Open Access Scientific Reports

LDG: Lateral Design Graph

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LDG is an Excel macro program to define and visualize lateral wind and seismic loads, with the objective to streamline lateral force design and visualize the impact of lateral load on buildings.LDG is based on equations and procedures of IBC, International Building Code, and ASCE 7 building loads, American Society of Civil Engineers. LDG is posted at the author's website:http://www.usc.edu/structures .

Click Links to display and/or download: LDG, LDG tutorial, IBC R-factors, USGS Seismic factors, and wind velocity map.To clarify, building data is displayed on white, seismic data on beige, and wind data on green background. Column A displays definitions and column B the related values. Prior to running LDG, the design data must be entered in column B.To run LDG with default or user defined data, press Ctrl-Shift-R together. The computed seismic and wind base shear are displayed at the respective bottom of columns AB. In case the data of AB gets corrupted, the data of TU may be copied and pasted into AB. Data display is defined as k= kip (1000#), psi = pounds per square foot.

Column	Data displayed:
A	Definitions
B	Values
C	Space
D	Levels
E	Length (feet)
F	Width (feet)
G	Story height (feet)
H	Mass (psf)
I	Seismic force (k)
J	Seismic shear (k)
K	Seismic overturn moment (k')
L	Wind pressure (psf)
M	X-wind load (k)
N	X-wind shear (k)
O	X-wind Overturn moment (k')
P	Y-wind force (k)
Q	Y-wind shear (k)
R	Y-wind Overturn moment (k')
S	Space
T	Data definitions (backup)
U	Data values (backup)
V	Space
W	Brief data description
X	Space
Y-AN	Data tables and wind map
	Site coefficients Fa (low-rise)
	Site coefficients Fv (high-rise)

LDG data may be displayed as graphs. However, since LDG is in protected mode to preventdata alterations, making graphs requires to copy and paste data in a new Excel sheet (Figure1,2). Selecting any data column and graph type will display the respective graph on the Excel screen. The user my move the graph to any position on the Excel screen or display it as independent graph (Figure 3,4). The user may also size and format the graphs to any desired size and color.

References

1. ASCE 7 (2010) Minimum Design Loads for Buildings and Other Structures, American Society of Civil Engineers.

2. IBC (2012) International Building Code,International Code Council, Falls Church, Virginia.

3. Schierle, GG (2006) Seismic Website, Building Technology Educators Conference.

4. Schierle, GG (2008) Structure and Design, Cognella.

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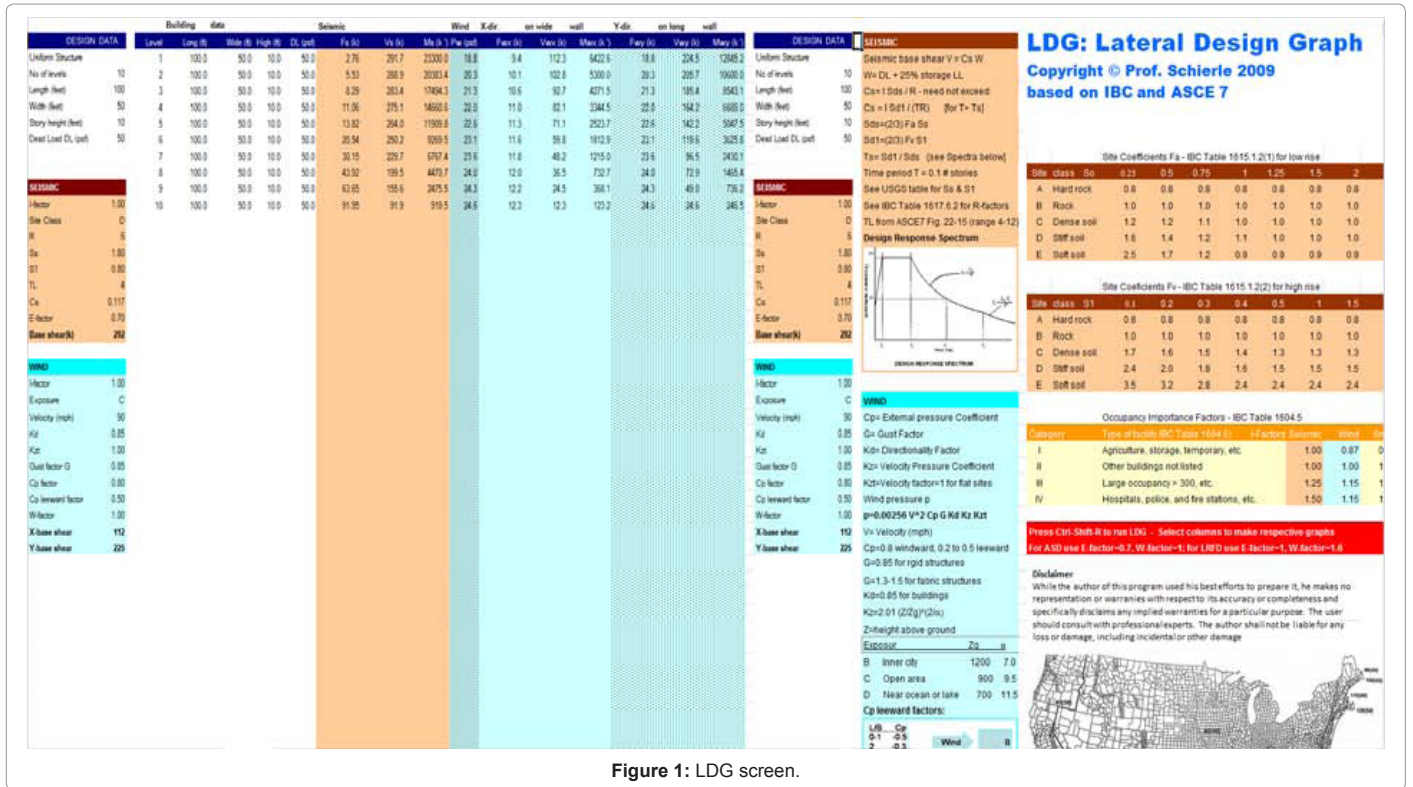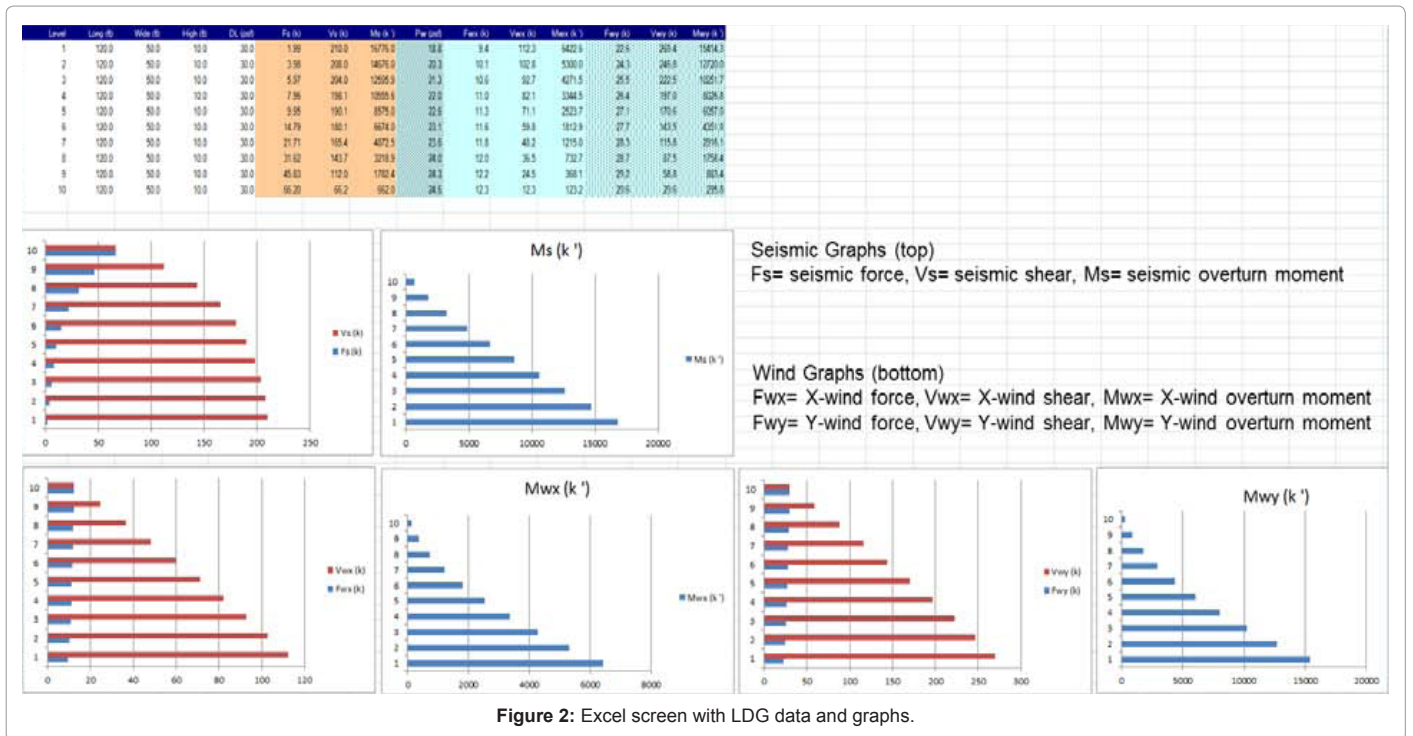
Figure 1: LDG screen.

Figure 2: Excel screen with LDG data and graphs.

Figure 3: Seismic force Fs and shear Vs(k).

Figure 4: Seismic Overturn momentMs(k').