# Testing

## Operational Testing

As the app relies upon data input from a text file as well as from the user, the following actions should be tried with the expected outcome:

**Case 1**: File name is incorrectly entered or the input file does not exist.

Description: The app expects an input file named inputFile.csv to exist containing the material name and the corresponding roughness value. In this test case, such a file will not be provided to the application and the observation in this scenario will be taken.

Expected output: The app should terminate after displaying a suitable error message.

**Case 2**: The input file doesn't contain 5 lines.

Description: The app expects the input file to contain 5 lines. In this test case, the input file will have less than 5 lines and the observation in this scenario will be taken.

Expected output: The app should terminate after displaying a suitable error message.

**Case 3**: The input file is not in the proper format.

Description: The app expects the input file to be in comma separated format. There shouldn't be any space before and after the comma as well. In this test case, the input file will not be following this specification and the observation in this scenario will be taken.

Expected output: The app should terminate after displaying a suitable error message.

**Case 4**: Any of the values input by the user is negative.

Description: The app taken the values of width, depth, rise and run of the channel via input from the user. The app expects these values to be positive numbers. In this test case, the values input will be negative and the observation in this scenario will be taken

Expected output: The app should display a suitable error message and given the user another chance of entering a valid value.

# Hand calculations to check result

Hand Calculations to check code output

Manning Equation → velocity $= \left(\frac{1}{n}\right) R_h^{0.67} S^{0.5}$

$R_h = \frac{A}{P}$ where $A$ = area $= b \times y$

$P$ = wetted perimeter $= b + 2y$

$S$ = bed slope $= \frac{\text{rise}}{\text{run}}$

& $n$ = Manning roughness factor

(1) let, Width = 10m.
Depth = 12m
Rise = 1m.
Run = 100m.
Material = Asphalt
$n = 0.016$

∴ Area $= 10 \times 12 = 120\ m^2$
Wetted Perimeter $= 10 + 2 \times 12 = 34$ m.

∴ $R_h = \frac{120\ m^2}{34\ m} = \frac{60}{17}\ m = 3.529$ m

$S = \frac{1\ m}{100\ m} = 0.01$

∴ velocity $= \left(\frac{1}{0.016}\right) \times (3.529)^{0.67} \times (0.01)^{0.5}$

velocity ≈ 14.55 m/s.

Flow Rate = velocity × area

∴ Flow rate for above channel = 14.55 × 120

= 1745.91 $m^3/s$

(2) Taking all the channel dimensions same as before.

Let Material = Concrete

∴ n = 0.011

$$\therefore \text{velocity} = \left(\frac{1}{0.011}\right) \times (3.529)^{0.67} \times (0.01)^{0.5}$$

velocity = 21.16 m/s.

∴ Flow rate for above channel = 21.16 × 120

= 2539.51 $m^3/s$