18. Click the “Clear the Table” button to begin a new analysis. The button to clear the table is highlighted in Figure 38.

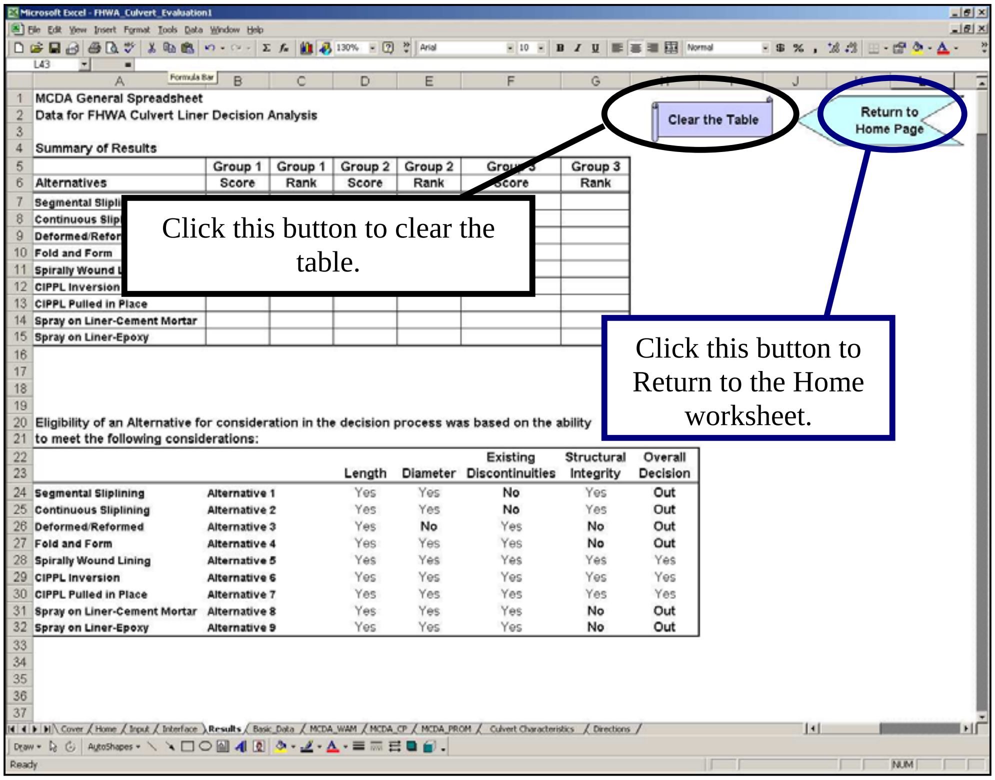

Figure 38. Screenshot. Results Worksheet, Clear the Table and Return to Home Worksheet.

19. To begin a new analysis, return to Home worksheet and follow steps 1 through 18.

EXAMPLE APPLICATION

Paragon Engineering Ltd. published an article by Kupskay (2001) titled *Coquitlam Capital Works: B&B Relines Deep Culverts in Coquitlam Improvement Project*. Kupskay’s case study presented the lining of two (2) corrugated metal pipe culverts in the City of Coquitlam, located approximately thirty (30) miles east of Vancouver.[55] Each year the City undertakes a complete overhaul of a residential neighborhood, including offering residents a chance to upgrade their streets in a cost-shared basis. The Neighborhood Improvement Project of 2001 involved the upgrading and replacement of underground infrastructure in advance of repaving scheduled for later in the year. Decision makers in this study were the City of Coquitlam who developed and primarily funded the project, and the residents who were required to prioritize neighborhood improvements and share project costs.

Two (2) pipes were rehabilitated in this study; one (1) was the Oneida Drive pipe, which was constructed of corrugated metal. Sections of the Oneida Drive pipe were missing from the bottom for lengths up to twelve (12) inches. There existed a short section where the top of the pipe had settled and was approaching ten (10) percent loss in ovality. Replacement of the culvert was ruled out because the depth of digging required was 4.42 meters (14.5 feet) to 5.5 meters (18 feet) below the road surface. Fold and form liners were chosen for the rehabilitation of both culverts. Total project costs reached $81,000, with an average construction cost of approximately $210 per linear foot. Details of this study, specifically the Oneida Drive pipe, have been incorporated into the following example, to illustrate the use of the MCDA.

Input Culvert Details

Initially, the culvert details were entered into the Culvert Characteristics worksheet, under the column labeled "Culvert A." In reference to the question regarding discontinuities and changes in diameter, "Severe" was selected due to the loss in ovality of the corrugated metal pipe. By selecting "Severe," the MCDA automatically eliminated segmental sliplining and continuous sliplining from the list of viable alternatives. This limitation was installed because the commonly used material for the sliplining process is polyethylene and according to the ASTM F 585 (2000) *Standard Practice for Insertion of Flexible Polyethylene Pipe Into Existing Sewers*,[15] polyethylene pipe can accommodate reasonable irregularities in external loading or in line and grade but excessive bending should be avoided. Due to the extent of deterioration and missing sections of pipe, the question regarding structural integrity was answered "Requires restoration of structural integrity." Selection of this option eliminated the alternatives cement-mortar spray-on lining, epoxy spray-on lining, close-fit lining fold and form method, and close-fit lining deformed/reformed method. Methods of spray-on lining are non-reinforcement methods[8] intended to halt corrosion and repair small leaks. Three (3) alternatives were considered for culvert rehabilitation in this example, the alternatives were spirally wound lining, cured-in-place lining inversion method, and cured-in-place lining pulled-in-place method. Figure 39 presents the Culvert Characteristics worksheet with the necessary culvert parameters entered.

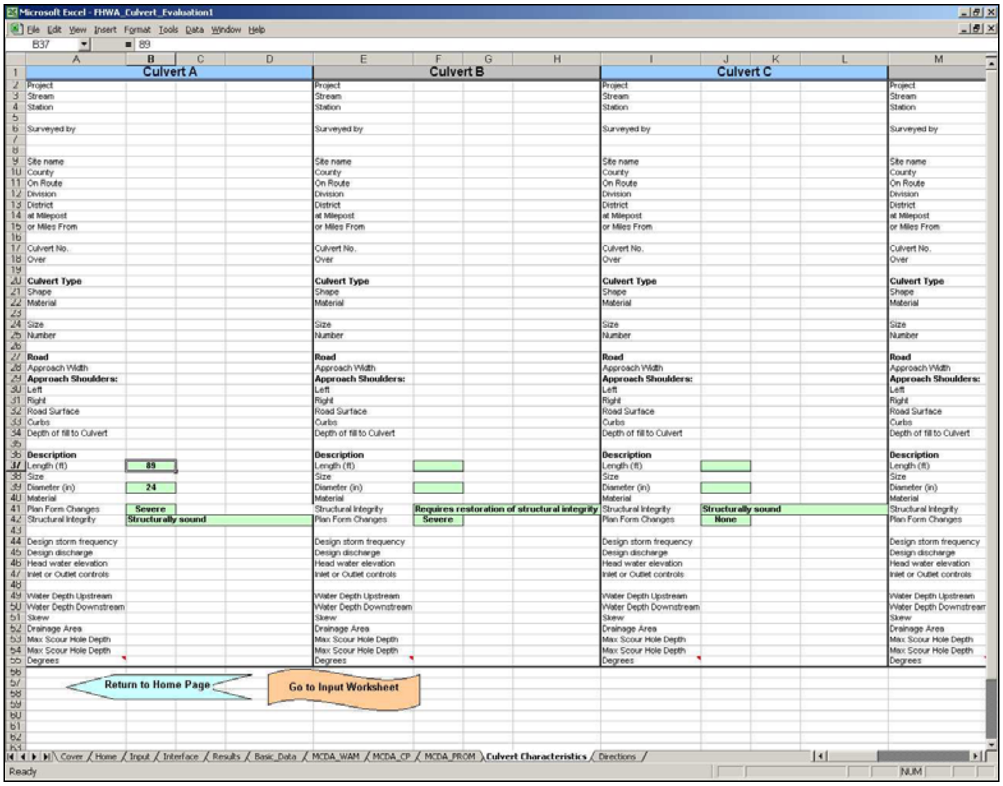

Figure 39. Screenshot. Input Worksheet for Coquitlam Improvements Project.

Next, the Inputs worksheet was selected. Culvert A was chosen in the dropdown box.

Determine Relative Importance Factors

Relative Importance factors were entered into the columns labeled G1 through G3 in the Interface worksheet. Details specific to the criteria outlined in the MCDA were not available from the article; therefore, relative importance factors were theorized for three (3) scenarios. In the first scenario, all criteria were of equal significance in ranking of relative importance factors. A subjective interpretation of relative importance factors for the case study details presented above was inputted into the column labeled G2 for the second scenario. In the second scenario, avoidance of flow bypass was given a high priority. This scenario was intended to represent the residents' preferences and the potential disputation bypass of the flow could create in day-to-day life. A variation of the relative importance factors used in the second scenario was entered for the third scenario. In the third scenario, cost of the project was given a highest priority, intending to represent the preferences of the decision makers for the City. Alternative weight was initially determined using the Weighted Average Method. Figure 40 presents a screenshot of the Interface worksheet with the fore-mentioned relative importance factor scenarios and selection of the Weighted Average Method for determination of alternative ranking.

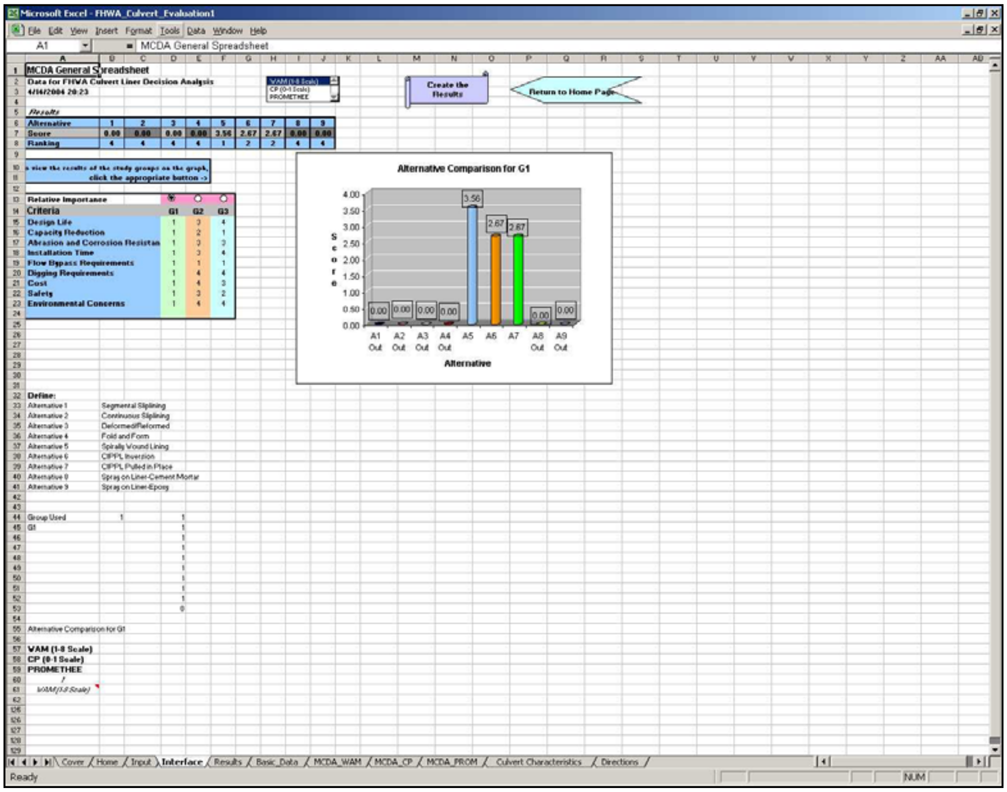

Figure 40. Screenshot. Interface Worksheet with Relative Importance Factors.

View Results

Clicking on the “Create the Results” button saved the results of the three (3) relative importance factor scenarios to the Results worksheet. Figure 41 illustrates the Results worksheets, with the alternative-ranking outcome from the previously presented relative importance factors.