



**The Regional Municipality of Durham
Works Department**

**Facilities Design, Construction and Asset Management
CAD and BIM Drawing Standards**

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1 General

The purpose of the first section of this Document is to define drawing standards that are common to both CAD and BIM files. Common requirements include PDF drawing file naming, numbering conventions and drawing composition.

Part A of this Document serves as a guideline specification for producing and delivering CAD drawings for the Region of Durham. The intent is to have all CAD drawings submissions follow this guideline.

The intent of Part B of this Document is to provide a framework that will let the owner, architect, engineers, and construction manager deploy building information modeling (BIM) technology.

The BIM Standard in Part B is expected to do the following:

- Delineate the roles and responsibilities of each party for Model creation
- Promote maintenance and collaboration at different stages of a project
- Define relevant business processes and supporting software
- Outline additional resources or services that may be needed
- Provide a baseline to measure progress throughout the project
- Review design progress, eliminate field conflicts and increase efficiency of design
- Integrate BIM model data with asset management

Prior to beginning the design for any Region of Durham Facilities Projects, the Consultant shall meet with Region of Durham staff to obtain or clarify Region of Durham requirements for presentation of Architecture/Engineering submissions.

Throughout this document, where the title “Project Manager” is used, it shall mean the Region’s Project Manager.

2 Drawing File Naming Convention

Contract drawing files (PDF format) shall be named based on the following convention which includes four parameters. An example is provided below.

Project File Number	Drawing Number	Submission Indicator (Optional)	File Revision Indicator
RDPS-P-032-20-01	E-001	(IFC)	CO-01

PDF filename for files with a Single Drawing:

- The filename for a file that includes a single electrical drawing could be something like RDPS-P-032-20-01-E-001.

PDF filename for files with Multiple Drawings:

- The filename for a file that includes multiple electrical drawings could be something like RDPS-P-032-20-01-E-001-045.

All project file numbers must be assigned by the Project Manager, with the remaining three file parameters provided by the designer.

2.1 Region of Durham Project File Number

Each project shall be assigned a Project File Number in the form of a multi-character alphanumeric code (e.g. RDPS-P-032-20-01). This code shall form the prefix of the filename. This file number will be provided by the Project Manager prior to commencement of the assignment.

2.2 Drawing Number

As a drawing package is completed, the number of drawings within the package will be established. The Drawing Number must include the discipline and the drawing number within that discipline.

Contract and other non-standard drawings shall be numbered in accordance with the following procedure. This Numbering Convention can be assigned by the designer following review of this process but must be approved by the Project Manager.

The Drawing Number shall consist of the following elements, in order, separated by a dash “-“:

- Discipline Code
- Sequential Number in the series of drawings within that discipline
- Submission Indicator, in round brackets (Optional)

Format: DD-XXX-(AB)

For example, drawings in the electrical discipline would have Drawing Numbers E-001, E-002, E-003, and so on.

.1 Discipline Code

The Region utilizes the following architectural/engineering discipline codes to identify drawings by discipline and provide a standard sequence for the submission. The discipline codes are listed in Table 1.

Table 1 – Discipline Codes

Discipline Code	Description
GE	Use for Cover Sheet and, on very small projects, where two or more disciplines appear on the same drawing.
S	Siting
ST	Structural
A	Architectural
M	Mechanical (Includes Plumbing, HVAC and Controls)
E	Electrical
C	Civil
T	Communication
F	Fire Protection
SE	Security
I	Interior Design

.2 Sequential Numbering

The last 3 characters in the Drawing Number are sequential numbers identifying the drawing number within the discipline number and related to the property.

Each discipline sequential number shall have 3 digits and begin with “001”. For example, the first drawing in a Siting series is S-001 and the first drawing in a Mechanical series is M-001. All drawing sequences must begin with the numerical values 001 and follow this sequence up to a maximum of 999.

.3 Floor Numbering (Optional)

There may be scenarios where a project will benefit by including the floor number in the drawing number. The inclusion of this system must be reviewed and approved by the Project Manager. If the Project Manager approves the use of floor numbering, the 3-digit sequential number shall use the floor numbering provided in Table 2 as the first digit.

Table 2 – Floor Numbering

Floor Number	Building Level
B	Basement
1	1 st Floor
2	2 nd Floor
3	3 rd Floor
4	4 th Floor
5	5 th Floor

For example, drawing number 35 of the Mechanical drawing set indicating services on the 3rd floor shall read – M-335

.4 Additions to Original Drawings

If, once the drawings have been Issued For Tender, additional clarifications, Sections, Details or Site Instructions are required to be added to the drawing package, a complete new drawing can be inserted in the sequence with a “.1” or succeeding number added to the IFT drawing number. This means the drawing shall follow the format identified below:

Drawing Number Example: M-401.1-(IFT)

The drawing number example above indicates an **additional detail** has been added to the first drawing of the Issued for Tender drawing set, on the 4th floor, in the mechanical series of a defined project.

2.3 Submission Indicator (Optional)

An optional Submission Indicator can be added to PDF filenames in order to identify at which stage in the construction cycle the files are. This indicator shall be added at the end of the file number inside brackets. Submission indicators can be chosen from Table 3.

Table 3 – Submission Indicator Codes

Submission Indicator	Description
(B)	Base Building
(IFP)	Issued for Permit
(IFT)	Issued for Tender
(IFC)	Issued for Construction
(AB)	Issued for As-Built
(RD)	Record Drawing

Example: RDPS-P-032-20-01-E-001-045(AB)

The filename example above indicates the As-Built conditions drawings E-001 to E-045, for Project number RDPS-P-032-20-01.

2.4 File Revision Indicator (Mandatory)

- During the Tender or Construction Phases, Addenda, Change Orders, Site Instructions or Change Directives may be required resulting in revisions to drawings. These revisions shall be tracked by the addition of the following information to the PDF Filename. The filename shall include a revision indicator followed by a 2 digit number for example:

Example: RDPS-P-032-20-01-E-001-045(IFC)CO-01

- The filename example above indicates a revision to the Issued for Construction set of drawings that was issued as a result of Change Order number 01, for drawings E-001-045, for Project number RDPS-P-032-20-01.

Table 4 – Revision Indicator Codes

Revision Indicator	Description
(AD)	Addendum
(CO)	Change Order
(CD)	Change Directive
(SI)	Site/Supplemental Instruction

3 Drawing Composition

Upon the award of the project assignment, the Region will provide the Consultant with the DWT, CTB and RFA files to help with the initial set up of the drawing files. Drawings shall be set-up and laid out according to the following requirements.

3.1 Title Block Set-Up

All final drawings shall use one of the Region's standard title blocks. These will be provided upon award of an assignment.

Borders in CAD can be placed **as a block**. Border blocks shall not be exploded.

Borders can be placed in, or referenced to, the sheet layout. Borders shall not be scaled in a sheet layout. The scaling of the design should occur through scaled reference or viewport attachments.

All layout viewport scales shall be locked when submitted. Borders should be initially set up using a Region of Durham template file.

3.2 Title Block Population

.1 Property Number

Each facility in the Region of Durham is located on a property identified by a Real Estate Property Number. This Property Number shall be provided by the Project Manager and included on the drawings for all submissions to the Region of Durham.

.2 Facility Code

Real Estate Properties may have multiple buildings located within the same property. The Facility Code will differentiate between the different buildings within that same property. This identifier shall be provided by the Project Manager and shall be identified on the drawings.

Note: Facility Code is mandatory for all Region-owned buildings, but not required for all Leased buildings.

.3 Contract Number

As projects are approaching 90% Design Submission, Contract numbers can be requested from the Project Manager and must be included on all submissions from Issued for Tender through to Record Drawings.

Each project will be assigned a specific Contract Number similar to the following:

- Non-Registry Informal Quotation: IQ-XX-[Year]-DCAM
- Q-303 Registry Quotation: Q-303-2020-A-XXX-DCAM

- Tender T-XXXX-[Year]

The Project Manager will provide the Consultant with the assigned Contract Number which the Consultant shall identify on all drawings.

.4 Drawing Titles

The Drawing Title will include both the project title and a drawing description. The project title will be provided by the Project Manager. This title will be consistent with the project title used in the header of each specification section.

Each drawing must have a unique description.

The project title and drawing description are to be located in the large space immediately below the Region’s logo. The project title is first, followed by the drawing description. Where the project necessitates a lot of text, the font size may be decreased with consent of the Project Manager. Drawing titles should be written in all CAPITALS, consistent with the drawing text.

.5 Drawing Revisions

During the design review stage of the project, internal revisions made by the Consultant shall be tracked in the “Revision Table” in the title block. This will record items such as, “Issued for Client Review”, “Issued for Final Client Review”, “Issued for Coordination”, etc.

Once the Consultant has reached the Issued for Tender documents stage, the Revision Block shall be cleared and “Issued for Tender” shall be recorded on line 01 in the Region’s Revision Table.

Drawing revisions after “Issued for Tender” shall be recorded sequentially in the Region’s Revision Table up to and including the As-Built Drawing Submission. Refer to Table 5 below.

Table 5 – Region’s Contract Revision Block

06	YYYY-MM-DD	DC	Issued for Record
05	YYYY-MM-DD	DC	Issued for Change Order 01
04	YYYY-MM-DD	DC	Issued for Construction
03	YYYY-MM-DD	DC	Issued for Addendum 02
02	YYYY-MM-DD	DC	Issued for Addendum 01
01	YYYY-MM-DD	DC	Issued for Tender
No.	Date	Name	Revisions

All drawing revisions shall be identified using a Revision Cloud feature in the latest version of AutoCAD. The Revision Cloud shall identify the specific location of the change in relation to the previous drawing.

.6 Sheet Number

Sheet numbers must be in sequential order, starting at 001. They do not need to share common numbers with the Drawing Number. Sheet numbers should be populated near the end of a project for contract submissions to avoid renumbering sheets.

If a new sheet is inserted into a submission set, the sheet number must be appended with an alpha character. (ie. 001, 002, 002A, 002B, 003).

3.3 Drawing Sheet Size Requirements

All model information shall be drawn true scale (1:1). That is, if a pipeline segment is 100 metres long, the line drawn to represent it shall also be 100 metres long.

Drawing Sheet Size shall be:

Full Size (Standard) ISO A1 (594 mm X 841 mm = 23.39 in. X 33.11 in).

and, if preferred, separate files for

Half Size (50% scale) ANSI B (279 mm X 432 mm = 11 in. X 17 in.)

3.4 Drawing Sheet Scales and Text Styles

The proper scales should be selected to avoid overcrowded or ambiguous conditions on the drawings.

.1 Region of Durham Preferred Drawing Scales

Drawings scales shall follow Metric Scale Factor.

1:1, 1:2, 1:5, 1:10, 1:20, 1:25, 1:50, 1:75, 1:100, 1:125, 1:150, 1:200, 1:250 etc.

.2 Multiple Scale Requirements

When two or more scales are used on the same drawing sheet, each scale shall be clearly indicated below each particular title, and the notation “AS NOTED” or “SCALE AS SHOWN” indicated in the Title Block Scale Identification Cell.

.3 Text Styles

Text on Region of Durham submitted drawings shall be Arial, size 2.5 mm for general notes, dimensions and annotations. Details, titles, sections, etc., shall be Arial, size 5 mm. Text shall be scaled appropriately to suit the drawing sheet scale. Drawing text should be written in all CAPITALS.

3.5 Units/Level of Accuracy

Projects will utilize metric system. The tolerance level of accuracy to be utilized in the design models is to be set at 1mm.

3.6 Cover Sheet and Drawing List

.1 Cover Sheet

The DCAM cover sheet is required unless the project manager specifically states otherwise. A DCAM cover sheet drawing template is available and will be provided upon request. The following items shall be completed on each cover sheet of a drawing set:

- Tender/Quote Number, Project Title and Location
- Drawing List
- Consultant logo

.2 Drawing List

The drawing list is to be populated on either the Cover Sheet (depending on the number of sheets and if it will fit) or on a separate sheet that immediately follows the cover sheet.

The drawing list is to be sorted by discipline and should include the drawing number, title and sheet number.

3.7 Reference Files

External reference files shall only be used during design development. All external reference files shall be bound within the final delivered electronic drawing files.

3.8 Delineation of Drawings and Specifications

Drawings shall not include specifications except where strictly required by an agency for approvals. The Consultant shall provide evidence of such requirement by an agency.

Specifications shall be written in the specification's documents, not on the Drawings. Discuss with the Region's Project Manager for Specifications and Support Services if the Consultant intends to have any specifications on the Drawings.

Part A: CAD Submissions

4 AutoCAD Drawing Standards Compliance

Drawings submitted to the Region of Durham shall comply with this standard. This Standard was developed in accordance with and is based on OAA standard which complies with the AIA CAD Layer Guidelines.

5 Drawing File Naming Convention

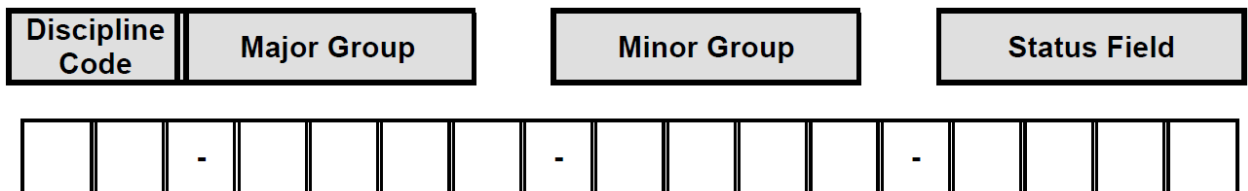
The Drawing File Naming Convention for CAD files shall follow the same format as the PDF file naming defined in Heading 2. This includes the Project File Number, Drawing Number, Submission Indicator and File Revision Indicator.

5.1 Layer Format

The Region of Durham Layer name format is based on the “American Institute of Architects (AIA) and the United States National CAD Standard NCS Version 4.0.

Exceptions to the standard will be accepted only in cases where items cannot be classified into one of the predefined layers. Layer names that are created shall follow the general Region of Durham layer name Format, and a description shall be provided.

The Layer Name Format is organized as a hierarchy with **four** defined Layer Name Data fields, separated from one another by dashes (“-”).



Note: The Discipline Designator and the Major Group are mandatory fields. The Minor Group and the Status Field are optional.

5.2 Discipline Designator

The Discipline Designator is a two-character code that denotes the category of subject matter contained on the specified layer. Discipline code are defined in Table 6 below. Other codes may be permitted at the discretion of the Region.

Table 6 – Discipline Designator Codes

Discipline Code	Discipline	Description
A	Architectural	
GO	Geotechnical	
H	Hazardous Material	
C	Civil	Includes all services located outside the building
M	Mechanical	Includes HVAC and Ductwork
F	Fire Protection	
PL	Plumbing	Piping, Plumbing and Drainage located inside the building.
E	Electrical	
T	Telecommunications	Includes Security
PR	Process	
G	General	Includes Title Block, Drawing Index, Architect and/or Engineer Stamps, Title Block Text, Key Plan, Logo etc.
L	Landscape	
S	Structural	
I	Interior	
O	Operations	

5.3 Major Group

The Major Group is a mandatory, four-character field that identifies a major building system, such as doors, walls, windows, etc. Although most Major Groups are logically associated with specific discipline codes, it is possible to combine a Major Group with any Discipline Designator.

Table 7 – Major Group Examples

Discipline Code	Major Group	Description
A	WALL	Architectural Wall
M	HVAC	Mechanical HVAC
E	LITE	Electrical Lighting
P	SANR	Sanitary Plumbing
F	ALRM	Fire Protection Alarm

For a full list of Major Group designations, refer to **Appendix D- The Region of Durham Works Department - AutoCAD Layering Standards.**

5.4 Minor Group

The Minor Group is a mandatory, four-character field to further define the Major Groups. All layers used on CAD submissions shall adopt a minor group designation.

Table 8 – Minor Group Examples

Discipline Code	Major Group	Minor Group	Description
A	WALL	FIRE	Architectural Fire Rated Wall
M	HVAC	DUCT	Mechanical HVAC Ductwork
E	LITE	JBOX	Electrical Lighting Junction Box
P	SANR	VENT	Sanitary Vent Piping
F	ALRM	ZONE	Fire Alarm Zone

For a full list of Minor Group designations, refer to **Appendix D.**

5.5 Status Field

The status field is an optional, four-character field that distinguishes the data contained on the layer according to the status of the work or the construction phase. Drawings produced by Consultants or Contractors will typically have an identifier on the layer corresponding to the scope of work.

Where a status field is used in the layer name, the Status shall be according to Table 9 and the layer name shall be modified as per Table 9. Examples are provided in Table 10.

Table 9 – Status Field Codes and Layer Modifications

Status	Color	Line Type	Weight	Description
-HIDE	As per layer	Dashed	As per layer	To identify or display hidden features
-NEW	As per layer	As per layer	0.50 mm	To identify new construction
-EXST	252	As per layer	0.25 mm	To identify existing conditions
-ABAN	252	As per layer	0.25 mm	To identify abandoned features
-DEMO	6	Demo_Dashed	0.35 mm	To identify features to be demolished

Table 10 – Status Field Examples

Discipline Code	Major Group	Minor Group	Status	Description
A	WALL	FIRE	EXST	Existing Architectural Fire Rated Wall
M	HVAC	DUCT	HIDE	Hidden Mechanical HVAC Ductwork
E	LITE	JBOX	NEW	New Electrical Lighting Junction Box
P	SANR	VENT	ABAN	Abandoned Sanitary Vent Piping
F	ALRM	ZONE	DEMO	Fire Alarm Zone demolished

5.6 Drawing Features

All features shall be drawn with their properties of colour, line width, and line style set to “By Layer”. This allows all properties of the objects to be inherited from the settings of the layer in which they are placed.

6 New, Demolition and Existing Features

In situations where you need to show existing design items in combination with items that are new, to be demolished, or relocated, it is preferred to have the existing design items subdued to appear as background information. This is achieved by making existing items appear grey and lightened; all other content is displayed normally or emphasized through bolding.

The following are acceptable options for how new, demolition, relocated and existing design items should be organized in the file.

- Option 1: Prior to drawing a new design, move all demolition items to the demolition layers provided. Create a new layer for all existing items (e.g. A_EXST) and move all existing features to this layer. Use the provided layers for the NEW design items.
- Option 2: For situations where separate design layers are needed to show new and existing construction, the standard layer naming convention shall be used for NEW and EXISTING. A status suffix of “-NEW” shall be placed at the end of the layer name for NEW items (e.g., A-WALL-NEW). A suffix of “-EXST” shall be placed at the end of the layer name for EXISTING items (e.g., A-WALL-EXST).
- Option 3: The drawing containing the demolition or existing information can be kept as is and referenced to a new drawing where you use the provided layers for the NEW design items. You have the option in this case to override the display of the item attributes of the reference to suit.
- Option 4: Where you have separate drawing files to show different construction conditions or phases, such as having a separate Demolition Plan and New Floor Plan, all layers with existing items to remain should be appended with the status “_EXST” with their colour and weight modified according to the standard. All other content that is new, to be removed, or relocated should be placed on their appropriate layers as provided, allowing them to appear bolder than the existing items to remain in the background.

7 Drawing Origin and Registration

The origins of CAD files shall be defined at coordinates (0,0,0). This is typically the lower left corner of the building. The model shall be oriented so that North is either to the top or left on the drawing document. The origin point shall remain consistent between all CAD files in a Project.

Part B: BIM Submissions

8 BIM Requirements

8.1 BIM Competence and Responsibilities

Prime Consultant must designate a BIM Manager to oversee the technical aspects of developing, managing and maintaining the BIM model. The Prime

Consultant must have, or must obtain at its own cost, sufficient software licenses and computer hardware to adequately perform the services required.

8.2 Relationship of BIM Requirements to other Requirements

Prime Consultant's use and development of the BIM must satisfy the requirements of The Region's Project Requirements, this BIM Standard, and any additional requirements noted in the Contract. To the greatest extent practical, the BIM should describe the project as it will be constructed, except for elements that cannot be practically modeled because of software limitations or that are smaller than elements normally modeled on similar projects. Those project elements that are not modeled must be constructed in accordance with supplementary design information prepared by the Prime Consultant that has been fully coordinated with the modeled information.

8.3 Prime Consultant BIM Deliverables

The Prime Consultant must update the models to remain current throughout construction of the project. During construction the Prime Consultant will be responsible for providing a fully coordinated and assembled model compatible with the original software authoring that is consistent with the:

- Native file format(s) of Models (Revit)
- IFC file format
- Collaboration software format (Navisworks Manage or equal) for fully coordinated and assembled BIM.

The Prime Consultant must provide As-Built model(s) for all building systems. The model(s) must be fully coordinated and the required instructions on file/folder setup must also be included:

- Final consolidated As-Built model(s) for building systems used in the multi-discipline coordination process
- IFC file format of the consolidated building systems models. Industry Foundation Classes (IFC) format, are an open file format used by Building Information Modeling (BIM) programs; contains a model of a building or facility, including spatial elements, materials, and shapes. The IFC file format is used for interoperability between industry BIM programs.

8.4 Reviews

Prime Consultant will provide The Region's Project Manager and designated reviewers with access to the BIM and associated servers. The Prime Consultant must coordinate with The Region's project manager and reviewers the use of the BIM for defined Client reviews.

8.5 Export Information

Prime Consultant will provide The Region with access to the BIM and associated servers for exporting information. The Region reserves the right to utilize information exported from the BIM at any time.

9 BIM Planning

9.1 BIM Execution Plan (BEP)

After execution of the Contract, the Prime Consultant must prepare a BIM Execution Plan (BEP) based on this document confirming the intended uses of the BIM on the project for design authoring, design coordination, and construction administration, along with a detailed design of the process, communication paths and model structure for executing BIM throughout the project lifecycle.

The BIM Execution Plan is a live document that should be modified and fine-tuned to accommodate the workflow and scope adjustments throughout the design and construction of this Project. The BEP must be provided to The Client for its review and approval. Once approved, the BEP should not be modified without The Client's approval.

9.2 Architect and Consulting Engineers Role

The A/E will be a key implementer and is responsible for directing, developing, and coordinating the work of their engineering consultants, and ensure that their BIM-based work is seamlessly integrated into the design models and resulting contract documents. During design, models will be posted on a regular basis for coordination every two weeks (minimum) by the A/E and in advance of significant document set issues. The A/E will work closely with The Client to receive design phase feedback and transition the model for construction phase integration.

10 Key Project BIM Contacts

10.1 BIM Manager

For each organization, a BIM Manager shall serve as the key point of contact for the Revit Coordinator for all BIM related activity on the project. Individuals in this role will have the necessary experience for the successful implementation of BIM regarding the scope and complexity of any given project. The BIM Manager assures development and compliance throughout their company with the BIM Execution Plan. The BIM Manager will coordinate and manage BIM related meetings with lead BIM technicians and will interface with IT managers to ensure proper hardware and software is in place and functioning properly.

10.2 Revit Coordinator (BIM Project Lead)

For each organization, a Revit Coordinator will be assigned. Their responsibilities encompass a wide range of duties, among which are the following:

- Model origin, coordinate system, and units
- Managing software version control
- File storage location(s)
- Processes for transferring and accessing Model files
- Model(s) coordination reports
- Access rights
- Collect incoming Models
- Coordinate submission and exchange of models
- Combing or linking multiple models
- Narrative report of changes/modifications during model exchanges
- Provide a general review that files are complete and usable in compliance with template protocols
- Maintain BIM archives and back-ups. The Revit Coordinator shall produce a Model Archive at the end of each Project Phase and shall preserve the Model Archive as a record that may not be altered for any reason

Use the following table example as a template for defining the key project contacts for each consulting team.

Table 11: Architect – Prime Consultant

Role	Organization	Contact Name	Location	E-Mail	Phone
Project Lead					
Project Manager					
BIM Manager					
Revit Coordinator					

11 Project Goals and BIM Uses

The models produced for the project must be modeled to LOD 300, with LOD 100 being the Schematic Design stage, LOD 200 being the Design Development stage and LOD 300 being the Contract Document stage. During all three of these stages the models will be used to generate the 2D documentation that is the contracted deliverable for the project.

In addition to the drawing production, the models will be used for the Design Review process (Coordination) during all three stages of the project.

11.1 Level of Development (LOD)

The following LOD descriptions identify the specific content requirements and associated authorized uses for each Model Element at three progressively detailed levels of completeness. Each subsequent LOD builds on the previous level and includes all the characteristics of previous levels. The parties shall utilize the three LOD described below and in completing the Model Element Table described in the Level of Development document, which establishes the required LOD for each Model Element at each phase of the Project. Refer to **Appendix A - (LOD) Information Exchange Workflow: Model Element Table**.

Refer to Section BIM +Facilities Management and **Appendix B - Asset Planner Field Requirements** for Facility Asset Management requirements.

Note: The LOD definitions that are used in this Specification are identical to those published in the IBC -201-2014, Authorized Uses and Model Table Element and AIA's updated Digital Practice Documents (G202-2013.1).

- LOD 100 (Schematic Design)

At LOD 100, Model Elements are in the form of narratives, program information, etc. An LOD 100 Model Element is not geometrically modeled but may be included in a Model as a symbol that does not represent actual geometry. It is also possible that the Model Element is not individually represented in the Model in any graphical sense, but its existence can be derived from other Model Elements that are graphically represented in the Model.

- LOD 200 (Design Development)

LOD 200 elements are generic placeholders. This is the lowest level at which a geometric representation of a Model Element will appear. By contrast, in LOD 100, a Model Element may be graphically represented by a symbol, but it will lack any geometry. For an LOD 200 Model Element, the size, shape, location, orientation, and any data associated with the Model Element are approximate.

LOD 200 elements are useful both early in the design process when specifics have not yet been determined (the designation of LOD 200 tells downstream

users that the element may change) and in final Models when selection of certain items, such as lighting fixtures, is left to others or is met by a range of choices.

- LOD 300 (Construction Documentation)

LOD 300 Model Elements are specific assemblies, such as specific wall types, engineered structural members, system components, etc. The design of the Model Element is developed in terms of composition, size, shape, location and orientation. Constructability and coordination of other building components may require change to some Model Elements after they are designated LOD 300, but such changes should be minimized as much as possible. Other information such as cost, thermal characteristics, specifications, warranty, and operation and maintenance instruction may be attached to the element.

12 Project Requirements

Model Authors should adhere to the following modeling practices at a minimum:

- Elements must be physically broken according to how they are sized and installed on the field. For example, concrete columns must be modeled by floor and drywall partitions must be terminated according to their height in relation to the ceiling line at each floor.
- Drywall partitions must be separate from adhered finishes
- Structural floors must be separate from floor finishes
- Ceilings must be independent from structural floors above
- Column furring must be separate from structural columns
- Identify wall types by their type names when that level of detail is reached
- Model railings as railings and not walls

All consultants shall refer to **Appendix C - Model Coordination Requirements** for minimum objects requirements for coordination.

Limit the use of:

- Generic Models
- Masses
- Architectural columns
- Roofs (model them as floors)
- Curtain Systems

- Groups
- Limit the number of views in the model.
- Purge families of unused objects before loading into the project files.
- Arrays can be utilized to insert multiple objects in an ordered fashion but ungroup and disassociate objects once inserted if this relationship is no longer necessary.
- Minimize the usage of constraints to avoid conflicts.
- Always review and address error warnings from the software. These should never be ignored.

12.1 Revit Family Structure

Consultants to populate schedules for certain families as required by Facility Management department (all mechanical equipment, lighting fixtures, architectural elements like doors and windows, etc) with minimum 10 specified parameters including serial number, model number, year of construction, etc... as directed by The Region.

Refer to Section BIM +Facilities Management and **Appendix B - Asset Planner Field Requirements** for asset management requirements.

13 Collaboration

The Prime Consultant shall establish the most effective and consistent method for how all project stakeholders will develop their electronic and collaboration activity procedure. The proposed method shall include the ability for The Region to easily access and review the 3D model(s) and/or 2D document sets.

13.1 Electronic Data Exchange Procedures

Collaboration data exchange frequency for Models during the design phase to occur on 2 weeks intervals.

Consultant specific interim changes, which may be more targeted design changes, and would include minimal files to be transferred, can be transferred as needed. Significant scope changes could also dictate additional data transfers outside of the defined 2-week interval.

13.2 E-mail Notification

The subject line of the notification shall be appropriate to what is uploaded for example, Project's Name-Company-Description. The body of the email as a minimum shall have a general outline of what was uploaded to the ftp site/cloud/

or an attachment can be provided for more detailed outline/instructions. This email notification shall be used as a formal record of who, what, and when the information was circulated.

13.3 Model File Naming Convention

- The model file names will be formatted as follows:

DISCIPLINE_Project File Number_Model Division.file extension

(example: A_ RDPS-P-032-20-01_CoreShell.rvt)

Discipline designator codes are outlined in Table 1 – Discipline Codes as the prefix of all model names.

When issuing models, all consultants should adhere to the same naming convention for ease of communication and exchange. Do not add a date, version or any other modifier that changes over time.

14 Model Guidelines

14.1 Origin Point

All models must be in the correct agreed upon location in 3D Space (X, Y, and Z coordinates) and will reside in quadrant I of the software whereas +X and +Y will be maintained in the design applications. These coordinates will be set by the Prime Consultant and distributed to all consultants for their use. This includes but is not limited to floor to floor elevations (z coordinates). The project insertion point is not to be relocated as it is critical and ensures that each model will align properly for the master aggregate Models without modification. Civil engineers will utilize state plane coordinates to locate the site plan and convert to design model local coordinate system.

14.2 Scale

All BIM/3D Models will be correct in scale and units unless specifically noted otherwise.

14.3 Software Build Versions

All members of the design teams will be working from the same “Build Version” of their associated design application software for their discipline as stated below:

- Autodesk Revit (Latest available)
- Autodesk Civil 3D (Latest available)
- Autodesk Navisworks (Latest available)

Note: The final model to be delivered to The Region shall be at the latest Revit build or as per The Region's direction/approval at project handover.

Consultants must not proceed to a new version, new service pack, new build, or new update, without following the procedure outlined herein and to be coordinated by the architect:

- Notifying ALL BIM Managers in the Design Team about the potential to upgrade
- Receiving a consensus from ALL BIM Managers in the Design Team that proceeding with upgrade is acceptable
- Notifying ALL BIM Managers in the Design Team of the date of upgrade
- Archive all Models PRIOR to upgrade
- Complete FULL Project Team Model Exchange per file/model exchange guidelines, immediately following upgrade
- Receive confirmation from ALL BIM Managers in the Design Team that there have been no adverse effects from the Model Upgrade.

*The above considerations are extremely important due to the programs (Revit) lack of backwards compatibility.

14.4 Best Practices for Model Transfers

This section describes requirements for Revit models transmitted between all design disciplines. Revit model content will appear in documents produced by other disciplines and will be used for visual coordination and automated clash detection. The following guidelines are intended to facilitate this process for all parties involved. The items address common problems with model coordination. This document is intended to be used in conjunction with the document **Level of Development (LOD)**.

14.5 General Requirements

- Revit warnings should be resolved and kept to a minimum. They should never be ignored
- Models should be composed of native Revit elements, created in the Revit interface
- Image files shall not be imported or linked into the model to represent geometry.
- Linked AutoCAD .dwg files should only be used when necessary. When using linked .dwg files keep the content to a minimum. Revit models should not

- utilize 3D solid content created in other programs unless approved by the Prime Consultant and The Client.
- Files should be audited, compressed, and purged of unused and unnecessary content before transmitting to any of the design team.
 - Files shall be free of any unnecessary sheet views and shall contain all required coordination views before transmitting to any of the design team.
 - Consultants are responsible for keeping detached archived models of all issuances.
 - All Revit models should use the coordinate system established by the Prime Consultant. Consultants should begin working by linking in a copy of the Prime Consultant's Revit model.
 - All parties can utilize worksets to organize their models into logical divisions of scope or discipline. Consultants are responsible for maintaining worksets and notifying the project team of any relevant changes to workset organization.
 - Any content not relevant to other parties, such as analysis elements, structural loads, studies, links, and reference information should be kept on its own workset, clearly identified as being for internal use. All parties will make reasonable attempts to accommodate workset organization requests from other members of the design team. The Prime Consultant will establish workset naming conventions.

14.6 Worksets

The collaborative nature of BIM dictates a need for simultaneous file access to each Revit file by multiple users. The Revit suite of products accomplishes this through its Worksharing functionality, a capability that allows users to gain exclusive access to sets of objects at a time, without the need to lock out access to the whole file.

Each linked Revit model is hosted on a separate workset. This approach significantly assists in improving Revit Model(s) access performance and visibility control. Each Revit link will reside on a workset named in a consistent and logical manner to aid navigation through the project.

14.7 Cloud-based BIM Construction Management Software

Autodesk uses BIM 360 as a cloud-based BIM management and collaboration solution that connects the entire project team and helps streamline BIM projects. Cloud-BIM technology can provide real-time monitoring of construction progress, coordination, clash detection and data sharing.

The Revit Models and documents would be located on the “cloud” and users can edit, share and view the files either directly through the web, or by opening shared models through their Revit application.

14.8 Sheet Names and Title Block Setup

Sheet View names and numbering shall follow the nomenclature outlined in Sections 2 and 3 above. The Prime Consultant shall create a Sheet Naming appendix to ensure the entire design team is consistent with document standards.

The title blocks shall also be setup in accordance with Sections 2 and 3.

15 Quality Control

15.1 Overall Strategy for Quality Control

Each consultant is responsible for their own internal quality control of their respective model(s). At a minimum the following checks need to be performed on all models:

- VISUAL CHECK - Ensure there are no unintended model components and the design intent has been followed
- INTERFERENCE CHECK - Detect problems in the model where two building components are clashing including soft and hard
- STANDARDS CHECK - Ensure that the BIM standards have been followed (fonts, dimensions, line styles, levels, etc.)

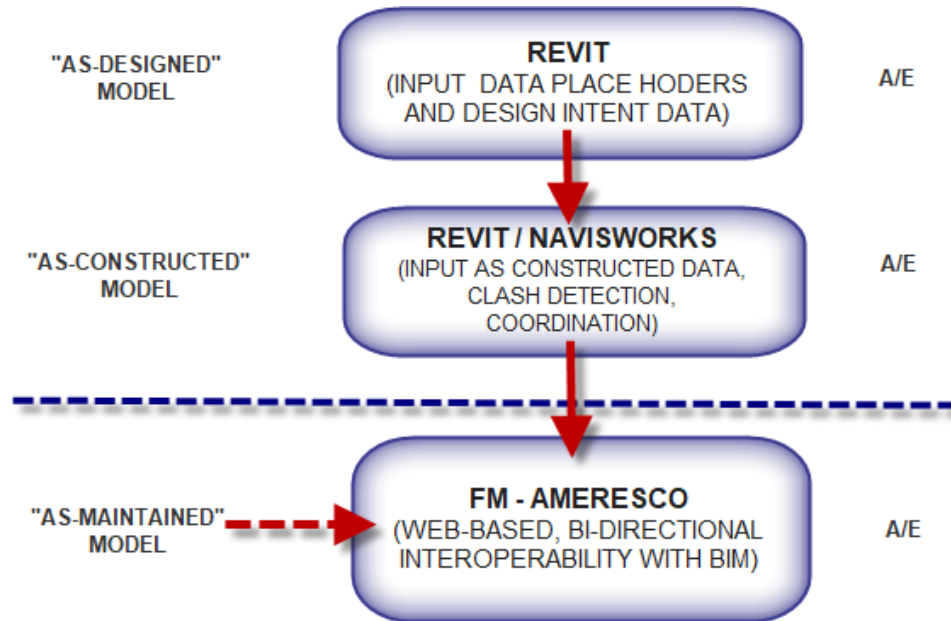
15.2 Interference Checking/Clash Detection Process

Interference checking is done to check for interferences between the designs of one or many models. For interference checking to work properly, project’s models need to have a common reference point. Interference reports should be generated at 60% CD, 90% and 100% CD. The Prime Consultant will be responsible for producing interference reports and coordinate with the rest of the consultants to solve the issues encountered.

At milestone submissions, the interference/clashing reports will be **shared with the client**. After the completion of the construction document model phase, the GC/Contractor shall produce their own interference drawings by using the BIM Models produced by the consultants or by building his own, to capture changes by Owner, architect or as proposed by the contractor.

16 BIM + Facilities Management

BIM is a critical tool for effective facilities management. There are several project milestones that define the primary intent of the BIM process: As-Designed, As-Constructed, and As-Maintained.



The project team will utilize the BIM Execution Plan to appropriately plan, design and construct the project to maximize the benefits of BIM. The completed as-built BIM can then create the foundation for building operations and maintenance, as well as a stepping stone to future building modifications.

The Prime Consultant shall collect all required FM data in the format outlined in **Appendix B– Asset Planner Field Requirements** into a compatible database system to be linked/downloaded and uploaded to The Region’s Asset Management application. The Building Condition Assessment Guide for Asset Planner & Audit Planner document provided by The Region shall further outline the complete requirements of required element data. **Refer to Appendix E: Building Condition Assessment.**

Elements/Components (Families) in the Revit Models will be populated with parameters required for Asset Management; these parameters/fields will include the Uniformat Number and Uniformat Category Name (Level 4). The Region’s Asset Management Team will provide breakdown within each Uniformat classification.

As the project progresses the Revit Models will be populated by each consultant with the required data. By the end of the project the Architect will collect all required FM data in an Excel spreadsheet to be transferred to Ameresco (The Region’s Asset Management application). The Excel spreadsheet will be produced as an export from Revit with additional data entered manually for

components not modeled in Revit (ie. Some elements like paint finishes are not modeled in Revit)

Ameresco or the Region's Asset Management team will be responsible for importing the room data using the excel spreadsheet prepared by the Architect.

Colour digital photographs will be taken of every element in the database and uploaded to Ameresco using the Ameresco mobile app.

The Prime Consultant shall coordinate with The Region the necessary components for the "As-Maintained" model to ensure the BIM is clean, error free and has bi-directional interoperability with The Region's Asset Management application.

17 Appendices

Appendix A - (LOD) Information Exchange Workflow: Model Element Table

Appendix B - Asset Planner Field Requirements

Appendix C - Model Coordination Requirements

Appendix D - The Regional of Durham Works Department: AutoCAD Layering Standards

Appendix E - Building Condition Assessment

Appendix A: Information Exchange Workflow -Model Element Table

Defining the BIM Deliverable

Information Exchange Requirements aids the team by increasing the predicability of the model content

LOD		Responsible Party	
300	Accurate Size & Location, include materials and object parameters	A	Architect
		C	Contractor
200	General Size & Location, include parameter data	SE	Structural Engineer
100	Schematic Size & Location	MEP	MEP Engineer
		FM	Facility Manager
		EE	Electrical Engineer
		FM	Facility Manager
		CV	Civil Engineer
	LA	Landscape Architect	
	TC	Trade Contractors	

Information: This column defines the information and detail required in the model content.

Responsible Party: This column aims to define the responsible parties for the model content of the BIM deliverables.

Consultants shall refer to The Client's Building Condition Assessment Guide for Asset Planner & AuditPlanner for complete FM data requirements.

	Site Clearing	100	CV	200	CV	100	CV			
	Site Demolition & Relocations	100	CV	200	CV	100	CV			
	Site Earthwork	100	CV	200	CV	100	CV			
	Hazardous Waste Remediation	100	CV	200	CV	100	CV			
	Site Improvements									
	Roadways	100	CV	200	CV	100	CV			
	Parking Lots	100	CV	200	CV	100	CV			
	Pedestrian Paving	100	CV	200	CV	100	CV			
	Site Development	100	CV	200	CV	100	CV			
	Landscaping	100	CV	200	CV	100	CV			
	Site Civil/Mech Utilities									
	Water Supply & Distribution Systems	100	MEP	200	MEP	100	MEP			
	Sanitary Sewer Systems	100	MEP	200	MEP	100	MEP			
	Storm Sewer Systems	100	MEP	200	MEP	100	MEP			
	Heating Distribution	100	MEP	200	MEP	100	MEP			
	Cooling Distribution	100	MEP	200	MEP	100	MEP			
	Fuel Distribution	100	MEP	200	MEP	100	MEP			
	Other Civil/Mechanical Utilities	100	MEP	200	MEP	100	MEP			
	Site Electrical Utilities									
	Electrical Distribution	100	MEP	200	MEP	100	MEP			
	Site Lighting	100	MEP	200	MEP	100	MEP			
	Site Communications & Security	100	MEP	200	MEP	100	MEP			
	Other Electrical Utilities	100	MEP	200	MEP	100	MEP			
	Other Site Construction									
	Service Tunnels	100	A	200	A	100	A			
	Other Site Systems & Equipment	100	A	200	A	100	A			
	1 Construction Systems									
	Construction Equipment	100	C	200	C	200	C			
	Temporary Safety	100	C	200	C	200	C			
	Temporary Security	100	C	200	C	200	C			
	Temporary Facilities	100	C	200	C	200	C			
	Weather Protection	100	C	200	C	200	C			
	2 Space									
	Construction Activity Space	100	C	200	C	200	C	Incorporate in 4D/Logistics		
	Analysis Space	100	C	200	C	200	C			
	3 Information									
	Construction Information	100	C	200	C	200	C			
	Engineering Information	100		200		200				
	Record Information	100		200		200				

APPENDIX B: ASSET PLANNER FIELD REQUIREMENTS

Asset Planner Fields	Description	Responsible Group (BIM / Architect)	Comments
Facility ID	Numerical code assigned to each facility	N/A	Generated by the software
Facility Name	Specific descriptor/name for the facility	Architect	Provided by Region of Durham to Architect
ID	Numerical code assigned to each Unifomat classification code	N/A	Generated by the software
Category:	UNIFORMAT 2010 category	BIM Generated	Possible drop down menu with preloaded Unifomat codes (Approximately over 1800 classification codes).
Asset Name	Equipment/asset name installed. E.G. Air handling unit is assigned an asset name of 'HVAC-AHU-01'.	BIM/Architect	
Element Number:	This refers to the number of categories per component and not the quantity of the element.	N/A	Generated by the software
Element ID	Numerical code assigned to each element entered	N/A	Generated by the software
Replacement Cost	The replacement cost field should capture the total value of the element. Be sure that this value matches up with any associated "Replacement" actions	Architect/BIM	BIM to include the Replacement Cost field for each element. Verified by the Architect at substantial.
Last Major Action:	Enter the year that the element was last replaced. In the case of Balconies, Exterior Walls or other systems that are typically not replaced you can use this field to indicate the year in which a major refurbishment took place.	Architect	At the time of Substantial performance, Architect to enter year of install.

Location/Name	This field is used to describe the exact location of specific items within the building where further clarity is required (e.g. Maintenance Room 2, Common Area Lobby, Second Floor Corridor, etc.)	Architect/BIM	BIM to include the Location/Name field for each element. Verified by the Architect at substantial.
Element Description	The element description should be utilized to provide a brief description which must include: general description of overall system, type, size, make, model, serial, quantity. E.g. <i>Two Boiler Brand, 1,500,000 BTU, gas fired, mid-efficiency 85% boilers model BOIL-85, serial no. XX##### (boiler 1 – Mechanical) and serial no XX##### (boiler 2) installed 2018’.</i>	Architect	At the time of substantial performance, Architect to enter element description.
Commentary	<p>Enter a description for the element detailing any additional information relating to its condition and any on-site observations. If no pertinent additional information is present, field can be left blank.</p> <p><i>e.g. “Listed as Fair Condition due to the major repair required on the South Elevation due to observed significant moisture ingress, otherwise remaining three elevations are in Good Condition.”</i></p> <p>For Category B- Shell elements, please include the quantity (or an estimate if the quantity is not available). Examples include:</p> <p><i>“12,500 sq. ft. of Modified SBS roof”</i> <i>“estimated 120 windows”</i> <i>“40% of wall area is cladded with brick veneer”</i></p>	Architect	
Overall Condition	Identify the overall condition of the entire element.	Architect	Prepopulated dropdown list, selected by architect at Substantial.

Action ID	Numerical code assigned to each action entered.	N/A	Generated by the software
Action Summary	Provide a brief description of the work to be conducted. E.g. <i>'Replace at end of useful life'</i> .		
Action Details	Provide longer explanation of the action. Use this field to include quantities, costs or measurements used to calculate the overall action cost.	Architect	
Data Source	Describes how/where the information was gathered	Architect	Prepopulated dropdown list, selected by Architect at substantial.
Cost	This is the cost to perform the action in the current year dollars.		Since this is a new facility, this action cost for the lifecycle replacement should match the 'Replacement Cost' field.
Repeat Interval (years)	The lifecycle of the element	Architect/BIM	Architect to verify at the time of substantial.
Element Quantity/ Measurement Unit	Sq ft, Linear ft, unit, each etc. ie. 100 sq ft of Carpet.	BIM	Total area or quantity of the element

Appendix C: Model Coordination Requirements

The following objects should be modeled as a minimum requirement for coordination of the building systems.

A. Architectural Model Requirements

- Wall thickness and height
- Roof with accurate slopes
- Hard ceilings and soffits
- Suspended acoustical ceilings
- Exteriors walls
- Shafts, wall chases
- Architectural features requiring utilities
- Project Work Point
- Revit Model Origin

B. Structural Model Requirements

Model the entire structural system. All structural members should be accurately sized, in the correct location and height. (Modeling typical conditions only does not meet this requirement.)

Model should include:

- Column grids
- Primary and secondary steel floor and roof framing
- Concrete and steel columns,
- Concrete slabs and foundations
- Concrete curbs and stem walls
- Retaining walls
- Seismic walls, bracing and gusset plates
- Miscellaneous metal supports
- External wall connections

C. Mechanical, Electrical, Plumbing Model Requirements

Model the entire system accurately using the correct sizes.

Include required clearances for access points and maintenance within each discipline model.

Mechanical Model

- Ducts
- Shaft locations
- VAV boxes, Air Handlers
- Fire Smoke Dampers
- Flex Ducts
- Diffuser locations
- HVAC Piping to VAV boxes
- Rooftop equipment (can be drawing as 3D blocks with accurate connection points)

Electrical Model

- Branch and feeder conduits
- All underground conduits
- Lighting fixtures
- Cable trays and other supports
- Outlets and switch locations
- Equipment Panels
- Distribution panel
- Transformer
- Generators
- Bus Ducts

Plumbing model

- Plumbing fixtures
- Graded cast iron pipelines
- Underground storm and sewer pipes
- All major waste and vent lines

- Cold and hot water piping
- All boilers and other equipment – (can be drawn as 3D block with accurate connection points)
- Specialty piping

Fire Protection

- Sprinkler mains and branches
- Sprinkler head drops
- Smaller sprinkler pipes
- Fire Pump
- Standpipes
- Fire commend Panel

Civil and Landscape CAD Drawings

- All contour lines must be drawn in 3D

Appendix D



**The Regional Municipality of Durham
Facilities Management - Works Department**

Facilities AutoCAD Layering Standards

Region of Durham Standard Layer Names

Layer	Color	Linetypes	Width	Description
A-BRF-SYMB	201	Continuous	0.25	Barrier-Free Symbols
A-CLNG-ACCS	6	Continuous	0.35	Access panels
A-CLNG-BULK	10	Dashed-Med	0.18	Bulkheads Above
A-CLNG-CTLJ	2	Continuous	0.35	Ceiling control joints
A-CLNG-GRID	1	Continuous	0.25	Ceiling grid
A-CLNG-OPEN	8	Continuous	0.18	Openings ceiling/roof penetrations
A-CLNG-PATT	8	Continuous	0.18	Ceiling patterns
A-CLNG-SUSP	5	Continuous	0.18	Suspended elements ceiling mounted specialties (e.g. clocks fans etc.)
A-CLNG-TEES	5	Continuous	0.18	Main tees
A-COLS-ENCL	121	Continuous	0.25	Column enclosures/fire protection
A-DOOR-FULL	121	Continuous	0.25	Full height (to ceiling) door: swing and leaf
A-DOOR-IDEN	121	Continuous	0.25	Door number
A-DOOR-PRHT	201	Continuous	0.25	Partial height door: swing and leaf
A-DOOR-SYMB	1	Continuous	0.25	Miscellaneous door symbols (e.g. overhead bi-fold pocket etc.)
A-ELEV-CASE	121	Continuous	0.25	Wall mounted casework
A-ELEV-FIXT	2	Continuous	0.35	Miscellaneous fixtures
A-ELEV-FNSH	121	Continuous	0.25	Finishes woodwork and trim
A-ELEV-IDEN	51	Continuous	0.25	Component identification numbers
A-ELEV-OTLN	6	Continuous	0.35	Building outlines
A-ELEV-PATT	8	Continuous	0.18	Textures and hatch patterns
A-ELEV-PFIX	6	Continuous	0.35	Plumbing fixtures in elevation
A-ELEV-SIGN	1	Continuous	0.25	Signage
A-EQPM-ACCS	6	Continuous	0.35	Equipment access
A-EQPM-CHLD	51	Continuous	0.25	Child development (play toys teaching rugs play forms)
A-EQPM-CHNY	1	Continuous	0.25	Chimney for wood gas electricity
A-EQPM-COPY	51	Continuous	0.25	Copiers fax machines office equipment
A-EQPM-FIXD	132	Continuous	0.35	Fixed equipment
A-EQPM-FRPL	1	Continuous	0.25	Fireplace for wood gas electricity
A-EQPM-IDEN	201	Continuous	0.25	Equipment identification numbers
A-EQPM-KITN	201	Continuous	0.25	Kitchen Appliances
A-EQPM-MEDI	51	Continuous	0.25	Medical (exam beds dental chairs etc.)
A-EQPM-MOVE	6	Continuous	0.35	Moveable equipment

Layer	Color	Linetypes	Width	Description
A-EQPM-NICN	6	Dashed-Med	0.35	Not in contract equipment
A-EQPM-OVHD	6	Continuous	0.35	Overhead ceiling mounted or suspended equipment
A-EQPM-STOR	51	Continuous	0.25	Storage equipment
A-FLOR-CASE	121	Continuous	0.25	Casework (manufactured cabinets)
A-FLOR-EMER	12	Continuous	0.35	Emergency Signs
A-FLOR-FENCE	151	Fence1	0.25	Chain Link Storage Fence-Cage
A-FLOR-FIXT	201	Continuous	0.25	Plumbing fixtures
A-FLOR-HRAL	1	Continuous	0.25	Stair and balcony handrails guard rails
A-FLOR-IDEN	121	Continuous	0.25	Room name space identification text
A-FLOR-LEVL	6	Continuous	0.35	Level changes shafts ramps pits breaks in construction and depressions
A-FLOR-NUMB	201	Continuous	0.25	Room/space identification number and symbol
A-FLOR-OPEN	2	Continuous	0.35	Floor Opening
A-FLOR-OTLN	6	Continuous	0.35	Floor outline/perimeter/building footprint
A-FLOR-OTLN-RPRM	2	Continuous	0.35	Room perimeter shape (Interior walls)
A-FLOR-OVHD	8	Dashed-Med	0.18	Overhead items (skylights overhangs etc.)
A-FLOR-PATT	8	Continuous	0.18	Paving tile carpet patterns
A-FLOR-RAIS	121	Continuous	0.25	Access (raised) flooring
A-FLOR-SIGN	1	Continuous	0.25	Signage
A-FLOR-SPCL	121	Continuous	0.25	Architectural specialties (e.g. toilet room accessories display cases)
A-FLOR-STRS	161	Continuous	0.25	Stair risers/treads escalators ladders
A-FLOR-TPTN	1	Continuous	0.25	Toilet partitions
A-FLOR-WDWK	121	Continuous	0.25	Architectural woodwork (field built cabinets and counters)
A-FURN-ACCS	1	Continuous	0.25	Accessories (vestibule mats partitions draperies clocks trash cans lecturns lamps etc)
A-FURN-ADPC	51	Continuous	0.25	Automated Data Processing Components
A-FURN-ARTW	51	Continuous	0.25	Artwork

Layer	Color	Linetypes	Width	Description
A-FURN-FLOOR	51	Continuous	0.25	Flooring (carpet rugs etc.)
A-FURN-FREE	201	Continuous	0.25	Free-standing furnishings (desks beds tables dressers credenzas casegoods)
A-FURN-GRID	121	Continuous	0.25	Planning grid/modular outline
A-FURN-IDEN	121	Continuous	0.25	Furniture code identification
A-FURN-PLNT	1	Continuous	0.25	Plants
A-FURN-SEAT	51	Continuous	0.25	Chairs sofas etc.
A-FURN-STOR	51	Continuous	0.25	File cabinets high density storage shelving
A-GLAZ-FULL	1	Continuous	0.25	Full height glazed walls and partitions
A-GLAZ-IDEN	121	Continuous	0.25	Window number
A-GLAZ-PRHT	1	Continuous	0.25	Partial height walls (do not appear on Reflected Ceiling Plan)
A-GLAZ-SILL	5	Continuous	0.18	Window sills
A-GLAZ-SYMB	1	Continuous	0.25	Window Unit
A-LITE-CLNG	132	Continuous	0.35	Ceiling Mounted Light Fixtures
A-RADON-SYMB	30	Continuous	0.18	Radon Symbol
A-ROOF-ACCS	6	Continuous	0.35	Roof Access or opening
A-ROOF-BELOW	51	Continuous	0.25	Lower Roof Levels
A-ROOF-CRTS	1	Continuous	0.25	Crickets flow arrows flow info
A-ROOF-EQMT	61	Continuous	0.25	Mechanical Equipment
A-ROOF-EXPJ	5	Continuous	0.18	Expansion joints
A-ROOF-GUTR	8	Continuous	0.18	Roof internal gutters
A-ROOF-HRAL	5	Continuous	0.18	Stair handrails nosings guard rails
A-ROOF-LEVL	5	Continuous	0.18	Level changes
A-ROOF-MECH	201	Continuous	0.25	Vent stacks - Roof Top Plumbing
A-ROOF-OTLN	6	Continuous	0.35	Roof perimeter/edge roof geometry
A-ROOF-PATT	8	Continuous	0.18	Roof surface patterns hatching
A-ROOF-RFDR	1	Continuous	0.25	Roof drains
A-ROOF-SLPE	10	Continuous	0.18	Insulation roof slope lines
A-ROOF-SPCL	121	Continuous	0.25	Roof specialties accessories access hatches dormers
A-ROOF-STRS	5	Continuous	0.18	Stair risers/treads ladders
A-ROOF-WALK	121	Continuous	0.25	Roof walkways

Layer	Color	Linetypes	Width	Description
A-ROOF-WALL	2	Continuous	0.35	Parapet walls and wall caps
A-SECT-IDEN	51	Continuous	0.25	Component identification numbers
A-SECT-MBND	5	Continuous	0.18	Material beyond section cut
A-SECT-MCUT	6	Continuous	0.35	Material cut by section
A-SECT-PATT	8	Continuous	0.18	Textures and hatch patterns
A-SYST-FURN	51	Continuous	0.25	Furniture
A-SYST-IDEN	1	Continuous	0.25	Code identification
A-SYST-LITE	121	Continuous	0.25	Lighting components
A-SYST-PATT	8	Continuous	0.18	Patterns
A-SYST-PNLS	51	Continuous	0.25	Panels
A-SYST-POWR	121	Continuous	0.25	Power communication components
A-SYST-STOR	51	Continuous	0.25	Storage components
A-SYST-WALL	51	Continuous	0.25	Systems furniture partition walls
A-SYST-WKSF	51	Continuous	0.25	Work surface components
A-WALL-BELOW	10	Dashed-Med	0.18	Perimeter Wall Below
A-WALL-CAVI	1	Continuous	0.25	Cavity wall lines
A-WALL-CNTR	5	Center-Dash	0.18	Wall centerlines
A-WALL-CWMG	1	Continuous	0.25	Curtain wall mullions and glass
A-WALL-FIRE	2	Continuous	0.35	Fire wall designators (patterning)
A-WALL-FULL-EXTR	2	Continuous	0.35	Exterior full height walls
A-WALL-FULL-INTR	3	Continuous	0.25	Interior full height walls
A-WALL-HEAD	1	Continuous	0.25	Door and window headers
A-WALL-IDEN	121	Continuous	0.25	Wall Identifier
A-WALL-JAMB	1	Continuous	0.25	Door and window jambs
A-WALL-MOVE	5	Continuous	0.18	Moveable walls/partitions
A-WALL-OPEN	201	Continuous	0.25	Wall Opening
A-WALL-PATT	8	Continuous	0.18	Wall insulation hatching and fill
A-WALL-PATT-BATT	8	Batting	0.18	Batten Insulation
A-WALL-PRHT	1	Continuous	0.25	Partial HT Walls
A-WALL-SPCL	1	Continuous	0.25	Wall-hung/attached specialties (e.g.

Layer	Color	Linetypes	Width	Description
				fixtures grab bars (incl. handicap) telephone booths)
C-ALGN-DATA	121	Continuous	0.25	Alignment coordinates and curve data
C-ALGN-LINE	2	Center-Dot	0.35	Alignments
C-ALGN-STAT	121	Continuous	0.25	Alignment stationing and tick marks
C-CHAN-AIDS	2	Continuous	0.35	Navigation aids and text
C-CHAN-CNTR	5	Center-Dot	0.18	Channel centerline and survey report lines
C-CHAN- CNTR-IDEN	5	Continuous	0.18	Channel centerline and survey report lines - Annotation
C-CHAN-DACL	121	Continuous	0.25	De-authorized channel limits anchorages etc
E-ALRM-IDEN	2	Continuous	0.35	Identifier tags symbol modifier and text
E-ALRM-SYMB	6	Continuous	0.35	Miscellaneous alarm system symbols
E-BELL-IDEN	2	Continuous	0.35	Identifier tags symbol modifier and text
E-BELL-SYMB	6	Continuous	0.35	Bell system symbols
E-CABL-COAX	83	Continuous	0.5	Coax cable
E-CABL-FIBR	83	Continuous	0.5	Fibre optics cable
E-CABL-IDEN	2	Continuous	0.35	Cable identifiers
E-CABL-MULT	83	Continuous	0.5	Multi-conductor cable
E-CABL-TRAY	6	Continuous	0.35	Cable trays and wireways
E-CATV-IDEN	2	Continuous	0.35	Identifier tags symbol modifier and text
E-CCTV-IDEN	2	Continuous	0.35	Identifier tags symbol modifier and text
E-CCTV-SYMB	6	Continuous	0.35	Closed-circuit television system symbols
E-CLOK-IDEN	2	Continuous	0.35	Identifier tags symbol modifier and text
E-CLOK-SYMB	6	Continuous	0.35	Clock system symbols
E-CODE-INFO	121	Continuous	0.25	Clearances and working space information
E-CONT-THER	121	Continuous	0.25	Thermostat Heaters
E-CONT-WIRE	121	Continuous	0.25	Low voltage wiring
E-DIAG-GRID	9	Continuous	0.09	Gridlines
E-DIAG-GRPH	7	Continuous	0.25	Misc Schematic Symbols
E-DIAG-IDEN	51	Continuous	0.25	Identifier tags symbol modifier and text
E-DICT-IDEN	2	Continuous	0.35	Identifier tags symbol modifier and text
E-GRND-CIRC	4	Continuous	0.5	Circuits

Layer	Color	Linetypes	Width	Description
E-GRND-DIAG	162	Continuous	0.35	Ground system diagram
E-GRND-EQUI	82	Continuous	0.35	Equipotential ground system
E-GRND-REFR	22	Continuous	0.35	Reference ground system
E-HEAT-BASE	121	Continuous	0.25	Heating
E-HEAT-CEIL	121	Continuous	0.25	Radiant
E-HEAT-FAIR	121	Continuous	0.25	Force air
E-HEAT-FLOR	121	Continuous	0.25	Wire in floor
E-INTC-IDEN	2	Continuous	0.35	Identifier tags symbol modifier and text
E-INTC-SYMB	6	Continuous	0.35	Intercom/PA system symbols
E-INTR-PANL	6	Continuous	0.35	Intrusion alarm pannel
E-LITE-CIRC	82	Phantom	0.35	Lighting circuits (including crosslines and homeruns)
E-LITE-CIRC- NUMB	51	Continuous	0.25	Lighting circuit numbers (e.g. panel/circuit number wire/conduit size)
E-LITE-CLNG	201	Continuous	0.25	Ceiling mounted fixtures
E-LITE-EMER	11	Continuous	0.25	Emergency fixtures
E-LITE-EXIT	201	Continuous	0.25	Exit Signs
E-LITE-FLOR	201	Continuous	0.25	Floor mounted fixtures (e.g. stage)
E-LITE-IDEN	51	Continuous	0.25	Light fixture identifier tags
E-LITE-JBOX	3	Continuous	0.25	Junction boxes
E-LITE-PANL	132	Continuous	0.35	Main distribution panels switchboards lighting panels
E-LITE-PANL- TEXT	121	Continuous	0.25	Panels text lighting
E-LITE-ROOF	201	Continuous	0.25	Roof lighting
E-LITE-SPCL	201	Continuous	0.25	Special fixtures
E-LITE-SWCH	160	Continuous	0.25	Lighting contactors photoelectric controls low-voltage lighting controls etc.
E-LITE-WALL	201	Continuous	0.25	Wall mounted fixtures
E-LTNG-COND	6	Continuous	0.35	Lightning protection conductors
E-LTNG-TERM	6	Continuous	0.35	Lightning protection terminals etc.
E-MONT-WELL	5	Continuous	0.18	Monitoring well
E-MONT- WELL-TEXT	161	Continuous	0.25	Monitoring Well Text

Layer	Color	Linetypes	Width	Description
E-NURS-IDEN	2	Continuous	0.35	Identifier tags symbol modifier and text
E-NURS-SYMB	6	Continuous	0.35	Nurse call/paging system symbols
E-PIEZOMETER	100	Continuous	0.18	Piezometer
E-POWR-BUSW	201	Continuous	0.25	Busways and wireways
E-POWR-CABL	201	Continuous	0.25	Cable trays
E-POWR-CIRC	83	Phantom	0.5	Power circuits (including crosslines and homeruns)
E-POWR-CIRC-NUMB	51	Continuous	0.25	Power circuit numbers (e.g. panel/circuit number wire/conduit size)
E-POWR-COND	201	Continuous	0.25	Power conduit - all types
E-POWR-COND-TEXT	21	Continuous	0.25	Power Conduit text
E-POWR-FEED	201	Continuous	0.25	Feeders (Secondary Voltage)
E-POWR-FLOR	21	Continuous	0.25	Floor outlets (receptacles and switches)
E-POWR-GENR	121	Continuous	0.25	Generators and auxiliary equipment
E-POWR-JBOX	82	Continuous	0.35	Junction boxes
E-POWR-MOTR	121	Continuous	0.25	Motors and utilization equipment
E-POWR-PANL	132	Continuous	0.35	Panelboards switchboards MCC unit substations
E-POWR-PANL-TEXT	121	Continuous	0.25	Power pannel text
E-POWR-SWCH	160	Continuous	0.25	Disconnect switches motor starters contactors etc.
E-POWR-URAC	201	Dashed-Long	0.25	Underfloor raceways
E-POWR-WALL	21	Continuous	0.25	Wall outlets (receptacles and switches)
E-POWR-WALL-TEXT	21	Continuous	0.25	Text outlet/switches
E-SERT-ACCS	22	Continuous	0.35	Access control system symbols
E-SERT-CLNG	22	Continuous	0.35	Ceiling mounted sensors
E-SERT-FLOR	22	Continuous	0.35	Floor mounted sensors
E-SERT-IDEN	2	Continuous	0.35	Identifier tags symbol modifier and

Layer	Color	Linetypes	Width	Description
				text
E-SERT-UNDR	22	Continuous	0.35	Buried sensors
E-SERT-WALL	22	Continuous	0.35	Wall mounted sensors
E-SOUN-IDEN	2	Continuous	0.35	Identifier tags symbol modifier and text
E-SOUN-SYMB	6	Continuous	0.35	Sound system symbols
E-SPCL-PANL	132	Continuous	0.35	Panelboards backing boards patch panel racks
E-TEXT	7	Continuous	0.18	Text
E-TVAN-IDEN	2	Continuous	0.35	Identifier tags symbol modifier and text
F-AFFF-EQPM	82	Continuous	0.35	Equipment
F-AFFF-PIPE	82	Continuous	0.35	Piping
F-ALRM-DTCT	22	Continuous	0.35	Smoke/heat/other detectors
F-ALRM-DTCT-TEXT	11	Continuous	0.25	Text fire detector flame
F-ALRM-INDC	82	Continuous	0.35	Indicating appliances
F-ALRM-INDC-TEXT	21	Continuous	0.25	Text annunciator
F-ALRM-JB	6	Continuous	0.35	Alarm Junction Box lines
F-ALRM-MANL	22	Continuous	0.35	Manual fire alarm pull stations
F-ALRM-MANL-TEXT	11	Continuous	0.25	Text Master fire alarm box
F-ALRM-PIPE	6	Continuous	0.35	Alarm System Piping
F-ALRM-ZONE	23	Continuous	0.5	Fire Alarm Zones
F-ALRM-ZONE-TEXT	11	Continuous	0.25	Text fire alarm zones
F-CO2S-EQPM	6	Continuous	0.35	Equipment
F-CO2S-PIPE	6	Continuous	0.35	CO2 piping or CO2 discharge nozzle piping
F-CTRL-PANL	22	Continuous	0.35	Control panels
F-CTRL-PANL-TEXT	11	Continuous	0.25	Text Control Equipment
F-FLOR-IDEN	121	Continuous	0.25	Room name space identification text
F-FLOR-NUMB	201	Continuous	0.25	Room/space identification number and symbol
F-HALN-EQPM	22	Continuous	0.35	Halon equipment

Layer	Color	Linetypes	Width	Description
F-HALN-PIPE	22	Continuous	0.35	Halon piping
F-IGAS-EQPM	162	Continuous	0.35	Inert gas equipment
F-IGAS-PIPE	162	Continuous	0.35	Inert gas piping
F-LITE-EMER	23	Continuous	0.5	Emergency fixtures
F-LITE-EXIT	203	Continuous	0.5	Exit fixtures
F-LSFT-EGRE	6	Continuous	0.35	Egress requirements designator
F-LSFT-OCCP	6	Continuous	0.35	Occupant load for egress capacity
F-LSFT-TRVL	6	Continuous	0.35	Maximum travel distance
F-PROT-CABN	2	Continuous	0.35	Fire hose cabinets
F-PROT-EXTN	2	Continuous	0.35	Fire extinguishers and fire extinguisher cabinets
F-PROT-HOSE	2	Continuous	0.35	Fire hoses
F-RATE-DOOR	4	Continuous	0.5	Door fire ratings
F-RATE-WALL	4	Continuous	0.5	Wall fire ratings
F-SMOK-DAMP	22	Continuous	0.35	Dampers
F-SPRN-CLHD	122	Continuous	0.35	Sprinkler - ceiling heads
F-SPRN-EQPM	6	Continuous	0.35	Equipment
F-SPRN-OTHD	122	Continuous	0.35	Sprinkler - other heads
F-SPRN-PIPE	132	Continuous	0.35	Sprinkler piping
F-SPRN-PIPE-EVAC	132	Sprinkler- Drain	0.35	Sprinkler piping
F-SPRN-PIPE-HEAD	132	Sprinkler- Branch	0.35	Sprinkler piping
F-SPRN-PIPE-MAIN	132	Sprinkler- Main	0.35	Sprinkler piping
F-SPRN-STAN	122	Continuous	0.35	Standpipe system
F-WATR-CONN	122	Continuous	0.35	Fire department connections
F-WATR-HYDR	122	Continuous	0.35	Hydrants
F-WATR-PIPE	132	Fire-Oh	0.35	Piping
F-WATR-PUMP	122	Continuous	0.35	Fire pumps
GO-BORE-HOLE	5	Continuous	0.18	Bore hole symbol
GO-BORE-HOLE-TEXT	5	Continuous	0.25	Bore hole ID
GO-GRID-EXTR	5	Center- Dash	0.18	Column Grid Outside Building

Layer	Color	Linetypes	Width	Description
GO-GRID-IDEN	51	Continuous	0.25	Column Grid Tags
GO-PLAN-OTLN	6	Continuous	0.35	Floor Outline/Perimeter/Building Footprint
GO-SITE-OTLN	6	Continuous	0.35	Site Plan-Key
GO-TEST-PIT	5	Continuous	0.18	Test Pit symbol
GO-TEXT	5	Continuous	0.18	Text
GO-BORE-ELEV	121	Continuous	0.25	Boring elev
GO-BORE-FDTA	121	Continuous	0.25	Field data
GO-BORE-IDEN	2	Continuous	0.35	Component ID #
GO-BORE-LDTA	1	Continuous	0.25	Laboratory data
GO-BORE-PATT	8	Continuous	0.18	Soil/rock patterns
GO-BORE-TPIT-TEXT	151	Continuous	0.25	Bore/Test Pit
H-BLDG-IDEN	7	Continuous	0.35	Annotation
H-BLDG-OTLN	12	Continuous	0.35	Command posts information centers
H-DECN-EQPM	1	Continuous	0.25	Decontamination equipment
H-DECN-IDEN	6	Continuous	0.35	Annotation
H-DETL-GRPH	7	Continuous	0.18	Graphics gridlines non-text items
H-DISP-HAZW	5	Continuous	0.18	Hazardous waste
H-DISP-IDEN	6	Continuous	0.35	Annotation
H-DISP-MUNT	5	Continuous	0.18	Munitions
H-DISP-TANK	6	Continuous	0.35	Spill containment tanks
H-FIXT-EYEW	121	Continuous	0.25	Emergency eyewashes
H-FIXT-SHOW	121	Continuous	0.25	Emergency showers
H-MNST-AIRQ	121	Continuous	0.25	Air quality
H-MNST-GWTR	121	Continuous	0.25	Ground water
H-MNST-IDEN	121	Continuous	0.25	Annotation
H-MNST-LAND	121	Continuous	0.25	Landfill gas
H-MNST-SOIL	121	Continuous	0.25	Soil gas
H-MNST-SWTR	121	Continuous	0.25	Surface water
H-POLL-CONC	2	Continuous	0.35	Polluted area of concern

Layer	Color	Linetypes	Width	Description
H-POLL-IDEN	2	Continuous	0.35	Annotation
H-POLL-ORIG	2	Continuous	0.35	Point of pollution origin
H-POLL-POTN	2	Continuous	0.35	Potential spill emission or release source
H-SAMP-AIRS	1	Continuous	0.25	Air samples
H-SAMP-BIOL	1	Continuous	0.25	Biological samples
H-SAMP-GWTR	1	Continuous	0.25	Ground water samples
H-SAMP-IDEN	1	Continuous	0.25	Annotation
H-SAMP-MAGN	1	Continuous	0.25	Magnetometer location points
H-SAMP-SEDI	1	Continuous	0.25	Sediment samples
H-SAMP-SOIL	1	Continuous	0.25	Soil samples
H-SAMP-SOLI	1	Continuous	0.25	Solid material samples
H-SAMP-SWTR	1	Continuous	0.25	Surface water samples
H-SAMP-WAST	1	Continuous	0.25	Waste samples
H-SECT-IDEN	2	Continuous	0.35	Component identification numbers
H-SECT-MBND	5	Continuous	0.18	Material beyond section cut
H-SECT-MCUT	4	Continuous	0.5	Material cut by section
H-SECT-PATT	8	Continuous	0.18	Textures and hatch patterns
H-STOR-HAZM	6	Continuous	0.35	Hazardous materials
H-STOR-HAZW	6	Continuous	0.35	Hazardous waste
H-STOR-IDEN	6	Continuous	0.35	Annotation
HI-STAT-EXST	252	Continuous	0.25	Existing
M-ACID-EQPM	6	Continuous	0.35	Acid alkaline and oil waste equipment
M-ACID-PIPE	2	Continuous	0.35	Acid alkaline and oil waste piping
M-ACID-VENT	2	Dashed-Med	0.35	Acid alkaline and oil waste vent piping
M-AFRZ-PIPE	82	Continuous	0.35	Anti-freeze piping
M-AFRZ-WAST	82	Continuous	0.35	Waste anti-freeze piping
M-BRIN-EQPM	6	Continuous	0.35	Brine system equipment
M-BRIN-PIPE	2	Continuous	0.35	Brine system piping supply
M-BRIN-PIPE-RETURN	2	Brine-Return	0.35	Brine system piping return
M-BRIN-PIPE-SUPPLY	2	Brine-Supply	0.35	Brine system piping supply
M-CHEM-PIPE	122	Continuous	0.35	Piping (includes fittings valves)

Layer	Color	Linetypes	Width	Description
M-CIRC-PIPE-RETURN	82	Circ-Wtr-Return	0.35	Circulating Water Return
M-CIRC-PIPE-SUPPLY	82	Circ-Wtr-Flow	0.35	Circulating water supply
M-CNDW-PIPE	82	Continuous	0.35	Condenser water piping
M-COLD-GLYCOL-RETURN	123	Cgr	0.5	Cold Glycol Supply Line
M-COLD-GLYCOL-SUPPLY	132	Cgs	0.35	Cold Glycol Supply Line
M-COND-PIPE	82	Continuous	0.35	Condensate piping (includes fittings valves)
M-COND-PIPE-RETURN	82	Cond-Wtr-Return	0.35	Condensate return
M-COND-PIPE-SUPPLY	82	Cond-Wtr-Flow	0.35	Condensate supply
M-CONT-HUM	12	Continuous	0.35	Humidistat
M-CONT-THER	121	Continuous	0.25	Pneumatic control etc.
M-CONT-WIRE	1	Dot	0.25	Low voltage wiring
M-CWTR-PIPE-RETURN	162	Chill-Wtr-Flow	0.35	Chilled Water Supply
M-CWTR-PIPE-SUPPLY	162	Chill-Wtr-Flow	0.35	Chilled Water Supply
M-DETL-GRPH	7	Continuous	0.18	Graphics gridlines non-text items
M-DIAG-GRPH	7	Continuous	0.35	Graphics/gridlines/non-text items
M-DIAG-INPD	1	Continuous	0.25	Inch-pound-specific dimensions and notes
M-DIAG-METR	121	Continuous	0.25	Metric-specific dimensions and notes
M-DISC-INFO	121	Dot	0.25	Clearances and working space information
M-DUAL-PIPE	22	Continuous	0.35	Piping (includes fittings valves)
M-DUST-DUCT	6	Continuous	0.35	Dust and fume duct
M-ELEV-FIXT	6	Continuous	0.35	Miscellaneous fixtures
M-ELEV-IDEN	51	Continuous	0.25	Component identification numbers
M-ELEV-OTLN	6	Continuous	0.35	Building outlines
M-ELEV-PATT	8	Continuous	0.18	Textures and hatch patterns

Layer	Color	Linetypes	Width	Description
M-ELEV-PFIX	6	Continuous	0.35	Plumbing fixtures
M-EQPM-CHNY	1	Continuous	0.25	Chimney for wood gas electricity
M-EXHS-DUCT	82	Continuous	0.35	Exhaust ductwork
M-FLOR-IDEN	121	Continuous	0.25	Room name space identification text
M-FLOR-NUMB	201	Continuous	0.25	Room/space identification number and symbol
M-GTHP-EQPM	6	Continuous	0.35	Equipment
M-GTHP-PIPE	6	Continuous	0.35	Piping (includes fittings valves)
M-HEAT-GLYCOL-RETURN	123	Hgr	0.5	Heating Glycol Return Line
M-HEAT-GLYCOL-SUPPLY	132	Hgs	0.35	Heating Glycol Supply Line
M-HTCW-ABND	210	Dashed-Med	0.18	Abandoned piping
M-HTCW-CHLL	6	Continuous	0.35	Main chilled water piping
M-HTCW-CHLP	6	Continuous	0.35	Chilled water plant
M-HTCW-CHLS	121	Continuous	0.25	Chilled water service piping
M-HTCW-DEVC	6	Continuous	0.35	Rigid anchors anchor guides rectifiers reducers markers meters pumps regulators tanks and valves
M-HTCW-FLOW	121	Continuous	0.25	Flow direction arrows
M-HTCW-FTTG	6	Continuous	0.35	Caps and flanges
M-HTCW-HTPL	1	Continuous	0.25	Main high temperature piping
M-HTCW-HTPP	6	Continuous	0.35	High temperature water plant
M-HTCW-HTPS	121	Continuous	0.25	High temperature service piping
M-HTCW-IDEN	51	Continuous	0.25	Identifier tags symbol modifier and text
M-HTCW-JBOX	1	Continuous	0.25	Junction boxes manholes handholes test boxes
M-HTCW-LTPL	2	Continuous	0.35	Main low temperature piping
M-HTCW-LTPS	121	Continuous	0.25	Low temperature service piping
M-HTCW-PITS	121	Continuous	0.25	Valve pits/vaults steam pits
M-HTCW-PLNT-IDEN	51	Continuous	0.25	Identifier tags symbol modifier and text

Layer	Color	Linetypes	Width	Description
M-HTCW-PUMP	6	Continuous	0.35	Pump stations
M-HTCW-RTRN	162	Continuous	0.35	Return for all HTCW lines
M-HTCW-STML	12	Continuous	0.35	Main steam piping
M-HTCW-STMS	132	Continuous	0.35	Steam service piping
M-HTCW-STNS-IDEN	51	Continuous	0.25	Identifier tags symbol modifier and text
M-HTCW-TEXT	7	Continuous	0.35	All HTCW Text
M-HVAC-ACCS	121	Continuous	0.25	Equipment access doors
M-HVAC-CDFF	12	Continuous	0.35	Ceiling diffusers registers and grilles
M-HVAC-DAMP	1	Continuous	0.25	Fire and smoke dampers
M-HVAC-EQPM	2	Continuous	0.35	Equipment
M-HVAC-FDFF	162	Continuous	0.35	Floor diffusers registers and grilles
M-HVAC-IDEN	6	Continuous	0.35	Duct sizes and pressure classes
M-HVAC-RETN	31	Continuous	0.35	Return duct
M-HVAC-ROOF	2	Continuous	0.35	Roof mounted HVAC equipment
M-HVAC-SUPP	132	Continuous	0.35	Supply duct
M-HVAC-TAGS	201	Continuous	0.25	Diffuser/register/grille tags and air flow arrows
M-HVAC-TEXT	7	Continuous	0.35	HVAC Text
M-HVAC-WDFF	2	Continuous	0.35	Wall diffusers registers and grilles
M-HWTR-PIPE	92	Continuous	0.35	Piping (includes fittings valves)
M-HYDR-EQPM	6	Continuous	0.35	Hydraulic system equipment
M-HYDR-PIPE	2	Continuous	0.35	Hydraulic system piping
M-INSL-EQPM	6	Continuous	0.35	Insulating oil equipment
M-INSL-PIPE	2	Continuous	0.35	Insulating oil piping
M-LUBE-EQPM	6	Continuous	0.35	Lubrication oil equipment
M-LUBE-PIPE	2	Continuous	0.35	Lubrication oil piping
M-MACH-BASE	2	Continuous	0.35	Machinery bases
M-MACH-COMP	2	Continuous	0.35	Miscellaneous machinery parts and components
M-MACH-EXST	252	Continuous	0.25	Existing machinery
M-MACH-FAST	2	Continuous	0.35	Welding symbols

Layer	Color	Linetypes	Width	Description
M-MACH-LROT	6	Continuous	0.35	Large rotating machinery (turbine and pump outlines)
M-MACH-MOTR	6	Continuous	0.35	Machinery motors
M-MATL-CRAN	2	Continuous	0.35	Bridge cranes jib cranes and monorails
M-MATL-HOIS	2	Continuous	0.35	Hoists and hooks
M-MATL-LIFT	6	Continuous	0.35	Miscellaneous lifting equipment
M-PENE-FLOR	121	Dashed-Med	0.25	Floor penetrations
M-PENE-ROOF	1	Dashed-Med	0.25	Roof penetrations
M-PROC-EQPM	6	Continuous	0.35	Equipment
M-PROC-PIPE	2	Continuous	0.35	Process piping
M-RCOV-PIPE	6	Continuous	0.35	Piping (includes fittings valves)
M-REFG-PIPE	162	Continuous	0.35	
M-REFG-PIPE-DISC	162	Discharge	0.35	Refrigeration discharge pipe
M-REFG-PIPE-SUCT	162	Refr-Suction	0.35	Refrigeration suction pipe
M-RWTR-EQPM	6	Continuous	0.35	Raw water equipment
M-RWTR-PIPE	2	Continuous	0.35	Raw water piping
M-SECT-IDEN	121	Continuous	0.25	Component identification numbers
M-SECT-MBND	5	Continuous	0.18	Material beyond section cut
M-SECT-MCUT	132	Continuous	0.35	Material cut by section
M-SECT-PATT	8	Continuous	0.18	Textures and hatch patterns
M-STAT-EXST	252	Continuous	0.25	Existing
M-STEM-PIPE-HPR	92	Hp-Return	0.35	Steam return high pressure
M-STEM-PIPE-HPS	92	Hp-Steam	0.35	Steam supply high pressure
M-STEM-PIPE-LPR	92	Lp-Return	0.35	Steam return Low pressure
M-STEM-PIPE-LPS	92	Lp-Steam	0.35	Steam supply Low pressure
M-STEM-PIPE-Mp-Return	92	Mp-Return	0.35	Steam return medium pressure

Layer	Color	Linetypes	Width	Description
MPR				
M-STEM-PIPE-MPS	92	Mp-Steam	0.35	Steam supply medium pressure
P-DOMW-ACCS	82	Continuous	0.35	Equipment access doors
P-DOMW-CPIP	122	Dcw	0.35	Domestic cold water piping
P-DOMW-EQPM	7	Continuous	0.35	Hot and cold water equipment
P-DOMW-FPIP	82	Continuous	0.35	Domestic filtered water piping
P-DOMW-HPIP	92	Dhw	0.35	Domestic hot water piping
P-DOMW-HPIP-RETURN	92	Dhwr	0.35	Domestic hot water piping return
P-DOMW-RISR	121	Dashed-Med	0.25	Domestic hot and cold water risers
P-DOMW-TEXT	7	Continuous	0.35	Domestic Water Text
P-FLOR-NUMB	201	Continuous	0.25	Room/space identification number and symbol
P-FUEL-EQPM	22	Continuous	0.35	Fuel Equipment
P-FUEL-FGAS	22	Continuous	0.35	Fuel gas piping
P-FUEL-FOIL	22	Continuous	0.35	Fuel oil piping
P-FUEL-NGAS	22	Continuous	0.35	Fuel Natural gas piping
P-FUEL-TEXT	7	Continuous	0.35	Fuel Text
P-GATE	210	Continuous	0.18	Gate
P-GATE-TEXT	210	Continuous	0.18	Gate ID
P-LGAS-EQPM	31	Continuous	0.35	Laboratory Equipment
P-LGAS-PIPE	31	Continuous	0.35	Laboratory Piping
P-MDGS-EQPM	22	Continuous	0.35	Medical Equipment
P-MDGS-PIPE	22	Continuous	0.35	Medical Piping
P-PENE-FLOR	121	Dashed-Med	0.25	Floor penetrations
P-PENE-ROOF	1	Dashed-Med	0.25	Roof penetrations
P-PIPE-AIRC	31	Comp-Air	0.35	Compress Air Pipe
P-PIPE-DEIO	31	Deionw	0.35	Deionized water line
P-PIPE-DIST	31	Dist	0.35	Distilled water line
P-PIPE-GAS	31	Gas-Line	0.35	Gas line

Layer	Color	Linetypes	Width	Description
P-PIPE-HWRL	31	Hr	0.35	Hot water return laboratoiry
P-PIPE-HWSL	31	Hs	0.35	Hot water supply laboratoiry
P-PIPE-OXYG	31	Oxy	0.35	Oxygene line
P-PIPE-VACP	31	Vac-Pump	0.35	Vacuum Pump
P-SANR-COND	82	Continuous	0.35	Sanitary Condensate piping
P-SANR-EQPM	6	Continuous	0.35	Sanitary Equipment (e.g. sand/oil/water separators)
P-SANR-FLDR	6	Continuous	0.35	Sanitary Floor drains sinks and cleanouts
P-SANR-PIPE	6	Continuous	0.35	Sanitary Piping
P-SANR-RISR	201	Dashed-Med	0.25	Sanitary risers
P-SANR-TEXT	7	Continuous	0.35	Sanitary Text
P-SANR-VENT	6	Continuous	0.35	Sanitary Vent piping
P-STRM-PIPE	162	Dashed-Med	0.35	Storm drain piping
P-STRM-RFDR	162	Continuous	0.35	Storm Roof drains
P-STRM-RISR	161	Dashed-Med	0.25	Storm drain risers
P-STRM-TEXT	7	Continuous	0.35	Storm Text
P-TEXT	7	Continuous	0.18	Text
S-BEAM-CNTR	5	Center-Dash	0.18	Beam centerlines
S-BEAM-PRIM	4	Continuous	0.5	Primary beams girders
S-BEAM-SECD	6	Continuous	0.35	Secondary beams girders
S-BRAC-LATL	2	Continuous	0.35	Lateral bracing
S-BRAC-SHEA	2	Continuous	0.35	Shear walls
S-BRAC-VERT	2	Continuous	0.35	Vertical bracing
S-COLS-CNTR	10	Center-Dash	0.18	Column centerlines/working lines
S-COLS-MS1	22	Continuous	0.35	Miscellaneous columns (Type 1)
S-COLS-PRIM	6	Continuous	0.35	Primary columns
S-COLS-SECD	2	Continuous	0.35	Secondary columns
S-DECK-FLOR	121	Continuous	0.25	Floor deck
S-DECK-OPEN	1	Continuous	0.25	Openings and penetrations
S-DECK-RBAR	7	Continuous	0.5	Deck/slab reinforcing

Layer	Color	Linetypes	Width	Description
S-DECK-ROOF	121	Continuous	0.25	Roof deck
S-DETL-GRPH	7	Continuous	0.18	Graphics gridlines non-text items
S-FEAT-GENL	6	Continuous	0.35	General features (miscellaneous items)
S-FNDN-CNTR	5	Center-Dash	0.18	Beam centerlines
S-FNDN-FTNG	7	Continuous	0.18	Footings
S-FNDN-GRBM	7	Continuous	0.18	Grade beams
S-FNDN-PEDS	7	Continuous	0.18	Column pedestals
S-FNDN-PILE	2	Continuous	0.35	Piles (steel sheet concrete wood) piers caisson piers drilled piers
S-FNDN-RBAR	7	Continuous	0.5	Foundation reinforcing
S-GRAT-ELEV	121	Continuous	0.25	Elevated grating (catwalks)
S-GRAT-FLOR	121	Continuous	0.25	Floor grating
S-GRAT-SUBS	121	Continuous	0.25	Subsurface grating
S-GRID-HORZ	5	Center-Dash	0.18	Primary grid lines (horizontal)
S-GRID-IDEN	121	Continuous	0.25	Column I.D. tags
S-GRID-MSC1	8	Continuous	0.18	Miscellaneous grid lines
S-GRID-MSC2	8	Continuous	0.18	Miscellaneous grid lines
S-GRID-MSC3	8	Continuous	0.18	Miscellaneous grid lines
S-GRID-MSC4	8	Continuous	0.18	Miscellaneous grid lines
S-GRID-VERT	5	Center-Dash	0.18	Primary grid lines (vertical)
S-JOIN-CNST	121	Continuous	0.25	Construction joints
S-JOIN-CTRL	1	Continuous	0.25	Control/expansion joints
S-JOIS-BRDG	1	Dashed-Med	0.25	Bridging
S-JOIS-PRIM	22	Continuous	0.35	Primary joists
S-JOIS-SECD	31	Continuous	0.35	Secondary joists
S-PADS-EQPM	6	Continuous	0.35	Equipment pads
S-PIPE-GATE	121	Continuous	0.25	Gates (flap gates sluice gates other)
S-PIPE-MISC	51	Continuous	0.25	Miscellaneous piping/culverts
S-PIPE-TRASH	121	Continuous	0.25	Trash racks
S-REIN-RBAR	7	Continuous	0.5	Rebar welded wire mesh
S-SECT-CMUW	2	Continuous	0.35	CMU outline (no patterning)
S-SECT-CNTR	5	Center-	0.18	Centerlines

Layer	Color	Linetypes Dash	Width	Description
S-SECT-CONC	6	Continuous	0.35	Concrete outline (no patterning)
S-SECT-EXST	252	Dashed- Long	0.25	Existing ground
S-SECT-FNGR	2	Continuous	0.35	Finished grade
S-SECT-GENF	6	Continuous	0.35	General features (miscellaneous items)
S-SECT-JOIN	1	Continuous	0.25	Joint materials (e.g. felt) vapor barrier other
S-SECT-MISC	121	Continuous	0.25	Miscellaneous fasteners anchor bolts supports
S-SECT-PRIM	132	Continuous	0.35	Primary beams/girders outlines
S-SECT-RBAR	7	Continuous	0.5	Rebar welded wire mesh
S-SECT-SHPS	121	Continuous	0.25	Miscellaneous shapes plates
S-SECT-STLS	121	Continuous	0.25	Wide flange shapes plates open web joists decking
S-SECT-WATR	121	Continuous	0.25	Water surface
S-SECT-WOOD	2	Continuous	0.35	Wood outline (no patterning)
S-SLAB-EDGE	2	Continuous	0.35	Edge of slab
S-SLAB-OPEN	1	Continuous	0.25	Openings and penetrations
S-SLAB-RBAR	7	Continuous	0.5	Slab reinforcing
S-SPPT-MISC	121	Continuous	0.25	Miscellaneous fasteners anchor bolts supports
S-SPPT-SHPS	121	Continuous	0.25	Miscellaneous fasteners anchor bolts supports
S-STRS-FENC	121	Continuous	0.25	Fencing
S-STRS-FRAM	6	Continuous	0.35	Stair/elevator framing
S-STRS-HRAL	121	Continuous	0.25	Handrails
S-STRS-LADD	121	Continuous	0.25	Ladders ladder handrails safety guard grab bars
S-STRS-RBAR	7	Continuous	0.5	Stair reinforcing
S-TRUS-PRIM	4	Continuous	0.5	Primary trusses
S-TRUS-SECD	6	Continuous	0.35	Secondary trusses
S-WALL-CONC	2	Continuous	0.35	Concrete walls
S-WALL-HBAR	4	Continuous	0.5	Horizontal/secondary reinforcement
S-WALL-LOAD	2	Continuous	0.35	Load bearing CMU walls
S-WALL-NONL	6	Continuous	0.35	Non-load bearing CMU walls

Layer	Color	Linetypes	Width	Description
S-WALL-OPEN	1	Continuous	0.25	Openings and penetrations
S-WALL-OTLN	2	Continuous	0.35	Wall outline
S-WALL-PCST	2	Continuous	0.35	Precast walls
S-WALL-RBAR	7	Continuous	0.5	Wall reinforcing
S-WALL-STUD	2	Continuous	0.35	Stud walls
S-WALL-VBAR	4	Continuous	0.5	Vertical/primary reinforcement

Region of Durham Standard Layer Name Abbreviations

Abbreviation	Description
ABND	Abandoned
ACCS	Access
ACSR	Accessories
ACID	Acid
ADPC	Automated Processing Component
AFRZ	Anti-Freeze
AIRQ	Air Quality
AIRS	Air
ALGN	Alignment
ALRM	Alarm
ANNO	Annotation
ARTW	Artwork
BELL	Bell
BIOL	Biological
BORD	Border
BORE	Boring
BRAC	Bracing
BRDG	Bridging
BRIN	Brine
BUSW	Bus Ways
CABL	Cable
CABN	Cabinet
CASE	Casework
CAVI	Cavity
CDFF	Diffuser
CHAN	Channel
CHEM	Chemical
CHLL	Chilled
CHLS	Chilled Water Service
CIRC	Circuit
CLNG	Ceiling
CLOK	Clock
CMPA	Compressed Air

Abbreviation	Description
CMUW	Concrete Modular Unit (Cmu)
CNDW	Condenser
CNST	Construction
CNTR	Center
COAX	Coaxial
COLS	Columns
COMB	Combined
COMM	Communication
CONC	Concrete
CNCR	Concern
COND	Condensate
CONN	Connection
CONT	Control
COOR	Coordinate
COPP	Copper
CPIP	Cold Water Piping
CRAN	Crane
CRTS	Cricket's Roof
CTLJ	Control Joint
CTRL	Control
CWVG	Curtain Wall Mullion
CWTR	Cold Water
DAMP	Damper
DEMO	Demolition
DETL	Detail
DEVC	Device
DIAG	Diagram
DIMS	Dimension
DISC	Discipline
DISP	Disposal
DOMW	Domestic Water
DRED	Dredge
DTCT	Detector
DUCT	Ductwork

Abbreviation	Description
ELEV	Elevation
EMCS	Energy Monitoring Control
EMER	Emergency
ENCL	Enclosure
EQPM	Equipment
EQUI	Equipotential
EVTR	Elevator
EXHS	Exhaust
EXPJ	Expansion Joint
EXST	Existing
EXTR	Exterior
EYEW	Eyewashes
FAIR	Forced Air
FAST	Fasteners
FDFD	Floor Diffuser
FDTA	Field Data
FEAT	Feature
FENC	Fence
FGAS	Fuel Gas
FIBR	Fiber Optical
FIXT	Fixture
FLDR	Floor Drain
FLOR	Floor
FLOW	Flow
FNDN	Foundation
FNGR	Finished Grade
FNSH	Finished
FOIL	Fuel Oil
FPIP	Filtered Water Piping
FRMG	Framing
FRAM	Frame
FTNG	Footing
FTTG	Caps And Flanges
FURN	Furnishing

Abbreviation	Description
GENL	General
GENR	Generator
GLAZ	Window
GRAD	Grade
GRBM	Grade Beams
GRID	Grid
GRND	Ground Water
GRPH	Graphic
GTHP	Geothermal Heat Pump
GUTR	Gutter
GWTR	Ground Water
HALN	Halogen
HAZM	Hazardous Material
HAZW	Hazardous Waste
HOIS	Hoists
HORZ	Horizontal
HPIP	Hot Water Piping
HRAL	Handrail
HTCW	Hot Water / Cold Water
HTPL	Height Temperature Piping
HTPS	Height Temperature Service Piping
HWTR	Hot Water
HYDR	Hydrant
HYDR	Hydraulic
IDEN	Identification
INPD	Inch Pound
INSL	Insulation
INTC	Intercom
INTR	Interior
JBOX	Junction Box
JOIN	Joint
JOIS	Joist
KITN	Kitchen
LADD	Ladder

Abbreviation	Description
LAND	Landfill Gas
LATL	Lateral
LDTA	Laboratory Data
LEGN	Legend
LEVL	Level
LGAS	Laboratory
LIFT	Lifting
LIMT	Limit
LITE	Light
LOAD	Load
LROT	Large Rotating
LTPL	Low Temperature Piping
LUBE	Lubrication
MACH	Machine
MAGN	Magnetometer
MAJR	Major
MANL	Manual
MATL	Material
MBND	Material Beyond
MCUT	Material Cut
MDGS	Medical Dental
MEDI	Medical
METL	Metal
METR	Metric
MINR	Minor
MISC	Miscellaneous
MOTR	Motor
MSC1	Miscellaneous Type 1
MULT	Multi-Conductor
MUNT	Munitions
NGAS	Natural Gas
NICN	Not In Contract
NONL	Non-Load
NPLT	Non Plotting

Abbreviation	Description
NUMB	Number
NURS	Nurse
OCCP	Occupant
OHWM	Ordinary High Water Marks
ORIG	Origin
OTHR	Other
OTLN	Outline
OVHD	Overhead
PANL	Panel
PATT	Pattern
PCST	Precast
PEDS	Pedestals
PENE	Penetration
PFIX	Plumbing Fixture
PHON	Phone
PHS1	Phase 1
PLNT	Plant
POTN	Potential
POWR	Power
PRHT	Partial Height
PRIM	Primary
PROC	Process
PROT	Protection
PSHP	Plot Area Shape
PSTP	Plot Stamp
PVMT	Pavement
RBAR	Rebar
RCOV	Recovery
REFG	Refrigerate
REFR	Reference
REIN	Reinforcing
RELA	Relay
RETN	Return
RFDR	Roof Drain

Abbreviation	Description
RISR	Hot And Cold Water Riser
RTRN	Return
RWTR	Raw Water
SANR	Sanitary
SEAT	Chair, Sofa Etc.
SECD	Secondary
SECT	Section
SEDI	Sediment
SERT	Security
SHEA	Shear
SHOR	Shore Line
SHOW	Showers
SHPS	Shapes
SIGN	Signage
SOIL	Soil Gas
SOLI	Solid
SOUN	Sound
SNDG	Sounding
SPCL	Special
SPPT	Support
SPRN	Sprinkler
STAT	Status
STEM	Steam
STLS	Steel
STML	Main Steam Piping
STMS	Steam Service Piping
STOR	Storage
STRC	Structural
STRM	Storm
STRP	Strip
STRS	Stairs
STUD	Stud
SUBS	Subsurface
SUPP	Supply

Abbreviation	Description
SURV	Survey
SUSP	Suspended
SWCH	Switch
SWTR	Surface Water
SYMB	Symbology
SYST	System
TANK	Tank
TEES	Main Tee
TERM	Terminal
THER	Thermostat
TOPO	Topography
TPIT	Pit
TPTN	Toilet Partition
TRAF	Traffic
TRAY	Tray
TRSH	Trash
TRUS	Truss
TURN	Turning Point
TXTE	English Text
TXTF	French Text
TXTS	Text On Border
UNDR	Underground
URAC	Underfloor Raceways
VENT	Vent
VERT	Vertical
WAST	Waste
WATR	Water
WDFE	Wall Diffuser
WDWK	Woodwork
WKSF	Works Surface Components

Appendix “E”
**Building Condition Assessment Guide for
*AssetPlanner™ & AuditPlanner™***

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1 Introduction

The Region of Durham utilizes Ameresco's **AssetPlanner**[™] software to identify and prioritize capital renewal needs, develop capital plans, demonstrate the funding requirements and measure the impact of capital investments. The Region of Durham also utilizes **AssetPlanner**[™] to calculate and report on the Facility Condition Index (FCI) of their Portfolio. Confidence in the data that resides in **AssetPlanner**[™] is critical to ensuring:

- The funding requirements of the Portfolio can be reviewed in parallel with other organizational priorities;
- The annual capital planning process appropriately allocates the limited funding to projects with the highest need; and
- The process used to calculate the FCI value is in line with established best practices

This confidence is achieved by establishing and consistently applying best practices-derived processes in data development and management. **The work of the Assessor in validating renewal needs during the on-site assessment is the main source of data that drives the capital planning and FCI reporting processes.** Integrity of the data collection and review process is paramount in ensuring confidence in the results. The goal of this guide is to provide clarity to Assessors on the Building Condition Assessment process and their role in ensuring confidence in the results.

2 During the On-site Assessment

The Region of Durham utilizes Ameresco's Data Development process (outlined in **Figure 1** below) to capture and maintain capital renewal needs for the buildings within **AssetPlanner**[™].

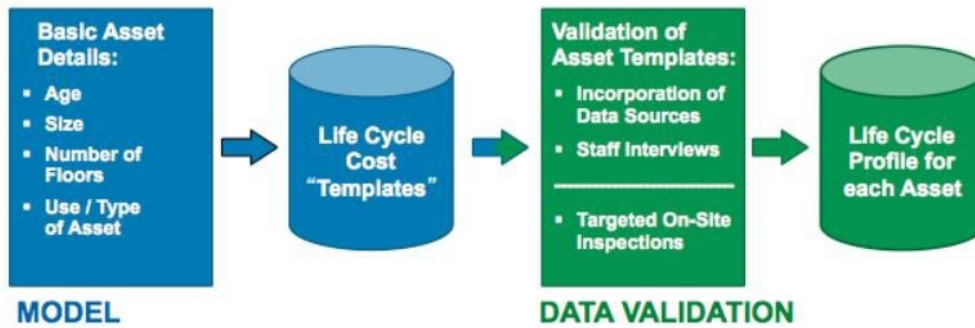


Figure 1: Data Development Process

This process begins with the creation of a “model” life cycle cost template. Using some basic asset details provided by the Region (age, size, # floors, # of units), Ameresco develops life cycle cost models for each building. The models contain a listing of building element inventory based on the various asset “types” (e.g. Apartment building, Townhouse complex, Single Family Home, etc.) and established order of magnitude replacement costs and renewal timelines for each major building system and element. Each model includes architectural, mechanical, and electrical components and systems as well as site elements. AssetPlanner™ follows the Uniformat 2010 Classification for Building Elements.

The second step is to “validate” the life cycle cost template through a visual, non-intrusive on-site assessment. The purpose of this assessment is to provide a visual assessment to understand the actual materials and assets on the building and the visual appearance of serviceability. This is undertaken by downloading the existing information from AssetPlanner™ to AuditPlanner™ for site assessment. The software refers to this process as an “Audit”. **Please note – Audits can be completed directly within AssetPlanner™ after photos and relevant condition data are collected from visiting the site. The direction provided by this guide is applicable whether you are entering data via AuditPlanner™ or within AssetPlanner™.**

Re-assessment of existing assets in AssetPlanner™ follows a similar process. The validation in the second step is more about updating the existing information and capturing any changes to the element inventory.

2.1 Assessment Reminders

Before commencing, ensure you have permission to contact the site and arrange for access. It is recommended that Assessors review and become familiar with this entire guide. Ensure that:

- You have a valid and functioning AssetPlanner™ login;
- You have been assigned the Audit;

- The Audit listing contains the correct buildings/sites;
- You are familiar with the Uniformat 2010 Classification system and hierarchy;
- **AssetPlanner™** houses Hard Cost estimates only, and excludes land from the Replacement Value.

2.2 Assessment On-Site Interview Questions

It is recommended that the auditor conducts a brief interview while on site with the site contact to determine additional information relating to the building, recent renovations or issues. Below is a sample questionnaire that you can use on-site or send out in advance of the site assessment:

- Facility Details
 - Can you confirm the age of the facility? (e.g.: “My report says 1990 but it looks much older can you confirm?”)
 - Does the facility have any additions or have there been any comprehensive renovation projects?
- Issues/Concerns
 - Are there any current or ongoing problems at the facility that we should know about (e.g.: leaks, temperature issues, mechanical/electrical problems, etc.)?
 - Is there anything that you are unsure of and would like us to take a closer look at during our site assessment?
- Planned Work
 - Have there been any recent major replacement or repair projects that have taken place at this facility?
 - Have there been any engineering studies/reports or building condition assessments over the last 5 years?
 - Are there any upcoming major replacement or repair projects? (e.g.: planned projects or quotes for work, etc.)
 - Is there a capital plan or list of projects that is available electronically (e.g.: excel, word, pdf etc.)?

This short questionnaire should help to fill in the blanks when it comes to unknown items such as concealed systems or the specific year that elements were recently replaced (last major action year). It will also help to identify areas of concern or ongoing issues that can be investigated further during your site review and documented as part of your report.

2.3 Assessment Cost Guidelines

When preparing cost estimates for your building condition assessment reports it is important to keep in mind the following:

- **AssetPlanner™** houses **Hard Cost** estimates only, and excludes land from the Replacement Value. As such, cost estimates should exclude soft cost items such as consulting, contingency allowances, sales taxes, etc.
- Pre-loaded cost values come from the model templates and reflect general assumptions based on basic asset details (refer to **Figure 1: Data Development Process** above). The model values are provided for reference purposes only. **It is expected that the assessor will update all cost values based on their own experience and professional opinion.**
- Cost estimates should be consistent across all reports for same elements and actions. For example, vinyl windows of roughly the same size and specification should carry the same replacement and action cost estimate across all facilities being assessed that have these same windows. If there are differences leading to differing cost estimates, please note them in the Element or Action commentary columns.
- Cost Estimates for all elements, including site elements (e.g.: exterior grounds, etc.), are to be calculated based on the quantity/actual area of the element, and not the area of the site. For example, the cost estimate for the parking area of a large, 5 acre, rural site should be based on a per-square-foot of parking lot area value and not a per-square-foot of 5 acres of site area value.

2.4 Completing the fields in **AuditPlanner™** (or in **AssetPlanner™**)

It is to be expected that you will come across building elements where the true condition is not evident due to the visual, non-intrusive nature of the **AuditPlanner™** site assessment. For cases where these elements have exceeded their estimated useful lives or there is a known issue with the element, a “Study” Action will have to be recorded to determine the exact conditions (as well as second “Replacement” Action). Please refer to the **Appendix C - Study and End of Life Matrix** for additional guidance.

Element & Action Consistency:

- Ensure that the recommended “Action Year” matches the timelines associated with your selections in the “Overall Condition” and “Urgency of Action” fields.
 - For Example: If a Replacement Action exists within the first 1-3 years the “Overall Condition” should not be “Good” and the “Urgency of Action” should not be “Low”.

- Ensure that the “Replacement Value” of an Element matches the “Replacement Action” cost.
- If a “Repair” or “Study” Action is suggested, always ensure that a “Replacement” action (cost/year) is also included and include a note in that Action to refer to the Study Action for more details.
- In general, all Elements should include an End of Life, full Replacement Action, with the exception of element A10/A20 Foundations and element B10 Superstructure. However, sub-categories of these two elements may require end of life replacement (e.g. Perimeter Drainage under A10 should have an end of life, full Replacement Action but not the actual Foundation itself).

2.5 Facility-Level Entries

Upon downloading each audit will contain basic facility level information such as Construction Year, Size, Number of Floors and Units. The information provided is a starting point for the audit and must be reviewed and corrected if necessary based on site observations. In addition to making corrections to the base details the auditor must fill out a building description and the associated Audit summary fields (General, Architectural, Mechanical, Electrical). The auditor must also take a representative photo of the facility as well as any different elevations or differences in the structure.

Audit:	Audit # and Summary which includes the Bundle #. This field is not editable.
Name of Facility:	The Facility name contains the Estate reference # and address. This field is not editable.
Address:	This field is for the full street address only (no city or province.). Do not use abbreviations (e.g.: Dr for Drive, Ave for Avenue, St for Street, etc.) as the system uses this address for GIS mapping. Correct it if it is incorrect.
Construction Year:	Year the building was constructed. Assessors are responsible for confirming the construction date. Correct as necessary.
Number of Units: (where applicable)	Typically utilized in residential buildings (ex. number of housing units) Where applicable, please review and confirm. The client should be advised if the unit count is off by a wide margin.
Size of Facility:	If the original size provided is incorrect please update it accordingly:

	<p>For Facility Assets assessors are responsible for confirming the number of heated square feet of building space, accurate to +/- 7% for each building being assessed.</p> <p>For Site Assets please review the size and update according to the full site area, which is to include the building footprint.</p>
<p>Floors Above Ground:</p>	<p>Number of floors above ground, including the ground floor.</p>
<p>Description:</p>	<p>For Facility Assets enter a brief description or summary of the building including items such as any additions with different construction years than the original, unusual construction types or other features (such as heritage status), and if applicable any differences noted in Facility Name.</p> <p><i>e.g.: "Sample Terrace is a 68-unit, 3-storey wood-frame apartment building built in 1968 serving Seniors. Units are mostly 1 bedroom with 12 being bachelors and 10 being 2 bedroom units. The canasta lounge was added to the rear of the building in 1997 and serves as a neighbourhood centre."</i></p> <p>For Site Assets enter a brief summary of the site including any significant site features. Please note in your description if the site is High Density (minimal site area/city lot) or Low Density (larger property typical rural/suburban setting).</p> <p><i>e.g.: "Sample terrace is a low density site covering 5 acres and includes 55 parking spaces, a gazebo and chain-link perimeter fencing. The site serves 5 facilities: 1 apartment, 3 row houses and 1 common bldg. "</i></p>
<p>General Summary:</p>	<p>Provide a general summary of the audit results. Note the general condition of the facility, any modernizations and a brief summary of any major concerns. Any specific notes from the onsite assessment can be included in this section (e.g. "Unable to access the roof due to lack of roof hatch key during assessment.").</p> <p><i>e.g.: "The roof was reported to have been replaced in 2006 and was reported to be in good condition. No access was available on the day of the site inspection. The external walls, majority of windows and the doors were reported to have been replaced in 2006 and they were observed to be in good condition. The windows at the back of the building are the older steel framed single glazed windows and they were observed to be in poor condition. The domestic hot water heaters in the mechanical room are in good condition and should be considered for replacement within approximately six years."</i></p>

<p>Architectural Summary:</p>	<p>Provide a general summary of the Architectural systems. Note the general condition of the architectural systems, any modernizations and a brief summary of any major concerns.</p> <p>e.g.: <i>“The exterior walls of the building are mainly clad with stucco, along with a portion of Fibre Cement siding at the building rear on the ground level . The walls were observed to be in good condition. Painting is required in the short term. The windows are a combination of newer, double-glazed, vinyl-framed units and older, steel-framed units. The vinyl-framed units were observed to be in good condition. The older, steel- framed units require replacing in the short term. The roof consists of two-ply SBS bitumen membrane and sloped roofing with asphalt shingles on the gazebo. The Interior finishes include carpet and vinyl flooring throughout the building, drywall partitions and ceilings, and ceramic tiles on the shower room walls.”</i></p>
<p>Mechanical Summary:</p>	<p>Provide a general summary of the Mechanical systems. Note the general condition of the mechanical systems, any modernizations and a brief summary of any major concerns.</p> <p>e.g.: <i>“There are two domestic hot water heaters in the mechanical room on the main floor. These were reported to have been installed in 2008 and are in good condition. The units within the building are heated by electric baseboard heaters with the common areas served by two roof-top packaged units, which also provide corridor ventilation. The baseboards, installed in 2008, and the roof top units, installed in 1998,</i></p>

	<p><i>were observed and reported to be in good condition. Plumbing fixtures appear to be in working order, however some consideration for water conservation should be reviewed. Fire protection is provided by a dry pipe sprinkler system in the basement and fire extinguishers throughout the remainder of the building.”</i></p>
<p>Electrical Summary:</p>	<p>Provide a general summary of the Electrical systems. Note the general condition of the electrical systems, any modernizations and a brief summary of any major concerns.</p> <p><i>e.g.: “The building is provided with a 400 amp service and distributed to circuit breaker panels. Electrical panel boards and branch wiring appear to be from the buildings renovation in 2006. These systems are in good condition. We recommend infrared testing in order to ensure safe and efficient operations. The interior lighting varies with linear, compact fluorescent units and some incandescent fixtures. The majority of incandescent and fluorescent lighting fixtures in the units were reported to have been installed in 2006 and are in good condition. Other electrical components include the new telephone equipment, exit and emergency lights and fire alarm system, which are all in good condition.”</i></p>
<p>Custom Details</p>	
<p>The “Custom Details” fields are located just below the summary fields. Scroll down past the summary fields on the facility page to reveal them.</p>	

2.6 Element-Level Entries

The goal of reviewing elements onsite is to provide a general summary of the current element condition, including actions required by the elements to maintain them in good working order for the long term. This information will be used to plan and prioritize capital renewal projects, so it is important that your information entries (and associated photographs) establish a clear picture of onsite conditions and required actions to enable planners and decision makers to appropriately respond. Ensure you take a photograph of any nameplates of building systems equipment and utility meters. When possible make sure that the model and serial numbers are legible in the photograph.

When to create multiple Elements?

Create multiple Elements, using the “Add” button from the Element screen, whenever you are dealing with one or more of the following: Differing Age, Differing Condition, or Differing Types of Elements. Generally speaking if the Cost or Lifecycle of any items are different, then they must be represented as their own Elements.

For example, a building may have a single roofing type, but a portion was replaced with the remainder being the original installation. These two portions should be entered as separate elements, with their different “Last Major Action Year”. In this example, you should ensure that the recently replaced portion is intended to last a typical full lifecycle and NOT be replaced with the remaining portion. If it is intended to be replaced with the remaining portion there is no need to create a separate element, just note this in both the Element and Action Commentaries.

Examples:

Differing Types (with different life cycles):

- Asphalt shingle roofing and flat built up roofing in the same building
- Brick exterior walls and wood siding exterior walls.

Differing Age:

- Flat roof sections installed in different years
- Boilers installed in different years

Differing Condition:

- Two roof sections installed in the same year, one in poor condition and one in good condition.

Deleting Elements

Ensure that you use the “Delete” button from the Element screen to remove an element. Do not note it as **no longer present in the description**.

Element Level Fields:

Element:	UNIFORMAT II category name is not editable
Element Number:	Not editable. This refers to the number of categories per component and not the quantity of the element.
Maintenance Type	This field is not applicable; updating is not required.
Last Major Action Year:	Enter the year that the element was last replaced. In the case of Balconies, Exterior Walls or other systems that are typically not replaced you can use this field to indicate the year in which a major refurbishment took place.
Overall Condition	Identify the overall condition of the entire element. The year ranges listed below relate to the Actions associated to the Element. Refer to “ When to create multiple Elements ” above for additional guidance.

	Good	Element is performing adequately and no work is foreseen in the next 5+ years
	Fair	Element is operational but replacement or major repair action is expected in 3-5 years
	Poor	Element requires replacement or major repair action in next 1-3 years
	Critical	Element is past the point of economic repair or is not functioning and should be replaced or repaired within 1 year
Replacement Cost:	The replacement cost field should capture the total value of the element. Be sure that this value matches up with any associated “Replacement” actions.	
Location:	This field is used to describe the exact location of specific items within the building where further clarity is required (e.g. Maintenance Room 2, Common Area Lobby, Second Floor Corridor, etc.)	
Element Description:	<p>The element description should be utilized to provide a brief description which must include: general description of overall system, type, size, make, model, serial, quantity.</p> <p><i>e.g. “Two Boiler Brand, 1,500,000 BTU, gas fired, mid-efficiency 85% boilers model BOIL-85, serial no XX##### (boiler 1 - Mechanical) and serial no XX##### (boiler 2) installed in 1985”</i></p> <p><i>“Domestic Water Distribution – copper mains, PEX distribution to suites”</i></p>	
Commentary:	<p>Enter a description for the element detailing any additional information relating to its condition and any on-site observations. If no pertinent additional information is present, field can be left blank.</p> <p><i>e.g. “Listed as Fair Condition due to the major repair required on the South Elevation due to observed significant moisture ingress, otherwise remaining three elevations are in Good Condition.”</i></p> <p>For Category B- Shell elements, please include the quantity (or an estimate if the quantity is not available). Examples include:</p> <ul style="list-style-type: none"> • <i>“12,500 sq. ft. of Modified SBS roof”</i> • <i>“estimated 120 windows”</i> • <i>“40% of wall area is cladded with brick veneer”</i> 	
Validated (Y/N):	This field has no impact on the data – it is entirely for the auditor’s personal use to keep track of Elements reviewed while on site. It does not need to be utilized.	

2.7 Action-Level Entries

The goal of reviewing Actions onsite is to provide a general summary of the Action required by elements to maintain them in good working order for the long term. This information will be used to plan and prioritize capital renewal projects, so it is important that your information entries (and associated photographs) establish a clear picture of onsite conditions and required actions to enable planners and decision makers to appropriately respond. **Ensure that you take photographs of deficiencies noted in the action items at the element level, especially for actions required within the next five years.**

When to create multiple Actions?

Create multiple actions for ***different action types*** (repair, replace, install, study). Remember if you are creating a repair or study action you must add another action to represent the full replacement value and forecasted year. ***Do not create multiple actions to represent phasing, allowances or for other budgetary concerns.*** The purpose of the capital plan is to identify building needs and present an accurate picture of condition, budgets and allowances can then be developed based on the findings. If you phase or include budget allocations this will understate the capital need and the capital plan will be inaccurate.

For Actions:

- Verify that Actions exist in appropriate years based on observed conditions (not based on budgetary concerns).
- If the scheduled Action Year is incorrect please adjust the year according to observed site conditions. This should align with your entry for "Overall Condition".
- Verify that Action Costs are appropriate based on recommended action.
- DO NOT include allowances or maintenance items (e.g. replace door handle on unit 121 or allowance for replacement of one door every year)
- Ensure that an Action Brief Description has been entered (e.g. Replace Boiler.)
- Where applicable include a justification or further detail about the action in the Action Commentary (e.g. we recommend replacing the boiler with an energy efficient model.)
- Ensure that Priority Answers have been selected.

- Assign “Low Urgency” and/or “Overall Condition: Good” Action items over multiple future years: do not assign all these items to one future year as this has an unintended, adverse effect on FCI.

Action Level Fields:

Action Number:	This refers to the number of action types per component. Not editable	
Action Cost:	The cost to perform the action in current year dollars, including removal, disposal and replacement. Do not include allowances – this should represent the full replacement not including soft costs.	
Action Year:	The year that the action is to be conducted.	
Repeat Interval (years):	The Lifecycle of the element. The template will generate a general assumption of how long a typical element will last. In most cases this will not require modification however it is expected that the auditor will adjust the Repeat Interval based on observed system(s) onsite.	
Action Type:	Replacement	Element is at the end of economic life and should be replaced
	Repair	Element can be repaired and its life extended. Remember to also include the associated “Replacement” action item.
	Install	Element that didn’t exist before and is to be installed.
	Study	A deficiency exists (or is likely to exist) and a study should be commissioned to determine scope of work and cost. Refer to Reference D - Study and End of Life Matrix for additional guidance. Remember to also include the associated “Replacement” action item.
Action Status:	Not Applicable.	
	Building condition assessments are generally not detailed code reviews. But if code issues are noted and life safety risks are evident, select the appropriate item below. Also for certain elements that have reached their estimated useful lives or show deficiencies that could cause a safety risk (e.g. old wiring, corroded gas piping, etc.), the “Safety Risk” drop down should be selected. Tripping hazards, loose handrails, mold, asbestos (friable, non-encapsulated) damaged stairs, etc.) should also be considered as “Safety Risks”. A brief description of the safety risk should be included and a picture. The action should be “Urgent” and in the current year. Safety Risks that require Immediate Attention should be brought to the attention of the building operator and the Region of Durham.	

Life Safety / Code Related?	No	The action is not related to code / life safety
	Grandfathered Code Issue	The action will need to comply with current code if it were to be replaced or repaired.
	Immediate Code Issue	The action is required to comply with applicable code.
	Safety Risk	The action will help avert serious injuries or health deterioration (e.g. mold, asbestos, loose handrails, tripping hazards, etc.)
Adverse Effect on Security?	Examples of Security-related issues include: doors that do not close properly, damaged door hardware, poorly lit building and site areas, lack of cameras or security monitoring equipment, CPTED related issues, etc.	
	No	Deferring this action will not impact building security.
	Yes	Deferring this action will have an impact on building security.
If Component Fails does Building Shut Down?	Examples of Elements that could potentially or partially shut down a building include active roof leaks, non-redundant heating plant, electrical switchgear and panelboards and failed fire alarm systems.	
	No	Failure of this element will not cause a building shut down.
	Yes	Failure of this element will cause a building shut down.
	Partial Shut Down	Failure of this element will cause a partial building shut down.

Operation/ Energy Savings	Will this Action to the Element result in operational savings (less maintenance or maintenance calls, avoid unplanned repairs) or result in energy savings (new, efficient element or improve the overall energy use of the building)? This field is often used to filter for energy-use reduction measures.	
	N/A	The action will not impact operational or energy savings
	Operation Saving	The action will result in operational savings. <i>e.g.: If this action is done in the specified year, additional costs will avoided through reduced operations and maintenance calls, and avoidance of unplanned repairs, especially if these are already being experienced.</i>
	Energy Saving	The action will result in energy savings. <i>e.g.: Converting T-12 to T-8 lamps, more efficient boilers and/or furnaces, improve thermal performance of building envelope, etc.</i>
Urgency of Action?	Urgency of Action is assigned based on the Assessor's judgment as to whether an action can be deferred or not. If an Action cannot be deferred then that should be considered an Urgent action.	
	Urgent	Action cannot be deferred and is necessary to get element functioning again or avoid imminent failure
	High	Action cannot be deferred and will be necessary to ensure continued element functionality for the next 1-3 years .
	Medium	Action can be deferred and/or will be necessary to ensure continued element functionality for the next 3-5 years .
	Low	Action can be deferred and/or will be necessary to ensure continued element functionality beyond 5 years
If deferred, will deterioration rate increase?	Will deferral of required Action(s) to this Element cause an increase in maintenance costs and/or make the required Action more expensive in the future? Is it worth doing this Action now to make the Element last longer? Especially relevant for Repair Actions.	
	No	Deferral will not result in any increase in costs and allow the Element to reach its intended useful life
	Yes	Deferral will cause additional operations and maintenance costs and unplanned repairs due to the Element failing more rapidly

<p>Action Summary:</p>	<p>Provide a brief description of the work to be conducted. Examples include:</p> <ul style="list-style-type: none"> • <i>Replace boiler</i> • <i>Conduct a Study to determine if the crack in the basement wall is an issue</i> • <i>Finish form tie sealant patches on wall adjacent to main entrance, to match rest of wall</i> • <i>Replacement of skylight along West perimeter of building, North of main entrance</i> • <i>Replacement of brick tile in main entrance lobby</i>
<p>Action Details:</p>	<p>Provide a longer explanation of the deficiency observed and justification for why the action is or will be necessary. You must also utilize this field to include any quantities, costs or measurements used to calculate the overall Action Cost. Examples include:</p> <ul style="list-style-type: none"> • <i>We recommend replacing the boiler with a more energy efficient condensing type</i> • <i>Brick tile appears to be quite durable; replacement may only be needed when finish becomes “dated”.</i> • <i>Modified bitumen roofing: 4550 square feet* \$10/sq. ft. = \$45,500. The modified bitumen roof membrane is reaching its projected useful life.</i> • <i>Linoleum flooring is in need of replacement due to cracking and peeling. About 600 square feet* \$6/ sq. ft. = \$3600</i>

3 After the On-site Assessment

At your earliest convenience, it is ***strongly recommended*** that you perform a ***manual back-up*** of the data that have just collected in AuditPlanner™. A manual backup secures your field data and provides a fall back in the case of unforeseen software or hardware issues. It is the auditor’s responsibility to ensure that they have backed up their work and store the data in a safe place. Please refer to **Reference A – AuditPlanner™ Back-up Guide** for more information.

3.1 Uploading from AuditPlanner™

Once you have completed entering and reviewing the building condition assessment data within AuditPlanner™, and backed up your data, the next step is to upload it into *AssetPlanner*™. To begin, first enable an internet connection on your device, then log into AuditPlanner™. From the “Configuration” menu, select the Facility you want the upload and then select “Upload Selected: Facility”. It is strongly recommended that you

only remove the facility from your device once you have reviewed your data upload in *AssetPlanner*[™].

Once a facility is removed from AuditPlanner's local storage the data is removed permanently and this process is irreversible.

3.2 Reviewing your data upload in *AssetPlanner*[™]

Assessors are responsible for reviewing their assessment data uploaded into *AssetPlanner*[™] (or entered directly into *AssetPlanner*[™] before submitting to the Region of Durham. Audits can be reviewed using "Audit Manager". Ensure that your data has been successfully transferred from AuditPlanner[™] into *AssetPlanner*[™]. Be aware that once you begin work in the Audit Manager any subsequent uploads from AuditPlanner[™] will overwrite all data currently in Audit Manager. It is therefore recommended that once your upload from AuditPlanner is complete, you make all further revisions within Audit Manager.

You must also perform a final Quality Control and Assurance check over your data to ensure it complies with this guide and the scope of your assessment and engagement to perform the assessment, in addition to being free and clear of simple data entry errors (e.g. \$100,000 versus \$10,000, 55 boilers versus 5 boilers, etc.). Audit Manager will highlight in **blue** the fields that have been updated via AuditPlanner[™]. Ensure your photos and their associated descriptions are present and attached to the correct elements. Assessors are responsible for notifying the Region of Durham via email (include Audit name and number) that the Audit is ready for their review once you completed your own QA/QC process.

3.3 Addressing Review Notes in *AssetPlanner*™

Assessors are responsible for responding to review comments on their Audits. The Region of Durham will review each report using Audit Manager and will flag cells in the grid where further revision and/or clarification is required. Once the Region of Durham has completed their review you will be notified via e-mail of any reports that require further revision.

The Region of Durham review will verify:

- adherence to these guidelines;
- adherence to the terms and conditions of the RFSQ;
- defined quantities; and
- appropriately defined and described elements and actions

In the “Audit Validation Grid” a red flag under the “Review Request” column will indicate where revisions are requested. Cells that have been flagged for review will appear with a red outline. To view the review message hover over any cell with a red outline. Refer to **Figure 2** below for more information.

Category	Review Request	Reviewed	Attachments	Last Major Action	Replace... Cost	Element Number	Location	Element Description	Element Commentary	Over Cond
A10 - Foundations		<input type="checkbox"/>		1986	40,000	1		Poured concrete foundation with insulated concrete	No issues noted or reported. Building element expected	Good
A10 - Foundations		<input type="checkbox"/>		1986	40,000	1			Original Value: Comment (by Analisa Solamillo): Add perimeter drainage, if any Reply:	

Figure 2: Review notes in “Audit Manager”

Once you have made the required adjustments, select the “Reviewed” checkbox to remove the flag. You can also reply to the original comments by right clicking and selecting “Edit/Reply Comment”. **Do not** click the ‘reviewed’ check box if you disagree with a comment and/or decide not to make the requested revision.

Please provide a reply to the original comment with your justification and leave the box unchecked.

It is imperative that Assessors review and respond to their comments in a proactive and timely manner within two weeks. If required, arrange a telephone call with the Region to go through their comments. This is often quicker than a series of email exchanges.

Inform the Region of Durham via email (include Audit name and number) once your revisions are completed.

Reference A: FAQs for Elements



B30 – Roofing (Canopies)

B1013 – Balcony Construction
(Balcony Railings/Guardrails)

B1013 – Balcony Construction
(Balcony Membranes)

B2040 – Industrial Doors
(Parkade Gate, Garage style roll- up or automated doors)

A20 – Basement Construction
(Underground Parking / Basement Walls)

A10 – Foundations
(Perimeter Drainage)

G2057 – Irrigation Systems
(Irrigation)



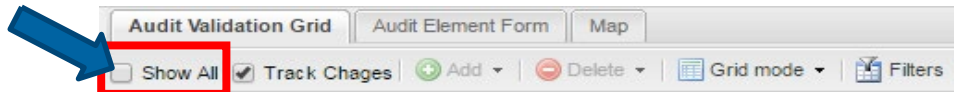
B10 – Superstructure
(Exterior Stairs/Deck and/or support Columns connected to building)

G2030 – Pedestrian Paving (Exterior Stairs not part of structure)

"Page content is subject to Confidentiality Restrictions"

FAQs for Elements - Common Mistakes & Reminders

- **Help I Can't Find an Element (Web Audit Tool):** When using the Audit Tool web interface if you cannot find an element in the listing please click on the checkbox above the grid "Show All" this will show all available elements to be added to the



audit. If you still can't find what you are looking for please contact Ameresco for support.

- **Parking Garages or Parkades** **should not** be added to the Site Asset as the site category for G2020 Parking Lots is for surface parking only. They should be included in the Facility Asset under **A20 Basement Construction**. This includes any related decking/slabs and/or waterproofing membranes.
- **Exterior Stairs & Ramps** are to be entered against the Site Asset category **G2030 Pedestrian Paving**. C20 Interior Stairs is for interior stairs only.
- **Exterior Wooden Non-Structural Patios/Decks** are to be entered against the Site Asset category G2040 Site Development.
- **Concrete/Structural Balconies** are to be entered under the Facility Asset under **B1013 Balcony Construction** – if the Balcony Construction category doesn't exist enter it against **B10 Superstructure**.
- **Fire Escape/Structural Exterior Stairs/Walkways:** Enter any structural stair or exterior passageway structures (think motel style) against **B10 Superstructure**
- **Exterior Fencing & Hardscaping Features:** Enter any fencing or site hardscaping features under **G2040 Site Development**. Please create additional elements for each unique site element (e.g: 1: Site Fencing, 2: Gazebo, 3: Metal benches, etc.).

4 Reference B: Additional Assessment Reminders

List of Items Required for On-Site Assessment:

- Permission to proceed with the Assessment and to contact site staff
- Arrangements made with site staff to attend site
- Fully charged iPad™ with iAuditor™ loaded and assessment sites downloaded
- Writing utensils and notepads
- Flashlight with fully charged batteries
- Screwdriver (optional)
- Identification
- Camera with flash, fully charged battery

Typical iAuditor Assessment Scope:

1. Interview the building occupants as well as existing maintenance and ownership personnel, discuss performance history and review copies of previous reports, drawings, photographs, and records of prior repairs.
2. Conduct a Visual Examination of the overall building assemblies. Commentary to note should include exposure of assemblies to the exterior environment, material types, and the interfaces between these. The assemblies and components reviewed should include, but not limited to, roofs, walls, windows, grading (i.e., soil, concrete, etc.), balconies and decks, exposed-column construction, overhangs, gutters, planters, all interior components, M&E services, site components, below-grade structures, and accessory structures. This portion of the assessment provides opportunity to verify the inventory of existing components on the building.
3. Evaluate the physical condition of each of the assemblies and components identified in the Visual Examination, and estimate the continued serviceability of the materials. Attention to interfaces between assemblies (roof or deck to wall, window perimeters, etc.) should be paid to determine how well the exterior enclosure is managing moisture movement.
4. Assess the number of heated square feet of building space, accurate to +/- 7%, for each building being assessed and record this value in iAuditor™.
5. Complete the summary fields for Architectural, Mechanical and Electrical within iAuditor.

5 Reference C: Study and End of Life Matrix

The following matrix applies to circumstances where the Assessor cannot appropriately determine the Overall Condition of an Element and/or determine the appropriate Action required (Replacement, Repair) and associated costs.

Rationale must be included with all Study Actions, as well as photos of the circumstances driving the Study Action. Please Note: A study is not required if the Assessor is able to appropriately determine Overall Condition and the appropriate Action required (Replacement, Repair) and associated costs.

Element Type	Overall Condition	Urgency of Action	Action Year
Life Safety or code/regulatory issue, and more subject matter expertise is required to fully assess condition, major issues present or reported	Critical	Urgent	Current Year
<i>e.g.: Fire Alarm panel has constant trouble alarms, generator issues, fire sprinkler leaks, dry system compressor issues, etc.</i>			
Not Entirely Visible, end of Life Cycle, active major issues present or reported, major building element	Critical	Urgent	Current Year
<i>e.g.: Active and major domestic water leaks, active and major roof leaks, active elevator issues, etc.</i>			
Not Entirely Visible, end of Life Cycle, some major issues present or reported, major building element, Main Electrical Distribution, Switchgear and Panelboards	Poor	High	Current Year
<i>e.g.: Settlement issues/cracks in Foundation or Superstructure, major roof leaks, major elevator issues, major envelope issues, domestic piping leaks, underground services (water mains, sewer lines), etc.</i>			
Visible, end of Life Cycle, active major issues present or reported	Critical	Urgent	Current Year
Visible, end of Life Cycle, some major issues present or reported	Poor	High	Current Year
Visible, end of Life Cycle, no issues present or reported	Fair	Study not required	
<i>e.g.: Roof, Envelope (including windows and doors), HVAC equipment, domestic piping, etc.</i>			

Assessors are responsible for providing the Replacement Action (with the Urgency of Action and Action Year reflective of the Overall Condition) for all Elements that require a Study Action. Ensure you include a note to refer to the associated Study Action for more details. This allows for the Replacement to be including in budgeting and forecasting processes pending the Study results.

6 Reference D: Multi-Building Sites Methodology

Multi-Building Sites

Developments that have multiple buildings on a single site are typically separated into individual buildings (and one site) within **AssetPlanner™**, therefore requiring a separate assessment/report for each building. This means that if you are assessing a site comprised of multiple townhouse buildings, you will have one audit for each townhome building present in **AssetPlanner™**. There is an option to assist Assessors with the repetitive nature of assessing sites with a volume of buildings types. Below is a run-through of this option:

1. One fully completed audit is required for each building type (Townhome, Apartment, Duplex etc.) including pictures, data & text.
2. In the case of multiple townhome buildings, once you have completed one full report, you can – at your discretion - contact Ameresco and request that the information be copied and pasted to the other buildings.

When contacting Ameresco be sure to note the following:

- a. Identify the source Audit either by Audit number or Facility Name (this will be the completed audit that you want data pasted from).
- b. Identify the destination audits (the audits of similar building type that you want the data pasted to) either by Audit number or Facility Name

Please Note: The copy and paste only transfers data (text, costs, years, priority answers, etc.), it does not copy photos. Pasting of data will remove all existing data including photos from the destination audits. ***Once this process is done it is irreversible.***

3. Once the data has been copied over it is the Assessor's responsibility to go into the individual reports and adjust them as necessary based on site observations. For example, if Block D had a different heating system or Block A had a foundation problem that was unique to that block it should be recorded in each of the individual reports.

Multi-Building Sites Represented by a Single Asset

Some developments that have multiple buildings may be summarized as one asset (per building type) and one site within **AssetPlanner™**. In these instances, **the Assessor must still review each physical building on site**. It is the Assessor's responsibility to create multiple elements and/or action items (following the best practices outlined earlier in this guide on when to do so) to capture the differences between buildings of a same type.