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Close Combat series of games

5CC - The Manual

(a description of my CC map-editor for PC & Mac)

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Special thanks for beta-testing to Jim Martin, Francisco Arias "Nembo", Darren Tejszerski "tejszd", "Q.M", Shane Cameron "Southern_land" and Keith Postuchow "kwp" and all the others not mentioned here!

The 5CC map editor is not endorsed or promoted by the original game manufacturers. You will use this program entirely at your own risk. I recommend that you work only on backups of your datas and that you save your work often!

New additions to program and/or manual are indicated by a blue bar on the righth side of the texts.

Installation and System Requirements

To install 5CC just copy the program file to your HD. I recommend to create a separate folder for 5CC, and to store the accompanying files (manual, readmes, terrain elements files) in the same folder.

The PC version of 5CC should work under W2K, WinXP, Vista and W7. Support of W95-W98 is dropped. The Mac version of 5CC is a carbonized application and should work under MacOS-X 10.2.8 or newer (PPC processor) and under MacOS 8.5 – 9.2.2 (requires CarbonLib 1.6 or newer). A separate Mach-O build to support Intel-Macs (requiring MacOS-X 10.3.9 or newer) is also included. **You must ensure to give 5CC enough (more than 100 MB) RAM in MacOS Classic's Finder! Otherwise a system breakdown with loss of data might occur!**

5CC is storing the entire map datas in RAM, so you will need a large amount of RAM to make 5CC working with large maps. Some example calculations:

for a 20x20 deployment tile map (= 2400x2400 pixels) you will need:

basic object code installation:	5000 KB
internal map data table:	450 KB
internal LOS tables:	2500 KB
background graphic:	11250 KB
additional interior graphic:	11250 KB
additional shadow/trunk layers:	33750 KB
OVM and MMM graphics:	1500 KB
assuming 50 roof entries:	7800 KB

63600 KB

for a 40x40 standard RtB/CCM map (= 4800x4800 pixels) you will need drastically more:

basic object code installation:	5000 KB
internal map data table:	1800 KB
internal LOS tables:	10000 KB
background graphic:	45000 KB
additional interior graphic:	45000 KB
additional shadow/trunk layers:	135000 KB
OVM and MMM graphics:	1500 KB
assuming 50 roof entries:	7800 KB

251100 KB

For a CCM-Big map you will need approxm. 500 - 1040 MB RAM! Keep this in mind when creating/editing such large maps. Use my tool CC2Tools (Mac & PC) to split/join maps if you run into memory troubles. Memory exceeding is not handled by 5CC and a program crash might cause loss of data! Please make backups of your work! And with all such modding software: you are using 5CC entirely at your own risk!

Introduction

5CC is intended to modify map datas of the CloseCombat series of computer games, ranging from CC2 to the latest CCM version. "Close Combat - A Bridge Too Far" (abbreviated CC2, ABTF, CC2-ABTF) was the second game of the CloseCombat-series created by Atomic and presented by Microsoft to the Mac- and PC-community in 1997. CC2 was the last game of this series for the MacOS. The series was then continued by SSI, UbiSoft, Destineer and MatrixGames for PCs only (up to day CC3, CC4, CC5, CCM (only public release is CCM version 3.1), "The Road to Baghdad" released in January 2004 (abbreviated: RtB), an updated CCM released to the USMC in summer 2005, CCRAFRegt released to UK forces in Feb. 2006, CC-CrossOfIron (a CC3-re-release) and CC-ModernTactics (a public CCM-re-release) in 2007, CC-WachtAmRhein (a CC4-re-release) in 2008, CC-TheLongestDay (a CC5-re-release) in 2009 and CC-LastStandArnhem in 2010).

During the years since 1997 many people made excellent works on unveiling the secrets of Close Combat map making. All games of the Close Combat series store their map datas and map graphical datas in several files. File formats differ slightly between CC2 and the later releases, also the file names and the storing location differs. First of all you must know what is stored in what kind of file:

- **map data file:** contains numerical description of the map's size and its terrain structure (terrain type and height). In CC3 and newer it is also stored here the name of the map and further map descriptions (general terrain type, display color in the user interface). The file format is plain ASCII text, with TAB-separated columns and CR-delimited lines in CC2 respectively CR+LF-delimited lines in CC3 or newer.
- **map los file:** contains line-of-sight informations for the entire map area. Identical file format throughout the whole CC series.
- **background graphics file:** stores the entire background of the map in 16-bit uncompressed RGB-format similiar to TARGA-graphics format. The game will use this graphic as a battleground.
- **overview graphics file:** stores a shrunked overview of the background graphics in the same format as the background graphics file. The game might uses this graphic in the deployment screen and perhaps when zooming out during battle.
- **monitoring graphics file:** stores a drastically shrunked minimap of the background graphics in the same format as the background graphics file. The game uses this graphic during battle for monitoring where the actual screen cutout is located on the map and as a "map icon" during map selection.
- **roof file:** stores multiple pairs of exterior and interior views of buildings together with coordinates informations. The interior view is pasted over the background graphic when a soldier enters a building, and the exterior view is pasted over the background when all soldiers have left a building during battle.
- **bridge file:** stores the graphic of the blown bridge and can contain in addition a graphic of the repaired bridge (Bailey Bridge). This kind of file is only available in CC2. During gameplay the bridge of your map can be blown by Axis troops. CC2 will do this by issuing a massive explosion, pasting shellholes over the bridge. When the game continues, some or all of these shellholes might disappear, because CC2's amount of displayable shellholes is limited. So the makers of CC2 needed this additional graphic to make the bridge blow effect visible throughout the whole battle. Repaired bridge graphic will be only pasted over the background graphic when XXX Corps reaches the bridge in Operation/Campaign play. This type of file is nearly identical with a CC2 roof file. New for CC-LSA in 2010: the "bridge blown" and "bridge repaired" graphics are stored in the file "Bridges.azp", which can be un- and repacked with the latest version of "RtBTool".

- **BTD file/Scenario file:** these files store informations about victory locations, forces setup and map connections. Such files cannot be edited with 5CC. Use the latest version of my tool "BED9 / BTD-Editor-2009" instead.

The graphic files in CC2 use the Macintosh/Motorola byte order BIG Endian, the graphic files of CC3 and newer releases use the Intel byte order LITTLE Endian. Except for the roof file their file formats are mainly identical. The roof file of CC3 is much more complex than it is in CC2. But the differences between these file formats are not so great to prevent tool makers like Gerry Shaw "Tin Tin", Cpl_Filth, Chris Ellens (and at last me) from making map editors for the whole CC series. The following table shows the main differences:

	CC2	CC3 and newer
folder to store map data file	../Data/Maps	../Maps
folder to store los file	../Data/Maps	../Maps
folder to store graphics files	../Graphics/Maps	../Maps
name of map data file	Map###	*.txt
map data file format	ASCII, TAB-seperated, CR-delimited lines	ASCII, TAB-seperated, CR+LF-delimited lines
name of los file	Map###.los	*.los
name of background graphics file	BGMap###	*.bgm
name of overview graphics file	OVMap###	*.ovm
name of monitoring graphics file	MMMap###	*.mmm
name of roof graphics file	Roof###	*.rfm
name of bridge graphics file	Bridg###	not available; since CC:LSA: separate file "Bridges.azp"
byte order of the graphics files	BIG Endian	LITTLE Endian

Short guide to map making

This map editor is not intended to generate/manipulate graphics. To do this please use your favorite graphics editor. Remember that all the CC graphics are stored in 16-bit! In the past the TARGA graphics format was used as the "de facto" standard for storing graphics to be imported by tools to manipulate CC files. 5CC will follow this rule. It can import external graphics in 16-bit uncompressed TARGA. In some cases it might be able to import further graphics formats:

- via the clipboard: 16-bit or better,
- on PC: depending on your operating system, 5CC should at least be able to import BMP-graphics,
- on MAC: depending on your MacOS version, 5CC should be able to import PNG-graphics (10.4 or newer) and perhaps PICT-graphics (MacOS 8.5 – 9.2).
- drag and drop of graphics is not supported!
- when importing external graphic files, 5CC will automatically convert the graphics to 16-bit (that is the reason why the import of graphics takes so much time, calculating each pixel).

The export of graphics depends again on your operating system. Minimum is exporting as 16-bit uncompressed TARGA.

Before editing a map, you must know what a "CC map" really is. A CC map is a non-repeating rectangle of limited size. The size limitation depends on the game version:

Version	max. map size...		
	...in pixel	...in deployment tiles	...in elevation tiles
CC2 (MAC & PC)	2280x2280	19x19	57x57
CC3	2880x2880 ¹	24x24	72x72
CC4	3000x3000 ²	25x25	75x75
CC5	3840x3840 ³	32x32	96x96
RtB	4800x4800	40x40	120x120
CCM / CCMT (standard map)	4800x4800	40x40	120x120
CCM / CCMT (BIG map)	19200x4800	160x40	480x120
CoI	2880x2880	24x24	72x72
CC:WaR	3840x3840	32x32	96x96
CC:TLD / CC:LSA	4800x4800	40x40	120x120
Future releases	19200x19200	160x160	480x480

Since v1.06 5CC is adjusting the amount of needed RAM according to the size of the loaded/created map. That means that on low-RAM computers 5CC is now able to work with small maps, and on the other hand 5CC is hypothetical able to load maps even beyond the actually expected max. size of 160x160 deployment tiles. 5CC's internal limit is the sequentially 32-bit numbering of the elevation tiles. 5CC uses internally signed long integers, so it is limited in fact to $2^{31}=2147483648$ elevation tiles = 15446x15446 deployment tiles (would be a RAM busting monster map).

For unit setup and for controlling the battle's progress a map is divided into tiles. These tiles are called inside the original CC2 files "Mega-Tiles". Each Mega-Tile has a size of 120x120 pixels. Because these tiles are used to define the deployment zones on battle start, we commonly refer to them as "deployment tiles". LOS-files (the files containing the line-of-sight informations) use the same logical tiling. A "LOS tile" is identical with a "deployment tile". If you know the map's size in deployment tiles, you can calculate the size of its background graphic (and vice versa).

The map data file describes the terrain type and terrain elevation in smaller tiles. Each line containing such datas in this file is numbered sequentially (starting from 0). Each line contains 16 columns of terrain type values and 16 columns of terrain height values (in case of CC2: only one column of height definition for the entire line). Because CC2 uses only one height for the entire line, we commonly refer to this kind of tile as an "elevation tile". An elevation tile has the size of 40x40 pixels. It is divided into 16 smaller "terrain tiles" of the size 10x10 pixels. The terrain tiles inside of each elevation tile are counted from 0 to 15, starting in the upper left edge of the elevation tile and going left-to-right, top-to-bottom.

¹ In late 2006 Demiurg published a patch to enable 4800x4800 maps in CC3, as used by his VoT-Mod.

² david_Michael reported in 2006 that max. CC4 map size is 2880x2880 pixels like in CC3!

³ In a thread of Feb. 2006 at CSO-forum Buck_Compton reported the possible map size of 3840x3840 pixels for CC5. Before his report we all assumed that 3600x3600 is the allowed maximum.

The sequence of the elevation tiles starts also in the upper left edge of the map, but their numbering goes from left-to-right and top-to-bottom without respecting the deployment tiles. If you want to edit terrain data or elevation, you must know where to edit: which elevation tile and which terrain tile inside this elevation tile. For battle setup and relating logics you must know the position in the deployment tile grid.

Because the elevation tiles are numbered sequentially from 0 to its (maximum - 1), I think an internal absolute CC map size limit might be the largest possible long-integer value 65535. But the actual game you which to modify may have much smaller map limits. In some cases not only the map size may be limited but also the amount of roof file entries and/or trees. In case you may run into trouble with your map, and you will be forced to shrink your map: for this reason I have published a tool (for Mac & PC) to shrink/expand/convert/rotate/join maps: CC2Tools.exe / CloseCombat2Tools.

After this technical basics let us setup a map making tactic. Please use actual and older map making guides and FAQs published by the CC community for more specific concepts:

Map size

- decide if you want to make a map for only one CC game or several ones,
- decide which size (in pixels: must be a multiple of 120 pixels),
- remember that in CC the sun direction is from top-left to bottom-right,
- map's rectangle: CC2 maps are mainly oriented horizontally, CC5 maps are often oriented vertically, RtB and CCM-standard maps must have a size of 4800x4800 pixels.
- remember the CC scale: 5 pixels per meter. But newer CC games shows often larger details on their maps.

Making the background graphics

- make your first artist's impression of your new map in your favorite graphics editor program. I recommend to save several stages of your work.
- make a basic background without shadows and without buildings.
- then add buildings and their shadows. Keep this stage of your work!
- for CC3 or newer you must then add the tree shadows, for CC2 you can omit this step because the tree shadows are stored in CC2's graphics file "Terrain". Original CC2 maps do have only the shadow of the tree-trunk painted onto the background.

Making a background graphic with interior views of the buildings

- if you have more than one building on your map, I recommend to duplicate your final background graphic,
- paint the interior views of your intended roof-areas.

You can create graphics for the overview and map-monitoring files, if you like.

For CC2 only: if needed create a blown bridge and (if needed, too) a repaired bridge graphic.

With 5CC you can then

- create a map filled with default data,
- import your graphics as background (and if available separate layers containing background with interior views, tree shadows and tree trunks),
- edit/define your terrain values (you will view always your background graphic),

- edit/define your elevations (including elevation generating from an imported greyscale image),
- define your roofs,
- for CC2: define your bridge blown graphics area - and if necessary: defining the datas of the repaired bridge and the repaired bridge graphics area,
- generate LOS, with the ability to edit LOS (LOS will be calculated while respecting the elevation, terrain type's height and the terrain type's level),
- generate your OVM and MMM graphics,
- save your work into files according the filename rules of your intended CC game.

And of course you can modify your (and others) work by editing existing maps. Please remember: save your work often. But also remember: make backups of your work, 5CC will not do this for you. When loading a map, 5CC will detect its file format: CC2 map data files will be identified easily because they have a different two byte header. LOS files have always the same file format (luckily!). CC2 background maps will be identified as CC2 files only if they are loaded together with CC2 map data files or if their header contains the correct CC2-BGMap#### sequence: 4D 41 50 49 00 02 00 00 hex. Roof (and bridge) files can be again identified easily by their unique header.

OVM and MMM maps do not have a header showing a CC-version dependend entry. They will be interpreted as a CC2 file if they are loaded together with a CC2-BGMap#### file. This might cause a program crash when you try to load a CC5 *.mmm together with a CC2 map. Dont do this! Dont mix CC2 map files together with map files from other CC games. Use my other tool (as told above) to convert maps between CC versions.

Here are some old traditional design rules to make a map work during gameplay:

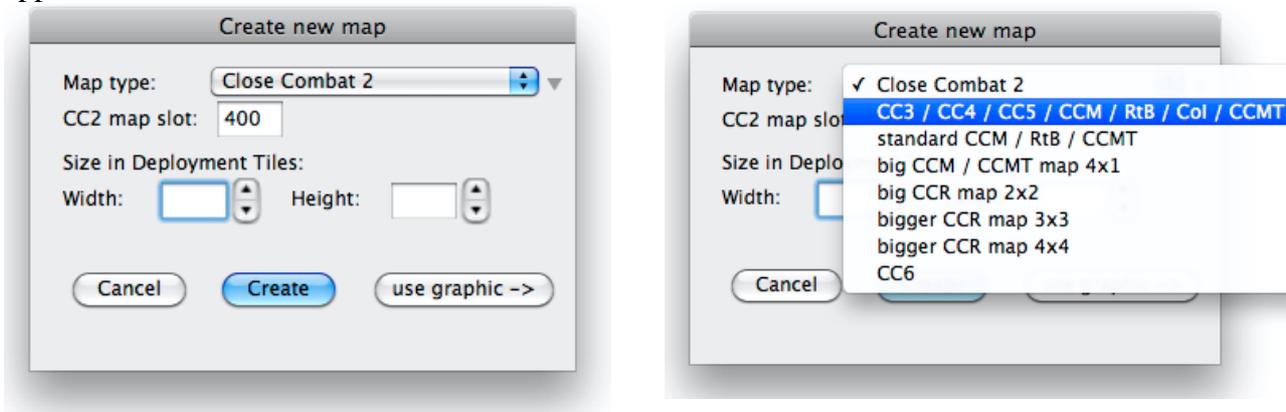
- Thickness of walls should be not more than 1 data element.
- Walls should not touch each other so that soldiers can pass through.
- Mud goes in the water around the bridge so as that your soldiers won't go there.
- Place crest elements anywhere you want the soldiers to line up against (exp.: tops of mountains).
- Everything with a roof needs a floor. Like if you have wooded floor that determines the type of roof overhead and how well it protects your soldiers from mortars.
- Keep the data elements touching on flat sides in appropriate situations (exp.: walls, crests, ...).
- It takes two data elements for a tank to go through and only one data element for soldiers.
- To ensure LOS hindrance for diagonal structures: keep the data elements touching on two flat sides.

The main menubar

For both installations (Mac & PC) the main menubar contains access to nearly all functions of the program. Common for both installations is also that the window "Roof informations" (see page 39ff) and the window "Map meta comments" (see page 58ff) have menubars of their own for special tasks. All menubars of 5CC give you access to calling the "Preferences window" and to quit the application. The following text describes the functionality of the main menubar (PC: which is part of the head of the "Editing window"):

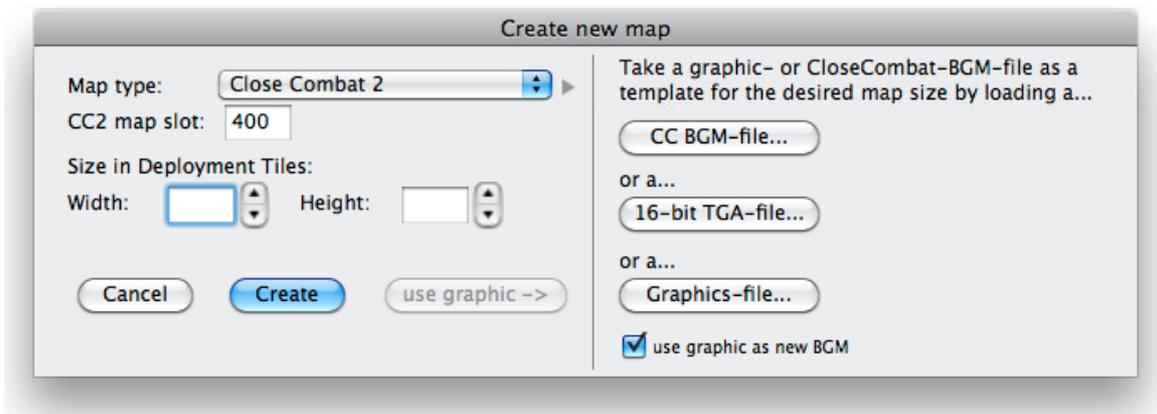
Menubar item "File"

Use from the menubar "File>New..." to create a new map from scratch. The following window will appear:



You must select whether you want to create a CC2 map or a map for newer CC games. When you select "standard CCM / RtB / CCMT", then map's width and height will be automatically set to 40x40 deployment tiles. Same for "big CCM map", result will be width / height 160x40 deployment tiles. For all other kind of maps you must fill in the desired map size, counted in deployment tiles (a deployment tiles is a square of 120x120 pixel). When you select "Close Combat 2", you can enter the map's slot number (its range can be from 100 to 999). This slot number will be used for displaying a file name suggestion when you save the map.

You can also use an existing background graphic or BGM-file to use it as a template for setting the according map dimensions. Just click on the button labeled "use graphic ->" to expand the window to it's right side. There you can select the template graphic to be imported from various sources:



If you want to toggle the maximum map size limit (of 160x160 deployment tiles) for creating new maps please use the "Preferences window", section "Map / Creating a map". This limit is implemented to avoid accidentally program crashes on low-RAM computers. Once you are sure that you have enough RAM installed to create larger maps feel free to disable this limit in the "Preferences window" (new since v1.06).

If you want to load an existing map, use "File>Open..." or "File>Open recent". Up to 16 recently loaded map data files will be remembered by 5CC. The file-search and -open dialog box (and its quality) is provided by the runtime environment and depends on the operating system you are using. 5CC will automatically detect the map data file's version by identifying the two byte header. If a CC2 header is found, 5CC will search for a suitable graphics file folder using the search path "../Graphics/Maps". For CC3 maps (or newer), 5CC will search for the graphics files in the same folder where the data file resides. 5CC will strictly obey the CC filename conventions: if the map data file name is "Map100", then 5CC will look of course for "BGMap100". And for CC3 files (or newer) it will change only the extension (example: "Andorra.txt" as data file, "Andorra.bgm" as background graphics file).

If a background graphics file cannot be found, 5CC will ask you for a valid file. It must be a CC file. External graphics files (TARGA, BMP, ...) cannot be loaded this way. After loading this file 5CC will do the same with the OVM and MMM files. If these files were not found, 5CC will create internally these graphics (a little bit time consuming process). Then it will look for a roof file and for CC2 only will look for a bridge file. LOS files will be not loaded automatically, but you can enable this in 5CC's "Preferences window".

For saving your work use "File>Save". 5CC will use the file names and paths from which the map was loaded. It will overwrite existing datas without warning. But it will only save datas or graphics that have been changed. Example: if you have loaded a map using the "File>Open..." command without OVM and MMM found, then the next "File>Save" command will save the created OVM and MMM graphics into CC files at the corresponding path of your map data file.

You can control inside the "Map properties window" whether and which datas / graphics have been changed.

Saving your entire map under a new name or to a new folder, use the "File>Save as..." command. All datas and graphics actually loaded will be written to disk, even if they were not changed. Special case CC2: if valid paths "../Data/Maps/" and "../Graphics/Maps/" were not found, then 5CC will store the files altogether in the same specified folder. You must ensure that you use a valid CC2-map data file name: "Map####" (where # stands for a single digit), otherwise the saving will fail! For Windows-users only: to get correct CC2 filenames without extension, you must add a dot "." at the end of the filename to prevent the adding of an extension!

The commands "File>Save" and "File>Save as..." will check the map terrain and elevation datas for negative values. If there are such values, then 5CC will give a warning. A map containing such negative values will not work in the CC game. But you can save your work anyway and it is recommended to correct these values. Use the command "File>Scan for negative values" to make a search for negative values without saving the map's datas.

Using the "File>Close" command will close the active window. For PC only: if the editing window is the active window, then 5CC itself will quit when issuing this command (or when clicking into the map-editing window's close button).

In all other cases you must use the "File>Quit" (MacOS-X: "5CC>Quit") command to terminate the program. If there are unsaved changes present, 5CC will ask you before quitting.

The command "File>Preferences..." (on Mac: "5CC>Preferences...") will bring the "Preferences window" to front. Here you can select various default settings of 5CC. All these settings (and much more) are saved to the Preferences file "5CC.ini" when 5CC quits. The file is automatically loaded when 5CC starts up. The location where this file is saved depends on your operation system. You can view this location by switching to the "About" subsection in the "Preferences window".

The command "File>Generate LOS" is intended for generating the whole LOS datas for a loaded map. In the "Preferences window" you can determine which LOS-generating routine will be used. And you can determine there if you restrict LOS distances to the same values as they are selected in the "LOS actions window". 5CC will keep all these settings in its Preferences file "5CC.ini".

The subsection "File>Import..." gives you the ability to import single CC files or external graphic files to your loaded or created map. Example: you have only the map data file ready, but not yet the graphics. Create a new map of the needed size in 5CC using the "File>New..." command and then load the already existing data file via "File>Import...>Import Map### / TXT file..." command. The "File>Import...>Import Map### / TXT file..." command will no longer (v1.11) create a complete new map in RAM. The import of data files will not (v1.11) erase any already existent map graphics (BGM/OVM/MMM graphics, roofs, bridges). To create a complete new map in RAM changing all map properties (data and graphics) please use the commands "File>New" or "File>Open...".

When importing a map data file (Map### / TXT) of a file format (CC2 vs. CC3-or-newer) or size which is different than the map defined in RAM, you will be asked if you really want to import these datas. Importing smaller map's data will be placed into the upper left edge of the map defined in RAM (leaving older datas in RAM in the lower right map area untouched). Importing larger map's data will import only a cutout of them which fits into the map defined in RAM.

All other "File>Import..." commands will add the imported graphical datas to the already loaded map datas (data and graphics). In this case the imported map graphic can be of different format (CC2 or CC3-and-newer) than the already loaded map data file: you can for example create a CC2 map in 5CC and can then import a CC4 background BGM file to be used as background graphic. Since v1.12 you must no longer obey that the imported graphic fits to the size of the already loaded map. Imported graphics too large for the defined datas will be cut off at the right side and/or the bottom of the map. Smaller graphics will generate white space at the right side and/or the bottom. Mixing CC2 maps with CC3-or-newer BGM files requires to load the OVM and/or MMM separately, and vice versa.⁴

5CC is also able to import external graphic files. Import of 16-bit TARGA graphics is a separate command. These graphics must be oriented left-to-right. Right-to-left oriented TARGAs can not be imported. 5CC is only able to import 16-bit top-to-bottom or 16-bit bottom-to-top TARGAs if their header is correct. There exists an update for Photoshop 7.0.1 to generate 16-bit TARGA files. And it seems that also other graphic editors / versions might have problems to generate 16-bit TARGA files correctly (in most cases they will save them as 24-bit graphics).

⁴ When importing BGM, the window "Coordinates" will not update the monitoring map graphic. You must use the menu commands "File>Generate>OVM from BGM" and "File>Generate>MMM from OVM" to get actual monitoring map graphic in this window after importing a BGM.

Another graphics import functionality depends solely on your operating system (and might be extended if you have QuickTime® installed): minimum should be BMP-graphics import on PCs and PNG- (perhaps JPEG-) graphics import under MacOS-X 10.4 or newer. In this case 5CC will automatically convert the imported graphics to 16-bit (independently from the color-depth used internally by 5CC, see chapter "Window Preferences, General Settings").

But remember: importing datas or graphics will erase the existing datas in RAM. Example: if you import a roof file, the existing roof definitions will be lost.

For special cases use the subsection "File>Add...". Using the "File>Add...>Add Roof file..." will add the imported roof definitions without erasing existing datas in RAM. This subsection is also intended for importing external graphics for a second background layer. This second background graphics layer can store the background view with buildings' interiors painted on. It will be used when new roof definitions will be made, but it is not part of a CC file and therefore will not be saved when a "File>Save" or "File>Save as..." command occurs.

In the subsection "File>Add..." you will also find import commands for already made tree shadow layer and tree trunks layer graphics. And you will find here the commands for importing greyscale images for defining the map's elevation. When you import such a greyscale image (it must be in fact a RGB 16-bit color graphic with shades of grey) the color black (= RGB(0,0,0)) will be interpreted as elevation = 0. The color white (= RGB(255,255,255)) will be interpreted as elevation = 255. 5CC will calculate the medium color of all pixels of a 10x10 pixel-square to get the elevation for a terrain tile (for CC2: 5CC will calculate the medium color of allpixels of a 40x40 pixel-square to get the elevation for an elevation tile).

Another special subsection: "File>Generate...". Here you can generate OVM and MMM graphics from the BGM graphic already in RAM. These graphics will be saved to disk only if you issue a "File>Save" or "File>Save as..." command. The command "File>Generate...>interior background picture from BGM and Roof-interiors" will combine the BGM background graphic in RAM with the interior views of your roof definitions in RAM. 5CC will take only non-white pixels out of the interior roof graphics. And it will respect the "Visual Width" value of CC3-or-newer roof definitions. With this command you can create the background view with buildings' interiors painted on in the second background layer discussed above. To save this created graphic you can only use the "File>Export...>interior background picture..." or the "File>Export...>interior background as 16-bit TARGA..." command described in the next chapter.

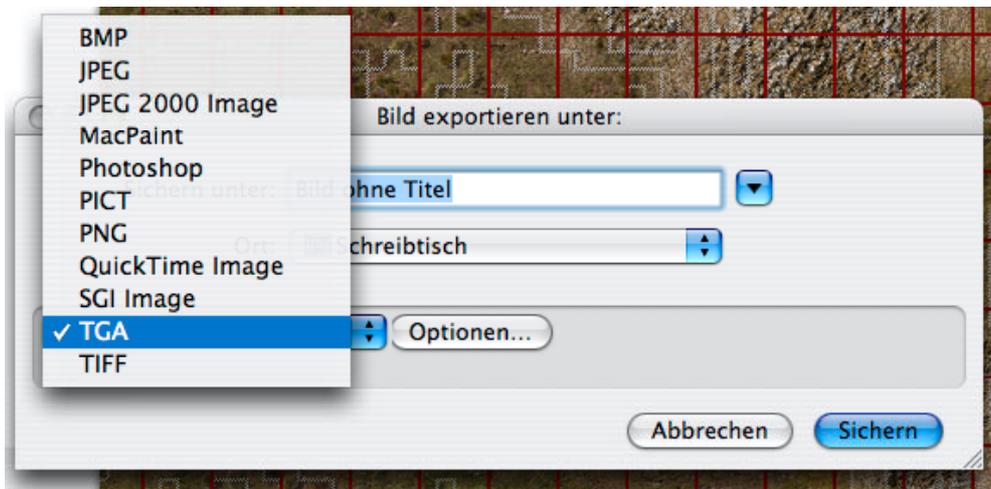
The command "File>Generate...>BGM from BGM and Roof-exterior" will combine the BGM background graphic in RAM with the exterior views of all your roof definitions in RAM, generating a new BGM graphic. Usefull for some very special purposes. The command "File>Generate...>BGM from BGM and tree images overlay" might be of interest for those who want to create OVM-graphics with trees painted on.

The subsection "File>Export..." gives you all the abilities for exporting datas / graphics corresponding to the contents of the import or add subsections. You can export:

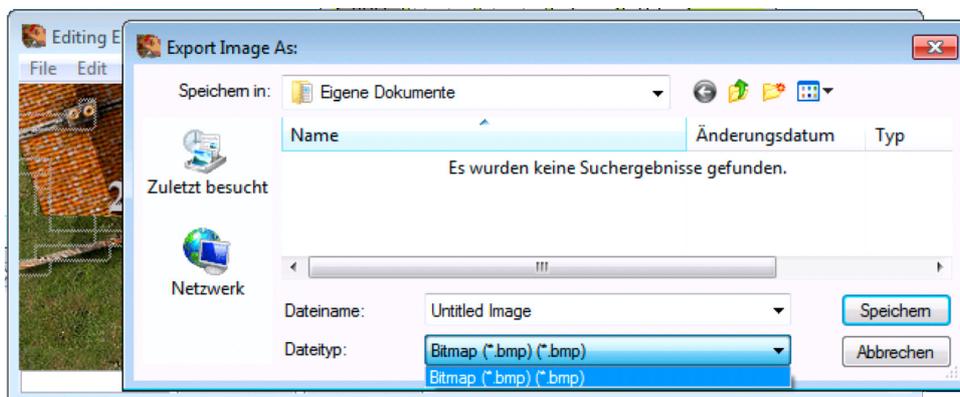
- map data file and LOS file,
- the background image as BGM file or picture file,
- the background image combined with the tree shadow and tree trunks layer as BGM or picture file,
- the tree shadow and tree trunks layer as picture files,
- the roof exterior or interior views pasted over the background image as picture files,

- the roof exterior or interior views pasted over a white image as picture files,
- tree images overlay pasted over the background image or over a white image as picture file,
- the elevation values translated into a greyscale picture file,
- a "screenshot" of the entire map graphics with all actually visible editing grids / numberings / highlightings / borders painted on.
- OVM and MMM images as OVM/MMM or picture file,
- Minefield-/Explosives-overview pasted over the OVM graphics as picture file,
- Minefield-/Explosives-overview pasted over a white image as picture file (in OVM size),
- roofs as roof file,
- CC2 bridge images as Bridg### file,
- and you can create here an empty roof file for CC5/RtB/CCM.

When exporting CC graphics as external graphics you can choose either exporting as 16-bit TARGA or you can use the graphics export functionality of the runtime environment. Its options depends on the operating system you are using. On PCs the export as BMP graphics should be possible, on Mac you should have all QuickTime® compatible formats available. The picture below shows what will be offered under MacOS-X 10.4 (same for 10.5 / 10.6):



Even under W7 only BMP-export is possible (what might be extended if you have QuickTime® installed on your PC):

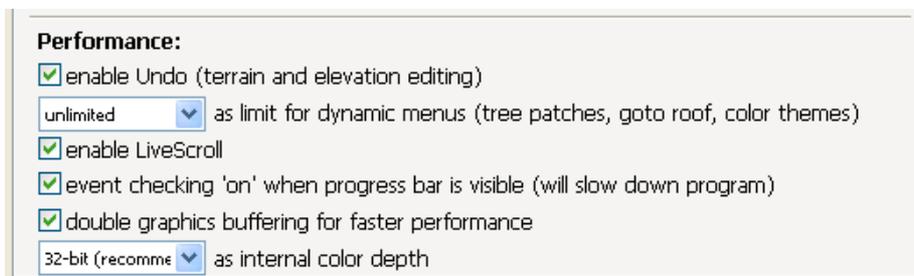


Window "Preferences"

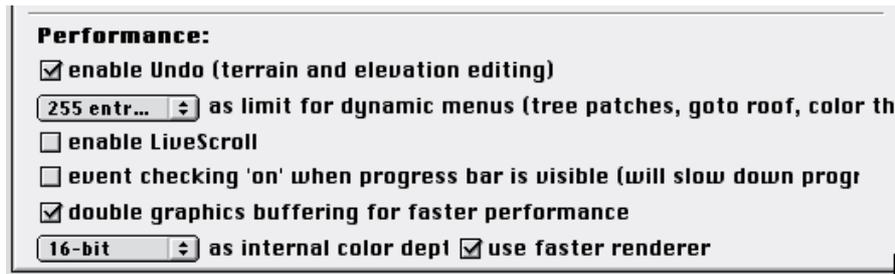
General settings:

- enable "Undo command" for all terrain and elevation editing tools.
- enable LiveScroll: enable this if you have a fast cpu to see smooth real-time scrolling.
- enable double graphics buffering to avoid screen flickering. When enabled the graphic's speed depends mainly on the cpu speed.
- set internal color-depth to 16-bit or 32-bit. Setting to 32-bit is recommended for machines running Win98-WinXP or newer in case the "Undo" command will produce white rectangles of size 200x200 pixels when making tree shadow patch placing undone. Setting to 32-bit is required for the i386(Intel)-built MacOS-X version. For the PPC-MacOS/MacOS-X-built the 16-bit color depth can be used without problems. The selected internal color-depth will have no effect upon the resulting CC files. These files will be always saved as 16-bit graphics.
- set color-depth for graphics exported to the clipboard. Should be 32-bit for PC- or i386(Intel)-built of 5CC, and should be 16-bit for PPC-version of 5CC.
- use faster renderer: only necessary for MacOS-X: use the old (but faster) QuickDraw engine instead of the newer Quartz engine.
- enabling "event checking 'on' when progress bar is visible" will decrease performance when loading/saving map files, but will make the program more responsive. Enabling is not necessary on PPC-Macs.
- for MacOS-9 you **must** limit the number of menuitems of dynamic menus to 255 entries. By default this is set for the MacOS-X version of 5CC too, although you can set it for MacOS-X and WinXP to "unlimited". Dynamic menus used by 5CC are those for color themes of the main menubar, the "Goto roof" submenu and the popupmenu of the tree patch tool of the window "Tools".
- select which windows will be shown immediately after program startup. For PCs the main editing window will be always present.
- select here also if the "Tools" window should be oriented vertically (recommended) or horizontally. Changing these radio buttons will have immediate effect.
- select whether the window "Terrain elements table" will disappear or not when switching to an elevation-, LOS- or roof-editing tool in the window "Tools".

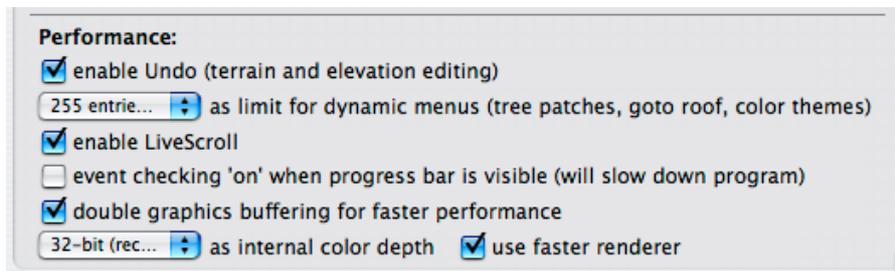
These are the recommended performance settings for WinXP-version. It is strongly recommended to use internally 32-bit graphics. You can enable "event checking 'on' when progress bar is visible". This will make the program more responsive during file loading/saving and will only slow down the program a little bit:



These are the recommended performance settings for MacOS-9. It is recommended to use internally 16-bit graphics and to disable "LiveScroll". You should disable "event checking 'on' when progress bar is visible". It is also necessary to limit popmenus to 255 entries:



And here the recommended performance settings for MacOS-X. It is required to use internally 32-bit graphics on an i386-Mac! For PPC-Macs you can use 16-bit graphics, which will be a little bit faster. You should not enable "event checking 'on' when progress bar is visible" on PPC-Macs. On i386-Macs this will slow down the program only a little bit:



Map settings:

- default terrain value to be used when creating a new map. This terrain element value will be used for the entire map for all CC versions. Possible range is "-1" (representing "not defined value" = "illegal value") to "254".
- default elevation value to be used when creating a new map for the entire map and for all CC versions.
- limit map size to 160x160 deployment tiles when creating a new map. This limit is implemented to avoid accidentally program crashes on low-RAM computers. Once you are sure that you have enough RAM installed to create larger maps feel free to disable this limit in the "Preferences window" (new since v1.06). Internally 5CC is capable to create maps up to a size of 15446x15446 deployment tiles (would be a RAM busting monster map, see page 5 of this manual).
- prefer CC2 editing: when enabled then the popup-menu, the "Create new map dialog window" will show "CC2 map" as default on its first show up. And all file saving / opening dialog boxes will default to search for "any file".
- CTRL-mouse click / right-mouse click functionality when editing a map: you can disable the contextual popupmenu functionality. In this case the CTRL-mouse click / right-mouse click will have eyedropper functionality when editing terrain or elevation values (like in 3C.exe by Cpl_Filth).
- cursor shape can be selected for roof rectangle / roof polygon definition mode.
- mouse wheel resolution can be set (sorry, no mouse wheel support in the PPC-Mac version).
- arrow key resolution (= stepwidth in pixels per keyhit) when using the cursor arrow keys (default value is 40 pixels per key click).
- enable always try to load LOS file when loading a map with the "File>Open..." command.
- enable always create OVM and MMM when loading a BGM file (via "File>Open..." or "File>Import..." subsection) and the OVM and MMM files were not found.
- enable automatically "Coordinates window" on when a map is created or loaded.
- define here what will happen when the "File>Generate LOS" command is issued. You can select one out of three different LOS calculation ways. And you can combine this with the

LOS distance restrictions selected in the "LOS actions window" (see page 55f of this manual)

Select "Elements File":

Terrain elements files are used by 5CC to interpret the map's terrain datas (which are stored as integer numbers in the map's data file, see page 3). In the window "Preferences", section "Elements file", you must select one out of 9 terrain element files to be used to interpret/edit the terrain datas. 5CC will recognize CC2's and CC3's original terrain element files as valid input files. 5CC will need an additional column in these files for terrain category grouping. If this column is missing, you will see only one single category (without heading) in 5CC's window "Terrain elements table". And since v1.08 5CC will use a further additional column for storing terrain-coloring values. If this column is missing, 5CC will generate the terrain-coloring values at runtime. Since v1.16 5CC uses a further additional column for storing the index number of the sprite IMAGE ("Sprite-Idx"; not the sequence like in the official "Workbooks") within the file "Terrain". Index number omitted or value "-1" means "no sprite to display".

In addition to these two formats, 5CC can use its own terrain element file format:

- plain ASCII, TAB-separated columns, line-end delimiter doesn't matter (CR or CR+LF),
- first line must contain a three byte header "5CC",
- the file must have 6 columns: first column must contain "element name", followed by columns for "terrain class number", "terrain height", "terrain level (for multistoring buildings)", "terrain category", "terrain-coloring" and "Sprite-Idx".
- the header line can be followed by comment lines,
- data start must be indicated by a line containing a "&" at its start,
- data end must be indicated by a line containing a "#" at its start.

This format is similar to the one used by the original CC2 and CC3 elements files except for stripping the not used columns. The following table shows the differences (columns counted from 0):

Terrain Elements File version	Header ID (string)	Column: Element name	Column: Terrain class number	Column: Terrain height	Column: Terrain buildings level	Column: Terrain category	Column: Terrain-coloring value in 6-digit hex	Column: Sprite-index	Tree ID (string)
CC2	46	0	1	2	39	42	43	44	Tree
CC3	14	0	1	2	42	47	48	49	Tree
5CC	5CC	0	1	2	3	4	5	6	Tree

The terrain category in the last column can be of any kind of character string. You can use as many categories as you like. The two reserved categories "Negative value" and "Unknown value" will be generated by 5CC at runtime to store map terrain elements not defined in the actually selected "Terrain Elements File". If you don't like my predefined category names, feel free to change them in the external terrain-elements files. Terrain elements with identical category will be bundled together in the window "Terrain elements table".

New since version 1.08 is the terrain-coloring value. These values must be stored as 6-digit hex values (each two hex-digits per color-channel: RRGGBB, without preceding or following "h" or "&h" or "hex"). Example: the value "FF0000" is light red. If the value is missing, 5CC will generate a suitable value at runtime via the following algorithm:

$$\text{Color-Red} = (\text{Index} * 4) + (\text{Ascii-Value-Second-Category-Character} * 2)$$

$$\text{Color-Green} = (\text{Index} * 30) + (\text{Ascii-Value-First-Category-Character} * 5)$$

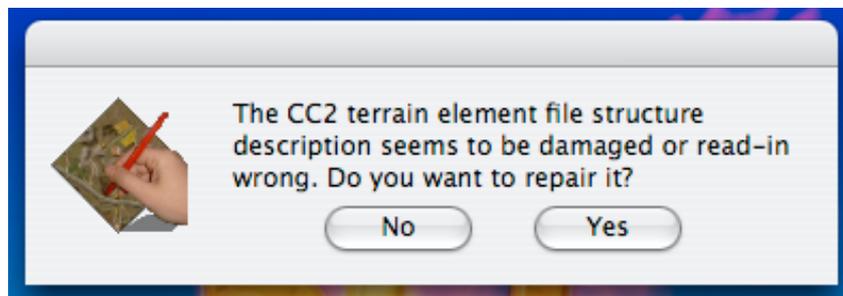
Color-Blue = (Index * 71) + (Ascii-Value-Last-Category-Character * 2)

where Index = index-number of terrain-element definition in file.

The factors "4, 2, 30, 5, 71, 2" are stored inside 5CC's Preferences file "5CC.ini" as values labeled from 120 to 125 and can be modified by interested users directly inside this file "5CC.ini".

5CC will recognize tree terrain elements by their name. Like in the original game, 5CC will scan the terrain elements' name for the predefined (can be changed within the Preferences file "5CC.ini") "Tree-ID" string (usually = "Tree"). Since v1.15 5CC will no longer accept the word "street" as "tree". Since v1.16 5CC will accept "Conifer"-entries as trees, too. 5CC is now able to count the number of trees on a map. This functionality is independent from the category defining.

These three predefined "Terrain Elements File"-format definitions can be changed inside 5CC's preferences file, but when loading the preferences file at program start-up 5CC will now check and rebuild (accidentally) damaged format definitions. 5CC will ask you if you want to repair the "damaged" entries. Press "Yes" if you are not sure that you have made changes to the preferences file manually! See also the text on page 75ff.



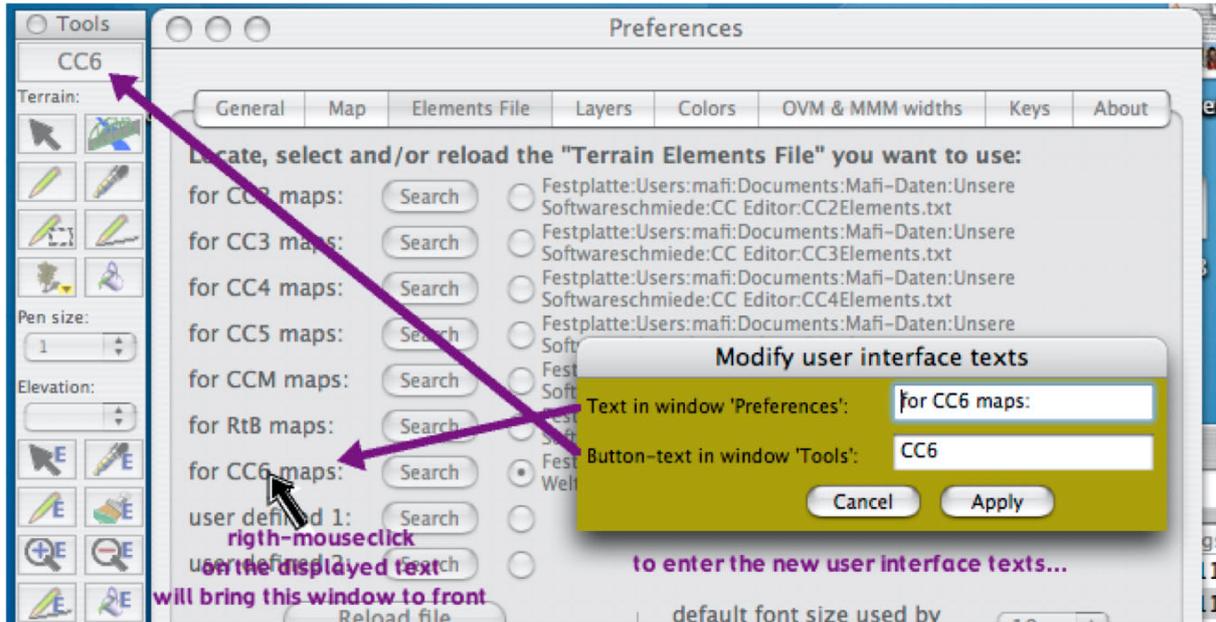
When you have updated your external "Terrain Elements File" while 5CC is running, you can reload this file by pressing the "Reload" button. The 5CC package contains ready-to-use terrain elements files for CC4, CC5, RtB, CCM, CoI, CCMT and CC:WaR in CC3-format, too. These files were generated using Qclone tool made by Sgt_Wilson (modified manually).

In this preferences section you can also define the default font size of the texts of the window "Terrain elements table". One exception: for the PC version you cannot use a character size less than 10pt. When you select 9pt or less on a PC you will get only lower text lines.

You can enable the adding of the "not defined" = "illegal" terrain element value to the actually selected elements table in RAM. When enabled, "-1" will be added to the terrain element table in RAM automatically every time a element table is loaded from disk without changing the files on disk themselves⁵. Another checkbox in this section let you enable to allow this illegal value to be written by the map terrain editing tools.

You can customize the texts of 5CC's user interface which describe the 9 available slots for terrain element files. Make a right-mouse click (on Mac: Ctrl-mouse click) on the texts of the window "Preferences". The following window will come to front:

⁵ you can establish terrain element table files containing negative class numbers, in this case 5CC will treat them as regular values (perhaps necessary for future expansions of CC). When doing so, you should disable the "add '-1' to the element table when it is loaded".



You can enter here new texts used in the window "Preferences" and new texts for the top-most button of the window "Tools".

Layers:

Layers are used in 5CC to hide/show temporarily certain editing effects (background picture, shadows, solid tree layer, terrain-coloring effect). In the section "Layers" of the window "Preferences" you can define the positioning of the window displaying the visible layers and some layer-display settings:

Tree shadow patch placing:

When placing a tree shadow patch element, you might want to avoid to have shadows to be stacked upon each other. In this preferences section you can select if you allow such doubled/overlying shadows or if you want to avoid them.



For optimized use of the exported shadow layer graphics in your favorite graphic editor I recommend to set default opacity to 100% and to reduce the shadow opacity later on in your graphic editor. An opacity of 55% - 45% is recommended only if you use 5CC to generate the new BGM composed of shadow layer and BGM layer.

On Win98-WinXP PCs the program will have under certain circumstances problems to identify the colors "White" and "Black" of tree shadow patch graphics correctly. You can determine in this section of the window "Preferences" the "tolerance for recognizing the colors" "White" and "Black". I recommend to set this tolerance value on PCs to "16". Otherwise some black pixels of the tree shadow patch graphic might not be recognized as "shadow" but as "trunk". If the internal color-depth (see "Preferences" section "General" mentioned on page 13) of 5CC is set to 16-bit such a correction of the tolerance might be necessary also for the color "White". On MacOS computers these corrections are of course not necessary.

Window "Visible layers":

And you can set here the position of the window displaying the visible layers. This window is usually only 20 pixels high. The MacOS-X version of 5CC will display it as a floating window in

the upper right edge of the main editing window's titlebar. You can change the horizontal placement offset counted in pixels from the right side of this window. The PC version of 5CC will place the window "Visible layers" as a normal window at the top of the main editing window. In this case the horizontal placement offset is counted in pixels from the left side of this window. You can change also the vertical placement offset (negative values are allowed) and the bounding to the editing window's top or bottom. It is also possible to bound the window "Visible layers" to other windows (coordinates, tools, terrain or to none).

Terrain-coloring effects:

You can determine if the terrain-coloring effect will be shown for all terrain values or only for those terrain values of the expanded categories in the window "Terrain elements table".

Terrain-coloring "Unknown" values:

You can determine whether unknown values (stored in the category "Unknown" of the window "Terrain elements table") should get all the same color (which can be set in the section "Colors" of the window "Preferences", see following chapter) or if they should get individual terrain-coloring values (values calculated at runtime).

Mines/Explosives in OVM:

You can select the diameter of the mines/explosives-indicator (a solid circle) here. It's color can be set in the section "Colors".

Colors:

You can modify the colors used by 5CC in the "Editing window". All color settings are bundled together to color themes. The number of possible color themes is limited to 99. Pressing the "+" button will add a color theme. Double clicking the theme's name gives you the ability to change the theme's name. To verify this changing press the "Apply color changes" button. Clicking on the colored rectangles let you change the specified colors. Again you must verify the changes by pressing the "Apply color changes" button. You can select the color theme which will be used in the "Editing window" in the menubar item "Colors". Two color themes are implemented by default and cannot be deleted, but you can change their color values.

Most of the colors defined in a color theme are related to tile and grid markings during map editing. Other colors are needed for roof/bridge-area rectangle marking. Version 1.08 has four new added colors for the terrain-coloring effect: the entry "Terrain-coloring transparency effect" stores the color which will be treated by 5CC as "the transparency color" when painting the terrain-coloring layer. All terrain-coloring values with this value will not be drawn, meaning that the background will still be visible even when terrain-coloring effect is on (has no effect to tile-/grid- or roof-marking). By default the value of this "the transparency color" is white = "FFFFFF".

You can also define the terrain-coloring values for "Unknown", "Negative" and "Invalid" terrain values. If you set them to the same value as "the transparency color", they will not be drawn by the terrain-coloring effect. "Unknown" terrain values can get individual terrain-coloring values generated at runtime if you set this functionality to "ON" in the section "Layers" of the window "Preferences" (see chapter before). "Invalid" terrain values should not occur, the defining of their terrain-coloring value is for debugging purposes only.

OVM and MMM widths:

enter here which image width 5CC must use as a maximum limit when creating OVM from BGM graphics and MMM from OVM graphics. If height will be greater than width, then these values will

be used as limit for the height calculation. Press the "Restore defaults" button to get the built-in default values. The maximum values found in original CC files are listed in the following table:

CC version	Max. OVM size in pixel	Max. MMM size in pixel
CC2	1142x646	144x144
CC3	1024x716	160x160
CC4	1024x716	160x160
CC5	1024x716	160x160
RtB / CCM standard map	716x716	160x160
CCRAFRegt squared maps	716x716	160x160
CCM big map	1024x256	640x160
CoI standard map	1024x716	160x160
CC:WaR / CC:TLD	1024x716	160x160
CC:LSA	1024x716	240x240
CCMT standard map	716x716	160x160
CCMT big map	1024x256	640x160

In CC:LSA it is recommended to have the MMM-size set to 6 pixels per map megatile.

Keys:

enter here keyboard shortcuts for the tools available in the window "Tools". The setting is case sensitive. Special characters (like TAB, spacebar, ...) are not allowed. The digits "0".."9" are reserved for entering elevation values. Since v1.15 it is possible to use the arrow keys to scroll through the map-editing window or the OVM-window. In the map-editing window you can use the TAB-char to jump to the next roof on the map (or SHIFT + TAB-char to jump to the roof's predecessor).

Menubar item "Edit"

"Edit>Undo" is implemented for the following situations (and only available if the window "Editing" is selected as active):

- you can undo the clearing of a complete roof (that means: when you have used the "roof erase tool" or the command "Edit>Clear" on the highlighted roof showing the exterior view),
- you can undo the erasing of all roofs (when you have used the command "Roof actions>Clear all Roofs"),
- and you can undo the data and the graphic changes when you have used the "tree shadow patch tool".
- all other terrain and elevation editing tools can be made undone if "Undo" is enabled in the window "Preferences" section "General". In this case the entire map datas are duplicated internally prior to using a command. Might be RAM- / time-consuming when editing large maps. That is the reason why you can disable undo there.
- you can undo the terrain and elevation actions accesible via the "Actions>Data actions..." command. To have access to the undo command you must activate the map's editing window.

The commands "Edit>Cut", "Edit>Copy" and "Edit>Paste" are available when a roof exterior or interior view is highlighted. "Edit>Copy" will copy the highlighted roof view (or the visible CC2 bridge image) to the clipboard. "Edit>Paste" will paste in the clipboard contents (if it is a picture) into the highlighted roof view only if its size fits exactly to the roof size. Same to say for the CC2 bridge images. "Edit>Cut" will clear the roof interior view (a black rectangle will indicate this) only, if you have selected "interior roof view" ON. If you have selected "exterior roof view" ON,

then the "Edit>Cut" command will delete the entire roof entry without warning. So if you want to "delete" only the roof exterior view contents, use the "Edit>Paste" command and paste in something graphical artwork.

A CC2-special: If you are in terrain editing mode for repaired bridge datas, then the "Edit>Cut" command will disable the selected elevation tile from being a repaired bridge data area.

The "Edit>Define as Roof" command will define the selected map area (selected by rectangle tool or by polygon tool) as a roof entry, setting the roof entry's coordinates (and vertices in case of CC3-or-newer roofs) and cutting out the background's area. This cut-out will be used for the roof exterior view and will be also pasted automatically to the clipboard (a technique introduced by Chris Ellen's CCEdit). You can use the clipboard graphic in your favorite graphics editor to paint the interior view over it, copy it back to the clipboard, switching to 5CC, selecting "interior roof view" ON and pasting this interior view in for the highlighted roof entry. The opportunity of this way is that you must not think about the cut-out size. If you have added a background view with buildings' interiors painted on in the second background layer (via the "File>Add...>Add interior background picture..." command), a cut-out from this layer will be transferred to the roof interior view when the "Edit>Define as Roof" command is issued. A technique introduced by Cpl_Filth's tool Groof. Recommended for maps with more than only few roofs or for maps with overlaying roofs.

The command "Edit>Select all" will mark all rows of the entire listbox as "selected" within the windows "Editing external Terrain-Element files" and "Map meta-comments". The command "Edit>Select all with header" will prefix the listboxes' header as additional line when using the command "Edit>Copy" later on these listboxes. A subsequent command "Edit>Copy" or "Edit>Cut" after "selecting all" on these listboxes will copy the entire contents of the selected listbox as plain text (columns TAB-char separated, lines terminated by CR+LF (PC) or CR-only (Mac)) to the clipboard.

The commands "Edit>Find..." and "Edit>Find next" can be used to search for given terrain element values or given elevation values within the map's data. These two commands are only enabled during terrain editing or elevation editing. The command "Edit>Find..." will bring the window "Data actions" to front (which can be accessed also via the menubar command "Actions", see page 21ff), where the user can enter the terrain or elevation value to be searched for, starting from top of file (= the upper left edge of the map).

When you are in terrain editing mode, and you select a terrain value within the map or within the window "Terrain", the entry of the "to-be-searched" value in the window "Data actions", section "Terrain", will change automatically to this newly selected value (an intended sideeffect).

The command "Edit>Find next" will search for the next 40x40 pixel tile (= elevation tile) containing the "to-be-searched" value (depending on the editing mode: terrain or elevation). Searching direction is from left to right and from top to bottom. If bottom is reached, you will here an error sound, and on the next command "Edit>Find next" the search will start from top of file.

The command "Edit>Select/Edit tree shadow patch..." will show the window "Trees", where the user can edit (and select) tree shadow patches and tree-patch libraries (see page 44ff).

The command "Edit>Select tree image overlay..." will show the window "Tree image overlay", where the user can select the single tree image to be used by the tree images overlay layer as preview of the in-game tree-effect.

The command "Edit>Edit external terrain elements file..." will show the window "Editing external Terrain-Elements", where the user can edit the terrain-elements files used by 5CC (see page 56f).

Menubar item "Roof"

Use the commands here for toggling the visibility of the roof images (or CC2 bridge images). It is only possible to view the roof exterior views or the roof interior views or the CC2 blown bridge image or the CC2 repaired bridge image or nothing of all these 4 (then the BGM will be shown). Usually the BGM view will be identical with the view "roof exterior view" ON. But there is another CC easter egg: during gameplay the roof exterior images will be pasted over the background not at map startup, but only if a soldier is leaving the building. You can use this feature on your custom map giving roof exterior views a slightly different image than used on the BGM (perhaps to indicate that the building was "visited"). Two custom maps using this feature are: CC2-ModifiedVeghelMap300 by Mick "xe5" Conmy (to simulate a ford) and my CC2-Settore-L map (to simulate minefield sweeping).

Changing the views is possible in all editing modes. So you can view your interiors when defining your terrain (otherwise you will not know where to place a window or door). If you are in roof editing mode and change the view to blown bridge view you will also switch to bridge image editing. And vice versa: if you are in bridge image editing and change the view to roof exterior / interior view, you will automatically switch to roof editing mode.

Quick access to toggling the visibility of roof or bridge images via the following menubar shortcuts:

- CTRL-R (PC) / ⌘-R (Mac) for roof exterior,
- CTRL-I (PC) / ⌘-I (Mac) for roof interior,
- CTRL-B (PC) / ⌘-B (Mac) for roof exterior painted over roof interior (to emulate the effect used by the CC:LSA engine during game),
- CTRL-1 (PC) / ⌘-1 (Mac) for blown bridge,
- CTRL-2 (PC) / ⌘-2 (Mac) for repaired bridge.

The "Roof>Rectangles or Polygons..." subsection is intended for roof editing mode. You can select here what kind of roof boundaries you will see of the already defined roof entries. You can also show/hide the roof index number (this index number is the sequence position in the list of roofs).

The "Roof>Goto roof..." and "Roof>Goto bridge..." subsections are intended for jumping directly to already defined areas on the map. These jumps will change the visible map area, but will not change the actual editing mode or the actual view. That means, if you goto a specific roof/bridge using these subsections, you will not see automatically the roof/bridge area or view. And you will not see automatically the specific roof/bridge highlighted. Use the visibility-toggling menubar items mentioned above to make the specific roof/bridge visible.

Menubar item "Actions"

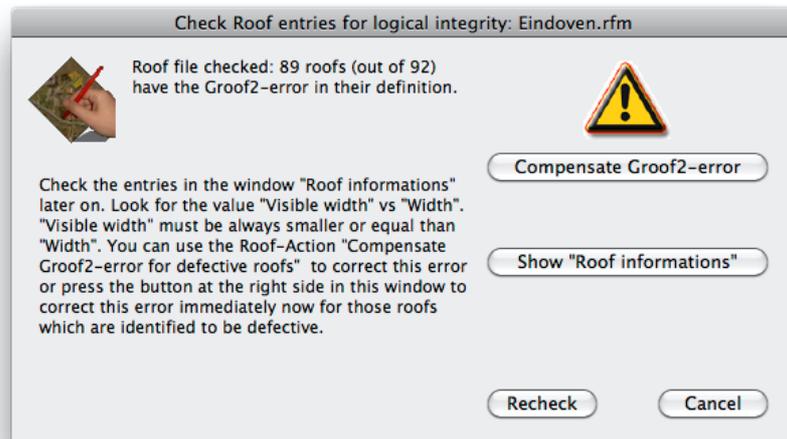
The subsection "Actions>BGM actions" give you the ability to clear the background graphics / layers and to adjust all layers to the map's size in case you have imported a larger or smaller BGM file (after the import of a smaller BGM the not filled map areas will be shown in white. After issuing the "Actions>BGM actions>Adjust all layers to map's size" command the formerly not filled areas will be painted black).

The subsection "Actions>Roof actions" bundles all commands which will have effect to all roof entries at the same time (reorganized for v1.16). Actions on single roof entries can be issued within the "Roof informations window" only.

The first menuitem in this subsection "Actions>Roof actions" is "Check all Roofs for logical integrity". Calling this menuitem, a check for

- roof entries containing the Groof2-error,
- roof entries lying completely outside of the map,
- roofs with one or more vertices defined outside their graphical rectangle

will be done, and the following window will appear in case of detected errors:



This window will offer you to correct the errors. You can leave the window without changes by pressing the button "Cancel". By default, the program will perform automatically the same check when loading a new map. This can be disabled in the window "Preferences", section "Map".

The command "Actions>Roof actions>Clear all Roofs" will ask the user prior to erasing all roofs. This command can be undone using the command "Edit>Undo". The command "Actions>Roof actions>Clear all Roofs outside map" will eliminate all roof entries which are entirely outside the map's borders. This command cannot be made undone!

The subsection "Actions>Roof actions>Update all Roof graphics" is intended for some special cases. In case you have already made several roof definitions and then decide to rework your background artwork, you would be usually forced to redo all roof definitions. To avoid this hard work use the commands out of this subsection to reload the graphic cut-outs for roof exterior view from the BGM graphic and / or the graphic cut-outs for roof interior view from the second layer (background view with buildings' interiors painted on) **without** changing the roof entries' coordinates!

Original CC3/4/5/M/RtB/CoI/CCMT/CCWaR/TLD/LSA-roof graphics are usually padded to a width which is a multiple of 4 pixels (= a multiple of 8 bytes) to make read-in on runtime faster.

The unused graphical area at the right side of these graphics is usually black. Since v1.06a4 5CC can eliminate these black strips at the right side of the graphics by adjusting the roofs' exterior and interior graphics to the dimension of the logical surrounding rectangle using the commands "Actions>Roof actions>Adjust all roof graphics to rectangle size" or "Actions>Roof actions>Adjust all roof graphics to polygon shape". To undo this action or to add these padding black strips to all your roof graphics you can use the command "Actions>Roof actions>Adjust all roof graphics to CC3/4/5's 8-byte format". The adjustment to 8-byte format can be done by using either black or white filling.

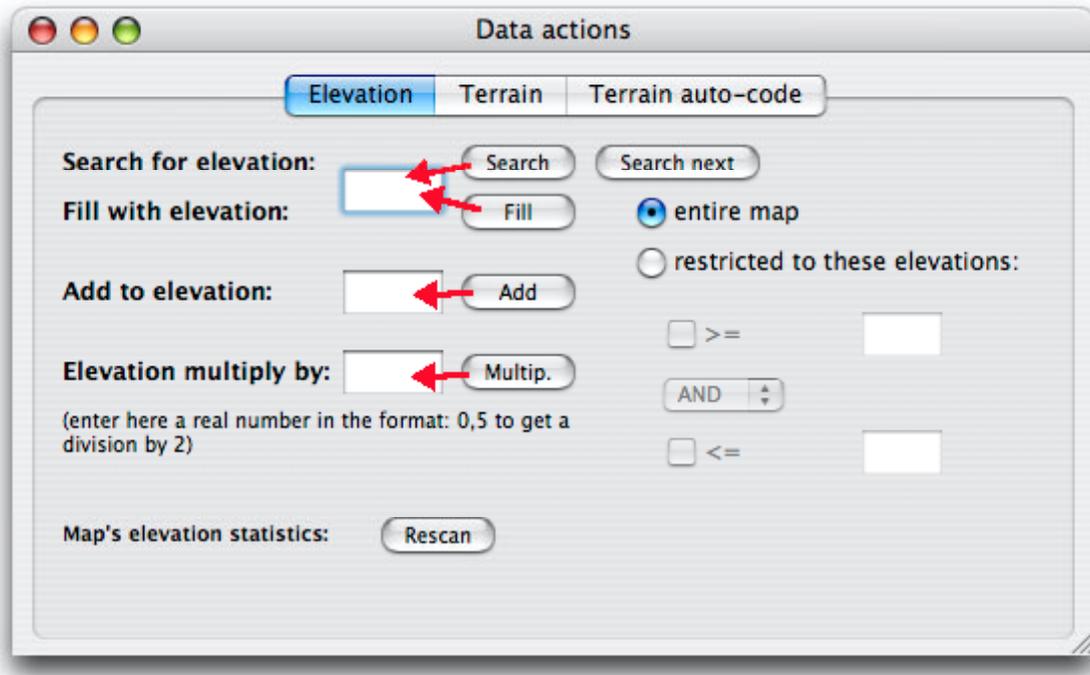
The command "Actions>Roof actions>Compensate Groof2-error for defective roofs" is intended to be used on CC3-CC6 maps to correct a logical bug if the map was created by the "Groof2.exe" tool. This command will not change the roof graphics and not the X/Y-position of the roof graphics on the map but only the logical vertices. Their X-coordinates will be moved one pixel to the left and the roof polygon will be adjusted to the roof's rectangle size. This command cannot be undone. The command "Actions>Roof actions>Compensate Groof2-error for all roofs" is only useful in case you are sure that the roof file was made entirely using Groof2.exe. This command cannot be undone either.

The command "Actions>Roof actions>Adjust all polygons to rectangle size" will move all polygon edges which are lying outside the logical rectangle of the roof to this rectangle's boundaries. It is possible that you will find such roof entries created by earlier 5CC versions. This command cannot be undone. The commands "Actions>Roof actions>Move all roof polygons one pixel to ..." might cause such errors and are available here for experimental purposes only.

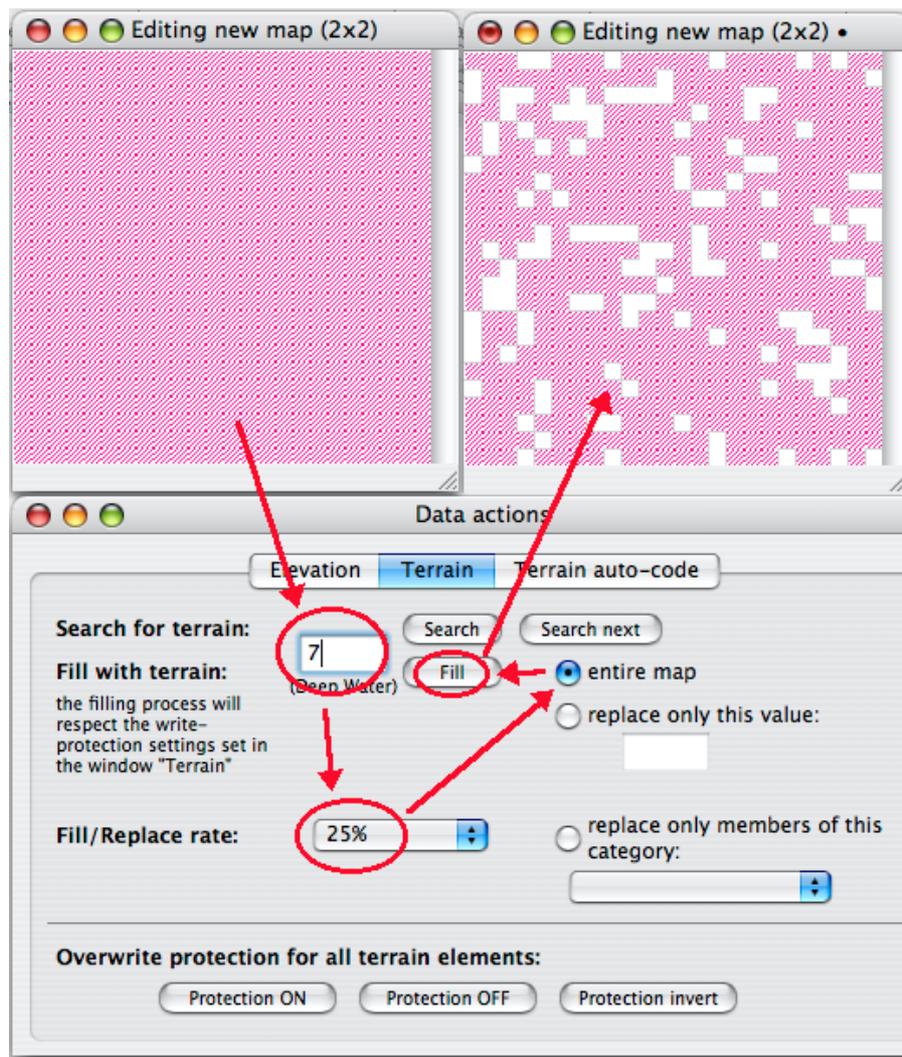
The command "Actions>LOS actions..." will bring a window to front to generate LOS or edit single LOS layers with more specifications. Will be discussed on page 26f of this manual.

The command "Actions>Tree library actions>Merge two tree libraries" is intended to merge to external tree-patch libraries into one file. To split a library into two or more files duplicate this file on your HD, load these duplicated files as libraries into the window "Trees" and edit them separately (deleting non-needed entries). See page 47ff.

The command "Actions>Data actions..." will bring a window to front to manipulate map's terrain and elevation data in a whole. The actions available for elevation will either have effect to the entire map or can be restricted to a selectable range of existing elevation values. Five actions are available: elevation searching (see above: menubar command "Edit>Find..."), elevation filling, elevation adding (works like an elevator), elevation multiplication (can be used to expand the contrast between minimal elevation differences) and scanning the map for min/max elevation entries. The elevation multiplication must be entered in your **localized** number format (examples: for US/UK: a period must be used for entering decimal values; for GE/FR: a comma must be used for entering decimal values) like it is shown in the information text in this window. The value "to-be-searched-for" or for "filling/replacement" has to be entered in the same edit field. For the other actions, the window has separate edit fields for entering the corresponding values.



Section "Terrain" of the window "Data actions" looks similar:

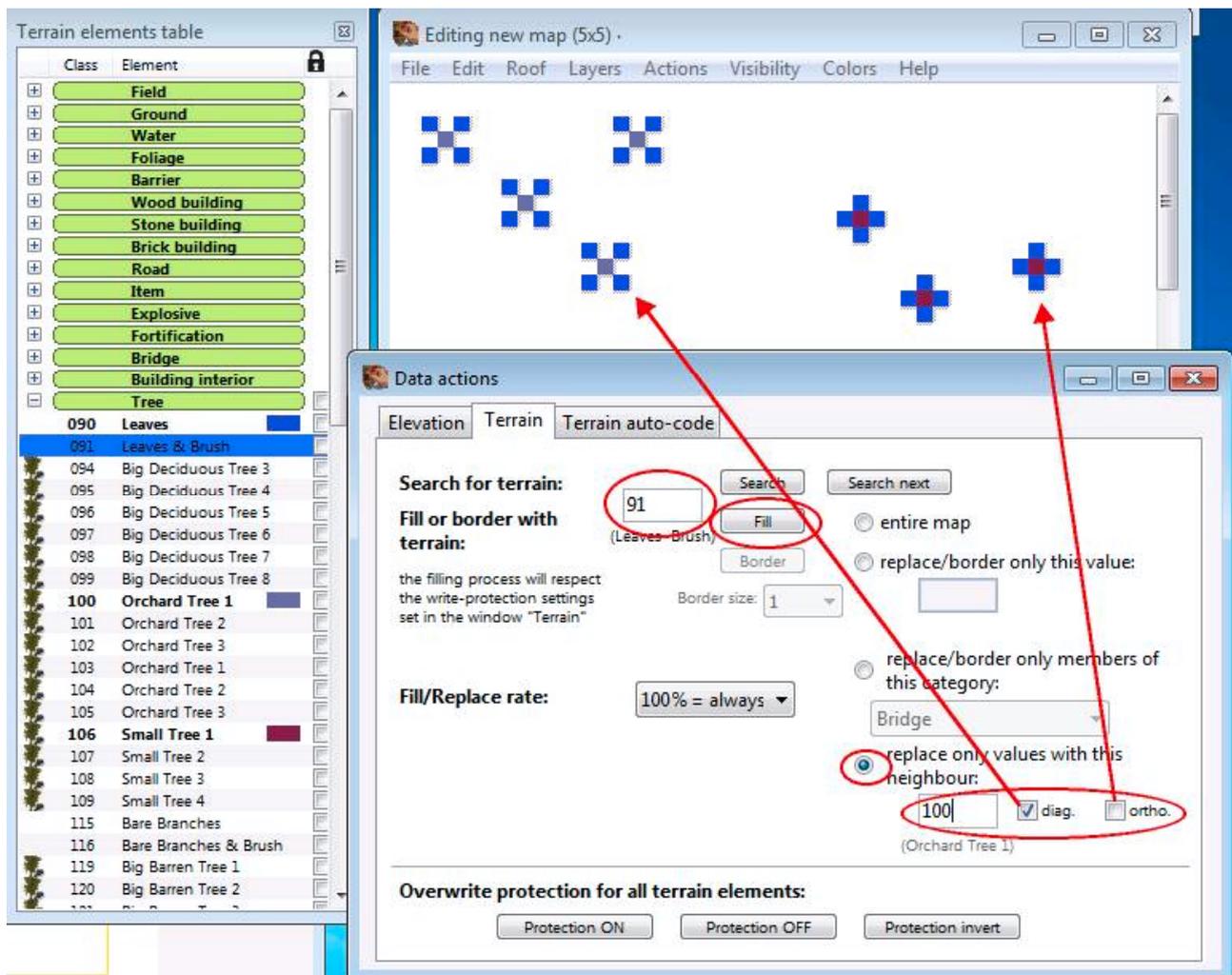


The actions available for terrain in the upper part of this window can have effect to the entire map or can be restricted to a single terrain value or to all values of a selected category. Two actions are available: searching and filling/replacement action. For filling you can select the filling rate ranging from 100% (= fill entirely) to 1% (= fill only few of them randomly). Setting a rate less than 100% will produce a randomly filling pattern. The action can be made undone using the command "Edit>Undo". To have access to the "Edit>Undo" command you must activate the map's editing window. Filling the entire map at a rate of 25% is shown in the picture on the previous page.

When you are in terrain editing mode, and you select a terrain value within the map or within the window "Terrain", the entry of the "to-be-searched" value in this window "Data actions", section "Terrain", will change automatically to the newly selected value (an intended sideeffect).

The window's section "Terrain" offers in its lower part to toggle all terrain elements' write-protection (on / off / invert).

New in 5CC v1.16: an additional button "border" in "Data actions":



put a data border around every data element of a given value (or if member of a category) on a map. PenSize 1 .. 25. Be careful: category-related bordering will overfill the map if you are bordering with a member out of the same category (for example: trees and leaves in same category. Bordering

all trees with leaves will fill the entire map with leaves. You must rearrange the categories first). Will respect not to border values written by the routine itself.

Also new in "Data actions": "replace only values with a given neighbour": three styles

- diagonally (the 4 elements in the edges)
- orthogonally (cross)
- or both combined (like bordering with pen-size = 1)

And: extended actions in "Data actions" -> "Elevation": bordering (even with slope) and selecting elements with a given terrain data.

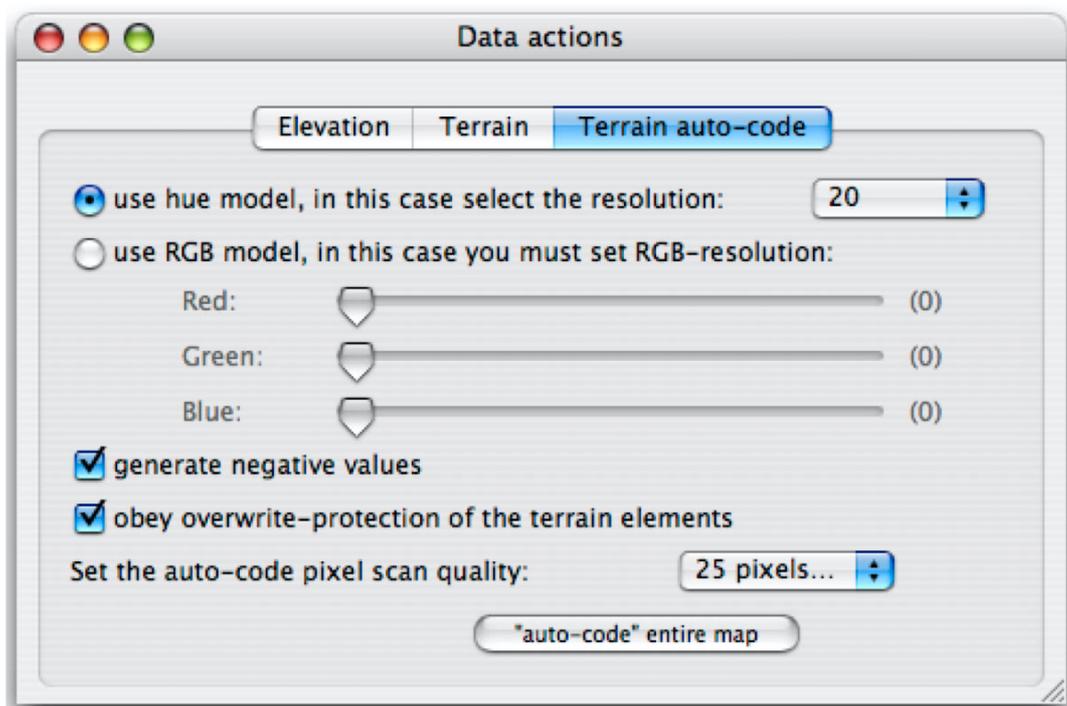
- negative slope: will create a slope of the selected border size,
- zero slope: will create an elevation border of the selected size,
- positive slope: will create an upward gradient.

Automatic map terrain coding

A critical and not really solved task of 5CC is to generate terrain datas from the colors of the background graphic. The third subsection of the menubar item "Actions>Data actions..." gives you access to a simple auto-coding routine (if the map's background graphics are loaded). The routine will scan each 10x10 pixel square of the map's graphic, determining it's color value and multiplying this value with a so-called "resolution". The higher the resolution is set (max. 255), the more different terrain element values will be generated. A too high resolution leads into a chaotic tile pattern without any use for further work. It is better to select less resolution (≤ 20) to make some of the auto-coding results usable. But you will be disappointed after auto-coding: a time consuming process which will you save no further works. I prefer not to use this functionality and using the color-based flood fill tool instead.

For those who want to test it I have implemented several adjustment possibilities. You can select the color-hue model or the RGB-channel model to differentiate the tile's color. Hue resolution can range from 1 to 255 (less than 20 is recommended). RGB-color resolution can range from 0 to 255. You can set the resolution for each channel seperately. A value of "0" means that this channel will not be checked when calculating the terrain element value. In all other cases the three RGB-channel values will be multiplied by their resolution and then divided by 255. All three RGB-channel values will be added (if their resolution is >0). The resulting value will be set as the tile's terrain element value. You can also determine if you want to generate negative values instead of positive values. And you can disable the terrain element's overwrite protection.

Be warned: it is a slow process. You can increase speed by selecting a faster pixel scanning method (popupmenu in the last row)



Menubar item "Visibility"

The "Visibility>Grid..." subsection let you select what kind of grid will be displayed. Because the "Coordinates window" shows you in which tile (elevation and deployment tile) the mouse pointer is located, you will not use this feature often I suppose. "Visibility>Grid...>Grid coordinates show" might be usefull for boot camp modders, because CC3-or-newer uses for deployment of troops in boot camp files the elevation tile numbering and for moving these troops an elevation tile coordinate grid (like CC2).

The "Visibility>Terrain elements table" subsection will give you access to some sorting operations, category visibility, "used-only" visibility, general category expanding/collapsing and general overwrite protection operations within the window "Terrain elements table". The same submenu will appear using right-mouse click (CTRL-mouse click on Mac) within this window itself. Since v1.11 the number of sorting criteria is extended and the program will save the last selected sorting criterium in the Preferences file.

All other commands are intended to bring several additional windows to front and / or to arrange them.

A shortcut to bring the main window "Map editor" to front is CTRL-M (PC) / -M (Mac). This is available within all windows (PC: also those windows without a menubar).

Menubar item "Color"

Select here which color theme to use in your "Editing window". It is a dynamically menu item, and it's (perhaps strange) behavior depends on your operating system (it is optimized for MacOS-X).

Menubar item "Layers"

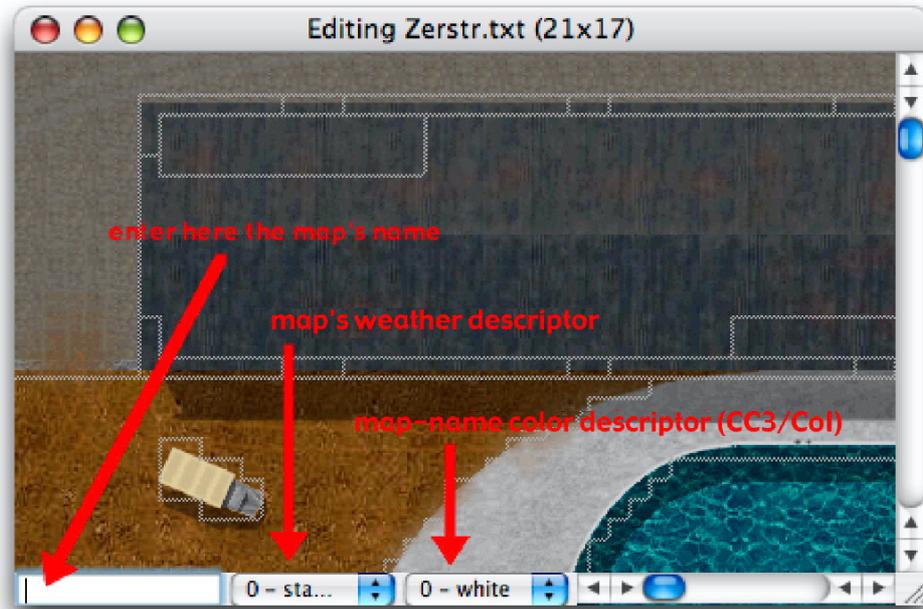
When within the main map-editing window, this menuitem lets you select the visibility of the BGM-layer, the shadow-layer, the trunks-layer, the tree-images-overlay and of the terrain-coloring effect. When the window "OVM" is the frontmost window (PC: within the window "OVM"), this menuitem lets you select the visibility of the OVM-graphics and the mines/explosives-layer. Works identical to the window "Visible layers" (see page 42f).

Since v1.15 you can have not only the tree-shadow-layer and the tree-trunk-layer, but also a graphical preview of the tree images which will be placed over the background by the game at runtime. You will have only one image for all tree data elements, so it will be no exact preview. To toggle the visibility of the tree images overlay select the menu item "Tree image".

Since v1.16 the layer "Interior" is added. "Interior" means the see the added or generated interior background image instead of the BGM-graphics. Might be usefull when defining roofs while the additional interior background image is loaded. Be warned: the visual effect will be strange when defining roofs. After the roof is defined, you will see the roof, and no longer the "interior", because the defined roof image is pasted over until you turn "Roof > Roofs" off or "Roof > Interiors" on. So I recommend to use this layer only for roof defining.

The windows

Window "Editing"



(the image shows the CC3-Zerstorer map by Andrew Glenn "Naked Foot" in the "Editing window". This map package contains an excellent CC3-map making guide)

This is the window where you will edit your map. In the window title you will find the map data file name and the map's size counted in elevation tiles.

For CC3-or-newer maps you can enter in the lower window area the map's name and you can set:

- the map's weather descriptor and
- the map-name color (for CC3/CoI maps), which will be used in some CCM/RtB/CCMT maps as terrain descriptor ("open/mixed/dense").

What will happen when clicking with the mouse pointer on the editing area depends on the selected editing mode. Selecting an editing mode is only possible in the "Tools window".

Changing the map's terrain values, the map's elevation values or the roof rectangles/polygon points must be done with the left-mouse click. When you are in terrain editing mode, you can use the right-mouse click (CTRL-mouse click on Macs) to bring a contextual popup menu to front. Beside some of the menuitems out of the menubar entry "Edit" it will display the last 10 used terrain elements, the default terrain element, the terrain element directly under the mouse pointer and the actual selected terrain element. You can change easily the desired terrain value using this way without moving across the screen to the window "Terrain elements table" and back (and it will be a good replacement for the missing "terrain eraser tool"). If the tools "Terrain pointer" or "Switch to CC2 repaired bridge data editing" are selected, then this contextual popup menu will contain a list of available tools for terrain editing.

Similar functionality is available for elevation- and LOS-editing. Right-mouse click in roof editing mode will bring the popup menu to front containing the commands of the menubar item "Edit" (for example the command "Edit>Define Roof") and easy access to the window "Roof informations". If available, the popup menu will give you also access to the "Edit>Undo" command.

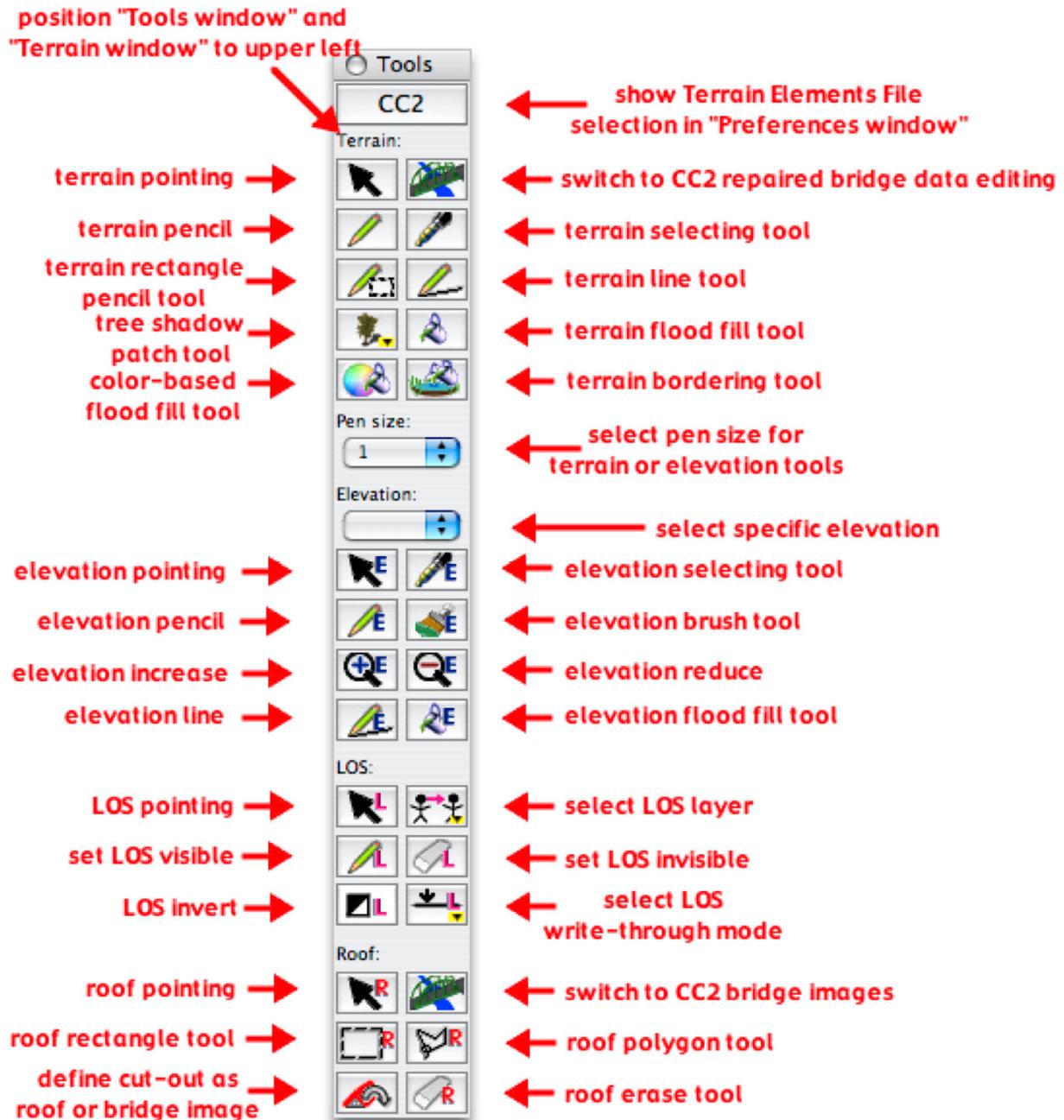
The functionality of the right-mouse click (CTRL-mouse click on Macs) can be changed to eyedropper functionality (like in 3C.exe by Cpl_Filth) in the window "Preferences", section "Map > Map editing".

In addition to the mouse you can use your keyboard to enter elevations when you are in elevation editing mode. This works identical to CCEdit: you must enter two digits via the keyboard to change the selected terrain/elevation tile's elevation. If you want to enter values below 10 you must press "0" and the desired digit. Entering elevations greater than 99 is only possible via the window "Tools".

Scrolling can be done by the scrollbars at the left and bottom side of the window and by mouse wheel (sorry, no mouse wheel support in the PPC-Mac-version). SHIFT+mouse wheel will scroll horizontally. The mouse wheel resolution can be set within the window "Preferences", section "Map > Map editing". CTRL+mouse wheel (or CTRL+SHIFT+mouse wheel) will temporarily double the mouse wheel resolution. Scrolling is also possible by using the arrow keys of the keyboard. The step width of the arrow keys can be set also within the window "Preferences", section "Map > Map editing". A combination of arrow key and ALT, CTRL or both of them will increase the step width.

Window "Tools"

This window contains a tool palette. Selecting a tool here will change the editing mode in the "Editing window". Not every tool is available for CC3-or-newer maps. The window's orientation can be altered between "vertically" and "horizontally" in the "General" section of the Preferences window.



The top most button of the palette will bring the window "Preferences" to front showing the "Terrain Element File" selection. When you click on the text "Terrain:" below, the window "Tools" will be positioned in the upper left edge of the screen. The window "Terrain elements table" will be positioned at its right side. Contextual help is available for most of the tools by holding down the ALT-key while clicking on the button (will show the window "Help").

The terrain editing tools:



terrain pointing: it is the default tool. Clicking with this tool on the editing area of the "Editing window" will only select internally the actual elevation tile and terrain tile. Special for CC2: if you have selected CC2-repaired bridge data editing, then this tool will let you activate the selected elevation tile as a valid "repaired bridge data area". These elevation tiles will be added at the CC2 data files end in the second data section. Look into CC2's original "Map300" file and my text "CC2Guide-Bridg-files_v6.pdf" available on the internet. To deselect such a tile you can only use the "Edit>Clear" command.



switch to CC2-repaired bridge data editing: only available in CC2. After pressing this button all other terrain editing tools will only have effect on the defined repaired bridge data area. All other map areas are pasted over with a colored pattern. When "repaired bridge data editing" is ON, then elevation editing is not possible. Only terrain editing is possible.



terrain pencil: define the clicked terrain tile with the actual terrain value. Pencil size depends on the selection set in the popup-menu "Pen size".



terrain selecting tool (eyedropper): click on a terrain tile to use its terrain value as actual terrain value. Alternatively you can select the actual terrain value in the "Terrain window".



terrain rectangle pencil tool: click and drag will fill the selected terrain tiles with the actual terrain value. This tool is not available for CC2-repaired-bridge data editing.



terrain line tool: will draw a terrain line from the first selected position to the next selected position. Line size depends on the selection set in the popup-menu "Pen size". The placing of the first selected position will look like the use of the "terrain pencil" tool. Sorry to say that no animated cursor is available to see the spinning line between the first selected position and the actual mouse cursor position. You can scroll prior to place the second selected position to draw lines larger than the visible editing window size. This tool is not available when editing CC2's repaired bridge datas.



terrain brush tool: will fill the entire elevation tile with the actual terrain value. If you want to see the placement area prior to using this tool I recommend to set the visibility of the elevation tile grid to "ON". Only available when editing CC2's repaired bridge datas.



terrain tree shadow patch tool: let you select the actual tree shadow patch and will turn tree shadow patch placing on. The placement of the selected patch depends on the position of the mouse pointer and the position of the patches hotspot. If your actual patch has a graphic associated, then not only the data values out of the patch will be placed but also all black pixels will be transferred to the layer "shadow" and all other non-white pixels will be transferred to the layer "trunks". Such a patch placement can be made undone using the command "Edit>Undo". This tool is not available for CC2-repaired-bridge data editing.

To select a tree shadow patch, just click a little bit longer on the icon to get a contextual popup-menu to select one. The library-related grouping of the available tree shadow patches is indicated by horizontal lines in this menu. You can also select the actual tree shadow patch in the list of the left area of the window "Trees".



terrain flood fill tool: will fill the area surrounding the clicked terrain tile as long as it contains the same terrain value. Filling an entire CCM-Big map will take about 10 seconds on slow cpus. The used algorithm is a non-optimized non-recursive linear 4-neighbours flood fill (for those who will be afraid to get a stack overflow). To work

properly this tool needs a lot of RAM (for heap). Don't use it under RAM-critical conditions. This tool is not available for CC2-repaired-bridge data editing.



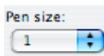
color-based flood fill tool: without respecting the existing terrain definitions (but you can enable overwrite protection as for the other tools, see page 37) this tool will fill the area surrounding the clicked terrain by following the color of the background graphics. This will give you the opportunity to auto-code wider map areas. The technique is the same as for the flood fill tool mentioned above. But it will popup always a modal window where you must set the tolerance of the flooding process and the scanning quality. Less quality will result in faster calculation and in some cases even better results. For an example on how to use this tool please look at pages 68ff.



terrain bordering tool: this tool works similar to the terrain flood fill tool, but it will not change the contents of the clicked terrain area. It will scan through the touching terrain elements with the same terrain value and will then give the entire area a border containing the active terrain value. The tool will respect the pen size setting (set in the popup-menu "Pen size") and it will respect terrain element overwrite-protection (set in the window "Terrain elements table", see page 37). The tool will also not overwrite non-touching terrain elements in the neighbourhood of the same value which was clicked. During border search the tool will overwrite the clicked area with terrain element value "-32001" to have faster backtracking. Later on it will refill automatically via flood-fill algorithm the area with the original value. That means that this tool will take twice as long as the terrain flood fill tool! Same restrictions as for this tool mentioned above. With pen size greater than 3 it will take really long to "border" a structure which is larger than your visible screen.

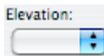
Don't use it under RAM-critical conditions. This tool is not available for CC2-repaired-bridge data editing.

The terrain writing of negative terrain element values is only possible if this is enabled in the window "Preferences" section "Terrain Elements file". The overwriting of terrain datas is only possible if they are not write-protected. Write-protection can be toggled on/off in the window "Terrain elements table" and in the window "Data actions" section "Terrain".



The popup-menu "Pen size": use this popup-menu to set the pen size for elevation-pencil **and** terrain-pencil for the tools "terrain pencil", "terrain line", "elevation pencil", "elevation line", "elevation increase" and "elevation decrease".

The elevation editing tools:



select specific elevation: use this popup-menu to set the actual elevation (one elevation step = 0.5 meters).



elevation pointing: use this tool to select the actual elevation tile (CC2 map) or terrain tile (CC3-or-newer map). The selected tile will be highlighted and its height will be shown numerically. The elevation height of all other tiles will be shown only if their neighbours have a different height.



elevation selecting tool: click on an elevation tile to use its elevation as actual elevation value. Alternatively you can select the actual elevation via the "select specific elevation" popup-menu.



elevation pencil: clicking with this tool on an elevation tile (CC2 map) or terrain tile (CC3-or-newer map) will change the tile's elevation height to the actual value as

selected in the popup-menu above. Pencil size depends on the selection set in the popup-menu "Pen size".



elevation brush tool: for CC3-or-newer maps this tool will set the actual elevation value for the entire elevation tile. For CC2 maps the highlighted elevation tile and its four neighbours will get the actual value.



elevation increase: will increase the highlighted tile's value in step by 1. Pencil size depends on the selection set in the popup-menu "Pen size".



elevation reduce: will decrease the highlighted tile's value in step by 1. Pencil size depends on the selection set in the popup-menu "Pen size".



elevation line tool: works similar to the tool "terrain line". Pencil size depends on the selection set in the popup-menu "Pen size".



elevation flood fill tool: works similar to the tool "terrain flood fill".

The LOS editing tools:



LOS pointing: use this tool to select the actual deployment tile. This tile will be highlighted. And the LOS from this tile to all other tiles will be shown for the selected "LOS layer". LOS can be "ON" or "OFF" (= line of sight is free or blocked). The deployment tiles with LOS "ON" will be shown clearly, those with (blocked) LOS "OFF" will have a pattern pasted over. The color of this pattern can be defined in your actual color theme. So if you click with this "LOS pointing tool" on various deployment tiles, you will get different results, because every deployment tile can have different LOS to the other tiles. That's normal. - **All LOS editing tools are only available if a LOS table is present in RAM (via generating or via loading).**



select LOS layer: in CC the LOS is not only defined for "Line-Of-Sight" from each deployment tile to all other deployment tiles. There are four LOS conditions defined for every relation:

1. Soldier viewing Soldier (abbreviated SvS),
2. Soldier viewing Vehicle (SvV),
3. Vehicle viewing Soldier (VvS),
4. Vehicle viewing Vehicle (VvV).

5CC will refer to these four LOS conditions as "LOS layers". They are 4, because it is defined this way in all CC games since CC2. Internally the LOS files are storing all these relations in 4 bit-fields, filled up to full byte length with padding zero bits, for every deployment tile⁶.



set LOS visible: when switching this tool or to the next one you will not change the actual deployment tile but you can set LOS "ON" for the deployment tile you are clicking on (usually LOS is "ON" for each tile to itself. You can control the effectiveness of the LOS calculation algorithm by checking if LOS is set "ON" for every tile to itself).

⁶ Cpl_Filth wrote in this comment in his cclos.h: ...file is made up of <number of deployment tiles> * 4 * <Ceiling(number of deployment tiles / 8)> byte rows; each row is a bitfield (0 can't see, 1 can see) from that mega tile to every other mega tile; the 4 rows correspond to: soldier viewing soldier, soldier viewing vehicle, vehicle viewing soldier, vehicle viewing vehicle; vehicle is used for standing soldier; los files are only used for strategic ai and therefore have no effect on 2 player games; a file with all zeros is valid but the AI wouldn't play worth a shit.



set LOS invisible: with this tool you can set LOS "OFF" for the relation between the actual highlighted deployment tile and the tile you have clicked on with the mouse pointer.



LOS invert: with this tool you will invert the LOS value below the mouse pointer.



select LOS write-through mode: at the moment six "modi operandi" are selectable for the tools "set LOS visible", "set LOS invisible" and "LOS invert":

- writing only to the active selected "LOS layer";
- writing to all 4 LOS layers at the same time (but only one layer will be visible for you in the editing window), to make LOS editing/correcting a little bit faster;
- writing to the selected "LOS layer" and the two "Soldier viewing ..." LOS layers;
- writing to the selected "LOS layer" and the two "Vehicle viewing ..." LOS layers;
- writing to the selected "LOS layer" and the two "... viewing Soldier" LOS layers;
- writing to the selected "LOS layer" and the two "... viewing Vehicle" LOS layers.

The roof editing tools:



roof pointing: select with the mouse pointer a roof entry and highlight it (= making it to the actual roof entry). If the "Roof informations window" is visible, then all the roof entry's values (including the graphics) will be ported to this window. The roof entry's graphic you will see in the "Editing window" depends on what you have selected via the menubar item "Roof>...": roof exterior view, roof interior view, blown bridge, repaired bridge or only the roof coordinate boundaries. Which roof entry boundaries will be shown can be selected via the commands of the "Roof>Rectangles or Polygons..." subsection. Warning: roof exterior view will be set automatically to "ON" when switching to roof editing! And blown bridge view will be set automatically to "ON" when switching to bridge image editing.



switch to CC2 bridge images: only available for CC2: switching to editing / defining CC2 blown (and if necessary repaired) bridge images. Warning: bridge blown view will be set automatically to "ON" when switching to bridge image editing! Because there is always one image allowed for blown bridge and one image for repaired bridge, these images will be always highlighted. "Edit>Copy" and "Edit>Paste" commands will have effect on this one and only image.

This tool is also available for CC:LSA maps after the file "Bridges.azp" is imported via the menubar entry "File>Import>Import Bridges.AZP file...".



roof rectangle tool: use this tool to select a cut-out for roof defining. The only possible tool when defining CC2 bridge image areas. It is a click-and-drag tool: the selected cut-out will get a pattern painted over which color can be set in the actual color theme⁷. To use this cut-out as a new roof entry, you must use the "define cut-out as roof or bridge image" tool or the "Edit>Define Roof" command. Cursor shape of this tool can be set in the window "Preferences", section "Map > Map editing".



bridge rectangle tool: same functionality as the "roof rectangle tool" mentioned above, but for CC2-bridge area defining. To use the cut-out defined by this tool as a new bridge area, you must use the "define cut-out as roof or bridge image" tool or the "Edit>Define Roof" command. Cursor shape of this tool can be set in the window "Preferences", section "Map > Map editing".

This tool is not available for CC:LSA maps.

⁷ a bug in certian MacOS-X environments: the pattern might vary if you are using some very light grey colors.



roof polygon tool: again a tool for selecting a cut-out for roof editing, compatible to the "12 vertices concept" of CC3-or-newer roof files. This tool is not available for CC2 bridge image cut-out selecting. Click with the mouse pointer on the edges of your desired roof area polygon (up to 12 points are allowed, I recommend to use the upper-left edge as a starting point). If the last click is near enough to the starting point, then 5CC will automatically close the polygon, otherwise it will be closed when the 12th point was set. While defining the polygon you will have a line going from the last defined polygon point to the actual mouse cursor position (only if double graphics buffering is set to "on" in Preferences). The selected cut-out will get a pattern painted over it. It's color can be set in the actual color theme². To use this cut-out as a new roof entry, you must use the "define cut-out as roof or bridge image" tool or the "Edit>Define Roof" command. When you have selected your cut-out with this tool, you can toggle to "roof rectangle tool" to use the surrounding rectangle as a cut-out (and you can toggle back unless you have not defined the cut-out as roof). This gives you (even when editing a CC2 map) the opportunity to select the edges of a building even if you want to define rectangles and no polygons. If you use this tool for defining CC2 roofs, the polygon will be automatically converted into the corresponding surrounding rectangle. Cursor shape of this tool can be set in the window "Preferences", section "Map > Map editing". The visual size of polygon edge-markers⁸ and polygon lines can be set in the window "Preferences", section "Map", too.



+
SHIFT-
key

roof polygon tool combined with pressed SHIFT-key: use it as described above to create a closed polygon. When closing the polygon while the SHIFT-key is pressed, the polygon lines will stay visible. You can now click on any polygon edge while the SHIFT-key is pressed and can drag it around to another location to make corrections to the polygon's shape. If you click at any area while the SHIFT-key is released, you will lose the polygon definition and the roof polygon tool will start to define a new polygon. If you click on the tool "define cut-out as roof or bridge image" or use the "Edit>Define Roof" command. The selected cut-out will get a pattern painted over it. It's color can be set in the actual color theme². To use this cut-out as a new roof entry, you must use the "define cut-out as roof or bridge image" tool or the "Edit>Define Roof" command again.



define cut-out as roof or bridge image: same effect as the "Edit>Define Roof" command (which can be reached via menubar shortcut CTRL-D (PC) / ⌘-D (Mac)). This tool will define the selected map area (selected by rectangle tool or by polygon tool) as a roof entry, setting the roof entry's coordinates (and vertices in case of CC3-or-newer roofs) and cutting out the background's area. This cut-out will be used for the roof exterior view and will be also pasted automatically to the clipboard (a technique introduced by Chris Ellen's CCEdit). You can use the clipboard graphic in your favorite graphics editor to paint the interior view over it, copy it back to the clipboard, sitching to 5CC, selecting "interior roof view" ON and pasting this interior view in for the highlighted roof entry. The opportunity of this way is that you must not think about the cut-out size. If you have added a background view with buildings' interiors painted on in the second background layer (via the "File>Add...>Add interior background picture..." command), a cut-out from this layer will be transfered to the roof interior view when the "Edit>Define as Roof" command is issued. A technique introduced by Cpl_Filth's tool Groof. Recommended for maps with more than only few roofs or for maps with overlaying roofs.

⁸ the edge-markers are centered around the hotspot. So setting pen-size to 5 will create a graphical cross 21x21 pixel centered over the hotspot for each edge-marker. For line pen-sizes the same: a pen-size greater than 1 for roof-cutout lines will create lines laying half the width over the defined area and half the width outside the defined cutout-area.



roof erase tool: if you have selected "Interior roof view ON" then this tool will delete the interior view image of the actual highlighted roof entry. If you have "Exterior roof view ON" then this tool will erase the entire roof entry (exterior and interior view) without warning. Works identical like the "Edit>Clear" command and can be undone via "Edit>Undo".



bridge erase tool: if you have selected "Bridge repaired view ON" then this tool will delete the repaired-bridge view image of the CC2-map. If you have "Bridge blown view ON" then this tool will erase only the blown-bridge view image (changed in v1.08 !). The tool will ask if you really want to delete the bridge image. Works identical like the "Edit>Clear" command and can be undone via "Edit>Undo".

Caution: if you delete only the blown-bridge view image and still keep the repaired-bridge view image, 5CC will not save this to a Bridg### file! To have a properly working Bridg### file for CC2, you must define a blown-bridge view image! The repaired-bridge view image can be missing. If the blown-bridge view image is missing, then the map will have no Bridg### file at all.

Something special you might find usefull concerning the toggle between roof rectangle tool and roof polygon tool: define a roof cut-out using the roof rectangle tool. Since v1.16 it is possible then to switch to roof polygon tool without losing the defined cut-out coordinates. You can then hold down the SHIFT-key and click on any edge of the rectangle to move the edges via mouse-dragging to another position, turning the shape of the rectangle into a polygon. Click on the tool button "define cut-out as roof or bridge image" twice to define now your altered cut-out as a roof entry. The opposite way is also possible: define a cut-out using the roof polygon tool. Switch then to the roof rectangle tool and the former polygon will be tranformed automatically into the shape of the surrounding rectangle (and you can then define it as a roof; - usefull for CC2-maps which allow only rectangular roof entries). Switching back to roof polygon tool will then restore the former polygon shape of the roof cut-out.

Window "Terrain elements table"

This window contains a three-column listbox. The first column contains the terrain element class numbers of the actual "Elements file", the second column the corresponding terrain element names and the third one the checkboxes to toggle the overwrite-protection for the terrain element (default is unchecked = no write-protection). Categories are marked with a light green rounded rectangle. These categories are user defined. See page 15f of this manual. If the actual "terrain elements file" does not contain a column "Category", you will see one single category with empty title only. The categories "Negative value" (for values less than zero) and "Unknown value" are reserved and generated by 5CC when loading a new map: these reserved categories will contain map terrain values found in the map which are not defined in the actual loaded "terrain elements file". The category "Negative value" will be added automatically if you have enabled "add '-1' to terrain tables in RAM" in the window "Preferences" section "Elements File". See page 16 of this manual.

Open a category by clicking on it's disclosure triangle / plus-icon and select a terrain entry to change the actual terrain element for terrain editing tools to be used in the "Editing window". If you click on the listbox's headings, the columns will be sorted alphabetically (thats why I have entered the numbers with leading zeros). When you enlarge the window you will see further columns containing terrain's height, level and category definitions. Under normal conditions, these values are needed for map editing. You can use right-mouse click (CTRL-mouse click on Mac) to bring a

context popup menu to front which will let you sort the list using different criteria, changing the font's size, toggle the view from "grouped" to "show all" and back or toggle the view from "used only" to "show all" and back. And: some sorting criteria have keyboard shortcuts for quick access.

You have quick access to expanding all categories via CTRL-E (PC) / -E (Mac) and to collapsing all categories via CTRL-K (PC) / -K (Mac).

Since version 1.06 the program will identify terrain elements representing a tree. These terrain elements usually contain the "Tree-ID" string "Tree" in their name (see page 16). This "Tree-ID" string can be changed inside the Preferences file "5CC.ini". Identified tree representing terrain elements are indicated by a little preceding graphic in the first column (). Such terrain elements will generate a tree image placement in the tree-images-overlay (new since v1.15)

If the terrain values are grouped into categories, the expanding/collapsing state of the categories will have effect on the terrain-coloring layer (if this is set in the window "Preferences", section "Layer"). By default, only the values out of expanded categories will show the terrain-coloring effect if the terrain-coloring layer is visible. If the terrain values are not grouped into categories, then the entire window contents will be treated as one entire category.

Window "Coordinates"

This window will show the position of the mouse pointer in your "Editing window" in absolute map pixel coordinates (counted from 0,0 = upper left corner) and translated into it's position counted in elevation and in deployment tiles. It shows also a minimap graphic (which is identical with the map's monitoring map (MMM) graphic). The actually displayed map cut-out in the "Editing window" is shown on this minimap as a rectangle. Clicking on this minimap will change the "Editing window" map cut-out. And the terrain element value and elevation under the actual mouse pointer position will be shown here.

Windows "OVM" and "MMM"

These windows are only able to show the OVM and MMM graphics. Editing is not possible there. To change the OVM and/or MMM graphics use the commands of the "File>Import..." or "File>Generate..." subsections.

Within the window "OVM", scrolling can be done by the scrollbars at the left and bottom side of the window and by mouse wheel (sorry, no mouse wheel support in the PPC-Mac-version). SHIFT+mouse wheel will scroll horizontally. The mouse wheel resolution can be set within the window "Preferences", section "Map > Map editing" (common mouse wheel resolution for window "OVM" and the main map-editing window). CTRL+mouse wheel (or CTRL+SHIFT+mouse wheel) will temporarily double the mouse wheel resolution.

PC-version: the window "OVM" has its own menubar. When the window "OVM" is the frontmost window (on Mac. PC: within the window "OVM"), the menubar entry "Layers" lets you select the visibility of the OVM-graphics and the mines/explosives-layer. Works identical to the window "Visible layers" (see page 42f).

The mines/explosives-layer is generated when toggling its view in the window "OVM" or when exporting a graphic containing this layer. It will show a filled circle marking on each elevation tile⁹ containing terrain values with one or more of the following conditions:

- the name of the terrain value contains the character sequence "explo",
- the name of the terrain value contains the character sequence "mine",
- the name of the terrain value contains the character sequence "muni",
- the name of the terrain value contains the character sequence "flam"; or
- the terrain value is member of a category containing the character sequence "explo",
- the terrain value is member of a category containing the character sequence "mine".

These character sequences can be changed in the window "Preferences", section "Layers". If you enter a blank character sequence in one of the edit fields there, 5CC will use less identification criteria to recognize terrain values as being explodable. The color and the diameter of the filled circle, which serves as the indicator can be set in the window "Preferences", sections "Layers" and "Colors".

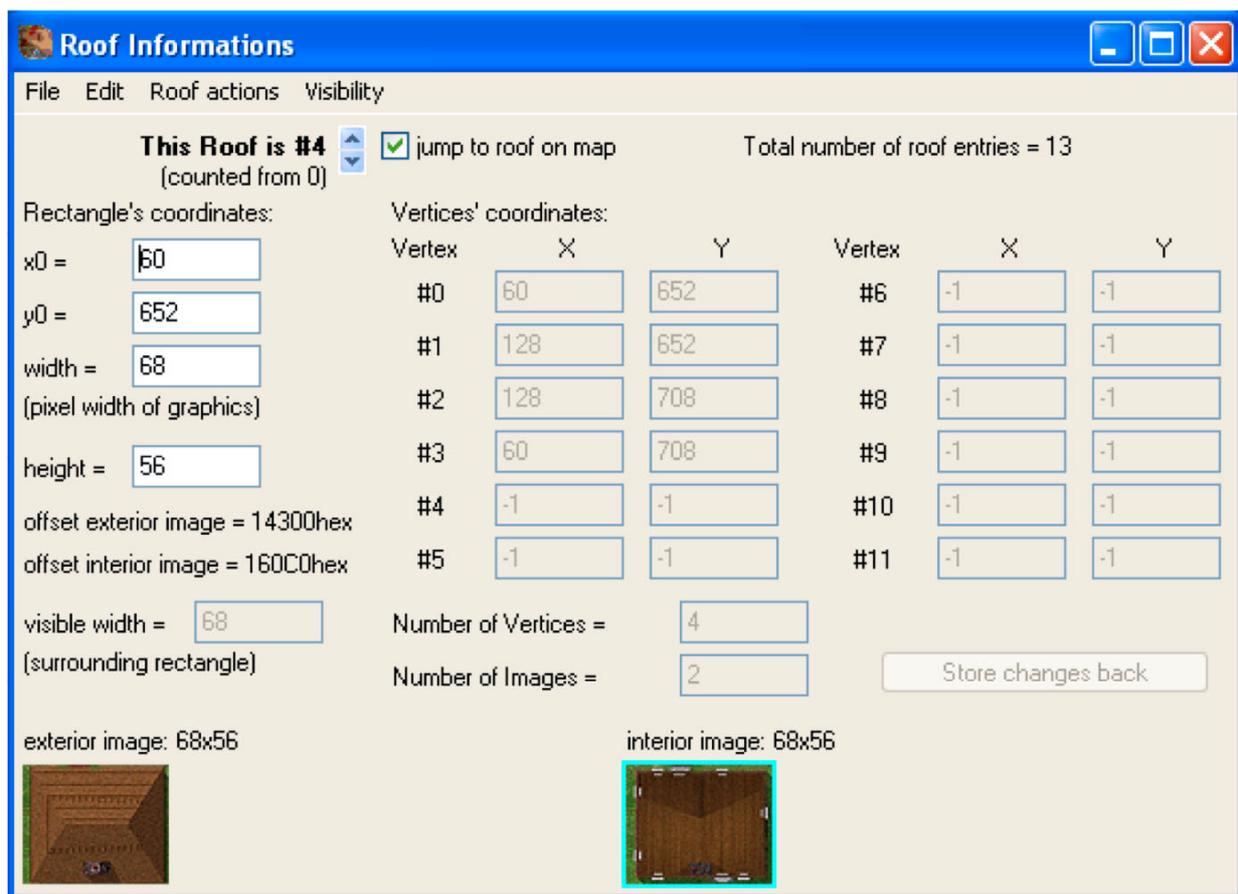
Window "Map properties"

Here you can control the names of the loaded files. Datas marked with a pencil icon have been changed. And you can get informations about the map's size. New since version 1.06 is tree counting (the number of trees is limited for certain conditions on CC2 maps). The number of trees is not updated during terrain editing. You must use the button "Rescan for trees" of this window to recalculate the actual number of trees on this map.

⁹ An elevation tile is 40x40 pixels large, containing 16 terrain tiles.

Window "Roof informations"

If you are in roof editing mode, this window will contain all datas of the actual highlighted roof entry (together with the total number of roof entries). For compatibility reasons 5CC will generate a basic set of four vertices (describing the roof rectangle) even for CC2 roof entries. You can change all numerical entries (except for the roof entry's sequence number and the graphic offsets) in this window and you can write these changes back to the roof entry in the "Editing window" by pressing the "Store changes back" button. The roof exterior and interior view graphics are editable here via copy & paste to/from the clipboard like in the "Editing window". To have access to the graphics you must select them by clicking with the mouse into them. This will highlight the selected graphic by painting a light blue rectangle around them (see screenshot below). You can deselect the graphic by clicking in non-active areas of this window or by clicking into one of the numerical entries.



(this screenshot shows a roof entry of a CC2- map in the "Roof informations window". Vertices are calculated for CC2 roofs, too, but they can not be edited. This is only allowed for CC3-or-newer maps. In the lower part of the window you can see the interior image selected and highlighted by a light blue rectangle.)

You are responsible to adjust the values of the numerical entries to the size of the pasted-in graphics. It is not allowed and not supported by any CC game to have different sizes of exterior and interior graphic! **Also you have to keep track of the value of the "Visible width": this value must be equal or lower than the width of the graphic!**

Behind the roof entry's sequence number there are two little arrows which you can use to scroll through the list of roofs (you will see the selected roof entry centered inside the "Editing window" if the checkbox "jump to roof on map" is set to on). This will give you access to roofs even outside the map. But there is now way for you to create new roofs using this window. This can be done solely inside the "Editing window".

The "Roof informations window" will show the roof's graphics without transparency effects. White color will be shown as white, and the black strip (used for 8-byte padding purposes by the CC-game inventors) at the right side of original CC3/4/5/M/RtB roof entries will be shown too.

The "Roof informations window" has a menubar of its own (Mac & PC). The menubar commands "File>Close Roof Informations" will close the window, the "File>Preferences..." (MacOS-X: "5CC>Preferences...") will show the "Preferences window" and the command "File>Quit" will terminate 5CC.

The commands "Edit>Copy" and "Edit>Paste" can be used to handle clipboard datas between the selected graphic or the selected numerical entry field of this window. The command "Edit>Keep roof graphics size when pasting-in new image" should be set "on" (= checked). This will guarantee that the graphic size of the already defined roof will not change if you are pasting-in a new graphic from the clipboard. If this command is set to "off" (= unchecked) you can paste-in a graphic will can be of a different size than the already defined one. **In this case you must re-adjust the numerical values (namely: "Visible width"!) manually.** All changes (to graphics and/or numericals) will take effect to the edited map only after pressing the button "Store changes back". Therefore an undo-functionality is not implemented in this window!

Several "this-roof-only" commands are accessible via the "Roof actions" subsection: "Roof actions>Adjust vertices to this exterior graphic's size" can be used to adjust the surrounding logical rectangle and the CC3/4/5-vertices to a newly pasted-in exterior graphic.

The commands "Roof actions>Clear this Roof" and "Clear this Roof outside of map" can be used to erase the actually shown entry. The "Roof actions>Clear this Roof" command can be made undone within the "Editing window": you must switch to the "Editing window" and command there "Edit>Undo".

Original CC3/4/5/M/RtB/CoI/CCMT-roof graphics are usually padded to a width which is a multiple of 4 pixels (= a multiple of 8 bytes) to make read-in on runtime faster. The unused graphical area at the right side of these graphics is usually black. For this actual shown roof inside this window you can eliminate these black strips at the right side of the graphics by adjusting the roofs' exterior and interior graphics to the dimension of the logical surrounding rectangle using the command "Roof actions>Adjust this roof graphics to rectangle size". To undo this action or to add these padding black strips to all your roof graphics you can use the command "Roof actions>Adjust this roof graphics to CC3/4/5's 8-byte format".

The command "Roof actions>Shift this roof vertices one pixel to the left" is intended to be used on CC3-CC6 maps to correct a logical bug if the map was created by the "Groof2.exe" tool. This command will not change the roof graphics and not the X/Y-position of the roof graphics on the map but only the logical vertices. Their X-coordinates will be moved one pixel to the left. This command cannot be undone.

As for all editings within this window you must press the button "Store changes back" to take effect for all these menubar commands mentioned above. The button will be active only if changes are present (and an additional small text will be shown, too).

The menubar command "Visibility>Show map editor" is for returning to the "Editing window" without closing the window (in case you got lost).

In case your roof file will not show the expected interiors/exteriors during gameplay, please look with this roof-information window for roof entries with "visible width = 0"! See above.

Window "Bridge informations"

This window works similar like the window "Roof informations". It is only available for CC2-maps. It will show both images ("bridge blown" and "bridge repaired") side by side together with their coordinates. You can manipulate these coordinates here directly. Don't forget to press the button "Store changes back" once you have made your settings. Pasting in / cutting out of the graphics is also possible in this window (using the clipboard).

Window "Visible layers"

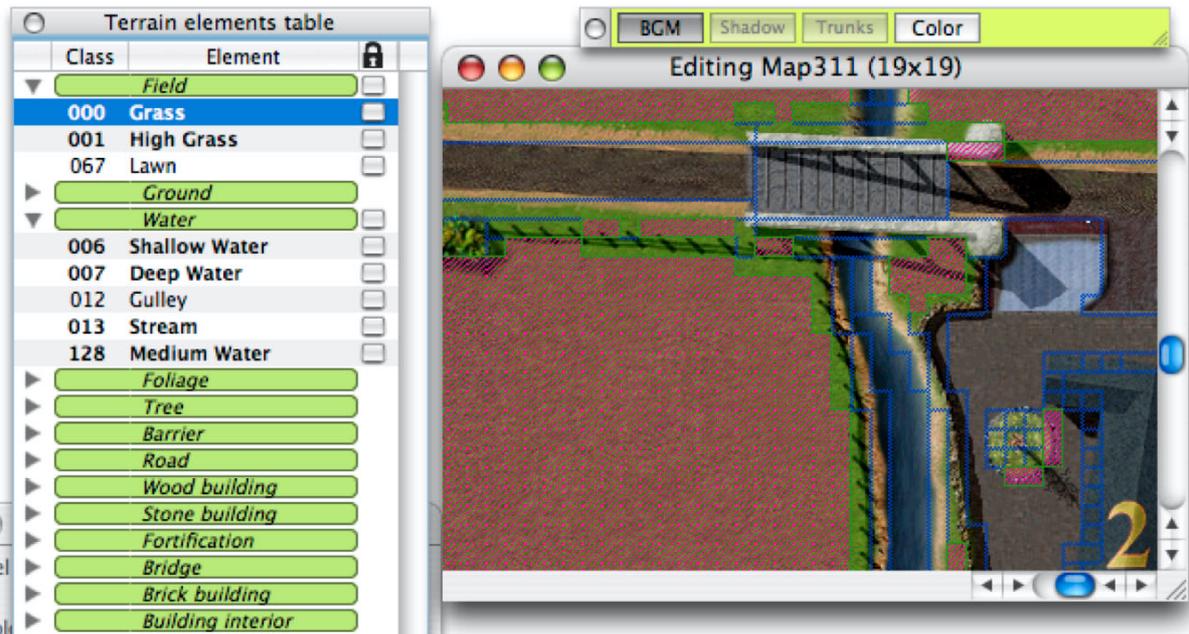
After loading/creating a map this small window will appear (usually on top of the title of the main window "Editing"). In the left part of this window there are 5 buttons to toggle the visibility of the BGM layer, shadow layer, trunks layer, tree-images-overlay and terrain-coloring effect layer of the main map-editing window. Maps without placed tree shadow patches and without imported shadow / trunks image files will have the shadow and trunks layer buttons disabled (the import of shadow / trunk layer graphics for already existing maps can be done via the "File>Add..." section of menubar commands). Turning BGM layer off will give you a white background. That will not mean that the BGM is erased. By default BGM layer is on. And by default the terrain-coloring layer is off. Setting terrain-coloring layer on will decrease program's performance.

Since v1.15 you can have not only the tree-shadow-layer and the tree-trunk-layer, but also a graphical preview of the tree images which will be placed over the background by the game at runtime. You will have only one image for all tree data elements, so it will be no exact preview. To toggle the visibility of the tree images overlay press the button "Tree".

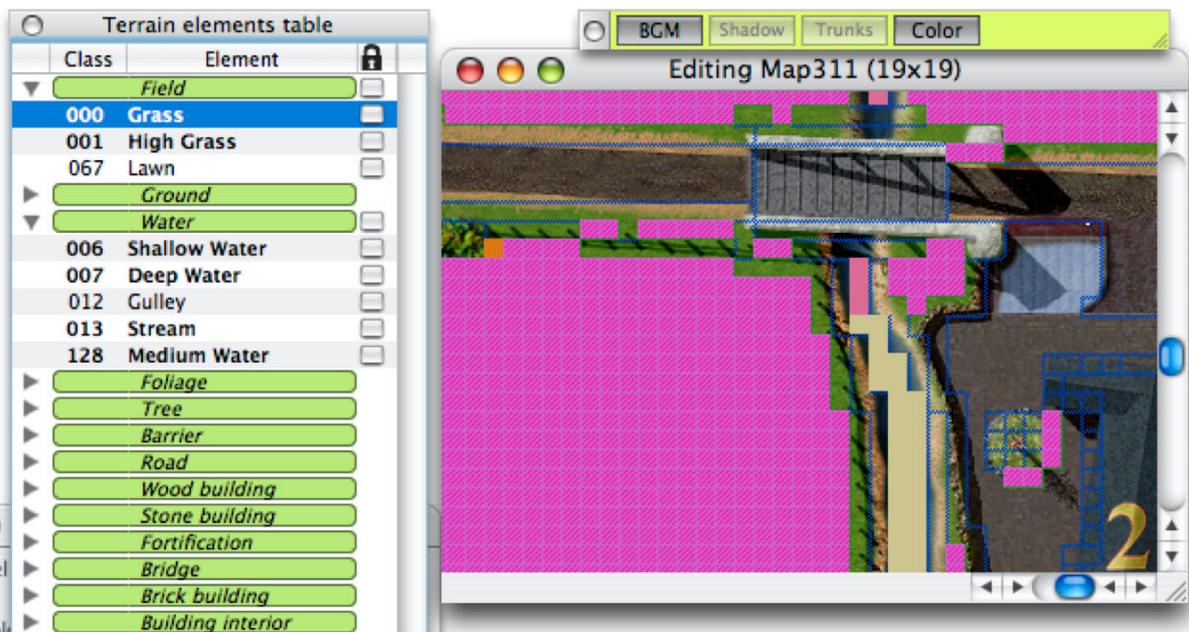
If the window "OVM" is the frontmost window, then the window "Visible layers" will show two buttons to toggle the visibility of the OVM graphics and the mines/explosives layer. By default OVM layer is on. Switching between main map-editing window "Editing" and the window "OVM" will change the buttons' visibilities, labelings and states accordingly.

Terrain-coloring effect and the terrain-coloring layer are added since version 1.08 to give the user a better way to differentiate between terrain values. All older PC-born CC-map editors used this technique (even the original "MapTool" by Atomic's Jason French). So users coming from Gerry Shaw "Tin Tin's MapMaker.exe, Kwazydog's MapMaker.exe or Cpl_Filth's 3C.exe will find it suitable but will miss the old color scheme. As described on page 15 the terrain-coloring values are usually generated by 5CC at runtime. But you can define them inside the terrain-elements file(s) to be used by 5CC. These values coming from the terrain-elements file will override the ones generated by 5CC.

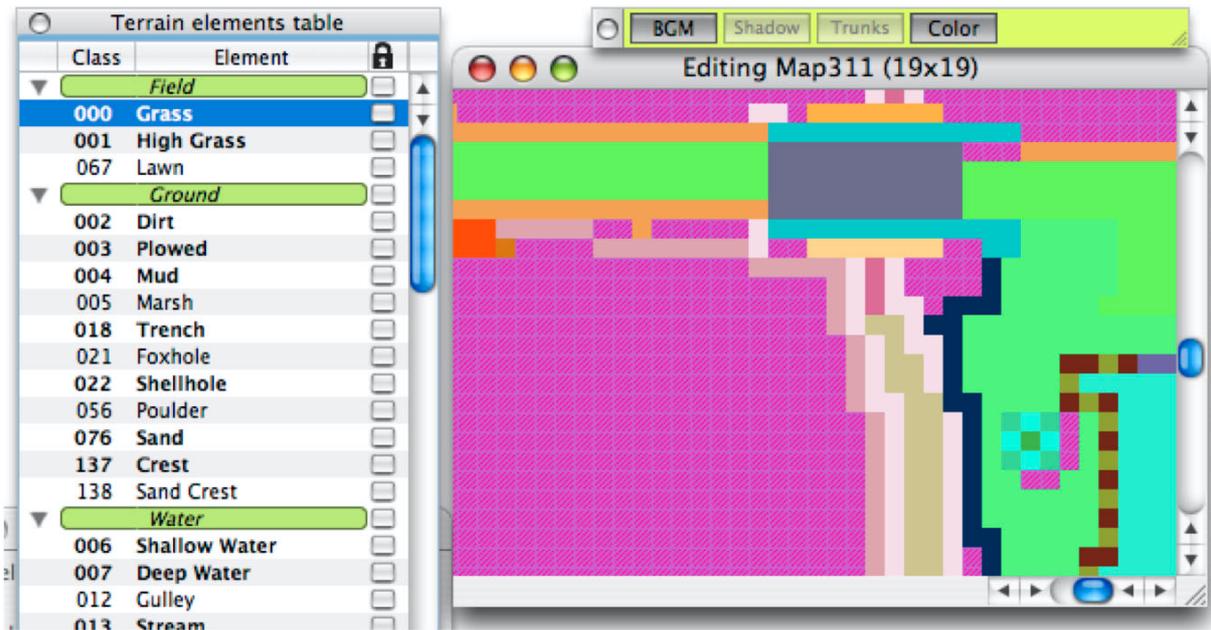
By default, only the values out of expanded categories of window "Terrain elements table" will show the terrain-coloring effect if the terrain-coloring layer is set to "ON".



Picture: terrain-coloring is "OFF", only two categories are expanded, "Grass" is selected.



Picture: terrain-coloring is "ON", only the terrain values of the two expanded categories are colored.



Picture: terrain-coloring is "ON", all categories are expanded and the entire map is colored.

If the terrain values are not grouped into categories, then the entire window contents will be treated as one entire expanded category and the entire map will be pasted over by the terrain-coloring effect if the terrain-coloring layer is set to "ON". In the window "Preferences", section "Layers", you can enable the terrain-coloring effect for collapsed categories, too. In the window "Preferences", section "Colors", you can define one terrain-coloring color as "the transparency color": the color-scheme entry "Terrain-coloring transparency effect" stores the color which will be treated by 5CC as "the transparency color" when painting the terrain-coloring layer. All terrain-coloring values with this value will not be drawn, meaning that the background will still be visible even when terrain-coloring effect is set to "ON". By default the value of this "the transparency color" is white = "FFFFFF".

In the right part of this window the actual selected terrain / elevation value will be displayed or the selected editing mode. The placement of this window differs between Mac and PC version of 5CC. See the section about the window "Preferences" in this manual on page 12.

Window "Trees"

This window was introduced together with the layer concept and the "tree shadow patch tool" in v1.03 of 5CC. The goal was to give the user the capability to place a user defined pattern of terrain elements. Simultaneously a relating graphic should be placed on the background image. And this graphic patch should consists of shadow and solid graphic. This feature is mainly needed for placing trees on CC maps. Without such a tool the map background creation must be done with trees painted on (CC2: tree trunks and a small central trunk shadow; all other CC versions: a small trunk and a complete tree shadow). The problem was always that the artist must know and respect the grid boundaries of CC when placing the trees and later on every tree must be recoded in the terrain editing. Cpl_Filth invented his own tree tool some years ago. 5CC is now combining all these needs together in one tool. And this gives the user the opportunity not only for using this feature for trees but it can be used also for building placing and the placement of terrain patterns without related graphics (like coast lines, streams, roads etc.).

Prior to using the "tree shadow patch tool" from the window "Tools" the user must create his own patches. The needed graphics must be created outside 5CC and can be imported only as 16-bit uncompressed TARGA graphics. It is also possible to import these graphics via clipboard (or via drag & drop in MacOS), but in this case the program will ask the user after pasting in the graphics, if he wants to save the image to an external TARGA graphics file. Otherwise these graphics imported via clipboard (or drag & drop) will not be saved when 5CC quits. The patch defining must be done in the window "Trees" (use command "Edit>Select/Edit tree shadow patch..." from to menubar to bring it to front).

The left part of this window shows a listbox containing the defined tree patches. Their definitions are stored in the Preferences file "5CC.ini". The predefined patches can be edited, deleted and 5CC will work even without any patch defined in the preferences file. Click on a list entry to change the entry's name (sometimes you must hit the "Enter" key after clicking on the entry to make the name inline-editable). The name is only for your own personal reference. Leading blanks are not allowed. Sorting the list is not possible and only allowed when you edit the file "5CC.ini" with an external text editor. But you can reorder the list's entries individually by mouse dragging. Below this listbox you will find four buttons:



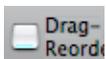
adding row below: adding/inserting a row below the currently selected row. If no row is selected, a new row at the end of the list will be added. New rows will get the name "new patch" by default.



duplicate row: duplicating the currently selected row and inserting the new row below the currently selected row.



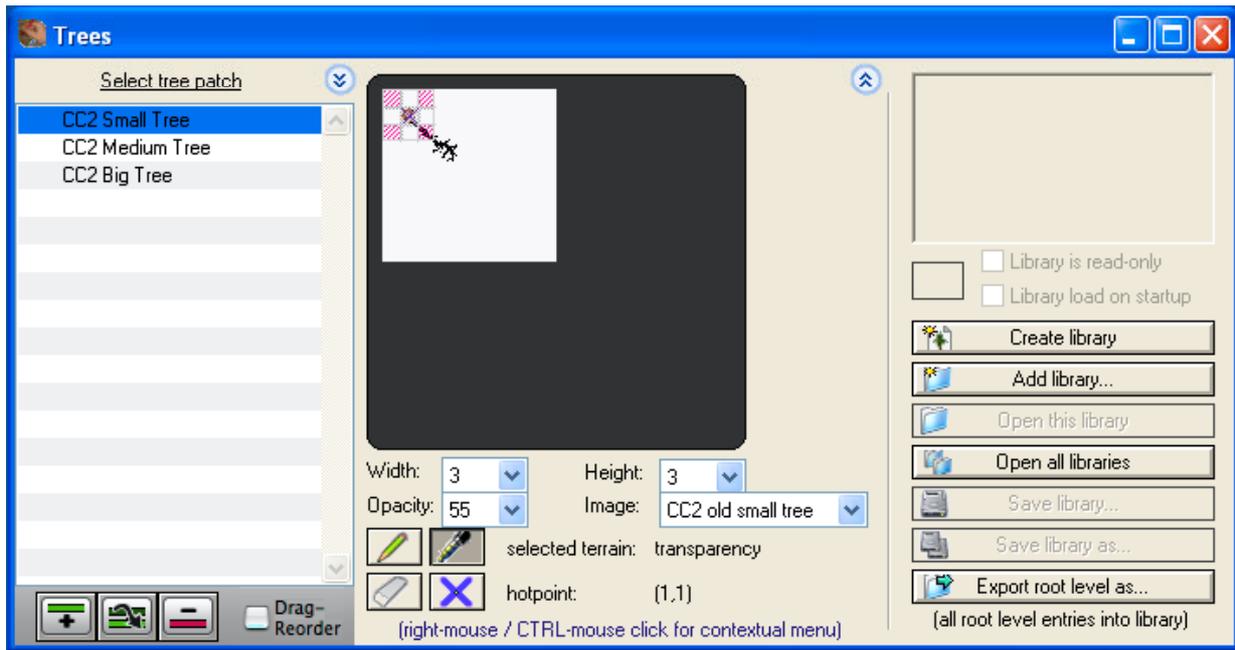
row removing: removing the currently selected row. This can be made undone via menubar "Edit>Undo" or CTRL-Z (PC) / -Z (Mac).



Enable drag reorder: reordering the listbox tree patch entries requires that the mouse can grab a row. In case of the window "Trees" this is always possible if the user is "grabbing" the row within it's outmost left area (where no text is placed and the expand/collapse-triangles (MacOS) / "+" / "-" -boxes are placed (PC). By clicking into this checkbox the user can disable the inline-editing of the listbox cells completely to make row dragging easier. Tree-patch libraries cannot be dragged around. But you can drag entries out of a library into another library or into the top level area and vice versa.

Use the disclosure triangle right to the heading to shrink the window's size and you will have a window showing only this listbox. This will make it suitable as an alternative to select to actual tree shadow patch (compared with the contextual popup menu of the terrain tree shadow patch tool  of the window "Tools").

The center part of this window shows a black rounded rectangle. The maximum size of a tree shadow patch can be 20x20 terrain tiles. The coordinates start in the upper-left edge, counting from 0,0. After selecting an entry from the listbox the next step you have to make is to define the size of your custom patch. Use the "Width" and "Height" popup menus to select the patch's size. Use the popup menu "Image" to select a built-in graphic for this patch or to import an external file. When you select to import an external file, it must be a 16-bit uncompressed TARGA graphics file. 5CC will store the absolute path of this file in his preferences file. If you move this file on your HD later on, 5CC will no longer find it and you must redo your link to this file.



The graphic associated with such a tree shadow patch must obey the following rules:

- must be stored externally as 16-bit uncompressed TARGA file,
- can be of any size (and is usually larger than the patch's defined data area),
- only the upper-left 200x200 pixels will be visible in the window "Trees", but the whole image will be placed when the patch is used,
- white pixels will be always treated as "transparency",
- black pixels will be always treated as "shadow", these pixels will be transferred to the layer "shadow". When opacity is set lower than 100 then the pixel will be placed as a grey value to this layer. If you are using multiple patches with different opacities you will have different shades of grey in the layer "shadow" (example: smaller trees less opacity = less shadow, big trees more opacity, buildings solid opacity). In this case I strongly recommend to disable "double/overlying shadows" in the window "Preferences", section "Layers". And you should place first your patches with solid opacity and the patches with less opacity last. So will have the "less" shadow added only in the areas where shadow was not placed yet.
- All other non-white/non-black pixels will be transferred to the layer "trunks". Your graphic must not contain such pixels at all. And it must not contain shadow pixels.

The layers will be pasted over the background in the window "Editing". Their visibility can be toggled using the buttons in the window "Visible layers". Their storing concept will be discussed later.

As mentioned already, you can define the opacity for your shadow pixels. Use the popup menu "Opacity" for it. Below this menu you can see buttons for tools to set the terrain values of your tree shadow patch. They are only active if you have set a valid size for your patch. The "terrain pencil tool" and the "terrain selecting tool" work identical to the tools of the window "Tools" (pen size = 1 only!). You can select the desired terrain from the window "Terrain Elements Table" as you would do when editing a map. Use the "terrain erase tool" to set the clicked terrain element to "transparent" (this is not possible in map editing). Such transparent terrain elements will not change the map contents when the tree shadow patch will be placed. If you select the negative value "-1" from the window "Terrain elements table" it will have the same effect like using the "terrain erase tool".

Use the "hotpoint center tool" to define the patch's hotpoint. The hotpoint is the terrain element of this patch which will be placed on the map at the mouse pointer's location. The window "Trees" will show in the lower-right corner the actual defined hotpoint coordinates (counted from 0,0 = upper-left edge of the patch) and the actually selected terrain element value. Selecting a terrain element value in the window "Terrain Elements Table" will have side-effects to both window "Editing" and window "Trees".

Now look on the example of the screenshot on the previous page 46: selected is the first entry named "CC2 Small tree". It uses a 3x3 data patch with transparent edges (at the moment no terrain element value is selected = transparency is selected). In the middle is the terrain element value set to "small tree" and the hotpoint is located at this position. The terrain elements "leaves" are grouped around this center/hotpoint/trunk like a cross. The patch is associated with an intrinsic graphic which is larger than the data patch. For CC2 it is not necessary to define the entire tree shadow in the background image, because CC2's Terrain file contains these graphics (don't know why they omitted this feature in CC3 and later on). For CC2 only a trunk with a little central trunk shadow is used on the original maps.

Tree-patch libraries

Since version 1.08 of 5CC you can bundle tree-shadow patches into external libraries. These tree-patch library files have their own format (see separate document). In the right area of the window "Trees" you can see 7 buttons to create, load and save libraries. The handling of libraries within the left area (listbox) of this window is limited:

- new libraries will be added always at the bottom of this list in the left area,
- libraries cannot be dragged around (cannot be reordered).

On the other hand this means, that the already existing tree patch entries of the main top root level of this list will be always placed on top of this list.

To make the right area of this window visible, use the disclosure triangle right to the grey rounded rectangle containing the tree shadow patch graphic/terrain definition.

The functionality of the buttons below this list in the left area is similar as described above:



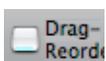
adding entry below: adding/inserting an entry to the library above or (also in case the library has no entry yet) to the selected library. New entries will get the name "new patch" by default.



duplicate library: duplicating the currently selected library and inserting the new library below the currently selected library.



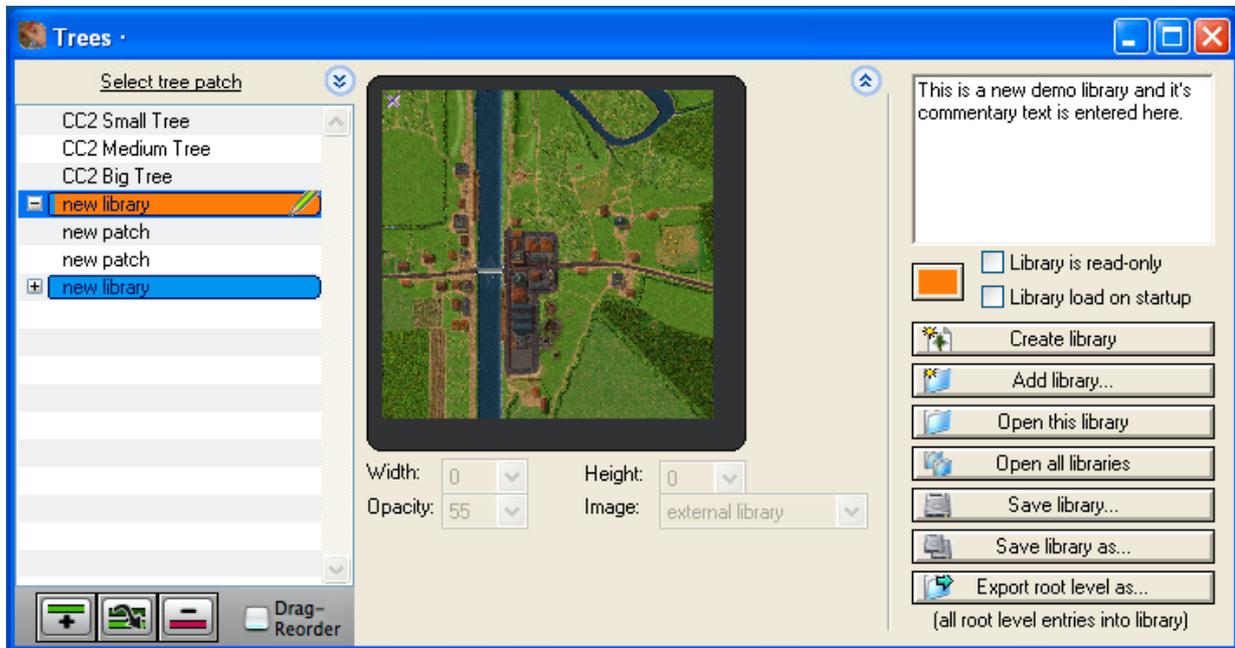
library removing: removing the currently selected library. This can be made undone via menubar "Edit>Undo" or CTRL-Z (PC) / -Z (Mac). You will be asked in case you are deleting a library with changes in it present. Changes present will be indicated by the icon "  " at the right hand side of the libraries name.



Enable drag reorder: reordering the listbox tree patch entries requires that the mouse can grab a row. In case of the window "Trees" this is always possible if the user is "grabbing" the row within its outmost left area (where no text is placed and the expand/collapse-triangles (MacOS) / "+" / "-" -boxes are placed (PC). By clicking into this checkbox the user can disable the inline-editing of the listbox cells completely to make row dragging easier. Tree-patch libraries cannot be dragged around. But you can drag

entries out of a library into another library or into the top level area and vice versa.

Libraries indicated by the icon "🔒" at the right hand side of the libraries name are "read-only" and cannot get additional entries (or duplicated ones within themselves) or changes to their name or their additional properties mentioned below). But you can delete such entries from the list (what will have no effect to the external files or the contents of these files).



In the center area you can place an image within the grey rounded rectangle (maximum size 200 x 200 pixels) as a "cover image" for the selected library. Insert this image via right-mouse click / CTRL-mouse click (a contextual menu will pop up) or on MacOS via drag & drop from an external source. A loading via the popupmenu "Image" is not implemented. This popupmenu will always show in disabled state the text "external library" if you have a library selected. Below this text you will find some library status informations.

In the right area of the window "Trees" you can change further library properties (from top to bottom):

- a commentary text (maximum length 255 characters),
- a checkbox to make the library "read-only",
- a color box to change the libraries background color in the list of the left area (in the example above the color "orange" is selected),
- a checkbox to make have the library loaded automatically on program startup.

The library's properties "cover image", "menu color", "commentary text", "read-only" will be written to an external library file together with it's entries. This will never be done automatically, you must use one of the buttons "Save" or "Save as..." of the righth area of the window "Trees". The property "load automatically on startup" will be stored within the "Preferences" file together with the libraries file path and name. On loading, the libraries name will be always updated from the imported file name.

You can create a new, empty library using the button "Create library". This will have only effect to the list of the left area of the window, but will not create a file. This must be done using the buttons "Save" or "Save as..." later on.

The button "Add library..." will import an existing tree-patch library file and add it as an entry to the list in the left area of the window. The button "Open library" is intended to load/reload a selected (and already defined) library entry within the list. The same action can be achieved by expanding the entry in the list (by clicking on its disclosure triangle / plus-icon). The button "Open all libraries" will expand and load all defined libraries of the list. Loaded libraries will be also added to the contextual popup-menu of the terrain tree-shadow patch tool " of the window "Tools".

The button "Export root level as..." is intended to export all (non-library) entries of the main top root level area of the list to an external tree-patch library. Such files will get a default "cover image" and "commentary text".

Using libraries for the first time

When using 5CC v1.08 for the first time coming from an older version, you will still see your already existing tree-shadow patch entries as usual. This is the best way to split them into external libraries to share them with others:

- Use the button "Export root level as..." to export all entries to an external library file.
- Duplicate this file on your HD as often as needed to have the intended number of libraries and one or two additional backup files!
- Give these library files suitable, short names, ending with the filename extension "5TL".
- Go back to 5CC and load these new library files using the button "Add library..." in your favorite sequence (please remember: you cannot change the sequence later on, except you are going to modify the "Preferences" file).
- Delete the not-needed entries from the libraries,
- Save the libraries back to file.
- Delete the entries of the main top root level area which you no longer want to have there.
- Change further library properties, save these changes.
- Make duplications/backups of these files on your HD and store them at a safe place.
- Indicate the libraries you need at startup as "load on startup" or mark all libraries to be loaded on program startup in the window "Preferences", section "General".

You can select between different concepts using tree-patch libraries:

- the old way without them: just define none. All tree-patches will be kept in the "Preferences" file (with the graphics in external TARGA files),
- all tree-shadow patches grouped in libraries, loaded only on request: this requires that the user must open the window "Trees" to load a library in case he wants to use the tree-shadow patch tool;
- all tree-shadow patches grouped in libraries and all libraries loaded on program startup: mark the corresponding checkbox in the window "Preferences", section "General". You will see the program's starting screen a little bit longer. You will be not informed about missing libraries in case they were moved on the HD.
- all tree-shadow patches grouped in libraries and only some libraries loaded on program startup: mark the checkboxes individually of the needed libraries to have them loaded automatically on program startup.
- or a mixture of all above.

Two merge two external tree-patch libraries into one file use the command "Actions>Tree library actions>Merge two tree libraries" of the main menubar (PC: the menubar of the window "Map editor").

Because the window "Trees" contains more than one Copy/Paste-sensitive areas, I decided to make use of contextual popupmenus. These are available for:

- the listbox in the left area to copy/paste text, expand/collapse library entries and to increase/decrease the listbox's font size (which will be saved in the "Preferences" file);
- the tree-shadow patch editing area in the center of the window (with the grey rounded rectangle) to copy/paste the patches' graphic or the library's "cover image";
- the text-editing field in the right upper corner of the window to copy/paste text to the library's "commentary text".

The menubar commands "Edit>Copy" / "Edit>Paste" (and their corresponding shortcuts) might work also depending on where the mouse pointer has clicked into. PC users will not see a menubar in this window, but the shortcuts CTRL-C / CTRL-V might still work.

The layer concept

When you use the "tree shadow patch tool" for the first time on a map, 5CC will create three (3) additional background graphics to store the graphics pasted in by this tool. This patch placement can be redone using the command "Edit>Undo", but the additional background graphics will remain in RAM until you load/create a new map. These additional background graphics will be used by 5CC like layers with transparency (white pixels). You can toggle the visibility of these layers using the buttons in the window "Visible layers".

When you are ready with your tree shadow patch placing, you will have changed your map's datas. But you will not have changed your internal BGM graphic, because the shadow and the trunks are stored in separate layers. Essential:

- When you use the command "File>Save" or "File>Save as..." your changed map datas will be saved as a new CC data file (in case of "File>Save": overwriting the existing one).
- Your BGM file will not be saved when you use "File>Save". Only the layers "shadow" and "trunks" will be saved as separate TARGA files (should use the same folder where the BGM file resides).
- When you use "File>Save as..." then your BGM file will be saved and the layers "shadow" and "trunks" will be saved as separate TARGA files (should use the same folder where the BGM file resides).
- But you can use the "File>Export>Export BGM / background" subsection to create a BGM (or a picture) with all layers pasted over the original BGM.
- OVM and MMM will not be changed when placing tree shadow patches.
- Roof entries / roof graphics will not be changed when placing tree shadow patches.
- CC2-bridge images will not be changed when placing tree shadow patches.
- If you must interrupt your work with 5CC you can reload manually your saved files. 5CC will not automatically load the shadow and trunks TARGAs.

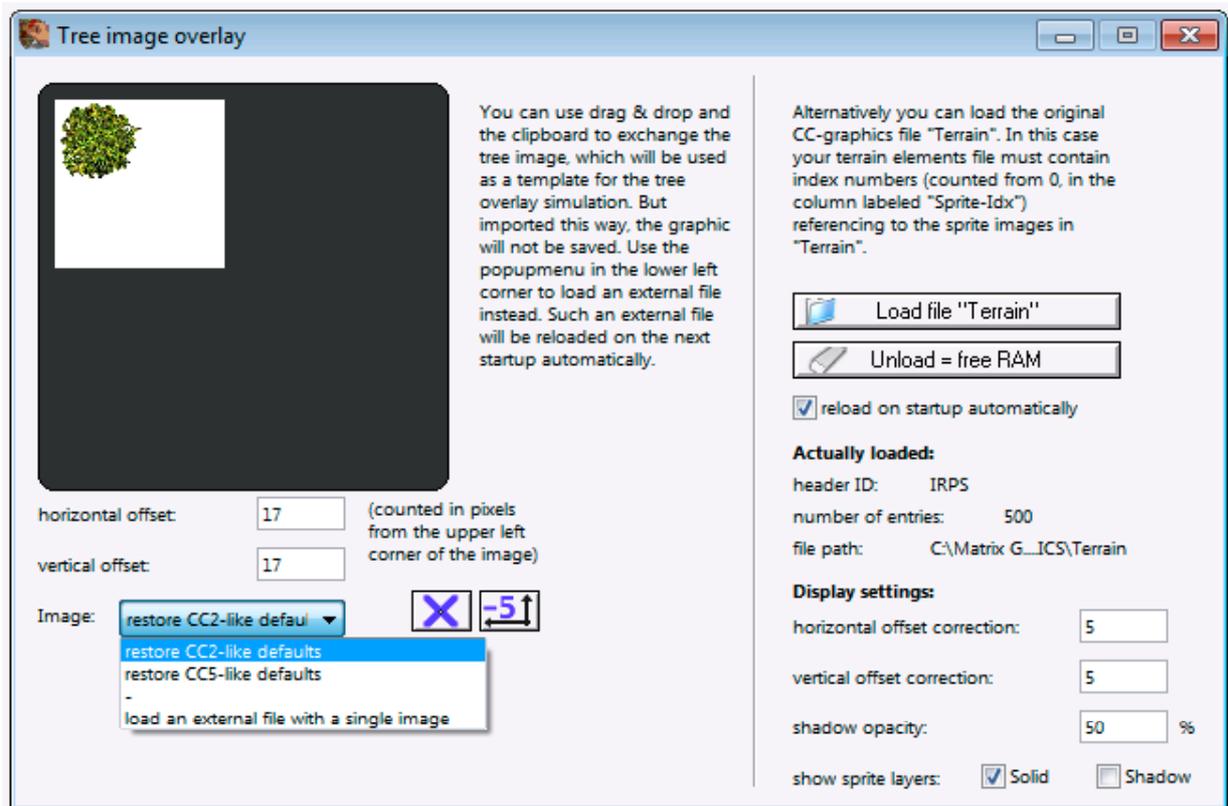
Why saving the layers in different files? In most cases shadows placed in 5CC must be reworked later on. Just think about a tree shadow hanging over a cliff or placed over a remarkably higher other object. In these cases the shadow must be clipped off. If you have the layers stored in separate layer files you can import them as layers back into your favorite graphics editor.

All in all I recommend to do the graphical background artwork first without tree shadows painted on the map. The roofing should be one of the last steps. Making CC2-bridge defining and LOS calculating should be last.

What you must know also: when loading an existing map, **5CC will not reload automatically** already saved shadow and/or trunk layer graphic files. You must use the commands "File>Add...>Add tree shadow layer picture..." and/or "File>Add...>Add tree trunks layer picture..." or the corresponding TARGA adding commands to import these graphics.

A serious question: why do I not see the same trees as in the actual game? Answer: the games of the CC series (since CC1) are pasting the tree graphics over the map's background graphic at runtime using a sprite technique. The tree sprites are stored inside the CC file "Terrain". Some games (namely CC2) are selecting the sprites in some cases by random. On the other hand some custom map artists of today are preferring to place the tree graphics completely on the map's background. 5CC does not interpret or read the file "Terrain". Use my tool "CC2Spriter.exe" / "CC2Spriter for Mac" to unpack this file. You can import these graphics into 5CC (it is up to you). And of course you can use 5CC's layer technique to place these sprite graphics on your map instead of only placing trunks there. This will be a good way to create OVM/MMM graphics containing full CC-runtime tree graphics. But it is not intended to implement a forth layer into 5CC to hold these graphics too. At the moment. Perhaps later on?

Window "Tree image overlay"



This window was introduced in v1.15 of 5CC and extended for v1.16. To have a visual preview of the tree images painted over the map's background graphic by the game during play, this window offers you to select out of two internal basic graphics or to import an external graphic file. Once such an external file is loaded, it's file path will be remembered by 5CC and it will be reloaded at next startup automatically. Such a graphic must follow the usual CC-graphic rules: 16-bit color, white color will serve as transparency area.

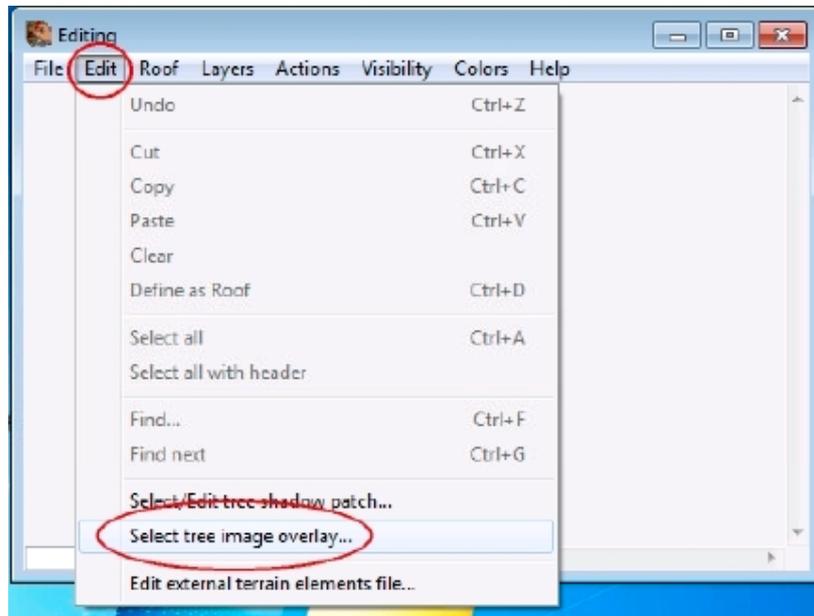
The upper left corner of the window shows a dark grey rounded rectangle. The used graphic will be shown here. You can paste an external graphic in here via clipboard (PC and Mac) or via drag & drop (MacOS). Graphics pasted in here by one of these ways will be lost when 5CC terminates. To select one of the two internal graphics, use the popupmenu in the window's lower left area labeled "Image". Use this popupmenu also to load external graphic files.

You should also define the placement offset of the graphic. There are two input fields in the left area of the window, one for the horizontal offset and the other one for the vertical offset (counted in pixels). You can use the button wearing the purple cross to use the cursor to click on the desired hotpoint within the graphic. Because the tree-image-overlay is pasted over the background area of a terrain tile with the size of 10x10 pixels, it is useful to reduce the hotpoint offset values by 5. To make this by one click, you can press the button "-5".

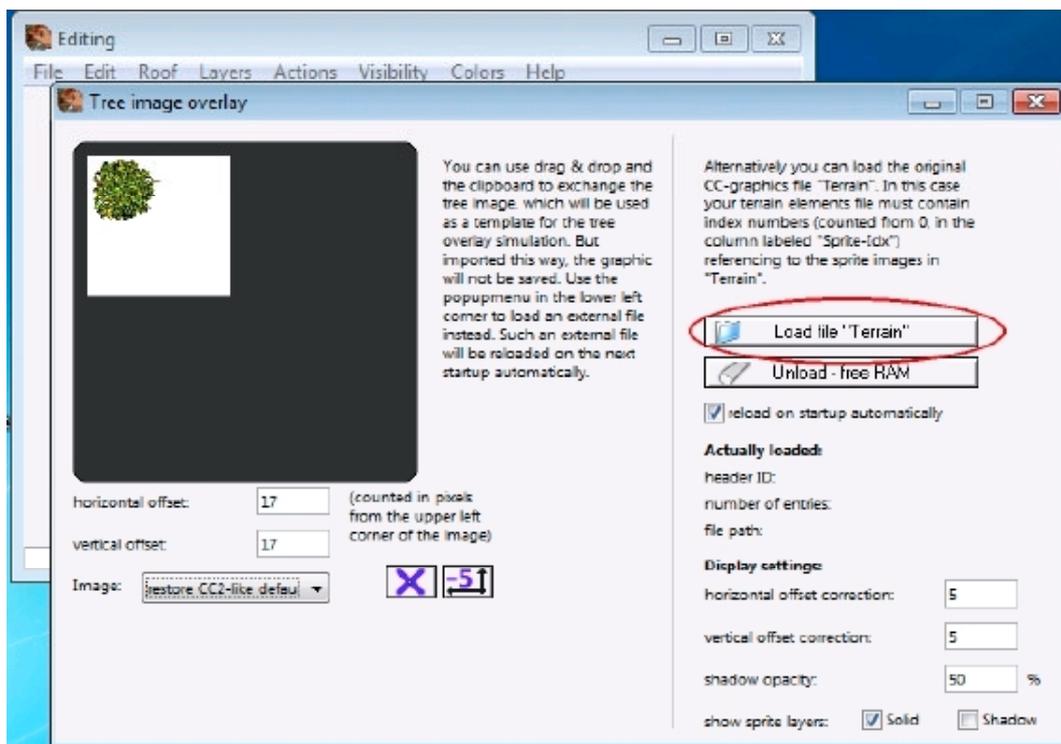
Since v1.16 you can also load the graphic file "Terrain" of your CC-installation. Use for this purpose the right side of this window: button "Load file "Terrain"". For CC2-Terrain files it is even possible, to visualize the shadows defined inside the sprites themselves (checkbox "Shadow"), but this will slow down 5CC's performance drastically. To access the sprites out of "Terrain" properly, you must enter their index numbers in the Terrain-elements file used by 5CC. When a "Terrain" file

is loaded, and the referencing to the sprites within it are valid (via the Terrain-elements file loaded in 5CC), then you can toggle the visibility of the sprites images for trees in the editor via the window "Visible Layers", button "Tree".

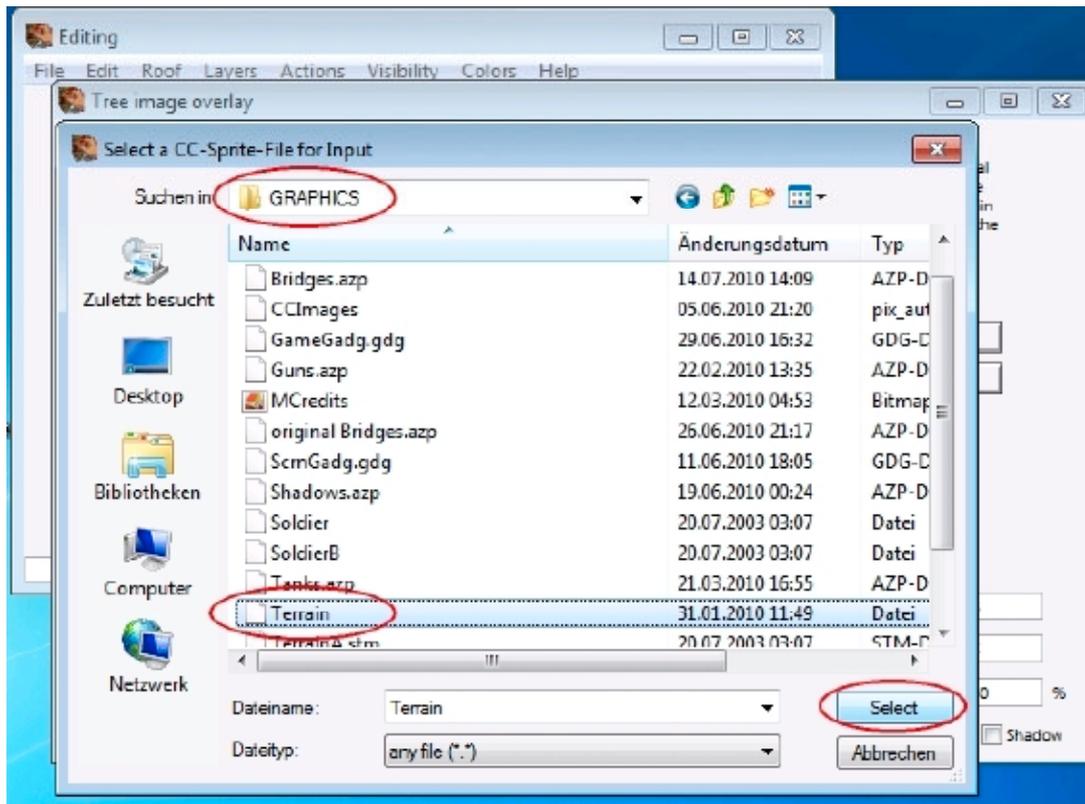
Example: first step: you must have loaded a Terrain-elements file containing the sprite-index numbers for those terrain elements representing trees! Second step: loading the graphic file "Terrain" via menubar, item "Edit > Select tree image overlay":



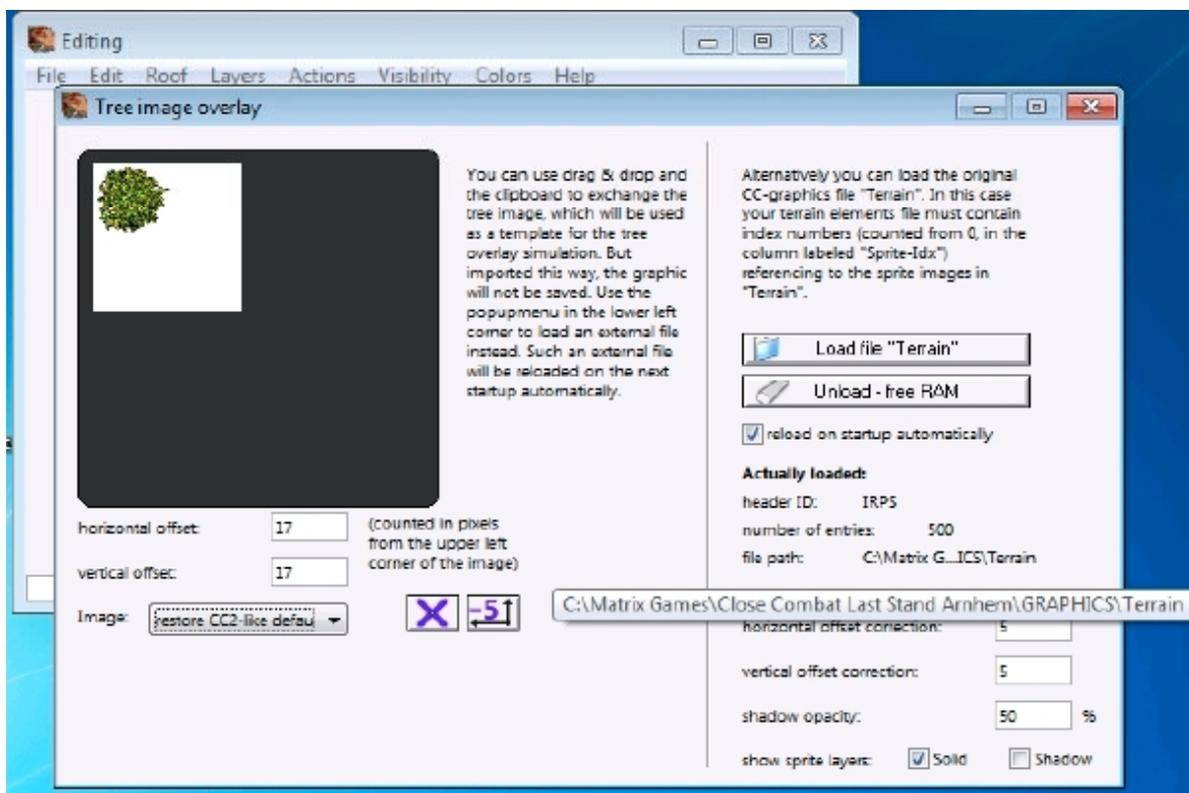
Then you will see this extended window. In the right area is everything related to the graphics file "Terrain". Third step: press the button "Load file 'Terrain'". Keep the checkbox below checked to have this file reloaded automatically on next startup of 5CC:



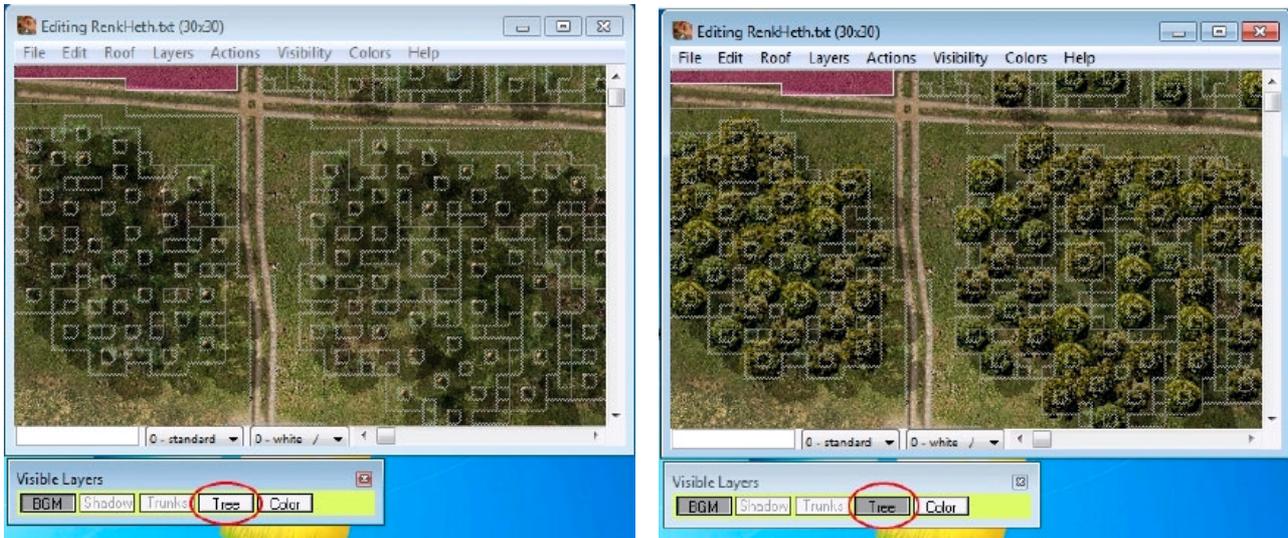
Select the needed graphics file "Terrain" (usually within the folder "Graphics"):



And you will get some infos about the loaded file:



If you have updated the Terrain-elements file with the sprite images' index numbers, you can toggle now the tree visibility via the window "Visible Layers":



This gives you the following new opportunities:

- you will see the real tree when editing the data elements;
- you can easily generate OVM/MMM with correct tree graphics pasted over;
- you can convert CC2-BGMs into CC3/LSA-BGMs by using extended sprites with shadow (for example the original CC2 sprites), toggling off the solid pixels, having only shadow coming from the sprites, and then using "Export" -> "Export tree images overlay" -> "tree images over BGM".

Window "LOS actions"

Generating a LOS (= line-of-sight) table will be done in RAM by 5CC. The result can be saved later using the commands "File>Save", "File>Save as..." or "File>Export>Export LOS file...". The window "LOS actions" offers various manipulations to the entire LOS table or to one of the four LOS layers:

1. Soldier viewing Soldier (abbreviated SvS),
2. Soldier viewing Vehicle (SvV),
3. Vehicle viewing Soldier (VvS),
4. Vehicle viewing Vehicle (VvV).

The first section of this window "initialize complete LOS" offers you the ability to generate LOS in four ways:

- without checking terrain values (respecting only the elevation),
- emulating the original way as it was described by Gerry Shaw "Tin Tin", "JM" and Vincent Viaud (it is only an emulation, not the original code implemented – this method checks terrain obstacles and elevation in steps by terrain tiles 10x10 pixels),
- checking LOS in steps by elevation tiles 40x40 pixels (will be faster than the original way with nearly the same result),
- checking LOS in steps by deployment tiles 120x120 pixels (less effective, but very fast).

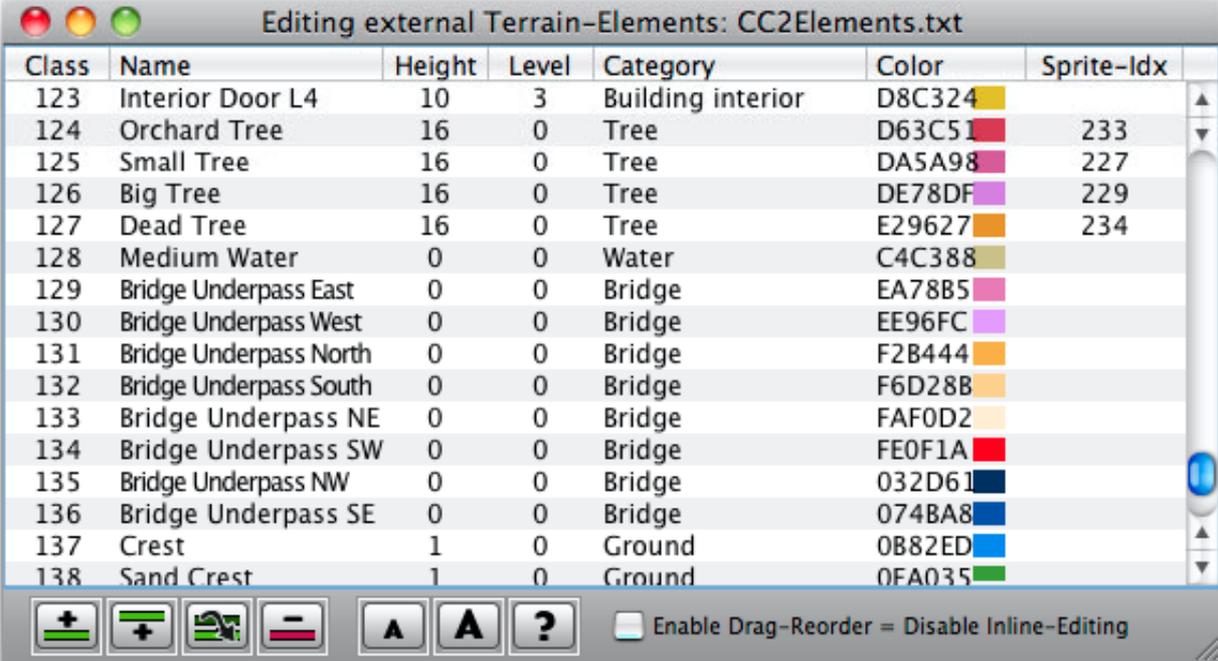
For all these methods it is possible to restrict the LOS checking distance from "no limitation" = time consuming to "nearest neighbours only" = very fast = emulating "fog". And this restriction can be set for each LOS layer individually.

The second section of this window "set entire layer" can be used to initialize single LOS layers to "LOS on" or "LOS off". The third section "layer copy" can be used to copy the values of an entire LOS layer to another layer.

The LOS generating methods which check the terrain and elevation values require a valid "Terrain Element File" loaded into RAM. Otherwise only the method "Generate LOS without checking the terrain values" will work. Prior to LOS generating the routines will check the entire map for negative values and will give a warning if there are such values found. LOS will take place anyway because negative or unknown terrain values in the map data will be ignored and only their elevation will be taken for LOS calculation.

The LOS generating methods used by 5CC require multiple checkings of visibility from one deployment tile to all other deployment tiles. If you use the original way, 5CC will perform this walking through the map from the center from every deployment to all other deployment tiles by checking every terrain tile's (10x10 pixels) elevation, terrain's level and terrain's height. In case of the two faster method not only the amount of checks is reduced by using larger tiles, but also by calculating the medium values (of elevation, terrain's level and terrain's height) of these tiles prior to generating the LOS table. This requires a little more RAM but saves a lot of time.

Window "Editing external Terrain-elements"



Class	Name	Height	Level	Category	Color	Sprite-Idx
123	Interior Door L4	10	3	Building interior	D8C324	
124	Orchard Tree	16	0	Tree	D63C51	233
125	Small Tree	16	0	Tree	DA5A98	227
126	Big Tree	16	0	Tree	DE78DF	229
127	Dead Tree	16	0	Tree	E29627	234
128	Medium Water	0	0	Water	C4C388	
129	Bridge Underpass East	0	0	Bridge	EA78B5	
130	Bridge Underpass West	0	0	Bridge	EE96FC	
131	Bridge Underpass North	0	0	Bridge	F2B444	
132	Bridge Underpass South	0	0	Bridge	F6D28B	
133	Bridge Underpass NE	0	0	Bridge	FAF0D2	
134	Bridge Underpass SW	0	0	Bridge	FE0F1A	
135	Bridge Underpass NW	0	0	Bridge	032D61	
136	Bridge Underpass SE	0	0	Bridge	074BA8	
137	Crest	1	0	Ground	0B82ED	
138	Sand Crest	1	0	Ground	0FA035	

Since version 1.08 5CC has a built-in terrain-elements file editor, located in this window (which has a separate menubar). Editing of terrain-element files can be done also with external ASCII-text-editors or MS-Excel. 5CC will read the Terrain-element file and will display the needed columns "element name", "terrain class number", "terrain height", "terrain level (for multistoring buildings)", "terrain category", "terrain-coloring" and "Sprite-index" in an editable listbox. The menuitem "Save" will let you write back the values, keeping the not-used columns in the original file

untouched. The menuitem "Save as..." will give you the ability to generate new files. In this case the not-used columns will be taken out of the original file. Also file format, header and comment lines will be taken from the original file. If you generate terrain-element files from scratch, 5CC will create the new file using it's own format with only 6 columns.

In the area below the listbox you will find several push-buttons and one checkbox:



adding row above: adding/inserting a row above the currently selected row.



adding row below: adding/inserting a row below the currently selected row.



duplicate row: duplicating the currently selected row and inserting the new row below the currently selected row.



row removing: removing the currently selected row. This can be made undone via menubar "Edit>Undo" or CTRL-Z (PC) / ⌘ -Z (Mac).



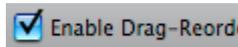
text size decrease: decreasing the size of the listboxes' font.



text size increase: increasing the size of the listboxes' font.



help: will bring the help window to front with two additional help texts.



Reordering the listbox requires that the mouse can grab a row. This is only possible if inline-editing of the listbox cells is disabled. Setting this checkbox will enable drag-reorder of the listbox and will disable inline-editing of it's cells.

Usually you can change the listbox cells' contents via inline-editing of the cells. You will enter inline-editing by clicking or double-clicking into the cell's area. You will leave inline-editing by pressing the "CR"- or "Enter"-key of your keyboard or by clicking into another cell. "Class number" should be a decimal integer equally or greater than zero. 5CC will do the zero padding automatically at the left side of the number to achieve three-digits format. "Name" and "Category" can contain any character string. "Height" and "Level" should be a decimal integer. "Color" must be entered as a 6-digit hexadecimal value without preceding or following "h" or "hex" or "&h".



To make it easier, you can click into the colored rectangle in the right area of the cell containing the "Color" value. The built-in color-select window will appear, and you can select the desired color there and 5CC will then enter the correct hex-value after closing the color-select window.

This window has it's own menubar. A contextual popupmenu is also available, offering the same commands like the menubar's item "Edit". The contextual popupmenu will show up when using right-mouse click / Ctrl-mouse click. The command "Edit>Select all" will mark all rows of the entire listbox as "selected". The command "Edit>Select all with header" will prefix the listboxes' header as additional line when using the command "Edit>Copy" later on the listbox. A subsequent command "Edit>Copy" or "Edit>Cut" after "selecting all" on the listbox will copy the entire contents of the selected listbox as plain text (columns TAB-char separated, lines terminated by CR+LF (PC) or CR-only (Mac)) to the clipboard.

To create terrain-elements files from scratch, you must use the menuitem "New". Files created this way can be saved only in 5CC's own terrain-elements file format with 6 columns (see page 15).

To use such a modified/newly created terrain-elements file in 5CC for map editing, you must reload it into 5CC again via the window "Preferences", section "Elements File" (see page 16).

To retrieve the "Sprite-index" numbers needed to interpret the graphic file "Terrain" of your CC-installation properly, use my tool "CC2Spriter", the official "Workbook" of your CC-installation and the example terrain-element files within the 5CC-package. "Sprite-index" (counted from zero) is the number given to the needed image by the file "Terrain" itself. It is not identical with the sequence number within the official "Workbook" of your CC-installation.

Window "Map meta comments"

Since v1.08 it is possible to add so-called "5CC meta comments" to the map data. This will expand the original map data file format. 5CC will append these "meta comments" to the first comment line of a map data file. Usually this comment line starts with the text "Idx". CC game engines use to expect this comment line (that means: loading a map data file will not work without such a comment line), but will not check it's contents. 5CC will append the "meta comments" separated by TAB-chars (Chr #9) at the end of this comment line, where the keyword will be enclosed by "<key>" and "</key>" xml-like tags. The corresponding value of this keyword will be followed by TAB-char and enclosed by "<string>" and "</string>" xml-like tags. You can use any keyword you like. It is not guaranteed, that future CC-game engines will work with map data files containing 5CC "meta comments". Tests revealed, that adding more comment lines to a map data file in the file's header area will be not accepted by the CC-engines.

The introduction of these "meta comments" is inspired by the suggestions at CSO forum in 2007 made by CSO_Sbufkle¹⁰. The goal was, to give the CC-community some custom map sorting criterias. With "5CC meta comments" it is possible to embed such map sorting criterias into the map's data file. The data file can be read by any text editor or by MS-Excel.

Some suggestions for usefull "meta comments" and example values:

- <key>Author</key> <string>the author's name</string>
- <key>Date</key> <string>2008-05-16</string>
- <key>Game</key> <string>CCMT</string>
- <key>Mod</key> <string>WWII</string>
- <key>Map name</key> <string>map's name in full length</string>
- <key>Map date</key> <string>1945-05-08</string>

The window for editing the "meta comments" works similiar like the window "Editing external Terrain-elements" discuss above, except for having an individual menubar (Mac) / except for having a menubar (PC). If you click on the black triangle of each row's first column, a popup-menu will appear, letting you select commonly used "meta comment keywords".

Loading and saving of the "meta comments" will be done together with the map datas. You can export the meta comments to a separate file. Use menubar item "Export>Export map meta

¹⁰ <http://closecombatonline.com/forums/forumdisplay.php?f=127>

comments..." subsection entries to export the "5CC meta comments" to plain ASCII-text file (TAB-char separated, CR+LF-char line delimited), HTML-file (HTML-version 4.01, using <dl>, <dt> and <dd> tags) or to XML-file (using <key> and <string> tags). An import of separate files, containing only meta comments is only possible in XML-format. Use the according menubar item "Import>Import map meta comments..." subsection entry.

This window has no own menubar (on PCs). But a contextual popupmenu is available, offering the same commands like the main window's menubar item "Edit". The contextual popupmenu will show up when using right-mouse click / Ctrl-mouse click. The command "Edit>Select all" will mark all rows of the entire listbox as "selected". The command "Edit>Select all with header" will prefix the listboxes' header as additional line when using the command "Edit>Copy" later on the listbox. A subsequent command "Edit>Copy" or "Edit>Cut" after "selecting all" on the listbox will copy the entire contents of the selected listbox as plain text (columns TAB-char separated, lines terminated by CR+LF (PC) or CR-only (Mac)) to the clipboard.

Window "Import Bridges.AZP file"

The new game CC:LSA introduces a new file and a new file format: "Bridges.AZP". "Bridges.AZP" is a package of TARGA-graphics files, representing the needed graphics for one or more bridges of a all maps of the game:

- bridge blown (similar to CC2),
- bridge repaired (similar to CC2),
- bridge girder undamaged,
- bridge girder blown.

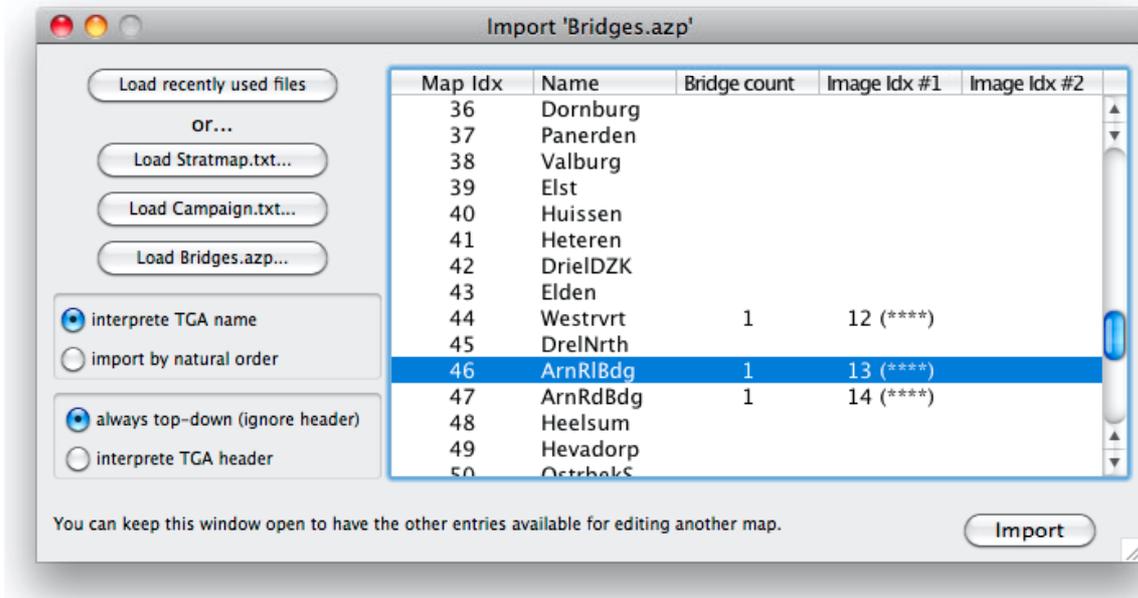
New is that all bridge-graphics are bundled into one package (in CC2: each map gets it's own Bridg###-file). CC:LSA-engine is taking all these TARGA-images at game start, loading them into RAM and ignoring the TARGA-header entries, expecting that these files are always 16-bit color graphics, uncompressed and encoded top-down. Currently there is a way implemented in 5CC to visualize the contents of the file "Bridges.AZP" (located in the folder "Graphics"), but although you can edit the first blown/repaired bridge images in 5CC, such changes will not be saved back to "Bridges.AZP"! For analyzing and un-/repacking this file, use my tool "RtBTool" in the latest version v2.37.

The correct detection of the graphics is only half the part. Other bridge-related infos are stored in the data files "Stratmap.TXT" (located in the folder "Maps") and "Campaign.TXT" (located in the folder "Data\Base"), which are plain ASCII-files. So it needs more than loading one file: after loading your CC:LSA map, use the menuitem "File > Import > Import Bridges.AZP file...". A window will show up, where you can load all the needed files, starting with "Stratmap.TXT", followed by "Campaign.TXT" and finally by "Bridges.AZP". The result will be shown in a listbox in the upper area of the window. After loading the TARGAs (TGAs) out of "Bridges.AZP": full size images will be indicated there by a "*", and 1x1-pixel-large placeholders by a ".". For CC:LSA it is necessary that 5CC interpret the TGA names for getting the indexes of the images.

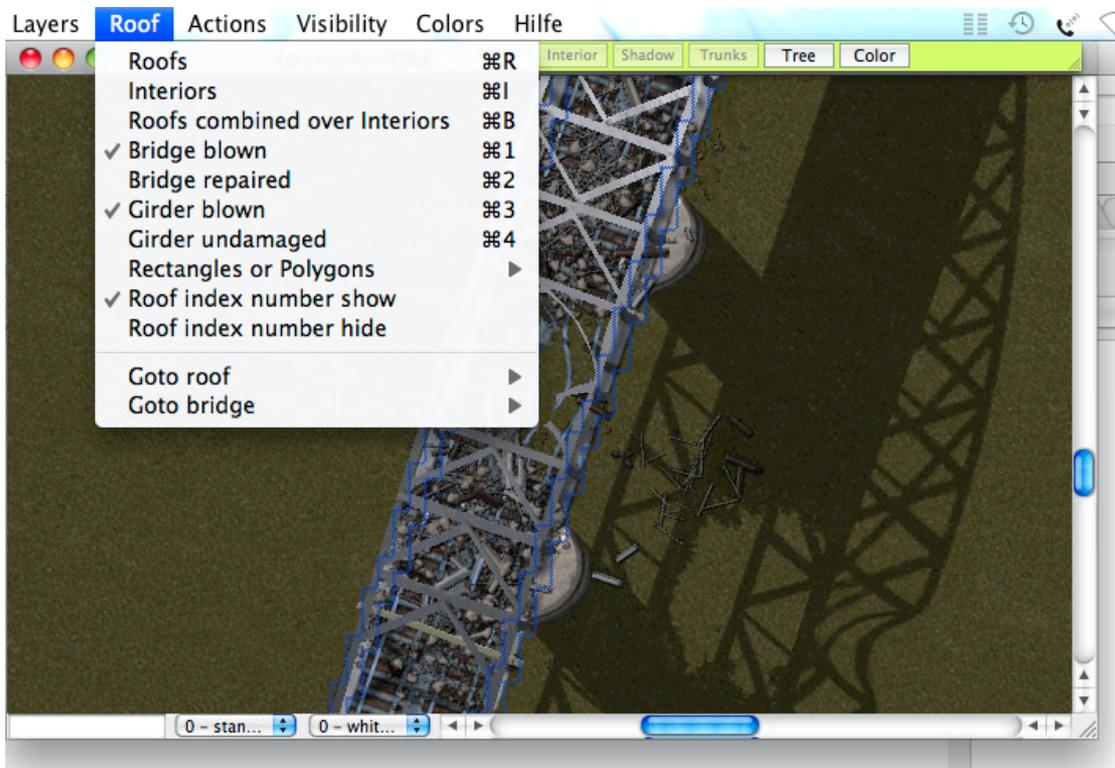
After loading the graphics, their import together with the data informations into the map already loaded in 5CC requires that you select the needed bridge entry manually. In the listbox on top of the window the names of the maps are listd. Select the one you need and press then the button "Import" in the lower portion of the window. You must not close the window, but you can. 5CC will

remember the contents and the graphics loaded in case they are needed for editing the next CC:LSA map until 5CC is closed.

Example: importing the datas for CC:LSA map "Arnhem Rail-Bridge" (1 bridge):



When you are not in Roof-/Bridge-editing mode, you can now toggle the visibility of bridge-blown/bridge-repaired and girder-undamaged/girder-blown via the menubar entry "Roof". Example: bridge-blown and girder-blown graphics on while in terrain-editing mode:



What you must accept: when you are in roof-editing mode, the visibility of the blown-bridge or girder-graphics is not possible! When you change the visibility of blown-bridge and/or girder-graphics via menubar entry "Roof", 5CC will enter bridge-graphics-editing mode and will leave therefore roof-editing mode. This mode will show the graphics with the needed borders, but you cannot edit them (if you want to check the bridge-associated datas, call the window "Bridge

informations" via menuitem "Visibility > Show bridge informations"). In bridge-graphics-editing mode the visibility of roof and/or interiors is not possible. When you change the visibility of roofs/interiors via menubar entry "Roof", 5CC will enter roof-editing mode. To toggle between these two modes, you can also use the tools "Roof pointer" and "Switch to CC2 bridge images" in the window "Tools".

This gives you currently the following new opportunities:

- you will see the girder when editing the data elements;
- you can easily generate OVM/MMM with correct girder graphics pasted over.

Tactics

Roof defining

Here a short introduction to roof defining with 5CC. The easiest way is the one introduced by Cpl_Filth for creating new maps:

- make your map basic terrain and elevation definitions in 5CC.
- create two BGM graphics: one with the exterior views, and another one with the interior views painted on. Both BGM graphics must have the same size fitting to the map's size.
- use the "File>Import...>Import background as 16-bit TARGA..." command to import the exterior view graphic.
- use the "File>Add...>Add interior background 16-bit TARGA..." command to import the interior view graphic.
- switch to roof editing mode via the "tools window", tool "roof pointing".
- turn roof exterior view "ON" using the "Roof>Roofs" command (if it is not already set). Then define your roofs using the following sequence:
 - for CC2 maps select the tool "roof rectangle", for CC3-or-newer maps select the tool "roof polygon" (but you can use both tools for "both worlds", 5CC will automatically adjust roofs for CC2 to rectangles if they were defined using the "roof polygon" tool),
 - use the mouse pointer to point and drag the desired cut-out rectangle or use the mouse pointer to point the polygon points,



- use the tool "define roof" or the "Edit>Define as roof" command to define the cut-out area as roof entry. Because you have both BGM layers (exterior and interior graphics) present, 5CC will create both roof graphics automatically (when you have used "roof polygon" tool, then the surrounding space will be filled automatically with white color = transparency area, but only if it is a CC3-or-newer map. In case of CC2 maps roof entries will be set automatically to rectangles (see picture below)).



- repeat these steps for all roof entries.

- save your work.

If you want to change an existing roof entry: I recommend to save the existent roof graphics first:

- switch to roof editing mode via the "tools window", tool "roof pointing",
- select the roof you want to change with this tool (it will be then highlighted),
- turn roof exterior view "ON" (if it is not already on) via "Roof>Roofs" command,
- use "Edit>Copy" command to transfer the graphics to the clipboard,
- use your graphics editing program to import this cut-out, saved it,
- go back to 5CC, turn roof interior view "ON" via "Roof>Interiors" command,
- use "Edit>Copy" command to transfer the interior graphics to the clipboard,
- use your graphics editing program to import this cut-out, saved it, too,

Now you can use several ways to make changes:

- delete the highlighted roof entry with the "roof erase" tool and define a new one.
- or use the "roof informations window" to change the coordinates.

Then you must adjust the roof entry's graphics:

- use the "Edit>Update all roof graphics..." commands to correct the exterior (and perhaps the interior if the BGM interior layer is loaded) graphic,
- turn roof interior view "ON" via "Roof>Interiors" command,
- paste in the new interior graphic in using the "Edit>Paste" command (after you have made the necessary artwork in your graphics editing program).

Alternative way making roofs if you have only the exterior view graphics ready:

- make your map basic terrain and elevation definitions in 5CC.
- create the BGM graphic with the exterior views, its size must fit to the map's size.
- use the "File>Import...>Import background as 16-bit TARGA..." command to import the exterior view graphic.
- switch to roof editing mode via the "tools window", tool "roof pointing".
- turn roof exterior view "ON" using the "Roof>Roofs" command (if it is not already set).

Then define your roofs using the following sequence:

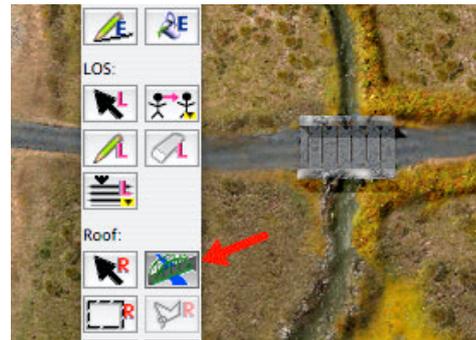
- for CC2 maps select the tool "roof rectangle", for CC3-or-newer maps select the tool "roof polygon",
- use the mouse pointer to point and drag the desired cut-out rectangle or use the mouse pointer to point the polygon points,
- use the tool "define roof" or the "Edit>Define as roof" command to define the cut-out area as roof entry. 5CC will create the exterior roof graphic automatically and it is copied to the clipboard automatically (when you have used "roof polygon" tool, then the surrounding space will be filled automatically with white color = transparency area, so I recommend to use the "roof rectangle" tool when creating a CC2 map).
- switch to your graphic editing program, create a new graphics there and use there the "Edit>Paste" command to paste in the exterior cut-out graphics. Make the necessary painting to get the interior view (avoid anti-aliasing). Copy this new graphic to the clipboard (must have same size like the exterior cut-out).
- go back to 5CC, turn roof interior view "ON" using the "Roof>Interiors" command.
- you will now see a highlighted black rectangle / polygon.
- use "Edit>Paste" command to paste in the interior graphic.
- repeat these steps for all roof entries.
- save your work.

After the roof defining is all done, you can adjust the terrain definitions to your graphics. To view the interiors just turn interior view "ON" using the "Roof>Interiors" command when you are in terrain editing mode (use tool "terrain pointing" or any other terrain editing tool).

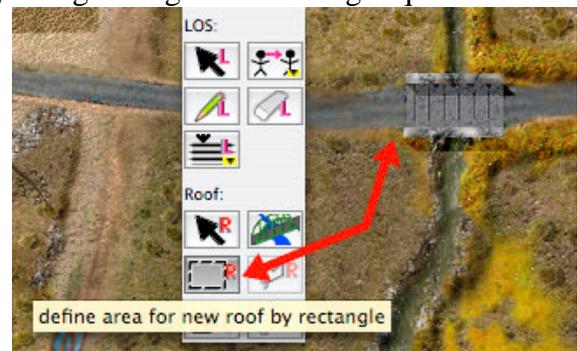
CC2 bridge image defining

Use the corresponding way as described for roof entries:

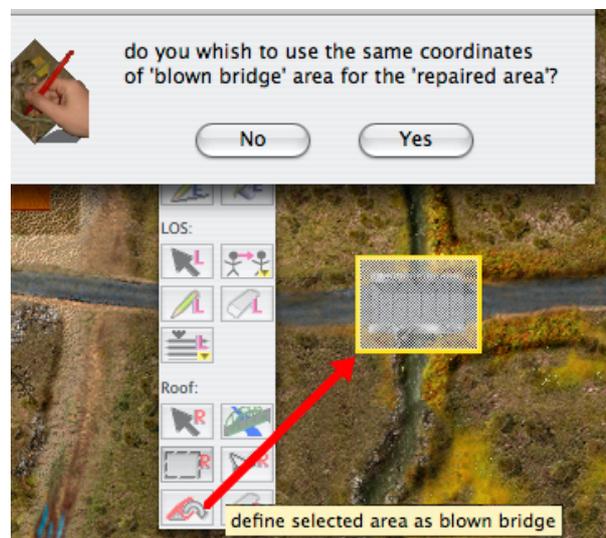
- make your map basic terrain and elevation definitions in 5CC.
- create the BGM graphic with the exterior views, its size must fit to the map's size.
- use the "File>Import...>Import background as 16-bit TARGA..." command to import the exterior view graphic.
- switch to bridge image editing mode via the "tools window", tool "switch to CC2 bridge images".



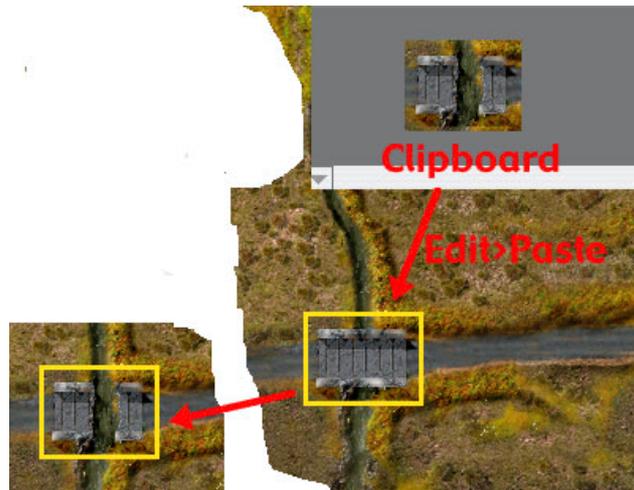
- turn blown bridge view "ON" using the "Roof>Bridge blown" command (if it is not already set). Then define your one and only blown bridge image using the following sequence:
 - select the tool "roof rectangle",
 - use the mouse pointer to point and drag the desired cut-out



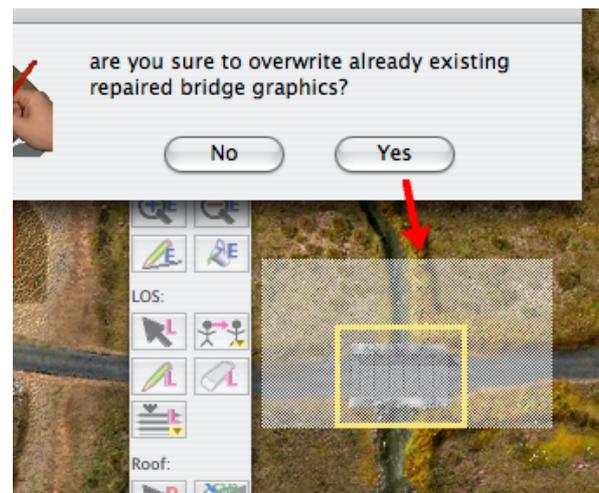
- use the tool "define bridge image" (same button as "define roof") or the "Edit>Define as blown bridge" command to define the cut-out area as blown bridge image. 5CC will take the cut-out as blown bridge graphic automatically and it is copied to the clipboard automatically.
- you will be asked if you want to have the same cut-out coordinates to be used for the repaired bridge image. Answer "NO" if you don't want to have a repaired bridge image.



- switch to your graphic editing program, create a new graphics there and use its "Edit>Paste" command to paste in the cut-out graphics. Make the necessary painting to get the blown bridge view (avoid anti-aliasing). Copy this new graphic to the clipboard (must have same size like the cut-out before).
- go back to 5CC, keep blown bridge view turned "ON" using the "Roof>Bridge blown" command.
- you will now see the BGM cut-out area still highlighted.
- use "Edit>Paste" command to paste in the blown bridge graphic.



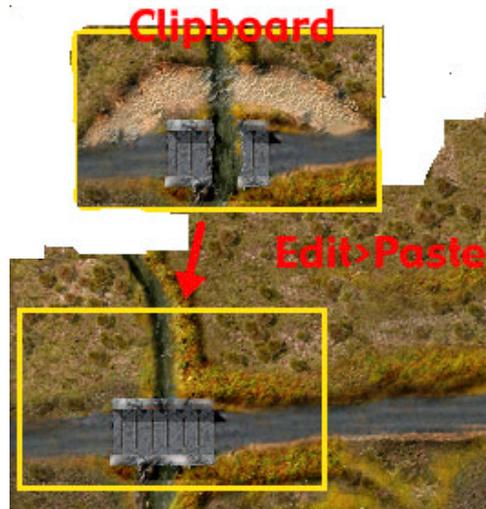
- if you want to have repaired bridge graphic, turn repaired bridge view "ON" using the "Roof>Bridge repaired" command. Then define your one and only repaired bridge image using the following sequence:
 - if you want to change the coordinates of the repaired bridge graphic, then define a new one using the tools "roof rectangle" and "define bridge image". You will be asked if you want to overwrite the already existing definition. You must use the "Edit>Copy" command to get this new cut-out to the clipboard. Transfer this cut-out to your graphic editing program.



- switch to your graphic editing program, take the blown bridge image and make the necessary paintings to get a repaired bridge image (avoid anti-aliasing). If your repaired bridge area has different coordinates than the blown bridge area, copy this image over the cut-out coming from the repaired bridge image definition from 5CC

(to get the correct image size). Copy this new graphic to the clipboard (must have same size like the cut-out before).

- go back to 5CC, keep repaired bridge view turned "ON" using the "Roof>Bridge repaired" command.
- you will now see the BGM cut-out area still highlighted.
- use "Edit>Paste" command to paste in the repaired bridge graphic.

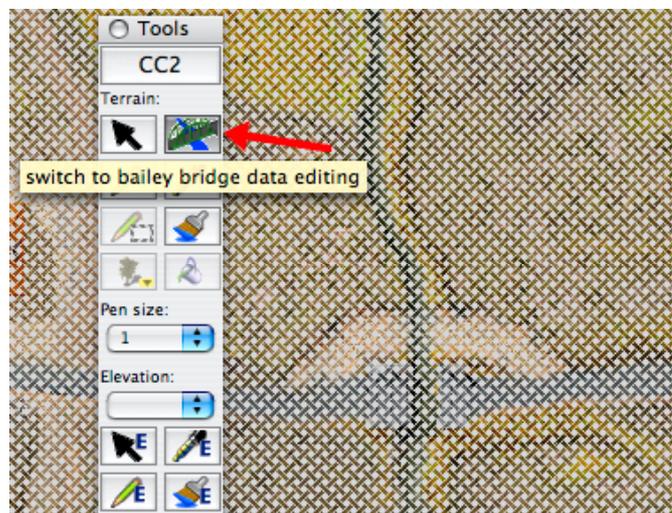


- save your work.

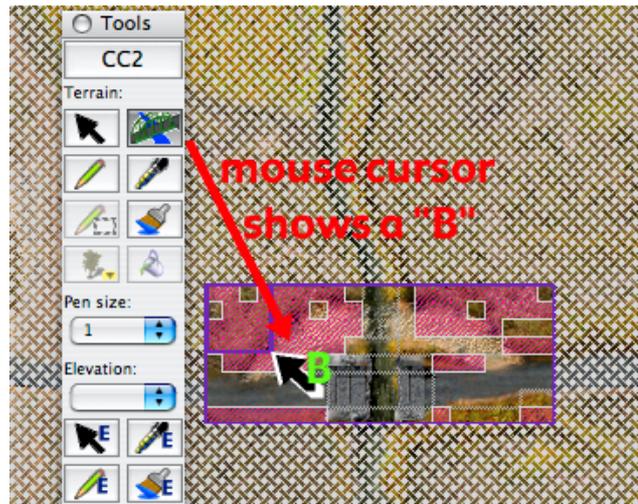
CC2 bailey bridge data defining

At runtime CC2 will paste in new terrain datas for the repaired bridge area (if XXX Corps has reached the bridge, operation/campaign play only). And of course the repaired bridge graphic. XXX Corps uses Bailey bridges to cross the rivers (watch how it works in the motion picture "A Bridge Too Far"). These terrain datas are located in the "Map####" data file behind the first "#". Only the changed elevation tiles will be redefined here. 5CC is the first tool to make editing/creating these datas easy:

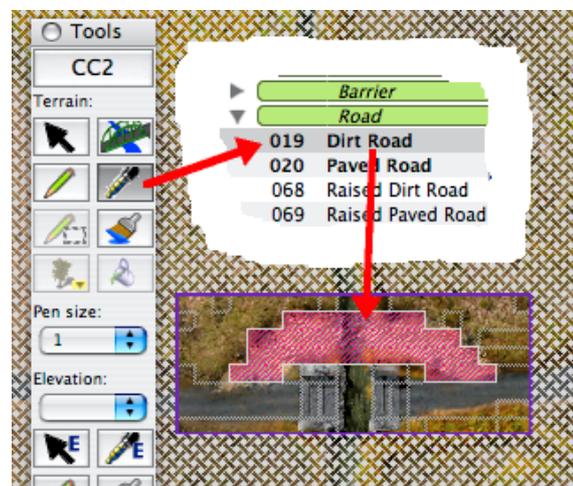
- make your map complete terrain and elevation definitions in 5CC.
- make all your BGM and roof graphics ready,
- make your CC2 blown and repaired bridge graphics ready,
- defining the bailey bridge datas is the very last step:
- turn repaired bridge view "ON" using the "Roof>Bridge repaired" command,
- use the tool "switch to CC2-repaired bridge data editing",
- you will now see the entire BGM graphic patched with a (light grey) pattern, indicating that there is nothing defined as bailey bridge area.



- use the mouse pointer (MacOS: arrow with a green "B") to define the elevation tiles you want to have as bailey bridge area. To undefine such an elevation tile use the "Edit>Clear" command. The already defined area will be highlighted (in purple) and the (light grey) pattern will be removed.



- use the tools "terrain pencil", "terrain selecting", "terrain rectangle pencil" and/or "terrain brush" to redefine the terrain of this area (other tools are not available in this mode). By default the basic terrain and elevation values are copied when an elevation tile is defined as bailey bridge area. Sorry to say you cannot change the elevation (in case you will really need it set the basic terrain with your bailey bridge elevation values, define the bailey bridge data area and then change the basic elevations).



- save your work.

For more details on the Bailey bridge data and graphics of CC2 please read my "CC2Guide-Bridg-files_v6.pdf".

Color based flood fill tool usage

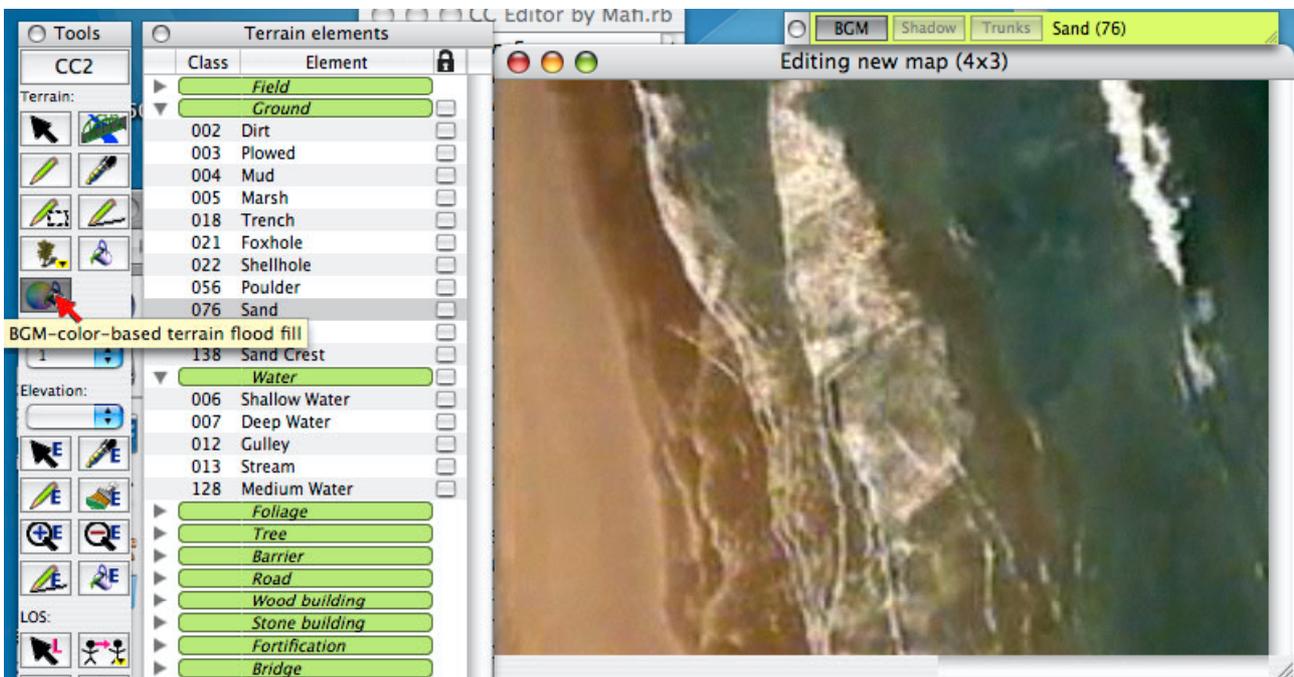


Usually a flood fill tool works like streaming water: it flows until it reaches its boundaries. The terrain flood fill tool takes as a limiting boundary any terrain tile value different than the value of the starting point (see page 33).

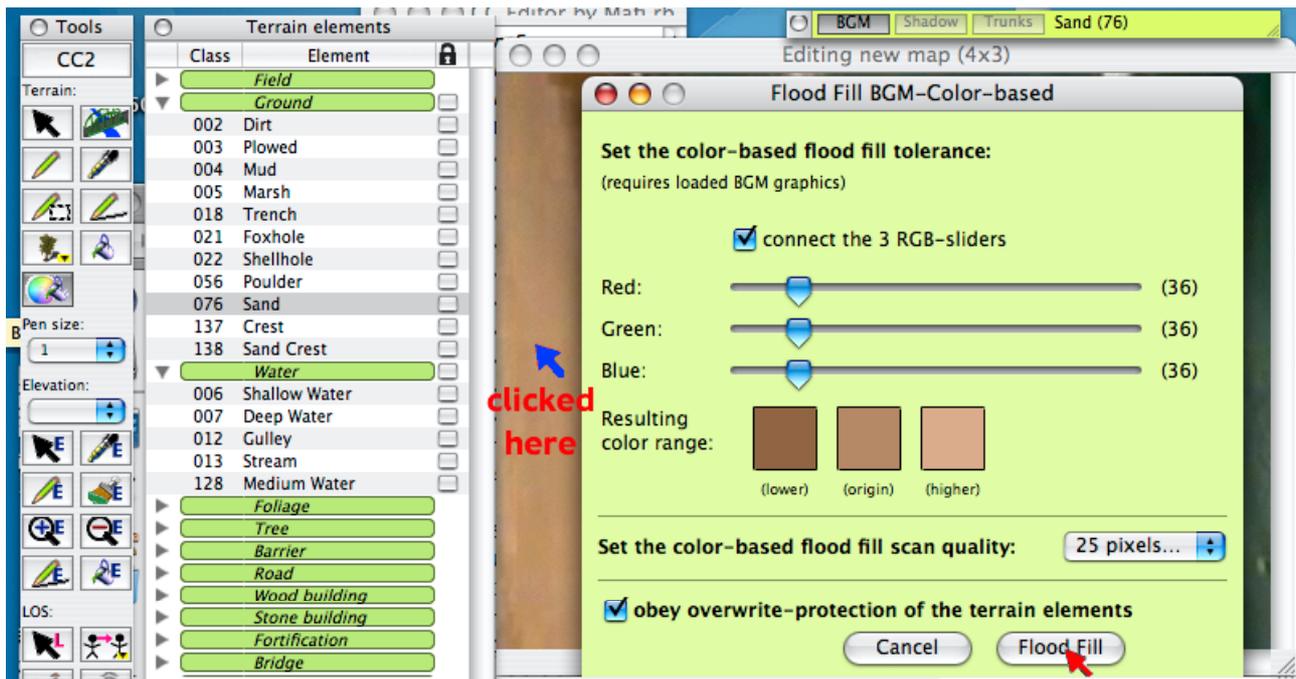


If you want to have the flood fill tool no longer respect existing (or non-existing) terrain tile definitions but to follow the colors of the background graphics, use the color-based flood fill tool. This tool works best with maps with high color contrasts (cartoon style). Real photo background graphics might be difficult to be flooded: too many color nuances representing the same terrain element. The following example shows this effect with a real birdview photo of a beach:

First create the new map and import the background graphic or load an existing map. Then select the color-based flood fill tool (see red pointer on picture below):



Now we want to flood the real beach with the terrain value "Sand". Just clicking with the cursor on the light-brown area on the left side of the map's BGM (see blue pointer on the following picture):

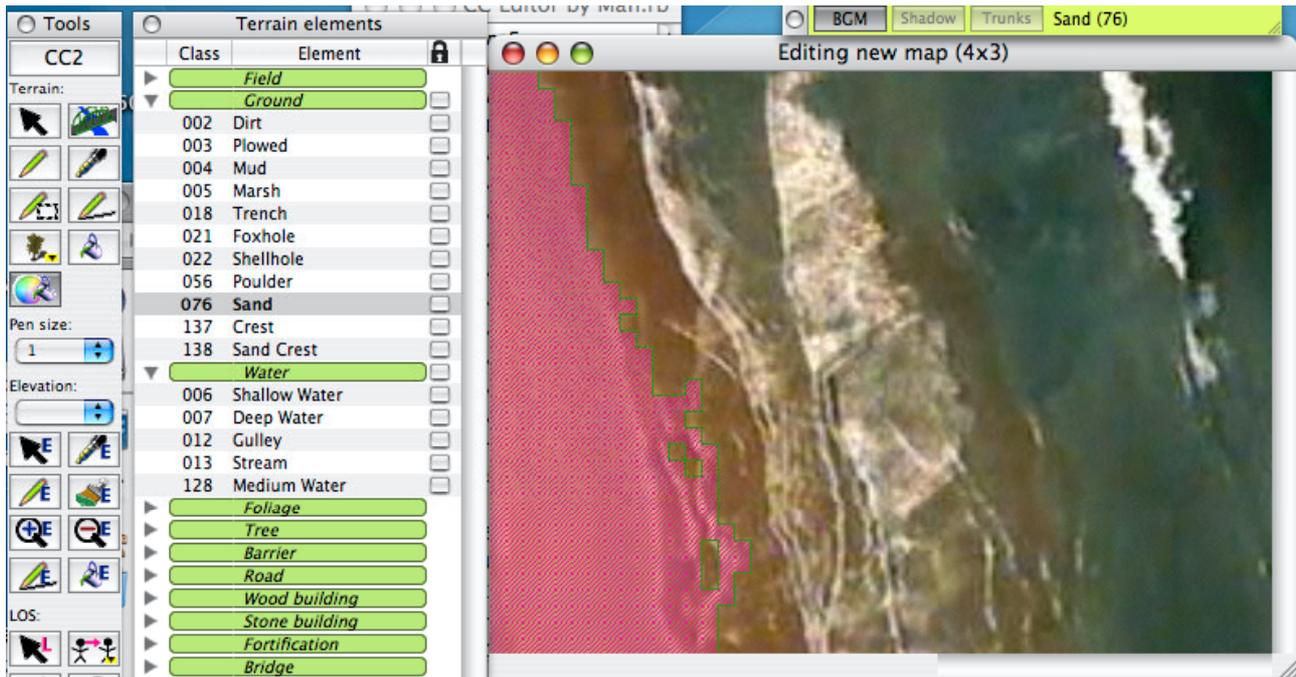


A window will come to front where you can set the sensitivity / tolerance of the flood fill process. A value of 36 will be good for such a smooth and identically colored area. You can change the flood fill tolerance for each color channel (RGB) separately.

The poppmenu below lets you select the pixel scanning quality. To calculate if the "to be flooded" terrain tile is within the range of the selected tolerance 5CC can scan all the 100 pixels of this terrain tile. This is a slow process (300 times calculating, 3 times per pixel). If you want to have a faster process, you can reduce the number of pixels "visited" down to 25, 16, 9 or even down to 4 (in this case they will be the four pixels in the center of the terrain tile), which will be much faster.

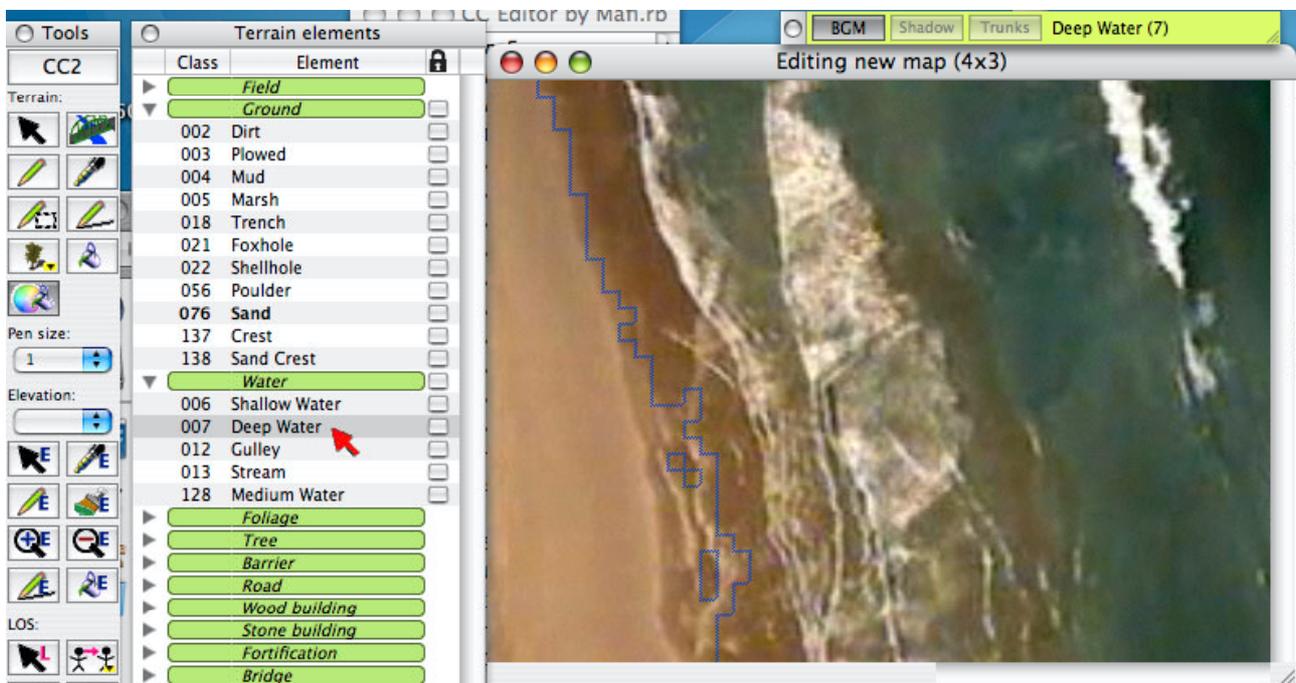
Usually you will have "obey overwrite-protection of the terrain elements" set to "on" to prevent harming of already defined terrain details (how to set overwrite-protection for terrain elements see page 37).

When all is adjusted, press the button "Flood Fill" (red pointer on picture above) and the flooding process will start. It is not fast, on extremely large maps you will wait and wait ...

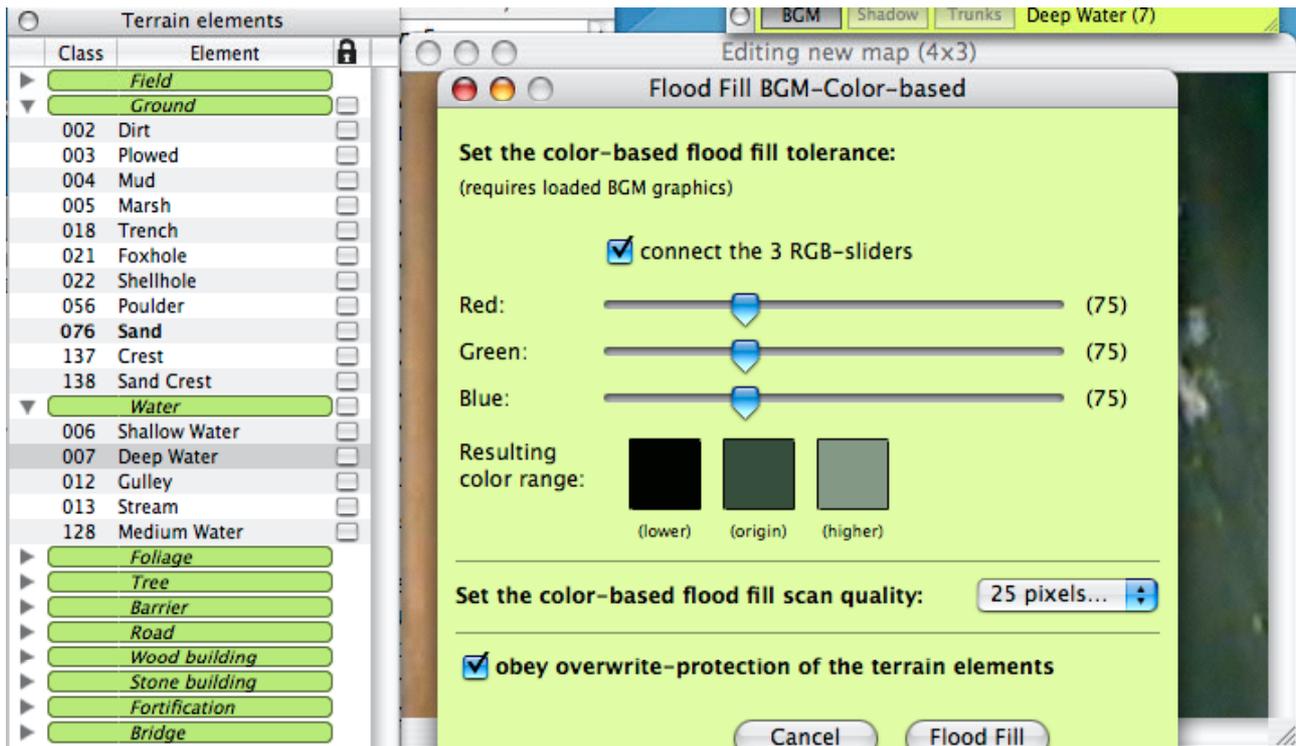


The picture above shows the result of the action. The light brown area of the beach is coded as "Sand". If you haven't it disabled in the window "Preferences" the action can be made undone.

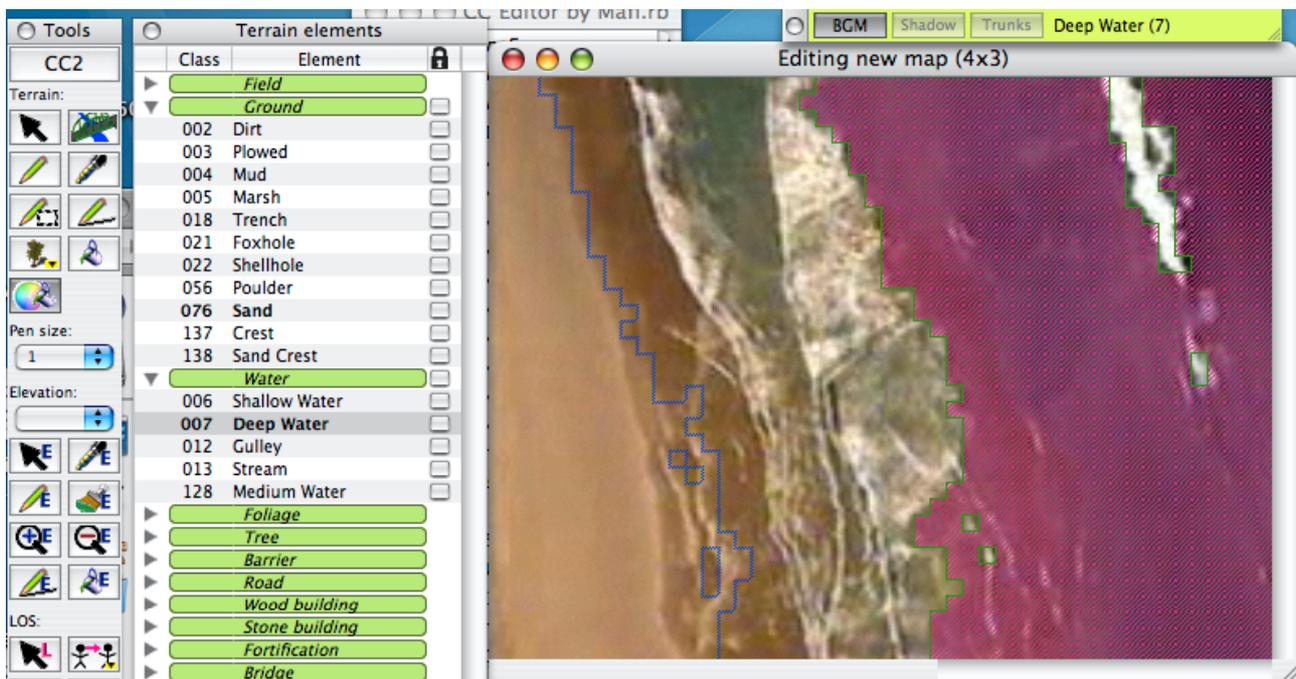
Next task: we want to have the sea coded as deep water. Selecting the terrain value "Deep Water" (red pointer on following picture). You will see the boundary of your already coded "Sand" as a blue line (depending on the color scheme you have selected):



So we are clicking now into the deep green area on the right side of our BGM. Again the following window will popup and this time we will use a wider range of tolerance:



The result can be seen on the following picture:



Except for the foam of the waves 5CC has no coded the sea as "Deep Water". The precision of the coding depends not only on the selected tolerance and scan quality but also on the contrast between the colors used on your background graphics. Snow maps will be still very difficult to be coded automatically this way.

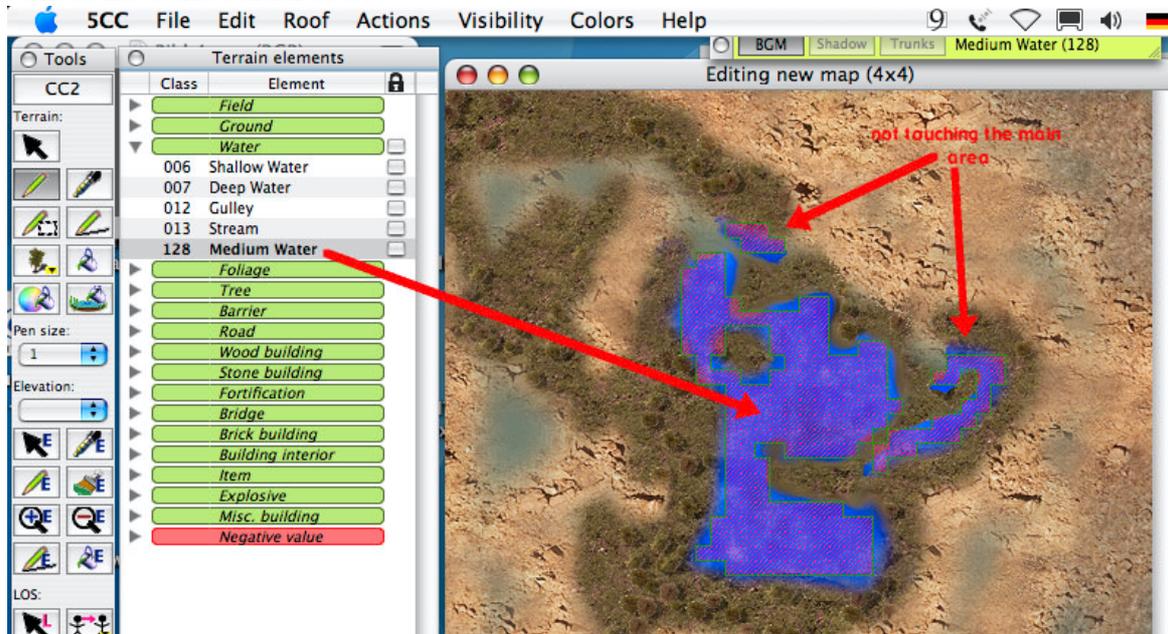
Terrain bordering tool usage



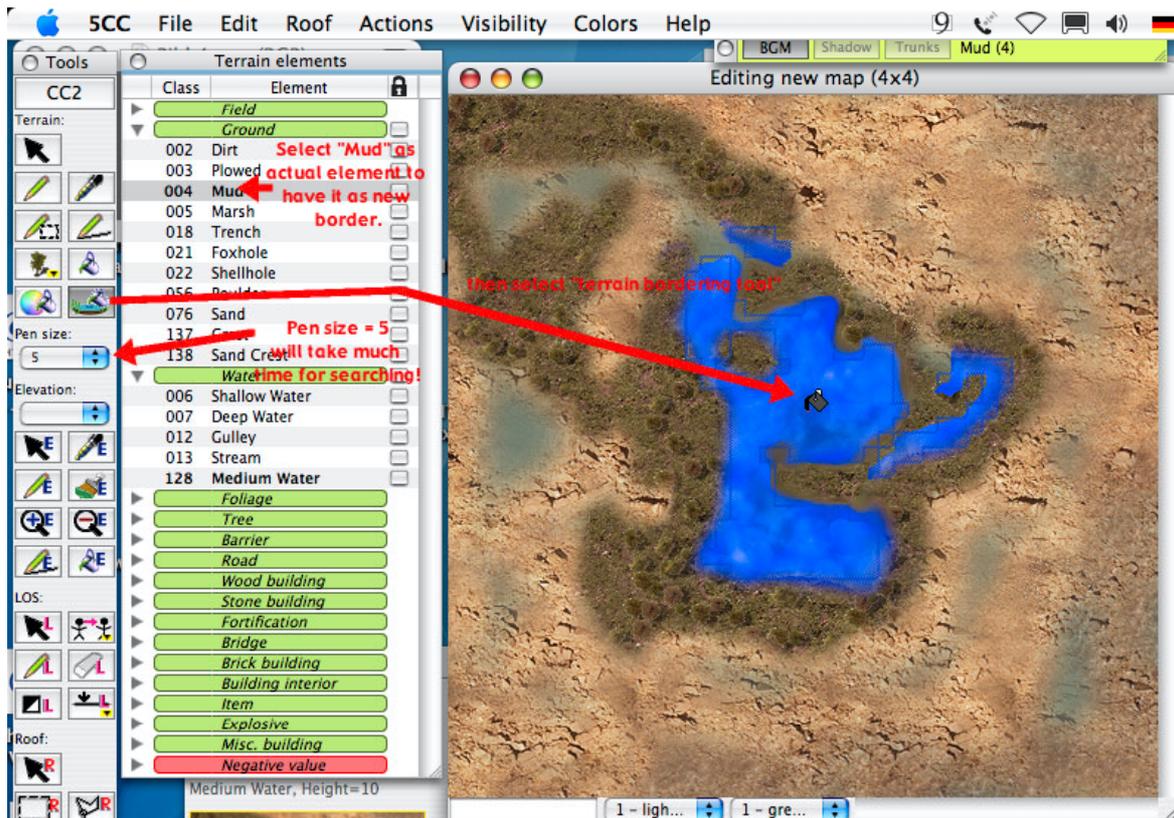
This tool will flood to the limiting boundary (which will be any terrain tile value different than the value of the starting point) without changing the area's terrain values, but will set a surrounding border. The width of this border depends on the pen size. The tool will not overwrite terrain elements in the neighbourhood with the same value like the starting point. In this case the resulting border might have gaps. And the tool will respect overwrite-protection as set in the window "Terrain elements table", see page 37.

This tool was intended to give the map maker some kind of "automatic gulleys and stream processing", although I must recommend I don not know if this was originally meant for terrain data management or for elevation management. The tool will work fast enough if you set pen size to 1. Larger pen sizes and/or greater areas to be "flooded" requires much time to do.

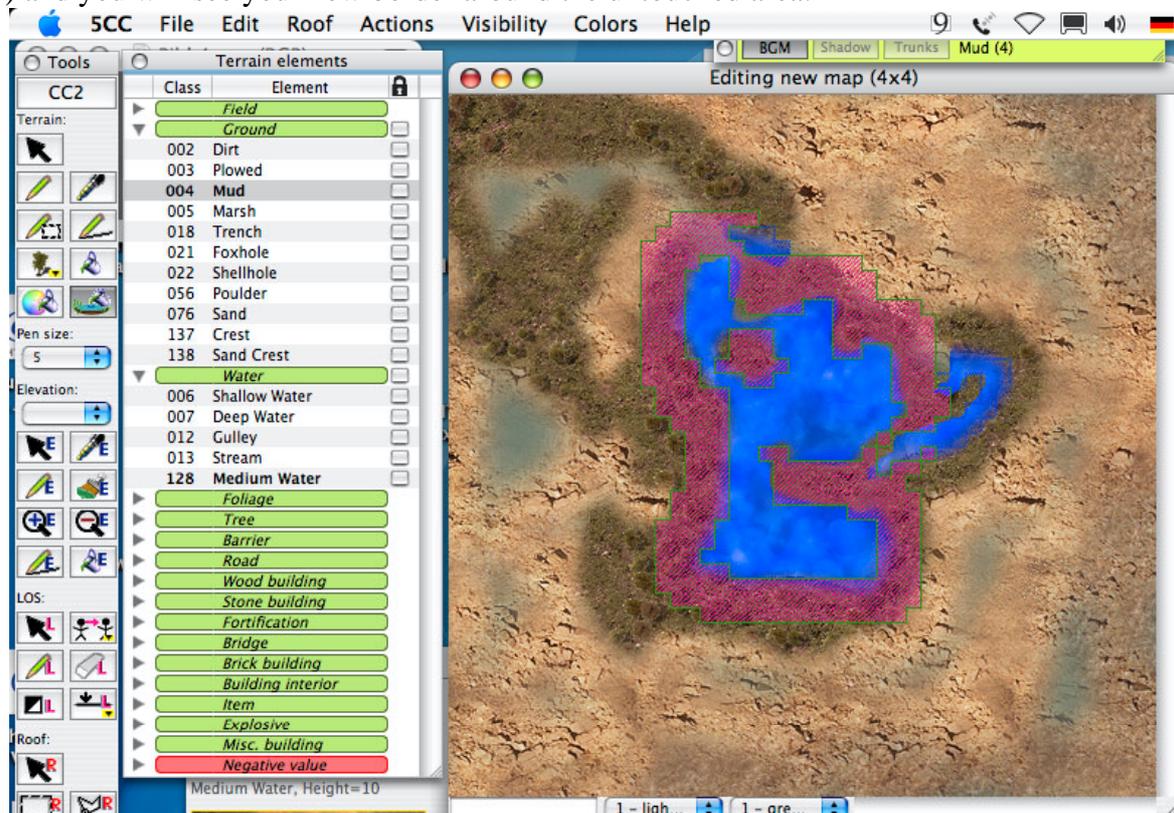
Example: define some areas as "medium water". Some of them might not touch the area which one you want to have the border set:



Now we want to have the main area to be bordered with "mud". Without changing the area's size and without overwriting other areas containing the same element value "medium water". Select as active terrain element value "Mud" from the window "Terrain elements table". Then set the pen size in the window "Tools" and select the "terrain bordering tool". Go to the main editing window, you will see that the cursor's shape will turn into the flood-fill-shape:



Click into the desired area, wait a little time (the example shown here took a minute on a 1.4 GHz Mac) and you will see your new border around the untouched area:



Element coding and roof's in-game appearance

This discussion is taken from CSO forum of April 2006, suggestions made by Pvt_Grunt and Tejszd:

Pvt_Grunt: ... I do remember a few problems with some elements where the game refused to change to the interior until I changed the element type. It was an RSR CC5 map I coded. I wanted to use pavement so that tanks could enter the building. It seemed to need a certain percentage of the elements to be "interior" type, but not all of them.

Tejszd: ... I agree with you pvt_Grunt there is some problem, at least with CC5, and the roof requiring some element or number of elements for the roof to work.

A couple more tips (for CC5) on the elements:

2 Dirt

35 Dirt Road

92 Leaves & Dirt

117 Bare Branches & Dirt

Change to mud because of rain.

16 Wreck

Is hard coded in the CC5.exe. For a 2nd battle on a map the CC5.exe adds the wrecked tank graphic and recodes the elements below the tank to #16.

9 Stone Fence

112 Small Hedge

Are crushable elements that get an updated graphic and the coding changed to the crush to #. Other elements do not get crushed even if the crush to # is set.

Pvt_Grunt made a reference to a forum's discussion of June 2004:

Question: I'm having trouble coding the interior of this large building so that tanks and armoured cars can enter it. I originally copied GJS map collombelles which has the big factory, it uses "pavement" element, but this screwed up the roof file. The roof would re-appear sometimes even with a unit inside. I used "stone floor" element instead, now the roofs work but I keep getting "No Clear Path" from the tanks, as the element file has a zero for tracked vehicles for this element. The map is finished now but I would like to change it to be able to drive a tank into the building during the battle. Any ideas????

Answer by pt11070: trick is to use combination of interior and exterior code elements. Like you experienced if you have only pavement can't see inside and if you use only wall element you can't get tank in. Two ways to do this is to:

1. make a new element in "element.ini" that would require some reserach and time.

or

2. make a base of the floor pavement, and put every so often an interior element(tall wall or factory wall/floor) that would enable the interior to be shown in the game.

Answer by CSO_Linebacker: pt's idea is the easiest. For my BreccourtV2 map (although not vehicles), I have all of the hedges coded so the foliage disappears and you can see you units

underneath. I coded the trunks as Wood Wall, used the Leaves Filler tool to add 'Dirt Floor' element all around it, and then coded the rest as bocage. Works fine.

Conclusion by Pvt_Grunt: Hi, thanks for the help.

Firstly, I was wrong about the steelworks floor in Colom map. It is mostly brick floor with occasional dock crane elements. I dont know why I thught it was pavement, must have been a 3C brain overload. I emailed BobD, who made the map to ask him how he did it. He said its been a while since he made any maps, but was helpful anyway, thanks to him.

I ended up using a mix of stone floor and dock crane / interior wall. It seems that when there is a large area of an exterior element, like pavement, the roof files will screw up. There doesn't seem to be any exact size, it doesnt always happen everytime. Also, vehicles will still sometimes go into the buildings, again it seems to be random. I got a Marder to drive in, but not a Staghorn. I dont think CC was made for these kind of maps, I dont remember any original maps with large buildings like hangers or garages.

For some of the larger buildings I broke the roofs up into smaller pieces, this seems to help. It's more realistic too, as you cant see every room in a building from the entrance.

Problems with the 5CC.ini file

Under certain conditions several users encountered problems with the preferences file. Several times the "Terrain Eelements File" structure definitions went wrong inside the "5CC.ini" Preferences file. Since version v1.06a4 5CC contains a self-repair strategy (see page 16). The following discussion is again taken from CSO forum of April 2006, help description by me:

Problem: you made a new elements file for 5CC but your 5CC is presenting them all together in one category without any level informations, and for this reason the LOS-generating failed, too.

My suggestion: the reason is that 5CC is not importing the level column and the category column.

Only possible solution:

- remove your actual "5CC.ini" file, there must be a fault in the 5CC-file format definition inside this file.
- restart 5CC and re-select the NewElements.txt
- if you will see the new categories, then the error depends solely on the old "5CC.ini" contents.

You can restore your previous "5CC.ini" contents into the new one except for all the three terrainn elements file format definitions. I think I introduced the "category" in v1.04, so your 5CC.ini may contain older infos not overwritten by the new version.

Make a search for your "5CC.ini" file. In Windows, the "5CC.ini" is hidden in the system folders. It is created by 5CC at runtime when the application is closing.

Use 5CC itself to determine where the file is stored:

- launch 5CC and
- use command "About 5CC...", look at the lines BELOW the http-url-texts in this little

window, there is a text telling where the 5CC.ini is stored!

Make a search in WinXP INCLUDING hidden & system files. It will show you this file. You can edit it! Although it is hidden! Go into "5CC.ini" and please look what is entered for the values 1620, 1621, 1622, 1623, 1624, 1625, 1626, 1627, the correct values must be 5CC, 0, 1, 2, 3, 4, Tree, 5. Take a look there. The fault must be there. I was able to rebuild your situation by changing the values for 1624 and 1625. But it maybe also some kind of RAM problem.

The values inside 5CC.ini should be

1620 = 5CC

1621 = 0

1622 = 1

1623 = 2

1624 = 3

1625 = 4

1626 = Tree

1627 = 5

If not, adjust these values for 5CC file format. Please look again into "5CC.ini" if the CC3-file format is missing, too, otherwise please add the lines:

1610 = 14

1611 = 0

1612 = 1

1613 = 2

1614 = 42

1615 = 47

1616 = Tree

1617 = 48

Used and recommended sources from the Internet:

- MICK "XE5" CONMY: CC2 Editing FAQ ("cc2eFAQ.zip"), July 1998.
- MATTHEW DAVID HILLS: several texts from his site, September 1998.
- ANDREW GLENN "NAKED FOOT": CC2 Map Making Guide ("MapFAQ.zip" inside the "MapMaker.zip"), November 1998.
- ANDREW GLENN "NAKED FOOT": Naked Foot's Close Combat III Map Making Guide, Edition 2 ("CC3 Map Making.doc" inside his map "zerstorer.zip", October 1999.
- GERRY SHAW "TIN TIN": several file format texts from his site, 1998-2002.
- GERRY SHAW "TIN TIN": ReadMe file of his tool MapMaker.exe for CC2, 1998.
- DAVID R. TIDY "THE OTHER DAVE": CC2 FAQ ("CC2Faq.wri"), June 1998.
- VINCENT VIAUD: source code and readmes of his tool "cclos.exe", June 1998.
- FRANK FIJNEMAN: running CC2 mods from HD under MacOS, 1999.
- "UGUR": a new method adding CC2 maps "<http://home.wanadoo.nl/cclinks/morecc2maps.html>", January 2001.
- PEKKA SAASTAMOINEN "CPL_FILTH": CC3-roof file format, readmes from his tool "3C.exe", 1999.
- CHRIS ELLENS: CCEdit manual and readmes, 2000.
- "SGT WILSON": "QClone.exe" tool results to get the terrain definitions of CC4-RtB.
- SHANE CAMERON "SOUTHERN_LAND": Southern_land's map making guide ("Southern_Land_Map_Guide.doc"), January 2003-2006.
- "KWP": forum text relating CC3 map data heading, November 2005.
- MANFRED "MAFI" FISCHER: The Bridge-File Guide ("CC2Guide-Bridg-files_v6.pdf"), March 2001-2003.
- MANFRED "MAFI" FISCHER: The Batnames-File Guide ("CC2Guide-NewBattlesMaps_v6.pdf"), March 2002-2005.
- MANFRED "MAFI" FISCHER: The CC-series Map File Formats ("CC2Guide-TxtfMapLosRoof-v3.pdf"), January 2006 - April 2008.

Some actual forums for CC-users (where you can try to contact me):

- CloseCombat HQ: <http://www.ryanross.net/cc/>
- CSO: <http://www.closecombat.org/>
- CCS: <http://www.closecombatseries.net/>

Mafi
closecombat2@claranet.de

<http://cc2revival.npage.de/>
<http://closecombat2.fortunecity.com/>
<http://www.closecombat2.claranet.de/>
<http://www.ftf.claranet.de/>
<http://www.geocities.com/cc2revival/>