



Master Municipal Construction Documents Association

Infrastructure Asset Data
Submission Specifications and
Procedures

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1. Introduction and Overview

This document describes technical standards and procedures for providing the Local Government Engineering and Finance Departments with data representing existing and new infrastructure assets.

The data required from infrastructure data submissions is required by Local Governments to enable efficient lifecycle management practices for infrastructure and to account for infrastructure assets on annual financial statements.

2. Technical Background

The MMCD Infrastructure Asset Data Exchange standards and procedures outlined in this document were developed to facilitate the transfer of infrastructure data to Local Governments upon completion of both design and construction project phases. Data is not only required for newly constructed infrastructure assets, but also for existing infrastructure that has been affected by the project.

Local Governments that adopt the MMCD Municipal CAD Standard will require consultants to use the drawing templates when working on infrastructure design projects. AutoCAD Map 3D object data functionality has been added to the MMCD Municipal CAD Standard to accommodate asset attribution.

AutoCAD Civil 3D can be used to design sanitary sewer, storm drainage and watermain pipe networks but is not required. The benefit in using AutoCAD Civil 3D is reduced physical property and material data entry in the AutoCAD Map 3D object data tables.

2.1. Infrastructure Project Data

The 4 sets of data created for a typical infrastructure project are summarized in the following bullets:

1. **Existing Recorded Assets (by City)** – existing infrastructure asset data sourced from Local Government GIS, attributed using AutoCAD Map 3D object data and placed on layers beginning with **R-*** that reference the same layer groups as in the MMCD C3D drawing template
2. **Existing Surveyed Assets (by Consultant)** – existing infrastructure asset data sourced from consultants pre-engineering topographic surveys in AutoCAD Civil 3D drawing using **V-*** layers from the MMCD C3D drawing template
3. **Proposed Asset Design (by Consultant)** – proposed asset design data created by consultants in AutoCAD Civil 3D drawing using **C-*** layers in the MMCD C3D drawing template
4. **Construction Recorded Assets (by Consultant)** – construction asset data created by consultants in AutoCAD Civil 3D drawing using **C-*** layers

Consultants shall copy the design drawing (from 3, above) and use the copied drawing to modify design data to reflect constructed conditions. This includes moving assets to their constructed location and to assign AutoCAD Map 3D object data tables to assets.

3. Asset Data Submission Standards

The following sections summarize the MMCD Local Government asset data submission standards.

3.1. Project Deliverables Summary

This section summarizes the specific items to be delivered by design consultants working on construction projects authorized by the Local Government.

Project deliverables consist of the existing recorded assets drawing, a construction recorded assets drawing and a LandXML file containing pipe network data for new sanitary, storm and watermain data modeled as pipe networks using AutoCAD Civil 3D.

The benefit to consultants using AutoCAD Civil 3D pipe networks (pipe and structure objects) to model sanitary, storm and watermain infrastructure is that the physical properties of pipes and structures are extracted from the LandXML file created from AutoCAD Civil 3D pipe networks. Using AutoCAD Civil 3D objects means that consultants are not required to enter physical properties in the AutoCAD Map 3D object data tables. Sanitary, storm and watermain designs represented with AutoCAD polylines and blocks require consultants to enter physical properties for pipes and structures in the AutoCAD Map 3D object data tables.

3.1.1. Pre-Construction

The following list of deliverables is to be provided by the consultant to the Local Government once tender design drawings are approved for construction:

1. **Existing Recorded Assets Drawing** – at project start, the Local Government provides consultants with an AutoCAD 2015 drawing file (DWG) containing existing recorded asset data attributed using AutoCAD Map 3D object data tables. The object data tables in the existing recorded assets drawing are updated by the consultant to reflect the new lifecycle state of existing assets for financial disposal.
2. **Design Recorded Assets Drawing** – design drawing is used to record details of newly designed infrastructure assets. Attribution of new assets is completed using AutoCAD Map 3D object data tables. When AutoCAD Civil 3D is used to model sanitary, storm and water infrastructure, pipe and structure physical properties are extracted from the objects via the LandXML file. If pipe networks are modeled using AutoCAD then physical properties are captured using AutoCAD Map 3D object data tables.
3. **LandXML File for Pipe Networks** – a LandXML containing pipe network data is required to provide physical properties for sanitary, storm and watermain modeled using AutoCAD Civil 3D pipe networks. Using AutoCAD Civil 3D to design pipe networks means that consultants are not required to enter pipe and structure physical properties in the AutoCAD Map 3D object data tables.

All drawings are to be provided in AutoCAD or AutoCAD Civil 3D release 2015.

3.1.2. Post-Construction

The following list of deliverables is to be provided by the consultant to the Local Government once construction is complete:

1. **Existing Recorded Assets Drawing** – at project start, the Local Government will provide consultants with an AutoCAD 2015 drawing file (DWG) containing existing recorded asset data attributed using AutoCAD Map 3D object data tables. The object data tables in the existing recorded assets drawing are updated by the consultant, after construction, to reflect the new lifecycle state of existing assets.
2. **Existing Survey Assets Drawing** – this drawing contains the pre-engineering base plan and existing ground surface model, and will be used by the Local Government to validate the location of existing assets in the GIS that are not affected by the project.

3. **Construction Recorded Assets Drawing** – the construction recorded assets drawing is created by copying the design model drawing and updating the drawing to reflect as-constructed conditions.
4. **LandXML File for Pipe Networks** – a LandXML containing pipe network data is required to provide physical properties for sanitary, storm and watermain modeled using AutoCAD Civil 3D pipe networks. Using AutoCAD Civil 3D to design pipe networks means that consultants are not required to enter pipe and structure physical properties in the AutoCAD Map 3D object data tables.

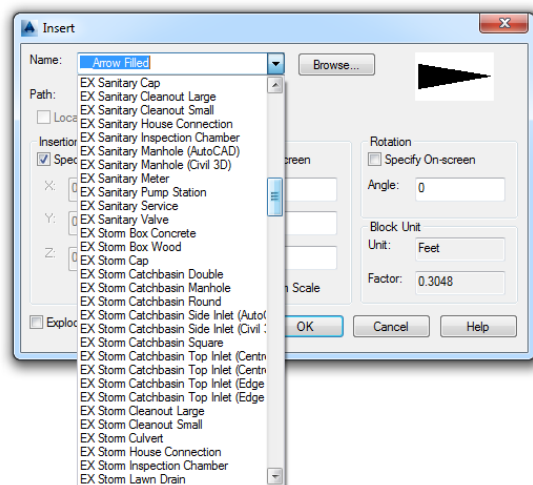
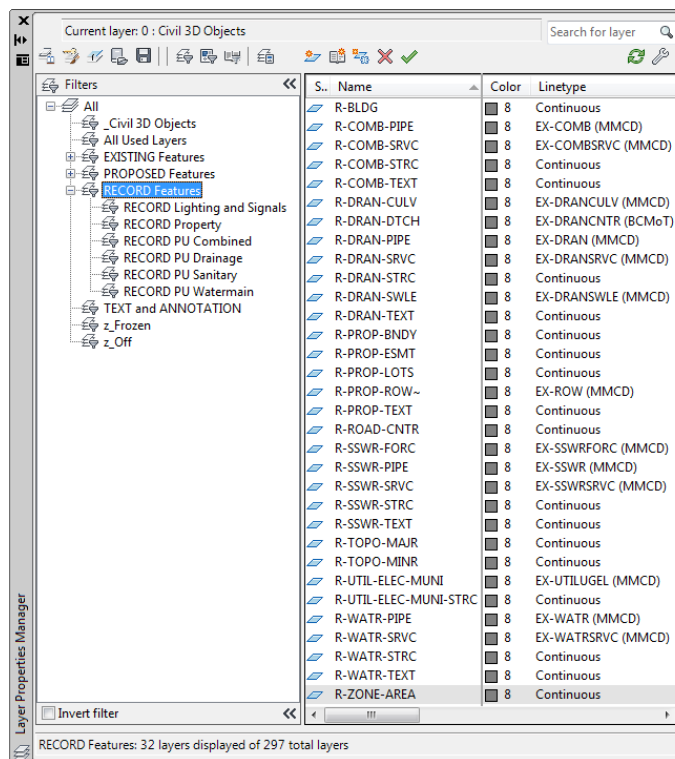
All drawings are to be provided in AutoCAD or AutoCAD Civil 3D release 2015.

The existing recorded assets drawing provided at project initiation by the Local Government is created using a template created from the MMCD Municipal CAD Standard containing standardized components required to show existing recorded assets. These standardized components include the R-* layers, block definitions for existing features and text styles. The construction recorded assets drawing created by the consultant is also created using the MMCD Municipal CAD Standard.

3.2. Data Provided by Local Government at Project Start

At the beginning of the infrastructure design project, the Local Government will provide consultants with a pre-design data package containing information on existing recorded assets. In addition to a high resolution aerial photograph for the project area, the Local Government will provide an existing recorded assets drawing with AutoCAD Map 3D object data attached to infrastructure, road and property features represented with AutoCAD polylines and blocks.

The existing recorded assets drawing is created from the MMCD drawing template file. Layers in the existing recorded assets drawing reference the same NCS (National CAD Standard) layer structure used for design, however a **R-*** prefix modifier is used to identify layers containing *existing recorded* data. All record **R-*** layers are assigned colour grey (8) and reference the same linetypes used by the existing survey layers **V-***. The block names in the existing recorded assets drawing reference the same blocks used in the Survey Recorded drawing. The existing recorded assets drawing does not contain AutoCAD Civil 3D data. Record data layer names and some block names are shown in the following illustration.



Note: Existing recorded infrastructure data provided by the Local Government at project initiation is not reliable for detailed design project activity. Consultants, therefore, are required to supplement pre-engineering existing recorded asset data with field data collected using topographic survey data collection and reduction practices.

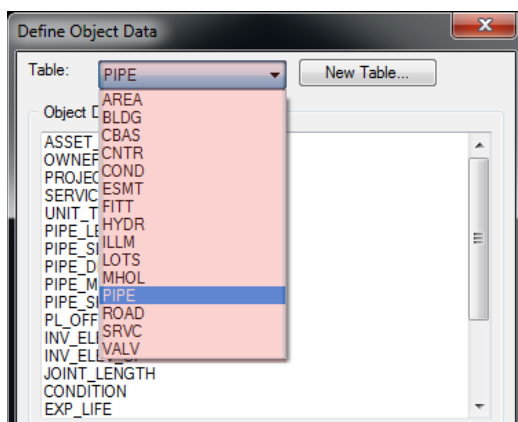
The object data tables in the MMCD Civil 3D template, and a brief description, are summarized in the following bullets:

- **AREA** – properties (information purposes only)
- **BASE** - road and lane structure granular (construction recorded assets only)
- **BLDG** – buildings (information purposes only)
- **CBAS** – catch basins (existing recorded and construction recorded assets)
- **CNTR** – road centrelines (information purposes only)
- **ESMT** – easements (information purposes only)
- **FITT** – watermain fittings (existing recorded and construction recorded assets)
- **HYDR** – fire hydrants (existing recorded and construction recorded assets)
- **ILLM** – illumination (existing and construction recorded assets)
- **LOTS** – individual lots (information purposes only)
- **MHOL** – sanitary, storm and combined manholes (existing and construction recorded assets)
- **PAVE** – road and lane top pavement structure (construction recorded assets only)
- **PIPE** – sanitary, storm, combined and water pipe (existing and construction recorded assets)
- **SRVC** – sanitary, storm and watermain services (existing and construction recorded assets)

- **TOPO** – topography contours (information purposes only)
- **VALV** – sanitary and watermain valves (existing recorded and construction recorded assets)
- **WALK** – sidewalk, pathways and trails (construction recorded assets only)
- **WBDY** – waterbodies (information purposes only)
- **WWAY** – waterways (construction recorded assets only)

Asset object data tables are generic and not tied to any one specific discipline. For instance, the PIPE object data table can apply to sanitary, storm and water pipe. Similarly, the MHOL object data table can apply to sanitary and storm manholes.

The object data tables in the existing recorded assets drawing are the same tables in the design and construction recorded assets drawings, and are shown in the following illustration.



Ribbon Command Reference

Workspace: Planning and Analysis

Ribbon Tab: Map Setup

Panel: Attribute Data

Command: Define Object Data

Command Line Reference

Command Line: adedefdata

The AREA, BLDG, CNTR, ESMT and LOTS object data tables are only used in the existing recorded assets drawing and are not used in the design or construction recorded assets drawing.

The existing recorded assets drawing is created using a NAD83 Zone 10N grid coordinate zone. Consultants shall apply a grid to ground scale factor (XY) when attaching the existing recorded assets drawing as an AutoCAD external reference to the design drawings created at a ground level coordinate system.

3.3. Object Data Tables

AutoCAD Map 3D object data tables are defined in the MMCD drawing template, and are used to attribute existing recorded, design and construction recorded assets. The following sections describe the object data tables for tracked assets.

3.3.1. Object Data Table - BASE

Use AutoCAD Map 3D object data table BASE to assign attributes to closed AutoCAD polylines representing constructed BASE assets. The closed polyline is used for hatching different types of base material (Net New road requiring base material or structural patch reconstruction) and is assigned to the layer as shown in the following table.

Drawing	Layer Name
Construction Recorded Assets	C-ROAD-BASE

Construction Recorded Assets	C-LANE-BASE
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Refer to the object data table BASE in the Appendices for a complete list of attributes and their allowable values.

3.3.2. Object Data Table - CBAS

Use AutoCAD Map 3D object data table CBAS to assign attributes to existing recorded drainage catch basins represented with AutoCAD blocks, and construction recorded drainage catch basins represented with AutoCAD blocks or Civil 3D structures.

Catch basin block and layer names are shown in the following table.

Drawing	Block Name	Layer Name
Existing Recorded Assets	EX Storm Catchbasin Double	R-DRAN-CBAS
Existing Recorded Assets	EX Storm Catchbasin Round	R-DRAN-CBAS
Existing Recorded Assets	EX Storm Catchbasin Side Inlet	R-DRAN-CBAS
Existing Recorded Assets	EX Storm Catchbasin Top Inlet	R-DRAN-CBAS
Existing Recorded Assets	EX Storm Catchbasin Square	R-DRAN-CBAS
Existing Recorded Assets	EX Storm Lawn Drain	R-DRAN-CBAS
Construction Recorded Assets	PR Storm Catchbasin Double	C-DRAN-CBAS
Construction Recorded Assets	PR Storm Catchbasin Side Inlet	C-DRAN-CBAS
Construction Recorded Assets	PR Storm Catchbasin Top Inlet	C-DRAN-CBAS
Construction Recorded Assets	PR Storm Lawn Drain	C-DRAN-CBAS

Refer to the object data table CBAS in the Appendices for a complete list of attributes and their allowable values.

3.3.3. Object Data Table - FITT

Use AutoCAD Map 3D object data table FITT to assign attributes to existing recorded and construction recorded water fittings represented with AutoCAD blocks.

Catch basin block and layer names are show in the following table.

Drawing	Block Name	Layer Name
Existing Recorded Assets	EX Water Air Valve	R-WATR-STRC
Existing Recorded Assets	EX Water Blowoff	R-WATR-STRC
Existing Recorded Assets	Ex Water Cap	R-WATR-STRC
Existing Recorded Assets	EX Water Chamber	R-WATR-STRC
Existing Recorded Assets	EX Water Flush	R-WATR-STRC
Existing Recorded Assets	EX Water Irr Control Valve	R-WATR-STRC
Existing Recorded Assets	EX Water Manhole	R-WATR-STRC
Existing Recorded Assets	EX Water Meter	R-WATR-STRC
Existing Recorded Assets	EX Water Service	R-WATR-STRC

Existing Recorded Assets	EX Water Sprinkler Head	R-WATR-STRC
Existing Recorded Assets	EX Water Valve	R-WATR-STRC
Existing Recorded Assets	EX Water Vent	R-WATR-STRC
Construction Recorded Assets	PR Water Air Valve	C-WATR-STRC
Construction Recorded Assets	PR Water Bends	C-WATR-STRC
Construction Recorded Assets	PR Water Blowoff	C-WATR-STRC
Construction Recorded Assets	PR Water Cap	C-WATR-STRC
Construction Recorded Assets	PR Water Cross	C-WATR-STRC
Construction Recorded Assets	PR Water Flush	C-WATR-STRC
Construction Recorded Assets	PR Water Hub Flange	C-WATR-STRC
Construction Recorded Assets	PR Water Manhole	C-WATR-STRC
Construction Recorded Assets	PR Water Meter	C-WATR-STRC
Construction Recorded Assets	PR Water Reducer	C-WATR-STRC
Construction Recorded Assets	PR Water Robar	C-WATR-STRC
Construction Recorded Assets	PR Water Service	C-WATR-STRC
Construction Recorded Assets	PR Water Tee	C-WATR-STRC
Construction Recorded Assets	PR Water Thrust Block	C-WATR-STRC
Construction Recorded Assets	PR Water Valve	C-WATR-STRC
Construction Recorded Assets	PR Water Valve Air	C-WATR-STRC

Refer to the object data table FITT in the Appendices for a complete list of attributes and their allowable values.

3.3.4. Object Data Table - HYDR

Use AutoCAD Map 3D object data table HYDR to assign attributes to existing and construction recorded fire hydrants represented with AutoCAD blocks.

The fire hydrant block and layer names are shown in the following table.

Drawing	Block Name	Layer Name
Existing Recorded Assets	EX Water Hydrant	R-WATR-HYDR
Construction Recorded Assets	PR Water Hydrant	C-WATR-HYDR

Refer to the object data table HYDR in the Appendices for a complete list of attributes and their allowable values.

3.3.5. Object Data Table - ILLM

Use AutoCAD Map 3D object data table ILLM to assign attributes to existing recorded and construction recorded luminaire fixtures represented with AutoCAD blocks.

The luminaire block and layer names are shown in the following table.

Drawing	Block Name	Layer Name
Existing Recorded Assets	EX Utility Lighting Davit Luminaire Pole	R-ILLM-STRC
Existing Recorded Assets	Ex Utility Lighting Ground Light	R-ILLM-STRC
Existing Recorded Assets	EX Utility Lighting Post Top Luminaire Pole	R-ILLM-STRC
Construction Recorded Assets	PR Utility Lighting Davit Luminaire Pole	C-ILLM-STRC
Construction Recorded Assets	PR Utility Lighting Ground Light	C-ILLM-STRC
Construction Recorded Assets	PR Utility Lighting Post Top Luminaire Pole	C-ILLM-STRC

Refer to the object data table ILLM in the Appendices for a complete list of attributes and their allowable values.

3.3.6. Object Data Table - MHOL

Use the AutoCAD Map 3D object data table MHOL to assign attributes to existing recorded combined, storm and sanitary manholes represented with AutoCAD block, and construction recorded combined, storm and sanitary manhole represented with AutoCAD block or AutoCAD Civil 3D structure objects.

AutoCAD Civil 3D object data for construction recorded structures is sourced from the LandXML file for physical property and material data. If AutoCAD Civil 3D is not used to represent construction recorded manholes then AutoCAD Map 3D object data tables must be populated with the required physical properties.

Manhole block and layer names are shown in the following table.

Drawing	Block Name	Layer Name
Existing Recorded Assets	EX Combined Manhole	R-COMB-STRC
Existing Recorded Assets	EX Storm Manhole	R-DRAN-STRC
Existing Recorded Assets	EX Sanitary Manhole	R-SSWR-STRC
Construction Recorded Assets	PR Combined Manhole	C-COMB-STRC
Construction Recorded Assets	PR Storm Manhole	C-DRAN-STRC
Construction Recorded Assets	PR Sanitary Manhole	C-SSWR-STRC

Refer to the object data table MHOL in the Appendices for a complete list of attributes and their allowable values.

3.3.7. Object Data Table - PAVE

Use AutoCAD Map 3D object data table ROAD to assign attributes to closed AutoCAD polylines representing construction recorded road assets. The closed polyline is used for hatching different types of paving (resurfacing, full depth reconstruction of upper and lower course) and is assigned to the layer as shown in the following table.

Edge layer names for closed polyline placement are shown in the following table.

Drawing	Layer Name
Construction Recorded Assets	C-ROAD-EDGE
Construction Recorded Assets	C-LANE-EDGE

Refer to the object data table ROAD in the Appendices for a complete list of attributes and their allowable values.

3.3.8. Object Data Table - PIPE

Use the AutoCAD Map 3D object data table PIPE to assign attributes to existing recorded combined, sanitary, storm, water pipes conduit represented with AutoCAD polylines, and construction recorded sanitary, storm, water pipes and conduit represented with AutoCAD polylines or AutoCAD Civil 3D pipe objects.

AutoCAD Civil 3D object data for constructed pipes is sourced from the LandXML file for physical property and material data. If AutoCAD Civil 3D is not used to represent construction recorded pipes then AutoCAD Map 3D object data tables must be populated with the required physical properties.

Pipe layer names for polyline placement are shown in the following table.

Drawing	Layer Name
Existing Recorded Assets	R-COMB-PIPE
Existing Recorded Assets	R-DRAN-PIPE
Existing Recorded Assets	R-SSWR-PIPE
Existing Recorded Assets	R-WATR-PIPE
Existing Recorded Assets	R-ILLM-PIPE
Construction Recorded Assets	C-DRAN-PIPE
Construction Recorded Assets	C-SSWR-PIPE
Construction Recorded Assets	C-WATR-PIPE
Construction Recorded Assets	C-ILLM-PIPE

Refer to the object data table PIPE in the Appendices for a complete list of attributes and their allowable values.

3.3.9. Object Data Table - SRVC

Use the AutoCAD Map 3D object data table SRVC to assign attributes to existing recorded and construction recorded sanitary, storm and water pipe service lines represented with AutoCAD polylines. Note that the service attributes are attached to the service polyline and not the service block.

Service layer names for polyline placement are shown in the following table.

Drawing	Layer Name
Existing Recorded Assets	R-COMB-SRVC
Existing Recorded Assets	R-DRAN-CBAS-LEAD
Existing Recorded Assets	R-DRAN-SRVC
Existing Recorded Assets	R-SSWR-SRVC
Existing Recorded Assets	R-WATR-HYDR-LEAD
Existing Recorded Assets	R-WATR-SRVC
Constructed Recorded Assets	C-DRAN-CBAS-LEAD

Construction Recorded Assets	C-DRAN-SRVC
Construction Recorded Assets	C-SSWR-SRVC
Construction Recorded Assets	C-WATR-HYDR-LEAD
Construction Recorded Assets	C-WATR-SRVC

Refer to the object data table SRVC in the Appendices for a complete list of attributes and their allowable values.

3.3.10. Object Data Table - VALV

Use AutoCAD Map 3D object data table VALV to assign attributes to existing recorded sanitary and water valves represented with AutoCAD blocks, and construction recorded sanitary and water valves represented with AutoCAD blocks or Civil 3D objects. Civil 3D object data representing constructed valves is not extracted for post construction data submissions.

Valve blocks and layer names are shown in the following table.

Drawing	Block Name	Layer Name
Existing Recorded Assets	EX Sanitary Valve	R-SSWR-VALV
Existing Recorded Assets	EX Water Valve	R-WATR-VALV
Construction Recorded Assets	PR Sanitary Valve	C-SSWR-VALV
Construction Recorded Assets	PR Water Valve	C-WATR-VALV

Refer to the object data table VALV in the Appendices for a complete list of attributes and their allowable values.

3.3.11. Object Data Table - WALK

Use AutoCAD Map 3D object data table WALK to assign attributes to closed AutoCAD polylines representing construction recorded sidewalk and trail assets. The closed polyline is used for hatching different types of walking surfaces and is assigned to the layer as shown in the following table.

Walk layer names for closed polyline placement are shown in the following table.

Drawing	Layer Name
Existing Recorded Assets	R-ROAD-TRAL-BIKE
Existing Recorded Assets	R-ROAD-TRAL-GPS
Existing Recorded Assets	R-ROAD-URBN
Existing Recorded Assets	R-ROAD-WALK
Constructed Recorded Assets	C-ROAD-TRAL-BIKE
Constructed Recorded Assets	C-ROAD-TRAL-GPS
Constructed Recorded Assets	C-ROAD-TRAL-URBN
Construction Recorded Assets	C-ROAD-WALK

Refer to the object data table WALK in the Appendices for a complete list of attributes and their allowable values.

3.3.12. Object Data Table – WWAY

Use AutoCAD Map 3D object data table WWAY to assign attributes to AutoCAD polyline representing centre channel and start to end point of waterway construction recorded asset.

Waterway layer names for polyline placement are shown in the following table.

Drawing	Layer Name
Existing Recorded Assets	R-DRAN-WWAY
Constructed Recorded Assets	R-DRAN-WWAY

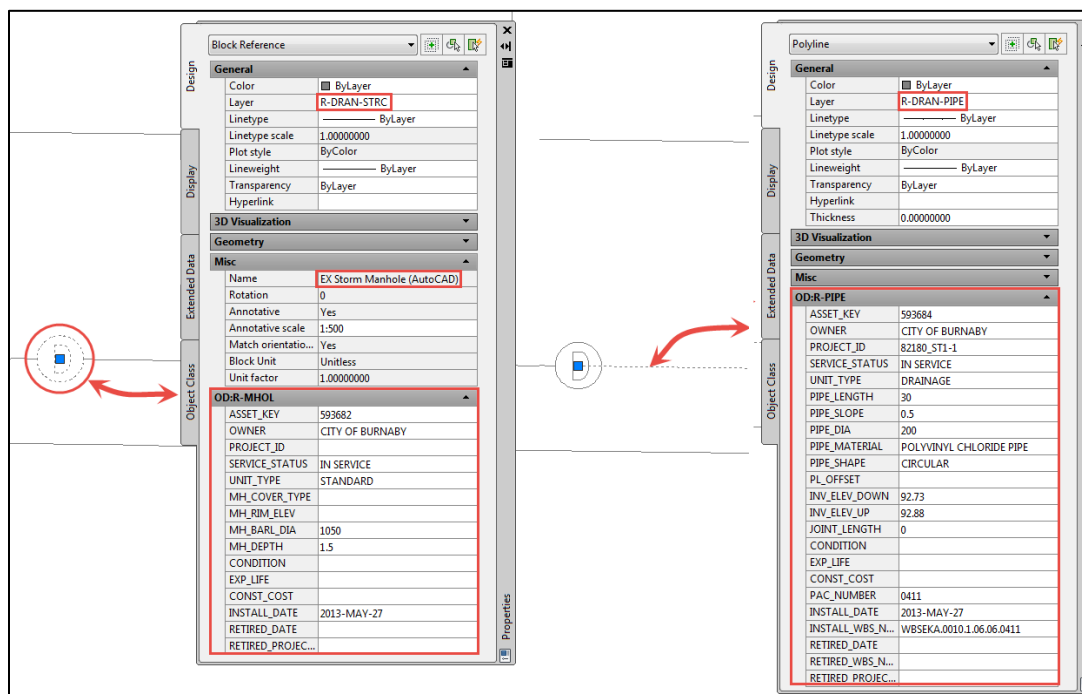
Refer to the object data table WWAY in the Appendices for a complete list of attributes and their allowable values.

3.4. Existing Recorded Assets

This section describes attribution for existing recorded assets. A significant portion of a Local Government infrastructure capital program is undertaken to replace aging assets that are beyond their useful life. Local Governments must account for the change of lifecycle state of existing assets for financial accounting and asset management practices.

The existing recorded assets drawing is provided by Local Governments to consultants at project initiation, and contains attributed infrastructure data in the project area that is sourced from the City GIS. AutoCAD Map 3D object data tables are used to assign attributes to existing recorded infrastructure assets.

An example of pipe and manhole attributes is shown in the following illustration. Note that the Map 3D object data is exposed in the AutoCAD properties palette.



The AutoCAD properties palette is especially useful for viewing all properties of similar entities and objects, and for editing object data simultaneously for multiple similar assets referencing the same AutoCAD Map 3D object data table.

After construction completion consultants update the object data attached to the existing recorded assets reflect any changes resulting from construction (retired, abandoned etc.)

The following attributes are most often updated.

- **SERVICE_STATUS** to reflect the new lifecycle state
- **RETIRED_DATE** to reflect the date the asset was retired
- **RETIRED_WBS_NUMBER** to reflect the WBS (Work Breakdown Structure Number) under which the asset was retired
- **RETIRED_PROJECT_ID** to reflect the current project number under which the asset was retired

Consultants are not required to update attributes for existing recorded assets if they are not affected by construction.

Refer to Appendix A for full description of the object data tables along with attributes and allowable values.

3.5. Construction Recorded Assets

Construction recorded assets represent newly constructed assets that the Local Government will track for both financial accounting and asset management purposes.

Construction recorded assets are represented in the construction recorded assets drawing, which is created using ground level coordinates to facilitate the generation of construction staking data. The Construction recorded assets drawing is created by copying the design model drawing and updating the drawing to reflect as-constructed conditions.

AutoCAD Civil 3D provides an advantage to consultants using pipe networks to model sanitary, storm and water infrastructure. When using AutoCAD Civil 3D, physical properties for pipes and structure (manholes) are extracted from the LandXML file, which means physical property and material attributes in AutoCAD Map 3D object data tables for pipes and structures (manholes only) are not required. If sanitary, storm and water infrastructure is represented with AutoCAD polylines and blocks, physical properties must be assigned in the AutoCAD Map 3D PIPE and MHOL object data tables.

AutoCAD Civil 3D objects are only recognized for the following types of infrastructure:

- Sanitary – pipes and manholes only
- Storm – pipes and manholes only
- Watermain – pipes only

Use AutoCAD Civil 3D pipe networks to model sanitary, storm and water infrastructure. Pressure pipe networks are not supported.

3.5.1. Sanitary Sewers

AutoCAD Civil 3D pipe networks (pipes and structures) or AutoCAD entities (blocks and polylines) can be used for sanitary sewer designs. A single entity or pipe object is required to represent a sanitary sewer pipe between manholes.

Use the following naming convention for AutoCAD Civil 3D sanitary sewer pipe networks:

PRSSWR<#>

The number sign # is used incrementally when assigning names to multiple sanitary sewer pipe networks.

3.5.2. Storm Drainage

AutoCAD Civil 3D pipe networks (pipes and structures) or AutoCAD entities (blocks and polylines) can be used for storm drainage designs. A single entity or pipe object is required to represent a storm drainage pipe between manholes.

Use the following naming convention for AutoCAD Civil 3D storm drainage pipe networks:

PRDRAN<#>

The number sign # is used incrementally when assigning names to multiple storm drainage pipe networks.

3.5.3. Water

AutoCAD Civil 3D pipe networks (pipes only and blocks) or AutoCAD entities (polylines and blocks) can be used for watermain designs.

A single entity / object is required to represent watermain pipe between fittings. Use the following naming convention for AutoCAD Civil 3D watermain pipe networks:

PRWATR<#>

The number sign # is used incrementally when assigning names to multiple watermain pipe networks. AutoCAD Civil 3D should only be used to model the pipes in a watermain network. All fittings are to be represented using AutoCAD blocks.

4. Infrastructure Project Data Structure

This section provides guidelines for engineering project data structure required for Local Government post construction submissions. The intent of digital submissions is for asset data submission. This means that the emphasis for the digital submission is on the *model* drawings and not the digital sheets themselves. Digital drawings such as title blocks, legends and indices, typical sections and details are not required.

An infrastructure design and construction project consists of the following data:

- Existing recorded asset drawing from Local Government
- Existing survey recorded drawing by consultants
- Design recorded drawing by consultant

- Construction recorded drawing by consultants

These drawings are discussed in the following sections.

4.1. Existing Recorded Asset Drawing

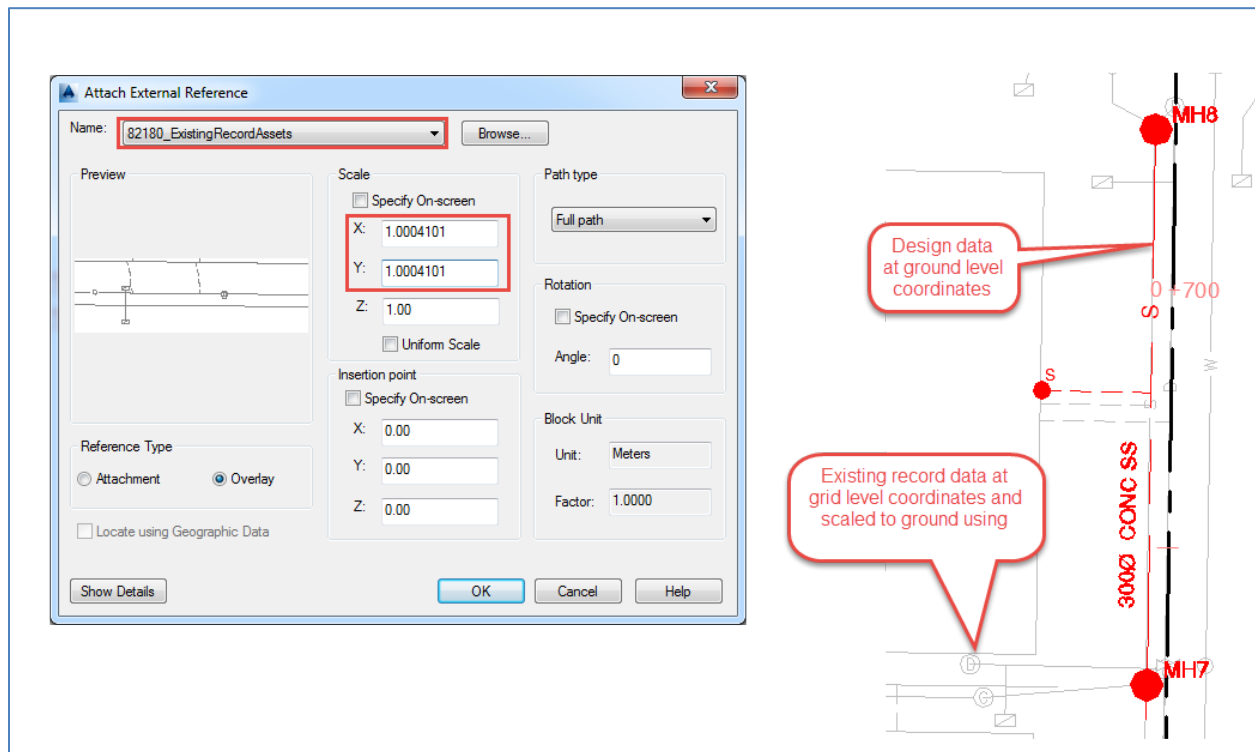
The only changes made to the existing recorded assets drawing are those required to update attributes for existing assets affected by construction. AutoCAD entities, layouts and AutoCAD Civil 3D objects should not be added to the existing recorded drawing. AutoCAD entities representing existing assets should not be removed from the existing recorded data drawing.

The naming standard for the existing recorded asset drawing is as follows:

- **<ProjectNumber>_ExistingRecorded.dwg**

The existing recorded drawing references the grid (UTM) coordinate system and can be attached as an AutoCAD external reference to the design drawing to facilitate updates to existing asset data. The grid to ground scale factor can be applied to the X and Y insertion scales in the *Attach External Reference* dialog box.

This is shown in the following illustration.



Use the AutoCAD *refedit* command to update AutoCAD Map 3D object data in the existing recorded assets drawing. Consultant may also choose to not attach the existing recorded assets drawing and open the drawing directly to update attributes on existing assets, however attaching and editing through the Xref will make it easier to identify existing assets that have changed as a result of the project.

4.2. Existing Survey Recorded Drawing

The existing survey recorded drawing contains the pre-engineering base plan and the existing ground surface model (if using AutoCAD Civil 3D) for the project, and should be created using the MMCD Civil 3D drawing template file. Description keys can be modified to meet consultant survey coding standards.

Base plan linework shall consist of AutoCAD polylines or preferably AutoCAD Civil 3D figures. Points can be represented with AutoCAD blocks or AutoCAD Civil 3D point objects. The project ground to grid factor and associated details shall be clearly identified in model space in the existing survey drawing.

The naming standard for the submitted existing survey drawing is as follows:

- **<ProjectNumber>_ExistingSurvey.dwg**

The existing survey drawing is submitted to the Local Government for the sole purpose of validating asset location for existing infrastructure assets not affected by the project.

4.3. Design Recorded Drawing

The design recorded drawing must not be spatially fragmented and should contain all design data and attribute for the project. Design model drawing should be created to ground level coordinates to facilitate construction staking activity.

Infrastructure design data should be represented in a single design model drawing. Production drawings can either be created as layouts in the design model drawings, or as independent drawings with layouts that reference data from design model drawings using AutoCAD external references and AutoCAD Civil 3D reference objects. Layouts used to create production drawings are not required for post construction digital submissions. The latter option is recommended in order to simplify layer management associated with keeping all design model and drawing production data in a single drawing.

The design model drawings are copied to create construction recorded drawings. These copied drawings are updated to reflect constructed locations and attributes, and are discussed in the next section.

4.4. Construction Recorded Drawing and Data

The construction recorded drawings are created by copying the design model drawing. These drawings are updated during and after construction to reflect the following:

- Adjusted asset location based on as-constructed conditions
- Data attachment using object data tables

The naming standard for constructed recorded drawing is as follows:

- **<ProjectNumber>_ConstructionRecorded_<GroundtoGridScaleFactor>.dwg**

For example if the project number is 82180, all design data is in a single drawing, and the ground to grid scale factor is 0.99959 then the file name is as follows:

- **82160_ConstructionRecorded1_0.99959.dwg**

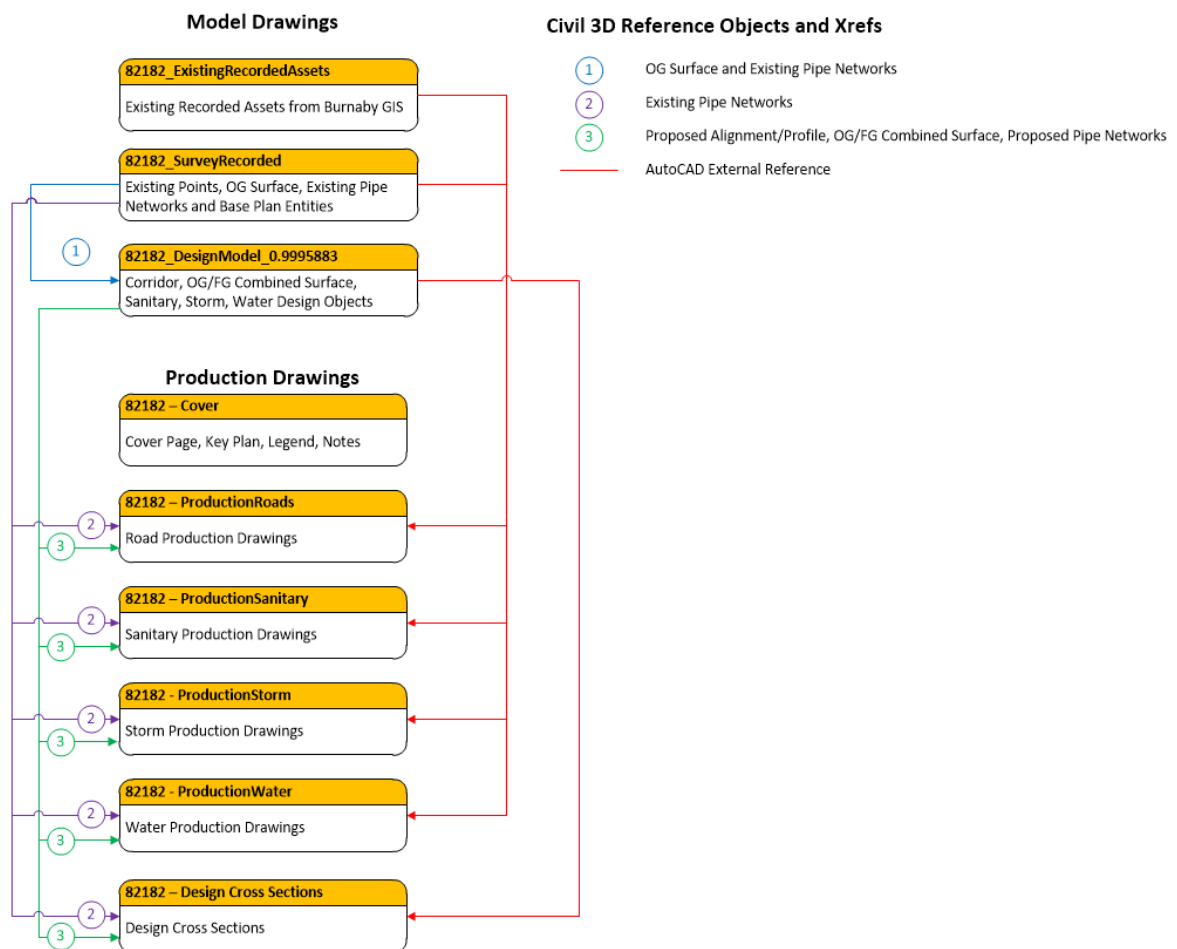
The scale factor is required in the drawing name to facilitate the conversion of ground based design and construction data to grid coordinate system used by the Local Government. In circumstances where

consultants design is created using grid level coordinates, the ground to grid scale factor referenced in the drawing name is 1.

In addition to the constructed recorded drawings, a LandXML file is required for sanitary, storm and water utility data designed using AutoCAD Civil 3D pipe networks. The file naming standard for the LandXML file is the same as for the constructed recorded drawing.

4.5. Sample Drawing / Data Architecture

This section outlines shows an example of how design model and production drawings are “stitched” together using AutoCAD external references and AutoCAD Civil 3D Data Shortcuts. Refer to the following illustration.



When working with Civil 3D reference objects it is essential to use good naming conventions and to keep your data organized.