



**Andhra Pradesh State Skill  
Development Corporation**



# **Extended Three-Dimensional Analysis of Building System**

## **ETABS**

### **Frame Load Assignments**

## FRAME LOAD ASSIGNMENTS

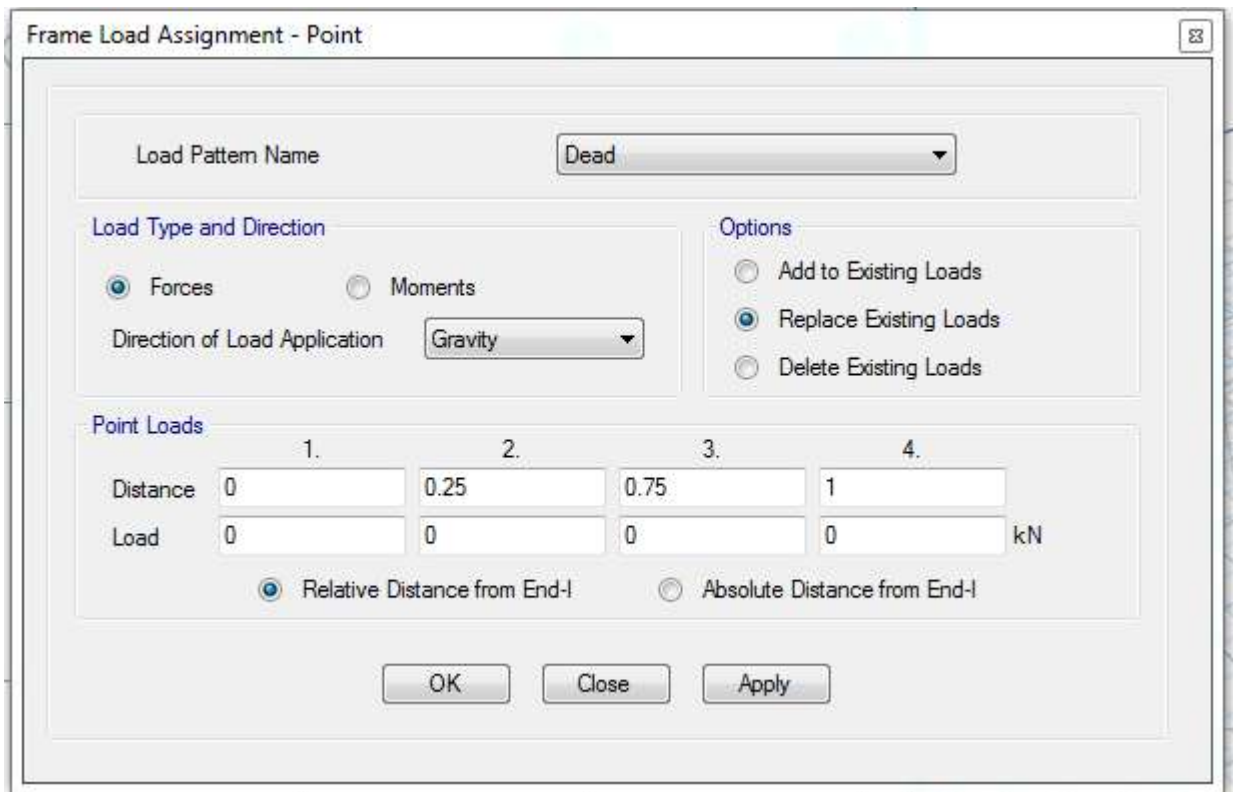
### Objective

This chapter describes the process of various frame load assignments. Generally there are three types of loadings namely Uniformly Distributed Load (UDL), Uniformly Varying Load (UVL) & Concentrated Load.

### Point or Concentrated Load

Assign point loads to frame objects as follows:

1. Select the frame object(s) to which point loads are to be assigned.
2. Click the **Assign menu > Frame Loads > Point** command to access the **Frame Load Assignment - Point** form.



	1.	2.	3.	4.	
Distance	0	0.25	0.75	1	
Load	0	0	0	0	kN

**Figure: Frame Load Assignment - Point form**

3. Use the following drop-down lists, options, and edit boxes to specify the parameters for the load
  - **Load Pattern Name** drop-down list. Select the name of a defined load pattern to which the specified point loads are to be assigned. Note that the **Define menu > Load Patterns** command is used to define load patterns.
  - **Load Type and Direction** options and drop-down list. Specify whether the loads are point loads or point moments. Also specify the direction of the load using the drop-down list. Note that the Gravity direction is downward in the negative global Z direction.

Defining the direction as Gravity rather than Global-Z allows gravity loads to be input using positive signs (or more likely, no sign) rather than negative signs.

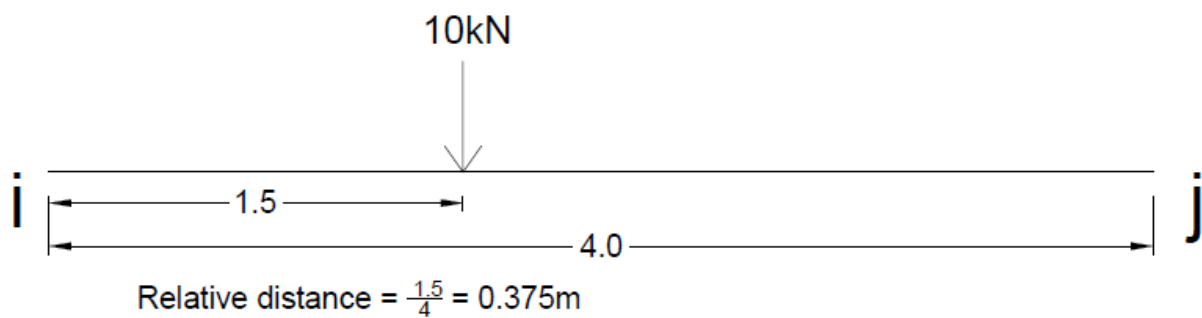
- **Distance and Load** edit boxes. Specify up to four point loads acting on the frame object by indicating a location and a load for the point load. The data for the first point load is input in the first set of *Distance* and *Load* edit boxes, the data for the second point load is entered in the second set of *Distance* and *Load* edit boxes, and so on.

The distance to the point load is always measured from the i-end of the frame object. Specify an absolute distance or a relative distance.

## Options

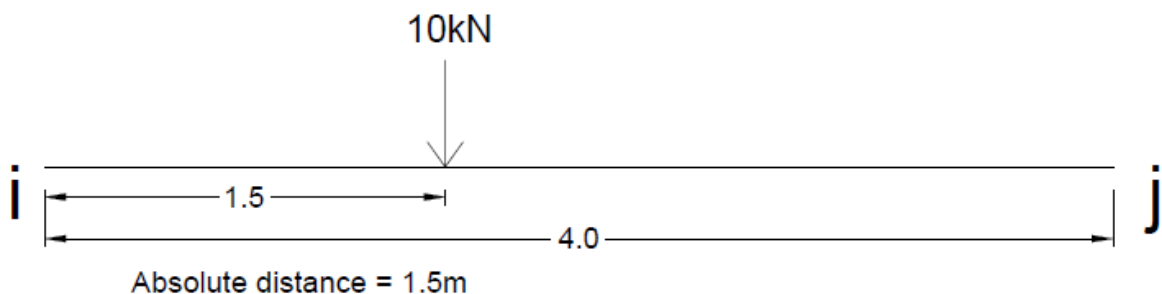
- **Relative Distance from End I** option. The relative distance is equal to the distance from the left end of the frame object to the point where the load intensity is specified divided by the length of the frame object. The relative distance is never larger than 1.0.

### Example:



- **Absolute Distance from End I** option. An absolute distance is the actual distance from the left end of the frame object to the point where the load intensity is specified.

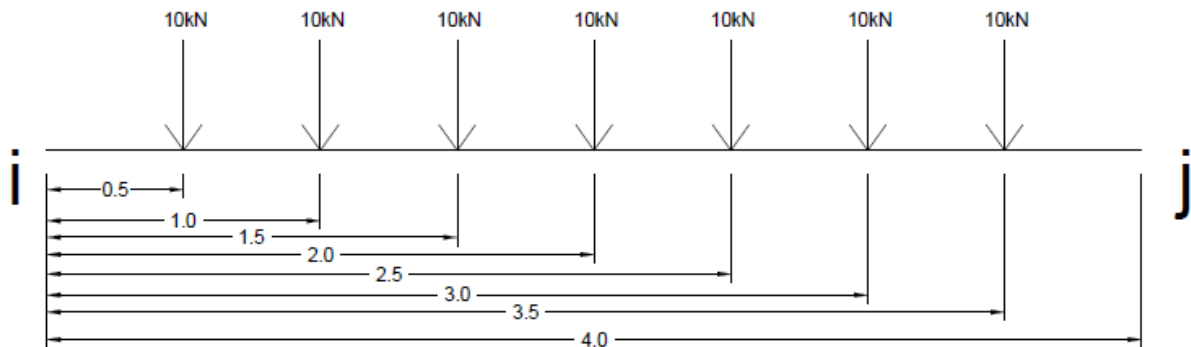
### Example:





- To specify more than four point loads, simply specify the first four point loads and click the **Apply** button to assign them, then reselect the frame object and click the **Assign menu > Frame Loads > Point** command to again access the Frame Load Assignment - Point form and specify additional point loads.

## Example:



## Options

- Add to Existing Loads:** Adds the specified point loads to the frame object. If one or more point load assignments have already been made at the same location on the frame object, this option increases the total point load on the joint object at that location, assuming a positive load is being specified.
  - Replace Existing Load:** Replaces the currently specified point load, if any, with the new point load assignment. If no assignments exist, the new assignment is still made. This is the default option. Note that only the loads in the load pattern specified above are replaced.
  - Delete Existing Loads:** Deletes any and all point load assignments made to the selected frame object(s). When this option is selected, the items in the *Load Type and Direction* area and the *Direction* and *Loads* edit boxes are ignored when the **Apply** button is clicked. Note that only the loads in the load pattern that is specified above are deleted.
- Note that the default option is Replace and that the program defaults to this every time the form is opened.

- Click the **Apply** button to complete the assignment.

When the **Apply** button is used, the Frame Load Assignment - Point form will remain open until it is closed by clicking the **Close** button. This allows selection of another frame object(s), to which other assignments can be made. If only one assignment is being made to only one set of selected objects, the **OK** button can be used to both apply the assignment and close the form.

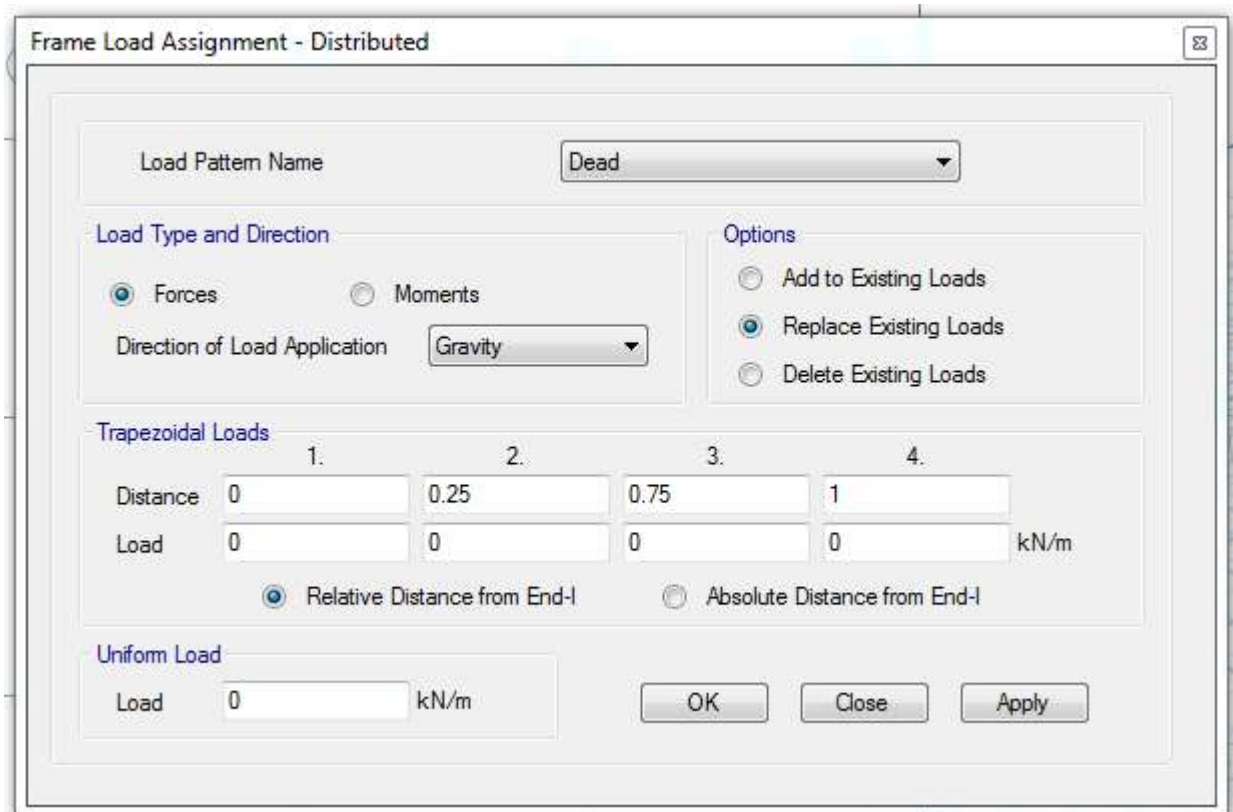
## Uniformly Distributed & Varying Load

Distributed loads may be specified as uniform over the length of a frame object, or they may be specified as trapezoidal loads over any length of a frame object.

Trapezoidal load edit box is used to assign the uniformly varying loads on frames.

**Assign a distributed load to a frame object as follows:**

1. Select the frame object to which a distributed load is to be assigned.
2. Select the **Assign menu > Frame Loads > Distributed** command to access the **Frame Load Assignment - Distributed** form.
3. Use the following drop-down lists, options, and edit boxes to define the parameters for the load:
  - **Load Pattern Name** drop-down list. Select the name of a defined load pattern to which the specified distributed load is to be assigned. (Note: Define load patterns using the Define menu > Load Pattern command.)
  - **Load Type and Direction** options and drop-down list. Select the option to specify the loads as forces (line loads) or moments (line moments). Also specify the direction of the load using the drop-down list. Note that the Gravity direction is downward in the negative global Z direction. Defining the direction as Gravity rather than Global-Z allows input of the gravity loads using positive signs (or more likely, no sign) rather than negative signs.



	1.	2.	3.	4.
Distance	0	0.25	0.75	1
Load	0	0	0	0

Units: kN/m

**Figure: Frame Load Assignment - Distributed form**

- **Trapezoidal Loads** edit boxes. Specify non-uniform distributed (UVL) loads acting on a frame object. The distributed loads can be specified over the full length of the frame object or just over part of the length. Distributed load specified in this area, if any, is additive with that specified in the *Uniform Load* area.

The loaded length for a trapezoidal load may be specified using **Relative** or **Absolute Distances**. An absolute distance is the actual distance from the left end of the frame object to the point where the load intensity is specified. A relative distance is equal to the distance from the left end of the frame object to the point where the load intensity is

specified divided by the length of the frame object. The relative distance is never larger than 1.0.

Trapezoidal loads are defined by specifying up to four sets of distances and loads. The distance and load sets are specified at locations where the rate of change of the load intensity changes, that is, at the corners of the loading intensity diagram. The figure below shows some examples. All of the distances shown in the figure are relative distances.

Set #	1	2	3	4
Distance	0.25	0.5	0	0
Load	1	1	0	0

Set #	1	2	3	4
Distance	0	1	0	0
Load	0	1	0	0

Set #	1	2	3	4
Distance	0	0.5	1	0
Load	0	1	1	0

Set #	1	2	3	4
Distance	0	0.33	0.67	1
Load	0	1	1.25	0

Set #	1	2	3	4
Distance	0	0.5	0.5	1
Load	1	1	2	2

Always specify the distance and load set closest to the i-end of the frame object in box 1, the next set in box 2 and so on. For any sets of boxes not used, set the distance to 0. ETABS ignores any boxes where the distance is smaller than the distance in the previous box.

- **Uniform Load** edit box. Enter a uniform load value that applies over the entire length of the beam. Any load that is entered in this area is additive to any load specified in the *Trapezoidal Loads* area.
- **Options**
  - **Add to Existing Loads:** Adds the specified distributed loads to the frame object. If one or more distributed load assignments have already been made at the same location on the frame object, this option increases the total distributed load on the frame object, assuming a positive load is being specified.
  - **Replace Existing Load:** Replaces the currently specified distributed load, if any, with the new distributed load assignment. If no assignment has been made, the new assignment is still made. This is the default option. Note that only the loads in the load pattern that is specified above are replaced.
  - **Delete Existing Loads:** Deletes any and all distributed load assignments made to the selected frame object(s). When this option is selected, the items in the *Load Type and Direction* and the *Trapezoidal Loads* areas of the form are ignored when



the Apply button is clicked. Note that only the loads in the load pattern that is specified above are deleted.

Note that the default option is Replace and the program defaults to this option every time the form is opened.

4. Click the **Apply** button to complete the assignment.

When the **Apply** button is used, the **Frame Load Assignment - Distributed** form will remain open until it is closed by clicking the **Close** button. This allows selection of another frame object(s), to which another assignment can be made.

If only one assignment is being made to only one set of selected objects, the **OK** button can be used to both apply the assignment and close the form.