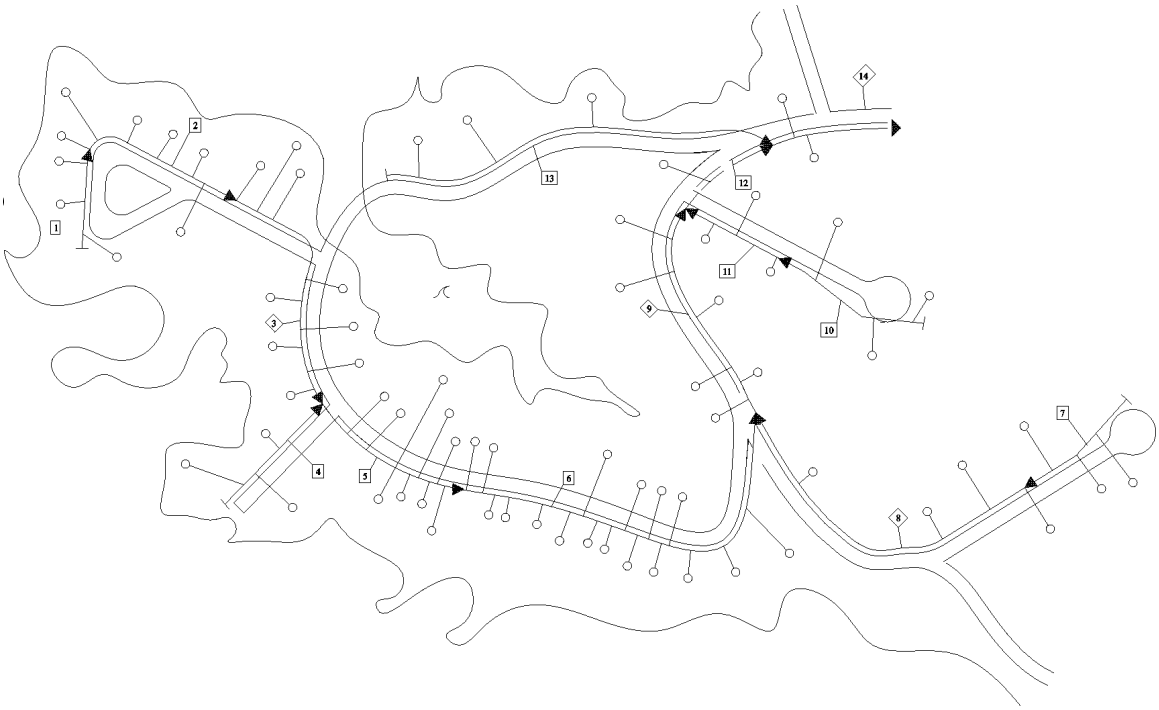
Low Pressure Sewer System Design Assistant 9.0



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ENVIRONMENT ONE LPSS DESIGN ASSISTANT Version 9.0

INTRODUCTION

Environment One is pleased to provide you with the most recent version of our Design Assistant software. As a service to our customers, Environment One continues to provide this software, coupled with support from our Design Center, as a tool to help design Environment One low pressure sewer systems. As a show of commitment, we continually work to improve this service. With new features and a more user friendly interface, our latest version of Design Assistant exemplifies that commitment.

We hope this user's manual will provide easy instruction for both those familiar with previous versions of Design Assistant, and those using it for the first time. If you have any questions or comments, please contact your local E/One grinder pump distributor or the Environment One Design Center at eone@eone.com or by phone at 518-346-6161. Design Assistant is a Microsoft® Windows® application and works with Windows Vista, Windows 7 and Windows 8. It requires the Microsoft .Net Framework version 4.0, which will be installed at setup time if needed.

Design Assistant computations are based on the Hazen-Williams formula for friction loss. Using cross-sectional area and flow rate, pipe sizes are selected that create "self-cleaning" flow velocities of 2.00 fps (0.61 lps) or higher, while limiting head to 185 feet (56 meters). Pipe sizes are based on the I.D. of the pipe type selected. A "C" factor of 150 (recommended by the Plastic Pipe Institute and pipe manufacturers) is used, but may be adjusted.

MINIMUM SYSTEM REQUIREMENTS

Design Assistant is a Microsoft® Windows®-based program. If you are not a Windows® user, familiarize yourself with Windows®-based conventions before using Design Assistant. This will ensure that you experience the highest degree of satisfaction when using Design Assistant. In addition, you must be sure that your computer meets the following minimum requirements:

- A PC that meets the minimum requirements for your version of Windows
- Windows Vista, Windows 7 or Windows 8
- A hard drive with at least 10 megabytes of uncompressed space
- A CD-ROM drive (if installing Design Assistant from a CD)
- VGA or higher resolution graphics card and monitor
- Mouse

Additional processor speed and memory will improve the speed of the program significantly.

INSTALLING DESIGN ASSISTANT

1. Insert the CD into your CD-ROM drive. The program will start automatically if auto-play is enabled.
2. If auto-play is disabled or the program fails to load automatically, click **Start**, **Run**. Type **D:\EONE.exe** in the box and press **Enter**. Substitute your CD-ROM drive letter if "D" is not your CD-ROM drive.
3. Follow the on-screen instructions. An **EONE** icon will be added to your **Programs** menu after installation is complete.

GETTING STARTED

Click the EONE icon located on the **Programs** menu to launch the program. A splash screen will display while the program loads. Project Information is the default page on starting the program.

Placing your mouse cursor over any of the icons at the top of the page reveals a description of that icon. The following is a description of the icons and keyboard shortcuts:

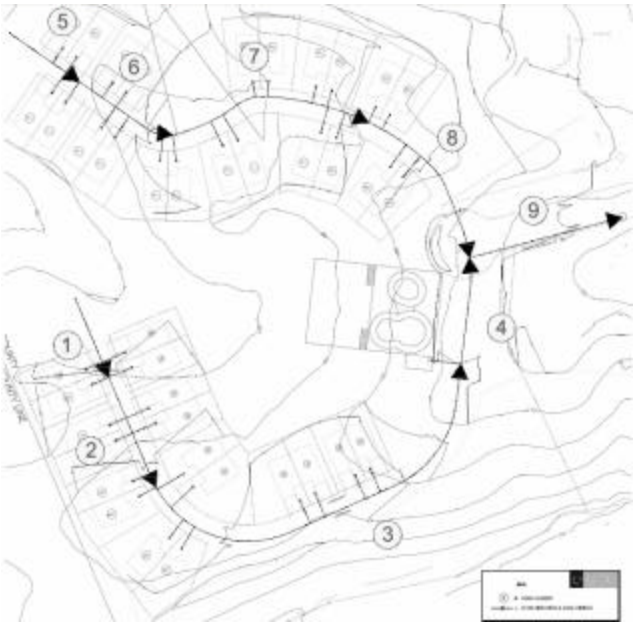
New Ctrl + N	Open Ctrl + O	Save Ctrl + S	Project Inf. Ctrl + J
Design Ctrl + D	Cost info.	Reports Ctrl + R	Edit price description

BEGINNING YOUR DESIGN

SYSTEM LAYOUT

Before using Design Assistant, a preliminary sketch of the entire pressure sewer system should be overlaid onto the drawing you are referencing for the project (Figure 1). This can be done by hand or electronically in AutoCAD or other drawing program.

Figure 1



Begin by *drawing the force main*. Generally, it is best to follow the most direct routes possible from the extremities of the system to the discharge end. It is also advantageous to choose routes that avoid extremes of elevation; e.g., it may make more sense to go around a peak than to go over it, even if the distance is longer. Note: It is important that "loops" are not drawn into the system, as they lead to unpredictable and uneven distribution of flow.

Next, *draw the lateral pipes* that connect each pump to the main. Approximate location of pumps and laterals is sufficient. Once the main and laterals are drawn, it is necessary to *divide the system into "zones"* per the instructions in Zone Designations below. Once the specific zones have been determined, *draw zone arrows* pointing in the direction of flow wherever a zone ends and another begins. Lastly, *draw zone numbers* that clearly identify every zone.

ZONE DESIGNATIONS

The LPS system illustrated in Figure 1 contains 41 pumps and is divided into nine individually numbered hydraulic zones. Zone divisions are indicated wherever the design flow rate within the system increases, due either to the accumulation of connections (Zones 1 through 4 and 5 through 8), or by a converging of branches (Zone 9). Thus delineated, the design program is able to assign pipe sizes by zone, as well as providing to the system designer the ability to change pipe sizes by zone in order to "optimize" or improve the hydraulic character of a zone or the system as a whole. Proper zone division also yields the most accurate flow calculations and enables pipe size selection that bring velocity, static head, and dynamic head losses to within design criteria.

Simultaneous Operations Table

The Simultaneous Operations table is the key component to the determination of design flow rates and zone division. It was initially developed after careful analysis of more than 58,000 pump events over a 307-day period during an early research and development project. The table was then extended for larger systems by linear extrapolation using data from ASCE national studies. The validity of this table has since been confirmed by the reliable operation of thousands of large and small LPS systems, domestic and international, for more than 35 years.

Referring to the Simultaneous Operations table, the left-hand column indicates quantities of grinder pumps as they accumulate along the route of a pressure sewer system, while the right-hand column indicates the daily maximum number of grinder pumps that will operate simultaneously per the quantity connected. For example, if a total of two or three pumps are connected, a maximum of two pumps can be expected to operate simultaneously on a daily basis. If between 31 and 50 pumps are connected, a maximum of six pumps can be expected to operate simultaneously, and so on.

Using Figure 1, the actual exercise of assigning zones is systematic. A zone continues until the accumulating number of pumps reaches a quantity that is sufficient to increase the maximum number of pumps in simultaneous operation by one, i.e., until the predicted maximum flow rate increases by the addition of a single pump's average discharge rate of 11 gpm (.69 lps). Referring to the Simultaneous Operations table, with one pump connected, the maximum number of pumps operating simultaneously is one, at 11 gpm (.69 lps). When the second pump is connected, the number of simultaneous operations increases to two, again at 11gpm (.69 lps) each, so 2 x 11gpm = 22 gpm (2 x .69 lps = 1.38 lps).

Number of Grinder Pump Cores Connected	Maximum Daily Number of Grinder Pump Cores Operating Simultaneously
1	1
2-3	2
4-9	3
10-18	4
19-30	5
31-50	6
51-80	7
81-113	8
114-146	9
147-179	10
180-212	11
213-245	12
246-278	13
279-311	14
312-344	15
345-377	16
378-410	17
411-443	18
444-476	19
477-509	20
510-542	21
543-575	22
576-608	23
609-641	24
642-674	25
675-707	26
708-740	27
741-773	28
774-806	29
807-839	30
840-872	31
873-905	32
906-938	33
939-971	34
972-1,004	35

After the fourth pump is connected, the number of simultaneous operations again increases. This increase is again multiplied by our pump's average flow rate to obtain the maximum flow for the section of pipe (33 gpm/2.07 lps).

To be practical, rather than start each zone with one pump, E/One recommends that each branch beginning consist of the first three pumps. Otherwise, the program may indicate a pipe size change at the point where the second pump ties in, which is often very close to the first pump. Zones 1 and 5 in Figure 1 illustrate this.

Examples of zone splits according to simultaneous operations are also shown in Figure 1; see Zones 1, 2 and 3. Each of these zones in the southern branch is split due to an increase in simultaneous operations. Zone 1 has three pumps, which on the table at right means that a maximum of two pumps will operate simultaneously. Zone 2 has six pumps connected to it, bringing the accumulated number of pumps for the zone to nine (3 from Zone 1 + 6 from Zone 2 = 9 accumulated) and increasing the maximum number of simultaneous operations to three. Zone 3 has nine pumps connected, bringing the accumulated number of pumps to 18 and again increasing the maximum number of simultaneous operations, this time to four.

Please note that the number of accumulated pumps in a zone includes all pumps that will pump through or discharge into a certain section of pipe. This can include flow from separate branches. For example, the number of accumulated pumps in Zone 9 (Figure 1) is 41 — 22 connections from the northern section and 19 connections from the southern.

Intersections

Any place where two or more independent sections of main join, or where the outfall is reached, also constitutes a zone division. Examples of these instances in Figure 1 are the intersection where Zones 8 and 4 meet, and the outfall (manhole) at the end of Zone 9.

Completion of Pipe Schedule and Branch Analysis

The elevation of the lowest-lying pump in each zone should be recorded and used in the final determination of static head loss. Since Environment One grinder pumps are semi-positive displacement and relatively insensitive to changes in head, precisely surveyed profiles are unnecessary. Elevation accuracy within 10 feet is generally sufficient.

The data recorded on the System Flow Diagram (Figure 1 is then transferred to a take-off sheet on page 5) as follows:

Take-off sheet column	Designation
1	Zone
2	Connects to Zone (next downstream zone)**
3	Pumps in Zone (alternating panel duplex counts as 1)
4	GPD/LPD
5	Zone Length
6	Max Elevation
7	Lowest Pump Elevation

**If the zone is the final zone (see Zone 9, Figure 1), then the zone is designated as connecting to itself.

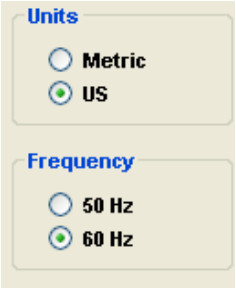
JOB: Figure 1 Example					DATE:	
ZONE	CONNECTS TO ZONE	PUMPS IN ZONE	GPD/ LPD	ZONE LENGTH	MAX ELEVATION	LOWEST PUMP ELEVATION
1	2	3	200	125	130	80
2	3	6	200	176	130	80
3	4	9	200	615	130	90
4	9	1	200	157	130	110
5	6	3	200	126	130	70
6	7	6	200	161	130	70
7	8	9	200	309	130	80
8	9	4	200	261	130	90
9	9	0	200	233	130	110

To complete the hydraulic analysis, refer to the drawing contours and record in Column 6 the maximum force main elevation between the point of discharge and the zone under consideration (high point can be in downstream zones). In Column 7, record the elevation of the lowest pump in the zone. When you have recorded all the data from the drawing to the take-off sheet, you are ready to enter that data into Design Assistant.

PROJECT INFORMATION

Here you can input all relevant information about the project. Press the **Tab** key to navigate through the boxes. The **Project Name** and **Prepared By** information will be printed on the top of Design Pages 1 and 2 for reference. The entire contents of the Project Information screen as well as the Notes section are printable.

Units/Frequency



If you are familiar with our previous Design Assistant software, you will notice a new feature added to this page. On the lower left-hand corner of the screen, you will see a set of radio buttons to choose what type of measurement you wish to use, US (imperial) or Metric, and the Frequency (50/60 Hz) of your power source.

Please note that after a design is started, you can not change the units of measure for that project.

Save your project after entering all project data. After entering all of the Project Information and saving your file, click the **Design** icon located at the top of the screen to go to the Design Information screen.

DESIGN INFORMATION

This is where you will enter the data for your project. Note that navigation is set up with tabs at the top of the screen. Do not click on the Design Page 1 or 2 until you have completely entered all of your zone information; an error may occur if you begin calculations prior to entering all information.

ZONE INFORMATION

There are eight rows of required information:

1. Zone Number
2. Connects to Zone
3. Pumps in Zone
4. Max Flow per Pump
5. GPD/LPD per Dwelling
6. Zone Length
7. Main Elev. (Max)
8. Pump Elev. (Min)

The data entered on this page should be collected from construction drawings for the project as outlined in pages 2 through 4.

Entering Data

After entering data, use the **Tab** key or **right arrow** key to proceed to the next row. The **max flow per pump** and **gpd/lpd** will automatically populate with the default value when tabbing through.

Pipe type choices are available and displayed when clicking on the pull-down menu at the top of the screen. Your selection should be displayed.

The “C” factor is user-adjustable. You can change this value as you did with the pipe type or by highlighting the value and entering a new value.

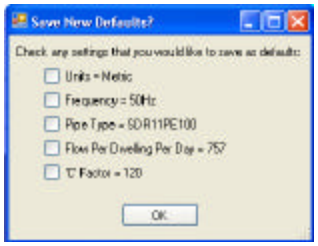
The GPD/LPD per dwelling value is also user-adjustable and will automatically update values. For example, if you completed your design with the default value of 200 GPD and discovered that the project requires 300 GPD, changing this default to 300 GPD will automatically change all 200 GPD values to 300 GPD.

Initial Defaults

	US	**Metric**
C-Factor	150	150
Pipe type	SDR 21 PVC	SDR 11 PE 100
Flow	200 GPD	757 LPD
Frequency	60 Hz	60 Hz

To adjust any default, click on the current value and use the pull-down menu or enter new default values.

Changing Initial Default Values



After you change the default values to specific values for your project, you may choose to use these values as initial default values for all projects. If you wish to save the new default values for all new projects, save the project and the **Save New Defaults?** screen will appear. Select which new default values you want to appear in future projects by clicking on the corresponding box. If you do not want to save any new defaults, do not select any boxes and all previous defaults will remain.

When you have entered the project data, click on the Design Page 1 tab. This will automatically start the calculations and load the Design Page 1 screen.

DESIGN PAGE 1: Pipe Sizing & Branch Analysis

You will see an analysis in a spreadsheet format on this page. Eighteen columns are displayed:

1. Zone Number
2. Connects to Zone
3. Number of Pumps in Zone
4. Accumulated Pumps in Zone
5. GPD/LPD per pump
6. Maximum Flow per Pump (GPM/LPS)
7. Maximum Simultaneous Operations
8. Maximum Flow (GPM/LPS)
9. Pipe Size (in/mm)
10. Maximum Velocity (FPS/MPS)
11. Length of Main this Zone (ft/m)
12. Friction Loss Factor (ft/100 ft. / m/100m)
13. Friction Loss this Zone (ft/m)
14. Accumulated Friction Loss (ft/m)
15. Maximum Main Elevation (ft/m)
16. Minimum Pump Elevation (ft/m)
17. Static Head (ft/m)
18. Total Dynamic Head (ft/m)

Zone Number: An individual pipe/section of the system. This is a user entry can only be changed on the “Zone Information” tab.

Connects to Zone: The downstream pipe or zone that the current zone connects to. This user entry can only be changed in the “Zone Information” tab.

Number of Pumps in Zone: Number of grinder pump cores (from zero to 33) in the current zone. Remember that duplex stations with an alternating panel (typical) count as one pump. This user entry may be changed on this page. **Note:** Any zone with zero cores must have flow through it from an upstream source.

Accumulated Pumps in Zone: Total number of grinder pump cores connected upstream of and including those in the current zone. Design Assistant makes this summation.

GPD/LPD per Pump: The average daily flow that the unit will have to pump. Default value is 200 GPD (757 LPD), but this value may be modified. This user entry may be changed on this tab.

Maximum Flow per Pump (GPM/LPS): The average flow rate from each pump default is 11 gpm (.69 lps). This value automatically populates when tabbing past the cell, but may be changed. This is user entry can only be changed on the "Zone Information" tab.

Maximum # of Simultaneous Operations: Based on the accumulated number of grinder pump cores flowing through the zone, it is the maximum number of grinder pumps expected to operate simultaneously up to that point in the system.

Maximum Flow (GPM/LPS): The maximum rate of flow (or "design flow rate") through the current zone. It is the product of the maximum number of grinder pumps expected to be operating simultaneously and the flow rate per pump. 11 gpm (.69 lps) is the default value representing an average flow rate from E/One's Grinder Pump Performance Curve. Design Assistant makes this calculation.

Pipe Size (in/mm): The nominal size of the pipe type selected. The program chooses the largest diameter that will result in self-cleaning flow velocities of 2.00 fps (.61 mps) or higher.

The program uses the I.D. for the pipe type selected. You can change the pipe size in any zone by clicking on the drop-down menu that appears in the pipe size field. Available pipe size choices will display. Calculations will begin immediately, allowing you to view the effect on the hydraulics. If you wish to return to the default pipe size(s) — you may have changed the pipe size in several zones — click on the "Reset Pipe Sizes" located above and to the right of the Design Page 1 tab.

Maximum Velocity (FPS/MPS): The velocity occurring during the maximum flow rate. Design Assistant makes this calculation. **Note:** The Maximum Velocity cell will be highlighted in red whenever the velocities drop below 2.00 fps (0.61 mps).

Length of Main this Zone: The length of the current zone in feet or meters. This user entry may be changed of this page.

Friction Loss Factor (ft/100 ft. / m/100m): The head loss due to friction per 100 ft or 100 m of the current zone's pipe. This calculation is based on the "C" factor, the pipe I.D. and the maximum flow rate through the current zone. Design Assistant makes this calculation using the Hazen-Williams formula for friction loss.

Friction Loss this Zone: Calculated by multiplying the length of a zone by its friction loss factor. Design Assistant makes this calculation.

Accumulated Friction Loss (Feet/Meters): This is the sum of the friction losses of all zones downstream of and including the current zone. Design Assistant makes this calculation.

Maximum Main Elevation: The highest elevation between the current zone and the discharge point. This user entry may be changed on this tab.

Minimum Pump Elevation: The lowest pump elevation of the current zone. This user entry may be changed on this tab.

Static Head (Feet/Meters): The difference in elevation between the highest point (Max. Main) and the lowest pump (Min. Pump) elevation. Design Assistant makes this calculation.

Total Dynamic Head (ft/m): Sum of the Static Head and Accumulated Friction Loss for each zone. This is the highest discharge pressure a pump in the current zone will experience during daily operation. **Note:** The cell will be highlighted in red if the value exceeds 185 feet (56 meters).

DESIGN PAGE 2 – Accumulated retention time

Click on the Design Page 2 tab. This will bring you to Design Page 2, Accumulated Retention Time Page(s). The analysis is in a spreadsheet format on this page. Eleven columns are displayed:

1. Zone number
2. Connects to zone
3. Accumulated total of pumps this zone
4. Pipe size (in/mm)
5. Gallons/Liters per 100 lineal feet/meters
6. Length of zone
7. Capacity of Zone (gal/l)
8. Average daily flow (gal/l)
9. Average fluid changes per day
10. Average retention time (hour)
11. Accumulated retention time (hour)

Zone Number: See Design Page 1

Connects to Zone: See Design Page 1

Accumulated Total of Pumps this Zone: See Design Page 1

Pipe Size (in/mm): See Design Page 1

(Gallons/Liters) per 100 lineal (feet/meters): Total volume 100 linear (feet/meters) of the current zone's pipe will hold.

Length of Zone: See Design Page 1

Capacity of Zone: Product of 100 (foot/meter) sections of the current zone and the (Gal/liters) per 100 linear (feet/meters). Design Assistant makes this calculation.

Average Daily Flow: Accumulation of all flow pumped through the current section of pipe. Design Assistant makes this calculation.

Average Fluid Changes per Day: Average daily flow divided by the capacity of zone. Design Assistant makes this calculation.

Average Retention Time (Hour): The average length of time it will take wastewater to pass through the zone. It is 24 (hrs/day) divided by the Average fluid changes per day. Design Assistant makes this calculation.

Accumulated Retention Time (Hour): The sum of the Average Retention times of all zones downstream of and including the current zone. Design Assistant makes this calculation.

PRELIMINARY PRESSURE SEWER - PIPE SIZING AND BRANCH ANALYSIS

Prepared By: Figure #1 Example

LPS Design Center

January 29,2008

Zone Number	Connects to Zone	Number of Pumps in Zone	Accum Pumps in Zone	Gal/Day per Pump	Max Flow per Pump (gpm)	Max Sim Ops	Max Flow (GPM)	Pipe Size (Inces)	Max Velocity (FPS)	Length of Main this Zone	Friction Loss Factor (ft/100ft)	Friction Loss this Zone	Accumulated Friction Loss (Feet)	Max Main Elevation	Minimum Pump Elevation	Static Head (Feet)	Total Dynamic Head (ft)
This spreadsheet was calculated using pipe diamters for: SDR21PVC										Friction loss calculations were based on a Constant for inside roughness 150							
1.00	2.00	3	3	200.00	11.00	2	22.00	1.50	3.04	125.00	2.15	2.69	29.79	130.00	80.00	50.00	79.79
2.00	3.00	6	9	200.00	11.00	3	33.00	2.00	2.92	176.00	1.54	2.72	27.10	130.00	80.00	50.00	77.10
3.00	4.00	9	18	200.00	11.00	4	44.00	2.00	3.89	615.00	2.63	16.17	24.68	130.00	90.00	40.00	64.38
4.00	9.00	1	19	200.00	11.00	5	55.00	2.00	4.86	157.00	3.97	6.24	8.21	130.00	110.00	20.00	28.21
5.00	6.00	3	3	200.00	11.00	2	22.00	1.50	3.04	126.00	2.15	2.71	25.65	130.00	70.00	60.00	85.65
6.00	7.00	6	9	200.00	11.00	3	33.00	2.00	2.92	161.00	1.54	2.48	22.94	130.00	70.00	60.00	82.94
7.00	8.00	9	18	200.00	11.00	4	44.00	2.00	3.89	309.00	2.63	8.12	20.46	130.00	80.00	50.00	70.46
8.00	9.00	4	22	200.00	11.00	5	55.00	2.00	4.86	261.00	3.97	10.37	12.34	130.00	90.00	40.00	52.34
9.00	9.00	0	41	200.00	11.00	6	66.00	3.00	2.69	233.00	0.85	1.97	1.97	130.00	110.00	20.00	21.97

Note: This analysis is valid only with the use of progressive cavity type grinder pumps as manufactured by Environment One.

PRELIMINARY PRESSURE SEWER - ACCUMULATED RENTENTION TIME (HR)

Prepared By: Figure #1 Example

LPS Design Center January 29, 2008

Zone Number	Connects to Zone	Accumulated Total Pumps this Zone	Pipe Size (in.)	Gallons per 100 Lineal Feet	Length of Zone	Capacity of Zone	Average Daily Flow	Average Fluid Changes per Day	Average Retention Time (Hr)	Accumulated Retention Time (Hr)
This spreadsheet was calculated using pipe diameters for: SDR21PVC										
1.00	2.00	3	1.50	12.07	125.00	15.09	600	39.77	0.60	2.28
2.00	3.00	9	2.00	18.84	176.00	33.16	1,800	54.28	0.44	1.68
3.00	4.00	18	2.00	18.84	615.00	115.88	3,600	31.07	0.77	1.24
4.00	9.00	19	2.00	18.84	157.00	29.58	3,800	128.45	0.19	0.47
5.00	6.00	3	1.50	12.07	126.00	15.21	600	39.45	0.61	1.95
6.00	7.00	9	2.00	18.84	161.00	30.34	1,800	59.33	0.40	1.34
7.00	8.00	18	2.00	18.84	309.00	58.22	3,600	61.83	0.39	0.94
8.00	9.00	22	2.00	18.84	261.00	49.18	4,400	89.47	0.27	0.55
9.00	9.00	41	3.00	40.90	233.00	95.29	8,200	86.06	0.28	0.28

Note: This analysis is valid only with the use of progressive cavity type grinder pumps as manufactured by Environment One

DESIGN REVIEW

The system characteristics displayed on the design pages should be reviewed for conformity with the criteria of flow velocity greater than or equal to 2.00 ft/s (.61 m/s) and less than 6.00 ft/s (1.83 m/s) and total dynamic head (TDH) of less than or equal to 185 ft (56 m).

Data should also be reviewed to determine whether system improvements could result from construction modifications. For example, deeper burial of pipe in one or two critical high elevation braches might bring the entire system into compliance with design criteria. Environment One should be consulted in marginal cases, and/or concerning:

- Odor control issues
- Frost protection issues
- High total dynamic head conditions (greater than 185 ft/56 m)
- Unusual applications

Air Release & Vacuum Relief Valves

Air release valves permit the release of air and/or gas from a pressurized sewer system. Air or gas pockets collecting at the high points of a system displace usable pipe cross-section. As the cross-section of the pipe artificially decreases, the pump experiences increased resistance to its ability to force liquid through the pipe (friction losses are greater).

Air release valves and combination air/vacuum valves prevent the concentration of air at the high points of a system. This is accomplished by exhausting large quantities of air when the system is filled initially, and also by releasing pockets of air as they accumulate during normal operation. Air/vacuum valves and vacuum relief valves also help to prevent a potentially destructive vacuum from forming in systems with long descending runs. **Note:** Environment One systems have built-in vacuum relief provided at each station by the pump's combined check- and anti-siphon valve.

Air release valves should be installed at system high points of 25 ft (7 m) or greater, at abrupt downhill changes in grade, and at intervals of 2,000 ft to 2,500 ft (609 m to 762 m) along horizontal runs that lack a clearly defined high point. Combination air/vacuum valves should be installed at high points that are followed by major downhill runs.

Note: Depending on the total dynamic head, flow velocity, and the particular system profile, air release valves and combination air/vacuum valves may or may not be necessary. The engineer should consult Environment One in cases where their necessity is in question.

Cleanout and Flushing Stations

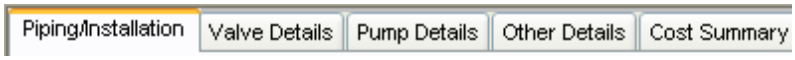
Cleanout and flushing stations should be incorporated into the pipe layout. In general, cleanouts should be installed at the beginning of branches, every 1,000 feet to 1,500 feet (305 m to 457 m) along straight runs of pipe, and at intersections.

COST INFORMATION – Budgetary low pressure sewer system cost analysis

Because installation costs vary widely from state to state, the Piping/Installation, Valve Details and Pump Details require editing in their pricing tables. See **Edit Pricing** on page 15.

Clicking on the Dollar/Cents icon opens the Cost Page.

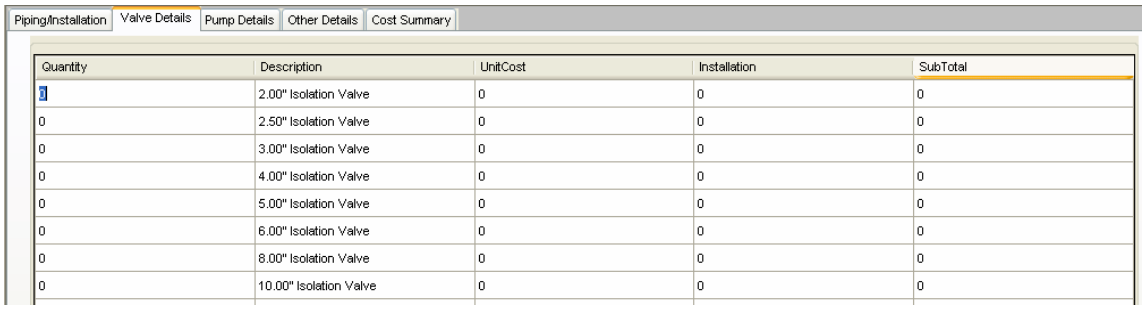
Design Assistant uses five tabs to navigate the cost analysis pages:



PIPING/INSTALLATION

No user input is required on this page. The software will automatically calculate and display the total length of each pipe size in your project. Only rows that have quantities entered will print in the final report. **Note:** Lateral pipe is not included on this page, but is included on the Pump Details page.

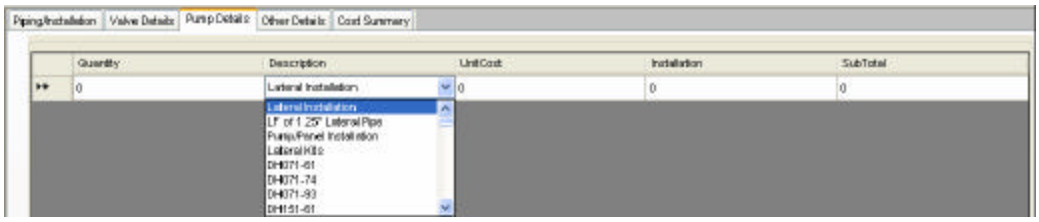
VALVE DETAILS



Quantity	Description	UnitCost	Installation	SubTotal
0	2.00" Isolation Valve	0	0	0
0	2.50" Isolation Valve	0	0	0
0	3.00" Isolation Valve	0	0	0
0	4.00" Isolation Valve	0	0	0
0	5.00" Isolation Valve	0	0	0
0	6.00" Isolation Valve	0	0	0
0	8.00" Isolation Valve	0	0	0
0	10.00" Isolation Valve	0	0	0

Determine the type and number of valves required in the system. Enter the quantity of each valve type in its respective quantity field.

PUMP DETAILS



To select a grinder pump station, first enter a quantity. Then click in the model number field and a drop down arrow will appear with every station listed in your database; scroll up or down and click on the desired model. Repeat for as many different stations as you like.

OTHER DETAILS

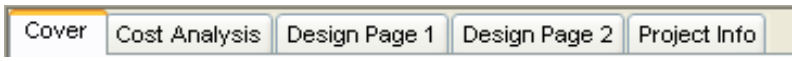
The Contractor Overhead and Contingencies are a percentage of the total LPSS project cost. Typically, 10 percent and 15 percent, respectively, are entered.

<u>REPORTS</u>

When you have completed your design and cost adjustments, you have complete control over printing. You may select to print all of the reports, or only certain reports.

Clicking the Reports icon opens a new page and gives you control over printing.

Click on any of the tabs to review individual reports. Five pages are available for printing:



- **Cover:** Takes your input from the Project Information and prints out a cover page suitable for a project report
- **Cost Analysis:** Prints all entered data from the Cost Summary
- **Design Page 1:** Prints the Pipe Sizing and Branch Analysis page(s)
- **Design Page 2:** Prints the Accumulated Retention Time page(s)
- **Project Info:** If you entered information into the NOTES section of the Project Information page, they can be reviewed and/or printed here

The control panel at the top of each report page offers several functions:

- The printer icon prints the current report page
- The arrows permit navigation back and forth though multi-page report pages
- The page with arrow icon lets you go to a specific page
- The binoculars icon is the search function
- The binoculars with plus sign is the zoom function

To print the entire report, go to **File**, **Print Reports**.

EDIT PRICING

Due to the varying nature of installation costs (frost depths, ancillary equipment, regional labor, etc.), you will need to edit the pricing database to reflect costs in your area. On the menu bar, click **Prices,** then click **Edit Prices.** This will open the **Edit Prices** page.

Pump Prices, Pipe Prices and Valve Prices

There are three tabs: Pump Prices, Pipe Prices and Valve Prices. Click on the tab to access the corresponding table. Click on the pricing field and type in the value you would like as a default. When you are finished, click **Save** and the new values will be entered into the database.

The Edit Prices page also allows you to add station models and valve types to the existing lists. Click in next blank row at the bottom of the selected list and enter the new item. Price the new item in the same manner described above.

DESIGN TIPS

For the initial calculations, Design Assistant chooses the largest pipe size for any zone that will yield a velocity of at least 2.00 fps (0.61 mps). However, with some modification, a more efficient system can be created. Reduce pipe sizes wherever possible — reduce 3.00-inch pipe to 2.00-inch, or 2.00-inch to 1.50-inch. Dong so optimizes the system by increasing velocity and decreasing retention time. It may also simplify and decrease system costs by minimizing the number of pipe size changes. It is acceptable when optimizing for Total Dynamic Head to climb as high as 185 ft (56 m), but flow velocities greater than 6.00 fps (1.83 mps) should be avoided.

AUTO CALCULATE

On large projects, keep the program from recalculating every time you change a pipe size by clicking Analysis on the menu bar. A checkmark next to Auto Calculate means that the program is in auto calculate mode. Click on Auto Calculate to remove the checkmark and change to manual mode (a calculator icon will appear).

ADDING A LIFT STATION

Design Assistant 8.0 permits the inclusion of one or more conventional lift (or pump) stations. A lift station should be included in the hydraulic analysis if:

- The low pressure sewer system discharges directly into a proposed lift station and there is an interest in determining its force main size; or

- The low pressure sewer system discharges directly into an existing force main whose source is a lift station.

LOW PRESSURE SYSTEM INTO PROPOSED LIFT STATION (LS):

Note: Auto Calculate should be turned off.

1. Enter all zone information data, treating the lift station as the discharge point (the zone pumping into the LS must pump into itself, such as “Zone 25 pumps to Zone 25”). You may calculate the system up to this point if you want to check your work.

2. Create the zone the LS pumps into. Do this on the Zone Information page as you would any other zone. This will be the force main from the LS, which may or may not be tapped into by other connections (i.e., grinder pumps). At least one core must be included in the data entry for this zone or an error will result. If this zone will only receive flow when the LS is on and has no other actual connections, add a core (imaginary) and enter zero for both “max flow per core” and “gal/day per dwelling.” Calculate again.

3. Return to the Zone Information page and click on the first field under “Lift Stations Pumping to this Zone.” Enter an abbreviated identification for the LS and tab to the next field. Enter the appropriate data or description for each field. After entering the Description, press Enter twice. Go to the next row and click in the first column under Station. The lift station you created should now be indicated in the field titled “All Lift Stations” (immediately below the Design Page 1 tab) and indicated as “OFF.”

4. Click to Design Page 1 and calculate (Auto Calculate is off, so you must click on the calculator icon). In order to turn the LS “ON,” click back to the Zone Information page and click on the red “OFF” until it turns to a green “ON.” Click back to Design Page 1 and calculate again. The flow from the LS should now be evident in the hydraulics.

Note: The LS may be turned on and off as many times as necessary when making changes to the design parameters.

LOW PRESSURE SYSTEM INTO EXISTING FORCE MAIN (FM):

1. Enter all zone information data, but include as the last zone the FM from the tie-in point of the LPS system to the discharge point. For example, if Zone 25 is the last zone of the LPS system, then it will pump into Zone 26, the FM from the tie-in point. As it is the last zone, Zone 26 must be defined as pumping to itself.

2. Follow procedures 3 and 4 above.

REMOVING DESIGN ASSISTANT

To remove Design Assistant from your hard drive:

1. Click **Start**.
2. Scroll up to **Settings**, highlight **Control Panel** and left click.
3. Double click on **Add/Remove Programs** in the Control Panel window.
4. Locate Design Assistant and left click **EONE**.
5. Click **Add/Remove Programs** and follow the on-screen instructions.

Thank you for using Environment One's Design Assistant. If you have any questions or comments, please contact us:

Tel: (518) 346-6161
Fax: (518) 346-6188
www.eone.com
eone@eone.com

JOB:

DATE:

ZONE	PUMPS TO ZONE	CORES IN ZONE	GPD	ZONE LENGTH	MAX ELEVATION	LOWEST PUMP ELEVATION

A Precision Castparts Company

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