LimA Platform Integration

Document Version:
LimA_Platform_Integration_v01_HS01.doc, 28-06-2016
LimA_Platform_Integration_v02_HS02.doc, 8-09-2016

Purpose of the document
The initial version V01 of this text will lay out key elements of the integration work necessary to use LimA modules for noise calculation in the background of another user interface.
It shall be revised by all participating parties to clarify details of the integration process.
Discussion on the text can as well continue in a telephonic meeting.

Key content of new document versions
Version V02describes an example application for platform communication. This includes recent changes in Lima setup and the design of the job_request file.
See section "Example case for Platform communication", page 14 **– 19**

Storage and naming convention
Communication between the platform and LimA modules will be file-based. File names shall use ASCII Code (English character set). File names shall not include blanks and shall follow Windows conventions.
The content of the files will as well use ASCII Code (English character set).

Files will potentially be placed in 2 locations:

1. LimA installation folder and subfolders
   In the initial phase of the project we assume it is placed in C:\lima\grunddat\.
   A system variable %PFADLIMA is supported by LimA.
   If set by the user, it will define the location of the current LimA installation, e.g.
   SET PFADLIMA=O:\lima\grunddat
   If not defined, PFADLIMA is the directory in which the running LimA-module is placed.
2. Project data folder
   This is the place where calculation is performed.
   In some cases LimA default background data from c:\lima\grunddat\...
   may be overwritten by a project related data-set,
   i.e. identical file name but stored in the project folder.
   A specific LimA module may only be started once in the same folder,
   i.e. does not run in parallel in the same folder.

LimA directory and project directories do not need to be placed on identical partitions (c: / d: etc.). But one should only use partition names which are commonly known by all computers participating in the system. Therefore C: drives will not be suitable if more than one machine is involved.

Organizational files
A number of files for organisational purpose are automatically generated in the project folder by LimA modules. They should be kept untouched

- OBJEKTPA
  Basic configuration information to be exchanged between LimA modules
- LIMA_*.MLL
  Log file of a LimA module process at run-time
- LimA_*.MLD or *.M7 etc.
  Renamed log file once a process is finished
- LimA_5.BIF
  Information of all recent menu settings of LimA_5 (GUI)
- LimA_5pr.bif
  information about parameter settings of former LimA module runs within the project

Model data and result files generated by LimA modules

- *.DUM
  Dummy files for temporary usage
- *.BNA
  Model data files generated during SHAPE import by LimA_39 or created by a noise calculation in Lima_7cn.exe (Chinese regulation) or LimA_7f.exe (ISO9613 regulation)
- *.BNX
  Graphics of results, unless result graphics are directly generated by the platform

- *.ERT
  Single point or grid results in comprehensive storage, but still plain text
- *.ERG
  Single point results in a detailed form

Files expected in the project folder to be set up by the platform

- SHAPE files (*.SHP, *.dbf, *.shx)
  All relevant model data used as input for calculation
- *.ASC
  Background data for octave sprectra, material data and directivity are stored as default values in 3 files in \lima\grunddat\.
  The platform can support project related data by storing an equivalent file in the project folder.
  The 3 files are:
  1. limafre.asc octave spectra
  2. limamat.asc material data for reflection losses for the 2 sides of an obstacle as well as transition loss
  3. limarwk.asc directivity

- *_ACEE_Request.txt
  A initial file that will be used by LimA to define job demands and provide the basic information for writing input file for calculation or other data processing by LimA modules.
  A LimA input file, e.g. *.L7 for the noise calculation, is generated based on few case related details described in *_ACEE_Request.txt in combination with LimA background information (job input template files).
  By avoiding to write *.L7, *.L39 etc. files directly by the platform, we can use LimA's template logic which will ease future modifications in the configuration.
  This will as well reduce development efforts as we can define a simple and universal interface (*_ACEE_Request.txt) for all kinds of applications. This file will be unique for the ACEE platform. So we are free to agree on any details. A structure for ACEE_Request.txt is suggested in the paragraph "Platform communication"

Files expected in folder "\lima\grunddat\spool1\" to be set up by the platform

To start processing jobs which the platform has defined for a certain project, the platform has to write a job-request file into the job queue directory \LIMA\GRUNDDAT\SPOOL1\.
A job request file will have any name and the extension shall be ".ANF".
If a limaserv.exe has been started to manage jobs in SPOOL1 he might immediately grep this job. Therefore the platform shall 1st create a job file with a dummy name, e.g. job_001.ANF.$$$ and finally rename the file to job_001.ANF.

Job will be handled one after the other in the timely order of job creation.
So, if order of jobs are time critical, there should be an adequate delay in create date/time.

A job request file consists of 3 lines and has the following structure:
One blank is placed in the 1st column of each line.

```
 d:\projects\proj_001          /* project folder
 Lima_5.exe                    /* request start of LimA_5
 Job_Request.mak               /* file to be processed by LimA_5
```

Define and describe object types and attributes

In LimA object types are named by 3 character long acronyms. In shape files different names can be used and during import/export a translation table is defining the relation.
The first attribute of an object has identical naming with the object type.
The geometry type (point. Line segment, polyline, polygon) is linked to object type and in some cases linked to object type + content of a further attribute.

Basic object types

- GEL
  horizontal contour line with height given in attribute GEL (polyline)
- GBO
  terrain breaklines, e.g. used for TIN terrain representation (polyline)
- TOP
  terrain surface description to define ground absorption (polygon)
- HIN
  obstacles with a more precise definition depending on a second attribute <HA>
  HA values and object description:
  1 general walls(polyline)
  2 buildings with horizontal roof (polygone), e.g. industrial and minor buildings only
  3 purpose built noise barriers (polyline)
  4 purpose built earth wall edges (polyline)
  7 bridge (polygon)
  8 escarpment edges (polyline)
- WGB
  Residential building objects (polygon) with horizontal roof,
  with attributes for number of dwellings and inhabitants
- CNR
  Chinese road object (polyline)
- IND
  industrial source
  Geometry type is rules by attribute <RQ>
  RQ values and object description
  0 point source (point)
  1 line source (polyline)
  2 area source (polygon)

All object types used by a customized LimA configuration for the Chinese Methods are enlisted in file
\lima\grunddat\objekte\LIMA5PA_CNM.
This file does reference separate *.ODE files for each object type. Each ODF file gives a list of all object attributes, i.e. acronyms of length of 1-4 character, including accepted length (characters) of content, initial content value and long text descriptor of attribute acronym.
It also references to explaining help text and suggested input values as well as syntax check rules. All this information is stored in
\lima\grunddat\objekte\helpe.ode

2d / 3d management in model data
Most objects will possess an attribute <Z>. By default input values are seen as relative height information. Input of just one letter "A" indicates 3-d polylines/polygons where each vertex carries its own absolute z-height. Absolute heights relate to MSL.

Structure of ODE files
Appendix "Object types" provides the list of attributes per object type as extract from project relevant ODE files. A brief description shall help to interpret the content of the files.

Extract from \lima\grunddat\objekte\\China\HIN.ODEHIN.ODE

```
INFO Object definition for obstacles


OBJEKT     HIN  /EQ HIN  Obstacles

ATTRIBUT /* N   DRH  CHA   BEZ.  Default    Content
         1   1    20   HIN   ...       obstacles
         2   2    16   ID    -        ident
         3   2     2   HA    2        obstacle-type

GEOTYP     HA   0.5  0  1.5 1  2.5 6  4.5 4  7.5 2  8.5 1  9.5 4  10.5 2  99 1

STIFT      Z   0.0  1012    1.0 15332    5.5  4332   10.5  1332
          25.0 11332   50.0 12332  100.0  9332 10000.  9022

HILFE
<HIN>  = HIN_H00
<ID>   = ID_H01
<HA>   = HA_H00

WERTE
<HIN>  = HIN_W00
<HA>   = HA_W00

ATI_CHK
<HA>   = HA_C00


SYMBOL

LEGENDE

ENDE
```

End of extract

The file contains several commands (yellow), which always start in the first column.
They define the subject which is treated in the same and in following lines until a new command is encountered.

Within a command parameters are defined. Parameter lines shall not start in 1st column to avoid potential ambiguity.

Attribute input limitations

In many cases LimA will accepts alphanumerical input and will extract numerical data or key words from the text. Where it is feasible to limit a shape attribute to pure numerical this can be dealt with during data import/export by LimA_39.
As an example of mixed input you can take entry for Industrial noise emission level for area sources. Here <PED> 60 will mean 60 dB/m². But you can also enter <PED> 90 Lw which defines the total emission of the are at 90 dB.

Attribute input limitations can in principle be defined by the user.
If it is seen to be helpful one might therefore limit the flexibility of input data as part of project configuration.

As indicated before the syntax checking rules are defined in \lima\objekte\helpe.ode.
The HIN.ODE file indicated the section "HIN_C00" to be used for syntax checking.
The relevant part in HELPE.ODE reads:

<HA_C00> /* HIN
:IL 1 2 3 4 5 6 7 8 10 12 21 22 23 24 |

:IL indicate that a list of integer values follow, each of which represents a valid input
| indicates the end of a single syntax definition.
Further definitions may follow. Any attribute content is valid, if one of the given definitions is properly fulfilled.

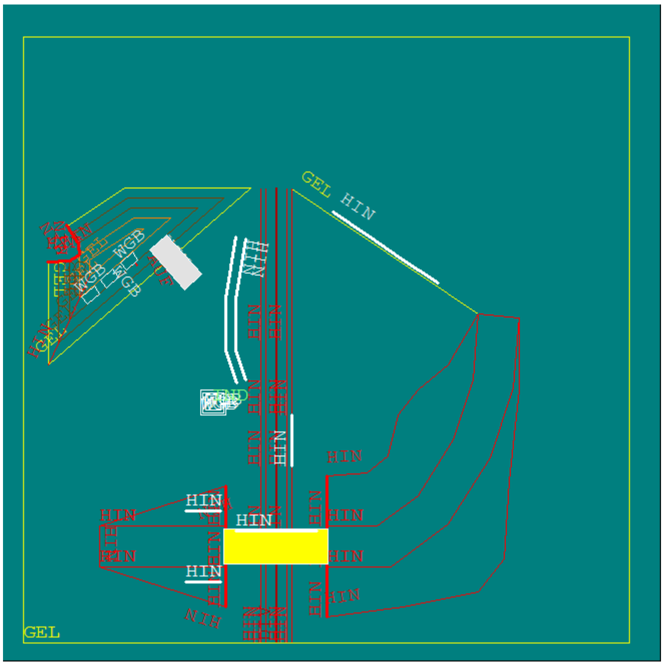
Other elements of the syntax check
{ } optional definition
:IR integer range, followed by 2 values, e.g. :IR 1 9
:R real value or :RL or :RR
:CA * string of undefined length :CA 16 of 16 characters
:CL String from list of strings. Use " " if a string contains blanks.
:CL "1 B" "2 B" "3 B" "4 B" "5 B" "1 C" |
:CS String provided by LimA

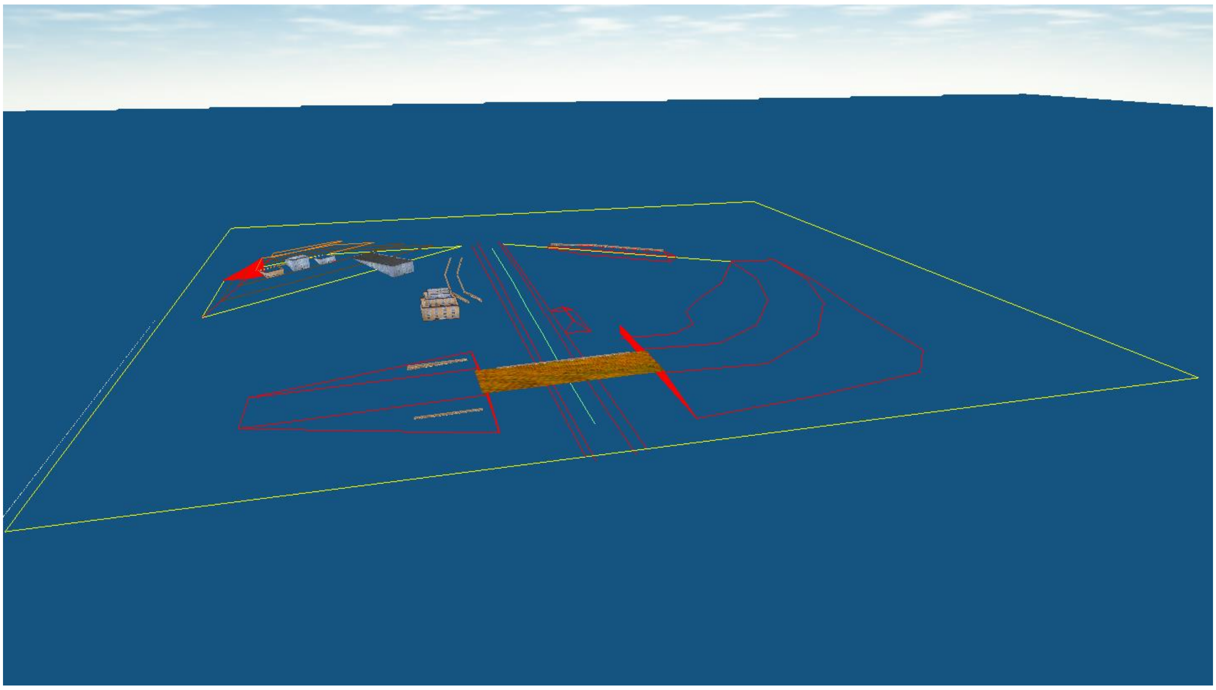
Further example:
:CA 10 :CL A B { :I } | :CL - |
Content of attribute can be a character string of up to 10 characters,
Followed by character A or B, optionally followed by one integer value.
Alternatively it can just be the string: "-"

Object example plus description

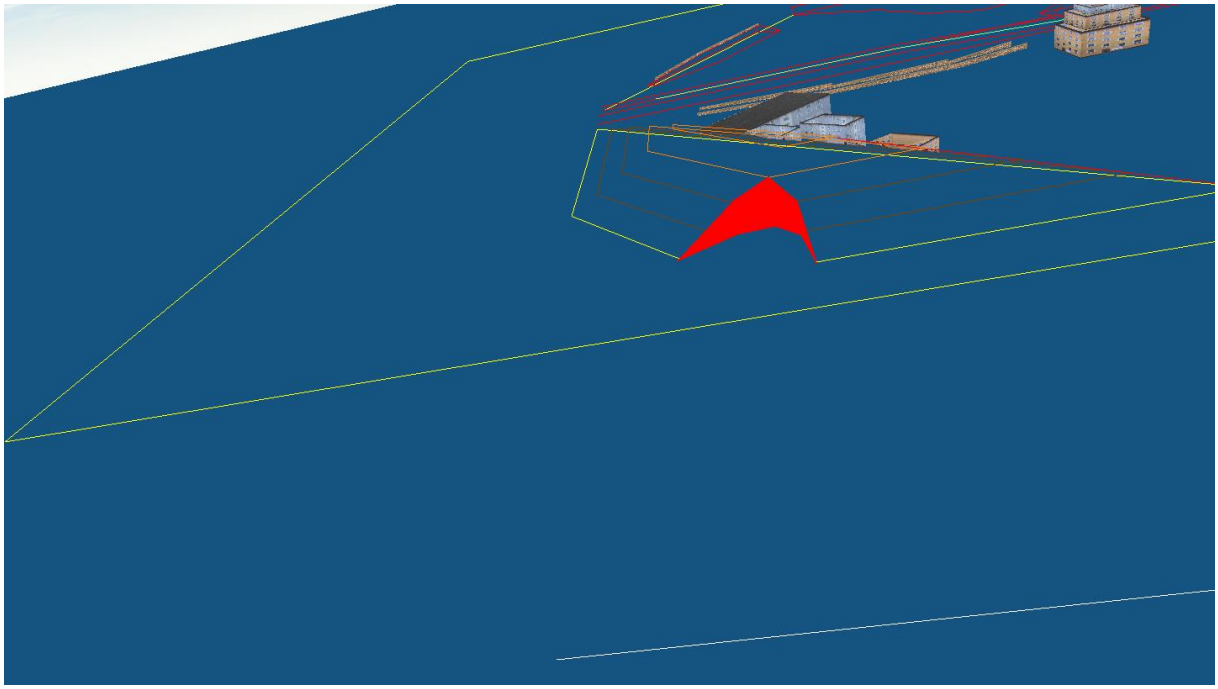
Two example cases shall be considered. A very simple first one (K216) which describes a few basic ideas for the model elements discussed in this project. K216 also shows some pit-falls in 3-d terrain modelling.

A 2nd case will deal with a somewhat larger model, extracted from a “Demo City”.





The small model above shown in 3-d



<GBO> <Z> 0 r 20 r i
GBO object with a constant climb from 0 m to 20 m above terrain. Intermediate vertex heights are interpolated.

<HIN> <HA> 3 <z> 2 d
Noise barriere 2 m above artifical building

<HIN> <HA> 8
Escarpment edges find terrain heights on each side of the poylline.
<Z> 0 is sufficient input.

<HIN> /Wall 0.66 1 <z> 4
An earth wall generated from the digitised bottom front line of the construction.
We suggest not to use LimA automated modelling features during thisn project, as the user will not see the identical model while modelling in the platform GUI.

<HIN> <HA> 2 <Z> 10 r
Buildings with relative height above terrain. For buidlings the terrain height at the first vertex (starting vertex) is used to add the relative height of the building in order to get the top height. As the roof is horizontal the top height will stay constant while the base heights may change.

Basic terrain modelling + explanation

LimA supports a potentially complex digital terrain concept. In the initial phase of Platform integration it will be enough to use the basic elements. The description below will also outline more complex terrain manipulations. Other than in standard GIS terrain, which shows an existing terrain model, the user may want to reshape this terrain for optional planning.

In absence of any terrain model a general terrain height (GOK) needs to be defined for calculation.

Contour lines and slope edges with absolute height are the most basic information.
Terrain objects with relative height definition are built up successively on top of this.
If objects relate to each other this is done in several loops.

Once absolute heights have been worked out for all terrain objects, the heights for artificial buildings are evaluated and finally the source heights are calculated.

Terrain is formed from

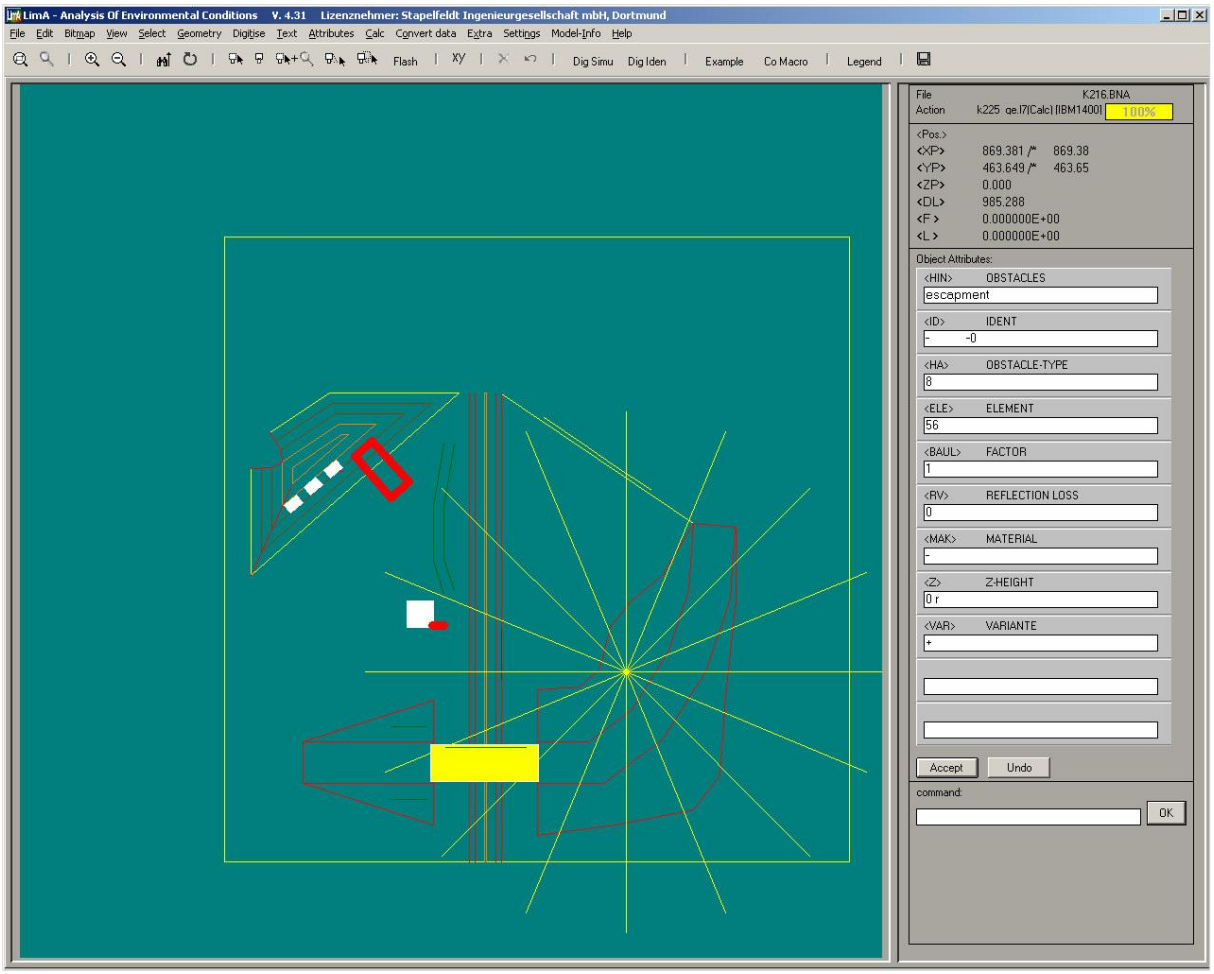
- punctual heights, short GEL objects or TPT point objects
  (one absolute z value in attribute GEL or TPT)
- contour lines, GEL objects
  (one absolute z value in attribute GEL)
- slope edges as HIN HA 4 objects
  3-d vertex input for polyline is supported otherwise
  height of edge is defined by one or two values in attribute Z.
  (absolute or relative to terrain, relative to other slope edges, relative to buildings, defined by gradient to neighbouring terrain information or defined by interpolation)
  This object shall be used for purpose built earth walls.
- slope edges as GBO objects
  3-d vertex input for polyline is supported otherwise
  height of edge is defined in attribute GBO – syntax similar to HIN objects.
  GBO represent breakline edges in normal terrain.
- escarpment edges, HIN HA 8
  (usual input is Z 0 , as top and bottom heights are retrieved from ambient terrain conditions)

When any of those objects have been imported as a 3-d object with x,y,z information per vertex, its attribute that will usually carry the height information will just contain the letter “A”.

A range of descriptions may be used to define heights by adding characters to the input value:

- A absolute height
- B related to slopes
- BL,BR related to slope on left or right
- SL, SR gradient to the left or to the right
- R relative to terrain
- D relative to buildings
- I defines interpolated z heights

For each terrain height evaluation LimA will perform the following procedure:
For 16 directions the nearest existing height information is search up to a distance defined by RADGEL.



The model above is available in tutorial K216.

All found information is weighted with respect to distance and the average value is the terrain height at test position.
Contour lines are always horizontal. Just 1 value and no suffix are expected in the GEL attribute and this input value is interpreted as absolute.
Point heights are digitized as short GEL segments. Imported points in geometric cross representation can also be used as GEL objects. While a point is useful to define the height of the digital terrain model, its geometry will almost produce no barrier effects.
As the edges of the terrain model are needed to define the barrier effect of the terrain, a model that purely consists of height points needs to be transformed into a contour line model.
Slope edges, such as edges of ramps and embankments (HIN HA 4 or GBO), might cross over contour lines. To avoid a potential conflict; the user can delete the contour lines underneath the earth construction. If not, LimA will still recognize a situation where the nearest terrain information is a slope and another slope is in diametric position and will not interpret any other information.
Slope edges are not reflecting and the RV attribute is void.
Escarpment edges (HIN HA 8) will typically not receive other height definition than “0 R”.

LimA will evaluate the terrain level on each side of the escarpment edge.
This will lead to the bottom and top height of the element and the visible surface may have reflection properties.

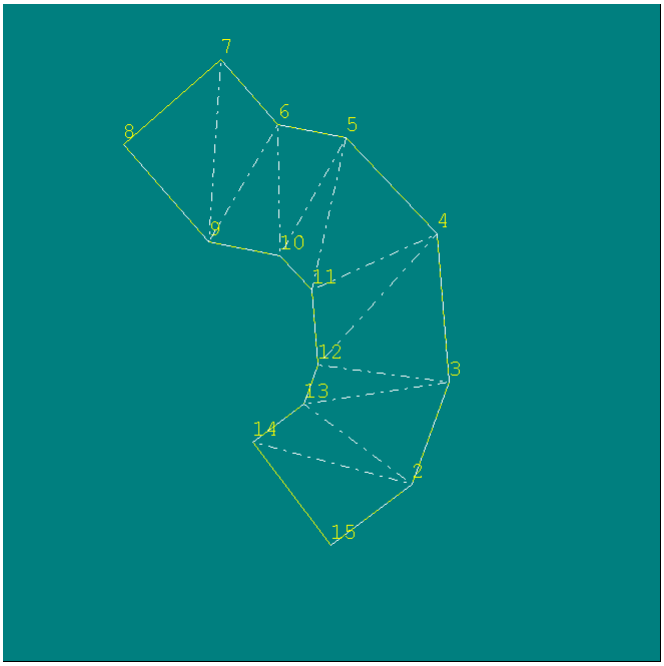
As an alternative to contour line based terrain models one will also find ridge edge models, e.g. in the form of triangular mash net (TIN). In LimA, GBO objects represent such edges. Imported TIN models have a lot of redundant information.

Option /WALL

A form of reshaping terrain is offered when earth walls are constructed.
This only requires the definition of front line of the earth wall as HIN HA 3 object.
The HIN attribute includes an option that will result in the new wall construction, which is automatically construction during calculation with help of HIN HA 4 objects.
E.g. /WALL 1.5 1.0
This will create an earth wall with a slope gradient of 1:1.5 and a width on top of 1.0 m.
The top height is defined by the attribute Z. When relative heights are defined, this relates to height of the terrain at the baseline.
The length of the backward slope will depend on the slope gradient of the basic terrain.
An example is given in K216.

Using Bridges

When using bridges some rules need to be obeyed to concerning the plan view geometry.
In LimA a bridge will be triangulated to create local plane levels that help to decide whether an object is place below or above the bridge.



The starting vertex is in bottom position, i.e. on one side support end (vertex 1 = vertex 15).
Next you follow the vertexes on the right edbe of the bridge.
At position 7 the opposite support is reached and edge 7-8 represents the support edge,
Which will be blocked for acoustice transmission.
Next the vertexes on the left edge are entered, ending with edge 14-15 which is the start support end.
On each of the two sides of the bridge, an equal number of vertex positions is given.

Platform communication

As explained before we see a "clear cut" interface between the Platform and LimA as the best way to achieve the envisaged goals. This "clear cut" is represented in the ACEE_Request.txt file which is stored in the individual (user related) project folder.

The envisaged structure for an ACEE_Request.txt file is shown below.
The text behind "/*" is seen as comment and will be ignored during interpretation of the file.
A section header starts in the first column.
Parameter details given for a section keep the first column as blank.
Letters do not need to be capital.
The request file may initiate more than one action by LimA modules.
Actions are processed from top to bottom.

/* Example for an ACEE_Request.txt file

```
START-TASK                          /* Begin of description for new task
SUB-PROJECT       Test_2            /* The sub-project name is used to generate unique
                                    /* files names, related to the job request
START-MODEL-SETUP
SHAPE-IMPORT                        /* give shape file names provided by the Platform
                                    /* LimA Object type  +  content
      TERRAIN     my_contours.shp   /* GEL   Name of contour SHAPE file
      SPOTHEIGHT  …                 /* TPT   Name of spot height file (terrain points)
      BREAKLINES  my_breaklines.shp /* GBO   Name of breakline shape file (slope edges)
      TOPOGRA     …                 /* TOP   Topography data (ground impedance)
      BUILDING    my_buildings.shp  /* WGB   Name of building SHAPE files, if existing
      OBSTACLES   …                 /* HIN   Other obstacles
      PARAPETS    …                 /* PPO   Complex screens
      PLANZONES   …                 /* NUT   Land use zones
      ROADS       …                 /* CRD   Name of road shape, if existing
      IND_POINTS  …                 /* IND   Industry point sources, if existing
      IND_LINES   …                 /* IND   Industry line sources, if existing
      RECEIVER    …                 /* AUF   single point receivers

/* Shape-import files might be defined more than once
/* Potentially other file formats might be supported as well
/* If no terrain heights are defined, terrain is horizontal at the height of 0.0 m

ENDE-MODEL-SETUP

CALCULATE_NOISE
      SOURCE      Industry          /* Request for industrial noise calculation (ISO9613)
                                    /* one choice only, so far "Industry"  or "Road"
      RECEIVER    REC-FILE          /* one choice only:
                                    /* REC-FILE :   single receiver positions from shape file
                                    /* HOR-GRID:  horizontal grid, relative to ground
                  HOR-GRID xmin xmax ymin ymax zrel
                                    /* xmin – ymax (m) in global coordinates
                                    /* zrel (m)
      RADIUS      1000              /* Fetching radius for sources (m)
      REFLEX      1                 /* Order of reflection

END-TASK

/* End of example
Further components of ACEE_Request.txt can be considered.
```

Example case for Platform communication

Platform communication is supported in LimA by a new macro CSV_JOB.MAK.
In CSV_JOB.MAK precaution was taken to include future data refinement needs. For this purpose CSV_JOB_Refine.MAK is called within CSV_JOB.MAK as part of the process.
Both files are stored in \lima\grunddat\makros.

Platform communication is explained and can be tested with help of a set of examples files provided as Platform_communication_example.zip.
Extract this file in a directory path without blanks, e.g. N:\A1617\DEMO\

In the example basic model input data are stored in subdirectory \DEMO\SHP_IMP\:
AUF_OBJ.shp
CRD_OBJ.shp
GBO_OBJ.shp
GEL_OBJ.shp
HIN_OBJ_L.shp
HIN_OBJ_P.shp
NUT_OBJ.shp
PPO_OBJ.shp
TOP_OBJ.shp
TPT_OBJ.shp
WGB_OBJ.shp

Basic calculation data are stored in \DEMO\CALC\

File case_01.xlsx
This file represents a template for platform communication.
It is just an informative example and not used by the software.
LimA will only use the CSV-Version of a file similar to this example.
The platform developer can take CASE_01.XLSX as template.
See next paragraph for a more detailed description.

File \case_00\RUN_case_01.ANF
The file represents a template to start the processing of a new project.

File \case_00\RUN_ACEE_Platform_JOB.MAK
The file needs to be copied/re-written into any new subdirectory that deals with a specific project.

File \case_00\case_01.csv
The file describes the action that shall be performed for the example “case_01”.
Data processing will be running in this subdirectory.
All result files will stay in here.

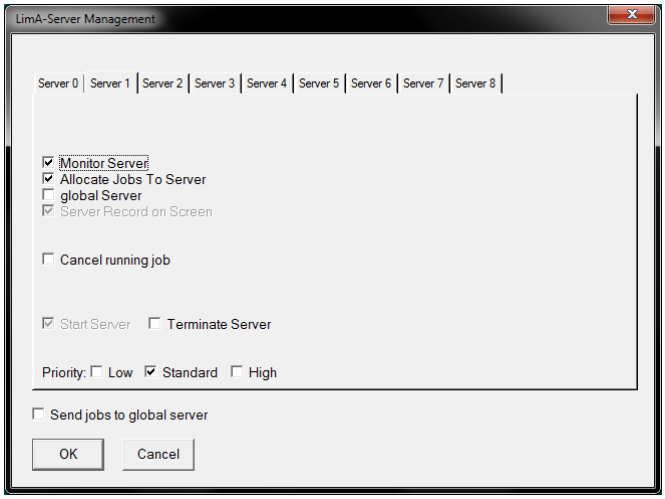
Starting a new project

Follow the steps described below:

1. After unpacking Platform_communication_example.zip
   in a directory of your choice you will have to update the new
   pathnames in the following example files in subdirectory \case_00\:
   a. Case_01.csv
   b. run_case_01.anf

2. Start LimA-Server, e.g. for SPOOL1
   This only needs to be if it is not already running, e.g. after booting your system
   Open Lima_5 (GUI)
   Use menu "Calc>LimA-Server" to start Server 1

   After starting the server you close LimA_5
   Do not activate the global server functionality (see screenshot)



3. Create a new sub-project for data processing,
   e.g. \DEMO\CALC\case_01

4. Store relevant shape files in path names of max 255 character length and no blanks.
   This should in future be done by the platform.
   For test purposes you can as well use the shape files
   which are provide in \DEMO\SHP_IMP\

5. Create a file similar to case_01.csv in directory \case_01\
   This should in future be done by the platform.
   For test purposes you can as well copy this file from directory \calc_00\
   In the next section we will describe the latest layout of the file.
   This job_request file was formerly suggested to be named ACEE_Request.txt.
   We now deviate from this to create a file that is easily readable in EXCEL.

6. Create a file "RUN_ACEE_Platform.MAK" in directory \calc_01\
   This should in future be done by the platform.
   For test purposes you can as well copy this file from directory \calc_00\

The file consists of 3 essential lines:
M CSV_JOB.MAK ***case_01.csv*** *ABJ*
quit
quit

case_01.csv refers to the csv file which describes the task.
ABJ refers to ACEE Beijing

Macro CSV_JOB.MAK has been set up to do the processing of job requests defined by the platform.

7. Request job-processing by LimA-Server
   The platform should create a new file called run_case_01.anf
   in the directory.
   For test purposes you can as well copy this file from directory \calc_00\

8. Copy run_case_01.anf into directory
   \lima\grunddat\spool1\

9. Wait until there is a new set of result shape files in directory \calc_01\

Description of job request file CASE_01.XLSX / CASE_01.CSV

	A	B	C	D
1	START-TASK			/* Begin of description for new task
2	SUB-PROJECT			/* The sub-project name is used to generate unique files names, related to the job request
3		Project-Name	CASE_01A	
4		Origin	390000 5700000	
5	SHAPE-IMPORT			/* give shape file names provided by the Platform
6				/* LimA Object type + content
7		TERRAIN	N:\A1617\M\DEMO\SHP_IMP\GEL_OBJ.shp	/* GEL Name of contour SHAPE file
8		SPOTHEIGHT	N:\A1617\M\DEMO\SHP_IMP\TPT_OBJ.shp	/* TPT Name of spot height file (terrain points)
9		BREAKLINES	N:\A1617\M\DEMO\SHP_IMP\GBO_OBJ.shp	/* GBO Name of breakline shape file (slope edges)
10		BrREAKLINE-REGIONS		
11		TOPOGRAPHY	N:\A1617\M\DEMO\SHP_IMP\TOP_OBJ.shp	/* TOP Topography data (ground impedance)
12		BUILDING	N:\A1617\M\DEMO\SHP_IMP\WGB_OBJ.shp	/* WGB Name of building SHAPE files, if existing
13		BRIDGES		
14		OBSTACLES	N:\A1617\M\DEMO\SHP_IMP\HIN_OBJ_L.shp	/* HIN Other obstacles
15		PARAPETS	N:\A1617\M\DEMO\SHP_IMP\PPO_OBJ.shp	/* PPO Complex screens
16		PLANZONES	N:\A1617\M\DEMO\SHP_IMP\NUT_OBJ.shp	/* NUT Land use zones
17		ROADS	N:\A1617\M\DEMO\SHP_IMP\CRD_OBJ.shp	/* CRD Name of road shape, if existing
18		IND_POINTS		/* IND Industry point sources, if existing
19		IND_LINES		/* IND Industry line sources, if existing
20		RECEIVER		/* AUF single point receivers
21				
22		END_PARAMS		/* Shape-import files might be defined more than once
23				/* Potentially other file formats might be supported as well
24				/* If no terrain heights are defined, terrain is horizontal at the height of 0.0 m
25				
26				
27				
28	CALCULATE_NOISE			
29		SOURCE	Road	/* Request for industrial noise calculation (ISO9613)
30				/* one choice only, so far "Industry" or "Road"
31		RECEIVER	HOR-GRID 395900 396100 5706600 5706800 2.0 50	
32				/* one choice only:
33				/* REC-FILE : single receiver positions from shape file with given region
34				/* REC-FILE: 395900 396100 5706600 5706800
35				/* HOR-GRID xmin xmax ymin ymax zrel grid-increment
36				/* HOR-GRID 395900 396100 5706600 5706800 2.0 50
37		DYNAMIC-ERROR		2
38		RADIUS		1000 /* Fetching radius for sources (m)
39		REFLEX	1 30	/* Order of reflection and fetching radius for Reflectors
40		END_PARAMS		
41	END-TASK			

- Column A
  Headers of major section of the file
  - START-TASK
  - SUB-PROJECT
  - SHAPE-IMPORT
  - CALCULATE_NOISE
  - END-TASK

  In future developments we might deal with several tasks (noise, air pollution etc.) and also with several projects (cases).

- Column B
  Key-words are followed by
  content information in column C
  and comments in column D.
  The meaning of key-words in linked to the related major section.
  For each key-word we explain content of column D.

  - Project-Name
    single string (max. 8 characters, no blank, potentially a valid windows directory name)

  - Origin
    X , Y (m) as bottom left coordinate of the relevant model area

  - TERRAIN
    Pathname of shape file for terrain contour data

  - SPOTHEIGHT
    Pathname of shape file for terrain height points

  - BREAKLINES
    Pathname of shape file for breaklines (GBO)

  - BREAKLINE-REGIONS
    Pathname of shape file for regions within which terrain is reshaped by GBO

  - TOPOGRAPHY
    Pathname of shape file for terrain surface area polygons (impedance)

  - BUILDING
    Pathname of shape file for buildings area polygons

  - BRIDGES
    Pathname of shape file for bridge area polygons

  - OBSTACLES
    Pathname of shape file for any other screens

- PARAPETS
  Pathname of shape file for parapet lines

- PLANZONES
  Pathname of shape file for planning zones

- ROADS
  Pathname of shape file for roads aces as sources

- IND_POINTS
  Pathname of shape file for industrial sources as point sources

- IND_LINES
  Pathname of shape file for industrial sources as line sources

- RECEIVER (shape import)
  Pathname of shape file for receivers

In case column D is empty, no SHAPE data is imported.

- END_PARAMS
  Start the data conversion or processing for the data defined in the section

- SOURCE
  Emitter type
  (only ROADS or INDUSTRY supported so far)

- RECEIVER (calculate noise)

  HOR-GRID 395900 396100 5706600 5706800 2.0 50
  Calculation request for horizontal grid within range in X and Y
  2 m above terrain and in a 50 m grid

  REC-FILE: 395900 396100 5706600 5706800
  All receiver points of the SHAPE file within the given region in X and Y

- DYNAMIC-ERROR
  Maximum Tolerance for calculation results (dB)

- RADIUS
  Fetching radius for sources (m)

- REFLEX
  Reflexion calculation parameters
  1 order of reflection with 30 m fetching radius for reflectors

- END-TASK
  End of task

Appendix A - Help, values and syntax check for attributes

On the next pages for each of the object types intended for use in the Platform
Attribute key names are given, followed by associated help text, suggested input values which the platform may offer to the user as selection tables and syntax check definition.

The syntax used to define the input limitations is described in the paragraph “Attribute input limitations”.

```
OBJ_TYP : <AUF>

Attribut: <AUF>
  HELP:
     Name of receptor point
     (for facades-IO the name of the
      building is adopted automatically)
     Receptor points which serve as measure points
     must be described correspondingly:
     . /MEP 01 55 40
     .            | ---> night measuring- or limiting value
     .         | ------> day measuring- or limiting value
     .       | --------> test point number
     Test points are required for the evaluation
     of the sound screen heights for wall optimisation
     for re-calculating on the emission or
     for the emission quota
     Meaning of the abbreviations for window dimensioning:
     SWF = Outside wall incl. windows
     SF  = Window area
     SG  = Base area

  VALUES:
      /MEP  : Opt. 1 measurement (no. day night) (/MEP 01 66.1 53.3)
      /IP   : Opt. 2 interior levels (dB), day night (/IP 35 25)
      /S    : Opt. 3 area quotas window (/S SWF/SG SF/SWF)

  SYNTAX:
    :CA 20 |

Attribut: <ID>
  HELP:
     Alphanumeric key of max. 10 characters which relates the object
     to any data base.
     The ID can also be used to group objects and guarantee that their
     attributes have common values, as far as the attributes are
     potentially organized in a data base according to the settings
     for data base use.
     Objects with ID - are not linked to database or other objects.
     Via menu item /EXTRA/IDENT NUMBERING
     the program assigns ident numbers automatically.

  VALUES:


  SYNTAX:
    :CA 10 { :I } | :CL - |

Attribut: <ELE>
  HELP:
     Element number of the object.
     Used to distinguish between objects of the same kind.
     The element number is automatically organized by the software.
     The element numbers can be reset to the order of digitizing
     with help of /EXTRA/RENUMBERING OF ELEMENTS.
     By using the Macro RENUAUF (/EXTRA/CALL MACRO)
     the receptor points are renumbered and will get the
     element number as an IO-No in the attribute ´position´.

  VALUES:


  SYNTAX:
    :I |

Attribut: <LA>
  HELP:
     Example of the description of the receptor position
     .   IO1 EG S Fas.
     .     |        |       |--> facade orientation
     .     |        |--------> position of the lowest receptor (EG for ground floor)
     .     |----------------> no. of the receptor position
     Position of receptor points.
     If receptors are to be calculated for several floor heights at
     the same time, a descriptor for the lowest height can be entered
     after the receptor position number.
     The facade orientation is set automatically according to the selected facade.
     (See attribute AB).
```

```
     Check the north orientation of the model file in the menu
     SETTINGS/DETERMINE NORTH DIRECTION.

  VALUES:


  SYNTAX:
    :CS |

Attribut: <AB>
  HELP:
     If the position is related to a facade, the value of attribute AB
     is equivalent to the distance (m) to the facade.
     A facade must be selected before digitizing the receptor position.
     The influence of the reflection from the facade depends
     on the calculation option settings.
     If AB is set to 0 it indicates free field conditions.
     For AB > 0 a constant correction of 2.5 dB will be given to take into
     account "own facade" reflection.

  VALUES:
    0.0 : Free field receptor
    0.5 : Receptor in front of facade (German standard)
    1.0 : UK standard

  SYNTAX:
    :RR 0.0 3.0 |

Attribut: <Z>
  HELP:
     Enter three values for the Z-height or alternatively
     a value plus relative height.
     With facades-IO the building height is evaluated automatically.
     Meaning of the three values:
        2.8  11.0  3.0  R
          |        |       |      |-> R  - relative above ground
          |        |       |      |-> A  - absolute height
          |        |       |      |-> D  - height reference to building's top edge
          |        |       |
          |        |       |------> height increment
          |        |------------> height of the last IO
          |-------------------> height of the first IO
         For heights relative to building's top edge
         enter the heights in negative values: -8.0 -2.0 3.0 D

  VALUES:
    2.8 12.0 3.0 R : height starting at 2.8 m and increasing 3.0 m until 12.0 m

  SYNTAX:
    :R { :R } { :R } { :CL  A B R D BL BR RL RR } |

Attribut: <VAR>
  HELP:
     VAR - suppresses an object during calculation.
     Suppressed objects (VAR-) are drawn as dotted line.
     One or more of the letters A to P can be
     assigned to the object in order to define this object
     to be part of max 16 groups.
     The group definition A to P may be used for
     calculation- or output purposes.
     The letter U may be set to indicate, that the attributes
     of this object shall be post-processed
     by the user-provided lima_usr.dll.

  VALUES:
      +  : Opt. 1   Object is taken into account
      -  : Opt. 1   Object isn't taken into account
    +A  : Group A
    +B  : Group B
    +C  : Group C
    +D  : Group D
    +E  : Group E
    +F  : Group F
    +G  : Group G
    +H  : Group H
    +I  : Group I
    +J  : Group J
    +K  : Group K
```

```
    +L   : Group L
    +M   : Group M
    +N   : Group N
    +O   : Group O
    +P   : Group P

  SYNTAX:
    :CL - + { :CA 16 } |
```

OBJ_TYP : <CRD>

```
Attribut: <CRD>
  HELP:
     Road object polyline

  VALUES:


Attribut: <ID>
  HELP:
     Alphanumeric key of max. 10 characters which relates the object
     to any data base.
     The ID can also be used to group objects and guarantee that their
     attributes have common values, as far as the attributes are
     potentially organized in a data base according to the settings
     for data base use.
     Objects with ID - are not linked to database or other objects.

  VALUES:


  SYNTAX:
    :CA 10 { :I } | :CL - |

Attribut: <RQ>
  HELP:
     RQ = 1    Single lane road (displayed as open polygon)
     RQ = 2    parking area
     RQ = 7.5  or more : road with two emitting lines
               unless the number passed represents a RQ as
               defined in RLS 81 or RLS 90
               this number is assumed to be the width of
               the road.
     When parapets are defined by extra attributes of the road object,
     the offset from road centre line is calculated from the width given in RQ.
     A minimum distance of 5.0 m is assumed.

  VALUES:
    0: Point
    1: Line
    2: Area

  SYNTAX:
    :IL 0 1 2 | :RR 3 90 |

Attribut: <ELE>
  HELP:
     Element number of the object.
     Used to destinguish between objects of the same kind.
     The element number is automatically organised by the software.
     The element numbers can be reset to the order of digitising
     with help of /EXTRA/RENUMBERING OF ELEMENTS.

  VALUES:


  SYNTAX:
    :I |

Attribut: <PD>
  HELP:
     Emission level for road, defined per meter.
     Value is automatically calculated on traffic input data.
     Fixed user defined values may be entered followed by ? V?
     e.g. PED 70 V
     Dimension will depend on the regulation.
     RLS 90   : Sound pressure level at 25 m distance from road (Lme)
     XPS       : Sound power level per meter (Lw?)
     CNOSSOS: Sound power level per meter (Lw?)
     CRTN     : Equivalent to Lme, automatically retrieved from L10
                    In CRTN standard emission values are L10D and L10N
     ODM      : Russian ODM 218.2.013-2011 with Sound Pressure Level at 7.5 m
     1. character of attribute name is ?P?
     2. character of attribute name is ?E? for environmental Noise analysis
        with 3 periods, such as EU END
        Last character defines time period.
     D : daytime
```

```
     N : night time
     E : evening
     Hint:
     Objects with emission set to 0.0 will be ignored for the related period.
     If emission of all periods is set to 0.0, the whole object will be ignored
     while reading the model into the calculation core.

  VALUES:
    0 V   : no emission
       V   : Opt. 1 user value will not be changed by the software

  SYNTAX:
    :R  { :CL V * }  | :CS |

Attribut: <PN>
  HELP:
     Emission level for road, defined per meter.
     Value is automatically calculated on traffic input data.
     Fixed user defined values may be entered followed by ? V?
     e.g. PED 70 V
     Dimension will depend on the regulation.
     RLS 90   : Sound pressure level at 25 m distance from road (Lme)
     XPS       : Sound power level per meter (Lw?)
     CNOSSOS: Sound power level per meter (Lw?)
     CRTN     : Equivalent to Lme, automatically retrieved from L10
                    In CRTN standard emission values are L10D and L10N
     ODM      : Russian ODM 218.2.013-2011 with Sound Pressure Level at 7.5 m
     1. character of attribute name is ?P?
     2. character of attribute name is ?E? for environmental Noise analysis
        with 3 periods, such as EU END
        Last character defines time period.
     D : daytime
     N : night time
     E : evening
     Hint:
     Objects with emission set to 0.0 will be ignored for the related period.
     If emission of all periods is set to 0.0, the whole object will be ignored
     while reading the model into the calculation core.

  VALUES:
    0 V   : no emission
       V   : Opt. 1 user value will not be changed by the software

  SYNTAX:
    :R { :CL LW LW' LW" }  { :CL V * } | :CS |

Attribut: <Z>
  HELP:
     Input of the height Z for start- and end-point of the object.
     The intermitting vertexes of the polygon will be interpolated,
     if a character I is placed at the end of the z definition.
     (e.g.  1 r 3 r i or 101 a 5 r i)
     If no interpolation is requested, start and end height will be
     applied for each segment of the polygon.
     If Z is defined as constant relative above ground (e.g. <Z> 0 R)
     this height is applied for all vertexes.
     Emitting objects, such as roads, which are positioned constant relative
     to terrain may be autoamtically fitted to changes in terrain grafients.
     If only the letter A is given as content of the attribut Z, the
     absolute height of each vertex is taken from the z-ordinate of
     the 3-d polygon.
     Special use for road and railway noise:
     The actual emission heights as defined above terrain in the regulation
     will always be added during calculation.
     Standard correction is:
     0.5 m for road
     0.6 m for rail
     separate heights for RLM2 or Transrapid or GOST 54933
     This general correction may be altered for calculation to e.g. 1 m
     by the (LimA_7) option Z-EMISSION 1.0.
     Special use for industry:
     For vertical area sources (RQ 3) enter the
     lower left and the upper right height!
     If the height is defined by D and the area lies
     outside buildings, the height of the rear building
     is used.
     If Z is entered with 0 R 0 R, the height of the facade is used.
```

```
  VALUES:
    A          : absolute value per vertex from 3-d co-ordinates
    5          : 5 m above ground (relative to ground (R) is default)
    0 R        : on ground
    0.1 D      : on top of a roof or bridge
    2 BL       : 2 m above slope edge on the left
    2 BR       : 2 m above slope edge on the right
    +0.2 SR    : height based on gradient towards slope edge on the right
    +0.2 SL    : height based on gradient towards slope edge on the left
    90 A       : 90 m above M.S.L
    2 r 4 r i  : interpolate values

  SYNTAX:
    :CL A | :CL I :CL I |
    :CL I :R { :CL A B R D BL BR RL RR } |
    :R { :CL A B R D BL BR RL RR } :CL I |
    :R :R { :CL A B R D BL BR RL RR } |
    :R { :CL A B R D BL BR RL RR } { :R { :CL A B R D BL BR RL RR } } |
    :R { :CL A B R D BL BR RL RR } { :R { :CL A B R D BL BR RL RR } } { :CL I } |

Attribut: <SRF>
  HELP:
     Surface correction will only be applied to small vehicles.

  VALUES:
      AS  : asphalt
      CA  : cement a
      CB  : cement b

  SYNTAX:
    :CL AS CA CB |

Attribut: <GRD>
  HELP:
     Simple number (%) defines a climb rate, which will be
     overwritten by LimA, e.g. +5 .
     Fixed, user defined climb rate (%) is followed by "V", e.g. -3 V.
     Flow direction taken from attribute DIR is used to
     destinguish between ascending and descending roads.
     For two directional flow, the correction is only applied on
     50% of the traffic.

  VALUES:
    0  : horizontal road
    2  : 2-3 dB correction for gradient of 2%
    4  : 2-5 dB correction for gradient of 4%

  SYNTAX:
    :RR 0.0 20.0 |

Attribut: <LANE>
  HELP:
     Total number of lanes used for potential
     automated distribution of sources

  VALUES:


Attribut: <LNW>
  HELP:
     Width per single lane (m).
     Potentially used by macros to generate
     further parallel lines.

  VALUES:
    2.00  : minimum lane width
    3.75  : typical lane width of German road
    5.00  : maximum lane width

  SYNTAX:
    :RR 2.0 5.0 |

Attribut: <DIR>
  HELP:
     Direction of traffic flow in comparison to direction of
     geometry vector.

  VALUES:
```

```
      0  : dual direction traffic flow
     +1  : Flow only in direction of digitization
     -1  : Flow in counter direction

  SYNTAX:
    :IL -1 0 1 |

Attribut: <VOL>
  HELP:
     Average traffic volume per day
     If DTV = 0,  the noise level will be determined by the input
     of hourly values (PKT etc.)

  VALUES:


  SYNTAX:
    :R |

Attribut: <VAD>
  HELP:
     Admitted speed for fastest vehicle category.
     Limits per other categories are respected automatically
     K1: 30 - 140   K2: 30 - 100   K3: 30 - 90

  VALUES:


  SYNTAX:
    :RR 10 400 |

Attribut: <QSD>
  HELP:
     hourly traffic of small vehicles below 3.5 t
     during day time.
     * for values deriving from ADT total daily flow.

  VALUES:


Attribut: <QMD>
  HELP:
     hourly traffic of medium vehicles 3.5 t to 12 t
     during day time.
     * for values deriving from ADT total daily flow.

  VALUES:


  SYNTAX:
    :C * |

Attribut: <QLD>
  HELP:
     hourly traffic of large vehicles above 12 t
     during day time.
     * for values deriving from ADT total daily flow.

  VALUES:


  SYNTAX:
    :RR 0 100000 |

Attribut: <QSN>
  HELP:
     hourly traffic of small vehicles below 3.5 t
     during night time.
     * for values deriving from ADT total daily flow.

  VALUES:


Attribut: <QMN>
  HELP:
     hourly traffic of medium vehicles 3.5 t to 12 t
     during night time.
      * for values deriving from ADT total daily flow.
```

```
  VALUES:


  SYNTAX:
    :C * |

Attribut: <QLN>
  HELP:
     hourly traffic of large vehicles above 12 t
     during night time.
     * for values deriving from ADT total daily flow.

  VALUES:


  SYNTAX:
    :RR 0 100000 |

Attribut: <FRQ>
  HELP:
     The detail of a mid frequency in Hz for the
     calculation in the octavo spectrum is unimportant
     if a spectrum is declared in the attribute FRK.

  VALUES:


  SYNTAX:
    :CA * |

Attribut: <FRK>
  HELP:
     A spectrum may be defined for an alternative calculation in octaves

  VALUES:
    RVSSPEKTRUM

  SYNTAX:
    :CA * |

Attribut: <REG>
  HELP:
      Regulation used for emission definition

  VALUES:
    JTG  : JTG B03 - 2006
    HJA  : Appendix A of HJ 2.4 - 2009

  SYNTAX:
    :CA * |

Attribut: <VAR>
  HELP:
     VAR - suppresses an object during calculation.
     Suppressed objects (VAR-) are drawn as dotted line.
     One or more of the letters A to P can be
     assigned to the object in order to define this object
     to be part of max 16 groups.
     The group definition A to P may be used for
     calculation- or output purposes.
     The letter U may be set to indicate, that the attributes
     of this object shall be post-processed
     by the user-provided lima_usr.dll.

  VALUES:
      +  : Opt. 1   Object is taken into account
      -  : Opt. 1   Object isn't taken into account
    +A  : Group A
    +B  : Group B
    +C  : Group C
    +D  : Group D
    +E  : Group E
    +F  : Group F
    +G  : Group G
    +H  : Group H
    +I  : Group I
    +J  : Group J
```

```
    +K   : Group K
    +L   : Group L
    +M   : Group M
    +N   : Group N
    +O   : Group O
    +P   : Group P

  SYNTAX:
    :CL - + { :CA 16 } |
```

```
OBJ_TYP : <DIV>

Attribut: <DIV>
  HELP:
     Element for applications without influence on this calculation-
     model as well as for the result displays

  VALUES:


  SYNTAX:
    :CA * |

Attribut: <ID>
  HELP:
     Alphanumeric key of max. 10 characters which relates the object
     to any data base.
     The ID can also be used to group objects and guarantee that their
     attributes have common values, as far as the attributes are
     potentially organized in a data base according to the settings
     for data base use.
     Objects with ID - are not linked to database or other objects.
     Via menu item /EXTRA/IDENT NUMBERING
     the program assigns ident numbers automatically.

  VALUES:


  SYNTAX:
    :CA 10 { :I } | :CL - |

Attribut: <RQ>
  HELP:
     Type of geometry:
     RQ = 0 for point objects (crosses)
     RQ = 1 for line objects (line or open polygon)
     RQ = 2 for area objects (closed polygon)

  VALUES:
    0: Point
    1: Line
    2: Area

  SYNTAX:
    :IL 0 1 2 | :RR 3 90 |

Attribut: <ELE>
  HELP:
     Element number of the object.
     Used to destinguish between objects of the same kind.
     The element number is automatically organised by the software.
     The element numbers can be reset to the order of digitising
     with help of /EXTRA/RENUMBERING OF ELEMENTS.

  VALUES:


  SYNTAX:
    :I |

Attribut: <XR>
  HELP:


  VALUES:


Attribut: <YR>
  HELP:


  VALUES:


Attribut: <ZR>
  HELP:
```

```
  VALUES:


Attribut: <Z>
  HELP:
     Input of the height Z for start- and end-point of the object.
     The intermitting vertexes of the polygon will be interpolated,
     if a character I is placed at the end of the z definition.
     (e.g.  1 r 3 r i or 101 a 5 r i)
     If no interpolation is requested, start and end height will be
     applied for each segment of the polygon.
     If Z is defined as constant relative above ground (e.g. <Z> 0 R)
     this height is applied for all vertexes.
     Emitting objects, such as roads, which are positioned constant relative
     to terrain may be autoamtically fitted to changes in terrain grafients.
     If only the letter A is given as content of the attribut Z, the
     absolute height of each vertex is taken from the z-ordinate of
     the 3-d polygon.
     Special use for road and railway noise:
     The actual emission heights as defined above terrain in the regulation
     will always be added during calculation.
     Standard correction is:
     0.5 m for road
     0.6 m for rail
     separate heights for RLM2 or Transrapid or GOST 54933
     This general correction may be altered for calculation to e.g. 1 m
     by the (LimA_7) option Z-EMISSION 1.0.
     Special use for industry:
     For vertical area sources (RQ 3) enter the
     lower left and the upper right height!
     If the height is defined by D and the area lies
     outside buildings, the height of the rear building
     is used.
     If Z is entered with 0 R 0 R, the height of the facade is used.

  VALUES:
    A         : absolute value per vertex from 3-d co-ordinates
    5         : 5 m above ground (relative to ground (R) is default)
    0 R       : on ground
    0.1 D     : on top of a roof or bridge
    2 BL      : 2 m above slope edge on the left
    2 BR      : 2 m above slope edge on the right
    +0.2 SR   : height based on gradient towards slope edge on the right
    +0.2 SL   : height based on gradient towards slope edge on the left
    90 A      : 90 m above M.S.L
    2 r 4 r i : interpolate values

  SYNTAX:
    :CL A | :CL I :CL I |
    :CL I :R { :CL A B R D BL BR RL RR } |
    :R { :CL A B R D BL BR RL RR } :CL I |
    :R :R { :CL A B R D BL BR RL RR } |
    :R { :CL A B R D BL BR RL RR } { :R { :CL A B R D BL BR RL RR } } |
    :R { :CL A B R D BL BR RL RR } { :R { :CL A B R D BL BR RL RR } } { :CL I } |

Attribut: <IPT>
  HELP:
     Day value of the result when <DIV> is used to represent
     results.

  VALUES:


  SYNTAX:
    :CS |

Attribut: <IPN>
  HELP:
     Night value of the result

  VALUES:


Attribut: <STIF>
  HELP:
     Pen definition of the object
     Pen number (*1000) + line thickness (*10) + line type (*1)
     e.g.:
```

```
     .    12  01  2
     .     |   |  |-> Line type
     .     |   |      2 = drawn line
     .     |   |      5 = dotted line
     .     |   |      6 = chain-dotted line
     .     |   |      7 = dotted line
     .     |   |      8 = invisible line
     .     |   |-->  Line thickness (1/10 mm) or filling type
     .     |          01-32 = line thicknesses
     .     |          33 = full flat filling
     .     |          49 = full flat filling+framing
     .     |          35 = simple hatching 45°
     .     |          36 = crossed hatching 45°
     .     |------>  Pen number = color

  VALUES:


  SYNTAX:
    :CL - | :RR 1012  31658 |

Attribut: <NUTZ>
  HELP:


  VALUES:


  SYNTAX:
    :CA 2 |

Attribut: <NEGD>
  HELP:


  VALUES:


  SYNTAX:
    :CL - | : I |

Attribut: <NEGN>
  HELP:


  VALUES:


  SYNTAX:
    :CL - | : I |

Attribut: <BEM>
  HELP:


  VALUES:


  SYNTAX:
    :CA * |

Attribut: <VAR>
  HELP:
     VAR - suppresses an object during calculation.
     Suppressed objects (VAR-) are drawn as dotted line.
     One or more of the letters A to P can be
     assigned to the object in order to define this object
     to be part of max 16 groups.
     The group definition A to P may be used for
     calculation- or output purposes.
     The letter U may be set to indicate, that the attributes
     of this object shall be post-processed
     by the user-provided lima_usr.dll.

  VALUES:
      +  : Opt. 1   Object is taken into account
      -  : Opt. 1   Object isn't taken into account
    +A   : Group A
```

```
   +B   : Group B
   +C   : Group C
   +D   : Group D
   +E   : Group E
   +F   : Group F
   +G   : Group G
   +H   : Group H
   +I   : Group I
   +J   : Group J
   +K   : Group K
   +L   : Group L
   +M   : Group M
   +N   : Group N
   +O   : Group O
   +P   : Group P

SYNTAX:
   :CL - + { :CA 16 } |
```

OBJ_TYP : <GBO>

```
Attribut: <GBO>
  HELP:
     Terrain ridge
     GBO typically gives the geometry as 3-d open polygon,
     e.g. imported from Shape with attribute <GBO> A .
     For calculation this object is interpreted similar to
     HIN HA 4  objects. Otehr than HIN HA 4, GBO edges will produce no
     screening while placed beneath the sound propagation plane.
     The GBO attribute can take the same input as the Z attribute
     of the HA 4 object.

  VALUES:
    A          : absolute value per vertex from 3-d co-ordinates
    5          : 5 m above ground (relative to ground (R) is default)
    0 R        : on ground
    0.1 D      : on top of a roof or bridge
    2 BL       : 2 m above slope edge on the left
    2 BR       : 2 m above slope edge on the right
    +0.2 SR    : height based on gradient towards slope edge on the right
    +0.2 SL    : height based on gradient towards slope edge on the left
    90 A       : 90 m above M.S.L
    2 r 4 r i  : interpolate values

  SYNTAX:
    :CL A | :CL I :CL I |
    :CL I :R { :CL A B R D BL BR RL RR } |
    :R { :CL A B R D BL BR RL RR } :CL I |
    :R :R { :CL A B R D BL BR RL RR } |
    :R { :CL A B R D BL BR RL RR } { :R { :CL A B R D BL BR RL RR } } { :CL I } |

Attribut: <ELE>
  HELP:
     Element number of the object.
     Used to destinguish between objects of the same kind.
     The element number is automatically organised by the software.
     The element numbers can be reset to the order of digitising
     with help of /EXTRA/RENUMBERING OF ELEMENTS.

  VALUES:


  SYNTAX:
    :I |

Attribut: <VAR>
  HELP:
     VAR - suppresses an object during calculation.
     Suppressed objects (VAR-) are drawn as dotted line.
     One or more of the letters A to P can be
     assigned to the object in order to define this object
     to be part of max 16 groups.
     The group definition A to P may be used for
     calculation- or output purposes.
     The letter U may be set to indicate, that the attributes
     of this object shall be post-processed
     by the user-provided lima_usr.dll.

  VALUES:
      +  : Opt. 1   Object is taken into account
      -  : Opt. 1   Object isn't taken into account
    +A   : Group A
    +B   : Group B
    +C   : Group C
    +D   : Group D
    +E   : Group E
    +F   : Group F
    +G   : Group G
    +H   : Group H
    +I   : Group I
    +J   : Group J
    +K   : Group K
    +L   : Group L
    +M   : Group M
    +N   : Group N
    +O   : Group O
    +P   : Group P
```

```
SYNTAX:
  :CL - + { :CA 16 } |
```

OBJ_TYP : <GEL>

```
Attribut: <GEL>
  HELP:
     The height of the contourline

  VALUES:


  SYNTAX:
    :R { :CL A } |

Attribut: <ELE>
  HELP:
     Element number of the object.
     Used to destinguish between objects of the same kind.
     The element number is automatically organised by the software.
     The element numbers can be reset to the order of digitising
     with help of /EXTRA/RENUMBERING OF ELEMENTS.

  VALUES:


  SYNTAX:
    :I |

Attribut: <VAR>
  HELP:
     VAR - suppresses an object during calculation.
     Suppressed objects (VAR-) are drawn as dotted line.
     One or more of the letters A to P can be
     assigned to the object in order to define this object
     to be part of max 16 groups.
     The group definition A to P may be used for
     calculation- or output purposes.
     The letter U may be set to indicate, that the attributes
     of this object shall be post-processed
     by the user-provided lima_usr.dll.

  VALUES:
      +  : Opt. 1   Object is taken into account
      -  : Opt. 1   Object isn't taken into account
    +A  : Group A
    +B  : Group B
    +C  : Group C
    +D  : Group D
    +E  : Group E
    +F  : Group F
    +G  : Group G
    +H  : Group H
    +I  : Group I
    +J  : Group J
    +K  : Group K
    +L  : Group L
    +M  : Group M
    +N  : Group N
    +O  : Group O
    +P  : Group P

  SYNTAX:
    :CL - + { :CA 16 } |
```

OBJ_TYP : <HIN>

```
Attribut: <HIN>
  HELP:
     Various types of obstacles, as defined in detail by attribute HA.
     The name attribute (HIN) may take one out of the options described
     below. The options will be interpreted during calculation (LimA_7)
     and accepted options will depend on the object type (HA).
     Note:
     /T (HA=2) gives the reverberation time in sec. The noise level of
     a point source associated with the building,
     i.e. placed inside and also having name option /T,
     defines the indoor sound power level or
     sound pressure level, if reverberation time is set to 0.
     /B (HA=2) option is used for calculating the annoyance.
     Buildings will be identified as residential or commercial/industrial
     by the option /B or by explicitly defining residential buildings
     as WGB objects.
     /B:W1 indicates that residential use starts at the 1st floor.
     /B:I  for industry objects
     /PODIUM (HA=2) will mark a building as a podium construction.
     Relative heights of Receptor positions are seen as relative
     to the top of the building.
     /WALL (HA=3) defines an embankment construction that will automatically be
     generated from one digitized line.
     Where the embankment is to the right of this line,
     the inclination is positive.
     Inclination ratio is the horizontal distance to the top
     of the embankment divided by its height, ie. 1.5 is aprox. 66%.
     /SSG (HA=3) is used to group screens for optimisation
     /TC (HA=4) defines a slope edge (HA 4) as construction line for
     a reshaped terrain. The new terrain will be split in 2 zones.
     For the width of zone A (m) the terrain will have the same gradient
     as the banking (%/100) of the road.
     Zone B will be placed outside zone A. Its width has the given value
     as maximum. If the terrain height matches the given slope
     gradient (%/100) at a shorter distance, this will define the end of zone B.
     Type 0 will initiate a terrain construction on both sides of the
     digitized line.
     Type 1 will only reshape terrain to the right and
     type 2 only to the left of this line.
     /PSA 1.5 defines an uncertainty of 1.5 m in position of object,
     which may be used in uncertainty analysis
     /A (HA=10) exclusion zone within calculation area.

  VALUES:
      /L_1                : Assignment to Level 1 (1-9 possible)
      /A                  : Opt. 1 For HA 10 this area is not calculated
      /SI                 : Opt. 1 Attenuation area "Site" (ISO9613) (default)
      /HS                 : Opt. 1 Attenuation area "House" (ISO9613)
      /SSG 01 0 4         : Opt. 1 Screen group (number, lower ht, upper ht)
      /WALL 1.5 1         : Opt. 1 Embankment (inclination, width of top (m))
      /WALL 1.5 1 2       : Opt. 1 Embankment (inclination, width of top,
                          : Opt. 1 height of screen)
      /TC .03 10 .66 50 0 : Opt. 1 Terrain construction (banking, zone A ,
                          : Opt. 1 slope gradient, zone B, type )
      /FL                 : Opt. 1 Floating barrier
      /IP 30              : Opt. 1 Target values for indoor noise levels (30 dB)
      /T 2                : Opt. 1 Reverberation time 2 sec
      /T 0                : Opt. 1 Internal sound pressure level
      /B:I                : Opt. 2 Non residential
      /B:W                : Opt. 2 Residential
      /PODIUM             : Opt. 2 elevated walk way on a building
      /HABS 0.7           : Opt. 2 Height (m) of absorbing screen socle in regulatio
      /PSA 1.0            : Opt. 3 Uncertainty (m) in positioning

  SYNTAX:
    :CA * |

Attribut: <ID>
  HELP:
     Alphanumeric key of max. 10 characters which relates the object
     to any data base.
     The ID can also be used to group objects and guarantee that their
     attributes have common values, as far as the attributes are
     potentially organized in a data base according to the settings
     for data base use.
     Objects with ID - are not linked to database or other objects.
```

```
  VALUES:


  SYNTAX:
    :CA 10 { :I } | :CL - |

Attribut: <OBJ>
  HELP:


  VALUES:


Attribut: <HA>
  HELP:
     Type of obstacle

  VALUES:
    1  : Wall
    2  : Building with flat roof
    3  : Screen or embankment
    4  : Embankment edge
    5  : Attenuation in a built up area
    6  : Attenuation through a wooded area
    7  : Bridge
    8  : Escarpment edge
    9  : Contour line (same as GEL)
    10 : Calculation area
    11 : - reserved -
    12 : Wall supporting cantilever roof

  SYNTAX:
    :IL 1 2 3 4 5 6 7 8 10 12 21 22 23 24 |

Attribut: <ELE>
  HELP:
     Element number of the object.
     Used to destinguish between objects of the same kind.
     The element number is automatically organised by the software.
     The element numbers can be reset to the order of digitising
     with help of /EXTRA/RENUMBERING OF ELEMENTS.

  VALUES:


  SYNTAX:
    :I |

Attribut: <BAUL>
  HELP:
     Ratio of the length of built up section without gaps against total length.
     Input value 0 will automatically be set to 1.
     For some regulations this value will influence diffraction loss and reflection.
     For RLM2 the option dB may be used to define a reduction
     in dB of a potential screening effect.
     The actual screening effect will not be less than 0.0.
     Values of -10 to 0 indicate an additional screening effect.

  VALUES:
      1      : attenuation factor or percentage/100 of screens without gaps
      0.5    : factor 1/2 for attenuation areas or 50 percent gaps in screen
      -2 dB  : Opt. 1  reduction of screening effect in RLM2/SRM2 tab. 5.4
      -5 dB  : Opt. 1  reduction of screening effect (see table 5.4)

  SYNTAX:
    :RR 0  1 |
    :RR 0 10 |
    :RR 0 1.

Attribut: <RV>
  HELP:
     Reflection losses in dB(A)
     If two values are entered, the first describes the
     wall's surface to the left of the direction of digitizing
     and the second the condition on the right surface.
     Option "A" indicates input values to be Alpha values.
     Reflection loss in (dB) is calculated by
```

```
     10. * lg (1.0-Alpha)

  VALUES:
      0 : no consideration of reflection
      1 : sound hard, even facade (R = 0.79, A = 0.21)
      2 : jointed façade
      3 : (R = 0.5, A = 0.5)
      4 : absorbing barrier
      7 : (R = 0.2, A = 0.8)
      8 : high absorbing barrier
      A : Opt. 1  Input as Alpha value

  SYNTAX:
    :CL - | :RR -8 8 { :RR -8 8 } { :CL V } |
    :RR 0 1 { :RR 0 1 }  :CL A { :CL V } |

Attribut: <MAK>
  HELP:
     Alphanumeric code of max. 20 characters of the
     assigned data set for the material.
     Required for sources inside a room.

  VALUES:


  SYNTAX:
    :CA * |

Attribut: <Z>
  HELP:
     Z-height

  VALUES:
    A          : absolute value per vertex from 3-d co-ordinates
    5          : 5 m above ground (relative to ground (R) is default)
    0 R        : on ground
    0.1 D      : on top of a roof or bridge
    2 BL       : 2 m above slope edge on the left
    2 BR       : 2 m above slope edge on the right
    +0.2 SR    : height based on gradient towards slope edge on the right
    +0.2 SL    : height based on gradient towards slope edge on the left
    90 A       : 90 m above M.S.L
    2 r 4 r i  : interpolate values

  SYNTAX:
    :CL A | :CL I :CL I |
    :CL I :R { :CL A B R D BL BR RL RR } |
    :R { :CL A B R D BL BR RL RR } :CL I |
    :R :R { :CL A B R D BL BR RL RR } |
    :R { :CL A B R D BL BR RL RR } { :R { :CL A B R D BL BR RL RR } } |
    :R { :CL A B R D BL BR RL RR } { :R { :CL A B R D BL BR RL RR } } { :CL I } |

Attribut: <BEM>
  HELP:


  VALUES:


  SYNTAX:
    :CA * |

Attribut: <BMP>
  HELP:
     A picture of object can be linked by entering the name of a *.BMP file.
     For buildings this is interpreted as facade view. When an additional
     scaling length (m) is added this is interpreted as module length of a
     "wallpaper" display of the bitmap, e.g. PIC3.BMP 3.0

  VALUES:


  SYNTAX:
    :CA * |

Attribut: <TEMP>
  HELP:
```

```
  VALUES:


  SYNTAX:
    :CA * |

Attribut: <VAR>
  HELP:
     VAR - suppresses an object during calculation.
     Suppressed objects (VAR-) are drawn as dotted line.
     One or more of the letters A to P can be
     assigned to the object in order to define this object
     to be part of max 16 groups.
     The group definition A to P may be used for
     calculation- or output purposes.
     The letter U may be set to indicate, that the attributes
     of this object shall be post-processed
     by the user-provided lima_usr.dll.

  VALUES:
      +  : Opt. 1   Object is taken into account
      -  : Opt. 1   Object isn't taken into account
    +A   : Group A
    +B   : Group B
    +C   : Group C
    +D   : Group D
    +E   : Group E
    +F   : Group F
    +G   : Group G
    +H   : Group H
    +I   : Group I
    +J   : Group J
    +K   : Group K
    +L   : Group L
    +M   : Group M
    +N   : Group N
    +O   : Group O
    +P   : Group P

  SYNTAX:
    :CL - + { :CA 16 } |
```

OBJ_TYP : <NUT>

```
Attribut: <NUT>
  HELP:
     Name or denotation of the planning zone

  VALUES:


  SYNTAX:
    :CA * |

Attribut: <ID>
  HELP:
     Alphanumeric key of max. 10 characters which relates the object
     to any data base.
     The ID can also be used to group objects and guarantee that their
     attributes have common values, as far as the attributes are
     potentially organized in a data base according to the settings
     for data base use.
     Objects with ID - are not linked to database or other objects.

  VALUES:


  SYNTAX:
    :CA 10 { :I } | :CL - |

Attribut: <RQ>
  HELP:
     Type of geometry:
     RQ = 0 for point objects (crosses)
     RQ = 1 for line objects (line or open polygon)
     RQ = 2 for area objects (closed polygon)

  VALUES:
    0: Point
    1: Line
    2: Area

  SYNTAX:
    :IL 0 1 2 | :RR 3 90 |

Attribut: <TYP>
  HELP:
     Definition of the area type,
     has to correspond with the OBJEKTPA.

  VALUES:
    WR: Pure residential area
    WA: General residential area
    SN: Redevelopment area

  SYNTAX:
    :CL - WR WA WS WB MI MD MK GI GE KG SO SN |

Attribut: <ELE>
  HELP:
     Element number of the object.
     Used to destinguish between objects of the same kind.
     The element number is automatically organised by the software.
     The element numbers can be reset to the order of digitising
     with help of /EXTRA/RENUMBERING OF ELEMENTS.

  VALUES:


  SYNTAX:
    :I |

Attribut: <EW>
  HELP:
     Number of the inhabitants in the area

  VALUES:


  SYNTAX:
```

```
    :CL - | :RR 0 1E8 | :RR 0 1E8  :CL * |

Attribut: <VAR>
  HELP:
     VAR - suppresses an object during calculation.
     Suppressed objects (VAR-) are drawn as dotted line.
     One or more of the letters A to P can be
     assigned to the object in order to define this object
     to be part of max 16 groups.
     The group definition A to P may be used for
     calculation- or output purposes.
     The letter U may be set to indicate, that the attributes
     of this object shall be post-processed
     by the user-provided lima_usr.dll.

  VALUES:
      +  : Opt. 1   Object is taken into account
      -  : Opt. 1   Object isn't taken into account
    +A  : Group A
    +B  : Group B
    +C  : Group C
    +D  : Group D
    +E  : Group E
    +F  : Group F
    +G  : Group G
    +H  : Group H
    +I  : Group I
    +J  : Group J
    +K  : Group K
    +L  : Group L
    +M  : Group M
    +N  : Group N
    +O  : Group O
    +P  : Group P

  SYNTAX:
    :CL - + { :CA 16 } |
```

OBJ_TYP : <PPO>

```
Attribut: <PPO>
  HELP:


  VALUES:


  SYNTAX:
    :CA * |

Attribut: <ID>
  HELP:
     Alphanumeric key of max. 10 characters which relates the object
     to any data base.
     The ID can also be used to group objects and guarantee that their
     attributes have common values, as far as the attributes are
     potentially organized in a data base according to the settings
     for data base use.
     Objects with ID - are not linked to database or other objects.

  VALUES:


  SYNTAX:
    :CA 10 { :I } | :CL - |

Attribut: <ELE>
  HELP:
     Element number of the object.
     Used to destinguish between objects of the same kind.
     The element number is automatically organised by the software.
     The element numbers can be reset to the order of digitising
     with help of /EXTRA/RENUMBERING OF ELEMENTS.

  VALUES:


  SYNTAX:
    :I |

Attribut: <Z>
  HELP:
     Input of the height Z for start- and end-point of the object.
     The intermitting vertexes of the polygon will be interpolated,
     if a character I is placed at the end of the z definition.
     (e.g.  1 r 3 r i or 101 a 5 r i)
     If no interpolation is requested, start and end height will be
     applied for each segment of the polygon.
     If Z is defined as constant relative above ground (e.g. <Z> 0 R)
     this height is applied for all vertexes.
     Emitting objects, such as roads, which are positioned constant relative
     to terrain may be autoamtically fitted to changes in terrain grafients.
     If only the letter A is given as content of the attribut Z, the
     absolute height of each vertex is taken from the z-ordinate of
     the 3-d polygon.
     Special use for road and railway noise:
     The actual emission heights as defined above terrain in the regulation
     will always be added during calculation.
     Standard correction is:
     0.5 m for road
     0.6 m for rail
     separate heights for RLM2 or Transrapid or GOST 54933
     This general correction may be altered for calculation to e.g. 1 m
     by the (LimA_7) option Z-EMISSION 1.0.
     Special use for industry:
     For vertical area sources (RQ 3) enter the
     lower left and the upper right height!
     If the height is defined by D and the area lies
     outside buildings, the height of the rear building
     is used.
     If Z is entered with 0 R 0 R, the height of the facade is used.

  VALUES:
    A          : absolute value per vertex from 3-d co-ordinates
    5          : 5 m above ground (relative to ground (R) is default)
    0 R        : on ground
```

```
    0.1 D     : on top of a roof or bridge
    2 BL      : 2 m above slope edge on the left
    2 BR      : 2 m above slope edge on the right
    +0.2 SR   : height based on gradient towards slope edge on the right
    +0.2 SL   : height based on gradient towards slope edge on the left
    90 A      : 90 m above M.S.L
    2 r 4 r i : interpolate values

  SYNTAX:
    :CL A | :CL I :CL I |
    :CL I :R { :CL A B R D BL BR RL RR } |
    :R { :CL A B R D BL BR RL RR } :CL I |
    :R :R { :CL A B R D BL BR RL RR } |
    :R { :CL A B R D BL BR RL RR } { :R { :CL A B R D BL BR RL RR } } |
    :R { :CL A B R D BL BR RL RR } { :R { :CL A B R D BL BR RL RR } } { :CL I } |

Attribut: <ELV>
  HELP:
     Indicator for elevated roads.
     A macro max be used to generate barriers parallel to elevated roads.
     This is useful if the bridge construction does not exist as part
     of the model. Road simplification by commands GRAD /S and SMOOTH
     should be applied first.
     If parapets exist, the barrier height will be increased.
     The automatically generated barriers as well as the roads are linked
     by name options (/PP) and Idents to ensure that the barrier effect
     is only taken into account for this road element.
     If a HA 7 bridge already exists, Z values for the PPO is set to "0 d"
     and ELV is 0.

  VALUES:
    0 : road at terrain level
    1 : elevated road (unless a separate HA 7 bridge already exists)

  SYNTAX:
    :CL - 0 1 |

Attribut: <PRP>
  HELP:
     Attribute information may be used to generate parapets.
     Parapets are assumed at RQ/2+1.5 m with a minimum
     of 5 m off the lane axis unless a different value is given in
     attribute PRH.
     For objects with attribute PRP set to the value of 4 (floating)
     default offset is assumed to be 0.0 m.

  VALUES:
    0 : No parapets
    1 : Parapets on both sides
    2 : Parapets on the left only, i.e. road to the right
    3 : Parapets on the right only, i.e. road to the left
    4 : Parapet as floating object (no bridge at bottom required)

  SYNTAX:
    :IR 0 4 | :CL - |

Attribut: <PRY>
  HELP:
     Type of parapet
     Parapets can be generate as purely vertical screen,
     screen with cantilever top or as complete tunnel

  VALUES:
    1 : simple screen
    2 : screen (HA 12) with cantilever top (HA 7)
    3 : 2 screens + roof, forming a tunnel

  SYNTAX:
    :IR 1 3 |

Attribut: <PRH>
  HELP:
     Up to 4 parameter define the geometry of the parapet construction
     1. Height (m) of parapet
     2. Offset (m) from road centre line
     3. Vertical increment (m) of the slanted cantilever top
     4. Horizontal width (m) of the cantilever top
     For PRP = 1 (parapets on both sides) it might be required to
```

```
     define a separate geometry for each side.
     Input for PRH refers to the left of the emitter axis and
     input for PR2 refers to the right.
     If PR2 has no valid input, geometry of both sides is defined
     by PRH.

  VALUES:
    -        : no input
    0        : no barrier or a simple bridge if elevated
    2        : barrier height 2 m
    2 4      : Screen height 2 m, offset from road axis 4 m
    6 4 2 3  : Screen Z=6 offset 4 m with cantilever screen (Z=2,O=3)

  SYNTAX:
    :CL - | :RR 0 20 | :RR 0 20 :RR 0 20  | :RR 0 20 :RR 0 20 :RR 0 20 :RR 0 20 |

Attribut: <PR2>
  HELP:
     Up to 4 parameter define the geometry of the parapet construction
     1. Height (m) of parapet
     2. Offset (m) from road centre line
     3. Vertical increment (m) of the slanted cantilever top
     4. Horizontal width (m) of the cantilever top
     For PRP = 1 (parapets on both sides) it might be required to
     define a separate geometry for each side.
     Input for PRH refers to the left of the emitter axis and
     input for PR2 refers to the right.
     If PR2 has no valid input, geometry of both sides is defined
     by PRH.

  VALUES:
    -        : no input
    0        : no barrier or a simple bridge if elevated
    2        : barrier height 2 m
    2 4      : Screen height 2 m, offset from road axis 4 m
    6 4 2 3  : Screen Z=6 offset 4 m with cantilever screen (Z=2,O=3)

  SYNTAX:
    :CL - | :RR 0 20 :RR 0 20  | :RR 0 20 :RR 0 20 :RR 0 20 :RR 0 20 |

Attribut: <RV>
  HELP:
     Reflection losses in dB(A)
     If two values are entered, the first describes the
     wall's surface to the left of the direction of digitizing
     and the second the condition on the right surface.
     Option "A" indicates input values to be Alpha values.
     Reflection loss in (dB) is calculated by
     10. * lg (1.0-Alpha)

  VALUES:
      0 : no consideration of reflection
      1 : sound hard, even facade (R = 0.79, A = 0.21)
      2 : jointed façade
      3 : (R = 0.5, A = 0.5)
      4 : absorbing barrier
      7 : (R = 0.2, A = 0.8)
      8 : high absorbing barrier
      A : Opt. 1  Input as Alpha value

  SYNTAX:
    :CL - | :RR -8 8 { :RR -8 8 } { :CL V } |
    :RR 0 1 { :RR 0 1 }  :CL A { :CL V } |

Attribut: <MAK>
  HELP:
     Alphanumeric code of max. 20 characters of the
     assigned data set for the material.
     Required for sources inside a room.

  VALUES:


  SYNTAX:
    :CA * |

Attribut: <VAR>
  HELP:
```

```
    VAR - suppresses an object during calculation.
    Suppressed objects (VAR-) are drawn as dotted line.
    One or more of the letters A to P can be
    assigned to the object in order to define this object
    to be part of max 16 groups.
    The group definition A to P may be used for
    calculation- or output purposes.
    The letter U may be set to indicate, that the attributes
    of this object shall be post-processed
    by the user-provided lima_usr.dll.

VALUES:
     +  : Opt. 1   Object is taken into account
     -  : Opt. 1   Object isn't taken into account
   +A  : Group A
   +B  : Group B
   +C  : Group C
   +D  : Group D
   +E  : Group E
   +F  : Group F
   +G  : Group G
   +H  : Group H
   +I  : Group I
   +J  : Group J
   +K  : Group K
   +L  : Group L
   +M  : Group M
   +N  : Group N
   +O  : Group O
   +P  : Group P

SYNTAX:
   :CL - + { :CA 16 } |
```

OBJ_TYP : <TOP>

```
Attribut: <TOP>
  HELP:
     Reflection properties of ground surface, as used in ISO 9613-2,
     Austrian or French regulation

  VALUES:


  SYNTAX:
    :CA * |

Attribut: <ID>
  HELP:
     Alphanumeric key of max. 10 characters which relates the object
     to any data base.
     The ID can also be used to group objects and guarantee that their
     attributes have common values, as far as the attributes are
     potentially organized in a data base according to the settings
     for data base use.
     Objects with ID - are not linked to database or other objects.
     Via menu item /EXTRA/IDENT NUMBERING
     the program assigns ident numbers automatically.

  VALUES:


  SYNTAX:
    :CA 10 { :I } | :CL - |

Attribut: <ELE>
  HELP:
     Element number of the object.
     Used to destinguish between objects of the same kind.
     The element number is automatically organised by the software.
     The element numbers can be reset to the order of digitising
     with help of /EXTRA/RENUMBERING OF ELEMENTS.

  VALUES:


  SYNTAX:
    :I |

Attribut: <G>
  HELP:
     Degree of reflection

  VALUES:
       0   : reflecting ground
       1   : absorbing ground
       .1  : hard surface                (Harmonoise)
       .3  : hard surface                (Harmonoise)
       .4  : compact dense ground        (Harmonoise)
       .5  : compact dense ground        (Harmonoise)
       .6  : compact field and gravel    (Harmonoise)
       .7  : normal uncompacted ground   (Harmonoise)
       .8  : uncompacted, loose ground   (Harmonoise)
       .9  : uncompacted, loose ground   (Harmonoise)
       .95 : soft forest floor           (Harmonoise)
      1.0  : very soft, snow or moss-like(Harmonoise)

Attribut: <VAR>
  HELP:
     VAR - suppresses an object during calculation.
     Suppressed objects (VAR-) are drawn as dotted line.
     One or more of the letters A to P can be
     assigned to the object in order to define this object
     to be part of max 16 groups.
     The group definition A to P may be used for
     calculation- or output purposes.
     The letter U may be set to indicate, that the attributes
     of this object shall be post-processed
     by the user-provided lima_usr.dll.

  VALUES:
      +  : Opt. 1   Object is taken into account
```

```
      -  : Opt. 1   Object isn't taken into account
    +A   : Group A
    +B   : Group B
    +C   : Group C
    +D   : Group D
    +E   : Group E
    +F   : Group F
    +G   : Group G
    +H   : Group H
    +I   : Group I
    +J   : Group J
    +K   : Group K
    +L   : Group L
    +M   : Group M
    +N   : Group N
    +O   : Group O
    +P   : Group P

  SYNTAX:
    :CL - + { :CA 16 } |
```

OBJ_TYP : <TPT>

```
Attribut: <TPT>
  HELP:
     The height of the contourline

  VALUES:


Attribut: <ELE>
  HELP:
     Element number of the object.
     Used to destinguish between objects of the same kind.
     The element number is automatically organised by the software.
     The element numbers can be reset to the order of digitising
     with help of /EXTRA/RENUMBERING OF ELEMENTS.

  VALUES:


  SYNTAX:
    :I |

Attribut: <Z>
  HELP:
     Input of the height Z for start- and end-point of the object.
     The intermitting vertexes of the polygon will be interpolated,
     if a character I is placed at the end of the z definition.
     (e.g.  1 r 3 r i or 101 a 5 r i)
     If no interpolation is requested, start and end height will be
     applied for each segment of the polygon.
     If Z is defined as constant relative above ground (e.g. <Z> 0 R)
     this height is applied for all vertexes.
     Emitting objects, such as roads, which are positioned constant relative
     to terrain may be autoamtically fitted to changes in terrain grafients.
     If only the letter A is given as content of the attribut Z, the
     absolute height of each vertex is taken from the z-ordinate of
     the 3-d polygon.
     Special use for road and railway noise:
     The actual emission heights as defined above terrain in the regulation
     will always be added during calculation.
     Standard correction is:
     0.5 m for road
     0.6 m for rail
     separate heights for RLM2 or Transrapid or GOST 54933
     This general correction may be altered for calculation to e.g. 1 m
     by the (LimA_7) option Z-EMISSION 1.0.
     Special use for industry:
     For vertical area sources (RQ 3) enter the
     lower left and the upper right height!
     If the height is defined by D and the area lies
     outside buildings, the height of the rear building
     is used.
     If Z is entered with 0 R 0 R, the height of the facade is used.

  VALUES:
    A         : absolute value per vertex from 3-d co-ordinates
    5         : 5 m above ground (relative to ground (R) is default)
    0 R       : on ground
    0.1 D     : on top of a roof or bridge
    2 BL      : 2 m above slope edge on the left
    2 BR      : 2 m above slope edge on the right
    +0.2 SR   : height based on gradient towards slope edge on the right
    +0.2 SL   : height based on gradient towards slope edge on the left
    90 A      : 90 m above M.S.L
    2 r 4 r i : interpolate values

  SYNTAX:
    :CL A | :CL I :CL I |
    :CL I :R { :CL A B R D BL BR RL RR } |
    :R { :CL A B R D BL BR RL RR } :CL I |
    :R :R { :CL A B R D BL BR RL RR } |
    :R { :CL A B R D BL BR RL RR } { :R { :CL A B R D BL BR RL RR } } |
    :R { :CL A B R D BL BR RL RR } { :R { :CL A B R D BL BR RL RR } } { :CL I } |

Attribut: <VAR>
  HELP:
     VAR - suppresses an object during calculation.
```

```
    Suppressed objects (VAR-) are drawn as dotted line.
    One or more of the letters A to P can be
    assigned to the object in order to define this object
    to be part of max 16 groups.
    The group definition A to P may be used for
    calculation- or output purposes.
    The letter U may be set to indicate, that the attributes
    of this object shall be post-processed
    by the user-provided lima_usr.dll.

VALUES:
     +  : Opt. 1   Object is taken into account
     -  : Opt. 1   Object isn't taken into account
   +A  : Group A
   +B  : Group B
   +C  : Group C
   +D  : Group D
   +E  : Group E
   +F  : Group F
   +G  : Group G
   +H  : Group H
   +I  : Group I
   +J  : Group J
   +K  : Group K
   +L  : Group L
   +M  : Group M
   +N  : Group N
   +O  : Group O
   +P  : Group P

SYNTAX:
   :CL - + { :CA 16 } |
```

OBJ_TYP : <TXT>

```
Attribut: <TXT>
  HELP:
     Text

  VALUES:


  SYNTAX:
    :CA * |

Attribut: <ID>
  HELP:
     Alphanumeric key of max. 10 characters which relates the object
     to any data base.
     The ID can also be used to group objects and guarantee that their
     attributes have common values, as far as the attributes are
     potentially organized in a data base according to the settings
     for data base use.
     Objects with ID - are not linked to database or other objects.
     Via menu item /EXTRA/IDENT NUMBERING
     the program assigns ident numbers automatically.

  VALUES:


  SYNTAX:
    :CA 10 { :I } | :CL - |

Attribut: <ELE>
  HELP:
     Element number of the object.
     Used to destinguish between objects of the same kind.
     The element number is automatically organised by the software.
     The element numbers can be reset to the order of digitising
     with help of /EXTRA/RENUMBERING OF ELEMENTS.

  VALUES:


  SYNTAX:
    :I |

Attribut: <TXI>
  HELP:
     Can be used to import text data from GIS.
     This allows to handle more than 32000 text items in LimA.

  VALUES:


  SYNTAX:
    :CA * |

Attribut: <STIF>
  HELP:
     Pen definition of the object
     Pen number (*1000) + line thickness (*10) + line type (*1)
     e.g.:
     .    12  01  2
     .     |   |  |-> Line type
     .     |   |      2 = drawn line
     .     |   |      5 = dotted line
     .     |   |      6 = chain-dotted line
     .     |   |      7 = dotted line
     .     |   |      8 = invisible line
     .     |   |-->  Line thickness (1/10 mm) or filling type
     .     |         01-32 = line thicknesses
     .     |         33 = full flat filling
     .     |         49 = full flat filling+framing
     .     |         35 = simple hatching 45°
     .     |         36 = crossed hatching 45°
     .     |------>  Pen number = color

  VALUES:
```

```
  SYNTAX:
    :CL - | :RR 1012  31658 |

Attribut: <VAR>
  HELP:
     VAR - suppresses an object during calculation.
     Suppressed objects (VAR-) are drawn as dotted line.
     One or more of the letters A to P can be
     assigned to the object in order to define this object
     to be part of max 16 groups.
     The group definition A to P may be used for
     calculation- or output purposes.
     The letter U may be set to indicate, that the attributes
     of this object shall be post-processed
     by the user-provided lima_usr.dll.

  VALUES:
      +  : Opt. 1   Object is taken into account
      -  : Opt. 1   Object isn't taken into account
    +A  : Group A
    +B  : Group B
    +C  : Group C
    +D  : Group D
    +E  : Group E
    +F  : Group F
    +G  : Group G
    +H  : Group H
    +I  : Group I
    +J  : Group J
    +K  : Group K
    +L  : Group L
    +M  : Group M
    +N  : Group N
    +O  : Group O
    +P  : Group P

  SYNTAX:
    :CL - + { :CA 16 } |
```

OBJ_TYP : <WGB>

```
Attribut: <WGB>
  HELP:
     WGB objects are a useful alternative
     to building (HIN  HA=2) when it is desired
     to calculate perceived noisiness

  VALUES:


  SYNTAX:
    :CA * |

Attribut: <ID>
  HELP:
     Alphanumeric key of max. 10 characters which relates the object
     to any data base.
     The ID can also be used to group objects and guarantee that their
     attributes have common values, as far as the attributes are
     potentially organized in a data base according to the settings
     for data base use.
     Objects with ID - are not linked to database or other objects.

  VALUES:


  SYNTAX:
    :CA 10 { :I } | :CL - |

Attribut: <ELE>
  HELP:
     Element number of the object.
     Used to destinguish between objects of the same kind.
     The element number is automatically organised by the software.
     The element numbers can be reset to the order of digitising
     with help of /EXTRA/RENUMBERING OF ELEMENTS.

  VALUES:


  SYNTAX:
    :I |

Attribut: <BAUL>
  HELP:
     Ratio of the length of built up section without gaps against total length.
     Input value 0 will automatically be set to 1.
     For some regulations this value will influence diffraction loss and reflection.
     For RLM2 the option dB may be used to define a reduction
     in dB of a potential screening effect.
     The actual screening effect will not be less than 0.0.
     Values of -10 to 0 indicate an additional screening effect.

  VALUES:
      1      : attenuation factor or percentage/100 of screens without gaps
      0.5    : factor 1/2 for attenuation areas or 50 percent gaps in screen
      -2 dB  : Opt. 1  reduction of screening effect in RLM2/SRM2 tab. 5.4
      -5 dB  : Opt. 1  reduction of screening effect (see table 5.4)

  SYNTAX:
    :RR 0  1 |
    :RR 0 10 |
    :RR 0 1.

Attribut: <RV>
  HELP:
     Reflection losses in dB(A)
     If two values are entered, the first describes the
     wall's surface to the left of the direction of digitizing
     and the second the condition on the right surface.
     Option "A" indicates input values to be Alpha values.
     Reflection loss in (dB) is calculated by
     10. * lg (1.0-Alpha)

  VALUES:
      0 : no consideration of reflection
      1 : sound hard, even facade (R = 0.79, A = 0.21)
```

```
      2 : jointed façade
      3 : (R = 0.5, A = 0.5)
      4 : absorbing barrier
      7 : (R = 0.2, A = 0.8)
      8 : high absorbing barrier
      A : Opt. 1  Input as Alpha value

  SYNTAX:
    :CL - | :RR -8 8 { :RR -8 8 } { :CL V } |
    :RR 0 1 { :RR 0 1 }  :CL A { :CL V } |

Attribut: <MAK>
  HELP:
     Alphanumeric code of max. 20 characters of the
     assigned data set for the material.
     Required for sources inside a room.

  VALUES:


  SYNTAX:
    :CA * |

Attribut: <Z>
  HELP:
     Z-height

  VALUES:
    A          : absolute value per vertex from 3-d co-ordinates
    5          : 5 m above ground (relative to ground (R) is default)
    0 R        : on ground
    0.1 D      : on top of a roof or bridge
    2 BL       : 2 m above slope edge on the left
    2 BR       : 2 m above slope edge on the right
    +0.2 SR    : height based on gradient towards slope edge on the right
    +0.2 SL    : height based on gradient towards slope edge on the left
    90 A       : 90 m above M.S.L
    2 r 4 r i  : interpolate values

  SYNTAX:
    :CL A | :CL I :CL I |
    :CL I :R { :CL A B R D BL BR RL RR } |
    :R { :CL A B R D BL BR RL RR } :CL I |
    :R :R { :CL A B R D BL BR RL RR } |
    :R { :CL A B R D BL BR RL RR } { :R { :CL A B R D BL BR RL RR } } |
    :R { :CL A B R D BL BR RL RR } { :R { :CL A B R D BL BR RL RR } } { :CL I } |

Attribut: <EW>
  HELP:
     Number of inhabitants of the building.
     Enter Blank or "-" to let the number be defined by the INHBDG command.
     Any other input value will be kept. The given number will be taken into account
     while the INHBDG command is applied.

  VALUES:


  SYNTAX:
    :CL - | :RR 0 1E8 | :RR 0 1E8  :CL * |

Attribut: <EWG>
  HELP:
     Attribute EWG represents a noise exposure indicator.
     Depending on the chosen method of analysis this value is linked to
     receiver noise levels and number of inhabitant and/or limit values of
     accepted noise levels.

  VALUES:


  SYNTAX:
    :CS |

Attribut: <DWG>
  HELP:
     Number of dwellings in a building

  VALUES:
```

```
  SYNTAX:
    :CL - | :R { :CL V * } |

Attribut: <INSU>
  HELP:
     Index describing facade insulation for END exposure analysis.

  VALUES:
    0 : No special insulation of facade
    1 : special insulation of facade

  SYNTAX:
    :IR 0 1 |

Attribut: <MODI>
  HELP:
      MODI contains a list of key word, each separated by "-",
      which can be combined by logical operators.
      e.g. AA MODI O -DF-  for an OR combination of existing content and  key -DF-
      Use MODI to keep track of any attribute modifications done automatically
      with a macro run. The choice of useful keywords is up to the user.

  VALUES:
    -DF- : Opt. 1 Default Setting

  SYNTAX:
    :CA 16 |

Attribut: <TEMP>
  HELP:


  VALUES:


  SYNTAX:
    :CA * |

Attribut: <VAR>
  HELP:
     VAR - suppresses an object during calculation.
     Suppressed objects (VAR-) are drawn as dotted line.
     One or more of the letters A to P can be
     assigned to the object in order to define this object
     to be part of max 16 groups.
     The group definition A to P may be used for
     calculation- or output purposes.
     The letter U may be set to indicate, that the attributes
     of this object shall be post-processed
     by the user-provided lima_usr.dll.

  VALUES:
      +  : Opt. 1   Object is taken into account
      -  : Opt. 1   Object isn't taken into account
    +A  : Group A
    +B  : Group B
    +C  : Group C
    +D  : Group D
    +E  : Group E
    +F  : Group F
    +G  : Group G
    +H  : Group H
    +I  : Group I
    +J  : Group J
    +K  : Group K
    +L  : Group L
    +M  : Group M
    +N  : Group N
    +O  : Group O
    +P  : Group P

  SYNTAX:
    :CL - + { :CA 16 } |
```