Building Gateway Airports for X-Plane 12



The arrival of X-Plane 12 brings significant new capability to the Gateway community. This document covers the tools and methods that are new to that version.

This document is specifically intended for artists that already know how to develop scenery for previous versions of X-Plane.

Non-version specific documentation for the creation of Gateway airports may be found at

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Upgrade heuristics applied to Gateway airports when captured into X-Plane 12

This chapter describes the automated upgrade heuristics that are applied when capturing Gateway airports into X-Plane 12.

Exclusion Zones

All exclusion zones carried over from existing X-Plane 11 submissions are removed. Exceptions are forest, object, and facade exclusions for existing X-Plane 11 heliports. Only exclusion zones included with new submissions made using WED 2.5 AND X-Plane 12 will be kept going forward. This is because the global scenery has been regenerated in X-Plane 12, and most existing exclusions no longer apply.

Ramp Starts

All ramp starts of type “Gate” or “Tie Down” will receive regionally appropriate airline assignments. X-Plane 12 features over 50 airline liveries, so these should look more plausible than before. If Gateway artists assign no airline, or an airline for which there is no stock livery, up to 5 regionally appropriate airlines will be automatically assigned. It is highly recommended that artists do NOT manually assign airlines for all ramp starts, in particular don’t try to specify all airlines that actually may use a given start, as this will in most cases have the opposite effect than intended.

If a group of gates are predominantly used by ONE airline - it’s good to assign this ONE airline to these gates, only. If all possible, i.e. even the less frequent ones are specified, there will be an even mix of all those airlines. Which, given the small number of gates and typical gate utilization on a typical terminal still looks essentially random - one of each airline and the rest empty. No notable “clustering’ or “three of the same kind” that makes a terminal recognizable.

Gates used by long haul airliners preferably also have no airline assigned. As long haul airliners fly globally, X-Plane choosing a livery at random is pretty plausible. It is also the only way that users actually see some of the more exotic liveries they may have installed via 3rd party libraries.

Gates not used by one airline only are best left empty. The Gateway export heuristics in WED are region-aware and will choose, out of the liveries available, several of them in a random but regionally appropriate mix. As over time the available liveries in X-Plane increase - every new Gateway export will automatically pick these up. This is unlike users specifying a fixed set - which will not allow X-Plane to pick any of the newer liveries any one user may have installed.

Draped Terrain polygons

Most draped terrain polygons (grass, dirt etc.) from existing X-Plane 11 submissions are removed (not including pavement). This is because the new terrain mesh in X-Plane 12 has been cut using the latest airport

boundary, and terrain polygons injected previously to correct this no longer apply.

Draped terrain polygons in X-Plane 12 submission are kept going forward. But it is requested to keep their use to an absolute minimum. Never cover whole airports in an opaque terrain polygon. Users of ortho sceneries will not appreciate having their orthose covered by an obviously mismatching terrain polygon.

Grunge objects

Grunge objects from X-Plane 11 submissions are all removed at export time. The new X-Plane 12 pavement_FX library provides much better assets to achieve this effect where desired.

Static Aircraft

Static aircraft objects (e.g., C-172.obj) that have been deprecated since XP11.00 within a certain radius of a ramp start are automatically removed, the same way as they were in X_plane 11. If true static aircraft are desired - place any one of the lib/airport/aircraft/* objects - but please not in areas where users may want to start up, taxi or park. Always and only place ramp starts there - so users or 3rd party traffic addons can disable these by using the “parked aircraft” option in X-Plane.

Tree Objects

Most tree objects (lib/g10/forests/atutogen*.obj and lib/airport/.../Tree*.obj) are converted into point-mode forest polygons. Only polygon forest trees are wind-animated in the simulator.

Jetways

Jetways that are made from individual objects (XP10 and earlier) are automatically converted to single façade jetway constructs. Menu function Airport -> Upgrade Jetways accomplishes the same thing. This is a requirement for auto-docking to occur in X-Plane 12. Artists should ensure the desired jetway is set for auto-docking and any remaining jetways at the same gate are disabled. See: Dynamic jetways

Grass mowing (lawn track) lines

The “terrain_FX” library path features assets that may be added to enhance the terrain at an airport. Included in these assets are lawn track polygons. These are semi-transparent overlays for grass areas, and automatically added during Gateway exports to X-Plane 12, unless the airport has one or more manually added terrain FX assets present (group “Terrain FX” is present after importing the airport from the Gateway).

The auto-added assets are identical to those placed by the menu function "Airport->Mow Grass". Artists have the option to either execute this menu function, and then manually refine that art, or add no Terrain FX” assets at all, and allow the next Gateway export to X-Plane 12 to add these automatically. The latter method has the benefit of NOT requiring future artists to make manual adjustments to terrain FX assets if pavement, taxiway or 3D taxi sign adjustments occur.

One thing to keep in mind – artists should add **ALL** terrain_FX assets they require, or **NONE**. There is no option to add just a few assets of this type (e.g. dirt tracks from the terrain_FX library) and then have grass mowing (lawn track) lines added automatically later.

If the automated mowing option is in play, it’s important that the airport boundary NOT extend over nearby beaches, terrain or water, otherwise the upgrade heuristics may visibly mow those areas. The artist should quality

check the outcome from automated mowing, and make adjustments where needed

Adding soft edges to pavement

The “pavement_FX” library path features assets that may be added to enhance the pavement at an airport. Included in these assets are .LIN (line) assets for cracked, elevated or soft edges. These are automatically added during Gateway exports to X-Plane 12, unless the airport has one or more manually added pavement FX assets present (group “Pavement FX” is present after importing the airport from the Gateway).

The auto-added assets are identical to those placed by the menu function "Airport-> Add Pavement Edges ". Artists have the option to either execute this menu function, and then manually refine that art, or add no Pavement FX” assets at all, and allow the next Gateway export to X-Plane 12 to add these automatically. The latter method has the benefit of NOT requiring future artists to make manual adjustments to pavement FX assets if pavement, taxiway or 3D taxi sign adjustments occur.

One thing to keep in mind – artists should add **ALL** pavement_FX assets they require, or **NONE**. There is no option to add just a few assets of this type (e.g. elevated edges from the pavement_FX library) and then have pavement edge lines added automatically later.

Always Flatten switch

The new global scenery will smooth all airport terrain per the current boundaries, making the existing XP11 global scenery ‘Always Flatten’ switch for most existing airports obsolete.

Remove all leading zeros from US runway names

X-Plane 12 does discern leading zeros in runway names. Except for a few military bases, all runways within FAA jurisdiction don't use leading zeros. Upgrade heuristics remove the leading zero within US jurisdiction airports, with known exceptions.

Outside the US - runway names are left as artists design them, with WED by default placing leading zeros into new runway names.

DO's and DON'T's guidelines when creating airports for X-Plane 12

The following guidelines will help steer artists towards the most desirable upgrades, when updating airports for X-Plane 12

- **DO UPGRADE** 3D art like towers, hangars, and other clutter (red/white huts ...), wherever there are superior assets available in X-Plane 12.

- **DO CHANGE** run/taxiways surfaces to use the large selection of new surface types, where applicable. This eliminates the need to place large polygons on top of taxiways to get other than "default looks". Make use of the dirty/worn/cracked surface types where applicable to get a truly new look and feel of existing airports.

- **DO** Export your airport to the Gateway target and examine the grass areas of your airport in the simulator. Determine if there is value from the addition of custom lawn-tracks to some of these areas (see lawn_tracks). Note that if NO "terrain_FX" assets are present at your airport, automatic lawn-tracks will be added.

- **DO CHECK ALL** jetways actually work in the simulator, as desired. WED's preview of their "reach" is only an

approximation.

- **DO BE CAREFUL** using exclusions. All existing airports have the area covered by the airport boundary already clear of all 3D content. Starting with X-Plane 12.02 the Global Scenery also automatically keeps autogen building and forests off the ends of runways and around existing approach lights sufficiently obstacle free. These automatic generated clearances are much more selective than what any one user can achieve with exclusion zones. Only airports, or (parts thereof) that are new and were not previously covered by an airport boundary will need exclusion zones to immediately remove the existing 3D objects there. Only the autogen relevant types (forests, objects, facades) should be selected in these exclusions. Do not select all types “just to be sure”. Future global scenery recuts may make use of these items and will keep them out of the airport boundary as needed. Any exclusion zones, even if currently seemingly not doing anything at all, may overreach and needlessly destroy future global scenery content much further from the airport than intended.

- **DO REMOVE** out-of-airport boundary assets and avoid the temptation to expand the boundary to "keep these inside". Assets that cross the airport boundary up to 10m / 30 feet are usually considered acceptable, in particular if these are forests. But airports should in case of doubt also avoid placing any assets really close to existing roads - as the exact location and shape of these may change and vary over time by some small amount.

- **DON’T PLACE** assets outside the airport boundary. Not even exclusion zones. Gateway artists should avoid changing, or improving scenery outside of airports, to keep the Global Airports compatible with all current, and future Laminar and 3rd party base mesh sceneries.

Major new assets available to Gateway artists in X-Plane 12

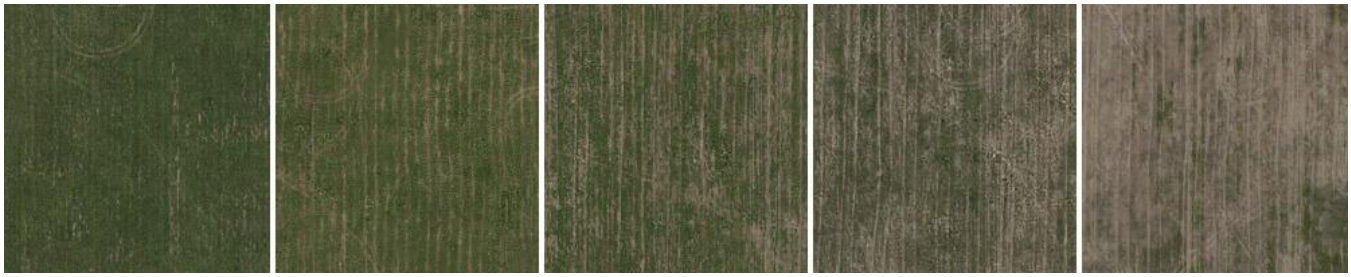
The remainder of this document describes the major new assets and features available to Gateway artists when creating airports for X-Plane 12. This is not an exhaustive list.

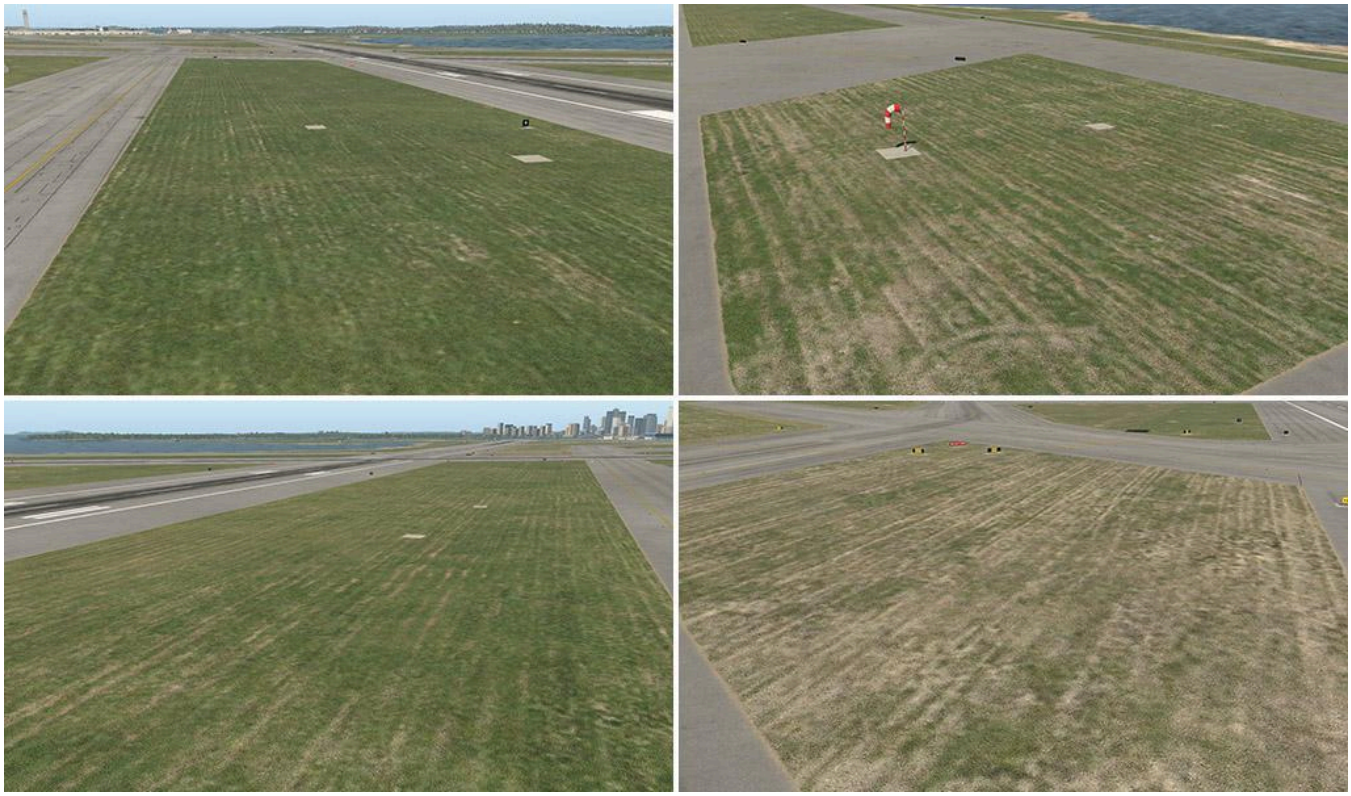
terrain(WED Path: lib/airport/ground)

X-Plane 12 features brand new textures for grass, soil, sand, and desert terrain draped polygons to be used as localized accents only. These are NOT intended to re-texture large or even the whole airport boundary area. As that would severely interfere with 3rd party ortho sceneries

Note: New grass, dirt, gravel, dry-lakebed, and snow textures are also available when creating taxiways (using the taxiway tool).

grass





sand, soil and desert



terrain_FX

(WED Path: lib/airport/ground)

lawn_tracks

The lawn-mower tracks effect comes in different forms. POL (polygon) files have a similar visual effect to those above. This time, however, they are transparent and contain only the lawnmower tracks themselves. These redner on top of any type of underlying terrain and are fine to be used over large areas. Due to being partially transparent these integrate well with orthosceneries..



LIN (line or stripe) files are useful as a natural border between grass with a lawn-mower effect and surrounding areas. Typical uses include grass islands bordering taxiways. There are various strips with corresponding colors of grass.





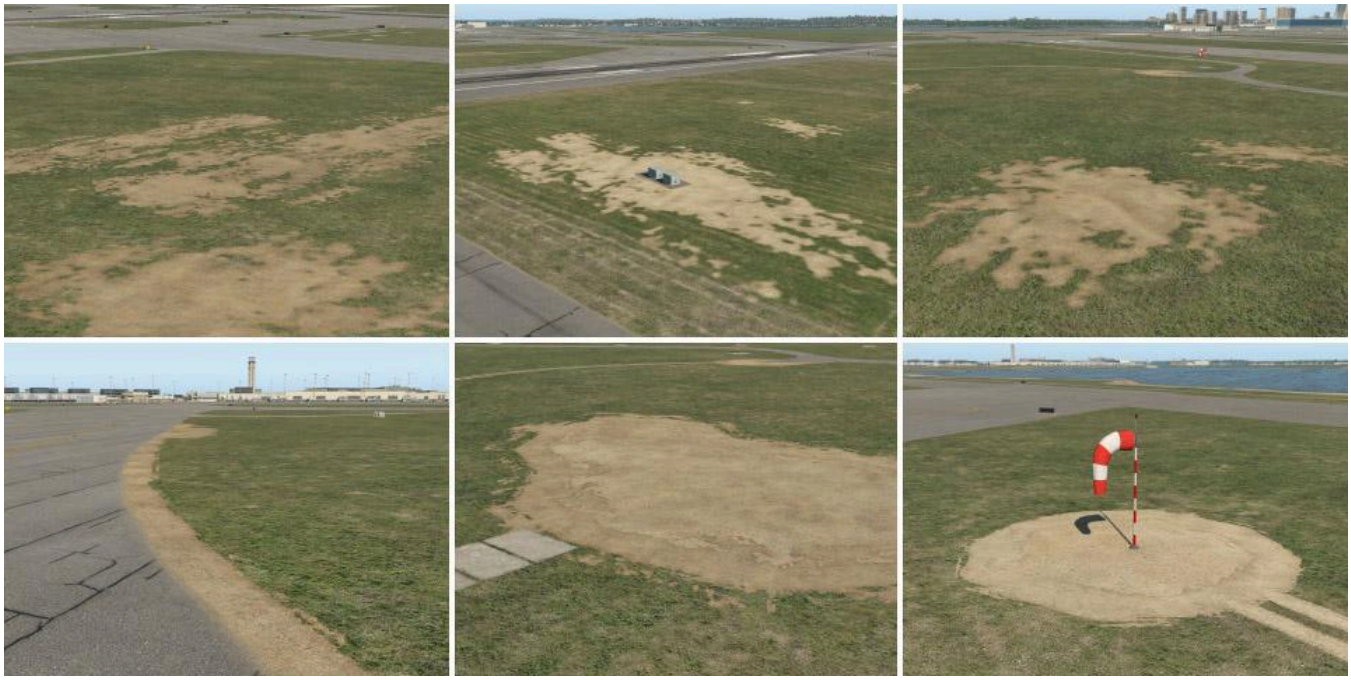

Objects (.OBJs) are provided for spots that have tracks in circular form. These can be placed typically in corners, or under various things in the middle of the grass (like taxi signs).





patches

Patches are available as single objects (.OBJs) with various sizes and shapes, and as lines (.LINs) with various widths. All corresponding colors for the basic terrain polygons are provided – grass, dark grass, dry grass, light and dark sand, and soil. These are useful for modeling various imperfections in basic terrain, spots, broken lawns, and so on. They can also be used along the edge of a taxiway, as an extension of the natural edges (see below).



Paths and strips

Paths and strip lines (.LINs) are available in various widths and materials (concrete, sand, and soil). Paths may be used for both pathways, and (narrow) roads inside the boundary of an airport.



Strips may be used to soften the edges of grass or pavement.



taxi_sign_base

These are paved bases for taxiway signs. Single objects (OBJs) are available in various sizes, and two colors (light and dark). If you can't find the desired size for a certain situation, you may use the line (.LIN) variant. These objects have an exception to the layer system described above. They render above the pavement, so they can be used above taxiways.





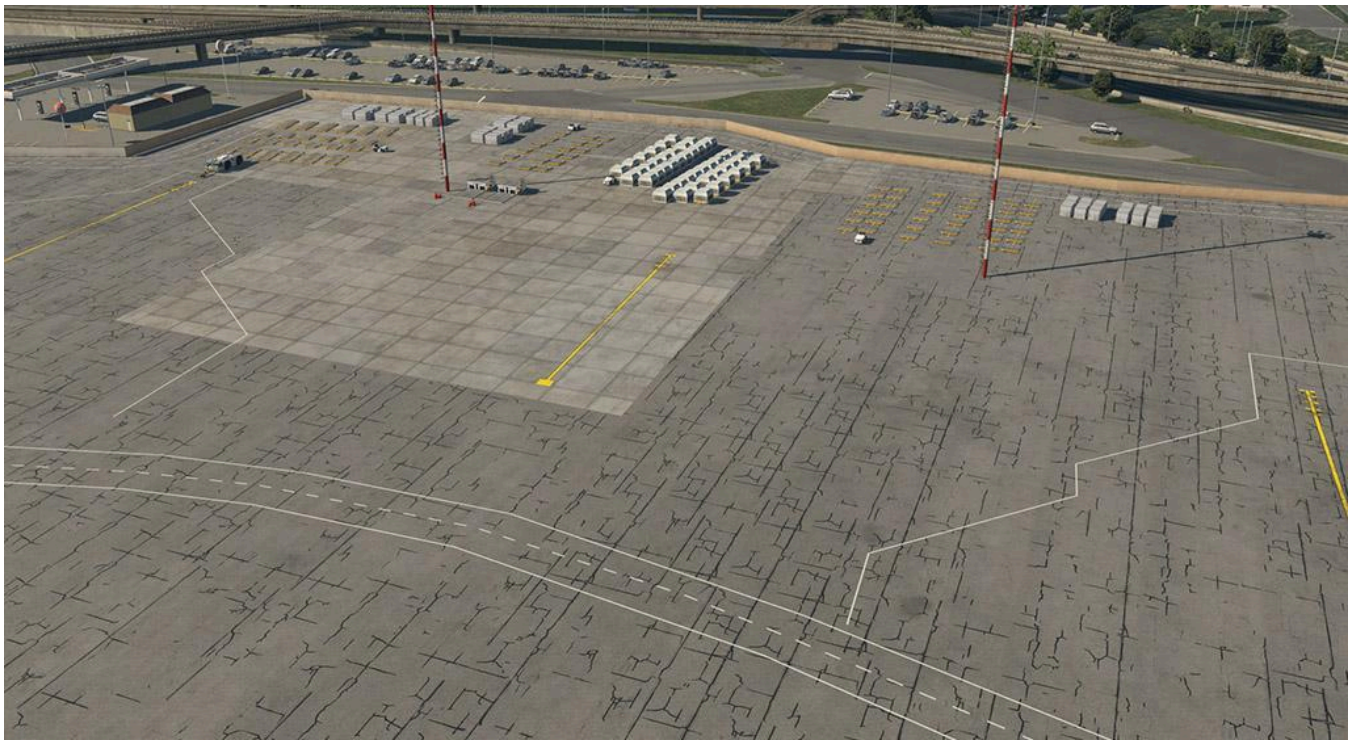


pavement

(WED Path: lib/airport/ground)

X-Plane 12 features brand new shaders, designed particularly for hard airport surfaces. Generally speaking, this technology can make better-looking asphalt and concrete, with less obvious texture repetitions over large areas.

Note: These asphalt and concrete shaders are also available when creating taxiways (using the taxiway tool).



asphalt_

Asphalt surfaces are available in five basic colors (shown here light to dark).



Each color variant is available with four different effects:

1 – plain: this variant is omnidirectional. It is useful for specific situations (typically taxiway shoulders) in conjunction with various effects (see below).

2 – strips: this is probably the most common variant with typically visible strips.

3 – worn: same as (2), but a bit worn. Gaps between strips are sometimes cracked or patched.

4 – patched: highly worn, irregular, and more visible cracks.



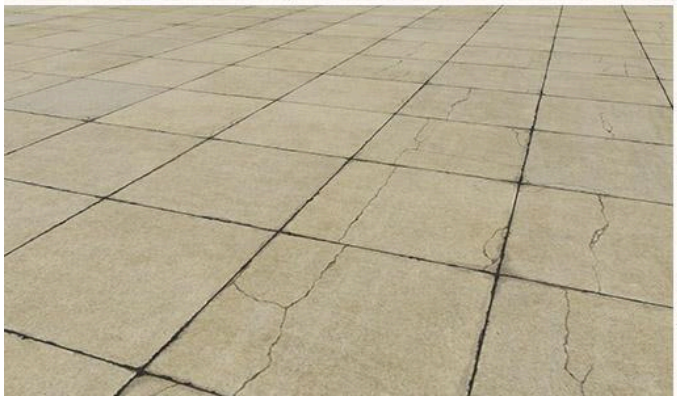
concrete_

Concrete doesn’t have a unified system like asphalt. We have three main colors (gray, light gray, and dark gray) but with slightly different effects for each of them. In addition, we also have the fourth color group which is tinted (red or yellowish). Here are some samples of the variants:










pavement_FX

(WED Path: lib/airport/ground)

This is a group of effects that can be placed on top of hard surfaces.

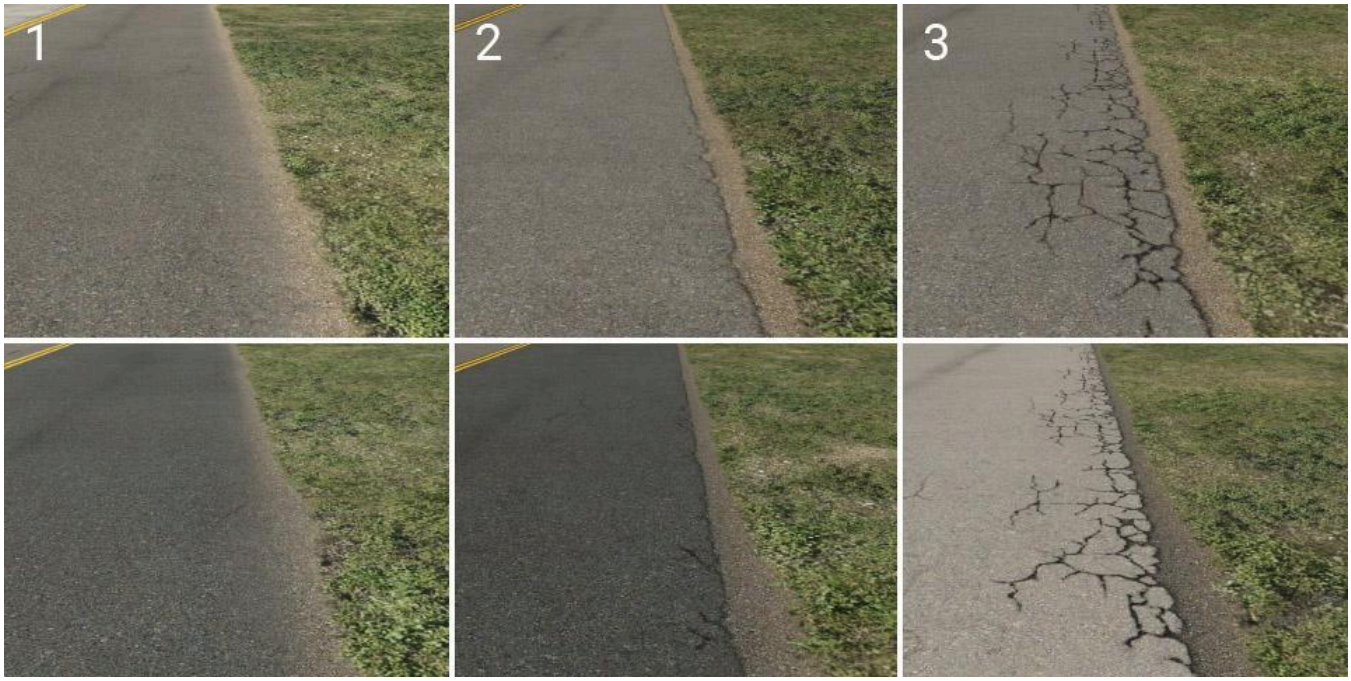
edge_

Edges are probably the assets with the most utility. Edges are dividers of pavement and natural surrounding terrain. They are available in two colors (light and dark) and have three variants:

1 – soft: basic edge suitable for most common situations, particularly for grass.

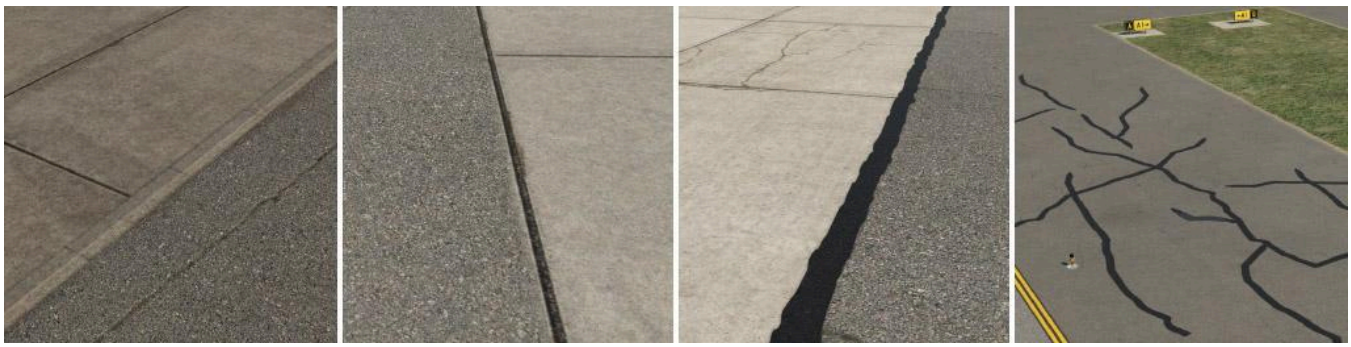
2 – elevated: pavement surface looks slightly elevated, and the edge is a little worn.

3 – cracked: a lot more cracked and worn.



seams

These are dividers of adjacent asphalt or concrete surfaces. A wide patch line can be used for manually painted large-scale cracks, however we recommend you do not repeat this small texture to cover large areas.



taxiway_

Here we have four different types of taxiway effects. Imagine transparent strips, with the very subtle effect of dirt on asphalt. These were designed to be used in conjunction with the plain variant of the asphalt taxiway polygon. These are available in different widths, which should roughly match the usual sizes of shoulders.



taxiway_cracks

Another effect that is useful for taxiway shoulders. Also available in multiple widths.



taxiway_dirt

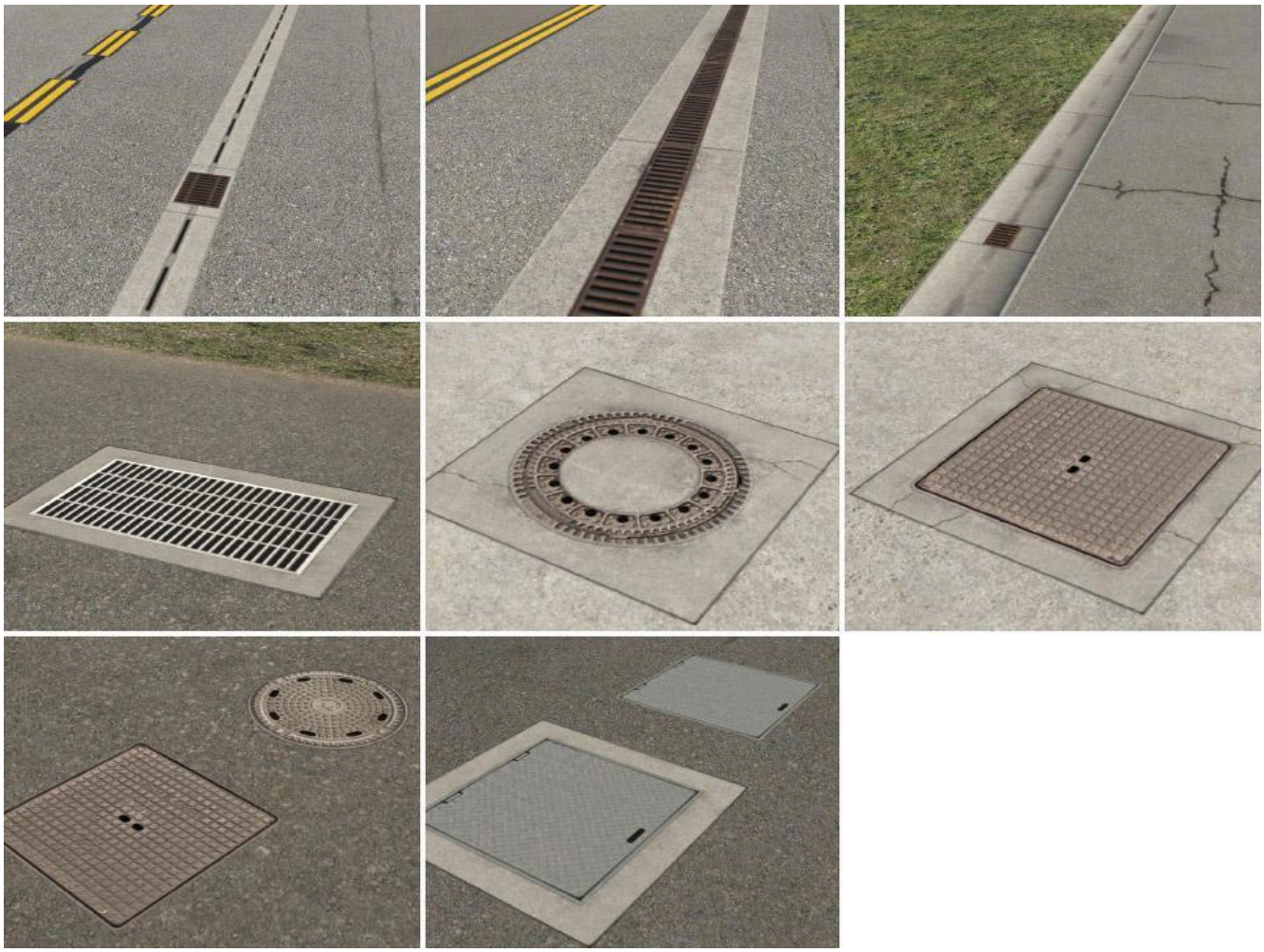
In this group, you can find subtle dirt effects. Some are designed for placement along the centerline, others are for the edge of the taxiway.



drains

These assets are available as objects (.OBJs) and lines (.LINS). They provide various drains and manhole covers.

(Hint: most .LIN effects have end caps. This means the line needs a minimum length to render the chosen assets).



Dynamic jetways

(WED Path: lib/airport/Ramp_Equipment/Jetways)

These are the same jetway facades that shipped with X-Plane 11, with the exception they are now dynamic in X-Plane 12. When the jetway is assembled and placed correctly, it may be docked, and undocked from an aircraft parked at the same gate. This is accomplished via the Ground Handling Window:



Constructing jetways

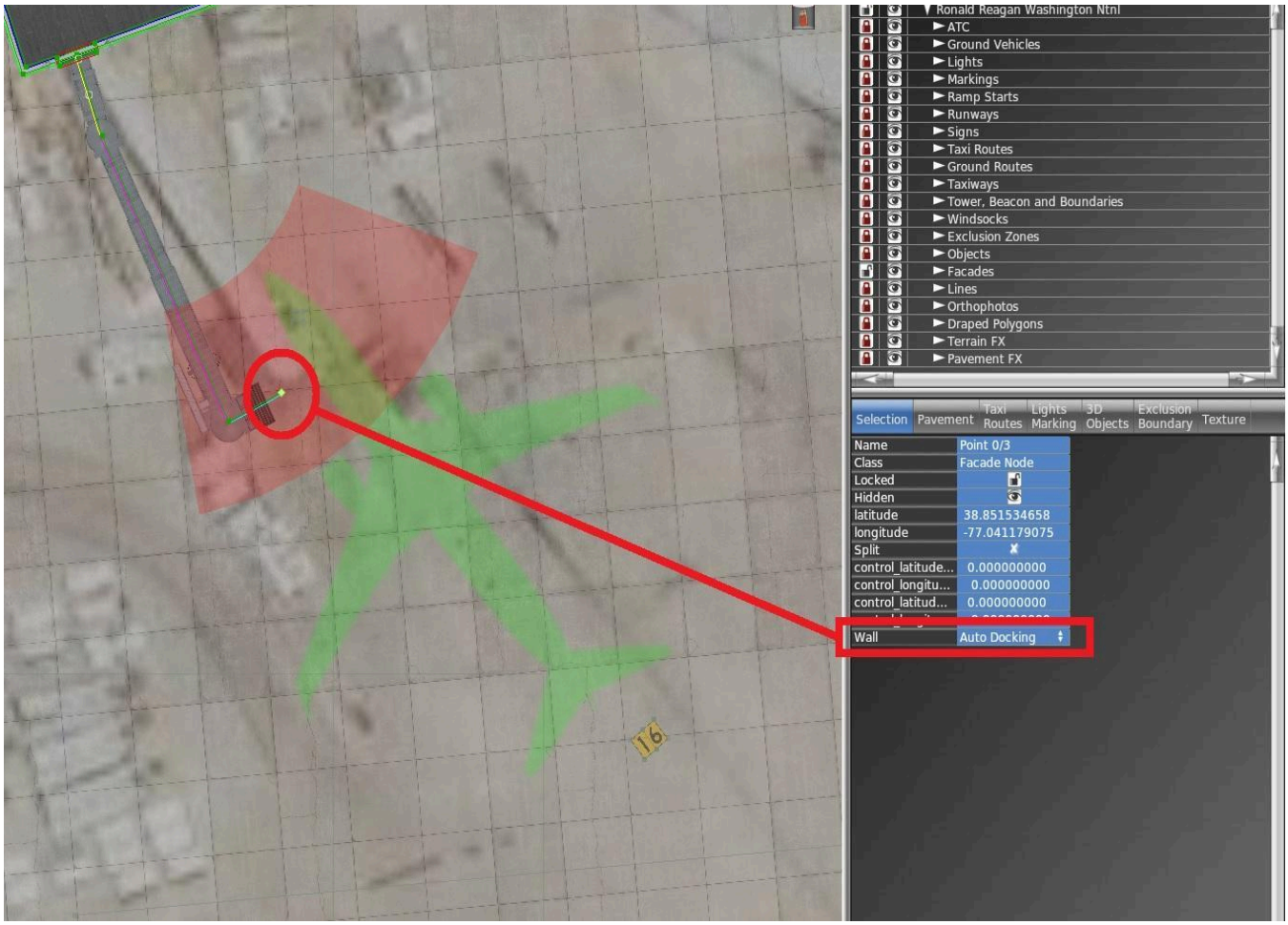
The following (X-Plane 11) article outlines how to construct jetway façade assemblies:
https://developer.x-plane.com/article/customizable-jetways/

In order for a jetway assembly to dock successfully with an aircraft at the gate, the following criteria must be met:

- Jetway must be properly constructed
- Jetway must be enabled for Auto Docking;

  Both above criteria are met when WED displays the red “jetway reach” arcs. When initially placing an new jetway facade, WED will also automatically populate the individual section to form a valid autodocking jetway.

- Range of motion for active jetway must overlap location of aircraft door

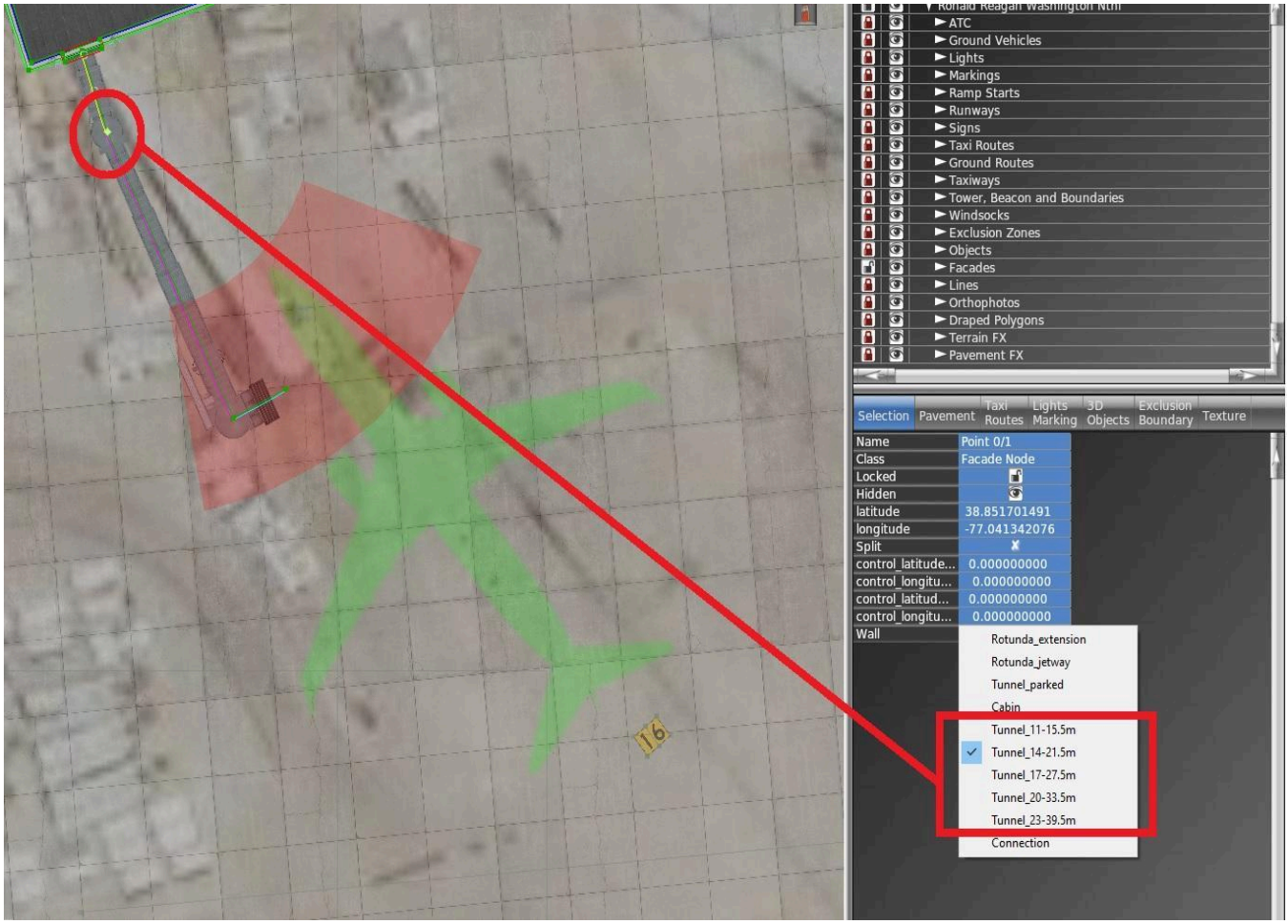


Placing jetway for auto-docking

Select the appropriate tunnel length vertex, such that the red zone of motion intersects with the nearest aircraft door. See illustrations below:

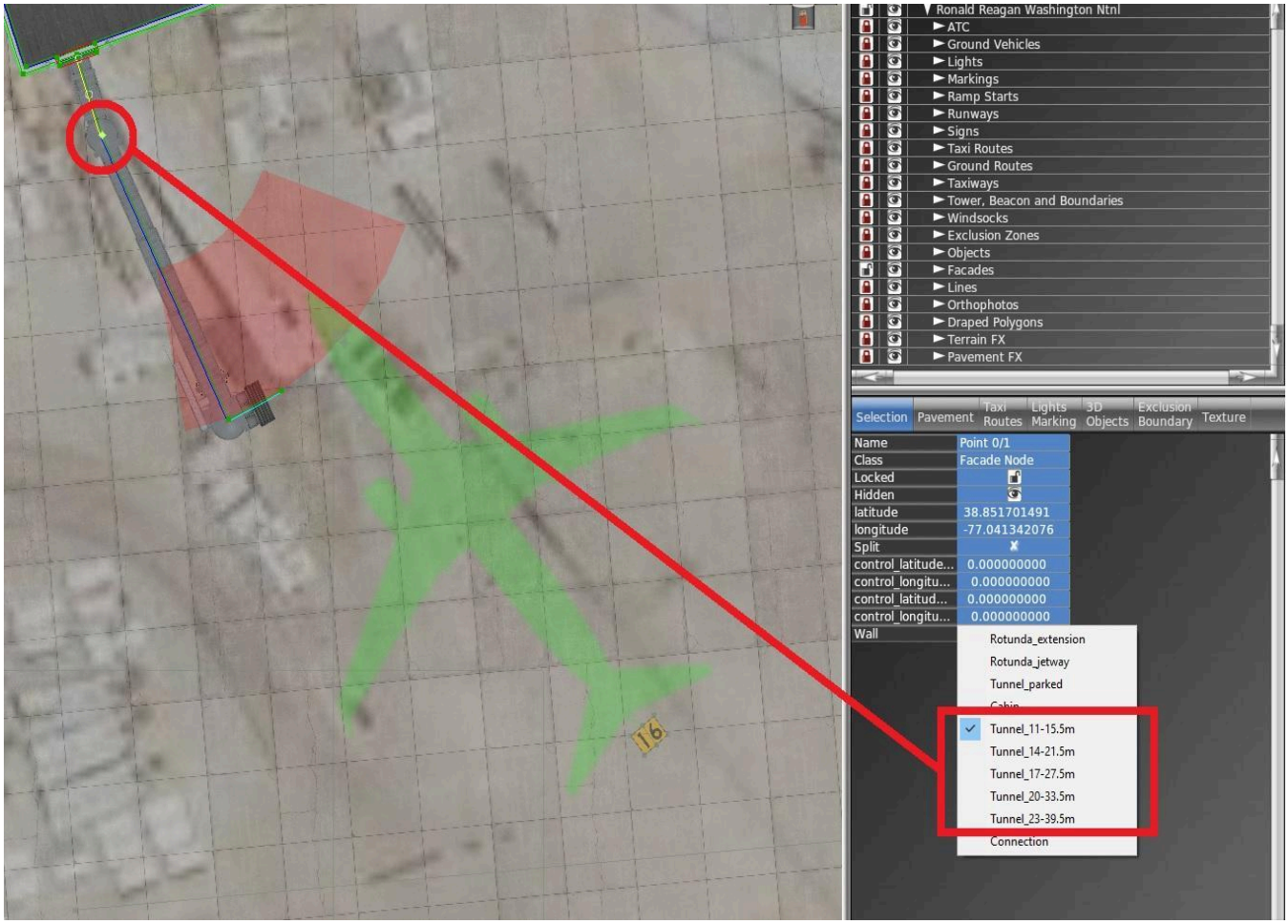
RIGHT

In the example below, the jetway cabin’s range of motion is centered around the location of the aircraft door.



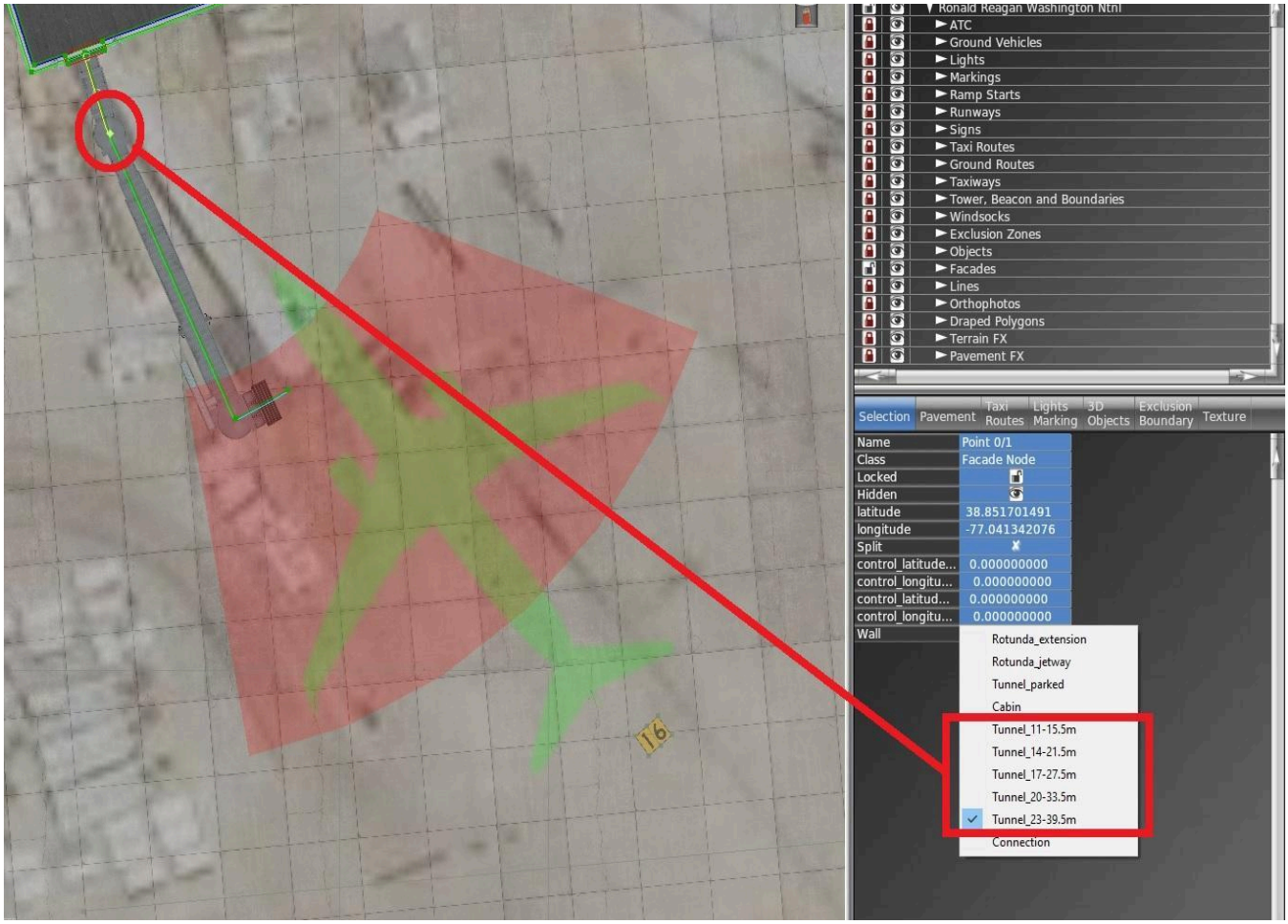
WRONG (tunnel is too short)

In the example below, the jetway cabin’s range of motion does not allow it to dock with the aircraft door.



WRONG (tunnel is too long)

In the example below, the jetway cabin’s range of motion covers an area that is much larger than required.



Multiple jetway clusters

Gates sometimes feature multiple jetway clusters. When this is true, only ONE jetway can be dynamic in X_plane at this time. It's therefore important to set the 'Auto Docking' property for the NEAREST jetway to the aircraft and unset this property for all others at THIS gate.

Also, be sure to place your jetway facades to ensure the dynamic jetway does not clip through any of its static neighbors when in motion.

The example below illustrates a correctly formed jetway cluster:



control_towers

(WED Path: lib/airport/control_towers)

This is a new set of generic control tower objects (.AGPs and .OBJs) that are loosely modeled on real-life towers and designed to provide a variety of styles and dimensions to suit most situations.

There are three model types that are new to X-Plane 12:

- ‘adjustable’ – commercial towers comprising column and cabin, with adjustable heights.
- ‘adjustable with base’ – commercial towers comprising base, column, and cabin, with adjustable heights.
- ‘military’ – fixed height objects (.OBJs) comprising small, medium, and large military-style tower buildings.

Setting tower height

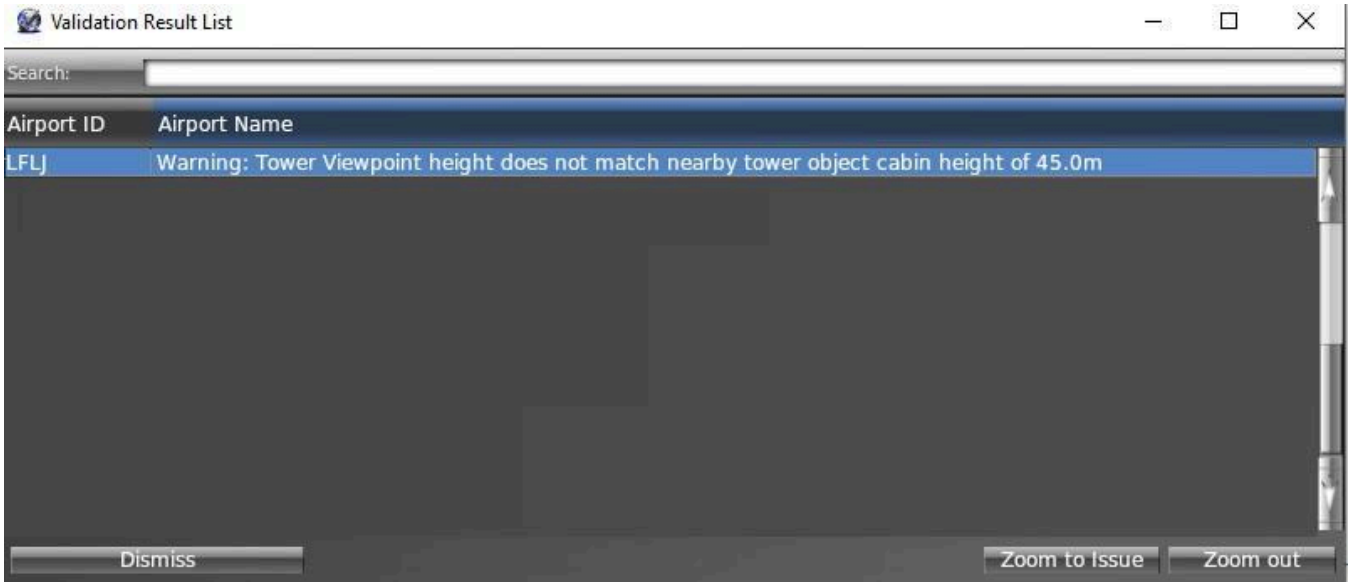
For adjustable-height towers, use the ‘SET AGL’ function to control the height of the model. Models incorporating a base will behave such that the base remains on the ground, irrespective of the selected height.



For an adjustable tower model, the available height options are shown at the bottom of the preview pane. This is expressed as a minimum and maximum height range, with the correct increments to use for this specific model.

Setting tower viewpoint elevation

Each tower model has a unique viewpoint elevation (AGL). When set correctly, this will place the viewpoint inside the tower cabin. To determine the correct height, first place your tower object, and select the desired height. Next, snap the tower viewpoint to the tower object, and run WED validation. The resulting warning message will inform you of the correct elevation to use for the viewpoint.



Tower models (without bases):

(WED Path: lib/airport/control_towers/adjustable)

These models feature an adjustable-height tower, without a fixed base. With the exception of TwrCYL_ColumnAluminium, these models work best as part of facade constructs.

Models:



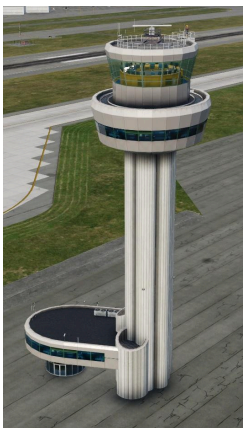
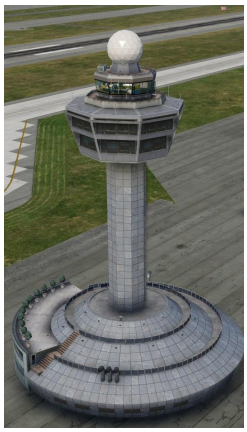
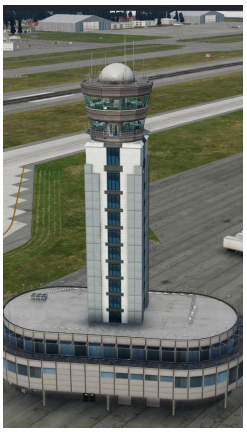
TwrCYL_ColumnAluminum	TwrCYL_ConicTop	TwrCYL_DoubleGreenTop	TwrCYL_ExtrudedTop	TwrELL_DoubleTopElevator
				
TwrOCT_ConcreteRedTop	TwrOCT_LargeTripleTop	TwrOCT_WhiteTopSupports	TwrSQU_GreyWhitePyramidal	TwrSQU_GreyWhiteStraight

Tower models (with bases):

(WED Path: lib/airport/control_towers/adjustable_with_base)

These models feature an adjustable-height tower, with a fixed base. The base remains at ground level irrespective of the chosen height (AGL) of the tower.

Models:

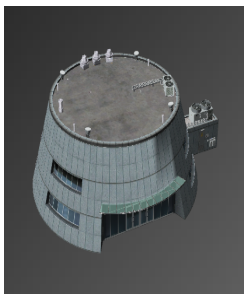
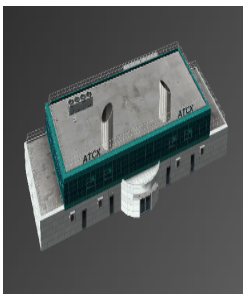
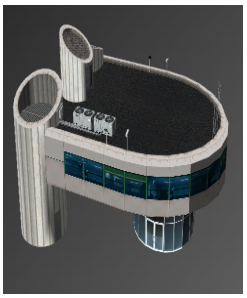
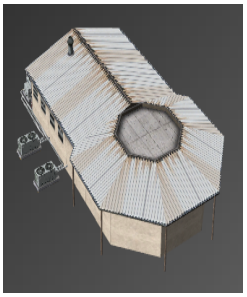
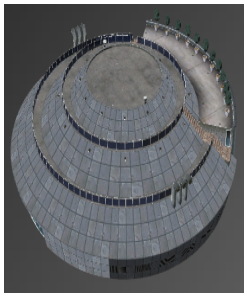
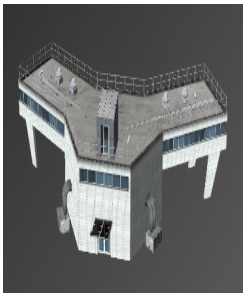
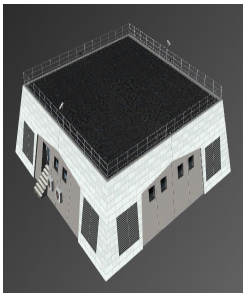
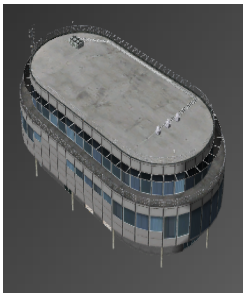
No Base Variant				
TwrCYL_ColumnAluminum	TwrCYL_ConicTop	TwrCYL_DoubleGreenTop	TwrCYL_ExtrudedTop	TwrELL_DoubleTopElevator
				
TwrOCT_ConcreteRedTop	TwrOCT_LargeTripleTop	TwrOCT_WhiteTopSupports	TwrSQU_GreyWhitePyramidal	TwrSQU_GreyWhiteStraight

Tower bases (only):

(WED Path: lib/airport/control_towers/base_buildings)

These models have limited utility but could potentially be useful - usually when combined with façade constructs.

Models:

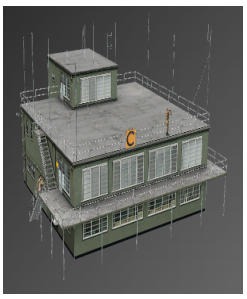
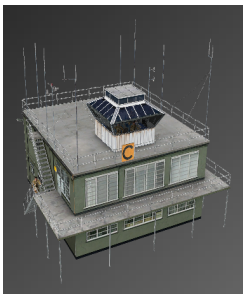
				
	TwrCYL_ConicTop _base	TwrCYL_DoubleGreenTop _base	TwrrCYL_ExtrudedTop _base	TwELL_DoubleTopElevator _base
					
TwrOCT_ConcreteRedTo _base	TwrOCT_LargeTripleTop _base	TwrOCT_WhiteTopSupports _base	TwrSQU_GreyWhitePyramidal _base	TwrSQU_GreyWhiteStraight _base

Tower models (military):

(WED Path: lib/airport/control_towers/military)

This is a set of four fixed height objects that represent typical military control towers.

Models:

			
TwrMIL_GreenBuildingC_BIG_office	TwrMIL_GreenBuildingC_BIG_tower	TwrMIL_GreenBuildingC_MEDIUM	TwrMIL_GreenBuildingC_SMALL

Parking Lots

(WED Path: lib/airport/Common_Elements/parking)

The parking lot polygon provided in the X-Plane 11 library did not produce plausible results, and was frequently substituted with hand-crafted lots consisting of parking-space ".agp" objects, or individually placed lines and static car objects.

X-Plane 12 features a new façade ("Parking_1.fac") specifically designed for the construction of parking lots that are plausible, fast to construct, and efficient to render. There are multiple vertex options that control the appearance of the parking spaces, as shown in the illustration below.

The new parking lot façade should be used wherever large parking lots are found inside airport boundaries, together with the removal of individually placed "static_car" objects, and hand-painted lines.



Hangar Kit

(WED Path: lib/airport/hangars/flat)

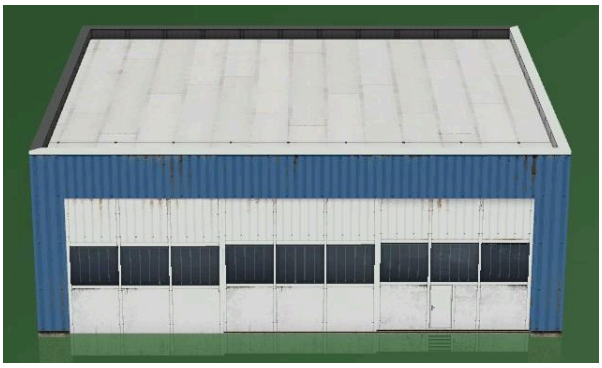


Prior to X-Plane 12, artists had available to them the choice of fixed objects, or the use of Terminal Kit ‘LEGO’ modules, to inject hangars into sceneries. Neither of these methods was ideal, and X-Plane 12 therefore features a dedicated hangar kit, that facilitates plausible hangar constructs that may be tailored to precise dimensions, and approximate styles.

Hangar kit currently allows for the creation of flat-roofed hangars only, and features multiple external, and internal façade choices.

Exterior Hangar Facades

At the time of writing, there are seven exterior façade options, with height options 7m / 9m / 11m / 15m / 17m / 21m / 25m / 29m

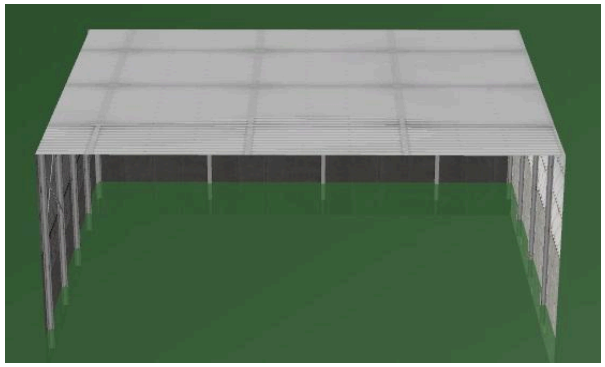
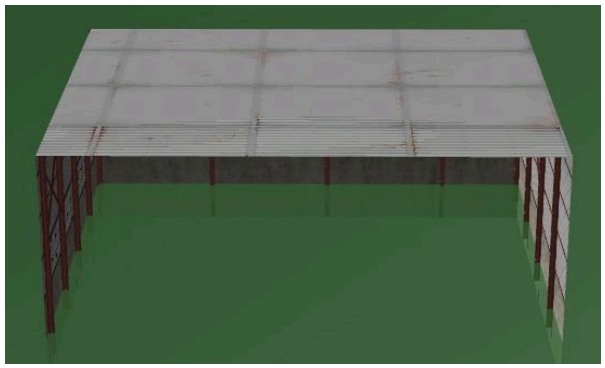
“aluminium_01.fac”	
“beige_01.fac”	
“beige_02.fac”	
“blue_01.fac”	

“blue_02.fac”	
“white_01.fac”	
“white_02.fac”	

Interior Hangar Facades

Interior facades are provided for hangars that feature open, or missing doors, and thus have visible interiors. These are not required for closed hangars. This method provides the opportunity to optimize the rendering overhead for hangar constructs, by eliminating unnecessary interiors.

At the time of writing, there are two interior hangar façades with height options 7m / 9m / 11m / 15m / 17m / 21m / 25m / 29m:

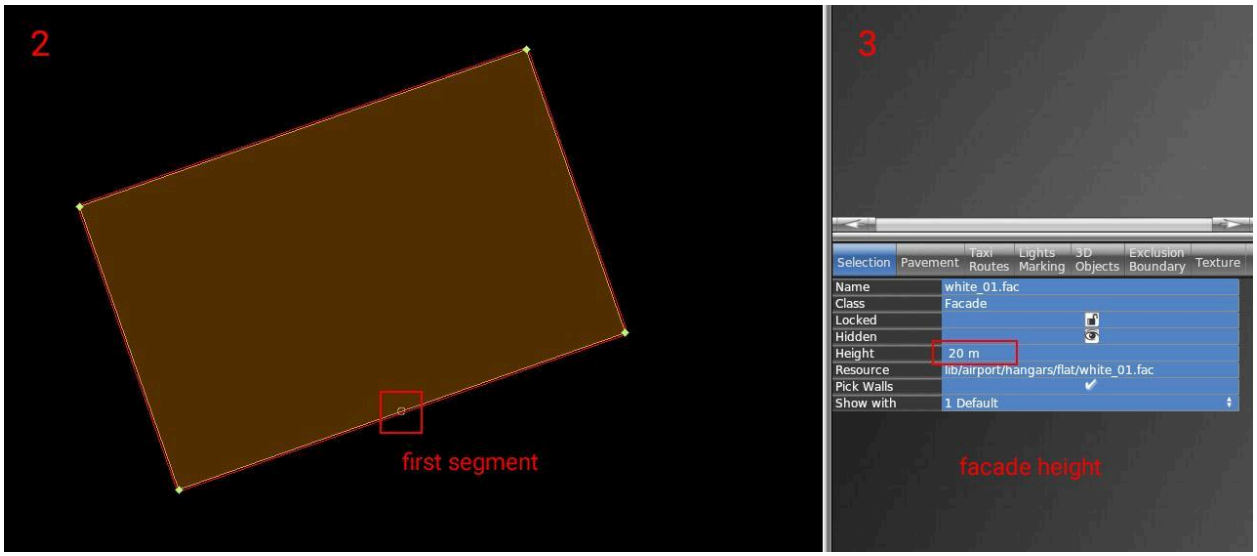
“interior_01.fac”	
“interior_02.fac”	

How to make an open hangar

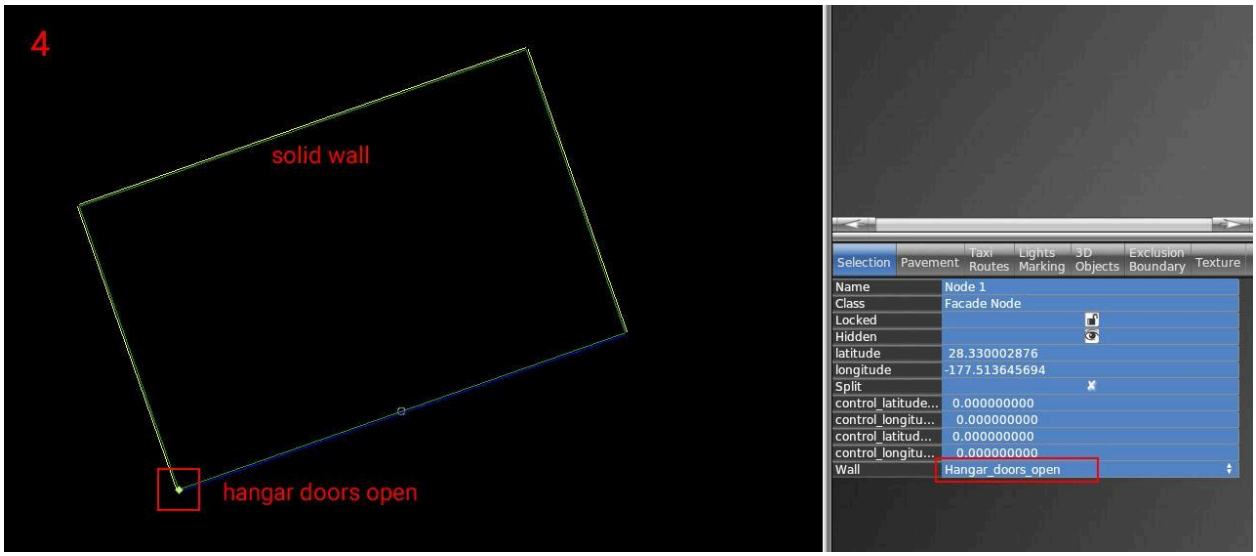
1 - As a first step, you need to put down an exterior facade. You can use any of the facades from **lib/airport/hangars/flat/xxx.fac**. Make sure the shape is orthogonal (CTRL + Q).

2 - Rotate the polygon (CTRL + R) until you get the first segment (marked with a small circle) to the place where the open doors should be. This is very important for future steps (aligning interior facade and doors).

3 - Set the desired height of the hangar (7m / 9m / 11m / 15m / 17m / 21m / 25m / 29m). This is very important because the exact dimensions of openings and related parts may vary based on facade height.



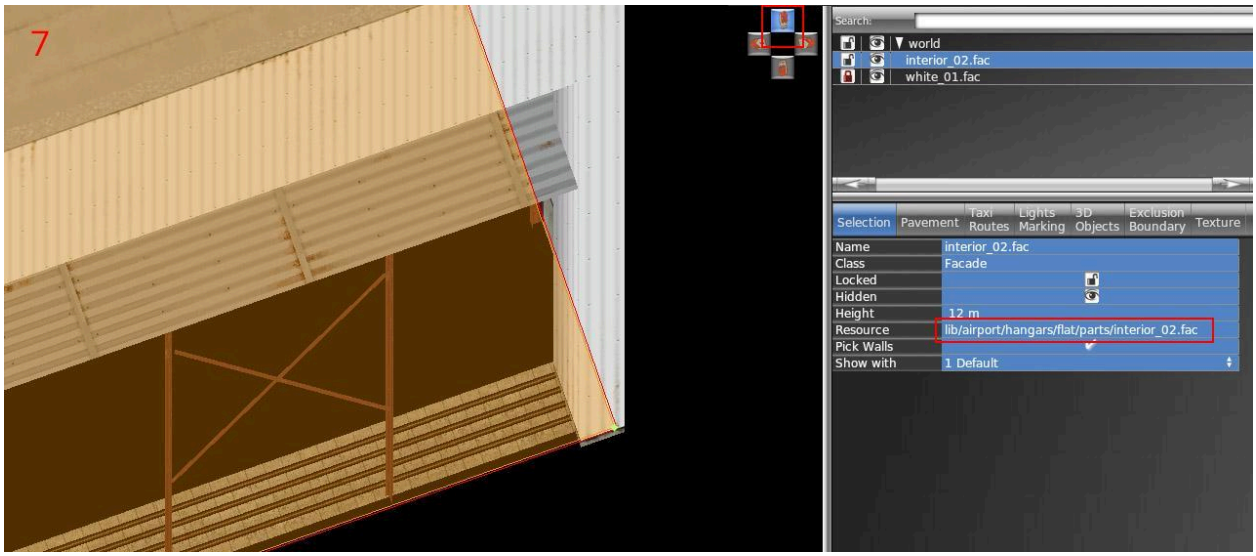
4 - Now set the correct wall types inside vertices. The most important is of course open doors (blue segment). For others, you can use whatever you need (solid walls, windows, etc).



5 - The exterior part is finished. Lock the shape to prevent unwanted edits (turn on the lock icon).

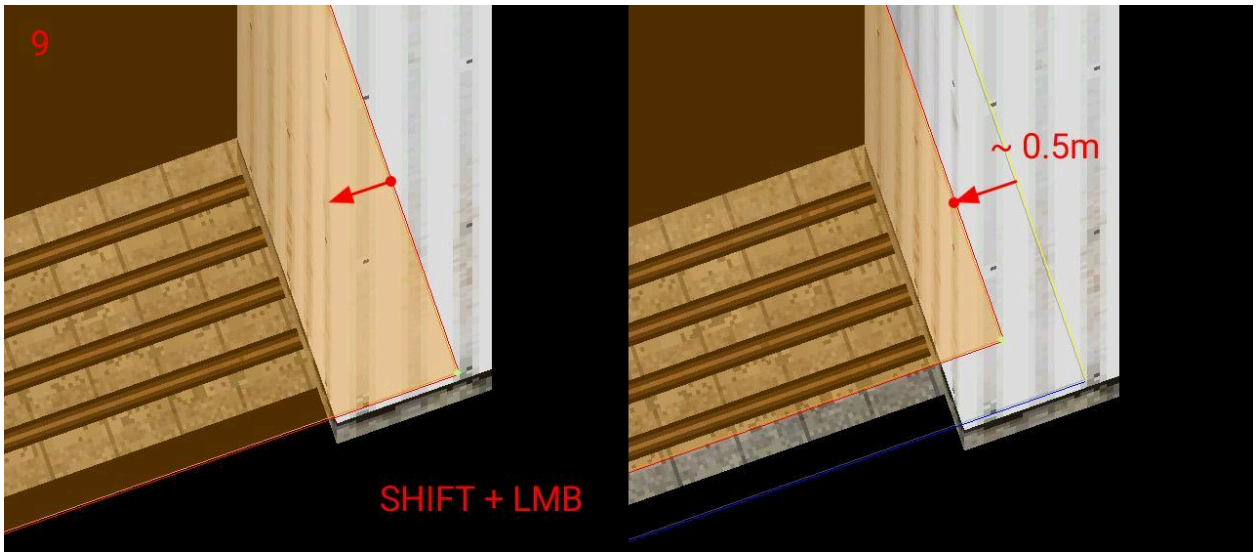
6 - Draw the hangar interior (**lib/airport/hangars/flat/parts/interior_xx.fac**) following the exact shape of the exterior. Use "snap to vertices" function. You should not break the exterior shape because it is locked.

7 - Make sure the WED preview is turned on (menu View / Toggle Preview). Zoom to the hangar corner and use an appropriate isometric view.

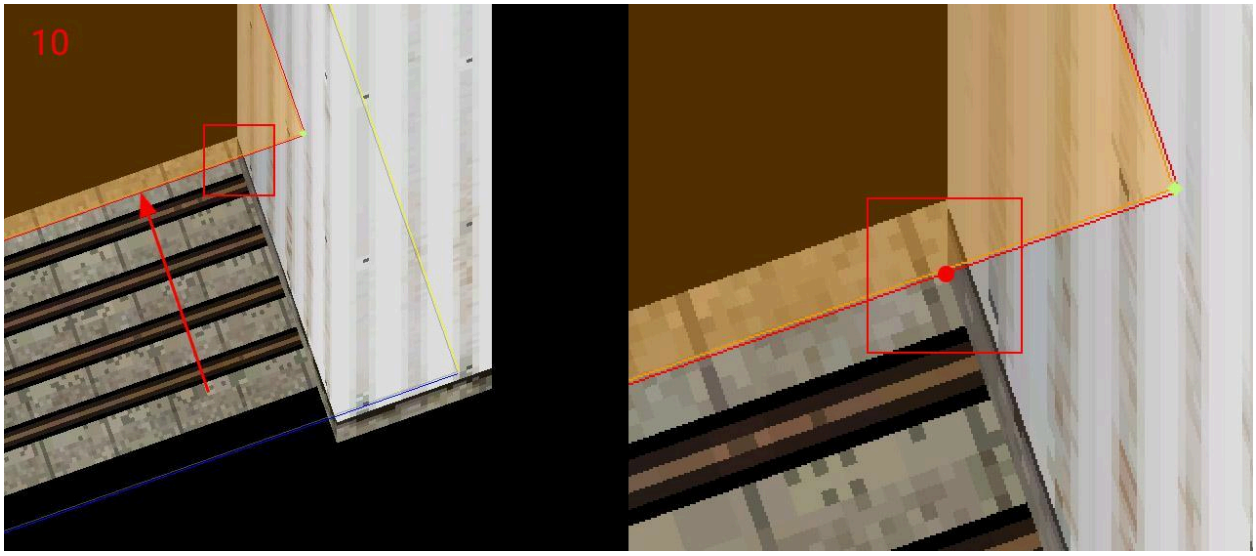


8 - Set the corresponding height of the interior (7, 9, 11, 15, 17, 21, or 29). Note the height is the height of the actual roof. Due to the crown surrounding all roofs, the topmost height of the buildings is one meter taller than the selected interior height.

9 - With SHIFT pressed, drag the polygon toward the inside roughly 0.5 meters.



10 - Drag the segment with open doors towards the inside until it reaches the end of the opening side. Make sure you're dragging only the single polygon segment (two vertices at a time), not the entire interior polygon.



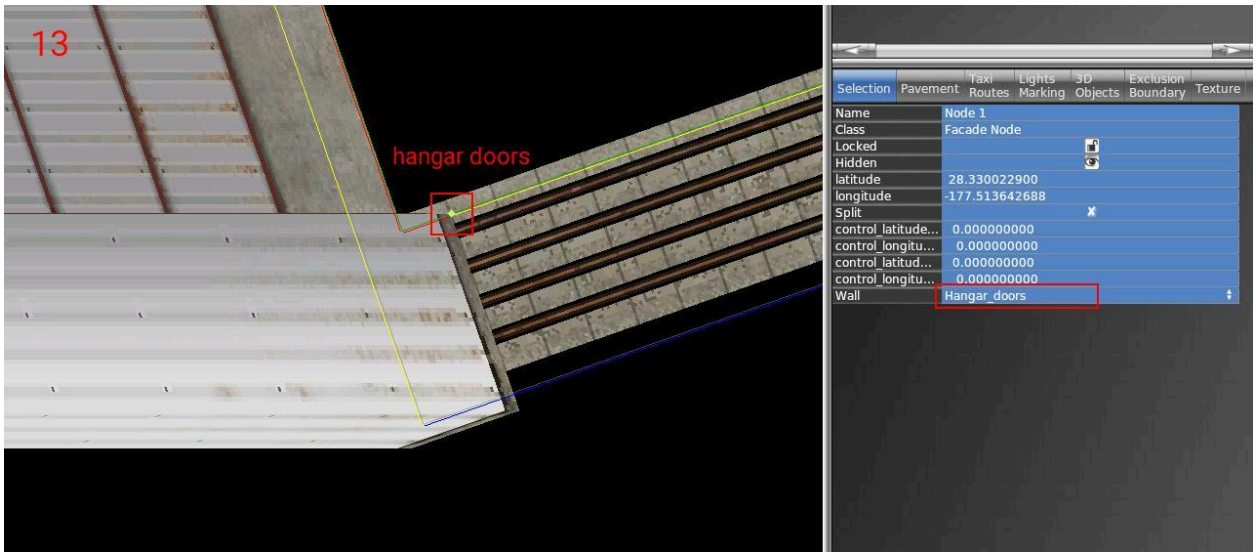
11 - Add a new vertex (using ALT + click) to the intersection of the polygon with the opening. Do the same on the opposite side of the doors (with an appropriate isometric view angle).



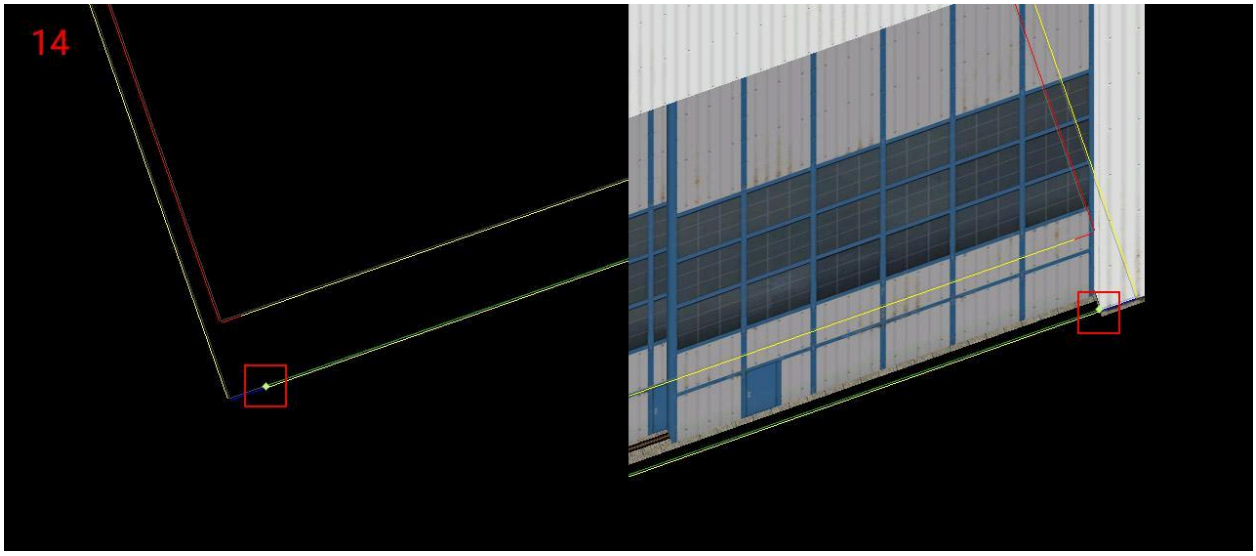
12 - Now rotate polygon segments (Ctrl + R) to get the first segment (white circle) to the corresponding position with the exterior facade polygon. This is very important for the alignment of both facades!



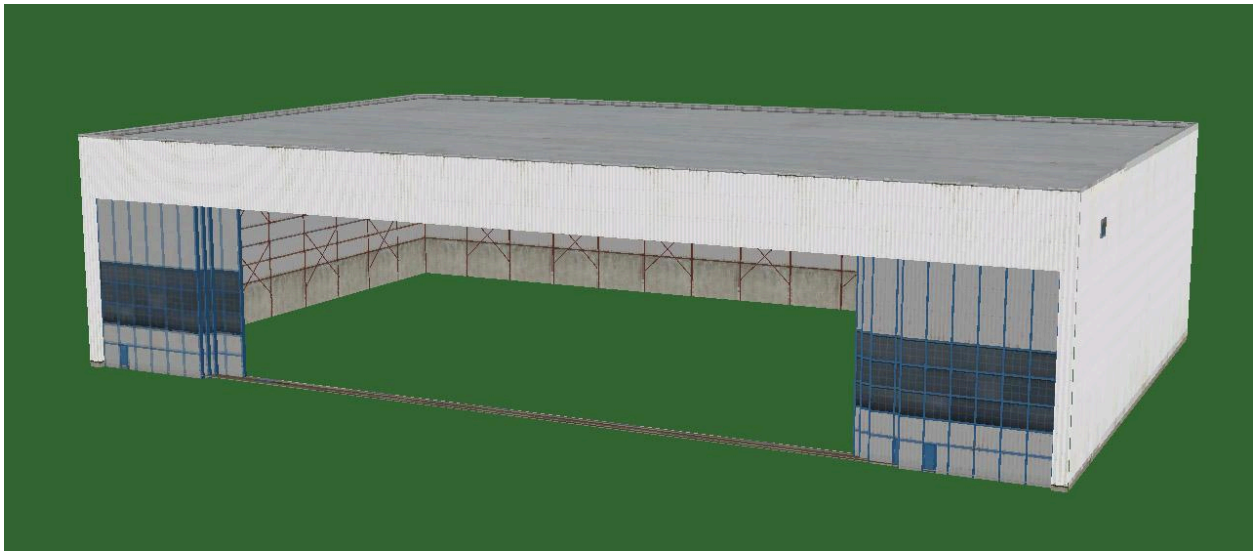
13 - Set the proper wall type to the opening (and other walls eventually). The Interior is done - you can lock the shape.



14 - Choose the door facade you want (**lib/airport/hangars/flat/parts/hangar_door_xx.fac**) and draw a single-segment polygon. Points should be placed exactly on the border of the exterior facade polygon (blue segment). Use the isometric preview to fit both endpoints.



15 - Set the corresponding height of the doors (matching hangar height levels - 8, 10, 12, 16, 18, 22, 26, or 30) and set the wall type to "**Hangar_doors_open**". You are done!



NOTE: All standalone door facades also have a wall with closed doors (Hangar_doors). This makes no sense in combination with the interior of course. But you can use it for making any combination of the exterior facade design and doors. In that case, you don't need to worry about the interior facade but everything else above is still true.

ATC Taxi Routes and Flows

X-Plane 12 features an all new ATC system. Details may be found here:

https://www.x-plane.com/2022/10/new-atc-features-v12

Documentation on the creation of taxi-networks and airport flows can be found here:

https://developer.x-plane.com/article/atc-taxi-route-authoring/

https://developer.x-plane.com/article/atc-flow-authoring-in-wed/

https://developer.x-plane.com/manuals/wed/

It's important to stress that **valid** flows and taxi-networks at Gateway airports are more important than ever. Artists should adhere to the following guidelines and in any case of doubt refrain from specifying flows and let X-plane auto-create these.

- When no flow is present, X-Plane will auto-create flows for all winds based on runway orientations. So for most airports with a single runway and no one-way restrictions, these auto-created flows are likely spot on and there is little need for user-specified flows.

- Test your flows in the simulator. Manually set the weather, and use the ATC system, or ATIS, to see that the runways you expect are in use for both takeoff and landing. Remember to check non-VFR weather as well as wind directions, by setting visibility to 0.

- When no taxi network is present, X-Plane derives one from the visible taxiways and runways, but this is unreliable at best and increases load time. If a runway or parking spot is unreachable, it will be unusable. If no runways or parking are reachable, the airport will be unusable.

- **DO** extend taxi spurs into aprons; both AI and user aircraft will try to reach the closest taxiway from parking and vice-versa, and if the

nearest one happens to be 200m away on the other side of the terminal, they will happily taxi through the terminal. Remember the taxi network is invisible, it doesn't matter whether the real airport has a paint line or not.

- **DO NOT** extend taxi-route spurs to directly connect to individual ramp starts. Leave a gap for the aircraft to maneuver. WED will show in the ATC view an estimation of what the nearest ATC taxi route is and the rough path the aircraft will take for pulling into the ramp start, i.e. parking spot. This allows you to recognize situations where the nearest ATC taxi route is an undesired one - like on the opposite side of a building or terminal. In those cases, short ATC taxi route stubs should be added to offer a better “closest” point the aircraft will take.

- **DO NOT** use one-way taxi routes near ramp starts. The ATC system will NOT distinguish between a route leading toward (i.e. to be used for arrivals) vs leading away (to be used for departures). So it will either upon arrival or departure select the wrong one and the aircraft will subsequently ignore ALL ATC taxi routes and make a beeline to/from the runway.

- Ensure your active taxi-route segments match with the visible hold-short lines. These strongly affect handoff to tower, and if the paint line is too far ahead of the actual active zone, a real person flying the sim will stop and wait for an instruction that will never arrive. The ATC system sees the active zone, not the paint.

- **DO NOT** split taxi network corners into small segments to create curves. The aircraft will taxi smoothly anyway, and the additional segments just add load time, and can sometimes cause problems like planes getting stuck, or taxying in circles around a point etc.

- **DO** name your taxiways, because the names are used in ATC taxi instructions. Use short names like “A1’ and never use full names like “Apron” - as voice ATC will always spell taxiway names phonetically, i.e. Alpha-Papa-Romeo-Oscar-November is the mentioned example. In such cases, leave the name blank.

- Ensure the airport has adequate numbers and types of ramp starts so arriving AI aircraft have places to park. This is likely to affect third-party AI systems too.

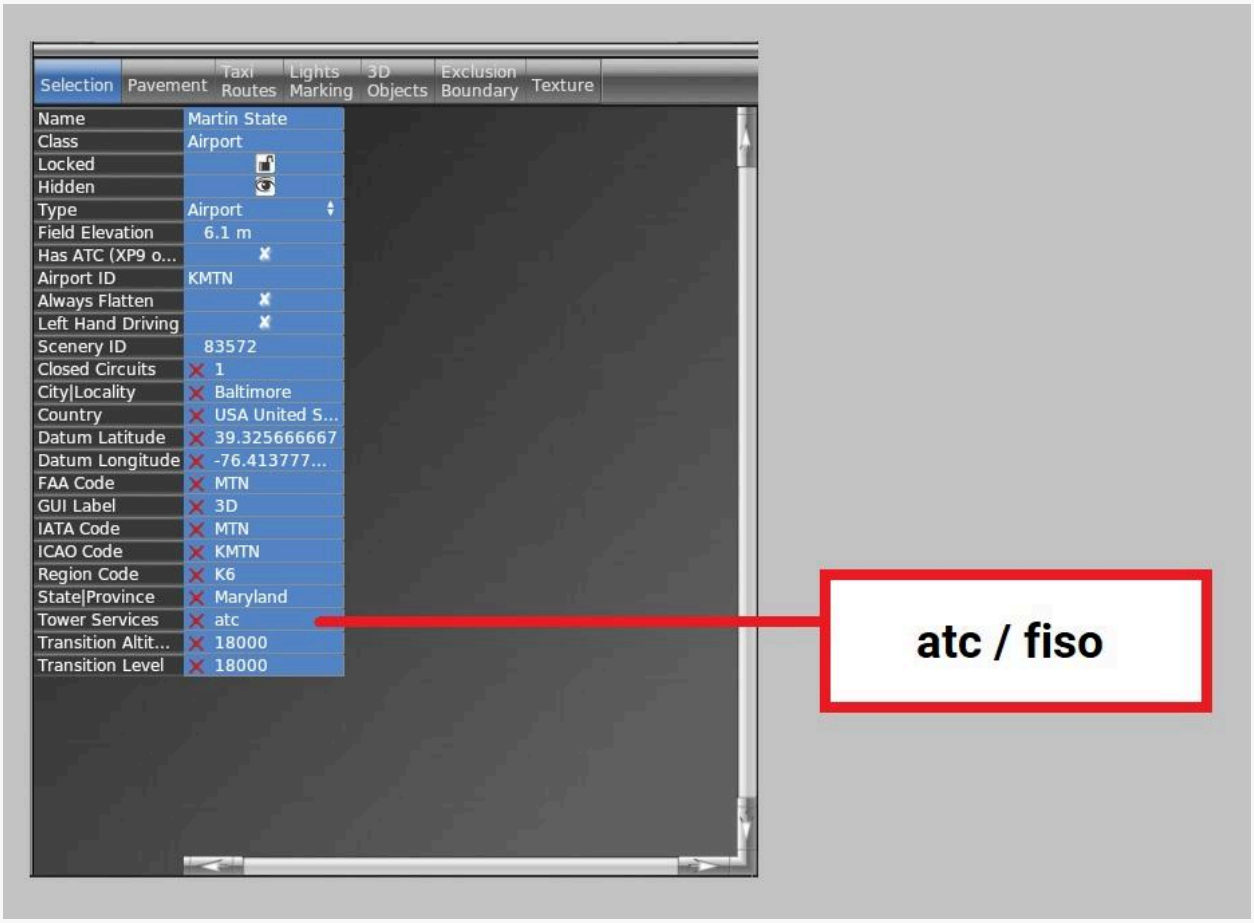
Radio frequency handling

- Previously, Gateway airport frequencies were shown in the map verbatim. Now they are checked against known controller data (when present), and the correct values substituted, so that the information in the map is correct and useful.

- If you specify a tower frequency, and no known tower actually exists, one with a standard cylindrical airspace will be created on the given frequency. If that frequency is available (after examining all known local controller frequencies) it will be used. If the frequency is not available, then a free one will be automatically allocated instead.

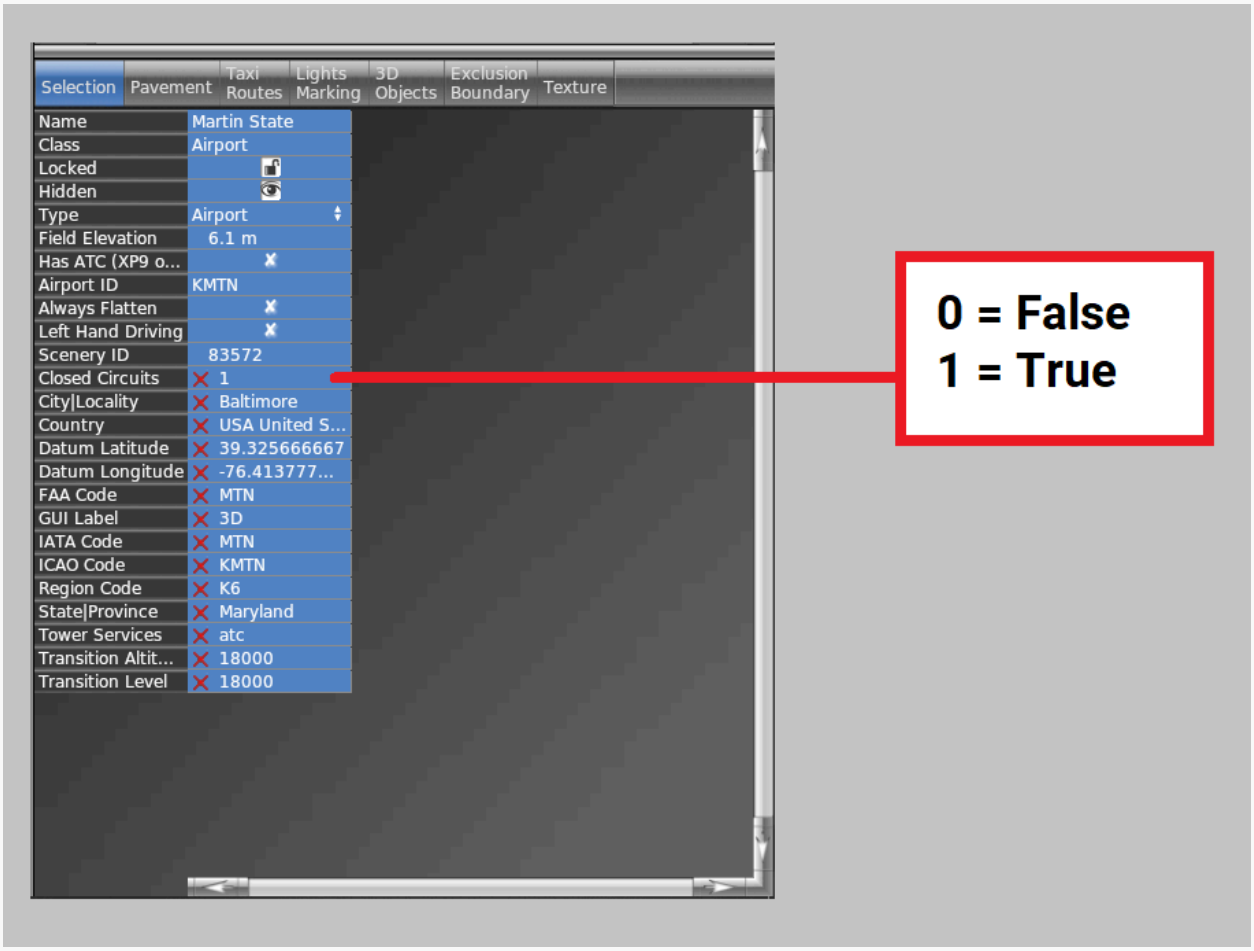
- Transition altitude values specified in airport metadata are now used by the ATC system. They are optional, and a default value will be taken from the region if it is not present.

- Airport metadata can specify whether the airport's tower provides a full ATC controlled service, or a basic FISO service. This completely changes the behavior of ATC at the airport. If uncertain what these operation types mean in any given region - do NOT specify this meta tag at all, let X-Plane make a plausible auto-determination.



- By default, all airports will offer circuits except the very largest. You can override this behavior with the new meta data tag “Closed Circuits”. Large airports should have this tag defined and set to “0”, so the tower will never instruct departing aircraft, but rather hand off to departure and the area controller will vector aircraft around for a new approach as needed. For small airfields with a single runway or unpaved airstrips there is little point in specifying that ATC should

offer closed circuit traffic - as X-Plane will reliably auto-determine this at those airports.

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Road network editing

A separate document providing guidelines for road networks at Gateway airports is available here:

https://forums.x-plane.org/index.php?/forums/topic/284910-road-editing-for-the-scenery-gateway/