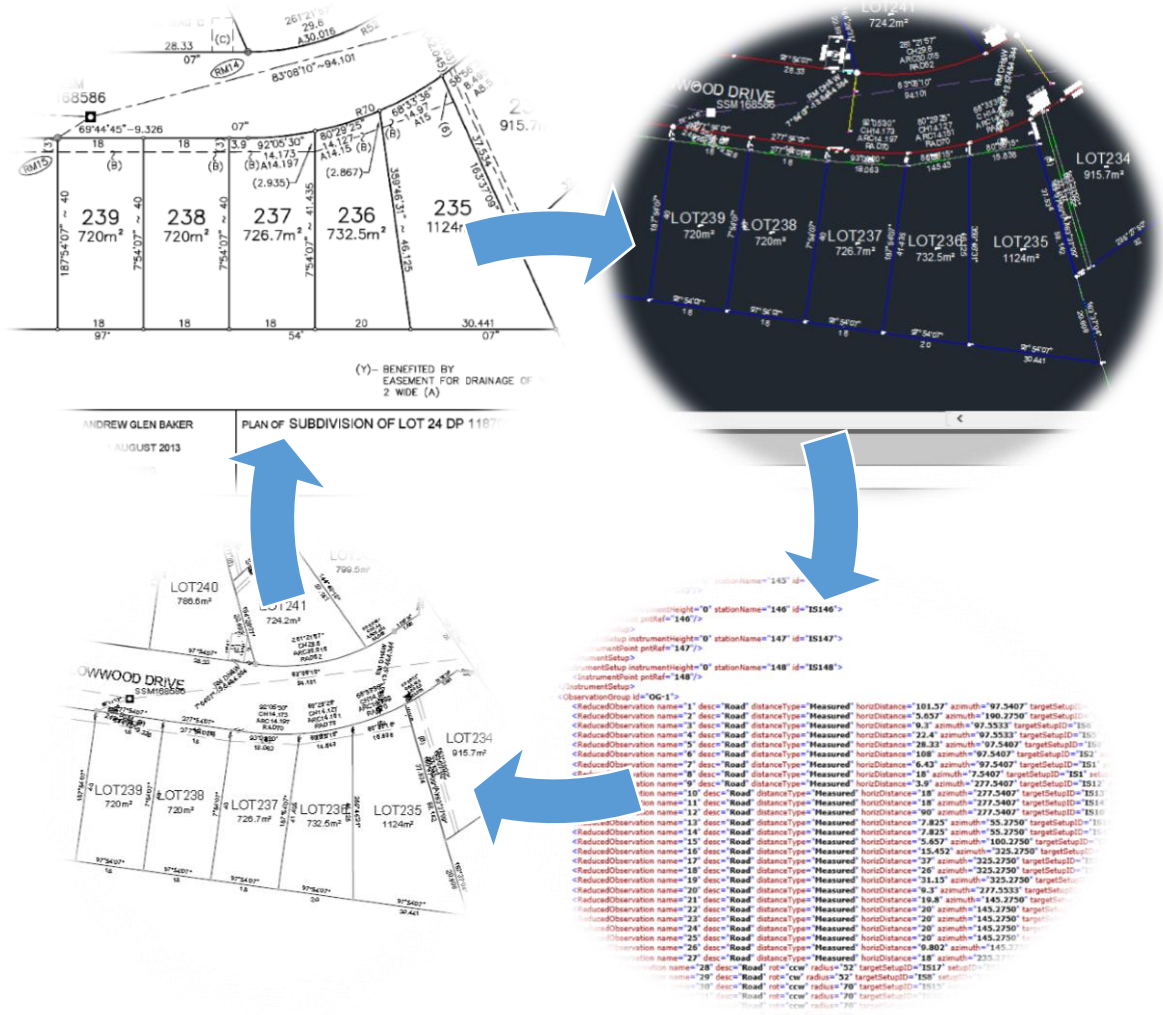
Land XML for AutoCAD – Vic Flavour

Version 1.4



Contents

Introduction

LandXML for AutoCAD was a tool originally written to NSW recipe LandXML files from AutoCAD. LandXML for Autocad Vic Flavour (LXML4ACVF) edited the original code to attempt to match the Victorian recipe. It was designed a link between the existing pdf or paper style drawings which are familiar to surveyors and the new XML format which the DELWP has adopted. The main difference between a NSW plan and a Victorian Plan is the use of multiple plans and documents to define survey parcels. The mission of the program in the Victorian Flavour is to have the survey plan and abstract of field records combined in one drawing, and using layers isolations to show the correct information depending on the plan, and to be able to export from the same drawing. An additional goal is to be able to import an xml that shows all this information.

It is written in the AutoCAD Visual Lisp language, and is supplied as fully functioning source code. This means that if you don't like how it works, you are welcome to change it to suit your needs. It also means if you are doing something boundary related that is not standard, or parts of the xml recipe are edited, the code can be changed by people other than the author.

This document outlines the tools in the LXML4ACVF program, how they work, and hopefully provides some guidance to those who are new to LandXML for Victoria

In this document I refer to LXML – a Land XML file following the Victorian Recipe, and LXML4ACVF – this program. Please don't confuse the two.

If you find a bug, have issues with the program or would like to request a feature please email LandXML4autocad@gmail.com

There is a crash course tutorial in the program showing its main features on Youtube here

https://youtu.be/4tPeiXa55UI

There is also a written tutorial at the end of this document

Background

In late 2014, the author of the code was exposed to LandXML on a limited basis. The company that he worked for was quoting for the input of all existing plans into LandXML format, and after looking at how it was being proposed to be done, thought using an existing CAD program that is widely used around the world might be a more suitable method. The contract was eventually given to a company outside Australia.

His vision (which was not the vision of his company of course) was that perhaps if it was easy enough and enough plans could be entered per day for a reasonable price, then the input of the plans could be done by Australia's own surveyors, who are the experts in reading and producing them. This would also give the inputted plans some responsibly, rather than being entered by a nameless data entry person, who may not care as much about the finer points on the plans. A by-product of this vision would be that many of surveyors would become familiar with the LandXML format.

After examining the LandXML recipe, he started to realise that the transition between the existing way of doing plans and the new format was going to be a big step for many surveyors, so he saw that the solution was to try to create something that looked like the existing plan formats, but could also be exported to XML and then re-imported and presented the same way. This was a key mission goal of the program.

The way LandXML works is very unsuitable for rendered plan production, as it does not take into account many drafting properties, such as drawings scale, text size, text rotation, line thickness, callouts and diagrams. To get the program to print something close to an existing plan, many rules, exceptions, if/else statements and checking/aligning routines had to be employed. In the author's opinion, it is very doubtful that a survey draftsperson was consulted during the entire compilation of the LandXML recipe (or LXML in general), but the benefits a digital version of the plan (of sorts) being stored are untold in terms of cost savings to surveyor; provided they are input correctly and care has been taken to ensure the completeness. The author has no survey drafting qualifications, but is a surveyor, who performs survey drafting for his company, has a reasonable understanding of survey plan drafting, and has an advanced understanding of the AutoCAD Visual Lisp programming language.

In 2017 the author switched states, and has spent a few years learning the "Victorian" way of plan drafting. There are quite large differences between a NSW and Victorian plan drafting, and of course the two recipes and methods of doing things with LXML are also quite different.

Goals of LandXML for AutoCAD

1. Create a viable LandXML format from:
   -Data entered using the program
   -Data from other programs which could be imported into AutoCAD using a number of methods
2. Print an existing pdf style plan from the same data with minimal effort
3. Be able to read existing LXML files and create a plan that was familiar to surveyors, so that it could be printed and used in the field.

Installation instructions

The program has been tested in AutoCAD 2012 and 2015. There is not an automatic installer, and users may not want to use the tool all the time.

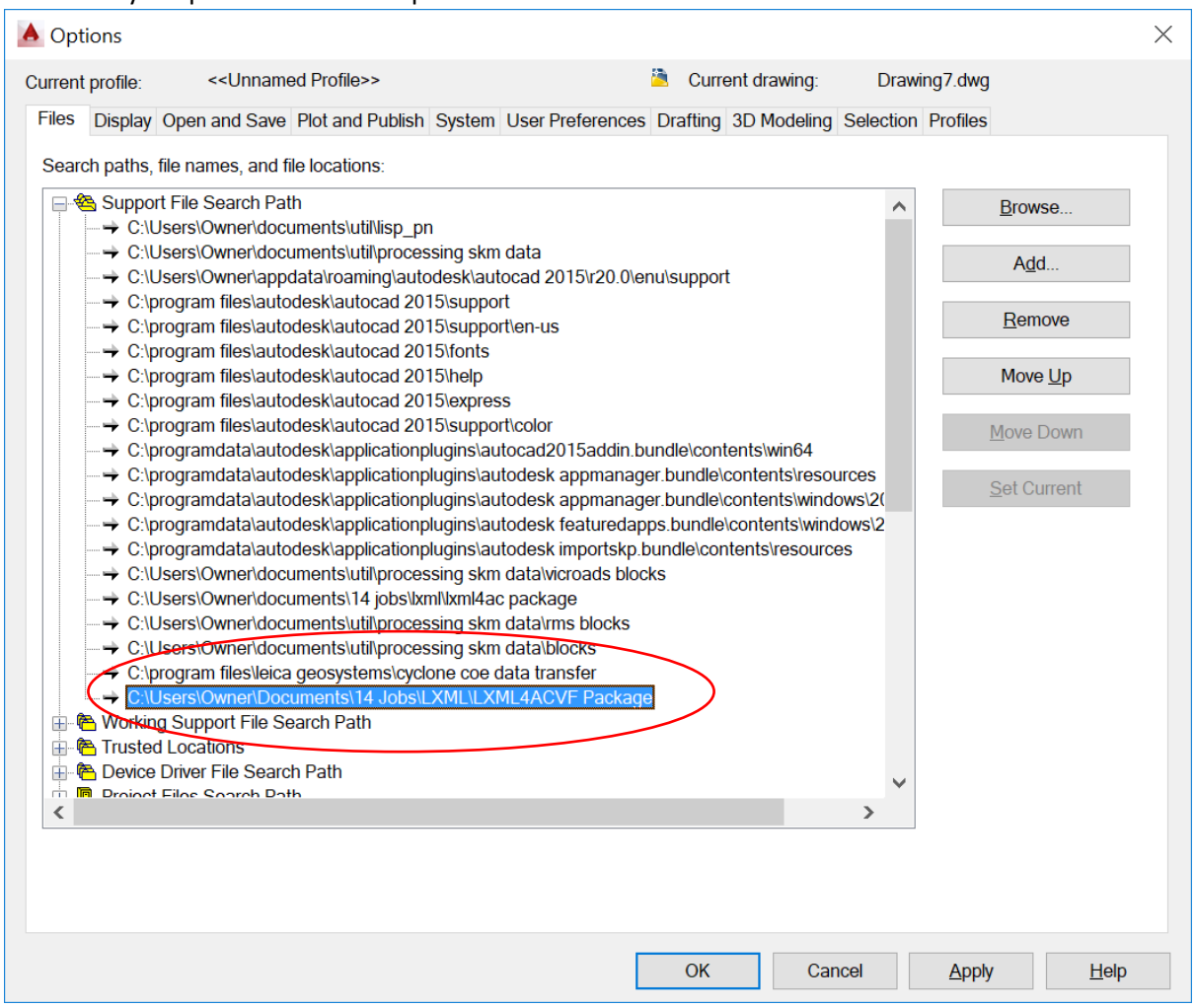
First time installation instructions

1. Download the Zip file and extract the contents to a folder.

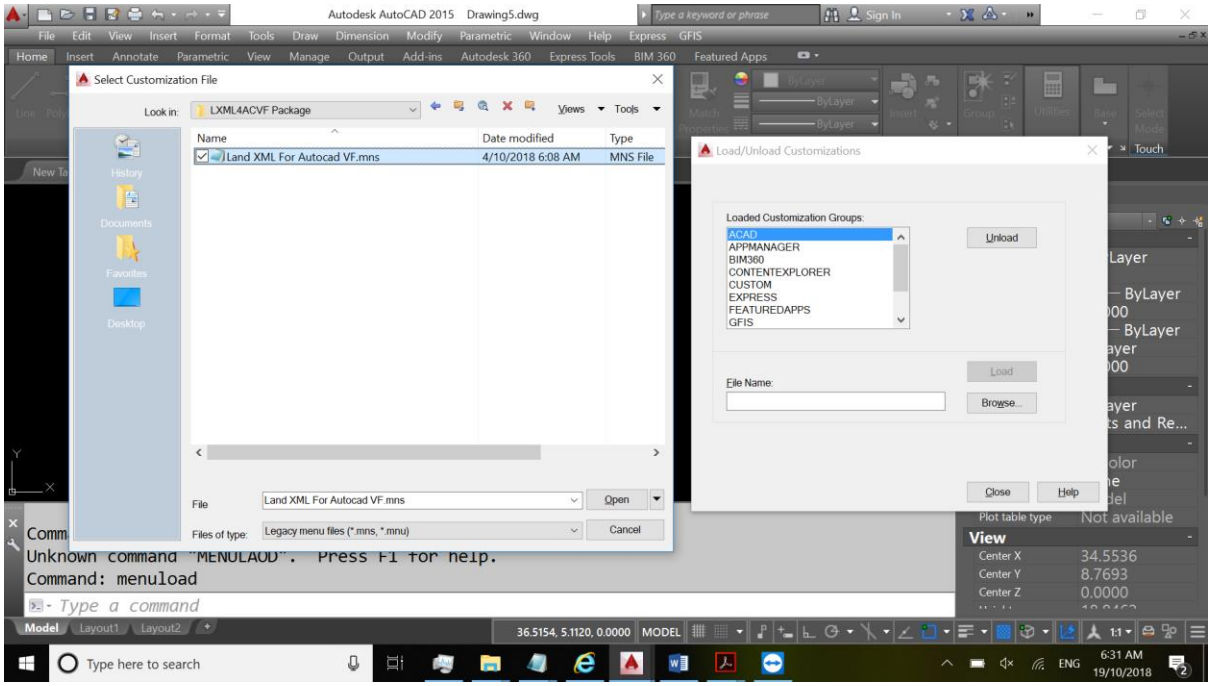
2. Open AutoCAD

3. Type *options*

4. Under the files tab, press the plus on the "Support file Search Path", press Add, Browse, and find the folder you specified in 1. Then press ok.

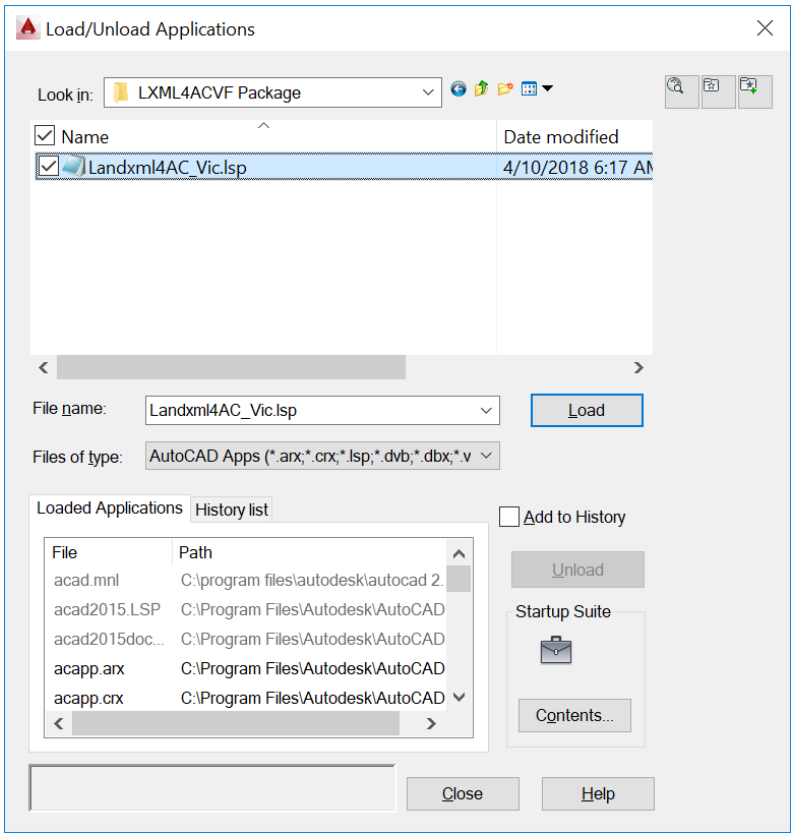


5. If you would like the drop down menu, type *menuload*, select browse and find the 'Land XML For Autocad VF.mns" file. Then press load and OK. The LandXML dropdown menu should then be added.



Each use Installation instructions

Each time you would like to use the LandXML functionality you need to load the lisp program. Either drag the Landxml4AC_Vic.lsp lisp file onto AutoCAD, or type *appload,* then find the lisp file and load it that way.



A number of things happen when you load the program.

1. The LandXML linetypes are loaded from LANDXMLVF.lin
2. LXML4ACVF Layers are added, assigned colours, thicknesses, linetypes and plotability
3. A number of checking lists and AutoCAD system variables are defined. The system variables are not changed back at the end of the program. The variables that are changed are:
   Osnapcoord – stops auto-snapping when drawing elements
   Angdir – sets angles to clockwise
   Angbase – sets 0° to north
   Attreq – prompts for attributes when inserting blocks
   Dimzin – gets rids of trailing zeros when making a string
   The annotation list is reset to defaults
   Cannoscale – set to 1:1
   Plinetype – set to 2
   Peditaccept – set to 0
4. The textheight of the current text style is set to 0 so when drawing a DTEXT autocad prompts for height.

Licencing

LandXML4ACVF is freeware distributed under the GNU Public Licence

This program is free software: you can redistribute it and/or modify it under the terms of the GNU General Public License as published by the Free Software Foundation, either version 3 of the License, or any later version.

This program is distributed in the hope that it will be useful, but WITHOUT ANY WARRANTY; without even the implied warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the GNU General Public License for more details.

To view a copy of the GNU General Public License see http://www.gnu.org/licenses/

And to a lesser extent a beerware licence

THE BEER-WARE LICENSE (Revision 42):
Phillip Nixon wrote this file. As long as you retain this notice you can do whatever you want with this stuff. If we meet some day, and you think this stuff is worth it, you can buy me a beer in return.

The GNU licence is required to cover me as obviously land definition can have large legal ramifications if some mistake is made. This is in case there is some mistake in my coding (or others modified coding) that leads to some definition error which ends up in a boundary dispute. I sincerely hope there is none of these errors, but I need to be covered.

Land XML for AutoCAD – The basics

AutoCAD uses many different object types, but LXML4ACVF only uses 7; the point, line, arc, polyline, text, mutlitext and block. LXML4ACVF works by adding what is known as xdata to the object. Xdata is not a new thing, and has been around in AutoCAD since 1985. Things such a lot names, mark types and bearing and distance are assigned to the objects, so they can be exported into the XML format. Understanding that this is happening is critical to understanding how LXML4ACVF works.

Point

As you would expect, point features are for defining things at a single point. The following are a list of things points are used for

1. Survey marks and occupation objects (e.g., Nail, Pipes, spikes, pins)
2. Permanent Marks
3. Datum points (A-B, X-Y) lines
4. Occupation of a point type
5. Non spatial lots and links (eg Easement descriptions)
6. *Coordinate geometry points (after import or export)*

Lines and Arcs

Lines and Arcs go in the same category because they define the same thing. They are used for defining the edges of lots, connections to things and occupation related objects. Each proposed lot polyline needs to have a series lines and arcs over the top of it to denote the geometry. The lines and arcs are stored in the Reduced Observation section of the LXML and are generally the same format except for their layer. Lines are used for the following purposes

1. Boundary lines – edges of new lots being created
2. Extinguished boundary lines – the edges of the lot being subdivided. These look like boundary lines in the xml (assigned the desc normal), but they are denoted differently so the lot can be isolated for field note plotting.
3. Traverse and sideshot lines
4. Topo lines – these are used connect floating lots and easements to external boundaries and do cross road and corner connections.
5. Easement lines – these look like boundary lines in the reduced observations section (desc normal), but are different in the lot section. They are denoted differently in LXML4ACVF so they can be plotted as a dashed line.
6. Occupation offsets – These lines are not recorded as a reduced observation. They are recorded in the plan features section.
7. Plan features – e.g. fences, walls, kerbs. These are all stored in the plan features section of the LXML. No reduced observation data is stored on these lines, so they can be created using any method and there is no need to assign information to the lines but it can be done.
8. Structural Boundaries – lines used to define a boundary on a structure (strata boundaries)

Polylines

Polylines are a series of joined lines and arcs. They can be either a lot definition, a plan feature or an irregular boundary.

1. Lot definitions – this is a closed polyline that shows the area of a lot, easement or new road. They are all stored under the layer “Lot Definitions”. It is important that the vertexes (end

points) of the polylines directly overlay the geometry. For example if there is a line with the same bearing but two distances, there must be a vertex between them, not a line all the way through.

2. Existing easements – Existing easements in a proposed lot don't require reduced observations (lines and arcs) so to get around this a polyline placed in the "Easement" layer will plot the existing easement
3. Plan features – Walls, fences, buildings and kerbs. These will be stored in the plan features area of the XML.
4. Irregular Boundary – A polyline which follows the line of an irregular boundary (eg Mean High Water Mark, or centre of creek etc). Irregular boundaries can also be 2d polylines, so a splined polyline can be used to create a smoothed polyline.
5. Chainage lines – These are polylines used to define occupations by chainage from a point
6. Structural Boundaries – polylines used to define a boundary on a structure (strata boundaries). This is the preferred method to create structural boundaries as a width of polyline can be used to make the line thicker.

Text

While building the file, LXML4ACVF will create many text objects, mostly on the drafting or drafting AFR (abstract of field records) layer. This is to display the information stored on the line for checking, but also to allow for the creation of a standard plan, as these are still required to be submitted. Every effort has been made to make the pieces of text go in the proper place, but overwriting may still occur, and will need to be moved for clarity. None of this text is exported, and it is all recreated in the default position when you reimport a LXML file. The program does its best to figure out whether a piece of text belongs on the drafting or AFR drafting layer, but given the mission of having the two plans combined in one drawing the task is difficult.

Multitext

The recipe contains some very long attributes, for example a full restriction description or plan notes that can end up being quite extensive. As Xdata is limited to 255 characters, which is more than enough to store a couple of lots etc the data can normally be stored on the object. Unfortunately this is not the case with these longer objects so extensive descriptions are inserted as multitext and an xdata identifier assigned to that. Examples are the survey report notes, general plan notations and council notations.

Blocks

Blocks are for a variety of utility tools as follows:

1. The administration sheet has all attributes currently shown on the sheet and a few others required by LXML
2. The layout sheets has attributes as shown on the current sheet
3. Drafting blocks including the Pegs, Post, PM, Nails etc

Programs in the Lisp File

A list of the commands is presented here and further expansion of each tool, how it works, and what is going on in the background is also presented. As mentioned earlier, every effort will be made to present how the program works, so if a problem arises, you can have a crack at finding a solution; it is freeware after all.

Global Steup
XSS - Set Drawing Scale
XRD - Set Drawing to Round
XMLC - Redefine Lot Centre Positions

Entry Tools
XTR - Traverse
XTA - Arc Traverse
XTC - Chainage Traverse
XCL - Create Lot
XCE - Create Easement Lot
XLE - Link Easement Geometry
XCR - Create Road/Reserve Lot
XCM - Create mark
XPM - Create PM mark (PM or SSM)
XDP - Create Datum Point
XOC - Create occupation offset
XOQ - Create Queenland style point occupation
XCF - Create Flow arrow
XAS - Create Admin Sheet
XLA - Add Layout Sheet
XCOC - Add Owners Corporation Schedule

Assigning tools
XAL- Assign line to XML
XALN - Assign line with note
XAA - Assign arc to XML
XAAN - Assign arc with note
XAP - Assign Polyline Lot to XML
XAE - Assign Polyline Easement to XML
XAR - Assign Polyline Road/Reserve to XML
XJL - Assign Polyline to Adjoining Boundary
XJR - Assign Polyline to Existing Road
XAI - Assign Polyline as Irregular Boundary
XAO - Assign description to Occupation
XTI – Assign title to polyline
XAD – Assign address to polyline
XAM- Assign multitext to lxml
XSL- Assign lines to Short Line Table
XSC - Assign arcs to Short Line Table

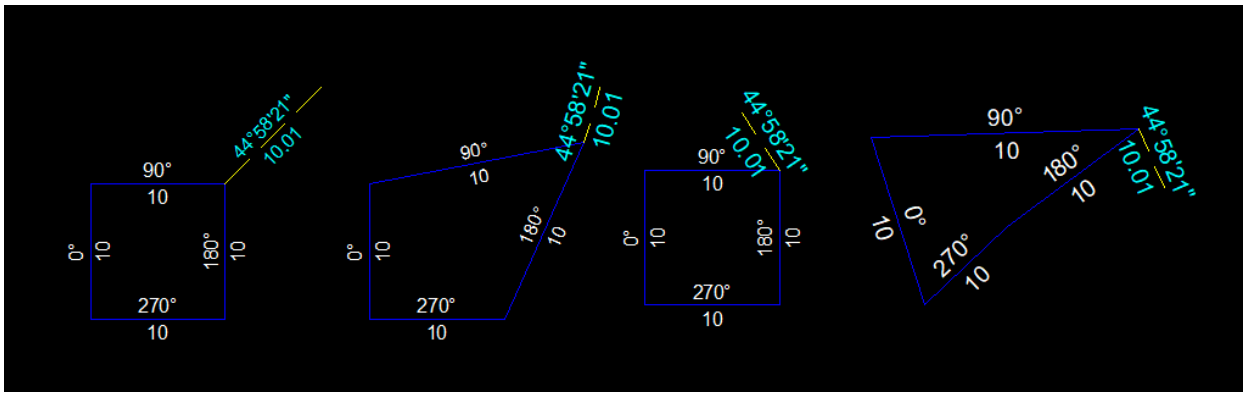
XOS- Offset line

Drafting tools
XSW - Swap text positions
XSP - Spin text 180°
XCB - Create brackets around text
XRT - Recreate Text from Xdata
XPU - Push text past line
XDE - Edit xdata manually
XCD – Check check digits
XAUD – Audit plan geometry

IO tools
XMO - Export Monuments to CSV
XIN - Import XML file
XINO - Import XML file from observations
XINS - Import simple XML file from observations
XOUT - Export XML file

The fundamental concept of Landxml

The biggest hurdle I see when surveyors start using xml is the observations –> cgpoint relationship. Think of the cgpoints as markers on a piece of paper, not coordinates in the real word. I can put the markers anywhere I like. Now I join the markers with observations - bearing and distance information. This information just a piece information that is attached to the line. This should be an easy concept for Victorian surveyors however because the abstract of field records is almost always not to scale, or positionally correct, but somehow we can use it to position the boundary in the field. Landxml can work in the same way. Don't be afraid to move points around once the geometrically information has been stored on the line.



In the picture above all 4 versions are valid landxml geometry. The bearing and distances don't change, only the positions of the points. Of course the worse you make it from where it should be the harder it is for users to understand, but one of the greatest things about landxml is we can rebuild the file using the bearing and distances only (ignoring the cgpoint coordinates) and get a file that is geometrically ready for the field investigation in seconds.

Victorian Land XML Format

LandXML is a text based (ASCII) format, designed in the XML style. Each object starts with <Something> and ends with </Something>. It is basically broken into a few main sections in the following order

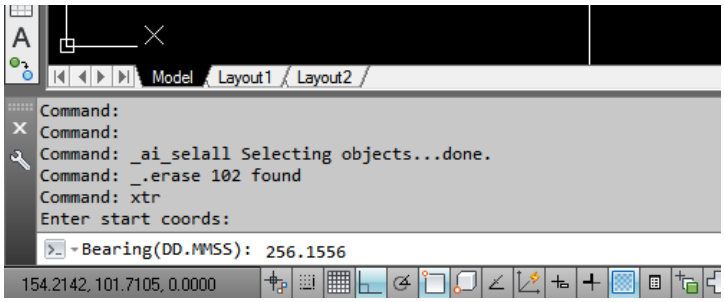
1. The header – contains information about the XML and some definition of where the plan might sit.
2. A list of points which many objects are linked to (known as CG points)
3. A list of lots, whose corners are defined by the CGpoints. This includes easements and special non-geometic lots.
4. A list of plan features whose corners are defined by the CGpoints. This section covers things such as occupations.
5. Plan metadata, surveyor, firm, date of survey etc.
6. A list of instrument stations (think of these as a link between the next step and the CGpoints). Don't think of these as setups in the field.
7. A list of observations. This is where it gets a little complicated. An observation is a line on the plan which will be denoted with a bearing and distance. The bearing and distance are recorded in the xml, as are two CGpoints which define where the line starts and finishes. **This bearing and distance have no real relation to the CGpoints which the line goes between**, think of it as a recording of textual information about a line.
8. A list of monuments, including RM's, RM's that have gone, nonstandard corner marks and occupation offsets.

If you want to learn more, read the Victorian ePlan Handbook from the DELWP.

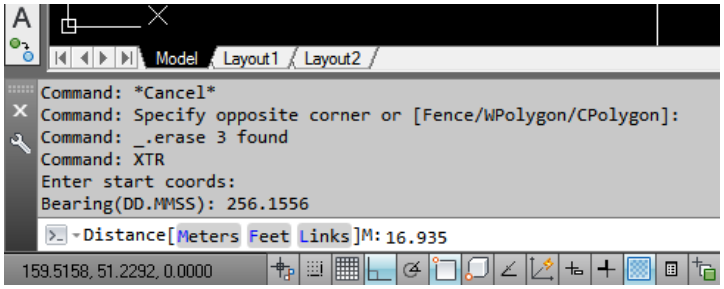
XTR – Traverse

This is a line traverse. The line is entered using a bearing and a distance. The bearing is entered in Sexagesimal format (DDD.MMSSdddd), and the distances can be entered in metric, imperial or links by pressing the appropriate key. Comments can also be added to the line, for example, “Per Original”, “By Me”, or “Occ to Occ”.

The program draws the first line and then goes into a continuous loop to keep drawing lines from the subsequent endpoint. Press esc to get out.

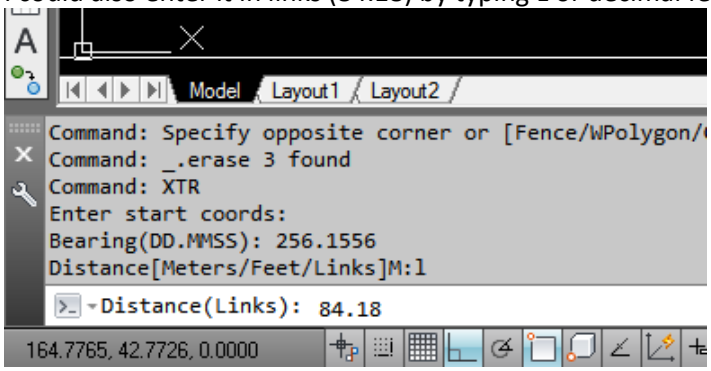


So here is the bearing 256°15’56”. There is also a function here where if an R is added to the front of the bearing it is automatically reversed. E.g. if the plan had read 76°15’56”, but I wanted it to head west, I could have typed in R76°15’56”. (Using R also means bearings are recorded exactly how they are shown on the existing plan even if you are travelling in the wrong direction). Bearings can also be entered as survey bearings, in this case S76.1256W. Many old Crown plans prior to 1900 use this format.

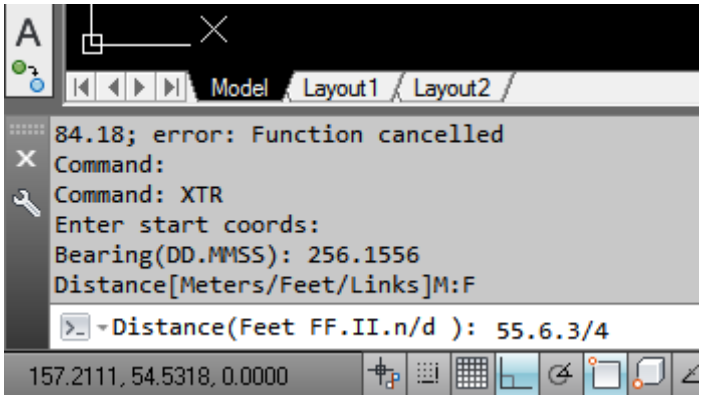


Here is the distance 16.935

I could also enter it in links (84.18) by typing L or decimal feet by typing D (55.56)

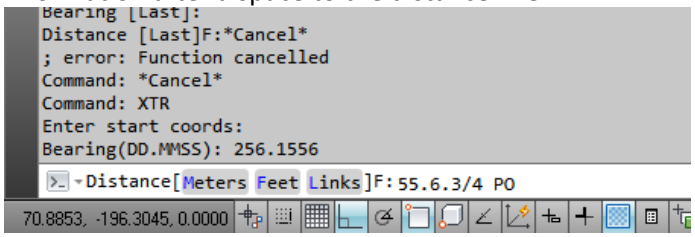


or in Imperial by typing F



Note that imperial measurement are entered as so - Feet.Inches.Fraction/OfanInch. When entering old style distances (feet, decimal feet or links) the entered distance will be written below the metric distance in italics. This is to aid in finding input errors. To remove these use a quick select and select all text obliquing at 70.

If there is a requirement to add a comment to the distance, for example PO or OCC-OCC, add the information after a space to the distance line.



This information is recorded in the LXML file as a field note attached to the reduced observation. There are also special comment types. See further on in the document for information on there. This should **not** be used for recording information about the ends of the lines (e.g. GI Nail placed etc.) as there is no way to determine which end of the line this comment refers to. Use a XCM (corner mark) for information about a corner.

Once one line is input the bearing or distance from the last line can be used again by pressing enter at the prompt or typing L. The program will remember the units from the last traverse until it is set back to metric (or links)

The program takes this information, does all the necessary conversions to convert it to metric, and then combines the measurement into a string which it types into the AutoCAD command line to create the line. It then runs a labelling routine, which labels the bearing and distance along the line. If the line is smaller than the text will fit, and autoshrink is turned on, the routine currently shrinks the text down to a suitable size. This was seen as preferable to doing a callout or short line table, as it keeps all the information plotted where it belongs, not hidden in the corner of the page. The text is placed on the layer drafting, and is not exported as part of the LXML file. There is a small function here that makes sure the text is rotated to the ISO standard (reads from bottom or right)

The bearing and distance information is also assigned to the line object at this time for future export to XML. The information connected to the line (*or any LXML4ACVF object*) can be examined by typing XDE and selecting the line.

The type of line (boundary, traverse or sideshot) is based on the layer, so all of the information can be input into AutoCAD, and then assigned to a layer post entry, by picking it up and changing the

layer. This is designed to speed up entry, as a lot might have four boundary lines and 3 easement lines for example. Assigning the layer post entry means the lot can be drawn as one long traverse.

What to do when things don't close perfectly

The problem with recording things as a vector (bearing and distance) eventually a situation will arise where geometry will not close on itself. This is not a big problem. In LXML4ACVF the line will retain its inputted xdata regardless of what you do with the line. **This can be very dangerous as end of lines can be moved large distances and still look the same in xml.** When you get to the end of a loop that does not close, and the closing distance **is within tolerance**, simply grab the end of the line and snap it to the starting point. Alternatively extend the lines to each other. (This is a rudimentary method of closing a lot, if you wish to use a Bowditch or other such coordinate adjustment you will need to use external software and look into using the XAL and XAA tools).

XTA – Arc Traverse

This is an arc traverse. The arc is entered using a bearing, a chord distance, a radius and selecting a side for the arc. The bearing is entered in Sexagesimal format (DDD.MMSSdddd), and the distances can be entered in metric, imperial or links by pressing the appropriate key. Comments can also be added to the line, for example, “Per Original”, “By Me”, and “Occ to Occ”. There are also special comment types. See further on in the document for information on there. It works in a similar manner to the XTR function (traverse) so refer to that section for entering imperial or link measurements, and comments.

Here is an arc with a chord bearing of 256°15’56”, and chord distance of 19.965 and a radius of 25. You can also choose to enter the Arc distance by typing A if there Chord distance is not shown. At this point the program draws this chord as a line and will ask for a side to draw the arc on. Move the cursor to the side of line the bulge will be on. Bearings can also be entered as survey bearings, in this case S76.1256W. Many old Crown plans prior to 1900 use this format.

The program then runs the arc labelling routine as well as assigning some xdata to the line. It is probably worth noting here the LXML doesn’t store the chord distance and this is an interpolated distance based on the radius and arc length, but most surveyors prefer to enter the chord distance and it is recorded on the plan.

Special Comments for XTR and XTA

When using XTR and XTA there are 4 special comments that are used to assign special values to the reduced observations azimuth and distance types. These are:

AD or ADOPT – This creates the adopt type and the distance label will have a suffix of AD. This can also be combined with other information for example a plan name if necessary (eg “AD and LP1234”) where the program is looking for the string “AD “(note the space).

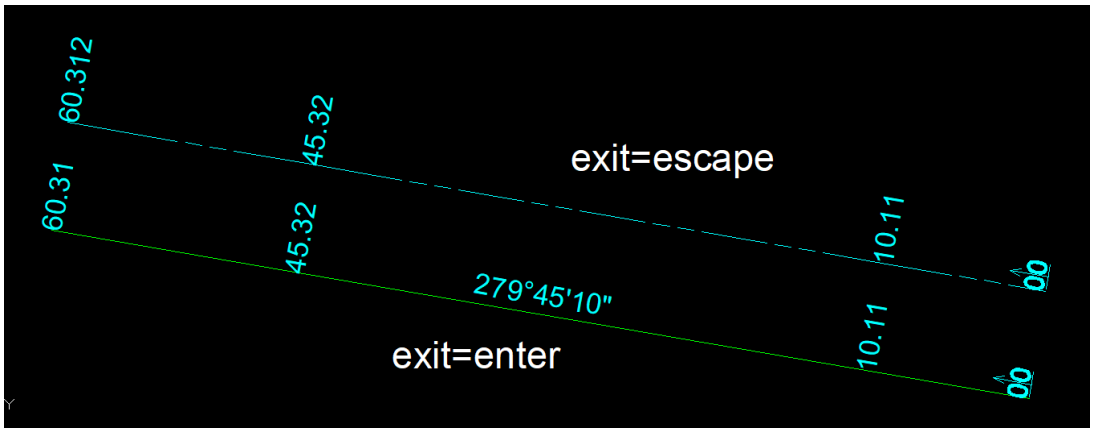
COMP OR COMPUTED – This creates the Computed type. This can also be combined with other information if necessary (eg “COMP GNSS”) where the program is looking for the string “COMP “ (note the space).

D or DERIVED – This creates the Derived Type. The text labels will be underlined. This can also be combined with other information if necessary (eg “DERIVED FROM LP1234”) where the program is looking for the string “DERIVED “ (note the space)

MEAS or MEASURED – This creates the measured type. While this should be the default type and is optional, it may be necessary to force this type for some reason (I can’t think of one yet). This can also be combined with other information (eg MEASURED FROM 1975 AERIAL IMAGE) where the program is looking for the string “MEASURED “ (note the space)

XTC – Traverse with chainages

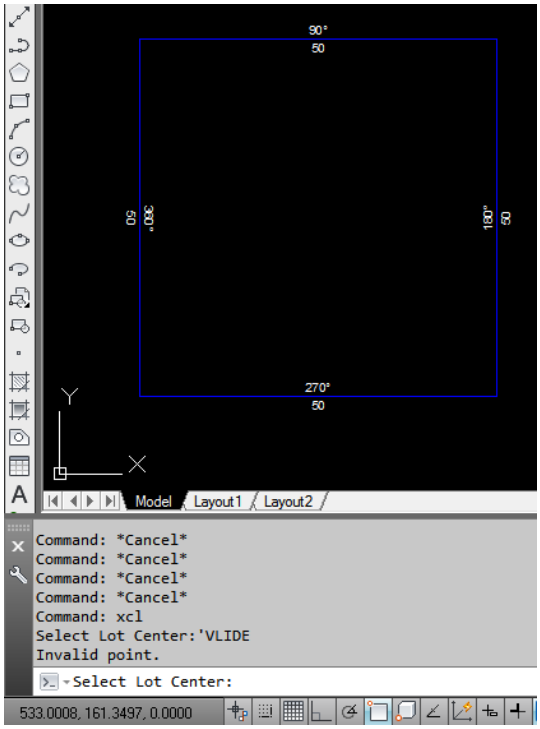
This tool works the same as a normal traverse, however it will ask you for only one bearing and then the series of chainages. The program will assign the distance between the chainages to the line segments, but label like a chainage. How you finish the program is very important. If you press **enter** on the distance prompt the lines will become a polyline and the information will be suitable for export as a plan feature – chainage. If you hit **escape** the program will hard exit and you will have a series of lines that have been assigned like individual line segments. **It is important to note that traverse lines cannot be exported as chainages in xml, chainages are a plan feature not a reduced observation.**



Because only the Segments of traverse lines have be assigned by this tool, but if you really desire to keep the overall distance from the measurement station you will need make overlapping reduced observations, however the line styles will not plot correctly. There are also two other chainage based tools XAC and XCC.

XCL – Create lot

This tool is used to take the lines and arcs created with the previous tools and define a lot. In LXML a lot is defined by a series or reference to points, a centre point and other information, for example a lot number and area. The tool works by creating a hatch, then tracing a polyline over the top of the hatch. The use of hatches was originally designed so that the tool HPGAPTOL could be used to define unclosed lots, but this is unadvisable for LXML.



So here is my nice simple lot, and I have typed XCL, and it asks me to select the centre. This will be the point where the lot text is added and is also written to the LXML as the lot centre. It is also used to flood the lot to create the hatch. A number of layers are turned off while the lot is being defined by the hatch flood.

The program will then create the hatch, put a polyline around it and the delete the hatch. The preview of your lot should come up as a green hatch. You are then prompted for the lot number, this will increment automatically if it can. For a multipart lot *type PT as well as the lot number.*

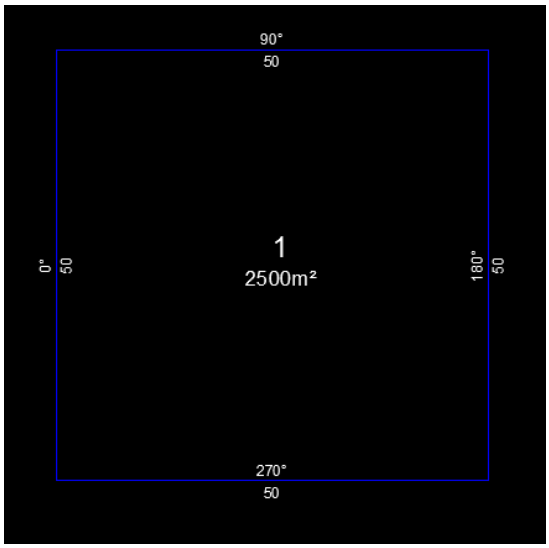
The next prompt will be the area. It can be calculated by typing C, or entered directly from an existing plan. There is a checking routine that will alert you if the entered area is out by more than 10%. The program will also finish by displaying the area difference (in percentage) when it finishes.

There is the ability to type acres, rood and perches here, by entering in the format acres.rood.perches. The two decimal points indicate that it is an imperial area, so if you enter in this format you might need to add 0 eg 200 acres is 200.0.0.

It will then prompt you for whether the lot is proposed or existing.

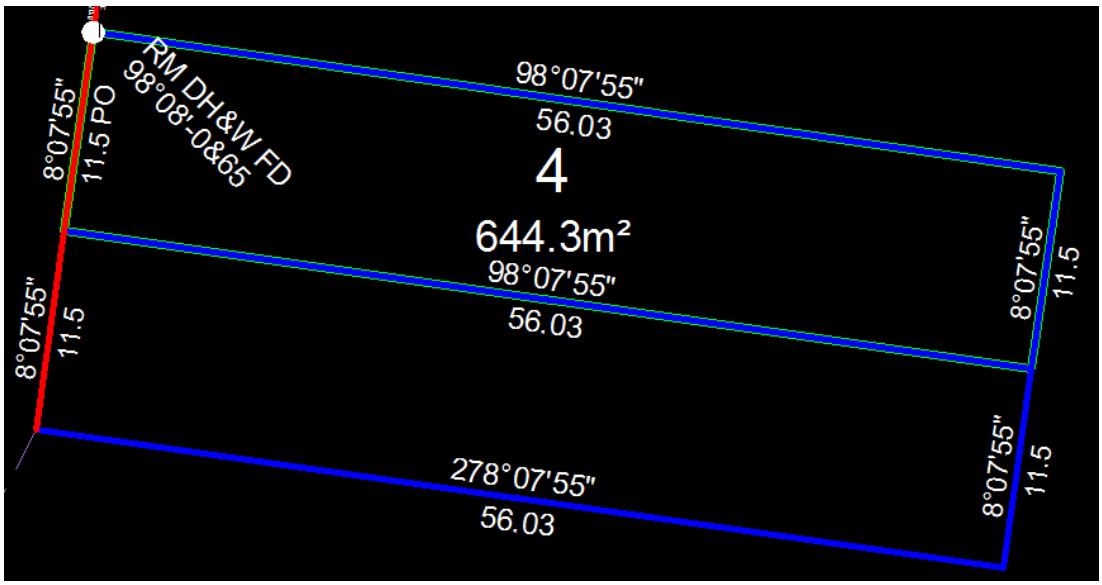
The program will then store this information as xdata on the polyline.

After this step the lot number and area are annotated and the lot polyline is moved behind the boundary geometry. The area annotation will be rounded to according to the practice directives but will be stored to 3 decimal places as a square meter value, as xdata for export to LXML. If pressing C the area annotation will always be rounded down (so you don't ever imply the lot is bigger than it is). If using a UCS the text will be rotated with regard to the current UCS, but centre point geometry will be related to world coordinates



Here is my annotated lot.

The lots can be seen underneath the overlying geometery by turning on the line thickness  . Lot definitions are given a thickness of 0.7. Note the slightly green tinge to the lines on the northern lot in the figure below.



One of the bugs that still exists in AutoCAD, is the hatch tool. There are certain geometrical situations where AutoCAD will not be able to hatch the lot and the program will bug out. This seems to happen often when curves are involved. In this situation, trace the outline of the lot with a closed polyline and then use the XAP tool instead.

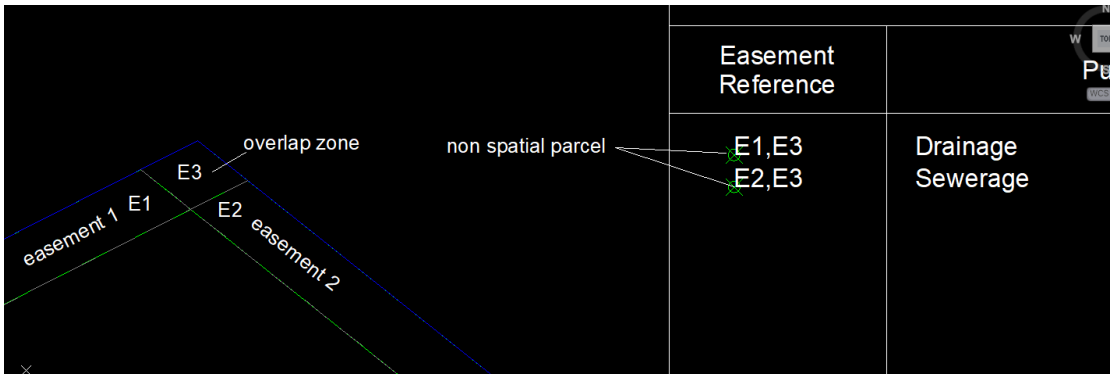
There is also a bug involving curves or short lines where the hatched polyline vertexes will not be placed directly on the existing line/arc ends. LXML4ACVF will find these point when exporting and alert you to their location and inserts orange (color 30) objects over the top. If there are a lot of these the XCT function may be able to clean up a lot of these. If there is still a problem after XCT a solution is to trace polylines with curves or zoom right in on the auto-created polyline and snap the vertex to the corner of the line/arc after the LXML exporter finds them.

XCE, XLE, XLRE – Create Easement, Link Easement and Link Restriction.

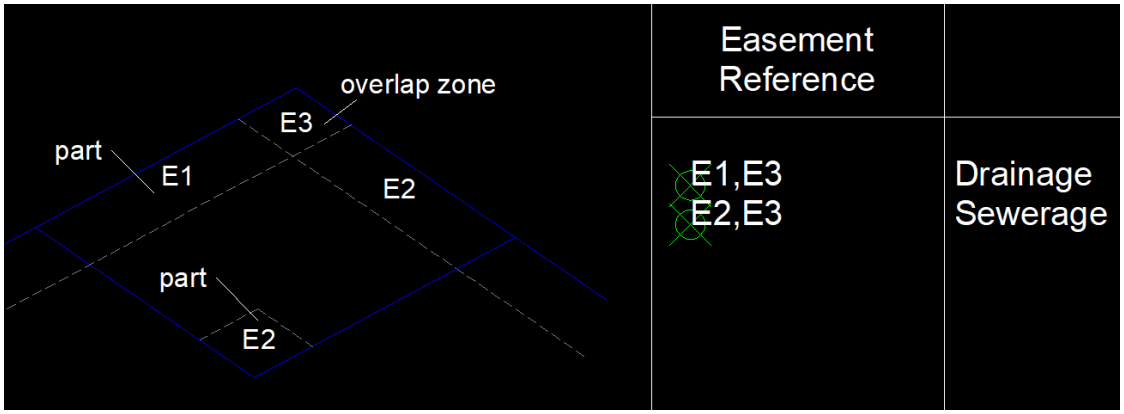
Easement segments are created in the same ways a lots, select in the middle of the parcel and the easement is created through the flood hatch method. The program will prompt for an easement identifier which must be in the format E# (not E-#). Restrictions can also be created in the same way, by using the format RST#.

There is also a routine in here to find the closest line or arc to the centre point and align the easement name to this.

Easements in the Victorian Flavour see the introduction of a "non-spatial" lot *(Good luck getting that into the DCDB*). Each easement is composed of two parcels, the geometry parcel (created with XCE) and the "non-spatial" parcel with the description (created with XEL). There is a reason for this. The general plan guidelines say "*When two or more easements intersect or overlap, one unique easement identifier is to be shown in each portion of the easement on the plan diagram*". So where there are overlapping easements the geometry of an easement parcel may reference two easement notations.



To make this more confusing- you can also have two easement identifiers with the same number subdivided into parts. To enter as part lot easement prefix the id with the letters "PT" (eg PTE3).



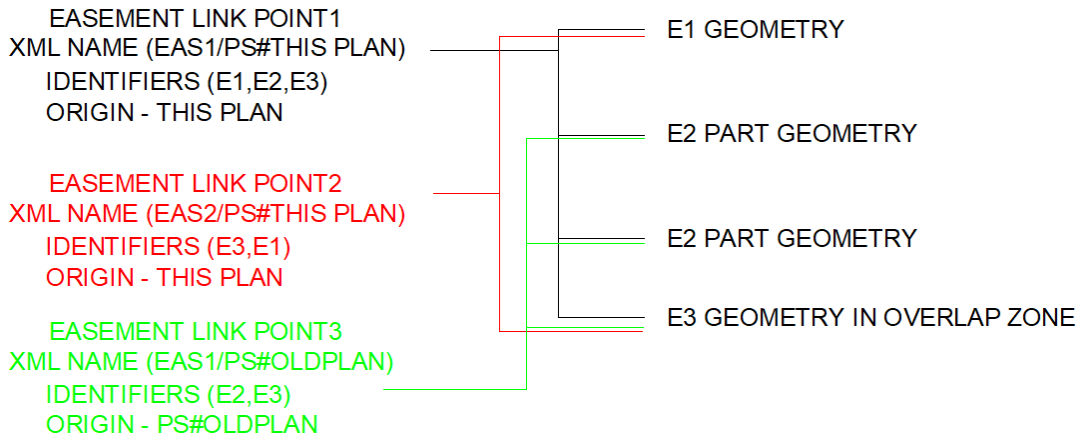
It is also important to note here that all segments of an easement need to be dimensioned. Using the width as a standard offset from an existing dimensioned line to reduce the need to dimension all segments of an easements cannot be used in xml. It needs the reduced observations to do its checks.

XLE

To facilitate connection of the geometry to the information about the easement (its identifiers and benefit's etc) are stored on a point (the green circle cross in the diagrams above). To create these the XLE tool is used to link the description to the parcel segments. You can type the easement identifiers in or press enter to select the geometry to be linked, then select the type of easement, width, it's origin, who it benefits, and give it an identifier for the xml link. The identifier is needed, even though it is not plotted.

The easement width which is stored as an annotation in the survey header section of xml is placed as xdata attached to a multitext (or multiple multitexts stacked on top of one another).

At the present point in time the easement identifying system for xml in Victoria appears to have some serious flaws, the main one being the need to denote easement geometry as created or existing where it could be both. Hopefully the diagram below might assist with understanding easement links and easement geometry.



In this configuration

-Easement one is new and covers all the portions on geometry

-Easement two is new and covers E1 and the overlap zone zone only

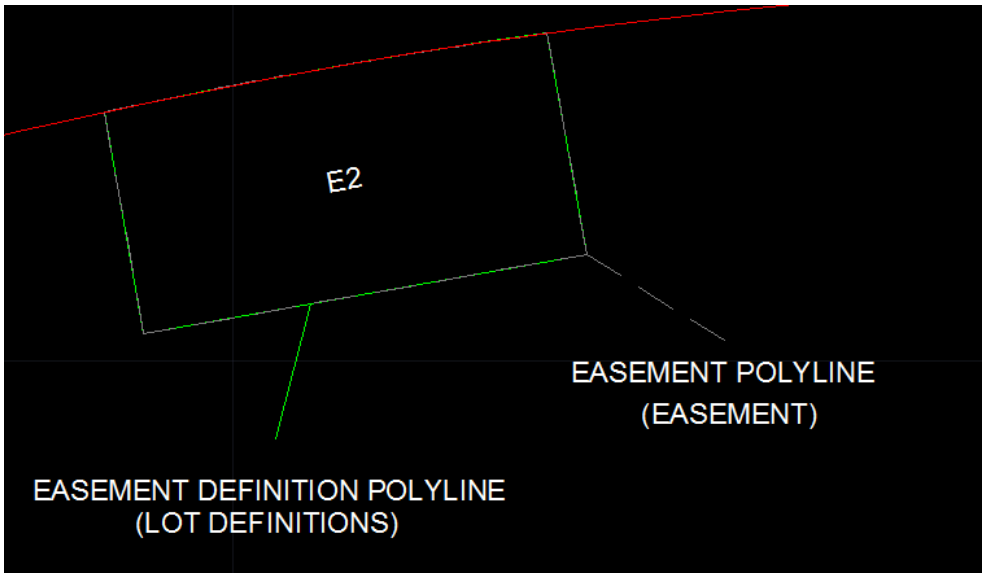
-Easement three is existing and denoted Easement 1 on and old plan (or would it be denoted E-1 on the old plan) and covers E1 and E2 on this plan, E2 which is in two separated sections.

Imagine if on the old plan Easement 1 had more than one identifier, for example if easement one on the old plan was similar to easement 1 on this plan which has three identifiers. When you create the new plan you would need to show and reference those individual portions to allow the xml easement identifiers, and those portions may or may not align to your new portions.

When an easement exists, it is important to create the parcel lots before the easements, as the edge of the easement will affect the lot finder.

Existing easements are also a special case as the geometry of an existing easement inside a proposed lots does not necessarily needs to be defined. As the lot definition polylines are not plotted, a polyline placed over the top of this lot in the "easement" layer that will allow the easement to be

plotted. Any line or arc in the easement layer would bug out as it will does have any xdata attached, but a polyline in the easement layer is not exported, but will plot as a dashed line. The XIN command also identifies these lots and places polylines in the easement layer over the top of the lot definition. An example is shown below.



XLRE

This tool is used to link a restriction parcel. The program will create a point with the non-spatial lot, but also at the same time add the “title” restrictions (the burden and benefit) to the already created lots. It will also ask for a description of the restriction, but this can also be added later using XAM.

Restrictions are slightly different to easements, in that they don’t need “geometry” parcels, because they are normally represented by hatching, instead of an identifier for type, but still require parcels. On export the description will be put with the parcel or multiparcel part of the xml, not in their own non-spatial parcel like an easement.

XCR - Create Road/Reserve lot

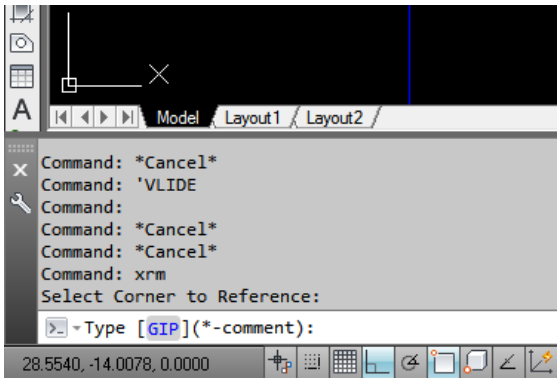
This tool is used to create new roads. It works the same as the XCL tool, however it will ask for a road identifier, and a road name. The name should be an R# number if it's a road and RES# if it's a reserve. It doesn't need the plan number; that will be added on export. It will also prompt for a description and a council/body/person. This is what is normally added to the second column in the vesting table.

The description is the proposed street name or reserve, or if there is no name (for example a cutoff corner, or road widening) the description should be "ROAD". Note this tool is not used for adjoining existing roads, these are done with the XAR tool.

XCM – Create mark (monument) on corner, Non peg mark on corner

This program is used to place a monument on the corner of a lot or on a traverse station or surveyed mark.

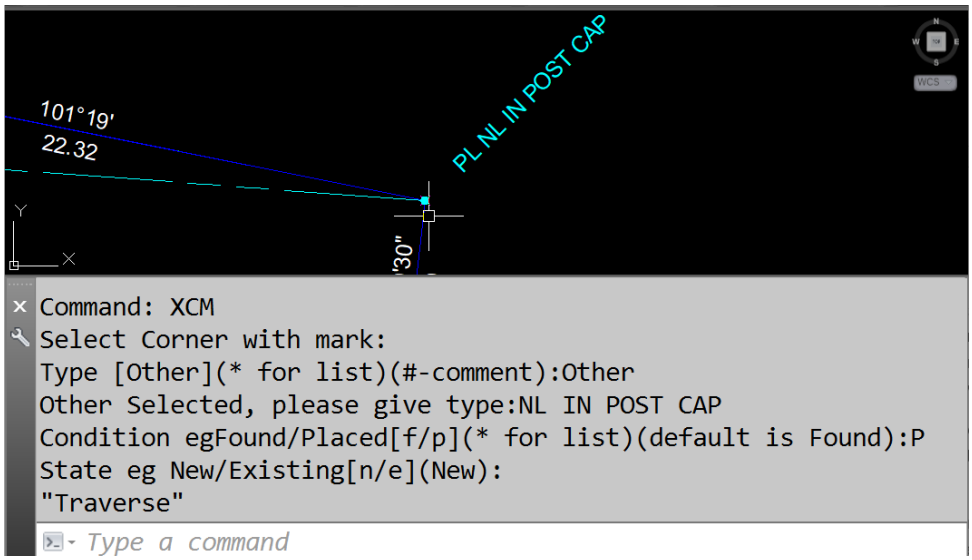
There are a series of prompts as follows



Comments

Type XCM to run and select the corner to place the mark on. At this point a comment can be added by adding a -, e.g. G.I. Nail-in Concrete. This will be stored as a description in the LXML data on the monument point. You can also type * in any one of these prompts to bring up a list of possible selections. If you want to add a comment as well as select from the list box type "*-*my comment*". The mark type will be checked against a series of known type, shown in the enumerations section of the LXML recipe. The list is case sensitive, which is why the selection box has been added to the prompts here. If the correct type is not entered an alert will come up and a list of possible entries.

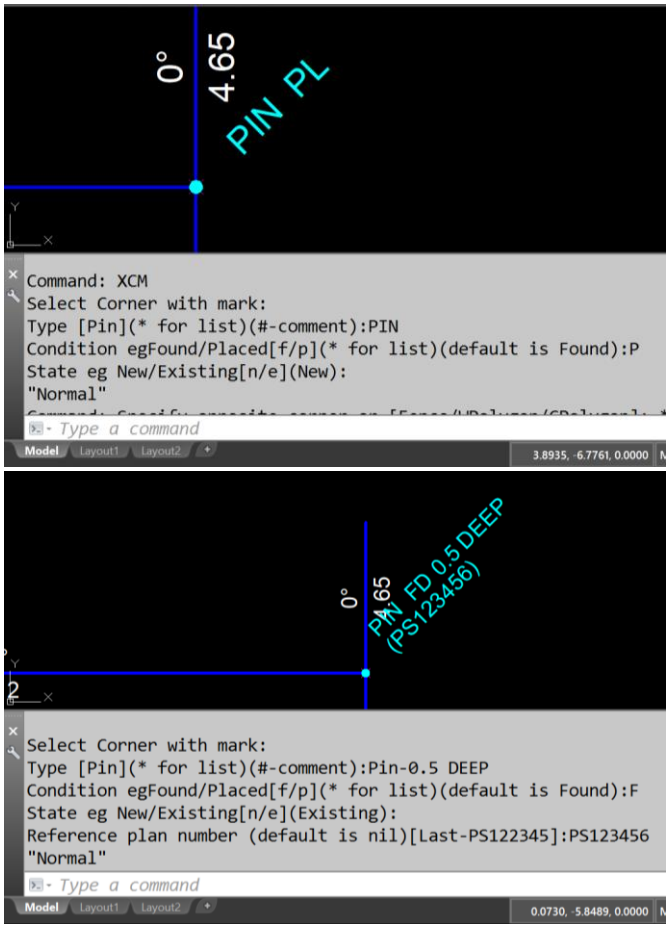
If your mark type does not exist in the list, you can choose other and specify the mark type. This is useful for monumenting wall corners, or placing nails in non-specified locations. If you type "other-*what type of mark it was*" it will continue on, however if you just type other or choose other from the list it will prompt you for the mark type.



RM's can also be placed with the comments add on. By giving the function the comment "-RM" the RM notation will be put on the front of the comment. This can also be combined with the list chooser, eg "*-RM"

The next prompt is condition, either found or placed. There are other options here in the enumeration for monument condition, e.g. Disturbed. Once again * can be used for a selection box. A check is made on this entry as well.

When using the two main ones (Found/Placed) the program will automatically suggest the next prompt which is state which only has two options – new or existing. Here are two examples of the output. If the condition is "found" the program will then prompt you for a reference plan.



The function does three things.

1. Places a point on the monument layer and adds monument xdata to it
2. Takes what you typed in and labels the information in the Drafting AFR layer. There is not yet a way to determine the rotation of the surrounding lines, the label will always be at 45°
3. Places an appropriate symbol on the point in the Drafting AFR layer

Occupation Points

This tool can also be used to denote occupations on corners, for example the end of party walls or corners of buildings. By selecting “other” from the type list a custom monument is added. You will be prompted for a description of the occupation.

XPM – Create PM/PCM

This program is for creating a Permanent Mark (PM). In the LXML file the PM is stored as a reduced position observation (in the same section as reduced line or arc). If you want to use the PM as a reference for a corner you need to use the XCM or XRM tool to put a monument on this corner. I had thought to make the entry of the information required directly copy-able from a SMES csv output, but there is a lot of redundant information in that type of entry (i.e. height) and the datum and fixsource are not listed there. The input is a comma delimited entry of information. This is designed so with a little bit of rearranging information from SMES or other sources in excel, a csv could be copied to the command line, speeding up entry for existing information, rather than asking for each individual item. The package includes a simple excel spreadsheet (PM CSV Maker.xlsx) that will concatenate the entered information, and then it is a matter of copying the concatenated cell to the command line in Autocad.

Here is an example input

The program does the following things

1. Creates a point and attaches the reducedpositionobservation xdata to it.
2. Adds the PM/PCM block symbol in the Drafting AFR layer
3. Adds the PM/PCM text in the Drafting AFR layer.
4. Adds a line of information to the Coordinate box. (If it is the first entry it will ask for a position for the coordinate box so it can draw the header information. This will be the top left hand corner. It will also attempt to find the zone from the admin box if it. If this is missing it prompts the user for them).
5. If the mark is a PM it will add a monument point in the monument layer.

The coordinate box is completely redundant. Interestingly the xml does see a return back to the recording of coordinates, even though it is not required on the plan or abstract of field records.

PCM's

PCM's are designed to be added over the top of a point already placed with XCM. This allows information such as mark type notes and reference plans to be added to the monument. A monument (as added in step 5 above) will not be inserted.

XDP – Create Datum Point

Datum points are used to define the main points used to define an alignment or identify specific corners that are noted in the survey report. The datum points are stored in the LXML file CGpoint section under the label “desc”. To place a datum point, select where you would like the datum point to be and then type the letter of the datum point.

The program does two things

1. Creates a point and assigns the Xdata of the datum point description to it.
2. Switches to the Drafting layer and types the datum letter in.

Datum points can also be used to create plan note markers, for example “No vehicle access is permitted across boundaries marked P-Q-R-S”.

Datum points can also be used to create plan note markers for basic two level inclined stratum definition. If the point selected has a 3d position or RL it will be assumed to be a stratum point and the RL will be labelled.

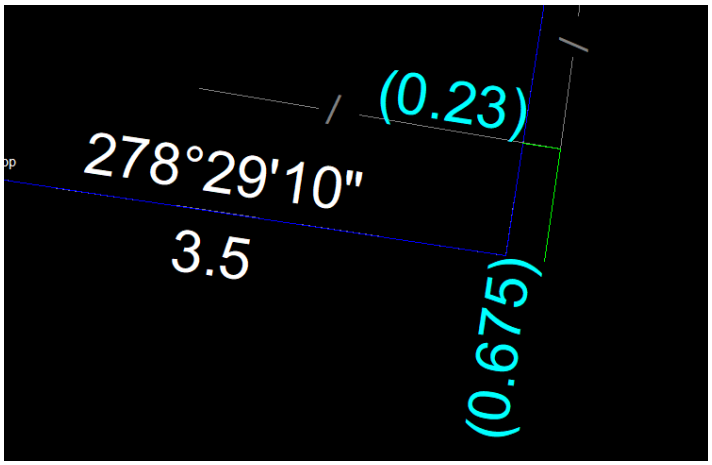
XOC – Create occupation offset

This is the first of the occupation tools and will probably be the most common one used. It is used to denote the perpendicular distance from the boundary line to an occupation, be it wall, fence, building or kerb.

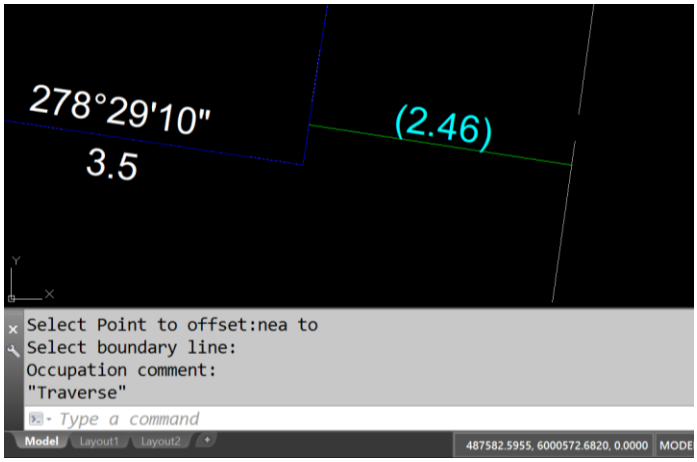
The program will ask for the occupation point, select the point on the occupation
It will then ask for the boundary to offset
It will then ask you for an occupation comment, for example is the occupation “over” or “clear”, or “wall to bdy” etc. This doesn’t need to be completed.

The program will then place an occupation line and attaches the xdata which will be stored in the plan features section of the LXML file.

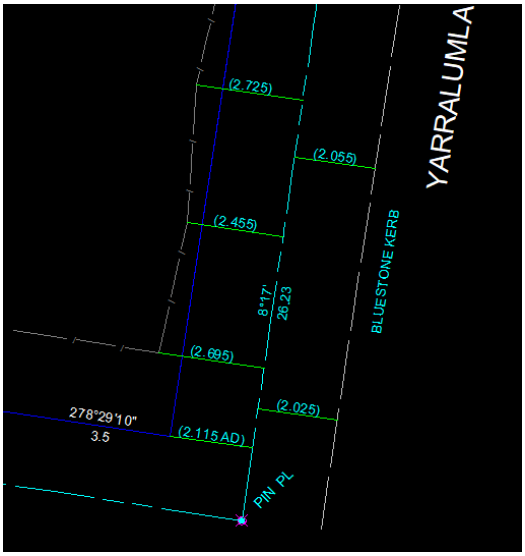
Here is an example of a double fence line offset. A green line is drawn from the occupation point perpendicular to the boundary, and the annotation placed over or to one side of the occupation.



Here is an example of a kerb line occ. Note the green line under the text is not printed when plotted.



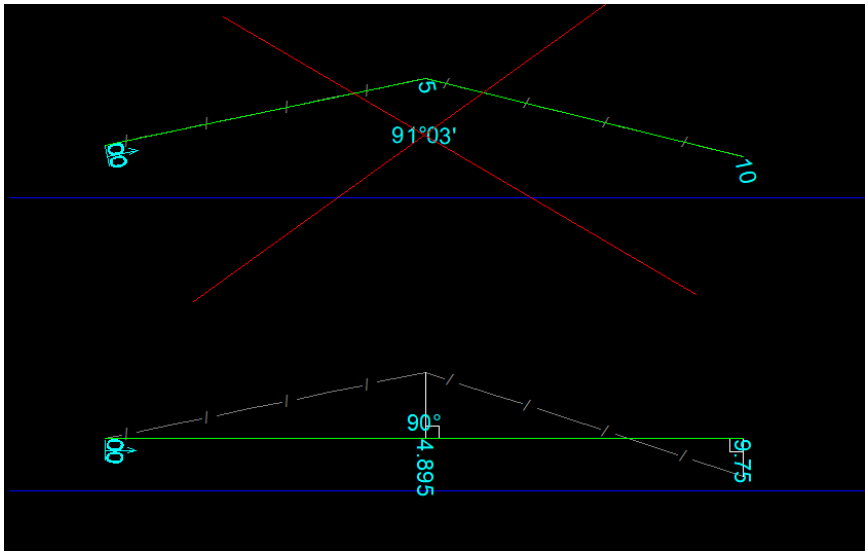
These are boundary to occupation offsets, which are more suited to the surveyors using GPS. The preferred urban method is to show an offset from a traverse or bearing from a station. The XOC tool can be used for this a well. For example



The occupation objects, e.g. fences, buildings, kerbs and walls, if in the occupation layers, will be exported to the LXML as plan features and have no Xdata unless it is assigned using XAO, so they can be created using the ordinary AutoCAD tools (e.g. offset, move, copy etc.) and can be lines, curves or polylines.

XAC – Assign chainage

This tool is used to create a chainage line, or series of chainage along a series of occupations. What is very important is the line polyline needs to be straight, so the line may have to be entered manually from the start point.

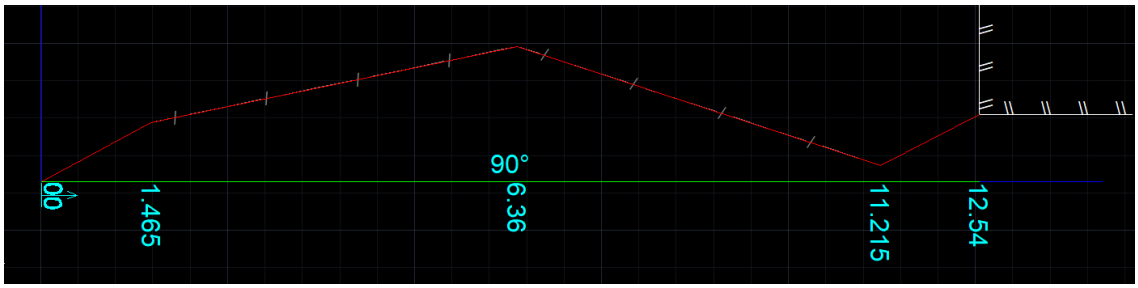


The diagram above shows how the chainages polyline (green) should look. If you are entering these numbers from field measurement this shouldn't be a problem (and they will be entered using XTC), however if you are running a chainage on GPS points, or want to show the through chainage on points measured from different stations, this might be important.

XCC – Create Chainage

As you can see from the diagram in the XAC tool there is a significant amount of work required to find the point perpendicular to the boundary. The XCC tool will automatically do this. To make it work you first create a polyline for the chainages (or one might already exists for eg a fence line), then type in the bearing or select the boundary line to measure the chainages perpendicular to.

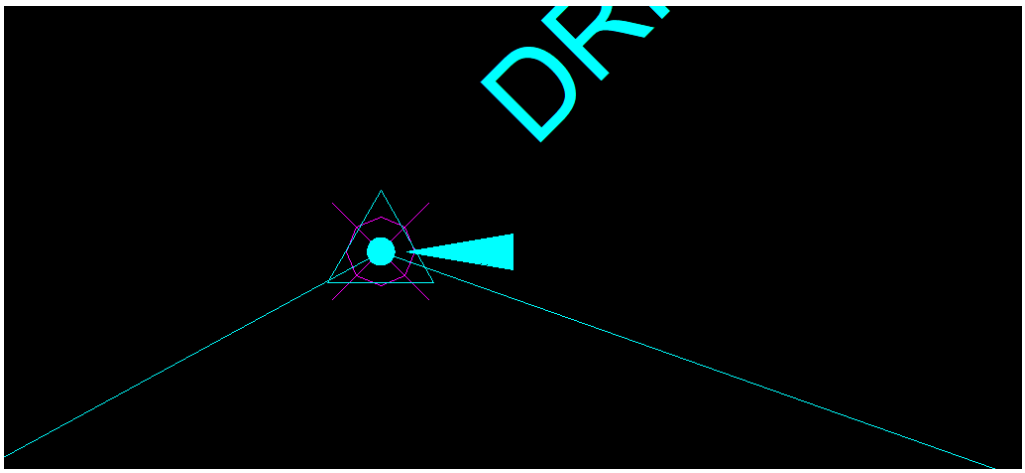
The program will then create a polyline of the perpendicular points along the bearing, and label this with the chainages. You then delete the original polyline if required.



As seen above the red line is the chainage polyline that needs to be calculated and the green line is the created chainages.

XCS – Create auto stations

The auto stations tool does exactly what you are thinking. It puts a station block on every traverse station. It uses traverse lines objects to put stations on the ends of traverse lines. The program makes a list of ends so multiple ends are not stationed twice. It keeps the original block as well which helps to identifiy the point type.



XAS – Create Admin Sheet

The admin sheet is used to store all metadata related to the plan. It is designed around the 1. Plan for Certification - front.dwg from the DELWP with attributes added out the side for things that are in the LXML that are not currently recorded on this sheet. The program will do the following checks and bring up the some choose lists. If you want to edit some of these later on, you can either double click the title block or type attedit and select the box.

- Plan number
- LGA – * brings up a list of current LGA's (at time of publishing). By selecting from the * box the number of the LGA will be automatically recorded, otherwise you will be prompted for the code.
- Parish- * brings up a choose box of parishes. By selecting from the * box the number of the Parish will be automatically recorded, otherwise you will be prompted for the code.
  If your survey covers more than one LGA or parish separate them with a "/"
- Firm- no check or corrections "&" symbol will fixed on export
- Surveyors Reference – no check or corrections, make sure it ends with "–Ver#"
- Township - * brings up a choose box of townships.
- Crown Section – no checks or corrections
- Crown allotment – no checks or corrections
- Crown portion – no check or corrections
- Title References – must be entered in format VVVV/FFFF (note this is automatically generated on import from data elsewhere in the xml file)
- Extinguished Lot Address – (note this is automatically generated on import from data elsewhere in the xml file)
- Last plan reference – no checks or corrections
- Depth limitations - (note this is automatically generated on import from data elsewhere in the xml file)
- Surveyed or Compiled – S or C shortcuts can be used here
- Purpose – Primary purpose for the plan. * bring up a list of purposes and their sections of acts
- Acts requiring the plan, a combination of acts can be used here but using the Acronym of the acts or entering them separated by &'s (eg SO = Subdivision Act 1988 & Owners Corporation Act 2006)
- Surveyor-no checks or corrections
- Surveyors Registration number – no checks or corrections
- Date of Survey – if the date is entered in normal format (dd.mm.yyyy or dd/mm/yyyy or dd-mm-yyyy) it will be corrected to (dd-mm-yyyy). It is corrected to xml format on export
- Jurisdiction – hitting enter will default to Victoria
- Terrain – An extract from the old 2005 Cadastral Surveys Regs, seems to be still requires. Shortcuts can be used.
- Azimuth - * brings up a list of azimuths. MGA94_Zone55 is selected in the list by default.

- Horizontal Datum - * brings up a list of datums. MGA94_Zone55 is selected in the list by default. *Stop and think about your plan here, in particular scale. While the CGpoints coordinates don't have to be in any particular datum, and are merely "used for visualisation purposes only", think about the next surveyor who will use your data. If you want to indicate MGA, don't forget to scale your data (I would suggest at the end just before exporting). Otherwise use local. A plan based on single datum point in MGA but with all information in plane distances is a "Local" system. So much confusion is caused by people who don't understand coordinate systems, let's not make it worse.*
- Zone - no checks or corrections. *While you may have specified already above the zone here is required for the CGpoints section. If working local leave it empty. Zone is optional in Victoria.*

Not all things included on a front sheet are attributes. Due to the variability of things written on the sheet and the strict requirement to categorise them by Victorian LXML protocol, many of the other items are added with the XAM text.


Plan of Subdivision
EDITION 1
PS619178G
LOCATION OF LAND
VESTING OF ROADS AND/OR RESERVES
NOTATIONS
NOTATIONS
DEPTH LIMITATION:
SURVEY:
EASEMENT INFORMATION
FIRM: WATSONS Pty.Ltd.
DATE OF SURVEY: 26-06-2008
LOA NUMBER: 352
PARISH NUMBER: 3175
Victoria
Level Land
MGA94_Zone55
MGA94_Zone55
55

XLA – Create Layout Sheet

This is a useful tool for printing. It goes back to the old system of not using autocads paper space; you place the sheet wherever you want to plot from.

A white hatch has been used to mask out the layout information from the survey data behind it. If you want to see what is written on the layout, change your background colour to white.

If you already have an admin sheet, the layout will be filled out with the appropriate data if it exists, and placed at the bottom left of the admin sheet if it exists, otherwise it will prompt you for a position. Pick it up and move it from here to an appropriate location.

You can select from a number of layouts depending on what type of plan you are doing by typing *.

The layout will also auto-scale itself to the current scale.

XAL – Assign line to XML

The tools we have used so far are good if you are entering in plan into AutoCAD for storage as LXML, but we all have our favourite survey packages which have their apparent advantages. One thing that is fairly common in the industry is that deliverables are often required in AutoCAD or Microstation. Quite a lot of survey drafting is also done in AutoCAD. For this reason I have made tools to use line work and objects imported into AutoCAD, and assign the xdata to it.

The XALN command also adds a note to be stored with the line (eg By survey, by OP1234 etc)

All the assigning tools have the ability to round the information. This is controlled by the XRD command, were you can decide to round the information stored and displayed. This is fairly common on Survey plans, as it gives an indication of the accuracy that surveyors on the ground work to. It also makes redundant precision decisions on short lines.

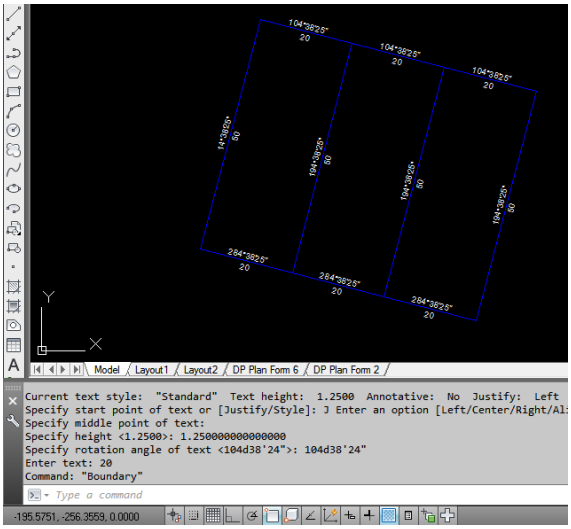
If turned on by default the Auto-round will do the following:

Bearings
Less than 30m round to 60 seconds
From 30m to 200m round to 10 seconds
Greater than 200m round to 10 seconds

Distance
Less than 500m round to 0.005
From 500m to 5000m round to 0.01
Greater than 5000m round to 0.1

These values can be changed by type XRD.

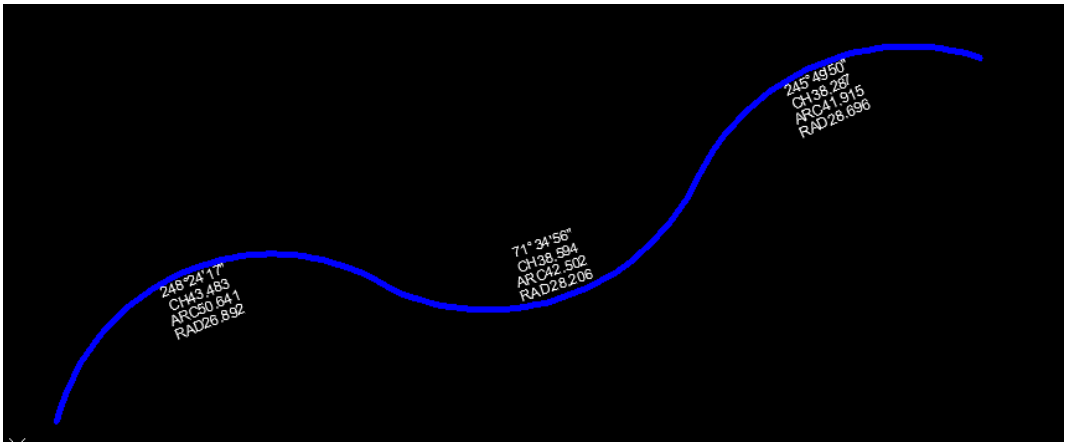
The tool works almost exactly the same as doing the normal entry. You select the lines that you want to assign the xdata to, and the calculations are done between the end points, the information stored as xdata on the line, and the information is drawn on the drafting layer at the line midpoint. Many lines can be done at once, and the layer can be assigned after the command is run.



The program deletes the existing line and replaces it with another in the same layer. This is how previously assigned LXML xdata is deleted from the line (if it has already been defined before). If using a UCS the text will be rotated with regard to the current UCS, but geometry will be related to world coordinates.

XAA – Assign Arc to XML

This tool works exactly the same as the line assigner. It deletes the arc and replaces it with another which is exactly the same, assigns the Xdata, and then runs the arc labelling routine. It will also autoround information if that is switched on. The XAAN command adds a note to be stored with the arc (eg by OP1234)
It will also do multiple arcs at once.



If using a UCS the text will be rotated with regard to the current UCS, but geometry will be related to world coordinates.

Special Comments for XALN and XAAN

When using XTR and XTA there are 4 special comments that are used to assign special values to the reduced observations azimuth and distance types. These are:

AD or ADOPT – This creates the adopt type and the distance label will have a suffix of AD. This can also be combined with other information for example a plan name if necessary (eg “AD and LP1234”) where the program is looking for the string “AD “(note the space).

COMP OR COMPUTED – This creates the Computed type. This can also be combined with other information if necessary (eg “COMP GNSS”) where the program is looking for the string “COMP “ (note the space).

D or DERIVED – This creates the Derived Type. The text labels will be underlined. This can also be combined with other information if necessary (eg “DERIVED FROM LP1234”) where the program is looking for the string “DERIVED “ (note the space)

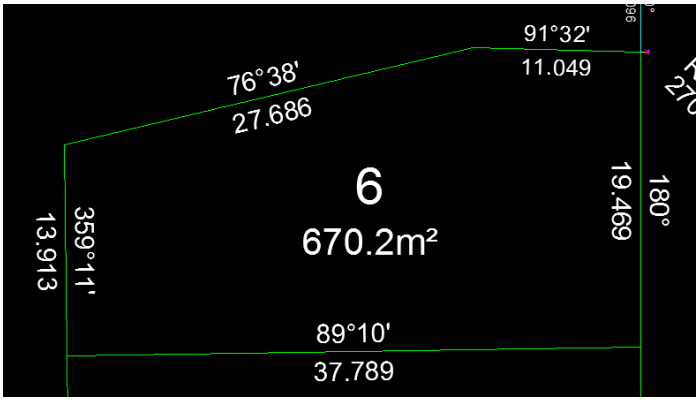
MEAS or MEASURED – This creates the measured type. While this should be the default type and is optional, it may be necessary to force this type for some reason (I can’t think of one yet). This can also be combined with other information (eg MEASURED FROM 1975 AERIAL IMAGE) where the program is looking for the string “MEASURED “ (note the space)

XAP, XAE, XAR – Assign Polyline

This tool can only be done one polyline at a time, as it needs to stop to ask for information. There are separate commands depending on what type of lot is being created. XAP for lots, XAR for roads and reserves and XAE for easements

The command asks for the following information

1. Select the polyline
2. Give the program the lot centre (if you press enter here the lot centre will be the centroid)
3. Then give the program a lot number, easement id or road name. *If it is a part lot, manually type in the PT, e.g. PT8*
4. If it is a standard lot you can the type the listed area or type C to calculate (or press enter to calculate)
   If you give the program an area, it will check it against the polyline and let you know if your enter value is >10% different
5. Tell the program if it is a program if it is Created/Extinguished/Affected/eXisting. Created is the default. Extinguished is used for when a lot is being removed.



The program gets the area of the polyline, checks it against your entered value (if one was entered), assigns xdata to the polyline then draws the lot number and area at the point you defined as the lot centre.

The annotation area will be rounded as per the practice directions for the drawing, but the more accurate value (to 3 decimals) will be stored as Xdata and exported to LXML. If pressing C the annotation area will always be rounded down (so you don't ever imply the lot is bigger than it is). If using a UCS the text will be rotated with regard to the current UCS, but centre point geometry will be related to world coordinates.

The easement will be labelled with the easement id. Use the prefix PT to mark part identifiers (eg PTE3) and after use XLE to link the geometry to its description.

XJL, XJR– Assign Polyline to Adjoining lot, existing road

This tool can only be done one polyline at a time, as it needs to stop to ask for information. There are separate commands depending on what type of lot is being created. XJL for adjoining lots and XJR for adjoining roads.

The command asks for the following information

1. Select the polyline
6. Give the program the lot centre (if you press enter here the lot centre will be the centroid)
2. Then give the program a lot number, road name or name. The adjoining lot needs to be all one word eg “CA12”.

The program will put the polyline in the “Adjoining Boundary” layer and assign appropriate xdata to it.

There is no requirement to close an adjoining lot, in fact the information can be assigned to a two point polyline.

XSL – Assign line to Short Line Table

This tool is used where there is very short lines and you don't want to reduce the text. **The LandXML recipe currently has no ability to facilitate short line tables, so they will not be reproduced on XML import.** This is just another section that makes it obvious no survey draftsmen were consulted in the compilation of the land XML recipes. This tool can be used however, when drafting and will create a line with xdata, the same as any other assigning or traversing tool.

To run the program type XSL. It will prompt you to select some lines.

It will then prompt you for a short line starting number. The lines are assigned the in order that they were selected.

If it is the first time the XSL tool has been used in that session it will prompt you for a position to place the short line table.

It then deletes and redraws the line, assigns the reduced observation xdata to it, places a short line circle, and fills out the respective information in the short line table at the appropriate scale.

Note that the identification numbers are shared between the short arc and short line table, so the automatic number will be sequential for both program.

XSC – Assign arc to short arc table

This tool is used to create a short arc table. **The LandXML recipe currently has no ability to facilitate short arc tables, so they will not be reproduced on XML import.** This tool can be used when drafting and will create an arc with xdata, the same as any other assigning or traversing tool.

To run the program type XSC. It will prompt you to select some arcs.

If it is the first time the XSC tool has been used in that session it will prompt you for a position to place the short arc table.

It then deletes and redraws the line, assigns the reduced observation xdata to it, places a short arc circle, and fills out the respective information in the short line table at the appropriate scale.

Note that the identification numbers are shared between the short arc and short line table, so the automatic number will be sequential for both program.

XOS – Offset line

This tool is used to offset lines. Autocad has offset line as a standard tool, but this one allows you to enter feet or links and have the distance converted to metric. It's designed to assist with data entry of old plans.

XDE – Edit Xdata

This tool can be used to manually edit xdata on an object, for example, add a comment to a reduced observation, or perhaps do something that is not ordinary. It also makes it easier to examine the information stored on an object.

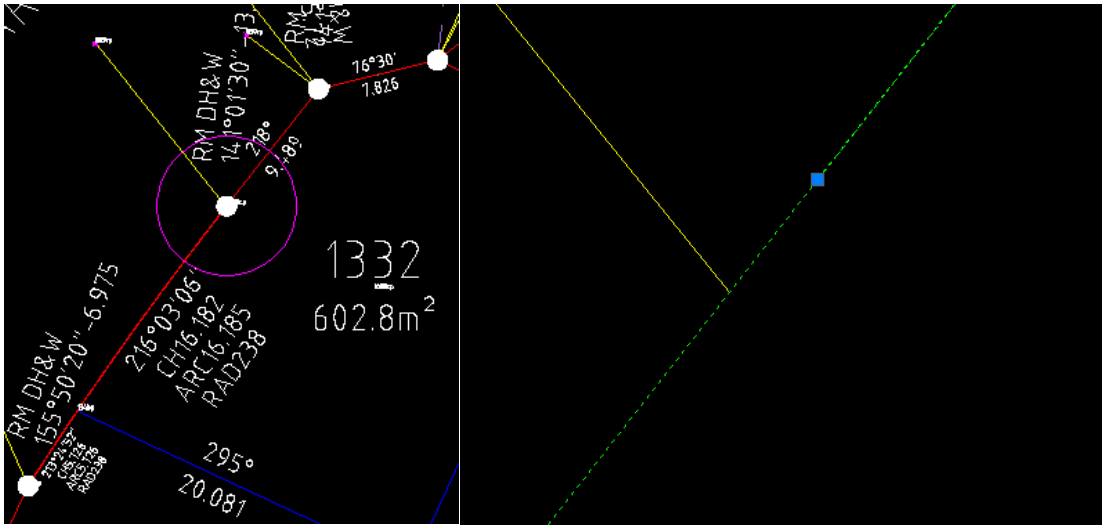
To run the program type XDE, then select the object you wish to change. Change the information in the text box (*this requires an understanding of lxml and how LXML4ACVF exports information)* and press ok.

XCT – Clean & Tidy coordinates

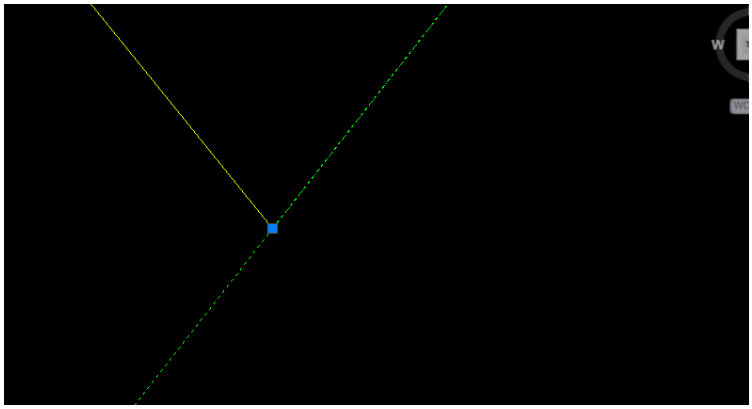
This tool is used to help fix coordinates of lots that may not have been created exactly on the coordinates of boundary lines. This often happens when using XCL on lots involving arcs or very short lines, where a bug in the method used by autocad will place the polygon vertex not directly on top of the overlying objects.

The tool will get all lines and arcs in the boundary, boundary extinguished and easement layers and store a list of the coordinates of their end points to 7 decimal places. It then gets all the lot definition polygons and compares the coordinates of each vertex to the list. If the coordinate is within 0.1mm of one found in the list it will change the lots coordinate. It also will give a list of the changes and by how much in on the command prompt.

Here is an example. Where the curve meets the line there is a small difference in the lot definition vertex. Zoomed in to the maximum we can see the vertex is not meeting the corner of the curve and arc by 0.00002092mm.



After running XCT the vertex is moved to the corner



XAI – Irregular Line Boundary

Irregular line boundaries are for example the bank or centre of a water course, Mean High Water Mark, or other such natural feature boundary. In LXML4ACVF they are shown via a polyline in the "Irregular Boundary" layer.

The irregular boundary is preferably a series of small straight lines as a polyline, but allowance has been made for a 2dpolyline to be used. By editing a standard polyline using the PEDIT command and selecting spline a wavy line will be fitted along the standard polyline and the vertex definition will remain the same.

The XAI tool is used to assign a label or description to the Irregular Boundary. A very simple tool, it asks you to select the polyline then give it a description. The name is then plotted half way along the line and stored on the polyline.

XIN – Land XML file importer

This is by far the most complicated piece of code in the program, but it is very simple to use. It attempts to follow as many of the rules of survey drafting a possible, as well as the rules set by the LXML4ACVF program.

To import an LXML file, type XIN, select the file and then wait patiently while the program loads all the information and plots it on the screen. It's that simple.

The rest of this description is an explanation of how the program works, in case you don't like what it is doing and want to edit it, or you have a LXML file that will not import for some reason.

1. Setup and empty all lists

2. Runs a standard get file routine

3. Checks to see if the file has linefeeds and re-writes non linefeed files with suffix WLF (with line feeds)

5. Reads the header information that is available (datum, horiz datum, coordinate system)

6. Linefeeds until it finds the monument area and stores them in a number of lists (monument, pm, occupation)

7. Linefeeds to the instrument station list and stores them in a list

8. Linefeeds to the CGpoints section or calculates the cgpoint from observations depending on whether using XIN or XINO. Note that if the cgpoints are latitude and longitudes they are converted to MGA (or UTM)

9. Reads and draws each CGpoint

In the background of this process it is finding the maximum easting and the minimum northing. This position is used as the point to plot the Admin sheet and coordinate block.

It also finds, draws and stores the datum points

10. The next section reads the parcel information, including dealing with multipart lots and road and easement lots. To create the lots it draws a series of lines and arcs and then joins them with polyline edit -> join command. This is drawn in the "Lot Definitions" layer. It also:

- Adds the lot number and area, road name or easement description on the centre point as defined by the LXML file.
- Stores the easement lines as a list so they can be identified later in the program and plotted as a dashed line in the easement layer.
- Finds and draws and joins any irregular boundaries, with appropriate labelling.
- Adds polylines over existing easements
- Stores any restriction, address, title and easement information for adding to the title block later on.

If the lot or road is adjoining (existing) it will perform the same functions but place the object in the "Adjoining Boundary" Layer.

11. The next section is the plan features section. This is used for occupation information, e.g. fences, building, walls, kerbs and chainages. It reads the information, draws and assigns the data to the correct layer. If it finds a boundary offset (the name will be “OFF-#” in the LXML file), these are stored in this area it will draw the occupation information.

12. The program then reads the Survey header. This is designed to deal with the sections that are required was well as areas that can be conditionally added. It then inserts an admin block and populates it with the information stored here as well as some on the information from the XML header, and some of the information that is stored in lots.

13. The next section reads the reduced observation data. This is the lines and arcs that go over the top if the defined lot areas and connect to external marks and information. As each line goes in it is checked for type and sorted into Boundary, Traverse, Sideshot and Topo. If there is a monument on one end of the line the monument will be added. It also draws all the required information under the “drafting layer” for example bearing and distance and field notes. It also checks for easement and extinguished boundary lines and assigns these. As simple as the preceding sentence was, the process of getting the line or arc information, translating the instrument station back to a CGpoint, checking for monuments, easement lines, extinguished lines, PM’s, checking for field notes and setting up the program to not draw the same line or information twice, then drawing the line, arc or monument and assigning the correct xdata and labelling the information, is reasonably complicated.

Also in this section there is the possibility of a reduced horizontal position observation (which are PM,s) This section places a point on the PM coordinate and stores all the required reduced position observation information. The reduced position observation information is also added to a coordinate box, located underneath the admin block. While the coordinate box is not currently necessary to be plotted in Victoria, it has been left in the code to assist with identifying which PM’s have been placed.

14. The program then goes through the occlist which was made from the monuments at the start to find all occupation offsets and plots these positions and labels the offsets in the drafting layer. As part of this program it goes through all lines and arcs to attempt to find the line that the offset originally references to align the offset properly.

16. The program then add pm blocks over the tops of the PM’s.

17. Any remaining Marks that are not a PM in the RM list, for example marks gone on adjoining boundaries with no connection to the corner, are plotted.

Debugging – If your xml file is not importing the line where then importer failed can be found by typing “(linetext)” into the command line. This will give you the current line of text being using by the importer, however discovering what is wrong might require more examination than that.

XOUT – Export XML

This program is used to export an xml. This is another simple program to run, type XOUT, give the program a filename and the program will do the rest. As with the XIN program there is a lot on things going on in the background. Here is a list of the basics.

It does not do a lot of checking so you are required to ensure that:

-Boundary, Boundary Extinguished, Traverse and Sideshots are all in the right layer. The lot definition polylines are completely covered by Lines and Arcs in the correct layer.

-All the RM's, PM's, corner marks and Datum points have been added

-That all lines, arc, points and polylines the LXML4ACVF layers have xdata assigned to them (except for occupation objects e.g. fence, kerb, building, and wall). The program will alert you when there are lines with no xdata, and change the first one it finds to the colour magenta and give a coordinate. You can use the quick select tool to find the object.

-An admin block exists

The program gets objects, extracts information and assigns CGpoints using the following hierarchy

0. Datum Points
1. Boundary lines
2. Boundary Arcs
3. Irregular Boundaries
4. Irregular Right Lines
5. Adjoining lots
6. Easement lines
7. Easement Arcs
8. PM's
9. Monument points
10. Connection lines (Traverse, Sideshot, Topo)
11. Connection arcs (Traverse, Sideshot, Topo)
12. Plan features - line
13. Plan features - arcs
14. Plan features - Polylines
15. Occupation lines
16. Chainages
17. Admin Sheet
18. Easement and Restriction link parcel text
19. Easement and Restriction link points
20. Created lots

The CGpoints are deleted and reassigned at each export based on the hierarchy above. On each export the number of the CGpoints are plotted to assist with referencing the LXML file to the objects on the screen. AutoCAD does not use point numbers like Civilcad and other survey based programs. For this reason and a few other small changes (eg LXML4ACVF deletes duplicate identical lines on import) an exported LXML file may not be identical to the imported XML. They should however both contain and plot the same information.

Due to the way a polyline arc is recorded in AutoCAD and other high precision short line definitions there may be small changes in Arc centres and other points, causing there to be two points very close to each other. Every effort has been made to eliminate these problems, but rounding information to 5mm then recording in LXML to 6 decimal places is the cause of many of these problems. You may see a number of these warnings pop up on the command line during export, some may be worth investigating, as it may highlight areas where lines don't match lot definitions.

Where polylines lot definitions don't match up with road, boundary or easement geometry, orange (colour 30) objects will be placed over the top to show where this is happening. It can often be an unclosed line or curve to line auto-polyline problem, or perhaps a through distance where there should be a vertex.

As the elements are selected lists are populated with the information to be sorted in the following main lists

Cgplevel – A list of coordinates and corresponding building levels (strata)
dpl – datum point list
CGPL – CGpoint list
Lotlist – List of lot definitions
Monlist – List of monuments
Arclist – A list of observed arcs to help with centrepoint definitions
pmlist – List of PM's
pflist – List of plan features
rolist – list of reduced observations
obslist – list of the point which the reduced observations go between
iblselist- Irregular boundary start and end points
ibllist - Irregular boundary line point list for polyline shuffler
islist- Instrument station list
mplist – multipart lot list
mpalist –multipart assignment list
mpolist – multipart output list (what is exported)
easelinklist – a list of easements and their link numbers
reslinklist – list of restriction link numbers
resdesclist – a list of restriction descriptions
oclist – list of owners cooperation entitlements

If debugging the contents of these lists can be examined by typing the name in brackets (e.g. "(monlist)") into the command line. If a list returns nil then it has not be created yet.

After going through all those objects it then moves on to the lot definitions, and checks each corner or arc centre is already in the CGpoint list. As mentioned above if a warning comes up it might be worth investigating, or it may be due to a short line, large radius definition problem. It also checks for and creates multipart lots. It will also check the direction of a polyline and reverse it if it is anticlockwise.

After that it gets the admin sheet and does a few changes to the information contained in there (e.g. change & to & , rearrange dates.

After that is all completed it asks for a file to write, then takes all the information it has gathered and writes it to the LXML file.

At the very end the program will add the CG point label next to the objects. Only the label is inserted, the point is not. This keeps the drawing simpler, when making small modifications.

XINO, XINS, XINOA - Land XML file importer using reduced observations

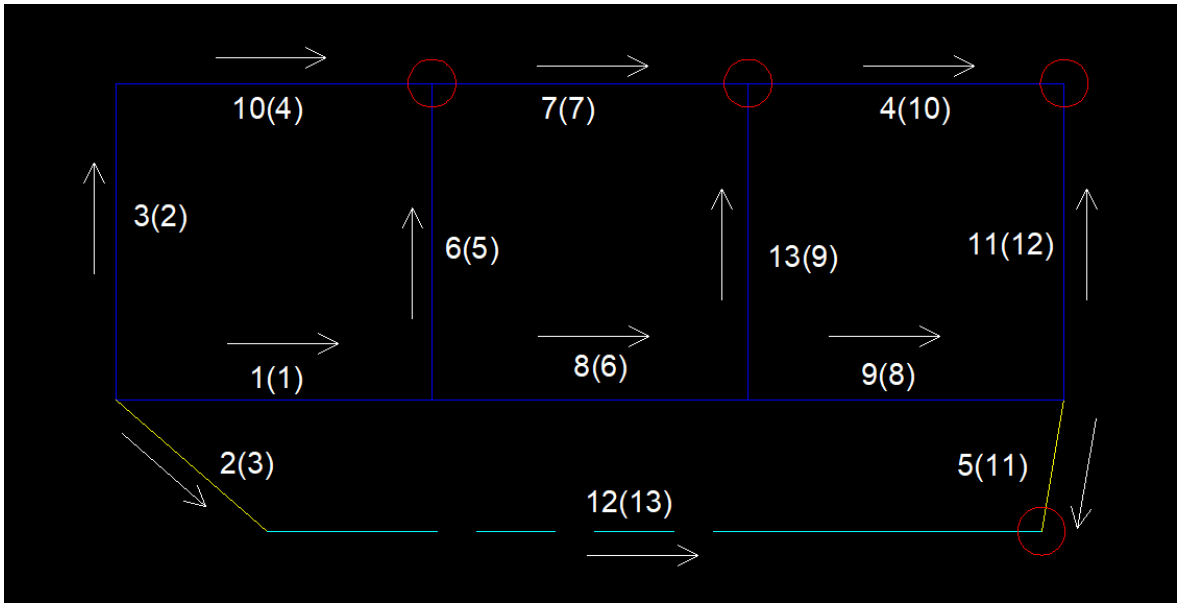
These tools work almost exactly the same as the XIN command. The only difference is the definition of the CG points. The user is asked to supply a starting point. From this point the lots and connections are built from the reduced observation section of the xml file instead of using the supplied CG points. The problem with using the reduced observations, or vectors which is what they are, is that eventually small miscloses will appear in the drawing.

It uses a priority system where the Boundary (normal) lines are plotted first, then the topo lines, and finally the traverse and sideshot lines. This is designed to emulate what a surveyor might do when entering the plan, but does not perhaps emulate what a surveyor might do in the field. The boundary would be drawn first as it's geometry is most important to be shown. When the lines close back onto themselves the misclose (if there is one) is plotted on the plan as a degree and millimetres notations with a line showing the direction and distance at 100 times the misclose distance. At the end of importing the largest misclose will be reported which is worth taking note of as it is a good check that all data has been entered correctly.

The program works following these steps

1. The first setup position is taken from the first boundary (normal) observation found in the file.
2. Create any Boundary lines from setup position
3. Create any Topo lines from setup position
4. Create any traverse/sideshot lines from setup position
5. Make the first boundary lines' target position the setup position
6. Create any boundary lines from new setup position found in observations
7. Create and topo lines from new setup position
8. Create any traverse/sideshot lines from new setup position found in observations
9. Find the next created boundary line from the setup positions completed
10. If no more boundary lines were created from the completed setup positions find first topo line created from completed setups and shift setup position to its target point and repeat from step 5
11. If no more topo lines were created from the completed setup positions find the first traverse/sideshot line created from completed setups and shift setup position to its target point and repeat from step 5
12. If a loop is completed (a line's target point has already been a setup position or has already been projected from a setup position) and a misclose exists the misclose is labelled in degrees and millimetres and a line 100 times the length of the misclose is drawn on the plan.

Hopefully the diagram below provides some clarity from this description. Blue lines are boundary, cyan & yellow – traverse/sideshots, a red circle is where a misclose check would be done. The first number is the order the reduced observations are recorded in the XML files, the bracketed number is the order in which the program plots the observations (or lines). The starting point is the left hand side of line 1.



XINO will go on to add all the other information as per the usual xin command using the calculated CG points, while XINS just leaves the basic observations with misclosed lines intact. XINS doesn't do as much assigning of lines as XINO, but could be more useful for compiling more than one plan together.

Both of these tools only work where the geometry of a lot is all connected. If there are isolated points which aren't connected by reduced observations, the program will list these points and error out.

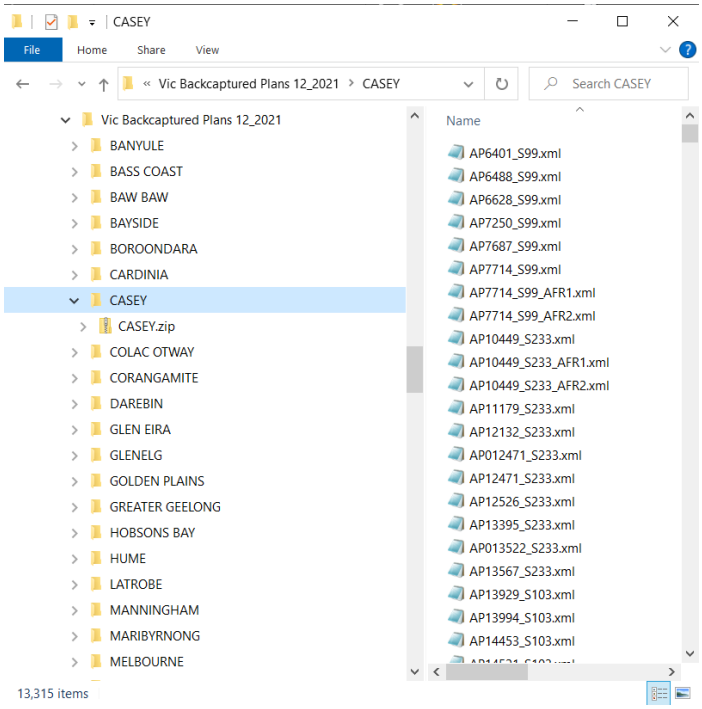
XINOA

With the availability of early release data back captured for around half of the state in late 2021 xino was found to be a bit clunky when searching through 500,000 xmls, so xinoa was added to search a series of folders for the required xml. Xinoa was written to allow a plan number to be copied from Lassi or just typed, and will automatically add leading 0's and the check digit. It will search through folders in a specified location for the file for loading. It requires a little bit of initial setup

XINOA will also search for supplementary AFR files associated with a plan and place them above the imported file at a set interval. These can them be group and pulled down onto the main drawing (keeping in mind they may not fix exactly because of the small miscloses and how xino works.

DELWPS early release data is available here https://www.land.vic.gov.au/maps-and-spatial/projects-and-programs/digital-cadastre-modernisation/early-data-release

The downloaded zip files need to be extracted to folders using their name, for example all of the Casey xmls need to be in a folder called CASEY, not sub-foldered into the batch folders. The folder location will need to be changed in the lisp file

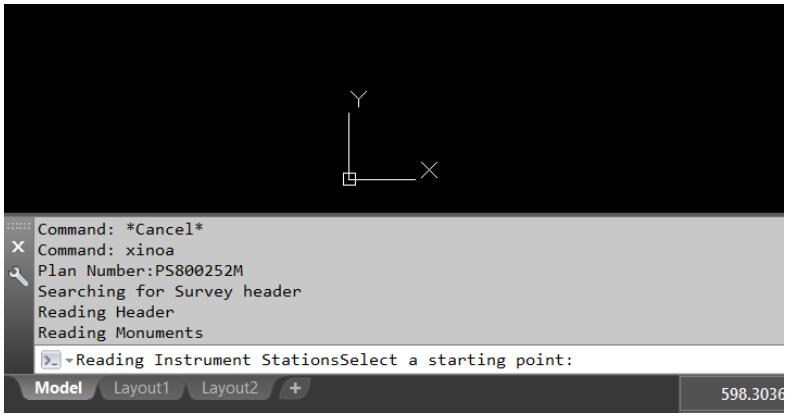


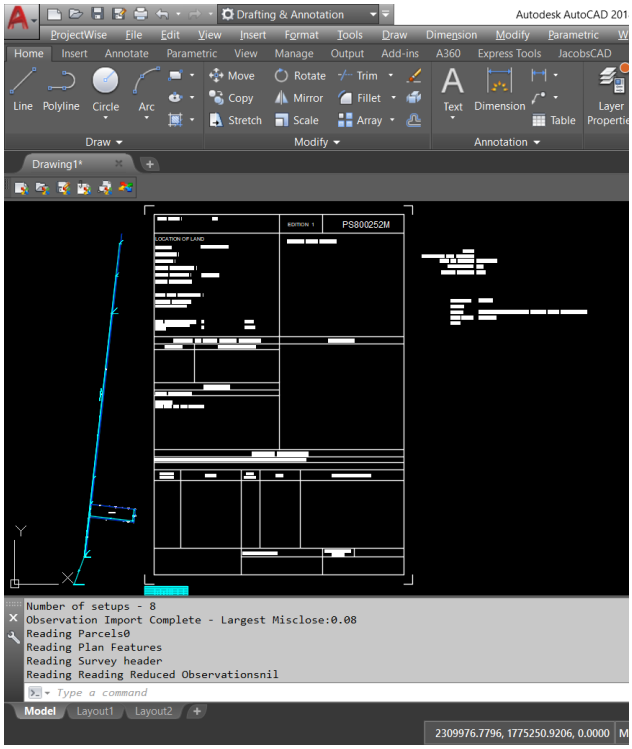
Open up the lisp file with notepad and go to about line 212 and change the folder location that looks like this

(setq autoloadff "D:\\Documents\\14 Jobs\\LXML\\Test Data\\Vic Backcaptured Plans 12_2021\\")

To your folder location when the subfolders are stored. Note that each backslash needs to be doubled

Underneath this is the list of sub folders the program will search for the plan you have typed in. As more are backcaptured this list will be expanded.





At the end of importing the largest misclose will be reported which is worth taking note of as it is a good check that all data has been entered correctly. On average for the early release data, 2-5% of plans have been found to have data entry, registrar drafting or survey errors.

XRD – Turn rounding on and off

Type in XRD, type Y or N to turn rounding on and off and Y or N to accept or change the default rounding values. This is used by the assigning tools XAL and XAA to round bearings and distances depending on the length. By default it is turned off. The default rules used are:

Bearings
Less than 30m round to 60 seconds
From 30m to 200m round to 10 seconds
Greater than 200m round to 10 seconds

Distance
Less than 500m round to 0.005
From 500m to 5000m round to 0.01
Greater than 5000m round to 0.1

These can be changed but there are only the three categories in each type.

XMLC – Move the lot centre definition of lots

This is a tool used to move the lot centre definitions. The centre of a lot is stored in the polyline xdata separated by an "!". When moving the lots in the drawing the centre definition doesn't update. This tool gets the existing centre of the lot, and then compares it with the text insertion point of a selected lot centre text. It then can apply this shift to multiple lots, rewriting the xdata of each.

XAO - Fences, Kerbs, Buildings, Walls etc

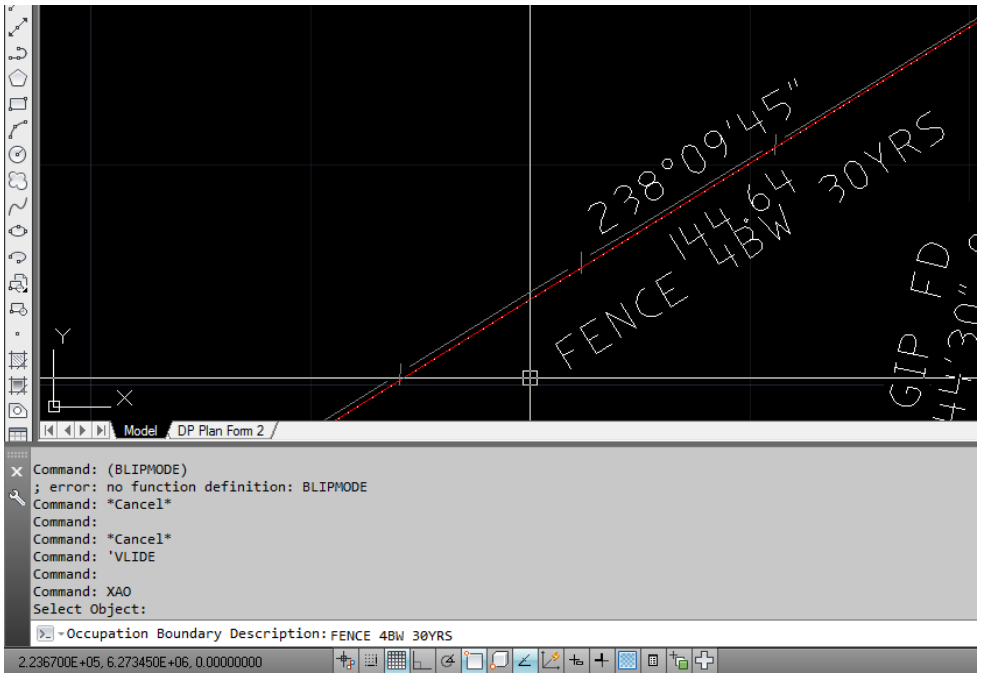
Fences, walls, buildings and kerbs etc can be entered in normal ways using the existing AutoCAD commands. There is no requirement for xdata to be attached to these objects, and they can be either lines, polylines or arcs. They are defined by the layer they are in. The XAO tool is used to assign a further description to the object that will be exported. If nothing is assigned the description will be fence or wall etc.

When doing walls, the hatching is always shown to the right of the, so if your line is hatched the wrong way, use the reverse tool to correct its display.

Fences will always be shown as the standard fence type, not fence on boundary. It has not yet been written into the program to identify fences on boundary lines and change the linetype. *This is because these lines don't always run the length of the boundary (i.e. the fence might only cover half the line), so there is no way to identify if this line is on the boundary based on end points….yet.* The program LandXML_VF.lin file does have a line type for fence on boundary, so on the drawing these can be changed, they just won't be reflected on an import.

These features are stored as plan features in the LXML file, and are designed to be diagrammatic only, however occupations are stored on the corners of these lines and offsets are calculated from them so it is a good idea to have them in the correct position. You may wish to draw exaggerated occupations in the drafting layers for plotting and suppress plotting on the respective occupation layer.

The program will ask you to select an object and then prompt for a description. It then stores the description xdata on the object and writes a piece of text in the centre of the object.



Structural Boundaries

Structural boundaries are created by adding polylines (or lines/arcs) over the top of lot definition polylines. This replaces the reduced observation over the top.

XTI – Assign title to polyline

The affected lot (the lot or lots being subdivided) is required to have the title information attached. This tool is used to assign a title to the affected lot. The title needs to be entered in the Vol/Folio format (using a forward slash).

XAD – Assign Address to polyline

The affected lot also required to have its current address attached. Given that in lxmls there is the possibility of 15 different attributes for an address, instead of creating a 15 prompt function and storing a silly amount of confusing data, the program uses what is called a “small address”. This is a specific comma delimited format of the address attributes. It can be created using the address tab in the PM CSV maker. It will be stored in the comma delimited format until export, where is it turned into the extensive lxml address.

XAM – Assign multitext to Plan notes or Restriction

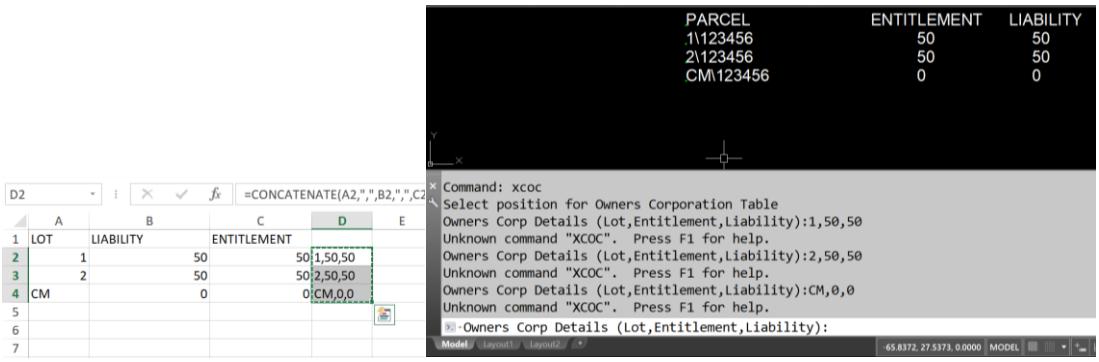
This tool is used to assign multitext to lxml. There are currently two type of multitext’s, the assignment of restriction descriptions to a restriction parcel, and plan notes.

There is an extensive list of type of plans notes which cover almost everything that might be on a plan, so it is worth becoming familiar with this list before starting. Optionally these annotations can be applied to a specific lot. On export most of these are stored in the annotations sections of the lxml, with the contents of the multitext populating the description section.

This is how the surveyors report normally attached to the abstract of field records is recorded into lxml.

XCOC – Create Owner Corporation Schedule

This tool is used to create an owners corporation schedule. If you don’t have an administration sheet the program will first ask you for a plan number. From there you can type in the lots, entitlement or benfiets, but it can be easier to paste them into the command line from excel. In the PM CSV Maker.csv there is a tab “OC ENT”. If you fill this in with the lots, entitlement and liability then grab the entire concatenated column and paste to the command line when prompted.



You will also need to add an address to the point “parcel” next to the word parcel using XAD. You will also need three notation statements using a mutlitext and XAM:

1. A statement with regard to the application of section 12(2) of the Sub Act 1988 (eg “Section 12(2) of the Subdivision Act 1988 does not apply vide this plan”)
2. The Purpose of the owners corporation (eg “Lots in this plan”) with allocation to OC1
3. The Basis For Allocation Of Lot Entitlement And Liability (eg “Lots in this plan”) with allocation to OC1

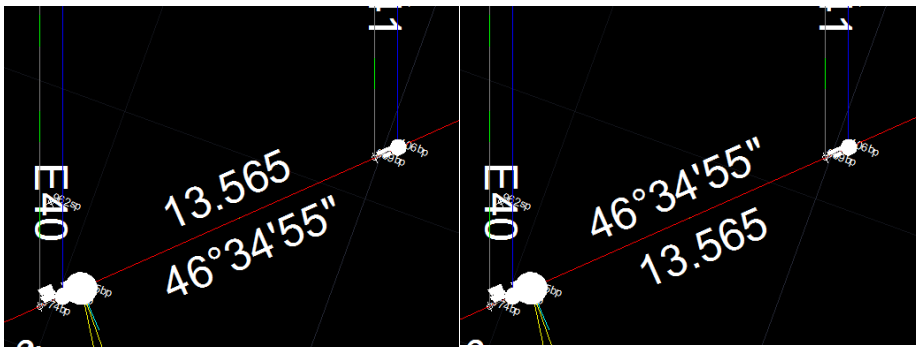
Drafting only Tools

The following set of tools are used to assist with drafting only. As many of the drafting settings are automated, sometimes the program doesn’t do things strictly to survey drafting format, for example it is conventional that bearings be put on the outside of the lots, so they can be spread along a frontage.

Please note that lxml has no ability to store the text position/rotation associated with anything in the drawing, and as such the rendering/importation of plans is very difficult. The changes made by these tools are not reflected in the xml, but are useful if you desire to submit your own PDF plan to Spear.

XSW – Swap text positions

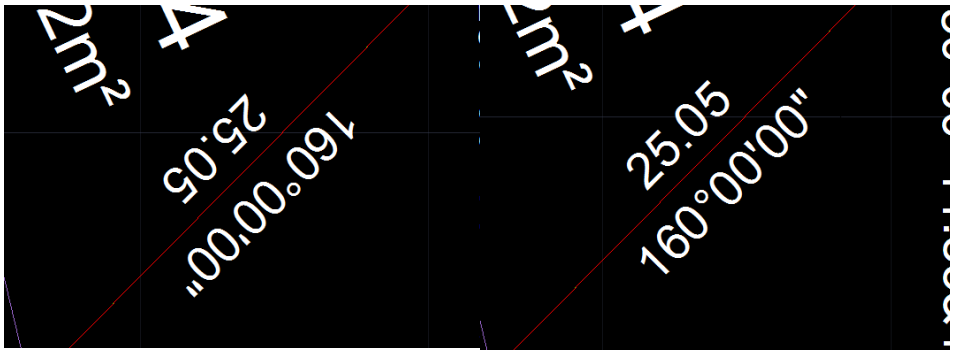
This tool is to swap the position of two pieces of text. Simply select the two pieces of text and right click. This tool only swaps two pieces of text at a time.



Before are after XSW

XSP – Spin text

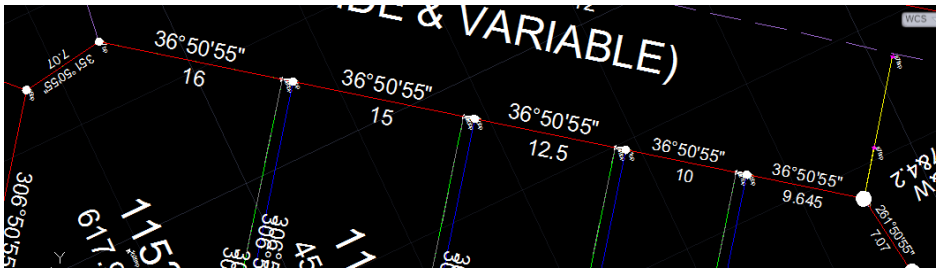
This tool is used to reverse the rotation of automatically assigned text, for example you wish to use a UCS (non-north orientation) on the plan. This allows you to quickly rotate the text so it complies with the ISO standard. This tool can be used on as many pieces of text as you like.



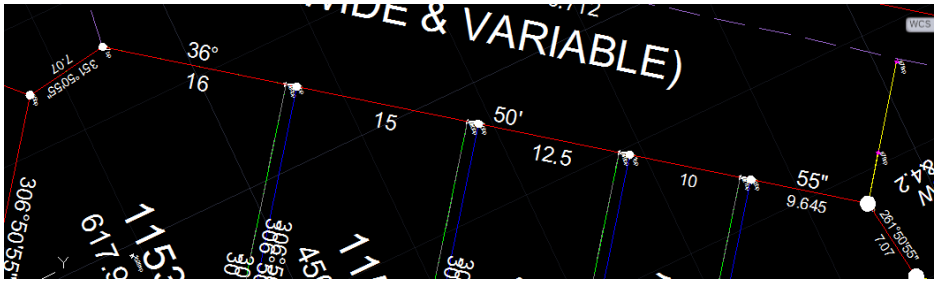
Before and after XSP

XSB – Spread bearings

Sometimes it is advantageous to spread a series of similar bearings along a lines. Personally I don't like this as I often don't see parts of the bearing when entering but it can speed up entry as the previous bearing function can be used, and makes a neater drawing. Select all the bearings and the program will find the piece of text with the lowest and highest x values and using these as the new end points, and creating a midpoint at the average of these two points.



Before XSB



After XSB

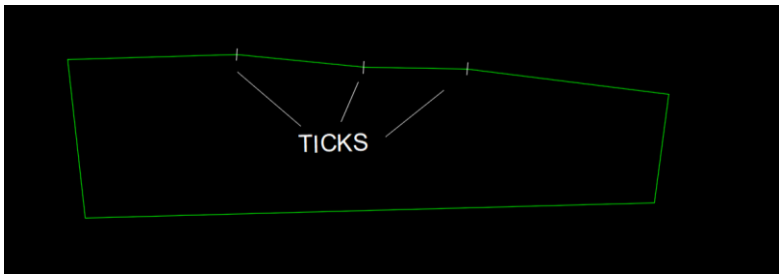
XCB – Create brackets around text

A super simple tool, it adds brackets around the selected text.

Unfortunately at this time in the lxml definition there is no way to tell the difference between a boundary that is bracketed and one that isn't, so these aren't stored in the xml file.

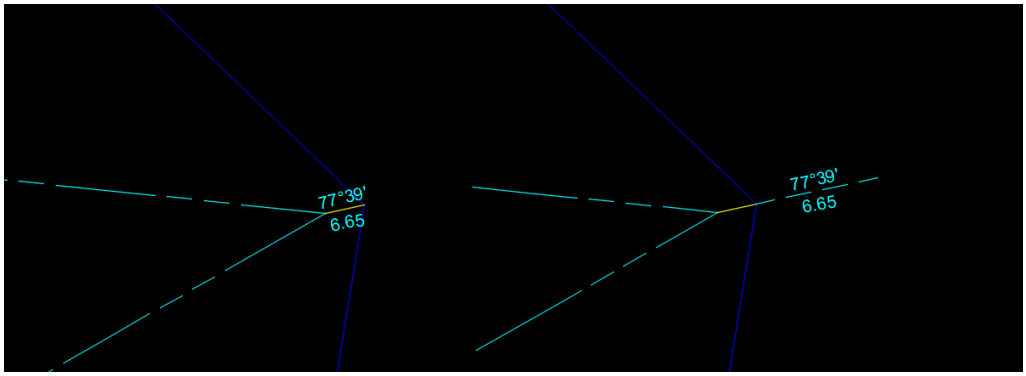
XMT – Make Tick marks

This is a tool that will add a small line (a tick) in the drafting layer for any deviation of a lot definition less than 20°. It works by selecting polylines in the Lot definitions lines.



XPU – Push Text past line

This tool is used to push the bearing and distance of a line past its edge. A line in created in the drafting layer and new bearing and distance is added.



XCD – Check check digits

The program comes with a number of checking tools. The first of these is the check digit checker. Check digits are used by the land registry to check the numbers that have been input. Often they are forgotten or the numbers transposed. XCD was written to check all text and mtext in a drawing or a report that has been imported into Autocad, find all PS,TP,PC,DP,LP,CD,CS and AP numbers and check them for the presence and correctness of the check digit. For a number of plan types it will only check for a check digit if the plan is over a certain number as follows.

BP's > 1699
LP's > 145855
CP's >157285
CS's > 1386
AP's >59999

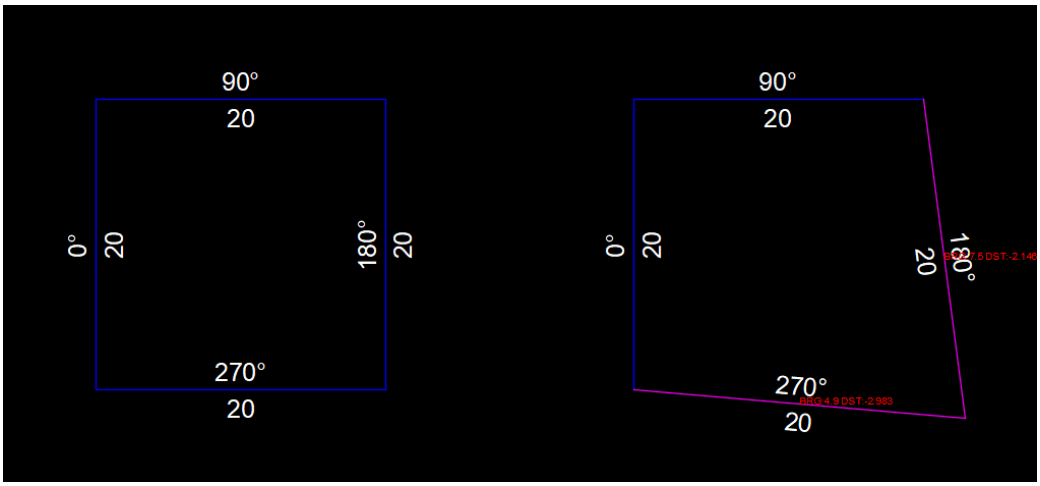
It will also add the required leading 0's automatically when doing then check. The check plan numbers will then be listed in the command line with any that don't work marked with notations. The tool will not automatically correct the check digit as it may be an error in either the number of the check digit. This is for the user to evaluate.

For reference - check digits are calculated by the following method

Format: XXnnnnnnA where
'XX' is a valid plan prefix
LP, PS, CP, PC, SP, CS, TP (if RP key as SP)
nnnnnn - a six digit number including leading zeroes
'A' is a valid check digit according to the following:
9 * character 1 (letter of alphabet)
+ 8 * character 2 (letter of alphabet)
+ 7 * char. 3 (number)
+ 6 * char. 4 (number)
+ 5 * char. 5 (number)
+ 4 * char. 6 (number)
+ 3 * char. 7 (number)
+ 2 * char. 8 (number)
Divide result by 23 giving remainder 'x'
Add 1 to 'x'
check digit = letter in position 'x' of string:
"YXWVUTSRQPNMLKJHGFEDCBA"
Formula supplied via email from spear.info@delwp.vic.gov.au Nov 2020.

XAUD – Audit Geometry against Xdata

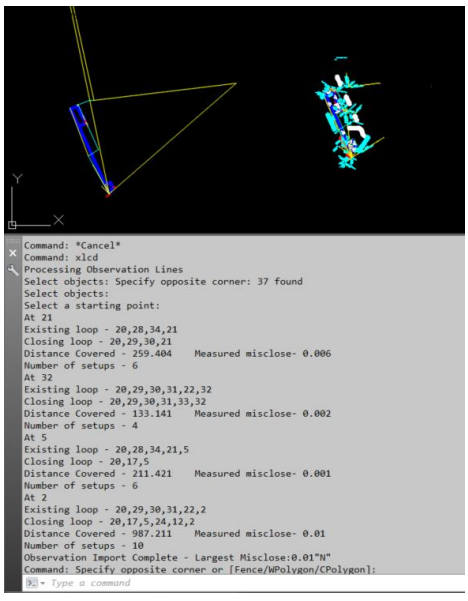
This tool is useful for when there is an error somewhere in the topology of a drawing. It is particularly useful when importing xmls using the xin or xino tools and there is a large misclose in the xml topology. It looks at the geometry of a line and compares it to the stored xdata information. If the difference between the two is greater than 1° or 0.1m it makes a note in the miscloses layer and changes the colour of the line to magenta. As most of the time errored lines are snapped to good lines the audit will hopefully indicate the most likely position of an error.



XLCD -Loop checker on Drawn objects

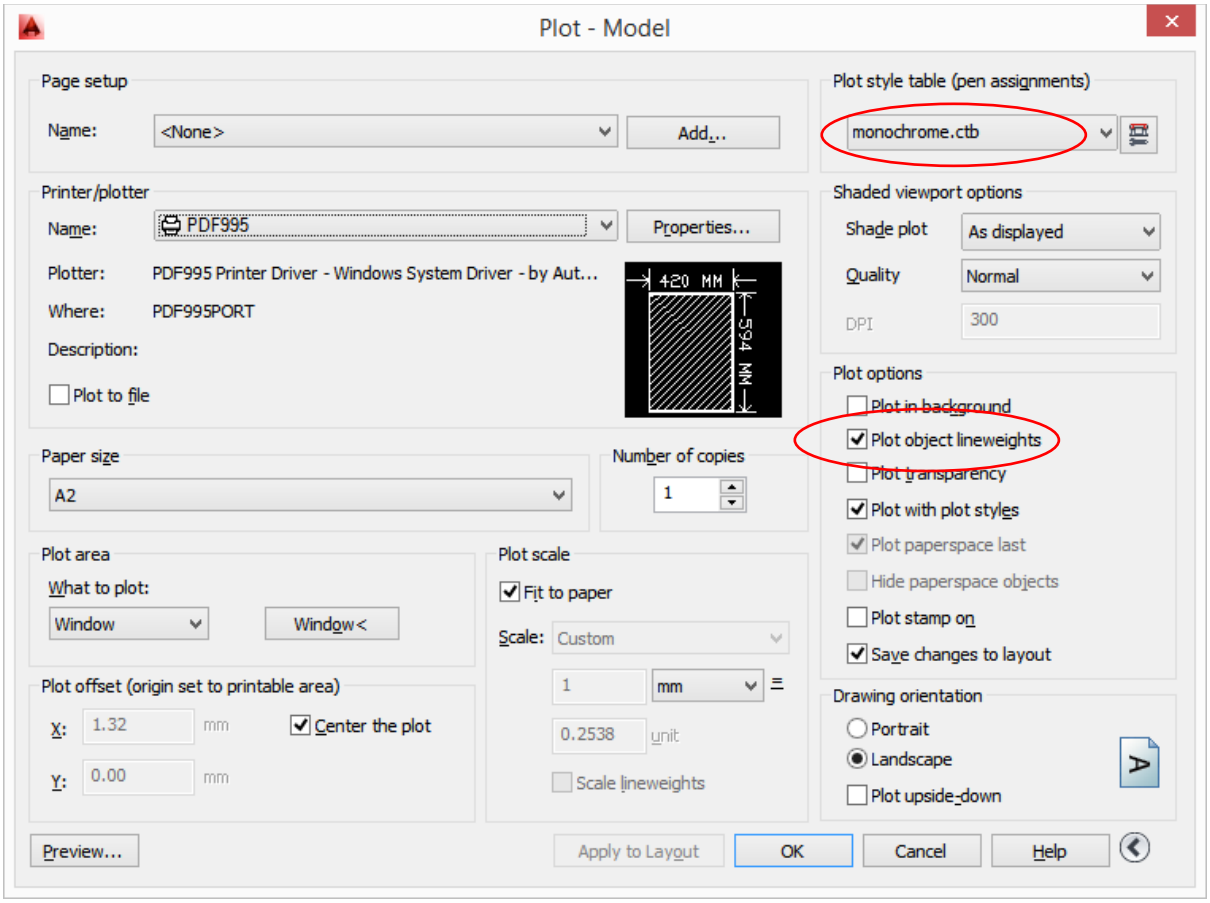
This tool works similar to the XINO tools where it takes the data and redraws them based on the observations while checking the miscloses, the main difference being that XLCD uses selected geometry in a drawing rather than importing it from a xml file. This is useful for checking topology without needing to export a xml, for example when you are doing an RE plan which currently does not have an admin sheet.

To use, type XLCD and select the drawn geometry, then select a place for the tool to start drawing geometry. You can see below, my out of scale RE on the right and the check geometry from XLCD on the left. The program also calculates and reports on loop closures similar to XINO.



Plotting

The plan will print with the standard linestyles and thickness, if you use the monochrome.ctb file (supplied with autocad) and have “plot object lineweights” turned on. See below. Use a window to surround your layout (or the thing you wish to print)



It will not print the following

-CGpoints

-Occupation Offset objects – the green ones

-Lot Definitions – Green polylines

-PM points – it will print the blocks

-Monuments – it will print the blocks

-Occupation – Not fenced

Much of the required information that is plotted with these objects is on the Drafting Layer and will be plotted from there.

The program is designed to plot the abstract and plan from the same drawing, however the user has to be responsible for turning layers on and off for plotting. To print the plan turn off the following layers

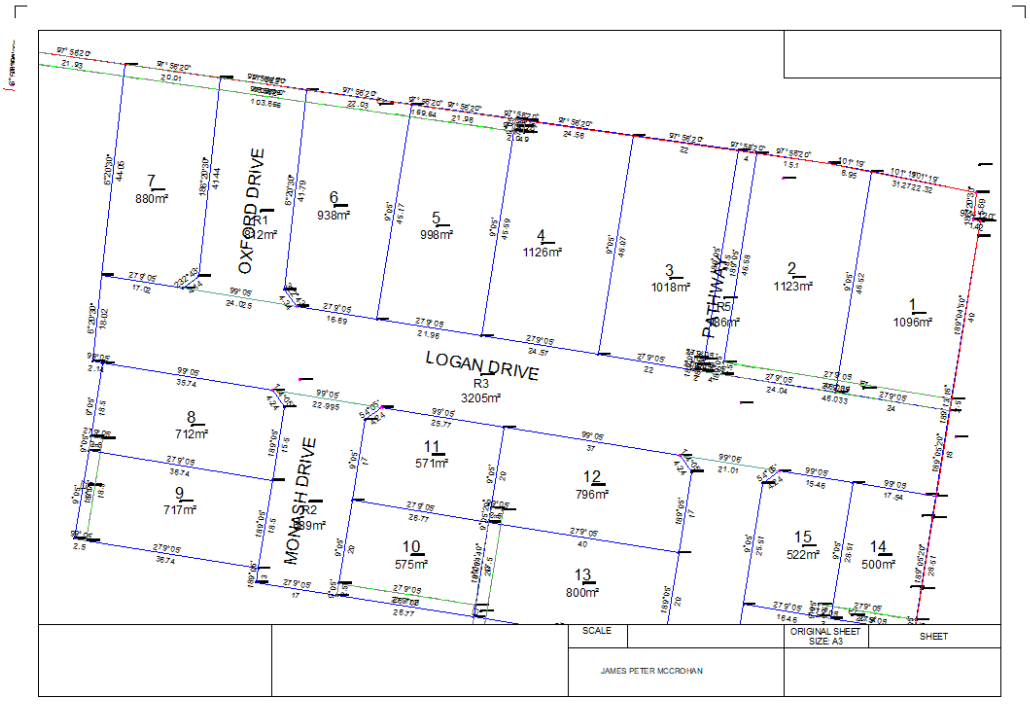
-Traverse

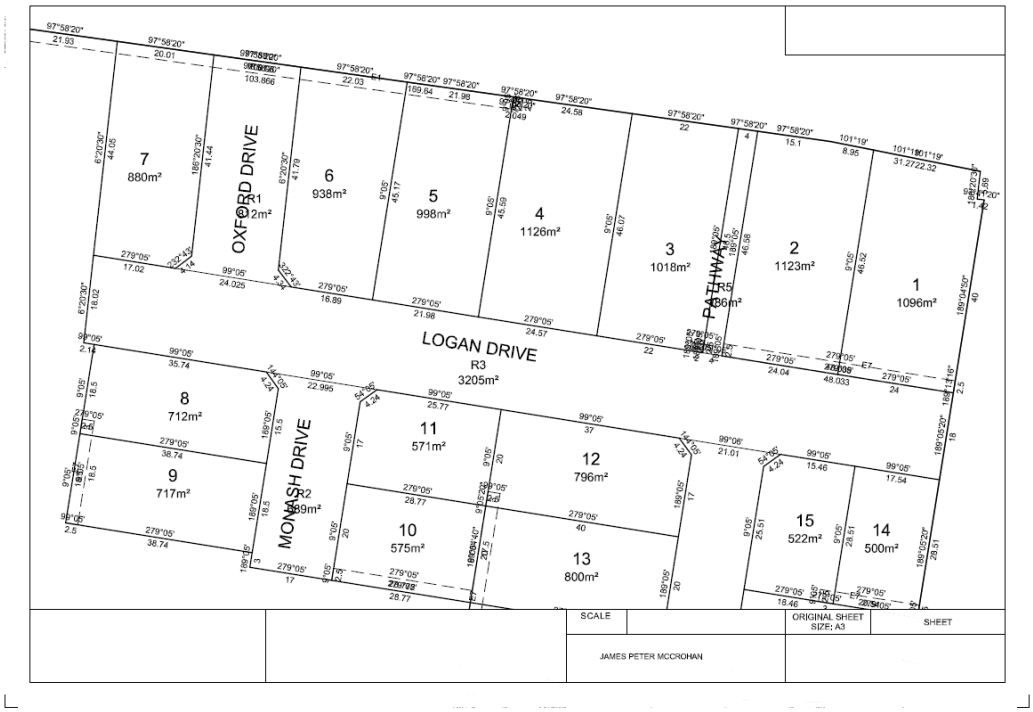
-Sideshot

-Drafting AFR

-All occupation layers

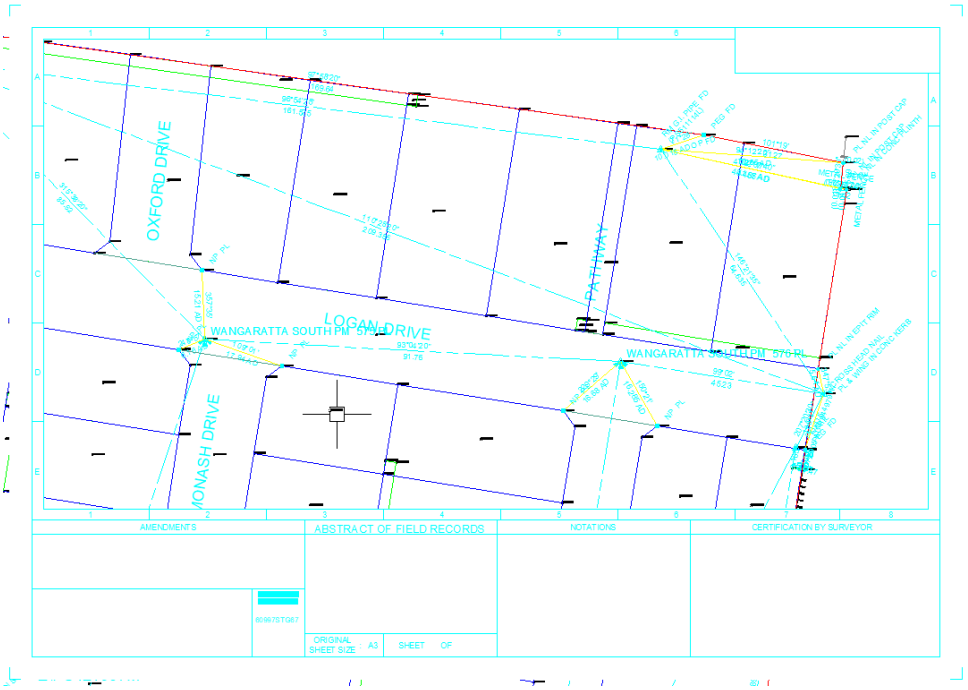
Here is an example plot of what is in AutoCAD and what is plotted with those layers turned off


OXFORD DRIVE
R1
2m²
MONASH DRIVE
R2
89m²
LOGAN DRIVE
R3
3205m²
PATHWAY
R5
86m²
7
880m²
6
938m²
5
998m²
4
1126m²
3
1018m²
2
1123m²
1
1096m²
8
712m²
9
717m²
11
571m²
12
796m²
10
575m²
13
800m²
15
522m²
14
500m²
SCALE
ORIGINAL SHEET SIZE: A3
SHEET
JAMES PETER MCCROHAN

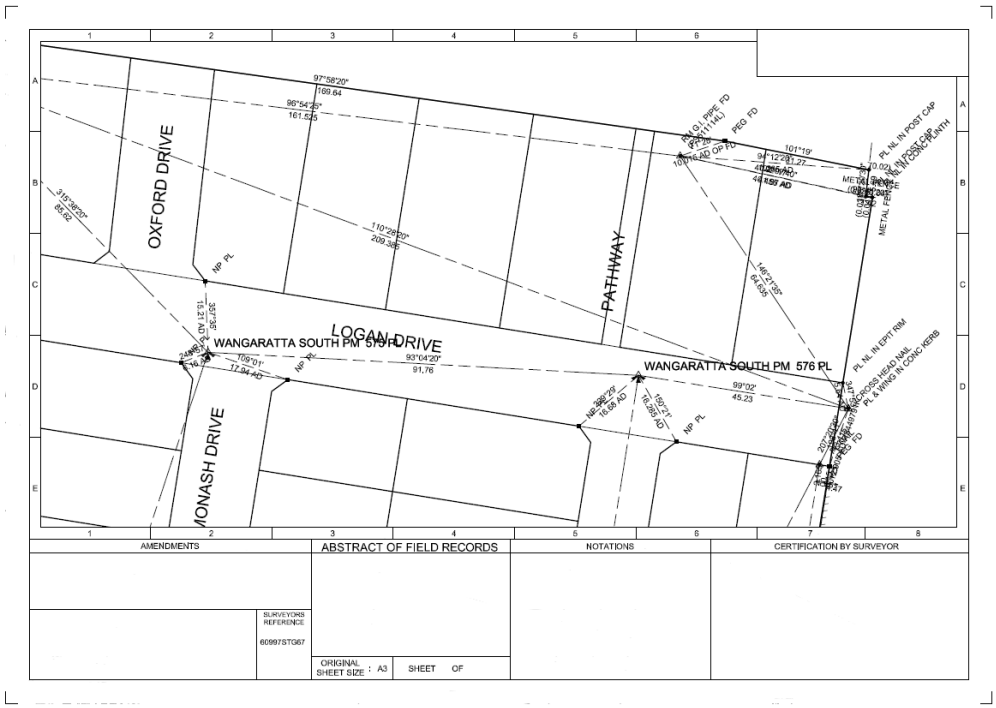

OXFORD DRIVE
R1
2m²
MONASH DRIVE
R2
89m²
LOGAN DRIVE
R3
3205m²
PATHWAY
R5
86m²
7
880m²
6
938m²
5
998m²
4
1126m²
3
1018m²
2
1123m²
1
1096m²
8
712m²
9
717m²
11
571m²
12
796m²
10
575m²
13
800m²
15
522m²
14
500m²
SCALE
ORIGINAL SHEET SIZE: A3
SHEET
JAMES PETER MCCROHAN

Then if we turn on all the layers again and turn off:
Drafting
Easement
(Optionally Boundary)
We can plot the abstract of field records

How it displays in Autocad



How it plots



You can see by the previous plot that is this far from a finished product. A lot of drafting still needs to be done to create a legible plan, a fact that seems to have been ignored by the creators of the lxml format, but it is at least a good start towards the finished product.

What doesn't LXML4ACVF do?

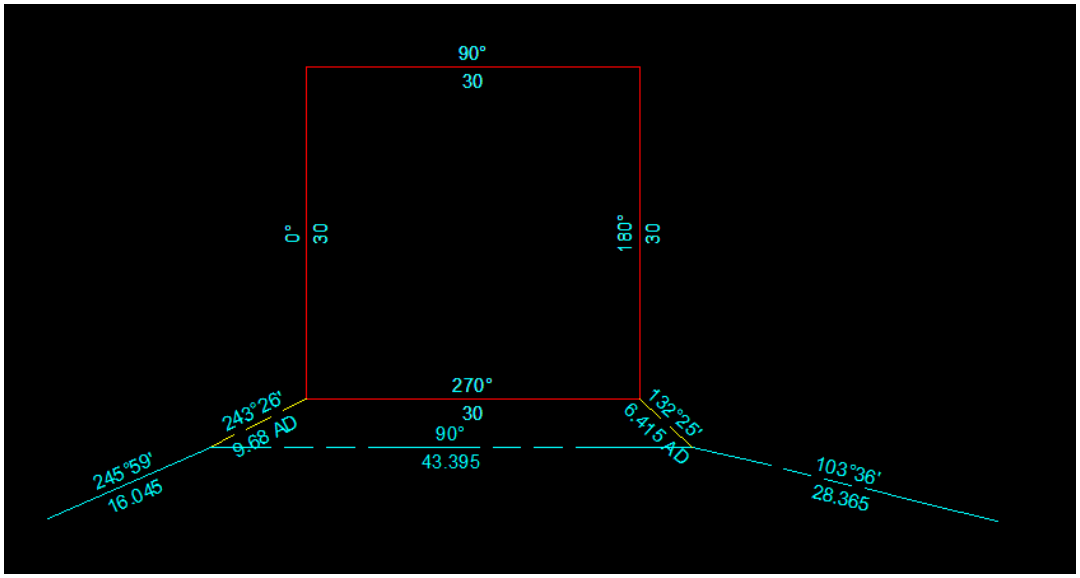
Currently there are a number of features of plans that LXML4ACVF does not cater for. The ones that are currently recognised are not deemed not common enough to warrant writing into the program at this time. Note that LXML4ACVF may struggle with the importation of these features, as they have not been accounted for.

-Parish, LGA and Township boundaries. These will need to be created using XAP and edited using the xde tool.

Example Use Tutorial

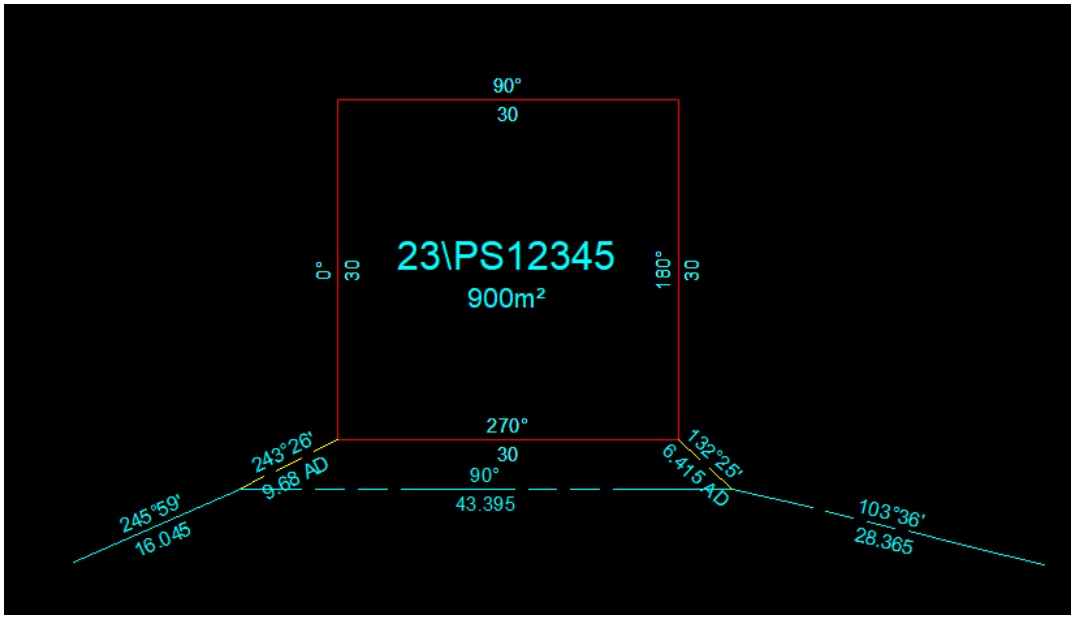
This is a basic tutorial covering the simple tools used by the program. Hopefully this covers the basic steps of the program.

1. Decide on the scale of the drawing and set using the XSS tool.
2. Enter the lots boundaries and connections using XTR and XTA tools and assign to the correct layer. This could also be done using imported geometry and the XAL and XAA tools. Note that to add the notation AD to the sideshots to the boundary corners I can used XALN or type "AD" after the distance entry

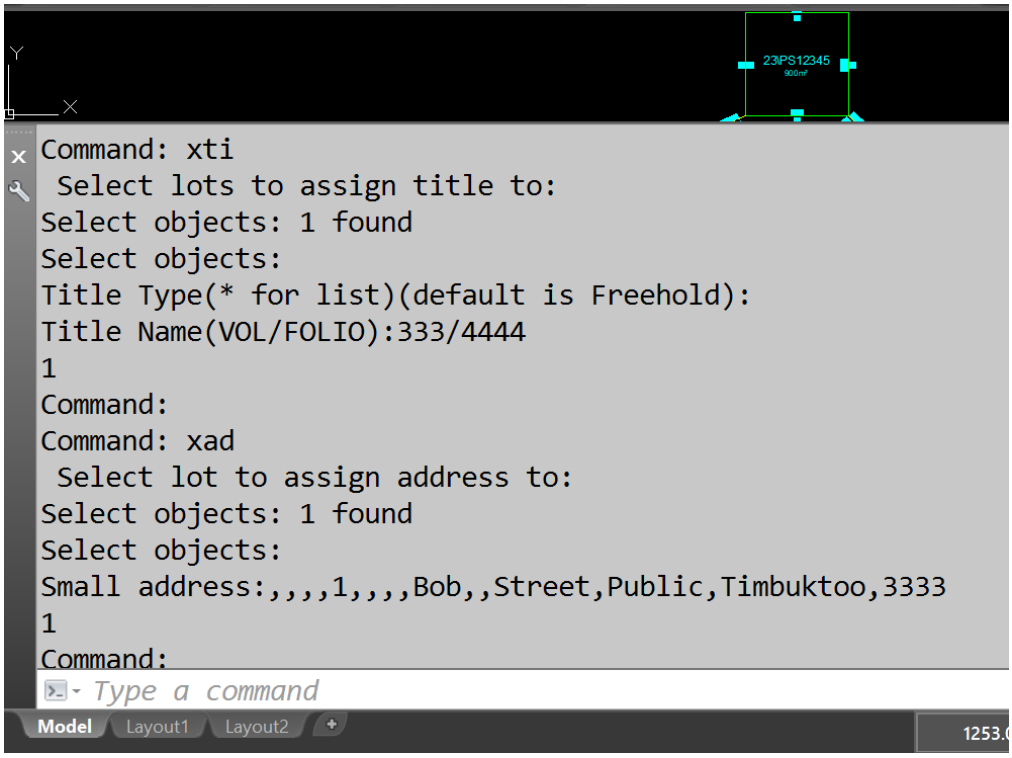


So here is my lot with connections that I'm going to do a two lot subdivision on.

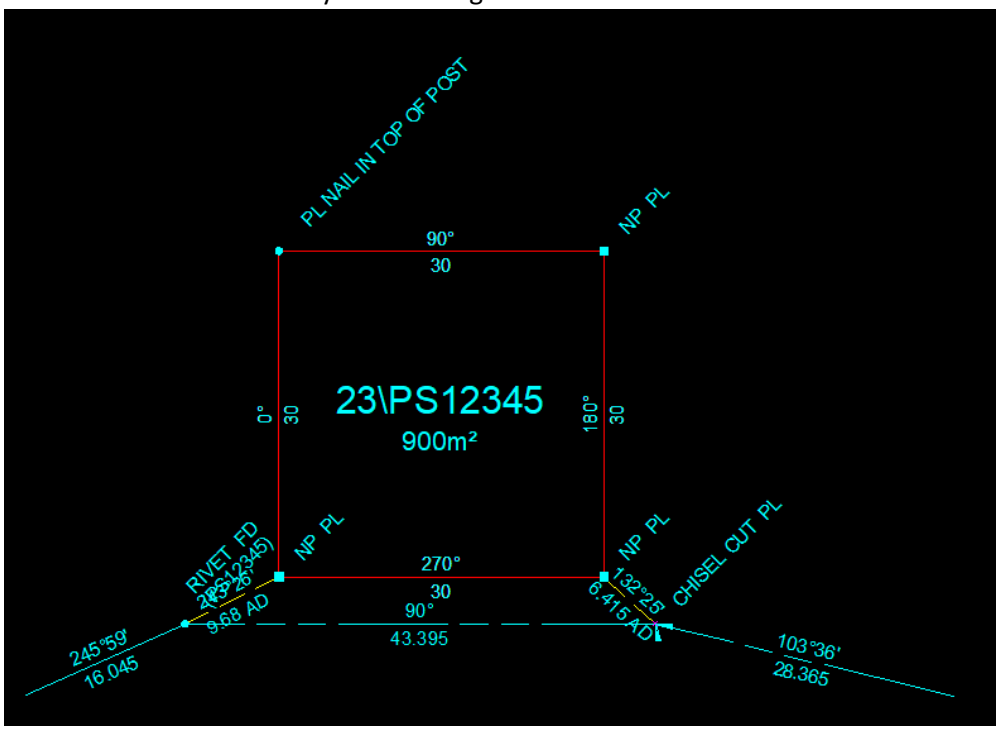
3. We need to make the extinguished lot, so at this point I'll use XCL to make the lot.



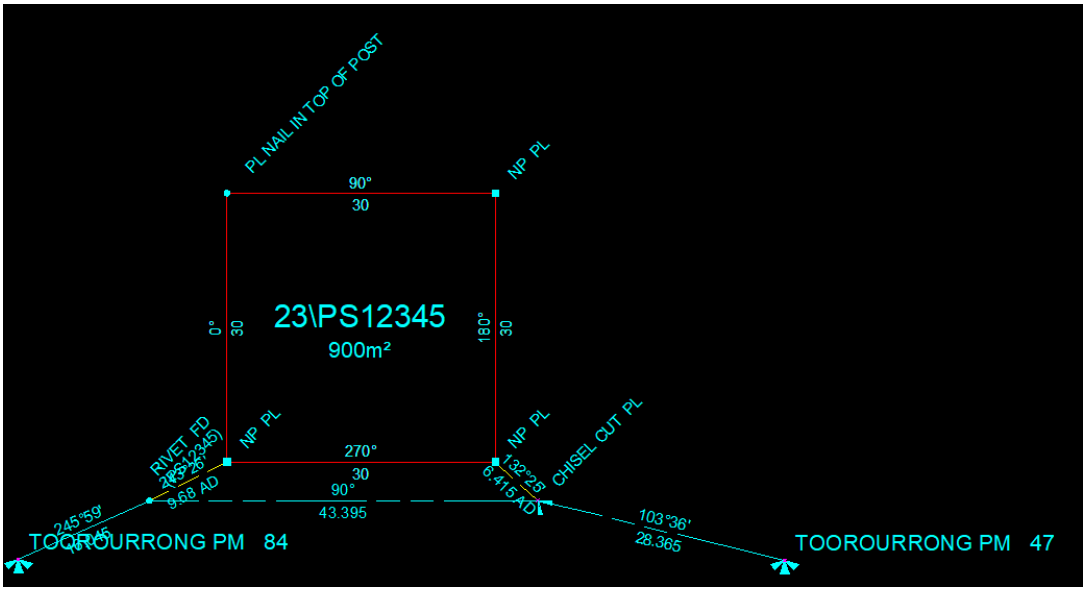
4. It's a good idea while this is the only lot to assign the title and small address using XTI and XAD (grabbing the concatenated form of the address from the PM_CSV_maker.xls small address page)



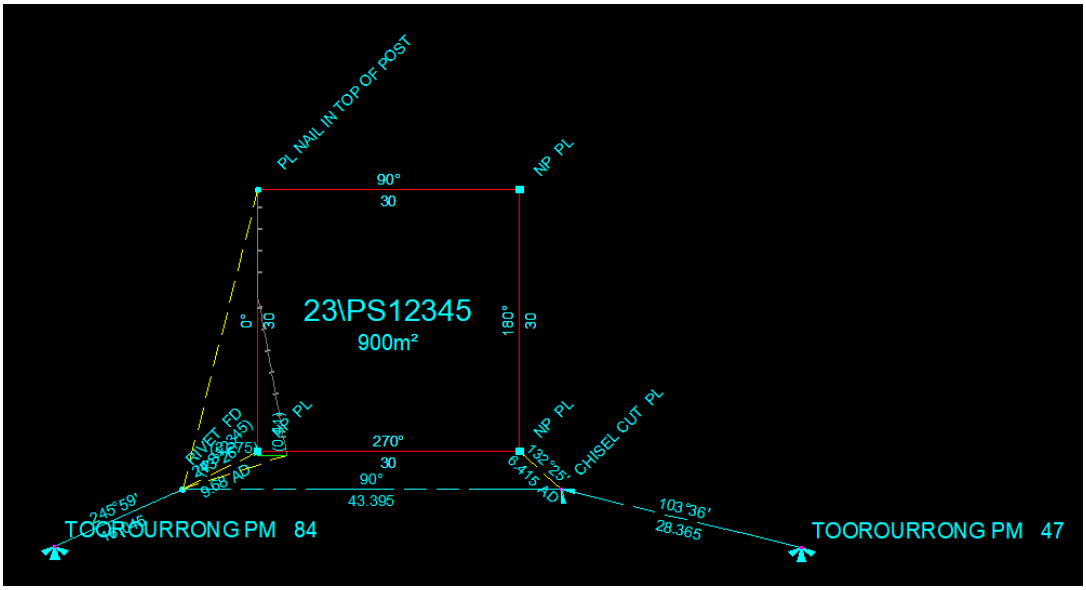
5. Now we can add our survey marks using XCM



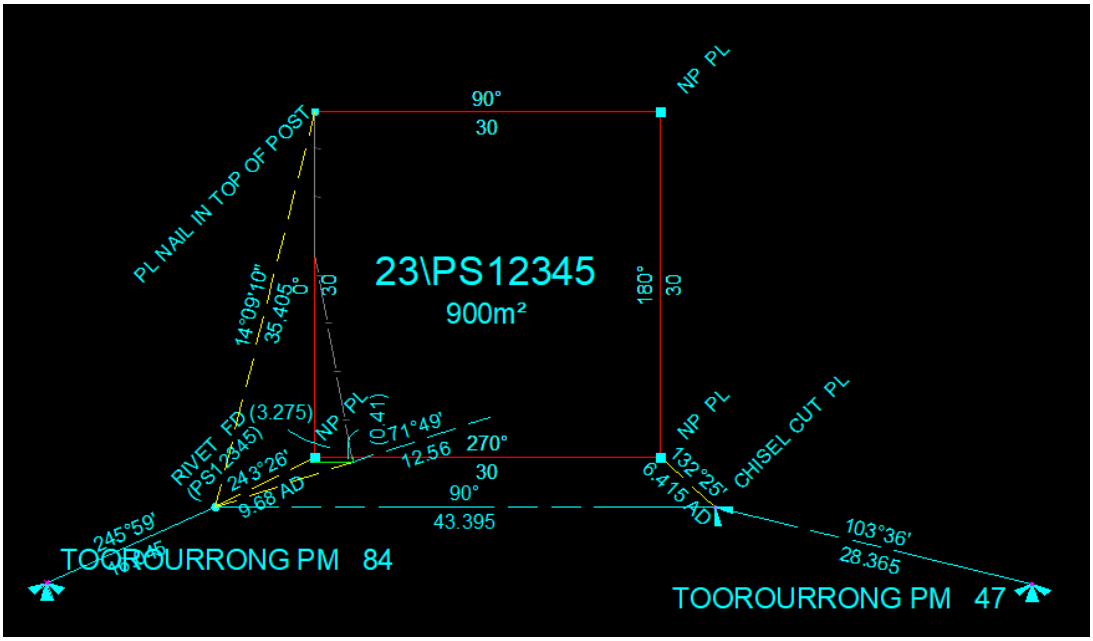
6. We then add our PM's with XPM



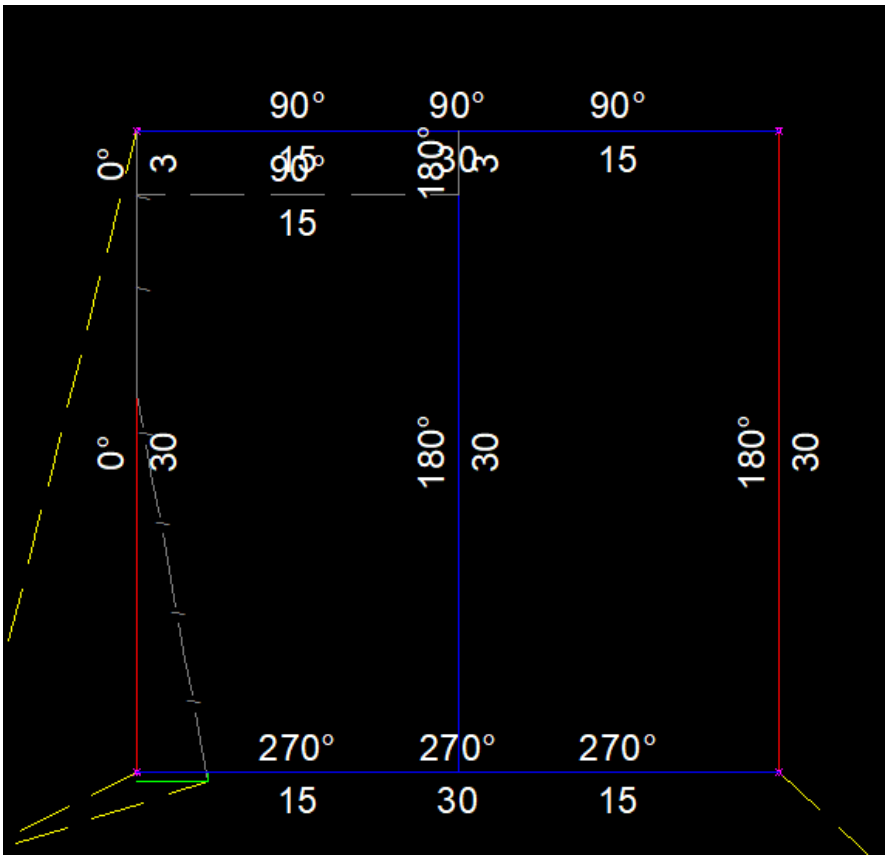
7. We then add our occupations and measure offsets using XOC. In my case I only have a fence down the western boundary



Things are getting a bit congested in the southwestern corner so I'll use XPU to push the fence radiation and move a few pieces of text around.

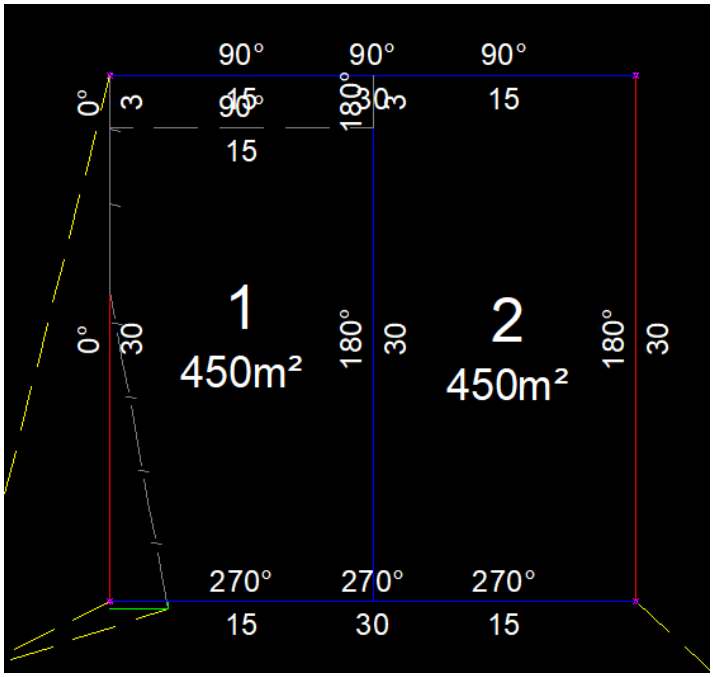


8. Now I'm ready to do my subdivision. I add the new lines in the boundary layer, along with an easement over one lot.

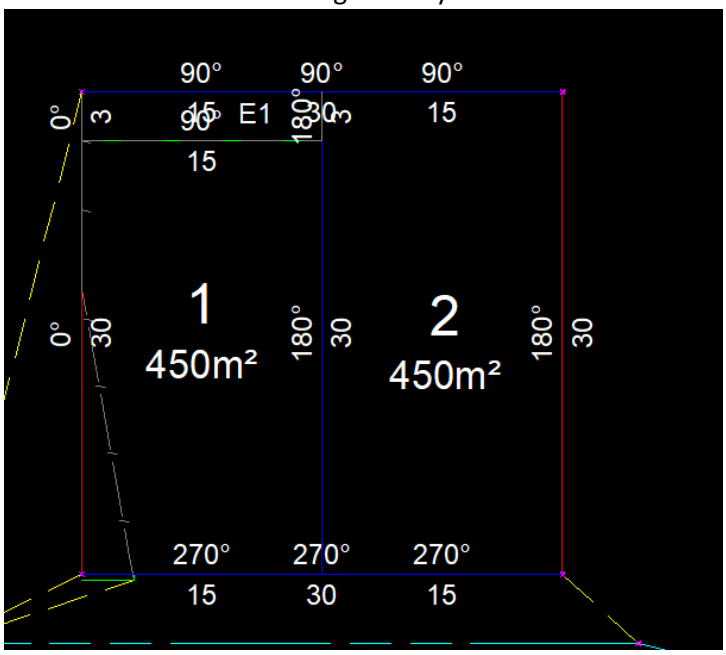


I've turned off Drafting AFR as we are now drafting for the plan not the AFR. You might also notice all the edges of the easement need to be defined (rather than the conventional width annotation), and I am getting a little bit of overwriting at this scale.

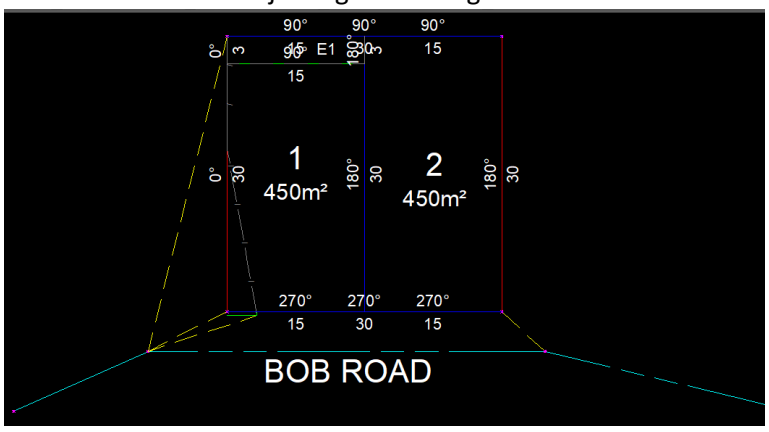
9. I then create the new lots using XCL or trace them with a polyline and use XAP



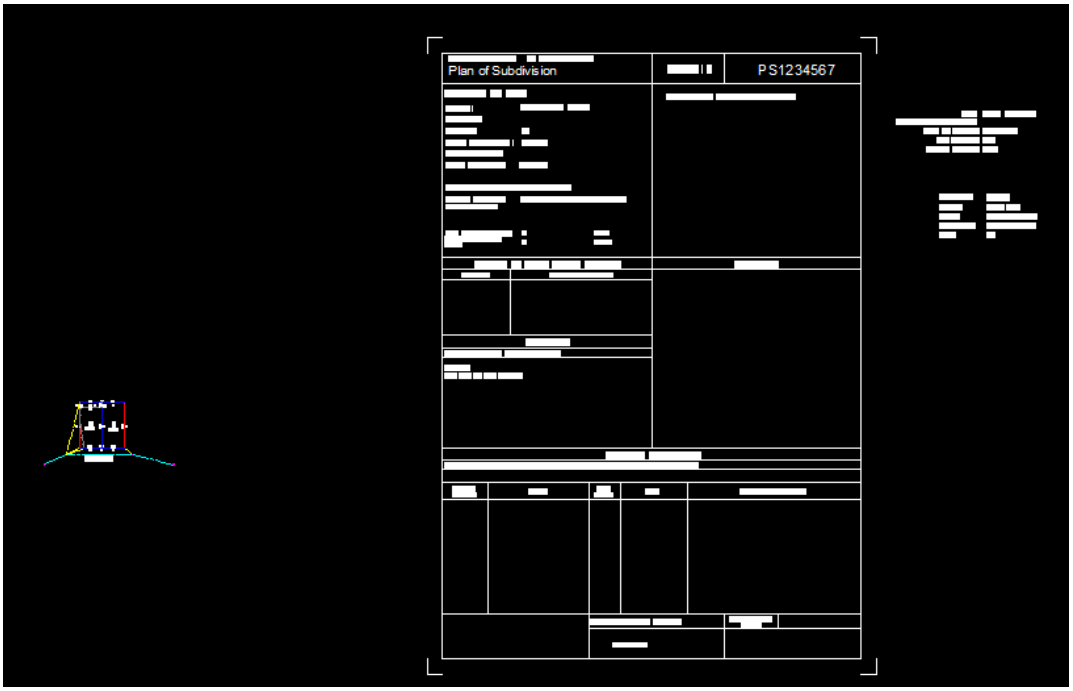
10. I then create the easement geometry lot with XCE



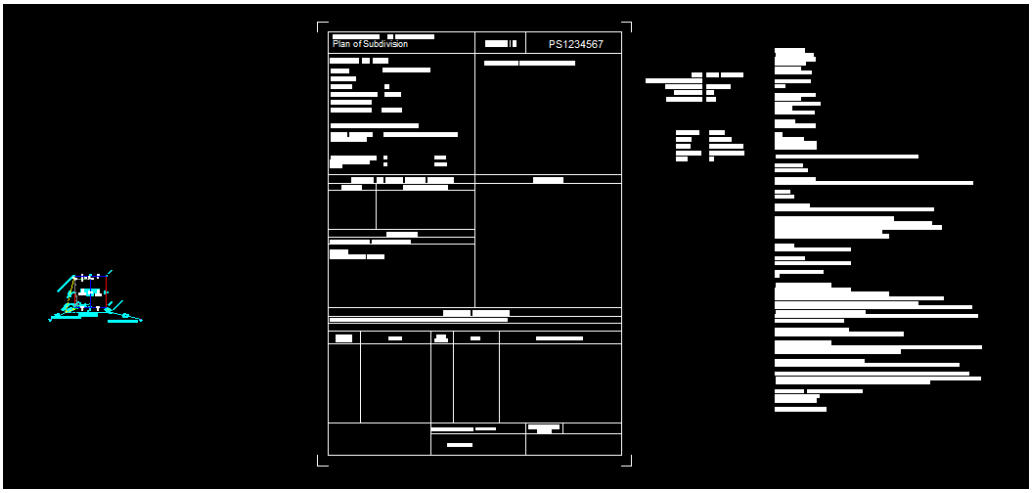
11. After that I add the adjoining road using XJR



12. I then add and fill in the admin sheet using XAS



13. I then add my survey report and assign it to “Surveyors Report Notation” using XAM

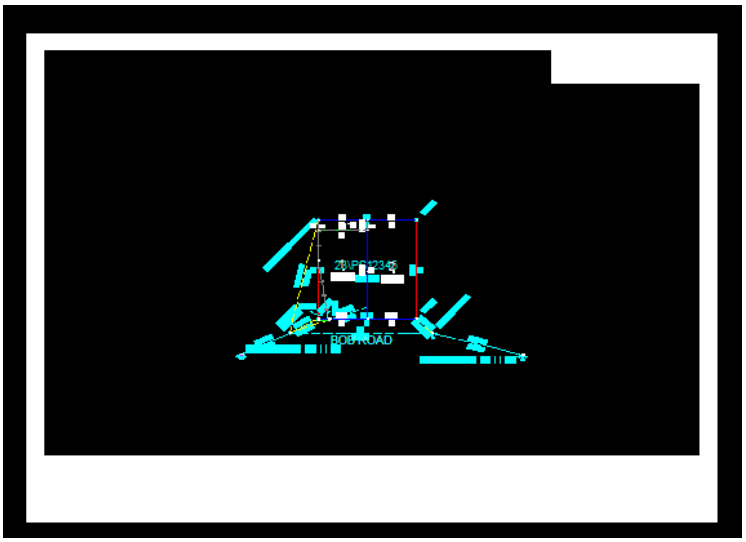


14. I then need to link my easement geometry to an easement notation using XLE

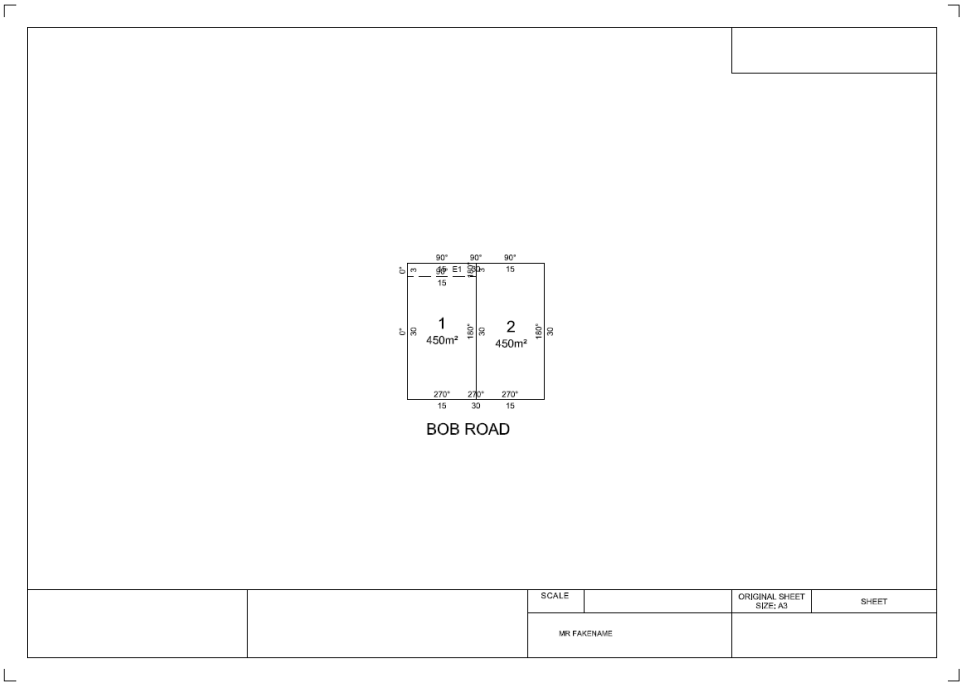
Easement Reference	Purpose	Width (Metres)	Origin	Land Benefite
E1	Drainage	3	This Plan	LOT 2

15. I’m then ready to export to xml using XOUT

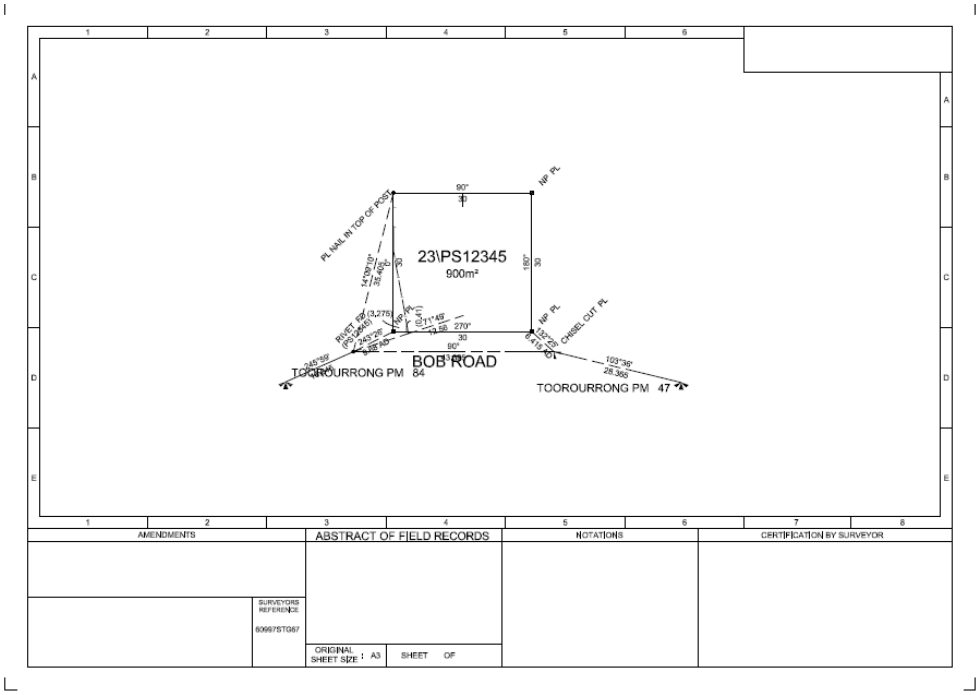
16. I now want to plot. I add a layout sheet using XLA and position it over my plan. The layout contains white hatches to allow it to block out surrounding info, so I can change my background colour to white to allow me to add the extra information required on this sheet.



17. I then switch off the AFR layers (Drafting AFR, sideshot, taverse, occupation etc) and plot using monochrome.

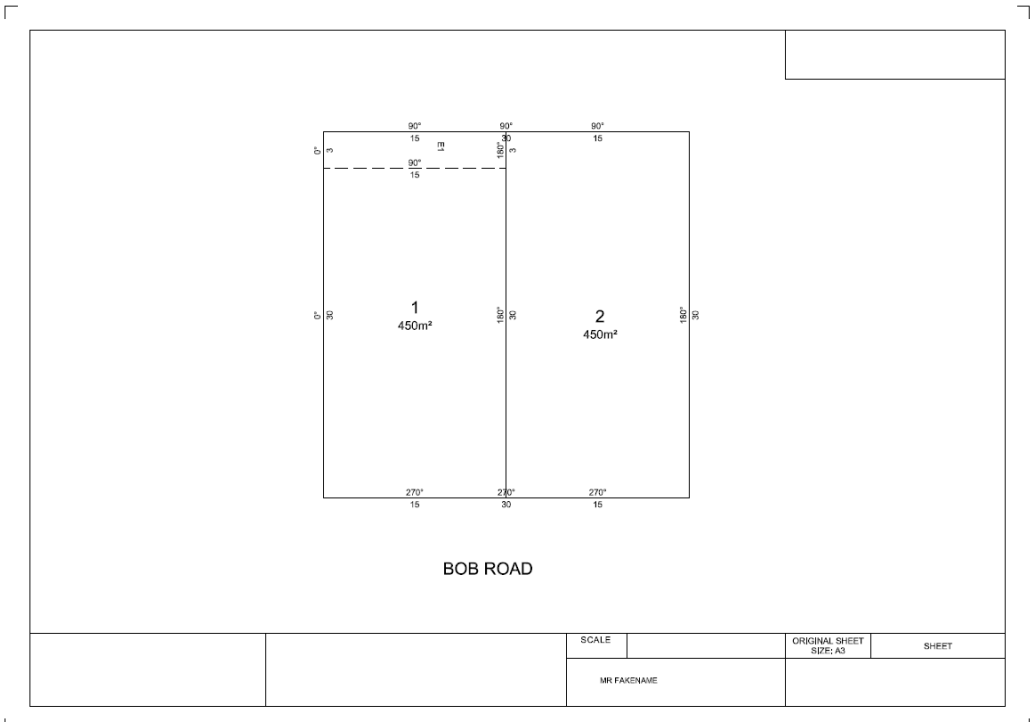


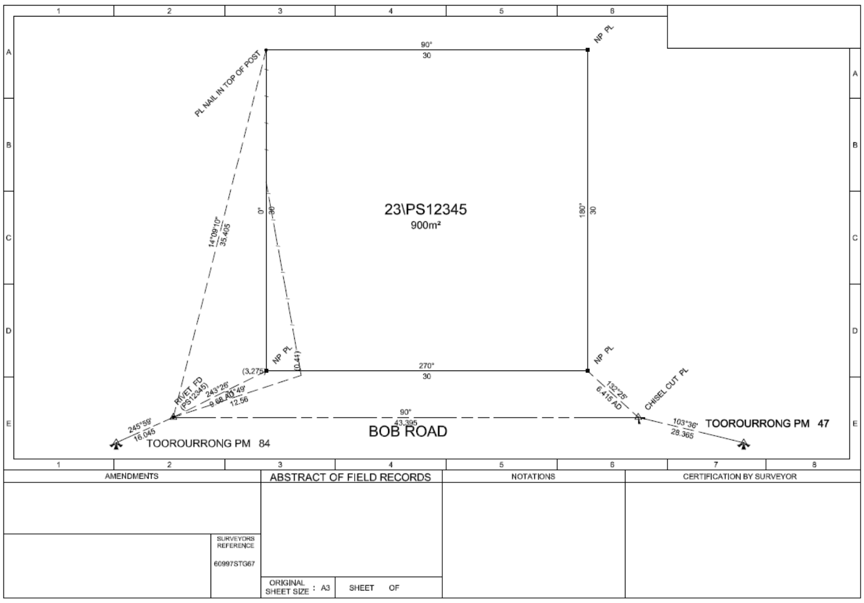
And here is my created plan. I would then do the same with the AFR with the layers switched (turn of drafting, boundary, easement).



And here is my created AFR

Now both plans have a little bit too much white space, so using the xout, switching the scale to something larger using XSS and doing and xin I can recreate the plan at a new scale in a matter of seconds (ignoring the fact that any text movements I have done won't be reflected after the xin).





23\PS12345
900m²
PL NAIL IN TOP OF POST
NP PL
NP PL
NP PL
CHISEL CUT PL
RIVET FD (PS12345)
BOB ROAD
TOOROURRONG PM 84
TOOROURRONG PM 47
AMENDMENTS
ABSTRACT OF FIELD RECORDS
NOTATIONS
CERTIFICATION BY SURVEYOR
SURVEYORS REFERENCE
60997STG67
ORIGINAL SHEET SIZE : A3
SHEET OF

Version information

;Edited from version 1.8.11 of NSW version
;Revision 1.0 – Beta
;Revision 1.1 Reserves added to road creators
; Fixed XAM not assigning text to Admin Sheet layer
; Checked for EAS while adding link parcels to easement
; Fixed XAS reference number prompt
;Revision 1.2 Fixed XAS reference number prompt
; Fixed problem with creating, importing and exporting restrictions
; Fixed problem with two point irregular lines
; Changes to topo and sideshot exporting pntsurv styles
; Other minor bug fixes
;Revision 1.2.1-Change CG point importer to deal with stringer different linefeeds
;Revision 1.2.2-Irregualr Duplicate point remover added
;Revision 1.2.3-Changed so XMO is not exporting all monuments in job
;Revision 1.2.4-Made head of power and purpose all captial and uncapitals on xo
; -Fixed problem with multiple hop export
; -Made allowance for bearing only lines on xin (not on xino yet)
;Revision 1.2.5-Improved importer to deal with non-linefed files
; -Added cardinal end letter checker
; -Median Face changed to median on xin and xout
; -Planfeatures importer modified to align better with Vic recipe
; -Fix problem with cardinals calcing 0' minutes
;Revision 1.3 -Set alerts for easement uses that are too long
; -Adjusted easement width mtext box
; -Fixed problem with single line restrictions
; -Updates to irregular line importer
; -Fix problem with easement widths not going in right place on xin
; -Added AD, COMP, DERI and MEAS to all reduced obs
; -Refinements to XRT and XPU
; -Added XCD function for checking check digits
;Revision 1.4 -Added XINOA function to automatically load xmls from specified file locations
; -Added latlong to MGA converter for early release back captured data for xin
; -Default scale set to 200
;Revision 1.4.1-Made estimated distances red
;Revision 1.4.2-XMT fixed to work in UCS
; -Added loop checker drawing XLCD command
;Revision 1.4.3-Expanded XRT
; -Removed default text height
; -Fixed version concatenator on export
; -Changed purposelist to be lower case
; -Added searching for Suplementary AFR's to XINOA