

Taxiway Sign Validator
Version 0.9c (Beta)

Designed to Work alongside
Airport Design Editor

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What it does

Taxi Sign Validator is designed to check that the taxi signs do not have incorrect designates. These sort of errors typically occur when a Taxiway's Designation is changed, and the scenery designer/editor fails to notice one or more signs that need to be changed.

This version checks:

- Signs that on the left of the taxiway approaching an intersection
- Signs that point to taxiways that are not directly off the current intersection, but are within 200 feet of the intersection.
- Intersections which only have a single designate but signage indicates a different path will trigger a 250 foot scan for taxiways.

The 2nd two items on this list are optional and triggered by clicking the Look Deeper Checkbox.

What it doesn't do:

- All signage that includes runway related designations are excluded. These are the signs that will usually be white lettering on a red background.
- Display Multiple Bad Signs for a single intersection. *This is very important. After correcting and recompiling an airport, it should be scanned again.*

Work Flow

1. Start by loading Airport Design Editor and make sure that when you compile, an XML file is saved. Record where that XML file is saved.
2. Load Taxiway Sign Validator (TSV)
3. Select File ...Set Default XML Path.
4. Browse your file system to locate the **folder** in which ADE is set to save the XML file.
5. Select File ... Open XML and select your XML file for the airport on which you are working.

Note: *The location of the folder is saved in your appdata\roaming folder and called MGC\READER\MGC.INI. I have had a problem with this file disappearing when I called it TSV.INI, hence the rather odd choice of name. I think my Anti-Virus software might be cleaning it off, but I have no idea why.*

Manual v Automatic Modes

Manual

In the default state, TSV loads in Manual Mode. Five lists will display, though to start with only the Taxiways list is populated. If you see any duplicated Taxiways listed, go back to ADE and correct this error, then reload the XML file once you have recompiled the airport.

Manual mode was basically my development model, where I worked out what I could do, but it does provide an idea for users as to how the automatic process works.

Selecting a Taxiway triggers a look up of all the Taxiway Paths that have the selected Designation.

I. e. Select Taxiway A1 and you will see the linked paths that include that designation. The list also includes the width of the taxiway, which I might use in a later version. To the right of the TaxiPaths list is the Intersection Count list. Whilst the Taxiway Paths are all intersections, they may be only links on the same path, rather than links to another path. If an intersection has more than 2 links, it goes into the Intersection Count List. Now these are Taxiway Points. That is, they only contain an index number and a position as Lat, Lon as far as I am concerned.

As you click on each intersection, the taxiways that pass through it are displayed to the right along with the designation name and the bearing of the path. Clicking on each Linked Path will show any taxiway Designation Names that are found on signage along that path.

For example:

Linked path =	Start	End	Name	Bearing
	10	11	A	120.94

Results in Taxi Signs Near Intersection

Taxiway Name

M
A
M

The actual sign is probably <M [A] M>

Since all those letters exist in the Linked Path Names, it can be considered valid. However, if a G were to appear on the Taxiway Names, this would indicate something to be further investigated.

Now for a large airport, this would be tedious in the extreme. Hence the development of a much faster method.

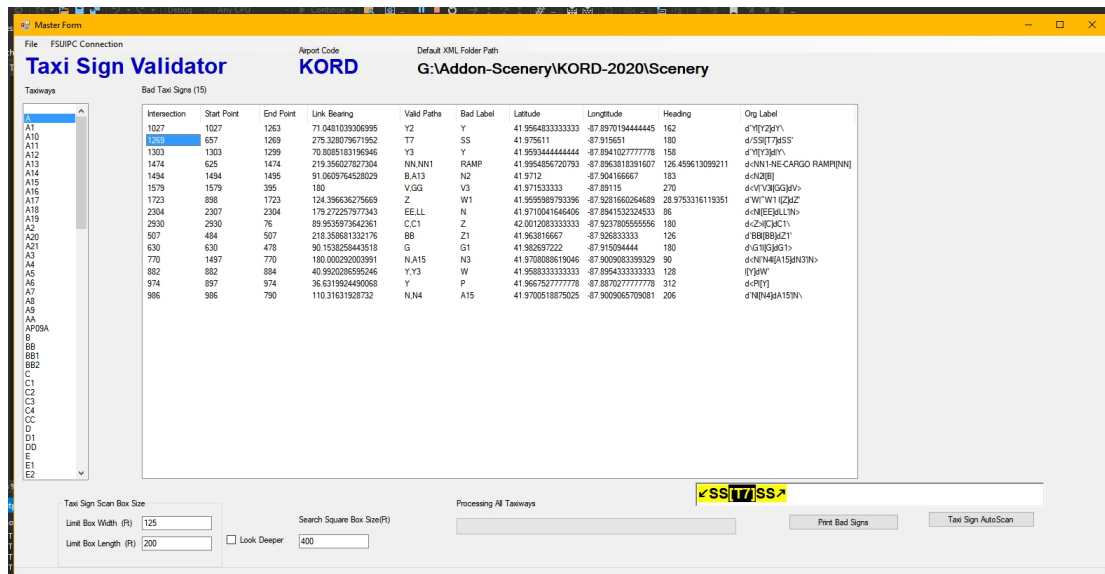
Auto(Taxi Sign Auto Scan)

If, without touching any other settings, you hit the Taxi Sign Auto Scan button, all but one of the lists will disappear and be replaced with a new one. This one will tell you all you need to know about the found provisional faults.

The label at the top which says **Bad Taxi Signs (n)** indicates via the n how many faults were found.

Each time a scan is run, a text file with the displayed information is generated in your MyDocuments folder and clicking **Print Bad Signs** will send it to your default printer.

Unlike the manual Sign Display, here we only see one bad label at a time. However, the original text of the label is displayed, so you can see what the sign says (provided you are used to adding taxi signs in ADE) and the Sign Heading is also displayed, which helps to nail down that faulty sign in ADE. Click on an intersection row in the first column, and the Taxi Sign Original Label will be displayed at the bottom. (See Screen Shot 1)



Screen Shot 1

This program detects problems, it does not fix them. That needs to be done in ADE. As of this version, FSUIPC can be used to connect to the Sim, which will move whatever aircraft you are flying to the position of the taxi sign indicated. If ADE is open for that airport, and connected to the Sim, then the aircraft icon on ADE will also move over the suspect taxiway.

Before going hunting for the indicated faulty sign, you can trigger a scan which looks more deeply into the source of the problem. It isn't fool proof, but when facing 60 potential errors, it can certainly help to focus the mind.

Click the Look Deeper Checkbox. This will cause Auto Scan to draw a metaphorical square box around the intersection and look for any other intersections inside the box. If any are found, their taxiway names are added as valid paths, which may in turn result in the taxi sign designations being valid.

When the Auto Scan is in operation, you might see the Search Square Box Size change to 500. This means it has found an intersection where all the path names are the same, but there is a sign with a name not included in the path. Experience has shown that where curving taxiways directly off runways, or splits between taxiways occur, the signage will indicate where they go, but that linked taxiway may not be very close to the intersection. Increasing the box to 500 ft Sq will often find those taxiways and prevent a false negative.

Defaults

There are three text boxes at the bottom.

- Limit Box Width (Ft) = 125
- Limit Box Length (Ft) = 200
- Search Square Box Size = 400

By all means experiment with these values. If you have very wide taxiways, it is certainly worth increasing the Limit Box Width, as this is measured from the center line of the taxiway. If the taxiway were to be 145 ft wide, the edge would be at 72.5 ft. The outer edge of the Limit box would be at 62.5 and thus the taxi signs would be outside the range.

This is on my list for changes. In a future version, the width of the taxiway will be taken into account, changing the default dynamically. I believe FAA Regulations say that taxiways > 150ft wide need taxi signs on both sides, so that complicates things considerably.

I've got my list, now what?

Load ADE for the airport.
Look at the first entry on your list.

As a Worked Example:

My list says intersection 1269, path from 1269 to 101 at a bearing of 61 degrees has a path name of A1 and only A1. (This print out was done without using the Look Deeper checkbox.) The list gives me the precise coordinates of the taxi sign, but we know it has a heading of 151 degrees, so it is 30 degrees off the North South axis. We also know it has the word TEST on it, and knowing the format of taxi signs, we know from dTEST being the label that it is yellow with black writing.

It doesn't take long to find in ADE if you do this.

In ADE select:

1. Lists .. Taxi Points.
2. In Filter, type the intersection number as 1169. If less than a 4 digit number, pad left with 0's. I.e. 0101 not 101.
3. Clicking the row with 1169 will select and center the ADE drawing over the intersection, but you need to close the Taxi Points window first.
4. A quick look around, hovering the mouse over the taxi signs will locate the culprit, or alternatively you could use Lists .. Taxi Signs and narrow the field using the heading as the filter. This method might be quicker, but you will not have the benefit of looking at the drawing and working out what is right and wrong.

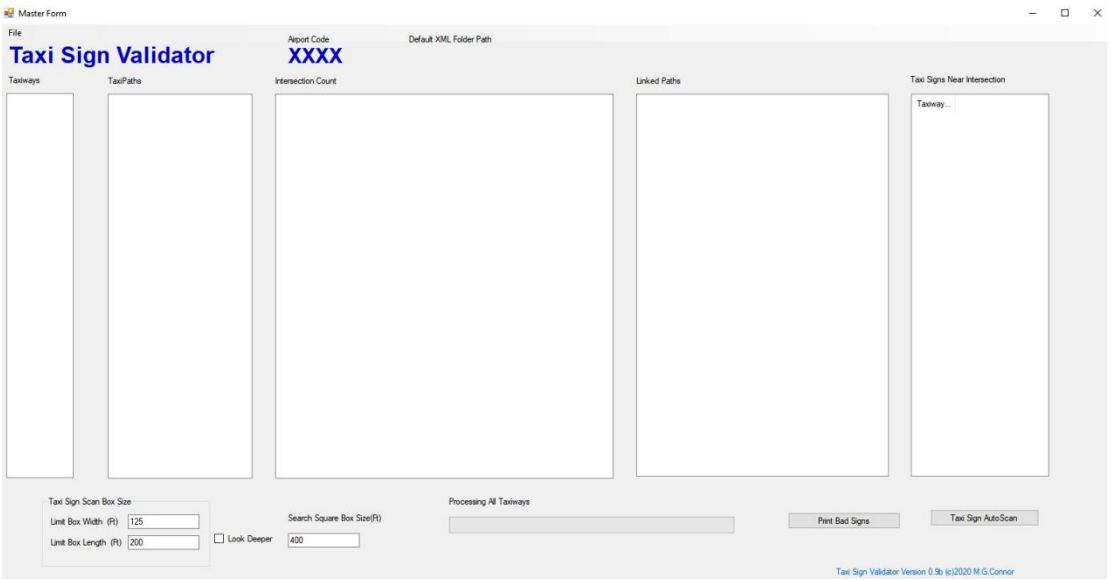
All Signs Corrected - Now What do I do?

Save the airport in ADE, then Compile.
TSV is supposed to detect that a file has changed in the default folder, in which case pressing Auto Scan again will reload the new file before scanning. If you see no change, this feature may have failed.

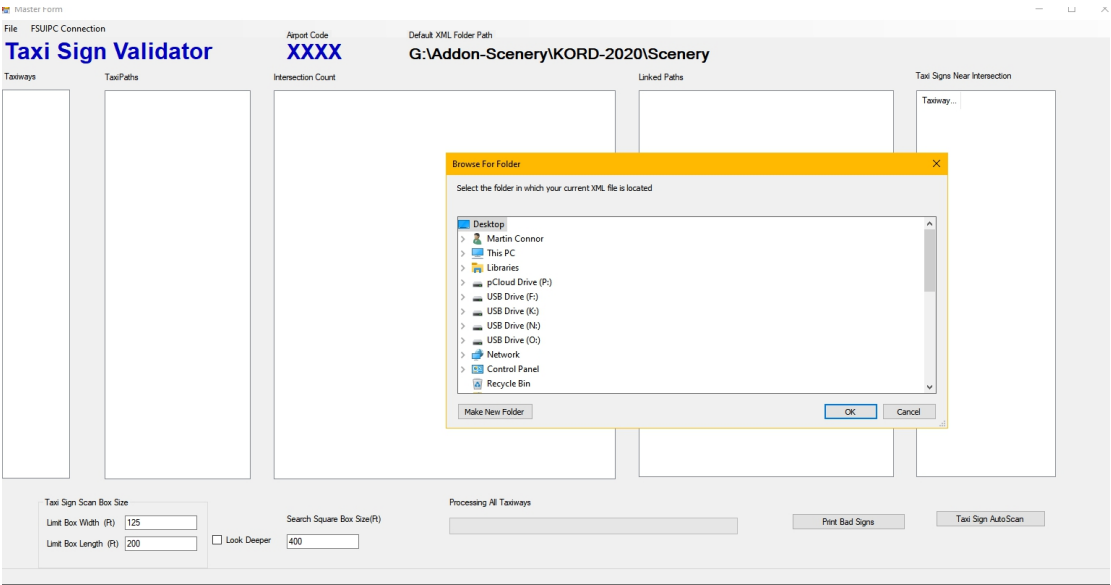
Look out for different issues. Compare the screen with your printout. You may well have new Bad Signs for the same intersections. Sorry, but that is the way it works currently.

Repeat the process until there are no more errors, or you can explain those that are there.

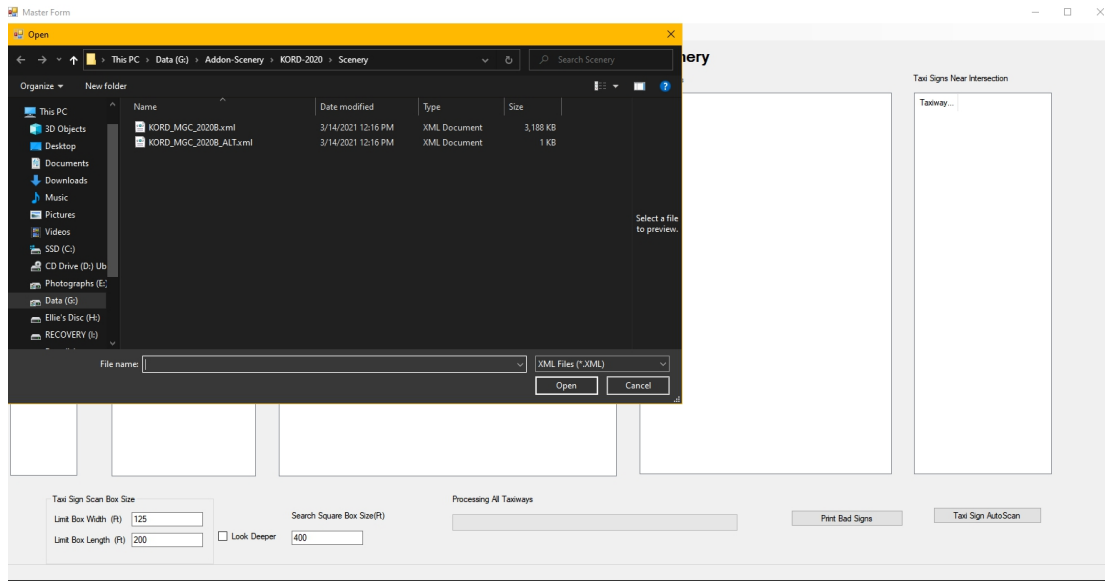
Screen Shots



First launch screen.

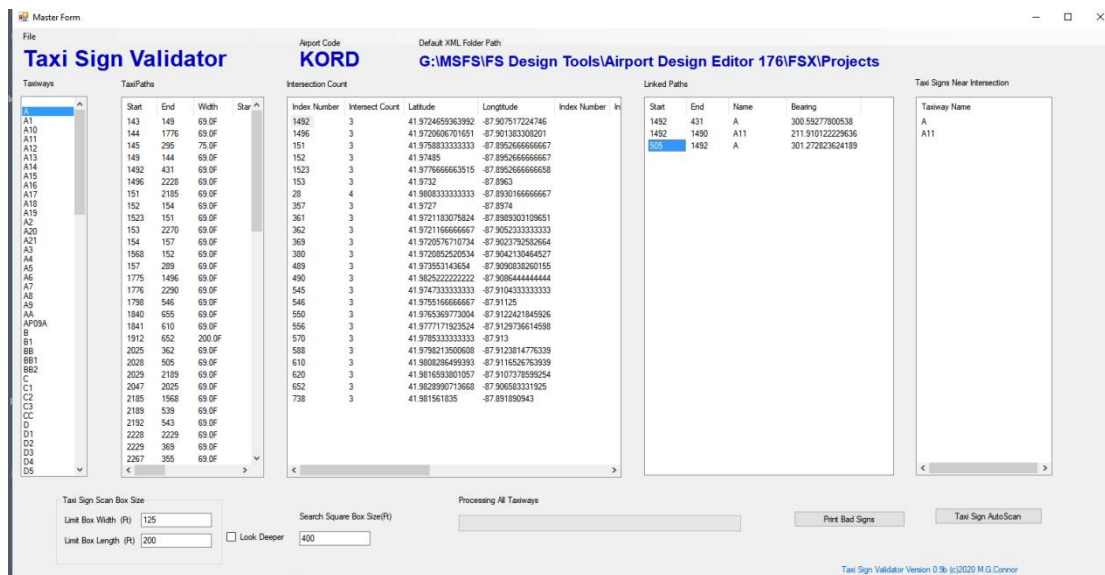


Selecting the Default XML Path



Selecting the XML file for the airport

Fresh load from KORD file. Current view is showing a taxiway that has yet to be labeled.



Taxiway A has been selected, followed by Intersection 1492. Linked Path 505 to 1492 has two taxi sign designations, A and A11. As both appear in the Linked Paths Name, these can be considered valid.

Master Form

File Report Code Default XML Folder Path

Taxi Sign Validator **KORD** **G:\MSFS\IFS Design Tools\Airport Design Editor 176\FSX\Projects**

Taxiways Bad Taxi Signs (26)

Taxiway	Intersection	Start Point	End Point	Link Bearing	Valid Paths	Bad Label	Latitude	Longitude	Heading	Orig Label
A1	1027	1027	1263	71.0481039596995	Y2	Y	41.9564833333333	-87.8970194444445	162	d\YV2dY\
A10	1169	1169	101	61.5948318786234	A1	TEST	41.9833283916929	-87.9080357150805	151.841648903409	d\TEST
A11	1247	1228	1247	270.000991862181	NLT	SS	41.970216667	-87.9091	177	d\NLTSS
A12	1269	657	1269	275.328079671491	T7	SS	41.975611111	-87.915308333	180	d\SS(T7)SS
A14	1303	1303	1299	70.8085183188489	Y3	Y	41.9893444444444	-87.8941027777778	158	d\Y3Y
A15	1474	625	1474	219.35602782716	NN,N,N1	RAMP	41.9954856720793	-87.8963818391607	126.459613099211	d\NN1-NE-CARGO RAMP(NN)
A16	1494	1494	1495	91.0609764530731	B,A13	N2	41.9712	-87.904166667	183	d\N2(B)
A17	1579	1579	295	180	V,G,G	V3	41.971533333	-87.89115	270	d\V3V3G3G3V3
A18	1616	1616	1647	89.470099563023	N,V4	D4	41.9702444444444	-87.8885638888889	180	d\N4D4
A19	1723	898	1723	124.3966362737	Z	W1	41.959589793396	-87.9281660264689	28.9753316119351	d\W1W1(Z)W1
A20	2304	2307	2304	179.272257977341	EE,LL	N	41.9710041646406	-87.8941532324533	86	d\N(E)E3(L)N
A3	28	30	28	229.64825428286	G2,A	U	41.980974761461	-87.892442369279	136	d\U3U3
A4	324	324	76	89.953911332869	C,C1	Z	42.0012083333333	-87.9227805555556	180	d\Z4C3C1
A5	507	484	507	217.8723238196	BB	Z1	41.963816667	-87.926833333	126	d\BB(B)Z1
A7	517	517	403	89.8356231633617	G,H	R	41.982691667	-87.916372222	180	d\R(R)
A8	536	536	536	141.121466762262	YY	Y	41.9938644618975	-87.924268936086	48	d\Y3
A9	592	591	592	142.760296261274	YY	Y	41.9916284521761	-87.927395288416	45	d\Y3
AA	594	593	594	137.441723296873	YY	Y	41.9927521818272	-87.9256540404571	45	d\Y3
AP08A	630	630	478	90.1538258444938	G	G1	41.982697222	-87.915094444	180	d\G1G1G1G1
B	770	1497	770	180.00025002991	N,A15	N3	41.9708088619046	-87.9090583399329	90	d\N3N3A15(N)N3
B8	778	778	788	187.114684111997	Z	C	42.0001013333333	-87.9283305555556	275	d\Z3C3C3
B82	821	822	821	271.34878600998	K2,L	L2	41.9712388888889	-87.9215222222222	180	d\L2L2
C	882	882	884	40.992028594094	Y,Y3	W	41.9888333333333	-87.8954333333333	128	d\W3W3
C1	913	913	172	49.443929979169	E	T	41.985566667	-87.92289	138	d\T(E)T
C2	974	897	974	36.6319504450068	Y	P	41.9667577777778	-87.8878277777778	312	d\P(Y)
C3	986	986	790	110.316319286911	N,N4	A15	41.970051875025	-87.900906579081	206	d\N4N4A15(N)

Taxi Sign Scan Box Size
Limit Box Width (ft) 125
Limit Box Length (ft) 200
☐ Look Deeper
Search Square Box Size(ft) 400

Processing All Taxiways

Print Bad Signs Taxi Sign AutoScan

Taxi Sign Validator Version 0.9b (c)2020 M.G. Connor

This is an example of running Taxi Sign AutoScan. Note that Intersection 1027 has a valid path of Y2, but a bad label of Y is flagged from a Taxisign with a heading of 162 degrees. A total of 26 possible problems have been flagged.

Then we tick Look Deeper and review the new results.

Master Form

File Report Code Default XML Folder Path

Taxi Sign Validator **KORD** **G:\MSFS\FS Design Tools\Airport Design Editor 176\FSX\Projects**

Taxiways Bad Taxi Signs (12)

	Intersection	Start Point	End Point	Link Bearing	Valid Paths	Bad Label	Latitude	Longitude	Heading	Org Label
A1	1169	1169	101	61.5948318796234	A1	TEST	41.5833283916929	-87.9080357150805	151.841648903409	dTEST
A10	1247	1228	1247	270.300991862181	N.T	S5	41.570218667	-87.9091	177	(N)S5
A11	1474	625	1474	219.35602782716	NN,NN1	RAMP	41.5954856720793	-87.8963818391607	126.459613099211	d<NN1>NE CARGO RAMP(NN)
A12	1616	1616	1647	89.470095953023	N.V4	D4	41.5702444444444	-87.8885638888889	180	(N)D4>
A13	28	30	28	229.648252428286	GZ.A	U	41.580974781461	-87.892442369275	136	(A)U>
A14	324	324	76	89.955913328569	C.C1	Z	42.0012803333333	-87.9277055555556	180	d<C1>(C)C1\
A15	517	517	403	89.8356231633617	G.H	R	41.582691667	-87.916372222	180	d(R)G
A16	536	535	536	141.121466762262	.YY	Y	41.5936644619975	-87.9242068936086	48	d(Y)>
A18	592	591	592	142.750296261274	YY	Y	41.591620421781	-87.9273952988416	45	d(Y)>
A20	594	593	594	137.441723296073	YY	Y	41.5927521818272	-87.9265440404041	45	d(Y)>
A21	778	778	788	187.114684111997	Z	C	42.0001833333333	-87.9269305555556	275	(Z)Z<C1C>
A3	821	822	821	271.34878600998	K2.L	L2	41.5712388888889	-87.9215222222222	180	(L)M-L2

Taxi Sign Scan Box Size

Limit Box Width (R) 125

Limit Box Length (R) 200

Search Square Box Size(R) 400

Processing All Taxiways

Print Bad Signs

Taxi Sign Auto Scan

Taxi Sign Validator Version 0.9b (c)2020 M.G. Connor

Now the Bad Sign Count has gone down to 12. The very first entry, 1027, is one of those missing bad signs.

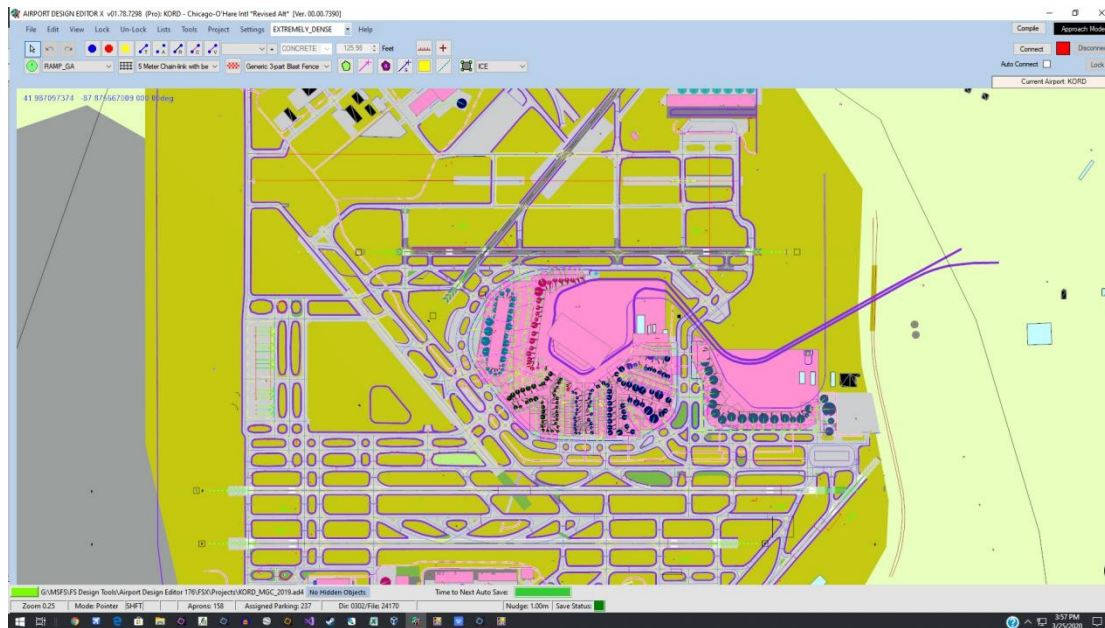
Now is the time to print this list and hunt them down whilst crossing them physically off the list.

As I mentioned earlier, FSUIPC can now be used to zero in quickly on the taxi signs by loading FSX or MSFS or even P4D probably. FSUIPC for FSX is different to MSFS in that it uses a new executable called FSUIPC7. This must be run before connecting from this TSV.

A big question is whether this code will work with ADE 2.xxx I performed the following test:

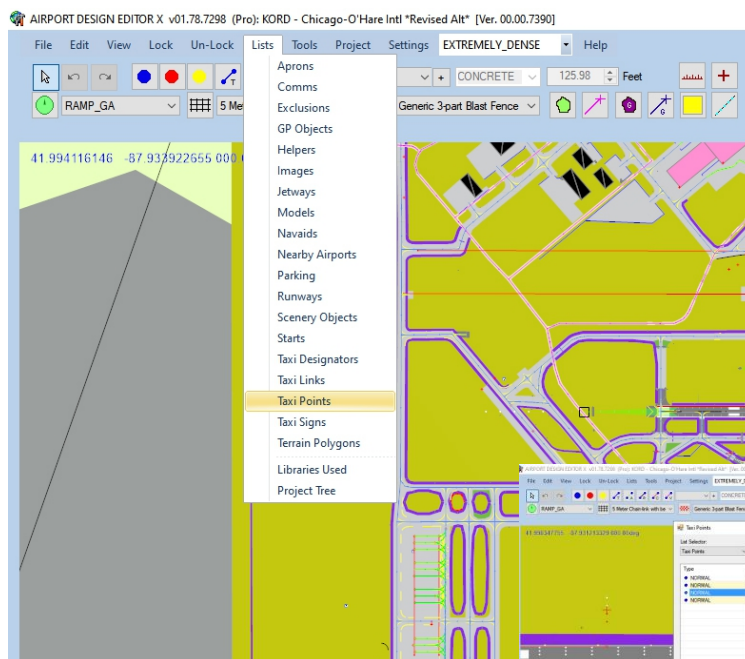
I loaded MSFS at Chicago O'Hare, then FSUIPC7 followed by ADE v20.17.7723 Alpha.

I loaded my XML for O'Hare, and whilst ADE threw plenty of errors, the core of the Airport was loaded and the taxisigns were there. By clicking on the Bad Signs Intersection Col, I was able to move the cross hairs to the positions of the taxisigns in question.



This is the airport which the XML file belongs to, Chicago O'Hare. This Airport has been undergoing a thorough upgrade for some years now, so taxiways keep changing, new runways introduced, old runways changed temporarily to taxiways etc. This was the trigger for building this software.

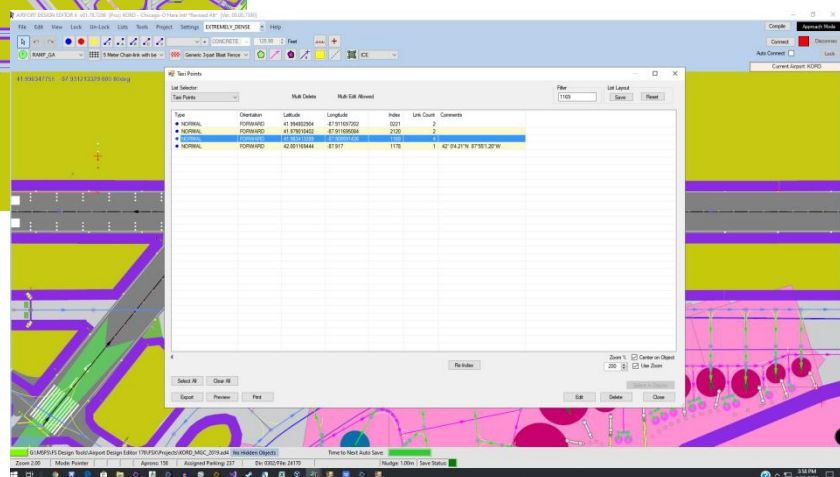
If FSUIPC method won't work for you, then this is the way to go with ADE 1.78

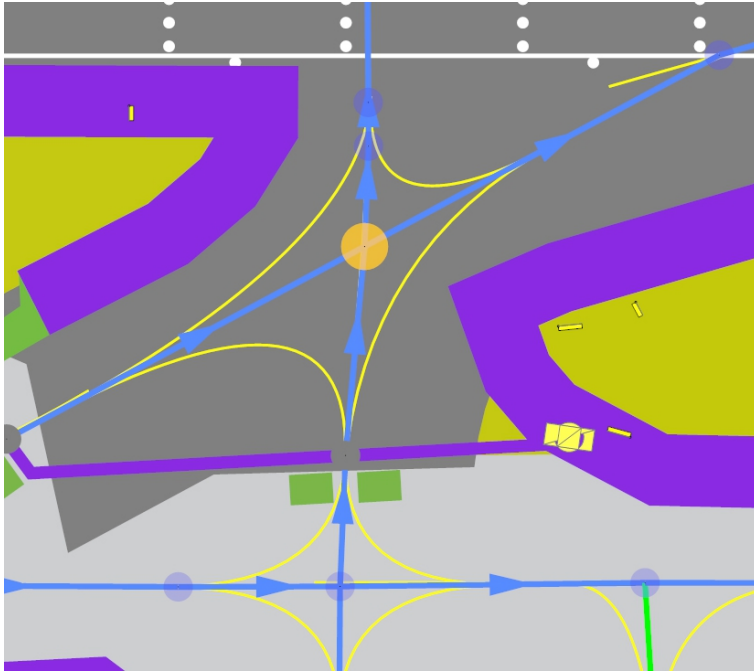


Selecting List Taxi Points is the first step in the hunt.

I have typed the Intersection number into the filter, then selected the Intersection in the list.

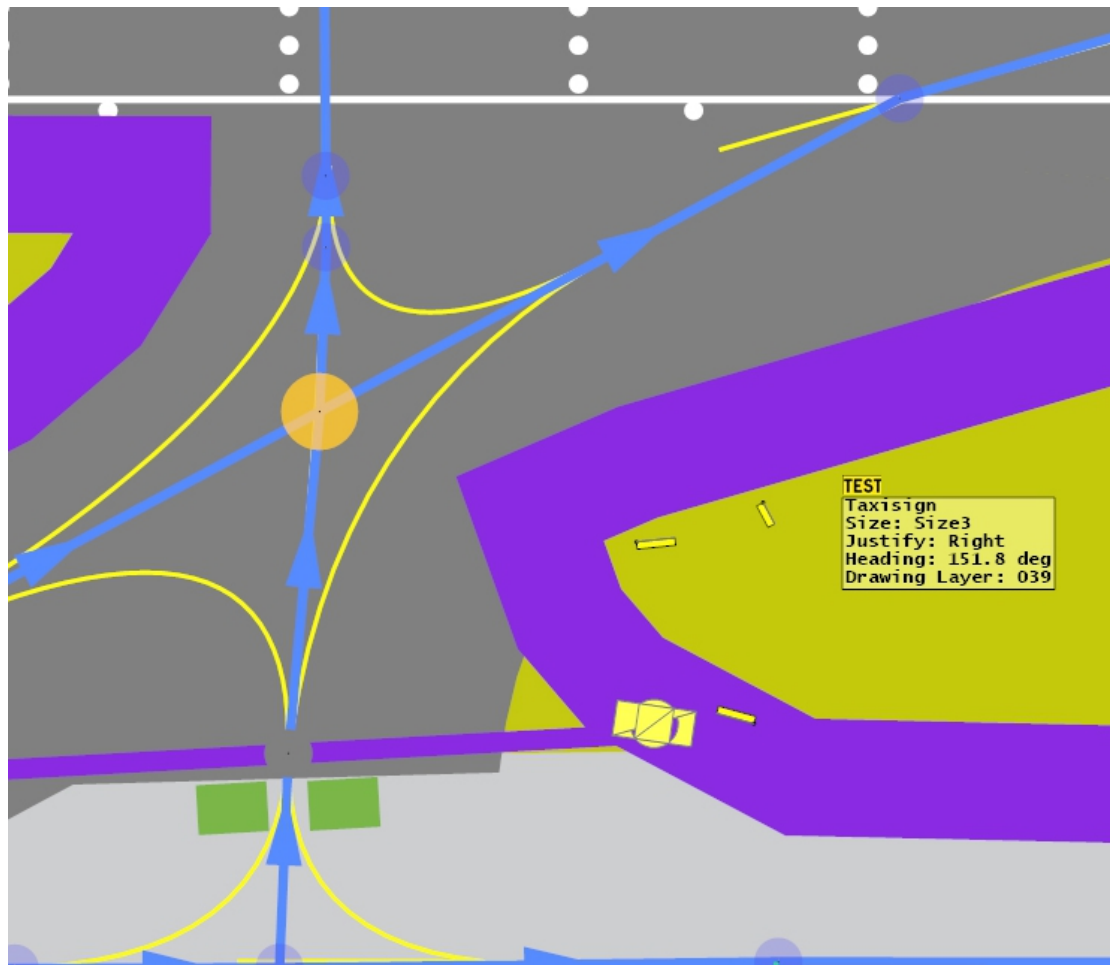
The software has zoomed in on that intersection.



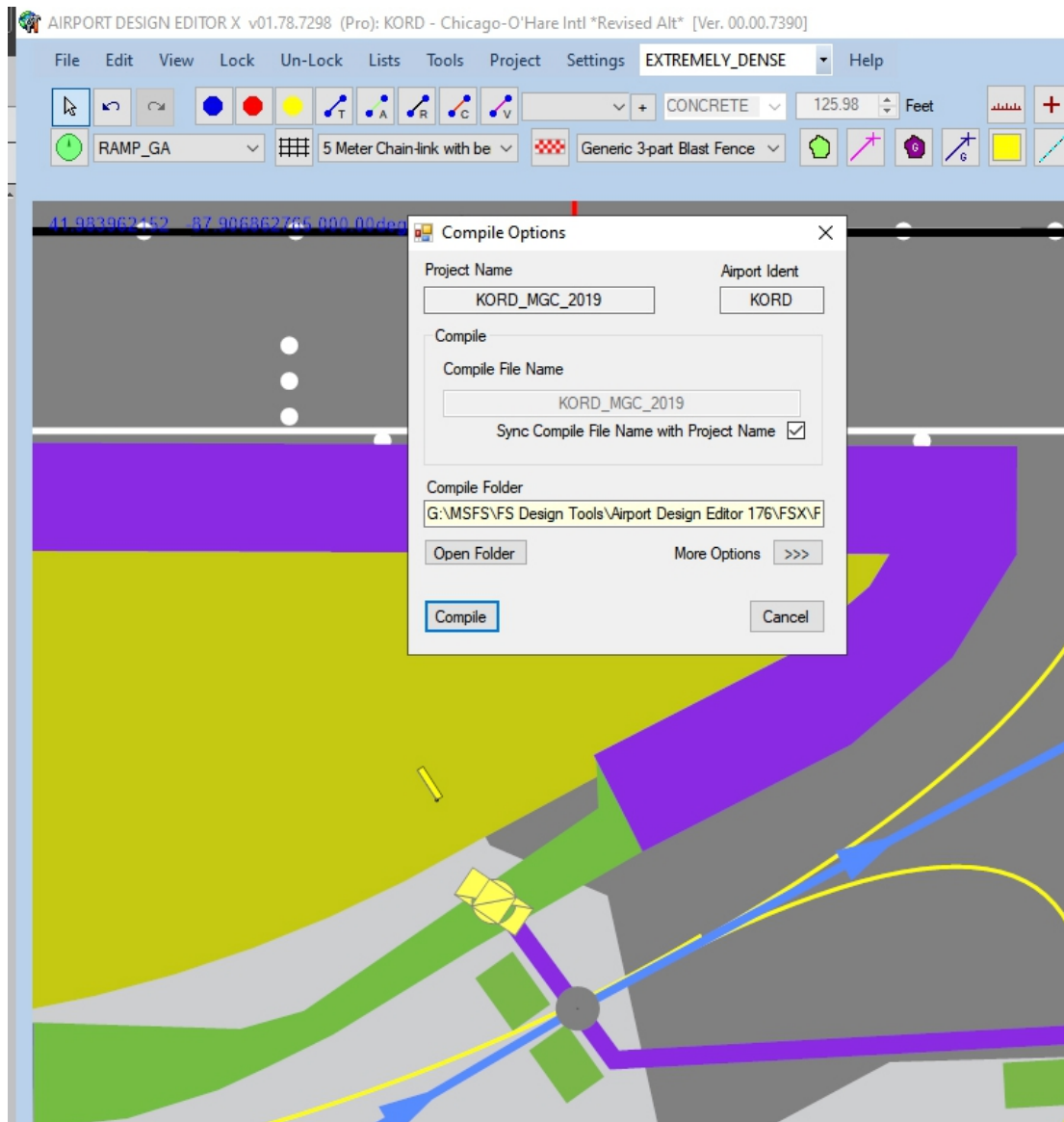


The yellow dot is the selected Intersection. Now look for any taxi sign which might be at an angle of 151.8 degrees.

Hover the mouse over it.



As you can see, this is the bad taxi sign, put in deliberately to make things easier. This one can be deleted, but usually you will be correcting them.



Re compile when all the items on the list have been hunted down. This should trigger TSV to reload the file when you re-scan it.

You repeat this process until there are no more errors, or you can explain those that there are.

Installation

This file is an executable, so it uses no DLL's and needs no install program. No registry entries are changed.

It can realistically be placed pretty much anywhere. It was written for .Net 4.7.2. If this proves to be a problem, I can probably push it back a bit.