OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT

CALCULATION COVER SHEET

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2. Calculation Title

Overall Ventilation System Flow Network Calculation for Site Recommendation

3. Document Identifier (including Revision Number)

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	Print Name	Signature	Date
6. Originator	Edward G. Thomas	Edward G. Thomas	08/02/01
7. Checker	Eric F. Loros	Eric F. Loros	08/02/2001
8. Lead	Jeff J. Steinhoff	Jeff J. Steinhoff	8/2/01

9. Remarks

The VNETPC v1.0a program setup and calculations were done by R. Jurani
A. Linden, using VULCAN V3.4, extracted portions of the input file data from the layout design as noted in the text.

This document may be affected by technical product information that requires confirmation. Any changes to the document that may occur as a result of completing the confirmation activities will be reflected in subsequent revisions. The status of the input information quality may be confirmed by review of the DIRS database.

Revision History

10. Revision No.	11. Description of Revision
00	Initial Issue

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1. PURPOSE

The scope of this calculation is to determine ventilation system resistances, pressure drops, airflows, and operating cost estimates for the Site Recommendation (SR) design as detailed in the *Site Recommendation Subsurface Layout* (BSC (Bechtel SAIC Company) 2001a). The statutory limit for emplacement of waste in Yucca Mountain is 70,000 metric tons of uranium (MTU) and is considered the base case for this report. The objective is to determine the overall repository system ventilation flow network for the monitoring phase during normal operations and to provide a basis for the system description document design descriptions. Any values derived from this calculation will not be used to support construction, fabrication, or procurement.

The work scope is identified in the *Technical Work Plan for Subsurface Design Section FY 01 Work Activities* (CRWMS M&O 2001, pp. 6 and 13). In accordance with the technical work plan this calculation was prepared in accordance with AP-3.12Q, *Calculations* and other procedures invoked by AP-3.12Q. It also incorporates the procedure AP-SI1.Q, *Software Management*.

2. METHOD

The repository layout defined in the *Site Recommendation Subsurface Layout* (BSC (Bechtel SAIC Company) 2001a) (hereafter referred to as the Subsurface Layout) provides the basis for the ventilation system airflow network. In Section 5.1.1, Figure 1 shows the 70,000 MTU repository layout (BSC (Bechtel SAIC Company) 2001a, Figure 11). In this layout the Exhaust Main has a center partition wall to isolate the warmer emplacement drift exhaust airflow from the service side airflow (BSC (Bechtel SAIC Company) 2001a, p. IV-5).

2.1 AIRFLOW NETWORK DESIGN METHOD

The primary task involved in this calculation is to utilize the qualified ventilation design program VNETPC v1.0a (hereafter referred to as VNETPC) to solve a mathematical representation of the repository ventilation network. The *Software Qualification Report for VNETPC for Windows Version 1.0a* (CRWMS M&O 1999b) details the verification and validation of the VNETPC ventilation program. The VNETPC program is a self-contained Windows based application (CRWMS M&O 1999aa) that is designed to aid the ventilation engineer in planning underground ventilation systems. In order to provide input data to the VNETPC program the ventilation engineer creates an airflow network that will graphically describe the repository as a system of branches and nodes denoting major or significant airflow routes. The nodes typically represent a physical point in the airflow network, or represent a dummy node that serves a specific use in the airflow network. Nodes may represent drift intersections, turnout/emplacement drift transitions, raise tops, raise bottoms, and the like. Dummy nodes may be used to establish a fan recirculation route, or provide a point used to improve the visual presentation of the network (necessary to prevent obliterated information).

A branch is simply the connecting line between two nodes. Each branch is unique and described by two nodes and by numerical data that indicate the characteristics of the airway. The airway characteristic data may include length, area, perimeter, and a resistance value or friction factor. The branch lengths as extracted from the *Subsurface Facility Planning Layout in Support of*

ANL-SFS-MG-000001, REV00 (CRWMS M&O 2000a). The airflow direction in a branch is described by the sequence nodes are entered into the data file; the first node defines the start point and the second node defines the end point. There is no error if the start/finish nodes are entered backward in the data file, the VNETPC program simply assigns a negative value to any airflow that is calculated as reverse of the node entry sequence.

A dummy branch may represent a surface connection, leakage path, fan recirculation path, or to assist with the visual presentation of the airflow network. Dummy branches do not contain a length, therefore no resistance (see Equation 1) is calculated. If a drift is represented by a series of branches, including a dummy branch, the actual layout distance and airway characteristics are included in one of the branches.

Fixed airflow quantity branches are used to hold a consistent airflow volume in a branch, or adjacent to the main fans to provide the airflow through the repository.

Airway friction factors are assigned per *Mine Ventilation and Air Conditioning* (Hartman et al. 1997, Table 5.1). Fan locations and characteristic curves are provided as input data (Section 5.1.3). The finished airflow network represents a closed circuit of interconnected branches. The input data file (Attachment I) contains the airway characteristic data for the airflow network and provides the basis for the VNETPC calculation. There are no unique electronic data handling requirements. Additional detail on the approach used for this calculation is included in Section 5.2.

2.2 VNETPC PROGRAM OPERATION INFORMATION

This section describes how the VNETPC program performs a network calculation. The VNETPC program allows the calculation to be made in either SI or Imperial units as described in the *VnetPC for Windows Version 1.0a Users Manual* (Mine Ventilation Services 1997, p. 5). This calculation uses SI units with Imperial unit conversions provided in Section 6, Results.

The VNETPC program calculates the normal branch resistance R ($N \cdot s^2/m^8$) using Equation 1 (Hartman et al. 1997, p. 242).

$$R = \frac{KO(l + l_e)}{A^3} \qquad \text{Equation 1}$$

Where: K= airway friction factor (dimensionless)
l = length, m
l_e = equivalent length, m
A = area, m^2
O = Perimeter, m

The VNETPC program assumes an incompressible flow and is based on Kirchoff's Laws (Mine Ventilation Services 1997, Section 2.1.1). The code utilizes an accelerated form of the Hardy Cross iterative method to converge on a numerical solution of the airflow network. Kirchoff's Laws assume an incompressible flow for which:

Law 1: The algebraic sum of the air volume entering and leaving each junction (node) equals zero.

Law 2: The algebraic sum of the pressure changes around any closed circuit equals zero considering frictional pressure losses and pressure gains caused by fans and natural ventilation.

The VNETPC code utilizes the Hardy Cross iterative method to reach a numerical solution. Briefly, the procedure is as follows (Mine Ventilation Services 1997, Section 2.1.1):

- The code scrutinizes the geometry of the airflow network and constructs a number of closed meshes. The minimum number of meshes in the network is equivalent to the number of branches minus the number of junctions, plus one. Each branch in the network is represented in at least one mesh, and in order to minimize calculating time, each mesh is designed to contain no more than one high resistance branch.
- For each mesh, an airflow quantity correction factor is calculated using airway resistances and fan pressures. The program estimates an initial airflow to start the simulation.
- The airflow correction factor is applied to the current airflows in all branches of the mesh. This is performed for each mesh in the network.
- The program repeats the previous three steps in an iterative process until Kirchoff's second law holds to a prescribed level of accuracy for each mesh in the network. The resulting network is considered balanced.

The ventilation engineer analyzes the VNETPC output file and can adjust components of individual branches to provide the desired airflow network. In concept, this is similar to adjusting the regulators on the air doors to provide the desired airflow rates. The VNETPC program provides a volumetric airflow balance in the system and does not have the capability to calculate psychometric or thermodynamic changes within the airflow network. The VNETPC calculation output file (Attachment II) includes the following items:

- Branch airflows
- Frictional pressure drops
- Pressure at each junction
- Airway resistance
- Air power loss in airways
- Ventilation cost of each airway
- Fan operating pressures and airflows
- Duties of required regulators.

3. ASSUMPTIONS

An assumption is a statement or proposition that is taken to be true or representative in the absence of direct confirming data or evidence. The assumptions used in this calculation are identified and explained in this section. No assumptions used will require further validation as assumptions utilized are conceptual for this calculation. Any values derived from this study will not be used to support construction, fabrication, or procurement.

This document may be affected by technical product information that requires confirmation. Any changes to the document that may occur as a result of completing the confirmation activities will be reflected in subsequent revisions. The status of the input information quality may be confirmed by review of the Document Input Reference System database.

3.1 POWER COST

The power cost is assumed to be 10 cents per kilowatt-hour. VNETPC uses this input to determine the operating cost for system fans and provide the cost of airflow in the individual airways. This power cost is consistent with *Design Feature 7: Continuous Preclosure Ventilation* (CRWMS M&O 1999c, p. 14) and there has been no new design information or analysis to change this cost basis. This is not labeled as to be verified (TBV) since any future change of this cost will not have an impact on the airflow network calculation. This assumption does not impact radiological safety or waste isolation. The power cost is manually entered into VNETPC, shown in Attachment II.

3.2 FAN EFFICIENCY

In order to estimate the conceptual ventilation system horsepower it is necessary to apply a fan operating efficiency. Ventilation fans do not operate at 100 percent efficiency. A vane-axial fan will operate in the 70 percent to 85 percent efficiency range (Hartman et al. 1997, Table 9.3). For the SR layout calculation, an efficiency of 70 percent has been assumed and lies within this range. This is not labeled as TBV since any future change of this efficiency does not have an impact on the outcome of the airflow network calculation. The fan efficiency is manually entered into VNETPC, shown in Attachment II.

3.3 EMPLACEMENT DRIFT EFFECTIVE AREA

It is assumed an emplacement drift lined with steel sets provides the same effective area and perimeter (15.62 m^2 and 16.02 m respectively, see Section 3.4) as a concrete lined emplacement drift as determined in the *Calculation of Effective Areas of Subsurface Openings During Emplacement Mode* (CRWMS M&O 1999a, Section 6, Table 1). This assumption does not impact radiological safety or waste isolation. This information is used in Table 2.

3.4 AIRFLOW PARAMETERS

Per Section 2, the repository airflow network is described as a system of branches and nodes for the VNETPC calculation. Table 1 contains the Imperial unit airway friction factors (K factors) (Hartman et al. 1997, Table 5.1) converted to SI units by multiplying by 1.855×10^6 (Section 5.1.5). Typical mine design K factors vary from 0.0019 kg/m^3 to 0.043 kg/m^3 (10 to 235 $lb.m^2/ft^4$) (Hartman et al. 1997, Table 5.1). Since the repository drifts are typically excavated with either a tunnel boring machine or a roadheader, this calculation uses K factors ranging from 0.0037 kg/m^3 to 0.0158 kg/m^3 (20 to 85 $lb.m^2/ft^4$). The K factors are considered corroborative information and not subject to verification. Actual resistance factors cannot be determined until the facility is in place. The selection of K factors does impact the calculation but does not impact radiological safety or waste isolation. Table 2 contains the information used to describe the airflow network branches.

Table 1. Resistance Factor Conversions to SI Units

Imperial Unit ($\times 10^{-10}$)**lb.m²/ft⁴** *	**SI Unit Kg/m³**
20	0.0037
25	0.0046
30	0.0056
60	0.0111
70	0.0130
85	0.0158

*Source: Hartman et al. 1997, Table 5.1

Table 2. Airflow Design Parameters

Description of Repository Airway (circular unless noted)	**Airway Resistance K-Factor**	**Radius (unless noted) or Dimension** (k)	**Airway Effective Area**	**Calculated Perimeter** (l unless noted)
	Kg/m³	m	m²	m
North Ramp	0.0056 (c)	3.51	36.17 (h)	22.05
South Ramp	0.0111(d)	3.51	36.17 (h)	22.05
Service Main Drift	0.0130 (e)	3.51	36.17 (h)	22.05
Emplacement Drift, spare emplacement	0.0158 (g)	2.55	15.62 (h)	16.02
Performance confirmation, cross-block, and Observation Drifts	0.0130 (e)	2.55	19.63 (h)	16.02
Ventilation Raise	0.0037 (a)	0.85	2.27 (h)	5.34
Emplacement Turnout (8 x 7 m horseshoe)	0.0130 (e)	w = 8 h = 7 (i)	42.98 (h,l)	25.14
Exhaust Main , service side	0.0130 (e)	3.51	17.07 (j)	17.09 (m)
Exhaust Main , exhaust side	0.0130 (e)	3.51	17.07 (j)	17.09 (m)
Intake Shaft connector drift	0.0046 (b)	7.62 (i) dia.	36.17 (same as ramp)	22.05
Exhaust Shaft connector drift (8 x 8.5 m horseshoe)	0.0046 (b)	w = 8 h = 8.5 (i)	52.58 (i,l)	27.42
Shaft (8m with a liner of 0.3m)	0.0046 (b)	3.7 (i)	43.00 (i,l)	23.25
ECRB	0.0130 (e)	2.35	16.50 (h)	14.76
Vent Raise Valve	0.0046 (f)	0.84	2.22(l)	5.28
Main Fan (12 ft. diameter)	0.0037 (a)	1.83 (Sect 5.1.3)	10.52(l)	11.49

Notes:

(a) From Hartman et al 1997, Table 5.1, for maximum straight, smooth lined, clean airway.

(b) From Hartman et al 1997, Table 5.1, for maximum straight, smooth lined, slightly obstructed airway.

(c) From Hartman et al 1997, Table 5.1, for average straight, smooth lined, moderately obstructed airway.

(d) From Hartman et al 1997, Table 5.1, for average straight, sedimentary rock, slightly obstructed airway. South Ramp factor is higher due to construction related components that may not be entirely removed.

(e) From Hartman et al 1997, Table 5.1, straight, sedimentary rock, moderately obstructed airway. Used in previous ventilation calculation (CRWMS M&O 1999c, Table 1) which is based on *Controlled Design Assumptions* (CRWMS M&O 1998, p. 7-16) which is no longer considered a valid reference. There has been no new design information established to justify changing this factor and it will provide a slightly conservative value for this calculation.

(f) See Section 3.5, a value of 0.0046 (25) is selected for use in this calculation based on Hartman 1997, Table 5.1, clean value, moderately curved, smooth airway.

(g) From Hartman et al 1997, Table 5.1, for maximum straight, sedimentary rock, moderately obstructed airway.

(h) From CRWMS M&O 1999a, Section 6, Table 1.

(i) Based on BSC (Bechtel SAIC Company) 2001a, pp. 96 and 98 less liner thickness of 0.3 m.

(j) BSC (Bechtel SAIC Company) 2001a, p. IV-9. This area is also used for the service side of the Exhaust Main since the area of the exhaust raise valve assembly influences only the area at the raise outlet. The remaining distance between drifts does not contain this obstruction.

(k) Radius or dimension from CRWMS M&O 1999a, pp. 27, 31, 34, 37, 43, and 46) unless noted otherwise.

(l) Geometry calculations: Area for a circle = πr^2, and area for a horseshoe shape = $w(h - r) + \frac{1}{2} \pi r^2$. Perimeter for a circle = πd, and perimeter for a horseshoe shape = $\frac{1}{2}\pi d + w + 2(h - r)$ where d = diameter, r = radius, w = width, and h = height. Adjusted for lining. Hand calculated.

(m) BSC (Bechtel SAIC Company) 2001a, Section IV.3. Perimeter = 2 * PI * r * (Change angle)/360 + height stopping + length of invert. 2*PI*3.51m*(180-34.9)/360+6.39m+1.81m = 17.09m.

3.5 REGULATOR/DOOR EQUIVALENT RESISTANCES

To control the airflow distribution at various locations in the network, the VNETPC calculation requires a resistance input (Rb) to represent doors, regulators, bulkheads, valves or dampers, and other field installed regulating devices (Hartman et al. 1997, p. 255). The resistance input of regulators may vary over a wide range of values depending upon the desired airflow. The resistance values listed below are assumed for the repository ventilation design for use in the VNETPC calculation. It is accepted engineering practice to estimate ventilation system design parameters during the conceptual stage and adjust the values as additional design information is obtained (Hartman et al. 1997, p. 546). This assumption does not require further validation, as the assumption is conceptual for this evaluation. This assumption is not considered TBV since it does not impact radiological safety or waste isolation. Any values derived from this study will not be used to support construction, fabrication, or procurement. Used in Attachment I.

Regulating Device	Resistance (Rb)
Door regulator at exhaust shafts or other doors (range)	0.01 to 4 units
Gate valve regulator/raise	225 units
Fan recirculation resistance	225 units
Fan installation (inlet/outlet adapters + air velocity)	0.0011 units

3.6 EQUIVALENT LENGTH

The equivalent length method is used to account for shock losses due to changes in airflow direction, minor misalignment and obstructions and is assumed to be +10 percent of the branch length. This is a general engineering practice to use equivalent lengths for shock loss calculations as they do not lend themselves to precise calculation (Hartman et al. 1997, p. 160). An equivalent length of 10 percent is selected since the excavations are typically straight and mechanically excavated. This assumption is not considered TBV since it does not impact radiological safety or waste isolation. Used in Attachment I.

4. USE OF COMPUTER SOFTWARE AND MODELS

This section reviews the use of computer software used in this calculation. There were no software routines or models used in this calculation.

4.1 VNETPC V1.0A

The primary task involved in this calculation is to utilize the qualified (CRWMS M&O 1999b) ventilation design program VNETPC V1.0A, CSCI: 30029-V1.0A, to solve a mathematical representation of the repository ventilation network. The commercially available VNETPC program (CRWMS M&O 1999aa) is a self-contained Windows based application that is designed to aid the ventilation engineer in planning underground ventilation systems.

The VNETPC software was obtained from Configuration Management in accordance with the applicable procedure. The software was appropriate for the applications used in this calculation. The software was used within its range of validation as specified in the software qualification report (CRWMS M&O 1999b, Section 4.1). The VNETPC calculation was run on a Gateway 2000 computer (CPU identifier CRWMS M&O #110957, located at 1020C) with a 166 MHz

Pentium processor as configured by Software Configuration Management to do Quality Affecting work.

In order to control the electronic information used to generate this calculation, access to the information on the workstations was controlled with password protection. An additional level of password protection controls the VNETPC calculation files. The VNETPC program itself is protected by a proprietary "key tag" installed on workstation CRWMS M&O #110957. The computer files were stored on the network "H" drive, which was backed up daily by the Enterprise Server Team Department.

4.2 VULCAN V3.4

The commercially available VULCAN V.3.4, STN: 10044-3.4-00, software program (CRWMS M&O 2001ab) was used to extract distance information from the Subsurface Layout electronic output file (CRWMS M&O 2000a). The VULCAN V3.4 software is installed on a Silicon Graphics Octane workstation running the IRIX 6.5 operating system (CPU identifier CRWMS M&O #116980, located at 1031G).

The VULCAN V3.4 software was obtained from Software Configuration Management, was appropriate for the application, and was used only within the range of validation in accordance with AP-SI.1Q, *Software Management*.

5. CALCULATION

This section presents the inputs, theoretical background, and approaches used in the calculation. The input data file for the 70,000 MTU VNETPC calculation is contained in Attachment I, output data file is included as Attachment II, and fan information is included as Attachment III.

The VNETPC program is validated (Section 4.1) and software routines do not need further confirmation. Input files for the calculation are Excel generated spreadsheets that are loaded into VNTEPC. The Attachment I input data file contains standard Excel functions that perform basic algebraic operations. The algebraic operations are described in the appropriate attachments and have been verified by hand calculations.

5.1 INPUTS

The following is a list of inputs used in this calculation.

5.1.1 Repository Layout

The SR repository layout is represented by the information contained in the Subsurface Layout (BSC (Bechtel SAIC Company) 2001a). Figure 1 shows the 70,000 MTU repository layout as detailed in the Layout Analysis (BSC (Bechtel SAIC Company) 2001a, Figure 11).

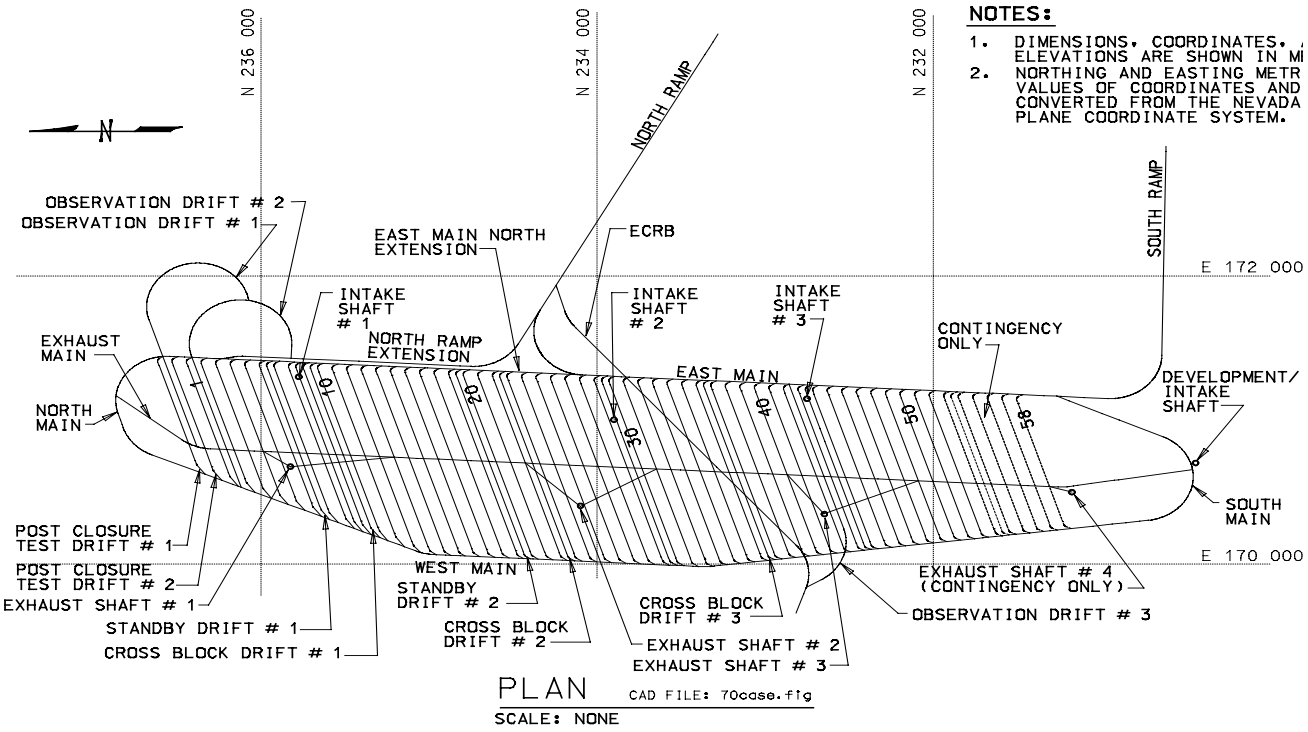

Figure 1. 70,000 MTU Site Recommendation Layout

Table 3 contains the quantities of primary system components of the SR layout, not including the North and South Ramps.

Table 3. Site Recommendation Layout Component Quantities

Component Description	Number of Components
Postclosure test drifts	2
Observation drifts	3
Cross block and standby drifts	5 (3 and 2 resp.)
Emplacement drifts	52
Intake Shafts	3
Exhaust Shaft	3
Development Shaft	1

Source: BSC 2001a, Section 7.1

5.1.2 Air Velocity Design Constraints

The following air velocity constraints are based on the typical industry maximum velocities found in *Subsurface Ventilation and Environmental Engineering* (McPherson 1992, Table 9.1, p. 295):

Maximum allowable air velocity in:

Excavations where personnel are allowed	8 m/s (meters per second)
Ventilation Shaft	20 m/s

The high air volume branches of the airflow network calculation output are spot-checked to ensure these velocity constraints are not exceeded (Section 6).

5.1.3 Fan Curves

The ventilation network calculation is provided with primary fans chosen from a fan catalog. The "Joy Axivane Fans Mining Catalog, J-670" (Joy 1982) was used to select a fan for the calculation. The fan curve obtained from Joy Technologies is contained in Attachment III.

Each fan is a variable pitch, axial flow fan whose blades can be adjusted to operate at any point on the fan curve. A blade tip angle that approximates the expected operating point is selected for the calculation. The blade setting provides an initial fan operating starting point for the calculation. In addition, the catalog fan curve has been modified to show potential stall points (Attachment III). The stall points are manually selected and follow the basic shape of curves for axial flow fans (Hartman et al. 1997, p. 347). A library of 36 fan curves was input during the VNETPC validation/verification process (CRWMS M&O 1999b, Section 3.1.1) and has been checked for use with the VNETPC program. Fan #3 was selected for this calculation, a Joy 144-79-710 at a 26° blade setting (Joy 1982, C-8248), with two fans operating in parallel.

5.1.4 Design Airflow Volumes

As the intake air passes over the waste packages it is heated, thereby expanding. An intake air volume of 15 m^3/s is expanded to a volume of 17 m^3/s (16.72 m^3/s rounded) (BSC (Bechtel SAIC Company) 2001a, p. IV-5) for use in this calculation for emplacement and standby drifts. Since the postclosure test drifts will simulate an emplacement drift, this volume is used for the postclosure drift airflow.

An airflow rate of 20 m^3/s per drift (19.63 m^3/s rounded) is used as the design basis for observation and cross block drifts (BSC (Bechtel SAIC Company) 2001a, p. IV-3).

Table 4 details how the total airflow quantity is estimated. As shown in Table 4, for this calculation the total air volume (2,144 m^3/s) is allocated evenly across the three exhaust shafts (2,144 $m^3/s \div 3$) for an estimated airflow of 715 m^3/s per shaft.

Table 4. Airflow Volumes

Component	**Design Airflow Volume/split (m^3/s)**	**Number of Components** (Table 3)	**Total Airflow** (airflow x number of components x 2 splits per)
Postclosure test drifts	17	2	68 m^3/s
Observation drifts	20	3	120 m^3/s
Cross block drifts	20	3	120 m^3/s
Emplacement and standby drifts	17	52 + 2	1,836 m^3/s
Total Airflow			2,144 m^3/s
Airflow estimate per Shaft (3 Shafts)			715 m^3/s

Fixed airflow quantity branches at the fan outlets are used to generate the airflow for the calculation. Using the fan curve data (Attachment III, Table III-1) an airflow volume of 755.2 m^3/s is selected since it is the closest identified point that satisfies the 715 m^3/s airflow estimated in Table 4. The 755.2 m^3/s airflow is used as the fixed quantity at the exhaust shafts (Attachment

I). For the purposes of this calculation the excess airflow volume flows through leakage paths where the Exhaust Main connects to both the North and South Mains.

5.1.5 Conversion Factors

The VNETPC calculation uses SI units in this calculation (Section 2.2). The following standard conversion factors are utilized (Hartman et al. 1997, Table B.3):

1 cubic meter per second (m^3/s) = 2,119 cubic feet per minute (rounded from 2,118.9)
1 meter (m) = 3.281 feet (ft)
1 m^2 = 10.764 ft^2
1 horsepower (Hp) = 0.7457 kilowatt (kW)
1 kilo Pascal (kPa) = 4.02 inches water gauge (wg).
Friction Factor, K x 10^{-10} ($lb.m^2/ft^4$) = 1.855 x 10^6 kg/m^3

5.2 CALCULATION APPROACH

As discussed in Section 2, the airflow network is described graphically as a system of branches and nodes. Figure 1 presented the 70,000 MTU Layout for SR. This section documents how the airflow network was described as a system of nodes and branches from this layout. In Attachment I Figures I-1a, I-1b, I-1c, and I-1d represent the airflow network reference diagram for the 70,000 MTU airflow network as described below.

5.2.1 70,000 MTU Airflow Network Arrangement

The 70,000 MTU airflow network nodes are numbered according to the pattern described below. There may be slight variations within the node numbering system but this does not impact to the VNETPC calculation. In the following description 'emplacement drift' is used generically to describe any drift whether it is an emplacement, cross-block, spare, or shaft connector drift.

- A node contains either three (xxx) or four numbers (xxxx).
- A node numbered less than 100 represents a primary intake or exhaust route (shaft or ramp), fan recirculation, or a surface airway connection point (dummy node).
- For nodes greater than 100, the first number (*xxx) represents a general location in the repository according to the following designation:
  - Nodes beginning with a 1 (1xx or 1xxx) represent a node on the East Main.
  - Nodes beginning with a 2 (2xx or 2xxx) represent either a node on the West Main, or an Exhaust Shaft Connector Drift.
  - Nodes beginning with a 3 (3xx or 3xxx) represent the end of the emplacement drift's east turnout and start of the emplacement drift east split.
  - Nodes beginning with a 4 (4xxx) represent a node at the top of a ventilation raise.
  - Nodes beginning with a 5 (5xxx) represent a node at the bottom of a ventilation raise.
  - Nodes beginning with a 6 (6xxx) represent a node on the service side of the Exhaust Main.
  - Nodes beginning with 7 (7xxx) represent a node on the emplacement side of the Exhaust Main.
  - Nodes beginning with 8 (8xx or 8xxx) represent the end of the emplacement drift's west turnout and start of the emplacement drift west split.

- For nodes greater than 100, the second two numbers (x**x) indicate the designated drift. For example: node 106 represents intersection of the East Main turnout (1xx) and Emplacement Drift 6 (x06).
- For nodes greater than 100, if there is a fourth number in the sequence, a 5 (xxx5), it represents a cross block or shaft connector drift located next to the respective emplacement drift. For example: node 1095 represents the intersection of the East Main (1xxx) and the cross block drift (xxx5) located after emplacement drift 9 (x09x). An exception is the test drift at the north end of the repository carry a (xx01) designation.

5.2.2 Dummy Nodes/Branches Used in the Airflow Network

The airflow network contains assorted dummy branches that 1) provide airway leakage paths or 2) assist with visual presentation of the airflow network to prevent obliterated information. As noted in Section 2, dummy nodes/branches do not contain a resistance so they do not effect the overall calculation. The following is a listing of the dummy node/branch information contained in the airflow network:

- Each fan contains an airway leakage path (recirculation) that VNETPC uses to allow the fan to find an operating point on its curve. The VNETPC program uses the fixed branch volume and the recirculation path to iterate a fan pressure that is compatible with the fan curve (Section 5.1.3).
- Nodes 12, 13, and 56 are surface loop nodes used for visual presentation.
- The exhaust shaft connector drifts contain dummy nodes/branches used for visual presentation.
- The ECRB contains dummy nodes/branches used for visual presentation.
- Other visual presentation related nodes might exist in the airflow network.

5.2.3 Other Airflow Network Notes

The following notes describe variations to the repository layout that were incorporated into the airflow network. They do not impact the calculation results.

- For simplification of the airflow network, the north ramp connections at the East Main intersect at Emplacement Drift turnouts #3 and #27.
- The Exhaust Main is drawn to differentiate between the service side and emplacement side. Regulators are used at the vent raise bottoms to direct the airflow to one side or the other as needed.
- The distance between vent raises at the Exhaust Main horizon is used for both the service side and emplacement side branches.
- Regulators are provided at each side of an emplacement, cross block, standby and intake shaft connector drift.
- To simply the VNETPC the calculation iteration process the emplacement drift exhaust airflows are fixed at 17 m^3/s per split. The cross block, observation, and standby drift airflow volumes are fixed at 20 m^3/s per split.
- The door located at the South Main connection to the Exhaust Main is left open to supplement airflow into the Service Side of the Exhaust Main.

6. RESULTS

The 70,000 MTU airflow network input data are contained in Attachment I, the VNETPC output data is contained in Attachment II and summarized in this section. This VNETPC calculation airflow network contained 776 branches and 565 junctions.

The results of this calculation are based on assumptions or information that must be confirmed prior to use. Table 5 is a summary of Attachment II, VNETPC calculation output. Additional information concerning pressure drops at specific nodes, or airflows in specific branches can be obtained by consulting Attachment II.

Table 5. 70,000 MTU Airflow Network Calculation Summary

Location	Air Volume				
	m^3/s	cfm[c]			
Intake Shaft #1	651.05	1,379,575			
Intake Shaft #2	549.04	1,163,416			
Intake Shaft #3	486.77	1,031,466			
North Ramp	204.24	432,785			
South Ramp	65.92	139,684	Fan Operating Information		
Development Shaft	308.57	653,860	Fan Pressure KPa (wg)[c]	Horsepower kW (Hp)[c]	Fan Volume[b] M^3/s (cfm)[c]
Exhaust Shaft #1	755.2	1,600,269	2.570 kPa 10.33 " wg	1,947 kW 2,611 Hp	757.59 m^3/s 1,605,333 cfm
Exhaust Shaft #2	755.2	1,600,269	2.570 kPa 10.33 " wg	1,947 kW 2,611 Hp	757.59 m^3/s 1,605,333 cfm
Exhaust Shaft #3	755.2	1,600,269	2.570 kPa 10.33 " wg	1,947 kW 2,611 Hp	757.59 m^3/s 1,605,333 cfm
Totals[a]	2,265.6	4,800,806	-	5,841 kW 7,833 Hp	2,272.77 m^3/s 4,815,999 cfm

Notes: [a] Intake and exhaust air volumes may vary due to internal program rounding
[b] Fan volumes include the recirculation at the fan
[c] Conversion factors Section 5.1.5

Table 6 shows the highest airflow branches and checks the air velocity to ensure the results are within design parameters established in Section 5.1.2.

Table 6. Branches with the Highest Calculated Air Velocities

Location	Branch Number	Airflow (m^3/s)	Area * (m^2)	Air Velocity (m^3/s)/area*	Maximum Design Air Velocity (Section 5.1.2)
Intake Shaft #1	20	651.05	43.00	15.1 m/s	20 m/s
Exhaust Shaft (all)	21,26,31	755.20	43.00	17.6 m/s	20 m/s
South Main Drift	394	249.69	36.17	6.9 m/s	8 m/s

* Note: area is from Table 2.

7. REFERENCES

7.1 DOCUMENTS CITED

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7.2 SOFTWARE CODES

CRWMS M&O 1999aa. Software Code: *VNETPC.* V1.0a. 30029 V1.0a.

CRWMS M&O 2001ab. *Software Code*: *VULCAN* . V3.4. UNIX. 10044-3.400.

8. ATTACHMENTS

Attachment I	70,000 MTU Data Input File
Attachment II	70,000 MTU VNETPC Airflow Network Calculation
Attachment III	Fan Curve
Attachment IV	Acronyms, Symbols, and Units

Attachment I

70,000 MTU Input Data File

Attachment I
INPUT DATA FILE

A brief explanatory outline is given for airway resistance tables developed for the 70,000 MTU SR Airflow Network data input file. The tables do not contain software routines or models and were spot-checked with hand calculations. Formulas are contained in appropriate column titles.

Line No.	BRANCH		VNETPC Input	Field Installed Regulator		Resistance (Ra)	K factor	Perimeter	Area	ACTUAL LENGTH *	Adjusted Length (L)	NOTES FOR BRANCH DESCRIPTION
	From	To	(Ra+Rb)	(Rb)	Notes	KPL/A^3	(K)	(P)	(A)	(L')	L'+10%	
			Ns^2/m^8	Ns^2/m^8		Ns^2/m^8	Kg/m^3	M	m^2	m	M	

"Line No." identifies the branch lines in the VNETPC Airflow Network Simulation.

"Branch" indicates the node points for the respective Line No. and the From/To represents airflow direction for the appropriate network diagram.

"VNETPC Input" is the sum of columns Ra and Rb.

"Field Installed Regulator" (Rb) is a regulator that represents a door, valve, or other regulating device that can be adjusted (Section 3.5). The "Notes" column provides additional branch information.

"Resistance" (Ra) is the calculated airway resistance value based on the K factor (K), perimeter (P), area (A) and Adjusted Length (L).

"Friction Factor" (K) represents the frictional roughness of the airway (Section 3.4).

"Area" (A) is the net cross sectional area.

"Perimeter" (P) is the total length in meters, of the lined airway in section (e.g., circumference of circle). The list of areas and perimeters used as input are found in Section 3.4.

The "Actual Length" (L') is the physical distance between nodes as extracted from the Subsurface Layout VULCAN output file (CRWMS M&O 2000b) and rounded to the nearest meter.

The "Adjusted Length" (L) is Actual Length (L') plus 10 percent and is used to account for shock losses in the drift under consideration (Section 3.6).

"Notes for Branch Description" provides detail of the respective branch and do not supply input to VNETPC.

The airflow network drawings Figures I-1a, I-1b, I-1c, and I-1d are included at the end of this attachment.

This attachment contains printouts from the Excel input file H:/RJurani/Vnet/SR70k201.xls, 327 KB, 08/01/2001.

70,000 MTU SR Repository Ventilation Network data input file											File H:\RJurani\Vnet\SR70k201.xls	
	* Distances by A. Linden, via *Subsurface Facility Planning Layout in Support of ANL-SFS-MG-000001, REV 00.*											
Line No.	BRANCH		VNETPC Input (Ra+Rb)	Field Installed Regulator		Resistance (Ra) KPL/A^3	K factor (K)	Perimeter (P)	Area (A)	ACTUAL LENGTH * (L')	Adjusted Length (L) L'+10%	NOTES FOR BRANCH DESCRIPTION
	From	To		(Rb)	Notes							
			Ns^2/m^8	Ns^2/m^8		Ns^2/m^8	Kg/m^3	m	m^2	m	m	
1	1	2	0.005718			0.005718	0.0056	22.05	36.17	1992	2191.2	North ramp to ECRB turnout
2	2	3	0.000560			0.000560	0.0056	22.05	36.17	195	214.5	North Ramp to East Main turnout
3	3	6	0.004828			0.004828	0.0056	22.05	36.17	1682	1850.2	North ramp extension to OD #2 turnout
4	6	7	0.001197			0.001197	0.0056	22.05	36.17	417	458.7	North ramp at OD #2 turnout to East Main
5	7	103	0.000000			0.000000	0.0056	22.05	36.17	0	0.0	Dummy
6	6	4	0.016112			0.016112	0.0130	16.02	19.63	532	585.2	OD #2 ramp to OD #1 ramp turnout
7	4	9	0.058482			0.058482	0.0130	16.02	19.63	1931	2124.1	OD #1 and ramp (former 4-3995)
8	9	6005	0.000000		20 cms	0.000000	0.0130	16.02	19.63	0	0.0	Dummy
9	4	8	0.039281			0.039281	0.0130	16.02	19.63	1297	1426.7	OD #2 from turnout to raise
10	8	4015	0.000000		20 cms	0.000000	0.0130	16.02	19.63	0	0.0	Dummy
11	3	127	0.001599			0.001599	0.0056	22.05	36.17	557	612.7	North ramp curve to East Main line 29
12	2	1355	0.123809			0.123809	0.0130	14.76	16.50	2635	2898.5	ECRB from turnout to interior ECRB turnout (3-2386)
13	1355	2355	0.000000			0.000000	0.0130	14.76	16.50	0	0.0	Dummy
14	2355	2425	0.000000			0.000000	0.0130	14.76	16.50	0	0.0	Dummy
15	2425	4425	0.042006		20 cms	0.042006	0.0130	14.76	16.50	894	983.4	OD #3, west side off the ECRB
16	35	57	0.012779			0.012779	0.0111	22.05	36.17	2246	2470.6	South Ramp (35-161)
17	57	1585	0.000000			0.000000	0.0111	22.05	36.17	0	0.0	Dummy
18	60	29	0.000407			0.000407	0.0046	23.25	43.00	275	302.5	Intake Shaft #3
19	61	21	0.000476			0.000476	0.0046	23.25	43.00	322	354.2	Intake Shaft #2
20	62	10	0.000571			0.000571	0.0046	23.25	43.00	386	424.6	Intake Shaft #1
21	14	15	0.000663			0.000663	0.0046	23.25	43.00	448	492.8	Exhaust Shaft #1
22	15	16	0.000000			0.000000	0.0037	11.49	10.51	0	0.0	Exhaust Shaft #1 - Fan
23	16	63	0.001100	0.0011	VP+Surf P	0.000000	0.0046	23.25	43.00	0	0.0	Exhaust Shaft #1 - Fixed Volume
24	16	17	225.000000	225	Fan BK	0.000000	0.0037	11.49	10.51	0	0.0	Exhaust Shaft #1 - Fan Recirculation
25	17	15	225.000000	225	Fan BK	0.000000	0.0037	11.49	10.51	0	0.0	Exhaust Shaft #1 - Fan Recirculation
26	23	24	0.000661			0.000661	0.0046	23.25	43.00	447	491.7	Exhaust Shaft #2
27	24	25	0.000000			0.000000	0.0037	11.49	10.51	0	0.0	Exhaust Shaft #2 - Fan
28	25	64	0.001100	0.0011	VP+Surf P	0.000000	0.0046	23.25	43.00	0	0.0	Exhaust Shaft #2 - Fixed Volume
29	25	26	225.000000	225	Fan BK	0.000000	0.0037	11.49	10.51	0	0.0	Exhaust Shaft #2 - Fan Recirculation
30	26	24	225.000000	225	Fan BK	0.000000	0.0037	11.49	10.51	0	0.0	Exhaust Shaft #2 - Fan Recirculation
31	31	32	0.000629			0.000629	0.0046	23.25	43.00	425	467.5	Exhaust Shaft #3
32	32	33	0.000000			0.000000	0.0037	11.49	10.51	0	0.0	Exhaust Shaft #3 - Fan
33	33	65	0.001100	0.0011	VP+Surf P	0.000000	0.0046	23.25	43.00	0	0.0	Exhaust Shaft #3 - Fixed Volume
34	33	34	225.000000	225	Fan BK	0.000000	0.0037	11.49	10.51	0	0.0	Exhaust Shaft #3 - Fan Recirculation
35	34	32	225.000000	225	Fan BK	0.000000	0.0037	11.49	10.51	0	0.0	Exhaust Shaft #3 - Fan Recirculation
36	59	43	0.000419			0.000419	0.0046	23.25	43.00	283	311.3	Development Shaft
37	43	6637	0.000016			0.000016	0.0046	27.42	52.58	17	18.7	Development Shaft Access Drift to South Loop
38	6637	6636	0.000233			0.000233	0.0111	22.05	36.17	41	45.1	South Loop from Dev. Shaft
39	1001	100	0.000000			0.000000	0.0130	22.05	36.17	0	0.0	Dummy
40	100	600	0.002812			0.002812	0.0130	22.05	36.17	422	464.2	North loop to Exhaust Main turnout (99-6000)
41	1002	1001	0.000600			0.000600	0.0130	22.05	36.17	90	99.0	East Main TD #1 to TD #2 (100-99)
42	101	1002	0.000580			0.000580	0.0130	22.05	36.17	87	95.7	East Main TD #1 to ED #1 (101-100)
43	102	101	0.000580			0.000580	0.0130	22.05	36.17	87	95.7	East Main ED #1 to ED #2
44	103	102	0.000580			0.000580	0.0130	22.05	36.17	87	95.7	East Main ED #2 to ED #3
45	104	103	0.000580			0.000580	0.0130	22.05	36.17	87	95.7	East Main ED #3 to ED #4
46	105	104	0.000580			0.000580	0.0130	22.05	36.17	87	95.7	East Main ED #4 to ED #5
47	106	105	0.000580			0.000580	0.0130	22.05	36.17	87	95.7	East Main ED #5 to ED #6
48	1065	106	0.000287			0.000287	0.0130	22.05	36.17	43	47.3	East Main ED #6 to SB #1
49	107	1065	0.000287			0.000287	0.0130	22.05	36.17	43	47.3	East Main SB#1 to ED#7
50	108	107	0.000580			0.000580	0.0130	22.05	36.17	87	95.7	East Main ED #7 to ED #8

70,000 MTU SR Repository Ventilation Network data input file												File H:\RJurani\Vnet\SR70k201.xls
	* Distances by A. Linden, via *Subsurface Facility Planning Layout in Support of ANL-SFS-MG-000001, REV 00.*											
Line No.	BRANCH		VNETPC Input (Ra+Rb)	Field Installed Regulator		Resistance (Ra) KPL/A^3	K factor (K)	Perimeter (P)	Area (A)	ACTUAL LENGTH * (L')	Adjusted Length (L) L'+10%	NOTES FOR BRANCH DESCRIPTION
	From	To		(Rb)	Notes							
			Ns^2/m^8	Ns^2/m^8		Ns^2/m^8	Kg/m^3	m	m^2	m	m	
51	1085	108	0.000287			0.000287	0.0130	22.05	36.17	43	47.3	East Main ED #8 to Shaft #1 Access
52	1085	109	0.000287			0.000287	0.0130	22.05	36.17	43	47.3	East Main Shaft #1 Access to ED #9
53	109	1095	0.000287			0.000287	0.0130	22.05	36.17	43	47.3	East Main ED #9 to CB #1
54	1095	110	0.000287			0.000287	0.0130	22.05	36.17	43	47.3	East Main CB #1 to ED #10
55	110	111	0.000580			0.000580	0.0130	22.05	36.17	87	95.7	East Main ED #10 to ED #11
56	111	112	0.000580			0.000580	0.0130	22.05	36.17	87	95.7	East Main ED #11 to ED #12
57	112	113	0.000580			0.000580	0.0130	22.05	36.17	87	95.7	East Main ED #12 to ED #13
58	113	114	0.000580			0.000580	0.0130	22.05	36.17	87	95.7	East Main ED #13 to ED #14
59	114	115	0.000580			0.000580	0.0130	22.05	36.17	87	95.7	East Main ED #14 to ED #15
60	115	116	0.000580			0.000580	0.0130	22.05	36.17	87	95.7	East Main ED #15 to ED #16
61	116	117	0.000580			0.000580	0.0130	22.05	36.17	87	95.7	East Main ED #16 to ED #17
62	118	117	0.000580			0.000580	0.0130	22.05	36.17	87	95.7	East Main ED #17 to ED #18
63	119	118	0.000580			0.000580	0.0130	22.05	36.17	87	95.7	East Main ED #18 to ED #19
64	1195	119	0.000287			0.000287	0.0130	22.05	36.17	43	47.3	East Main ED #19 to SB #2
65	120	1195	0.000287			0.000287	0.0130	22.05	36.17	43	47.3	East Main SB #2 to ED #20
66	121	120	0.000580			0.000580	0.0130	22.05	36.17	87	95.7	East Main ED #20 to ED #21
67	122	121	0.000580			0.000580	0.0130	22.05	36.17	87	95.7	East Main ED #21 to ED #22
68	1225	122	0.000287			0.000287	0.0130	22.05	36.17	43	47.3	East Main ED #22 to CB #2
69	123	1225	0.000287			0.000287	0.0130	22.05	36.17	43	47.3	East Main CB #2 to ED #23
70	124	123	0.000580			0.000580	0.0130	22.05	36.17	87	95.7	East Main ED #23 to ED #24
71	125	124	0.000580			0.000580	0.0130	22.05	36.17	87	95.7	East Main ED #24 to ED #25
72	126	125	0.000580			0.000580	0.0130	22.05	36.17	87	95.7	East Main ED #25 to ED #26
73	127	126	0.000580			0.000580	0.0130	22.05	36.17	87	95.7	East Main ED #26 to ED #27
74	128	127	0.000580			0.000580	0.0130	22.05	36.17	87	95.7	East Main ED #27 to ED #28
75	129	128	0.000580			0.000580	0.0130	22.05	36.17	87	95.7	East Main ED #28 to ED #29
76	1295	129	0.000287			0.000287	0.0130	22.05	36.17	43	47.3	East Main ED #29 to Shaft #2 Access
77	1295	130	0.000287			0.000287	0.0130	22.05	36.17	43	47.3	East Main Shaft #2 Access to ED #30
78	130	131	0.000580			0.000580	0.0130	22.05	36.17	87	95.7	East Main ED #30 to ED #31
79	131	132	0.000580			0.000580	0.0130	22.05	36.17	87	95.7	East Main ED #31 to ED #32
80	132	133	0.000580			0.000580	0.0130	22.05	36.17	87	95.7	East Main ED #32 to ED #33
81	133	134	0.000580			0.000580	0.0130	22.05	36.17	87	95.7	East Main ED #33 to ED #34
82	134	135	0.000580			0.000580	0.0130	22.05	36.17	87	95.7	East Main ED #34 to ED #35
83	135	136	0.000580			0.000580	0.0130	22.05	36.17	87	95.7	East Main ED #35 to ED #36
84	136	1365	0.000287			0.000287	0.0130	22.05	36.17	43	47.3	East Main ED #36 to CB #3
85	137	1365	0.000287			0.000287	0.0130	22.05	36.17	43	47.3	East Main CB #3 to ED #37
86	138	137	0.000580			0.000580	0.0130	22.05	36.17	87	95.7	East Main ED #37 to ED #38
87	139	138	0.000580			0.000580	0.0130	22.05	36.17	87	95.7	East Main ED #38 to ED #39
88	140	139	0.000580			0.000580	0.0130	22.05	36.17	87	95.7	East Main ED #39 to ED #40
89	141	140	0.000580			0.000580	0.0130	22.05	36.17	87	95.7	East Main ED #40 to ED #41
90	142	141	0.000580			0.000580	0.0130	22.05	36.17	87	95.7	East Main ED #41 to ED #42
91	143	142	0.000580			0.000580	0.0130	22.05	36.17	87	95.7	East Main ED #42 to ED #43
92	1435	143	0.000287			0.000287	0.0130	22.05	36.17	43	47.3	East Main Shaft #3 Access to ED #43
93	1435	144	0.000287			0.000287	0.0130	22.05	36.17	43	47.3	East Main Shaft #3 Access to ED #44
94	144	145	0.000580			0.000580	0.0130	22.05	36.17	87	95.7	East Main ED #44 to ED #45
95	145	146	0.000580			0.000580	0.0130	22.05	36.17	87	95.7	East Main ED #45 to ED #46
96	146	147	0.000580			0.000580	0.0130	22.05	36.17	87	95.7	East Main ED #46 to ED #47
97	147	148	0.000580			0.000580	0.0130	22.05	36.17	87	95.7	East Main ED #47 to ED #48
98	148	149	0.000580			0.000580	0.0130	22.05	36.17	87	95.7	East Main ED #48 to ED #49
99	149	150	0.000580			0.000580	0.0130	22.05	36.17	87	95.7	East Main ED #49 to ED #50
100	150	151	0.000580			0.000580	0.0130	22.05	36.17	87	95.7	East Main ED #50 to ED #51

70,000 MTU SR Repository Ventilation Network data input file												File H:\RJurani\Vnet\SR70k201.xls
	* Distances by A. Linden, via *Subsurface Facility Planning Layout in Support of ANL-SFS-MG-000001, REV 00.*											
Line No.	BRANCH		VNETPC Input (Ra+Rb)	Field Installed Regulator		Resistance (Ra) KPL/A^3	K factor (K)	Perimeter (P)	Area (A)	ACTUAL LENGTH * (L')	Adjusted Length (L) L'+10%	NOTES FOR BRANCH DESCRIPTION
	From	To		(Rb)	Notes							
			Ns^2/m^8	Ns^2/m^8		Ns^2/m^8	Kg/m^3	m	m^2	m	m	
101	152	151	0.000580			0.000580	0.0130	22.05	36.17	87	95.7	East Main ED #51 to ED #52
102	1585	152	0.004131			0.004131	0.0111	22.05	36.17	726	798.6	East Main, South Ramp to ED #52 (161-152)
103	1585	6637	0.005411			0.005411	0.0111	22.05	36.17	951	1046.1	South Loop from ramp to Development Shaft Access(161-6637)
104	1001	3001	0.000349			0.000349	0.0130	25.14	42.98	77	84.7	East turnout/air doors test drift #1 (99-299)
105	1002	3002	0.000362			0.000362	0.0130	25.14	42.98	80	88.0	East turnout/air doors test drift #2 (100-300)
106	101	301	0.000362			0.000362	0.0130	25.14	42.98	80	88.0	East turnout/air doors emplacement drift #1
107	102	302	0.000362			0.000362	0.0130	25.14	42.98	80	88.0	East turnout/air doors emplacement drift #2
108	103	303	0.000362			0.000362	0.0130	25.14	42.98	80	88.0	East turnout/air doors emplacement drift #3
109	104	304	0.000362			0.000362	0.0130	25.14	42.98	80	88.0	East turnout/air doors emplacement drift #4
110	105	305	0.000362			0.000362	0.0130	25.14	42.98	80	88.0	East turnout/air doors emplacement drift #5
111	106	306	0.000362			0.000362	0.0130	25.14	42.98	80	88.0	East turnout/air doors emplacement drift #6
112	1065	3065	0.000362			0.000362	0.0130	25.14	42.98	80	88.0	East turnout/air standby drift #1
113	107	307	0.000362			0.000362	0.0130	25.14	42.98	80	88.0	East turnout/air doors emplacement drift #7
114	108	308	0.000362			0.000362	0.0130	25.14	42.98	80	88.0	East turnout/air doors emplacement drift #8
115	1085	3085	0.000362			0.000362	0.0130	25.14	42.98	80	88.0	East turnout/air doors regiulator Shaft #1 Access
116	109	309	0.000362			0.000362	0.0130	25.14	42.98	80	88.0	East turnout/air doors emplacement drift #9
117	1095	3095	0.000362			0.000362	0.0130	25.14	42.98	80	88.0	East turnout/air doors cross block drift #1
118	110	310	0.000362			0.000362	0.0130	25.14	42.98	80	88.0	East turnout/air doors emplacement drift #10
119	111	311	0.000362			0.000362	0.0130	25.14	42.98	80	88.0	East turnout/air doors emplacement drift #11
120	112	312	0.000362			0.000362	0.0130	25.14	42.98	80	88.0	East turnout/air doors emplacement drift #12
121	113	313	0.000362			0.000362	0.0130	25.14	42.98	80	88.0	East turnout/air doors emplacement drift #13
122	114	314	0.000362			0.000362	0.0130	25.14	42.98	80	88.0	East turnout/air doors emplacement drift #14
123	115	315	0.000362			0.000362	0.0130	25.14	42.98	80	88.0	East turnout/air doors emplacement drift #15
124	116	316	0.000362			0.000362	0.0130	25.14	42.98	80	88.0	East turnout/air doors emplacement drift #16
125	117	317	0.000362			0.000362	0.0130	25.14	42.98	80	88.0	East turnout/air doors emplacement drift #17
126	118	318	0.000362			0.000362	0.0130	25.14	42.98	80	88.0	East turnout/air doors emplacement drift #18
127	119	319	0.000362			0.000362	0.0130	25.14	42.98	80	88.0	East turnout/air doors emplacement drift #19
128	1195	3195	0.000362			0.000362	0.0130	25.14	42.98	80	88.0	East turnout/air doors standby drift #2
129	120	320	0.000362			0.000362	0.0130	25.14	42.98	80	88.0	East turnout/air doors emplacement drift #20
130	121	321	0.000362			0.000362	0.0130	25.14	42.98	80	88.0	East turnout/air doors emplacement drift #21
131	122	322	0.000362			0.000362	0.0130	25.14	42.98	80	88.0	East turnout/air doors emplacement drift #22
132	1225	3225	0.000362			0.000362	0.0130	25.14	42.98	80	88.0	East turnout/air doors cross block drift #2
133	123	323	0.000362			0.000362	0.0130	25.14	42.98	80	88.0	East turnout/air doors emplacement drift #23
134	124	324	0.000362			0.000362	0.0130	25.14	42.98	80	88.0	East turnout/air doors emplacement drift #24
135	125	325	0.000362			0.000362	0.0130	25.14	42.98	80	88.0	East turnout/air doors emplacement drift #25
136	126	326	0.000362			0.000362	0.0130	25.14	42.98	80	88.0	East turnout/air doors emplacement drift #26
137	127	327	0.000362			0.000362	0.0130	25.14	42.98	80	88.0	East turnout/air doors emplacement drift #27
138	128	328	0.000362			0.000362	0.0130	25.14	42.98	80	88.0	East turnout/air doors emplacement drift #28
139	129	329	0.000362			0.000362	0.0130	25.14	42.98	80	88.0	East turnout/air doors emplacement drift #29
140	3295	1295	0.000362			0.000362	0.0130	25.14	42.98	80	88.0	East turnout/air door/regulator Shaft #2 Access
141	130	330	0.000362			0.000362	0.0130	25.14	42.98	80	88.0	East turnout/air doors emplacement drift #30
142	131	331	0.000362			0.000362	0.0130	25.14	42.98	80	88.0	East turnout/air doors emplacement drift #31
143	132	332	0.000362			0.000362	0.0130	25.14	42.98	80	88.0	East turnout/air doors emplacement drift #32
144	133	333	0.000362			0.000362	0.0130	25.14	42.98	80	88.0	East turnout/air doors emplacement drift #33
145	134	334	0.000362			0.000362	0.0130	25.14	42.98	80	88.0	East turnout/air doors emplacement drift #34
146	135	335	0.000362			0.000362	0.0130	25.14	42.98	80	88.0	East turnout/air doors emplacement drift #35
147	136	336	0.000362			0.000362	0.0130	25.14	42.98	80	88.0	East turnout/air doors emplacement drift #36
148	1365	3365	0.000362			0.000362	0.0130	25.14	42.98	80	88.0	East turnout/air doors cross block drift #3
149	137	337	0.000362			0.000362	0.0130	25.14	42.98	80	88.0	East turnout/air doors emplacement drift #37
150	138	338	0.000362			0.000362	0.0130	25.14	42.98	80	88.0	East turnout/air doors emplacement drift #38

70,000 MTU SR Repository Ventilation Network data input file												File H:\RJurani\Vnet\SR70k201.xls
	* Distances by A. Linden, via *Subsurface Facility Planning Layout in Support of ANL-SFS-MG-000001, REV 00.*											
Line No.	BRANCH		VNETPC Input (Ra+Rb)	Field Installed Regulator		Resistance (Ra) KPL/A^3	K factor (K)	Perimeter (P)	Area (A)	ACTUAL LENGTH * (L')	Adjusted Length (L) L'+10%	NOTES FOR BRANCH DESCRIPTION
	From	To		(Rb)	Notes							
			Ns^2/m^8	Ns^2/m^8		Ns^2/m^8	Kg/m^3	m	m^2	m	m	
151	139	339	0.000362			0.000362	0.0130	25.14	42.98	80	88.0	East turnout/air doors emplacement drift #39
152	140	340	0.000362			0.000362	0.0130	25.14	42.98	80	88.0	East turnout/air doors emplacement drift #40
153	141	341	0.000362			0.000362	0.0130	25.14	42.98	80	88.0	East turnout/air doors emplacement drift #41
154	142	342	0.000362			0.000362	0.0130	25.14	42.98	80	88.0	East turnout/air doors emplacement drift #42
155	142	3425	0.148644			0.148644	0.0037	5.34	2.27	80	88.0	East turnout/raise to OD #3
156	143	343	0.000362			0.000362	0.0130	25.14	42.98	80	88.0	East turnout/air doors emplacement drift #43
157	3435	1435	0.000362			0.000362	0.0130	25.14	42.98	80	88.0	East turnout/air doors/regulator at Shaft #3 Access
158	144	344	0.000362			0.000362	0.0130	25.14	42.98	80	88.0	East turnout/air doors emplacement drift #44
159	145	345	0.000362			0.000362	0.0130	25.14	42.98	80	88.0	East turnout/air doors emplacement drift #45
160	146	346	0.000362			0.000362	0.0130	25.14	42.98	80	88.0	East turnout/air doors emplacement drift #46
161	147	347	0.000362			0.000362	0.0130	25.14	42.98	80	88.0	East turnout/air doors emplacement drift #47
162	148	348	0.000362			0.000362	0.0130	25.14	42.98	80	88.0	East turnout/air doors emplacement drift #48
163	149	349	0.000362			0.000362	0.0130	25.14	42.98	80	88.0	East turnout/air doors emplacement drift #49
164	150	350	0.000362			0.000362	0.0130	25.14	42.98	80	88.0	East turnout/air doors emplacement drift #50
165	151	351	0.000362			0.000362	0.0130	25.14	42.98	80	88.0	East turnout/air doors emplacement drift #51
166	152	352	0.000362			0.000362	0.0130	25.14	42.98	80	88.0	East turnout/air doors emplacement drift #52
167	3001	4001	0.041716		17 cms	0.041716	0.0158	16.02	15.62	571	628.1	East Split of Test Drift #1 (299-399)
168	3002	4002	0.044346		17 cms	0.044346	0.0158	16.02	15.62	607	667.7	East Split of Test Drift #2 (300-400)
169	301	401	0.044492		17 cms	0.044492	0.0158	16.02	15.62	609	669.9	East split of emplacement drift #1
170	302	402	0.044492		17 cms	0.044492	0.0158	16.02	15.62	609	669.9	East split of emplacement drift #2
171	303	403	0.044492		17 cms	0.044492	0.0158	16.02	15.62	609	669.9	East split of emplacement drift #3
172	304	404	0.044492		17 cms	0.044492	0.0158	16.02	15.62	609	669.9	East split of emplacement drift #4
173	305	405	0.044492		17 cms	0.044492	0.0158	16.02	15.62	609	669.9	East split of emplacement drift #5
174	306	406	0.044492		17 cms	0.044492	0.0158	16.02	15.62	609	669.9	East split of emplacement drift #6
175	3065	4065	0.044492		17 cms	0.044492	0.0158	16.02	15.62	609	669.9	East split of standby drift #1
176	307	407	0.044492		17 cms	0.044492	0.0158	16.02	15.62	609	669.9	East split of emplacement drift #7
177	308	408	0.044492		17 cms	0.044492	0.0158	16.02	15.62	609	669.9	East split of emplacement drift #8
178	10	3085	0.000101			0.000101	0.0046	22.05	36.17	43	47.3	Intake Shaft #1 east access drift
179	309	409	0.044492		17 cms	0.044492	0.0158	16.02	15.62	609	669.9	East split of emplacement drift #9
180	3095	4095	0.018444		20 cms	0.018444	0.0130	16.02	19.63	609	669.9	East split of cross block drift #1
181	310	410	0.044492		17 cms	0.044492	0.0158	16.02	15.62	609	669.9	East split of emplacement drift #10
182	311	411	0.044492		17 cms	0.044492	0.0158	16.02	15.62	609	669.9	East split of emplacement drift #11
183	312	412	0.044492		17 cms	0.044492	0.0158	16.02	15.62	609	669.9	East split of emplacement drift #12
184	313	413	0.044492		17 cms	0.044492	0.0158	16.02	15.62	609	669.9	East split of emplacement drift #13
185	314	414	0.044492		17 cms	0.044492	0.0158	16.02	15.62	609	669.9	East split of emplacement drift #14
186	315	415	0.044492		17 cms	0.044492	0.0158	16.02	15.62	609	669.9	East split of emplacement drift #15
187	316	416	0.044492		17 cms	0.044492	0.0158	16.02	15.62	609	669.9	East split of emplacement drift #16
188	317	417	0.044492		17 cms	0.044492	0.0158	16.02	15.62	609	669.9	East split of emplacement drift #17
189	318	418	0.044492		17 cms	0.044492	0.0158	16.02	15.62	609	669.9	East split of emplacement drift #18
190	319	419	0.044492		17 cms	0.044492	0.0158	16.02	15.62	609	669.9	East split of emplacement drift #19
191	3195	4195	0.044492		17 cms	0.044492	0.0158	16.02	15.62	609	669.9	East split of standby drift #2
192	320	420	0.044492		17 cms	0.044492	0.0158	16.02	15.62	609	669.9	East split of emplacement drift #20
193	321	421	0.044492		17 cms	0.044492	0.0158	16.02	15.62	609	669.9	East split of emplacement drift #21
194	322	422	0.044492		17 cms	0.044492	0.0158	16.02	15.62	609	669.9	East split of emplacement drift #22
195	3225	4225	0.018444		20 cms	0.018444	0.0130	16.02	19.63	609	669.9	East split of cross block drift #2
196	323	423	0.044492		17 cms	0.044492	0.0158	16.02	15.62	609	669.9	East split of emplacement drift #23
197	324	424	0.044492		17 cms	0.044492	0.0158	16.02	15.62	609	669.9	East split of emplacement drift #24
198	325	425	0.044492		17 cms	0.044492	0.0158	16.02	15.62	609	669.9	East split of emplacement drift #25
199	326	426	0.044492		17 cms	0.044492	0.0158	16.02	15.62	609	669.9	East split of emplacement drift #26
200	327	427	0.044492		17 cms	0.044492	0.0158	16.02	15.62	609	669.9	East split of emplacement drift #27

70,000 MTU SR Repository Ventilation Network data input file												File H:\RJurani\Vnet\SR70k201.xls
	* Distances by A. Linden, via *Subsurface Facility Planning Layout in Support of ANL-SFS-MG-000001, REV 00.*											
Line No.	BRANCH		VNETPC Input (Ra+Rb)	Field Installed Regulator		Resistance (Ra) KPL/A^3	K factor (K)	Perimeter (P)	Area (A)	ACTUAL LENGTH * (L')	Adjusted Length (L) L'+10%	NOTES FOR BRANCH DESCRIPTION
	From	To		(Rb)	Notes							
			Ns^2/m^8	Ns^2/m^8		Ns^2/m^8	Kg/m^3	m	m^2	m	m	
201	328	428	0.044492		17 cms	0.044492	0.0158	16.02	15.62	609	669.9	East split of emplacement drift #28
202	329	429	0.044492		17 cms	0.044492	0.0158	16.02	15.62	609	669.9	East split of emplacement drift #29
203	21	3295	0.000601			0.000601	0.0046	22.05	36.17	255	280.5	Intake Shaft #2 east access drift
204	330	430	0.044492		17 cms	0.044492	0.0158	16.02	15.62	609	669.9	East split of emplacement drift #30
205	331	431	0.044492		17 cms	0.044492	0.0158	16.02	15.62	609	669.9	East split of emplacement drift #31
206	332	432	0.044492		17 cms	0.044492	0.0158	16.02	15.62	609	669.9	East split of emplacement drift #32
207	333	433	0.044492		17 cms	0.044492	0.0158	16.02	15.62	609	669.9	East split of emplacement drift #33
208	334	434	0.044492		17 cms	0.044492	0.0158	16.02	15.62	609	669.9	East split of emplacement drift #34
209	335	435	0.044492		17 cms	0.044492	0.0158	16.02	15.62	609	669.9	East split of emplacement drift #35
210	336	436	0.044492		17 cms	0.044492	0.0158	16.02	15.62	609	669.9	East split of emplacement drift #36
211	3365	4365	0.018444		20 cms	0.018444	0.0130	16.02	19.63	609	669.9	East split of cross block drift #3
212	337	437	0.044492		17 cms	0.044492	0.0158	16.02	15.62	609	669.9	East split of emplacement drift #37
213	338	438	0.044492		17 cms	0.044492	0.0158	16.02	15.62	609	669.9	East split of emplacement drift #38
214	339	439	0.044492		17 cms	0.044492	0.0158	16.02	15.62	609	669.9	East split of emplacement drift #39
215	340	440	0.044492		17 cms	0.044492	0.0158	16.02	15.62	609	669.9	East split of emplacement drift #40
216	341	441	0.044492		17 cms	0.044492	0.0158	16.02	15.62	609	669.9	East split of emplacement drift #41
217	342	442	0.044492		17 cms	0.044492	0.0158	16.02	15.62	609	669.9	East split of emplacement drift #42
218	3425	4425	0.028615		20 cms	0.028615	0.0130	14.76	16.50	609	669.9	East Split of OD #3
219	343	443	0.044492		17 cms	0.044492	0.0158	16.02	15.62	609	669.9	East split of emplacement drift #43
220	29	3435	0.000075			0.000075	0.0046	22.05	36.17	32	35.2	Intake Shaft #3 east access drift
221	344	444	0.044492		17 cms	0.044492	0.0158	16.02	15.62	609	669.9	East split of emplacement drift #44
222	345	445	0.044492		17 cms	0.044492	0.0158	16.02	15.62	609	669.9	East split of emplacement drift #45
223	346	446	0.044492		17 cms	0.044492	0.0158	16.02	15.62	609	669.9	East split of emplacement drift #46
224	347	447	0.044492		17 cms	0.044492	0.0158	16.02	15.62	609	669.9	East split of emplacement drift #47
225	348	448	0.044492		17 cms	0.044492	0.0158	16.02	15.62	609	669.9	East split of emplacement drift #48
226	349	449	0.044492		17 cms	0.044492	0.0158	16.02	15.62	609	669.9	East split of emplacement drift #49
227	350	450	0.044492		17 cms	0.044492	0.0158	16.02	15.62	609	669.9	East split of emplacement drift #50
228	351	451	0.044492		17 cms	0.044492	0.0158	16.02	15.62	609	669.9	East split of emplacement drift #51
229	352	452	0.044492		17 cms	0.044492	0.0158	16.02	15.62	609	669.9	East split of emplacement drift #52
230	8001	4001	0.009205		17 cms	0.009205	0.0158	16.02	15.62	126	138.6	West split of Test Drift #1 (799-399)
231	8002	4002	0.009863		17 cms	0.009863	0.0158	16.02	15.62	135	148.5	West split of Test Drift #2 (800-400)
232	801	401	0.012566		17 cms	0.012566	0.0158	16.02	15.62	172	189.2	West split of emplacment drift #1
233	8015	4015	0.008329		20 cms	0.008329	0.0130	16.02	19.63	275	302.5	West Split of OD #2
234	802	402	0.015488		17 cms	0.015488	0.0158	16.02	15.62	212	233.2	West split of emplacment drift #2
235	803	403	0.018338		17 cms	0.018338	0.0158	16.02	15.62	251	276.1	West split of emplacment drift #3
236	804	404	0.021187		17 cms	0.021187	0.0158	16.02	15.62	290	319.0	West split of emplacment drift #4
237	805	405	0.024109		17 cms	0.024109	0.0158	16.02	15.62	330	363.0	West split of emplacment drift #5
238	806	406	0.026958		17 cms	0.026958	0.0158	16.02	15.62	369	405.9	West split of emplacment drift #6
239	8065	4065	0.028347		17 cms	0.028347	0.0158	16.02	15.62	388	426.8	West split of standby drift #1
240	807	407	0.029808		17 cms	0.029808	0.0158	16.02	15.62	408	448.8	West split of emplacment drift #7
241	808	408	0.032657		17 cms	0.032657	0.0158	16.02	15.62	447	491.7	West split of emplacment drift #8
242	10	8085	0.002436			0.002436	0.0046	22.05	36.17	1033	1136.3	Intake Shaft #1 west access drift
243	809	409	0.035579		17 cms	0.035579	0.0158	16.02	15.62	487	535.7	West split of emplacment drift #9
244	8095	4095	0.015325		20 cms	0.015325	0.0130	16.02	19.63	506	556.6	West split of cross block drift #1
245	810	410	0.038429		17 cms	0.038429	0.0158	16.02	15.62	526	578.6	West split of emplacment drift #10
246	811	411	0.041278		17 cms	0.041278	0.0158	16.02	15.62	565	621.5	West split of emplacment drift #11
247	812	412	0.045369		17 cms	0.045369	0.0158	16.02	15.62	621	683.1	West split of emplacment drift #12
248	813	413	0.047853		17 cms	0.047853	0.0158	16.02	15.62	655	720.5	West split of emplacment drift #13
249	814	414	0.047853		17 cms	0.047853	0.0158	16.02	15.62	655	720.5	West split of emplacment drift #14
250	815	415	0.047853		17 cms	0.047853	0.0158	16.02	15.62	655	720.5	West split of emplacment drift #15

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	* Distances by A. Linden, via *Subsurface Facility Planning Layout in Support of ANL-SFS-MG-000001, REV 00.*											
Line No.	BRANCH		VNETPC Input (Ra+Rb)	Field Installed Regulator		Resistance (Ra) KPL/A^3	K factor (K)	Perimeter (P)	Area (A)	ACTUAL LENGTH * (L')	Adjusted Length (L) L'+10%	NOTES FOR BRANCH DESCRIPTION
	From	To		(Rb)	Notes							
			Ns^2/m^8	Ns^2/m^8		Ns^2/m^8	Kg/m^3	m	m^2	m	m	
251	816	416	0.047853		17 cms	0.047853	0.0158	16.02	15.62	655	720.5	West split of emplacment drift #16
252	817	417	0.047853		17 cms	0.047853	0.0158	16.02	15.62	655	720.5	West split of emplacment drift #17
253	818	418	0.047853		17 cms	0.047853	0.0158	16.02	15.62	655	720.5	West split of emplacment drift #18
254	819	419	0.047853		17 cms	0.047853	0.0158	16.02	15.62	655	720.5	West split of emplacment drift #19
255	8195	4195	0.047853		17 cms	0.047853	0.0158	16.02	15.62	655	720.5	West split of standby drift #2
256	820	420	0.047853		17 cms	0.047853	0.0158	16.02	15.62	655	720.5	West split of emplacment drift #20
257	821	421	0.047853		17 cms	0.047853	0.0158	16.02	15.62	655	720.5	West split of emplacment drift #21
258	822	422	0.047853		17 cms	0.047853	0.0158	16.02	15.62	655	720.5	West split of emplacment drift #22
259	8225	4225	0.019837		20 cms	0.019837	0.0130	16.02	19.63	655	720.5	West split of cross block drift #2
260	823	423	0.047853		17 cms	0.047853	0.0158	16.02	15.62	655	720.5	West split of emplacment drift #23
261	824	424	0.047853		17 cms	0.047853	0.0158	16.02	15.62	655	720.5	West split of emplacment drift #24
262	825	425	0.047853		17 cms	0.047853	0.0158	16.02	15.62	655	720.5	West split of emplacment drift #25
263	826	426	0.047853		17 cms	0.047853	0.0158	16.02	15.62	655	720.5	West split of emplacment drift #26
264	827	427	0.047853		17 cms	0.047853	0.0158	16.02	15.62	655	720.5	West split of emplacment drift #27
265	828	428	0.047853		17 cms	0.047853	0.0158	16.02	15.62	655	720.5	West split of emplacment drift #28
266	829	429	0.047853		17 cms	0.047853	0.0158	16.02	15.62	655	720.5	West split of emplacment drift #29
267	21	8295	0.002379			0.002379	0.0046	22.05	36.17	1009	1109.9	Intake Shaft #2 west access drift
268	830	430	0.047853		17 cms	0.047853	0.0158	16.02	15.62	655	720.5	West split of emplacment drift #30
269	831	431	0.047853		17 cms	0.047853	0.0158	16.02	15.62	655	720.5	West split of emplacment drift #31
270	832	432	0.047853		17 cms	0.047853	0.0158	16.02	15.62	655	720.5	West split of emplacment drift #32
271	833	433	0.046757		17 cms	0.046757	0.0158	16.02	15.62	640	704.0	West split of emplacment drift #33
272	834	434	0.045588		17 cms	0.045588	0.0158	16.02	15.62	624	686.4	West split of emplacment drift #34
273	835	435	0.044492		17 cms	0.044492	0.0158	16.02	15.62	609	669.9	West split of emplacment drift #35
274	836	436	0.043324		17 cms	0.043324	0.0158	16.02	15.62	593	652.3	West split of emplacment drift #36
275	8365	4365	0.017747		20 cms	0.017747	0.0130	16.02	19.63	586	644.6	West split of cross block drift #3
276	837	437	0.042228		17 cms	0.042228	0.0158	16.02	15.62	578	635.8	West split of emplacment drift #37
277	838	438	0.041132		17 cms	0.041132	0.0158	16.02	15.62	563	619.3	West split of emplacment drift #38
278	839	439	0.039963		17 cms	0.039963	0.0158	16.02	15.62	547	601.7	West split of emplacment drift #39
279	840	440	0.038867		17 cms	0.038867	0.0158	16.02	15.62	532	585.2	West split of emplacment drift #40
280	841	441	0.037771		17 cms	0.037771	0.0158	16.02	15.62	517	568.7	West split of emplacment drift #41
281	842	442	0.036602		17 cms	0.036602	0.0158	16.02	15.62	501	551.1	West split of emplacment drift #42
282	843	443	0.035506		17 cms	0.035506	0.0158	16.02	15.62	486	534.6	West split of emplacment drift #43
283	29	8435	0.002488			0.002488	0.0046	22.05	36.17	1055	1160.5	Intake Shaft #3 west access drift
284	844	444	0.034410		17 cms	0.034410	0.0158	16.02	15.62	471	518.1	West split of emplacment drift #44
285	845	445	0.033241		17 cms	0.033241	0.0158	16.02	15.62	455	500.5	West split of emplacment drift #45
286	846	446	0.032146		17 cms	0.032146	0.0158	16.02	15.62	440	484.0	West split of emplacment drift #46
287	847	447	0.031050		17 cms	0.031050	0.0158	16.02	15.62	425	467.5	West split of emplacment drift #47
288	848	448	0.029881		17 cms	0.029881	0.0158	16.02	15.62	409	449.9	West split of emplacment drift #48
289	849	449	0.028785		17 cms	0.028785	0.0158	16.02	15.62	394	433.4	West split of emplacment drift #49
290	850	450	0.027689		17 cms	0.027689	0.0158	16.02	15.62	379	416.9	West split of emplacment drift #50
291	851	451	0.026520		17 cms	0.026520	0.0158	16.02	15.62	363	399.3	West split of emplacment drift #51
292	852	452	0.025424		17 cms	0.025424	0.0158	16.02	15.62	348	382.8	West split of emplacment drift #52
293	2001	8001	0.000503			0.000503	0.0130	25.14	42.98	111	122.1	West turnout/air doors Test Drift #1 (199-799)
294	2002	8002	0.000503			0.000503	0.0130	25.14	42.98	111	122.1	West turnout/air doors Test Drift #2 (200-800)
295	201	801	0.000503			0.000503	0.0130	25.14	42.98	111	122.1	West turnout/air doors emplacement drift #1
296	2015	8015	0.040877			0.040877	0.0037	5.34	2.27	22	24.2	West raise of OD #2
297	202	802	0.000503			0.000503	0.0130	25.14	42.98	111	122.1	West turnout/air doors emplacement drift #2
298	203	803	0.000503			0.000503	0.0130	25.14	42.98	111	122.1	West turnout/air doors emplacement drift #3
299	204	804	0.000503			0.000503	0.0130	25.14	42.98	111	122.1	West turnout/air doors emplacement drift #4
300	205	805	0.000503			0.000503	0.0130	25.14	42.98	111	122.1	West turnout/air doors emplacement drift #5

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Line No.	BRANCH		VNETPC Input (Ra+Rb)	Field Installed Regulator		Resistance (Ra) KPL/A^3	K factor (K)	Perimeter (P)	Area (A)	ACTUAL LENGTH * (L')	Adjusted Length (L) L'+10%	NOTES FOR BRANCH DESCRIPTION
	From	To		(Rb)	Notes							
			Ns^2/m^8	Ns^2/m^8		Ns^2/m^8	Kg/m^3	m	m^2	m	m	
301	206	806	0.000503			0.000503	0.0130	25.14	42.98	111	122.1	West turnout/air doors emplacement drift #6
302	2065	8065	0.000503			0.000503	0.0130	25.14	42.98	111	122.1	West turnout/air doors standby drift #1
303	207	807	0.000503			0.000503	0.0130	25.14	42.98	111	122.1	West turnout/air doors emplacement drift #7
304	208	808	0.000503			0.000503	0.0130	25.14	42.98	111	122.1	West turnout/air doors emplacement drift #8
305	8085	2085	0.000503			0.000503	0.0130	25.14	42.98	111	122.1	Intake Shaft #1 west regulator/turnout
306	209	809	0.000503			0.000503	0.0130	25.14	42.98	111	122.1	West turnout/air doors emplacement drift #9
307	2095	8095	0.000503			0.000503	0.0130	25.14	42.98	111	122.1	West split of cross block drift #1
308	210	810	0.000503			0.000503	0.0130	25.14	42.98	111	122.1	West turnout/air doors emplacement drift #10
309	211	811	0.000503			0.000503	0.0130	25.14	42.98	111	122.1	West turnout/air doors emplacement drift #11
310	212	812	0.000421			0.000421	0.0130	25.14	42.98	93	102.3	West turnout/air doors emplacement drift #12
311	213	813	0.000344			0.000344	0.0130	25.14	42.98	76	83.6	West turnout/air doors emplacement drift #13
312	214	814	0.000344			0.000344	0.0130	25.14	42.98	76	83.6	West turnout/air doors emplacement drift #14
313	215	815	0.000344			0.000344	0.0130	25.14	42.98	76	83.6	West turnout/air doors emplacement drift #15
314	216	816	0.000344			0.000344	0.0130	25.14	42.98	76	83.6	West turnout/air doors emplacement drift #16
315	217	817	0.000344			0.000344	0.0130	25.14	42.98	76	83.6	West turnout/air doors emplacement drift #17
316	218	818	0.000344			0.000344	0.0130	25.14	42.98	76	83.6	West turnout/air doors emplacement drift #18
317	219	819	0.000344			0.000344	0.0130	25.14	42.98	76	83.6	West turnout/air doors emplacement drift #19
318	2195	8195	0.000344			0.000344	0.0130	25.14	42.98	76	83.6	West turnout/air doors standby drift #2
319	220	820	0.000344			0.000344	0.0130	25.14	42.98	76	83.6	West turnout/air doors emplacement drift #20
320	221	821	0.000344			0.000344	0.0130	25.14	42.98	76	83.6	West turnout/air doors emplacement drift #21
321	222	822	0.000344			0.000344	0.0130	25.14	42.98	76	83.6	West turnout/air doors emplacement drift #22
322	2225	8225	0.000344			0.000344	0.0130	25.14	42.98	76	83.6	West split of cross block drift #2
323	223	823	0.000344			0.000344	0.0130	25.14	42.98	76	83.6	West turnout/air doors emplacement drift #23
324	224	824	0.000344			0.000344	0.0130	25.14	42.98	76	83.6	West turnout/air doors emplacement drift #24
325	225	825	0.000344			0.000344	0.0130	25.14	42.98	76	83.6	West turnout/air doors emplacement drift #25
326	226	826	0.000344			0.000344	0.0130	25.14	42.98	76	83.6	West turnout/air doors emplacement drift #26
327	227	827	0.000344			0.000344	0.0130	25.14	42.98	76	83.6	West turnout/air doors emplacement drift #27
328	228	828	0.000344			0.000344	0.0130	25.14	42.98	76	83.6	West turnout/air doors emplacement drift #28
329	229	829	0.000344			0.000344	0.0130	25.14	42.98	76	83.6	West turnout/air doors emplacement drift #29
330	8295	2295	0.000344			0.000344	0.0130	25.14	42.98	76	83.6	Intake Shaft #2 west regulator/turnout
331	230	830	0.000344			0.000344	0.0130	25.14	42.98	76	83.6	West turnout/air doors emplacement drift #30
332	231	831	0.000344			0.000344	0.0130	25.14	42.98	76	83.6	West turnout/air doors emplacement drift #31
333	232	832	0.000331			0.000331	0.0130	25.14	42.98	73	80.3	West turnout/air doors emplacement drift #32
334	233	833	0.000331			0.000331	0.0130	25.14	42.98	73	80.3	West turnout/air doors emplacement drift #33
335	234	834	0.000331			0.000331	0.0130	25.14	42.98	73	80.3	West turnout/air doors emplacement drift #34
336	235	835	0.000331			0.000331	0.0130	25.14	42.98	73	80.3	West turnout/air doors emplacement drift #35
337	236	836	0.000331			0.000331	0.0130	25.14	42.98	73	80.3	West turnout/air doors emplacement drift #36
338	2365	8365	0.000331			0.000331	0.0130	25.14	42.98	73	80.3	West split of cross block drift #2
339	237	837	0.000331			0.000331	0.0130	25.14	42.98	73	80.3	West turnout/air doors emplacement drift #37
340	238	838	0.000331			0.000331	0.0130	25.14	42.98	73	80.3	West turnout/air doors emplacement drift #38
341	239	839	0.000331			0.000331	0.0130	25.14	42.98	73	80.3	West turnout/air doors emplacement drift #39
342	240	840	0.000331			0.000331	0.0130	25.14	42.98	73	80.3	West turnout/air doors emplacement drift #40
343	241	841	0.000331			0.000331	0.0130	25.14	42.98	73	80.3	West turnout/air doors emplacement drift #41
344	242	842	0.000331			0.000331	0.0130	25.14	42.98	73	80.3	West turnout/air doors emplacement drift #42
345	243	843	0.000331			0.000331	0.0130	25.14	42.98	73	80.3	West turnout/air doors emplacement drift #43
346	8435	2435	0.000331			0.000331	0.0130	25.14	42.98	73	80.3	Intake Shaft #3 west regulator/turnout
347	244	844	0.000331			0.000331	0.0130	25.14	42.98	73	80.3	West turnout/air doors emplacement drift #44
348	245	845	0.000331			0.000331	0.0130	25.14	42.98	73	80.3	West turnout/air doors emplacement drift #45
349	246	846	0.000331			0.000331	0.0130	25.14	42.98	73	80.3	West turnout/air doors emplacement drift #46
350	247	847	0.000331			0.000331	0.0130	25.14	42.98	73	80.3	West turnout/air doors emplacement drift #47

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	* Distances by A. Linden, via *Subsurface Facility Planning Layout in Support of ANL-SFS-MG-000001, REV 00.*											
Line No.	BRANCH		VNETPC Input (Ra+Rb)	Field Installed Regulator		Resistance (Ra) KPL/A^3	K factor (K)	Perimeter (P)	Area (A)	ACTUAL LENGTH * (L')	Adjusted Length (L) L'+10%	NOTES FOR BRANCH DESCRIPTION
	From	To		(Rb)	Notes							
			Ns^2/m^8	Ns^2/m^8		Ns^2/m^8	Kg/m^3	m	m^2	m	m	
351	248	848	0.000331			0.000331	0.0130	25.14	42.98	73	80.3	West turnout/air doors emplacement drift #48
352	249	849	0.000331			0.000331	0.0130	25.14	42.98	73	80.3	West turnout/air doors emplacement drift #49
353	250	850	0.000331			0.000331	0.0130	25.14	42.98	73	80.3	West turnout/air doors emplacement drift #50
354	251	851	0.000331			0.000331	0.0130	25.14	42.98	73	80.3	West turnout/air doors emplacement drift #51
355	252	852	0.000331			0.000331	0.0130	25.14	42.98	73	80.3	West turnout/air doors emplacement drift #52
356	600	200	0.005564			0.005564	0.0130	22.05	36.17	835	918.5	North Loop, Exhaust Main turnout to TD #1 (6000-199)
357	200	2001	0.000000			0.000000	0.0130	22.05	36.17	0	0.0	Dummy
358	2001	2002	0.000713			0.000713	0.0130	22.05	36.17	107	117.7	West Main between TD #1 and TD #2 (199-200)
359	2002	201	0.000713			0.000713	0.0130	22.05	36.17	107	117.7	West Main between TD #2 and ED #1 (200-201)
360	201	2015	0.000120			0.000120	0.0130	22.05	36.17	18	19.8	West Main between ED #1 and OD #2 raise
361	202	2015	0.000600			0.000600	0.0130	22.05	36.17	90	99.0	West Main between OD #2 raise and ED #2
362	203	202	0.000713			0.000713	0.0130	22.05	36.17	107	117.7	West Main between ED #2 and ED #3
363	204	203	0.000713			0.000713	0.0130	22.05	36.17	107	117.7	West Main between ED #3 and ED #4
364	205	204	0.000713			0.000713	0.0130	22.05	36.17	107	117.7	West Main between ED #4 and ED #5
365	206	205	0.000713			0.000713	0.0130	22.05	36.17	107	117.7	West Main between ED #5 and ED #6
366	2065	206	0.000360			0.000360	0.0130	22.05	36.17	54	59.4	West Main between ED #6 and SB #1
367	207	2065	0.000360			0.000360	0.0130	22.05	36.17	54	59.4	West Main between SB #1 and ED #7
368	208	207	0.000713			0.000713	0.0130	22.05	36.17	107	117.7	West Main between ED #7 and ED #8
369	2085	208	0.000360			0.000360	0.0130	22.05	36.17	54	59.4	West Main between ED #8 and Shaft #1 Access
370	2085	209	0.000360			0.000360	0.0130	22.05	36.17	54	59.4	West Main between Shaft #1 Access and ED #9
371	209	2095	0.000360			0.000360	0.0130	22.05	36.17	54	59.4	West Main between ED #9 and CB #1
372	2095	210	0.000360			0.000360	0.0130	22.05	36.17	54	59.4	West Main between CB #1 and ED #10
373	210	211	0.000713			0.000713	0.0130	22.05	36.17	107	117.7	West Main between ED #10 and ED #11
374	211	212	0.000700			0.000700	0.0130	22.05	36.17	105	115.5	West Main between ED #11 and ED #12
375	212	213	0.000626			0.000626	0.0130	22.05	36.17	94	103.4	West Main between ED #12 and ED #13
376	213	214	0.000580			0.000580	0.0130	22.05	36.17	87	95.7	West Main between ED #13 and ED #14
377	214	215	0.000580			0.000580	0.0130	22.05	36.17	87	95.7	West Main between ED #14 and ED #15
378	215	216	0.000580			0.000580	0.0130	22.05	36.17	87	95.7	West Main between ED #15 and ED #16
379	216	217	0.000580			0.000580	0.0130	22.05	36.17	87	95.7	West Main between ED #16 and ED #17
380	217	218	0.000580			0.000580	0.0130	22.05	36.17	87	95.7	West Main between ED #17 and ED #18
381	219	218	0.000580			0.000580	0.0130	22.05	36.17	87	95.7	West Main between ED #18 and ED #19
382	2195	219	0.000287			0.000287	0.0130	22.05	36.17	43	47.3	West Main between ED #19 and SB #2
383	220	2195	0.000287			0.000287	0.0130	22.05	36.17	43	47.3	West Main between SB #2 and ED #20
384	221	220	0.000580			0.000580	0.0130	22.05	36.17	87	95.7	West Main between ED #20 and ED #21
385	222	221	0.000580			0.000580	0.0130	22.05	36.17	87	95.7	West Main between ED #21 and ED #22
386	2225	222	0.000580			0.000580	0.0130	22.05	36.17	87	95.7	West Main between ED #22 and CB #2
387	223	2225	0.000287			0.000287	0.0130	22.05	36.17	43	47.3	West Main between CB #2 and ED #23
388	224	223	0.000287			0.000287	0.0130	22.05	36.17	43	47.3	West Main between ED #23 and ED #24
389	225	224	0.000580			0.000580	0.0130	22.05	36.17	87	95.7	West Main between ED #24 and ED #25
390	226	225	0.000580			0.000580	0.0130	22.05	36.17	87	95.7	West Main between ED #25 and ED #26
391	227	226	0.000580			0.000580	0.0130	22.05	36.17	87	95.7	West Main between ED #26 and ED #27
392	228	227	0.000580			0.000580	0.0130	22.05	36.17	87	95.7	West Main between ED #27 and ED #28
393	229	228	0.000580			0.000580	0.0130	22.05	36.17	87	95.7	West Main between ED #28 and ED #29
394	2295	229	0.000287			0.000287	0.0130	22.05	36.17	43	47.3	West Main between ED #29 and Shaft #2 Access
395	2295	230	0.000287			0.000287	0.0130	22.05	36.17	43	47.3	West Main between Shaft #2 Access and ED #30
396	230	231	0.000580			0.000580	0.0130	22.05	36.17	87	95.7	West Main between ED #30 and ED #31
397	231	232	0.000580			0.000580	0.0130	22.05	36.17	87	95.7	West Main between ED #31 and ED #32
398	232	233	0.000553			0.000553	0.0130	22.05	36.17	83	91.3	West Main between ED #32 and ED #33
399	233	234	0.000553			0.000553	0.0130	22.05	36.17	83	91.3	West Main between ED #33 and ED #34
400	234	235	0.000553			0.000553	0.0130	22.05	36.17	83	91.3	West Main between ED #34 and ED #35

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Line No.	BRANCH		VNETPC Input (Ra+Rb)	Field Installed Regulator		Resistance (Ra) KPL/A^3	K factor (K)	Perimeter (P)	Area (A)	ACTUAL LENGTH * (L')	Adjusted Length (L) L'+10%	NOTES FOR BRANCH DESCRIPTION
	From	To		(Rb)	Notes							
			Ns^2/m^8	Ns^2/m^8		Ns^2/m^8	Kg/m^3	m	m^2	m	m	
401	235	236	0.000553			0.000553	0.0130	22.05	36.17	83	91.3	West Main between ED #35 and ED #36
402	236	2365	0.000273			0.000273	0.0130	22.05	36.17	41	45.1	West Main between ED #36 and CB #3
403	237	2365	0.000273			0.000273	0.0130	22.05	36.17	41	45.1	West Main between CB #3 and ED #37
404	238	237	0.000553			0.000553	0.0130	22.05	36.17	83	91.3	West Main between ED #37 and ED #38
405	239	238	0.000553			0.000553	0.0130	22.05	36.17	83	91.3	West Main between ED #38 and ED #39
406	240	239	0.000553			0.000553	0.0130	22.05	36.17	83	91.3	West Main between ED #39 and ED #40
407	241	240	0.000553			0.000553	0.0130	22.05	36.17	83	91.3	West Main between ED #40 and ED #41
408	242	241	0.000553			0.000553	0.0130	22.05	36.17	83	91.3	West Main between ED #41 and ED #42
409	243	242	0.000553			0.000553	0.0130	22.05	36.17	83	91.3	West Main between ED #42 and ED #43
410	2435	243	0.000273			0.000273	0.0130	22.05	36.17	41	45.1	West Main between ED #43 and Shaft #3 Access
411	2435	244	0.000273			0.000273	0.0130	22.05	36.17	41	45.1	West Main between ED Shaft #3 Access and ED #44
412	244	245	0.000553			0.000553	0.0130	22.05	36.17	83	91.3	West Main between ED #44 and ED #45
413	245	246	0.000553			0.000553	0.0130	22.05	36.17	83	91.3	West Main between ED #45 and ED #46
414	246	247	0.000553			0.000553	0.0130	22.05	36.17	83	91.3	West Main between ED #46 and ED #47
415	247	248	0.000553			0.000553	0.0130	22.05	36.17	83	91.3	West Main between ED #47 and ED #48
416	248	249	0.000553			0.000553	0.0130	22.05	36.17	83	91.3	West Main between ED #48 and ED #49
417	249	250	0.000553			0.000553	0.0130	22.05	36.17	83	91.3	West Main between ED #49 and ED #50
418	250	251	0.000553			0.000553	0.0130	22.05	36.17	83	91.3	West Main between ED #50 and ED #51
419	252	251	0.000553			0.000553	0.0130	22.05	36.17	83	91.3	West Main between ED #51 and ED #52
420	2585	252	0.008250			0.008250	0.0111	22.05	36.17	1450	1595.0	South Loop Exhaust Main turnout to ED #52(6636-252)
421	6636	2585	0.000000			0.000000	0.0111	22.05	36.17	0	0.0	Dummy
422	4001	5001	0.042735			0.042735	0.0037	5.34	2.27	23	25.3	Vent Raise Test Drift #1 (399-499)
423	4002	5002	0.044593			0.044593	0.0037	5.34	2.27	24	26.4	Vent Raise Test Drift #2 (400-500)
424	401	501	0.044593			0.044593	0.0037	5.34	2.27	24	26.4	Vent Raise emplacement drift #1
425	4015	5015	0.079896			0.079896	0.0037	5.34	2.27	43	47.3	Vent Raise OD #2
426	402	502	0.044593			0.044593	0.0037	5.34	2.27	24	26.4	Vent Raise emplacement drift #2
427	403	503	0.046451			0.046451	0.0037	5.34	2.27	25	27.5	Vent Raise emplacement drift #3
428	404	504	0.046451			0.046451	0.0037	5.34	2.27	25	27.5	Vent Raise emplacement drift #4
429	405	505	0.046451			0.046451	0.0037	5.34	2.27	25	27.5	Vent Raise emplacement drift #5
430	406	506	0.046451			0.046451	0.0037	5.34	2.27	25	27.5	Vent Raise emplacement drift #6
431	4065	5065	0.046451			0.046451	0.0037	5.34	2.27	25	27.5	Vent Raise standby drift #1
432	407	507	0.046451			0.046451	0.0037	5.34	2.27	25	27.5	Vent Raise emplacement drift #7
433	408	508	0.046451			0.046451	0.0037	5.34	2.27	25	27.5	Vent Raise emplacement drift #8
434	409	509	0.046451			0.046451	0.0037	5.34	2.27	25	27.5	Vent Raise emplacement drift #9
435	4095	5095	0.046451			0.046451	0.0037	5.34	2.27	25	27.5	Vent Raise cross block drift #1
436	410	510	0.046451			0.046451	0.0037	5.34	2.27	25	27.5	Vent Raise emplacement drift #10
437	411	511	0.046451			0.046451	0.0037	5.34	2.27	25	27.5	Vent Raise emplacement drift #11
438	412	512	0.046451			0.046451	0.0037	5.34	2.27	25	27.5	Vent Raise emplacement drift #12
439	413	513	0.046451			0.046451	0.0037	5.34	2.27	25	27.5	Vent Raise emplacement drift #13
440	414	514	0.046451			0.046451	0.0037	5.34	2.27	25	27.5	Vent Raise emplacement drift #14
441	415	515	0.046451			0.046451	0.0037	5.34	2.27	25	27.5	Vent Raise emplacement drift #15
442	416	516	0.046451			0.046451	0.0037	5.34	2.27	25	27.5	Vent Raise emplacement drift #16
443	417	517	0.046451			0.046451	0.0037	5.34	2.27	25	27.5	Vent Raise emplacement drift #17
444	418	518	0.046451			0.046451	0.0037	5.34	2.27	25	27.5	Vent Raise emplacement drift #18
445	419	519	0.046451			0.046451	0.0037	5.34	2.27	25	27.5	Vent Raise emplacement drift #19
446	4195	5195	0.046451			0.046451	0.0037	5.34	2.27	25	27.5	Vent Raise standby drift #2
447	420	520	0.046451			0.046451	0.0037	5.34	2.27	25	27.5	Vent Raise emplacement drift #20
448	421	521	0.046451			0.046451	0.0037	5.34	2.27	25	27.5	Vent Raise emplacement drift #21
449	422	522	0.046451			0.046451	0.0037	5.34	2.27	25	27.5	Vent Raise emplacement drift #22
450	4225	5225	0.046451			0.046451	0.0037	5.34	2.27	25	27.5	Vent Raise cross block drift #2

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Line No.	BRANCH		VNETPC Input (Ra+Rb)	Field Installed Regulator		Resistance (Ra) KPL/A^3	K factor (K)	Perimeter (P)	Area (A)	ACTUAL LENGTH * (L')	Adjusted Length (L) L'+10%	NOTES FOR BRANCH DESCRIPTION
	From	To		(Rb)	Notes							
			Ns^2/m^8	Ns^2/m^8		Ns^2/m^8	Kg/m^3	m	m^2	m	m	
451	423	523	0.046451			0.046451	0.0037	5.34	2.27	25	27.5	Vent Raise emplacement drift #23
452	424	524	0.046451			0.046451	0.0037	5.34	2.27	25	27.5	Vent Raise emplacement drift #24
453	425	525	0.046451			0.046451	0.0037	5.34	2.27	25	27.5	Vent Raise emplacement drift #25
454	426	526	0.044593			0.044593	0.0037	5.34	2.27	24	26.4	Vent Raise emplacement drift #26
455	427	527	0.044593			0.044593	0.0037	5.34	2.27	24	26.4	Vent Raise emplacement drift #27
456	428	528	0.044593			0.044593	0.0037	5.34	2.27	24	26.4	Vent Raise emplacement drift #28
457	429	529	0.044593			0.044593	0.0037	5.34	2.27	24	26.4	Vent Raise emplacement drift #29
458	430	530	0.044593			0.044593	0.0037	5.34	2.27	24	26.4	Vent Raise emplacement drift #30
459	431	531	0.044593			0.044593	0.0037	5.34	2.27	24	26.4	Vent Raise emplacement drift #31
460	432	532	0.044593			0.044593	0.0037	5.34	2.27	24	26.4	Vent Raise emplacement drift #32
461	433	533	0.044593			0.044593	0.0037	5.34	2.27	24	26.4	Vent Raise emplacement drift #33
462	434	534	0.044593			0.044593	0.0037	5.34	2.27	24	26.4	Vent Raise emplacement drift #34
463	435	535	0.044593			0.044593	0.0037	5.34	2.27	24	26.4	Vent Raise emplacement drift #35
464	436	536	0.044593			0.044593	0.0037	5.34	2.27	24	26.4	Vent Raise emplacement drift #36
465	4365	5365	0.044593			0.044593	0.0037	5.34	2.27	24	26.4	Vent Raise cross block drift #3
466	437	537	0.044593			0.044593	0.0037	5.34	2.27	24	26.4	Vent Raise emplacement drift #37
467	438	538	0.044593			0.044593	0.0037	5.34	2.27	24	26.4	Vent Raise emplacement drift #38
468	439	539	0.044593			0.044593	0.0037	5.34	2.27	24	26.4	Vent Raise emplacement drift #39
469	440	540	0.044593			0.044593	0.0037	5.34	2.27	24	26.4	Vent Raise emplacement drift #40
470	441	541	0.044593			0.044593	0.0037	5.34	2.27	24	26.4	Vent Raise emplacement drift #41
471	442	542	0.044593			0.044593	0.0037	5.34	2.27	24	26.4	Vent Raise emplacement drift #42
472	4425	5425	0.087328			0.087328	0.0037	5.34	2.27	47	51.7	Vent Raise OD #3
473	443	543	0.044593			0.044593	0.0037	5.34	2.27	24	26.4	Vent Raise emplacement drift #43
474	444	544	0.044593			0.044593	0.0037	5.34	2.27	24	26.4	Vent Raise emplacement drift #44
475	445	545	0.044593			0.044593	0.0037	5.34	2.27	24	26.4	Vent Raise emplacement drift #45
476	446	546	0.044593			0.044593	0.0037	5.34	2.27	24	26.4	Vent Raise emplacement drift #46
477	447	547	0.044593			0.044593	0.0037	5.34	2.27	24	26.4	Vent Raise emplacement drift #47
478	448	548	0.044593			0.044593	0.0037	5.34	2.27	24	26.4	Vent Raise emplacement drift #48
479	449	549	0.044593			0.044593	0.0037	5.34	2.27	24	26.4	Vent Raise emplacement drift #49
480	450	550	0.044593			0.044593	0.0037	5.34	2.27	24	26.4	Vent Raise emplacement drift #50
481	451	551	0.044593			0.044593	0.0037	5.34	2.27	24	26.4	Vent Raise emplacement drift #51
482	452	552	0.044593			0.044593	0.0037	5.34	2.27	24	26.4	Vent Raise emplacement drift #52
483	600	6000	0.503638	0.5	Door	0.003638	0.0130	22.05	36.17	546	600.6	Service Main from North Loop (6000-559)
484	6000	6001	0.000000			0.000000	0.0130	17.09	17.07	0	0.0	Dummy
485	6001	6005	0.002653			0.002653	0.0130	17.09	17.07	54	59.4	Service Main from TD #1 to OD #1 (599-5995)
486	6005	6002	0.002358			0.002358	0.0130	17.09	17.07	48	52.8	Service Main from OD #1 to TD #2 (5995-600)
487	6002	601	0.004324			0.004324	0.0130	17.09	17.07	88	96.8	Service Main from TD #2 to ED #1 (600-601)
488	601	6015	0.002113			0.002113	0.0130	17.09	17.07	43	47.3	Service Main from ED #1 to OD #2
489	6015	602	0.002113			0.002113	0.0130	17.09	17.07	43	47.3	Service Main from OD #2 to ED #2
490	602	603	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Service Main from ED #2 to ED #3
491	603	604	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Service Main from ED #3 to Shaft connector (603-901)
492	604	6045	0.000000			0.000000	0.0130	17.09	17.07	0	0.0	Service Main from Shaft connector to ED #4 (604-901)
493	605	6045	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Service Main from ED #4 to ED #5 (605-604)
494	606	605	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Service Main from ED #5 to ED #6
495	6065	606	0.002113			0.002113	0.0130	17.09	17.07	43	47.3	Service Main from ED #6 to SB #1
496	607	6065	0.002113			0.002113	0.0130	17.09	17.07	43	47.3	Service Main from SB #1 to ED #2
497	608	607	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Service Main from ED #7 to ED #8
498	609	608	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Service Main from ED #8 to ED #9
499	609	6095	0.002113			0.002113	0.0130	17.09	17.07	43	47.3	Service Main from ED #9 to CB #1
500	6095	610	0.002113			0.002113	0.0130	17.09	17.07	43	47.3	Service Main from CB #2 to ED #10

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Line No.	BRANCH		VNETPC Input (Ra+Rb)	Field Installed Regulator		Resistance (Ra) KPL/A^3	K factor (K)	Perimeter (P)	Area (A)	ACTUAL LENGTH * (L')	Adjusted Length (L) L'+10%	NOTES FOR BRANCH DESCRIPTION
	From	To		(Rb)	Notes							
			Ns^2/m^8	Ns^2/m^8		Ns^2/m^8	Kg/m^3	m	m^2	m	m	
501	610	611	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Service Main from ED #10 to ED #11
502	611	612	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Service Main from ED #11 to ED #12
503	612	6125	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Service Main from ED #12 to ED #13 (612-613)
504	613	6125	0.000000			0.000000	0.0130	17.09	17.07	0	0.0	Service Main from ED #13 to shaft connection (613-903)
505	614	613	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Service Main from shaft connection to ED #14
506	615	614	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Service Main from ED #14 to ED #15
507	616	615	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Service Main from ED #15 to ED #16
508	617	616	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Service Main from ED #16 to ED #17
509	618	617	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Service Main from ED #17 to ED #18
510	619	618	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Service Main from ED #18 to ED #19
511	619	6195	0.002113			0.002113	0.0130	17.09	17.07	43	47.3	Service Main from ED #19 to SB #2
512	6195	620	0.002113			0.002113	0.0130	17.09	17.07	43	47.3	Service Main from SB #2 to ED #20
513	620	621	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Service Main from ED #20 to ED #21
514	621	622	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Service Main from ED #21 to shaft connection (621-905)
515	622	6224	0.000000			0.000000	0.0130	17.09	17.07	0	0.0	Service Main from Shaft connection to ED #22 (622-905)
516	6225	6224	0.002113			0.002113	0.0130	17.09	17.07	43	47.3	Service Main from ED #22 to CB #2 (6225-622)
517	623	6225	0.002113			0.002113	0.0130	17.09	17.07	43	47.3	Service Main from CB #2 to ED #23
518	624	623	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Service Main from ED #23 to ED #24
519	625	624	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Service Main from ED #24 to ED #25
520	626	625	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Service Main from ED #25 to ED #26
521	627	626	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Service Main from ED #26 to ED #27
522	628	627	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Service Main from ED #27 to ED #28 (267-628)
523	628	629	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Service Main from ED #28 to ED #29
524	629	630	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Service Main from ED #29 to ED #30
525	630	6305	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Service Main from ED #30 to ED #31 (630-631)
526	631	6305	0.000000			0.000000	0.0130	17.09	17.07	0	0.0	Service Main from ED #31 to shaft connection (631-907)
527	632	631	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Service Main from Shaft connection to ED #32 (632-907)
528	633	632	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Service Main from ED #32 to ED #33
529	634	633	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Service Main from ED #33 to ED #34
530	635	634	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Service Main from ED #34 to ED #35
531	636	635	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Service Main from ED #35 to ED #36
532	6365	636	0.002113			0.002113	0.0130	17.09	17.07	43	47.3	Service Main from ED #36 to CB #3
533	6365	637	0.002113			0.002113	0.0130	17.09	17.07	43	47.3	Service Main from CB #3 to ED #37
534	637	638	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Service Main from ED #37 to ED #38
535	638	639	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Service Main from ED #38 to ED #39
536	639	640	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Service Main from ED #39 to shaft connection (639-909)
537	640	6405	0.000000			0.000000	0.0130	17.09	17.07	0	0.0	Service Main from shaft connection to ED #40 (640-909)
538	641	6405	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Service Main from ED #40 to ED #41 (641-640)
539	642	641	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Service Main from ED #41 to ED #42
540	6425	642	0.002113			0.002113	0.0130	17.09	17.07	43	47.3	Service Main from ED #40 to OD #3
541	643	6425	0.002113			0.002113	0.0130	17.09	17.07	43	47.3	Service Main from OD #4 to ED #43
542	644	643	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Service Main from ED #43 to ED #44
543	644	645	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Service Main from ED #44 to ED #45 (645-645)
544	645	646	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Service Main from ED #45 to ED #46
545	646	647	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Service Main from ED #46 to ED #47
546	647	648	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Service Main from ED #47 to ED #48
547	648	6485	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Service Main from ED #48 to ED #49 (648-649)
548	649	6485	0.000000			0.000000	0.0130	17.09	17.07	0	0.0	Service Main from ED #49 to shaft connection (649-911)
549	650	649	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Service Main from ED #50 to shaft connection (650-911)
550	651	650	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Service Main from ED #50 to ED #51

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	From	To		(Rb)	Notes							
			Ns^2/m^8	Ns^2/m^8		Ns^2/m^8	Kg/m^3	m	m^2	m	m	
551	652	651	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Service Main from ED #51 to ED #52
552	6638	652	0.067853	0	Door Open	0.067853	0.0130	17.09	17.07	1381	1519.1	Service Main from ED #52 to South loop (6636-652)
553	6636	6638	0.000000			0.000000	0.0130	22.05	36.17	0	0.0	Dummy
554	6000	700	3.000000	3	Door Reg	0.000000	0.0130	17.09	17.07	0	0.0	Door to Exhaust Main
555	700	7001	0.000000			0.000000	0.0130	17.09	17.07	0	0.0	Dummy
556	5001	6001	225.000000	225	Door+Valve	0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve TD #1 to Service Main (499-599)
557	5002	6002	225.000000	225	Door+Valve	0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve TD #2 to Service Main (500-600)
558	501	601	225.000000	225	Door+Valve	0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #1 to Service Main
559	5015	6015	0.000000			0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve OD #2 to Service Main
560	502	602	225.000000	225	Door+Valve	0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #2 to Service Main
561	503	603	225.000000	225	Door+Valve	0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #3 to Service Main
562	504	604	225.000000	225	Door+Valve	0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #4 to Service Main
563	505	605	225.000000	225	Door+Valve	0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #5 to Service Main
564	506	606	225.000000	225	Door+Valve	0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #6 to Service Main
565	5065	6065	225.000000	225	Door+Valve	0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve SB #1 to Service Main
566	507	607	225.000000	225	Door+Valve	0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #7 to Service Main
567	508	608	225.000000	225	Door+Valve	0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #8 to Service Main
568	509	609	225.000000	225	Door+Valve	0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #9 to Service Main
569	5095	6095	0.000000			0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve CB #1 to Service Main
570	510	610	225.000000	225	Door+Valve	0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve EB #10 to Service Main
571	511	611	225.000000	225	Door+Valve	0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #11 to Service Main
572	512	612	225.000000	225	Door+Valve	0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #12 to Service Main
573	513	613	225.000000	225	Door+Valve	0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #13 to Service Main
574	514	614	225.000000	225	Door+Valve	0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #14 to Service Main
575	515	615	225.000000	225	Door+Valve	0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #15 to Service Main
576	516	616	225.000000	225	Door+Valve	0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #16 to Service Main
577	517	617	225.000000	225	Door+Valve	0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #17 to Service Main
578	518	618	225.000000	225	Door+Valve	0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #18 to Service Main
579	519	619	225.000000	225	Door+Valve	0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #19 to Service Main
580	5195	6195	225.000000	225	Door+Valve	0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve SB #2 to Service Main
581	520	620	225.000000	225	Door+Valve	0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #20 to Service Main
582	521	621	225.000000	225	Door+Valve	0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #21 to Service Main
583	522	622	225.000000	225	Door+Valve	0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #22 to Service Main
584	5225	6225	0.000000			0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve CB #2 to Service Main
585	523	623	225.000000	225	Door+Valve	0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #23 to Service Main
586	524	624	225.000000	225	Door+Valve	0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #24 to Service Main
587	525	625	225.000000	225	Door+Valve	0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #25 to Service Main
588	526	626	225.000000	225	Door+Valve	0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #26 to Service Main
589	527	627	225.000000	225	Door+Valve	0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #27 to Service Main
590	528	628	225.000000	225	Door+Valve	0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #28 to Service Main
591	529	629	225.000000	225	Door+Valve	0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #29 to Service Main
592	530	630	225.000000	225	Door+Valve	0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #30 to Service Main
593	531	631	225.000000	225	Door+Valve	0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #31 to Service Main
594	532	632	225.000000	225	Door+Valve	0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #32 to Service Main
595	533	633	225.000000	225	Door+Valve	0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #33 to Service Main
596	534	634	225.000000	225	Door+Valve	0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #34 to Service Main
597	535	635	225.000000	225	Door+Valve	0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #35 to Service Main
598	536	636	225.000000	225	Door+Valve	0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #36 to Service Main
599	5365	6365	0.000000			0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve CB #3 to Service Main
600	537	637	225.000000	225	Door+Valve	0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #37 to Service Main

70,000 MTU SR Repository Ventilation Network data input file												File H:\RJurani\Vnet\SR70k201.xls
	* Distances by A. Linden, via *Subsurface Facility Planning Layout in Support of ANL-SFS-MG-000001, REV 00.*											
Line No.	BRANCH		VNETPC Input (Ra+Rb)	Field Installed Regulator		Resistance (Ra) KPL/A^3	K factor (K)	Perimeter (P)	Area (A)	ACTUAL LENGTH * (L')	Adjusted Length (L) L'+10%	NOTES FOR BRANCH DESCRIPTION
	From	To		(Rb)	Notes							
			Ns^2/m^8	Ns^2/m^8		Ns^2/m^8	Kg/m^3	m	m^2	m	m	
601	538	638	225.000000	225	Door+Valve	0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #38 to Service Main
602	539	639	225.000000	225	Door+Valve	0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #39 to Service Main
603	540	640	225.000000	225	Door+Valve	0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #40 to Service Main
604	541	641	225.000000	225	Door+Valve	0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #41 to Service Main
605	542	642	225.000000	225	Door+Valve	0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #42 to Service Main
606	5425	6425	0.000000			0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve OD #3 to Service Main
607	543	643	225.000000	225	Door+Valve	0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #43 to Service Main
608	544	644	225.000000	225	Door+Valve	0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #44 to Service Main
609	545	645	225.000000	225	Door+Valve	0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #45 to Service Main
610	546	646	225.000000	225	Door+Valve	0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #46 to Service Main
611	547	647	225.000000	225	Door+Valve	0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #47 to Service Main
612	548	648	225.000000	225	Door+Valve	0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #48 to Service Main
613	549	649	225.000000	225	Door+Valve	0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #49 to Service Main
614	550	650	225.000000	225	Door+Valve	0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #50 to Service Main
615	551	651	225.000000	225	Door+Valve	0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #51 to Service Main
616	552	652	225.000000	225	Door+Valve	0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #52 to Service Main
617	5001	7001	0.000000			0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve TD #1 to Exhaust Main (499-699)
618	5002	7002	0.000000			0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve TD #2 to Exhaust Main (500-700)
619	501	701	0.000000			0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #1 to Exhaust Main
620	5015	7015	225.000000	225		0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve OD #2 to Exhaust Main
621	502	702	0.000000			0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #2 to Exhaust Main
622	503	703	0.000000			0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #3 to Exhaust Main
623	504	704	0.000000			0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #4 to Exhaust Main
624	505	705	0.000000			0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #5 to Exhaust Main
625	506	706	0.000000			0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #6 to Exhaust Main
626	5065	7065	0.000000			0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve SB #1 to Exhaust Main
627	507	707	0.000000			0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #7 to Exhaust Main
628	508	708	0.000000			0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #8 to Exhaust Main
629	509	709	0.000000			0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #9 to Exhaust Main
630	5095	7095	225.000000	225	Door+Valve	0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve CB #1 to Exhaust Main
631	510	710	0.000000			0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #10 to Exhaust Main
632	511	711	0.000000			0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #11 to Exhaust Main
633	512	712	0.000000			0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #12 to Exhaust Main
634	513	713	0.000000			0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #13 to Exhaust Main
635	514	714	0.000000			0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #14 to Exhaust Main
636	515	715	0.000000			0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #15 to Exhaust Main
637	516	716	0.000000			0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #16 to Exhaust Main
638	517	717	0.000000			0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #17 to Exhaust Main
639	518	718	0.000000			0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #18 to Exhaust Main
640	519	719	0.000000			0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #19 to Exhaust Main
641	5195	7195	0.000000			0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve SB #2 to Exhaust Main
642	520	720	0.000000			0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #1 to Exhaust Main
643	521	721	0.000000			0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #21 to Exhaust Main
644	522	722	0.000000			0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #22 to Exhaust Main
645	5225	7225	225.000000	225	Door+Valve	0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve CB #2 to Exhaust Main
646	523	723	0.000000			0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #1 to Exhaust Main
647	524	724	0.000000			0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #24 to Exhaust Main
648	525	725	0.000000			0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #25 to Exhaust Main
649	526	726	0.000000			0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #26 to Exhaust Main
650	527	727	0.000000			0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #27 to Exhaust Main

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	* Distances by A. Linden, via *Subsurface Facility Planning Layout in Support of ANL-SFS-MG-000001, REV 00.*											
Line No.	BRANCH		VNETPC Input (Ra+Rb)	Field Installed Regulator		Resistance (Ra) KPL/A^3	K factor (K)	Perimeter (P)	Area (A)	ACTUAL LENGTH * (L')	Adjusted Length (L) L'+10%	NOTES FOR BRANCH DESCRIPTION
	From	To		(Rb)	Notes							
			Ns^2/m^8	Ns^2/m^8		Ns^2/m^8	Kg/m^3	m	m^2	m	m	
651	528	728	0.000000			0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #28 to Exhaust Main
652	529	729	0.000000			0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #298 to Exhaust Main
653	530	730	0.000000			0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #30 to Exhaust Main
654	531	731	0.000000			0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #31 to Exhaust Main
655	532	732	0.000000			0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #32 to Exhaust Main
656	533	733	0.000000			0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #33 to Exhaust Main
657	534	734	0.000000			0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #34 to Exhaust Main
658	535	735	0.000000			0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #35 to Exhaust Main
659	536	736	0.000000			0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #36 to Exhaust Main
660	5365	7365	225.000000	225	Door+Valve	0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve CB #3 to Exhaust Main
661	537	737	0.000000			0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #37 to Exhaust Main
662	538	738	0.000000			0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #38 to Exhaust Main
663	539	739	0.000000			0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #39 to Exhaust Main
664	540	740	0.000000			0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #40 to Exhaust Main
665	541	741	0.000000			0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #41 to Exhaust Main
666	542	742	0.000000			0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #42 to Exhaust Main
667	5425	7425	225.000000	225	Door+Valve	0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve OD #3 to Exhaust Main
668	543	743	0.000000			0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #43 to Exhaust Main
669	544	744	0.000000			0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #44 to Exhaust Main
670	545	745	0.000000			0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #45 to Exhaust Main
671	546	746	0.000000			0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #46 to Exhaust Main
672	547	747	0.000000			0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #47 to Exhaust Main
673	548	748	0.000000			0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #48 to Exhaust Main
674	549	749	0.000000			0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #49 to Exhaust Main
675	550	750	0.000000			0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #50 to Exhaust Main
676	551	751	0.000000			0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #51 to Exhaust Main
677	552	752	0.000000			0.000000	0.0046	5.27	2.21	0	0.0	Raise/valve ED #52 to Exhaust Main
678	7001	7005	0.002653			0.002653	0.0130	17.09	17.07	54	59.4	Exhaust Main from TD #1 to OD #1 (699-6995)
679	7005	7002	0.002358			0.002358	0.0130	17.09	17.07	48	52.8	Exhaust Main from OD #1 to TD #2 (6995-700)
680	7002	701	0.004324			0.004324	0.0130	17.09	17.07	88	96.8	Exhaust Main from TD #2 to ED #1 (700-701)
681	701	7015	0.002113			0.002113	0.0130	17.09	17.07	43	47.3	Exhaust Main from ED #1 to OD #2
682	7015	702	0.002113			0.002113	0.0130	17.09	17.07	43	47.3	Exhaust Main from OD #2 to ED #2
683	702	703	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Exhaust Main from ED #2 to ED #3
684	703	704	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Exhaust Main from ED #3 to shaft connection (703-902)
685	704	7045	0.000000			0.000000	0.0130	17.09	17.07	0	0.0	Exhaust Main from shaft connection ED #4 (704-902)
686	705	7045	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Exhaust Main from ED #4 to ED #5 (705-704)
687	706	705	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Exhaust Main from ED #5 to ED #6
688	7065	706	0.002113			0.002113	0.0130	17.09	17.07	43	47.3	Exhaust Main from ED #6 to SB #1
689	707	7065	0.002113			0.002113	0.0130	17.09	17.07	43	47.3	Exhaust Main from SB #1 to ED #7
690	708	707	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Exhaust Main from ED #7 to ED #8
691	709	708	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Exhaust Main from ED #8 to ED #9
692	709	7095	0.002113			0.002113	0.0130	17.09	17.07	43	47.3	Exhaust Main from ED #9 to CB #1
693	7095	710	0.002113			0.002113	0.0130	17.09	17.07	43	47.3	Exhaust Main from CB #1 to ED #10
694	710	711	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Exhaust Main from ED #10 to ED #11
695	711	712	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Exhaust Main from ED #11 to ED #12
696	712	7125	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Exhaust Main from ED #12 to ED #13 (712-713)
697	713	7125	0.000000			0.000000	0.0130	17.09	17.07	0	0.0	Exhaust Main from ED #13 to shaft connection (713-904)
698	714	713	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Exhaust Main from shaft connection to ED #14 (714-904)
699	715	714	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Exhaust Main from ED #14 to ED #15
700	716	715	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Exhaust Main from ED #15 to ED #16

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Line No.	BRANCH		VNETPC Input (Ra+Rb)	Field Installed Regulator		Resistance (Ra) KPL/A^3	K factor (K)	Perimeter (P)	Area (A)	ACTUAL LENGTH * (L')	Adjusted Length (L) L'+10%	NOTES FOR BRANCH DESCRIPTION
	From	To		(Rb)	Notes							
			Ns^2/m^8	Ns^2/m^8		Ns^2/m^8	Kg/m^3	m	m^2	m	m	
701	717	716	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Exhaust Main from ED #16 to ED #17
702	718	717	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Exhaust Main from ED #17 to ED #18
703	719	718	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Exhaust Main from ED #18 to ED #19
704	719	7195	0.002113			0.002113	0.0130	17.09	17.07	43	47.3	Exhaust Main from ED #19 to SB #2
705	7195	720	0.002113			0.002113	0.0130	17.09	17.07	43	47.3	Exhaust Main from SB #2 to ED #20
706	720	721	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Exhaust Main from ED #20 to ED #21
707	721	722	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Exhaust Main from ED #21 to shaft connection (721-906)
708	722	7224	0.000000			0.000000	0.0130	17.09	17.07	0	0.0	Exhaust Main from shaft connection to ED #22 (722-906)
709	7225	7224	0.002113			0.002113	0.0130	17.09	17.07	43	47.3	Exhaust Main from CB #2 to ED #22 (7225-722)
710	723	7225	0.002113			0.002113	0.0130	17.09	17.07	43	47.3	Exhaust Main from CB #2 to ED #23
711	724	723	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Exhaust Main from ED #23 to ED #24
712	725	724	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Exhaust Main from ED #24 to ED #25
713	726	725	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Exhaust Main from ED #25 to ED #26
714	727	726	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Exhaust Main from ED #26 to ED #27
715	727	728	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Exhaust Main from ED #27 to ED #28
716	728	729	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Exhaust Main from ED #28 to ED #29
717	729	730	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Exhaust Main from ED #29 to ED #30
718	730	7305	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Exhaust Main from ED #30 to ED #31 (730-731)
719	731	7305	0.000000			0.000000	0.0130	17.09	17.07	0	0.0	Exhaust Main from ED #31 to shaft connection (731-908)
720	732	731	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Exhaust Main from shaft connection to ED #32 (732-908)
721	733	732	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Exhaust Main from ED #32 to ED #33
722	734	733	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Exhaust Main from ED #33 to ED #34
723	735	734	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Exhaust Main from ED #34 to ED #35
724	736	735	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Exhaust Main from ED #35 to ED #36
725	7365	736	0.002113			0.002113	0.0130	17.09	17.07	43	47.3	Exhaust Main from ED #36 to CB #3
726	7365	737	0.002113			0.002113	0.0130	17.09	17.07	43	47.3	Exhaust Main from CB #3 to ED #37
727	737	738	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Exhaust Main from ED #37 to ED #38
728	738	739	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Exhaust Main from ED #38 to ED #39
729	739	740	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Exhaust Main from ED #39 to shaft connection (739-910)
730	740	7405	0.000000			0.000000	0.0130	17.09	17.07	0	0.0	Exhaust Main from shaft connection to ED #40 (740-910)
731	741	7405	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Exhaust Main from ED #40 to ED #41 (741-740)
732	742	741	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Exhaust Main from ED #41 to ED #42
733	7425	742	0.002113			0.002113	0.0130	17.09	17.07	43	47.3	Exhaust Main from ED #42 to OD #3
734	743	7425	0.002113			0.002113	0.0130	17.09	17.07	43	47.3	Exhaust Main from OD #3 to ED #43
735	744	743	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Exhaust Main from ED #43 to ED #44
736	745	744	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Exhaust Main from ED #44 to ED #45
737	745	746	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Exhaust Main from ED #45 to ED #46
738	746	747	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Exhaust Main from ED #46 to ED #47
739	747	748	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Exhaust Main from ED #47 to ED #48
740	748	7485	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Exhaust Main from ED #48 to ED #49 (748-749)
741	749	7485	0.000000			0.000000	0.0130	17.09	17.07	0	0.0	Exhaust Main from ED #49 to shaft connection (749-912)
742	750	749	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Exhaust Main from shaft connection to ED #50 (750-912)
743	751	750	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Exhaust Main from ED #50 to ED #51
744	752	751	0.004275			0.004275	0.0130	17.09	17.07	87	95.7	Exhaust Main from ED #51 to ED #52
745	7639	752	4.067853	4	Door Reg	0.067853	0.0130	17.09	17.07	1381	1519.1	Exhaust Main from ED #52 to South Loop
746	6638	7639	0.000000			0.000000	0.0130	17.09	17.07	0	0.0	Door Reg
747	6045	7045	1.000000	1	Door Reg	0.000000	0.0046	27.42	52.58	0	0.0	Door Regulator towards Exhaust Shaft #1 (901-902)
748	7045	2045	0.000000			0.000000	0.0046	27.42	52.58	0	0.0	Dummy
749	6125	7125	1.000000	1	Door Reg	0.000000	0.0046	27.42	52.58	0	0.0	Door Regulator towards Exhaust Shaft #1 (903-904)
750	7125	2125	0.000000			0.000000	0.0046	27.42	52.58	0	0.0	Dummy

70,000 MTU SR Repository Ventilation Network data input file												File H:\RJurani\Vnet\SR70k201.xls
	* Distances by A. Linden, via *Subsurface Facility Planning Layout in Support of ANL-SFS-MG-000001, REV 00.*											
Line No.	BRANCH		VNETPC Input (Ra+Rb)	Field Installed Regulator		Resistance (Ra) KPL/A^3	K factor (K)	Perimeter (P)	Area (A)	ACTUAL LENGTH * (L')	Adjusted Length (L) L'+10%	NOTES FOR BRANCH DESCRIPTION
	From	To		(Rb)	Notes							
			Ns^2/m^8	Ns^2/m^8		Ns^2/m^8	Kg/m^3	m	m^2	m	m	
751	6224	7224	0.010000	0.01	Door Reg	0.000000	0.0046	27.42	52.58	0	0.0	Door Regulator towards Exhaust Shaft #2 (905-906)
752	7224	2224	0.000000			0.000000	0.0046	27.42	52.58	0	0.0	Dummy
753	6305	7305	2.000000	2	Door Reg	0.000000	0.0046	27.42	52.58	0	0.0	Door Regulator towards Exhaust Shaft #2 (907-908)
754	7305	2305	0.000000			0.000000	0.0046	27.42	52.58	0	0.0	Dummy
755	6405	7405	0.050000	0.05	Door Reg	0.000000	0.0046	27.42	52.58	0	0.0	Door Regulator towards Exhaust Shaft #3 (909-910)
756	7405	2405	0.000000			0.000000	0.0046	27.42	52.58		0.0	Dummy
757	6485	7485	3.000000	3	Door Reg	0.000000	0.0046	27.42	52.58	0	0.0	Door Regulator towards Exhaust Shaft #3 (911-912)
758	7485	2485	0.000000			0.000000	0.0046	27.42	52.58		0.0	Dummy
759	2045	14	0.000186			0.000186	0.0046	27.42	52.58	195	214.5	Shaft connector drift, Exhaust Shaft #1 (902-14)
760	2125	14	0.000594			0.000594	0.0046	27.42	52.58	622	684.2	Shaft connector drift, Exhaust Shaft #1 (904-14)
761	2224	23	0.000425			0.000425	0.0046	27.42	52.58	445	489.5	Shaft connector drift, Exhaust Shaft #2 (906-23)
762	2305	23	0.000499			0.000499	0.0046	27.42	52.58	523	575.3	Shaft connector drift, Exhaust Shaft #2 (908-23)
763	2405	31	0.000331			0.000331	0.0046	27.42	52.58	347	381.7	Shaft connector drift, Exhaust Shaft #3 (910-31)
764	2485	31	0.000579			0.000579	0.0046	27.42	52.58	607	667.7	Shaft connector drift, Exhaust Shaft #3 (912-31)
765	64	63	0.000000			0.000000	0.0000	0.00	0.00	0	0.0	Surface Connector
766	63	13	0.000000			0.000000	0.0000	0.00	0.00	0	0.0	Surface Connector
767	13	12	0.000000			0.000000	0.0000	0.00	0.00	0	0.0	Surface Connector
768	12	62	0.000000			0.000000	0.0000	0.00	0.00	0	0.0	Surface Connector (63-62)
769	62	1	0.000000			0.000000	0.0000	0.00	0.00	0	0.0	Surface Connector
770	1	61	0.000000			0.000000	0.0000	0.00	0.00	0	0.0	Surface Connector
771	61	60	0.000000			0.000000	0.0000	0.00	0.00	0	0.0	Surface Connector
772	60	35	0.000000			0.000000	0.0000	0.00	0.00	0	0.0	Surface Connector
773	35	59	0.000000			0.000000	0.0000	0.00	0.00	0	0.0	Surface Connector
774	59	56	0.000000			0.000000	0.0000	0.00	0.00	0	0.0	Surface Connector (59-65)
775	56	65	0.000000			0.000000	0.0000	0.00	0.00	0	0.0	Surface Connector (64-64)
776	65	64	0.000000			0.000000	0.0000	0.00	0.00	0	0.0	Surface Connector

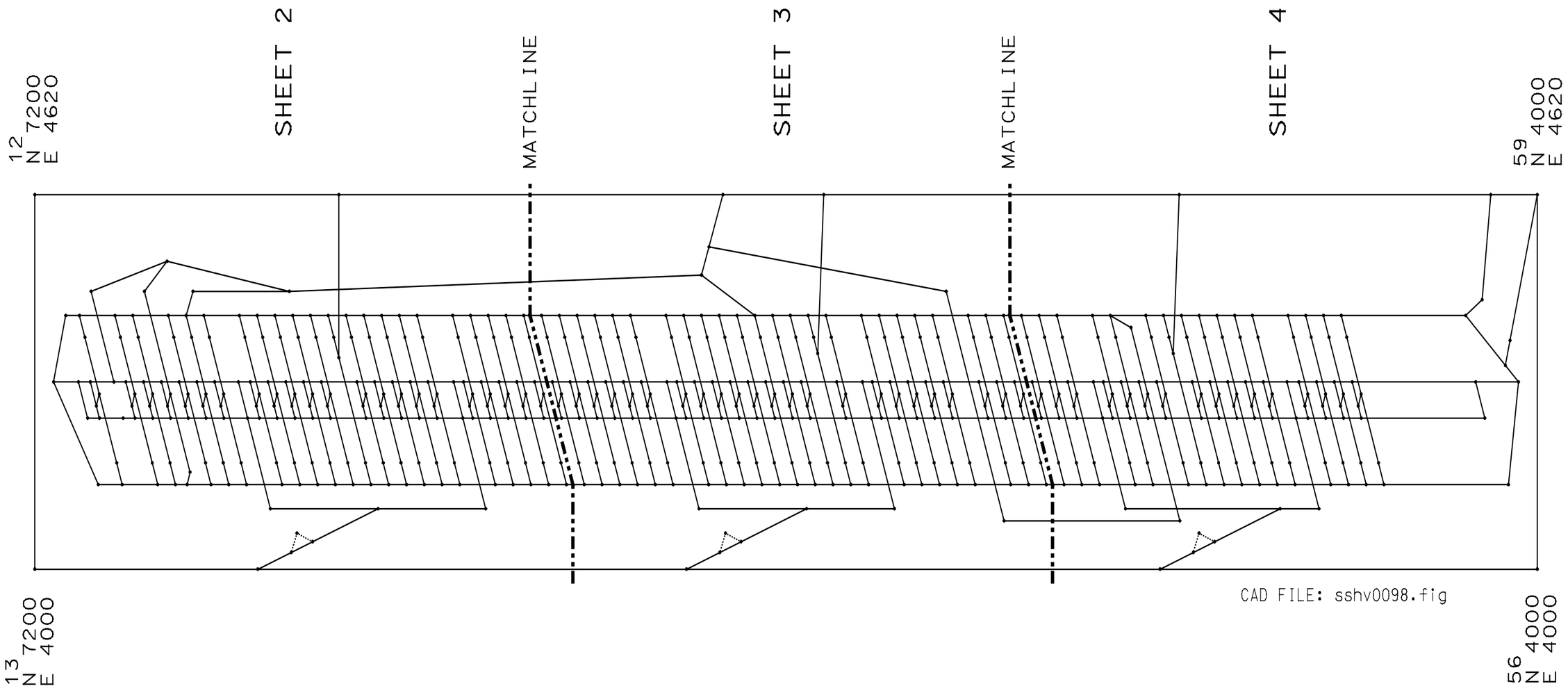

Figure I-1a. 70,000 MTU Airflow Network Nodes, Master Sheet

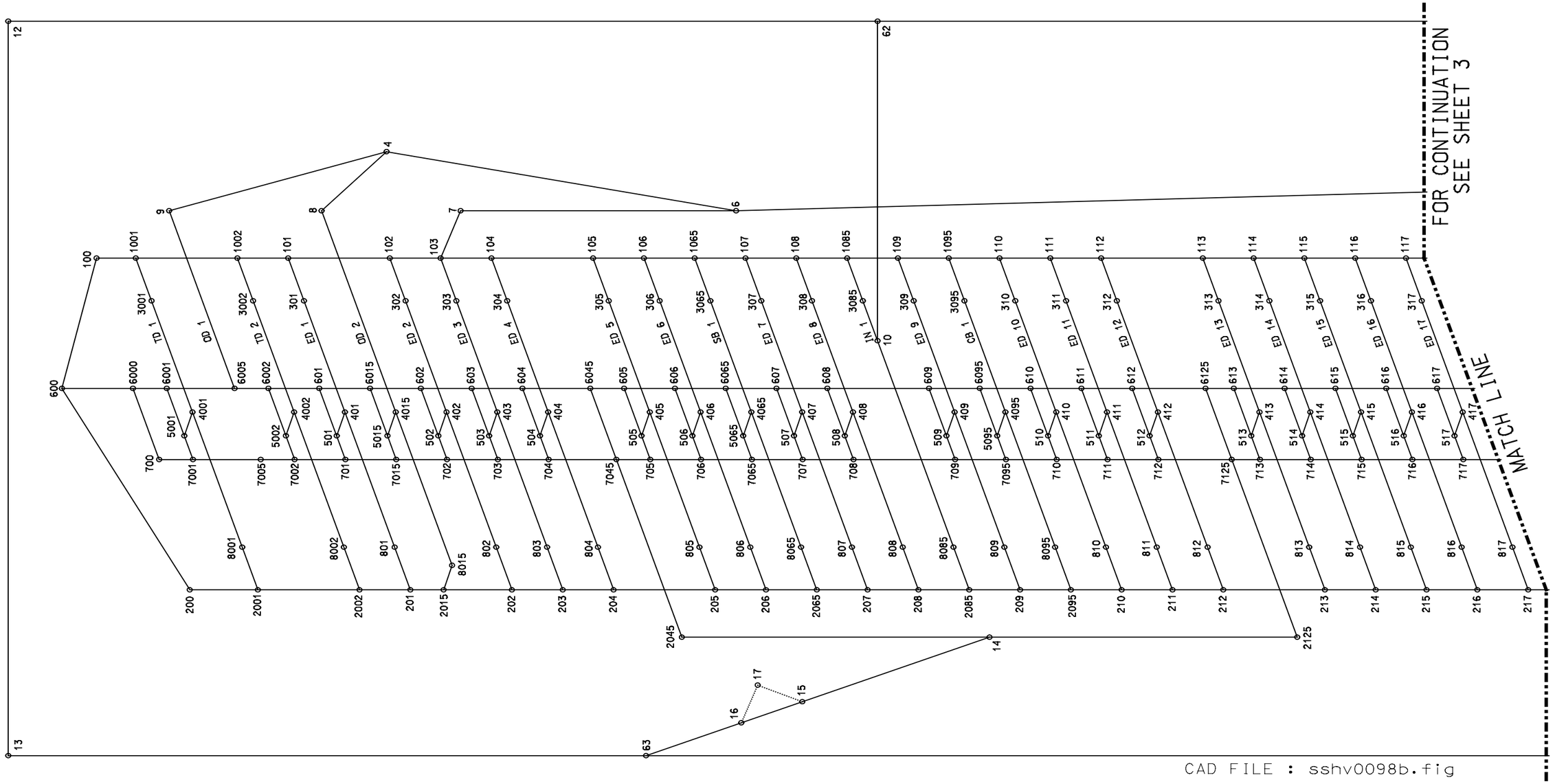

Figure I-1b. 70,000 MTU Airflow Network Diagram, Sheet 2

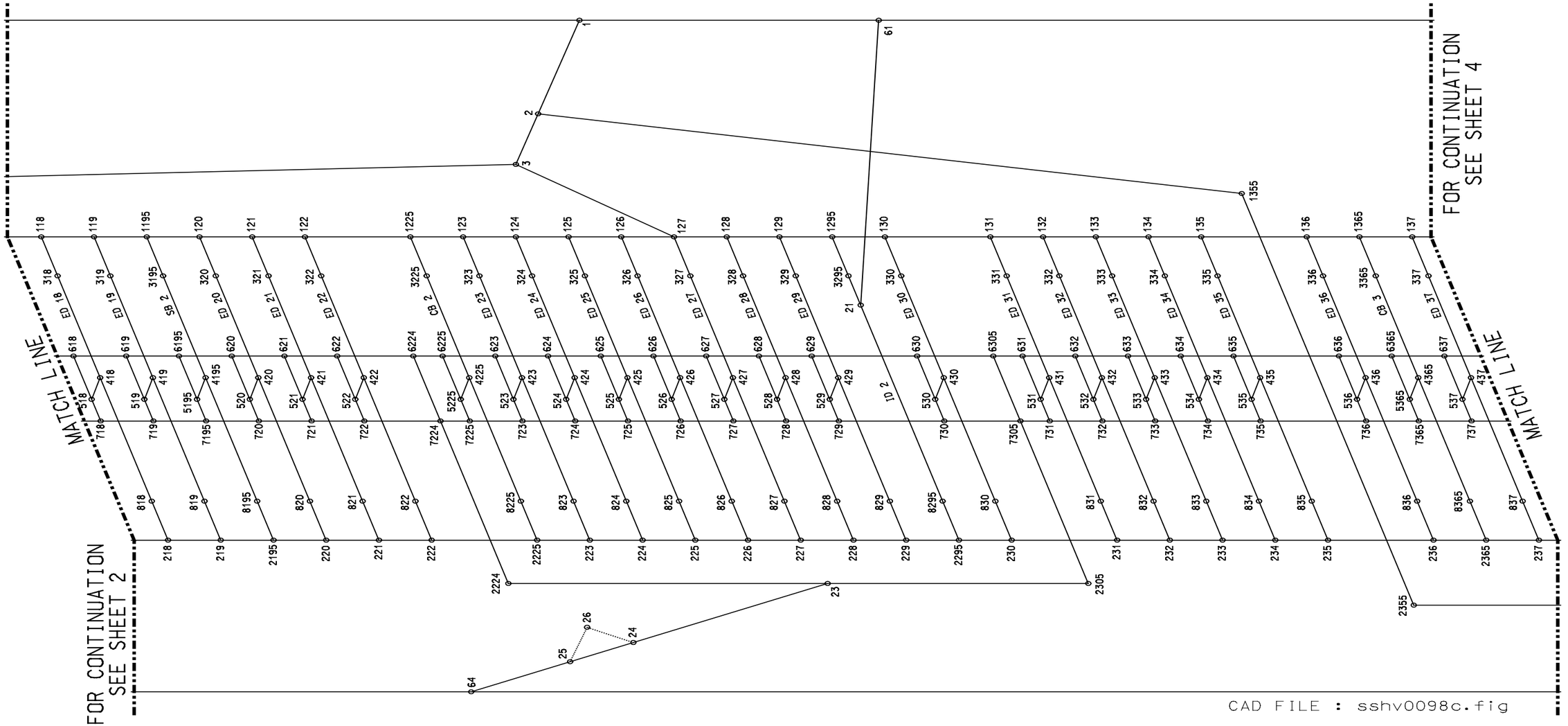

Figure I-1c. 70,000 MTU Airflow Network Diagram, Sheet 3

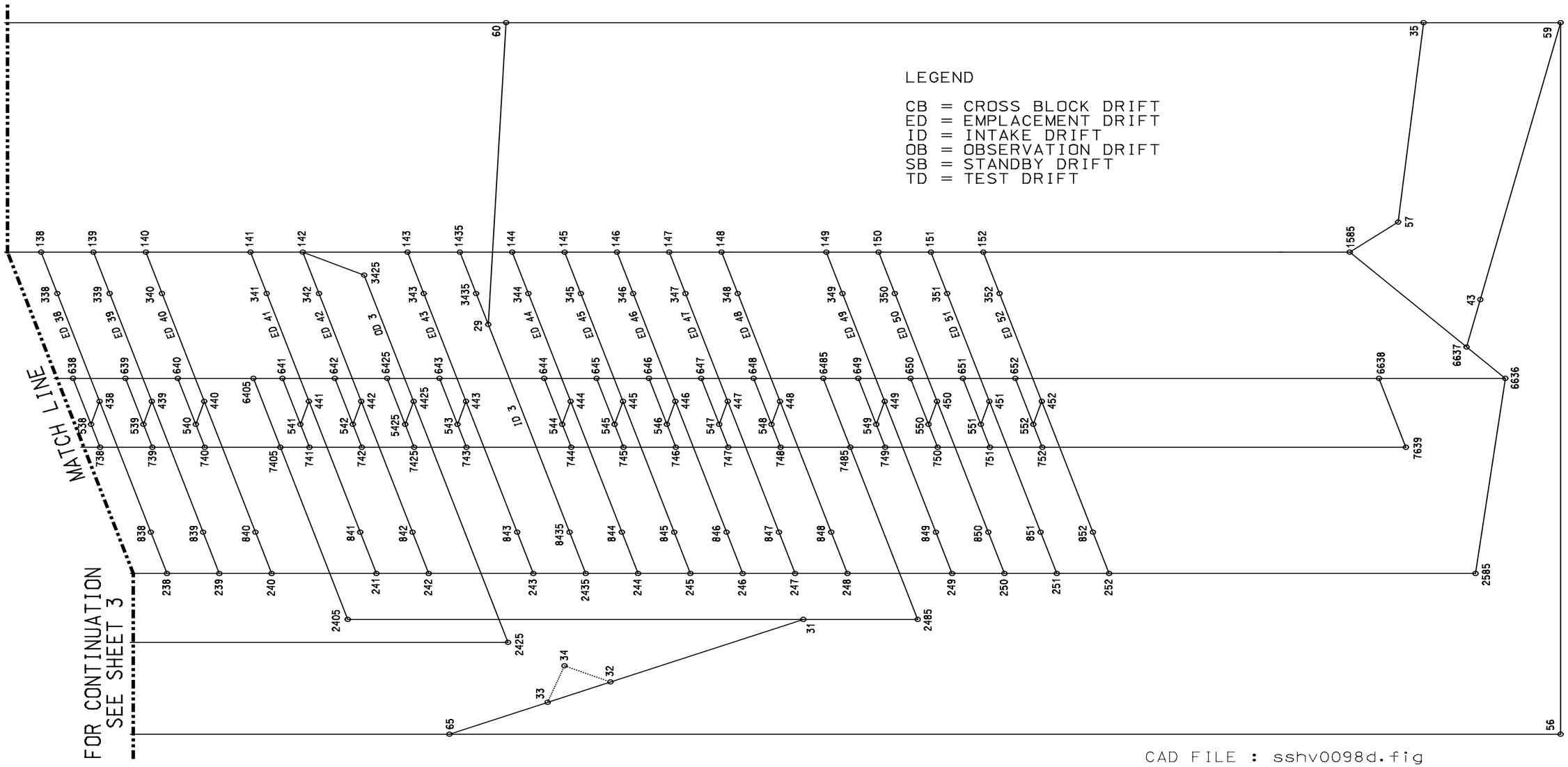

Figure I-1d. 70,000 MTU Airflow Network Diagram, Sheet 4

Attachment II

70,000 MTU VNETPC Airflow Network Calculation

Attachment II

70,000 MTU VNETPC Airflow Network Calculation

This attachment contains printouts from the VNETPC output file H:\RJURANI\VNET\SR70K201.VNW, 91 KB, 04/09/2001.

Fan efficiency is 70 percent (Section 3.2).
Power cost is 10 cents per kilowatt-hour (Section 3.1).
Fan locations and nodes are shown in Figures I-1a, I-1b, I-1c, and I-1d.

Total Fan Airflow = 757.59 + 757.59 + 757.59 = 2,272.77 m^3/s (4,815,599 cfm)

Conversion to metric is 1 m^3/s = 2,119 cfm. (Section 5.1.5)

Total Fan Horsepower = 2,611 + 2,614 + 2,614 = 7,833 Hp (5,841 kW)

The VNETPC program generated the output files are arranged in the following order:

Heading	VNTEPC output page number
Model Information	page 1
Branch Inputs	pages 2 - 15
Branch Results	pages 16 - 29
Fixed Quantities	page 30 - 32
Fan Input	pages 33 - 34
Fan Results	page 35
Jct. Relative Pressure	pages 36 – 45

SR 70kMTU 15cms Exhaust System
YMP Fixed Expanded Q on Empl. Dr.
BSC/R.S.Jurani
3 Exht Shafts, Exht Dr Part. @ Center

Avg. Fan Efficiency: 70.0 %
Cost of Power: 10.00 c/kWh
Reference Junction: 1
Units: SI

Number of Branches: 776
Number of Junctions: 565
Number of Fans: 3
Fixed Quantities: 126

Last Airflow Analysis
Date: 04/09/01
Time: 04:15 PM
Elapsed Time: 00:00:26

Number of Iterations: 2
Number of Errors: 0
Modified Since: NO

Branch No.	From	To	F Q i	Type	Branch Resistance (Ns^2/m^8)	Airflow (m^3/s)	Pressure Drop (Pa)	Friction Factor (kg/m^3)	Resistance per Length (R/1000m)
1	1	2		R	0.00572				
2	2	3		R	0.00056				
3	3	6		R	0.00483				
4	6	7		R	0.00120				
5	7	103		R	0.00000				
6	6	4		R	0.01611				
7	4	9		R	0.05848				
8	9	6005	Q	R	0.00000				
9	4	8		R	0.03928				
10	8	4015	Q	R	0.00000				
11	3	127		R	0.00160				
12	2	1355		R	0.12381				
13	1355	2355		R	0.00000				
14	2355	2425		R	0.00000				
15	2425	4425	Q	R	0.04201				
16	35	57		R	0.01278				
17	57	1585		R	0.00000				
18	60	29		R	0.00041				
19	61	21		R	0.00048				
20	62	10		R	0.00057				
21	14	15		R	0.00066				
22	15	16	F	R	0.00000				
23	16	63	Q	R	0.00110				
24	16	17		R	225.00000				
25	17	15		R	225.00000				
26	23	24		R	0.00066				
27	24	25	F	R	0.00000				
28	25	64	Q	R	0.00110				
29	25	26		R	225.00000				
30	26	24		R	225.00000				
31	31	32		R	0.00063				
32	32	33	F	R	0.00000				
33	33	65	Q	R	0.00110				
34	33	34		R	225.00000				
35	34	32		R	225.00000				
36	59	43		R	0.00042				
37	43	6637		R	0.00002				
38	6637	6636		R	0.00023				
39	1001	100		R	0.00000				
40	100	600		R	0.00281				
41	1002	1001		R	0.00060				
42	101	1002		R	0.00058				
43	102	101		R	0.00058				
44	103	102		R	0.00058				
45	104	103		R	0.00058				
46	105	104		R	0.00058				
47	106	105		R	0.00058				
48	1065	106		R	0.00029				
49	107	1065		R	0.00029				
50	108	107		R	0.00058				
51	1085	108		R	0.00029				
52	1085	109		R	0.00029				
53	109	1095		R	0.00029				
54	1095	110		R	0.00029				
55	110	111		R	0.00058				
56	111	112		R	0.00058				
57	112	113		R	0.00058				

Branch No.	From	To	F Q i	Type	Branch Resistance (Ns^2/m^8)	Airflow (m^3/s)	Pressure Drop (Pa)	Friction Factor (kg/m^3)	Resistance per Length (R/1000m)
58	113	114		R	0.00058				
59	114	115		R	0.00058				
60	115	116		R	0.00058				
61	116	117		R	0.00058				
62	118	117		R	0.00058				
63	119	118		R	0.00058				
64	1195	119		R	0.00029				
65	120	1195		R	0.00029				
66	121	120		R	0.00058				
67	122	121		R	0.00058				
68	1225	122		R	0.00029				
69	123	1225		R	0.00029				
70	124	123		R	0.00058				
71	125	124		R	0.00058				
72	126	125		R	0.00058				
73	127	126		R	0.00058				
74	128	127		R	0.00058				
75	129	128		R	0.00058				
76	1295	129		R	0.00029				
77	1295	130		R	0.00029				
78	130	131		R	0.00058				
79	131	132		R	0.00058				
80	132	133		R	0.00058				
81	133	134		R	0.00058				
82	134	135		R	0.00058				
83	135	136		R	0.00058				
84	136	1365		R	0.00029				
85	137	1365		R	0.00029				
86	138	137		R	0.00058				
87	139	138		R	0.00058				
88	140	139		R	0.00058				
89	141	140		R	0.00058				
90	142	141		R	0.00058				
91	143	142		R	0.00058				
92	1435	143		R	0.00029				
93	1435	144		R	0.00029				
94	144	145		R	0.00058				
95	145	146		R	0.00058				
96	146	147		R	0.00058				
97	147	148		R	0.00058				
98	148	149		R	0.00058				
99	149	150		R	0.00058				
100	150	151		R	0.00058				
101	152	151		R	0.00058				
102	1585	152		R	0.00413				
103	1585	6637		R	0.00541				
104	1001	3001		R	0.00035				
105	1002	3002		R	0.00036				
106	101	301		R	0.00036				
107	102	302		R	0.00036				
108	103	303		R	0.00036				
109	104	304		R	0.00036				
110	105	305		R	0.00036				
111	106	306		R	0.00036				
112	1065	3065		R	0.00036				
113	107	307		R	0.00036				
114	108	308		R	0.00036				

Branch No.	From	To	F Q i	Type	Branch Resistance (Ns^2/m^8)	Airflow (m^3/s)	Pressure Drop (Pa)	Friction Factor (kg/m^3)	Resistance per Length (R/1000m)
115	1085	3085		R	0.00036				
116	109	309		R	0.00036				
117	1095	3095		R	0.00036				
118	110	310		R	0.00036				
119	111	311		R	0.00036				
120	112	312		R	0.00036				
121	113	313		R	0.00036				
122	114	314		R	0.00036				
123	115	315		R	0.00036				
124	116	316		R	0.00036				
125	117	317		R	0.00036				
126	118	318		R	0.00036				
127	119	319		R	0.00036				
128	1195	3195		R	0.00036				
129	120	320		R	0.00036				
130	121	321		R	0.00036				
131	122	322		R	0.00036				
132	1225	3225		R	0.00036				
133	123	323		R	0.00036				
134	124	324		R	0.00036				
135	125	325		R	0.00036				
136	126	326		R	0.00036				
137	127	327		R	0.00036				
138	128	328		R	0.00036				
139	129	329		R	0.00036				
140	3295	1295		R	0.00036				
141	130	330		R	0.00036				
142	131	331		R	0.00036				
143	132	332		R	0.00036				
144	133	333		R	0.00036				
145	134	334		R	0.00036				
146	135	335		R	0.00036				
147	136	336		R	0.00036				
148	1365	3365		R	0.00036				
149	137	337		R	0.00036				
150	138	338		R	0.00036				
151	139	339		R	0.00036				
152	140	340		R	0.00036				
153	141	341		R	0.00036				
154	142	342		R	0.00036				
155	142	3425		R	0.14864				
156	143	343		R	0.00036				
157	3435	1435		R	0.00036				
158	144	344		R	0.00036				
159	145	345		R	0.00036				
160	146	346		R	0.00036				
161	147	347		R	0.00036				
162	148	348		R	0.00036				
163	149	349		R	0.00036				
164	150	350		R	0.00036				
165	151	351		R	0.00036				
166	152	352		R	0.00036				
167	3001	4001	Q	R	0.04172				
168	3002	4002	Q	R	0.04435				
169	301	401	Q	R	0.04449				
170	302	402	Q	R	0.04449				
171	303	403	Q	R	0.04449				

Branch No.	From	To	F Q i	Type	Branch Resistance (Ns^2/m^8)	Airflow (m^3/s)	Pressure Drop (Pa)	Friction Factor (kg/m^3)	Resistance per Length (R/1000m)
172	304	404	Q	R	0.04449				
173	305	405	Q	R	0.04449				
174	306	406	Q	R	0.04449				
175	3065	4065	Q	R	0.04449				
176	307	407	Q	R	0.04449				
177	308	408	Q	R	0.04449				
178	10	3085		R	0.00010				
179	309	409	Q	R	0.04449				
180	3095	4095	Q	R	0.01844				
181	310	410	Q	R	0.04449				
182	311	411	Q	R	0.04449				
183	312	412	Q	R	0.04449				
184	313	413	Q	R	0.04449				
185	314	414	Q	R	0.04449				
186	315	415	Q	R	0.04449				
187	316	416	Q	R	0.04449				
188	317	417	Q	R	0.04449				
189	318	418	Q	R	0.04449				
190	319	419	Q	R	0.04449				
191	3195	4195	Q	R	0.04449				
192	320	420	Q	R	0.04449				
193	321	421	Q	R	0.04449				
194	322	422	Q	R	0.04449				
195	3225	4225	Q	R	0.01844				
196	323	423	Q	R	0.04449				
197	324	424	Q	R	0.04449				
198	325	425	Q	R	0.04449				
199	326	426	Q	R	0.04449				
200	327	427	Q	R	0.04449				
201	328	428	Q	R	0.04449				
202	329	429	Q	R	0.04449				
203	21	3295		R	0.00060				
204	330	430	Q	R	0.04449				
205	331	431	Q	R	0.04449				
206	332	432	Q	R	0.04449				
207	333	433	Q	R	0.04449				
208	334	434	Q	R	0.04449				
209	335	435	Q	R	0.04449				
210	336	436	Q	R	0.04449				
211	3365	4365	Q	R	0.01844				
212	337	437	Q	R	0.04449				
213	338	438	Q	R	0.04449				
214	339	439	Q	R	0.04449				
215	340	440	Q	R	0.04449				
216	341	441	Q	R	0.04449				
217	342	442	Q	R	0.04449				
218	3425	4425	Q	R	0.02862				
219	343	443	Q	R	0.04449				
220	29	3435		R	0.00007				
221	344	444	Q	R	0.04449				
222	345	445	Q	R	0.04449				
223	346	446	Q	R	0.04449				
224	347	447	Q	R	0.04449				
225	348	448	Q	R	0.04449				
226	349	449	Q	R	0.04449				
227	350	450	Q	R	0.04449				
228	351	451	Q	R	0.04449				

Branch No.	From	To	F Q i	Type	Branch Resistance (Ns^2/m^8)	Airflow (m^3/s)	Pressure Drop (Pa)	Friction Factor (kg/m^3)	Resistance per Length (R/1000m)
229	352	452	Q	R	0.04449				
230	8001	4001	Q	R	0.00921				
231	8002	4002	Q	R	0.00986				
232	801	401	Q	R	0.01257				
233	8015	4015	Q	R	0.00833				
234	802	402	Q	R	0.01549				
235	803	403	Q	R	0.01834				
236	804	404	Q	R	0.02119				
237	805	405	Q	R	0.02411				
238	806	406	Q	R	0.02696				
239	8065	4065	Q	R	0.02835				
240	807	407	Q	R	0.02981				
241	808	408	Q	R	0.03266				
242	10	8085		R	0.00244				
243	809	409	Q	R	0.03558				
244	8095	4095	Q	R	0.01533				
245	810	410	Q	R	0.03843				
246	811	411	Q	R	0.04128				
247	812	412	Q	R	0.04537				
248	813	413	Q	R	0.04785				
249	814	414	Q	R	0.04785				
250	815	415	Q	R	0.04785				
251	816	416	Q	R	0.04785				
252	817	417	Q	R	0.04785				
253	818	418	Q	R	0.04785				
254	819	419	Q	R	0.04785				
255	8195	4195	Q	R	0.04785				
256	820	420	Q	R	0.04785				
257	821	421	Q	R	0.04785				
258	822	422	Q	R	0.04785				
259	8225	4225	Q	R	0.01984				
260	823	423	Q	R	0.04785				
261	824	424	Q	R	0.04785				
262	825	425	Q	R	0.04785				
263	826	426	Q	R	0.04785				
264	827	427	Q	R	0.04785				
265	828	428	Q	R	0.04785				
266	829	429	Q	R	0.04785				
267	21	8295		R	0.00238				
268	830	430	Q	R	0.04785				
269	831	431	Q	R	0.04785				
270	832	432	Q	R	0.04785				
271	833	433	Q	R	0.04676				
272	834	434	Q	R	0.04559				
273	835	435	Q	R	0.04449				
274	836	436	Q	R	0.04332				
275	8365	4365	Q	R	0.01775				
276	837	437	Q	R	0.04223				
277	838	438	Q	R	0.04113				
278	839	439	Q	R	0.03996				
279	840	440	Q	R	0.03887				
280	841	441	Q	R	0.03777				
281	842	442	Q	R	0.03660				
282	843	443	Q	R	0.03551				
283	29	8435		R	0.00249				
284	844	444	Q	R	0.03441				
285	845	445	Q	R	0.03324				

Branch No.	From	To	F Q i	Type	Branch Resistance (Ns^2/m^8)	Airflow (m^3/s)	Pressure Drop (Pa)	Friction Factor (kg/m^3)	Resistance per Length (R/1000m)
286	846	446	Q	R	0.03215				
287	847	447	Q	R	0.03105				
288	848	448	Q	R	0.02988				
289	849	449	Q	R	0.02879				
290	850	450	Q	R	0.02769				
291	851	451	Q	R	0.02652				
292	852	452	Q	R	0.02542				
293	2001	8001		R	0.00050				
294	2002	8002		R	0.00050				
295	201	801		R	0.00050				
296	2015	8015		R	0.04088				
297	202	802		R	0.00050				
298	203	803		R	0.00050				
299	204	804		R	0.00050				
300	205	805		R	0.00050				
301	206	806		R	0.00050				
302	2065	8065		R	0.00050				
303	207	807		R	0.00050				
304	208	808		R	0.00050				
305	8085	2085		R	0.00050				
306	209	809		R	0.00050				
307	2095	8095		R	0.00050				
308	210	810		R	0.00050				
309	211	811		R	0.00050				
310	212	812		R	0.00042				
311	213	813		R	0.00034				
312	214	814		R	0.00034				
313	215	815		R	0.00034				
314	216	816		R	0.00034				
315	217	817		R	0.00034				
316	218	818		R	0.00034				
317	219	819		R	0.00034				
318	2195	8195		R	0.00034				
319	220	820		R	0.00034				
320	221	821		R	0.00034				
321	222	822		R	0.00034				
322	2225	8225		R	0.00034				
323	223	823		R	0.00034				
324	224	824		R	0.00034				
325	225	825		R	0.00034				
326	226	826		R	0.00034				
327	227	827		R	0.00034				
328	228	828		R	0.00034				
329	229	829		R	0.00034				
330	8295	2295		R	0.00034				
331	230	830		R	0.00034				
332	231	831		R	0.00034				
333	232	832		R	0.00033				
334	233	833		R	0.00033				
335	234	834		R	0.00033				
336	235	835		R	0.00033				
337	236	836		R	0.00033				
338	2365	8365		R	0.00033				
339	237	837		R	0.00033				
340	238	838		R	0.00033				
341	239	839		R	0.00033				
342	240	840		R	0.00033				

Branch No.	From	To	F Q i	Type	Branch Resistance (Ns^2/m^8)	Airflow (m^3/s)	Pressure Drop (Pa)	Friction Factor (kg/m^3)	Resistance per Length (R/1000m)
343	241	841		R	0.00033				
344	242	842		R	0.00033				
345	243	843		R	0.00033				
346	8435	2435		R	0.00033				
347	244	844		R	0.00033				
348	245	845		R	0.00033				
349	246	846		R	0.00033				
350	247	847		R	0.00033				
351	248	848		R	0.00033				
352	249	849		R	0.00033				
353	250	850		R	0.00033				
354	251	851		R	0.00033				
355	252	852		R	0.00033				
356	600	200		R	0.00556				
357	200	2001		R	0.00000				
358	2001	2002		R	0.00071				
359	2002	201		R	0.00071				
360	201	2015		R	0.00012				
361	202	2015		R	0.00060				
362	203	202		R	0.00071				
363	204	203		R	0.00071				
364	205	204		R	0.00071				
365	206	205		R	0.00071				
366	2065	206		R	0.00036				
367	207	2065		R	0.00036				
368	208	207		R	0.00071				
369	2085	208		R	0.00036				
370	2085	209		R	0.00036				
371	209	2095		R	0.00036				
372	2095	210		R	0.00036				
373	210	211		R	0.00071				
374	211	212		R	0.00070				
375	212	213		R	0.00063				
376	213	214		R	0.00058				
377	214	215		R	0.00058				
378	215	216		R	0.00058				
379	216	217		R	0.00058				
380	217	218		R	0.00058				
381	219	218		R	0.00058				
382	2195	219		R	0.00029				
383	220	2195		R	0.00029				
384	221	220		R	0.00058				
385	222	221		R	0.00058				
386	2225	222		R	0.00058				
387	223	2225		R	0.00029				
388	224	223		R	0.00029				
389	225	224		R	0.00058				
390	226	225		R	0.00058				
391	227	226		R	0.00058				
392	228	227		R	0.00058				
393	229	228		R	0.00058				
394	2295	229		R	0.00029				
395	2295	230		R	0.00029				
396	230	231		R	0.00058				
397	231	232		R	0.00058				
398	232	233		R	0.00055				
399	233	234		R	0.00055				

Branch No.	From	To	F Q i	Type	Branch Resistance (Ns^2/m^8)	Airflow (m^3/s)	Pressure Drop (Pa)	Friction Factor (kg/m^3)	Resistance per Length (R/1000m)
400	234	235		R	0.00055				
401	235	236		R	0.00055				
402	236	2365		R	0.00027				
403	237	2365		R	0.00027				
404	238	237		R	0.00055				
405	239	238		R	0.00055				
406	240	239		R	0.00055				
407	241	240		R	0.00055				
408	242	241		R	0.00055				
409	243	242		R	0.00055				
410	2435	243		R	0.00027				
411	2435	244		R	0.00027				
412	244	245		R	0.00055				
413	245	246		R	0.00055				
414	246	247		R	0.00055				
415	247	248		R	0.00055				
416	248	249		R	0.00055				
417	249	250		R	0.00055				
418	250	251		R	0.00055				
419	252	251		R	0.00055				
420	2585	252		R	0.00825				
421	6636	2585		R	0.00000				
422	4001	5001		R	0.04274				
423	4002	5002		R	0.04459				
424	401	501		R	0.04459				
425	4015	5015		R	0.07990				
426	402	502		R	0.04459				
427	403	503		R	0.04645				
428	404	504		R	0.04645				
429	405	505		R	0.04645				
430	406	506		R	0.04645				
431	4065	5065		R	0.04645				
432	407	507		R	0.04645				
433	408	508		R	0.04645				
434	409	509		R	0.04645				
435	4095	5095		R	0.04645				
436	410	510		R	0.04645				
437	411	511		R	0.04645				
438	412	512		R	0.04645				
439	413	513		R	0.04645				
440	414	514		R	0.04645				
441	415	515		R	0.04645				
442	416	516		R	0.04645				
443	417	517		R	0.04645				
444	418	518		R	0.04645				
445	419	519		R	0.04645				
446	4195	5195		R	0.04645				
447	420	520		R	0.04645				
448	421	521		R	0.04645				
449	422	522		R	0.04645				
450	4225	5225		R	0.04645				
451	423	523		R	0.04645				
452	424	524		R	0.04645				
453	425	525		R	0.04645				
454	426	526		R	0.04459				
455	427	527		R	0.04459				
456	428	528		R	0.04459				

Branch No.	From	To	F Q i	Type	Branch Resistance (Ns^2/m^8)	Airflow (m^3/s)	Pressure Drop (Pa)	Friction Factor (kg/m^3)	Resistance per Length (R/1000m)
457	429	529		R	0.04459				
458	430	530		R	0.04459				
459	431	531		R	0.04459				
460	432	532		R	0.04459				
461	433	533		R	0.04459				
462	434	534		R	0.04459				
463	435	535		R	0.04459				
464	436	536		R	0.04459				
465	4365	5365		R	0.04459				
466	437	537		R	0.04459				
467	438	538		R	0.04459				
468	439	539		R	0.04459				
469	440	540		R	0.04459				
470	441	541		R	0.04459				
471	442	542		R	0.04459				
472	4425	5425		R	0.08733				
473	443	543		R	0.04459				
474	444	544		R	0.04459				
475	445	545		R	0.04459				
476	446	546		R	0.04459				
477	447	547		R	0.04459				
478	448	548		R	0.04459				
479	449	549		R	0.04459				
480	450	550		R	0.04459				
481	451	551		R	0.04459				
482	452	552		R	0.04459				
483	600	6000		R	0.50364				
484	6000	6001		R	0.00000				
485	6001	6005		R	0.00265				
486	6005	6002		R	0.00236				
487	6002	601		R	0.00432				
488	601	6015		R	0.00211				
489	6015	602		R	0.00211				
490	602	603		R	0.00428				
491	603	604		R	0.00428				
492	604	6045		R	0.00000				
493	605	6045		R	0.00428				
494	606	605		R	0.00428				
495	6065	606		R	0.00211				
496	607	6065		R	0.00211				
497	608	607		R	0.00428				
498	609	608		R	0.00428				
499	609	6095		R	0.00211				
500	6095	610		R	0.00211				
501	610	611		R	0.00428				
502	611	612		R	0.00428				
503	612	6125		R	0.00428				
504	613	6125		R	0.00000				
505	614	613		R	0.00428				
506	615	614		R	0.00428				
507	616	615		R	0.00428				
508	617	616		R	0.00428				
509	618	617		R	0.00428				
510	619	618		R	0.00428				
511	619	6195		R	0.00211				
512	6195	620		R	0.00211				
513	620	621		R	0.00428				

Branch No.	From	To	F Q i	Type	Branch Resistance (Ns^2/m^8)	Airflow (m^3/s)	Pressure Drop (Pa)	Friction Factor (kg/m^3)	Resistance per Length (R/1000m)
514	621	622		R	0.00428				
515	622	6224		R	0.00000				
516	6225	6224		R	0.00211				
517	623	6225		R	0.00211				
518	624	623		R	0.00428				
519	625	624		R	0.00428				
520	626	625		R	0.00428				
521	627	626		R	0.00428				
522	628	627		R	0.00428				
523	628	629		R	0.00428				
524	629	630		R	0.00428				
525	630	6305		R	0.00428				
526	631	6305		R	0.00000				
527	632	631		R	0.00428				
528	633	632		R	0.00428				
529	634	633		R	0.00428				
530	635	634		R	0.00428				
531	636	635		R	0.00428				
532	6365	636		R	0.00211				
533	6365	637		R	0.00211				
534	637	638		R	0.00428				
535	638	639		R	0.00428				
536	639	640		R	0.00428				
537	640	6405		R	0.00000				
538	641	6405		R	0.00428				
539	642	641		R	0.00428				
540	6425	642		R	0.00211				
541	643	6425		R	0.00211				
542	644	643		R	0.00428				
543	644	645		R	0.00428				
544	645	646		R	0.00428				
545	646	647		R	0.00428				
546	647	648		R	0.00428				
547	648	6485		R	0.00428				
548	649	6485		R	0.00000				
549	650	649		R	0.00428				
550	651	650		R	0.00428				
551	652	651		R	0.00428				
552	6638	652		R	0.06785				
553	6636	6638		R	0.00000				
554	6000	700		R	3.00000				
555	700	7001		R	0.00000				
556	5001	6001		R	225.00000				
557	5002	6002		R	225.00000				
558	501	601		R	225.00000				
559	5015	6015		R	0.00000				
560	502	602		R	225.00000				
561	503	603		R	225.00000				
562	504	604		R	225.00000				
563	505	605		R	225.00000				
564	506	606		R	225.00000				
565	5065	6065		R	225.00000				
566	507	607		R	225.00000				
567	508	608		R	225.00000				
568	509	609		R	225.00000				
569	5095	6095		R	0.00000				
570	510	610		R	225.00000				

Branch No.	From	To	F Q i	Type	Branch Resistance (Ns^2/m^8)	Airflow (m^3/s)	Pressure Drop (Pa)	Friction Factor (kg/m^3)	Resistance per Length (R/1000m)
571	511	611		R	225.00000				
572	512	612		R	225.00000				
573	513	613		R	225.00000				
574	514	614		R	225.00000				
575	515	615		R	225.00000				
576	516	616		R	225.00000				
577	517	617		R	225.00000				
578	518	618		R	225.00000				
579	519	619		R	225.00000				
580	5195	6195		R	225.00000				
581	520	620		R	225.00000				
582	521	621		R	225.00000				
583	522	622		R	225.00000				
584	5225	6225		R	0.00000				
585	523	623		R	225.00000				
586	524	624		R	225.00000				
587	525	625		R	225.00000				
588	526	626		R	225.00000				
589	527	627		R	225.00000				
590	528	628		R	225.00000				
591	529	629		R	225.00000				
592	530	630		R	225.00000				
593	531	631		R	225.00000				
594	532	632		R	225.00000				
595	533	633		R	225.00000				
596	534	634		R	225.00000				
597	535	635		R	225.00000				
598	536	636		R	225.00000				
599	5365	6365		R	0.00000				
600	537	637		R	225.00000				
601	538	638		R	225.00000				
602	539	639		R	225.00000				
603	540	640		R	225.00000				
604	541	641		R	225.00000				
605	542	642		R	225.00000				
606	5425	6425		R	0.00000				
607	543	643		R	225.00000				
608	544	644		R	225.00000				
609	545	645		R	225.00000				
610	546	646		R	225.00000				
611	547	647		R	225.00000				
612	548	648		R	225.00000				
613	549	649		R	225.00000				
614	550	650		R	225.00000				
615	551	651		R	225.00000				
616	552	652		R	225.00000				
617	5001	7001		R	0.00000				
618	5002	7002		R	0.00000				
619	501	701		R	0.00000				
620	5015	7015		R	225.00000				
621	502	702		R	0.00000				
622	503	703		R	0.00000				
623	504	704		R	0.00000				
624	505	705		R	0.00000				
625	506	706		R	0.00000				
626	5065	7065		R	0.00000				
627	507	707		R	0.00000				

Branch No.	From	To	F Q i	Type	Branch Resistance (Ns^2/m^8)	Airflow (m^3/s)	Pressure Drop (Pa)	Friction Factor (kg/m^3)	Resistance per Length (R/1000m)
628	508	708		R	0.00000				
629	509	709		R	0.00000				
630	5095	7095		R	225.00000				
631	510	710		R	0.00000				
632	511	711		R	0.00000				
633	512	712		R	0.00000				
634	513	713		R	0.00000				
635	514	714		R	0.00000				
636	515	715		R	0.00000				
637	516	716		R	0.00000				
638	517	717		R	0.00000				
639	518	718		R	0.00000				
640	519	719		R	0.00000				
641	5195	7195		R	0.00000				
642	520	720		R	0.00000				
643	521	721		R	0.00000				
644	522	722		R	0.00000				
645	5225	7225		R	225.00000				
646	523	723		R	0.00000				
647	524	724		R	0.00000				
648	525	725		R	0.00000				
649	526	726		R	0.00000				
650	527	727		R	0.00000				
651	528	728		R	0.00000				
652	529	729		R	0.00000				
653	530	730		R	0.00000				
654	531	731		R	0.00000				
655	532	732		R	0.00000				
656	533	733		R	0.00000				
657	534	734		R	0.00000				
658	535	735		R	0.00000				
659	536	736		R	0.00000				
660	5365	7365		R	225.00000				
661	537	737		R	0.00000				
662	538	738		R	0.00000				
663	539	739		R	0.00000				
664	540	740		R	0.00000				
665	541	741		R	0.00000				
666	542	742		R	0.00000				
667	5425	7425		R	225.00000				
668	543	743		R	0.00000				
669	544	744		R	0.00000				
670	545	745		R	0.00000				
671	546	746		R	0.00000				
672	547	747		R	0.00000				
673	548	748		R	0.00000				
674	549	749		R	0.00000				
675	550	750		R	0.00000				
676	551	751		R	0.00000				
677	552	752		R	0.00000				
678	7001	7005		R	0.00265				
679	7005	7002		R	0.00236				
680	7002	701		R	0.00432				
681	701	7015		R	0.00211				
682	7015	702		R	0.00211				
683	702	703		R	0.00428				
684	703	704		R	0.00428				

Branch No.	From	To	F Q i	Type	Branch Resistance (Ns^2/m^8)	Airflow (m^3/s)	Pressure Drop (Pa)	Friction Factor (kg/m^3)	Resistance per Length (R/1000m)
685	704	7045		R	0.00000				
686	705	7045		R	0.00428				
687	706	705		R	0.00428				
688	7065	706		R	0.00211				
689	707	7065		R	0.00211				
690	708	707		R	0.00428				
691	709	708		R	0.00428				
692	709	7095		R	0.00211				
693	7095	710		R	0.00211				
694	710	711		R	0.00428				
695	711	712		R	0.00428				
696	712	7125		R	0.00428				
697	713	7125		R	0.00000				
698	714	713		R	0.00428				
699	715	714		R	0.00428				
700	716	715		R	0.00428				
701	717	716		R	0.00428				
702	718	717		R	0.00428				
703	719	718		R	0.00428				
704	719	7195		R	0.00211				
705	7195	720		R	0.00211				
706	720	721		R	0.00428				
707	721	722		R	0.00428				
708	722	7224		R	0.00000				
709	7225	7224		R	0.00211				
710	723	7225		R	0.00211				
711	724	723		R	0.00428				
712	725	724		R	0.00428				
713	726	725		R	0.00428				
714	727	726		R	0.00428				
715	727	728		R	0.00428				
716	728	729		R	0.00428				
717	729	730		R	0.00428				
718	730	7305		R	0.00428				
719	731	7305		R	0.00000				
720	732	731		R	0.00428				
721	733	732		R	0.00428				
722	734	733		R	0.00428				
723	735	734		R	0.00428				
724	736	735		R	0.00428				
725	7365	736		R	0.00211				
726	7365	737		R	0.00211				
727	737	738		R	0.00428				
728	738	739		R	0.00428				
729	739	740		R	0.00428				
730	740	7405		R	0.00000				
731	741	7405		R	0.00428				
732	742	741		R	0.00428				
733	7425	742		R	0.00211				
734	743	7425		R	0.00211				
735	744	743		R	0.00428				
736	745	744		R	0.00428				
737	745	746		R	0.00428				
738	746	747		R	0.00428				
739	747	748		R	0.00428				
740	748	7485		R	0.00428				
741	749	7485		R	0.00000				

Branch No.	From	To	F Q i	Type	Branch Resistance (Ns^2/m^8)	Airflow (m^3/s)	Pressure Drop (Pa)	Friction Factor (kg/m^3)	Resistance per Length (R/1000m)
742	750	749		R	0.00428				
743	751	750		R	0.00428				
744	752	751		R	0.00428				
745	7639	752		R	4.06785				
746	6638	7639		R	0.00000				
747	6045	7045		R	1.00000				
748	7045	2045		R	0.00000				
749	6125	7125		R	1.00000				
750	7125	2125		R	0.00000				
751	6224	7224		R	0.01000				
752	7224	2224		R	0.00000				
753	6305	7305		R	2.00000				
754	7305	2305		R	0.00000				
755	6405	7405		R	0.05000				
756	7405	2405		R	0.00000				
757	6485	7485		R	3.00000				
758	7485	2485		R	0.00000				
759	2045	14		R	0.00019				
760	2125	14		R	0.00059				
761	2224	23		R	0.00043				
762	2305	23		R	0.00050				
763	2405	31		R	0.00033				
764	2485	31		R	0.00058				
765	64	63		R	0.00000				
766	63	13		R	0.00000				
767	13	12		R	0.00000				
768	12	62		R	0.00000				
769	62	1		R	0.00000				
770	1	61		R	0.00000				
771	61	60		R	0.00000				
772	60	35		R	0.00000				
773	35	59		R	0.00000				
774	59	56		R	0.00000				
775	56	65		R	0.00000				
776	65	64		R	0.00000				

Branch No.	From	To	F R B	Total Resistance (Ns^2/m^8)	Airflow (m^3/s)	Pressure Drop (Pa)	Air Power Loss (kW)	Operating Cost ($/yr)
1	1	2		0.00572	204.24	238.6	48.73	60984
2	2	3		0.00056	184.24	19.0	3.50	4381
3	3	6		0.00483	142.17	97.6	13.88	17365
4	6	7		0.00120	102.18	12.5	1.28	1598
5	7	103		0.00000	102.18	0.0	0.00	0
6	6	4		0.01611	40.00	25.8	1.03	1291
7	4	9		0.05848	20.00	23.4	0.47	586
8	9	6005	R	0.98069	20.00	392.3	7.85	9819
9	4	8		0.03928	20.00	15.7	0.31	393
10	8	4015	R	0.70890	20.00	283.6	5.67	7098
11	3	127		0.00160	42.07	2.8	0.12	147
12	2	1355		0.12381	20.00	49.5	0.99	1239
13	1355	2355		0.00000	20.00	0.0	0.00	0
14	2355	2425		0.00000	20.00	0.0	0.00	0
15	2425	4425	R	1.32740	20.00	531.0	10.62	13290
16	35	57		0.01278	65.92	55.5	3.66	4578
17	57	1585		0.00000	65.92	0.0	0.00	0
18	60	29		0.00041	486.77	97.1	47.27	59149
19	61	21		0.00048	549.04	144.7	79.45	99421
20	62	10		0.00057	651.05	241.6	157.29	196842
21	14	15		0.00066	755.20	376.4	284.26	355728
22	15	16	F	0.00000	757.59	0.0	0.00	0
23	16	63	R	0.00148	755.20	845.4	638.45	798970
24	16	17		225.00000	2.39	1285.2	3.07	3844
25	17	15		225.00000	2.39	1285.2	3.07	3844
26	23	24		0.00066	755.20	376.4	284.26	355728
27	24	25	F	0.00000	757.59	0.0	0.00	0
28	25	64	R	0.00141	755.20	803.5	606.80	759371
29	25	26		225.00000	2.39	1285.2	3.07	3844
30	26	24		225.00000	2.39	1285.2	3.07	3844
31	31	32		0.00063	755.20	359.3	271.34	339567
32	32	33	F	0.00000	757.59	0.0	0.00	0
33	33	65	R	0.00113	755.20	645.1	487.18	609670
34	33	34		225.00000	2.39	1285.2	3.07	3844
35	34	32		225.00000	2.39	1285.2	3.07	3844
36	59	43		0.00042	308.57	40.0	12.34	15446
37	43	6637		0.00002	308.57	1.9	0.59	734
38	6637	6636		0.00023	258.35	15.4	3.98	4979
39	1001	100		0.00000	110.92	0.0	0.00	0
40	100	600		0.00281	110.92	34.6	3.84	4803
41	1002	1001		0.00060	127.92	9.8	1.25	1569
42	101	1002		0.00058	144.92	12.2	1.77	2213
43	102	101		0.00058	161.92	15.2	2.46	3080
44	103	102		0.00058	178.92	18.6	3.33	4165
45	104	103		0.00058	93.74	5.1	0.48	598
46	105	104		0.00058	110.74	7.1	0.79	984
47	106	105		0.00058	127.74	9.5	1.21	1519
48	1065	106		0.00029	144.74	6.1	0.88	1105
49	107	1065		0.00029	161.74	7.6	1.23	1538
50	108	107		0.00058	178.74	18.5	3.31	4138
51	1085	108		0.00029	195.74	11.1	2.17	2719
52	1085	109		0.00029	169.01	8.3	1.40	1755
53	109	1095		0.00029	152.01	6.7	1.02	1275
54	1095	110		0.00029	132.01	5.1	0.67	843
55	110	111		0.00058	115.01	7.7	0.89	1108
56	111	112		0.00058	98.01	5.6	0.55	687
57	112	113		0.00058	81.01	3.8	0.31	385

Branch No.	From	To	F R B	Total Resistance (Ns^2/m^8)	Airflow (m^3/s)	Pressure Drop (Pa)	Air Power Loss (kW)	Operating Cost ($/yr)
58	113	114		0.00058	64.01	2.4	0.15	192
59	114	115		0.00058	47.01	1.3	0.06	76
60	115	116		0.00058	30.01	0.5	0.02	19
61	116	117		0.00058	13.01	0.1	0.00	0
62	118	117		0.00058	3.99	0.0	0.00	0
63	119	118		0.00058	20.99	0.3	0.00	0
64	1195	119		0.00029	37.99	0.4	0.00	0
65	120	1195		0.00029	54.99	0.9	0.05	62
66	121	120		0.00058	71.99	3.0	0.22	270
67	122	121		0.00058	88.99	4.6	0.41	512
68	1225	122		0.00029	105.99	3.3	0.35	438
69	123	1225		0.00029	125.99	4.6	0.58	725
70	124	123		0.00058	142.99	11.9	1.70	2129
71	125	124		0.00058	159.99	14.8	2.37	2963
72	126	125		0.00058	176.99	18.2	3.22	4031
73	127	126		0.00058	193.99	21.8	4.23	5292
74	128	127		0.00058	168.92	16.6	2.80	3509
75	129	128		0.00058	185.92	20.0	3.72	4653
76	1295	129		0.00029	202.92	11.9	2.41	3022
77	1295	130		0.00029	61.70	1.1	0.07	85
78	130	131		0.00058	44.70	1.2	0.05	67
79	131	132		0.00058	27.70	0.4	0.00	0
80	132	133		0.00058	10.70	0.1	0.00	0
81	133	134		0.00058	-6.30	0.0	0.00	0
82	134	135		0.00058	-23.30	-0.3	0.00	0
83	135	136		0.00058	-40.30	-0.9	0.04	45
84	136	1365		0.00029	-57.30	-1.0	0.06	72
85	137	1365		0.00029	77.30	1.7	0.13	164
86	138	137		0.00058	94.30	5.2	0.49	614
87	139	138		0.00058	111.30	7.2	0.80	1003
88	140	139		0.00058	128.30	9.5	1.22	1525
89	141	140		0.00058	145.30	12.2	1.77	2218
90	142	141		0.00058	162.30	15.3	2.48	3108
91	143	142		0.00058	199.30	23.0	4.58	5736
92	1435	143		0.00029	216.30	13.6	2.94	3681
93	1435	144		0.00029	36.86	0.4	0.00	0
94	144	145		0.00058	19.86	0.2	0.00	0
95	145	146		0.00058	2.86	0.0	0.00	0
96	146	147		0.00058	-14.14	-0.1	0.00	0
97	147	148		0.00058	-31.14	-0.6	0.02	23
98	148	149		0.00058	-48.14	-1.3	0.06	78
99	149	150		0.00058	-65.14	-2.5	0.16	204
100	150	151		0.00058	-82.14	-3.9	0.32	401
101	152	151		0.00058	99.14	5.7	0.57	707
102	1585	152		0.00413	116.14	55.7	6.47	8095
103	1585	6637		0.00541	-50.22	-13.6	0.68	855
104	1001	3001		0.00035	17.00	0.1	0.00	0
105	1002	3002		0.00036	17.00	0.1	0.00	0
106	101	301		0.00036	17.00	0.1	0.00	0
107	102	302		0.00036	17.00	0.1	0.00	0
108	103	303		0.00036	17.00	0.1	0.00	0
109	104	304		0.00036	17.00	0.1	0.00	0
110	105	305		0.00036	17.00	0.1	0.00	0
111	106	306		0.00036	17.00	0.1	0.00	0
112	1065	3065		0.00036	17.00	0.1	0.00	0
113	107	307		0.00036	17.00	0.1	0.00	0
114	108	308		0.00036	17.00	0.1	0.00	0

Branch No.	From	To	F R B	Total Resistance (Ns^2/m^8)	Airflow (m^3/s)	Pressure Drop (Pa)	Air Power Loss (kW)	Operating Cost ($/yr)
115	1085	3085		0.00036	-364.75	-47.9	17.47	21864
116	109	309		0.00036	17.00	0.1	0.00	0
117	1095	3095		0.00036	20.00	0.1	0.00	0
118	110	310		0.00036	17.00	0.1	0.00	0
119	111	311		0.00036	17.00	0.1	0.00	0
120	112	312		0.00036	17.00	0.1	0.00	0
121	113	313		0.00036	17.00	0.1	0.00	0
122	114	314		0.00036	17.00	0.1	0.00	0
123	115	315		0.00036	17.00	0.1	0.00	0
124	116	316		0.00036	17.00	0.1	0.00	0
125	117	317		0.00036	17.00	0.1	0.00	0
126	118	318		0.00036	17.00	0.1	0.00	0
127	119	319		0.00036	17.00	0.1	0.00	0
128	1195	3195		0.00036	17.00	0.1	0.00	0
129	120	320		0.00036	17.00	0.1	0.00	0
130	121	321		0.00036	17.00	0.1	0.00	0
131	122	322		0.00036	17.00	0.1	0.00	0
132	1225	3225		0.00036	20.00	0.1	0.00	0
133	123	323		0.00036	17.00	0.1	0.00	0
134	124	324		0.00036	17.00	0.1	0.00	0
135	125	325		0.00036	17.00	0.1	0.00	0
136	126	326		0.00036	17.00	0.1	0.00	0
137	127	327		0.00036	17.00	0.1	0.00	0
138	128	328		0.00036	17.00	0.1	0.00	0
139	129	329		0.00036	17.00	0.1	0.00	0
140	3295	1295		0.00036	264.62	25.2	6.67	8345
141	130	330		0.00036	17.00	0.1	0.00	0
142	131	331		0.00036	17.00	0.1	0.00	0
143	132	332		0.00036	17.00	0.1	0.00	0
144	133	333		0.00036	17.00	0.1	0.00	0
145	134	334		0.00036	17.00	0.1	0.00	0
146	135	335		0.00036	17.00	0.1	0.00	0
147	136	336		0.00036	17.00	0.1	0.00	0
148	1365	3365		0.00036	20.00	0.1	0.00	0
149	137	337		0.00036	17.00	0.1	0.00	0
150	138	338		0.00036	17.00	0.1	0.00	0
151	139	339		0.00036	17.00	0.1	0.00	0
152	140	340		0.00036	17.00	0.1	0.00	0
153	141	341		0.00036	17.00	0.1	0.00	0
154	142	342		0.00036	17.00	0.1	0.00	0
155	142	3425		0.14864	20.00	59.5	1.19	1489
156	143	343		0.00036	17.00	0.1	0.00	0
157	3435	1435		0.00036	253.16	23.1	5.85	7318
158	144	344		0.00036	17.00	0.1	0.00	0
159	145	345		0.00036	17.00	0.1	0.00	0
160	146	346		0.00036	17.00	0.1	0.00	0
161	147	347		0.00036	17.00	0.1	0.00	0
162	148	348		0.00036	17.00	0.1	0.00	0
163	149	349		0.00036	17.00	0.1	0.00	0
164	150	350		0.00036	17.00	0.1	0.00	0
165	151	351		0.00036	17.00	0.1	0.00	0
166	152	352		0.00036	17.00	0.1	0.00	0
167	3001	4001	R	1.77945	17.00	514.3	8.74	10941
168	3002	4002	R	1.83793	17.00	531.2	9.03	11301
169	301	401	R	1.97066	17.00	569.5	9.68	12116
170	302	402	R	2.21086	17.00	638.9	10.86	13592
171	303	403	R	2.59615	17.00	750.3	12.76	15962

Branch No.	From	To	F R B	Total Resistance (Ns^2/m^8)	Airflow (m^3/s)	Pressure Drop (Pa)	Air Power Loss (kW)	Operating Cost ($/yr)
172	304	404	R	3.11595	17.00	900.5	15.31	19157
173	305	405	R	2.72791	17.00	788.4	13.40	16773
174	306	406	R	2.50368	17.00	723.6	12.30	15394
175	3065	4065	R	2.45643	17.00	709.9	12.07	15103
176	307	407	R	2.45487	17.00	709.5	12.06	15094
177	308	408	R	2.50837	17.00	724.9	12.32	15422
178	10	3085		0.00010	364.75	13.3	4.85	6071
179	309	409	R	2.51913	17.00	728.0	12.38	15488
180	3095	4095	R	1.30576	20.00	522.3	10.45	13072
181	310	410	R	2.50609	17.00	724.3	12.31	15409
182	311	411	R	2.57155	17.00	743.2	12.63	15811
183	312	412	R	2.74370	17.00	792.9	13.48	16868
184	313	413	R	3.05768	17.00	883.7	15.02	18800
185	314	414	R	2.72753	17.00	788.3	13.40	16771
186	315	415	R	2.53531	17.00	732.7	12.46	15588
187	316	416	R	2.44343	17.00	706.2	12.01	15024
188	317	417	R	2.41501	17.00	697.9	11.86	14847
189	318	418	R	2.41378	17.00	697.6	11.86	14841
190	319	419	R	2.42384	17.00	700.5	11.91	14903
191	3195	4195	R	2.45044	17.00	708.2	12.04	15066
192	320	420	R	2.51595	17.00	727.1	12.36	15469
193	321	421	R	2.76369	17.00	798.7	13.58	16992
194	322	422	R	3.16389	17.00	914.4	15.54	19453
195	3225	4225	R	1.84383	20.00	737.5	14.75	18459
196	323	423	R	2.93827	17.00	849.2	14.44	18066
197	324	424	R	2.84114	17.00	821.1	13.96	17468
198	325	425	R	2.83538	17.00	819.4	13.93	17432
199	326	426	R	2.89429	17.00	836.5	14.22	17796
200	327	427	R	2.97048	17.00	858.5	14.59	18264
201	328	428	R	3.05277	17.00	882.3	15.00	18770
202	329	429	R	3.20676	17.00	926.8	15.76	19717
203	21	3295		0.00060	264.62	42.0	11.11	13908
204	330	430	R	3.42402	17.00	989.5	16.82	21051
205	331	431	R	3.73113	17.00	1078.3	18.33	22940
206	332	432	R	3.53726	17.00	1022.3	17.38	21749
207	333	433	R	3.44444	17.00	995.4	16.92	21176
208	334	434	R	3.41555	17.00	987.1	16.78	21000
209	335	435	R	3.41533	17.00	987.0	16.78	20998
210	336	436	R	3.42820	17.00	990.8	16.84	21079
211	3365	4365	R	1.97768	20.00	791.1	15.82	19800
212	337	437	R	3.49149	17.00	1009.0	17.15	21466
213	338	438	R	3.64639	17.00	1053.8	17.91	22419
214	339	439	R	3.92628	17.00	1134.7	19.29	24140
215	340	440	R	4.36938	17.00	1262.8	21.47	26865
216	341	441	R	4.11425	17.00	1189.0	20.21	25295
217	342	442	R	3.99940	17.00	1155.8	19.65	24589
218	3425	4425	R	1.49582	20.00	598.3	11.97	14975
219	343	443	R	4.00666	17.00	1157.9	19.68	24633
220	29	3435		0.00007	253.16	4.5	1.14	1426
221	344	444	R	4.03467	17.00	1166.0	19.82	24806
222	345	445	R	4.03389	17.00	1165.8	19.82	24802
223	346	446	R	4.05339	17.00	1171.4	19.91	24921
224	347	447	R	4.13000	17.00	1193.6	20.29	25393
225	348	448	R	4.30223	17.00	1243.3	21.14	26450
226	349	449	R	4.60902	17.00	1332.0	22.64	28337
227	350	450	R	4.38503	17.00	1267.3	21.54	26961
228	351	451	R	4.27970	17.00	1236.8	21.03	26312

Branch No.	From	To	F R B	Total Resistance (Ns^2/m^8)	Airflow (m^3/s)	Pressure Drop (Pa)	Air Power Loss (kW)	Operating Cost ($/yr)
229	352	452	R	4.25644	17.00	1230.1	20.91	26169
230	8001	4001	R	1.52062	17.00	439.5	7.47	9350
231	8002	4002	R	1.53377	17.00	443.3	7.54	9431
232	801	401	R	1.61796	17.00	467.6	7.95	9948
233	8015	4015	R	0.40092	20.00	160.4	3.21	4015
234	802	402	R	1.80467	17.00	521.5	8.87	11095
235	803	403	R	2.12573	17.00	614.3	10.44	13069
236	804	404	R	2.62888	17.00	759.7	12.91	16162
237	805	405	R	2.21958	17.00	641.5	10.91	13647
238	806	406	R	1.96976	17.00	569.3	9.68	12111
239	8065	4065	R	1.90777	17.00	551.3	9.37	11729
240	807	407	R	1.88960	17.00	546.1	9.28	11618
241	808	408	R	1.90606	17.00	550.9	9.37	11720
242	10	8085		0.00244	286.30	200.0	57.26	71657
243	809	409	R	1.89195	17.00	546.8	9.30	11633
244	8095	4095	R	0.84980	20.00	339.9	6.80	8507
245	810	410	R	1.87236	17.00	541.1	9.20	11512
246	811	411	R	1.93447	17.00	559.1	9.50	11894
247	812	412	R	2.10488	17.00	608.3	10.34	12941
248	813	413	R	2.41942	17.00	699.2	11.89	14875
249	814	414	R	2.09043	17.00	604.1	10.27	12852
250	815	415	R	1.89906	17.00	548.8	9.33	11675
251	816	416	R	1.80770	17.00	522.4	8.88	11114
252	817	417	R	1.77948	17.00	514.3	8.74	10941
253	818	418	R	1.77836	17.00	513.9	8.74	10933
254	819	419	R	1.78886	17.00	517.0	8.79	10999
255	8195	4195	R	1.81585	17.00	524.8	8.92	11165
256	820	420	R	1.88190	17.00	543.9	9.25	11571
257	821	421	R	2.13104	17.00	615.9	10.47	13103
258	822	422	R	2.53296	17.00	732.0	12.44	15573
259	8225	4225	R	1.39761	20.00	559.0	11.18	13991
260	823	423	R	2.32187	17.00	671.0	11.41	14275
261	824	424	R	2.20559	17.00	637.4	10.84	13560
262	825	425	R	2.20289	17.00	636.6	10.82	13543
263	826	426	R	2.26520	17.00	654.6	11.13	13926
264	827	427	R	2.34509	17.00	677.7	11.52	14418
265	828	428	R	2.46349	17.00	711.9	12.10	15145
266	829	429	R	2.65676	17.00	767.8	13.05	16334
267	21	8295		0.00238	284.42	192.5	54.75	68517
268	830	430	R	2.89787	17.00	837.5	14.24	17817
269	831	431	R	3.20836	17.00	927.2	15.76	19726
270	832	432	R	3.01604	17.00	871.6	14.82	18543
271	833	433	R	2.92396	17.00	845.0	14.37	17977
272	834	434	R	2.89709	17.00	837.3	14.23	17813
273	835	435	R	2.90059	17.00	838.3	14.25	17834
274	836	436	R	2.91881	17.00	843.5	14.34	17945
275	8365	4365	R	1.61207	20.00	644.8	12.90	16138
276	837	437	R	2.98960	17.00	864.0	14.69	18381
277	838	438	R	3.15464	17.00	911.7	15.50	19396
278	839	439	R	3.44605	17.00	995.9	16.93	21187
279	840	440	R	3.90199	17.00	1127.7	19.17	23991
280	841	441	R	3.66097	17.00	1058.0	17.99	22508
281	842	442	R	3.56143	17.00	1029.3	17.50	21898
282	843	443	R	3.56994	17.00	1031.7	17.54	21949
283	29	8435		0.00249	233.61	135.9	31.75	39730
284	844	444	R	3.59884	17.00	1040.1	17.68	22127
285	845	445	R	3.59893	17.00	1040.1	17.68	22127

Branch No.	From	To	F R B	Total Resistance (Ns^2/m^8)	Airflow (m^3/s)	Pressure Drop (Pa)	Air Power Loss (kW)	Operating Cost ($/yr)
286	846	446	R	3.61951	17.00	1046.0	17.78	22253
287	847	447	R	3.69886	17.00	1069.0	18.17	22742
288	848	448	R	3.87548	17.00	1120.0	19.04	23827
289	849	449	R	4.18823	17.00	1210.4	20.58	25750
290	850	450	R	3.97170	17.00	1147.8	19.51	24419
291	851	451	R	3.87530	17.00	1120.0	19.04	23827
292	852	452	R	3.86237	17.00	1116.2	18.98	23746
293	2001	8001		0.00050	17.00	0.1	0.00	0
294	2002	8002		0.00050	17.00	0.1	0.00	0
295	201	801		0.00050	17.00	0.1	0.00	0
296	2015	8015		0.04088	20.00	16.4	0.33	410
297	202	802		0.00050	17.00	0.1	0.00	0
298	203	803		0.00050	17.00	0.1	0.00	0
299	204	804		0.00050	17.00	0.1	0.00	0
300	205	805		0.00050	17.00	0.1	0.00	0
301	206	806		0.00050	17.00	0.1	0.00	0
302	2065	8065		0.00050	17.00	0.1	0.00	0
303	207	807		0.00050	17.00	0.1	0.00	0
304	208	808		0.00050	17.00	0.1	0.00	0
305	8085	2085		0.00050	286.30	41.0	11.74	14690
306	209	809		0.00050	17.00	0.1	0.00	0
307	2095	8095		0.00050	20.00	0.2	0.00	0
308	210	810		0.00050	17.00	0.1	0.00	0
309	211	811		0.00050	17.00	0.1	0.00	0
310	212	812		0.00042	17.00	0.1	0.00	0
311	213	813		0.00034	17.00	0.1	0.00	0
312	214	814		0.00034	17.00	0.1	0.00	0
313	215	815		0.00034	17.00	0.1	0.00	0
314	216	816		0.00034	17.00	0.1	0.00	0
315	217	817		0.00034	17.00	0.1	0.00	0
316	218	818		0.00034	17.00	0.1	0.00	0
317	219	819		0.00034	17.00	0.1	0.00	0
318	2195	8195		0.00034	17.00	0.1	0.00	0
319	220	820		0.00034	17.00	0.1	0.00	0
320	221	821		0.00034	17.00	0.1	0.00	0
321	222	822		0.00034	17.00	0.1	0.00	0
322	2225	8225		0.00034	20.00	0.1	0.00	0
323	223	823		0.00034	17.00	0.1	0.00	0
324	224	824		0.00034	17.00	0.1	0.00	0
325	225	825		0.00034	17.00	0.1	0.00	0
326	226	826		0.00034	17.00	0.1	0.00	0
327	227	827		0.00034	17.00	0.1	0.00	0
328	228	828		0.00034	17.00	0.1	0.00	0
329	229	829		0.00034	17.00	0.1	0.00	0
330	8295	2295		0.00034	284.42	27.5	7.82	9788
331	230	830		0.00034	17.00	0.1	0.00	0
332	231	831		0.00034	17.00	0.1	0.00	0
333	232	832		0.00033	17.00	0.1	0.00	0
334	233	833		0.00033	17.00	0.1	0.00	0
335	234	834		0.00033	17.00	0.1	0.00	0
336	235	835		0.00033	17.00	0.1	0.00	0
337	236	836		0.00033	17.00	0.1	0.00	0
338	2365	8365		0.00033	20.00	0.1	0.00	0
339	237	837		0.00033	17.00	0.1	0.00	0
340	238	838		0.00033	17.00	0.1	0.00	0
341	239	839		0.00033	17.00	0.1	0.00	0
342	240	840		0.00033	17.00	0.1	0.00	0

Branch No.	From	To	F R B	Total Resistance (Ns^2/m^8)	Airflow (m^3/s)	Pressure Drop (Pa)	Air Power Loss (kW)	Operating Cost ($/yr)
343	241	841		0.00033	17.00	0.1	0.00	0
344	242	842		0.00033	17.00	0.1	0.00	0
345	243	843		0.00033	17.00	0.1	0.00	0
346	8435	2435		0.00033	233.61	18.0	4.20	5262
347	244	844		0.00033	17.00	0.1	0.00	0
348	245	845		0.00033	17.00	0.1	0.00	0
349	246	846		0.00033	17.00	0.1	0.00	0
350	247	847		0.00033	17.00	0.1	0.00	0
351	248	848		0.00033	17.00	0.1	0.00	0
352	249	849		0.00033	17.00	0.1	0.00	0
353	250	850		0.00033	17.00	0.1	0.00	0
354	251	851		0.00033	17.00	0.1	0.00	0
355	252	852		0.00033	17.00	0.1	0.00	0
356	600	200		0.00556	85.02	40.2	3.42	4277
357	200	2001		0.00000	85.02	0.0	0.00	0
358	2001	2002		0.00071	68.02	3.3	0.22	281
359	2002	201		0.00071	51.02	1.8	0.09	115
360	201	2015		0.00012	34.02	0.1	0.00	0
361	202	2015		0.00060	-14.02	-0.1	0.00	0
362	203	202		0.00071	2.98	0.0	0.00	0
363	204	203		0.00071	19.98	0.3	0.00	0
364	205	204		0.00071	36.98	1.0	0.04	46
365	206	205		0.00071	53.98	2.1	0.11	142
366	2065	206		0.00036	70.98	1.8	0.13	160
367	207	2065		0.00036	87.98	2.8	0.25	308
368	208	207		0.00071	104.98	7.8	0.82	1025
369	2085	208		0.00036	121.98	5.4	0.66	824
370	2085	209		0.00036	164.31	9.7	1.59	1995
371	209	2095		0.00036	147.31	7.8	1.15	1438
372	2095	210		0.00036	127.31	5.8	0.74	924
373	210	211		0.00071	110.31	8.6	0.95	1187
374	211	212		0.00070	93.31	6.1	0.57	712
375	212	213		0.00063	76.31	3.7	0.28	353
376	213	214		0.00058	59.31	2.0	0.12	148
377	214	215		0.00058	42.31	1.0	0.04	53
378	215	216		0.00058	25.31	0.4	0.00	0
379	216	217		0.00058	8.31	0.0	0.00	0
380	217	218		0.00058	-8.69	0.0	0.00	0
381	219	218		0.00058	25.69	0.4	0.00	0
382	2195	219		0.00029	42.69	0.5	0.02	27
383	220	2195		0.00029	59.69	1.0	0.06	75
384	221	220		0.00058	76.69	3.4	0.26	326
385	222	221		0.00058	93.69	5.1	0.48	598
386	2225	222		0.00058	110.69	7.1	0.79	983
387	223	2225		0.00029	130.69	5.0	0.65	818
388	224	223		0.00029	147.69	6.3	0.93	1164
389	225	224		0.00058	164.69	15.7	2.59	3236
390	226	225		0.00058	181.69	19.1	3.47	4343
391	227	226		0.00058	198.69	22.9	4.55	5694
392	228	227		0.00058	215.69	27.0	5.82	7288
393	229	228		0.00058	232.69	31.4	7.31	9144
394	2295	229		0.00029	249.69	18.1	4.52	5656
395	2295	230		0.00029	34.74	0.4	0.00	0
396	230	231		0.00058	17.74	0.2	0.00	0
397	231	232		0.00058	0.74	0.0	0.00	0
398	232	233		0.00055	-16.26	-0.1	0.00	0
399	233	234		0.00055	-33.26	-0.6	0.02	25

Branch No.	From	To	F R B	Total Resistance (Ns^2/m^8)	Airflow (m^3/s)	Pressure Drop (Pa)	Air Power Loss (kW)	Operating Cost ($/yr)
400	234	235		0.00055	-50.26	-1.4	0.07	88
401	235	236		0.00055	-67.26	-2.5	0.17	210
402	236	2365		0.00027	-84.26	-1.9	0.16	200
403	237	2365		0.00027	104.26	2.9	0.30	378
404	238	237		0.00055	121.26	8.1	0.98	1229
405	239	238		0.00055	138.26	10.5	1.45	1817
406	240	239		0.00055	155.26	13.3	2.06	2584
407	241	240		0.00055	172.26	16.3	2.81	3514
408	242	241		0.00055	189.26	19.7	3.73	4666
409	243	242		0.00055	206.26	23.4	4.83	6040
410	2435	243		0.00027	223.26	13.5	3.01	3772
411	2435	244		0.00027	10.35	0.0	0.00	0
412	244	245		0.00055	-6.65	0.0	0.00	0
413	245	246		0.00055	-23.65	-0.3	0.00	0
414	246	247		0.00055	-40.65	-0.9	0.04	46
415	247	248		0.00055	-57.65	-1.8	0.10	130
416	248	249		0.00055	-74.65	-3.1	0.23	290
417	249	250		0.00055	-91.65	-4.6	0.42	528
418	250	251		0.00055	-108.65	-6.5	0.71	884
419	252	251		0.00055	125.65	8.7	1.09	1368
420	2585	252		0.00825	142.65	167.9	23.95	29973
421	6636	2585		0.00000	142.65	0.0	0.00	0
422	4001	5001		0.04274	34.00	49.4	1.68	2102
423	4002	5002		0.04459	34.00	51.5	1.75	2191
424	401	501		0.04459	34.00	51.5	1.75	2191
425	4015	5015		0.07990	40.00	127.8	5.11	6397
426	402	502		0.04459	34.00	51.5	1.75	2191
427	403	503		0.04645	34.00	53.7	1.83	2285
428	404	504		0.04645	34.00	53.7	1.83	2285
429	405	505		0.04645	34.00	53.7	1.83	2285
430	406	506		0.04645	34.00	53.7	1.83	2285
431	4065	5065		0.04645	34.00	53.7	1.83	2285
432	407	507		0.04645	34.00	53.7	1.83	2285
433	408	508		0.04645	34.00	53.7	1.83	2285
434	409	509		0.04645	34.00	53.7	1.83	2285
435	4095	5095		0.04645	40.00	74.3	2.97	3719
436	410	510		0.04645	34.00	53.7	1.83	2285
437	411	511		0.04645	34.00	53.7	1.83	2285
438	412	512		0.04645	34.00	53.7	1.83	2285
439	413	513		0.04645	34.00	53.7	1.83	2285
440	414	514		0.04645	34.00	53.7	1.83	2285
441	415	515		0.04645	34.00	53.7	1.83	2285
442	416	516		0.04645	34.00	53.7	1.83	2285
443	417	517		0.04645	34.00	53.7	1.83	2285
444	418	518		0.04645	34.00	53.7	1.83	2285
445	419	519		0.04645	34.00	53.7	1.83	2285
446	4195	5195		0.04645	34.00	53.7	1.83	2285
447	420	520		0.04645	34.00	53.7	1.83	2285
448	421	521		0.04645	34.00	53.7	1.83	2285
449	422	522		0.04645	34.00	53.7	1.83	2285
450	4225	5225		0.04645	40.00	74.3	2.97	3719
451	423	523		0.04645	34.00	53.7	1.83	2285
452	424	524		0.04645	34.00	53.7	1.83	2285
453	425	525		0.04645	34.00	53.7	1.83	2285
454	426	526		0.04459	34.00	51.5	1.75	2191
455	427	527		0.04459	34.00	51.5	1.75	2191
456	428	528		0.04459	34.00	51.5	1.75	2191

Branch No.	From	To	F R B	Total Resistance (Ns^2/m^8)	Airflow (m^3/s)	Pressure Drop (Pa)	Air Power Loss (kW)	Operating Cost ($/yr)
457	429	529		0.04459	34.00	51.5	1.75	2191
458	430	530		0.04459	34.00	51.5	1.75	2191
459	431	531		0.04459	34.00	51.5	1.75	2191
460	432	532		0.04459	34.00	51.5	1.75	2191
461	433	533		0.04459	34.00	51.5	1.75	2191
462	434	534		0.04459	34.00	51.5	1.75	2191
463	435	535		0.04459	34.00	51.5	1.75	2191
464	436	536		0.04459	34.00	51.5	1.75	2191
465	4365	5365		0.04459	40.00	71.3	2.85	3569
466	437	537		0.04459	34.00	51.5	1.75	2191
467	438	538		0.04459	34.00	51.5	1.75	2191
468	439	539		0.04459	34.00	51.5	1.75	2191
469	440	540		0.04459	34.00	51.5	1.75	2191
470	441	541		0.04459	34.00	51.5	1.75	2191
471	442	542		0.04459	34.00	51.5	1.75	2191
472	4425	5425		0.08733	40.00	139.7	5.59	6993
473	443	543		0.04459	34.00	51.5	1.75	2191
474	444	544		0.04459	34.00	51.5	1.75	2191
475	445	545		0.04459	34.00	51.5	1.75	2191
476	446	546		0.04459	34.00	51.5	1.75	2191
477	447	547		0.04459	34.00	51.5	1.75	2191
478	448	548		0.04459	34.00	51.5	1.75	2191
479	449	549		0.04459	34.00	51.5	1.75	2191
480	450	550		0.04459	34.00	51.5	1.75	2191
481	451	551		0.04459	34.00	51.5	1.75	2191
482	452	552		0.04459	34.00	51.5	1.75	2191
483	600	6000		0.50364	25.90	337.8	8.75	10949
484	6000	6001		0.00000	17.91	0.0	0.00	0
485	6001	6005		0.00265	16.99	0.8	0.01	17
486	6005	6002		0.00236	36.99	3.2	0.12	148
487	6002	601		0.00432	36.06	5.6	0.20	253
488	601	6015		0.00211	35.07	2.6	0.09	114
489	6015	602		0.00211	74.04	11.6	0.86	1075
490	602	603		0.00428	72.97	22.8	1.66	2082
491	603	604		0.00428	71.76	22.0	1.58	1976
492	604	6045		0.00000	70.34	0.0	0.00	0
493	605	6045		0.00428	-49.07	-10.3	0.51	632
494	606	605		0.00428	-47.87	-9.8	0.47	587
495	6065	606		0.00211	-46.84	-4.6	0.22	270
496	607	6065		0.00211	-45.87	-4.4	0.20	253
497	608	607		0.00428	-44.92	-8.6	0.39	483
498	609	608		0.00428	-44.00	-8.3	0.37	457
499	609	6095		0.00211	43.10	3.9	0.17	210
500	6095	610		0.00211	82.20	14.3	1.18	1471
501	610	611		0.00428	81.32	28.3	2.30	2880
502	611	612		0.00428	80.45	27.7	2.23	2789
503	612	6125		0.00428	79.52	27.1	2.15	2697
504	613	6125		0.00000	-63.22	0.0	0.00	0
505	614	613		0.00428	-62.14	-16.5	1.03	1283
506	615	614		0.00428	-61.30	-16.1	0.99	1235
507	616	615		0.00428	-60.69	-15.8	0.96	1200
508	617	616		0.00428	-60.25	-15.5	0.93	1169
509	618	617		0.00428	-59.95	-15.4	0.92	1155
510	619	618		0.00428	-59.81	-15.3	0.92	1145
511	619	6195		0.00211	60.00	7.6	0.46	571
512	6195	620		0.00211	60.20	7.6	0.46	573
513	620	621		0.00428	60.11	15.5	0.93	1166

Branch No.	From	To	F R B	Total Resistance (Ns^2/m^8)	Airflow (m^3/s)	Pressure Drop (Pa)	Air Power Loss (kW)	Operating Cost ($/yr)
514	621	622		0.00428	59.61	15.2	0.91	1134
515	622	6224		0.00000	58.79	0.0	0.00	0
516	6225	6224		0.00211	64.00	8.6	0.55	689
517	623	6225		0.00211	24.74	1.3	0.03	40
518	624	623		0.00428	25.36	2.8	0.07	89
519	625	624		0.00428	25.84	2.9	0.07	94
520	626	625		0.00428	26.24	2.9	0.08	95
521	627	626		0.00428	26.64	3.0	0.08	100
522	628	627		0.00428	27.06	3.1	0.08	105
523	628	629		0.00428	-27.54	-3.2	0.09	110
524	629	630		0.00428	-28.12	-3.4	0.10	120
525	630	6305		0.00428	-28.89	-3.6	0.10	130
526	631	6305		0.00000	39.54	0.0	0.00	0
527	632	631		0.00428	40.54	7.0	0.28	355
528	633	632		0.00428	41.43	7.3	0.30	378
529	634	633		0.00428	42.27	7.6	0.32	402
530	635	634		0.00428	43.11	8.0	0.34	432
531	636	635		0.00428	43.97	8.3	0.36	457
532	6365	636		0.00211	44.85	4.2	0.19	236
533	6365	637		0.00211	-5.77	-0.1	0.00	0
534	637	638		0.00428	-6.70	-0.2	0.00	0
535	638	639		0.00428	-7.73	-0.3	0.00	0
536	639	640		0.00428	-8.90	-0.3	0.00	0
537	640	6405		0.00000	-10.28	0.0	0.00	0
538	641	6405		0.00428	102.92	45.3	4.66	5835
539	642	641		0.00428	104.23	46.5	4.85	6065
540	6425	642		0.00211	105.54	23.5	2.48	3104
541	643	6425		0.00211	66.88	9.4	0.63	787
542	644	643		0.00428	68.21	19.9	1.36	1699
543	644	645		0.00428	-69.56	-20.7	1.44	1802
544	645	646		0.00428	-70.95	-21.5	1.53	1909
545	646	647		0.00428	-72.38	-22.4	1.62	2029
546	647	648		0.00428	-73.88	-23.4	1.73	2163
547	648	6485		0.00428	-75.48	-24.4	1.84	2305
548	649	6485		0.00000	90.65	0.0	0.00	0
549	650	649		0.00428	92.40	36.5	3.37	4221
550	651	650		0.00428	94.11	37.9	3.57	4464
551	652	651		0.00428	95.83	39.3	3.77	4713
552	6638	652		0.06785	97.58	646.0	63.04	78886
553	6636	6638		0.00000	115.70	0.0	0.00	0
554	6000	700		3.00000	7.99	191.4	1.53	1914
555	700	7001		0.00000	7.99	0.0	0.00	0
556	5001	6001		225.00000	-0.92	-191.4	0.18	220
557	5002	6002		225.00000	-0.93	-196.6	0.18	229
558	501	601		225.00000	-0.98	-217.1	0.21	266
559	5015	6015		0.00000	38.96	0.0	0.00	0
560	502	602		225.00000	-1.07	-257.2	0.28	344
561	503	603		225.00000	-1.21	-329.3	0.40	499
562	504	604		225.00000	-1.42	-452.4	0.64	804
563	505	605		225.00000	-1.20	-322.8	0.39	485
564	506	606		225.00000	-1.03	-238.8	0.25	308
565	5065	6065		225.00000	-0.98	-214.4	0.21	263
566	507	607		225.00000	-0.95	-201.9	0.19	240
567	508	608		225.00000	-0.92	-190.2	0.17	219
568	509	609		225.00000	-0.90	-182.3	0.16	205
569	5095	6095		0.00000	39.10	0.0	0.00	0
570	510	610		225.00000	-0.87	-172.1	0.15	187

Branch No.	From	To	F R B	Total Resistance (Ns^2/m^8)	Airflow (m^3/s)	Pressure Drop (Pa)	Air Power Loss (kW)	Operating Cost ($/yr)
571	511	611		225.00000	-0.87	-170.3	0.15	185
572	512	612		225.00000	-0.94	-198.0	0.19	233
573	513	613		225.00000	-1.09	-265.5	0.29	362
574	514	614		225.00000	-0.83	-155.9	0.13	162
575	515	615		225.00000	-0.62	-85.5	0.05	66
576	516	616		225.00000	-0.44	-43.7	0.02	24
577	517	617		225.00000	-0.30	-20.1	0.01	8
578	518	618		225.00000	-0.14	-4.4	0.00	1
579	519	619		225.00000	0.19	8.3	0.00	2
580	5195	6195		225.00000	0.20	8.6	0.00	2
581	520	620		225.00000	-0.09	-1.8	0.00	0
582	521	621		225.00000	-0.49	-54.9	0.03	34
583	522	622		225.00000	-0.82	-150.8	0.12	155
584	5225	6225		0.00000	39.26	0.0	0.00	0
585	523	623		225.00000	-0.62	-87.7	0.05	68
586	524	624		225.00000	-0.47	-50.5	0.02	30
587	525	625		225.00000	-0.40	-36.8	0.01	18
588	526	626		225.00000	-0.40	-36.5	0.01	18
589	527	627		225.00000	-0.42	-39.7	0.02	21
590	528	628		225.00000	-0.47	-50.1	0.02	29
591	529	629		225.00000	-0.59	-77.8	0.05	57
592	530	630		225.00000	-0.77	-133.1	0.10	128
593	531	631		225.00000	-1.00	-226.6	0.23	284
594	532	632		225.00000	-0.89	-178.1	0.16	198
595	533	633		225.00000	-0.84	-158.6	0.13	167
596	534	634		225.00000	-0.84	-157.9	0.13	166
597	535	635		225.00000	-0.86	-165.5	0.14	178
598	536	636		225.00000	-0.89	-176.5	0.16	197
599	5365	6365		0.00000	39.08	0.0	0.00	0
600	537	637		225.00000	-0.93	-196.5	0.18	229
601	538	638		225.00000	-1.02	-236.3	0.24	302
602	539	639		225.00000	-1.17	-310.2	0.36	454
603	540	640		225.00000	-1.38	-429.1	0.59	741
604	541	641		225.00000	-1.31	-388.4	0.51	637
605	542	642		225.00000	-1.31	-386.5	0.51	634
606	5425	6425		0.00000	38.67	0.0	0.00	0
607	543	643		225.00000	-1.33	-398.5	0.53	663
608	544	644		225.00000	-1.36	-413.3	0.56	703
609	545	645		225.00000	-1.39	-434.0	0.60	755
610	546	646		225.00000	-1.43	-461.2	0.66	825
611	547	647		225.00000	-1.50	-505.7	0.76	949
612	548	648		225.00000	-1.60	-578.2	0.93	1158
613	549	649		225.00000	-1.75	-689.9	1.21	1511
614	550	650		225.00000	-1.71	-659.3	1.13	1411
615	551	651		225.00000	-1.72	-662.8	1.14	1427
616	552	652		225.00000	-1.75	-689.7	1.21	1510
617	5001	7001		0.00000	34.92	0.0	0.00	0
618	5002	7002		0.00000	34.93	0.0	0.00	0
619	501	701		0.00000	34.98	0.0	0.00	0
620	5015	7015		225.00000	1.04	241.5	0.25	314
621	502	702		0.00000	35.07	0.0	0.00	0
622	503	703		0.00000	35.21	0.0	0.00	0
623	504	704		0.00000	35.42	0.0	0.00	0
624	505	705		0.00000	35.20	0.0	0.00	0
625	506	706		0.00000	35.03	0.0	0.00	0
626	5065	7065		0.00000	34.98	0.0	0.00	0
627	507	707		0.00000	34.95	0.0	0.00	0

Branch No.	From	To	F R B	Total Resistance (Ns^2/m^8)	Airflow (m^3/s)	Pressure Drop (Pa)	Air Power Loss (kW)	Operating Cost ($/yr)
628	508	708		0.00000	34.92	0.0	0.00	0
629	509	709		0.00000	34.90	0.0	0.00	0
630	5095	7095		225.00000	0.90	182.3	0.16	205
631	510	710		0.00000	34.87	0.0	0.00	0
632	511	711		0.00000	34.87	0.0	0.00	0
633	512	712		0.00000	34.94	0.0	0.00	0
634	513	713		0.00000	35.09	0.0	0.00	0
635	514	714		0.00000	34.83	0.0	0.00	0
636	515	715		0.00000	34.62	0.0	0.00	0
637	516	716		0.00000	34.44	0.0	0.00	0
638	517	717		0.00000	34.30	0.0	0.00	0
639	518	718		0.00000	34.14	0.0	0.00	0
640	519	719		0.00000	33.81	0.0	0.00	0
641	5195	7195		0.00000	33.80	0.0	0.00	0
642	520	720		0.00000	34.09	0.0	0.00	0
643	521	721		0.00000	34.49	0.0	0.00	0
644	522	722		0.00000	34.82	0.0	0.00	0
645	5225	7225		225.00000	0.74	122.7	0.09	114
646	523	723		0.00000	34.62	0.0	0.00	0
647	524	724		0.00000	34.47	0.0	0.00	0
648	525	725		0.00000	34.40	0.0	0.00	0
649	526	726		0.00000	34.40	0.0	0.00	0
650	527	727		0.00000	34.42	0.0	0.00	0
651	528	728		0.00000	34.47	0.0	0.00	0
652	529	729		0.00000	34.59	0.0	0.00	0
653	530	730		0.00000	34.77	0.0	0.00	0
654	531	731		0.00000	35.00	0.0	0.00	0
655	532	732		0.00000	34.89	0.0	0.00	0
656	533	733		0.00000	34.84	0.0	0.00	0
657	534	734		0.00000	34.84	0.0	0.00	0
658	535	735		0.00000	34.86	0.0	0.00	0
659	536	736		0.00000	34.89	0.0	0.00	0
660	5365	7365		225.00000	0.92	188.5	0.17	217
661	537	737		0.00000	34.93	0.0	0.00	0
662	538	738		0.00000	35.02	0.0	0.00	0
663	539	739		0.00000	35.17	0.0	0.00	0
664	540	740		0.00000	35.38	0.0	0.00	0
665	541	741		0.00000	35.31	0.0	0.00	0
666	542	742		0.00000	35.31	0.0	0.00	0
667	5425	7425		225.00000	1.33	399.3	0.53	665
668	543	743		0.00000	35.33	0.0	0.00	0
669	544	744		0.00000	35.36	0.0	0.00	0
670	545	745		0.00000	35.39	0.0	0.00	0
671	546	746		0.00000	35.43	0.0	0.00	0
672	547	747		0.00000	35.50	0.0	0.00	0
673	548	748		0.00000	35.60	0.0	0.00	0
674	549	749		0.00000	35.75	0.0	0.00	0
675	550	750		0.00000	35.71	0.0	0.00	0
676	551	751		0.00000	35.72	0.0	0.00	0
677	552	752		0.00000	35.75	0.0	0.00	0
678	7001	7005		0.00265	42.91	4.9	0.21	263
679	7005	7002		0.00236	42.91	4.3	0.18	231
680	7002	701		0.00432	77.84	26.2	2.04	2552
681	701	7015		0.00211	112.83	26.9	3.04	3798
682	7015	702		0.00211	113.86	27.4	3.12	3904
683	702	703		0.00428	148.93	94.9	14.13	17687
684	703	704		0.00428	184.14	145.1	26.72	33437

Branch No.	From	To	F R B	Total Resistance (Ns^2/m^8)	Airflow (m^3/s)	Pressure Drop (Pa)	Air Power Loss (kW)	Operating Cost ($/yr)
685	704	7045		0.00000	219.56	0.0	0.00	0
686	705	7045		0.00428	166.93	119.3	19.91	24922
687	706	705		0.00428	131.73	74.3	9.79	12248
688	7065	706		0.00211	96.70	19.7	1.90	2384
689	707	7065		0.00211	61.72	8.0	0.49	618
690	708	707		0.00428	26.77	3.1	0.08	104
691	709	708		0.00428	-8.15	-0.3	0.00	0
692	709	7095		0.00211	43.05	3.9	0.17	210
693	7095	710		0.00211	43.95	4.1	0.18	226
694	710	711		0.00428	78.82	26.6	2.10	2624
695	711	712		0.00428	113.69	55.3	6.29	7868
696	712	7125		0.00428	148.63	94.5	14.05	17577
697	713	7125		0.00000	182.52	0.0	0.00	0
698	714	713		0.00428	147.44	93.0	13.71	17159
699	715	714		0.00428	112.60	54.3	6.11	7651
700	716	715		0.00428	77.99	26.0	2.03	2538
701	717	716		0.00428	43.55	8.1	0.35	441
702	718	717		0.00428	9.25	0.4	0.00	0
703	719	718		0.00428	-24.89	-2.7	0.07	84
704	719	7195		0.00211	58.70	7.3	0.43	536
705	7195	720		0.00211	92.50	18.1	1.67	2095
706	720	721		0.00428	126.59	68.6	8.68	10867
707	721	722		0.00428	161.09	111.1	17.90	22397
708	722	7224		0.00000	195.91	0.0	0.00	0
709	7225	7224		0.00211	131.95	36.7	4.84	6060
710	723	7225		0.00211	131.21	36.3	4.76	5960
711	724	723		0.00428	96.59	39.9	3.85	4823
712	725	724		0.00428	62.11	16.5	1.02	1282
713	726	725		0.00428	27.71	3.3	0.09	114
714	727	726		0.00428	-6.69	-0.2	0.00	0
715	727	728		0.00428	41.11	7.2	0.30	370
716	728	729		0.00428	75.59	24.5	1.85	2318
717	729	730		0.00428	110.17	52.0	5.73	7169
718	730	7305		0.00428	144.94	89.9	13.03	16306
719	731	7305		0.00000	148.96	0.0	0.00	0
720	732	731		0.00428	113.96	55.6	6.34	7929
721	733	732		0.00428	79.07	26.8	2.12	2652
722	734	733		0.00428	44.23	8.4	0.37	465
723	735	734		0.00428	9.39	0.4	0.00	0
724	736	735		0.00428	-25.47	-2.8	0.07	89
725	7365	736		0.00211	-60.35	-7.7	0.46	582
726	7365	737		0.00211	61.27	7.9	0.48	606
727	737	738		0.00428	96.20	39.6	3.81	4767
728	738	739		0.00428	131.23	73.7	9.67	12103
729	739	740		0.00428	166.40	118.5	19.72	24676
730	740	7405		0.00000	201.78	0.0	0.00	0
731	741	7405		0.00428	141.73	86.0	12.19	15253
732	742	741		0.00428	106.42	48.5	5.16	6459
733	7425	742		0.00211	71.11	10.7	0.76	952
734	743	7425		0.00211	69.77	10.3	0.72	899
735	744	743		0.00428	34.44	5.1	0.18	220
736	745	744		0.00428	-0.91	0.0	0.00	0
737	745	746		0.00428	36.30	5.6	0.20	254
738	746	747		0.00428	71.73	22.0	1.58	1975
739	747	748		0.00428	107.23	49.2	5.28	6602
740	748	7485		0.00428	142.83	87.3	12.47	15604
741	749	7485		0.00000	161.05	0.0	0.00	0

Branch No.	From	To	F R B	Total Resistance (Ns^2/m^8)	Airflow (m^3/s)	Pressure Drop (Pa)	Air Power Loss (kW)	Operating Cost ($/yr)
742	750	749		0.00428	125.30	67.2	8.42	10537
743	751	750		0.00428	89.59	34.4	3.08	3857
744	752	751		0.00428	53.87	12.4	0.67	836
745	7639	752		4.06785	18.12	1335.8	24.20	30290
746	6638	7639		0.00000	18.12	0.0	0.00	0
747	6045	7045		1.00000	21.27	452.5	9.62	12045
748	7045	2045		0.00000	407.76	0.0	0.00	0
749	6125	7125		1.00000	16.29	265.5	4.32	5412
750	7125	2125		0.00000	347.44	0.0	0.00	0
751	6224	7224		0.01000	122.79	150.8	18.52	23172
752	7224	2224		0.00000	450.65	0.0	0.00	0
753	6305	7305		2.00000	10.64	226.6	2.41	3017
754	7305	2305		0.00000	304.55	0.0	0.00	0
755	6405	7405		0.05000	92.64	429.1	39.75	49747
756	7405	2405		0.00000	436.15	0.0	0.00	0
757	6485	7485		3.00000	15.16	689.9	10.46	13089
758	7485	2485		0.00000	319.05	0.0	0.00	0
759	2045	14		0.00019	407.76	31.6	12.89	16125
760	2125	14		0.00059	347.44	71.2	24.74	30957
761	2224	23		0.00043	450.65	87.3	39.34	49233
762	2305	23		0.00050	304.55	46.4	14.13	17684
763	2405	31		0.00033	436.15	62.8	27.39	34277
764	2485	31		0.00058	319.05	59.0	18.82	23557
765	64	63		0.00000	388.16	0.0	0.00	0
766	63	13		0.00000	1143.36	0.0	0.00	0
767	13	12		0.00000	1143.36	0.0	0.00	0
768	12	62		0.00000	1143.36	0.0	0.00	0
769	62	1		0.00000	492.31	0.0	0.00	0
770	1	61		0.00000	288.07	0.0	0.00	0
771	61	60		0.00000	-260.98	0.0	0.00	0
772	60	35		0.00000	-747.75	0.0	0.00	0
773	35	59		0.00000	-813.67	0.0	0.00	0
774	59	56		0.00000	-1122.24	0.0	0.00	0
775	56	65		0.00000	-1122.24	0.0	0.00	0
776	65	64		0.00000	-367.04	0.0	0.00	0

Branch No.	From	To	I R	Fixed Airflow (m^3/s)	Booster Pressure (Pa)	Regulator Resistance (Ns^2/m^8)	Branch Resistance (Ns^2/m^8)	Total Resistance (Ns^2/m^8)
8	9	6005		20.00		0.98069	0.00000	0.98069
10	8	4015		20.00		0.70890	0.00000	0.70890
15	2425	4425		20.00		1.28539	0.04201	1.32740
23	16	63		755.20		0.00038	0.00110	0.00148
28	25	64		755.20		0.00031	0.00110	0.00141
33	33	65		755.20		0.00003	0.00110	0.00113
167	3001	4001		17.00		1.73773	0.04172	1.77945
168	3002	4002		17.00		1.79358	0.04435	1.83793
169	301	401		17.00		1.92617	0.04449	1.97066
170	302	402		17.00		2.16637	0.04449	2.21086
171	303	403		17.00		2.55166	0.04449	2.59615
172	304	404		17.00		3.07146	0.04449	3.11595
173	305	405		17.00		2.68342	0.04449	2.72791
174	306	406		17.00		2.45919	0.04449	2.50368
175	3065	4065		17.00		2.41194	0.04449	2.45643
176	307	407		17.00		2.41038	0.04449	2.45487
177	308	408		17.00		2.46388	0.04449	2.50837
179	309	409		17.00		2.47464	0.04449	2.51913
180	3095	4095		20.00		1.28732	0.01844	1.30576
181	310	410		17.00		2.46160	0.04449	2.50609
182	311	411		17.00		2.52706	0.04449	2.57155
183	312	412		17.00		2.69921	0.04449	2.74370
184	313	413		17.00		3.01319	0.04449	3.05768
185	314	414		17.00		2.68304	0.04449	2.72753
186	315	415		17.00		2.49082	0.04449	2.53531
187	316	416		17.00		2.39894	0.04449	2.44343
188	317	417		17.00		2.37052	0.04449	2.41501
189	318	418		17.00		2.36929	0.04449	2.41378
190	319	419		17.00		2.37935	0.04449	2.42384
191	3195	4195		17.00		2.40595	0.04449	2.45044
192	320	420		17.00		2.47146	0.04449	2.51595
193	321	421		17.00		2.71920	0.04449	2.76369
194	322	422		17.00		3.11940	0.04449	3.16389
195	3225	4225		20.00		1.82539	0.01844	1.84383
196	323	423		17.00		2.89378	0.04449	2.93827
197	324	424		17.00		2.79665	0.04449	2.84114
198	325	425		17.00		2.79089	0.04449	2.83538
199	326	426		17.00		2.84980	0.04449	2.89429
200	327	427		17.00		2.92599	0.04449	2.97048
201	328	428		17.00		3.00828	0.04449	3.05277
202	329	429		17.00		3.16227	0.04449	3.20676
204	330	430		17.00		3.37953	0.04449	3.42402
205	331	431		17.00		3.68664	0.04449	3.73113
206	332	432		17.00		3.49277	0.04449	3.53726
207	333	433		17.00		3.39995	0.04449	3.44444
208	334	434		17.00		3.37106	0.04449	3.41555
209	335	435		17.00		3.37084	0.04449	3.41533
210	336	436		17.00		3.38371	0.04449	3.42820
211	3365	4365		20.00		1.95924	0.01844	1.97768
212	337	437		17.00		3.44700	0.04449	3.49149
213	338	438		17.00		3.60190	0.04449	3.64639
214	339	439		17.00		3.88179	0.04449	3.92628
215	340	440		17.00		4.32489	0.04449	4.36938
216	341	441		17.00		4.06976	0.04449	4.11425
217	342	442		17.00		3.95491	0.04449	3.99940
218	3425	4425		20.00		1.46720	0.02862	1.49582
219	343	443		17.00		3.96217	0.04449	4.00666

Branch No.	From	To	I R	Fixed Airflow (m^3/s)	Booster Pressure (Pa)	Regulator Resistance (Ns^2/m^8)	Branch Resistance (Ns^2/m^8)	Total Resistance (Ns^2/m^8)
221	344	444		17.00		3.99018	0.04449	4.03467
222	345	445		17.00		3.98940	0.04449	4.03389
223	346	446		17.00		4.00890	0.04449	4.05339
224	347	447		17.00		4.08551	0.04449	4.13000
225	348	448		17.00		4.25774	0.04449	4.30223
226	349	449		17.00		4.56453	0.04449	4.60902
227	350	450		17.00		4.34054	0.04449	4.38503
228	351	451		17.00		4.23521	0.04449	4.27970
229	352	452		17.00		4.21195	0.04449	4.25644
230	8001	4001		17.00		1.51141	0.00921	1.52062
231	8002	4002		17.00		1.52391	0.00986	1.53377
232	801	401		17.00		1.60539	0.01257	1.61796
233	8015	4015		20.00		0.39259	0.00833	0.40092
234	802	402		17.00		1.78918	0.01549	1.80467
235	803	403		17.00		2.10739	0.01834	2.12573
236	804	404		17.00		2.60769	0.02119	2.62888
237	805	405		17.00		2.19547	0.02411	2.21958
238	806	406		17.00		1.94280	0.02696	1.96976
239	8065	4065		17.00		1.87942	0.02835	1.90777
240	807	407		17.00		1.85979	0.02981	1.88960
241	808	408		17.00		1.87340	0.03266	1.90606
243	809	409		17.00		1.85637	0.03558	1.89195
244	8095	4095		20.00		0.83447	0.01533	0.84980
245	810	410		17.00		1.83393	0.03843	1.87236
246	811	411		17.00		1.89319	0.04128	1.93447
247	812	412		17.00		2.05951	0.04537	2.10488
248	813	413		17.00		2.37157	0.04785	2.41942
249	814	414		17.00		2.04258	0.04785	2.09043
250	815	415		17.00		1.85121	0.04785	1.89906
251	816	416		17.00		1.75985	0.04785	1.80770
252	817	417		17.00		1.73163	0.04785	1.77948
253	818	418		17.00		1.73051	0.04785	1.77836
254	819	419		17.00		1.74101	0.04785	1.78886
255	8195	4195		17.00		1.76800	0.04785	1.81585
256	820	420		17.00		1.83405	0.04785	1.88190
257	821	421		17.00		2.08319	0.04785	2.13104
258	822	422		17.00		2.48511	0.04785	2.53296
259	8225	4225		20.00		1.37777	0.01984	1.39761
260	823	423		17.00		2.27402	0.04785	2.32187
261	824	424		17.00		2.15774	0.04785	2.20559
262	825	425		17.00		2.15504	0.04785	2.20289
263	826	426		17.00		2.21735	0.04785	2.26520
264	827	427		17.00		2.29724	0.04785	2.34509
265	828	428		17.00		2.41564	0.04785	2.46349
266	829	429		17.00		2.60891	0.04785	2.65676
268	830	430		17.00		2.85002	0.04785	2.89787
269	831	431		17.00		3.16051	0.04785	3.20836
270	832	432		17.00		2.96819	0.04785	3.01604
271	833	433		17.00		2.87720	0.04676	2.92396
272	834	434		17.00		2.85150	0.04559	2.89709
273	835	435		17.00		2.85610	0.04449	2.90059
274	836	436		17.00		2.87549	0.04332	2.91881
275	8365	4365		20.00		1.59432	0.01775	1.61207
276	837	437		17.00		2.94737	0.04223	2.98960
277	838	438		17.00		3.11351	0.04113	3.15464
278	839	439		17.00		3.40609	0.03996	3.44605
279	840	440		17.00		3.86312	0.03887	3.90199

Branch No.	From	To	I R	Fixed Airflow (m^3/s)	Booster Pressure (Pa)	Regulator Resistance (Ns^2/m^8)	Branch Resistance (Ns^2/m^8)	Total Resistance (Ns^2/m^8)
280	841	441		17.00		3.62320	0.03777	3.66097
281	842	442		17.00		3.52483	0.03660	3.56143
282	843	443		17.00		3.53443	0.03551	3.56994
284	844	444		17.00		3.56443	0.03441	3.59884
285	845	445		17.00		3.56569	0.03324	3.59893
286	846	446		17.00		3.58736	0.03215	3.61951
287	847	447		17.00		3.66781	0.03105	3.69886
288	848	448		17.00		3.84560	0.02988	3.87548
289	849	449		17.00		4.15944	0.02879	4.18823
290	850	450		17.00		3.94401	0.02769	3.97170
291	851	451		17.00		3.84878	0.02652	3.87530
292	852	452		17.00		3.83695	0.02542	3.86237

Fan No.: 1
From: 15
To: 16
Pressure: 0.000 kPa
Description:

Fan Name: Joy M144-79-710 (2 P)
Fan Setting: 26 degrees
Comments: Two Parallel - Metric Units
Points: 10

Quantity	Pressure	Description
283.20	2.488	
377.60	2.986	
472.00	3.285	
585.28	3.484	
660.80	3.160	
708.00	2.887	
755.20	2.588	
802.40	2.240	
849.60	1.841	
906.24	1.244	

Fan No.: 2
From: 24
To: 25
Pressure: 0.000 kPa
Description:

Fan Name: Joy M144-79-710 (2 P)
Fan Setting: 26 degrees
Comments: Two Parallel - Metric Units
Points: 10

Quantity	Pressure	Description
283.20	2.488	
377.60	2.986	
472.00	3.285	
585.28	3.484	
660.80	3.160	
708.00	2.887	
755.20	2.588	
802.40	2.240	
849.60	1.841	
906.24	1.244	

Fan No.: 3
From: 32
To: 33
Pressure: 0.000 kPa
Description:

Fan Name: Joy M144-79-710 (2 P)
Fan Setting: 26 degrees
Comments: Two Parallel - Metric Units
Points: 10

Quantity	Pressure	Description
283.20	2.488	
377.60	2.986	
472.00	3.285	
585.28	3.484	
660.80	3.160	
708.00	2.887	
755.20	2.588	
802.40	2.240	
849.60	1.841	
906.24	1.244	

Fan No.	From	To	Fan Pressure (kPa)	Fan Airflow (m^3/s)	Fan Curve	Air Power (kW)	Operating Cost ($/yr)	Fan Description
1	15	16	2.570	757.59	On	1947.01	2436539	
2	24	25	2.570	757.59	On	1947.01	2436539	
3	32	33	2.570	757.59	On	1947.01	2436539	

Junction No.	X Coordinate	Y Coordinate	Branches Attached	Relative Pressure (Pa)
1	46.2	57.3	3	0.0
2	45.3	57.6	3	-238.6
3	44.9	57.8	3	-257.6
4	45.1	69.2	3	-380.8
6	44.6	66.6	3	-355.1
7	44.6	68.8	2	-367.6
8	44.6	69.7	2	-396.4
9	44.6	70.8	2	-404.1
10	43.5	65.5	3	-241.8
12	46.2	72.0	2	-0.3
13	40.0	72.0	2	-0.3
14	41.0	64.7	3	-1348.5
15	40.5	66.1	3	-1724.8
16	40.3	66.5	3	845.1
17	40.6	66.4	2	-440.0
21	43.6	55.3	3	-144.7
23	41.0	55.6	3	-1390.4
24	40.5	57.0	3	-1766.7
25	40.3	57.4	3	803.2
26	40.6	57.3	2	-481.9
29	43.6	47.8	3	-97.6
31	41.0	45.5	3	-1566.3
32	40.5	46.9	3	-1925.5
33	40.3	47.3	3	644.4
34	40.6	47.2	2	-640.7
35	46.2	41.0	3	0.0
43	43.8	40.6	2	-40.0
56	40.0	40.0	2	0.0
57	44.5	41.2	2	-55.5
59	46.2	40.0	3	0.0
60	46.2	47.6	3	0.0
61	46.2	55.2	3	0.0
62	46.2	65.5	3	0.0
63	40.0	67.3	3	-0.3
64	40.0	58.1	3	0.0
65	40.0	48.0	3	0.0
100	44.2	71.3	2	-423.3
101	44.2	69.9	3	-401.3
102	44.2	69.2	3	-386.2
103	44.2	68.8	4	-367.6
104	44.2	68.4	3	-362.6
105	44.2	67.6	3	-355.6
106	44.2	67.3	3	-346.1
107	44.2	66.5	3	-332.6
108	44.2	66.1	3	-314.1
109	44.2	65.4	3	-311.3
110	44.2	64.6	3	-322.9
111	44.2	64.2	3	-330.5
112	44.2	63.9	3	-336.0
113	44.2	63.1	3	-339.7
114	44.2	62.7	3	-342.1
115	44.2	62.3	3	-343.3
116	44.2	62.0	3	-343.8
117	44.2	61.6	3	-343.9
118	44.2	61.2	3	-343.9
119	44.2	60.8	3	-343.6
120	44.2	60.1	3	-342.4

Junction No.	X Coordinate	Y Coordinate	Branches Attached	Relative Pressure (Pa)
121	44.2	59.7	3	-339.4
122	44.2	59.3	3	-334.9
123	44.2	58.2	3	-327.2
124	44.2	57.8	3	-315.4
125	44.2	57.4	3	-300.6
126	44.2	57.0	3	-282.4
127	44.2	56.7	4	-260.3
128	44.2	56.3	3	-243.7
129	44.2	55.9	3	-223.7
130	44.2	55.1	3	-213.0
131	44.2	54.4	3	-214.2
132	44.2	54.0	3	-214.6
133	44.2	53.6	3	-214.7
134	44.2	53.3	3	-214.7
135	44.2	52.9	3	-214.4
136	44.2	52.1	3	-213.6
137	44.2	51.4	3	-210.9
138	44.2	51.0	3	-205.8
139	44.2	50.6	3	-198.7
140	44.2	50.2	3	-189.2
141	44.2	49.5	3	-177.1
142	44.2	49.1	4	-161.8
143	44.2	48.3	3	-138.8
144	44.2	47.6	3	-125.6
145	44.2	47.2	3	-125.8
146	44.2	46.8	3	-125.8
147	44.2	46.5	3	-125.7
148	44.2	46.1	3	-125.1
149	44.2	45.3	3	-123.9
150	44.2	44.9	3	-121.4
151	44.2	44.5	3	-117.5
152	44.2	44.2	3	-111.9
200	41.4	70.7	2	-497.8
201	41.4	69.0	3	-503.3
202	41.4	68.3	3	-503.6
203	41.4	67.9	3	-503.6
204	41.4	67.5	3	-503.4
205	41.4	66.7	3	-502.5
206	41.4	66.3	3	-500.4
207	41.4	65.6	3	-496.1
208	41.4	65.2	3	-488.1
209	41.4	64.4	3	-492.6
210	41.4	63.7	3	-506.1
211	41.4	63.3	3	-514.7
212	41.4	62.9	3	-520.7
213	41.4	62.2	3	-524.2
214	41.4	61.8	3	-526.3
215	41.4	61.4	3	-527.3
216	41.4	61.1	3	-527.6
217	41.4	60.7	3	-527.6
218	41.4	60.3	3	-527.5
219	41.4	59.9	3	-527.1
220	41.4	59.2	3	-525.5
221	41.4	58.8	3	-522.2
222	41.4	58.4	3	-517.3
223	41.4	57.3	3	-505.4
224	41.4	56.9	3	-499.0

Junction No.	X Coordinate	Y Coordinate	Branches Attached	Relative Pressure (Pa)
225	41.4	56.5	3	-483.5
226	41.4	56.1	3	-464.4
227	41.4	55.8	3	-441.1
228	41.4	55.4	3	-414.0
229	41.4	55.0	3	-382.7
230	41.4	54.2	3	-365.0
231	41.4	53.5	3	-365.3
232	41.4	53.1	3	-365.3
233	41.4	52.7	3	-365.1
234	41.4	52.3	3	-364.5
235	41.4	52.0	3	-363.2
236	41.4	51.2	3	-360.8
237	41.4	50.5	3	-355.9
238	41.4	50.1	3	-347.9
239	41.4	49.7	3	-337.4
240	41.4	49.3	3	-324.4
241	41.4	48.6	3	-308.1
242	41.4	48.2	3	-288.3
243	41.4	47.4	3	-265.1
244	41.4	46.7	3	-251.6
245	41.4	46.3	3	-251.6
246	41.4	45.9	3	-251.2
247	41.4	45.5	3	-250.2
248	41.4	45.2	3	-248.4
249	41.4	44.4	3	-245.5
250	41.4	44.0	3	-240.9
251	41.4	43.6	3	-234.3
252	41.4	43.3	3	-225.8
301	43.8	69.8	2	-401.4
302	43.8	69.0	2	-386.3
303	43.8	68.7	2	-367.7
304	43.8	68.3	2	-362.7
305	43.8	67.5	2	-355.7
306	43.8	67.2	2	-346.2
307	43.8	66.4	2	-332.7
308	43.8	66.0	2	-314.2
309	43.8	65.3	2	-311.4
310	43.8	64.5	2	-323.0
311	43.8	64.1	2	-330.6
312	43.8	63.7	2	-336.1
313	43.8	63.0	2	-339.8
314	43.8	62.6	2	-342.2
315	43.8	62.2	2	-343.4
316	43.8	61.8	2	-343.9
317	43.8	61.5	2	-344.0
318	43.8	61.1	2	-344.0
319	43.8	60.7	2	-343.7
320	43.8	60.0	2	-342.5
321	43.8	59.6	2	-339.5
322	43.8	59.2	2	-335.0
323	43.8	58.1	2	-327.3
324	43.8	57.7	2	-315.5
325	43.8	57.3	2	-300.7
326	43.8	56.9	2	-282.5
327	43.8	56.5	2	-260.4
328	43.8	56.2	2	-243.8
329	43.8	55.8	2	-223.8

Junction No.	X Coordinate	Y Coordinate	Branches Attached	Relative Pressure (Pa)
330	43.8	55.0	2	-213.1
331	43.8	54.3	2	-214.3
332	43.8	53.9	2	-214.7
333	43.8	53.5	2	-214.8
334	43.8	53.1	2	-214.8
335	43.8	52.8	2	-214.5
336	43.8	52.0	2	-213.7
337	43.8	51.3	2	-211.0
338	43.8	50.9	2	-205.9
339	43.8	50.5	2	-198.8
340	43.8	50.1	2	-189.3
341	43.8	49.4	2	-177.2
342	43.8	49.0	2	-161.9
343	43.8	48.2	2	-138.9
344	43.8	47.5	2	-125.7
345	43.8	47.1	2	-125.9
346	43.8	46.7	2	-125.9
347	43.8	46.3	2	-125.8
348	43.8	46.0	2	-125.2
349	43.8	45.2	2	-124.0
350	43.8	44.8	2	-121.5
351	43.8	44.4	2	-117.6
352	43.8	44.1	2	-112.0
401	42.9	69.5	3	-970.9
402	42.9	68.7	3	-1025.2
403	42.9	68.4	3	-1117.9
404	42.9	68.0	3	-1263.2
405	42.9	67.2	3	-1144.1
406	42.9	66.8	3	-1069.7
407	42.9	66.1	3	-1042.2
408	42.9	65.7	3	-1039.1
409	42.9	64.9	3	-1039.4
410	42.9	64.2	3	-1047.2
411	42.9	63.8	3	-1073.8
412	42.9	63.4	3	-1129.0
413	42.9	62.7	3	-1223.5
414	42.9	62.3	3	-1130.4
415	42.9	61.9	3	-1076.1
416	42.9	61.5	3	-1050.1
417	42.9	61.2	3	-1041.9
418	42.9	60.8	3	-1041.5
419	42.9	60.4	3	-1044.2
420	42.9	59.6	3	-1069.5
421	42.9	59.3	3	-1138.2
422	42.9	58.9	3	-1249.4
423	42.9	57.8	3	-1176.5
424	42.9	57.4	3	-1136.5
425	42.9	57.0	3	-1120.1
426	42.9	56.6	3	-1119.0
427	42.9	56.2	3	-1118.9
428	42.9	55.9	3	-1126.0
429	42.9	55.5	3	-1150.5
430	42.9	54.7	3	-1202.6
431	42.9	54.0	3	-1292.6
432	42.9	53.6	3	-1236.9
433	42.9	53.2	3	-1210.2
434	42.9	52.8	3	-1201.8

Junction No.	X Coordinate	Y Coordinate	Branches Attached	Relative Pressure (Pa)
435	42.9	52.5	3	-1201.5
436	42.9	51.7	3	-1204.4
437	42.9	50.9	3	-1220.0
438	42.9	50.6	3	-1259.7
439	42.9	50.2	3	-1333.4
440	42.9	49.8	3	-1452.1
441	42.9	49.0	3	-1366.2
442	42.9	48.7	3	-1317.7
443	42.9	47.9	3	-1296.8
444	42.9	47.2	3	-1291.7
445	42.9	46.8	3	-1291.7
446	42.9	46.4	3	-1297.3
447	42.9	46.0	3	-1319.3
448	42.9	45.6	3	-1368.5
449	42.9	44.9	3	-1456.0
450	42.9	44.5	3	-1388.8
451	42.9	44.1	3	-1354.4
452	42.9	43.8	3	-1342.0
501	42.7	69.5	3	-1022.1
502	42.7	68.8	3	-1076.7
503	42.7	68.4	3	-1171.6
504	42.7	68.0	3	-1316.9
505	42.7	67.3	3	-1197.8
506	42.7	66.9	3	-1123.4
507	42.7	66.2	3	-1095.9
508	42.7	65.8	3	-1092.8
509	42.7	65.0	3	-1093.1
510	42.7	64.3	3	-1100.9
511	42.7	63.9	3	-1127.5
512	42.7	63.5	3	-1182.7
513	42.7	62.7	3	-1277.2
514	42.7	62.4	3	-1184.1
515	42.7	62.0	3	-1129.8
516	42.7	61.6	3	-1103.8
517	42.7	61.2	3	-1095.6
518	42.7	60.8	3	-1095.2
519	42.7	60.5	3	-1097.9
520	42.7	59.7	3	-1123.2
521	42.7	59.3	3	-1191.9
522	42.7	58.9	3	-1303.1
523	42.7	57.8	3	-1230.2
524	42.7	57.4	3	-1190.2
525	42.7	57.1	3	-1173.8
526	42.7	56.7	3	-1170.5
527	42.7	56.3	3	-1170.4
528	42.7	55.9	3	-1177.5
529	42.7	55.5	3	-1202.0
530	42.7	54.8	3	-1254.1
531	42.7	54.0	3	-1344.1
532	42.7	53.7	3	-1288.4
533	42.7	53.3	3	-1261.7
534	42.7	52.9	3	-1253.3
535	42.7	52.5	3	-1253.0
536	42.7	51.8	3	-1255.9
537	42.7	51.0	3	-1271.5
538	42.7	50.6	3	-1311.2
539	42.7	50.3	3	-1384.9

Junction No.	X Coordinate	Y Coordinate	Branches Attached	Relative Pressure (Pa)
540	42.7	49.9	3	-1503.6
541	42.7	49.1	3	-1417.7
542	42.7	48.7	3	-1369.2
543	42.7	48.0	3	-1348.3
544	42.7	47.2	3	-1343.2
545	42.7	46.8	3	-1343.2
546	42.7	46.5	3	-1348.8
547	42.7	46.1	3	-1370.8
548	42.7	45.7	3	-1420.0
549	42.7	45.0	3	-1507.5
550	42.7	44.6	3	-1440.3
551	42.7	44.2	3	-1405.9
552	42.7	43.8	3	-1393.5
600	43.1	71.6	3	-457.8
601	43.1	69.7	3	-805.0
602	43.1	68.9	3	-819.1
603	43.1	68.5	3	-841.8
604	43.1	68.2	3	-863.8
605	43.1	67.4	3	-874.1
606	43.1	67.0	3	-883.9
607	43.1	66.3	3	-892.8
608	43.1	65.9	3	-901.4
609	43.1	65.1	3	-909.7
610	43.1	64.4	3	-927.9
611	43.1	64.0	3	-956.1
612	43.1	63.6	3	-983.8
613	43.1	62.9	3	-1010.9
614	43.1	62.5	3	-1027.4
615	43.1	62.1	3	-1043.5
616	43.1	61.7	3	-1059.3
617	43.1	61.4	3	-1074.8
618	43.1	61.0	3	-1090.1
619	43.1	60.6	3	-1105.4
620	43.1	59.8	3	-1120.4
621	43.1	59.5	3	-1135.9
622	43.1	59.1	3	-1151.0
623	43.1	57.9	3	-1141.2
624	43.1	57.6	3	-1138.5
625	43.1	57.2	3	-1135.6
626	43.1	56.8	3	-1132.7
627	43.1	56.4	3	-1129.7
628	43.1	56.1	3	-1126.7
629	43.1	55.7	3	-1123.5
630	43.1	54.9	3	-1120.1
631	43.1	54.2	3	-1116.6
632	43.1	53.8	3	-1109.6
633	43.1	53.4	3	-1102.3
634	43.1	53.0	3	-1094.8
635	43.1	52.6	3	-1086.8
636	43.1	51.9	3	-1078.5
637	43.1	51.1	3	-1074.3
638	43.1	50.8	3	-1074.1
639	43.1	50.4	3	-1073.8
640	43.1	50.0	3	-1073.5
641	43.1	49.2	3	-1028.3
642	43.1	48.9	3	-981.8
643	43.1	48.1	3	-949.0

Junction No.	X Coordinate	Y Coordinate	Branches Attached	Relative Pressure (Pa)
644	43.1	47.3	3	-929.2
645	43.1	47.0	3	-908.5
646	43.1	46.6	3	-887.0
647	43.1	46.2	3	-864.7
648	43.1	45.8	3	-841.4
649	43.1	45.1	3	-817.1
650	43.1	44.7	3	-780.6
651	43.1	44.3	3	-742.7
652	43.1	43.9	3	-703.5
700	42.5	70.9	2	-986.8
701	42.5	69.5	3	-1022.1
702	42.5	68.7	3	-1076.7
703	42.5	68.3	3	-1171.6
704	42.5	68.0	3	-1316.9
705	42.5	67.2	3	-1197.8
706	42.5	66.8	3	-1123.4
707	42.5	66.1	3	-1095.9
708	42.5	65.7	3	-1092.8
709	42.5	64.9	3	-1093.1
710	42.5	64.2	3	-1100.9
711	42.5	63.8	3	-1127.5
712	42.5	63.4	3	-1182.7
713	42.5	62.7	3	-1277.2
714	42.5	62.3	3	-1184.1
715	42.5	61.9	3	-1129.8
716	42.5	61.5	3	-1103.8
717	42.5	61.2	3	-1095.6
718	42.5	60.8	3	-1095.2
719	42.5	60.4	3	-1097.9
720	42.5	59.6	3	-1123.2
721	42.5	59.3	3	-1191.9
722	42.5	58.9	3	-1303.1
723	42.5	57.8	3	-1230.2
724	42.5	57.4	3	-1190.2
725	42.5	57.0	3	-1173.8
726	42.5	56.6	3	-1170.5
727	42.5	56.2	3	-1170.4
728	42.5	55.9	3	-1177.5
729	42.5	55.5	3	-1202.0
730	42.5	54.7	3	-1254.1
731	42.5	54.0	3	-1344.1
732	42.5	53.6	3	-1288.4
733	42.5	53.2	3	-1261.7
734	42.5	52.8	3	-1253.3
735	42.5	52.4	3	-1253.0
736	42.5	51.7	3	-1255.9
737	42.5	50.9	3	-1271.5
738	42.5	50.6	3	-1311.2
739	42.5	50.2	3	-1384.9
740	42.5	49.8	3	-1503.6
741	42.5	49.0	3	-1417.7
742	42.5	48.7	3	-1369.2
743	42.5	47.9	3	-1348.3
744	42.5	47.2	3	-1343.2
745	42.5	46.8	3	-1343.2
746	42.5	46.4	3	-1348.8
747	42.5	46.0	3	-1370.8

Junction No.	X Coordinate	Y Coordinate	Branches Attached	Relative Pressure (Pa)
748	42.5	45.6	3	-1420.0
749	42.5	44.9	3	-1507.5
750	42.5	44.5	3	-1440.3
751	42.5	44.1	3	-1405.9
752	42.5	43.8	3	-1393.5
801	41.8	69.1	2	-503.3
802	41.8	68.4	2	-503.7
803	41.8	68.0	2	-503.7
804	41.8	67.6	2	-503.5
805	41.8	66.8	2	-502.6
806	41.8	66.5	2	-500.5
807	41.8	65.7	2	-496.2
808	41.8	65.3	2	-488.2
809	41.8	64.6	2	-492.7
810	41.8	63.8	2	-506.2
811	41.8	63.4	2	-514.8
812	41.8	63.1	2	-520.8
813	41.8	62.3	2	-524.3
814	41.8	61.9	2	-526.4
815	41.8	61.5	2	-527.4
816	41.8	61.2	2	-527.7
817	41.8	60.8	2	-527.7
818	41.8	60.4	2	-527.6
819	41.8	60.0	2	-527.2
820	41.8	59.3	2	-525.6
821	41.8	58.9	2	-522.3
822	41.8	58.5	2	-517.4
823	41.8	57.4	2	-505.5
824	41.8	57.0	2	-499.1
825	41.8	56.6	2	-483.6
826	41.8	56.3	2	-464.5
827	41.8	55.9	2	-441.2
828	41.8	55.5	2	-414.1
829	41.8	55.1	2	-382.8
830	41.8	54.4	2	-365.1
831	41.8	53.6	2	-365.4
832	41.8	53.2	2	-365.4
833	41.8	52.8	2	-365.2
834	41.8	52.5	2	-364.6
835	41.8	52.1	2	-363.3
836	41.8	51.3	2	-360.9
837	41.8	50.6	2	-356.0
838	41.8	50.2	2	-348.0
839	41.8	49.8	2	-337.5
840	41.8	49.4	2	-324.5
841	41.8	48.7	2	-308.2
842	41.8	48.3	2	-288.4
843	41.8	47.5	2	-265.2
844	41.8	46.8	2	-251.7
845	41.8	46.4	2	-251.7
846	41.8	46.0	2	-251.3
847	41.8	45.6	2	-250.3
848	41.8	45.3	2	-248.5
849	41.8	44.5	2	-245.6
850	41.8	44.1	2	-241.0
851	41.8	43.8	2	-234.4
852	41.8	43.4	2	-225.9

Junction No.	X Coordinate	Y Coordinate	Branches Attached	Relative Pressure (Pa)
1001	44.2	71.0	3	-423.2
1002	44.2	70.3	3	-413.4
1065	44.2	66.9	3	-340.1
1085	44.2	65.8	3	-303.0
1095	44.2	65.0	3	-317.9
1195	44.2	60.4	3	-343.2
1225	44.2	58.6	3	-331.7
1295	44.2	55.5	3	-211.9
1355	44.6	52.6	2	-288.1
1365	44.2	51.8	3	-212.6
1435	44.2	48.0	3	-125.2
1585	44.2	41.5	3	-56.2
2001	41.4	70.1	3	-497.8
2002	41.4	69.4	3	-501.6
2015	41.4	68.8	3	-503.4
2045	41.0	67.1	2	-1316.9
2065	41.4	66.0	3	-498.8
2085	41.4	64.8	3	-482.8
2095	41.4	64.1	3	-500.2
2125	41.0	62.5	2	-1277.2
2195	41.4	59.5	3	-526.7
2224	41.0	57.7	2	-1303.1
2225	41.4	57.6	3	-510.2
2295	41.4	54.6	3	-364.7
2305	41.0	53.8	2	-1344.0
2355	41.0	51.3	2	-288.1
2365	41.4	50.8	3	-358.9
2405	41.0	48.8	2	-1503.6
2425	40.8	47.6	2	-288.1
2435	41.4	47.0	3	-251.4
2485	41.0	44.8	2	-1507.3
2585	41.4	40.6	2	-58.0
3001	43.8	70.9	2	-423.2
3002	43.8	70.2	2	-413.5
3065	43.8	66.8	2	-340.2
3085	43.8	65.6	2	-255.1
3095	43.8	64.9	2	-318.0
3195	43.8	60.3	2	-343.3
3225	43.8	58.4	2	-331.8
3295	43.8	55.4	2	-186.7
3365	43.8	51.6	2	-212.7
3425	44.0	48.6	2	-221.3
3435	43.8	47.8	2	-102.1
4001	42.9	70.6	3	-937.4
4002	42.9	69.9	3	-944.6
4015	42.9	69.1	3	-680.0
4065	42.9	66.4	3	-1050.1
4095	42.9	64.6	3	-840.2
4195	42.9	60.0	3	-1051.5
4225	42.9	58.1	3	-1069.3
4365	42.9	51.3	3	-1003.7
4425	42.9	48.3	3	-819.1
5001	42.7	70.7	3	-986.8
5002	42.7	69.9	3	-996.1
5015	42.7	69.2	3	-807.8
5065	42.7	66.5	3	-1103.8
5095	42.7	64.6	3	-914.5

Junction No.	X Coordinate	Y Coordinate	Branches Attached	Relative Pressure (Pa)
5195	42.7	60.1	3	-1105.2
5225	42.7	58.2	3	-1143.6
5365	42.7	51.4	3	-1075.0
5425	42.7	48.4	3	-958.7
6000	43.1	71.1	3	-795.5
6001	43.1	70.8	3	-795.5
6002	43.1	70.1	3	-799.5
6005	43.1	70.3	3	-796.3
6015	43.1	69.3	3	-807.5
6045	43.1	67.7	3	-863.8
6065	43.1	66.7	3	-888.4
6095	43.1	64.8	3	-913.6
6125	43.1	63.1	3	-1010.9
6195	43.1	60.2	3	-1112.9
6224	43.1	58.5	3	-1151.0
6225	43.1	58.3	3	-1142.4
6305	43.1	54.4	3	-1116.6
6365	43.1	51.5	3	-1074.4
6405	43.1	49.5	3	-1073.5
6425	43.1	48.5	3	-958.3
6485	43.1	45.3	3	-817.1
6636	43.1	40.4	3	-58.0
6637	43.4	40.7	3	-42.6
6638	43.1	41.3	3	-57.5
7001	42.5	70.6	3	-986.8
7002	42.5	69.9	3	-996.1
7005	42.5	70.1	2	-991.7
7015	42.5	69.1	3	-1049.3
7045	42.5	67.5	4	-1316.9
7065	42.5	66.4	3	-1103.8
7095	42.5	64.6	3	-1096.8
7125	42.5	62.9	4	-1277.2
7195	42.5	60.0	3	-1105.2
7224	42.5	58.3	4	-1303.1
7225	42.5	58.1	3	-1266.2
7305	42.5	54.2	4	-1344.0
7365	42.5	51.3	3	-1263.5
7405	42.5	49.3	4	-1503.6
7425	42.5	48.3	3	-1357.9
7485	42.5	45.1	4	-1507.3
7639	42.5	41.1	2	-57.7
8001	41.8	70.3	2	-497.9
8002	41.8	69.5	2	-501.4
8015	41.6	68.7	2	-519.7
8065	41.8	66.1	2	-498.9
8085	41.8	64.9	2	-441.8
8095	41.8	64.2	2	-500.4
8195	41.8	59.7	2	-526.8
8225	41.8	57.8	2	-510.3
8295	41.8	54.7	2	-337.2
8365	41.8	51.0	2	-359.0
8435	41.8	47.2	2	-233.4

Attachment III

Fan Curve

Attachment III
Fan Curve

This attachment contains information on the fan curve used to provide input to the calculation. A primary fan is selected from the fan catalog "Joy Axivane Fans, Mining Catalog J-670", Joy Mining Machinery (1982). The fan is a variable pitch, axial flow fan. A blade tip angle setting was selected for the calculation and the appropriate fan curve information provides input. Per Section 5.1.4, the fan curve is modified to show potential stall points.

Fan Curve #C-8248, Joy Axivane Fan Model M144-79-710, with a blade tip angle of 26° was selected for this calculation (Figure III-1), with two fans operating in parallel. For fans operating in parallel, the airflows are additive for any given fan pressure in order to obtain the characteristic curve (Hartman et al. 1997, p. 372). In Table III-1 the "single fan, Imperial units" columns provide the information from the fan curve (Joy, C-8248), that information is then converted to "single fan, metric units", and then converted to "two parallel, metric units" by doubling the quantity and keeping the pressure constant. The "two parallel, metric units" is input for the VNETPC calculation.

Table III-1. Fan Curve Data

Joy M144-79-710 (single fan, Imperial units)		Joy M144-79-710 (single fan, metric units)		Joy M144-79-710 (two parallel, metric units)	
Quantity Cfm	Pressure Inches wg.	Quantity m^3/s	Pressure kPa	Quantity m^3/s	Pressure kPa
300,000	10.0	141.60	2.488	283.20	2.488
400,000	12.0	188.80	2.986	377.60	2.986
500,000	13.2	236.00	3.285	472.00	3.285
620,000	14.0	292.64	3.484	585.28	3.484
700,000	12.7	330.40	3.160	660.80	3.160
750,000	11.6	354.00	2.887	708.00	2.887
800,000	10.4	377.60	2.588	755.20	2.588
850,000	9.0	401.20	2.240	802.40	2.240
900,000	7.4	424.80	1.841	849.60	1.841
960,000	5.0	453.12	1.244	906.24	1.244

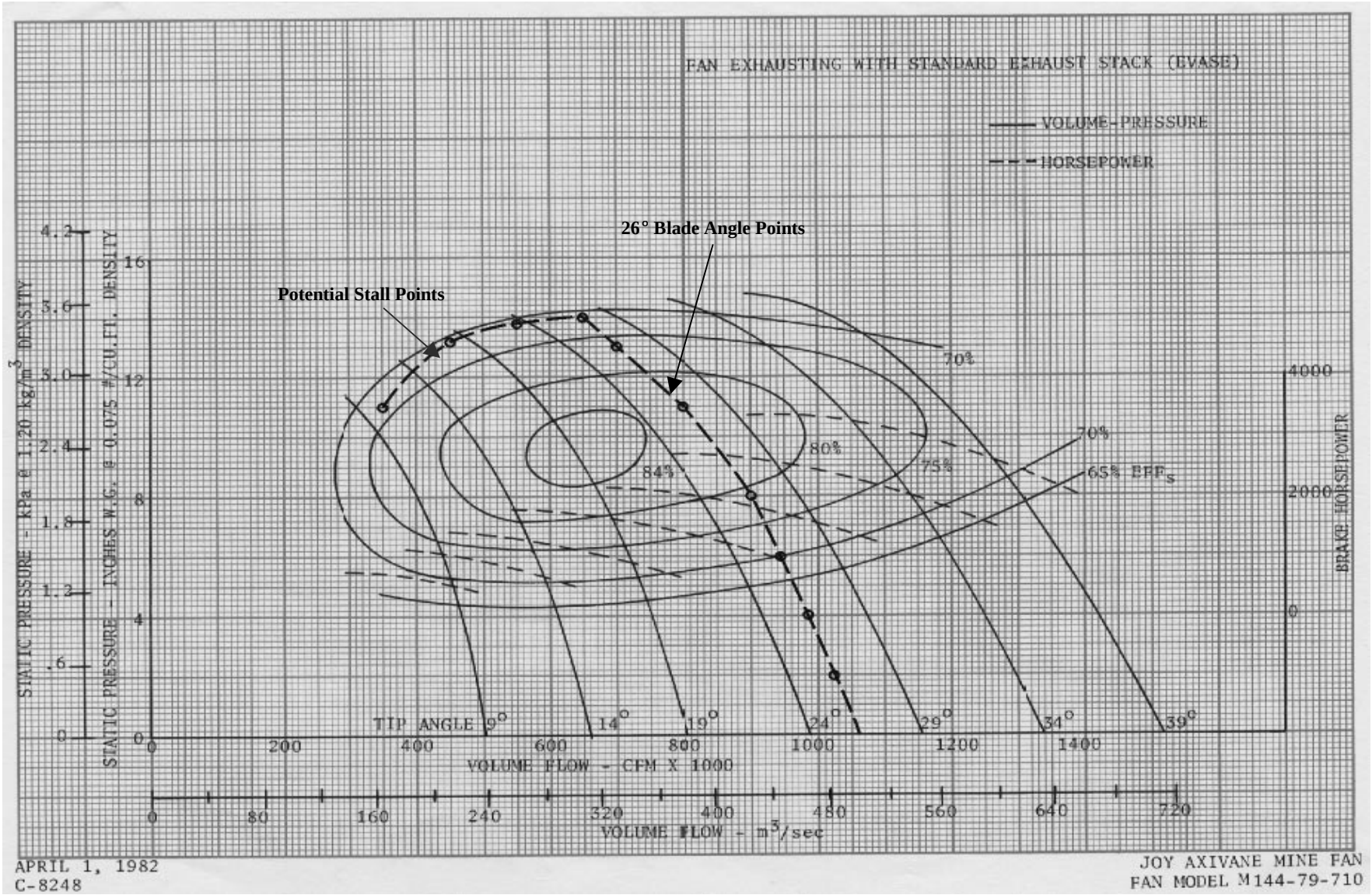

Figure III-1. Fan Curve #C-8248 Showing 26° blade angle and Potential Stall Points

Attachment IV
Acronyms, Symbols, and Units

Acronyms

BSC	Bechtel SAIC Company
CRWMS M&O	Civilian Radioactive Waste Management System and Operating Contractor
MTU	metric tons of uranium
SR	Site Recommendation
TBV	to be verified

Symbols and Units

R	branch resistance
K	airway friction factor
O	perimeter, m
l	length, m
l_e	equivalent length, m
A	area, m^2
°C	degrees Celsius
°F	degrees Fahrenheit
m	meter
Rb	resistance input for regulating device
m/s	meters per second
m^3/s	cubic meters per second
cfm	cubic feet per minute
kW	kilowatt
kPa	kilo pascals
wg	inches water gauge
Hp	horsepower