BIM INTEROPERABILITY FOR LANDSCAPE ARCHITECTURE:
IFC EXCHANGES IN VECTORWORKS LANDMARK

VECTORWORKS®

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INTRODUCTION AND OVERVIEW

For more than 10 years now, landscape architects and other site design professionals have increasingly been considering the process of Building Information Modeling (BIM) for their own firm's practice. Of course, those employed within an architecturally focused multidisciplinary firm were the first to feel the pressure from coworkers to implement BIM, so exchanging files between building and site teams using the same software provided a perception that these workflows worked for each team. Meanwhile, other landscape architecture firms became increasingly motivated by external architects and building design professionals to consider switching from conventional CAD workflows. Additionally, jurisdictional standards and corporate mandates have provided little room for these professionals to do anything but switch. And interestingly enough, a growing number of landscape architects and landscape designers who are not feeling the pressure to switch have still sought to know more about this BIM process, because word has spread about the ultimate efficiencies found in designing, modeling, analyzing, and reporting. The only challenge that remains for all of these professionals considering the switch is to determine what BIM means for them in the landscape industries, and how do they use and collaborate effectively in these workflows.

BIM COLLABORATION WITH IFC

ADVANTAGES WITH VECTORWORKS LANDMARK

BIM FOR LANDSCAPE

Vectorworks Landmark offers the site design professional BIM workflows which can be intuitively integrated into their workflow. Landscape-focused tools such as plants, landscape areas, hardscapes, terrain models, and irrigation provide purpose-built 2D and 3D objects, which carry the information needed from those objects to enable analysis and documentation just like the building-focused tools do in architectural BIM software without the compromises.

BIM COLLABORATION

For collaboration with other BIM-participating professionals, Vectorworks Landmark operates through the non-proprietary BIM format "Industry Foundation Classes" (IFC). Firms can export and share a data-rich model, treated consistently among other BIM software, as well as analyze with user-defined criteria within model checking software like Solibri. These file exchanges not only share object geometry, but data — such as material information within the proposed features, compliance factors, and maintenance instructions — exchange smoothly as well. Some firms also benefit from geospatial management of exported data to inform earth-moving equipment to affect the proposed changes to the site's terrain and to georeference their BIM model for GIS scene creation.

WHAT IS IFC?

IFC, or Industry Foundation Classes, is an international standardized open-source file format, developed by the non-profit organization buildingSMART International, who have optimized the format for BIM.

Much like PDF or HTML, the specification for the code to write this file format is freely available to the public and to developers for the creation of their own tools to handle the data format. This means that all software vendors have equal access to the specifications and can create the necessary import and export technology. No single vendor controls this format or profits from licensing the technology.

The most important thing to remember is that IFC encodes both geometry *and data*, making IFC the ideal for an open BIM exchange.

The IFC file format includes:

GEOMETRY - IFC geometry is robust and includes vectors, solids, surfaces, etc. to define the appearance of objects.

DATA - IFC supports three main aspects of the data in a BIM model:

· Semantics - the meaning or identity of a collection of geometry related to the proposed constructed objects, such as a plant shown on the site's surface.

BIM COLLABORATION WITH IFC

- Relationships - speaks to how the geometry are related to each other, such as a door inserted into a wall or a plant inserted into a terrain's surface.

- Properties - definition of materials that includes data, such as cost or model number.

Though many of the site-specific objects in Vectorworks Landmark are intelligent with their own built-in appended data, the IFC tagging relies heavily on the use of IfcBuildingElementProxy with custom naming rules and property sets to define them. Keep in mind that although the established nomenclature and schema seem most relevant to buildings, this will not always be the case. According to buildingSMART's article IFC for Site, Landscape, and Urban Planning – call for participation:

> "...a great deal of work is being undertaken by many parties in the buildingSMART International community to address how the IFC schema can be extended to express built infrastructure – roads, railways, bridges, tunnels, and more..."

Within landscape-focused BIM workflows, and considering the nature of BIM file exchanges, using the closest-related IFC schema and tagging for each site element will ensure the data shared with the site object geometry is still meaningful and informative. More will be shared about these tagging recommendations, but it is good to recognize where IFC development will continue to support site, landscape, and urban planning/design in the near future.

WHY IFC IS IMPORTANT

Being an open-source file format, IFC supports a more collaborative BIM process, allowing each project stakeholder to make meaningful contributions to the project using the best-suited tool for the job. Every member of the project team has different needs and different end-goals, meaning that each of them uses their own BIM model for different purposes and to gather or generate different data. There is no single application that can fulfill all these different uses and needs. If each project member is able to use the tool of their choice, then they are able to do their part in an efficient, effective, and executable manner, all the while creating a model that can be shared and effectively used throughout the BIM process.

For firms that previously committed drawings and/or models to the architecture firm to then transform that geometry into a BIM model for submission, the ownership of your site project contribution will become another benefit in using the IFC file format. Other benefits include: being independent of limitations of versioning found in proprietary file formats, portability and accessibility of project information from different applications, and the extensibility of an IFC file

WHAT DOES IFC MEAN FOR VECTORWORKS LANDMARK USERS?

For Vectorworks Landmark users, IFC is the file format needed to share both the geometry and data of their landscape BIM models with other project team members, such as the project owner, the project consultants, the construction manager, or others who may not be using Vectorworks.

BIM COLLABORATION WITH IFC

Vectorworks supports BIM interoperability using the IFC file format. Vectorworks Landmark currently supports IFC versions 2x2, 2x3, and 4. Though the 2x3 version may be the most supported, version 4 includes support for features such as georeferencing, which can be very helpful in site file exchanges. As more applications move towards supporting version 4, the need to use 2x3 will decrease. Vectorworks Landmark has been certified by buildingSMART International for the export of models based on the IFC2x3 Coordination View 2.0 – Architecture model view definition, as well as the import of any IFC2x3 Coordination View 2.0 model.

IFC OBJECTS IN VECTORWORKS LANDMARK

Vectorworks Landmark provides you with the necessary tools to create a complete and useful IFC model of the site. Every object is enabled to be tagged for IFC export, requiring minimum user effort. This is especially true for the purpose-built smart objects like plants, hardscapes, landscape areas, etc. as these objects have default IFC property definitions. These default definitions will be covered in the section IFC Object Tags for Standard Site Objects.

For objects with no pre-assigned IFC property definition, or for users who would like to append additional ones, it is easy to manually assign property definitions. With the **Attach IFC** command, you can assign IFC object tags and properties to BIM objects like plants, hardscapes, and stairs as well as custom-built geometry, so applications that read IFC files can identify these objects.

PLANT = IfcBuildingElementProxy
Description: *Carpinus betulus*

PERGOLA RAFTER = IfcBeam
Description: 5cm Coated Steel

PERGOLA POST = IfcMember
Description: 5cm Coated Steel

SYMBOLS = IfcFurnitureType
Description: Sicilia Bar Table 55x30

HARDSCAPE = IfcSlab
Description: Wood Deck on Bison Pedestal

FIGURE 1: IFC Objects in Vectorworks Landmark

Additionally, when IFC files are imported into Vectorworks, the IFC objects within the file are brought in as a particular and flexible kind of plug-in object called an IFC Entity. An IFC Entity, as opposed to a Vectorworks object, is created because the properties of objects created in other programs cannot easily be matched to all the corresponding Vectorworks object properties and controlling parameters. For more detailed information on the export and import of IFC files, see the Exporting and Importing sections of this guide.

BIM COLLABORATION WITH IFC

When using the existing semantic definitions of an IFC Entity, such as an IfcStair, IfcWall, or IfcRailing, the definitions are maintained and displayed. Like a group or symbol, an IFC Entity can contain a collection of geometry and has sets of data and properties attached to it. Also, the IFC Entity can act like a plug-in object and be inserted into walls. This may initially sound strange, but imagine designing a wall fountain. This would be a good example of an object that would need to have its own IFC record and be inserted within a wall for appropriate representation in the BIM model.

IFC OBJECTS AND PROPERTY SETS

An IFC object is a building or site object that has been defined by both its occurrence and type. This means that a site object created in Vectorworks, either with the default tools or a user-created object, can be tagged as an IFC object to define its semantics, properties, and relationships to other site objects.

When an object is tagged for IFC, it is assigned an IFC Property Definition known as a property set (pSet). An IFC Property Definition captures an object's property set, or associative data. This set of properties is attached to the object. More than one property set can be associated with an IFC object, including custom property sets that are defined by the Vectorworks user.

IFC OBJECT TAGS FOR STANDARD SITE OBJECTS

Vectorworks Landmark (and Vectorworks Designer) contains site-specific tools and features which provide the landscape architect, landscape designer, and land planner with purpose-built elements to simplify their design and documentation process. In many cases, the objects designed into the project have a 2D representation as well as a 3D representation to create a virtualized model to plan, analyze, visualize, and report holistically. This provides an advantage over traditional 2D design methods, especially when site-specific data cannot easily be appended or harvested from the elements incorporated in the design.

The challenge, however, comes when firms who are used to 2D workflows, manual labeling, and disintegrated reporting because the interconnected relationship of the data and geometry available with BIM workflows forces these same professionals to approach design with smart tools more holistically. This challenge is not insurmountable; in fact, once the firms commit to designing in BIM workflows, they will quickly begin to recognize the overall efficiencies with smart objects, parametric modeling, and as we are discussing in this guide, the ability to exchange the data and geometry from the landscape project model with other collaborators who need this information to continue their iterative design process.

This section shares recommendations for how typical site elements proposed in a project model should be designated as IFC objects. These suggestions are based on the element's function/s and components (geometric representation). The IFC tag is the default IFC property definition assigned to each object type.

BIM COLLABORATION WITH IFC

	HARDSCAPE	ROAD
Smart Object	Yes	Yes
Toolset	Site Planning	Site Planning
Function	Pavement / hard surface (i.e. plaza, patio, path, driveway, pedestal decking, sport court)	Pavement / hard surface (i.e. street, road, bike path, cul-de-sac)
Components	Horizontal strata Texture bed (No depth) Drainage tools Surface modifiers (To alter the terrain surface) Align to site elements	Surface and curb Surface modifiers (To alter the terrain surface)
IFC Tag	IfcSlab	IfcBuildingElementProxy

FIGURE 2: Walking surface represented by Hardscape Object (Image courtesy of Huitt Zollars)

FIGURE 3: Vehicular surface represented by Road Object (Image courtesy of Pacific Coast Land Design)

BIM COLLABORATION WITH IFC

	PARKING	PLANTING
Smart Object	Yes (Parking Area, Parking Along Path and Parking Spaces)	Yes (Existing Tree, Plant)
Toolset	Site Planning	Site Planning
Function	Used in conjunction with Hardscape Object (For layered surface representation and drainage)	Individual, hedged or massed planting
Components	Spaces and drive aisles (Parking spaces can be counted and customized for accessibility codes)	2D Plan symbol (Customizable) 3D Generated plant form (Best for IFC exchanges) 3D Image prop (Best for efficient rendering) 3D Modeled plants (i.e. VB Visual, SketchUp, Plant Factory, Laubwerk)
IFC Tag	IfcSpace	IfcBuildingElementProxy

FIGURE 4: Parking represented by Parking Along Path Object
(Image courtesy of Holcombe Norton Partners)

FIGURE 5: Trees and understory represented by Plant Object

BIM COLLABORATION WITH IFC

	LANDSCAPE AREA	SITE MODEL
Smart Object	Yes	Yes
Toolset	Site Planning	Landmark Pull-down Menu
Function	Mono- and multi- species planting; spatial use planning; texture bed; softscape strata	Digital Terrain Model (DTM) (Create, analyze and manage elevational grade changes with contours and surfaces for pre- and post- development)
Components	2D Fill or plant symbol 3D Textured components 3D Texture bed 3D Image props/modeled plants	2D Contours (Surface flow arrows, elevational color fills, and slope analysis color fills) 3D Contours (Mesh surface, extruded contours, elevational color fills, and slope analysis color fills) Displays 3D texture bed objects Calculates cut/fill volumes
IFC Tag	IfcBuildingElementProxy	IfcSite
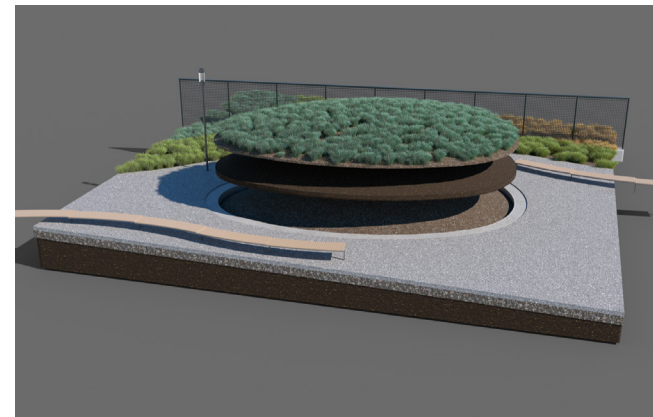
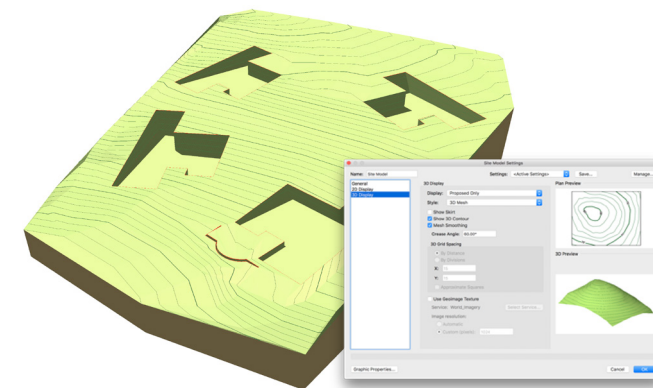FIGURE 6: Mass planting represented by Landscape Area

FIGURE 7: Terrain surface represented by the Site Model

BIM COLLABORATION WITH IFC

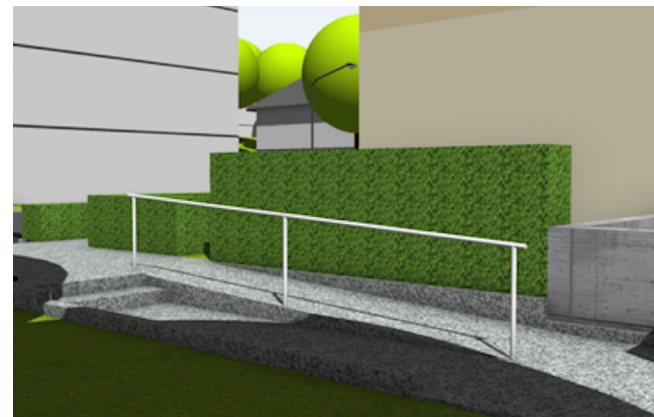|	RAILING/FENCE	RAMP
Smart Object	Yes	Yes
Toolset	Site Planning	Building Shell
Function	Path-based object (With settings for fence and railing/guardrail applications horizontally and terrain-, stair- and ramp- following)	Parametric object (Controlled by width, height, and slope to produce straight and turned ramps, including landings)
Components	2D Top rail 2D Post 2D Bracket 2D Frame/panel 3D Top rail 3D Post 3D Frame/panel	Ramp (Custom thickness) Left rail Right rail Slope arrow
IFC Tag	IfcRailing	IfcRamp
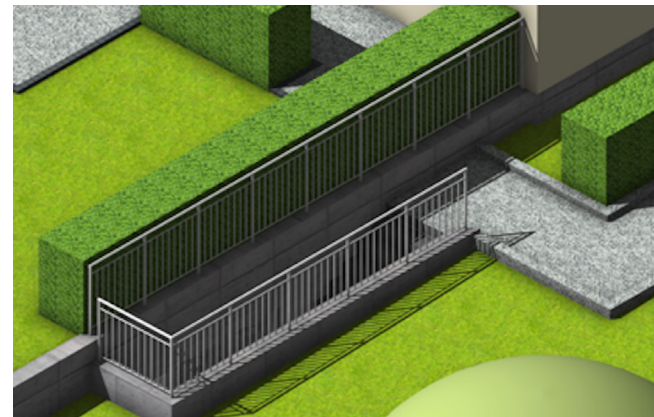
FIGURE 8: Guardrail represented by the Railing/Fence object

FIGURE 9: Accessible surface represented by the Ramp object

BIM COLLABORATION WITH IFC

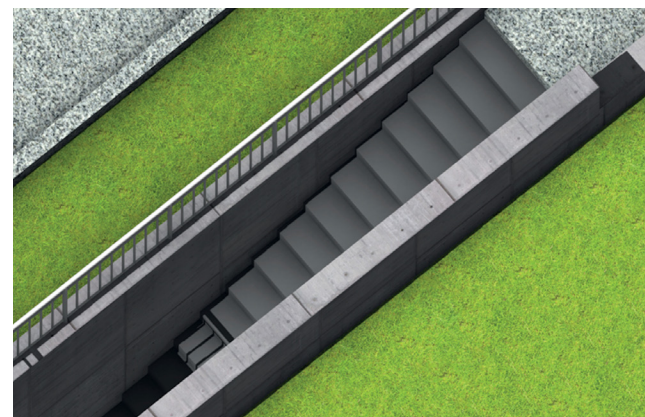|	STAIR	WALL
Smart Object	Yes	Yes
Toolset	Building Shell	Site Planning
Function	Parametric object (Controlled by width, rise height, tread depth, as well as step length ratio/angle)	Parametric object (Controlled by height, width [incl. component width], component offsets; walls can be stepped or sloped)
Components	2D Plan (Incl. walk line [direction])	2D Plan and 2D section (Shows 2D fill in vertical component strata)
	Solid or stringer framed stair	3D Views (Show 3D texture of overall wall or component strata)
	Left railing/posts (Incl. guardrail)	Displaced Soil Volume (Represents displaced soil when combined with Retaining Wall Site Modifier)
	Right rail/posts (Incl. guardrail)	
	Return landing	
	Nosing	
IFC Tag	IfcStair	IfcWall or IfcWallStandardCase

FIGURE 10: Stairway represented by the Stair object

FIGURE 11: Retaining wall represented by the Wall object

BIM COLLABORATION WITH IFC

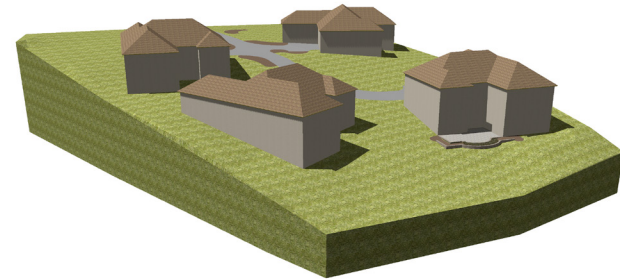|	BUILDING (MASSING MODEL)	BIM OBJECT
Smart Object	Yes	No
Toolset	Site Planning	Furn/Fixtures
Function	Parametric object (Controlled by height, footprint path, and roof style)	3D Model of manufactured feature (With preconfigured 2D and 3D representations and appended model information)
Components	2D Plan (Shows roof or footprint) 3D Model shell wall 3D Model roof (And eave settings) 3D Floor separation Site Modifier at massing bottom Floor usage data	Dependent on object
IFC Tag	IfcBuilding	Depends on manufacturer (Different IFC properties are already assigned here)

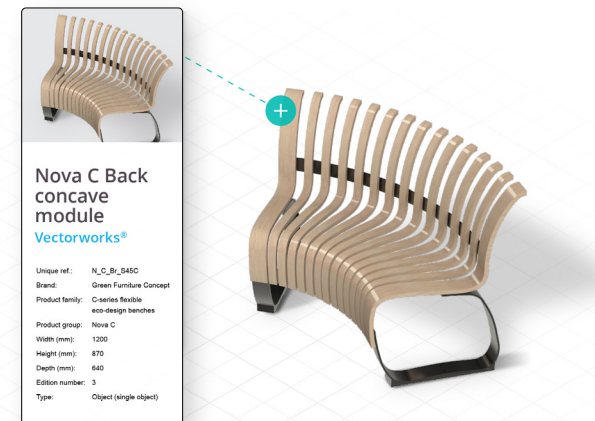FIGURE 12: Buildings on site represented by Massing Models

Nova C Back concave module
Vectorworks®

Unique ref.:	N_C_Br_S45C
Brand:	Green Furniture Concept
Product family:	C-series flexible eco-design benches
Product group:	Nova C
Width (mm):	1200
Height (mm):	870
Depth (mm):	640
Edition number:	3
Type:	Object (single object)

FIGURE 13: Manufacturer's BIM content such bimobject (imports as IFCFurnitureElement)

BIM COLLABORATION WITH IFC

	FREE-FORM MODELED OBJECT	MARIONETTE OBJECT
Smart Object	No	Yes (If scripted with parameters)
Toolset	3D Modeling and Model pull-down menu	Basic
Function	3D Model of custom feature (Which can be symbolized with 2D and 3D representations and appended material information)	Objects created by algorithmic aided design
Components	Dependent on object	Dependent on object
IFC Tag	Depends on manufacturer (Different IFC properties are already assigned here)	Depending on the object (Different IFC properties can be assigned)

FIGURE 14: Custom elements produced by free-form modeling
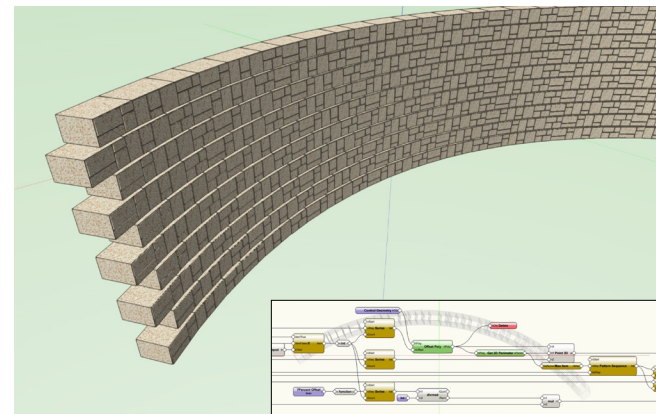
FIGURE 15: Custom element produced by Marionette

BIM COLLABORATION WITH IFC

Though the examples shown and illustrated with typical IFC designations represent most of the elements expected to be included in a BIM file exchange from the landscape architect or designer via IFC files. The following chart is a more comprehensive list of those and other smart and parametric site features along with their corresponding IFC object tags. This can be used as a guide to determine the appropriate IFC tag for user-defined objects.

User-Defined Objects	IFC Tag
Column	IfcColumn
Column Wrap (Architectural column)	IfcCovering
Comm Device	IfcDistributionFlowElement
Curtain Wall (Straight & Curved)	IfcCurtainWall
Curtain Wall Frames	IfcMember
Curtain Wall Panels	IfcPlate
Door	IfcDoor
Drilled Footing	IfcFooting
Existing Tree	IfcBuildingElementProxy
Fence	IfcRailing
Fireplace	IfcDistributionFlowElement
Floor	IfcSlab
Framing Member	IfcBeam
Guardrail (Curved & Straight)	IfcRailing

BIM COLLABORATION WITH IFC

User-Defined Objects	IFC Tag
Handrail (Curved & Straight)	IfcRailing
Landscape Area	IfcBuildingElementProxy
Lighting Fixture	IfcDistributionFlowElement
Retaining Wall	IfcWall
Massing Model	IfcBuilding
Mullion	IfcMember
Parking Spaces	IfcSpace
Pilaster	IfcColumn
Pillar	IfcColumn
Piping Run	IfcDistributionFlowElement
Plant	IfcBuildingElementProxy
Ramp	IfcRamp
Receptacle (electrical)	IfcDistributionFlowElement
Roadway (all types)	IfcTransportElement

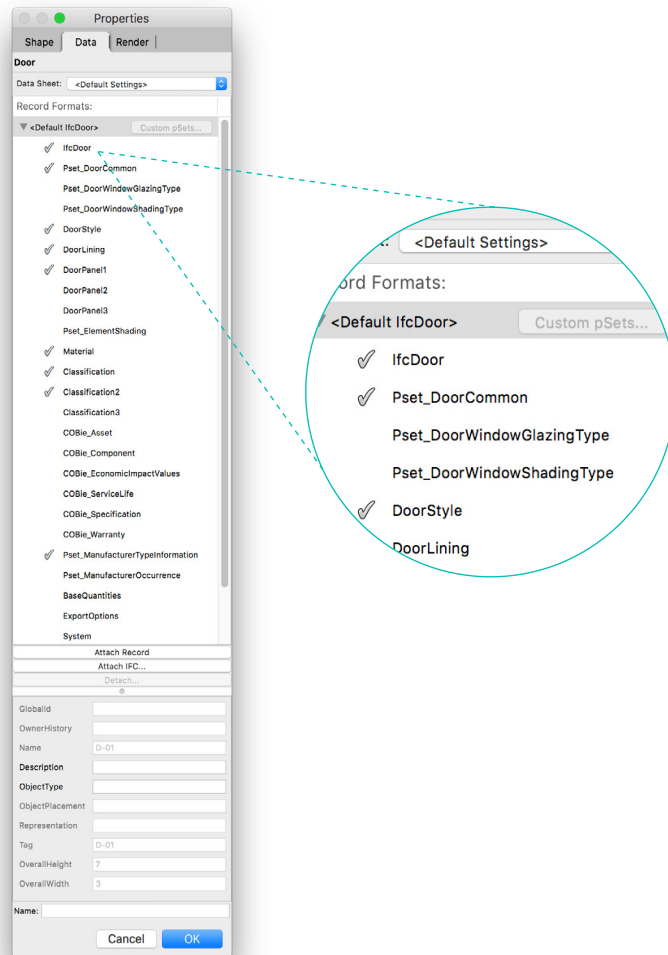| User-Defined Objects	IFC Tag
Roof	IfcRoof (contains instances of IfcSlab)
Roof Face	IfcSlab
Seating Layout	IfcFurnishingElement
Round Wall	IfcWall or IfcWallStandardCase
Wall	IfcWall or IfcWallStandardCase
Site Model (terrain surface)	IfcSite
Slab	IfcSlab
Stair	IfcStair
Switch (electrical)	IfcDistributionFlowElement
Table	IfcFurnishingElement
Tables and Chairs	IfcFurnishingElement
Outdoor Plumbing Fixture	IfcFlowTerminal
Window	IfcWindow

BIM COLLABORATION WITH IFC

When exporting architectural objects, such as doors, geometric information (width, height, opening direction, etc.) is automatically exported, as it is based on the physical geometry of the object. This way, model checking applications like Solibri can find collisions with other geometry, such as columns, low ceilings, or MEP elements like pipes or ducts. When these objects have a default IFC tag, they are also assigned an appropriate default property set associated with the IFC object. For example, a default door object is tagged as an IfcDoor and has the IfcDoor property set associated with it (Fig. 16). Other property sets can be assigned to the object as needed. For most landscape objects, there may not be this amount of pre-set tagging, however the tagging of additional pSets can be included to be exported, along with the represented geometry.

This guide covers the behavior of some default objects to help professionals understand the process of assigning and managing IFC data and the IFC export within Vectorworks. Not all objects will be covered in detail. The hope is that with a better understanding of the IFC export behavior, the user will be able to troubleshoot any problems that arise due to missing data and/or geometry.

FIGURE 16: Multiple default pSets attached to a Door object

BIM COLLABORATION WITH IFC

THE IFC DATA DIALOG BOX

As mentioned before, nearly all smart objects in Vectorworks will already have a default IFC property definition assigned to them, however specific data about the object can and should be added. Use the IFC Data dialog box to assign, view, and edit IFC data associated with an object.

TO ACCESS THE IFC DATA DIALOG BOX:

1. Select the object (multiple items can be selected).

2. Select the menu Landmark → Architectural → IFC Data (if using Designer: AEC → IFC Data).

If the selected object does not have IFC data assigned to it, the Select IFC Object dialog box will open (Fig. 17). This will prompt you to choose the IFC designation for the selected object(s). See the Assigning IFC Data to Objects section of this document.

If the selected objects already have an IFC designation, the IFC Data dialog box will appear (Fig. 18).
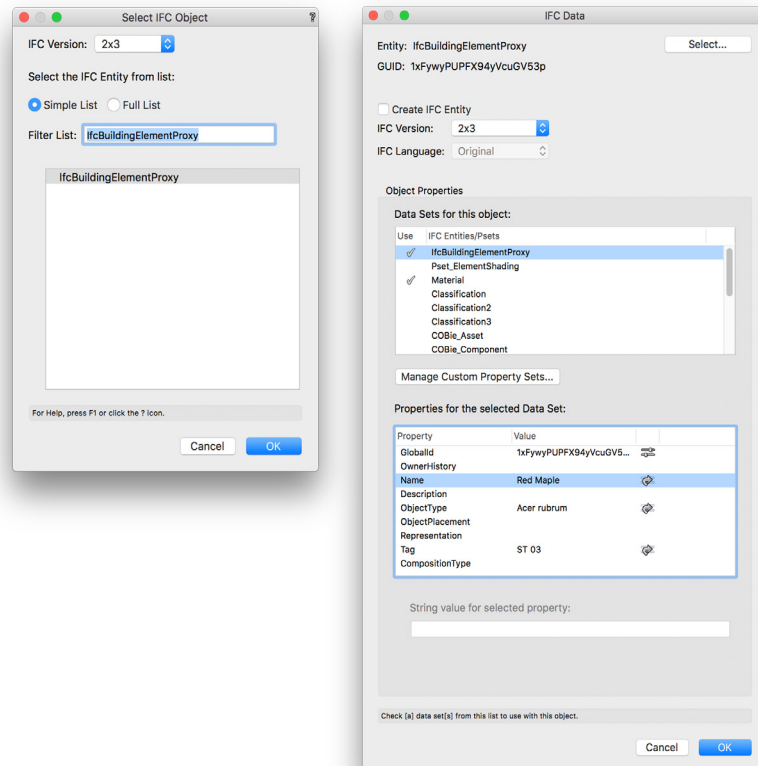
FIGURE 17 & 18: Select IFC Object Dialog and IFC Data Dialog

BIM COLLABORATION WITH IFC

THE IFC DATA DIALOG BOX WILL DISPLAY FOUR KEY ITEMS:

1. An object's IFC tag, or designation, and GUID (Global Unique Identifier) (Fig. 18A).

2. The data sets assigned to the object, referred to as property sets, or pSets (Fig. 18B). A check mark under the **Use** column indicates that this data set is attached to the object.
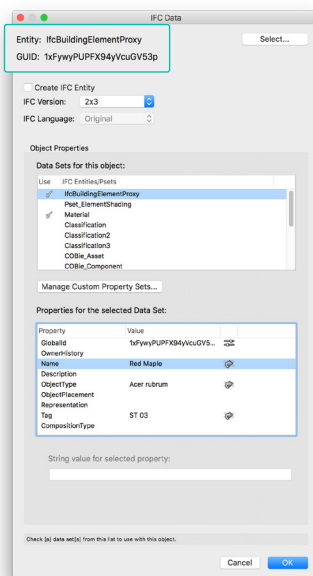
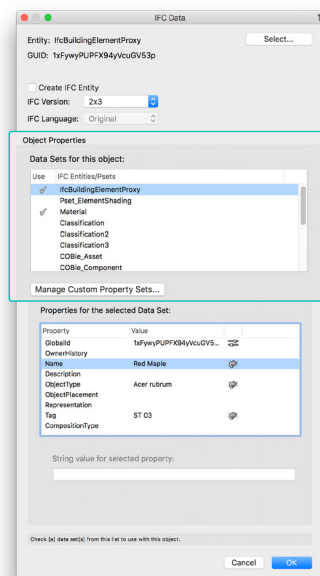3. The properties or values for the selected Data Sets and whether the value is **by instance** or **by style** (Fig. 18C).

· A **by instance** icon indicates that the property value comes from either the value set within the IFC Data dialog box or an equivalent Vectorworks object parameter (a default value).

· A **by style** icon indicates that the property value comes from a custom data mapping that is defined by the user. See the IFC Data Mapping Command section.
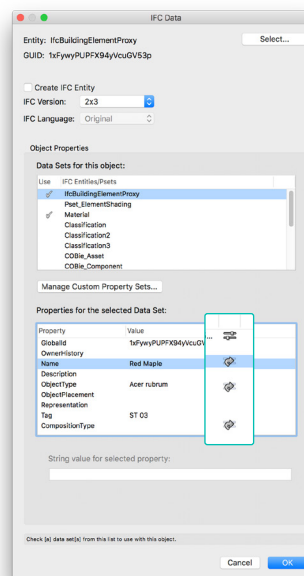
For more detailed information regarding the available fields in the IFC Data dialog box, visit Vectorworks online Help.

ASSIGNING IFC DATA TO OBJECTS

When a Vectorworks project is exported as an IFC file, Vectorworks' default site and building objects and the majority of default library symbols that have pre-assigned IFC data are exported as IFC objects. However, custom-made objects, or user-defined objects, are not exported unless they receive IFC assignments prior to export. Assigning IFC data to an object

FIGURE 18A

FIGURE 18B

FIGURE 18C

BIM COLLABORATION WITH IFC

does not alter it in any visible way within Vectorworks. The object can still be edited with standard Vectorworks tools and commands.

IFC assignments can be performed with the **IFC Data** command or with the **IFC Data Mapping** Command.

TO ASSIGN IFC DATA WITH THE IFC DATA COMMAND:

1. Select the object, group, or symbol instance (symbols that have been placed in the drawing) for assignment of IFC data (multiple items can be selected) (Fig. 19a).

2. Select the menu Landmark → Architectural → IFC Data (if using Designer: AEC → IFC Data).

   Alternatively, you can access the IFC Data dialog box by selecting an object and clicking the Data pane at the top of the Object Info palette (OIP). Then click the **Attach IFC** button found near the bottom of the palette (Fig. 19b).

3. The Select IFC Object dialog box opens, listing available IFC object types (Fig. 19c). You have the ability to first choose which version of IFC to apply. Select the IFC object type to assign to the building object. Most entities supported by Vectorworks for export can be found in the **Simple List**.
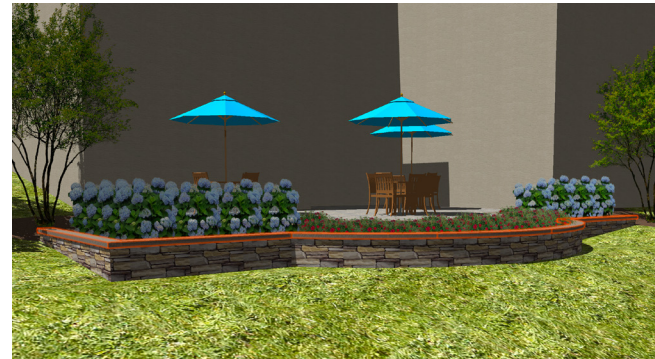

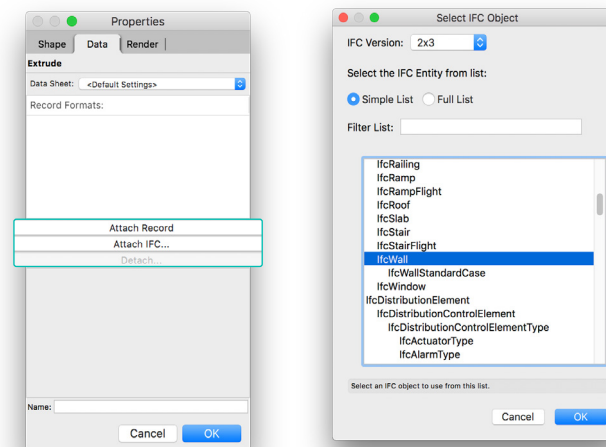**FIGURE 19A:** Wall coping (extrude selected)

FIGURE 19B (LEFT): Attach IFC button in OIP

FIGURE 19C (RIGHT): IFCWall chosen in Select IFC Object dialog

BIM COLLABORATION WITH IFC

If you are using the **Filter List** option, please keep in mind that Filter List is not a Search function and cannot *find* a corresponding IFC tag for objects. For example, you cannot type in "toilet" and have the **IfcFlowTerminal** tag returned. To find the correct IFC tags for typical building objects, See the IFC Object Tags for Standard Objects section to find the correct IFC tags for typical buildings or to tag custom-made objects.

4. Select the IFC object type and click **OK**. The IFC Data dialog box opens in the Object Info Palette (also can be seen similarly in Properties dialog) **(Fig. 19d)**. Under **Record Formats**, select the property set to attach to the IFC object by adding a check mark under the **Use** column. You can select multiple property sets. To enter the desired values for the properties of the selected data set, use the second pane to select the property and the **String** value field.

    If you are attaching a custom property set to a unique instance of an object, select the **Manage Custom Property Sets** button (see the When to Use Custom IFC Property Sets section for more information).

5. Click **OK** to assign the IFC data to the object. The Data Pane of the Object Info Palette (or Properties dialog) will now display the selected object's IFC Entity type and the associated property sets **(Fig. 19e)**.

6. When attaching data to a symbol, it may be easiest to do so from within the active file resources in the resource manager. Simply right clicking on the symbol invokes the context menu where **IFC Data** should be selected. Add data by choosing the IFC tag and ensuring that there's a check mark before the proper pSet. Once accepting the added data by clicking **OK**, a notice will assure you that the data will be attached to all existing and future instances of that symbol **(Fig. 19f)**. This means that any future placement of the symbol will include the data as well.
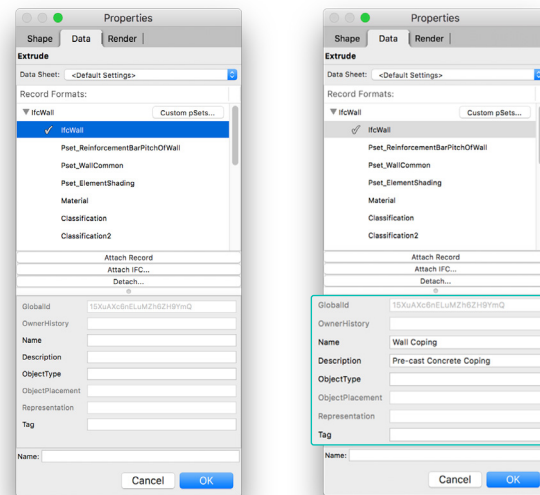

FIGURE 19D (LEFT): IFCWall pSet chosenenabling IFC fillable data fields

FIGURE 19E (RIGHT): IFCWall pSet fields populated before saving
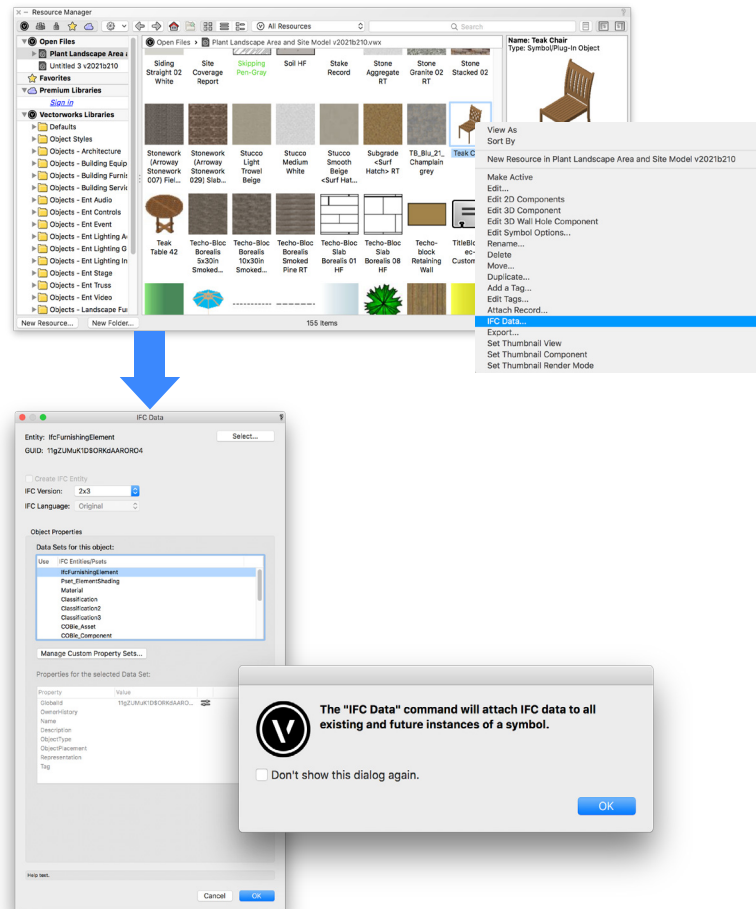
BIM COLLABORATION WITH IFC

VIEWING AND EDITING IFC DATA

The data attached to Vectorworks objects or IFC entities, whether created in Vectorworks or imported from an IFC file, can be viewed and edited with the **IFC Data** command or from the Data pane of the Object Info palette.

TO ACCESS IFC DATA FOR EDITING THROUGH THE IFC DATA COMMAND:

1. Select the IFC Entity or Vectorworks object (multiple items can be selected).

2. Select Landmark → Architectural → IFC Data (if using Designer: AEC → IFC Data).

3. When the items to be edited have been specified, the IFC Data dialog box opens. View or edit the IFC data as described in the **Assigning IFC Data to Objects** section.

If an IFC Entity is selected, the IFC Data dialog box displays the data attached to the entity as described in the previous Assigning IFC Data to Objects section.

Creating a group containing multiple objects with differing IFC object types is not recommended. Doing so will result in the IFC tag assigned to the group not being assigned to the individual objects. In other words, the objects within the group will retain their respective IFC tags.

BIM COLLABORATION WITH IFC

If a symbol contains multiple objects with different IFC object types, a property set cannot be set to the symbol definition or symbol instance itself. Instead the objects within the symbol should be grouped and the appropriate property set can be attached to the group within the symbol.

The source of specific data values for a property set's parameters can be determined by the **Data Source** field at the bottom of the IFC Data dialog box.

TO ACCESS IFC DATA FOR EDITING THROUGH THE OBJECT INFO PALETTE:

1. Select the IFC Entity or Vectorworks Object (multiple items can be selected).

2. Click the **Data** pane in the Object Info palette. The assigned IFC entity type displays at the top of the palette **(Fig. 20)**. All default property sets for the IFC entity display below the entity type name. Property sets in use will have a check mark to the left of the property set name.

3. To add an additional property set, click in the left column to add a checkmark next to the property set.

4. Once the property set is added, the values for the parameters of the set displays below the buttons **(Fig. 20)**. Some fields can be filled out directly. If the parameter field is grayed out and cannot be accessed, this indicates that the parameter is populated by either a predefined default mapping from an object parameter, or from a user-defined mapping (see the IFC Data Mapping Command section of this document).

5. Remember that any data added through the Object Info palette or through the IFC Data dialog is only applied to that instance of the object.

IFC DATA MAPPING VIA THE DATA MANAGER COMMAND

The **IFC Data Manager** command allows the user to define what parameters (and corresponding values) of an object are transferred to an identified, parallel IFC data set. In essence, this command allows customized control of data transfer from Vectorworks objects to IFC objects.
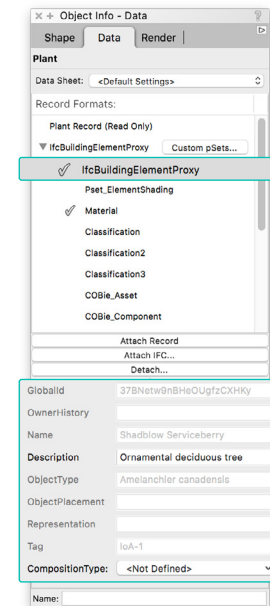

FIGURE 20: IFC data editing through the Object Info Palette

BIM COLLABORATION WITH IFC

The command gives you the ability to:

· Map non-IFC objects with a defined set of IFC parameters

· Map a Vectorworks object parameter value to the equivalent IFC parameter

· Attach property and data sets to objects in addition to the default IFC property set

· Identify which specific object parameters or record format parameters should map to an IFC parameter within the identified property set

· Define, save, and recall multiple various custom mapping configurations as a saved setting

The **IFC Data Manager** command allows the user to edit or redefine the default IFC tag or assignment for all default objects within Vectorworks.

This command also allows you to set a default IFC assignment for all custom-made objects. From here, you can define what additional property and data sets within the IFC assignment are used by default (Fig. 21).

In the third pane of the dialog box, users can define the mapping for the specific IFC parameters (Fig. 22). Find a full explanation of the IFC Data Mapping dialog box in Vectorworks online Help. It is highly recommended to read through the online Help to understand the purpose of all parameters and settings in this command.
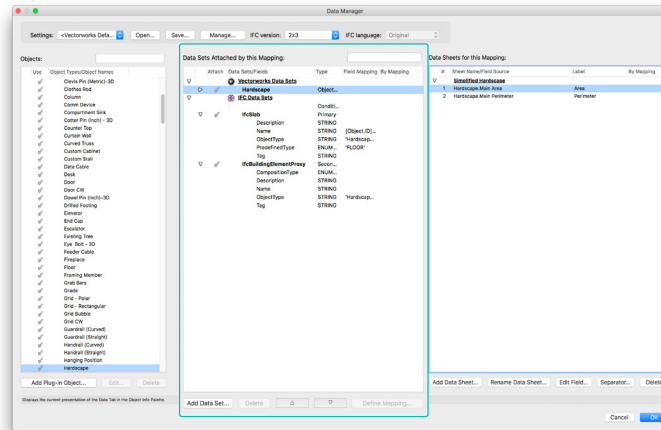

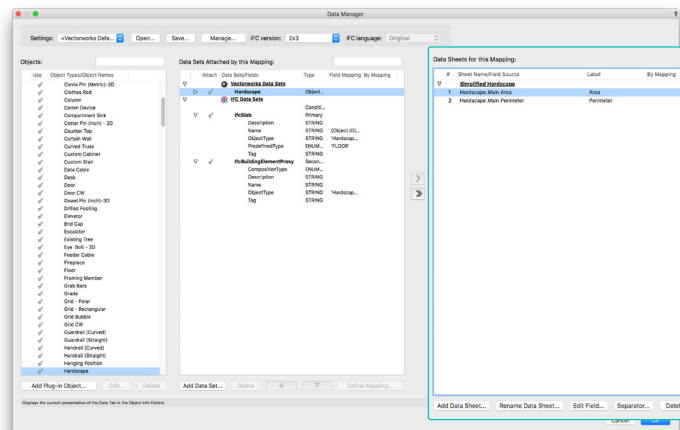**FIGURE 21:** 2nd pane of the Data Manager dialog box

FIGURE 22: 3rd pane of the Data Manager dialog box

BIM COLLABORATION WITH IFC

WHEN TO USE THE IFC DATA MAPPING COMMAND

There are multiple instances in which the **IFC Data Mapping** command should be used.

1. When additional data needs to be added to an object's default IFC assignment

A number of Vectorworks objects will contain user-defined data that are not included as part of the default IFC assignment. For example, the common name and botanical name of a plant are automatically mapped to the "name" and "object type" fields within its IFC Data Set (IfcBuildingElementProxy pSet) respectively, however the "Description" field is not yet populated. This is an opportunity for user-defined data describing the plant to be mapped to this field.

To show the Define Mapping dialog, select the "Description" Data Field and choose the **Define Mapping** button at the bottom of the 2nd pane. Because the data can be mapped from the plant's existing Record Format, select this option for the Initial Field Value, then **Plant Record.Category** for the next pull-down menu. Since the "Category" within the plant's data record describes the type of plant, this is most appropriate **(Fig. 23)**.

By clicking **OK**, the plant's category (description) will now be added to the IFC Data Set to accompany this plant object **(Fig. 24)**. Note that the greyed-out tone of the text and the field indicate this is now being provided by the object's data automatically.To change this moving forward, change the category data or re-define the mapping.
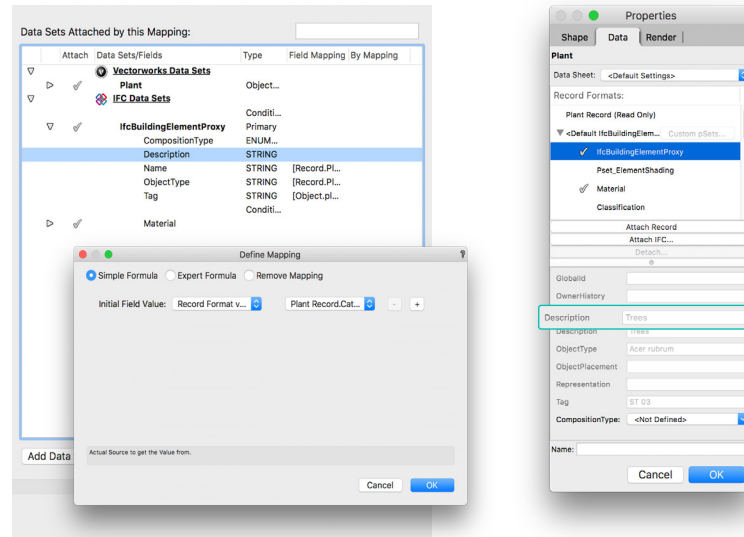

FIGURE 23 (LEFT): User-defined mapping in the Data Manager's 2nd pane

FIGURE 24 (RIGHT): User-defined data now in Description field of the IFC Data Set

2. When data from a custom record format needs to be mapped to an IFC property set

In Vectorworks, custom data records are attached to objects (default objects, plug-in objects, and custom-modeled objects) using **record formats (Fig. 25)**. For detailed information on creating custom record formats, go to Vectorworks online Help.

BIM COLLABORATION WITH IFC

The parameters of a custom record format can be mapped to the correct corresponding IFC property set. For example, it is easy enough to define the weight of a proposed rooftop plant as-installed — but what if the architect and structural engineer request to know the plant's projected weight at 10 years and 20 years past installation? This is a great example of how the custom record format for this data will need to be attached to the object in the IFC file, so that the collaborators can have this data on each plant object.

Using the same data mapping processes shown above, say the user wants to add a new Data Set within the IFC Data Sets in the Data Manager. Clicking the Add Data Set button activates the Add Data Set dialog, where the IFC pSets (Custom) is chosen to then pick the Weight Installed & Future Record Format. If this Record Format does not show at first, this can be added via the Manage Custom Property Sets button. The parameters for these records can be mapped to the identified IFC Classification data set to ensure that the data is transferred during an IFC model exchange (Fig. 26).

3. When custom-made objects or symbols need a default IFC assignment and property sets attached

This is directly related to the second use of the **IFC Data Mapping** command described above. IFC assignments and property sets can be defined for all custom-made objects, ensuring that each time the custom object is placed in the file, it will receive that appropriate IFC tag assignment.
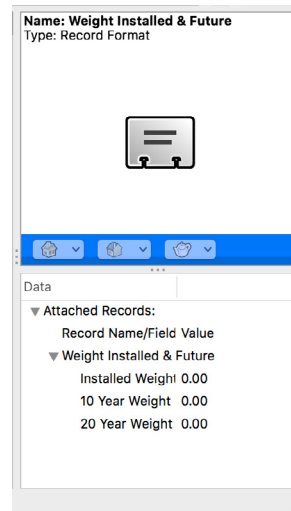
FIGURE 25 (LEFT): Custom Record Format
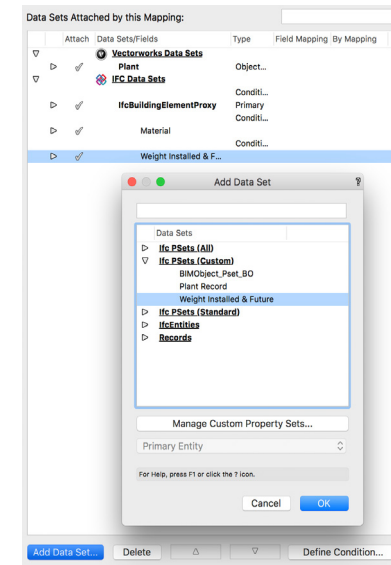
FIGURE 26 (RIGHT): Adding Custom Record Format as and IFC Data Set

4. When file exchange requirements include mandatory or default IFC values

There are some scenarios when BIM data exchange has specific requirements that need to be fulfilled. Some of these requirements may specify that every data field needs to have a default value or that certain data fields should not be left empty.

BIM COLLABORATION WITH IFC

USING THE IFC DATA MANAGER FOR COBIE REPORTS

The Construction Operations Building Information Exchange (COBie), an international standard related to asset management, is a sub-set of IFC that's focused on delivering asset data, especially for maintainable assets. It is divided into several data subsets which include Contact, Type, Component, System, and Attribute.

Strictly speaking, COBie is a dataset and can be contained in a database. Plainly speaking, it is a set of worksheets with a predetermined layout, showing the data embedded in a model. It will contain object information and quantities needed for continuous maintenance of the asset.

To report on content using the COBie worksheet structure, set up the desired data sets using the Data Manager, just as for other IFC information. Vectorworks ships with a COBie datasets schema right out of the box.

Under **Settings** at the top of the Data Manager, select **<COBie Defaults>**. The workflow is the same as for normal IFC data sets (Fig. 27a).

Just as for IFC, Vectorworks comes already loaded with COBie record formats attached to most parametric objects. If you are required to report on objects without these attached, you can add them via the Data Manager.

Vectorworks also comes with a set of pre-made COBie reports (Fig. 27b). These are mainly intended to be used as pre-flight, pre-checking reports, prior to exporting the data through the IFC file export.
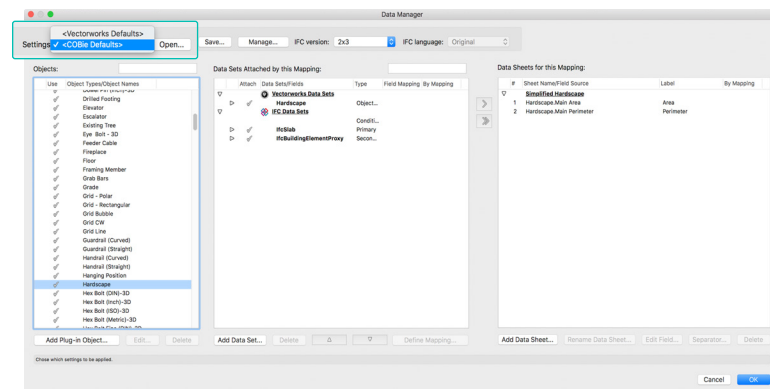

FIGURE 27A: Vectorworks' Data Manager provides mapping opportunities for COBie

BIM COLLABORATION WITH IFC

Name	CreatedBy	CreatedOn	Category	SheetName	RowName	Value	Unit	ExtSystem	ExtObject	ExtIdentifier	Description	AllowedValues
IsLandmarked	n/a	2020-08-20T16:59:46	n/a	Facility	n/a	FALSE	n/a	Vectorworks Architect	IfcBuilding	n/a	IsLandmarked	n/a
BuildingID	n/a	2020-08-20T16:59:46	n/a	Facility	n/a	n/a	n/a	Vectorworks Architect	IfcBuilding	n/a	BuildingID	n/a
OccupancyType	n/a	2020-08-20T16:59:46	n/a	Facility	n/a	n/a	n/a	Vectorworks Architect	IfcBuilding	n/a	OccupancyType	n/a
GrossPlannedArea	n/a	2020-08-20T16:59:46	n/a	Facility	n/a	0	square meters	Vectorworks Architect	IfcBuilding	n/a	GrossPlannedArea	n/a
YearOfConstruction	n/a	2020-08-20T16:59:46	n/a	Facility	n/a	n/a	n/a	Vectorworks Architect	IfcBuilding	n/a	YearOfConstruction	n/a
NumberOfStoreys	n/a	2020-08-20T16:59:46	n/a	Facility	n/a	0	n/a	Vectorworks Architect	IfcBuilding	n/a	NumberOfStoreys	n/a
GrossFloorArea	n/a	2020-08-20T16:59:46	n/a	Facility	n/a	0.000000	square meters	Vectorworks Architect	IfcBuilding	n/a	GrossFloorArea	n/a
Component 1	n/a	2020-08-20T16:59:46	n/a	Component	Floor	Default	n/a	Vectorworks Architect	IfcSlab		Component 1	n/a
Component 1	n/a	2020-08-20T16:59:46	n/a	Component	Floor	Default	n/a	Vectorworks Architect	IfcSlab		Component 1	n/a
Component 1	n/a	2020-08-20T16:59:46	n/a	Component	Floor	Default	n/a	Vectorworks Architect	IfcSlab		Component 1	n/a
Component 1	n/a	2020-08-20T16:59:46	n/a	Component	Floor	Default	n/a	Vectorworks Architect	IfcSlab		Component 1	n/a
Component 1	n/a	2020-08-20T16:59:46	n/a	Component	Floor	Default	n/a	Vectorworks Architect	IfcSlab		Component 1	n/a
Component 1	n/a	2020-08-20T16:59:46	n/a	Component	Floor	Default	n/a	Vectorworks Architect	IfcSlab		Component 1	n/a
Component 1	n/a	2020-08-20T16:59:46	n/a	Component	Floor	Default	n/a	Vectorworks Architect	IfcSlab		Component 1	n/a
Component 1	n/a	2020-08-20T16:59:46	n/a	Component	Floor	Default	n/a	Vectorworks Architect	IfcSlab		Component 1	n/a
Component 1	n/a	2020-08-20T16:59:46	n/a	Component	TR13-1	Default	n/a	Vectorworks Architect	IfcBuildingElementProxy		Component 1	n/a
Component 1	n/a	2020-08-20T16:59:46	n/a	Component	Untitled ID-01	Default	n/a	Vectorworks Architect	IfcBuildingElementProxy		Component 1	n/a
Component 1	n/a	2020-08-20T16:59:46	n/a	Component	Untitled ID-02	Default	n/a	Vectorworks Architect	IfcBuildingElementProxy		Component 1	n/a
Component 1	n/a	2020-08-20T16:59:46	n/a	Component	Ornamental Tree 01	Default	n/a	Vectorworks Architect	IfcBuildingElementProxy		Component 1	n/a
Component 1	n/a	2020-08-20T16:59:46	n/a	Component	Shade Tree 02	Default	n/a	Vectorworks Architect	IfcBuildingElementProxy		Component 1	n/a
Component 1	n/a	2020-08-20T16:59:46	n/a	Component	Shade Tree 03	Default	n/a	Vectorworks Architect	IfcBuildingElementProxy		Component 1	n/a
Component 1	n/a	2020-08-20T16:59:46	n/a	Component	Oneseed Hawthorn	Default	n/a	Vectorworks Architect	IfcBuildingElementProxy		Component 1	n/a
Component 1	n/a	2020-08-20T16:59:46	n/a	Component	White Fir	Default	n/a	Vectorworks Architect	IfcBuildingElementProxy		Component 1	n/a
Component 1	n/a	2020-08-20T16:59:46	n/a	Component	Eastern Arborvitae	Default	n/a	Vectorworks Architect	IfcBuildingElementProxy		Component 1	n/a
Component 1	n/a	2020-08-20T16:59:46	n/a	Component	Untitled ID-2-1	Default	n/a	Vectorworks Architect	IfcBuildingElementProxy		Component 1	n/a
Component 1	n/a	2020-08-20T16:59:46	n/a	Component	Untitled ID-3-1	Default	n/a	Vectorworks Architect	IfcBuildingElementProxy		Component 1	n/a
Component 1	n/a	2020-08-20T16:59:46	n/a	Component	Untitled ID-13-1	Default	n/a	Vectorworks Architect	IfcBuildingElementProxy		Component 1	n/a
Component 1	n/a	2020-08-20T16:59:46	n/a	Component	Epal-1	Default	n/a	Vectorworks Architect	IfcBuildingElementProxy		Component 1	n/a
Component 1	n/a	2020-08-20T16:59:46	n/a	Component	Untitled ID-23-1	Default	n/a	Vectorworks Architect	IfcBuildingElementProxy		Component 1	n/a
Component 1	n/a	2020-08-20T16:59:46	n/a	Component	Untitled ID-9-1	Default	n/a	Vectorworks Architect	IfcBuildingElementProxy		Component 1	n/a
Component 1	n/a	2020-08-20T16:59:46	n/a	Component	Untitled ID-8-1	Default	n/a	Vectorworks Architect	IfcBuildingElementProxy		Component 1	n/a
Component 1	n/a	2020-08-20T16:59:46	n/a	Component	Untitled ID-18-1	Default	n/a	Vectorworks Architect	IfcBuildingElementProxy		Component 1	n/a
Component 1	n/a	2020-08-20T16:59:46	n/a	Component	Untitled ID-24-1	Default	n/a	Vectorworks Architect	IfcBuildingElementProxy		Component 1	n/a
Component 1	n/a	2020-08-20T16:59:46	n/a	Component	PerBlu-1	Default	n/a	Vectorworks Architect	IfcBuildingElementProxy		Component 1	n/a
Component 1	n/a	2020-08-20T16:59:46	n/a	Component	Evergreen Tree 02	Default	n/a	Vectorworks Architect	IfcBuildingElementProxy		Component 1	n/a
Component 1	n/a	2020-08-20T16:59:46	n/a	Component	Concept Landscape Area	Default	n/a	Vectorworks Architect	IfcBuildingElementProxy		Component 1	n/a
Component 1	n/a	2020-08-20T16:59:46	n/a	Component	Concept Landscape Area 2D	Default	n/a	Vectorworks Architect	IfcBuildingElementProxy		Component 1	n/a

FIGURE 27B: COBie report generated from Vectorworks from a preconfigured worksheet

EXCHANGING IFC FILES WITH VECTORWORKS LANDMARK

Aside from the data transmitting in a BIM file exchange, it is also very important for the geometries within a shared IFC file to be positioned correctly. Whether importing a building context model in IFC format or exporting the proposed landscape model in IFC format, the "point of origin" or "project base point" must be the same. Once the site file is either geolocated or aligned to the survey file by its user origin within Vectorworks, then a common reference point — such as the corner of the imported building — should be established. If geolocated, this may be its latitude and longitude or easting and northing, or at least the same "X and Y," to be sure the geometry lines up. Elevational positioning, which will also be addressed in the sections related to model preparations, is crucial to the exchange as well, especially for projects where landscape is designed over structure.

EXPORTING IFC FROM VECTORWORKS

Generally, Vectorworks Landmark files are exported as entire projects (proposed landscape on site terrain and/or on structure) to be exchanged or analyzed with other IFC-compatible applications. When you use the **Export IFC Project** command, you assign design layers to landscape hierarchy. Mapping can also be controlled manually, letting you override or edit the automated process. The manual process is also used if you have chosen not to use Vectorworks' story organization. Keep in mind that when the layers are mapped manually, the last mapping settings are retained by Vectorworks. You will only need to map layers again if you add any new layers.

MODEL PREPARATIONS

The following guidelines may be useful when preparing your model for export:

- Take care to set up the elevation values of layers correctly. Verify that all the objects in the drawing are vertically aligned as necessary.

- If you are using standard Vectorworks plug-in objects, it is best to use those listed in the **IFC Object Tags for Standard Objects** portion of this guide.

- Use the **IFC Data** command to attach IFC data to custom symbols and objects, so that they will be recognized at IFC export.

- Use the **Choose Schedule** command to generate IFC schedules for default objects or create your own schedules to verify and correct the IFC data attached to objects (be aware that these schedules are not bi-directional).

FOR FASTER EXPORT PERFORMANCE, BEFORE EXPORTING:

- Set the **3D Conversion Resolution** lower to optimize the file size. Accomplish this by following the path Tools → Options → Vectorworks Preferences → 3D → 3D conversion resolution → Low.

- Select only the layers you want exported by using the **Export Visible Objects Only** option on the Export IFC Project dialog box's Data tab.

EXCHANGING IFC FILES WITH VECTORWORKS LANDMARK

- Set the model to Top/Plan view before exporting.

- Zoom your view into a small, simple corner of your model before exporting.

TESTING IFC EXPORTS

Test the quality of the IFC export file by verifying it in an IFC model browser. Almost all free IFC browsers can view and validate the model, but they may be more limited in capabilities when compared to paid packages. Some examples of free IFC browsers include:

Solibri Model Viewer	Macintosh or Windows
FZKViewer	Windows
DDS-CAD Viewer	Windows
Trimble Connect (Formerly Tekla BIMsight)	Macintosh or Windows
Constructivity Model Viewer	Windows
RDF IFC Viewer	Windows, Macintosh (Linux versions planned)
IFC WebServer	Web browser
xBIM Xplorer	Windows
IfcPlusPlus	Windows
DESITE BIM	N/A

For more information regarding IFC viewers and other IFC-compatible applications, visit the buildingSMART IFC-Compatible Implementations Database or IfcWiki.org websites.

Vectorworks project files can be exported to .ifc, .ifczip, and .ifcxml formats.

Export to IFC Versions 2x2, 2x3, and 4 is supported, but version 2x3 is most commonly used in current practice. The export of a project to an IFC file is based on specifying the geometry and associated data needed for the use of the exported file. This specification is called a **Model View Definition** (MVD). Vectorworks software supports the use of MVDs to automate the export, or the user can manually define a custom set of geometry and data to be exported.

TO EXPORT A VECTORWORKS FILE TO IFC

1. Select File → Export → Export IFC Project.

    The Export IFC Project dialog box opens (Fig. 28).

2. Under the **Data** tab, you'll see a number of options for specifying the export options as well as the overall project information, such as project data, author data, site data, and building data. Any required field within this tab will be automatically filled based on the existing Vectorworks project information.

EXCHANGING IFC FILES WITH VECTORWORKS LANDMARK

For **Export Options**, select IFC version 2x3 (the default) and the **CV 2.0 – Architecture** Model View (also the default). This particular Model View is an official buildingSMART international view for exporting architectural models for coordination with structural and MEP models.

If you have created any custom property sets, make sure that the **Export Custom Property Sets** box is checked (this should also be checked by default).

To better understand all the parameters within the **Data** tab of the dialog box, please visit Vectorworks online Help.

3. Click the **Layer Mapping** tab to specify which layers to export, then click the Vectorworks and IFC Site (Story) Name to assign to them at export (Fig. 29).

   If a site model is set to a **site layer** and has been tagged for IFC, it will also be included.

   Mapping can also be controlled manually. Specify the associated building or site data for each of the mapped layers.

   To better understand all the parameters within this tab of the dialog box, please visit Vectorworks online Help.
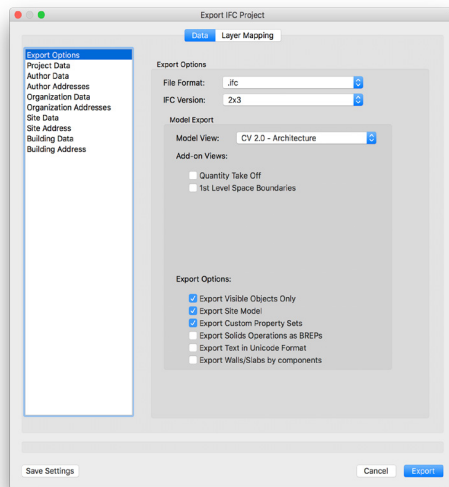
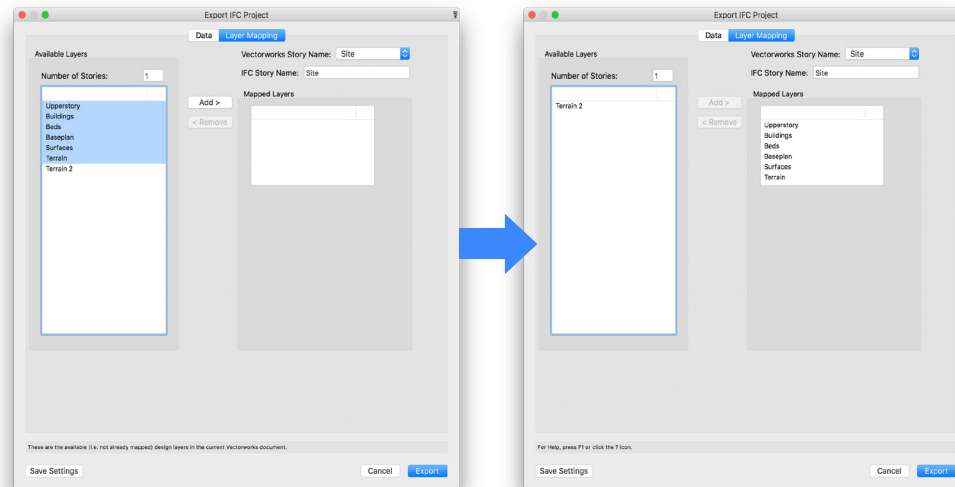**FIGURE 28:** Export IFC Project dialog box – data tab

FIGURE 29: Export IFC Project dialog box – layer mapping tab confirms which layers will export

EXCHANGING IFC FILES WITH VECTORWORKS LANDMARK

4. Click **OK** to export the project.

   Indicate the file name and location in the Save As dialog box. Be sure to append the file name with the .ifc file extension.

IMPORTING IFC INTO VECTORWORKS

IMPORTING IFC

Even IFC projects containing multiple buildings or large information sets can be imported into a Vectorworks file. The units of the imported file are determined by the Vectorworks file settings. An important thing to understand is that the file's original presentation layers or CAD layers from an imported IFC file are assigned to corresponding Vectorworks classes. Also, the Import IFC command automatically assigns IFC building stories to their own design layers.

TO IMPORT AN IFC FILE:

1. Select File → Import → Import IFC

2. Select the .ifc, .ifczip, or .ifcxml file to open, and click Open. The IFC import can be filtered based on elements or stories.

3. Alternatively, click the file to import and drag it into a window with an open Vectorworks document.

4. All IFC Stories and elements are imported by default. However, a filter can be applied to choose specific Stories or particular elements (Fig. 30).

5. If **Stories** is selected, a list of all stories in the IFC file will be displayed. Stories with the designated check mark to the left are marked to be imported. If a story needs to be removed, click on the check mark to remove it and exclude the story and all its elements from being imported.
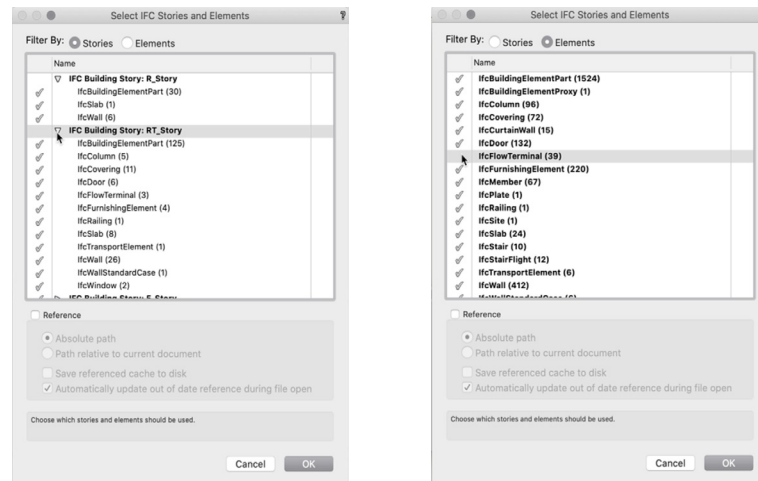

FIGURE 30: Select IFC Stories and Elements dialogs

EXCHANGING IFC FILES WITH VECTORWORKS LANDMARK

6. If **Elements** is selected, a list of all IFC elements in the IFC file will be displayed along with the number of elements. Follow the same process as with Stories to include or exclude particular elements.

7. Click **OK**. The file will be imported.

By directly importing the IFC, the imported geometry and appended IFC data not only become visible, the site designer can select geometry and identify labeled objects and materials all while incorporating the collaborators' models to better inform their comprehensive analysis of the site with building and other structures.

Imported models and elements can react to Vectorworks' visibility controls, such as turning specific layers on, off, or grayed. These custom visibility settings help the designer to either view everything, isolated floors while others are off, or perhaps see selected floors prominently while others are grayed (Fig. 31).

For more detail on the IFC file import options, visit Vectorworks online Help.

REFERENCING IFC

Similar to directly importing an IFC file, using a **referenced IFC import** will provide the context from the project's design collaborators (i.e. building and infrastructure) but adds the opportunity to incorporate revisions from the collaborator/s via the referenced IFC file. This is much like how an external DWG file, when referenced, can be routinely updated.

Within Vectorworks' Navigation Palette, the user can simply select the References tab, then right-click on the IFC file's reference in the list to get the context menu. Within the context menu, the designer then clicks on the Update option to then see the referenced IFC model update with the collaborators' exported updates (Fig. 32).

Once imported, should the user opt to import each story as a referenced design layer, they can choose the Layer Import setting through the Organization dialog box (Fig. 33). This enables creation of separate viewports with varied stories turned on or off.
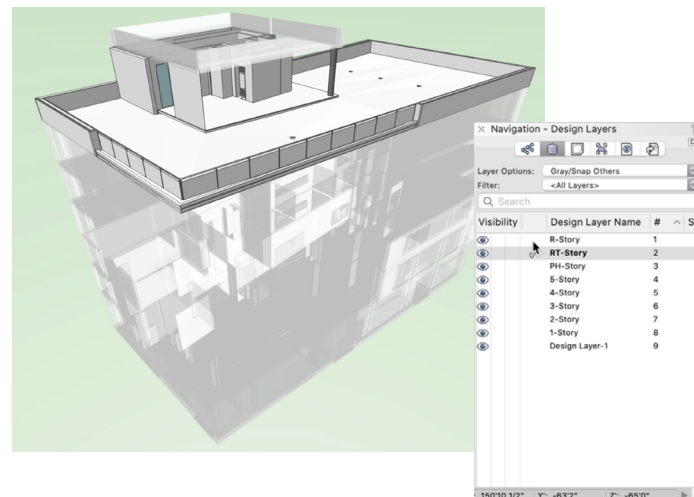

FIGURE 31: Imported IFC Stories with changed visibilities

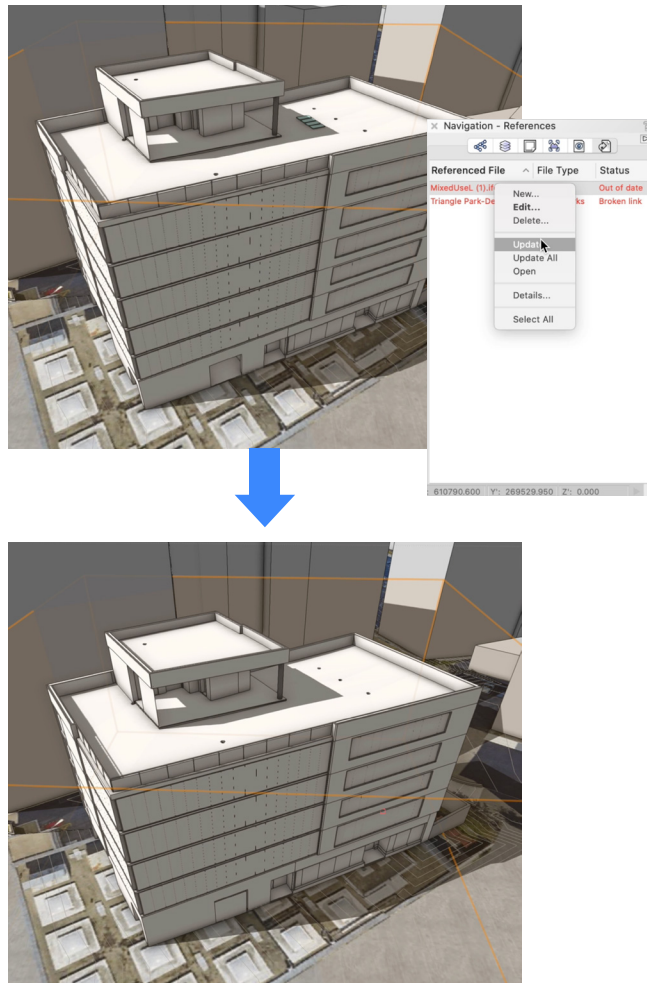# EXCHANGING IFC FILES WITH VECTORWORKS LANDMARK

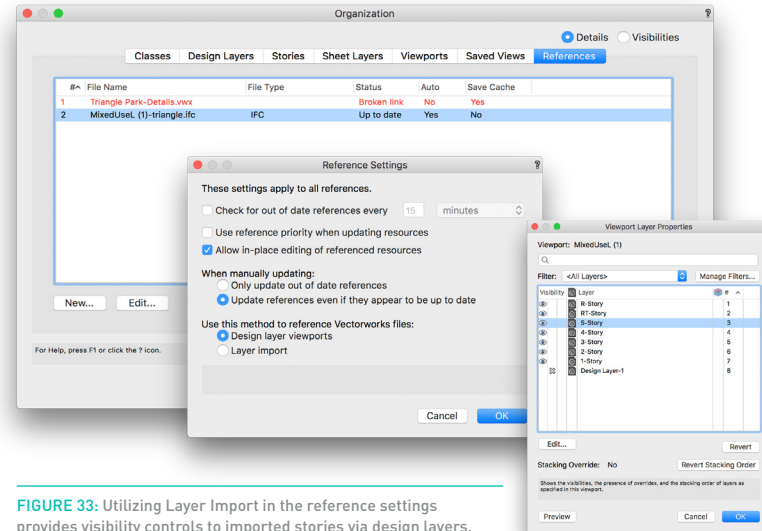FIGURE 32: Referenced IFC model updated after change received

FIGURE 33: Utilizing Layer Import in the reference settings provides visibility controls to imported stories via design layers.

EXCHANGING IFC FILES WITH VECTORWORKS LANDMARK

ANALYZING IMPORTED AND REFERENCED IFC FILES

The always-expanding opportunities for analysis of a BIM project actually extends to imported IFC files, both directly imported and referenced. This is because the data that comes appended with the geometry in the shared files can continue to be of use to the site designer. If designing landscapes on structure, for example, the landscape architect's or landscape designer's work will certainly be reviewed by the architect and structural engineers to be sure the design does not clash or risk structural failure. Because Vectorworks Landmark is suited for design development analysis, the ability to analyze the building or structure to be proactive in the proposed solution is an essential step.

Below are some examples of ways in which an imported IFC model can be analyzed within the site design firm's workflows in Vectorworks Landmark, as if they were analyzing their own project, using Data Visualization and Clip-Cube features **(Fig. 34)**.
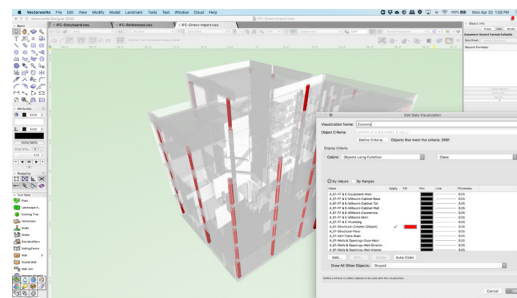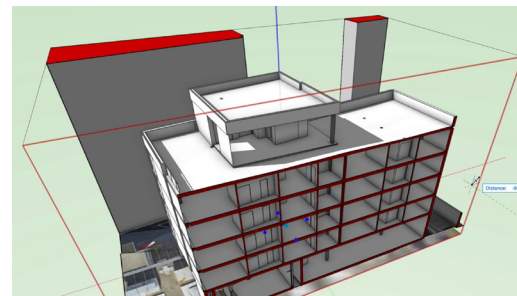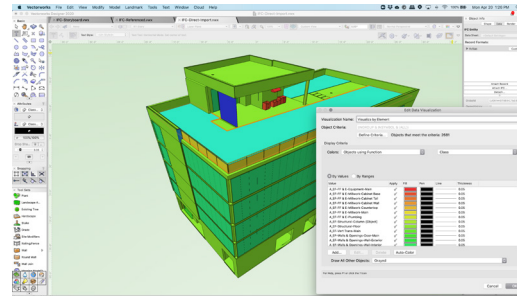

FIGURE 34: Referenced IFC building model analyzed for material, load bearing walls and support column positions change received

CONCLUSION

As the only stand-alone software application that offers integrated 2D/3D information modeling (BIM) specific to landscape architecture and site design, landscape architects, landscape designers, and land planners have a powerful BIM tool for the landscape in Vectorworks Landmark. This becomes even more powerful when incorporating Open BIM interoperability with IFC files. Whether importing to aid in the contextual understanding of how the collaborators' building and other structure work inform the landscape solution, or by exporting to share the proposed landscape with those same collaborators to aid in a more cohesive approach to building, structure, and site, firms will undoubtedly appreciate the efficiencies of Open BIM workflows with IFC interoperability.

The Vectorworks development team looks forward to continuing future IFC exchange support and development. Users can expect ever-improving interoperability, not only with BIM solutions, but with geospatial integration opportunities as well. With this in mind, users are always encouraged to share input, insight and inspiration for how BIM integrations can improve. Please use the contact information provided in the end of the guide to share input.
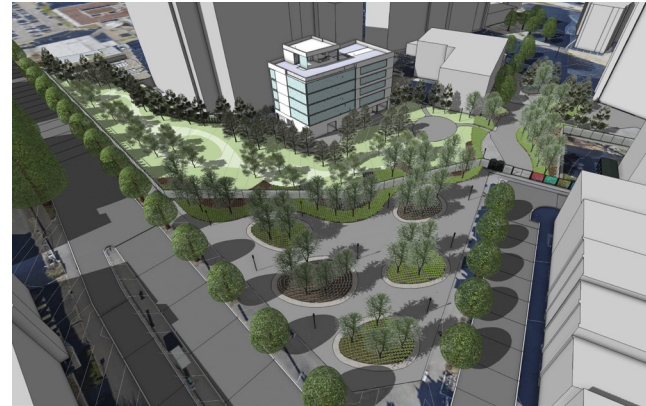

FIGURE 35A: Example of landscape over structure via referenced IFC model of building

FIGURE 35B: Example of referenced IFC model of building within the proposed landscape (Site design by PWP Landscape Architecture)

OTHER RESOURCES AND INFORMATION

There are multiple places online to access more detailed information regarding IFC and buildingSMART, the entity that oversees IFC.

You can visit the IFC Wiki page here.

You can also access a full list of the different software that are IFC certified by buildingSMART here.

Information regarding Model View Definitions and the standardization of Exchange Requirements by buildingSMART can be found here.

Helpful resources to understand the IFC Entity data schemes and their corresponding property sets are also available online.

For IFC 2x3, they can be found here.

For IFC4 Reference View, they can be found here.

TERMINOLOGY

IFC (INDUSTRY FOUNDATION CLASSES)

A platform neutral, open file format that is not controlled by a single software vendor or a group of vendors. It is an object-based file format with a data model developed by buildingSMART to facilitate interoperability in the AEC industry. It is a commonly used collaboration format in BIM-based projects.

OPEN SOURCE FILE FORMAT

A format whose technology is freely available to the public for development.

STANDARDIZED FILE FORMAT

A format that follows a standard way that information is encoded for storage in a computer file. It specifies how bits are used to encode information in a digital storage medium.

SEMANTIC OBJECT

A representation of a collection of attributes that describe an identifiable object. This means that the model describes the meaning of instance. The support of semantic objects is what makes IFC ideal for an open BIM exchange.

DYNAMICALLY EXTENSIBLE

The principle of being able to dynamically change or load in new information without changing the existing information. Adding new IFC information to an existing Record Format is a good example of this.

EXTENSIBILITY

A design or coding principle that takes future growth into consideration. Extensions can be through the addition of new information or through modification of existing functionality. IFC is an extensible file format in that new information can be added to existing information or existing information can be modified.

IFC OBJECT TAG

A label or tag that helps identify an IFC object.

IFC OBJECT TYPE

An object that has been identified as building element with the corresponding IFC tag.

PROPERTY SET

Attributes that define a particular type of object. IFCPropertySets are a collection of predefined attributes that are used to define an object. Property sets are also referred to as pSets.

CUSTOM PROPERTY SET

User-created/defined property sets.

MODEL VIEW DEFINITION (MVD)

Also called an IFC View Definition, a Model View Definition defines the IFC information needed to satisfy.

LEARN MORE

about how Vectorworks can help
you maintain a more collaborative
BIM process with IFC. Email us at
landmark@vectorworks.net.