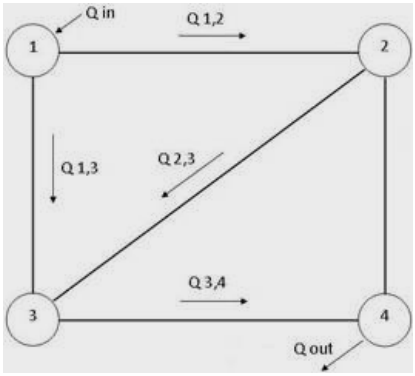
QuicKalc



Scope

QuicKalc is a simple sprinkler hydraulics estimating program that will allows modeling of sprinkler system performance of tree and grid layout sprinkler systems. The focus of the program is on estimating sprinkler performance of existing systems based on limited data.

Limitations

QuicKalc is not a full blown hydraulics program. The program is limited to calculating layouts that it generates. No editing of generated data is possible. This keeps the program interface simple and allows for some interesting flexibilities of calculations.

Disclaimer

The program uses the Hardy-Cross iterative method of calculating systems. The calculations are accurate to within .10 psi at any node. The results are considered estimates because exact systems layouts cannot be entered. The output estimates are not a substitute for an engineering analysis where detailed answers are required

Head and Line Distance - Distances can be entered as decimals (e.g. 10.5), or as feet-inches (e.g. 10-6).

Note: The quality of the calculations is totally dependent on the quality of this data.
Assuming that a system is spaced 10â€™ X 10â€™ when it is actually 10â€™-6â€ X 10â€™-6â€ can make a difference of up to 15 psi in the demand.

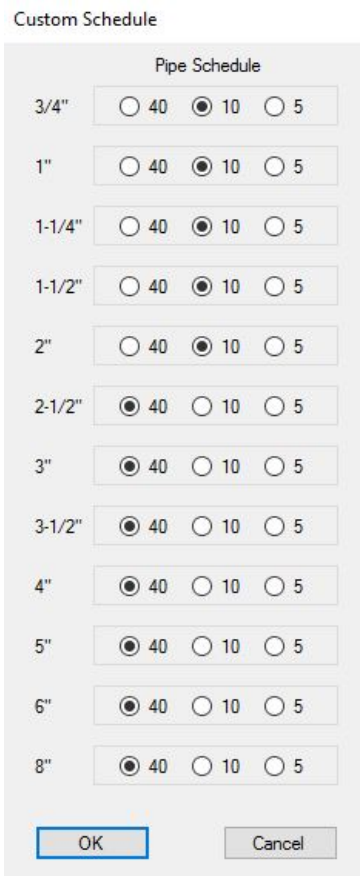
Head K Factor â€“ Enter the K factor of the sprinkler heads (e.g. 5.6, 8, 11.2, 14, 16.8, 19.2 etc).

Head Elevation â€“ Enter the elevation of the sprinkler heads above the base of riser (BOR). The elevation can be entered as decimals (e.g. 20.5), or as feet-inches (e.g. 20-6).

Pipe Schedule â€“ This should be self-explanatory except the custom option. Many modern systems use schedule 10 (thinwall) for pipes 2â€ and smaller and schedule 40 for the balance of the pipes. This is very common in grid systems. The custom option will let the user generate a system with this (or other) pipe sizing..

Nominal Diam.	.75	1	1.25	.5	2	2.5	3	3.5	4	5	6	8
Schedule 40	0.875	1.049	1.379	1.610	2.066	2.469	3.068	3.548	4.026	5.046	6.065	8.071
Schedule 10	0.000	1.097	1.442	1.682	2.157	2.634	3.259	3.759	4.260	5.295	6.356	8.248
Schedule 5	0.000	1.185	1.530	1.770	2.245	2.709	3.334	3.834	4.334	5.345	6.407	8.250

Custom Schedule - Selecting Custom Schedule on the drop down menu will bring up a dialog box that will allow you to select the pipe type for each size of pipe individually. To keep things simple only Schedule 40, Schedule 10, and Schedule 5 types are included.



Riser Nipple â€“ A riser nipple is a pipe between the cross-main and the branch line elevating the branch line above the cross-main. Enter the length and nominal diameter (grid only) of the pipe.

This is an optional entry. If the system does not incorporate riser nipples it may be left blank.

Feed Pipe â€“Feed pipe is the pipe between the area of the sprinkler system with branch lines and the Base Of Riser (BOR). This includes horizontal feed pipe and the system riser.

Lengths for 4", 5", 6" and 8" pipes can be entered. Enter the length as a decimal (e.g. 40.5), or as feet-inches (e.g. 40-6).

Add any pipe fitting combination from the adjacent drop down menus to complete the entry.

At least one length of pipe must be entered for the program to calculate.

Fittings â€“ Use the drop down menus to add/delete fittings for the feed pipe and riser.

Tree â€“ Layout Schedule â€“Select the NFPA layout schedule of the system. Below are the schedules built into the program. For example a 3" nominal diameter pipe in an ordinary hazard system can supply 40 sprinkler heads.

Nominal Diam.	.75	1	1.25	.5	2	2.5	3	3.5	4	5	6	8
Sched. 1905	1	2	3	5	10	20	36	55	80	140	200	200
Sched. 1940	0	2	3	5	10	20	40	65	100	160	250	250
Light Hazard	0	2	3	5	10	30	60	100	400	400	400	400
Ordinary Hazard	0	2	3	5	10	20	40	65	100	160	275	400
Extra Hazard	0	1	2	5	8	15	27	40	55	90	150	150

Tree - Heads Left/Right Side â€“Enter the number of heads on the branch line. This entry is total heads, the program will decide which heads to open.

If the system is a side feed system only one side head count need be entered.

Grid â€“ Far/Near/Branch/Riser Nipple Diameter â€“ Enter the nominal diameter of the pipe. The actual diameter will be, indexed from the Pipe Schedule, used in the calculations.

Grid â€“ Heads per Branch â€“ Enter the total heads on a branch line. Do not try to figure out how many heads are open on a line, the program will select which heads to open and peak the calculations.

Grid â€“ Entry â€“ Enter the branch line number where the feed pipe connects to the grid.

The program numbers branch lines, starting at the furthest line in the design area, with Zero (0). The furthest branch line from the design area is numbered one less than the branch line count (i.e. the furthest branch line in a system with 10 branches would be number 9).

If you leave this entry blank the program will default to the furthest branch line.

Grid â€“ ESFR Layout â€“ â€“ Checking this will force the program to layout the system with 3 lines of 4 open heads each.

Water Supply â€“ This is an optional entry. If you enter the data the program will compare the demand to the supply.

The program will accept a two point water supply (hydrant test), or a three point water supply (fire/booster pump test).

Calculations â€“ â€“ the program will return a calculated demand, and if a water supply is entered it will estimate the the intersection of the supply and demand curves.

System Demand Calculations
System calculated to an end head pressure of 15.00 psi @ 2000 sf
Demand 644.30 gpm @ 46.29 psi
Available 644.30 gpm @ 70.42 psi
Safety Factor of 24.13 psi

System Performance Estimates
There is 786.85 gpm @ 62.55 psi available for sprinklers disregarding the hose allowance. This yields an end head pressure of 17.44 gpm/sf (116%) of the design pressure.
There is 698.13 gpm @ 52.07 psi available for sprinklers with a 250 gpm hose allowance. This yields an end head pressure of 15.91 gpm/sf (106%) of the design pressure.

Pipes/Nodes/Flows â€“ â€“ Views are available for the specifics of the calculations. Customize the available views by selecting [View] on the menu, and checking the desired view tabs.

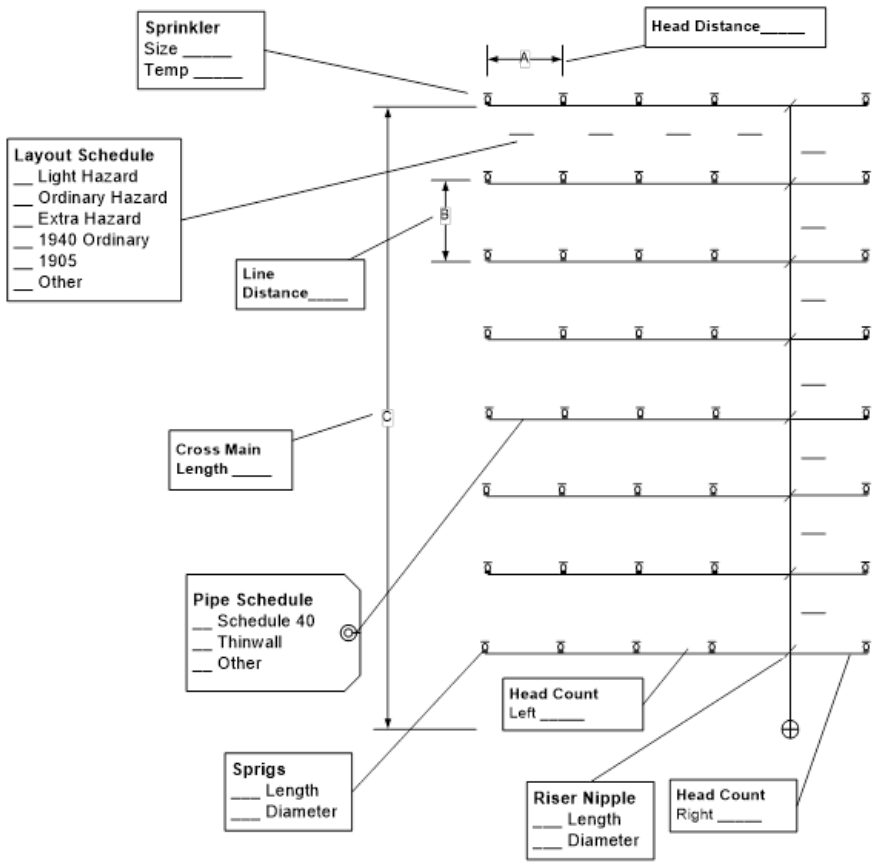
The visible view can be copied to the clipboard by clicking on [Edit][Copy] on the menu.

Editing the data on these viewtabs will NOT change data used in the calculations.

File Saves **â€“** The default file save format (HXDAT) saves the sprinkler system configuration information, the design information, and the water supply. It is basically a snapshot of the entered data. From this Hardy-Cross can regenerate the system and calculate.

File Exports **â€“** This option format (HXRAW) will save the raw sprinkler node, and sprinkler pipe data as well as the generated route and loop data. It does not save configuration data like head distance, line count etc. It also does not save water supply information or design densities. It can be imported back into the program and calculated, but only using the "end head pressure" method. It is not recommended for normal saves.

Hardy-Cross



Customer:_____

Location:_____

Address:_____

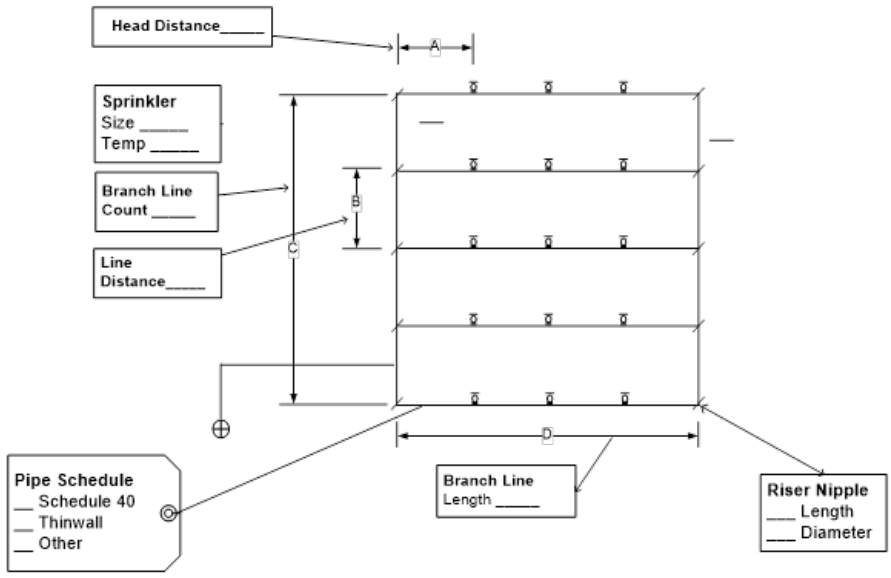
Date:_____

By:_____

Feed, Riser and Underground Pipe

Diameter	Length	C Factor	Fittings

Hardy-Cross



Customer:_____

Location:_____

Address:_____

Date:_____

By:_____

Feed, Riser and Underground Pipe

Diameter	Length	C Factor	Fittings

FAQ

How accurate are the calculations? *The calculations are accurate to within NFPA 13 requirements. However the system generation routines produce generic systems that may not match the details of field conditions (varying head spacing, extra fittings, backflow preventers, etc). Therefor the answers should be considered estimates not hydraulic calculations.*

Why don't you include better system generation routines to increase the accuracy of the calculations? *To get any meaningful increase in accuracy would require considerably more user input and complexity. QuicKalc/Hardy-Cross is not a hydraulics program. The level of data entry provided is in line with scope of the program.*

Why don't you allow the user to edit the generated system data? *The Hardy-Cross method of calculations requires an immense amount of properly formatted data. Any mistake in the data entry will cause the program to hang up when calculating. To allow data editing would require the program to do extensive data verification (and considerable documentation). I was not interested in adding that level of complexity to the program. (see next question for a way of doing it manually)*

What is the purpose of Import/Export files? *This file format option is found in the File Save and File Open dialog boxes. The Raw data file is a text file with just the information that the calculation routine needs to calculate. This data can be edited in a text editor (Notepad), imported back into the program and calculated. Not for the faint of heart to say the least.*

Why don't you provide the source code and let users add their own edit routines? *Well, I kind of do. The source code for the Hardy-Cross calculations is available for free on my website. Anyone is welcome to it and they can put their own interface on it. I know it is a bit more work, but it is free!*

Sprinkler Riser â€“The sprinkler riser is the vertical pipe between the cross main and the floor.

Enter a nominal diameter, and length. Enter the length as a decimal (e.g. 40.5), or as feet-inches (e.g. 40-6).

Select any pipe fitting combination from the adjacent drop down menu to complete the entry.

Branch Line Count â€“ Enter the total number of branch lines connected to the cross-main. In a tree system enter the number from the end of the system to the riser connection. In a grid system enter the total number of branch lines. Note: In a center feed system both sides of the branch line count as one branch line.