet:					
- Flush Valve	35	x		=	
- Tank Type	4	x		=	
Urinal:					
- Pedestal Flush Valve	35	x		=	
- Wall Flush Valve	16	x		=	
Wash Sink (Each Set of Faucets)	4	x		=	
Washing Machine	6	x		=	

For single family residential properties, the meter size shall be 19 mm, unless the Applicant can demonstrate the need for a larger meter.

CITY OF NANAIMO
THE HARBOUR CITY

Water Meter Sizing Calculation Sheet

Page 2 of 2

Step 1 (cont.)

Fixture	Fixture Value (GPM @ 60 psi)		No. of Fixtures		Fixture Value
Other:					
_____	_____	x	_____	=	_____
_____	_____	x	_____	=	_____
_____	_____	x	_____	=	_____

Total Domestic Fixture Value = _____ GPM (A)

Step 2: Calculate Probable Peak Domestic Demand

Refer to AWWA Manual M22, Sizing Water Service Lines and Meters, Figure 4-2 or 4-3

Probable Peak Domestic Demand = _____ GPM (B)

Step 3: Apply Pressure Adjustment Factor

City Water System Pressure (not to exceed 80 psi) = _____ psi

Pressure Factor from *Table 4 = _____ (C)

*AWWA Manual M22, Sizing Water Service Lines and Meters

Adjusted Peak Domestic Demand (B x C) = _____ GPM (D)

Step 4: Identify Irrigation Demand

Total Irrigation Demand = _____ GPM (E)

For irrigation demands greater than 35 GPM, a detailed irrigation plan shall be provided with appropriately designed zones.

Step 5: Calculate Total Peak Demand

Total Peak Demand (D + E) = _____ GPM (F)

Step 6: Select Water Meter

Water Meter Make / Model: = _____

Water Meter Size * = _____ inches

Water Service Connection Size = _____ inches

* Total Peak Demand (F) not to exceed 80% of Meter Rated Peak Instantaneous Flow
* Pressure Loss at Total Peak Demand (F) not to exceed 5 psi

Professional Certification

Seal

Name: _____

Company: _____

Date: _____

Comments: _____

For single family residential properties, the meter size shall be 19 mm, unless the Applicant can demonstrate the need for a larger meter.

CITY OF NANAIMO
THE HARBOUR CITY

Water Meter Sizing Calculation Sheet

For Non-Fire Service Meters

AWWA M22 Fixture Value Methodology

Example

Page 1 of 3

General Information

Customer Name:	Example			File No.	Example
Address / Legal Description:	Example			Building Permit No.	Example
	Example				
Occupancy Type:	Industrial [ ]	Commercial [ ]	Institutional [ ]		
	Multifamily [X]	Agricultural [ ]	Other [ ]		
Is this a phased development?	Yes [ ]	No [X]			
Calculations pertain to:	Buildout [X]	Phase [ ]	Phase No.		

This meter sizing calculation is based on the AWWA M22 Fixture Value Methodology. Applicant's Engineers are expected to purchase and use the *AWWA Manual of Water Supply Practices M22 Sizing Water Service Lines and Meters* when completing this methodology.

This section includes general information about the customer and proposed development.

A 30 unit townhouse complex has been chosen as an example to demonstrate the use of this sizing methodology.

Step 1: Calculate Total Domestic Fixture Value

Fixture	Fixture Value (GPM @ 60 psi)		No. of Fixtures		Fixture Value
Bathtub	8	x	30	=	240
Bedpan Washers	10	x		=	
Bidet	2	x		=	
Dental Unit	2	x		=	
Dishwasher	2	x	30	=	60
Drinking Fountain - Public	2	x		=	
Hose Bibs (c/w 50 ft wash down):					
- 1/2 inch	5	x	30	=	150
- 5/8 inch	9	x		=	
- 3/4 inch	12	x		=	
Kitchen Sink	2.2	x	30	=	66
Lavatory	1.5	x	90	=	135
Showerhead (Shower Only)	2.5	x	30	=	75
Service Sink	4	x		=	
Toilet:					
- Flush Valve	35	x		=	
- Tank Type	4	x	90	=	360
Urinal:					
- Pedestal Flush Valve	35	x		=	
- Wall Flush Valve	16	x		=	
Wash Sink (Each Set of Faucets)	4	x	30	=	120
Washing Machine	6	x	30	=	180
Other:					
		x		=	
		x		=	
		x		=	
		Total Domestic Fixture Value		=	1386 **GPM (A)**

In this example, the following fixtures are identified for each of the 30 units in the proposed development:

- 1 bathtub
- 1 shower
- 3 toilets (tank type)
- 3 bathroom sinks
- 1 dishwasher
- 1 kitchen sink
- 1 washing machine
- 1 laundry sink
- 1 hose bib (1/2 inch)

These fixtures yield a Total Domestic Fixture Value of 1386 GPM.

Note: If a fixture is proposed that is not on the list then the peak flow value (fixture value) can be included on one of the blank lines under "Other" based on the manufacturer's information.

CITY OF NANAIMO
THE HARBOUR CITY

Water Meter Sizing Calculation Sheet

For Non-Fire Service Meters

AWWA M22 Fixture Value Methodology

Example

Step 2: Calculate Probable Peak Domestic Demand

Refer to Figure 4-2 or 4-3

Probable Peak Domestic Demand = 65 GPM (B)

The AWWA Manual M22 includes two graphs (Figures 4-2 and 4-3) which provide a correlation between the Total Domestic Fixture Value and Probable Peak Domestic Demand for various development types.

For this example, Figure 4-3 applies since the Total Domestic Fixture Value is in the "high range". The "Apartments" curve indicates that a Total Domestic Fixture Value of 1386 GPM corresponds to a Probable Peak Domestic Demand of 65 GPM.

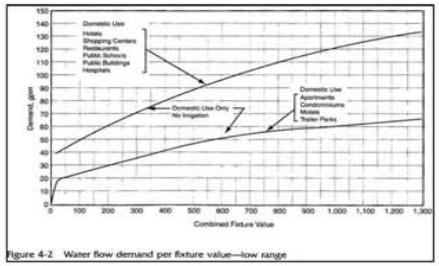


Figure 4-2 Water flow demand per fixture value—low range

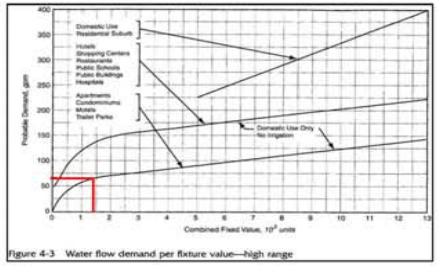


Figure 4-3 Water flow demand per fixture value—high range

Step 3: Apply Pressure Adjustment Factor

City Water System Pressure (not to exceed 80 psi) = 70 psi

Pressure Factor from Table 4-1 = 1.09 (C)

Adjusted Peak Domestic Demand (B x C) = 70.85 GPM (D)

The fixture values listed in Step 1 are based on a pressure of 60 psi. This step increases or decreases the peak demand based on the pressure at the outlet of the meter. Table 4-1 in the AWWA M22 Manual provides adjustment factors for various pressures.

For this example, the pressure downstream of the meter is identified as 70 psi. From Table 4-1, the pressure adjustment factor is 1.09 and the Adjusted Peak Domestic Demand is 70.85 GPM.

Note that for the purpose of this sizing methodology, the maximum pressure for which to apply an adjustment is 80 psi.

Table 4-1 Pressure adjustment factors*

Working Pressure at Meter Discharge (psi)	Average Flow from 50 ft of ⅝-in. Hose and Sprinkler (gpm)	Pressure Adjustment Factor
35	6.7	0.74
40	7.2	0.80
50	8.1	0.90
60	9.0	1.00
70	9.8	1.09
80	10.5	1.17
90	11.2	1.25
100	12.1	1.34

*derived from Table 4-1 and 4-2 of Manual M22 (1975).

NOTE: To convert psi to kPa: psi × 6.89476; to convert gpm to m³/hr: gpm × 0.227.

CITY OF NANAIMO
THE HARBOUR CITY

Water Meter Sizing Calculation Sheet

For Non-Fire Service Meters

AWWA M22 Fixture Value Methodology

Example

Page 3 of 3

Step 4: Identify Irrigation Demand

Total Irrigation Demand = 23.2 **GPM (E)**

For irrigation demands greater than 35 GPM, a detailed irrigation plan shall be provided with appropriately designed zones.

The Total Irrigation Demand is identified in this step. The AWWA Manual M22 provides guidance for calculating irrigation demands. However, the Applicant's Engineer may refer to an irrigation system design flow specified by the manufacturer or identified by the irrigation system designer.

For this example, an area of 2000 ft^2 is irrigated by a spray irrigation system. The AWWA M22 Manual indicates that for spray irrigation each "section" represents a flow of 1.16 GPM. A "section" is defined as 100 ft^2. So the calculation yields:

Total Irrigation Demand = 2000 ft^2 / 100 ft^2 = 20 sections x 1.16 GPM = 23.2 GPM

Step 5: Calculate Total Peak Demand

Total Peak Demand (D + E) = 94.05 **GPM (F)**

The Adjusted Peak Domestic Demand of 70.85 GPM from Step 3 is combined with the Total Irrigation Demand of 35 GPM from Step 4 to yield a Total Peak Demand of 105.85 GPM.

Step 6: Select Water Meter

Water Meter Make / Model: = Sensus OMNI C^2

Water Meter Size * = 1.5 inches

Water Service Connection Size = 2 inches

* Total Peak Demand (F) not to exceed 80% of Meter Rated Peak Instantaneous Flow
* Pressure Loss at Total Peak Demand (F) not to exceed 5 psi

The selected meter is a 1.5" Sensus OMNI C^2.

The manufacturer specified maximum intermittent flow rating for this meter is 200 GPM.
80% of 200 GPM = 160 GPM > 94.05 GPM

The manufacturer specified pressure loss for this meter (with strainer) at 94.05 GPM is approximately 4 psi (< 5 psi).

Professional Certification

Seal

Seal

Name: Example

Company: Example

Date: Example

Comments:

This section is for the Applicant's Engineer to certify the water meter sizing calculation.

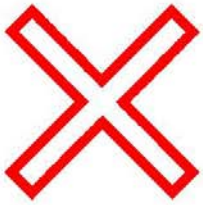
The comments space is provided to explain any unique aspects of the development that impact the proposed meter sizing.

STOP
RA 1
600mm x 600mm

YIELD
RA 2
750mm x 750 x mm 750mm

SCHOOL CROSSWALK
RA 3L/R
600mm x 750mm

PEDESTRIAN CROSSWALK
RA 4L/R
600mm x 750mm



CROSS BUCK
RA 6
CROSS LENGTHS 1200 x 200mm

RAILWAY CROSSING SIGN
RA 6S
700mm X 450mm

ROUNDABOUT YIELD
RA 7
750mm x 750mm x 750mmm

MAXIMUM SPEED
RB 1
600mm x 750mm

NO TURN
RB-11 L/R
600mm X 600mm

TURN ONLY
RB-14 L/R
600mm x 600mm

NOTES:
1. THIS HANDBOOK IS FOR GENERAL REFERENCE ONLY.
2. REFER TO SECTION 9.14 STREET NAME AND TRAFFIC SIGNS.

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5.13.2016

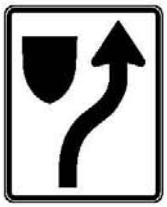
CITY OF NANAIMO
THE HARBOUR CITY

CITY OF NANAIMO'S FIELD
HANDBOOK OF GENERAL SIGNS

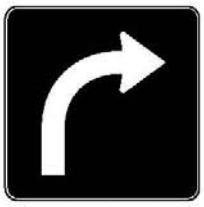
Scale: N.T.S.
Created: JUNE 2013
Rev DateNOV 2016
Dwg No: SHT-1

ONE WAY
RB 21
900mm x 300mm

DO NOT ENTER
RB 23
600mm x 600mm



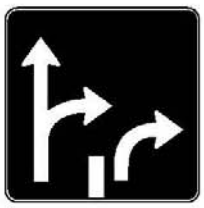
KEEP RIGHT
RB 25
600mm x 750mm



TURN ONLY LANE
RB-41 L/R
600mm x 600mm

THRU OR TURN LANE
RB-42 L/R
600mm x 600mm

DOUBLE TURN ONLY
RB-46 L/R
600mm x 600mm



STRAIGHT OR DOUBLE TURN LANE
RB-47 L/R
600mm x 600mm

STOP LINE
RC-4 L/R
600mm x 750mm

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6.20.2016

CITY OF NANAIMO
THE HARBOUR CITY

CITY OF NANAIMO'S FIELD
HANDBOOK OF GENERAL SIGNS

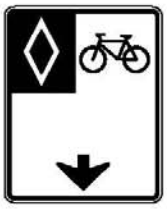
Scale:	N.T.S.
Created:	JUN 2013
Rev Date	NOV 2016
Dwg No:	SHT-2

TWO WAY LEFT TURN LANE
RB–48
900mm x 900mm

CENTER LANE
RB–48S
600mm x 300mm

NO PARKING ANYTIME
RB–52
300mm x 450mm

NO STOPPING
RB–57
300mm x 450mm



RESERVED BIKE LANE
RB–91
600mm x 750mm

RESERVED BIKE LANE ENDS
RB 92
600mm x 750mm

LEFT TURN SIGNAL
RB–18
600mm x 750mm

YIELD ON GREEN
R–110
450mm X 600mm (MOTI)

CURVE 90°
WA–1 L/R
600mm x 600mm

SHARP CURVE
WA–2 L/R
600mm x 600mm

CURVE
WA–3 L/R
600mm x 600mm

REVERSE TURN
WA–4 L/R
600mm x 600mm

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5.13.2016

CITY OF NANAIMO
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CITY OF NANAIMO'S FIELD
HANDBOOK OF GENERAL SIGNS

Scale: N.T.S.
Created: JUN 2013
Rev DateNOV 2016
Dwg No: SHT–3

REVERSE CURVE
WA-5L/R
600mm x 600mm

WINDING ROAD
WA-6L/R
600mm x 600mm

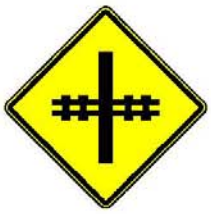
CHECKERBOARD
WA-8B
750mm x 750mm

CHEVRON ALIGNMENT
WA-9
450mm x 600mm

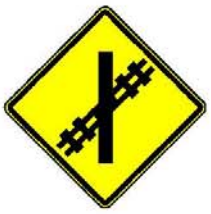
CONCEALED INTERSECTION
WA-11
600mm x 600mm

ACUTE ANGLE CONCEALED INTERSECTION
WA-12L/R
600mm x 600mm

90 ANGLE CONCEALED INTERSECTION
WA-13L/R
600mm x 600mm



RAILWAY CROSSING STRAIGHT
WA-18
750mm x 750mm



RAILWAY CROSSING ANGLED
WA-18L/R
750mm x 750mm

LANE ENDS
WA-33L/R
750mm x 750mm

OBJECT MARKER
WA-36
450mm x 900mm

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CITY OF NANAIMO
THE HARBOUR CITY

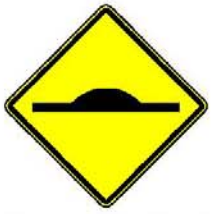
CITY OF NANAIMO'S FIELD
HANDBOOK OF GENERAL SIGNS

Scale: N.T.S.
Created: JUN 2013
Rev DateNOV 2016
Dwg No: SHT-4

OBJECT MARKER
WA–36L
300mm x 900mm

ROUNDABOUT DIRECTION
WA–38
60mm x 1660mm

ROUNDABOUT AHEAD
WA–39
900mm x 900mm



NEIGHBOURHOOD SPEED HUMP
WA–50
600mm x 600mm

STOP AHEAD
WB–1
750mm x 750mm

YIELD AHEAD
WB–2
750mm x 750mm

SIGNAL AHEAD
WB–4
600mm x 600mm

BIKE LANE AHEAD
WB–10
750mm x 750mm

SCHOOL CROSSWALK AHEAD
WB–16L/R
600mm x 600mm

PEDESTRIAN CROSSWALK AHEAD
WC–2L/R
600mm x 600mm

PLAYGROUND AHEAD
WC–3R/L
600mm x 600mm

BICYCLE CROSSING AHEAD
WC–7
600mm x 600mm

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CITY OF NANAIMO
THE HARBOUR CITY

CITY OF NANAIMO'S FIELD
HANDBOOK OF GENERAL SIGNS

Scale: N.T.S.
Created: JUN 2013
Rev DateNOV 2016
Dwg No: SHT–5

FIRE TRUCK ENTRANCE
WC–17L/R
750mm x 750mm

BIKE PEDESTRIAN CROSSING AHEAD
WC–46L/R
600mm x 600mm

BIKES ON ROADWAY
WC–19
600mm x 600mm

CUL–DE SAC SIGN
ID–31
600mm x 600mm

PEDESTRIAN PUSHBUTTON SIGN
ID–21L/R
130mm x 200mm

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5.13.2016

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HANDBOOK OF GENERAL SIGNS

Scale: N.T.S.
Created: JUN 2013
Rev DateNOV 2016
Dwg No: SHT-6

SAMPLE - BC Hydro SLIM Connection Form – Ornamental Lights

Development Title:		Date:_____
Comments:		

Request:

Request Type**:**	
Reason Type:	
Lamp Type:	
Wattage:	
Lens Type:	
Request Details: *(# of lights, wattages, etc.)*	

Electrician:

Name:	
Company:	
Phone #:	
Permit #: ***provided by electrician*	

	SLIM ID#:_____

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