Ref. Teddy Boen
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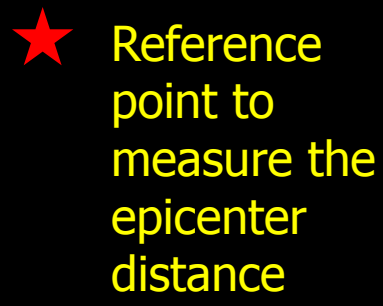
Hands-on Working Procedure in RADIUS

Scenario

- Estimate the damaged by an Earthquake in a sample area is shown in the following picture.
- Assumption in that area
  - Total population : 7815
  - Total buildings : 1915
  - Mesh spacing : 0.05 km/mesh
  - Local road : 5 km
  - Bridge : 1
  - Road electric poles : 500
  - Water distribution line : 30 km
  - Gasoline stations : 1

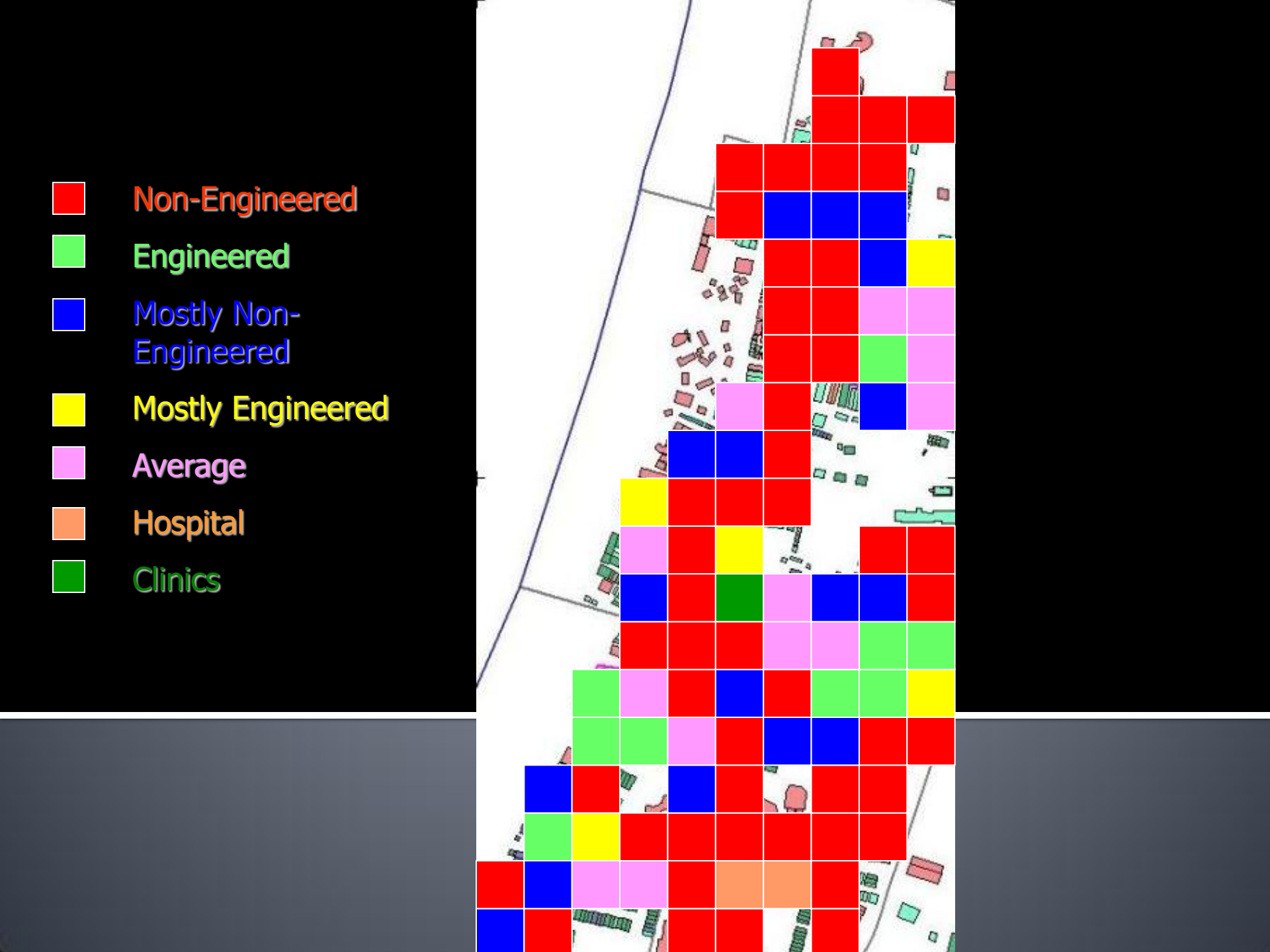

Reference point to measure the epicenter distance

Scenario

- The earthquake data are as follows:
  - Magnitude : 9
  - Depth : 33 km
  - Occurrence Time : 8 a.m.
  - Direction : South – West
  - Attenuation Equation : Joyner & Boore, 1981
  - Epicentral Distance : 200 km
  - Reference point to measure the distance from hypocenter can be seen in the previous picture.

Scenario

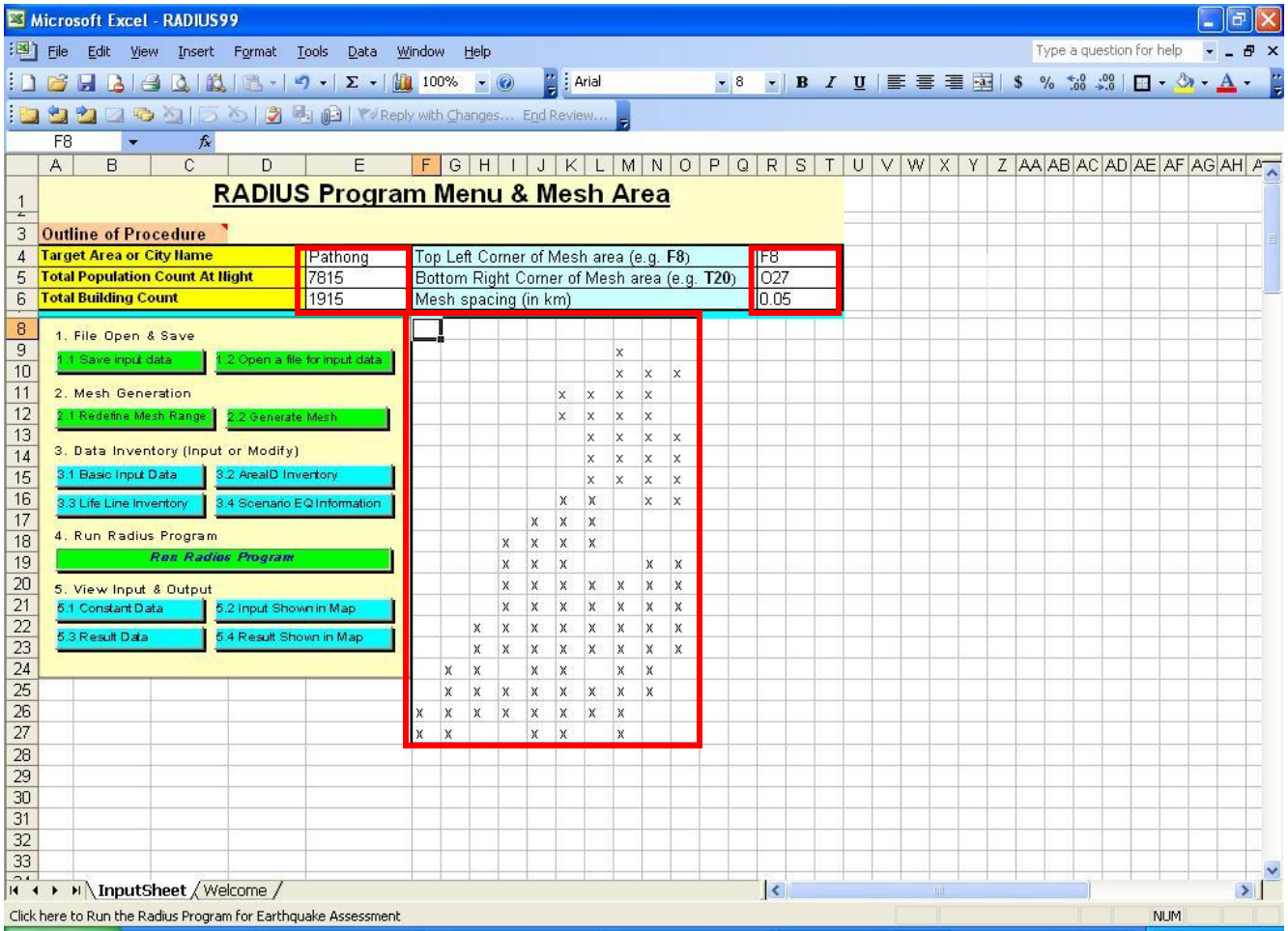
- Composition of buildings per mesh at the sample area can be grouped as follows:
  - Non-Engineered Buildings:
    - 100% masonry buildings with height up to 2 stories
  - Engineered Buildings:
    - 100% engineered buildings with height from 2 stories above
  - Mostly Non-Engineered:
    - 80% Non-Engineered and 20% Engineered
  - Mostly Engineered:
    - 20% Non-Engineered and 80% Engineered
  - Average:
    - 50% Non-Engineered and 50% Engineered
  - Hospital:
    - 100% high rise hospital
  - Clinics:
    - 10% clinics and 90% non-engineered buildings


Non-Engineered
Engineered
Mostly Non-Engineered
Mostly Engineered
Average
Hospital
Clinics

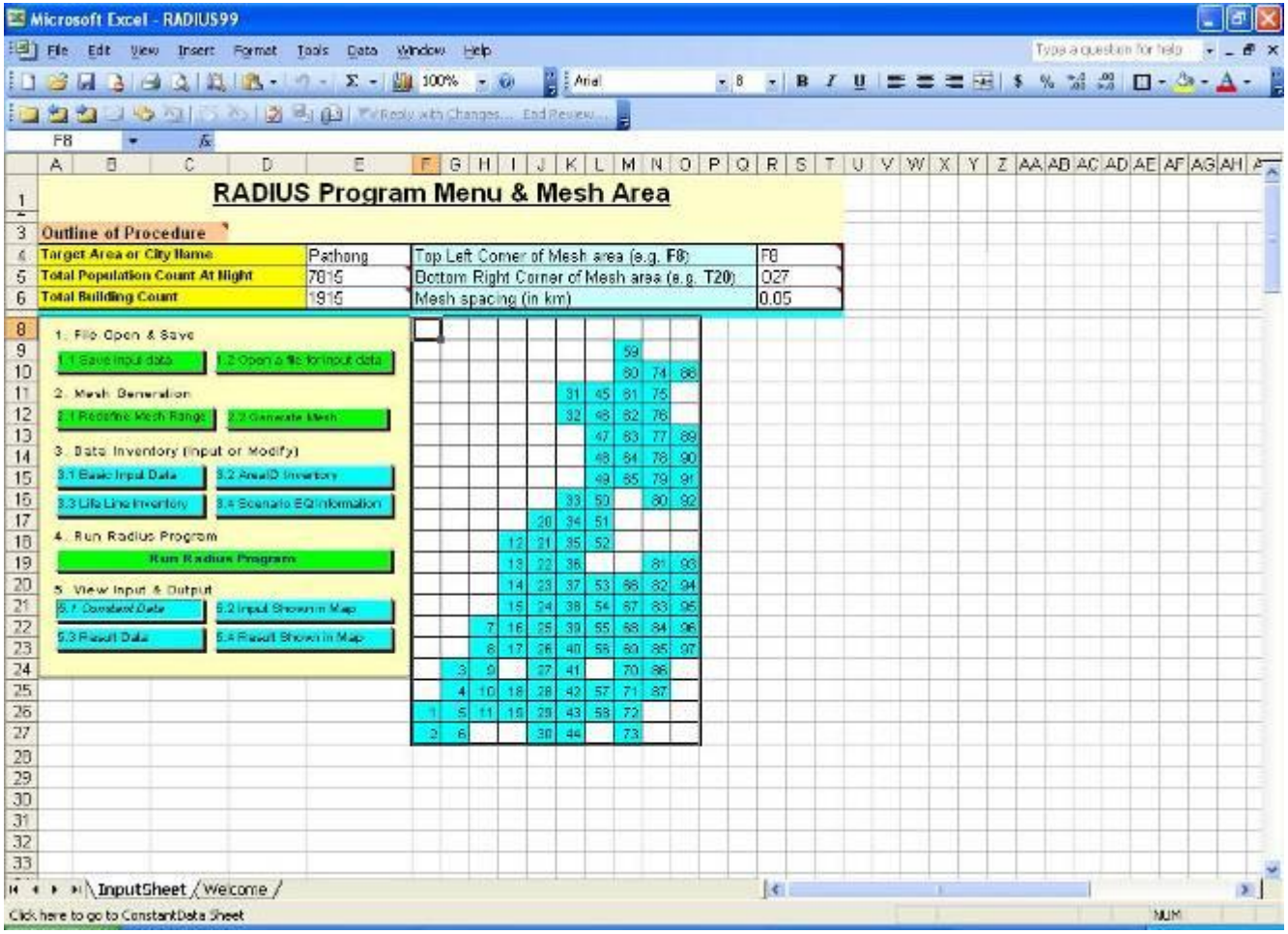
Scenario

- The importance factor will be decided considering local factors (e.g. population density).
- Local soil type for all areas is average stiff soil.

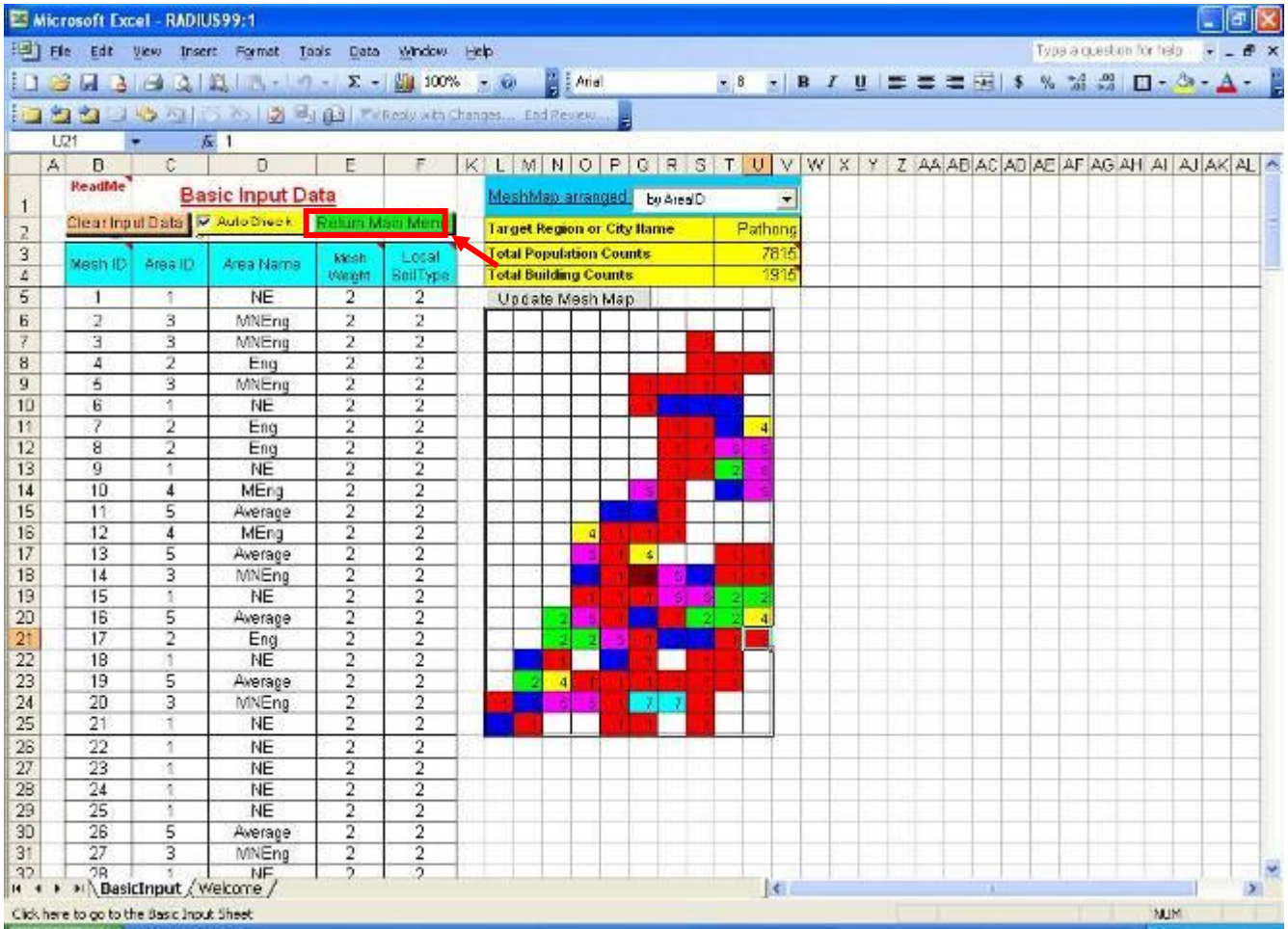
- Identified:
  - Target Area or City Name, Total Population Count at Night, Total Building Count
  - Top Left Corner or Mesh Area, Bottom Right Corner or Mesh Area, Mesh spacing (in km)
- Defines the meshes on the RADIUS Program interface
  - Number the meshes using integers, alphabets or a combination of the two



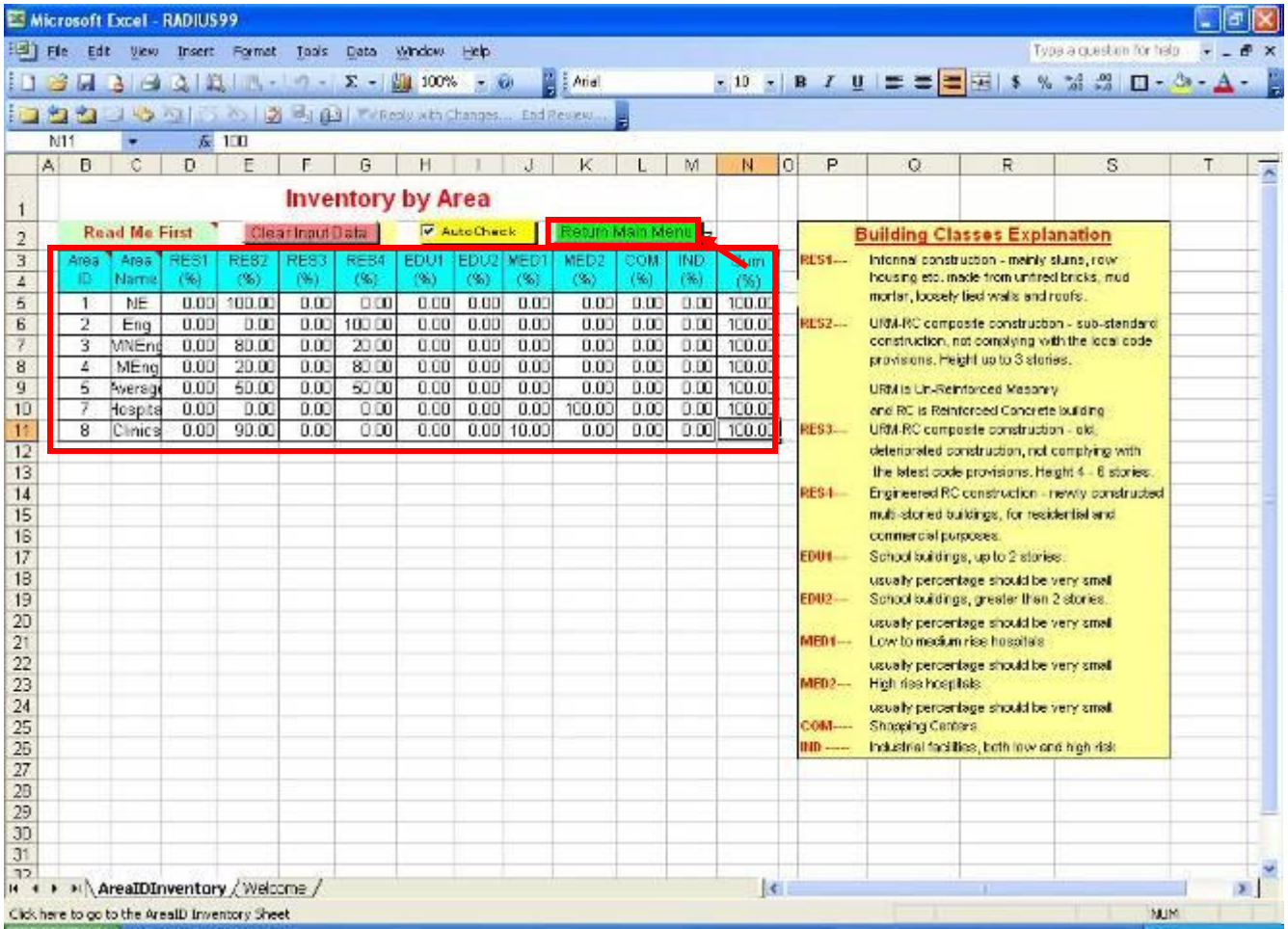
- Generate Mesh → The RADIUS Program automatically assigns MeshID values to meshes from left to right and top to bottom, after the user input is complete.



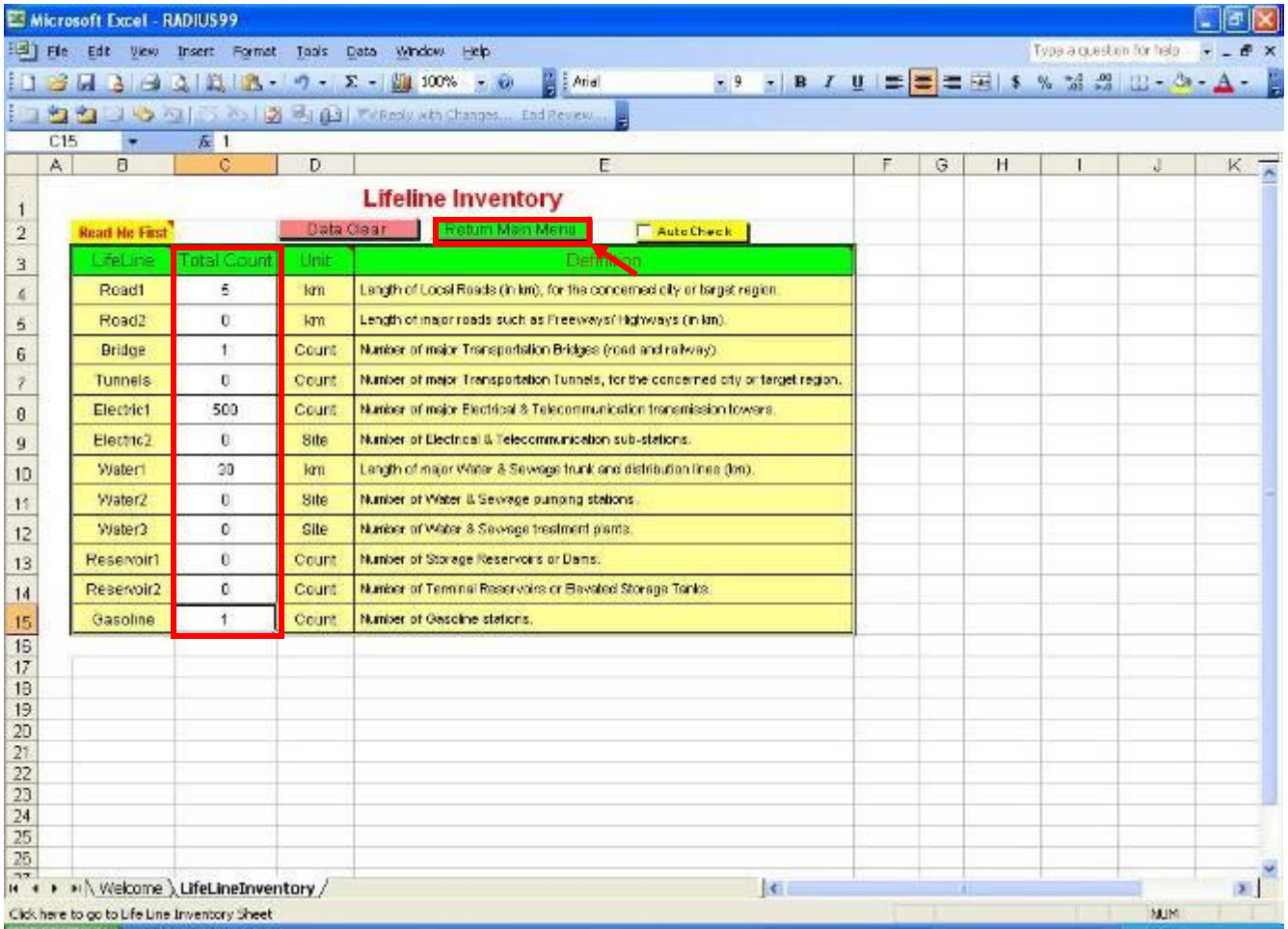
- Input or modify the data that will be used by click **3.1. Basic Input Data** button.
- Fill the Area ID, Area name, Mass Weight, and Local Soil Type for each mesh.
- The input data can be viewed in map by click down the box opposite to **Mesh Map arranged**, and choose the option you want to see.
- Click **Return Main Menu** button to go back to main menu.



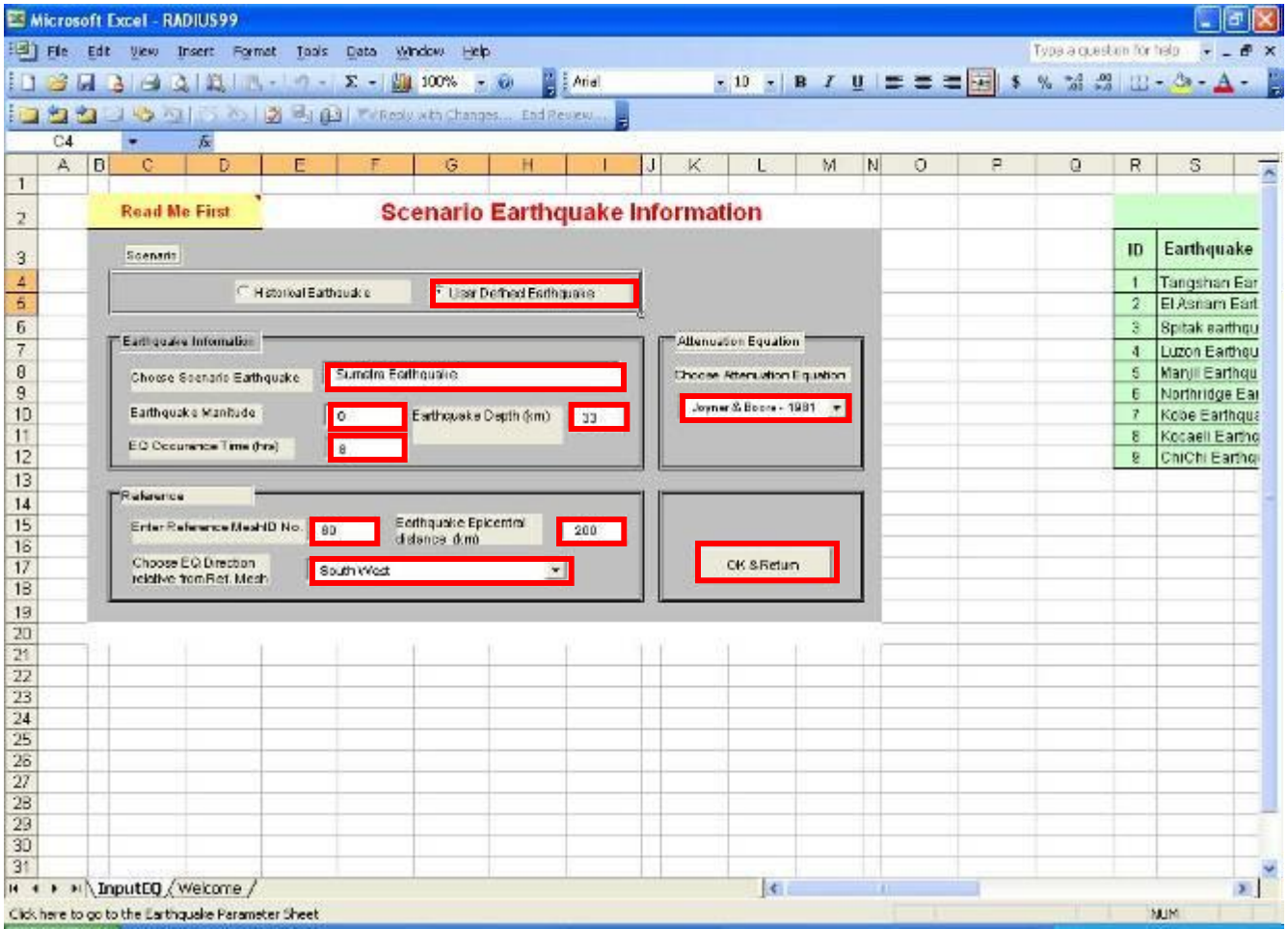
- Define the buildings that consist in each area by click **3.2. AreaID Inventory** button.
  - Building classes explanation included in this form.
  - Fill the blank area for each area name from left to right.
  - Remember, the Sum for each area must be 100 %, if not the program will display warning.
- After the data is completed, return to main menu by click **Return Main Menu**.



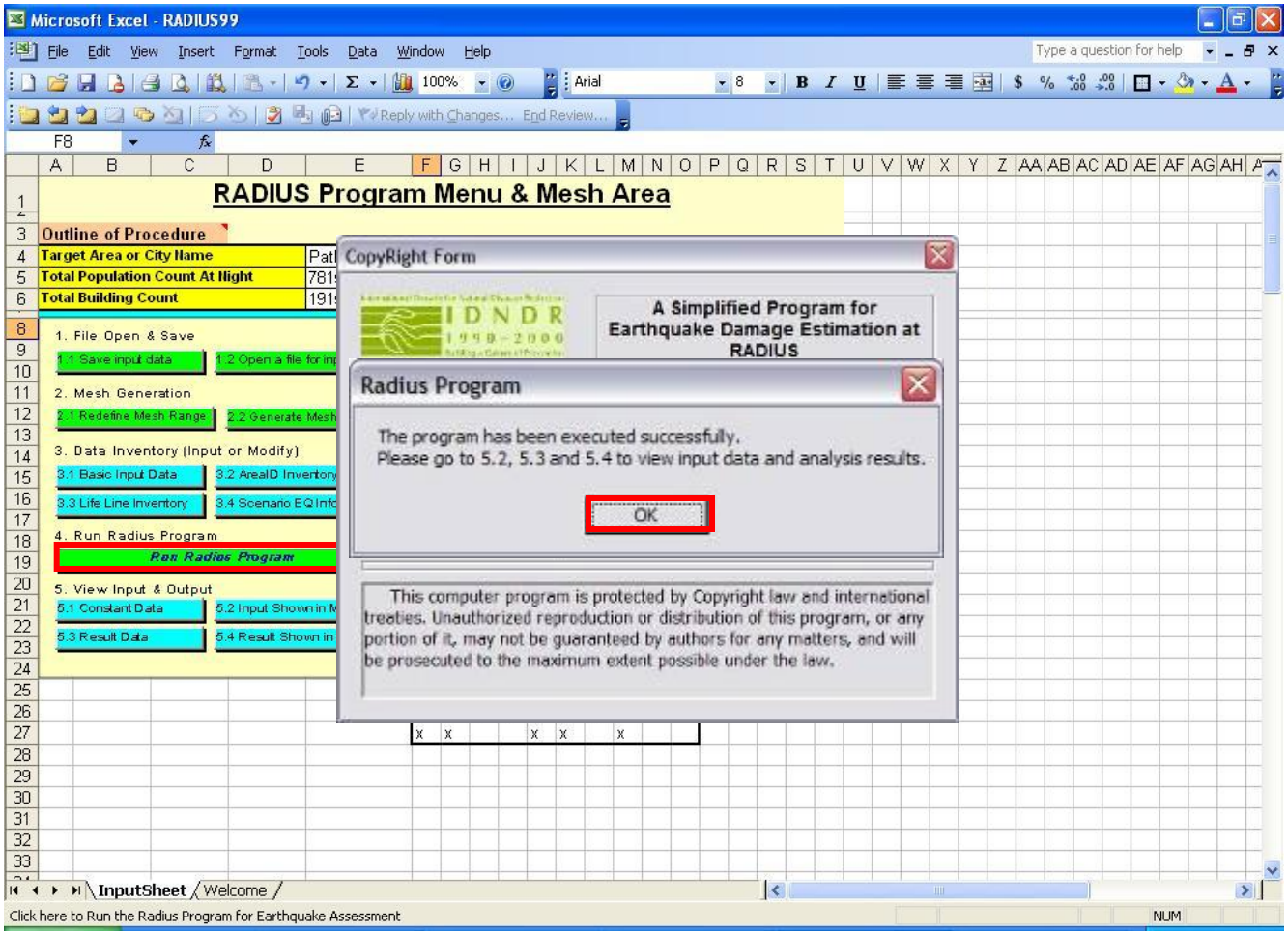
- The RADIUS Program could be used for earthquake damage estimation of many lifelines, but not for some other essential facilities like railways or telecommunications, and damage to contents and business interruption.
  - Click **3.3. Life Line Inventory** button.
  - Fill the blank box at **Total Count** column for each lifeline. If there is no lifeline, leave the box or fill o.
  - The definition of each lifelines are included in this form.
- After the data is completed, return to main menu by click **Return Main Menu**.



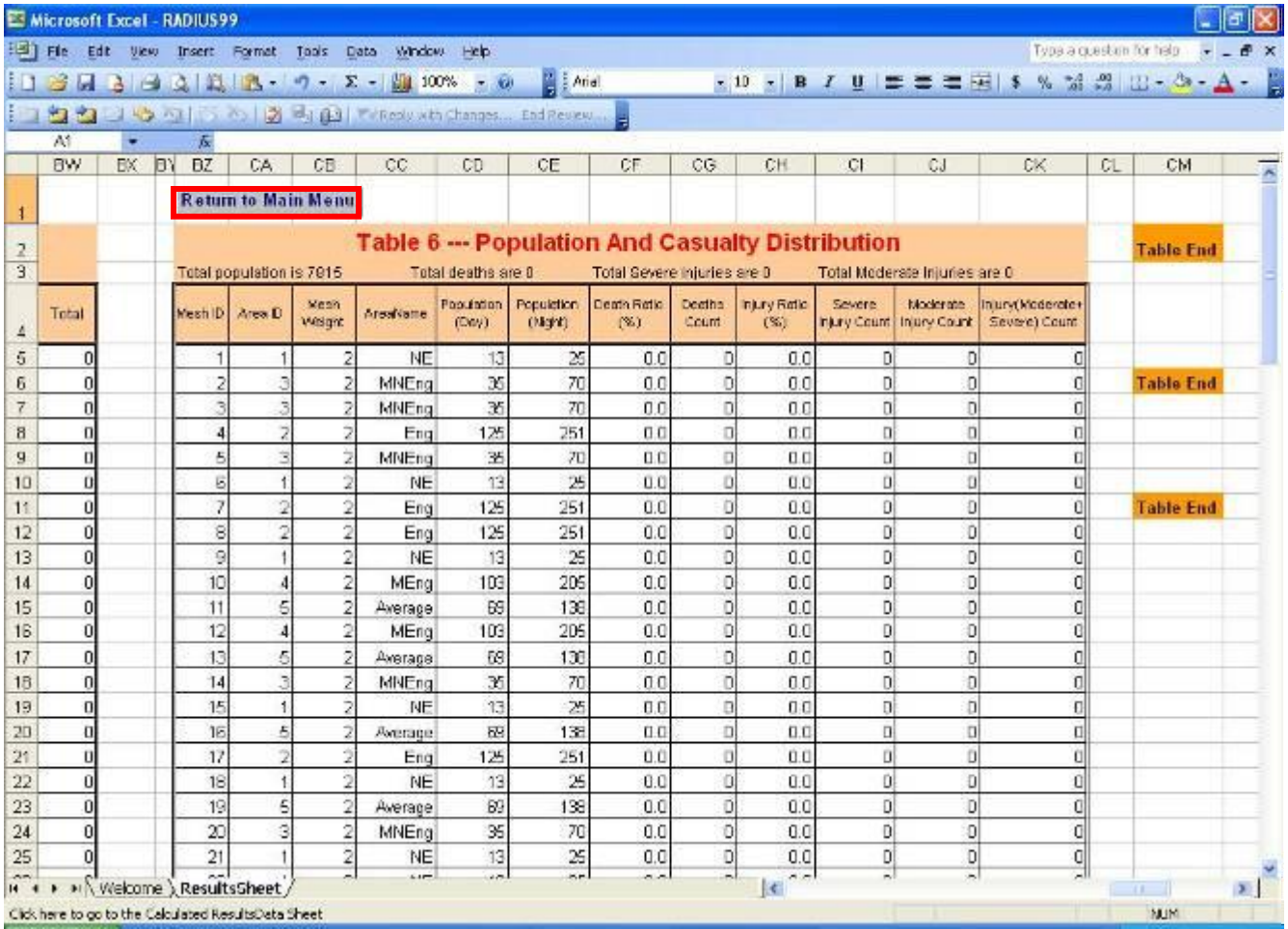
- The last data required is earthquake motion that will be used to estimate the damage.
- Click the **3.4. Scenario EQ Information** button.
  - The form below will be displayed. Choose **User Defined Earthquake** button
  - Fill the data required : **Scenario Earthquake, EQ Magnitude, EQ Depth, EQ Occurance Time, Reference MeshID,** and **EQ Epicentral.**
  - Drop down the box opposite to **EQ Direction** to choose the EQ Direction.
  - Drop down the box below **Choose Attenuation Equation** to choose the attenuation equation.
  - Click **OK & Return** button to go back to main menu.



- Click **Run Radius Program** button to analyze the scenario and obtain the result.
  - The box below will appear, click the **GO** button.
  - Wait for a moment.
  - After the program finished, the box below will appear, click the **OK** button.



- Review the result by click **5.3. Result Data** button.
  - There are six tables represent the result:
    - Table 1: Main Results
    - Table 2: Lifeline Inventory and Damage
    - Table 3: Building Inventory Partitioned to Meshes
    - Table 4: Building Damage Ratio (%)
    - Table 5: Number of Buildings Damaged by Earthquake
    - Table 6: Population and Casualty Distribution
  - Click the **Return to Main Menu** button that always on the top of each tables to go back to main menu.



- The results in map format can be viewed by click **5.4. Result Shown in Map** button.
  - Choose one of the following result options in the **Result Data Dialogue**
    - MMI
    - Damaged Building
    - Damaged Building Ratio
    - Casualties (Death)
    - Casualties (Injury)
  - Click **Exit** button to return to main menu.