How Can You Manager Your Assets if You Don’t Have the Data?

City of Kelowna and MMCD Infrastructure Data Standards (IDS)

Andrew Walther, P.Eng.
June 25, 2024

ASSET MANAGEMENT BC

AGENDA

1. City of Kelowna – the Challenge and Solution
2. What is MMCD and Why Is It Good for IDS?
3. What Exactly is IDS?
4. Current LG Practices for Updating Asset Register (GIS) – Data Intake
5. “Construction Recorded” Data Submissions – How do They Work?
6. Data Delivery Specification – The “Asset Information Model”
7. Data Consumption by GIS – MMCD IDS
8. Why is This So Important?
9. Drivers for a Common Standard (Burnaby, Kelowna, Prince George, Saanich)
10. City of Kelowna – Implementation
11. BIM

The City of Kelowna

- Has been and will continue to experience rapid growth
- 2022 Population 155,000
- 2045 Population Projection 245,000 (61% Growth)
- ESRI ArcInfo with City Works for Enterprise Asset Management
- GIS serves as asset register

The City of Kelowna - Challenges

- GIS technicians could not keep up – redrawing and data transposing
- No standardized for data or HC deliverables
- No mechanisms for data deliverable enforcement
- Aging infrastructure and not enough funds to replace (AM)
- They got what they got

City of Kelowna - The Challenge

Keeping staff resources

- Record Drawing and Data Submission Backlogs!
- Asset Databases (GIS) Not Current

City of Kelowna – The Solution

IDS
Infrastructure Data Standards

What is MMCD and Why Is It Good for IDS?

MMCD (www.mmcd.net)

- BC's Master Municipal Construction Documents Association
- Founded in 1995 as a non-profit to bring standardization to infrastructure specifications and contract documents (procurement)
- Member driven and funded - owners, engineers and contractors
- Board represented consists of BCMoTI, EGBC, BC Roadbuilders, Provincial Government (MMA), Local Governments, consultants and contractors
- Approximately 65 Local Governments
- **Established organization with a history and membership**

What is IDS?

MMCD (www.mmcd.net)

Autodesk Civil 3D Tools to bring consistency to the creation of infrastructure designs, tender drawings, construction layout data and post construction data deliverables.

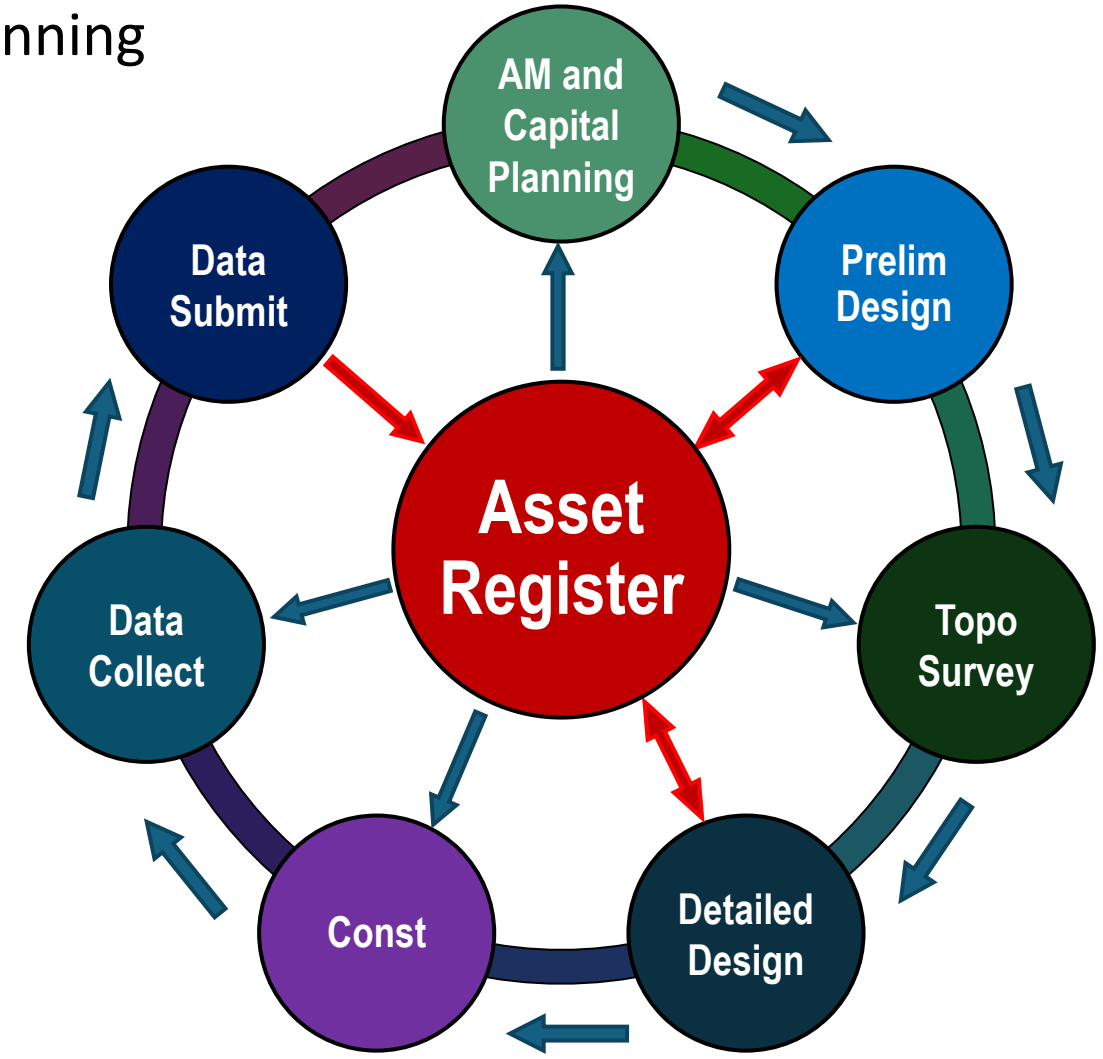
“How can you manage your assets if you don’t have the data?”

IDS – Infrastructure Data Standards

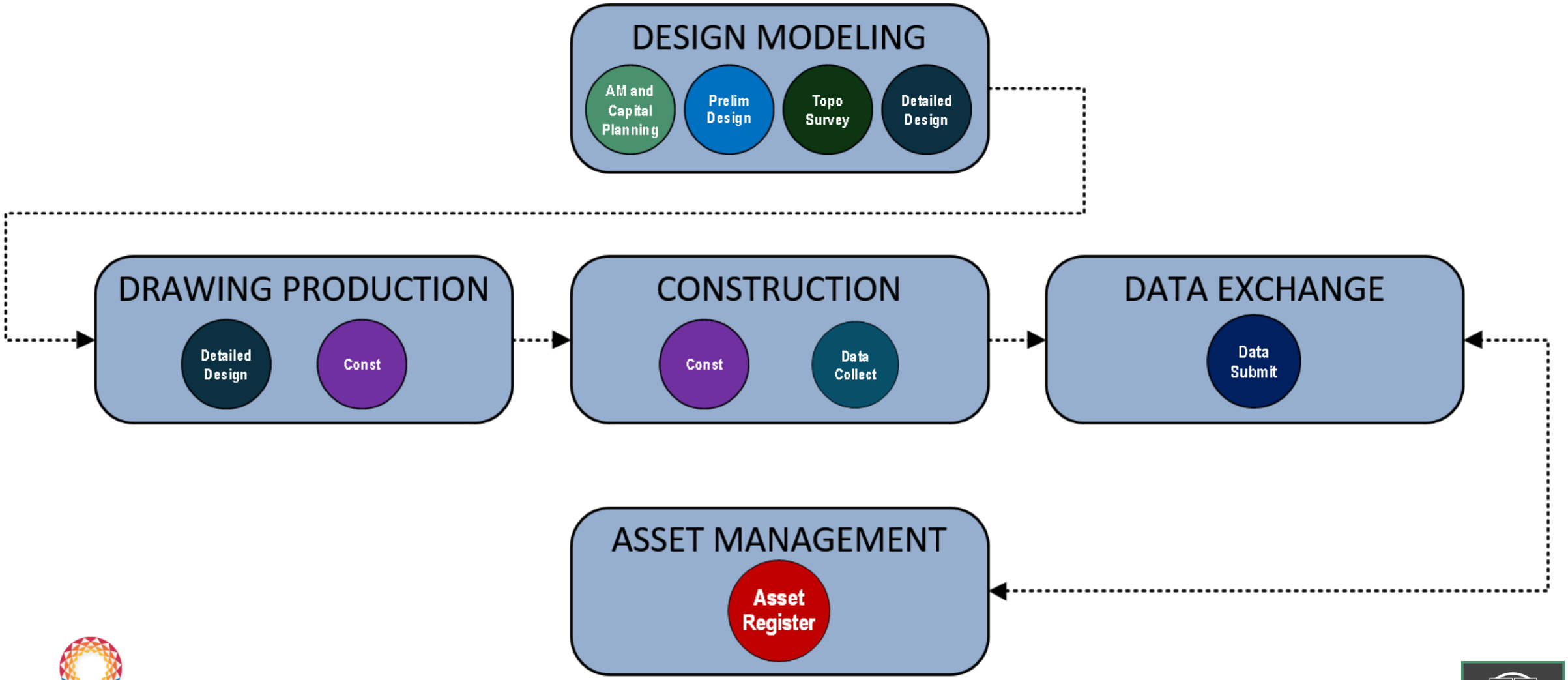
1. **Asset Management Initiative (2009)**
2. **Standards for infrastructure procurement and lifecycle management**
   - Built on Autodesk Civil 3D
   - GIS Data Extraction (response and planning) – “Existing Recorded” Assets
   - Topographic Survey (survey codes)
   - Infrastructure Design Modeling
   - Tender and Construction Drawings
   - Standardized “Construction Recorded” Data Delivery to Local Government
   - AMDR – Asset Management Data Register
3. **Freeware – MMCD Membership is Encouraged**

Infrastructure Procurement

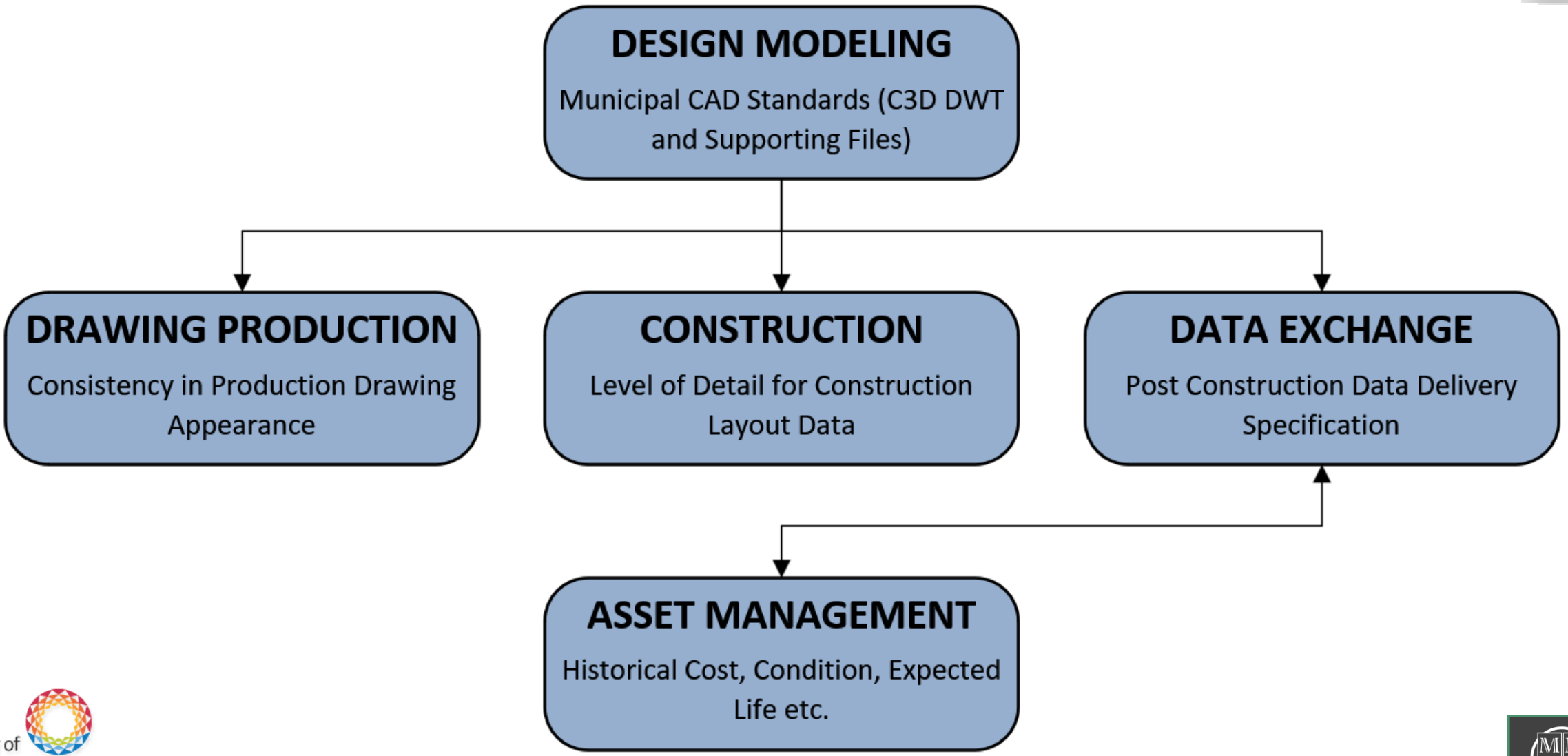
1. Asset Management and Capital Planning
2. Preliminary Design
3. Topographic Survey
4. Detailed Design Modeling
5. Construction
6. Asset Data Collection
7. Asset Data Submission



IDS – Workflow



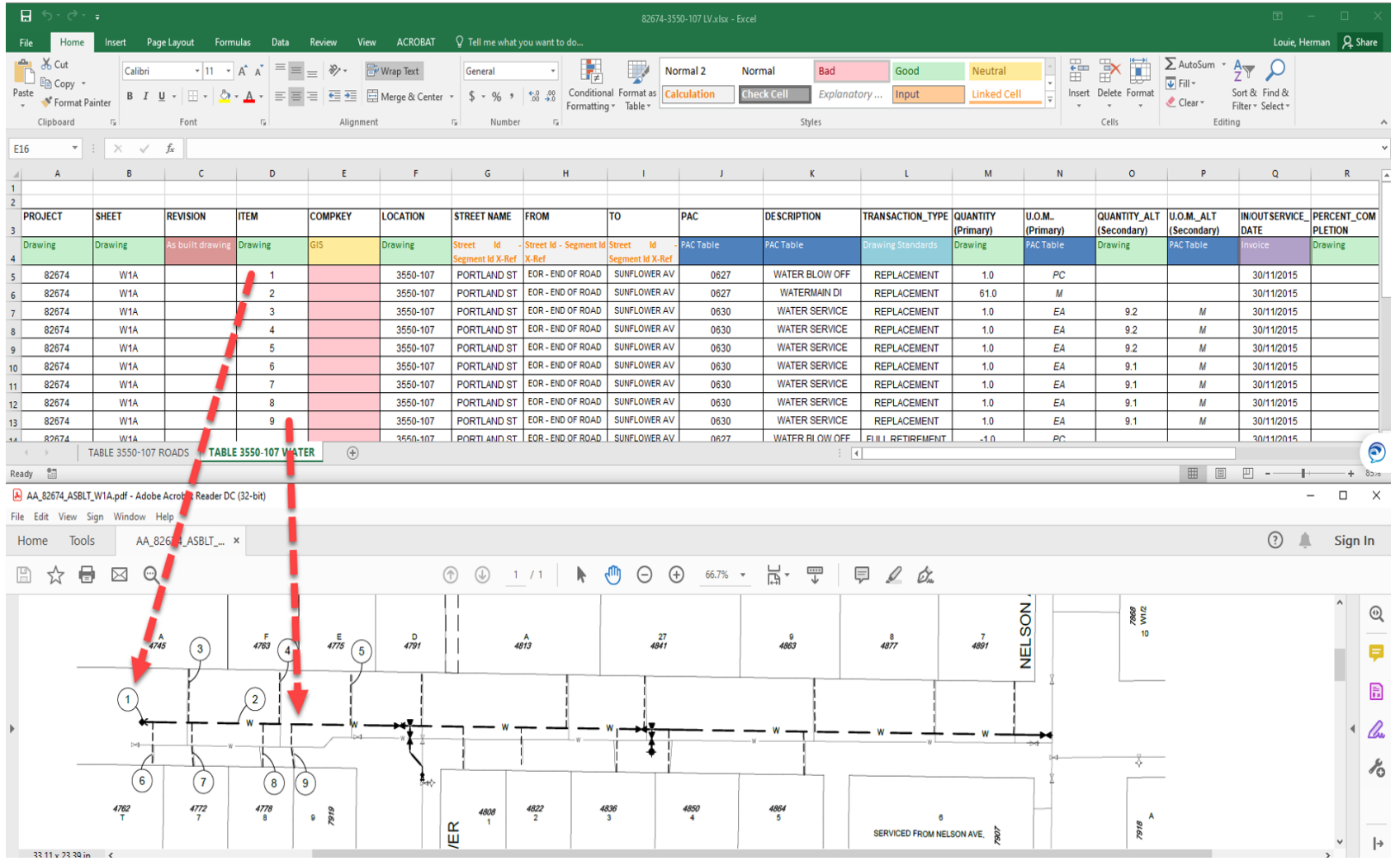
IDS – Components



Current Local Government Practices for Updating Asset Register (GIS)

1. Redrawing and manual attribution from HC Construction Drawings (As-Builts)
2. Reuse of design graphics and manual attribution (spatially coordinated?)

Label and Table…



PROJECT	SHEET	REVISION	ITEM	COMPKEY	LOCATION	STREET NAME	FROM	TO	PAC	DESCRIPTION	TRANSACTION_TYPE	QUANTITY (Primary)	U.O.M. (Primary)	QUANTITY_ALT (Secondary)	U.O.M._ALT (Secondary)	IN/OUTSERVICE_DATE	PERCENT_COMPLETION
Drawing	Drawing	As built drawing	Drawing	GIS	Drawing	Street Id Segment Id X-Ref	Street Id - Segment Id X-Ref	Street Id Segment Id X-Ref	PAC Table	PAC Table	Drawing Standards	Drawing	PAC Table	Drawing	PAC Table	Invoice	Drawing
82674	W1A		1		3550-107	PORTLAND ST	EOR - END OF ROAD	SUNFLOWER AV	0627	WATER BLOW OFF	REPLACEMENT	1.0	PC			30/11/2015	
82674	W1A		2		3550-107	PORTLAND ST	EOR - END OF ROAD	SUNFLOWER AV	0627	WATERMAIN DI	REPLACEMENT	61.0	M			30/11/2015	
82674	W1A		3		3550-107	PORTLAND ST	EOR - END OF ROAD	SUNFLOWER AV	0630	WATER SERVICE	REPLACEMENT	1.0	EA	9.2	M	30/11/2015	
82674	W1A		4		3550-107	PORTLAND ST	EOR - END OF ROAD	SUNFLOWER AV	0630	WATER SERVICE	REPLACEMENT	1.0	EA	9.2	M	30/11/2015	
82674	W1A		5		3550-107	PORTLAND ST	EOR - END OF ROAD	SUNFLOWER AV	0630	WATER SERVICE	REPLACEMENT	1.0	EA	9.2	M	30/11/2015	
82674	W1A		6		3550-107	PORTLAND ST	EOR - END OF ROAD	SUNFLOWER AV	0630	WATER SERVICE	REPLACEMENT	1.0	EA	9.1	M	30/11/2015	
82674	W1A		7		3550-107	PORTLAND ST	EOR - END OF ROAD	SUNFLOWER AV	0630	WATER SERVICE	REPLACEMENT	1.0	EA	9.1	M	30/11/2015	
82674	W1A		8		3550-107	PORTLAND ST	EOR - END OF ROAD	SUNFLOWER AV	0630	WATER SERVICE	REPLACEMENT	1.0	EA	9.1	M	30/11/2015	
82674	W1A		9		3550-107	PORTLAND ST	EOR - END OF ROAD	SUNFLOWER AV	0630	WATER SERVICE	REPLACEMENT	1.0	EA	9.1	M	30/11/2015	
82674	W1A				3550-107	PORTLAND ST	EOR - END OF ROAD	SUNFLOWER AV	0627	WATER BLOW OFF	FULL RETIREMENT	-1.0	PC			30/11/2015	

City of Kelowna

Current Practices for GIS Updates

1. Significant Amount of Work
2. Duplication of Effort
3. Data Transposition Errors

Further Complicated with Lack of **Data** and **Drawing Production** Standards!

MMCD (www.mmcd.net)

"Construction Recorded" Data Submissions

It all starts with the DESIGN!

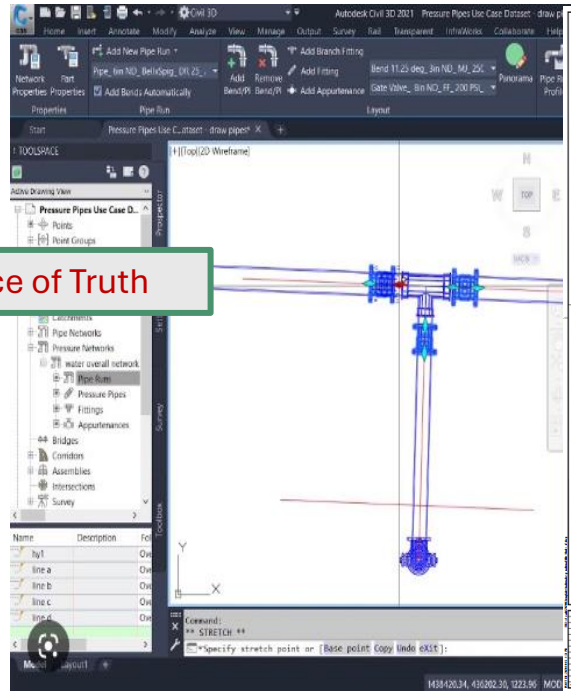
How Does It Work (IDS)?

“Construction Recorded” Data Submissions

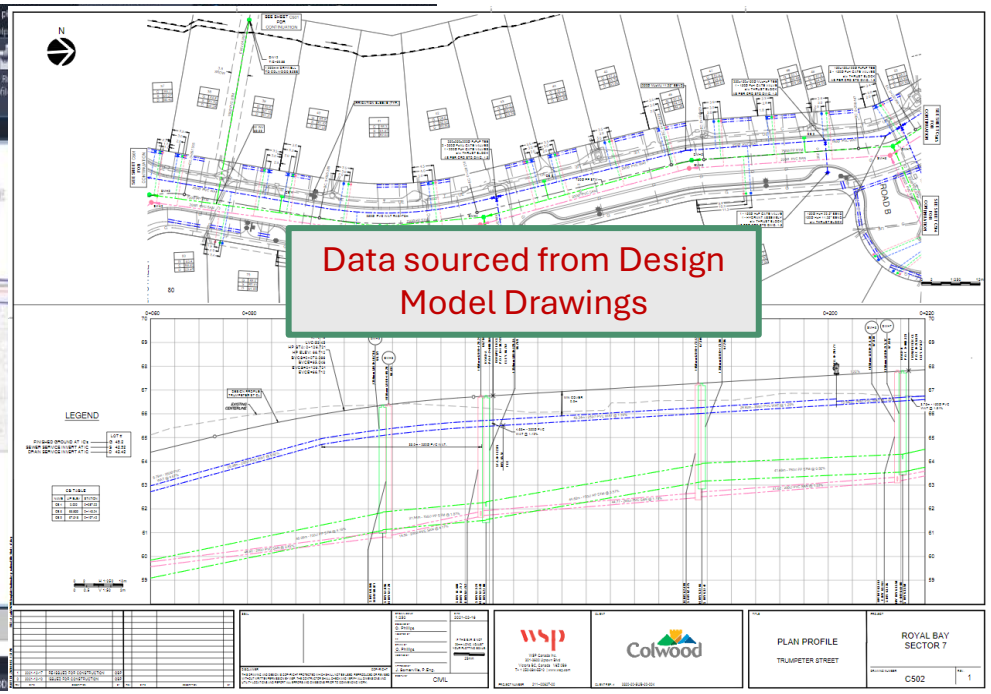
DESIGN MODEL DWGs
Design Modeler

PRODUCTION DWGs
Drawing Producer

Source of Truth

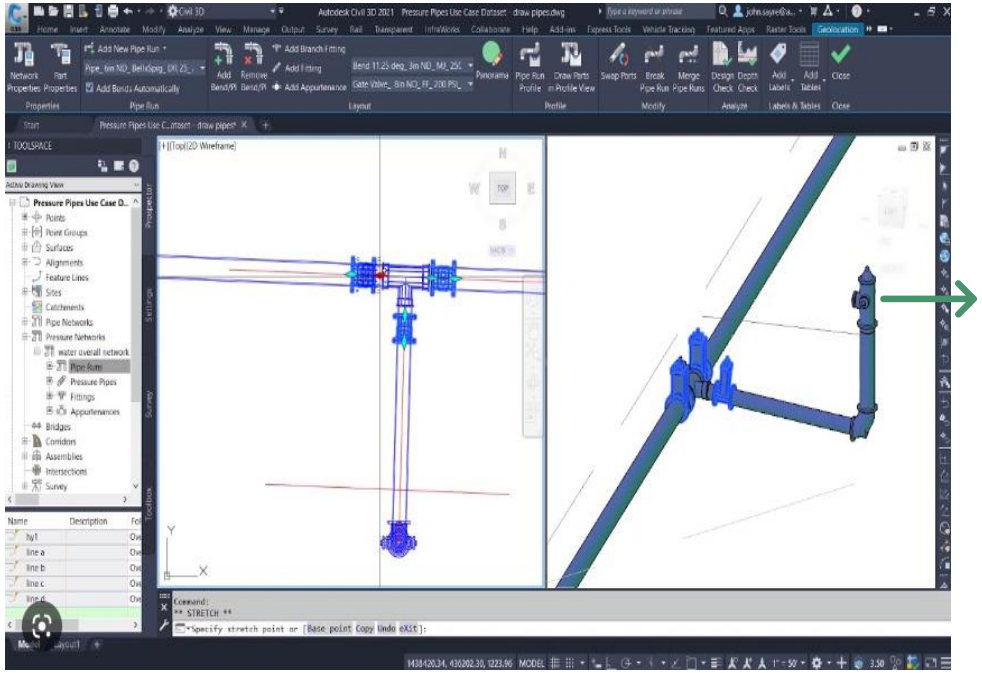


Data sourced from Design Model Drawings

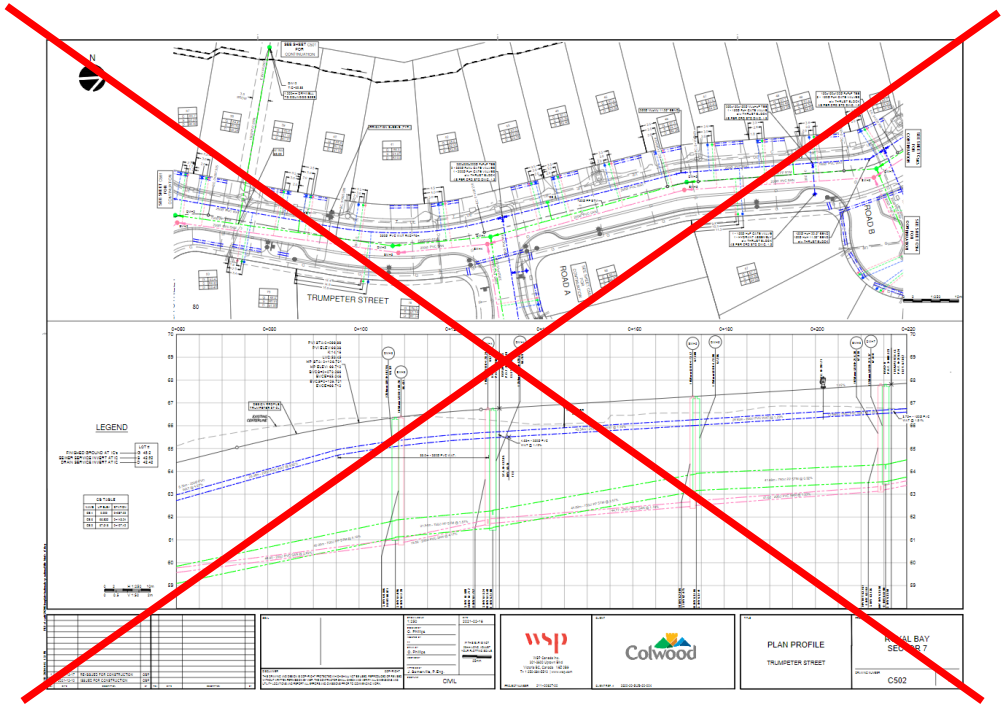


“Construction Recorded” Data Submissions

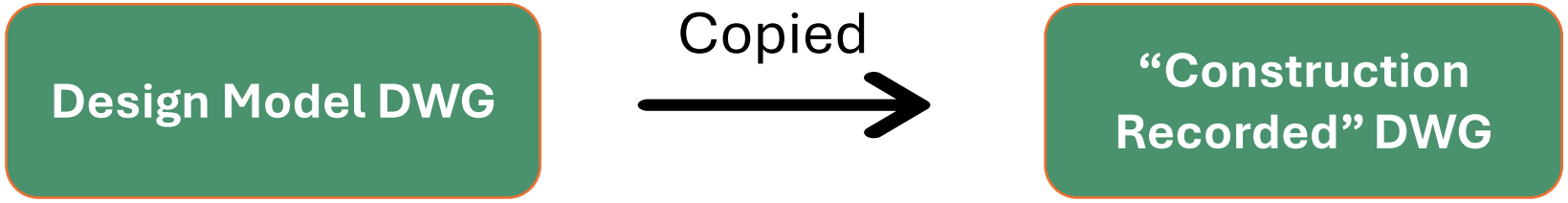
DESIGN MODEL DWGs
Design Modeler



PRODUCTION DWGs
Drawing Producer



“Construction Recorded” Data Submissions



Updated to…

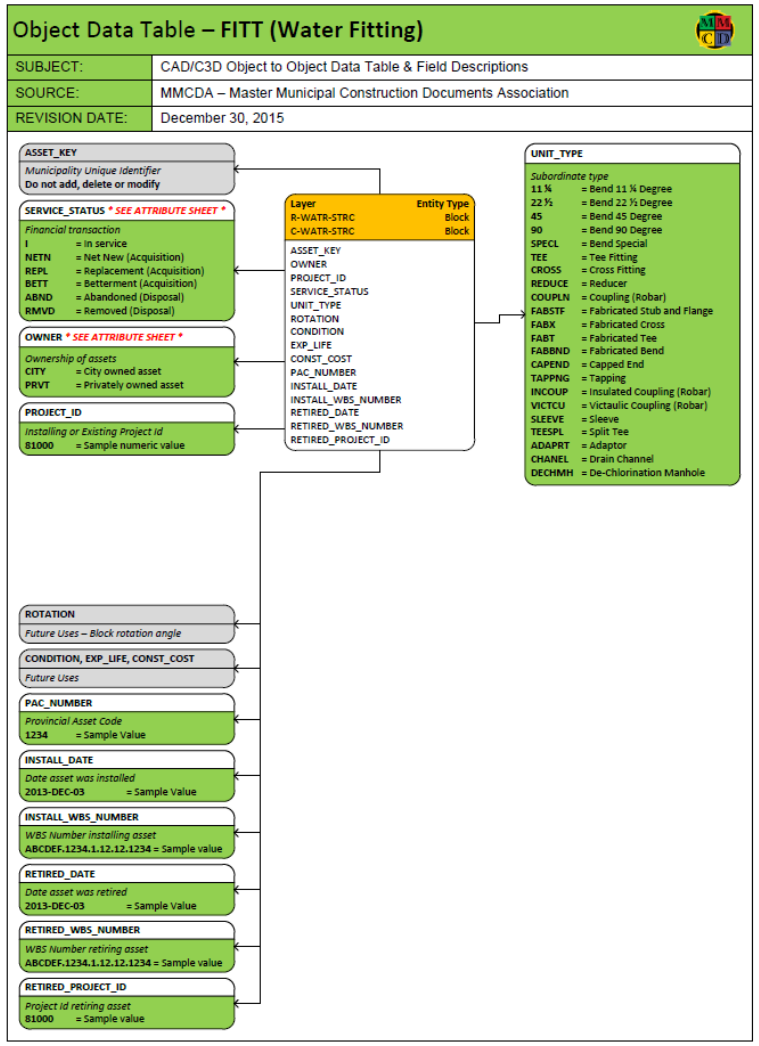
1. Remove title blocks and engineering annotations
2. Modify to reflect “as constructed” conditions
3. Add additional attribution

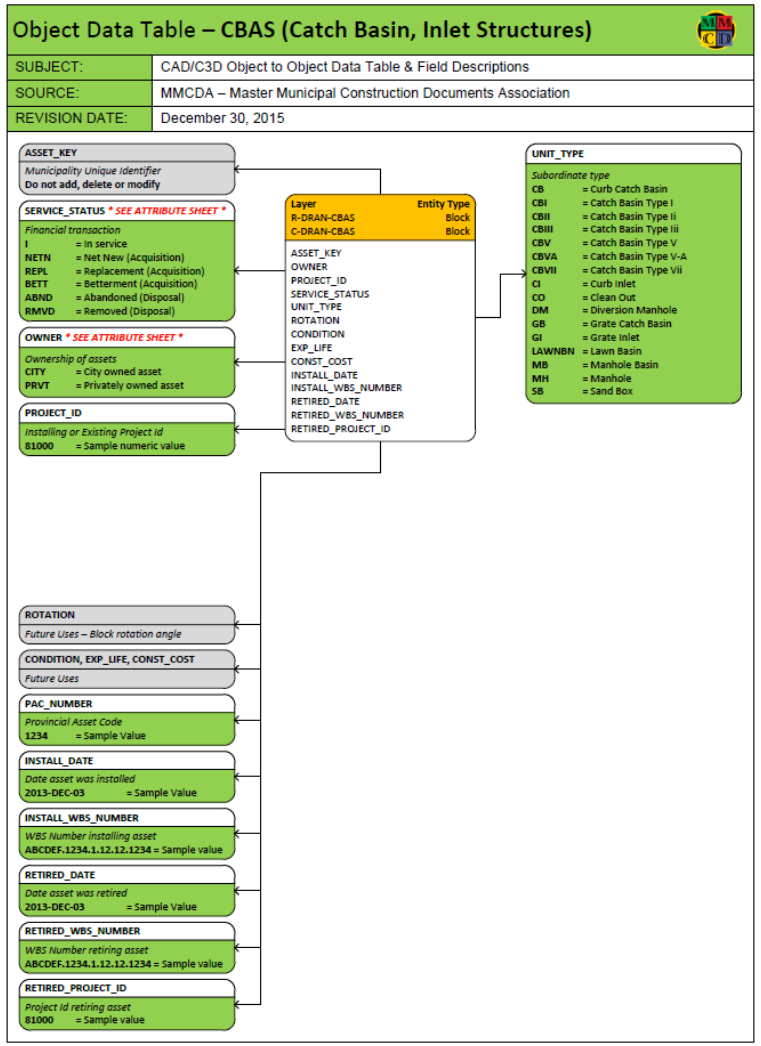
Data Delivery Specification
The “Asset Information Model”

Data Delivery Specification

1. List of Asset Types
2. List of Attributes for Each Asset Type
3. Allowable Attribute Values
4. Feature Representation (ACAD block, C3D objects?)

Data Delivery Specification

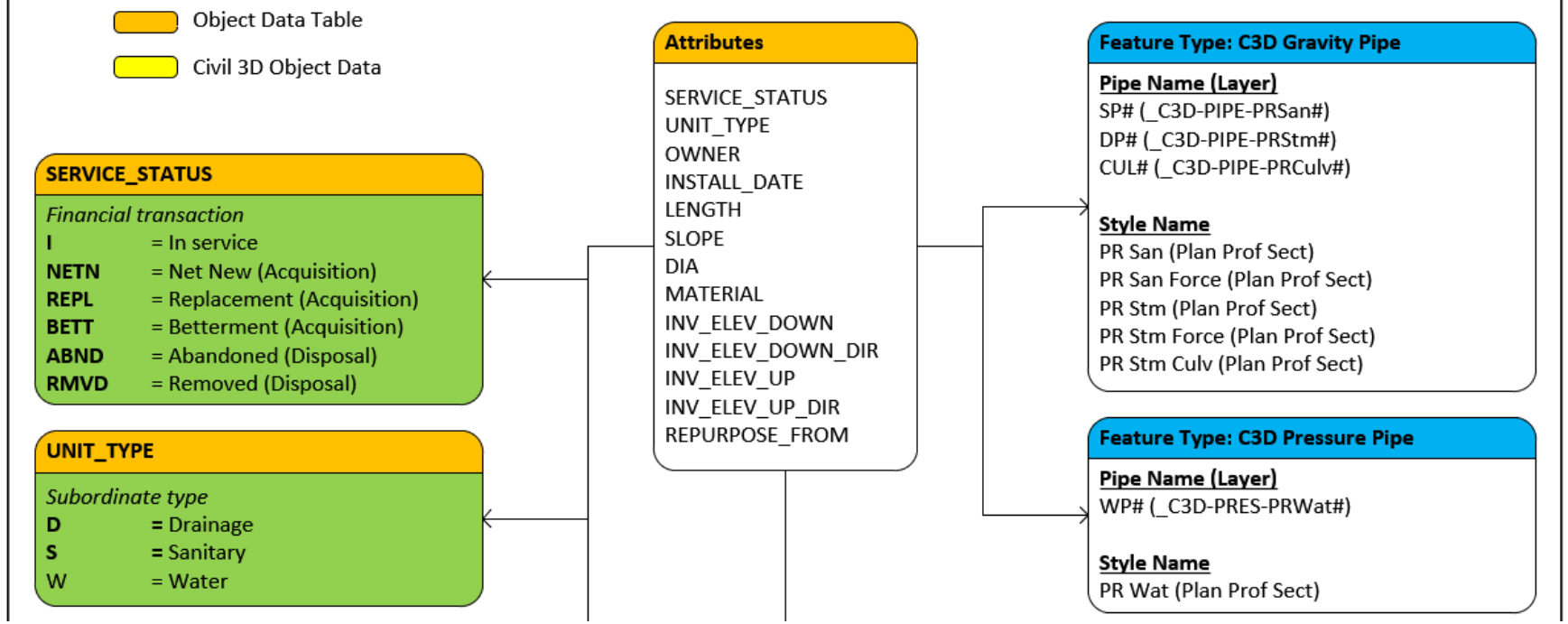




Data Delivery Specification

Object Data Table – **PIPE (Pipe Main, Culvert)**

SUBJECT:	Attribution and Feature Representation
SOURCE:	City of Kelowna GIS Department
REVISION DATE:	October 11, 2024

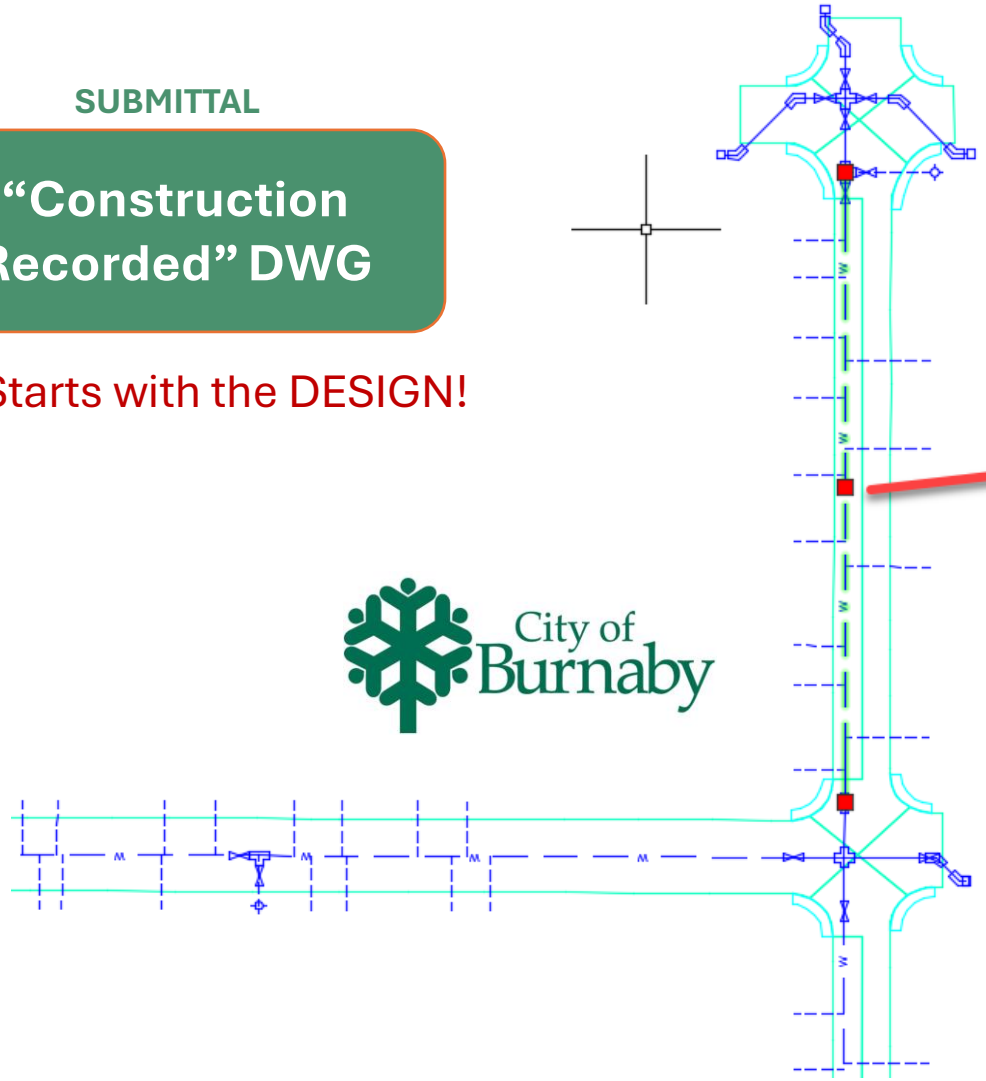


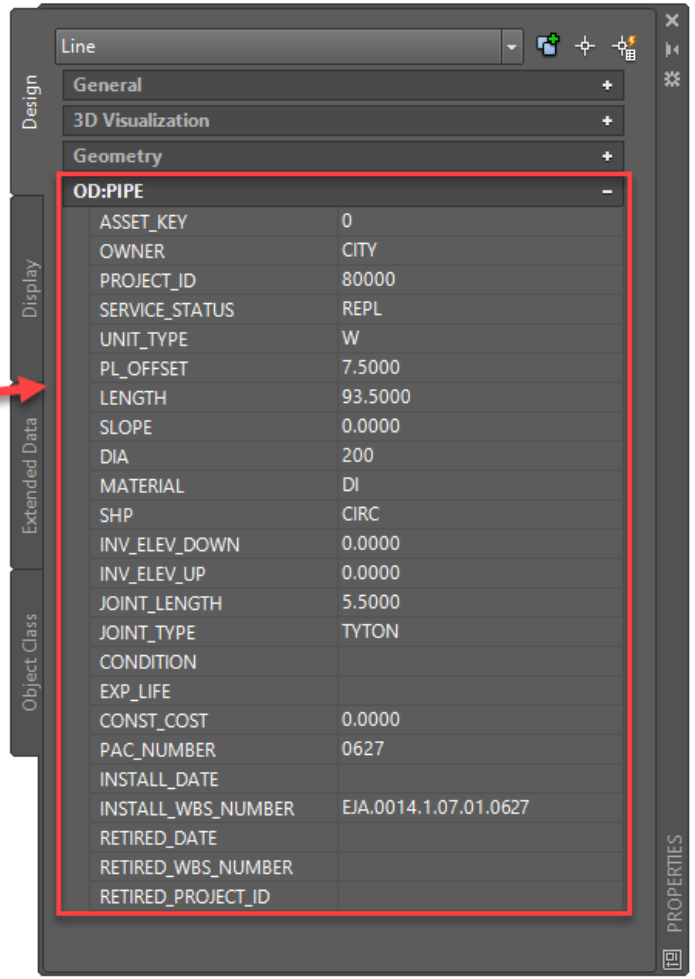
Data Delivery Specification

SUBMITTAL

“Construction Recorded” DWG

It All Starts with the DESIGN!





ASSET_KEY	0
OWNER	CITY
PROJECT_ID	80000
SERVICE_STATUS	REPL
UNIT_TYPE	W
PL_OFFSET	7.5000
LENGTH	93.5000
SLOPE	0.0000
DIA	200
MATERIAL	DI
SHP	CIRC
INV_ELEV_DOWN	0.0000
INV_ELEV_UP	0.0000
JOINT_LENGTH	5.5000
JOINT_TYPE	TYTON
CONDITION	
EXP_LIFE	
CONST_COST	0.0000
PAC_NUMBER	0627
INSTALL_DATE	
INSTALL_WBS_NUMBER	EJA.0014.1.07.01.0627
RETIRED_DATE	
RETIRED_WBS_NUMBER	
RETIRED_PROJECT_ID	

Data Consumption by GIS – MMCD IDS

Data Consumption by GIS

SAFE SOFTWARE®

Feature Manipulation Engine

Integration – 1990
BC has a Unique Opportunity

Why is This So Important?

Resilience…

It’s All About the Data!

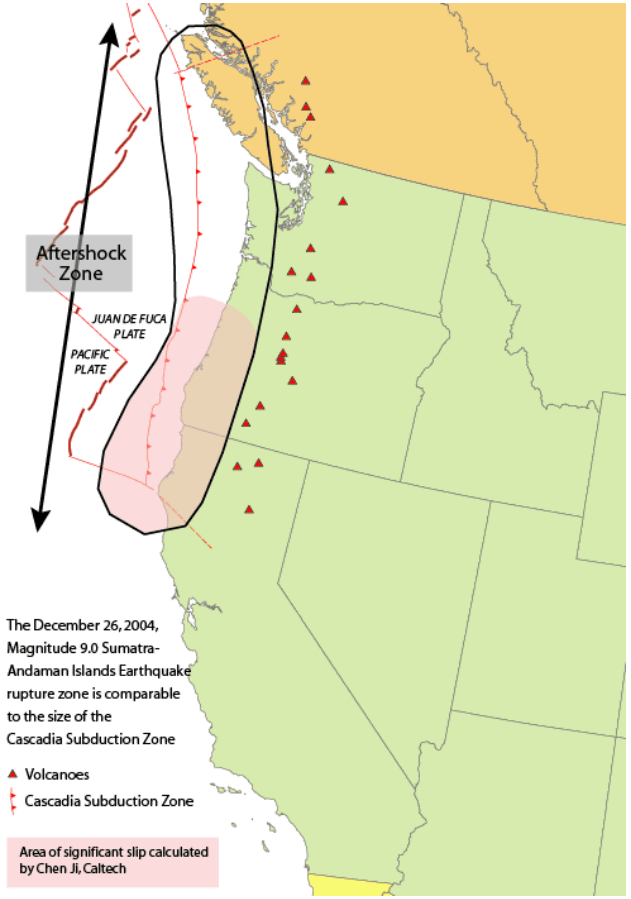
Why is this Important? Resilience!

1. Fort McMurray wildfires (2016): **$4 billion**
2. British Columbia flood (2021): **3.4 billiion**
3. Eastern ice storm (1998): **$2.3 billion**
4. Southern Alberta floods (2013): **$1.8 billion**
5. Alberta hailstorm (2020): **$1.2 billion**
6. Toronto flood (2013): **$1 billion**
7. Ontario-Quebec windstorm (2022): **$1 billion**
8. Hurricane Fiona (2022): **$800 million**
9. Toronto Flood (2005): **$780 million**
10. Ontario windstorm (2018): **$695 million**

Why is this Important? Resilience!

	Event Type	Place	Event Start Date	Fatalities	Injured / Infected	Evacuated	Estimated Total Cost
	Meteorological - Hydrological: Wildfire	Fort McMurray AB	April 30, 2016	2	Unknown	90000	$4,068,678,000
	Meteorological - Hydrological: Flood	Southern Alberta	June 19, 2013	4	0	100000	$2,715,742,000
	Meteorological - Hydrological: Flood	Southern Alberta and Saskatchewan	June 17, 2010	0	0	2065	$1,031,670,000
	Meteorological - Hydrological: Storms and Severe Thunderstorms	Calgary AB	September 7, 1991	0	0	0	$884,595,372
	Meteorological - Hydrological: Drought	Prairie Provinces	January 1, 1990	0	0	0	$581,891,545
	Meteorological - Hydrological: Wildfire	Slave Lake AB	May 15, 2011	Unknown	Unknown	12055	$581,099,000
	Meteorological - Hydrological: Drought	Prairie Provinces	January 1, 1992	0	0	0	$580,597,523
	Meteorological - Hydrological: Flood	Fort McMurray AB	July 30, 2016	Unknown	Unknown	Unknown	$462,528,000
	Meteorological - Hydrological: Storm - Unspecified / Other	Calgary AB	July 12, 2010	0	0	0	$400,000,000
	Meteorological - Hydrological: Wildfire	British Columbia	July 1, 2014	0	0	4500	$300,000,000

Why is this Important? Resilience!



est. year	interval (years)
1700 AD	> 322
1310 AD	390
810 AD	500
600 BC	430
400 AD	410
170 BC	570

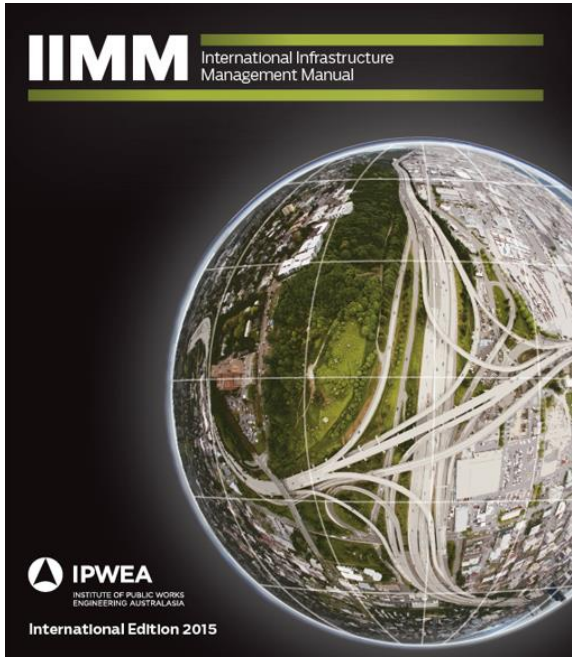
Megathrust Earthquake / Tsunami

Why is this Important? Resilience!

1. Data is an asset, and we should treat it as such
2. Resilience is synonymous with critical built asset reliability (vulnerability)
3. LG's must equip themselves with resilience-based strategies for less vulnerability
4. Innovations in technology and processes strengthen resilience
5. Rules applicable to financial information should be equally applicable to asset data

International Infrastructure Management Manual

“It will never be cheaper and more efficient to obtain complete and accurate asset data other than at the time of commissioning”



MMCD (www.mmcd.net)

Drivers For a Common Standard

Drivers for a Common Standard

1. **City of Burnaby (pop. 250,000)** – Finance and Accounting (PSAB 3150 and TCA)
2. **City of Prince George (pop. 75,000)** – Asset Management
3. **District of Saanich (pop. 120,000)** – Consistent Engineering Workflows
4. **City of Kelowna (pop. 150,000)** – Staffing Resources

Drivers for a Common Standard

Let alone the fact that most Local Government roles have a vested interest in correct and current infrastructure data…

Drivers for a Common Standard

What is the cost of outdated, missing or incomplete information?

- Finance Departments can't do their work (TCA – Tangible Capital Assets)
- Inability to plan and react (asset management)
- Difficulties in working with inconsistent production standards
- Inability for engineers / public officials to do their work properly
- Construction mistakes


City of Kelowna

The City of Kelowna - Implementation

1. Cross Departmental Management Support
    - GIS, Infrastructure Delivery, Development Services and Asset Management
2. Asset Management Administrative Policy

POLICY # AM-01

City of Kelowna
1435 Water Street
Kelowna, BC V1Y 1J4
250 469-8500
kelowna.ca

Administration Policy

Corporate Asset Management

Contact Department: Infrastructure Division

Guiding Principle

The City of Kelowna provides a wide range of services to the community that require the ownership and responsible operation, maintenance and rehabilitation of physical assets including land, buildings, equipment, information technology, communication, transportation, drainage, sewer and water.

Asset Management (AM) is an integrated approach to delivering value to the community through the effective management of existing and new infrastructure assets. The intent is to ensure public safety, maximize benefits, reduce risk of asset failure and provide satisfactory levels of service to the community in a sustainable manner that does not compromise the ability of future generations to meet their own needs.

Purpose

To articulate Senior Managements commitment to asset management and provide policy statements to guide staff in carrying out corporate asset management to achieve sustainable service delivery.

Scope and Application

This policy applies to all staff using or managing infrastructure assets to provide services for the City.

The asset management program is comprised of 9 asset groups each with an assigned asset owner:

1. Water Utility,
2. Wastewater Utility,
3. Storm Drainage,
4. Solid Waste,
5. Transportation,
6. Buildings and Facilities,
7. Parks,
8. Vehicles & Equipment,
9. IT and Communication Infrastructure

The City of Kelowna - Implementation

1. Cross Departmental Management Support
    - GIS, Infrastructure Delivery, Development Services and Asset Management
2. Asset Management Administrative Policy
3. Data Delivery Administrative Policy

ADMINISTRATIVE POLICY - 265

Engineering Drawing and Data Submission Requirements

APPROVED DATE: 2025-01-01

PURPOSE

The purpose of this Policy is to specify the minimum standards and requirements the City will accept for the submission of designs, drawings, and data for infrastructure and land development engineering work(s) and services regulated under Subdivision, Development & Servicing Bylaw No. 7900. The document will be reviewed and updated annually or as needed.

The following table summarizes the history and revisions of the document.

Date	Version	Author	Comments
March 15, 2024	1.0	Nelson Chapman	Revised to incorporate MMCD IDS standards

POLICY SCOPE

This Policy applies to all submissions of infrastructure and land development engineering drawings and data relating to works and services regulated under Subdivision, Development & Servicing Bylaw No. 7900.

The City Engineer or designate will review each submission for conformance. This Policy outlines high level requirements for all project submissions to the City.

Additional detail on drawings and submission requirements can be found in the City of Kelowna MMCD Infrastructure Data Standards Manual.

BACKGROUND

This Policy replaces Council Policy 265: Engineering Drawing Submission Requirements.

Policies are Corporate Documents that are Endorsed by the Executive

The City of Kelowna - Implementation

1. Cross Departmental Management Support
    - GIS, Infrastructure Delivery, Development Services and Asset Management
2. Asset Management Administrative Policy
3. Data Delivery Administrative Policy
4. Capital Infrastructure Contracts
5. Land Development Completion Certificates (HC As Built's now, Data Later)

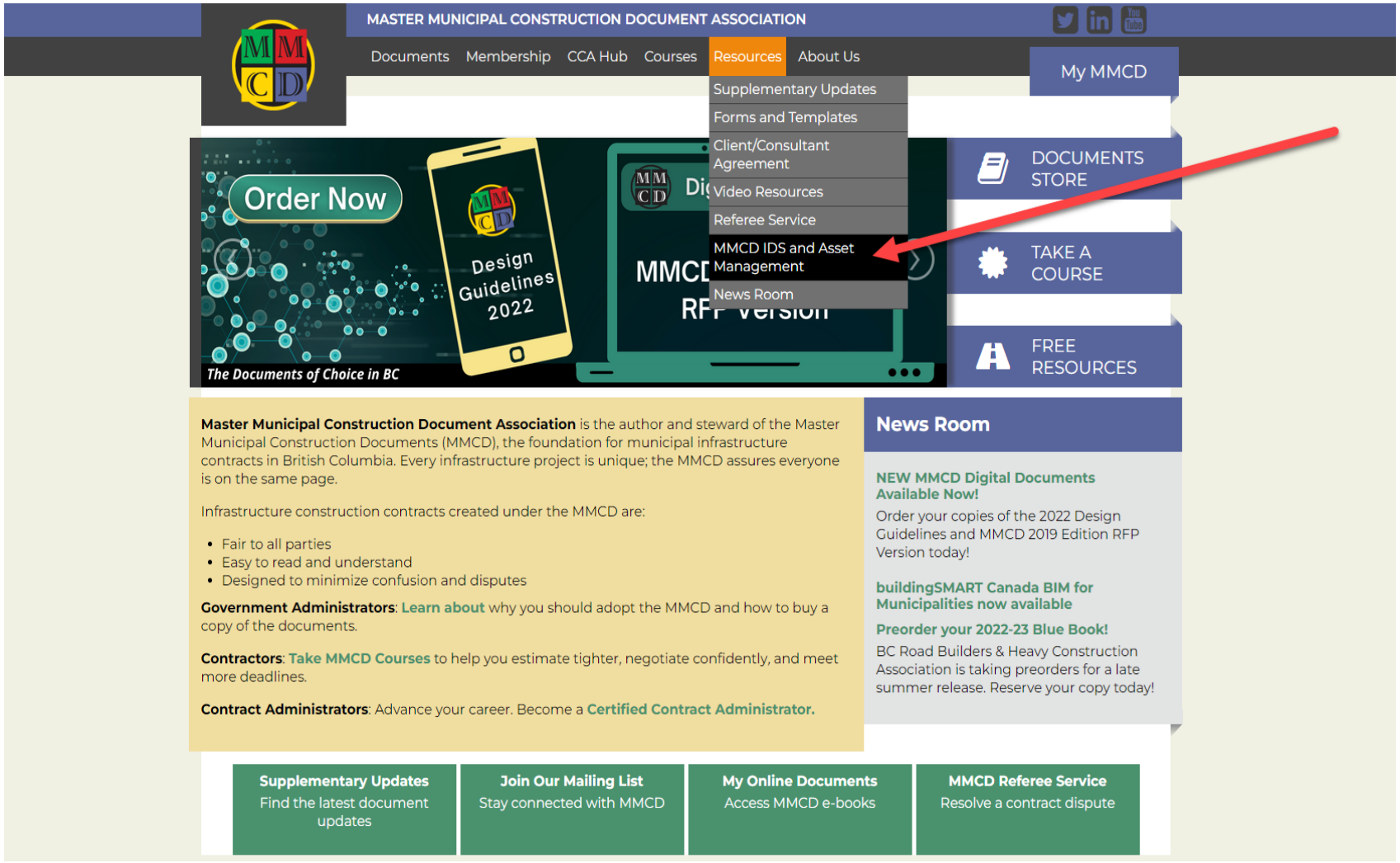
The City of Kelowna - Implementation

1. Phased Approach
    - P1 - Set precedent for standardization (use the tools provided)
    - P2 – Detailed data delivery specification
    - P3 – Implementation of detailed Data Delivery Specification

The City of Kelowna - Implementation

2. Stakeholder Engagement
    - Training and Support
    - Surveys
    - Stakeholder Meetings

www.mmcd.net



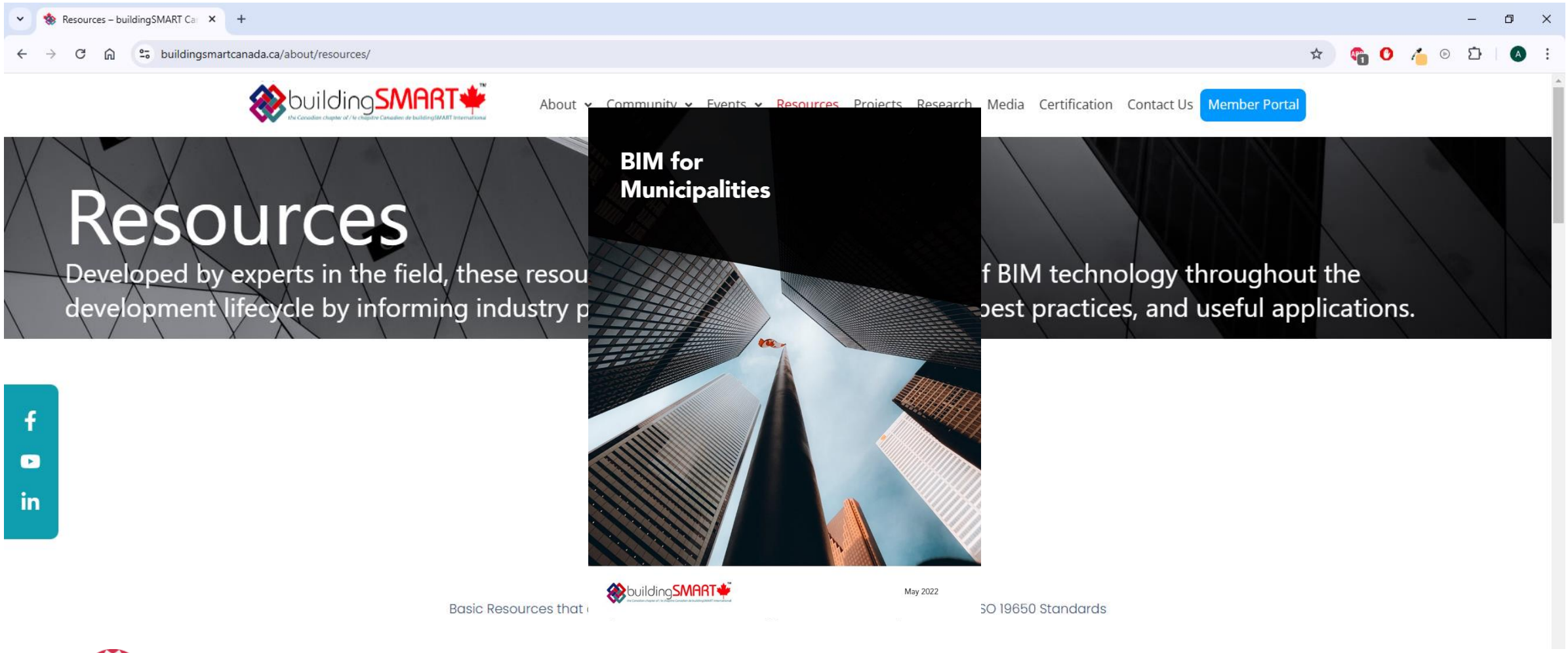
City of Kelowna

BIM

BIM – Building Information Modeling

1. Founded with “vertical” assets
2. Digitalization of the “built asset” industry
3. **Processes, public policy and technologies for collaboration on infrastructure procurement and lifecycle management**
4. Data preservation – planning, detailed deign, construction, records
5. Promoting open, international standards and solutions
6. BIM For Municipalities White Paper
   - Asset Management
   - CIM – City Information Model (GIS), or a “Digital Twin”
   - Simulate, optimize, predict, and make decisions through AI

www.buildingsmartcanada.ca



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