UNISONT ENGINEERING, INC.

# CALCULATION COVER SHEET

| PROJECT | PROJECT ID [2] | CALCULATION NO [3] |
|---|---|---|
| **Hope Creek (HCGS)** | **8038** | **P0004** |

TITLE [4]
**Water Hammer Analysis of the HCGS Fire Protection System**

DISCIPLINE [5]
**Plant Engineering**

CALCULATION STATUS [6]
☐ PRELIMINARY ☒ CONFIRMED ☐ SUPERSEDED ☐ VOIDED

COMPUTER PROGRAM [7]
☒ Standard Application Programs (SAPS) ☐ COTS
☐ None ☐ Other (specify) _____

PROGRAM ID. [8] USLAM
RELEASE NO. 2

COMPUTER/WORKSTATION TYPE [9]
☒ PC ☐ Mac ☐ Main Frame ☐ Other (specify) _____

NOTES AND REMARKS:

This calculation is prepared to evaluate the HCGS Fire Protection System for potential water hammer events. The calculation also aims at the evaluation of the effectiveness of preventative and mitigative measures with the implementation of eleven (11) vacuum breakers at selected high points in the system.

Attachment I gives the UEI responses to the PSEG comments dated January 10, 2017, April 27, 2017, June 27, 2017, and September 9, 2018 as these comments are incorporated in the calculation.

**Revision 1 Changes**

1. Title of the calculation changes to "Water Hammer Analysis of the HCGS Fire Protection System"
2. Responses to the PSEG comments dated June 27, 2017 are on page 304 in Attachment 1.
3. Appendix G was added in Revision 1 of this calculation (pages 268 to 299). It contains the analysis documenting the forcing functions for Riser # 10 and Riser # RB2.
4. All pages in this calculation are marked as Revision 1 for convenience. Pages 2, 5, 17, 43, 77, and 78 are those that have been changed in addition to added pages 268 to 306.

Note:

1. This calculation has been prepared for the analysis under the 10 CFR 50 Appendix B Program per Unisont QA Manual, Rev 1, dated December 17, 2013 under contract PO#4500861893/2.
2. USLAM computer program has been utilized in the Unisont office.

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|---|---|---|---|---|---|---|---|
| | | | | | | | |
| 1 | Issued for use | 306 | 306 | A. Arastu | E. Tom | M. Dong | 9/14/18 |
| 0 | Issued for use | 271 | 271 | A. Arastu | E. Tom | M. Dong | 6/29/2018 |
| Rev. [12] No | Reason For Revision. [13] | Total No. of Sheets. [14] | Last Sheet No [15]. | By [16] | Checked [17] | Approved / Accepted [18] | Date [19] |
| **RECORD OF REVISIONS** | | | | | | | |

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# ACRONYMS

| | |
|---|---|
| HCGS | Hope Creek Generating Station |
| PSEG | Public Service Electric and Gas Company |
| FPS | Fire Protection System |
| ME101 | Bechtel computer program for the linear elastic analysis of piping systems |
| P&ID | Piping and Instrumentation Diagram |
| QA | Quality Assurance |
| UEI | Unisont Engineering Inc. |
| NRC | Nuclear Regulatory Commission |
| USLAM | Unified Steam Liquid hAMmer Computer Program |
| TB | Turbine Building |
| AB | Auxiliary Building |
| RW | Rad Waste Building |
| RB | Reactor Building |

# 1. OBJECTIVES AND SUMMARY

NRC Information Notice 98-31 describes a water hammer event that occurred at Columbia Generating Station. In this event, actuation of a Fire Protection System led to voiding in tall dead-ended risers with subsequent water hammer in the risers when the main fire pumps started automatically filling the voids.

Reference 1 provided an evaluation performed to determine if the Hope Creek Generating Station (HCGS) Fire Water System (FPS) is susceptible to similar water hammer event. It was determined that the HCGS FPS is susceptible to the water hammer event similar to the one that occurred at Columbia Generation Station. Reference 1 proposed modifications to protect the FPS against this potentially damaging water hammer event. However, a review of Reference 1 evaluation showed that the investigation did not consider all possible operating scenarios for the FPS. Also, a full review of the system was recommended to ensure that the system would be adequately protected by the proposed system modifications by analysis of bounding conditions.

PSEG requested Unisont Engineering Inc. (UEI) to evaluate the Fire Protection System at HCGS. UEI proposed a phased approach for this evaluation.

The first phase involved a hydraulic evaluation of the Fire Protection System to quantify the susceptibility of the water hammer using in house computer program USLAM. The computer program USLAM is a single phase fluid transients (water hammer) code developed by UEI. In this phase the HCGS FPS is modeled and selected analysis cases are run to quantify the waterhammer pressures and loads.

Phase II performed a limited structural analysis of the FPS piping using the results from the Phase I analysis. It included a preliminary assessment of the water hammer effect on a selected piping system to determine the severity of the waterhammer loads. It was concluded that the sample system analyzed for one particular case could potentially experience loads far in excess of the faulted allowable. These two phases were requested under PSEG Purchase Order 4500861893 (Reference 2) and the results of the analyses were reported to PSEG in Reference 3.

Phase III was initiated when the water hammer severity determined from Phases I and II was judged to be severe enough to potentially damage to piping system. This Phase III aims at the evaluation of the effectiveness of preventative/mitigative measures. Reference 4 (PSEG Purchase Order 4500861893 Change Order) authorized UEI to perform the Phase III work. In Reference 4, PSEG requested UEI to incorporate the addition of vacuum breakers in the system as the preferred mitigation measure to the water hammer issue.

UNISONT ENGINEERING, INC.

# CALCULATION SHEET

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| Project: | HOPE CREEK GENERATING STATION | Job Number: | 8038 |
| Calc No. | 8038-P0004 | Sheet No. | 6 |
| By: | A Arastu Date: 9/14/18 | Rev. No. | 1 |
| Subject: | Water Hammer Analysis of the HCGS Fire Protection System | | |

This calculation gives the results of the Phase III analysis with vacuum breakers installed at selected high points to reduce the forces in the risers to acceptable levels. The force time history results from this analysis are used in the follow-up structural analysis to finalize the mitigation measures considered in this calculation.

Phase IV (Revision 1 of this calculation) performed the analysis documenting the forcing functions generation for Riser # 10 and Riser # RB2. Details of this analysis are contained in Appendix G . PSEG Purchase Order 4500861893/2 Change Order authorized UEI to perform the Phase IV work. A deluge/pre-action valve opening time of 1 second was used in the Phase IV analysis as discussed in Appendix G.

## 2. DESCRIPTION OF THE SYSTEM

The Fire Protection System (FPS) at Hope Creek Generating Station (HCGS) consists of two main fire pumps (one electric and one diesel driven) and one jockey pump connected to the yard piping (partly underground) that runs around the perimeter of the plant and supplies fire water to the various deluge and pre-action station zones and fire hoses. Piping from the ring header connects to vertical standpipes located inside the Turbine, Auxiliary, Radwaste, and Reactor Buildings. Some of these reach significantly high elevations. Figure 1 below gives the schematic diagram for the HCGS Fire Protection System showing a few of the risers where vacuum breakers are proposed and some of the important pre-action/deluge valves.

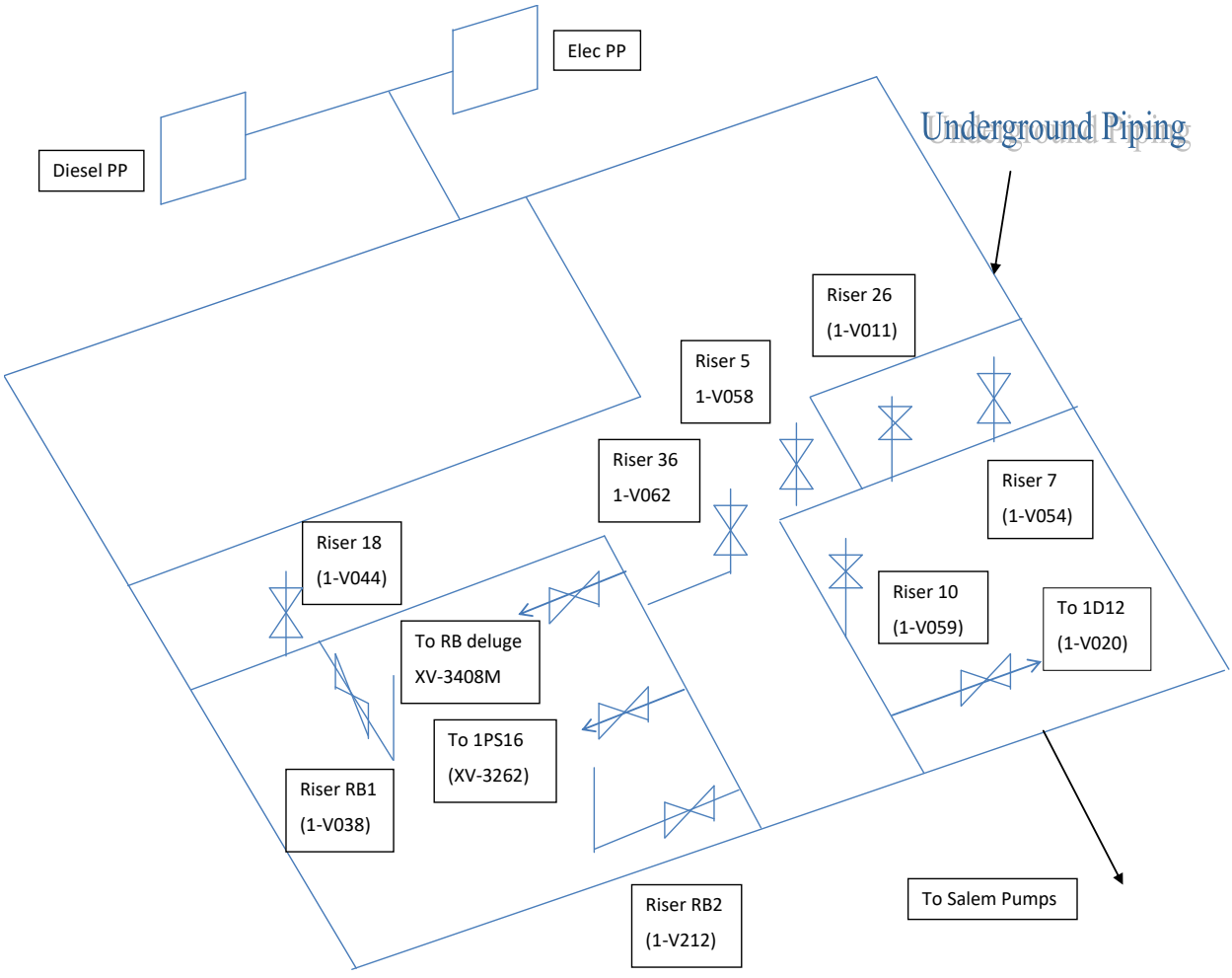


Figure 1: Schematic Diagram of the Fire Protection System at HGCS showing a few of the risers where vacuum breakers are proposed and some of the important pre-action/deluge valves.

Elevation diagrams have been prepared by PSEG for the FPS in which the vertical piping is drawn approximately to scale but not the horizontal. Figures 2 through 6 show the elevation diagrams of some of the tallest risers in each of the 3 buildings (Turbine, Auxiliary, and Reactor buildings). From these diagrams the highest standpipe reaches an elevation of 208 ft (ground elevation is 100 ft). Figures 7 through 10 show other high risers in the system. Because some of the piping in the FPS is taller than what the atmosphere pressure can support (Fire water tank water level plus 34 feet), a keep full system powered by the jockey pump operates continuously to keep the system full, i.e. prevent vapor void formation at high points when the system is on standby. This is a low capacity pump to cater for small system leakages.

The evaluation in phase 1 involved a review of the system P&ID's, isometrics, system description, and operation procedures. The isometric drawings and schematics of the Fire Protection system were provided by PSEG and were used to generate the FPS computer model for the water hammer analysis. The system design specification and Design Information Transmittal (References 5 and 6) were reviewed to determine the modes of operation of the system. In addition, the cross-tie with the Salem plant Fire Protection system is also considered due to possibility of the HGCS Fire Protection pumps being not available or failing to start. The Reference 1 analysis did not consider the case of the use of Salem fire water pumps.

As per data in Appendix A, the Hope Creek Jockey Pump maintains a fire main system pressure of between 115 psig to 125 psig during system standby operation. This pump is rated at 50 gpm. When the fire water flow demand exceeds the jockey pump capacity, the system pressure would drop. At 110 psig fire main pressure, the electric pump gets the signal to start. The electric pump speed up time was measured on June 9, 2015 and the pump discharge pressure reaches the peak of 150 psig from an initial hydrostatic pressure in 1.8 seconds. If the electric motor driven pump is not available or cannot supply the demand flow, the header pressure downstream of the pump check valve will drop further. If it reaches the diesel pump set point of 100 psig, then the diesel pump gets a signal to start. The diesel pump takes a little longer to start and was measured to take about 2.8 seconds to reach a 150 psig steady value (there is no delay between pump start and the start signal). Both these pumps are rated at 2500 gpm. The diesel pump uses batteries to start and therefore is not rendered inoperable by a loss of site electrical power. These pumps take suction from storage tanks A and B in the Hope Creek FPS system.

The Salem/Hope Creek Cross-tie line is opened within seven days after any one of the fire water pumps not being available at Hope Creek. The cross-tie is opened immediately if both fire pumps are unavailable at Hope Creek. The Salem Fire Pump #1 (Diesel) will automatically start following a 2 second delay if the Fire System pressure drops to 85 psig. Fire Pump #1 (also Diesel) will reach the shaft speed to its maximum value in 3.1 seconds. This time was measured on June 4, 2015. The Salem

Fire Pump #2 will automatically start following a designed 15 second delay if the Fire System pressure drops to 75 psig. Salem Fire Pump #2 was tested in June 11, 2015 and pump has a delay of 21.3 seconds after the header set-point pressure (75 psig) is reached. This value will be used in the evaluation instead of 15 seconds designed value as the longer delay time is more bounding from waterhammer point of view. The pump shaft speed up time after this delay is 5.2 seconds. Both pumps are rated at 2500 gpm. The Salem Jockey pump (50 gpm rated flow) comes on at 115 psig header pressure and shuts off at 135 psig. All the above data are taken from the Design Specification (Ref. 2) and Design Information Transmittal (Reference 3) included as Appendix F in this calculation.

Table 1 of Reference 3 (Phase I & II Report) shows the designation of all riser numbers, their location, valve ID number in the riser, maximum elevation, and pipe diameter of the main riser section. This table has been reproduced as Table 1 in this calculation.

Figures 2, 3, and 4 show the elevation diagrams for the Turbine building showing riser numbers 4, 5, 26, Auxiliary Building Diesel Control Area showing riser # 18, and Auxiliary Building South Service R/W Area showing riser number 36.

Figures 5 and 6 show the elevation diagrams for the Reactor building area for riser numbers RB1 and RB2. respectively.

Figures 7 and 8 show the elevation diagrams for the Rad Waste Building riser numbers 33 and 15. respectively.

Figures 9 and 10 show the elevation diagrams for the Turbine Building riser numbers 7 & 8 and 9, 10, 11, & 12, respectively.

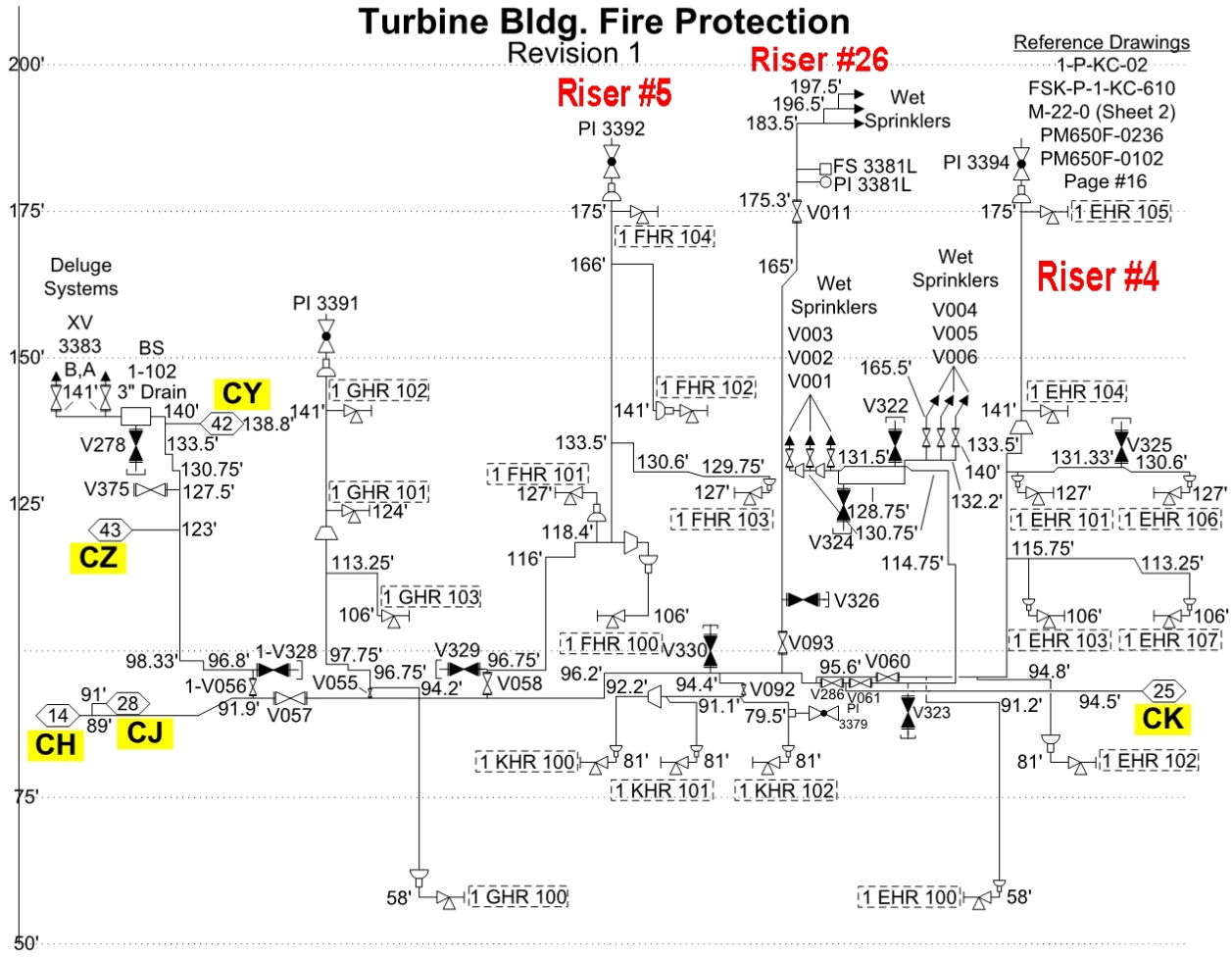


Figure 2: Elevation Diagram of Risers #4, #5, and #26 in Turbine Building at HGCS

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| Project: | HOPE CREEK GENERATING STATION | Job Number: | 8038 |
| Calc No. | 8038-P0004 | Sheet No. | 11 |
| By: | A Arastu Date: 9/14/18 | Rev. No. | 1 |
| Subject: | Water Hammer Analysis of the HCGS Fire Protection System | | |

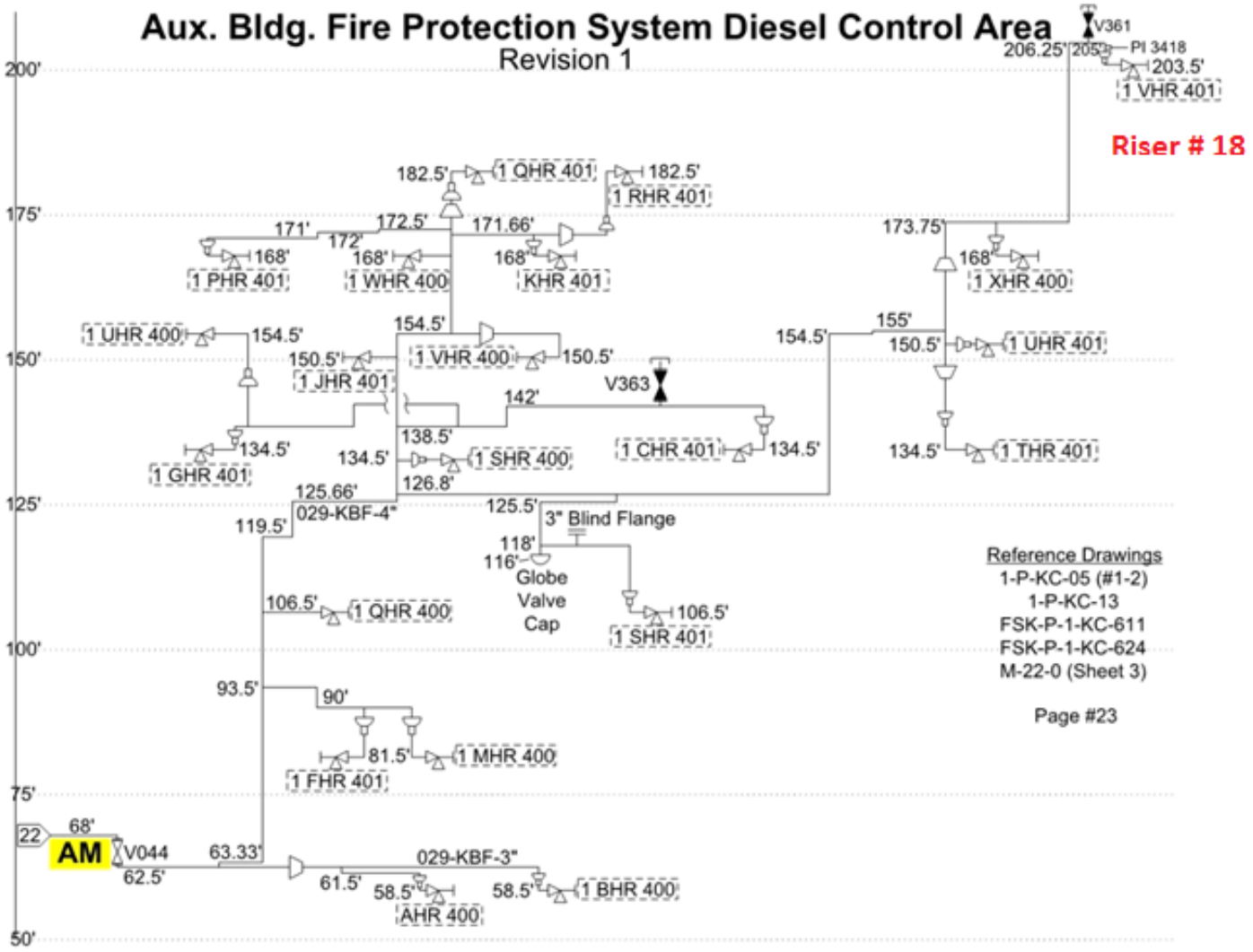



Figure 3: Elevation Diagram of Riser #18 in Auxiliary Building Diesel Area at HGCS

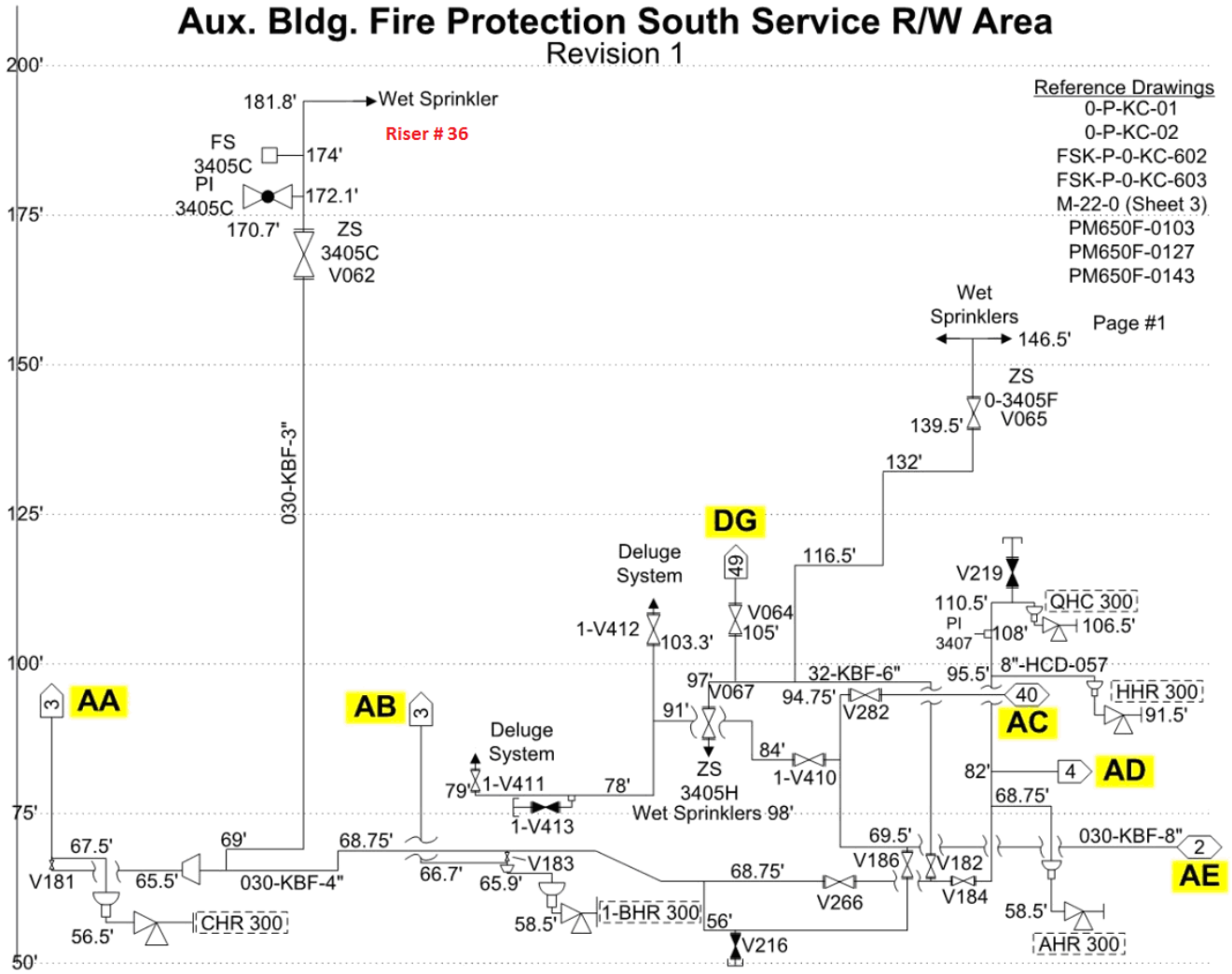



Figure 4: Elevation Diagram of Riser #36 in Auxiliary Building Radwaste Area at HGCS

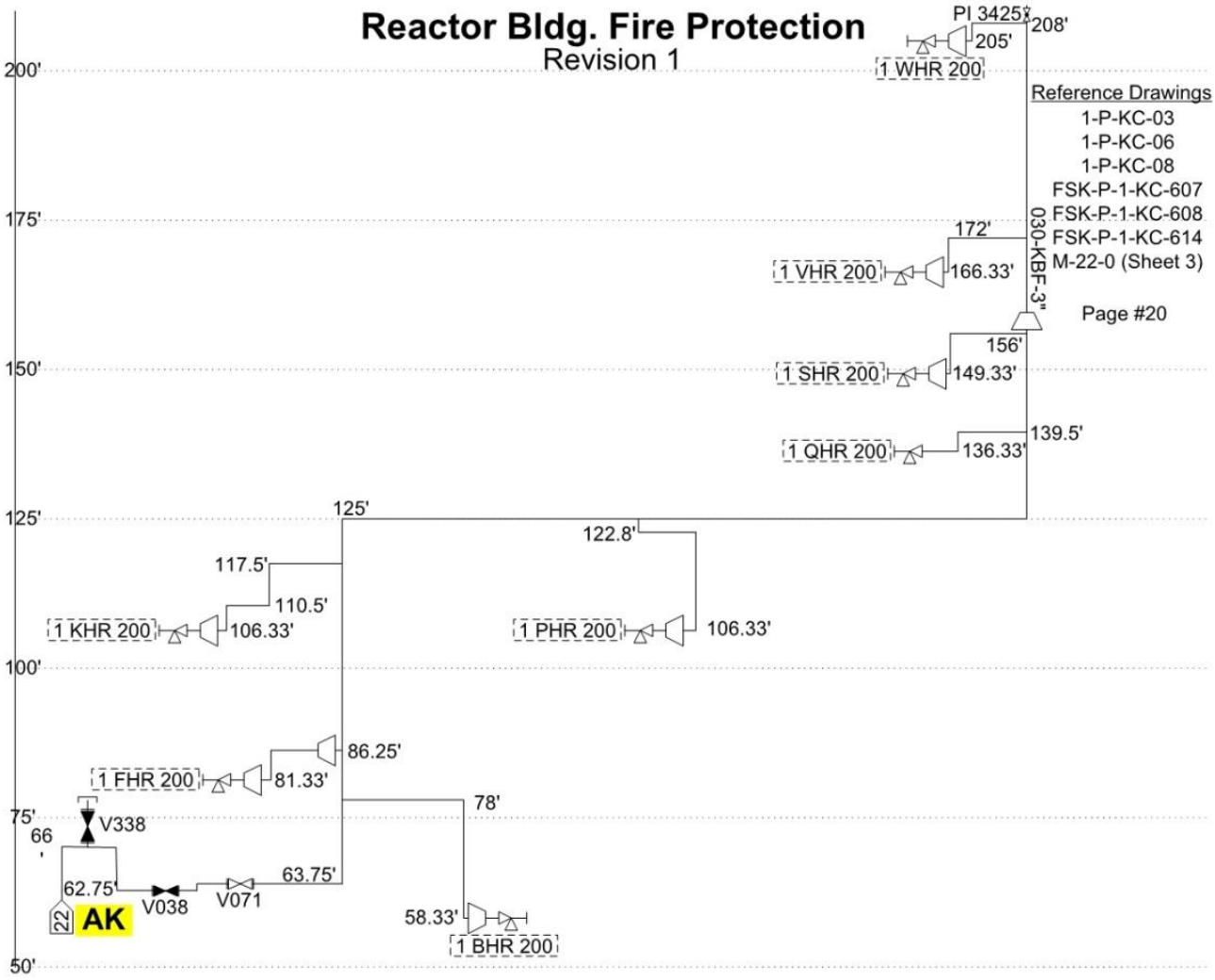



Figure 5: Elevation Diagram of Riser RB1 in Reactor Building at HGCS

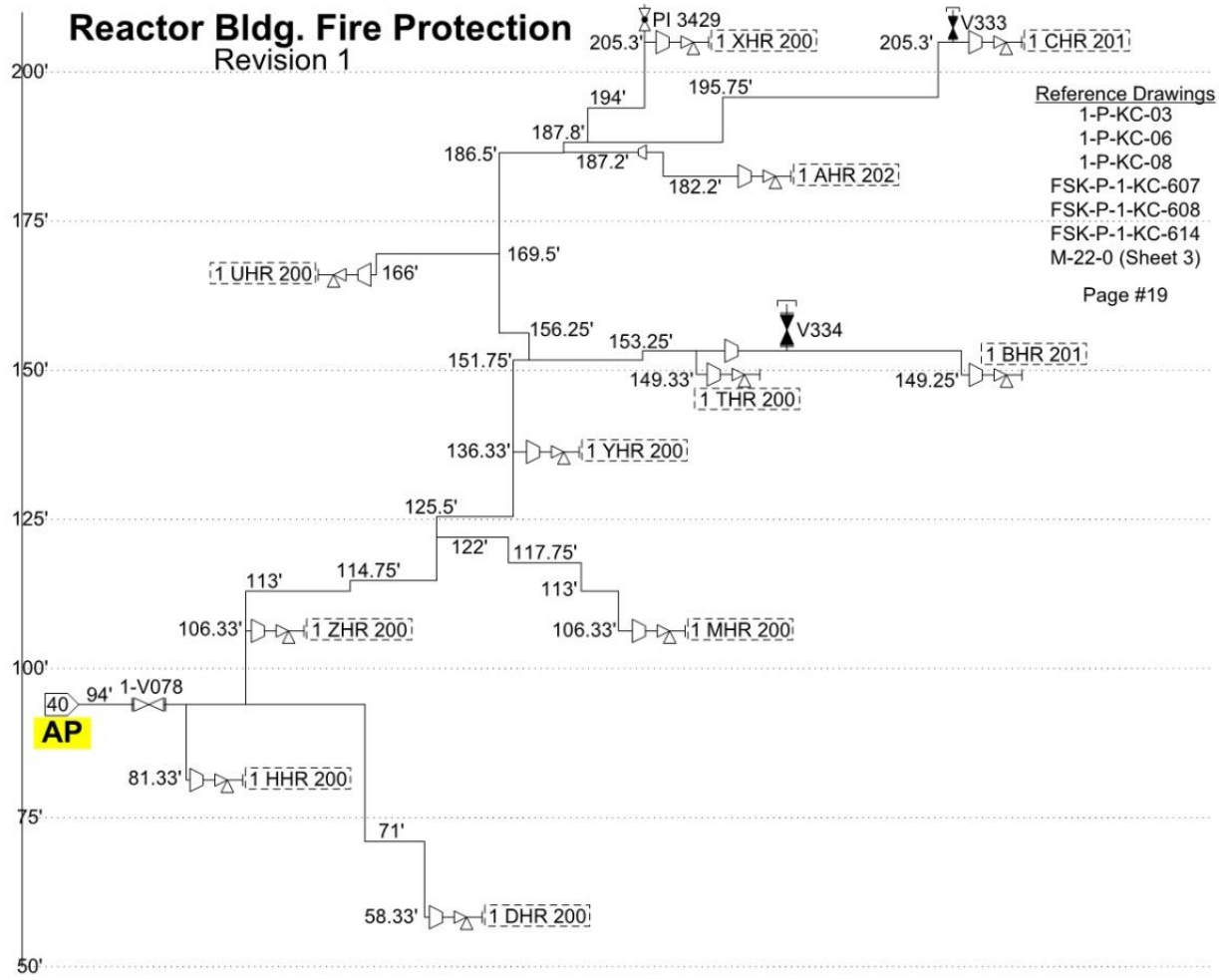



Figure 6: Elevation Diagram of Riser RB2 in Reactor Building at HGCS

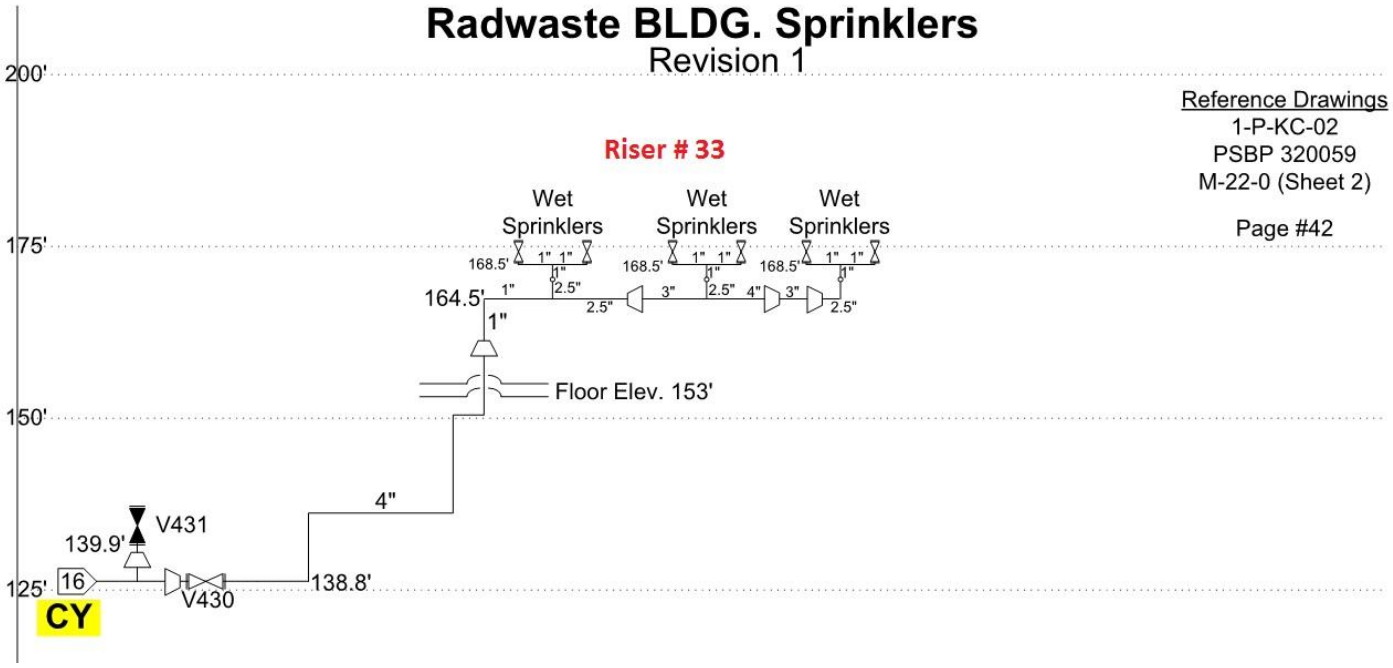



Figure 7: Elevation Diagram of Riser 33 in AB Radwaste Building for information only - this diagram differs from Drg PSBP 320059 slightly (see PSBP 320059 for exact configuration)

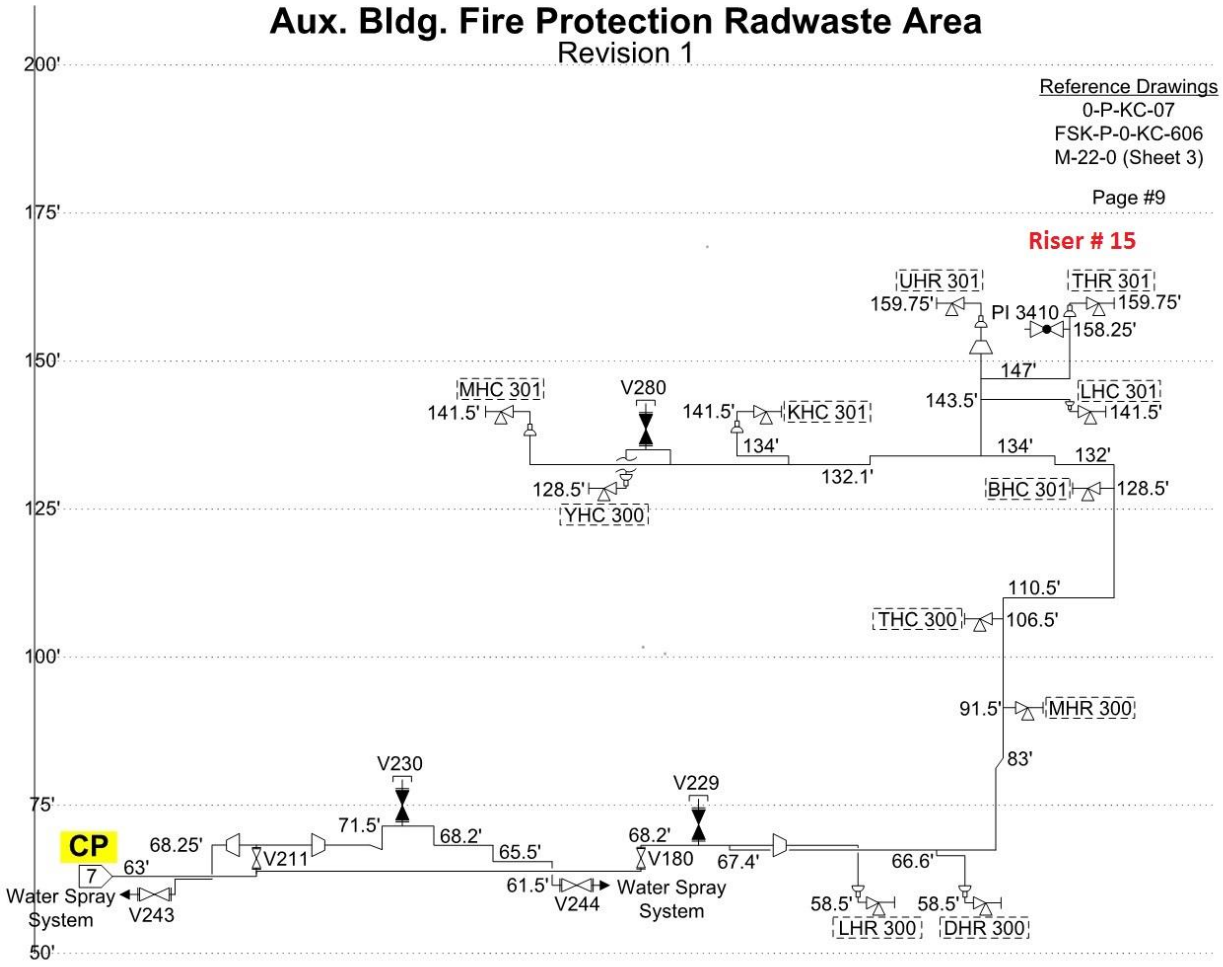



Figure 8 Elevation Diagram of Riser 15 in Aux. Building Rad Waste Area at HGCS

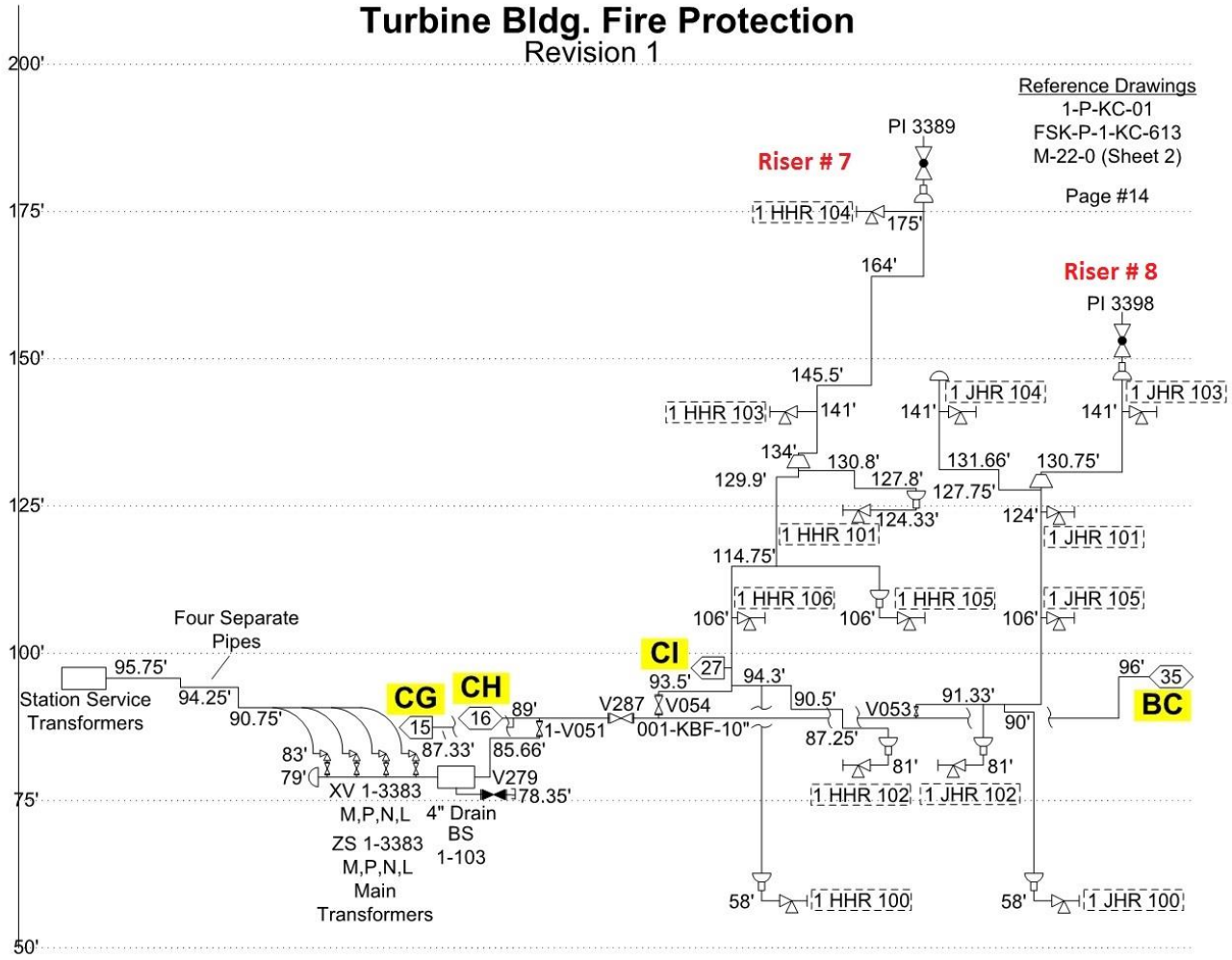



Figure 9 Elevation Diagram of Risers 7 and 8 in Turbine Building at HGCS

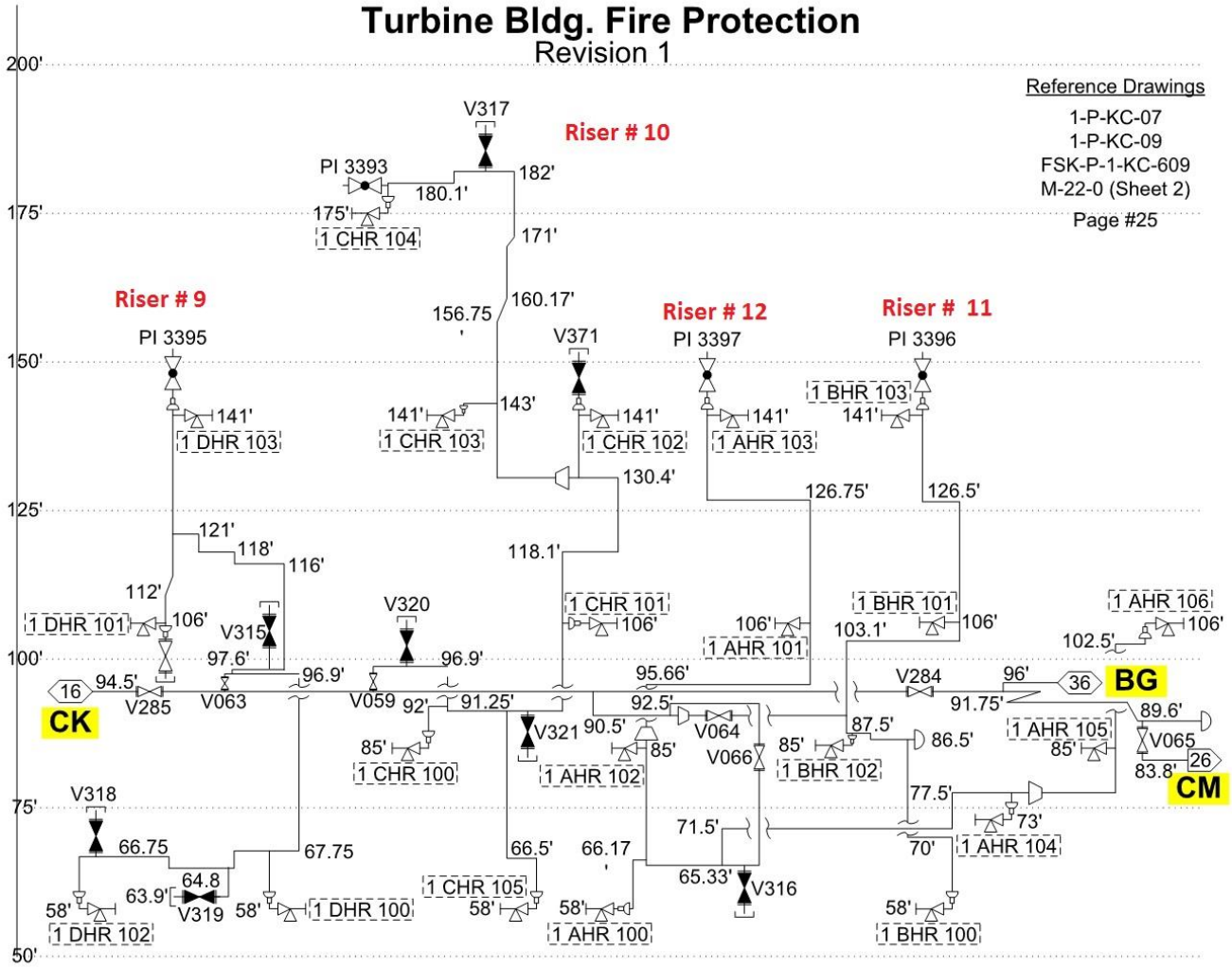



Figure 10 Elevation Diagram of Risers 9, 10, 11, & 12 in Turbine Building at HGCS

The reactor building hose stations are normally isolated (per P&ID), and require that yard PIVs 1KCV212 and 1KCV076, and isolation valves 1KCV038 and 1KCV068 be manually opened. For a fire inside the reactor building, the appropriate hose station supply valve will be opened first and then the fire hose will be activated. The supply valve is opened manually and takes 2 minutes (approximately) to open fully. The manual valves that supply water to a fire hose take 45 seconds (approximately) to open. The above opening times are based on Fire department experience. The piping downstream of the inside valves 1KCV038 and 1KCV068 is isolated from the jockey pump when these inside valves are closed. It is assumed that the piping between the isolation valves and hose station valves is full of water before the transient begins. Therefore, it is assumed that all piping

between the fire pump and deluge valves, between the pump and pre-action valves, and the pump and the fire stations is full of water initially with the jockey pump running.

There are several deluge and pre-action valves in the system. From a matrix of valve sizes and piping elevations downstream of these valves, worst case valve actuations are selected for water hammer analysis. Table 1 summarizes the risers modeled in the USLAM runs (riser numbers correspond to Gothic analysis used in Reference 13. RB1 and RB2 are not in the Reference 13 analysis).

**Table 1: Riser Number and General Informtion for HGCS FPS**

| Riser No. | Location | Valve ID | Max. Elev. | Pipe Dia. |
|---|---|---|---|---|
| 1 | 10" header in TB | V346 | 149' | 3" |
| 2 | 10" header in TB | V348 | 146' | 3" |
| 3 | 10" header in TB | V349 | 150' | 3" |
| 4 | 10" header in TB | V060 | 175.8' | 3" |
| 5 | 10" header in TB | V058 | 175.8' | 3" |
| 6 | 10" header in TB | V055 | 141.8' | 3" |
| 7 | 10" header in TB | V054 | 175.8' | 3" |
| 8 | 10" header in TB | V053 | 141.8' | 3" |
| 9 | 10" header in TB | V063 | 141.8' | 3" |
| 10 | 10" header in TB | V059 | 182' | 3" |
| 11 | 10" header in TB | V064 | 141.8' | 3" |
| 12 | 10" header in TB | V066 | 141.8' | 3" |
| 13 | AB Radwaste Building | V181 | 179' | 3" |
| 14 | AB Radwaste Building | V183 | 163.5' | 3" |
| 15 | AB Radwaste Building | V180 | 160' | 3" |
| 16 | AB Radwaste Building | V178 | 141.5' | 3" |
| 17 | 8" header in AB Wing Area | V175 | 128.5' | 3" |
| 18 | 8" header in AB Diesel Area | V044 | 206' | 3" |
| 19 | 8" header in AB Wing Area | V041 | 165' | 3" |
| 20 | Deluge System 1D8 in TB | V017 | 141' | 4" |
| 21 | Wet Sprinkler 0WS6 in AB Radwaste Area | V065 | 146.5' | 6" |
| 22 | Deluge System 1D9 in TB | V018 | 141' | 4" |
| 24 | Wet Sprinkler 1WS13 in TB | V081 | 137' | 8" |
| 25 | Wet Sprinkler 1WS7 in TB | V007 | 137' | 8" |
| 26 | Wet Sprinkler 1WS11 in TB | V011 | 197.5' | 3" |
| 27 | Wet Sprinkler 1WS4 in TB | V004 | 169.5' | 3" |
| 28 | Wet Sprinkler 1WS5 in TB | V005 | 169.5' | 3" |
| 29 | Wet Sprinkler 1WS6 in TB | V006 | 169.5' | 3" |
| 31 | Wet Sprinkler 0WS13 in AB Radwaste Area | V072 | 147.5' | 3" |
| 33 (1) | Wet Sprinkler in AB Radwaste Area | V430 | 167' | 4" |
| 34 (1) | Deluge Systems 1D5 and 1D6 in TB | V014/V015 | 137' | 6" |
| 36 | Wet Sprinkler 0WS3 in AB Radwaste Area | V062 | 182' | 3" |
| RB1 | Reactor Building | V038 | 208' | 3" |
| RB2 | Reactor Building | V212 | 205' | 3" |

Note:

1. Riser 33 is not the same as that from Gothic analysis. It is for the sprinklers shown in Figure 7. Riser 34 coressponds to the Riser 33/34 from the Gothic analysis.

Tables 2 and 3 show the list of pre-action and deluge valves in the HCGS FPS. The description of these valves, the system number to which they belong to, their size, elevation, etc. are detailed in these tables.

**Table 2: Pre-action Valve Systems List at HGCS**

| System No. | Description | Valve Size | Elev. Of Riser/Valve | Highest Point | Supv. Air[1] Pressure | Comments |
|---|---|---|---|---|---|---|
| 0PS1 | Control Area | 2” | 102’ | 102’ | None | Floor elevations[2] |
| 0PS2 | Radwaste Area | 3” | 102’ | 124’ | None | Shown for |
| 0PS3 | Turbine Building | 3” | 102’ | 102’ | None | All valves |
| 1PS1 | Intake Structure | 3” | 102’ | 102’ | None | |
| 1PS2 | Intake Structure | 3” | 102’ | 102’ | None | |
| 1PS3 | Circ. Water Pump Structure | 3” | 102’ | 102’ | None | |
| 1PS6 | Control & Radwaste Areas | 6” | 77’ | 77’ | None | |
| 1PS7 | Control/DG Area | 4” | 77’ | 77’ | None | |
| 1PS8 | Control/DG Area | 6” | 102’ | 102’ | None | |
| 1PS9 | Control & Radwaste Areas | 6” | 102’ | 124’ | None | |
| 1PS10 | Control/DG Area | 4” | 137’ | 150’ | None | |
| 1PS11 | Control/DG Area | 4” | 137’ | 150’ | None | |
| 1PS12 | Control/DG Area | 4” | 137’ | 150’ | None | |
| 1PS13 | Control/DG Area | 4” | 137’ | 150’ | None | |
| 1PS14 | Control/DG Area | 4” | 137’ | 150’ | None | |
| 1PS15 | Reactor Building | 4” | 77’ | 77’ | None | |
| 1PS16 | Reactor Building | 6” | 102’ | 102’ | None | Valve = 8” in P&ID |
| 1PD3 | Reactor Building | 6” | 54’ | 205’ | 20 psi | |

Note:

1. Only the PD system is supplied with supervisory air; PS systems are pre-action wet sprinklers with deluge valves and are not pressurized.
2. Elevations shown are floor elevation, actual location of valves will be slightly higher and highest point of pipe will be up to the ceiling about 15 feet above the floor.

**Table 3 : Deluge Valve Systems List at HGCS**

| System No. | Description | Valve Size | Elev. Of Riser/Valve | Highest Point |
|---|---|---|---|---|
| 1D5 | M.G. Unit | 4” | 137’ | 137’ |
| 1D6 | M.G. Unit | 4” | 137’ | 137’ |
| 1D7 | H2 Seal Oil Unit | 2” | 102’ | 102’ |
| 1D8 | Turbine Bearing and Housing | 2” | 137’ | 137’ |
| 1D9 | Turbine Bearing and Housing | 2” | 137’ | 137’ |
| 1D10 | L.O. Reservoir and L.O. Purifier | 3” | 102’ | 102’ |
| 1D12 | Main Transformer | 6” | 102’ | 102’ |
| 1D13 | Main Transformer | 4” | 102’ | 102’ |
| 1D14 | Main Transformer | 4” | 102’ | 102’ |
| 1D15 | Station Service Transformer | 3” | 102’ | 102’ |
| 1D16 | Station Service Transformer | 3” | 102’ | 102’ |
| 1D17 | Station Service Transformer | 3” | 102’ | 102’ |
| 1D18 | Station Service Transformer | 3” | 102’ | 102’ |
| 1D19 | Circ. Water Pump House XFMR | 3” | 102’ | 102’ |
| 1D20 | Circ. Water Pump House XFMR | 3” | 102’ | 102’ |
| 1D26 | Station Service Transformer | 3” | 102’ | 102’ |
| 1D27 | Station Service Transformer | 3” | 102’ | 102’ |
| 1D21 | L.O. Receiver Storage Tank | 4” | 77’ | 77’ |

Note: Elevations shown are floor elevation, actual location of valves will be slightly higher and highest point of pipe will be up to the ceiling about 15 feet above the floor.

# 3 ANALYSIS METHODOLOGY AND CASES

## USLAM MODEL OF HCGS FPS

The Fire Protection System at HCGS is modeled using the UEI computer program USLAM. This program is well suited for water hammer analysis of complex systems with vapor voids, air pockets, vacuum breakers, etc. The current version of USLAM is based on the Method of Characteristics (MOC) solution of the unsteady mass and momentum conservation equation for liquids.

The USLAM hydraulic model for the piping network is composed of a set of links (with constant cross sectional area), each of which is subdivided into two or more equidistant nodes. The distance between two adjacent nodes is known as a "reach length" or "nodal distance". At the end of each link is an identified boundary device such as a valve, a branch, a reservoir, or a simple continuation, etc. These boundary devices can lead to outside the network (external devices) or within the network (internal devices). Examples of external devices are the source, sinks, dead ends, etc. Examples of internal devices are valves, pumps, orifices, vacuum breakers, etc. The USLAM model development for this system for the cases analyzed is shown in Appendix A. There is no lumping of the piping in this model. There are 496 links modeling the entire HCGS FPS with the Salem connection and Salem pumps/Fire water supply tanks. The nodal distance ($\Delta x$) or reach length is constant at 5 feet. This speed of sound (a) is estimated as 4000 ft/s over the range of pipe sizes and thicknesses. Therefore, the time step for computations is 1.25 milliseconds ($=\Delta x/a$ – where $\Delta x$ is the nodal distance and "a" the speed of sound in the FPS piping). The model starts from link 1, which is connected to the source for the HCGS electric pump. All other pumps are modeled as going to sinks with negative flow. This is one way of modeling multiple sources in a USLAM model.

In the USLAM program, positive flow direction is defined as in the increasing link numbering direction. Thus, there are 10 sinks in the model having 4 main pumps (two for HCGS and two for Salem) and 2 jockey pumps (One for HCGS and one for Salem). Other salient features of the model are about 100 branches, 79 dead ends, 4 check valves, 13 regular valves, etc. The pipe run segments for forcing functions calculation are designated in Appendix C of this calculation. A pipe run segments is a straight section of piping bounded by changes in direction at each end. The pressure and velocity at each node are then used internally by the code to calculate forcing functions on specified pipe run segments bounded by direction changes such as elbows. Surge pressure waves cause unbalanced forces on these segments. The piping forces calculated by USLAM serve as the dynamic forcing functions which are input for pipe stress analysis work to evaluate ASME and/or B31.1 Code Compliance.

As mentioned before, details of the preparation of the link data for the USLAM model are shown in Appendix A. This is an important part of the USLAM model. The physical data for piping layout, pipe

schedules, and pipe diameters, valve flow coefficients, etc. and the source from where these were obtained are some of the items discussed further in Appendix A.

The USLAM input data file listings for the cases analyzed are given in Appendix B.

In the HCGS USLAM model the transient starts upon the opening of the pre-action/deluge valves. When such a valve opens, the flow through it from a pressurized FPS will lead to a reduction in system pressure as the jockey pump is not designed to deliver large flows beyond its capacity (50 gpm). When the pressure at high points reaches the vapor pressure of the fluid, void (vapor) formation will result there and the liquid level will drop. This draindown will supply a part of the flow through the deluge/pre-action valve. If there are vacuum breakers present at the high points, they will open upon reaching their set point pressures admitting air into the piping at that point. The pumps start when their set pressures are reached during the transient. The USLAM program calculates the system drain down and the subsequent refilling upon pump start. It also computes the air ingestion into the piping via the vacuum breakers and their subsequent pressurization upon pump start.

In the Phase I & II analyses (Reference 3), from the several different types and number of transient initiating valves/conditions (pre-action, wet sprinkler, deluge) at different locations in the system, a selection of worst case valve types and locations were chosen to reduce the number of USLAM runs. The same cases were run in this current Phase III analysis with vacuum breakers installed at strategic locations in the FP system to minimize water hammer in the system. The wet sprinkler type of initiating condition is not considered in this selection because the demand flow from a few sprinkler head is much smaller than that when a pre-action or deluge valve opens. Note that the main flow resistance in the system from these valves to the outside environment is the sprinkler head flow resistance. For the wet type, this resistance is seen by the flow immediately which is not the case for the pre-action or deluge valve actuations. Tables 2 and 3 show the various pre-action and deluge valves in the system, valve elevations, maximum piping elevations downstream of the valves, and supervisory air pressures, are all taken from data provided by PSEG.

The vacuum breakers selected in this calculation are ½-inch nominal size oriented vertically with the outlet facing down. Vacuum breaker without a spring is chosen. The manufacturer for the vacuum breaker used is Johnson Corporation and the data sheet used to model is attached as Appendix E. The vacuum breakers should be located at high point in the risers (See Section 6 of this calculation for these locations). If the high point is a horizontal section, then the vacuum breaker can be located at any convenient location on that horizontal section. Two parallel vacuum breakers can be used for redundancy, if needed.

## CASES ANALYZED

Among the pre-action valve/system group (Table 2), only system 1PD3 (pre-action to Reactor Building) is supplied with supervisory air. All others are wet sprinkler system with deluge valves. Of these systems 1PS16 (Deluge to RB Corridor Room #4301) is an 8-inch valve which bounds all others and its highest point is about 102' floor elevation (piping elevation is about 15 feet higher). The lower piping elevation and larger valve size means the pipe downstream of the pre-action valve could refill quicker and consequently result in higher hammer severity. For the Reactor Building standpipes, they will only be pressurized when there is a fire located inside the Reactor Building and opening of the relevant isolation valves. System 1PD3 will be initiated when there is a fire located inside the Reactor Building. The air volume in 1PD3 is not modeled for conservatism, since this air volume will be pressurized and consequently result in lower void size and lower void collapse velocity. Therefore, the cases selected from the pre-action group for the USLAM run is 1PS16 and 1PD3.

The deluge valve group is shown in Table 3. Since the air downstream of the valve is not pressurized and the system is open, flow will continuously be going out of the deluge system after the deluge valve opens and the pump is started to refill the system when its set point is reached. This means less flow can be going into the standpipes (pump flow minus deluge valve flow) thus slowing system refilling and consequently resulting in lower void collapse water hammer severity. The Main Transformer C Deluge System (1D12) is selected as a bench mark since it is the enveloping case used in the Water hammer susceptibility study (Reference 13). Several cases are considered representing the various scenarios that the system can undergo. The final cases documented in this calculation are for various pump operation scenarios. The aim of this evaluation is to determine the worst-case water hammer by covering all possible system operations scenarios. Below is a brief description of the cases analyzed by USLAM in this calculation:

- Case 1 represents the bench mark case with the Main Transformer Deluge System (1D12) valve V-020 opening and the electric pump starts normally.

- Case 2 is the same as case 1 except the diesel pump starting instead of the electric pump due to unavailability of the electric pump.

- Case 3 is the same as case 1 but with both electric and diesel pumps starting due to low system pressure.

- Case 4 is with the Reactor Building Pre-Action System (1PS16) valve XV-3262 opening and the diesel pump starting. All other normally closed valves outside the reactor building (V038, V212, and V046) are assumed to remain closed.

- Case 5 is the same as case 4 except both Hope Creek fire pumps are not available and the Salem Fire pump #1 starting after a 2 second delay.

- Case 6 is the same as case 5 except Salem Fire pump #2 starting after a 21.3 second delay due to the failure of Salem Fire pump #1 to start.

- Case 7 is the case where there is a fire inside the Reactor Building, the Reactor Building Pre-Action System (1PD3) valve XV3408M opens and Salem Fire pump #1 starts after a 2 second delay. All other normally closed valves outside reactor building (V038, V212, and V046) are assumed to be open as well.

- Case 8 is the same as case 7 except Salem Fire pump #2 starting after a 21.3 second delay.

- Case 9 is the same as case 7 except Hope Creek electric pump starting normally with Salem Fire Protection system isolated.

Table 4 shows which Pre-action or Deluge valve opens for each of the 9 analysis cases. It also indicates if the Reactor Building riser piping is valved IN (Valves V038 and V212 open) or OUT (Valves V038 and V212 closed). Further, it also shows which pump starts for each of the cases and the equivalent case number of the previous HCGS GOTHIC analysis (Reference 13).

Figure 11 shows the location of these valves on a system schematic.

Table 5 shows the Pump Set Points for the various analysis cases and the Fire Main loop initial pressure.

Table 6 shows the Pump Startup Times (including the delay time in parenthesis) for the various analysis cases.

Cases 1 and 2 correspond to cases 1 and 2 from the previous HCGS GOTHIC analysis and were chosen for comparison purposes (Reference 13) in Phases I and II of this analysis. The GOTHIC cases are not identical but similar to USLAM cases as was discussed in the Phase I & II report (Reference 3).

Table 4**: USLAM Analysis Cases Showing Pre-Action or Deluge Valve Actuations and Reactor Building Risers (RB1 and RB2) Connection Status**

| Cases Analyzed | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **USLAM** | **Main Pump HCGS** | | **Salem Pumps (Diesel)** | | **Opening Valve Number Size (System)** | | **GOTHIC Case** | **Reactor Bldg.** |
| **Case** | **Electric** | **Diesel** | **Pump 1** | **Pump 2** | **Pre-action** | **Deluge** | | **Piping** |
| **1** | Y | N | N | N | N/A | 1-V020 6" (1D12) | 1 | Isolated |
| **2** | N | Y | N | N | N/A | 1-V020 6" (1D12) | 2 | Isolated |
| **3** | Y | Y | N | N | N/A | 1-V020 6" (1D12) | N/A | Isolated |
| **4** | N | Y | N | N | XV3262 8" (1PS16) | N/A | N/A | Isolated |
| **5** | N | N | Y | N | XV3262 8" (1PS16) | N/A | N/A | Isolated |
| **6** | N | N | N | Y | XV3262 8" (1PS16) | N/A | N/A | Isolated |
| **7** | N | N | Y | N | XV3408M 6" (1PD3) | N/A | N/A | NOT Isolated |
| **8** | N | N | N | Y | XV3408M 6" (1PD3) | N/A | N/A | NOT Isolated |
| **9** | Y | N | N | N | XV3408M 6" (1PD3) | N/A | N/A | NOT Isolated |

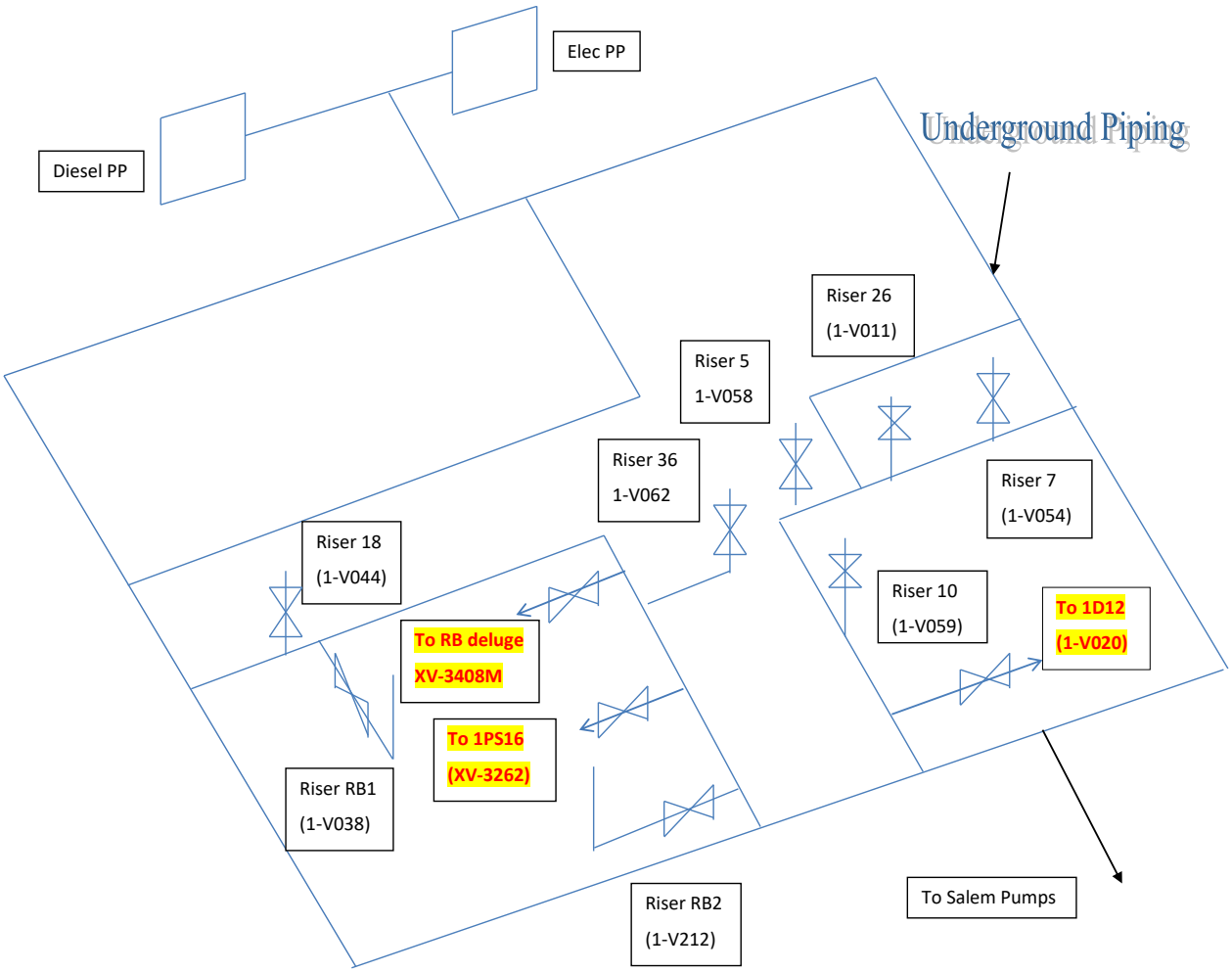
Table 5**: USLAM Analysis Cases Showing Pump Set Points and System Initial Pressure**

| **Cases Analyzed** | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| USLAM | Main Pumps HCGS start? | | Main Pumps Salem start? | | Pump Start Set Pressures (psig) | | | | Initial Fire Main Pressure |
| Case | Electric | Diesel | Pump 1 | Pump 2 | HCGS Electric | HCGS Diesel | Salem Pump 1 | Salem Pump 2 | psig |
| 1 | Y | N | N | N | 110 | | | | 125 |
| 2 | N | Y | N | N | | 100 | | | 125 |
| 3 | Y | Y | N | N | 110 | 100 | | | 125 |
| 4 | N | Y | N | N | | 100 | | | 125 |
| 5 | N | N | Y | N | | | 85 | | 135 |
| 6 | N | N | N | Y | | | | 75 | 135 |
| 7 | N | N | Y | N | | | 85 | | 135 |
| 8 | N | N | N | Y | | | | 75 | 135 |
| 9 | Y | N | N | N | 110 | | | | 125 |

Table 6**: USLAM Analysis Cases Showing Pump Startup Times Including Delay Times**

| Cases Analyzed | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| USLAM | Main Pump HCGS | | Main Pump Salem | | Total Pump Start Time (Delay Time) - Seconds | | | |
| Case | Electric | Diesel | Pump 1 | Pump 2 | HC Electric | HC Diesel | Salem #1 | Salem #2 |
| 1 | Y | N | N | N | 1.8 (0) | | | |
| 2 | N | Y | N | N | | 2.8 (0) | | |
| 3 | Y | Y | N | N | 1.8 (0) | 2.8 (0) | | |
| 4 | N | Y | N | N | | 2.8 (0) | | |
| 5 | N | N | Y | N | | | 5.1(2) | |
| 6 | N | N | N | Y | | | | 26.5(21.3) |
| 7 | N | N | Y | N | | | 5.1(2) | |
| 8 | N | N | N | Y | | | | 26.5(21.3) |
| 9 | Y | N | N | N | 1.8 (0) | | | |

Note: The pump startup times are from the time the pumps get the start signal. They are not from time zero of the analysis when the deluge or pre-action valve begin to open. Typically it takes about 1/2 second from time zero when the pump start set point is reached.




- Valve V020 (Deluge to Main Transformer system, 1D12) opens for cases 1, 2, and 3
- Valve XV3262 (Pre-Action in RB Corridor system, 1PS16) opens for cases 4, 5, and 6
- Valve XV3408M (Deluge to various RB manual Pre-Action water spray systems, 1PD3) opens for cases 7, 8, and 9 with RB Isolation valve open

Figure 11: HGCS Fire Protection System Schematic Showing locations of Pre-Action and Deluge Valves for the Various Analysis Cases

## USLAM INPUT DATA

The USLAM input data file for Case 5 is listed below with a brief explanation of the input (see USLAM User's Manual for a detailed explanation of the input data – Reference 7). Listings of the input data files for other cases are in Appendix B of this calculation.

The first line is run title, line 2 is the total number of time steps for this run, next 4 lines are analysis type, options, and output control. Next line is fluid properties. Next 5 lines are pipe wall friction data. Next 7 lines are source type & head discharge data at the source. Note that for ease of modeling, the HCGS electric pump is modeled as the source with a downstream opening valve simulating pump start. Detailed pump model is not required as pump trip is not modeled in this analysis. Similarly, other pumps are modeled as sources with specified head discharge characteristics. The next line is the minimum number of nodal distances in the smallest link. In the data below, this is 1. Since the smallest length among all links is 5 feet, the nodal distance in the USLAM model is 5 feet.

The next block of 496 lines is link data – one line per link for a total of 496 links in the HCGS FPS model. Appendix A discusses details of the Link data which consists of information on pipe link length, diameter, friction multipliers, boundary devices, elevations, initial flow, link connection data, sonic speed, etc.

The next 5 blocks of data define the 5 other pumps in the system (HCGS electric & diesel, Salem diesels, and HCGS & Salem jockey pumps) and their corresponding head discharge characteristics.

The remaining data is for the various valves modeled in the system including check valves, data for 9 vacuum breakers (note that the 2 vacuum breakers in the Reactor Building are not modeled in this Case 5 because the RB piping is valved out – however, they are modeled in Cases 7, 8, and 9 as can be seen in the input data for these cases in Appendix B), data for post processor plotting of pressure head and velocity, pipe run segment force calculation data, and output printing specification data. There is a total of 11 vacuum breakers modeled in the system as waterhammer mitigation devices.

# CALCULATION SHEET

| | | | |
|---|---|---|---|
| Project: | HOPE CREEK GENERATING STATION | Job Number: | 8038 |
| Calc No. | 8038-P0004 | Sheet No. | 31 |
| By: | A Arastu Date: 9/14/18 | Rev. No. | 1 |
| Subject: | Water Hammer Analysis of the HCGS Fire Protection System | | |

## USLAM Input Data File Listing for Case 5

```
HCGS FP Case 5b: 9 VBs.  Forces in Riser # 26 only
10000
0  0  1  0  0  0
2   2   0.  12.
2   1   0   0
0   1   0  0  0  0  0  1 0 0
1.9  62.4  7.83E-6
1.0  2   13    0    0
       0.0    1000.0    2000.0   2.0E+04   6.0E+04   1.0E+05   3.0E+05   6.0E+05
   1.0E+06   1.5E+06   3.5E+06   1.0E+11   1.0E+33
      0.10     0.061     0.048     0.026     0.021      .019    0.0167    0.0155
    0.0150    0.0147     0.014     0.014     0.014
495.3   3  17  0    0
  -10.00   .000   .557  1.114  1.671  2.228  2.785  3.342
   3.899  4.456  5.013  5.570  6.127  6.684  7.241  8.912
   13.4
   495.3  495.3     494.3     492.3     491.3     488.3     485.3     481.3
   477.3  472.3     466.3     459.3     448.3     436.3     423.3     375.3
   170.3
   1
   1    1.104000     55.00    5.492   4      99.400    94.000     2     0.00000   0   2     0   4000.00      0.00
   2    1.000000     20.00    7.400   4      94.000   105.040     2     0.00000   1   3     0   4000.00      0.00
   3    1.000000     10.00    7.180   4     105.040   105.040     2     0.00000   2   4     0   4000.00      0.00
   4    1.000000     10.00    3.538   2     105.040   104.500     2     0.00000   3   5     0   4000.00      0.00
   5    1.000000      5.00   18.508  13     104.500   104.750     2     0.00000   4   6     0   4000.00      0.00
   6    1.000000     10.00    5.200   4     104.750   110.000     2     0.00000   5   7     0   4000.00      0.00
   7    1.000000     20.00    3.400   3     110.000   105.000     2     0.00000   6   8     0   4000.00      0.00
   8    1.000000    115.00    2.402   3     105.000    96.900     2     0.00000   7  86     0   4000.00      0.00
   9    1.007000      5.00    2.611   4      96.900    96.900     2     0.00000   8  10     0   4000.00      0.00
  10    1.007000     10.00    3.014   4      96.900    96.900     2     0.00000   9  11     0   4000.00      0.00
  11    1.007000     10.00    1.806   4      96.900    96.900     2     0.00000  10  12     0   4000.00      0.00
  12    1.007000     10.00    3.014   3      96.900    96.900     2     0.00000  11  13     0   4000.00      0.00
  13    1.007000    110.00    1.183   4      96.900    96.900     2     0.00000  12  14     0   4000.00      0.00
  14    1.007000    110.00    1.363   4      96.900    95.900     2     0.00000  13  15     0   4000.00      0.00
  15    1.007000     10.00    3.014   4      95.900    95.900     2     0.00000  14  16     0   4000.00      0.00
  16    1.007000     30.00    1.671   4      95.900    95.900     2     0.00000  15  17     0   4000.00      0.00
  17    1.007000     80.00    1.252   4      95.900    95.900     2     0.00000  16  18     0   4000.00      0.00
  18    1.007000     20.00    1.403   4      95.900    95.900     2     0.00000  17  19     0   4000.00      0.00
  19    1.007000    130.00    1.155   4      95.900    95.900     2     0.00000  18  20     0   4000.00      0.00
  20    1.007000    135.00    1.060   4      95.900    95.400     2     0.00000  19  21     0   4000.00      0.00
  21    1.007000     10.00    2.994   4      95.400    93.500     2     0.00000  20  22     0   4000.00      0.00
  22    1.007000     65.00    1.217   4      93.500    93.500     2     0.00000  21  23     0   4000.00      0.00
  23    1.007000      5.00    1.000   4      93.500    93.500     2     0.00000  22  24     0   4000.00      0.00
  24    1.007000     20.00    3.004   4      93.500    97.000     2     0.00000  23  25     0   4000.00      0.00
  25    1.007000    200.00    1.300   4      97.000    97.000     2     0.00000  24  26     0   4000.00      0.00
  26    1.007000     55.00    1.513   4      97.000    97.000     2     0.00000  25  27     0   4000.00      0.00
  27    1.007000     20.00    1.997   4      97.000    93.000     2     0.00000  26  28     0   4000.00      0.00
  28    1.007000    230.00    1.088   3      93.000    93.000     2     0.00000  27 181     0   4000.00      0.00
  29    1.007000     40.00    1.503   3      93.000    93.000     2     0.00000  28  30     0   4000.00      0.00
  30    1.007000    240.00    1.117   4      93.000    94.500     2     0.00000  29  31     0   4000.00      0.00
  31    1.007000     45.00    1.448   4      94.500    94.500     2     0.00000  30  32     0   4000.00      0.00
  32    1.007000     35.00    1.570   4      94.500    91.000     2     0.00000  31  33     0   4000.00      0.00
  33    1.007000    180.00    1.111   4      91.000    96.000     2     0.00000  32  34     0   4000.00      0.00
  34    1.007000     10.00    3.014   4      96.000    96.000     2     0.00000  33  35     0   4000.00      0.00
  35    1.007000      5.00    5.028   4      96.000    96.000     2     0.00000  34  36     0   4000.00      0.00
  36    1.007000      5.00    2.611   4      96.000    96.000     2     0.00000  35  37     0   4000.00      0.00
  37    1.007000     10.00    3.014   4      96.000    96.000     2     0.00000  36  38     0   4000.00      0.00
  38    1.007000     30.00    2.141   4      96.000    96.000     2     0.00000  37  39     0   4000.00      0.00
  39    1.007000     20.00    1.403   4      96.000    96.000     2     0.00000  38  40     0   4000.00      0.00
  40    1.007000     80.00    1.252   3      96.000    96.000     2     0.00000  39  41     0   4000.00      0.00
  41    1.007000     10.00    1.806   4      96.000    96.000     2     0.00000  40  42     0   4000.00      0.00
```

# CALCULATION SHEET

| | | | |
|---|---|---|---|
| Project: | HOPE CREEK GENERATING STATION | Job Number: | 8038 |
| Calc No. | 8038-P0004 | Sheet No. | 32 |
| By: | A Arastu Date: 9/14/18 | Rev. No. | 1 |
| Subject: | Water Hammer Analysis of the HCGS Fire Protection System | | |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 42 | 1.007000 | 20.00 | 1.000 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 41 | 43 | 0 | 4000.00 | 0.00 |
| 43 | 1.007000 | 55.00 | 1.363 | 4 | 96.000 | 97.200 | 2 | 0.00000 | 42 | 44 | 0 | 4000.00 | 0.00 |
| 44 | 1.007000 | 5.00 | 5.028 | 4 | 97.200 | 97.200 | 2 | 0.00000 | 43 | 45 | 0 | 4000.00 | 0.00 |
| 45 | 1.007000 | 160.00 | 1.175 | 4 | 97.200 | 96.200 | 2 | 0.00000 | 44 | 46 | 0 | 4000.00 | 0.00 |
| 46 | 1.007000 | 15.00 | 2.343 | 3 | 96.200 | 96.200 | 2 | 0.00000 | 45 | 162 | 0 | 4000.00 | 0.00 |
| 47 | 1.007000 | 5.00 | 5.028 | 4 | 96.200 | 96.200 | 2 | 0.00000 | 46 | 48 | 0 | 4000.00 | 0.00 |
| 48 | 1.007000 | 15.00 | 6.357 | 4 | 96.200 | 97.000 | 2 | 0.00000 | 47 | 49 | 0 | 4000.00 | 0.00 |
| 49 | 1.007000 | 60.00 | 1.166 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 48 | 50 | 0 | 4000.00 | 0.00 |
| 50 | 1.007000 | 15.00 | 2.994 | 4 | 97.000 | 94.500 | 2 | 0.00000 | 49 | 51 | 0 | 4000.00 | 0.00 |
| 51 | 1.007000 | 5.00 | 4.605 | 4 | 94.500 | 97.000 | 2 | 0.00000 | 50 | 52 | 0 | 4000.00 | 0.00 |
| 52 | 1.007000 | 15.00 | 2.329 | 4 | 97.000 | 94.000 | 2 | 0.00000 | 51 | 53 | 0 | 4000.00 | 0.00 |
| 53 | 1.007000 | 80.00 | 1.501 | 4 | 94.000 | 96.500 | 2 | 0.00000 | 52 | 54 | 0 | 4000.00 | 0.00 |
| 54 | 1.007000 | 65.00 | 1.310 | 3 | 96.500 | 96.500 | 2 | 0.00000 | 53 | 55 | 0 | 4000.00 | 0.00 |
| 55 | 1.007000 | 50.00 | 1.481 | 4 | 96.500 | 97.200 | 2 | 0.00000 | 54 | 56 | 0 | 4000.00 | 0.00 |
| 56 | 1.007000 | 25.00 | 1.322 | 4 | 97.200 | 97.200 | 2 | 0.00000 | 55 | 57 | 0 | 4000.00 | 0.00 |
| 57 | 1.007000 | 5.00 | 3.820 | 4 | 97.200 | 97.200 | 2 | 0.00000 | 56 | 58 | 0 | 4000.00 | 0.00 |
| 58 | 1.007000 | 70.00 | 1.288 | 4 | 97.200 | 97.200 | 2 | 0.00000 | 57 | 59 | 0 | 4000.00 | 0.00 |
| 59 | 1.007000 | 10.00 | 1.806 | 4 | 97.200 | 97.200 | 2 | 0.00000 | 58 | 60 | 0 | 4000.00 | 0.00 |
| 60 | 1.007000 | 195.00 | 1.103 | 4 | 97.200 | 97.200 | 2 | 0.00000 | 59 | 61 | 0 | 4000.00 | 0.00 |
| 61 | 1.007000 | 240.00 | 1.159 | 4 | 97.200 | 94.500 | 2 | 0.00000 | 60 | 62 | 0 | 4000.00 | 0.00 |
| 62 | 1.007000 | 215.00 | 1.094 | 4 | 94.500 | 94.500 | 2 | 0.00000 | 61 | 63 | 0 | 4000.00 | 0.00 |
| 63 | 1.007000 | 110.00 | 1.183 | 4 | 94.500 | 94.500 | 2 | 0.00000 | 62 | 64 | 0 | 4000.00 | 0.00 |
| 64 | 1.007000 | 195.00 | 1.103 | 4 | 94.500 | 94.500 | 2 | 0.00000 | 63 | 65 | 0 | 4000.00 | 0.00 |
| 65 | 1.007000 | 5.00 | 5.028 | 4 | 94.500 | 94.500 | 2 | 0.00000 | 64 | 66 | 0 | 4000.00 | 0.00 |
| 66 | 1.007000 | 30.00 | 1.665 | 4 | 94.500 | 95.800 | 2 | 0.00000 | 65 | 67 | 0 | 4000.00 | 0.00 |
| 67 | 1.007000 | 5.00 | 2.611 | 4 | 95.800 | 95.800 | 2 | 0.00000 | 66 | 68 | 0 | 4000.00 | 0.00 |
| 68 | 1.007000 | 25.00 | 1.806 | 3 | 95.800 | 95.800 | 2 | 0.00000 | 67 | 229 | 0 | 4000.00 | 0.00 |
| 69 | 1.007000 | 130.00 | 1.155 | 4 | 95.800 | 95.500 | 2 | 0.00000 | 68 | 70 | 0 | 4000.00 | 0.00 |
| 70 | 1.007000 | 5.00 | 2.611 | 3 | 95.500 | 95.500 | 2 | 0.00000 | 69 | 261 | 0 | 4000.00 | 0.00 |
| 71 | 1.007000 | 5.00 | 5.028 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 70 | 72 | 0 | 4000.00 | 0.00 |
| 72 | 1.007000 | 5.00 | 2.611 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 71 | 73 | 0 | 4000.00 | 0.00 |
| 73 | 1.007000 | 205.00 | 1.098 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 72 | 74 | 0 | 4000.00 | 0.00 |
| 74 | 1.007000 | 240.00 | 1.117 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 73 | 75 | 0 | 4000.00 | 0.00 |
| 75 | 1.007000 | 20.00 | 4.021 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 74 | 76 | 0 | 4000.00 | 0.00 |
| 76 | 1.007000 | 30.00 | 1.665 | 4 | 95.500 | 91.500 | 2 | 0.00000 | 75 | 77 | 0 | 4000.00 | 0.00 |
| 77 | 1.007000 | 25.00 | 2.120 | 4 | 91.500 | 97.000 | 2 | 0.00000 | 76 | 78 | 0 | 4000.00 | 0.00 |
| 78 | 1.007000 | 50.00 | 1.403 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 77 | 79 | 0 | 4000.00 | 0.00 |
| 79 | 1.007000 | 50.00 | 1.403 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 78 | 80 | 0 | 4000.00 | 0.00 |
| 80 | 1.007000 | 20.00 | 1.997 | 4 | 97.000 | 90.500 | 2 | 0.00000 | 79 | 81 | 0 | 4000.00 | 0.00 |
| 81 | 1.007000 | 40.00 | 2.002 | 4 | 90.500 | 96.900 | 2 | 0.00000 | 80 | 82 | 0 | 4000.00 | 0.00 |
| 82 | 1.007000 | 165.00 | 1.122 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 81 | 83 | 0 | 4000.00 | 0.00 |
| 83 | 1.007000 | 135.00 | 1.060 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 82 | 84 | 0 | 4000.00 | 0.00 |
| 84 | 1.007000 | 10.00 | 3.014 | 3 | 96.900 | 96.900 | 2 | 0.00000 | 83 | 101 | 0 | 4000.00 | 0.00 |
| 85 | 1.007000 | 60.00 | 1.134 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 84 | 86 | 0 | 4000.00 | 0.00 |
| 86 | 1.007000 | 5.00 | 5.028 | 3 | 96.900 | 96.900 | 2 | 0.00000 | 85 | 9 | 1 | 4000.00 | 0.00 |
| 87 | 0.336000 | 10.00 | 5.771 | 3 | 105.000 | 112.070 | 2 | 0.00000 | 7 | 88 | 0 | 4000.00 | 0.00 |
| 88 | 0.336000 | 5.00 | 5.570 | 4 | 112.070 | 113.750 | 2 | 0.00000 | 87 | 89 | 0 | 4000.00 | 0.00 |
| 89 | 0.256000 | 30.00 | 1.870 | 4 | 113.750 | 109.000 | 2 | 0.00000 | 88 | 90 | 0 | 4000.00 | 0.00 |
| 90 | 0.256000 | 10.00 | 1.205 | 2 | 109.000 | 104.250 | 2 | 0.00000 | 89 | 91 | 0 | 4000.00 | 0.00 |
| 91 | 0.256000 | 5.00 | 5.933 | 1 | 104.250 | 103.750 | 2 | 0.00000 | 90 | 0 | 0 | 4000.00 | 0.00 |
| 92 | 0.336000 | 40.00 | 2.714 | 3 | 112.070 | 105.000 | 2 | 0.00000 | 87 | 93 | 0 | 4000.00 | 0.00 |
| 93 | 1.000000 | 20.00 | 3.400 | 4 | 105.000 | 110.200 | 2 | 0.00000 | 92 | 94 | 0 | 4000.00 | 0.00 |
| 94 | 1.000000 | 10.00 | 3.800 | 4 | 110.200 | 104.750 | 2 | 0.00000 | 93 | 95 | 0 | 4000.00 | 0.00 |
| 95 | 1.000000 | 5.00 | 18.508 | 4 | 104.750 | 104.750 | 2 | 0.00000 | 94 | 96 | 0 | 4000.00 | 0.00 |
| 96 | 1.000000 | 10.00 | 3.538 | 2 | 104.750 | 104.750 | 2 | 0.00000 | 95 | 97 | 0 | 4000.00 | 0.00 |
| 97 | 1.000000 | 5.00 | 9.400 | 4 | 104.750 | 105.040 | 2 | 0.00000 | 96 | 98 | 0 | 4000.00 | 0.00 |
| 98 | 1.000000 | 20.00 | 7.400 | 4 | 105.040 | 94.000 | 2 | 0.00000 | 97 | 99 | 0 | 4000.00 | 0.00 |
| 99 | 1.104000 | 30.00 | 4.874 | 1 | 94.000 | 99.400 | 2 | 0.00000 | 98 | 0 | 0 | 4000.00 | 0.00 |
| 100 | 1.000000 | 85.00 | 1.864 | 4 | 105.000 | 91.000 | 2 | 0.00000 | 92 | 101 | 0 | 4000.00 | 0.00 |
| 101 | 1.000000 | 25.00 | 4.512 | 3 | 91.000 | 96.900 | 2 | 0.00000 | 100 | 85 | 1 | 4000.00 | 0.00 |
| 102 | 0.835000 | 5.00 | 12.356 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 40 | 103 | 0 | 4000.00 | 0.00 |
| 103 | 0.788000 | 60.00 | 1.628 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 102 | 104 | 0 | 4000.00 | 0.00 |
| 104 | 0.788000 | 100.00 | 1.000 | 4 | 96.000 | 95.500 | 2 | 0.00000 | 103 | 105 | 0 | 4000.00 | 0.00 |
| 105 | 0.788000 | 100.00 | 1.000 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 104 | 106 | 0 | 4000.00 | 0.00 |
| 106 | 0.788000 | 30.00 | 2.786 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 105 | 107 | 0 | 4000.00 | 0.00 |

# CALCULATION SHEET

| | | | |
|---|---|---|---|
| Project: | HOPE CREEK GENERATING STATION | Job Number: | 8038 |
| Calc No. | 8038-P0004 | Sheet No. | 33 |
| By: | A Arastu Date: 9/14/18 | Rev. No. | 1 |
| Subject: | Water Hammer Analysis of the HCGS Fire Protection System | | |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 107 | 0.927000 | 35.00 | 2.059 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 106 108 | 0 | 4000.00 | 0.00 |
| 108 | 0.927000 | 150.00 | 1.494 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 107 109 | 0 | 4000.00 | 0.00 |
| 109 | 0.927000 | 50.00 | 1.519 | 3 | 95.500 | 95.500 | 2 | 0.00000 | 108 110 | 0 | 4000.00 | 0.00 |
| 110 | 0.927000 | 20.00 | 2.298 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 109 111 | 0 | 4000.00 | 0.00 |
| 111 | 0.927000 | 10.00 | 7.860 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 110 112 | 0 | 4000.00 | 0.00 |
| 112 | 1.000000 | 10.00 | 9.000 | 4 | 95.500 | 101.700 | 2 | 0.00000 | 111 113 | 0 | 4000.00 | 0.00 |
| 113 | 1.000000 | 5.00 | 5.400 | 4 | 101.700 | 102.800 | 2 | 0.00000 | 112 114 | 0 | 4000.00 | 0.00 |
| 114 | 1.000000 | 10.00 | 12.354 | 2 | 102.800 | 102.800 | 2 | 0.00000 | 113 115 | 0 | 4000.00 | 0.00 |
| 115 | 1.000000 | 5.00 | 8.877 | 4 | 102.800 | 102.800 | 2 | 0.00000 | 114 116 | 0 | 4000.00 | 0.00 |
| 116 | 1.000000 | 5.00 | 5.000 | 4 | 102.800 | 102.800 | 2 | 0.00000 | 115 117 | 0 | 4000.00 | 0.00 |
| 117 | 1.250000 | 30.00 | 3.333 | 1 | 102.800 | 103.000 | 2 | 0.00000 | 116 0 | 0 | 4000.00 | 0.00 |
| 118 | 0.927000 | 10.00 | 6.562 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 109 119 | 0 | 4000.00 | 0.00 |
| 119 | 1.000000 | 10.00 | 2.400 | 3 | 95.500 | 101.700 | 2 | 0.00000 | 118 120 | 0 | 4000.00 | 0.00 |
| 120 | 1.000000 | 5.00 | 7.800 | 4 | 101.700 | 102.800 | 2 | 0.00000 | 119 121 | 0 | 4000.00 | 0.00 |
| 121 | 1.000000 | 10.00 | 13.154 | 2 | 102.800 | 102.800 | 2 | 0.00000 | 120 122 | 0 | 4000.00 | 0.00 |
| 122 | 1.000000 | 10.00 | 8.938 | 4 | 102.800 | 102.800 | 2 | 0.00000 | 121 123 | 0 | 4000.00 | 0.00 |
| 123 | 1.250000 | 20.00 | 3.250 | 1 | 102.800 | 103.000 | 2 | 0.00000 | 122 0 | 0 | 4000.00 | 0.00 |
| 124 | 0.134000 | 5.00 | 3.624 | 4 | 101.700 | 101.700 | 2 | 0.00000 | 119 125 | 0 | 4000.00 | 0.00 |
| 125 | 0.134000 | 5.00 | 3.141 | 4 | 101.700 | 101.700 | 2 | 0.00000 | 124 126 | 0 | 4000.00 | 0.00 |
| 126 | 0.134000 | 5.00 | 1.000 | 2 | 101.700 | 101.700 | 2 | 0.00000 | 125 127 | 0 | 4000.00 | 0.00 |
| 127 | 0.134000 | 10.00 | 1.000 | 4 | 101.700 | 101.700 | 2 | 0.00000 | 126 128 | 0 | 4000.00 | 0.00 |
| 128 | 0.134000 | 10.00 | 1.000 | 4 | 101.700 | 101.700 | 2 | 0.00000 | 127 129 | 0 | 4000.00 | 0.00 |
| 129 | 0.134000 | 10.00 | 1.000 | 1 | 101.700 | 103.000 | 2 | 0.00000 | 128 0 | 0 | 4000.00 | 0.00 |
| 130 | 0.835000 | 5.00 | 11.020 | 4 | 93.000 | 93.000 | 2 | 0.00000 | 29 131 | 0 | 4000.00 | 0.00 |
| 131 | 0.835000 | 100.00 | 1.331 | 4 | 93.000 | 96.010 | 2 | 0.00000 | 130 132 | 0 | 4000.00 | 0.00 |
| 132 | 0.835000 | 25.00 | 1.267 | 4 | 96.010 | 96.010 | 2 | 0.00000 | 131 133 | 0 | 4000.00 | 0.00 |
| 133 | 0.835000 | 65.00 | 1.000 | 4 | 96.010 | 96.000 | 2 | 0.00000 | 132 134 | 0 | 4000.00 | 0.00 |
| 134 | 0.835000 | 20.00 | 2.653 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 133 135 | 0 | 4000.00 | 0.00 |
| 135 | 0.835000 | 105.00 | 1.382 | 3 | 96.000 | 89.000 | 2 | 0.00000 | 134 136 | 0 | 4000.00 | 0.00 |
| 136 | 0.835000 | 5.00 | 3.338 | 4 | 89.000 | 89.000 | 2 | 0.00000 | 135 137 | 0 | 4000.00 | 0.00 |
| 137 | 0.835000 | 50.00 | 1.334 | 3 | 89.000 | 89.000 | 2 | 0.00000 | 136 138 | 0 | 4000.00 | 0.00 |
| 138 | 0.835000 | 5.00 | 5.676 | 4 | 89.000 | 89.000 | 2 | 0.00000 | 137 139 | 0 | 4000.00 | 0.00 |
| 139 | 0.835000 | 5.00 | 4.340 | 3 | 89.000 | 89.000 | 2 | 0.00000 | 138 140 | 0 | 4000.00 | 0.00 |
| 140 | 0.835000 | 55.00 | 1.000 | 4 | 89.000 | 89.000 | 2 | 0.00000 | 139 141 | 0 | 4000.00 | 0.00 |
| 141 | 0.835000 | 25.00 | 1.668 | 3 | 89.000 | 89.000 | 2 | 0.00000 | 140 142 | 0 | 4000.00 | 0.00 |
| 142 | 0.835000 | 15.00 | 2.882 | 4 | 89.000 | 91.940 | 2 | 0.00000 | 141 143 | 0 | 4000.00 | 0.00 |
| 143 | 0.835000 | 25.00 | 1.668 | 3 | 91.940 | 91.940 | 2 | 0.00000 | 142 144 | 0 | 4000.00 | 0.00 |
| 144 | 0.835000 | 5.00 | 5.676 | 3 | 91.940 | 91.940 | 2 | 0.00000 | 143 145 | 0 | 4000.00 | 0.00 |
| 145 | 0.835000 | 5.00 | 4.340 | 3 | 91.940 | 91.940 | 2 | 0.00000 | 144 146 | 0 | 4000.00 | 0.00 |
| 146 | 0.835000 | 10.00 | 3.338 | 4 | 91.940 | 96.200 | 2 | 0.00000 | 145 147 | 0 | 4000.00 | 0.00 |
| 147 | 0.835000 | 5.00 | 3.338 | 4 | 96.200 | 96.200 | 2 | 0.00000 | 146 148 | 0 | 4000.00 | 0.00 |
| 148 | 0.835000 | 145.00 | 1.000 | 4 | 96.200 | 96.200 | 2 | 0.00000 | 147 149 | 0 | 4000.00 | 0.00 |
| 149 | 0.835000 | 10.00 | 2.670 | 4 | 96.200 | 96.200 | 2 | 0.00000 | 148 150 | 0 | 4000.00 | 0.00 |
| 150 | 0.835000 | 90.00 | 1.186 | 3 | 96.200 | 96.200 | 2 | 0.00000 | 149 151 | 0 | 4000.00 | 0.00 |
| 151 | 0.835000 | 5.00 | 5.676 | 4 | 96.200 | 94.530 | 2 | 0.00000 | 150 152 | 0 | 4000.00 | 0.00 |
| 152 | 0.835000 | 15.00 | 2.664 | 3 | 94.530 | 94.530 | 2 | 0.00000 | 151 153 | 0 | 4000.00 | 0.00 |
| 153 | 0.835000 | 5.00 | 2.336 | 4 | 94.530 | 94.530 | 2 | 0.00000 | 152 154 | 0 | 4000.00 | 0.00 |
| 154 | 0.835000 | 5.00 | 4.340 | 3 | 94.530 | 94.540 | 2 | 0.00000 | 153 155 | 0 | 4000.00 | 0.00 |
| 155 | 0.835000 | 15.00 | 2.559 | 3 | 94.540 | 94.540 | 2 | 0.00000 | 154 156 | 0 | 4000.00 | 0.00 |
| 156 | 0.835000 | 5.00 | 4.340 | 3 | 94.540 | 94.540 | 2 | 0.00000 | 155 157 | 0 | 4000.00 | 0.00 |
| 157 | 0.835000 | 5.00 | 3.338 | 4 | 94.540 | 94.540 | 2 | 0.00000 | 156 158 | 0 | 4000.00 | 0.00 |
| 158 | 0.835000 | 5.00 | 3.338 | 3 | 94.540 | 94.500 | 2 | 0.00000 | 157 159 | 0 | 4000.00 | 0.00 |
| 159 | 0.835000 | 5.00 | 4.340 | 4 | 94.500 | 94.500 | 2 | 0.00000 | 158 160 | 0 | 4000.00 | 0.00 |
| 160 | 0.835000 | 55.00 | 1.425 | 3 | 94.500 | 94.500 | 2 | 0.00000 | 159 161 | 0 | 4000.00 | 0.00 |
| 161 | 0.835000 | 175.00 | 1.286 | 4 | 94.500 | 96.200 | 2 | 0.00000 | 160 162 | 0 | 4000.00 | 0.00 |
| 162 | 0.835000 | 100.00 | 1.568 | 3 | 96.200 | 96.200 | 2 | 0.00000 | 161 47 | 1 | 4000.00 | 0.00 |
| 163 | 0.835000 | 10.00 | 3.338 | 4 | 94.500 | 91.750 | 2 | 0.00000 | 160 164 | 0 | 4000.00 | 0.00 |
| 164 | 0.835000 | 40.00 | 1.413 | 4 | 91.750 | 89.580 | 2 | 0.00000 | 163 165 | 0 | 4000.00 | 0.00 |
| 165 | 0.835000 | 25.00 | 3.071 | 4 | 89.580 | 89.580 | 2 | 0.00000 | 164 166 | 0 | 4000.00 | 0.00 |
| 166 | 0.835000 | 5.00 | 4.340 | 3 | 89.580 | 89.580 | 2 | 0.00000 | 165 167 | 0 | 4000.00 | 0.00 |
| 167 | 0.835000 | 5.00 | 1.000 | 16 | 89.580 | 89.580 | 2 | 0.00000 | 166 0 | 0 | 4000.00 | 0.00 |
| 168 | 0.835000 | 5.00 | 13.358 | 4 | 89.000 | 91.000 | 2 | 0.00000 | 141 169 | 0 | 4000.00 | 0.00 |
| 169 | 0.835000 | 35.00 | 2.002 | 3 | 91.000 | 91.000 | 2 | 0.00000 | 168 170 | 0 | 4000.00 | 0.00 |
| 170 | 0.835000 | 10.00 | 4.340 | 3 | 91.000 | 91.000 | 2 | 0.00000 | 169 171 | 0 | 4000.00 | 0.00 |
| 171 | 0.835000 | 75.00 | 1.312 | 4 | 91.000 | 91.000 | 2 | 0.00000 | 170 172 | 0 | 4000.00 | 0.00 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 172 | 0.835000 | 45.00 | 2.002 | 3 | 91.000 | 91.000 | 2 | 0.00000 | 171 | 173 | 0 | 4000.00 | 0.00 |
| 173 | 0.835000 | 5.00 | 3.338 | 4 | 91.000 | 91.000 | 2 | 0.00000 | 172 | 174 | 0 | 4000.00 | 0.00 |
| 174 | 0.835000 | 15.00 | 1.779 | 4 | 91.000 | 96.040 | 2 | 0.00000 | 173 | 175 | 0 | 4000.00 | 0.00 |
| 175 | 0.835000 | 15.00 | 2.559 | 4 | 96.040 | 96.000 | 2 | 0.00000 | 174 | 176 | 0 | 4000.00 | 0.00 |
| 176 | 0.835000 | 95.00 | 1.176 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 175 | 177 | 0 | 4000.00 | 0.00 |
| 177 | 0.835000 | 55.00 | 1.213 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 176 | 178 | 0 | 4000.00 | 0.00 |
| 178 | 0.835000 | 5.00 | 3.338 | 4 | 96.000 | 91.000 | 2 | 0.00000 | 177 | 179 | 0 | 4000.00 | 0.00 |
| 179 | 0.835000 | 50.00 | 1.795 | 4 | 91.000 | 93.000 | 2 | 0.00000 | 178 | 180 | 0 | 4000.00 | 0.00 |
| 180 | 0.835000 | 80.00 | 1.146 | 4 | 93.000 | 93.000 | 2 | 0.00000 | 179 | 181 | 0 | 4000.00 | 0.00 |
| 181 | 0.835000 | 25.00 | 3.472 | 3 | 93.000 | 93.000 | 2 | 0.00000 | 180 | 29 | 1 | 4000.00 | 0.00 |
| 182 | 0.336000 | 45.00 | 1.866 | 3 | 91.000 | 96.000 | 2 | 0.00000 | 169 | 183 | 0 | 4000.00 | 0.00 |
| 183 | 0.336000 | 120.00 | 1.482 | 4 | 96.000 | 149.000 | 2 | 0.00000 | 182 | 184 | 0 | 4000.00 | 0.00 |
| 184 | 0.256000 | 205.00 | 1.092 | 16 | 149.000 | 142.500 | 2 | 0.00000 | 183 | 0 | 0 | 4000.00 | 0.00 |
| 185 | 0.256000 | 60.00 | 1.674 | 16 | 96.000 | 59.000 | 2 | 0.00000 | 182 | 0 | 0 | 4000.00 | 0.00 |
| 186 | 0.336000 | 10.00 | 4.427 | 3 | 91.000 | 94.800 | 2 | 0.00000 | 170 | 187 | 0 | 4000.00 | 0.00 |
| 187 | 0.336000 | 55.00 | 1.586 | 3 | 94.800 | 113.000 | 2 | 0.00000 | 186 | 188 | 0 | 4000.00 | 0.00 |
| 188 | 0.336000 | 230.00 | 1.231 | 4 | 113.000 | 146.000 | 2 | 0.00000 | 187 | 189 | 0 | 4000.00 | 0.00 |
| 189 | 0.256000 | 105.00 | 1.111 | 16 | 146.000 | 143.000 | 2 | 0.00000 | 188 | 0 | 0 | 4000.00 | 0.00 |
| 190 | 0.256000 | 100.00 | 1.297 | 16 | 94.800 | 83.700 | 2 | 0.00000 | 186 | 0 | 0 | 4000.00 | 0.00 |
| 191 | 0.256000 | 75.00 | 1.416 | 16 | 113.000 | 107.000 | 2 | 0.00000 | 187 | 0 | 0 | 4000.00 | 0.00 |
| 192 | 0.336000 | 5.00 | 7.854 | 4 | 91.000 | 95.000 | 2 | 0.00000 | 172 | 193 | 0 | 4000.00 | 0.00 |
| 193 | 0.336000 | 240.00 | 1.316 | 4 | 95.000 | 150.000 | 2 | 0.00000 | 192 | 194 | 0 | 4000.00 | 0.00 |
| 194 | 0.256000 | 180.00 | 1.105 | 16 | 150.000 | 142.000 | 2 | 0.00000 | 193 | 0 | 0 | 4000.00 | 0.00 |
| 195 | 0.665000 | 15.00 | 4.015 | 4 | 96.500 | 96.500 | 2 | 0.00000 | 54 | 196 | 0 | 4000.00 | 0.00 |
| 196 | 0.665000 | 11.00 | 2.197 | 4 | 96.500 | 94.500 | 2 | 0.00000 | 195 | 197 | 0 | 4400.00 | 0.00 |
| 197 | 0.665000 | 20.00 | 1.658 | 4 | 94.500 | 96.600 | 2 | 0.00000 | 196 | 198 | 0 | 4000.00 | 0.00 |
| 198 | 0.665000 | 115.00 | 1.000 | 4 | 96.600 | 96.600 | 2 | 0.00000 | 197 | 199 | 0 | 4000.00 | 0.00 |
| 199 | 0.665000 | 220.00 | 1.120 | 3 | 96.600 | 94.000 | 2 | 0.00000 | 198 | 200 | 0 | 4000.00 | 0.00 |
| 200 | 0.665000 | 20.00 | 2.862 | 4 | 94.000 | 94.750 | 2 | 0.00000 | 199 | 201 | 0 | 4000.00 | 0.00 |
| 201 | 0.665000 | 20.00 | 1.000 | 4 | 94.750 | 94.750 | 2 | 0.00000 | 200 | 202 | 0 | 4000.00 | 0.00 |
| 202 | 0.665000 | 20.00 | 2.197 | 4 | 94.750 | 94.750 | 2 | 0.00000 | 201 | 203 | 0 | 4000.00 | 0.00 |
| 203 | 0.665000 | 15.00 | 1.000 | 4 | 94.750 | 94.750 | 2 | 0.00000 | 202 | 204 | 0 | 4000.00 | 0.00 |
| 204 | 0.665000 | 30.00 | 1.973 | 3 | 94.750 | 84.100 | 2 | 0.00000 | 203 | 205 | 0 | 4000.00 | 0.00 |
| 205 | 0.665000 | 15.00 | 1.621 | 4 | 84.100 | 69.500 | 2 | 0.00000 | 204 | 206 | 0 | 4000.00 | 0.00 |
| 206 | 0.665000 | 15.00 | 1.887 | 3 | 69.500 | 69.500 | 2 | 0.00000 | 205 | 207 | 0 | 4000.00 | 0.00 |
| 207 | 0.665000 | 20.00 | 1.465 | 4 | 69.500 | 69.500 | 2 | 0.00000 | 206 | 208 | 0 | 4000.00 | 0.00 |
| 208 | 0.665000 | 20.00 | 4.125 | 3 | 69.500 | 61.750 | 2 | 0.00000 | 207 | 209 | 0 | 4000.00 | 0.00 |
| 209 | 0.665000 | 70.00 | 1.454 | 4 | 61.750 | 62.750 | 2 | 0.00000 | 208 | 210 | 0 | 4000.00 | 0.00 |
| 210 | 0.665000 | 5.00 | 6.320 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 209 | 211 | 0 | 4000.00 | 0.00 |
| 211 | 0.665000 | 50.00 | 1.293 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 210 | 212 | 0 | 4000.00 | 0.00 |
| 212 | 0.665000 | 20.00 | 2.330 | 3 | 62.750 | 62.750 | 2 | 0.00000 | 211 | 213 | 0 | 4000.00 | 0.00 |
| 213 | 0.665000 | 25.00 | 2.277 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 212 | 214 | 0 | 4000.00 | 0.00 |
| 214 | 0.665000 | 20.00 | 1.665 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 213 | 215 | 0 | 4000.00 | 0.00 |
| 215 | 0.665000 | 45.00 | 1.414 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 214 | 216 | 0 | 4000.00 | 0.00 |
| 216 | 0.665000 | 20.00 | 1.665 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 215 | 217 | 0 | 4000.00 | 0.00 |
| 217 | 0.665000 | 85.00 | 2.033 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 216 | 218 | 0 | 4000.00 | 0.00 |
| 218 | 0.665000 | 5.00 | 3.660 | 3 | 62.750 | 62.750 | 2 | 0.00000 | 217 | 219 | 0 | 4000.00 | 0.00 |
| 219 | 0.665000 | 25.00 | 2.649 | 3 | 62.750 | 66.000 | 2 | 0.00000 | 218 | 220 | 0 | 4000.00 | 0.00 |
| 220 | 0.665000 | 30.00 | 1.749 | 4 | 66.000 | 96.000 | 2 | 0.00000 | 219 | 221 | 0 | 4000.00 | 0.00 |
| 221 | 0.665000 | 20.00 | 1.329 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 220 | 222 | 0 | 4000.00 | 0.00 |
| 222 | 0.665000 | 5.00 | 4.977 | 4 | 96.000 | 94.400 | 2 | 0.00000 | 221 | 223 | 0 | 4000.00 | 0.00 |
| 223 | 0.665000 | 95.00 | 1.139 | 4 | 94.400 | 97.000 | 2 | 0.00000 | 222 | 224 | 0 | 4000.00 | 0.00 |
| 224 | 0.665000 | 35.00 | 1.646 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 223 | 225 | 0 | 4000.00 | 0.00 |
| 225 | 0.665000 | 65.00 | 1.614 | 4 | 97.000 | 96.500 | 2 | 0.00000 | 224 | 226 | 0 | 4000.00 | 0.00 |
| 226 | 0.665000 | 35.00 | 1.000 | 4 | 96.500 | 96.500 | 2 | 0.00000 | 225 | 227 | 0 | 4000.00 | 0.00 |
| 227 | 0.665000 | 35.00 | 1.830 | 4 | 96.500 | 94.200 | 2 | 0.00000 | 226 | 228 | 0 | 4000.00 | 0.00 |
| 228 | 0.665000 | 35.00 | 1.266 | 4 | 94.200 | 96.200 | 2 | 0.00000 | 227 | 229 | 0 | 4000.00 | 0.00 |
| 229 | 0.665000 | 120.00 | 1.377 | 3 | 96.200 | 95.800 | 2 | 0.00000 | 228 | 69 | 1 | 4000.00 | 0.00 |
| 230 | 0.665000 | 10.00 | 6.453 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 12 | 231 | 0 | 4000.00 | 0.00 |
| 231 | 0.665000 | 25.00 | 1.372 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 230 | 232 | 0 | 4000.00 | 0.00 |
| 232 | 0.665000 | 150.00 | 1.062 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 231 | 233 | 0 | 4000.00 | 0.00 |
| 233 | 0.665000 | 135.00 | 1.069 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 232 | 234 | 0 | 4000.00 | 0.00 |
| 234 | 0.665000 | 45.00 | 1.146 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 233 | 235 | 0 | 4000.00 | 0.00 |
| 235 | 0.665000 | 20.00 | 1.658 | 4 | 96.900 | 95.000 | 2 | 0.00000 | 234 | 236 | 0 | 4000.00 | 0.00 |
| 236 | 0.665000 | 35.00 | 1.564 | 4 | 95.000 | 95.500 | 2 | 0.00000 | 235 | 237 | 0 | 4000.00 | 0.00 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 237 | 0.665000 | 15.00 | 1.621 | 4 | 95.500 | 96.000 | 2 | 0.00000 | 236 | 238 | 0 | 4000.00 | 0.00 |
| 238 | 0.665000 | 30.00 | 1.621 | 4 | 96.000 | 72.000 | 2 | 0.00000 | 237 | 239 | 0 | 4000.00 | 0.00 |
| 239 | 0.665000 | 5.00 | 3.660 | 3 | 72.000 | 67.000 | 2 | 0.00000 | 238 | 240 | 0 | 4000.00 | 0.00 |
| 240 | 0.665000 | 75.00 | 1.497 | 4 | 67.000 | 64.250 | 2 | 0.00000 | 239 | 241 | 0 | 4000.00 | 0.00 |
| 241 | 0.665000 | 35.00 | 1.000 | 4 | 64.250 | 64.250 | 2 | 0.00000 | 240 | 242 | 0 | 4000.00 | 0.00 |
| 242 | 0.665000 | 65.00 | 1.286 | 4 | 64.250 | 61.750 | 2 | 0.00000 | 241 | 243 | 0 | 4000.00 | 0.00 |
| 243 | 0.665000 | 20.00 | 2.995 | 3 | 61.750 | 61.750 | 2 | 0.00000 | 242 | 244 | 0 | 4000.00 | 0.00 |
| 244 | 0.665000 | 5.00 | 2.064 | 4 | 61.750 | 61.750 | 2 | 0.00000 | 243 | 245 | 0 | 4000.00 | 0.00 |
| 245 | 0.665000 | 20.00 | 2.260 | 4 | 61.750 | 62.750 | 2 | 0.00000 | 244 | 246 | 0 | 4000.00 | 0.00 |
| 246 | 0.665000 | 15.00 | 1.887 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 245 | 247 | 0 | 4000.00 | 0.00 |
| 247 | 0.665000 | 10.00 | 2.330 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 246 | 248 | 0 | 4000.00 | 0.00 |
| 248 | 0.665000 | 15.00 | 1.887 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 247 | 249 | 0 | 4000.00 | 0.00 |
| 249 | 0.665000 | 35.00 | 1.380 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 248 | 250 | 0 | 4000.00 | 0.00 |
| 250 | 0.665000 | 100.00 | 1.000 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 249 | 251 | 0 | 4000.00 | 0.00 |
| 251 | 0.665000 | 10.00 | 3.647 | 4 | 62.750 | 62.500 | 2 | 0.00000 | 250 | 252 | 0 | 4000.00 | 0.00 |
| 252 | 0.665000 | 30.00 | 1.749 | 4 | 62.500 | 67.900 | 2 | 0.00000 | 251 | 253 | 0 | 4000.00 | 0.00 |
| 253 | 0.665000 | 30.00 | 1.310 | 4 | 67.900 | 96.000 | 2 | 0.00000 | 252 | 254 | 0 | 4000.00 | 0.00 |
| 254 | 0.665000 | 20.00 | 2.317 | 4 | 96.000 | 97.000 | 2 | 0.00000 | 253 | 255 | 0 | 4000.00 | 0.00 |
| 255 | 0.665000 | 145.00 | 1.000 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 254 | 256 | 0 | 4000.00 | 0.00 |
| 256 | 0.665000 | 35.00 | 1.752 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 255 | 257 | 0 | 4000.00 | 0.00 |
| 257 | 0.665000 | 60.00 | 1.110 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 256 | 258 | 0 | 4000.00 | 0.00 |
| 258 | 0.665000 | 40.00 | 1.165 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 257 | 259 | 0 | 4000.00 | 0.00 |
| 259 | 0.665000 | 5.00 | 3.660 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 258 | 260 | 0 | 4000.00 | 0.00 |
| 260 | 0.665000 | 45.00 | 1.118 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 259 | 261 | 0 | 4000.00 | 0.00 |
| 261 | 0.665000 | 15.00 | 4.538 | 3 | 97.000 | 95.500 | 2 | 0.00000 | 260 | 71 | 1 | 4000.00 | 0.00 |
| 262 | 0.505000 | 20.00 | 2.315 | 4 | 61.750 | 63.000 | 2 | 0.00000 | 243 | 263 | 0 | 4000.00 | 0.00 |
| 263 | 0.505000 | 10.00 | 3.318 | 4 | 63.000 | 56.000 | 2 | 0.00000 | 262 | 264 | 0 | 4000.00 | 0.00 |
| 264 | 0.505000 | 30.00 | 2.380 | 4 | 56.000 | 61.750 | 2 | 0.00000 | 263 | 265 | 0 | 4000.00 | 0.00 |
| 265 | 0.505000 | 5.00 | 3.020 | 3 | 61.750 | 62.900 | 2 | 0.00000 | 264 | 266 | 0 | 4000.00 | 0.00 |
| 266 | 0.505000 | 5.00 | 10.494 | 4 | 62.900 | 67.000 | 2 | 0.00000 | 265 | 267 | 0 | 4000.00 | 0.00 |
| 267 | 0.505000 | 5.00 | 3.828 | 4 | 67.000 | 67.000 | 2 | 0.00000 | 266 | 268 | 0 | 4000.00 | 0.00 |
| 268 | 0.505000 | 65.00 | 1.155 | 3 | 67.000 | 67.000 | 2 | 0.00000 | 267 | 269 | 0 | 4000.00 | 0.00 |
| 269 | 0.505000 | 15.00 | 1.000 | 4 | 67.000 | 67.000 | 2 | 0.00000 | 268 | 270 | 0 | 4000.00 | 0.00 |
| 270 | 0.505000 | 35.00 | 1.866 | 3 | 67.000 | 67.000 | 2 | 0.00000 | 269 | 271 | 0 | 4000.00 | 0.00 |
| 271 | 0.256000 | 25.00 | 1.143 | 4 | 67.000 | 67.000 | 2 | 0.00000 | 270 | 272 | 0 | 4000.00 | 0.00 |
| 272 | 0.256000 | 10.00 | 3.099 | 4 | 67.000 | 65.000 | 2 | 0.00000 | 271 | 273 | 0 | 4000.00 | 0.00 |
| 273 | 0.256000 | 55.00 | 1.289 | 16 | 65.000 | 94.500 | 2 | 0.00000 | 272 | 0 | 0 | 4000.00 | 0.00 |
| 274 | 0.505000 | 15.00 | 1.000 | 3 | 62.900 | 63.900 | 2 | 0.00000 | 265 | 275 | 0 | 4000.00 | 0.00 |
| 275 | 0.505000 | 15.00 | 1.741 | 3 | 63.900 | 68.200 | 2 | 0.00000 | 274 | 276 | 0 | 4000.00 | 0.00 |
| 276 | 0.336000 | 135.00 | 1.170 | 4 | 68.200 | 71.500 | 2 | 0.00000 | 275 | 277 | 0 | 4000.00 | 0.00 |
| 277 | 0.336000 | 40.00 | 1.773 | 16 | 71.500 | 61.500 | 2 | 0.00000 | 276 | 0 | 0 | 4000.00 | 0.00 |
| 278 | 0.336000 | 20.00 | 2.518 | 16 | 68.200 | 61.500 | 2 | 0.00000 | 275 | 0 | 0 | 4000.00 | 0.00 |
| 279 | 0.505000 | 85.00 | 2.305 | 4 | 69.500 | 68.750 | 2 | 0.00000 | 206 | 280 | 0 | 4000.00 | 0.00 |
| 280 | 0.505000 | 10.00 | 2.010 | 3 | 68.750 | 68.750 | 2 | 0.00000 | 279 | 281 | 0 | 4000.00 | 0.00 |
| 281 | 0.505000 | 45.00 | 1.382 | 4 | 68.750 | 68.750 | 2 | 0.00000 | 280 | 282 | 0 | 4000.00 | 0.00 |
| 282 | 0.505000 | 10.00 | 1.707 | 4 | 68.750 | 68.750 | 2 | 0.00000 | 281 | 283 | 0 | 4000.00 | 0.00 |
| 283 | 0.505000 | 70.00 | 1.447 | 3 | 68.750 | 68.750 | 2 | 0.00000 | 282 | 284 | 0 | 4000.00 | 0.00 |
| 284 | 0.505000 | 20.00 | 1.354 | 4 | 68.750 | 68.750 | 2 | 0.00000 | 283 | 285 | 0 | 4000.00 | 0.00 |
| 285 | 0.505000 | 5.00 | 2.414 | 4 | 68.750 | 65.500 | 2 | 0.00000 | 284 | 286 | 0 | 4000.00 | 0.00 |
| 286 | 0.505000 | 25.00 | 1.404 | 3 | 65.500 | 65.500 | 2 | 0.00000 | 285 | 287 | 0 | 4000.00 | 0.00 |
| 287 | 0.336000 | 65.00 | 1.868 | 4 | 65.500 | 113.000 | 2 | 0.00000 | 286 | 288 | 0 | 4000.00 | 0.00 |
| 288 | 0.336000 | 35.00 | 2.150 | 3 | 113.000 | 147.000 | 2 | 0.00000 | 287 | 289 | 0 | 4000.00 | 0.00 |
| 289 | 0.256000 | 55.00 | 1.419 | 4 | 147.000 | 178.000 | 2 | 0.00000 | 288 | 290 | 0 | 4000.00 | 0.00 |
| 290 | 0.256000 | 10.00 | 1.000 | 16 | 178.000 | 178.000 | 2 | 0.00000 | 289 | 0 | 0 | 4000.00 | 0.00 |
| 291 | 0.256000 | 35.00 | 1.247 | 16 | 147.000 | 159.750 | 2 | 0.00000 | 288 | 0 | 0 | 4000.00 | 0.00 |
| 292 | 0.256000 | 115.00 | 1.686 | 16 | 67.000 | 128.500 | 2 | 0.00000 | 239 | 0 | 0 | 4000.00 | 0.00 |
| 293 | 0.336000 | 5.00 | 7.451 | 4 | 65.710 | 62.500 | 2 | 0.00000 | 219 | 294 | 0 | 4000.00 | 0.00 |
| 294 | 0.336000 | 60.00 | 1.112 | 4 | 62.500 | 62.500 | 2 | 0.00000 | 293 | 295 | 0 | 4000.00 | 0.00 |
| 295 | 0.336000 | 40.00 | 1.907 | 4 | 62.500 | 93.500 | 2 | 0.00000 | 294 | 296 | 0 | 4000.00 | 0.00 |
| 296 | 0.336000 | 45.00 | 1.729 | 3 | 93.500 | 126.800 | 2 | 0.00000 | 295 | 297 | 0 | 4000.00 | 0.00 |
| 297 | 0.336000 | 45.00 | 1.149 | 3 | 126.800 | 142.000 | 2 | 0.00000 | 296 | 298 | 0 | 4000.00 | 0.00 |
| 298 | 0.336000 | 40.00 | 1.571 | 3 | 142.000 | 154.500 | 2 | 0.00000 | 297 | 299 | 0 | 4000.00 | 0.00 |
| 299 | 0.256000 | 95.00 | 1.107 | 16 | 154.500 | 155.500 | 2 | 0.00000 | 298 | 0 | 0 | 4000.00 | 0.00 |
| 300 | 0.256000 | 100.00 | 1.623 | 16 | 142.000 | 143.000 | 2 | 0.00000 | 297 | 0 | 0 | 4000.00 | 0.00 |
| 301 | 0.336000 | 25.00 | 2.452 | 3 | 154.500 | 156.300 | 2 | 0.00000 | 298 | 302 | 0 | 4000.00 | 0.00 |

# CALCULATION SHEET

| | | | |
|---|---|---|---|
| Project: | HOPE CREEK GENERATING STATION | Job Number: | 8038 |
| Calc No. | 8038-P0004 | Sheet No. | 36 |
| By: | A Arastu Date: 9/14/18 | Rev. No. | 1 |
| Subject: | Water Hammer Analysis of the HCGS Fire Protection System | | |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 302 | 0.336000 | 45.00 | 1.893 | 4 | 156.300 | 172.300 | 2 | 0.00000 | 301 303 | 0 | 4000.00 | 0.00 |
| 303 | 0.256000 | 55.00 | 1.304 | 4 | 172.300 | 178.000 | 2 | 0.00000 | 302 304 | 0 | 4000.00 | 0.00 |
| 304 | 0.256000 | 10.00 | 1.000 | 16 | 178.000 | 178.000 | 2 | 0.00000 | 303 0 | 0 | 4000.00 | 0.00 |
| 305 | 0.336000 | 5.00 | 6.376 | 4 | 156.300 | 156.300 | 2 | 0.00000 | 301 306 | 0 | 4000.00 | 0.00 |
| 306 | 0.256000 | 130.00 | 1.405 | 16 | 156.300 | 156.300 | 2 | 0.00000 | 305 0 | 0 | 4000.00 | 0.00 |
| 307 | 0.336000 | 105.00 | 1.914 | 4 | 126.800 | 155.000 | 2 | 0.00000 | 296 308 | 0 | 4000.00 | 0.00 |
| 308 | 0.256000 | 130.00 | 1.287 | 19 | 155.000 | 206.300 | 2 | 0.00000 | 307 309 | 0 | 4000.00 | 0.00 |
| 309 | 0.256000 | 20.00 | 1.000 | 16 | 206.300 | 203.000 | 2 | 0.00000 | 308 0 | 0 | 4000.00 | 0.00 |
| 310 | 0.336000 | 10.00 | 5.301 | 3 | 62.750 | 71.500 | 2 | 0.00000 | 212 311 | 0 | 4000.00 | 0.00 |
| 311 | 0.336000 | 65.00 | 1.424 | 3 | 71.500 | 133.500 | 2 | 0.00000 | 310 312 | 0 | 4000.00 | 0.00 |
| 312 | 0.256000 | 15.00 | 1.439 | 4 | 133.500 | 147.300 | 2 | 0.00000 | 311 313 | 0 | 4000.00 | 0.00 |
| 313 | 0.256000 | 60.00 | 1.281 | 4 | 147.300 | 165.100 | 2 | 0.00000 | 312 314 | 0 | 4000.00 | 0.00 |
| 314 | 0.256000 | 30.00 | 1.527 | 16 | 165.100 | 160.000 | 2 | 0.00000 | 313 0 | 0 | 4000.00 | 0.00 |
| 315 | 0.256000 | 25.00 | 1.407 | 16 | 71.500 | 81.500 | 2 | 0.00000 | 310 0 | 0 | 4000.00 | 0.00 |
| 316 | 0.336000 | 10.00 | 3.688 | 4 | 133.500 | 133.500 | 2 | 0.00000 | 311 317 | 0 | 4000.00 | 0.00 |
| 317 | 0.256000 | 80.00 | 1.717 | 16 | 133.500 | 141.500 | 2 | 0.00000 | 316 0 | 0 | 4000.00 | 0.00 |
| 318 | 0.336000 | 10.00 | 6.443 | 4 | 68.750 | 66.700 | 2 | 0.00000 | 283 319 | 0 | 4000.00 | 0.00 |
| 319 | 0.336000 | 100.00 | 1.672 | 3 | 66.700 | 120.000 | 2 | 0.00000 | 318 320 | 0 | 4000.00 | 0.00 |
| 320 | 0.336000 | 15.00 | 2.792 | 3 | 120.000 | 132.000 | 2 | 0.00000 | 319 321 | 0 | 4000.00 | 0.00 |
| 321 | 0.336000 | 15.00 | 1.448 | 4 | 132.000 | 146.000 | 2 | 0.00000 | 320 322 | 0 | 4000.00 | 0.00 |
| 322 | 0.256000 | 55.00 | 1.604 | 16 | 146.000 | 163.500 | 2 | 0.00000 | 321 0 | 0 | 4000.00 | 0.00 |
| 323 | 0.256000 | 25.00 | 1.492 | 16 | 120.000 | 128.500 | 2 | 0.00000 | 319 0 | 0 | 4000.00 | 0.00 |
| 324 | 0.336000 | 45.00 | 1.806 | 3 | 132.000 | 132.000 | 2 | 0.00000 | 320 325 | 0 | 4000.00 | 0.00 |
| 325 | 0.256000 | 30.00 | 2.263 | 16 | 132.000 | 157.500 | 2 | 0.00000 | 324 0 | 0 | 4000.00 | 0.00 |
| 326 | 0.256000 | 35.00 | 1.188 | 16 | 132.000 | 141.500 | 2 | 0.00000 | 324 0 | 0 | 4000.00 | 0.00 |
| 327 | 0.336000 | 30.00 | 2.456 | 4 | 63.900 | 68.100 | 2 | 0.00000 | 274 328 | 0 | 4000.00 | 0.00 |
| 328 | 0.336000 | 90.00 | 1.939 | 3 | 68.100 | 134.000 | 2 | 0.00000 | 327 329 | 0 | 4000.00 | 0.00 |
| 329 | 0.336000 | 45.00 | 1.612 | 4 | 134.000 | 132.000 | 2 | 0.00000 | 328 330 | 0 | 4000.00 | 0.00 |
| 330 | 0.362000 | 90.00 | 1.181 | 16 | 132.000 | 141.500 | 2 | 0.00000 | 329 0 | 0 | 4000.00 | 0.00 |
| 331 | 0.336000 | 15.00 | 3.554 | 3 | 134.000 | 147.000 | 2 | 0.00000 | 328 332 | 0 | 4000.00 | 0.00 |
| 332 | 0.256000 | 10.00 | 1.200 | 4 | 147.000 | 150.000 | 2 | 0.00000 | 331 333 | 0 | 4000.00 | 0.00 |
| 333 | 0.256000 | 10.00 | 1.200 | 16 | 150.000 | 159.000 | 2 | 0.00000 | 332 0 | 0 | 4000.00 | 0.00 |
| 334 | 0.256000 | 50.00 | 1.451 | 19 | 147.000 | 159.75 | 2 | 0.00000 | 331 335 | 0 | 4000.00 | 0.00 |
| 335 | 0.090000 | 10.00 | 1.000 | 16 | 159.750 | 159.000 | 2 | 0.00000 | 334 0 | 0 | 4000.00 | 0.00 |
| 336 | 0.336000 | 10.00 | 6.712 | 4 | 67.000 | 65.000 | 2 | 0.00000 | 268 337 | 0 | 4000.00 | 0.00 |
| 337 | 0.336000 | 90.00 | 1.538 | 3 | 65.000 | 115.200 | 2 | 0.00000 | 336 338 | 0 | 4000.00 | 0.00 |
| 338 | 0.336000 | 40.00 | 1.403 | 3 | 115.200 | 133.800 | 2 | 0.00000 | 337 339 | 0 | 4000.00 | 0.00 |
| 339 | 0.336000 | 50.00 | 2.423 | 3 | 133.800 | 133.300 | 2 | 0.00000 | 338 340 | 0 | 4000.00 | 0.00 |
| 340 | 0.336000 | 10.00 | 3.016 | 3 | 133.300 | 133.300 | 2 | 0.00000 | 339 341 | 0 | 4000.00 | 0.00 |
| 341 | 0.256000 | 45.00 | 1.340 | 16 | 133.300 | 141.500 | 2 | 0.00000 | 340 0 | 0 | 4000.00 | 0.00 |
| 342 | 0.256000 | 15.00 | 1.678 | 16 | 133.300 | 141.500 | 2 | 0.00000 | 340 0 | 0 | 4000.00 | 0.00 |
| 343 | 0.256000 | 10.00 | 1.300 | 16 | 133.800 | 141.500 | 2 | 0.00000 | 338 0 | 0 | 4000.00 | 0.00 |
| 344 | 0.256000 | 35.00 | 1.644 | 16 | 133.300 | 128.500 | 2 | 0.00000 | 339 0 | 0 | 4000.00 | 0.00 |
| 345 | 0.256000 | 5.00 | 5.813 | 3 | 115.200 | 115.200 | 2 | 0.00000 | 337 346 | 0 | 4000.00 | 0.00 |
| 346 | 0.256000 | 80.00 | 1.288 | 3 | 115.200 | 116.500 | 2 | 0.00000 | 345 347 | 0 | 4000.00 | 0.00 |
| 347 | 0.256000 | 55.00 | 1.726 | 16 | 116.500 | 141.500 | 2 | 0.00000 | 346 0 | 0 | 4000.00 | 0.00 |
| 348 | 0.256000 | 15.00 | 2.601 | 16 | 116.500 | 128.500 | 2 | 0.00000 | 346 0 | 0 | 4000.00 | 0.00 |
| 349 | 0.256000 | 50.00 | 1.594 | 16 | 115.200 | 106.500 | 2 | 0.00000 | 345 0 | 0 | 4000.00 | 0.00 |
| 350 | 0.505000 | 175.00 | 1.669 | 4 | 68.750 | 140.000 | 2 | 0.00000 | 280 351 | 0 | 4000.00 | 0.00 |
| 351 | 0.336000 | 50.00 | 1.000 | 16 | 140.000 | 138.000 | 2 | 0.00000 | 350 0 | 0 | 4000.00 | 0.00 |
| 352 | 0.336000 | 10.00 | 4.226 | 4 | 67.000 | 65.000 | 2 | 0.00000 | 270 353 | 0 | 4000.00 | 0.00 |
| 353 | 0.336000 | 80.00 | 1.285 | 4 | 65.000 | 105.700 | 2 | 0.00000 | 352 354 | 0 | 4000.00 | 0.00 |
| 354 | 0.336000 | 80.00 | 1.630 | 3 | 105.700 | 130.500 | 2 | 0.00000 | 353 355 | 0 | 4000.00 | 0.00 |
| 355 | 0.256000 | 30.00 | 1.458 | 4 | 130.500 | 147.500 | 2 | 0.00000 | 354 356 | 0 | 4000.00 | 0.00 |
| 356 | 0.256000 | 25.00 | 1.225 | 4 | 147.500 | 141.500 | 2 | 0.00000 | 355 357 | 0 | 4000.00 | 0.00 |
| 357 | 0.162000 | 50.00 | 1.843 | 16 | 141.500 | 141.500 | 2 | 0.00000 | 356 0 | 0 | 4000.00 | 0.00 |
| 358 | 0.336000 | 5.00 | 5.570 | 4 | 130.500 | 130.500 | 2 | 0.00000 | 354 359 | 0 | 4000.00 | 0.00 |
| 359 | 0.162000 | 35.00 | 1.759 | 16 | 130.500 | 132.200 | 2 | 0.00000 | 358 0 | 0 | 4000.00 | 0.00 |
| 360 | 0.336000 | 45.00 | 2.343 | 4 | 94.500 | 115.800 | 2 | 0.00000 | 152 361 | 0 | 4000.00 | 0.00 |
| 361 | 0.336000 | 15.00 | 1.448 | 3 | 115.800 | 130.600 | 2 | 0.00000 | 360 362 | 0 | 4000.00 | 0.00 |
| 362 | 0.256000 | 50.00 | 1.510 | 19 | 130.600 | 176.000 | 2 | 0.00000 | 361 363 | 0 | 4000.00 | 0.00 |
| 363 | 0.256000 | 15.00 | 1.000 | 16 | 176.000 | 176.000 | 2 | 0.00000 | 362 0 | 0 | 4000.00 | 0.00 |
| 364 | 0.362000 | 145.00 | 1.539 | 16 | 130.600 | 129.600 | 2 | 0.00000 | 361 0 | 0 | 4000.00 | 0.00 |
| 365 | 0.336000 | 65.00 | 1.940 | 3 | 92.000 | 118.400 | 2 | 0.00000 | 145 366 | 0 | 4000.00 | 0.00 |
| 366 | 0.336000 | 20.00 | 1.544 | 3 | 118.400 | 118.400 | 2 | 0.00000 | 365 367 | 0 | 4000.00 | 0.00 |

# CALCULATION SHEET

| | | | |
|---|---|---|---|
| Project: | HOPE CREEK GENERATING STATION | Job Number: | 8038 |
| Calc No. | 8038-P0004 | Sheet No. | 37 |
| By: | A Arastu Date: 9/14/18 | Rev. No. | 1 |
| Subject: | Water Hammer Analysis of the HCGS Fire Protection System | | |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 367 | 0.256000 | 15.00 | 1.239 | 16 | 118.400 | 115.000 | 2 | 0.00000 | 366 | 0 | 0 | 4000.00 | 0.00 |
| 368 | 0.256000 | 20.00 | 1.947 | 16 | 118.400 | 127.000 | 2 | 0.00000 | 365 | 0 | 0 | 4000.00 | 0.00 |
| 369 | 0.336000 | 30.00 | 2.275 | 4 | 118.400 | 133.500 | 2 | 0.00000 | 366 | 370 | 0 | 4000.00 | 0.00 |
| 370 | 0.256000 | 35.00 | 1.232 | 3 | 133.500 | 166.000 | 2 | 0.00000 | 369 | 371 | 0 | 4000.00 | 0.00 |
| 371 | 0.256000 | 10.00 | 1.000 | 19 | 166.000 | 176.000 | 2 | 0.00000 | 370 | 372 | 0 | 4000.00 | 0.00 |
| 372 | 0.256000 | 20.00 | 2.970 | 16 | 176.000 | 175.000 | 2 | 0.00000 | 371 | 0 | 0 | 4000.00 | 0.00 |
| 373 | 0.256000 | 55.00 | 1.521 | 16 | 166.000 | 141.000 | 2 | 0.00000 | 370 | 0 | 0 | 4000.00 | 0.00 |
| 374 | 0.336000 | 5.00 | 6.914 | 3 | 92.000 | 94.200 | 2 | 0.00000 | 144 | 375 | 0 | 4000.00 | 0.00 |
| 375 | 0.336000 | 50.00 | 1.605 | 3 | 94.200 | 113.250 | 2 | 0.00000 | 374 | 376 | 0 | 4000.00 | 0.00 |
| 376 | 0.256000 | 30.00 | 1.100 | 16 | 113.250 | 141.750 | 2 | 0.00000 | 375 | 0 | 0 | 4000.00 | 0.00 |
| 377 | 0.256000 | 30.00 | 1.751 | 16 | 94.200 | 74.000 | 2 | 0.00000 | 374 | 0 | 0 | 4000.00 | 0.00 |
| 378 | 0.256000 | 20.00 | 2.380 | 16 | 113.300 | 111.000 | 2 | 0.00000 | 375 | 0 | 0 | 4000.00 | 0.00 |
| 379 | 0.336000 | 10.00 | 4.898 | 4 | 89.000 | 94.330 | 2 | 0.00000 | 137 | 380 | 0 | 4000.00 | 0.00 |
| 380 | 0.336000 | 5.00 | 2.344 | 3 | 94.330 | 95.000 | 2 | 0.00000 | 379 | 381 | 0 | 4000.00 | 0.00 |
| 381 | 0.336000 | 100.00 | 1.322 | 4 | 95.000 | 130.700 | 2 | 0.00000 | 380 | 382 | 0 | 4000.00 | 0.00 |
| 382 | 0.256000 | 65.00 | 1.598 | 19 | 130.700 | 176.000 | 2 | 0.00000 | 381 | 383 | 0 | 4000.00 | 0.00 |
| 383 | 0.025600 | 20.00 | 1.000 | 16 | 176.000 | 175.000 | 2 | 0.00000 | 382 | 0 | 0 | 4000.00 | 0.00 |
| 384 | 0.336000 | 50.00 | 1.859 | 3 | 95.000 | 96.500 | 2 | 0.00000 | 380 | 385 | 0 | 4000.00 | 0.00 |
| 385 | 0.256000 | 75.00 | 1.252 | 3 | 96.500 | 98.000 | 2 | 0.00000 | 384 | 386 | 0 | 4000.00 | 0.00 |
| 386 | 0.256000 | 40.00 | 1.269 | 16 | 98.000 | 71.000 | 2 | 0.00000 | 385 | 0 | 0 | 4000.00 | 0.00 |
| 387 | 0.256000 | 15.00 | 2.741 | 16 | 96.500 | 103.000 | 2 | 0.00000 | 384 | 0 | 0 | 4000.00 | 0.00 |
| 388 | 0.256000 | 40.00 | 1.922 | 16 | 98.000 | 94.500 | 2 | 0.00000 | 385 | 0 | 0 | 4000.00 | 0.00 |
| 389 | 0.336000 | 45.00 | 1.567 | 3 | 89.000 | 127.750 | 2 | 0.00000 | 135 | 390 | 0 | 4000.00 | 0.00 |
| 390 | 0.256000 | 20.00 | 1.688 | 16 | 127.750 | 141.750 | 2 | 0.00000 | 389 | 0 | 0 | 4000.00 | 0.00 |
| 391 | 0.256000 | 110.00 | 1.335 | 16 | 127.750 | 141.750 | 2 | 0.00000 | 389 | 0 | 0 | 4000.00 | 0.00 |
| 392 | 0.336000 | 5.00 | 7.854 | 3 | 94.500 | 96.800 | 2 | 0.00000 | 155 | 393 | 0 | 4000.00 | 0.00 |
| 393 | 0.256000 | 215.00 | 1.316 | 16 | 96.800 | 65.000 | 2 | 0.00000 | 392 | 0 | 0 | 4000.00 | 0.00 |
| 394 | 0.256000 | 125.00 | 1.470 | 16 | 96.800 | 141.750 | 2 | 0.00000 | 392 | 0 | 0 | 4000.00 | 0.00 |
| 395 | 0.336000 | 150.00 | 1.528 | 3 | 94.500 | 130.400 | 2 | 0.00000 | 156 | 396 | 0 | 4000.00 | 0.00 |
| 396 | 0.256000 | 155.00 | 1.280 | 19 | 130.400 | 182.000 | 2 | 0.00000 | 395 | 397 | 0 | 4000.00 | 0.00 |
| 397 | 0.256000 | 30.00 | 1.478 | 16 | 182.000 | 179.000 | 2 | 0.00000 | 396 | 0 | 0 | 4000.00 | 0.00 |
| 398 | 0.256000 | 40.00 | 1.653 | 16 | 130.400 | 141.750 | 2 | 0.00000 | 395 | 0 | 0 | 4000.00 | 0.00 |
| 399 | 0.505000 | 120.00 | 1.538 | 3 | 94.500 | 90.500 | 2 | 0.00000 | 158 | 400 | 0 | 4000.00 | 0.00 |
| 400 | 0.336000 | 5.00 | 8.007 | 4 | 90.500 | 90.500 | 2 | 0.00000 | 399 | 401 | 0 | 4000.00 | 0.00 |
| 401 | 0.256000 | 60.00 | 1.349 | 16 | 90.500 | 141.750 | 2 | 0.00000 | 400 | 0 | 0 | 4000.00 | 0.00 |
| 402 | 0.336000 | 130.00 | 1.496 | 3 | 90.500 | 65.300 | 2 | 0.00000 | 399 | 403 | 0 | 4000.00 | 0.00 |
| 403 | 0.336000 | 50.00 | 1.228 | 4 | 65.300 | 94.700 | 2 | 0.00000 | 402 | 404 | 0 | 4000.00 | 0.00 |
| 404 | 0.256000 | 55.00 | 1.315 | 16 | 94.700 | 141.750 | 2 | 0.00000 | 403 | 0 | 0 | 4000.00 | 0.00 |
| 405 | 0.336000 | 40.00 | 2.260 | 3 | 65.300 | 77.500 | 2 | 0.00000 | 402 | 406 | 0 | 4000.00 | 0.00 |
| 406 | 0.256000 | 30.00 | 1.458 | 16 | 77.500 | 103.500 | 2 | 0.00000 | 405 | 0 | 0 | 4000.00 | 0.00 |
| 407 | 0.256000 | 125.00 | 1.180 | 16 | 77.500 | 75.000 | 2 | 0.00000 | 405 | 0 | 0 | 4000.00 | 0.00 |
| 408 | 0.336000 | 135.00 | 1.552 | 4 | 79.000 | 142.000 | 2 | 0.00000 | 139 | 409 | 0 | 4000.00 | 0.00 |
| 409 | 0.336000 | 20.00 | 1.000 | 16 | 142.000 | 141.750 | 2 | 0.00000 | 408 | 0 | 0 | 4000.00 | 0.00 |
| 410 | 0.256000 | 95.00 | 1.334 | 19 | 96.200 | 174.000 | 2 | 0.00000 | 150 | 411 | 0 | 4000.00 | 0.00 |
| 411 | 0.256000 | 10.00 | 1.358 | 4 | 174.000 | 183.500 | 2 | 0.00000 | 410 | 412 | 0 | 4000.00 | 0.00 |
| 412 | 0.107000 | 60.00 | 1.439 | 4 | 183.500 | 197.500 | 2 | 0.00000 | 411 | 413 | 0 | 4000.00 | 0.00 |
| 413 | 0.107000 | 25.00 | 1.000 | 16 | 197.500 | 197.500 | 2 | 0.00000 | 412 | 0 | 0 | 4000.00 | 0.00 |
| 414 | 0.505000 | 100.00 | 2.373 | 3 | 91.940 | 138.300 | 2 | 0.00000 | 143 | 415 | 0 | 4000.00 | 0.00 |
| 415 | 0.505000 | 5.00 | 5.848 | 2 | 138.300 | 142.000 | 2 | 0.00000 | 414 | 416 | 0 | 4000.00 | 0.00 |
| 416 | 0.336000 | 5.00 | 1.000 | 4 | 142.000 | 142.000 | 2 | 0.00000 | 415 | 417 | 0 | 4000.00 | 0.00 |
| 417 | 0.336000 | 50.00 | 1.000 | 4 | 142.000 | 160.000 | 2 | 0.00000 | 416 | 418 | 0 | 4000.00 | 0.00 |
| 418 | 0.336000 | 50.00 | 1.000 | 16 | 160.000 | 160.000 | 2 | 0.00000 | 417 | 0 | 0 | 4000.00 | 0.00 |
| 419 | 0.505000 | 85.00 | 2.031 | 4 | 94.500 | 131.500 | 2 | 0.00000 | 154 | 420 | 0 | 4000.00 | 0.00 |
| 420 | 0.505000 | 50.00 | 1.443 | 4 | 131.500 | 130.750 | 2 | 0.00000 | 419 | 421 | 0 | 4000.00 | 0.00 |
| 421 | 0.505000 | 30.00 | 1.909 | 4 | 130.750 | 130.750 | 2 | 0.00000 | 420 | 422 | 0 | 4000.00 | 0.00 |
| 422 | 0.505000 | 40.00 | 2.361 | 4 | 130.750 | 128.750 | 2 | 0.00000 | 421 | 423 | 0 | 4000.00 | 0.00 |
| 423 | 0.505000 | 35.00 | 1.491 | 3 | 128.750 | 132.170 | 2 | 0.00000 | 422 | 424 | 0 | 4000.00 | 0.00 |
| 424 | 0.256000 | 10.00 | 1.505 | 4 | 132.170 | 138.000 | 2 | 0.00000 | 423 | 425 | 0 | 4000.00 | 0.00 |
| 425 | 0.162000 | 105.00 | 1.580 | 16 | 138.000 | 169.500 | 2 | 0.00000 | 424 | 0 | 0 | 4000.00 | 0.00 |
| 426 | 0.336000 | 40.00 | 1.843 | 3 | 132.170 | 132.170 | 2 | 0.00000 | 423 | 427 | 0 | 4000.00 | 0.00 |
| 427 | 0.256000 | 10.00 | 1.000 | 4 | 132.170 | 138.000 | 2 | 0.00000 | 426 | 428 | 0 | 4000.00 | 0.00 |
| 428 | 0.162000 | 100.00 | 1.632 | 16 | 138.000 | 169.500 | 2 | 0.00000 | 427 | 0 | 0 | 4000.00 | 0.00 |
| 429 | 0.256000 | 40.00 | 1.165 | 4 | 132.170 | 138.000 | 2 | 0.00000 | 426 | 430 | 0 | 4000.00 | 0.00 |
| 430 | 0.162000 | 155.00 | 1.548 | 16 | 138.000 | 169.500 | 2 | 0.00000 | 429 | 0 | 0 | 4000.00 | 0.00 |
| 431 | 0.256000 | 40.00 | 1.934 | 4 | 65.500 | 69.000 | 2 | 0.00000 | 286 | 432 | 0 | 4000.00 | 0.00 |

# CALCULATION SHEET

| | | | |
|---|---|---|---|
| Project: | HOPE CREEK GENERATING STATION | Job Number: | 8038 |
| Calc No. | 8038-P0004 | Sheet No. | 38 |
| By: | A Arastu Date: 9/14/18 | Rev. No. | 1 |
| Subject: | Water Hammer Analysis of the HCGS Fire Protection System | | |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 432 | 0.256000 | 105.00 | 1.020 | 4 | 69.000 | 171.000 | 2 | 0.00000 | 431 | 433 | 0 | 4000.00 | 0.00 |
| 433 | 0.162000 | 10.00 | 1.227 | 19 | 171.000 | 181.000 | 2 | 0.00000 | 432 | 434 | 0 | 4000.00 | 0.00 |
| 434 | 0.162000 | 40.00 | 1.332 | 16 | 181.000 | 180.000 | 2 | 0.00000 | 433 | 0 | 0 | 4000.00 | 0.00 |
| 435 | 0.665000 | 15.00 | 5.522 | 3 | 89.600 | 83.800 | 2 | 0.00000 | 166 | 436 | 0 | 4000.00 | 0.00 |
| 436 | 0.665000 | 5.00 | 3.660 | 3 | 83.800 | 83.800 | 2 | 0.00000 | 435 | 437 | 0 | 4000.00 | 0.00 |
| 437 | 0.665000 | 5.00 | 14.300 | 3 | 83.800 | 83.800 | 2 | 0.00000 | 436 | 438 | 0 | 4000.00 | 0.00 |
| 438 | 0.505000 | 5.00 | 4.652 | 13 | 83.800 | 88.000 | 2 | 0.00000 | 437 | 439 | 0 | 4000.00 | 0.00 |
| 439 | 0.505000 | 5.00 | 6.050 | 2 | 88.000 | 89.000 | 2 | 0.00000 | 438 | 440 | 0 | 4000.00 | 0.00 |
| 440 | 0.336000 | 60.00 | 5.000 | 1 | 89.000 | 113.000 | 2 | 0.00000 | 439 | 0 | 0 | 4000.00 | 0.00 |
| 441 | 0.665000 | 10.00 | 9.911 | 3 | 83.800 | 91.500 | 2 | 0.00000 | 437 | 442 | 0 | 4000.00 | 0.00 |
| 442 | 0.665000 | 80.00 | 1.865 | 3 | 91.500 | 102.800 | 2 | 0.00000 | 441 | 443 | 0 | 4000.00 | 0.00 |
| 443 | 0.665000 | 50.00 | 1.106 | 16 | 102.800 | 130.000 | 2 | 0.00000 | 442 | 0 | 0 | 4000.00 | 0.00 |
| 444 | 0.336000 | 10.00 | 5.435 | 16 | 102.800 | 107.800 | 2 | 0.00000 | 442 | 0 | 0 | 4000.00 | 0.00 |
| 445 | 0.665000 | 40.00 | 2.658 | 16 | 91.500 | 86.000 | 2 | 0.00000 | 441 | 0 | 0 | 4000.00 | 0.00 |
| 446 | 0.505000 | 5.00 | 7.868 | 13 | 83.800 | 88.000 | 2 | 0.00000 | 435 | 447 | 0 | 4000.00 | 0.00 |
| 447 | 0.505000 | 5.00 | 1.000 | 2 | 88.000 | 89.000 | 2 | 0.00000 | 446 | 448 | 0 | 4000.00 | 0.00 |
| 448 | 0.505000 | 45.00 | 2.301 | 4 | 89.000 | 103.000 | 2 | 0.00000 | 447 | 449 | 0 | 4000.00 | 0.00 |
| 449 | 0.336000 | 20.00 | 2.613 | 4 | 103.000 | 112.000 | 2 | 0.00000 | 448 | 450 | 0 | 4000.00 | 0.00 |
| 450 | 0.336000 | 110.00 | 2.307 | 1 | 112.000 | 113.000 | 2 | 0.00000 | 449 | 0 | 0 | 4000.00 | 0.00 |
| 451 | 0.336000 | 160.00 | 1.474 | 4 | 83.800 | 141.000 | 2 | 0.00000 | 436 | 452 | 0 | 4000.00 | 0.00 |
| 452 | 0.336000 | 5.00 | 1.000 | 2 | 141.000 | 141.000 | 2 | 0.00000 | 451 | 453 | 0 | 4000.00 | 0.00 |
| 453 | 0.256000 | 50.00 | 1.000 | 1 | 141.000 | 141.000 | 2 | 0.00000 | 452 | 0 | 0 | 4000.00 | 0.00 |
| 454 | 0.665000 | 30.00 | 4.979 | 3 | 84.100 | 93.500 | 2 | 0.00000 | 204 | 455 | 0 | 4000.00 | 0.00 |
| 455 | 0.665000 | 10.00 | 2.862 | 2 | 93.500 | 103.500 | 2 | 0.00000 | 454 | 456 | 0 | 4000.00 | 0.00 |
| 456 | 0.505000 | 50.00 | 5.000 | 1 | 103.500 | 103.500 | 2 | 0.00000 | 455 | 0 | 0 | 4000.00 | 0.00 |
| 457 | 0.505000 | 20.00 | 2.414 | 4 | 93.500 | 80.300 | 2 | 0.00000 | 454 | 458 | 0 | 4080.00 | 0.00 |
| 458 | 0.505000 | 50.00 | 1.000 | 16 | 80.300 | 80.300 | 2 | 0.00000 | 457 | 0 | 0 | 4000.00 | 0.00 |
| 459 | 0.336000 | 20.00 | 3.318 | 2 | 62.750 | 62.750 | 2 | 0.00000 | 218 | 460 | 0 | 4000.00 | 0.00 |
| 460 | 0.336000 | 10.00 | 2.210 | 4 | 62.750 | 63.750 | 2 | 0.00000 | 459 | 461 | 0 | 4000.00 | 0.00 |
| 461 | 0.336000 | 30.00 | 1.762 | 4 | 63.750 | 86.250 | 2 | 0.00000 | 460 | 462 | 0 | 4000.00 | 0.00 |
| 462 | 0.336000 | 40.00 | 1.286 | 4 | 86.250 | 125.000 | 2 | 0.00000 | 461 | 463 | 0 | 4000.00 | 0.00 |
| 463 | 0.336000 | 130.00 | 1.233 | 4 | 125.000 | 125.000 | 2 | 0.00000 | 462 | 464 | 0 | 4000.00 | 0.00 |
| 464 | 0.336000 | 30.00 | 1.587 | 4 | 125.000 | 155.000 | 2 | 0.00000 | 463 | 465 | 0 | 4000.00 | 0.00 |
| 465 | 0.256000 | 60.00 | 1.171 | 4 | 155.000 | 208.000 | 2 | 0.00000 | 464 | 466 | 0 | 4000.00 | 0.00 |
| 466 | 0.001000 | 10.00 | 1.000 | 16 | 208.000 | 205.000 | 2 | 0.00000 | 465 | 0 | 0 | 4000.00 | 0.00 |
| 467 | 0.336000 | 20.00 | 2.378 | 2 | 94.000 | 94.000 | 2 | 0.00000 | 199 | 468 | 0 | 4000.00 | 0.00 |
| 468 | 0.336000 | 20.00 | 1.000 | 4 | 94.000 | 94.000 | 2 | 0.00000 | 467 | 469 | 0 | 4000.00 | 0.00 |
| 469 | 0.336000 | 5.00 | 1.538 | 4 | 94.000 | 94.000 | 2 | 0.00000 | 468 | 470 | 0 | 4000.00 | 0.00 |
| 470 | 0.336000 | 25.00 | 2.665 | 4 | 94.000 | 113.000 | 2 | 0.00000 | 469 | 471 | 0 | 4000.00 | 0.00 |
| 471 | 0.336000 | 75.00 | 1.403 | 4 | 113.000 | 122.000 | 2 | 0.00000 | 470 | 472 | 0 | 4000.00 | 0.00 |
| 472 | 0.336000 | 35.00 | 1.708 | 3 | 122.000 | 151.800 | 2 | 0.00000 | 471 | 473 | 0 | 4000.00 | 0.00 |
| 473 | 0.336000 | 30.00 | 2.322 | 3 | 151.800 | 169.500 | 2 | 0.00000 | 472 | 474 | 0 | 4000.00 | 0.00 |
| 474 | 0.336000 | 35.00 | 1.770 | 4 | 169.500 | 187.800 | 2 | 0.00000 | 473 | 475 | 0 | 4000.00 | 0.00 |
| 475 | 0.256000 | 15.00 | 1.717 | 4 | 187.800 | 187.800 | 2 | 0.00000 | 474 | 476 | 0 | 4000.00 | 0.00 |
| 476 | 0.256000 | 110.00 | 1.130 | 4 | 187.800 | 205.300 | 2 | 0.00000 | 475 | 477 | 0 | 4000.00 | 0.00 |
| 477 | 0.256000 | 10.00 | 1.000 | 16 | 205.300 | 204.300 | 2 | 0.00000 | 476 | 0 | 0 | 4000.00 | 0.00 |
| 478 | 0.256000 | 40.00 | 1.849 | 16 | 169.500 | 166.000 | 2 | 0.00000 | 473 | 0 | 0 | 4000.00 | 0.00 |
| 479 | 0.336000 | 10.00 | 4.769 | 4 | 151.800 | 153.300 | 2 | 0.00000 | 472 | 480 | 0 | 4000.00 | 0.00 |
| 480 | 0.256000 | 60.00 | 1.293 | 16 | 153.300 | 149.300 | 2 | 0.00000 | 479 | 0 | 0 | 4000.00 | 0.00 |
| 481 | 0.505000 | 5.00 | 14.146 | 4 | 61.750 | 57.700 | 2 | 0.00000 | 208 | 482 | 0 | 4000.00 | 0.00 |
| 482 | 0.505000 | 20.00 | 3.323 | 4 | 57.700 | 71.000 | 2 | 0.00000 | 481 | 483 | 0 | 4000.00 | 0.00 |
| 483 | 0.505000 | 10.00 | 1.000 | 2 | 71.000 | 71.000 | 2 | 0.00000 | 482 | 484 | 0 | 4000.00 | 0.00 |
| 484 | 0.505000 | 50.00 | 5.000 | 1 | 71.000 | 71.000 | 2 | 0.00000 | 483 | 0 | 0 | 4000.00 | 0.00 |
| 485 | 0.505000 | 5.00 | 13.184 | 4 | 138.300 | 138.300 | 2 | 0.00000 | 414 | 486 | 0 | 4000.00 | 0.00 |
| 486 | 0.336000 | 90.00 | 1.157 | 4 | 138.300 | 143.500 | 2 | 0.00000 | 485 | 487 | 0 | 4000.00 | 0.00 |
| 487 | 0.336000 | 15.00 | 1.627 | 4 | 143.500 | 147.400 | 2 | 0.00000 | 486 | 488 | 0 | 4000.00 | 0.00 |
| 488 | 0.336000 | 75.00 | 1.314 | 4 | 147.400 | 165.800 | 2 | 0.00000 | 487 | 489 | 0 | 4000.00 | 0.00 |
| 489 | 0.336000 | 70.00 | 1.355 | 4 | 165.800 | 164.000 | 2 | 0.00000 | 488 | 490 | 0 | 4000.00 | 0.00 |
| 490 | 0.336000 | 10.00 | 3.486 | 4 | 164.000 | 164.000 | 2 | 0.00000 | 489 | 491 | 0 | 4000.00 | 0.00 |
| 491 | 0.336000 | 10.00 | 1.416 | 4 | 164.000 | 164.000 | 2 | 0.00000 | 490 | 492 | 0 | 4000.00 | 0.00 |
| 492 | 0.256000 | 10.00 | 1.251 | 4 | 164.000 | 164.000 | 2 | 0.00000 | 491 | 493 | 0 | 4000.00 | 0.00 |
| 493 | 0.206000 | 10.00 | 3.225 | 4 | 164.000 | 166.000 | 2 | 0.00000 | 492 | 494 | 0 | 4000.00 | 0.00 |
| 494 | 0.206000 | 75.00 | 1.549 | 4 | 166.000 | 166.000 | 2 | 0.00000 | 493 | 495 | 0 | 4000.00 | 0.00 |
| 495 | 0.172000 | 20.00 | 1.757 | 19 | 166.000 | 166.000 | 2 | 0.00000 | 494 | 496 | 0 | 4000.00 | 0.00 |
| 496 | 0.087000 | 10.00 | 2.409 | 16 | 166.000 | 168.000 | 2 | 0.00000 | 495 | 0 | 0 | 4000.00 | 0.00 |

```
@EOR

91 570.3   0  18
  20.00   .000     -0.022     -0.033    -0.045    -0.056    -0.067    -0.078
 -0.089  -.100     -0.111     -0.123    -0.134    -0.145    -0.156    -0.167
 -0.200   -100.0
  570.3  570.3     587.3     590.3     587.3     580.3     568.3     558.3
  542.3  520.3     490.3     460.3     420.3     370.3     310.3     240.3
   170.3  170.3

99 495.3   0  18
  20.00   .000     -0.557     -1.114    -1.671    -2.228    -2.785    -3.342
 -3.899  -4.46     -5.013     -5.570    -6.127    -6.684    -7.241    -8.912
 -13.4   -100.0
  495.3  495.3     494.3     492.3     491.3     488.3     485.3     481.3
  477.3  472.3     466.3     459.3     448.3     436.3     423.3     375.3
  170.3  170.3

117 512.1  0 17
  20.00  -.000     -0.557    -1.114    -1.671    -2.228    -2.785    -3.342
 -3.899  -4.46     -5.013    -5.57     -6.127    -6.684    -7.241    -8.912
 -13.37
  512.1  512.1     510.1     507.1     505.1     502.1     500.1     498.1
  495.1  492.1     487.8     481.1     476.1     467.1     457.1     412.1
  160.1

123 512.1  0 17
  20.00  -.000     -0.557    -1.114    -1.671    -2.228    -2.785    -3.342
 -3.899  -4.46     -5.013    -5.57     -6.127    -6.684    -7.241    -8.912
 -13.37
  512.1  512.1     510.1     507.1     505.1     502.1     500.1     498.1
  495.1  492.1     487.8     481.1     476.1     467.1     457.1     412.1
  160.1

129 482.1   0  16
  20.00   .000     -0.022     -0.033    -0.045    -0.056    -0.067    -0.078
 -0.089  -.100     -0.111     -0.123    -0.134    -0.145    -0.156    -100.0
  482.1  482.1     478.1     473.1     463.1     448.1     428.1     403.1
  374.1  343.1     308.1     268.1     233.1     198.1     168.1     168.1

440 147.0   0   0

450 147.0   0   0

453 175.0   0   0

456 137.5   0   0

484 105.0   0   0

  4 0  100.  100. 1.0E+20   2  9  4  0  .01   416.4
0     .56   2.36    100
100.  100.  100.    100.
0     50.0   90.0  92.5   95.3   97.5      99.0      99.7       100.0
0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

 90 0  100  100  1.0E+20    2  9  3  0  .01  570.3
0       0.01  100
100     0    0
0     50.0   90.0  92.5   95.3   97.5      99.0      99.7       100.0
0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

 96 0  100  100  1.0E+20   2  9  4  0  .01  495.3
0      .63   3.43   100
100.   100.  100.   100.
```

```
0     50.0   90.0  92.5   95.3   97.5      99.0      99.7       100.0
 0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

 114 0  100  100  1.0E+20    2  9  4  0  .01  512.1
 0       2.51  5.61   100
 100     100   0.     0.
 0     50.0   90.0  92.5   95.3   97.5      99.0      99.7       100.0
 0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

 121 0  100  100  1.0E+20    2  9  4  0  .01  512.1
 0       21.93 27.13 100
 100     100   100   100
 0     50.0   90.0  92.5   95.3   97.5      99.0      99.7       100.0
 0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

 126 0  100  100  1.0E+20    2  9  3  0  .01  482.1
0       0.01  100
100     0     0
0     50.0   90.0  92.5   95.3   97.5      99.0      99.7       100.0
 0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

 415  0  100  100  1.0E+20   2  16  3  0  1.79  194.
 0      0.1    100
 100     100    100
 0   11.1   16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
 97.5     99.0     99.7  100.0
 10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
 203570   1596000  0.49259E+08  0.1E+21

 439  0  100  100  1.0E+20   2  16  3  0  1.79  147.
 0       0.1    100
 100     100    100
 0    11.1  16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
 97.5     99.0     99.7  100.0
 10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
 203570   1596000  0.49259E+08  0.1E+21

 447  0  100  100  1.0E+20   2  16  3  0  1.79  147.
 0       0.01    100
 100     100     100
 0    11.1  16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
 97.5     99.0     99.7  100.0
 10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
 203570   1596000  0.49259E+08  0.1E+21

 452  0  100  100  1.0E+20   2  16  3  0  1.785  175.
 0       0.01   100
 100     100    100
 0    11.1  16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
 97.5     99.0     99.7  100.0
 10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
 203570   1596000  0.49259E+08  0.1E+21

 455  0  100  100  1.0E+20   2  16  3  0  0.695  137.5
0       0.01   100
100     0      0
0    11.1  16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
97.5     99.0     99.7  100.0
10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
 203570   1596000  0.49259E+08  0.1E+21

 459  0  100  100  1.0E+20   2  9  3  0  .01  96.8
 0       1.0   100
 100     100   100
 0     50.0   90.0  92.5   95.3   97.5      99.0      99.7       100.0
```

```
 0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

 467  0  100  100  1.0E+20   2  9  3  0  .01  128.
 0       1.0   100
 100     100   100
 0     50.0   90.0  92.5   95.3   97.5      99.0      99.7       100.0
 0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

 483  0  100  100  1.0E+20  2  16  4  0  0.99  105.0
 0       0.1   0.11  100
 100     100   100   100
 0    11.1  16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
 97.5     99.0     99.7  100.0
 10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
 203570   1596000  0.49259E+08  0.1E+21


   5  2  0.650  0.01 0.7850 0.0  ID 1.0000
 438  2  0.750  0.01 0.2003 0.0  ID 0.5050
 446  2  0.750  0.01 0.2003 0.0  ID 0.5050

308   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102

410   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102


433   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102

362   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102

396   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102


495   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102

334   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102

371   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102

382   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
```

```
0.21       14.7      0.02     68.0
53.3   2         .102


 1.           1.
 6     2
 94    2
 97    2
 102   2
 113   2
 120   2
 184   41
 188   46
 194   31
 289   11
 290    7
 291    6
 292   23
 299   17
 303   11
 304   1
 306   24
 308   26
 314   6
 322   11
 325    5
 332    2
 334    9
 347   11
 351   10
 362    9
 371   2
 376   6
 382   13
 383    3
 396   31
 409   4
 410   17
 412   11
 418   9
 425   21
 428   20
 430   32
 432   20
 433   3
 450   22
 455   2
 465   1
 466   2
 476   4
 477   22
 478   8
 480   11
 483   2
 495   4
@EOR
410       1       410      3          1
410       3       410      5          2
410       4       410      18         3
410       18      410      19         4
410       18      411      3          5
412       1       412      2          6
412       1       412      3          7
412       3       412      6          8
412       5       412      6          9
```

# CALCULATION SHEET

| | | | |
|---|---|---|---|
| Project: | HOPE CREEK GENERATING STATION | Job Number: | 8038 |
| Calc No. | 8038-P0004 | Sheet No. | 43 |
| By: | A Arastu Date: 9/14/18 | Rev. No. | 1 |
| Subject: | Water Hammer Analysis of the HCGS Fire Protection System | | |

```
      412       6       412      7          10
      412       7       412      10         11
      431       1       431      2          12
      431       2       431      3          13
      431       2       431      5          14
      431       5       431      8          15
      431       8       431      9          16
      432       1       432      22         17
      308       1       308      5          18
      308       5       308      6          19
      308       5       308      18         20
      308       18      308      20         21
      308       20      308      21         22
      308       21      308      27         23
      @EOR
      0      3.0   1000   1
      3.0   30.0    500   1
30.0 888.   1000   1
30.0 888.   1000   1
```

# CALCULATION SHEET

| | | | |
|---|---|---|---|
| Project: | HOPE CREEK GENERATING STATION | Job Number: | 8038 |
| Calc No. | 8038-P0004 | Sheet No. | 44 |
| By: | A Arastu Date: 9/14/18 | Rev. No. | 1 |
| Subject: | Water Hammer Analysis of the HCGS Fire Protection System | | |

## ASSUMPTIONS

### General Assumptions

The following are the basic assumptions in the USLAM methodology for water hammer analysis documented in this calculation (these are generic assumptions in all computer programs of this type):

- One dimensional flow
- single phase compressible fluid with constant density (Liquid only Option in USLAM code)
- velocity and head constant across the pipe cross-section
- no heat transfer considered
- pipe wall is elastic. Sonic speed is constant in a link but can vary between links.
- transient flow friction factor formulation same as that under steady flow.

### Specific Assumptions

The following summarizes the data and assumptions used in the USLAM modeling for HCGS Fire Protection System water hammer analysis. This data has been obtained from the material supplied by PSEG and is referred to when quoted and used in this calculation:

1. In the Phase III analysis, the pre-action and deluge valve opening times are assumed to be 0.01 seconds. In Phase IV, a more realistic valve opening time of 1 second was used to remove undue conservatism as discussed in Appendix G.

2. Ambient water temperature assumed for the system.

3. Air coming out of solution is conservatively ignored.

4. All small hose station branches in the standpipes are ignored conservatively. They will cause pressure wave reflections and reduce forces on the standpipes.

5. If more than 1 vacuum breaker is installed in parallel for redundancy, only one vacuum breaker is conservatively assumed to open at each standpipe where vacuum breakers are installed. The other redundant vacuum breaker is assumed to fail in closed position. The vacuum breakers are assumed to be installed in the correct installation configuration. If the second Vacuum Breaker does open (as it should), that will introduce more air into the system. Thus, a single Vacuum Breaker opening is more conservative.

6. Minimum water levels were used in the HCGS and Salem fire water tanks. This is conservative as a lower level will cause the system pressure to drop more when a pre-action or deluge valve is opened. The transient analyzed is very short, therefore, the water level is assumed to remain at the minimum. The level will drop as the water is used from the tank.

**Important Data Used:**

1. The HCGS electric and diesel pumps start up times (zero to full flow) are taken as 1.8 and 2.8 seconds, respectively. These are measured values (Reference 6). Set points for pump start for the electric and diesel pumps are 110 and 100 psig, respectively. There are no delays in the startup of these pumps. See Tables 5 and 6 for the use of this data.

2. The Salem fire pumps 1 and 2 startup times (zero to full flow) are taken as 3.1 and 5.2 seconds, respectively (Reference 6). Delay times for these pumps are 2.0 and 21.3 seconds, respectively. Set points for pump start for pumps 1 and 2 are 85 and 75 psig, respectively. See Tables 5 and 6 for the use of this data.

3. The Salem/Hope Creek cross tie is opened within 7 days after any ONE Fire Pump is not available at Hope Creek. The cross tie is opened immediately if both HCGS fire pump are not available (Reference 6).

4. The Reactor building system are normally valve out from the fire system (valve to the Reactor Building is normally closed except the 1PS15 and 1PS16 pre-action systems which are not valved out). When there is a fire in the Reactor Building, the fire fighters open this isolation valve. This action will equalize the pressure across the valve and Reactor Building piping will then be at the fire main pressure. After this, the isolation valve at the hose station will be opened (slow process) and the jockey pump will pressure the hose pipe up to the nozzle valve (and may fill the hose pipe, if it is not full). Until this point there is no drop in system pressure and no transient is expected. The transient begins when the valve at the hose nozzle is opened (rather quickly). This scenario is described in Reference 6.

   The installation of Vacuum Breakers at the high point in the Reactor Building risers will mitigate water hammer if the piping downstream of the Reactor Building isolation valve is initially not full.

5. Vacuum breaker data used is as specified by the manufacturer, see Appendix A-5 (data from Reference 24).

6. All other data used, such as pump curves, reservoirs levels, etc. are from Reference 6.

# 4 ANALYSIS RESULTS AND DISCUSSION

In the USLAM runs for the various cases analyzed, surge pressures, velocities, and forces on pipe run segments are calculated – the force calculations being on selected pipe run segments on selected tall risers.

Cases 1 and 2 correspond to cases 1 and 2 from the previous HCGS GOTHIC analysis and were chosen for comparison purposes (Reference 13) in Phase I and II of this analyses. The GOTHIC cases are not identical but similar to USLAM cases. For Case 1, the impact velocity calculated by GOTHIC is 44.6 ft/s in riser # 26. The corresponding estimated surge pressure is 2716 psi. When dissolved air release is taken into consideration, the surge pressure reduces to 2246 psi. For Case 2, the impact velocity calculated by GOTHIC is 63.5 ft/s in riser # 36 (not # 26). The corresponding estimated surge pressure is 3991 psi. When dissolved air release is taken into consideration, the surge pressure is 2317 psi. In the Phase I USLAM analysis, air release is not considered as it is difficult to quantify and justify the effect of air release. Other major differences between the GOTHIC and USLAM analysis approaches were discussed in Reference 3. The USLAM phase I & II results pointed to the need for mitigation measures to reduce the water hammer loads. Vacuum breakers are considered for this purpose in this calculation. Through iterative USLAM runs it was determined that ½-inch vacuum breakers installed at the following 11 risers would reduce the water hammer loads to within acceptable limits (as documented in References 25 and 26). The exact proposed locations for the vacuum breakers are given in Figure 52 through 59.

1. Aux. Building Riser # 18
2. Rad Waste Building Riser # 15
3. Turbine Building Riser # 4
4. Turbine Building Riser # 26
5. Rad Waste Building Riser # 36
6. Turbine Building Riser # 5
7. Turbine Building Riser # 7
8. Turbine Building Riser # 10
9. Rad Waste Building Riser # 33
10. Reactor Building Riser # RB1
11. Reactor Building Riser # RB2

# CALCULATION SHEET

| | | | |
|---|---|---|---|
| Project: | HOPE CREEK GENERATING STATION | Job Number: | 8038 |
| Calc No. | 8038-P0004 | Sheet No. | 47 |
| By: | A Arastu Date: 9/14/18 | Rev. No. | 1 |
| Subject: | Water Hammer Analysis of the HCGS Fire Protection System | | |

Force time histories were generated for the following 3 situations:

1. Forces on the pipe segments leading to Turbine Building Riser # 26 for follow-up structural analysis.
2. Forces on the pipe segments leading to Reactor Building Riser # RB1 for follow-up structural analysis.
3. Forces on some miscellaneous pipe segments in other high risers where high pressures were calculated (for information only).

Table 7 gives the USLAM calculated peak pressures in the various high elevation risers where vacuum breakers are installed for Cases 1 through 9. Note that for cases 1 through 6, the Reactor Building risers are valved out.

Table 7**: Summary of Peak pressure (psia) in Risers with Vacuum Breakers**

| Summary of Peak Pressures for Risers With Vacuum Breakers | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | <------ Hope Creek Pumps ----> | | | | <------- Salem Pumps --------> | | | | HC Pump |
| **Gothic** | **Bldg** | **USLAM** | **Valve ID** | **Elev.** | **Dia** | **Maximum Pressures (psia) for Cases** | | | | | | | | |
| **Riser #** | | **Link** | | **ft** | **in** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** |
| 18 | AB DG | 308 | V044 | 206.3 | 3 | 176.1 | 168.3 | 151.0 | 366.5 | 194.2 | 90.8 | 227.1 | 110.3 | 213.7 |
| 15 | AB RW | 334 | V180 | 159.75 | 3 | 195.3 | 194.9 | 176.7 | 240.4 | 321.3 | 117.4 | 275.9 | 146.0 | 243.0 |
| 4 | TB | 362 | V060 | 176 | 3 | 182.7 | 180.1 | 166.2 | 277.5 | 260.2 | 103.9 | 206.9 | 133.8 | 205.6 |
| 5 | TB | 371 | V058 | 176 | 3 | 171.0 | 183.1 | 159.7 | 225.5 | 258.0 | 103.9 | 206.9 | 138.5 | 188.7 |
| 7 | TB | 382 | V054 | 176 | 3 | 171.4 | 174.9 | 161.5 | 215.6 | 277.1 | 104.8 | 248.1 | 138.1 | 197.8 |
| 10 | TB | 396 | V059 | 182 | 3 | 176.2 | 176.6 | 165.8 | 684.4 | 498.3 | 123.8 | 487.0 | 155.8 | 417.7 |
| 26 | TB | 411 | V011 | 197.4 | 3 | 164.3 | 168.2 | 156.5 | 317.1 | 190.3 | 94.6 | 221.0 | 131.9 | 236.2 |
| 36 | AB RW | 433 | V062 | 181 | 3 | 168.8 | 178.4 | 167.1 | 308.7 | 233.3 | 101.7 | 204.8 | 123.8 | 333.8 |
| RB1 | RB | 465 | V038 | 208 | 3 | N/A | N/A | N/A | N/A | N/A | N/A | 261.9 | 116.9 | 283.1 |
| RB2 | RB | 476 | V212 | 205 | 3 | N/A | N/A | N/A | N/A | N/A | N/A | 267.5 | 106.5 | 518.6 |
| 33 | AB RW | 495 | V430 | 168 | 2 | 202.2 | 208.2 | 193.1 | 261.0 | 227.7 | 126.0 | 274.5 | 172.3 | 240.3 |

AB RW refers to the Auxiliary Building Radwaste Area

AB DG refers to the Auxiliary Building Diesel Area

Table 8 gives the USLAM calculated peak pressures in the remaining high elevation risers (higher than ~150 ft) where vacuum breakers are NOT installed for Cases 1 through 9. Note that for cases 1 through 6, the Reactor Building risers are valved out.

Table 8**: Summary of Peak pressure (psia) in Risers without Vacuum Breakers**

| Summary of Peak Pressures for Risers Without Vacuum Breakers | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Gothic** | **Bldg** | **USLAM** | **Valve ID** | **Elev.** | **Dia** | <---- Hope Creek Pumps ----------> | | | | <---------- Salem Pumps ---------- | | | | HC Pump |
| **Riser #** | | **Link** | | **ft** | **in** | **Peak Pressure (psia) for Case** | | | | | | | | |
| | | | | | | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** |
| 13 | AB RW | 289 | V181 | 178 | 3 | 170.6 | 178.8 | 168.8 | 222.1 | 240.7 | 236.4 | 257.6 | 258.0 | 244.2 |
| 13 | AB RW | 291 | V181 | 159.75 | 3 | 177.6 | 186.3 | 176.3 | 286.3 | 233.0 | 233.0 | 234.7 | 235.2 | 249.5 |
| 18 | AB DG | 299 | V044 | 155.5 | 3 | 200.2 | 190.3 | 173.4 | 259.5 | 183.3 | 159.1 | 213.6 | 205.4 | 243.5 |
| 18 | AB DG | 304 | V044 | 177 | 3 | 189.6 | 184.0 | 164.5 | 257.1 | 209.1 | 206.9 | 212.6 | 212.6 | 251.9 |
| 18 | AB DG | 306 | V044 | 156.3 | 3 | 198.6 | 191.6 | 175.6 | 263.1 | 210.7 | 210.7 | 212.0 | 203.3 | 255.3 |
| 19 | AB W | 314 | V041 | 160 | 3 | 190.0 | 191.3 | 182.3 | 166.7 | 196.5 | 196.5 | 171.9 | 145.5 | 206.9 |
| 14 | AB RW | 322 | V183 | 163.5 | 3 | 176.0 | 185.9 | 176.0 | 225.3 | 195.9 | 195.9 | 226.2 | 226.2 | 262.6 |
| 14 | AB RW | 325 | V183 | 157.5 | 3 | 179.0 | 190.7 | 179.0 | 227.1 | 254.8 | 254.8 | 208.9 | 208.9 | 254.8 |
| 15 | AB RW | 332 | V180 | 159.75 | 3 | 194.5 | 192.7 | 175.9 | 226.5 | 302.3 | 116.6 | 282.8 | 147.3 | 244.7 |
| 5 | TB | 372 | V058 | 175 | 3 | 174.0 | 184.0 | 162.8 | 242.4 | 271.4 | 104.8 | 219.9 | 146.8 | 200.0 |
| 7 | TB | 383 | V054 | 175 | 3 | 219.0 | 203.5 | 222.5 | 224.2 | 280.5 | 106.1 | 261.0 | 148.1 | 212.6 |
| 29 | TB | 425 | V004 | 169.5 | 2 | 203.7 | 208.4 | 197.2 | 194.2 | 330.5 | 293.7 | 312.8 | 291.6 | 208.9 |
| 28 | TB | 428 | V005 | 169.5 | 2 | 217.1 | 213.2 | 206.7 | 210.2 | 392.0 | 294.2 | 267.7 | 284.6 | 214.5 |
| 27 | TB | 430 | V006 | 169.5 | 2 | 192.9 | 195.9 | 181.6 | 278.6 | 331.4 | 269.9 | 298.5 | 298.5 | 236.6 |
| RB2 | RB | 478 | V212 | 166 | 3 | N/A | N/A | N/A | N/A | N/A | N/A | 199.1 | 122.9 | 445.5 |
| RB2 | RB | 480 | V212 | 149.3 | 3 | N/A | N/A | N/A | N/A | N/A | N/A | 195.1 | 131.5 | 434.1 |

AB RW refers to the Auxiliary Building Radwaste Area
AB DG refers to the Auxiliary Building Diesel Area
AB W refers to the Auxiliary Building Wng Area

One can see from Tables 7 and 8 that the vacuum breakers are very effective in reducing the waterhammer in the HCGS FP system. For example, the largest pressure calculated in Reference 3 without any vacuum breakers in the system is 2777 psia in riser # 26 for Case 5. At the same riser and for the same case (see Table 7 above) the peak pressure calculated with vacuum breakers is 190 psia. For case 4, the peak pressure reduces to 317 psia from 2524 psia. In riser # 10, the peak pressure reduction is much smaller (684 psia down from 830 psia for case 4. But for other cases the reduction is more significant in riser # 10. Another benefit of introducing air in the system via vacuum breakers or other means is that the pressure increase is gradual as air get pressurized. With no air, the vapor pocket collapse is instantaneous. This makes a big difference in the

calculated forces as will be seen later in this calculation. In Table 8, it is seen that not having vacuum breakers in these risers do not result in any significant pressure surges. The 11 vacuum breakers in the system have a global effect in suppressing severe waterhammer in the FP system. ***Therefore, it is concluded that the number and location of vacuum breakers used in the HCGS FP system model are adequate to mitigate the waterhammer.***

Under the scope of work, forcing functions for Riser # 26 and the Reactor Building riser RB1 are to be generated in this hydraulic calculation for use in the structural evaluation of the piping in these two risers. Since high pressures are calculated in Riser # 10 (see Table 7), forces on two longest pipe run segments in Riser # 10 are also calculated. In addition, forces are calculated for riser # 18 and 36 for cases 5, 7, 8, & 9.

Table 9 gives a summary of the USLAM calculated peak forces in various high elevation risers in the HCGS FPS with vacuum breakers modeled.

Table 9**: Summary of Peak Forces (kips) in Selected Riser Vicinity Pipe Run Segments**

| Riser # | Location | Elev. | Case 1 | Case 2 | Case 3 | Case 4 | Case 5 | Case 6 | Case 7 | Case 8 | Case 9 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | TB | 182’ | - | - | - | 0.684 | 0.430 | - | - | - | - |
| 26 | TB | 197’ | 0.114 | 0.129 | 0.115 | 1.111 | 0.370 | 0.348 | 0.387 | 0.222 | 0.550 |
| 36 | AB Radwaste Area | 181’ | - | - | - | - | 0.842 | - | 0.681 | 0.681 | 0.820 |
| 18 | AB Diesel Area | 206’ | - | - | - | - | 0.443 | - | 0.577 | 0.577 | 0.615 |
| RB1 | RB | 206’ | N/A | N/A | N/A | N/A | N/A | N/A | 0.426 | 0.381 | 0.441 |
| RB2 | RB | 205’ | N/A | N/A | N/A | N/A | N/A | N/A | 0.285 | 0.285 | 0.414 |

Note: For Cases 1 through 6, RB risers are valve out and thus have no forces. In risers where forces are not given in the table above, the forces were not calculated because they have lower pressure surges (see Tables 7 and 8)**.** Only cases with large forces are shown for bounding structural evaluation. The peak forces shown in this table are *maximum absolute values* and occur at the long pipe run segments leading to the top of the risers. Positive forces are in the direction of normal flow which is from the bottom of riser towards the top (peak values shown are the larger of the absolute positive and negative peak forces).

From the Table above, it is obvious that in Riser # 26, the maximum peak force occurs in Case 4. This is in segment 3 which is the longest segment (about 70 feet long).

The effectiveness of vacuum breakers on pipe segment forces can be judged by comparing the largest peak forces in the various risers with and without vacuum breaker in the system. Table 9 in Reference 3 gives the maximum peak forces in the various risers and for cases 1 through 9 without vacuum breaker in the HCGS FP system. Table 9 of this calculation gives the maximum peak forces for the same cases with vacuum breaker modeled. It is seen that the forces are significantly reduced with vacuum breakers (typically more than by a factor of 10), although smaller reductions are seen in the peak pressures, as expected. For example, In Riser # 26, the largest peak forces are in cases 4 and 5 (10.2 and 11.5 kips, respectively) without vacuum breakers. With vacuum breaker, these are now 1.1 and 0.37 kips, respectively. For Reactor Building riser # RB1, the largest peak force in Case 7 reduced from 17.1 kips to 0.426 kips.

Figures 12 through 17 give the pressure head time histories in Risers 7, 10, 15, 18, 26, and 36 respectively for Case 5. These are the risers with vacuum breakers exhibiting larger peak pressures. All these plots show typical response with air pockets – slow pressure oscillations which help a lot in reducing forces on pipe run segments.

Figure 18 shows the velocity time history at Salem pump 1 for Case 5. One can see that this pump begins to starts at about 2 ½ seconds (time to reach the pump start set point plus 2 second delay) and reaches full speed at about 5.1 seconds. Time zero is when the 8-inch deluge valve starts to open. In Figure 18, the flow velocity is negative is due to the modeling of the Salem fire tank as a sink at the End of the line rather than a source (USLAM allows one source only and the Hope Creek Electric Pump is that source in this model). All other sources are modeled as sinks. Thus, the increasing link numbers are from the system to the sink and flow from the fire tank to the system is therefore negative (flow in positive along increasing link numbers). Figure 19 shows the velocity time history at the deluge valve for Case 5. Here, as expected, the flow starts at time zero (valve is assumed to open instantaneously). Between time zero and 2 ½ seconds, the flow through the deluge valve (Figure 19) is partly supplied by the jockey pump (small capacity), but mainly by the draining of the risers with air being drawn by the vacuum breakers. The flow increases due to system pressure by the jockey pumps and drops when the system depressurizes. As the pump starts, the flow increases again.

Figure 20 shows the velocity time history in Riser 10 for Case 5. The correlation between the pressure and velocity time histories is clearly (see Figure 13 for pressure plot). For example, the rapid drop in velocity in Figure 20 due to the compression of the air pocket (air is introduced by the vacuum breaker) is exhibited as a pressure increase in Figure 13 at about 8 seconds.

Figure 21 shows the velocity time history in Riser 15 for Case 5. The corresponding pressure time history is shown in Figure 14. Again, one can see that a rapid drop in velocity corresponds to a larger surge in pressure. When the velocity change rates are small, the surge pressure are much smaller, as expected.

Figures 22 through 25 give the pressure head time histories in Risers 10, 18, 26, and 36 respectively for Case 4. Figure 26 shows the velocity time history in Riser 10 for Case 4. The rapid drop in flow velocity as the air pocket is pressurized at about 5 seconds (Figure 25) corresponds to the large surge pressure in Figure 22. The peak pressure of 684 psia is shown in Figure 22 (also see Table 7). The increase in pressure is gradual and the forces are not large in this riser as we will see later in this calculation. In these figures the oscillations in pressure and velocity due to air bubble are seen.

Figures 27 through 30 give the pressure head time histories in Risers 10, 33, RB1, and RB2 respectively for Case 7. The air bubble oscillation is again obvious as expected. Peak pressure in riser 10 is 487 psia (Figure 27).

Figures 31 through 34 give the pressure head time histories in Risers 10, 36, RB1, and RB2 respectively for Case 9. Peak pressure in riser 10 is 418 psia (Figure 31).

Figures 35 through 45 show the force time history plots for segments 1 through 11 of Riser # 26 in the turbine building for Case 5. Figures 31 through 35 are segments before the vacuum breaker and Figures 36 through 41 are segments after the vacuum breaker. Figure C-1 in Appendix C shows the location of the 11 pipe segments in Riser # 26 and the direction of positive fluid force.

Figure 46 shows the force time history plot for segment 3 of Riser # 26 in the Turbine Building for Case 4. This is the maximum force calculated as listed in Table 9. The force time histories for cases 1 through 9 are used in the follow-on structural analysis of Riser # 26 in Reference 26.

Figures 47 and 48 show the force time history plots for segment 17 in Riser # 36 (RW) and segment 20 in Riser # 18 (TB) for Case 5. Also, refer to Table 9 for peak values in these segments.

Figure 49 shows the force time history plot for segment 16 in Riser # RB1 (RB) for Case 7. Figures 50 and 51 show the force time history plots in Riser # 10 (TB) for Cases 4 and 5.

It should be noted that positive force direction in USLAM is along increasing link number (generally in the normal flow direction). Also, USLAM calculates the fluid force on the piping. The pipe will react in the opposite direction. For the Hope Creek FPS USLAM model, all risers are modeled with link numbers increasing towards the top of the riser. Therefore, the peak force of -1.11 kips (Case 4 TB Riser # 26, Segment 3) is the fluid force on the pipe in the downward direction. The pipe would tend to react in the opposite direction, i.e. tend to move up, as expected.

Figure C-2 in Appendix C shows the location of the pipe segments in Riser # RB1 and the direction of positive fluid force. Selected force time history plots for all cases are given in Appendix C. For the Reactor Building Riser RB1, Figures C-3 through C-19 in Appendix C show the time history plots for pipe run segments #1 through #17 for Case 7. Figures C-20, C-21, C-22, and C-23 show the force plots for Cases 1, 2, 3, and 6 peak force segments in Riser # 26. Figure C-24 shows the force plots for Cases 7 peak force segments in Risers # RB2. Figures C-25 and C-26 show the force plots for Case 9 peak force segments in Risers # RB1 and RB2, respectively. Thus, force time history plots for most of the peak force pipe segments for all cases are given in this section and Appendix C. Reference 25 documents the structural analysis of riser RB1 for Case 7, 8, and 9.

Additional pressure head and velocity time history plots at selected locations (near risers 7, 27, 28, and 29) in the system for cases 1, 2, 3, 6, and 8 are given in Appendix D of this calculation. These plot locations are where the largest pressures are calculated in Table 8 (risers without vacuum breakers). For the other cases, the plots are given in Figures 8 through 30 as discussed above. In the plots in Appendix D, one can see that there are locations where column separation and rejoining occur and we could have placed vacuum breaker(s) there. But the pressures are much smaller than the peak pressures in the system. Further, these locations are at risers 27 and 28 for cases 8 and 6, respectively. These are the cases of Salem Pump 2 start only and consequently the time delay before the pump start is long (21.3 secs). Column separation and rejoining is expected under this long delay.

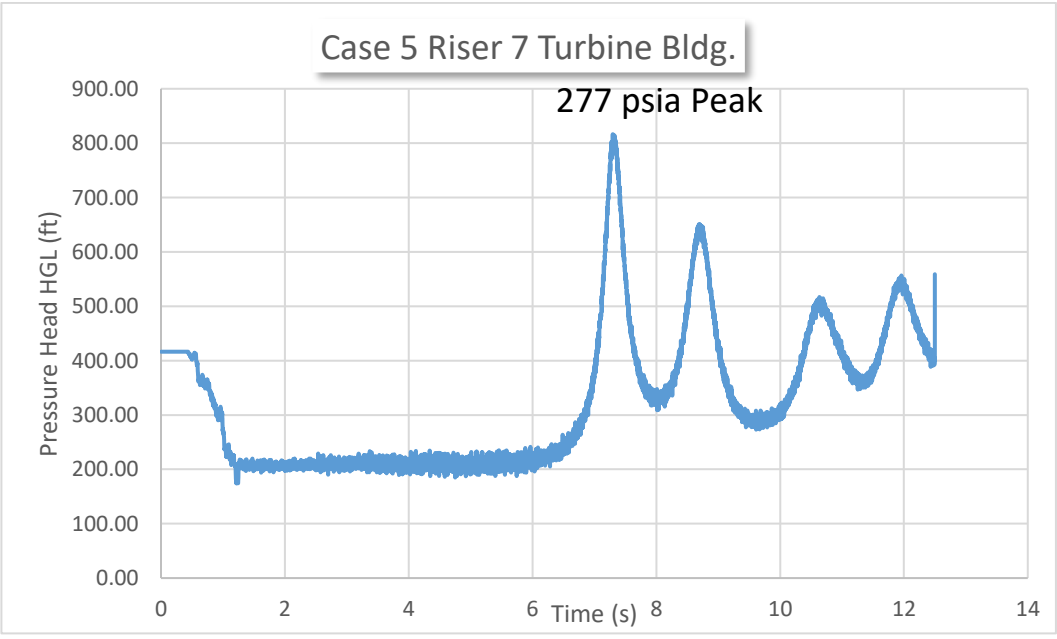


Figure 12: Case 5 Pressure Time History Plot for Riser # 7

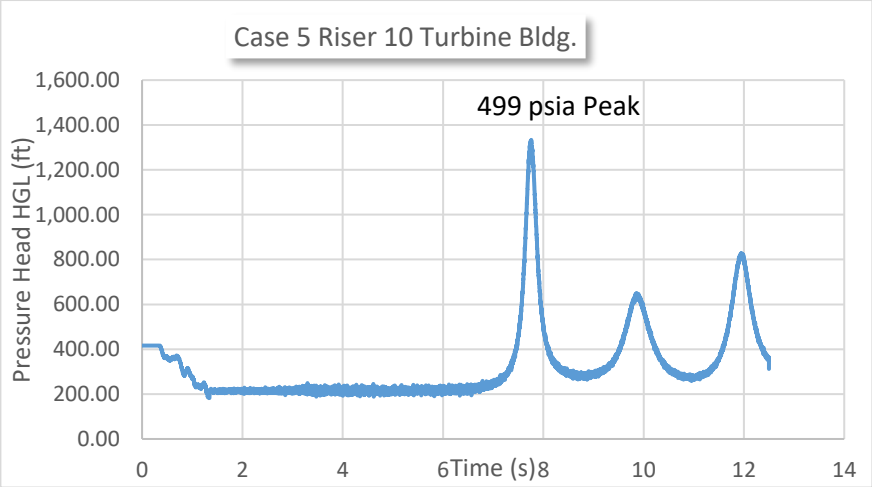



Figure 13: Case 5 Pressure Time History Plot for Riser # 10

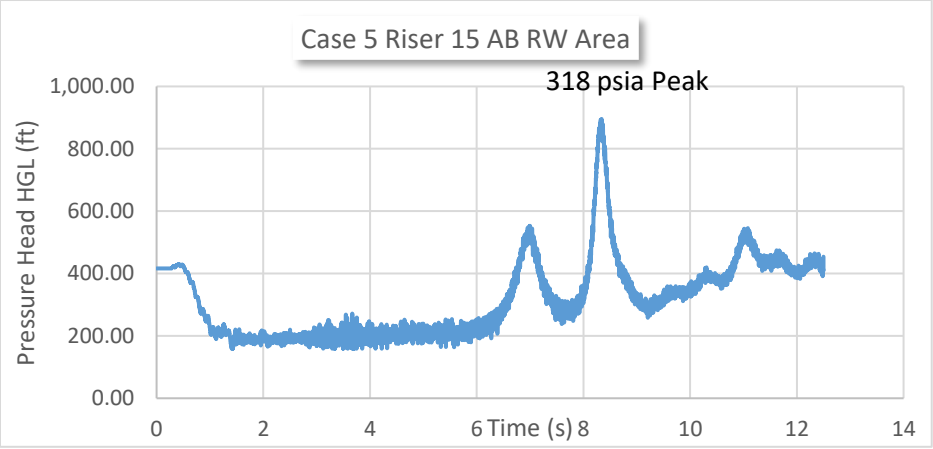



Figure 14: Case 5 Pressure Time History Plot for Riser # 15

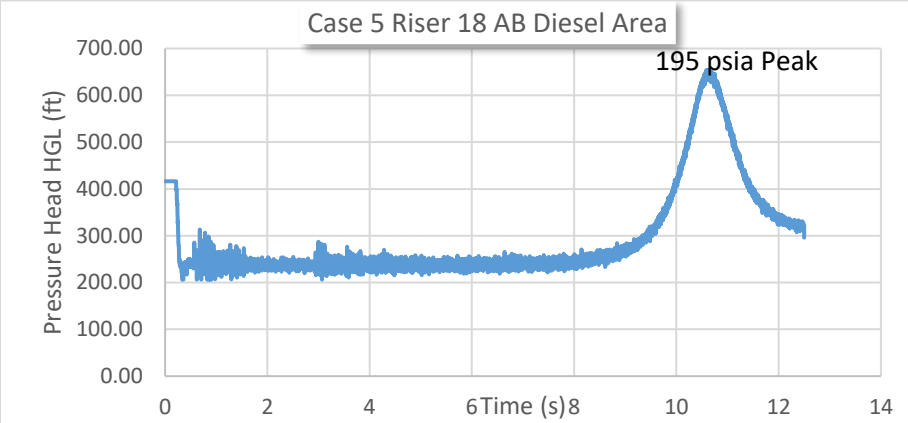



Figure 15: Case 5 Pressure Time History Plot for Riser # 18

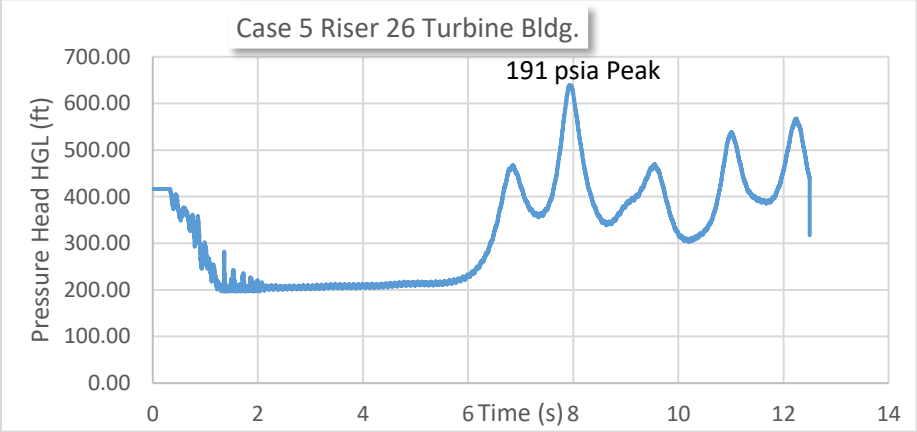



Figure 16: Case 5 Pressure Time History Plot for Riser # 26

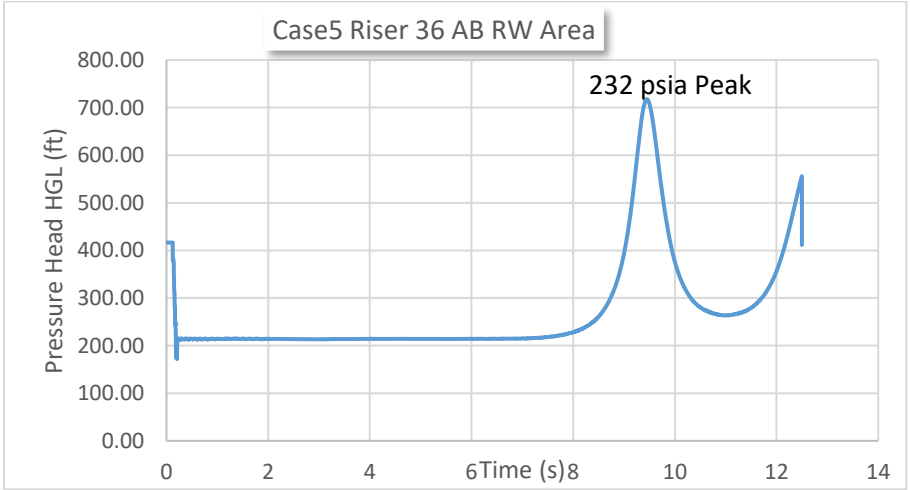



Figure 17: Case 5 Pressure Time History Plot for Riser # 36

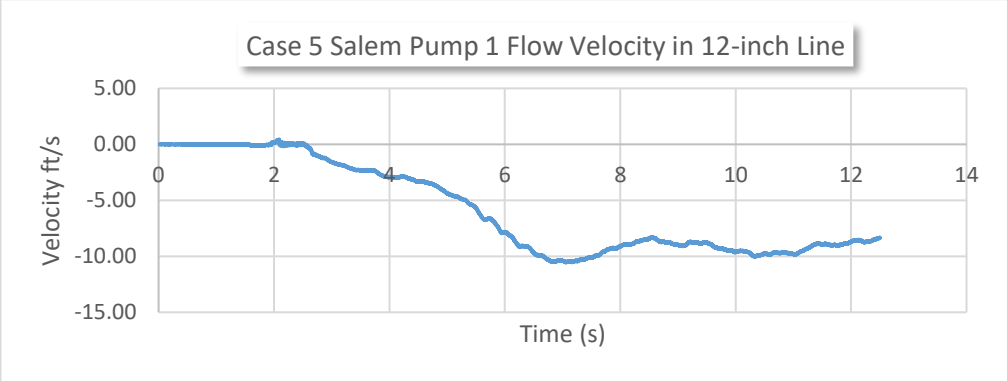



Figure 18: Case 5 Velocity Time History Plot at Salem Pump 1

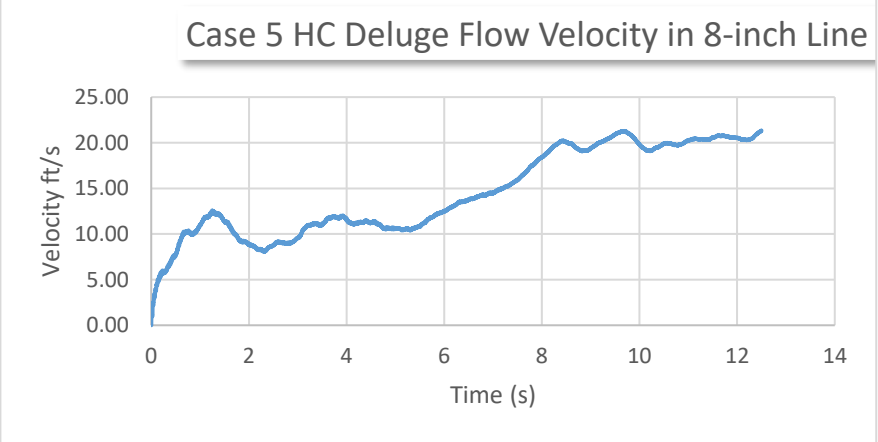



Figure 19: Case 5 Velocity Time History Plot at Deluge Valve

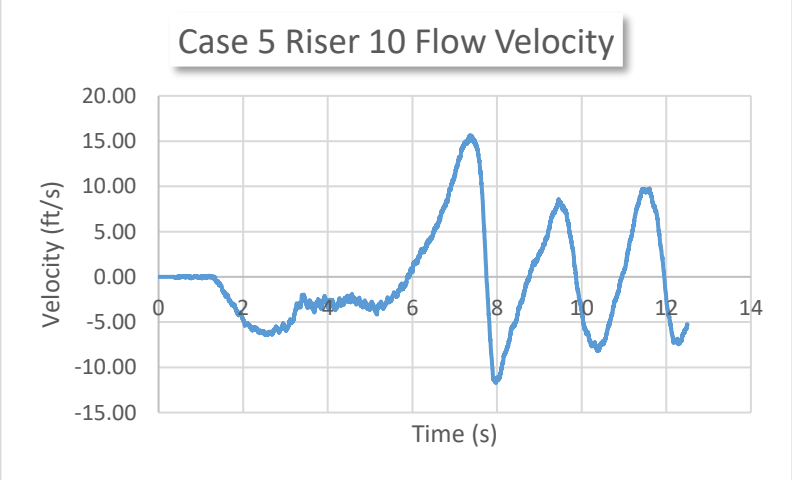


Figure 20: Case 5 Velocity Time History Plot for Riser #10

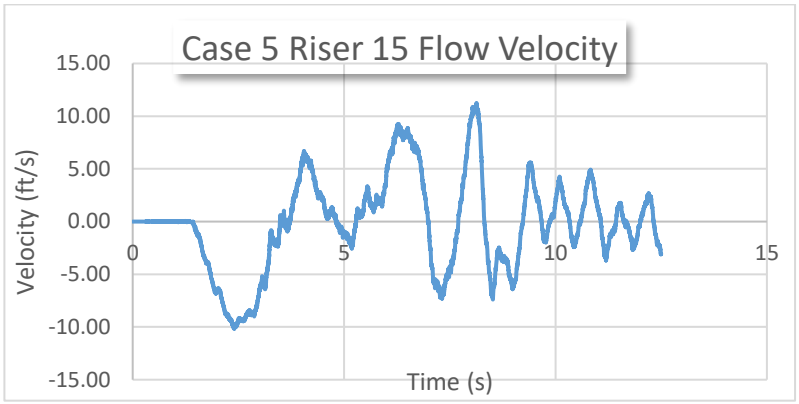



Figure 21: Case 5 Velocity Time History Plot for Riser #15

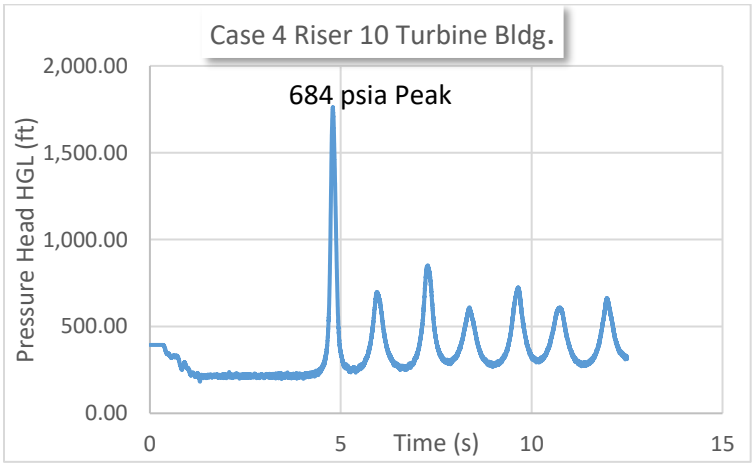



Figure 22: Case 4 Pressure Time History Plot for Riser # 10

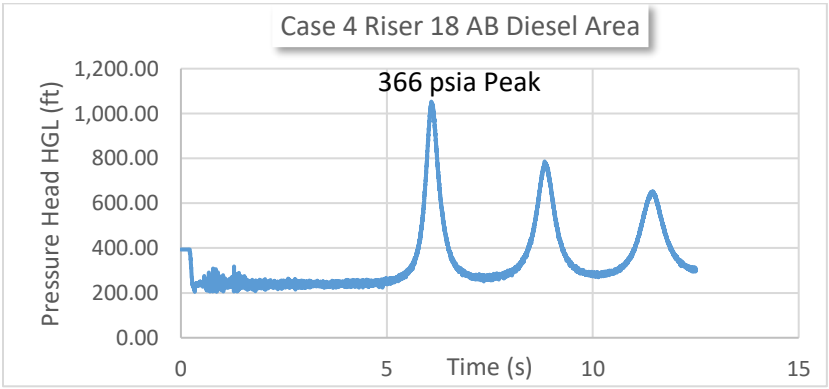



Figure 23: Case 4 Pressure Time History Plot for Riser # 18

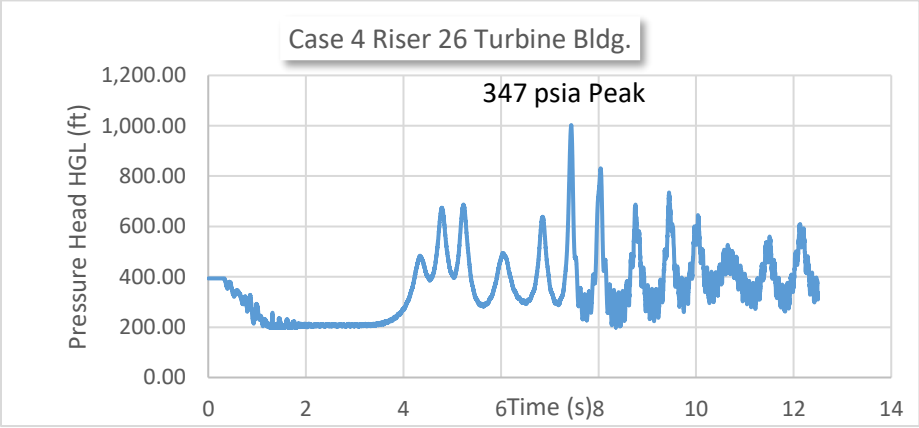



Figure 24: Case 4 Pressure Time History Plot for Riser # 26

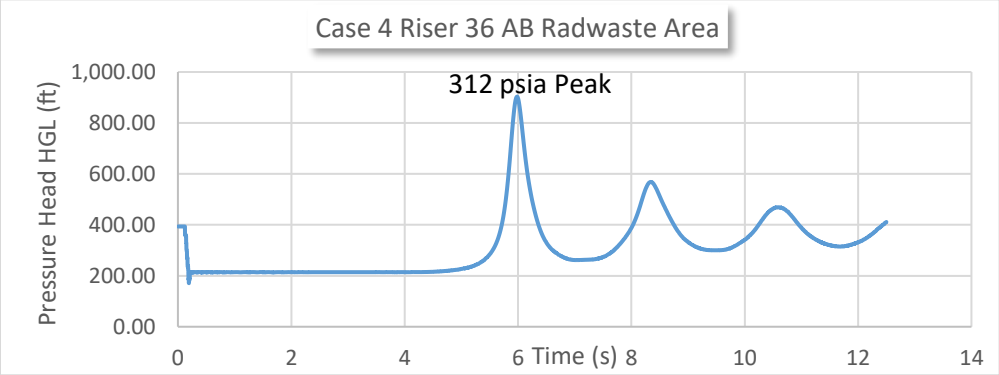



Figure 25: Case 4 Pressure Time History Plot for Riser # 36

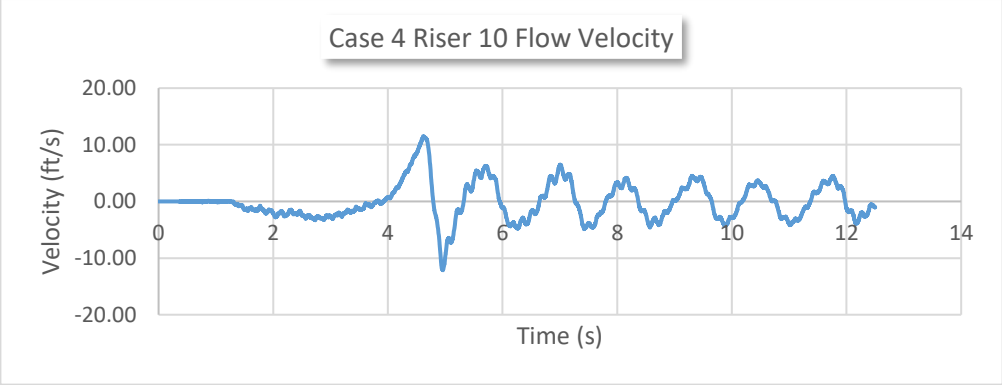



Figure 26: Case 4 Velocity Time History Plot for Riser #10

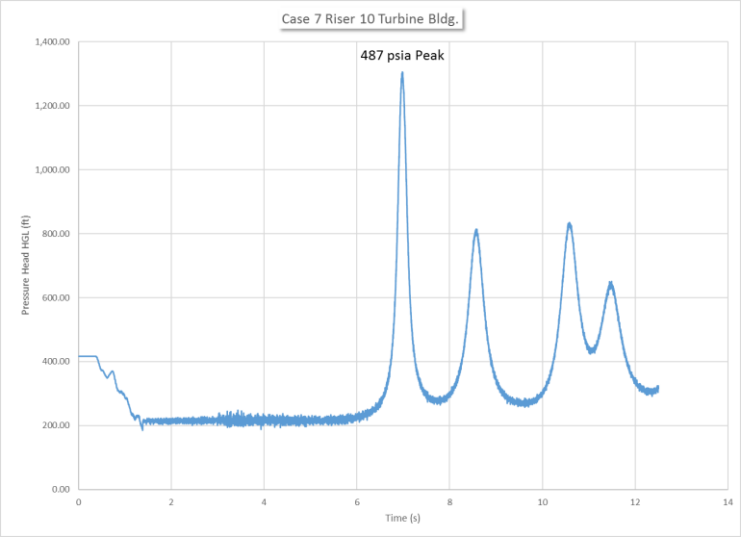



Figure 27: Case 7 Pressure Time History Plot for Riser # 10

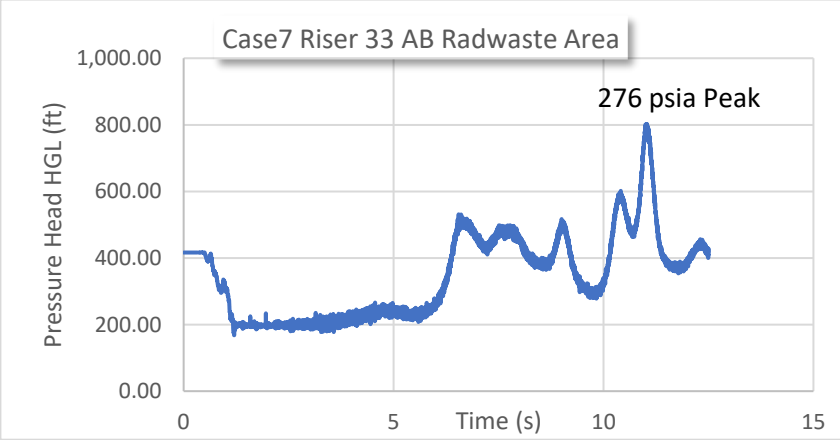



Figure 28: Case 7 Pressure Time History Plot for Riser # 33

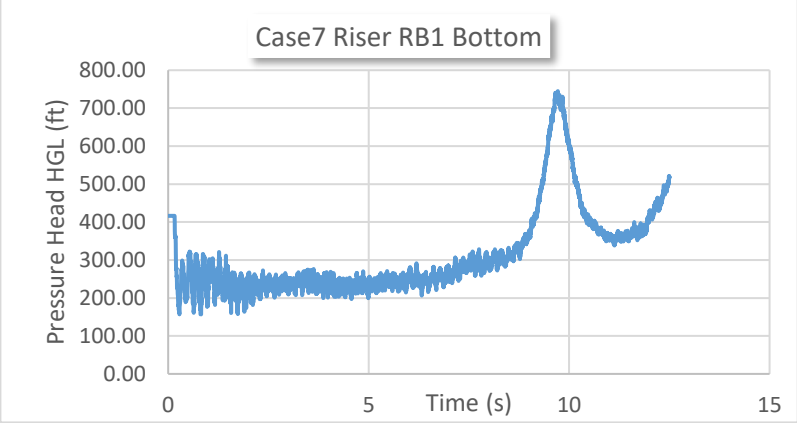


Figure 29: Case 7 Pressure Time History Plot for Riser # RB1

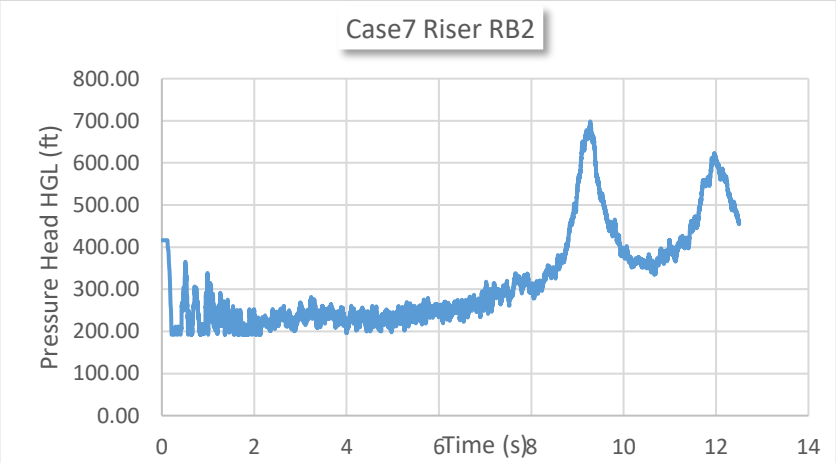



Figure 30: Case 7 Pressure Time History Plot for Riser # RB2

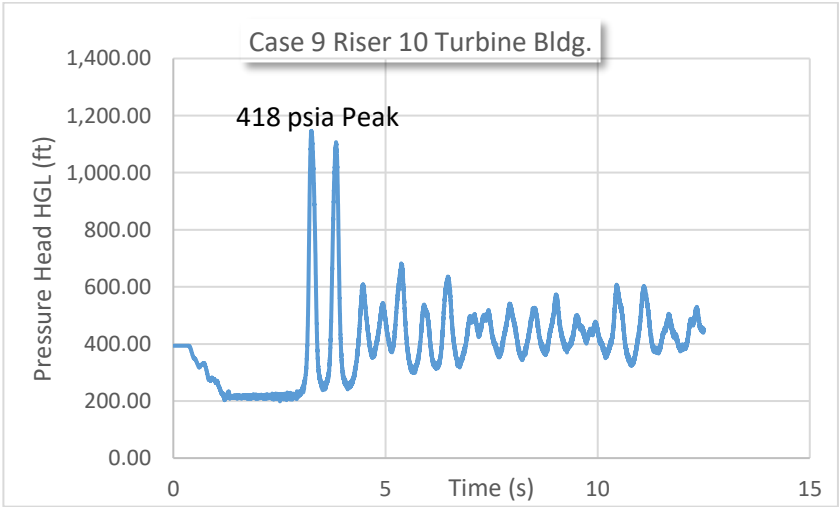



Figure 31: Case 9 Pressure Time History Plot for Riser # 10

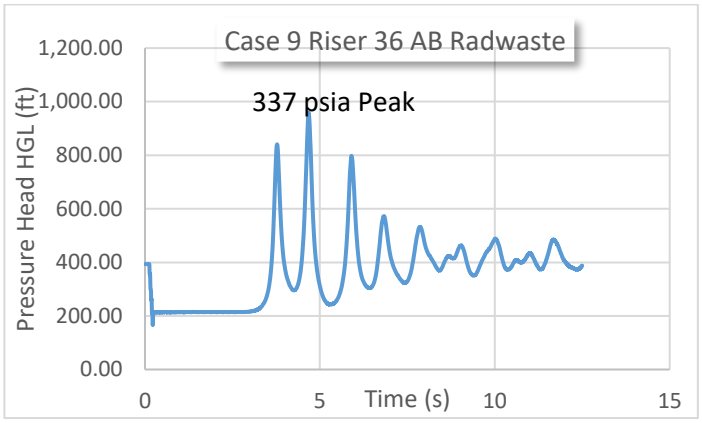



Figure 32: Case 9 Pressure Time History Plot for Riser # 36

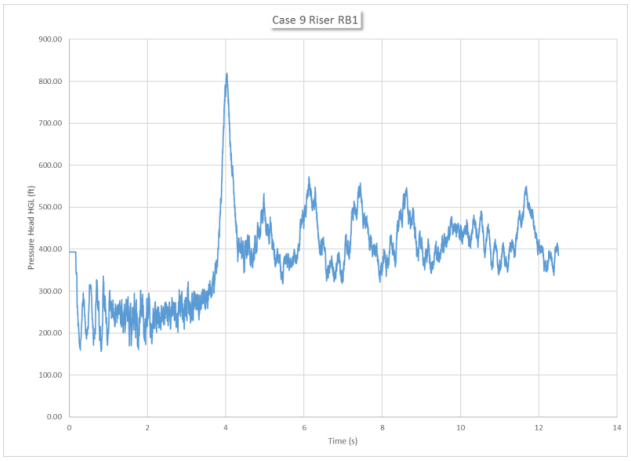



Figure 33: Case 9 Pressure Time History Plot for Riser # RB1

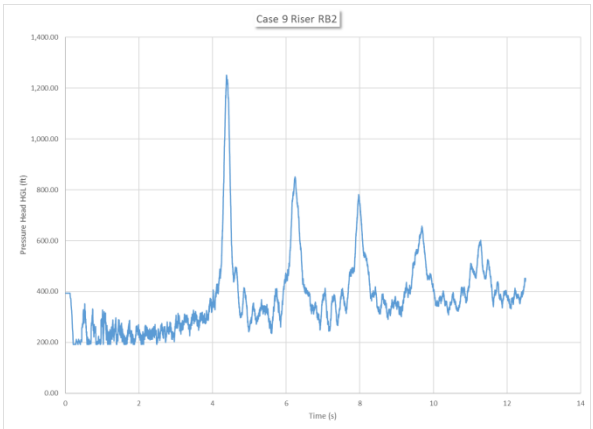



Figure 34: Case 9 Pressure Time History Plot for Riser # RB2

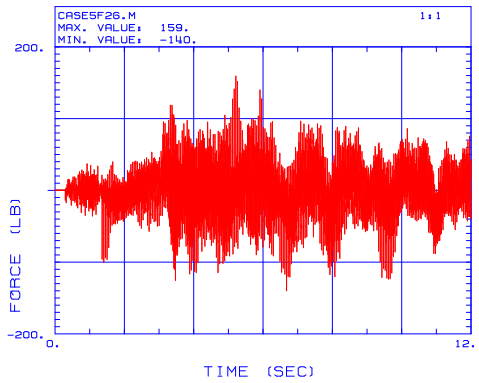



Figure 35: Force Time History Plot for Case 5 TB Riser # 26 (Segment 1)

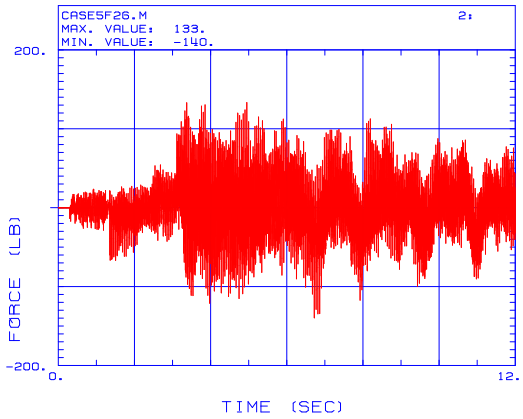



Figure 36: Force Time History Plot for Case 5 TB Riser # 26 (Segment 2)

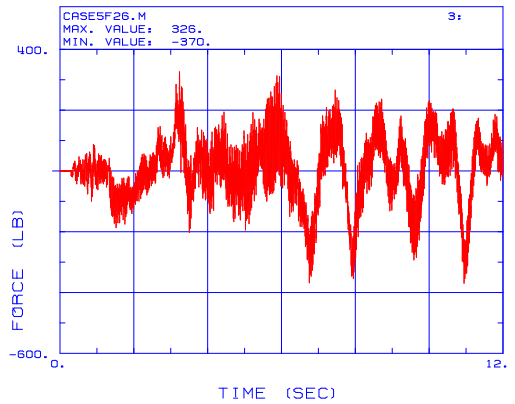



Figure 37: Force Time History Plot for Case 5 TB Riser # 26 (Segment 3)

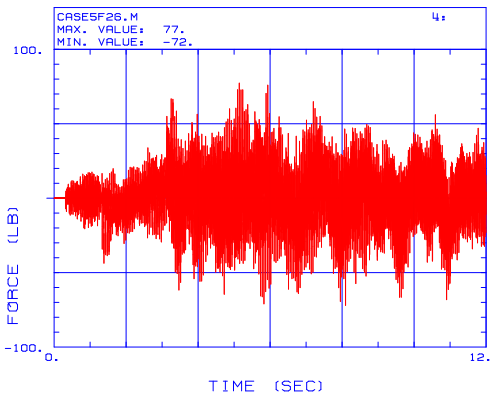



Figure 38: Force Time History Plot for Case 5 TB Riser # 26 (Segment 4)

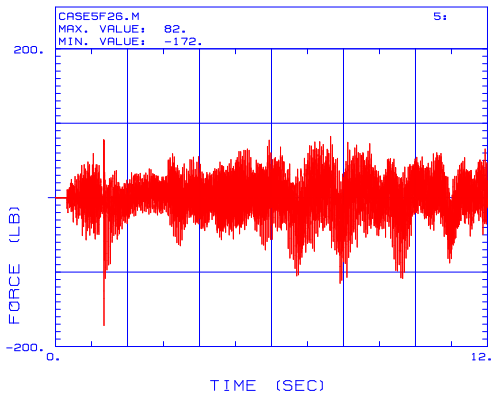



Figure 39: Force Time History Plot for Case 5 TB Riser # 26 (Segment 5)

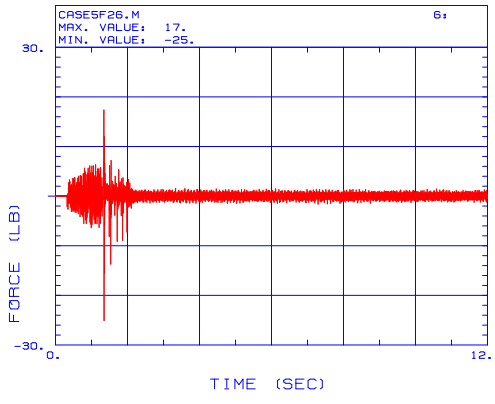



Figure 40: Force Time History Plot for Case 5 TB Riser # 26 (Segment 6)

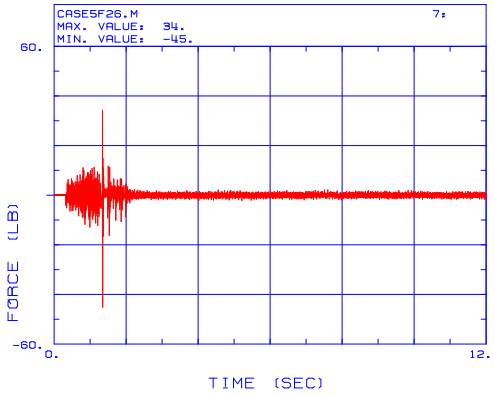



Figure 41: Force Time History Plot for Case 5 TB Riser # 26 (Segment 7)

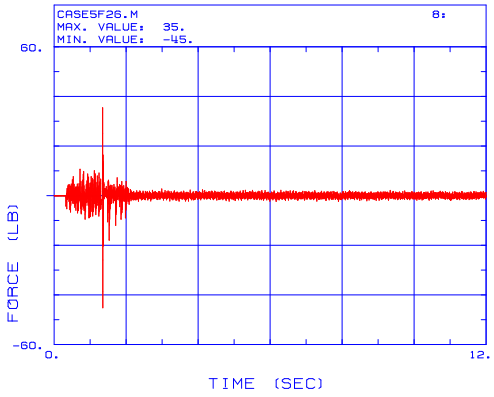



Figure 42: Force Time History Plot for Case 5 TB Riser # 26 (Segment 8)

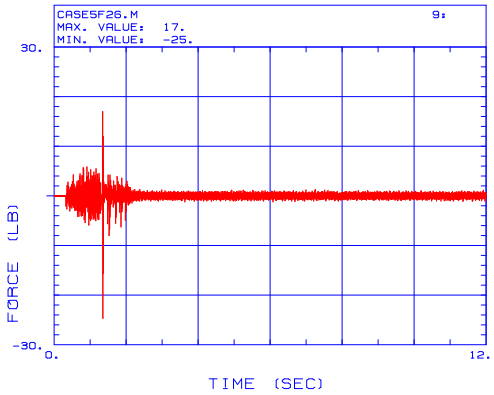



Figure 43: Force Time History Plot for Case 5 TB Riser # 26 (Segment 9)

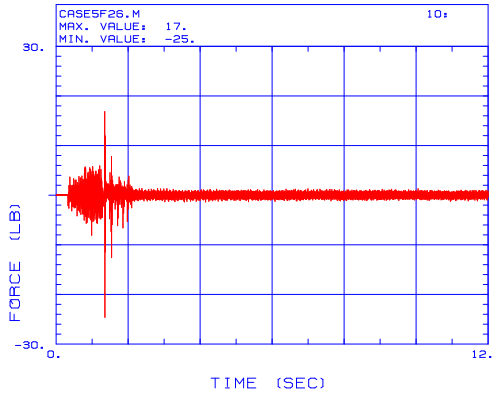



Figure 44: Force Time History Plot for Case 5 TB Riser # 26 (Segment 10)

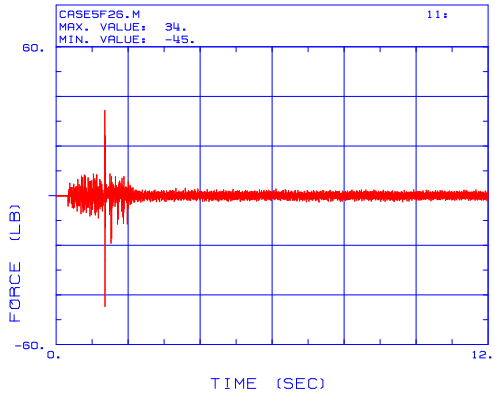



Figure 45: Force Time History Plot for Case 5 TB Riser # 26 (Segment 11)

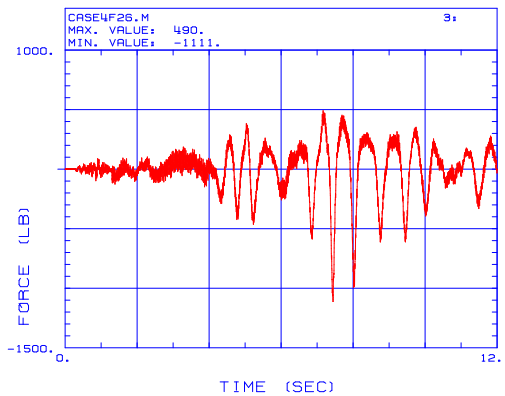



Figure 46: Force Time History Plot for Case 4 TB Riser # 26 (Segment 3)

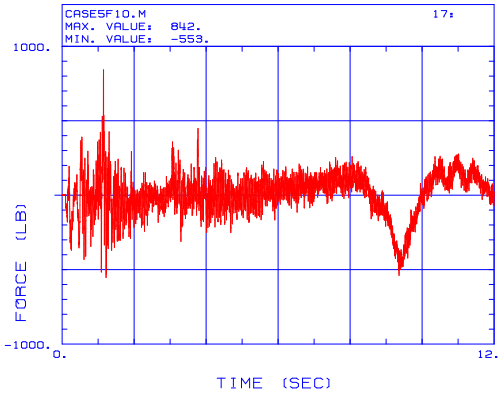



Figure 47: Force Time History Plot for Case 5
RW Riser # 36 (Segment 17)

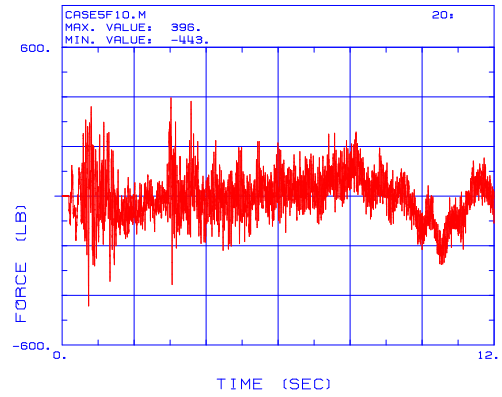



Figure 48: Force Time History Plot for Case 5
TB Riser # 18 (Segment 20)

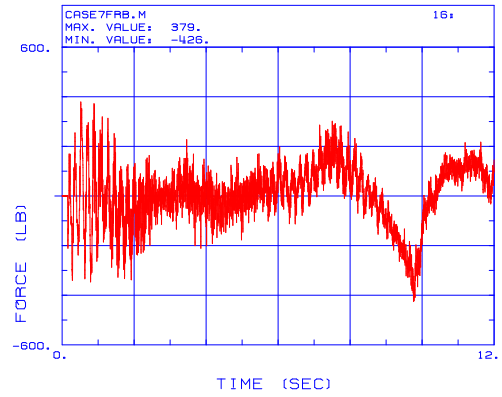



Figure 49: Force Time History Plot for Case 7
Reactor Building Riser # RB1 (Segment 16)

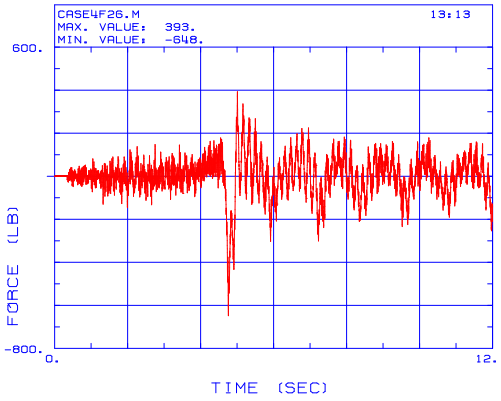



Figure 50: Force Time History Plot for Case 4
TB Riser # 10 (Segment 13)

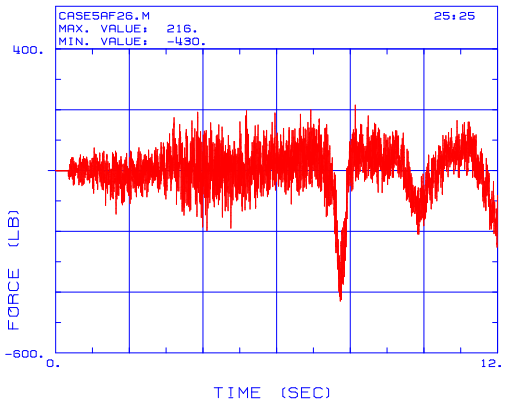



Figure 51: Force Time History Plot for Case 5
TB Riser # 10 (Segment 25)

# CALCULATION SHEET

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|---|---|---|---|
| Project: | HOPE CREEK GENERATING STATION | Job Number: | 8038 |
| Calc No. | 8038-P0004 | Sheet No. | 64 |
| By: | A Arastu Date: 9/14/18 | Rev. No. | 1 |
| Subject: | Water Hammer Analysis of the HCGS Fire Protection System | | |

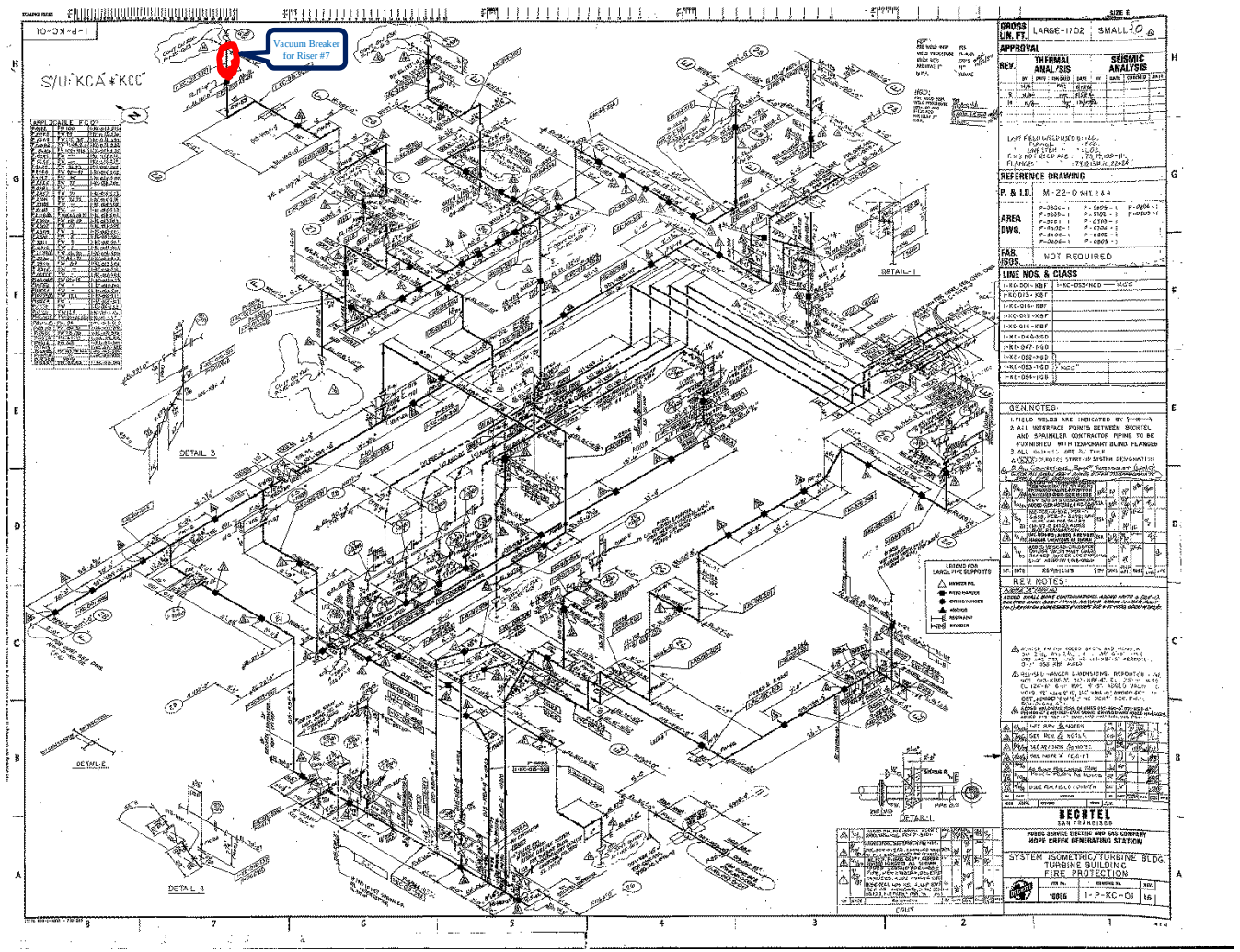


Figure 52: Vacuum breaker Location in Riser # 7

# CALCULATION SHEET

| | | | |
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| Project: | HOPE CREEK GENERATING STATION | Job Number: | 8038 |
| Calc No. | 8038-P0004 | Sheet No. | 65 |
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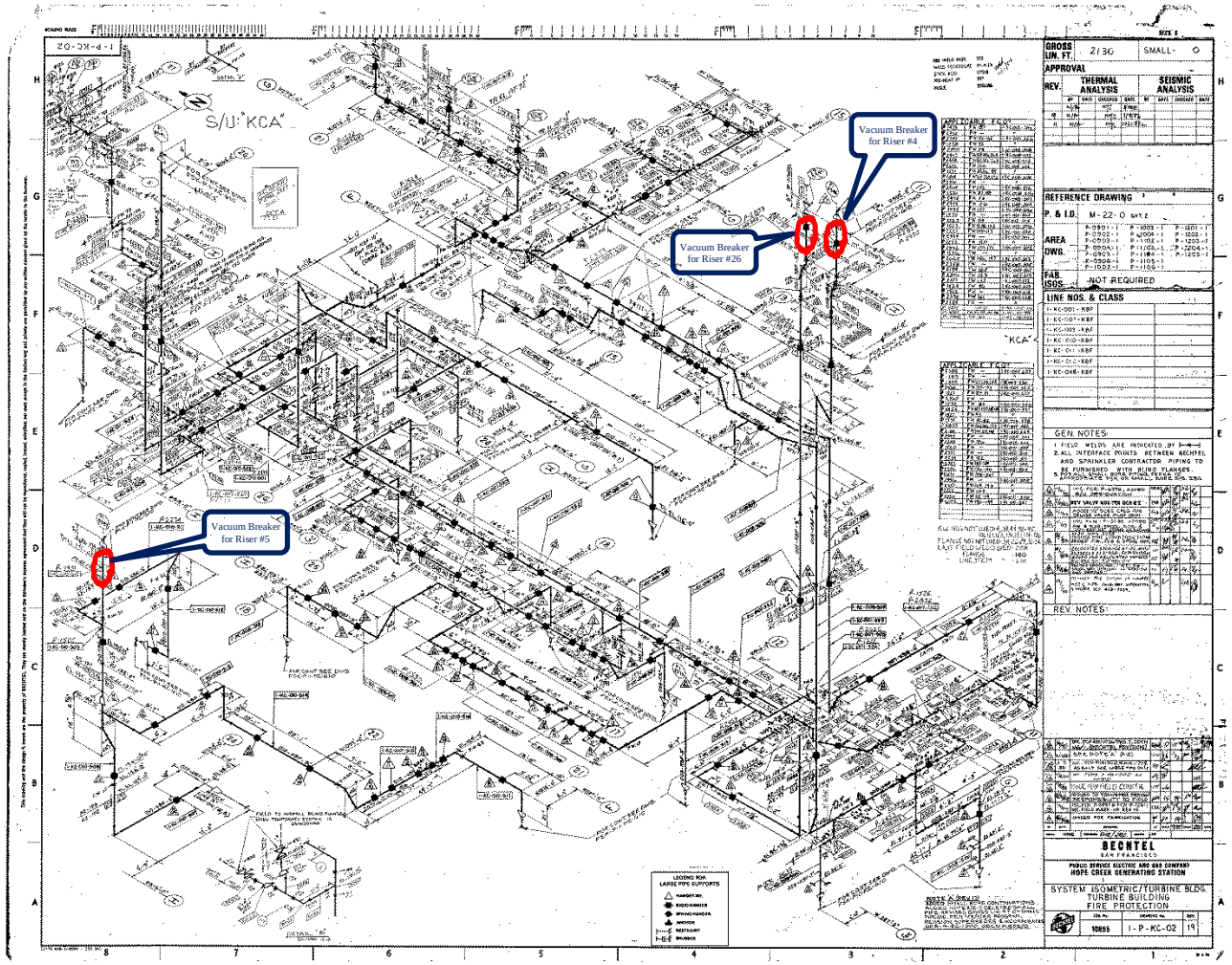


Figure 53: Vacuum breaker Location in Risers # 4, 5, and 26

# CALCULATION SHEET

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| Project: | HOPE CREEK GENERATING STATION | Job Number: | 8038 |
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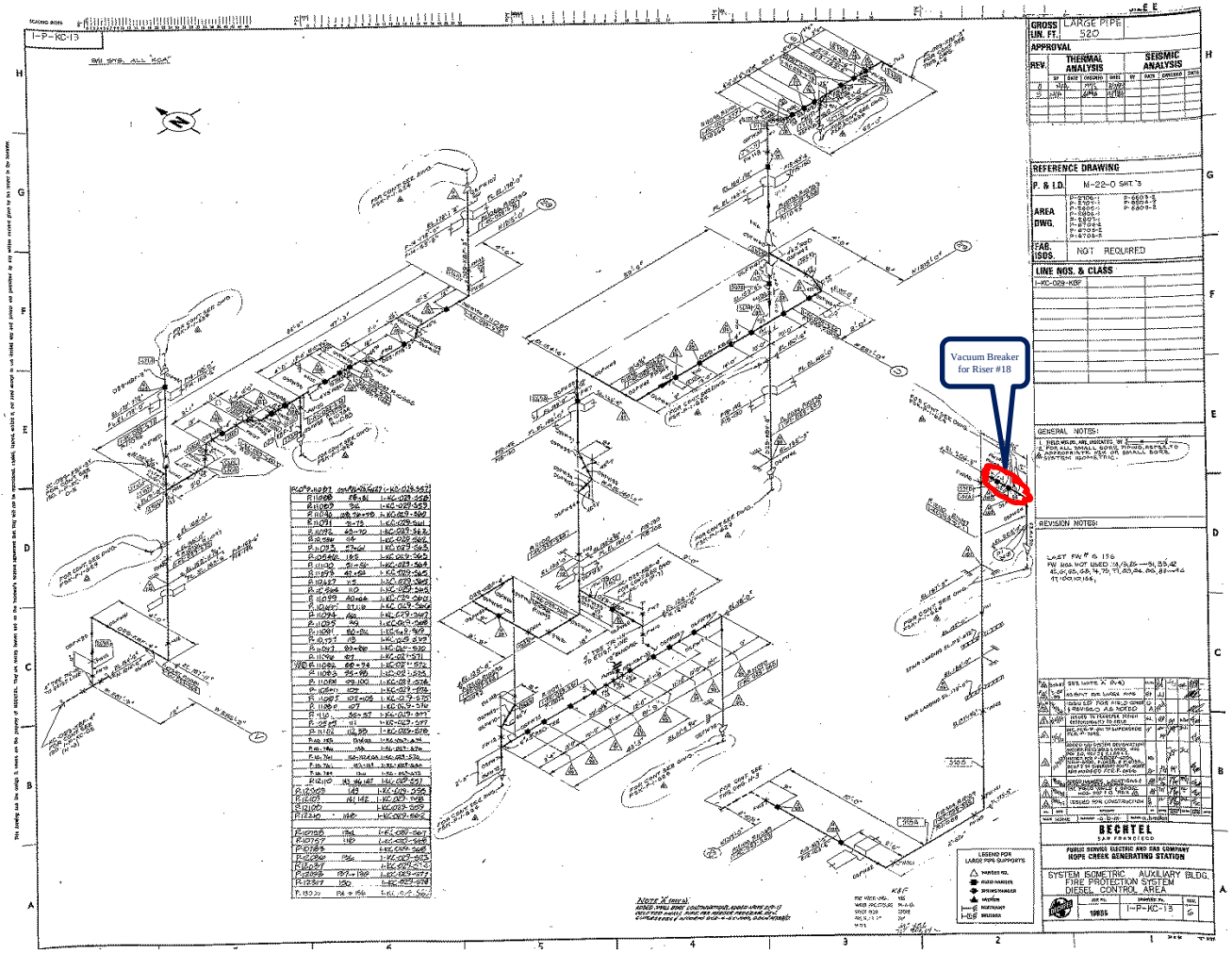


Figure 54: Vacuum breaker Location in Riser # 18

# CALCULATION SHEET

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|---|---|---|---|
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| By: | A Arastu Date: 9/14/18 | Rev. No. | 1 |
| Subject: | Water Hammer Analysis of the HCGS Fire Protection System | | |

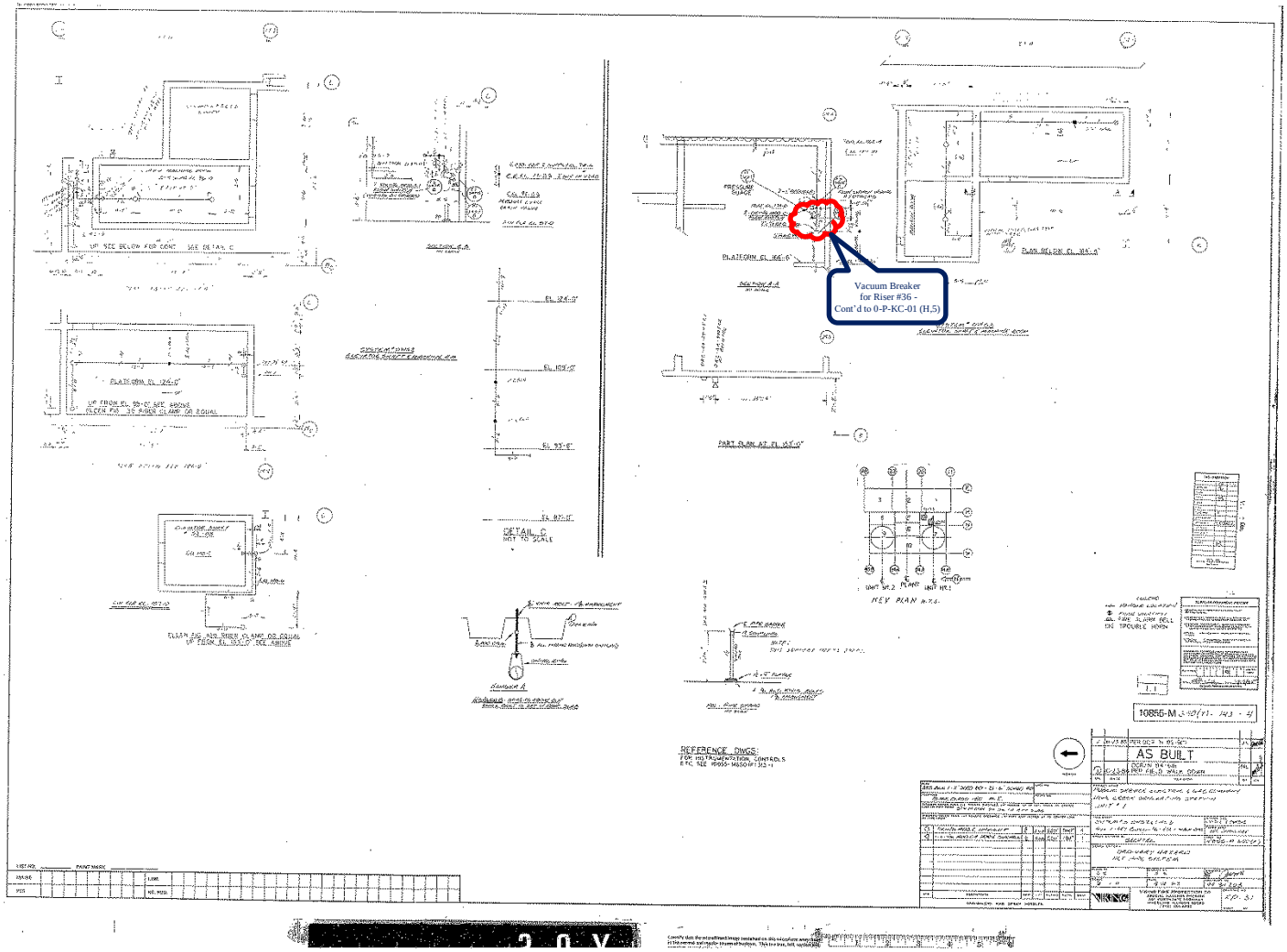


Figure 55: Vacuum breaker Location in Riser # 36

# CALCULATION SHEET

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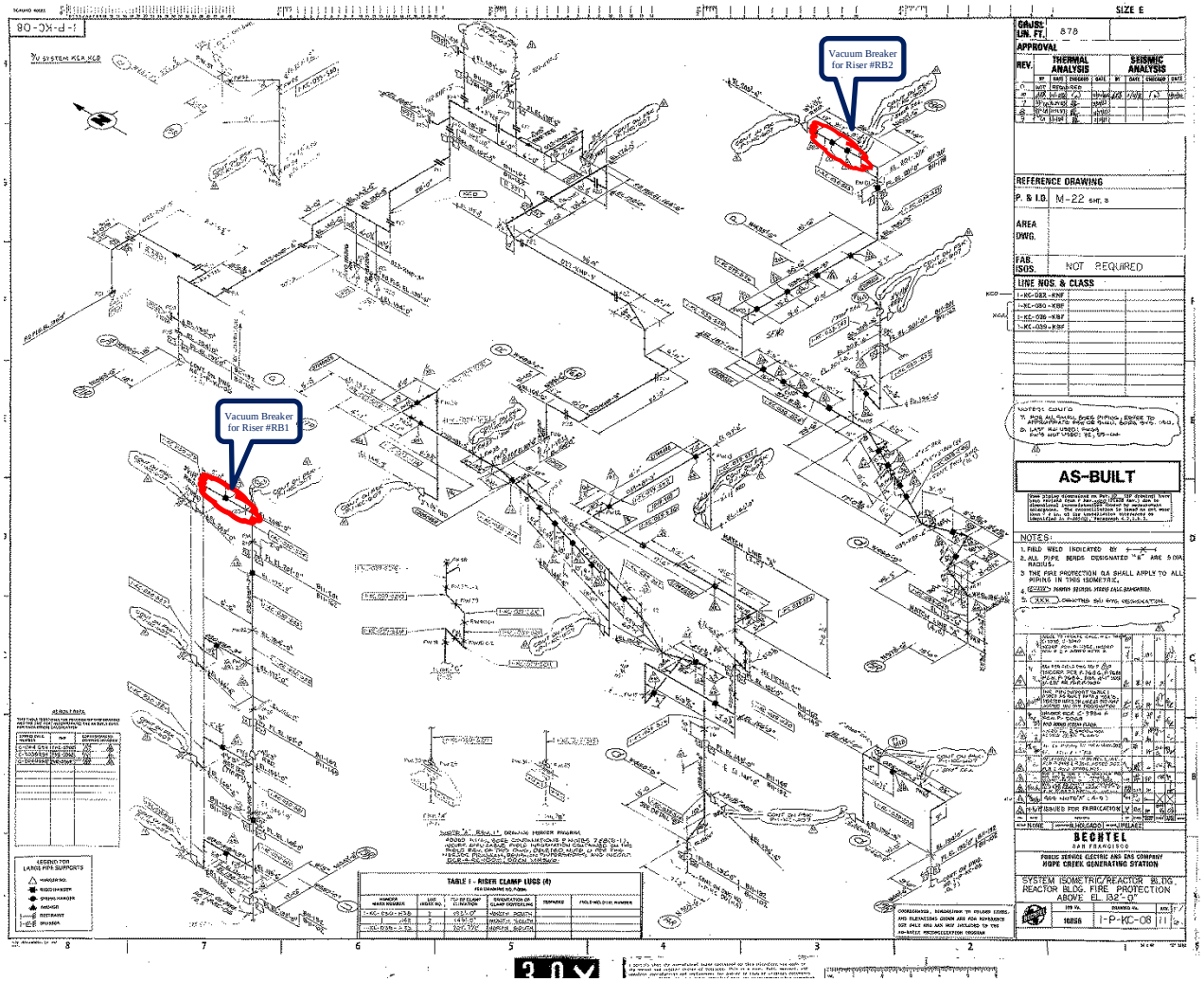


Figure 56: Vacuum breaker Location in Riser # RB1 and RB2

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# CALCULATION SHEET

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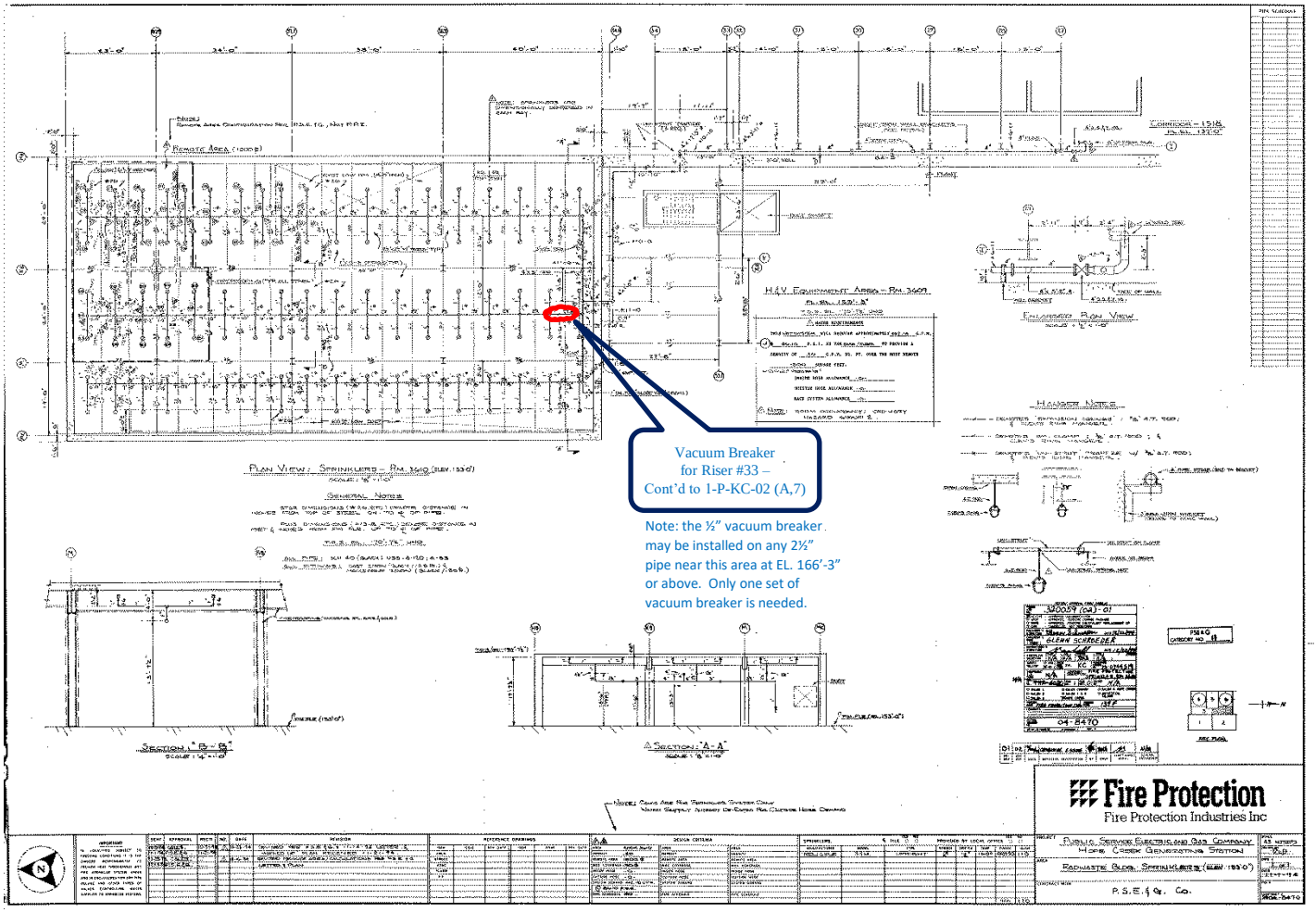


Figure 57: Vacuum breaker Location in Riser # 33

# CALCULATION SHEET

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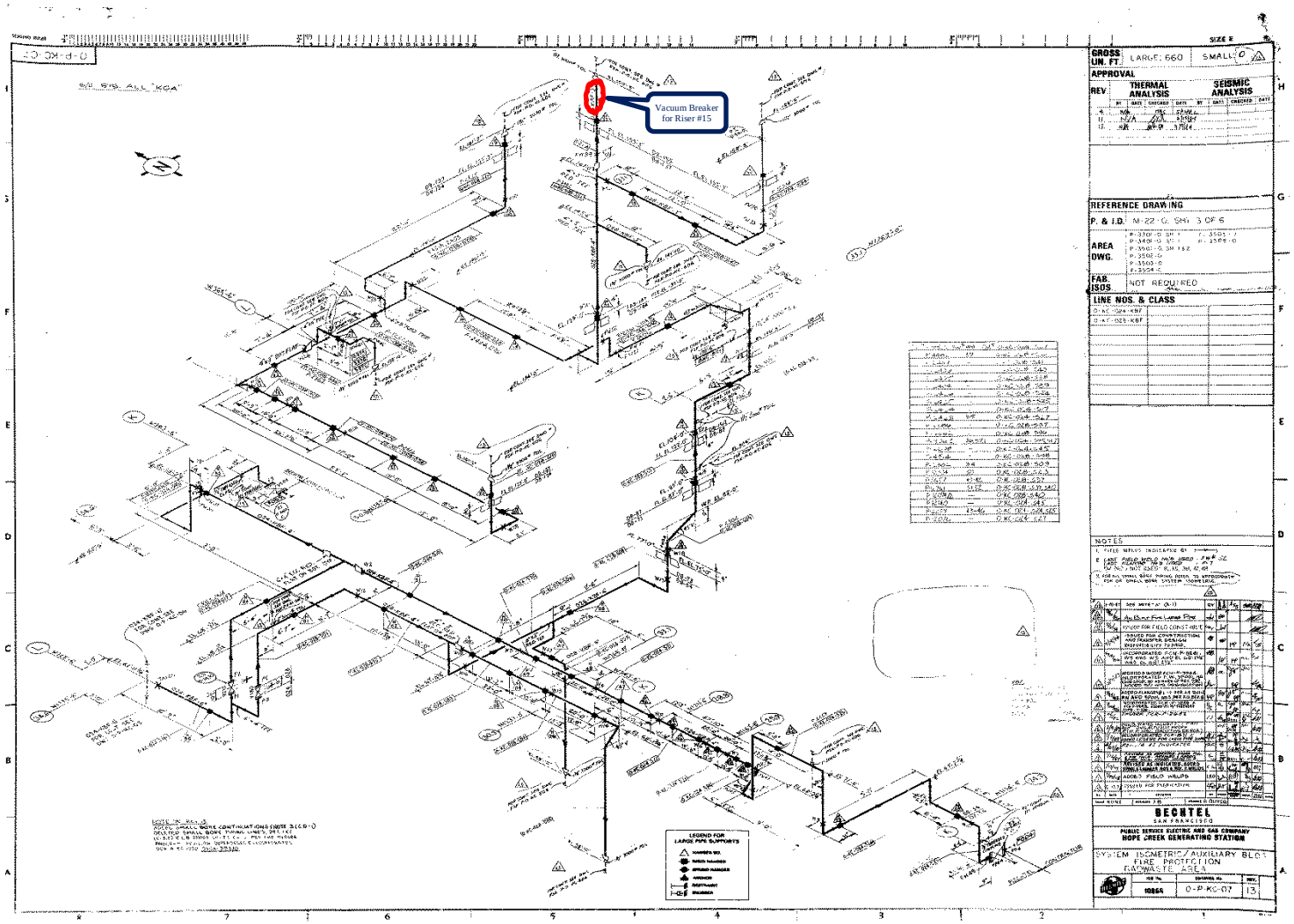


Figure 58: Vacuum breaker Location in Riser # 15

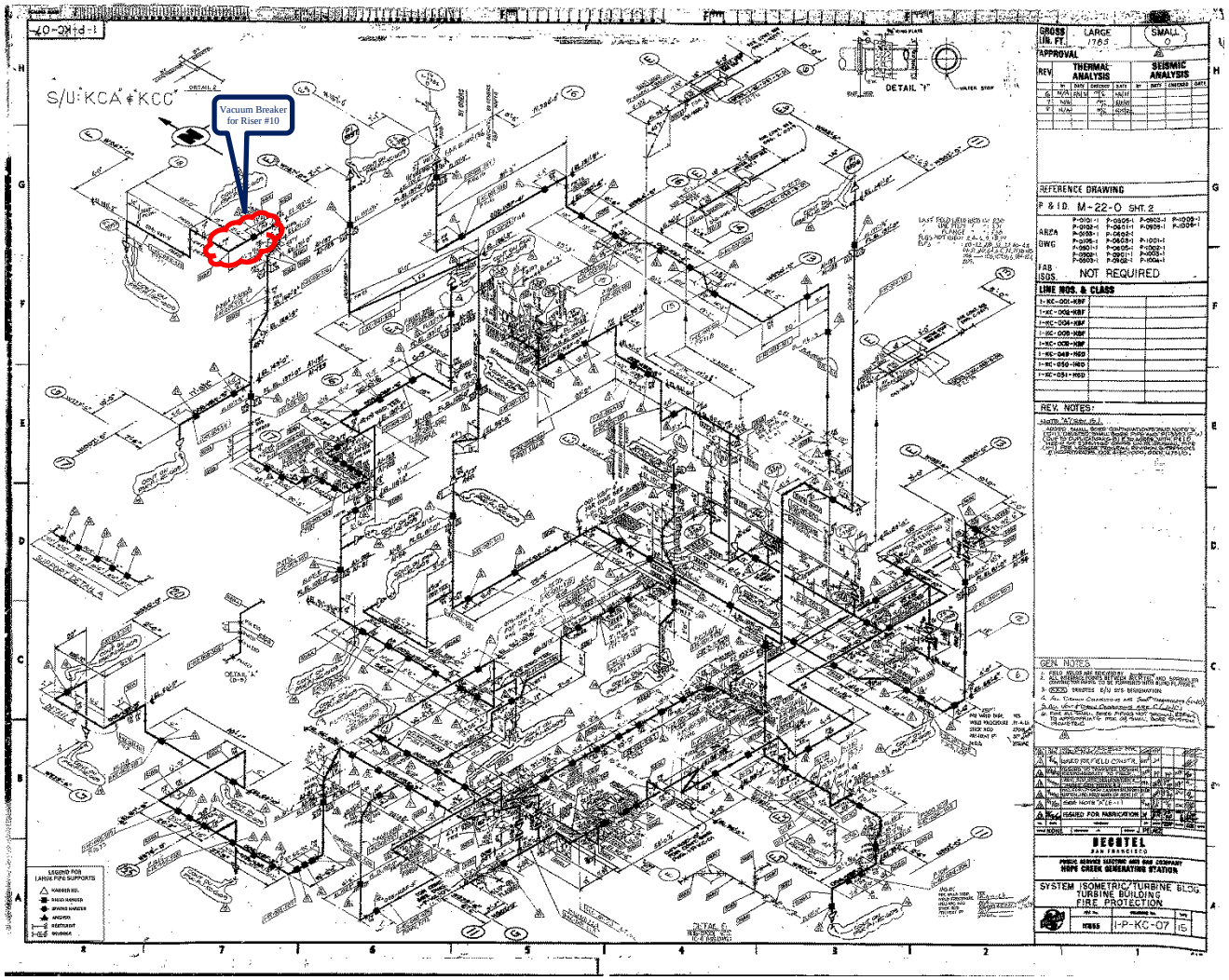


Figure 59: Vacuum breaker Location in Riser # 10

# 5 COMPUTER PROGRAM VERIFICATION

The USLAM computer runs for this calculation were made on an IBM compatible Personal Computer. This PC is a Dell model Optiplex 330, Pentium Dual CPU processor E2140 @ 1.60 GHz and 1.98 GB of Ram. It has a 160 Gigabyte hard drive. Its operating system is Windows XP. Validation of this computer for use with USLAM was performed by running all the USLAM Validation Cases before the HCGS cases were run. The complete set of verification runs of USLAM Release 2 was performed on February, 3, 2017. Before running the USLAM computer program, this computer was turned on and successful completion of the POST (**P**ower **on S**elf-**T**est) was observed.

# 6 CONCLUSIONS

The USLAM phase I&II results pointed to the need for mitigation measures to reduce the water hammer loads (Reference 3). Very large forces and surge pressures were calculated in Reference 3 analysis. Vacuum breakers are considered for this mitigation purpose in this calculation. The USLAM computer code was used for the mitigation analysis document here. Through iterative USLAM runs it was determined that a minimum of eleven (11) half-inch vacuum breakers installed at the locations shown in Table 10 below (before dead ends and near high points preferably in larger diameter pipe– exact locations near the high points are not critical unless stated) would reduce the water hammer loads to within acceptable limits (as documented in References 25 and 26):

**Table 10: Vacuum Breaker Locations**

| Riser Number | Building | Valve ID | Approx. Elevation (ft) | Pipe Diameter (in) | Ref. Elevation Diagram Figure No. | Figure Number showing Proposed Vacuum Breaker Location on drawing |
|---|---|---|---|---|---|---|
| 18 | AB Diesel Area | V044 | 206 | 3 | 3 | 54 |
| 15 | AB Radwaste Area | V180 | 159 | 3 | 8 | 58 |
| 4 | Turbine | V060 | 176 | 3 | 2 | 53 |
| 26 | Turbine | V011 | 198 | 3 | 2 | 53 |
| 36 | AB Radwaste Area | V062 | 173 | 3 | 4 | 55 |
| 5 | Turbine | V058 | 176 | 3 | 2 | 53 |
| 7 | Turbine | V054 | 176 | 3 | 9 | 52 |
| 10 | Turbine | V059 | 182 | 3 | 10 | 59 |
| 33 | AB Radwaste Area | V430 | 167 | 2.5 | 7 | 57 |
| RB1 | Reactor | V038 | 208 | 3 | 5 | 56 |
| RB2 | Reactor | V212 | 205 | 3 | 6 | 56 |

Tables 7 and 8 give the calculated peak pressures in risers with and without vacuum breakers. The selection of vacuum breaker locations was done by targeting the tallest risers first and then eliminating the ones that are less effective. To ensure that the selected number and locations of the vacuum breakers is satisfactory, maximum peak pressures in all risers higher than 150 feet not having vacuum breakers are listed in Table 8. The largest peak pressures in this table are much smaller than that in Table 7 with vacuum breakers.

Therefore, one can conclude that the number and location of vacuum breakers in the HCGS model are adequate.

As per the scope of work (References 2 and 4), force time histories were generated for the riser piping for the following situations:

- Forces on the pipe segments leading to Turbine Building Riser # 26 for follow-up structural analysis.
- Forces on the pipe segments leading to Reactor Building Riser # RB1 for follow-up structural analysis.

Further, forces were generated on miscellaneous pipe segments in other high risers to make sure that the expected bounding case risers (TB#26 and RB1) from the previous analysis without vacuum breakers are still the bounding ones with vacuum breakers.

Table 9 gives a summary of the USLAM calculated peak forces in various high elevation risers in the HCGS FPS with vacuum breakers modeled confirming that the bounding case risers are #26 and RB1 for which follow-up structural analyses were performed (References 25 and 26). The use of 11 vacuum breakers is shown to mitigate the water hammer as per the analysis in References 25 and 26.

The vacuum breakers chosen are ½-inch nominal size. Johnson Corporation manufactures these vacuum breakers and their component data was used for this analysis. It should be noted that vacuum breakers by other manufacturers with similar data can be used to mitigate water hammer. The results are not highly sensitive to the vacuum breaker data if a similar vacuum breaker size and configuration is used in the FPS.

# 7 REFERENCES

1) Technical Evaluation No. 70069535-0010, "If Hope Creek Fire Water system is Susceptible to Waterhammer and if so then Propose System Modifications", dated October 23, 2009.

2) PSEG Purchase Order 4500861893.

3) Hope Creek Generating Station Summary Report TR-61893-160130R0, Water Hammer Evaluation of the Fire Protection System, Phases I & II, Unisont Engineering Inc., April 21, 2016.

4) PSEG Purchase Order 4500861893 Change Order

5) PSEG Specification No. D3.22, "Design, Installation, and Test Specification for Fire Protection System for the Hope Creek Generating Station", Revision 7.

6) Typical Design Information Transmittal Nos. H-TODI-2015-0023, dated May 19, 2015 and H-TODI-2015-0023 (Addendum 1), dated July 17, 2015.

7) USLAM User's Manual, Rev. 2

8) P&ID drawings:

   M-22-0 Sheet 1, Rev. 30, "HCGS, Fire Protection Fire Water System – Permanent & Temporary Fire Pumphouse"

   M-22-0 Sheet 2, Rev. 33, "HCGS, Fire Protection Fire Water System – Turbine Building"

   M-22-0 Sheet 3, Rev. 36, "HCGS, Fire Protection Fire Water System – Reactor and Auxiliary Buildings"

   M-22-0 Sheet 4, Rev. 12, "HCGS, Fire Protection - Fire Water System Details"

   M-22-0 Sheet 6, Rev. 23, "HCGS, Fire Protection - Fire Water and Foam System Details"

   M-22-0 Sheet 7, Rev. 24, "HCGS, Fire Protection - Fire Water System Details"

   205222 A 8760-62 Sheet 4, Rev. 62, "Salem Nuclear Generating Station, Fire Protection"

9) Isometric drawings:

   0-P-KC-01, Rev. 17, "Auxiliary Bldg. Fire Protection, Aux. Bldg. – South Service & R/W Area, Below El. 87'0"

0-P-KC-02, sh 1, Rev. 19, "Auxiliary Bldg. Fire Protection, Aux. Bldg. – South Service & R/W Area, Above El. 87'0"

0-P-KC-05, Rev. 13, "Auxiliary Bldg. Fire Protection, Control and Radwaste Area"

0-P-KC-06, Rev. 10, "Auxiliary Bldg. Fire Protection, Radwaste Area"

0-P-KC-07, Rev. 13, "Auxiliary Bldg. Fire Protection, Radwaste Area"

0-P-KC-018, Rev. 4, "Auxiliary Bldg. Fire Protection, Radwaste Area"

1-P-KC-05, sh 1, Rev. 23, "Auxiliary Bldg. Fire Protection, Diesel Control Area"

1-P-KC-05, sh 2, Rev. 0, "Auxiliary Bldg. Fire Protection, Service Area & Control D/G Area"

1-P-KC-17, sh 1, Rev. 6, "Auxiliary Bldg. Fire Protection, Diesel Control Area"

1-P-KC-01, Rev. 16, "Turbine Building Fire Protection"

1-P-KC-02, Rev. 19, "Turbine Building Fire Protection"

1-P-KC-07, Rev. 15, "Turbine Building Fire Protection"

1-P-KC-09, Rev. 6, "Turbine Building Fire Protection"

1-P-KC-15, Rev. 7, "Turbine Building Fire Protection"

1-P-KC-16, Rev. 5, "Turbine Building Fire Protection"

0-P-KC-04, Rev. 12, "Fire Pump House Fire Protection System"

1-P-KC-03, Rev. 16, "Reactor Building Fire Protection, Below El. 102'-0"

1-P-KC-06, Rev. 14, "Reactor Building Fire Protection, El. 102'-0"

1-P-KC-08, Rev. 11, "Reactor Building Fire Protection, Above El.132'-0"

10) Civil drawings:

C-0019-0, Rev. 25, "HGCS Fire Protection System Plan"

C-0055-0, Rev. 22, "HCGS Yard Piping Area B5"

C-0056-0, Rev. 24, "HCGS Yard Piping Area B6"

C-0057-0, Rev. 8, "HCGS Yard Piping Area B7"

C-0059-0, Rev. 33, "HCGS Yard Piping Area C5"

C-0060-0, Rev. 27, "HCGS Yard Piping Area C6"

C-0061-0, Rev. 21, "HCGS Yard Piping Area C7"

C-0063-0, Rev. 25, "HCGS Yard Piping Area D5"

C-0064-0, Rev. 22, "HCGS Yard Piping Area D6"

C-0065-0, Rev. 18, "HCGS Yard Piping Area D7"

C-0079-0, Rev. 11, "HCGS Typical Yard Piping Detail Sh 1"

218723 A8921, Sheet-2, Rev. 17, "Salem Yard, Fresh Water & Fire Protection Piping Arrangement"

212823 A8881, Sheet 1, Rev. 15, "Salem Fire Pump House, Fire Protection Pumps & Piping Arrangement"

212823 A8881, Sheet 2, Rev. 1, "Salem Fire Pump House, Fire Protection Pumps & Piping Arrangement"

Sketch of HCGS/Salem Cross-tie in Yard Area D7, dated 08-08-2009.

11) Viking Fire Water Piping drawings:

VTD PM650F-0143, Rev. 4 (Viking Drawing No.: FP-31), "Systems 0WS2 and 0WS3, Auxiliary Bldg. Elevator Machine Rooms"

VTD PM650F-0102, Rev. 4 (Viking Drawing No.: FP-9), "Systems 1WS1 thru 1WS6, Turbine Bldg. RFPT Lube Oil Reservoir and RFP Turb. Rooms"

VTD PM650F-0236, Rev. 3 (Viking Drawing No.: FP-51), "System 1WS11, Turbine Bldg. Elevator Shaft No. 11-2 and Machine Room No. 1702"

VTD PM650F-0151, Rev. 6 (Viking Drawing No.: FP-20), "System 1D12, Main Transformer C"

12) T131, "Pipe Specification Dimension/FP Pipe", dated 08-14-2009.

13) Calculation H-1-KC-MDC-2054, Rev. 1, "Hope Creek Fire Protection Piping Evaluation for Potential Water Hammer".

14) Document No. 313235-01, "Hope Creek Diesel Driven Fire Pump Curve", dated 3/28/90.

15) Document No. 313234-01, "Hope Creek Motor Driven Fire Pump Curve", dated 3/28/90.

16) Specification No. 10855-M-662, Rev. 1, "Technical Specification for Jockey Pump for HCGS".

17) Document No. PM650F-0271-02, Rev. 1 and PM650F-0273-02, Rev. 1, "Deluge and Pre-action Valve Sizes".

18) Technical Data, “Viking Deluge Valve Model D-5”, dated August 1979 and “Viking Deluge Valve Model E-1”, dated March 1984 (Valve friction data).

19) Peerless Pump Company, “Salem Jockey Pump Type J Pump Curve”.

20) Peerless Pump Company, “Salem Fire Pump No. 1 (1FPE12) Pump Curve”, dated 2-11-93.

21) Peerless Pump Company, “Salem Fire Pump No. 2 (2FPE12) Pump Curve”, dated 6-21-93.

22) Hope Creek Fire Protection System Elevation Diagrams, Rev. 1, dated 7-31-2105.

23) ME101, “Piping Stress Analysis User Manual”, Version N9, 2004, Bechtel Corporation.

24) Vacuum Breaker Data from The Johnson Corporation, 805 Wood Street, Three Rivers, Michigan, USA 49093.

25) Unisont Engineering Inc Calculation 8038-P0005 (RB1)

26) Unisont Engineering Inc Calculation 8038-P0006 (TB 26)

27) Unisont Engineering Inc Calculation 8038-P0007 (RB2)

28) Unisont Engineering Inc Calculation 8038-P0008 (TB 10)

# APPENDICES

**APPENDIX A**: USLAM Input Data Preparation

- A1 Friction Multiplier Calculations and Link Lengths
- A2 Flow Resistance Coefficients for Valves
- A3 Pump Data for All HCGS and Salem FPS Pumps
- A4 Additional Flow Resistance (K) Calculations
- A5 Vacuum Breaker Data
- A6 Description of Input (USLAM) – Case 1
- A7 Figures
- A8 List of Isometric Drawings Used to Draw Schematic Diagram (Figure A.1)
- A9 References

**APPENDIX B**: USLAM Input Data Events Listing

**APPENDIX C**: Force Time History Plots

**APPENDIX D**: Sample Pressure/Velocity Plots for Cases 1, 2, 3, 6 and 8

**APPENDIX E**: Vacuum Breaker Data Sheet

**APPENDIX F**: Miscellaneous Data Provided by PSEG

**APPENDIX G**: Forcing Functions for Riser # 10 and RB2 Piping

# APPENDIX A: Input Data Preparation

## A1 Friction Multiplier Calculations and Link Lengths

In the USLAM input data for links, the devices causing pressure drop can be modeled as either concentrated losses (restriction boundary condition) or as losses smeared uniformly over the pipe (link). This use of smearing rather than equivalent lengths allows the user not to change the pipe lengths because the pressure wave travels times are length dependent. Small losses such as elbows, full open valves, etc. can be smeared over the link length. In USLAM the friction factor is multiplied by a "friction factor multiplier (FFMult)" in each link to allow for the smearing of losses. The following is the equation for the friction factor multiplier:

$$FFMult = (L_{phy} + L_{eq})/L_{phy}$$

Following table gives the calculated values of FFMult's for all links for the flow devices present. The link lengths were taken from Figures A.1. It should be noted that in this table the following values of equivalent length to diameter ratios from Reference A-4 are used: Also shown in this table are the actual lengths from the link lengths are calculated. The minimum link length is 5 feet and all other link lengths are multiples of 5 feet. Differences between the actual and model lengths are expected to have minimal effect on the results.

$90^o$ Elbow, L/D = 14
$45^o$ Elbow, L/D = 11
Branch Tee, L/D = 60
Thru Tee, L/D = 20
Fully open Gate Valve, L/D = 8
Fully open Check Valve, L/D = 50
Sudden contraction and expansion (reducer), K calculated using eq. 2.9 and 2.10 of Ref. A-4.

UNISONT ENGINEERING, INC.

# CALCULATION SHEET

| | | | |
|---|---|---|---|
| Project: | HOPE CREEK GENERATING STATION | Job Number: | 8038 |
| Calc No. | 8038-P0004 | Sheet No. | 81 |
| By: | A Arastu Date: 9/14/18 | Rev. No. | 1 |
| Subject: | Water Hammer Analysis of the HCGS Fire Protection System | | |

## Table of Friction Factor Multiplier Data (FFMult) and Link Lengths

| Link No. | Dia | 90 Deg Bend | 45 Deg Bend | Thru Tee | Branch Tee | Gate Valve | Globe Valve | Butterfly Valve | Plug Valve | Ball Valve | Swing Check | Other L/D | Other K | Friction Factor | Total K | Link Length USLAM | Link Length Actual | Friction Factor Multiplier FFMult | Conn | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (ft) | | | | | | | | | | | | | | | (ft) | (ft) | | | |
| Pump House | | | | | | | | | | | | | | | | | | | | |
| 1 | 1.104 | 2 | 2 | 2 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 2.91 | 55 | 53.45 | 5.492 | Tank B | PUMP HOUSE |
| 2 | 1.000 | 0 | 0 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 1.66 | 20 | 21 | 7.4 | | x-tie |
| 3 | 1.000 | 1 | 2 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.8 | 10 | 9.9 | 7.18 | | v047 |
| 4 | 1.000 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.15 | 0.013 | 0.33 | 10 | 8.5 | 3.538 | | pump-e |
| 5 | 1.000 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0.31 | 0.013 | 1.14 | 5 | 5.9 | 18.508 | | v005 |
| 6 | 1.000 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.55 | 10 | 7.25 | 5.2 | | V049 |
| 7 | 1.000 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.62 | 20 | 18 | 3.4 | | to jockey pump |
| 8 | 1.000 | 1 | 8 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 2.1 | 115 | 114.5 | 2.402 | Yard-K | |
| Yard | | | | | | | | | | | | | | | | | | | | |
| 9 | 1.007 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.1 | 5 | 6 | 2.611 | K | v044 |
| 10 | 1.007 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.26 | 10 | 5 | 3.014 | | to const pp |
| 11 | 1.007 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.1 | 10 | 5 | 1.806 | | v045 |
| 12 | 1.007 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.26 | 10 | 10 | 3.014 | I | Aux Bld |
| 13 | 1.007 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.26 | 110 | 110 | 1.183 | | fire hose #41 |
| 14 | 1.007 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.51 | 110 | 110 | 1.363 | | |
| 15 | 1.007 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.26 | 10 | 9 | 3.014 | | fire hose #23 |
| 16 | 1.007 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.26 | 30 | 31 | 1.671 | | |
| 17 | 1.007 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.26 | 80 | 79 | 1.252 | | cap pipe |
| 18 | 1.007 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.1 | 20 | 17 | 1.403 | | v095 |
| 19 | 1.007 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.26 | 130 | 132 | 1.155 | | to preaction "C" |
| 20 | 1.007 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.1 | 135 | 135 | 1.06 | | v087 |
| 21 | 1.007 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.26 | 10 | 12 | 2.994 | | |
| 22 | 1.007 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.18 | 65 | 70 | 1.217 | | |
| 23 | 1.007 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0 | 5 | 5 | 1 | | |
| 24 | 1.007 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.52 | 20 | 1 | 3.004 | | to Nuclear bldg |
| 25 | 1.007 | 0 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.77 | 200 | 202 | 1.3 | | to Nucl bldg |
| 26 | 1.007 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.36 | 55 | 54 | 1.513 | | fire hose #20 |

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# CALCULATION SHEET

| | | | |
|---|---|---|---|
| Project: | HOPE CREEK GENERATING STATION | Job Number: | 8038 |
| Calc No. | 8038-P0004 | Sheet No. | 82 |
| By: | A Arastu Date: 9/14/18 | Rev. No. | 1 |
| Subject: | Water Hammer Analysis of the HCGS Fire Protection System | | |

| Link No. | Dia | 90 Deg Bend | 45 Deg Bend | Thru Tee | Branch Tee | Gate Valve | Globe Valve | Butterfly Valve | Plug Valve | Ball Valve | Swing Check | Other L/D | Other K | Friction Factor | Total K | Link Length USLAM | Link Length Actual | Friction Factor Multiplier FFMult | Conn | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (ft) | | | | | | | | | | | | | | | (ft) | (ft) | | | |
| 27 | 1.007 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.26 | 20 | 19 | 1.997 | | v97 |
| 28 | 1.007 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.26 | 230 | 230 | 1.088 | A | turbine bld |
| 29 | 1.007 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.26 | 40 | 40 | 1.503 | B | turbine bld |
| 30 | 1.007 | 0 | 2 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.36 | 240 | 238 | 1.117 | | v100 |
| 31 | 1.007 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.26 | 45 | 46 | 1.448 | | fire hose #17 |
| 32 | 1.007 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.26 | 35 | 36 | 1.57 | | |
| 33 | 1.007 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.26 | 180 | 180.5 | 1.111 | | |
| 34 | 1.007 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.26 | 10 | 8.5 | 3.014 | | fire hose #63 |
| 35 | 1.007 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.26 | 5 | 5 | 5.028 | | to guard house |
| 36 | 1.007 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.1 | 5 | 5 | 2.611 | | v293 |
| 37 | 1.007 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.26 | 10 | 10 | 3.014 | | to guard house |
| 38 | 1.007 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.44 | 30 | 28 | 2.141 | | fire hose |
| 39 | 1.007 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.1 | 20 | 22 | 1.403 | | V114 |
| 40 | 1.007 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.26 | 80 | 79 | 1.252 | | to Salem |
| 41 | 1.007 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.1 | 10 | 10 | 1.806 | | V116 |
| 42 | 1.007 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0 | 20 | 20 | 1 | | |
| 43 | 1.007 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.26 | 55 | 55 | 1.363 | | |
| 44 | 1.007 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.26 | 5 | 5 | 5.028 | | fire hose #16 |
| 45 | 1.007 | 0 | 2 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.36 | 160 | 157 | 1.175 | | v117 |
| 46 | 1.007 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.26 | 15 | 13 | 2.343 | E | turbine bld |
| 47 | 1.007 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.26 | 5 | 6 | 5.028 | | fire hose #13 |
| 48 | 1.007 | 0 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 1.04 | 15 | 13 | 6.357 | | fire hose #12 |
| 49 | 1.007 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.13 | 60 | 60 | 1.166 | | |
| 50 | 1.007 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.39 | 15 | 14 | 2.994 | | |
| 51 | 1.007 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.23 | 5 | 3 | 4.605 | | v125 |
| 52 | 1.007 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.26 | 15 | 17 | 2.329 | | |
| 53 | 1.007 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.52 | 80 | 81 | 1.501 | | fire hose #11 |
| 54 | 1.007 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.26 | 65 | 65 | 1.31 | F | Aux/RB |
| 55 | 1.007 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.31 | 50 | 50 | 1.481 | | |
| 56 | 1.007 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.1 | 25 | 25 | 1.322 | | v137 |
| 57 | 1.007 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.18 | 5 | 5 | 3.82 | | |

UNISONT ENGINEERING, INC.

# CALCULATION SHEET

| | | | |
|---|---|---|---|
| Project: | HOPE CREEK GENERATING STATION | Job Number: | 8038 |
| Calc No. | 8038-P0004 | Sheet No. | 83 |
| By: | A Arastu Date: 9/14/18 | Rev. No. | 1 |
| Subject: | Water Hammer Analysis of the HCGS Fire Protection System | | |

| Link No. | Dia | 90 Deg Bend | 45 Deg Bend | Thru Tee | Branch Tee | Gate Valve | Globe Valve | Butterfly Valve | Plug Valve | Ball Valve | Swing Check | Other L/D | Other K | Friction Factor | Total K | Link Length USLAM | Link Length Actual | Friction Factor Multiplier FFMult | Conn | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (ft) | | | | | | | | | | | | | | | (ft) | (ft) | | | |
| 58 | 1.007 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.26 | 70 | 69 | 1.288 | | to temp const pipe |
| 59 | 1.007 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.1 | 10 | 10 | 1.806 | | v126 |
| 60 | 1.007 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.26 | 195 | 194 | 1.103 | | fire hose #8 |
| 61 | 1.007 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.49 | 240 | 240 | 1.159 | | |
| 62 | 1.007 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.26 | 215 | 214 | 1.094 | | fire hose #64 |
| 63 | 1.007 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.26 | 110 | 110 | 1.183 | | fire hose #7 |
| 64 | 1.007 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.26 | 195 | 193 | 1.103 | | fire hose #15 |
| 65 | 1.007 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.26 | 5 | 3 | 5.028 | | to radwaste |
| 66 | 1.007 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.26 | 30 | 28 | 1.665 | | |
| 67 | 1.007 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.1 | 5 | 5 | 2.611 | | v127 |
| 68 | 1.007 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.26 | 25 | 25 | 1.806 | G | Aux/RB |
| 69 | 1.007 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.26 | 130 | 132 | 1.155 | H | Aux Bld |
| 70 | 1.007 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.1 | 5 | 5 | 2.611 | | v128 |
| 71 | 1.007 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.26 | 5 | 5 | 5.028 | | to intake struc |
| 72 | 1.007 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.1 | 5 | 5 | 2.611 | | v473 |
| 73 | 1.007 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.26 | 205 | 205 | 1.098 | | fire hose #4 |
| 74 | 1.007 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.36 | 240 | 237 | 1.117 | | v129/Hazard mat |
| 75 | 1.007 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.78 | 20 | 12 | 4.021 | | to FO storage |
| 76 | 1.007 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.26 | 30 | 30 | 1.665 | | |
| 77 | 1.007 | 0 | 2 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.36 | 25 | 24 | 2.12 | | v167 |
| 78 | 1.007 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.26 | 50 | 47 | 1.403 | | fire hose #37/50 |
| 79 | 1.007 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.26 | 50 | 50 | 1.403 | | fire hose #22 |
| 80 | 1.007 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.26 | 20 | 21 | 1.997 | | |
| 81 | 1.007 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.52 | 40 | 42 | 2.002 | | fire hose #3 |
| 82 | 1.007 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.26 | 165 | 166 | 1.122 | | fire hose #2 |
| 83 | 1.007 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.1 | 135 | 136 | 1.06 | | v042 |
| 84 | 1.007 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.26 | 10 | 10 | 3.014 | J | Pump House |
| 85 | 1.007 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.1 | 60 | 60 | 1.134 | | fire hose #1 |
| 86 | 1.007 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.26 | 5 | 5 | 5.028 | k | Pump House |
| Pump House | | | | | | | | | | | | | | | | | | | | |
| 87 | 0.336 | 1 | 0 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 2.41 | 10 | 9.57 | 5.771 | | v013 - from elec |

UNISONT ENGINEERING, INC.

# CALCULATION SHEET

| | | | |
|---|---|---|---|
| Project: | HOPE CREEK GENERATING STATION | Job Number: | 8038 |
| Calc No. | 8038-P0004 | Sheet No. | 84 |
| By: | A Arastu Date: 9/14/18 | Rev. No. | 1 |
| Subject: | Water Hammer Analysis of the HCGS Fire Protection System | | |

| Link No. | Dia | 90 Deg Bend | 45 Deg Bend | Thru Tee | Branch Tee | Gate Valve | Globe Valve | Butterfly Valve | Plug Valve | Ball Valve | Swing Check | Other L/D | Other K | Friction Factor | Total K | Link Length USLAM | Link Length Actual | Friction Factor Multiplier FFMult | Conn | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (ft) | | | | | | | | | | | | | | | (ft) | (ft) | | | |
| | | | | | | | | | | | | | | | | | | | | pump |
| 88 | 0.336 | 2 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 1.15 | 5 | 4.43 | 5.57 | | |
| 89 | 0.256 | 3 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.018 | 1.83 | 30 | 30 | 1.87 | | |
| 90 | 0.256 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.018 | 0.14 | 10 | 10 | 1.205 | | v018 |
| 91 | 0.256 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0.58 | 0.018 | 1.73 | 5 | 4.59 | 5.933 | Pump-j | v019 |
| 92 | 0.336 | 4 | 0 | 1 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 3.46 | 40 | 40 | 2.714 | | v012 - to diesel pump |
| 93 | 1.000 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.62 | 20 | 18.3 | 3.4 | | |
| 94 | 1.000 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.36 | 10 | 7.25 | 3.8 | | v048 |
| 95 | 1.000 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0.31 | 0.013 | 1.14 | 5 | 5.7 | 18.508 | | v002 |
| 96 | 1.000 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.15 | 0.013 | 0.33 | 10 | 7.86 | 3.538 | | pump-d |
| 97 | 1.000 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.55 | 5 | 6.52 | 9.4 | | v046 |
| 98 | 1.000 | 0 | 0 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 1.66 | 20 | 21 | 7.4 | | |
| 99 | 1.104 | 2 | 2 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.38 | 0.013 | 1.37 | 30 | 33.15 | 4.874 | Tank A | |
| 100 | 1.000 | 1 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.95 | 85 | 85 | 1.864 | | |
| 101 | 1.000 | 0 | 2 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 1.14 | 25 | 25 | 4.512 | Yard-J | |
| Salem | | | | | | | | | | | | | | | | | | | | |
| 102 | 0.835 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.95 | 5 | 5 | 12.356 | HC yard | v015 |
| 103 | 0.788 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.67 | 60 | 61.9 | 1.628 | | |
| 104 | 0.788 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0 | 100 | 230 | 1 | | |
| 105 | 0.788 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0 | 100 | | 1 | | |
| 106 | 0.788 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.95 | 30 | | 2.786 | | 1VFP30 |
| 107 | 0.927 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.54 | 35 | 35 | 2.059 | to salem pump house | |
| 108 | 0.927 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 1.08 | 150 | 150 | 1.494 | to boiler | |
| 109 | 0.927 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.38 | 50 | 50 | 1.519 | to #2 FP | 1VFP21 |
| 110 | 0.927 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.38 | 20 | 17.5 | 2.298 | to #1 FP | 1VFP20 |
| 111 | 0.927 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.99 | 10 | 10 | 7.86 | | |
| 112 | 1.000 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 1.04 | 10 | 6.7 | 9 | to JP | |
| 113 | 1.000 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.29 | 5 | 3.3 | 5.4 | | 1VFP13 |
| 114 | 1.000 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0.31 | 0.013 | 1.48 | 10 | 12.8 | 12.354 | #1 FP | 1VFP9 |
| 115 | 1.000 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.15 | 0.013 | 0.51 | 5 | 6 | 8.877 | | 1VFP7 |

UNISONT ENGINEERING, INC.

# CALCULATION SHEET

| | | | |
|---|---|---|---|
| Project: | HOPE CREEK GENERATING STATION | Job Number: | 8038 |
| Calc No. | 8038-P0004 | Sheet No. | 85 |
| By: | A Arastu Date: 9/14/18 | Rev. No. | 1 |
| Subject: | Water Hammer Analysis of the HCGS Fire Protection System | | |

| Link No. | Dia | 90 Deg Bend | 45 Deg Bend | Thru Tee | Branch Tee | Gate Valve | Globe Valve | Butterfly Valve | Plug Valve | Ball Valve | Swing Check | Other L/D | Other K | Friction Factor | Total K | Link Length USLAM | Link Length Actual | Friction Factor Multiplier FFMult | Conn | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (ft) | | | | | | | | | | | | | | | (ft) | (ft) | | | |
| 116 | 1.000 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.26 | 5 | 2 | 5 | | |
| 117 | 1.250 | 2 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.73 | 30 | 27.7 | 3.333 | Tank 1 | 1VFP1 |
| 118 | 0.927 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.81 | 10 | 10 | 6.562 | Header | |
| 119 | 1.000 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.18 | 10 | 8 | 2.4 | to jp | |
| 120 | 1.000 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.44 | 5 | 3.1 | 7.8 | | 2VFP13 |
| 121 | 1.000 | 0 | 0 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0.31 | 0.013 | 1.58 | 10 | 12.5 | 13.154 | | 2VFP9 |
| 122 | 1.000 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.15 | 0.013 | 1.03 | 10 | 8 | 8.938 | #2 FP | 2VFP7 |
| 123 | 1.250 | 2 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013 | 0.47 | 20 | 17.5 | 3.25 | Tank 2 | 2VFP1 |
| 124 | 0.134 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.021 | 2.01 | 5 | 5 | 3.624 | JP Xtie | 1VFP6 |
| 125 | 0.134 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0.021 | 1.64 | 5 | 5 | 3.141 | | 1VFP5 |
| 126 | 0.134 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.021 | 0 | 5 | 5 | 1 | JP | |
| 127 | 0.134 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.021 | 0 | 10 | 9.1 | 1 | from p1 | |
| 128 | 0.134 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.021 | 0 | 10 | 12.7 | 1 | | |
| 129 | 0.134 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.021 | 0 | 10 | 8.1 | 1 | to p2 | 1VFP547 |
| Turbine Building 10-inch Header # 1 | | | | | | | | | | | | | | | | | | | | |
| 130 | 0.835 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.84 | 5 | 7 | 11.02 | B | yard |
| 131 | 0.835 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.55 | 100 | 102 | 1.331 | | |
| 132 | 0.835 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.11 | 25 | 23 | 1.267 | | v99 |
| 133 | 0.835 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0 | 65 | 65.06 | 1 | | |
| 134 | 0.835 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.55 | 20 | 17.24 | 2.653 | | |
| 135 | 0.835 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.67 | 105 | 104.24 | 1.382 | riser #8 | |
| 136 | 0.835 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.2 | 5 | 4.04 | 3.338 | | |
| 137 | 0.835 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.28 | 50 | 52 | 1.334 | riser #7 | |
| 138 | 0.835 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.39 | 5 | 5.3 | 5.676 | | statn XFR |
| 139 | 0.835 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.28 | 5 | 5.6 | 4.34 | riser #22 | wet sprinkler |
| 140 | 0.835 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0 | 55 | 53.4 | 1 | | to iso. KC-02 |
| 141 | 0.835 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.28 | 25 | 23.27 | 1.668 | C | 10"hdr 2 |
| 142 | 0.835 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.47 | 15 | 16.44 | 2.882 | | |
| 143 | 0.835 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.28 | 25 | 24.24 | 1.668 | 6"hdr 2 | to deluge system B |
| 144 | 0.835 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.39 | 5 | 3.24 | 5.676 | #6 | v57 |
| 145 | 0.835 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.28 | 5 | 1.25 | 4.34 | #5 | |

UNISONT ENGINEERING, INC.

# CALCULATION SHEET

| | | | |
|---|---|---|---|
| Project: | HOPE CREEK GENERATING STATION | Job Number: | 8038 |
| Calc No. | 8038-P0004 | Sheet No. | 86 |
| By: | A Arastu Date: 9/14/18 | Rev. No. | 1 |
| Subject: | Water Hammer Analysis of the HCGS Fire Protection System | | |

| Link No. | Dia | 90 Deg Bend | 45 Deg Bend | Thru Tee | Branch Tee | Gate Valve | Globe Valve | Butterfly Valve | Plug Valve | Ball Valve | Swing Check | Other L/D | Other K | Friction Factor | Total K | Link Length USLAM | Link Length Actual | Friction Factor Multiplier FFMult | Conn | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (ft) | | | | | | | | | | | | | | | (ft) | (ft) | | | |
| 146 | 0.835 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.39 | 10 | 9 | 3.338 | | |
| 147 | 0.835 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.2 | 5 | 4.58 | 3.338 | | |
| 148 | 0.835 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0 | 145 | 146.5 | 1 | | |
| 149 | 0.835 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.28 | 10 | 11.84 | 2.67 | | to KHR100/102 |
| 150 | 0.835 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.28 | 90 | 91.81 | 1.186 | riser#26 | |
| 151 | 0.835 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.39 | 5 | 2.9 | 5.676 | | |
| 152 | 0.835 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.42 | 15 | 15.32 | 2.664 | riser #4 | |
| 153 | 0.835 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.11 | 5 | 3.34 | 2.336 | | v286 |
| 154 | 0.835 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.28 | 5 | 5.86 | 4.34 | 6"hdr 3 | to iso. KC-07 |
| 155 | 0.835 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.39 | 15 | 13.1 | 2.559 | #9 | v285 |
| 156 | 0.835 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.28 | 5 | 1.42 | 4.34 | #10 | |
| 157 | 0.835 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.2 | 5 | 2.71 | 3.338 | | |
| 158 | 0.835 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.2 | 5 | 2.5 | 3.338 | #11/12 | |
| 159 | 0.835 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.28 | 5 | 2.5 | 4.34 | | |
| 160 | 0.835 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.39 | 55 | 55.5 | 1.425 | D - v284 | to iso. KC-01/pt E |
| 161 | 0.835 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.84 | 175 | 175 | 1.286 | | |
| 162 | 0.835 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.95 | 100 | 100 | 1.568 | E | yard |
| 163 | 0.835 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.39 | 10 | 8.83 | 3.338 | | |
| 164 | 0.835 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.28 | 40 | 39.64 | 1.413 | | |
| 165 | 0.835 | 3 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.87 | 25 | 27.04 | 3.071 | | |
| 166 | 0.835 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.28 | 5 | 1 | 4.34 | 8"hdr 3 | to main XFC |
| 167 | 0.835 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0 | 5 | 4.83 | 1 | L | cap end |
| Turbine Building 10-inch Header # 2 | | | | | | | | | | | | | | | | | | | | |
| 168 | 0.835 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 1.04 | 5 | 1.96 | 13.358 | C | 10"hdr1 |
| 169 | 0.835 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.59 | 35 | 36.08 | 2.002 | riser #1 | v344 |
| 170 | 0.835 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.56 | 10 | 11.56 | 4.34 | riser #2 | also to deluge system ZS-3383X/Y (admin) |
| 171 | 0.835 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.39 | 75 | 76.71 | 1.312 | | v347 |
| 172 | 0.835 | 1 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.76 | 45 | 46.09 | 2.002 | riser #3 | to iso. KC-16 |
| 173 | 0.835 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.2 | 5 | 5 | 3.338 | | |

UNISONT ENGINEERING, INC.

# CALCULATION SHEET

| | | | |
|---|---|---|---|
| Project: | HOPE CREEK GENERATING STATION | Job Number: | 8038 |
| Calc No. | 8038-P0004 | Sheet No. | 87 |
| By: | A Arastu Date: 9/14/18 | Rev. No. | 1 |
| Subject: | Water Hammer Analysis of the HCGS Fire Protection System | | |

| Link No. | Dia | 90 Deg Bend | 45 Deg Bend | Thru Tee | Branch Tee | Gate Valve | Globe Valve | Butterfly Valve | Plug Valve | Ball Valve | Swing Check | Other L/D | Other K | Friction Factor | Total K | Link Length USLAM | Link Length Actual | Friction Factor Multiplier FFMult | Conn | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (ft) | | | | | | | | | | | | | | | (ft) | (ft) | | | |
| 174 | 0.835 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.2 | 15 | 14.87 | 1.779 | | |
| 175 | 0.835 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.39 | 15 | 14.6 | 2.559 | | to iso. C-0064 |
| 176 | 0.835 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.28 | 95 | 96 | 1.176 | FH #19 | |
| 177 | 0.835 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.2 | 55 | 53 | 1.213 | | |
| 178 | 0.835 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.2 | 5 | 7 | 3.338 | | |
| 179 | 0.835 | 0 | 4 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.67 | 50 | 49 | 1.795 | | v98 |
| 180 | 0.835 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.2 | 80 | 80 | 1.146 | | |
| 181 | 0.835 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 1.04 | 25 | 26 | 3.472 | A | yard |
| TB/Admin Bldg Risers | | | | | | | | | | | | | | | | | | | | |
| 182 | 0.336 | 2 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 1.97 | 45 | 43.3 | 1.866 | 10"hdr2 | admin (riser 1) |
| 183 | 0.336 | 8 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 2.92 | 120 | 120.1 | 1.251 | | v346 |
| 184 | 0.256 | 3 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.21 | 0.018 | 1.32 | 205 | 204.1 | 1.092 | | |
| 185 | 0.256 | 7 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.018 | 2.83 | 60 | 57.4 | 1.674 | | |
| 186 | 0.336 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 1.73 | 10 | 8.3 | 4.427 | hdr #2 | admin (riser 2) |
| 187 | 0.336 | 4 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 1.63 | 55 | 57.8 | 1.586 | | v348 |
| 188 | 0.336 | 7 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 2.68 | 230 | 231.2 | 1.231 | | |
| 189 | 0.256 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.21 | 0.018 | 0.82 | 105 | 104 | 1.111 | | |
| 190 | 0.256 | 4 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.018 | 2.08 | 100 | 101.9 | 1.297 | | |
| 191 | 0.256 | 3 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.018 | 2.18 | 75 | 74.5 | 1.416 | | |
| 192 | 0.336 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 1.73 | 5 | 4.8 | 7.854 | hdr #2 | admin (riser 3) |
| 193 | 0.336 | 9 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 3.83 | 240 | 243 | 1.316 | | v349 |
| 194 | 0.256 | 3 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.21 | 0.018 | 1.32 | 180 | 177 | 1.105 | | |
| Aux Bldg 8-inch Headers | | | | | | | | | | | | | | | | | | | | |
| 195 | 0.665 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.95 | 15 | 15 | 4.015 | F | V140 - Yard |
| 196 | 0.665 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.28 | 11 | 11 | 2.197 | | |
| 197 | 0.665 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.28 | 20 | 20 | 1.658 | | |
| 198 | 0.665 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0 | 115 | 115 | 1 | | |
| 199 | 0.665 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.56 | 220 | 219.6 | 1.12 | to RB riser 2 | |
| 200 | 0.665 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.78 | 20 | 18.3 | 2.862 | | |
| 201 | 0.665 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0 | 20 | 17.6 | 1 | | |

UNISONT ENGINEERING, INC.

# CALCULATION SHEET

| | | | |
|---|---|---|---|
| Project: | HOPE CREEK GENERATING STATION | Job Number: | 8038 |
| Calc No. | 8038-P0004 | Sheet No. | 88 |
| By: | A Arastu Date: 9/14/18 | Rev. No. | 1 |
| Subject: | Water Hammer Analysis of the HCGS Fire Protection System | | |

| Link No. | Dia | 90 Deg Bend | 45 Deg Bend | Thru Tee | Branch Tee | Gate Valve | Globe Valve | Butterfly Valve | Plug Valve | Ball Valve | Swing Check | Other L/D | Other K | Friction Factor | Total K | Link Length USLAM | Link Length Actual | Friction Factor Multiplier FFMult | Conn | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (ft) | | | | | | | | | | | | | | | (ft) | (ft) | | | |
| 202 | 0.665 | 2 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.5 | 20 | 18.96 | 2.197 | | v282 |
| 203 | 0.665 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0 | 15 | 14.83 | 1 | | |
| 204 | 0.665 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.62 | 30 | 30.25 | 1.973 | to RB deluge systems | |
| 205 | 0.665 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.2 | 15 | 14.5 | 1.621 | | |
| 206 | 0.665 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.28 | 15 | 14.06 | 1.887 | 6"hdr 4 | |
| 207 | 0.665 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.2 | 20 | 20.79 | 1.465 | | |
| 208 | 0.665 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 1.32 | 20 | 19.5 | 4.125 | to RB riser 3 | |
| 209 | 0.665 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.67 | 70 | 69.16 | 1.454 | | |
| 210 | 0.665 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.56 | 5 | 4.5 | 6.32 | | to NHR400 |
| 211 | 0.665 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.31 | 50 | 52.93 | 1.293 | | v189 |
| 212 | 0.665 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.56 | 20 | 21.18 | 2.33 | riser #19 | spray system E/preaction B |
| 213 | 0.665 | 0 | 0 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.67 | 25 | 24.8 | 2.277 | | spray system A/B and preaction D |
| 214 | 0.665 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.28 | 20 | 17.2 | 1.665 | | to RB el. 140 |
| 215 | 0.665 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.39 | 45 | 44.83 | 1.414 | | v290 |
| 216 | 0.665 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.28 | 20 | 20.75 | 1.665 | | to deluge systems w,v,u,t |
| 217 | 0.665 | 8 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 1.85 | 85 | 85.9 | 2.033 | | to BHR401 |
| 218 | 0.665 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.28 | 5 | 5 | 3.66 | to wet sprinkler/RB riser 1 | |
| 219 | 0.665 | 1 | 0 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.87 | 25 | 23.83 | 2.649 | riser #18 | v074 |
| 220 | 0.665 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.47 | 30 | 30.29 | 1.749 | | to yard pt G |
| 221 | 0.665 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.14 | 20 | 18.5 | 1.329 | | iso. c-60 |
| 222 | 0.665 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.42 | 5 | 3 | 4.977 | | to RB |
| 223 | 0.665 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.28 | 95 | 93 | 1.139 | | |
| 224 | 0.665 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.48 | 35 | 33.46 | 1.646 | | FH # 6 |
| 225 | 0.665 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.84 | 65 | 65 | 1.614 | | |
| 226 | 0.665 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0 | 35 | 35 | 1 | | iso. c-56 |
| 227 | 0.665 | 1 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.61 | 35 | 34 | 1.83 | | |
| 228 | 0.665 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.2 | 35 | 33.46 | 1.266 | | |
| 229 | 0.665 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.95 | 120 | 121 | 1.377 | G | v148 |

UNISONT ENGINEERING, INC.

# CALCULATION SHEET

| | | | |
|---|---|---|---|
| Project: | HOPE CREEK GENERATING STATION | Job Number: | 8038 |
| Calc No. | 8038-P0004 | Sheet No. | 89 |
| By: | A Arastu Date: 9/14/18 | Rev. No. | 1 |
| Subject: | Water Hammer Analysis of the HCGS Fire Protection System | | |

| Link No. | Dia | 90 Deg Bend | 45 Deg Bend | Thru Tee | Branch Tee | Gate Valve | Globe Valve | Butterfly Valve | Plug Valve | Ball Valve | Swing Check | Other L/D | Other K | Friction Factor | Total K | Link Length USLAM | Link Length Actual | Friction Factor Multiplier FFMult | Conn | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (ft) | | | | | | | | | | | | | | | (ft) | (ft) | | | |
| Aux Bldg 8-inch Header # 2 | | | | | | | | | | | | | | | | | | | | |
| 230 | 0.665 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 1.15 | 10 | 11 | 6.453 | Yard | |
| 231 | 0.665 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.2 | 25 | 25 | 1.372 | v134 | |
| 232 | 0.665 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.2 | 150 | 150 | 1.062 | | |
| 233 | 0.665 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.2 | 135 | 134.25 | 1.069 | | |
| 234 | 0.665 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.14 | 45 | 44 | 1.146 | | |
| 235 | 0.665 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.28 | 20 | 17 | 1.658 | | |
| 236 | 0.665 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.42 | 35 | 35 | 1.564 | | |
| 237 | 0.665 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.2 | 15 | 15 | 1.621 | iso. 0-kc-02 | |
| 238 | 0.665 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.39 | 30 | 28.25 | 1.621 | iso. 0-KC-05 | |
| 239 | 0.665 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.28 | 5 | 5.25 | 3.66 | | |
| 240 | 0.665 | 2 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.78 | 75 | 74.46 | 1.497 | v283 | |
| 241 | 0.665 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0 | 35 | 35.04 | 1 | | |
| 242 | 0.665 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.39 | 65 | 65 | 1.286 | | |
| 243 | 0.665 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.84 | 20 | 17.83 | 2.995 | | |
| 244 | 0.665 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.11 | 5 | 1.71 | 2.064 | v188 | |
| 245 | 0.665 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.53 | 20 | 19.95 | 2.26 | | |
| 246 | 0.665 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.28 | 15 | 15.32 | 1.887 | | |
| 247 | 0.665 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.28 | 10 | 9.92 | 2.33 | iso. 1-kc-17 | |
| 248 | 0.665 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.28 | 15 | 17.17 | 1.887 | | |
| 249 | 0.665 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.28 | 35 | 33.58 | 1.38 | | |
| 250 | 0.665 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0 | 100 | 97.5 | 1 | | |
| 251 | 0.665 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.56 | 10 | 9.23 | 3.647 | | |
| 252 | 0.665 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.47 | 30 | 31.48 | 1.749 | | |
| 253 | 0.665 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.2 | 30 | 28.1 | 1.31 | | |
| 254 | 0.665 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.55 | 20 | 19 | 2.317 | to yard H | |
| 255 | 0.665 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0 | 145 | 145 | 1 | c-0056 | |
| 256 | 0.665 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.55 | 35 | 35 | 1.752 | | |

UNISONT ENGINEERING, INC.

# CALCULATION SHEET

| | | | |
|---|---|---|---|
| Project: | HOPE CREEK GENERATING STATION | Job Number: | 8038 |
| Calc No. | 8038-P0004 | Sheet No. | 90 |
| By: | A Arastu Date: 9/14/18 | Rev. No. | 1 |
| Subject: | Water Hammer Analysis of the HCGS Fire Protection System | | |

| Link No. | Dia | 90 Deg Bend | 45 Deg Bend | Thru Tee | Branch Tee | Gate Valve | Globe Valve | Butterfly Valve | Plug Valve | Ball Valve | Swing Check | Other L/D | Other K | Friction Factor | Total K | Link Length USLAM | Link Length Actual | Friction Factor Multiplier FFMult | Conn | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (ft) | | | | | | | | | | | | | | | (ft) | (ft) | | | |
| 257 | 0.665 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.14 | 60 | 62 | 1.11 | | |
| 258 | 0.665 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.14 | 40 | 38.2 | 1.165 | | |
| 259 | 0.665 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.28 | 5 | 6 | 3.66 | FH #9 | |
| 260 | 0.665 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.11 | 45 | 45 | 1.118 | v151 | |
| 261 | 0.665 | 0 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 1.12 | 15 | 15 | 4.538 | Yard | |
| Aux Bldg 6-inch Headers | | | | | | | | | | | | | | | | | | | | |
| 262 | 0.505 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.21 | 0.015 | 0.78 | 20 | 19.55 | 2.315 | 8"hdr 2 | |
| 263 | 0.505 | 2 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.015 | 0.69 | 10 | 11.8 | 3.318 | v176 | |
| 264 | 0.505 | 3 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.015 | 1.23 | 30 | 28.25 | 2.38 | | |
| 265 | 0.505 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.015 | 0.3 | 5 | 1.15 | 3.02 | to riser 15 | |
| 266 | 0.505 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.015 | 1.41 | 5 | 5 | 10.494 | | iso. 0-KC-06 |
| 267 | 0.505 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.015 | 0.42 | 5 | 5.43 | 3.828 | | |
| 268 | 0.505 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.015 | 0.3 | 65 | 65.83 | 1.155 | #16 | |
| 269 | 0.505 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.015 | 0 | 15 | 16 | 1 | | |
| 270 | 0.505 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.015 | 0.9 | 35 | 36 | 1.866 | #31 | |
| 271 | 0.256 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.018 | 0.25 | 25 | 26.25 | 1.143 | | |
| 272 | 0.256 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.018 | 1.47 | 10 | 10.65 | 3.099 | | v177 |
| 273 | 0.256 | 3 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.018 | 1.11 | 55 | 54.25 | 1.289 | | |
| 274 | 0.505 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.015 | 0 | 15 | 11.75 | 1 | riser #15 | |
| 275 | 0.505 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.015 | 0.33 | 15 | 16.6 | 1.741 | | |
| 276 | 0.336 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.21 | 0.017 | 1.16 | 135 | 136.5 | 1.17 | | |
| 277 | 0.336 | 6 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 1.56 | 40 | 39.15 | 1.773 | | spray |
| 278 | 0.336 | 5 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.21 | 0.017 | 1.53 | 20 | 20.45 | 2.518 | | spray |
| Aux Bldg 6-inch Header # 4 | | | | | | | | | | | | | | | | | | | | |
| 279 | 0.505 | 3 | 3 | 1 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.015 | 3.29 | 85 | 84.72 | 2.305 | 8"hdr 1 | v186 |
| 280 | 0.505 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.015 | 0.3 | 10 | 11.5 | 2.01 | #21 | |
| 281 | 0.505 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.015 | 0.51 | 45 | 46.25 | 1.382 | | |
| 282 | 0.505 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.015 | 0.21 | 10 | 9.5 | 1.707 | | |
| 283 | 0.505 | 3 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.015 | 0.93 | 70 | 69.5 | 1.447 | #14 | |
| 284 | 0.505 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.015 | 0.21 | 20 | 20.25 | 1.354 | | |

UNISONT ENGINEERING, INC.

# CALCULATION SHEET

| | | | |
|---|---|---|---|
| Project: | HOPE CREEK GENERATING STATION | Job Number: | 8038 |
| Calc No. | 8038-P0004 | Sheet No. | 91 |
| By: | A Arastu Date: 9/14/18 | Rev. No. | 1 |
| Subject: | Water Hammer Analysis of the HCGS Fire Protection System | | |

| Link No. | Dia | 90 Deg Bend | 45 Deg Bend | Thru Tee | Branch Tee | Gate Valve | Globe Valve | Butterfly Valve | Plug Valve | Ball Valve | Swing Check | Other L/D | Other K | Friction Factor | Total K | Link Length USLAM | Link Length Actual | Friction Factor Multiplier FFMult | Conn | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (ft) | | | | | | | | | | | | | | | (ft) | (ft) | | | |
| 285 | 0.505 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.015 | 0.21 | 5 | 3.25 | 2.414 | | |
| 286 | 0.505 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.015 | 0.3 | 25 | 24.67 | 1.404 | #36,13 | |
| 287 | 0.336 | 5 | 1 | 4 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 2.85 | 65 | 64.3 | 1.868 | 6"hdr 4 | v181 |
| 288 | 0.336 | 0 | 2 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 2.03 | 35 | 34 | 2.15 | | |
| 289 | 0.256 | 5 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.018 | 1.61 | 55 | 57.75 | 1.419 | | WHR301 |
| 290 | 0.256 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.018 | 1.33 | 40 | 39.25 | 1.474 | | ZHC300 |
| 291 | 0.256 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.018 | 0.61 | 35 | 36 | 1.247 | | XHR301 |
| Aux Bldg Risers | | | | | | | | | | | | | | | | | | | | |
| 292 | 0.256 | 10 | 0 | 2 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.018 | 5.52 | 115 | 113.75 | 1.686 | 8"hdr2 | (riser 17) |
| 293 | 0.336 | 2 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 1.63 | 5 | 5.21 | 7.451 | 8"hdr1 | v044 |
| 294 | 0.336 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 0.34 | 60 | 62.3 | 1.112 | | to 1BHR400 |
| 295 | 0.336 | 2 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 1.83 | 40 | 38 | 1.907 | | to 1MHR400 |
| 296 | 0.336 | 2 | 3 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 1.66 | 45 | 44.05 | 1.729 | | to iso. 1kc-13 (1XHR401) |
| 297 | 0.336 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 0.34 | 45 | 45.45 | 1.149 | | to 1CHR401 |
| 298 | 0.336 | 2 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 1.15 | 40 | 42.75 | 1.571 | | to 1QHR401/RHR401 |
| 299 | 0.256 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.21 | 0.018 | 0.71 | 95 | 93.75 | 1.107 | | 1VHR400 |
| 300 | 0.256 | 6 | 8 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.018 | 4.36 | 100 | 100.5 | 1.623 | | 1CHR401 |
| 301 | 0.336 | 2 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 1.83 | 25 | 24.2 | 2.452 | | iso. 1kc-13 to 1QHR401 |
| 302 | 0.336 | 0 | 4 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 2.03 | 45 | 44 | 1.893 | | |
| 303 | 0.256 | 1 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.21 | 0.018 | 1.17 | 55 | 54 | 1.304 | | 1RHR401 |
| 304 | 0.256 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.018 | 0 | 10 | 11 | 1 | | 1QHR401 |
| 305 | 0.336 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 1.36 | 5 | 1.2 | 6.376 | | to 1PHR401 |
| 306 | 0.256 | 9 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.018 | 3.69 | 130 | 131.35 | 1.405 | | 1PHR401 |
| 307 | 0.336 | 4 | 3 | 1 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 4.85 | 105 | 104.2 | 1.914 | | |
| 308 | 0.256 | 6 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.21 | 0.018 | 2.61 | 130 | 129.8 | 1.287 | | |
| 309 | 0.256 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.018 | 0 | 20 | 19.6 | 1 | | 1XHR401 |
| 310 | 0.336 | 0 | 0 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 2.17 | 10 | 8.75 | 5.301 | | |
| 311 | 0.336 | 3 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 1.39 | 65 | 66.6 | 1.424 | | to 1YHR400 |
| 312 | 0.256 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.21 | 0.018 | 0.46 | 15 | 13.8 | 1.439 | | |

UNISONT ENGINEERING, INC.

# CALCULATION SHEET

| | | | |
|---|---|---|---|
| Project: | HOPE CREEK GENERATING STATION | Job Number: | 8038 |
| Calc No. | 8038-P0004 | Sheet No. | 92 |
| By: | A Arastu Date: 9/14/18 | Rev. No. | 1 |
| Subject: | Water Hammer Analysis of the HCGS Fire Protection System | | |

| Link No. | Dia | 90 Deg Bend | 45 Deg Bend | Thru Tee | Branch Tee | Gate Valve | Globe Valve | Butterfly Valve | Plug Valve | Ball Valve | Swing Check | Other L/D | Other K | Friction Factor | Total K | Link Length USLAM | Link Length Actual | Friction Factor Multiplier FFMult | Conn | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (ft) | | | | | | | | | | | | | | | (ft) | (ft) | | | |
| 313 | 0.256 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.018 | 1.18 | 60 | 57.8 | 1.281 | | iso. 1kc-14 |
| 314 | 0.256 | 3 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.018 | 1.11 | 30 | 27.9 | 1.527 | | 1YHR400 |
| 315 | 0.256 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.21 | 0.018 | 0.71 | 25 | 23 | 1.407 | | 1HHR400 |
| 316 | 0.336 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 1.36 | 10 | 12.3 | 3.688 | | |
| 317 | 0.256 | 6 | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.018 | 4.02 | 80 | 78.8 | 1.717 | | 1THR400 |
| 318 | 0.336 | 1 | 0 | 1 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 2.75 | 10 | 8.35 | 6.443 | | v183 |
| 319 | 0.336 | 5 | 1 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 3.39 | 100 | 102.75 | 1.672 | | to XHC300 |
| 320 | 0.336 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 1.36 | 15 | 12 | 2.792 | | to FHC301 |
| 321 | 0.336 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 0.34 | 15 | 14 | 1.448 | | |
| 322 | 0.256 | 7 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.21 | 0.018 | 2.33 | 55 | 56.1 | 1.604 | | DHR201 |
| 323 | 0.256 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.018 | 0.86 | 25 | 26.1 | 1.492 | | XHC300 |
| 324 | 0.336 | 2 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 1.83 | 45 | 44.4 | 1.806 | | to FHC301 |
| 325 | 0.256 | 2 | 0 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.018 | 2.65 | 30 | 32.5 | 2.263 | | RHR301 |
| 326 | 0.256 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.21 | 0.018 | 0.46 | 35 | 33 | 1.188 | | FHC301 |
| 327 | 0.336 | 3 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 2.21 | 30 | 28.7 | 2.456 | 6"hdr 1 | v180 |
| 328 | 0.336 | 8 | 4 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 4.27 | 90 | 92.15 | 1.939 | | to THR301 |
| 329 | 0.336 | 3 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 1.05 | 30 | 28.3 | 1.694 | | |
| 330 | 0.336 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 0.34 | 15 | 13.75 | 1.448 | | to RHC301 |
| 331 | 0.256 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.21 | 0.018 | 1.14 | 90 | 90.65 | 1.181 | | MHC301 |
| 332 | 0.256 | 4 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.018 | 2.08 | 15 | 16.1 | 2.98 | | RHC301 |
| 333 | 0.336 | 1 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 1.93 | 15 | 13.8 | 3.554 | | to RHC301 |
| 334 | 0.256 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.21 | 0.018 | 0.21 | 15 | 12.75 | 1.2 | | UHR301 |
| 335 | 0.256 | 2 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.018 | 1.58 | 50 | 49.75 | 1.451 | | THR301 |
| 336 | 0.336 | 3 | 0 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 2.88 | 10 | 12.8 | 6.712 | 6" hdr 1 | v178 |
| 337 | 0.336 | 6 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 2.44 | 90 | 90.65 | 1.538 | | to AHR302 |
| 338 | 0.336 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 0.81 | 40 | 38.6 | 1.403 | | to PHC301 |
| 339 | 0.336 | 8 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 3.59 | 50 | 49.55 | 2.423 | | to AHC301 |
| 340 | 0.336 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 1.02 | 10 | 12.3 | 3.016 | | |
| 341 | 0.256 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.21 | 0.018 | 1.07 | 45 | 45.2 | 1.34 | | NHC301 |
| 342 | 0.256 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.21 | 0.018 | 0.71 | 15 | 14.5 | 1.678 | | vent line |
| 343 | 0.256 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.21 | 0.018 | 0.21 | 10 | 7.7 | 1.3 | | PHC301 |

UNISONT ENGINEERING, INC.

# CALCULATION SHEET

| | | | |
|---|---|---|---|
| Project: | HOPE CREEK GENERATING STATION | Job Number: | 8038 |
| Calc No. | 8038-P0004 | Sheet No. | 93 |
| By: | A Arastu Date: 9/14/18 | Rev. No. | 1 |
| Subject: | Water Hammer Analysis of the HCGS Fire Protection System | | |

| Link No. | Dia | 90 Deg Bend | 45 Deg Bend | Thru Tee | Branch Tee | Gate Valve | Globe Valve | Butterfly Valve | Plug Valve | Ball Valve | Swing Check | Other L/D | Other K | Friction Factor | Total K | Link Length USLAM | Link Length Actual | Friction Factor Multiplier FFMult | Conn | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (ft) | | | | | | | | | | | | | | | (ft) | (ft) | | | |
| 344 | 0.256 | 2 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.018 | 1.58 | 35 | 35.5 | 1.644 | | AHC301 |
| 345 | 0.256 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.018 | 1.69 | 5 | 5 | 5.813 | | to EHR300 |
| 346 | 0.256 | 5 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.018 | 1.61 | 80 | 80.63 | 1.288 | | to WHR300 |
| 347 | 0.256 | 4 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.018 | 2.8 | 55 | 56.7 | 1.726 | | AHR302 |
| 348 | 0.256 | 1 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.018 | 1.68 | 15 | 14.8 | 2.601 | | WHR300 |
| 349 | 0.256 | 4 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.018 | 2.08 | 50 | 49.2 | 1.594 | | EHR300 |
| 350 | 0.505 | 7 | 3 | 1 | 1 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.015 | 3.47 | 175 | 177.55 | 1.669 | 6"hdr 4 | v182 |
| 351 | 0.336 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 0 | 50 | 50 | 1 | | v065 |
| 352 | 0.336 | 2 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 1.63 | 10 | 10.7 | 4.226 | 6" hdr 1 | v179 |
| 353 | 0.336 | 2 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 1.15 | 80 | 78 | 1.285 | | |
| 354 | 0.336 | 5 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 2.55 | 80 | 78.3 | 1.63 | | |
| 355 | 0.256 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.21 | 0.018 | 0.96 | 30 | 30 | 1.458 | | |
| 356 | 0.256 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.018 | 0.39 | 25 | 26 | 1.225 | | v072 |
| 357 | 0.162 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 0.019 | 5 | 50 | 50 | 1.843 | | |
| 358 | 0.336 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 1.15 | 5 | 5.4 | 5.57 | | v066 |
| 359 | 0.162 | 6 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.019 | 3.15 | 35 | 32.4 | 1.759 | | |
| Turbine Bldg Risers | | | | | | | | | | | | | | | | | | | | |
| 360 | 0.336 | 3 | 1 | 3 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 3.05 | 45 | 44.2 | 2.343 | 10"hdr1 | TB |
| 361 | 0.336 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 0.34 | 15 | 14.8 | 1.448 | | v60 |
| 362 | 0.256 | 2 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.21 | 0.018 | 1.78 | 50 | 48.9 | 1.51 | | |
| 363 | 0.256 | 9 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.018 | 3.87 | 145 | 146 | 1.381 | | |
| 364 | 0.256 | 3 | 5 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.018 | 3.07 | 100 | 97.7 | 1.439 | | |
| 365 | 0.336 | 6 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 3.09 | 65 | 64.62 | 1.94 | hdr #1 | v58 |
| 366 | 0.336 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.21 | 0.017 | 0.55 | 20 | 21.33 | 1.544 | | |
| 367 | 0.256 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.018 | 0.25 | 15 | 17.3 | 1.239 | | |
| 368 | 0.256 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.018 | 1.33 | 20 | 21.7 | 1.947 | | 1FHR101 |
| 369 | 0.336 | 1 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 1.93 | 30 | 28.43 | 2.275 | | |
| 370 | 0.256 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.21 | 0.018 | 0.57 | 35 | 32.5 | 1.232 | | |
| 371 | 0.256 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.018 | 0 | 10 | 10 | 1 | | 1FHR104 |
| 372 | 0.256 | 6 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.018 | 2.76 | 20 | 21.7 | 2.97 | | |
| 373 | 0.256 | 3 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.018 | 2.01 | 55 | 54.5 | 1.521 | | |

UNISONT ENGINEERING, INC.

# CALCULATION SHEET

| | | | |
|---|---|---|---|
| Project: | HOPE CREEK GENERATING STATION | Job Number: | 8038 |
| Calc No. | 8038-P0004 | Sheet No. | 94 |
| By: | A Arastu Date: 9/14/18 | Rev. No. | 1 |
| Subject: | Water Hammer Analysis of the HCGS Fire Protection System | | |

| Link No. | Dia | 90 Deg Bend | 45 Deg Bend | Thru Tee | Branch Tee | Gate Valve | Globe Valve | Butterfly Valve | Plug Valve | Ball Valve | Swing Check | Other L/D | Other K | Friction Factor | Total K | Link Length USLAM | Link Length Actual | Friction Factor Multiplier FFMult | Conn | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (ft) | | | | | | | | | | | | | | | (ft) | (ft) | | | |
| 374 | 0.336 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 1.49 | 5 | 2.2 | 6.914 | hdr #1 | v055 |
| 375 | 0.336 | 5 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 1.53 | 50 | 53.1 | 1.605 | | |
| 376 | 0.256 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.21 | 0.018 | 0.21 | 30 | 28.7 | 1.1 | | |
| 377 | 0.256 | 2 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.018 | 1.58 | 30 | 31.2 | 1.751 | | |
| 378 | 0.256 | 2 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.018 | 1.93 | 20 | 19.5 | 2.38 | | |
| 379 | 0.336 | 2 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 1.97 | 10 | 10.8 | 4.898 | hdr #1 | v054 |
| 380 | 0.336 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 0.34 | 5 | 0.7 | 2.344 | | |
| 381 | 0.336 | 4 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 1.63 | 100 | 103.5 | 1.322 | | |
| 382 | 0.256 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.21 | 0.018 | 2.72 | 65 | 64.7 | 1.598 | | |
| 383 | 0.256 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.018 | 0 | 20 | 20 | 1 | | |
| 384 | 0.336 | 2 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 2.17 | 50 | 49.95 | 1.859 | | on iso KC-09 |
| 385 | 0.256 | 3 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.21 | 0.018 | 1.32 | 75 | 77.7 | 1.252 | | |
| 386 | 0.256 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.018 | 0.75 | 40 | 40.3 | 1.269 | | |
| 387 | 0.256 | 3 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.018 | 1.83 | 15 | 17.7 | 2.741 | | |
| 388 | 0.256 | 6 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.018 | 2.58 | 40 | 38.7 | 1.922 | | |
| 389 | 0.336 | 2 | 0 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 1.29 | 45 | 43.25 | 1.567 | hdr #1 | v053 |
| 390 | 0.256 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.21 | 0.018 | 0.96 | 20 | 19.25 | 1.688 | | |
| 391 | 0.256 | 6 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.018 | 2.58 | 110 | 109.75 | 1.335 | | 1JHR104 |
| 392 | 0.336 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 1.73 | 5 | 3.1 | 7.854 | hdr #1 | v063 |
| 393 | 0.256 | 11 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.21 | 0.018 | 4.76 | 215 | 215.25 | 1.316 | | |
| 394 | 0.256 | 10 | 7 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.018 | 4.11 | 125 | 123.45 | 1.47 | | 1DHR103 |
| 395 | 0.336 | 7 | 1 | 3 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 4 | 150 | 149.15 | 1.528 | hdr #1 | v059 |
| 396 | 0.256 | 7 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.21 | 0.018 | 3.04 | 155 | 155.6 | 1.28 | | |
| 397 | 0.256 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.018 | 1 | 30 | 30.9 | 1.478 | | 1CHR104 |
| 398 | 0.256 | 3 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.018 | 1.83 | 40 | 40.15 | 1.653 | | 1CHR102 |
| 399 | 0.505 | 2 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.015 | 1.91 | 120 | 119.25 | 1.538 | hdr #1 | |
| 400 | 0.336 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.28 | 0.017 | 1.77 | 5 | 1.5 | 8.007 | | v064 |
| 401 | 0.256 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.21 | 0.018 | 1.46 | 60 | 61.25 | 1.349 | | 1BHR103 |
| 402 | 0.336 | 6 | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 3.25 | 130 | 132.2 | 1.496 | #11 | v066 |
| 403 | 0.336 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 0.58 | 50 | 52.15 | 1.228 | | |
| 404 | 0.256 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.21 | 0.018 | 1.21 | 55 | 55.45 | 1.315 | | 1AHR103 |

UNISONT ENGINEERING, INC.

# CALCULATION SHEET

| | | | |
|---|---|---|---|
| Project: | HOPE CREEK GENERATING STATION | Job Number: | 8038 |
| Calc No. | 8038-P0004 | Sheet No. | 95 |
| By: | A Arastu Date: 9/14/18 | Rev. No. | 1 |
| Subject: | Water Hammer Analysis of the HCGS Fire Protection System | | |

| Link No. | Dia | 90 Deg Bend | 45 Deg Bend | Thru Tee | Branch Tee | Gate Valve | Globe Valve | Butterfly Valve | Plug Valve | Ball Valve | Swing Check | Other L/D | Other K | Friction Factor | Total K | Link Length USLAM | Link Length Actual | Friction Factor Multiplier FFMult | Conn | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (ft) | | | | | | | | | | | | | | | (ft) | (ft) | | | |
| 405 | 0.336 | 5 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 2.55 | 40 | 37.75 | 2.26 | | on iso. Kc-09 |
| 406 | 0.256 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.21 | 0.018 | 0.96 | 30 | 30.4 | 1.458 | | 1AHR106 |
| 407 | 0.256 | 2 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.018 | 1.58 | 125 | 125.25 | 1.18 | | 1AHR104 |
| 408 | 0.336 | 9 | 2 | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 3.76 | 135 | 134.45 | 1.552 | hdr #1 | v094 |
| 409 | 0.336 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 0 | 20 | 20 | 1 | | wet sprinkler |
| 410 | 0.256 | 2 | 2 | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.018 | 2.22 | 95 | 95 | 1.334 | hdr #1 | v093 |
| 411 | 0.256 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.018 | 0.25 | 10 | 10 | 1.358 | | ZS-3381L (V011) |
| 412 | 0.107 | 9 | 0 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.022 | 5.38 | 60 | 60 | 1.439 | | |
| 413 | 0.107 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.022 | 0 | 25 | 25 | 1 | | arbitrary link |
| Turbine Bldg 6-inch Header 2 | | | | | | | | | | | | | | | | | | | | |
| 414 | 0.505 | 11 | 1 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.015 | 4.07 | 100 | 100 | 2.373 | v056 | #35 |
| 415 | 0.505 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.015 | 0.72 | 5 | 5 | 5.848 | (riser 33/34) | |
| 416 | 0.336 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 0 | 5 | 5 | 1 | (assumed) | |
| 417 | 0.336 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 0 | 50 | 50 | 1 | | |
| 418 | 0.336 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 0 | 50 | 50 | 1 | | |
| Turbine Bldg 8-inch Header 3 | | | | | | | | | | | | | | | | | | | | |
| 419 | 0.505 | 4 | 5 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.015 | 2.6 | 85 | 84.99 | 2.031 | 10"hdr1 | v061 |
| 420 | 0.505 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.015 | 0.66 | 50 | 50.87 | 1.443 | | |
| 421 | 0.505 | 1 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.015 | 0.81 | 30 | 32.75 | 1.909 | | v001/002/003 (not modeled - low elev.) |
| 422 | 0.505 | 2 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.015 | 1.61 | 40 | 39.75 | 2.361 | | |
| 423 | 0.505 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.015 | 0.51 | 35 | 36.92 | 1.491 | #29 | |
| 424 | 0.256 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.21 | 0.018 | 0.35 | 10 | 5.8 | 1.505 | | ZS-3381F(v006) |
| 425 | 0.162 | 4 | 0 | 10 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.019 | 7.23 | 105 | 105 | 1.58 | | (riser 29) |
| 426 | 0.336 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.21 | 0.017 | 1.7 | 40 | 41.55 | 1.843 | #28 | |
| 427 | 0.256 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.018 | 0 | 10 | 10 | 1 | | ZS-3381E(v005) |
| 428 | 0.162 | 5 | 0 | 10 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.019 | 7.5 | 100 | 100 | 1.632 | | (riser 28) |
| 429 | 0.256 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.21 | 0.018 | 0.46 | 40 | 39.8 | 1.165 | #27 | ZS-3381D(v004) |
| 430 | 0.162 | 6 | 0 | 13 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.019 | 10.07 | 155 | 154.4 | 1.548 | | (riser 27) |

UNISONT ENGINEERING, INC.

# CALCULATION SHEET

| | | | |
|---|---|---|---|
| Project: | HOPE CREEK GENERATING STATION | Job Number: | 8038 |
| Calc No. | 8038-P0004 | Sheet No. | 96 |
| By: | A Arastu Date: 9/14/18 | Rev. No. | 1 |
| Subject: | Water Hammer Analysis of the HCGS Fire Protection System | | |

| Link No. | Dia | 90 Deg Bend | 45 Deg Bend | Thru Tee | Branch Tee | Gate Valve | Globe Valve | Butterfly Valve | Plug Valve | Ball Valve | Swing Check | Other L/D | Other K | Friction Factor | Total K | Link Length USLAM | Link Length Actual | Friction Factor Multiplier FFMult | Conn | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (ft) | | | | | | | | | | | | | | | (ft) | (ft) | | | |
| RW Riser # 36 | | | | | | | | | | | | | | | | | | | | |
| 431 | 0.256 | 5 | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.018 | 2.62 | 40 | 42.1 | 1.934 | 6"hdr4 | v101 |
| 432 | 0.256 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.018 | 0.14 | 105 | 102 | 1.02 | | v062 |
| 433 | 0.162 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.019 | 0.27 | 10 | 10 | 1.227 | | |
| 434 | 0.162 | 3 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.019 | 1.58 | 40 | 38.9 | 1.332 | | |
| Turbine Bldg 8-inch Header 3 | | | | | | | | | | | | | | | | | | | | |
| 435 | 0.665 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 1.43 | 15 | 15.13 | 5.522 | L | v65 |
| 436 | 0.665 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.28 | 5 | 4 | 3.66 | riser #20 | |
| 437 | 0.665 | 0 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 1.4 | 5 | 6.83 | 14.3 | riser #24,25 | |
| 438 | 0.505 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.21 | 0.015 | 0.54 | 5 | 5.03 | 4.652 | | deluge to XFR A |
| 439 | 0.505 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0.015 | 0.75 | 5 | 1 | 6.05 | | v22/XV3383K |
| 440 | 0.336 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 0 | 60 | 60 | 1 | | (assumed) |
| XFR-C Deluge/Spray System and Risers | | | | | | | | | | | | | | | | | | | | |
| 441 | 0.665 | 1 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 1.88 | 10 | 9.7 | 9.911 | riser #24 | |
| 442 | 0.665 | 6 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 1.46 | 80 | 81.5 | 1.865 | | |
| 443 | 0.665 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.11 | 50 | 50 | 1.106 | v007 | wet sprinkler - no drain |
| 444 | 0.336 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0.017 | 2.24 | 10 | 7.5 | 5.435 | v006 | wet sprinkler - no drain |
| 445 | 0.665 | 3 | 3 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 1.4 | 40 | 39.25 | 2.658 | v081 | (riser #25) |
| 446 | 0.505 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.015 | 1.02 | 5 | 4.2 | 7.868 | v020 | (deluge to M XFR C) |
| 447 | 0.505 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.015 | 0 | 5 | 1 | 1 | XV-1-3383H | |
| 448 | 0.505 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0.015 | 1.74 | 45 | 47 | 2.301 | iso. C-0064 | |
| 449 | 0.336 | 2 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 1.63 | 20 | 20.5 | 2.613 | vendor pipe | |
| 450 | 0.336 | 12 | 0 | 10 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 7.26 | 110 | 108.39 | 2.307 | (lumped both loops to 1) | |
| 451 | 0.336 | 7 | 4 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 3.83 | 160 | 161.07 | 1.474 | to deluge | |
| 452 | 0.336 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 0 | 5 | 4.43 | 1 | V017/XV3383D | |
| 453 | 0.256 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.018 | 0 | 50 | 48.09 | 1 | (assumed not acting) | |

UNISONT ENGINEERING, INC.

# CALCULATION SHEET

| | | | |
|---|---|---|---|
| Project: | HOPE CREEK GENERATING STATION | Job Number: | 8038 |
| Calc No. | 8038-P0004 | Sheet No. | 97 |
| By: | A Arastu Date: 9/14/18 | Rev. No. | 1 |
| Subject: | Water Hammer Analysis of the HCGS Fire Protection System | | |

| Link No. | Dia | 90 Deg Bend | 45 Deg Bend | Thru Tee | Branch Tee | Gate Valve | Globe Valve | Butterfly Valve | Plug Valve | Ball Valve | Swing Check | Other L/D | Other K | Friction Factor | Total K | Link Length USLAM | Link Length Actual | Friction Factor Multiplier FFMult | Conn | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (ft) | | | | | | | | | | | | | | | (ft) | (ft) | | | |
| Reactor Building Deluge | | | | | | | | | | | | | | | | | | | | |
| 454 | 0.665 | 3 | 5 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 2.51 | 30 | 28 | 4.979 | 8"hdr1 | v410 |
| 455 | 0.665 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.014 | 0.39 | 10 | 10 | 2.862 | | V412 |
| 456 | 0.505 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.015 | 0 | 50 | 50 | 1 | | to sprinklers (assumed) |
| 457 | 0.505 | 2 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.015 | 0.84 | 20.4 | 20.4 | 2.386 | | v411 |
| 458 | 0.505 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.015 | 0 | 50 | 50 | 1 | | to sprinklers (assumed) |
| Reactor Building Risers | | | | | | | | | | | | | | | | | | | | |
| 459 | 0.336 | 5 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 2.34 | 20 | 21.6 | 3.318 | AB hdr 1 | v038 |
| 460 | 0.336 | 2 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 0.61 | 10 | 7.5 | 2.21 | | iso. 1p-kc-03 |
| 461 | 0.336 | 2 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 1.15 | 30 | 33.1 | 1.762 | | v071 |
| 462 | 0.336 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 0.58 | 40 | 38.75 | 1.286 | | iso. 1p-kc-06 |
| 463 | 0.336 | 5 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 1.53 | 130 | 128.8 | 1.233 | | |
| 464 | 0.336 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.21 | 0.017 | 0.89 | 30 | 31 | 1.587 | | iso. 1p-kc-08 |
| 465 | 0.256 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.018 | 0.72 | 55 | 52 | 1.186 | | |
| 466 | 0.256 | 2 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 0.018 | 1.88 | 10 | 10 | 3.681 | | to 1-WHR200 |
| Reactor Building Riser 2 | | | | | | | | | | | | | | | | | | | | |
| 467 | 0.336 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 1.39 | 20 | 17.8 | 2.378 | AB hdr 1 | v212 |
| 468 | 0.336 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 0 | 20 | 19.4 | 1 | | |
| 469 | 0.336 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 0.14 | 5 | 7.5 | 1.538 | | v078 |
| 470 | 0.336 | 1 | 1 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 2.1 | 25 | 24 | 2.665 | | |
| 471 | 0.336 | 5 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 1.53 | 75 | 76.8 | 1.403 | | (iso. 1p-kc-06) |
| 472 | 0.336 | 1 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 1.25 | 35 | 35 | 1.708 | | to BHR201 |
| 473 | 0.336 | 7 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 2 | 30 | 29.3 | 2.322 | | to UHR200 |
| 474 | 0.336 | 2 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.21 | 0.017 | 1.36 | 35 | 37.5 | 1.77 | | to XHR210 |
| 475 | 0.256 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.018 | 0.75 | 15 | 16.3 | 1.717 | | |
| 476 | 0.256 | 2 | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 0.018 | 3.31 | 110 | 112.4 | 1.43 | | XHR210 |
| 477 | 0.256 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 0.018 | 1.3 | 10 | 10 | 2.862 | | |
| 478 | 0.256 | 4 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 0.018 | 2.38 | 40 | 100 | 1.849 | | UHR200 |
| 479 | 0.336 | 0 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.21 | 0.017 | 1.9 | 10 | 12 | 4.769 | | |
| 480 | 0.256 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 0.018 | 1.23 | 60 | 59.5 | 1.293 | | BHR201 |

UNISONT ENGINEERING, INC.

# CALCULATION SHEET

| | | | |
|---|---|---|---|
| Project: | HOPE CREEK GENERATING STATION | Job Number: | 8038 |
| Calc No. | 8038-P0004 | Sheet No. | 98 |
| By: | A Arastu Date: 9/14/18 | Rev. No. | 1 |
| Subject: | Water Hammer Analysis of the HCGS Fire Protection System | | |

| Link No. | Dia | 90 Deg Bend | 45 Deg Bend | Thru Tee | Branch Tee | Gate Valve | Globe Valve | Butterfly Valve | Plug Valve | Ball Valve | Swing Check | Other L/D | Other K | Friction Factor | Total K | Link Length USLAM | Link Length Actual | Friction Factor Multiplier FFMult | Conn | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (ft) | | | | | | | | | | | | | | | (ft) | (ft) | | | |
| Reactor Building Riser 3 (Manual Pre-Action Valves) | | | | | | | | | | | | | | | | | | | | |
| 481 | 0.505 | 2 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.21 | 0.015 | 1.95 | 5 | 5 | 14.146 | AB hdr 1 | v046 |
| 482 | 0.505 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0.015 | 1.38 | 20 | 16.3 | 3.323 | | (xv3408M consist of a deluge valve and a check valve) |
| 483 | 0.505 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.015 | 0 | 10 | 16.4 | 1 | | piping downstream of preaction valve consist of pressurized air at 20 psig |
| 484 | 0.505 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.015 | 0 | 50 | 50 | 1 | | not modeled |
| Radwate Building Riser from valve (V430) | | | | | | | | | | | | | | | | | | | | |
| 485 | 0.505 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.28 | 0.015 | 1.81 | 5 | 6.3 | 13.184 | | |
| 486 | 0.336 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 0.71 | 90 | 90.5 | 1.157 | | |
| 487 | 0.336 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 0.48 | 15 | 14.7 | 1.627 | | |
| 488 | 0.336 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 1.19 | 75 | 73.7 | 1.314 | | |
| 489 | 0.336 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 1.26 | 70 | 72.7 | 1.355 | | |
| 490 | 0.336 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.017 | 1.26 | 10 | 9.4 | 3.486 | | |
| 491 | 0.336 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.21 | 0.017 | 0.21 | 10 | 8 | 1.416 | | |
| 492 | 0.256 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.18 | 0.018 | 0.18 | 10 | 7.5 | 1.251 | | |
| 493 | 0.206 | 2 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.018 | 1.95 | 10 | 8.8 | 3.225 | | |
| 494 | 0.206 | 0 | 0 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.018 | 3.61 | 75 | 76 | 1.549 | | |
| 495 | 0.172 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.15 | 0.019 | 1.66 | 20 | 20 | 1.757 | | |
| 496 | 0.087 | 1 | 0 | 1 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.023 | 3.7 | 10 | 9 | 2.409 | | |

## A2 Flow Resistance Coefficients for Valves

The resistance coefficient (K) for open valves can be calculated from the following equation:

$$K = f*(L/d)$$

where: f = Friction Factor (see Crane 410, Ref. A-4)
L/d = Length to diameter ratio (see Ref. A-4)

The K values Vs. valve opening area for the gate valves are taken from Lyons handbook for standard valves (see Reference A-5). The K value at full open position is taken as 0.01, since loss across the full open valve is negligible.

The K values vs. valve opening area for the deluge valves are taken from Lyons handbook for standard valves (see Reference A-5). The K value at full open position is calculated based on the equivalent length taken from vendor data (Viking Valves, Ref. A-13) where the equivalent length (L) for 6-inch valve is 33 and 4-inch valve is 35. There is no data for 8-inch valve and the equivalent length for 6-inch valve is conservatively used.

The calculated K values are:

8-inch valve, K = 0.695
6-inch valve, K = 0.99
4-inch valve, K = 1.785

Deluge valve XV-3408M for system 1PD3 (Viking model D-5) PSEG valve list identified this as a 4-inch valve. Since the actual valve size modeled and the connecting pipe is 6 inch a K value of 0.99 is used conservatively. Similarly, deluge valve XV-3383H for system 1D12 (Viking model D-5) also used a K value of 0.99 for a 6-inch valve. Deluge valve XV-3262 for system 1PS16 (Viking model E-1) PSEG valve list identified this as a 6-inch valve, since actual valve size modeled and the connecting pipe is 8 inch a K value of 0.695 is used conservatively.

Other open valves:

The restriction coefficients for other open valves are internally calculated by USLAM (see Section A1).

## A3 Pump Data for All HCGS and Salem FPS Pumps

The pump characteristic is based on the Pump Performance Data provided and is taken from Manufacture pump curves, References A-7 thru A-12. The flow (Q) versus head data for both the Hope Creek electric and diesel pumps and the Salem diesel pumps and their jockey pumps are digitized in the tables below.

Hope Creek Electric and Diesel Fire System Pumps:

| Q (gpm) | Head (ft) | Adjusted Head (Hydraulic Gradeline) (ft) |
|---|---|---|
| 0 | 325 | 495.3 |
| 250 | 324 | 494.3 |
| 500 | 322 | 492.3 |
| 750 | 321 | 491.3 |
| 1000 | 318 | 488.3 |
| 1250 | 315 | 485.3 |
| 1500 | 311 | 481.3 |
| 1750 | 307 | 477.3 |
| 2000 | 302 | 472.3 |
| 2250 | 296 | 466.3 |
| 2500 | 289 | 459.3 |
| 2750 | 278 | 448.3 |
| 3000 | 266 | 436.3 |
| 3250 | 253 | 423.3 |
| 4000 | 205 | 375.3 |
| 6000 | 0 | 170.3 |

The hydraulic grade line is calculated by adding the elevation head of 140.3 ft (minimum tank water level) plus the atmospheric head of 34 feet to the pump head minus the difference in elevation between the pump discharge and tank nozzle (102.8 – 98.75) of 4.05 feet. The hydraulic grade line will then be 170.3 feet.

UNISONT ENGINEERING, INC.

# CALCULATION SHEET

| | | | |
|---|---|---|---|
| Project: | HOPE CREEK GENERATING STATION | Job Number: | 8038 |
| Calc No. | 8038-P0004 | Sheet No. | 101 |
| By: | A Arastu Date: 9/14/18 | Rev. No. | 1 |
| Subject: | Water Hammer Analysis of the HCGS Fire Protection System | | |

HCGS Jockey Pump:

| **Q** (gpm) | Head (ft) | Adjusted Head (Hydraulic Gradeline) (ft) |
|---|---|---|
| 0 | 400 | 570.3 |
| 10 | 417 | 587.3 |
| 15 | 430 | 590.3 |
| 20 | 417 | 587.3 |
| 25 | 410 | 580.3 |
| 30 | 398 | 568.3 |
| 35 | 388 | 558.3 |
| 40 | 372 | 542.3 |
| 45 | 350 | 520.3 |
| 50 | 320 | 490.3 |
| 55 | 290 | 460.3 |
| 60 | 250 | 420.3 |
| 65 | 200 | 370.3 |
| 70 | 140 | 310.3 |
| 75 | 70 | 240.3 |
| 80 | 0 | 170.3 |

The hydraulic grade line is the same as the Fire pumps.

UNISONT ENGINEERING, INC.

# CALCULATION SHEET

| | | | |
|---|---|---|---|
| Project: | HOPE CREEK GENERATING STATION | Job Number: | 8038 |
| Calc No. | 8038-P0004 | Sheet No. | 102 |
| By: | A Arastu Date: 9/14/18 | Rev. No. | 1 |
| Subject: | Water Hammer Analysis of the HCGS Fire Protection System | | |

Salem Fire System Pumps P1 and P2:

| Q (gpm) | Head (ft) | Adjusted Head (Hydraulic Gradeline) (ft) |
|---|---|---|
| 0 | 345 | 512.1 |
| 250 | 343 | 510.1 |
| 500 | 340 | 507.1 |
| 750 | 338 | 505.1 |
| 1000 | 335 | 502.1 |
| 1250 | 333 | 500.1 |
| 1500 | 331 | 498.1 |
| 1750 | 328 | 495.1 |
| 2000 | 325 | 492.1 |
| 2250 | 320 | 487.1 |
| 2500 | 315 | 482.1 |
| 2750 | 309 | 476.1 |
| 3000 | 300 | 467.1 |
| 3250 | 290 | 457.1 |
| 4000 | 245 | 412.1 |
| 6000 | 0 | 167.1 |

The hydraulic grade line is calculated by adding the elevation head of 132.8 ft (minimum tank water level) plus the atmospheric head of 34 feet to the pump head minus the difference in elevation between the pump discharge and tank nozzle (102.75 – 103) of 0.3 feet. The hydraulic grade line will then be 167.1 feet.

Salem Jockey Pump:

| **Q** (gpm) | Head (ft) | Adjusted Head (Hydraulic Gradeline) (ft) |
|---|---|---|
| 0 | 314 | 482.1 |
| 10 | 310 | 478.1 |
| 15 | 305 | 473.1 |
| 20 | 295 | 463.1 |
| 25 | 280 | 448.1 |
| 30 | 260 | 428.1 |
| 35 | 235 | 403.1 |
| 40 | 206 | 374.1 |
| 45 | 175 | 343.1 |
| 50 | 140 | 308.1 |
| 55 | 100 | 268.1 |
| 60 | 65 | 233.1 |
| 65 | 30 | 198.1 |
| 70 | 0 | 168.1 |

The hydraulic grade line is calculated by adding the elevation head of 132.8 ft (minimum tank water level) plus the atmospheric head of 34 feet to the pump head minus the difference in elevation between the pump discharge and tank nozzle (101.7 – 103) of 1.3 feet. The hydraulic grade line will then be 168.1 feet.

Pump Start Delay Times:

The pump initiation start times for all cases are dependent on the various pump alignments. HC electric pump will start upon system pressure fall below 110 psig (Reference A-2). HC diesel pump will start upon system pressure fall below 100 psig (Ref. A-2). Salem fire pump #1 will start upon system pressure fall below 85 psig with a 2 second delay (Ref. A-3). Salem fire pump #2 will start upon system pressure fall below 75 psig with 21.3 second delay (Ref. A-3). The HC electric pump takes 1.8 seconds reach full flow after starting (Ref. A-3). The HC diesel pump takes 2.8 seconds to come to full flow after starting (Ref. A-3). The Salem fire pump #1 takes 3.1 seconds to reach full flow after a 2 second delay for a total of 5.1 seconds after receiving signal to start (Ref. A-3). The Salem fire pump #2 takes 5.2 seconds to

reach full flow after a 21.3 second delay for a total of 26.3 second after receiving signal to start (Ref. A-3).

## A4 Additional Flow Resistance (K) Calculation

The pipe downstream of the pre-action valve XV-3408M is not explicitly modeled. The equivalent flow resistance (K) of the piping components downstream of the pre-action valve will be estimated based on an equivalent 6" pipe, number of elbows, number of branches etc. This equivalent K will be applied at the throat of the valve. Below is an approximate calculation of the K value:

The piping downstream of pre-action valve consists of 16 feet of 6 in. pipe, 265 feet of 4 in. pipe, and 145 feet of 3 in. pipe. There are numerous 1 inch branch pipe and losses in the fittings will be conservatively ignored. Thus, the equivalent K can be calculated as follows:

6-inch pipe

**90 elbows, L/D = 14, for 2 elbows, L/D = 2x14 = 28**

Equivalent K = f (L/D) = 0.015 x 28 = 0.42

16 feet of 6 in. pipe (ID=0.505 feet), K = f (L/D) = 0.015 (16/0.505) = 0.48

Total K = 0.42+0.48 = 0.9

4-inch pipe

90 elbows, L/D = 14, for 20 elbows, L/D = 20x14 = 280

Tees, L/D = 20, for 7 thru Tees, L/D = 7x20 = 140

265 feet of 4-inch pipe (ID=0.336)

Therefore, the total K = 0.017(280+140+265)/0.336 = 20.55

3-inch pipe

90 elbows, L/D = 14, for 8 elbows, L/D = 8x14 = 112

45 elbows, L/D = 11, for 2 elbows, L/D = 2x11 = 22

Tees, L/D = 20, for 2 thru Tees, L/D = 2x20 = 40

145 feet of 3-inch pipe (ID=0.256)

Therefore, the total K = 0.018(112+22+145)/0.256 = 13.43

Thus, the equivalent K value based on a 6-inch pipe is then = 0.9+20.55(0.336/0.505) +13.43(0.256/0.505) = 21.32. A (K) value of 5.0 will be conservatively used at the pipe downstream of the deluge valve to allow for downstream piping losses.

Similarly, a (K) value of 5.0 will be conservatively used at the pipe downstream of the deluge valves for pre-action system 1PS16 (valve ID XV-3262) and deluge system 1D14 (valve XV-3383K).

## A5 Vacuum Breaker Data

A half inch vacuum breakers nominal size was chosen as the sprinkler piping and the piping to fire hose valves at the top of the riser are about 1 to 2 inches in diameter in most cases. The vacuum breaker data are provided by the manufacturer (The Johnson Corporation, see Appendix E) for an ½ inch valve model VB8-51. Following data is used for modelling the vacuum breakers:

Physical dimensions:

Disk (ball) diameter is 0.5 inch.

Throat diameter is taken as 0.344 inch.

Disk weight is assumed as half the total weight of vacuum breaker (2 oz.), therefore disk weight is 1 oz. or 0.083 lb.

Vacuum breaker setting:

Vacuum required to open for ½ inch valve is 0.16 psid (vertical position with no spring). This is a nominal value, per manufacturer this value can range from 0 to 1.0 psid. Allowing for a 30% margin, per Supply System instruction, a setting of 0.21 (0.16x1.3) psid shall be used for the analyses.

Air properties:

Air temperature is taken as 68 F.

Air density is taken as 53.3 lbm/ft$^3$

Air pressure outside is taken as 14.7 psia.

Valve flow coefficient ($C_v$):

The flow coefficient can be calculated based on the following equation (Ref. A-4):

$$Q_m = \frac{13.9 P_1 C_v}{\sqrt{S_g T_1}}$$

Where,

$Q_m$ = 14, Rate of gas flow in cubic ft per min at standard condition – 14.7 psia and 60 F at full open position (SCFM), which is just beyond the set pressure of 0.21 psi. (See Appendix E)

$P_1$ = 14.7, Valve absolute inlet pressure (PSIA)

$T_1$ = 68 + 460 = 528, Air absolute temperature ($^0$R) at valve inlet.

$S_g$ = 1.0, Specific gravity of gas relative to air

Therefore,

$Cv = 14 \times (1.0 \times 528)^{1/2} / (13.9 \times 14.7)$

$= 1.5$

There are two vacuum breakers installed at each major standpipe and only 1 is assumed to open in the analysis.

## A6 Description of Input (USLAM) – Case 1

```
Start of USLAM Input Data File Echo

 HCGS FP Case 1: 9 VBs.  Forces in Riser # 26 only
 10000
 0  0  1  0  1  0
 2   2   0.  12.
 2   1   0   0
 0   1   0  0  0  0  0  1 0 0
 1.9  62.4  7.83E-6
 1.0  2   13    0    0
        0.0    1000.0    2000.0   2.0E+04   6.0E+04   1.0E+05   3.0E+05   6.0E+05
    1.0E+06   1.5E+06   3.5E+06   1.0E+11   1.0E+33
       0.10     0.061     0.048     0.026     0.021      .019    0.0167    0.0155
     0.0150    0.0147     0.014     0.014     0.014
 495.3   3  17  0    0
   -10.00   .000   .557  1.114  1.671  2.228  2.785  3.342
    3.899  4.456  5.013  5.570  6.127  6.684  7.241  8.912
    13.4
    495.3  495.3     494.3     492.3     491.3     488.3     485.3     481.3
    477.3  472.3     466.3     459.3     448.3     436.3     423.3     375.3
    170.3
    1
    1    1.104000     55.00    5.492   4      99.400    94.000     2     0.00000   0   2     0   4000.00       0.0
    2    1.000000     20.00    7.400   4      94.000   105.040     2     0.00000   1   3     0   4000.00       0.0
    3    1.000000     10.00    7.180   4     105.040   105.040     2     0.00000   2   4     0   4000.00       0.0
    4    1.000000     10.00    3.538   2     105.040   104.500     2     0.00000   3   5     0   4000.00       0.0
    5    1.000000      5.00   18.508  13     104.500   104.750     2     0.00000   4   6     0   4000.00       0.0
    6    1.000000     10.00    5.200   4     104.750   110.000     2     0.00000   5   7     0   4000.00       0.0
    7    1.000000     20.00    3.400   3     110.000   105.000     2     0.00000   6   8     0   4000.00       0.0
    8    1.000000    115.00    2.402   3     105.000    96.900     2     0.00000   7  86     0   4000.00       0.0
    9    1.007000      5.00    2.611   4      96.900    96.900     2     0.00000   8  10     0   4000.00       0.0
   10    1.007000     10.00    3.014   4      96.900    96.900     2     0.00000   9  11     0   4000.00       0.0
   11    1.007000     10.00    1.806   4      96.900    96.900     2     0.00000  10  12     0   4000.00       0.0
   12    1.007000     10.00    3.014   3      96.900    96.900     2     0.00000  11  13     0   4000.00       0.0
   13    1.007000    110.00    1.183   4      96.900    96.900     2     0.00000  12  14     0   4000.00       0.0
   14    1.007000    110.00    1.363   4      96.900    95.900     2     0.00000  13  15     0   4000.00       0.0
   15    1.007000     10.00    3.014   4      95.900    95.900     2     0.00000  14  16     0   4000.00       0.0
   16    1.007000     30.00    1.671   4      95.900    95.900     2     0.00000  15  17     0   4000.00       0.0
   17    1.007000     80.00    1.252   4      95.900    95.900     2     0.00000  16  18     0   4000.00       0.0
   18    1.007000     20.00    1.403   4      95.900    95.900     2     0.00000  17  19     0   4000.00       0.0
   19    1.007000    130.00    1.155   4      95.900    95.900     2     0.00000  18  20     0   4000.00       0.0
   20    1.007000    135.00    1.060   4      95.900    95.400     2     0.00000  19  21     0   4000.00       0.0
   21    1.007000     10.00    2.994   4      95.400    93.500     2     0.00000  20  22     0   4000.00       0.0
   22    1.007000     65.00    1.217   4      93.500    93.500     2     0.00000  21  23     0   4000.00       0.0
   23    1.007000      5.00    1.000   4      93.500    93.500     2     0.00000  22  24     0   4000.00       0.0
   24    1.007000     20.00    3.004   4      93.500    97.000     2     0.00000  23  25     0   4000.00       0.0
   25    1.007000    200.00    1.300   4      97.000    97.000     2     0.00000  24  26     0   4000.00       0.0
   26    1.007000     55.00    1.513   4      97.000    97.000     2     0.00000  25  27     0   4000.00       0.0
   27    1.007000     20.00    1.997   4      97.000    93.000     2     0.00000  26  28     0   4000.00       0.0
   28    1.007000    230.00    1.088   3      93.000    93.000     2     0.00000  27 181     0   4000.00       0.0
   29    1.007000     40.00    1.503   3      93.000    93.000     2     0.00000  28  30     0   4000.00       0.0
   30    1.007000    240.00    1.117   4      93.000    94.500     2     0.00000  29  31     0   4000.00       0.0
   31    1.007000     45.00    1.448   4      94.500    94.500     2     0.00000  30  32     0   4000.00       0.0
   32    1.007000     35.00    1.570   4      94.500    91.000     2     0.00000  31  33     0   4000.00       0.0
   33    1.007000    180.00    1.111   4      91.000    96.000     2     0.00000  32  34     0   4000.00       0.0
   34    1.007000     10.00    3.014   4      96.000    96.000     2     0.00000  33  35     0   4000.00       0.0
   35    1.007000      5.00    5.028   4      96.000    96.000     2     0.00000  34  36     0   4000.00       0.0
   36    1.007000      5.00    2.611   4      96.000    96.000     2     0.00000  35  37     0   4000.00       0.0
   37    1.007000     10.00    3.014   4      96.000    96.000     2     0.00000  36  38     0   4000.00       0.0
   38    1.007000     30.00    2.141   4      96.000    96.000     2     0.00000  37  39     0   4000.00       0.0
   39    1.007000     20.00    1.403   4      96.000    96.000     2     0.00000  38  40     0   4000.00       0.0
   40    1.007000     80.00    1.252   3      96.000    96.000     2     0.00000  39  41     0   4000.00       0.0
   41    1.007000     10.00    1.806   4      96.000    96.000     2     0.00000  40  42     0   4000.00       0.0
   42    1.007000     20.00    1.000   4      96.000    96.000     2     0.00000  41  43     0   4000.00       0.0
   43    1.007000     55.00    1.363   4      96.000    97.200     2     0.00000  42  44     0   4000.00       0.0
   44    1.007000      5.00    5.028   4      97.200    97.200     2     0.00000  43  45     0   4000.00       0.0
   45    1.007000    160.00    1.175   4      97.200    96.200     2     0.00000  44  46     0   4000.00       0.0
   46    1.007000     15.00    2.343   3      96.200    96.200     2     0.00000  45 162     0   4000.00       0.0
   47    1.007000      5.00    5.028   4      96.200    96.200     2     0.00000  46  48     0   4000.00       0.0
   48    1.007000     15.00    6.357   4      96.200    97.000     2     0.00000  47  49     0   4000.00       0.0
```

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 49 | 1.007000 | 60.00 | 1.166 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 48 | 50 | 0 | 4000.00 | 0.0 |
| 50 | 1.007000 | 15.00 | 2.994 | 4 | 97.000 | 94.500 | 2 | 0.00000 | 49 | 51 | 0 | 4000.00 | 0.0 |
| 51 | 1.007000 | 5.00 | 4.605 | 4 | 94.500 | 97.000 | 2 | 0.00000 | 50 | 52 | 0 | 4000.00 | 0.0 |
| 52 | 1.007000 | 15.00 | 2.329 | 4 | 97.000 | 94.000 | 2 | 0.00000 | 51 | 53 | 0 | 4000.00 | 0.0 |
| 53 | 1.007000 | 80.00 | 1.501 | 4 | 94.000 | 96.500 | 2 | 0.00000 | 52 | 54 | 0 | 4000.00 | 0.0 |
| 54 | 1.007000 | 65.00 | 1.310 | 3 | 96.500 | 96.500 | 2 | 0.00000 | 53 | 55 | 0 | 4000.00 | 0.0 |
| 55 | 1.007000 | 50.00 | 1.481 | 4 | 96.500 | 97.200 | 2 | 0.00000 | 54 | 56 | 0 | 4000.00 | 0.0 |
| 56 | 1.007000 | 25.00 | 1.322 | 4 | 97.200 | 97.200 | 2 | 0.00000 | 55 | 57 | 0 | 4000.00 | 0.0 |
| 57 | 1.007000 | 5.00 | 3.820 | 4 | 97.200 | 97.200 | 2 | 0.00000 | 56 | 58 | 0 | 4000.00 | 0.0 |
| 58 | 1.007000 | 70.00 | 1.288 | 4 | 97.200 | 97.200 | 2 | 0.00000 | 57 | 59 | 0 | 4000.00 | 0.0 |
| 59 | 1.007000 | 10.00 | 1.806 | 4 | 97.200 | 97.200 | 2 | 0.00000 | 58 | 60 | 0 | 4000.00 | 0.0 |
| 60 | 1.007000 | 195.00 | 1.103 | 4 | 97.200 | 97.200 | 2 | 0.00000 | 59 | 61 | 0 | 4000.00 | 0.0 |
| 61 | 1.007000 | 240.00 | 1.159 | 4 | 97.200 | 94.500 | 2 | 0.00000 | 60 | 62 | 0 | 4000.00 | 0.0 |
| 62 | 1.007000 | 215.00 | 1.094 | 4 | 94.500 | 94.500 | 2 | 0.00000 | 61 | 63 | 0 | 4000.00 | 0.0 |
| 63 | 1.007000 | 110.00 | 1.183 | 4 | 94.500 | 94.500 | 2 | 0.00000 | 62 | 64 | 0 | 4000.00 | 0.0 |
| 64 | 1.007000 | 195.00 | 1.103 | 4 | 94.500 | 94.500 | 2 | 0.00000 | 63 | 65 | 0 | 4000.00 | 0.0 |
| 65 | 1.007000 | 5.00 | 5.028 | 4 | 94.500 | 94.500 | 2 | 0.00000 | 64 | 66 | 0 | 4000.00 | 0.0 |
| 66 | 1.007000 | 30.00 | 1.665 | 4 | 94.500 | 95.800 | 2 | 0.00000 | 65 | 67 | 0 | 4000.00 | 0.0 |
| 67 | 1.007000 | 5.00 | 2.611 | 4 | 95.800 | 95.800 | 2 | 0.00000 | 66 | 68 | 0 | 4000.00 | 0.0 |
| 68 | 1.007000 | 25.00 | 1.806 | 3 | 95.800 | 95.800 | 2 | 0.00000 | 67 | 229 | 0 | 4000.00 | 0.0 |
| 69 | 1.007000 | 130.00 | 1.155 | 4 | 95.800 | 95.500 | 2 | 0.00000 | 68 | 70 | 0 | 4000.00 | 0.0 |
| 70 | 1.007000 | 5.00 | 2.611 | 3 | 95.500 | 95.500 | 2 | 0.00000 | 69 | 261 | 0 | 4000.00 | 0.0 |
| 71 | 1.007000 | 5.00 | 5.028 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 70 | 72 | 0 | 4000.00 | 0.0 |
| 72 | 1.007000 | 5.00 | 2.611 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 71 | 73 | 0 | 4000.00 | 0.0 |
| 73 | 1.007000 | 205.00 | 1.098 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 72 | 74 | 0 | 4000.00 | 0.0 |
| 74 | 1.007000 | 240.00 | 1.117 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 73 | 75 | 0 | 4000.00 | 0.0 |
| 75 | 1.007000 | 20.00 | 4.021 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 74 | 76 | 0 | 4000.00 | 0.0 |
| 76 | 1.007000 | 30.00 | 1.665 | 4 | 95.500 | 91.500 | 2 | 0.00000 | 75 | 77 | 0 | 4000.00 | 0.0 |
| 77 | 1.007000 | 25.00 | 2.120 | 4 | 91.500 | 97.000 | 2 | 0.00000 | 76 | 78 | 0 | 4000.00 | 0.0 |
| 78 | 1.007000 | 50.00 | 1.403 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 77 | 79 | 0 | 4000.00 | 0.0 |
| 79 | 1.007000 | 50.00 | 1.403 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 78 | 80 | 0 | 4000.00 | 0.0 |
| 80 | 1.007000 | 20.00 | 1.997 | 4 | 97.000 | 90.500 | 2 | 0.00000 | 79 | 81 | 0 | 4000.00 | 0.0 |
| 81 | 1.007000 | 40.00 | 2.002 | 4 | 90.500 | 96.900 | 2 | 0.00000 | 80 | 82 | 0 | 4000.00 | 0.0 |
| 82 | 1.007000 | 165.00 | 1.122 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 81 | 83 | 0 | 4000.00 | 0.0 |
| 83 | 1.007000 | 135.00 | 1.060 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 82 | 84 | 0 | 4000.00 | 0.0 |
| 84 | 1.007000 | 10.00 | 3.014 | 3 | 96.900 | 96.900 | 2 | 0.00000 | 83 | 101 | 0 | 4000.00 | 0.0 |
| 85 | 1.007000 | 60.00 | 1.134 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 84 | 86 | 0 | 4000.00 | 0.0 |
| 86 | 1.007000 | 5.00 | 5.028 | 3 | 96.900 | 96.900 | 2 | 0.00000 | 85 | 9 | 1 | 4000.00 | 0.0 |
| 87 | 0.336000 | 10.00 | 5.771 | 3 | 105.000 | 112.070 | 2 | 0.00000 | 7 | 88 | 0 | 4000.00 | 0.0 |
| 88 | 0.336000 | 5.00 | 5.570 | 4 | 112.070 | 113.750 | 2 | 0.00000 | 87 | 89 | 0 | 4000.00 | 0.0 |
| 89 | 0.256000 | 30.00 | 1.870 | 4 | 113.750 | 109.000 | 2 | 0.00000 | 88 | 90 | 0 | 4000.00 | 0.0 |
| 90 | 0.256000 | 10.00 | 1.205 | 2 | 109.000 | 104.250 | 2 | 0.00000 | 89 | 91 | 0 | 4000.00 | 0.0 |
| 91 | 0.256000 | 5.00 | 5.933 | 1 | 104.250 | 103.750 | 2 | 0.00000 | 90 | 0 | 0 | 4000.00 | 0.0 |
| 92 | 0.336000 | 40.00 | 2.714 | 3 | 112.070 | 105.000 | 2 | 0.00000 | 87 | 93 | 0 | 4000.00 | 0.0 |
| 93 | 1.000000 | 20.00 | 3.400 | 4 | 105.000 | 110.200 | 2 | 0.00000 | 92 | 94 | 0 | 4000.00 | 0.0 |
| 94 | 1.000000 | 10.00 | 3.800 | 4 | 110.200 | 104.750 | 2 | 0.00000 | 93 | 95 | 0 | 4000.00 | 0.0 |
| 95 | 1.000000 | 5.00 | 18.508 | 4 | 104.750 | 104.750 | 2 | 0.00000 | 94 | 96 | 0 | 4000.00 | 0.0 |
| 96 | 1.000000 | 10.00 | 3.538 | 2 | 104.750 | 104.750 | 2 | 0.00000 | 95 | 97 | 0 | 4000.00 | 0.0 |
| 97 | 1.000000 | 5.00 | 9.400 | 4 | 104.750 | 105.040 | 2 | 0.00000 | 96 | 98 | 0 | 4000.00 | 0.0 |
| 98 | 1.000000 | 20.00 | 7.400 | 4 | 105.040 | 94.000 | 2 | 0.00000 | 97 | 99 | 0 | 4000.00 | 0.0 |
| 99 | 1.104000 | 30.00 | 4.874 | 1 | 94.000 | 99.400 | 2 | 0.00000 | 98 | 0 | 0 | 4000.00 | 0.0 |
| 100 | 1.000000 | 85.00 | 1.864 | 4 | 105.000 | 91.000 | 2 | 0.00000 | 92 | 101 | 0 | 4000.00 | 0.0 |
| 101 | 1.000000 | 25.00 | 4.512 | 3 | 91.000 | 96.900 | 2 | 0.00000 | 100 | 85 | 1 | 4000.00 | 0.0 |
| 102 | 0.835000 | 5.00 | 12.356 | 2 | 96.000 | 96.000 | 2 | 0.00000 | 40 | 103 | 0 | 4000.00 | 0.0 |
| 103 | 0.788000 | 60.00 | 1.628 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 102 | 104 | 0 | 4000.00 | 0.0 |
| 104 | 0.788000 | 100.00 | 1.000 | 4 | 96.000 | 95.500 | 2 | 0.00000 | 103 | 105 | 0 | 4000.00 | 0.0 |
| 105 | 0.788000 | 100.00 | 1.000 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 104 | 106 | 0 | 4000.00 | 0.0 |
| 106 | 0.788000 | 30.00 | 2.786 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 105 | 107 | 0 | 4000.00 | 0.0 |
| 107 | 0.927000 | 35.00 | 2.059 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 106 | 108 | 0 | 4000.00 | 0.0 |
| 108 | 0.927000 | 150.00 | 1.494 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 107 | 109 | 0 | 4000.00 | 0.0 |
| 109 | 0.927000 | 50.00 | 1.519 | 3 | 95.500 | 95.500 | 2 | 0.00000 | 108 | 110 | 0 | 4000.00 | 0.0 |
| 110 | 0.927000 | 20.00 | 2.298 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 109 | 111 | 0 | 4000.00 | 0.0 |
| 111 | 0.927000 | 10.00 | 7.860 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 110 | 112 | 0 | 4000.00 | 0.0 |
| 112 | 1.000000 | 10.00 | 9.000 | 4 | 95.500 | 101.700 | 2 | 0.00000 | 111 | 113 | 0 | 4000.00 | 0.0 |
| 113 | 1.000000 | 5.00 | 5.400 | 4 | 101.700 | 102.800 | 2 | 0.00000 | 112 | 114 | 0 | 4000.00 | 0.0 |
| 114 | 1.000000 | 10.00 | 12.354 | 2 | 102.800 | 102.800 | 2 | 0.00000 | 113 | 115 | 0 | 4000.00 | 0.0 |
| 115 | 1.000000 | 5.00 | 8.877 | 4 | 102.800 | 102.800 | 2 | 0.00000 | 114 | 116 | 0 | 4000.00 | 0.0 |
| 116 | 1.000000 | 5.00 | 5.000 | 4 | 102.800 | 102.800 | 2 | 0.00000 | 115 | 117 | 0 | 4000.00 | 0.0 |
| 117 | 1.250000 | 30.00 | 3.333 | 1 | 102.800 | 103.000 | 2 | 0.00000 | 116 | 0 | 0 | 4000.00 | 0.0 |
| 118 | 0.927000 | 10.00 | 6.562 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 109 | 119 | 0 | 4000.00 | 0.0 |
| 119 | 1.000000 | 10.00 | 2.400 | 3 | 95.500 | 101.700 | 2 | 0.00000 | 118 | 120 | 0 | 4000.00 | 0.0 |
| 120 | 1.000000 | 5.00 | 7.800 | 4 | 101.700 | 102.800 | 2 | 0.00000 | 119 | 121 | 0 | 4000.00 | 0.0 |
| 121 | 1.000000 | 10.00 | 13.154 | 2 | 102.800 | 102.800 | 2 | 0.00000 | 120 | 122 | 0 | 4000.00 | 0.0 |
| 122 | 1.000000 | 10.00 | 8.938 | 4 | 102.800 | 102.800 | 2 | 0.00000 | 121 | 123 | 0 | 4000.00 | 0.0 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 123 | 1.250000 | 20.00 | 3.250 | 1 | 102.800 | 103.000 | 2 | 0.00000 | 122 0 | 0 | 4000.00 | 0.0 |
| 124 | 0.134000 | 5.00 | 3.624 | 4 | 101.700 | 101.700 | 2 | 0.00000 | 119 125 | 0 | 4000.00 | 0.0 |
| 125 | 0.134000 | 5.00 | 3.141 | 4 | 101.700 | 101.700 | 2 | 0.00000 | 124 126 | 0 | 4000.00 | 0.0 |
| 126 | 0.134000 | 5.00 | 1.000 | 2 | 101.700 | 101.700 | 2 | 0.00000 | 125 127 | 0 | 4000.00 | 0.0 |
| 127 | 0.134000 | 10.00 | 1.000 | 4 | 101.700 | 101.700 | 2 | 0.00000 | 126 128 | 0 | 4000.00 | 0.0 |
| 128 | 0.134000 | 10.00 | 1.000 | 4 | 101.700 | 101.700 | 2 | 0.00000 | 127 129 | 0 | 4000.00 | 0.0 |
| 129 | 0.134000 | 10.00 | 1.000 | 1 | 101.700 | 103.000 | 2 | 0.00000 | 128 0 | 0 | 4000.00 | 0.0 |
| 130 | 0.835000 | 5.00 | 11.020 | 4 | 93.000 | 93.000 | 2 | 0.00000 | 29 131 | 0 | 4000.00 | 0.0 |
| 131 | 0.835000 | 100.00 | 1.331 | 4 | 93.000 | 96.010 | 2 | 0.00000 | 130 132 | 0 | 4000.00 | 0.0 |
| 132 | 0.835000 | 25.00 | 1.267 | 4 | 96.010 | 96.010 | 2 | 0.00000 | 131 133 | 0 | 4000.00 | 0.0 |
| 133 | 0.835000 | 65.00 | 1.000 | 4 | 96.010 | 96.000 | 2 | 0.00000 | 132 134 | 0 | 4000.00 | 0.0 |
| 134 | 0.835000 | 20.00 | 2.653 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 133 135 | 0 | 4000.00 | 0.0 |
| 135 | 0.835000 | 105.00 | 1.382 | 3 | 96.000 | 89.000 | 2 | 0.00000 | 134 136 | 0 | 4000.00 | 0.0 |
| 136 | 0.835000 | 5.00 | 3.338 | 4 | 89.000 | 89.000 | 2 | 0.00000 | 135 137 | 0 | 4000.00 | 0.0 |
| 137 | 0.835000 | 50.00 | 1.334 | 3 | 89.000 | 89.000 | 2 | 0.00000 | 136 138 | 0 | 4000.00 | 0.0 |
| 138 | 0.835000 | 5.00 | 5.676 | 4 | 89.000 | 89.000 | 2 | 0.00000 | 137 139 | 0 | 4000.00 | 0.0 |
| 139 | 0.835000 | 5.00 | 4.340 | 3 | 89.000 | 89.000 | 2 | 0.00000 | 138 140 | 0 | 4000.00 | 0.0 |
| 140 | 0.835000 | 55.00 | 1.000 | 4 | 89.000 | 89.000 | 2 | 0.00000 | 139 141 | 0 | 4000.00 | 0.0 |
| 141 | 0.835000 | 25.00 | 1.668 | 3 | 89.000 | 89.000 | 2 | 0.00000 | 140 142 | 0 | 4000.00 | 0.0 |
| 142 | 0.835000 | 15.00 | 2.882 | 4 | 89.000 | 91.940 | 2 | 0.00000 | 141 143 | 0 | 4000.00 | 0.0 |
| 143 | 0.835000 | 25.00 | 1.668 | 3 | 91.940 | 91.940 | 2 | 0.00000 | 142 144 | 0 | 4000.00 | 0.0 |
| 144 | 0.835000 | 5.00 | 5.676 | 3 | 91.940 | 91.940 | 2 | 0.00000 | 143 145 | 0 | 4000.00 | 0.0 |
| 145 | 0.835000 | 5.00 | 4.340 | 3 | 91.940 | 91.940 | 2 | 0.00000 | 144 146 | 0 | 4000.00 | 0.0 |
| 146 | 0.835000 | 10.00 | 3.338 | 4 | 91.940 | 96.200 | 2 | 0.00000 | 145 147 | 0 | 4000.00 | 0.0 |
| 147 | 0.835000 | 5.00 | 3.338 | 4 | 96.200 | 96.200 | 2 | 0.00000 | 146 148 | 0 | 4000.00 | 0.0 |
| 148 | 0.835000 | 145.00 | 1.000 | 4 | 96.200 | 96.200 | 2 | 0.00000 | 147 149 | 0 | 4000.00 | 0.0 |
| 149 | 0.835000 | 10.00 | 2.670 | 4 | 96.200 | 96.200 | 2 | 0.00000 | 148 150 | 0 | 4000.00 | 0.0 |
| 150 | 0.835000 | 90.00 | 1.186 | 3 | 96.200 | 96.200 | 2 | 0.00000 | 149 151 | 0 | 4000.00 | 0.0 |
| 151 | 0.835000 | 5.00 | 5.676 | 4 | 96.200 | 94.530 | 2 | 0.00000 | 150 152 | 0 | 4000.00 | 0.0 |
| 152 | 0.835000 | 15.00 | 2.664 | 3 | 94.530 | 94.530 | 2 | 0.00000 | 151 153 | 0 | 4000.00 | 0.0 |
| 153 | 0.835000 | 5.00 | 2.336 | 4 | 94.530 | 94.530 | 2 | 0.00000 | 152 154 | 0 | 4000.00 | 0.0 |
| 154 | 0.835000 | 5.00 | 4.340 | 3 | 94.530 | 94.540 | 2 | 0.00000 | 153 155 | 0 | 4000.00 | 0.0 |
| 155 | 0.835000 | 15.00 | 2.559 | 3 | 94.540 | 94.540 | 2 | 0.00000 | 154 156 | 0 | 4000.00 | 0.0 |
| 156 | 0.835000 | 5.00 | 4.340 | 3 | 94.540 | 94.540 | 2 | 0.00000 | 155 157 | 0 | 4000.00 | 0.0 |
| 157 | 0.835000 | 5.00 | 3.338 | 4 | 94.540 | 94.540 | 2 | 0.00000 | 156 158 | 0 | 4000.00 | 0.0 |
| 158 | 0.835000 | 5.00 | 3.338 | 3 | 94.540 | 94.500 | 2 | 0.00000 | 157 159 | 0 | 4000.00 | 0.0 |
| 159 | 0.835000 | 5.00 | 4.340 | 4 | 94.500 | 94.500 | 2 | 0.00000 | 158 160 | 0 | 4000.00 | 0.0 |
| 160 | 0.835000 | 55.00 | 1.425 | 3 | 94.500 | 94.500 | 2 | 0.00000 | 159 161 | 0 | 4000.00 | 0.0 |
| 161 | 0.835000 | 175.00 | 1.286 | 4 | 94.500 | 96.200 | 2 | 0.00000 | 160 162 | 0 | 4000.00 | 0.0 |
| 162 | 0.835000 | 100.00 | 1.568 | 3 | 96.200 | 96.200 | 2 | 0.00000 | 161 47 | 1 | 4000.00 | 0.0 |
| 163 | 0.835000 | 10.00 | 3.338 | 4 | 94.500 | 91.750 | 2 | 0.00000 | 160 164 | 0 | 4000.00 | 0.0 |
| 164 | 0.835000 | 40.00 | 1.413 | 4 | 91.750 | 89.580 | 2 | 0.00000 | 163 165 | 0 | 4000.00 | 0.0 |
| 165 | 0.835000 | 25.00 | 3.071 | 4 | 89.580 | 89.580 | 2 | 0.00000 | 164 166 | 0 | 4000.00 | 0.0 |
| 166 | 0.835000 | 5.00 | 4.340 | 3 | 89.580 | 89.580 | 2 | 0.00000 | 165 167 | 0 | 4000.00 | 0.0 |
| 167 | 0.835000 | 5.00 | 1.000 | 16 | 89.580 | 89.580 | 2 | 0.00000 | 166 0 | 0 | 4000.00 | 0.0 |
| 168 | 0.835000 | 5.00 | 13.358 | 4 | 89.000 | 91.000 | 2 | 0.00000 | 141 169 | 0 | 4000.00 | 0.0 |
| 169 | 0.835000 | 35.00 | 2.002 | 3 | 91.000 | 91.000 | 2 | 0.00000 | 168 170 | 0 | 4000.00 | 0.0 |
| 170 | 0.835000 | 10.00 | 4.340 | 3 | 91.000 | 91.000 | 2 | 0.00000 | 169 171 | 0 | 4000.00 | 0.0 |
| 171 | 0.835000 | 75.00 | 1.312 | 4 | 91.000 | 91.000 | 2 | 0.00000 | 170 172 | 0 | 4000.00 | 0.0 |
| 172 | 0.835000 | 45.00 | 2.002 | 3 | 91.000 | 91.000 | 2 | 0.00000 | 171 173 | 0 | 4000.00 | 0.0 |
| 173 | 0.835000 | 5.00 | 3.338 | 4 | 91.000 | 91.000 | 2 | 0.00000 | 172 174 | 0 | 4000.00 | 0.0 |
| 174 | 0.835000 | 15.00 | 1.779 | 4 | 91.000 | 96.040 | 2 | 0.00000 | 173 175 | 0 | 4000.00 | 0.0 |
| 175 | 0.835000 | 15.00 | 2.559 | 4 | 96.040 | 96.000 | 2 | 0.00000 | 174 176 | 0 | 4000.00 | 0.0 |
| 176 | 0.835000 | 95.00 | 1.176 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 175 177 | 0 | 4000.00 | 0.0 |
| 177 | 0.835000 | 55.00 | 1.213 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 176 178 | 0 | 4000.00 | 0.0 |
| 178 | 0.835000 | 5.00 | 3.338 | 4 | 96.000 | 91.000 | 2 | 0.00000 | 177 179 | 0 | 4000.00 | 0.0 |
| 179 | 0.835000 | 50.00 | 1.795 | 4 | 91.000 | 93.000 | 2 | 0.00000 | 178 180 | 0 | 4000.00 | 0.0 |
| 180 | 0.835000 | 80.00 | 1.146 | 4 | 93.000 | 93.000 | 2 | 0.00000 | 179 181 | 0 | 4000.00 | 0.0 |
| 181 | 0.835000 | 25.00 | 3.472 | 3 | 93.000 | 93.000 | 2 | 0.00000 | 180 29 | 1 | 4000.00 | 0.0 |
| 182 | 0.336000 | 45.00 | 1.866 | 3 | 91.000 | 96.000 | 2 | 0.00000 | 169 183 | 0 | 4000.00 | 0.0 |
| 183 | 0.336000 | 120.00 | 1.482 | 4 | 96.000 | 149.000 | 2 | 0.00000 | 182 184 | 0 | 4000.00 | 0.0 |
| 184 | 0.256000 | 205.00 | 1.092 | 16 | 149.000 | 142.500 | 2 | 0.00000 | 183 0 | 0 | 4000.00 | 0.0 |
| 185 | 0.256000 | 60.00 | 1.674 | 16 | 96.000 | 59.000 | 2 | 0.00000 | 182 0 | 0 | 4000.00 | 0.0 |
| 186 | 0.336000 | 10.00 | 4.427 | 3 | 91.000 | 94.800 | 2 | 0.00000 | 170 187 | 0 | 4000.00 | 0.0 |
| 187 | 0.336000 | 55.00 | 1.586 | 3 | 94.800 | 113.000 | 2 | 0.00000 | 186 188 | 0 | 4000.00 | 0.0 |
| 188 | 0.336000 | 230.00 | 1.231 | 4 | 113.000 | 146.000 | 2 | 0.00000 | 187 189 | 0 | 4000.00 | 0.0 |
| 189 | 0.256000 | 105.00 | 1.111 | 16 | 146.000 | 143.000 | 2 | 0.00000 | 188 0 | 0 | 4000.00 | 0.0 |
| 190 | 0.256000 | 100.00 | 1.297 | 16 | 94.800 | 83.700 | 2 | 0.00000 | 186 0 | 0 | 4000.00 | 0.0 |
| 191 | 0.256000 | 75.00 | 1.416 | 16 | 113.000 | 107.000 | 2 | 0.00000 | 187 0 | 0 | 4000.00 | 0.0 |
| 192 | 0.336000 | 5.00 | 7.854 | 4 | 91.000 | 95.000 | 2 | 0.00000 | 172 193 | 0 | 4000.00 | 0.0 |
| 193 | 0.336000 | 240.00 | 1.316 | 4 | 95.000 | 150.000 | 2 | 0.00000 | 192 194 | 0 | 4000.00 | 0.0 |
| 194 | 0.256000 | 180.00 | 1.105 | 16 | 150.000 | 142.000 | 2 | 0.00000 | 193 0 | 0 | 4000.00 | 0.0 |
| 195 | 0.665000 | 15.00 | 4.015 | 4 | 96.500 | 96.500 | 2 | 0.00000 | 54 196 | 0 | 4000.00 | 0.0 |
| 196 | 0.665000 | 11.00 | 2.197 | 4 | 96.500 | 94.500 | 2 | 0.00000 | 195 197 | 0 | 4400.00 | 0.0 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 197 | 0.665000 | 20.00 | 1.658 | 4 | 94.500 | 96.600 | 2 | 0.00000 | 196 198 | 0 | 4000.00 | 0.0 |
| 198 | 0.665000 | 115.00 | 1.000 | 4 | 96.600 | 96.600 | 2 | 0.00000 | 197 199 | 0 | 4000.00 | 0.0 |
| 199 | 0.665000 | 220.00 | 1.120 | 3 | 96.600 | 94.000 | 2 | 0.00000 | 198 200 | 0 | 4000.00 | 0.0 |
| 200 | 0.665000 | 20.00 | 2.862 | 4 | 94.000 | 94.750 | 2 | 0.00000 | 199 201 | 0 | 4000.00 | 0.0 |
| 201 | 0.665000 | 20.00 | 1.000 | 4 | 94.750 | 94.750 | 2 | 0.00000 | 200 202 | 0 | 4000.00 | 0.0 |
| 202 | 0.665000 | 20.00 | 2.197 | 4 | 94.750 | 94.750 | 2 | 0.00000 | 201 203 | 0 | 4000.00 | 0.0 |
| 203 | 0.665000 | 15.00 | 1.000 | 4 | 94.750 | 94.750 | 2 | 0.00000 | 202 204 | 0 | 4000.00 | 0.0 |
| 204 | 0.665000 | 30.00 | 1.973 | 3 | 94.750 | 84.100 | 2 | 0.00000 | 203 205 | 0 | 4000.00 | 0.0 |
| 205 | 0.665000 | 15.00 | 1.621 | 4 | 84.100 | 69.500 | 2 | 0.00000 | 204 206 | 0 | 4000.00 | 0.0 |
| 206 | 0.665000 | 15.00 | 1.887 | 3 | 69.500 | 69.500 | 2 | 0.00000 | 205 207 | 0 | 4000.00 | 0.0 |
| 207 | 0.665000 | 20.00 | 1.465 | 4 | 69.500 | 69.500 | 2 | 0.00000 | 206 208 | 0 | 4000.00 | 0.0 |
| 208 | 0.665000 | 20.00 | 4.125 | 3 | 69.500 | 61.750 | 2 | 0.00000 | 207 209 | 0 | 4000.00 | 0.0 |
| 209 | 0.665000 | 70.00 | 1.454 | 4 | 61.750 | 62.750 | 2 | 0.00000 | 208 210 | 0 | 4000.00 | 0.0 |
| 210 | 0.665000 | 5.00 | 6.320 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 209 211 | 0 | 4000.00 | 0.0 |
| 211 | 0.665000 | 50.00 | 1.293 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 210 212 | 0 | 4000.00 | 0.0 |
| 212 | 0.665000 | 20.00 | 2.330 | 3 | 62.750 | 62.750 | 2 | 0.00000 | 211 213 | 0 | 4000.00 | 0.0 |
| 213 | 0.665000 | 25.00 | 2.277 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 212 214 | 0 | 4000.00 | 0.0 |
| 214 | 0.665000 | 20.00 | 1.665 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 213 215 | 0 | 4000.00 | 0.0 |
| 215 | 0.665000 | 45.00 | 1.414 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 214 216 | 0 | 4000.00 | 0.0 |
| 216 | 0.665000 | 20.00 | 1.665 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 215 217 | 0 | 4000.00 | 0.0 |
| 217 | 0.665000 | 85.00 | 2.033 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 216 218 | 0 | 4000.00 | 0.0 |
| 218 | 0.665000 | 5.00 | 3.660 | 3 | 62.750 | 62.750 | 2 | 0.00000 | 217 219 | 0 | 4000.00 | 0.0 |
| 219 | 0.665000 | 25.00 | 2.649 | 3 | 62.750 | 66.000 | 2 | 0.00000 | 218 220 | 0 | 4000.00 | 0.0 |
| 220 | 0.665000 | 30.00 | 1.749 | 4 | 66.000 | 96.000 | 2 | 0.00000 | 219 221 | 0 | 4000.00 | 0.0 |
| 221 | 0.665000 | 20.00 | 1.329 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 220 222 | 0 | 4000.00 | 0.0 |
| 222 | 0.665000 | 5.00 | 4.977 | 4 | 96.000 | 94.400 | 2 | 0.00000 | 221 223 | 0 | 4000.00 | 0.0 |
| 223 | 0.665000 | 95.00 | 1.139 | 4 | 94.400 | 97.000 | 2 | 0.00000 | 222 224 | 0 | 4000.00 | 0.0 |
| 224 | 0.665000 | 35.00 | 1.646 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 223 225 | 0 | 4000.00 | 0.0 |
| 225 | 0.665000 | 65.00 | 1.614 | 4 | 97.000 | 96.500 | 2 | 0.00000 | 224 226 | 0 | 4000.00 | 0.0 |
| 226 | 0.665000 | 35.00 | 1.000 | 4 | 96.500 | 96.500 | 2 | 0.00000 | 225 227 | 0 | 4000.00 | 0.0 |
| 227 | 0.665000 | 35.00 | 1.830 | 4 | 96.500 | 94.200 | 2 | 0.00000 | 226 228 | 0 | 4000.00 | 0.0 |
| 228 | 0.665000 | 35.00 | 1.266 | 4 | 94.200 | 96.200 | 2 | 0.00000 | 227 229 | 0 | 4000.00 | 0.0 |
| 229 | 0.665000 | 120.00 | 1.377 | 3 | 96.200 | 95.800 | 2 | 0.00000 | 228 69 | 1 | 4000.00 | 0.0 |
| 230 | 0.665000 | 10.00 | 6.453 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 12 231 | 0 | 4000.00 | 0.0 |
| 231 | 0.665000 | 25.00 | 1.372 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 230 232 | 0 | 4000.00 | 0.0 |
| 232 | 0.665000 | 150.00 | 1.062 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 231 233 | 0 | 4000.00 | 0.0 |
| 233 | 0.665000 | 135.00 | 1.069 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 232 234 | 0 | 4000.00 | 0.0 |
| 234 | 0.665000 | 45.00 | 1.146 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 233 235 | 0 | 4000.00 | 0.0 |
| 235 | 0.665000 | 20.00 | 1.658 | 4 | 96.900 | 95.000 | 2 | 0.00000 | 234 236 | 0 | 4000.00 | 0.0 |
| 236 | 0.665000 | 35.00 | 1.564 | 4 | 95.000 | 95.500 | 2 | 0.00000 | 235 237 | 0 | 4000.00 | 0.0 |
| 237 | 0.665000 | 15.00 | 1.621 | 4 | 95.500 | 96.000 | 2 | 0.00000 | 236 238 | 0 | 4000.00 | 0.0 |
| 238 | 0.665000 | 30.00 | 1.621 | 4 | 96.000 | 72.000 | 2 | 0.00000 | 237 239 | 0 | 4000.00 | 0.0 |
| 239 | 0.665000 | 5.00 | 3.660 | 3 | 72.000 | 67.000 | 2 | 0.00000 | 238 240 | 0 | 4000.00 | 0.0 |
| 240 | 0.665000 | 75.00 | 1.497 | 4 | 67.000 | 64.250 | 2 | 0.00000 | 239 241 | 0 | 4000.00 | 0.0 |
| 241 | 0.665000 | 35.00 | 1.000 | 4 | 64.250 | 64.250 | 2 | 0.00000 | 240 242 | 0 | 4000.00 | 0.0 |
| 242 | 0.665000 | 65.00 | 1.286 | 4 | 64.250 | 61.750 | 2 | 0.00000 | 241 243 | 0 | 4000.00 | 0.0 |
| 243 | 0.665000 | 20.00 | 2.995 | 3 | 61.750 | 61.750 | 2 | 0.00000 | 242 244 | 0 | 4000.00 | 0.0 |
| 244 | 0.665000 | 5.00 | 2.064 | 4 | 61.750 | 61.750 | 2 | 0.00000 | 243 245 | 0 | 4000.00 | 0.0 |
| 245 | 0.665000 | 20.00 | 2.260 | 4 | 61.750 | 62.750 | 2 | 0.00000 | 244 246 | 0 | 4000.00 | 0.0 |
| 246 | 0.665000 | 15.00 | 1.887 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 245 247 | 0 | 4000.00 | 0.0 |
| 247 | 0.665000 | 10.00 | 2.330 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 246 248 | 0 | 4000.00 | 0.0 |
| 248 | 0.665000 | 15.00 | 1.887 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 247 249 | 0 | 4000.00 | 0.0 |
| 249 | 0.665000 | 35.00 | 1.380 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 248 250 | 0 | 4000.00 | 0.0 |
| 250 | 0.665000 | 100.00 | 1.000 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 249 251 | 0 | 4000.00 | 0.0 |
| 251 | 0.665000 | 10.00 | 3.647 | 4 | 62.750 | 62.500 | 2 | 0.00000 | 250 252 | 0 | 4000.00 | 0.0 |
| 252 | 0.665000 | 30.00 | 1.749 | 4 | 62.500 | 67.900 | 2 | 0.00000 | 251 253 | 0 | 4000.00 | 0.0 |
| 253 | 0.665000 | 30.00 | 1.310 | 4 | 67.900 | 96.000 | 2 | 0.00000 | 252 254 | 0 | 4000.00 | 0.0 |
| 254 | 0.665000 | 20.00 | 2.317 | 4 | 96.000 | 97.000 | 2 | 0.00000 | 253 255 | 0 | 4000.00 | 0.0 |
| 255 | 0.665000 | 145.00 | 1.000 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 254 256 | 0 | 4000.00 | 0.0 |
| 256 | 0.665000 | 35.00 | 1.752 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 255 257 | 0 | 4000.00 | 0.0 |
| 257 | 0.665000 | 60.00 | 1.110 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 256 258 | 0 | 4000.00 | 0.0 |
| 258 | 0.665000 | 40.00 | 1.165 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 257 259 | 0 | 4000.00 | 0.0 |
| 259 | 0.665000 | 5.00 | 3.660 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 258 260 | 0 | 4000.00 | 0.0 |
| 260 | 0.665000 | 45.00 | 1.118 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 259 261 | 0 | 4000.00 | 0.0 |
| 261 | 0.665000 | 15.00 | 4.538 | 3 | 97.000 | 95.500 | 2 | 0.00000 | 260 71 | 1 | 4000.00 | 0.0 |
| 262 | 0.505000 | 20.00 | 2.315 | 4 | 61.750 | 63.000 | 2 | 0.00000 | 243 263 | 0 | 4000.00 | 0.0 |
| 263 | 0.505000 | 10.00 | 3.318 | 4 | 63.000 | 56.000 | 2 | 0.00000 | 262 264 | 0 | 4000.00 | 0.0 |
| 264 | 0.505000 | 30.00 | 2.380 | 4 | 56.000 | 61.750 | 2 | 0.00000 | 263 265 | 0 | 4000.00 | 0.0 |
| 265 | 0.505000 | 5.00 | 3.020 | 3 | 61.750 | 62.900 | 2 | 0.00000 | 264 266 | 0 | 4000.00 | 0.0 |
| 266 | 0.505000 | 5.00 | 10.494 | 4 | 62.900 | 67.000 | 2 | 0.00000 | 265 267 | 0 | 4000.00 | 0.0 |
| 267 | 0.505000 | 5.00 | 3.828 | 4 | 67.000 | 67.000 | 2 | 0.00000 | 266 268 | 0 | 4000.00 | 0.0 |
| 268 | 0.505000 | 65.00 | 1.155 | 3 | 67.000 | 67.000 | 2 | 0.00000 | 267 269 | 0 | 4000.00 | 0.0 |
| 269 | 0.505000 | 15.00 | 1.000 | 4 | 67.000 | 67.000 | 2 | 0.00000 | 268 270 | 0 | 4000.00 | 0.0 |
| 270 | 0.505000 | 35.00 | 1.866 | 3 | 67.000 | 67.000 | 2 | 0.00000 | 269 271 | 0 | 4000.00 | 0.0 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 271 | 0.256000 | 25.00 | 1.143 | 4 | 67.000 | 67.000 | 2 | 0.00000 | 270 272 | 0 | 4000.00 | 0.0 |
| 272 | 0.256000 | 10.00 | 3.099 | 4 | 67.000 | 65.000 | 2 | 0.00000 | 271 273 | 0 | 4000.00 | 0.0 |
| 273 | 0.256000 | 55.00 | 1.289 | 16 | 65.000 | 94.500 | 2 | 0.00000 | 272 0 | 0 | 4000.00 | 0.0 |
| 274 | 0.505000 | 15.00 | 1.000 | 3 | 62.900 | 63.900 | 2 | 0.00000 | 265 275 | 0 | 4000.00 | 0.0 |
| 275 | 0.505000 | 15.00 | 1.741 | 3 | 63.900 | 68.200 | 2 | 0.00000 | 274 276 | 0 | 4000.00 | 0.0 |
| 276 | 0.336000 | 135.00 | 1.170 | 4 | 68.200 | 71.500 | 2 | 0.00000 | 275 277 | 0 | 4000.00 | 0.0 |
| 277 | 0.336000 | 40.00 | 1.773 | 16 | 71.500 | 61.500 | 2 | 0.00000 | 276 0 | 0 | 4000.00 | 0.0 |
| 278 | 0.336000 | 20.00 | 2.518 | 16 | 68.200 | 61.500 | 2 | 0.00000 | 275 0 | 0 | 4000.00 | 0.0 |
| 279 | 0.505000 | 85.00 | 2.305 | 4 | 69.500 | 68.750 | 2 | 0.00000 | 206 280 | 0 | 4000.00 | 0.0 |
| 280 | 0.505000 | 10.00 | 2.010 | 3 | 68.750 | 68.750 | 2 | 0.00000 | 279 281 | 0 | 4000.00 | 0.0 |
| 281 | 0.505000 | 45.00 | 1.382 | 4 | 68.750 | 68.750 | 2 | 0.00000 | 280 282 | 0 | 4000.00 | 0.0 |
| 282 | 0.505000 | 10.00 | 1.707 | 4 | 68.750 | 68.750 | 2 | 0.00000 | 281 283 | 0 | 4000.00 | 0.0 |
| 283 | 0.505000 | 70.00 | 1.447 | 3 | 68.750 | 68.750 | 2 | 0.00000 | 282 284 | 0 | 4000.00 | 0.0 |
| 284 | 0.505000 | 20.00 | 1.354 | 4 | 68.750 | 68.750 | 2 | 0.00000 | 283 285 | 0 | 4000.00 | 0.0 |
| 285 | 0.505000 | 5.00 | 2.414 | 4 | 68.750 | 65.500 | 2 | 0.00000 | 284 286 | 0 | 4000.00 | 0.0 |
| 286 | 0.505000 | 25.00 | 1.404 | 3 | 65.500 | 65.500 | 2 | 0.00000 | 285 287 | 0 | 4000.00 | 0.0 |
| 287 | 0.336000 | 65.00 | 1.868 | 4 | 65.500 | 113.000 | 2 | 0.00000 | 286 288 | 0 | 4000.00 | 0.0 |
| 288 | 0.336000 | 35.00 | 2.150 | 3 | 113.000 | 147.000 | 2 | 0.00000 | 287 289 | 0 | 4000.00 | 0.0 |
| 289 | 0.256000 | 55.00 | 1.419 | 4 | 147.000 | 178.000 | 2 | 0.00000 | 288 290 | 0 | 4000.00 | 0.0 |
| 290 | 0.256000 | 10.00 | 1.000 | 16 | 178.000 | 178.000 | 2 | 0.00000 | 289 0 | 0 | 4000.00 | 0.0 |
| 291 | 0.256000 | 35.00 | 1.247 | 16 | 147.000 | 159.750 | 2 | 0.00000 | 288 0 | 0 | 4000.00 | 0.0 |
| 292 | 0.256000 | 115.00 | 1.686 | 16 | 67.000 | 128.500 | 2 | 0.00000 | 239 0 | 0 | 4000.00 | 0.0 |
| 293 | 0.336000 | 5.00 | 7.451 | 4 | 65.710 | 62.500 | 2 | 0.00000 | 219 294 | 0 | 4000.00 | 0.0 |
| 294 | 0.336000 | 60.00 | 1.112 | 4 | 62.500 | 62.500 | 2 | 0.00000 | 293 295 | 0 | 4000.00 | 0.0 |
| 295 | 0.336000 | 40.00 | 1.907 | 4 | 62.500 | 93.500 | 2 | 0.00000 | 294 296 | 0 | 4000.00 | 0.0 |
| 296 | 0.336000 | 45.00 | 1.729 | 3 | 93.500 | 126.800 | 2 | 0.00000 | 295 297 | 0 | 4000.00 | 0.0 |
| 297 | 0.336000 | 45.00 | 1.149 | 3 | 126.800 | 142.000 | 2 | 0.00000 | 296 298 | 0 | 4000.00 | 0.0 |
| 298 | 0.336000 | 40.00 | 1.571 | 3 | 142.000 | 154.500 | 2 | 0.00000 | 297 299 | 0 | 4000.00 | 0.0 |
| 299 | 0.256000 | 95.00 | 1.107 | 16 | 154.500 | 155.500 | 2 | 0.00000 | 298 0 | 0 | 4000.00 | 0.0 |
| 300 | 0.256000 | 100.00 | 1.623 | 16 | 142.000 | 143.000 | 2 | 0.00000 | 297 0 | 0 | 4000.00 | 0.0 |
| 301 | 0.336000 | 25.00 | 2.452 | 3 | 154.500 | 156.300 | 2 | 0.00000 | 298 302 | 0 | 4000.00 | 0.0 |
| 302 | 0.336000 | 45.00 | 1.893 | 4 | 156.300 | 172.300 | 2 | 0.00000 | 301 303 | 0 | 4000.00 | 0.0 |
| 303 | 0.256000 | 55.00 | 1.304 | 4 | 172.300 | 178.000 | 2 | 0.00000 | 302 304 | 0 | 4000.00 | 0.0 |
| 304 | 0.256000 | 10.00 | 1.000 | 16 | 178.000 | 178.000 | 2 | 0.00000 | 303 0 | 0 | 4000.00 | 0.0 |
| 305 | 0.336000 | 5.00 | 6.376 | 4 | 156.300 | 156.300 | 2 | 0.00000 | 301 306 | 0 | 4000.00 | 0.0 |
| 306 | 0.256000 | 130.00 | 1.405 | 16 | 156.300 | 156.300 | 2 | 0.00000 | 305 0 | 0 | 4000.00 | 0.0 |
| 307 | 0.336000 | 105.00 | 1.914 | 4 | 126.800 | 155.000 | 2 | 0.00000 | 296 308 | 0 | 4000.00 | 0.0 |
| 308 | 0.256000 | 130.00 | 1.287 | 19 | 155.000 | 206.300 | 2 | 0.00000 | 307 309 | 0 | 4000.00 | 0.0 |
| 309 | 0.256000 | 20.00 | 1.000 | 16 | 206.300 | 203.000 | 2 | 0.00000 | 308 0 | 0 | 4000.00 | 0.0 |
| 310 | 0.336000 | 10.00 | 5.301 | 3 | 62.750 | 71.500 | 2 | 0.00000 | 212 311 | 0 | 4000.00 | 0.0 |
| 311 | 0.336000 | 65.00 | 1.424 | 3 | 71.500 | 133.500 | 2 | 0.00000 | 310 312 | 0 | 4000.00 | 0.0 |
| 312 | 0.256000 | 15.00 | 1.439 | 4 | 133.500 | 147.300 | 2 | 0.00000 | 311 313 | 0 | 4000.00 | 0.0 |
| 313 | 0.256000 | 60.00 | 1.281 | 4 | 147.300 | 165.100 | 2 | 0.00000 | 312 314 | 0 | 4000.00 | 0.0 |
| 314 | 0.256000 | 30.00 | 1.527 | 16 | 165.100 | 160.000 | 2 | 0.00000 | 313 0 | 0 | 4000.00 | 0.0 |
| 315 | 0.256000 | 25.00 | 1.407 | 16 | 71.500 | 81.500 | 2 | 0.00000 | 310 0 | 0 | 4000.00 | 0.0 |
| 316 | 0.336000 | 10.00 | 3.688 | 4 | 133.500 | 133.500 | 2 | 0.00000 | 311 317 | 0 | 4000.00 | 0.0 |
| 317 | 0.256000 | 80.00 | 1.717 | 16 | 133.500 | 141.500 | 2 | 0.00000 | 316 0 | 0 | 4000.00 | 0.0 |
| 318 | 0.336000 | 10.00 | 6.443 | 4 | 68.750 | 66.700 | 2 | 0.00000 | 283 319 | 0 | 4000.00 | 0.0 |
| 319 | 0.336000 | 100.00 | 1.672 | 3 | 66.700 | 120.000 | 2 | 0.00000 | 318 320 | 0 | 4000.00 | 0.0 |
| 320 | 0.336000 | 15.00 | 2.792 | 3 | 120.000 | 132.000 | 2 | 0.00000 | 319 321 | 0 | 4000.00 | 0.0 |
| 321 | 0.336000 | 15.00 | 1.448 | 4 | 132.000 | 146.000 | 2 | 0.00000 | 320 322 | 0 | 4000.00 | 0.0 |
| 322 | 0.256000 | 55.00 | 1.604 | 16 | 146.000 | 163.500 | 2 | 0.00000 | 321 0 | 0 | 4000.00 | 0.0 |
| 323 | 0.256000 | 25.00 | 1.492 | 16 | 120.000 | 128.500 | 2 | 0.00000 | 319 0 | 0 | 4000.00 | 0.0 |
| 324 | 0.336000 | 45.00 | 1.806 | 3 | 132.000 | 132.000 | 2 | 0.00000 | 320 325 | 0 | 4000.00 | 0.0 |
| 325 | 0.256000 | 30.00 | 2.263 | 16 | 132.000 | 157.500 | 2 | 0.00000 | 324 0 | 0 | 4000.00 | 0.0 |
| 326 | 0.256000 | 35.00 | 1.188 | 16 | 132.000 | 141.500 | 2 | 0.00000 | 324 0 | 0 | 4000.00 | 0.0 |
| 327 | 0.336000 | 30.00 | 2.456 | 4 | 63.900 | 68.100 | 2 | 0.00000 | 274 328 | 0 | 4000.00 | 0.0 |
| 328 | 0.336000 | 90.00 | 1.939 | 3 | 68.100 | 134.000 | 2 | 0.00000 | 327 329 | 0 | 4000.00 | 0.0 |
| 329 | 0.336000 | 45.00 | 1.612 | 4 | 134.000 | 132.000 | 2 | 0.00000 | 328 330 | 0 | 4000.00 | 0.0 |
| 330 | 0.362000 | 90.00 | 1.181 | 16 | 132.000 | 141.500 | 2 | 0.00000 | 329 0 | 0 | 4000.00 | 0.0 |
| 331 | 0.336000 | 15.00 | 3.554 | 3 | 134.000 | 147.000 | 2 | 0.00000 | 328 332 | 0 | 4000.00 | 0.0 |
| 332 | 0.256000 | 10.00 | 1.200 | 4 | 147.000 | 150.000 | 2 | 0.00000 | 331 333 | 0 | 4000.00 | 0.0 |
| 333 | 0.256000 | 10.00 | 1.200 | 16 | 150.000 | 159.000 | 2 | 0.00000 | 332 0 | 0 | 4000.00 | 0.0 |
| 334 | 0.256000 | 50.00 | 1.451 | 19 | 147.000 | 159.75 | 2 | 0.00000 | 331 335 | 0 | 4000.00 | 0.0 |
| 335 | 0.090000 | 10.00 | 1.000 | 16 | 159.750 | 159.000 | 2 | 0.00000 | 334 0 | 0 | 4000.00 | 0.0 |
| 336 | 0.336000 | 10.00 | 6.712 | 4 | 67.000 | 65.000 | 2 | 0.00000 | 268 337 | 0 | 4000.00 | 0.0 |
| 337 | 0.336000 | 90.00 | 1.538 | 3 | 65.000 | 115.200 | 2 | 0.00000 | 336 338 | 0 | 4000.00 | 0.0 |
| 338 | 0.336000 | 40.00 | 1.403 | 3 | 115.200 | 133.800 | 2 | 0.00000 | 337 339 | 0 | 4000.00 | 0.0 |
| 339 | 0.336000 | 50.00 | 2.423 | 3 | 133.800 | 133.300 | 2 | 0.00000 | 338 340 | 0 | 4000.00 | 0.0 |
| 340 | 0.336000 | 10.00 | 3.016 | 3 | 133.300 | 133.300 | 2 | 0.00000 | 339 341 | 0 | 4000.00 | 0.0 |
| 341 | 0.256000 | 45.00 | 1.340 | 16 | 133.300 | 141.500 | 2 | 0.00000 | 340 0 | 0 | 4000.00 | 0.0 |
| 342 | 0.256000 | 15.00 | 1.678 | 16 | 133.300 | 141.500 | 2 | 0.00000 | 340 0 | 0 | 4000.00 | 0.0 |
| 343 | 0.256000 | 10.00 | 1.300 | 16 | 133.800 | 141.500 | 2 | 0.00000 | 338 0 | 0 | 4000.00 | 0.0 |
| 344 | 0.256000 | 35.00 | 1.644 | 16 | 133.300 | 128.500 | 2 | 0.00000 | 339 0 | 0 | 4000.00 | 0.0 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 345 | 0.256000 | 5.00 | 5.813 | 3 | 115.200 | 115.200 | 2 | 0.00000 | 337 346 | 0 | 4000.00 | 0.0 |
| 346 | 0.256000 | 80.00 | 1.288 | 3 | 115.200 | 116.500 | 2 | 0.00000 | 345 347 | 0 | 4000.00 | 0.0 |
| 347 | 0.256000 | 55.00 | 1.726 | 16 | 116.500 | 141.500 | 2 | 0.00000 | 346 0 | 0 | 4000.00 | 0.0 |
| 348 | 0.256000 | 15.00 | 2.601 | 16 | 116.500 | 128.500 | 2 | 0.00000 | 346 0 | 0 | 4000.00 | 0.0 |
| 349 | 0.256000 | 50.00 | 1.594 | 16 | 115.200 | 106.500 | 2 | 0.00000 | 345 0 | 0 | 4000.00 | 0.0 |
| 350 | 0.505000 | 175.00 | 1.669 | 4 | 68.750 | 140.000 | 2 | 0.00000 | 280 351 | 0 | 4000.00 | 0.0 |
| 351 | 0.336000 | 50.00 | 1.000 | 16 | 140.000 | 138.000 | 2 | 0.00000 | 350 0 | 0 | 4000.00 | 0.0 |
| 352 | 0.336000 | 10.00 | 4.226 | 4 | 67.000 | 65.000 | 2 | 0.00000 | 270 353 | 0 | 4000.00 | 0.0 |
| 353 | 0.336000 | 80.00 | 1.285 | 4 | 65.000 | 105.700 | 2 | 0.00000 | 352 354 | 0 | 4000.00 | 0.0 |
| 354 | 0.336000 | 80.00 | 1.630 | 3 | 105.700 | 130.500 | 2 | 0.00000 | 353 355 | 0 | 4000.00 | 0.0 |
| 355 | 0.256000 | 30.00 | 1.458 | 4 | 130.500 | 147.500 | 2 | 0.00000 | 354 356 | 0 | 4000.00 | 0.0 |
| 356 | 0.256000 | 25.00 | 1.225 | 4 | 147.500 | 141.500 | 2 | 0.00000 | 355 357 | 0 | 4000.00 | 0.0 |
| 357 | 0.162000 | 50.00 | 1.843 | 16 | 141.500 | 141.500 | 2 | 0.00000 | 356 0 | 0 | 4000.00 | 0.0 |
| 358 | 0.336000 | 5.00 | 5.570 | 4 | 130.500 | 130.500 | 2 | 0.00000 | 354 359 | 0 | 4000.00 | 0.0 |
| 359 | 0.162000 | 35.00 | 1.759 | 16 | 130.500 | 132.200 | 2 | 0.00000 | 358 0 | 0 | 4000.00 | 0.0 |
| 360 | 0.336000 | 45.00 | 2.343 | 4 | 94.500 | 115.800 | 2 | 0.00000 | 152 361 | 0 | 4000.00 | 0.0 |
| 361 | 0.336000 | 15.00 | 1.448 | 3 | 115.800 | 130.600 | 2 | 0.00000 | 360 362 | 0 | 4000.00 | 0.0 |
| 362 | 0.256000 | 50.00 | 1.510 | 19 | 130.600 | 176.000 | 2 | 0.00000 | 361 363 | 0 | 4000.00 | 0.0 |
| 363 | 0.256000 | 15.00 | 1.000 | 16 | 176.000 | 176.000 | 2 | 0.00000 | 362 0 | 0 | 4000.00 | 0.0 |
| 364 | 0.362000 | 145.00 | 1.539 | 16 | 130.600 | 129.600 | 2 | 0.00000 | 361 0 | 0 | 4000.00 | 0.0 |
| 365 | 0.336000 | 65.00 | 1.940 | 3 | 92.000 | 118.400 | 2 | 0.00000 | 145 366 | 0 | 4000.00 | 0.0 |
| 366 | 0.336000 | 20.00 | 1.544 | 3 | 118.400 | 118.400 | 2 | 0.00000 | 365 367 | 0 | 4000.00 | 0.0 |
| 367 | 0.256000 | 15.00 | 1.239 | 16 | 118.400 | 115.000 | 2 | 0.00000 | 366 0 | 0 | 4000.00 | 0.0 |
| 368 | 0.256000 | 20.00 | 1.947 | 16 | 118.400 | 127.000 | 2 | 0.00000 | 365 0 | 0 | 4000.00 | 0.0 |
| 369 | 0.336000 | 30.00 | 2.275 | 4 | 118.400 | 133.500 | 2 | 0.00000 | 366 370 | 0 | 4000.00 | 0.0 |
| 370 | 0.256000 | 35.00 | 1.232 | 3 | 133.500 | 166.000 | 2 | 0.00000 | 369 371 | 0 | 4000.00 | 0.0 |
| 371 | 0.256000 | 10.00 | 1.000 | 19 | 166.000 | 176.000 | 2 | 0.00000 | 370 372 | 0 | 4000.00 | 0.0 |
| 372 | 0.256000 | 20.00 | 2.970 | 16 | 176.000 | 175.000 | 2 | 0.00000 | 371 0 | 0 | 4000.00 | 0.0 |
| 373 | 0.256000 | 55.00 | 1.521 | 16 | 166.000 | 141.000 | 2 | 0.00000 | 370 0 | 0 | 4000.00 | 0.0 |
| 374 | 0.336000 | 5.00 | 6.914 | 3 | 92.000 | 94.200 | 2 | 0.00000 | 144 375 | 0 | 4000.00 | 0.0 |
| 375 | 0.336000 | 50.00 | 1.605 | 3 | 94.200 | 113.250 | 2 | 0.00000 | 374 376 | 0 | 4000.00 | 0.0 |
| 376 | 0.256000 | 30.00 | 1.100 | 16 | 113.250 | 141.750 | 2 | 0.00000 | 375 0 | 0 | 4000.00 | 0.0 |
| 377 | 0.256000 | 30.00 | 1.751 | 16 | 94.200 | 74.000 | 2 | 0.00000 | 374 0 | 0 | 4000.00 | 0.0 |
| 378 | 0.256000 | 20.00 | 2.380 | 16 | 113.300 | 111.000 | 2 | 0.00000 | 375 0 | 0 | 4000.00 | 0.0 |
| 379 | 0.336000 | 10.00 | 4.898 | 4 | 89.000 | 94.330 | 2 | 0.00000 | 137 380 | 0 | 4000.00 | 0.0 |
| 380 | 0.336000 | 5.00 | 2.344 | 3 | 94.330 | 95.000 | 2 | 0.00000 | 379 381 | 0 | 4000.00 | 0.0 |
| 381 | 0.336000 | 100.00 | 1.322 | 4 | 95.000 | 130.700 | 2 | 0.00000 | 380 382 | 0 | 4000.00 | 0.0 |
| 382 | 0.256000 | 65.00 | 1.598 | 19 | 130.700 | 176.000 | 2 | 0.00000 | 381 383 | 0 | 4000.00 | 0.0 |
| 383 | 0.025600 | 20.00 | 1.000 | 16 | 176.000 | 175.000 | 2 | 0.00000 | 382 0 | 0 | 4000.00 | 0.0 |
| 384 | 0.336000 | 50.00 | 1.859 | 3 | 95.000 | 96.500 | 2 | 0.00000 | 380 385 | 0 | 4000.00 | 0.0 |
| 385 | 0.256000 | 75.00 | 1.252 | 3 | 96.500 | 98.000 | 2 | 0.00000 | 384 386 | 0 | 4000.00 | 0.0 |
| 386 | 0.256000 | 40.00 | 1.269 | 16 | 98.000 | 71.000 | 2 | 0.00000 | 385 0 | 0 | 4000.00 | 0.0 |
| 387 | 0.256000 | 15.00 | 2.741 | 16 | 96.500 | 103.000 | 2 | 0.00000 | 384 0 | 0 | 4000.00 | 0.0 |
| 388 | 0.256000 | 40.00 | 1.922 | 16 | 98.000 | 94.500 | 2 | 0.00000 | 385 0 | 0 | 4000.00 | 0.0 |
| 389 | 0.336000 | 45.00 | 1.567 | 3 | 89.000 | 127.750 | 2 | 0.00000 | 135 390 | 0 | 4000.00 | 0.0 |
| 390 | 0.256000 | 20.00 | 1.688 | 16 | 127.750 | 141.750 | 2 | 0.00000 | 389 0 | 0 | 4000.00 | 0.0 |
| 391 | 0.256000 | 110.00 | 1.335 | 16 | 127.750 | 141.750 | 2 | 0.00000 | 389 0 | 0 | 4000.00 | 0.0 |
| 392 | 0.336000 | 5.00 | 7.854 | 3 | 94.500 | 96.800 | 2 | 0.00000 | 155 393 | 0 | 4000.00 | 0.0 |
| 393 | 0.256000 | 215.00 | 1.316 | 16 | 96.800 | 65.000 | 2 | 0.00000 | 392 0 | 0 | 4000.00 | 0.0 |
| 394 | 0.256000 | 125.00 | 1.470 | 16 | 96.800 | 141.750 | 2 | 0.00000 | 392 0 | 0 | 4000.00 | 0.0 |
| 395 | 0.336000 | 150.00 | 1.528 | 3 | 94.500 | 130.400 | 2 | 0.00000 | 156 396 | 0 | 4000.00 | 0.0 |
| 396 | 0.256000 | 155.00 | 1.280 | 19 | 130.400 | 182.000 | 2 | 0.00000 | 395 397 | 0 | 4000.00 | 0.0 |
| 397 | 0.256000 | 30.00 | 1.478 | 16 | 182.000 | 179.000 | 2 | 0.00000 | 396 0 | 0 | 4000.00 | 0.0 |
| 398 | 0.256000 | 40.00 | 1.653 | 16 | 130.400 | 141.750 | 2 | 0.00000 | 395 0 | 0 | 4000.00 | 0.0 |
| 399 | 0.505000 | 120.00 | 1.538 | 3 | 94.500 | 90.500 | 2 | 0.00000 | 158 400 | 0 | 4000.00 | 0.0 |
| 400 | 0.336000 | 5.00 | 8.007 | 4 | 90.500 | 90.500 | 2 | 0.00000 | 399 401 | 0 | 4000.00 | 0.0 |
| 401 | 0.256000 | 60.00 | 1.349 | 16 | 90.500 | 141.750 | 2 | 0.00000 | 400 0 | 0 | 4000.00 | 0.0 |
| 402 | 0.336000 | 130.00 | 1.496 | 3 | 90.500 | 65.300 | 2 | 0.00000 | 399 403 | 0 | 4000.00 | 0.0 |
| 403 | 0.336000 | 50.00 | 1.228 | 4 | 65.300 | 94.700 | 2 | 0.00000 | 402 404 | 0 | 4000.00 | 0.0 |
| 404 | 0.256000 | 55.00 | 1.315 | 16 | 94.700 | 141.750 | 2 | 0.00000 | 403 0 | 0 | 4000.00 | 0.0 |
| 405 | 0.336000 | 40.00 | 2.260 | 3 | 65.300 | 77.500 | 2 | 0.00000 | 402 406 | 0 | 4000.00 | 0.0 |
| 406 | 0.256000 | 30.00 | 1.458 | 16 | 77.500 | 103.500 | 2 | 0.00000 | 405 0 | 0 | 4000.00 | 0.0 |
| 407 | 0.256000 | 125.00 | 1.180 | 16 | 77.500 | 75.000 | 2 | 0.00000 | 405 0 | 0 | 4000.00 | 0.0 |
| 408 | 0.336000 | 135.00 | 1.552 | 4 | 79.000 | 142.000 | 2 | 0.00000 | 139 409 | 0 | 4000.00 | 0.0 |
| 409 | 0.336000 | 20.00 | 1.000 | 16 | 142.000 | 141.750 | 2 | 0.00000 | 408 0 | 0 | 4000.00 | 0.0 |
| 410 | 0.256000 | 95.00 | 1.334 | 19 | 96.200 | 174.000 | 2 | 0.00000 | 150 411 | 0 | 4000.00 | 0.0 |
| 411 | 0.256000 | 10.00 | 1.358 | 4 | 174.000 | 183.500 | 2 | 0.00000 | 410 412 | 0 | 4000.00 | 0.0 |
| 412 | 0.107000 | 60.00 | 1.439 | 4 | 183.500 | 197.500 | 2 | 0.00000 | 411 413 | 0 | 4000.00 | 0.0 |
| 413 | 0.107000 | 25.00 | 1.000 | 16 | 197.500 | 197.500 | 2 | 0.00000 | 412 0 | 0 | 4000.00 | 0.0 |
| 414 | 0.505000 | 100.00 | 2.373 | 3 | 91.940 | 138.300 | 2 | 0.00000 | 143 415 | 0 | 4000.00 | 0.0 |
| 415 | 0.505000 | 5.00 | 5.848 | 2 | 138.300 | 142.000 | 2 | 0.00000 | 414 416 | 0 | 4000.00 | 0.0 |
| 416 | 0.336000 | 5.00 | 1.000 | 4 | 142.000 | 142.000 | 2 | 0.00000 | 415 417 | 0 | 4000.00 | 0.0 |
| 417 | 0.336000 | 50.00 | 1.000 | 4 | 142.000 | 160.000 | 2 | 0.00000 | 416 418 | 0 | 4000.00 | 0.0 |
| 418 | 0.336000 | 50.00 | 1.000 | 16 | 160.000 | 160.000 | 2 | 0.00000 | 417 0 | 0 | 4000.00 | 0.0 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 419 | 0.505000 | 85.00 | 2.031 | 4 | 94.500 | 131.500 | 2 | 0.00000 | 154 | 420 | 0 | 4000.00 | 0.0 |
| 420 | 0.505000 | 50.00 | 1.443 | 4 | 131.500 | 130.750 | 2 | 0.00000 | 419 | 421 | 0 | 4000.00 | 0.0 |
| 421 | 0.505000 | 30.00 | 1.909 | 4 | 130.750 | 130.750 | 2 | 0.00000 | 420 | 422 | 0 | 4000.00 | 0.0 |
| 422 | 0.505000 | 40.00 | 2.361 | 4 | 130.750 | 128.750 | 2 | 0.00000 | 421 | 423 | 0 | 4000.00 | 0.0 |
| 423 | 0.505000 | 35.00 | 1.491 | 3 | 128.750 | 132.170 | 2 | 0.00000 | 422 | 424 | 0 | 4000.00 | 0.0 |
| 424 | 0.256000 | 10.00 | 1.505 | 4 | 132.170 | 138.000 | 2 | 0.00000 | 423 | 425 | 0 | 4000.00 | 0.0 |
| 425 | 0.162000 | 105.00 | 1.580 | 16 | 138.000 | 169.500 | 2 | 0.00000 | 424 | 0 | 0 | 4000.00 | 0.0 |
| 426 | 0.336000 | 40.00 | 1.843 | 3 | 132.170 | 132.170 | 2 | 0.00000 | 423 | 427 | 0 | 4000.00 | 0.0 |
| 427 | 0.256000 | 10.00 | 1.000 | 4 | 132.170 | 138.000 | 2 | 0.00000 | 426 | 428 | 0 | 4000.00 | 0.0 |
| 428 | 0.162000 | 100.00 | 1.632 | 16 | 138.000 | 169.500 | 2 | 0.00000 | 427 | 0 | 0 | 4000.00 | 0.0 |
| 429 | 0.256000 | 40.00 | 1.165 | 4 | 132.170 | 138.000 | 2 | 0.00000 | 426 | 430 | 0 | 4000.00 | 0.0 |
| 430 | 0.162000 | 155.00 | 1.548 | 16 | 138.000 | 169.500 | 2 | 0.00000 | 429 | 0 | 0 | 4000.00 | 0.0 |
| 431 | 0.256000 | 40.00 | 1.934 | 4 | 65.500 | 69.000 | 2 | 0.00000 | 286 | 432 | 0 | 4000.00 | 0.0 |
| 432 | 0.256000 | 105.00 | 1.020 | 4 | 69.000 | 171.000 | 2 | 0.00000 | 431 | 433 | 0 | 4000.00 | 0.0 |
| 433 | 0.162000 | 10.00 | 1.227 | 19 | 171.000 | 181.000 | 2 | 0.00000 | 432 | 434 | 0 | 4000.00 | 0.0 |
| 434 | 0.162000 | 40.00 | 1.332 | 16 | 181.000 | 180.000 | 2 | 0.00000 | 433 | 0 | 0 | 4000.00 | 0.0 |
| 435 | 0.665000 | 15.00 | 5.522 | 3 | 89.600 | 83.800 | 2 | 0.00000 | 166 | 436 | 0 | 4000.00 | 0.0 |
| 436 | 0.665000 | 5.00 | 3.660 | 3 | 83.800 | 83.800 | 2 | 0.00000 | 435 | 437 | 0 | 4000.00 | 0.0 |
| 437 | 0.665000 | 5.00 | 14.300 | 3 | 83.800 | 83.800 | 2 | 0.00000 | 436 | 438 | 0 | 4000.00 | 0.0 |
| 438 | 0.505000 | 5.00 | 4.652 | 13 | 83.800 | 88.000 | 2 | 0.00000 | 437 | 439 | 0 | 4000.00 | 0.0 |
| 439 | 0.505000 | 5.00 | 6.050 | 2 | 88.000 | 89.000 | 2 | 0.00000 | 438 | 440 | 0 | 4000.00 | 0.0 |
| 440 | 0.336000 | 60.00 | 5.000 | 1 | 89.000 | 113.000 | 2 | 0.00000 | 439 | 0 | 0 | 4000.00 | 0.0 |
| 441 | 0.665000 | 10.00 | 9.911 | 3 | 83.800 | 91.500 | 2 | 0.00000 | 437 | 442 | 0 | 4000.00 | 0.0 |
| 442 | 0.665000 | 80.00 | 1.865 | 3 | 91.500 | 102.800 | 2 | 0.00000 | 441 | 443 | 0 | 4000.00 | 0.0 |
| 443 | 0.665000 | 50.00 | 1.106 | 16 | 102.800 | 130.000 | 2 | 0.00000 | 442 | 0 | 0 | 4000.00 | 0.0 |
| 444 | 0.336000 | 10.00 | 5.435 | 16 | 102.800 | 107.800 | 2 | 0.00000 | 442 | 0 | 0 | 4000.00 | 0.0 |
| 445 | 0.665000 | 40.00 | 2.658 | 16 | 91.500 | 86.000 | 2 | 0.00000 | 441 | 0 | 0 | 4000.00 | 0.0 |
| 446 | 0.505000 | 5.00 | 7.868 | 13 | 83.800 | 88.000 | 2 | 0.00000 | 435 | 447 | 0 | 4000.00 | 0.0 |
| 447 | 0.505000 | 5.00 | 1.000 | 2 | 88.000 | 89.000 | 2 | 0.00000 | 446 | 448 | 0 | 4000.00 | 0.0 |
| 448 | 0.505000 | 45.00 | 2.301 | 4 | 89.000 | 103.000 | 2 | 0.00000 | 447 | 449 | 0 | 4000.00 | 0.0 |
| 449 | 0.336000 | 20.00 | 2.613 | 4 | 103.000 | 112.000 | 2 | 0.00000 | 448 | 450 | 0 | 4000.00 | 0.0 |
| 450 | 0.336000 | 110.00 | 2.307 | 1 | 112.000 | 113.000 | 2 | 0.00000 | 449 | 0 | 0 | 4000.00 | 0.0 |
| 451 | 0.336000 | 160.00 | 1.474 | 4 | 83.800 | 141.000 | 2 | 0.00000 | 436 | 452 | 0 | 4000.00 | 0.0 |
| 452 | 0.336000 | 5.00 | 1.000 | 2 | 141.000 | 141.000 | 2 | 0.00000 | 451 | 453 | 0 | 4000.00 | 0.0 |
| 453 | 0.256000 | 50.00 | 1.000 | 1 | 141.000 | 141.000 | 2 | 0.00000 | 452 | 0 | 0 | 4000.00 | 0.0 |
| 454 | 0.665000 | 30.00 | 4.979 | 3 | 84.100 | 93.500 | 2 | 0.00000 | 204 | 455 | 0 | 4000.00 | 0.0 |
| 455 | 0.665000 | 10.00 | 2.862 | 2 | 93.500 | 103.500 | 2 | 0.00000 | 454 | 456 | 0 | 4000.00 | 0.0 |
| 456 | 0.505000 | 50.00 | 5.000 | 1 | 103.500 | 103.500 | 2 | 0.00000 | 455 | 0 | 0 | 4000.00 | 0.0 |
| 457 | 0.505000 | 20.00 | 2.414 | 4 | 93.500 | 80.300 | 2 | 0.00000 | 454 | 458 | 0 | 4080.00 | 0.0 |
| 458 | 0.505000 | 50.00 | 1.000 | 16 | 80.300 | 80.300 | 2 | 0.00000 | 457 | 0 | 0 | 4000.00 | 0.0 |
| 459 | 0.336000 | 20.00 | 3.318 | 2 | 62.750 | 62.750 | 2 | 0.00000 | 218 | 460 | 0 | 4000.00 | 0.0 |
| 460 | 0.336000 | 10.00 | 2.210 | 4 | 62.750 | 63.750 | 2 | 0.00000 | 459 | 461 | 0 | 4000.00 | 0.0 |
| 461 | 0.336000 | 30.00 | 1.762 | 4 | 63.750 | 86.250 | 2 | 0.00000 | 460 | 462 | 0 | 4000.00 | 0.0 |
| 462 | 0.336000 | 40.00 | 1.286 | 4 | 86.250 | 125.000 | 2 | 0.00000 | 461 | 463 | 0 | 4000.00 | 0.0 |
| 463 | 0.336000 | 130.00 | 1.233 | 4 | 125.000 | 125.000 | 2 | 0.00000 | 462 | 464 | 0 | 4000.00 | 0.0 |
| 464 | 0.336000 | 30.00 | 1.587 | 4 | 125.000 | 155.000 | 2 | 0.00000 | 463 | 465 | 0 | 4000.00 | 0.0 |
| 465 | 0.256000 | 60.00 | 1.171 | 4 | 155.000 | 208.000 | 2 | 0.00000 | 464 | 466 | 0 | 4000.00 | 0.0 |
| 466 | 0.001000 | 10.00 | 1.000 | 16 | 208.000 | 205.000 | 2 | 0.00000 | 465 | 0 | 0 | 4000.00 | 0.0 |
| 467 | 0.336000 | 20.00 | 2.378 | 2 | 94.000 | 94.000 | 2 | 0.00000 | 199 | 468 | 0 | 4000.00 | 0.0 |
| 468 | 0.336000 | 20.00 | 1.000 | 4 | 94.000 | 94.000 | 2 | 0.00000 | 467 | 469 | 0 | 4000.00 | 0.0 |
| 469 | 0.336000 | 5.00 | 1.538 | 4 | 94.000 | 94.000 | 2 | 0.00000 | 468 | 470 | 0 | 4000.00 | 0.0 |
| 470 | 0.336000 | 25.00 | 2.665 | 4 | 94.000 | 113.000 | 2 | 0.00000 | 469 | 471 | 0 | 4000.00 | 0.0 |
| 471 | 0.336000 | 75.00 | 1.403 | 4 | 113.000 | 122.000 | 2 | 0.00000 | 470 | 472 | 0 | 4000.00 | 0.0 |
| 472 | 0.336000 | 35.00 | 1.708 | 3 | 122.000 | 151.800 | 2 | 0.00000 | 471 | 473 | 0 | 4000.00 | 0.0 |
| 473 | 0.336000 | 30.00 | 2.322 | 3 | 151.800 | 169.500 | 2 | 0.00000 | 472 | 474 | 0 | 4000.00 | 0.0 |
| 474 | 0.336000 | 35.00 | 1.770 | 4 | 169.500 | 187.800 | 2 | 0.00000 | 473 | 475 | 0 | 4000.00 | 0.0 |
| 475 | 0.256000 | 15.00 | 1.717 | 4 | 187.800 | 187.800 | 2 | 0.00000 | 474 | 476 | 0 | 4000.00 | 0.0 |
| 476 | 0.256000 | 110.00 | 1.130 | 4 | 187.800 | 205.300 | 2 | 0.00000 | 475 | 477 | 0 | 4000.00 | 0.0 |
| 477 | 0.256000 | 10.00 | 1.000 | 16 | 205.300 | 204.300 | 2 | 0.00000 | 476 | 0 | 0 | 4000.00 | 0.0 |
| 478 | 0.256000 | 40.00 | 1.849 | 16 | 169.500 | 166.000 | 2 | 0.00000 | 473 | 0 | 0 | 4000.00 | 0.0 |
| 479 | 0.336000 | 10.00 | 4.769 | 4 | 151.800 | 153.300 | 2 | 0.00000 | 472 | 480 | 0 | 4000.00 | 0.0 |
| 480 | 0.256000 | 60.00 | 1.293 | 16 | 153.300 | 149.300 | 2 | 0.00000 | 479 | 0 | 0 | 4000.00 | 0.0 |
| 481 | 0.505000 | 5.00 | 14.146 | 4 | 61.750 | 57.700 | 2 | 0.00000 | 208 | 482 | 0 | 4000.00 | 0.0 |
| 482 | 0.505000 | 20.00 | 3.323 | 4 | 57.700 | 71.000 | 2 | 0.00000 | 481 | 483 | 0 | 4000.00 | 0.0 |
| 483 | 0.505000 | 10.00 | 1.000 | 2 | 71.000 | 71.000 | 2 | 0.00000 | 482 | 484 | 0 | 4000.00 | 0.0 |
| 484 | 0.505000 | 50.00 | 5.000 | 1 | 71.000 | 71.000 | 2 | 0.00000 | 483 | 0 | 0 | 4000.00 | 0.0 |
| 485 | 0.505000 | 5.00 | 13.184 | 4 | 138.300 | 138.300 | 2 | 0.00000 | 414 | 486 | 0 | 4000.00 | 0.0 |
| 486 | 0.336000 | 90.00 | 1.157 | 4 | 138.300 | 143.500 | 2 | 0.00000 | 485 | 487 | 0 | 4000.00 | 0.0 |
| 487 | 0.336000 | 15.00 | 1.627 | 4 | 143.500 | 147.400 | 2 | 0.00000 | 486 | 488 | 0 | 4000.00 | 0.0 |
| 488 | 0.336000 | 75.00 | 1.314 | 4 | 147.400 | 165.800 | 2 | 0.00000 | 487 | 489 | 0 | 4000.00 | 0.0 |
| 489 | 0.336000 | 70.00 | 1.355 | 4 | 165.800 | 164.000 | 2 | 0.00000 | 488 | 490 | 0 | 4000.00 | 0.0 |
| 490 | 0.336000 | 10.00 | 3.486 | 4 | 164.000 | 164.000 | 2 | 0.00000 | 489 | 491 | 0 | 4000.00 | 0.0 |
| 491 | 0.336000 | 10.00 | 1.416 | 4 | 164.000 | 164.000 | 2 | 0.00000 | 490 | 492 | 0 | 4000.00 | 0.0 |
| 492 | 0.256000 | 10.00 | 1.251 | 4 | 164.000 | 164.000 | 2 | 0.00000 | 491 | 493 | 0 | 4000.00 | 0.0 |

# CALCULATION SHEET

| | | | |
|---|---|---|---|
| Project: | HOPE CREEK GENERATING STATION | Job Number: | 8038 |
| Calc No. | 8038-P0004 | Sheet No. | 115 |
| By: | A Arastu Date: 9/14/18 | Rev. No. | 1 |
| Subject: | Water Hammer Analysis of the HCGS Fire Protection System | | |

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        493    0.206000     10.00    3.225   4     164.000   166.000     2     0.00000 492 494     0   4000.00       0.0
        494    0.206000     75.00    1.549   4     166.000   166.000     2     0.00000 493 495     0   4000.00       0.0
        495    0.172000     20.00    1.757  19     166.000   166.000     2     0.00000 494 496     0   4000.00       0.0
        496    0.087000     10.00    2.409  16     166.000   168.000     2     0.00000 495   0     0   4000.00       0.0
       @EOR

        91 570.3   0  18
 20.00   .000     -0.022     -0.033    -0.045    -0.056    -0.067    -0.078
-0.089  -.100     -0.111     -0.123    -0.134    -0.145    -0.156    -0.167
-0.200   -100.0
 570.3  570.3     587.3     590.3     587.3     580.3     568.3     558.3
 542.3  520.3     490.3     460.3     420.3     370.3     310.3     240.3
        170.3  170.3

        99 495.3   0  18
          20.00   .000     -0.557     -1.114    -1.671    -2.228    -2.785    -3.342
          -3.899  -4.46     -5.013     -5.570    -6.127    -6.684    -7.241    -8.912
          -13.4   -100.0
           495.3  495.3     494.3     492.3     491.3     488.3     485.3     481.3
           477.3  472.3     466.3     459.3     448.3     436.3     423.3     375.3
           170.3  170.3

       117 512.1  0 17
          20.00  -.000     -0.557    -1.114    -1.671    -2.228    -2.785    -3.342
          -3.899  -4.46     -5.013    -5.57     -6.127    -6.684    -7.241    -8.912
          -13.37
           512.1  512.1     510.1     507.1     505.1     502.1     500.1     498.1
           495.1  492.1     487.8     481.1     476.1     467.1     457.1     412.1
           160.1

       123 512.1  0 17
          20.00  -.000     -0.557    -1.114    -1.671    -2.228    -2.785    -3.342
          -3.899  -4.46     -5.013    -5.57     -6.127    -6.684    -7.241    -8.912
          -13.37
           512.1  512.1     510.1     507.1     505.1     502.1     500.1     498.1
           495.1  492.1     487.8     481.1     476.1     467.1     457.1     412.1
           160.1

       129 482.1   0  16
          20.00   .000     -0.022     -0.033    -0.045    -0.056    -0.067    -0.078
          -0.089  -.100     -0.111     -0.123    -0.134    -0.145    -0.156    -100.0
          482.1  482.1     478.1     473.1     463.1     448.1     428.1     403.1
          374.1  343.1     308.1     268.1     233.1     198.1     168.1     168.1

       440 147.0   0   0

       450 147.0   0   0

       453 175.0   0   0

       456 137.5   0   0

       484 105.0   0   0

         4 0  100.  100. 1.0E+20   2  9  4  0  .01   393.6
       0     .56   2.36    100
       100.  100.  0.      0.
       0     50.0   90.0  92.5   95.3   97.5      99.0      99.7       100.0
       0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

        90 0  100  100  1.0E+20    2  9  3  0  .01  570.3
0       0.01  100
100     0    0
0     50.0   90.0  92.5   95.3   97.5      99.0      99.7       100.0
       0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

        96 0  100  100  1.0E+20   2  9  4  0  .01  495.3
0      .63   3.43   100
100.   100.  100.   100.
0     50.0   90.0  92.5   95.3   97.5      99.0      99.7       100.0
       0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

       102 0  100.  100. 1.0E+20   2  9  4  0  .01   393.6
0     2.0   2.01    100
```

```
100.  100.  100.    100.
0     50.0   90.0  92.5   95.3   97.5      99.0      99.7       100.0
       0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

       114 0  100  100  1.0E+20    2  9  4  0  .01  512.1
       0       2.51  5.61   100
       100     100   100.   100.
       0     50.0   90.0  92.5   95.3   97.5      99.0      99.7       100.0
       0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

       121 0  100  100  1.0E+20    2  9  4  0  .01  512.1
       0       21.93 27.13 100
       100     100   100   100
       0     50.0   90.0  92.5   95.3   97.5      99.0      99.7       100.0
       0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

       126 0  100  100  1.0E+20    2  9  3  0  .01  482.1
0       0.01  100
100     100   100
0     50.0   90.0  92.5   95.3   97.5      99.0      99.7       100.0
       0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

       415  0  100  100  1.0E+20   2  16  3  0  1.79  194.
       00.1    100
       100     100    100
       0   11.1   16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
       97.5     99.0     99.7  100.0
       10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
       203570   1596000  0.49259E+08  0.1E+21

       439  0  100  100  1.0E+20   2  16  3  0  1.79  147.
       0       0.1    100
       100     100    100
       0    11.1  16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
       97.5     99.0     99.7  100.0
       10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
       203570   1596000  0.49259E+08  0.1E+21

       447  0  100  100  1.0E+20   2  16  3  0  0.99  147.
       0       0.01    100
       100     0       0
       0    11.1  16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
       97.5     99.0     99.7  100.0
       10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
       203570   1596000  0.49259E+08  0.1E+21

       452  0  100  100  1.0E+20   2  16  3  0  1.785  175.
       0       0.01   100
       100     100    100
       0    11.1  16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
       97.5     99.0     99.7  100.0
       10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
       203570   1596000  0.49259E+08  0.1E+21

       455  0  100  100  1.0E+20   2  16  3  0  0.695  137.5
0       0.01   100
100     100    100
0    11.1  16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
97.5     99.0     99.7  100.0
10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
       203570   1596000  0.49259E+08  0.1E+21

       459  0  100  100  1.0E+20   2  9  3  0  .01  96.8
       0       1.0   100
       100     100   100
       0     50.0   90.0  92.5   95.3   97.5      99.0      99.7       100.0
       0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

       467  0  100  100  1.0E+20   2  9  3  0  .01  128.
       0       1.0   100
       100     100   100
       0     50.0   90.0  92.5   95.3   97.5      99.0      99.7       100.0
       0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21
```

```
 483  0  100  100  1.0E+20  2  16  4  0  0.99  105.0
 0       0.1   0.11  100
 100     100   100   100
 0    11.1  16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
 97.5     99.0     99.7  100.0
 10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
 203570   1596000  0.49259E+08  0.1E+21


   5  2  0.650  0.01 0.7850 0.0  ID 1.0000
 438  2  0.750  0.01 0.2003 0.0  ID 0.5050
 446  2  0.750  0.01 0.2003 0.0  ID 0.5050

308   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102

410   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102


433   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102

362   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102

396   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102


495   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102

334   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102

371   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102

382   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102


 1.          1.
 6     2
 94    2
 97    2
 102   2
 113   2
 120   2
 184   41
 188   46
 194   31
 289   11
 290    7
 291    6
```

```
292   23
299   17
303   11
304   1
306   24
308   26
314   6
322   11
325    5
332    2
334    9
347   11
351   10
362    9
371   2
376   6
382   13
383    3
396   31
409   4
410   17
412   11
418   9
425   21
428   20
430   32
432   20
433   3
450   22
455   2
465   1
466   2
476   4
477   22
478   8
480   11
483   2
495   4
@EOR
410       1       410      3          1
410       3       410      5          2
410       4       410      18         3
410       18      410      19         4
410       18      411      3          5
412       1       412      2          6
412       1       412      3          7
412       3       412      6          8
412       5       412      6          9
412       6       412      7          10
412       7       412      10         11
@EOR
0      1.0    100   1
1.0   30.0    500   1
30.0 888.    1000   1


End of USLAM Input Data File Echo
```

```
                                  ****************************************************
                                  *  U S L A M (Unified Steam Liquid hAMmer analysis) *
                                  ****************************************************

USLAM run started on :    02/13/17   at time :  10:46:44.99

 Input Data File : Case1f26
 Output File : Case1f26.o
 Force Time Output File in ME101 Format : Case1f26.m
 Plot File for Heads (HGL):  Case1f26.h
   Plot File for Velocity :  Case1f26.v
     Plot File for Forces :  Case1f26.f
Peak Force Summary of File:  Case1f26.sum


    * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *

            HCGS FP Case 1: 9 VBs.  Forces in Riser # 26 only

    * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *



  Input Data As Read/Processed by USLAM


 **** Job Identification ****

        HCGS FP Case 1: 9 VBs.  Forces in Riser # 26 only

 **** Maximum Number of Time Steps ****

 Mtotal= Total Number of Computational Time Steps=  10000

 **** Run Options ****

 WCS, System Filling, Elongated Bubble Options Selected:
 IFull = 0. ITair = 0.  IWCS = 1. BCtol= 0.00000E+00.  IWCtEB= 1.  BSFrDX= 0.10000

 Forcing Function Options Selected:
 IFRCop = 2.   IPRTop = 2

 **** Output Options ****

 **** Post Processor Plot & Output  ****:
 Iplot= 2.  MPfreq =   1    IPPMPsp = 0.  IPforc= 0

 Printing & Debugging Options:
 IPRTop = 0.  Imxplt = 1
 Idebug = 0.  MDBBeg =     0. MDBEnd =     0.  Mdblb =   0.  Mdblq =   0
 MPRTin = 1.  IPRThs = 0. Mprnel= 0

 **** Fluid Properties ****

 VaporP =  0.19000E+01 RhoL =  0.62400E+02 Visck = 0.78300E-05

 **** Friction Data ****

  FFMgbl =  0.10000E+01 IFFCop =    2 NEfvRe =   13 Refdia=  0.00000E+00Rufnes= 0.18000E-02

 Reynolds Number Vs Friction Factor) Table

 Reynolds Numbers Array of NEfvRe =  13 Entries

   0.00000E+00  0.10000E+04  0.20000E+04  0.20000E+05  0.60000E+05  0.10000E+06
   0.30000E+06  0.60000E+06  0.10000E+07  0.15000E+07  0.35000E+07  0.10000E+12
   0.10000E+34

 Friction Factors (ff) array of  NEfvRe =  13 Entries

   0.100000  0.061000  0.048000  0.026000  0.021000  0.019000  0.016700  0.015500
   0.015000  0.014700  0.014000  0.014000  0.014000
```

# CALCULATION SHEET

| | | | |
|---|---|---|---|
| Project: | HOPE CREEK GENERATING STATION | Job Number: | 8038 |
| Calc No. | 8038-P0004 | Sheet No. | 120 |
| By: | A Arastu Date: 9/14/18 | Rev. No. | 1 |
| Subject: | Water Hammer Analysis of the HCGS Fire Protection System | | |

```
**** Source Data ****

HSrc =  0.49530E+03 ISrcOp=  3 NESHvtQ=  17 Ntsorc=   0 Source Elevation=  0.00000E+00
     Source has Head Vs Discharge Dependence)
Discharge (Q) Values in Head Vs Q Table
-0.100000E+02 0.000000E+00 0.557000E+00 0.111400E+01 0.167100E+01 0.222800E+01 0.278500E+01 0.334200E+01
Discharge (Q) Values in Head Vs Q Table
 0.389900E+01 0.445600E+01 0.501300E+01 0.557000E+01 0.612700E+01 0.668400E+01 0.724100E+01 0.891200E+01
Discharge (Q) Values in Head Vs Q Table
 0.134000E+02
Head Values in Head Vs Discharge Table
 0.495300E+03 0.495300E+03 0.494300E+03 0.492300E+03 0.491300E+03 0.488300E+03 0.485300E+03 0.481300E+03
Head Values in Head Vs Discharge Table
 0.477300E+03 0.472300E+03 0.466300E+03 0.459300E+03 0.448300E+03 0.436300E+03 0.423300E+03 0.375300E+03
Head Values in Head Vs Discharge Table
 0.170300E+03

**** Nodal Distance Control ****

No. of nodal distances in the shortest Link =    1

**** PIPE LINK Data ****

No. of Links specified in this USLAM model =496

FFMULT = Pipe Friction multiplier  LEBD = Link End Boundary Device
PelvBg,PelvEd = Pipe Link Beginning and Ending elevations  Flow = Pipe Link Initial Flow rate
LkUp,LkDn = Upstream and downstream links
LKsp = Special Reverse Link Flag  SonicS = Speed of Sound in Link
```

| Link | Diameter | Length | FFMult | LEBD | PelvBg | PelvEd | LFWcsS | Flow | LkUp | LkDn | LKSp | SonicS | Prmx |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.104000 | 55.00 | 5.492 | 4 | 99.400 | 94.000 | 2 | 0.00000 | 0 | 2 | 0 | 4000.00 | 0.00 |
| 2 | 1.000000 | 20.00 | 7.400 | 4 | 94.000 | 105.040 | 2 | 0.00000 | 1 | 3 | 0 | 4000.00 | 0.00 |
| 3 | 1.000000 | 10.00 | 7.180 | 4 | 105.040 | 105.040 | 2 | 0.00000 | 2 | 4 | 0 | 4000.00 | 0.00 |
| 4 | 1.000000 | 10.00 | 3.538 | 2 | 105.040 | 104.500 | 2 | 0.00000 | 3 | 5 | 0 | 4000.00 | 0.00 |
| 5 | 1.000000 | 5.00 | 18.508 | 13 | 104.500 | 104.750 | 2 | 0.00000 | 4 | 6 | 0 | 4000.00 | 0.00 |
| 6 | 1.000000 | 10.00 | 5.200 | 4 | 104.750 | 110.000 | 2 | 0.00000 | 5 | 7 | 0 | 4000.00 | 0.00 |
| 7 | 1.000000 | 20.00 | 3.400 | 3 | 110.000 | 105.000 | 2 | 0.00000 | 6 | 8 | 0 | 4000.00 | 0.00 |
| 8 | 1.000000 | 115.00 | 2.402 | 3 | 105.000 | 96.900 | 2 | 0.00000 | 7 | 86 | 0 | 4000.00 | 0.00 |
| 9 | 1.007000 | 5.00 | 2.611 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 8 | 10 | 0 | 4000.00 | 0.00 |
| 10 | 1.007000 | 10.00 | 3.014 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 9 | 11 | 0 | 4000.00 | 0.00 |
| 11 | 1.007000 | 10.00 | 1.806 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 10 | 12 | 0 | 4000.00 | 0.00 |
| 12 | 1.007000 | 10.00 | 3.014 | 3 | 96.900 | 96.900 | 2 | 0.00000 | 11 | 13 | 0 | 4000.00 | 0.00 |
| 13 | 1.007000 | 110.00 | 1.183 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 12 | 14 | 0 | 4000.00 | 0.00 |
| 14 | 1.007000 | 110.00 | 1.363 | 4 | 96.900 | 95.900 | 2 | 0.00000 | 13 | 15 | 0 | 4000.00 | 0.00 |
| 15 | 1.007000 | 10.00 | 3.014 | 4 | 95.900 | 95.900 | 2 | 0.00000 | 14 | 16 | 0 | 4000.00 | 0.00 |
| 16 | 1.007000 | 30.00 | 1.671 | 4 | 95.900 | 95.900 | 2 | 0.00000 | 15 | 17 | 0 | 4000.00 | 0.00 |
| 17 | 1.007000 | 80.00 | 1.252 | 4 | 95.900 | 95.900 | 2 | 0.00000 | 16 | 18 | 0 | 4000.00 | 0.00 |
| 18 | 1.007000 | 20.00 | 1.403 | 4 | 95.900 | 95.900 | 2 | 0.00000 | 17 | 19 | 0 | 4000.00 | 0.00 |
| 19 | 1.007000 | 130.00 | 1.155 | 4 | 95.900 | 95.900 | 2 | 0.00000 | 18 | 20 | 0 | 4000.00 | 0.00 |
| 20 | 1.007000 | 135.00 | 1.060 | 4 | 95.900 | 95.400 | 2 | 0.00000 | 19 | 21 | 0 | 4000.00 | 0.00 |
| 21 | 1.007000 | 10.00 | 2.994 | 4 | 95.400 | 93.500 | 2 | 0.00000 | 20 | 22 | 0 | 4000.00 | 0.00 |
| 22 | 1.007000 | 65.00 | 1.217 | 4 | 93.500 | 93.500 | 2 | 0.00000 | 21 | 23 | 0 | 4000.00 | 0.00 |
| 23 | 1.007000 | 5.00 | 1.000 | 4 | 93.500 | 93.500 | 2 | 0.00000 | 22 | 24 | 0 | 4000.00 | 0.00 |
| 24 | 1.007000 | 20.00 | 3.004 | 4 | 93.500 | 97.000 | 2 | 0.00000 | 23 | 25 | 0 | 4000.00 | 0.00 |
| 25 | 1.007000 | 200.00 | 1.300 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 24 | 26 | 0 | 4000.00 | 0.00 |
| 26 | 1.007000 | 55.00 | 1.513 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 25 | 27 | 0 | 4000.00 | 0.00 |
| 27 | 1.007000 | 20.00 | 1.997 | 4 | 97.000 | 93.000 | 2 | 0.00000 | 26 | 28 | 0 | 4000.00 | 0.00 |
| 28 | 1.007000 | 230.00 | 1.088 | 3 | 93.000 | 93.000 | 2 | 0.00000 | 27 | 181 | 0 | 4000.00 | 0.00 |
| 29 | 1.007000 | 40.00 | 1.503 | 3 | 93.000 | 93.000 | 2 | 0.00000 | 28 | 30 | 0 | 4000.00 | 0.00 |
| 30 | 1.007000 | 240.00 | 1.117 | 4 | 93.000 | 94.500 | 2 | 0.00000 | 29 | 31 | 0 | 4000.00 | 0.00 |
| 31 | 1.007000 | 45.00 | 1.448 | 4 | 94.500 | 94.500 | 2 | 0.00000 | 30 | 32 | 0 | 4000.00 | 0.00 |
| 32 | 1.007000 | 35.00 | 1.570 | 4 | 94.500 | 91.000 | 2 | 0.00000 | 31 | 33 | 0 | 4000.00 | 0.00 |
| 33 | 1.007000 | 180.00 | 1.111 | 4 | 91.000 | 96.000 | 2 | 0.00000 | 32 | 34 | 0 | 4000.00 | 0.00 |
| 34 | 1.007000 | 10.00 | 3.014 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 33 | 35 | 0 | 4000.00 | 0.00 |
| 35 | 1.007000 | 5.00 | 5.028 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 34 | 36 | 0 | 4000.00 | 0.00 |
| 36 | 1.007000 | 5.00 | 2.611 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 35 | 37 | 0 | 4000.00 | 0.00 |
| 37 | 1.007000 | 10.00 | 3.014 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 36 | 38 | 0 | 4000.00 | 0.00 |
| 38 | 1.007000 | 30.00 | 2.141 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 37 | 39 | 0 | 4000.00 | 0.00 |
| 39 | 1.007000 | 20.00 | 1.403 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 38 | 40 | 0 | 4000.00 | 0.00 |
| 40 | 1.007000 | 80.00 | 1.252 | 3 | 96.000 | 96.000 | 2 | 0.00000 | 39 | 41 | 0 | 4000.00 | 0.00 |
| 41 | 1.007000 | 10.00 | 1.806 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 40 | 42 | 0 | 4000.00 | 0.00 |
| 42 | 1.007000 | 20.00 | 1.000 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 41 | 43 | 0 | 4000.00 | 0.00 |
| 43 | 1.007000 | 55.00 | 1.363 | 4 | 96.000 | 97.200 | 2 | 0.00000 | 42 | 44 | 0 | 4000.00 | 0.00 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 44 | 1.007000 | 5.00 | 5.028 | 4 | 97.200 | 97.200 | 2 | 0.00000 | 43 | 45 | 0 | 4000.00 | 0.00 |
| 45 | 1.007000 | 160.00 | 1.175 | 4 | 97.200 | 96.200 | 2 | 0.00000 | 44 | 46 | 0 | 4000.00 | 0.00 |
| 46 | 1.007000 | 15.00 | 2.343 | 3 | 96.200 | 96.200 | 2 | 0.00000 | 45 | 162 | 0 | 4000.00 | 0.00 |
| 47 | 1.007000 | 5.00 | 5.028 | 4 | 96.200 | 96.200 | 2 | 0.00000 | 46 | 48 | 0 | 4000.00 | 0.00 |
| 48 | 1.007000 | 15.00 | 6.357 | 4 | 96.200 | 97.000 | 2 | 0.00000 | 47 | 49 | 0 | 4000.00 | 0.00 |
| 49 | 1.007000 | 60.00 | 1.166 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 48 | 50 | 0 | 4000.00 | 0.00 |
| 50 | 1.007000 | 15.00 | 2.994 | 4 | 97.000 | 94.500 | 2 | 0.00000 | 49 | 51 | 0 | 4000.00 | 0.00 |
| 51 | 1.007000 | 5.00 | 4.605 | 4 | 94.500 | 97.000 | 2 | 0.00000 | 50 | 52 | 0 | 4000.00 | 0.00 |
| 52 | 1.007000 | 15.00 | 2.329 | 4 | 97.000 | 94.000 | 2 | 0.00000 | 51 | 53 | 0 | 4000.00 | 0.00 |
| 53 | 1.007000 | 80.00 | 1.501 | 4 | 94.000 | 96.500 | 2 | 0.00000 | 52 | 54 | 0 | 4000.00 | 0.00 |
| 54 | 1.007000 | 65.00 | 1.310 | 3 | 96.500 | 96.500 | 2 | 0.00000 | 53 | 55 | 0 | 4000.00 | 0.00 |
| 55 | 1.007000 | 50.00 | 1.481 | 4 | 96.500 | 97.200 | 2 | 0.00000 | 54 | 56 | 0 | 4000.00 | 0.00 |
| 56 | 1.007000 | 25.00 | 1.322 | 4 | 97.200 | 97.200 | 2 | 0.00000 | 55 | 57 | 0 | 4000.00 | 0.00 |
| 57 | 1.007000 | 5.00 | 3.820 | 4 | 97.200 | 97.200 | 2 | 0.00000 | 56 | 58 | 0 | 4000.00 | 0.00 |
| 58 | 1.007000 | 70.00 | 1.288 | 4 | 97.200 | 97.200 | 2 | 0.00000 | 57 | 59 | 0 | 4000.00 | 0.00 |
| 59 | 1.007000 | 10.00 | 1.806 | 4 | 97.200 | 97.200 | 2 | 0.00000 | 58 | 60 | 0 | 4000.00 | 0.00 |
| 60 | 1.007000 | 195.00 | 1.103 | 4 | 97.200 | 97.200 | 2 | 0.00000 | 59 | 61 | 0 | 4000.00 | 0.00 |
| 61 | 1.007000 | 240.00 | 1.159 | 4 | 97.200 | 94.500 | 2 | 0.00000 | 60 | 62 | 0 | 4000.00 | 0.00 |
| 62 | 1.007000 | 215.00 | 1.094 | 4 | 94.500 | 94.500 | 2 | 0.00000 | 61 | 63 | 0 | 4000.00 | 0.00 |
| 63 | 1.007000 | 110.00 | 1.183 | 4 | 94.500 | 94.500 | 2 | 0.00000 | 62 | 64 | 0 | 4000.00 | 0.00 |
| 64 | 1.007000 | 195.00 | 1.103 | 4 | 94.500 | 94.500 | 2 | 0.00000 | 63 | 65 | 0 | 4000.00 | 0.00 |
| 65 | 1.007000 | 5.00 | 5.028 | 4 | 94.500 | 94.500 | 2 | 0.00000 | 64 | 66 | 0 | 4000.00 | 0.00 |
| 66 | 1.007000 | 30.00 | 1.665 | 4 | 94.500 | 95.800 | 2 | 0.00000 | 65 | 67 | 0 | 4000.00 | 0.00 |
| 67 | 1.007000 | 5.00 | 2.611 | 4 | 95.800 | 95.800 | 2 | 0.00000 | 66 | 68 | 0 | 4000.00 | 0.00 |
| 68 | 1.007000 | 25.00 | 1.806 | 3 | 95.800 | 95.800 | 2 | 0.00000 | 67 | 229 | 0 | 4000.00 | 0.00 |
| 69 | 1.007000 | 130.00 | 1.155 | 4 | 95.800 | 95.500 | 2 | 0.00000 | 68 | 70 | 0 | 4000.00 | 0.00 |
| 70 | 1.007000 | 5.00 | 2.611 | 3 | 95.500 | 95.500 | 2 | 0.00000 | 69 | 261 | 0 | 4000.00 | 0.00 |
| 71 | 1.007000 | 5.00 | 5.028 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 70 | 72 | 0 | 4000.00 | 0.00 |
| 72 | 1.007000 | 5.00 | 2.611 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 71 | 73 | 0 | 4000.00 | 0.00 |
| 73 | 1.007000 | 205.00 | 1.098 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 72 | 74 | 0 | 4000.00 | 0.00 |
| 74 | 1.007000 | 240.00 | 1.117 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 73 | 75 | 0 | 4000.00 | 0.00 |
| 75 | 1.007000 | 20.00 | 4.021 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 74 | 76 | 0 | 4000.00 | 0.00 |
| 76 | 1.007000 | 30.00 | 1.665 | 4 | 95.500 | 91.500 | 2 | 0.00000 | 75 | 77 | 0 | 4000.00 | 0.00 |
| 77 | 1.007000 | 25.00 | 2.120 | 4 | 91.500 | 97.000 | 2 | 0.00000 | 76 | 78 | 0 | 4000.00 | 0.00 |
| 78 | 1.007000 | 50.00 | 1.403 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 77 | 79 | 0 | 4000.00 | 0.00 |
| 79 | 1.007000 | 50.00 | 1.403 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 78 | 80 | 0 | 4000.00 | 0.00 |
| 80 | 1.007000 | 20.00 | 1.997 | 4 | 97.000 | 90.500 | 2 | 0.00000 | 79 | 81 | 0 | 4000.00 | 0.00 |
| 81 | 1.007000 | 40.00 | 2.002 | 4 | 90.500 | 96.900 | 2 | 0.00000 | 80 | 82 | 0 | 4000.00 | 0.00 |
| 82 | 1.007000 | 165.00 | 1.122 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 81 | 83 | 0 | 4000.00 | 0.00 |
| 83 | 1.007000 | 135.00 | 1.060 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 82 | 84 | 0 | 4000.00 | 0.00 |
| 84 | 1.007000 | 10.00 | 3.014 | 3 | 96.900 | 96.900 | 2 | 0.00000 | 83 | 101 | 0 | 4000.00 | 0.00 |
| 85 | 1.007000 | 60.00 | 1.134 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 84 | 86 | 0 | 4000.00 | 0.00 |
| 86 | 1.007000 | 5.00 | 5.028 | 3 | 96.900 | 96.900 | 2 | 0.00000 | 85 | 9 | 1 | 4000.00 | 0.00 |
| 87 | 0.336000 | 10.00 | 5.771 | 3 | 105.000 | 112.070 | 2 | 0.00000 | 7 | 88 | 0 | 4000.00 | 0.00 |
| 88 | 0.336000 | 5.00 | 5.570 | 4 | 112.070 | 113.750 | 2 | 0.00000 | 87 | 89 | 0 | 4000.00 | 0.00 |
| 89 | 0.256000 | 30.00 | 1.870 | 4 | 113.750 | 109.000 | 2 | 0.00000 | 88 | 90 | 0 | 4000.00 | 0.00 |
| 90 | 0.256000 | 10.00 | 1.205 | 2 | 109.000 | 104.250 | 2 | 0.00000 | 89 | 91 | 0 | 4000.00 | 0.00 |
| 91 | 0.256000 | 5.00 | 5.933 | 1 | 104.250 | 103.750 | 2 | 0.00000 | 90 | 0 | 0 | 4000.00 | 0.00 |
| 92 | 0.336000 | 40.00 | 2.714 | 3 | 112.070 | 105.000 | 2 | 0.00000 | 87 | 93 | 0 | 4000.00 | 0.00 |
| 93 | 1.000000 | 20.00 | 3.400 | 4 | 105.000 | 110.200 | 2 | 0.00000 | 92 | 94 | 0 | 4000.00 | 0.00 |
| 94 | 1.000000 | 10.00 | 3.800 | 4 | 110.200 | 104.750 | 2 | 0.00000 | 93 | 95 | 0 | 4000.00 | 0.00 |
| 95 | 1.000000 | 5.00 | 18.508 | 4 | 104.750 | 104.750 | 2 | 0.00000 | 94 | 96 | 0 | 4000.00 | 0.00 |
| 96 | 1.000000 | 10.00 | 3.538 | 2 | 104.750 | 104.750 | 2 | 0.00000 | 95 | 97 | 0 | 4000.00 | 0.00 |
| 97 | 1.000000 | 5.00 | 9.400 | 4 | 104.750 | 105.040 | 2 | 0.00000 | 96 | 98 | 0 | 4000.00 | 0.00 |
| 98 | 1.000000 | 20.00 | 7.400 | 4 | 105.040 | 94.000 | 2 | 0.00000 | 97 | 99 | 0 | 4000.00 | 0.00 |
| 99 | 1.104000 | 30.00 | 4.874 | 1 | 94.000 | 99.400 | 2 | 0.00000 | 98 | 0 | 0 | 4000.00 | 0.00 |
| 100 | 1.000000 | 85.00 | 1.864 | 4 | 105.000 | 91.000 | 2 | 0.00000 | 92 | 101 | 0 | 4000.00 | 0.00 |
| 101 | 1.000000 | 25.00 | 4.512 | 3 | 91.000 | 96.900 | 2 | 0.00000 | 100 | 85 | 1 | 4000.00 | 0.00 |
| 102 | 0.835000 | 5.00 | 12.356 | 2 | 96.000 | 96.000 | 2 | 0.00000 | 40 | 103 | 0 | 4000.00 | 0.00 |
| 103 | 0.788000 | 60.00 | 1.628 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 102 | 104 | 0 | 4000.00 | 0.00 |
| 104 | 0.788000 | 100.00 | 1.000 | 4 | 96.000 | 95.500 | 2 | 0.00000 | 103 | 105 | 0 | 4000.00 | 0.00 |
| 105 | 0.788000 | 100.00 | 1.000 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 104 | 106 | 0 | 4000.00 | 0.00 |
| 106 | 0.788000 | 30.00 | 2.786 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 105 | 107 | 0 | 4000.00 | 0.00 |
| 107 | 0.927000 | 35.00 | 2.059 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 106 | 108 | 0 | 4000.00 | 0.00 |
| 108 | 0.927000 | 150.00 | 1.494 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 107 | 109 | 0 | 4000.00 | 0.00 |
| 109 | 0.927000 | 50.00 | 1.519 | 3 | 95.500 | 95.500 | 2 | 0.00000 | 108 | 110 | 0 | 4000.00 | 0.00 |
| 110 | 0.927000 | 20.00 | 2.298 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 109 | 111 | 0 | 4000.00 | 0.00 |
| 111 | 0.927000 | 10.00 | 7.860 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 110 | 112 | 0 | 4000.00 | 0.00 |
| 112 | 1.000000 | 10.00 | 9.000 | 4 | 95.500 | 101.700 | 2 | 0.00000 | 111 | 113 | 0 | 4000.00 | 0.00 |
| 113 | 1.000000 | 5.00 | 5.400 | 4 | 101.700 | 102.800 | 2 | 0.00000 | 112 | 114 | 0 | 4000.00 | 0.00 |
| 114 | 1.000000 | 10.00 | 12.354 | 2 | 102.800 | 102.800 | 2 | 0.00000 | 113 | 115 | 0 | 4000.00 | 0.00 |
| 115 | 1.000000 | 5.00 | 8.877 | 4 | 102.800 | 102.800 | 2 | 0.00000 | 114 | 116 | 0 | 4000.00 | 0.00 |
| 116 | 1.000000 | 5.00 | 5.000 | 4 | 102.800 | 102.800 | 2 | 0.00000 | 115 | 117 | 0 | 4000.00 | 0.00 |
| 117 | 1.250000 | 30.00 | 3.333 | 1 | 102.800 | 103.000 | 2 | 0.00000 | 116 | 0 | 0 | 4000.00 | 0.00 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 118 | 0.927000 | 10.00 | 6.562 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 109 | 119 | 0 | 4000.00 | 0.00 |
| 119 | 1.000000 | 10.00 | 2.400 | 3 | 95.500 | 101.700 | 2 | 0.00000 | 118 | 120 | 0 | 4000.00 | 0.00 |
| 120 | 1.000000 | 5.00 | 7.800 | 4 | 101.700 | 102.800 | 2 | 0.00000 | 119 | 121 | 0 | 4000.00 | 0.00 |
| 121 | 1.000000 | 10.00 | 13.154 | 2 | 102.800 | 102.800 | 2 | 0.00000 | 120 | 122 | 0 | 4000.00 | 0.00 |
| 122 | 1.000000 | 10.00 | 8.938 | 4 | 102.800 | 102.800 | 2 | 0.00000 | 121 | 123 | 0 | 4000.00 | 0.00 |
| 123 | 1.250000 | 20.00 | 3.250 | 1 | 102.800 | 103.000 | 2 | 0.00000 | 122 | 0 | 0 | 4000.00 | 0.00 |
| 124 | 0.134000 | 5.00 | 3.624 | 4 | 101.700 | 101.700 | 2 | 0.00000 | 119 | 125 | 0 | 4000.00 | 0.00 |
| 125 | 0.134000 | 5.00 | 3.141 | 4 | 101.700 | 101.700 | 2 | 0.00000 | 124 | 126 | 0 | 4000.00 | 0.00 |
| 126 | 0.134000 | 5.00 | 1.000 | 2 | 101.700 | 101.700 | 2 | 0.00000 | 125 | 127 | 0 | 4000.00 | 0.00 |
| 127 | 0.134000 | 10.00 | 1.000 | 4 | 101.700 | 101.700 | 2 | 0.00000 | 126 | 128 | 0 | 4000.00 | 0.00 |
| 128 | 0.134000 | 10.00 | 1.000 | 4 | 101.700 | 101.700 | 2 | 0.00000 | 127 | 129 | 0 | 4000.00 | 0.00 |
| 129 | 0.134000 | 10.00 | 1.000 | 1 | 101.700 | 103.000 | 2 | 0.00000 | 128 | 0 | 0 | 4000.00 | 0.00 |
| 130 | 0.835000 | 5.00 | 11.020 | 4 | 93.000 | 93.000 | 2 | 0.00000 | 29 | 131 | 0 | 4000.00 | 0.00 |
| 131 | 0.835000 | 100.00 | 1.331 | 4 | 93.000 | 96.010 | 2 | 0.00000 | 130 | 132 | 0 | 4000.00 | 0.00 |
| 132 | 0.835000 | 25.00 | 1.267 | 4 | 96.010 | 96.010 | 2 | 0.00000 | 131 | 133 | 0 | 4000.00 | 0.00 |
| 133 | 0.835000 | 65.00 | 1.000 | 4 | 96.010 | 96.000 | 2 | 0.00000 | 132 | 134 | 0 | 4000.00 | 0.00 |
| 134 | 0.835000 | 20.00 | 2.653 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 133 | 135 | 0 | 4000.00 | 0.00 |
| 135 | 0.835000 | 105.00 | 1.382 | 3 | 96.000 | 89.000 | 2 | 0.00000 | 134 | 136 | 0 | 4000.00 | 0.00 |
| 136 | 0.835000 | 5.00 | 3.338 | 4 | 89.000 | 89.000 | 2 | 0.00000 | 135 | 137 | 0 | 4000.00 | 0.00 |
| 137 | 0.835000 | 50.00 | 1.334 | 3 | 89.000 | 89.000 | 2 | 0.00000 | 136 | 138 | 0 | 4000.00 | 0.00 |
| 138 | 0.835000 | 5.00 | 5.676 | 4 | 89.000 | 89.000 | 2 | 0.00000 | 137 | 139 | 0 | 4000.00 | 0.00 |
| 139 | 0.835000 | 5.00 | 4.340 | 3 | 89.000 | 89.000 | 2 | 0.00000 | 138 | 140 | 0 | 4000.00 | 0.00 |
| 140 | 0.835000 | 55.00 | 1.000 | 4 | 89.000 | 89.000 | 2 | 0.00000 | 139 | 141 | 0 | 4000.00 | 0.00 |
| 141 | 0.835000 | 25.00 | 1.668 | 3 | 89.000 | 89.000 | 2 | 0.00000 | 140 | 142 | 0 | 4000.00 | 0.00 |
| 142 | 0.835000 | 15.00 | 2.882 | 4 | 89.000 | 91.940 | 2 | 0.00000 | 141 | 143 | 0 | 4000.00 | 0.00 |
| 143 | 0.835000 | 25.00 | 1.668 | 3 | 91.940 | 91.940 | 2 | 0.00000 | 142 | 144 | 0 | 4000.00 | 0.00 |
| 144 | 0.835000 | 5.00 | 5.676 | 3 | 91.940 | 91.940 | 2 | 0.00000 | 143 | 145 | 0 | 4000.00 | 0.00 |
| 145 | 0.835000 | 5.00 | 4.340 | 3 | 91.940 | 91.940 | 2 | 0.00000 | 144 | 146 | 0 | 4000.00 | 0.00 |
| 146 | 0.835000 | 10.00 | 3.338 | 4 | 91.940 | 96.200 | 2 | 0.00000 | 145 | 147 | 0 | 4000.00 | 0.00 |
| 147 | 0.835000 | 5.00 | 3.338 | 4 | 96.200 | 96.200 | 2 | 0.00000 | 146 | 148 | 0 | 4000.00 | 0.00 |
| 148 | 0.835000 | 145.00 | 1.000 | 4 | 96.200 | 96.200 | 2 | 0.00000 | 147 | 149 | 0 | 4000.00 | 0.00 |
| 149 | 0.835000 | 10.00 | 2.670 | 4 | 96.200 | 96.200 | 2 | 0.00000 | 148 | 150 | 0 | 4000.00 | 0.00 |
| 150 | 0.835000 | 90.00 | 1.186 | 3 | 96.200 | 96.200 | 2 | 0.00000 | 149 | 151 | 0 | 4000.00 | 0.00 |
| 151 | 0.835000 | 5.00 | 5.676 | 4 | 96.200 | 94.530 | 2 | 0.00000 | 150 | 152 | 0 | 4000.00 | 0.00 |
| 152 | 0.835000 | 15.00 | 2.664 | 3 | 94.530 | 94.530 | 2 | 0.00000 | 151 | 153 | 0 | 4000.00 | 0.00 |
| 153 | 0.835000 | 5.00 | 2.336 | 4 | 94.530 | 94.530 | 2 | 0.00000 | 152 | 154 | 0 | 4000.00 | 0.00 |
| 154 | 0.835000 | 5.00 | 4.340 | 3 | 94.530 | 94.540 | 2 | 0.00000 | 153 | 155 | 0 | 4000.00 | 0.00 |
| 155 | 0.835000 | 15.00 | 2.559 | 3 | 94.540 | 94.540 | 2 | 0.00000 | 154 | 156 | 0 | 4000.00 | 0.00 |
| 156 | 0.835000 | 5.00 | 4.340 | 3 | 94.540 | 94.540 | 2 | 0.00000 | 155 | 157 | 0 | 4000.00 | 0.00 |
| 157 | 0.835000 | 5.00 | 3.338 | 4 | 94.540 | 94.540 | 2 | 0.00000 | 156 | 158 | 0 | 4000.00 | 0.00 |
| 158 | 0.835000 | 5.00 | 3.338 | 3 | 94.540 | 94.500 | 2 | 0.00000 | 157 | 159 | 0 | 4000.00 | 0.00 |
| 159 | 0.835000 | 5.00 | 4.340 | 4 | 94.500 | 94.500 | 2 | 0.00000 | 158 | 160 | 0 | 4000.00 | 0.00 |
| 160 | 0.835000 | 55.00 | 1.425 | 3 | 94.500 | 94.500 | 2 | 0.00000 | 159 | 161 | 0 | 4000.00 | 0.00 |
| 161 | 0.835000 | 175.00 | 1.286 | 4 | 94.500 | 96.200 | 2 | 0.00000 | 160 | 162 | 0 | 4000.00 | 0.00 |
| 162 | 0.835000 | 100.00 | 1.568 | 3 | 96.200 | 96.200 | 2 | 0.00000 | 161 | 47 | 1 | 4000.00 | 0.00 |
| 163 | 0.835000 | 10.00 | 3.338 | 4 | 94.500 | 91.750 | 2 | 0.00000 | 160 | 164 | 0 | 4000.00 | 0.00 |
| 164 | 0.835000 | 40.00 | 1.413 | 4 | 91.750 | 89.580 | 2 | 0.00000 | 163 | 165 | 0 | 4000.00 | 0.00 |
| 165 | 0.835000 | 25.00 | 3.071 | 4 | 89.580 | 89.580 | 2 | 0.00000 | 164 | 166 | 0 | 4000.00 | 0.00 |
| 166 | 0.835000 | 5.00 | 4.340 | 3 | 89.580 | 89.580 | 2 | 0.00000 | 165 | 167 | 0 | 4000.00 | 0.00 |
| 167 | 0.835000 | 5.00 | 1.000 | 16 | 89.580 | 89.580 | 2 | 0.00000 | 166 | 0 | 0 | 4000.00 | 0.00 |
| 168 | 0.835000 | 5.00 | 13.358 | 4 | 89.000 | 91.000 | 2 | 0.00000 | 141 | 169 | 0 | 4000.00 | 0.00 |
| 169 | 0.835000 | 35.00 | 2.002 | 3 | 91.000 | 91.000 | 2 | 0.00000 | 168 | 170 | 0 | 4000.00 | 0.00 |
| 170 | 0.835000 | 10.00 | 4.340 | 3 | 91.000 | 91.000 | 2 | 0.00000 | 169 | 171 | 0 | 4000.00 | 0.00 |
| 171 | 0.835000 | 75.00 | 1.312 | 4 | 91.000 | 91.000 | 2 | 0.00000 | 170 | 172 | 0 | 4000.00 | 0.00 |
| 172 | 0.835000 | 45.00 | 2.002 | 3 | 91.000 | 91.000 | 2 | 0.00000 | 171 | 173 | 0 | 4000.00 | 0.00 |
| 173 | 0.835000 | 5.00 | 3.338 | 4 | 91.000 | 91.000 | 2 | 0.00000 | 172 | 174 | 0 | 4000.00 | 0.00 |
| 174 | 0.835000 | 15.00 | 1.779 | 4 | 91.000 | 96.040 | 2 | 0.00000 | 173 | 175 | 0 | 4000.00 | 0.00 |
| 175 | 0.835000 | 15.00 | 2.559 | 4 | 96.040 | 96.000 | 2 | 0.00000 | 174 | 176 | 0 | 4000.00 | 0.00 |
| 176 | 0.835000 | 95.00 | 1.176 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 175 | 177 | 0 | 4000.00 | 0.00 |
| 177 | 0.835000 | 55.00 | 1.213 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 176 | 178 | 0 | 4000.00 | 0.00 |
| 178 | 0.835000 | 5.00 | 3.338 | 4 | 96.000 | 91.000 | 2 | 0.00000 | 177 | 179 | 0 | 4000.00 | 0.00 |
| 179 | 0.835000 | 50.00 | 1.795 | 4 | 91.000 | 93.000 | 2 | 0.00000 | 178 | 180 | 0 | 4000.00 | 0.00 |
| 180 | 0.835000 | 80.00 | 1.146 | 4 | 93.000 | 93.000 | 2 | 0.00000 | 179 | 181 | 0 | 4000.00 | 0.00 |
| 181 | 0.835000 | 25.00 | 3.472 | 3 | 93.000 | 93.000 | 2 | 0.00000 | 180 | 29 | 1 | 4000.00 | 0.00 |
| 182 | 0.336000 | 45.00 | 1.866 | 3 | 91.000 | 96.000 | 2 | 0.00000 | 169 | 183 | 0 | 4000.00 | 0.00 |
| 183 | 0.336000 | 120.00 | 1.482 | 4 | 96.000 | 149.000 | 2 | 0.00000 | 182 | 184 | 0 | 4000.00 | 0.00 |
| 184 | 0.256000 | 205.00 | 1.092 | 16 | 149.000 | 142.500 | 2 | 0.00000 | 183 | 0 | 0 | 4000.00 | 0.00 |
| 185 | 0.256000 | 60.00 | 1.674 | 16 | 96.000 | 59.000 | 2 | 0.00000 | 182 | 0 | 0 | 4000.00 | 0.00 |
| 186 | 0.336000 | 10.00 | 4.427 | 3 | 91.000 | 94.800 | 2 | 0.00000 | 170 | 187 | 0 | 4000.00 | 0.00 |
| 187 | 0.336000 | 55.00 | 1.586 | 3 | 94.800 | 113.000 | 2 | 0.00000 | 186 | 188 | 0 | 4000.00 | 0.00 |
| 188 | 0.336000 | 230.00 | 1.231 | 4 | 113.000 | 146.000 | 2 | 0.00000 | 187 | 189 | 0 | 4000.00 | 0.00 |
| 189 | 0.256000 | 105.00 | 1.111 | 16 | 146.000 | 143.000 | 2 | 0.00000 | 188 | 0 | 0 | 4000.00 | 0.00 |
| 190 | 0.256000 | 100.00 | 1.297 | 16 | 94.800 | 83.700 | 2 | 0.00000 | 186 | 0 | 0 | 4000.00 | 0.00 |
| 191 | 0.256000 | 75.00 | 1.416 | 16 | 113.000 | 107.000 | 2 | 0.00000 | 187 | 0 | 0 | 4000.00 | 0.00 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 192 | 0.336000 | 5.00 | 7.854 | 4 | 91.000 | 95.000 | 2 | 0.00000 | 172 | 193 | 0 | 4000.00 | 0.00 |
| 193 | 0.336000 | 240.00 | 1.316 | 4 | 95.000 | 150.000 | 2 | 0.00000 | 192 | 194 | 0 | 4000.00 | 0.00 |
| 194 | 0.256000 | 180.00 | 1.105 | 16 | 150.000 | 142.000 | 2 | 0.00000 | 193 | 0 | 0 | 4000.00 | 0.00 |
| 195 | 0.665000 | 15.00 | 4.015 | 4 | 96.500 | 96.500 | 2 | 0.00000 | 54 | 196 | 0 | 4000.00 | 0.00 |
| 196 | 0.665000 | 11.00 | 2.197 | 4 | 96.500 | 94.500 | 2 | 0.00000 | 195 | 197 | 0 | 4400.00 | 0.00 |
| 197 | 0.665000 | 20.00 | 1.658 | 4 | 94.500 | 96.600 | 2 | 0.00000 | 196 | 198 | 0 | 4000.00 | 0.00 |
| 198 | 0.665000 | 115.00 | 1.000 | 4 | 96.600 | 96.600 | 2 | 0.00000 | 197 | 199 | 0 | 4000.00 | 0.00 |
| 199 | 0.665000 | 220.00 | 1.120 | 3 | 96.600 | 94.000 | 2 | 0.00000 | 198 | 200 | 0 | 4000.00 | 0.00 |
| 200 | 0.665000 | 20.00 | 2.862 | 4 | 94.000 | 94.750 | 2 | 0.00000 | 199 | 201 | 0 | 4000.00 | 0.00 |
| 201 | 0.665000 | 20.00 | 1.000 | 4 | 94.750 | 94.750 | 2 | 0.00000 | 200 | 202 | 0 | 4000.00 | 0.00 |
| 202 | 0.665000 | 20.00 | 2.197 | 4 | 94.750 | 94.750 | 2 | 0.00000 | 201 | 203 | 0 | 4000.00 | 0.00 |
| 203 | 0.665000 | 15.00 | 1.000 | 4 | 94.750 | 94.750 | 2 | 0.00000 | 202 | 204 | 0 | 4000.00 | 0.00 |
| 204 | 0.665000 | 30.00 | 1.973 | 3 | 94.750 | 84.100 | 2 | 0.00000 | 203 | 205 | 0 | 4000.00 | 0.00 |
| 205 | 0.665000 | 15.00 | 1.621 | 4 | 84.100 | 69.500 | 2 | 0.00000 | 204 | 206 | 0 | 4000.00 | 0.00 |
| 206 | 0.665000 | 15.00 | 1.887 | 3 | 69.500 | 69.500 | 2 | 0.00000 | 205 | 207 | 0 | 4000.00 | 0.00 |
| 207 | 0.665000 | 20.00 | 1.465 | 4 | 69.500 | 69.500 | 2 | 0.00000 | 206 | 208 | 0 | 4000.00 | 0.00 |
| 208 | 0.665000 | 20.00 | 4.125 | 3 | 69.500 | 61.750 | 2 | 0.00000 | 207 | 209 | 0 | 4000.00 | 0.00 |
| 209 | 0.665000 | 70.00 | 1.454 | 4 | 61.750 | 62.750 | 2 | 0.00000 | 208 | 210 | 0 | 4000.00 | 0.00 |
| 210 | 0.665000 | 5.00 | 6.320 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 209 | 211 | 0 | 4000.00 | 0.00 |
| 211 | 0.665000 | 50.00 | 1.293 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 210 | 212 | 0 | 4000.00 | 0.00 |
| 212 | 0.665000 | 20.00 | 2.330 | 3 | 62.750 | 62.750 | 2 | 0.00000 | 211 | 213 | 0 | 4000.00 | 0.00 |
| 213 | 0.665000 | 25.00 | 2.277 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 212 | 214 | 0 | 4000.00 | 0.00 |
| 214 | 0.665000 | 20.00 | 1.665 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 213 | 215 | 0 | 4000.00 | 0.00 |
| 215 | 0.665000 | 45.00 | 1.414 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 214 | 216 | 0 | 4000.00 | 0.00 |
| 216 | 0.665000 | 20.00 | 1.665 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 215 | 217 | 0 | 4000.00 | 0.00 |
| 217 | 0.665000 | 85.00 | 2.033 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 216 | 218 | 0 | 4000.00 | 0.00 |
| 218 | 0.665000 | 5.00 | 3.660 | 3 | 62.750 | 62.750 | 2 | 0.00000 | 217 | 219 | 0 | 4000.00 | 0.00 |
| 219 | 0.665000 | 25.00 | 2.649 | 3 | 62.750 | 66.000 | 2 | 0.00000 | 218 | 220 | 0 | 4000.00 | 0.00 |
| 220 | 0.665000 | 30.00 | 1.749 | 4 | 66.000 | 96.000 | 2 | 0.00000 | 219 | 221 | 0 | 4000.00 | 0.00 |
| 221 | 0.665000 | 20.00 | 1.329 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 220 | 222 | 0 | 4000.00 | 0.00 |
| 222 | 0.665000 | 5.00 | 4.977 | 4 | 96.000 | 94.400 | 2 | 0.00000 | 221 | 223 | 0 | 4000.00 | 0.00 |
| 223 | 0.665000 | 95.00 | 1.139 | 4 | 94.400 | 97.000 | 2 | 0.00000 | 222 | 224 | 0 | 4000.00 | 0.00 |
| 224 | 0.665000 | 35.00 | 1.646 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 223 | 225 | 0 | 4000.00 | 0.00 |
| 225 | 0.665000 | 65.00 | 1.614 | 4 | 97.000 | 96.500 | 2 | 0.00000 | 224 | 226 | 0 | 4000.00 | 0.00 |
| 226 | 0.665000 | 35.00 | 1.000 | 4 | 96.500 | 96.500 | 2 | 0.00000 | 225 | 227 | 0 | 4000.00 | 0.00 |
| 227 | 0.665000 | 35.00 | 1.830 | 4 | 96.500 | 94.200 | 2 | 0.00000 | 226 | 228 | 0 | 4000.00 | 0.00 |
| 228 | 0.665000 | 35.00 | 1.266 | 4 | 94.200 | 96.200 | 2 | 0.00000 | 227 | 229 | 0 | 4000.00 | 0.00 |
| 229 | 0.665000 | 120.00 | 1.377 | 3 | 96.200 | 95.800 | 2 | 0.00000 | 228 | 69 | 1 | 4000.00 | 0.00 |
| 230 | 0.665000 | 10.00 | 6.453 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 12 | 231 | 0 | 4000.00 | 0.00 |
| 231 | 0.665000 | 25.00 | 1.372 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 230 | 232 | 0 | 4000.00 | 0.00 |
| 232 | 0.665000 | 150.00 | 1.062 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 231 | 233 | 0 | 4000.00 | 0.00 |
| 233 | 0.665000 | 135.00 | 1.069 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 232 | 234 | 0 | 4000.00 | 0.00 |
| 234 | 0.665000 | 45.00 | 1.146 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 233 | 235 | 0 | 4000.00 | 0.00 |
| 235 | 0.665000 | 20.00 | 1.658 | 4 | 96.900 | 95.000 | 2 | 0.00000 | 234 | 236 | 0 | 4000.00 | 0.00 |
| 236 | 0.665000 | 35.00 | 1.564 | 4 | 95.000 | 95.500 | 2 | 0.00000 | 235 | 237 | 0 | 4000.00 | 0.00 |
| 237 | 0.665000 | 15.00 | 1.621 | 4 | 95.500 | 96.000 | 2 | 0.00000 | 236 | 238 | 0 | 4000.00 | 0.00 |
| 238 | 0.665000 | 30.00 | 1.621 | 4 | 96.000 | 72.000 | 2 | 0.00000 | 237 | 239 | 0 | 4000.00 | 0.00 |
| 239 | 0.665000 | 5.00 | 3.660 | 3 | 72.000 | 67.000 | 2 | 0.00000 | 238 | 240 | 0 | 4000.00 | 0.00 |
| 240 | 0.665000 | 75.00 | 1.497 | 4 | 67.000 | 64.250 | 2 | 0.00000 | 239 | 241 | 0 | 4000.00 | 0.00 |
| 241 | 0.665000 | 35.00 | 1.000 | 4 | 64.250 | 64.250 | 2 | 0.00000 | 240 | 242 | 0 | 4000.00 | 0.00 |
| 242 | 0.665000 | 65.00 | 1.286 | 4 | 64.250 | 61.750 | 2 | 0.00000 | 241 | 243 | 0 | 4000.00 | 0.00 |
| 243 | 0.665000 | 20.00 | 2.995 | 3 | 61.750 | 61.750 | 2 | 0.00000 | 242 | 244 | 0 | 4000.00 | 0.00 |
| 244 | 0.665000 | 5.00 | 2.064 | 4 | 61.750 | 61.750 | 2 | 0.00000 | 243 | 245 | 0 | 4000.00 | 0.00 |
| 245 | 0.665000 | 20.00 | 2.260 | 4 | 61.750 | 62.750 | 2 | 0.00000 | 244 | 246 | 0 | 4000.00 | 0.00 |
| 246 | 0.665000 | 15.00 | 1.887 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 245 | 247 | 0 | 4000.00 | 0.00 |
| 247 | 0.665000 | 10.00 | 2.330 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 246 | 248 | 0 | 4000.00 | 0.00 |
| 248 | 0.665000 | 15.00 | 1.887 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 247 | 249 | 0 | 4000.00 | 0.00 |
| 249 | 0.665000 | 35.00 | 1.380 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 248 | 250 | 0 | 4000.00 | 0.00 |
| 250 | 0.665000 | 100.00 | 1.000 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 249 | 251 | 0 | 4000.00 | 0.00 |
| 251 | 0.665000 | 10.00 | 3.647 | 4 | 62.750 | 62.500 | 2 | 0.00000 | 250 | 252 | 0 | 4000.00 | 0.00 |
| 252 | 0.665000 | 30.00 | 1.749 | 4 | 62.500 | 67.900 | 2 | 0.00000 | 251 | 253 | 0 | 4000.00 | 0.00 |
| 253 | 0.665000 | 30.00 | 1.310 | 4 | 67.900 | 96.000 | 2 | 0.00000 | 252 | 254 | 0 | 4000.00 | 0.00 |
| 254 | 0.665000 | 20.00 | 2.317 | 4 | 96.000 | 97.000 | 2 | 0.00000 | 253 | 255 | 0 | 4000.00 | 0.00 |
| 255 | 0.665000 | 145.00 | 1.000 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 254 | 256 | 0 | 4000.00 | 0.00 |
| 256 | 0.665000 | 35.00 | 1.752 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 255 | 257 | 0 | 4000.00 | 0.00 |
| 257 | 0.665000 | 60.00 | 1.110 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 256 | 258 | 0 | 4000.00 | 0.00 |
| 258 | 0.665000 | 40.00 | 1.165 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 257 | 259 | 0 | 4000.00 | 0.00 |
| 259 | 0.665000 | 5.00 | 3.660 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 258 | 260 | 0 | 4000.00 | 0.00 |
| 260 | 0.665000 | 45.00 | 1.118 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 259 | 261 | 0 | 4000.00 | 0.00 |
| 261 | 0.665000 | 15.00 | 4.538 | 3 | 97.000 | 95.500 | 2 | 0.00000 | 260 | 71 | 1 | 4000.00 | 0.00 |
| 262 | 0.505000 | 20.00 | 2.315 | 4 | 61.750 | 63.000 | 2 | 0.00000 | 243 | 263 | 0 | 4000.00 | 0.00 |
| 263 | 0.505000 | 10.00 | 3.318 | 4 | 63.000 | 56.000 | 2 | 0.00000 | 262 | 264 | 0 | 4000.00 | 0.00 |
| 264 | 0.505000 | 30.00 | 2.380 | 4 | 56.000 | 61.750 | 2 | 0.00000 | 263 | 265 | 0 | 4000.00 | 0.00 |
| 265 | 0.505000 | 5.00 | 3.020 | 3 | 61.750 | 62.900 | 2 | 0.00000 | 264 | 266 | 0 | 4000.00 | 0.00 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 266 | 0.505000 | 5.00 | 10.494 | 4 | 62.900 | 67.000 | 2 | 0.00000 | 265 | 267 | 0 | 4000.00 | 0.00 |
| 267 | 0.505000 | 5.00 | 3.828 | 4 | 67.000 | 67.000 | 2 | 0.00000 | 266 | 268 | 0 | 4000.00 | 0.00 |
| 268 | 0.505000 | 65.00 | 1.155 | 3 | 67.000 | 67.000 | 2 | 0.00000 | 267 | 269 | 0 | 4000.00 | 0.00 |
| 269 | 0.505000 | 15.00 | 1.000 | 4 | 67.000 | 67.000 | 2 | 0.00000 | 268 | 270 | 0 | 4000.00 | 0.00 |
| 270 | 0.505000 | 35.00 | 1.866 | 3 | 67.000 | 67.000 | 2 | 0.00000 | 269 | 271 | 0 | 4000.00 | 0.00 |
| 271 | 0.256000 | 25.00 | 1.143 | 4 | 67.000 | 67.000 | 2 | 0.00000 | 270 | 272 | 0 | 4000.00 | 0.00 |
| 272 | 0.256000 | 10.00 | 3.099 | 4 | 67.000 | 65.000 | 2 | 0.00000 | 271 | 273 | 0 | 4000.00 | 0.00 |
| 273 | 0.256000 | 55.00 | 1.289 | 16 | 65.000 | 94.500 | 2 | 0.00000 | 272 | 0 | 0 | 4000.00 | 0.00 |
| 274 | 0.505000 | 15.00 | 1.000 | 3 | 62.900 | 63.900 | 2 | 0.00000 | 265 | 275 | 0 | 4000.00 | 0.00 |
| 275 | 0.505000 | 15.00 | 1.741 | 3 | 63.900 | 68.200 | 2 | 0.00000 | 274 | 276 | 0 | 4000.00 | 0.00 |
| 276 | 0.336000 | 135.00 | 1.170 | 4 | 68.200 | 71.500 | 2 | 0.00000 | 275 | 277 | 0 | 4000.00 | 0.00 |
| 277 | 0.336000 | 40.00 | 1.773 | 16 | 71.500 | 61.500 | 2 | 0.00000 | 276 | 0 | 0 | 4000.00 | 0.00 |
| 278 | 0.336000 | 20.00 | 2.518 | 16 | 68.200 | 61.500 | 2 | 0.00000 | 275 | 0 | 0 | 4000.00 | 0.00 |
| 279 | 0.505000 | 85.00 | 2.305 | 4 | 69.500 | 68.750 | 2 | 0.00000 | 206 | 280 | 0 | 4000.00 | 0.00 |
| 280 | 0.505000 | 10.00 | 2.010 | 3 | 68.750 | 68.750 | 2 | 0.00000 | 279 | 281 | 0 | 4000.00 | 0.00 |
| 281 | 0.505000 | 45.00 | 1.382 | 4 | 68.750 | 68.750 | 2 | 0.00000 | 280 | 282 | 0 | 4000.00 | 0.00 |
| 282 | 0.505000 | 10.00 | 1.707 | 4 | 68.750 | 68.750 | 2 | 0.00000 | 281 | 283 | 0 | 4000.00 | 0.00 |
| 283 | 0.505000 | 70.00 | 1.447 | 3 | 68.750 | 68.750 | 2 | 0.00000 | 282 | 284 | 0 | 4000.00 | 0.00 |
| 284 | 0.505000 | 20.00 | 1.354 | 4 | 68.750 | 68.750 | 2 | 0.00000 | 283 | 285 | 0 | 4000.00 | 0.00 |
| 285 | 0.505000 | 5.00 | 2.414 | 4 | 68.750 | 65.500 | 2 | 0.00000 | 284 | 286 | 0 | 4000.00 | 0.00 |
| 286 | 0.505000 | 25.00 | 1.404 | 3 | 65.500 | 65.500 | 2 | 0.00000 | 285 | 287 | 0 | 4000.00 | 0.00 |
| 287 | 0.336000 | 65.00 | 1.868 | 4 | 65.500 | 113.000 | 2 | 0.00000 | 286 | 288 | 0 | 4000.00 | 0.00 |
| 288 | 0.336000 | 35.00 | 2.150 | 3 | 113.000 | 147.000 | 2 | 0.00000 | 287 | 289 | 0 | 4000.00 | 0.00 |
| 289 | 0.256000 | 55.00 | 1.419 | 4 | 147.000 | 178.000 | 2 | 0.00000 | 288 | 290 | 0 | 4000.00 | 0.00 |
| 290 | 0.256000 | 10.00 | 1.000 | 16 | 178.000 | 178.000 | 2 | 0.00000 | 289 | 0 | 0 | 4000.00 | 0.00 |
| 291 | 0.256000 | 35.00 | 1.247 | 16 | 147.000 | 159.750 | 2 | 0.00000 | 288 | 0 | 0 | 4000.00 | 0.00 |
| 292 | 0.256000 | 115.00 | 1.686 | 16 | 67.000 | 128.500 | 2 | 0.00000 | 239 | 0 | 0 | 4000.00 | 0.00 |
| 293 | 0.336000 | 5.00 | 7.451 | 4 | 65.710 | 62.500 | 2 | 0.00000 | 219 | 294 | 0 | 4000.00 | 0.00 |
| 294 | 0.336000 | 60.00 | 1.112 | 4 | 62.500 | 62.500 | 2 | 0.00000 | 293 | 295 | 0 | 4000.00 | 0.00 |
| 295 | 0.336000 | 40.00 | 1.907 | 4 | 62.500 | 93.500 | 2 | 0.00000 | 294 | 296 | 0 | 4000.00 | 0.00 |
| 296 | 0.336000 | 45.00 | 1.729 | 3 | 93.500 | 126.800 | 2 | 0.00000 | 295 | 297 | 0 | 4000.00 | 0.00 |
| 297 | 0.336000 | 45.00 | 1.149 | 3 | 126.800 | 142.000 | 2 | 0.00000 | 296 | 298 | 0 | 4000.00 | 0.00 |
| 298 | 0.336000 | 40.00 | 1.571 | 3 | 142.000 | 154.500 | 2 | 0.00000 | 297 | 299 | 0 | 4000.00 | 0.00 |
| 299 | 0.256000 | 95.00 | 1.107 | 16 | 154.500 | 155.500 | 2 | 0.00000 | 298 | 0 | 0 | 4000.00 | 0.00 |
| 300 | 0.256000 | 100.00 | 1.623 | 16 | 142.000 | 143.000 | 2 | 0.00000 | 297 | 0 | 0 | 4000.00 | 0.00 |
| 301 | 0.336000 | 25.00 | 2.452 | 3 | 154.500 | 156.300 | 2 | 0.00000 | 298 | 302 | 0 | 4000.00 | 0.00 |
| 302 | 0.336000 | 45.00 | 1.893 | 4 | 156.300 | 172.300 | 2 | 0.00000 | 301 | 303 | 0 | 4000.00 | 0.00 |
| 303 | 0.256000 | 55.00 | 1.304 | 4 | 172.300 | 178.000 | 2 | 0.00000 | 302 | 304 | 0 | 4000.00 | 0.00 |
| 304 | 0.256000 | 10.00 | 1.000 | 16 | 178.000 | 178.000 | 2 | 0.00000 | 303 | 0 | 0 | 4000.00 | 0.00 |
| 305 | 0.336000 | 5.00 | 6.376 | 4 | 156.300 | 156.300 | 2 | 0.00000 | 301 | 306 | 0 | 4000.00 | 0.00 |
| 306 | 0.256000 | 130.00 | 1.405 | 16 | 156.300 | 156.300 | 2 | 0.00000 | 305 | 0 | 0 | 4000.00 | 0.00 |
| 307 | 0.336000 | 105.00 | 1.914 | 4 | 126.800 | 155.000 | 2 | 0.00000 | 296 | 308 | 0 | 4000.00 | 0.00 |
| 308 | 0.256000 | 130.00 | 1.287 | 19 | 155.000 | 206.300 | 2 | 0.00000 | 307 | 309 | 0 | 4000.00 | 0.00 |
| 309 | 0.256000 | 20.00 | 1.000 | 16 | 206.300 | 203.000 | 2 | 0.00000 | 308 | 0 | 0 | 4000.00 | 0.00 |
| 310 | 0.336000 | 10.00 | 5.301 | 3 | 62.750 | 71.500 | 2 | 0.00000 | 212 | 311 | 0 | 4000.00 | 0.00 |
| 311 | 0.336000 | 65.00 | 1.424 | 3 | 71.500 | 133.500 | 2 | 0.00000 | 310 | 312 | 0 | 4000.00 | 0.00 |
| 312 | 0.256000 | 15.00 | 1.439 | 4 | 133.500 | 147.300 | 2 | 0.00000 | 311 | 313 | 0 | 4000.00 | 0.00 |
| 313 | 0.256000 | 60.00 | 1.281 | 4 | 147.300 | 165.100 | 2 | 0.00000 | 312 | 314 | 0 | 4000.00 | 0.00 |
| 314 | 0.256000 | 30.00 | 1.527 | 16 | 165.100 | 160.000 | 2 | 0.00000 | 313 | 0 | 0 | 4000.00 | 0.00 |
| 315 | 0.256000 | 25.00 | 1.407 | 16 | 71.500 | 81.500 | 2 | 0.00000 | 310 | 0 | 0 | 4000.00 | 0.00 |
| 316 | 0.336000 | 10.00 | 3.688 | 4 | 133.500 | 133.500 | 2 | 0.00000 | 311 | 317 | 0 | 4000.00 | 0.00 |
| 317 | 0.256000 | 80.00 | 1.717 | 16 | 133.500 | 141.500 | 2 | 0.00000 | 316 | 0 | 0 | 4000.00 | 0.00 |
| 318 | 0.336000 | 10.00 | 6.443 | 4 | 68.750 | 66.700 | 2 | 0.00000 | 283 | 319 | 0 | 4000.00 | 0.00 |
| 319 | 0.336000 | 100.00 | 1.672 | 3 | 66.700 | 120.000 | 2 | 0.00000 | 318 | 320 | 0 | 4000.00 | 0.00 |
| 320 | 0.336000 | 15.00 | 2.792 | 3 | 120.000 | 132.000 | 2 | 0.00000 | 319 | 321 | 0 | 4000.00 | 0.00 |
| 321 | 0.336000 | 15.00 | 1.448 | 4 | 132.000 | 146.000 | 2 | 0.00000 | 320 | 322 | 0 | 4000.00 | 0.00 |
| 322 | 0.256000 | 55.00 | 1.604 | 16 | 146.000 | 163.500 | 2 | 0.00000 | 321 | 0 | 0 | 4000.00 | 0.00 |
| 323 | 0.256000 | 25.00 | 1.492 | 16 | 120.000 | 128.500 | 2 | 0.00000 | 319 | 0 | 0 | 4000.00 | 0.00 |
| 324 | 0.336000 | 45.00 | 1.806 | 3 | 132.000 | 132.000 | 2 | 0.00000 | 320 | 325 | 0 | 4000.00 | 0.00 |
| 325 | 0.256000 | 30.00 | 2.263 | 16 | 132.000 | 157.500 | 2 | 0.00000 | 324 | 0 | 0 | 4000.00 | 0.00 |
| 326 | 0.256000 | 35.00 | 1.188 | 16 | 132.000 | 141.500 | 2 | 0.00000 | 324 | 0 | 0 | 4000.00 | 0.00 |
| 327 | 0.336000 | 30.00 | 2.456 | 4 | 63.900 | 68.100 | 2 | 0.00000 | 274 | 328 | 0 | 4000.00 | 0.00 |
| 328 | 0.336000 | 90.00 | 1.939 | 3 | 68.100 | 134.000 | 2 | 0.00000 | 327 | 329 | 0 | 4000.00 | 0.00 |
| 329 | 0.336000 | 45.00 | 1.612 | 4 | 134.000 | 132.000 | 2 | 0.00000 | 328 | 330 | 0 | 4000.00 | 0.00 |
| 330 | 0.362000 | 90.00 | 1.181 | 16 | 132.000 | 141.500 | 2 | 0.00000 | 329 | 0 | 0 | 4000.00 | 0.00 |
| 331 | 0.336000 | 15.00 | 3.554 | 3 | 134.000 | 147.000 | 2 | 0.00000 | 328 | 332 | 0 | 4000.00 | 0.00 |
| 332 | 0.256000 | 10.00 | 1.200 | 4 | 147.000 | 150.000 | 2 | 0.00000 | 331 | 333 | 0 | 4000.00 | 0.00 |
| 333 | 0.256000 | 10.00 | 1.200 | 16 | 150.000 | 159.000 | 2 | 0.00000 | 332 | 0 | 0 | 4000.00 | 0.00 |
| 334 | 0.256000 | 50.00 | 1.451 | 19 | 147.000 | 159.750 | 2 | 0.00000 | 331 | 335 | 0 | 4000.00 | 0.00 |
| 335 | 0.090000 | 10.00 | 1.000 | 16 | 159.750 | 159.000 | 2 | 0.00000 | 334 | 0 | 0 | 4000.00 | 0.00 |
| 336 | 0.336000 | 10.00 | 6.712 | 4 | 67.000 | 65.000 | 2 | 0.00000 | 268 | 337 | 0 | 4000.00 | 0.00 |
| 337 | 0.336000 | 90.00 | 1.538 | 3 | 65.000 | 115.200 | 2 | 0.00000 | 336 | 338 | 0 | 4000.00 | 0.00 |
| 338 | 0.336000 | 40.00 | 1.403 | 3 | 115.200 | 133.800 | 2 | 0.00000 | 337 | 339 | 0 | 4000.00 | 0.00 |
| 339 | 0.336000 | 50.00 | 2.423 | 3 | 133.800 | 133.300 | 2 | 0.00000 | 338 | 340 | 0 | 4000.00 | 0.00 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 340 | 0.336000 | 10.00 | 3.016 | 3 | 133.300 | 133.300 | 2 | 0.00000 | 339 341 | 0 | 4000.00 | 0.00 |
| 341 | 0.256000 | 45.00 | 1.340 | 16 | 133.300 | 141.500 | 2 | 0.00000 | 340 0 | 0 | 4000.00 | 0.00 |
| 342 | 0.256000 | 15.00 | 1.678 | 16 | 133.300 | 141.500 | 2 | 0.00000 | 340 0 | 0 | 4000.00 | 0.00 |
| 343 | 0.256000 | 10.00 | 1.300 | 16 | 133.800 | 141.500 | 2 | 0.00000 | 338 0 | 0 | 4000.00 | 0.00 |
| 344 | 0.256000 | 35.00 | 1.644 | 16 | 133.300 | 128.500 | 2 | 0.00000 | 339 0 | 0 | 4000.00 | 0.00 |
| 345 | 0.256000 | 5.00 | 5.813 | 3 | 115.200 | 115.200 | 2 | 0.00000 | 337 346 | 0 | 4000.00 | 0.00 |
| 346 | 0.256000 | 80.00 | 1.288 | 3 | 115.200 | 116.500 | 2 | 0.00000 | 345 347 | 0 | 4000.00 | 0.00 |
| 347 | 0.256000 | 55.00 | 1.726 | 16 | 116.500 | 141.500 | 2 | 0.00000 | 346 0 | 0 | 4000.00 | 0.00 |
| 348 | 0.256000 | 15.00 | 2.601 | 16 | 116.500 | 128.500 | 2 | 0.00000 | 346 0 | 0 | 4000.00 | 0.00 |
| 349 | 0.256000 | 50.00 | 1.594 | 16 | 115.200 | 106.500 | 2 | 0.00000 | 345 0 | 0 | 4000.00 | 0.00 |
| 350 | 0.505000 | 175.00 | 1.669 | 4 | 68.750 | 140.000 | 2 | 0.00000 | 280 351 | 0 | 4000.00 | 0.00 |
| 351 | 0.336000 | 50.00 | 1.000 | 16 | 140.000 | 138.000 | 2 | 0.00000 | 350 0 | 0 | 4000.00 | 0.00 |
| 352 | 0.336000 | 10.00 | 4.226 | 4 | 67.000 | 65.000 | 2 | 0.00000 | 270 353 | 0 | 4000.00 | 0.00 |
| 353 | 0.336000 | 80.00 | 1.285 | 4 | 65.000 | 105.700 | 2 | 0.00000 | 352 354 | 0 | 4000.00 | 0.00 |
| 354 | 0.336000 | 80.00 | 1.630 | 3 | 105.700 | 130.500 | 2 | 0.00000 | 353 355 | 0 | 4000.00 | 0.00 |
| 355 | 0.256000 | 30.00 | 1.458 | 4 | 130.500 | 147.500 | 2 | 0.00000 | 354 356 | 0 | 4000.00 | 0.00 |
| 356 | 0.256000 | 25.00 | 1.225 | 4 | 147.500 | 141.500 | 2 | 0.00000 | 355 357 | 0 | 4000.00 | 0.00 |
| 357 | 0.162000 | 50.00 | 1.843 | 16 | 141.500 | 141.500 | 2 | 0.00000 | 356 0 | 0 | 4000.00 | 0.00 |
| 358 | 0.336000 | 5.00 | 5.570 | 4 | 130.500 | 130.500 | 2 | 0.00000 | 354 359 | 0 | 4000.00 | 0.00 |
| 359 | 0.162000 | 35.00 | 1.759 | 16 | 130.500 | 132.200 | 2 | 0.00000 | 358 0 | 0 | 4000.00 | 0.00 |
| 360 | 0.336000 | 45.00 | 2.343 | 4 | 94.500 | 115.800 | 2 | 0.00000 | 152 361 | 0 | 4000.00 | 0.00 |
| 361 | 0.336000 | 15.00 | 1.448 | 3 | 115.800 | 130.600 | 2 | 0.00000 | 360 362 | 0 | 4000.00 | 0.00 |
| 362 | 0.256000 | 50.00 | 1.510 | 19 | 130.600 | 176.000 | 2 | 0.00000 | 361 363 | 0 | 4000.00 | 0.00 |
| 363 | 0.256000 | 15.00 | 1.000 | 16 | 176.000 | 176.000 | 2 | 0.00000 | 362 0 | 0 | 4000.00 | 0.00 |
| 364 | 0.362000 | 145.00 | 1.539 | 16 | 130.600 | 129.600 | 2 | 0.00000 | 361 0 | 0 | 4000.00 | 0.00 |
| 365 | 0.336000 | 65.00 | 1.940 | 3 | 92.000 | 118.400 | 2 | 0.00000 | 145 366 | 0 | 4000.00 | 0.00 |
| 366 | 0.336000 | 20.00 | 1.544 | 3 | 118.400 | 118.400 | 2 | 0.00000 | 365 367 | 0 | 4000.00 | 0.00 |
| 367 | 0.256000 | 15.00 | 1.239 | 16 | 118.400 | 115.000 | 2 | 0.00000 | 366 0 | 0 | 4000.00 | 0.00 |
| 368 | 0.256000 | 20.00 | 1.947 | 16 | 118.400 | 127.000 | 2 | 0.00000 | 365 0 | 0 | 4000.00 | 0.00 |
| 369 | 0.336000 | 30.00 | 2.275 | 4 | 118.400 | 133.500 | 2 | 0.00000 | 366 370 | 0 | 4000.00 | 0.00 |
| 370 | 0.256000 | 35.00 | 1.232 | 3 | 133.500 | 166.000 | 2 | 0.00000 | 369 371 | 0 | 4000.00 | 0.00 |
| 371 | 0.256000 | 10.00 | 1.000 | 19 | 166.000 | 176.000 | 2 | 0.00000 | 370 372 | 0 | 4000.00 | 0.00 |
| 372 | 0.256000 | 20.00 | 2.970 | 16 | 176.000 | 175.000 | 2 | 0.00000 | 371 0 | 0 | 4000.00 | 0.00 |
| 373 | 0.256000 | 55.00 | 1.521 | 16 | 166.000 | 141.000 | 2 | 0.00000 | 370 0 | 0 | 4000.00 | 0.00 |
| 374 | 0.336000 | 5.00 | 6.914 | 3 | 92.000 | 94.200 | 2 | 0.00000 | 144 375 | 0 | 4000.00 | 0.00 |
| 375 | 0.336000 | 50.00 | 1.605 | 3 | 94.200 | 113.250 | 2 | 0.00000 | 374 376 | 0 | 4000.00 | 0.00 |
| 376 | 0.256000 | 30.00 | 1.100 | 16 | 113.250 | 141.750 | 2 | 0.00000 | 375 0 | 0 | 4000.00 | 0.00 |
| 377 | 0.256000 | 30.00 | 1.751 | 16 | 94.200 | 74.000 | 2 | 0.00000 | 374 0 | 0 | 4000.00 | 0.00 |
| 378 | 0.256000 | 20.00 | 2.380 | 16 | 113.300 | 111.000 | 2 | 0.00000 | 375 0 | 0 | 4000.00 | 0.00 |
| 379 | 0.336000 | 10.00 | 4.898 | 4 | 89.000 | 94.330 | 2 | 0.00000 | 137 380 | 0 | 4000.00 | 0.00 |
| 380 | 0.336000 | 5.00 | 2.344 | 3 | 94.330 | 95.000 | 2 | 0.00000 | 379 381 | 0 | 4000.00 | 0.00 |
| 381 | 0.336000 | 100.00 | 1.322 | 4 | 95.000 | 130.700 | 2 | 0.00000 | 380 382 | 0 | 4000.00 | 0.00 |
| 382 | 0.256000 | 65.00 | 1.598 | 19 | 130.700 | 176.000 | 2 | 0.00000 | 381 383 | 0 | 4000.00 | 0.00 |
| 383 | 0.025600 | 20.00 | 1.000 | 16 | 176.000 | 175.000 | 2 | 0.00000 | 382 0 | 0 | 4000.00 | 0.00 |
| 384 | 0.336000 | 50.00 | 1.859 | 3 | 95.000 | 96.500 | 2 | 0.00000 | 380 385 | 0 | 4000.00 | 0.00 |
| 385 | 0.256000 | 75.00 | 1.252 | 3 | 96.500 | 98.000 | 2 | 0.00000 | 384 386 | 0 | 4000.00 | 0.00 |
| 386 | 0.256000 | 40.00 | 1.269 | 16 | 98.000 | 71.000 | 2 | 0.00000 | 385 0 | 0 | 4000.00 | 0.00 |
| 387 | 0.256000 | 15.00 | 2.741 | 16 | 96.500 | 103.000 | 2 | 0.00000 | 384 0 | 0 | 4000.00 | 0.00 |
| 388 | 0.256000 | 40.00 | 1.922 | 16 | 98.000 | 94.500 | 2 | 0.00000 | 385 0 | 0 | 4000.00 | 0.00 |
| 389 | 0.336000 | 45.00 | 1.567 | 3 | 89.000 | 127.750 | 2 | 0.00000 | 135 390 | 0 | 4000.00 | 0.00 |
| 390 | 0.256000 | 20.00 | 1.688 | 16 | 127.750 | 141.750 | 2 | 0.00000 | 389 0 | 0 | 4000.00 | 0.00 |
| 391 | 0.256000 | 110.00 | 1.335 | 16 | 127.750 | 141.750 | 2 | 0.00000 | 389 0 | 0 | 4000.00 | 0.00 |
| 392 | 0.336000 | 5.00 | 7.854 | 3 | 94.500 | 96.800 | 2 | 0.00000 | 155 393 | 0 | 4000.00 | 0.00 |
| 393 | 0.256000 | 215.00 | 1.316 | 16 | 96.800 | 65.000 | 2 | 0.00000 | 392 0 | 0 | 4000.00 | 0.00 |
| 394 | 0.256000 | 125.00 | 1.470 | 16 | 96.800 | 141.750 | 2 | 0.00000 | 392 0 | 0 | 4000.00 | 0.00 |
| 395 | 0.336000 | 150.00 | 1.528 | 3 | 94.500 | 130.400 | 2 | 0.00000 | 156 396 | 0 | 4000.00 | 0.00 |
| 396 | 0.256000 | 155.00 | 1.280 | 19 | 130.400 | 182.000 | 2 | 0.00000 | 395 397 | 0 | 4000.00 | 0.00 |
| 397 | 0.256000 | 30.00 | 1.478 | 16 | 182.000 | 179.000 | 2 | 0.00000 | 396 0 | 0 | 4000.00 | 0.00 |
| 398 | 0.256000 | 40.00 | 1.653 | 16 | 130.400 | 141.750 | 2 | 0.00000 | 395 0 | 0 | 4000.00 | 0.00 |
| 399 | 0.505000 | 120.00 | 1.538 | 3 | 94.500 | 90.500 | 2 | 0.00000 | 158 400 | 0 | 4000.00 | 0.00 |
| 400 | 0.336000 | 5.00 | 8.007 | 4 | 90.500 | 90.500 | 2 | 0.00000 | 399 401 | 0 | 4000.00 | 0.00 |
| 401 | 0.256000 | 60.00 | 1.349 | 16 | 90.500 | 141.750 | 2 | 0.00000 | 400 0 | 0 | 4000.00 | 0.00 |
| 402 | 0.336000 | 130.00 | 1.496 | 3 | 90.500 | 65.300 | 2 | 0.00000 | 399 403 | 0 | 4000.00 | 0.00 |
| 403 | 0.336000 | 50.00 | 1.228 | 4 | 65.300 | 94.700 | 2 | 0.00000 | 402 404 | 0 | 4000.00 | 0.00 |
| 404 | 0.256000 | 55.00 | 1.315 | 16 | 94.700 | 141.750 | 2 | 0.00000 | 403 0 | 0 | 4000.00 | 0.00 |
| 405 | 0.336000 | 40.00 | 2.260 | 3 | 65.300 | 77.500 | 2 | 0.00000 | 402 406 | 0 | 4000.00 | 0.00 |
| 406 | 0.256000 | 30.00 | 1.458 | 16 | 77.500 | 103.500 | 2 | 0.00000 | 405 0 | 0 | 4000.00 | 0.00 |
| 407 | 0.256000 | 125.00 | 1.180 | 16 | 77.500 | 75.000 | 2 | 0.00000 | 405 0 | 0 | 4000.00 | 0.00 |
| 408 | 0.336000 | 135.00 | 1.552 | 4 | 79.000 | 142.000 | 2 | 0.00000 | 139 409 | 0 | 4000.00 | 0.00 |
| 409 | 0.336000 | 20.00 | 1.000 | 16 | 142.000 | 141.750 | 2 | 0.00000 | 408 0 | 0 | 4000.00 | 0.00 |
| 410 | 0.256000 | 95.00 | 1.334 | 19 | 96.200 | 174.000 | 2 | 0.00000 | 150 411 | 0 | 4000.00 | 0.00 |
| 411 | 0.256000 | 10.00 | 1.358 | 4 | 174.000 | 183.500 | 2 | 0.00000 | 410 412 | 0 | 4000.00 | 0.00 |
| 412 | 0.107000 | 60.00 | 1.439 | 4 | 183.500 | 197.500 | 2 | 0.00000 | 411 413 | 0 | 4000.00 | 0.00 |
| 413 | 0.107000 | 25.00 | 1.000 | 16 | 197.500 | 197.500 | 2 | 0.00000 | 412 0 | 0 | 4000.00 | 0.00 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 414 | 0.505000 | 100.00 | 2.373 | 3 | 91.940 | 138.300 | 2 | 0.00000 | 143 415 | 0 | 4000.00 | 0.00 |
| 415 | 0.505000 | 5.00 | 5.848 | 2 | 138.300 | 142.000 | 2 | 0.00000 | 414 416 | 0 | 4000.00 | 0.00 |
| 416 | 0.336000 | 5.00 | 1.000 | 4 | 142.000 | 142.000 | 2 | 0.00000 | 415 417 | 0 | 4000.00 | 0.00 |
| 417 | 0.336000 | 50.00 | 1.000 | 4 | 142.000 | 160.000 | 2 | 0.00000 | 416 418 | 0 | 4000.00 | 0.00 |
| 418 | 0.336000 | 50.00 | 1.000 | 16 | 160.000 | 160.000 | 2 | 0.00000 | 417 0 | 0 | 4000.00 | 0.00 |
| 419 | 0.505000 | 85.00 | 2.031 | 4 | 94.500 | 131.500 | 2 | 0.00000 | 154 420 | 0 | 4000.00 | 0.00 |
| 420 | 0.505000 | 50.00 | 1.443 | 4 | 131.500 | 130.750 | 2 | 0.00000 | 419 421 | 0 | 4000.00 | 0.00 |
| 421 | 0.505000 | 30.00 | 1.909 | 4 | 130.750 | 130.750 | 2 | 0.00000 | 420 422 | 0 | 4000.00 | 0.00 |
| 422 | 0.505000 | 40.00 | 2.361 | 4 | 130.750 | 128.750 | 2 | 0.00000 | 421 423 | 0 | 4000.00 | 0.00 |
| 423 | 0.505000 | 35.00 | 1.491 | 3 | 128.750 | 132.170 | 2 | 0.00000 | 422 424 | 0 | 4000.00 | 0.00 |
| 424 | 0.256000 | 10.00 | 1.505 | 4 | 132.170 | 138.000 | 2 | 0.00000 | 423 425 | 0 | 4000.00 | 0.00 |
| 425 | 0.162000 | 105.00 | 1.580 | 16 | 138.000 | 169.500 | 2 | 0.00000 | 424 0 | 0 | 4000.00 | 0.00 |
| 426 | 0.336000 | 40.00 | 1.843 | 3 | 132.170 | 132.170 | 2 | 0.00000 | 423 427 | 0 | 4000.00 | 0.00 |
| 427 | 0.256000 | 10.00 | 1.000 | 4 | 132.170 | 138.000 | 2 | 0.00000 | 426 428 | 0 | 4000.00 | 0.00 |
| 428 | 0.162000 | 100.00 | 1.632 | 16 | 138.000 | 169.500 | 2 | 0.00000 | 427 0 | 0 | 4000.00 | 0.00 |
| 429 | 0.256000 | 40.00 | 1.165 | 4 | 132.170 | 138.000 | 2 | 0.00000 | 426 430 | 0 | 4000.00 | 0.00 |
| 430 | 0.162000 | 155.00 | 1.548 | 16 | 138.000 | 169.500 | 2 | 0.00000 | 429 0 | 0 | 4000.00 | 0.00 |
| 431 | 0.256000 | 40.00 | 1.934 | 4 | 65.500 | 69.000 | 2 | 0.00000 | 286 432 | 0 | 4000.00 | 0.00 |
| 432 | 0.256000 | 105.00 | 1.020 | 4 | 69.000 | 171.000 | 2 | 0.00000 | 431 433 | 0 | 4000.00 | 0.00 |
| 433 | 0.162000 | 10.00 | 1.227 | 19 | 171.000 | 181.000 | 2 | 0.00000 | 432 434 | 0 | 4000.00 | 0.00 |
| 434 | 0.162000 | 40.00 | 1.332 | 16 | 181.000 | 180.000 | 2 | 0.00000 | 433 0 | 0 | 4000.00 | 0.00 |
| 435 | 0.665000 | 15.00 | 5.522 | 3 | 89.600 | 83.800 | 2 | 0.00000 | 166 436 | 0 | 4000.00 | 0.00 |
| 436 | 0.665000 | 5.00 | 3.660 | 3 | 83.800 | 83.800 | 2 | 0.00000 | 435 437 | 0 | 4000.00 | 0.00 |
| 437 | 0.665000 | 5.00 | 14.300 | 3 | 83.800 | 83.800 | 2 | 0.00000 | 436 438 | 0 | 4000.00 | 0.00 |
| 438 | 0.505000 | 5.00 | 4.652 | 13 | 83.800 | 88.000 | 2 | 0.00000 | 437 439 | 0 | 4000.00 | 0.00 |
| 439 | 0.505000 | 5.00 | 6.050 | 2 | 88.000 | 89.000 | 2 | 0.00000 | 438 440 | 0 | 4000.00 | 0.00 |
| 440 | 0.336000 | 60.00 | 5.000 | 1 | 89.000 | 113.000 | 2 | 0.00000 | 439 0 | 0 | 4000.00 | 0.00 |
| 441 | 0.665000 | 10.00 | 9.911 | 3 | 83.800 | 91.500 | 2 | 0.00000 | 437 442 | 0 | 4000.00 | 0.00 |
| 442 | 0.665000 | 80.00 | 1.865 | 3 | 91.500 | 102.800 | 2 | 0.00000 | 441 443 | 0 | 4000.00 | 0.00 |
| 443 | 0.665000 | 50.00 | 1.106 | 16 | 102.800 | 130.000 | 2 | 0.00000 | 442 0 | 0 | 4000.00 | 0.00 |
| 444 | 0.336000 | 10.00 | 5.435 | 16 | 102.800 | 107.800 | 2 | 0.00000 | 442 0 | 0 | 4000.00 | 0.00 |
| 445 | 0.665000 | 40.00 | 2.658 | 16 | 91.500 | 86.000 | 2 | 0.00000 | 441 0 | 0 | 4000.00 | 0.00 |
| 446 | 0.505000 | 5.00 | 7.868 | 13 | 83.800 | 88.000 | 2 | 0.00000 | 435 447 | 0 | 4000.00 | 0.00 |
| 447 | 0.505000 | 5.00 | 1.000 | 2 | 88.000 | 89.000 | 2 | 0.00000 | 446 448 | 0 | 4000.00 | 0.00 |
| 448 | 0.505000 | 45.00 | 2.301 | 4 | 89.000 | 103.000 | 2 | 0.00000 | 447 449 | 0 | 4000.00 | 0.00 |
| 449 | 0.336000 | 20.00 | 2.613 | 4 | 103.000 | 112.000 | 2 | 0.00000 | 448 450 | 0 | 4000.00 | 0.00 |
| 450 | 0.336000 | 110.00 | 2.307 | 1 | 112.000 | 113.000 | 2 | 0.00000 | 449 0 | 0 | 4000.00 | 0.00 |
| 451 | 0.336000 | 160.00 | 1.474 | 4 | 83.800 | 141.000 | 2 | 0.00000 | 436 452 | 0 | 4000.00 | 0.00 |
| 452 | 0.336000 | 5.00 | 1.000 | 2 | 141.000 | 141.000 | 2 | 0.00000 | 451 453 | 0 | 4000.00 | 0.00 |
| 453 | 0.256000 | 50.00 | 1.000 | 1 | 141.000 | 141.000 | 2 | 0.00000 | 452 0 | 0 | 4000.00 | 0.00 |
| 454 | 0.665000 | 30.00 | 4.979 | 3 | 84.100 | 93.500 | 2 | 0.00000 | 204 455 | 0 | 4000.00 | 0.00 |
| 455 | 0.665000 | 10.00 | 2.862 | 2 | 93.500 | 103.500 | 2 | 0.00000 | 454 456 | 0 | 4000.00 | 0.00 |
| 456 | 0.505000 | 50.00 | 5.000 | 1 | 103.500 | 103.500 | 2 | 0.00000 | 455 0 | 0 | 4000.00 | 0.00 |
| 457 | 0.505000 | 20.00 | 2.414 | 4 | 93.500 | 80.300 | 2 | 0.00000 | 454 458 | 0 | 4000.00 | 0.00 |
| 458 | 0.505000 | 50.00 | 1.000 | 16 | 80.300 | 80.300 | 2 | 0.00000 | 457 0 | 0 | 4000.00 | 0.00 |
| 459 | 0.336000 | 20.00 | 3.318 | 2 | 62.750 | 62.750 | 2 | 0.00000 | 218 460 | 0 | 4000.00 | 0.00 |
| 460 | 0.336000 | 10.00 | 2.210 | 4 | 62.750 | 63.750 | 2 | 0.00000 | 459 461 | 0 | 4000.00 | 0.00 |
| 461 | 0.336000 | 30.00 | 1.762 | 4 | 63.750 | 86.250 | 2 | 0.00000 | 460 462 | 0 | 4000.00 | 0.00 |
| 462 | 0.336000 | 40.00 | 1.286 | 4 | 86.250 | 125.000 | 2 | 0.00000 | 461 463 | 0 | 4000.00 | 0.00 |
| 463 | 0.336000 | 130.00 | 1.233 | 4 | 125.000 | 125.000 | 2 | 0.00000 | 462 464 | 0 | 4000.00 | 0.00 |
| 464 | 0.336000 | 30.00 | 1.587 | 4 | 125.000 | 155.000 | 2 | 0.00000 | 463 465 | 0 | 4000.00 | 0.00 |
| 465 | 0.256000 | 60.00 | 1.171 | 4 | 155.000 | 208.000 | 2 | 0.00000 | 464 466 | 0 | 4000.00 | 0.00 |
| 466 | 0.001000 | 10.00 | 1.000 | 16 | 208.000 | 205.000 | 2 | 0.00000 | 465 0 | 0 | 4000.00 | 0.00 |
| 467 | 0.336000 | 20.00 | 2.378 | 2 | 94.000 | 94.000 | 2 | 0.00000 | 199 468 | 0 | 4000.00 | 0.00 |
| 468 | 0.336000 | 20.00 | 1.000 | 4 | 94.000 | 94.000 | 2 | 0.00000 | 467 469 | 0 | 4000.00 | 0.00 |
| 469 | 0.336000 | 5.00 | 1.538 | 4 | 94.000 | 94.000 | 2 | 0.00000 | 468 470 | 0 | 4000.00 | 0.00 |
| 470 | 0.336000 | 25.00 | 2.665 | 4 | 94.000 | 113.000 | 2 | 0.00000 | 469 471 | 0 | 4000.00 | 0.00 |
| 471 | 0.336000 | 75.00 | 1.403 | 4 | 113.000 | 122.000 | 2 | 0.00000 | 470 472 | 0 | 4000.00 | 0.00 |
| 472 | 0.336000 | 35.00 | 1.708 | 3 | 122.000 | 151.800 | 2 | 0.00000 | 471 473 | 0 | 4000.00 | 0.00 |
| 473 | 0.336000 | 30.00 | 2.322 | 3 | 151.800 | 169.500 | 2 | 0.00000 | 472 474 | 0 | 4000.00 | 0.00 |
| 474 | 0.336000 | 35.00 | 1.770 | 4 | 169.500 | 187.800 | 2 | 0.00000 | 473 475 | 0 | 4000.00 | 0.00 |
| 475 | 0.256000 | 15.00 | 1.717 | 4 | 187.800 | 187.800 | 2 | 0.00000 | 474 476 | 0 | 4000.00 | 0.00 |
| 476 | 0.256000 | 110.00 | 1.130 | 4 | 187.800 | 205.300 | 2 | 0.00000 | 475 477 | 0 | 4000.00 | 0.00 |
| 477 | 0.256000 | 10.00 | 1.000 | 16 | 205.300 | 204.300 | 2 | 0.00000 | 476 0 | 0 | 4000.00 | 0.00 |
| 478 | 0.256000 | 40.00 | 1.849 | 16 | 169.500 | 166.000 | 2 | 0.00000 | 473 0 | 0 | 4000.00 | 0.00 |
| 479 | 0.336000 | 10.00 | 4.769 | 4 | 151.800 | 153.300 | 2 | 0.00000 | 472 480 | 0 | 4000.00 | 0.00 |
| 480 | 0.256000 | 60.00 | 1.293 | 16 | 153.300 | 149.300 | 2 | 0.00000 | 479 0 | 0 | 4000.00 | 0.00 |
| 481 | 0.505000 | 5.00 | 14.146 | 4 | 61.750 | 57.700 | 2 | 0.00000 | 208 482 | 0 | 4000.00 | 0.00 |
| 482 | 0.505000 | 20.00 | 3.323 | 4 | 57.700 | 71.000 | 2 | 0.00000 | 481 483 | 0 | 4000.00 | 0.00 |
| 483 | 0.505000 | 10.00 | 1.000 | 2 | 71.000 | 71.000 | 2 | 0.00000 | 482 484 | 0 | 4000.00 | 0.00 |
| 484 | 0.505000 | 50.00 | 5.000 | 1 | 71.000 | 71.000 | 2 | 0.00000 | 483 0 | 0 | 4000.00 | 0.00 |
| 485 | 0.505000 | 5.00 | 13.184 | 4 | 138.300 | 138.300 | 2 | 0.00000 | 414 486 | 0 | 4000.00 | 0.00 |
| 486 | 0.336000 | 90.00 | 1.157 | 4 | 138.300 | 143.500 | 2 | 0.00000 | 485 487 | 0 | 4000.00 | 0.00 |
| 487 | 0.336000 | 15.00 | 1.627 | 4 | 143.500 | 147.400 | 2 | 0.00000 | 486 488 | 0 | 4000.00 | 0.00 |

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 488    0.336000     75.00    1.314   4     147.400   165.800     2     0.00000 487 489     0   4000.00      0.00
 489    0.336000     70.00    1.355   4     165.800   164.000     2     0.00000 488 490     0   4000.00      0.00
 490    0.336000     10.00    3.486   4     164.000   164.000     2     0.00000 489 491     0   4000.00      0.00
 491    0.336000     10.00    1.416   4     164.000   164.000     2     0.00000 490 492     0   4000.00      0.00
 492    0.256000     10.00    1.251   4     164.000   164.000     2     0.00000 491 493     0   4000.00      0.00
 493    0.206000     10.00    3.225   4     164.000   166.000     2     0.00000 492 494     0   4000.00      0.00
 494    0.206000     75.00    1.549   4     166.000   166.000     2     0.00000 493 495     0   4000.00      0.00
 495    0.172000     20.00    1.757  19     166.000   166.000     2     0.00000 494 496     0   4000.00      0.00
 496    0.087000     10.00    2.409  16     166.000   168.000     2     0.00000 495   0     0   4000.00      0.00


  **** Boundary Devices in Network ****
Total Number of Sinks =   10
Total Number of Valves =   15
Total Number of Branches with 2 Exit Pipes =   98
Total Number of Continous Link Junctions =  278
Total Number of Check Valves =    3
Total Number of Dead Ends =   77
Total Number of Vacuum Breakers =    9

There are   6 Special Reverse Links in USLAM Model.
The following Links are Special Reverse Links:  86 101 162 181 229 261

******** END OF LINK DATA  **********************


****Input Data for SINK Boundary Devices(LEBD=1)
Number of Sinks =  10.
Pipe Links Ending With Sink Boundary Device:
  91  99 117 123 129 440 450 453 456 484

Data for Sink Boundary Device Sequence Number   1
This Sink is at the end of Pipe Link =  91
Steady State Constant Head (HSink) at this Sink =     570.3000
No. of Entries in Time Vs Head Table (NEStvH)=   0
No. of Entries in Discharge Vs Head Table (NESQvH)=  18
   1)     91    570.3000   0  18
Array of Discharge Values in Q Vs Head Table
TQvHA=
   20.0000    0.0000   -0.0220   -0.0330   -0.0450   -0.0560   -0.0670   -0.0780
   -0.0890   -0.1000   -0.1110   -0.1230   -0.1340   -0.1450   -0.1560   -0.1670
   -0.2000 -100.0000
Array of Head Values corresponding to Array of Q
HvTQA=
 0.57030E+03 0.57030E+03 0.58730E+03 0.59030E+03 0.58730E+03 0.58030E+03 0.56830E+03 0.55830E+03
 0.54230E+03 0.52030E+03 0.49030E+03 0.46030E+03 0.42030E+03 0.37030E+03 0.31030E+03 0.24030E+03
 0.17030E+03 0.17030E+03

Data for Sink Boundary Device Sequence Number   2
This Sink is at the end of Pipe Link =  99
Steady State Constant Head (HSink) at this Sink =     495.3000
No. of Entries in Time Vs Head Table (NEStvH)=   0
No. of Entries in Discharge Vs Head Table (NESQvH)=  18
   2)     99    495.3000   0  18
Array of Discharge Values in Q Vs Head Table
TQvHA=
   20.0000    0.0000   -0.5570   -1.1140   -1.6710   -2.2280   -2.7850   -3.3420
   -3.8990   -4.4600   -5.0130   -5.5700   -6.1270   -6.6840   -7.2410   -8.9120
  -13.4000 -100.0000
Array of Head Values corresponding to Array of Q
HvTQA=
 0.49530E+03 0.49530E+03 0.49430E+03 0.49230E+03 0.49130E+03 0.48830E+03 0.48530E+03 0.48130E+03
 0.47730E+03 0.47230E+03 0.46630E+03 0.45930E+03 0.44830E+03 0.43630E+03 0.42330E+03 0.37530E+03
 0.17030E+03 0.17030E+03

Data for Sink Boundary Device Sequence Number   3
This Sink is at the end of Pipe Link = 117
Steady State Constant Head (HSink) at this Sink =     512.1000
No. of Entries in Time Vs Head Table (NEStvH)=   0
No. of Entries in Discharge Vs Head Table (NESQvH)=  17
   3)    117    512.1000   0  17
Array of Discharge Values in Q Vs Head Table
TQvHA=
   20.0000    0.0000   -0.5570   -1.1140   -1.6710   -2.2280   -2.7850   -3.3420
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   -3.8990   -4.4600   -5.0130   -5.5700   -6.1270   -6.6840   -7.2410   -8.9120
  -13.3700
Array of Head Values corresponding to Array of Q
HvTQA=
 0.51210E+03 0.51210E+03 0.51010E+03 0.50710E+03 0.50510E+03 0.50210E+03 0.50010E+03 0.49810E+03
 0.49510E+03 0.49210E+03 0.48780E+03 0.48110E+03 0.47610E+03 0.46710E+03 0.45710E+03 0.41210E+03
 0.16010E+03

Data for Sink Boundary Device Sequence Number   4
This Sink is at the end of Pipe Link = 123
Steady State Constant Head (HSink) at this Sink =     512.1000
No. of Entries in Time Vs Head Table (NEStvH)=   0
No. of Entries in Discharge Vs Head Table (NESQvH)=  17
   4)    123    512.1000   0  17
Array of Discharge Values in Q Vs Head Table
TQvHA=
   20.0000    0.0000   -0.5570   -1.1140   -1.6710   -2.2280   -2.7850   -3.3420
   -3.8990   -4.4600   -5.0130   -5.5700   -6.1270   -6.6840   -7.2410   -8.9120
  -13.3700
Array of Head Values corresponding to Array of Q
HvTQA=
 0.51210E+03 0.51210E+03 0.51010E+03 0.50710E+03 0.50510E+03 0.50210E+03 0.50010E+03 0.49810E+03
 0.49510E+03 0.49210E+03 0.48780E+03 0.48110E+03 0.47610E+03 0.46710E+03 0.45710E+03 0.41210E+03
 0.16010E+03

Data for Sink Boundary Device Sequence Number   5
This Sink is at the end of Pipe Link = 129
Steady State Constant Head (HSink) at this Sink =     482.1000
No. of Entries in Time Vs Head Table (NEStvH)=   0
No. of Entries in Discharge Vs Head Table (NESQvH)=  16
   5)    129    482.1000   0  16
Array of Discharge Values in Q Vs Head Table
TQvHA=
   20.0000    0.0000   -0.0220   -0.0330   -0.0450   -0.0560   -0.0670   -0.0780
   -0.0890   -0.1000   -0.1110   -0.1230   -0.1340   -0.1450   -0.1560 -100.0000
Array of Head Values corresponding to Array of Q
HvTQA=
 0.48210E+03 0.48210E+03 0.47810E+03 0.47310E+03 0.46310E+03 0.44810E+03 0.42810E+03 0.40310E+03
 0.37410E+03 0.34310E+03 0.30810E+03 0.26810E+03 0.23310E+03 0.19810E+03 0.16810E+03 0.16810E+03

Data for Sink Boundary Device Sequence Number   6
This Sink is at the end of Pipe Link = 440
Steady State Constant Head (HSink) at this Sink =     147.0000
No. of Entries in Time Vs Head Table (NEStvH)=   0
No. of Entries in Discharge Vs Head Table (NESQvH)=   0
   6)    440    147.0000   0   0

Data for Sink Boundary Device Sequence Number   7
This Sink is at the end of Pipe Link = 450
Steady State Constant Head (HSink) at this Sink =     147.0000
No. of Entries in Time Vs Head Table (NEStvH)=   0
No. of Entries in Discharge Vs Head Table (NESQvH)=   0
   7)    450    147.0000   0   0

Data for Sink Boundary Device Sequence Number   8
This Sink is at the end of Pipe Link = 453
Steady State Constant Head (HSink) at this Sink =     175.0000
No. of Entries in Time Vs Head Table (NEStvH)=   0
No. of Entries in Discharge Vs Head Table (NESQvH)=   0
   8)    453    175.0000   0   0

Data for Sink Boundary Device Sequence Number   9
This Sink is at the end of Pipe Link = 456
Steady State Constant Head (HSink) at this Sink =     137.5000
No. of Entries in Time Vs Head Table (NEStvH)=   0
No. of Entries in Discharge Vs Head Table (NESQvH)=   0
   9)    456    137.5000   0   0

Data for Sink Boundary Device Sequence Number  10
This Sink is at the end of Pipe Link = 484
Steady State Constant Head (HSink) at this Sink =     105.0000
No. of Entries in Time Vs Head Table (NEStvH)=   0
No. of Entries in Discharge Vs Head Table (NESQvH)=   0
  10)    484    105.0000   0   0
```

```
********** End of Sink Data **********


 ****Input data for Valve Boundary Device
Number of Valves =  15.
Pipe Links Ending With Valve Boundary Devices:   4  90  96 102 114 121 126 415 439 447
 452 455 459 467 483
Data for Valve no.  1
This Valve is at the end of Pipe Link =   4
Time at which this Valve starts to close (TVsc) =   0.000s
    Valve closure time (TVClose) =  100.000s
    Valve % closed area @ time zero (PVCt0)=  100.00  sqft
    Valve Resistance Coeff. at  time zero (Zt0) =    0.10000E+21
    Valve Closure Type/Option (IVCop) =   2
No. of Entries in % Closed Area Vs Valve Flow Resistance Table (NEPCvk)=   9
No. of Entries in % Closed Time Vs % Closed Area(NEPCtA)=   4
    Full open Valve Throat Area (AVFO) =     0.78540E+00sqft
    Valve Full open Resistance Coeff.(VkFO) =     0.10000E-01
    Head Downstream of Closed Valve (HVDCV) =     0.39360E+03

   1)      4    0.0000  100.0000  100.0000    0.10000E+21   2   9   4    0.7854   0.01000 393.60001
 Corrected resistance coefficient at t=0 based on upstream area =     0.10000E+21

    ** Table of % valve closing time versus % valve closed area.

    Array of % valve closing time.

   0.000   0.560   2.360 100.000

    Array of % valve closed area.

 100.000 100.000   0.000   0.000

    ** Table of % Valve Closed Area Vs Resistance coefficient

    Array of % valve closed area.

   0.000  50.000  90.000  92.500  95.300  97.500  99.000  99.700
 100.000

    Array of valve resistances.

 0.10000E-01 0.20000E+04 0.40000E+04 0.70930E+04 0.18062E+05 0.20357E+06 0.15960E+07 0.49259E+08
 0.10000E+21

     Corrected resistance coefficients based on area of upstream pipe.
 0.10000E-01 0.20000E+04 0.40000E+04 0.70930E+04 0.18062E+05 0.20357E+06 0.15960E+07 0.49259E+08
 0.10000E+21
Data for Valve no.  2
This Valve is at the end of Pipe Link =  90
Time at which this Valve starts to close (TVsc) =   0.000s
    Valve closure time (TVClose) =  100.000s
    Valve % closed area @ time zero (PVCt0)=  100.00  sqft
    Valve Resistance Coeff. at  time zero (Zt0) =    0.10000E+21
    Valve Closure Type/Option (IVCop) =   2
No. of Entries in % Closed Area Vs Valve Flow Resistance Table (NEPCvk)=   9
No. of Entries in % Closed Time Vs % Closed Area(NEPCtA)=   3
    Full open Valve Throat Area (AVFO) =     0.51472E-01sqft
    Valve Full open Resistance Coeff.(VkFO) =     0.10000E-01
    Head Downstream of Closed Valve (HVDCV) =     0.57030E+03

   2)     90    0.0000  100.0000  100.0000    0.10000E+21   2   9   3    0.0515   0.01000 570.29999
 Corrected resistance coefficient at t=0 based on upstream area =     0.10000E+21

    ** Table of % valve closing time versus % valve closed area.

    Array of % valve closing time.

   0.000   0.010 100.000

    Array of % valve closed area.

 100.000   0.000   0.000
```

```
    ** Table of % Valve Closed Area Vs Resistance coefficient

    Array of % valve closed area.

   0.000  50.000  90.000  92.500  95.300  97.500  99.000  99.700
 100.000

    Array of valve resistances.

 0.10000E-01 0.20000E+04 0.40000E+04 0.70930E+04 0.18062E+05 0.20357E+06 0.15960E+07 0.49259E+08
 0.10000E+21

     Corrected resistance coefficients based on area of upstream pipe.
 0.10000E-01 0.20000E+04 0.40000E+04 0.70930E+04 0.18062E+05 0.20357E+06 0.15960E+07 0.49259E+08
 0.10000E+21
Data for Valve no.  3
This Valve is at the end of Pipe Link =  96
Time at which this Valve starts to close (TVsc) =   0.000s
    Valve closure time (TVClose) =  100.000s
    Valve % closed area @ time zero (PVCt0)=  100.00  sqft
    Valve Resistance Coeff. at  time zero (Zt0) =    0.10000E+21
    Valve Closure Type/Option (IVCop) =   2
No. of Entries in % Closed Area Vs Valve Flow Resistance Table (NEPCvk)=   9
No. of Entries in % Closed Time Vs % Closed Area(NEPCtA)=   4
    Full open Valve Throat Area (AVFO) =     0.78540E+00sqft
    Valve Full open Resistance Coeff.(VkFO) =     0.10000E-01
    Head Downstream of Closed Valve (HVDCV) =     0.49530E+03

   3)     96    0.0000  100.0000  100.0000    0.10000E+21   2   9   4    0.7854   0.01000 495.29999
 Corrected resistance coefficient at t=0 based on upstream area =     0.10000E+21

    ** Table of % valve closing time versus % valve closed area.

    Array of % valve closing time.

   0.000   0.630   3.430 100.000

    Array of % valve closed area.

 100.000 100.000 100.000 100.000

    ** Table of % Valve Closed Area Vs Resistance coefficient

    Array of % valve closed area.

   0.000  50.000  90.000  92.500  95.300  97.500  99.000  99.700
 100.000

    Array of valve resistances.

 0.10000E-01 0.20000E+04 0.40000E+04 0.70930E+04 0.18062E+05 0.20357E+06 0.15960E+07 0.49259E+08
 0.10000E+21

     Corrected resistance coefficients based on area of upstream pipe.
 0.10000E-01 0.20000E+04 0.40000E+04 0.70930E+04 0.18062E+05 0.20357E+06 0.15960E+07 0.49259E+08
 0.10000E+21
Data for Valve no.  4
This Valve is at the end of Pipe Link = 102
Time at which this Valve starts to close (TVsc) =   0.000s
    Valve closure time (TVClose) =  100.000s
    Valve % closed area @ time zero (PVCt0)=  100.00  sqft
    Valve Resistance Coeff. at  time zero (Zt0) =    0.10000E+21
    Valve Closure Type/Option (IVCop) =   2
No. of Entries in % Closed Area Vs Valve Flow Resistance Table (NEPCvk)=   9
No. of Entries in % Closed Time Vs % Closed Area(NEPCtA)=   4
    Full open Valve Throat Area (AVFO) =     0.54760E+00sqft
    Valve Full open Resistance Coeff.(VkFO) =     0.10000E-01
    Head Downstream of Closed Valve (HVDCV) =     0.39360E+03

   4)    102    0.0000  100.0000  100.0000    0.10000E+21   2   9   4    0.5476   0.01000 393.60001
 Corrected resistance coefficient at t=0 based on upstream area =     0.10000E+21

    ** Table of % valve closing time versus % valve closed area.
```

```
    Array of % valve closing time.

   0.000   2.000   2.010 100.000

    Array of % valve closed area.

 100.000 100.000 100.000 100.000

    ** Table of % Valve Closed Area Vs Resistance coefficient

    Array of % valve closed area.

   0.000  50.000  90.000  92.500  95.300  97.500  99.000  99.700
 100.000

    Array of valve resistances.

 0.10000E-01 0.20000E+04 0.40000E+04 0.70930E+04 0.18062E+05 0.20357E+06 0.15960E+07 0.49259E+08
 0.10000E+21

     Corrected resistance coefficients based on area of upstream pipe.
 0.10000E-01 0.20000E+04 0.40000E+04 0.70930E+04 0.18062E+05 0.20357E+06 0.15960E+07 0.49259E+08
 0.10000E+21
Data for Valve no.  5
This Valve is at the end of Pipe Link = 114
Time at which this Valve starts to close (TVsc) =   0.000s
    Valve closure time (TVClose) =  100.000s
    Valve % closed area @ time zero (PVCt0)=  100.00  sqft
    Valve Resistance Coeff. at  time zero (Zt0) =    0.10000E+21
    Valve Closure Type/Option (IVCop) =   2
No. of Entries in % Closed Area Vs Valve Flow Resistance Table (NEPCvk)=   9
No. of Entries in % Closed Time Vs % Closed Area(NEPCtA)=   4
    Full open Valve Throat Area (AVFO) =     0.78540E+00sqft
    Valve Full open Resistance Coeff.(VkFO) =     0.10000E-01
    Head Downstream of Closed Valve (HVDCV) =     0.51210E+03

   5)    114    0.0000  100.0000  100.0000    0.10000E+21   2   9   4    0.7854   0.01000 512.09998
 Corrected resistance coefficient at t=0 based on upstream area =     0.10000E+21

    ** Table of % valve closing time versus % valve closed area.

    Array of % valve closing time.

   0.000   2.510   5.610 100.000

    Array of % valve closed area.

 100.000 100.000 100.000 100.000

    ** Table of % Valve Closed Area Vs Resistance coefficient

    Array of % valve closed area.

   0.000  50.000  90.000  92.500  95.300  97.500  99.000  99.700
 100.000

    Array of valve resistances.

 0.10000E-01 0.20000E+04 0.40000E+04 0.70930E+04 0.18062E+05 0.20357E+06 0.15960E+07 0.49259E+08
 0.10000E+21

     Corrected resistance coefficients based on area of upstream pipe.
 0.10000E-01 0.20000E+04 0.40000E+04 0.70930E+04 0.18062E+05 0.20357E+06 0.15960E+07 0.49259E+08
 0.10000E+21
Data for Valve no.  6
This Valve is at the end of Pipe Link = 121
Time at which this Valve starts to close (TVsc) =   0.000s
    Valve closure time (TVClose) =  100.000s
    Valve % closed area @ time zero (PVCt0)=  100.00  sqft
    Valve Resistance Coeff. at  time zero (Zt0) =    0.10000E+21
    Valve Closure Type/Option (IVCop) =   2
No. of Entries in % Closed Area Vs Valve Flow Resistance Table (NEPCvk)=   9
No. of Entries in % Closed Time Vs % Closed Area(NEPCtA)=   4
```

```
    Full open Valve Throat Area (AVFO) =     0.78540E+00sqft
    Valve Full open Resistance Coeff.(VkFO) =     0.10000E-01
    Head Downstream of Closed Valve (HVDCV) =     0.51210E+03

   6)    121    0.0000  100.0000  100.0000    0.10000E+21   2   9   4    0.7854   0.01000 512.09998
 Corrected resistance coefficient at t=0 based on upstream area =     0.10000E+21

    ** Table of % valve closing time versus % valve closed area.

    Array of % valve closing time.

   0.000  21.930  27.130 100.000

    Array of % valve closed area.

 100.000 100.000 100.000 100.000

    ** Table of % Valve Closed Area Vs Resistance coefficient

    Array of % valve closed area.

   0.000  50.000  90.000  92.500  95.300  97.500  99.000  99.700
 100.000

    Array of valve resistances.

 0.10000E-01 0.20000E+04 0.40000E+04 0.70930E+04 0.18062E+05 0.20357E+06 0.15960E+07 0.49259E+08
 0.10000E+21

     Corrected resistance coefficients based on area of upstream pipe.
 0.10000E-01 0.20000E+04 0.40000E+04 0.70930E+04 0.18062E+05 0.20357E+06 0.15960E+07 0.49259E+08
 0.10000E+21
Data for Valve no.  7
This Valve is at the end of Pipe Link = 126
Time at which this Valve starts to close (TVsc) =   0.000s
    Valve closure time (TVClose) =  100.000s
    Valve % closed area @ time zero (PVCt0)=  100.00  sqft
    Valve Resistance Coeff. at  time zero (Zt0) =    0.10000E+21
    Valve Closure Type/Option (IVCop) =   2
No. of Entries in % Closed Area Vs Valve Flow Resistance Table (NEPCvk)=   9
No. of Entries in % Closed Time Vs % Closed Area(NEPCtA)=   3
    Full open Valve Throat Area (AVFO) =     0.14103E-01sqft
    Valve Full open Resistance Coeff.(VkFO) =     0.10000E-01
    Head Downstream of Closed Valve (HVDCV) =     0.48210E+03

   7)    126    0.0000  100.0000  100.0000    0.10000E+21   2   9   3    0.0141   0.01000 482.10001
 Corrected resistance coefficient at t=0 based on upstream area =     0.10000E+21

    ** Table of % valve closing time versus % valve closed area.

    Array of % valve closing time.

   0.000   0.010 100.000

    Array of % valve closed area.

 100.000 100.000 100.000

    ** Table of % Valve Closed Area Vs Resistance coefficient

    Array of % valve closed area.

   0.000  50.000  90.000  92.500  95.300  97.500  99.000  99.700
 100.000

    Array of valve resistances.

 0.10000E-01 0.20000E+04 0.40000E+04 0.70930E+04 0.18062E+05 0.20357E+06 0.15960E+07 0.49259E+08
 0.10000E+21

     Corrected resistance coefficients based on area of upstream pipe.
 0.10000E-01 0.20000E+04 0.40000E+04 0.70930E+04 0.18062E+05 0.20357E+06 0.15960E+07 0.49259E+08
 0.10000E+21
Data for Valve no.  8
```

```
This Valve is at the end of Pipe Link = 415
Time at which this Valve starts to close (TVsc) =   0.000s
    Valve closure time (TVClose) =  100.000s
    Valve % closed area @ time zero (PVCt0)=  100.00  sqft
    Valve Resistance Coeff. at  time zero (Zt0) =    0.10000E+21
    Valve Closure Type/Option (IVCop) =   2
No. of Entries in % Closed Area Vs Valve Flow Resistance Table (NEPCvk)=  16
No. of Entries in % Closed Time Vs % Closed Area(NEPCtA)=   3
    Full open Valve Throat Area (AVFO) =     0.20030E+00sqft
    Valve Full open Resistance Coeff.(VkFO) =     0.17900E+01
    Head Downstream of Closed Valve (HVDCV) =     0.19400E+03

   8)    415    0.0000  100.0000  100.0000    0.10000E+21   2  16   3    0.2003   1.79000 194.00000
 Corrected resistance coefficient at t=0 based on upstream area =     0.10000E+21

    ** Table of % valve closing time versus % valve closed area.

    Array of % valve closing time.

   0.000   0.100 100.000

    Array of % valve closed area.

 100.000 100.000 100.000

    ** Table of % Valve Closed Area Vs Resistance coefficient

    Array of % valve closed area.

   0.000  11.100  16.200  33.300  44.400  55.500  66.600  77.700
  88.800  90.000  92.500  95.300  97.500  99.000  99.700 100.000

    Array of valve resistances.

 0.10400E+02 0.11000E+02 0.12000E+02 0.20000E+02 0.25000E+02 0.40000E+02 0.80000E+02 0.48000E+03
 0.27590E+04 0.39900E+04 0.70930E+04 0.18062E+05 0.20357E+06 0.15960E+07 0.49259E+08 0.10000E+21

     Corrected resistance coefficients based on area of upstream pipe.
 0.10400E+02 0.11000E+02 0.12000E+02 0.20000E+02 0.25000E+02 0.40000E+02 0.80000E+02 0.48000E+03
 0.27590E+04 0.39900E+04 0.70930E+04 0.18062E+05 0.20357E+06 0.15960E+07 0.49259E+08 0.10000E+21
Data for Valve no.  9
This Valve is at the end of Pipe Link = 439
Time at which this Valve starts to close (TVsc) =   0.000s
    Valve closure time (TVClose) =  100.000s
    Valve % closed area @ time zero (PVCt0)=  100.00  sqft
    Valve Resistance Coeff. at  time zero (Zt0) =    0.10000E+21
    Valve Closure Type/Option (IVCop) =   2
No. of Entries in % Closed Area Vs Valve Flow Resistance Table (NEPCvk)=  16
No. of Entries in % Closed Time Vs % Closed Area(NEPCtA)=   3
    Full open Valve Throat Area (AVFO) =     0.20030E+00sqft
    Valve Full open Resistance Coeff.(VkFO) =     0.17900E+01
    Head Downstream of Closed Valve (HVDCV) =     0.14700E+03

   9)    439    0.0000  100.0000  100.0000    0.10000E+21   2  16   3    0.2003   1.79000 147.00000
 Corrected resistance coefficient at t=0 based on upstream area =     0.10000E+21

    ** Table of % valve closing time versus % valve closed area.

    Array of % valve closing time.

   0.000   0.100 100.000

    Array of % valve closed area.

 100.000 100.000 100.000

    ** Table of % Valve Closed Area Vs Resistance coefficient

    Array of % valve closed area.

   0.000  11.100  16.200  33.300  44.400  55.500  66.600  77.700
  88.800  90.000  92.500  95.300  97.500  99.000  99.700 100.000

    Array of valve resistances.
```

```
 0.10400E+02 0.11000E+02 0.12000E+02 0.20000E+02 0.25000E+02 0.40000E+02 0.80000E+02 0.48000E+03
 0.27590E+04 0.39900E+04 0.70930E+04 0.18062E+05 0.20357E+06 0.15960E+07 0.49259E+08 0.10000E+21

     Corrected resistance coefficients based on area of upstream pipe.
 0.10400E+02 0.11000E+02 0.12000E+02 0.20000E+02 0.25000E+02 0.40000E+02 0.80000E+02 0.48000E+03
 0.27590E+04 0.39900E+04 0.70930E+04 0.18062E+05 0.20357E+06 0.15960E+07 0.49259E+08 0.10000E+21
Data for Valve no. 10
This Valve is at the end of Pipe Link = 447
Time at which this Valve starts to close (TVsc) =   0.000s
    Valve closure time (TVClose) =  100.000s
    Valve % closed area @ time zero (PVCt0)=  100.00  sqft
    Valve Resistance Coeff. at  time zero (Zt0) =    0.10000E+21
    Valve Closure Type/Option (IVCop) =   2
No. of Entries in % Closed Area Vs Valve Flow Resistance Table (NEPCvk)=  16
No. of Entries in % Closed Time Vs % Closed Area(NEPCtA)=   3
    Full open Valve Throat Area (AVFO) =     0.20030E+00sqft
    Valve Full open Resistance Coeff.(VkFO) =     0.99000E+00
    Head Downstream of Closed Valve (HVDCV) =     0.14700E+03

  10)    447    0.0000  100.0000  100.0000    0.10000E+21   2  16   3    0.2003   0.99000 147.00000
 Corrected resistance coefficient at t=0 based on upstream area =     0.10000E+21

    ** Table of % valve closing time versus % valve closed area.

    Array of % valve closing time.

   0.000   0.010 100.000

    Array of % valve closed area.

 100.000   0.000   0.000

    ** Table of % Valve Closed Area Vs Resistance coefficient

    Array of % valve closed area.

   0.000  11.100  16.200  33.300  44.400  55.500  66.600  77.700
  88.800  90.000  92.500  95.300  97.500  99.000  99.700 100.000

    Array of valve resistances.

 0.10400E+02 0.11000E+02 0.12000E+02 0.20000E+02 0.25000E+02 0.40000E+02 0.80000E+02 0.48000E+03
 0.27590E+04 0.39900E+04 0.70930E+04 0.18062E+05 0.20357E+06 0.15960E+07 0.49259E+08 0.10000E+21

     Corrected resistance coefficients based on area of upstream pipe.
 0.10400E+02 0.11000E+02 0.12000E+02 0.20000E+02 0.25000E+02 0.40000E+02 0.80000E+02 0.48000E+03
 0.27590E+04 0.39900E+04 0.70930E+04 0.18062E+05 0.20357E+06 0.15960E+07 0.49259E+08 0.10000E+21
Data for Valve no. 11
This Valve is at the end of Pipe Link = 452
Time at which this Valve starts to close (TVsc) =   0.000s
    Valve closure time (TVClose) =  100.000s
    Valve % closed area @ time zero (PVCt0)=  100.00  sqft
    Valve Resistance Coeff. at  time zero (Zt0) =    0.10000E+21
    Valve Closure Type/Option (IVCop) =   2
No. of Entries in % Closed Area Vs Valve Flow Resistance Table (NEPCvk)=  16
No. of Entries in % Closed Time Vs % Closed Area(NEPCtA)=   3
    Full open Valve Throat Area (AVFO) =     0.88668E-01sqft
    Valve Full open Resistance Coeff.(VkFO) =     0.17850E+01
    Head Downstream of Closed Valve (HVDCV) =     0.17500E+03

  11)    452    0.0000  100.0000  100.0000    0.10000E+21   2  16   3    0.0887   1.78500 175.00000
 Corrected resistance coefficient at t=0 based on upstream area =     0.10000E+21

    ** Table of % valve closing time versus % valve closed area.

    Array of % valve closing time.

   0.000   0.010 100.000

    Array of % valve closed area.

 100.000 100.000 100.000
```

```
    ** Table of % Valve Closed Area Vs Resistance coefficient

    Array of % valve closed area.

   0.000  11.100  16.200  33.300  44.400  55.500  66.600  77.700
  88.800  90.000  92.500  95.300  97.500  99.000  99.700 100.000

    Array of valve resistances.

 0.10400E+02 0.11000E+02 0.12000E+02 0.20000E+02 0.25000E+02 0.40000E+02 0.80000E+02 0.48000E+03
 0.27590E+04 0.39900E+04 0.70930E+04 0.18062E+05 0.20357E+06 0.15960E+07 0.49259E+08 0.10000E+21

     Corrected resistance coefficients based on area of upstream pipe.
 0.10400E+02 0.11000E+02 0.12000E+02 0.20000E+02 0.25000E+02 0.40000E+02 0.80000E+02 0.48000E+03
 0.27590E+04 0.39900E+04 0.70930E+04 0.18062E+05 0.20357E+06 0.15960E+07 0.49259E+08 0.10000E+21
Data for Valve no. 12
This Valve is at the end of Pipe Link = 455
Time at which this Valve starts to close (TVsc) =   0.000s
    Valve closure time (TVClose) =  100.000s
    Valve % closed area @ time zero (PVCt0)=  100.00  sqft
    Valve Resistance Coeff. at  time zero (Zt0) =    0.10000E+21
    Valve Closure Type/Option (IVCop) =   2
No. of Entries in % Closed Area Vs Valve Flow Resistance Table (NEPCvk)=  16
No. of Entries in % Closed Time Vs % Closed Area(NEPCtA)=   3
    Full open Valve Throat Area (AVFO) =     0.34732E+00sqft
    Valve Full open Resistance Coeff.(VkFO) =     0.69500E+00
    Head Downstream of Closed Valve (HVDCV) =     0.13750E+03

  12)    455    0.0000  100.0000  100.0000    0.10000E+21   2  16   3    0.3473   0.69500 137.50000
 Corrected resistance coefficient at t=0 based on upstream area =     0.10000E+21

    ** Table of % valve closing time versus % valve closed area.

    Array of % valve closing time.

   0.000   0.010 100.000

    Array of % valve closed area.

 100.000 100.000 100.000

    ** Table of % Valve Closed Area Vs Resistance coefficient

    Array of % valve closed area.

   0.000  11.100  16.200  33.300  44.400  55.500  66.600  77.700
  88.800  90.000  92.500  95.300  97.500  99.000  99.700 100.000

    Array of valve resistances.

 0.10400E+02 0.11000E+02 0.12000E+02 0.20000E+02 0.25000E+02 0.40000E+02 0.80000E+02 0.48000E+03
 0.27590E+04 0.39900E+04 0.70930E+04 0.18062E+05 0.20357E+06 0.15960E+07 0.49259E+08 0.10000E+21

     Corrected resistance coefficients based on area of upstream pipe.
 0.10400E+02 0.11000E+02 0.12000E+02 0.20000E+02 0.25000E+02 0.40000E+02 0.80000E+02 0.48000E+03
 0.27590E+04 0.39900E+04 0.70930E+04 0.18062E+05 0.20357E+06 0.15960E+07 0.49259E+08 0.10000E+21
Data for Valve no. 13
This Valve is at the end of Pipe Link = 459
Time at which this Valve starts to close (TVsc) =   0.000s
    Valve closure time (TVClose) =  100.000s
    Valve % closed area @ time zero (PVCt0)=  100.00  sqft
    Valve Resistance Coeff. at  time zero (Zt0) =    0.10000E+21
    Valve Closure Type/Option (IVCop) =   2
No. of Entries in % Closed Area Vs Valve Flow Resistance Table (NEPCvk)=   9
No. of Entries in % Closed Time Vs % Closed Area(NEPCtA)=   3
    Full open Valve Throat Area (AVFO) =     0.88668E-01sqft
    Valve Full open Resistance Coeff.(VkFO) =     0.10000E-01
    Head Downstream of Closed Valve (HVDCV) =     0.96800E+02

  13)    459    0.0000  100.0000  100.0000    0.10000E+21   2   9   3    0.0887   0.01000  96.80000
 Corrected resistance coefficient at t=0 based on upstream area =     0.10000E+21

    ** Table of % valve closing time versus % valve closed area.
```

```
    Array of % valve closing time.

   0.000   1.000 100.000

    Array of % valve closed area.

 100.000 100.000 100.000

    ** Table of % Valve Closed Area Vs Resistance coefficient

    Array of % valve closed area.

   0.000  50.000  90.000  92.500  95.300  97.500  99.000  99.700
 100.000

    Array of valve resistances.

 0.10000E-01 0.20000E+04 0.40000E+04 0.70930E+04 0.18062E+05 0.20357E+06 0.15960E+07 0.49259E+08
 0.10000E+21

     Corrected resistance coefficients based on area of upstream pipe.
 0.10000E-01 0.20000E+04 0.40000E+04 0.70930E+04 0.18062E+05 0.20357E+06 0.15960E+07 0.49259E+08
 0.10000E+21
Data for Valve no. 14
This Valve is at the end of Pipe Link = 467
Time at which this Valve starts to close (TVsc) =   0.000s
    Valve closure time (TVClose) =  100.000s
    Valve % closed area @ time zero (PVCt0)=  100.00  sqft
    Valve Resistance Coeff. at  time zero (Zt0) =    0.10000E+21
    Valve Closure Type/Option (IVCop) =   2
No. of Entries in % Closed Area Vs Valve Flow Resistance Table (NEPCvk)=   9
No. of Entries in % Closed Time Vs % Closed Area(NEPCtA)=   3
    Full open Valve Throat Area (AVFO) =     0.88668E-01sqft
    Valve Full open Resistance Coeff.(VkFO) =     0.10000E-01
    Head Downstream of Closed Valve (HVDCV) =     0.12800E+03

  14)    467    0.0000  100.0000  100.0000    0.10000E+21   2   9   3    0.0887   0.01000 128.00000
 Corrected resistance coefficient at t=0 based on upstream area =     0.10000E+21

    ** Table of % valve closing time versus % valve closed area.

    Array of % valve closing time.

   0.000   1.000 100.000

    Array of % valve closed area.

 100.000 100.000 100.000

    ** Table of % Valve Closed Area Vs Resistance coefficient

    Array of % valve closed area.

   0.000  50.000  90.000  92.500  95.300  97.500  99.000  99.700
 100.000

    Array of valve resistances.

 0.10000E-01 0.20000E+04 0.40000E+04 0.70930E+04 0.18062E+05 0.20357E+06 0.15960E+07 0.49259E+08
 0.10000E+21

     Corrected resistance coefficients based on area of upstream pipe.
 0.10000E-01 0.20000E+04 0.40000E+04 0.70930E+04 0.18062E+05 0.20357E+06 0.15960E+07 0.49259E+08
 0.10000E+21
Data for Valve no. 15
This Valve is at the end of Pipe Link = 483
Time at which this Valve starts to close (TVsc) =   0.000s
    Valve closure time (TVClose) =  100.000s
    Valve % closed area @ time zero (PVCt0)=  100.00  sqft
    Valve Resistance Coeff. at  time zero (Zt0) =    0.10000E+21
    Valve Closure Type/Option (IVCop) =   2
No. of Entries in % Closed Area Vs Valve Flow Resistance Table (NEPCvk)=  16
No. of Entries in % Closed Time Vs % Closed Area(NEPCtA)=   4
    Full open Valve Throat Area (AVFO) =     0.20030E+00sqft
```

```
   Valve Full open Resistance Coeff.(VkFO) =     0.99000E+00
   Head Downstream of Closed Valve (HVDCV) =     0.10500E+03

 15)    483    0.0000  100.0000  100.0000    0.10000E+21   2  16   4    0.2003   0.99000 105.00000
Corrected resistance coefficient at t=0 based on upstream area =     0.10000E+21

   ** Table of % valve closing time versus % valve closed area.

   Array of % valve closing time.

  0.000   0.100   0.110 100.000

   Array of % valve closed area.

100.000 100.000 100.000 100.000

   ** Table of % Valve Closed Area Vs Resistance coefficient

   Array of % valve closed area.

  0.000  11.100  16.200  33.300  44.400  55.500  66.600  77.700
 88.800  90.000  92.500  95.300  97.500  99.000  99.700 100.000

   Array of valve resistances.

0.10400E+02 0.11000E+02 0.12000E+02 0.20000E+02 0.25000E+02 0.40000E+02 0.80000E+02 0.48000E+03
0.27590E+04 0.39900E+04 0.70930E+04 0.18062E+05 0.20357E+06 0.15960E+07 0.49259E+08 0.10000E+21

    Corrected resistance coefficients based on area of upstream pipe.
0.10400E+02 0.11000E+02 0.12000E+02 0.20000E+02 0.25000E+02 0.40000E+02 0.80000E+02 0.48000E+03
0.27590E+04 0.39900E+04 0.70930E+04 0.18062E+05 0.20357E+06 0.15960E+07 0.49259E+08 0.10000E+21

********** End of valve data **********


** Input Data for Branch with two Exit Pipes **:
Number of Branches with 2 Exit Pipes =  98.
Links Ending With Branch (2 Exit Pipes) Boundary Device:
   7   8  12  28  29  40  46  54  68  70  84  87  92 109 119
 135 137 139 141 143 144 145 150 152 154 155 156 158 160 166
 169 170 172 182 186 187 199 204 206 208 212 218 219 239 243
 265 268 270 274 275 280 283 286 288 296 297 298 301 310 311
 319 320 324 328 331 337 338 339 340 345 346 354 361 365 366
 370 374 375 380 384 385 389 392 395 399 402 405 414 423 426
 435 436 437 441 442 454 472 473

Sequence No.   Link Ending in Branch   First Exit Pipe          Second Exit Pipe
         1)          7                     8                      87
         2)          8                    86                       9
         3)         12                    13                     230
         4)         28                   181                      29
         5)         29                    30                     130
         6)         40                    41                     102
         7)         46                   162                      47
         8)         54                    55                     195
         9)         68                   229                      69
        10)         70                   261                      71
        11)         84                   101                      85
        12)         87                    88                      92
        13)         92                    93                     100
        14)        109                   110                     118
        15)        119                   120                     124
        16)        135                   136                     389
        17)        137                   138                     379
        18)        139                   140                     408
        19)        141                   142                     168
        20)        143                   144                     414
        21)        144                   145                     374
        22)        145                   146                     365
        23)        150                   151                     410
        24)        152                   153                     360
        25)        154                   155                     419
        26)        155                   156                     392
        27)        156                   157                     395
```

| | | | |
|---|---|---|---|
| 28) | 158 | 159 | 399 |
| 29) | 160 | 161 | 163 |
| 30) | 166 | 167 | 435 |
| 31) | 169 | 170 | 182 |
| 32) | 170 | 171 | 186 |
| 33) | 172 | 173 | 192 |
| 34) | 182 | 183 | 185 |
| 35) | 186 | 187 | 190 |
| 36) | 187 | 188 | 191 |
| 37) | 199 | 200 | 467 |
| 38) | 204 | 205 | 454 |
| 39) | 206 | 207 | 279 |
| 40) | 208 | 209 | 481 |
| 41) | 212 | 213 | 310 |
| 42) | 218 | 219 | 459 |
| 43) | 219 | 220 | 293 |
| 44) | 239 | 240 | 292 |
| 45) | 243 | 244 | 262 |
| 46) | 265 | 266 | 274 |
| 47) | 268 | 269 | 336 |
| 48) | 270 | 271 | 352 |
| 49) | 274 | 275 | 327 |
| 50) | 275 | 276 | 278 |
| 51) | 280 | 281 | 350 |
| 52) | 283 | 284 | 318 |
| 53) | 286 | 287 | 431 |
| 54) | 288 | 289 | 291 |
| 55) | 296 | 297 | 307 |
| 56) | 297 | 298 | 300 |
| 57) | 298 | 299 | 301 |
| 58) | 301 | 302 | 305 |
| 59) | 310 | 311 | 315 |
| 60) | 311 | 312 | 316 |
| 61) | 319 | 320 | 323 |
| 62) | 320 | 321 | 324 |
| 63) | 324 | 325 | 326 |
| 64) | 328 | 329 | 331 |
| 65) | 331 | 332 | 334 |
| 66) | 337 | 338 | 345 |
| 67) | 338 | 339 | 343 |
| 68) | 339 | 340 | 344 |
| 69) | 340 | 341 | 342 |
| 70) | 345 | 346 | 349 |
| 71) | 346 | 347 | 348 |
| 72) | 354 | 355 | 358 |
| 73) | 361 | 362 | 364 |
| 74) | 365 | 366 | 368 |
| 75) | 366 | 367 | 369 |
| 76) | 370 | 371 | 373 |
| 77) | 374 | 375 | 377 |
| 78) | 375 | 376 | 378 |
| 79) | 380 | 381 | 384 |
| 80) | 384 | 385 | 387 |
| 81) | 385 | 386 | 388 |
| 82) | 389 | 390 | 391 |
| 83) | 392 | 393 | 394 |
| 84) | 395 | 396 | 398 |
| 85) | 399 | 400 | 402 |
| 86) | 402 | 403 | 405 |
| 87) | 405 | 406 | 407 |
| 88) | 414 | 415 | 485 |
| 89) | 423 | 424 | 426 |
| 90) | 426 | 427 | 429 |
| 91) | 435 | 436 | 446 |
| 92) | 436 | 437 | 451 |
| 93) | 437 | 438 | 441 |
| 94) | 441 | 442 | 445 |
| 95) | 442 | 443 | 444 |
| 96) | 454 | 455 | 457 |
| 97) | 472 | 473 | 479 |
| 98) | 473 | 474 | 478 |

********End of 2 Exit Pipe Branch Data ********

```
** Check Valve Data (LEBD = 13)
Number of Check Valves =   3.
Links Ending With Check Valve Boundary Condition:
   5 438 446
   1).  Link No.   5, Check Valve Type   2
ZCVin, QCVin, ACVk, TCVoc   0.65000E+00 0.10000E-01 0.78500E+00 0.00000E+00
   2).  Link No. 438, Check Valve Type   2
ZCVin, QCVin, ACVk, TCVoc   0.75000E+00 0.10000E-01 0.20030E+00 0.00000E+00
   3).  Link No. 446, Check Valve Type   2
ZCVin, QCVin, ACVk, TCVoc   0.75000E+00 0.10000E-01 0.20030E+00 0.00000E+00

********** End of Check Valve Data **********



***Input Data for Vacuum Breaker Device
Number of Vacuum Breakers =   9.
Links Ending With Vacuum Breaker Boundary Condition:
 308 334 362 371 382 396 410 433 495
  Data for Vacuum Breaker Device No. =   1
Link = 308:VB Number=   1:VBdskA=     0.00136
AF=     0.00060:CVFO=     1.50000:GAM=     0.00000

   1)   308 0.13600E-02 0.60000E-03 0.15000E+01 0.00000E+00

VBdskMOI=     0.00000:VBspngK=     1.00000
VBlaL=     0.00000:VBdiskM=     0.08300

     0.00000     1.00000     0.00000     0.08300

VBsetP=     0.21000:VBPamb=    14.70000
VBdskmX=     0.02000:VBTamb=    68.00000

     0.21000    14.70000     0.02000    68.00000

VBairGc=    53.30000 IVBTYP=     0.00000 VBairPSnc=     0.10200

    53.30000   2     0.10200

  Data for Vacuum Breaker Device No. =   2
Link = 410:VB Number=   2:VBdskA=     0.00136
AF=     0.00060:CVFO=     1.50000:GAM=     0.00000

   2)   410 0.13600E-02 0.60000E-03 0.15000E+01 0.00000E+00

VBdskMOI=     0.00000:VBspngK=     1.00000
VBlaL=     0.00000:VBdiskM=     0.08300

     0.00000     1.00000     0.00000     0.08300

VBsetP=     0.21000:VBPamb=    14.70000
VBdskmX=     0.02000:VBTamb=    68.00000

     0.21000    14.70000     0.02000    68.00000

VBairGc=    53.30000 IVBTYP=     0.00000 VBairPSnc=     0.10200

    53.30000   2     0.10200

  Data for Vacuum Breaker Device No. =   3
Link = 433:VB Number=   3:VBdskA=     0.00136
AF=     0.00060:CVFO=     1.50000:GAM=     0.00000

   3)   433 0.13600E-02 0.60000E-03 0.15000E+01 0.00000E+00

VBdskMOI=     0.00000:VBspngK=     1.00000
VBlaL=     0.00000:VBdiskM=     0.08300

     0.00000     1.00000     0.00000     0.08300

VBsetP=     0.21000:VBPamb=    14.70000
VBdskmX=     0.02000:VBTamb=    68.00000

     0.21000    14.70000     0.02000    68.00000
```

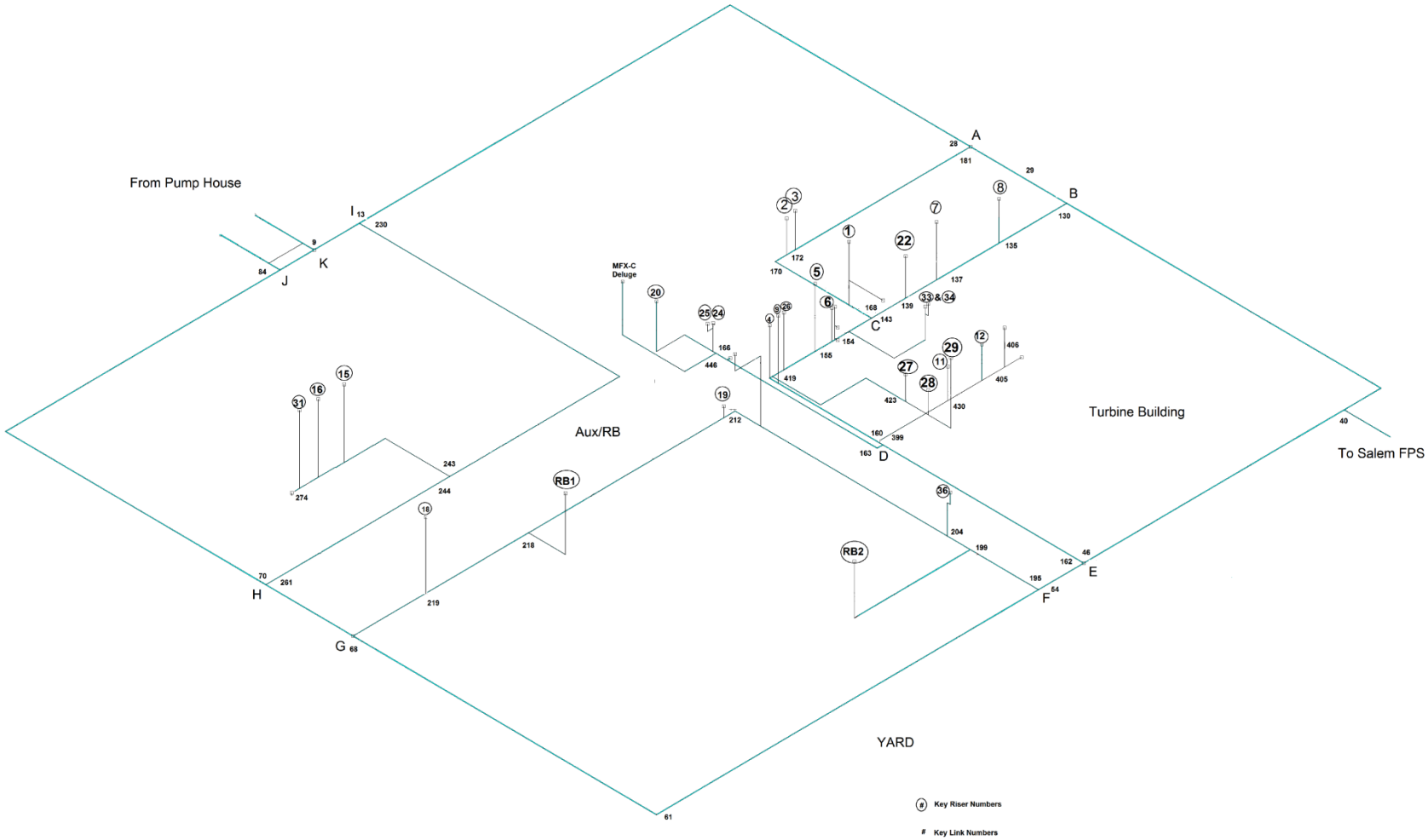
```
VBairGc=    53.30000 IVBTYP=     0.00000 VBairPSnc=     0.10200

    53.30000   2     0.10200

  Data for Vacuum Breaker Device No. =   4
Link = 362:VB Number=   4:VBdskA=     0.00136
AF=     0.00060:CVFO=     1.50000:GAM=     0.00000

   4)   362 0.13600E-02 0.60000E-03 0.15000E+01 0.00000E+00

VBdskMOI=     0.00000:VBspngK=     1.00000
VBlaL=     0.00000:VBdiskM=     0.08300

     0.00000     1.00000     0.00000     0.08300

VBsetP=     0.21000:VBPamb=    14.70000
VBdskmX=     0.02000:VBTamb=    68.00000

     0.21000    14.70000     0.02000    68.00000

VBairGc=    53.30000 IVBTYP=     0.00000 VBairPSnc=     0.10200

    53.30000   2     0.10200

  Data for Vacuum Breaker Device No. =   5
Link = 396:VB Number=   5:VBdskA=     0.00136
AF=     0.00060:CVFO=     1.50000:GAM=     0.00000

   5)   396 0.13600E-02 0.60000E-03 0.15000E+01 0.00000E+00

VBdskMOI=     0.00000:VBspngK=     1.00000
VBlaL=     0.00000:VBdiskM=     0.08300

     0.00000     1.00000     0.00000     0.08300

VBsetP=     0.21000:VBPamb=    14.70000
VBdskmX=     0.02000:VBTamb=    68.00000

     0.21000    14.70000     0.02000    68.00000

VBairGc=    53.30000 IVBTYP=     0.00000 VBairPSnc=     0.10200

    53.30000   2     0.10200

  Data for Vacuum Breaker Device No. =   6
Link = 495:VB Number=   6:VBdskA=     0.00136
AF=     0.00060:CVFO=     1.50000:GAM=     0.00000

   6)   495 0.13600E-02 0.60000E-03 0.15000E+01 0.00000E+00

VBdskMOI=     0.00000:VBspngK=     1.00000
VBlaL=     0.00000:VBdiskM=     0.08300

     0.00000     1.00000     0.00000     0.08300

VBsetP=     0.21000:VBPamb=    14.70000
VBdskmX=     0.02000:VBTamb=    68.00000

     0.21000    14.70000     0.02000    68.00000

VBairGc=    53.30000 IVBTYP=     0.00000 VBairPSnc=     0.10200

    53.30000   2     0.10200

  Data for Vacuum Breaker Device No. =   7
Link = 334:VB Number=   7:VBdskA=     0.00136
AF=     0.00060:CVFO=     1.50000:GAM=     0.00000

   7)   334 0.13600E-02 0.60000E-03 0.15000E+01 0.00000E+00

VBdskMOI=     0.00000:VBspngK=     1.00000
VBlaL=     0.00000:VBdiskM=     0.08300
```

```
     0.00000     1.00000     0.00000     0.08300

VBsetP=     0.21000:VBPamb=    14.70000
VBdskmX=     0.02000:VBTamb=    68.00000

     0.21000    14.70000     0.02000    68.00000

VBairGc=    53.30000 IVBTYP=     0.00000 VBairPSnc=     0.10200

    53.30000   2     0.10200

  Data for Vacuum Breaker Device No. =   8
Link = 371:VB Number=   8:VBdskA=     0.00136
AF=     0.00060:CVFO=     1.50000:GAM=     0.00000

   8)   371 0.13600E-02 0.60000E-03 0.15000E+01 0.00000E+00

VBdskMOI=     0.00000:VBspngK=     1.00000
VBlaL=     0.00000:VBdiskM=     0.08300

     0.00000     1.00000     0.00000     0.08300

VBsetP=     0.21000:VBPamb=    14.70000
VBdskmX=     0.02000:VBTamb=    68.00000

     0.21000    14.70000     0.02000    68.00000

VBairGc=    53.30000 IVBTYP=     0.00000 VBairPSnc=     0.10200

    53.30000   2     0.10200

  Data for Vacuum Breaker Device No. =   9
Link = 382:VB Number=   9:VBdskA=     0.00136
AF=     0.00060:CVFO=     1.50000:GAM=     0.00000

   9)   382 0.13600E-02 0.60000E-03 0.15000E+01 0.00000E+00

VBdskMOI=     0.00000:VBspngK=     1.00000
VBlaL=     0.00000:VBdiskM=     0.08300

     0.00000     1.00000     0.00000     0.08300

VBsetP=     0.21000:VBPamb=    14.70000
VBdskmX=     0.02000:VBTamb=    68.00000

     0.21000    14.70000     0.02000    68.00000

VBairGc=    53.30000 IVBTYP=     0.00000 VBairPSnc=     0.10200

    53.30000   2     0.10200

End of Vacuum Breaker data


                  ***************

**** Plot Data ****
Factor for Multiplying Heads (Calculated in ft) PLHmult =      1.00000
Factor for Multiplying Velocities (Calculated in ft/sec) PLVmult =      1.00000

       Link No.    Node No.

   1)     6           2
   2)    94           2
   3)    97           2
   4)   102           2
   5)   113           2
   6)   120           2
   7)   184          41
   8)   188          46
   9)   194          31
  10)   289          11
  11)   290           7
  12)   291           6
```

```
  13)   292          23
  14)   299          17
  15)   303          11
  16)   304           1
  17)   306          24
  18)   308          26
  19)   314           6
  20)   322          11
  21)   325           5
  22)   332           2
  23)   334           9
  24)   347          11
  25)   351          10
  26)   362           9
  27)   371           2
  28)   376           6
  29)   382          13
  30)   383           3
  31)   396          31
  32)   409           4
  33)   410          17
  34)   412          11
  35)   418           9
  36)   425          21
  37)   428          20
  38)   430          32
  39)   432          20
  40)   433           3
  41)   450          22
  42)   455           2
  43)   465           1
  44)   466           2
  45)   476           4
  46)   477          22
  47)   478           8
  48)   480          11
  49)   483           2
  50)   495           4

No. of plot locations specified = 50


********** End of Plot Data **********

****************************************** Pipe Runs Data ******************************************
Pipe Run Forces calculation option IFRCop =   2
LPIP1(  1)= 410 =LINK NO. --- NPIP1(  1)=   1 =NODE NO. OF THE UPSTREAM END OF PIPERUN NO.  1
LPIP2(  1)= 410 =LINK NO. --- NPIP2(  1)   3 =NODE NO. OF THE DOWNSTREAM END OF PIPERUN NO.  1
  1)        410          1               410          3
LPIP1(  2)= 410 =LINK NO. --- NPIP1(  2)=   3 =NODE NO. OF THE UPSTREAM END OF PIPERUN NO.  2
LPIP2(  2)= 410 =LINK NO. --- NPIP2(  2)   5 =NODE NO. OF THE DOWNSTREAM END OF PIPERUN NO.  2
  2)        410          3               410          5
LPIP1(  3)= 410 =LINK NO. --- NPIP1(  3)=   4 =NODE NO. OF THE UPSTREAM END OF PIPERUN NO.  3
LPIP2(  3)= 410 =LINK NO. --- NPIP2(  3)  18 =NODE NO. OF THE DOWNSTREAM END OF PIPERUN NO.  3
  3)        410          4               410         18
LPIP1(  4)= 410 =LINK NO. --- NPIP1(  4)=  18 =NODE NO. OF THE UPSTREAM END OF PIPERUN NO.  4
LPIP2(  4)= 410 =LINK NO. --- NPIP2(  4)  19 =NODE NO. OF THE DOWNSTREAM END OF PIPERUN NO.  4
  4)        410         18               410         19
LPIP1(  5)= 410 =LINK NO. --- NPIP1(  5)=  18 =NODE NO. OF THE UPSTREAM END OF PIPERUN NO.  5
LPIP2(  5)= 411 =LINK NO. --- NPIP2(  5)   3 =NODE NO. OF THE DOWNSTREAM END OF PIPERUN NO.  5
  5)        410         18               411          3
LPIP1(  6)= 412 =LINK NO. --- NPIP1(  6)=   1 =NODE NO. OF THE UPSTREAM END OF PIPERUN NO.  6
LPIP2(  6)= 412 =LINK NO. --- NPIP2(  6)   2 =NODE NO. OF THE DOWNSTREAM END OF PIPERUN NO.  6
  6)        412          1               412          2
LPIP1(  7)= 412 =LINK NO. --- NPIP1(  7)=   1 =NODE NO. OF THE UPSTREAM END OF PIPERUN NO.  7
LPIP2(  7)= 412 =LINK NO. --- NPIP2(  7)   3 =NODE NO. OF THE DOWNSTREAM END OF PIPERUN NO.  7
  7)        412          1               412          3
LPIP1(  8)= 412 =LINK NO. --- NPIP1(  8)=   3 =NODE NO. OF THE UPSTREAM END OF PIPERUN NO.  8
LPIP2(  8)= 412 =LINK NO. --- NPIP2(  8)   6 =NODE NO. OF THE DOWNSTREAM END OF PIPERUN NO.  8
  8)        412          3               412          6
LPIP1(  9)= 412 =LINK NO. --- NPIP1(  9)=   5 =NODE NO. OF THE UPSTREAM END OF PIPERUN NO.  9
LPIP2(  9)= 412 =LINK NO. --- NPIP2(  9)   6 =NODE NO. OF THE DOWNSTREAM END OF PIPERUN NO.  9
  9)        412          5               412          6
LPIP1( 10)= 412 =LINK NO. --- NPIP1( 10)=   6 =NODE NO. OF THE UPSTREAM END OF PIPERUN NO. 10
```

```
LPIP2( 10)= 412 =LINK NO. --- NPIP2( 10)   7 =NODE NO. OF THE DOWNSTREAM END OF PIPERUN NO. 10
 10)        412          6                412          7
LPIP1( 11)= 412 =LINK NO. --- NPIP1( 11)=   7 =NODE NO. OF THE UPSTREAM END OF PIPERUN NO. 11
LPIP2( 11)= 412 =LINK NO. --- NPIP2( 11)  10 =NODE NO. OF THE DOWNSTREAM END OF PIPERUN NO. 11
 11)        412          7                412         10

No. of pipe run segments specified for forcing function calculations = 11


***********************************End of Pipe Runs Data************************************


**** Print Frequency Data ****
         Begin Time    End Time            Print Frequency
                                          Time Step    Nodes
  1).   0.00000E+00   0.10000E+01            100        1
  2).   0.10000E+01   0.30000E+02            500        1
  3).   0.30000E+02   0.88800E+03           1000        1


End of Input Data Listing
```

## A7 Figures of Hydraulic Model




A.1 Schematic Diagram of the Fire Protection System with Link Numbers

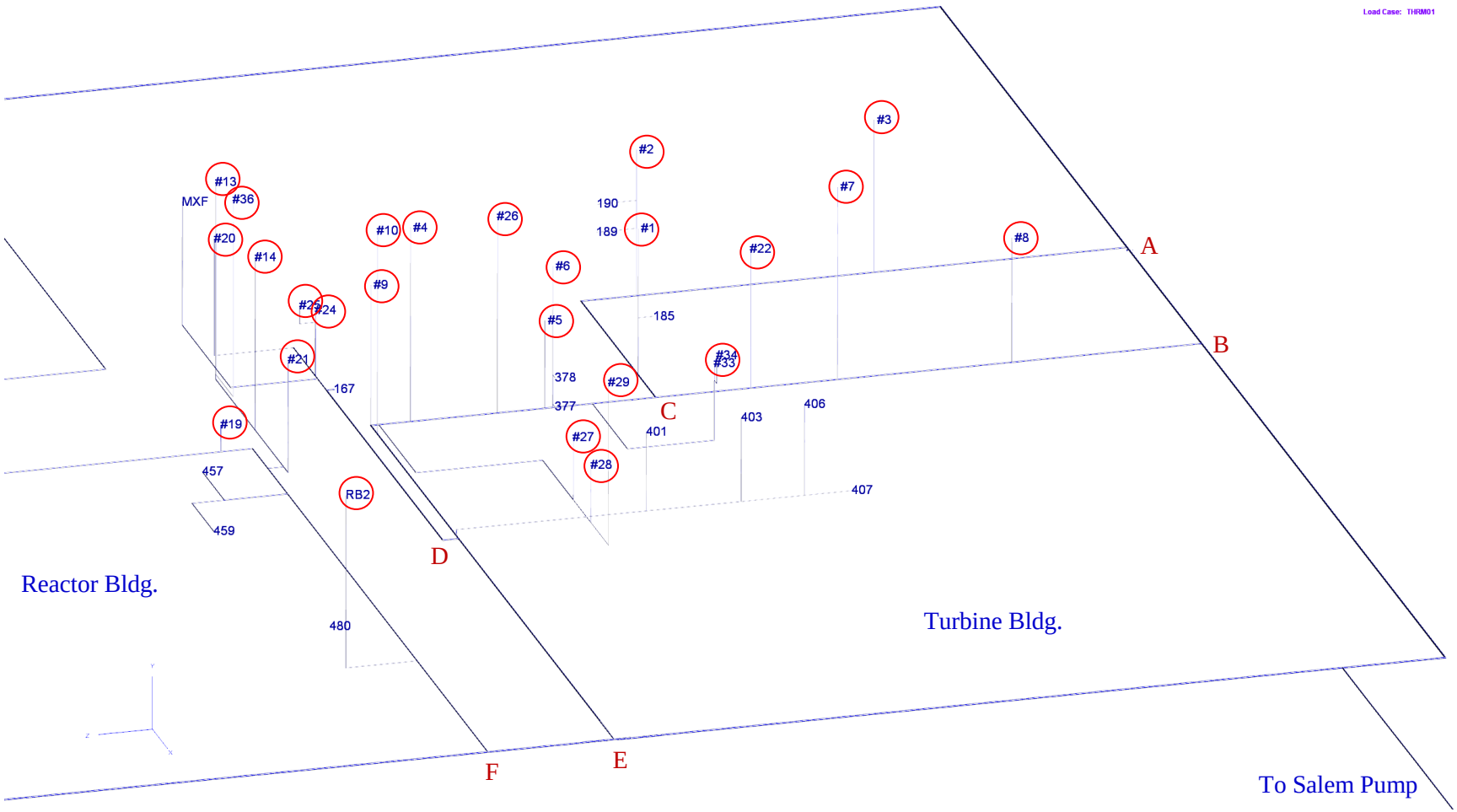



Figure A.2 Schematic Diagram of the FPS in Turbine Bldg. with Riser and Key Link Numbers

## A8 List of Isometric Drawings Used to Draw Schematic Diagram (Figure A.1)

| ISOMETRIC DWG. | REV. # | MISCELLANEOUS DWG. | REV. # |
|---|---|---|---|
| 0-P-KC-01 | 17 | VIKING DWG FP-31 | 4 |
| 0-P-KC-02 SH 1 | 19 | VIKING DWG FP-9 | 4 |
| 0-P-KC-04 | 12 | VIKING DWG FP-51 | 3 |
| 0-P-KC-05 | 13 | VIKING DWG FP-20 | 6 |
| 0-P-KC-06 | 10 | | |
| 0-P-KC-07 | 13 | | |
| 0-P-KC-18 | 4 | P&ID DWG M-22-0 SH 1 | 30 |
| 1-P-KC-01 | 16 | P&ID DWG M-22-0 SH 2 | 33 |
| 1-P-KC-02 | 19 | P&ID DWG M-22-0 SH 3 | 36 |
| 1-P-KC-03 | 16 | P&ID DWG M-22-0 SH 4 | 12 |
| 1-P-KC-05 SH 1 | 23 | P&ID DWG M-22-0 SH 6 | 23 |
| 1-P-KC-05 SH 2 | 0 | P&ID DWG M-22-0 SH 7 | 24 |
| 1-P-KC-06 | 14 | P&ID DWG 20522 2 A8760 SH 4 | 62 |
| 1-P-KC-07 | 15 | | |
| 1-P-KC-08 | 11 | C-0019-0 | 25 |
| 1-P-KC-09 | 6 | C-0055-0 | 22 |
| 1-P-KC-15 | 7 | C-0056-0 | 24 |
| 1-P-KC-16 | 5 | C-0057-0 | 8 |
| 1-P-KC-17 | 6 | C-0059-0 | 33 |
| | | C-0060-0 | 27 |
| 21823 A8881 SH 1 | 15 | C-0061-0 | 21 |
| 21823 A8881 SH 2 | 1 | C-0063-0 | 25 |
| HCGS/SALEM X-TIE SKETCH | | C-0064-0 | 22 |
| | | C-0065-0 | 18 |
| | | C-0079-0 | 11 |
| | | 218723 A8921 SH 2 | 17 |
| | | | |
| | | | |
| | | | |

## A9 References:


A-1. USLAM User Manual Rev. 2, dated February, 2017.

A-2. PSEG Specification No.: D3.22, "Design, Installation, and Test Specification for Fire Protection System for the Hope Creek Generating Station", Revision 7.

A-3. Typical Design Information Transmittal Nos: H-TODI-2015-0023, dated May 19, 2015 and H-TODI-2015-0023 (Addendum 1), dated July 17, 2015.

A-4. Flow of Fluids Through Valves, Fittings, and Pipe, Crane Technical Paper No. 410, Crane Co., Twentieth Printing, 1981.

A-5. Lyon's valve Designer's Handbook, by Jerry L. Lyons, Published by Van Nostrand Reinhold Company, 1982.

A-6. T131, "Pipe Specification Dimension/FP Pipe", dated 08-14-2009.

A-7. Document No. 313235-01, "Hope Creek Diesel Driven Fire Pump Curve", dated 3/28/90.

A-8. Document No. 313234-01, "Hope Creek Motor Driven Fire Pump Curve", dated 3/28/90.

A-9. Specification No. 10855-M-662, Rev. 1, "Technical Specification for Jockey Pump for HCGS".

A-10. Peerless Pump Company, "Salem Fire Pump No. 1 (1FPE12) Pump Curve", dated 2-11-93.

A-11. Peerless Pump Company, "Salem Fire Pump No. 2 (2FPE12) Pump Curve", dated 6-21-93.

A-12. Peerless Pump Company, "Salem Jockey Pump Type J Pump Curve".

A-13. Technical Data, "Viking Deluge Valve Model D-5", dated August 1979 and "Viking Deluge Valve Model E-1", dated March 1984 (Valve friction data).

# APPENDIX B: USLAM Input Data Events Listing

**Contents:**


B1 Case 1 (6-inch Deluge Valve w/HC Electric Pump) with Vacuum Breakers

B2 Case 2 (6-inch Deluge Valve w/HC Diesel Pump) with Vacuum Breakers

B3 Case 3 (6-inch Deluge Valve w/HC Electric & Diesel Pumps) with Vacuum Breakers

B4 Case 4 (8-inch Deluge Valve w/HC Diesel Pump) with Vacuum Breakers

B5 Case 5 (8-inch Deluge Valve w/Salem Pump #1) with Vacuum Breakers

B6 Case 6 (8-inch Deluge Valve w/Salem Pump #2) with Vacuum Breakers

B7 Case 7 (6-inch Deluge Valve in RB w/Salem Pump #1) with Vacuum Breakers

B8 Case 8 (6-inch Deluge Valve in RB w/Salem Pump #2) with Vacuum Breakers

B9 Case 9 (6-inch Deluge Valve in RB w/HC Electric Pump) with Vacuum Breakers

B10 Reactor Building RB1 Pipe Run Segments for Cases 7, 8, and 9

B11 Miscellaneous Pipe Run Segments for all cases

## B1 - Case 1 (6-inch Deluge Valve w/HC Electric Pump) with Vacuum Breakers

```
HCGS FP Case 1: 9 VBs.  Forces in Riser # 26 only
10000
0  0  1  0  1  0
2   2   0.  12.
2   1   0   0
0   1   0  0  0  0  0  1 0 0
1.9  62.4  7.83E-6
1.0  2   13    0    0
       0.0    1000.0    2000.0   2.0E+04   6.0E+04   1.0E+05   3.0E+05   6.0E+05
   1.0E+06   1.5E+06   3.5E+06   1.0E+11   1.0E+33
      0.10     0.061     0.048     0.026     0.021      .019    0.0167    0.0155
    0.0150    0.0147     0.014     0.014     0.014
495.3   3  17  0    0
  -10.00   .000   .557  1.114  1.671  2.228  2.785  3.342
   3.899  4.456  5.013  5.570  6.127  6.684  7.241  8.912
   13.4
   495.3  495.3     494.3     492.3     491.3     488.3     485.3     481.3
   477.3  472.3     466.3     459.3     448.3     436.3     423.3     375.3
   170.3
   1
   1    1.104000     55.00    5.492   4      99.400    94.000     2     0.00000   0   2     0   4000.00       0.00
   2    1.000000     20.00    7.400   4      94.000   105.040     2     0.00000   1   3     0   4000.00       0.00
   3    1.000000     10.00    7.180   4     105.040   105.040     2     0.00000   2   4     0   4000.00       0.00
   4    1.000000     10.00    3.538   2     105.040   104.500     2     0.00000   3   5     0   4000.00       0.00
   5    1.000000      5.00   18.508  13     104.500   104.750     2     0.00000   4   6     0   4000.00       0.00
   6    1.000000     10.00    5.200   4     104.750   110.000     2     0.00000   5   7     0   4000.00       0.00
   7    1.000000     20.00    3.400   3     110.000   105.000     2     0.00000   6   8     0   4000.00       0.00
   8    1.000000    115.00    2.402   3     105.000    96.900     2     0.00000   7  86     0   4000.00       0.00
   9    1.007000      5.00    2.611   4      96.900    96.900     2     0.00000   8  10     0   4000.00       0.00
  10    1.007000     10.00    3.014   4      96.900    96.900     2     0.00000   9  11     0   4000.00       0.00
  11    1.007000     10.00    1.806   4      96.900    96.900     2     0.00000  10  12     0   4000.00       0.00
  12    1.007000     10.00    3.014   3      96.900    96.900     2     0.00000  11  13     0   4000.00       0.00
  13    1.007000    110.00    1.183   4      96.900    96.900     2     0.00000  12  14     0   4000.00       0.00
  14    1.007000    110.00    1.363   4      96.900    95.900     2     0.00000  13  15     0   4000.00       0.00
  15    1.007000     10.00    3.014   4      95.900    95.900     2     0.00000  14  16     0   4000.00       0.00
  16    1.007000     30.00    1.671   4      95.900    95.900     2     0.00000  15  17     0   4000.00       0.00
  17    1.007000     80.00    1.252   4      95.900    95.900     2     0.00000  16  18     0   4000.00       0.00
  18    1.007000     20.00    1.403   4      95.900    95.900     2     0.00000  17  19     0   4000.00       0.00
  19    1.007000    130.00    1.155   4      95.900    95.900     2     0.00000  18  20     0   4000.00       0.00
  20    1.007000    135.00    1.060   4      95.900    95.400     2     0.00000  19  21     0   4000.00       0.00
  21    1.007000     10.00    2.994   4      95.400    93.500     2     0.00000  20  22     0   4000.00       0.00
  22    1.007000     65.00    1.217   4      93.500    93.500     2     0.00000  21  23     0   4000.00       0.00
  23    1.007000      5.00    1.000   4      93.500    93.500     2     0.00000  22  24     0   4000.00       0.00
  24    1.007000     20.00    3.004   4      93.500    97.000     2     0.00000  23  25     0   4000.00       0.00
  25    1.007000    200.00    1.300   4      97.000    97.000     2     0.00000  24  26     0   4000.00       0.00
  26    1.007000     55.00    1.513   4      97.000    97.000     2     0.00000  25  27     0   4000.00       0.00
  27    1.007000     20.00    1.997   4      97.000    93.000     2     0.00000  26  28     0   4000.00       0.00
  28    1.007000    230.00    1.088   3      93.000    93.000     2     0.00000  27 181     0   4000.00       0.00
  29    1.007000     40.00    1.503   3      93.000    93.000     2     0.00000  28  30     0   4000.00       0.00
  30    1.007000    240.00    1.117   4      93.000    94.500     2     0.00000  29  31     0   4000.00       0.00
  31    1.007000     45.00    1.448   4      94.500    94.500     2     0.00000  30  32     0   4000.00       0.00
  32    1.007000     35.00    1.570   4      94.500    91.000     2     0.00000  31  33     0   4000.00       0.00
  33    1.007000    180.00    1.111   4      91.000    96.000     2     0.00000  32  34     0   4000.00       0.00
  34    1.007000     10.00    3.014   4      96.000    96.000     2     0.00000  33  35     0   4000.00       0.00
  35    1.007000      5.00    5.028   4      96.000    96.000     2     0.00000  34  36     0   4000.00       0.00
  36    1.007000      5.00    2.611   4      96.000    96.000     2     0.00000  35  37     0   4000.00       0.00
  37    1.007000     10.00    3.014   4      96.000    96.000     2     0.00000  36  38     0   4000.00       0.00
  38    1.007000     30.00    2.141   4      96.000    96.000     2     0.00000  37  39     0   4000.00       0.00
  39    1.007000     20.00    1.403   4      96.000    96.000     2     0.00000  38  40     0   4000.00       0.00
  40    1.007000     80.00    1.252   3      96.000    96.000     2     0.00000  39  41     0   4000.00       0.00
  41    1.007000     10.00    1.806   4      96.000    96.000     2     0.00000  40  42     0   4000.00       0.00
  42    1.007000     20.00    1.000   4      96.000    96.000     2     0.00000  41  43     0   4000.00       0.00
  43    1.007000     55.00    1.363   4      96.000    97.200     2     0.00000  42  44     0   4000.00       0.00
  44    1.007000      5.00    5.028   4      97.200    97.200     2     0.00000  43  45     0   4000.00       0.00
  45    1.007000    160.00    1.175   4      97.200    96.200     2     0.00000  44  46     0   4000.00       0.00
  46    1.007000     15.00    2.343   3      96.200    96.200     2     0.00000  45 162     0   4000.00       0.00
  47    1.007000      5.00    5.028   4      96.200    96.200     2     0.00000  46  48     0   4000.00       0.00
  48    1.007000     15.00    6.357   4      96.200    97.000     2     0.00000  47  49     0   4000.00       0.00
  49    1.007000     60.00    1.166   4      97.000    97.000     2     0.00000  48  50     0   4000.00       0.00
  50    1.007000     15.00    2.994   4      97.000    94.500     2     0.00000  49  51     0   4000.00       0.00
  51    1.007000      5.00    4.605   4      94.500    97.000     2     0.00000  50  52     0   4000.00       0.00
  52    1.007000     15.00    2.329   4      97.000    94.000     2     0.00000  51  53     0   4000.00       0.00
  53    1.007000     80.00    1.501   4      94.000    96.500     2     0.00000  52  54     0   4000.00       0.00
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| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 54 | 1.007000 | 65.00 | 1.310 | 3 | 96.500 | 96.500 | 2 | 0.00000 | 53 | 55 | 0 | 4000.00 | 0.00 |
| 55 | 1.007000 | 50.00 | 1.481 | 4 | 96.500 | 97.200 | 2 | 0.00000 | 54 | 56 | 0 | 4000.00 | 0.00 |
| 56 | 1.007000 | 25.00 | 1.322 | 4 | 97.200 | 97.200 | 2 | 0.00000 | 55 | 57 | 0 | 4000.00 | 0.00 |
| 57 | 1.007000 | 5.00 | 3.820 | 4 | 97.200 | 97.200 | 2 | 0.00000 | 56 | 58 | 0 | 4000.00 | 0.00 |
| 58 | 1.007000 | 70.00 | 1.288 | 4 | 97.200 | 97.200 | 2 | 0.00000 | 57 | 59 | 0 | 4000.00 | 0.00 |
| 59 | 1.007000 | 10.00 | 1.806 | 4 | 97.200 | 97.200 | 2 | 0.00000 | 58 | 60 | 0 | 4000.00 | 0.00 |
| 60 | 1.007000 | 195.00 | 1.103 | 4 | 97.200 | 97.200 | 2 | 0.00000 | 59 | 61 | 0 | 4000.00 | 0.00 |
| 61 | 1.007000 | 240.00 | 1.159 | 4 | 97.200 | 94.500 | 2 | 0.00000 | 60 | 62 | 0 | 4000.00 | 0.00 |
| 62 | 1.007000 | 215.00 | 1.094 | 4 | 94.500 | 94.500 | 2 | 0.00000 | 61 | 63 | 0 | 4000.00 | 0.00 |
| 63 | 1.007000 | 110.00 | 1.183 | 4 | 94.500 | 94.500 | 2 | 0.00000 | 62 | 64 | 0 | 4000.00 | 0.00 |
| 64 | 1.007000 | 195.00 | 1.103 | 4 | 94.500 | 94.500 | 2 | 0.00000 | 63 | 65 | 0 | 4000.00 | 0.00 |
| 65 | 1.007000 | 5.00 | 5.028 | 4 | 94.500 | 94.500 | 2 | 0.00000 | 64 | 66 | 0 | 4000.00 | 0.00 |
| 66 | 1.007000 | 30.00 | 1.665 | 4 | 94.500 | 95.800 | 2 | 0.00000 | 65 | 67 | 0 | 4000.00 | 0.00 |
| 67 | 1.007000 | 5.00 | 2.611 | 4 | 95.800 | 95.800 | 2 | 0.00000 | 66 | 68 | 0 | 4000.00 | 0.00 |
| 68 | 1.007000 | 25.00 | 1.806 | 3 | 95.800 | 95.800 | 2 | 0.00000 | 67 | 229 | 0 | 4000.00 | 0.00 |
| 69 | 1.007000 | 130.00 | 1.155 | 4 | 95.800 | 95.500 | 2 | 0.00000 | 68 | 70 | 0 | 4000.00 | 0.00 |
| 70 | 1.007000 | 5.00 | 2.611 | 3 | 95.500 | 95.500 | 2 | 0.00000 | 69 | 261 | 0 | 4000.00 | 0.00 |
| 71 | 1.007000 | 5.00 | 5.028 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 70 | 72 | 0 | 4000.00 | 0.00 |
| 72 | 1.007000 | 5.00 | 2.611 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 71 | 73 | 0 | 4000.00 | 0.00 |
| 73 | 1.007000 | 205.00 | 1.098 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 72 | 74 | 0 | 4000.00 | 0.00 |
| 74 | 1.007000 | 240.00 | 1.117 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 73 | 75 | 0 | 4000.00 | 0.00 |
| 75 | 1.007000 | 20.00 | 4.021 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 74 | 76 | 0 | 4000.00 | 0.00 |
| 76 | 1.007000 | 30.00 | 1.665 | 4 | 95.500 | 91.500 | 2 | 0.00000 | 75 | 77 | 0 | 4000.00 | 0.00 |
| 77 | 1.007000 | 25.00 | 2.120 | 4 | 91.500 | 97.000 | 2 | 0.00000 | 76 | 78 | 0 | 4000.00 | 0.00 |
| 78 | 1.007000 | 50.00 | 1.403 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 77 | 79 | 0 | 4000.00 | 0.00 |
| 79 | 1.007000 | 50.00 | 1.403 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 78 | 80 | 0 | 4000.00 | 0.00 |
| 80 | 1.007000 | 20.00 | 1.997 | 4 | 97.000 | 90.500 | 2 | 0.00000 | 79 | 81 | 0 | 4000.00 | 0.00 |
| 81 | 1.007000 | 40.00 | 2.002 | 4 | 90.500 | 96.900 | 2 | 0.00000 | 80 | 82 | 0 | 4000.00 | 0.00 |
| 82 | 1.007000 | 165.00 | 1.122 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 81 | 83 | 0 | 4000.00 | 0.00 |
| 83 | 1.007000 | 135.00 | 1.060 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 82 | 84 | 0 | 4000.00 | 0.00 |
| 84 | 1.007000 | 10.00 | 3.014 | 3 | 96.900 | 96.900 | 2 | 0.00000 | 83 | 101 | 0 | 4000.00 | 0.00 |
| 85 | 1.007000 | 60.00 | 1.134 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 84 | 86 | 0 | 4000.00 | 0.00 |
| 86 | 1.007000 | 5.00 | 5.028 | 3 | 96.900 | 96.900 | 2 | 0.00000 | 85 | 9 | 1 | 4000.00 | 0.00 |
| 87 | 0.336000 | 10.00 | 5.771 | 3 | 105.000 | 112.070 | 2 | 0.00000 | 7 | 88 | 0 | 4000.00 | 0.00 |
| 88 | 0.336000 | 5.00 | 5.570 | 4 | 112.070 | 113.750 | 2 | 0.00000 | 87 | 89 | 0 | 4000.00 | 0.00 |
| 89 | 0.256000 | 30.00 | 1.870 | 4 | 113.750 | 109.000 | 2 | 0.00000 | 88 | 90 | 0 | 4000.00 | 0.00 |
| 90 | 0.256000 | 10.00 | 1.205 | 2 | 109.000 | 104.250 | 2 | 0.00000 | 89 | 91 | 0 | 4000.00 | 0.00 |
| 91 | 0.256000 | 5.00 | 5.933 | 1 | 104.250 | 103.750 | 2 | 0.00000 | 90 | 0 | 0 | 4000.00 | 0.00 |
| 92 | 0.336000 | 40.00 | 2.714 | 3 | 112.070 | 105.000 | 2 | 0.00000 | 87 | 93 | 0 | 4000.00 | 0.00 |
| 93 | 1.000000 | 20.00 | 3.400 | 4 | 105.000 | 110.200 | 2 | 0.00000 | 92 | 94 | 0 | 4000.00 | 0.00 |
| 94 | 1.000000 | 10.00 | 3.800 | 4 | 110.200 | 104.750 | 2 | 0.00000 | 93 | 95 | 0 | 4000.00 | 0.00 |
| 95 | 1.000000 | 5.00 | 18.508 | 4 | 104.750 | 104.750 | 2 | 0.00000 | 94 | 96 | 0 | 4000.00 | 0.00 |
| 96 | 1.000000 | 10.00 | 3.538 | 2 | 104.750 | 104.750 | 2 | 0.00000 | 95 | 97 | 0 | 4000.00 | 0.00 |
| 97 | 1.000000 | 5.00 | 9.400 | 4 | 104.750 | 105.040 | 2 | 0.00000 | 96 | 98 | 0 | 4000.00 | 0.00 |
| 98 | 1.000000 | 20.00 | 7.400 | 4 | 105.040 | 94.000 | 2 | 0.00000 | 97 | 99 | 0 | 4000.00 | 0.00 |
| 99 | 1.104000 | 30.00 | 4.874 | 1 | 94.000 | 99.400 | 2 | 0.00000 | 98 | 0 | 0 | 4000.00 | 0.00 |
| 100 | 1.000000 | 85.00 | 1.864 | 4 | 105.000 | 91.000 | 2 | 0.00000 | 92 | 101 | 0 | 4000.00 | 0.00 |
| 101 | 1.000000 | 25.00 | 4.512 | 3 | 91.000 | 96.900 | 2 | 0.00000 | 100 | 85 | 1 | 4000.00 | 0.00 |
| 102 | 0.835000 | 5.00 | 12.356 | 2 | 96.000 | 96.000 | 2 | 0.00000 | 40 | 103 | 0 | 4000.00 | 0.00 |
| 103 | 0.788000 | 60.00 | 1.628 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 102 | 104 | 0 | 4000.00 | 0.00 |
| 104 | 0.788000 | 100.00 | 1.000 | 4 | 96.000 | 95.500 | 2 | 0.00000 | 103 | 105 | 0 | 4000.00 | 0.00 |
| 105 | 0.788000 | 100.00 | 1.000 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 104 | 106 | 0 | 4000.00 | 0.00 |
| 106 | 0.788000 | 30.00 | 2.786 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 105 | 107 | 0 | 4000.00 | 0.00 |
| 107 | 0.927000 | 35.00 | 2.059 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 106 | 108 | 0 | 4000.00 | 0.00 |
| 108 | 0.927000 | 150.00 | 1.494 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 107 | 109 | 0 | 4000.00 | 0.00 |
| 109 | 0.927000 | 50.00 | 1.519 | 3 | 95.500 | 95.500 | 2 | 0.00000 | 108 | 110 | 0 | 4000.00 | 0.00 |
| 110 | 0.927000 | 20.00 | 2.298 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 109 | 111 | 0 | 4000.00 | 0.00 |
| 111 | 0.927000 | 10.00 | 7.860 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 110 | 112 | 0 | 4000.00 | 0.00 |
| 112 | 1.000000 | 10.00 | 9.000 | 4 | 95.500 | 101.700 | 2 | 0.00000 | 111 | 113 | 0 | 4000.00 | 0.00 |
| 113 | 1.000000 | 5.00 | 5.400 | 4 | 101.700 | 102.800 | 2 | 0.00000 | 112 | 114 | 0 | 4000.00 | 0.00 |
| 114 | 1.000000 | 10.00 | 12.354 | 2 | 102.800 | 102.800 | 2 | 0.00000 | 113 | 115 | 0 | 4000.00 | 0.00 |
| 115 | 1.000000 | 5.00 | 8.877 | 4 | 102.800 | 102.800 | 2 | 0.00000 | 114 | 116 | 0 | 4000.00 | 0.00 |
| 116 | 1.000000 | 5.00 | 5.000 | 4 | 102.800 | 102.800 | 2 | 0.00000 | 115 | 117 | 0 | 4000.00 | 0.00 |
| 117 | 1.250000 | 30.00 | 3.333 | 1 | 102.800 | 103.000 | 2 | 0.00000 | 116 | 0 | 0 | 4000.00 | 0.00 |
| 118 | 0.927000 | 10.00 | 6.562 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 109 | 119 | 0 | 4000.00 | 0.00 |
| 119 | 1.000000 | 10.00 | 2.400 | 3 | 95.500 | 101.700 | 2 | 0.00000 | 118 | 120 | 0 | 4000.00 | 0.00 |
| 120 | 1.000000 | 5.00 | 7.800 | 4 | 101.700 | 102.800 | 2 | 0.00000 | 119 | 121 | 0 | 4000.00 | 0.00 |
| 121 | 1.000000 | 10.00 | 13.154 | 2 | 102.800 | 102.800 | 2 | 0.00000 | 120 | 122 | 0 | 4000.00 | 0.00 |
| 122 | 1.000000 | 10.00 | 8.938 | 4 | 102.800 | 102.800 | 2 | 0.00000 | 121 | 123 | 0 | 4000.00 | 0.00 |
| 123 | 1.250000 | 20.00 | 3.250 | 1 | 102.800 | 103.000 | 2 | 0.00000 | 122 | 0 | 0 | 4000.00 | 0.00 |
| 124 | 0.134000 | 5.00 | 3.624 | 4 | 101.700 | 101.700 | 2 | 0.00000 | 119 | 125 | 0 | 4000.00 | 0.00 |
| 125 | 0.134000 | 5.00 | 3.141 | 4 | 101.700 | 101.700 | 2 | 0.00000 | 124 | 126 | 0 | 4000.00 | 0.00 |
| 126 | 0.134000 | 5.00 | 1.000 | 2 | 101.700 | 101.700 | 2 | 0.00000 | 125 | 127 | 0 | 4000.00 | 0.00 |
| 127 | 0.134000 | 10.00 | 1.000 | 4 | 101.700 | 101.700 | 2 | 0.00000 | 126 | 128 | 0 | 4000.00 | 0.00 |
| 128 | 0.134000 | 10.00 | 1.000 | 4 | 101.700 | 101.700 | 2 | 0.00000 | 127 | 129 | 0 | 4000.00 | 0.00 |
| 129 | 0.134000 | 10.00 | 1.000 | 1 | 101.700 | 103.000 | 2 | 0.00000 | 128 | 0 | 0 | 4000.00 | 0.00 |
| 130 | 0.835000 | 5.00 | 11.020 | 4 | 93.000 | 93.000 | 2 | 0.00000 | 29 | 131 | 0 | 4000.00 | 0.00 |
| 131 | 0.835000 | 100.00 | 1.331 | 4 | 93.000 | 96.010 | 2 | 0.00000 | 130 | 132 | 0 | 4000.00 | 0.00 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 132 | 0.835000 | 25.00 | 1.267 | 4 | 96.010 | 96.010 | 2 | 0.00000 | 131 | 133 | 0 | 4000.00 | 0.00 |
| 133 | 0.835000 | 65.00 | 1.000 | 4 | 96.010 | 96.000 | 2 | 0.00000 | 132 | 134 | 0 | 4000.00 | 0.00 |
| 134 | 0.835000 | 20.00 | 2.653 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 133 | 135 | 0 | 4000.00 | 0.00 |
| 135 | 0.835000 | 105.00 | 1.382 | 3 | 96.000 | 89.000 | 2 | 0.00000 | 134 | 136 | 0 | 4000.00 | 0.00 |
| 136 | 0.835000 | 5.00 | 3.338 | 4 | 89.000 | 89.000 | 2 | 0.00000 | 135 | 137 | 0 | 4000.00 | 0.00 |
| 137 | 0.835000 | 50.00 | 1.334 | 3 | 89.000 | 89.000 | 2 | 0.00000 | 136 | 138 | 0 | 4000.00 | 0.00 |
| 138 | 0.835000 | 5.00 | 5.676 | 4 | 89.000 | 89.000 | 2 | 0.00000 | 137 | 139 | 0 | 4000.00 | 0.00 |
| 139 | 0.835000 | 5.00 | 4.340 | 3 | 89.000 | 89.000 | 2 | 0.00000 | 138 | 140 | 0 | 4000.00 | 0.00 |
| 140 | 0.835000 | 55.00 | 1.000 | 4 | 89.000 | 89.000 | 2 | 0.00000 | 139 | 141 | 0 | 4000.00 | 0.00 |
| 141 | 0.835000 | 25.00 | 1.668 | 3 | 89.000 | 89.000 | 2 | 0.00000 | 140 | 142 | 0 | 4000.00 | 0.00 |
| 142 | 0.835000 | 15.00 | 2.882 | 4 | 89.000 | 91.940 | 2 | 0.00000 | 141 | 143 | 0 | 4000.00 | 0.00 |
| 143 | 0.835000 | 25.00 | 1.668 | 3 | 91.940 | 91.940 | 2 | 0.00000 | 142 | 144 | 0 | 4000.00 | 0.00 |
| 144 | 0.835000 | 5.00 | 5.676 | 3 | 91.940 | 91.940 | 2 | 0.00000 | 143 | 145 | 0 | 4000.00 | 0.00 |
| 145 | 0.835000 | 5.00 | 4.340 | 3 | 91.940 | 91.940 | 2 | 0.00000 | 144 | 146 | 0 | 4000.00 | 0.00 |
| 146 | 0.835000 | 10.00 | 3.338 | 4 | 91.940 | 96.200 | 2 | 0.00000 | 145 | 147 | 0 | 4000.00 | 0.00 |
| 147 | 0.835000 | 5.00 | 3.338 | 4 | 96.200 | 96.200 | 2 | 0.00000 | 146 | 148 | 0 | 4000.00 | 0.00 |
| 148 | 0.835000 | 145.00 | 1.000 | 4 | 96.200 | 96.200 | 2 | 0.00000 | 147 | 149 | 0 | 4000.00 | 0.00 |
| 149 | 0.835000 | 10.00 | 2.670 | 4 | 96.200 | 96.200 | 2 | 0.00000 | 148 | 150 | 0 | 4000.00 | 0.00 |
| 150 | 0.835000 | 90.00 | 1.186 | 3 | 96.200 | 96.200 | 2 | 0.00000 | 149 | 151 | 0 | 4000.00 | 0.00 |
| 151 | 0.835000 | 5.00 | 5.676 | 4 | 96.200 | 94.530 | 2 | 0.00000 | 150 | 152 | 0 | 4000.00 | 0.00 |
| 152 | 0.835000 | 15.00 | 2.664 | 3 | 94.530 | 94.530 | 2 | 0.00000 | 151 | 153 | 0 | 4000.00 | 0.00 |
| 153 | 0.835000 | 5.00 | 2.336 | 4 | 94.530 | 94.530 | 2 | 0.00000 | 152 | 154 | 0 | 4000.00 | 0.00 |
| 154 | 0.835000 | 5.00 | 4.340 | 3 | 94.530 | 94.540 | 2 | 0.00000 | 153 | 155 | 0 | 4000.00 | 0.00 |
| 155 | 0.835000 | 15.00 | 2.559 | 3 | 94.540 | 94.540 | 2 | 0.00000 | 154 | 156 | 0 | 4000.00 | 0.00 |
| 156 | 0.835000 | 5.00 | 4.340 | 3 | 94.540 | 94.540 | 2 | 0.00000 | 155 | 157 | 0 | 4000.00 | 0.00 |
| 157 | 0.835000 | 5.00 | 3.338 | 4 | 94.540 | 94.540 | 2 | 0.00000 | 156 | 158 | 0 | 4000.00 | 0.00 |
| 158 | 0.835000 | 5.00 | 3.338 | 3 | 94.540 | 94.500 | 2 | 0.00000 | 157 | 159 | 0 | 4000.00 | 0.00 |
| 159 | 0.835000 | 5.00 | 4.340 | 4 | 94.500 | 94.500 | 2 | 0.00000 | 158 | 160 | 0 | 4000.00 | 0.00 |
| 160 | 0.835000 | 55.00 | 1.425 | 3 | 94.500 | 94.500 | 2 | 0.00000 | 159 | 161 | 0 | 4000.00 | 0.00 |
| 161 | 0.835000 | 175.00 | 1.286 | 4 | 94.500 | 96.200 | 2 | 0.00000 | 160 | 162 | 0 | 4000.00 | 0.00 |
| 162 | 0.835000 | 100.00 | 1.568 | 3 | 96.200 | 96.200 | 2 | 0.00000 | 161 | 47 | 1 | 4000.00 | 0.00 |
| 163 | 0.835000 | 10.00 | 3.338 | 4 | 94.500 | 91.750 | 2 | 0.00000 | 160 | 164 | 0 | 4000.00 | 0.00 |
| 164 | 0.835000 | 40.00 | 1.413 | 4 | 91.750 | 89.580 | 2 | 0.00000 | 163 | 165 | 0 | 4000.00 | 0.00 |
| 165 | 0.835000 | 25.00 | 3.071 | 4 | 89.580 | 89.580 | 2 | 0.00000 | 164 | 166 | 0 | 4000.00 | 0.00 |
| 166 | 0.835000 | 5.00 | 4.340 | 3 | 89.580 | 89.580 | 2 | 0.00000 | 165 | 167 | 0 | 4000.00 | 0.00 |
| 167 | 0.835000 | 5.00 | 1.000 | 16 | 89.580 | 89.580 | 2 | 0.00000 | 166 | 0 | 0 | 4000.00 | 0.00 |
| 168 | 0.835000 | 5.00 | 13.358 | 4 | 89.000 | 91.000 | 2 | 0.00000 | 141 | 169 | 0 | 4000.00 | 0.00 |
| 169 | 0.835000 | 35.00 | 2.002 | 3 | 91.000 | 91.000 | 2 | 0.00000 | 168 | 170 | 0 | 4000.00 | 0.00 |
| 170 | 0.835000 | 10.00 | 4.340 | 3 | 91.000 | 91.000 | 2 | 0.00000 | 169 | 171 | 0 | 4000.00 | 0.00 |
| 171 | 0.835000 | 75.00 | 1.312 | 4 | 91.000 | 91.000 | 2 | 0.00000 | 170 | 172 | 0 | 4000.00 | 0.00 |
| 172 | 0.835000 | 45.00 | 2.002 | 3 | 91.000 | 91.000 | 2 | 0.00000 | 171 | 173 | 0 | 4000.00 | 0.00 |
| 173 | 0.835000 | 5.00 | 3.338 | 4 | 91.000 | 91.000 | 2 | 0.00000 | 172 | 174 | 0 | 4000.00 | 0.00 |
| 174 | 0.835000 | 15.00 | 1.779 | 4 | 91.000 | 96.040 | 2 | 0.00000 | 173 | 175 | 0 | 4000.00 | 0.00 |
| 175 | 0.835000 | 15.00 | 2.559 | 4 | 96.040 | 96.000 | 2 | 0.00000 | 174 | 176 | 0 | 4000.00 | 0.00 |
| 176 | 0.835000 | 95.00 | 1.176 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 175 | 177 | 0 | 4000.00 | 0.00 |
| 177 | 0.835000 | 55.00 | 1.213 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 176 | 178 | 0 | 4000.00 | 0.00 |
| 178 | 0.835000 | 5.00 | 3.338 | 4 | 96.000 | 91.000 | 2 | 0.00000 | 177 | 179 | 0 | 4000.00 | 0.00 |
| 179 | 0.835000 | 50.00 | 1.795 | 4 | 91.000 | 93.000 | 2 | 0.00000 | 178 | 180 | 0 | 4000.00 | 0.00 |
| 180 | 0.835000 | 80.00 | 1.146 | 4 | 93.000 | 93.000 | 2 | 0.00000 | 179 | 181 | 0 | 4000.00 | 0.00 |
| 181 | 0.835000 | 25.00 | 3.472 | 3 | 93.000 | 93.000 | 2 | 0.00000 | 180 | 29 | 1 | 4000.00 | 0.00 |
| 182 | 0.336000 | 45.00 | 1.866 | 3 | 91.000 | 96.000 | 2 | 0.00000 | 169 | 183 | 0 | 4000.00 | 0.00 |
| 183 | 0.336000 | 120.00 | 1.482 | 4 | 96.000 | 149.000 | 2 | 0.00000 | 182 | 184 | 0 | 4000.00 | 0.00 |
| 184 | 0.256000 | 205.00 | 1.092 | 16 | 149.000 | 142.500 | 2 | 0.00000 | 183 | 0 | 0 | 4000.00 | 0.00 |
| 185 | 0.256000 | 60.00 | 1.674 | 16 | 96.000 | 59.000 | 2 | 0.00000 | 182 | 0 | 0 | 4000.00 | 0.00 |
| 186 | 0.336000 | 10.00 | 4.427 | 3 | 91.000 | 94.800 | 2 | 0.00000 | 170 | 187 | 0 | 4000.00 | 0.00 |
| 187 | 0.336000 | 55.00 | 1.586 | 3 | 94.800 | 113.000 | 2 | 0.00000 | 186 | 188 | 0 | 4000.00 | 0.00 |
| 188 | 0.336000 | 230.00 | 1.231 | 4 | 113.000 | 146.000 | 2 | 0.00000 | 187 | 189 | 0 | 4000.00 | 0.00 |
| 189 | 0.256000 | 105.00 | 1.111 | 16 | 146.000 | 143.000 | 2 | 0.00000 | 188 | 0 | 0 | 4000.00 | 0.00 |
| 190 | 0.256000 | 100.00 | 1.297 | 16 | 94.800 | 83.700 | 2 | 0.00000 | 186 | 0 | 0 | 4000.00 | 0.00 |
| 191 | 0.256000 | 75.00 | 1.416 | 16 | 113.000 | 107.000 | 2 | 0.00000 | 187 | 0 | 0 | 4000.00 | 0.00 |
| 192 | 0.336000 | 5.00 | 7.854 | 4 | 91.000 | 95.000 | 2 | 0.00000 | 172 | 193 | 0 | 4000.00 | 0.00 |
| 193 | 0.336000 | 240.00 | 1.316 | 4 | 95.000 | 150.000 | 2 | 0.00000 | 192 | 194 | 0 | 4000.00 | 0.00 |
| 194 | 0.256000 | 180.00 | 1.105 | 16 | 150.000 | 142.000 | 2 | 0.00000 | 193 | 0 | 0 | 4000.00 | 0.00 |
| 195 | 0.665000 | 15.00 | 4.015 | 4 | 96.500 | 96.500 | 2 | 0.00000 | 54 | 196 | 0 | 4000.00 | 0.00 |
| 196 | 0.665000 | 11.00 | 2.197 | 4 | 96.500 | 94.500 | 2 | 0.00000 | 195 | 197 | 0 | 4400.00 | 0.00 |
| 197 | 0.665000 | 20.00 | 1.658 | 4 | 94.500 | 96.600 | 2 | 0.00000 | 196 | 198 | 0 | 4000.00 | 0.00 |
| 198 | 0.665000 | 115.00 | 1.000 | 4 | 96.600 | 96.600 | 2 | 0.00000 | 197 | 199 | 0 | 4000.00 | 0.00 |
| 199 | 0.665000 | 220.00 | 1.120 | 3 | 96.600 | 94.000 | 2 | 0.00000 | 198 | 200 | 0 | 4000.00 | 0.00 |
| 200 | 0.665000 | 20.00 | 2.862 | 4 | 94.000 | 94.750 | 2 | 0.00000 | 199 | 201 | 0 | 4000.00 | 0.00 |
| 201 | 0.665000 | 20.00 | 1.000 | 4 | 94.750 | 94.750 | 2 | 0.00000 | 200 | 202 | 0 | 4000.00 | 0.00 |
| 202 | 0.665000 | 20.00 | 2.197 | 4 | 94.750 | 94.750 | 2 | 0.00000 | 201 | 203 | 0 | 4000.00 | 0.00 |
| 203 | 0.665000 | 15.00 | 1.000 | 4 | 94.750 | 94.750 | 2 | 0.00000 | 202 | 204 | 0 | 4000.00 | 0.00 |
| 204 | 0.665000 | 30.00 | 1.973 | 3 | 94.750 | 84.100 | 2 | 0.00000 | 203 | 205 | 0 | 4000.00 | 0.00 |
| 205 | 0.665000 | 15.00 | 1.621 | 4 | 84.100 | 69.500 | 2 | 0.00000 | 204 | 206 | 0 | 4000.00 | 0.00 |
| 206 | 0.665000 | 15.00 | 1.887 | 3 | 69.500 | 69.500 | 2 | 0.00000 | 205 | 207 | 0 | 4000.00 | 0.00 |
| 207 | 0.665000 | 20.00 | 1.465 | 4 | 69.500 | 69.500 | 2 | 0.00000 | 206 | 208 | 0 | 4000.00 | 0.00 |
| 208 | 0.665000 | 20.00 | 4.125 | 3 | 69.500 | 61.750 | 2 | 0.00000 | 207 | 209 | 0 | 4000.00 | 0.00 |
| 209 | 0.665000 | 70.00 | 1.454 | 4 | 61.750 | 62.750 | 2 | 0.00000 | 208 | 210 | 0 | 4000.00 | 0.00 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 210 | 0.665000 | 5.00 | 6.320 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 209 | 211 | 0 | 4000.00 | 0.00 |
| 211 | 0.665000 | 50.00 | 1.293 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 210 | 212 | 0 | 4000.00 | 0.00 |
| 212 | 0.665000 | 20.00 | 2.330 | 3 | 62.750 | 62.750 | 2 | 0.00000 | 211 | 213 | 0 | 4000.00 | 0.00 |
| 213 | 0.665000 | 25.00 | 2.277 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 212 | 214 | 0 | 4000.00 | 0.00 |
| 214 | 0.665000 | 20.00 | 1.665 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 213 | 215 | 0 | 4000.00 | 0.00 |
| 215 | 0.665000 | 45.00 | 1.414 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 214 | 216 | 0 | 4000.00 | 0.00 |
| 216 | 0.665000 | 20.00 | 1.665 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 215 | 217 | 0 | 4000.00 | 0.00 |
| 217 | 0.665000 | 85.00 | 2.033 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 216 | 218 | 0 | 4000.00 | 0.00 |
| 218 | 0.665000 | 5.00 | 3.660 | 3 | 62.750 | 62.750 | 2 | 0.00000 | 217 | 219 | 0 | 4000.00 | 0.00 |
| 219 | 0.665000 | 25.00 | 2.649 | 3 | 62.750 | 66.000 | 2 | 0.00000 | 218 | 220 | 0 | 4000.00 | 0.00 |
| 220 | 0.665000 | 30.00 | 1.749 | 4 | 66.000 | 96.000 | 2 | 0.00000 | 219 | 221 | 0 | 4000.00 | 0.00 |
| 221 | 0.665000 | 20.00 | 1.329 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 220 | 222 | 0 | 4000.00 | 0.00 |
| 222 | 0.665000 | 5.00 | 4.977 | 4 | 96.000 | 94.400 | 2 | 0.00000 | 221 | 223 | 0 | 4000.00 | 0.00 |
| 223 | 0.665000 | 95.00 | 1.139 | 4 | 94.400 | 97.000 | 2 | 0.00000 | 222 | 224 | 0 | 4000.00 | 0.00 |
| 224 | 0.665000 | 35.00 | 1.646 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 223 | 225 | 0 | 4000.00 | 0.00 |
| 225 | 0.665000 | 65.00 | 1.614 | 4 | 97.000 | 96.500 | 2 | 0.00000 | 224 | 226 | 0 | 4000.00 | 0.00 |
| 226 | 0.665000 | 35.00 | 1.000 | 4 | 96.500 | 96.500 | 2 | 0.00000 | 225 | 227 | 0 | 4000.00 | 0.00 |
| 227 | 0.665000 | 35.00 | 1.830 | 4 | 96.500 | 94.200 | 2 | 0.00000 | 226 | 228 | 0 | 4000.00 | 0.00 |
| 228 | 0.665000 | 35.00 | 1.266 | 4 | 94.200 | 96.200 | 2 | 0.00000 | 227 | 229 | 0 | 4000.00 | 0.00 |
| 229 | 0.665000 | 120.00 | 1.377 | 3 | 96.200 | 95.800 | 2 | 0.00000 | 228 | 69 | 1 | 4000.00 | 0.00 |
| 230 | 0.665000 | 10.00 | 6.453 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 12 | 231 | 0 | 4000.00 | 0.00 |
| 231 | 0.665000 | 25.00 | 1.372 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 230 | 232 | 0 | 4000.00 | 0.00 |
| 232 | 0.665000 | 150.00 | 1.062 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 231 | 233 | 0 | 4000.00 | 0.00 |
| 233 | 0.665000 | 135.00 | 1.069 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 232 | 234 | 0 | 4000.00 | 0.00 |
| 234 | 0.665000 | 45.00 | 1.146 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 233 | 235 | 0 | 4000.00 | 0.00 |
| 235 | 0.665000 | 20.00 | 1.658 | 4 | 96.900 | 95.000 | 2 | 0.00000 | 234 | 236 | 0 | 4000.00 | 0.00 |
| 236 | 0.665000 | 35.00 | 1.564 | 4 | 95.000 | 95.500 | 2 | 0.00000 | 235 | 237 | 0 | 4000.00 | 0.00 |
| 237 | 0.665000 | 15.00 | 1.621 | 4 | 95.500 | 96.000 | 2 | 0.00000 | 236 | 238 | 0 | 4000.00 | 0.00 |
| 238 | 0.665000 | 30.00 | 1.621 | 4 | 96.000 | 72.000 | 2 | 0.00000 | 237 | 239 | 0 | 4000.00 | 0.00 |
| 239 | 0.665000 | 5.00 | 3.660 | 3 | 72.000 | 67.000 | 2 | 0.00000 | 238 | 240 | 0 | 4000.00 | 0.00 |
| 240 | 0.665000 | 75.00 | 1.497 | 4 | 67.000 | 64.250 | 2 | 0.00000 | 239 | 241 | 0 | 4000.00 | 0.00 |
| 241 | 0.665000 | 35.00 | 1.000 | 4 | 64.250 | 64.250 | 2 | 0.00000 | 240 | 242 | 0 | 4000.00 | 0.00 |
| 242 | 0.665000 | 65.00 | 1.286 | 4 | 64.250 | 61.750 | 2 | 0.00000 | 241 | 243 | 0 | 4000.00 | 0.00 |
| 243 | 0.665000 | 20.00 | 2.995 | 3 | 61.750 | 61.750 | 2 | 0.00000 | 242 | 244 | 0 | 4000.00 | 0.00 |
| 244 | 0.665000 | 5.00 | 2.064 | 4 | 61.750 | 61.750 | 2 | 0.00000 | 243 | 245 | 0 | 4000.00 | 0.00 |
| 245 | 0.665000 | 20.00 | 2.260 | 4 | 61.750 | 62.750 | 2 | 0.00000 | 244 | 246 | 0 | 4000.00 | 0.00 |
| 246 | 0.665000 | 15.00 | 1.887 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 245 | 247 | 0 | 4000.00 | 0.00 |
| 247 | 0.665000 | 10.00 | 2.330 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 246 | 248 | 0 | 4000.00 | 0.00 |
| 248 | 0.665000 | 15.00 | 1.887 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 247 | 249 | 0 | 4000.00 | 0.00 |
| 249 | 0.665000 | 35.00 | 1.380 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 248 | 250 | 0 | 4000.00 | 0.00 |
| 250 | 0.665000 | 100.00 | 1.000 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 249 | 251 | 0 | 4000.00 | 0.00 |
| 251 | 0.665000 | 10.00 | 3.647 | 4 | 62.750 | 62.500 | 2 | 0.00000 | 250 | 252 | 0 | 4000.00 | 0.00 |
| 252 | 0.665000 | 30.00 | 1.749 | 4 | 62.500 | 67.900 | 2 | 0.00000 | 251 | 253 | 0 | 4000.00 | 0.00 |
| 253 | 0.665000 | 30.00 | 1.310 | 4 | 67.900 | 96.000 | 2 | 0.00000 | 252 | 254 | 0 | 4000.00 | 0.00 |
| 254 | 0.665000 | 20.00 | 2.317 | 4 | 96.000 | 97.000 | 2 | 0.00000 | 253 | 255 | 0 | 4000.00 | 0.00 |
| 255 | 0.665000 | 145.00 | 1.000 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 254 | 256 | 0 | 4000.00 | 0.00 |
| 256 | 0.665000 | 35.00 | 1.752 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 255 | 257 | 0 | 4000.00 | 0.00 |
| 257 | 0.665000 | 60.00 | 1.110 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 256 | 258 | 0 | 4000.00 | 0.00 |
| 258 | 0.665000 | 40.00 | 1.165 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 257 | 259 | 0 | 4000.00 | 0.00 |
| 259 | 0.665000 | 5.00 | 3.660 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 258 | 260 | 0 | 4000.00 | 0.00 |
| 260 | 0.665000 | 45.00 | 1.118 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 259 | 261 | 0 | 4000.00 | 0.00 |
| 261 | 0.665000 | 15.00 | 4.538 | 3 | 97.000 | 95.500 | 2 | 0.00000 | 260 | 71 | 1 | 4000.00 | 0.00 |
| 262 | 0.505000 | 20.00 | 2.315 | 4 | 61.750 | 63.000 | 2 | 0.00000 | 243 | 263 | 0 | 4000.00 | 0.00 |
| 263 | 0.505000 | 10.00 | 3.318 | 4 | 63.000 | 56.000 | 2 | 0.00000 | 262 | 264 | 0 | 4000.00 | 0.00 |
| 264 | 0.505000 | 30.00 | 2.380 | 4 | 56.000 | 61.750 | 2 | 0.00000 | 263 | 265 | 0 | 4000.00 | 0.00 |
| 265 | 0.505000 | 5.00 | 3.020 | 3 | 61.750 | 62.900 | 2 | 0.00000 | 264 | 266 | 0 | 4000.00 | 0.00 |
| 266 | 0.505000 | 5.00 | 10.494 | 4 | 62.900 | 67.000 | 2 | 0.00000 | 265 | 267 | 0 | 4000.00 | 0.00 |
| 267 | 0.505000 | 5.00 | 3.828 | 4 | 67.000 | 67.000 | 2 | 0.00000 | 266 | 268 | 0 | 4000.00 | 0.00 |
| 268 | 0.505000 | 65.00 | 1.155 | 3 | 67.000 | 67.000 | 2 | 0.00000 | 267 | 269 | 0 | 4000.00 | 0.00 |
| 269 | 0.505000 | 15.00 | 1.000 | 4 | 67.000 | 67.000 | 2 | 0.00000 | 268 | 270 | 0 | 4000.00 | 0.00 |
| 270 | 0.505000 | 35.00 | 1.866 | 3 | 67.000 | 67.000 | 2 | 0.00000 | 269 | 271 | 0 | 4000.00 | 0.00 |
| 271 | 0.256000 | 25.00 | 1.143 | 4 | 67.000 | 67.000 | 2 | 0.00000 | 270 | 272 | 0 | 4000.00 | 0.00 |
| 272 | 0.256000 | 10.00 | 3.099 | 4 | 67.000 | 65.000 | 2 | 0.00000 | 271 | 273 | 0 | 4000.00 | 0.00 |
| 273 | 0.256000 | 55.00 | 1.289 | 16 | 65.000 | 94.500 | 2 | 0.00000 | 272 | 0 | 0 | 4000.00 | 0.00 |
| 274 | 0.505000 | 15.00 | 1.000 | 3 | 62.900 | 63.900 | 2 | 0.00000 | 265 | 275 | 0 | 4000.00 | 0.00 |
| 275 | 0.505000 | 15.00 | 1.741 | 3 | 63.900 | 68.200 | 2 | 0.00000 | 274 | 276 | 0 | 4000.00 | 0.00 |
| 276 | 0.336000 | 135.00 | 1.170 | 4 | 68.200 | 71.500 | 2 | 0.00000 | 275 | 277 | 0 | 4000.00 | 0.00 |
| 277 | 0.336000 | 40.00 | 1.773 | 16 | 71.500 | 61.500 | 2 | 0.00000 | 276 | 0 | 0 | 4000.00 | 0.00 |
| 278 | 0.336000 | 20.00 | 2.518 | 16 | 68.200 | 61.500 | 2 | 0.00000 | 275 | 0 | 0 | 4000.00 | 0.00 |
| 279 | 0.505000 | 85.00 | 2.305 | 4 | 69.500 | 68.750 | 2 | 0.00000 | 206 | 280 | 0 | 4000.00 | 0.00 |
| 280 | 0.505000 | 10.00 | 2.010 | 3 | 68.750 | 68.750 | 2 | 0.00000 | 279 | 281 | 0 | 4000.00 | 0.00 |
| 281 | 0.505000 | 45.00 | 1.382 | 4 | 68.750 | 68.750 | 2 | 0.00000 | 280 | 282 | 0 | 4000.00 | 0.00 |
| 282 | 0.505000 | 10.00 | 1.707 | 4 | 68.750 | 68.750 | 2 | 0.00000 | 281 | 283 | 0 | 4000.00 | 0.00 |
| 283 | 0.505000 | 70.00 | 1.447 | 3 | 68.750 | 68.750 | 2 | 0.00000 | 282 | 284 | 0 | 4000.00 | 0.00 |
| 284 | 0.505000 | 20.00 | 1.354 | 4 | 68.750 | 68.750 | 2 | 0.00000 | 283 | 285 | 0 | 4000.00 | 0.00 |
| 285 | 0.505000 | 5.00 | 2.414 | 4 | 68.750 | 65.500 | 2 | 0.00000 | 284 | 286 | 0 | 4000.00 | 0.00 |
| 286 | 0.505000 | 25.00 | 1.404 | 3 | 65.500 | 65.500 | 2 | 0.00000 | 285 | 287 | 0 | 4000.00 | 0.00 |
| 287 | 0.336000 | 65.00 | 1.868 | 4 | 65.500 | 113.000 | 2 | 0.00000 | 286 | 288 | 0 | 4000.00 | 0.00 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 288 | 0.336000 | 35.00 | 2.150 | 3 | 113.000 | 147.000 | 2 | 0.00000 | 287 289 | 0 | 4000.00 | 0.00 |
| 289 | 0.256000 | 55.00 | 1.419 | 4 | 147.000 | 178.000 | 2 | 0.00000 | 288 290 | 0 | 4000.00 | 0.00 |
| 290 | 0.256000 | 10.00 | 1.000 | 16 | 178.000 | 178.000 | 2 | 0.00000 | 289 0 | 0 | 4000.00 | 0.00 |
| 291 | 0.256000 | 35.00 | 1.247 | 16 | 147.000 | 159.750 | 2 | 0.00000 | 288 0 | 0 | 4000.00 | 0.00 |
| 292 | 0.256000 | 115.00 | 1.686 | 16 | 67.000 | 128.500 | 2 | 0.00000 | 239 0 | 0 | 4000.00 | 0.00 |
| 293 | 0.336000 | 5.00 | 7.451 | 4 | 65.710 | 62.500 | 2 | 0.00000 | 219 294 | 0 | 4000.00 | 0.00 |
| 294 | 0.336000 | 60.00 | 1.112 | 4 | 62.500 | 62.500 | 2 | 0.00000 | 293 295 | 0 | 4000.00 | 0.00 |
| 295 | 0.336000 | 40.00 | 1.907 | 4 | 62.500 | 93.500 | 2 | 0.00000 | 294 296 | 0 | 4000.00 | 0.00 |
| 296 | 0.336000 | 45.00 | 1.729 | 3 | 93.500 | 126.800 | 2 | 0.00000 | 295 297 | 0 | 4000.00 | 0.00 |
| 297 | 0.336000 | 45.00 | 1.149 | 3 | 126.800 | 142.000 | 2 | 0.00000 | 296 298 | 0 | 4000.00 | 0.00 |
| 298 | 0.336000 | 40.00 | 1.571 | 3 | 142.000 | 154.500 | 2 | 0.00000 | 297 299 | 0 | 4000.00 | 0.00 |
| 299 | 0.256000 | 95.00 | 1.107 | 16 | 154.500 | 155.500 | 2 | 0.00000 | 298 0 | 0 | 4000.00 | 0.00 |
| 300 | 0.256000 | 100.00 | 1.623 | 16 | 142.000 | 143.000 | 2 | 0.00000 | 297 0 | 0 | 4000.00 | 0.00 |
| 301 | 0.336000 | 25.00 | 2.452 | 3 | 154.500 | 156.300 | 2 | 0.00000 | 298 302 | 0 | 4000.00 | 0.00 |
| 302 | 0.336000 | 45.00 | 1.893 | 4 | 156.300 | 172.300 | 2 | 0.00000 | 301 303 | 0 | 4000.00 | 0.00 |
| 303 | 0.256000 | 55.00 | 1.304 | 4 | 172.300 | 178.000 | 2 | 0.00000 | 302 304 | 0 | 4000.00 | 0.00 |
| 304 | 0.256000 | 10.00 | 1.000 | 16 | 178.000 | 178.000 | 2 | 0.00000 | 303 0 | 0 | 4000.00 | 0.00 |
| 305 | 0.336000 | 5.00 | 6.376 | 4 | 156.300 | 156.300 | 2 | 0.00000 | 301 306 | 0 | 4000.00 | 0.00 |
| 306 | 0.256000 | 130.00 | 1.405 | 16 | 156.300 | 156.300 | 2 | 0.00000 | 305 0 | 0 | 4000.00 | 0.00 |
| 307 | 0.336000 | 105.00 | 1.914 | 4 | 126.800 | 155.000 | 2 | 0.00000 | 296 308 | 0 | 4000.00 | 0.00 |
| 308 | 0.256000 | 130.00 | 1.287 | 19 | 155.000 | 206.300 | 2 | 0.00000 | 307 309 | 0 | 4000.00 | 0.00 |
| 309 | 0.256000 | 20.00 | 1.000 | 16 | 206.300 | 203.000 | 2 | 0.00000 | 308 0 | 0 | 4000.00 | 0.00 |
| 310 | 0.336000 | 10.00 | 5.301 | 3 | 62.750 | 71.500 | 2 | 0.00000 | 212 311 | 0 | 4000.00 | 0.00 |
| 311 | 0.336000 | 65.00 | 1.424 | 3 | 71.500 | 133.500 | 2 | 0.00000 | 310 312 | 0 | 4000.00 | 0.00 |
| 312 | 0.256000 | 15.00 | 1.439 | 4 | 133.500 | 147.300 | 2 | 0.00000 | 311 313 | 0 | 4000.00 | 0.00 |
| 313 | 0.256000 | 60.00 | 1.281 | 4 | 147.300 | 165.100 | 2 | 0.00000 | 312 314 | 0 | 4000.00 | 0.00 |
| 314 | 0.256000 | 30.00 | 1.527 | 16 | 165.100 | 160.000 | 2 | 0.00000 | 313 0 | 0 | 4000.00 | 0.00 |
| 315 | 0.256000 | 25.00 | 1.407 | 16 | 71.500 | 81.500 | 2 | 0.00000 | 310 0 | 0 | 4000.00 | 0.00 |
| 316 | 0.336000 | 10.00 | 3.688 | 4 | 133.500 | 133.500 | 2 | 0.00000 | 311 317 | 0 | 4000.00 | 0.00 |
| 317 | 0.256000 | 80.00 | 1.717 | 16 | 133.500 | 141.500 | 2 | 0.00000 | 316 0 | 0 | 4000.00 | 0.00 |
| 318 | 0.336000 | 10.00 | 6.443 | 4 | 68.750 | 66.700 | 2 | 0.00000 | 283 319 | 0 | 4000.00 | 0.00 |
| 319 | 0.336000 | 100.00 | 1.672 | 3 | 66.700 | 120.000 | 2 | 0.00000 | 318 320 | 0 | 4000.00 | 0.00 |
| 320 | 0.336000 | 15.00 | 2.792 | 3 | 120.000 | 132.000 | 2 | 0.00000 | 319 321 | 0 | 4000.00 | 0.00 |
| 321 | 0.336000 | 15.00 | 1.448 | 4 | 132.000 | 146.000 | 2 | 0.00000 | 320 322 | 0 | 4000.00 | 0.00 |
| 322 | 0.256000 | 55.00 | 1.604 | 16 | 146.000 | 163.500 | 2 | 0.00000 | 321 0 | 0 | 4000.00 | 0.00 |
| 323 | 0.256000 | 25.00 | 1.492 | 16 | 120.000 | 128.500 | 2 | 0.00000 | 319 0 | 0 | 4000.00 | 0.00 |
| 324 | 0.336000 | 45.00 | 1.806 | 3 | 132.000 | 132.000 | 2 | 0.00000 | 320 325 | 0 | 4000.00 | 0.00 |
| 325 | 0.256000 | 30.00 | 2.263 | 16 | 132.000 | 157.500 | 2 | 0.00000 | 324 0 | 0 | 4000.00 | 0.00 |
| 326 | 0.256000 | 35.00 | 1.188 | 16 | 132.000 | 141.500 | 2 | 0.00000 | 324 0 | 0 | 4000.00 | 0.00 |
| 327 | 0.336000 | 30.00 | 2.456 | 4 | 63.900 | 68.100 | 2 | 0.00000 | 274 328 | 0 | 4000.00 | 0.00 |
| 328 | 0.336000 | 90.00 | 1.939 | 3 | 68.100 | 134.000 | 2 | 0.00000 | 327 329 | 0 | 4000.00 | 0.00 |
| 329 | 0.336000 | 45.00 | 1.612 | 4 | 134.000 | 132.000 | 2 | 0.00000 | 328 330 | 0 | 4000.00 | 0.00 |
| 330 | 0.362000 | 90.00 | 1.181 | 16 | 132.000 | 141.500 | 2 | 0.00000 | 329 0 | 0 | 4000.00 | 0.00 |
| 331 | 0.336000 | 15.00 | 3.554 | 3 | 134.000 | 147.000 | 2 | 0.00000 | 328 332 | 0 | 4000.00 | 0.00 |
| 332 | 0.256000 | 10.00 | 1.200 | 4 | 147.000 | 150.000 | 2 | 0.00000 | 331 333 | 0 | 4000.00 | 0.00 |
| 333 | 0.256000 | 10.00 | 1.200 | 16 | 150.000 | 159.000 | 2 | 0.00000 | 332 0 | 0 | 4000.00 | 0.00 |
| 334 | 0.256000 | 50.00 | 1.451 | 19 | 147.000 | 159.75 | 2 | 0.00000 | 331 335 | 0 | 4000.00 | 0.00 |
| 335 | 0.090000 | 10.00 | 1.000 | 16 | 159.750 | 159.000 | 2 | 0.00000 | 334 0 | 0 | 4000.00 | 0.00 |
| 336 | 0.336000 | 10.00 | 6.712 | 4 | 67.000 | 65.000 | 2 | 0.00000 | 268 337 | 0 | 4000.00 | 0.00 |
| 337 | 0.336000 | 90.00 | 1.538 | 3 | 65.000 | 115.200 | 2 | 0.00000 | 336 338 | 0 | 4000.00 | 0.00 |
| 338 | 0.336000 | 40.00 | 1.403 | 3 | 115.200 | 133.800 | 2 | 0.00000 | 337 339 | 0 | 4000.00 | 0.00 |
| 339 | 0.336000 | 50.00 | 2.423 | 3 | 133.800 | 133.300 | 2 | 0.00000 | 338 340 | 0 | 4000.00 | 0.00 |
| 340 | 0.336000 | 10.00 | 3.016 | 3 | 133.300 | 133.300 | 2 | 0.00000 | 339 341 | 0 | 4000.00 | 0.00 |
| 341 | 0.256000 | 45.00 | 1.340 | 16 | 133.300 | 141.500 | 2 | 0.00000 | 340 0 | 0 | 4000.00 | 0.00 |
| 342 | 0.256000 | 15.00 | 1.678 | 16 | 133.300 | 141.500 | 2 | 0.00000 | 340 0 | 0 | 4000.00 | 0.00 |
| 343 | 0.256000 | 10.00 | 1.300 | 16 | 133.800 | 141.500 | 2 | 0.00000 | 338 0 | 0 | 4000.00 | 0.00 |
| 344 | 0.256000 | 35.00 | 1.644 | 16 | 133.300 | 128.500 | 2 | 0.00000 | 339 0 | 0 | 4000.00 | 0.00 |
| 345 | 0.256000 | 5.00 | 5.813 | 3 | 115.200 | 115.200 | 2 | 0.00000 | 337 346 | 0 | 4000.00 | 0.00 |
| 346 | 0.256000 | 80.00 | 1.288 | 3 | 115.200 | 116.500 | 2 | 0.00000 | 345 347 | 0 | 4000.00 | 0.00 |
| 347 | 0.256000 | 55.00 | 1.726 | 16 | 116.500 | 141.500 | 2 | 0.00000 | 346 0 | 0 | 4000.00 | 0.00 |
| 348 | 0.256000 | 15.00 | 2.601 | 16 | 116.500 | 128.500 | 2 | 0.00000 | 346 0 | 0 | 4000.00 | 0.00 |
| 349 | 0.256000 | 50.00 | 1.594 | 16 | 115.200 | 106.500 | 2 | 0.00000 | 345 0 | 0 | 4000.00 | 0.00 |
| 350 | 0.505000 | 175.00 | 1.669 | 4 | 68.750 | 140.000 | 2 | 0.00000 | 280 351 | 0 | 4000.00 | 0.00 |
| 351 | 0.336000 | 50.00 | 1.000 | 16 | 140.000 | 138.000 | 2 | 0.00000 | 350 0 | 0 | 4000.00 | 0.00 |
| 352 | 0.336000 | 10.00 | 4.226 | 4 | 67.000 | 65.000 | 2 | 0.00000 | 270 353 | 0 | 4000.00 | 0.00 |
| 353 | 0.336000 | 80.00 | 1.285 | 4 | 65.000 | 105.700 | 2 | 0.00000 | 352 354 | 0 | 4000.00 | 0.00 |
| 354 | 0.336000 | 80.00 | 1.630 | 3 | 105.700 | 130.500 | 2 | 0.00000 | 353 355 | 0 | 4000.00 | 0.00 |
| 355 | 0.256000 | 30.00 | 1.458 | 4 | 130.500 | 147.500 | 2 | 0.00000 | 354 356 | 0 | 4000.00 | 0.00 |
| 356 | 0.256000 | 25.00 | 1.225 | 4 | 147.500 | 141.500 | 2 | 0.00000 | 355 357 | 0 | 4000.00 | 0.00 |
| 357 | 0.162000 | 50.00 | 1.843 | 16 | 141.500 | 141.500 | 2 | 0.00000 | 356 0 | 0 | 4000.00 | 0.00 |
| 358 | 0.336000 | 5.00 | 5.570 | 4 | 130.500 | 130.500 | 2 | 0.00000 | 354 359 | 0 | 4000.00 | 0.00 |
| 359 | 0.162000 | 35.00 | 1.759 | 16 | 130.500 | 132.200 | 2 | 0.00000 | 358 0 | 0 | 4000.00 | 0.00 |
| 360 | 0.336000 | 45.00 | 2.343 | 4 | 94.500 | 115.800 | 2 | 0.00000 | 152 361 | 0 | 4000.00 | 0.00 |
| 361 | 0.336000 | 15.00 | 1.448 | 3 | 115.800 | 130.600 | 2 | 0.00000 | 360 362 | 0 | 4000.00 | 0.00 |
| 362 | 0.256000 | 50.00 | 1.510 | 19 | 130.600 | 176.000 | 2 | 0.00000 | 361 363 | 0 | 4000.00 | 0.00 |
| 363 | 0.256000 | 15.00 | 1.000 | 16 | 176.000 | 176.000 | 2 | 0.00000 | 362 0 | 0 | 4000.00 | 0.00 |
| 364 | 0.362000 | 145.00 | 1.539 | 16 | 130.600 | 129.600 | 2 | 0.00000 | 361 0 | 0 | 4000.00 | 0.00 |
| 365 | 0.336000 | 65.00 | 1.940 | 3 | 92.000 | 118.400 | 2 | 0.00000 | 145 366 | 0 | 4000.00 | 0.00 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 366 | 0.336000 | 20.00 | 1.544 | 3 | 118.400 | 118.400 | 2 | 0.00000 | 365 367 | 0 | 4000.00 | 0.00 |
| 367 | 0.256000 | 15.00 | 1.239 | 16 | 118.400 | 115.000 | 2 | 0.00000 | 366 0 | 0 | 4000.00 | 0.00 |
| 368 | 0.256000 | 20.00 | 1.947 | 16 | 118.400 | 127.000 | 2 | 0.00000 | 365 0 | 0 | 4000.00 | 0.00 |
| 369 | 0.336000 | 30.00 | 2.275 | 4 | 118.400 | 133.500 | 2 | 0.00000 | 366 370 | 0 | 4000.00 | 0.00 |
| 370 | 0.256000 | 35.00 | 1.232 | 3 | 133.500 | 166.000 | 2 | 0.00000 | 369 371 | 0 | 4000.00 | 0.00 |
| 371 | 0.256000 | 10.00 | 1.000 | 19 | 166.000 | 176.000 | 2 | 0.00000 | 370 372 | 0 | 4000.00 | 0.00 |
| 372 | 0.256000 | 20.00 | 2.970 | 16 | 176.000 | 175.000 | 2 | 0.00000 | 371 0 | 0 | 4000.00 | 0.00 |
| 373 | 0.256000 | 55.00 | 1.521 | 16 | 166.000 | 141.000 | 2 | 0.00000 | 370 0 | 0 | 4000.00 | 0.00 |
| 374 | 0.336000 | 5.00 | 6.914 | 3 | 92.000 | 94.200 | 2 | 0.00000 | 144 375 | 0 | 4000.00 | 0.00 |
| 375 | 0.336000 | 50.00 | 1.605 | 3 | 94.200 | 113.250 | 2 | 0.00000 | 374 376 | 0 | 4000.00 | 0.00 |
| 376 | 0.256000 | 30.00 | 1.100 | 16 | 113.250 | 141.750 | 2 | 0.00000 | 375 0 | 0 | 4000.00 | 0.00 |
| 377 | 0.256000 | 30.00 | 1.751 | 16 | 94.200 | 74.000 | 2 | 0.00000 | 374 0 | 0 | 4000.00 | 0.00 |
| 378 | 0.256000 | 20.00 | 2.380 | 16 | 113.300 | 111.000 | 2 | 0.00000 | 375 0 | 0 | 4000.00 | 0.00 |
| 379 | 0.336000 | 10.00 | 4.898 | 4 | 89.000 | 94.330 | 2 | 0.00000 | 137 380 | 0 | 4000.00 | 0.00 |
| 380 | 0.336000 | 5.00 | 2.344 | 3 | 94.330 | 95.000 | 2 | 0.00000 | 379 381 | 0 | 4000.00 | 0.00 |
| 381 | 0.336000 | 100.00 | 1.322 | 4 | 95.000 | 130.700 | 2 | 0.00000 | 380 382 | 0 | 4000.00 | 0.00 |
| 382 | 0.256000 | 65.00 | 1.598 | 19 | 130.700 | 176.000 | 2 | 0.00000 | 381 383 | 0 | 4000.00 | 0.00 |
| 383 | 0.025600 | 20.00 | 1.000 | 16 | 176.000 | 175.000 | 2 | 0.00000 | 382 0 | 0 | 4000.00 | 0.00 |
| 384 | 0.336000 | 50.00 | 1.859 | 3 | 95.000 | 96.500 | 2 | 0.00000 | 380 385 | 0 | 4000.00 | 0.00 |
| 385 | 0.256000 | 75.00 | 1.252 | 3 | 96.500 | 98.000 | 2 | 0.00000 | 384 386 | 0 | 4000.00 | 0.00 |
| 386 | 0.256000 | 40.00 | 1.269 | 16 | 98.000 | 71.000 | 2 | 0.00000 | 385 0 | 0 | 4000.00 | 0.00 |
| 387 | 0.256000 | 15.00 | 2.741 | 16 | 96.500 | 103.000 | 2 | 0.00000 | 384 0 | 0 | 4000.00 | 0.00 |
| 388 | 0.256000 | 40.00 | 1.922 | 16 | 98.000 | 94.500 | 2 | 0.00000 | 385 0 | 0 | 4000.00 | 0.00 |
| 389 | 0.336000 | 45.00 | 1.567 | 3 | 89.000 | 127.750 | 2 | 0.00000 | 135 390 | 0 | 4000.00 | 0.00 |
| 390 | 0.256000 | 20.00 | 1.688 | 16 | 127.750 | 141.750 | 2 | 0.00000 | 389 0 | 0 | 4000.00 | 0.00 |
| 391 | 0.256000 | 110.00 | 1.335 | 16 | 127.750 | 141.750 | 2 | 0.00000 | 389 0 | 0 | 4000.00 | 0.00 |
| 392 | 0.336000 | 5.00 | 7.854 | 3 | 94.500 | 96.800 | 2 | 0.00000 | 155 393 | 0 | 4000.00 | 0.00 |
| 393 | 0.256000 | 215.00 | 1.316 | 16 | 96.800 | 65.000 | 2 | 0.00000 | 392 0 | 0 | 4000.00 | 0.00 |
| 394 | 0.256000 | 125.00 | 1.470 | 16 | 96.800 | 141.750 | 2 | 0.00000 | 392 0 | 0 | 4000.00 | 0.00 |
| 395 | 0.336000 | 150.00 | 1.528 | 3 | 94.500 | 130.400 | 2 | 0.00000 | 156 396 | 0 | 4000.00 | 0.00 |
| 396 | 0.256000 | 155.00 | 1.280 | 19 | 130.400 | 182.000 | 2 | 0.00000 | 395 397 | 0 | 4000.00 | 0.00 |
| 397 | 0.256000 | 30.00 | 1.478 | 16 | 182.000 | 179.000 | 2 | 0.00000 | 396 0 | 0 | 4000.00 | 0.00 |
| 398 | 0.256000 | 40.00 | 1.653 | 16 | 130.400 | 141.750 | 2 | 0.00000 | 395 0 | 0 | 4000.00 | 0.00 |
| 399 | 0.505000 | 120.00 | 1.538 | 3 | 94.500 | 90.500 | 2 | 0.00000 | 158 400 | 0 | 4000.00 | 0.00 |
| 400 | 0.336000 | 5.00 | 8.007 | 4 | 90.500 | 90.500 | 2 | 0.00000 | 399 401 | 0 | 4000.00 | 0.00 |
| 401 | 0.256000 | 60.00 | 1.349 | 16 | 90.500 | 141.750 | 2 | 0.00000 | 400 0 | 0 | 4000.00 | 0.00 |
| 402 | 0.336000 | 130.00 | 1.496 | 3 | 90.500 | 65.300 | 2 | 0.00000 | 399 403 | 0 | 4000.00 | 0.00 |
| 403 | 0.336000 | 50.00 | 1.228 | 4 | 65.300 | 94.700 | 2 | 0.00000 | 402 404 | 0 | 4000.00 | 0.00 |
| 404 | 0.256000 | 55.00 | 1.315 | 16 | 94.700 | 141.750 | 2 | 0.00000 | 403 0 | 0 | 4000.00 | 0.00 |
| 405 | 0.336000 | 40.00 | 2.260 | 3 | 65.300 | 77.500 | 2 | 0.00000 | 402 406 | 0 | 4000.00 | 0.00 |
| 406 | 0.256000 | 30.00 | 1.458 | 16 | 77.500 | 103.500 | 2 | 0.00000 | 405 0 | 0 | 4000.00 | 0.00 |
| 407 | 0.256000 | 125.00 | 1.180 | 16 | 77.500 | 75.000 | 2 | 0.00000 | 405 0 | 0 | 4000.00 | 0.00 |
| 408 | 0.336000 | 135.00 | 1.552 | 4 | 79.000 | 142.000 | 2 | 0.00000 | 139 409 | 0 | 4000.00 | 0.00 |
| 409 | 0.336000 | 20.00 | 1.000 | 16 | 142.000 | 141.750 | 2 | 0.00000 | 408 0 | 0 | 4000.00 | 0.00 |
| 410 | 0.256000 | 95.00 | 1.334 | 19 | 96.200 | 174.000 | 2 | 0.00000 | 150 411 | 0 | 4000.00 | 0.00 |
| 411 | 0.256000 | 10.00 | 1.358 | 4 | 174.000 | 183.500 | 2 | 0.00000 | 410 412 | 0 | 4000.00 | 0.00 |
| 412 | 0.107000 | 60.00 | 1.439 | 4 | 183.500 | 197.500 | 2 | 0.00000 | 411 413 | 0 | 4000.00 | 0.00 |
| 413 | 0.107000 | 25.00 | 1.000 | 16 | 197.500 | 197.500 | 2 | 0.00000 | 412 0 | 0 | 4000.00 | 0.00 |
| 414 | 0.505000 | 100.00 | 2.373 | 3 | 91.940 | 138.300 | 2 | 0.00000 | 143 415 | 0 | 4000.00 | 0.00 |
| 415 | 0.505000 | 5.00 | 5.848 | 2 | 138.300 | 142.000 | 2 | 0.00000 | 414 416 | 0 | 4000.00 | 0.00 |
| 416 | 0.336000 | 5.00 | 1.000 | 4 | 142.000 | 142.000 | 2 | 0.00000 | 415 417 | 0 | 4000.00 | 0.00 |
| 417 | 0.336000 | 50.00 | 1.000 | 4 | 142.000 | 160.000 | 2 | 0.00000 | 416 418 | 0 | 4000.00 | 0.00 |
| 418 | 0.336000 | 50.00 | 1.000 | 16 | 160.000 | 160.000 | 2 | 0.00000 | 417 0 | 0 | 4000.00 | 0.00 |
| 419 | 0.505000 | 85.00 | 2.031 | 4 | 94.500 | 131.500 | 2 | 0.00000 | 154 420 | 0 | 4000.00 | 0.00 |
| 420 | 0.505000 | 50.00 | 1.443 | 4 | 131.500 | 130.750 | 2 | 0.00000 | 419 421 | 0 | 4000.00 | 0.00 |
| 421 | 0.505000 | 30.00 | 1.909 | 4 | 130.750 | 130.750 | 2 | 0.00000 | 420 422 | 0 | 4000.00 | 0.00 |
| 422 | 0.505000 | 40.00 | 2.361 | 4 | 130.750 | 128.750 | 2 | 0.00000 | 421 423 | 0 | 4000.00 | 0.00 |
| 423 | 0.505000 | 35.00 | 1.491 | 3 | 128.750 | 132.170 | 2 | 0.00000 | 422 424 | 0 | 4000.00 | 0.00 |
| 424 | 0.256000 | 10.00 | 1.505 | 4 | 132.170 | 138.000 | 2 | 0.00000 | 423 425 | 0 | 4000.00 | 0.00 |
| 425 | 0.162000 | 105.00 | 1.580 | 16 | 138.000 | 169.500 | 2 | 0.00000 | 424 0 | 0 | 4000.00 | 0.00 |
| 426 | 0.336000 | 40.00 | 1.843 | 3 | 132.170 | 132.170 | 2 | 0.00000 | 423 427 | 0 | 4000.00 | 0.00 |
| 427 | 0.256000 | 10.00 | 1.000 | 4 | 132.170 | 138.000 | 2 | 0.00000 | 426 428 | 0 | 4000.00 | 0.00 |
| 428 | 0.162000 | 100.00 | 1.632 | 16 | 138.000 | 169.500 | 2 | 0.00000 | 427 0 | 0 | 4000.00 | 0.00 |
| 429 | 0.256000 | 40.00 | 1.165 | 4 | 132.170 | 138.000 | 2 | 0.00000 | 426 430 | 0 | 4000.00 | 0.00 |
| 430 | 0.162000 | 155.00 | 1.548 | 16 | 138.000 | 169.500 | 2 | 0.00000 | 429 0 | 0 | 4000.00 | 0.00 |
| 431 | 0.256000 | 40.00 | 1.934 | 4 | 65.500 | 69.000 | 2 | 0.00000 | 286 432 | 0 | 4000.00 | 0.00 |
| 432 | 0.256000 | 105.00 | 1.020 | 4 | 69.000 | 171.000 | 2 | 0.00000 | 431 433 | 0 | 4000.00 | 0.00 |
| 433 | 0.162000 | 10.00 | 1.227 | 19 | 171.000 | 181.000 | 2 | 0.00000 | 432 434 | 0 | 4000.00 | 0.00 |
| 434 | 0.162000 | 40.00 | 1.332 | 16 | 181.000 | 180.000 | 2 | 0.00000 | 433 0 | 0 | 4000.00 | 0.00 |
| 435 | 0.665000 | 15.00 | 5.522 | 3 | 89.600 | 83.800 | 2 | 0.00000 | 166 436 | 0 | 4000.00 | 0.00 |
| 436 | 0.665000 | 5.00 | 3.660 | 3 | 83.800 | 83.800 | 2 | 0.00000 | 435 437 | 0 | 4000.00 | 0.00 |
| 437 | 0.665000 | 5.00 | 14.300 | 3 | 83.800 | 83.800 | 2 | 0.00000 | 436 438 | 0 | 4000.00 | 0.00 |
| 438 | 0.505000 | 5.00 | 4.652 | 13 | 83.800 | 88.000 | 2 | 0.00000 | 437 439 | 0 | 4000.00 | 0.00 |
| 439 | 0.505000 | 5.00 | 6.050 | 2 | 88.000 | 89.000 | 2 | 0.00000 | 438 440 | 0 | 4000.00 | 0.00 |
| 440 | 0.336000 | 60.00 | 5.000 | 1 | 89.000 | 113.000 | 2 | 0.00000 | 439 0 | 0 | 4000.00 | 0.00 |
| 441 | 0.665000 | 10.00 | 9.911 | 3 | 83.800 | 91.500 | 2 | 0.00000 | 437 442 | 0 | 4000.00 | 0.00 |
| 442 | 0.665000 | 80.00 | 1.865 | 3 | 91.500 | 102.800 | 2 | 0.00000 | 441 443 | 0 | 4000.00 | 0.00 |
| 443 | 0.665000 | 50.00 | 1.106 | 16 | 102.800 | 130.000 | 2 | 0.00000 | 442 0 | 0 | 4000.00 | 0.00 |

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 444    0.336000     10.00    5.435  16     102.800   107.800     2     0.00000 442   0     0   4000.00      0.00
 445    0.665000     40.00    2.658  16      91.500    86.000     2     0.00000 441   0     0   4000.00      0.00
 446    0.505000      5.00    7.868  13      83.800    88.000     2     0.00000 435 447     0   4000.00      0.00
 447    0.505000      5.00    1.000   2      88.000    89.000     2     0.00000 446 448     0   4000.00      0.00
 448    0.505000     45.00    2.301   4      89.000   103.000     2     0.00000 447 449     0   4000.00      0.00
 449    0.336000     20.00    2.613   4     103.000   112.000     2     0.00000 448 450     0   4000.00      0.00
 450    0.336000    110.00    2.307   1     112.000   113.000     2     0.00000 449   0     0   4000.00      0.00
 451    0.336000    160.00    1.474   4      83.800   141.000     2     0.00000 436 452     0   4000.00      0.00
 452    0.336000      5.00    1.000   2     141.000   141.000     2     0.00000 451 453     0   4000.00      0.00
 453    0.256000     50.00    1.000   1     141.000   141.000     2     0.00000 452   0     0   4000.00      0.00
 454    0.665000     30.00    4.979   3      84.100    93.500     2     0.00000 204 455     0   4000.00      0.00
 455    0.665000     10.00    2.862   2      93.500   103.500     2     0.00000 454 456     0   4000.00      0.00
 456    0.505000     50.00    5.000   1     103.500   103.500     2     0.00000 455   0     0   4000.00      0.00
 457    0.505000     20.00    2.414   4      93.500    80.300     2     0.00000 454 458     0   4080.00      0.00
 458    0.505000     50.00    1.000  16      80.300    80.300     2     0.00000 457   0     0   4000.00      0.00
 459    0.336000     20.00    3.318   2      62.750    62.750     2     0.00000 218 460     0   4000.00      0.00
 460    0.336000     10.00    2.210   4      62.750    63.750     2     0.00000 459 461     0   4000.00      0.00
 461    0.336000     30.00    1.762   4      63.750    86.250     2     0.00000 460 462     0   4000.00      0.00
 462    0.336000     40.00    1.286   4      86.250   125.000     2     0.00000 461 463     0   4000.00      0.00
 463    0.336000    130.00    1.233   4     125.000   125.000     2     0.00000 462 464     0   4000.00      0.00
 464    0.336000     30.00    1.587   4     125.000   155.000     2     0.00000 463 465     0   4000.00      0.00
 465    0.256000     60.00    1.171   4     155.000   208.000     2     0.00000 464 466     0   4000.00      0.00
 466    0.001000     10.00    1.000  16     208.000   205.000     2     0.00000 465   0     0   4000.00      0.00
 467    0.336000     20.00    2.378   2      94.000    94.000     2     0.00000 199 468     0   4000.00      0.00
 468    0.336000     20.00    1.000   4      94.000    94.000     2     0.00000 467 469     0   4000.00      0.00
 469    0.336000      5.00    1.538   4      94.000    94.000     2     0.00000 468 470     0   4000.00      0.00
 470    0.336000     25.00    2.665   4      94.000   113.000     2     0.00000 469 471     0   4000.00      0.00
 471    0.336000     75.00    1.403   4     113.000   122.000     2     0.00000 470 472     0   4000.00      0.00
 472    0.336000     35.00    1.708   3     122.000   151.800     2     0.00000 471 473     0   4000.00      0.00
 473    0.336000     30.00    2.322   3     151.800   169.500     2     0.00000 472 474     0   4000.00      0.00
 474    0.336000     35.00    1.770   4     169.500   187.800     2     0.00000 473 475     0   4000.00      0.00
 475    0.256000     15.00    1.717   4     187.800   187.800     2     0.00000 474 476     0   4000.00      0.00
 476    0.256000    110.00    1.130   4     187.800   205.300     2     0.00000 475 477     0   4000.00      0.00
 477    0.256000     10.00    1.000  16     205.300   204.300     2     0.00000 476   0     0   4000.00      0.00
 478    0.256000     40.00    1.849  16     169.500   166.000     2     0.00000 473   0     0   4000.00      0.00
 479    0.336000     10.00    4.769   4     151.800   153.300     2     0.00000 472 480     0   4000.00      0.00
 480    0.256000     60.00    1.293  16     153.300   149.300     2     0.00000 479   0     0   4000.00      0.00
 481    0.505000      5.00   14.146   4      61.750    57.700     2     0.00000 208 482     0   4000.00      0.00
 482    0.505000     20.00    3.323   4      57.700    71.000     2     0.00000 481 483     0   4000.00      0.00
 483    0.505000     10.00    1.000   2      71.000    71.000     2     0.00000 482 484     0   4000.00      0.00
 484    0.505000     50.00    5.000   1      71.000    71.000     2     0.00000 483   0     0   4000.00      0.00
 485    0.505000      5.00   13.184   4     138.300   138.300     2     0.00000 414 486     0   4000.00      0.00
 486    0.336000     90.00    1.157   4     138.300   143.500     2     0.00000 485 487     0   4000.00      0.00
 487    0.336000     15.00    1.627   4     143.500   147.400     2     0.00000 486 488     0   4000.00      0.00
 488    0.336000     75.00    1.314   4     147.400   165.800     2     0.00000 487 489     0   4000.00      0.00
 489    0.336000     70.00    1.355   4     165.800   164.000     2     0.00000 488 490     0   4000.00      0.00
 490    0.336000     10.00    3.486   4     164.000   164.000     2     0.00000 489 491     0   4000.00      0.00
 491    0.336000     10.00    1.416   4     164.000   164.000     2     0.00000 490 492     0   4000.00      0.00
 492    0.256000     10.00    1.251   4     164.000   164.000     2     0.00000 491 493     0   4000.00      0.00
 493    0.206000     10.00    3.225   4     164.000   166.000     2     0.00000 492 494     0   4000.00      0.00
 494    0.206000     75.00    1.549   4     166.000   166.000     2     0.00000 493 495     0   4000.00      0.00
 495    0.172000     20.00    1.757  19     166.000   166.000     2     0.00000 494 496     0   4000.00      0.00
 496    0.087000     10.00    2.409  16     166.000   168.000     2     0.00000 495   0     0   4000.00      0.00
@EOR

 91 570.3   0  18
   20.00   .000     -0.022     -0.033    -0.045    -0.056    -0.067    -0.078
  -0.089  -.100     -0.111     -0.123    -0.134    -0.145    -0.156    -0.167
  -0.200   -100.0
    570.3  570.3     587.3     590.3     587.3     580.3     568.3     558.3
    542.3  520.3     490.3     460.3     420.3     370.3     310.3     240.3
    170.3  170.3

 99 495.3   0  18
   20.00   .000     -0.557     -1.114    -1.671    -2.228    -2.785    -3.342
  -3.899  -4.46     -5.013     -5.570    -6.127    -6.684    -7.241    -8.912
  -13.4   -100.0
    495.3  495.3     494.3     492.3     491.3     488.3     485.3     481.3
    477.3  472.3     466.3     459.3     448.3     436.3     423.3     375.3
    170.3  170.3

117 512.1  0 17
   20.00  -.000     -0.557    -1.114    -1.671    -2.228    -2.785    -3.342
  -3.899  -4.46     -5.013    -5.57     -6.127    -6.684    -7.241    -8.912
  -13.37
    512.1  512.1     510.1     507.1     505.1     502.1     500.1     498.1
    495.1  492.1     487.8     481.1     476.1     467.1     457.1     412.1
    160.1
```

```
123 512.1  0 17
   20.00  -.000     -0.557    -1.114    -1.671    -2.228    -2.785    -3.342
  -3.899  -4.46     -5.013    -5.57     -6.127    -6.684    -7.241    -8.912
  -13.37
   512.1  512.1     510.1     507.1     505.1     502.1     500.1     498.1
   495.1  492.1     487.8     481.1     476.1     467.1     457.1     412.1
   160.1

129 482.1   0  16
   20.00   .000     -0.022     -0.033    -0.045    -0.056    -0.067    -0.078
  -0.089  -.100     -0.111     -0.123    -0.134    -0.145    -0.156    -100.0
  482.1  482.1     478.1     473.1     463.1     448.1     428.1     403.1
  374.1  343.1     308.1     268.1     233.1     198.1     168.1     168.1

440 147.0   0   0

450 147.0   0   0

453 175.0   0   0

456 137.5   0   0

484 105.0   0   0

  4 0  100.  100. 1.0E+20   2  9  4  0  .01   393.6
0     .56   2.36    100
100.  100.  0.      0.
0     50.0   90.0  92.5   95.3   97.5      99.0      99.7       100.0
0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

 90 0  100  100  1.0E+20    2  9  3  0  .01  570.3
 0       0.01  100
 100     0    0
 0     50.0   90.0  92.5   95.3   97.5      99.0      99.7       100.0
0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

 96 0  100  100  1.0E+20   2  9  4  0  .01  495.3
 0      .63   3.43   100
 100.   100.  100.   100.
 0     50.0   90.0  92.5   95.3   97.5      99.0      99.7       100.0
0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

102 0  100.  100. 1.0E+20   2  9  4  0  .01   393.6
 0     2.0   2.01    100
 100.  100.  100.    100.
 0     50.0   90.0  92.5   95.3   97.5      99.0      99.7       100.0
0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

114 0  100  100  1.0E+20    2  9  4  0  .01  512.1
0       2.51  5.61   100
100     100   100.   100.
0     50.0   90.0  92.5   95.3   97.5      99.0      99.7       100.0
0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

121 0  100  100  1.0E+20    2  9  4  0  .01  512.1
0       21.93 27.13 100
100     100   100   100
0     50.0   90.0  92.5   95.3   97.5      99.0      99.7       100.0
0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

126 0  100  100  1.0E+20    2  9  3  0  .01  482.1
 0       0.01  100
 100     100   100
 0     50.0   90.0  92.5   95.3   97.5      99.0      99.7       100.0
0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

415  0  100  100  1.0E+20   2  16  3  0  1.79  194.
0        0.1    100
100     100    100
0   11.1   16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
97.5     99.0     99.7  100.0
10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
203570   1596000  0.49259E+08  0.1E+21

439  0  100  100  1.0E+20   2  16  3  0  1.79  147.
0       0.1    100
100     100    100
```

```
0    11.1  16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
97.5     99.0     99.7  100.0
10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
203570   1596000  0.49259E+08  0.1E+21

447  0  100  100  1.0E+20   2  16  3  0  0.99  147.
0       0.01    100
100     0       0
0    11.1  16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
97.5     99.0     99.7  100.0
10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
203570   1596000  0.49259E+08  0.1E+21

452  0  100  100  1.0E+20   2  16  3  0  1.785  175.
0       0.01   100
100     100    100
0    11.1  16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
97.5     99.0     99.7  100.0
10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
203570   1596000  0.49259E+08  0.1E+21

455  0  100  100  1.0E+20   2  16  3  0  0.695  137.5
 0       0.01   100
 100     100    100
 0    11.1  16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
 97.5     99.0     99.7  100.0
 10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
203570   1596000  0.49259E+08  0.1E+21

459  0  100  100  1.0E+20   2  9  3  0  .01  96.8
0       1.0   100
100     100   100
0     50.0   90.0  92.5   95.3   97.5      99.0      99.7       100.0
0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

467  0  100  100  1.0E+20   2  9  3  0  .01  128.
0       1.0   100
100     100   100
0     50.0   90.0  92.5   95.3   97.5      99.0      99.7       100.0
0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

483  0  100  100  1.0E+20  2  16  4  0  0.99  105.0
0       0.1   0.11  100
100     100   100   100
0    11.1  16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
97.5     99.0     99.7  100.0
10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
203570   1596000  0.49259E+08  0.1E+21


  5  2  0.650  0.01 0.7850 0.0  ID 1.0000
438  2  0.750  0.01 0.2003 0.0  ID 0.5050
446  2  0.750  0.01 0.2003 0.0  ID 0.5050

308   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102

410   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102


433   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102

362   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102

396   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
```

```
53.3   2        .102


495   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102

334   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102

371   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102

382   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102


 1.          1.
 6     2
 94    2
 97    2
 102   2
 113   2
 120   2
 184   41
 188   46
 194   31
 289   11
 290    7
 291    6
 292   23
 299   17
 303   11
 304   1
 306   24
 308   26
 314   6
 322   11
 325    5
 332    2
 334    9
 347   11
 351   10
 362    9
 371   2
 376   6
 382   13
 383    3
 396   31
 409   4
 410   17
 412   11
 418   9
 425   21
 428   20
 430   32
 432   20
 433   3
 450   22
 455   2
 465   1
 466   2
 476   4
 477   22
 478   8
 480   11
 483   2
 495   4
@EOR
 410      1      410     3          1
 410      3      410     5          2
```

# CALCULATION SHEET

| | | | |
|---|---|---|---|
| Project: | HOPE CREEK GENERATING STATION | Job Number: | 8038 |
| Calc No. | 8038-P0004 | Sheet No. | 159 |
| By: | A. Arastu Date: 9/14/18 | Rev. No. | 1 |
| Subject: | Water Hammer Analysis of the HCGS Fire Protection System | | |

```
410       4       410      18         3
410       18      410      19         4
410       18      411      3          5
412       1       412      2          6
412       1       412      3          7
412       3       412      6          8
412       5       412      6          9
412       6       412      7          10
412       7       412      10         11
@EOR
0      1.0    100   1
1.0   30.0    500   1
30.0 888.    1000   1
```

## B2 - Case 2 (6 inch Deluge Valve w/HC Diesel Pump) with Vacuum Breakers

*Note the run title in the first line below should be Case 2. It was erroneously typed as Case 9. This has no impact on the calculation results.*

```
HCGS FP Case 9: 9 VBs.  Forces in Riser # 26 only
10000
0  0  1  0  1  0
2   2   0.  12.
2   1   0   0
0   1   0  0  0  0  0  1 0 0
1.9  62.4  7.83E-6
1.0  2   13    0    0
       0.0    1000.0    2000.0   2.0E+04   6.0E+04   1.0E+05   3.0E+05   6.0E+05
   1.0E+06   1.5E+06   3.5E+06   1.0E+11   1.0E+33
      0.10     0.061     0.048     0.026     0.021      .019    0.0167    0.0155
    0.0150    0.0147     0.014     0.014     0.014
495.3   3  17  0    0
  -10.00   .000   .557  1.114  1.671  2.228  2.785  3.342
   3.899  4.456  5.013  5.570  6.127  6.684  7.241  8.912
   13.4
   495.3  495.3     494.3     492.3     491.3     488.3     485.3     481.3
   477.3  472.3     466.3     459.3     448.3     436.3     423.3     375.3
   170.3
   1
   1    1.104000     55.00    5.492   4      99.400    94.000     2     0.00000   0   2     0   4000.00       0.00
   2    1.000000     20.00    7.400   4      94.000   105.040     2     0.00000   1   3     0   4000.00       0.00
   3    1.000000     10.00    7.180   4     105.040   105.040     2     0.00000   2   4     0   4000.00       0.00
   4    1.000000     10.00    3.538   2     105.040   104.500     2     0.00000   3   5     0   4000.00       0.00
   5    1.000000      5.00   18.508  13     104.500   104.750     2     0.00000   4   6     0   4000.00       0.00
   6    1.000000     10.00    5.200   4     104.750   110.000     2     0.00000   5   7     0   4000.00       0.00
   7    1.000000     20.00    3.400   3     110.000   105.000     2     0.00000   6   8     0   4000.00       0.00
   8    1.000000    115.00    2.402   3     105.000    96.900     2     0.00000   7  86     0   4000.00       0.00
   9    1.007000      5.00    2.611   4      96.900    96.900     2     0.00000   8  10     0   4000.00       0.00
  10    1.007000     10.00    3.014   4      96.900    96.900     2     0.00000   9  11     0   4000.00       0.00
  11    1.007000     10.00    1.806   4      96.900    96.900     2     0.00000  10  12     0   4000.00       0.00
  12    1.007000     10.00    3.014   3      96.900    96.900     2     0.00000  11  13     0   4000.00       0.00
  13    1.007000    110.00    1.183   4      96.900    96.900     2     0.00000  12  14     0   4000.00       0.00
  14    1.007000    110.00    1.363   4      96.900    95.900     2     0.00000  13  15     0   4000.00       0.00
  15    1.007000     10.00    3.014   4      95.900    95.900     2     0.00000  14  16     0   4000.00       0.00
  16    1.007000     30.00    1.671   4      95.900    95.900     2     0.00000  15  17     0   4000.00       0.00
  17    1.007000     80.00    1.252   4      95.900    95.900     2     0.00000  16  18     0   4000.00       0.00
  18    1.007000     20.00    1.403   4      95.900    95.900     2     0.00000  17  19     0   4000.00       0.00
  19    1.007000    130.00    1.155   4      95.900    95.900     2     0.00000  18  20     0   4000.00       0.00
  20    1.007000    135.00    1.060   4      95.900    95.400     2     0.00000  19  21     0   4000.00       0.00
  21    1.007000     10.00    2.994   4      95.400    93.500     2     0.00000  20  22     0   4000.00       0.00
  22    1.007000     65.00    1.217   4      93.500    93.500     2     0.00000  21  23     0   4000.00       0.00
  23    1.007000      5.00    1.000   4      93.500    93.500     2     0.00000  22  24     0   4000.00       0.00
  24    1.007000     20.00    3.004   4      93.500    97.000     2     0.00000  23  25     0   4000.00       0.00
  25    1.007000    200.00    1.300   4      97.000    97.000     2     0.00000  24  26     0   4000.00       0.00
  26    1.007000     55.00    1.513   4      97.000    97.000     2     0.00000  25  27     0   4000.00       0.00
  27    1.007000     20.00    1.997   4      97.000    93.000     2     0.00000  26  28     0   4000.00       0.00
  28    1.007000    230.00    1.088   3      93.000    93.000     2     0.00000  27 181     0   4000.00       0.00
  29    1.007000     40.00    1.503   3      93.000    93.000     2     0.00000  28  30     0   4000.00       0.00
  30    1.007000    240.00    1.117   4      93.000    94.500     2     0.00000  29  31     0   4000.00       0.00
  31    1.007000     45.00    1.448   4      94.500    94.500     2     0.00000  30  32     0   4000.00       0.00
  32    1.007000     35.00    1.570   4      94.500    91.000     2     0.00000  31  33     0   4000.00       0.00
  33    1.007000    180.00    1.111   4      91.000    96.000     2     0.00000  32  34     0   4000.00       0.00
  34    1.007000     10.00    3.014   4      96.000    96.000     2     0.00000  33  35     0   4000.00       0.00
  35    1.007000      5.00    5.028   4      96.000    96.000     2     0.00000  34  36     0   4000.00       0.00
  36    1.007000      5.00    2.611   4      96.000    96.000     2     0.00000  35  37     0   4000.00       0.00
  37    1.007000     10.00    3.014   4      96.000    96.000     2     0.00000  36  38     0   4000.00       0.00
  38    1.007000     30.00    2.141   4      96.000    96.000     2     0.00000  37  39     0   4000.00       0.00
  39    1.007000     20.00    1.403   4      96.000    96.000     2     0.00000  38  40     0   4000.00       0.00
  40    1.007000     80.00    1.252   3      96.000    96.000     2     0.00000  39  41     0   4000.00       0.00
  41    1.007000     10.00    1.806   4      96.000    96.000     2     0.00000  40  42     0   4000.00       0.00
  42    1.007000     20.00    1.000   4      96.000    96.000     2     0.00000  41  43     0   4000.00       0.00
  43    1.007000     55.00    1.363   4      96.000    97.200     2     0.00000  42  44     0   4000.00       0.00
  44    1.007000      5.00    5.028   4      97.200    97.200     2     0.00000  43  45     0   4000.00       0.00
  45    1.007000    160.00    1.175   4      97.200    96.200     2     0.00000  44  46     0   4000.00       0.00
  46    1.007000     15.00    2.343   3      96.200    96.200     2     0.00000  45 162     0   4000.00       0.00
  47    1.007000      5.00    5.028   4      96.200    96.200     2     0.00000  46  48     0   4000.00       0.00
```

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 48 | 1.007000 | 15.00 | 6.357 | 4 | 96.200 | 97.000 | 2 | 0.00000 | 47 | 49 | 0 | 4000.00 | 0.00 |
| 49 | 1.007000 | 60.00 | 1.166 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 48 | 50 | 0 | 4000.00 | 0.00 |
| 50 | 1.007000 | 15.00 | 2.994 | 4 | 97.000 | 94.500 | 2 | 0.00000 | 49 | 51 | 0 | 4000.00 | 0.00 |
| 51 | 1.007000 | 5.00 | 4.605 | 4 | 94.500 | 97.000 | 2 | 0.00000 | 50 | 52 | 0 | 4000.00 | 0.00 |
| 52 | 1.007000 | 15.00 | 2.329 | 4 | 97.000 | 94.000 | 2 | 0.00000 | 51 | 53 | 0 | 4000.00 | 0.00 |
| 53 | 1.007000 | 80.00 | 1.501 | 4 | 94.000 | 96.500 | 2 | 0.00000 | 52 | 54 | 0 | 4000.00 | 0.00 |
| 54 | 1.007000 | 65.00 | 1.310 | 3 | 96.500 | 96.500 | 2 | 0.00000 | 53 | 55 | 0 | 4000.00 | 0.00 |
| 55 | 1.007000 | 50.00 | 1.481 | 4 | 96.500 | 97.200 | 2 | 0.00000 | 54 | 56 | 0 | 4000.00 | 0.00 |
| 56 | 1.007000 | 25.00 | 1.322 | 4 | 97.200 | 97.200 | 2 | 0.00000 | 55 | 57 | 0 | 4000.00 | 0.00 |
| 57 | 1.007000 | 5.00 | 3.820 | 4 | 97.200 | 97.200 | 2 | 0.00000 | 56 | 58 | 0 | 4000.00 | 0.00 |
| 58 | 1.007000 | 70.00 | 1.288 | 4 | 97.200 | 97.200 | 2 | 0.00000 | 57 | 59 | 0 | 4000.00 | 0.00 |
| 59 | 1.007000 | 10.00 | 1.806 | 4 | 97.200 | 97.200 | 2 | 0.00000 | 58 | 60 | 0 | 4000.00 | 0.00 |
| 60 | 1.007000 | 195.00 | 1.103 | 4 | 97.200 | 97.200 | 2 | 0.00000 | 59 | 61 | 0 | 4000.00 | 0.00 |
| 61 | 1.007000 | 240.00 | 1.159 | 4 | 97.200 | 94.500 | 2 | 0.00000 | 60 | 62 | 0 | 4000.00 | 0.00 |
| 62 | 1.007000 | 215.00 | 1.094 | 4 | 94.500 | 94.500 | 2 | 0.00000 | 61 | 63 | 0 | 4000.00 | 0.00 |
| 63 | 1.007000 | 110.00 | 1.183 | 4 | 94.500 | 94.500 | 2 | 0.00000 | 62 | 64 | 0 | 4000.00 | 0.00 |
| 64 | 1.007000 | 195.00 | 1.103 | 4 | 94.500 | 94.500 | 2 | 0.00000 | 63 | 65 | 0 | 4000.00 | 0.00 |
| 65 | 1.007000 | 5.00 | 5.028 | 4 | 94.500 | 94.500 | 2 | 0.00000 | 64 | 66 | 0 | 4000.00 | 0.00 |
| 66 | 1.007000 | 30.00 | 1.665 | 4 | 94.500 | 95.800 | 2 | 0.00000 | 65 | 67 | 0 | 4000.00 | 0.00 |
| 67 | 1.007000 | 5.00 | 2.611 | 4 | 95.800 | 95.800 | 2 | 0.00000 | 66 | 68 | 0 | 4000.00 | 0.00 |
| 68 | 1.007000 | 25.00 | 1.806 | 3 | 95.800 | 95.800 | 2 | 0.00000 | 67 | 229 | 0 | 4000.00 | 0.00 |
| 69 | 1.007000 | 130.00 | 1.155 | 4 | 95.800 | 95.500 | 2 | 0.00000 | 68 | 70 | 0 | 4000.00 | 0.00 |
| 70 | 1.007000 | 5.00 | 2.611 | 3 | 95.500 | 95.500 | 2 | 0.00000 | 69 | 261 | 0 | 4000.00 | 0.00 |
| 71 | 1.007000 | 5.00 | 5.028 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 70 | 72 | 0 | 4000.00 | 0.00 |
| 72 | 1.007000 | 5.00 | 2.611 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 71 | 73 | 0 | 4000.00 | 0.00 |
| 73 | 1.007000 | 205.00 | 1.098 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 72 | 74 | 0 | 4000.00 | 0.00 |
| 74 | 1.007000 | 240.00 | 1.117 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 73 | 75 | 0 | 4000.00 | 0.00 |
| 75 | 1.007000 | 20.00 | 4.021 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 74 | 76 | 0 | 4000.00 | 0.00 |
| 76 | 1.007000 | 30.00 | 1.665 | 4 | 95.500 | 91.500 | 2 | 0.00000 | 75 | 77 | 0 | 4000.00 | 0.00 |
| 77 | 1.007000 | 25.00 | 2.120 | 4 | 91.500 | 97.000 | 2 | 0.00000 | 76 | 78 | 0 | 4000.00 | 0.00 |
| 78 | 1.007000 | 50.00 | 1.403 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 77 | 79 | 0 | 4000.00 | 0.00 |
| 79 | 1.007000 | 50.00 | 1.403 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 78 | 80 | 0 | 4000.00 | 0.00 |
| 80 | 1.007000 | 20.00 | 1.997 | 4 | 97.000 | 90.500 | 2 | 0.00000 | 79 | 81 | 0 | 4000.00 | 0.00 |
| 81 | 1.007000 | 40.00 | 2.002 | 4 | 90.500 | 96.900 | 2 | 0.00000 | 80 | 82 | 0 | 4000.00 | 0.00 |
| 82 | 1.007000 | 165.00 | 1.122 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 81 | 83 | 0 | 4000.00 | 0.00 |
| 83 | 1.007000 | 135.00 | 1.060 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 82 | 84 | 0 | 4000.00 | 0.00 |
| 84 | 1.007000 | 10.00 | 3.014 | 3 | 96.900 | 96.900 | 2 | 0.00000 | 83 | 101 | 0 | 4000.00 | 0.00 |
| 85 | 1.007000 | 60.00 | 1.134 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 84 | 86 | 0 | 4000.00 | 0.00 |
| 86 | 1.007000 | 5.00 | 5.028 | 3 | 96.900 | 96.900 | 2 | 0.00000 | 85 | 9 | 1 | 4000.00 | 0.00 |
| 87 | 0.336000 | 10.00 | 5.771 | 3 | 105.000 | 112.070 | 2 | 0.00000 | 7 | 88 | 0 | 4000.00 | 0.00 |
| 88 | 0.336000 | 5.00 | 5.570 | 4 | 112.070 | 113.750 | 2 | 0.00000 | 87 | 89 | 0 | 4000.00 | 0.00 |
| 89 | 0.256000 | 30.00 | 1.870 | 4 | 113.750 | 109.000 | 2 | 0.00000 | 88 | 90 | 0 | 4000.00 | 0.00 |
| 90 | 0.256000 | 10.00 | 1.205 | 2 | 109.000 | 104.250 | 2 | 0.00000 | 89 | 91 | 0 | 4000.00 | 0.00 |
| 91 | 0.256000 | 5.00 | 5.933 | 1 | 104.250 | 103.750 | 2 | 0.00000 | 90 | 0 | 0 | 4000.00 | 0.00 |
| 92 | 0.336000 | 40.00 | 2.714 | 3 | 112.070 | 105.000 | 2 | 0.00000 | 87 | 93 | 0 | 4000.00 | 0.00 |
| 93 | 1.000000 | 20.00 | 3.400 | 4 | 105.000 | 110.200 | 2 | 0.00000 | 92 | 94 | 0 | 4000.00 | 0.00 |
| 94 | 1.000000 | 10.00 | 3.800 | 4 | 110.200 | 104.750 | 2 | 0.00000 | 93 | 95 | 0 | 4000.00 | 0.00 |
| 95 | 1.000000 | 5.00 | 18.508 | 4 | 104.750 | 104.750 | 2 | 0.00000 | 94 | 96 | 0 | 4000.00 | 0.00 |
| 96 | 1.000000 | 10.00 | 3.538 | 2 | 104.750 | 104.750 | 2 | 0.00000 | 95 | 97 | 0 | 4000.00 | 0.00 |
| 97 | 1.000000 | 5.00 | 9.400 | 4 | 104.750 | 105.040 | 2 | 0.00000 | 96 | 98 | 0 | 4000.00 | 0.00 |
| 98 | 1.000000 | 20.00 | 7.400 | 4 | 105.040 | 94.000 | 2 | 0.00000 | 97 | 99 | 0 | 4000.00 | 0.00 |
| 99 | 1.104000 | 30.00 | 4.874 | 1 | 94.000 | 99.400 | 2 | 0.00000 | 98 | 0 | 0 | 4000.00 | 0.00 |
| 100 | 1.000000 | 85.00 | 1.864 | 4 | 105.000 | 91.000 | 2 | 0.00000 | 92 | 101 | 0 | 4000.00 | 0.00 |
| 101 | 1.000000 | 25.00 | 4.512 | 3 | 91.000 | 96.900 | 2 | 0.00000 | 100 | 85 | 1 | 4000.00 | 0.00 |
| 102 | 0.835000 | 5.00 | 12.356 | 2 | 96.000 | 96.000 | 2 | 0.00000 | 40 | 103 | 0 | 4000.00 | 0.00 |
| 103 | 0.788000 | 60.00 | 1.628 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 102 | 104 | 0 | 4000.00 | 0.00 |
| 104 | 0.788000 | 100.00 | 1.000 | 4 | 96.000 | 95.500 | 2 | 0.00000 | 103 | 105 | 0 | 4000.00 | 0.00 |
| 105 | 0.788000 | 100.00 | 1.000 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 104 | 106 | 0 | 4000.00 | 0.00 |
| 106 | 0.788000 | 30.00 | 2.786 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 105 | 107 | 0 | 4000.00 | 0.00 |
| 107 | 0.927000 | 35.00 | 2.059 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 106 | 108 | 0 | 4000.00 | 0.00 |
| 108 | 0.927000 | 150.00 | 1.494 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 107 | 109 | 0 | 4000.00 | 0.00 |
| 109 | 0.927000 | 50.00 | 1.519 | 3 | 95.500 | 95.500 | 2 | 0.00000 | 108 | 110 | 0 | 4000.00 | 0.00 |
| 110 | 0.927000 | 20.00 | 2.298 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 109 | 111 | 0 | 4000.00 | 0.00 |
| 111 | 0.927000 | 10.00 | 7.860 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 110 | 112 | 0 | 4000.00 | 0.00 |
| 112 | 1.000000 | 10.00 | 9.000 | 4 | 95.500 | 101.700 | 2 | 0.00000 | 111 | 113 | 0 | 4000.00 | 0.00 |
| 113 | 1.000000 | 5.00 | 5.400 | 4 | 101.700 | 102.800 | 2 | 0.00000 | 112 | 114 | 0 | 4000.00 | 0.00 |
| 114 | 1.000000 | 10.00 | 12.354 | 2 | 102.800 | 102.800 | 2 | 0.00000 | 113 | 115 | 0 | 4000.00 | 0.00 |
| 115 | 1.000000 | 5.00 | 8.877 | 4 | 102.800 | 102.800 | 2 | 0.00000 | 114 | 116 | 0 | 4000.00 | 0.00 |
| 116 | 1.000000 | 5.00 | 5.000 | 4 | 102.800 | 102.800 | 2 | 0.00000 | 115 | 117 | 0 | 4000.00 | 0.00 |
| 117 | 1.250000 | 30.00 | 3.333 | 1 | 102.800 | 103.000 | 2 | 0.00000 | 116 | 0 | 0 | 4000.00 | 0.00 |
| 118 | 0.927000 | 10.00 | 6.562 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 109 | 119 | 0 | 4000.00 | 0.00 |
| 119 | 1.000000 | 10.00 | 2.400 | 3 | 95.500 | 101.700 | 2 | 0.00000 | 118 | 120 | 0 | 4000.00 | 0.00 |
| 120 | 1.000000 | 5.00 | 7.800 | 4 | 101.700 | 102.800 | 2 | 0.00000 | 119 | 121 | 0 | 4000.00 | 0.00 |
| 121 | 1.000000 | 10.00 | 13.154 | 2 | 102.800 | 102.800 | 2 | 0.00000 | 120 | 122 | 0 | 4000.00 | 0.00 |
| 122 | 1.000000 | 10.00 | 8.938 | 4 | 102.800 | 102.800 | 2 | 0.00000 | 121 | 123 | 0 | 4000.00 | 0.00 |
| 123 | 1.250000 | 20.00 | 3.250 | 1 | 102.800 | 103.000 | 2 | 0.00000 | 122 | 0 | 0 | 4000.00 | 0.00 |
| 124 | 0.134000 | 5.00 | 3.624 | 4 | 101.700 | 101.700 | 2 | 0.00000 | 119 | 125 | 0 | 4000.00 | 0.00 |
| 125 | 0.134000 | 5.00 | 3.141 | 4 | 101.700 | 101.700 | 2 | 0.00000 | 124 | 126 | 0 | 4000.00 | 0.00 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 126 | 0.134000 | 5.00 | 1.000 | 2 | 101.700 | 101.700 | 2 | 0.00000 | 125 | 127 | 0 | 4000.00 | 0.00 |
| 127 | 0.134000 | 10.00 | 1.000 | 4 | 101.700 | 101.700 | 2 | 0.00000 | 126 | 128 | 0 | 4000.00 | 0.00 |
| 128 | 0.134000 | 10.00 | 1.000 | 4 | 101.700 | 101.700 | 2 | 0.00000 | 127 | 129 | 0 | 4000.00 | 0.00 |
| 129 | 0.134000 | 10.00 | 1.000 | 1 | 101.700 | 103.000 | 2 | 0.00000 | 128 | 0 | 0 | 4000.00 | 0.00 |
| 130 | 0.835000 | 5.00 | 11.020 | 4 | 93.000 | 93.000 | 2 | 0.00000 | 29 | 131 | 0 | 4000.00 | 0.00 |
| 131 | 0.835000 | 100.00 | 1.331 | 4 | 93.000 | 96.010 | 2 | 0.00000 | 130 | 132 | 0 | 4000.00 | 0.00 |
| 132 | 0.835000 | 25.00 | 1.267 | 4 | 96.010 | 96.010 | 2 | 0.00000 | 131 | 133 | 0 | 4000.00 | 0.00 |
| 133 | 0.835000 | 65.00 | 1.000 | 4 | 96.010 | 96.000 | 2 | 0.00000 | 132 | 134 | 0 | 4000.00 | 0.00 |
| 134 | 0.835000 | 20.00 | 2.653 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 133 | 135 | 0 | 4000.00 | 0.00 |
| 135 | 0.835000 | 105.00 | 1.382 | 3 | 96.000 | 89.000 | 2 | 0.00000 | 134 | 136 | 0 | 4000.00 | 0.00 |
| 136 | 0.835000 | 5.00 | 3.338 | 4 | 89.000 | 89.000 | 2 | 0.00000 | 135 | 137 | 0 | 4000.00 | 0.00 |
| 137 | 0.835000 | 50.00 | 1.334 | 3 | 89.000 | 89.000 | 2 | 0.00000 | 136 | 138 | 0 | 4000.00 | 0.00 |
| 138 | 0.835000 | 5.00 | 5.676 | 4 | 89.000 | 89.000 | 2 | 0.00000 | 137 | 139 | 0 | 4000.00 | 0.00 |
| 139 | 0.835000 | 5.00 | 4.340 | 3 | 89.000 | 89.000 | 2 | 0.00000 | 138 | 140 | 0 | 4000.00 | 0.00 |
| 140 | 0.835000 | 55.00 | 1.000 | 4 | 89.000 | 89.000 | 2 | 0.00000 | 139 | 141 | 0 | 4000.00 | 0.00 |
| 141 | 0.835000 | 25.00 | 1.668 | 3 | 89.000 | 89.000 | 2 | 0.00000 | 140 | 142 | 0 | 4000.00 | 0.00 |
| 142 | 0.835000 | 15.00 | 2.882 | 4 | 89.000 | 91.940 | 2 | 0.00000 | 141 | 143 | 0 | 4000.00 | 0.00 |
| 143 | 0.835000 | 25.00 | 1.668 | 3 | 91.940 | 91.940 | 2 | 0.00000 | 142 | 144 | 0 | 4000.00 | 0.00 |
| 144 | 0.835000 | 5.00 | 5.676 | 3 | 91.940 | 91.940 | 2 | 0.00000 | 143 | 145 | 0 | 4000.00 | 0.00 |
| 145 | 0.835000 | 5.00 | 4.340 | 3 | 91.940 | 91.940 | 2 | 0.00000 | 144 | 146 | 0 | 4000.00 | 0.00 |
| 146 | 0.835000 | 10.00 | 3.338 | 4 | 91.940 | 96.200 | 2 | 0.00000 | 145 | 147 | 0 | 4000.00 | 0.00 |
| 147 | 0.835000 | 5.00 | 3.338 | 4 | 96.200 | 96.200 | 2 | 0.00000 | 146 | 148 | 0 | 4000.00 | 0.00 |
| 148 | 0.835000 | 145.00 | 1.000 | 4 | 96.200 | 96.200 | 2 | 0.00000 | 147 | 149 | 0 | 4000.00 | 0.00 |
| 149 | 0.835000 | 10.00 | 2.670 | 4 | 96.200 | 96.200 | 2 | 0.00000 | 148 | 150 | 0 | 4000.00 | 0.00 |
| 150 | 0.835000 | 90.00 | 1.186 | 3 | 96.200 | 96.200 | 2 | 0.00000 | 149 | 151 | 0 | 4000.00 | 0.00 |
| 151 | 0.835000 | 5.00 | 5.676 | 4 | 96.200 | 94.530 | 2 | 0.00000 | 150 | 152 | 0 | 4000.00 | 0.00 |
| 152 | 0.835000 | 15.00 | 2.664 | 3 | 94.530 | 94.530 | 2 | 0.00000 | 151 | 153 | 0 | 4000.00 | 0.00 |
| 153 | 0.835000 | 5.00 | 2.336 | 4 | 94.530 | 94.530 | 2 | 0.00000 | 152 | 154 | 0 | 4000.00 | 0.00 |
| 154 | 0.835000 | 5.00 | 4.340 | 3 | 94.530 | 94.540 | 2 | 0.00000 | 153 | 155 | 0 | 4000.00 | 0.00 |
| 155 | 0.835000 | 15.00 | 2.559 | 3 | 94.540 | 94.540 | 2 | 0.00000 | 154 | 156 | 0 | 4000.00 | 0.00 |
| 156 | 0.835000 | 5.00 | 4.340 | 3 | 94.540 | 94.540 | 2 | 0.00000 | 155 | 157 | 0 | 4000.00 | 0.00 |
| 157 | 0.835000 | 5.00 | 3.338 | 4 | 94.540 | 94.540 | 2 | 0.00000 | 156 | 158 | 0 | 4000.00 | 0.00 |
| 158 | 0.835000 | 5.00 | 3.338 | 3 | 94.540 | 94.500 | 2 | 0.00000 | 157 | 159 | 0 | 4000.00 | 0.00 |
| 159 | 0.835000 | 5.00 | 4.340 | 4 | 94.500 | 94.500 | 2 | 0.00000 | 158 | 160 | 0 | 4000.00 | 0.00 |
| 160 | 0.835000 | 55.00 | 1.425 | 3 | 94.500 | 94.500 | 2 | 0.00000 | 159 | 161 | 0 | 4000.00 | 0.00 |
| 161 | 0.835000 | 175.00 | 1.286 | 4 | 94.500 | 96.200 | 2 | 0.00000 | 160 | 162 | 0 | 4000.00 | 0.00 |
| 162 | 0.835000 | 100.00 | 1.568 | 3 | 96.200 | 96.200 | 2 | 0.00000 | 161 | 47 | 1 | 4000.00 | 0.00 |
| 163 | 0.835000 | 10.00 | 3.338 | 4 | 94.500 | 91.750 | 2 | 0.00000 | 160 | 164 | 0 | 4000.00 | 0.00 |
| 164 | 0.835000 | 40.00 | 1.413 | 4 | 91.750 | 89.580 | 2 | 0.00000 | 163 | 165 | 0 | 4000.00 | 0.00 |
| 165 | 0.835000 | 25.00 | 3.071 | 4 | 89.580 | 89.580 | 2 | 0.00000 | 164 | 166 | 0 | 4000.00 | 0.00 |
| 166 | 0.835000 | 5.00 | 4.340 | 3 | 89.580 | 89.580 | 2 | 0.00000 | 165 | 167 | 0 | 4000.00 | 0.00 |
| 167 | 0.835000 | 5.00 | 1.000 | 16 | 89.580 | 89.580 | 2 | 0.00000 | 166 | 0 | 0 | 4000.00 | 0.00 |
| 168 | 0.835000 | 5.00 | 13.358 | 4 | 89.000 | 91.000 | 2 | 0.00000 | 141 | 169 | 0 | 4000.00 | 0.00 |
| 169 | 0.835000 | 35.00 | 2.002 | 3 | 91.000 | 91.000 | 2 | 0.00000 | 168 | 170 | 0 | 4000.00 | 0.00 |
| 170 | 0.835000 | 10.00 | 4.340 | 3 | 91.000 | 91.000 | 2 | 0.00000 | 169 | 171 | 0 | 4000.00 | 0.00 |
| 171 | 0.835000 | 75.00 | 1.312 | 4 | 91.000 | 91.000 | 2 | 0.00000 | 170 | 172 | 0 | 4000.00 | 0.00 |
| 172 | 0.835000 | 45.00 | 2.002 | 3 | 91.000 | 91.000 | 2 | 0.00000 | 171 | 173 | 0 | 4000.00 | 0.00 |
| 173 | 0.835000 | 5.00 | 3.338 | 4 | 91.000 | 91.000 | 2 | 0.00000 | 172 | 174 | 0 | 4000.00 | 0.00 |
| 174 | 0.835000 | 15.00 | 1.779 | 4 | 91.000 | 96.040 | 2 | 0.00000 | 173 | 175 | 0 | 4000.00 | 0.00 |
| 175 | 0.835000 | 15.00 | 2.559 | 4 | 96.040 | 96.000 | 2 | 0.00000 | 174 | 176 | 0 | 4000.00 | 0.00 |
| 176 | 0.835000 | 95.00 | 1.176 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 175 | 177 | 0 | 4000.00 | 0.00 |
| 177 | 0.835000 | 55.00 | 1.213 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 176 | 178 | 0 | 4000.00 | 0.00 |
| 178 | 0.835000 | 5.00 | 3.338 | 4 | 96.000 | 91.000 | 2 | 0.00000 | 177 | 179 | 0 | 4000.00 | 0.00 |
| 179 | 0.835000 | 50.00 | 1.795 | 4 | 91.000 | 93.000 | 2 | 0.00000 | 178 | 180 | 0 | 4000.00 | 0.00 |
| 180 | 0.835000 | 80.00 | 1.146 | 4 | 93.000 | 93.000 | 2 | 0.00000 | 179 | 181 | 0 | 4000.00 | 0.00 |
| 181 | 0.835000 | 25.00 | 3.472 | 3 | 93.000 | 93.000 | 2 | 0.00000 | 180 | 29 | 1 | 4000.00 | 0.00 |
| 182 | 0.336000 | 45.00 | 1.866 | 3 | 91.000 | 96.000 | 2 | 0.00000 | 169 | 183 | 0 | 4000.00 | 0.00 |
| 183 | 0.336000 | 120.00 | 1.482 | 4 | 96.000 | 149.000 | 2 | 0.00000 | 182 | 184 | 0 | 4000.00 | 0.00 |
| 184 | 0.256000 | 205.00 | 1.092 | 16 | 149.000 | 142.500 | 2 | 0.00000 | 183 | 0 | 0 | 4000.00 | 0.00 |
| 185 | 0.256000 | 60.00 | 1.674 | 16 | 96.000 | 59.000 | 2 | 0.00000 | 182 | 0 | 0 | 4000.00 | 0.00 |
| 186 | 0.336000 | 10.00 | 4.427 | 3 | 91.000 | 94.800 | 2 | 0.00000 | 170 | 187 | 0 | 4000.00 | 0.00 |
| 187 | 0.336000 | 55.00 | 1.586 | 3 | 94.800 | 113.000 | 2 | 0.00000 | 186 | 188 | 0 | 4000.00 | 0.00 |
| 188 | 0.336000 | 230.00 | 1.231 | 4 | 113.000 | 146.000 | 2 | 0.00000 | 187 | 189 | 0 | 4000.00 | 0.00 |
| 189 | 0.256000 | 105.00 | 1.111 | 16 | 146.000 | 143.000 | 2 | 0.00000 | 188 | 0 | 0 | 4000.00 | 0.00 |
| 190 | 0.256000 | 100.00 | 1.297 | 16 | 94.800 | 83.700 | 2 | 0.00000 | 186 | 0 | 0 | 4000.00 | 0.00 |
| 191 | 0.256000 | 75.00 | 1.416 | 16 | 113.000 | 107.000 | 2 | 0.00000 | 187 | 0 | 0 | 4000.00 | 0.00 |
| 192 | 0.336000 | 5.00 | 7.854 | 4 | 91.000 | 95.000 | 2 | 0.00000 | 172 | 193 | 0 | 4000.00 | 0.00 |
| 193 | 0.336000 | 240.00 | 1.316 | 4 | 95.000 | 150.000 | 2 | 0.00000 | 192 | 194 | 0 | 4000.00 | 0.00 |
| 194 | 0.256000 | 180.00 | 1.105 | 16 | 150.000 | 142.000 | 2 | 0.00000 | 193 | 0 | 0 | 4000.00 | 0.00 |
| 195 | 0.665000 | 15.00 | 4.015 | 4 | 96.500 | 96.500 | 2 | 0.00000 | 54 | 196 | 0 | 4000.00 | 0.00 |
| 196 | 0.665000 | 11.00 | 2.197 | 4 | 96.500 | 94.500 | 2 | 0.00000 | 195 | 197 | 0 | 4400.00 | 0.00 |
| 197 | 0.665000 | 20.00 | 1.658 | 4 | 94.500 | 96.600 | 2 | 0.00000 | 196 | 198 | 0 | 4000.00 | 0.00 |
| 198 | 0.665000 | 115.00 | 1.000 | 4 | 96.600 | 96.600 | 2 | 0.00000 | 197 | 199 | 0 | 4000.00 | 0.00 |
| 199 | 0.665000 | 220.00 | 1.120 | 3 | 96.600 | 94.000 | 2 | 0.00000 | 198 | 200 | 0 | 4000.00 | 0.00 |
| 200 | 0.665000 | 20.00 | 2.862 | 4 | 94.000 | 94.750 | 2 | 0.00000 | 199 | 201 | 0 | 4000.00 | 0.00 |
| 201 | 0.665000 | 20.00 | 1.000 | 4 | 94.750 | 94.750 | 2 | 0.00000 | 200 | 202 | 0 | 4000.00 | 0.00 |
| 202 | 0.665000 | 20.00 | 2.197 | 4 | 94.750 | 94.750 | 2 | 0.00000 | 201 | 203 | 0 | 4000.00 | 0.00 |
| 203 | 0.665000 | 15.00 | 1.000 | 4 | 94.750 | 94.750 | 2 | 0.00000 | 202 | 204 | 0 | 4000.00 | 0.00 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 204 | 0.665000 | 30.00 | 1.973 | 3 | 94.750 | 84.100 | 2 | 0.00000 | 203 | 205 | 0 | 4000.00 | 0.00 |
| 205 | 0.665000 | 15.00 | 1.621 | 4 | 84.100 | 69.500 | 2 | 0.00000 | 204 | 206 | 0 | 4000.00 | 0.00 |
| 206 | 0.665000 | 15.00 | 1.887 | 3 | 69.500 | 69.500 | 2 | 0.00000 | 205 | 207 | 0 | 4000.00 | 0.00 |
| 207 | 0.665000 | 20.00 | 1.465 | 4 | 69.500 | 69.500 | 2 | 0.00000 | 206 | 208 | 0 | 4000.00 | 0.00 |
| 208 | 0.665000 | 20.00 | 4.125 | 3 | 69.500 | 61.750 | 2 | 0.00000 | 207 | 209 | 0 | 4000.00 | 0.00 |
| 209 | 0.665000 | 70.00 | 1.454 | 4 | 61.750 | 62.750 | 2 | 0.00000 | 208 | 210 | 0 | 4000.00 | 0.00 |
| 210 | 0.665000 | 5.00 | 6.320 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 209 | 211 | 0 | 4000.00 | 0.00 |
| 211 | 0.665000 | 50.00 | 1.293 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 210 | 212 | 0 | 4000.00 | 0.00 |
| 212 | 0.665000 | 20.00 | 2.330 | 3 | 62.750 | 62.750 | 2 | 0.00000 | 211 | 213 | 0 | 4000.00 | 0.00 |
| 213 | 0.665000 | 25.00 | 2.277 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 212 | 214 | 0 | 4000.00 | 0.00 |
| 214 | 0.665000 | 20.00 | 1.665 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 213 | 215 | 0 | 4000.00 | 0.00 |
| 215 | 0.665000 | 45.00 | 1.414 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 214 | 216 | 0 | 4000.00 | 0.00 |
| 216 | 0.665000 | 20.00 | 1.665 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 215 | 217 | 0 | 4000.00 | 0.00 |
| 217 | 0.665000 | 85.00 | 2.033 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 216 | 218 | 0 | 4000.00 | 0.00 |
| 218 | 0.665000 | 5.00 | 3.660 | 3 | 62.750 | 62.750 | 2 | 0.00000 | 217 | 219 | 0 | 4000.00 | 0.00 |
| 219 | 0.665000 | 25.00 | 2.649 | 3 | 62.750 | 66.000 | 2 | 0.00000 | 218 | 220 | 0 | 4000.00 | 0.00 |
| 220 | 0.665000 | 30.00 | 1.749 | 4 | 66.000 | 96.000 | 2 | 0.00000 | 219 | 221 | 0 | 4000.00 | 0.00 |
| 221 | 0.665000 | 20.00 | 1.329 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 220 | 222 | 0 | 4000.00 | 0.00 |
| 222 | 0.665000 | 5.00 | 4.977 | 4 | 96.000 | 94.400 | 2 | 0.00000 | 221 | 223 | 0 | 4000.00 | 0.00 |
| 223 | 0.665000 | 95.00 | 1.139 | 4 | 94.400 | 97.000 | 2 | 0.00000 | 222 | 224 | 0 | 4000.00 | 0.00 |
| 224 | 0.665000 | 35.00 | 1.646 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 223 | 225 | 0 | 4000.00 | 0.00 |
| 225 | 0.665000 | 65.00 | 1.614 | 4 | 97.000 | 96.500 | 2 | 0.00000 | 224 | 226 | 0 | 4000.00 | 0.00 |
| 226 | 0.665000 | 35.00 | 1.000 | 4 | 96.500 | 96.500 | 2 | 0.00000 | 225 | 227 | 0 | 4000.00 | 0.00 |
| 227 | 0.665000 | 35.00 | 1.830 | 4 | 96.500 | 94.200 | 2 | 0.00000 | 226 | 228 | 0 | 4000.00 | 0.00 |
| 228 | 0.665000 | 35.00 | 1.266 | 4 | 94.200 | 96.200 | 2 | 0.00000 | 227 | 229 | 0 | 4000.00 | 0.00 |
| 229 | 0.665000 | 120.00 | 1.377 | 3 | 96.200 | 95.800 | 2 | 0.00000 | 228 | 69 | 1 | 4000.00 | 0.00 |
| 230 | 0.665000 | 10.00 | 6.453 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 12 | 231 | 0 | 4000.00 | 0.00 |
| 231 | 0.665000 | 25.00 | 1.372 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 230 | 232 | 0 | 4000.00 | 0.00 |
| 232 | 0.665000 | 150.00 | 1.062 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 231 | 233 | 0 | 4000.00 | 0.00 |
| 233 | 0.665000 | 135.00 | 1.069 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 232 | 234 | 0 | 4000.00 | 0.00 |
| 234 | 0.665000 | 45.00 | 1.146 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 233 | 235 | 0 | 4000.00 | 0.00 |
| 235 | 0.665000 | 20.00 | 1.658 | 4 | 96.900 | 95.000 | 2 | 0.00000 | 234 | 236 | 0 | 4000.00 | 0.00 |
| 236 | 0.665000 | 35.00 | 1.564 | 4 | 95.000 | 95.500 | 2 | 0.00000 | 235 | 237 | 0 | 4000.00 | 0.00 |
| 237 | 0.665000 | 15.00 | 1.621 | 4 | 95.500 | 96.000 | 2 | 0.00000 | 236 | 238 | 0 | 4000.00 | 0.00 |
| 238 | 0.665000 | 30.00 | 1.621 | 4 | 96.000 | 72.000 | 2 | 0.00000 | 237 | 239 | 0 | 4000.00 | 0.00 |
| 239 | 0.665000 | 5.00 | 3.660 | 3 | 72.000 | 67.000 | 2 | 0.00000 | 238 | 240 | 0 | 4000.00 | 0.00 |
| 240 | 0.665000 | 75.00 | 1.497 | 4 | 67.000 | 64.250 | 2 | 0.00000 | 239 | 241 | 0 | 4000.00 | 0.00 |
| 241 | 0.665000 | 35.00 | 1.000 | 4 | 64.250 | 64.250 | 2 | 0.00000 | 240 | 242 | 0 | 4000.00 | 0.00 |
| 242 | 0.665000 | 65.00 | 1.286 | 4 | 64.250 | 61.750 | 2 | 0.00000 | 241 | 243 | 0 | 4000.00 | 0.00 |
| 243 | 0.665000 | 20.00 | 2.995 | 3 | 61.750 | 61.750 | 2 | 0.00000 | 242 | 244 | 0 | 4000.00 | 0.00 |
| 244 | 0.665000 | 5.00 | 2.064 | 4 | 61.750 | 61.750 | 2 | 0.00000 | 243 | 245 | 0 | 4000.00 | 0.00 |
| 245 | 0.665000 | 20.00 | 2.260 | 4 | 61.750 | 62.750 | 2 | 0.00000 | 244 | 246 | 0 | 4000.00 | 0.00 |
| 246 | 0.665000 | 15.00 | 1.887 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 245 | 247 | 0 | 4000.00 | 0.00 |
| 247 | 0.665000 | 10.00 | 2.330 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 246 | 248 | 0 | 4000.00 | 0.00 |
| 248 | 0.665000 | 15.00 | 1.887 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 247 | 249 | 0 | 4000.00 | 0.00 |
| 249 | 0.665000 | 35.00 | 1.380 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 248 | 250 | 0 | 4000.00 | 0.00 |
| 250 | 0.665000 | 100.00 | 1.000 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 249 | 251 | 0 | 4000.00 | 0.00 |
| 251 | 0.665000 | 10.00 | 3.647 | 4 | 62.750 | 62.500 | 2 | 0.00000 | 250 | 252 | 0 | 4000.00 | 0.00 |
| 252 | 0.665000 | 30.00 | 1.749 | 4 | 62.500 | 67.900 | 2 | 0.00000 | 251 | 253 | 0 | 4000.00 | 0.00 |
| 253 | 0.665000 | 30.00 | 1.310 | 4 | 67.900 | 96.000 | 2 | 0.00000 | 252 | 254 | 0 | 4000.00 | 0.00 |
| 254 | 0.665000 | 20.00 | 2.317 | 4 | 96.000 | 97.000 | 2 | 0.00000 | 253 | 255 | 0 | 4000.00 | 0.00 |
| 255 | 0.665000 | 145.00 | 1.000 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 254 | 256 | 0 | 4000.00 | 0.00 |
| 256 | 0.665000 | 35.00 | 1.752 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 255 | 257 | 0 | 4000.00 | 0.00 |
| 257 | 0.665000 | 60.00 | 1.110 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 256 | 258 | 0 | 4000.00 | 0.00 |
| 258 | 0.665000 | 40.00 | 1.165 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 257 | 259 | 0 | 4000.00 | 0.00 |
| 259 | 0.665000 | 5.00 | 3.660 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 258 | 260 | 0 | 4000.00 | 0.00 |
| 260 | 0.665000 | 45.00 | 1.118 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 259 | 261 | 0 | 4000.00 | 0.00 |
| 261 | 0.665000 | 15.00 | 4.538 | 3 | 97.000 | 95.500 | 2 | 0.00000 | 260 | 71 | 1 | 4000.00 | 0.00 |
| 262 | 0.505000 | 20.00 | 2.315 | 4 | 61.750 | 63.000 | 2 | 0.00000 | 243 | 263 | 0 | 4000.00 | 0.00 |
| 263 | 0.505000 | 10.00 | 3.318 | 4 | 63.000 | 56.000 | 2 | 0.00000 | 262 | 264 | 0 | 4000.00 | 0.00 |
| 264 | 0.505000 | 30.00 | 2.380 | 4 | 56.000 | 61.750 | 2 | 0.00000 | 263 | 265 | 0 | 4000.00 | 0.00 |
| 265 | 0.505000 | 5.00 | 3.020 | 3 | 61.750 | 62.900 | 2 | 0.00000 | 264 | 266 | 0 | 4000.00 | 0.00 |
| 266 | 0.505000 | 5.00 | 10.494 | 4 | 62.900 | 67.000 | 2 | 0.00000 | 265 | 267 | 0 | 4000.00 | 0.00 |
| 267 | 0.505000 | 5.00 | 3.828 | 4 | 67.000 | 67.000 | 2 | 0.00000 | 266 | 268 | 0 | 4000.00 | 0.00 |
| 268 | 0.505000 | 65.00 | 1.155 | 3 | 67.000 | 67.000 | 2 | 0.00000 | 267 | 269 | 0 | 4000.00 | 0.00 |
| 269 | 0.505000 | 15.00 | 1.000 | 4 | 67.000 | 67.000 | 2 | 0.00000 | 268 | 270 | 0 | 4000.00 | 0.00 |
| 270 | 0.505000 | 35.00 | 1.866 | 3 | 67.000 | 67.000 | 2 | 0.00000 | 269 | 271 | 0 | 4000.00 | 0.00 |
| 271 | 0.256000 | 25.00 | 1.143 | 4 | 67.000 | 67.000 | 2 | 0.00000 | 270 | 272 | 0 | 4000.00 | 0.00 |
| 272 | 0.256000 | 10.00 | 3.099 | 4 | 67.000 | 65.000 | 2 | 0.00000 | 271 | 273 | 0 | 4000.00 | 0.00 |
| 273 | 0.256000 | 55.00 | 1.289 | 16 | 65.000 | 94.500 | 2 | 0.00000 | 272 | 0 | 0 | 4000.00 | 0.00 |
| 274 | 0.505000 | 15.00 | 1.000 | 3 | 62.900 | 63.900 | 2 | 0.00000 | 265 | 275 | 0 | 4000.00 | 0.00 |
| 275 | 0.505000 | 15.00 | 1.741 | 3 | 63.900 | 68.200 | 2 | 0.00000 | 274 | 276 | 0 | 4000.00 | 0.00 |
| 276 | 0.336000 | 135.00 | 1.170 | 4 | 68.200 | 71.500 | 2 | 0.00000 | 275 | 277 | 0 | 4000.00 | 0.00 |
| 277 | 0.336000 | 40.00 | 1.773 | 16 | 71.500 | 61.500 | 2 | 0.00000 | 276 | 0 | 0 | 4000.00 | 0.00 |
| 278 | 0.336000 | 20.00 | 2.518 | 16 | 68.200 | 61.500 | 2 | 0.00000 | 275 | 0 | 0 | 4000.00 | 0.00 |
| 279 | 0.505000 | 85.00 | 2.305 | 4 | 69.500 | 68.750 | 2 | 0.00000 | 206 | 280 | 0 | 4000.00 | 0.00 |
| 280 | 0.505000 | 10.00 | 2.010 | 3 | 68.750 | 68.750 | 2 | 0.00000 | 279 | 281 | 0 | 4000.00 | 0.00 |
| 281 | 0.505000 | 45.00 | 1.382 | 4 | 68.750 | 68.750 | 2 | 0.00000 | 280 | 282 | 0 | 4000.00 | 0.00 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 282 | 0.505000 | 10.00 | 1.707 | 4 | 68.750 | 68.750 | 2 | 0.00000 | 281 283 | 0 | 4000.00 | 0.00 |
| 283 | 0.505000 | 70.00 | 1.447 | 3 | 68.750 | 68.750 | 2 | 0.00000 | 282 284 | 0 | 4000.00 | 0.00 |
| 284 | 0.505000 | 20.00 | 1.354 | 4 | 68.750 | 68.750 | 2 | 0.00000 | 283 285 | 0 | 4000.00 | 0.00 |
| 285 | 0.505000 | 5.00 | 2.414 | 4 | 68.750 | 65.500 | 2 | 0.00000 | 284 286 | 0 | 4000.00 | 0.00 |
| 286 | 0.505000 | 25.00 | 1.404 | 3 | 65.500 | 65.500 | 2 | 0.00000 | 285 287 | 0 | 4000.00 | 0.00 |
| 287 | 0.336000 | 65.00 | 1.868 | 4 | 65.500 | 113.000 | 2 | 0.00000 | 286 288 | 0 | 4000.00 | 0.00 |
| 288 | 0.336000 | 35.00 | 2.150 | 3 | 113.000 | 147.000 | 2 | 0.00000 | 287 289 | 0 | 4000.00 | 0.00 |
| 289 | 0.256000 | 55.00 | 1.419 | 4 | 147.000 | 178.000 | 2 | 0.00000 | 288 290 | 0 | 4000.00 | 0.00 |
| 290 | 0.256000 | 10.00 | 1.000 | 16 | 178.000 | 178.000 | 2 | 0.00000 | 289 0 | 0 | 4000.00 | 0.00 |
| 291 | 0.256000 | 35.00 | 1.247 | 16 | 147.000 | 159.750 | 2 | 0.00000 | 288 0 | 0 | 4000.00 | 0.00 |
| 292 | 0.256000 | 115.00 | 1.686 | 16 | 67.000 | 128.500 | 2 | 0.00000 | 239 0 | 0 | 4000.00 | 0.00 |
| 293 | 0.336000 | 5.00 | 7.451 | 4 | 65.710 | 62.500 | 2 | 0.00000 | 219 294 | 0 | 4000.00 | 0.00 |
| 294 | 0.336000 | 60.00 | 1.112 | 4 | 62.500 | 62.500 | 2 | 0.00000 | 293 295 | 0 | 4000.00 | 0.00 |
| 295 | 0.336000 | 40.00 | 1.907 | 4 | 62.500 | 93.500 | 2 | 0.00000 | 294 296 | 0 | 4000.00 | 0.00 |
| 296 | 0.336000 | 45.00 | 1.729 | 3 | 93.500 | 126.800 | 2 | 0.00000 | 295 297 | 0 | 4000.00 | 0.00 |
| 297 | 0.336000 | 45.00 | 1.149 | 3 | 126.800 | 142.000 | 2 | 0.00000 | 296 298 | 0 | 4000.00 | 0.00 |
| 298 | 0.336000 | 40.00 | 1.571 | 3 | 142.000 | 154.500 | 2 | 0.00000 | 297 299 | 0 | 4000.00 | 0.00 |
| 299 | 0.256000 | 95.00 | 1.107 | 16 | 154.500 | 155.500 | 2 | 0.00000 | 298 0 | 0 | 4000.00 | 0.00 |
| 300 | 0.256000 | 100.00 | 1.623 | 16 | 142.000 | 143.000 | 2 | 0.00000 | 297 0 | 0 | 4000.00 | 0.00 |
| 301 | 0.336000 | 25.00 | 2.452 | 3 | 154.500 | 156.300 | 2 | 0.00000 | 298 302 | 0 | 4000.00 | 0.00 |
| 302 | 0.336000 | 45.00 | 1.893 | 4 | 156.300 | 172.300 | 2 | 0.00000 | 301 303 | 0 | 4000.00 | 0.00 |
| 303 | 0.256000 | 55.00 | 1.304 | 4 | 172.300 | 178.000 | 2 | 0.00000 | 302 304 | 0 | 4000.00 | 0.00 |
| 304 | 0.256000 | 10.00 | 1.000 | 16 | 178.000 | 178.000 | 2 | 0.00000 | 303 0 | 0 | 4000.00 | 0.00 |
| 305 | 0.336000 | 5.00 | 6.376 | 4 | 156.300 | 156.300 | 2 | 0.00000 | 301 306 | 0 | 4000.00 | 0.00 |
| 306 | 0.256000 | 130.00 | 1.405 | 16 | 156.300 | 156.300 | 2 | 0.00000 | 305 0 | 0 | 4000.00 | 0.00 |
| 307 | 0.336000 | 105.00 | 1.914 | 4 | 126.800 | 155.000 | 2 | 0.00000 | 296 308 | 0 | 4000.00 | 0.00 |
| 308 | 0.256000 | 130.00 | 1.287 | 19 | 155.000 | 206.300 | 2 | 0.00000 | 307 309 | 0 | 4000.00 | 0.00 |
| 309 | 0.256000 | 20.00 | 1.000 | 16 | 206.300 | 203.000 | 2 | 0.00000 | 308 0 | 0 | 4000.00 | 0.00 |
| 310 | 0.336000 | 10.00 | 5.301 | 3 | 62.750 | 71.500 | 2 | 0.00000 | 212 311 | 0 | 4000.00 | 0.00 |
| 311 | 0.336000 | 65.00 | 1.424 | 3 | 71.500 | 133.500 | 2 | 0.00000 | 310 312 | 0 | 4000.00 | 0.00 |
| 312 | 0.256000 | 15.00 | 1.439 | 4 | 133.500 | 147.300 | 2 | 0.00000 | 311 313 | 0 | 4000.00 | 0.00 |
| 313 | 0.256000 | 60.00 | 1.281 | 4 | 147.300 | 165.100 | 2 | 0.00000 | 312 314 | 0 | 4000.00 | 0.00 |
| 314 | 0.256000 | 30.00 | 1.527 | 16 | 165.100 | 160.000 | 2 | 0.00000 | 313 0 | 0 | 4000.00 | 0.00 |
| 315 | 0.256000 | 25.00 | 1.407 | 16 | 71.500 | 81.500 | 2 | 0.00000 | 310 0 | 0 | 4000.00 | 0.00 |
| 316 | 0.336000 | 10.00 | 3.688 | 4 | 133.500 | 133.500 | 2 | 0.00000 | 311 317 | 0 | 4000.00 | 0.00 |
| 317 | 0.256000 | 80.00 | 1.717 | 16 | 133.500 | 141.500 | 2 | 0.00000 | 316 0 | 0 | 4000.00 | 0.00 |
| 318 | 0.336000 | 10.00 | 6.443 | 4 | 68.750 | 66.700 | 2 | 0.00000 | 283 319 | 0 | 4000.00 | 0.00 |
| 319 | 0.336000 | 100.00 | 1.672 | 3 | 66.700 | 120.000 | 2 | 0.00000 | 318 320 | 0 | 4000.00 | 0.00 |
| 320 | 0.336000 | 15.00 | 2.792 | 3 | 120.000 | 132.000 | 2 | 0.00000 | 319 321 | 0 | 4000.00 | 0.00 |
| 321 | 0.336000 | 15.00 | 1.448 | 4 | 132.000 | 146.000 | 2 | 0.00000 | 320 322 | 0 | 4000.00 | 0.00 |
| 322 | 0.256000 | 55.00 | 1.604 | 16 | 146.000 | 163.500 | 2 | 0.00000 | 321 0 | 0 | 4000.00 | 0.00 |
| 323 | 0.256000 | 25.00 | 1.492 | 16 | 120.000 | 128.500 | 2 | 0.00000 | 319 0 | 0 | 4000.00 | 0.00 |
| 324 | 0.336000 | 45.00 | 1.806 | 3 | 132.000 | 132.000 | 2 | 0.00000 | 320 325 | 0 | 4000.00 | 0.00 |
| 325 | 0.256000 | 30.00 | 2.263 | 16 | 132.000 | 157.500 | 2 | 0.00000 | 324 0 | 0 | 4000.00 | 0.00 |
| 326 | 0.256000 | 35.00 | 1.188 | 16 | 132.000 | 141.500 | 2 | 0.00000 | 324 0 | 0 | 4000.00 | 0.00 |
| 327 | 0.336000 | 30.00 | 2.456 | 4 | 63.900 | 68.100 | 2 | 0.00000 | 274 328 | 0 | 4000.00 | 0.00 |
| 328 | 0.336000 | 90.00 | 1.939 | 3 | 68.100 | 134.000 | 2 | 0.00000 | 327 329 | 0 | 4000.00 | 0.00 |
| 329 | 0.336000 | 45.00 | 1.612 | 4 | 134.000 | 132.000 | 2 | 0.00000 | 328 330 | 0 | 4000.00 | 0.00 |
| 330 | 0.362000 | 90.00 | 1.181 | 16 | 132.000 | 141.500 | 2 | 0.00000 | 329 0 | 0 | 4000.00 | 0.00 |
| 331 | 0.336000 | 15.00 | 3.554 | 3 | 134.000 | 147.000 | 2 | 0.00000 | 328 332 | 0 | 4000.00 | 0.00 |
| 332 | 0.256000 | 10.00 | 1.200 | 4 | 147.000 | 150.000 | 2 | 0.00000 | 331 333 | 0 | 4000.00 | 0.00 |
| 333 | 0.256000 | 10.00 | 1.200 | 16 | 150.000 | 159.000 | 2 | 0.00000 | 332 0 | 0 | 4000.00 | 0.00 |
| 334 | 0.256000 | 50.00 | 1.451 | 19 | 147.000 | 159.75 | 2 | 0.00000 | 331 335 | 0 | 4000.00 | 0.00 |
| 335 | 0.090000 | 10.00 | 1.000 | 16 | 159.750 | 159.000 | 2 | 0.00000 | 334 0 | 0 | 4000.00 | 0.00 |
| 336 | 0.336000 | 10.00 | 6.712 | 4 | 67.000 | 65.000 | 2 | 0.00000 | 268 337 | 0 | 4000.00 | 0.00 |
| 337 | 0.336000 | 90.00 | 1.538 | 3 | 65.000 | 115.200 | 2 | 0.00000 | 336 338 | 0 | 4000.00 | 0.00 |
| 338 | 0.336000 | 40.00 | 1.403 | 3 | 115.200 | 133.800 | 2 | 0.00000 | 337 339 | 0 | 4000.00 | 0.00 |
| 339 | 0.336000 | 50.00 | 2.423 | 3 | 133.800 | 133.300 | 2 | 0.00000 | 338 340 | 0 | 4000.00 | 0.00 |
| 340 | 0.336000 | 10.00 | 3.016 | 3 | 133.300 | 133.300 | 2 | 0.00000 | 339 341 | 0 | 4000.00 | 0.00 |
| 341 | 0.256000 | 45.00 | 1.340 | 16 | 133.300 | 141.500 | 2 | 0.00000 | 340 0 | 0 | 4000.00 | 0.00 |
| 342 | 0.256000 | 15.00 | 1.678 | 16 | 133.300 | 141.500 | 2 | 0.00000 | 340 0 | 0 | 4000.00 | 0.00 |
| 343 | 0.256000 | 10.00 | 1.300 | 16 | 133.800 | 141.500 | 2 | 0.00000 | 338 0 | 0 | 4000.00 | 0.00 |
| 344 | 0.256000 | 35.00 | 1.644 | 16 | 133.300 | 128.500 | 2 | 0.00000 | 339 0 | 0 | 4000.00 | 0.00 |
| 345 | 0.256000 | 5.00 | 5.813 | 3 | 115.200 | 115.200 | 2 | 0.00000 | 337 346 | 0 | 4000.00 | 0.00 |
| 346 | 0.256000 | 80.00 | 1.288 | 3 | 115.200 | 116.500 | 2 | 0.00000 | 345 347 | 0 | 4000.00 | 0.00 |
| 347 | 0.256000 | 55.00 | 1.726 | 16 | 116.500 | 141.500 | 2 | 0.00000 | 346 0 | 0 | 4000.00 | 0.00 |
| 348 | 0.256000 | 15.00 | 2.601 | 16 | 116.500 | 128.500 | 2 | 0.00000 | 346 0 | 0 | 4000.00 | 0.00 |
| 349 | 0.256000 | 50.00 | 1.594 | 16 | 115.200 | 106.500 | 2 | 0.00000 | 345 0 | 0 | 4000.00 | 0.00 |
| 350 | 0.505000 | 175.00 | 1.669 | 4 | 68.750 | 140.000 | 2 | 0.00000 | 280 351 | 0 | 4000.00 | 0.00 |
| 351 | 0.336000 | 50.00 | 1.000 | 16 | 140.000 | 138.000 | 2 | 0.00000 | 350 0 | 0 | 4000.00 | 0.00 |
| 352 | 0.336000 | 10.00 | 4.226 | 4 | 67.000 | 65.000 | 2 | 0.00000 | 270 353 | 0 | 4000.00 | 0.00 |
| 353 | 0.336000 | 80.00 | 1.285 | 4 | 65.000 | 105.700 | 2 | 0.00000 | 352 354 | 0 | 4000.00 | 0.00 |
| 354 | 0.336000 | 80.00 | 1.630 | 3 | 105.700 | 130.500 | 2 | 0.00000 | 353 355 | 0 | 4000.00 | 0.00 |
| 355 | 0.256000 | 30.00 | 1.458 | 4 | 130.500 | 147.500 | 2 | 0.00000 | 354 356 | 0 | 4000.00 | 0.00 |
| 356 | 0.256000 | 25.00 | 1.225 | 4 | 147.500 | 141.500 | 2 | 0.00000 | 355 357 | 0 | 4000.00 | 0.00 |
| 357 | 0.162000 | 50.00 | 1.843 | 16 | 141.500 | 141.500 | 2 | 0.00000 | 356 0 | 0 | 4000.00 | 0.00 |
| 358 | 0.336000 | 5.00 | 5.570 | 4 | 130.500 | 130.500 | 2 | 0.00000 | 354 359 | 0 | 4000.00 | 0.00 |
| 359 | 0.162000 | 35.00 | 1.759 | 16 | 130.500 | 132.200 | 2 | 0.00000 | 358 0 | 0 | 4000.00 | 0.00 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 360 | 0.336000 | 45.00 | 2.343 | 4 | 94.500 | 115.800 | 2 | 0.00000 | 152 361 | 0 | 4000.00 | 0.00 |
| 361 | 0.336000 | 15.00 | 1.448 | 3 | 115.800 | 130.600 | 2 | 0.00000 | 360 362 | 0 | 4000.00 | 0.00 |
| 362 | 0.256000 | 50.00 | 1.510 | 19 | 130.600 | 176.000 | 2 | 0.00000 | 361 363 | 0 | 4000.00 | 0.00 |
| 363 | 0.256000 | 15.00 | 1.000 | 16 | 176.000 | 176.000 | 2 | 0.00000 | 362 0 | 0 | 4000.00 | 0.00 |
| 364 | 0.362000 | 145.00 | 1.539 | 16 | 130.600 | 129.600 | 2 | 0.00000 | 361 0 | 0 | 4000.00 | 0.00 |
| 365 | 0.336000 | 65.00 | 1.940 | 3 | 92.000 | 118.400 | 2 | 0.00000 | 145 366 | 0 | 4000.00 | 0.00 |
| 366 | 0.336000 | 20.00 | 1.544 | 3 | 118.400 | 118.400 | 2 | 0.00000 | 365 367 | 0 | 4000.00 | 0.00 |
| 367 | 0.256000 | 15.00 | 1.239 | 16 | 118.400 | 115.000 | 2 | 0.00000 | 366 0 | 0 | 4000.00 | 0.00 |
| 368 | 0.256000 | 20.00 | 1.947 | 16 | 118.400 | 127.000 | 2 | 0.00000 | 365 0 | 0 | 4000.00 | 0.00 |
| 369 | 0.336000 | 30.00 | 2.275 | 4 | 118.400 | 133.500 | 2 | 0.00000 | 366 370 | 0 | 4000.00 | 0.00 |
| 370 | 0.256000 | 35.00 | 1.232 | 3 | 133.500 | 166.000 | 2 | 0.00000 | 369 371 | 0 | 4000.00 | 0.00 |
| 371 | 0.256000 | 10.00 | 1.000 | 19 | 166.000 | 176.000 | 2 | 0.00000 | 370 372 | 0 | 4000.00 | 0.00 |
| 372 | 0.256000 | 20.00 | 2.970 | 16 | 176.000 | 175.000 | 2 | 0.00000 | 371 0 | 0 | 4000.00 | 0.00 |
| 373 | 0.256000 | 55.00 | 1.521 | 16 | 166.000 | 141.000 | 2 | 0.00000 | 370 0 | 0 | 4000.00 | 0.00 |
| 374 | 0.336000 | 5.00 | 6.914 | 3 | 92.000 | 94.200 | 2 | 0.00000 | 144 375 | 0 | 4000.00 | 0.00 |
| 375 | 0.336000 | 50.00 | 1.605 | 3 | 94.200 | 113.250 | 2 | 0.00000 | 374 376 | 0 | 4000.00 | 0.00 |
| 376 | 0.256000 | 30.00 | 1.100 | 16 | 113.250 | 141.750 | 2 | 0.00000 | 375 0 | 0 | 4000.00 | 0.00 |
| 377 | 0.256000 | 30.00 | 1.751 | 16 | 94.200 | 74.000 | 2 | 0.00000 | 374 0 | 0 | 4000.00 | 0.00 |
| 378 | 0.256000 | 20.00 | 2.380 | 16 | 113.300 | 111.000 | 2 | 0.00000 | 375 0 | 0 | 4000.00 | 0.00 |
| 379 | 0.336000 | 10.00 | 4.898 | 4 | 89.000 | 94.330 | 2 | 0.00000 | 137 380 | 0 | 4000.00 | 0.00 |
| 380 | 0.336000 | 5.00 | 2.344 | 3 | 94.330 | 95.000 | 2 | 0.00000 | 379 381 | 0 | 4000.00 | 0.00 |
| 381 | 0.336000 | 100.00 | 1.322 | 4 | 95.000 | 130.700 | 2 | 0.00000 | 380 382 | 0 | 4000.00 | 0.00 |
| 382 | 0.256000 | 65.00 | 1.598 | 19 | 130.700 | 176.000 | 2 | 0.00000 | 381 383 | 0 | 4000.00 | 0.00 |
| 383 | 0.025600 | 20.00 | 1.000 | 16 | 176.000 | 175.000 | 2 | 0.00000 | 382 0 | 0 | 4000.00 | 0.00 |
| 384 | 0.336000 | 50.00 | 1.859 | 3 | 95.000 | 96.500 | 2 | 0.00000 | 380 385 | 0 | 4000.00 | 0.00 |
| 385 | 0.256000 | 75.00 | 1.252 | 3 | 96.500 | 98.000 | 2 | 0.00000 | 384 386 | 0 | 4000.00 | 0.00 |
| 386 | 0.256000 | 40.00 | 1.269 | 16 | 98.000 | 71.000 | 2 | 0.00000 | 385 0 | 0 | 4000.00 | 0.00 |
| 387 | 0.256000 | 15.00 | 2.741 | 16 | 96.500 | 103.000 | 2 | 0.00000 | 384 0 | 0 | 4000.00 | 0.00 |
| 388 | 0.256000 | 40.00 | 1.922 | 16 | 98.000 | 94.500 | 2 | 0.00000 | 385 0 | 0 | 4000.00 | 0.00 |
| 389 | 0.336000 | 45.00 | 1.567 | 3 | 89.000 | 127.750 | 2 | 0.00000 | 135 390 | 0 | 4000.00 | 0.00 |
| 390 | 0.256000 | 20.00 | 1.688 | 16 | 127.750 | 141.750 | 2 | 0.00000 | 389 0 | 0 | 4000.00 | 0.00 |
| 391 | 0.256000 | 110.00 | 1.335 | 16 | 127.750 | 141.750 | 2 | 0.00000 | 389 0 | 0 | 4000.00 | 0.00 |
| 392 | 0.336000 | 5.00 | 7.854 | 3 | 94.500 | 96.800 | 2 | 0.00000 | 155 393 | 0 | 4000.00 | 0.00 |
| 393 | 0.256000 | 215.00 | 1.316 | 16 | 96.800 | 65.000 | 2 | 0.00000 | 392 0 | 0 | 4000.00 | 0.00 |
| 394 | 0.256000 | 125.00 | 1.470 | 16 | 96.800 | 141.750 | 2 | 0.00000 | 392 0 | 0 | 4000.00 | 0.00 |
| 395 | 0.336000 | 150.00 | 1.528 | 3 | 94.500 | 130.400 | 2 | 0.00000 | 156 396 | 0 | 4000.00 | 0.00 |
| 396 | 0.256000 | 155.00 | 1.280 | 19 | 130.400 | 182.000 | 2 | 0.00000 | 395 397 | 0 | 4000.00 | 0.00 |
| 397 | 0.256000 | 30.00 | 1.478 | 16 | 182.000 | 179.000 | 2 | 0.00000 | 396 0 | 0 | 4000.00 | 0.00 |
| 398 | 0.256000 | 40.00 | 1.653 | 16 | 130.400 | 141.750 | 2 | 0.00000 | 395 0 | 0 | 4000.00 | 0.00 |
| 399 | 0.505000 | 120.00 | 1.538 | 3 | 94.500 | 90.500 | 2 | 0.00000 | 158 400 | 0 | 4000.00 | 0.00 |
| 400 | 0.336000 | 5.00 | 8.007 | 4 | 90.500 | 90.500 | 2 | 0.00000 | 399 401 | 0 | 4000.00 | 0.00 |
| 401 | 0.256000 | 60.00 | 1.349 | 16 | 90.500 | 141.750 | 2 | 0.00000 | 400 0 | 0 | 4000.00 | 0.00 |
| 402 | 0.336000 | 130.00 | 1.496 | 3 | 90.500 | 65.300 | 2 | 0.00000 | 399 403 | 0 | 4000.00 | 0.00 |
| 403 | 0.336000 | 50.00 | 1.228 | 4 | 65.300 | 94.700 | 2 | 0.00000 | 402 404 | 0 | 4000.00 | 0.00 |
| 404 | 0.256000 | 55.00 | 1.315 | 16 | 94.700 | 141.750 | 2 | 0.00000 | 403 0 | 0 | 4000.00 | 0.00 |
| 405 | 0.336000 | 40.00 | 2.260 | 3 | 65.300 | 77.500 | 2 | 0.00000 | 402 406 | 0 | 4000.00 | 0.00 |
| 406 | 0.256000 | 30.00 | 1.458 | 16 | 77.500 | 103.500 | 2 | 0.00000 | 405 0 | 0 | 4000.00 | 0.00 |
| 407 | 0.256000 | 125.00 | 1.180 | 16 | 77.500 | 75.000 | 2 | 0.00000 | 405 0 | 0 | 4000.00 | 0.00 |
| 408 | 0.336000 | 135.00 | 1.552 | 4 | 79.000 | 142.000 | 2 | 0.00000 | 139 409 | 0 | 4000.00 | 0.00 |
| 409 | 0.336000 | 20.00 | 1.000 | 16 | 142.000 | 141.750 | 2 | 0.00000 | 408 0 | 0 | 4000.00 | 0.00 |
| 410 | 0.256000 | 95.00 | 1.334 | 19 | 96.200 | 174.000 | 2 | 0.00000 | 150 411 | 0 | 4000.00 | 0.00 |
| 411 | 0.256000 | 10.00 | 1.358 | 4 | 174.000 | 183.500 | 2 | 0.00000 | 410 412 | 0 | 4000.00 | 0.00 |
| 412 | 0.107000 | 60.00 | 1.439 | 4 | 183.500 | 197.500 | 2 | 0.00000 | 411 413 | 0 | 4000.00 | 0.00 |
| 413 | 0.107000 | 25.00 | 1.000 | 16 | 197.500 | 197.500 | 2 | 0.00000 | 412 0 | 0 | 4000.00 | 0.00 |
| 414 | 0.505000 | 100.00 | 2.373 | 3 | 91.940 | 138.300 | 2 | 0.00000 | 143 415 | 0 | 4000.00 | 0.00 |
| 415 | 0.505000 | 5.00 | 5.848 | 2 | 138.300 | 142.000 | 2 | 0.00000 | 414 416 | 0 | 4000.00 | 0.00 |
| 416 | 0.336000 | 5.00 | 1.000 | 4 | 142.000 | 142.000 | 2 | 0.00000 | 415 417 | 0 | 4000.00 | 0.00 |
| 417 | 0.336000 | 50.00 | 1.000 | 4 | 142.000 | 160.000 | 2 | 0.00000 | 416 418 | 0 | 4000.00 | 0.00 |
| 418 | 0.336000 | 50.00 | 1.000 | 16 | 160.000 | 160.000 | 2 | 0.00000 | 417 0 | 0 | 4000.00 | 0.00 |
| 419 | 0.505000 | 85.00 | 2.031 | 4 | 94.500 | 131.500 | 2 | 0.00000 | 154 420 | 0 | 4000.00 | 0.00 |
| 420 | 0.505000 | 50.00 | 1.443 | 4 | 131.500 | 130.750 | 2 | 0.00000 | 419 421 | 0 | 4000.00 | 0.00 |
| 421 | 0.505000 | 30.00 | 1.909 | 4 | 130.750 | 130.750 | 2 | 0.00000 | 420 422 | 0 | 4000.00 | 0.00 |
| 422 | 0.505000 | 40.00 | 2.361 | 4 | 130.750 | 128.750 | 2 | 0.00000 | 421 423 | 0 | 4000.00 | 0.00 |
| 423 | 0.505000 | 35.00 | 1.491 | 3 | 128.750 | 132.170 | 2 | 0.00000 | 422 424 | 0 | 4000.00 | 0.00 |
| 424 | 0.256000 | 10.00 | 1.505 | 4 | 132.170 | 138.000 | 2 | 0.00000 | 423 425 | 0 | 4000.00 | 0.00 |
| 425 | 0.162000 | 105.00 | 1.580 | 16 | 138.000 | 169.500 | 2 | 0.00000 | 424 0 | 0 | 4000.00 | 0.00 |
| 426 | 0.336000 | 40.00 | 1.843 | 3 | 132.170 | 132.170 | 2 | 0.00000 | 423 427 | 0 | 4000.00 | 0.00 |
| 427 | 0.256000 | 10.00 | 1.000 | 4 | 132.170 | 138.000 | 2 | 0.00000 | 426 428 | 0 | 4000.00 | 0.00 |
| 428 | 0.162000 | 100.00 | 1.632 | 16 | 138.000 | 169.500 | 2 | 0.00000 | 427 0 | 0 | 4000.00 | 0.00 |
| 429 | 0.256000 | 40.00 | 1.165 | 4 | 132.170 | 138.000 | 2 | 0.00000 | 426 430 | 0 | 4000.00 | 0.00 |
| 430 | 0.162000 | 155.00 | 1.548 | 16 | 138.000 | 169.500 | 2 | 0.00000 | 429 0 | 0 | 4000.00 | 0.00 |
| 431 | 0.256000 | 40.00 | 1.934 | 4 | 65.500 | 69.000 | 2 | 0.00000 | 286 432 | 0 | 4000.00 | 0.00 |
| 432 | 0.256000 | 105.00 | 1.020 | 4 | 69.000 | 171.000 | 2 | 0.00000 | 431 433 | 0 | 4000.00 | 0.00 |
| 433 | 0.162000 | 10.00 | 1.227 | 19 | 171.000 | 181.000 | 2 | 0.00000 | 432 434 | 0 | 4000.00 | 0.00 |
| 434 | 0.162000 | 40.00 | 1.332 | 16 | 181.000 | 180.000 | 2 | 0.00000 | 433 0 | 0 | 4000.00 | 0.00 |
| 435 | 0.665000 | 15.00 | 5.522 | 3 | 89.600 | 83.800 | 2 | 0.00000 | 166 436 | 0 | 4000.00 | 0.00 |
| 436 | 0.665000 | 5.00 | 3.660 | 3 | 83.800 | 83.800 | 2 | 0.00000 | 435 437 | 0 | 4000.00 | 0.00 |
| 437 | 0.665000 | 5.00 | 14.300 | 3 | 83.800 | 83.800 | 2 | 0.00000 | 436 438 | 0 | 4000.00 | 0.00 |

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 438    0.505000      5.00    4.652  13      83.800     88.000     2     0.00000 437 439     0   4000.00      0.00
 439    0.505000      5.00    6.050   2      88.000     89.000     2     0.00000 438 440     0   4000.00      0.00
 440    0.336000     60.00    5.000   1      89.000    113.000     2     0.00000 439   0     0   4000.00      0.00
 441    0.665000     10.00    9.911   3      83.800     91.500     2     0.00000 437 442     0   4000.00      0.00
 442    0.665000     80.00    1.865   3      91.500    102.800     2     0.00000 441 443     0   4000.00      0.00
 443    0.665000     50.00    1.106  16     102.800    130.000     2     0.00000 442   0     0   4000.00      0.00
 444    0.336000     10.00    5.435  16     102.800    107.800     2     0.00000 442   0     0   4000.00      0.00
 445    0.665000     40.00    2.658  16      91.500     86.000     2     0.00000 441   0     0   4000.00      0.00
 446    0.505000      5.00    7.868  13      83.800     88.000     2     0.00000 435 447     0   4000.00      0.00
 447    0.505000      5.00    1.000   2      88.000     89.000     2     0.00000 446 448     0   4000.00      0.00
 448    0.505000     45.00    2.301   4      89.000    103.000     2     0.00000 447 449     0   4000.00      0.00
 449    0.336000     20.00    2.613   4     103.000    112.000     2     0.00000 448 450     0   4000.00      0.00
 450    0.336000    110.00    2.307   1     112.000    113.000     2     0.00000 449   0     0   4000.00      0.00
 451    0.336000    160.00    1.474   4      83.800    141.000     2     0.00000 436 452     0   4000.00      0.00
 452    0.336000      5.00    1.000   2     141.000    141.000     2     0.00000 451 453     0   4000.00      0.00
 453    0.256000     50.00    1.000   1     141.000    141.000     2     0.00000 452   0     0   4000.00      0.00
 454    0.665000     30.00    4.979   3      84.100     93.500     2     0.00000 204 455     0   4000.00      0.00
 455    0.665000     10.00    2.862   2      93.500    103.500     2     0.00000 454 456     0   4000.00      0.00
 456    0.505000     50.00    5.000   1     103.500    103.500     2     0.00000 455   0     0   4000.00      0.00
 457    0.505000     20.00    2.414   4      93.500     80.300     2     0.00000 454 458     0   4080.00      0.00
 458    0.505000     50.00    1.000  16      80.300     80.300     2     0.00000 457   0     0   4000.00      0.00
 459    0.336000     20.00    3.318   2      62.750     62.750     2     0.00000 218 460     0   4000.00      0.00
 460    0.336000     10.00    2.210   4      62.750     63.750     2     0.00000 459 461     0   4000.00      0.00
 461    0.336000     30.00    1.762   4      63.750     86.250     2     0.00000 460 462     0   4000.00      0.00
 462    0.336000     40.00    1.286   4      86.250    125.000     2     0.00000 461 463     0   4000.00      0.00
 463    0.336000    130.00    1.233   4     125.000    125.000     2     0.00000 462 464     0   4000.00      0.00
 464    0.336000     30.00    1.587   4     125.000    155.000     2     0.00000 463 465     0   4000.00      0.00
 465    0.256000     60.00    1.171   4     155.000    208.000     2     0.00000 464 466     0   4000.00      0.00
 466    0.001000     10.00    1.000  16     208.000    205.000     2     0.00000 465   0     0   4000.00      0.00
 467    0.336000     20.00    2.378   2      94.000     94.000     2     0.00000 199 468     0   4000.00      0.00
 468    0.336000     20.00    1.000   4      94.000     94.000     2     0.00000 467 469     0   4000.00      0.00
 469    0.336000      5.00    1.538   4      94.000     94.000     2     0.00000 468 470     0   4000.00      0.00
 470    0.336000     25.00    2.665   4      94.000    113.000     2     0.00000 469 471     0   4000.00      0.00
 471    0.336000     75.00    1.403   4     113.000    122.000     2     0.00000 470 472     0   4000.00      0.00
 472    0.336000     35.00    1.708   3     122.000    151.800     2     0.00000 471 473     0   4000.00      0.00
 473    0.336000     30.00    2.322   3     151.800    169.500     2     0.00000 472 474     0   4000.00      0.00
 474    0.336000     35.00    1.770   4     169.500    187.800     2     0.00000 473 475     0   4000.00      0.00
 475    0.256000     15.00    1.717   4     187.800    187.800     2     0.00000 474 476     0   4000.00      0.00
 476    0.256000    110.00    1.130   4     187.800    205.300     2     0.00000 475 477     0   4000.00      0.00
 477    0.256000     10.00    1.000  16     205.300    204.300     2     0.00000 476   0     0   4000.00      0.00
 478    0.256000     40.00    1.849  16     169.500    166.000     2     0.00000 473   0     0   4000.00      0.00
 479    0.336000     10.00    4.769   4     151.800    153.300     2     0.00000 472 480     0   4000.00      0.00
 480    0.256000     60.00    1.293  16     153.300    149.300     2     0.00000 479   0     0   4000.00      0.00
 481    0.505000      5.00   14.146   4      61.750     57.700     2     0.00000 208 482     0   4000.00      0.00
 482    0.505000     20.00    3.323   4      57.700     71.000     2     0.00000 481 483     0   4000.00      0.00
 483    0.505000     10.00    1.000   2      71.000     71.000     2     0.00000 482 484     0   4000.00      0.00
 484    0.505000     50.00    5.000   1      71.000     71.000     2     0.00000 483   0     0   4000.00      0.00
 485    0.505000      5.00   13.184   4     138.300    138.300     2     0.00000 414 486     0   4000.00      0.00
 486    0.336000     90.00    1.157   4     138.300    143.500     2     0.00000 485 487     0   4000.00      0.00
 487    0.336000     15.00    1.627   4     143.500    147.400     2     0.00000 486 488     0   4000.00      0.00
 488    0.336000     75.00    1.314   4     147.400    165.800     2     0.00000 487 489     0   4000.00      0.00
 489    0.336000     70.00    1.355   4     165.800    164.000     2     0.00000 488 490     0   4000.00      0.00
 490    0.336000     10.00    3.486   4     164.000    164.000     2     0.00000 489 491     0   4000.00      0.00
 491    0.336000     10.00    1.416   4     164.000    164.000     2     0.00000 490 492     0   4000.00      0.00
 492    0.256000     10.00    1.251   4     164.000    164.000     2     0.00000 491 493     0   4000.00      0.00
 493    0.206000     10.00    3.225   4     164.000    166.000     2     0.00000 492 494     0   4000.00      0.00
 494    0.206000     75.00    1.549   4     166.000    166.000     2     0.00000 493 495     0   4000.00      0.00
 495    0.172000     20.00    1.757  19     166.000    166.000     2     0.00000 494 496     0   4000.00      0.00
 496    0.087000     10.00    2.409  16     166.000    168.000     2     0.00000 495   0     0   4000.00      0.00
@EOR

 91 570.3   0  18
   20.00   .000     -0.022     -0.033    -0.045    -0.056    -0.067    -0.078
  -0.089  -.100     -0.111     -0.123    -0.134    -0.145    -0.156    -0.167
  -0.200   -100.0
   570.3  570.3     587.3      590.3     587.3     580.3     568.3     558.3
   542.3  520.3     490.3      460.3     420.3     370.3     310.3     240.3
   170.3  170.3

 99 495.3   0  18
   20.00   .000     -0.557     -1.114    -1.671    -2.228    -2.785    -3.342
  -3.899  -4.46     -5.013     -5.570    -6.127    -6.684    -7.241    -8.912
  -13.4   -100.0
   495.3  495.3     494.3      492.3     491.3     488.3     485.3     481.3
   477.3  472.3     466.3      459.3     448.3     436.3     423.3     375.3
   170.3  170.3

117 512.1  0 17
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   20.00  -.000     -0.557    -1.114    -1.671    -2.228    -2.785    -3.342
  -3.899  -4.46     -5.013    -5.57     -6.127    -6.684    -7.241    -8.912
  -13.37
   512.1  512.1     510.1     507.1     505.1     502.1     500.1     498.1
   495.1  492.1     487.8     481.1     476.1     467.1     457.1     412.1
   160.1

123 512.1  0 17
   20.00  -.000     -0.557    -1.114    -1.671    -2.228    -2.785    -3.342
  -3.899  -4.46     -5.013    -5.57     -6.127    -6.684    -7.241    -8.912
  -13.37
   512.1  512.1     510.1     507.1     505.1     502.1     500.1     498.1
   495.1  492.1     487.8     481.1     476.1     467.1     457.1     412.1
   160.1

129 482.1   0  16
   20.00   .000     -0.022     -0.033    -0.045    -0.056    -0.067    -0.078
  -0.089  -.100     -0.111     -0.123    -0.134    -0.145    -0.156    -100.0
   482.1  482.1     478.1     473.1     463.1     448.1     428.1     403.1
   374.1  343.1     308.1     268.1     233.1     198.1     168.1     168.1

440 147.0   0   0

450 147.0   0   0

453 175.0   0   0

456 137.5   0   0

484 105.0   0   0

  4 0  100.  100. 1.0E+20   2  9  4  0  .01   393.6
0     .56   2.36    100
100.  100.  100.    100.
0     50.0   90.0  92.5   95.3   97.5      99.0      99.7       100.0
0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

 90 0  100  100  1.0E+20    2  9  3  0  .01  570.3
 0       0.01  100
 100     0    0
 0     50.0   90.0  92.5   95.3   97.5      99.0      99.7       100.0
0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

 96 0  100  100  1.0E+20   2  9  4  0  .01  495.3
 0      .63   3.43   100
 100.   100.  0.     0.
 0     50.0   90.0  92.5   95.3   97.5      99.0      99.7       100.0
0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

102 0  100.  100. 1.0E+20   2  9  4  0  .01   393.6
 0     2.0   2.01    100
 100.  100.  100.    100.
 0     50.0   90.0  92.5   95.3   97.5      99.0      99.7       100.0
0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

114 0  100  100  1.0E+20    2  9  4  0  .01  512.1
0       2.51  5.61   100
100     100   100.   100.
0     50.0   90.0  92.5   95.3   97.5      99.0      99.7       100.0
0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

121 0  100  100  1.0E+20    2  9  4  0  .01  512.1
0       21.93 27.13 100
100     100   100   100
0     50.0   90.0  92.5   95.3   97.5      99.0      99.7       100.0
0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

126 0  100  100  1.0E+20    2  9  3  0  .01  482.1
 0       0.01  100
 100     100   100
 0     50.0   90.0  92.5   95.3   97.5      99.0      99.7       100.0
0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

415  0  100  100  1.0E+20   2  16  3  0  1.79  194.
0        0.1    100
100     100    100
0   11.1   16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
97.5     99.0     99.7  100.0
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10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
203570   1596000  0.49259E+08  0.1E+21

439  0  100  100  1.0E+20   2  16  3  0  1.79  147.
0       0.1    100
100     100    100
0    11.1  16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
97.5     99.0     99.7  100.0
10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
203570   1596000  0.49259E+08  0.1E+21

447  0  100  100  1.0E+20   2  16  3  0  0.99  147.
0       0.01    100
100     0       0
0    11.1  16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
97.5     99.0     99.7  100.0
10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
203570   1596000  0.49259E+08  0.1E+21

452  0  100  100  1.0E+20   2  16  3  0  1.785  175.
0       0.01   100
100     100    100
0    11.1  16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
97.5     99.0     99.7  100.0
10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
203570   1596000  0.49259E+08  0.1E+21

455  0  100  100  1.0E+20   2  16  3  0  0.695  137.5
 0       0.01   100
 100     100    100
 0    11.1  16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
 97.5     99.0     99.7  100.0
 10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
203570   1596000  0.49259E+08  0.1E+21

459  0  100  100  1.0E+20   2  9  3  0  .01  96.8
0       1.0   100
100     100   100
0     50.0   90.0  92.5   95.3   97.5      99.0      99.7        100.0
0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

467  0  100  100  1.0E+20   2  9  3  0  .01  128.
0       1.0   100
100     100   100
0     50.0   90.0  92.5   95.3   97.5      99.0      99.7        100.0
0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

483  0  100  100  1.0E+20  2  16  4  0  0.99  105.0
0       0.1   0.11  100
100     100   100   100
0    11.1  16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
97.5     99.0     99.7  100.0
10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
203570   1596000  0.49259E+08  0.1E+21


  5  2  0.650  0.01 0.7850 0.0  ID 1.0000
438  2  0.750  0.01 0.2003 0.0  ID 0.5050
446  2  0.750  0.01 0.2003 0.0  ID 0.5050

308   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102

410   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102


433   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102

362   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
```

```
0.21        14.7        0.02      68.0
53.3    2          .102

396    0.00136      0.0006       1.5      0.
0.0           1.0         0.      0.083
0.21        14.7        0.02      68.0
53.3    2          .102


495    0.00136      0.0006       1.5      0.
0.0           1.0         0.      0.083
0.21        14.7        0.02      68.0
53.3    2          .102

334    0.00136      0.0006       1.5      0.
0.0           1.0         0.      0.083
0.21        14.7        0.02      68.0
53.3    2          .102

371    0.00136      0.0006       1.5      0.
0.0           1.0         0.      0.083
0.21        14.7        0.02      68.0
53.3    2          .102

382    0.00136      0.0006       1.5      0.
0.0           1.0         0.      0.083
0.21        14.7        0.02      68.0
53.3    2          .102


 1.           1.
 6     2
 94    2
 97    2
 102   2
 113   2
 120   2
 184   41
 188   46
 194   31
 289   11
 290    7
 291    6
 292   23
 299   17
 303   11
 304   1
 306   24
 308   26
 314   6
 322   11
 325    5
 332    2
 334    9
 347   11
 351   10
 362    9
 371   2
 376   6
 382   13
 383    3
 396   31
 409   4
 410   17
 412   11
 418   9
 425   21
 428   20
 430   32
 432   20
 433   3
 450   22
 455   2
 465   1
 466   2
 476   4
 477   22
 478   8
```

# CALCULATION SHEET

| | | | |
|---|---|---|---|
| Project: | HOPE CREEK GENERATING STATION | Job Number: | 8038 |
| Calc No. | 8038-P0004 | Sheet No. | 170 |
| By: | A. Arastu Date: 9/14/18 | Rev. No. | 1 |
| Subject: | Water Hammer Analysis of the HCGS Fire Protection System | | |

```
480   11
483   2
495   4
@EOR
410      1      410     3          1
410      3      410     5          2
410      4      410     18         3
410      18     410     19         4
410      18     411     3          5
412      1      412     2          6
412      1      412     3          7
412      3      412     6          8
412      5      412     6          9
412      6      412     7          10
412      7      412     10         11
@EOR
0     1.0   100  1
1.0  30.0   500  1
30.0 888.  1000  1
```

## B3 - Case 3 (6 inch Deluge Valve w/HC Electric & Diesel Pumps) with Vacuum Breakers

```
HCGS FP Case 3: 9 VBs.  Forces in Riser # 26 only
10000
0  0  1  0  1  0
2   2   0.  12.0
2   1   0   0
0   1   0  0  0  0  0  1 0 0
1.9  62.4  7.83E-6
1.0  2   13    0    0
       0.0    1000.0    2000.0   2.0E+04   6.0E+04   1.0E+05   3.0E+05   6.0E+05
   1.0E+06   1.5E+06   3.5E+06   1.0E+11   1.0E+33
      0.10     0.061     0.048     0.026     0.021      .019    0.0167    0.0155
    0.0150    0.0147     0.014     0.014     0.014
495.3   3  17  0    0
  -10.00   .000   .557  1.114  1.671  2.228  2.785  3.342
   3.899  4.456  5.013  5.570  6.127  6.684  7.241  8.912
   13.4
   495.3  495.3     494.3     492.3     491.3     488.3     485.3     481.3
   477.3  472.3     466.3     459.3     448.3     436.3     423.3     375.3
   170.3
   1
   1    1.104000     55.00    5.492   4      99.400    94.000     2     0.00000   0   2     0   4000.00       0.00
   2    1.000000     20.00    7.400   4      94.000   105.040     2     0.00000   1   3     0   4000.00       0.00
   3    1.000000     10.00    7.180   4     105.040   105.040     2     0.00000   2   4     0   4000.00       0.00
   4    1.000000     10.00    3.538   2     105.040   104.500     2     0.00000   3   5     0   4000.00       0.00
   5    1.000000      5.00   18.508  13     104.500   104.750     2     0.00000   4   6     0   4000.00       0.00
   6    1.000000     10.00    5.200   4     104.750   110.000     2     0.00000   5   7     0   4000.00       0.00
   7    1.000000     20.00    3.400   3     110.000   105.000     2     0.00000   6   8     0   4000.00       0.00
   8    1.000000    115.00    2.402   3     105.000    96.900     2     0.00000   7  86     0   4000.00       0.00
   9    1.007000      5.00    2.611   4      96.900    96.900     2     0.00000   8  10     0   4000.00       0.00
  10    1.007000     10.00    3.014   4      96.900    96.900     2     0.00000   9  11     0   4000.00       0.00
  11    1.007000     10.00    1.806   4      96.900    96.900     2     0.00000  10  12     0   4000.00       0.00
  12    1.007000     10.00    3.014   3      96.900    96.900     2     0.00000  11  13     0   4000.00       0.00
  13    1.007000    110.00    1.183   4      96.900    96.900     2     0.00000  12  14     0   4000.00       0.00
  14    1.007000    110.00    1.363   4      96.900    95.900     2     0.00000  13  15     0   4000.00       0.00
  15    1.007000     10.00    3.014   4      95.900    95.900     2     0.00000  14  16     0   4000.00       0.00
  16    1.007000     30.00    1.671   4      95.900    95.900     2     0.00000  15  17     0   4000.00       0.00
  17    1.007000     80.00    1.252   4      95.900    95.900     2     0.00000  16  18     0   4000.00       0.00
  18    1.007000     20.00    1.403   4      95.900    95.900     2     0.00000  17  19     0   4000.00       0.00
  19    1.007000    130.00    1.155   4      95.900    95.900     2     0.00000  18  20     0   4000.00       0.00
  20    1.007000    135.00    1.060   4      95.900    95.400     2     0.00000  19  21     0   4000.00       0.00
  21    1.007000     10.00    2.994   4      95.400    93.500     2     0.00000  20  22     0   4000.00       0.00
  22    1.007000     65.00    1.217   4      93.500    93.500     2     0.00000  21  23     0   4000.00       0.00
  23    1.007000      5.00    1.000   4      93.500    93.500     2     0.00000  22  24     0   4000.00       0.00
  24    1.007000     20.00    3.004   4      93.500    97.000     2     0.00000  23  25     0   4000.00       0.00
  25    1.007000    200.00    1.300   4      97.000    97.000     2     0.00000  24  26     0   4000.00       0.00
  26    1.007000     55.00    1.513   4      97.000    97.000     2     0.00000  25  27     0   4000.00       0.00
  27    1.007000     20.00    1.997   4      97.000    93.000     2     0.00000  26  28     0   4000.00       0.00
  28    1.007000    230.00    1.088   3      93.000    93.000     2     0.00000  27 181     0   4000.00       0.00
  29    1.007000     40.00    1.503   3      93.000    93.000     2     0.00000  28  30     0   4000.00       0.00
  30    1.007000    240.00    1.117   4      93.000    94.500     2     0.00000  29  31     0   4000.00       0.00
  31    1.007000     45.00    1.448   4      94.500    94.500     2     0.00000  30  32     0   4000.00       0.00
  32    1.007000     35.00    1.570   4      94.500    91.000     2     0.00000  31  33     0   4000.00       0.00
  33    1.007000    180.00    1.111   4      91.000    96.000     2     0.00000  32  34     0   4000.00       0.00
  34    1.007000     10.00    3.014   4      96.000    96.000     2     0.00000  33  35     0   4000.00       0.00
  35    1.007000      5.00    5.028   4      96.000    96.000     2     0.00000  34  36     0   4000.00       0.00
  36    1.007000      5.00    2.611   4      96.000    96.000     2     0.00000  35  37     0   4000.00       0.00
  37    1.007000     10.00    3.014   4      96.000    96.000     2     0.00000  36  38     0   4000.00       0.00
  38    1.007000     30.00    2.141   4      96.000    96.000     2     0.00000  37  39     0   4000.00       0.00
  39    1.007000     20.00    1.403   4      96.000    96.000     2     0.00000  38  40     0   4000.00       0.00
  40    1.007000     80.00    1.252   3      96.000    96.000     2     0.00000  39  41     0   4000.00       0.00
  41    1.007000     10.00    1.806   4      96.000    96.000     2     0.00000  40  42     0   4000.00       0.00
  42    1.007000     20.00    1.000   4      96.000    96.000     2     0.00000  41  43     0   4000.00       0.00
  43    1.007000     55.00    1.363   4      96.000    97.200     2     0.00000  42  44     0   4000.00       0.00
  44    1.007000      5.00    5.028   4      97.200    97.200     2     0.00000  43  45     0   4000.00       0.00
  45    1.007000    160.00    1.175   4      97.200    96.200     2     0.00000  44  46     0   4000.00       0.00
  46    1.007000     15.00    2.343   3      96.200    96.200     2     0.00000  45 162     0   4000.00       0.00
  47    1.007000      5.00    5.028   4      96.200    96.200     2     0.00000  46  48     0   4000.00       0.00
  48    1.007000     15.00    6.357   4      96.200    97.000     2     0.00000  47  49     0   4000.00       0.00
  49    1.007000     60.00    1.166   4      97.000    97.000     2     0.00000  48  50     0   4000.00       0.00
  50    1.007000     15.00    2.994   4      97.000    94.500     2     0.00000  49  51     0   4000.00       0.00
  51    1.007000      5.00    4.605   4      94.500    97.000     2     0.00000  50  52     0   4000.00       0.00
```

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 52 | 1.007000 | 15.00 | 2.329 | 4 | 97.000 | 94.000 | 2 | 0.00000 | 51 | 53 | 0 | 4000.00 | 0.00 |
| 53 | 1.007000 | 80.00 | 1.501 | 4 | 94.000 | 96.500 | 2 | 0.00000 | 52 | 54 | 0 | 4000.00 | 0.00 |
| 54 | 1.007000 | 65.00 | 1.310 | 3 | 96.500 | 96.500 | 2 | 0.00000 | 53 | 55 | 0 | 4000.00 | 0.00 |
| 55 | 1.007000 | 50.00 | 1.481 | 4 | 96.500 | 97.200 | 2 | 0.00000 | 54 | 56 | 0 | 4000.00 | 0.00 |
| 56 | 1.007000 | 25.00 | 1.322 | 4 | 97.200 | 97.200 | 2 | 0.00000 | 55 | 57 | 0 | 4000.00 | 0.00 |
| 57 | 1.007000 | 5.00 | 3.820 | 4 | 97.200 | 97.200 | 2 | 0.00000 | 56 | 58 | 0 | 4000.00 | 0.00 |
| 58 | 1.007000 | 70.00 | 1.288 | 4 | 97.200 | 97.200 | 2 | 0.00000 | 57 | 59 | 0 | 4000.00 | 0.00 |
| 59 | 1.007000 | 10.00 | 1.806 | 4 | 97.200 | 97.200 | 2 | 0.00000 | 58 | 60 | 0 | 4000.00 | 0.00 |
| 60 | 1.007000 | 195.00 | 1.103 | 4 | 97.200 | 97.200 | 2 | 0.00000 | 59 | 61 | 0 | 4000.00 | 0.00 |
| 61 | 1.007000 | 240.00 | 1.159 | 4 | 97.200 | 94.500 | 2 | 0.00000 | 60 | 62 | 0 | 4000.00 | 0.00 |
| 62 | 1.007000 | 215.00 | 1.094 | 4 | 94.500 | 94.500 | 2 | 0.00000 | 61 | 63 | 0 | 4000.00 | 0.00 |
| 63 | 1.007000 | 110.00 | 1.183 | 4 | 94.500 | 94.500 | 2 | 0.00000 | 62 | 64 | 0 | 4000.00 | 0.00 |
| 64 | 1.007000 | 195.00 | 1.103 | 4 | 94.500 | 94.500 | 2 | 0.00000 | 63 | 65 | 0 | 4000.00 | 0.00 |
| 65 | 1.007000 | 5.00 | 5.028 | 4 | 94.500 | 94.500 | 2 | 0.00000 | 64 | 66 | 0 | 4000.00 | 0.00 |
| 66 | 1.007000 | 30.00 | 1.665 | 4 | 94.500 | 95.800 | 2 | 0.00000 | 65 | 67 | 0 | 4000.00 | 0.00 |
| 67 | 1.007000 | 5.00 | 2.611 | 4 | 95.800 | 95.800 | 2 | 0.00000 | 66 | 68 | 0 | 4000.00 | 0.00 |
| 68 | 1.007000 | 25.00 | 1.806 | 3 | 95.800 | 95.800 | 2 | 0.00000 | 67 | 229 | 0 | 4000.00 | 0.00 |
| 69 | 1.007000 | 130.00 | 1.155 | 4 | 95.800 | 95.500 | 2 | 0.00000 | 68 | 70 | 0 | 4000.00 | 0.00 |
| 70 | 1.007000 | 5.00 | 2.611 | 3 | 95.500 | 95.500 | 2 | 0.00000 | 69 | 261 | 0 | 4000.00 | 0.00 |
| 71 | 1.007000 | 5.00 | 5.028 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 70 | 72 | 0 | 4000.00 | 0.00 |
| 72 | 1.007000 | 5.00 | 2.611 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 71 | 73 | 0 | 4000.00 | 0.00 |
| 73 | 1.007000 | 205.00 | 1.098 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 72 | 74 | 0 | 4000.00 | 0.00 |
| 74 | 1.007000 | 240.00 | 1.117 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 73 | 75 | 0 | 4000.00 | 0.00 |
| 75 | 1.007000 | 20.00 | 4.021 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 74 | 76 | 0 | 4000.00 | 0.00 |
| 76 | 1.007000 | 30.00 | 1.665 | 4 | 95.500 | 91.500 | 2 | 0.00000 | 75 | 77 | 0 | 4000.00 | 0.00 |
| 77 | 1.007000 | 25.00 | 2.120 | 4 | 91.500 | 97.000 | 2 | 0.00000 | 76 | 78 | 0 | 4000.00 | 0.00 |
| 78 | 1.007000 | 50.00 | 1.403 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 77 | 79 | 0 | 4000.00 | 0.00 |
| 79 | 1.007000 | 50.00 | 1.403 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 78 | 80 | 0 | 4000.00 | 0.00 |
| 80 | 1.007000 | 20.00 | 1.997 | 4 | 97.000 | 90.500 | 2 | 0.00000 | 79 | 81 | 0 | 4000.00 | 0.00 |
| 81 | 1.007000 | 40.00 | 2.002 | 4 | 90.500 | 96.900 | 2 | 0.00000 | 80 | 82 | 0 | 4000.00 | 0.00 |
| 82 | 1.007000 | 165.00 | 1.122 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 81 | 83 | 0 | 4000.00 | 0.00 |
| 83 | 1.007000 | 135.00 | 1.060 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 82 | 84 | 0 | 4000.00 | 0.00 |
| 84 | 1.007000 | 10.00 | 3.014 | 3 | 96.900 | 96.900 | 2 | 0.00000 | 83 | 101 | 0 | 4000.00 | 0.00 |
| 85 | 1.007000 | 60.00 | 1.134 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 84 | 86 | 0 | 4000.00 | 0.00 |
| 86 | 1.007000 | 5.00 | 5.028 | 3 | 96.900 | 96.900 | 2 | 0.00000 | 85 | 9 | 1 | 4000.00 | 0.00 |
| 87 | 0.336000 | 10.00 | 5.771 | 3 | 105.000 | 112.070 | 2 | 0.00000 | 7 | 88 | 0 | 4000.00 | 0.00 |
| 88 | 0.336000 | 5.00 | 5.570 | 4 | 112.070 | 113.750 | 2 | 0.00000 | 87 | 89 | 0 | 4000.00 | 0.00 |
| 89 | 0.256000 | 30.00 | 1.870 | 4 | 113.750 | 109.000 | 2 | 0.00000 | 88 | 90 | 0 | 4000.00 | 0.00 |
| 90 | 0.256000 | 10.00 | 1.205 | 2 | 109.000 | 104.250 | 2 | 0.00000 | 89 | 91 | 0 | 4000.00 | 0.00 |
| 91 | 0.256000 | 5.00 | 5.933 | 1 | 104.250 | 103.750 | 2 | 0.00000 | 90 | 0 | 0 | 4000.00 | 0.00 |
| 92 | 0.336000 | 40.00 | 2.714 | 3 | 112.070 | 105.000 | 2 | 0.00000 | 87 | 93 | 0 | 4000.00 | 0.00 |
| 93 | 1.000000 | 20.00 | 3.400 | 4 | 105.000 | 110.200 | 2 | 0.00000 | 92 | 94 | 0 | 4000.00 | 0.00 |
| 94 | 1.000000 | 10.00 | 3.800 | 4 | 110.200 | 104.750 | 2 | 0.00000 | 93 | 95 | 0 | 4000.00 | 0.00 |
| 95 | 1.000000 | 5.00 | 18.508 | 4 | 104.750 | 104.750 | 2 | 0.00000 | 94 | 96 | 0 | 4000.00 | 0.00 |
| 96 | 1.000000 | 10.00 | 3.538 | 2 | 104.750 | 104.750 | 2 | 0.00000 | 95 | 97 | 0 | 4000.00 | 0.00 |
| 97 | 1.000000 | 5.00 | 9.400 | 4 | 104.750 | 105.040 | 2 | 0.00000 | 96 | 98 | 0 | 4000.00 | 0.00 |
| 98 | 1.000000 | 20.00 | 7.400 | 4 | 105.040 | 94.000 | 2 | 0.00000 | 97 | 99 | 0 | 4000.00 | 0.00 |
| 99 | 1.104000 | 30.00 | 4.874 | 1 | 94.000 | 99.400 | 2 | 0.00000 | 98 | 0 | 0 | 4000.00 | 0.00 |
| 100 | 1.000000 | 85.00 | 1.864 | 4 | 105.000 | 91.000 | 2 | 0.00000 | 92 | 101 | 0 | 4000.00 | 0.00 |
| 101 | 1.000000 | 25.00 | 4.512 | 3 | 91.000 | 96.900 | 2 | 0.00000 | 100 | 85 | 1 | 4000.00 | 0.00 |
| 102 | 0.835000 | 5.00 | 12.356 | 2 | 96.000 | 96.000 | 2 | 0.00000 | 40 | 103 | 0 | 4000.00 | 0.00 |
| 103 | 0.788000 | 60.00 | 1.628 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 102 | 104 | 0 | 4000.00 | 0.00 |
| 104 | 0.788000 | 100.00 | 1.000 | 4 | 96.000 | 95.500 | 2 | 0.00000 | 103 | 105 | 0 | 4000.00 | 0.00 |
| 105 | 0.788000 | 100.00 | 1.000 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 104 | 106 | 0 | 4000.00 | 0.00 |
| 106 | 0.788000 | 30.00 | 2.786 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 105 | 107 | 0 | 4000.00 | 0.00 |
| 107 | 0.927000 | 35.00 | 2.059 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 106 | 108 | 0 | 4000.00 | 0.00 |
| 108 | 0.927000 | 150.00 | 1.494 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 107 | 109 | 0 | 4000.00 | 0.00 |
| 109 | 0.927000 | 50.00 | 1.519 | 3 | 95.500 | 95.500 | 2 | 0.00000 | 108 | 110 | 0 | 4000.00 | 0.00 |
| 110 | 0.927000 | 20.00 | 2.298 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 109 | 111 | 0 | 4000.00 | 0.00 |
| 111 | 0.927000 | 10.00 | 7.860 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 110 | 112 | 0 | 4000.00 | 0.00 |
| 112 | 1.000000 | 10.00 | 9.000 | 4 | 95.500 | 101.700 | 2 | 0.00000 | 111 | 113 | 0 | 4000.00 | 0.00 |
| 113 | 1.000000 | 5.00 | 5.400 | 4 | 101.700 | 102.800 | 2 | 0.00000 | 112 | 114 | 0 | 4000.00 | 0.00 |
| 114 | 1.000000 | 10.00 | 12.354 | 2 | 102.800 | 102.800 | 2 | 0.00000 | 113 | 115 | 0 | 4000.00 | 0.00 |
| 115 | 1.000000 | 5.00 | 8.877 | 4 | 102.800 | 102.800 | 2 | 0.00000 | 114 | 116 | 0 | 4000.00 | 0.00 |
| 116 | 1.000000 | 5.00 | 5.000 | 4 | 102.800 | 102.800 | 2 | 0.00000 | 115 | 117 | 0 | 4000.00 | 0.00 |
| 117 | 1.250000 | 30.00 | 3.333 | 1 | 102.800 | 103.000 | 2 | 0.00000 | 116 | 0 | 0 | 4000.00 | 0.00 |
| 118 | 0.927000 | 10.00 | 6.562 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 109 | 119 | 0 | 4000.00 | 0.00 |
| 119 | 1.000000 | 10.00 | 2.400 | 3 | 95.500 | 101.700 | 2 | 0.00000 | 118 | 120 | 0 | 4000.00 | 0.00 |
| 120 | 1.000000 | 5.00 | 7.800 | 4 | 101.700 | 102.800 | 2 | 0.00000 | 119 | 121 | 0 | 4000.00 | 0.00 |
| 121 | 1.000000 | 10.00 | 13.154 | 2 | 102.800 | 102.800 | 2 | 0.00000 | 120 | 122 | 0 | 4000.00 | 0.00 |
| 122 | 1.000000 | 10.00 | 8.938 | 4 | 102.800 | 102.800 | 2 | 0.00000 | 121 | 123 | 0 | 4000.00 | 0.00 |
| 123 | 1.250000 | 20.00 | 3.250 | 1 | 102.800 | 103.000 | 2 | 0.00000 | 122 | 0 | 0 | 4000.00 | 0.00 |
| 124 | 0.134000 | 5.00 | 3.624 | 4 | 101.700 | 101.700 | 2 | 0.00000 | 119 | 125 | 0 | 4000.00 | 0.00 |
| 125 | 0.134000 | 5.00 | 3.141 | 4 | 101.700 | 101.700 | 2 | 0.00000 | 124 | 126 | 0 | 4000.00 | 0.00 |
| 126 | 0.134000 | 5.00 | 1.000 | 2 | 101.700 | 101.700 | 2 | 0.00000 | 125 | 127 | 0 | 4000.00 | 0.00 |
| 127 | 0.134000 | 10.00 | 1.000 | 4 | 101.700 | 101.700 | 2 | 0.00000 | 126 | 128 | 0 | 4000.00 | 0.00 |
| 128 | 0.134000 | 10.00 | 1.000 | 4 | 101.700 | 101.700 | 2 | 0.00000 | 127 | 129 | 0 | 4000.00 | 0.00 |
| 129 | 0.134000 | 10.00 | 1.000 | 1 | 101.700 | 103.000 | 2 | 0.00000 | 128 | 0 | 0 | 4000.00 | 0.00 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 130 | 0.835000 | 5.00 | 11.020 | 4 | 93.000 | 93.000 | 2 | 0.00000 | 29 | 131 | 0 | 4000.00 | 0.00 |
| 131 | 0.835000 | 100.00 | 1.331 | 4 | 93.000 | 96.010 | 2 | 0.00000 | 130 | 132 | 0 | 4000.00 | 0.00 |
| 132 | 0.835000 | 25.00 | 1.267 | 4 | 96.010 | 96.010 | 2 | 0.00000 | 131 | 133 | 0 | 4000.00 | 0.00 |
| 133 | 0.835000 | 65.00 | 1.000 | 4 | 96.010 | 96.000 | 2 | 0.00000 | 132 | 134 | 0 | 4000.00 | 0.00 |
| 134 | 0.835000 | 20.00 | 2.653 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 133 | 135 | 0 | 4000.00 | 0.00 |
| 135 | 0.835000 | 105.00 | 1.382 | 3 | 96.000 | 89.000 | 2 | 0.00000 | 134 | 136 | 0 | 4000.00 | 0.00 |
| 136 | 0.835000 | 5.00 | 3.338 | 4 | 89.000 | 89.000 | 2 | 0.00000 | 135 | 137 | 0 | 4000.00 | 0.00 |
| 137 | 0.835000 | 50.00 | 1.334 | 3 | 89.000 | 89.000 | 2 | 0.00000 | 136 | 138 | 0 | 4000.00 | 0.00 |
| 138 | 0.835000 | 5.00 | 5.676 | 4 | 89.000 | 89.000 | 2 | 0.00000 | 137 | 139 | 0 | 4000.00 | 0.00 |
| 139 | 0.835000 | 5.00 | 4.340 | 3 | 89.000 | 89.000 | 2 | 0.00000 | 138 | 140 | 0 | 4000.00 | 0.00 |
| 140 | 0.835000 | 55.00 | 1.000 | 4 | 89.000 | 89.000 | 2 | 0.00000 | 139 | 141 | 0 | 4000.00 | 0.00 |
| 141 | 0.835000 | 25.00 | 1.668 | 3 | 89.000 | 89.000 | 2 | 0.00000 | 140 | 142 | 0 | 4000.00 | 0.00 |
| 142 | 0.835000 | 15.00 | 2.882 | 4 | 89.000 | 91.940 | 2 | 0.00000 | 141 | 143 | 0 | 4000.00 | 0.00 |
| 143 | 0.835000 | 25.00 | 1.668 | 3 | 91.940 | 91.940 | 2 | 0.00000 | 142 | 144 | 0 | 4000.00 | 0.00 |
| 144 | 0.835000 | 5.00 | 5.676 | 3 | 91.940 | 91.940 | 2 | 0.00000 | 143 | 145 | 0 | 4000.00 | 0.00 |
| 145 | 0.835000 | 5.00 | 4.340 | 3 | 91.940 | 91.940 | 2 | 0.00000 | 144 | 146 | 0 | 4000.00 | 0.00 |
| 146 | 0.835000 | 10.00 | 3.338 | 4 | 91.940 | 96.200 | 2 | 0.00000 | 145 | 147 | 0 | 4000.00 | 0.00 |
| 147 | 0.835000 | 5.00 | 3.338 | 4 | 96.200 | 96.200 | 2 | 0.00000 | 146 | 148 | 0 | 4000.00 | 0.00 |
| 148 | 0.835000 | 145.00 | 1.000 | 4 | 96.200 | 96.200 | 2 | 0.00000 | 147 | 149 | 0 | 4000.00 | 0.00 |
| 149 | 0.835000 | 10.00 | 2.670 | 4 | 96.200 | 96.200 | 2 | 0.00000 | 148 | 150 | 0 | 4000.00 | 0.00 |
| 150 | 0.835000 | 90.00 | 1.186 | 3 | 96.200 | 96.200 | 2 | 0.00000 | 149 | 151 | 0 | 4000.00 | 0.00 |
| 151 | 0.835000 | 5.00 | 5.676 | 4 | 96.200 | 94.530 | 2 | 0.00000 | 150 | 152 | 0 | 4000.00 | 0.00 |
| 152 | 0.835000 | 15.00 | 2.664 | 3 | 94.530 | 94.530 | 2 | 0.00000 | 151 | 153 | 0 | 4000.00 | 0.00 |
| 153 | 0.835000 | 5.00 | 2.336 | 4 | 94.530 | 94.530 | 2 | 0.00000 | 152 | 154 | 0 | 4000.00 | 0.00 |
| 154 | 0.835000 | 5.00 | 4.340 | 3 | 94.530 | 94.540 | 2 | 0.00000 | 153 | 155 | 0 | 4000.00 | 0.00 |
| 155 | 0.835000 | 15.00 | 2.559 | 3 | 94.540 | 94.540 | 2 | 0.00000 | 154 | 156 | 0 | 4000.00 | 0.00 |
| 156 | 0.835000 | 5.00 | 4.340 | 3 | 94.540 | 94.540 | 2 | 0.00000 | 155 | 157 | 0 | 4000.00 | 0.00 |
| 157 | 0.835000 | 5.00 | 3.338 | 4 | 94.540 | 94.540 | 2 | 0.00000 | 156 | 158 | 0 | 4000.00 | 0.00 |
| 158 | 0.835000 | 5.00 | 3.338 | 3 | 94.540 | 94.500 | 2 | 0.00000 | 157 | 159 | 0 | 4000.00 | 0.00 |
| 159 | 0.835000 | 5.00 | 4.340 | 4 | 94.500 | 94.500 | 2 | 0.00000 | 158 | 160 | 0 | 4000.00 | 0.00 |
| 160 | 0.835000 | 55.00 | 1.425 | 3 | 94.500 | 94.500 | 2 | 0.00000 | 159 | 161 | 0 | 4000.00 | 0.00 |
| 161 | 0.835000 | 175.00 | 1.286 | 4 | 94.500 | 96.200 | 2 | 0.00000 | 160 | 162 | 0 | 4000.00 | 0.00 |
| 162 | 0.835000 | 100.00 | 1.568 | 3 | 96.200 | 96.200 | 2 | 0.00000 | 161 | 47 | 1 | 4000.00 | 0.00 |
| 163 | 0.835000 | 10.00 | 3.338 | 4 | 94.500 | 91.750 | 2 | 0.00000 | 160 | 164 | 0 | 4000.00 | 0.00 |
| 164 | 0.835000 | 40.00 | 1.413 | 4 | 91.750 | 89.580 | 2 | 0.00000 | 163 | 165 | 0 | 4000.00 | 0.00 |
| 165 | 0.835000 | 25.00 | 3.071 | 4 | 89.580 | 89.580 | 2 | 0.00000 | 164 | 166 | 0 | 4000.00 | 0.00 |
| 166 | 0.835000 | 5.00 | 4.340 | 3 | 89.580 | 89.580 | 2 | 0.00000 | 165 | 167 | 0 | 4000.00 | 0.00 |
| 167 | 0.835000 | 5.00 | 1.000 | 16 | 89.580 | 89.580 | 2 | 0.00000 | 166 | 0 | 0 | 4000.00 | 0.00 |
| 168 | 0.835000 | 5.00 | 13.358 | 4 | 89.000 | 91.000 | 2 | 0.00000 | 141 | 169 | 0 | 4000.00 | 0.00 |
| 169 | 0.835000 | 35.00 | 2.002 | 3 | 91.000 | 91.000 | 2 | 0.00000 | 168 | 170 | 0 | 4000.00 | 0.00 |
| 170 | 0.835000 | 10.00 | 4.340 | 3 | 91.000 | 91.000 | 2 | 0.00000 | 169 | 171 | 0 | 4000.00 | 0.00 |
| 171 | 0.835000 | 75.00 | 1.312 | 4 | 91.000 | 91.000 | 2 | 0.00000 | 170 | 172 | 0 | 4000.00 | 0.00 |
| 172 | 0.835000 | 45.00 | 2.002 | 3 | 91.000 | 91.000 | 2 | 0.00000 | 171 | 173 | 0 | 4000.00 | 0.00 |
| 173 | 0.835000 | 5.00 | 3.338 | 4 | 91.000 | 91.000 | 2 | 0.00000 | 172 | 174 | 0 | 4000.00 | 0.00 |
| 174 | 0.835000 | 15.00 | 1.779 | 4 | 91.000 | 96.040 | 2 | 0.00000 | 173 | 175 | 0 | 4000.00 | 0.00 |
| 175 | 0.835000 | 15.00 | 2.559 | 4 | 96.040 | 96.000 | 2 | 0.00000 | 174 | 176 | 0 | 4000.00 | 0.00 |
| 176 | 0.835000 | 95.00 | 1.176 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 175 | 177 | 0 | 4000.00 | 0.00 |
| 177 | 0.835000 | 55.00 | 1.213 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 176 | 178 | 0 | 4000.00 | 0.00 |
| 178 | 0.835000 | 5.00 | 3.338 | 4 | 96.000 | 91.000 | 2 | 0.00000 | 177 | 179 | 0 | 4000.00 | 0.00 |
| 179 | 0.835000 | 50.00 | 1.795 | 4 | 91.000 | 93.000 | 2 | 0.00000 | 178 | 180 | 0 | 4000.00 | 0.00 |
| 180 | 0.835000 | 80.00 | 1.146 | 4 | 93.000 | 93.000 | 2 | 0.00000 | 179 | 181 | 0 | 4000.00 | 0.00 |
| 181 | 0.835000 | 25.00 | 3.472 | 3 | 93.000 | 93.000 | 2 | 0.00000 | 180 | 29 | 1 | 4000.00 | 0.00 |
| 182 | 0.336000 | 45.00 | 1.866 | 3 | 91.000 | 96.000 | 2 | 0.00000 | 169 | 183 | 0 | 4000.00 | 0.00 |
| 183 | 0.336000 | 120.00 | 1.482 | 4 | 96.000 | 149.000 | 2 | 0.00000 | 182 | 184 | 0 | 4000.00 | 0.00 |
| 184 | 0.256000 | 205.00 | 1.092 | 16 | 149.000 | 142.500 | 2 | 0.00000 | 183 | 0 | 0 | 4000.00 | 0.00 |
| 185 | 0.256000 | 60.00 | 1.674 | 16 | 96.000 | 59.000 | 2 | 0.00000 | 182 | 0 | 0 | 4000.00 | 0.00 |
| 186 | 0.336000 | 10.00 | 4.427 | 3 | 91.000 | 94.800 | 2 | 0.00000 | 170 | 187 | 0 | 4000.00 | 0.00 |
| 187 | 0.336000 | 55.00 | 1.586 | 3 | 94.800 | 113.000 | 2 | 0.00000 | 186 | 188 | 0 | 4000.00 | 0.00 |
| 188 | 0.336000 | 230.00 | 1.231 | 4 | 113.000 | 146.000 | 2 | 0.00000 | 187 | 189 | 0 | 4000.00 | 0.00 |
| 189 | 0.256000 | 105.00 | 1.111 | 16 | 146.000 | 143.000 | 2 | 0.00000 | 188 | 0 | 0 | 4000.00 | 0.00 |
| 190 | 0.256000 | 100.00 | 1.297 | 16 | 94.800 | 83.700 | 2 | 0.00000 | 186 | 0 | 0 | 4000.00 | 0.00 |
| 191 | 0.256000 | 75.00 | 1.416 | 16 | 113.000 | 107.000 | 2 | 0.00000 | 187 | 0 | 0 | 4000.00 | 0.00 |
| 192 | 0.336000 | 5.00 | 7.854 | 4 | 91.000 | 95.000 | 2 | 0.00000 | 172 | 193 | 0 | 4000.00 | 0.00 |
| 193 | 0.336000 | 240.00 | 1.316 | 4 | 95.000 | 150.000 | 2 | 0.00000 | 192 | 194 | 0 | 4000.00 | 0.00 |
| 194 | 0.256000 | 180.00 | 1.105 | 16 | 150.000 | 142.000 | 2 | 0.00000 | 193 | 0 | 0 | 4000.00 | 0.00 |
| 195 | 0.665000 | 15.00 | 4.015 | 4 | 96.500 | 96.500 | 2 | 0.00000 | 54 | 196 | 0 | 4000.00 | 0.00 |
| 196 | 0.665000 | 11.00 | 2.197 | 4 | 96.500 | 94.500 | 2 | 0.00000 | 195 | 197 | 0 | 4400.00 | 0.00 |
| 197 | 0.665000 | 20.00 | 1.658 | 4 | 94.500 | 96.600 | 2 | 0.00000 | 196 | 198 | 0 | 4000.00 | 0.00 |
| 198 | 0.665000 | 115.00 | 1.000 | 4 | 96.600 | 96.600 | 2 | 0.00000 | 197 | 199 | 0 | 4000.00 | 0.00 |
| 199 | 0.665000 | 220.00 | 1.120 | 3 | 96.600 | 94.000 | 2 | 0.00000 | 198 | 200 | 0 | 4000.00 | 0.00 |
| 200 | 0.665000 | 20.00 | 2.862 | 4 | 94.000 | 94.750 | 2 | 0.00000 | 199 | 201 | 0 | 4000.00 | 0.00 |
| 201 | 0.665000 | 20.00 | 1.000 | 4 | 94.750 | 94.750 | 2 | 0.00000 | 200 | 202 | 0 | 4000.00 | 0.00 |
| 202 | 0.665000 | 20.00 | 2.197 | 4 | 94.750 | 94.750 | 2 | 0.00000 | 201 | 203 | 0 | 4000.00 | 0.00 |
| 203 | 0.665000 | 15.00 | 1.000 | 4 | 94.750 | 94.750 | 2 | 0.00000 | 202 | 204 | 0 | 4000.00 | 0.00 |
| 204 | 0.665000 | 30.00 | 1.973 | 3 | 94.750 | 84.100 | 2 | 0.00000 | 203 | 205 | 0 | 4000.00 | 0.00 |
| 205 | 0.665000 | 15.00 | 1.621 | 4 | 84.100 | 69.500 | 2 | 0.00000 | 204 | 206 | 0 | 4000.00 | 0.00 |
| 206 | 0.665000 | 15.00 | 1.887 | 3 | 69.500 | 69.500 | 2 | 0.00000 | 205 | 207 | 0 | 4000.00 | 0.00 |
| 207 | 0.665000 | 20.00 | 1.465 | 4 | 69.500 | 69.500 | 2 | 0.00000 | 206 | 208 | 0 | 4000.00 | 0.00 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 208 | 0.665000 | 20.00 | 4.125 | 3 | 69.500 | 61.750 | 2 | 0.00000 207 209 | 0 | 4000.00 | 0.00 |
| 209 | 0.665000 | 70.00 | 1.454 | 4 | 61.750 | 62.750 | 2 | 0.00000 208 210 | 0 | 4000.00 | 0.00 |
| 210 | 0.665000 | 5.00 | 6.320 | 4 | 62.750 | 62.750 | 2 | 0.00000 209 211 | 0 | 4000.00 | 0.00 |
| 211 | 0.665000 | 50.00 | 1.293 | 4 | 62.750 | 62.750 | 2 | 0.00000 210 212 | 0 | 4000.00 | 0.00 |
| 212 | 0.665000 | 20.00 | 2.330 | 3 | 62.750 | 62.750 | 2 | 0.00000 211 213 | 0 | 4000.00 | 0.00 |
| 213 | 0.665000 | 25.00 | 2.277 | 4 | 62.750 | 62.750 | 2 | 0.00000 212 214 | 0 | 4000.00 | 0.00 |
| 214 | 0.665000 | 20.00 | 1.665 | 4 | 62.750 | 62.750 | 2 | 0.00000 213 215 | 0 | 4000.00 | 0.00 |
| 215 | 0.665000 | 45.00 | 1.414 | 4 | 62.750 | 62.750 | 2 | 0.00000 214 216 | 0 | 4000.00 | 0.00 |
| 216 | 0.665000 | 20.00 | 1.665 | 4 | 62.750 | 62.750 | 2 | 0.00000 215 217 | 0 | 4000.00 | 0.00 |
| 217 | 0.665000 | 85.00 | 2.033 | 4 | 62.750 | 62.750 | 2 | 0.00000 216 218 | 0 | 4000.00 | 0.00 |
| 218 | 0.665000 | 5.00 | 3.660 | 3 | 62.750 | 62.750 | 2 | 0.00000 217 219 | 0 | 4000.00 | 0.00 |
| 219 | 0.665000 | 25.00 | 2.649 | 3 | 62.750 | 66.000 | 2 | 0.00000 218 220 | 0 | 4000.00 | 0.00 |
| 220 | 0.665000 | 30.00 | 1.749 | 4 | 66.000 | 96.000 | 2 | 0.00000 219 221 | 0 | 4000.00 | 0.00 |
| 221 | 0.665000 | 20.00 | 1.329 | 4 | 96.000 | 96.000 | 2 | 0.00000 220 222 | 0 | 4000.00 | 0.00 |
| 222 | 0.665000 | 5.00 | 4.977 | 4 | 96.000 | 94.400 | 2 | 0.00000 221 223 | 0 | 4000.00 | 0.00 |
| 223 | 0.665000 | 95.00 | 1.139 | 4 | 94.400 | 97.000 | 2 | 0.00000 222 224 | 0 | 4000.00 | 0.00 |
| 224 | 0.665000 | 35.00 | 1.646 | 4 | 97.000 | 97.000 | 2 | 0.00000 223 225 | 0 | 4000.00 | 0.00 |
| 225 | 0.665000 | 65.00 | 1.614 | 4 | 97.000 | 96.500 | 2 | 0.00000 224 226 | 0 | 4000.00 | 0.00 |
| 226 | 0.665000 | 35.00 | 1.000 | 4 | 96.500 | 96.500 | 2 | 0.00000 225 227 | 0 | 4000.00 | 0.00 |
| 227 | 0.665000 | 35.00 | 1.830 | 4 | 96.500 | 94.200 | 2 | 0.00000 226 228 | 0 | 4000.00 | 0.00 |
| 228 | 0.665000 | 35.00 | 1.266 | 4 | 94.200 | 96.200 | 2 | 0.00000 227 229 | 0 | 4000.00 | 0.00 |
| 229 | 0.665000 | 120.00 | 1.377 | 3 | 96.200 | 95.800 | 2 | 0.00000 228 69 | 1 | 4000.00 | 0.00 |
| 230 | 0.665000 | 10.00 | 6.453 | 4 | 96.900 | 96.900 | 2 | 0.00000 12 231 | 0 | 4000.00 | 0.00 |
| 231 | 0.665000 | 25.00 | 1.372 | 4 | 96.900 | 96.900 | 2 | 0.00000 230 232 | 0 | 4000.00 | 0.00 |
| 232 | 0.665000 | 150.00 | 1.062 | 4 | 96.900 | 96.900 | 2 | 0.00000 231 233 | 0 | 4000.00 | 0.00 |
| 233 | 0.665000 | 135.00 | 1.069 | 4 | 96.900 | 96.900 | 2 | 0.00000 232 234 | 0 | 4000.00 | 0.00 |
| 234 | 0.665000 | 45.00 | 1.146 | 4 | 96.900 | 96.900 | 2 | 0.00000 233 235 | 0 | 4000.00 | 0.00 |
| 235 | 0.665000 | 20.00 | 1.658 | 4 | 96.900 | 95.000 | 2 | 0.00000 234 236 | 0 | 4000.00 | 0.00 |
| 236 | 0.665000 | 35.00 | 1.564 | 4 | 95.000 | 95.500 | 2 | 0.00000 235 237 | 0 | 4000.00 | 0.00 |
| 237 | 0.665000 | 15.00 | 1.621 | 4 | 95.500 | 96.000 | 2 | 0.00000 236 238 | 0 | 4000.00 | 0.00 |
| 238 | 0.665000 | 30.00 | 1.621 | 4 | 96.000 | 72.000 | 2 | 0.00000 237 239 | 0 | 4000.00 | 0.00 |
| 239 | 0.665000 | 5.00 | 3.660 | 3 | 72.000 | 67.000 | 2 | 0.00000 238 240 | 0 | 4000.00 | 0.00 |
| 240 | 0.665000 | 75.00 | 1.497 | 4 | 67.000 | 64.250 | 2 | 0.00000 239 241 | 0 | 4000.00 | 0.00 |
| 241 | 0.665000 | 35.00 | 1.000 | 4 | 64.250 | 64.250 | 2 | 0.00000 240 242 | 0 | 4000.00 | 0.00 |
| 242 | 0.665000 | 65.00 | 1.286 | 4 | 64.250 | 61.750 | 2 | 0.00000 241 243 | 0 | 4000.00 | 0.00 |
| 243 | 0.665000 | 20.00 | 2.995 | 3 | 61.750 | 61.750 | 2 | 0.00000 242 244 | 0 | 4000.00 | 0.00 |
| 244 | 0.665000 | 5.00 | 2.064 | 4 | 61.750 | 61.750 | 2 | 0.00000 243 245 | 0 | 4000.00 | 0.00 |
| 245 | 0.665000 | 20.00 | 2.260 | 4 | 61.750 | 62.750 | 2 | 0.00000 244 246 | 0 | 4000.00 | 0.00 |
| 246 | 0.665000 | 15.00 | 1.887 | 4 | 62.750 | 62.750 | 2 | 0.00000 245 247 | 0 | 4000.00 | 0.00 |
| 247 | 0.665000 | 10.00 | 2.330 | 4 | 62.750 | 62.750 | 2 | 0.00000 246 248 | 0 | 4000.00 | 0.00 |
| 248 | 0.665000 | 15.00 | 1.887 | 4 | 62.750 | 62.750 | 2 | 0.00000 247 249 | 0 | 4000.00 | 0.00 |
| 249 | 0.665000 | 35.00 | 1.380 | 4 | 62.750 | 62.750 | 2 | 0.00000 248 250 | 0 | 4000.00 | 0.00 |
| 250 | 0.665000 | 100.00 | 1.000 | 4 | 62.750 | 62.750 | 2 | 0.00000 249 251 | 0 | 4000.00 | 0.00 |
| 251 | 0.665000 | 10.00 | 3.647 | 4 | 62.750 | 62.500 | 2 | 0.00000 250 252 | 0 | 4000.00 | 0.00 |
| 252 | 0.665000 | 30.00 | 1.749 | 4 | 62.500 | 67.900 | 2 | 0.00000 251 253 | 0 | 4000.00 | 0.00 |
| 253 | 0.665000 | 30.00 | 1.310 | 4 | 67.900 | 96.000 | 2 | 0.00000 252 254 | 0 | 4000.00 | 0.00 |
| 254 | 0.665000 | 20.00 | 2.317 | 4 | 96.000 | 97.000 | 2 | 0.00000 253 255 | 0 | 4000.00 | 0.00 |
| 255 | 0.665000 | 145.00 | 1.000 | 4 | 97.000 | 97.000 | 2 | 0.00000 254 256 | 0 | 4000.00 | 0.00 |
| 256 | 0.665000 | 35.00 | 1.752 | 4 | 97.000 | 97.000 | 2 | 0.00000 255 257 | 0 | 4000.00 | 0.00 |
| 257 | 0.665000 | 60.00 | 1.110 | 4 | 97.000 | 97.000 | 2 | 0.00000 256 258 | 0 | 4000.00 | 0.00 |
| 258 | 0.665000 | 40.00 | 1.165 | 4 | 97.000 | 97.000 | 2 | 0.00000 257 259 | 0 | 4000.00 | 0.00 |
| 259 | 0.665000 | 5.00 | 3.660 | 4 | 97.000 | 97.000 | 2 | 0.00000 258 260 | 0 | 4000.00 | 0.00 |
| 260 | 0.665000 | 45.00 | 1.118 | 4 | 97.000 | 97.000 | 2 | 0.00000 259 261 | 0 | 4000.00 | 0.00 |
| 261 | 0.665000 | 15.00 | 4.538 | 3 | 97.000 | 95.500 | 2 | 0.00000 260 71 | 1 | 4000.00 | 0.00 |
| 262 | 0.505000 | 20.00 | 2.315 | 4 | 61.750 | 63.000 | 2 | 0.00000 243 263 | 0 | 4000.00 | 0.00 |
| 263 | 0.505000 | 10.00 | 3.318 | 4 | 63.000 | 56.000 | 2 | 0.00000 262 264 | 0 | 4000.00 | 0.00 |
| 264 | 0.505000 | 30.00 | 2.380 | 4 | 56.000 | 61.750 | 2 | 0.00000 263 265 | 0 | 4000.00 | 0.00 |
| 265 | 0.505000 | 5.00 | 3.020 | 3 | 61.750 | 62.900 | 2 | 0.00000 264 266 | 0 | 4000.00 | 0.00 |
| 266 | 0.505000 | 5.00 | 10.494 | 4 | 62.900 | 67.000 | 2 | 0.00000 265 267 | 0 | 4000.00 | 0.00 |
| 267 | 0.505000 | 5.00 | 3.828 | 4 | 67.000 | 67.000 | 2 | 0.00000 266 268 | 0 | 4000.00 | 0.00 |
| 268 | 0.505000 | 65.00 | 1.155 | 3 | 67.000 | 67.000 | 2 | 0.00000 267 269 | 0 | 4000.00 | 0.00 |
| 269 | 0.505000 | 15.00 | 1.000 | 4 | 67.000 | 67.000 | 2 | 0.00000 268 270 | 0 | 4000.00 | 0.00 |
| 270 | 0.505000 | 35.00 | 1.866 | 3 | 67.000 | 67.000 | 2 | 0.00000 269 271 | 0 | 4000.00 | 0.00 |
| 271 | 0.256000 | 25.00 | 1.143 | 4 | 67.000 | 67.000 | 2 | 0.00000 270 272 | 0 | 4000.00 | 0.00 |
| 272 | 0.256000 | 10.00 | 3.099 | 4 | 67.000 | 65.000 | 2 | 0.00000 271 273 | 0 | 4000.00 | 0.00 |
| 273 | 0.256000 | 55.00 | 1.289 | 16 | 65.000 | 94.500 | 2 | 0.00000 272 0 | 0 | 4000.00 | 0.00 |
| 274 | 0.505000 | 15.00 | 1.000 | 3 | 62.900 | 63.900 | 2 | 0.00000 265 275 | 0 | 4000.00 | 0.00 |
| 275 | 0.505000 | 15.00 | 1.741 | 3 | 63.900 | 68.200 | 2 | 0.00000 274 276 | 0 | 4000.00 | 0.00 |
| 276 | 0.336000 | 135.00 | 1.170 | 4 | 68.200 | 71.500 | 2 | 0.00000 275 277 | 0 | 4000.00 | 0.00 |
| 277 | 0.336000 | 40.00 | 1.773 | 16 | 71.500 | 61.500 | 2 | 0.00000 276 0 | 0 | 4000.00 | 0.00 |
| 278 | 0.336000 | 20.00 | 2.518 | 16 | 68.200 | 61.500 | 2 | 0.00000 275 0 | 0 | 4000.00 | 0.00 |
| 279 | 0.505000 | 85.00 | 2.305 | 4 | 69.500 | 68.750 | 2 | 0.00000 206 280 | 0 | 4000.00 | 0.00 |
| 280 | 0.505000 | 10.00 | 2.010 | 3 | 68.750 | 68.750 | 2 | 0.00000 279 281 | 0 | 4000.00 | 0.00 |
| 281 | 0.505000 | 45.00 | 1.382 | 4 | 68.750 | 68.750 | 2 | 0.00000 280 282 | 0 | 4000.00 | 0.00 |
| 282 | 0.505000 | 10.00 | 1.707 | 4 | 68.750 | 68.750 | 2 | 0.00000 281 283 | 0 | 4000.00 | 0.00 |
| 283 | 0.505000 | 70.00 | 1.447 | 3 | 68.750 | 68.750 | 2 | 0.00000 282 284 | 0 | 4000.00 | 0.00 |
| 284 | 0.505000 | 20.00 | 1.354 | 4 | 68.750 | 68.750 | 2 | 0.00000 283 285 | 0 | 4000.00 | 0.00 |
| 285 | 0.505000 | 5.00 | 2.414 | 4 | 68.750 | 65.500 | 2 | 0.00000 284 286 | 0 | 4000.00 | 0.00 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 286 | 0.505000 | 25.00 | 1.404 | 3 | 65.500 | 65.500 | 2 | 0.00000 | 285 287 | 0 | 4000.00 | 0.00 |
| 287 | 0.336000 | 65.00 | 1.868 | 4 | 65.500 | 113.000 | 2 | 0.00000 | 286 288 | 0 | 4000.00 | 0.00 |
| 288 | 0.336000 | 35.00 | 2.150 | 3 | 113.000 | 147.000 | 2 | 0.00000 | 287 289 | 0 | 4000.00 | 0.00 |
| 289 | 0.256000 | 55.00 | 1.419 | 4 | 147.000 | 178.000 | 2 | 0.00000 | 288 290 | 0 | 4000.00 | 0.00 |
| 290 | 0.256000 | 10.00 | 1.000 | 16 | 178.000 | 178.000 | 2 | 0.00000 | 289 0 | 0 | 4000.00 | 0.00 |
| 291 | 0.256000 | 35.00 | 1.247 | 16 | 147.000 | 159.750 | 2 | 0.00000 | 288 0 | 0 | 4000.00 | 0.00 |
| 292 | 0.256000 | 115.00 | 1.686 | 16 | 67.000 | 128.500 | 2 | 0.00000 | 239 0 | 0 | 4000.00 | 0.00 |
| 293 | 0.336000 | 5.00 | 7.451 | 4 | 65.710 | 62.500 | 2 | 0.00000 | 219 294 | 0 | 4000.00 | 0.00 |
| 294 | 0.336000 | 60.00 | 1.112 | 4 | 62.500 | 62.500 | 2 | 0.00000 | 293 295 | 0 | 4000.00 | 0.00 |
| 295 | 0.336000 | 40.00 | 1.907 | 4 | 62.500 | 93.500 | 2 | 0.00000 | 294 296 | 0 | 4000.00 | 0.00 |
| 296 | 0.336000 | 45.00 | 1.729 | 3 | 93.500 | 126.800 | 2 | 0.00000 | 295 297 | 0 | 4000.00 | 0.00 |
| 297 | 0.336000 | 45.00 | 1.149 | 3 | 126.800 | 142.000 | 2 | 0.00000 | 296 298 | 0 | 4000.00 | 0.00 |
| 298 | 0.336000 | 40.00 | 1.571 | 3 | 142.000 | 154.500 | 2 | 0.00000 | 297 299 | 0 | 4000.00 | 0.00 |
| 299 | 0.256000 | 95.00 | 1.107 | 16 | 154.500 | 155.500 | 2 | 0.00000 | 298 0 | 0 | 4000.00 | 0.00 |
| 300 | 0.256000 | 100.00 | 1.623 | 16 | 142.000 | 143.000 | 2 | 0.00000 | 297 0 | 0 | 4000.00 | 0.00 |
| 301 | 0.336000 | 25.00 | 2.452 | 3 | 154.500 | 156.300 | 2 | 0.00000 | 298 302 | 0 | 4000.00 | 0.00 |
| 302 | 0.336000 | 45.00 | 1.893 | 4 | 156.300 | 172.300 | 2 | 0.00000 | 301 303 | 0 | 4000.00 | 0.00 |
| 303 | 0.256000 | 55.00 | 1.304 | 4 | 172.300 | 178.000 | 2 | 0.00000 | 302 304 | 0 | 4000.00 | 0.00 |
| 304 | 0.256000 | 10.00 | 1.000 | 16 | 178.000 | 178.000 | 2 | 0.00000 | 303 0 | 0 | 4000.00 | 0.00 |
| 305 | 0.336000 | 5.00 | 6.376 | 4 | 156.300 | 156.300 | 2 | 0.00000 | 301 306 | 0 | 4000.00 | 0.00 |
| 306 | 0.256000 | 130.00 | 1.405 | 16 | 156.300 | 156.300 | 2 | 0.00000 | 305 0 | 0 | 4000.00 | 0.00 |
| 307 | 0.336000 | 105.00 | 1.914 | 4 | 126.800 | 155.000 | 2 | 0.00000 | 296 308 | 0 | 4000.00 | 0.00 |
| 308 | 0.256000 | 130.00 | 1.287 | 19 | 155.000 | 206.300 | 2 | 0.00000 | 307 309 | 0 | 4000.00 | 0.00 |
| 309 | 0.256000 | 20.00 | 1.000 | 16 | 206.300 | 203.000 | 2 | 0.00000 | 308 0 | 0 | 4000.00 | 0.00 |
| 310 | 0.336000 | 10.00 | 5.301 | 3 | 62.750 | 71.500 | 2 | 0.00000 | 212 311 | 0 | 4000.00 | 0.00 |
| 311 | 0.336000 | 65.00 | 1.424 | 3 | 71.500 | 133.500 | 2 | 0.00000 | 310 312 | 0 | 4000.00 | 0.00 |
| 312 | 0.256000 | 15.00 | 1.439 | 4 | 133.500 | 147.300 | 2 | 0.00000 | 311 313 | 0 | 4000.00 | 0.00 |
| 313 | 0.256000 | 60.00 | 1.281 | 4 | 147.300 | 165.100 | 2 | 0.00000 | 312 314 | 0 | 4000.00 | 0.00 |
| 314 | 0.256000 | 30.00 | 1.527 | 16 | 165.100 | 160.000 | 2 | 0.00000 | 313 0 | 0 | 4000.00 | 0.00 |
| 315 | 0.256000 | 25.00 | 1.407 | 16 | 71.500 | 81.500 | 2 | 0.00000 | 310 0 | 0 | 4000.00 | 0.00 |
| 316 | 0.336000 | 10.00 | 3.688 | 4 | 133.500 | 133.500 | 2 | 0.00000 | 311 317 | 0 | 4000.00 | 0.00 |
| 317 | 0.256000 | 80.00 | 1.717 | 16 | 133.500 | 141.500 | 2 | 0.00000 | 316 0 | 0 | 4000.00 | 0.00 |
| 318 | 0.336000 | 10.00 | 6.443 | 4 | 68.750 | 66.700 | 2 | 0.00000 | 283 319 | 0 | 4000.00 | 0.00 |
| 319 | 0.336000 | 100.00 | 1.672 | 3 | 66.700 | 120.000 | 2 | 0.00000 | 318 320 | 0 | 4000.00 | 0.00 |
| 320 | 0.336000 | 15.00 | 2.792 | 3 | 120.000 | 132.000 | 2 | 0.00000 | 319 321 | 0 | 4000.00 | 0.00 |
| 321 | 0.336000 | 15.00 | 1.448 | 4 | 132.000 | 146.000 | 2 | 0.00000 | 320 322 | 0 | 4000.00 | 0.00 |
| 322 | 0.256000 | 55.00 | 1.604 | 16 | 146.000 | 163.500 | 2 | 0.00000 | 321 0 | 0 | 4000.00 | 0.00 |
| 323 | 0.256000 | 25.00 | 1.492 | 16 | 120.000 | 128.500 | 2 | 0.00000 | 319 0 | 0 | 4000.00 | 0.00 |
| 324 | 0.336000 | 45.00 | 1.806 | 3 | 132.000 | 132.000 | 2 | 0.00000 | 320 325 | 0 | 4000.00 | 0.00 |
| 325 | 0.256000 | 30.00 | 2.263 | 16 | 132.000 | 157.500 | 2 | 0.00000 | 324 0 | 0 | 4000.00 | 0.00 |
| 326 | 0.256000 | 35.00 | 1.188 | 16 | 132.000 | 141.500 | 2 | 0.00000 | 324 0 | 0 | 4000.00 | 0.00 |
| 327 | 0.336000 | 30.00 | 2.456 | 4 | 63.900 | 68.100 | 2 | 0.00000 | 274 328 | 0 | 4000.00 | 0.00 |
| 328 | 0.336000 | 90.00 | 1.939 | 3 | 68.100 | 134.000 | 2 | 0.00000 | 327 329 | 0 | 4000.00 | 0.00 |
| 329 | 0.336000 | 45.00 | 1.612 | 4 | 134.000 | 132.000 | 2 | 0.00000 | 328 330 | 0 | 4000.00 | 0.00 |
| 330 | 0.362000 | 90.00 | 1.181 | 16 | 132.000 | 141.500 | 2 | 0.00000 | 329 0 | 0 | 4000.00 | 0.00 |
| 331 | 0.336000 | 15.00 | 3.554 | 3 | 134.000 | 147.000 | 2 | 0.00000 | 328 332 | 0 | 4000.00 | 0.00 |
| 332 | 0.256000 | 10.00 | 1.200 | 4 | 147.000 | 150.000 | 2 | 0.00000 | 331 333 | 0 | 4000.00 | 0.00 |
| 333 | 0.256000 | 10.00 | 1.200 | 16 | 150.000 | 159.000 | 2 | 0.00000 | 332 0 | 0 | 4000.00 | 0.00 |
| 334 | 0.256000 | 50.00 | 1.451 | 19 | 147.000 | 159.75 | 2 | 0.00000 | 331 335 | 0 | 4000.00 | 0.00 |
| 335 | 0.090000 | 10.00 | 1.000 | 16 | 159.750 | 159.000 | 2 | 0.00000 | 334 0 | 0 | 4000.00 | 0.00 |
| 336 | 0.336000 | 10.00 | 6.712 | 4 | 67.000 | 65.000 | 2 | 0.00000 | 268 337 | 0 | 4000.00 | 0.00 |
| 337 | 0.336000 | 90.00 | 1.538 | 3 | 65.000 | 115.200 | 2 | 0.00000 | 336 338 | 0 | 4000.00 | 0.00 |
| 338 | 0.336000 | 40.00 | 1.403 | 3 | 115.200 | 133.800 | 2 | 0.00000 | 337 339 | 0 | 4000.00 | 0.00 |
| 339 | 0.336000 | 50.00 | 2.423 | 3 | 133.800 | 133.300 | 2 | 0.00000 | 338 340 | 0 | 4000.00 | 0.00 |
| 340 | 0.336000 | 10.00 | 3.016 | 3 | 133.300 | 133.300 | 2 | 0.00000 | 339 341 | 0 | 4000.00 | 0.00 |
| 341 | 0.256000 | 45.00 | 1.340 | 16 | 133.300 | 141.500 | 2 | 0.00000 | 340 0 | 0 | 4000.00 | 0.00 |
| 342 | 0.256000 | 15.00 | 1.678 | 16 | 133.300 | 141.500 | 2 | 0.00000 | 340 0 | 0 | 4000.00 | 0.00 |
| 343 | 0.256000 | 10.00 | 1.300 | 16 | 133.800 | 141.500 | 2 | 0.00000 | 338 0 | 0 | 4000.00 | 0.00 |
| 344 | 0.256000 | 35.00 | 1.644 | 16 | 133.300 | 128.500 | 2 | 0.00000 | 339 0 | 0 | 4000.00 | 0.00 |
| 345 | 0.256000 | 5.00 | 5.813 | 3 | 115.200 | 115.200 | 2 | 0.00000 | 337 346 | 0 | 4000.00 | 0.00 |
| 346 | 0.256000 | 80.00 | 1.288 | 3 | 115.200 | 116.500 | 2 | 0.00000 | 345 347 | 0 | 4000.00 | 0.00 |
| 347 | 0.256000 | 55.00 | 1.726 | 16 | 116.500 | 141.500 | 2 | 0.00000 | 346 0 | 0 | 4000.00 | 0.00 |
| 348 | 0.256000 | 15.00 | 2.601 | 16 | 116.500 | 128.500 | 2 | 0.00000 | 346 0 | 0 | 4000.00 | 0.00 |
| 349 | 0.256000 | 50.00 | 1.594 | 16 | 115.200 | 106.500 | 2 | 0.00000 | 345 0 | 0 | 4000.00 | 0.00 |
| 350 | 0.505000 | 175.00 | 1.669 | 4 | 68.750 | 140.000 | 2 | 0.00000 | 280 351 | 0 | 4000.00 | 0.00 |
| 351 | 0.336000 | 50.00 | 1.000 | 16 | 140.000 | 138.000 | 2 | 0.00000 | 350 0 | 0 | 4000.00 | 0.00 |
| 352 | 0.336000 | 10.00 | 4.226 | 4 | 67.000 | 65.000 | 2 | 0.00000 | 270 353 | 0 | 4000.00 | 0.00 |
| 353 | 0.336000 | 80.00 | 1.285 | 4 | 65.000 | 105.700 | 2 | 0.00000 | 352 354 | 0 | 4000.00 | 0.00 |
| 354 | 0.336000 | 80.00 | 1.630 | 3 | 105.700 | 130.500 | 2 | 0.00000 | 353 355 | 0 | 4000.00 | 0.00 |
| 355 | 0.256000 | 30.00 | 1.458 | 4 | 130.500 | 147.500 | 2 | 0.00000 | 354 356 | 0 | 4000.00 | 0.00 |
| 356 | 0.256000 | 25.00 | 1.225 | 4 | 147.500 | 141.500 | 2 | 0.00000 | 355 357 | 0 | 4000.00 | 0.00 |
| 357 | 0.162000 | 50.00 | 1.843 | 16 | 141.500 | 141.500 | 2 | 0.00000 | 356 0 | 0 | 4000.00 | 0.00 |
| 358 | 0.336000 | 5.00 | 5.570 | 4 | 130.500 | 130.500 | 2 | 0.00000 | 354 359 | 0 | 4000.00 | 0.00 |
| 359 | 0.162000 | 35.00 | 1.759 | 16 | 130.500 | 132.200 | 2 | 0.00000 | 358 0 | 0 | 4000.00 | 0.00 |
| 360 | 0.336000 | 45.00 | 2.343 | 4 | 94.500 | 115.800 | 2 | 0.00000 | 152 361 | 0 | 4000.00 | 0.00 |
| 361 | 0.336000 | 15.00 | 1.448 | 3 | 115.800 | 130.600 | 2 | 0.00000 | 360 362 | 0 | 4000.00 | 0.00 |
| 362 | 0.256000 | 50.00 | 1.510 | 19 | 130.600 | 176.000 | 2 | 0.00000 | 361 363 | 0 | 4000.00 | 0.00 |
| 363 | 0.256000 | 15.00 | 1.000 | 16 | 176.000 | 176.000 | 2 | 0.00000 | 362 0 | 0 | 4000.00 | 0.00 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 364 | 0.362000 | 145.00 | 1.539 | 16 | 130.600 | 129.600 | 2 | 0.00000 | 361 0 | 0 | 4000.00 | 0.00 |
| 365 | 0.336000 | 65.00 | 1.940 | 3 | 92.000 | 118.400 | 2 | 0.00000 | 145 366 | 0 | 4000.00 | 0.00 |
| 366 | 0.336000 | 20.00 | 1.544 | 3 | 118.400 | 118.400 | 2 | 0.00000 | 365 367 | 0 | 4000.00 | 0.00 |
| 367 | 0.256000 | 15.00 | 1.239 | 16 | 118.400 | 115.000 | 2 | 0.00000 | 366 0 | 0 | 4000.00 | 0.00 |
| 368 | 0.256000 | 20.00 | 1.947 | 16 | 118.400 | 127.000 | 2 | 0.00000 | 365 0 | 0 | 4000.00 | 0.00 |
| 369 | 0.336000 | 30.00 | 2.275 | 4 | 118.400 | 133.500 | 2 | 0.00000 | 366 370 | 0 | 4000.00 | 0.00 |
| 370 | 0.256000 | 35.00 | 1.232 | 3 | 133.500 | 166.000 | 2 | 0.00000 | 369 371 | 0 | 4000.00 | 0.00 |
| 371 | 0.256000 | 10.00 | 1.000 | 19 | 166.000 | 176.000 | 2 | 0.00000 | 370 372 | 0 | 4000.00 | 0.00 |
| 372 | 0.256000 | 20.00 | 2.970 | 16 | 176.000 | 175.000 | 2 | 0.00000 | 371 0 | 0 | 4000.00 | 0.00 |
| 373 | 0.256000 | 55.00 | 1.521 | 16 | 166.000 | 141.000 | 2 | 0.00000 | 370 0 | 0 | 4000.00 | 0.00 |
| 374 | 0.336000 | 5.00 | 6.914 | 3 | 92.000 | 94.200 | 2 | 0.00000 | 144 375 | 0 | 4000.00 | 0.00 |
| 375 | 0.336000 | 50.00 | 1.605 | 3 | 94.200 | 113.250 | 2 | 0.00000 | 374 376 | 0 | 4000.00 | 0.00 |
| 376 | 0.256000 | 30.00 | 1.100 | 16 | 113.250 | 141.750 | 2 | 0.00000 | 375 0 | 0 | 4000.00 | 0.00 |
| 377 | 0.256000 | 30.00 | 1.751 | 16 | 94.200 | 74.000 | 2 | 0.00000 | 374 0 | 0 | 4000.00 | 0.00 |
| 378 | 0.256000 | 20.00 | 2.380 | 16 | 113.300 | 111.000 | 2 | 0.00000 | 375 0 | 0 | 4000.00 | 0.00 |
| 379 | 0.336000 | 10.00 | 4.898 | 4 | 89.000 | 94.330 | 2 | 0.00000 | 137 380 | 0 | 4000.00 | 0.00 |
| 380 | 0.336000 | 5.00 | 2.344 | 3 | 94.330 | 95.000 | 2 | 0.00000 | 379 381 | 0 | 4000.00 | 0.00 |
| 381 | 0.336000 | 100.00 | 1.322 | 4 | 95.000 | 130.700 | 2 | 0.00000 | 380 382 | 0 | 4000.00 | 0.00 |
| 382 | 0.256000 | 65.00 | 1.598 | 19 | 130.700 | 176.000 | 2 | 0.00000 | 381 383 | 0 | 4000.00 | 0.00 |
| 383 | 0.025600 | 20.00 | 1.000 | 16 | 176.000 | 175.000 | 2 | 0.00000 | 382 0 | 0 | 4000.00 | 0.00 |
| 384 | 0.336000 | 50.00 | 1.859 | 3 | 95.000 | 96.500 | 2 | 0.00000 | 380 385 | 0 | 4000.00 | 0.00 |
| 385 | 0.256000 | 75.00 | 1.252 | 3 | 96.500 | 98.000 | 2 | 0.00000 | 384 386 | 0 | 4000.00 | 0.00 |
| 386 | 0.256000 | 40.00 | 1.269 | 16 | 98.000 | 71.000 | 2 | 0.00000 | 385 0 | 0 | 4000.00 | 0.00 |
| 387 | 0.256000 | 15.00 | 2.741 | 16 | 96.500 | 103.000 | 2 | 0.00000 | 384 0 | 0 | 4000.00 | 0.00 |
| 388 | 0.256000 | 40.00 | 1.922 | 16 | 98.000 | 94.500 | 2 | 0.00000 | 385 0 | 0 | 4000.00 | 0.00 |
| 389 | 0.336000 | 45.00 | 1.567 | 3 | 89.000 | 127.750 | 2 | 0.00000 | 135 390 | 0 | 4000.00 | 0.00 |
| 390 | 0.256000 | 20.00 | 1.688 | 16 | 127.750 | 141.750 | 2 | 0.00000 | 389 0 | 0 | 4000.00 | 0.00 |
| 391 | 0.256000 | 110.00 | 1.335 | 16 | 127.750 | 141.750 | 2 | 0.00000 | 389 0 | 0 | 4000.00 | 0.00 |
| 392 | 0.336000 | 5.00 | 7.854 | 3 | 94.500 | 96.800 | 2 | 0.00000 | 155 393 | 0 | 4000.00 | 0.00 |
| 393 | 0.256000 | 215.00 | 1.316 | 16 | 96.800 | 65.000 | 2 | 0.00000 | 392 0 | 0 | 4000.00 | 0.00 |
| 394 | 0.256000 | 125.00 | 1.470 | 16 | 96.800 | 141.750 | 2 | 0.00000 | 392 0 | 0 | 4000.00 | 0.00 |
| 395 | 0.336000 | 150.00 | 1.528 | 3 | 94.500 | 130.400 | 2 | 0.00000 | 156 396 | 0 | 4000.00 | 0.00 |
| 396 | 0.256000 | 155.00 | 1.280 | 19 | 130.400 | 182.000 | 2 | 0.00000 | 395 397 | 0 | 4000.00 | 0.00 |
| 397 | 0.256000 | 30.00 | 1.478 | 16 | 182.000 | 179.000 | 2 | 0.00000 | 396 0 | 0 | 4000.00 | 0.00 |
| 398 | 0.256000 | 40.00 | 1.653 | 16 | 130.400 | 141.750 | 2 | 0.00000 | 395 0 | 0 | 4000.00 | 0.00 |
| 399 | 0.505000 | 120.00 | 1.538 | 3 | 94.500 | 90.500 | 2 | 0.00000 | 158 400 | 0 | 4000.00 | 0.00 |
| 400 | 0.336000 | 5.00 | 8.007 | 4 | 90.500 | 90.500 | 2 | 0.00000 | 399 401 | 0 | 4000.00 | 0.00 |
| 401 | 0.256000 | 60.00 | 1.349 | 16 | 90.500 | 141.750 | 2 | 0.00000 | 400 0 | 0 | 4000.00 | 0.00 |
| 402 | 0.336000 | 130.00 | 1.496 | 3 | 90.500 | 65.300 | 2 | 0.00000 | 399 403 | 0 | 4000.00 | 0.00 |
| 403 | 0.336000 | 50.00 | 1.228 | 4 | 65.300 | 94.700 | 2 | 0.00000 | 402 404 | 0 | 4000.00 | 0.00 |
| 404 | 0.256000 | 55.00 | 1.315 | 16 | 94.700 | 141.750 | 2 | 0.00000 | 403 0 | 0 | 4000.00 | 0.00 |
| 405 | 0.336000 | 40.00 | 2.260 | 3 | 65.300 | 77.500 | 2 | 0.00000 | 402 406 | 0 | 4000.00 | 0.00 |
| 406 | 0.256000 | 30.00 | 1.458 | 16 | 77.500 | 103.500 | 2 | 0.00000 | 405 0 | 0 | 4000.00 | 0.00 |
| 407 | 0.256000 | 125.00 | 1.180 | 16 | 77.500 | 75.000 | 2 | 0.00000 | 405 0 | 0 | 4000.00 | 0.00 |
| 408 | 0.336000 | 135.00 | 1.552 | 4 | 79.000 | 142.000 | 2 | 0.00000 | 139 409 | 0 | 4000.00 | 0.00 |
| 409 | 0.336000 | 20.00 | 1.000 | 16 | 142.000 | 141.750 | 2 | 0.00000 | 408 0 | 0 | 4000.00 | 0.00 |
| 410 | 0.256000 | 95.00 | 1.334 | 19 | 96.200 | 174.000 | 2 | 0.00000 | 150 411 | 0 | 4000.00 | 0.00 |
| 411 | 0.256000 | 10.00 | 1.358 | 4 | 174.000 | 183.500 | 2 | 0.00000 | 410 412 | 0 | 4000.00 | 0.00 |
| 412 | 0.107000 | 60.00 | 1.439 | 4 | 183.500 | 197.500 | 2 | 0.00000 | 411 413 | 0 | 4000.00 | 0.00 |
| 413 | 0.107000 | 25.00 | 1.000 | 16 | 197.500 | 197.500 | 2 | 0.00000 | 412 0 | 0 | 4000.00 | 0.00 |
| 414 | 0.505000 | 100.00 | 2.373 | 3 | 91.940 | 138.300 | 2 | 0.00000 | 143 415 | 0 | 4000.00 | 0.00 |
| 415 | 0.505000 | 5.00 | 5.848 | 2 | 138.300 | 142.000 | 2 | 0.00000 | 414 416 | 0 | 4000.00 | 0.00 |
| 416 | 0.336000 | 5.00 | 1.000 | 4 | 142.000 | 142.000 | 2 | 0.00000 | 415 417 | 0 | 4000.00 | 0.00 |
| 417 | 0.336000 | 50.00 | 1.000 | 4 | 142.000 | 160.000 | 2 | 0.00000 | 416 418 | 0 | 4000.00 | 0.00 |
| 418 | 0.336000 | 50.00 | 1.000 | 16 | 160.000 | 160.000 | 2 | 0.00000 | 417 0 | 0 | 4000.00 | 0.00 |
| 419 | 0.505000 | 85.00 | 2.031 | 4 | 94.500 | 131.500 | 2 | 0.00000 | 154 420 | 0 | 4000.00 | 0.00 |
| 420 | 0.505000 | 50.00 | 1.443 | 4 | 131.500 | 130.750 | 2 | 0.00000 | 419 421 | 0 | 4000.00 | 0.00 |
| 421 | 0.505000 | 30.00 | 1.909 | 4 | 130.750 | 130.750 | 2 | 0.00000 | 420 422 | 0 | 4000.00 | 0.00 |
| 422 | 0.505000 | 40.00 | 2.361 | 4 | 130.750 | 128.750 | 2 | 0.00000 | 421 423 | 0 | 4000.00 | 0.00 |
| 423 | 0.505000 | 35.00 | 1.491 | 3 | 128.750 | 132.170 | 2 | 0.00000 | 422 424 | 0 | 4000.00 | 0.00 |
| 424 | 0.256000 | 10.00 | 1.505 | 4 | 132.170 | 138.000 | 2 | 0.00000 | 423 425 | 0 | 4000.00 | 0.00 |
| 425 | 0.162000 | 105.00 | 1.580 | 16 | 138.000 | 169.500 | 2 | 0.00000 | 424 0 | 0 | 4000.00 | 0.00 |
| 426 | 0.336000 | 40.00 | 1.843 | 3 | 132.170 | 132.170 | 2 | 0.00000 | 423 427 | 0 | 4000.00 | 0.00 |
| 427 | 0.256000 | 10.00 | 1.000 | 4 | 132.170 | 138.000 | 2 | 0.00000 | 426 428 | 0 | 4000.00 | 0.00 |
| 428 | 0.162000 | 100.00 | 1.632 | 16 | 138.000 | 169.500 | 2 | 0.00000 | 427 0 | 0 | 4000.00 | 0.00 |
| 429 | 0.256000 | 40.00 | 1.165 | 4 | 132.170 | 138.000 | 2 | 0.00000 | 426 430 | 0 | 4000.00 | 0.00 |
| 430 | 0.162000 | 155.00 | 1.548 | 16 | 138.000 | 169.500 | 2 | 0.00000 | 429 0 | 0 | 4000.00 | 0.00 |
| 431 | 0.256000 | 40.00 | 1.934 | 4 | 65.500 | 69.000 | 2 | 0.00000 | 286 432 | 0 | 4000.00 | 0.00 |
| 432 | 0.256000 | 105.00 | 1.020 | 4 | 69.000 | 171.000 | 2 | 0.00000 | 431 433 | 0 | 4000.00 | 0.00 |
| 433 | 0.162000 | 10.00 | 1.227 | 19 | 171.000 | 181.000 | 2 | 0.00000 | 432 434 | 0 | 4000.00 | 0.00 |
| 434 | 0.162000 | 40.00 | 1.332 | 16 | 181.000 | 180.000 | 2 | 0.00000 | 433 0 | 0 | 4000.00 | 0.00 |
| 435 | 0.665000 | 15.00 | 5.522 | 3 | 89.600 | 83.800 | 2 | 0.00000 | 166 436 | 0 | 4000.00 | 0.00 |
| 436 | 0.665000 | 5.00 | 3.660 | 3 | 83.800 | 83.800 | 2 | 0.00000 | 435 437 | 0 | 4000.00 | 0.00 |
| 437 | 0.665000 | 5.00 | 14.300 | 3 | 83.800 | 83.800 | 2 | 0.00000 | 436 438 | 0 | 4000.00 | 0.00 |
| 438 | 0.505000 | 5.00 | 4.652 | 13 | 83.800 | 88.000 | 2 | 0.00000 | 437 439 | 0 | 4000.00 | 0.00 |
| 439 | 0.505000 | 5.00 | 6.050 | 2 | 88.000 | 89.000 | 2 | 0.00000 | 438 440 | 0 | 4000.00 | 0.00 |
| 440 | 0.336000 | 60.00 | 5.000 | 1 | 89.000 | 113.000 | 2 | 0.00000 | 439 0 | 0 | 4000.00 | 0.00 |
| 441 | 0.665000 | 10.00 | 9.911 | 3 | 83.800 | 91.500 | 2 | 0.00000 | 437 442 | 0 | 4000.00 | 0.00 |

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442    0.665000     80.00    1.865   3      91.500   102.800     2     0.00000 441 443     0   4000.00       0.00
443    0.665000     50.00    1.106  16     102.800   130.000     2     0.00000 442   0     0   4000.00       0.00
444    0.336000     10.00    5.435  16     102.800   107.800     2     0.00000 442   0     0   4000.00       0.00
445    0.665000     40.00    2.658  16      91.500    86.000     2     0.00000 441   0     0   4000.00       0.00
446    0.505000      5.00    7.868  13      83.800    88.000     2     0.00000 435 447     0   4000.00       0.00
447    0.505000      5.00    1.000   2      88.000    89.000     2     0.00000 446 448     0   4000.00       0.00
448    0.505000     45.00    2.301   4      89.000   103.000     2     0.00000 447 449     0   4000.00       0.00
449    0.336000     20.00    2.613   4     103.000   112.000     2     0.00000 448 450     0   4000.00       0.00
450    0.336000    110.00    2.307   1     112.000   113.000     2     0.00000 449   0     0   4000.00       0.00
451    0.336000    160.00    1.474   4      83.800   141.000     2     0.00000 436 452     0   4000.00       0.00
452    0.336000      5.00    1.000   2     141.000   141.000     2     0.00000 451 453     0   4000.00       0.00
453    0.256000     50.00    1.000   1     141.000   141.000     2     0.00000 452   0     0   4000.00       0.00
454    0.665000     30.00    4.979   3      84.100    93.500     2     0.00000 204 455     0   4000.00       0.00
455    0.665000     10.00    2.862   2      93.500   103.500     2     0.00000 454 456     0   4000.00       0.00
456    0.505000     50.00    5.000   1     103.500   103.500     2     0.00000 455   0     0   4000.00       0.00
457    0.505000     20.00    2.414   4      93.500    80.300     2     0.00000 454 458     0   4080.00       0.00
458    0.505000     50.00    1.000  16      80.300    80.300     2     0.00000 457   0     0   4000.00       0.00
459    0.336000     20.00    3.318   2      62.750    62.750     2     0.00000 218 460     0   4000.00       0.00
460    0.336000     10.00    2.210   4      62.750    63.750     2     0.00000 459 461     0   4000.00       0.00
461    0.336000     30.00    1.762   4      63.750    86.250     2     0.00000 460 462     0   4000.00       0.00
462    0.336000     40.00    1.286   4      86.250   125.000     2     0.00000 461 463     0   4000.00       0.00
463    0.336000    130.00    1.233   4     125.000   125.000     2     0.00000 462 464     0   4000.00       0.00
464    0.336000     30.00    1.587   4     125.000   155.000     2     0.00000 463 465     0   4000.00       0.00
465    0.256000     60.00    1.171   4     155.000   208.000     2     0.00000 464 466     0   4000.00       0.00
466    0.001000     10.00    1.000  16     208.000   205.000     2     0.00000 465   0     0   4000.00       0.00
467    0.336000     20.00    2.378   2      94.000    94.000     2     0.00000 199 468     0   4000.00       0.00
468    0.336000     20.00    1.000   4      94.000    94.000     2     0.00000 467 469     0   4000.00       0.00
469    0.336000      5.00    1.538   4      94.000    94.000     2     0.00000 468 470     0   4000.00       0.00
470    0.336000     25.00    2.665   4      94.000   113.000     2     0.00000 469 471     0   4000.00       0.00
471    0.336000     75.00    1.403   4     113.000   122.000     2     0.00000 470 472     0   4000.00       0.00
472    0.336000     35.00    1.708   3     122.000   151.800     2     0.00000 471 473     0   4000.00       0.00
473    0.336000     30.00    2.322   3     151.800   169.500     2     0.00000 472 474     0   4000.00       0.00
474    0.336000     35.00    1.770   4     169.500   187.800     2     0.00000 473 475     0   4000.00       0.00
475    0.256000     15.00    1.717   4     187.800   187.800     2     0.00000 474 476     0   4000.00       0.00
476    0.256000    110.00    1.130   4     187.800   205.300     2     0.00000 475 477     0   4000.00       0.00
477    0.256000     10.00    1.000  16     205.300   204.300     2     0.00000 476   0     0   4000.00       0.00
478    0.256000     40.00    1.849  16     169.500   166.000     2     0.00000 473   0     0   4000.00       0.00
479    0.336000     10.00    4.769   4     151.800   153.300     2     0.00000 472 480     0   4000.00       0.00
480    0.256000     60.00    1.293  16     153.300   149.300     2     0.00000 479   0     0   4000.00       0.00
481    0.505000      5.00   14.146   4      61.750    57.700     2     0.00000 208 482     0   4000.00       0.00
482    0.505000     20.00    3.323   4      57.700    71.000     2     0.00000 481 483     0   4000.00       0.00
483    0.505000     10.00    1.000   2      71.000    71.000     2     0.00000 482 484     0   4000.00       0.00
484    0.505000     50.00    5.000   1      71.000    71.000     2     0.00000 483   0     0   4000.00       0.00
485    0.505000      5.00   13.184   4     138.300   138.300     2     0.00000 414 486     0   4000.00       0.00
486    0.336000     90.00    1.157   4     138.300   143.500     2     0.00000 485 487     0   4000.00       0.00
487    0.336000     15.00    1.627   4     143.500   147.400     2     0.00000 486 488     0   4000.00       0.00
488    0.336000     75.00    1.314   4     147.400   165.800     2     0.00000 487 489     0   4000.00       0.00
489    0.336000     70.00    1.355   4     165.800   164.000     2     0.00000 488 490     0   4000.00       0.00
490    0.336000     10.00    3.486   4     164.000   164.000     2     0.00000 489 491     0   4000.00       0.00
491    0.336000     10.00    1.416   4     164.000   164.000     2     0.00000 490 492     0   4000.00       0.00
492    0.256000     10.00    1.251   4     164.000   164.000     2     0.00000 491 493     0   4000.00       0.00
493    0.206000     10.00    3.225   4     164.000   166.000     2     0.00000 492 494     0   4000.00       0.00
494    0.206000     75.00    1.549   4     166.000   166.000     2     0.00000 493 495     0   4000.00       0.00
495    0.172000     20.00    1.757  19     166.000   166.000     2     0.00000 494 496     0   4000.00       0.00
496    0.087000     10.00    2.409  16     166.000   168.000     2     0.00000 495   0     0   4000.00       0.00
@EOR

 91 570.3   0  18
  20.00   .000     -0.022     -0.033    -0.045    -0.056    -0.067    -0.078
 -0.089  -.100     -0.111     -0.123    -0.134    -0.145    -0.156    -0.167
 -0.200   -100.0
  570.3  570.3     587.3     590.3     587.3     580.3     568.3     558.3
  542.3  520.3     490.3     460.3     420.3     370.3     310.3     240.3
    170.3  170.3

 99 495.3   0  18
   20.00   .000     -0.557     -1.114    -1.671    -2.228    -2.785    -3.342
  -3.899  -4.46     -5.013     -5.570    -6.127    -6.684    -7.241    -8.912
  -13.4   -100.0
   495.3  495.3     494.3     492.3     491.3     488.3     485.3     481.3
   477.3  472.3     466.3     459.3     448.3     436.3     423.3     375.3
   170.3  170.3

117 512.1  0 17
   20.00  -.000     -0.557     -1.114    -1.671    -2.228    -2.785    -3.342
  -3.899  -4.46     -5.013     -5.57     -6.127    -6.684    -7.241    -8.912
  -13.37
   512.1  512.1     510.1     507.1     505.1     502.1     500.1     498.1
```

```
   495.1  492.1     487.8     481.1     476.1     467.1     457.1     412.1
   160.1

 123 512.1  0 17
    20.00  -.000     -0.557    -1.114    -1.671    -2.228    -2.785    -3.342
   -3.899  -4.46     -5.013    -5.57     -6.127    -6.684    -7.241    -8.912
   -13.37
    512.1  512.1     510.1     507.1     505.1     502.1     500.1     498.1
    495.1  492.1     487.8     481.1     476.1     467.1     457.1     412.1
    160.1

 129 482.1   0  16
    20.00   .000     -0.022     -0.033    -0.045    -0.056    -0.067    -0.078
   -0.089  -.100     -0.111     -0.123    -0.134    -0.145    -0.156    -100.0
    482.1  482.1     478.1     473.1     463.1     448.1     428.1     403.1
    374.1  343.1     308.1     268.1     233.1     198.1     168.1     168.1

 440 147.0   0   0

 450 147.0   0   0

 453 175.0   0   0

 456 137.5   0   0

 484 105.0   0   0

   4 0  100.  100. 1.0E+20   2  9  4  0  .01   393.6
 0     .56   2.36    100
 100.  100.  0.      0.
 0     50.0   90.0  92.5   95.3   97.5      99.0      99.7       100.0
 0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

  90 0  100  100  1.0E+20    2  9  3  0  .01  570.3
0       0.01  100
100     0    0
0     50.0   90.0  92.5   95.3   97.5      99.0      99.7       100.0
 0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

  96 0  100  100  1.0E+20   2  9  4  0  .01  495.3
0      .63   3.43   100
100.   100.  0.     0.
0     50.0   90.0  92.5   95.3   97.5      99.0      99.7       100.0
 0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

 102 0  100.  100. 1.0E+20   2  9  4  0  .01   393.6
0     2.0   2.01    100
100.  100.  100.    100.
0     50.0   90.0  92.5   95.3   97.5      99.0      99.7       100.0
 0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

 114 0  100  100  1.0E+20    2  9  4  0  .01  512.1
 0       2.51  5.61   100
 100     100   100.   100.
 0     50.0   90.0  92.5   95.3   97.5      99.0      99.7       100.0
 0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

 121 0  100  100  1.0E+20    2  9  4  0  .01  512.1
 0       21.93 27.13 100
 100     100   100   100
 0     50.0   90.0  92.5   95.3   97.5      99.0      99.7       100.0
 0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

 126 0  100  100  1.0E+20    2  9  3  0  .01  482.1
0       0.01  100
100     100   100
0     50.0   90.0  92.5   95.3   97.5      99.0      99.7       100.0
 0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

 415  0  100  100  1.0E+20   2  16  3  0  1.79  194.
 0       0.1    100
 100     100    100
 0   11.1   16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
 97.5     99.0     99.7  100.0
 10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
 203570   1596000  0.49259E+08  0.1E+21

 439  0  100  100  1.0E+20   2  16  3  0  1.79  147.
```

# CALCULATION SHEET

| | | | |
|---|---|---|---|
| Project: | HOPE CREEK GENERATING STATION | Job Number: | 8038 |
| Calc No. | 8038-P0004 | Sheet No. | 179 |
| By: | A. Arastu Date: 9/14/18 | Rev. No. | 1 |
| Subject: | Water Hammer Analysis of the HCGS Fire Protection System | | |

```
 0       0.1    100
 100     100    100
 0    11.1  16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
 97.5     99.0     99.7  100.0
 10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
 203570   1596000  0.49259E+08  0.1E+21

 447  0  100  100  1.0E+20   2  16  3  0  0.99  147.
 0       0.01    100
 100     0       0
 0    11.1  16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
 97.5     99.0     99.7  100.0
 10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
 203570   1596000  0.49259E+08  0.1E+21

 452  0  100  100  1.0E+20   2  16  3  0  1.785  175.
 0       0.01   100
 100     100    100
 0    11.1  16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
 97.5     99.0     99.7  100.0
 10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
 203570   1596000  0.49259E+08  0.1E+21

 455  0  100  100  1.0E+20   2  16  3  0  0.695  137.5
0       0.01   100
100     100    100
0    11.1  16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
97.5     99.0     99.7  100.0
10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
 203570   1596000  0.49259E+08  0.1E+21

 459  0  100  100  1.0E+20   2  9  3  0  .01  96.8
 0       1.0   100
 100     100   100
 0     50.0   90.0  92.5   95.3   97.5      99.0      99.7        100.0
 0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

 467  0  100  100  1.0E+20   2  9  3  0  .01  128.
 0       1.0   100
 100     100   100
 0     50.0   90.0  92.5   95.3   97.5      99.0      99.7        100.0
 0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

 483  0  100  100  1.0E+20  2  16  4  0  0.99  105.0
 0       0.1   0.11  100
 100     100   100   100
 0    11.1  16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
 97.5     99.0     99.7  100.0
 10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
 203570   1596000  0.49259E+08  0.1E+21


   5  2  0.650  0.01 0.7850 0.0  ID 1.0000
 438  2  0.750  0.01 0.2003 0.0  ID 0.5050
 446  2  0.750  0.01 0.2003 0.0  ID 0.5050


308   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102

410   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102


433   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102

362   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102
```

```
396   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2         .102


495   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2         .102

334   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2         .102

371   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2         .102

382   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2         .102


 1.          1.
 6     2
 94    2
 97    2
 102   2
 113   2
 120   2
 184   41
 188   46
 194   31
 289   11
 290    7
 291    6
 292   23
 299   17
 303   11
 304   1
 306   24
 308   26
 314   6
 322   11
 325    5
 332    2
 334    9
 347   11
 351   10
 362    9
 371   2
 376   6
 382   13
 383    3
 396   31
 409   4
 410   17
 412   11
 418   9
 425   21
 428   20
 430   32
 432   20
 433   3
 450   22
 455   2
 465   1
 466   2
 476   4
 477   22
 478   8
 480   11
 483   2
 495   4
```

# CALCULATION SHEET

| | | | |
|---|---|---|---|
| Project: | HOPE CREEK GENERATING STATION | Job Number: | 8038 |
| Calc No. | 8038-P0004 | Sheet No. | 181 |
| By: | A. Arastu Date: 9/14/18 | Rev. No. | 1 |
| Subject: | Water Hammer Analysis of the HCGS Fire Protection System | | |

```
@EOR
410       1       410      3          1
410       3       410      5          2
410       4       410      18         3
410       18      410      19         4
410       18      411      3          5
412       1       412      2          6
412       1       412      3          7
412       3       412      6          8
412       5       412      6          9
412       6       412      7          10
412       7       412      10         11
@EOR
0      1.0    100   1
1.0   30.0    500   1
30.0 888.    1000   1
```

## B4 - Case 4 (8 inch Deluge Valve w/HC Diesel Pump) with Vacuum Breakers

```
HCGS FP Case 4: 9 VB.  Forces in Riser # 26 only
10000
0  0  1  0  0  0
2   2   0.  12.
2   1   0   0
0   1   0  0  0  0  0  1 0 0
1.9  62.4  7.83E-6
1.0  2   13    0    0
       0.0    1000.0    2000.0   2.0E+04   6.0E+04   1.0E+05   3.0E+05   6.0E+05
   1.0E+06   1.5E+06   3.5E+06   1.0E+11   1.0E+33
      0.10     0.061     0.048     0.026     0.021      .019    0.0167    0.0155
    0.0150    0.0147     0.014     0.014     0.014
495.3   3  17  0    0
  -10.00   .000   .557  1.114  1.671  2.228  2.785  3.342
   3.899  4.456  5.013  5.570  6.127  6.684  7.241  8.912
   13.4
   495.3  495.3     494.3     492.3     491.3     488.3     485.3     481.3
   477.3  472.3     466.3     459.3     448.3     436.3     423.3     375.3
   170.3
   1
   1    1.104000     55.00    5.492   4      99.400    94.000     2     0.00000   0   2     0   4000.00       0.00
   2    1.000000     20.00    7.400   4      94.000   105.040     2     0.00000   1   3     0   4000.00       0.00
   3    1.000000     10.00    7.180   4     105.040   105.040     2     0.00000   2   4     0   4000.00       0.00
   4    1.000000     10.00    3.538   2     105.040   104.500     2     0.00000   3   5     0   4000.00       0.00
   5    1.000000      5.00   18.508  13     104.500   104.750     2     0.00000   4   6     0   4000.00       0.00
   6    1.000000     10.00    5.200   4     104.750   110.000     2     0.00000   5   7     0   4000.00       0.00
   7    1.000000     20.00    3.400   3     110.000   105.000     2     0.00000   6   8     0   4000.00       0.00
   8    1.000000    115.00    2.402   3     105.000    96.900     2     0.00000   7  86     0   4000.00       0.00
   9    1.007000      5.00    2.611   4      96.900    96.900     2     0.00000   8  10     0   4000.00       0.00
  10    1.007000     10.00    3.014   4      96.900    96.900     2     0.00000   9  11     0   4000.00       0.00
  11    1.007000     10.00    1.806   4      96.900    96.900     2     0.00000  10  12     0   4000.00       0.00
  12    1.007000     10.00    3.014   3      96.900    96.900     2     0.00000  11  13     0   4000.00       0.00
  13    1.007000    110.00    1.183   4      96.900    96.900     2     0.00000  12  14     0   4000.00       0.00
  14    1.007000    110.00    1.363   4      96.900    95.900     2     0.00000  13  15     0   4000.00       0.00
  15    1.007000     10.00    3.014   4      95.900    95.900     2     0.00000  14  16     0   4000.00       0.00
  16    1.007000     30.00    1.671   4      95.900    95.900     2     0.00000  15  17     0   4000.00       0.00
  17    1.007000     80.00    1.252   4      95.900    95.900     2     0.00000  16  18     0   4000.00       0.00
  18    1.007000     20.00    1.403   4      95.900    95.900     2     0.00000  17  19     0   4000.00       0.00
  19    1.007000    130.00    1.155   4      95.900    95.900     2     0.00000  18  20     0   4000.00       0.00
  20    1.007000    135.00    1.060   4      95.900    95.400     2     0.00000  19  21     0   4000.00       0.00
  21    1.007000     10.00    2.994   4      95.400    93.500     2     0.00000  20  22     0   4000.00       0.00
  22    1.007000     65.00    1.217   4      93.500    93.500     2     0.00000  21  23     0   4000.00       0.00
  23    1.007000      5.00    1.000   4      93.500    93.500     2     0.00000  22  24     0   4000.00       0.00
  24    1.007000     20.00    3.004   4      93.500    97.000     2     0.00000  23  25     0   4000.00       0.00
  25    1.007000    200.00    1.300   4      97.000    97.000     2     0.00000  24  26     0   4000.00       0.00
  26    1.007000     55.00    1.513   4      97.000    97.000     2     0.00000  25  27     0   4000.00       0.00
  27    1.007000     20.00    1.997   4      97.000    93.000     2     0.00000  26  28     0   4000.00       0.00
  28    1.007000    230.00    1.088   3      93.000    93.000     2     0.00000  27 181     0   4000.00       0.00
  29    1.007000     40.00    1.503   3      93.000    93.000     2     0.00000  28  30     0   4000.00       0.00
  30    1.007000    240.00    1.117   4      93.000    94.500     2     0.00000  29  31     0   4000.00       0.00
  31    1.007000     45.00    1.448   4      94.500    94.500     2     0.00000  30  32     0   4000.00       0.00
  32    1.007000     35.00    1.570   4      94.500    91.000     2     0.00000  31  33     0   4000.00       0.00
  33    1.007000    180.00    1.111   4      91.000    96.000     2     0.00000  32  34     0   4000.00       0.00
  34    1.007000     10.00    3.014   4      96.000    96.000     2     0.00000  33  35     0   4000.00       0.00
  35    1.007000      5.00    5.028   4      96.000    96.000     2     0.00000  34  36     0   4000.00       0.00
  36    1.007000      5.00    2.611   4      96.000    96.000     2     0.00000  35  37     0   4000.00       0.00
  37    1.007000     10.00    3.014   4      96.000    96.000     2     0.00000  36  38     0   4000.00       0.00
  38    1.007000     30.00    2.141   4      96.000    96.000     2     0.00000  37  39     0   4000.00       0.00
  39    1.007000     20.00    1.403   4      96.000    96.000     2     0.00000  38  40     0   4000.00       0.00
  40    1.007000     80.00    1.252   3      96.000    96.000     2     0.00000  39  41     0   4000.00       0.00
  41    1.007000     10.00    1.806   4      96.000    96.000     2     0.00000  40  42     0   4000.00       0.00
  42    1.007000     20.00    1.000   4      96.000    96.000     2     0.00000  41  43     0   4000.00       0.00
  43    1.007000     55.00    1.363   4      96.000    97.200     2     0.00000  42  44     0   4000.00       0.00
  44    1.007000      5.00    5.028   4      97.200    97.200     2     0.00000  43  45     0   4000.00       0.00
  45    1.007000    160.00    1.175   4      97.200    96.200     2     0.00000  44  46     0   4000.00       0.00
  46    1.007000     15.00    2.343   3      96.200    96.200     2     0.00000  45 162     0   4000.00       0.00
  47    1.007000      5.00    5.028   4      96.200    96.200     2     0.00000  46  48     0   4000.00       0.00
  48    1.007000     15.00    6.357   4      96.200    97.000     2     0.00000  47  49     0   4000.00       0.00
  49    1.007000     60.00    1.166   4      97.000    97.000     2     0.00000  48  50     0   4000.00       0.00
  50    1.007000     15.00    2.994   4      97.000    94.500     2     0.00000  49  51     0   4000.00       0.00
  51    1.007000      5.00    4.605   4      94.500    97.000     2     0.00000  50  52     0   4000.00       0.00
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| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 52 | 1.007000 | 15.00 | 2.329 | 4 | 97.000 | 94.000 | 2 | 0.00000 | 51 | 53 | 0 | 4000.00 | 0.00 |
| 53 | 1.007000 | 80.00 | 1.501 | 4 | 94.000 | 96.500 | 2 | 0.00000 | 52 | 54 | 0 | 4000.00 | 0.00 |
| 54 | 1.007000 | 65.00 | 1.310 | 3 | 96.500 | 96.500 | 2 | 0.00000 | 53 | 55 | 0 | 4000.00 | 0.00 |
| 55 | 1.007000 | 50.00 | 1.481 | 4 | 96.500 | 97.200 | 2 | 0.00000 | 54 | 56 | 0 | 4000.00 | 0.00 |
| 56 | 1.007000 | 25.00 | 1.322 | 4 | 97.200 | 97.200 | 2 | 0.00000 | 55 | 57 | 0 | 4000.00 | 0.00 |
| 57 | 1.007000 | 5.00 | 3.820 | 4 | 97.200 | 97.200 | 2 | 0.00000 | 56 | 58 | 0 | 4000.00 | 0.00 |
| 58 | 1.007000 | 70.00 | 1.288 | 4 | 97.200 | 97.200 | 2 | 0.00000 | 57 | 59 | 0 | 4000.00 | 0.00 |
| 59 | 1.007000 | 10.00 | 1.806 | 4 | 97.200 | 97.200 | 2 | 0.00000 | 58 | 60 | 0 | 4000.00 | 0.00 |
| 60 | 1.007000 | 195.00 | 1.103 | 4 | 97.200 | 97.200 | 2 | 0.00000 | 59 | 61 | 0 | 4000.00 | 0.00 |
| 61 | 1.007000 | 240.00 | 1.159 | 4 | 97.200 | 94.500 | 2 | 0.00000 | 60 | 62 | 0 | 4000.00 | 0.00 |
| 62 | 1.007000 | 215.00 | 1.094 | 4 | 94.500 | 94.500 | 2 | 0.00000 | 61 | 63 | 0 | 4000.00 | 0.00 |
| 63 | 1.007000 | 110.00 | 1.183 | 4 | 94.500 | 94.500 | 2 | 0.00000 | 62 | 64 | 0 | 4000.00 | 0.00 |
| 64 | 1.007000 | 195.00 | 1.103 | 4 | 94.500 | 94.500 | 2 | 0.00000 | 63 | 65 | 0 | 4000.00 | 0.00 |
| 65 | 1.007000 | 5.00 | 5.028 | 4 | 94.500 | 94.500 | 2 | 0.00000 | 64 | 66 | 0 | 4000.00 | 0.00 |
| 66 | 1.007000 | 30.00 | 1.665 | 4 | 94.500 | 95.800 | 2 | 0.00000 | 65 | 67 | 0 | 4000.00 | 0.00 |
| 67 | 1.007000 | 5.00 | 2.611 | 4 | 95.800 | 95.800 | 2 | 0.00000 | 66 | 68 | 0 | 4000.00 | 0.00 |
| 68 | 1.007000 | 25.00 | 1.806 | 3 | 95.800 | 95.800 | 2 | 0.00000 | 67 | 229 | 0 | 4000.00 | 0.00 |
| 69 | 1.007000 | 130.00 | 1.155 | 4 | 95.800 | 95.500 | 2 | 0.00000 | 68 | 70 | 0 | 4000.00 | 0.00 |
| 70 | 1.007000 | 5.00 | 2.611 | 3 | 95.500 | 95.500 | 2 | 0.00000 | 69 | 261 | 0 | 4000.00 | 0.00 |
| 71 | 1.007000 | 5.00 | 5.028 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 70 | 72 | 0 | 4000.00 | 0.00 |
| 72 | 1.007000 | 5.00 | 2.611 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 71 | 73 | 0 | 4000.00 | 0.00 |
| 73 | 1.007000 | 205.00 | 1.098 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 72 | 74 | 0 | 4000.00 | 0.00 |
| 74 | 1.007000 | 240.00 | 1.117 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 73 | 75 | 0 | 4000.00 | 0.00 |
| 75 | 1.007000 | 20.00 | 4.021 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 74 | 76 | 0 | 4000.00 | 0.00 |
| 76 | 1.007000 | 30.00 | 1.665 | 4 | 95.500 | 91.500 | 2 | 0.00000 | 75 | 77 | 0 | 4000.00 | 0.00 |
| 77 | 1.007000 | 25.00 | 2.120 | 4 | 91.500 | 97.000 | 2 | 0.00000 | 76 | 78 | 0 | 4000.00 | 0.00 |
| 78 | 1.007000 | 50.00 | 1.403 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 77 | 79 | 0 | 4000.00 | 0.00 |
| 79 | 1.007000 | 50.00 | 1.403 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 78 | 80 | 0 | 4000.00 | 0.00 |
| 80 | 1.007000 | 20.00 | 1.997 | 4 | 97.000 | 90.500 | 2 | 0.00000 | 79 | 81 | 0 | 4000.00 | 0.00 |
| 81 | 1.007000 | 40.00 | 2.002 | 4 | 90.500 | 96.900 | 2 | 0.00000 | 80 | 82 | 0 | 4000.00 | 0.00 |
| 82 | 1.007000 | 165.00 | 1.122 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 81 | 83 | 0 | 4000.00 | 0.00 |
| 83 | 1.007000 | 135.00 | 1.060 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 82 | 84 | 0 | 4000.00 | 0.00 |
| 84 | 1.007000 | 10.00 | 3.014 | 3 | 96.900 | 96.900 | 2 | 0.00000 | 83 | 101 | 0 | 4000.00 | 0.00 |
| 85 | 1.007000 | 60.00 | 1.134 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 84 | 86 | 0 | 4000.00 | 0.00 |
| 86 | 1.007000 | 5.00 | 5.028 | 3 | 96.900 | 96.900 | 2 | 0.00000 | 85 | 9 | 1 | 4000.00 | 0.00 |
| 87 | 0.336000 | 10.00 | 5.771 | 3 | 105.000 | 112.070 | 2 | 0.00000 | 7 | 88 | 0 | 4000.00 | 0.00 |
| 88 | 0.336000 | 5.00 | 5.570 | 4 | 112.070 | 113.750 | 2 | 0.00000 | 87 | 89 | 0 | 4000.00 | 0.00 |
| 89 | 0.256000 | 30.00 | 1.870 | 4 | 113.750 | 109.000 | 2 | 0.00000 | 88 | 90 | 0 | 4000.00 | 0.00 |
| 90 | 0.256000 | 10.00 | 1.205 | 2 | 109.000 | 104.250 | 2 | 0.00000 | 89 | 91 | 0 | 4000.00 | 0.00 |
| 91 | 0.256000 | 5.00 | 5.933 | 1 | 104.250 | 103.750 | 2 | 0.00000 | 90 | 0 | 0 | 4000.00 | 0.00 |
| 92 | 0.336000 | 40.00 | 2.714 | 3 | 112.070 | 105.000 | 2 | 0.00000 | 87 | 93 | 0 | 4000.00 | 0.00 |
| 93 | 1.000000 | 20.00 | 3.400 | 4 | 105.000 | 110.200 | 2 | 0.00000 | 92 | 94 | 0 | 4000.00 | 0.00 |
| 94 | 1.000000 | 10.00 | 3.800 | 4 | 110.200 | 104.750 | 2 | 0.00000 | 93 | 95 | 0 | 4000.00 | 0.00 |
| 95 | 1.000000 | 5.00 | 18.508 | 4 | 104.750 | 104.750 | 2 | 0.00000 | 94 | 96 | 0 | 4000.00 | 0.00 |
| 96 | 1.000000 | 10.00 | 3.538 | 2 | 104.750 | 104.750 | 2 | 0.00000 | 95 | 97 | 0 | 4000.00 | 0.00 |
| 97 | 1.000000 | 5.00 | 9.400 | 4 | 104.750 | 105.040 | 2 | 0.00000 | 96 | 98 | 0 | 4000.00 | 0.00 |
| 98 | 1.000000 | 20.00 | 7.400 | 4 | 105.040 | 94.000 | 2 | 0.00000 | 97 | 99 | 0 | 4000.00 | 0.00 |
| 99 | 1.104000 | 30.00 | 4.874 | 1 | 94.000 | 99.400 | 2 | 0.00000 | 98 | 0 | 0 | 4000.00 | 0.00 |
| 100 | 1.000000 | 85.00 | 1.864 | 4 | 105.000 | 91.000 | 2 | 0.00000 | 92 | 101 | 0 | 4000.00 | 0.00 |
| 101 | 1.000000 | 25.00 | 4.512 | 3 | 91.000 | 96.900 | 2 | 0.00000 | 100 | 85 | 1 | 4000.00 | 0.00 |
| 102 | 0.835000 | 5.00 | 12.356 | 2 | 96.000 | 96.000 | 2 | 0.00000 | 40 | 103 | 0 | 4000.00 | 0.00 |
| 103 | 0.788000 | 60.00 | 1.628 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 102 | 104 | 0 | 4000.00 | 0.00 |
| 104 | 0.788000 | 100.00 | 1.000 | 4 | 96.000 | 95.500 | 2 | 0.00000 | 103 | 105 | 0 | 4000.00 | 0.00 |
| 105 | 0.788000 | 100.00 | 1.000 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 104 | 106 | 0 | 4000.00 | 0.00 |
| 106 | 0.788000 | 30.00 | 2.786 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 105 | 107 | 0 | 4000.00 | 0.00 |
| 107 | 0.927000 | 35.00 | 2.059 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 106 | 108 | 0 | 4000.00 | 0.00 |
| 108 | 0.927000 | 150.00 | 1.494 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 107 | 109 | 0 | 4000.00 | 0.00 |
| 109 | 0.927000 | 50.00 | 1.519 | 3 | 95.500 | 95.500 | 2 | 0.00000 | 108 | 110 | 0 | 4000.00 | 0.00 |
| 110 | 0.927000 | 20.00 | 2.298 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 109 | 111 | 0 | 4000.00 | 0.00 |
| 111 | 0.927000 | 10.00 | 7.860 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 110 | 112 | 0 | 4000.00 | 0.00 |
| 112 | 1.000000 | 10.00 | 9.000 | 4 | 95.500 | 101.700 | 2 | 0.00000 | 111 | 113 | 0 | 4000.00 | 0.00 |
| 113 | 1.000000 | 5.00 | 5.400 | 4 | 101.700 | 102.800 | 2 | 0.00000 | 112 | 114 | 0 | 4000.00 | 0.00 |
| 114 | 1.000000 | 10.00 | 12.354 | 2 | 102.800 | 102.800 | 2 | 0.00000 | 113 | 115 | 0 | 4000.00 | 0.00 |
| 115 | 1.000000 | 5.00 | 8.877 | 4 | 102.800 | 102.800 | 2 | 0.00000 | 114 | 116 | 0 | 4000.00 | 0.00 |
| 116 | 1.000000 | 5.00 | 5.000 | 4 | 102.800 | 102.800 | 2 | 0.00000 | 115 | 117 | 0 | 4000.00 | 0.00 |
| 117 | 1.250000 | 30.00 | 3.333 | 1 | 102.800 | 103.000 | 2 | 0.00000 | 116 | 0 | 0 | 4000.00 | 0.00 |
| 118 | 0.927000 | 10.00 | 6.562 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 109 | 119 | 0 | 4000.00 | 0.00 |
| 119 | 1.000000 | 10.00 | 2.400 | 3 | 95.500 | 101.700 | 2 | 0.00000 | 118 | 120 | 0 | 4000.00 | 0.00 |
| 120 | 1.000000 | 5.00 | 7.800 | 4 | 101.700 | 102.800 | 2 | 0.00000 | 119 | 121 | 0 | 4000.00 | 0.00 |
| 121 | 1.000000 | 10.00 | 13.154 | 2 | 102.800 | 102.800 | 2 | 0.00000 | 120 | 122 | 0 | 4000.00 | 0.00 |
| 122 | 1.000000 | 10.00 | 8.938 | 4 | 102.800 | 102.800 | 2 | 0.00000 | 121 | 123 | 0 | 4000.00 | 0.00 |
| 123 | 1.250000 | 20.00 | 3.250 | 1 | 102.800 | 103.000 | 2 | 0.00000 | 122 | 0 | 0 | 4000.00 | 0.00 |
| 124 | 0.134000 | 5.00 | 3.624 | 4 | 101.700 | 101.700 | 2 | 0.00000 | 119 | 125 | 0 | 4000.00 | 0.00 |
| 125 | 0.134000 | 5.00 | 3.141 | 4 | 101.700 | 101.700 | 2 | 0.00000 | 124 | 126 | 0 | 4000.00 | 0.00 |
| 126 | 0.134000 | 5.00 | 1.000 | 2 | 101.700 | 101.700 | 2 | 0.00000 | 125 | 127 | 0 | 4000.00 | 0.00 |
| 127 | 0.134000 | 10.00 | 1.000 | 4 | 101.700 | 101.700 | 2 | 0.00000 | 126 | 128 | 0 | 4000.00 | 0.00 |
| 128 | 0.134000 | 10.00 | 1.000 | 4 | 101.700 | 101.700 | 2 | 0.00000 | 127 | 129 | 0 | 4000.00 | 0.00 |
| 129 | 0.134000 | 10.00 | 1.000 | 1 | 101.700 | 103.000 | 2 | 0.00000 | 128 | 0 | 0 | 4000.00 | 0.00 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 130 | 0.835000 | 5.00 | 11.020 | 4 | 93.000 | 93.000 | 2 | 0.00000 | 29 131 | 0 | 4000.00 | 0.00 |
| 131 | 0.835000 | 100.00 | 1.331 | 4 | 93.000 | 96.010 | 2 | 0.00000 | 130 132 | 0 | 4000.00 | 0.00 |
| 132 | 0.835000 | 25.00 | 1.267 | 4 | 96.010 | 96.010 | 2 | 0.00000 | 131 133 | 0 | 4000.00 | 0.00 |
| 133 | 0.835000 | 65.00 | 1.000 | 4 | 96.010 | 96.000 | 2 | 0.00000 | 132 134 | 0 | 4000.00 | 0.00 |
| 134 | 0.835000 | 20.00 | 2.653 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 133 135 | 0 | 4000.00 | 0.00 |
| 135 | 0.835000 | 105.00 | 1.382 | 3 | 96.000 | 89.000 | 2 | 0.00000 | 134 136 | 0 | 4000.00 | 0.00 |
| 136 | 0.835000 | 5.00 | 3.338 | 4 | 89.000 | 89.000 | 2 | 0.00000 | 135 137 | 0 | 4000.00 | 0.00 |
| 137 | 0.835000 | 50.00 | 1.334 | 3 | 89.000 | 89.000 | 2 | 0.00000 | 136 138 | 0 | 4000.00 | 0.00 |
| 138 | 0.835000 | 5.00 | 5.676 | 4 | 89.000 | 89.000 | 2 | 0.00000 | 137 139 | 0 | 4000.00 | 0.00 |
| 139 | 0.835000 | 5.00 | 4.340 | 3 | 89.000 | 89.000 | 2 | 0.00000 | 138 140 | 0 | 4000.00 | 0.00 |
| 140 | 0.835000 | 55.00 | 1.000 | 4 | 89.000 | 89.000 | 2 | 0.00000 | 139 141 | 0 | 4000.00 | 0.00 |
| 141 | 0.835000 | 25.00 | 1.668 | 3 | 89.000 | 89.000 | 2 | 0.00000 | 140 142 | 0 | 4000.00 | 0.00 |
| 142 | 0.835000 | 15.00 | 2.882 | 4 | 89.000 | 91.940 | 2 | 0.00000 | 141 143 | 0 | 4000.00 | 0.00 |
| 143 | 0.835000 | 25.00 | 1.668 | 3 | 91.940 | 91.940 | 2 | 0.00000 | 142 144 | 0 | 4000.00 | 0.00 |
| 144 | 0.835000 | 5.00 | 5.676 | 3 | 91.940 | 91.940 | 2 | 0.00000 | 143 145 | 0 | 4000.00 | 0.00 |
| 145 | 0.835000 | 5.00 | 4.340 | 3 | 91.940 | 91.940 | 2 | 0.00000 | 144 146 | 0 | 4000.00 | 0.00 |
| 146 | 0.835000 | 10.00 | 3.338 | 4 | 91.940 | 96.200 | 2 | 0.00000 | 145 147 | 0 | 4000.00 | 0.00 |
| 147 | 0.835000 | 5.00 | 3.338 | 4 | 96.200 | 96.200 | 2 | 0.00000 | 146 148 | 0 | 4000.00 | 0.00 |
| 148 | 0.835000 | 145.00 | 1.000 | 4 | 96.200 | 96.200 | 2 | 0.00000 | 147 149 | 0 | 4000.00 | 0.00 |
| 149 | 0.835000 | 10.00 | 2.670 | 4 | 96.200 | 96.200 | 2 | 0.00000 | 148 150 | 0 | 4000.00 | 0.00 |
| 150 | 0.835000 | 90.00 | 1.186 | 3 | 96.200 | 96.200 | 2 | 0.00000 | 149 151 | 0 | 4000.00 | 0.00 |
| 151 | 0.835000 | 5.00 | 5.676 | 4 | 96.200 | 94.530 | 2 | 0.00000 | 150 152 | 0 | 4000.00 | 0.00 |
| 152 | 0.835000 | 15.00 | 2.664 | 3 | 94.530 | 94.530 | 2 | 0.00000 | 151 153 | 0 | 4000.00 | 0.00 |
| 153 | 0.835000 | 5.00 | 2.336 | 4 | 94.530 | 94.530 | 2 | 0.00000 | 152 154 | 0 | 4000.00 | 0.00 |
| 154 | 0.835000 | 5.00 | 4.340 | 3 | 94.530 | 94.540 | 2 | 0.00000 | 153 155 | 0 | 4000.00 | 0.00 |
| 155 | 0.835000 | 15.00 | 2.559 | 3 | 94.540 | 94.540 | 2 | 0.00000 | 154 156 | 0 | 4000.00 | 0.00 |
| 156 | 0.835000 | 5.00 | 4.340 | 3 | 94.540 | 94.540 | 2 | 0.00000 | 155 157 | 0 | 4000.00 | 0.00 |
| 157 | 0.835000 | 5.00 | 3.338 | 4 | 94.540 | 94.540 | 2 | 0.00000 | 156 158 | 0 | 4000.00 | 0.00 |
| 158 | 0.835000 | 5.00 | 3.338 | 3 | 94.540 | 94.500 | 2 | 0.00000 | 157 159 | 0 | 4000.00 | 0.00 |
| 159 | 0.835000 | 5.00 | 4.340 | 4 | 94.500 | 94.500 | 2 | 0.00000 | 158 160 | 0 | 4000.00 | 0.00 |
| 160 | 0.835000 | 55.00 | 1.425 | 3 | 94.500 | 94.500 | 2 | 0.00000 | 159 161 | 0 | 4000.00 | 0.00 |
| 161 | 0.835000 | 175.00 | 1.286 | 4 | 94.500 | 96.200 | 2 | 0.00000 | 160 162 | 0 | 4000.00 | 0.00 |
| 162 | 0.835000 | 100.00 | 1.568 | 3 | 96.200 | 96.200 | 2 | 0.00000 | 161 47 | 1 | 4000.00 | 0.00 |
| 163 | 0.835000 | 10.00 | 3.338 | 4 | 94.500 | 91.750 | 2 | 0.00000 | 160 164 | 0 | 4000.00 | 0.00 |
| 164 | 0.835000 | 40.00 | 1.413 | 4 | 91.750 | 89.580 | 2 | 0.00000 | 163 165 | 0 | 4000.00 | 0.00 |
| 165 | 0.835000 | 25.00 | 3.071 | 4 | 89.580 | 89.580 | 2 | 0.00000 | 164 166 | 0 | 4000.00 | 0.00 |
| 166 | 0.835000 | 5.00 | 4.340 | 3 | 89.580 | 89.580 | 2 | 0.00000 | 165 167 | 0 | 4000.00 | 0.00 |
| 167 | 0.835000 | 5.00 | 1.000 | 16 | 89.580 | 89.580 | 2 | 0.00000 | 166 0 | 0 | 4000.00 | 0.00 |
| 168 | 0.835000 | 5.00 | 13.358 | 4 | 89.000 | 91.000 | 2 | 0.00000 | 141 169 | 0 | 4000.00 | 0.00 |
| 169 | 0.835000 | 35.00 | 2.002 | 3 | 91.000 | 91.000 | 2 | 0.00000 | 168 170 | 0 | 4000.00 | 0.00 |
| 170 | 0.835000 | 10.00 | 4.340 | 3 | 91.000 | 91.000 | 2 | 0.00000 | 169 171 | 0 | 4000.00 | 0.00 |
| 171 | 0.835000 | 75.00 | 1.312 | 4 | 91.000 | 91.000 | 2 | 0.00000 | 170 172 | 0 | 4000.00 | 0.00 |
| 172 | 0.835000 | 45.00 | 2.002 | 3 | 91.000 | 91.000 | 2 | 0.00000 | 171 173 | 0 | 4000.00 | 0.00 |
| 173 | 0.835000 | 5.00 | 3.338 | 4 | 91.000 | 91.000 | 2 | 0.00000 | 172 174 | 0 | 4000.00 | 0.00 |
| 174 | 0.835000 | 15.00 | 1.779 | 4 | 91.000 | 96.040 | 2 | 0.00000 | 173 175 | 0 | 4000.00 | 0.00 |
| 175 | 0.835000 | 15.00 | 2.559 | 4 | 96.040 | 96.000 | 2 | 0.00000 | 174 176 | 0 | 4000.00 | 0.00 |
| 176 | 0.835000 | 95.00 | 1.176 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 175 177 | 0 | 4000.00 | 0.00 |
| 177 | 0.835000 | 55.00 | 1.213 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 176 178 | 0 | 4000.00 | 0.00 |
| 178 | 0.835000 | 5.00 | 3.338 | 4 | 96.000 | 91.000 | 2 | 0.00000 | 177 179 | 0 | 4000.00 | 0.00 |
| 179 | 0.835000 | 50.00 | 1.795 | 4 | 91.000 | 93.000 | 2 | 0.00000 | 178 180 | 0 | 4000.00 | 0.00 |
| 180 | 0.835000 | 80.00 | 1.146 | 4 | 93.000 | 93.000 | 2 | 0.00000 | 179 181 | 0 | 4000.00 | 0.00 |
| 181 | 0.835000 | 25.00 | 3.472 | 3 | 93.000 | 93.000 | 2 | 0.00000 | 180 29 | 1 | 4000.00 | 0.00 |
| 182 | 0.336000 | 45.00 | 1.866 | 3 | 91.000 | 96.000 | 2 | 0.00000 | 169 183 | 0 | 4000.00 | 0.00 |
| 183 | 0.336000 | 120.00 | 1.482 | 4 | 96.000 | 149.000 | 2 | 0.00000 | 182 184 | 0 | 4000.00 | 0.00 |
| 184 | 0.256000 | 205.00 | 1.092 | 16 | 149.000 | 142.500 | 2 | 0.00000 | 183 0 | 0 | 4000.00 | 0.00 |
| 185 | 0.256000 | 60.00 | 1.674 | 16 | 96.000 | 59.000 | 2 | 0.00000 | 182 0 | 0 | 4000.00 | 0.00 |
| 186 | 0.336000 | 10.00 | 4.427 | 3 | 91.000 | 94.800 | 2 | 0.00000 | 170 187 | 0 | 4000.00 | 0.00 |
| 187 | 0.336000 | 55.00 | 1.586 | 3 | 94.800 | 113.000 | 2 | 0.00000 | 186 188 | 0 | 4000.00 | 0.00 |
| 188 | 0.336000 | 230.00 | 1.231 | 4 | 113.000 | 146.000 | 2 | 0.00000 | 187 189 | 0 | 4000.00 | 0.00 |
| 189 | 0.256000 | 105.00 | 1.111 | 16 | 146.000 | 143.000 | 2 | 0.00000 | 188 0 | 0 | 4000.00 | 0.00 |
| 190 | 0.256000 | 100.00 | 1.297 | 16 | 94.800 | 83.700 | 2 | 0.00000 | 186 0 | 0 | 4000.00 | 0.00 |
| 191 | 0.256000 | 75.00 | 1.416 | 16 | 113.000 | 107.000 | 2 | 0.00000 | 187 0 | 0 | 4000.00 | 0.00 |
| 192 | 0.336000 | 5.00 | 7.854 | 4 | 91.000 | 95.000 | 2 | 0.00000 | 172 193 | 0 | 4000.00 | 0.00 |
| 193 | 0.336000 | 240.00 | 1.316 | 4 | 95.000 | 150.000 | 2 | 0.00000 | 192 194 | 0 | 4000.00 | 0.00 |
| 194 | 0.256000 | 180.00 | 1.105 | 16 | 150.000 | 142.000 | 2 | 0.00000 | 193 0 | 0 | 4000.00 | 0.00 |
| 195 | 0.665000 | 15.00 | 4.015 | 4 | 96.500 | 96.500 | 2 | 0.00000 | 54 196 | 0 | 4000.00 | 0.00 |
| 196 | 0.665000 | 11.00 | 2.197 | 4 | 96.500 | 94.500 | 2 | 0.00000 | 195 197 | 0 | 4400.00 | 0.00 |
| 197 | 0.665000 | 20.00 | 1.658 | 4 | 94.500 | 96.600 | 2 | 0.00000 | 196 198 | 0 | 4000.00 | 0.00 |
| 198 | 0.665000 | 115.00 | 1.000 | 4 | 96.600 | 96.600 | 2 | 0.00000 | 197 199 | 0 | 4000.00 | 0.00 |
| 199 | 0.665000 | 220.00 | 1.120 | 3 | 96.600 | 94.000 | 2 | 0.00000 | 198 200 | 0 | 4000.00 | 0.00 |
| 200 | 0.665000 | 20.00 | 2.862 | 4 | 94.000 | 94.750 | 2 | 0.00000 | 199 201 | 0 | 4000.00 | 0.00 |
| 201 | 0.665000 | 20.00 | 1.000 | 4 | 94.750 | 94.750 | 2 | 0.00000 | 200 202 | 0 | 4000.00 | 0.00 |
| 202 | 0.665000 | 20.00 | 2.197 | 4 | 94.750 | 94.750 | 2 | 0.00000 | 201 203 | 0 | 4000.00 | 0.00 |
| 203 | 0.665000 | 15.00 | 1.000 | 4 | 94.750 | 94.750 | 2 | 0.00000 | 202 204 | 0 | 4000.00 | 0.00 |
| 204 | 0.665000 | 30.00 | 1.973 | 3 | 94.750 | 84.100 | 2 | 0.00000 | 203 205 | 0 | 4000.00 | 0.00 |
| 205 | 0.665000 | 15.00 | 1.621 | 4 | 84.100 | 69.500 | 2 | 0.00000 | 204 206 | 0 | 4000.00 | 0.00 |
| 206 | 0.665000 | 15.00 | 1.887 | 3 | 69.500 | 69.500 | 2 | 0.00000 | 205 207 | 0 | 4000.00 | 0.00 |
| 207 | 0.665000 | 20.00 | 1.465 | 4 | 69.500 | 69.500 | 2 | 0.00000 | 206 208 | 0 | 4000.00 | 0.00 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 208 | 0.665000 | 20.00 | 4.125 | 3 | 69.500 | 61.750 | 2 | 0.00000 | 207 209 | 0 | 4000.00 | 0.00 |
| 209 | 0.665000 | 70.00 | 1.454 | 4 | 61.750 | 62.750 | 2 | 0.00000 | 208 210 | 0 | 4000.00 | 0.00 |
| 210 | 0.665000 | 5.00 | 6.320 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 209 211 | 0 | 4000.00 | 0.00 |
| 211 | 0.665000 | 50.00 | 1.293 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 210 212 | 0 | 4000.00 | 0.00 |
| 212 | 0.665000 | 20.00 | 2.330 | 3 | 62.750 | 62.750 | 2 | 0.00000 | 211 213 | 0 | 4000.00 | 0.00 |
| 213 | 0.665000 | 25.00 | 2.277 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 212 214 | 0 | 4000.00 | 0.00 |
| 214 | 0.665000 | 20.00 | 1.665 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 213 215 | 0 | 4000.00 | 0.00 |
| 215 | 0.665000 | 45.00 | 1.414 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 214 216 | 0 | 4000.00 | 0.00 |
| 216 | 0.665000 | 20.00 | 1.665 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 215 217 | 0 | 4000.00 | 0.00 |
| 217 | 0.665000 | 85.00 | 2.033 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 216 218 | 0 | 4000.00 | 0.00 |
| 218 | 0.665000 | 5.00 | 3.660 | 3 | 62.750 | 62.750 | 2 | 0.00000 | 217 219 | 0 | 4000.00 | 0.00 |
| 219 | 0.665000 | 25.00 | 2.649 | 3 | 62.750 | 66.000 | 2 | 0.00000 | 218 220 | 0 | 4000.00 | 0.00 |
| 220 | 0.665000 | 30.00 | 1.749 | 4 | 66.000 | 96.000 | 2 | 0.00000 | 219 221 | 0 | 4000.00 | 0.00 |
| 221 | 0.665000 | 20.00 | 1.329 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 220 222 | 0 | 4000.00 | 0.00 |
| 222 | 0.665000 | 5.00 | 4.977 | 4 | 96.000 | 94.400 | 2 | 0.00000 | 221 223 | 0 | 4000.00 | 0.00 |
| 223 | 0.665000 | 95.00 | 1.139 | 4 | 94.400 | 97.000 | 2 | 0.00000 | 222 224 | 0 | 4000.00 | 0.00 |
| 224 | 0.665000 | 35.00 | 1.646 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 223 225 | 0 | 4000.00 | 0.00 |
| 225 | 0.665000 | 65.00 | 1.614 | 4 | 97.000 | 96.500 | 2 | 0.00000 | 224 226 | 0 | 4000.00 | 0.00 |
| 226 | 0.665000 | 35.00 | 1.000 | 4 | 96.500 | 96.500 | 2 | 0.00000 | 225 227 | 0 | 4000.00 | 0.00 |
| 227 | 0.665000 | 35.00 | 1.830 | 4 | 96.500 | 94.200 | 2 | 0.00000 | 226 228 | 0 | 4000.00 | 0.00 |
| 228 | 0.665000 | 35.00 | 1.266 | 4 | 94.200 | 96.200 | 2 | 0.00000 | 227 229 | 0 | 4000.00 | 0.00 |
| 229 | 0.665000 | 120.00 | 1.377 | 3 | 96.200 | 95.800 | 2 | 0.00000 | 228 69 | 1 | 4000.00 | 0.00 |
| 230 | 0.665000 | 10.00 | 6.453 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 12 231 | 0 | 4000.00 | 0.00 |
| 231 | 0.665000 | 25.00 | 1.372 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 230 232 | 0 | 4000.00 | 0.00 |
| 232 | 0.665000 | 150.00 | 1.062 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 231 233 | 0 | 4000.00 | 0.00 |
| 233 | 0.665000 | 135.00 | 1.069 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 232 234 | 0 | 4000.00 | 0.00 |
| 234 | 0.665000 | 45.00 | 1.146 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 233 235 | 0 | 4000.00 | 0.00 |
| 235 | 0.665000 | 20.00 | 1.658 | 4 | 96.900 | 95.000 | 2 | 0.00000 | 234 236 | 0 | 4000.00 | 0.00 |
| 236 | 0.665000 | 35.00 | 1.564 | 4 | 95.000 | 95.500 | 2 | 0.00000 | 235 237 | 0 | 4000.00 | 0.00 |
| 237 | 0.665000 | 15.00 | 1.621 | 4 | 95.500 | 96.000 | 2 | 0.00000 | 236 238 | 0 | 4000.00 | 0.00 |
| 238 | 0.665000 | 30.00 | 1.621 | 4 | 96.000 | 72.000 | 2 | 0.00000 | 237 239 | 0 | 4000.00 | 0.00 |
| 239 | 0.665000 | 5.00 | 3.660 | 3 | 72.000 | 67.000 | 2 | 0.00000 | 238 240 | 0 | 4000.00 | 0.00 |
| 240 | 0.665000 | 75.00 | 1.497 | 4 | 67.000 | 64.250 | 2 | 0.00000 | 239 241 | 0 | 4000.00 | 0.00 |
| 241 | 0.665000 | 35.00 | 1.000 | 4 | 64.250 | 64.250 | 2 | 0.00000 | 240 242 | 0 | 4000.00 | 0.00 |
| 242 | 0.665000 | 65.00 | 1.286 | 4 | 64.250 | 61.750 | 2 | 0.00000 | 241 243 | 0 | 4000.00 | 0.00 |
| 243 | 0.665000 | 20.00 | 2.995 | 3 | 61.750 | 61.750 | 2 | 0.00000 | 242 244 | 0 | 4000.00 | 0.00 |
| 244 | 0.665000 | 5.00 | 2.064 | 4 | 61.750 | 61.750 | 2 | 0.00000 | 243 245 | 0 | 4000.00 | 0.00 |
| 245 | 0.665000 | 20.00 | 2.260 | 4 | 61.750 | 62.750 | 2 | 0.00000 | 244 246 | 0 | 4000.00 | 0.00 |
| 246 | 0.665000 | 15.00 | 1.887 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 245 247 | 0 | 4000.00 | 0.00 |
| 247 | 0.665000 | 10.00 | 2.330 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 246 248 | 0 | 4000.00 | 0.00 |
| 248 | 0.665000 | 15.00 | 1.887 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 247 249 | 0 | 4000.00 | 0.00 |
| 249 | 0.665000 | 35.00 | 1.380 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 248 250 | 0 | 4000.00 | 0.00 |
| 250 | 0.665000 | 100.00 | 1.000 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 249 251 | 0 | 4000.00 | 0.00 |
| 251 | 0.665000 | 10.00 | 3.647 | 4 | 62.750 | 62.500 | 2 | 0.00000 | 250 252 | 0 | 4000.00 | 0.00 |
| 252 | 0.665000 | 30.00 | 1.749 | 4 | 62.500 | 67.900 | 2 | 0.00000 | 251 253 | 0 | 4000.00 | 0.00 |
| 253 | 0.665000 | 30.00 | 1.310 | 4 | 67.900 | 96.000 | 2 | 0.00000 | 252 254 | 0 | 4000.00 | 0.00 |
| 254 | 0.665000 | 20.00 | 2.317 | 4 | 96.000 | 97.000 | 2 | 0.00000 | 253 255 | 0 | 4000.00 | 0.00 |
| 255 | 0.665000 | 145.00 | 1.000 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 254 256 | 0 | 4000.00 | 0.00 |
| 256 | 0.665000 | 35.00 | 1.752 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 255 257 | 0 | 4000.00 | 0.00 |
| 257 | 0.665000 | 60.00 | 1.110 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 256 258 | 0 | 4000.00 | 0.00 |
| 258 | 0.665000 | 40.00 | 1.165 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 257 259 | 0 | 4000.00 | 0.00 |
| 259 | 0.665000 | 5.00 | 3.660 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 258 260 | 0 | 4000.00 | 0.00 |
| 260 | 0.665000 | 45.00 | 1.118 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 259 261 | 0 | 4000.00 | 0.00 |
| 261 | 0.665000 | 15.00 | 4.538 | 3 | 97.000 | 95.500 | 2 | 0.00000 | 260 71 | 1 | 4000.00 | 0.00 |
| 262 | 0.505000 | 20.00 | 2.315 | 4 | 61.750 | 63.000 | 2 | 0.00000 | 243 263 | 0 | 4000.00 | 0.00 |
| 263 | 0.505000 | 10.00 | 3.318 | 4 | 63.000 | 56.000 | 2 | 0.00000 | 262 264 | 0 | 4000.00 | 0.00 |
| 264 | 0.505000 | 30.00 | 2.380 | 4 | 56.000 | 61.750 | 2 | 0.00000 | 263 265 | 0 | 4000.00 | 0.00 |
| 265 | 0.505000 | 5.00 | 3.020 | 3 | 61.750 | 62.900 | 2 | 0.00000 | 264 266 | 0 | 4000.00 | 0.00 |
| 266 | 0.505000 | 5.00 | 10.494 | 4 | 62.900 | 67.000 | 2 | 0.00000 | 265 267 | 0 | 4000.00 | 0.00 |
| 267 | 0.505000 | 5.00 | 3.828 | 4 | 67.000 | 67.000 | 2 | 0.00000 | 266 268 | 0 | 4000.00 | 0.00 |
| 268 | 0.505000 | 65.00 | 1.155 | 3 | 67.000 | 67.000 | 2 | 0.00000 | 267 269 | 0 | 4000.00 | 0.00 |
| 269 | 0.505000 | 15.00 | 1.000 | 4 | 67.000 | 67.000 | 2 | 0.00000 | 268 270 | 0 | 4000.00 | 0.00 |
| 270 | 0.505000 | 35.00 | 1.866 | 3 | 67.000 | 67.000 | 2 | 0.00000 | 269 271 | 0 | 4000.00 | 0.00 |
| 271 | 0.256000 | 25.00 | 1.143 | 4 | 67.000 | 67.000 | 2 | 0.00000 | 270 272 | 0 | 4000.00 | 0.00 |
| 272 | 0.256000 | 10.00 | 3.099 | 4 | 67.000 | 65.000 | 2 | 0.00000 | 271 273 | 0 | 4000.00 | 0.00 |
| 273 | 0.256000 | 55.00 | 1.289 | 16 | 65.000 | 94.500 | 2 | 0.00000 | 272 0 | 0 | 4000.00 | 0.00 |
| 274 | 0.505000 | 15.00 | 1.000 | 3 | 62.900 | 63.900 | 2 | 0.00000 | 265 275 | 0 | 4000.00 | 0.00 |
| 275 | 0.505000 | 15.00 | 1.741 | 3 | 63.900 | 68.200 | 2 | 0.00000 | 274 276 | 0 | 4000.00 | 0.00 |
| 276 | 0.336000 | 135.00 | 1.170 | 4 | 68.200 | 71.500 | 2 | 0.00000 | 275 277 | 0 | 4000.00 | 0.00 |
| 277 | 0.336000 | 40.00 | 1.773 | 16 | 71.500 | 61.500 | 2 | 0.00000 | 276 0 | 0 | 4000.00 | 0.00 |
| 278 | 0.336000 | 20.00 | 2.518 | 16 | 68.200 | 61.500 | 2 | 0.00000 | 275 0 | 0 | 4000.00 | 0.00 |
| 279 | 0.505000 | 85.00 | 2.305 | 4 | 69.500 | 68.750 | 2 | 0.00000 | 206 280 | 0 | 4000.00 | 0.00 |
| 280 | 0.505000 | 10.00 | 2.010 | 3 | 68.750 | 68.750 | 2 | 0.00000 | 279 281 | 0 | 4000.00 | 0.00 |
| 281 | 0.505000 | 45.00 | 1.382 | 4 | 68.750 | 68.750 | 2 | 0.00000 | 280 282 | 0 | 4000.00 | 0.00 |
| 282 | 0.505000 | 10.00 | 1.707 | 4 | 68.750 | 68.750 | 2 | 0.00000 | 281 283 | 0 | 4000.00 | 0.00 |
| 283 | 0.505000 | 70.00 | 1.447 | 3 | 68.750 | 68.750 | 2 | 0.00000 | 282 284 | 0 | 4000.00 | 0.00 |
| 284 | 0.505000 | 20.00 | 1.354 | 4 | 68.750 | 68.750 | 2 | 0.00000 | 283 285 | 0 | 4000.00 | 0.00 |
| 285 | 0.505000 | 5.00 | 2.414 | 4 | 68.750 | 65.500 | 2 | 0.00000 | 284 286 | 0 | 4000.00 | 0.00 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 286 | 0.505000 | 25.00 | 1.404 | 3 | 65.500 | 65.500 | 2 | 0.00000 | 285 287 | 0 | 4000.00 | 0.00 |
| 287 | 0.336000 | 65.00 | 1.868 | 4 | 65.500 | 113.000 | 2 | 0.00000 | 286 288 | 0 | 4000.00 | 0.00 |
| 288 | 0.336000 | 35.00 | 2.150 | 3 | 113.000 | 147.000 | 2 | 0.00000 | 287 289 | 0 | 4000.00 | 0.00 |
| 289 | 0.256000 | 55.00 | 1.419 | 4 | 147.000 | 178.000 | 2 | 0.00000 | 288 290 | 0 | 4000.00 | 0.00 |
| 290 | 0.256000 | 10.00 | 1.000 | 16 | 178.000 | 178.000 | 2 | 0.00000 | 289 0 | 0 | 4000.00 | 0.00 |
| 291 | 0.256000 | 35.00 | 1.247 | 16 | 147.000 | 159.750 | 2 | 0.00000 | 288 0 | 0 | 4000.00 | 0.00 |
| 292 | 0.256000 | 115.00 | 1.686 | 16 | 67.000 | 128.500 | 2 | 0.00000 | 239 0 | 0 | 4000.00 | 0.00 |
| 293 | 0.336000 | 5.00 | 7.451 | 4 | 65.710 | 62.500 | 2 | 0.00000 | 219 294 | 0 | 4000.00 | 0.00 |
| 294 | 0.336000 | 60.00 | 1.112 | 4 | 62.500 | 62.500 | 2 | 0.00000 | 293 295 | 0 | 4000.00 | 0.00 |
| 295 | 0.336000 | 40.00 | 1.907 | 4 | 62.500 | 93.500 | 2 | 0.00000 | 294 296 | 0 | 4000.00 | 0.00 |
| 296 | 0.336000 | 45.00 | 1.729 | 3 | 93.500 | 126.800 | 2 | 0.00000 | 295 297 | 0 | 4000.00 | 0.00 |
| 297 | 0.336000 | 45.00 | 1.149 | 3 | 126.800 | 142.000 | 2 | 0.00000 | 296 298 | 0 | 4000.00 | 0.00 |
| 298 | 0.336000 | 40.00 | 1.571 | 3 | 142.000 | 154.500 | 2 | 0.00000 | 297 299 | 0 | 4000.00 | 0.00 |
| 299 | 0.256000 | 95.00 | 1.107 | 16 | 154.500 | 155.500 | 2 | 0.00000 | 298 0 | 0 | 4000.00 | 0.00 |
| 300 | 0.256000 | 100.00 | 1.623 | 16 | 142.000 | 143.000 | 2 | 0.00000 | 297 0 | 0 | 4000.00 | 0.00 |
| 301 | 0.336000 | 25.00 | 2.452 | 3 | 154.500 | 156.300 | 2 | 0.00000 | 298 302 | 0 | 4000.00 | 0.00 |
| 302 | 0.336000 | 45.00 | 1.893 | 4 | 156.300 | 172.300 | 2 | 0.00000 | 301 303 | 0 | 4000.00 | 0.00 |
| 303 | 0.256000 | 55.00 | 1.304 | 4 | 172.300 | 178.000 | 2 | 0.00000 | 302 304 | 0 | 4000.00 | 0.00 |
| 304 | 0.256000 | 10.00 | 1.000 | 16 | 178.000 | 178.000 | 2 | 0.00000 | 303 0 | 0 | 4000.00 | 0.00 |
| 305 | 0.336000 | 5.00 | 6.376 | 4 | 156.300 | 156.300 | 2 | 0.00000 | 301 306 | 0 | 4000.00 | 0.00 |
| 306 | 0.256000 | 130.00 | 1.405 | 16 | 156.300 | 156.300 | 2 | 0.00000 | 305 0 | 0 | 4000.00 | 0.00 |
| 307 | 0.336000 | 105.00 | 1.914 | 4 | 126.800 | 155.000 | 2 | 0.00000 | 296 308 | 0 | 4000.00 | 0.00 |
| 308 | 0.256000 | 130.00 | 1.287 | 19 | 155.000 | 206.300 | 2 | 0.00000 | 307 309 | 0 | 4000.00 | 0.00 |
| 309 | 0.256000 | 20.00 | 1.000 | 16 | 206.300 | 203.000 | 2 | 0.00000 | 308 0 | 0 | 4000.00 | 0.00 |
| 310 | 0.336000 | 10.00 | 5.301 | 3 | 62.750 | 71.500 | 2 | 0.00000 | 212 311 | 0 | 4000.00 | 0.00 |
| 311 | 0.336000 | 65.00 | 1.424 | 3 | 71.500 | 133.500 | 2 | 0.00000 | 310 312 | 0 | 4000.00 | 0.00 |
| 312 | 0.256000 | 15.00 | 1.439 | 4 | 133.500 | 147.300 | 2 | 0.00000 | 311 313 | 0 | 4000.00 | 0.00 |
| 313 | 0.256000 | 60.00 | 1.281 | 4 | 147.300 | 165.100 | 2 | 0.00000 | 312 314 | 0 | 4000.00 | 0.00 |
| 314 | 0.256000 | 30.00 | 1.527 | 16 | 165.100 | 160.000 | 2 | 0.00000 | 313 0 | 0 | 4000.00 | 0.00 |
| 315 | 0.256000 | 25.00 | 1.407 | 16 | 71.500 | 81.500 | 2 | 0.00000 | 310 0 | 0 | 4000.00 | 0.00 |
| 316 | 0.336000 | 10.00 | 3.688 | 4 | 133.500 | 133.500 | 2 | 0.00000 | 311 317 | 0 | 4000.00 | 0.00 |
| 317 | 0.256000 | 80.00 | 1.717 | 16 | 133.500 | 141.500 | 2 | 0.00000 | 316 0 | 0 | 4000.00 | 0.00 |
| 318 | 0.336000 | 10.00 | 6.443 | 4 | 68.750 | 66.700 | 2 | 0.00000 | 283 319 | 0 | 4000.00 | 0.00 |
| 319 | 0.336000 | 100.00 | 1.672 | 3 | 66.700 | 120.000 | 2 | 0.00000 | 318 320 | 0 | 4000.00 | 0.00 |
| 320 | 0.336000 | 15.00 | 2.792 | 3 | 120.000 | 132.000 | 2 | 0.00000 | 319 321 | 0 | 4000.00 | 0.00 |
| 321 | 0.336000 | 15.00 | 1.448 | 4 | 132.000 | 146.000 | 2 | 0.00000 | 320 322 | 0 | 4000.00 | 0.00 |
| 322 | 0.256000 | 55.00 | 1.604 | 16 | 146.000 | 163.500 | 2 | 0.00000 | 321 0 | 0 | 4000.00 | 0.00 |
| 323 | 0.256000 | 25.00 | 1.492 | 16 | 120.000 | 128.500 | 2 | 0.00000 | 319 0 | 0 | 4000.00 | 0.00 |
| 324 | 0.336000 | 45.00 | 1.806 | 3 | 132.000 | 132.000 | 2 | 0.00000 | 320 325 | 0 | 4000.00 | 0.00 |
| 325 | 0.256000 | 30.00 | 2.263 | 16 | 132.000 | 157.500 | 2 | 0.00000 | 324 0 | 0 | 4000.00 | 0.00 |
| 326 | 0.256000 | 35.00 | 1.188 | 16 | 132.000 | 141.500 | 2 | 0.00000 | 324 0 | 0 | 4000.00 | 0.00 |
| 327 | 0.336000 | 30.00 | 2.456 | 4 | 63.900 | 68.100 | 2 | 0.00000 | 274 328 | 0 | 4000.00 | 0.00 |
| 328 | 0.336000 | 90.00 | 1.939 | 3 | 68.100 | 134.000 | 2 | 0.00000 | 327 329 | 0 | 4000.00 | 0.00 |
| 329 | 0.336000 | 45.00 | 1.612 | 4 | 134.000 | 132.000 | 2 | 0.00000 | 328 330 | 0 | 4000.00 | 0.00 |
| 330 | 0.362000 | 90.00 | 1.181 | 16 | 132.000 | 141.500 | 2 | 0.00000 | 329 0 | 0 | 4000.00 | 0.00 |
| 331 | 0.336000 | 15.00 | 3.554 | 3 | 134.000 | 147.000 | 2 | 0.00000 | 328 332 | 0 | 4000.00 | 0.00 |
| 332 | 0.256000 | 10.00 | 1.200 | 4 | 147.000 | 150.000 | 2 | 0.00000 | 331 333 | 0 | 4000.00 | 0.00 |
| 333 | 0.256000 | 10.00 | 1.200 | 16 | 150.000 | 159.000 | 2 | 0.00000 | 332 0 | 0 | 4000.00 | 0.00 |
| 334 | 0.256000 | 50.00 | 1.451 | 19 | 147.000 | 159.75 | 2 | 0.00000 | 331 335 | 0 | 4000.00 | 0.00 |
| 335 | 0.090000 | 10.00 | 1.000 | 16 | 159.750 | 159.000 | 2 | 0.00000 | 334 0 | 0 | 4000.00 | 0.00 |
| 336 | 0.336000 | 10.00 | 6.712 | 4 | 67.000 | 65.000 | 2 | 0.00000 | 268 337 | 0 | 4000.00 | 0.00 |
| 337 | 0.336000 | 90.00 | 1.538 | 3 | 65.000 | 115.200 | 2 | 0.00000 | 336 338 | 0 | 4000.00 | 0.00 |
| 338 | 0.336000 | 40.00 | 1.403 | 3 | 115.200 | 133.800 | 2 | 0.00000 | 337 339 | 0 | 4000.00 | 0.00 |
| 339 | 0.336000 | 50.00 | 2.423 | 3 | 133.800 | 133.300 | 2 | 0.00000 | 338 340 | 0 | 4000.00 | 0.00 |
| 340 | 0.336000 | 10.00 | 3.016 | 3 | 133.300 | 133.300 | 2 | 0.00000 | 339 341 | 0 | 4000.00 | 0.00 |
| 341 | 0.256000 | 45.00 | 1.340 | 16 | 133.300 | 141.500 | 2 | 0.00000 | 340 0 | 0 | 4000.00 | 0.00 |
| 342 | 0.256000 | 15.00 | 1.678 | 16 | 133.300 | 141.500 | 2 | 0.00000 | 340 0 | 0 | 4000.00 | 0.00 |
| 343 | 0.256000 | 10.00 | 1.300 | 16 | 133.800 | 141.500 | 2 | 0.00000 | 338 0 | 0 | 4000.00 | 0.00 |
| 344 | 0.256000 | 35.00 | 1.644 | 16 | 133.300 | 128.500 | 2 | 0.00000 | 339 0 | 0 | 4000.00 | 0.00 |
| 345 | 0.256000 | 5.00 | 5.813 | 3 | 115.200 | 115.200 | 2 | 0.00000 | 337 346 | 0 | 4000.00 | 0.00 |
| 346 | 0.256000 | 80.00 | 1.288 | 3 | 115.200 | 116.500 | 2 | 0.00000 | 345 347 | 0 | 4000.00 | 0.00 |
| 347 | 0.256000 | 55.00 | 1.726 | 16 | 116.500 | 141.500 | 2 | 0.00000 | 346 0 | 0 | 4000.00 | 0.00 |
| 348 | 0.256000 | 15.00 | 2.601 | 16 | 116.500 | 128.500 | 2 | 0.00000 | 346 0 | 0 | 4000.00 | 0.00 |
| 349 | 0.256000 | 50.00 | 1.594 | 16 | 115.200 | 106.500 | 2 | 0.00000 | 345 0 | 0 | 4000.00 | 0.00 |
| 350 | 0.505000 | 175.00 | 1.669 | 4 | 68.750 | 140.000 | 2 | 0.00000 | 280 351 | 0 | 4000.00 | 0.00 |
| 351 | 0.336000 | 50.00 | 1.000 | 16 | 140.000 | 138.000 | 2 | 0.00000 | 350 0 | 0 | 4000.00 | 0.00 |
| 352 | 0.336000 | 10.00 | 4.226 | 4 | 67.000 | 65.000 | 2 | 0.00000 | 270 353 | 0 | 4000.00 | 0.00 |
| 353 | 0.336000 | 80.00 | 1.285 | 4 | 65.000 | 105.700 | 2 | 0.00000 | 352 354 | 0 | 4000.00 | 0.00 |
| 354 | 0.336000 | 80.00 | 1.630 | 3 | 105.700 | 130.500 | 2 | 0.00000 | 353 355 | 0 | 4000.00 | 0.00 |
| 355 | 0.256000 | 30.00 | 1.458 | 4 | 130.500 | 147.500 | 2 | 0.00000 | 354 356 | 0 | 4000.00 | 0.00 |
| 356 | 0.256000 | 25.00 | 1.225 | 4 | 147.500 | 141.500 | 2 | 0.00000 | 355 357 | 0 | 4000.00 | 0.00 |
| 357 | 0.162000 | 50.00 | 1.843 | 16 | 141.500 | 141.500 | 2 | 0.00000 | 356 0 | 0 | 4000.00 | 0.00 |
| 358 | 0.336000 | 5.00 | 5.570 | 4 | 130.500 | 130.500 | 2 | 0.00000 | 354 359 | 0 | 4000.00 | 0.00 |
| 359 | 0.162000 | 35.00 | 1.759 | 16 | 130.500 | 132.200 | 2 | 0.00000 | 358 0 | 0 | 4000.00 | 0.00 |
| 360 | 0.336000 | 45.00 | 2.343 | 4 | 94.500 | 115.800 | 2 | 0.00000 | 152 361 | 0 | 4000.00 | 0.00 |
| 361 | 0.336000 | 15.00 | 1.448 | 3 | 115.800 | 130.600 | 2 | 0.00000 | 360 362 | 0 | 4000.00 | 0.00 |
| 362 | 0.256000 | 50.00 | 1.510 | 19 | 130.600 | 176.000 | 2 | 0.00000 | 361 363 | 0 | 4000.00 | 0.00 |
| 363 | 0.256000 | 15.00 | 1.000 | 16 | 176.000 | 176.000 | 2 | 0.00000 | 362 0 | 0 | 4000.00 | 0.00 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 364 | 0.362000 | 145.00 | 1.539 | 16 | 130.600 | 129.600 | 2 | 0.00000 | 361 0 | 0 | 4000.00 | 0.00 |
| 365 | 0.336000 | 65.00 | 1.940 | 3 | 92.000 | 118.400 | 2 | 0.00000 | 145 366 | 0 | 4000.00 | 0.00 |
| 366 | 0.336000 | 20.00 | 1.544 | 3 | 118.400 | 118.400 | 2 | 0.00000 | 365 367 | 0 | 4000.00 | 0.00 |
| 367 | 0.256000 | 15.00 | 1.239 | 16 | 118.400 | 115.000 | 2 | 0.00000 | 366 0 | 0 | 4000.00 | 0.00 |
| 368 | 0.256000 | 20.00 | 1.947 | 16 | 118.400 | 127.000 | 2 | 0.00000 | 365 0 | 0 | 4000.00 | 0.00 |
| 369 | 0.336000 | 30.00 | 2.275 | 4 | 118.400 | 133.500 | 2 | 0.00000 | 366 370 | 0 | 4000.00 | 0.00 |
| 370 | 0.256000 | 35.00 | 1.232 | 3 | 133.500 | 166.000 | 2 | 0.00000 | 369 371 | 0 | 4000.00 | 0.00 |
| 371 | 0.256000 | 10.00 | 1.000 | 19 | 166.000 | 176.000 | 2 | 0.00000 | 370 372 | 0 | 4000.00 | 0.00 |
| 372 | 0.256000 | 20.00 | 2.970 | 16 | 176.000 | 175.000 | 2 | 0.00000 | 371 0 | 0 | 4000.00 | 0.00 |
| 373 | 0.256000 | 55.00 | 1.521 | 16 | 166.000 | 141.000 | 2 | 0.00000 | 370 0 | 0 | 4000.00 | 0.00 |
| 374 | 0.336000 | 5.00 | 6.914 | 3 | 92.000 | 94.200 | 2 | 0.00000 | 144 375 | 0 | 4000.00 | 0.00 |
| 375 | 0.336000 | 50.00 | 1.605 | 3 | 94.200 | 113.250 | 2 | 0.00000 | 374 376 | 0 | 4000.00 | 0.00 |
| 376 | 0.256000 | 30.00 | 1.100 | 16 | 113.250 | 141.750 | 2 | 0.00000 | 375 0 | 0 | 4000.00 | 0.00 |
| 377 | 0.256000 | 30.00 | 1.751 | 16 | 94.200 | 74.000 | 2 | 0.00000 | 374 0 | 0 | 4000.00 | 0.00 |
| 378 | 0.256000 | 20.00 | 2.380 | 16 | 113.300 | 111.000 | 2 | 0.00000 | 375 0 | 0 | 4000.00 | 0.00 |
| 379 | 0.336000 | 10.00 | 4.898 | 4 | 89.000 | 94.330 | 2 | 0.00000 | 137 380 | 0 | 4000.00 | 0.00 |
| 380 | 0.336000 | 5.00 | 2.344 | 3 | 94.330 | 95.000 | 2 | 0.00000 | 379 381 | 0 | 4000.00 | 0.00 |
| 381 | 0.336000 | 100.00 | 1.322 | 4 | 95.000 | 130.700 | 2 | 0.00000 | 380 382 | 0 | 4000.00 | 0.00 |
| 382 | 0.256000 | 65.00 | 1.598 | 19 | 130.700 | 176.000 | 2 | 0.00000 | 381 383 | 0 | 4000.00 | 0.00 |
| 383 | 0.025600 | 20.00 | 1.000 | 16 | 176.000 | 175.000 | 2 | 0.00000 | 382 0 | 0 | 4000.00 | 0.00 |
| 384 | 0.336000 | 50.00 | 1.859 | 3 | 95.000 | 96.500 | 2 | 0.00000 | 380 385 | 0 | 4000.00 | 0.00 |
| 385 | 0.256000 | 75.00 | 1.252 | 3 | 96.500 | 98.000 | 2 | 0.00000 | 384 386 | 0 | 4000.00 | 0.00 |
| 386 | 0.256000 | 40.00 | 1.269 | 16 | 98.000 | 71.000 | 2 | 0.00000 | 385 0 | 0 | 4000.00 | 0.00 |
| 387 | 0.256000 | 15.00 | 2.741 | 16 | 96.500 | 103.000 | 2 | 0.00000 | 384 0 | 0 | 4000.00 | 0.00 |
| 388 | 0.256000 | 40.00 | 1.922 | 16 | 98.000 | 94.500 | 2 | 0.00000 | 385 0 | 0 | 4000.00 | 0.00 |
| 389 | 0.336000 | 45.00 | 1.567 | 3 | 89.000 | 127.750 | 2 | 0.00000 | 135 390 | 0 | 4000.00 | 0.00 |
| 390 | 0.256000 | 20.00 | 1.688 | 16 | 127.750 | 141.750 | 2 | 0.00000 | 389 0 | 0 | 4000.00 | 0.00 |
| 391 | 0.256000 | 110.00 | 1.335 | 16 | 127.750 | 141.750 | 2 | 0.00000 | 389 0 | 0 | 4000.00 | 0.00 |
| 392 | 0.336000 | 5.00 | 7.854 | 3 | 94.500 | 96.800 | 2 | 0.00000 | 155 393 | 0 | 4000.00 | 0.00 |
| 393 | 0.256000 | 215.00 | 1.316 | 16 | 96.800 | 65.000 | 2 | 0.00000 | 392 0 | 0 | 4000.00 | 0.00 |
| 394 | 0.256000 | 125.00 | 1.470 | 16 | 96.800 | 141.750 | 2 | 0.00000 | 392 0 | 0 | 4000.00 | 0.00 |
| 395 | 0.336000 | 150.00 | 1.528 | 3 | 94.500 | 130.400 | 2 | 0.00000 | 156 396 | 0 | 4000.00 | 0.00 |
| 396 | 0.256000 | 155.00 | 1.280 | 19 | 130.400 | 182.000 | 2 | 0.00000 | 395 397 | 0 | 4000.00 | 0.00 |
| 397 | 0.256000 | 30.00 | 1.478 | 16 | 182.000 | 179.000 | 2 | 0.00000 | 396 0 | 0 | 4000.00 | 0.00 |
| 398 | 0.256000 | 40.00 | 1.653 | 16 | 130.400 | 141.750 | 2 | 0.00000 | 395 0 | 0 | 4000.00 | 0.00 |
| 399 | 0.505000 | 120.00 | 1.538 | 3 | 94.500 | 90.500 | 2 | 0.00000 | 158 400 | 0 | 4000.00 | 0.00 |
| 400 | 0.336000 | 5.00 | 8.007 | 4 | 90.500 | 90.500 | 2 | 0.00000 | 399 401 | 0 | 4000.00 | 0.00 |
| 401 | 0.256000 | 60.00 | 1.349 | 16 | 90.500 | 141.750 | 2 | 0.00000 | 400 0 | 0 | 4000.00 | 0.00 |
| 402 | 0.336000 | 130.00 | 1.496 | 3 | 90.500 | 65.300 | 2 | 0.00000 | 399 403 | 0 | 4000.00 | 0.00 |
| 403 | 0.336000 | 50.00 | 1.228 | 4 | 65.300 | 94.700 | 2 | 0.00000 | 402 404 | 0 | 4000.00 | 0.00 |
| 404 | 0.256000 | 55.00 | 1.315 | 16 | 94.700 | 141.750 | 2 | 0.00000 | 403 0 | 0 | 4000.00 | 0.00 |
| 405 | 0.336000 | 40.00 | 2.260 | 3 | 65.300 | 77.500 | 2 | 0.00000 | 402 406 | 0 | 4000.00 | 0.00 |
| 406 | 0.256000 | 30.00 | 1.458 | 16 | 77.500 | 103.500 | 2 | 0.00000 | 405 0 | 0 | 4000.00 | 0.00 |
| 407 | 0.256000 | 125.00 | 1.180 | 16 | 77.500 | 75.000 | 2 | 0.00000 | 405 0 | 0 | 4000.00 | 0.00 |
| 408 | 0.336000 | 135.00 | 1.552 | 4 | 79.000 | 142.000 | 2 | 0.00000 | 139 409 | 0 | 4000.00 | 0.00 |
| 409 | 0.336000 | 20.00 | 1.000 | 16 | 142.000 | 141.750 | 2 | 0.00000 | 408 0 | 0 | 4000.00 | 0.00 |
| 410 | 0.256000 | 95.00 | 1.334 | 19 | 96.200 | 174.000 | 2 | 0.00000 | 150 411 | 0 | 4000.00 | 0.00 |
| 411 | 0.256000 | 10.00 | 1.358 | 4 | 174.000 | 183.500 | 2 | 0.00000 | 410 412 | 0 | 4000.00 | 0.00 |
| 412 | 0.107000 | 60.00 | 1.439 | 4 | 183.500 | 197.500 | 2 | 0.00000 | 411 413 | 0 | 4000.00 | 0.00 |
| 413 | 0.107000 | 25.00 | 1.000 | 16 | 197.500 | 197.500 | 2 | 0.00000 | 412 0 | 0 | 4000.00 | 0.00 |
| 414 | 0.505000 | 100.00 | 2.373 | 3 | 91.940 | 138.300 | 2 | 0.00000 | 143 415 | 0 | 4000.00 | 0.00 |
| 415 | 0.505000 | 5.00 | 5.848 | 2 | 138.300 | 142.000 | 2 | 0.00000 | 414 416 | 0 | 4000.00 | 0.00 |
| 416 | 0.336000 | 5.00 | 1.000 | 4 | 142.000 | 142.000 | 2 | 0.00000 | 415 417 | 0 | 4000.00 | 0.00 |
| 417 | 0.336000 | 50.00 | 1.000 | 4 | 142.000 | 160.000 | 2 | 0.00000 | 416 418 | 0 | 4000.00 | 0.00 |
| 418 | 0.336000 | 50.00 | 1.000 | 16 | 160.000 | 160.000 | 2 | 0.00000 | 417 0 | 0 | 4000.00 | 0.00 |
| 419 | 0.505000 | 85.00 | 2.031 | 4 | 94.500 | 131.500 | 2 | 0.00000 | 154 420 | 0 | 4000.00 | 0.00 |
| 420 | 0.505000 | 50.00 | 1.443 | 4 | 131.500 | 130.750 | 2 | 0.00000 | 419 421 | 0 | 4000.00 | 0.00 |
| 421 | 0.505000 | 30.00 | 1.909 | 4 | 130.750 | 130.750 | 2 | 0.00000 | 420 422 | 0 | 4000.00 | 0.00 |
| 422 | 0.505000 | 40.00 | 2.361 | 4 | 130.750 | 128.750 | 2 | 0.00000 | 421 423 | 0 | 4000.00 | 0.00 |
| 423 | 0.505000 | 35.00 | 1.491 | 3 | 128.750 | 132.170 | 2 | 0.00000 | 422 424 | 0 | 4000.00 | 0.00 |
| 424 | 0.256000 | 10.00 | 1.505 | 4 | 132.170 | 138.000 | 2 | 0.00000 | 423 425 | 0 | 4000.00 | 0.00 |
| 425 | 0.162000 | 105.00 | 1.580 | 16 | 138.000 | 169.500 | 2 | 0.00000 | 424 0 | 0 | 4000.00 | 0.00 |
| 426 | 0.336000 | 40.00 | 1.843 | 3 | 132.170 | 132.170 | 2 | 0.00000 | 423 427 | 0 | 4000.00 | 0.00 |
| 427 | 0.256000 | 10.00 | 1.000 | 4 | 132.170 | 138.000 | 2 | 0.00000 | 426 428 | 0 | 4000.00 | 0.00 |
| 428 | 0.162000 | 100.00 | 1.632 | 16 | 138.000 | 169.500 | 2 | 0.00000 | 427 0 | 0 | 4000.00 | 0.00 |
| 429 | 0.256000 | 40.00 | 1.165 | 4 | 132.170 | 138.000 | 2 | 0.00000 | 426 430 | 0 | 4000.00 | 0.00 |
| 430 | 0.162000 | 155.00 | 1.548 | 16 | 138.000 | 169.500 | 2 | 0.00000 | 429 0 | 0 | 4000.00 | 0.00 |
| 431 | 0.256000 | 40.00 | 1.934 | 4 | 65.500 | 69.000 | 2 | 0.00000 | 286 432 | 0 | 4000.00 | 0.00 |
| 432 | 0.256000 | 105.00 | 1.020 | 4 | 69.000 | 171.000 | 2 | 0.00000 | 431 433 | 0 | 4000.00 | 0.00 |
| 433 | 0.162000 | 10.00 | 1.227 | 19 | 171.000 | 181.000 | 2 | 0.00000 | 432 434 | 0 | 4000.00 | 0.00 |
| 434 | 0.162000 | 40.00 | 1.332 | 16 | 181.000 | 180.000 | 2 | 0.00000 | 433 0 | 0 | 4000.00 | 0.00 |
| 435 | 0.665000 | 15.00 | 5.522 | 3 | 89.600 | 83.800 | 2 | 0.00000 | 166 436 | 0 | 4000.00 | 0.00 |
| 436 | 0.665000 | 5.00 | 3.660 | 3 | 83.800 | 83.800 | 2 | 0.00000 | 435 437 | 0 | 4000.00 | 0.00 |
| 437 | 0.665000 | 5.00 | 14.300 | 3 | 83.800 | 83.800 | 2 | 0.00000 | 436 438 | 0 | 4000.00 | 0.00 |
| 438 | 0.505000 | 5.00 | 4.652 | 13 | 83.800 | 88.000 | 2 | 0.00000 | 437 439 | 0 | 4000.00 | 0.00 |
| 439 | 0.505000 | 5.00 | 6.050 | 2 | 88.000 | 89.000 | 2 | 0.00000 | 438 440 | 0 | 4000.00 | 0.00 |
| 440 | 0.336000 | 60.00 | 5.000 | 1 | 89.000 | 113.000 | 2 | 0.00000 | 439 0 | 0 | 4000.00 | 0.00 |
| 441 | 0.665000 | 10.00 | 9.911 | 3 | 83.800 | 91.500 | 2 | 0.00000 | 437 442 | 0 | 4000.00 | 0.00 |

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442    0.665000     80.00    1.865   3     91.500   102.800    2     0.00000 441 443     0   4000.00      0.00
443    0.665000     50.00    1.106  16    102.800   130.000    2     0.00000 442   0     0   4000.00      0.00
444    0.336000     10.00    5.435  16    102.800   107.800    2     0.00000 442   0     0   4000.00      0.00
445    0.665000     40.00    2.658  16     91.500    86.000    2     0.00000 441   0     0   4000.00      0.00
446    0.505000      5.00    7.868  13     83.800    88.000    2     0.00000 435 447     0   4000.00      0.00
447    0.505000      5.00    1.000   2     88.000    89.000    2     0.00000 446 448     0   4000.00      0.00
448    0.505000     45.00    2.301   4     89.000   103.000    2     0.00000 447 449     0   4000.00      0.00
449    0.336000     20.00    2.613   4    103.000   112.000    2     0.00000 448 450     0   4000.00      0.00
450    0.336000    110.00    2.307   1    112.000   113.000    2     0.00000 449   0     0   4000.00      0.00
451    0.336000    160.00    1.474   4     83.800   141.000    2     0.00000 436 452     0   4000.00      0.00
452    0.336000      5.00    1.000   2    141.000   141.000    2     0.00000 451 453     0   4000.00      0.00
453    0.256000     50.00    1.000   1    141.000   141.000    2     0.00000 452   0     0   4000.00      0.00
454    0.665000     30.00    4.979   3     84.100    93.500    2     0.00000 204 455     0   4000.00      0.00
455    0.665000     10.00    2.862   2     93.500   103.500    2     0.00000 454 456     0   4000.00      0.00
456    0.505000     50.00    5.000   1    103.500   103.500    2     0.00000 455   0     0   4000.00      0.00
457    0.505000     20.00    2.414   4     93.500    80.300    2     0.00000 454 458     0   4080.00      0.00
458    0.505000     50.00    1.000  16     80.300    80.300    2     0.00000 457   0     0   4000.00      0.00
459    0.336000     20.00    3.318   2     62.750    62.750    2     0.00000 218 460     0   4000.00      0.00
460    0.336000     10.00    2.210   4     62.750    63.750    2     0.00000 459 461     0   4000.00      0.00
461    0.336000     30.00    1.762   4     63.750    86.250    2     0.00000 460 462     0   4000.00      0.00
462    0.336000     40.00    1.286   4     86.250   125.000    2     0.00000 461 463     0   4000.00      0.00
463    0.336000    130.00    1.233   4    125.000   125.000    2     0.00000 462 464     0   4000.00      0.00
464    0.336000     30.00    1.587   4    125.000   155.000    2     0.00000 463 465     0   4000.00      0.00
465    0.256000     60.00    1.171   4    155.000   208.000    2     0.00000 464 466     0   4000.00      0.00
466    0.001000     10.00    1.000  16    208.000   205.000    2     0.00000 465   0     0   4000.00      0.00
467    0.336000     20.00    2.378   2     94.000    94.000    2     0.00000 199 468     0   4000.00      0.00
468    0.336000     20.00    1.000   4     94.000    94.000    2     0.00000 467 469     0   4000.00      0.00
469    0.336000      5.00    1.538   4     94.000    94.000    2     0.00000 468 470     0   4000.00      0.00
470    0.336000     25.00    2.665   4     94.000   113.000    2     0.00000 469 471     0   4000.00      0.00
471    0.336000     75.00    1.403   4    113.000   122.000    2     0.00000 470 472     0   4000.00      0.00
472    0.336000     35.00    1.708   3    122.000   151.800    2     0.00000 471 473     0   4000.00      0.00
473    0.336000     30.00    2.322   3    151.800   169.500    2     0.00000 472 474     0   4000.00      0.00
474    0.336000     35.00    1.770   4    169.500   187.800    2     0.00000 473 475     0   4000.00      0.00
475    0.256000     15.00    1.717   4    187.800   187.800    2     0.00000 474 476     0   4000.00      0.00
476    0.256000    110.00    1.130   4    187.800   205.300    2     0.00000 475 477     0   4000.00      0.00
477    0.256000     10.00    1.000  16    205.300   204.300    2     0.00000 476   0     0   4000.00      0.00
478    0.256000     40.00    1.849  16    169.500   166.000    2     0.00000 473   0     0   4000.00      0.00
479    0.336000     10.00    4.769   4    151.800   153.300    2     0.00000 472 480     0   4000.00      0.00
480    0.256000     60.00    1.293  16    153.300   149.300    2     0.00000 479   0     0   4000.00      0.00
481    0.505000      5.00   14.146   4     61.750    57.700    2     0.00000 208 482     0   4000.00      0.00
482    0.505000     20.00    3.323   4     57.700    71.000    2     0.00000 481 483     0   4000.00      0.00
483    0.505000     10.00    1.000   2     71.000    71.000    2     0.00000 482 484     0   4000.00      0.00
484    0.505000     50.00    5.000   1     71.000    71.000    2     0.00000 483   0     0   4000.00      0.00
485    0.505000      5.00   13.184   4    138.300   138.300    2     0.00000 414 486     0   4000.00      0.00
486    0.336000     90.00    1.157   4    138.300   143.500    2     0.00000 485 487     0   4000.00      0.00
487    0.336000     15.00    1.627   4    143.500   147.400    2     0.00000 486 488     0   4000.00      0.00
488    0.336000     75.00    1.314   4    147.400   165.800    2     0.00000 487 489     0   4000.00      0.00
489    0.336000     70.00    1.355   4    165.800   164.000    2     0.00000 488 490     0   4000.00      0.00
490    0.336000     10.00    3.486   4    164.000   164.000    2     0.00000 489 491     0   4000.00      0.00
491    0.336000     10.00    1.416   4    164.000   164.000    2     0.00000 490 492     0   4000.00      0.00
492    0.256000     10.00    1.251   4    164.000   164.000    2     0.00000 491 493     0   4000.00      0.00
493    0.206000     10.00    3.225   4    164.000   166.000    2     0.00000 492 494     0   4000.00      0.00
494    0.206000     75.00    1.549   4    166.000   166.000    2     0.00000 493 495     0   4000.00      0.00
495    0.172000     20.00    1.757  19    166.000   166.000    2     0.00000 494 496     0   4000.00      0.00
496    0.087000     10.00    2.409  16    166.000   168.000    2     0.00000 495   0     0   4000.00      0.00
@EOR

 91 570.3   0  18
  20.00    .000     -0.022     -0.033     -0.045     -0.056     -0.067     -0.078
 -0.089   -.100     -0.111     -0.123     -0.134     -0.145     -0.156     -0.167
 -0.200   -100.0
  570.3   570.3     587.3      590.3      587.3      580.3      568.3      558.3
  542.3   520.3     490.3      460.3      420.3      370.3      310.3      240.3
    170.3   170.3

 99 495.3   0  18
   20.00    .000     -0.557     -1.114     -1.671     -2.228     -2.785     -3.342
  -3.899   -4.46     -5.013     -5.570     -6.127     -6.684     -7.241     -8.912
  -13.4    -100.0
   495.3   495.3     494.3      492.3      491.3      488.3      485.3      481.3
   477.3   472.3     466.3      459.3      448.3      436.3      423.3      375.3
   170.3   170.3

117 512.1  0 17
   20.00   -.000     -0.557     -1.114     -1.671     -2.228     -2.785     -3.342
  -3.899   -4.46     -5.013     -5.57      -6.127     -6.684     -7.241     -8.912
  -13.37
   512.1   512.1     510.1      507.1      505.1      502.1      500.1      498.1
```

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   495.1  492.1     487.8     481.1     476.1     467.1     457.1     412.1
   160.1

 123 512.1  0 17
    20.00  -.000     -0.557    -1.114    -1.671    -2.228    -2.785    -3.342
   -3.899  -4.46     -5.013    -5.57     -6.127    -6.684    -7.241    -8.912
   -13.37
    512.1  512.1     510.1     507.1     505.1     502.1     500.1     498.1
    495.1  492.1     487.8     481.1     476.1     467.1     457.1     412.1
    160.1

 129 482.1   0  16
    20.00   .000     -0.022     -0.033    -0.045    -0.056    -0.067    -0.078
   -0.089  -.100     -0.111     -0.123    -0.134    -0.145    -0.156    -100.0
   482.1  482.1     478.1     473.1     463.1     448.1     428.1     403.1
   374.1  343.1     308.1     268.1     233.1     198.1     168.1     168.1

 440 147.0   0   0

 450 147.0   0   0

 453 175.0   0   0

 456 137.5   0   0

 484 105.0   0   0

   4 0  100.  100. 1.0E+20   2  9  4  0  .01   393.6
 0     .56   2.36    100
 100.  100.  100.    100.
 0     50.0   90.0  92.5   95.3   97.5      99.0      99.7       100.0
 0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

  90 0  100  100  1.0E+20    2  9  3  0  .01  570.3
0       0.01  100
100     0    0
0     50.0   90.0  92.5   95.3   97.5      99.0      99.7       100.0
 0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

  96 0  100  100  1.0E+20   2  9  4  0  .01  495.3
0      .63   3.43   100
100.   100.  0.     0.
0     50.0   90.0  92.5   95.3   97.5      99.0      99.7       100.0
 0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

 102 0  100.  100. 1.0E+20   2  9  4  0  .01   393.6
0     2.0   2.01    100
100.  100.  100.    100.
0     50.0   90.0  92.5   95.3   97.5      99.0      99.7       100.0
 0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

 114 0  100  100  1.0E+20    2  9  4  0  .01  512.1
 0       2.51  5.61   100
 100     100   100.   100.
 0     50.0   90.0  92.5   95.3   97.5      99.0      99.7       100.0
 0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

 121 0  100  100  1.0E+20    2  9  4  0  .01  512.1
 0       21.93 27.13 100
 100     100   100   100
 0     50.0   90.0  92.5   95.3   97.5      99.0      99.7       100.0
 0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

 126 0  100  100  1.0E+20    2  9  3  0  .01  482.1
0       0.01  100
100     100   100
0     50.0   90.0  92.5   95.3   97.5      99.0      99.7       100.0
 0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

 415  0  100  100  1.0E+20   2  16  3  0  1.79  194.
 0       0.1    100
 100     100    100
 0   11.1   16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
 97.5     99.0     99.7  100.0
 10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
 203570   1596000  0.49259E+08  0.1E+21

 439  0  100  100  1.0E+20   2  16  3  0  1.79  147.
```

# CALCULATION SHEET

| | | | |
|---|---|---|---|
| Project: | HOPE CREEK GENERATING STATION | Job Number: | 8038 |
| Calc No. | 8038-P0004 | Sheet No. | 190 |
| By: | A. Arastu Date: 9/14/18 | Rev. No. | 1 |
| Subject: | Water Hammer Analysis of the HCGS Fire Protection System | | |

```
0       0.1    100
100     100    100
0    11.1  16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
97.5     99.0     99.7  100.0
10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
203570   1596000  0.49259E+08  0.1E+21

447  0  100  100  1.0E+20   2  16  3  0  0.99  147.
0       0.01    100
100     100     100
0    11.1  16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
97.5     99.0     99.7  100.0
10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
203570   1596000  0.49259E+08  0.1E+21

452  0  100  100  1.0E+20   2  16  3  0  1.785  175.
0       0.01   100
100     100    100
0    11.1  16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
97.5     99.0     99.7  100.0
10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
203570   1596000  0.49259E+08  0.1E+21

455  0  100  100  1.0E+20   2  16  3  0  0.695  137.5
0       0.01   100
100     0      0
0    11.1  16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
97.5     99.0     99.7  100.0
10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
203570   1596000  0.49259E+08  0.1E+21

459  0  100  100  1.0E+20   2  9  3  0  .01  96.8
0       1.0    100
100     100    100
0     50.0   90.0  92.5   95.3   97.5      99.0      99.7        100.0
0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

467  0  100  100  1.0E+20   2  9  3  0  .01  128.
0       1.0    100
100     100    100
0     50.0   90.0  92.5   95.3   97.5      99.0      99.7        100.0
0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

483  0  100  100  1.0E+20  2  16  4  0  0.99  105.0
0       0.1   0.11  100
100     100   100   100
0    11.1  16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
97.5     99.0     99.7  100.0
10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
203570   1596000  0.49259E+08  0.1E+21


  5  2  0.650  0.01 0.7850 0.0  ID 1.0000
438  2  0.750  0.01 0.2003 0.0  ID 0.5050
446  2  0.750  0.01 0.2003 0.0  ID 0.5050


308   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102

410   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102


433   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102

362   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102
```

# CALCULATION SHEET

| | | | |
|---|---|---|---|
| Project: | HOPE CREEK GENERATING STATION | Job Number: | 8038 |
| Calc No. | 8038-P0004 | Sheet No. | 191 |
| By: | A. Arastu Date: 9/14/18 | Rev. No. | 1 |
| Subject: | Water Hammer Analysis of the HCGS Fire Protection System | | |

```
396   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2         .102


495   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2         .102

334   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2         .102

371   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2         .102

382   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2         .102


 1.          1.
 6     2
 94    2
 97    2
 102   2
 113   2
 120   2
 184   41
 188   46
 194   31
 289   11
 290    7
 291    6
 292   23
 299   17
 303   11
 304   1
 306   24
 308   26
 314   6
 322   11
 325    5
 332    2
 334    9
 347   11
 351   10
 362    9
 371   2
 376   6
 382   13
 383    3
 396   31
 409   4
 410   17
 412   11
 418   9
 425   21
 428   20
 430   32
 432   20
 433   3
 450   22
 455   2
 465   1
 466   2
 476   4
 477   22
 478   8
 480   11
 483   2
 495   4
```

# CALCULATION SHEET

| | | | |
|---|---|---|---|
| Project: | HOPE CREEK GENERATING STATION | Job Number: | 8038 |
| Calc No. | 8038-P0004 | Sheet No. | 192 |
| By: | A. Arastu Date: 9/14/18 | Rev. No. | 1 |
| Subject: | Water Hammer Analysis of the HCGS Fire Protection System | | |

```
@EOR
410       1       410      3          1
410       3       410      5          2
410       4       410      18         3
410       18      410      19         4
410       18      411      3          5
412       1       412      2          6
412       1       412      3          7
412       3       412      6          8
412       5       412      6          9
412       6       412      7          10
412       7       412      10         11
396       13      396      18         12
396       18      396      25         13
@EOR
0      1.0    100   1
1.0   30.0    500   1
30.0 888.    1000   1
```

UNISONT ENGINEERING, INC.

# CALCULATION SHEET

| | | | |
|---|---|---|---|
| Project: | HOPE CREEK GENERATING STATION | Job Number: | 8038 |
| Calc No. | 8038-P0004 | Sheet No. | 193 |
| By: | A. Arastu Date: 9/14/18 | Rev. No. | 1 |
| Subject: | Water Hammer Analysis of the HCGS Fire Protection System | | |

## B5 - Case 5 (8 inch Deluge Valve w/Salem Pump #1) with Vacuum Breakers

```
HCGS FP Case 5b: 9 VBs.  Forces in Riser # 26 only
10000
0  0  1  0  0  0
2   2   0.  12.
2   1   0   0
0   1   0  0  0  0  0  1 0 0
1.9  62.4  7.83E-6
1.0  2   13    0    0
       0.0    1000.0    2000.0   2.0E+04   6.0E+04   1.0E+05   3.0E+05   6.0E+05
   1.0E+06   1.5E+06   3.5E+06   1.0E+11   1.0E+33
      0.10     0.061     0.048     0.026     0.021      .019    0.0167    0.0155
    0.0150    0.0147     0.014     0.014     0.014
495.3   3  17  0    0
  -10.00   .000   .557  1.114  1.671  2.228  2.785  3.342
   3.899  4.456  5.013  5.570  6.127  6.684  7.241  8.912
   13.4
   495.3  495.3     494.3     492.3     491.3     488.3     485.3     481.3
   477.3  472.3     466.3     459.3     448.3     436.3     423.3     375.3
   170.3
   1
   1    1.104000     55.00    5.492   4      99.400    94.000     2     0.00000   0   2     0   4000.00       0.00
   2    1.000000     20.00    7.400   4      94.000   105.040     2     0.00000   1   3     0   4000.00       0.00
   3    1.000000     10.00    7.180   4     105.040   105.040     2     0.00000   2   4     0   4000.00       0.00
   4    1.000000     10.00    3.538   2     105.040   104.500     2     0.00000   3   5     0   4000.00       0.00
   5    1.000000      5.00   18.508  13     104.500   104.750     2     0.00000   4   6     0   4000.00       0.00
   6    1.000000     10.00    5.200   4     104.750   110.000     2     0.00000   5   7     0   4000.00       0.00
   7    1.000000     20.00    3.400   3     110.000   105.000     2     0.00000   6   8     0   4000.00       0.00
   8    1.000000    115.00    2.402   3     105.000    96.900     2     0.00000   7  86     0   4000.00       0.00
   9    1.007000      5.00    2.611   4      96.900    96.900     2     0.00000   8  10     0   4000.00       0.00
  10    1.007000     10.00    3.014   4      96.900    96.900     2     0.00000   9  11     0   4000.00       0.00
  11    1.007000     10.00    1.806   4      96.900    96.900     2     0.00000  10  12     0   4000.00       0.00
  12    1.007000     10.00    3.014   3      96.900    96.900     2     0.00000  11  13     0   4000.00       0.00
  13    1.007000    110.00    1.183   4      96.900    96.900     2     0.00000  12  14     0   4000.00       0.00
  14    1.007000    110.00    1.363   4      96.900    95.900     2     0.00000  13  15     0   4000.00       0.00
  15    1.007000     10.00    3.014   4      95.900    95.900     2     0.00000  14  16     0   4000.00       0.00
  16    1.007000     30.00    1.671   4      95.900    95.900     2     0.00000  15  17     0   4000.00       0.00
  17    1.007000     80.00    1.252   4      95.900    95.900     2     0.00000  16  18     0   4000.00       0.00
  18    1.007000     20.00    1.403   4      95.900    95.900     2     0.00000  17  19     0   4000.00       0.00
  19    1.007000    130.00    1.155   4      95.900    95.900     2     0.00000  18  20     0   4000.00       0.00
  20    1.007000    135.00    1.060   4      95.900    95.400     2     0.00000  19  21     0   4000.00       0.00
  21    1.007000     10.00    2.994   4      95.400    93.500     2     0.00000  20  22     0   4000.00       0.00
  22    1.007000     65.00    1.217   4      93.500    93.500     2     0.00000  21  23     0   4000.00       0.00
  23    1.007000      5.00    1.000   4      93.500    93.500     2     0.00000  22  24     0   4000.00       0.00
  24    1.007000     20.00    3.004   4      93.500    97.000     2     0.00000  23  25     0   4000.00       0.00
  25    1.007000    200.00    1.300   4      97.000    97.000     2     0.00000  24  26     0   4000.00       0.00
  26    1.007000     55.00    1.513   4      97.000    97.000     2     0.00000  25  27     0   4000.00       0.00
  27    1.007000     20.00    1.997   4      97.000    93.000     2     0.00000  26  28     0   4000.00       0.00
  28    1.007000    230.00    1.088   3      93.000    93.000     2     0.00000  27 181     0   4000.00       0.00
  29    1.007000     40.00    1.503   3      93.000    93.000     2     0.00000  28  30     0   4000.00       0.00
  30    1.007000    240.00    1.117   4      93.000    94.500     2     0.00000  29  31     0   4000.00       0.00
  31    1.007000     45.00    1.448   4      94.500    94.500     2     0.00000  30  32     0   4000.00       0.00
  32    1.007000     35.00    1.570   4      94.500    91.000     2     0.00000  31  33     0   4000.00       0.00
  33    1.007000    180.00    1.111   4      91.000    96.000     2     0.00000  32  34     0   4000.00       0.00
  34    1.007000     10.00    3.014   4      96.000    96.000     2     0.00000  33  35     0   4000.00       0.00
  35    1.007000      5.00    5.028   4      96.000    96.000     2     0.00000  34  36     0   4000.00       0.00
  36    1.007000      5.00    2.611   4      96.000    96.000     2     0.00000  35  37     0   4000.00       0.00
  37    1.007000     10.00    3.014   4      96.000    96.000     2     0.00000  36  38     0   4000.00       0.00
  38    1.007000     30.00    2.141   4      96.000    96.000     2     0.00000  37  39     0   4000.00       0.00
  39    1.007000     20.00    1.403   4      96.000    96.000     2     0.00000  38  40     0   4000.00       0.00
  40    1.007000     80.00    1.252   3      96.000    96.000     2     0.00000  39  41     0   4000.00       0.00
  41    1.007000     10.00    1.806   4      96.000    96.000     2     0.00000  40  42     0   4000.00       0.00
  42    1.007000     20.00    1.000   4      96.000    96.000     2     0.00000  41  43     0   4000.00       0.00
  43    1.007000     55.00    1.363   4      96.000    97.200     2     0.00000  42  44     0   4000.00       0.00
  44    1.007000      5.00    5.028   4      97.200    97.200     2     0.00000  43  45     0   4000.00       0.00
  45    1.007000    160.00    1.175   4      97.200    96.200     2     0.00000  44  46     0   4000.00       0.00
  46    1.007000     15.00    2.343   3      96.200    96.200     2     0.00000  45 162     0   4000.00       0.00
  47    1.007000      5.00    5.028   4      96.200    96.200     2     0.00000  46  48     0   4000.00       0.00
  48    1.007000     15.00    6.357   4      96.200    97.000     2     0.00000  47  49     0   4000.00       0.00
  49    1.007000     60.00    1.166   4      97.000    97.000     2     0.00000  48  50     0   4000.00       0.00
  50    1.007000     15.00    2.994   4      97.000    94.500     2     0.00000  49  51     0   4000.00       0.00
  51    1.007000      5.00    4.605   4      94.500    97.000     2     0.00000  50  52     0   4000.00       0.00
  52    1.007000     15.00    2.329   4      97.000    94.000     2     0.00000  51  53     0   4000.00       0.00
  53    1.007000     80.00    1.501   4      94.000    96.500     2     0.00000  52  54     0   4000.00       0.00
```

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 54 | 1.007000 | 65.00 | 1.310 | 3 | 96.500 | 96.500 | 2 | 0.00000 | 53 | 55 | 0 | 4000.00 | 0.00 |
| 55 | 1.007000 | 50.00 | 1.481 | 4 | 96.500 | 97.200 | 2 | 0.00000 | 54 | 56 | 0 | 4000.00 | 0.00 |
| 56 | 1.007000 | 25.00 | 1.322 | 4 | 97.200 | 97.200 | 2 | 0.00000 | 55 | 57 | 0 | 4000.00 | 0.00 |
| 57 | 1.007000 | 5.00 | 3.820 | 4 | 97.200 | 97.200 | 2 | 0.00000 | 56 | 58 | 0 | 4000.00 | 0.00 |
| 58 | 1.007000 | 70.00 | 1.288 | 4 | 97.200 | 97.200 | 2 | 0.00000 | 57 | 59 | 0 | 4000.00 | 0.00 |
| 59 | 1.007000 | 10.00 | 1.806 | 4 | 97.200 | 97.200 | 2 | 0.00000 | 58 | 60 | 0 | 4000.00 | 0.00 |
| 60 | 1.007000 | 195.00 | 1.103 | 4 | 97.200 | 97.200 | 2 | 0.00000 | 59 | 61 | 0 | 4000.00 | 0.00 |
| 61 | 1.007000 | 240.00 | 1.159 | 4 | 97.200 | 94.500 | 2 | 0.00000 | 60 | 62 | 0 | 4000.00 | 0.00 |
| 62 | 1.007000 | 215.00 | 1.094 | 4 | 94.500 | 94.500 | 2 | 0.00000 | 61 | 63 | 0 | 4000.00 | 0.00 |
| 63 | 1.007000 | 110.00 | 1.183 | 4 | 94.500 | 94.500 | 2 | 0.00000 | 62 | 64 | 0 | 4000.00 | 0.00 |
| 64 | 1.007000 | 195.00 | 1.103 | 4 | 94.500 | 94.500 | 2 | 0.00000 | 63 | 65 | 0 | 4000.00 | 0.00 |
| 65 | 1.007000 | 5.00 | 5.028 | 4 | 94.500 | 94.500 | 2 | 0.00000 | 64 | 66 | 0 | 4000.00 | 0.00 |
| 66 | 1.007000 | 30.00 | 1.665 | 4 | 94.500 | 95.800 | 2 | 0.00000 | 65 | 67 | 0 | 4000.00 | 0.00 |
| 67 | 1.007000 | 5.00 | 2.611 | 4 | 95.800 | 95.800 | 2 | 0.00000 | 66 | 68 | 0 | 4000.00 | 0.00 |
| 68 | 1.007000 | 25.00 | 1.806 | 3 | 95.800 | 95.800 | 2 | 0.00000 | 67 | 229 | 0 | 4000.00 | 0.00 |
| 69 | 1.007000 | 130.00 | 1.155 | 4 | 95.800 | 95.500 | 2 | 0.00000 | 68 | 70 | 0 | 4000.00 | 0.00 |
| 70 | 1.007000 | 5.00 | 2.611 | 3 | 95.500 | 95.500 | 2 | 0.00000 | 69 | 261 | 0 | 4000.00 | 0.00 |
| 71 | 1.007000 | 5.00 | 5.028 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 70 | 72 | 0 | 4000.00 | 0.00 |
| 72 | 1.007000 | 5.00 | 2.611 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 71 | 73 | 0 | 4000.00 | 0.00 |
| 73 | 1.007000 | 205.00 | 1.098 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 72 | 74 | 0 | 4000.00 | 0.00 |
| 74 | 1.007000 | 240.00 | 1.117 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 73 | 75 | 0 | 4000.00 | 0.00 |
| 75 | 1.007000 | 20.00 | 4.021 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 74 | 76 | 0 | 4000.00 | 0.00 |
| 76 | 1.007000 | 30.00 | 1.665 | 4 | 95.500 | 91.500 | 2 | 0.00000 | 75 | 77 | 0 | 4000.00 | 0.00 |
| 77 | 1.007000 | 25.00 | 2.120 | 4 | 91.500 | 97.000 | 2 | 0.00000 | 76 | 78 | 0 | 4000.00 | 0.00 |
| 78 | 1.007000 | 50.00 | 1.403 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 77 | 79 | 0 | 4000.00 | 0.00 |
| 79 | 1.007000 | 50.00 | 1.403 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 78 | 80 | 0 | 4000.00 | 0.00 |
| 80 | 1.007000 | 20.00 | 1.997 | 4 | 97.000 | 90.500 | 2 | 0.00000 | 79 | 81 | 0 | 4000.00 | 0.00 |
| 81 | 1.007000 | 40.00 | 2.002 | 4 | 90.500 | 96.900 | 2 | 0.00000 | 80 | 82 | 0 | 4000.00 | 0.00 |
| 82 | 1.007000 | 165.00 | 1.122 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 81 | 83 | 0 | 4000.00 | 0.00 |
| 83 | 1.007000 | 135.00 | 1.060 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 82 | 84 | 0 | 4000.00 | 0.00 |
| 84 | 1.007000 | 10.00 | 3.014 | 3 | 96.900 | 96.900 | 2 | 0.00000 | 83 | 101 | 0 | 4000.00 | 0.00 |
| 85 | 1.007000 | 60.00 | 1.134 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 84 | 86 | 0 | 4000.00 | 0.00 |
| 86 | 1.007000 | 5.00 | 5.028 | 3 | 96.900 | 96.900 | 2 | 0.00000 | 85 | 9 | 1 | 4000.00 | 0.00 |
| 87 | 0.336000 | 10.00 | 5.771 | 3 | 105.000 | 112.070 | 2 | 0.00000 | 7 | 88 | 0 | 4000.00 | 0.00 |
| 88 | 0.336000 | 5.00 | 5.570 | 4 | 112.070 | 113.750 | 2 | 0.00000 | 87 | 89 | 0 | 4000.00 | 0.00 |
| 89 | 0.256000 | 30.00 | 1.870 | 4 | 113.750 | 109.000 | 2 | 0.00000 | 88 | 90 | 0 | 4000.00 | 0.00 |
| 90 | 0.256000 | 10.00 | 1.205 | 2 | 109.000 | 104.250 | 2 | 0.00000 | 89 | 91 | 0 | 4000.00 | 0.00 |
| 91 | 0.256000 | 5.00 | 5.933 | 1 | 104.250 | 103.750 | 2 | 0.00000 | 90 | 0 | 0 | 4000.00 | 0.00 |
| 92 | 0.336000 | 40.00 | 2.714 | 3 | 112.070 | 105.000 | 2 | 0.00000 | 87 | 93 | 0 | 4000.00 | 0.00 |
| 93 | 1.000000 | 20.00 | 3.400 | 4 | 105.000 | 110.200 | 2 | 0.00000 | 92 | 94 | 0 | 4000.00 | 0.00 |
| 94 | 1.000000 | 10.00 | 3.800 | 4 | 110.200 | 104.750 | 2 | 0.00000 | 93 | 95 | 0 | 4000.00 | 0.00 |
| 95 | 1.000000 | 5.00 | 18.508 | 4 | 104.750 | 104.750 | 2 | 0.00000 | 94 | 96 | 0 | 4000.00 | 0.00 |
| 96 | 1.000000 | 10.00 | 3.538 | 2 | 104.750 | 104.750 | 2 | 0.00000 | 95 | 97 | 0 | 4000.00 | 0.00 |
| 97 | 1.000000 | 5.00 | 9.400 | 4 | 104.750 | 105.040 | 2 | 0.00000 | 96 | 98 | 0 | 4000.00 | 0.00 |
| 98 | 1.000000 | 20.00 | 7.400 | 4 | 105.040 | 94.000 | 2 | 0.00000 | 97 | 99 | 0 | 4000.00 | 0.00 |
| 99 | 1.104000 | 30.00 | 4.874 | 1 | 94.000 | 99.400 | 2 | 0.00000 | 98 | 0 | 0 | 4000.00 | 0.00 |
| 100 | 1.000000 | 85.00 | 1.864 | 4 | 105.000 | 91.000 | 2 | 0.00000 | 92 | 101 | 0 | 4000.00 | 0.00 |
| 101 | 1.000000 | 25.00 | 4.512 | 3 | 91.000 | 96.900 | 2 | 0.00000 | 100 | 85 | 1 | 4000.00 | 0.00 |
| 102 | 0.835000 | 5.00 | 12.356 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 40 | 103 | 0 | 4000.00 | 0.00 |
| 103 | 0.788000 | 60.00 | 1.628 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 102 | 104 | 0 | 4000.00 | 0.00 |
| 104 | 0.788000 | 100.00 | 1.000 | 4 | 96.000 | 95.500 | 2 | 0.00000 | 103 | 105 | 0 | 4000.00 | 0.00 |
| 105 | 0.788000 | 100.00 | 1.000 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 104 | 106 | 0 | 4000.00 | 0.00 |
| 106 | 0.788000 | 30.00 | 2.786 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 105 | 107 | 0 | 4000.00 | 0.00 |
| 107 | 0.927000 | 35.00 | 2.059 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 106 | 108 | 0 | 4000.00 | 0.00 |
| 108 | 0.927000 | 150.00 | 1.494 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 107 | 109 | 0 | 4000.00 | 0.00 |
| 109 | 0.927000 | 50.00 | 1.519 | 3 | 95.500 | 95.500 | 2 | 0.00000 | 108 | 110 | 0 | 4000.00 | 0.00 |
| 110 | 0.927000 | 20.00 | 2.298 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 109 | 111 | 0 | 4000.00 | 0.00 |
| 111 | 0.927000 | 10.00 | 7.860 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 110 | 112 | 0 | 4000.00 | 0.00 |
| 112 | 1.000000 | 10.00 | 9.000 | 4 | 95.500 | 101.700 | 2 | 0.00000 | 111 | 113 | 0 | 4000.00 | 0.00 |
| 113 | 1.000000 | 5.00 | 5.400 | 4 | 101.700 | 102.800 | 2 | 0.00000 | 112 | 114 | 0 | 4000.00 | 0.00 |
| 114 | 1.000000 | 10.00 | 12.354 | 2 | 102.800 | 102.800 | 2 | 0.00000 | 113 | 115 | 0 | 4000.00 | 0.00 |
| 115 | 1.000000 | 5.00 | 8.877 | 4 | 102.800 | 102.800 | 2 | 0.00000 | 114 | 116 | 0 | 4000.00 | 0.00 |
| 116 | 1.000000 | 5.00 | 5.000 | 4 | 102.800 | 102.800 | 2 | 0.00000 | 115 | 117 | 0 | 4000.00 | 0.00 |
| 117 | 1.250000 | 30.00 | 3.333 | 1 | 102.800 | 103.000 | 2 | 0.00000 | 116 | 0 | 0 | 4000.00 | 0.00 |
| 118 | 0.927000 | 10.00 | 6.562 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 109 | 119 | 0 | 4000.00 | 0.00 |
| 119 | 1.000000 | 10.00 | 2.400 | 3 | 95.500 | 101.700 | 2 | 0.00000 | 118 | 120 | 0 | 4000.00 | 0.00 |
| 120 | 1.000000 | 5.00 | 7.800 | 4 | 101.700 | 102.800 | 2 | 0.00000 | 119 | 121 | 0 | 4000.00 | 0.00 |
| 121 | 1.000000 | 10.00 | 13.154 | 2 | 102.800 | 102.800 | 2 | 0.00000 | 120 | 122 | 0 | 4000.00 | 0.00 |
| 122 | 1.000000 | 10.00 | 8.938 | 4 | 102.800 | 102.800 | 2 | 0.00000 | 121 | 123 | 0 | 4000.00 | 0.00 |
| 123 | 1.250000 | 20.00 | 3.250 | 1 | 102.800 | 103.000 | 2 | 0.00000 | 122 | 0 | 0 | 4000.00 | 0.00 |
| 124 | 0.134000 | 5.00 | 3.624 | 4 | 101.700 | 101.700 | 2 | 0.00000 | 119 | 125 | 0 | 4000.00 | 0.00 |
| 125 | 0.134000 | 5.00 | 3.141 | 4 | 101.700 | 101.700 | 2 | 0.00000 | 124 | 126 | 0 | 4000.00 | 0.00 |
| 126 | 0.134000 | 5.00 | 1.000 | 2 | 101.700 | 101.700 | 2 | 0.00000 | 125 | 127 | 0 | 4000.00 | 0.00 |
| 127 | 0.134000 | 10.00 | 1.000 | 4 | 101.700 | 101.700 | 2 | 0.00000 | 126 | 128 | 0 | 4000.00 | 0.00 |
| 128 | 0.134000 | 10.00 | 1.000 | 4 | 101.700 | 101.700 | 2 | 0.00000 | 127 | 129 | 0 | 4000.00 | 0.00 |
| 129 | 0.134000 | 10.00 | 1.000 | 1 | 101.700 | 103.000 | 2 | 0.00000 | 128 | 0 | 0 | 4000.00 | 0.00 |
| 130 | 0.835000 | 5.00 | 11.020 | 4 | 93.000 | 93.000 | 2 | 0.00000 | 29 | 131 | 0 | 4000.00 | 0.00 |
| 131 | 0.835000 | 100.00 | 1.331 | 4 | 93.000 | 96.010 | 2 | 0.00000 | 130 | 132 | 0 | 4000.00 | 0.00 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 132 | 0.835000 | 25.00 | 1.267 | 4 | 96.010 | 96.010 | 2 | 0.00000 | 131 | 133 | 0 | 4000.00 | 0.00 |
| 133 | 0.835000 | 65.00 | 1.000 | 4 | 96.010 | 96.000 | 2 | 0.00000 | 132 | 134 | 0 | 4000.00 | 0.00 |
| 134 | 0.835000 | 20.00 | 2.653 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 133 | 135 | 0 | 4000.00 | 0.00 |
| 135 | 0.835000 | 105.00 | 1.382 | 3 | 96.000 | 89.000 | 2 | 0.00000 | 134 | 136 | 0 | 4000.00 | 0.00 |
| 136 | 0.835000 | 5.00 | 3.338 | 4 | 89.000 | 89.000 | 2 | 0.00000 | 135 | 137 | 0 | 4000.00 | 0.00 |
| 137 | 0.835000 | 50.00 | 1.334 | 3 | 89.000 | 89.000 | 2 | 0.00000 | 136 | 138 | 0 | 4000.00 | 0.00 |
| 138 | 0.835000 | 5.00 | 5.676 | 4 | 89.000 | 89.000 | 2 | 0.00000 | 137 | 139 | 0 | 4000.00 | 0.00 |
| 139 | 0.835000 | 5.00 | 4.340 | 3 | 89.000 | 89.000 | 2 | 0.00000 | 138 | 140 | 0 | 4000.00 | 0.00 |
| 140 | 0.835000 | 55.00 | 1.000 | 4 | 89.000 | 89.000 | 2 | 0.00000 | 139 | 141 | 0 | 4000.00 | 0.00 |
| 141 | 0.835000 | 25.00 | 1.668 | 3 | 89.000 | 89.000 | 2 | 0.00000 | 140 | 142 | 0 | 4000.00 | 0.00 |
| 142 | 0.835000 | 15.00 | 2.882 | 4 | 89.000 | 91.940 | 2 | 0.00000 | 141 | 143 | 0 | 4000.00 | 0.00 |
| 143 | 0.835000 | 25.00 | 1.668 | 3 | 91.940 | 91.940 | 2 | 0.00000 | 142 | 144 | 0 | 4000.00 | 0.00 |
| 144 | 0.835000 | 5.00 | 5.676 | 3 | 91.940 | 91.940 | 2 | 0.00000 | 143 | 145 | 0 | 4000.00 | 0.00 |
| 145 | 0.835000 | 5.00 | 4.340 | 3 | 91.940 | 91.940 | 2 | 0.00000 | 144 | 146 | 0 | 4000.00 | 0.00 |
| 146 | 0.835000 | 10.00 | 3.338 | 4 | 91.940 | 96.200 | 2 | 0.00000 | 145 | 147 | 0 | 4000.00 | 0.00 |
| 147 | 0.835000 | 5.00 | 3.338 | 4 | 96.200 | 96.200 | 2 | 0.00000 | 146 | 148 | 0 | 4000.00 | 0.00 |
| 148 | 0.835000 | 145.00 | 1.000 | 4 | 96.200 | 96.200 | 2 | 0.00000 | 147 | 149 | 0 | 4000.00 | 0.00 |
| 149 | 0.835000 | 10.00 | 2.670 | 4 | 96.200 | 96.200 | 2 | 0.00000 | 148 | 150 | 0 | 4000.00 | 0.00 |
| 150 | 0.835000 | 90.00 | 1.186 | 3 | 96.200 | 96.200 | 2 | 0.00000 | 149 | 151 | 0 | 4000.00 | 0.00 |
| 151 | 0.835000 | 5.00 | 5.676 | 4 | 96.200 | 94.530 | 2 | 0.00000 | 150 | 152 | 0 | 4000.00 | 0.00 |
| 152 | 0.835000 | 15.00 | 2.664 | 3 | 94.530 | 94.530 | 2 | 0.00000 | 151 | 153 | 0 | 4000.00 | 0.00 |
| 153 | 0.835000 | 5.00 | 2.336 | 4 | 94.530 | 94.530 | 2 | 0.00000 | 152 | 154 | 0 | 4000.00 | 0.00 |
| 154 | 0.835000 | 5.00 | 4.340 | 3 | 94.530 | 94.540 | 2 | 0.00000 | 153 | 155 | 0 | 4000.00 | 0.00 |
| 155 | 0.835000 | 15.00 | 2.559 | 3 | 94.540 | 94.540 | 2 | 0.00000 | 154 | 156 | 0 | 4000.00 | 0.00 |
| 156 | 0.835000 | 5.00 | 4.340 | 3 | 94.540 | 94.540 | 2 | 0.00000 | 155 | 157 | 0 | 4000.00 | 0.00 |
| 157 | 0.835000 | 5.00 | 3.338 | 4 | 94.540 | 94.540 | 2 | 0.00000 | 156 | 158 | 0 | 4000.00 | 0.00 |
| 158 | 0.835000 | 5.00 | 3.338 | 3 | 94.540 | 94.500 | 2 | 0.00000 | 157 | 159 | 0 | 4000.00 | 0.00 |
| 159 | 0.835000 | 5.00 | 4.340 | 4 | 94.500 | 94.500 | 2 | 0.00000 | 158 | 160 | 0 | 4000.00 | 0.00 |
| 160 | 0.835000 | 55.00 | 1.425 | 3 | 94.500 | 94.500 | 2 | 0.00000 | 159 | 161 | 0 | 4000.00 | 0.00 |
| 161 | 0.835000 | 175.00 | 1.286 | 4 | 94.500 | 96.200 | 2 | 0.00000 | 160 | 162 | 0 | 4000.00 | 0.00 |
| 162 | 0.835000 | 100.00 | 1.568 | 3 | 96.200 | 96.200 | 2 | 0.00000 | 161 | 47 | 1 | 4000.00 | 0.00 |
| 163 | 0.835000 | 10.00 | 3.338 | 4 | 94.500 | 91.750 | 2 | 0.00000 | 160 | 164 | 0 | 4000.00 | 0.00 |
| 164 | 0.835000 | 40.00 | 1.413 | 4 | 91.750 | 89.580 | 2 | 0.00000 | 163 | 165 | 0 | 4000.00 | 0.00 |
| 165 | 0.835000 | 25.00 | 3.071 | 4 | 89.580 | 89.580 | 2 | 0.00000 | 164 | 166 | 0 | 4000.00 | 0.00 |
| 166 | 0.835000 | 5.00 | 4.340 | 3 | 89.580 | 89.580 | 2 | 0.00000 | 165 | 167 | 0 | 4000.00 | 0.00 |
| 167 | 0.835000 | 5.00 | 1.000 | 16 | 89.580 | 89.580 | 2 | 0.00000 | 166 | 0 | 0 | 4000.00 | 0.00 |
| 168 | 0.835000 | 5.00 | 13.358 | 4 | 89.000 | 91.000 | 2 | 0.00000 | 141 | 169 | 0 | 4000.00 | 0.00 |
| 169 | 0.835000 | 35.00 | 2.002 | 3 | 91.000 | 91.000 | 2 | 0.00000 | 168 | 170 | 0 | 4000.00 | 0.00 |
| 170 | 0.835000 | 10.00 | 4.340 | 3 | 91.000 | 91.000 | 2 | 0.00000 | 169 | 171 | 0 | 4000.00 | 0.00 |
| 171 | 0.835000 | 75.00 | 1.312 | 4 | 91.000 | 91.000 | 2 | 0.00000 | 170 | 172 | 0 | 4000.00 | 0.00 |
| 172 | 0.835000 | 45.00 | 2.002 | 3 | 91.000 | 91.000 | 2 | 0.00000 | 171 | 173 | 0 | 4000.00 | 0.00 |
| 173 | 0.835000 | 5.00 | 3.338 | 4 | 91.000 | 91.000 | 2 | 0.00000 | 172 | 174 | 0 | 4000.00 | 0.00 |
| 174 | 0.835000 | 15.00 | 1.779 | 4 | 91.000 | 96.040 | 2 | 0.00000 | 173 | 175 | 0 | 4000.00 | 0.00 |
| 175 | 0.835000 | 15.00 | 2.559 | 4 | 96.040 | 96.000 | 2 | 0.00000 | 174 | 176 | 0 | 4000.00 | 0.00 |
| 176 | 0.835000 | 95.00 | 1.176 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 175 | 177 | 0 | 4000.00 | 0.00 |
| 177 | 0.835000 | 55.00 | 1.213 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 176 | 178 | 0 | 4000.00 | 0.00 |
| 178 | 0.835000 | 5.00 | 3.338 | 4 | 96.000 | 91.000 | 2 | 0.00000 | 177 | 179 | 0 | 4000.00 | 0.00 |
| 179 | 0.835000 | 50.00 | 1.795 | 4 | 91.000 | 93.000 | 2 | 0.00000 | 178 | 180 | 0 | 4000.00 | 0.00 |
| 180 | 0.835000 | 80.00 | 1.146 | 4 | 93.000 | 93.000 | 2 | 0.00000 | 179 | 181 | 0 | 4000.00 | 0.00 |
| 181 | 0.835000 | 25.00 | 3.472 | 3 | 93.000 | 93.000 | 2 | 0.00000 | 180 | 29 | 1 | 4000.00 | 0.00 |
| 182 | 0.336000 | 45.00 | 1.866 | 3 | 91.000 | 96.000 | 2 | 0.00000 | 169 | 183 | 0 | 4000.00 | 0.00 |
| 183 | 0.336000 | 120.00 | 1.482 | 4 | 96.000 | 149.000 | 2 | 0.00000 | 182 | 184 | 0 | 4000.00 | 0.00 |
| 184 | 0.256000 | 205.00 | 1.092 | 16 | 149.000 | 142.500 | 2 | 0.00000 | 183 | 0 | 0 | 4000.00 | 0.00 |
| 185 | 0.256000 | 60.00 | 1.674 | 16 | 96.000 | 59.000 | 2 | 0.00000 | 182 | 0 | 0 | 4000.00 | 0.00 |
| 186 | 0.336000 | 10.00 | 4.427 | 3 | 91.000 | 94.800 | 2 | 0.00000 | 170 | 187 | 0 | 4000.00 | 0.00 |
| 187 | 0.336000 | 55.00 | 1.586 | 3 | 94.800 | 113.000 | 2 | 0.00000 | 186 | 188 | 0 | 4000.00 | 0.00 |
| 188 | 0.336000 | 230.00 | 1.231 | 4 | 113.000 | 146.000 | 2 | 0.00000 | 187 | 189 | 0 | 4000.00 | 0.00 |
| 189 | 0.256000 | 105.00 | 1.111 | 16 | 146.000 | 143.000 | 2 | 0.00000 | 188 | 0 | 0 | 4000.00 | 0.00 |
| 190 | 0.256000 | 100.00 | 1.297 | 16 | 94.800 | 83.700 | 2 | 0.00000 | 186 | 0 | 0 | 4000.00 | 0.00 |
| 191 | 0.256000 | 75.00 | 1.416 | 16 | 113.000 | 107.000 | 2 | 0.00000 | 187 | 0 | 0 | 4000.00 | 0.00 |
| 192 | 0.336000 | 5.00 | 7.854 | 4 | 91.000 | 95.000 | 2 | 0.00000 | 172 | 193 | 0 | 4000.00 | 0.00 |
| 193 | 0.336000 | 240.00 | 1.316 | 4 | 95.000 | 150.000 | 2 | 0.00000 | 192 | 194 | 0 | 4000.00 | 0.00 |
| 194 | 0.256000 | 180.00 | 1.105 | 16 | 150.000 | 142.000 | 2 | 0.00000 | 193 | 0 | 0 | 4000.00 | 0.00 |
| 195 | 0.665000 | 15.00 | 4.015 | 4 | 96.500 | 96.500 | 2 | 0.00000 | 54 | 196 | 0 | 4000.00 | 0.00 |
| 196 | 0.665000 | 11.00 | 2.197 | 4 | 96.500 | 94.500 | 2 | 0.00000 | 195 | 197 | 0 | 4400.00 | 0.00 |
| 197 | 0.665000 | 20.00 | 1.658 | 4 | 94.500 | 96.600 | 2 | 0.00000 | 196 | 198 | 0 | 4000.00 | 0.00 |
| 198 | 0.665000 | 115.00 | 1.000 | 4 | 96.600 | 96.600 | 2 | 0.00000 | 197 | 199 | 0 | 4000.00 | 0.00 |
| 199 | 0.665000 | 220.00 | 1.120 | 3 | 96.600 | 94.000 | 2 | 0.00000 | 198 | 200 | 0 | 4000.00 | 0.00 |
| 200 | 0.665000 | 20.00 | 2.862 | 4 | 94.000 | 94.750 | 2 | 0.00000 | 199 | 201 | 0 | 4000.00 | 0.00 |
| 201 | 0.665000 | 20.00 | 1.000 | 4 | 94.750 | 94.750 | 2 | 0.00000 | 200 | 202 | 0 | 4000.00 | 0.00 |
| 202 | 0.665000 | 20.00 | 2.197 | 4 | 94.750 | 94.750 | 2 | 0.00000 | 201 | 203 | 0 | 4000.00 | 0.00 |
| 203 | 0.665000 | 15.00 | 1.000 | 4 | 94.750 | 94.750 | 2 | 0.00000 | 202 | 204 | 0 | 4000.00 | 0.00 |
| 204 | 0.665000 | 30.00 | 1.973 | 3 | 94.750 | 84.100 | 2 | 0.00000 | 203 | 205 | 0 | 4000.00 | 0.00 |
| 205 | 0.665000 | 15.00 | 1.621 | 4 | 84.100 | 69.500 | 2 | 0.00000 | 204 | 206 | 0 | 4000.00 | 0.00 |
| 206 | 0.665000 | 15.00 | 1.887 | 3 | 69.500 | 69.500 | 2 | 0.00000 | 205 | 207 | 0 | 4000.00 | 0.00 |
| 207 | 0.665000 | 20.00 | 1.465 | 4 | 69.500 | 69.500 | 2 | 0.00000 | 206 | 208 | 0 | 4000.00 | 0.00 |
| 208 | 0.665000 | 20.00 | 4.125 | 3 | 69.500 | 61.750 | 2 | 0.00000 | 207 | 209 | 0 | 4000.00 | 0.00 |
| 209 | 0.665000 | 70.00 | 1.454 | 4 | 61.750 | 62.750 | 2 | 0.00000 | 208 | 210 | 0 | 4000.00 | 0.00 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 210 | 0.665000 | 5.00 | 6.320 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 209 | 211 | 0 | 4000.00 | 0.00 |
| 211 | 0.665000 | 50.00 | 1.293 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 210 | 212 | 0 | 4000.00 | 0.00 |
| 212 | 0.665000 | 20.00 | 2.330 | 3 | 62.750 | 62.750 | 2 | 0.00000 | 211 | 213 | 0 | 4000.00 | 0.00 |
| 213 | 0.665000 | 25.00 | 2.277 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 212 | 214 | 0 | 4000.00 | 0.00 |
| 214 | 0.665000 | 20.00 | 1.665 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 213 | 215 | 0 | 4000.00 | 0.00 |
| 215 | 0.665000 | 45.00 | 1.414 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 214 | 216 | 0 | 4000.00 | 0.00 |
| 216 | 0.665000 | 20.00 | 1.665 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 215 | 217 | 0 | 4000.00 | 0.00 |
| 217 | 0.665000 | 85.00 | 2.033 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 216 | 218 | 0 | 4000.00 | 0.00 |
| 218 | 0.665000 | 5.00 | 3.660 | 3 | 62.750 | 62.750 | 2 | 0.00000 | 217 | 219 | 0 | 4000.00 | 0.00 |
| 219 | 0.665000 | 25.00 | 2.649 | 3 | 62.750 | 66.000 | 2 | 0.00000 | 218 | 220 | 0 | 4000.00 | 0.00 |
| 220 | 0.665000 | 30.00 | 1.749 | 4 | 66.000 | 96.000 | 2 | 0.00000 | 219 | 221 | 0 | 4000.00 | 0.00 |
| 221 | 0.665000 | 20.00 | 1.329 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 220 | 222 | 0 | 4000.00 | 0.00 |
| 222 | 0.665000 | 5.00 | 4.977 | 4 | 96.000 | 94.400 | 2 | 0.00000 | 221 | 223 | 0 | 4000.00 | 0.00 |
| 223 | 0.665000 | 95.00 | 1.139 | 4 | 94.400 | 97.000 | 2 | 0.00000 | 222 | 224 | 0 | 4000.00 | 0.00 |
| 224 | 0.665000 | 35.00 | 1.646 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 223 | 225 | 0 | 4000.00 | 0.00 |
| 225 | 0.665000 | 65.00 | 1.614 | 4 | 97.000 | 96.500 | 2 | 0.00000 | 224 | 226 | 0 | 4000.00 | 0.00 |
| 226 | 0.665000 | 35.00 | 1.000 | 4 | 96.500 | 96.500 | 2 | 0.00000 | 225 | 227 | 0 | 4000.00 | 0.00 |
| 227 | 0.665000 | 35.00 | 1.830 | 4 | 96.500 | 94.200 | 2 | 0.00000 | 226 | 228 | 0 | 4000.00 | 0.00 |
| 228 | 0.665000 | 35.00 | 1.266 | 4 | 94.200 | 96.200 | 2 | 0.00000 | 227 | 229 | 0 | 4000.00 | 0.00 |
| 229 | 0.665000 | 120.00 | 1.377 | 3 | 96.200 | 95.800 | 2 | 0.00000 | 228 | 69 | 1 | 4000.00 | 0.00 |
| 230 | 0.665000 | 10.00 | 6.453 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 12 | 231 | 0 | 4000.00 | 0.00 |
| 231 | 0.665000 | 25.00 | 1.372 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 230 | 232 | 0 | 4000.00 | 0.00 |
| 232 | 0.665000 | 150.00 | 1.062 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 231 | 233 | 0 | 4000.00 | 0.00 |
| 233 | 0.665000 | 135.00 | 1.069 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 232 | 234 | 0 | 4000.00 | 0.00 |
| 234 | 0.665000 | 45.00 | 1.146 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 233 | 235 | 0 | 4000.00 | 0.00 |
| 235 | 0.665000 | 20.00 | 1.658 | 4 | 96.900 | 95.000 | 2 | 0.00000 | 234 | 236 | 0 | 4000.00 | 0.00 |
| 236 | 0.665000 | 35.00 | 1.564 | 4 | 95.000 | 95.500 | 2 | 0.00000 | 235 | 237 | 0 | 4000.00 | 0.00 |
| 237 | 0.665000 | 15.00 | 1.621 | 4 | 95.500 | 96.000 | 2 | 0.00000 | 236 | 238 | 0 | 4000.00 | 0.00 |
| 238 | 0.665000 | 30.00 | 1.621 | 4 | 96.000 | 72.000 | 2 | 0.00000 | 237 | 239 | 0 | 4000.00 | 0.00 |
| 239 | 0.665000 | 5.00 | 3.660 | 3 | 72.000 | 67.000 | 2 | 0.00000 | 238 | 240 | 0 | 4000.00 | 0.00 |
| 240 | 0.665000 | 75.00 | 1.497 | 4 | 67.000 | 64.250 | 2 | 0.00000 | 239 | 241 | 0 | 4000.00 | 0.00 |
| 241 | 0.665000 | 35.00 | 1.000 | 4 | 64.250 | 64.250 | 2 | 0.00000 | 240 | 242 | 0 | 4000.00 | 0.00 |
| 242 | 0.665000 | 65.00 | 1.286 | 4 | 64.250 | 61.750 | 2 | 0.00000 | 241 | 243 | 0 | 4000.00 | 0.00 |
| 243 | 0.665000 | 20.00 | 2.995 | 3 | 61.750 | 61.750 | 2 | 0.00000 | 242 | 244 | 0 | 4000.00 | 0.00 |
| 244 | 0.665000 | 5.00 | 2.064 | 4 | 61.750 | 61.750 | 2 | 0.00000 | 243 | 245 | 0 | 4000.00 | 0.00 |
| 245 | 0.665000 | 20.00 | 2.260 | 4 | 61.750 | 62.750 | 2 | 0.00000 | 244 | 246 | 0 | 4000.00 | 0.00 |
| 246 | 0.665000 | 15.00 | 1.887 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 245 | 247 | 0 | 4000.00 | 0.00 |
| 247 | 0.665000 | 10.00 | 2.330 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 246 | 248 | 0 | 4000.00 | 0.00 |
| 248 | 0.665000 | 15.00 | 1.887 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 247 | 249 | 0 | 4000.00 | 0.00 |
| 249 | 0.665000 | 35.00 | 1.380 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 248 | 250 | 0 | 4000.00 | 0.00 |
| 250 | 0.665000 | 100.00 | 1.000 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 249 | 251 | 0 | 4000.00 | 0.00 |
| 251 | 0.665000 | 10.00 | 3.647 | 4 | 62.750 | 62.500 | 2 | 0.00000 | 250 | 252 | 0 | 4000.00 | 0.00 |
| 252 | 0.665000 | 30.00 | 1.749 | 4 | 62.500 | 67.900 | 2 | 0.00000 | 251 | 253 | 0 | 4000.00 | 0.00 |
| 253 | 0.665000 | 30.00 | 1.310 | 4 | 67.900 | 96.000 | 2 | 0.00000 | 252 | 254 | 0 | 4000.00 | 0.00 |
| 254 | 0.665000 | 20.00 | 2.317 | 4 | 96.000 | 97.000 | 2 | 0.00000 | 253 | 255 | 0 | 4000.00 | 0.00 |
| 255 | 0.665000 | 145.00 | 1.000 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 254 | 256 | 0 | 4000.00 | 0.00 |
| 256 | 0.665000 | 35.00 | 1.752 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 255 | 257 | 0 | 4000.00 | 0.00 |
| 257 | 0.665000 | 60.00 | 1.110 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 256 | 258 | 0 | 4000.00 | 0.00 |
| 258 | 0.665000 | 40.00 | 1.165 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 257 | 259 | 0 | 4000.00 | 0.00 |
| 259 | 0.665000 | 5.00 | 3.660 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 258 | 260 | 0 | 4000.00 | 0.00 |
| 260 | 0.665000 | 45.00 | 1.118 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 259 | 261 | 0 | 4000.00 | 0.00 |
| 261 | 0.665000 | 15.00 | 4.538 | 3 | 97.000 | 95.500 | 2 | 0.00000 | 260 | 71 | 1 | 4000.00 | 0.00 |
| 262 | 0.505000 | 20.00 | 2.315 | 4 | 61.750 | 63.000 | 2 | 0.00000 | 243 | 263 | 0 | 4000.00 | 0.00 |
| 263 | 0.505000 | 10.00 | 3.318 | 4 | 63.000 | 56.000 | 2 | 0.00000 | 262 | 264 | 0 | 4000.00 | 0.00 |
| 264 | 0.505000 | 30.00 | 2.380 | 4 | 56.000 | 61.750 | 2 | 0.00000 | 263 | 265 | 0 | 4000.00 | 0.00 |
| 265 | 0.505000 | 5.00 | 3.020 | 3 | 61.750 | 62.900 | 2 | 0.00000 | 264 | 266 | 0 | 4000.00 | 0.00 |
| 266 | 0.505000 | 5.00 | 10.494 | 4 | 62.900 | 67.000 | 2 | 0.00000 | 265 | 267 | 0 | 4000.00 | 0.00 |
| 267 | 0.505000 | 5.00 | 3.828 | 4 | 67.000 | 67.000 | 2 | 0.00000 | 266 | 268 | 0 | 4000.00 | 0.00 |
| 268 | 0.505000 | 65.00 | 1.155 | 3 | 67.000 | 67.000 | 2 | 0.00000 | 267 | 269 | 0 | 4000.00 | 0.00 |
| 269 | 0.505000 | 15.00 | 1.000 | 4 | 67.000 | 67.000 | 2 | 0.00000 | 268 | 270 | 0 | 4000.00 | 0.00 |
| 270 | 0.505000 | 35.00 | 1.866 | 3 | 67.000 | 67.000 | 2 | 0.00000 | 269 | 271 | 0 | 4000.00 | 0.00 |
| 271 | 0.256000 | 25.00 | 1.143 | 4 | 67.000 | 67.000 | 2 | 0.00000 | 270 | 272 | 0 | 4000.00 | 0.00 |
| 272 | 0.256000 | 10.00 | 3.099 | 4 | 67.000 | 65.000 | 2 | 0.00000 | 271 | 273 | 0 | 4000.00 | 0.00 |
| 273 | 0.256000 | 55.00 | 1.289 | 16 | 65.000 | 94.500 | 2 | 0.00000 | 272 | 0 | 0 | 4000.00 | 0.00 |
| 274 | 0.505000 | 15.00 | 1.000 | 3 | 62.900 | 63.900 | 2 | 0.00000 | 265 | 275 | 0 | 4000.00 | 0.00 |
| 275 | 0.505000 | 15.00 | 1.741 | 3 | 63.900 | 68.200 | 2 | 0.00000 | 274 | 276 | 0 | 4000.00 | 0.00 |
| 276 | 0.336000 | 135.00 | 1.170 | 4 | 68.200 | 71.500 | 2 | 0.00000 | 275 | 277 | 0 | 4000.00 | 0.00 |
| 277 | 0.336000 | 40.00 | 1.773 | 16 | 71.500 | 61.500 | 2 | 0.00000 | 276 | 0 | 0 | 4000.00 | 0.00 |
| 278 | 0.336000 | 20.00 | 2.518 | 16 | 68.200 | 61.500 | 2 | 0.00000 | 275 | 0 | 0 | 4000.00 | 0.00 |
| 279 | 0.505000 | 85.00 | 2.305 | 4 | 69.500 | 68.750 | 2 | 0.00000 | 206 | 280 | 0 | 4000.00 | 0.00 |
| 280 | 0.505000 | 10.00 | 2.010 | 3 | 68.750 | 68.750 | 2 | 0.00000 | 279 | 281 | 0 | 4000.00 | 0.00 |
| 281 | 0.505000 | 45.00 | 1.382 | 4 | 68.750 | 68.750 | 2 | 0.00000 | 280 | 282 | 0 | 4000.00 | 0.00 |
| 282 | 0.505000 | 10.00 | 1.707 | 4 | 68.750 | 68.750 | 2 | 0.00000 | 281 | 283 | 0 | 4000.00 | 0.00 |
| 283 | 0.505000 | 70.00 | 1.447 | 3 | 68.750 | 68.750 | 2 | 0.00000 | 282 | 284 | 0 | 4000.00 | 0.00 |
| 284 | 0.505000 | 20.00 | 1.354 | 4 | 68.750 | 68.750 | 2 | 0.00000 | 283 | 285 | 0 | 4000.00 | 0.00 |
| 285 | 0.505000 | 5.00 | 2.414 | 4 | 68.750 | 65.500 | 2 | 0.00000 | 284 | 286 | 0 | 4000.00 | 0.00 |
| 286 | 0.505000 | 25.00 | 1.404 | 3 | 65.500 | 65.500 | 2 | 0.00000 | 285 | 287 | 0 | 4000.00 | 0.00 |
| 287 | 0.336000 | 65.00 | 1.868 | 4 | 65.500 | 113.000 | 2 | 0.00000 | 286 | 288 | 0 | 4000.00 | 0.00 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 288 | 0.336000 | 35.00 | 2.150 | 3 | 113.000 | 147.000 | 2 | 0.00000 | 287 | 289 | 0 | 4000.00 | 0.00 |
| 289 | 0.256000 | 55.00 | 1.419 | 4 | 147.000 | 178.000 | 2 | 0.00000 | 288 | 290 | 0 | 4000.00 | 0.00 |
| 290 | 0.256000 | 10.00 | 1.000 | 16 | 178.000 | 178.000 | 2 | 0.00000 | 289 | 0 | 0 | 4000.00 | 0.00 |
| 291 | 0.256000 | 35.00 | 1.247 | 16 | 147.000 | 159.750 | 2 | 0.00000 | 288 | 0 | 0 | 4000.00 | 0.00 |
| 292 | 0.256000 | 115.00 | 1.686 | 16 | 67.000 | 128.500 | 2 | 0.00000 | 239 | 0 | 0 | 4000.00 | 0.00 |
| 293 | 0.336000 | 5.00 | 7.451 | 4 | 65.710 | 62.500 | 2 | 0.00000 | 219 | 294 | 0 | 4000.00 | 0.00 |
| 294 | 0.336000 | 60.00 | 1.112 | 4 | 62.500 | 62.500 | 2 | 0.00000 | 293 | 295 | 0 | 4000.00 | 0.00 |
| 295 | 0.336000 | 40.00 | 1.907 | 4 | 62.500 | 93.500 | 2 | 0.00000 | 294 | 296 | 0 | 4000.00 | 0.00 |
| 296 | 0.336000 | 45.00 | 1.729 | 3 | 93.500 | 126.800 | 2 | 0.00000 | 295 | 297 | 0 | 4000.00 | 0.00 |
| 297 | 0.336000 | 45.00 | 1.149 | 3 | 126.800 | 142.000 | 2 | 0.00000 | 296 | 298 | 0 | 4000.00 | 0.00 |
| 298 | 0.336000 | 40.00 | 1.571 | 3 | 142.000 | 154.500 | 2 | 0.00000 | 297 | 299 | 0 | 4000.00 | 0.00 |
| 299 | 0.256000 | 95.00 | 1.107 | 16 | 154.500 | 155.500 | 2 | 0.00000 | 298 | 0 | 0 | 4000.00 | 0.00 |
| 300 | 0.256000 | 100.00 | 1.623 | 16 | 142.000 | 143.000 | 2 | 0.00000 | 297 | 0 | 0 | 4000.00 | 0.00 |
| 301 | 0.336000 | 25.00 | 2.452 | 3 | 154.500 | 156.300 | 2 | 0.00000 | 298 | 302 | 0 | 4000.00 | 0.00 |
| 302 | 0.336000 | 45.00 | 1.893 | 4 | 156.300 | 172.300 | 2 | 0.00000 | 301 | 303 | 0 | 4000.00 | 0.00 |
| 303 | 0.256000 | 55.00 | 1.304 | 4 | 172.300 | 178.000 | 2 | 0.00000 | 302 | 304 | 0 | 4000.00 | 0.00 |
| 304 | 0.256000 | 10.00 | 1.000 | 16 | 178.000 | 178.000 | 2 | 0.00000 | 303 | 0 | 0 | 4000.00 | 0.00 |
| 305 | 0.336000 | 5.00 | 6.376 | 4 | 156.300 | 156.300 | 2 | 0.00000 | 301 | 306 | 0 | 4000.00 | 0.00 |
| 306 | 0.256000 | 130.00 | 1.405 | 16 | 156.300 | 156.300 | 2 | 0.00000 | 305 | 0 | 0 | 4000.00 | 0.00 |
| 307 | 0.336000 | 105.00 | 1.914 | 4 | 126.800 | 155.000 | 2 | 0.00000 | 296 | 308 | 0 | 4000.00 | 0.00 |
| 308 | 0.256000 | 130.00 | 1.287 | 19 | 155.000 | 206.300 | 2 | 0.00000 | 307 | 309 | 0 | 4000.00 | 0.00 |
| 309 | 0.256000 | 20.00 | 1.000 | 16 | 206.300 | 203.000 | 2 | 0.00000 | 308 | 0 | 0 | 4000.00 | 0.00 |
| 310 | 0.336000 | 10.00 | 5.301 | 3 | 62.750 | 71.500 | 2 | 0.00000 | 212 | 311 | 0 | 4000.00 | 0.00 |
| 311 | 0.336000 | 65.00 | 1.424 | 3 | 71.500 | 133.500 | 2 | 0.00000 | 310 | 312 | 0 | 4000.00 | 0.00 |
| 312 | 0.256000 | 15.00 | 1.439 | 4 | 133.500 | 147.300 | 2 | 0.00000 | 311 | 313 | 0 | 4000.00 | 0.00 |
| 313 | 0.256000 | 60.00 | 1.281 | 4 | 147.300 | 165.100 | 2 | 0.00000 | 312 | 314 | 0 | 4000.00 | 0.00 |
| 314 | 0.256000 | 30.00 | 1.527 | 16 | 165.100 | 160.000 | 2 | 0.00000 | 313 | 0 | 0 | 4000.00 | 0.00 |
| 315 | 0.256000 | 25.00 | 1.407 | 16 | 71.500 | 81.500 | 2 | 0.00000 | 310 | 0 | 0 | 4000.00 | 0.00 |
| 316 | 0.336000 | 10.00 | 3.688 | 4 | 133.500 | 133.500 | 2 | 0.00000 | 311 | 317 | 0 | 4000.00 | 0.00 |
| 317 | 0.256000 | 80.00 | 1.717 | 16 | 133.500 | 141.500 | 2 | 0.00000 | 316 | 0 | 0 | 4000.00 | 0.00 |
| 318 | 0.336000 | 10.00 | 6.443 | 4 | 68.750 | 66.700 | 2 | 0.00000 | 283 | 319 | 0 | 4000.00 | 0.00 |
| 319 | 0.336000 | 100.00 | 1.672 | 3 | 66.700 | 120.000 | 2 | 0.00000 | 318 | 320 | 0 | 4000.00 | 0.00 |
| 320 | 0.336000 | 15.00 | 2.792 | 3 | 120.000 | 132.000 | 2 | 0.00000 | 319 | 321 | 0 | 4000.00 | 0.00 |
| 321 | 0.336000 | 15.00 | 1.448 | 4 | 132.000 | 146.000 | 2 | 0.00000 | 320 | 322 | 0 | 4000.00 | 0.00 |
| 322 | 0.256000 | 55.00 | 1.604 | 16 | 146.000 | 163.500 | 2 | 0.00000 | 321 | 0 | 0 | 4000.00 | 0.00 |
| 323 | 0.256000 | 25.00 | 1.492 | 16 | 120.000 | 128.500 | 2 | 0.00000 | 319 | 0 | 0 | 4000.00 | 0.00 |
| 324 | 0.336000 | 45.00 | 1.806 | 3 | 132.000 | 132.000 | 2 | 0.00000 | 320 | 325 | 0 | 4000.00 | 0.00 |
| 325 | 0.256000 | 30.00 | 2.263 | 16 | 132.000 | 157.500 | 2 | 0.00000 | 324 | 0 | 0 | 4000.00 | 0.00 |
| 326 | 0.256000 | 35.00 | 1.188 | 16 | 132.000 | 141.500 | 2 | 0.00000 | 324 | 0 | 0 | 4000.00 | 0.00 |
| 327 | 0.336000 | 30.00 | 2.456 | 4 | 63.900 | 68.100 | 2 | 0.00000 | 274 | 328 | 0 | 4000.00 | 0.00 |
| 328 | 0.336000 | 90.00 | 1.939 | 3 | 68.100 | 134.000 | 2 | 0.00000 | 327 | 329 | 0 | 4000.00 | 0.00 |
| 329 | 0.336000 | 45.00 | 1.612 | 4 | 134.000 | 132.000 | 2 | 0.00000 | 328 | 330 | 0 | 4000.00 | 0.00 |
| 330 | 0.362000 | 90.00 | 1.181 | 16 | 132.000 | 141.500 | 2 | 0.00000 | 329 | 0 | 0 | 4000.00 | 0.00 |
| 331 | 0.336000 | 15.00 | 3.554 | 3 | 134.000 | 147.000 | 2 | 0.00000 | 328 | 332 | 0 | 4000.00 | 0.00 |
| 332 | 0.256000 | 10.00 | 1.200 | 4 | 147.000 | 150.000 | 2 | 0.00000 | 331 | 333 | 0 | 4000.00 | 0.00 |
| 333 | 0.256000 | 10.00 | 1.200 | 16 | 150.000 | 159.000 | 2 | 0.00000 | 332 | 0 | 0 | 4000.00 | 0.00 |
| 334 | 0.256000 | 50.00 | 1.451 | 19 | 147.000 | 159.75 | 2 | 0.00000 | 331 | 335 | 0 | 4000.00 | 0.00 |
| 335 | 0.090000 | 10.00 | 1.000 | 16 | 159.750 | 159.000 | 2 | 0.00000 | 334 | 0 | 0 | 4000.00 | 0.00 |
| 336 | 0.336000 | 10.00 | 6.712 | 4 | 67.000 | 65.000 | 2 | 0.00000 | 268 | 337 | 0 | 4000.00 | 0.00 |
| 337 | 0.336000 | 90.00 | 1.538 | 3 | 65.000 | 115.200 | 2 | 0.00000 | 336 | 338 | 0 | 4000.00 | 0.00 |
| 338 | 0.336000 | 40.00 | 1.403 | 3 | 115.200 | 133.800 | 2 | 0.00000 | 337 | 339 | 0 | 4000.00 | 0.00 |
| 339 | 0.336000 | 50.00 | 2.423 | 3 | 133.800 | 133.300 | 2 | 0.00000 | 338 | 340 | 0 | 4000.00 | 0.00 |
| 340 | 0.336000 | 10.00 | 3.016 | 3 | 133.300 | 133.300 | 2 | 0.00000 | 339 | 341 | 0 | 4000.00 | 0.00 |
| 341 | 0.256000 | 45.00 | 1.340 | 16 | 133.300 | 141.500 | 2 | 0.00000 | 340 | 0 | 0 | 4000.00 | 0.00 |
| 342 | 0.256000 | 15.00 | 1.678 | 16 | 133.300 | 141.500 | 2 | 0.00000 | 340 | 0 | 0 | 4000.00 | 0.00 |
| 343 | 0.256000 | 10.00 | 1.300 | 16 | 133.800 | 141.500 | 2 | 0.00000 | 338 | 0 | 0 | 4000.00 | 0.00 |
| 344 | 0.256000 | 35.00 | 1.644 | 16 | 133.300 | 128.500 | 2 | 0.00000 | 339 | 0 | 0 | 4000.00 | 0.00 |
| 345 | 0.256000 | 5.00 | 5.813 | 3 | 115.200 | 115.200 | 2 | 0.00000 | 337 | 346 | 0 | 4000.00 | 0.00 |
| 346 | 0.256000 | 80.00 | 1.288 | 3 | 115.200 | 116.500 | 2 | 0.00000 | 345 | 347 | 0 | 4000.00 | 0.00 |
| 347 | 0.256000 | 55.00 | 1.726 | 16 | 116.500 | 141.500 | 2 | 0.00000 | 346 | 0 | 0 | 4000.00 | 0.00 |
| 348 | 0.256000 | 15.00 | 2.601 | 16 | 116.500 | 128.500 | 2 | 0.00000 | 346 | 0 | 0 | 4000.00 | 0.00 |
| 349 | 0.256000 | 50.00 | 1.594 | 16 | 115.200 | 106.500 | 2 | 0.00000 | 345 | 0 | 0 | 4000.00 | 0.00 |
| 350 | 0.505000 | 175.00 | 1.669 | 4 | 68.750 | 140.000 | 2 | 0.00000 | 280 | 351 | 0 | 4000.00 | 0.00 |
| 351 | 0.336000 | 50.00 | 1.000 | 16 | 140.000 | 138.000 | 2 | 0.00000 | 350 | 0 | 0 | 4000.00 | 0.00 |
| 352 | 0.336000 | 10.00 | 4.226 | 4 | 67.000 | 65.000 | 2 | 0.00000 | 270 | 353 | 0 | 4000.00 | 0.00 |
| 353 | 0.336000 | 80.00 | 1.285 | 4 | 65.000 | 105.700 | 2 | 0.00000 | 352 | 354 | 0 | 4000.00 | 0.00 |
| 354 | 0.336000 | 80.00 | 1.630 | 3 | 105.700 | 130.500 | 2 | 0.00000 | 353 | 355 | 0 | 4000.00 | 0.00 |
| 355 | 0.256000 | 30.00 | 1.458 | 4 | 130.500 | 147.500 | 2 | 0.00000 | 354 | 356 | 0 | 4000.00 | 0.00 |
| 356 | 0.256000 | 25.00 | 1.225 | 4 | 147.500 | 141.500 | 2 | 0.00000 | 355 | 357 | 0 | 4000.00 | 0.00 |
| 357 | 0.162000 | 50.00 | 1.843 | 16 | 141.500 | 141.500 | 2 | 0.00000 | 356 | 0 | 0 | 4000.00 | 0.00 |
| 358 | 0.336000 | 5.00 | 5.570 | 4 | 130.500 | 130.500 | 2 | 0.00000 | 354 | 359 | 0 | 4000.00 | 0.00 |
| 359 | 0.162000 | 35.00 | 1.759 | 16 | 130.500 | 132.200 | 2 | 0.00000 | 358 | 0 | 0 | 4000.00 | 0.00 |
| 360 | 0.336000 | 45.00 | 2.343 | 4 | 94.500 | 115.800 | 2 | 0.00000 | 152 | 361 | 0 | 4000.00 | 0.00 |
| 361 | 0.336000 | 15.00 | 1.448 | 3 | 115.800 | 130.600 | 2 | 0.00000 | 360 | 362 | 0 | 4000.00 | 0.00 |
| 362 | 0.256000 | 50.00 | 1.510 | 19 | 130.600 | 176.000 | 2 | 0.00000 | 361 | 363 | 0 | 4000.00 | 0.00 |
| 363 | 0.256000 | 15.00 | 1.000 | 16 | 176.000 | 176.000 | 2 | 0.00000 | 362 | 0 | 0 | 4000.00 | 0.00 |
| 364 | 0.362000 | 145.00 | 1.539 | 16 | 130.600 | 129.600 | 2 | 0.00000 | 361 | 0 | 0 | 4000.00 | 0.00 |
| 365 | 0.336000 | 65.00 | 1.940 | 3 | 92.000 | 118.400 | 2 | 0.00000 | 145 | 366 | 0 | 4000.00 | 0.00 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 366 | 0.336000 | 20.00 | 1.544 | 3 | 118.400 | 118.400 | 2 | 0.00000 | 365 367 | 0 | 4000.00 | 0.00 |
| 367 | 0.256000 | 15.00 | 1.239 | 16 | 118.400 | 115.000 | 2 | 0.00000 | 366 0 | 0 | 4000.00 | 0.00 |
| 368 | 0.256000 | 20.00 | 1.947 | 16 | 118.400 | 127.000 | 2 | 0.00000 | 365 0 | 0 | 4000.00 | 0.00 |
| 369 | 0.336000 | 30.00 | 2.275 | 4 | 118.400 | 133.500 | 2 | 0.00000 | 366 370 | 0 | 4000.00 | 0.00 |
| 370 | 0.256000 | 35.00 | 1.232 | 3 | 133.500 | 166.000 | 2 | 0.00000 | 369 371 | 0 | 4000.00 | 0.00 |
| 371 | 0.256000 | 10.00 | 1.000 | 19 | 166.000 | 176.000 | 2 | 0.00000 | 370 372 | 0 | 4000.00 | 0.00 |
| 372 | 0.256000 | 20.00 | 2.970 | 16 | 176.000 | 175.000 | 2 | 0.00000 | 371 0 | 0 | 4000.00 | 0.00 |
| 373 | 0.256000 | 55.00 | 1.521 | 16 | 166.000 | 141.000 | 2 | 0.00000 | 370 0 | 0 | 4000.00 | 0.00 |
| 374 | 0.336000 | 5.00 | 6.914 | 3 | 92.000 | 94.200 | 2 | 0.00000 | 144 375 | 0 | 4000.00 | 0.00 |
| 375 | 0.336000 | 50.00 | 1.605 | 3 | 94.200 | 113.250 | 2 | 0.00000 | 374 376 | 0 | 4000.00 | 0.00 |
| 376 | 0.256000 | 30.00 | 1.100 | 16 | 113.250 | 141.750 | 2 | 0.00000 | 375 0 | 0 | 4000.00 | 0.00 |
| 377 | 0.256000 | 30.00 | 1.751 | 16 | 94.200 | 74.000 | 2 | 0.00000 | 374 0 | 0 | 4000.00 | 0.00 |
| 378 | 0.256000 | 20.00 | 2.380 | 16 | 113.300 | 111.000 | 2 | 0.00000 | 375 0 | 0 | 4000.00 | 0.00 |
| 379 | 0.336000 | 10.00 | 4.898 | 4 | 89.000 | 94.330 | 2 | 0.00000 | 137 380 | 0 | 4000.00 | 0.00 |
| 380 | 0.336000 | 5.00 | 2.344 | 3 | 94.330 | 95.000 | 2 | 0.00000 | 379 381 | 0 | 4000.00 | 0.00 |
| 381 | 0.336000 | 100.00 | 1.322 | 4 | 95.000 | 130.700 | 2 | 0.00000 | 380 382 | 0 | 4000.00 | 0.00 |
| 382 | 0.256000 | 65.00 | 1.598 | 19 | 130.700 | 176.000 | 2 | 0.00000 | 381 383 | 0 | 4000.00 | 0.00 |
| 383 | 0.025600 | 20.00 | 1.000 | 16 | 176.000 | 175.000 | 2 | 0.00000 | 382 0 | 0 | 4000.00 | 0.00 |
| 384 | 0.336000 | 50.00 | 1.859 | 3 | 95.000 | 96.500 | 2 | 0.00000 | 380 385 | 0 | 4000.00 | 0.00 |
| 385 | 0.256000 | 75.00 | 1.252 | 3 | 96.500 | 98.000 | 2 | 0.00000 | 384 386 | 0 | 4000.00 | 0.00 |
| 386 | 0.256000 | 40.00 | 1.269 | 16 | 98.000 | 71.000 | 2 | 0.00000 | 385 0 | 0 | 4000.00 | 0.00 |
| 387 | 0.256000 | 15.00 | 2.741 | 16 | 96.500 | 103.000 | 2 | 0.00000 | 384 0 | 0 | 4000.00 | 0.00 |
| 388 | 0.256000 | 40.00 | 1.922 | 16 | 98.000 | 94.500 | 2 | 0.00000 | 385 0 | 0 | 4000.00 | 0.00 |
| 389 | 0.336000 | 45.00 | 1.567 | 3 | 89.000 | 127.750 | 2 | 0.00000 | 135 390 | 0 | 4000.00 | 0.00 |
| 390 | 0.256000 | 20.00 | 1.688 | 16 | 127.750 | 141.750 | 2 | 0.00000 | 389 0 | 0 | 4000.00 | 0.00 |
| 391 | 0.256000 | 110.00 | 1.335 | 16 | 127.750 | 141.750 | 2 | 0.00000 | 389 0 | 0 | 4000.00 | 0.00 |
| 392 | 0.336000 | 5.00 | 7.854 | 3 | 94.500 | 96.800 | 2 | 0.00000 | 155 393 | 0 | 4000.00 | 0.00 |
| 393 | 0.256000 | 215.00 | 1.316 | 16 | 96.800 | 65.000 | 2 | 0.00000 | 392 0 | 0 | 4000.00 | 0.00 |
| 394 | 0.256000 | 125.00 | 1.470 | 16 | 96.800 | 141.750 | 2 | 0.00000 | 392 0 | 0 | 4000.00 | 0.00 |
| 395 | 0.336000 | 150.00 | 1.528 | 3 | 94.500 | 130.400 | 2 | 0.00000 | 156 396 | 0 | 4000.00 | 0.00 |
| 396 | 0.256000 | 155.00 | 1.280 | 19 | 130.400 | 182.000 | 2 | 0.00000 | 395 397 | 0 | 4000.00 | 0.00 |
| 397 | 0.256000 | 30.00 | 1.478 | 16 | 182.000 | 179.000 | 2 | 0.00000 | 396 0 | 0 | 4000.00 | 0.00 |
| 398 | 0.256000 | 40.00 | 1.653 | 16 | 130.400 | 141.750 | 2 | 0.00000 | 395 0 | 0 | 4000.00 | 0.00 |
| 399 | 0.505000 | 120.00 | 1.538 | 3 | 94.500 | 90.500 | 2 | 0.00000 | 158 400 | 0 | 4000.00 | 0.00 |
| 400 | 0.336000 | 5.00 | 8.007 | 4 | 90.500 | 90.500 | 2 | 0.00000 | 399 401 | 0 | 4000.00 | 0.00 |
| 401 | 0.256000 | 60.00 | 1.349 | 16 | 90.500 | 141.750 | 2 | 0.00000 | 400 0 | 0 | 4000.00 | 0.00 |
| 402 | 0.336000 | 130.00 | 1.496 | 3 | 90.500 | 65.300 | 2 | 0.00000 | 399 403 | 0 | 4000.00 | 0.00 |
| 403 | 0.336000 | 50.00 | 1.228 | 4 | 65.300 | 94.700 | 2 | 0.00000 | 402 404 | 0 | 4000.00 | 0.00 |
| 404 | 0.256000 | 55.00 | 1.315 | 16 | 94.700 | 141.750 | 2 | 0.00000 | 403 0 | 0 | 4000.00 | 0.00 |
| 405 | 0.336000 | 40.00 | 2.260 | 3 | 65.300 | 77.500 | 2 | 0.00000 | 402 406 | 0 | 4000.00 | 0.00 |
| 406 | 0.256000 | 30.00 | 1.458 | 16 | 77.500 | 103.500 | 2 | 0.00000 | 405 0 | 0 | 4000.00 | 0.00 |
| 407 | 0.256000 | 125.00 | 1.180 | 16 | 77.500 | 75.000 | 2 | 0.00000 | 405 0 | 0 | 4000.00 | 0.00 |
| 408 | 0.336000 | 135.00 | 1.552 | 4 | 79.000 | 142.000 | 2 | 0.00000 | 139 409 | 0 | 4000.00 | 0.00 |
| 409 | 0.336000 | 20.00 | 1.000 | 16 | 142.000 | 141.750 | 2 | 0.00000 | 408 0 | 0 | 4000.00 | 0.00 |
| 410 | 0.256000 | 95.00 | 1.334 | 19 | 96.200 | 174.000 | 2 | 0.00000 | 150 411 | 0 | 4000.00 | 0.00 |
| 411 | 0.256000 | 10.00 | 1.358 | 4 | 174.000 | 183.500 | 2 | 0.00000 | 410 412 | 0 | 4000.00 | 0.00 |
| 412 | 0.107000 | 60.00 | 1.439 | 4 | 183.500 | 197.500 | 2 | 0.00000 | 411 413 | 0 | 4000.00 | 0.00 |
| 413 | 0.107000 | 25.00 | 1.000 | 16 | 197.500 | 197.500 | 2 | 0.00000 | 412 0 | 0 | 4000.00 | 0.00 |
| 414 | 0.505000 | 100.00 | 2.373 | 3 | 91.940 | 138.300 | 2 | 0.00000 | 143 415 | 0 | 4000.00 | 0.00 |
| 415 | 0.505000 | 5.00 | 5.848 | 2 | 138.300 | 142.000 | 2 | 0.00000 | 414 416 | 0 | 4000.00 | 0.00 |
| 416 | 0.336000 | 5.00 | 1.000 | 4 | 142.000 | 142.000 | 2 | 0.00000 | 415 417 | 0 | 4000.00 | 0.00 |
| 417 | 0.336000 | 50.00 | 1.000 | 4 | 142.000 | 160.000 | 2 | 0.00000 | 416 418 | 0 | 4000.00 | 0.00 |
| 418 | 0.336000 | 50.00 | 1.000 | 16 | 160.000 | 160.000 | 2 | 0.00000 | 417 0 | 0 | 4000.00 | 0.00 |
| 419 | 0.505000 | 85.00 | 2.031 | 4 | 94.500 | 131.500 | 2 | 0.00000 | 154 420 | 0 | 4000.00 | 0.00 |
| 420 | 0.505000 | 50.00 | 1.443 | 4 | 131.500 | 130.750 | 2 | 0.00000 | 419 421 | 0 | 4000.00 | 0.00 |
| 421 | 0.505000 | 30.00 | 1.909 | 4 | 130.750 | 130.750 | 2 | 0.00000 | 420 422 | 0 | 4000.00 | 0.00 |
| 422 | 0.505000 | 40.00 | 2.361 | 4 | 130.750 | 128.750 | 2 | 0.00000 | 421 423 | 0 | 4000.00 | 0.00 |
| 423 | 0.505000 | 35.00 | 1.491 | 3 | 128.750 | 132.170 | 2 | 0.00000 | 422 424 | 0 | 4000.00 | 0.00 |
| 424 | 0.256000 | 10.00 | 1.505 | 4 | 132.170 | 138.000 | 2 | 0.00000 | 423 425 | 0 | 4000.00 | 0.00 |
| 425 | 0.162000 | 105.00 | 1.580 | 16 | 138.000 | 169.500 | 2 | 0.00000 | 424 0 | 0 | 4000.00 | 0.00 |
| 426 | 0.336000 | 40.00 | 1.843 | 3 | 132.170 | 132.170 | 2 | 0.00000 | 423 427 | 0 | 4000.00 | 0.00 |
| 427 | 0.256000 | 10.00 | 1.000 | 4 | 132.170 | 138.000 | 2 | 0.00000 | 426 428 | 0 | 4000.00 | 0.00 |
| 428 | 0.162000 | 100.00 | 1.632 | 16 | 138.000 | 169.500 | 2 | 0.00000 | 427 0 | 0 | 4000.00 | 0.00 |
| 429 | 0.256000 | 40.00 | 1.165 | 4 | 132.170 | 138.000 | 2 | 0.00000 | 426 430 | 0 | 4000.00 | 0.00 |
| 430 | 0.162000 | 155.00 | 1.548 | 16 | 138.000 | 169.500 | 2 | 0.00000 | 429 0 | 0 | 4000.00 | 0.00 |
| 431 | 0.256000 | 40.00 | 1.934 | 4 | 65.500 | 69.000 | 2 | 0.00000 | 286 432 | 0 | 4000.00 | 0.00 |
| 432 | 0.256000 | 105.00 | 1.020 | 4 | 69.000 | 171.000 | 2 | 0.00000 | 431 433 | 0 | 4000.00 | 0.00 |
| 433 | 0.162000 | 10.00 | 1.227 | 19 | 171.000 | 181.000 | 2 | 0.00000 | 432 434 | 0 | 4000.00 | 0.00 |
| 434 | 0.162000 | 40.00 | 1.332 | 16 | 181.000 | 180.000 | 2 | 0.00000 | 433 0 | 0 | 4000.00 | 0.00 |
| 435 | 0.665000 | 15.00 | 5.522 | 3 | 89.600 | 83.800 | 2 | 0.00000 | 166 436 | 0 | 4000.00 | 0.00 |
| 436 | 0.665000 | 5.00 | 3.660 | 3 | 83.800 | 83.800 | 2 | 0.00000 | 435 437 | 0 | 4000.00 | 0.00 |
| 437 | 0.665000 | 5.00 | 14.300 | 3 | 83.800 | 83.800 | 2 | 0.00000 | 436 438 | 0 | 4000.00 | 0.00 |
| 438 | 0.505000 | 5.00 | 4.652 | 13 | 83.800 | 88.000 | 2 | 0.00000 | 437 439 | 0 | 4000.00 | 0.00 |
| 439 | 0.505000 | 5.00 | 6.050 | 2 | 88.000 | 89.000 | 2 | 0.00000 | 438 440 | 0 | 4000.00 | 0.00 |
| 440 | 0.336000 | 60.00 | 5.000 | 1 | 89.000 | 113.000 | 2 | 0.00000 | 439 0 | 0 | 4000.00 | 0.00 |
| 441 | 0.665000 | 10.00 | 9.911 | 3 | 83.800 | 91.500 | 2 | 0.00000 | 437 442 | 0 | 4000.00 | 0.00 |
| 442 | 0.665000 | 80.00 | 1.865 | 3 | 91.500 | 102.800 | 2 | 0.00000 | 441 443 | 0 | 4000.00 | 0.00 |
| 443 | 0.665000 | 50.00 | 1.106 | 16 | 102.800 | 130.000 | 2 | 0.00000 | 442 0 | 0 | 4000.00 | 0.00 |

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444    0.336000     10.00    5.435  16     102.800   107.800     2     0.00000 442   0     0   4000.00       0.00
445    0.665000     40.00    2.658  16      91.500    86.000     2     0.00000 441   0     0   4000.00       0.00
446    0.505000      5.00    7.868  13      83.800    88.000     2     0.00000 435 447     0   4000.00       0.00
447    0.505000      5.00    1.000   2      88.000    89.000     2     0.00000 446 448     0   4000.00       0.00
448    0.505000     45.00    2.301   4      89.000   103.000     2     0.00000 447 449     0   4000.00       0.00
449    0.336000     20.00    2.613   4     103.000   112.000     2     0.00000 448 450     0   4000.00       0.00
450    0.336000    110.00    2.307   1     112.000   113.000     2     0.00000 449   0     0   4000.00       0.00
451    0.336000    160.00    1.474   4      83.800   141.000     2     0.00000 436 452     0   4000.00       0.00
452    0.336000      5.00    1.000   2     141.000   141.000     2     0.00000 451 453     0   4000.00       0.00
453    0.256000     50.00    1.000   1     141.000   141.000     2     0.00000 452   0     0   4000.00       0.00
454    0.665000     30.00    4.979   3      84.100    93.500     2     0.00000 204 455     0   4000.00       0.00
455    0.665000     10.00    2.862   2      93.500   103.500     2     0.00000 454 456     0   4000.00       0.00
456    0.505000     50.00    5.000   1     103.500   103.500     2     0.00000 455   0     0   4000.00       0.00
457    0.505000     20.00    2.414   4      93.500    80.300     2     0.00000 454 458     0   4080.00       0.00
458    0.505000     50.00    1.000  16      80.300    80.300     2     0.00000 457   0     0   4000.00       0.00
459    0.336000     20.00    3.318   2      62.750    62.750     2     0.00000 218 460     0   4000.00       0.00
460    0.336000     10.00    2.210   4      62.750    63.750     2     0.00000 459 461     0   4000.00       0.00
461    0.336000     30.00    1.762   4      63.750    86.250     2     0.00000 460 462     0   4000.00       0.00
462    0.336000     40.00    1.286   4      86.250   125.000     2     0.00000 461 463     0   4000.00       0.00
463    0.336000    130.00    1.233   4     125.000   125.000     2     0.00000 462 464     0   4000.00       0.00
464    0.336000     30.00    1.587   4     125.000   155.000     2     0.00000 463 465     0   4000.00       0.00
465    0.256000     60.00    1.171   4     155.000   208.000     2     0.00000 464 466     0   4000.00       0.00
466    0.001000     10.00    1.000  16     208.000   205.000     2     0.00000 465   0     0   4000.00       0.00
467    0.336000     20.00    2.378   2      94.000    94.000     2     0.00000 199 468     0   4000.00       0.00
468    0.336000     20.00    1.000   4      94.000    94.000     2     0.00000 467 469     0   4000.00       0.00
469    0.336000      5.00    1.538   4      94.000    94.000     2     0.00000 468 470     0   4000.00       0.00
470    0.336000     25.00    2.665   4      94.000   113.000     2     0.00000 469 471     0   4000.00       0.00
471    0.336000     75.00    1.403   4     113.000   122.000     2     0.00000 470 472     0   4000.00       0.00
472    0.336000     35.00    1.708   3     122.000   151.800     2     0.00000 471 473     0   4000.00       0.00
473    0.336000     30.00    2.322   3     151.800   169.500     2     0.00000 472 474     0   4000.00       0.00
474    0.336000     35.00    1.770   4     169.500   187.800     2     0.00000 473 475     0   4000.00       0.00
475    0.256000     15.00    1.717   4     187.800   187.800     2     0.00000 474 476     0   4000.00       0.00
476    0.256000    110.00    1.130   4     187.800   205.300     2     0.00000 475 477     0   4000.00       0.00
477    0.256000     10.00    1.000  16     205.300   204.300     2     0.00000 476   0     0   4000.00       0.00
478    0.256000     40.00    1.849  16     169.500   166.000     2     0.00000 473   0     0   4000.00       0.00
479    0.336000     10.00    4.769   4     151.800   153.300     2     0.00000 472 480     0   4000.00       0.00
480    0.256000     60.00    1.293  16     153.300   149.300     2     0.00000 479   0     0   4000.00       0.00
481    0.505000      5.00   14.146   4      61.750    57.700     2     0.00000 208 482     0   4000.00       0.00
482    0.505000     20.00    3.323   4      57.700    71.000     2     0.00000 481 483     0   4000.00       0.00
483    0.505000     10.00    1.000   2      71.000    71.000     2     0.00000 482 484     0   4000.00       0.00
484    0.505000     50.00    5.000   1      71.000    71.000     2     0.00000 483   0     0   4000.00       0.00
485    0.505000      5.00   13.184   4     138.300   138.300     2     0.00000 414 486     0   4000.00       0.00
486    0.336000     90.00    1.157   4     138.300   143.500     2     0.00000 485 487     0   4000.00       0.00
487    0.336000     15.00    1.627   4     143.500   147.400     2     0.00000 486 488     0   4000.00       0.00
488    0.336000     75.00    1.314   4     147.400   165.800     2     0.00000 487 489     0   4000.00       0.00
489    0.336000     70.00    1.355   4     165.800   164.000     2     0.00000 488 490     0   4000.00       0.00
490    0.336000     10.00    3.486   4     164.000   164.000     2     0.00000 489 491     0   4000.00       0.00
491    0.336000     10.00    1.416   4     164.000   164.000     2     0.00000 490 492     0   4000.00       0.00
492    0.256000     10.00    1.251   4     164.000   164.000     2     0.00000 491 493     0   4000.00       0.00
493    0.206000     10.00    3.225   4     164.000   166.000     2     0.00000 492 494     0   4000.00       0.00
494    0.206000     75.00    1.549   4     166.000   166.000     2     0.00000 493 495     0   4000.00       0.00
495    0.172000     20.00    1.757  19     166.000   166.000     2     0.00000 494 496     0   4000.00       0.00
496    0.087000     10.00    2.409  16     166.000   168.000     2     0.00000 495   0     0   4000.00       0.00
@EOR

 91 570.3   0  18
  20.00   .000     -0.022     -0.033    -0.045    -0.056    -0.067    -0.078
-0.089  -.100     -0.111     -0.123    -0.134    -0.145    -0.156    -0.167
-0.200   -100.0
 570.3  570.3     587.3     590.3     587.3     580.3     568.3     558.3
 542.3  520.3     490.3     460.3     420.3     370.3     310.3     240.3
  170.3  170.3

 99 495.3   0  18
   20.00   .000     -0.557     -1.114    -1.671    -2.228    -2.785    -3.342
  -3.899  -4.46     -5.013     -5.570    -6.127    -6.684    -7.241    -8.912
  -13.4   -100.0
   495.3  495.3     494.3     492.3     491.3     488.3     485.3     481.3
   477.3  472.3     466.3     459.3     448.3     436.3     423.3     375.3
   170.3  170.3

117 512.1  0 17
   20.00  -.000     -0.557    -1.114    -1.671    -2.228    -2.785    -3.342
  -3.899  -4.46     -5.013    -5.57     -6.127    -6.684    -7.241    -8.912
  -13.37
   512.1  512.1     510.1     507.1     505.1     502.1     500.1     498.1
   495.1  492.1     487.8     481.1     476.1     467.1     457.1     412.1
   160.1
```

```
 123 512.1  0 17
    20.00  -.000     -0.557    -1.114    -1.671    -2.228    -2.785    -3.342
   -3.899  -4.46     -5.013    -5.57     -6.127    -6.684    -7.241    -8.912
   -13.37
    512.1  512.1     510.1     507.1     505.1     502.1     500.1     498.1
    495.1  492.1     487.8     481.1     476.1     467.1     457.1     412.1
    160.1

 129 482.1   0  16
    20.00   .000     -0.022     -0.033    -0.045    -0.056    -0.067    -0.078
   -0.089  -.100     -0.111     -0.123    -0.134    -0.145    -0.156    -100.0
    482.1  482.1     478.1     473.1     463.1     448.1     428.1     403.1
    374.1  343.1     308.1     268.1     233.1     198.1     168.1     168.1

 440 147.0   0   0

 450 147.0   0   0

 453 175.0   0   0

 456 137.5   0   0

 484 105.0   0   0

   4 0  100.  100. 1.0E+20   2  9  4  0  .01   416.4
 0     .56   2.36    100
 100.  100.  100.    100.
 0     50.0   90.0  92.5   95.3   97.5      99.0      99.7       100.0
 0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

  90 0  100  100  1.0E+20    2  9  3  0  .01  570.3
0       0.01  100
100     0    0
0     50.0   90.0  92.5   95.3   97.5      99.0      99.7       100.0
 0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

  96 0  100  100  1.0E+20   2  9  4  0  .01  495.3
0      .63   3.43   100
100.   100.  100.   100.
0     50.0   90.0  92.5   95.3   97.5      99.0      99.7       100.0
 0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

 114 0  100  100  1.0E+20    2  9  4  0  .01  512.1
 0       2.51  5.61   100
 100     100   0.     0.
 0     50.0   90.0  92.5   95.3   97.5      99.0      99.7       100.0
 0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

 121 0  100  100  1.0E+20    2  9  4  0  .01  512.1
 0       21.93 27.13 100
 100     100   100   100
 0     50.0   90.0  92.5   95.3   97.5      99.0      99.7       100.0
 0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

 126 0  100  100  1.0E+20    2  9  3  0  .01  482.1
0       0.01  100
100     0    0
0     50.0   90.0  92.5   95.3   97.5      99.0      99.7       100.0
 0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

 415  0  100  100  1.0E+20   2  16  3  0  1.79  194.
 0       0.1    100
 100     100    100
 0   11.1   16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
 97.5     99.0     99.7  100.0
 10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
 203570   1596000  0.49259E+08  0.1E+21

 439  0  100  100  1.0E+20   2  16  3  0  1.79  147.
 0       0.1    100
 100     100    100
 0    11.1  16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
 97.5     99.0     99.7  100.0
 10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
 203570   1596000  0.49259E+08  0.1E+21

 447  0  100  100  1.0E+20   2  16  3  0  1.79  147.
```

```
 0       0.01    100
 100     100     100
 0    11.1  16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
 97.5     99.0     99.7  100.0
 10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
 203570   1596000  0.49259E+08  0.1E+21

 452  0  100  100  1.0E+20   2  16  3  0  1.785  175.
 0       0.01   100
 100     100    100
 0    11.1  16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
 97.5     99.0     99.7  100.0
 10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
 203570   1596000  0.49259E+08  0.1E+21

 455  0  100  100  1.0E+20   2  16  3  0  0.695  137.5
0       0.01   100
100     0      0
0    11.1  16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
97.5     99.0     99.7  100.0
10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
 203570   1596000  0.49259E+08  0.1E+21

 459  0  100  100  1.0E+20   2  9  3  0  .01  96.8
 0       1.0   100
 100     100   100
 0     50.0   90.0  92.5   95.3   97.5      99.0      99.7        100.0
 0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

 467  0  100  100  1.0E+20   2  9  3  0  .01  128.
 0       1.0   100
 100     100   100
 0     50.0   90.0  92.5   95.3   97.5      99.0      99.7        100.0
 0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

 483  0  100  100  1.0E+20  2  16  4  0  0.99  105.0
 0       0.1   0.11  100
 100     100   100   100
 0    11.1  16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
 97.5     99.0     99.7  100.0
 10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
 203570   1596000  0.49259E+08  0.1E+21


   5  2  0.650  0.01 0.7850 0.0  ID 1.0000
 438  2  0.750  0.01 0.2003 0.0  ID 0.5050
 446  2  0.750  0.01 0.2003 0.0  ID 0.5050

308   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102

410   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102


433   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102

362   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102

396   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102


495   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
```

```
53.3   2        .102

334   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102

371   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102

382   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102


 1.          1.
 6     2
 94    2
 97    2
 102   2
 113   2
 120   2
 184   41
 188   46
 194   31
 289   11
 290    7
 291    6
 292   23
 299   17
 303   11
 304   1
 306   24
 308   26
 314   6
 322   11
 325    5
 332    2
 334    9
 347   11
 351   10
 362    9
 371   2
 376   6
 382   13
 383    3
 396   31
 409   4
 410   17
 412   11
 418   9
 425   21
 428   20
 430   32
 432   20
 433   3
 450   22
 455   2
 465   1
 466   2
 476   4
 477   22
 478   8
 480   11
 483   2
 495   4
@EOR
410       1       410      3          1
410       3       410      5          2
410       4       410      18         3
410       18      410      19         4
410       18      411      3          5
412       1       412      2          6
412       1       412      3          7
412       3       412      6          8
```

# CALCULATION SHEET

| | | | |
|---|---|---|---|
| Project: | HOPE CREEK GENERATING STATION | Job Number: | 8038 |
| Calc No. | 8038-P0004 | Sheet No. | 203 |
| By: | A. Arastu Date: 9/14/18 | Rev. No. | 1 |
| Subject: | Water Hammer Analysis of the HCGS Fire Protection System | | |

```
412       5       412      6          9
412       6       412      7          10
412       7       412      10         11
431       1       431      2          12
431       2       431      3          13
431       2       431      5          14
431       5       431      8          15
431       8       431      9          16
432       1       432      22         17
308       1       308      5          18
308       5       308      6          19
308       5       308      18         20
308       18      308      20         21
308       20      308      21         22
308       21      308      27         23
@EOR
0      3.0   1000   1
3.0   30.0    500   1
30.0 888.    1000   1
```

# CALCULATION SHEET

| | | | |
|---|---|---|---|
| Project: | HOPE CREEK GENERATING STATION | Job Number: | 8038 |
| Calc No. | 8038-P0004 | Sheet No. | 204 |
| By: | A. Arastu Date: 9/14/18 | Rev. No. | 1 |
| Subject: | Water Hammer Analysis of the HCGS Fire Protection System | | |

## B6 - Case 6 (8 inch Deluge Valve w/Salem Pump #2) with Vacuum Breakers

```
HCGS FP Case 6c: 9 VBs  Forces in Riser # 26 only
        36000
        0  0  1  0  0  0
        2   2    0.  45.
        2   1   0   0
        0   1   0  0  0  0  0  1 0 0
        1.9  62.4  7.83E-6
        1.0  2   13    0    0
               0.0    1000.0    2000.0   2.0E+04   6.0E+04   1.0E+05   3.0E+05   6.0E+05
           1.0E+06   1.5E+06   3.5E+06   1.0E+11   1.0E+33
             0.10      0.061     0.048     0.026     0.021      .019    0.0167    0.0155
            0.0150    0.0147     0.014     0.014     0.014
        495.3   3  17  0    0
          -10.00   .000   .557  1.114  1.671  2.228  2.785  3.342
           3.899  4.456  5.013  5.570  6.127  6.684  7.241  8.912
           13.4
           495.3  495.3     494.3     492.3     491.3     488.3     485.3     481.3
           477.3  472.3     466.3     459.3     448.3     436.3     423.3     375.3
           170.3
           1
           1    1.104000     55.00    5.492   4      99.400    94.000     2     0.00000   0   2     0   4000.00       0.00
           2    1.000000     20.00    7.400   4      94.000   105.040     2     0.00000   1   3     0   4000.00       0.00
           3    1.000000     10.00    7.180   4     105.040   105.040     2     0.00000   2   4     0   4000.00       0.00
           4    1.000000     10.00    3.538   2     105.040   104.500     2     0.00000   3   5     0   4000.00       0.00
           5    1.000000      5.00   18.508  13     104.500   104.750     2     0.00000   4   6     0   4000.00       0.00
           6    1.000000     10.00    5.200   4     104.750   110.000     2     0.00000   5   7     0   4000.00       0.00
           7    1.000000     20.00    3.400   3     110.000   105.000     2     0.00000   6   8     0   4000.00       0.00
           8    1.000000    115.00    2.402   3     105.000    96.900     2     0.00000   7  86     0   4000.00       0.00
           9    1.007000      5.00    2.611   4      96.900    96.900     2     0.00000   8  10     0   4000.00       0.00
          10    1.007000     10.00    3.014   4      96.900    96.900     2     0.00000   9  11     0   4000.00       0.00
          11    1.007000     10.00    1.806   4      96.900    96.900     2     0.00000  10  12     0   4000.00       0.00
          12    1.007000     10.00    3.014   3      96.900    96.900     2     0.00000  11  13     0   4000.00       0.00
          13    1.007000    110.00    1.183   4      96.900    96.900     2     0.00000  12  14     0   4000.00       0.00
          14    1.007000    110.00    1.363   4      96.900    95.900     2     0.00000  13  15     0   4000.00       0.00
          15    1.007000     10.00    3.014   4      95.900    95.900     2     0.00000  14  16     0   4000.00       0.00
          16    1.007000     30.00    1.671   4      95.900    95.900     2     0.00000  15  17     0   4000.00       0.00
          17    1.007000     80.00    1.252   4      95.900    95.900     2     0.00000  16  18     0   4000.00       0.00
          18    1.007000     20.00    1.403   4      95.900    95.900     2     0.00000  17  19     0   4000.00       0.00
          19    1.007000    130.00    1.155   4      95.900    95.900     2     0.00000  18  20     0   4000.00       0.00
          20    1.007000    135.00    1.060   4      95.900    95.400     2     0.00000  19  21     0   4000.00       0.00
          21    1.007000     10.00    2.994   4      95.400    93.500     2     0.00000  20  22     0   4000.00       0.00
          22    1.007000     65.00    1.217   4      93.500    93.500     2     0.00000  21  23     0   4000.00       0.00
          23    1.007000      5.00    1.000   4      93.500    93.500     2     0.00000  22  24     0   4000.00       0.00
          24    1.007000     20.00    3.004   4      93.500    97.000     2     0.00000  23  25     0   4000.00       0.00
          25    1.007000    200.00    1.300   4      97.000    97.000     2     0.00000  24  26     0   4000.00       0.00
          26    1.007000     55.00    1.513   4      97.000    97.000     2     0.00000  25  27     0   4000.00       0.00
          27    1.007000     20.00    1.997   4      97.000    93.000     2     0.00000  26  28     0   4000.00       0.00
          28    1.007000    230.00    1.088   3      93.000    93.000     2     0.00000  27 181     0   4000.00       0.00
          29    1.007000     40.00    1.503   3      93.000    93.000     2     0.00000  28  30     0   4000.00       0.00
          30    1.007000    240.00    1.117   4      93.000    94.500     2     0.00000  29  31     0   4000.00       0.00
          31    1.007000     45.00    1.448   4      94.500    94.500     2     0.00000  30  32     0   4000.00       0.00
          32    1.007000     35.00    1.570   4      94.500    91.000     2     0.00000  31  33     0   4000.00       0.00
          33    1.007000    180.00    1.111   4      91.000    96.000     2     0.00000  32  34     0   4000.00       0.00
          34    1.007000     10.00    3.014   4      96.000    96.000     2     0.00000  33  35     0   4000.00       0.00
          35    1.007000      5.00    5.028   4      96.000    96.000     2     0.00000  34  36     0   4000.00       0.00
          36    1.007000      5.00    2.611   4      96.000    96.000     2     0.00000  35  37     0   4000.00       0.00
          37    1.007000     10.00    3.014   4      96.000    96.000     2     0.00000  36  38     0   4000.00       0.00
          38    1.007000     30.00    2.141   4      96.000    96.000     2     0.00000  37  39     0   4000.00       0.00
          39    1.007000     20.00    1.403   4      96.000    96.000     2     0.00000  38  40     0   4000.00       0.00
          40    1.007000     80.00    1.252   3      96.000    96.000     2     0.00000  39  41     0   4000.00       0.00
          41    1.007000     10.00    1.806   4      96.000    96.000     2     0.00000  40  42     0   4000.00       0.00
          42    1.007000     20.00    1.000   4      96.000    96.000     2     0.00000  41  43     0   4000.00       0.00
          43    1.007000     55.00    1.363   4      96.000    97.200     2     0.00000  42  44     0   4000.00       0.00
          44    1.007000      5.00    5.028   4      97.200    97.200     2     0.00000  43  45     0   4000.00       0.00
          45    1.007000    160.00    1.175   4      97.200    96.200     2     0.00000  44  46     0   4000.00       0.00
          46    1.007000     15.00    2.343   3      96.200    96.200     2     0.00000  45 162     0   4000.00       0.00
          47    1.007000      5.00    5.028   4      96.200    96.200     2     0.00000  46  48     0   4000.00       0.00
          48    1.007000     15.00    6.357   4      96.200    97.000     2     0.00000  47  49     0   4000.00       0.00
          49    1.007000     60.00    1.166   4      97.000    97.000     2     0.00000  48  50     0   4000.00       0.00
          50    1.007000     15.00    2.994   4      97.000    94.500     2     0.00000  49  51     0   4000.00       0.00
          51    1.007000      5.00    4.605   4      94.500    97.000     2     0.00000  50  52     0   4000.00       0.00
          52    1.007000     15.00    2.329   4      97.000    94.000     2     0.00000  51  53     0   4000.00       0.00
          53    1.007000     80.00    1.501   4      94.000    96.500     2     0.00000  52  54     0   4000.00       0.00
          54    1.007000     65.00    1.310   3      96.500    96.500     2     0.00000  53  55     0   4000.00       0.00
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| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 55 | 1.007000 | 50.00 | 1.481 | 4 | 96.500 | 97.200 | 2 | 0.00000 | 54 | 56 | 0 | 4000.00 | 0.00 |
| 56 | 1.007000 | 25.00 | 1.322 | 4 | 97.200 | 97.200 | 2 | 0.00000 | 55 | 57 | 0 | 4000.00 | 0.00 |
| 57 | 1.007000 | 5.00 | 3.820 | 4 | 97.200 | 97.200 | 2 | 0.00000 | 56 | 58 | 0 | 4000.00 | 0.00 |
| 58 | 1.007000 | 70.00 | 1.288 | 4 | 97.200 | 97.200 | 2 | 0.00000 | 57 | 59 | 0 | 4000.00 | 0.00 |
| 59 | 1.007000 | 10.00 | 1.806 | 4 | 97.200 | 97.200 | 2 | 0.00000 | 58 | 60 | 0 | 4000.00 | 0.00 |
| 60 | 1.007000 | 195.00 | 1.103 | 4 | 97.200 | 97.200 | 2 | 0.00000 | 59 | 61 | 0 | 4000.00 | 0.00 |
| 61 | 1.007000 | 240.00 | 1.159 | 4 | 97.200 | 94.500 | 2 | 0.00000 | 60 | 62 | 0 | 4000.00 | 0.00 |
| 62 | 1.007000 | 215.00 | 1.094 | 4 | 94.500 | 94.500 | 2 | 0.00000 | 61 | 63 | 0 | 4000.00 | 0.00 |
| 63 | 1.007000 | 110.00 | 1.183 | 4 | 94.500 | 94.500 | 2 | 0.00000 | 62 | 64 | 0 | 4000.00 | 0.00 |
| 64 | 1.007000 | 195.00 | 1.103 | 4 | 94.500 | 94.500 | 2 | 0.00000 | 63 | 65 | 0 | 4000.00 | 0.00 |
| 65 | 1.007000 | 5.00 | 5.028 | 4 | 94.500 | 94.500 | 2 | 0.00000 | 64 | 66 | 0 | 4000.00 | 0.00 |
| 66 | 1.007000 | 30.00 | 1.665 | 4 | 94.500 | 95.800 | 2 | 0.00000 | 65 | 67 | 0 | 4000.00 | 0.00 |
| 67 | 1.007000 | 5.00 | 2.611 | 4 | 95.800 | 95.800 | 2 | 0.00000 | 66 | 68 | 0 | 4000.00 | 0.00 |
| 68 | 1.007000 | 25.00 | 1.806 | 3 | 95.800 | 95.800 | 2 | 0.00000 | 67 | 229 | 0 | 4000.00 | 0.00 |
| 69 | 1.007000 | 130.00 | 1.155 | 4 | 95.800 | 95.500 | 2 | 0.00000 | 68 | 70 | 0 | 4000.00 | 0.00 |
| 70 | 1.007000 | 5.00 | 2.611 | 3 | 95.500 | 95.500 | 2 | 0.00000 | 69 | 261 | 0 | 4000.00 | 0.00 |
| 71 | 1.007000 | 5.00 | 5.028 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 70 | 72 | 0 | 4000.00 | 0.00 |
| 72 | 1.007000 | 5.00 | 2.611 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 71 | 73 | 0 | 4000.00 | 0.00 |
| 73 | 1.007000 | 205.00 | 1.098 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 72 | 74 | 0 | 4000.00 | 0.00 |
| 74 | 1.007000 | 240.00 | 1.117 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 73 | 75 | 0 | 4000.00 | 0.00 |
| 75 | 1.007000 | 20.00 | 4.021 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 74 | 76 | 0 | 4000.00 | 0.00 |
| 76 | 1.007000 | 30.00 | 1.665 | 4 | 95.500 | 91.500 | 2 | 0.00000 | 75 | 77 | 0 | 4000.00 | 0.00 |
| 77 | 1.007000 | 25.00 | 2.120 | 4 | 91.500 | 97.000 | 2 | 0.00000 | 76 | 78 | 0 | 4000.00 | 0.00 |
| 78 | 1.007000 | 50.00 | 1.403 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 77 | 79 | 0 | 4000.00 | 0.00 |
| 79 | 1.007000 | 50.00 | 1.403 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 78 | 80 | 0 | 4000.00 | 0.00 |
| 80 | 1.007000 | 20.00 | 1.997 | 4 | 97.000 | 90.500 | 2 | 0.00000 | 79 | 81 | 0 | 4000.00 | 0.00 |
| 81 | 1.007000 | 40.00 | 2.002 | 4 | 90.500 | 96.900 | 2 | 0.00000 | 80 | 82 | 0 | 4000.00 | 0.00 |
| 82 | 1.007000 | 165.00 | 1.122 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 81 | 83 | 0 | 4000.00 | 0.00 |
| 83 | 1.007000 | 135.00 | 1.060 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 82 | 84 | 0 | 4000.00 | 0.00 |
| 84 | 1.007000 | 10.00 | 3.014 | 3 | 96.900 | 96.900 | 2 | 0.00000 | 83 | 101 | 0 | 4000.00 | 0.00 |
| 85 | 1.007000 | 60.00 | 1.134 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 84 | 86 | 0 | 4000.00 | 0.00 |
| 86 | 1.007000 | 5.00 | 5.028 | 3 | 96.900 | 96.900 | 2 | 0.00000 | 85 | 9 | 1 | 4000.00 | 0.00 |
| 87 | 0.336000 | 10.00 | 5.771 | 3 | 105.000 | 112.070 | 2 | 0.00000 | 7 | 88 | 0 | 4000.00 | 0.00 |
| 88 | 0.336000 | 5.00 | 5.570 | 4 | 112.070 | 113.750 | 2 | 0.00000 | 87 | 89 | 0 | 4000.00 | 0.00 |
| 89 | 0.256000 | 30.00 | 1.870 | 4 | 113.750 | 109.000 | 2 | 0.00000 | 88 | 90 | 0 | 4000.00 | 0.00 |
| 90 | 0.256000 | 10.00 | 1.205 | 2 | 109.000 | 104.250 | 2 | 0.00000 | 89 | 91 | 0 | 4000.00 | 0.00 |
| 91 | 0.256000 | 5.00 | 5.933 | 1 | 104.250 | 103.750 | 2 | 0.00000 | 90 | 0 | 0 | 4000.00 | 0.00 |
| 92 | 0.336000 | 40.00 | 2.714 | 3 | 112.070 | 105.000 | 2 | 0.00000 | 87 | 93 | 0 | 4000.00 | 0.00 |
| 93 | 1.000000 | 20.00 | 3.400 | 4 | 105.000 | 110.200 | 2 | 0.00000 | 92 | 94 | 0 | 4000.00 | 0.00 |
| 94 | 1.000000 | 10.00 | 3.800 | 4 | 110.200 | 104.750 | 2 | 0.00000 | 93 | 95 | 0 | 4000.00 | 0.00 |
| 95 | 1.000000 | 5.00 | 18.508 | 4 | 104.750 | 104.750 | 2 | 0.00000 | 94 | 96 | 0 | 4000.00 | 0.00 |
| 96 | 1.000000 | 10.00 | 3.538 | 2 | 104.750 | 104.750 | 2 | 0.00000 | 95 | 97 | 0 | 4000.00 | 0.00 |
| 97 | 1.000000 | 5.00 | 9.400 | 4 | 104.750 | 105.040 | 2 | 0.00000 | 96 | 98 | 0 | 4000.00 | 0.00 |
| 98 | 1.000000 | 20.00 | 7.400 | 4 | 105.040 | 94.000 | 2 | 0.00000 | 97 | 99 | 0 | 4000.00 | 0.00 |
| 99 | 1.104000 | 30.00 | 4.874 | 1 | 94.000 | 99.400 | 2 | 0.00000 | 98 | 0 | 0 | 4000.00 | 0.00 |
| 100 | 1.000000 | 85.00 | 1.864 | 4 | 105.000 | 91.000 | 2 | 0.00000 | 92 | 101 | 0 | 4000.00 | 0.00 |
| 101 | 1.000000 | 25.00 | 4.512 | 3 | 91.000 | 96.900 | 2 | 0.00000 | 100 | 85 | 1 | 4000.00 | 0.00 |
| 102 | 0.835000 | 5.00 | 12.356 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 40 | 103 | 0 | 4000.00 | 0.00 |
| 103 | 0.788000 | 60.00 | 1.628 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 102 | 104 | 0 | 4000.00 | 0.00 |
| 104 | 0.788000 | 100.00 | 1.000 | 4 | 96.000 | 95.500 | 2 | 0.00000 | 103 | 105 | 0 | 4000.00 | 0.00 |
| 105 | 0.788000 | 100.00 | 1.000 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 104 | 106 | 0 | 4000.00 | 0.00 |
| 106 | 0.788000 | 30.00 | 2.786 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 105 | 107 | 0 | 4000.00 | 0.00 |
| 107 | 0.927000 | 35.00 | 2.059 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 106 | 108 | 0 | 4000.00 | 0.00 |
| 108 | 0.927000 | 150.00 | 1.494 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 107 | 109 | 0 | 4000.00 | 0.00 |
| 109 | 0.927000 | 50.00 | 1.519 | 3 | 95.500 | 95.500 | 2 | 0.00000 | 108 | 110 | 0 | 4000.00 | 0.00 |
| 110 | 0.927000 | 20.00 | 2.298 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 109 | 111 | 0 | 4000.00 | 0.00 |
| 111 | 0.927000 | 10.00 | 7.860 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 110 | 112 | 0 | 4000.00 | 0.00 |
| 112 | 1.000000 | 10.00 | 9.000 | 4 | 95.500 | 101.700 | 2 | 0.00000 | 111 | 113 | 0 | 4000.00 | 0.00 |
| 113 | 1.000000 | 5.00 | 5.400 | 4 | 101.700 | 102.800 | 2 | 0.00000 | 112 | 114 | 0 | 4000.00 | 0.00 |
| 114 | 1.000000 | 10.00 | 12.354 | 2 | 102.800 | 102.800 | 2 | 0.00000 | 113 | 115 | 0 | 4000.00 | 0.00 |
| 115 | 1.000000 | 5.00 | 8.877 | 4 | 102.800 | 102.800 | 2 | 0.00000 | 114 | 116 | 0 | 4000.00 | 0.00 |
| 116 | 1.000000 | 5.00 | 5.000 | 4 | 102.800 | 102.800 | 2 | 0.00000 | 115 | 117 | 0 | 4000.00 | 0.00 |
| 117 | 1.250000 | 30.00 | 3.333 | 1 | 102.800 | 103.000 | 2 | 0.00000 | 116 | 0 | 0 | 4000.00 | 0.00 |
| 118 | 0.927000 | 10.00 | 6.562 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 109 | 119 | 0 | 4000.00 | 0.00 |
| 119 | 1.000000 | 10.00 | 2.400 | 3 | 95.500 | 101.700 | 2 | 0.00000 | 118 | 120 | 0 | 4000.00 | 0.00 |
| 120 | 1.000000 | 5.00 | 7.800 | 4 | 101.700 | 102.800 | 2 | 0.00000 | 119 | 121 | 0 | 4000.00 | 0.00 |
| 121 | 1.000000 | 10.00 | 13.154 | 2 | 102.800 | 102.800 | 2 | 0.00000 | 120 | 122 | 0 | 4000.00 | 0.00 |
| 122 | 1.000000 | 10.00 | 8.938 | 4 | 102.800 | 102.800 | 2 | 0.00000 | 121 | 123 | 0 | 4000.00 | 0.00 |
| 123 | 1.250000 | 20.00 | 3.250 | 1 | 102.800 | 103.000 | 2 | 0.00000 | 122 | 0 | 0 | 4000.00 | 0.00 |
| 124 | 0.134000 | 5.00 | 3.624 | 4 | 101.700 | 101.700 | 2 | 0.00000 | 119 | 125 | 0 | 4000.00 | 0.00 |
| 125 | 0.134000 | 5.00 | 3.141 | 4 | 101.700 | 101.700 | 2 | 0.00000 | 124 | 126 | 0 | 4000.00 | 0.00 |
| 126 | 0.134000 | 5.00 | 1.000 | 2 | 101.700 | 101.700 | 2 | 0.00000 | 125 | 127 | 0 | 4000.00 | 0.00 |
| 127 | 0.134000 | 10.00 | 1.000 | 4 | 101.700 | 101.700 | 2 | 0.00000 | 126 | 128 | 0 | 4000.00 | 0.00 |
| 128 | 0.134000 | 10.00 | 1.000 | 4 | 101.700 | 101.700 | 2 | 0.00000 | 127 | 129 | 0 | 4000.00 | 0.00 |
| 129 | 0.134000 | 10.00 | 1.000 | 1 | 101.700 | 103.000 | 2 | 0.00000 | 128 | 0 | 0 | 4000.00 | 0.00 |
| 130 | 0.835000 | 5.00 | 11.020 | 4 | 93.000 | 93.000 | 2 | 0.00000 | 29 | 131 | 0 | 4000.00 | 0.00 |
| 131 | 0.835000 | 100.00 | 1.331 | 4 | 93.000 | 96.010 | 2 | 0.00000 | 130 | 132 | 0 | 4000.00 | 0.00 |
| 132 | 0.835000 | 25.00 | 1.267 | 4 | 96.010 | 96.010 | 2 | 0.00000 | 131 | 133 | 0 | 4000.00 | 0.00 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 133 | 0.835000 | 65.00 | 1.000 | 4 | 96.010 | 96.000 | 2 | 0.00000 | 132 | 134 | 0 | 4000.00 | 0.00 |
| 134 | 0.835000 | 20.00 | 2.653 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 133 | 135 | 0 | 4000.00 | 0.00 |
| 135 | 0.835000 | 105.00 | 1.382 | 3 | 96.000 | 89.000 | 2 | 0.00000 | 134 | 136 | 0 | 4000.00 | 0.00 |
| 136 | 0.835000 | 5.00 | 3.338 | 4 | 89.000 | 89.000 | 2 | 0.00000 | 135 | 137 | 0 | 4000.00 | 0.00 |
| 137 | 0.835000 | 50.00 | 1.334 | 3 | 89.000 | 89.000 | 2 | 0.00000 | 136 | 138 | 0 | 4000.00 | 0.00 |
| 138 | 0.835000 | 5.00 | 5.676 | 4 | 89.000 | 89.000 | 2 | 0.00000 | 137 | 139 | 0 | 4000.00 | 0.00 |
| 139 | 0.835000 | 5.00 | 4.340 | 3 | 89.000 | 89.000 | 2 | 0.00000 | 138 | 140 | 0 | 4000.00 | 0.00 |
| 140 | 0.835000 | 55.00 | 1.000 | 4 | 89.000 | 89.000 | 2 | 0.00000 | 139 | 141 | 0 | 4000.00 | 0.00 |
| 141 | 0.835000 | 25.00 | 1.668 | 3 | 89.000 | 89.000 | 2 | 0.00000 | 140 | 142 | 0 | 4000.00 | 0.00 |
| 142 | 0.835000 | 15.00 | 2.882 | 4 | 89.000 | 91.940 | 2 | 0.00000 | 141 | 143 | 0 | 4000.00 | 0.00 |
| 143 | 0.835000 | 25.00 | 1.668 | 3 | 91.940 | 91.940 | 2 | 0.00000 | 142 | 144 | 0 | 4000.00 | 0.00 |
| 144 | 0.835000 | 5.00 | 5.676 | 3 | 91.940 | 91.940 | 2 | 0.00000 | 143 | 145 | 0 | 4000.00 | 0.00 |
| 145 | 0.835000 | 5.00 | 4.340 | 3 | 91.940 | 91.940 | 2 | 0.00000 | 144 | 146 | 0 | 4000.00 | 0.00 |
| 146 | 0.835000 | 10.00 | 3.338 | 4 | 91.940 | 96.200 | 2 | 0.00000 | 145 | 147 | 0 | 4000.00 | 0.00 |
| 147 | 0.835000 | 5.00 | 3.338 | 4 | 96.200 | 96.200 | 2 | 0.00000 | 146 | 148 | 0 | 4000.00 | 0.00 |
| 148 | 0.835000 | 145.00 | 1.000 | 4 | 96.200 | 96.200 | 2 | 0.00000 | 147 | 149 | 0 | 4000.00 | 0.00 |
| 149 | 0.835000 | 10.00 | 2.670 | 4 | 96.200 | 96.200 | 2 | 0.00000 | 148 | 150 | 0 | 4000.00 | 0.00 |
| 150 | 0.835000 | 90.00 | 1.186 | 3 | 96.200 | 96.200 | 2 | 0.00000 | 149 | 151 | 0 | 4000.00 | 0.00 |
| 151 | 0.835000 | 5.00 | 5.676 | 4 | 96.200 | 94.530 | 2 | 0.00000 | 150 | 152 | 0 | 4000.00 | 0.00 |
| 152 | 0.835000 | 15.00 | 2.664 | 3 | 94.530 | 94.530 | 2 | 0.00000 | 151 | 153 | 0 | 4000.00 | 0.00 |
| 153 | 0.835000 | 5.00 | 2.336 | 4 | 94.530 | 94.530 | 2 | 0.00000 | 152 | 154 | 0 | 4000.00 | 0.00 |
| 154 | 0.835000 | 5.00 | 4.340 | 3 | 94.530 | 94.540 | 2 | 0.00000 | 153 | 155 | 0 | 4000.00 | 0.00 |
| 155 | 0.835000 | 15.00 | 2.559 | 3 | 94.540 | 94.540 | 2 | 0.00000 | 154 | 156 | 0 | 4000.00 | 0.00 |
| 156 | 0.835000 | 5.00 | 4.340 | 3 | 94.540 | 94.540 | 2 | 0.00000 | 155 | 157 | 0 | 4000.00 | 0.00 |
| 157 | 0.835000 | 5.00 | 3.338 | 4 | 94.540 | 94.540 | 2 | 0.00000 | 156 | 158 | 0 | 4000.00 | 0.00 |
| 158 | 0.835000 | 5.00 | 3.338 | 3 | 94.540 | 94.500 | 2 | 0.00000 | 157 | 159 | 0 | 4000.00 | 0.00 |
| 159 | 0.835000 | 5.00 | 4.340 | 4 | 94.500 | 94.500 | 2 | 0.00000 | 158 | 160 | 0 | 4000.00 | 0.00 |
| 160 | 0.835000 | 55.00 | 1.425 | 3 | 94.500 | 94.500 | 2 | 0.00000 | 159 | 161 | 0 | 4000.00 | 0.00 |
| 161 | 0.835000 | 175.00 | 1.286 | 4 | 94.500 | 96.200 | 2 | 0.00000 | 160 | 162 | 0 | 4000.00 | 0.00 |
| 162 | 0.835000 | 100.00 | 1.568 | 3 | 96.200 | 96.200 | 2 | 0.00000 | 161 | 47 | 1 | 4000.00 | 0.00 |
| 163 | 0.835000 | 10.00 | 3.338 | 4 | 94.500 | 91.750 | 2 | 0.00000 | 160 | 164 | 0 | 4000.00 | 0.00 |
| 164 | 0.835000 | 40.00 | 1.413 | 4 | 91.750 | 89.580 | 2 | 0.00000 | 163 | 165 | 0 | 4000.00 | 0.00 |
| 165 | 0.835000 | 25.00 | 3.071 | 4 | 89.580 | 89.580 | 2 | 0.00000 | 164 | 166 | 0 | 4000.00 | 0.00 |
| 166 | 0.835000 | 5.00 | 4.340 | 3 | 89.580 | 89.580 | 2 | 0.00000 | 165 | 167 | 0 | 4000.00 | 0.00 |
| 167 | 0.835000 | 5.00 | 1.000 | 16 | 89.580 | 89.580 | 2 | 0.00000 | 166 | 0 | 0 | 4000.00 | 0.00 |
| 168 | 0.835000 | 5.00 | 13.358 | 4 | 89.000 | 91.000 | 2 | 0.00000 | 141 | 169 | 0 | 4000.00 | 0.00 |
| 169 | 0.835000 | 35.00 | 2.002 | 3 | 91.000 | 91.000 | 2 | 0.00000 | 168 | 170 | 0 | 4000.00 | 0.00 |
| 170 | 0.835000 | 10.00 | 4.340 | 3 | 91.000 | 91.000 | 2 | 0.00000 | 169 | 171 | 0 | 4000.00 | 0.00 |
| 171 | 0.835000 | 75.00 | 1.312 | 4 | 91.000 | 91.000 | 2 | 0.00000 | 170 | 172 | 0 | 4000.00 | 0.00 |
| 172 | 0.835000 | 45.00 | 2.002 | 3 | 91.000 | 91.000 | 2 | 0.00000 | 171 | 173 | 0 | 4000.00 | 0.00 |
| 173 | 0.835000 | 5.00 | 3.338 | 4 | 91.000 | 91.000 | 2 | 0.00000 | 172 | 174 | 0 | 4000.00 | 0.00 |
| 174 | 0.835000 | 15.00 | 1.779 | 4 | 91.000 | 96.040 | 2 | 0.00000 | 173 | 175 | 0 | 4000.00 | 0.00 |
| 175 | 0.835000 | 15.00 | 2.559 | 4 | 96.040 | 96.000 | 2 | 0.00000 | 174 | 176 | 0 | 4000.00 | 0.00 |
| 176 | 0.835000 | 95.00 | 1.176 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 175 | 177 | 0 | 4000.00 | 0.00 |
| 177 | 0.835000 | 55.00 | 1.213 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 176 | 178 | 0 | 4000.00 | 0.00 |
| 178 | 0.835000 | 5.00 | 3.338 | 4 | 96.000 | 91.000 | 2 | 0.00000 | 177 | 179 | 0 | 4000.00 | 0.00 |
| 179 | 0.835000 | 50.00 | 1.795 | 4 | 91.000 | 93.000 | 2 | 0.00000 | 178 | 180 | 0 | 4000.00 | 0.00 |
| 180 | 0.835000 | 80.00 | 1.146 | 4 | 93.000 | 93.000 | 2 | 0.00000 | 179 | 181 | 0 | 4000.00 | 0.00 |
| 181 | 0.835000 | 25.00 | 3.472 | 3 | 93.000 | 93.000 | 2 | 0.00000 | 180 | 29 | 1 | 4000.00 | 0.00 |
| 182 | 0.336000 | 45.00 | 1.866 | 3 | 91.000 | 96.000 | 2 | 0.00000 | 169 | 183 | 0 | 4000.00 | 0.00 |
| 183 | 0.336000 | 120.00 | 1.482 | 4 | 96.000 | 149.000 | 2 | 0.00000 | 182 | 184 | 0 | 4000.00 | 0.00 |
| 184 | 0.256000 | 205.00 | 1.092 | 16 | 149.000 | 142.500 | 2 | 0.00000 | 183 | 0 | 0 | 4000.00 | 0.00 |
| 185 | 0.256000 | 60.00 | 1.674 | 16 | 96.000 | 59.000 | 2 | 0.00000 | 182 | 0 | 0 | 4000.00 | 0.00 |
| 186 | 0.336000 | 10.00 | 4.427 | 3 | 91.000 | 94.800 | 2 | 0.00000 | 170 | 187 | 0 | 4000.00 | 0.00 |
| 187 | 0.336000 | 55.00 | 1.586 | 3 | 94.800 | 113.000 | 2 | 0.00000 | 186 | 188 | 0 | 4000.00 | 0.00 |
| 188 | 0.336000 | 230.00 | 1.231 | 4 | 113.000 | 146.000 | 2 | 0.00000 | 187 | 189 | 0 | 4000.00 | 0.00 |
| 189 | 0.256000 | 105.00 | 1.111 | 16 | 146.000 | 143.000 | 2 | 0.00000 | 188 | 0 | 0 | 4000.00 | 0.00 |
| 190 | 0.256000 | 100.00 | 1.297 | 16 | 94.800 | 83.700 | 2 | 0.00000 | 186 | 0 | 0 | 4000.00 | 0.00 |
| 191 | 0.256000 | 75.00 | 1.416 | 16 | 113.000 | 107.000 | 2 | 0.00000 | 187 | 0 | 0 | 4000.00 | 0.00 |
| 192 | 0.336000 | 5.00 | 7.854 | 4 | 91.000 | 95.000 | 2 | 0.00000 | 172 | 193 | 0 | 4000.00 | 0.00 |
| 193 | 0.336000 | 240.00 | 1.316 | 4 | 95.000 | 150.000 | 2 | 0.00000 | 192 | 194 | 0 | 4000.00 | 0.00 |
| 194 | 0.256000 | 180.00 | 1.105 | 16 | 150.000 | 142.000 | 2 | 0.00000 | 193 | 0 | 0 | 4000.00 | 0.00 |
| 195 | 0.665000 | 15.00 | 4.015 | 4 | 96.500 | 96.500 | 2 | 0.00000 | 54 | 196 | 0 | 4000.00 | 0.00 |
| 196 | 0.665000 | 11.00 | 2.197 | 4 | 96.500 | 94.500 | 2 | 0.00000 | 195 | 197 | 0 | 4400.00 | 0.00 |
| 197 | 0.665000 | 20.00 | 1.658 | 4 | 94.500 | 96.600 | 2 | 0.00000 | 196 | 198 | 0 | 4000.00 | 0.00 |
| 198 | 0.665000 | 115.00 | 1.000 | 4 | 96.600 | 96.600 | 2 | 0.00000 | 197 | 199 | 0 | 4000.00 | 0.00 |
| 199 | 0.665000 | 220.00 | 1.120 | 3 | 96.600 | 94.000 | 2 | 0.00000 | 198 | 200 | 0 | 4000.00 | 0.00 |
| 200 | 0.665000 | 20.00 | 2.862 | 4 | 94.000 | 94.750 | 2 | 0.00000 | 199 | 201 | 0 | 4000.00 | 0.00 |
| 201 | 0.665000 | 20.00 | 1.000 | 4 | 94.750 | 94.750 | 2 | 0.00000 | 200 | 202 | 0 | 4000.00 | 0.00 |
| 202 | 0.665000 | 20.00 | 2.197 | 4 | 94.750 | 94.750 | 2 | 0.00000 | 201 | 203 | 0 | 4000.00 | 0.00 |
| 203 | 0.665000 | 15.00 | 1.000 | 4 | 94.750 | 94.750 | 2 | 0.00000 | 202 | 204 | 0 | 4000.00 | 0.00 |
| 204 | 0.665000 | 30.00 | 1.973 | 3 | 94.750 | 84.100 | 2 | 0.00000 | 203 | 205 | 0 | 4000.00 | 0.00 |
| 205 | 0.665000 | 15.00 | 1.621 | 4 | 84.100 | 69.500 | 2 | 0.00000 | 204 | 206 | 0 | 4000.00 | 0.00 |
| 206 | 0.665000 | 15.00 | 1.887 | 3 | 69.500 | 69.500 | 2 | 0.00000 | 205 | 207 | 0 | 4000.00 | 0.00 |
| 207 | 0.665000 | 20.00 | 1.465 | 4 | 69.500 | 69.500 | 2 | 0.00000 | 206 | 208 | 0 | 4000.00 | 0.00 |
| 208 | 0.665000 | 20.00 | 4.125 | 3 | 69.500 | 61.750 | 2 | 0.00000 | 207 | 209 | 0 | 4000.00 | 0.00 |
| 209 | 0.665000 | 70.00 | 1.454 | 4 | 61.750 | 62.750 | 2 | 0.00000 | 208 | 210 | 0 | 4000.00 | 0.00 |
| 210 | 0.665000 | 5.00 | 6.320 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 209 | 211 | 0 | 4000.00 | 0.00 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 211 | 0.665000 | 50.00 | 1.293 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 210 | 212 | 0 | 4000.00 | 0.00 |
| 212 | 0.665000 | 20.00 | 2.330 | 3 | 62.750 | 62.750 | 2 | 0.00000 | 211 | 213 | 0 | 4000.00 | 0.00 |
| 213 | 0.665000 | 25.00 | 2.277 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 212 | 214 | 0 | 4000.00 | 0.00 |
| 214 | 0.665000 | 20.00 | 1.665 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 213 | 215 | 0 | 4000.00 | 0.00 |
| 215 | 0.665000 | 45.00 | 1.414 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 214 | 216 | 0 | 4000.00 | 0.00 |
| 216 | 0.665000 | 20.00 | 1.665 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 215 | 217 | 0 | 4000.00 | 0.00 |
| 217 | 0.665000 | 85.00 | 2.033 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 216 | 218 | 0 | 4000.00 | 0.00 |
| 218 | 0.665000 | 5.00 | 3.660 | 3 | 62.750 | 62.750 | 2 | 0.00000 | 217 | 219 | 0 | 4000.00 | 0.00 |
| 219 | 0.665000 | 25.00 | 2.649 | 3 | 62.750 | 66.000 | 2 | 0.00000 | 218 | 220 | 0 | 4000.00 | 0.00 |
| 220 | 0.665000 | 30.00 | 1.749 | 4 | 66.000 | 96.000 | 2 | 0.00000 | 219 | 221 | 0 | 4000.00 | 0.00 |
| 221 | 0.665000 | 20.00 | 1.329 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 220 | 222 | 0 | 4000.00 | 0.00 |
| 222 | 0.665000 | 5.00 | 4.977 | 4 | 96.000 | 94.400 | 2 | 0.00000 | 221 | 223 | 0 | 4000.00 | 0.00 |
| 223 | 0.665000 | 95.00 | 1.139 | 4 | 94.400 | 97.000 | 2 | 0.00000 | 222 | 224 | 0 | 4000.00 | 0.00 |
| 224 | 0.665000 | 35.00 | 1.646 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 223 | 225 | 0 | 4000.00 | 0.00 |
| 225 | 0.665000 | 65.00 | 1.614 | 4 | 97.000 | 96.500 | 2 | 0.00000 | 224 | 226 | 0 | 4000.00 | 0.00 |
| 226 | 0.665000 | 35.00 | 1.000 | 4 | 96.500 | 96.500 | 2 | 0.00000 | 225 | 227 | 0 | 4000.00 | 0.00 |
| 227 | 0.665000 | 35.00 | 1.830 | 4 | 96.500 | 94.200 | 2 | 0.00000 | 226 | 228 | 0 | 4000.00 | 0.00 |
| 228 | 0.665000 | 35.00 | 1.266 | 4 | 94.200 | 96.200 | 2 | 0.00000 | 227 | 229 | 0 | 4000.00 | 0.00 |
| 229 | 0.665000 | 120.00 | 1.377 | 3 | 96.200 | 95.800 | 2 | 0.00000 | 228 | 69 | 1 | 4000.00 | 0.00 |
| 230 | 0.665000 | 10.00 | 6.453 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 12 | 231 | 0 | 4000.00 | 0.00 |
| 231 | 0.665000 | 25.00 | 1.372 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 230 | 232 | 0 | 4000.00 | 0.00 |
| 232 | 0.665000 | 150.00 | 1.062 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 231 | 233 | 0 | 4000.00 | 0.00 |
| 233 | 0.665000 | 135.00 | 1.069 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 232 | 234 | 0 | 4000.00 | 0.00 |
| 234 | 0.665000 | 45.00 | 1.146 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 233 | 235 | 0 | 4000.00 | 0.00 |
| 235 | 0.665000 | 20.00 | 1.658 | 4 | 96.900 | 95.000 | 2 | 0.00000 | 234 | 236 | 0 | 4000.00 | 0.00 |
| 236 | 0.665000 | 35.00 | 1.564 | 4 | 95.000 | 95.500 | 2 | 0.00000 | 235 | 237 | 0 | 4000.00 | 0.00 |
| 237 | 0.665000 | 15.00 | 1.621 | 4 | 95.500 | 96.000 | 2 | 0.00000 | 236 | 238 | 0 | 4000.00 | 0.00 |
| 238 | 0.665000 | 30.00 | 1.621 | 4 | 96.000 | 72.000 | 2 | 0.00000 | 237 | 239 | 0 | 4000.00 | 0.00 |
| 239 | 0.665000 | 5.00 | 3.660 | 3 | 72.000 | 67.000 | 2 | 0.00000 | 238 | 240 | 0 | 4000.00 | 0.00 |
| 240 | 0.665000 | 75.00 | 1.497 | 4 | 67.000 | 64.250 | 2 | 0.00000 | 239 | 241 | 0 | 4000.00 | 0.00 |
| 241 | 0.665000 | 35.00 | 1.000 | 4 | 64.250 | 64.250 | 2 | 0.00000 | 240 | 242 | 0 | 4000.00 | 0.00 |
| 242 | 0.665000 | 65.00 | 1.286 | 4 | 64.250 | 61.750 | 2 | 0.00000 | 241 | 243 | 0 | 4000.00 | 0.00 |
| 243 | 0.665000 | 20.00 | 2.995 | 3 | 61.750 | 61.750 | 2 | 0.00000 | 242 | 244 | 0 | 4000.00 | 0.00 |
| 244 | 0.665000 | 5.00 | 2.064 | 4 | 61.750 | 61.750 | 2 | 0.00000 | 243 | 245 | 0 | 4000.00 | 0.00 |
| 245 | 0.665000 | 20.00 | 2.260 | 4 | 61.750 | 62.750 | 2 | 0.00000 | 244 | 246 | 0 | 4000.00 | 0.00 |
| 246 | 0.665000 | 15.00 | 1.887 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 245 | 247 | 0 | 4000.00 | 0.00 |
| 247 | 0.665000 | 10.00 | 2.330 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 246 | 248 | 0 | 4000.00 | 0.00 |
| 248 | 0.665000 | 15.00 | 1.887 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 247 | 249 | 0 | 4000.00 | 0.00 |
| 249 | 0.665000 | 35.00 | 1.380 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 248 | 250 | 0 | 4000.00 | 0.00 |
| 250 | 0.665000 | 100.00 | 1.000 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 249 | 251 | 0 | 4000.00 | 0.00 |
| 251 | 0.665000 | 10.00 | 3.647 | 4 | 62.750 | 62.500 | 2 | 0.00000 | 250 | 252 | 0 | 4000.00 | 0.00 |
| 252 | 0.665000 | 30.00 | 1.749 | 4 | 62.500 | 67.900 | 2 | 0.00000 | 251 | 253 | 0 | 4000.00 | 0.00 |
| 253 | 0.665000 | 30.00 | 1.310 | 4 | 67.900 | 96.000 | 2 | 0.00000 | 252 | 254 | 0 | 4000.00 | 0.00 |
| 254 | 0.665000 | 20.00 | 2.317 | 4 | 96.000 | 97.000 | 2 | 0.00000 | 253 | 255 | 0 | 4000.00 | 0.00 |
| 255 | 0.665000 | 145.00 | 1.000 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 254 | 256 | 0 | 4000.00 | 0.00 |
| 256 | 0.665000 | 35.00 | 1.752 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 255 | 257 | 0 | 4000.00 | 0.00 |
| 257 | 0.665000 | 60.00 | 1.110 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 256 | 258 | 0 | 4000.00 | 0.00 |
| 258 | 0.665000 | 40.00 | 1.165 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 257 | 259 | 0 | 4000.00 | 0.00 |
| 259 | 0.665000 | 5.00 | 3.660 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 258 | 260 | 0 | 4000.00 | 0.00 |
| 260 | 0.665000 | 45.00 | 1.118 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 259 | 261 | 0 | 4000.00 | 0.00 |
| 261 | 0.665000 | 15.00 | 4.538 | 3 | 97.000 | 95.500 | 2 | 0.00000 | 260 | 71 | 1 | 4000.00 | 0.00 |
| 262 | 0.505000 | 20.00 | 2.315 | 4 | 61.750 | 63.000 | 2 | 0.00000 | 243 | 263 | 0 | 4000.00 | 0.00 |
| 263 | 0.505000 | 10.00 | 3.318 | 4 | 63.000 | 56.000 | 2 | 0.00000 | 262 | 264 | 0 | 4000.00 | 0.00 |
| 264 | 0.505000 | 30.00 | 2.380 | 4 | 56.000 | 61.750 | 2 | 0.00000 | 263 | 265 | 0 | 4000.00 | 0.00 |
| 265 | 0.505000 | 5.00 | 3.020 | 3 | 61.750 | 62.900 | 2 | 0.00000 | 264 | 266 | 0 | 4000.00 | 0.00 |
| 266 | 0.505000 | 5.00 | 10.494 | 4 | 62.900 | 67.000 | 2 | 0.00000 | 265 | 267 | 0 | 4000.00 | 0.00 |
| 267 | 0.505000 | 5.00 | 3.828 | 4 | 67.000 | 67.000 | 2 | 0.00000 | 266 | 268 | 0 | 4000.00 | 0.00 |
| 268 | 0.505000 | 65.00 | 1.155 | 3 | 67.000 | 67.000 | 2 | 0.00000 | 267 | 269 | 0 | 4000.00 | 0.00 |
| 269 | 0.505000 | 15.00 | 1.000 | 4 | 67.000 | 67.000 | 2 | 0.00000 | 268 | 270 | 0 | 4000.00 | 0.00 |
| 270 | 0.505000 | 35.00 | 1.866 | 3 | 67.000 | 67.000 | 2 | 0.00000 | 269 | 271 | 0 | 4000.00 | 0.00 |
| 271 | 0.256000 | 25.00 | 1.143 | 4 | 67.000 | 67.000 | 2 | 0.00000 | 270 | 272 | 0 | 4000.00 | 0.00 |
| 272 | 0.256000 | 10.00 | 3.099 | 4 | 67.000 | 65.000 | 2 | 0.00000 | 271 | 273 | 0 | 4000.00 | 0.00 |
| 273 | 0.256000 | 55.00 | 1.289 | 16 | 65.000 | 94.500 | 2 | 0.00000 | 272 | 0 | 0 | 4000.00 | 0.00 |
| 274 | 0.505000 | 15.00 | 1.000 | 3 | 62.900 | 63.900 | 2 | 0.00000 | 265 | 275 | 0 | 4000.00 | 0.00 |
| 275 | 0.505000 | 15.00 | 1.741 | 3 | 63.900 | 68.200 | 2 | 0.00000 | 274 | 276 | 0 | 4000.00 | 0.00 |
| 276 | 0.336000 | 135.00 | 1.170 | 4 | 68.200 | 71.500 | 2 | 0.00000 | 275 | 277 | 0 | 4000.00 | 0.00 |
| 277 | 0.336000 | 40.00 | 1.773 | 16 | 71.500 | 61.500 | 2 | 0.00000 | 276 | 0 | 0 | 4000.00 | 0.00 |
| 278 | 0.336000 | 20.00 | 2.518 | 16 | 68.200 | 61.500 | 2 | 0.00000 | 275 | 0 | 0 | 4000.00 | 0.00 |
| 279 | 0.505000 | 85.00 | 2.305 | 4 | 69.500 | 68.750 | 2 | 0.00000 | 206 | 280 | 0 | 4000.00 | 0.00 |
| 280 | 0.505000 | 10.00 | 2.010 | 3 | 68.750 | 68.750 | 2 | 0.00000 | 279 | 281 | 0 | 4000.00 | 0.00 |
| 281 | 0.505000 | 45.00 | 1.382 | 4 | 68.750 | 68.750 | 2 | 0.00000 | 280 | 282 | 0 | 4000.00 | 0.00 |
| 282 | 0.505000 | 10.00 | 1.707 | 4 | 68.750 | 68.750 | 2 | 0.00000 | 281 | 283 | 0 | 4000.00 | 0.00 |
| 283 | 0.505000 | 70.00 | 1.447 | 3 | 68.750 | 68.750 | 2 | 0.00000 | 282 | 284 | 0 | 4000.00 | 0.00 |
| 284 | 0.505000 | 20.00 | 1.354 | 4 | 68.750 | 68.750 | 2 | 0.00000 | 283 | 285 | 0 | 4000.00 | 0.00 |
| 285 | 0.505000 | 5.00 | 2.414 | 4 | 68.750 | 65.500 | 2 | 0.00000 | 284 | 286 | 0 | 4000.00 | 0.00 |
| 286 | 0.505000 | 25.00 | 1.404 | 3 | 65.500 | 65.500 | 2 | 0.00000 | 285 | 287 | 0 | 4000.00 | 0.00 |
| 287 | 0.336000 | 65.00 | 1.868 | 4 | 65.500 | 113.000 | 2 | 0.00000 | 286 | 288 | 0 | 4000.00 | 0.00 |
| 288 | 0.336000 | 35.00 | 2.150 | 3 | 113.000 | 147.000 | 2 | 0.00000 | 287 | 289 | 0 | 4000.00 | 0.00 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 289 | 0.256000 | 55.00 | 1.419 | 4 | 147.000 | 178.000 | 2 | 0.00000 | 288 | 290 | 0 | 4000.00 | 0.00 |
| 290 | 0.256000 | 10.00 | 1.000 | 16 | 178.000 | 178.000 | 2 | 0.00000 | 289 | 0 | 0 | 4000.00 | 0.00 |
| 291 | 0.256000 | 35.00 | 1.247 | 16 | 147.000 | 159.750 | 2 | 0.00000 | 288 | 0 | 0 | 4000.00 | 0.00 |
| 292 | 0.256000 | 115.00 | 1.686 | 16 | 67.000 | 128.500 | 2 | 0.00000 | 239 | 0 | 0 | 4000.00 | 0.00 |
| 293 | 0.336000 | 5.00 | 7.451 | 4 | 65.710 | 62.500 | 2 | 0.00000 | 219 | 294 | 0 | 4000.00 | 0.00 |
| 294 | 0.336000 | 60.00 | 1.112 | 4 | 62.500 | 62.500 | 2 | 0.00000 | 293 | 295 | 0 | 4000.00 | 0.00 |
| 295 | 0.336000 | 40.00 | 1.907 | 4 | 62.500 | 93.500 | 2 | 0.00000 | 294 | 296 | 0 | 4000.00 | 0.00 |
| 296 | 0.336000 | 45.00 | 1.729 | 3 | 93.500 | 126.800 | 2 | 0.00000 | 295 | 297 | 0 | 4000.00 | 0.00 |
| 297 | 0.336000 | 45.00 | 1.149 | 3 | 126.800 | 142.000 | 2 | 0.00000 | 296 | 298 | 0 | 4000.00 | 0.00 |
| 298 | 0.336000 | 40.00 | 1.571 | 3 | 142.000 | 154.500 | 2 | 0.00000 | 297 | 299 | 0 | 4000.00 | 0.00 |
| 299 | 0.256000 | 95.00 | 1.107 | 16 | 154.500 | 155.500 | 2 | 0.00000 | 298 | 0 | 0 | 4000.00 | 0.00 |
| 300 | 0.256000 | 100.00 | 1.623 | 16 | 142.000 | 143.000 | 2 | 0.00000 | 297 | 0 | 0 | 4000.00 | 0.00 |
| 301 | 0.336000 | 25.00 | 2.452 | 3 | 154.500 | 156.300 | 2 | 0.00000 | 298 | 302 | 0 | 4000.00 | 0.00 |
| 302 | 0.336000 | 45.00 | 1.893 | 4 | 156.300 | 172.300 | 2 | 0.00000 | 301 | 303 | 0 | 4000.00 | 0.00 |
| 303 | 0.256000 | 55.00 | 1.304 | 4 | 172.300 | 178.000 | 2 | 0.00000 | 302 | 304 | 0 | 4000.00 | 0.00 |
| 304 | 0.256000 | 10.00 | 1.000 | 16 | 178.000 | 178.000 | 2 | 0.00000 | 303 | 0 | 0 | 4000.00 | 0.00 |
| 305 | 0.336000 | 5.00 | 6.376 | 4 | 156.300 | 156.300 | 2 | 0.00000 | 301 | 306 | 0 | 4000.00 | 0.00 |
| 306 | 0.256000 | 130.00 | 1.405 | 16 | 156.300 | 156.300 | 2 | 0.00000 | 305 | 0 | 0 | 4000.00 | 0.00 |
| 307 | 0.336000 | 105.00 | 1.914 | 4 | 126.800 | 155.000 | 2 | 0.00000 | 296 | 308 | 0 | 4000.00 | 0.00 |
| 308 | 0.256000 | 130.00 | 1.287 | 19 | 155.000 | 206.300 | 2 | 0.00000 | 307 | 309 | 0 | 4000.00 | 0.00 |
| 309 | 0.256000 | 20.00 | 1.000 | 16 | 206.300 | 203.000 | 2 | 0.00000 | 308 | 0 | 0 | 4000.00 | 0.00 |
| 310 | 0.336000 | 10.00 | 5.301 | 3 | 62.750 | 71.500 | 2 | 0.00000 | 212 | 311 | 0 | 4000.00 | 0.00 |
| 311 | 0.336000 | 65.00 | 1.424 | 3 | 71.500 | 133.500 | 2 | 0.00000 | 310 | 312 | 0 | 4000.00 | 0.00 |
| 312 | 0.256000 | 15.00 | 1.439 | 4 | 133.500 | 147.300 | 2 | 0.00000 | 311 | 313 | 0 | 4000.00 | 0.00 |
| 313 | 0.256000 | 60.00 | 1.281 | 4 | 147.300 | 165.100 | 2 | 0.00000 | 312 | 314 | 0 | 4000.00 | 0.00 |
| 314 | 0.256000 | 30.00 | 1.527 | 16 | 165.100 | 160.000 | 2 | 0.00000 | 313 | 0 | 0 | 4000.00 | 0.00 |
| 315 | 0.256000 | 25.00 | 1.407 | 16 | 71.500 | 81.500 | 2 | 0.00000 | 310 | 0 | 0 | 4000.00 | 0.00 |
| 316 | 0.336000 | 10.00 | 3.688 | 4 | 133.500 | 133.500 | 2 | 0.00000 | 311 | 317 | 0 | 4000.00 | 0.00 |
| 317 | 0.256000 | 80.00 | 1.717 | 16 | 133.500 | 141.500 | 2 | 0.00000 | 316 | 0 | 0 | 4000.00 | 0.00 |
| 318 | 0.336000 | 10.00 | 6.443 | 4 | 68.750 | 66.700 | 2 | 0.00000 | 283 | 319 | 0 | 4000.00 | 0.00 |
| 319 | 0.336000 | 100.00 | 1.672 | 3 | 66.700 | 120.000 | 2 | 0.00000 | 318 | 320 | 0 | 4000.00 | 0.00 |
| 320 | 0.336000 | 15.00 | 2.792 | 3 | 120.000 | 132.000 | 2 | 0.00000 | 319 | 321 | 0 | 4000.00 | 0.00 |
| 321 | 0.336000 | 15.00 | 1.448 | 4 | 132.000 | 146.000 | 2 | 0.00000 | 320 | 322 | 0 | 4000.00 | 0.00 |
| 322 | 0.256000 | 55.00 | 1.604 | 16 | 146.000 | 163.500 | 2 | 0.00000 | 321 | 0 | 0 | 4000.00 | 0.00 |
| 323 | 0.256000 | 25.00 | 1.492 | 16 | 120.000 | 128.500 | 2 | 0.00000 | 319 | 0 | 0 | 4000.00 | 0.00 |
| 324 | 0.336000 | 45.00 | 1.806 | 3 | 132.000 | 132.000 | 2 | 0.00000 | 320 | 325 | 0 | 4000.00 | 0.00 |
| 325 | 0.256000 | 30.00 | 2.263 | 16 | 132.000 | 157.500 | 2 | 0.00000 | 324 | 0 | 0 | 4000.00 | 0.00 |
| 326 | 0.256000 | 35.00 | 1.188 | 16 | 132.000 | 141.500 | 2 | 0.00000 | 324 | 0 | 0 | 4000.00 | 0.00 |
| 327 | 0.336000 | 30.00 | 2.456 | 4 | 63.900 | 68.100 | 2 | 0.00000 | 274 | 328 | 0 | 4000.00 | 0.00 |
| 328 | 0.336000 | 90.00 | 1.939 | 3 | 68.100 | 134.000 | 2 | 0.00000 | 327 | 329 | 0 | 4000.00 | 0.00 |
| 329 | 0.336000 | 45.00 | 1.612 | 4 | 134.000 | 132.000 | 2 | 0.00000 | 328 | 330 | 0 | 4000.00 | 0.00 |
| 330 | 0.362000 | 90.00 | 1.181 | 16 | 132.000 | 141.500 | 2 | 0.00000 | 329 | 0 | 0 | 4000.00 | 0.00 |
| 331 | 0.336000 | 15.00 | 3.554 | 3 | 134.000 | 147.000 | 2 | 0.00000 | 328 | 332 | 0 | 4000.00 | 0.00 |
| 332 | 0.256000 | 10.00 | 1.200 | 4 | 147.000 | 150.000 | 2 | 0.00000 | 331 | 333 | 0 | 4000.00 | 0.00 |
| 333 | 0.256000 | 10.00 | 1.200 | 16 | 150.000 | 159.000 | 2 | 0.00000 | 332 | 0 | 0 | 4000.00 | 0.00 |
| 334 | 0.256000 | 50.00 | 1.451 | 19 | 147.000 | 159.75 | 2 | 0.00000 | 331 | 335 | 0 | 4000.00 | 0.00 |
| 335 | 0.090000 | 10.00 | 1.000 | 16 | 159.750 | 159.000 | 2 | 0.00000 | 334 | 0 | 0 | 4000.00 | 0.00 |
| 336 | 0.336000 | 10.00 | 6.712 | 4 | 67.000 | 65.000 | 2 | 0.00000 | 268 | 337 | 0 | 4000.00 | 0.00 |
| 337 | 0.336000 | 90.00 | 1.538 | 3 | 65.000 | 115.200 | 2 | 0.00000 | 336 | 338 | 0 | 4000.00 | 0.00 |
| 338 | 0.336000 | 40.00 | 1.403 | 3 | 115.200 | 133.800 | 2 | 0.00000 | 337 | 339 | 0 | 4000.00 | 0.00 |
| 339 | 0.336000 | 50.00 | 2.423 | 3 | 133.800 | 133.300 | 2 | 0.00000 | 338 | 340 | 0 | 4000.00 | 0.00 |
| 340 | 0.336000 | 10.00 | 3.016 | 3 | 133.300 | 133.300 | 2 | 0.00000 | 339 | 341 | 0 | 4000.00 | 0.00 |
| 341 | 0.256000 | 45.00 | 1.340 | 16 | 133.300 | 141.500 | 2 | 0.00000 | 340 | 0 | 0 | 4000.00 | 0.00 |
| 342 | 0.256000 | 15.00 | 1.678 | 16 | 133.300 | 141.500 | 2 | 0.00000 | 340 | 0 | 0 | 4000.00 | 0.00 |
| 343 | 0.256000 | 10.00 | 1.300 | 16 | 133.800 | 141.500 | 2 | 0.00000 | 338 | 0 | 0 | 4000.00 | 0.00 |
| 344 | 0.256000 | 35.00 | 1.644 | 16 | 133.300 | 128.500 | 2 | 0.00000 | 339 | 0 | 0 | 4000.00 | 0.00 |
| 345 | 0.256000 | 5.00 | 5.813 | 3 | 115.200 | 115.200 | 2 | 0.00000 | 337 | 346 | 0 | 4000.00 | 0.00 |
| 346 | 0.256000 | 80.00 | 1.288 | 3 | 115.200 | 116.500 | 2 | 0.00000 | 345 | 347 | 0 | 4000.00 | 0.00 |
| 347 | 0.256000 | 55.00 | 1.726 | 16 | 116.500 | 141.500 | 2 | 0.00000 | 346 | 0 | 0 | 4000.00 | 0.00 |
| 348 | 0.256000 | 15.00 | 2.601 | 16 | 116.500 | 128.500 | 2 | 0.00000 | 346 | 0 | 0 | 4000.00 | 0.00 |
| 349 | 0.256000 | 50.00 | 1.594 | 16 | 115.200 | 106.500 | 2 | 0.00000 | 345 | 0 | 0 | 4000.00 | 0.00 |
| 350 | 0.505000 | 175.00 | 1.669 | 4 | 68.750 | 140.000 | 2 | 0.00000 | 280 | 351 | 0 | 4000.00 | 0.00 |
| 351 | 0.336000 | 50.00 | 1.000 | 16 | 140.000 | 138.000 | 2 | 0.00000 | 350 | 0 | 0 | 4000.00 | 0.00 |
| 352 | 0.336000 | 10.00 | 4.226 | 4 | 67.000 | 65.000 | 2 | 0.00000 | 270 | 353 | 0 | 4000.00 | 0.00 |
| 353 | 0.336000 | 80.00 | 1.285 | 4 | 65.000 | 105.700 | 2 | 0.00000 | 352 | 354 | 0 | 4000.00 | 0.00 |
| 354 | 0.336000 | 80.00 | 1.630 | 3 | 105.700 | 130.500 | 2 | 0.00000 | 353 | 355 | 0 | 4000.00 | 0.00 |
| 355 | 0.256000 | 30.00 | 1.458 | 4 | 130.500 | 147.500 | 2 | 0.00000 | 354 | 356 | 0 | 4000.00 | 0.00 |
| 356 | 0.256000 | 25.00 | 1.225 | 4 | 147.500 | 141.500 | 2 | 0.00000 | 355 | 357 | 0 | 4000.00 | 0.00 |
| 357 | 0.162000 | 50.00 | 1.843 | 16 | 141.500 | 141.500 | 2 | 0.00000 | 356 | 0 | 0 | 4000.00 | 0.00 |
| 358 | 0.336000 | 5.00 | 5.570 | 4 | 130.500 | 130.500 | 2 | 0.00000 | 354 | 359 | 0 | 4000.00 | 0.00 |
| 359 | 0.162000 | 35.00 | 1.759 | 16 | 130.500 | 132.200 | 2 | 0.00000 | 358 | 0 | 0 | 4000.00 | 0.00 |
| 360 | 0.336000 | 45.00 | 2.343 | 4 | 94.500 | 115.800 | 2 | 0.00000 | 152 | 361 | 0 | 4000.00 | 0.00 |
| 361 | 0.336000 | 15.00 | 1.448 | 3 | 115.800 | 130.600 | 2 | 0.00000 | 360 | 362 | 0 | 4000.00 | 0.00 |
| 362 | 0.256000 | 50.00 | 1.510 | 19 | 130.600 | 176.000 | 2 | 0.00000 | 361 | 363 | 0 | 4000.00 | 0.00 |
| 363 | 0.256000 | 15.00 | 1.000 | 16 | 176.000 | 176.000 | 2 | 0.00000 | 362 | 0 | 0 | 4000.00 | 0.00 |
| 364 | 0.362000 | 145.00 | 1.539 | 16 | 130.600 | 129.600 | 2 | 0.00000 | 361 | 0 | 0 | 4000.00 | 0.00 |
| 365 | 0.336000 | 65.00 | 1.940 | 3 | 92.000 | 118.400 | 2 | 0.00000 | 145 | 366 | 0 | 4000.00 | 0.00 |
| 366 | 0.336000 | 20.00 | 1.544 | 3 | 118.400 | 118.400 | 2 | 0.00000 | 365 | 367 | 0 | 4000.00 | 0.00 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 367 | 0.256000 | 15.00 | 1.239 | 16 | 118.400 | 115.000 | 2 | 0.00000 | 366 | 0 | 0 | 4000.00 | 0.00 |
| 368 | 0.256000 | 20.00 | 1.947 | 16 | 118.400 | 127.000 | 2 | 0.00000 | 365 | 0 | 0 | 4000.00 | 0.00 |
| 369 | 0.336000 | 30.00 | 2.275 | 4 | 118.400 | 133.500 | 2 | 0.00000 | 366 | 370 | 0 | 4000.00 | 0.00 |
| 370 | 0.256000 | 35.00 | 1.232 | 3 | 133.500 | 166.000 | 2 | 0.00000 | 369 | 371 | 0 | 4000.00 | 0.00 |
| 371 | 0.256000 | 10.00 | 1.000 | 19 | 166.000 | 176.000 | 2 | 0.00000 | 370 | 372 | 0 | 4000.00 | 0.00 |
| 372 | 0.256000 | 20.00 | 2.970 | 16 | 176.000 | 175.000 | 2 | 0.00000 | 371 | 0 | 0 | 4000.00 | 0.00 |
| 373 | 0.256000 | 55.00 | 1.521 | 16 | 166.000 | 141.000 | 2 | 0.00000 | 370 | 0 | 0 | 4000.00 | 0.00 |
| 374 | 0.336000 | 5.00 | 6.914 | 3 | 92.000 | 94.200 | 2 | 0.00000 | 144 | 375 | 0 | 4000.00 | 0.00 |
| 375 | 0.336000 | 50.00 | 1.605 | 3 | 94.200 | 113.250 | 2 | 0.00000 | 374 | 376 | 0 | 4000.00 | 0.00 |
| 376 | 0.256000 | 30.00 | 1.100 | 16 | 113.250 | 141.750 | 2 | 0.00000 | 375 | 0 | 0 | 4000.00 | 0.00 |
| 377 | 0.256000 | 30.00 | 1.751 | 16 | 94.200 | 74.000 | 2 | 0.00000 | 374 | 0 | 0 | 4000.00 | 0.00 |
| 378 | 0.256000 | 20.00 | 2.380 | 16 | 113.300 | 111.000 | 2 | 0.00000 | 375 | 0 | 0 | 4000.00 | 0.00 |
| 379 | 0.336000 | 10.00 | 4.898 | 4 | 89.000 | 94.330 | 2 | 0.00000 | 137 | 380 | 0 | 4000.00 | 0.00 |
| 380 | 0.336000 | 5.00 | 2.344 | 3 | 94.330 | 95.000 | 2 | 0.00000 | 379 | 381 | 0 | 4000.00 | 0.00 |
| 381 | 0.336000 | 100.00 | 1.322 | 4 | 95.000 | 130.700 | 2 | 0.00000 | 380 | 382 | 0 | 4000.00 | 0.00 |
| 382 | 0.256000 | 65.00 | 1.598 | 19 | 130.700 | 176.000 | 2 | 0.00000 | 381 | 383 | 0 | 4000.00 | 0.00 |
| 383 | 0.025600 | 20.00 | 1.000 | 16 | 176.000 | 175.000 | 2 | 0.00000 | 382 | 0 | 0 | 4000.00 | 0.00 |
| 384 | 0.336000 | 50.00 | 1.859 | 3 | 95.000 | 96.500 | 2 | 0.00000 | 380 | 385 | 0 | 4000.00 | 0.00 |
| 385 | 0.256000 | 75.00 | 1.252 | 3 | 96.500 | 98.000 | 2 | 0.00000 | 384 | 386 | 0 | 4000.00 | 0.00 |
| 386 | 0.256000 | 40.00 | 1.269 | 16 | 98.000 | 71.000 | 2 | 0.00000 | 385 | 0 | 0 | 4000.00 | 0.00 |
| 387 | 0.256000 | 15.00 | 2.741 | 16 | 96.500 | 103.000 | 2 | 0.00000 | 384 | 0 | 0 | 4000.00 | 0.00 |
| 388 | 0.256000 | 40.00 | 1.922 | 16 | 98.000 | 94.500 | 2 | 0.00000 | 385 | 0 | 0 | 4000.00 | 0.00 |
| 389 | 0.336000 | 45.00 | 1.567 | 3 | 89.000 | 127.750 | 2 | 0.00000 | 135 | 390 | 0 | 4000.00 | 0.00 |
| 390 | 0.256000 | 20.00 | 1.688 | 16 | 127.750 | 141.750 | 2 | 0.00000 | 389 | 0 | 0 | 4000.00 | 0.00 |
| 391 | 0.256000 | 110.00 | 1.335 | 16 | 127.750 | 141.750 | 2 | 0.00000 | 389 | 0 | 0 | 4000.00 | 0.00 |
| 392 | 0.336000 | 5.00 | 7.854 | 3 | 94.500 | 96.800 | 2 | 0.00000 | 155 | 393 | 0 | 4000.00 | 0.00 |
| 393 | 0.256000 | 215.00 | 1.316 | 16 | 96.800 | 65.000 | 2 | 0.00000 | 392 | 0 | 0 | 4000.00 | 0.00 |
| 394 | 0.256000 | 125.00 | 1.470 | 16 | 96.800 | 141.750 | 2 | 0.00000 | 392 | 0 | 0 | 4000.00 | 0.00 |
| 395 | 0.336000 | 150.00 | 1.528 | 3 | 94.500 | 130.400 | 2 | 0.00000 | 156 | 396 | 0 | 4000.00 | 0.00 |
| 396 | 0.256000 | 155.00 | 1.280 | 19 | 130.400 | 182.000 | 2 | 0.00000 | 395 | 397 | 0 | 4000.00 | 0.00 |
| 397 | 0.256000 | 30.00 | 1.478 | 16 | 182.000 | 179.000 | 2 | 0.00000 | 396 | 0 | 0 | 4000.00 | 0.00 |
| 398 | 0.256000 | 40.00 | 1.653 | 16 | 130.400 | 141.750 | 2 | 0.00000 | 395 | 0 | 0 | 4000.00 | 0.00 |
| 399 | 0.505000 | 120.00 | 1.538 | 3 | 94.500 | 90.500 | 2 | 0.00000 | 158 | 400 | 0 | 4000.00 | 0.00 |
| 400 | 0.336000 | 5.00 | 8.007 | 4 | 90.500 | 90.500 | 2 | 0.00000 | 399 | 401 | 0 | 4000.00 | 0.00 |
| 401 | 0.256000 | 60.00 | 1.349 | 16 | 90.500 | 141.750 | 2 | 0.00000 | 400 | 0 | 0 | 4000.00 | 0.00 |
| 402 | 0.336000 | 130.00 | 1.496 | 3 | 90.500 | 65.300 | 2 | 0.00000 | 399 | 403 | 0 | 4000.00 | 0.00 |
| 403 | 0.336000 | 50.00 | 1.228 | 4 | 65.300 | 94.700 | 2 | 0.00000 | 402 | 404 | 0 | 4000.00 | 0.00 |
| 404 | 0.256000 | 55.00 | 1.315 | 16 | 94.700 | 141.750 | 2 | 0.00000 | 403 | 0 | 0 | 4000.00 | 0.00 |
| 405 | 0.336000 | 40.00 | 2.260 | 3 | 65.300 | 77.500 | 2 | 0.00000 | 402 | 406 | 0 | 4000.00 | 0.00 |
| 406 | 0.256000 | 30.00 | 1.458 | 16 | 77.500 | 103.500 | 2 | 0.00000 | 405 | 0 | 0 | 4000.00 | 0.00 |
| 407 | 0.256000 | 125.00 | 1.180 | 16 | 77.500 | 75.000 | 2 | 0.00000 | 405 | 0 | 0 | 4000.00 | 0.00 |
| 408 | 0.336000 | 135.00 | 1.552 | 4 | 79.000 | 142.000 | 2 | 0.00000 | 139 | 409 | 0 | 4000.00 | 0.00 |
| 409 | 0.336000 | 20.00 | 1.000 | 16 | 142.000 | 141.750 | 2 | 0.00000 | 408 | 0 | 0 | 4000.00 | 0.00 |
| 410 | 0.256000 | 95.00 | 1.334 | 19 | 96.200 | 174.000 | 2 | 0.00000 | 150 | 411 | 0 | 4000.00 | 0.00 |
| 411 | 0.256000 | 10.00 | 1.358 | 4 | 174.000 | 183.500 | 2 | 0.00000 | 410 | 412 | 0 | 4000.00 | 0.00 |
| 412 | 0.107000 | 60.00 | 1.439 | 4 | 183.500 | 197.500 | 2 | 0.00000 | 411 | 413 | 0 | 4000.00 | 0.00 |
| 413 | 0.107000 | 25.00 | 1.000 | 16 | 197.500 | 197.500 | 2 | 0.00000 | 412 | 0 | 0 | 4000.00 | 0.00 |
| 414 | 0.505000 | 100.00 | 2.373 | 3 | 91.940 | 138.300 | 2 | 0.00000 | 143 | 415 | 0 | 4000.00 | 0.00 |
| 415 | 0.505000 | 5.00 | 5.848 | 2 | 138.300 | 142.000 | 2 | 0.00000 | 414 | 416 | 0 | 4000.00 | 0.00 |
| 416 | 0.336000 | 5.00 | 1.000 | 4 | 142.000 | 142.000 | 2 | 0.00000 | 415 | 417 | 0 | 4000.00 | 0.00 |
| 417 | 0.336000 | 50.00 | 1.000 | 4 | 142.000 | 160.000 | 2 | 0.00000 | 416 | 418 | 0 | 4000.00 | 0.00 |
| 418 | 0.336000 | 50.00 | 1.000 | 16 | 160.000 | 160.000 | 2 | 0.00000 | 417 | 0 | 0 | 4000.00 | 0.00 |
| 419 | 0.505000 | 85.00 | 2.031 | 4 | 94.500 | 131.500 | 2 | 0.00000 | 154 | 420 | 0 | 4000.00 | 0.00 |
| 420 | 0.505000 | 50.00 | 1.443 | 4 | 131.500 | 130.750 | 2 | 0.00000 | 419 | 421 | 0 | 4000.00 | 0.00 |
| 421 | 0.505000 | 30.00 | 1.909 | 4 | 130.750 | 130.750 | 2 | 0.00000 | 420 | 422 | 0 | 4000.00 | 0.00 |
| 422 | 0.505000 | 40.00 | 2.361 | 4 | 130.750 | 128.750 | 2 | 0.00000 | 421 | 423 | 0 | 4000.00 | 0.00 |
| 423 | 0.505000 | 35.00 | 1.491 | 3 | 128.750 | 132.170 | 2 | 0.00000 | 422 | 424 | 0 | 4000.00 | 0.00 |
| 424 | 0.256000 | 10.00 | 1.505 | 4 | 132.170 | 138.000 | 2 | 0.00000 | 423 | 425 | 0 | 4000.00 | 0.00 |
| 425 | 0.162000 | 105.00 | 1.580 | 16 | 138.000 | 169.500 | 2 | 0.00000 | 424 | 0 | 0 | 4000.00 | 0.00 |
| 426 | 0.336000 | 40.00 | 1.843 | 3 | 132.170 | 132.170 | 2 | 0.00000 | 423 | 427 | 0 | 4000.00 | 0.00 |
| 427 | 0.256000 | 10.00 | 1.000 | 4 | 132.170 | 138.000 | 2 | 0.00000 | 426 | 428 | 0 | 4000.00 | 0.00 |
| 428 | 0.162000 | 100.00 | 1.632 | 16 | 138.000 | 169.500 | 2 | 0.00000 | 427 | 0 | 0 | 4000.00 | 0.00 |
| 429 | 0.256000 | 40.00 | 1.165 | 4 | 132.170 | 138.000 | 2 | 0.00000 | 426 | 430 | 0 | 4000.00 | 0.00 |
| 430 | 0.162000 | 155.00 | 1.548 | 16 | 138.000 | 169.500 | 2 | 0.00000 | 429 | 0 | 0 | 4000.00 | 0.00 |
| 431 | 0.256000 | 40.00 | 1.934 | 4 | 65.500 | 69.000 | 2 | 0.00000 | 286 | 432 | 0 | 4000.00 | 0.00 |
| 432 | 0.256000 | 105.00 | 1.020 | 4 | 69.000 | 171.000 | 2 | 0.00000 | 431 | 433 | 0 | 4000.00 | 0.00 |
| 433 | 0.162000 | 10.00 | 1.227 | 19 | 171.000 | 181.000 | 2 | 0.00000 | 432 | 434 | 0 | 4000.00 | 0.00 |
| 434 | 0.162000 | 40.00 | 1.332 | 16 | 181.000 | 180.000 | 2 | 0.00000 | 433 | 0 | 0 | 4000.00 | 0.00 |
| 435 | 0.665000 | 15.00 | 5.522 | 3 | 89.600 | 83.800 | 2 | 0.00000 | 166 | 436 | 0 | 4000.00 | 0.00 |
| 436 | 0.665000 | 5.00 | 3.660 | 3 | 83.800 | 83.800 | 2 | 0.00000 | 435 | 437 | 0 | 4000.00 | 0.00 |
| 437 | 0.665000 | 5.00 | 14.300 | 3 | 83.800 | 83.800 | 2 | 0.00000 | 436 | 438 | 0 | 4000.00 | 0.00 |
| 438 | 0.505000 | 5.00 | 4.652 | 13 | 83.800 | 88.000 | 2 | 0.00000 | 437 | 439 | 0 | 4000.00 | 0.00 |
| 439 | 0.505000 | 5.00 | 6.050 | 2 | 88.000 | 89.000 | 2 | 0.00000 | 438 | 440 | 0 | 4000.00 | 0.00 |
| 440 | 0.336000 | 60.00 | 5.000 | 1 | 89.000 | 113.000 | 2 | 0.00000 | 439 | 0 | 0 | 4000.00 | 0.00 |
| 441 | 0.665000 | 10.00 | 9.911 | 3 | 83.800 | 91.500 | 2 | 0.00000 | 437 | 442 | 0 | 4000.00 | 0.00 |
| 442 | 0.665000 | 80.00 | 1.865 | 3 | 91.500 | 102.800 | 2 | 0.00000 | 441 | 443 | 0 | 4000.00 | 0.00 |
| 443 | 0.665000 | 50.00 | 1.106 | 16 | 102.800 | 130.000 | 2 | 0.00000 | 442 | 0 | 0 | 4000.00 | 0.00 |
| 444 | 0.336000 | 10.00 | 5.435 | 16 | 102.800 | 107.800 | 2 | 0.00000 | 442 | 0 | 0 | 4000.00 | 0.00 |

# CALCULATION SHEET

| | | | |
|---|---|---|---|
| Project: | HOPE CREEK GENERATING STATION | Job Number: | 8038 |
| Calc No. | 8038-P0004 | Sheet No. | 210 |
| By: | A. Arastu Date: 9/14/18 | Rev. No. | 1 |
| Subject: | Water Hammer Analysis of the HCGS Fire Protection System | | |

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 445    0.665000     40.00    2.658  16      91.500    86.000     2     0.00000 441   0     0   4000.00        0.00
 446    0.505000      5.00    7.868  13      83.800    88.000     2     0.00000 435 447     0   4000.00        0.00
 447    0.505000      5.00    1.000   2      88.000    89.000     2     0.00000 446 448     0   4000.00        0.00
 448    0.505000     45.00    2.301   4      89.000   103.000     2     0.00000 447 449     0   4000.00        0.00
 449    0.336000     20.00    2.613   4     103.000   112.000     2     0.00000 448 450     0   4000.00        0.00
 450    0.336000    110.00    2.307   1     112.000   113.000     2     0.00000 449   0     0   4000.00        0.00
 451    0.336000    160.00    1.474   4      83.800   141.000     2     0.00000 436 452     0   4000.00        0.00
 452    0.336000      5.00    1.000   2     141.000   141.000     2     0.00000 451 453     0   4000.00        0.00
 453    0.256000     50.00    1.000   1     141.000   141.000     2     0.00000 452   0     0   4000.00        0.00
 454    0.665000     30.00    4.979   3      84.100    93.500     2     0.00000 204 455     0   4000.00        0.00
 455    0.665000     10.00    2.862   2      93.500   103.500     2     0.00000 454 456     0   4000.00        0.00
 456    0.505000     50.00    5.000   1     103.500   103.500     2     0.00000 455   0     0   4000.00        0.00
 457    0.505000     20.00    2.414   4      93.500    80.300     2     0.00000 454 458     0   4080.00        0.00
 458    0.505000     50.00    1.000  16      80.300    80.300     2     0.00000 457   0     0   4000.00        0.00
 459    0.336000     20.00    3.318   2      62.750    62.750     2     0.00000 218 460     0   4000.00        0.00
 460    0.336000     10.00    2.210   4      62.750    63.750     2     0.00000 459 461     0   4000.00        0.00
 461    0.336000     30.00    1.762   4      63.750    86.250     2     0.00000 460 462     0   4000.00        0.00
 462    0.336000     40.00    1.286   4      86.250   125.000     2     0.00000 461 463     0   4000.00        0.00
 463    0.336000    130.00    1.233   4     125.000   125.000     2     0.00000 462 464     0   4000.00        0.00
 464    0.336000     30.00    1.587   4     125.000   155.000     2     0.00000 463 465     0   4000.00        0.00
 465    0.256000     60.00    1.171   4     155.000   208.000     2     0.00000 464 466     0   4000.00        0.00
 466    0.001000     10.00    1.000  16     208.000   205.000     2     0.00000 465   0     0   4000.00        0.00
 467    0.336000     20.00    2.378   2      94.000    94.000     2     0.00000 199 468     0   4000.00        0.00
 468    0.336000     20.00    1.000   4      94.000    94.000     2     0.00000 467 469     0   4000.00        0.00
 469    0.336000      5.00    1.538   4      94.000    94.000     2     0.00000 468 470     0   4000.00        0.00
 470    0.336000     25.00    2.665   4      94.000   113.000     2     0.00000 469 471     0   4000.00        0.00
 471    0.336000     75.00    1.403   4     113.000   122.000     2     0.00000 470 472     0   4000.00        0.00
 472    0.336000     35.00    1.708   3     122.000   151.800     2     0.00000 471 473     0   4000.00        0.00
 473    0.336000     30.00    2.322   3     151.800   169.500     2     0.00000 472 474     0   4000.00        0.00
 474    0.336000     35.00    1.770   4     169.500   187.800     2     0.00000 473 475     0   4000.00        0.00
 475    0.256000     15.00    1.717   4     187.800   187.800     2     0.00000 474 476     0   4000.00        0.00
 476    0.256000    110.00    1.130   4     187.800   205.300     2     0.00000 475 477     0   4000.00        0.00
 477    0.256000     10.00    1.000  16     205.300   204.300     2     0.00000 476   0     0   4000.00        0.00
 478    0.256000     40.00    1.849  16     169.500   166.000     2     0.00000 473   0     0   4000.00        0.00
 479    0.336000     10.00    4.769   4     151.800   153.300     2     0.00000 472 480     0   4000.00        0.00
 480    0.256000     60.00    1.293  16     153.300   149.300     2     0.00000 479   0     0   4000.00        0.00
 481    0.505000      5.00   14.146   4      61.750    57.700     2     0.00000 208 482     0   4000.00        0.00
 482    0.505000     20.00    3.323   4      57.700    71.000     2     0.00000 481 483     0   4000.00        0.00
 483    0.505000     10.00    1.000   2      71.000    71.000     2     0.00000 482 484     0   4000.00        0.00
 484    0.505000     50.00    5.000   1      71.000    71.000     2     0.00000 483   0     0   4000.00        0.00
 485    0.505000      5.00   13.184   4     138.300   138.300     2     0.00000 414 486     0   4000.00        0.00
 486    0.336000     90.00    1.157   4     138.300   143.500     2     0.00000 485 487     0   4000.00        0.00
 487    0.336000     15.00    1.627   4     143.500   147.400     2     0.00000 486 488     0   4000.00        0.00
 488    0.336000     75.00    1.314   4     147.400   165.800     2     0.00000 487 489     0   4000.00        0.00
 489    0.336000     70.00    1.355   4     165.800   164.000     2     0.00000 488 490     0   4000.00        0.00
 490    0.336000     10.00    3.486   4     164.000   164.000     2     0.00000 489 491     0   4000.00        0.00
 491    0.336000     10.00    1.416   4     164.000   164.000     2     0.00000 490 492     0   4000.00        0.00
 492    0.256000     10.00    1.251   4     164.000   164.000     2     0.00000 491 493     0   4000.00        0.00
 493    0.206000     10.00    3.225   4     164.000   166.000     2     0.00000 492 494     0   4000.00        0.00
 494    0.206000     75.00    1.549   4     166.000   166.000     2     0.00000 493 495     0   4000.00        0.00
 495    0.172000     20.00    1.757  19     166.000   166.000     2     0.00000 494 496     0   4000.00        0.00
 496    0.087000     10.00    2.409  16     166.000   168.000     2     0.00000 495   0     0   4000.00        0.00
@EOR

 91 570.3   0  18
  20.00   .000     -0.022     -0.033    -0.045    -0.056    -0.067    -0.078
 -0.089  -.100     -0.111     -0.123    -0.134    -0.145    -0.156    -0.167
 -0.200   -100.0
  570.3  570.3     587.3     590.3     587.3     580.3     568.3     558.3
  542.3  520.3     490.3     460.3     420.3     370.3     310.3     240.3
   170.3  170.3

 99 495.3   0  18
   20.00   .000     -0.557     -1.114    -1.671    -2.228    -2.785    -3.342
  -3.899  -4.46     -5.013     -5.570    -6.127    -6.684    -7.241    -8.912
  -13.4   -100.0
   495.3  495.3     494.3     492.3     491.3     488.3     485.3     481.3
   477.3  472.3     466.3     459.3     448.3     436.3     423.3     375.3
   170.3  170.3

117 512.1  0 17
   20.00  -.000     -0.557    -1.114    -1.671    -2.228    -2.785    -3.342
  -3.899  -4.46     -5.013    -5.57     -6.127    -6.684    -7.241    -8.912
  -13.37
   512.1  512.1     510.1     507.1     505.1     502.1     500.1     498.1
   495.1  492.1     487.8     481.1     476.1     467.1     457.1     412.1
   160.1
```

```
123 512.1  0 17
   20.00  -.000     -0.557    -1.114    -1.671    -2.228    -2.785    -3.342
  -3.899  -4.46     -5.013    -5.57     -6.127    -6.684    -7.241    -8.912
  -13.37
   512.1  512.1     510.1     507.1     505.1     502.1     500.1     498.1
   495.1  492.1     487.8     481.1     476.1     467.1     457.1     412.1
   160.1

129 482.1   0  16
   20.00   .000     -0.022     -0.033    -0.045    -0.056    -0.067    -0.078
  -0.089  -.100     -0.111     -0.123    -0.134    -0.145    -0.156    -100.0
  482.1  482.1     478.1     473.1     463.1     448.1     428.1     403.1
  374.1  343.1     308.1     268.1     233.1     198.1     168.1     168.1

440 147.0   0   0

450 147.0   0   0

453 175.0   0   0

456 137.5   0   0

484 105.0   0   0

  4 0  100.  100. 1.0E+20   2  9  4  0  .01   416.4
0     .56   2.36    100
100.  100.  100.    100.
0     50.0   90.0  92.5   95.3   97.5      99.0      99.7       100.0
0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

 90 0  100  100  1.0E+20    2  9  3  0  .01  570.3
0       0.01  100
100     0    0
0     50.0   90.0  92.5   95.3   97.5      99.0      99.7       100.0
0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

 96 0  100  100  1.0E+20   2  9  4  0  .01  495.3
0      .63   3.43   100
100.   100.  100.   100.
0     50.0   90.0  92.5   95.3   97.5      99.0      99.7       100.0
0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

114 0  100  100  1.0E+20    2  9  4  0  .01  512.1
0       2.51  5.61   100
100     100   100.   100.
0     50.0   90.0  92.5   95.3   97.5      99.0      99.7       100.0
0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

121 0  100  100  1.0E+20    2  9  4  0  .01  512.1
0       21.93 27.13 100
100     100   0     0
0     50.0   90.0  92.5   95.3   97.5      99.0      99.7       100.0
0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

126 0  100  100  1.0E+20    2  9  3  0  .01  482.1
0       0.01  100
100     0    0
0     50.0   90.0  92.5   95.3   97.5      99.0      99.7       100.0
0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

415  0  100  100  1.0E+20   2  16  3  0  1.79  194.
0       0.1    100
100     100    100
0   11.1   16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
97.5     99.0     99.7  100.0
10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
203570   1596000  0.49259E+08  0.1E+21

439  0  100  100  1.0E+20   2  16  3  0  1.79  147.
0       0.1    100
100     100    100
0    11.1  16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
97.5     99.0     99.7  100.0
10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
203570   1596000  0.49259E+08  0.1E+21

447  0  100  100  1.0E+20   2  16  3  0  1.79  147.
0       0.01    100
```

```
 100     100     100
 0    11.1  16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
 97.5     99.0     99.7  100.0
 10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
 203570   1596000  0.49259E+08  0.1E+21

 452  0  100  100  1.0E+20   2  16  3  0  1.785  175.
 0       0.01   100
 100     100    100
 0    11.1  16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
 97.5     99.0     99.7  100.0
 10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
 203570   1596000  0.49259E+08  0.1E+21

 455  0  100  100  1.0E+20   2  16  3  0  0.695  137.5
0       0.01   100
100     0      0
0    11.1  16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
97.5     99.0     99.7  100.0
10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
 203570   1596000  0.49259E+08  0.1E+21

 459  0  100  100  1.0E+20   2  9  3  0  .01  96.8
 0       1.0   100
 100     100   100
 0     50.0   90.0  92.5   95.3   97.5      99.0      99.7        100.0
 0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

 467  0  100  100  1.0E+20   2  9  3  0  .01  128.
 0       1.0   100
 100     100   100
 0     50.0   90.0  92.5   95.3   97.5      99.0      99.7        100.0
 0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

 483  0  100  100  1.0E+20  2  16  4  0  0.99  105.0
 0       0.1   0.11  100
 100     100   100   100
 0    11.1  16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
 97.5     99.0     99.7  100.0
 10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
 203570   1596000  0.49259E+08  0.1E+21


   5  2  0.650  0.01 0.7850 0.0  ID 1.0000
 438  2  0.750  0.01 0.2003 0.0  ID 0.5050
 446  2  0.750  0.01 0.2003 0.0  ID 0.5050


308   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102

410   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102


433   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102

362   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102

396   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102


495   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
```

```
53.3   2        .102

334   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102

371   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102

382   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102


 1.          1.
 6     2
 94    2
 97    2
 102   2
 113   2
 120   2
 184   41
 188   46
 194   31
 289   11
 290    7
 291    6
 292   23
 299   17
 303   11
 304   1
 306   24
 308   26
 314   6
 322   11
 325    5
 332    2
 334    9
 347   11
 351   10
 362    9
 371   2
 376   6
 382   13
 383    3
 396   31
 409   4
 410   17
 412   11
 418   9
 425   21
 428   20
 430   32
 432   20
 433   3
 450   22
 455   2
 465   1
 466   2
 476   4
 477   22
 478   8
 480   11
 483   2
 495   4
@EOR
410      1      410     3          1
410      3      410     5          2
410      4      410     18         3
410      18     410     19         4
410      18     411     3          5
412      1      412     2          6
412      1      412     3          7
412      3      412     6          8
```

```
412       5       412      6          9
412       6       412      7          10
412       7       412      10         11
@EOR
0     20.0   1000   1
20.0  30.0    500   1
30.0  888.   1000   1
```

## B7 - Case 7 (6 inch Deluge Valve in RB w/Salem Pump #1) with Vacuum Breakers

```
HCGS FP Case 7: 11 Vacuum Breakers.  Forces in Riser # 26 only
12000
0  0  1  0  0  0
2   2   0.0  12.0
2   1   0   0
0   1   0  0  0  0  0  1 0 0
1.9  62.4  7.83E-6
1.0  2   13    0    0
       0.0    1000.0    2000.0   2.0E+04   6.0E+04   1.0E+05   3.0E+05   6.0E+05
   1.0E+06   1.5E+06   3.5E+06   1.0E+11   1.0E+33
      0.10     0.061     0.048     0.026     0.021      .019    0.0167    0.0155
    0.0150    0.0147     0.014     0.014     0.014
495.3   3  17  0    0
  -10.00   .000   .557  1.114  1.671  2.228  2.785  3.342
   3.899  4.456  5.013  5.570  6.127  6.684  7.241  8.912
   13.4
   495.3  495.3     494.3     492.3     491.3     488.3     485.3     481.3
   477.3  472.3     466.3     459.3     448.3     436.3     423.3     375.3
   170.3
   1
   1    1.104000     55.00    5.492   4      99.400    94.000     2     0.00000   0   2     0   4000.00       0.00
   2    1.000000     20.00    7.400   4      94.000   105.040     2     0.00000   1   3     0   4000.00       0.00
   3    1.000000     10.00    7.180   4     105.040   105.040     2     0.00000   2   4     0   4000.00       0.00
   4    1.000000     10.00    3.538   2     105.040   104.500     2     0.00000   3   5     0   4000.00       0.00
   5    1.000000      5.00   18.508  13     104.500   104.750     2     0.00000   4   6     0   4000.00       0.00
   6    1.000000     10.00    5.200   4     104.750   110.000     2     0.00000   5   7     0   4000.00       0.00
   7    1.000000     20.00    3.400   3     110.000   105.000     2     0.00000   6   8     0   4000.00       0.00
   8    1.000000    115.00    2.402   3     105.000    96.900     2     0.00000   7  86     0   4000.00       0.00
   9    1.007000      5.00    2.611   4      96.900    96.900     2     0.00000   8  10     0   4000.00       0.00
  10    1.007000     10.00    3.014   4      96.900    96.900     2     0.00000   9  11     0   4000.00       0.00
  11    1.007000     10.00    1.806   4      96.900    96.900     2     0.00000  10  12     0   4000.00       0.00
  12    1.007000     10.00    3.014   3      96.900    96.900     2     0.00000  11  13     0   4000.00       0.00
  13    1.007000    110.00    1.183   4      96.900    96.900     2     0.00000  12  14     0   4000.00       0.00
  14    1.007000    110.00    1.363   4      96.900    95.900     2     0.00000  13  15     0   4000.00       0.00
  15    1.007000     10.00    3.014   4      95.900    95.900     2     0.00000  14  16     0   4000.00       0.00
  16    1.007000     30.00    1.671   4      95.900    95.900     2     0.00000  15  17     0   4000.00       0.00
  17    1.007000     80.00    1.252   4      95.900    95.900     2     0.00000  16  18     0   4000.00       0.00
  18    1.007000     20.00    1.403   4      95.900    95.900     2     0.00000  17  19     0   4000.00       0.00
  19    1.007000    130.00    1.155   4      95.900    95.900     2     0.00000  18  20     0   4000.00       0.00
  20    1.007000    135.00    1.060   4      95.900    95.400     2     0.00000  19  21     0   4000.00       0.00
  21    1.007000     10.00    2.994   4      95.400    93.500     2     0.00000  20  22     0   4000.00       0.00
  22    1.007000     65.00    1.217   4      93.500    93.500     2     0.00000  21  23     0   4000.00       0.00
  23    1.007000      5.00    1.000   4      93.500    93.500     2     0.00000  22  24     0   4000.00       0.00
  24    1.007000     20.00    3.004   4      93.500    97.000     2     0.00000  23  25     0   4000.00       0.00
  25    1.007000    200.00    1.300   4      97.000    97.000     2     0.00000  24  26     0   4000.00       0.00
  26    1.007000     55.00    1.513   4      97.000    97.000     2     0.00000  25  27     0   4000.00       0.00
  27    1.007000     20.00    1.997   4      97.000    93.000     2     0.00000  26  28     0   4000.00       0.00
  28    1.007000    230.00    1.088   3      93.000    93.000     2     0.00000  27 181     0   4000.00       0.00
  29    1.007000     40.00    1.503   3      93.000    93.000     2     0.00000  28  30     0   4000.00       0.00
  30    1.007000    240.00    1.117   4      93.000    94.500     2     0.00000  29  31     0   4000.00       0.00
  31    1.007000     45.00    1.448   4      94.500    94.500     2     0.00000  30  32     0   4000.00       0.00
  32    1.007000     35.00    1.570   4      94.500    91.000     2     0.00000  31  33     0   4000.00       0.00
  33    1.007000    180.00    1.111   4      91.000    96.000     2     0.00000  32  34     0   4000.00       0.00
  34    1.007000     10.00    3.014   4      96.000    96.000     2     0.00000  33  35     0   4000.00       0.00
  35    1.007000      5.00    5.028   4      96.000    96.000     2     0.00000  34  36     0   4000.00       0.00
  36    1.007000      5.00    2.611   4      96.000    96.000     2     0.00000  35  37     0   4000.00       0.00
  37    1.007000     10.00    3.014   4      96.000    96.000     2     0.00000  36  38     0   4000.00       0.00
  38    1.007000     30.00    2.141   4      96.000    96.000     2     0.00000  37  39     0   4000.00       0.00
  39    1.007000     20.00    1.403   4      96.000    96.000     2     0.00000  38  40     0   4000.00       0.00
  40    1.007000     80.00    1.252   3      96.000    96.000     2     0.00000  39  41     0   4000.00       0.00
  41    1.007000     10.00    1.806   4      96.000    96.000     2     0.00000  40  42     0   4000.00       0.00
  42    1.007000     20.00    1.000   4      96.000    96.000     2     0.00000  41  43     0   4000.00       0.00
  43    1.007000     55.00    1.363   4      96.000    97.200     2     0.00000  42  44     0   4000.00       0.00
  44    1.007000      5.00    5.028   4      97.200    97.200     2     0.00000  43  45     0   4000.00       0.00
  45    1.007000    160.00    1.175   4      97.200    96.200     2     0.00000  44  46     0   4000.00       0.00
  46    1.007000     15.00    2.343   3      96.200    96.200     2     0.00000  45 162     0   4000.00       0.00
  47    1.007000      5.00    5.028   4      96.200    96.200     2     0.00000  46  48     0   4000.00       0.00
  48    1.007000     15.00    6.357   4      96.200    97.000     2     0.00000  47  49     0   4000.00       0.00
  49    1.007000     60.00    1.166   4      97.000    97.000     2     0.00000  48  50     0   4000.00       0.00
  50    1.007000     15.00    2.994   4      97.000    94.500     2     0.00000  49  51     0   4000.00       0.00
  51    1.007000      5.00    4.605   4      94.500    97.000     2     0.00000  50  52     0   4000.00       0.00
  52    1.007000     15.00    2.329   4      97.000    94.000     2     0.00000  51  53     0   4000.00       0.00
  53    1.007000     80.00    1.501   4      94.000    96.500     2     0.00000  52  54     0   4000.00       0.00
```

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 54 | 1.007000 | 65.00 | 1.310 | 3 | 96.500 | 96.500 | 2 | 0.00000 | 53 | 55 | 0 | 4000.00 | 0.00 |
| 55 | 1.007000 | 50.00 | 1.481 | 4 | 96.500 | 97.200 | 2 | 0.00000 | 54 | 56 | 0 | 4000.00 | 0.00 |
| 56 | 1.007000 | 25.00 | 1.322 | 4 | 97.200 | 97.200 | 2 | 0.00000 | 55 | 57 | 0 | 4000.00 | 0.00 |
| 57 | 1.007000 | 5.00 | 3.820 | 4 | 97.200 | 97.200 | 2 | 0.00000 | 56 | 58 | 0 | 4000.00 | 0.00 |
| 58 | 1.007000 | 70.00 | 1.288 | 4 | 97.200 | 97.200 | 2 | 0.00000 | 57 | 59 | 0 | 4000.00 | 0.00 |
| 59 | 1.007000 | 10.00 | 1.806 | 4 | 97.200 | 97.200 | 2 | 0.00000 | 58 | 60 | 0 | 4000.00 | 0.00 |
| 60 | 1.007000 | 195.00 | 1.103 | 4 | 97.200 | 97.200 | 2 | 0.00000 | 59 | 61 | 0 | 4000.00 | 0.00 |
| 61 | 1.007000 | 240.00 | 1.159 | 4 | 97.200 | 94.500 | 2 | 0.00000 | 60 | 62 | 0 | 4000.00 | 0.00 |
| 62 | 1.007000 | 215.00 | 1.094 | 4 | 94.500 | 94.500 | 2 | 0.00000 | 61 | 63 | 0 | 4000.00 | 0.00 |
| 63 | 1.007000 | 110.00 | 1.183 | 4 | 94.500 | 94.500 | 2 | 0.00000 | 62 | 64 | 0 | 4000.00 | 0.00 |
| 64 | 1.007000 | 195.00 | 1.103 | 4 | 94.500 | 94.500 | 2 | 0.00000 | 63 | 65 | 0 | 4000.00 | 0.00 |
| 65 | 1.007000 | 5.00 | 5.028 | 4 | 94.500 | 94.500 | 2 | 0.00000 | 64 | 66 | 0 | 4000.00 | 0.00 |
| 66 | 1.007000 | 30.00 | 1.665 | 4 | 94.500 | 95.800 | 2 | 0.00000 | 65 | 67 | 0 | 4000.00 | 0.00 |
| 67 | 1.007000 | 5.00 | 2.611 | 4 | 95.800 | 95.800 | 2 | 0.00000 | 66 | 68 | 0 | 4000.00 | 0.00 |
| 68 | 1.007000 | 25.00 | 1.806 | 3 | 95.800 | 95.800 | 2 | 0.00000 | 67 | 229 | 0 | 4000.00 | 0.00 |
| 69 | 1.007000 | 130.00 | 1.155 | 4 | 95.800 | 95.500 | 2 | 0.00000 | 68 | 70 | 0 | 4000.00 | 0.00 |
| 70 | 1.007000 | 5.00 | 2.611 | 3 | 95.500 | 95.500 | 2 | 0.00000 | 69 | 261 | 0 | 4000.00 | 0.00 |
| 71 | 1.007000 | 5.00 | 5.028 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 70 | 72 | 0 | 4000.00 | 0.00 |
| 72 | 1.007000 | 5.00 | 2.611 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 71 | 73 | 0 | 4000.00 | 0.00 |
| 73 | 1.007000 | 205.00 | 1.098 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 72 | 74 | 0 | 4000.00 | 0.00 |
| 74 | 1.007000 | 240.00 | 1.117 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 73 | 75 | 0 | 4000.00 | 0.00 |
| 75 | 1.007000 | 20.00 | 4.021 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 74 | 76 | 0 | 4000.00 | 0.00 |
| 76 | 1.007000 | 30.00 | 1.665 | 4 | 95.500 | 91.500 | 2 | 0.00000 | 75 | 77 | 0 | 4000.00 | 0.00 |
| 77 | 1.007000 | 25.00 | 2.120 | 4 | 91.500 | 97.000 | 2 | 0.00000 | 76 | 78 | 0 | 4000.00 | 0.00 |
| 78 | 1.007000 | 50.00 | 1.403 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 77 | 79 | 0 | 4000.00 | 0.00 |
| 79 | 1.007000 | 50.00 | 1.403 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 78 | 80 | 0 | 4000.00 | 0.00 |
| 80 | 1.007000 | 20.00 | 1.997 | 4 | 97.000 | 90.500 | 2 | 0.00000 | 79 | 81 | 0 | 4000.00 | 0.00 |
| 81 | 1.007000 | 40.00 | 2.002 | 4 | 90.500 | 96.900 | 2 | 0.00000 | 80 | 82 | 0 | 4000.00 | 0.00 |
| 82 | 1.007000 | 165.00 | 1.122 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 81 | 83 | 0 | 4000.00 | 0.00 |
| 83 | 1.007000 | 135.00 | 1.060 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 82 | 84 | 0 | 4000.00 | 0.00 |
| 84 | 1.007000 | 10.00 | 3.014 | 3 | 96.900 | 96.900 | 2 | 0.00000 | 83 | 101 | 0 | 4000.00 | 0.00 |
| 85 | 1.007000 | 60.00 | 1.134 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 84 | 86 | 0 | 4000.00 | 0.00 |
| 86 | 1.007000 | 5.00 | 5.028 | 3 | 96.900 | 96.900 | 2 | 0.00000 | 85 | 9 | 1 | 4000.00 | 0.00 |
| 87 | 0.336000 | 10.00 | 5.771 | 3 | 105.000 | 112.070 | 2 | 0.00000 | 7 | 88 | 0 | 4000.00 | 0.00 |
| 88 | 0.336000 | 5.00 | 5.570 | 4 | 112.070 | 113.750 | 2 | 0.00000 | 87 | 89 | 0 | 4000.00 | 0.00 |
| 89 | 0.256000 | 30.00 | 1.870 | 4 | 113.750 | 109.000 | 2 | 0.00000 | 88 | 90 | 0 | 4000.00 | 0.00 |
| 90 | 0.256000 | 10.00 | 1.205 | 2 | 109.000 | 104.250 | 2 | 0.00000 | 89 | 91 | 0 | 4000.00 | 0.00 |
| 91 | 0.256000 | 5.00 | 5.933 | 1 | 104.250 | 103.750 | 2 | 0.00000 | 90 | 0 | 0 | 4000.00 | 0.00 |
| 92 | 0.336000 | 40.00 | 2.714 | 3 | 112.070 | 105.000 | 2 | 0.00000 | 87 | 93 | 0 | 4000.00 | 0.00 |
| 93 | 1.000000 | 20.00 | 3.400 | 4 | 105.000 | 110.200 | 2 | 0.00000 | 92 | 94 | 0 | 4000.00 | 0.00 |
| 94 | 1.000000 | 10.00 | 3.800 | 4 | 110.200 | 104.750 | 2 | 0.00000 | 93 | 95 | 0 | 4000.00 | 0.00 |
| 95 | 1.000000 | 5.00 | 18.508 | 4 | 104.750 | 104.750 | 2 | 0.00000 | 94 | 96 | 0 | 4000.00 | 0.00 |
| 96 | 1.000000 | 10.00 | 3.538 | 2 | 104.750 | 104.750 | 2 | 0.00000 | 95 | 97 | 0 | 4000.00 | 0.00 |
| 97 | 1.000000 | 5.00 | 9.400 | 4 | 104.750 | 105.040 | 2 | 0.00000 | 96 | 98 | 0 | 4000.00 | 0.00 |
| 98 | 1.000000 | 20.00 | 7.400 | 4 | 105.040 | 94.000 | 2 | 0.00000 | 97 | 99 | 0 | 4000.00 | 0.00 |
| 99 | 1.104000 | 30.00 | 4.874 | 1 | 94.000 | 99.400 | 2 | 0.00000 | 98 | 0 | 0 | 4000.00 | 0.00 |
| 100 | 1.000000 | 85.00 | 1.864 | 4 | 105.000 | 91.000 | 2 | 0.00000 | 92 | 101 | 0 | 4000.00 | 0.00 |
| 101 | 1.000000 | 25.00 | 4.512 | 3 | 91.000 | 96.900 | 2 | 0.00000 | 100 | 85 | 1 | 4000.00 | 0.00 |
| 102 | 0.835000 | 5.00 | 12.356 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 40 | 103 | 0 | 4000.00 | 0.00 |
| 103 | 0.788000 | 60.00 | 1.628 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 102 | 104 | 0 | 4000.00 | 0.00 |
| 104 | 0.788000 | 100.00 | 1.000 | 4 | 96.000 | 95.500 | 2 | 0.00000 | 103 | 105 | 0 | 4000.00 | 0.00 |
| 105 | 0.788000 | 100.00 | 1.000 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 104 | 106 | 0 | 4000.00 | 0.00 |
| 106 | 0.788000 | 30.00 | 2.786 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 105 | 107 | 0 | 4000.00 | 0.00 |
| 107 | 0.927000 | 35.00 | 2.059 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 106 | 108 | 0 | 4000.00 | 0.00 |
| 108 | 0.927000 | 150.00 | 1.494 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 107 | 109 | 0 | 4000.00 | 0.00 |
| 109 | 0.927000 | 50.00 | 1.519 | 3 | 95.500 | 95.500 | 2 | 0.00000 | 108 | 110 | 0 | 4000.00 | 0.00 |
| 110 | 0.927000 | 20.00 | 2.298 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 109 | 111 | 0 | 4000.00 | 0.00 |
| 111 | 0.927000 | 10.00 | 7.860 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 110 | 112 | 0 | 4000.00 | 0.00 |
| 112 | 1.000000 | 10.00 | 9.000 | 4 | 95.500 | 101.700 | 2 | 0.00000 | 111 | 113 | 0 | 4000.00 | 0.00 |
| 113 | 1.000000 | 5.00 | 5.400 | 4 | 101.700 | 102.800 | 2 | 0.00000 | 112 | 114 | 0 | 4000.00 | 0.00 |
| 114 | 1.000000 | 10.00 | 12.354 | 2 | 102.800 | 102.800 | 2 | 0.00000 | 113 | 115 | 0 | 4000.00 | 0.00 |
| 115 | 1.000000 | 5.00 | 8.877 | 4 | 102.800 | 102.800 | 2 | 0.00000 | 114 | 116 | 0 | 4000.00 | 0.00 |
| 116 | 1.000000 | 5.00 | 5.000 | 4 | 102.800 | 102.800 | 2 | 0.00000 | 115 | 117 | 0 | 4000.00 | 0.00 |
| 117 | 1.250000 | 30.00 | 3.333 | 1 | 102.800 | 103.000 | 2 | 0.00000 | 116 | 0 | 0 | 4000.00 | 0.00 |
| 118 | 0.927000 | 10.00 | 6.562 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 109 | 119 | 0 | 4000.00 | 0.00 |
| 119 | 1.000000 | 10.00 | 2.400 | 3 | 95.500 | 101.700 | 2 | 0.00000 | 118 | 120 | 0 | 4000.00 | 0.00 |
| 120 | 1.000000 | 5.00 | 7.800 | 4 | 101.700 | 102.800 | 2 | 0.00000 | 119 | 121 | 0 | 4000.00 | 0.00 |
| 121 | 1.000000 | 10.00 | 13.154 | 2 | 102.800 | 102.800 | 2 | 0.00000 | 120 | 122 | 0 | 4000.00 | 0.00 |
| 122 | 1.000000 | 10.00 | 8.938 | 4 | 102.800 | 102.800 | 2 | 0.00000 | 121 | 123 | 0 | 4000.00 | 0.00 |
| 123 | 1.250000 | 20.00 | 3.250 | 1 | 102.800 | 103.000 | 2 | 0.00000 | 122 | 0 | 0 | 4000.00 | 0.00 |
| 124 | 0.134000 | 5.00 | 3.624 | 4 | 101.700 | 101.700 | 2 | 0.00000 | 119 | 125 | 0 | 4000.00 | 0.00 |
| 125 | 0.134000 | 5.00 | 3.141 | 4 | 101.700 | 101.700 | 2 | 0.00000 | 124 | 126 | 0 | 4000.00 | 0.00 |
| 126 | 0.134000 | 5.00 | 1.000 | 2 | 101.700 | 101.700 | 2 | 0.00000 | 125 | 127 | 0 | 4000.00 | 0.00 |
| 127 | 0.134000 | 10.00 | 1.000 | 4 | 101.700 | 101.700 | 2 | 0.00000 | 126 | 128 | 0 | 4000.00 | 0.00 |
| 128 | 0.134000 | 10.00 | 1.000 | 4 | 101.700 | 101.700 | 2 | 0.00000 | 127 | 129 | 0 | 4000.00 | 0.00 |
| 129 | 0.134000 | 10.00 | 1.000 | 1 | 101.700 | 103.000 | 2 | 0.00000 | 128 | 0 | 0 | 4000.00 | 0.00 |
| 130 | 0.835000 | 5.00 | 11.020 | 4 | 93.000 | 93.000 | 2 | 0.00000 | 29 | 131 | 0 | 4000.00 | 0.00 |
| 131 | 0.835000 | 100.00 | 1.331 | 4 | 93.000 | 96.010 | 2 | 0.00000 | 130 | 132 | 0 | 4000.00 | 0.00 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 132 | 0.835000 | 25.00 | 1.267 | 4 | 96.010 | 96.010 | 2 | 0.00000 | 131 | 133 | 0 | 4000.00 | 0.00 |
| 133 | 0.835000 | 65.00 | 1.000 | 4 | 96.010 | 96.000 | 2 | 0.00000 | 132 | 134 | 0 | 4000.00 | 0.00 |
| 134 | 0.835000 | 20.00 | 2.653 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 133 | 135 | 0 | 4000.00 | 0.00 |
| 135 | 0.835000 | 105.00 | 1.382 | 3 | 96.000 | 89.000 | 2 | 0.00000 | 134 | 136 | 0 | 4000.00 | 0.00 |
| 136 | 0.835000 | 5.00 | 3.338 | 4 | 89.000 | 89.000 | 2 | 0.00000 | 135 | 137 | 0 | 4000.00 | 0.00 |
| 137 | 0.835000 | 50.00 | 1.334 | 3 | 89.000 | 89.000 | 2 | 0.00000 | 136 | 138 | 0 | 4000.00 | 0.00 |
| 138 | 0.835000 | 5.00 | 5.676 | 4 | 89.000 | 89.000 | 2 | 0.00000 | 137 | 139 | 0 | 4000.00 | 0.00 |
| 139 | 0.835000 | 5.00 | 4.340 | 3 | 89.000 | 89.000 | 2 | 0.00000 | 138 | 140 | 0 | 4000.00 | 0.00 |
| 140 | 0.835000 | 55.00 | 1.000 | 4 | 89.000 | 89.000 | 2 | 0.00000 | 139 | 141 | 0 | 4000.00 | 0.00 |
| 141 | 0.835000 | 25.00 | 1.668 | 3 | 89.000 | 89.000 | 2 | 0.00000 | 140 | 142 | 0 | 4000.00 | 0.00 |
| 142 | 0.835000 | 15.00 | 2.882 | 4 | 89.000 | 91.940 | 2 | 0.00000 | 141 | 143 | 0 | 4000.00 | 0.00 |
| 143 | 0.835000 | 25.00 | 1.668 | 3 | 91.940 | 91.940 | 2 | 0.00000 | 142 | 144 | 0 | 4000.00 | 0.00 |
| 144 | 0.835000 | 5.00 | 5.676 | 3 | 91.940 | 91.940 | 2 | 0.00000 | 143 | 145 | 0 | 4000.00 | 0.00 |
| 145 | 0.835000 | 5.00 | 4.340 | 3 | 91.940 | 91.940 | 2 | 0.00000 | 144 | 146 | 0 | 4000.00 | 0.00 |
| 146 | 0.835000 | 10.00 | 3.338 | 4 | 91.940 | 96.200 | 2 | 0.00000 | 145 | 147 | 0 | 4000.00 | 0.00 |
| 147 | 0.835000 | 5.00 | 3.338 | 4 | 96.200 | 96.200 | 2 | 0.00000 | 146 | 148 | 0 | 4000.00 | 0.00 |
| 148 | 0.835000 | 145.00 | 1.000 | 4 | 96.200 | 96.200 | 2 | 0.00000 | 147 | 149 | 0 | 4000.00 | 0.00 |
| 149 | 0.835000 | 10.00 | 2.670 | 4 | 96.200 | 96.200 | 2 | 0.00000 | 148 | 150 | 0 | 4000.00 | 0.00 |
| 150 | 0.835000 | 90.00 | 1.186 | 3 | 96.200 | 96.200 | 2 | 0.00000 | 149 | 151 | 0 | 4000.00 | 0.00 |
| 151 | 0.835000 | 5.00 | 5.676 | 4 | 96.200 | 94.530 | 2 | 0.00000 | 150 | 152 | 0 | 4000.00 | 0.00 |
| 152 | 0.835000 | 15.00 | 2.664 | 3 | 94.530 | 94.530 | 2 | 0.00000 | 151 | 153 | 0 | 4000.00 | 0.00 |
| 153 | 0.835000 | 5.00 | 2.336 | 4 | 94.530 | 94.530 | 2 | 0.00000 | 152 | 154 | 0 | 4000.00 | 0.00 |
| 154 | 0.835000 | 5.00 | 4.340 | 3 | 94.530 | 94.540 | 2 | 0.00000 | 153 | 155 | 0 | 4000.00 | 0.00 |
| 155 | 0.835000 | 15.00 | 2.559 | 3 | 94.540 | 94.540 | 2 | 0.00000 | 154 | 156 | 0 | 4000.00 | 0.00 |
| 156 | 0.835000 | 5.00 | 4.340 | 3 | 94.540 | 94.540 | 2 | 0.00000 | 155 | 157 | 0 | 4000.00 | 0.00 |
| 157 | 0.835000 | 5.00 | 3.338 | 4 | 94.540 | 94.540 | 2 | 0.00000 | 156 | 158 | 0 | 4000.00 | 0.00 |
| 158 | 0.835000 | 5.00 | 3.338 | 3 | 94.540 | 94.500 | 2 | 0.00000 | 157 | 159 | 0 | 4000.00 | 0.00 |
| 159 | 0.835000 | 5.00 | 4.340 | 4 | 94.500 | 94.500 | 2 | 0.00000 | 158 | 160 | 0 | 4000.00 | 0.00 |
| 160 | 0.835000 | 55.00 | 1.425 | 3 | 94.500 | 94.500 | 2 | 0.00000 | 159 | 161 | 0 | 4000.00 | 0.00 |
| 161 | 0.835000 | 175.00 | 1.286 | 4 | 94.500 | 96.200 | 2 | 0.00000 | 160 | 162 | 0 | 4000.00 | 0.00 |
| 162 | 0.835000 | 100.00 | 1.568 | 3 | 96.200 | 96.200 | 2 | 0.00000 | 161 | 47 | 1 | 4000.00 | 0.00 |
| 163 | 0.835000 | 10.00 | 3.338 | 4 | 94.500 | 91.750 | 2 | 0.00000 | 160 | 164 | 0 | 4000.00 | 0.00 |
| 164 | 0.835000 | 40.00 | 1.413 | 4 | 91.750 | 89.580 | 2 | 0.00000 | 163 | 165 | 0 | 4000.00 | 0.00 |
| 165 | 0.835000 | 25.00 | 3.071 | 4 | 89.580 | 89.580 | 2 | 0.00000 | 164 | 166 | 0 | 4000.00 | 0.00 |
| 166 | 0.835000 | 5.00 | 4.340 | 3 | 89.580 | 89.580 | 2 | 0.00000 | 165 | 167 | 0 | 4000.00 | 0.00 |
| 167 | 0.835000 | 5.00 | 1.000 | 16 | 89.580 | 89.580 | 2 | 0.00000 | 166 | 0 | 0 | 4000.00 | 0.00 |
| 168 | 0.835000 | 5.00 | 13.358 | 4 | 89.000 | 91.000 | 2 | 0.00000 | 141 | 169 | 0 | 4000.00 | 0.00 |
| 169 | 0.835000 | 35.00 | 2.002 | 3 | 91.000 | 91.000 | 2 | 0.00000 | 168 | 170 | 0 | 4000.00 | 0.00 |
| 170 | 0.835000 | 10.00 | 4.340 | 3 | 91.000 | 91.000 | 2 | 0.00000 | 169 | 171 | 0 | 4000.00 | 0.00 |
| 171 | 0.835000 | 75.00 | 1.312 | 4 | 91.000 | 91.000 | 2 | 0.00000 | 170 | 172 | 0 | 4000.00 | 0.00 |
| 172 | 0.835000 | 45.00 | 2.002 | 3 | 91.000 | 91.000 | 2 | 0.00000 | 171 | 173 | 0 | 4000.00 | 0.00 |
| 173 | 0.835000 | 5.00 | 3.338 | 4 | 91.000 | 91.000 | 2 | 0.00000 | 172 | 174 | 0 | 4000.00 | 0.00 |
| 174 | 0.835000 | 15.00 | 1.779 | 4 | 91.000 | 96.040 | 2 | 0.00000 | 173 | 175 | 0 | 4000.00 | 0.00 |
| 175 | 0.835000 | 15.00 | 2.559 | 4 | 96.040 | 96.000 | 2 | 0.00000 | 174 | 176 | 0 | 4000.00 | 0.00 |
| 176 | 0.835000 | 95.00 | 1.176 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 175 | 177 | 0 | 4000.00 | 0.00 |
| 177 | 0.835000 | 55.00 | 1.213 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 176 | 178 | 0 | 4000.00 | 0.00 |
| 178 | 0.835000 | 5.00 | 3.338 | 4 | 96.000 | 91.000 | 2 | 0.00000 | 177 | 179 | 0 | 4000.00 | 0.00 |
| 179 | 0.835000 | 50.00 | 1.795 | 4 | 91.000 | 93.000 | 2 | 0.00000 | 178 | 180 | 0 | 4000.00 | 0.00 |
| 180 | 0.835000 | 80.00 | 1.146 | 4 | 93.000 | 93.000 | 2 | 0.00000 | 179 | 181 | 0 | 4000.00 | 0.00 |
| 181 | 0.835000 | 25.00 | 3.472 | 3 | 93.000 | 93.000 | 2 | 0.00000 | 180 | 29 | 1 | 4000.00 | 0.00 |
| 182 | 0.336000 | 45.00 | 1.866 | 3 | 91.000 | 96.000 | 2 | 0.00000 | 169 | 183 | 0 | 4000.00 | 0.00 |
| 183 | 0.336000 | 120.00 | 1.482 | 4 | 96.000 | 149.000 | 2 | 0.00000 | 182 | 184 | 0 | 4000.00 | 0.00 |
| 184 | 0.256000 | 205.00 | 1.092 | 16 | 149.000 | 142.500 | 2 | 0.00000 | 183 | 0 | 0 | 4000.00 | 0.00 |
| 185 | 0.256000 | 60.00 | 1.674 | 16 | 96.000 | 59.000 | 2 | 0.00000 | 182 | 0 | 0 | 4000.00 | 0.00 |
| 186 | 0.336000 | 10.00 | 4.427 | 3 | 91.000 | 94.800 | 2 | 0.00000 | 170 | 187 | 0 | 4000.00 | 0.00 |
| 187 | 0.336000 | 55.00 | 1.586 | 3 | 94.800 | 113.000 | 2 | 0.00000 | 186 | 188 | 0 | 4000.00 | 0.00 |
| 188 | 0.336000 | 230.00 | 1.231 | 4 | 113.000 | 146.000 | 2 | 0.00000 | 187 | 189 | 0 | 4000.00 | 0.00 |
| 189 | 0.256000 | 105.00 | 1.111 | 16 | 146.000 | 143.000 | 2 | 0.00000 | 188 | 0 | 0 | 4000.00 | 0.00 |
| 190 | 0.256000 | 100.00 | 1.297 | 16 | 94.800 | 83.700 | 2 | 0.00000 | 186 | 0 | 0 | 4000.00 | 0.00 |
| 191 | 0.256000 | 75.00 | 1.416 | 16 | 113.000 | 107.000 | 2 | 0.00000 | 187 | 0 | 0 | 4000.00 | 0.00 |
| 192 | 0.336000 | 5.00 | 7.854 | 4 | 91.000 | 95.000 | 2 | 0.00000 | 172 | 193 | 0 | 4000.00 | 0.00 |
| 193 | 0.336000 | 240.00 | 1.316 | 4 | 95.000 | 150.000 | 2 | 0.00000 | 192 | 194 | 0 | 4000.00 | 0.00 |
| 194 | 0.256000 | 180.00 | 1.105 | 16 | 150.000 | 142.000 | 2 | 0.00000 | 193 | 0 | 0 | 4000.00 | 0.00 |
| 195 | 0.665000 | 15.00 | 4.015 | 4 | 96.500 | 96.500 | 2 | 0.00000 | 54 | 196 | 0 | 4000.00 | 0.00 |
| 196 | 0.665000 | 11.00 | 2.197 | 4 | 96.500 | 94.500 | 2 | 0.00000 | 195 | 197 | 0 | 4400.00 | 0.00 |
| 197 | 0.665000 | 20.00 | 1.658 | 4 | 94.500 | 96.600 | 2 | 0.00000 | 196 | 198 | 0 | 4000.00 | 0.00 |
| 198 | 0.665000 | 115.00 | 1.000 | 4 | 96.600 | 96.600 | 2 | 0.00000 | 197 | 199 | 0 | 4000.00 | 0.00 |
| 199 | 0.665000 | 220.00 | 1.120 | 3 | 96.600 | 94.000 | 2 | 0.00000 | 198 | 200 | 0 | 4000.00 | 0.00 |
| 200 | 0.665000 | 20.00 | 2.862 | 4 | 94.000 | 94.750 | 2 | 0.00000 | 199 | 201 | 0 | 4000.00 | 0.00 |
| 201 | 0.665000 | 20.00 | 1.000 | 4 | 94.750 | 94.750 | 2 | 0.00000 | 200 | 202 | 0 | 4000.00 | 0.00 |
| 202 | 0.665000 | 20.00 | 2.197 | 4 | 94.750 | 94.750 | 2 | 0.00000 | 201 | 203 | 0 | 4000.00 | 0.00 |
| 203 | 0.665000 | 15.00 | 1.000 | 4 | 94.750 | 94.750 | 2 | 0.00000 | 202 | 204 | 0 | 4000.00 | 0.00 |
| 204 | 0.665000 | 30.00 | 1.973 | 3 | 94.750 | 84.100 | 2 | 0.00000 | 203 | 205 | 0 | 4000.00 | 0.00 |
| 205 | 0.665000 | 15.00 | 1.621 | 4 | 84.100 | 69.500 | 2 | 0.00000 | 204 | 206 | 0 | 4000.00 | 0.00 |
| 206 | 0.665000 | 15.00 | 1.887 | 3 | 69.500 | 69.500 | 2 | 0.00000 | 205 | 207 | 0 | 4000.00 | 0.00 |
| 207 | 0.665000 | 20.00 | 1.465 | 4 | 69.500 | 69.500 | 2 | 0.00000 | 206 | 208 | 0 | 4000.00 | 0.00 |
| 208 | 0.665000 | 20.00 | 4.125 | 3 | 69.500 | 61.750 | 2 | 0.00000 | 207 | 209 | 0 | 4000.00 | 0.00 |
| 209 | 0.665000 | 70.00 | 1.454 | 4 | 61.750 | 62.750 | 2 | 0.00000 | 208 | 210 | 0 | 4000.00 | 0.00 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 210 | 0.665000 | 5.00 | 6.320 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 209 | 211 | 0 | 4000.00 | 0.00 |
| 211 | 0.665000 | 50.00 | 1.293 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 210 | 212 | 0 | 4000.00 | 0.00 |
| 212 | 0.665000 | 20.00 | 2.330 | 3 | 62.750 | 62.750 | 2 | 0.00000 | 211 | 213 | 0 | 4000.00 | 0.00 |
| 213 | 0.665000 | 25.00 | 2.277 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 212 | 214 | 0 | 4000.00 | 0.00 |
| 214 | 0.665000 | 20.00 | 1.665 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 213 | 215 | 0 | 4000.00 | 0.00 |
| 215 | 0.665000 | 45.00 | 1.414 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 214 | 216 | 0 | 4000.00 | 0.00 |
| 216 | 0.665000 | 20.00 | 1.665 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 215 | 217 | 0 | 4000.00 | 0.00 |
| 217 | 0.665000 | 85.00 | 2.033 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 216 | 218 | 0 | 4000.00 | 0.00 |
| 218 | 0.665000 | 5.00 | 3.660 | 3 | 62.750 | 62.750 | 2 | 0.00000 | 217 | 219 | 0 | 4000.00 | 0.00 |
| 219 | 0.665000 | 25.00 | 2.649 | 3 | 62.750 | 66.000 | 2 | 0.00000 | 218 | 220 | 0 | 4000.00 | 0.00 |
| 220 | 0.665000 | 30.00 | 1.749 | 4 | 66.000 | 96.000 | 2 | 0.00000 | 219 | 221 | 0 | 4000.00 | 0.00 |
| 221 | 0.665000 | 20.00 | 1.329 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 220 | 222 | 0 | 4000.00 | 0.00 |
| 222 | 0.665000 | 5.00 | 4.977 | 4 | 96.000 | 94.400 | 2 | 0.00000 | 221 | 223 | 0 | 4000.00 | 0.00 |
| 223 | 0.665000 | 95.00 | 1.139 | 4 | 94.400 | 97.000 | 2 | 0.00000 | 222 | 224 | 0 | 4000.00 | 0.00 |
| 224 | 0.665000 | 35.00 | 1.646 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 223 | 225 | 0 | 4000.00 | 0.00 |
| 225 | 0.665000 | 65.00 | 1.614 | 4 | 97.000 | 96.500 | 2 | 0.00000 | 224 | 226 | 0 | 4000.00 | 0.00 |
| 226 | 0.665000 | 35.00 | 1.000 | 4 | 96.500 | 96.500 | 2 | 0.00000 | 225 | 227 | 0 | 4000.00 | 0.00 |
| 227 | 0.665000 | 35.00 | 1.830 | 4 | 96.500 | 94.200 | 2 | 0.00000 | 226 | 228 | 0 | 4000.00 | 0.00 |
| 228 | 0.665000 | 35.00 | 1.266 | 4 | 94.200 | 96.200 | 2 | 0.00000 | 227 | 229 | 0 | 4000.00 | 0.00 |
| 229 | 0.665000 | 120.00 | 1.377 | 3 | 96.200 | 95.800 | 2 | 0.00000 | 228 | 69 | 1 | 4000.00 | 0.00 |
| 230 | 0.665000 | 10.00 | 6.453 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 12 | 231 | 0 | 4000.00 | 0.00 |
| 231 | 0.665000 | 25.00 | 1.372 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 230 | 232 | 0 | 4000.00 | 0.00 |
| 232 | 0.665000 | 150.00 | 1.062 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 231 | 233 | 0 | 4000.00 | 0.00 |
| 233 | 0.665000 | 135.00 | 1.069 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 232 | 234 | 0 | 4000.00 | 0.00 |
| 234 | 0.665000 | 45.00 | 1.146 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 233 | 235 | 0 | 4000.00 | 0.00 |
| 235 | 0.665000 | 20.00 | 1.658 | 4 | 96.900 | 95.000 | 2 | 0.00000 | 234 | 236 | 0 | 4000.00 | 0.00 |
| 236 | 0.665000 | 35.00 | 1.564 | 4 | 95.000 | 95.500 | 2 | 0.00000 | 235 | 237 | 0 | 4000.00 | 0.00 |
| 237 | 0.665000 | 15.00 | 1.621 | 4 | 95.500 | 96.000 | 2 | 0.00000 | 236 | 238 | 0 | 4000.00 | 0.00 |
| 238 | 0.665000 | 30.00 | 1.621 | 4 | 96.000 | 72.000 | 2 | 0.00000 | 237 | 239 | 0 | 4000.00 | 0.00 |
| 239 | 0.665000 | 5.00 | 3.660 | 3 | 72.000 | 67.000 | 2 | 0.00000 | 238 | 240 | 0 | 4000.00 | 0.00 |
| 240 | 0.665000 | 75.00 | 1.497 | 4 | 67.000 | 64.250 | 2 | 0.00000 | 239 | 241 | 0 | 4000.00 | 0.00 |
| 241 | 0.665000 | 35.00 | 1.000 | 4 | 64.250 | 64.250 | 2 | 0.00000 | 240 | 242 | 0 | 4000.00 | 0.00 |
| 242 | 0.665000 | 65.00 | 1.286 | 4 | 64.250 | 61.750 | 2 | 0.00000 | 241 | 243 | 0 | 4000.00 | 0.00 |
| 243 | 0.665000 | 20.00 | 2.995 | 3 | 61.750 | 61.750 | 2 | 0.00000 | 242 | 244 | 0 | 4000.00 | 0.00 |
| 244 | 0.665000 | 5.00 | 2.064 | 4 | 61.750 | 61.750 | 2 | 0.00000 | 243 | 245 | 0 | 4000.00 | 0.00 |
| 245 | 0.665000 | 20.00 | 2.260 | 4 | 61.750 | 62.750 | 2 | 0.00000 | 244 | 246 | 0 | 4000.00 | 0.00 |
| 246 | 0.665000 | 15.00 | 1.887 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 245 | 247 | 0 | 4000.00 | 0.00 |
| 247 | 0.665000 | 10.00 | 2.330 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 246 | 248 | 0 | 4000.00 | 0.00 |
| 248 | 0.665000 | 15.00 | 1.887 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 247 | 249 | 0 | 4000.00 | 0.00 |
| 249 | 0.665000 | 35.00 | 1.380 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 248 | 250 | 0 | 4000.00 | 0.00 |
| 250 | 0.665000 | 100.00 | 1.000 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 249 | 251 | 0 | 4000.00 | 0.00 |
| 251 | 0.665000 | 10.00 | 3.647 | 4 | 62.750 | 62.500 | 2 | 0.00000 | 250 | 252 | 0 | 4000.00 | 0.00 |
| 252 | 0.665000 | 30.00 | 1.749 | 4 | 62.500 | 67.900 | 2 | 0.00000 | 251 | 253 | 0 | 4000.00 | 0.00 |
| 253 | 0.665000 | 30.00 | 1.310 | 4 | 67.900 | 96.000 | 2 | 0.00000 | 252 | 254 | 0 | 4000.00 | 0.00 |
| 254 | 0.665000 | 20.00 | 2.317 | 4 | 96.000 | 97.000 | 2 | 0.00000 | 253 | 255 | 0 | 4000.00 | 0.00 |
| 255 | 0.665000 | 145.00 | 1.000 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 254 | 256 | 0 | 4000.00 | 0.00 |
| 256 | 0.665000 | 35.00 | 1.752 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 255 | 257 | 0 | 4000.00 | 0.00 |
| 257 | 0.665000 | 60.00 | 1.110 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 256 | 258 | 0 | 4000.00 | 0.00 |
| 258 | 0.665000 | 40.00 | 1.165 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 257 | 259 | 0 | 4000.00 | 0.00 |
| 259 | 0.665000 | 5.00 | 3.660 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 258 | 260 | 0 | 4000.00 | 0.00 |
| 260 | 0.665000 | 45.00 | 1.118 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 259 | 261 | 0 | 4000.00 | 0.00 |
| 261 | 0.665000 | 15.00 | 4.538 | 3 | 97.000 | 95.500 | 2 | 0.00000 | 260 | 71 | 1 | 4000.00 | 0.00 |
| 262 | 0.505000 | 20.00 | 2.315 | 4 | 61.750 | 63.000 | 2 | 0.00000 | 243 | 263 | 0 | 4000.00 | 0.00 |
| 263 | 0.505000 | 10.00 | 3.318 | 4 | 63.000 | 56.000 | 2 | 0.00000 | 262 | 264 | 0 | 4000.00 | 0.00 |
| 264 | 0.505000 | 30.00 | 2.380 | 4 | 56.000 | 61.750 | 2 | 0.00000 | 263 | 265 | 0 | 4000.00 | 0.00 |
| 265 | 0.505000 | 5.00 | 3.020 | 3 | 61.750 | 62.900 | 2 | 0.00000 | 264 | 266 | 0 | 4000.00 | 0.00 |
| 266 | 0.505000 | 5.00 | 10.494 | 4 | 62.900 | 67.000 | 2 | 0.00000 | 265 | 267 | 0 | 4000.00 | 0.00 |
| 267 | 0.505000 | 5.00 | 3.828 | 4 | 67.000 | 67.000 | 2 | 0.00000 | 266 | 268 | 0 | 4000.00 | 0.00 |
| 268 | 0.505000 | 65.00 | 1.155 | 3 | 67.000 | 67.000 | 2 | 0.00000 | 267 | 269 | 0 | 4000.00 | 0.00 |
| 269 | 0.505000 | 15.00 | 1.000 | 4 | 67.000 | 67.000 | 2 | 0.00000 | 268 | 270 | 0 | 4000.00 | 0.00 |
| 270 | 0.505000 | 35.00 | 1.866 | 3 | 67.000 | 67.000 | 2 | 0.00000 | 269 | 271 | 0 | 4000.00 | 0.00 |
| 271 | 0.256000 | 25.00 | 1.143 | 4 | 67.000 | 67.000 | 2 | 0.00000 | 270 | 272 | 0 | 4000.00 | 0.00 |
| 272 | 0.256000 | 10.00 | 3.099 | 4 | 67.000 | 65.000 | 2 | 0.00000 | 271 | 273 | 0 | 4000.00 | 0.00 |
| 273 | 0.256000 | 55.00 | 1.289 | 16 | 65.000 | 94.500 | 2 | 0.00000 | 272 | 0 | 0 | 4000.00 | 0.00 |
| 274 | 0.505000 | 15.00 | 1.000 | 3 | 62.900 | 63.900 | 2 | 0.00000 | 265 | 275 | 0 | 4000.00 | 0.00 |
| 275 | 0.505000 | 15.00 | 1.741 | 3 | 63.900 | 68.200 | 2 | 0.00000 | 274 | 276 | 0 | 4000.00 | 0.00 |
| 276 | 0.336000 | 135.00 | 1.170 | 4 | 68.200 | 71.500 | 2 | 0.00000 | 275 | 277 | 0 | 4000.00 | 0.00 |
| 277 | 0.336000 | 40.00 | 1.773 | 16 | 71.500 | 61.500 | 2 | 0.00000 | 276 | 0 | 0 | 4000.00 | 0.00 |
| 278 | 0.336000 | 20.00 | 2.518 | 16 | 68.200 | 61.500 | 2 | 0.00000 | 275 | 0 | 0 | 4000.00 | 0.00 |
| 279 | 0.505000 | 85.00 | 2.305 | 4 | 69.500 | 68.750 | 2 | 0.00000 | 206 | 280 | 0 | 4000.00 | 0.00 |
| 280 | 0.505000 | 10.00 | 2.010 | 3 | 68.750 | 68.750 | 2 | 0.00000 | 279 | 281 | 0 | 4000.00 | 0.00 |
| 281 | 0.505000 | 45.00 | 1.382 | 4 | 68.750 | 68.750 | 2 | 0.00000 | 280 | 282 | 0 | 4000.00 | 0.00 |
| 282 | 0.505000 | 10.00 | 1.707 | 4 | 68.750 | 68.750 | 2 | 0.00000 | 281 | 283 | 0 | 4000.00 | 0.00 |
| 283 | 0.505000 | 70.00 | 1.447 | 3 | 68.750 | 68.750 | 2 | 0.00000 | 282 | 284 | 0 | 4000.00 | 0.00 |
| 284 | 0.505000 | 20.00 | 1.354 | 4 | 68.750 | 68.750 | 2 | 0.00000 | 283 | 285 | 0 | 4000.00 | 0.00 |
| 285 | 0.505000 | 5.00 | 2.414 | 4 | 68.750 | 65.500 | 2 | 0.00000 | 284 | 286 | 0 | 4000.00 | 0.00 |
| 286 | 0.505000 | 25.00 | 1.404 | 3 | 65.500 | 65.500 | 2 | 0.00000 | 285 | 287 | 0 | 4000.00 | 0.00 |
| 287 | 0.336000 | 65.00 | 1.868 | 4 | 65.500 | 113.000 | 2 | 0.00000 | 286 | 288 | 0 | 4000.00 | 0.00 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 288 | 0.336000 | 35.00 | 2.150 | 3 | 113.000 | 147.000 | 2 | 0.00000 | 287 289 | 0 | 4000.00 | 0.00 |
| 289 | 0.256000 | 55.00 | 1.419 | 4 | 147.000 | 178.000 | 2 | 0.00000 | 288 290 | 0 | 4000.00 | 0.00 |
| 290 | 0.256000 | 10.00 | 1.000 | 16 | 178.000 | 178.000 | 2 | 0.00000 | 289 0 | 0 | 4000.00 | 0.00 |
| 291 | 0.256000 | 35.00 | 1.247 | 16 | 147.000 | 159.750 | 2 | 0.00000 | 288 0 | 0 | 4000.00 | 0.00 |
| 292 | 0.256000 | 115.00 | 1.686 | 16 | 67.000 | 128.500 | 2 | 0.00000 | 239 0 | 0 | 4000.00 | 0.00 |
| 293 | 0.336000 | 5.00 | 7.451 | 4 | 65.710 | 62.500 | 2 | 0.00000 | 219 294 | 0 | 4000.00 | 0.00 |
| 294 | 0.336000 | 60.00 | 1.112 | 4 | 62.500 | 62.500 | 2 | 0.00000 | 293 295 | 0 | 4000.00 | 0.00 |
| 295 | 0.336000 | 40.00 | 1.907 | 4 | 62.500 | 93.500 | 2 | 0.00000 | 294 296 | 0 | 4000.00 | 0.00 |
| 296 | 0.336000 | 45.00 | 1.729 | 3 | 93.500 | 126.800 | 2 | 0.00000 | 295 297 | 0 | 4000.00 | 0.00 |
| 297 | 0.336000 | 45.00 | 1.149 | 3 | 126.800 | 142.000 | 2 | 0.00000 | 296 298 | 0 | 4000.00 | 0.00 |
| 298 | 0.336000 | 40.00 | 1.571 | 3 | 142.000 | 154.500 | 2 | 0.00000 | 297 299 | 0 | 4000.00 | 0.00 |
| 299 | 0.256000 | 95.00 | 1.107 | 16 | 154.500 | 155.500 | 2 | 0.00000 | 298 0 | 0 | 4000.00 | 0.00 |
| 300 | 0.256000 | 100.00 | 1.623 | 16 | 142.000 | 143.000 | 2 | 0.00000 | 297 0 | 0 | 4000.00 | 0.00 |
| 301 | 0.336000 | 25.00 | 2.452 | 3 | 154.500 | 156.300 | 2 | 0.00000 | 298 302 | 0 | 4000.00 | 0.00 |
| 302 | 0.336000 | 45.00 | 1.893 | 4 | 156.300 | 172.300 | 2 | 0.00000 | 301 303 | 0 | 4000.00 | 0.00 |
| 303 | 0.256000 | 55.00 | 1.304 | 4 | 172.300 | 178.000 | 2 | 0.00000 | 302 304 | 0 | 4000.00 | 0.00 |
| 304 | 0.256000 | 10.00 | 1.000 | 16 | 178.000 | 178.000 | 2 | 0.00000 | 303 0 | 0 | 4000.00 | 0.00 |
| 305 | 0.336000 | 5.00 | 6.376 | 4 | 156.300 | 156.300 | 2 | 0.00000 | 301 306 | 0 | 4000.00 | 0.00 |
| 306 | 0.256000 | 130.00 | 1.405 | 16 | 156.300 | 156.300 | 2 | 0.00000 | 305 0 | 0 | 4000.00 | 0.00 |
| 307 | 0.336000 | 105.00 | 1.914 | 4 | 126.800 | 155.000 | 2 | 0.00000 | 296 308 | 0 | 4000.00 | 0.00 |
| 308 | 0.256000 | 130.00 | 1.287 | 19 | 155.000 | 206.300 | 2 | 0.00000 | 307 309 | 0 | 4000.00 | 0.00 |
| 309 | 0.256000 | 20.00 | 1.000 | 16 | 206.300 | 203.000 | 2 | 0.00000 | 308 0 | 0 | 4000.00 | 0.00 |
| 310 | 0.336000 | 10.00 | 5.301 | 3 | 62.750 | 71.500 | 2 | 0.00000 | 212 311 | 0 | 4000.00 | 0.00 |
| 311 | 0.336000 | 65.00 | 1.424 | 3 | 71.500 | 133.500 | 2 | 0.00000 | 310 312 | 0 | 4000.00 | 0.00 |
| 312 | 0.256000 | 15.00 | 1.439 | 4 | 133.500 | 147.300 | 2 | 0.00000 | 311 313 | 0 | 4000.00 | 0.00 |
| 313 | 0.256000 | 60.00 | 1.281 | 4 | 147.300 | 165.100 | 2 | 0.00000 | 312 314 | 0 | 4000.00 | 0.00 |
| 314 | 0.256000 | 30.00 | 1.527 | 16 | 165.100 | 160.000 | 2 | 0.00000 | 313 0 | 0 | 4000.00 | 0.00 |
| 315 | 0.256000 | 25.00 | 1.407 | 16 | 71.500 | 81.500 | 2 | 0.00000 | 310 0 | 0 | 4000.00 | 0.00 |
| 316 | 0.336000 | 10.00 | 3.688 | 4 | 133.500 | 133.500 | 2 | 0.00000 | 311 317 | 0 | 4000.00 | 0.00 |
| 317 | 0.256000 | 80.00 | 1.717 | 16 | 133.500 | 141.500 | 2 | 0.00000 | 316 0 | 0 | 4000.00 | 0.00 |
| 318 | 0.336000 | 10.00 | 6.443 | 4 | 68.750 | 66.700 | 2 | 0.00000 | 283 319 | 0 | 4000.00 | 0.00 |
| 319 | 0.336000 | 100.00 | 1.672 | 3 | 66.700 | 120.000 | 2 | 0.00000 | 318 320 | 0 | 4000.00 | 0.00 |
| 320 | 0.336000 | 15.00 | 2.792 | 3 | 120.000 | 132.000 | 2 | 0.00000 | 319 321 | 0 | 4000.00 | 0.00 |
| 321 | 0.336000 | 15.00 | 1.448 | 4 | 132.000 | 146.000 | 2 | 0.00000 | 320 322 | 0 | 4000.00 | 0.00 |
| 322 | 0.256000 | 55.00 | 1.604 | 16 | 146.000 | 163.500 | 2 | 0.00000 | 321 0 | 0 | 4000.00 | 0.00 |
| 323 | 0.256000 | 25.00 | 1.492 | 16 | 120.000 | 128.500 | 2 | 0.00000 | 319 0 | 0 | 4000.00 | 0.00 |
| 324 | 0.336000 | 45.00 | 1.806 | 3 | 132.000 | 132.000 | 2 | 0.00000 | 320 325 | 0 | 4000.00 | 0.00 |
| 325 | 0.256000 | 30.00 | 2.263 | 16 | 132.000 | 157.500 | 2 | 0.00000 | 324 0 | 0 | 4000.00 | 0.00 |
| 326 | 0.256000 | 35.00 | 1.188 | 16 | 132.000 | 141.500 | 2 | 0.00000 | 324 0 | 0 | 4000.00 | 0.00 |
| 327 | 0.336000 | 30.00 | 2.456 | 4 | 63.900 | 68.100 | 2 | 0.00000 | 274 328 | 0 | 4000.00 | 0.00 |
| 328 | 0.336000 | 90.00 | 1.939 | 3 | 68.100 | 134.000 | 2 | 0.00000 | 327 329 | 0 | 4000.00 | 0.00 |
| 329 | 0.336000 | 30.00 | 1.694 | 4 | 134.000 | 132.000 | 2 | 0.00000 | 328 330 | 0 | 4000.00 | 0.00 |
| 330 | 0.336000 | 15.00 | 1.448 | 3 | 132.000 | 132.000 | 2 | 0.00000 | 329 331 | 0 | 4000.00 | 0.00 |
| 331 | 0.256000 | 90.00 | 1.181 | 16 | 132.000 | 141.500 | 2 | 0.00000 | 330 0 | 0 | 4000.00 | 0.00 |
| 332 | 0.256000 | 15.00 | 2.980 | 16 | 132.000 | 141.500 | 2 | 0.00000 | 330 0 | 0 | 4000.00 | 0.00 |
| 333 | 0.336000 | 15.00 | 3.554 | 4 | 134.000 | 147.000 | 2 | 0.00000 | 328 334 | 0 | 4000.00 | 0.00 |
| 334 | 0.256000 | 15.00 | 1.451 | 19 | 147.000 | 159.750 | 2 | 0.00000 | 333 335 | 0 | 4000.00 | 0.00 |
| 335 | 0.256000 | 50.00 | 1.000 | 16 | 159.750 | 159.750 | 2 | 0.00000 | 334 0 | 0 | 4000.00 | 0.00 |
| 336 | 0.336000 | 10.00 | 6.712 | 4 | 67.000 | 65.000 | 2 | 0.00000 | 268 337 | 0 | 4000.00 | 0.00 |
| 337 | 0.336000 | 90.00 | 1.538 | 3 | 65.000 | 115.200 | 2 | 0.00000 | 336 338 | 0 | 4000.00 | 0.00 |
| 338 | 0.336000 | 40.00 | 1.403 | 3 | 115.200 | 133.800 | 2 | 0.00000 | 337 339 | 0 | 4000.00 | 0.00 |
| 339 | 0.336000 | 50.00 | 2.423 | 3 | 133.800 | 133.300 | 2 | 0.00000 | 338 340 | 0 | 4000.00 | 0.00 |
| 340 | 0.336000 | 10.00 | 3.016 | 3 | 133.300 | 133.300 | 2 | 0.00000 | 339 341 | 0 | 4000.00 | 0.00 |
| 341 | 0.256000 | 45.00 | 1.340 | 16 | 133.300 | 141.500 | 2 | 0.00000 | 340 0 | 0 | 4000.00 | 0.00 |
| 342 | 0.256000 | 15.00 | 1.678 | 16 | 133.300 | 141.500 | 2 | 0.00000 | 340 0 | 0 | 4000.00 | 0.00 |
| 343 | 0.256000 | 10.00 | 1.300 | 16 | 133.800 | 141.500 | 2 | 0.00000 | 338 0 | 0 | 4000.00 | 0.00 |
| 344 | 0.256000 | 35.00 | 1.644 | 16 | 133.300 | 128.500 | 2 | 0.00000 | 339 0 | 0 | 4000.00 | 0.00 |
| 345 | 0.256000 | 5.00 | 5.813 | 3 | 115.200 | 115.200 | 2 | 0.00000 | 337 346 | 0 | 4000.00 | 0.00 |
| 346 | 0.256000 | 80.00 | 1.288 | 3 | 115.200 | 116.500 | 2 | 0.00000 | 345 347 | 0 | 4000.00 | 0.00 |
| 347 | 0.256000 | 55.00 | 1.726 | 16 | 116.500 | 141.500 | 2 | 0.00000 | 346 0 | 0 | 4000.00 | 0.00 |
| 348 | 0.256000 | 15.00 | 2.601 | 16 | 116.500 | 128.500 | 2 | 0.00000 | 346 0 | 0 | 4000.00 | 0.00 |
| 349 | 0.256000 | 50.00 | 1.594 | 16 | 115.200 | 106.500 | 2 | 0.00000 | 345 0 | 0 | 4000.00 | 0.00 |
| 350 | 0.505000 | 175.00 | 1.669 | 4 | 68.750 | 140.000 | 2 | 0.00000 | 280 351 | 0 | 4000.00 | 0.00 |
| 351 | 0.336000 | 50.00 | 1.000 | 16 | 140.000 | 138.000 | 2 | 0.00000 | 350 0 | 0 | 4000.00 | 0.00 |
| 352 | 0.336000 | 10.00 | 4.226 | 4 | 67.000 | 65.000 | 2 | 0.00000 | 270 353 | 0 | 4000.00 | 0.00 |
| 353 | 0.336000 | 80.00 | 1.285 | 4 | 65.000 | 105.700 | 2 | 0.00000 | 352 354 | 0 | 4000.00 | 0.00 |
| 354 | 0.336000 | 80.00 | 1.630 | 3 | 105.700 | 130.500 | 2 | 0.00000 | 353 355 | 0 | 4000.00 | 0.00 |
| 355 | 0.256000 | 30.00 | 1.458 | 4 | 130.500 | 147.500 | 2 | 0.00000 | 354 356 | 0 | 4000.00 | 0.00 |
| 356 | 0.256000 | 25.00 | 1.225 | 4 | 147.500 | 141.500 | 2 | 0.00000 | 355 357 | 0 | 4000.00 | 0.00 |
| 357 | 0.162000 | 50.00 | 1.843 | 16 | 141.500 | 141.500 | 2 | 0.00000 | 356 0 | 0 | 4000.00 | 0.00 |
| 358 | 0.336000 | 5.00 | 5.570 | 4 | 130.500 | 130.500 | 2 | 0.00000 | 354 359 | 0 | 4000.00 | 0.00 |
| 359 | 0.162000 | 35.00 | 1.759 | 16 | 130.500 | 132.200 | 2 | 0.00000 | 358 0 | 0 | 4000.00 | 0.00 |
| 360 | 0.336000 | 45.00 | 2.343 | 4 | 94.500 | 115.800 | 2 | 0.00000 | 152 361 | 0 | 4000.00 | 0.00 |
| 361 | 0.336000 | 15.00 | 1.448 | 3 | 115.800 | 130.600 | 2 | 0.00000 | 360 362 | 0 | 4000.00 | 0.00 |
| 362 | 0.256000 | 50.00 | 1.510 | 19 | 130.600 | 176.000 | 2 | 0.00000 | 361 363 | 0 | 4000.00 | 0.00 |
| 363 | 0.256000 | 15.00 | 1.000 | 16 | 176.000 | 176.000 | 2 | 0.00000 | 362 0 | 0 | 4000.00 | 0.00 |
| 364 | 0.362000 | 145.00 | 1.539 | 16 | 130.600 | 129.600 | 2 | 0.00000 | 361 0 | 0 | 4000.00 | 0.00 |
| 365 | 0.336000 | 65.00 | 1.940 | 3 | 92.000 | 118.400 | 2 | 0.00000 | 145 366 | 0 | 4000.00 | 0.00 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 366 | 0.336000 | 20.00 | 1.544 | 3 | 118.400 | 118.400 | 2 | 0.00000 | 365 367 | 0 | 4000.00 | 0.00 |
| 367 | 0.256000 | 15.00 | 1.239 | 16 | 118.400 | 115.000 | 2 | 0.00000 | 366 0 | 0 | 4000.00 | 0.00 |
| 368 | 0.256000 | 20.00 | 1.947 | 16 | 118.400 | 127.000 | 2 | 0.00000 | 365 0 | 0 | 4000.00 | 0.00 |
| 369 | 0.336000 | 30.00 | 2.275 | 4 | 118.400 | 133.500 | 2 | 0.00000 | 366 370 | 0 | 4000.00 | 0.00 |
| 370 | 0.256000 | 35.00 | 1.232 | 3 | 133.500 | 166.000 | 2 | 0.00000 | 369 371 | 0 | 4000.00 | 0.00 |
| 371 | 0.256000 | 10.00 | 1.000 | 19 | 166.000 | 176.000 | 2 | 0.00000 | 370 372 | 0 | 4000.00 | 0.00 |
| 372 | 0.256000 | 20.00 | 2.970 | 16 | 176.000 | 175.000 | 2 | 0.00000 | 371 0 | 0 | 4000.00 | 0.00 |
| 373 | 0.256000 | 55.00 | 1.521 | 16 | 166.000 | 141.000 | 2 | 0.00000 | 370 0 | 0 | 4000.00 | 0.00 |
| 374 | 0.336000 | 5.00 | 6.914 | 3 | 92.000 | 94.200 | 2 | 0.00000 | 144 375 | 0 | 4000.00 | 0.00 |
| 375 | 0.336000 | 50.00 | 1.605 | 3 | 94.200 | 113.250 | 2 | 0.00000 | 374 376 | 0 | 4000.00 | 0.00 |
| 376 | 0.256000 | 30.00 | 1.100 | 16 | 113.250 | 141.750 | 2 | 0.00000 | 375 0 | 0 | 4000.00 | 0.00 |
| 377 | 0.256000 | 30.00 | 1.751 | 16 | 94.200 | 74.000 | 2 | 0.00000 | 374 0 | 0 | 4000.00 | 0.00 |
| 378 | 0.256000 | 20.00 | 2.380 | 16 | 113.300 | 111.000 | 2 | 0.00000 | 375 0 | 0 | 4000.00 | 0.00 |
| 379 | 0.336000 | 10.00 | 4.898 | 4 | 89.000 | 94.330 | 2 | 0.00000 | 137 380 | 0 | 4000.00 | 0.00 |
| 380 | 0.336000 | 5.00 | 2.344 | 3 | 94.330 | 95.000 | 2 | 0.00000 | 379 381 | 0 | 4000.00 | 0.00 |
| 381 | 0.336000 | 100.00 | 1.322 | 4 | 95.000 | 130.700 | 2 | 0.00000 | 380 382 | 0 | 4000.00 | 0.00 |
| 382 | 0.256000 | 65.00 | 1.598 | 19 | 130.700 | 176.000 | 2 | 0.00000 | 381 383 | 0 | 4000.00 | 0.00 |
| 383 | 0.256000 | 20.00 | 1.000 | 16 | 176.000 | 175.000 | 2 | 0.00000 | 382 0 | 0 | 4000.00 | 0.00 |
| 384 | 0.336000 | 50.00 | 1.859 | 3 | 95.000 | 96.500 | 2 | 0.00000 | 380 385 | 0 | 4000.00 | 0.00 |
| 385 | 0.256000 | 75.00 | 1.252 | 3 | 96.500 | 98.000 | 2 | 0.00000 | 384 386 | 0 | 4000.00 | 0.00 |
| 386 | 0.256000 | 40.00 | 1.269 | 16 | 98.000 | 71.000 | 2 | 0.00000 | 385 0 | 0 | 4000.00 | 0.00 |
| 387 | 0.256000 | 15.00 | 2.741 | 16 | 96.500 | 103.000 | 2 | 0.00000 | 384 0 | 0 | 4000.00 | 0.00 |
| 388 | 0.256000 | 40.00 | 1.922 | 16 | 98.000 | 94.500 | 2 | 0.00000 | 385 0 | 0 | 4000.00 | 0.00 |
| 389 | 0.336000 | 45.00 | 1.567 | 3 | 89.000 | 127.750 | 2 | 0.00000 | 135 390 | 0 | 4000.00 | 0.00 |
| 390 | 0.256000 | 20.00 | 1.688 | 16 | 127.750 | 141.750 | 2 | 0.00000 | 389 0 | 0 | 4000.00 | 0.00 |
| 391 | 0.256000 | 110.00 | 1.335 | 16 | 127.750 | 141.750 | 2 | 0.00000 | 389 0 | 0 | 4000.00 | 0.00 |
| 392 | 0.336000 | 5.00 | 7.854 | 3 | 94.500 | 96.800 | 2 | 0.00000 | 155 393 | 0 | 4000.00 | 0.00 |
| 393 | 0.256000 | 215.00 | 1.316 | 16 | 96.800 | 65.000 | 2 | 0.00000 | 392 0 | 0 | 4000.00 | 0.00 |
| 394 | 0.256000 | 125.00 | 1.470 | 16 | 96.800 | 141.750 | 2 | 0.00000 | 392 0 | 0 | 4000.00 | 0.00 |
| 395 | 0.336000 | 150.00 | 1.528 | 3 | 94.500 | 130.400 | 2 | 0.00000 | 156 396 | 0 | 4000.00 | 0.00 |
| 396 | 0.256000 | 155.00 | 1.280 | 19 | 130.400 | 182.000 | 2 | 0.00000 | 395 397 | 0 | 4000.00 | 0.00 |
| 397 | 0.256000 | 30.00 | 1.478 | 16 | 182.000 | 179.000 | 2 | 0.00000 | 396 0 | 0 | 4000.00 | 0.00 |
| 398 | 0.256000 | 40.00 | 1.653 | 16 | 130.400 | 141.750 | 2 | 0.00000 | 395 0 | 0 | 4000.00 | 0.00 |
| 399 | 0.505000 | 120.00 | 1.538 | 3 | 94.500 | 90.500 | 2 | 0.00000 | 158 400 | 0 | 4000.00 | 0.00 |
| 400 | 0.336000 | 5.00 | 8.007 | 4 | 90.500 | 90.500 | 2 | 0.00000 | 399 401 | 0 | 4000.00 | 0.00 |
| 401 | 0.256000 | 60.00 | 1.349 | 16 | 90.500 | 141.750 | 2 | 0.00000 | 400 0 | 0 | 4000.00 | 0.00 |
| 402 | 0.336000 | 130.00 | 1.496 | 3 | 90.500 | 65.300 | 2 | 0.00000 | 399 403 | 0 | 4000.00 | 0.00 |
| 403 | 0.336000 | 50.00 | 1.228 | 4 | 65.300 | 94.700 | 2 | 0.00000 | 402 404 | 0 | 4000.00 | 0.00 |
| 404 | 0.256000 | 55.00 | 1.315 | 16 | 94.700 | 141.750 | 2 | 0.00000 | 403 0 | 0 | 4000.00 | 0.00 |
| 405 | 0.336000 | 40.00 | 2.260 | 3 | 65.300 | 77.500 | 2 | 0.00000 | 402 406 | 0 | 4000.00 | 0.00 |
| 406 | 0.256000 | 30.00 | 1.458 | 16 | 77.500 | 103.500 | 2 | 0.00000 | 405 0 | 0 | 4000.00 | 0.00 |
| 407 | 0.256000 | 125.00 | 1.180 | 16 | 77.500 | 75.000 | 2 | 0.00000 | 405 0 | 0 | 4000.00 | 0.00 |
| 408 | 0.336000 | 135.00 | 1.552 | 4 | 79.000 | 142.000 | 2 | 0.00000 | 139 409 | 0 | 4000.00 | 0.00 |
| 409 | 0.336000 | 20.00 | 1.000 | 16 | 142.000 | 141.750 | 2 | 0.00000 | 408 0 | 0 | 4000.00 | 0.00 |
| 410 | 0.256000 | 95.00 | 1.334 | 19 | 96.200 | 174.000 | 2 | 0.00000 | 150 411 | 0 | 4000.00 | 0.00 |
| 411 | 0.256000 | 10.00 | 1.358 | 4 | 174.000 | 183.500 | 2 | 0.00000 | 410 412 | 0 | 4000.00 | 0.00 |
| 412 | 0.107000 | 60.00 | 1.439 | 4 | 183.500 | 197.500 | 2 | 0.00000 | 411 413 | 0 | 4000.00 | 0.00 |
| 413 | 0.107000 | 25.00 | 1.000 | 16 | 197.500 | 197.500 | 2 | 0.00000 | 412 0 | 0 | 4000.00 | 0.00 |
| 414 | 0.505000 | 100.00 | 2.373 | 3 | 91.940 | 138.300 | 2 | 0.00000 | 143 415 | 0 | 4000.00 | 0.00 |
| 415 | 0.505000 | 5.00 | 5.848 | 2 | 138.300 | 142.000 | 2 | 0.00000 | 414 416 | 0 | 4000.00 | 0.00 |
| 416 | 0.336000 | 5.00 | 1.000 | 4 | 142.000 | 142.000 | 2 | 0.00000 | 415 417 | 0 | 4000.00 | 0.00 |
| 417 | 0.336000 | 50.00 | 1.000 | 4 | 142.000 | 160.000 | 2 | 0.00000 | 416 418 | 0 | 4000.00 | 0.00 |
| 418 | 0.336000 | 50.00 | 1.000 | 16 | 160.000 | 160.000 | 2 | 0.00000 | 417 0 | 0 | 4000.00 | 0.00 |
| 419 | 0.505000 | 85.00 | 2.031 | 4 | 94.500 | 131.500 | 2 | 0.00000 | 154 420 | 0 | 4000.00 | 0.00 |
| 420 | 0.505000 | 50.00 | 1.443 | 4 | 131.500 | 130.750 | 2 | 0.00000 | 419 421 | 0 | 4000.00 | 0.00 |
| 421 | 0.505000 | 30.00 | 1.909 | 4 | 130.750 | 130.750 | 2 | 0.00000 | 420 422 | 0 | 4000.00 | 0.00 |
| 422 | 0.505000 | 40.00 | 2.361 | 4 | 130.750 | 128.750 | 2 | 0.00000 | 421 423 | 0 | 4000.00 | 0.00 |
| 423 | 0.505000 | 35.00 | 1.491 | 3 | 128.750 | 132.170 | 2 | 0.00000 | 422 424 | 0 | 4000.00 | 0.00 |
| 424 | 0.256000 | 10.00 | 1.505 | 4 | 132.170 | 138.000 | 2 | 0.00000 | 423 425 | 0 | 4000.00 | 0.00 |
| 425 | 0.162000 | 105.00 | 1.580 | 16 | 138.000 | 169.500 | 2 | 0.00000 | 424 0 | 0 | 4000.00 | 0.00 |
| 426 | 0.336000 | 40.00 | 1.843 | 3 | 132.170 | 132.170 | 2 | 0.00000 | 423 427 | 0 | 4000.00 | 0.00 |
| 427 | 0.256000 | 10.00 | 1.000 | 4 | 132.170 | 138.000 | 2 | 0.00000 | 426 428 | 0 | 4000.00 | 0.00 |
| 428 | 0.162000 | 100.00 | 1.632 | 16 | 138.000 | 169.500 | 2 | 0.00000 | 427 0 | 0 | 4000.00 | 0.00 |
| 429 | 0.256000 | 40.00 | 1.165 | 4 | 132.170 | 138.000 | 2 | 0.00000 | 426 430 | 0 | 4000.00 | 0.00 |
| 430 | 0.162000 | 155.00 | 1.548 | 16 | 138.000 | 169.500 | 2 | 0.00000 | 429 0 | 0 | 4000.00 | 0.00 |
| 431 | 0.256000 | 40.00 | 1.934 | 4 | 65.500 | 69.000 | 2 | 0.00000 | 286 432 | 0 | 4000.00 | 0.00 |
| 432 | 0.256000 | 105.00 | 1.020 | 4 | 69.000 | 171.000 | 2 | 0.00000 | 431 433 | 0 | 4000.00 | 0.00 |
| 433 | 0.162000 | 10.00 | 1.227 | 19 | 171.000 | 181.000 | 2 | 0.00000 | 432 434 | 0 | 4000.00 | 0.00 |
| 434 | 0.162000 | 40.00 | 1.332 | 16 | 181.000 | 180.000 | 2 | 0.00000 | 433 0 | 0 | 4000.00 | 0.00 |
| 435 | 0.665000 | 15.00 | 5.522 | 3 | 89.600 | 83.800 | 2 | 0.00000 | 166 436 | 0 | 4000.00 | 0.00 |
| 436 | 0.665000 | 5.00 | 3.660 | 3 | 83.800 | 83.800 | 2 | 0.00000 | 435 437 | 0 | 4000.00 | 0.00 |
| 437 | 0.665000 | 5.00 | 14.300 | 3 | 83.800 | 83.800 | 2 | 0.00000 | 436 438 | 0 | 4000.00 | 0.00 |
| 438 | 0.505000 | 5.00 | 4.652 | 13 | 83.800 | 88.000 | 2 | 0.00000 | 437 439 | 0 | 4000.00 | 0.00 |
| 439 | 0.505000 | 5.00 | 6.050 | 2 | 88.000 | 89.000 | 2 | 0.00000 | 438 440 | 0 | 4000.00 | 0.00 |
| 440 | 0.336000 | 60.00 | 5.000 | 1 | 89.000 | 113.000 | 2 | 0.00000 | 439 0 | 0 | 4000.00 | 0.00 |
| 441 | 0.665000 | 10.00 | 9.911 | 3 | 83.800 | 91.500 | 2 | 0.00000 | 437 442 | 0 | 4000.00 | 0.00 |
| 442 | 0.665000 | 80.00 | 1.865 | 3 | 91.500 | 102.800 | 2 | 0.00000 | 441 443 | 0 | 4000.00 | 0.00 |
| 443 | 0.665000 | 50.00 | 1.106 | 16 | 102.800 | 130.000 | 2 | 0.00000 | 442 0 | 0 | 4000.00 | 0.00 |

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 444    0.336000     10.00     5.435  16     102.800   107.800     2     0.00000 442   0     0   4000.00      0.00
 445    0.665000     40.00     2.658  16      91.500    86.000     2     0.00000 441   0     0   4000.00      0.00
 446    0.505000      5.00     7.868  13      83.800    88.000     2     0.00000 435 447     0   4000.00      0.00
 447    0.505000      5.00     1.000   2      88.000    89.000     2     0.00000 446 448     0   4000.00      0.00
 448    0.505000     45.00     2.301   4      89.000   103.000     2     0.00000 447 449     0   4000.00      0.00
 449    0.336000     20.00     2.613   4     103.000   112.000     2     0.00000 448 450     0   4000.00      0.00
 450    0.336000    110.00     2.307   1     112.000   113.000     2     0.00000 449   0     0   4000.00      0.00
 451    0.336000    160.00     1.474   4      83.800   141.000     2     0.00000 436 452     0   4000.00      0.00
 452    0.336000      5.00     1.000   2     141.000   141.000     2     0.00000 451 453     0   4000.00      0.00
 453    0.256000     50.00     1.000   1     141.000   141.000     2     0.00000 452   0     0   4000.00      0.00
 454    0.665000     30.00     4.979   3      84.100    93.500     2     0.00000 204 455     0   4000.00      0.00
 455    0.665000     10.00     2.862   2      93.500   103.500     2     0.00000 454 456     0   4000.00      0.00
 456    0.505000     50.00     5.000   1     103.500   103.500     2     0.00000 455   0     0   4000.00      0.00
 457    0.505000     20.00     2.414   4      93.500    80.300     2     0.00000 454 458     0   4080.00      0.00
 458    0.505000     50.00     1.000  16      80.300    80.300     2     0.00000 457   0     0   4000.00      0.00
 459    0.336000     20.00     3.318   4      62.750    62.750     2     0.00000 218 460     0   4000.00      0.00
 460    0.336000     10.00     2.210   4      62.750    63.750     2     0.00000 459 461     0   4000.00      0.00
 461    0.336000     30.00     1.762   4      63.750    86.250     2     0.00000 460 462     0   4000.00      0.00
 462    0.336000     40.00     1.286   4      86.250   125.000     2     0.00000 461 463     0   4000.00      0.00
 463    0.336000    130.00     1.233   4     125.000   125.000     2     0.00000 462 464     0   4000.00      0.00
 464    0.336000     30.00     1.587   4     125.000   155.000     2     0.00000 463 465     0   4000.00      0.00
 465    0.256000     60.00     1.171  19     155.000   208.000     2     0.00000 464 466     0   4000.00      0.00
 466    0.001000     10.00     1.000  16     208.000   205.000     2     0.00000 465   0     0   4000.00      0.00
 467    0.336000     20.00     2.378   4      94.000    94.000     2     0.00000 199 468     0   4000.00      0.00
 468    0.336000     20.00     1.000   4      94.000    94.000     2     0.00000 467 469     0   4000.00      0.00
 469    0.336000      5.00     1.538   4      94.000    94.000     2     0.00000 468 470     0   4000.00      0.00
 470    0.336000     25.00     2.665   4      94.000   113.000     2     0.00000 469 471     0   4000.00      0.00
 471    0.336000     75.00     1.403   4     113.000   122.000     2     0.00000 470 472     0   4000.00      0.00
 472    0.336000     35.00     1.708   3     122.000   151.800     2     0.00000 471 473     0   4000.00      0.00
 473    0.336000     30.00     2.322   3     151.800   169.500     2     0.00000 472 474     0   4000.00      0.00
 474    0.336000     35.00     1.770   4     169.500   187.800     2     0.00000 473 475     0   4000.00      0.00
 475    0.256000     15.00     1.717   4     187.800   187.800     2     0.00000 474 476     0   4000.00      0.00
 476    0.256000    110.00     1.130  19     187.800   205.300     2     0.00000 475 477     0   4000.00      0.00
 477    0.256000     10.00     1.000  16     205.300   204.300     2     0.00000 476   0     0   4000.00      0.00
 478    0.256000     40.00     1.849  16     169.500   166.000     2     0.00000 473   0     0   4000.00      0.00
 479    0.336000     10.00     4.769   4     151.800   153.300     2     0.00000 472 480     0   4000.00      0.00
 480    0.256000     60.00     1.293  16     153.300   149.300     2     0.00000 479   0     0   4000.00      0.00
 481    0.505000      5.00    14.146   4      61.750    57.700     2     0.00000 208 482     0   4000.00      0.00
 482    0.505000     20.00     3.323   4      57.700    71.000     2     0.00000 481 483     0   4000.00      0.00
 483    0.505000     10.00     1.000   2      71.000    71.000     2     0.00000 482 484     0   4000.00      0.00
 484    0.505000     50.00     5.000   1      71.000    71.000     2     0.00000 483   0     0   4000.00      0.00
 485    0.505000      5.00    13.184   4     138.300   138.300     2     0.00000 414 486     0   4000.00      0.00
 486    0.336000     90.00     1.157   4     138.300   143.500     2     0.00000 485 487     0   4000.00      0.00
 487    0.336000     15.00     1.627   4     143.500   147.400     2     0.00000 486 488     0   4000.00      0.00
 488    0.336000     75.00     1.314   4     147.400   165.800     2     0.00000 487 489     0   4000.00      0.00
 489    0.336000     70.00     1.355   4     165.800   164.000     2     0.00000 488 490     0   4000.00      0.00
 490    0.336000     10.00     3.486   4     164.000   164.000     2     0.00000 489 491     0   4000.00      0.00
 491    0.336000     10.00     1.416   4     164.000   164.000     2     0.00000 490 492     0   4000.00      0.00
 492    0.256000     10.00     1.251   4     164.000   164.000     2     0.00000 491 493     0   4000.00      0.00
 493    0.206000     10.00     3.225   4     164.000   166.000     2     0.00000 492 494     0   4000.00      0.00
 494    0.206000     75.00     1.549   4     166.000   166.000     2     0.00000 493 495     0   4000.00      0.00
 495    0.172000     20.00     1.757  19     166.000   166.000     2     0.00000 494 496     0   4000.00      0.00
 496    0.087000     10.00     2.409  16     166.000   168.000     2     0.00000 495   0     0   4000.00      0.00

@EOR

 91 570.3   0  18
   20.00   .000     -0.022     -0.033    -0.045    -0.056    -0.067    -0.078
  -0.089  -.100     -0.111     -0.123    -0.134    -0.145    -0.156    -0.167
  -0.200   -100.0
    570.3  570.3     587.3     590.3     587.3     580.3     568.3     558.3
    542.3  520.3     490.3     460.3     420.3     370.3     310.3     240.3
     170.3  170.3

 99 495.3   0  18
   20.00   .000     -0.557     -1.114    -1.671    -2.228    -2.785    -3.342
  -3.899  -4.46     -5.013     -5.570    -6.127    -6.684    -7.241    -8.912
  -13.4   -100.0
    495.3  495.3     494.3     492.3     491.3     488.3     485.3     481.3
    477.3  472.3     466.3     459.3     448.3     436.3     423.3     375.3
    170.3  170.3

117 512.1  0 17
   20.00  -.000     -0.557     -1.114    -1.671    -2.228    -2.785    -3.342
  -3.899  -4.46     -5.013     -5.57     -6.127    -6.684    -7.241    -8.912
  -13.37
    512.1  512.1     510.1     507.1     505.1     502.1     500.1     498.1
    495.1  492.1     487.8     481.1     476.1     467.1     457.1     412.1
```

```
   160.1

123 512.1  0 17
   20.00  -.000     -0.557    -1.114    -1.671    -2.228    -2.785    -3.342
  -3.899  -4.46     -5.013    -5.57     -6.127    -6.684    -7.241    -8.912
  -13.37
   512.1  512.1     510.1     507.1     505.1     502.1     500.1     498.1
   495.1  492.1     487.8     481.1     476.1     467.1     457.1     412.1
   160.1

129 482.1   0  16
   20.00   .000     -0.022     -0.033    -0.045    -0.056    -0.067    -0.078
  -0.089  -.100     -0.111     -0.123    -0.134    -0.145    -0.156    -100.0
  482.1  482.1     478.1     473.1     463.1     448.1     428.1     403.1
  374.1  343.1     308.1     268.1     233.1     198.1     168.1     168.1

440 147.0   0   0

450 147.0   0   0

453 175.0   0   0

456 137.5   0   0

484 105.0   0   0

  4 0  100.  100. 1.0E+20   2  9  4  0  .01   416.4
0     .56   2.36    100
100.  100.  100.    100.
0     50.0   90.0  92.5   95.3   97.5      99.0      99.7       100.0
0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

 90 0  100  100  1.0E+20    2  9  3  0  .01  570.3
 0       0.01  100
 100     0    0
 0     50.0   90.0  92.5   95.3   97.5      99.0      99.7       100.0
0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

 96 0  100  100  1.0E+20   2  9  4  0  .01  495.3
 0      .63   3.43   100
 100.   100.  100.   100.
 0     50.0   90.0  92.5   95.3   97.5      99.0      99.7       100.0
0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

114 0  100  100  1.0E+20    2  9  4  0  .01  512.1
0       2.51  5.61   100
100     100   0.     0.
0     50.0   90.0  92.5   95.3   97.5      99.0      99.7       100.0
0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

121 0  100  100  1.0E+20    2  9  4  0  .01  512.1
0       21.93 27.13 100
100     100   100   100
0     50.0   90.0  92.5   95.3   97.5      99.0      99.7       100.0
0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

126 0  100  100  1.0E+20    2  9  3  0  .01  482.1
 0       0.01  100
 100     0    0
 0     50.0   90.0  92.5   95.3   97.5      99.0      99.7       100.0
0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

415  0  100  100  1.0E+20   2  16  3  0  1.79  194.
0        0.1    100
100     100    100
0   11.1   16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
97.5     99.0     99.7  100.0
10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
203570   1596000  0.49259E+08  0.1E+21

439  0  100  100  1.0E+20   2  16  3  0  1.79  147.
0       0.1    100
100     100    100
0    11.1  16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
97.5     99.0     99.7  100.0
10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
203570   1596000  0.49259E+08  0.1E+21
```

```
 447  0  100  100  1.0E+20   2  16  3  0  1.79  147.
 0       0.01    100
 100     100     100
 0    11.1  16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
 97.5     99.0     99.7  100.0
 10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
 203570   1596000  0.49259E+08  0.1E+21

 452  0  100  100  1.0E+20   2  16  3  0  1.785  175.
 0       0.01   100
 100     100    100
 0    11.1  16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
 97.5     99.0     99.7  100.0
 10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
 203570   1596000  0.49259E+08  0.1E+21

 455  0  100  100  1.0E+20   2  16  3  0  0.695  137.5
  0       0.01   100
  100     100    100
  0    11.1  16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
  97.5     99.0     99.7  100.0
  10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
 203570   1596000  0.49259E+08  0.1E+21


 483  0  100  100  1.0E+20  2  16  3  0  0.99  105.0
 0       0.1   100
 100     0     0
 0    11.1  16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
 97.5     99.0     99.7  100.0
 10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
 203570   1596000  0.49259E+08  0.1E+21


   5  2  0.650  0.01 0.7850 0.0  ID 1.0000
 438  2  0.750  0.01 0.2003 0.0  ID 0.5050
 446  2  0.750  0.01 0.2003 0.0  ID 0.5050

465   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102


476   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102

308   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102


410   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102


433   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102

396   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102

362   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102

371   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
```

# CALCULATION SHEET

| | | | |
|---|---|---|---|
| Project: | HOPE CREEK GENERATING STATION | Job Number: | 8038 |
| Calc No. | 8038-P0004 | Sheet No. | 224 |
| By: | A. Arastu Date: 9/14/18 | Rev. No. | 1 |
| Subject: | Water Hammer Analysis of the HCGS Fire Protection System | | |

```
0.21        14.7       0.02     68.0
53.3   2         .102

334   0.00136      0.0006       1.5      0.
0.0          1.0         0.      0.083
0.21        14.7       0.02     68.0
53.3   2         .102

382   0.00136      0.0006       1.5      0.
0.0          1.0         0.      0.083
0.21        14.7       0.02     68.0
53.3   2         .102

495   0.00136      0.0006       1.5      0.
0.0          1.0         0.      0.083
0.21        14.7       0.02     68.0
53.3   2         .102

 1.           1.
 6     2
 94    2
 97    2
 102   2
 113   2
 120   2
 184   41
 188   46
 194   31
 289   11
 292   23
 303   11
 309   4
 313   12
 322   11
 334   3
 347   11
 351   10
 362   10
 371   2
 376   6
 382   13
 396   31
 401   12
 404   11
 409   4
 410   17
 418   9
 425   21
 428   20
 430   32
 432   20
 433   3
 450   22
 451   32
 465   1
 466   2
 476   4
 477   22
 478   8
 480   12
 495   4


@EOR
410       1       410      3          1
410       3       410      5          2
410       4       410      18         3
410       18      410      19         4
410       18      411      3          5
412       1       412      2          6
412       1       412      3          7
412       3       412      6          8
412       5       412      6          9
412       6       412      7          10
412       7       412      10         11
431       1       431      2          12
431       2       431      3          13
431       2       431      5          14
```

# CALCULATION SHEET

| | | | |
|---|---|---|---|
| Project: | HOPE CREEK GENERATING STATION | Job Number: | 8038 |
| Calc No. | 8038-P0004 | Sheet No. | 225 |
| By: | A. Arastu Date: 9/14/18 | Rev. No. | 1 |
| Subject: | Water Hammer Analysis of the HCGS Fire Protection System | | |

```
431       5       431      8          15
431       8       431      9          16
432       1       432      22         17
308       1       308      5          18
308       5       308      6          19
308       5       308      18         20
308       18      308      20         21
308       20      308      21         22
308       21      308      27         23
@EOR
0      3.0   1000   1
3.0   30.0    500   1
30.0 888.    1000   1
```

## B8 - Case 8 (6-inch Deluge Valve in RB w/Salem Pump #2) with Vacuum Breakers

```
HCGS FP Case 8: 11 Vacuum Breakers.  Forces in Riser # 26 only
42000
0  0  1  0  0  0
2   2  0.0  12.0
2   1   0   0
0   1   0  0  0  0  0  1 0 0
1.9  62.4  7.83E-6
1.0  2   13    0    0
       0.0    1000.0    2000.0   2.0E+04   6.0E+04   1.0E+05   3.0E+05   6.0E+05
   1.0E+06   1.5E+06   3.5E+06   1.0E+11   1.0E+33
      0.10     0.061     0.048     0.026     0.021      .019    0.0167    0.0155
    0.0150    0.0147     0.014     0.014     0.014
495.3   3  17  0    0
  -10.00   .000   .557  1.114  1.671  2.228  2.785  3.342
   3.899  4.456  5.013  5.570  6.127  6.684  7.241  8.912
   13.4
   495.3  495.3     494.3     492.3     491.3     488.3     485.3     481.3
   477.3  472.3     466.3     459.3     448.3     436.3     423.3     375.3
   170.3
   1
   1    1.104000     55.00    5.492   4      99.400    94.000     2     0.00000   0   2     0   4000.00       0.00
   2    1.000000     20.00    7.400   4      94.000   105.040     2     0.00000   1   3     0   4000.00       0.00
   3    1.000000     10.00    7.180   4     105.040   105.040     2     0.00000   2   4     0   4000.00       0.00
   4    1.000000     10.00    3.538   2     105.040   104.500     2     0.00000   3   5     0   4000.00       0.00
   5    1.000000      5.00   18.508  13     104.500   104.750     2     0.00000   4   6     0   4000.00       0.00
   6    1.000000     10.00    5.200   4     104.750   110.000     2     0.00000   5   7     0   4000.00       0.00
   7    1.000000     20.00    3.400   3     110.000   105.000     2     0.00000   6   8     0   4000.00       0.00
   8    1.000000    115.00    2.402   3     105.000    96.900     2     0.00000   7  86     0   4000.00       0.00
   9    1.007000      5.00    2.611   4      96.900    96.900     2     0.00000   8  10     0   4000.00       0.00
  10    1.007000     10.00    3.014   4      96.900    96.900     2     0.00000   9  11     0   4000.00       0.00
  11    1.007000     10.00    1.806   4      96.900    96.900     2     0.00000  10  12     0   4000.00       0.00
  12    1.007000     10.00    3.014   3      96.900    96.900     2     0.00000  11  13     0   4000.00       0.00
  13    1.007000    110.00    1.183   4      96.900    96.900     2     0.00000  12  14     0   4000.00       0.00
  14    1.007000    110.00    1.363   4      96.900    95.900     2     0.00000  13  15     0   4000.00       0.00
  15    1.007000     10.00    3.014   4      95.900    95.900     2     0.00000  14  16     0   4000.00       0.00
  16    1.007000     30.00    1.671   4      95.900    95.900     2     0.00000  15  17     0   4000.00       0.00
  17    1.007000     80.00    1.252   4      95.900    95.900     2     0.00000  16  18     0   4000.00       0.00
  18    1.007000     20.00    1.403   4      95.900    95.900     2     0.00000  17  19     0   4000.00       0.00
  19    1.007000    130.00    1.155   4      95.900    95.900     2     0.00000  18  20     0   4000.00       0.00
  20    1.007000    135.00    1.060   4      95.900    95.400     2     0.00000  19  21     0   4000.00       0.00
  21    1.007000     10.00    2.994   4      95.400    93.500     2     0.00000  20  22     0   4000.00       0.00
  22    1.007000     65.00    1.217   4      93.500    93.500     2     0.00000  21  23     0   4000.00       0.00
  23    1.007000      5.00    1.000   4      93.500    93.500     2     0.00000  22  24     0   4000.00       0.00
  24    1.007000     20.00    3.004   4      93.500    97.000     2     0.00000  23  25     0   4000.00       0.00
  25    1.007000    200.00    1.300   4      97.000    97.000     2     0.00000  24  26     0   4000.00       0.00
  26    1.007000     55.00    1.513   4      97.000    97.000     2     0.00000  25  27     0   4000.00       0.00
  27    1.007000     20.00    1.997   4      97.000    93.000     2     0.00000  26  28     0   4000.00       0.00
  28    1.007000    230.00    1.088   3      93.000    93.000     2     0.00000  27 181     0   4000.00       0.00
  29    1.007000     40.00    1.503   3      93.000    93.000     2     0.00000  28  30     0   4000.00       0.00
  30    1.007000    240.00    1.117   4      93.000    94.500     2     0.00000  29  31     0   4000.00       0.00
  31    1.007000     45.00    1.448   4      94.500    94.500     2     0.00000  30  32     0   4000.00       0.00
  32    1.007000     35.00    1.570   4      94.500    91.000     2     0.00000  31  33     0   4000.00       0.00
  33    1.007000    180.00    1.111   4      91.000    96.000     2     0.00000  32  34     0   4000.00       0.00
  34    1.007000     10.00    3.014   4      96.000    96.000     2     0.00000  33  35     0   4000.00       0.00
  35    1.007000      5.00    5.028   4      96.000    96.000     2     0.00000  34  36     0   4000.00       0.00
  36    1.007000      5.00    2.611   4      96.000    96.000     2     0.00000  35  37     0   4000.00       0.00
  37    1.007000     10.00    3.014   4      96.000    96.000     2     0.00000  36  38     0   4000.00       0.00
  38    1.007000     30.00    2.141   4      96.000    96.000     2     0.00000  37  39     0   4000.00       0.00
  39    1.007000     20.00    1.403   4      96.000    96.000     2     0.00000  38  40     0   4000.00       0.00
  40    1.007000     80.00    1.252   3      96.000    96.000     2     0.00000  39  41     0   4000.00       0.00
  41    1.007000     10.00    1.806   4      96.000    96.000     2     0.00000  40  42     0   4000.00       0.00
  42    1.007000     20.00    1.000   4      96.000    96.000     2     0.00000  41  43     0   4000.00       0.00
  43    1.007000     55.00    1.363   4      96.000    97.200     2     0.00000  42  44     0   4000.00       0.00
  44    1.007000      5.00    5.028   4      97.200    97.200     2     0.00000  43  45     0   4000.00       0.00
  45    1.007000    160.00    1.175   4      97.200    96.200     2     0.00000  44  46     0   4000.00       0.00
  46    1.007000     15.00    2.343   3      96.200    96.200     2     0.00000  45 162     0   4000.00       0.00
  47    1.007000      5.00    5.028   4      96.200    96.200     2     0.00000  46  48     0   4000.00       0.00
  48    1.007000     15.00    6.357   4      96.200    97.000     2     0.00000  47  49     0   4000.00       0.00
  49    1.007000     60.00    1.166   4      97.000    97.000     2     0.00000  48  50     0   4000.00       0.00
  50    1.007000     15.00    2.994   4      97.000    94.500     2     0.00000  49  51     0   4000.00       0.00
  51    1.007000      5.00    4.605   4      94.500    97.000     2     0.00000  50  52     0   4000.00       0.00
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| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 52 | 1.007000 | 15.00 | 2.329 | 4 | 97.000 | 94.000 | 2 | 0.00000 | 51 | 53 | 0 | 4000.00 | 0.00 |
| 53 | 1.007000 | 80.00 | 1.501 | 4 | 94.000 | 96.500 | 2 | 0.00000 | 52 | 54 | 0 | 4000.00 | 0.00 |
| 54 | 1.007000 | 65.00 | 1.310 | 3 | 96.500 | 96.500 | 2 | 0.00000 | 53 | 55 | 0 | 4000.00 | 0.00 |
| 55 | 1.007000 | 50.00 | 1.481 | 4 | 96.500 | 97.200 | 2 | 0.00000 | 54 | 56 | 0 | 4000.00 | 0.00 |
| 56 | 1.007000 | 25.00 | 1.322 | 4 | 97.200 | 97.200 | 2 | 0.00000 | 55 | 57 | 0 | 4000.00 | 0.00 |
| 57 | 1.007000 | 5.00 | 3.820 | 4 | 97.200 | 97.200 | 2 | 0.00000 | 56 | 58 | 0 | 4000.00 | 0.00 |
| 58 | 1.007000 | 70.00 | 1.288 | 4 | 97.200 | 97.200 | 2 | 0.00000 | 57 | 59 | 0 | 4000.00 | 0.00 |
| 59 | 1.007000 | 10.00 | 1.806 | 4 | 97.200 | 97.200 | 2 | 0.00000 | 58 | 60 | 0 | 4000.00 | 0.00 |
| 60 | 1.007000 | 195.00 | 1.103 | 4 | 97.200 | 97.200 | 2 | 0.00000 | 59 | 61 | 0 | 4000.00 | 0.00 |
| 61 | 1.007000 | 240.00 | 1.159 | 4 | 97.200 | 94.500 | 2 | 0.00000 | 60 | 62 | 0 | 4000.00 | 0.00 |
| 62 | 1.007000 | 215.00 | 1.094 | 4 | 94.500 | 94.500 | 2 | 0.00000 | 61 | 63 | 0 | 4000.00 | 0.00 |
| 63 | 1.007000 | 110.00 | 1.183 | 4 | 94.500 | 94.500 | 2 | 0.00000 | 62 | 64 | 0 | 4000.00 | 0.00 |
| 64 | 1.007000 | 195.00 | 1.103 | 4 | 94.500 | 94.500 | 2 | 0.00000 | 63 | 65 | 0 | 4000.00 | 0.00 |
| 65 | 1.007000 | 5.00 | 5.028 | 4 | 94.500 | 94.500 | 2 | 0.00000 | 64 | 66 | 0 | 4000.00 | 0.00 |
| 66 | 1.007000 | 30.00 | 1.665 | 4 | 94.500 | 95.800 | 2 | 0.00000 | 65 | 67 | 0 | 4000.00 | 0.00 |
| 67 | 1.007000 | 5.00 | 2.611 | 4 | 95.800 | 95.800 | 2 | 0.00000 | 66 | 68 | 0 | 4000.00 | 0.00 |
| 68 | 1.007000 | 25.00 | 1.806 | 3 | 95.800 | 95.800 | 2 | 0.00000 | 67 | 229 | 0 | 4000.00 | 0.00 |
| 69 | 1.007000 | 130.00 | 1.155 | 4 | 95.800 | 95.500 | 2 | 0.00000 | 68 | 70 | 0 | 4000.00 | 0.00 |
| 70 | 1.007000 | 5.00 | 2.611 | 3 | 95.500 | 95.500 | 2 | 0.00000 | 69 | 261 | 0 | 4000.00 | 0.00 |
| 71 | 1.007000 | 5.00 | 5.028 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 70 | 72 | 0 | 4000.00 | 0.00 |
| 72 | 1.007000 | 5.00 | 2.611 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 71 | 73 | 0 | 4000.00 | 0.00 |
| 73 | 1.007000 | 205.00 | 1.098 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 72 | 74 | 0 | 4000.00 | 0.00 |
| 74 | 1.007000 | 240.00 | 1.117 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 73 | 75 | 0 | 4000.00 | 0.00 |
| 75 | 1.007000 | 20.00 | 4.021 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 74 | 76 | 0 | 4000.00 | 0.00 |
| 76 | 1.007000 | 30.00 | 1.665 | 4 | 95.500 | 91.500 | 2 | 0.00000 | 75 | 77 | 0 | 4000.00 | 0.00 |
| 77 | 1.007000 | 25.00 | 2.120 | 4 | 91.500 | 97.000 | 2 | 0.00000 | 76 | 78 | 0 | 4000.00 | 0.00 |
| 78 | 1.007000 | 50.00 | 1.403 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 77 | 79 | 0 | 4000.00 | 0.00 |
| 79 | 1.007000 | 50.00 | 1.403 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 78 | 80 | 0 | 4000.00 | 0.00 |
| 80 | 1.007000 | 20.00 | 1.997 | 4 | 97.000 | 90.500 | 2 | 0.00000 | 79 | 81 | 0 | 4000.00 | 0.00 |
| 81 | 1.007000 | 40.00 | 2.002 | 4 | 90.500 | 96.900 | 2 | 0.00000 | 80 | 82 | 0 | 4000.00 | 0.00 |
| 82 | 1.007000 | 165.00 | 1.122 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 81 | 83 | 0 | 4000.00 | 0.00 |
| 83 | 1.007000 | 135.00 | 1.060 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 82 | 84 | 0 | 4000.00 | 0.00 |
| 84 | 1.007000 | 10.00 | 3.014 | 3 | 96.900 | 96.900 | 2 | 0.00000 | 83 | 101 | 0 | 4000.00 | 0.00 |
| 85 | 1.007000 | 60.00 | 1.134 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 84 | 86 | 0 | 4000.00 | 0.00 |
| 86 | 1.007000 | 5.00 | 5.028 | 3 | 96.900 | 96.900 | 2 | 0.00000 | 85 | 9 | 1 | 4000.00 | 0.00 |
| 87 | 0.336000 | 10.00 | 5.771 | 3 | 105.000 | 112.070 | 2 | 0.00000 | 7 | 88 | 0 | 4000.00 | 0.00 |
| 88 | 0.336000 | 5.00 | 5.570 | 4 | 112.070 | 113.750 | 2 | 0.00000 | 87 | 89 | 0 | 4000.00 | 0.00 |
| 89 | 0.256000 | 30.00 | 1.870 | 4 | 113.750 | 109.000 | 2 | 0.00000 | 88 | 90 | 0 | 4000.00 | 0.00 |
| 90 | 0.256000 | 10.00 | 1.205 | 2 | 109.000 | 104.250 | 2 | 0.00000 | 89 | 91 | 0 | 4000.00 | 0.00 |
| 91 | 0.256000 | 5.00 | 5.933 | 1 | 104.250 | 103.750 | 2 | 0.00000 | 90 | 0 | 0 | 4000.00 | 0.00 |
| 92 | 0.336000 | 40.00 | 2.714 | 3 | 112.070 | 105.000 | 2 | 0.00000 | 87 | 93 | 0 | 4000.00 | 0.00 |
| 93 | 1.000000 | 20.00 | 3.400 | 4 | 105.000 | 110.200 | 2 | 0.00000 | 92 | 94 | 0 | 4000.00 | 0.00 |
| 94 | 1.000000 | 10.00 | 3.800 | 4 | 110.200 | 104.750 | 2 | 0.00000 | 93 | 95 | 0 | 4000.00 | 0.00 |
| 95 | 1.000000 | 5.00 | 18.508 | 4 | 104.750 | 104.750 | 2 | 0.00000 | 94 | 96 | 0 | 4000.00 | 0.00 |
| 96 | 1.000000 | 10.00 | 3.538 | 2 | 104.750 | 104.750 | 2 | 0.00000 | 95 | 97 | 0 | 4000.00 | 0.00 |
| 97 | 1.000000 | 5.00 | 9.400 | 4 | 104.750 | 105.040 | 2 | 0.00000 | 96 | 98 | 0 | 4000.00 | 0.00 |
| 98 | 1.000000 | 20.00 | 7.400 | 4 | 105.040 | 94.000 | 2 | 0.00000 | 97 | 99 | 0 | 4000.00 | 0.00 |
| 99 | 1.104000 | 30.00 | 4.874 | 1 | 94.000 | 99.400 | 2 | 0.00000 | 98 | 0 | 0 | 4000.00 | 0.00 |
| 100 | 1.000000 | 85.00 | 1.864 | 4 | 105.000 | 91.000 | 2 | 0.00000 | 92 | 101 | 0 | 4000.00 | 0.00 |
| 101 | 1.000000 | 25.00 | 4.512 | 3 | 91.000 | 96.900 | 2 | 0.00000 | 100 | 85 | 1 | 4000.00 | 0.00 |
| 102 | 0.835000 | 5.00 | 12.356 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 40 | 103 | 0 | 4000.00 | 0.00 |
| 103 | 0.788000 | 60.00 | 1.628 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 102 | 104 | 0 | 4000.00 | 0.00 |
| 104 | 0.788000 | 100.00 | 1.000 | 4 | 96.000 | 95.500 | 2 | 0.00000 | 103 | 105 | 0 | 4000.00 | 0.00 |
| 105 | 0.788000 | 100.00 | 1.000 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 104 | 106 | 0 | 4000.00 | 0.00 |
| 106 | 0.788000 | 30.00 | 2.786 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 105 | 107 | 0 | 4000.00 | 0.00 |
| 107 | 0.927000 | 35.00 | 2.059 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 106 | 108 | 0 | 4000.00 | 0.00 |
| 108 | 0.927000 | 150.00 | 1.494 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 107 | 109 | 0 | 4000.00 | 0.00 |
| 109 | 0.927000 | 50.00 | 1.519 | 3 | 95.500 | 95.500 | 2 | 0.00000 | 108 | 110 | 0 | 4000.00 | 0.00 |
| 110 | 0.927000 | 20.00 | 2.298 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 109 | 111 | 0 | 4000.00 | 0.00 |
| 111 | 0.927000 | 10.00 | 7.860 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 110 | 112 | 0 | 4000.00 | 0.00 |
| 112 | 1.000000 | 10.00 | 9.000 | 4 | 95.500 | 101.700 | 2 | 0.00000 | 111 | 113 | 0 | 4000.00 | 0.00 |
| 113 | 1.000000 | 5.00 | 5.400 | 4 | 101.700 | 102.800 | 2 | 0.00000 | 112 | 114 | 0 | 4000.00 | 0.00 |
| 114 | 1.000000 | 10.00 | 12.354 | 2 | 102.800 | 102.800 | 2 | 0.00000 | 113 | 115 | 0 | 4000.00 | 0.00 |
| 115 | 1.000000 | 5.00 | 8.877 | 4 | 102.800 | 102.800 | 2 | 0.00000 | 114 | 116 | 0 | 4000.00 | 0.00 |
| 116 | 1.000000 | 5.00 | 5.000 | 4 | 102.800 | 102.800 | 2 | 0.00000 | 115 | 117 | 0 | 4000.00 | 0.00 |
| 117 | 1.250000 | 30.00 | 3.333 | 1 | 102.800 | 103.000 | 2 | 0.00000 | 116 | 0 | 0 | 4000.00 | 0.00 |
| 118 | 0.927000 | 10.00 | 6.562 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 109 | 119 | 0 | 4000.00 | 0.00 |
| 119 | 1.000000 | 10.00 | 2.400 | 3 | 95.500 | 101.700 | 2 | 0.00000 | 118 | 120 | 0 | 4000.00 | 0.00 |
| 120 | 1.000000 | 5.00 | 7.800 | 4 | 101.700 | 102.800 | 2 | 0.00000 | 119 | 121 | 0 | 4000.00 | 0.00 |
| 121 | 1.000000 | 10.00 | 13.154 | 2 | 102.800 | 102.800 | 2 | 0.00000 | 120 | 122 | 0 | 4000.00 | 0.00 |
| 122 | 1.000000 | 10.00 | 8.938 | 4 | 102.800 | 102.800 | 2 | 0.00000 | 121 | 123 | 0 | 4000.00 | 0.00 |
| 123 | 1.250000 | 20.00 | 3.250 | 1 | 102.800 | 103.000 | 2 | 0.00000 | 122 | 0 | 0 | 4000.00 | 0.00 |
| 124 | 0.134000 | 5.00 | 3.624 | 4 | 101.700 | 101.700 | 2 | 0.00000 | 119 | 125 | 0 | 4000.00 | 0.00 |
| 125 | 0.134000 | 5.00 | 3.141 | 4 | 101.700 | 101.700 | 2 | 0.00000 | 124 | 126 | 0 | 4000.00 | 0.00 |
| 126 | 0.134000 | 5.00 | 1.000 | 2 | 101.700 | 101.700 | 2 | 0.00000 | 125 | 127 | 0 | 4000.00 | 0.00 |
| 127 | 0.134000 | 10.00 | 1.000 | 4 | 101.700 | 101.700 | 2 | 0.00000 | 126 | 128 | 0 | 4000.00 | 0.00 |
| 128 | 0.134000 | 10.00 | 1.000 | 4 | 101.700 | 101.700 | 2 | 0.00000 | 127 | 129 | 0 | 4000.00 | 0.00 |
| 129 | 0.134000 | 10.00 | 1.000 | 1 | 101.700 | 103.000 | 2 | 0.00000 | 128 | 0 | 0 | 4000.00 | 0.00 |

# CALCULATION SHEET

| | | | |
|---|---|---|---|
| Project: | HOPE CREEK GENERATING STATION | Job Number: | 8038 |
| Calc No. | 8038-P0004 | Sheet No. | 228 |
| By: | A. Arastu Date: 9/14/18 | Rev. No. | 1 |
| Subject: | Water Hammer Analysis of the HCGS Fire Protection System | | |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 130 | 0.835000 | 5.00 | 11.020 | 4 | 93.000 | 93.000 | 2 | 0.00000 | 29 | 131 | 0 | 4000.00 | 0.00 |
| 131 | 0.835000 | 100.00 | 1.331 | 4 | 93.000 | 96.010 | 2 | 0.00000 | 130 | 132 | 0 | 4000.00 | 0.00 |
| 132 | 0.835000 | 25.00 | 1.267 | 4 | 96.010 | 96.010 | 2 | 0.00000 | 131 | 133 | 0 | 4000.00 | 0.00 |
| 133 | 0.835000 | 65.00 | 1.000 | 4 | 96.010 | 96.000 | 2 | 0.00000 | 132 | 134 | 0 | 4000.00 | 0.00 |
| 134 | 0.835000 | 20.00 | 2.653 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 133 | 135 | 0 | 4000.00 | 0.00 |
| 135 | 0.835000 | 105.00 | 1.382 | 3 | 96.000 | 89.000 | 2 | 0.00000 | 134 | 136 | 0 | 4000.00 | 0.00 |
| 136 | 0.835000 | 5.00 | 3.338 | 4 | 89.000 | 89.000 | 2 | 0.00000 | 135 | 137 | 0 | 4000.00 | 0.00 |
| 137 | 0.835000 | 50.00 | 1.334 | 3 | 89.000 | 89.000 | 2 | 0.00000 | 136 | 138 | 0 | 4000.00 | 0.00 |
| 138 | 0.835000 | 5.00 | 5.676 | 4 | 89.000 | 89.000 | 2 | 0.00000 | 137 | 139 | 0 | 4000.00 | 0.00 |
| 139 | 0.835000 | 5.00 | 4.340 | 3 | 89.000 | 89.000 | 2 | 0.00000 | 138 | 140 | 0 | 4000.00 | 0.00 |
| 140 | 0.835000 | 55.00 | 1.000 | 4 | 89.000 | 89.000 | 2 | 0.00000 | 139 | 141 | 0 | 4000.00 | 0.00 |
| 141 | 0.835000 | 25.00 | 1.668 | 3 | 89.000 | 89.000 | 2 | 0.00000 | 140 | 142 | 0 | 4000.00 | 0.00 |
| 142 | 0.835000 | 15.00 | 2.882 | 4 | 89.000 | 91.940 | 2 | 0.00000 | 141 | 143 | 0 | 4000.00 | 0.00 |
| 143 | 0.835000 | 25.00 | 1.668 | 3 | 91.940 | 91.940 | 2 | 0.00000 | 142 | 144 | 0 | 4000.00 | 0.00 |
| 144 | 0.835000 | 5.00 | 5.676 | 3 | 91.940 | 91.940 | 2 | 0.00000 | 143 | 145 | 0 | 4000.00 | 0.00 |
| 145 | 0.835000 | 5.00 | 4.340 | 3 | 91.940 | 91.940 | 2 | 0.00000 | 144 | 146 | 0 | 4000.00 | 0.00 |
| 146 | 0.835000 | 10.00 | 3.338 | 4 | 91.940 | 96.200 | 2 | 0.00000 | 145 | 147 | 0 | 4000.00 | 0.00 |
| 147 | 0.835000 | 5.00 | 3.338 | 4 | 96.200 | 96.200 | 2 | 0.00000 | 146 | 148 | 0 | 4000.00 | 0.00 |
| 148 | 0.835000 | 145.00 | 1.000 | 4 | 96.200 | 96.200 | 2 | 0.00000 | 147 | 149 | 0 | 4000.00 | 0.00 |
| 149 | 0.835000 | 10.00 | 2.670 | 4 | 96.200 | 96.200 | 2 | 0.00000 | 148 | 150 | 0 | 4000.00 | 0.00 |
| 150 | 0.835000 | 90.00 | 1.186 | 3 | 96.200 | 96.200 | 2 | 0.00000 | 149 | 151 | 0 | 4000.00 | 0.00 |
| 151 | 0.835000 | 5.00 | 5.676 | 4 | 96.200 | 94.530 | 2 | 0.00000 | 150 | 152 | 0 | 4000.00 | 0.00 |
| 152 | 0.835000 | 15.00 | 2.664 | 3 | 94.530 | 94.530 | 2 | 0.00000 | 151 | 153 | 0 | 4000.00 | 0.00 |
| 153 | 0.835000 | 5.00 | 2.336 | 4 | 94.530 | 94.530 | 2 | 0.00000 | 152 | 154 | 0 | 4000.00 | 0.00 |
| 154 | 0.835000 | 5.00 | 4.340 | 3 | 94.530 | 94.540 | 2 | 0.00000 | 153 | 155 | 0 | 4000.00 | 0.00 |
| 155 | 0.835000 | 15.00 | 2.559 | 3 | 94.540 | 94.540 | 2 | 0.00000 | 154 | 156 | 0 | 4000.00 | 0.00 |
| 156 | 0.835000 | 5.00 | 4.340 | 3 | 94.540 | 94.540 | 2 | 0.00000 | 155 | 157 | 0 | 4000.00 | 0.00 |
| 157 | 0.835000 | 5.00 | 3.338 | 4 | 94.540 | 94.540 | 2 | 0.00000 | 156 | 158 | 0 | 4000.00 | 0.00 |
| 158 | 0.835000 | 5.00 | 3.338 | 3 | 94.540 | 94.500 | 2 | 0.00000 | 157 | 159 | 0 | 4000.00 | 0.00 |
| 159 | 0.835000 | 5.00 | 4.340 | 4 | 94.500 | 94.500 | 2 | 0.00000 | 158 | 160 | 0 | 4000.00 | 0.00 |
| 160 | 0.835000 | 55.00 | 1.425 | 3 | 94.500 | 94.500 | 2 | 0.00000 | 159 | 161 | 0 | 4000.00 | 0.00 |
| 161 | 0.835000 | 175.00 | 1.286 | 4 | 94.500 | 96.200 | 2 | 0.00000 | 160 | 162 | 0 | 4000.00 | 0.00 |
| 162 | 0.835000 | 100.00 | 1.568 | 3 | 96.200 | 96.200 | 2 | 0.00000 | 161 | 47 | 1 | 4000.00 | 0.00 |
| 163 | 0.835000 | 10.00 | 3.338 | 4 | 94.500 | 91.750 | 2 | 0.00000 | 160 | 164 | 0 | 4000.00 | 0.00 |
| 164 | 0.835000 | 40.00 | 1.413 | 4 | 91.750 | 89.580 | 2 | 0.00000 | 163 | 165 | 0 | 4000.00 | 0.00 |
| 165 | 0.835000 | 25.00 | 3.071 | 4 | 89.580 | 89.580 | 2 | 0.00000 | 164 | 166 | 0 | 4000.00 | 0.00 |
| 166 | 0.835000 | 5.00 | 4.340 | 3 | 89.580 | 89.580 | 2 | 0.00000 | 165 | 167 | 0 | 4000.00 | 0.00 |
| 167 | 0.835000 | 5.00 | 1.000 | 16 | 89.580 | 89.580 | 2 | 0.00000 | 166 | 0 | 0 | 4000.00 | 0.00 |
| 168 | 0.835000 | 5.00 | 13.358 | 4 | 89.000 | 91.000 | 2 | 0.00000 | 141 | 169 | 0 | 4000.00 | 0.00 |
| 169 | 0.835000 | 35.00 | 2.002 | 3 | 91.000 | 91.000 | 2 | 0.00000 | 168 | 170 | 0 | 4000.00 | 0.00 |
| 170 | 0.835000 | 10.00 | 4.340 | 3 | 91.000 | 91.000 | 2 | 0.00000 | 169 | 171 | 0 | 4000.00 | 0.00 |
| 171 | 0.835000 | 75.00 | 1.312 | 4 | 91.000 | 91.000 | 2 | 0.00000 | 170 | 172 | 0 | 4000.00 | 0.00 |
| 172 | 0.835000 | 45.00 | 2.002 | 3 | 91.000 | 91.000 | 2 | 0.00000 | 171 | 173 | 0 | 4000.00 | 0.00 |
| 173 | 0.835000 | 5.00 | 3.338 | 4 | 91.000 | 91.000 | 2 | 0.00000 | 172 | 174 | 0 | 4000.00 | 0.00 |
| 174 | 0.835000 | 15.00 | 1.779 | 4 | 91.000 | 96.040 | 2 | 0.00000 | 173 | 175 | 0 | 4000.00 | 0.00 |
| 175 | 0.835000 | 15.00 | 2.559 | 4 | 96.040 | 96.000 | 2 | 0.00000 | 174 | 176 | 0 | 4000.00 | 0.00 |
| 176 | 0.835000 | 95.00 | 1.176 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 175 | 177 | 0 | 4000.00 | 0.00 |
| 177 | 0.835000 | 55.00 | 1.213 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 176 | 178 | 0 | 4000.00 | 0.00 |
| 178 | 0.835000 | 5.00 | 3.338 | 4 | 96.000 | 91.000 | 2 | 0.00000 | 177 | 179 | 0 | 4000.00 | 0.00 |
| 179 | 0.835000 | 50.00 | 1.795 | 4 | 91.000 | 93.000 | 2 | 0.00000 | 178 | 180 | 0 | 4000.00 | 0.00 |
| 180 | 0.835000 | 80.00 | 1.146 | 4 | 93.000 | 93.000 | 2 | 0.00000 | 179 | 181 | 0 | 4000.00 | 0.00 |
| 181 | 0.835000 | 25.00 | 3.472 | 3 | 93.000 | 93.000 | 2 | 0.00000 | 180 | 29 | 1 | 4000.00 | 0.00 |
| 182 | 0.336000 | 45.00 | 1.866 | 3 | 91.000 | 96.000 | 2 | 0.00000 | 169 | 183 | 0 | 4000.00 | 0.00 |
| 183 | 0.336000 | 120.00 | 1.482 | 4 | 96.000 | 149.000 | 2 | 0.00000 | 182 | 184 | 0 | 4000.00 | 0.00 |
| 184 | 0.256000 | 205.00 | 1.092 | 16 | 149.000 | 142.500 | 2 | 0.00000 | 183 | 0 | 0 | 4000.00 | 0.00 |
| 185 | 0.256000 | 60.00 | 1.674 | 16 | 96.000 | 59.000 | 2 | 0.00000 | 182 | 0 | 0 | 4000.00 | 0.00 |
| 186 | 0.336000 | 10.00 | 4.427 | 3 | 91.000 | 94.800 | 2 | 0.00000 | 170 | 187 | 0 | 4000.00 | 0.00 |
| 187 | 0.336000 | 55.00 | 1.586 | 3 | 94.800 | 113.000 | 2 | 0.00000 | 186 | 188 | 0 | 4000.00 | 0.00 |
| 188 | 0.336000 | 230.00 | 1.231 | 4 | 113.000 | 146.000 | 2 | 0.00000 | 187 | 189 | 0 | 4000.00 | 0.00 |
| 189 | 0.256000 | 105.00 | 1.111 | 16 | 146.000 | 143.000 | 2 | 0.00000 | 188 | 0 | 0 | 4000.00 | 0.00 |
| 190 | 0.256000 | 100.00 | 1.297 | 16 | 94.800 | 83.700 | 2 | 0.00000 | 186 | 0 | 0 | 4000.00 | 0.00 |
| 191 | 0.256000 | 75.00 | 1.416 | 16 | 113.000 | 107.000 | 2 | 0.00000 | 187 | 0 | 0 | 4000.00 | 0.00 |
| 192 | 0.336000 | 5.00 | 7.854 | 4 | 91.000 | 95.000 | 2 | 0.00000 | 172 | 193 | 0 | 4000.00 | 0.00 |
| 193 | 0.336000 | 240.00 | 1.316 | 4 | 95.000 | 150.000 | 2 | 0.00000 | 192 | 194 | 0 | 4000.00 | 0.00 |
| 194 | 0.256000 | 180.00 | 1.105 | 16 | 150.000 | 142.000 | 2 | 0.00000 | 193 | 0 | 0 | 4000.00 | 0.00 |
| 195 | 0.665000 | 15.00 | 4.015 | 4 | 96.500 | 96.500 | 2 | 0.00000 | 54 | 196 | 0 | 4000.00 | 0.00 |
| 196 | 0.665000 | 11.00 | 2.197 | 4 | 96.500 | 94.500 | 2 | 0.00000 | 195 | 197 | 0 | 4400.00 | 0.00 |
| 197 | 0.665000 | 20.00 | 1.658 | 4 | 94.500 | 96.600 | 2 | 0.00000 | 196 | 198 | 0 | 4000.00 | 0.00 |
| 198 | 0.665000 | 115.00 | 1.000 | 4 | 96.600 | 96.600 | 2 | 0.00000 | 197 | 199 | 0 | 4000.00 | 0.00 |
| 199 | 0.665000 | 220.00 | 1.120 | 3 | 96.600 | 94.000 | 2 | 0.00000 | 198 | 200 | 0 | 4000.00 | 0.00 |
| 200 | 0.665000 | 20.00 | 2.862 | 4 | 94.000 | 94.750 | 2 | 0.00000 | 199 | 201 | 0 | 4000.00 | 0.00 |
| 201 | 0.665000 | 20.00 | 1.000 | 4 | 94.750 | 94.750 | 2 | 0.00000 | 200 | 202 | 0 | 4000.00 | 0.00 |
| 202 | 0.665000 | 20.00 | 2.197 | 4 | 94.750 | 94.750 | 2 | 0.00000 | 201 | 203 | 0 | 4000.00 | 0.00 |
| 203 | 0.665000 | 15.00 | 1.000 | 4 | 94.750 | 94.750 | 2 | 0.00000 | 202 | 204 | 0 | 4000.00 | 0.00 |
| 204 | 0.665000 | 30.00 | 1.973 | 3 | 94.750 | 84.100 | 2 | 0.00000 | 203 | 205 | 0 | 4000.00 | 0.00 |
| 205 | 0.665000 | 15.00 | 1.621 | 4 | 84.100 | 69.500 | 2 | 0.00000 | 204 | 206 | 0 | 4000.00 | 0.00 |
| 206 | 0.665000 | 15.00 | 1.887 | 3 | 69.500 | 69.500 | 2 | 0.00000 | 205 | 207 | 0 | 4000.00 | 0.00 |
| 207 | 0.665000 | 20.00 | 1.465 | 4 | 69.500 | 69.500 | 2 | 0.00000 | 206 | 208 | 0 | 4000.00 | 0.00 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 208 | 0.665000 | 20.00 | 4.125 | 3 | 69.500 | 61.750 | 2 | 0.00000 | 207 209 | 0 | 4000.00 | 0.00 |
| 209 | 0.665000 | 70.00 | 1.454 | 4 | 61.750 | 62.750 | 2 | 0.00000 | 208 210 | 0 | 4000.00 | 0.00 |
| 210 | 0.665000 | 5.00 | 6.320 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 209 211 | 0 | 4000.00 | 0.00 |
| 211 | 0.665000 | 50.00 | 1.293 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 210 212 | 0 | 4000.00 | 0.00 |
| 212 | 0.665000 | 20.00 | 2.330 | 3 | 62.750 | 62.750 | 2 | 0.00000 | 211 213 | 0 | 4000.00 | 0.00 |
| 213 | 0.665000 | 25.00 | 2.277 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 212 214 | 0 | 4000.00 | 0.00 |
| 214 | 0.665000 | 20.00 | 1.665 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 213 215 | 0 | 4000.00 | 0.00 |
| 215 | 0.665000 | 45.00 | 1.414 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 214 216 | 0 | 4000.00 | 0.00 |
| 216 | 0.665000 | 20.00 | 1.665 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 215 217 | 0 | 4000.00 | 0.00 |
| 217 | 0.665000 | 85.00 | 2.033 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 216 218 | 0 | 4000.00 | 0.00 |
| 218 | 0.665000 | 5.00 | 3.660 | 3 | 62.750 | 62.750 | 2 | 0.00000 | 217 219 | 0 | 4000.00 | 0.00 |
| 219 | 0.665000 | 25.00 | 2.649 | 3 | 62.750 | 66.000 | 2 | 0.00000 | 218 220 | 0 | 4000.00 | 0.00 |
| 220 | 0.665000 | 30.00 | 1.749 | 4 | 66.000 | 96.000 | 2 | 0.00000 | 219 221 | 0 | 4000.00 | 0.00 |
| 221 | 0.665000 | 20.00 | 1.329 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 220 222 | 0 | 4000.00 | 0.00 |
| 222 | 0.665000 | 5.00 | 4.977 | 4 | 96.000 | 94.400 | 2 | 0.00000 | 221 223 | 0 | 4000.00 | 0.00 |
| 223 | 0.665000 | 95.00 | 1.139 | 4 | 94.400 | 97.000 | 2 | 0.00000 | 222 224 | 0 | 4000.00 | 0.00 |
| 224 | 0.665000 | 35.00 | 1.646 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 223 225 | 0 | 4000.00 | 0.00 |
| 225 | 0.665000 | 65.00 | 1.614 | 4 | 97.000 | 96.500 | 2 | 0.00000 | 224 226 | 0 | 4000.00 | 0.00 |
| 226 | 0.665000 | 35.00 | 1.000 | 4 | 96.500 | 96.500 | 2 | 0.00000 | 225 227 | 0 | 4000.00 | 0.00 |
| 227 | 0.665000 | 35.00 | 1.830 | 4 | 96.500 | 94.200 | 2 | 0.00000 | 226 228 | 0 | 4000.00 | 0.00 |
| 228 | 0.665000 | 35.00 | 1.266 | 4 | 94.200 | 96.200 | 2 | 0.00000 | 227 229 | 0 | 4000.00 | 0.00 |
| 229 | 0.665000 | 120.00 | 1.377 | 3 | 96.200 | 95.800 | 2 | 0.00000 | 228 69 | 1 | 4000.00 | 0.00 |
| 230 | 0.665000 | 10.00 | 6.453 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 12 231 | 0 | 4000.00 | 0.00 |
| 231 | 0.665000 | 25.00 | 1.372 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 230 232 | 0 | 4000.00 | 0.00 |
| 232 | 0.665000 | 150.00 | 1.062 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 231 233 | 0 | 4000.00 | 0.00 |
| 233 | 0.665000 | 135.00 | 1.069 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 232 234 | 0 | 4000.00 | 0.00 |
| 234 | 0.665000 | 45.00 | 1.146 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 233 235 | 0 | 4000.00 | 0.00 |
| 235 | 0.665000 | 20.00 | 1.658 | 4 | 96.900 | 95.000 | 2 | 0.00000 | 234 236 | 0 | 4000.00 | 0.00 |
| 236 | 0.665000 | 35.00 | 1.564 | 4 | 95.000 | 95.500 | 2 | 0.00000 | 235 237 | 0 | 4000.00 | 0.00 |
| 237 | 0.665000 | 15.00 | 1.621 | 4 | 95.500 | 96.000 | 2 | 0.00000 | 236 238 | 0 | 4000.00 | 0.00 |
| 238 | 0.665000 | 30.00 | 1.621 | 4 | 96.000 | 72.000 | 2 | 0.00000 | 237 239 | 0 | 4000.00 | 0.00 |
| 239 | 0.665000 | 5.00 | 3.660 | 3 | 72.000 | 67.000 | 2 | 0.00000 | 238 240 | 0 | 4000.00 | 0.00 |
| 240 | 0.665000 | 75.00 | 1.497 | 4 | 67.000 | 64.250 | 2 | 0.00000 | 239 241 | 0 | 4000.00 | 0.00 |
| 241 | 0.665000 | 35.00 | 1.000 | 4 | 64.250 | 64.250 | 2 | 0.00000 | 240 242 | 0 | 4000.00 | 0.00 |
| 242 | 0.665000 | 65.00 | 1.286 | 4 | 64.250 | 61.750 | 2 | 0.00000 | 241 243 | 0 | 4000.00 | 0.00 |
| 243 | 0.665000 | 20.00 | 2.995 | 3 | 61.750 | 61.750 | 2 | 0.00000 | 242 244 | 0 | 4000.00 | 0.00 |
| 244 | 0.665000 | 5.00 | 2.064 | 4 | 61.750 | 61.750 | 2 | 0.00000 | 243 245 | 0 | 4000.00 | 0.00 |
| 245 | 0.665000 | 20.00 | 2.260 | 4 | 61.750 | 62.750 | 2 | 0.00000 | 244 246 | 0 | 4000.00 | 0.00 |
| 246 | 0.665000 | 15.00 | 1.887 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 245 247 | 0 | 4000.00 | 0.00 |
| 247 | 0.665000 | 10.00 | 2.330 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 246 248 | 0 | 4000.00 | 0.00 |
| 248 | 0.665000 | 15.00 | 1.887 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 247 249 | 0 | 4000.00 | 0.00 |
| 249 | 0.665000 | 35.00 | 1.380 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 248 250 | 0 | 4000.00 | 0.00 |
| 250 | 0.665000 | 100.00 | 1.000 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 249 251 | 0 | 4000.00 | 0.00 |
| 251 | 0.665000 | 10.00 | 3.647 | 4 | 62.750 | 62.500 | 2 | 0.00000 | 250 252 | 0 | 4000.00 | 0.00 |
| 252 | 0.665000 | 30.00 | 1.749 | 4 | 62.500 | 67.900 | 2 | 0.00000 | 251 253 | 0 | 4000.00 | 0.00 |
| 253 | 0.665000 | 30.00 | 1.310 | 4 | 67.900 | 96.000 | 2 | 0.00000 | 252 254 | 0 | 4000.00 | 0.00 |
| 254 | 0.665000 | 20.00 | 2.317 | 4 | 96.000 | 97.000 | 2 | 0.00000 | 253 255 | 0 | 4000.00 | 0.00 |
| 255 | 0.665000 | 145.00 | 1.000 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 254 256 | 0 | 4000.00 | 0.00 |
| 256 | 0.665000 | 35.00 | 1.752 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 255 257 | 0 | 4000.00 | 0.00 |
| 257 | 0.665000 | 60.00 | 1.110 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 256 258 | 0 | 4000.00 | 0.00 |
| 258 | 0.665000 | 40.00 | 1.165 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 257 259 | 0 | 4000.00 | 0.00 |
| 259 | 0.665000 | 5.00 | 3.660 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 258 260 | 0 | 4000.00 | 0.00 |
| 260 | 0.665000 | 45.00 | 1.118 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 259 261 | 0 | 4000.00 | 0.00 |
| 261 | 0.665000 | 15.00 | 4.538 | 3 | 97.000 | 95.500 | 2 | 0.00000 | 260 71 | 1 | 4000.00 | 0.00 |
| 262 | 0.505000 | 20.00 | 2.315 | 4 | 61.750 | 63.000 | 2 | 0.00000 | 243 263 | 0 | 4000.00 | 0.00 |
| 263 | 0.505000 | 10.00 | 3.318 | 4 | 63.000 | 56.000 | 2 | 0.00000 | 262 264 | 0 | 4000.00 | 0.00 |
| 264 | 0.505000 | 30.00 | 2.380 | 4 | 56.000 | 61.750 | 2 | 0.00000 | 263 265 | 0 | 4000.00 | 0.00 |
| 265 | 0.505000 | 5.00 | 3.020 | 3 | 61.750 | 62.900 | 2 | 0.00000 | 264 266 | 0 | 4000.00 | 0.00 |
| 266 | 0.505000 | 5.00 | 10.494 | 4 | 62.900 | 67.000 | 2 | 0.00000 | 265 267 | 0 | 4000.00 | 0.00 |
| 267 | 0.505000 | 5.00 | 3.828 | 4 | 67.000 | 67.000 | 2 | 0.00000 | 266 268 | 0 | 4000.00 | 0.00 |
| 268 | 0.505000 | 65.00 | 1.155 | 3 | 67.000 | 67.000 | 2 | 0.00000 | 267 269 | 0 | 4000.00 | 0.00 |
| 269 | 0.505000 | 15.00 | 1.000 | 4 | 67.000 | 67.000 | 2 | 0.00000 | 268 270 | 0 | 4000.00 | 0.00 |
| 270 | 0.505000 | 35.00 | 1.866 | 3 | 67.000 | 67.000 | 2 | 0.00000 | 269 271 | 0 | 4000.00 | 0.00 |
| 271 | 0.256000 | 25.00 | 1.143 | 4 | 67.000 | 67.000 | 2 | 0.00000 | 270 272 | 0 | 4000.00 | 0.00 |
| 272 | 0.256000 | 10.00 | 3.099 | 4 | 67.000 | 65.000 | 2 | 0.00000 | 271 273 | 0 | 4000.00 | 0.00 |
| 273 | 0.256000 | 55.00 | 1.289 | 16 | 65.000 | 94.500 | 2 | 0.00000 | 272 0 | 0 | 4000.00 | 0.00 |
| 274 | 0.505000 | 15.00 | 1.000 | 3 | 62.900 | 63.900 | 2 | 0.00000 | 265 275 | 0 | 4000.00 | 0.00 |
| 275 | 0.505000 | 15.00 | 1.741 | 3 | 63.900 | 68.200 | 2 | 0.00000 | 274 276 | 0 | 4000.00 | 0.00 |
| 276 | 0.336000 | 135.00 | 1.170 | 4 | 68.200 | 71.500 | 2 | 0.00000 | 275 277 | 0 | 4000.00 | 0.00 |
| 277 | 0.336000 | 40.00 | 1.773 | 16 | 71.500 | 61.500 | 2 | 0.00000 | 276 0 | 0 | 4000.00 | 0.00 |
| 278 | 0.336000 | 20.00 | 2.518 | 16 | 68.200 | 61.500 | 2 | 0.00000 | 275 0 | 0 | 4000.00 | 0.00 |
| 279 | 0.505000 | 85.00 | 2.305 | 4 | 69.500 | 68.750 | 2 | 0.00000 | 206 280 | 0 | 4000.00 | 0.00 |
| 280 | 0.505000 | 10.00 | 2.010 | 3 | 68.750 | 68.750 | 2 | 0.00000 | 279 281 | 0 | 4000.00 | 0.00 |
| 281 | 0.505000 | 45.00 | 1.382 | 4 | 68.750 | 68.750 | 2 | 0.00000 | 280 282 | 0 | 4000.00 | 0.00 |
| 282 | 0.505000 | 10.00 | 1.707 | 4 | 68.750 | 68.750 | 2 | 0.00000 | 281 283 | 0 | 4000.00 | 0.00 |
| 283 | 0.505000 | 70.00 | 1.447 | 3 | 68.750 | 68.750 | 2 | 0.00000 | 282 284 | 0 | 4000.00 | 0.00 |
| 284 | 0.505000 | 20.00 | 1.354 | 4 | 68.750 | 68.750 | 2 | 0.00000 | 283 285 | 0 | 4000.00 | 0.00 |
| 285 | 0.505000 | 5.00 | 2.414 | 4 | 68.750 | 65.500 | 2 | 0.00000 | 284 286 | 0 | 4000.00 | 0.00 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 286 | 0.505000 | 25.00 | 1.404 | 3 | 65.500 | 65.500 | 2 | 0.00000 | 285 287 | 0 | 4000.00 | 0.00 |
| 287 | 0.336000 | 65.00 | 1.868 | 4 | 65.500 | 113.000 | 2 | 0.00000 | 286 288 | 0 | 4000.00 | 0.00 |
| 288 | 0.336000 | 35.00 | 2.150 | 3 | 113.000 | 147.000 | 2 | 0.00000 | 287 289 | 0 | 4000.00 | 0.00 |
| 289 | 0.256000 | 55.00 | 1.419 | 4 | 147.000 | 178.000 | 2 | 0.00000 | 288 290 | 0 | 4000.00 | 0.00 |
| 290 | 0.256000 | 10.00 | 1.000 | 16 | 178.000 | 178.000 | 2 | 0.00000 | 289 0 | 0 | 4000.00 | 0.00 |
| 291 | 0.256000 | 35.00 | 1.247 | 16 | 147.000 | 159.750 | 2 | 0.00000 | 288 0 | 0 | 4000.00 | 0.00 |
| 292 | 0.256000 | 115.00 | 1.686 | 16 | 67.000 | 128.500 | 2 | 0.00000 | 239 0 | 0 | 4000.00 | 0.00 |
| 293 | 0.336000 | 5.00 | 7.451 | 4 | 65.710 | 62.500 | 2 | 0.00000 | 219 294 | 0 | 4000.00 | 0.00 |
| 294 | 0.336000 | 60.00 | 1.112 | 4 | 62.500 | 62.500 | 2 | 0.00000 | 293 295 | 0 | 4000.00 | 0.00 |
| 295 | 0.336000 | 40.00 | 1.907 | 4 | 62.500 | 93.500 | 2 | 0.00000 | 294 296 | 0 | 4000.00 | 0.00 |
| 296 | 0.336000 | 45.00 | 1.729 | 3 | 93.500 | 126.800 | 2 | 0.00000 | 295 297 | 0 | 4000.00 | 0.00 |
| 297 | 0.336000 | 45.00 | 1.149 | 3 | 126.800 | 142.000 | 2 | 0.00000 | 296 298 | 0 | 4000.00 | 0.00 |
| 298 | 0.336000 | 40.00 | 1.571 | 3 | 142.000 | 154.500 | 2 | 0.00000 | 297 299 | 0 | 4000.00 | 0.00 |
| 299 | 0.256000 | 95.00 | 1.107 | 16 | 154.500 | 155.500 | 2 | 0.00000 | 298 0 | 0 | 4000.00 | 0.00 |
| 300 | 0.256000 | 100.00 | 1.623 | 16 | 142.000 | 143.000 | 2 | 0.00000 | 297 0 | 0 | 4000.00 | 0.00 |
| 301 | 0.336000 | 25.00 | 2.452 | 3 | 154.500 | 156.300 | 2 | 0.00000 | 298 302 | 0 | 4000.00 | 0.00 |
| 302 | 0.336000 | 45.00 | 1.893 | 4 | 156.300 | 172.300 | 2 | 0.00000 | 301 303 | 0 | 4000.00 | 0.00 |
| 303 | 0.256000 | 55.00 | 1.304 | 4 | 172.300 | 178.000 | 2 | 0.00000 | 302 304 | 0 | 4000.00 | 0.00 |
| 304 | 0.256000 | 10.00 | 1.000 | 16 | 178.000 | 178.000 | 2 | 0.00000 | 303 0 | 0 | 4000.00 | 0.00 |
| 305 | 0.336000 | 5.00 | 6.376 | 4 | 156.300 | 156.300 | 2 | 0.00000 | 301 306 | 0 | 4000.00 | 0.00 |
| 306 | 0.256000 | 130.00 | 1.405 | 16 | 156.300 | 156.300 | 2 | 0.00000 | 305 0 | 0 | 4000.00 | 0.00 |
| 307 | 0.336000 | 105.00 | 1.914 | 4 | 126.800 | 155.000 | 2 | 0.00000 | 296 308 | 0 | 4000.00 | 0.00 |
| 308 | 0.256000 | 130.00 | 1.287 | 19 | 155.000 | 206.300 | 2 | 0.00000 | 307 309 | 0 | 4000.00 | 0.00 |
| 309 | 0.256000 | 20.00 | 1.000 | 16 | 206.300 | 203.000 | 2 | 0.00000 | 308 0 | 0 | 4000.00 | 0.00 |
| 310 | 0.336000 | 10.00 | 5.301 | 3 | 62.750 | 71.500 | 2 | 0.00000 | 212 311 | 0 | 4000.00 | 0.00 |
| 311 | 0.336000 | 65.00 | 1.424 | 3 | 71.500 | 133.500 | 2 | 0.00000 | 310 312 | 0 | 4000.00 | 0.00 |
| 312 | 0.256000 | 15.00 | 1.439 | 4 | 133.500 | 147.300 | 2 | 0.00000 | 311 313 | 0 | 4000.00 | 0.00 |
| 313 | 0.256000 | 60.00 | 1.281 | 4 | 147.300 | 165.100 | 2 | 0.00000 | 312 314 | 0 | 4000.00 | 0.00 |
| 314 | 0.256000 | 30.00 | 1.527 | 16 | 165.100 | 160.000 | 2 | 0.00000 | 313 0 | 0 | 4000.00 | 0.00 |
| 315 | 0.256000 | 25.00 | 1.407 | 16 | 71.500 | 81.500 | 2 | 0.00000 | 310 0 | 0 | 4000.00 | 0.00 |
| 316 | 0.336000 | 10.00 | 3.688 | 4 | 133.500 | 133.500 | 2 | 0.00000 | 311 317 | 0 | 4000.00 | 0.00 |
| 317 | 0.256000 | 80.00 | 1.717 | 16 | 133.500 | 141.500 | 2 | 0.00000 | 316 0 | 0 | 4000.00 | 0.00 |
| 318 | 0.336000 | 10.00 | 6.443 | 4 | 68.750 | 66.700 | 2 | 0.00000 | 283 319 | 0 | 4000.00 | 0.00 |
| 319 | 0.336000 | 100.00 | 1.672 | 3 | 66.700 | 120.000 | 2 | 0.00000 | 318 320 | 0 | 4000.00 | 0.00 |
| 320 | 0.336000 | 15.00 | 2.792 | 3 | 120.000 | 132.000 | 2 | 0.00000 | 319 321 | 0 | 4000.00 | 0.00 |
| 321 | 0.336000 | 15.00 | 1.448 | 4 | 132.000 | 146.000 | 2 | 0.00000 | 320 322 | 0 | 4000.00 | 0.00 |
| 322 | 0.256000 | 55.00 | 1.604 | 16 | 146.000 | 163.500 | 2 | 0.00000 | 321 0 | 0 | 4000.00 | 0.00 |
| 323 | 0.256000 | 25.00 | 1.492 | 16 | 120.000 | 128.500 | 2 | 0.00000 | 319 0 | 0 | 4000.00 | 0.00 |
| 324 | 0.336000 | 45.00 | 1.806 | 3 | 132.000 | 132.000 | 2 | 0.00000 | 320 325 | 0 | 4000.00 | 0.00 |
| 325 | 0.256000 | 30.00 | 2.263 | 16 | 132.000 | 157.500 | 2 | 0.00000 | 324 0 | 0 | 4000.00 | 0.00 |
| 326 | 0.256000 | 35.00 | 1.188 | 16 | 132.000 | 141.500 | 2 | 0.00000 | 324 0 | 0 | 4000.00 | 0.00 |
| 327 | 0.336000 | 30.00 | 2.456 | 4 | 63.900 | 68.100 | 2 | 0.00000 | 274 328 | 0 | 4000.00 | 0.00 |
| 328 | 0.336000 | 90.00 | 1.939 | 3 | 68.100 | 134.000 | 2 | 0.00000 | 327 329 | 0 | 4000.00 | 0.00 |
| 329 | 0.336000 | 30.00 | 1.694 | 4 | 134.000 | 132.000 | 2 | 0.00000 | 328 330 | 0 | 4000.00 | 0.00 |
| 330 | 0.336000 | 15.00 | 1.448 | 3 | 132.000 | 132.000 | 2 | 0.00000 | 329 331 | 0 | 4000.00 | 0.00 |
| 331 | 0.256000 | 90.00 | 1.181 | 16 | 132.000 | 141.500 | 2 | 0.00000 | 330 0 | 0 | 4000.00 | 0.00 |
| 332 | 0.256000 | 15.00 | 2.980 | 16 | 132.000 | 141.500 | 2 | 0.00000 | 330 0 | 0 | 4000.00 | 0.00 |
| 333 | 0.336000 | 15.00 | 3.554 | 4 | 134.000 | 147.000 | 2 | 0.00000 | 328 334 | 0 | 4000.00 | 0.00 |
| 334 | 0.256000 | 15.00 | 1.451 | 19 | 147.000 | 159.750 | 2 | 0.00000 | 333 335 | 0 | 4000.00 | 0.00 |
| 335 | 0.256000 | 50.00 | 1.000 | 16 | 159.750 | 159.750 | 2 | 0.00000 | 334 0 | 0 | 4000.00 | 0.00 |
| 336 | 0.336000 | 10.00 | 6.712 | 4 | 67.000 | 65.000 | 2 | 0.00000 | 268 337 | 0 | 4000.00 | 0.00 |
| 337 | 0.336000 | 90.00 | 1.538 | 3 | 65.000 | 115.200 | 2 | 0.00000 | 336 338 | 0 | 4000.00 | 0.00 |
| 338 | 0.336000 | 40.00 | 1.403 | 3 | 115.200 | 133.800 | 2 | 0.00000 | 337 339 | 0 | 4000.00 | 0.00 |
| 339 | 0.336000 | 50.00 | 2.423 | 3 | 133.800 | 133.300 | 2 | 0.00000 | 338 340 | 0 | 4000.00 | 0.00 |
| 340 | 0.336000 | 10.00 | 3.016 | 3 | 133.300 | 133.300 | 2 | 0.00000 | 339 341 | 0 | 4000.00 | 0.00 |
| 341 | 0.256000 | 45.00 | 1.340 | 16 | 133.300 | 141.500 | 2 | 0.00000 | 340 0 | 0 | 4000.00 | 0.00 |
| 342 | 0.256000 | 15.00 | 1.678 | 16 | 133.300 | 141.500 | 2 | 0.00000 | 340 0 | 0 | 4000.00 | 0.00 |
| 343 | 0.256000 | 10.00 | 1.300 | 16 | 133.800 | 141.500 | 2 | 0.00000 | 338 0 | 0 | 4000.00 | 0.00 |
| 344 | 0.256000 | 35.00 | 1.644 | 16 | 133.300 | 128.500 | 2 | 0.00000 | 339 0 | 0 | 4000.00 | 0.00 |
| 345 | 0.256000 | 5.00 | 5.813 | 3 | 115.200 | 115.200 | 2 | 0.00000 | 337 346 | 0 | 4000.00 | 0.00 |
| 346 | 0.256000 | 80.00 | 1.288 | 3 | 115.200 | 116.500 | 2 | 0.00000 | 345 347 | 0 | 4000.00 | 0.00 |
| 347 | 0.256000 | 55.00 | 1.726 | 16 | 116.500 | 141.500 | 2 | 0.00000 | 346 0 | 0 | 4000.00 | 0.00 |
| 348 | 0.256000 | 15.00 | 2.601 | 16 | 116.500 | 128.500 | 2 | 0.00000 | 346 0 | 0 | 4000.00 | 0.00 |
| 349 | 0.256000 | 50.00 | 1.594 | 16 | 115.200 | 106.500 | 2 | 0.00000 | 345 0 | 0 | 4000.00 | 0.00 |
| 350 | 0.505000 | 175.00 | 1.669 | 4 | 68.750 | 140.000 | 2 | 0.00000 | 280 351 | 0 | 4000.00 | 0.00 |
| 351 | 0.336000 | 50.00 | 1.000 | 16 | 140.000 | 138.000 | 2 | 0.00000 | 350 0 | 0 | 4000.00 | 0.00 |
| 352 | 0.336000 | 10.00 | 4.226 | 4 | 67.000 | 65.000 | 2 | 0.00000 | 270 353 | 0 | 4000.00 | 0.00 |
| 353 | 0.336000 | 80.00 | 1.285 | 4 | 65.000 | 105.700 | 2 | 0.00000 | 352 354 | 0 | 4000.00 | 0.00 |
| 354 | 0.336000 | 80.00 | 1.630 | 3 | 105.700 | 130.500 | 2 | 0.00000 | 353 355 | 0 | 4000.00 | 0.00 |
| 355 | 0.256000 | 30.00 | 1.458 | 4 | 130.500 | 147.500 | 2 | 0.00000 | 354 356 | 0 | 4000.00 | 0.00 |
| 356 | 0.256000 | 25.00 | 1.225 | 4 | 147.500 | 141.500 | 2 | 0.00000 | 355 357 | 0 | 4000.00 | 0.00 |
| 357 | 0.162000 | 50.00 | 1.843 | 16 | 141.500 | 141.500 | 2 | 0.00000 | 356 0 | 0 | 4000.00 | 0.00 |
| 358 | 0.336000 | 5.00 | 5.570 | 4 | 130.500 | 130.500 | 2 | 0.00000 | 354 359 | 0 | 4000.00 | 0.00 |
| 359 | 0.162000 | 35.00 | 1.759 | 16 | 130.500 | 132.200 | 2 | 0.00000 | 358 0 | 0 | 4000.00 | 0.00 |
| 360 | 0.336000 | 45.00 | 2.343 | 4 | 94.500 | 115.800 | 2 | 0.00000 | 152 361 | 0 | 4000.00 | 0.00 |
| 361 | 0.336000 | 15.00 | 1.448 | 3 | 115.800 | 130.600 | 2 | 0.00000 | 360 362 | 0 | 4000.00 | 0.00 |
| 362 | 0.256000 | 50.00 | 1.510 | 19 | 130.600 | 176.000 | 2 | 0.00000 | 361 363 | 0 | 4000.00 | 0.00 |
| 363 | 0.256000 | 15.00 | 1.000 | 16 | 176.000 | 176.000 | 2 | 0.00000 | 362 0 | 0 | 4000.00 | 0.00 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 364 | 0.362000 | 145.00 | 1.539 | 16 | 130.600 | 129.600 | 2 | 0.00000 | 361 0 | 0 | 4000.00 | 0.00 |
| 365 | 0.336000 | 65.00 | 1.940 | 3 | 92.000 | 118.400 | 2 | 0.00000 | 145 366 | 0 | 4000.00 | 0.00 |
| 366 | 0.336000 | 20.00 | 1.544 | 3 | 118.400 | 118.400 | 2 | 0.00000 | 365 367 | 0 | 4000.00 | 0.00 |
| 367 | 0.256000 | 15.00 | 1.239 | 16 | 118.400 | 115.000 | 2 | 0.00000 | 366 0 | 0 | 4000.00 | 0.00 |
| 368 | 0.256000 | 20.00 | 1.947 | 16 | 118.400 | 127.000 | 2 | 0.00000 | 365 0 | 0 | 4000.00 | 0.00 |
| 369 | 0.336000 | 30.00 | 2.275 | 4 | 118.400 | 133.500 | 2 | 0.00000 | 366 370 | 0 | 4000.00 | 0.00 |
| 370 | 0.256000 | 35.00 | 1.232 | 3 | 133.500 | 166.000 | 2 | 0.00000 | 369 371 | 0 | 4000.00 | 0.00 |
| 371 | 0.256000 | 10.00 | 1.000 | 19 | 166.000 | 176.000 | 2 | 0.00000 | 370 372 | 0 | 4000.00 | 0.00 |
| 372 | 0.256000 | 20.00 | 2.970 | 16 | 176.000 | 175.000 | 2 | 0.00000 | 371 0 | 0 | 4000.00 | 0.00 |
| 373 | 0.256000 | 55.00 | 1.521 | 16 | 166.000 | 141.000 | 2 | 0.00000 | 370 0 | 0 | 4000.00 | 0.00 |
| 374 | 0.336000 | 5.00 | 6.914 | 3 | 92.000 | 94.200 | 2 | 0.00000 | 144 375 | 0 | 4000.00 | 0.00 |
| 375 | 0.336000 | 50.00 | 1.605 | 3 | 94.200 | 113.250 | 2 | 0.00000 | 374 376 | 0 | 4000.00 | 0.00 |
| 376 | 0.256000 | 30.00 | 1.100 | 16 | 113.250 | 141.750 | 2 | 0.00000 | 375 0 | 0 | 4000.00 | 0.00 |
| 377 | 0.256000 | 30.00 | 1.751 | 16 | 94.200 | 74.000 | 2 | 0.00000 | 374 0 | 0 | 4000.00 | 0.00 |
| 378 | 0.256000 | 20.00 | 2.380 | 16 | 113.300 | 111.000 | 2 | 0.00000 | 375 0 | 0 | 4000.00 | 0.00 |
| 379 | 0.336000 | 10.00 | 4.898 | 4 | 89.000 | 94.330 | 2 | 0.00000 | 137 380 | 0 | 4000.00 | 0.00 |
| 380 | 0.336000 | 5.00 | 2.344 | 3 | 94.330 | 95.000 | 2 | 0.00000 | 379 381 | 0 | 4000.00 | 0.00 |
| 381 | 0.336000 | 100.00 | 1.322 | 4 | 95.000 | 130.700 | 2 | 0.00000 | 380 382 | 0 | 4000.00 | 0.00 |
| 382 | 0.256000 | 65.00 | 1.598 | 19 | 130.700 | 176.000 | 2 | 0.00000 | 381 383 | 0 | 4000.00 | 0.00 |
| 383 | 0.256000 | 20.00 | 1.000 | 16 | 176.000 | 175.000 | 2 | 0.00000 | 382 0 | 0 | 4000.00 | 0.00 |
| 384 | 0.336000 | 50.00 | 1.859 | 3 | 95.000 | 96.500 | 2 | 0.00000 | 380 385 | 0 | 4000.00 | 0.00 |
| 385 | 0.256000 | 75.00 | 1.252 | 3 | 96.500 | 98.000 | 2 | 0.00000 | 384 386 | 0 | 4000.00 | 0.00 |
| 386 | 0.256000 | 40.00 | 1.269 | 16 | 98.000 | 71.000 | 2 | 0.00000 | 385 0 | 0 | 4000.00 | 0.00 |
| 387 | 0.256000 | 15.00 | 2.741 | 16 | 96.500 | 103.000 | 2 | 0.00000 | 384 0 | 0 | 4000.00 | 0.00 |
| 388 | 0.256000 | 40.00 | 1.922 | 16 | 98.000 | 94.500 | 2 | 0.00000 | 385 0 | 0 | 4000.00 | 0.00 |
| 389 | 0.336000 | 45.00 | 1.567 | 3 | 89.000 | 127.750 | 2 | 0.00000 | 135 390 | 0 | 4000.00 | 0.00 |
| 390 | 0.256000 | 20.00 | 1.688 | 16 | 127.750 | 141.750 | 2 | 0.00000 | 389 0 | 0 | 4000.00 | 0.00 |
| 391 | 0.256000 | 110.00 | 1.335 | 16 | 127.750 | 141.750 | 2 | 0.00000 | 389 0 | 0 | 4000.00 | 0.00 |
| 392 | 0.336000 | 5.00 | 7.854 | 3 | 94.500 | 96.800 | 2 | 0.00000 | 155 393 | 0 | 4000.00 | 0.00 |
| 393 | 0.256000 | 215.00 | 1.316 | 16 | 96.800 | 65.000 | 2 | 0.00000 | 392 0 | 0 | 4000.00 | 0.00 |
| 394 | 0.256000 | 125.00 | 1.470 | 16 | 96.800 | 141.750 | 2 | 0.00000 | 392 0 | 0 | 4000.00 | 0.00 |
| 395 | 0.336000 | 150.00 | 1.528 | 3 | 94.500 | 130.400 | 2 | 0.00000 | 156 396 | 0 | 4000.00 | 0.00 |
| 396 | 0.256000 | 155.00 | 1.280 | 19 | 130.400 | 182.000 | 2 | 0.00000 | 395 397 | 0 | 4000.00 | 0.00 |
| 397 | 0.256000 | 30.00 | 1.478 | 16 | 182.000 | 179.000 | 2 | 0.00000 | 396 0 | 0 | 4000.00 | 0.00 |
| 398 | 0.256000 | 40.00 | 1.653 | 16 | 130.400 | 141.750 | 2 | 0.00000 | 395 0 | 0 | 4000.00 | 0.00 |
| 399 | 0.505000 | 120.00 | 1.538 | 3 | 94.500 | 90.500 | 2 | 0.00000 | 158 400 | 0 | 4000.00 | 0.00 |
| 400 | 0.336000 | 5.00 | 8.007 | 4 | 90.500 | 90.500 | 2 | 0.00000 | 399 401 | 0 | 4000.00 | 0.00 |
| 401 | 0.256000 | 60.00 | 1.349 | 16 | 90.500 | 141.750 | 2 | 0.00000 | 400 0 | 0 | 4000.00 | 0.00 |
| 402 | 0.336000 | 130.00 | 1.496 | 3 | 90.500 | 65.300 | 2 | 0.00000 | 399 403 | 0 | 4000.00 | 0.00 |
| 403 | 0.336000 | 50.00 | 1.228 | 4 | 65.300 | 94.700 | 2 | 0.00000 | 402 404 | 0 | 4000.00 | 0.00 |
| 404 | 0.256000 | 55.00 | 1.315 | 16 | 94.700 | 141.750 | 2 | 0.00000 | 403 0 | 0 | 4000.00 | 0.00 |
| 405 | 0.336000 | 40.00 | 2.260 | 3 | 65.300 | 77.500 | 2 | 0.00000 | 402 406 | 0 | 4000.00 | 0.00 |
| 406 | 0.256000 | 30.00 | 1.458 | 16 | 77.500 | 103.500 | 2 | 0.00000 | 405 0 | 0 | 4000.00 | 0.00 |
| 407 | 0.256000 | 125.00 | 1.180 | 16 | 77.500 | 75.000 | 2 | 0.00000 | 405 0 | 0 | 4000.00 | 0.00 |
| 408 | 0.336000 | 135.00 | 1.552 | 4 | 79.000 | 142.000 | 2 | 0.00000 | 139 409 | 0 | 4000.00 | 0.00 |
| 409 | 0.336000 | 20.00 | 1.000 | 16 | 142.000 | 141.750 | 2 | 0.00000 | 408 0 | 0 | 4000.00 | 0.00 |
| 410 | 0.256000 | 95.00 | 1.334 | 19 | 96.200 | 174.000 | 2 | 0.00000 | 150 411 | 0 | 4000.00 | 0.00 |
| 411 | 0.256000 | 10.00 | 1.358 | 4 | 174.000 | 183.500 | 2 | 0.00000 | 410 412 | 0 | 4000.00 | 0.00 |
| 412 | 0.107000 | 60.00 | 1.439 | 4 | 183.500 | 197.500 | 2 | 0.00000 | 411 413 | 0 | 4000.00 | 0.00 |
| 413 | 0.107000 | 25.00 | 1.000 | 16 | 197.500 | 197.500 | 2 | 0.00000 | 412 0 | 0 | 4000.00 | 0.00 |
| 414 | 0.505000 | 100.00 | 2.373 | 3 | 91.940 | 138.300 | 2 | 0.00000 | 143 415 | 0 | 4000.00 | 0.00 |
| 415 | 0.505000 | 5.00 | 5.848 | 2 | 138.300 | 142.000 | 2 | 0.00000 | 414 416 | 0 | 4000.00 | 0.00 |
| 416 | 0.336000 | 5.00 | 1.000 | 4 | 142.000 | 142.000 | 2 | 0.00000 | 415 417 | 0 | 4000.00 | 0.00 |
| 417 | 0.336000 | 50.00 | 1.000 | 4 | 142.000 | 160.000 | 2 | 0.00000 | 416 418 | 0 | 4000.00 | 0.00 |
| 418 | 0.336000 | 50.00 | 1.000 | 16 | 160.000 | 160.000 | 2 | 0.00000 | 417 0 | 0 | 4000.00 | 0.00 |
| 419 | 0.505000 | 85.00 | 2.031 | 4 | 94.500 | 131.500 | 2 | 0.00000 | 154 420 | 0 | 4000.00 | 0.00 |
| 420 | 0.505000 | 50.00 | 1.443 | 4 | 131.500 | 130.750 | 2 | 0.00000 | 419 421 | 0 | 4000.00 | 0.00 |
| 421 | 0.505000 | 30.00 | 1.909 | 4 | 130.750 | 130.750 | 2 | 0.00000 | 420 422 | 0 | 4000.00 | 0.00 |
| 422 | 0.505000 | 40.00 | 2.361 | 4 | 130.750 | 128.750 | 2 | 0.00000 | 421 423 | 0 | 4000.00 | 0.00 |
| 423 | 0.505000 | 35.00 | 1.491 | 3 | 128.750 | 132.170 | 2 | 0.00000 | 422 424 | 0 | 4000.00 | 0.00 |
| 424 | 0.256000 | 10.00 | 1.505 | 4 | 132.170 | 138.000 | 2 | 0.00000 | 423 425 | 0 | 4000.00 | 0.00 |
| 425 | 0.162000 | 105.00 | 1.580 | 16 | 138.000 | 169.500 | 2 | 0.00000 | 424 0 | 0 | 4000.00 | 0.00 |
| 426 | 0.336000 | 40.00 | 1.843 | 3 | 132.170 | 132.170 | 2 | 0.00000 | 423 427 | 0 | 4000.00 | 0.00 |
| 427 | 0.256000 | 10.00 | 1.000 | 4 | 132.170 | 138.000 | 2 | 0.00000 | 426 428 | 0 | 4000.00 | 0.00 |
| 428 | 0.162000 | 100.00 | 1.632 | 16 | 138.000 | 169.500 | 2 | 0.00000 | 427 0 | 0 | 4000.00 | 0.00 |
| 429 | 0.256000 | 40.00 | 1.165 | 4 | 132.170 | 138.000 | 2 | 0.00000 | 426 430 | 0 | 4000.00 | 0.00 |
| 430 | 0.162000 | 155.00 | 1.548 | 16 | 138.000 | 169.500 | 2 | 0.00000 | 429 0 | 0 | 4000.00 | 0.00 |
| 431 | 0.256000 | 40.00 | 1.934 | 4 | 65.500 | 69.000 | 2 | 0.00000 | 286 432 | 0 | 4000.00 | 0.00 |
| 432 | 0.256000 | 105.00 | 1.020 | 4 | 69.000 | 171.000 | 2 | 0.00000 | 431 433 | 0 | 4000.00 | 0.00 |
| 433 | 0.162000 | 10.00 | 1.227 | 19 | 171.000 | 181.000 | 2 | 0.00000 | 432 434 | 0 | 4000.00 | 0.00 |
| 434 | 0.162000 | 40.00 | 1.332 | 16 | 181.000 | 180.000 | 2 | 0.00000 | 433 0 | 0 | 4000.00 | 0.00 |
| 435 | 0.665000 | 15.00 | 5.522 | 3 | 89.600 | 83.800 | 2 | 0.00000 | 166 436 | 0 | 4000.00 | 0.00 |
| 436 | 0.665000 | 5.00 | 3.660 | 3 | 83.800 | 83.800 | 2 | 0.00000 | 435 437 | 0 | 4000.00 | 0.00 |
| 437 | 0.665000 | 5.00 | 14.300 | 3 | 83.800 | 83.800 | 2 | 0.00000 | 436 438 | 0 | 4000.00 | 0.00 |
| 438 | 0.505000 | 5.00 | 4.652 | 13 | 83.800 | 88.000 | 2 | 0.00000 | 437 439 | 0 | 4000.00 | 0.00 |
| 439 | 0.505000 | 5.00 | 6.050 | 2 | 88.000 | 89.000 | 2 | 0.00000 | 438 440 | 0 | 4000.00 | 0.00 |
| 440 | 0.336000 | 60.00 | 5.000 | 1 | 89.000 | 113.000 | 2 | 0.00000 | 439 0 | 0 | 4000.00 | 0.00 |
| 441 | 0.665000 | 10.00 | 9.911 | 3 | 83.800 | 91.500 | 2 | 0.00000 | 437 442 | 0 | 4000.00 | 0.00 |

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442    0.665000     80.00    1.865   3      91.500   102.800     2     0.00000 441 443     0   4000.00       0.00
443    0.665000     50.00    1.106  16     102.800   130.000     2     0.00000 442   0     0   4000.00       0.00
444    0.336000     10.00    5.435  16     102.800   107.800     2     0.00000 442   0     0   4000.00       0.00
445    0.665000     40.00    2.658  16      91.500    86.000     2     0.00000 441   0     0   4000.00       0.00
446    0.505000      5.00    7.868  13      83.800    88.000     2     0.00000 435 447     0   4000.00       0.00
447    0.505000      5.00    1.000   2      88.000    89.000     2     0.00000 446 448     0   4000.00       0.00
448    0.505000     45.00    2.301   4      89.000   103.000     2     0.00000 447 449     0   4000.00       0.00
449    0.336000     20.00    2.613   4     103.000   112.000     2     0.00000 448 450     0   4000.00       0.00
450    0.336000    110.00    2.307   1     112.000   113.000     2     0.00000 449   0     0   4000.00       0.00
451    0.336000    160.00    1.474   4      83.800   141.000     2     0.00000 436 452     0   4000.00       0.00
452    0.336000      5.00    1.000   2     141.000   141.000     2     0.00000 451 453     0   4000.00       0.00
453    0.256000     50.00    1.000   1     141.000   141.000     2     0.00000 452   0     0   4000.00       0.00
454    0.665000     30.00    4.979   3      84.100    93.500     2     0.00000 204 455     0   4000.00       0.00
455    0.665000     10.00    2.862   2      93.500   103.500     2     0.00000 454 456     0   4000.00       0.00
456    0.505000     50.00    5.000   1     103.500   103.500     2     0.00000 455   0     0   4000.00       0.00
457    0.505000     20.00    2.414   4      93.500    80.300     2     0.00000 454 458     0   4080.00       0.00
458    0.505000     50.00    1.000  16      80.300    80.300     2     0.00000 457   0     0   4000.00       0.00
459    0.336000     20.00    3.318   4      62.750    62.750     2     0.00000 218 460     0   4000.00       0.00
460    0.336000     10.00    2.210   4      62.750    63.750     2     0.00000 459 461     0   4000.00       0.00
461    0.336000     30.00    1.762   4      63.750    86.250     2     0.00000 460 462     0   4000.00       0.00
462    0.336000     40.00    1.286   4      86.250   125.000     2     0.00000 461 463     0   4000.00       0.00
463    0.336000    130.00    1.233   4     125.000   125.000     2     0.00000 462 464     0   4000.00       0.00
464    0.336000     30.00    1.587   4     125.000   155.000     2     0.00000 463 465     0   4000.00       0.00
465    0.256000     60.00    1.171  19     155.000   208.000     2     0.00000 464 466     0   4000.00       0.00
466    0.001000     10.00    1.000  16     208.000   205.000     2     0.00000 465   0     0   4000.00       0.00
467    0.336000     20.00    2.378   4      94.000    94.000     2     0.00000 199 468     0   4000.00       0.00
468    0.336000     20.00    1.000   4      94.000    94.000     2     0.00000 467 469     0   4000.00       0.00
469    0.336000      5.00    1.538   4      94.000    94.000     2     0.00000 468 470     0   4000.00       0.00
470    0.336000     25.00    2.665   4      94.000   113.000     2     0.00000 469 471     0   4000.00       0.00
471    0.336000     75.00    1.403   4     113.000   122.000     2     0.00000 470 472     0   4000.00       0.00
472    0.336000     35.00    1.708   3     122.000   151.800     2     0.00000 471 473     0   4000.00       0.00
473    0.336000     30.00    2.322   3     151.800   169.500     2     0.00000 472 474     0   4000.00       0.00
474    0.336000     35.00    1.770   4     169.500   187.800     2     0.00000 473 475     0   4000.00       0.00
475    0.256000     15.00    1.717   4     187.800   187.800     2     0.00000 474 476     0   4000.00       0.00
476    0.256000    110.00    1.130  19     187.800   205.300     2     0.00000 475 477     0   4000.00       0.00
477    0.256000     10.00    1.000  16     205.300   204.300     2     0.00000 476   0     0   4000.00       0.00
478    0.256000     40.00    1.849  16     169.500   166.000     2     0.00000 473   0     0   4000.00       0.00
479    0.336000     10.00    4.769   4     151.800   153.300     2     0.00000 472 480     0   4000.00       0.00
480    0.256000     60.00    1.293  16     153.300   149.300     2     0.00000 479   0     0   4000.00       0.00
481    0.505000      5.00   14.146   4      61.750    57.700     2     0.00000 208 482     0   4000.00       0.00
482    0.505000     20.00    3.323   4      57.700    71.000     2     0.00000 481 483     0   4000.00       0.00
483    0.505000     10.00    1.000   2      71.000    71.000     2     0.00000 482 484     0   4000.00       0.00
484    0.505000     50.00    5.000   1      71.000    71.000     2     0.00000 483   0     0   4000.00       0.00
485    0.505000      5.00   13.184   4     138.300   138.300     2     0.00000 414 486     0   4000.00       0.00
486    0.336000     90.00    1.157   4     138.300   143.500     2     0.00000 485 487     0   4000.00       0.00
487    0.336000     15.00    1.627   4     143.500   147.400     2     0.00000 486 488     0   4000.00       0.00
488    0.336000     75.00    1.314   4     147.400   165.800     2     0.00000 487 489     0   4000.00       0.00
489    0.336000     70.00    1.355   4     165.800   164.000     2     0.00000 488 490     0   4000.00       0.00
490    0.336000     10.00    3.486   4     164.000   164.000     2     0.00000 489 491     0   4000.00       0.00
491    0.336000     10.00    1.416   4     164.000   164.000     2     0.00000 490 492     0   4000.00       0.00
492    0.256000     10.00    1.251   4     164.000   164.000     2     0.00000 491 493     0   4000.00       0.00
493    0.206000     10.00    3.225   4     164.000   166.000     2     0.00000 492 494     0   4000.00       0.00
494    0.206000     75.00    1.549   4     166.000   166.000     2     0.00000 493 495     0   4000.00       0.00
495    0.172000     20.00    1.757  19     166.000   166.000     2     0.00000 494 496     0   4000.00       0.00
496    0.087000     10.00    2.409  16     166.000   168.000     2     0.00000 495   0     0   4000.00       0.00
@EOR

 91 570.3   0  18
  20.00   .000     -0.022     -0.033    -0.045    -0.056    -0.067    -0.078
 -0.089  -.100     -0.111     -0.123    -0.134    -0.145    -0.156    -0.167
 -0.200   -100.0
  570.3  570.3     587.3     590.3     587.3     580.3     568.3     558.3
  542.3  520.3     490.3     460.3     420.3     370.3     310.3     240.3
    170.3  170.3

 99 495.3   0  18
   20.00   .000     -0.557     -1.114    -1.671    -2.228    -2.785    -3.342
  -3.899  -4.46     -5.013     -5.570    -6.127    -6.684    -7.241    -8.912
  -13.4   -100.0
   495.3  495.3     494.3     492.3     491.3     488.3     485.3     481.3
   477.3  472.3     466.3     459.3     448.3     436.3     423.3     375.3
   170.3  170.3

117 512.1  0 17
   20.00  -.000     -0.557     -1.114    -1.671    -2.228    -2.785    -3.342
  -3.899  -4.46     -5.013     -5.57     -6.127    -6.684    -7.241    -8.912
  -13.37
   512.1  512.1     510.1     507.1     505.1     502.1     500.1     498.1
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   495.1  492.1     487.8     481.1     476.1     467.1     457.1     412.1
   160.1

 123 512.1  0 17
   20.00  -.000     -0.557    -1.114    -1.671    -2.228    -2.785    -3.342
  -3.899  -4.46     -5.013    -5.57     -6.127    -6.684    -7.241    -8.912
  -13.37
   512.1  512.1     510.1     507.1     505.1     502.1     500.1     498.1
   495.1  492.1     487.8     481.1     476.1     467.1     457.1     412.1
   160.1

 129 482.1   0  16
   20.00   .000     -0.022     -0.033    -0.045    -0.056    -0.067    -0.078
  -0.089  -.100     -0.111     -0.123    -0.134    -0.145    -0.156    -100.0
   482.1  482.1     478.1     473.1     463.1     448.1     428.1     403.1
   374.1  343.1     308.1     268.1     233.1     198.1     168.1     168.1

 440 147.0   0   0

 450 147.0   0   0

 453 175.0   0   0

 456 137.5   0   0

 484 105.0   0   0

   4 0  100.  100. 1.0E+20   2  9  4  0  .01   416.4
 0     .56   2.36    100
 100.  100.  100.    100.
 0     50.0   90.0  92.5   95.3   97.5      99.0      99.7        100.0
 0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

  90 0  100  100  1.0E+20    2  9  3  0  .01  570.3
0       0.01  100
100     0    0
0     50.0   90.0  92.5   95.3   97.5      99.0      99.7        100.0
 0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

  96 0  100  100  1.0E+20   2  9  4  0  .01  495.3
0      .63   3.43   100
100.   100.  100.   100.
0     50.0   90.0  92.5   95.3   97.5      99.0      99.7        100.0
 0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

 114 0  100  100  1.0E+20    2  9  4  0  .01  512.1
 0       2.51  5.61   100
 100     100   100.   100.
 0     50.0   90.0  92.5   95.3   97.5      99.0      99.7        100.0
 0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

 121 0  100  100  1.0E+20    2  9  4  0  .01  512.1
 0       21.95 27.15 100
 100     100   0.0   0.0
 0     50.0   90.0  92.5   95.3   97.5      99.0      99.7        100.0
 0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

 126 0  100  100  1.0E+20    2  9  3  0  .01  482.1
0       0.01  100
100     0    0
0     50.0   90.0  92.5   95.3   97.5      99.0      99.7        100.0
 0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

 415  0  100  100  1.0E+20   2  16  3  0  1.79  194.
 0       0.1    100
 100     100    100
 0   11.1   16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
 97.5     99.0     99.7  100.0
 10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
 203570   1596000  0.49259E+08  0.1E+21

 439  0  100  100  1.0E+20   2  16  3  0  1.79  147.
 0       0.1    100
 100     100    100
 0    11.1  16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
 97.5     99.0     99.7  100.0
 10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
 203570   1596000  0.49259E+08  0.1E+21
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 447  0  100  100  1.0E+20   2  16  3  0  1.79  147.
 0       0.01    100
 100     100     100
 0    11.1  16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
 97.5     99.0     99.7  100.0
 10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
 203570   1596000  0.49259E+08  0.1E+21

 452  0  100  100  1.0E+20   2  16  3  0  1.785  175.
 0       0.01   100
 100     100    100
 0    11.1  16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
 97.5     99.0     99.7  100.0
 10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
 203570   1596000  0.49259E+08  0.1E+21

 455  0  100  100  1.0E+20   2  16  3  0  0.695  137.5
0       0.01   100
100     100    100
0    11.1  16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
97.5     99.0     99.7  100.0
10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
 203570   1596000  0.49259E+08  0.1E+21


 483  0  100  100  1.0E+20  2  16  3  0  0.99  105.0
 0       0.1   100
 100     0     0
 0    11.1  16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
 97.5     99.0     99.7  100.0
 10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
 203570   1596000  0.49259E+08  0.1E+21

   5  2  0.650  0.01 0.7850 0.0  ID 1.0000
 438  2  0.750  0.01 0.2003 0.0  ID 0.5050
 446  2  0.750  0.01 0.2003 0.0  ID 0.5050

465   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102


476   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102

308   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102


410   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102


433   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102

396   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102

362   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102

371   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
```

```
0.21        14.7        0.02      68.0
53.3    2          .102

334    0.00136      0.0006       1.5      0.
0.0           1.0         0.      0.083
0.21        14.7        0.02      68.0
53.3    2          .102

382    0.00136      0.0006       1.5      0.
0.0           1.0         0.      0.083
0.21        14.7        0.02      68.0
53.3    2          .102

495    0.00136      0.0006       1.5      0.
0.0           1.0         0.      0.083
0.21        14.7        0.02      68.0
53.3    2          .102

 1.            1.
 6      2
 94     2
 97     2
 102    2
 113    2
 120    2
 184    41
 188    46
 194    31
 289    11
 292    23
 303    11
 309    4
 313    12
 322    11
 335    10
 347    11
 351    10
 362    10
 371    2
 376    6
 382    13
 396    31
 401    12
 404    11
 409    4
 410    17
 418    9
 425    21
 428    20
 430    32
 432    20
 433    3
 450    22
 451    32
 465    1
 466    2
 476    4
 477    22
 478    8
 480    12
 495    4
@EOR
410        1        410      3          1
410        3        410      5          2
410        4        410      18         3
410        18       410      19         4
410        18       411      3          5
412        1        412      2          6
412        1        412      3          7
412        3        412      6          8
412        5        412      6          9
412        6        412      7          10
412        7        412      10         11
431        1        431      2          12
431        2        431      3          13
431        2        431      5          14
431        5        431      8          15
431        8        431      9          16
```

# CALCULATION SHEET

| | | | |
|---|---|---|---|
| Project: | HOPE CREEK GENERATING STATION | Job Number: | 8038 |
| Calc No. | 8038-P0004 | Sheet No. | 236 |
| By: | A. Arastu Date: 9/14/18 | Rev. No. | 1 |
| Subject: | Water Hammer Analysis of the HCGS Fire Protection System | | |

```
432      1      432     22        17
308      1      308     5         18
308      5      308     6         19
308      5      308     18        20
308      18     308     20        21
308      20     308     21        22
308      21     308     27        23
@EOR
0    20.0  1000  1
20.  40.0   500  1
40.0 888.  1000  1
```

## B9 - Case 9 (6-inch Deluge Valve in RB w/HC Electric Pump) with Vacuum Breakers

```
HCGS FP Case 9: 11 Vacuum Breakers.  Forces in Riser # 26 only
10000
0  0  1   0   0   0
2   2   0.0  12.0
2   1   0   0
0   1   0   0   0   0   0  1 0 0
1.9  62.4  7.83E-6
1.0  2   13    0    0
       0.0    1000.0    2000.0   2.0E+04   6.0E+04   1.0E+05   3.0E+05   6.0E+05
   1.0E+06   1.5E+06   3.5E+06   1.0E+11   1.0E+33
      0.10     0.061     0.048     0.026     0.021      .019    0.0167    0.0155
    0.0150    0.0147     0.014     0.014     0.014
495.3   3  17  0    0
  -10.00   .000   .557  1.114  1.671  2.228  2.785  3.342
   3.899  4.456  5.013  5.570  6.127  6.684  7.241  8.912
   13.4
   495.3  495.3     494.3     492.3     491.3     488.3     485.3     481.3
   477.3  472.3     466.3     459.3     448.3     436.3     423.3     375.3
   170.3
   1
   1    1.104000     55.00    5.492   4      99.400    94.000     2     0.00000   0   2     0   4000.00       0.00
   2    1.000000     20.00    7.400   4      94.000   105.040     2     0.00000   1   3     0   4000.00       0.00
   3    1.000000     10.00    7.180   4     105.040   105.040     2     0.00000   2   4     0   4000.00       0.00
   4    1.000000     10.00    3.538   2     105.040   104.500     2     0.00000   3   5     0   4000.00       0.00
   5    1.000000      5.00   18.508  13     104.500   104.750     2     0.00000   4   6     0   4000.00       0.00
   6    1.000000     10.00    5.200   4     104.750   110.000     2     0.00000   5   7     0   4000.00       0.00
   7    1.000000     20.00    3.400   3     110.000   105.000     2     0.00000   6   8     0   4000.00       0.00
   8    1.000000    115.00    2.402   3     105.000    96.900     2     0.00000   7  86     0   4000.00       0.00
   9    1.007000      5.00    2.611   4      96.900    96.900     2     0.00000   8  10     0   4000.00       0.00
  10    1.007000     10.00    3.014   4      96.900    96.900     2     0.00000   9  11     0   4000.00       0.00
  11    1.007000     10.00    1.806   4      96.900    96.900     2     0.00000  10  12     0   4000.00       0.00
  12    1.007000     10.00    3.014   3      96.900    96.900     2     0.00000  11  13     0   4000.00       0.00
  13    1.007000    110.00    1.183   4      96.900    96.900     2     0.00000  12  14     0   4000.00       0.00
  14    1.007000    110.00    1.363   4      96.900    95.900     2     0.00000  13  15     0   4000.00       0.00
  15    1.007000     10.00    3.014   4      95.900    95.900     2     0.00000  14  16     0   4000.00       0.00
  16    1.007000     30.00    1.671   4      95.900    95.900     2     0.00000  15  17     0   4000.00       0.00
  17    1.007000     80.00    1.252   4      95.900    95.900     2     0.00000  16  18     0   4000.00       0.00
  18    1.007000     20.00    1.403   4      95.900    95.900     2     0.00000  17  19     0   4000.00       0.00
  19    1.007000    130.00    1.155   4      95.900    95.900     2     0.00000  18  20     0   4000.00       0.00
  20    1.007000    135.00    1.060   4      95.900    95.400     2     0.00000  19  21     0   4000.00       0.00
  21    1.007000     10.00    2.994   4      95.400    93.500     2     0.00000  20  22     0   4000.00       0.00
  22    1.007000     65.00    1.217   4      93.500    93.500     2     0.00000  21  23     0   4000.00       0.00
  23    1.007000      5.00    1.000   4      93.500    93.500     2     0.00000  22  24     0   4000.00       0.00
  24    1.007000     20.00    3.004   4      93.500    97.000     2     0.00000  23  25     0   4000.00       0.00
  25    1.007000    200.00    1.300   4      97.000    97.000     2     0.00000  24  26     0   4000.00       0.00
  26    1.007000     55.00    1.513   4      97.000    97.000     2     0.00000  25  27     0   4000.00       0.00
  27    1.007000     20.00    1.997   4      97.000    93.000     2     0.00000  26  28     0   4000.00       0.00
  28    1.007000    230.00    1.088   3      93.000    93.000     2     0.00000  27 181     0   4000.00       0.00
  29    1.007000     40.00    1.503   3      93.000    93.000     2     0.00000  28  30     0   4000.00       0.00
  30    1.007000    240.00    1.117   4      93.000    94.500     2     0.00000  29  31     0   4000.00       0.00
  31    1.007000     45.00    1.448   4      94.500    94.500     2     0.00000  30  32     0   4000.00       0.00
  32    1.007000     35.00    1.570   4      94.500    91.000     2     0.00000  31  33     0   4000.00       0.00
  33    1.007000    180.00    1.111   4      91.000    96.000     2     0.00000  32  34     0   4000.00       0.00
  34    1.007000     10.00    3.014   4      96.000    96.000     2     0.00000  33  35     0   4000.00       0.00
  35    1.007000      5.00    5.028   4      96.000    96.000     2     0.00000  34  36     0   4000.00       0.00
  36    1.007000      5.00    2.611   4      96.000    96.000     2     0.00000  35  37     0   4000.00       0.00
  37    1.007000     10.00    3.014   4      96.000    96.000     2     0.00000  36  38     0   4000.00       0.00
  38    1.007000     30.00    2.141   4      96.000    96.000     2     0.00000  37  39     0   4000.00       0.00
  39    1.007000     20.00    1.403   4      96.000    96.000     2     0.00000  38  40     0   4000.00       0.00
  40    1.007000     80.00    1.252   3      96.000    96.000     2     0.00000  39  41     0   4000.00       0.00
  41    1.007000     10.00    1.806   4      96.000    96.000     2     0.00000  40  42     0   4000.00       0.00
  42    1.007000     20.00    1.000   4      96.000    96.000     2     0.00000  41  43     0   4000.00       0.00
  43    1.007000     55.00    1.363   4      96.000    97.200     2     0.00000  42  44     0   4000.00       0.00
  44    1.007000      5.00    5.028   4      97.200    97.200     2     0.00000  43  45     0   4000.00       0.00
  45    1.007000    160.00    1.175   4      97.200    96.200     2     0.00000  44  46     0   4000.00       0.00
  46    1.007000     15.00    2.343   3      96.200    96.200     2     0.00000  45 162     0   4000.00       0.00
  47    1.007000      5.00    5.028   4      96.200    96.200     2     0.00000  46  48     0   4000.00       0.00
  48    1.007000     15.00    6.357   4      96.200    97.000     2     0.00000  47  49     0   4000.00       0.00
  49    1.007000     60.00    1.166   4      97.000    97.000     2     0.00000  48  50     0   4000.00       0.00
  50    1.007000     15.00    2.994   4      97.000    94.500     2     0.00000  49  51     0   4000.00       0.00
  51    1.007000      5.00    4.605   4      94.500    97.000     2     0.00000  50  52     0   4000.00       0.00
  52    1.007000     15.00    2.329   4      97.000    94.000     2     0.00000  51  53     0   4000.00       0.00
  53    1.007000     80.00    1.501   4      94.000    96.500     2     0.00000  52  54     0   4000.00       0.00
```

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 54 | 1.007000 | 65.00 | 1.310 | 3 | 96.500 | 96.500 | 2 | 0.00000 | 53 | 55 | 0 | 4000.00 | 0.00 |
| 55 | 1.007000 | 50.00 | 1.481 | 4 | 96.500 | 97.200 | 2 | 0.00000 | 54 | 56 | 0 | 4000.00 | 0.00 |
| 56 | 1.007000 | 25.00 | 1.322 | 4 | 97.200 | 97.200 | 2 | 0.00000 | 55 | 57 | 0 | 4000.00 | 0.00 |
| 57 | 1.007000 | 5.00 | 3.820 | 4 | 97.200 | 97.200 | 2 | 0.00000 | 56 | 58 | 0 | 4000.00 | 0.00 |
| 58 | 1.007000 | 70.00 | 1.288 | 4 | 97.200 | 97.200 | 2 | 0.00000 | 57 | 59 | 0 | 4000.00 | 0.00 |
| 59 | 1.007000 | 10.00 | 1.806 | 4 | 97.200 | 97.200 | 2 | 0.00000 | 58 | 60 | 0 | 4000.00 | 0.00 |
| 60 | 1.007000 | 195.00 | 1.103 | 4 | 97.200 | 97.200 | 2 | 0.00000 | 59 | 61 | 0 | 4000.00 | 0.00 |
| 61 | 1.007000 | 240.00 | 1.159 | 4 | 97.200 | 94.500 | 2 | 0.00000 | 60 | 62 | 0 | 4000.00 | 0.00 |
| 62 | 1.007000 | 215.00 | 1.094 | 4 | 94.500 | 94.500 | 2 | 0.00000 | 61 | 63 | 0 | 4000.00 | 0.00 |
| 63 | 1.007000 | 110.00 | 1.183 | 4 | 94.500 | 94.500 | 2 | 0.00000 | 62 | 64 | 0 | 4000.00 | 0.00 |
| 64 | 1.007000 | 195.00 | 1.103 | 4 | 94.500 | 94.500 | 2 | 0.00000 | 63 | 65 | 0 | 4000.00 | 0.00 |
| 65 | 1.007000 | 5.00 | 5.028 | 4 | 94.500 | 94.500 | 2 | 0.00000 | 64 | 66 | 0 | 4000.00 | 0.00 |
| 66 | 1.007000 | 30.00 | 1.665 | 4 | 94.500 | 95.800 | 2 | 0.00000 | 65 | 67 | 0 | 4000.00 | 0.00 |
| 67 | 1.007000 | 5.00 | 2.611 | 4 | 95.800 | 95.800 | 2 | 0.00000 | 66 | 68 | 0 | 4000.00 | 0.00 |
| 68 | 1.007000 | 25.00 | 1.806 | 3 | 95.800 | 95.800 | 2 | 0.00000 | 67 | 229 | 0 | 4000.00 | 0.00 |
| 69 | 1.007000 | 130.00 | 1.155 | 4 | 95.800 | 95.500 | 2 | 0.00000 | 68 | 70 | 0 | 4000.00 | 0.00 |
| 70 | 1.007000 | 5.00 | 2.611 | 3 | 95.500 | 95.500 | 2 | 0.00000 | 69 | 261 | 0 | 4000.00 | 0.00 |
| 71 | 1.007000 | 5.00 | 5.028 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 70 | 72 | 0 | 4000.00 | 0.00 |
| 72 | 1.007000 | 5.00 | 2.611 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 71 | 73 | 0 | 4000.00 | 0.00 |
| 73 | 1.007000 | 205.00 | 1.098 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 72 | 74 | 0 | 4000.00 | 0.00 |
| 74 | 1.007000 | 240.00 | 1.117 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 73 | 75 | 0 | 4000.00 | 0.00 |
| 75 | 1.007000 | 20.00 | 4.021 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 74 | 76 | 0 | 4000.00 | 0.00 |
| 76 | 1.007000 | 30.00 | 1.665 | 4 | 95.500 | 91.500 | 2 | 0.00000 | 75 | 77 | 0 | 4000.00 | 0.00 |
| 77 | 1.007000 | 25.00 | 2.120 | 4 | 91.500 | 97.000 | 2 | 0.00000 | 76 | 78 | 0 | 4000.00 | 0.00 |
| 78 | 1.007000 | 50.00 | 1.403 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 77 | 79 | 0 | 4000.00 | 0.00 |
| 79 | 1.007000 | 50.00 | 1.403 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 78 | 80 | 0 | 4000.00 | 0.00 |
| 80 | 1.007000 | 20.00 | 1.997 | 4 | 97.000 | 90.500 | 2 | 0.00000 | 79 | 81 | 0 | 4000.00 | 0.00 |
| 81 | 1.007000 | 40.00 | 2.002 | 4 | 90.500 | 96.900 | 2 | 0.00000 | 80 | 82 | 0 | 4000.00 | 0.00 |
| 82 | 1.007000 | 165.00 | 1.122 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 81 | 83 | 0 | 4000.00 | 0.00 |
| 83 | 1.007000 | 135.00 | 1.060 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 82 | 84 | 0 | 4000.00 | 0.00 |
| 84 | 1.007000 | 10.00 | 3.014 | 3 | 96.900 | 96.900 | 2 | 0.00000 | 83 | 101 | 0 | 4000.00 | 0.00 |
| 85 | 1.007000 | 60.00 | 1.134 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 84 | 86 | 0 | 4000.00 | 0.00 |
| 86 | 1.007000 | 5.00 | 5.028 | 3 | 96.900 | 96.900 | 2 | 0.00000 | 85 | 9 | 1 | 4000.00 | 0.00 |
| 87 | 0.336000 | 10.00 | 5.771 | 3 | 105.000 | 112.070 | 2 | 0.00000 | 7 | 88 | 0 | 4000.00 | 0.00 |
| 88 | 0.336000 | 5.00 | 5.570 | 4 | 112.070 | 113.750 | 2 | 0.00000 | 87 | 89 | 0 | 4000.00 | 0.00 |
| 89 | 0.256000 | 30.00 | 1.870 | 4 | 113.750 | 109.000 | 2 | 0.00000 | 88 | 90 | 0 | 4000.00 | 0.00 |
| 90 | 0.256000 | 10.00 | 1.205 | 2 | 109.000 | 104.250 | 2 | 0.00000 | 89 | 91 | 0 | 4000.00 | 0.00 |
| 91 | 0.256000 | 5.00 | 5.933 | 1 | 104.250 | 103.750 | 2 | 0.00000 | 90 | 0 | 0 | 4000.00 | 0.00 |
| 92 | 0.336000 | 40.00 | 2.714 | 3 | 112.070 | 105.000 | 2 | 0.00000 | 87 | 93 | 0 | 4000.00 | 0.00 |
| 93 | 1.000000 | 20.00 | 3.400 | 4 | 105.000 | 110.200 | 2 | 0.00000 | 92 | 94 | 0 | 4000.00 | 0.00 |
| 94 | 1.000000 | 10.00 | 3.800 | 4 | 110.200 | 104.750 | 2 | 0.00000 | 93 | 95 | 0 | 4000.00 | 0.00 |
| 95 | 1.000000 | 5.00 | 18.508 | 4 | 104.750 | 104.750 | 2 | 0.00000 | 94 | 96 | 0 | 4000.00 | 0.00 |
| 96 | 1.000000 | 10.00 | 3.538 | 2 | 104.750 | 104.750 | 2 | 0.00000 | 95 | 97 | 0 | 4000.00 | 0.00 |
| 97 | 1.000000 | 5.00 | 9.400 | 4 | 104.750 | 105.040 | 2 | 0.00000 | 96 | 98 | 0 | 4000.00 | 0.00 |
| 98 | 1.000000 | 20.00 | 7.400 | 4 | 105.040 | 94.000 | 2 | 0.00000 | 97 | 99 | 0 | 4000.00 | 0.00 |
| 99 | 1.104000 | 30.00 | 4.874 | 1 | 94.000 | 99.400 | 2 | 0.00000 | 98 | 0 | 0 | 4000.00 | 0.00 |
| 100 | 1.000000 | 85.00 | 1.864 | 4 | 105.000 | 91.000 | 2 | 0.00000 | 92 | 101 | 0 | 4000.00 | 0.00 |
| 101 | 1.000000 | 25.00 | 4.512 | 3 | 91.000 | 96.900 | 2 | 0.00000 | 100 | 85 | 1 | 4000.00 | 0.00 |
| 102 | 0.835000 | 5.00 | 12.356 | 2 | 96.000 | 96.000 | 2 | 0.00000 | 40 | 103 | 0 | 4000.00 | 0.00 |
| 103 | 0.788000 | 60.00 | 1.628 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 102 | 104 | 0 | 4000.00 | 0.00 |
| 104 | 0.788000 | 100.00 | 1.000 | 4 | 96.000 | 95.500 | 2 | 0.00000 | 103 | 105 | 0 | 4000.00 | 0.00 |
| 105 | 0.788000 | 100.00 | 1.000 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 104 | 106 | 0 | 4000.00 | 0.00 |
| 106 | 0.788000 | 30.00 | 2.786 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 105 | 107 | 0 | 4000.00 | 0.00 |
| 107 | 0.927000 | 35.00 | 2.059 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 106 | 108 | 0 | 4000.00 | 0.00 |
| 108 | 0.927000 | 150.00 | 1.494 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 107 | 109 | 0 | 4000.00 | 0.00 |
| 109 | 0.927000 | 50.00 | 1.519 | 3 | 95.500 | 95.500 | 2 | 0.00000 | 108 | 110 | 0 | 4000.00 | 0.00 |
| 110 | 0.927000 | 20.00 | 2.298 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 109 | 111 | 0 | 4000.00 | 0.00 |
| 111 | 0.927000 | 10.00 | 7.860 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 110 | 112 | 0 | 4000.00 | 0.00 |
| 112 | 1.000000 | 10.00 | 9.000 | 4 | 95.500 | 101.700 | 2 | 0.00000 | 111 | 113 | 0 | 4000.00 | 0.00 |
| 113 | 1.000000 | 5.00 | 5.400 | 4 | 101.700 | 102.800 | 2 | 0.00000 | 112 | 114 | 0 | 4000.00 | 0.00 |
| 114 | 1.000000 | 10.00 | 12.354 | 2 | 102.800 | 102.800 | 2 | 0.00000 | 113 | 115 | 0 | 4000.00 | 0.00 |
| 115 | 1.000000 | 5.00 | 8.877 | 4 | 102.800 | 102.800 | 2 | 0.00000 | 114 | 116 | 0 | 4000.00 | 0.00 |
| 116 | 1.000000 | 5.00 | 5.000 | 4 | 102.800 | 102.800 | 2 | 0.00000 | 115 | 117 | 0 | 4000.00 | 0.00 |
| 117 | 1.250000 | 30.00 | 3.333 | 1 | 102.800 | 103.000 | 2 | 0.00000 | 116 | 0 | 0 | 4000.00 | 0.00 |
| 118 | 0.927000 | 10.00 | 6.562 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 109 | 119 | 0 | 4000.00 | 0.00 |
| 119 | 1.000000 | 10.00 | 2.400 | 3 | 95.500 | 101.700 | 2 | 0.00000 | 118 | 120 | 0 | 4000.00 | 0.00 |
| 120 | 1.000000 | 5.00 | 7.800 | 4 | 101.700 | 102.800 | 2 | 0.00000 | 119 | 121 | 0 | 4000.00 | 0.00 |
| 121 | 1.000000 | 10.00 | 13.154 | 2 | 102.800 | 102.800 | 2 | 0.00000 | 120 | 122 | 0 | 4000.00 | 0.00 |
| 122 | 1.000000 | 10.00 | 8.938 | 4 | 102.800 | 102.800 | 2 | 0.00000 | 121 | 123 | 0 | 4000.00 | 0.00 |
| 123 | 1.250000 | 20.00 | 3.250 | 1 | 102.800 | 103.000 | 2 | 0.00000 | 122 | 0 | 0 | 4000.00 | 0.00 |
| 124 | 0.134000 | 5.00 | 3.624 | 4 | 101.700 | 101.700 | 2 | 0.00000 | 119 | 125 | 0 | 4000.00 | 0.00 |
| 125 | 0.134000 | 5.00 | 3.141 | 4 | 101.700 | 101.700 | 2 | 0.00000 | 124 | 126 | 0 | 4000.00 | 0.00 |
| 126 | 0.134000 | 5.00 | 1.000 | 2 | 101.700 | 101.700 | 2 | 0.00000 | 125 | 127 | 0 | 4000.00 | 0.00 |
| 127 | 0.134000 | 10.00 | 1.000 | 4 | 101.700 | 101.700 | 2 | 0.00000 | 126 | 128 | 0 | 4000.00 | 0.00 |
| 128 | 0.134000 | 10.00 | 1.000 | 4 | 101.700 | 101.700 | 2 | 0.00000 | 127 | 129 | 0 | 4000.00 | 0.00 |
| 129 | 0.134000 | 10.00 | 1.000 | 1 | 101.700 | 103.000 | 2 | 0.00000 | 128 | 0 | 0 | 4000.00 | 0.00 |
| 130 | 0.835000 | 5.00 | 11.020 | 4 | 93.000 | 93.000 | 2 | 0.00000 | 29 | 131 | 0 | 4000.00 | 0.00 |
| 131 | 0.835000 | 100.00 | 1.331 | 4 | 93.000 | 96.010 | 2 | 0.00000 | 130 | 132 | 0 | 4000.00 | 0.00 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 132 | 0.835000 | 25.00 | 1.267 | 4 | 96.010 | 96.010 | 2 | 0.00000 | 131 | 133 | 0 | 4000.00 | 0.00 |
| 133 | 0.835000 | 65.00 | 1.000 | 4 | 96.010 | 96.000 | 2 | 0.00000 | 132 | 134 | 0 | 4000.00 | 0.00 |
| 134 | 0.835000 | 20.00 | 2.653 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 133 | 135 | 0 | 4000.00 | 0.00 |
| 135 | 0.835000 | 105.00 | 1.382 | 3 | 96.000 | 89.000 | 2 | 0.00000 | 134 | 136 | 0 | 4000.00 | 0.00 |
| 136 | 0.835000 | 5.00 | 3.338 | 4 | 89.000 | 89.000 | 2 | 0.00000 | 135 | 137 | 0 | 4000.00 | 0.00 |
| 137 | 0.835000 | 50.00 | 1.334 | 3 | 89.000 | 89.000 | 2 | 0.00000 | 136 | 138 | 0 | 4000.00 | 0.00 |
| 138 | 0.835000 | 5.00 | 5.676 | 4 | 89.000 | 89.000 | 2 | 0.00000 | 137 | 139 | 0 | 4000.00 | 0.00 |
| 139 | 0.835000 | 5.00 | 4.340 | 3 | 89.000 | 89.000 | 2 | 0.00000 | 138 | 140 | 0 | 4000.00 | 0.00 |
| 140 | 0.835000 | 55.00 | 1.000 | 4 | 89.000 | 89.000 | 2 | 0.00000 | 139 | 141 | 0 | 4000.00 | 0.00 |
| 141 | 0.835000 | 25.00 | 1.668 | 3 | 89.000 | 89.000 | 2 | 0.00000 | 140 | 142 | 0 | 4000.00 | 0.00 |
| 142 | 0.835000 | 15.00 | 2.882 | 4 | 89.000 | 91.940 | 2 | 0.00000 | 141 | 143 | 0 | 4000.00 | 0.00 |
| 143 | 0.835000 | 25.00 | 1.668 | 3 | 91.940 | 91.940 | 2 | 0.00000 | 142 | 144 | 0 | 4000.00 | 0.00 |
| 144 | 0.835000 | 5.00 | 5.676 | 3 | 91.940 | 91.940 | 2 | 0.00000 | 143 | 145 | 0 | 4000.00 | 0.00 |
| 145 | 0.835000 | 5.00 | 4.340 | 3 | 91.940 | 91.940 | 2 | 0.00000 | 144 | 146 | 0 | 4000.00 | 0.00 |
| 146 | 0.835000 | 10.00 | 3.338 | 4 | 91.940 | 96.200 | 2 | 0.00000 | 145 | 147 | 0 | 4000.00 | 0.00 |
| 147 | 0.835000 | 5.00 | 3.338 | 4 | 96.200 | 96.200 | 2 | 0.00000 | 146 | 148 | 0 | 4000.00 | 0.00 |
| 148 | 0.835000 | 145.00 | 1.000 | 4 | 96.200 | 96.200 | 2 | 0.00000 | 147 | 149 | 0 | 4000.00 | 0.00 |
| 149 | 0.835000 | 10.00 | 2.670 | 4 | 96.200 | 96.200 | 2 | 0.00000 | 148 | 150 | 0 | 4000.00 | 0.00 |
| 150 | 0.835000 | 90.00 | 1.186 | 3 | 96.200 | 96.200 | 2 | 0.00000 | 149 | 151 | 0 | 4000.00 | 0.00 |
| 151 | 0.835000 | 5.00 | 5.676 | 4 | 96.200 | 94.530 | 2 | 0.00000 | 150 | 152 | 0 | 4000.00 | 0.00 |
| 152 | 0.835000 | 15.00 | 2.664 | 3 | 94.530 | 94.530 | 2 | 0.00000 | 151 | 153 | 0 | 4000.00 | 0.00 |
| 153 | 0.835000 | 5.00 | 2.336 | 4 | 94.530 | 94.530 | 2 | 0.00000 | 152 | 154 | 0 | 4000.00 | 0.00 |
| 154 | 0.835000 | 5.00 | 4.340 | 3 | 94.530 | 94.540 | 2 | 0.00000 | 153 | 155 | 0 | 4000.00 | 0.00 |
| 155 | 0.835000 | 15.00 | 2.559 | 3 | 94.540 | 94.540 | 2 | 0.00000 | 154 | 156 | 0 | 4000.00 | 0.00 |
| 156 | 0.835000 | 5.00 | 4.340 | 3 | 94.540 | 94.540 | 2 | 0.00000 | 155 | 157 | 0 | 4000.00 | 0.00 |
| 157 | 0.835000 | 5.00 | 3.338 | 4 | 94.540 | 94.540 | 2 | 0.00000 | 156 | 158 | 0 | 4000.00 | 0.00 |
| 158 | 0.835000 | 5.00 | 3.338 | 3 | 94.540 | 94.500 | 2 | 0.00000 | 157 | 159 | 0 | 4000.00 | 0.00 |
| 159 | 0.835000 | 5.00 | 4.340 | 4 | 94.500 | 94.500 | 2 | 0.00000 | 158 | 160 | 0 | 4000.00 | 0.00 |
| 160 | 0.835000 | 55.00 | 1.425 | 3 | 94.500 | 94.500 | 2 | 0.00000 | 159 | 161 | 0 | 4000.00 | 0.00 |
| 161 | 0.835000 | 175.00 | 1.286 | 4 | 94.500 | 96.200 | 2 | 0.00000 | 160 | 162 | 0 | 4000.00 | 0.00 |
| 162 | 0.835000 | 100.00 | 1.568 | 3 | 96.200 | 96.200 | 2 | 0.00000 | 161 | 47 | 1 | 4000.00 | 0.00 |
| 163 | 0.835000 | 10.00 | 3.338 | 4 | 94.500 | 91.750 | 2 | 0.00000 | 160 | 164 | 0 | 4000.00 | 0.00 |
| 164 | 0.835000 | 40.00 | 1.413 | 4 | 91.750 | 89.580 | 2 | 0.00000 | 163 | 165 | 0 | 4000.00 | 0.00 |
| 165 | 0.835000 | 25.00 | 3.071 | 4 | 89.580 | 89.580 | 2 | 0.00000 | 164 | 166 | 0 | 4000.00 | 0.00 |
| 166 | 0.835000 | 5.00 | 4.340 | 3 | 89.580 | 89.580 | 2 | 0.00000 | 165 | 167 | 0 | 4000.00 | 0.00 |
| 167 | 0.835000 | 5.00 | 1.000 | 16 | 89.580 | 89.580 | 2 | 0.00000 | 166 | 0 | 0 | 4000.00 | 0.00 |
| 168 | 0.835000 | 5.00 | 13.358 | 4 | 89.000 | 91.000 | 2 | 0.00000 | 141 | 169 | 0 | 4000.00 | 0.00 |
| 169 | 0.835000 | 35.00 | 2.002 | 3 | 91.000 | 91.000 | 2 | 0.00000 | 168 | 170 | 0 | 4000.00 | 0.00 |
| 170 | 0.835000 | 10.00 | 4.340 | 3 | 91.000 | 91.000 | 2 | 0.00000 | 169 | 171 | 0 | 4000.00 | 0.00 |
| 171 | 0.835000 | 75.00 | 1.312 | 4 | 91.000 | 91.000 | 2 | 0.00000 | 170 | 172 | 0 | 4000.00 | 0.00 |
| 172 | 0.835000 | 45.00 | 2.002 | 3 | 91.000 | 91.000 | 2 | 0.00000 | 171 | 173 | 0 | 4000.00 | 0.00 |
| 173 | 0.835000 | 5.00 | 3.338 | 4 | 91.000 | 91.000 | 2 | 0.00000 | 172 | 174 | 0 | 4000.00 | 0.00 |
| 174 | 0.835000 | 15.00 | 1.779 | 4 | 91.000 | 96.040 | 2 | 0.00000 | 173 | 175 | 0 | 4000.00 | 0.00 |
| 175 | 0.835000 | 15.00 | 2.559 | 4 | 96.040 | 96.000 | 2 | 0.00000 | 174 | 176 | 0 | 4000.00 | 0.00 |
| 176 | 0.835000 | 95.00 | 1.176 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 175 | 177 | 0 | 4000.00 | 0.00 |
| 177 | 0.835000 | 55.00 | 1.213 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 176 | 178 | 0 | 4000.00 | 0.00 |
| 178 | 0.835000 | 5.00 | 3.338 | 4 | 96.000 | 91.000 | 2 | 0.00000 | 177 | 179 | 0 | 4000.00 | 0.00 |
| 179 | 0.835000 | 50.00 | 1.795 | 4 | 91.000 | 93.000 | 2 | 0.00000 | 178 | 180 | 0 | 4000.00 | 0.00 |
| 180 | 0.835000 | 80.00 | 1.146 | 4 | 93.000 | 93.000 | 2 | 0.00000 | 179 | 181 | 0 | 4000.00 | 0.00 |
| 181 | 0.835000 | 25.00 | 3.472 | 3 | 93.000 | 93.000 | 2 | 0.00000 | 180 | 29 | 1 | 4000.00 | 0.00 |
| 182 | 0.336000 | 45.00 | 1.866 | 3 | 91.000 | 96.000 | 2 | 0.00000 | 169 | 183 | 0 | 4000.00 | 0.00 |
| 183 | 0.336000 | 120.00 | 1.482 | 4 | 96.000 | 149.000 | 2 | 0.00000 | 182 | 184 | 0 | 4000.00 | 0.00 |
| 184 | 0.256000 | 205.00 | 1.092 | 16 | 149.000 | 142.500 | 2 | 0.00000 | 183 | 0 | 0 | 4000.00 | 0.00 |
| 185 | 0.256000 | 60.00 | 1.674 | 16 | 96.000 | 59.000 | 2 | 0.00000 | 182 | 0 | 0 | 4000.00 | 0.00 |
| 186 | 0.336000 | 10.00 | 4.427 | 3 | 91.000 | 94.800 | 2 | 0.00000 | 170 | 187 | 0 | 4000.00 | 0.00 |
| 187 | 0.336000 | 55.00 | 1.586 | 3 | 94.800 | 113.000 | 2 | 0.00000 | 186 | 188 | 0 | 4000.00 | 0.00 |
| 188 | 0.336000 | 230.00 | 1.231 | 4 | 113.000 | 146.000 | 2 | 0.00000 | 187 | 189 | 0 | 4000.00 | 0.00 |
| 189 | 0.256000 | 105.00 | 1.111 | 16 | 146.000 | 143.000 | 2 | 0.00000 | 188 | 0 | 0 | 4000.00 | 0.00 |
| 190 | 0.256000 | 100.00 | 1.297 | 16 | 94.800 | 83.700 | 2 | 0.00000 | 186 | 0 | 0 | 4000.00 | 0.00 |
| 191 | 0.256000 | 75.00 | 1.416 | 16 | 113.000 | 107.000 | 2 | 0.00000 | 187 | 0 | 0 | 4000.00 | 0.00 |
| 192 | 0.336000 | 5.00 | 7.854 | 4 | 91.000 | 95.000 | 2 | 0.00000 | 172 | 193 | 0 | 4000.00 | 0.00 |
| 193 | 0.336000 | 240.00 | 1.316 | 4 | 95.000 | 150.000 | 2 | 0.00000 | 192 | 194 | 0 | 4000.00 | 0.00 |
| 194 | 0.256000 | 180.00 | 1.105 | 16 | 150.000 | 142.000 | 2 | 0.00000 | 193 | 0 | 0 | 4000.00 | 0.00 |
| 195 | 0.665000 | 15.00 | 4.015 | 4 | 96.500 | 96.500 | 2 | 0.00000 | 54 | 196 | 0 | 4000.00 | 0.00 |
| 196 | 0.665000 | 11.00 | 2.197 | 4 | 96.500 | 94.500 | 2 | 0.00000 | 195 | 197 | 0 | 4400.00 | 0.00 |
| 197 | 0.665000 | 20.00 | 1.658 | 4 | 94.500 | 96.600 | 2 | 0.00000 | 196 | 198 | 0 | 4000.00 | 0.00 |
| 198 | 0.665000 | 115.00 | 1.000 | 4 | 96.600 | 96.600 | 2 | 0.00000 | 197 | 199 | 0 | 4000.00 | 0.00 |
| 199 | 0.665000 | 220.00 | 1.120 | 3 | 96.600 | 94.000 | 2 | 0.00000 | 198 | 200 | 0 | 4000.00 | 0.00 |
| 200 | 0.665000 | 20.00 | 2.862 | 4 | 94.000 | 94.750 | 2 | 0.00000 | 199 | 201 | 0 | 4000.00 | 0.00 |
| 201 | 0.665000 | 20.00 | 1.000 | 4 | 94.750 | 94.750 | 2 | 0.00000 | 200 | 202 | 0 | 4000.00 | 0.00 |
| 202 | 0.665000 | 20.00 | 2.197 | 4 | 94.750 | 94.750 | 2 | 0.00000 | 201 | 203 | 0 | 4000.00 | 0.00 |
| 203 | 0.665000 | 15.00 | 1.000 | 4 | 94.750 | 94.750 | 2 | 0.00000 | 202 | 204 | 0 | 4000.00 | 0.00 |
| 204 | 0.665000 | 30.00 | 1.973 | 3 | 94.750 | 84.100 | 2 | 0.00000 | 203 | 205 | 0 | 4000.00 | 0.00 |
| 205 | 0.665000 | 15.00 | 1.621 | 4 | 84.100 | 69.500 | 2 | 0.00000 | 204 | 206 | 0 | 4000.00 | 0.00 |
| 206 | 0.665000 | 15.00 | 1.887 | 3 | 69.500 | 69.500 | 2 | 0.00000 | 205 | 207 | 0 | 4000.00 | 0.00 |
| 207 | 0.665000 | 20.00 | 1.465 | 4 | 69.500 | 69.500 | 2 | 0.00000 | 206 | 208 | 0 | 4000.00 | 0.00 |
| 208 | 0.665000 | 20.00 | 4.125 | 3 | 69.500 | 61.750 | 2 | 0.00000 | 207 | 209 | 0 | 4000.00 | 0.00 |
| 209 | 0.665000 | 70.00 | 1.454 | 4 | 61.750 | 62.750 | 2 | 0.00000 | 208 | 210 | 0 | 4000.00 | 0.00 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 210 | 0.665000 | 5.00 | 6.320 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 209 | 211 | 0 | 4000.00 | 0.00 |
| 211 | 0.665000 | 50.00 | 1.293 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 210 | 212 | 0 | 4000.00 | 0.00 |
| 212 | 0.665000 | 20.00 | 2.330 | 3 | 62.750 | 62.750 | 2 | 0.00000 | 211 | 213 | 0 | 4000.00 | 0.00 |
| 213 | 0.665000 | 25.00 | 2.277 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 212 | 214 | 0 | 4000.00 | 0.00 |
| 214 | 0.665000 | 20.00 | 1.665 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 213 | 215 | 0 | 4000.00 | 0.00 |
| 215 | 0.665000 | 45.00 | 1.414 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 214 | 216 | 0 | 4000.00 | 0.00 |
| 216 | 0.665000 | 20.00 | 1.665 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 215 | 217 | 0 | 4000.00 | 0.00 |
| 217 | 0.665000 | 85.00 | 2.033 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 216 | 218 | 0 | 4000.00 | 0.00 |
| 218 | 0.665000 | 5.00 | 3.660 | 3 | 62.750 | 62.750 | 2 | 0.00000 | 217 | 219 | 0 | 4000.00 | 0.00 |
| 219 | 0.665000 | 25.00 | 2.649 | 3 | 62.750 | 66.000 | 2 | 0.00000 | 218 | 220 | 0 | 4000.00 | 0.00 |
| 220 | 0.665000 | 30.00 | 1.749 | 4 | 66.000 | 96.000 | 2 | 0.00000 | 219 | 221 | 0 | 4000.00 | 0.00 |
| 221 | 0.665000 | 20.00 | 1.329 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 220 | 222 | 0 | 4000.00 | 0.00 |
| 222 | 0.665000 | 5.00 | 4.977 | 4 | 96.000 | 94.400 | 2 | 0.00000 | 221 | 223 | 0 | 4000.00 | 0.00 |
| 223 | 0.665000 | 95.00 | 1.139 | 4 | 94.400 | 97.000 | 2 | 0.00000 | 222 | 224 | 0 | 4000.00 | 0.00 |
| 224 | 0.665000 | 35.00 | 1.646 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 223 | 225 | 0 | 4000.00 | 0.00 |
| 225 | 0.665000 | 65.00 | 1.614 | 4 | 97.000 | 96.500 | 2 | 0.00000 | 224 | 226 | 0 | 4000.00 | 0.00 |
| 226 | 0.665000 | 35.00 | 1.000 | 4 | 96.500 | 96.500 | 2 | 0.00000 | 225 | 227 | 0 | 4000.00 | 0.00 |
| 227 | 0.665000 | 35.00 | 1.830 | 4 | 96.500 | 94.200 | 2 | 0.00000 | 226 | 228 | 0 | 4000.00 | 0.00 |
| 228 | 0.665000 | 35.00 | 1.266 | 4 | 94.200 | 96.200 | 2 | 0.00000 | 227 | 229 | 0 | 4000.00 | 0.00 |
| 229 | 0.665000 | 120.00 | 1.377 | 3 | 96.200 | 95.800 | 2 | 0.00000 | 228 | 69 | 1 | 4000.00 | 0.00 |
| 230 | 0.665000 | 10.00 | 6.453 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 12 | 231 | 0 | 4000.00 | 0.00 |
| 231 | 0.665000 | 25.00 | 1.372 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 230 | 232 | 0 | 4000.00 | 0.00 |
| 232 | 0.665000 | 150.00 | 1.062 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 231 | 233 | 0 | 4000.00 | 0.00 |
| 233 | 0.665000 | 135.00 | 1.069 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 232 | 234 | 0 | 4000.00 | 0.00 |
| 234 | 0.665000 | 45.00 | 1.146 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 233 | 235 | 0 | 4000.00 | 0.00 |
| 235 | 0.665000 | 20.00 | 1.658 | 4 | 96.900 | 95.000 | 2 | 0.00000 | 234 | 236 | 0 | 4000.00 | 0.00 |
| 236 | 0.665000 | 35.00 | 1.564 | 4 | 95.000 | 95.500 | 2 | 0.00000 | 235 | 237 | 0 | 4000.00 | 0.00 |
| 237 | 0.665000 | 15.00 | 1.621 | 4 | 95.500 | 96.000 | 2 | 0.00000 | 236 | 238 | 0 | 4000.00 | 0.00 |
| 238 | 0.665000 | 30.00 | 1.621 | 4 | 96.000 | 72.000 | 2 | 0.00000 | 237 | 239 | 0 | 4000.00 | 0.00 |
| 239 | 0.665000 | 5.00 | 3.660 | 3 | 72.000 | 67.000 | 2 | 0.00000 | 238 | 240 | 0 | 4000.00 | 0.00 |
| 240 | 0.665000 | 75.00 | 1.497 | 4 | 67.000 | 64.250 | 2 | 0.00000 | 239 | 241 | 0 | 4000.00 | 0.00 |
| 241 | 0.665000 | 35.00 | 1.000 | 4 | 64.250 | 64.250 | 2 | 0.00000 | 240 | 242 | 0 | 4000.00 | 0.00 |
| 242 | 0.665000 | 65.00 | 1.286 | 4 | 64.250 | 61.750 | 2 | 0.00000 | 241 | 243 | 0 | 4000.00 | 0.00 |
| 243 | 0.665000 | 20.00 | 2.995 | 3 | 61.750 | 61.750 | 2 | 0.00000 | 242 | 244 | 0 | 4000.00 | 0.00 |
| 244 | 0.665000 | 5.00 | 2.064 | 4 | 61.750 | 61.750 | 2 | 0.00000 | 243 | 245 | 0 | 4000.00 | 0.00 |
| 245 | 0.665000 | 20.00 | 2.260 | 4 | 61.750 | 62.750 | 2 | 0.00000 | 244 | 246 | 0 | 4000.00 | 0.00 |
| 246 | 0.665000 | 15.00 | 1.887 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 245 | 247 | 0 | 4000.00 | 0.00 |
| 247 | 0.665000 | 10.00 | 2.330 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 246 | 248 | 0 | 4000.00 | 0.00 |
| 248 | 0.665000 | 15.00 | 1.887 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 247 | 249 | 0 | 4000.00 | 0.00 |
| 249 | 0.665000 | 35.00 | 1.380 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 248 | 250 | 0 | 4000.00 | 0.00 |
| 250 | 0.665000 | 100.00 | 1.000 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 249 | 251 | 0 | 4000.00 | 0.00 |
| 251 | 0.665000 | 10.00 | 3.647 | 4 | 62.750 | 62.500 | 2 | 0.00000 | 250 | 252 | 0 | 4000.00 | 0.00 |
| 252 | 0.665000 | 30.00 | 1.749 | 4 | 62.500 | 67.900 | 2 | 0.00000 | 251 | 253 | 0 | 4000.00 | 0.00 |
| 253 | 0.665000 | 30.00 | 1.310 | 4 | 67.900 | 96.000 | 2 | 0.00000 | 252 | 254 | 0 | 4000.00 | 0.00 |
| 254 | 0.665000 | 20.00 | 2.317 | 4 | 96.000 | 97.000 | 2 | 0.00000 | 253 | 255 | 0 | 4000.00 | 0.00 |
| 255 | 0.665000 | 145.00 | 1.000 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 254 | 256 | 0 | 4000.00 | 0.00 |
| 256 | 0.665000 | 35.00 | 1.752 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 255 | 257 | 0 | 4000.00 | 0.00 |
| 257 | 0.665000 | 60.00 | 1.110 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 256 | 258 | 0 | 4000.00 | 0.00 |
| 258 | 0.665000 | 40.00 | 1.165 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 257 | 259 | 0 | 4000.00 | 0.00 |
| 259 | 0.665000 | 5.00 | 3.660 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 258 | 260 | 0 | 4000.00 | 0.00 |
| 260 | 0.665000 | 45.00 | 1.118 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 259 | 261 | 0 | 4000.00 | 0.00 |
| 261 | 0.665000 | 15.00 | 4.538 | 3 | 97.000 | 95.500 | 2 | 0.00000 | 260 | 71 | 1 | 4000.00 | 0.00 |
| 262 | 0.505000 | 20.00 | 2.315 | 4 | 61.750 | 63.000 | 2 | 0.00000 | 243 | 263 | 0 | 4000.00 | 0.00 |
| 263 | 0.505000 | 10.00 | 3.318 | 4 | 63.000 | 56.000 | 2 | 0.00000 | 262 | 264 | 0 | 4000.00 | 0.00 |
| 264 | 0.505000 | 30.00 | 2.380 | 4 | 56.000 | 61.750 | 2 | 0.00000 | 263 | 265 | 0 | 4000.00 | 0.00 |
| 265 | 0.505000 | 5.00 | 3.020 | 3 | 61.750 | 62.900 | 2 | 0.00000 | 264 | 266 | 0 | 4000.00 | 0.00 |
| 266 | 0.505000 | 5.00 | 10.494 | 4 | 62.900 | 67.000 | 2 | 0.00000 | 265 | 267 | 0 | 4000.00 | 0.00 |
| 267 | 0.505000 | 5.00 | 3.828 | 4 | 67.000 | 67.000 | 2 | 0.00000 | 266 | 268 | 0 | 4000.00 | 0.00 |
| 268 | 0.505000 | 65.00 | 1.155 | 3 | 67.000 | 67.000 | 2 | 0.00000 | 267 | 269 | 0 | 4000.00 | 0.00 |
| 269 | 0.505000 | 15.00 | 1.000 | 4 | 67.000 | 67.000 | 2 | 0.00000 | 268 | 270 | 0 | 4000.00 | 0.00 |
| 270 | 0.505000 | 35.00 | 1.866 | 3 | 67.000 | 67.000 | 2 | 0.00000 | 269 | 271 | 0 | 4000.00 | 0.00 |
| 271 | 0.256000 | 25.00 | 1.143 | 4 | 67.000 | 67.000 | 2 | 0.00000 | 270 | 272 | 0 | 4000.00 | 0.00 |
| 272 | 0.256000 | 10.00 | 3.099 | 4 | 67.000 | 65.000 | 2 | 0.00000 | 271 | 273 | 0 | 4000.00 | 0.00 |
| 273 | 0.256000 | 55.00 | 1.289 | 16 | 65.000 | 94.500 | 2 | 0.00000 | 272 | 0 | 0 | 4000.00 | 0.00 |
| 274 | 0.505000 | 15.00 | 1.000 | 3 | 62.900 | 63.900 | 2 | 0.00000 | 265 | 275 | 0 | 4000.00 | 0.00 |
| 275 | 0.505000 | 15.00 | 1.741 | 3 | 63.900 | 68.200 | 2 | 0.00000 | 274 | 276 | 0 | 4000.00 | 0.00 |
| 276 | 0.336000 | 135.00 | 1.170 | 4 | 68.200 | 71.500 | 2 | 0.00000 | 275 | 277 | 0 | 4000.00 | 0.00 |
| 277 | 0.336000 | 40.00 | 1.773 | 16 | 71.500 | 61.500 | 2 | 0.00000 | 276 | 0 | 0 | 4000.00 | 0.00 |
| 278 | 0.336000 | 20.00 | 2.518 | 16 | 68.200 | 61.500 | 2 | 0.00000 | 275 | 0 | 0 | 4000.00 | 0.00 |
| 279 | 0.505000 | 85.00 | 2.305 | 4 | 69.500 | 68.750 | 2 | 0.00000 | 206 | 280 | 0 | 4000.00 | 0.00 |
| 280 | 0.505000 | 10.00 | 2.010 | 3 | 68.750 | 68.750 | 2 | 0.00000 | 279 | 281 | 0 | 4000.00 | 0.00 |
| 281 | 0.505000 | 45.00 | 1.382 | 4 | 68.750 | 68.750 | 2 | 0.00000 | 280 | 282 | 0 | 4000.00 | 0.00 |
| 282 | 0.505000 | 10.00 | 1.707 | 4 | 68.750 | 68.750 | 2 | 0.00000 | 281 | 283 | 0 | 4000.00 | 0.00 |
| 283 | 0.505000 | 70.00 | 1.447 | 3 | 68.750 | 68.750 | 2 | 0.00000 | 282 | 284 | 0 | 4000.00 | 0.00 |
| 284 | 0.505000 | 20.00 | 1.354 | 4 | 68.750 | 68.750 | 2 | 0.00000 | 283 | 285 | 0 | 4000.00 | 0.00 |
| 285 | 0.505000 | 5.00 | 2.414 | 4 | 68.750 | 65.500 | 2 | 0.00000 | 284 | 286 | 0 | 4000.00 | 0.00 |
| 286 | 0.505000 | 25.00 | 1.404 | 3 | 65.500 | 65.500 | 2 | 0.00000 | 285 | 287 | 0 | 4000.00 | 0.00 |
| 287 | 0.336000 | 65.00 | 1.868 | 4 | 65.500 | 113.000 | 2 | 0.00000 | 286 | 288 | 0 | 4000.00 | 0.00 |

# CALCULATION SHEET

| | | | |
|---|---|---|---|
| Project: | HOPE CREEK GENERATING STATION | Job Number: | 8038 |
| Calc No. | 8038-P0004 | Sheet No. | 241 |
| By: | A. Arastu Date: 9/14/18 | Rev. No. | 1 |
| Subject: | Water Hammer Analysis of the HCGS Fire Protection System | | |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 288 | 0.336000 | 35.00 | 2.150 | 3 | 113.000 | 147.000 | 2 | 0.00000 | 287 289 | 0 | 4000.00 | 0.00 |
| 289 | 0.256000 | 55.00 | 1.419 | 4 | 147.000 | 178.000 | 2 | 0.00000 | 288 290 | 0 | 4000.00 | 0.00 |
| 290 | 0.256000 | 10.00 | 1.000 | 16 | 178.000 | 178.000 | 2 | 0.00000 | 289 0 | 0 | 4000.00 | 0.00 |
| 291 | 0.256000 | 35.00 | 1.247 | 16 | 147.000 | 159.750 | 2 | 0.00000 | 288 0 | 0 | 4000.00 | 0.00 |
| 292 | 0.256000 | 115.00 | 1.686 | 16 | 67.000 | 128.500 | 2 | 0.00000 | 239 0 | 0 | 4000.00 | 0.00 |
| 293 | 0.336000 | 5.00 | 7.451 | 4 | 65.710 | 62.500 | 2 | 0.00000 | 219 294 | 0 | 4000.00 | 0.00 |
| 294 | 0.336000 | 60.00 | 1.112 | 4 | 62.500 | 62.500 | 2 | 0.00000 | 293 295 | 0 | 4000.00 | 0.00 |
| 295 | 0.336000 | 40.00 | 1.907 | 4 | 62.500 | 93.500 | 2 | 0.00000 | 294 296 | 0 | 4000.00 | 0.00 |
| 296 | 0.336000 | 45.00 | 1.729 | 3 | 93.500 | 126.800 | 2 | 0.00000 | 295 297 | 0 | 4000.00 | 0.00 |
| 297 | 0.336000 | 45.00 | 1.149 | 3 | 126.800 | 142.000 | 2 | 0.00000 | 296 298 | 0 | 4000.00 | 0.00 |
| 298 | 0.336000 | 40.00 | 1.571 | 3 | 142.000 | 154.500 | 2 | 0.00000 | 297 299 | 0 | 4000.00 | 0.00 |
| 299 | 0.256000 | 95.00 | 1.107 | 16 | 154.500 | 155.500 | 2 | 0.00000 | 298 0 | 0 | 4000.00 | 0.00 |
| 300 | 0.256000 | 100.00 | 1.623 | 16 | 142.000 | 143.000 | 2 | 0.00000 | 297 0 | 0 | 4000.00 | 0.00 |
| 301 | 0.336000 | 25.00 | 2.452 | 3 | 154.500 | 156.300 | 2 | 0.00000 | 298 302 | 0 | 4000.00 | 0.00 |
| 302 | 0.336000 | 45.00 | 1.893 | 4 | 156.300 | 172.300 | 2 | 0.00000 | 301 303 | 0 | 4000.00 | 0.00 |
| 303 | 0.256000 | 55.00 | 1.304 | 4 | 172.300 | 178.000 | 2 | 0.00000 | 302 304 | 0 | 4000.00 | 0.00 |
| 304 | 0.256000 | 10.00 | 1.000 | 16 | 178.000 | 178.000 | 2 | 0.00000 | 303 0 | 0 | 4000.00 | 0.00 |
| 305 | 0.336000 | 5.00 | 6.376 | 4 | 156.300 | 156.300 | 2 | 0.00000 | 301 306 | 0 | 4000.00 | 0.00 |
| 306 | 0.256000 | 130.00 | 1.405 | 16 | 156.300 | 156.300 | 2 | 0.00000 | 305 0 | 0 | 4000.00 | 0.00 |
| 307 | 0.336000 | 105.00 | 1.914 | 4 | 126.800 | 155.000 | 2 | 0.00000 | 296 308 | 0 | 4000.00 | 0.00 |
| 308 | 0.256000 | 130.00 | 1.287 | 19 | 155.000 | 206.300 | 2 | 0.00000 | 307 309 | 0 | 4000.00 | 0.00 |
| 309 | 0.256000 | 20.00 | 1.000 | 16 | 206.300 | 203.000 | 2 | 0.00000 | 308 0 | 0 | 4000.00 | 0.00 |
| 310 | 0.336000 | 10.00 | 5.301 | 3 | 62.750 | 71.500 | 2 | 0.00000 | 212 311 | 0 | 4000.00 | 0.00 |
| 311 | 0.336000 | 65.00 | 1.424 | 3 | 71.500 | 133.500 | 2 | 0.00000 | 310 312 | 0 | 4000.00 | 0.00 |
| 312 | 0.256000 | 15.00 | 1.439 | 4 | 133.500 | 147.300 | 2 | 0.00000 | 311 313 | 0 | 4000.00 | 0.00 |
| 313 | 0.256000 | 60.00 | 1.281 | 4 | 147.300 | 165.100 | 2 | 0.00000 | 312 314 | 0 | 4000.00 | 0.00 |
| 314 | 0.256000 | 30.00 | 1.527 | 16 | 165.100 | 160.000 | 2 | 0.00000 | 313 0 | 0 | 4000.00 | 0.00 |
| 315 | 0.256000 | 25.00 | 1.407 | 16 | 71.500 | 81.500 | 2 | 0.00000 | 310 0 | 0 | 4000.00 | 0.00 |
| 316 | 0.336000 | 10.00 | 3.688 | 4 | 133.500 | 133.500 | 2 | 0.00000 | 311 317 | 0 | 4000.00 | 0.00 |
| 317 | 0.256000 | 80.00 | 1.717 | 16 | 133.500 | 141.500 | 2 | 0.00000 | 316 0 | 0 | 4000.00 | 0.00 |
| 318 | 0.336000 | 10.00 | 6.443 | 4 | 68.750 | 66.700 | 2 | 0.00000 | 283 319 | 0 | 4000.00 | 0.00 |
| 319 | 0.336000 | 100.00 | 1.672 | 3 | 66.700 | 120.000 | 2 | 0.00000 | 318 320 | 0 | 4000.00 | 0.00 |
| 320 | 0.336000 | 15.00 | 2.792 | 3 | 120.000 | 132.000 | 2 | 0.00000 | 319 321 | 0 | 4000.00 | 0.00 |
| 321 | 0.336000 | 15.00 | 1.448 | 4 | 132.000 | 146.000 | 2 | 0.00000 | 320 322 | 0 | 4000.00 | 0.00 |
| 322 | 0.256000 | 55.00 | 1.604 | 16 | 146.000 | 163.500 | 2 | 0.00000 | 321 0 | 0 | 4000.00 | 0.00 |
| 323 | 0.256000 | 25.00 | 1.492 | 16 | 120.000 | 128.500 | 2 | 0.00000 | 319 0 | 0 | 4000.00 | 0.00 |
| 324 | 0.336000 | 45.00 | 1.806 | 3 | 132.000 | 132.000 | 2 | 0.00000 | 320 325 | 0 | 4000.00 | 0.00 |
| 325 | 0.256000 | 30.00 | 2.263 | 16 | 132.000 | 157.500 | 2 | 0.00000 | 324 0 | 0 | 4000.00 | 0.00 |
| 326 | 0.256000 | 35.00 | 1.188 | 16 | 132.000 | 141.500 | 2 | 0.00000 | 324 0 | 0 | 4000.00 | 0.00 |
| 327 | 0.336000 | 30.00 | 2.456 | 4 | 63.900 | 68.100 | 2 | 0.00000 | 274 328 | 0 | 4000.00 | 0.00 |
| 328 | 0.336000 | 90.00 | 1.939 | 3 | 68.100 | 134.000 | 2 | 0.00000 | 327 329 | 0 | 4000.00 | 0.00 |
| 329 | 0.336000 | 30.00 | 1.694 | 4 | 134.000 | 132.000 | 2 | 0.00000 | 328 330 | 0 | 4000.00 | 0.00 |
| 330 | 0.336000 | 15.00 | 1.448 | 3 | 132.000 | 132.000 | 2 | 0.00000 | 329 331 | 0 | 4000.00 | 0.00 |
| 331 | 0.256000 | 90.00 | 1.181 | 16 | 132.000 | 141.500 | 2 | 0.00000 | 330 0 | 0 | 4000.00 | 0.00 |
| 332 | 0.256000 | 15.00 | 2.980 | 16 | 132.000 | 141.500 | 2 | 0.00000 | 330 0 | 0 | 4000.00 | 0.00 |
| 333 | 0.336000 | 15.00 | 3.554 | 4 | 134.000 | 147.000 | 2 | 0.00000 | 328 334 | 0 | 4000.00 | 0.00 |
| 334 | 0.256000 | 15.00 | 1.451 | 19 | 147.000 | 159.750 | 2 | 0.00000 | 333 335 | 0 | 4000.00 | 0.00 |
| 335 | 0.256000 | 50.00 | 1.000 | 16 | 159.750 | 159.750 | 2 | 0.00000 | 334 0 | 0 | 4000.00 | 0.00 |
| 336 | 0.336000 | 10.00 | 6.712 | 4 | 67.000 | 65.000 | 2 | 0.00000 | 268 337 | 0 | 4000.00 | 0.00 |
| 337 | 0.336000 | 90.00 | 1.538 | 3 | 65.000 | 115.200 | 2 | 0.00000 | 336 338 | 0 | 4000.00 | 0.00 |
| 338 | 0.336000 | 40.00 | 1.403 | 3 | 115.200 | 133.800 | 2 | 0.00000 | 337 339 | 0 | 4000.00 | 0.00 |
| 339 | 0.336000 | 50.00 | 2.423 | 3 | 133.800 | 133.300 | 2 | 0.00000 | 338 340 | 0 | 4000.00 | 0.00 |
| 340 | 0.336000 | 10.00 | 3.016 | 3 | 133.300 | 133.300 | 2 | 0.00000 | 339 341 | 0 | 4000.00 | 0.00 |
| 341 | 0.256000 | 45.00 | 1.340 | 16 | 133.300 | 141.500 | 2 | 0.00000 | 340 0 | 0 | 4000.00 | 0.00 |
| 342 | 0.256000 | 15.00 | 1.678 | 16 | 133.300 | 141.500 | 2 | 0.00000 | 340 0 | 0 | 4000.00 | 0.00 |
| 343 | 0.256000 | 10.00 | 1.300 | 16 | 133.800 | 141.500 | 2 | 0.00000 | 338 0 | 0 | 4000.00 | 0.00 |
| 344 | 0.256000 | 35.00 | 1.644 | 16 | 133.300 | 128.500 | 2 | 0.00000 | 339 0 | 0 | 4000.00 | 0.00 |
| 345 | 0.256000 | 5.00 | 5.813 | 3 | 115.200 | 115.200 | 2 | 0.00000 | 337 346 | 0 | 4000.00 | 0.00 |
| 346 | 0.256000 | 80.00 | 1.288 | 3 | 115.200 | 116.500 | 2 | 0.00000 | 345 347 | 0 | 4000.00 | 0.00 |
| 347 | 0.256000 | 55.00 | 1.726 | 16 | 116.500 | 141.500 | 2 | 0.00000 | 346 0 | 0 | 4000.00 | 0.00 |
| 348 | 0.256000 | 15.00 | 2.601 | 16 | 116.500 | 128.500 | 2 | 0.00000 | 346 0 | 0 | 4000.00 | 0.00 |
| 349 | 0.256000 | 50.00 | 1.594 | 16 | 115.200 | 106.500 | 2 | 0.00000 | 345 0 | 0 | 4000.00 | 0.00 |
| 350 | 0.505000 | 175.00 | 1.669 | 4 | 68.750 | 140.000 | 2 | 0.00000 | 280 351 | 0 | 4000.00 | 0.00 |
| 351 | 0.336000 | 50.00 | 1.000 | 16 | 140.000 | 138.000 | 2 | 0.00000 | 350 0 | 0 | 4000.00 | 0.00 |
| 352 | 0.336000 | 10.00 | 4.226 | 4 | 67.000 | 65.000 | 2 | 0.00000 | 270 353 | 0 | 4000.00 | 0.00 |
| 353 | 0.336000 | 80.00 | 1.285 | 4 | 65.000 | 105.700 | 2 | 0.00000 | 352 354 | 0 | 4000.00 | 0.00 |
| 354 | 0.336000 | 80.00 | 1.630 | 3 | 105.700 | 130.500 | 2 | 0.00000 | 353 355 | 0 | 4000.00 | 0.00 |
| 355 | 0.256000 | 30.00 | 1.458 | 4 | 130.500 | 147.500 | 2 | 0.00000 | 354 356 | 0 | 4000.00 | 0.00 |
| 356 | 0.256000 | 25.00 | 1.225 | 4 | 147.500 | 141.500 | 2 | 0.00000 | 355 357 | 0 | 4000.00 | 0.00 |
| 357 | 0.162000 | 50.00 | 1.843 | 16 | 141.500 | 141.500 | 2 | 0.00000 | 356 0 | 0 | 4000.00 | 0.00 |
| 358 | 0.336000 | 5.00 | 5.570 | 4 | 130.500 | 130.500 | 2 | 0.00000 | 354 359 | 0 | 4000.00 | 0.00 |
| 359 | 0.162000 | 35.00 | 1.759 | 16 | 130.500 | 132.200 | 2 | 0.00000 | 358 0 | 0 | 4000.00 | 0.00 |
| 360 | 0.336000 | 45.00 | 2.343 | 4 | 94.500 | 115.800 | 2 | 0.00000 | 152 361 | 0 | 4000.00 | 0.00 |
| 361 | 0.336000 | 15.00 | 1.448 | 3 | 115.800 | 130.600 | 2 | 0.00000 | 360 362 | 0 | 4000.00 | 0.00 |
| 362 | 0.256000 | 50.00 | 1.510 | 19 | 130.600 | 176.000 | 2 | 0.00000 | 361 363 | 0 | 4000.00 | 0.00 |
| 363 | 0.256000 | 15.00 | 1.000 | 16 | 176.000 | 176.000 | 2 | 0.00000 | 362 0 | 0 | 4000.00 | 0.00 |
| 364 | 0.362000 | 145.00 | 1.539 | 16 | 130.600 | 129.600 | 2 | 0.00000 | 361 0 | 0 | 4000.00 | 0.00 |
| 365 | 0.336000 | 65.00 | 1.940 | 3 | 92.000 | 118.400 | 2 | 0.00000 | 145 366 | 0 | 4000.00 | 0.00 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 366 | 0.336000 | 20.00 | 1.544 | 3 | 118.400 | 118.400 | 2 | 0.00000 | 365 | 367 | 0 | 4000.00 | 0.00 |
| 367 | 0.256000 | 15.00 | 1.239 | 16 | 118.400 | 115.000 | 2 | 0.00000 | 366 | 0 | 0 | 4000.00 | 0.00 |
| 368 | 0.256000 | 20.00 | 1.947 | 16 | 118.400 | 127.000 | 2 | 0.00000 | 365 | 0 | 0 | 4000.00 | 0.00 |
| 369 | 0.336000 | 30.00 | 2.275 | 4 | 118.400 | 133.500 | 2 | 0.00000 | 366 | 370 | 0 | 4000.00 | 0.00 |
| 370 | 0.256000 | 35.00 | 1.232 | 3 | 133.500 | 166.000 | 2 | 0.00000 | 369 | 371 | 0 | 4000.00 | 0.00 |
| 371 | 0.256000 | 10.00 | 1.000 | 19 | 166.000 | 176.000 | 2 | 0.00000 | 370 | 372 | 0 | 4000.00 | 0.00 |
| 372 | 0.256000 | 20.00 | 2.970 | 16 | 176.000 | 175.000 | 2 | 0.00000 | 371 | 0 | 0 | 4000.00 | 0.00 |
| 373 | 0.256000 | 55.00 | 1.521 | 16 | 166.000 | 141.000 | 2 | 0.00000 | 370 | 0 | 0 | 4000.00 | 0.00 |
| 374 | 0.336000 | 5.00 | 6.914 | 3 | 92.000 | 94.200 | 2 | 0.00000 | 144 | 375 | 0 | 4000.00 | 0.00 |
| 375 | 0.336000 | 50.00 | 1.605 | 3 | 94.200 | 113.250 | 2 | 0.00000 | 374 | 376 | 0 | 4000.00 | 0.00 |
| 376 | 0.256000 | 30.00 | 1.100 | 16 | 113.250 | 141.750 | 2 | 0.00000 | 375 | 0 | 0 | 4000.00 | 0.00 |
| 377 | 0.256000 | 30.00 | 1.751 | 16 | 94.200 | 74.000 | 2 | 0.00000 | 374 | 0 | 0 | 4000.00 | 0.00 |
| 378 | 0.256000 | 20.00 | 2.380 | 16 | 113.300 | 111.000 | 2 | 0.00000 | 375 | 0 | 0 | 4000.00 | 0.00 |
| 379 | 0.336000 | 10.00 | 4.898 | 4 | 89.000 | 94.330 | 2 | 0.00000 | 137 | 380 | 0 | 4000.00 | 0.00 |
| 380 | 0.336000 | 5.00 | 2.344 | 3 | 94.330 | 95.000 | 2 | 0.00000 | 379 | 381 | 0 | 4000.00 | 0.00 |
| 381 | 0.336000 | 100.00 | 1.322 | 4 | 95.000 | 130.700 | 2 | 0.00000 | 380 | 382 | 0 | 4000.00 | 0.00 |
| 382 | 0.256000 | 65.00 | 1.598 | 19 | 130.700 | 176.000 | 2 | 0.00000 | 381 | 383 | 0 | 4000.00 | 0.00 |
| 383 | 0.256000 | 20.00 | 1.000 | 16 | 176.000 | 175.000 | 2 | 0.00000 | 382 | 0 | 0 | 4000.00 | 0.00 |
| 384 | 0.336000 | 50.00 | 1.859 | 3 | 95.000 | 96.500 | 2 | 0.00000 | 380 | 385 | 0 | 4000.00 | 0.00 |
| 385 | 0.256000 | 75.00 | 1.252 | 3 | 96.500 | 98.000 | 2 | 0.00000 | 384 | 386 | 0 | 4000.00 | 0.00 |
| 386 | 0.256000 | 40.00 | 1.269 | 16 | 98.000 | 71.000 | 2 | 0.00000 | 385 | 0 | 0 | 4000.00 | 0.00 |
| 387 | 0.256000 | 15.00 | 2.741 | 16 | 96.500 | 103.000 | 2 | 0.00000 | 384 | 0 | 0 | 4000.00 | 0.00 |
| 388 | 0.256000 | 40.00 | 1.922 | 16 | 98.000 | 94.500 | 2 | 0.00000 | 385 | 0 | 0 | 4000.00 | 0.00 |
| 389 | 0.336000 | 45.00 | 1.567 | 3 | 89.000 | 127.750 | 2 | 0.00000 | 135 | 390 | 0 | 4000.00 | 0.00 |
| 390 | 0.256000 | 20.00 | 1.688 | 16 | 127.750 | 141.750 | 2 | 0.00000 | 389 | 0 | 0 | 4000.00 | 0.00 |
| 391 | 0.256000 | 110.00 | 1.335 | 16 | 127.750 | 141.750 | 2 | 0.00000 | 389 | 0 | 0 | 4000.00 | 0.00 |
| 392 | 0.336000 | 5.00 | 7.854 | 3 | 94.500 | 96.800 | 2 | 0.00000 | 155 | 393 | 0 | 4000.00 | 0.00 |
| 393 | 0.256000 | 215.00 | 1.316 | 16 | 96.800 | 65.000 | 2 | 0.00000 | 392 | 0 | 0 | 4000.00 | 0.00 |
| 394 | 0.256000 | 125.00 | 1.470 | 16 | 96.800 | 141.750 | 2 | 0.00000 | 392 | 0 | 0 | 4000.00 | 0.00 |
| 395 | 0.336000 | 150.00 | 1.528 | 3 | 94.500 | 130.400 | 2 | 0.00000 | 156 | 396 | 0 | 4000.00 | 0.00 |
| 396 | 0.256000 | 155.00 | 1.280 | 19 | 130.400 | 182.000 | 2 | 0.00000 | 395 | 397 | 0 | 4000.00 | 0.00 |
| 397 | 0.256000 | 30.00 | 1.478 | 16 | 182.000 | 179.000 | 2 | 0.00000 | 396 | 0 | 0 | 4000.00 | 0.00 |
| 398 | 0.256000 | 40.00 | 1.653 | 16 | 130.400 | 141.750 | 2 | 0.00000 | 395 | 0 | 0 | 4000.00 | 0.00 |
| 399 | 0.505000 | 120.00 | 1.538 | 3 | 94.500 | 90.500 | 2 | 0.00000 | 158 | 400 | 0 | 4000.00 | 0.00 |
| 400 | 0.336000 | 5.00 | 8.007 | 4 | 90.500 | 90.500 | 2 | 0.00000 | 399 | 401 | 0 | 4000.00 | 0.00 |
| 401 | 0.256000 | 60.00 | 1.349 | 16 | 90.500 | 141.750 | 2 | 0.00000 | 400 | 0 | 0 | 4000.00 | 0.00 |
| 402 | 0.336000 | 130.00 | 1.496 | 3 | 90.500 | 65.300 | 2 | 0.00000 | 399 | 403 | 0 | 4000.00 | 0.00 |
| 403 | 0.336000 | 50.00 | 1.228 | 4 | 65.300 | 94.700 | 2 | 0.00000 | 402 | 404 | 0 | 4000.00 | 0.00 |
| 404 | 0.256000 | 55.00 | 1.315 | 16 | 94.700 | 141.750 | 2 | 0.00000 | 403 | 0 | 0 | 4000.00 | 0.00 |
| 405 | 0.336000 | 40.00 | 2.260 | 3 | 65.300 | 77.500 | 2 | 0.00000 | 402 | 406 | 0 | 4000.00 | 0.00 |
| 406 | 0.256000 | 30.00 | 1.458 | 16 | 77.500 | 103.500 | 2 | 0.00000 | 405 | 0 | 0 | 4000.00 | 0.00 |
| 407 | 0.256000 | 125.00 | 1.180 | 16 | 77.500 | 75.000 | 2 | 0.00000 | 405 | 0 | 0 | 4000.00 | 0.00 |
| 408 | 0.336000 | 135.00 | 1.552 | 4 | 79.000 | 142.000 | 2 | 0.00000 | 139 | 409 | 0 | 4000.00 | 0.00 |
| 409 | 0.336000 | 20.00 | 1.000 | 16 | 142.000 | 141.750 | 2 | 0.00000 | 408 | 0 | 0 | 4000.00 | 0.00 |
| 410 | 0.256000 | 95.00 | 1.334 | 19 | 96.200 | 174.000 | 2 | 0.00000 | 150 | 411 | 0 | 4000.00 | 0.00 |
| 411 | 0.256000 | 10.00 | 1.358 | 4 | 174.000 | 183.500 | 2 | 0.00000 | 410 | 412 | 0 | 4000.00 | 0.00 |
| 412 | 0.107000 | 60.00 | 1.439 | 4 | 183.500 | 197.500 | 2 | 0.00000 | 411 | 413 | 0 | 4000.00 | 0.00 |
| 413 | 0.107000 | 25.00 | 1.000 | 16 | 197.500 | 197.500 | 2 | 0.00000 | 412 | 0 | 0 | 4000.00 | 0.00 |
| 414 | 0.505000 | 100.00 | 2.373 | 3 | 91.940 | 138.300 | 2 | 0.00000 | 143 | 415 | 0 | 4000.00 | 0.00 |
| 415 | 0.505000 | 5.00 | 5.848 | 2 | 138.300 | 142.000 | 2 | 0.00000 | 414 | 416 | 0 | 4000.00 | 0.00 |
| 416 | 0.336000 | 5.00 | 1.000 | 4 | 142.000 | 142.000 | 2 | 0.00000 | 415 | 417 | 0 | 4000.00 | 0.00 |
| 417 | 0.336000 | 50.00 | 1.000 | 4 | 142.000 | 160.000 | 2 | 0.00000 | 416 | 418 | 0 | 4000.00 | 0.00 |
| 418 | 0.336000 | 50.00 | 1.000 | 16 | 160.000 | 160.000 | 2 | 0.00000 | 417 | 0 | 0 | 4000.00 | 0.00 |
| 419 | 0.505000 | 85.00 | 2.031 | 4 | 94.500 | 131.500 | 2 | 0.00000 | 154 | 420 | 0 | 4000.00 | 0.00 |
| 420 | 0.505000 | 50.00 | 1.443 | 4 | 131.500 | 130.750 | 2 | 0.00000 | 419 | 421 | 0 | 4000.00 | 0.00 |
| 421 | 0.505000 | 30.00 | 1.909 | 4 | 130.750 | 130.750 | 2 | 0.00000 | 420 | 422 | 0 | 4000.00 | 0.00 |
| 422 | 0.505000 | 40.00 | 2.361 | 4 | 130.750 | 128.750 | 2 | 0.00000 | 421 | 423 | 0 | 4000.00 | 0.00 |
| 423 | 0.505000 | 35.00 | 1.491 | 3 | 128.750 | 132.170 | 2 | 0.00000 | 422 | 424 | 0 | 4000.00 | 0.00 |
| 424 | 0.256000 | 10.00 | 1.505 | 4 | 132.170 | 138.000 | 2 | 0.00000 | 423 | 425 | 0 | 4000.00 | 0.00 |
| 425 | 0.162000 | 105.00 | 1.580 | 16 | 138.000 | 169.500 | 2 | 0.00000 | 424 | 0 | 0 | 4000.00 | 0.00 |
| 426 | 0.336000 | 40.00 | 1.843 | 3 | 132.170 | 132.170 | 2 | 0.00000 | 423 | 427 | 0 | 4000.00 | 0.00 |
| 427 | 0.256000 | 10.00 | 1.000 | 4 | 132.170 | 138.000 | 2 | 0.00000 | 426 | 428 | 0 | 4000.00 | 0.00 |
| 428 | 0.162000 | 100.00 | 1.632 | 16 | 138.000 | 169.500 | 2 | 0.00000 | 427 | 0 | 0 | 4000.00 | 0.00 |
| 429 | 0.256000 | 40.00 | 1.165 | 4 | 132.170 | 138.000 | 2 | 0.00000 | 426 | 430 | 0 | 4000.00 | 0.00 |
| 430 | 0.162000 | 155.00 | 1.548 | 16 | 138.000 | 169.500 | 2 | 0.00000 | 429 | 0 | 0 | 4000.00 | 0.00 |
| 431 | 0.256000 | 40.00 | 1.934 | 4 | 65.500 | 69.000 | 2 | 0.00000 | 286 | 432 | 0 | 4000.00 | 0.00 |
| 432 | 0.256000 | 105.00 | 1.020 | 4 | 69.000 | 171.000 | 2 | 0.00000 | 431 | 433 | 0 | 4000.00 | 0.00 |
| 433 | 0.162000 | 10.00 | 1.227 | 19 | 171.000 | 181.000 | 2 | 0.00000 | 432 | 434 | 0 | 4000.00 | 0.00 |
| 434 | 0.162000 | 40.00 | 1.332 | 16 | 181.000 | 180.000 | 2 | 0.00000 | 433 | 0 | 0 | 4000.00 | 0.00 |
| 435 | 0.665000 | 15.00 | 5.522 | 3 | 89.600 | 83.800 | 2 | 0.00000 | 166 | 436 | 0 | 4000.00 | 0.00 |
| 436 | 0.665000 | 5.00 | 3.660 | 3 | 83.800 | 83.800 | 2 | 0.00000 | 435 | 437 | 0 | 4000.00 | 0.00 |
| 437 | 0.665000 | 5.00 | 14.300 | 3 | 83.800 | 83.800 | 2 | 0.00000 | 436 | 438 | 0 | 4000.00 | 0.00 |
| 438 | 0.505000 | 5.00 | 4.652 | 13 | 83.800 | 88.000 | 2 | 0.00000 | 437 | 439 | 0 | 4000.00 | 0.00 |
| 439 | 0.505000 | 5.00 | 6.050 | 2 | 88.000 | 89.000 | 2 | 0.00000 | 438 | 440 | 0 | 4000.00 | 0.00 |
| 440 | 0.336000 | 60.00 | 5.000 | 1 | 89.000 | 113.000 | 2 | 0.00000 | 439 | 0 | 0 | 4000.00 | 0.00 |
| 441 | 0.665000 | 10.00 | 9.911 | 3 | 83.800 | 91.500 | 2 | 0.00000 | 437 | 442 | 0 | 4000.00 | 0.00 |
| 442 | 0.665000 | 80.00 | 1.865 | 3 | 91.500 | 102.800 | 2 | 0.00000 | 441 | 443 | 0 | 4000.00 | 0.00 |
| 443 | 0.665000 | 50.00 | 1.106 | 16 | 102.800 | 130.000 | 2 | 0.00000 | 442 | 0 | 0 | 4000.00 | 0.00 |

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444    0.336000     10.00    5.435  16     102.800   107.800     2     0.00000 442   0     0   4000.00       0.00
445    0.665000     40.00    2.658  16      91.500    86.000     2     0.00000 441   0     0   4000.00       0.00
446    0.505000      5.00    7.868  13      83.800    88.000     2     0.00000 435 447     0   4000.00       0.00
447    0.505000      5.00    1.000   2      88.000    89.000     2     0.00000 446 448     0   4000.00       0.00
448    0.505000     45.00    2.301   4      89.000   103.000     2     0.00000 447 449     0   4000.00       0.00
449    0.336000     20.00    2.613   4     103.000   112.000     2     0.00000 448 450     0   4000.00       0.00
450    0.336000    110.00    2.307   1     112.000   113.000     2     0.00000 449   0     0   4000.00       0.00
451    0.336000    160.00    1.474   4      83.800   141.000     2     0.00000 436 452     0   4000.00       0.00
452    0.336000      5.00    1.000   2     141.000   141.000     2     0.00000 451 453     0   4000.00       0.00
453    0.256000     50.00    1.000   1     141.000   141.000     2     0.00000 452   0     0   4000.00       0.00
454    0.665000     30.00    4.979   3      84.100    93.500     2     0.00000 204 455     0   4000.00       0.00
455    0.665000     10.00    2.862   2      93.500   103.500     2     0.00000 454 456     0   4000.00       0.00
456    0.505000     50.00    5.000   1     103.500   103.500     2     0.00000 455   0     0   4000.00       0.00
457    0.505000     20.00    2.414   4      93.500    80.300     2     0.00000 454 458     0   4080.00       0.00
458    0.505000     50.00    1.000  16      80.300    80.300     2     0.00000 457   0     0   4000.00       0.00
459    0.336000     20.00    3.318   4      62.750    62.750     2     0.00000 218 460     0   4000.00       0.00
460    0.336000     10.00    2.210   4      62.750    63.750     2     0.00000 459 461     0   4000.00       0.00
461    0.336000     30.00    1.762   4      63.750    86.250     2     0.00000 460 462     0   4000.00       0.00
462    0.336000     40.00    1.286   4      86.250   125.000     2     0.00000 461 463     0   4000.00       0.00
463    0.336000    130.00    1.233   4     125.000   125.000     2     0.00000 462 464     0   4000.00       0.00
464    0.336000     30.00    1.587   4     125.000   155.000     2     0.00000 463 465     0   4000.00       0.00
465    0.256000     60.00    1.171  19     155.000   208.000     2     0.00000 464 466     0   4000.00       0.00
466    0.001000     10.00    1.000  16     208.000   205.000     2     0.00000 465   0     0   4000.00       0.00
467    0.336000     20.00    2.378   4      94.000    94.000     2     0.00000 199 468     0   4000.00       0.00
468    0.336000     20.00    1.000   4      94.000    94.000     2     0.00000 467 469     0   4000.00       0.00
469    0.336000      5.00    1.538   4      94.000    94.000     2     0.00000 468 470     0   4000.00       0.00
470    0.336000     25.00    2.665   4      94.000   113.000     2     0.00000 469 471     0   4000.00       0.00
471    0.336000     75.00    1.403   4     113.000   122.000     2     0.00000 470 472     0   4000.00       0.00
472    0.336000     35.00    1.708   3     122.000   151.800     2     0.00000 471 473     0   4000.00       0.00
473    0.336000     30.00    2.322   3     151.800   169.500     2     0.00000 472 474     0   4000.00       0.00
474    0.336000     35.00    1.770   4     169.500   187.800     2     0.00000 473 475     0   4000.00       0.00
475    0.256000     15.00    1.717   4     187.800   187.800     2     0.00000 474 476     0   4000.00       0.00
476    0.256000    110.00    1.130  19     187.800   205.300     2     0.00000 475 477     0   4000.00       0.00
477    0.256000     10.00    1.000  16     205.300   204.300     2     0.00000 476   0     0   4000.00       0.00
478    0.256000     40.00    1.849  16     169.500   166.000     2     0.00000 473   0     0   4000.00       0.00
479    0.336000     10.00    4.769   4     151.800   153.300     2     0.00000 472 480     0   4000.00       0.00
480    0.256000     60.00    1.293  16     153.300   149.300     2     0.00000 479   0     0   4000.00       0.00
481    0.505000      5.00   14.146   4      61.750    57.700     2     0.00000 208 482     0   4000.00       0.00
482    0.505000     20.00    3.323   4      57.700    71.000     2     0.00000 481 483     0   4000.00       0.00
483    0.505000     10.00    1.000   2      71.000    71.000     2     0.00000 482 484     0   4000.00       0.00
484    0.505000     50.00    5.000   1      71.000    71.000     2     0.00000 483   0     0   4000.00       0.00
485    0.505000      5.00   13.184   4     138.300   138.300     2     0.00000 414 486     0   4000.00       0.00
486    0.336000     90.00    1.157   4     138.300   143.500     2     0.00000 485 487     0   4000.00       0.00
487    0.336000     15.00    1.627   4     143.500   147.400     2     0.00000 486 488     0   4000.00       0.00
488    0.336000     75.00    1.314   4     147.400   165.800     2     0.00000 487 489     0   4000.00       0.00
489    0.336000     70.00    1.355   4     165.800   164.000     2     0.00000 488 490     0   4000.00       0.00
490    0.336000     10.00    3.486   4     164.000   164.000     2     0.00000 489 491     0   4000.00       0.00
491    0.336000     10.00    1.416   4     164.000   164.000     2     0.00000 490 492     0   4000.00       0.00
492    0.256000     10.00    1.251   4     164.000   164.000     2     0.00000 491 493     0   4000.00       0.00
493    0.206000     10.00    3.225   4     164.000   166.000     2     0.00000 492 494     0   4000.00       0.00
494    0.206000     75.00    1.549   4     166.000   166.000     2     0.00000 493 495     0   4000.00       0.00
495    0.172000     20.00    1.757  19     166.000   166.000     2     0.00000 494 496     0   4000.00       0.00
496    0.087000     10.00    2.409  16     166.000   168.000     2     0.00000 495   0     0   4000.00       0.00
@EOR

 91 570.3   0  18
  20.00   .000     -0.022     -0.033    -0.045    -0.056    -0.067    -0.078
-0.089  -.100     -0.111     -0.123    -0.134    -0.145    -0.156    -0.167
-0.200   -100.0
  570.3  570.3     587.3     590.3     587.3     580.3     568.3     558.3
  542.3  520.3     490.3     460.3     420.3     370.3     310.3     240.3
   170.3  170.3

 99 495.3   0  18
   20.00   .000     -0.557     -1.114    -1.671    -2.228    -2.785    -3.342
  -3.899  -4.46     -5.013     -5.570    -6.127    -6.684    -7.241    -8.912
  -13.4   -100.0
   495.3  495.3     494.3     492.3     491.3     488.3     485.3     481.3
   477.3  472.3     466.3     459.3     448.3     436.3     423.3     375.3
   170.3  170.3

117 512.1  0 17
   20.00  -.000     -0.557    -1.114    -1.671    -2.228    -2.785    -3.342
  -3.899  -4.46     -5.013    -5.57     -6.127    -6.684    -7.241    -8.912
  -13.37
   512.1  512.1     510.1     507.1     505.1     502.1     500.1     498.1
   495.1  492.1     487.8     481.1     476.1     467.1     457.1     412.1
   160.1
```

```
 123 512.1  0 17
    20.00  -.000     -0.557    -1.114    -1.671    -2.228    -2.785    -3.342
   -3.899  -4.46     -5.013    -5.57     -6.127    -6.684    -7.241    -8.912
   -13.37
    512.1  512.1     510.1     507.1     505.1     502.1     500.1     498.1
    495.1  492.1     487.8     481.1     476.1     467.1     457.1     412.1
    160.1

 129 482.1   0  16
    20.00   .000     -0.022     -0.033    -0.045    -0.056    -0.067    -0.078
   -0.089  -.100     -0.111     -0.123    -0.134    -0.145    -0.156    -100.0
    482.1  482.1     478.1     473.1     463.1     448.1     428.1     403.1
    374.1  343.1     308.1     268.1     233.1     198.1     168.1     168.1

 440 147.0   0   0

 450 147.0   0   0

 453 175.0   0   0

 456 137.5   0   0

 484 105.0   0   0

   4 0  100.  100. 1.0E+20   2  9  4  0  .01   393.6
 0     .56   2.36    100
 100.  100.  0.      0.
 0     50.0   90.0  92.5   95.3   97.5      99.0      99.7       100.0
 0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

  90 0  100  100  1.0E+20    2  9  3  0  .01  570.3
0       0.01  100
100     0    0
0     50.0   90.0  92.5   95.3   97.5      99.0      99.7       100.0
 0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

  96 0  100  100  1.0E+20   2  9  4  0  .01  495.3
0      .63   3.43   100
100.   100.  100.   100.
0     50.0   90.0  92.5   95.3   97.5      99.0      99.7       100.0
 0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

 102 0  100.  100. 1.0E+20   2  9  4  0  .01   393.6
0     2.0   2.01    100
100.  100.  100.    100.
0     50.0   90.0  92.5   95.3   97.5      99.0      99.7       100.0
0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

 114 0  100  100  1.0E+20    2  9  4  0  .01  512.1
 0       2.51  5.61   100
 100     100   100   100
 0     50.0   90.0  92.5   95.3   97.5      99.0      99.7       100.0
 0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

 121 0  100  100  1.0E+20    2  9  4  0  .01  512.1
 0       21.9  27.1  100
 100     100    100  100
 0     50.0   90.0  92.5   95.3   97.5      99.0      99.7       100.0
 0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

 126 0  100  100  1.0E+20    2  9  3  0  .01  482.1
0       0.01  100
100     100   100
0     50.0   90.0  92.5   95.3   97.5      99.0      99.7       100.0
 0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

 415  0  100  100  1.0E+20   2  16  3  0  1.79  194.
 0       0.1    100
 100     100    100
 0   11.1   16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
 97.5     99.0     99.7  100.0
 10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
 203570   1596000  0.49259E+08  0.1E+21

 439  0  100  100  1.0E+20   2  16  3  0  1.79  147.
 0       0.1    100
 100     100    100
```

```
 0    11.1  16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
 97.5     99.0     99.7  100.0
 10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
 203570   1596000  0.49259E+08  0.1E+21

 447  0  100  100  1.0E+20   2  16  3  0  1.79  147.
 0       0.01    100
 100     100     100
 0    11.1  16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
 97.5     99.0     99.7  100.0
 10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
 203570   1596000  0.49259E+08  0.1E+21

 452  0  100  100  1.0E+20   2  16  3  0  1.785  175.
 0       0.01   100
 100     100    100
 0    11.1  16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
 97.5     99.0     99.7  100.0
 10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
 203570   1596000  0.49259E+08  0.1E+21


 455  0  100  100  1.0E+20   2  16  3  0  0.695  137.5
0       0.01   100
100     100    100
0    11.1  16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
97.5     99.0     99.7  100.0
10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
 203570   1596000  0.49259E+08  0.1E+21


 483  0  100  100  1.0E+20  2  16  3  0  0.99  105.0
 0       0.1   100
 100     0     0
 0    11.1  16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
 97.5     99.0     99.7  100.0
 10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
 203570   1596000  0.49259E+08  0.1E+21

   5  2  0.650  0.01 0.7850 0.0  ID 1.0000
 438  2  0.750  0.01 0.2003 0.0  ID 0.5050
 446  2  0.750  0.01 0.2003 0.0  ID 0.5050


465   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2         .102


476   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2         .102

308   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2         .102


410   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2         .102


433   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2         .102

396   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2         .102

362   0.00136     0.0006      1.5     0.
```

```
0.0          1.0        0.      0.083
0.21        14.7       0.02     68.0
53.3   2          .102

371   0.00136     0.0006       1.5      0.
0.0          1.0        0.      0.083
0.21        14.7       0.02     68.0
53.3   2          .102

334   0.00136     0.0006       1.5      0.
0.0          1.0        0.      0.083
0.21        14.7       0.02     68.0
53.3   2          .102

382   0.00136     0.0006       1.5      0.
0.0          1.0        0.      0.083
0.21        14.7       0.02     68.0
53.3   2          .102

495   0.00136     0.0006       1.5      0.
0.0          1.0        0.      0.083
0.21        14.7       0.02     68.0
53.3   2          .102

 1.           1.
 6     2
 94    2
 97    2
 102   2
 113   2
 120   2
 184   41
 188   46
 194   31
 289   11
 292   23
 303   11
 308   18
 313   12
 322   11
 335   10
 347   11
 351   10
 362   10
 371   2
 376   6
 382   13
 396   31
 401   12
 404   11
 409   4
 410   17
 412   11
 418   9
 425   21
 428   20
 430   32
 432   20
 433   3
 450   22
 451   32
 465   1
 466   2
 476   4
 477   22
 478   8
 480   12
 495   4
 @EOR
 410       1       410      3          1
 410       3       410      5          2
 410       4       410      18         3
 410       18      410      19         4
 410       18      411      3          5
 412       1       412      2          6
 412       1       412      3          7
 412       3       412      6          8
 412       5       412      6          9
```

# CALCULATION SHEET

| | | | |
|---|---|---|---|
| Project: | HOPE CREEK GENERATING STATION | Job Number: | 8038 |
| Calc No. | 8038-P0004 | Sheet No. | 247 |
| By: | A. Arastu Date: 9/14/18 | Rev. No. | 1 |
| Subject: | Water Hammer Analysis of the HCGS Fire Protection System | | |

```
412       6       412      7          10
412       7       412      10         11
431       1       431      2          12
431       2       431      3          13
431       2       431      5          14
431       5       431      8          15
431       8       431      9          16
432       1       432      22         17
308       1       308      5          18
308       5       308      6          19
308       5       308      18         20
308       18      308      20         21
308       20      308      21         22
308       21      308      27         23
@EOR
0     3.0     200   1
3.0   30.0    200   1
30.0  888.    1000  1
```

## B10 - Reactor Building RB1 Pipe Run Segments for Cases 7, 8, and 9 (Segments 1 through 17)

For Reactor Building Riser # RB1, the data below replaces the second last data block in appendices B-7, B-8, and B-9 above which are for Cases 7, 8, and 9 with TB Riser # 26 pipe segments specified. Note that pipe segment in lines 18 through 22 (5th column) are for the pipe segments for RB Riser RB2.

```
459     1     459     2     1
459     2     459     3     2
459     3     459     5     3
460     1     460     2     4
460     2     460     3     5
461     1     461     3     6
461     2     461     3     7
461     3     461     5     8
461     5     461     6     9
461     5     462     9     10
463     1     463     9     11
463     9     463     18    12
463     18    463     21    13
463     21    463     26    14
463     26    463     27    15
464     1     465     11    16
465     11    465     12    17
476     1     476     7     18
476     7     476     9     19
476     9     476     15    20
476     15    476     17    21
476     17    476     22    22
```

# APPENDIX C: Forcing Function Segment ID Plots

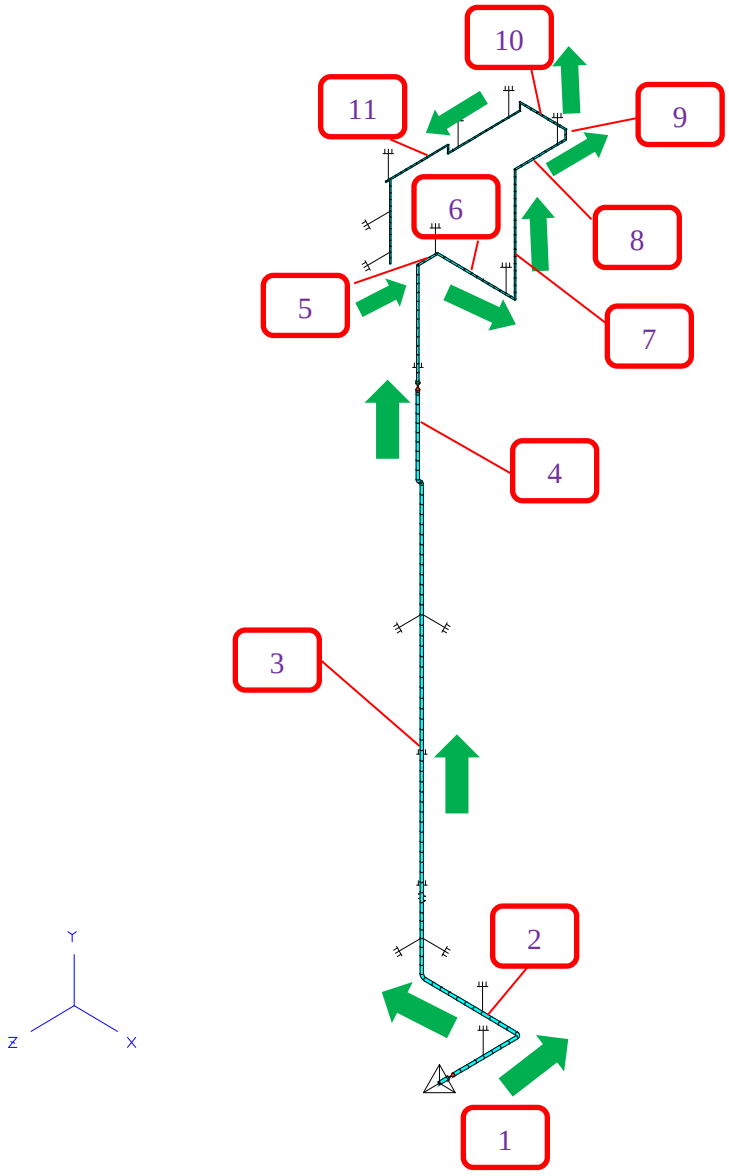



**Figure C-1: Pipe Run Segments for Turbine Building Riser 26 (Showing Direction of Positive Fluid Force)**

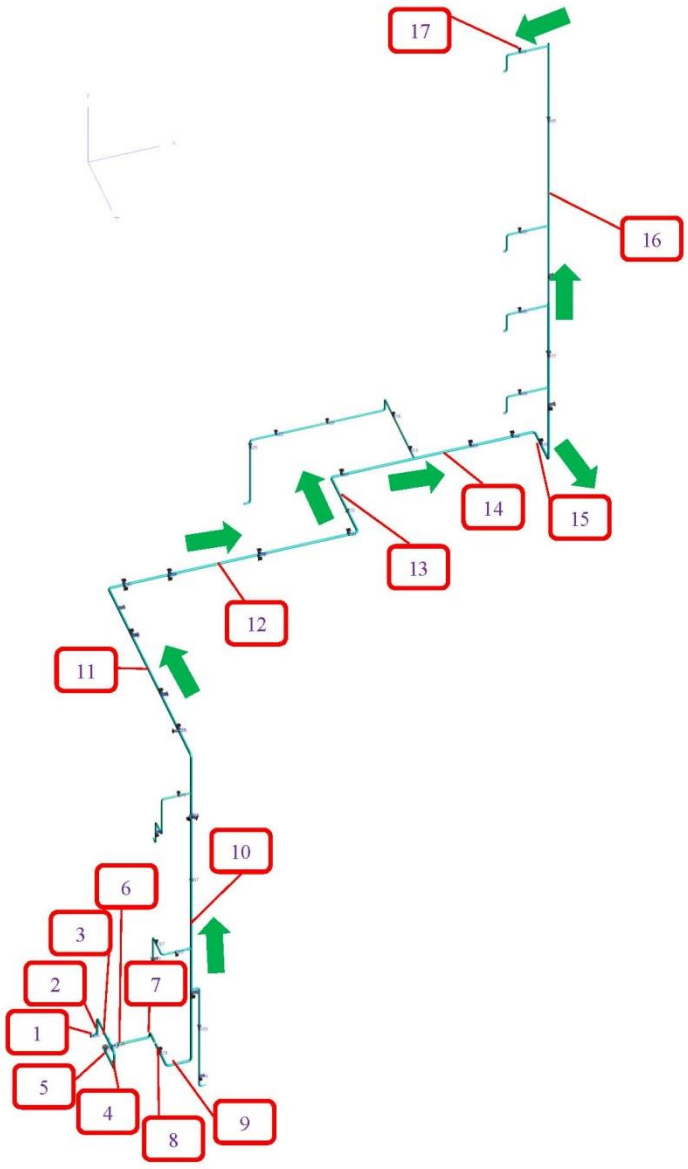



**Figure C-2: Pipe Run Segments for Reactor Building Riser RB1 (Showing Direction of Positive Fluid Force)**

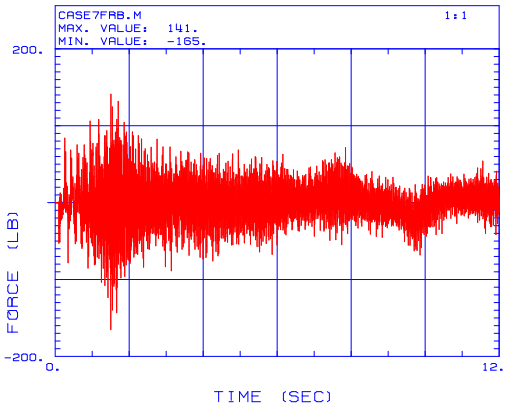



**Figure C-3: Force Time History for Case 7 Reactor Building Riser # RB1 (Segment # 1)**

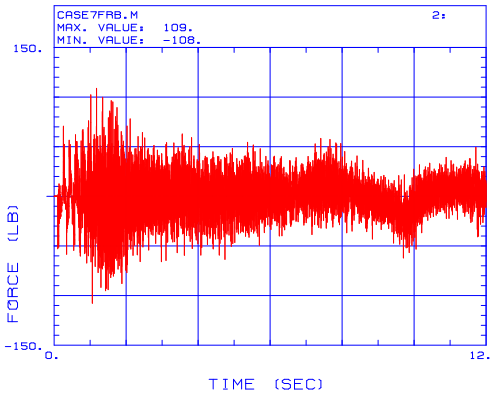



**Figure C-4: Force Time History for Case 7 Reactor Building Riser # RB1 (Segment # 2)**

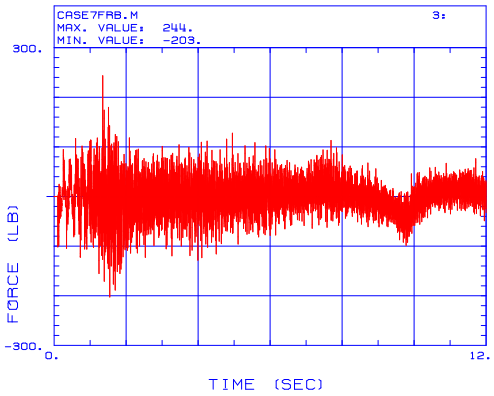



**Figure C-5: Force Time History for Case 7 Reactor Building Riser # RB1 (Segment # 3)**

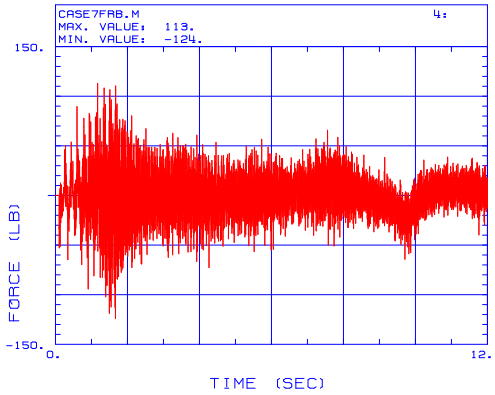



**Figure C-6: Force Time History for Case 7 Reactor Building Riser # RB1 (Segment # 4)**

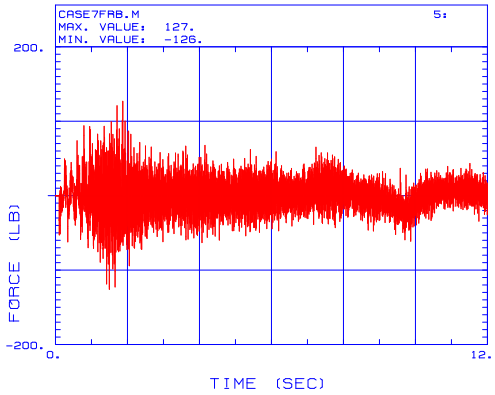



**Figure C-7: Force Time History for Case 7 Reactor Building Riser # RB1 (Segment # 5)**

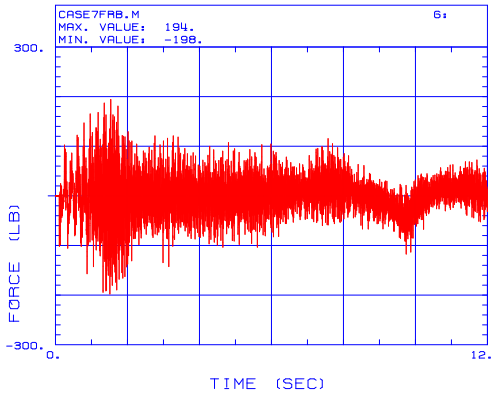



**Figure C-8: Force Time History for Case 7 Reactor Building Riser # RB1 (Segment # 6)**

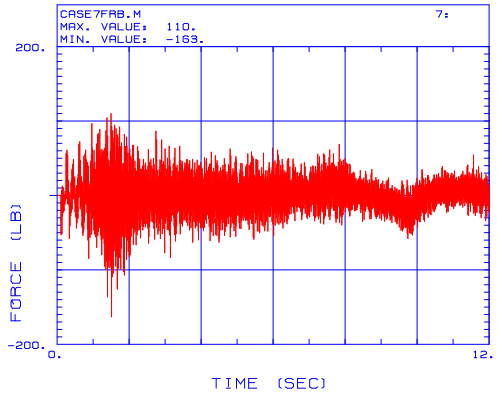



**Figure C-9: Force Time History for Case 7 Reactor Building Riser # RB1 (Segment # 7)**

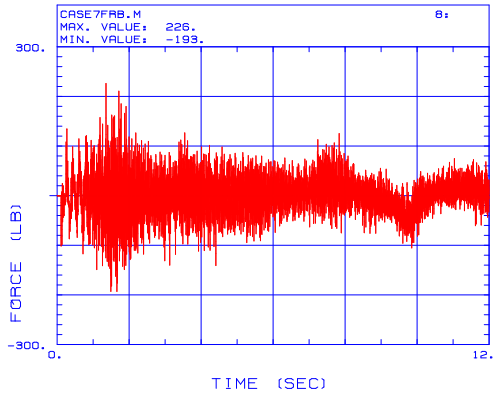



**Figure C-10: Force Time History for Case 7 Reactor Building Riser # RB1 (Segment # 8)**

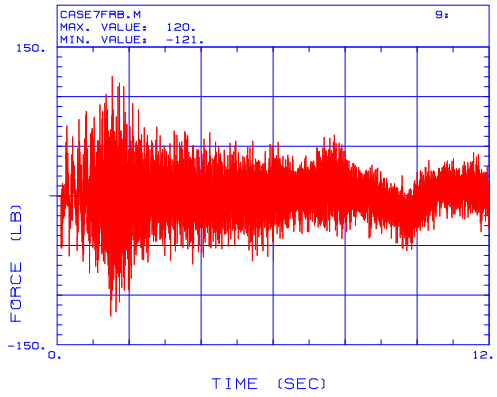



**Figure C-11: Force Time History for Case 7 Reactor Building Riser # RB1 (Segment # 9)**

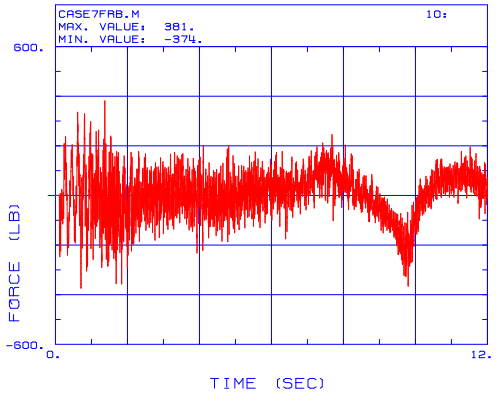



**Figure C-12: Force Time History for Case 7 Reactor Building Riser # RB1 (Segment # 10)**

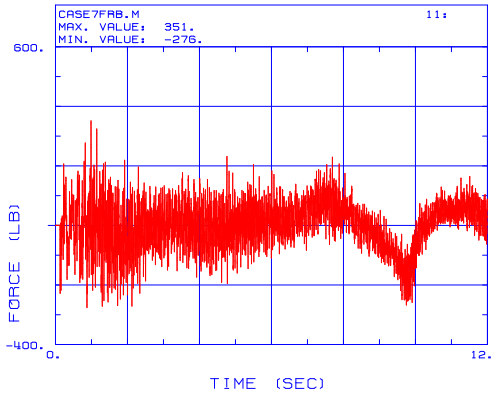



**Figure C-13: Force Time History for Case 7 Reactor Building Riser # RB1 (Segment # 11)**

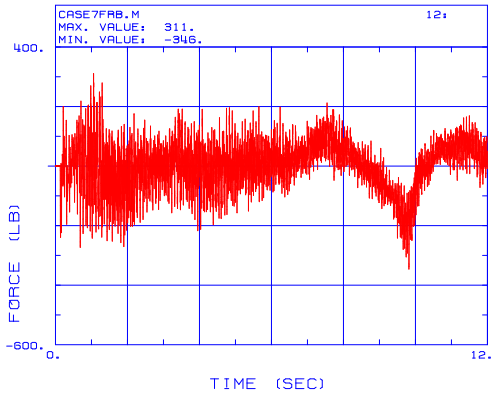



**Figure C-14: Force Time History for Case 7 Reactor Building Riser # RB1 (Segment # 12)**

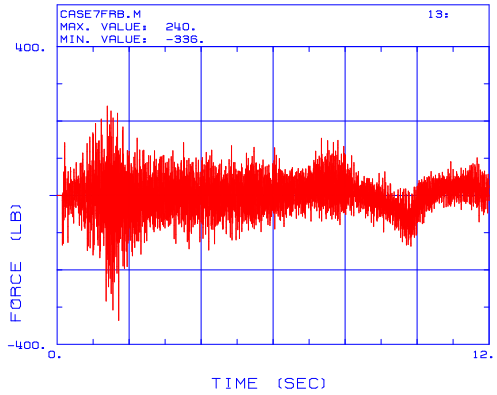



**Figure C-15: Force Time History for Case 7 Reactor Building Riser # RB1 (Segment # 13)**

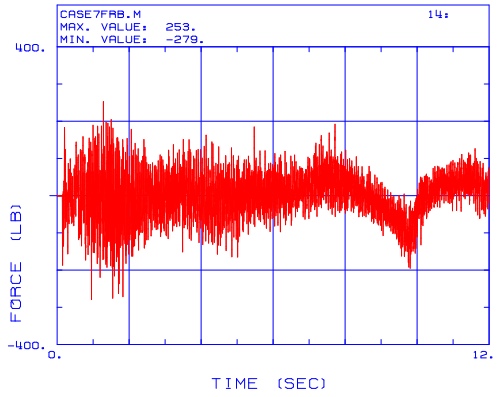



**Figure C-16: Force Time History for Case 7 Reactor Building Riser # RB1 (Segment # 14)**

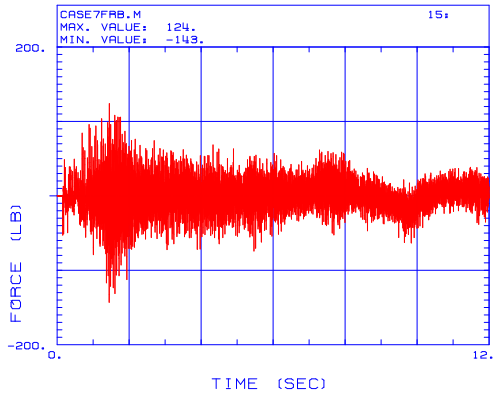



**Figure C-17: Force Time History for Case 7 Reactor Building Riser # RB1 (Segment # 15)**

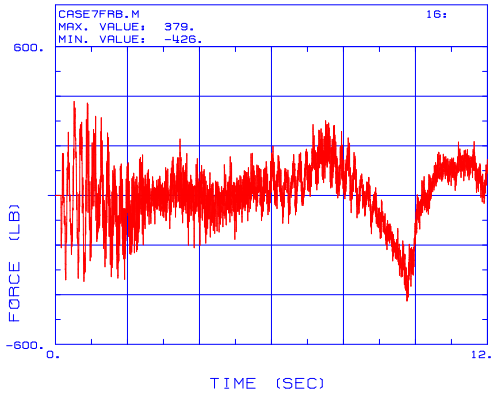



**Figure C-18: Force Time History for Case 7 Reactor Building Riser # RB1 (Segment # 16)**

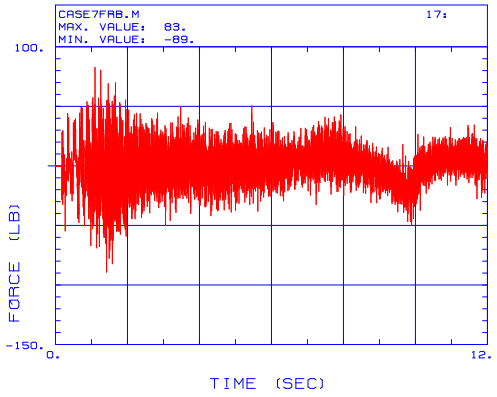



**Figure C-19: Force Time History for Case 7 Reactor Building Riser # RB1 (Segment # 17)**

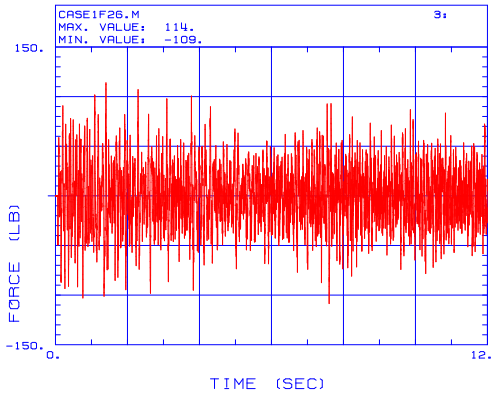



**Figure C-20: Force Time History for Case 1 TB Riser # 26 (Segment # 3)**

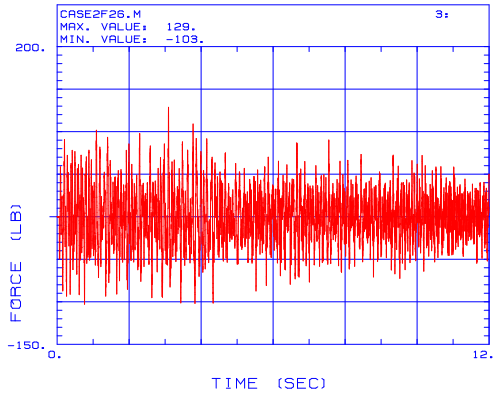



**Figure C-21: Force Time History for Case 2 TB Riser # 26 (Segment # 3)**

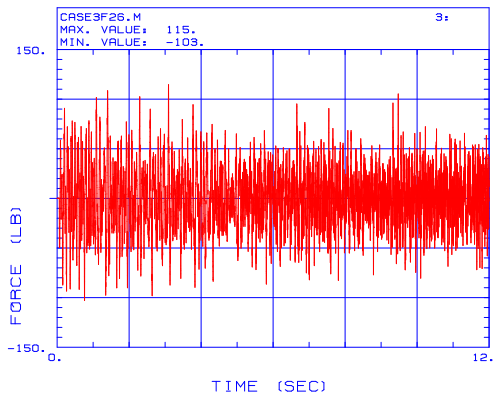



**Figure C-22: Force Time History for Case 3 TB Riser # 26 (Segment # 3)**

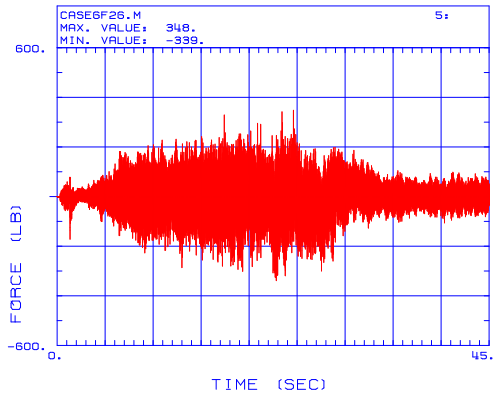



**Figure C-23: Force Time History for Case 6 TB Riser # 26 (Segment # 5)**

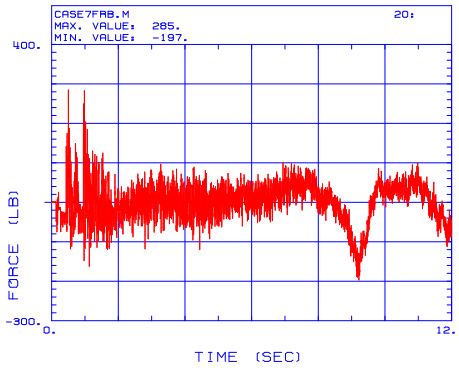



**Figure C-24: Force Time History for Case 7 Reactor Building Riser # RB2 (Segment # 20)**

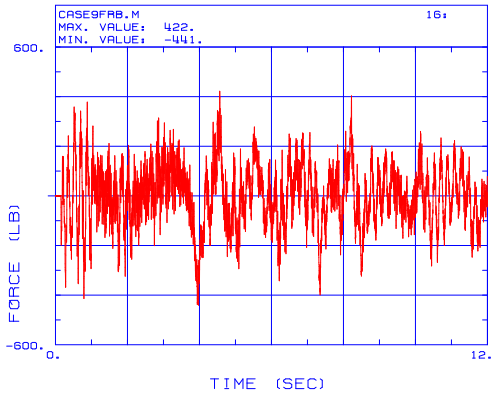



**Figure C-25: Force Time History for Case 9 Reactor Building Riser # RB1 (Segment # 16)**

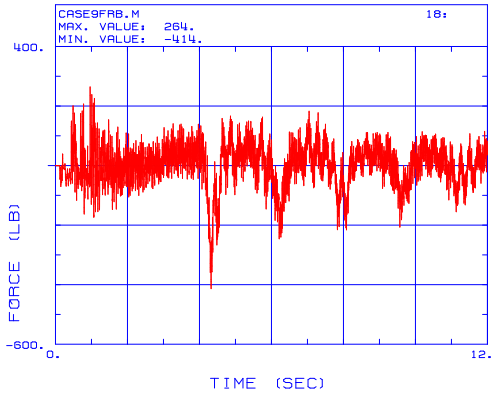



**Figure C-26: Force Time History for Case 9 Reactor Building Riser # RB2 (Segment # 18)**

# APPENDIX D: Sample Head and Velocity Plots for Cases 1,2,3,6, & 8

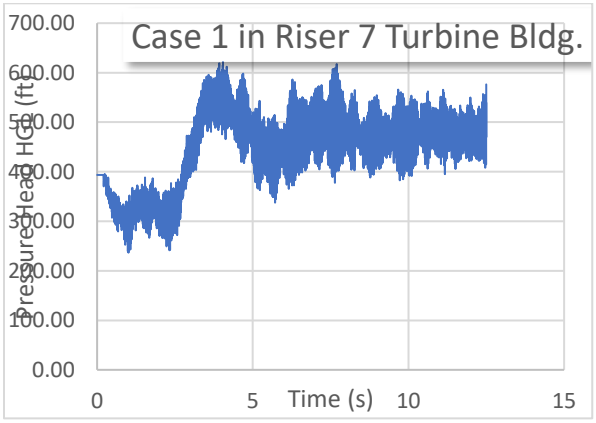



**Figure D-1: Case 1 Pressure Head in Riser # 7**

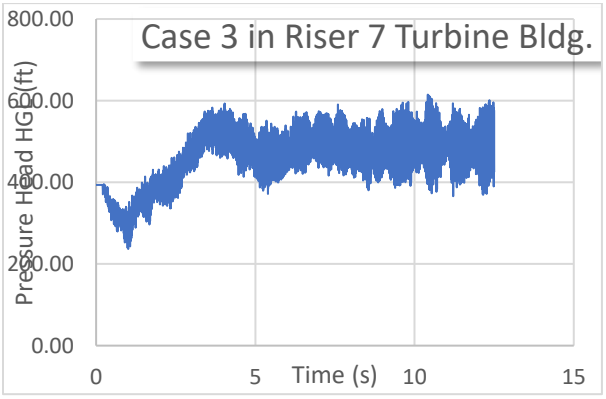



**Figure D-2: Case 3 Pressure Head in Riser # 7**

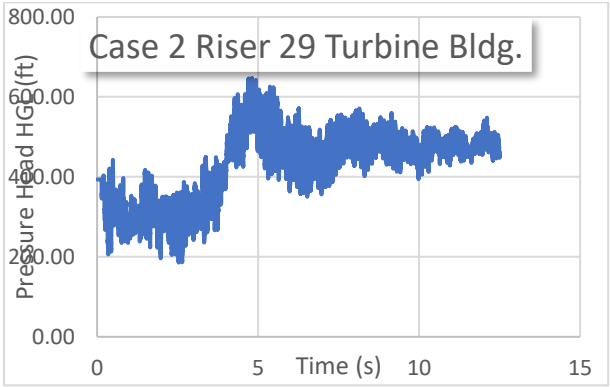



**Figure D-3: Case 2 Pressure Head in Riser # 29**

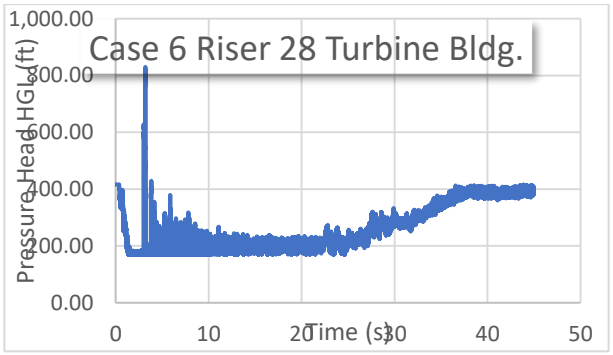



**Figure D-4: Case 6 Pressure Head in Riser 28**

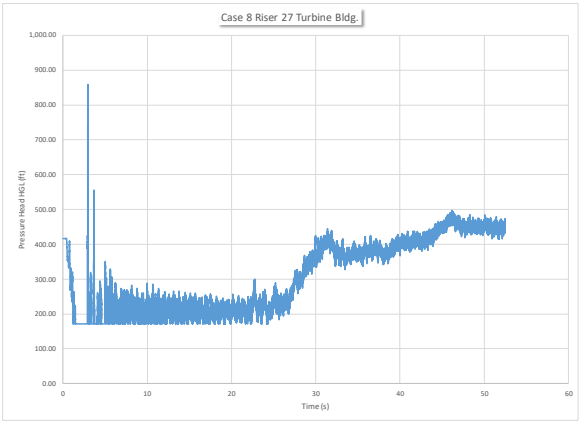



**Figure D-5: Case 8 Pressure Head in Riser 27**

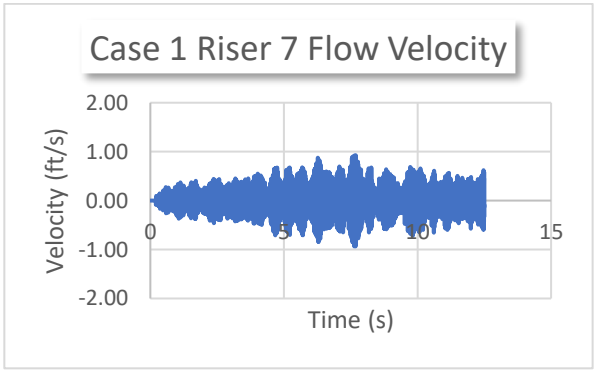



**Figure D-6: Case 1 Velocity in Riser # 7**

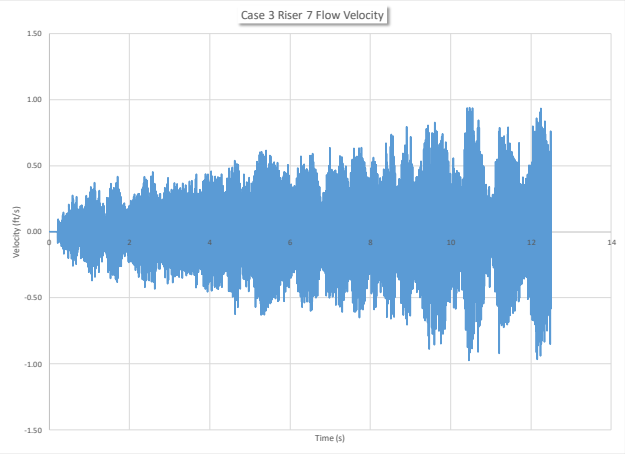



**Figure D-7: Case 3 Velocity in Riser # 7**

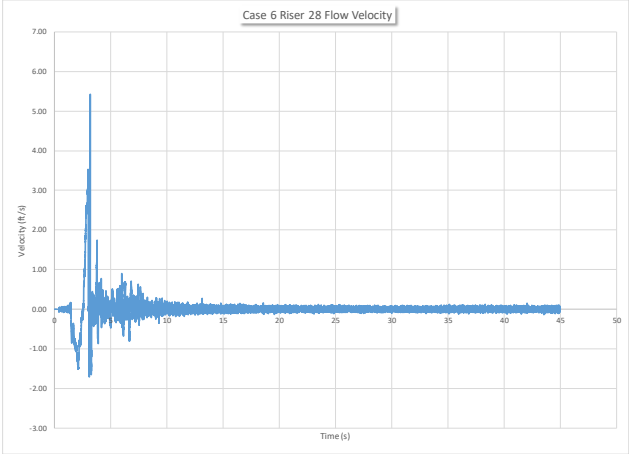



**Figure D-9: Case 6 Velocity in Riser 28**

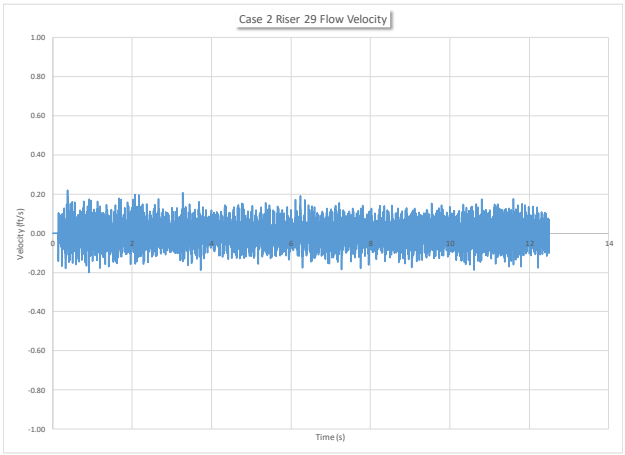



**Figure D-8: Case 2 Velocity in Riser # 29**

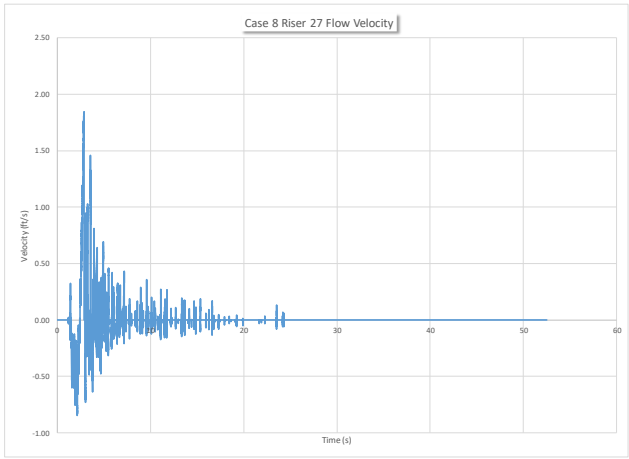
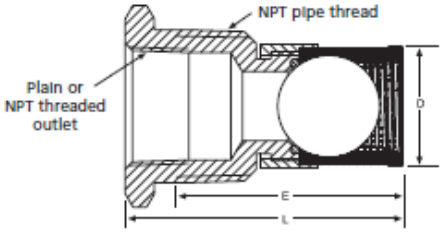



**Figure D-10: Case 8 Velocity in Riser 27**

# APPENDIX E: Vacuum Breaker Data Sheet




| Size | Quick Ship No. (Brass) | Quick Ship No. (Stainless Steel) | Outlet | Outlet Size | Total Length "L" | Engaged Length "E" | O.D. of Tube "D" | Diameter of Orifice |
|---|---|---|---|---|---|---|---|---|
| 3/8" | – | 24A75500 | Plain | 1/4" | 1 1/2" | 1 1/8" | 9/16" | 1/4" |
| 3/8" | 24A75200 | 24A75600 | Threaded | 1/4" | 1 1/2" | 1 1/8" | 9/16" | 1/4" |
| 1/2" | 24A75900 | 24A76300 | Plain | 3/8" | 1 3/4" | 1 3/8" | 11/16" | 9/32" |
| 1/2" | 24A76000 | 24A76400 | Threaded | 3/8" | 1 3/4" | 1 3/8" | 11/16" | 9/32" |
| 3/4" | 24A76700 | 24A77100 | Plain | 1/2" | 2 1/8" | 1 5/8" | 13/16" | 13/32" |
| 3/4" | 24A76800 | 24A77200 | Threaded | 1/2" | 2 1/8" | 1 5/8" | 13/16" | 13/32" |
| 1" | 24A77500 | 24A77900 | Plain | 3/4" | 2 3/8" | 1 7/8" | 1 1/16" | 19/32" |
| 1" | 24A77600 | 24A78000 | Threaded | 3/4" | 2 3/8" | 1 7/8" | 1 1/16" | 19/32" |
| 1 1/4" | 24A78300 | 24A78500 | Plain | 1" | 2 15/16" | 2 5/16" | 1 5/16" | 3/4" |
| 1 1/4" | 24A78400 | 24A78600 | Threaded | 1" | 2 15/16" | 2 5/16" | 1 5/16" | 3/4" |
| 1 1/2" | 24A78700 | 24A78900 | Plain | 1 1/4" | 3 1/16" | 2 1/2" | 1 9/16" | 7/8" |
| 1 1/2" | 24A78800 | 24A79000 | Threaded | 1 1/4" | 3 1/16" | 2 1/2" | 1 9/16" | 7/8" |

**Simple Installation**
The drawings at the right show how the vacuum breaker can be installed in a threaded opening in either a vertical or horizontal position. When installed in a pipeline fitting, use of a reducing bushing is required to make sure the vacuum breaker does not intrude far enough to impede flow in the line or bind against any internal wall.

Figure 1
Horizontal installation in either end or side outlet of tee, showing use of reducing bushing.

Figure 2
Vertical installation in top outlet of tee, showing use of reducing bushing.

Figure 3
Vertical installation in bottom outlet of tee, showing use of reducing bushing.

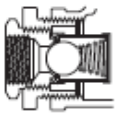


Figure 1

Figure 2

Figure 3

**Vacuum required to open**

| | | Horizontal | Vertical | | |
|---|---|---|---|---|---|
| | | | Top Outlet | Bottom Outlet | No Spring |
| VB8-38 3/8" | In. $H_2O$ | 7.00 | 4.30 | 10.5 | 3.50 |
| | In. Hg | 0.51 | 0.32 | 0.77 | 0.26 |
| | PSI | 0.25 | 0.16 | 0.38 | 0.13 |
| VB8-51 1/2" | In. $H_2O$ | 9.30 | 10.6 | 18.0 | 4.40 |
| | In. Hg | 0.68 | 0.78 | 1.32 | 0.32 |
| | PSI | 0.34 | 0.38 | 0.65 | 0.16 |
| VB8-76 3/4" | In. $H_2O$ | 15.3 | 15.0 | 25.0 | 5.10 |
| | In. Hg | 1.13 | 1.10 | 1.84 | 0.37 |
| | PSI | 0.55 | 0.54 | 0.90 | 0.18 |
| VB8-101 1" | In. $H_2O$ | 10.0 | 5.90 | 19.5 | 6.60 |
| | In. Hg | 0.73 | 0.43 | 1.43 | 0.48 |
| | PSI | 0.36 | 0.21 | 0.70 | 0.24 |
| VB8-126 1 1/4" | In. $H_2O$ | 10.5 | 7.10 | 21.0 | 6.90 |
| | In. Hg | 0.77 | 0.52 | 1.54 | 0.51 |
| | PSI | 0.38 | 0.26 | 0.76 | 0.25 |
| VB8-151 1 1/2" | In. $H_2O$ | 10.0 | 4.90 | 20.3 | 7.90 |
| | In. Hg | 0.73 | 0.36 | 1.49 | 0.58 |
| | PSI | 0.36 | 0.18 | 0.73 | 0.29 |

*Note: Stainless steel ball was used to arrive at all figures.*
*Values given are averages of test results and may vary slightly.*

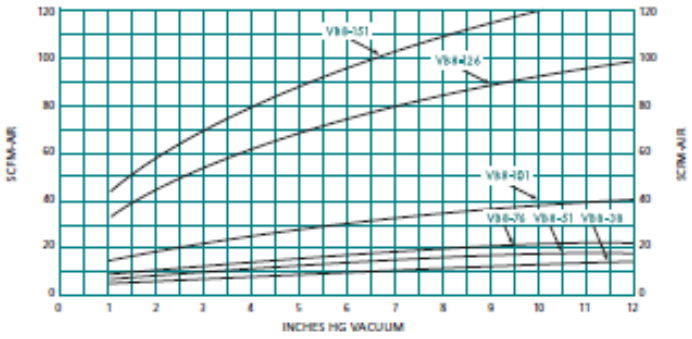
# CALCULATION SHEET

| | | | |
|---|---|---|---|
| Project: | HOPE CREEK GENERATING STATION | Job Number: | 8038 |
| Calc No. | 8038-P0004 | Sheet No. | 258 |
| By: | A. Arastu Date: 9/14/18 | Rev. No. | 1 |
| Subject: | Water Hammer Analysis of the HCGS Fire Protection System | | |

## Kadant Johnson Vacuum Breakers

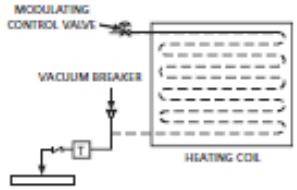
**Approximate air handling capacities**

The air handling capacity curves were plotted from calculations using the $C_V$ factors of the vacuum breaker. The $C_V$ factor is a flow coefficient determined by actual test which mathematically gives the relationship between the rate of flow and the pressure drop. The flow formula used was recommended by the Fluid Controls Institute.

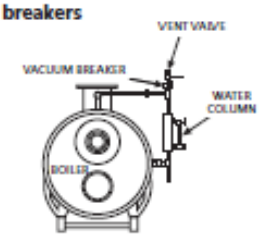



NOTE: Capacities will vary slightly due to position of installation.

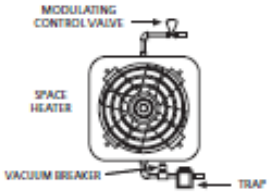
**Typical installations of Kadant Johnson vacuum breakers**



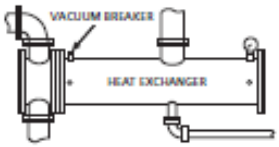

Vacuum breaker installed on heating coil. When the modulating control valve closes, the steam in the coil will condense. A vacuum may exist in the coil even with the control valve partly open and positive pressure between the control valve and the coil.




Typical application of a vacuum breaker as used on a steam boiler to break a vacuum imposed when a boiler is shut down, thereby condensing the steam in the boiler and creating a vacuum. This condition causes the boiler to be flooded by pulling in excess water from the return system.

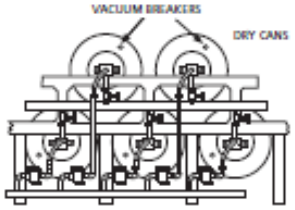



Typical space heater installation with vacuum breaker protection.




Typical installation of a vacuum breaker in a heat exchanger.

Horizontal storage heater with heating coils protected by a vacuum breaker.




Textile dry cans, multiple slasher cylinders, print cans, etc., can be protected against collapse with vacuum breakers.

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Vacuum Breakers-3001 (US) 04/2015
Replaces: VB-3000 (US)
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# APPENDIX F: Miscellaneous Data Provided by PSEG

CC-AA-310
Revision 5

## TYPICAL DESIGN INFORMATION TRANSMITTAL

Transmittal Number: H-TODI-2015-0023

Date: May 19, 2015

To: Name (or title): Asif Arastu
Organization and Location: UNISONT Engineering Inc.
1970 Broadway, Suite 1020
Oakland, CA 94612

From: Name (or title): Vijay Chandra
Organization and Location: PSEG – Hope Creek Mechanical Design Engineering
Phone: 856-339-1845; e-mail vijay.chandra@pseg.com

Alternate Contact: Michael Reeser
Phone: 856-339-1809; e-mail michael.reeser@pseg.com

Subject: Hope Creek Fire Protection System Waterhammer Analysis

Basis Information for preparing transmittal:

This transmittal document is being prepared to answer UNISONT questions regarding Hope Creek Fire Water System.

We have loaded the following documents (items 1 through 6) on UNISONT web site.

1. All Hope Creek P&ID and Isometric piping drawings
2. All Salem P&ID's
3. Hope Creek Fire Water Pump Characteristics (Jockey, Electric Motor Driven Pump, Diesel Engine Driven Pump).
4. Salem plant has two diesel engine driven pumps; their characteristic curves are loaded on UNISONT web site. Salem Jockey pump curve was loaded on UNISONT web site on June 8, 2015.
5. Hope Creek fire protection system steady state analysis calculation KC-0009.
6. Salem Hope Creek Cross-tie line drawings.

Other information is as follows:

7. Elevation of minimum water level in Salem fire water tank = 132.8 ft.
   Elevation of maximum water level in Salem fire water tank = 138.2 ft
   [Ref. 6, 7]

   Elevation of minimum water level in Hope Creek fire water tank = 140.3 ft.
   Elevation of maximum water level in Hope Creek fire water tank = 142.8 ft
   [Ref. 8]

   The water level elevations shown above are the pre-event pressure. While the fire is being fought, the water level will continue to drop.

8. Hope Creek Pump Start Sequence:

   Hope Creek Fire Water Pumps start automatically at their respective pressure set-points. The set-points are given below.

   Hope Creek jockey pump starts when pump discharge pressure drops to 115 psig and stops when pump discharge pressure increases to 125 psig [Ref. 1].

   Hope Creek electric motor driven pump starts when pump discharge pressure drops to 110 psig and it stops when pump discharge pressure increases to 125 psig [Ref. 2]. This pump will not start if tagged out or electric power is not available. Pump speed up time of this pump was measured on June 9, 2015. The pump discharge pressure reaches the peak 150 psig value from an initial hydrostatic pressure in 1.8 seconds.

   Hope Creek diesel engine driven pump starts when pump discharge pressure drops to 100 psig and continues to run [Ref. 3]. This pump will not start if tagged out. If electric motor driven pump is not available and the header pressure downstream of the pump check valve drops to its 100 psig set-point then diesel engine driven pump discharge pressure reaches from its initial hydrostatic pressure to 150 psig steady value after 2.8 seconds. This information was obtained during a weekly pump surveillance tests.

   It is possible that both pumps may be running if header pressure drops below 100 psig. It may not be obvious in the beginning which case (one pump case or 2 pump case) is more severe.

9. Salem/Hope Creek Cross-tie line:

   This cross tie is opened within seven days after any one fire water pump is not available at Hope Creek [Section 4.5.4 of Ref. 4]. The cross tie is opened immediately if both fire pumps are unavailable at Hope Creek [Section 4.5.5 of Ref. 4].

10. Salem Fire Pump Start Sequence [Section 3.2 of Ref. 5]:

    3.2 With Fire Pump Selector Switches in AUTO the following will occur:

    3.2.1 IF Fire System pressure decreases to 85 psig, THEN Fire Pump #1 will automatically start following a 2 second delay.

    3.2.2 IF Fire System pressure decreases to 75 psig, THEN Fire Pump #2 will automatically start following a 15 second delay.

    The time to reach the shaft speed to its maximum value for No. 1 Salem fire pump is 3.1 second. This time was measured on June 4, 2015 during Salem No. 1 fire pump surveillance test and it is the time between the starting 3-way solenoid valve clicking sound and pump discharge pressure reaching its maximum value.

    Salem Jockey pump comes on at 115 psig header pressure and shuts off at 135 psig header pressure [Ref. 10].

    For Hope Creek Fire Protection System waterhammer analysis, the worst case situation is when none of the Hope Creek pumps are available, cross-tie line is open and Salem fire pump No. 1 does not start and Salem Fire pump No. 2 starts with its built in delay. Salem No. 2 fire pump test was timed on June 11, 2015. The data shows that pump has a delay of 21.3 seconds after the header set-point pressure (75 psig) is reached. The pump shaft speed up time after this delay is 5.2 seconds. Please use this measured data in your waterhammer analysis instead of the 15 second delay mentioned above [Ref. 11].

The following information was extracted from page 27 of Ref. [9]

> Each fire pump is automatically started based on system pressure. The pressure sensing line for the No. 1 fire pump is located between the discharge check valve and isolation valve for No. 1 fire pump. The pressure sensing line for the No. 2 fire pump is located between the discharge check valve and isolation valve for No. 2 fire pump. If system pressure drops to 85 psig, the lead fire pump (No. 1) starts. If the system pressure continues to drop, at 75 psig, the second pump receives a signal to start but will not start immediately. The No. 2 fire pump controller is equipped with a start sequencer. In the event of a sudden pressure drop in the fire water system that results in start signals for both fire pumps, the start sequencer delays starting the No. 2 fire pump for a predetermined period to allow for start of the No. 1 fire pump. If the No. 1 fire pump starts to restore system pressure, the start signal for the No. 2 fire pump is cancelled. In the event that the No. 1 fire pump either does not start or cannot restore system pressure, the No. 2 fire pump will start. In the event that the No. 1 fire pump is out of service, the start sequencer can be reprogrammed to defeat the start delay for the No. 2 fire pump. Upon loss of normal AC power, both fire pumps will also automatically start using power from the independent 12-volt batteries.

11. Hope Creek Pre-action and deluge valve opening characteristics (Cv vs. time). We are still looking for this information.

12. Other relevant information

    The reactor building hose stations are normally isolated, and require that yard PIVs 1KCV212 and 1KC076, and inside valves 1KCV038 and 1KCV068 be manually opened [per M-22-0 sheet 3 rev. 36 and Ref. 3]. For a fire inside the reactor building, the appropriate hose station supply valve (two are PIVs and two are chain operated) will be opened first and then the fire hose will be activated. The supply valve is opened manually and takes 2 minutes (approximately) to open fully. Fire department provided this information based on their experience.

    The manual valves that supply water to a fire hose take 45 seconds (approximately) to open. Fire department provided this information based on their experience.

13. Model Conservatism and Design Margins

    Please use your judgement in adding conservatism to the model and adjust the pump start delay time and speed up time accordingly.

Intended use of the information being provided:
This information is intended to be used for Hope Creek Fire protection system waterhammer analysis.

Limitations on the use of the transmittal information:
Use of this information is limited to fire protection system waterhammer analysis.

References:

1. ICD card of Pressure Switch H0KC -0KCPSHL-7777
2. ICD card of Pressure Switch H0KC -0KCPSHL-7752
3. ICD card of Pressure Switch H0KC -0KCPSHL-7713
4. Procedure HC-FP-004(Q) rev. 3
5. Procedure SC.FP-SO.FP-0001, Rev. 9, Section 3.2.
6. Drawing 212823, sh. 1, Revision 15, Salem Fire Pump House, Fire Protection Pump and Piping
7. Drawing 208418, sh. 1, Revision 6, Salem Fire Protection & Domestic Water Storage Tanks
8. Drawing J-L5000, sheet 06A, Rev. 3, Hope Creek Level Setting Diagram-Fire Water Tank
9. Programmatic Standard, Appendix 6, NC.DE-PS-0001-A6-GEN, Rev. 2
10. ICD Card of Pressure Switch S1FP -1PD3633
11. DCRMS Record No. DEH150153

# CALCULATION SHEET

| | | | |
|---|---|---|---|
| Project: | HOPE CREEK GENERATING STATION | Job Number: | 8038 |
| Calc No. | 8038-P0004 | Sheet No. | 263 |
| By: | A. Arastu Date: 9/14/18 | Rev. No. | 1 |
| Subject: | Water Hammer Analysis of the HCGS Fire Protection System | | |



Preparer: Vijay Chandra VIJAY CHANDRA Date: JUNE 11, 2015
(Print and Sign)

Reviewer: Michael Reeser (Hope Creek) Date: 6-11-15

Thedore Di Nunzio (Salem) Theodore N. DiNunzio Date: 6-11-15
(Print and Sign)

Approver: James Boyer (Branch Mgr) ANDREW PRESTON FOR JSB Date: 6-11-15
(Print and Sign)

**TYPICAL DESIGN INFORMATION TRANSMITTAL**

Transmittal Number: H-TODI-2015-0023 (Addendum 1)

Date: July 17, 2015

To: Name (or title): Asif Arastu
Organization and Location: UNISONT Engineering Inc.
1970 Broadway, Suite 1020
Oakland, CA 94612

From: Name (or title): Vijay Chandra
Organization and Location: PSEG – Hope Creek Mechanical Design Engineering
Phone: 856-339-1845; e-mail vijay.chandra@pseg.com

Alternate Contact: Michael Reese
Phone: 856-339-1809; e-mail michael.reese@pseg.com

Subject: Hope Creek Fire Protection System Waterhammer Analysis

We received the following questions and clarification items from you and we are providing our response:

"Hi Vijay,

It was nice and informative talking to you, Jim, and Mike today. Below are the issues where we need data or clarification.

1. Need following Civil ISOs:
   - C-0053
   - C-0055
   - C-0058
   - C-0057
   - C-0059
   - C-0060
   - C-0061
   - C-0063
   - C-0064
   - C-0065
   - C-0079

2. Need Piping ISOs downstream of excess check valve ZS-3405C (drawings by FP contractor). Valve is shown 0-p-kc-01. Also need ISOs downstream of valve V-011 (ZS-3334L) shown on ISO 1-p-kc-02.
3. Deluge valves ZS-XV3259 and ZS-XV3262 to Reactor Building Rooms 4201 and 4301 are 6-inch and 8-inch, respectively per P&ID M-22-0 Sht3. Is this true? Are these valves different sizes?
4. In P&ID M-22-0 Sht3, the branch piping to deluge valves ZS-XV3259 and ZS-XV3262 is between valve V282 and branch to valve V186. We cannot see this branch on ISO 0-p-kc-01. Please clarify. (piping is shown on iso. 1-P-KC-05, elevation shown is 84'1" branch off 8"KBF-030 riser pipe)
5. Need Pre-action and deluge valve opening characteristics. At least, the opening times of these valves are needed while you are searching for the characteristics.

From our discussion we understand that:

- When the Salem cross connect is open, the Hope Creek pumps are valved out from the FP system.
- There are no automatic opening valves between the closed valves to Reactor Building risers to the Hose Stations. Thus opening of these closed isolation valves will not happen under a voided condition.
- When the HC pumps are inoperable, the failure of the Salem pump 1 is credible. In other words, the start of Salem Pump # 2 (with a delay of 20.3 seconds, measured) appears to be the worst case. This pump was measured to be at full speed at 26.5 seconds."

**Hope Creek Response**

Item 1: We have loaded drawings C-0053-0, C-0055-0, C-0056-0, C-0057-0, C-0059-0, C-0060-0, C-0061-0, C-0063-0, C-0064-0, C-0065-0, and C-0079 on UNISONT web site. Some of these drawings have posted changes against them. The posted changes show the change to the base drawings.

Item 2: The piping downstream of valve ZS-3405C is designated as system 0WS3. This piping is shown in Viking vendor drawing FP-31 which is stored as file VTD PM650F-0143. This drawing shows system 0WS3 and 0WS2. System 0WS3 piping extends approximately up to elevation 184.3 ft. This VTD has been loaded on UNISONT web site. The piping downstream of valve V-011 is shown in Viking drawing FP-51 which is stored as file PM650F-0236. This drawing has been stored at UNISONT web site.

Item 3: We have looked at SAP component Data Module (PSEG computer system) and verified that valve IV-412 (ZS3262) is a 6 inch valve and valve IV411 (ZS3259) is an 8 inch valve.

Item 4: The branch line to valve 1V410 is at coordinate (C, 4) of drawing 0-P-KC-01 and is circled. The details of branch connection inside the circle is "detail 3" which is shown at coordinate (E, 4) of the same drawing. We can talk on phone about this if you still have difficulty in reading this drawing.

Item 5: We will contact the valve vendor to get the stroke time and Cv of pre-action and deluge valves. However, the stroke time may not be a critical parameter because there is a 21.3 second delay in starting the second Salem pump.

Other bulleted items:

(a) We discussed the Salem cross-tie operation with Fire Department. They said that it is not always true that when Salem cross-tie line is open, Hope Creek fire pumps are valved out. One situation when the Salem cross-tie line is open and Hope Creek pumps are also connected is when Salem jockey pump is not working and Hope Creek jockey pump keeps the Salem piping pressurized. Hope Creek pumps may be valved out when Salem cross-tie line is open.

(b) It is true that there are no automatic opening valves between closed valves and Reactor Building Hose Stations. However, after thinking through the sequence of events we have now concluded that significant waterhammer can occur in these lines for the following reason:

In case there is fire at a lower elevation in the Reactor Building, the fire fighters will first open the closed valve to the reactor building. Opening of this valve causes no transients. It simply equalizes pressure on both sides of the valve. After this action, the hose station isolation valve will be opened. This is also a slow process. While the hose station valve is being opened, the jockey pump might be able to fill up the hose and no water will come out of the hose nozzle and no significant waterhammer transient would occur. At this point, the main fire pump still has not received the signal to start.

After the fire hose is filled up, the valve at the hose nozzle will be opened rather quickly and water would begin to flow out of the nozzle. This would result in depressurization of the fire header. While this is happening, the fire pump would get the signal to start. If the first pump does not start for any reason, the second pump would start after a 21.3 second delay (it is being assumed that Salem cross-tie line is in service). During this delay period, the upper elevation piping would drain through the open fire hose nozzle creating a vapor cavity at the upper elevations. As the pump starts, the upper elevation piping void would

collapse and cause a vapor cavity collapse waterhammer. This is expected to be the worst case situation.

**Therefore, the reactor building piping needs to be modeled, to analyze the waterhammer transient.**

It may be possible (but needs to be determined) that while the hose is being filled by opening the hose station valve with the nozzle valve closed, the main fire pump might start if the header pressure reaches the pressure set-point. If this happens, then the upper elevation piping would not drain after the nozzle valve is opened.

(c) After discussing with fire protection program engineer, it has been concluded that when Salem cross-tie line is open because Hope Creek fire pumps are not available, the failure of Salem lead fire pump is a credible situation.

We are providing the following additional general information:

(d) We have loaded pshp220059-2 which shows piping to elevation 153 ft of Radwaste Building. This piping is downstream of open valve 1-V430 shown on P&ID M-22-0, sheet 2, coordinates (B, 3).

(e) Please note that the elevation numbers shown on P&ID M-22-0 are the floor elevations. Therefore, the piping elevation may be up to 20 ft higher than floor elevation. Please see isometric drawings to determine the piping elevation.

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# CALCULATION SHEET

| | | | |
|---|---|---|---|
| Project: | HOPE CREEK GENERATING STATION | Job Number: | 8038 |
| Calc No. | 8038-P0004 | Sheet No. | 268 |
| By: | A. Arastu Date: 9/14/18 | Rev. No. | 1 |
| Subject: | Water Hammer Analysis of the HCGS Fire Protection System | | |



Preparer: Vijay Chandra (Print and Sign) Date: July 20, 2015

Reviewer: Michael Reeser (Hope Creek) Date: 7-20-15

Approver: James Boyar (Branch Mgr) (Print and Sign) Date: 7-20-15

# APPENDIX G: Forcing Functions for Riser # 10 and RB2 Piping

## G1 Introduction and Background

In Reference G-1 (PSEG Purchase Order 4500861893 Change Order) authorized UEI to perform the Phase IV work. Phase IV (Revision 1 of this calculation) performed the analysis documenting the forcing functions generation for Risers # 10 in the Turbine Building (See Figure 10 for elevation diagram) and RB2 in the Reactor Building (See Figure 6 for elevation diagram). Details of the Phase IV forcing function analysis are given in this Appendix.

The basic USLAM model for this analysis is the same as the model used in Phase III analysis. Some details in the Riser # 10 and # RB2 area are modeled in more detail so that forcing functions can be calculated more accurately in these areas.

## G2 USLAM Model Changes

Figure G-1 shows the geometry for Riser # 10 piping. Pipe run segment number for each segment are shown in circles and segment lengths (distance between two direction changes, e.g. elbows) are also shown. The USLAM link numbers (395 to 398, and 498) are also shown for this piping in hexagonal boxes. Link 398 is for modeling convenience only. The vacuum breaker is placed between links 397 and 398. There is a total of 29 pipe run segments in the riser # 10 piping.

Figure G-2 shows the geometry for Riser # RB2 piping. Again, pipe run segment number for each segment are shown in circles and segment lengths are shown. The USLAM link numbers (467 to 480, and 497) are also shown for this piping in hexagonal boxes. Link 477 is for modeling convenience only. The vacuum breaker is placed between links 476 and 477. The total number of pipe run segments are 44 in the RB2 piping.

## G3 Description of Input Data Changes for Riser # 10 and RB2 Piping

As discussed in the main text of this calculation, Riser # 10 is connected to the FPS for all 9 cases analyzed. However, the Reactor Building risers RB1 and RB2 are isolated for Cases 1 through 6 and connected to the FPS for Cases 7, 8, and 9. Images of input data files are therefore, given in this section for representative cases for both risers # 10 and RB2. The differences in the input data as compared to those in Appendix B are discussed for these representative cases and apply to other cases also. These representative cases are Case 1 for riser 10 and Case 7 for riser RB2.

Figures G-3 and G-4 give the Riser # 10 USLAM input data file for Case 1 and Riser RB2 USLAM input data for Case 7.

Comparing the input data file in Figure G-3 with the data file in Appendix B (Case1) for riser # 10, one can see that there are differences in Figure G-3 in: 1) Link data for Links 395 to 398, 470 to 480, and added Links 497 & 498; 2) Plot point data; 3) Data for specifying pipe run segments for force calculation; and 4) deluge valve opening time of 1 second (Reference G-2). For other cases analyzed for riser 10 (Cases 2 through 9), the same changes are made to the relevant input data files.

Comparing the input data file in Figure G-4 with the data file in Appendix B (Case7) for riser RB2, one can see that there are differences in Figure G-4 in: 1) Link data for Links 395 to 398, 470 to 476, 478 to 480, 496, and added Links 497 & 498; 2) Plot point data; 3) Data for specifying pipe run segments for forces; and 4) deluge valve opening time of 1 second (Reference G-2). For other cases analyzed for riser RB2 (Cases 8 and 9), the same changes are made to the relevant input data files.

For both risers, the link data in the riser 10 and RB2 areas correspond to the piping geometry and dimensions in Figures G-1 and G-2. There are no changes in other areas. The pipe run segment data for these risers also correspond to the pipe runs shown in Figures G-1 and G-2.

## G4 Analysis Results and Discussion

As was done in the Revision 0 analysis, the USLAM code was run with the input data file for Riser # 10 for a total of 9 (Case 1 to Case 9) cases. For riser RB2, Cases 7, 8, and 9 were run. Note that Riser RB2 piping is valved out for Cases 1 to 6.

Tables G-1 and G-2 show the calculated peak pressures for high elevation risers using the revised USLAM input data for the two risers and 9 analysis cases for the risers with vacuum breakers and without vacuum breakers, respectively. These correspond to Tables 7 and 8 in Rev. 0 of this calculation. Comparing these tables, one can see that the peak pressures are not very different when more detailed models are used for risers 10 and RB2. Some differences are expected as any change in the model will affect the entire model response, but the peak pressures are lower in Risers 10 and RB2 which are modeled in more detail (therefore more accurately) and by using a slower deluge valve opening time. For example, the peak pressure in riser 10 was about 684 psia for Case 4 and 498 psia for Case 5. It is now 468 psia and 457, respectively. In RB2, the peak pressure for case 9 was 519 psia and is now 332 psia.

Figures G-5 through G-12 show sample plots of pressure and velocity time histories for the two risers. These compare reasonably well with the Phase 3 corresponding plots. For example, Figures 22 and G-5 (pressure head for Case 4 Riser # 10) compare well considering that the peak values are different as discussed above.

Figure G-13 show sample plot of forcing function for Case 5 Riser # 10 segment 6 (largest force in this riser). Figure G-14 show sample plot of forcing function for Case 7 Riser RB2 segment 5 (largest force in this riser). The full set of forcing functions is documented in the structural analysis calculations in Reference G-3.

## G5 Conclusions

The generation of forcing functions for Risers 10 and RB2 are documented in this appendix as Phase 4 analysis. These risers are modeled in more detail as compared to in Phase 3 analysis models documented in the main body of the calculation. The forcing functions in this appendix are used in the follow-up structural analysis of these risers documented in References G-3 and G-4. Plots of pressure and velocity time histories show that the results are reasonable and compare well with the corresponding plots for Phase 3 analysis.

## G6 References

G-1 PSEG Purchase Order 450086193/2 (Phase 4) Change Order

G-2 Data sheet for Deluge valve (see Figure G-15 in this Appendix)

G-3 Riser RB2 Structural Calculation Number 8038-P0007, Rev. 0.

G-4 Riser #10 Structural Calculation Number 8038-P0008, Rev. 0

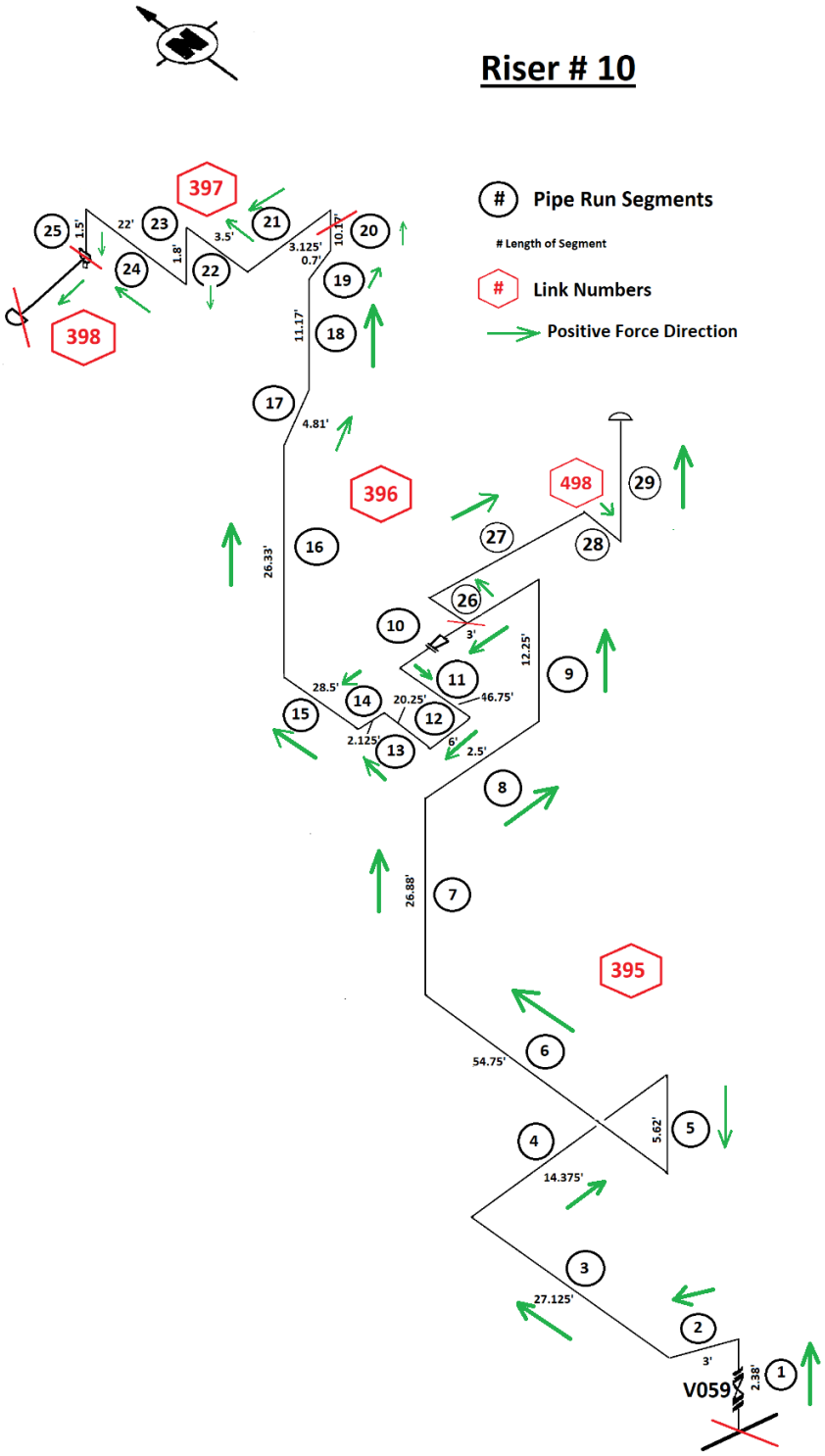


**Figure G-1: Piping geometry, lengths, Pipe Segments, and USLAM Link numbers for Riser # 10**

# CALCULATION SHEET

| | | | |
|---|---|---|---|
| Project: | HOPE CREEK GENERATING STATION | Job Number: | 8038 |
| Calc No. | 8038-P0004 | Sheet No. | 273 |
| By: | A. Arastu Date: 9/14/18 | Rev. No. | 1 |
| Subject: | Water Hammer Analysis of the HCGS Fire Protection System | | |

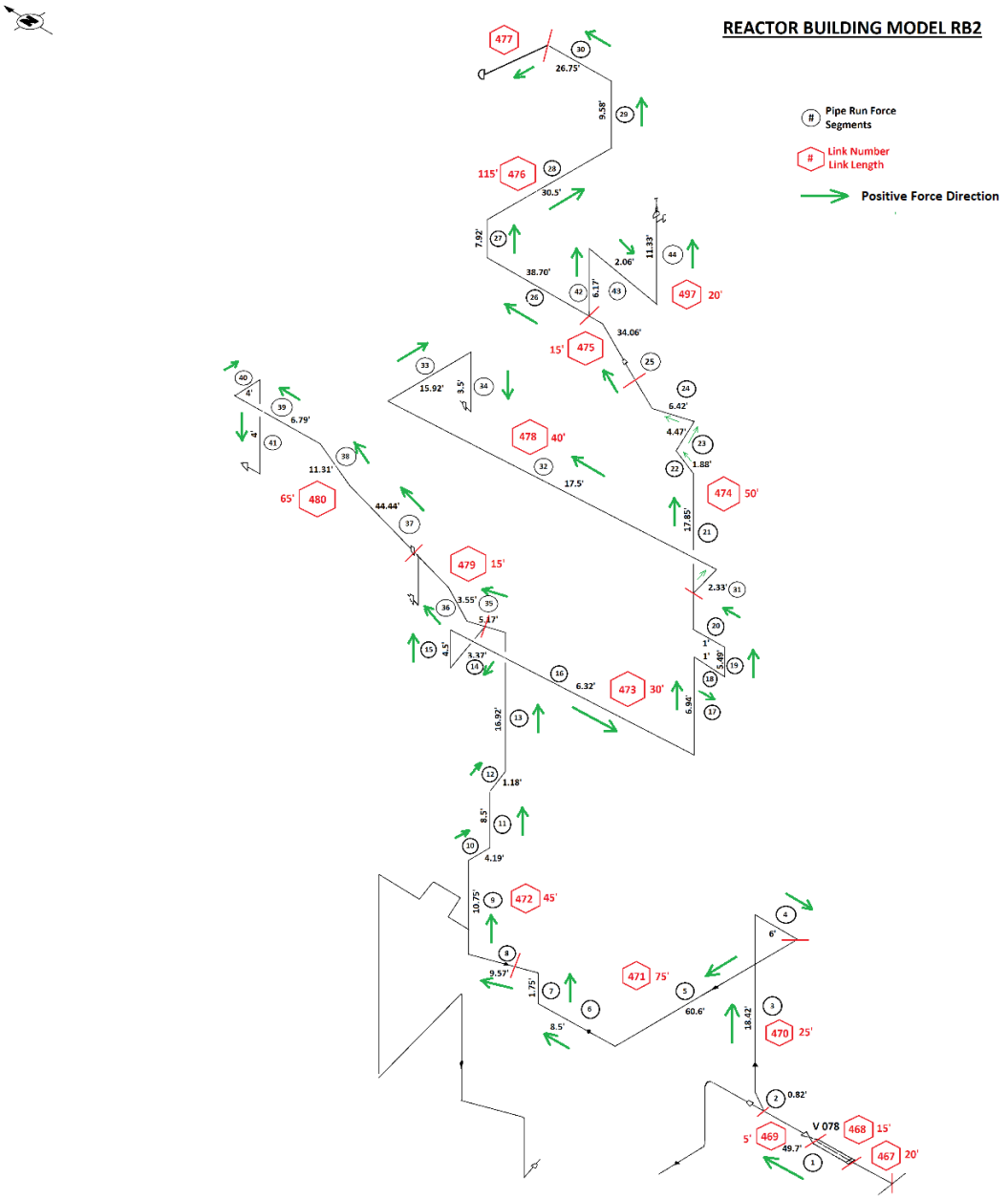


**Figure G-2: Piping geometry, Lengths, Pipe Segments, and USLAM Link numbers for Riser #RB2**

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# CALCULATION SHEET

| | | | |
|---|---|---|---|
| Project: | HOPE CREEK GENERATING STATION | Job Number: | 8038 |
| Calc No. | 8038-P0004 | Sheet No. | 274 |
| By: | A. Arastu Date: 9/14/18 | Rev. No. | 1 |
| Subject: | Water Hammer Analysis of the HCGS Fire Protection System | | |

```
HCGS FP Case 1: 9 VBs.  Forces in Riser # 10 only
10000
0  0  1  0  1  0
2   2   0.  12.
2   1   0   0
0   1   0  0  0  0  0  1 0 0
1.9  62.4  7.83E-6
1.0  2   13    0    0
       0.0    1000.0    2000.0   2.0E+04   6.0E+04   1.0E+05   3.0E+05   6.0E+05
   1.0E+06   1.5E+06   3.5E+06   1.0E+11   1.0E+33
      0.10      0.061     0.048     0.026     0.021      .019    0.0167    0.0155
    0.0150    0.0147     0.014     0.014     0.014
495.3   3  17  0    0
  -10.00   .000   .557  1.114  1.671  2.228  2.785  3.342
   3.899  4.456  5.013  5.570  6.127  6.684  7.241  8.912
   13.4
   495.3  495.3     494.3     492.3     491.3     488.3     485.3     481.3
   477.3  472.3     466.3     459.3     448.3     436.3     423.3     375.3
   170.3
   1
   1    1.104000     55.00    5.492   4      99.400    94.000     2     0.00000   0   2     0   4000.00       0.00
   2    1.000000     20.00    7.400   4      94.000   105.040     2     0.00000   1   3     0   4000.00       0.00
   3    1.000000     10.00    7.180   4     105.040   105.040     2     0.00000   2   4     0   4000.00       0.00
   4    1.000000     10.00    3.538   2     105.040   104.500     2     0.00000   3   5     0   4000.00       0.00
   5    1.000000      5.00   18.508  13     104.500   104.750     2     0.00000   4   6     0   4000.00       0.00
   6    1.000000     10.00    5.200   4     104.750   110.000     2     0.00000   5   7     0   4000.00       0.00
   7    1.000000     20.00    3.400   3     110.000   105.000     2     0.00000   6   8     0   4000.00       0.00
   8    1.000000    115.00    2.402   3     105.000    96.900     2     0.00000   7  86     0   4000.00       0.00
   9    1.007000      5.00    2.611   4      96.900    96.900     2     0.00000   8  10     0   4000.00       0.00
  10    1.007000     10.00    3.014   4      96.900    96.900     2     0.00000   9  11     0   4000.00       0.00
  11    1.007000     10.00    1.806   4      96.900    96.900     2     0.00000  10  12     0   4000.00       0.00
  12    1.007000     10.00    3.014   3      96.900    96.900     2     0.00000  11  13     0   4000.00       0.00
  13    1.007000    110.00    1.183   4      96.900    96.900     2     0.00000  12  14     0   4000.00       0.00
  14    1.007000    110.00    1.363   4      96.900    95.900     2     0.00000  13  15     0   4000.00       0.00
  15    1.007000     10.00    3.014   4      95.900    95.900     2     0.00000  14  16     0   4000.00       0.00
  16    1.007000     30.00    1.671   4      95.900    95.900     2     0.00000  15  17     0   4000.00       0.00
  17    1.007000     80.00    1.252   4      95.900    95.900     2     0.00000  16  18     0   4000.00       0.00
  18    1.007000     20.00    1.403   4      95.900    95.900     2     0.00000  17  19     0   4000.00       0.00
  19    1.007000    130.00    1.155   4      95.900    95.900     2     0.00000  18  20     0   4000.00       0.00
  20    1.007000    135.00    1.060   4      95.900    95.400     2     0.00000  19  21     0   4000.00       0.00
  21    1.007000     10.00    2.994   4      95.400    93.500     2     0.00000  20  22     0   4000.00       0.00
  22    1.007000     65.00    1.217   4      93.500    93.500     2     0.00000  21  23     0   4000.00       0.00
  23    1.007000      5.00    1.000   4      93.500    93.500     2     0.00000  22  24     0   4000.00       0.00
  24    1.007000     20.00    3.004   4      93.500    97.000     2     0.00000  23  25     0   4000.00       0.00
  25    1.007000    200.00    1.300   4      97.000    97.000     2     0.00000  24  26     0   4000.00       0.00
  26    1.007000     55.00    1.513   4      97.000    97.000     2     0.00000  25  27     0   4000.00       0.00
  27    1.007000     20.00    1.997   4      97.000    93.000     2     0.00000  26  28     0   4000.00       0.00
  28    1.007000    230.00    1.088   3      93.000    93.000     2     0.00000  27 181     0   4000.00       0.00
  29    1.007000     40.00    1.503   3      93.000    93.000     2     0.00000  28  30     0   4000.00       0.00
  30    1.007000    240.00    1.117   4      93.000    94.500     2     0.00000  29  31     0   4000.00       0.00
  31    1.007000     45.00    1.448   4      94.500    94.500     2     0.00000  30  32     0   4000.00       0.00
  32    1.007000     35.00    1.570   4      94.500    91.000     2     0.00000  31  33     0   4000.00       0.00
  33    1.007000    180.00    1.111   4      91.000    96.000     2     0.00000  32  34     0   4000.00       0.00
  34    1.007000     10.00    3.014   4      96.000    96.000     2     0.00000  33  35     0   4000.00       0.00
  35    1.007000      5.00    5.028   4      96.000    96.000     2     0.00000  34  36     0   4000.00       0.00
  36    1.007000      5.00    2.611   4      96.000    96.000     2     0.00000  35  37     0   4000.00       0.00
  37    1.007000     10.00    3.014   4      96.000    96.000     2     0.00000  36  38     0   4000.00       0.00
  38    1.007000     30.00    2.141   4      96.000    96.000     2     0.00000  37  39     0   4000.00       0.00
  39    1.007000     20.00    1.403   4      96.000    96.000     2     0.00000  38  40     0   4000.00       0.00
  40    1.007000     80.00    1.252   3      96.000    96.000     2     0.00000  39  41     0   4000.00       0.00
  41    1.007000     10.00    1.806   4      96.000    96.000     2     0.00000  40  42     0   4000.00       0.00
  42    1.007000     20.00    1.000   4      96.000    96.000     2     0.00000  41  43     0   4000.00       0.00
  43    1.007000     55.00    1.363   4      96.000    97.200     2     0.00000  42  44     0   4000.00       0.00
  44    1.007000      5.00    5.028   4      97.200    97.200     2     0.00000  43  45     0   4000.00       0.00
  45    1.007000    160.00    1.175   4      97.200    96.200     2     0.00000  44  46     0   4000.00       0.00
  46    1.007000     15.00    2.343   3      96.200    96.200     2     0.00000  45 162     0   4000.00       0.00
  47    1.007000      5.00    5.028   4      96.200    96.200     2     0.00000  46  48     0   4000.00       0.00
  48    1.007000     15.00    6.357   4      96.200    97.000     2     0.00000  47  49     0   4000.00       0.00
  49    1.007000     60.00    1.166   4      97.000    97.000     2     0.00000  48  50     0   4000.00       0.00
  50    1.007000     15.00    2.994   4      97.000    94.500     2     0.00000  49  51     0   4000.00       0.00
  51    1.007000      5.00    4.605   4      94.500    97.000     2     0.00000  50  52     0   4000.00       0.00
  52    1.007000     15.00    2.329   4      97.000    94.000     2     0.00000  51  53     0   4000.00       0.00
  53    1.007000     80.00    1.501   4      94.000    96.500     2     0.00000  52  54     0   4000.00       0.00
  54    1.007000     65.00    1.310   3      96.500    96.500     2     0.00000  53  55     0   4000.00       0.00
  55    1.007000     50.00    1.481   4      96.500    97.200     2     0.00000  54  56     0   4000.00       0.00
  56    1.007000     25.00    1.322   4      97.200    97.200     2     0.00000  55  57     0   4000.00       0.00
  57    1.007000      5.00    3.820   4      97.200    97.200     2     0.00000  56  58     0   4000.00       0.00
  58    1.007000     70.00    1.288   4      97.200    97.200     2     0.00000  57  59     0   4000.00       0.00
  59    1.007000     10.00    1.806   4      97.200    97.200     2     0.00000  58  60     0   4000.00       0.00
  60    1.007000    195.00    1.103   4      97.200    97.200     2     0.00000  59  61     0   4000.00       0.00
  61    1.007000    240.00    1.159   4      97.200    94.500     2     0.00000  60  62     0   4000.00       0.00
  62    1.007000    215.00    1.094   4      94.500    94.500     2     0.00000  61  63     0   4000.00       0.00
  63    1.007000    110.00    1.183   4      94.500    94.500     2     0.00000  62  64     0   4000.00       0.00
  64    1.007000    195.00    1.103   4      94.500    94.500     2     0.00000  63  65     0   4000.00       0.00
  65    1.007000      5.00    5.028   4      94.500    94.500     2     0.00000  64  66     0   4000.00       0.00
  66    1.007000     30.00    1.665   4      94.500    95.800     2     0.00000  65  67     0   4000.00       0.00
  67    1.007000      5.00    2.611   4      95.800    95.800     2     0.00000  66  68     0   4000.00       0.00
  68    1.007000     25.00    1.806   3      95.800    95.800     2     0.00000  67 229     0   4000.00       0.00
  69    1.007000    130.00    1.155   4      95.800    95.500     2     0.00000  68  70     0   4000.00       0.00
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# CALCULATION SHEET

| | | | |
|---|---|---|---|
| Project: | HOPE CREEK GENERATING STATION | Job Number: | 8038 |
| Calc No. | 8038-P0004 | Sheet No. | 275 |
| By: | A. Arastu Date: 9/14/18 | Rev. No. | 1 |
| Subject: | Water Hammer Analysis of the HCGS Fire Protection System | | |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 70 | 1.007000 | 5.00 | 2.611 | 3 | 95.500 | 95.500 | 2 | 0.00000 | 69 | 261 | 0 | 4000.00 | 0.00 |
| 71 | 1.007000 | 5.00 | 5.028 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 70 | 72 | 0 | 4000.00 | 0.00 |
| 72 | 1.007000 | 5.00 | 2.611 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 71 | 73 | 0 | 4000.00 | 0.00 |
| 73 | 1.007000 | 205.00 | 1.098 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 72 | 74 | 0 | 4000.00 | 0.00 |
| 74 | 1.007000 | 240.00 | 1.117 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 73 | 75 | 0 | 4000.00 | 0.00 |
| 75 | 1.007000 | 20.00 | 4.021 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 74 | 76 | 0 | 4000.00 | 0.00 |
| 76 | 1.007000 | 30.00 | 1.665 | 4 | 95.500 | 91.500 | 2 | 0.00000 | 75 | 77 | 0 | 4000.00 | 0.00 |
| 77 | 1.007000 | 25.00 | 2.120 | 4 | 91.500 | 97.000 | 2 | 0.00000 | 76 | 78 | 0 | 4000.00 | 0.00 |
| 78 | 1.007000 | 50.00 | 1.403 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 77 | 79 | 0 | 4000.00 | 0.00 |
| 79 | 1.007000 | 50.00 | 1.403 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 78 | 80 | 0 | 4000.00 | 0.00 |
| 80 | 1.007000 | 20.00 | 1.997 | 4 | 97.000 | 90.500 | 2 | 0.00000 | 79 | 81 | 0 | 4000.00 | 0.00 |
| 81 | 1.007000 | 40.00 | 2.002 | 4 | 90.500 | 96.900 | 2 | 0.00000 | 80 | 82 | 0 | 4000.00 | 0.00 |
| 82 | 1.007000 | 165.00 | 1.122 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 81 | 83 | 0 | 4000.00 | 0.00 |
| 83 | 1.007000 | 135.00 | 1.060 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 82 | 84 | 0 | 4000.00 | 0.00 |
| 84 | 1.007000 | 10.00 | 3.014 | 3 | 96.900 | 96.900 | 2 | 0.00000 | 83 | 101 | 0 | 4000.00 | 0.00 |
| 85 | 1.007000 | 60.00 | 1.134 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 84 | 86 | 0 | 4000.00 | 0.00 |
| 86 | 1.007000 | 5.00 | 5.028 | 3 | 96.900 | 96.900 | 2 | 0.00000 | 85 | 9 | 1 | 4000.00 | 0.00 |
| 87 | 0.336000 | 10.00 | 5.771 | 3 | 105.000 | 112.070 | 2 | 0.00000 | 7 | 88 | 0 | 4000.00 | 0.00 |
| 88 | 0.336000 | 5.00 | 5.570 | 4 | 112.070 | 113.750 | 2 | 0.00000 | 87 | 89 | 0 | 4000.00 | 0.00 |
| 89 | 0.256000 | 30.00 | 1.870 | 4 | 113.750 | 109.000 | 2 | 0.00000 | 88 | 90 | 0 | 4000.00 | 0.00 |
| 90 | 0.256000 | 10.00 | 1.205 | 2 | 109.000 | 104.250 | 2 | 0.00000 | 89 | 91 | 0 | 4000.00 | 0.00 |
| 91 | 0.256000 | 5.00 | 5.933 | 1 | 104.250 | 103.750 | 2 | 0.00000 | 90 | 0 | 0 | 4000.00 | 0.00 |
| 92 | 0.336000 | 40.00 | 2.714 | 3 | 112.070 | 105.000 | 2 | 0.00000 | 87 | 93 | 0 | 4000.00 | 0.00 |
| 93 | 1.000000 | 20.00 | 3.400 | 4 | 105.000 | 110.200 | 2 | 0.00000 | 92 | 94 | 0 | 4000.00 | 0.00 |
| 94 | 1.000000 | 10.00 | 3.800 | 4 | 110.200 | 104.750 | 2 | 0.00000 | 93 | 95 | 0 | 4000.00 | 0.00 |
| 95 | 1.000000 | 5.00 | 18.508 | 4 | 104.750 | 104.750 | 2 | 0.00000 | 94 | 96 | 0 | 4000.00 | 0.00 |
| 96 | 1.000000 | 10.00 | 3.538 | 2 | 104.750 | 104.750 | 2 | 0.00000 | 95 | 97 | 0 | 4000.00 | 0.00 |
| 97 | 1.000000 | 5.00 | 9.400 | 4 | 104.750 | 105.040 | 2 | 0.00000 | 96 | 98 | 0 | 4000.00 | 0.00 |
| 98 | 1.000000 | 20.00 | 7.400 | 4 | 105.040 | 94.000 | 2 | 0.00000 | 97 | 99 | 0 | 4000.00 | 0.00 |
| 99 | 1.104000 | 30.00 | 4.874 | 1 | 94.000 | 99.400 | 2 | 0.00000 | 98 | 0 | 0 | 4000.00 | 0.00 |
| 100 | 1.000000 | 85.00 | 1.864 | 4 | 105.000 | 91.000 | 2 | 0.00000 | 92 | 101 | 0 | 4000.00 | 0.00 |
| 101 | 1.000000 | 25.00 | 4.512 | 3 | 91.000 | 96.900 | 2 | 0.00000 | 100 | 85 | 1 | 4000.00 | 0.00 |
| 102 | 0.835000 | 5.00 | 12.356 | 2 | 96.000 | 96.000 | 2 | 0.00000 | 40 | 103 | 0 | 4000.00 | 0.00 |
| 103 | 0.788000 | 60.00 | 1.628 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 102 | 104 | 0 | 4000.00 | 0.00 |
| 104 | 0.788000 | 100.00 | 1.000 | 4 | 96.000 | 95.500 | 2 | 0.00000 | 103 | 105 | 0 | 4000.00 | 0.00 |
| 105 | 0.788000 | 100.00 | 1.000 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 104 | 106 | 0 | 4000.00 | 0.00 |
| 106 | 0.788000 | 30.00 | 2.786 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 105 | 107 | 0 | 4000.00 | 0.00 |
| 107 | 0.927000 | 35.00 | 2.059 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 106 | 108 | 0 | 4000.00 | 0.00 |
| 108 | 0.927000 | 150.00 | 1.494 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 107 | 109 | 0 | 4000.00 | 0.00 |
| 109 | 0.927000 | 50.00 | 1.519 | 3 | 95.500 | 95.500 | 2 | 0.00000 | 108 | 110 | 0 | 4000.00 | 0.00 |
| 110 | 0.927000 | 20.00 | 2.298 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 109 | 111 | 0 | 4000.00 | 0.00 |
| 111 | 0.927000 | 10.00 | 7.860 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 110 | 112 | 0 | 4000.00 | 0.00 |
| 112 | 1.000000 | 10.00 | 9.000 | 4 | 95.500 | 101.700 | 2 | 0.00000 | 111 | 113 | 0 | 4000.00 | 0.00 |
| 113 | 1.000000 | 5.00 | 5.400 | 4 | 101.700 | 102.800 | 2 | 0.00000 | 112 | 114 | 0 | 4000.00 | 0.00 |
| 114 | 1.000000 | 10.00 | 12.354 | 2 | 102.800 | 102.800 | 2 | 0.00000 | 113 | 115 | 0 | 4000.00 | 0.00 |
| 115 | 1.000000 | 5.00 | 8.877 | 4 | 102.800 | 102.800 | 2 | 0.00000 | 114 | 116 | 0 | 4000.00 | 0.00 |
| 116 | 1.000000 | 5.00 | 5.000 | 4 | 102.800 | 102.800 | 2 | 0.00000 | 115 | 117 | 0 | 4000.00 | 0.00 |
| 117 | 1.250000 | 30.00 | 3.333 | 1 | 102.800 | 103.000 | 2 | 0.00000 | 116 | 0 | 0 | 4000.00 | 0.00 |
| 118 | 0.927000 | 10.00 | 6.562 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 109 | 119 | 0 | 4000.00 | 0.00 |
| 119 | 1.000000 | 10.00 | 2.400 | 3 | 95.500 | 101.700 | 2 | 0.00000 | 118 | 120 | 0 | 4000.00 | 0.00 |
| 120 | 1.000000 | 5.00 | 7.800 | 4 | 101.700 | 102.800 | 2 | 0.00000 | 119 | 121 | 0 | 4000.00 | 0.00 |
| 121 | 1.000000 | 10.00 | 13.154 | 2 | 102.800 | 102.800 | 2 | 0.00000 | 120 | 122 | 0 | 4000.00 | 0.00 |
| 122 | 1.000000 | 10.00 | 8.938 | 4 | 102.800 | 102.800 | 2 | 0.00000 | 121 | 123 | 0 | 4000.00 | 0.00 |
| 123 | 1.250000 | 20.00 | 3.250 | 1 | 102.800 | 103.000 | 2 | 0.00000 | 122 | 0 | 0 | 4000.00 | 0.00 |
| 124 | 0.134000 | 5.00 | 3.624 | 4 | 101.700 | 101.700 | 2 | 0.00000 | 119 | 125 | 0 | 4000.00 | 0.00 |
| 125 | 0.134000 | 5.00 | 3.141 | 4 | 101.700 | 101.700 | 2 | 0.00000 | 124 | 126 | 0 | 4000.00 | 0.00 |
| 126 | 0.134000 | 5.00 | 1.000 | 2 | 101.700 | 101.700 | 2 | 0.00000 | 125 | 127 | 0 | 4000.00 | 0.00 |
| 127 | 0.134000 | 10.00 | 1.000 | 4 | 101.700 | 101.700 | 2 | 0.00000 | 126 | 128 | 0 | 4000.00 | 0.00 |
| 128 | 0.134000 | 10.00 | 1.000 | 4 | 101.700 | 101.700 | 2 | 0.00000 | 127 | 129 | 0 | 4000.00 | 0.00 |
| 129 | 0.134000 | 10.00 | 1.000 | 1 | 101.700 | 103.000 | 2 | 0.00000 | 128 | 0 | 0 | 4000.00 | 0.00 |
| 130 | 0.835000 | 5.00 | 11.020 | 4 | 93.000 | 93.000 | 2 | 0.00000 | 29 | 131 | 0 | 4000.00 | 0.00 |
| 131 | 0.835000 | 100.00 | 1.331 | 4 | 93.000 | 96.010 | 2 | 0.00000 | 130 | 132 | 0 | 4000.00 | 0.00 |
| 132 | 0.835000 | 25.00 | 1.267 | 4 | 96.010 | 96.010 | 2 | 0.00000 | 131 | 133 | 0 | 4000.00 | 0.00 |
| 133 | 0.835000 | 65.00 | 1.000 | 4 | 96.010 | 96.000 | 2 | 0.00000 | 132 | 134 | 0 | 4000.00 | 0.00 |
| 134 | 0.835000 | 20.00 | 2.653 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 133 | 135 | 0 | 4000.00 | 0.00 |
| 135 | 0.835000 | 105.00 | 1.382 | 3 | 96.000 | 89.000 | 2 | 0.00000 | 134 | 136 | 0 | 4000.00 | 0.00 |
| 136 | 0.835000 | 5.00 | 3.338 | 4 | 89.000 | 89.000 | 2 | 0.00000 | 135 | 137 | 0 | 4000.00 | 0.00 |
| 137 | 0.835000 | 50.00 | 1.334 | 3 | 89.000 | 89.000 | 2 | 0.00000 | 136 | 138 | 0 | 4000.00 | 0.00 |
| 138 | 0.835000 | 5.00 | 5.676 | 4 | 89.000 | 89.000 | 2 | 0.00000 | 137 | 139 | 0 | 4000.00 | 0.00 |
| 139 | 0.835000 | 5.00 | 4.340 | 3 | 89.000 | 89.000 | 2 | 0.00000 | 138 | 140 | 0 | 4000.00 | 0.00 |
| 140 | 0.835000 | 55.00 | 1.000 | 4 | 89.000 | 89.000 | 2 | 0.00000 | 139 | 141 | 0 | 4000.00 | 0.00 |
| 141 | 0.835000 | 25.00 | 1.668 | 3 | 89.000 | 89.000 | 2 | 0.00000 | 140 | 142 | 0 | 4000.00 | 0.00 |
| 142 | 0.835000 | 15.00 | 2.882 | 4 | 89.000 | 91.940 | 2 | 0.00000 | 141 | 143 | 0 | 4000.00 | 0.00 |
| 143 | 0.835000 | 25.00 | 1.668 | 3 | 91.940 | 91.940 | 2 | 0.00000 | 142 | 144 | 0 | 4000.00 | 0.00 |
| 144 | 0.835000 | 5.00 | 5.676 | 3 | 91.940 | 91.940 | 2 | 0.00000 | 143 | 145 | 0 | 4000.00 | 0.00 |
| 145 | 0.835000 | 5.00 | 4.340 | 3 | 91.940 | 91.940 | 2 | 0.00000 | 144 | 146 | 0 | 4000.00 | 0.00 |
| 146 | 0.835000 | 10.00 | 3.338 | 4 | 91.940 | 96.200 | 2 | 0.00000 | 145 | 147 | 0 | 4000.00 | 0.00 |
| 147 | 0.835000 | 5.00 | 3.338 | 4 | 96.200 | 96.200 | 2 | 0.00000 | 146 | 148 | 0 | 4000.00 | 0.00 |
| 148 | 0.835000 | 145.00 | 1.000 | 4 | 96.200 | 96.200 | 2 | 0.00000 | 147 | 149 | 0 | 4000.00 | 0.00 |
| 149 | 0.835000 | 10.00 | 2.670 | 4 | 96.200 | 96.200 | 2 | 0.00000 | 148 | 150 | 0 | 4000.00 | 0.00 |
| 150 | 0.835000 | 90.00 | 1.186 | 3 | 96.200 | 96.200 | 2 | 0.00000 | 149 | 151 | 0 | 4000.00 | 0.00 |
| 151 | 0.835000 | 5.00 | 5.676 | 4 | 96.200 | 94.530 | 2 | 0.00000 | 150 | 152 | 0 | 4000.00 | 0.00 |
| 152 | 0.835000 | 15.00 | 2.664 | 3 | 94.530 | 94.530 | 2 | 0.00000 | 151 | 153 | 0 | 4000.00 | 0.00 |
| 153 | 0.835000 | 5.00 | 2.336 | 4 | 94.530 | 94.530 | 2 | 0.00000 | 152 | 154 | 0 | 4000.00 | 0.00 |
| 154 | 0.835000 | 5.00 | 4.340 | 3 | 94.530 | 94.540 | 2 | 0.00000 | 153 | 155 | 0 | 4000.00 | 0.00 |
| 155 | 0.835000 | 15.00 | 2.559 | 3 | 94.540 | 94.540 | 2 | 0.00000 | 154 | 156 | 0 | 4000.00 | 0.00 |
| 156 | 0.835000 | 5.00 | 4.340 | 3 | 94.540 | 94.540 | 2 | 0.00000 | 155 | 157 | 0 | 4000.00 | 0.00 |
| 157 | 0.835000 | 5.00 | 3.338 | 4 | 94.540 | 94.540 | 2 | 0.00000 | 156 | 158 | 0 | 4000.00 | 0.00 |
| 158 | 0.835000 | 5.00 | 3.338 | 3 | 94.540 | 94.500 | 2 | 0.00000 | 157 | 159 | 0 | 4000.00 | 0.00 |
| 159 | 0.835000 | 5.00 | 4.340 | 4 | 94.500 | 94.500 | 2 | 0.00000 | 158 | 160 | 0 | 4000.00 | 0.00 |
| 160 | 0.835000 | 55.00 | 1.425 | 3 | 94.500 | 94.500 | 2 | 0.00000 | 159 | 161 | 0 | 4000.00 | 0.00 |

# CALCULATION SHEET

| | | | |
|---|---|---|---|
| Project: | HOPE CREEK GENERATING STATION | Job Number: | 8038 |
| Calc No. | 8038-P0004 | Sheet No. | 276 |
| By: | A. Arastu Date: 9/14/18 | Rev. No. | 1 |
| Subject: | Water Hammer Analysis of the HCGS Fire Protection System | | |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 161 | 0.835000 | 175.00 | 1.286 | 4 | 94.500 | 96.200 | 2 | 0.00000 | 160 | 162 | 0 | 4000.00 | 0.00 |
| 162 | 0.835000 | 100.00 | 1.568 | 3 | 96.200 | 96.200 | 2 | 0.00000 | 161 | 47 | 1 | 4000.00 | 0.00 |
| 163 | 0.835000 | 10.00 | 3.338 | 4 | 94.500 | 91.750 | 2 | 0.00000 | 160 | 164 | 0 | 4000.00 | 0.00 |
| 164 | 0.835000 | 40.00 | 1.413 | 4 | 91.750 | 89.580 | 2 | 0.00000 | 163 | 165 | 0 | 4000.00 | 0.00 |
| 165 | 0.835000 | 25.00 | 3.071 | 4 | 89.580 | 89.580 | 2 | 0.00000 | 164 | 166 | 0 | 4000.00 | 0.00 |
| 166 | 0.835000 | 5.00 | 4.340 | 3 | 89.580 | 89.580 | 2 | 0.00000 | 165 | 167 | 0 | 4000.00 | 0.00 |
| 167 | 0.835000 | 5.00 | 1.000 | 16 | 89.580 | 89.580 | 2 | 0.00000 | 166 | 0 | 0 | 4000.00 | 0.00 |
| 168 | 0.835000 | 5.00 | 13.358 | 4 | 89.000 | 91.000 | 2 | 0.00000 | 141 | 169 | 0 | 4000.00 | 0.00 |
| 169 | 0.835000 | 35.00 | 2.002 | 3 | 91.000 | 91.000 | 2 | 0.00000 | 168 | 170 | 0 | 4000.00 | 0.00 |
| 170 | 0.835000 | 10.00 | 4.340 | 3 | 91.000 | 91.000 | 2 | 0.00000 | 169 | 171 | 0 | 4000.00 | 0.00 |
| 171 | 0.835000 | 75.00 | 1.312 | 4 | 91.000 | 91.000 | 2 | 0.00000 | 170 | 172 | 0 | 4000.00 | 0.00 |
| 172 | 0.835000 | 45.00 | 2.002 | 3 | 91.000 | 91.000 | 2 | 0.00000 | 171 | 173 | 0 | 4000.00 | 0.00 |
| 173 | 0.835000 | 5.00 | 3.338 | 4 | 91.000 | 91.000 | 2 | 0.00000 | 172 | 174 | 0 | 4000.00 | 0.00 |
| 174 | 0.835000 | 15.00 | 1.779 | 4 | 91.000 | 96.040 | 2 | 0.00000 | 173 | 175 | 0 | 4000.00 | 0.00 |
| 175 | 0.835000 | 15.00 | 2.559 | 4 | 96.040 | 96.000 | 2 | 0.00000 | 174 | 176 | 0 | 4000.00 | 0.00 |
| 176 | 0.835000 | 95.00 | 1.176 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 175 | 177 | 0 | 4000.00 | 0.00 |
| 177 | 0.835000 | 55.00 | 1.213 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 176 | 178 | 0 | 4000.00 | 0.00 |
| 178 | 0.835000 | 5.00 | 3.338 | 4 | 96.000 | 91.000 | 2 | 0.00000 | 177 | 179 | 0 | 4000.00 | 0.00 |
| 179 | 0.835000 | 50.00 | 1.795 | 4 | 91.000 | 93.000 | 2 | 0.00000 | 178 | 180 | 0 | 4000.00 | 0.00 |
| 180 | 0.835000 | 80.00 | 1.146 | 4 | 93.000 | 93.000 | 2 | 0.00000 | 179 | 181 | 0 | 4000.00 | 0.00 |
| 181 | 0.835000 | 25.00 | 3.472 | 3 | 93.000 | 93.000 | 2 | 0.00000 | 180 | 29 | 1 | 4000.00 | 0.00 |
| 182 | 0.336000 | 45.00 | 1.866 | 3 | 91.000 | 96.000 | 2 | 0.00000 | 169 | 183 | 0 | 4000.00 | 0.00 |
| 183 | 0.336000 | 120.00 | 1.482 | 4 | 96.000 | 149.000 | 2 | 0.00000 | 182 | 184 | 0 | 4000.00 | 0.00 |
| 184 | 0.256000 | 205.00 | 1.092 | 16 | 149.000 | 142.500 | 2 | 0.00000 | 183 | 0 | 0 | 4000.00 | 0.00 |
| 185 | 0.256000 | 60.00 | 1.674 | 16 | 96.000 | 59.000 | 2 | 0.00000 | 182 | 0 | 0 | 4000.00 | 0.00 |
| 186 | 0.336000 | 10.00 | 4.427 | 3 | 91.000 | 94.800 | 2 | 0.00000 | 170 | 187 | 0 | 4000.00 | 0.00 |
| 187 | 0.336000 | 55.00 | 1.586 | 3 | 94.800 | 113.000 | 2 | 0.00000 | 186 | 188 | 0 | 4000.00 | 0.00 |
| 188 | 0.336000 | 230.00 | 1.231 | 4 | 113.000 | 146.000 | 2 | 0.00000 | 187 | 189 | 0 | 4000.00 | 0.00 |
| 189 | 0.256000 | 105.00 | 1.111 | 16 | 146.000 | 143.000 | 2 | 0.00000 | 188 | 0 | 0 | 4000.00 | 0.00 |
| 190 | 0.256000 | 100.00 | 1.297 | 16 | 94.800 | 83.700 | 2 | 0.00000 | 186 | 0 | 0 | 4000.00 | 0.00 |
| 191 | 0.256000 | 75.00 | 1.416 | 16 | 113.000 | 107.000 | 2 | 0.00000 | 187 | 0 | 0 | 4000.00 | 0.00 |
| 192 | 0.336000 | 5.00 | 7.854 | 4 | 91.000 | 95.000 | 2 | 0.00000 | 172 | 193 | 0 | 4000.00 | 0.00 |
| 193 | 0.336000 | 240.00 | 1.316 | 4 | 95.000 | 150.000 | 2 | 0.00000 | 192 | 194 | 0 | 4000.00 | 0.00 |
| 194 | 0.256000 | 180.00 | 1.105 | 16 | 150.000 | 142.000 | 2 | 0.00000 | 193 | 0 | 0 | 4000.00 | 0.00 |
| 195 | 0.665000 | 15.00 | 4.015 | 4 | 96.500 | 96.500 | 2 | 0.00000 | 54 | 196 | 0 | 4000.00 | 0.00 |
| 196 | 0.665000 | 11.00 | 2.197 | 4 | 96.500 | 94.500 | 2 | 0.00000 | 195 | 197 | 0 | 4400.00 | 0.00 |
| 197 | 0.665000 | 20.00 | 1.658 | 4 | 94.500 | 96.600 | 2 | 0.00000 | 196 | 198 | 0 | 4000.00 | 0.00 |
| 198 | 0.665000 | 115.00 | 1.000 | 4 | 96.600 | 96.600 | 2 | 0.00000 | 197 | 199 | 0 | 4000.00 | 0.00 |
| 199 | 0.665000 | 220.00 | 1.120 | 3 | 96.600 | 94.000 | 2 | 0.00000 | 198 | 200 | 0 | 4000.00 | 0.00 |
| 200 | 0.665000 | 20.00 | 2.862 | 4 | 94.000 | 94.750 | 2 | 0.00000 | 199 | 201 | 0 | 4000.00 | 0.00 |
| 201 | 0.665000 | 20.00 | 1.000 | 4 | 94.750 | 94.750 | 2 | 0.00000 | 200 | 202 | 0 | 4000.00 | 0.00 |
| 202 | 0.665000 | 20.00 | 2.197 | 4 | 94.750 | 94.750 | 2 | 0.00000 | 201 | 203 | 0 | 4000.00 | 0.00 |
| 203 | 0.665000 | 15.00 | 1.000 | 4 | 94.750 | 94.750 | 2 | 0.00000 | 202 | 204 | 0 | 4000.00 | 0.00 |
| 204 | 0.665000 | 30.00 | 1.973 | 3 | 94.750 | 84.100 | 2 | 0.00000 | 203 | 205 | 0 | 4000.00 | 0.00 |
| 205 | 0.665000 | 15.00 | 1.621 | 4 | 84.100 | 69.500 | 2 | 0.00000 | 204 | 206 | 0 | 4000.00 | 0.00 |
| 206 | 0.665000 | 15.00 | 1.887 | 3 | 69.500 | 69.500 | 2 | 0.00000 | 205 | 207 | 0 | 4000.00 | 0.00 |
| 207 | 0.665000 | 20.00 | 1.465 | 4 | 69.500 | 69.500 | 2 | 0.00000 | 206 | 208 | 0 | 4000.00 | 0.00 |
| 208 | 0.665000 | 20.00 | 4.125 | 3 | 69.500 | 61.750 | 2 | 0.00000 | 207 | 209 | 0 | 4000.00 | 0.00 |
| 209 | 0.665000 | 70.00 | 1.454 | 4 | 61.750 | 62.750 | 2 | 0.00000 | 208 | 210 | 0 | 4000.00 | 0.00 |
| 210 | 0.665000 | 5.00 | 6.320 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 209 | 211 | 0 | 4000.00 | 0.00 |
| 211 | 0.665000 | 50.00 | 1.293 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 210 | 212 | 0 | 4000.00 | 0.00 |
| 212 | 0.665000 | 20.00 | 2.330 | 3 | 62.750 | 62.750 | 2 | 0.00000 | 211 | 213 | 0 | 4000.00 | 0.00 |
| 213 | 0.665000 | 25.00 | 2.277 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 212 | 214 | 0 | 4000.00 | 0.00 |
| 214 | 0.665000 | 20.00 | 1.665 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 213 | 215 | 0 | 4000.00 | 0.00 |
| 215 | 0.665000 | 45.00 | 1.414 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 214 | 216 | 0 | 4000.00 | 0.00 |
| 216 | 0.665000 | 20.00 | 1.665 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 215 | 217 | 0 | 4000.00 | 0.00 |
| 217 | 0.665000 | 85.00 | 2.033 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 216 | 218 | 0 | 4000.00 | 0.00 |
| 218 | 0.665000 | 5.00 | 3.660 | 3 | 62.750 | 62.750 | 2 | 0.00000 | 217 | 219 | 0 | 4000.00 | 0.00 |
| 219 | 0.665000 | 25.00 | 2.649 | 3 | 62.750 | 66.000 | 2 | 0.00000 | 218 | 220 | 0 | 4000.00 | 0.00 |
| 220 | 0.665000 | 30.00 | 1.749 | 4 | 66.000 | 96.000 | 2 | 0.00000 | 219 | 221 | 0 | 4000.00 | 0.00 |
| 221 | 0.665000 | 20.00 | 1.329 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 220 | 222 | 0 | 4000.00 | 0.00 |
| 222 | 0.665000 | 5.00 | 4.977 | 4 | 96.000 | 94.400 | 2 | 0.00000 | 221 | 223 | 0 | 4000.00 | 0.00 |
| 223 | 0.665000 | 95.00 | 1.139 | 4 | 94.400 | 97.000 | 2 | 0.00000 | 222 | 224 | 0 | 4000.00 | 0.00 |
| 224 | 0.665000 | 35.00 | 1.646 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 223 | 225 | 0 | 4000.00 | 0.00 |
| 225 | 0.665000 | 65.00 | 1.614 | 4 | 97.000 | 96.500 | 2 | 0.00000 | 224 | 226 | 0 | 4000.00 | 0.00 |
| 226 | 0.665000 | 35.00 | 1.000 | 4 | 96.500 | 96.500 | 2 | 0.00000 | 225 | 227 | 0 | 4000.00 | 0.00 |
| 227 | 0.665000 | 35.00 | 1.830 | 4 | 96.500 | 94.200 | 2 | 0.00000 | 226 | 228 | 0 | 4000.00 | 0.00 |
| 228 | 0.665000 | 35.00 | 1.266 | 4 | 94.200 | 96.200 | 2 | 0.00000 | 227 | 229 | 0 | 4000.00 | 0.00 |
| 229 | 0.665000 | 120.00 | 1.377 | 3 | 96.200 | 95.800 | 2 | 0.00000 | 228 | 69 | 1 | 4000.00 | 0.00 |
| 230 | 0.665000 | 10.00 | 6.453 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 12 | 231 | 0 | 4000.00 | 0.00 |
| 231 | 0.665000 | 25.00 | 1.372 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 230 | 232 | 0 | 4000.00 | 0.00 |
| 232 | 0.665000 | 150.00 | 1.062 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 231 | 233 | 0 | 4000.00 | 0.00 |
| 233 | 0.665000 | 135.00 | 1.069 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 232 | 234 | 0 | 4000.00 | 0.00 |
| 234 | 0.665000 | 45.00 | 1.146 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 233 | 235 | 0 | 4000.00 | 0.00 |
| 235 | 0.665000 | 20.00 | 1.658 | 4 | 96.900 | 95.000 | 2 | 0.00000 | 234 | 236 | 0 | 4000.00 | 0.00 |
| 236 | 0.665000 | 35.00 | 1.564 | 4 | 95.000 | 95.500 | 2 | 0.00000 | 235 | 237 | 0 | 4000.00 | 0.00 |
| 237 | 0.665000 | 15.00 | 1.621 | 4 | 95.500 | 96.000 | 2 | 0.00000 | 236 | 238 | 0 | 4000.00 | 0.00 |
| 238 | 0.665000 | 30.00 | 1.621 | 4 | 96.000 | 72.000 | 2 | 0.00000 | 237 | 239 | 0 | 4000.00 | 0.00 |
| 239 | 0.665000 | 5.00 | 3.660 | 3 | 72.000 | 67.000 | 2 | 0.00000 | 238 | 240 | 0 | 4000.00 | 0.00 |
| 240 | 0.665000 | 75.00 | 1.497 | 4 | 67.000 | 64.250 | 2 | 0.00000 | 239 | 241 | 0 | 4000.00 | 0.00 |
| 241 | 0.665000 | 35.00 | 1.000 | 4 | 64.250 | 64.250 | 2 | 0.00000 | 240 | 242 | 0 | 4000.00 | 0.00 |
| 242 | 0.665000 | 65.00 | 1.286 | 4 | 64.250 | 61.750 | 2 | 0.00000 | 241 | 243 | 0 | 4000.00 | 0.00 |
| 243 | 0.665000 | 20.00 | 2.995 | 3 | 61.750 | 61.750 | 2 | 0.00000 | 242 | 244 | 0 | 4000.00 | 0.00 |
| 244 | 0.665000 | 5.00 | 2.064 | 4 | 61.750 | 61.750 | 2 | 0.00000 | 243 | 245 | 0 | 4000.00 | 0.00 |
| 245 | 0.665000 | 20.00 | 2.260 | 4 | 61.750 | 62.750 | 2 | 0.00000 | 244 | 246 | 0 | 4000.00 | 0.00 |
| 246 | 0.665000 | 15.00 | 1.887 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 245 | 247 | 0 | 4000.00 | 0.00 |
| 247 | 0.665000 | 10.00 | 2.330 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 246 | 248 | 0 | 4000.00 | 0.00 |
| 248 | 0.665000 | 15.00 | 1.887 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 247 | 249 | 0 | 4000.00 | 0.00 |
| 249 | 0.665000 | 35.00 | 1.380 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 248 | 250 | 0 | 4000.00 | 0.00 |
| 250 | 0.665000 | 100.00 | 1.000 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 249 | 251 | 0 | 4000.00 | 0.00 |
| 251 | 0.665000 | 10.00 | 3.647 | 4 | 62.750 | 62.500 | 2 | 0.00000 | 250 | 252 | 0 | 4000.00 | 0.00 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 252 | 0.665000 | 30.00 | 1.749 | 4 | 62.500 | 67.900 | 2 | 0.00000 | 251 | 253 | 0 | 4000.00 | 0.00 |
| 253 | 0.665000 | 30.00 | 1.310 | 4 | 67.900 | 96.000 | 2 | 0.00000 | 252 | 254 | 0 | 4000.00 | 0.00 |
| 254 | 0.665000 | 20.00 | 2.317 | 4 | 96.000 | 97.000 | 2 | 0.00000 | 253 | 255 | 0 | 4000.00 | 0.00 |
| 255 | 0.665000 | 145.00 | 1.000 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 254 | 256 | 0 | 4000.00 | 0.00 |
| 256 | 0.665000 | 35.00 | 1.752 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 255 | 257 | 0 | 4000.00 | 0.00 |
| 257 | 0.665000 | 60.00 | 1.110 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 256 | 258 | 0 | 4000.00 | 0.00 |
| 258 | 0.665000 | 40.00 | 1.165 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 257 | 259 | 0 | 4000.00 | 0.00 |
| 259 | 0.665000 | 5.00 | 3.660 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 258 | 260 | 0 | 4000.00 | 0.00 |
| 260 | 0.665000 | 45.00 | 1.118 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 259 | 261 | 0 | 4000.00 | 0.00 |
| 261 | 0.665000 | 15.00 | 4.538 | 3 | 97.000 | 95.500 | 2 | 0.00000 | 260 | 71 | 1 | 4000.00 | 0.00 |
| 262 | 0.505000 | 20.00 | 2.315 | 4 | 61.750 | 63.000 | 2 | 0.00000 | 243 | 263 | 0 | 4000.00 | 0.00 |
| 263 | 0.505000 | 10.00 | 3.318 | 4 | 63.000 | 56.000 | 2 | 0.00000 | 262 | 264 | 0 | 4000.00 | 0.00 |
| 264 | 0.505000 | 30.00 | 2.380 | 4 | 56.000 | 61.750 | 2 | 0.00000 | 263 | 265 | 0 | 4000.00 | 0.00 |
| 265 | 0.505000 | 5.00 | 3.020 | 3 | 61.750 | 62.900 | 2 | 0.00000 | 264 | 266 | 0 | 4000.00 | 0.00 |
| 266 | 0.505000 | 5.00 | 10.494 | 4 | 62.900 | 67.000 | 2 | 0.00000 | 265 | 267 | 0 | 4000.00 | 0.00 |
| 267 | 0.505000 | 5.00 | 3.828 | 4 | 67.000 | 67.000 | 2 | 0.00000 | 266 | 268 | 0 | 4000.00 | 0.00 |
| 268 | 0.505000 | 65.00 | 1.155 | 3 | 67.000 | 67.000 | 2 | 0.00000 | 267 | 269 | 0 | 4000.00 | 0.00 |
| 269 | 0.505000 | 15.00 | 1.000 | 4 | 67.000 | 67.000 | 2 | 0.00000 | 268 | 270 | 0 | 4000.00 | 0.00 |
| 270 | 0.505000 | 35.00 | 1.866 | 3 | 67.000 | 67.000 | 2 | 0.00000 | 269 | 271 | 0 | 4000.00 | 0.00 |
| 271 | 0.256000 | 25.00 | 1.143 | 4 | 67.000 | 67.000 | 2 | 0.00000 | 270 | 272 | 0 | 4000.00 | 0.00 |
| 272 | 0.256000 | 10.00 | 3.099 | 4 | 67.000 | 65.000 | 2 | 0.00000 | 271 | 273 | 0 | 4000.00 | 0.00 |
| 273 | 0.256000 | 55.00 | 1.289 | 16 | 65.000 | 94.500 | 2 | 0.00000 | 272 | 0 | 0 | 4000.00 | 0.00 |
| 274 | 0.505000 | 15.00 | 1.000 | 3 | 62.900 | 63.900 | 2 | 0.00000 | 265 | 275 | 0 | 4000.00 | 0.00 |
| 275 | 0.505000 | 15.00 | 1.741 | 3 | 63.900 | 68.200 | 2 | 0.00000 | 274 | 276 | 0 | 4000.00 | 0.00 |
| 276 | 0.336000 | 135.00 | 1.170 | 4 | 68.200 | 71.500 | 2 | 0.00000 | 275 | 277 | 0 | 4000.00 | 0.00 |
| 277 | 0.336000 | 40.00 | 1.773 | 16 | 71.500 | 61.500 | 2 | 0.00000 | 276 | 0 | 0 | 4000.00 | 0.00 |
| 278 | 0.336000 | 20.00 | 2.518 | 16 | 68.200 | 61.500 | 2 | 0.00000 | 275 | 0 | 0 | 4000.00 | 0.00 |
| 279 | 0.505000 | 85.00 | 2.305 | 4 | 69.500 | 68.750 | 2 | 0.00000 | 206 | 280 | 0 | 4000.00 | 0.00 |
| 280 | 0.505000 | 10.00 | 2.010 | 3 | 68.750 | 68.750 | 2 | 0.00000 | 279 | 281 | 0 | 4000.00 | 0.00 |
| 281 | 0.505000 | 45.00 | 1.382 | 4 | 68.750 | 68.750 | 2 | 0.00000 | 280 | 282 | 0 | 4000.00 | 0.00 |
| 282 | 0.505000 | 10.00 | 1.707 | 4 | 68.750 | 68.750 | 2 | 0.00000 | 281 | 283 | 0 | 4000.00 | 0.00 |
| 283 | 0.505000 | 70.00 | 1.447 | 3 | 68.750 | 68.750 | 2 | 0.00000 | 282 | 284 | 0 | 4000.00 | 0.00 |
| 284 | 0.505000 | 20.00 | 1.354 | 4 | 68.750 | 68.750 | 2 | 0.00000 | 283 | 285 | 0 | 4000.00 | 0.00 |
| 285 | 0.505000 | 5.00 | 2.414 | 4 | 68.750 | 65.500 | 2 | 0.00000 | 284 | 286 | 0 | 4000.00 | 0.00 |
| 286 | 0.505000 | 25.00 | 1.404 | 3 | 65.500 | 65.500 | 2 | 0.00000 | 285 | 287 | 0 | 4000.00 | 0.00 |
| 287 | 0.336000 | 65.00 | 1.868 | 4 | 65.500 | 113.000 | 2 | 0.00000 | 286 | 288 | 0 | 4000.00 | 0.00 |
| 288 | 0.336000 | 35.00 | 2.150 | 3 | 113.000 | 147.000 | 2 | 0.00000 | 287 | 289 | 0 | 4000.00 | 0.00 |
| 289 | 0.256000 | 55.00 | 1.419 | 4 | 147.000 | 178.000 | 2 | 0.00000 | 288 | 290 | 0 | 4000.00 | 0.00 |
| 290 | 0.256000 | 10.00 | 1.000 | 16 | 178.000 | 178.000 | 2 | 0.00000 | 289 | 0 | 0 | 4000.00 | 0.00 |
| 291 | 0.256000 | 35.00 | 1.247 | 16 | 147.000 | 159.750 | 2 | 0.00000 | 288 | 0 | 0 | 4000.00 | 0.00 |
| 292 | 0.256000 | 115.00 | 1.686 | 16 | 67.000 | 128.500 | 2 | 0.00000 | 239 | 0 | 0 | 4000.00 | 0.00 |
| 293 | 0.336000 | 5.00 | 7.451 | 4 | 65.710 | 62.500 | 2 | 0.00000 | 219 | 294 | 0 | 4000.00 | 0.00 |
| 294 | 0.336000 | 60.00 | 1.112 | 4 | 62.500 | 62.500 | 2 | 0.00000 | 293 | 295 | 0 | 4000.00 | 0.00 |
| 295 | 0.336000 | 40.00 | 1.907 | 4 | 62.500 | 93.500 | 2 | 0.00000 | 294 | 296 | 0 | 4000.00 | 0.00 |
| 296 | 0.336000 | 45.00 | 1.729 | 3 | 93.500 | 126.800 | 2 | 0.00000 | 295 | 297 | 0 | 4000.00 | 0.00 |
| 297 | 0.336000 | 45.00 | 1.149 | 3 | 126.800 | 142.000 | 2 | 0.00000 | 296 | 298 | 0 | 4000.00 | 0.00 |
| 298 | 0.336000 | 40.00 | 1.571 | 3 | 142.000 | 154.500 | 2 | 0.00000 | 297 | 299 | 0 | 4000.00 | 0.00 |
| 299 | 0.256000 | 95.00 | 1.107 | 16 | 154.500 | 155.500 | 2 | 0.00000 | 298 | 0 | 0 | 4000.00 | 0.00 |
| 300 | 0.256000 | 100.00 | 1.623 | 16 | 142.000 | 143.000 | 2 | 0.00000 | 297 | 0 | 0 | 4000.00 | 0.00 |
| 301 | 0.336000 | 25.00 | 2.452 | 3 | 154.500 | 156.300 | 2 | 0.00000 | 298 | 302 | 0 | 4000.00 | 0.00 |
| 302 | 0.336000 | 45.00 | 1.893 | 4 | 156.300 | 172.300 | 2 | 0.00000 | 301 | 303 | 0 | 4000.00 | 0.00 |
| 303 | 0.256000 | 55.00 | 1.304 | 4 | 172.300 | 178.000 | 2 | 0.00000 | 302 | 304 | 0 | 4000.00 | 0.00 |
| 304 | 0.256000 | 10.00 | 1.000 | 16 | 178.000 | 178.000 | 2 | 0.00000 | 303 | 0 | 0 | 4000.00 | 0.00 |
| 305 | 0.336000 | 5.00 | 6.376 | 4 | 156.300 | 156.300 | 2 | 0.00000 | 301 | 306 | 0 | 4000.00 | 0.00 |
| 306 | 0.256000 | 130.00 | 1.405 | 16 | 156.300 | 156.300 | 2 | 0.00000 | 305 | 0 | 0 | 4000.00 | 0.00 |
| 307 | 0.336000 | 105.00 | 1.914 | 4 | 126.800 | 155.000 | 2 | 0.00000 | 296 | 308 | 0 | 4000.00 | 0.00 |
| 308 | 0.256000 | 130.00 | 1.287 | 19 | 155.000 | 206.300 | 2 | 0.00000 | 307 | 309 | 0 | 4000.00 | 0.00 |
| 309 | 0.256000 | 20.00 | 1.000 | 16 | 206.300 | 203.000 | 2 | 0.00000 | 308 | 0 | 0 | 4000.00 | 0.00 |
| 310 | 0.336000 | 10.00 | 5.301 | 3 | 62.750 | 71.500 | 2 | 0.00000 | 212 | 311 | 0 | 4000.00 | 0.00 |
| 311 | 0.336000 | 65.00 | 1.424 | 3 | 71.500 | 133.500 | 2 | 0.00000 | 310 | 312 | 0 | 4000.00 | 0.00 |
| 312 | 0.256000 | 15.00 | 1.439 | 4 | 133.500 | 147.300 | 2 | 0.00000 | 311 | 313 | 0 | 4000.00 | 0.00 |
| 313 | 0.256000 | 60.00 | 1.281 | 4 | 147.300 | 165.100 | 2 | 0.00000 | 312 | 314 | 0 | 4000.00 | 0.00 |
| 314 | 0.256000 | 30.00 | 1.527 | 16 | 165.100 | 160.000 | 2 | 0.00000 | 313 | 0 | 0 | 4000.00 | 0.00 |
| 315 | 0.256000 | 25.00 | 1.407 | 16 | 71.500 | 81.500 | 2 | 0.00000 | 310 | 0 | 0 | 4000.00 | 0.00 |
| 316 | 0.336000 | 10.00 | 3.688 | 4 | 133.500 | 133.500 | 2 | 0.00000 | 311 | 317 | 0 | 4000.00 | 0.00 |
| 317 | 0.256000 | 80.00 | 1.717 | 16 | 133.500 | 141.500 | 2 | 0.00000 | 316 | 0 | 0 | 4000.00 | 0.00 |
| 318 | 0.336000 | 10.00 | 6.443 | 4 | 68.750 | 66.700 | 2 | 0.00000 | 283 | 319 | 0 | 4000.00 | 0.00 |
| 319 | 0.336000 | 100.00 | 1.672 | 3 | 66.700 | 120.000 | 2 | 0.00000 | 318 | 320 | 0 | 4000.00 | 0.00 |
| 320 | 0.336000 | 15.00 | 2.792 | 3 | 120.000 | 132.000 | 2 | 0.00000 | 319 | 321 | 0 | 4000.00 | 0.00 |
| 321 | 0.336000 | 15.00 | 1.448 | 4 | 132.000 | 146.000 | 2 | 0.00000 | 320 | 322 | 0 | 4000.00 | 0.00 |
| 322 | 0.256000 | 55.00 | 1.604 | 16 | 146.000 | 163.500 | 2 | 0.00000 | 321 | 0 | 0 | 4000.00 | 0.00 |
| 323 | 0.256000 | 25.00 | 1.492 | 16 | 120.000 | 128.500 | 2 | 0.00000 | 319 | 0 | 0 | 4000.00 | 0.00 |
| 324 | 0.336000 | 45.00 | 1.806 | 3 | 132.000 | 132.000 | 2 | 0.00000 | 320 | 325 | 0 | 4000.00 | 0.00 |
| 325 | 0.256000 | 30.00 | 2.263 | 16 | 132.000 | 157.500 | 2 | 0.00000 | 324 | 0 | 0 | 4000.00 | 0.00 |
| 326 | 0.256000 | 35.00 | 1.188 | 16 | 132.000 | 141.500 | 2 | 0.00000 | 324 | 0 | 0 | 4000.00 | 0.00 |
| 327 | 0.336000 | 30.00 | 2.456 | 4 | 63.900 | 68.100 | 2 | 0.00000 | 274 | 328 | 0 | 4000.00 | 0.00 |
| 328 | 0.336000 | 90.00 | 1.939 | 3 | 68.100 | 134.000 | 2 | 0.00000 | 327 | 329 | 0 | 4000.00 | 0.00 |
| 329 | 0.336000 | 45.00 | 1.612 | 4 | 134.000 | 132.000 | 2 | 0.00000 | 328 | 330 | 0 | 4000.00 | 0.00 |
| 330 | 0.362000 | 90.00 | 1.181 | 16 | 132.000 | 141.500 | 2 | 0.00000 | 329 | 0 | 0 | 4000.00 | 0.00 |
| 331 | 0.336000 | 15.00 | 3.554 | 3 | 134.000 | 147.000 | 2 | 0.00000 | 328 | 332 | 0 | 4000.00 | 0.00 |
| 332 | 0.256000 | 10.00 | 1.200 | 4 | 147.000 | 150.000 | 2 | 0.00000 | 331 | 333 | 0 | 4000.00 | 0.00 |
| 333 | 0.256000 | 10.00 | 1.200 | 16 | 150.000 | 159.000 | 2 | 0.00000 | 332 | 0 | 0 | 4000.00 | 0.00 |
| 334 | 0.256000 | 50.00 | 1.451 | 19 | 147.000 | 159.75 | 2 | 0.00000 | 331 | 335 | 0 | 4000.00 | 0.00 |
| 335 | 0.090000 | 10.00 | 1.000 | 16 | 159.750 | 159.000 | 2 | 0.00000 | 334 | 0 | 0 | 4000.00 | 0.00 |
| 336 | 0.336000 | 10.00 | 6.712 | 4 | 67.000 | 65.000 | 2 | 0.00000 | 268 | 337 | 0 | 4000.00 | 0.00 |
| 337 | 0.336000 | 90.00 | 1.538 | 3 | 65.000 | 115.200 | 2 | 0.00000 | 336 | 338 | 0 | 4000.00 | 0.00 |
| 338 | 0.336000 | 40.00 | 1.403 | 3 | 115.200 | 133.800 | 2 | 0.00000 | 337 | 339 | 0 | 4000.00 | 0.00 |
| 339 | 0.336000 | 50.00 | 2.423 | 3 | 133.800 | 133.300 | 2 | 0.00000 | 338 | 340 | 0 | 4000.00 | 0.00 |
| 340 | 0.336000 | 10.00 | 3.016 | 3 | 133.300 | 133.300 | 2 | 0.00000 | 339 | 341 | 0 | 4000.00 | 0.00 |
| 341 | 0.256000 | 45.00 | 1.340 | 16 | 133.300 | 141.500 | 2 | 0.00000 | 340 | 0 | 0 | 4000.00 | 0.00 |
| 342 | 0.256000 | 15.00 | 1.678 | 16 | 133.300 | 141.500 | 2 | 0.00000 | 340 | 0 | 0 | 4000.00 | 0.00 |

# CALCULATION SHEET

| | | | |
|---|---|---|---|
| Project: | HOPE CREEK GENERATING STATION | Job Number: | 8038 |
| Calc No. | 8038-P0004 | Sheet No. | 278 |
| By: | A. Arastu Date: 9/14/18 | Rev. No. | 1 |
| Subject: | Water Hammer Analysis of the HCGS Fire Protection System | | |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 343 | 0.256000 | 10.00 | 1.300 | 16 | 133.800 | 141.500 | 2 | 0.00000 | 338 | 0 | 0 | 4000.00 | 0.00 |
| 344 | 0.256000 | 35.00 | 1.644 | 16 | 133.300 | 128.500 | 2 | 0.00000 | 339 | 0 | 0 | 4000.00 | 0.00 |
| 345 | 0.256000 | 5.00 | 5.813 | 3 | 115.200 | 115.200 | 2 | 0.00000 | 337 | 346 | 0 | 4000.00 | 0.00 |
| 346 | 0.256000 | 80.00 | 1.288 | 3 | 115.200 | 116.500 | 2 | 0.00000 | 345 | 347 | 0 | 4000.00 | 0.00 |
| 347 | 0.256000 | 55.00 | 1.726 | 16 | 116.500 | 141.500 | 2 | 0.00000 | 346 | 0 | 0 | 4000.00 | 0.00 |
| 348 | 0.256000 | 15.00 | 2.601 | 16 | 116.500 | 128.500 | 2 | 0.00000 | 346 | 0 | 0 | 4000.00 | 0.00 |
| 349 | 0.256000 | 50.00 | 1.594 | 16 | 115.200 | 106.500 | 2 | 0.00000 | 345 | 0 | 0 | 4000.00 | 0.00 |
| 350 | 0.505000 | 175.00 | 1.669 | 4 | 68.750 | 140.000 | 2 | 0.00000 | 280 | 351 | 0 | 4000.00 | 0.00 |
| 351 | 0.336000 | 50.00 | 1.000 | 16 | 140.000 | 138.000 | 2 | 0.00000 | 350 | 0 | 0 | 4000.00 | 0.00 |
| 352 | 0.336000 | 10.00 | 4.226 | 4 | 67.000 | 65.000 | 2 | 0.00000 | 270 | 353 | 0 | 4000.00 | 0.00 |
| 353 | 0.336000 | 80.00 | 1.285 | 4 | 65.000 | 105.700 | 2 | 0.00000 | 352 | 354 | 0 | 4000.00 | 0.00 |
| 354 | 0.336000 | 80.00 | 1.630 | 3 | 105.700 | 130.500 | 2 | 0.00000 | 353 | 355 | 0 | 4000.00 | 0.00 |
| 355 | 0.256000 | 30.00 | 1.458 | 4 | 130.500 | 147.500 | 2 | 0.00000 | 354 | 356 | 0 | 4000.00 | 0.00 |
| 356 | 0.256000 | 25.00 | 1.225 | 4 | 147.500 | 141.500 | 2 | 0.00000 | 355 | 357 | 0 | 4000.00 | 0.00 |
| 357 | 0.162000 | 50.00 | 1.843 | 16 | 141.500 | 141.500 | 2 | 0.00000 | 356 | 0 | 0 | 4000.00 | 0.00 |
| 358 | 0.336000 | 5.00 | 5.570 | 4 | 130.500 | 130.500 | 2 | 0.00000 | 354 | 359 | 0 | 4000.00 | 0.00 |
| 359 | 0.162000 | 35.00 | 1.759 | 16 | 130.500 | 132.200 | 2 | 0.00000 | 358 | 0 | 0 | 4000.00 | 0.00 |
| 360 | 0.336000 | 45.00 | 2.343 | 4 | 94.500 | 115.800 | 2 | 0.00000 | 152 | 361 | 0 | 4000.00 | 0.00 |
| 361 | 0.336000 | 15.00 | 1.448 | 3 | 115.800 | 130.600 | 2 | 0.00000 | 360 | 362 | 0 | 4000.00 | 0.00 |
| 362 | 0.256000 | 50.00 | 1.510 | 19 | 130.600 | 176.000 | 2 | 0.00000 | 361 | 363 | 0 | 4000.00 | 0.00 |
| 363 | 0.256000 | 15.00 | 1.000 | 16 | 176.000 | 176.000 | 2 | 0.00000 | 362 | 0 | 0 | 4000.00 | 0.00 |
| 364 | 0.362000 | 145.00 | 1.539 | 16 | 130.600 | 129.600 | 2 | 0.00000 | 361 | 0 | 0 | 4000.00 | 0.00 |
| 365 | 0.336000 | 65.00 | 1.940 | 3 | 92.000 | 118.400 | 2 | 0.00000 | 145 | 366 | 0 | 4000.00 | 0.00 |
| 366 | 0.336000 | 20.00 | 1.544 | 3 | 118.400 | 118.400 | 2 | 0.00000 | 365 | 367 | 0 | 4000.00 | 0.00 |
| 367 | 0.256000 | 15.00 | 1.239 | 16 | 118.400 | 115.000 | 2 | 0.00000 | 366 | 0 | 0 | 4000.00 | 0.00 |
| 368 | 0.256000 | 20.00 | 1.947 | 16 | 118.400 | 127.000 | 2 | 0.00000 | 365 | 0 | 0 | 4000.00 | 0.00 |
| 369 | 0.336000 | 30.00 | 2.275 | 4 | 118.400 | 133.500 | 2 | 0.00000 | 366 | 370 | 0 | 4000.00 | 0.00 |
| 370 | 0.256000 | 35.00 | 1.232 | 3 | 133.500 | 166.000 | 2 | 0.00000 | 369 | 371 | 0 | 4000.00 | 0.00 |
| 371 | 0.256000 | 10.00 | 1.000 | 19 | 166.000 | 176.000 | 2 | 0.00000 | 370 | 372 | 0 | 4000.00 | 0.00 |
| 372 | 0.256000 | 20.00 | 2.970 | 16 | 176.000 | 175.000 | 2 | 0.00000 | 371 | 0 | 0 | 4000.00 | 0.00 |
| 373 | 0.256000 | 55.00 | 1.521 | 16 | 166.000 | 141.000 | 2 | 0.00000 | 370 | 0 | 0 | 4000.00 | 0.00 |
| 374 | 0.336000 | 5.00 | 6.914 | 3 | 92.000 | 94.200 | 2 | 0.00000 | 144 | 375 | 0 | 4000.00 | 0.00 |
| 375 | 0.336000 | 50.00 | 1.605 | 3 | 94.200 | 113.250 | 2 | 0.00000 | 374 | 376 | 0 | 4000.00 | 0.00 |
| 376 | 0.256000 | 30.00 | 1.100 | 16 | 113.250 | 141.750 | 2 | 0.00000 | 375 | 0 | 0 | 4000.00 | 0.00 |
| 377 | 0.256000 | 30.00 | 1.751 | 16 | 94.200 | 74.000 | 2 | 0.00000 | 374 | 0 | 0 | 4000.00 | 0.00 |
| 378 | 0.256000 | 20.00 | 2.380 | 16 | 113.300 | 111.000 | 2 | 0.00000 | 375 | 0 | 0 | 4000.00 | 0.00 |
| 379 | 0.336000 | 10.00 | 4.898 | 4 | 89.000 | 94.330 | 2 | 0.00000 | 137 | 380 | 0 | 4000.00 | 0.00 |
| 380 | 0.336000 | 5.00 | 2.344 | 3 | 94.330 | 95.000 | 2 | 0.00000 | 379 | 381 | 0 | 4000.00 | 0.00 |
| 381 | 0.336000 | 100.00 | 1.322 | 4 | 95.000 | 130.700 | 2 | 0.00000 | 380 | 382 | 0 | 4000.00 | 0.00 |
| 382 | 0.256000 | 65.00 | 1.598 | 19 | 130.700 | 176.000 | 2 | 0.00000 | 381 | 383 | 0 | 4000.00 | 0.00 |
| 383 | 0.025600 | 20.00 | 1.000 | 16 | 176.000 | 175.000 | 2 | 0.00000 | 382 | 0 | 0 | 4000.00 | 0.00 |
| 384 | 0.336000 | 50.00 | 1.859 | 3 | 95.000 | 96.500 | 2 | 0.00000 | 380 | 385 | 0 | 4000.00 | 0.00 |
| 385 | 0.256000 | 75.00 | 1.252 | 3 | 96.500 | 98.000 | 2 | 0.00000 | 384 | 386 | 0 | 4000.00 | 0.00 |
| 386 | 0.256000 | 40.00 | 1.269 | 16 | 98.000 | 71.000 | 2 | 0.00000 | 385 | 0 | 0 | 4000.00 | 0.00 |
| 387 | 0.256000 | 15.00 | 2.741 | 16 | 96.500 | 103.000 | 2 | 0.00000 | 384 | 0 | 0 | 4000.00 | 0.00 |
| 388 | 0.256000 | 40.00 | 1.922 | 16 | 98.000 | 94.500 | 2 | 0.00000 | 385 | 0 | 0 | 4000.00 | 0.00 |
| 389 | 0.336000 | 45.00 | 1.567 | 3 | 89.000 | 127.750 | 2 | 0.00000 | 135 | 390 | 0 | 4000.00 | 0.00 |
| 390 | 0.256000 | 20.00 | 1.688 | 16 | 127.750 | 141.750 | 2 | 0.00000 | 389 | 0 | 0 | 4000.00 | 0.00 |
| 391 | 0.256000 | 110.00 | 1.335 | 16 | 127.750 | 141.750 | 2 | 0.00000 | 389 | 0 | 0 | 4000.00 | 0.00 |
| 392 | 0.336000 | 5.00 | 7.854 | 3 | 94.500 | 96.800 | 2 | 0.00000 | 155 | 393 | 0 | 4000.00 | 0.00 |
| 393 | 0.256000 | 215.00 | 1.316 | 16 | 96.800 | 65.000 | 2 | 0.00000 | 392 | 0 | 0 | 4000.00 | 0.00 |
| 394 | 0.256000 | 125.00 | 1.470 | 16 | 96.800 | 141.750 | 2 | 0.00000 | 392 | 0 | 0 | 4000.00 | 0.00 |
| 395 | 0.336000 | 150.00 | 1.531 | 3 | 94.500 | 130.400 | 2 | 0.00000 | 156 | 396 | 0 | 4000.00 | 0.00 |
| 396 | 0.256000 | 155.00 | 1.264 | 4 | 130.400 | 182.000 | 2 | 0.00000 | 395 | 397 | 0 | 4000.00 | 0.00 |
| 397 | 0.256000 | 35.00 | 1.512 | 19 | 182.000 | 179.000 | 2 | 0.00000 | 396 | 398 | 0 | 4000.00 | 0.00 |
| 398 | 0.256000 | 10.00 | 1.000 | 16 | 179.000 | 178.000 | 2 | 0.00000 | 397 | 0 | 0 | 4000.00 | 0.00 |
| 399 | 0.505000 | 120.00 | 1.538 | 3 | 94.500 | 90.500 | 2 | 0.00000 | 158 | 400 | 0 | 4000.00 | 0.00 |
| 400 | 0.336000 | 5.00 | 8.007 | 4 | 90.500 | 90.500 | 2 | 0.00000 | 399 | 401 | 0 | 4000.00 | 0.00 |
| 401 | 0.256000 | 60.00 | 1.349 | 16 | 90.500 | 141.750 | 2 | 0.00000 | 400 | 0 | 0 | 4000.00 | 0.00 |
| 402 | 0.336000 | 130.00 | 1.496 | 3 | 90.500 | 65.300 | 2 | 0.00000 | 399 | 403 | 0 | 4000.00 | 0.00 |
| 403 | 0.336000 | 50.00 | 1.228 | 4 | 65.300 | 94.700 | 2 | 0.00000 | 402 | 404 | 0 | 4000.00 | 0.00 |
| 404 | 0.256000 | 55.00 | 1.315 | 16 | 94.700 | 141.750 | 2 | 0.00000 | 403 | 0 | 0 | 4000.00 | 0.00 |
| 405 | 0.336000 | 40.00 | 2.260 | 3 | 65.300 | 77.500 | 2 | 0.00000 | 402 | 406 | 0 | 4000.00 | 0.00 |
| 406 | 0.256000 | 30.00 | 1.458 | 16 | 77.500 | 103.500 | 2 | 0.00000 | 405 | 0 | 0 | 4000.00 | 0.00 |
| 407 | 0.256000 | 125.00 | 1.180 | 16 | 77.500 | 75.000 | 2 | 0.00000 | 405 | 0 | 0 | 4000.00 | 0.00 |
| 408 | 0.336000 | 135.00 | 1.552 | 4 | 79.000 | 142.000 | 2 | 0.00000 | 139 | 409 | 0 | 4000.00 | 0.00 |
| 409 | 0.336000 | 20.00 | 1.000 | 16 | 142.000 | 141.750 | 2 | 0.00000 | 408 | 0 | 0 | 4000.00 | 0.00 |
| 410 | 0.256000 | 95.00 | 1.334 | 19 | 96.200 | 174.000 | 2 | 0.00000 | 150 | 411 | 0 | 4000.00 | 0.00 |
| 411 | 0.256000 | 10.00 | 1.358 | 4 | 174.000 | 183.500 | 2 | 0.00000 | 410 | 412 | 0 | 4000.00 | 0.00 |
| 412 | 0.107000 | 60.00 | 1.439 | 4 | 183.500 | 197.500 | 2 | 0.00000 | 411 | 413 | 0 | 4000.00 | 0.00 |
| 413 | 0.107000 | 25.00 | 1.000 | 16 | 197.500 | 197.500 | 2 | 0.00000 | 412 | 0 | 0 | 4000.00 | 0.00 |
| 414 | 0.505000 | 100.00 | 2.373 | 3 | 91.940 | 138.300 | 2 | 0.00000 | 143 | 415 | 0 | 4000.00 | 0.00 |
| 415 | 0.505000 | 5.00 | 5.848 | 2 | 138.300 | 142.000 | 2 | 0.00000 | 414 | 416 | 0 | 4000.00 | 0.00 |
| 416 | 0.336000 | 5.00 | 1.000 | 4 | 142.000 | 142.000 | 2 | 0.00000 | 415 | 417 | 0 | 4000.00 | 0.00 |
| 417 | 0.336000 | 50.00 | 1.000 | 4 | 142.000 | 160.000 | 2 | 0.00000 | 416 | 418 | 0 | 4000.00 | 0.00 |
| 418 | 0.336000 | 50.00 | 1.000 | 16 | 160.000 | 160.000 | 2 | 0.00000 | 417 | 0 | 0 | 4000.00 | 0.00 |
| 419 | 0.505000 | 85.00 | 2.031 | 4 | 94.500 | 131.500 | 2 | 0.00000 | 154 | 420 | 0 | 4000.00 | 0.00 |
| 420 | 0.505000 | 50.00 | 1.443 | 4 | 131.500 | 130.750 | 2 | 0.00000 | 419 | 421 | 0 | 4000.00 | 0.00 |
| 421 | 0.505000 | 30.00 | 1.909 | 4 | 130.750 | 130.750 | 2 | 0.00000 | 420 | 422 | 0 | 4000.00 | 0.00 |
| 422 | 0.505000 | 40.00 | 2.361 | 4 | 130.750 | 128.750 | 2 | 0.00000 | 421 | 423 | 0 | 4000.00 | 0.00 |
| 423 | 0.505000 | 35.00 | 1.491 | 3 | 128.750 | 132.170 | 2 | 0.00000 | 422 | 424 | 0 | 4000.00 | 0.00 |
| 424 | 0.256000 | 10.00 | 1.505 | 4 | 132.170 | 138.000 | 2 | 0.00000 | 423 | 425 | 0 | 4000.00 | 0.00 |
| 425 | 0.162000 | 105.00 | 1.580 | 16 | 138.000 | 169.500 | 2 | 0.00000 | 424 | 0 | 0 | 4000.00 | 0.00 |
| 426 | 0.336000 | 40.00 | 1.843 | 3 | 132.170 | 132.170 | 2 | 0.00000 | 423 | 427 | 0 | 4000.00 | 0.00 |
| 427 | 0.256000 | 10.00 | 1.000 | 4 | 132.170 | 138.000 | 2 | 0.00000 | 426 | 428 | 0 | 4000.00 | 0.00 |
| 428 | 0.162000 | 100.00 | 1.632 | 16 | 138.000 | 169.500 | 2 | 0.00000 | 427 | 0 | 0 | 4000.00 | 0.00 |
| 429 | 0.256000 | 40.00 | 1.165 | 4 | 132.170 | 138.000 | 2 | 0.00000 | 426 | 430 | 0 | 4000.00 | 0.00 |
| 430 | 0.162000 | 155.00 | 1.548 | 16 | 138.000 | 169.500 | 2 | 0.00000 | 429 | 0 | 0 | 4000.00 | 0.00 |
| 431 | 0.256000 | 40.00 | 1.934 | 4 | 65.500 | 69.000 | 2 | 0.00000 | 286 | 432 | 0 | 4000.00 | 0.00 |
| 432 | 0.256000 | 105.00 | 1.020 | 4 | 69.000 | 171.000 | 2 | 0.00000 | 431 | 433 | 0 | 4000.00 | 0.00 |
| 433 | 0.162000 | 10.00 | 1.227 | 19 | 171.000 | 181.000 | 2 | 0.00000 | 432 | 434 | 0 | 4000.00 | 0.00 |

# CALCULATION SHEET

| | | | |
|---|---|---|---|
| Project: | HOPE CREEK GENERATING STATION | Job Number: | 8038 |
| Calc No. | 8038-P0004 | Sheet No. | 279 |
| By: | A. Arastu Date: 9/14/18 | Rev. No. | 1 |
| Subject: | Water Hammer Analysis of the HCGS Fire Protection System | | |

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 434    0.162000     40.00    1.332  16     181.000   180.000     2     0.00000 433   0     0   4000.00       0.00
 435    0.665000     15.00    5.522   3      89.600    83.800     2     0.00000 166 436     0   4000.00       0.00
 436    0.665000      5.00    3.660   3      83.800    83.800     2     0.00000 435 437     0   4000.00       0.00
 437    0.665000      5.00   14.300   3      83.800    83.800     2     0.00000 436 438     0   4000.00       0.00
 438    0.505000      5.00    4.652  13      83.800    88.000     2     0.00000 437 439     0   4000.00       0.00
 439    0.505000      5.00    6.050   2      88.000    89.000     2     0.00000 438 440     0   4000.00       0.00
 440    0.336000     60.00    5.000   1      89.000   113.000     2     0.00000 439   0     0   4000.00       0.00
 441    0.665000     10.00    9.911   3      83.800    91.500     2     0.00000 437 442     0   4000.00       0.00
 442    0.665000     80.00    1.865   3      91.500   102.800     2     0.00000 441 443     0   4000.00       0.00
 443    0.665000     50.00    1.106  16     102.800   130.000     2     0.00000 442   0     0   4000.00       0.00
 444    0.336000     10.00    5.435  16     102.800   107.800     2     0.00000 442   0     0   4000.00       0.00
 445    0.665000     40.00    2.658  16      91.500    86.000     2     0.00000 441   0     0   4000.00       0.00
 446    0.505000      5.00    7.868  13      83.800    88.000     2     0.00000 435 447     0   4000.00       0.00
 447    0.505000      5.00    1.000   2      88.000    89.000     2     0.00000 446 448     0   4000.00       0.00
 448    0.505000     45.00    2.301   4      89.000   103.000     2     0.00000 447 449     0   4000.00       0.00
 449    0.336000     20.00    2.613   4     103.000   112.000     2     0.00000 448 450     0   4000.00       0.00
 450    0.336000    110.00    2.307   1     112.000   113.000     2     0.00000 449   0     0   4000.00       0.00
 451    0.336000    160.00    1.474   4      83.800   141.000     2     0.00000 436 452     0   4000.00       0.00
 452    0.336000      5.00    1.000   2     141.000   141.000     2     0.00000 451 453     0   4000.00       0.00
 453    0.256000     50.00    1.000   1     141.000   141.000     2     0.00000 452   0     0   4000.00       0.00
 454    0.665000     30.00    4.979   3      84.100    93.500     2     0.00000 204 455     0   4000.00       0.00
 455    0.665000     10.00    2.862   2      93.500   103.500     2     0.00000 454 456     0   4000.00       0.00
 456    0.505000     50.00    5.000   1     103.500   103.500     2     0.00000 455   0     0   4000.00       0.00
 457    0.505000     20.00    2.414   4      93.500    80.300     2     0.00000 454 458     0   4080.00       0.00
 458    0.505000     50.00    1.000  16      80.300    80.300     2     0.00000 457   0     0   4000.00       0.00
 459    0.336000     20.00    3.318   2      62.750    62.750     2     0.00000 218 460     0   4000.00       0.00
 460    0.336000     10.00    2.210   4      62.750    63.750     2     0.00000 459 461     0   4000.00       0.00
 461    0.336000     30.00    1.762   4      63.750    86.250     2     0.00000 460 462     0   4000.00       0.00
 462    0.336000     40.00    1.286   4      86.250   125.000     2     0.00000 461 463     0   4000.00       0.00
 463    0.336000    130.00    1.233   4     125.000   125.000     2     0.00000 462 464     0   4000.00       0.00
 464    0.336000     30.00    1.587   4     125.000   155.000     2     0.00000 463 465     0   4000.00       0.00
 465    0.256000     60.00    1.171   4     155.000   208.000     2     0.00000 464 466     0   4000.00       0.00
 466    0.001000     10.00    1.000  16     208.000   205.000     2     0.00000 465   0     0   4000.00       0.00
 467    0.336000     20.00    2.378   2      94.000    94.000     2     0.00000 199 468     0   4000.00       0.00
 468    0.336000     20.00    1.000   4      94.000    94.000     2     0.00000 467 469     0   4000.00       0.00
 469    0.336000      5.00    1.538   4      94.000    94.000     2     0.00000 468 470     0   4000.00       0.00
 470    0.336000     25.00    2.680   4      94.000   113.000     2     0.00000 469 471     0   4000.00       0.00
 471    0.336000     75.00    1.340   4     113.000   122.000     2     0.00000 470 472     0   4000.00       0.00
 472    0.336000     45.00    1.881   3     122.000   151.800     2     0.00000 471 473     0   4000.00       0.00
 473    0.336000     30.00    2.994   3     151.800   169.500     2     0.00000 472 474     0   4000.00       0.00
 474    0.336000     50.00    1.540   4     169.500   187.000     2     0.00000 473 475     0   4000.00       0.00
 475    0.256000     15.00    1.580   3     187.000   187.800     2     0.00000 474 476     0   4000.00       0.00
 476    0.256000    115.00    1.169   4     187.800   205.300     2     0.00000 475 477     0   4000.00       0.00
 477    0.256000     10.00    1.000  16     205.300   204.300     2     0.00000 476   0     0   4000.00       0.00
 478    0.256000     40.00    1.870  16     169.500   166.000     2     0.00000 473   0     0   4000.00       0.00
 479    0.336000     15.00    3.517   4     151.800   153.300     2     0.00000 472 480     0   4000.00       0.00
 480    0.256000     65.00    1.287  16     153.300   149.300     2     0.00000 479   0     0   4000.00       0.00
 481    0.505000      5.00   14.146   4      61.750    57.700     2     0.00000 208 482     0   4000.00       0.00
 482    0.505000     20.00    3.323   4      57.700    71.000     2     0.00000 481 483     0   4000.00       0.00
 483    0.505000     10.00    1.000   2      71.000    71.000     2     0.00000 482 484     0   4000.00       0.00
 484    0.505000     50.00    5.000   1      71.000    71.000     2     0.00000 483   0     0   4000.00       0.00
 485    0.505000      5.00   13.184   4     138.300   138.300     2     0.00000 414 486     0   4000.00       0.00
 486    0.336000     90.00    1.157   4     138.300   143.500     2     0.00000 485 487     0   4000.00       0.00
 487    0.336000     15.00    1.627   4     143.500   147.400     2     0.00000 486 488     0   4000.00       0.00
 488    0.336000     75.00    1.314   4     147.400   165.800     2     0.00000 487 489     0   4000.00       0.00
 489    0.336000     70.00    1.355   4     165.800   164.000     2     0.00000 488 490     0   4000.00       0.00
 490    0.336000     10.00    3.486   4     164.000   164.000     2     0.00000 489 491     0   4000.00       0.00
 491    0.336000     10.00    1.416   4     164.000   164.000     2     0.00000 490 492     0   4000.00       0.00
 492    0.256000     10.00    1.251   4     164.000   164.000     2     0.00000 491 493     0   4000.00       0.00
 493    0.206000     10.00    3.225   4     164.000   166.000     2     0.00000 492 494     0   4000.00       0.00
 494    0.206000     75.00    1.549   4     166.000   166.000     2     0.00000 493 495     0   4000.00       0.00
 495    0.172000     20.00    1.757  19     166.000   166.000     2     0.00000 494 496     0   4000.00       0.00
 496    0.087000     10.00    2.409  16     166.000   168.000     2     0.00000 495   0     0   4000.00       0.00
 497    0.256000     20.00    3.406  16     187.800   205.300     2     0.00000 475   0     0   4000.00       0.00
 498    0.256000     40.00    1.653  16     130.400   141.000     2     0.00000 395   0     0   4000.00       0.00
@EOR

 91 570.3   0  18
     20.00   .000     -0.022     -0.033    -0.045    -0.056    -0.067    -0.078
    -0.089  -.100     -0.111     -0.123    -0.134    -0.145    -0.156    -0.167
    -0.200   -100.0
     570.3  570.3     587.3      590.3     587.3     580.3     568.3     558.3
     542.3  520.3     490.3      460.3     420.3     370.3     310.3     240.3
   170.3  170.3

 99 495.3   0  18
   20.00   .000     -0.557     -1.114    -1.671    -2.228    -2.785    -3.342
  -3.899  -4.46     -5.013     -5.570    -6.127    -6.684    -7.241    -8.912
  -13.4   -100.0
    495.3  495.3     494.3      492.3     491.3     488.3     485.3     481.3
    477.3  472.3     466.3      459.3     448.3     436.3     423.3     375.3
    170.3  170.3

117 512.1  0 17
   20.00  -.000     -0.557     -1.114    -1.671    -2.228    -2.785    -3.342
  -3.899  -4.46     -5.013     -5.57     -6.127    -6.684    -7.241    -8.912
  -13.37
    512.1  512.1     510.1      507.1     505.1     502.1     500.1     498.1
    495.1  492.1     487.8      481.1     476.1     467.1     457.1     412.1
    160.1
```

```
123 512.1  0 17
   20.00  -.000     -0.557    -1.114    -1.671    -2.228    -2.785    -3.342
  -3.899  -4.46     -5.013    -5.57     -6.127    -6.684    -7.241    -8.912
  -13.37
   512.1  512.1     510.1     507.1     505.1     502.1     500.1     498.1
   495.1  492.1     487.8     481.1     476.1     467.1     457.1     412.1
   160.1

129 482.1   0  16
   20.00   .000     -0.022     -0.033    -0.045    -0.056    -0.067    -0.078
  -0.089  -.100     -0.111     -0.123    -0.134    -0.145    -0.156    -100.0
  482.1  482.1     478.1     473.1     463.1     448.1     428.1     403.1
  374.1  343.1     308.1     268.1     233.1     198.1     168.1     168.1

440 147.0   0   0

450 147.0   0   0

453 175.0   0   0

456 137.5   0   0

484 105.0   0   0

  4 0  100.  100. 1.0E+20   2  9  4  0  .01   393.6
0     0.56   2.36    100
100.  100.  0.       0.
0     50.0   90.0  92.5   95.3   97.5      99.0      99.7        100.0
0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

 90 0  100  100  1.0E+20    2  9  3  0  .01  570.3
  0       1.01  100
  100     0    0
  0     50.0   90.0  92.5   95.3   97.5      99.0      99.7        100.0
0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

 96 0  100  100  1.0E+20   2  9  4  0  .01  495.3
  0      .63   3.43   100
  100.   100.  100.   100.
  0     50.0   90.0  92.5   95.3   97.5      99.0      99.7        100.0
0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

102 0  100.  100. 1.0E+20   2  9  4  0  .01   393.6
  0     2.0   2.01    100
  100.  100.  100.    100.
  0     50.0   90.0  92.5   95.3   97.5      99.0      99.7        100.0
0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

114 0  100  100  1.0E+20    2  9  4  0  .01  512.1
0       2.51  5.61   100
100     100   100.   100.
0     50.0   90.0  92.5   95.3   97.5      99.0      99.7        100.0
0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

121 0  100  100  1.0E+20    2  9  4  0  .01  512.1
0       21.93 27.13 100
100     100   100   100
0     50.0   90.0  92.5   95.3   97.5      99.0      99.7        100.0
0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

126 0  100  100  1.0E+20    2  9  3  0  .01  482.1
  0       0.01  100
  100     100   100
  0     50.0   90.0  92.5   95.3   97.5      99.0      99.7        100.0
0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

415  0  100  100  1.0E+20   2  16  3  0  1.79  194.
0 0.1    100
100     100    100
0   11.1   16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
97.5     99.0     99.7  100.0
10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
203570   1596000  0.49259E+08  0.1E+21

439  0  100  100  1.0E+20   2  16  3  0  1.79  147.
0       0.1    100
100     100    100
0    11.1  16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
97.5     99.0     99.7  100.0
10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
203570   1596000  0.49259E+08  0.1E+21

447  0  100  100  1.0E+20   2  16  3  0  0.99  147.
0       1.01    100
100     0       0
0    11.1  16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
97.5     99.0     99.7  100.0
10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
203570   1596000  0.49259E+08  0.1E+21

452  0  100  100  1.0E+20   2  16  3  0  1.785  175.
```

# CALCULATION SHEET

| | | | |
|---|---|---|---|
| Project: | HOPE CREEK GENERATING STATION | Job Number: | 8038 |
| Calc No. | 8038-P0004 | Sheet No. | 281 |
| By: | A. Arastu Date: 9/14/18 | Rev. No. | 1 |
| Subject: | Water Hammer Analysis of the HCGS Fire Protection System | | |

```
0       0.01   100
100     100    100
0    11.1  16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
97.5     99.0     99.7  100.0
10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
203570   1596000  0.49259E+08  0.1E+21

455  0  100  100  1.0E+20   2  16  3  0  0.695  137.5
  0       0.01   100
  100     100    100
  0    11.1  16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
  97.5     99.0     99.7  100.0
  10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
203570   1596000  0.49259E+08  0.1E+21

459  0  100  100  1.0E+20   2  9  3  0  .01  96.8
0       1.0   100
100     100   100
0     50.0   90.0  92.5   95.3   97.5      99.0      99.7        100.0
0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

467  0  100  100  1.0E+20   2  9  3  0  .01  128.
0       1.0   100
100     100   100
0     50.0   90.0  92.5   95.3   97.5      99.0      99.7        100.0
0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

483  0  100  100  1.0E+20  2  16  4  0  0.99  105.0
0       0.1   0.11  100
100     100   100   100
0    11.1  16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
97.5     99.0     99.7  100.0
10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
203570   1596000  0.49259E+08  0.1E+21


  5  2  0.650  0.01 0.7850 0.0  ID 1.0000
438  2  0.750  0.01 0.2003 0.0  ID 0.5050
446  2  0.750  0.01 0.2003 0.0  ID 0.5050

308   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102

410   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102


433   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102

362   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102

397   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102


495   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102

334   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102

371   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102

382   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102


 1.          1.
 6     2
 395   31
```

```
396   31
@EOR
395      1      395     2         1
395      1      395     2         2
395      2      395     8         3
395      8      395     11        4
395      10     395     12        5
395      12     395     23        6
395      22     395     28        7
395      28     395     29        8
395      28     395     31        9
395      30     395     31        10
396      1      396     11        11
396      10     396     12        12
396      12     396     16        13
396      16     396     17        14
396      16     396     22        15
396      22     396     27        16
396      27     396     28        17
396      28     396     31        18
396      30     396     31        19
396      31     397     2         20
397      1      397     2         21
397      2      397     3         22
397      3      397     4         23
397      3      397     8         24
397      7      397     8         25
498      1      498     2         26
498      1      498     7         27
498      6      498     7         28
498      7      498     9         29

@EOR
0     1.0   100  1
1.0  30.0   500  1
30.0 888.  1000  1
```

**Figure G-3: USLAM Input Data for Riser # 10**

# CALCULATION SHEET

| | | | |
|---|---|---|---|
| Project: | HOPE CREEK GENERATING STATION | Job Number: | 8038 |
| Calc No. | 8038-P0004 | Sheet No. | 283 |
| By: | A. Arastu Date: 9/14/18 | Rev. No. | 1 |
| Subject: | Water Hammer Analysis of the HCGS Fire Protection System | | |

```
HCGS FP Case 7: 11 Vacuum Breakers.  Forces in RB2 only
12000
0  0  1  0  0  0
2   2   0.0  12.0
2   1   0   0
0   1   0  0  0  0  0  1 0 0
1.9  62.4  7.83E-6
1.0  2   13    0    0
       0.0    1000.0    2000.0   2.0E+04   6.0E+04   1.0E+05   3.0E+05   6.0E+05
   1.0E+06   1.5E+06   3.5E+06   1.0E+11   1.0E+33
      0.10      0.061     0.048     0.026     0.021      .019    0.0167    0.0155
    0.0150    0.0147     0.014     0.014     0.014
495.3   3  17  0    0
  -10.00   .000   .557  1.114  1.671  2.228  2.785  3.342
   3.899  4.456  5.013  5.570  6.127  6.684  7.241  8.912
   13.4
   495.3  495.3     494.3     492.3     491.3     488.3     485.3     481.3
   477.3  472.3     466.3     459.3     448.3     436.3     423.3     375.3
   170.3
   1
   1    1.104000     55.00    5.492   4      99.400    94.000     2     0.00000   0   2     0   4000.00      0.00  Link Data Start
   2    1.000000     20.00    7.400   4      94.000   105.040     2     0.00000   1   3     0   4000.00      0.00
   3    1.000000     10.00    7.180   4     105.040   105.040     2     0.00000   2   4     0   4000.00      0.00
   4    1.000000     10.00    3.538   2     105.040   104.500     2     0.00000   3   5     0   4000.00      0.00
   5    1.000000      5.00   18.508  13     104.500   104.750     2     0.00000   4   6     0   4000.00      0.00
   6    1.000000     10.00    5.200   4     104.750   110.000     2     0.00000   5   7     0   4000.00      0.00
   7    1.000000     20.00    3.400   3     110.000   105.000     2     0.00000   6   8     0   4000.00      0.00
   8    1.000000    115.00    2.402   3     105.000    96.900     2     0.00000   7  86     0   4000.00      0.00
   9    1.007000      5.00    2.611   4      96.900    96.900     2     0.00000   8  10     0   4000.00      0.00
  10    1.007000     10.00    3.014   4      96.900    96.900     2     0.00000   9  11     0   4000.00      0.00
  11    1.007000     10.00    1.806   4      96.900    96.900     2     0.00000  10  12     0   4000.00      0.00
  12    1.007000     10.00    3.014   3      96.900    96.900     2     0.00000  11  13     0   4000.00      0.00
  13    1.007000    110.00    1.183   4      96.900    96.900     2     0.00000  12  14     0   4000.00      0.00
  14    1.007000    110.00    1.363   4      96.900    95.900     2     0.00000  13  15     0   4000.00      0.00
  15    1.007000     10.00    3.014   4      95.900    95.900     2     0.00000  14  16     0   4000.00      0.00
  16    1.007000     30.00    1.671   4      95.900    95.900     2     0.00000  15  17     0   4000.00      0.00
  17    1.007000     80.00    1.252   4      95.900    95.900     2     0.00000  16  18     0   4000.00      0.00
  18    1.007000     20.00    1.403   4      95.900    95.900     2     0.00000  17  19     0   4000.00      0.00
  19    1.007000    130.00    1.155   4      95.900    95.900     2     0.00000  18  20     0   4000.00      0.00
  20    1.007000    135.00    1.060   4      95.900    95.400     2     0.00000  19  21     0   4000.00      0.00
  21    1.007000     10.00    2.994   4      95.400    93.500     2     0.00000  20  22     0   4000.00      0.00
  22    1.007000     65.00    1.217   4      93.500    93.500     2     0.00000  21  23     0   4000.00      0.00
  23    1.007000      5.00    1.000   4      93.500    93.500     2     0.00000  22  24     0   4000.00      0.00
  24    1.007000     20.00    3.004   4      93.500    97.000     2     0.00000  23  25     0   4000.00      0.00
  25    1.007000    200.00    1.300   4      97.000    97.000     2     0.00000  24  26     0   4000.00      0.00
  26    1.007000     55.00    1.513   4      97.000    97.000     2     0.00000  25  27     0   4000.00      0.00
  27    1.007000     20.00    1.997   4      97.000    93.000     2     0.00000  26  28     0   4000.00      0.00
  28    1.007000    230.00    1.088   3      93.000    93.000     2     0.00000  27 181     0   4000.00      0.00
  29    1.007000     40.00    1.503   3      93.000    93.000     2     0.00000  28  30     0   4000.00      0.00
  30    1.007000    240.00    1.117   4      93.000    94.500     2     0.00000  29  31     0   4000.00      0.00
  31    1.007000     45.00    1.448   4      94.500    94.500     2     0.00000  30  32     0   4000.00      0.00
  32    1.007000     35.00    1.570   4      94.500    91.000     2     0.00000  31  33     0   4000.00      0.00
  33    1.007000    180.00    1.111   4      91.000    96.000     2     0.00000  32  34     0   4000.00      0.00
  34    1.007000     10.00    3.014   4      96.000    96.000     2     0.00000  33  35     0   4000.00      0.00
  35    1.007000      5.00    5.028   4      96.000    96.000     2     0.00000  34  36     0   4000.00      0.00
  36    1.007000      5.00    2.611   4      96.000    96.000     2     0.00000  35  37     0   4000.00      0.00
  37    1.007000     10.00    3.014   4      96.000    96.000     2     0.00000  36  38     0   4000.00      0.00
  38    1.007000     30.00    2.141   4      96.000    96.000     2     0.00000  37  39     0   4000.00      0.00
  39    1.007000     20.00    1.403   4      96.000    96.000     2     0.00000  38  40     0   4000.00      0.00
  40    1.007000     80.00    1.252   3      96.000    96.000     2     0.00000  39  41     0   4000.00      0.00
  41    1.007000     10.00    1.806   4      96.000    96.000     2     0.00000  40  42     0   4000.00      0.00
  42    1.007000     20.00    1.000   4      96.000    96.000     2     0.00000  41  43     0   4000.00      0.00
  43    1.007000     55.00    1.363   4      96.000    97.200     2     0.00000  42  44     0   4000.00      0.00
  44    1.007000      5.00    5.028   4      97.200    97.200     2     0.00000  43  45     0   4000.00      0.00
  45    1.007000    160.00    1.175   4      97.200    96.200     2     0.00000  44  46     0   4000.00      0.00
  46    1.007000     15.00    2.343   3      96.200    96.200     2     0.00000  45 162     0   4000.00      0.00
  47    1.007000      5.00    5.028   4      96.200    96.200     2     0.00000  46  48     0   4000.00      0.00
  48    1.007000     15.00    6.357   4      96.200    97.000     2     0.00000  47  49     0   4000.00      0.00
  49    1.007000     60.00    1.166   4      97.000    97.000     2     0.00000  48  50     0   4000.00      0.00
  50    1.007000     15.00    2.994   4      97.000    94.500     2     0.00000  49  51     0   4000.00      0.00
  51    1.007000      5.00    4.605   4      94.500    97.000     2     0.00000  50  52     0   4000.00      0.00
  52    1.007000     15.00    2.329   4      97.000    94.000     2     0.00000  51  53     0   4000.00      0.00
  53    1.007000     80.00    1.501   4      94.000    96.500     2     0.00000  52  54     0   4000.00      0.00
  54    1.007000     65.00    1.310   3      96.500    96.500     2     0.00000  53  55     0   4000.00      0.00
  55    1.007000     50.00    1.481   4      96.500    97.200     2     0.00000  54  56     0   4000.00      0.00
  56    1.007000     25.00    1.322   4      97.200    97.200     2     0.00000  55  57     0   4000.00      0.00
  57    1.007000      5.00    3.820   4      97.200    97.200     2     0.00000  56  58     0   4000.00      0.00
  58    1.007000     70.00    1.288   4      97.200    97.200     2     0.00000  57  59     0   4000.00      0.00
  59    1.007000     10.00    1.806   4      97.200    97.200     2     0.00000  58  60     0   4000.00      0.00
  60    1.007000    195.00    1.103   4      97.200    97.200     2     0.00000  59  61     0   4000.00      0.00
  61    1.007000    240.00    1.159   4      97.200    94.500     2     0.00000  60  62     0   4000.00      0.00
  62    1.007000    215.00    1.094   4      94.500    94.500     2     0.00000  61  63     0   4000.00      0.00
  63    1.007000    110.00    1.183   4      94.500    94.500     2     0.00000  62  64     0   4000.00      0.00
  64    1.007000    195.00    1.103   4      94.500    94.500     2     0.00000  63  65     0   4000.00      0.00
  65    1.007000      5.00    5.028   4      94.500    94.500     2     0.00000  64  66     0   4000.00      0.00
  66    1.007000     30.00    1.665   4      94.500    95.800     2     0.00000  65  67     0   4000.00      0.00
  67    1.007000      5.00    2.611   4      95.800    95.800     2     0.00000  66  68     0   4000.00      0.00
  68    1.007000     25.00    1.806   3      95.800    95.800     2     0.00000  67 229     0   4000.00      0.00
  69    1.007000    130.00    1.155   4      95.800    95.500     2     0.00000  68  70     0   4000.00      0.00
```

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 70 | 1.007000 | 5.00 | 2.611 | 3 | 95.500 | 95.500 | 2 | 0.00000 | 69 | 261 | 0 | 4000.00 | 0.00 |
| 71 | 1.007000 | 5.00 | 5.028 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 70 | 72 | 0 | 4000.00 | 0.00 |
| 72 | 1.007000 | 5.00 | 2.611 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 71 | 73 | 0 | 4000.00 | 0.00 |
| 73 | 1.007000 | 205.00 | 1.098 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 72 | 74 | 0 | 4000.00 | 0.00 |
| 74 | 1.007000 | 240.00 | 1.117 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 73 | 75 | 0 | 4000.00 | 0.00 |
| 75 | 1.007000 | 20.00 | 4.021 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 74 | 76 | 0 | 4000.00 | 0.00 |
| 76 | 1.007000 | 30.00 | 1.665 | 4 | 95.500 | 91.500 | 2 | 0.00000 | 75 | 77 | 0 | 4000.00 | 0.00 |
| 77 | 1.007000 | 25.00 | 2.120 | 4 | 91.500 | 97.000 | 2 | 0.00000 | 76 | 78 | 0 | 4000.00 | 0.00 |
| 78 | 1.007000 | 50.00 | 1.403 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 77 | 79 | 0 | 4000.00 | 0.00 |
| 79 | 1.007000 | 50.00 | 1.403 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 78 | 80 | 0 | 4000.00 | 0.00 |
| 80 | 1.007000 | 20.00 | 1.997 | 4 | 97.000 | 90.500 | 2 | 0.00000 | 79 | 81 | 0 | 4000.00 | 0.00 |
| 81 | 1.007000 | 40.00 | 2.002 | 4 | 90.500 | 96.900 | 2 | 0.00000 | 80 | 82 | 0 | 4000.00 | 0.00 |
| 82 | 1.007000 | 165.00 | 1.122 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 81 | 83 | 0 | 4000.00 | 0.00 |
| 83 | 1.007000 | 135.00 | 1.060 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 82 | 84 | 0 | 4000.00 | 0.00 |
| 84 | 1.007000 | 10.00 | 3.014 | 3 | 96.900 | 96.900 | 2 | 0.00000 | 83 | 101 | 0 | 4000.00 | 0.00 |
| 85 | 1.007000 | 60.00 | 1.134 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 84 | 86 | 0 | 4000.00 | 0.00 |
| 86 | 1.007000 | 5.00 | 5.028 | 3 | 96.900 | 96.900 | 2 | 0.00000 | 85 | 9 | 1 | 4000.00 | 0.00 |
| 87 | 0.336000 | 10.00 | 5.771 | 3 | 105.000 | 112.070 | 2 | 0.00000 | 7 | 88 | 0 | 4000.00 | 0.00 |
| 88 | 0.336000 | 5.00 | 5.570 | 4 | 112.070 | 113.750 | 2 | 0.00000 | 87 | 89 | 0 | 4000.00 | 0.00 |
| 89 | 0.256000 | 30.00 | 1.870 | 4 | 113.750 | 109.000 | 2 | 0.00000 | 88 | 90 | 0 | 4000.00 | 0.00 |
| 90 | 0.256000 | 10.00 | 1.205 | 2 | 109.000 | 104.250 | 2 | 0.00000 | 89 | 91 | 0 | 4000.00 | 0.00 |
| 91 | 0.256000 | 5.00 | 5.933 | 1 | 104.250 | 103.750 | 2 | 0.00000 | 90 | 0 | 0 | 4000.00 | 0.00 |
| 92 | 0.336000 | 40.00 | 2.714 | 3 | 112.070 | 105.000 | 2 | 0.00000 | 87 | 93 | 0 | 4000.00 | 0.00 |
| 93 | 1.000000 | 20.00 | 3.400 | 4 | 105.000 | 110.200 | 2 | 0.00000 | 92 | 94 | 0 | 4000.00 | 0.00 |
| 94 | 1.000000 | 10.00 | 3.800 | 4 | 110.200 | 104.750 | 2 | 0.00000 | 93 | 95 | 0 | 4000.00 | 0.00 |
| 95 | 1.000000 | 5.00 | 18.508 | 4 | 104.750 | 104.750 | 2 | 0.00000 | 94 | 96 | 0 | 4000.00 | 0.00 |
| 96 | 1.000000 | 10.00 | 3.538 | 2 | 104.750 | 104.750 | 2 | 0.00000 | 95 | 97 | 0 | 4000.00 | 0.00 |
| 97 | 1.000000 | 5.00 | 9.400 | 4 | 104.750 | 105.040 | 2 | 0.00000 | 96 | 98 | 0 | 4000.00 | 0.00 |
| 98 | 1.000000 | 20.00 | 7.400 | 4 | 105.040 | 94.000 | 2 | 0.00000 | 97 | 99 | 0 | 4000.00 | 0.00 |
| 99 | 1.104000 | 30.00 | 4.874 | 1 | 94.000 | 99.400 | 2 | 0.00000 | 98 | 0 | 0 | 4000.00 | 0.00 |
| 100 | 1.000000 | 85.00 | 1.864 | 4 | 105.000 | 91.000 | 2 | 0.00000 | 92 | 101 | 0 | 4000.00 | 0.00 |
| 101 | 1.000000 | 25.00 | 4.512 | 3 | 91.000 | 96.900 | 2 | 0.00000 | 100 | 85 | 1 | 4000.00 | 0.00 |
| 102 | 0.835000 | 5.00 | 12.356 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 40 | 103 | 0 | 4000.00 | 0.00 |
| 103 | 0.788000 | 60.00 | 1.628 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 102 | 104 | 0 | 4000.00 | 0.00 |
| 104 | 0.788000 | 100.00 | 1.000 | 4 | 96.000 | 95.500 | 2 | 0.00000 | 103 | 105 | 0 | 4000.00 | 0.00 |
| 105 | 0.788000 | 100.00 | 1.000 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 104 | 106 | 0 | 4000.00 | 0.00 |
| 106 | 0.788000 | 30.00 | 2.786 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 105 | 107 | 0 | 4000.00 | 0.00 |
| 107 | 0.927000 | 35.00 | 2.059 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 106 | 108 | 0 | 4000.00 | 0.00 |
| 108 | 0.927000 | 150.00 | 1.494 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 107 | 109 | 0 | 4000.00 | 0.00 |
| 109 | 0.927000 | 50.00 | 1.519 | 3 | 95.500 | 95.500 | 2 | 0.00000 | 108 | 110 | 0 | 4000.00 | 0.00 |
| 110 | 0.927000 | 20.00 | 2.298 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 109 | 111 | 0 | 4000.00 | 0.00 |
| 111 | 0.927000 | 10.00 | 7.860 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 110 | 112 | 0 | 4000.00 | 0.00 |
| 112 | 1.000000 | 10.00 | 9.000 | 4 | 95.500 | 101.700 | 2 | 0.00000 | 111 | 113 | 0 | 4000.00 | 0.00 |
| 113 | 1.000000 | 5.00 | 5.400 | 4 | 101.700 | 102.800 | 2 | 0.00000 | 112 | 114 | 0 | 4000.00 | 0.00 |
| 114 | 1.000000 | 10.00 | 12.354 | 2 | 102.800 | 102.800 | 2 | 0.00000 | 113 | 115 | 0 | 4000.00 | 0.00 |
| 115 | 1.000000 | 5.00 | 8.877 | 4 | 102.800 | 102.800 | 2 | 0.00000 | 114 | 116 | 0 | 4000.00 | 0.00 |
| 116 | 1.000000 | 5.00 | 5.000 | 4 | 102.800 | 102.800 | 2 | 0.00000 | 115 | 117 | 0 | 4000.00 | 0.00 |
| 117 | 1.250000 | 30.00 | 3.333 | 1 | 102.800 | 103.000 | 2 | 0.00000 | 116 | 0 | 0 | 4000.00 | 0.00 |
| 118 | 0.927000 | 10.00 | 6.562 | 4 | 95.500 | 95.500 | 2 | 0.00000 | 109 | 119 | 0 | 4000.00 | 0.00 |
| 119 | 1.000000 | 10.00 | 2.400 | 3 | 95.500 | 101.700 | 2 | 0.00000 | 118 | 120 | 0 | 4000.00 | 0.00 |
| 120 | 1.000000 | 5.00 | 7.800 | 4 | 101.700 | 102.800 | 2 | 0.00000 | 119 | 121 | 0 | 4000.00 | 0.00 |
| 121 | 1.000000 | 10.00 | 13.154 | 2 | 102.800 | 102.800 | 2 | 0.00000 | 120 | 122 | 0 | 4000.00 | 0.00 |
| 122 | 1.000000 | 10.00 | 8.938 | 4 | 102.800 | 102.800 | 2 | 0.00000 | 121 | 123 | 0 | 4000.00 | 0.00 |
| 123 | 1.250000 | 20.00 | 3.250 | 1 | 102.800 | 103.000 | 2 | 0.00000 | 122 | 0 | 0 | 4000.00 | 0.00 |
| 124 | 0.134000 | 5.00 | 3.624 | 4 | 101.700 | 101.700 | 2 | 0.00000 | 119 | 125 | 0 | 4000.00 | 0.00 |
| 125 | 0.134000 | 5.00 | 3.141 | 4 | 101.700 | 101.700 | 2 | 0.00000 | 124 | 126 | 0 | 4000.00 | 0.00 |
| 126 | 0.134000 | 5.00 | 1.000 | 2 | 101.700 | 101.700 | 2 | 0.00000 | 125 | 127 | 0 | 4000.00 | 0.00 |
| 127 | 0.134000 | 10.00 | 1.000 | 4 | 101.700 | 101.700 | 2 | 0.00000 | 126 | 128 | 0 | 4000.00 | 0.00 |
| 128 | 0.134000 | 10.00 | 1.000 | 4 | 101.700 | 101.700 | 2 | 0.00000 | 127 | 129 | 0 | 4000.00 | 0.00 |
| 129 | 0.134000 | 10.00 | 1.000 | 1 | 101.700 | 103.000 | 2 | 0.00000 | 128 | 0 | 0 | 4000.00 | 0.00 |
| 130 | 0.835000 | 5.00 | 11.020 | 4 | 93.000 | 93.000 | 2 | 0.00000 | 29 | 131 | 0 | 4000.00 | 0.00 |
| 131 | 0.835000 | 100.00 | 1.331 | 4 | 93.000 | 96.010 | 2 | 0.00000 | 130 | 132 | 0 | 4000.00 | 0.00 |
| 132 | 0.835000 | 25.00 | 1.267 | 4 | 96.010 | 96.010 | 2 | 0.00000 | 131 | 133 | 0 | 4000.00 | 0.00 |
| 133 | 0.835000 | 65.00 | 1.000 | 4 | 96.010 | 96.000 | 2 | 0.00000 | 132 | 134 | 0 | 4000.00 | 0.00 |
| 134 | 0.835000 | 20.00 | 2.653 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 133 | 135 | 0 | 4000.00 | 0.00 |
| 135 | 0.835000 | 105.00 | 1.382 | 3 | 96.000 | 89.000 | 2 | 0.00000 | 134 | 136 | 0 | 4000.00 | 0.00 |
| 136 | 0.835000 | 5.00 | 3.338 | 4 | 89.000 | 89.000 | 2 | 0.00000 | 135 | 137 | 0 | 4000.00 | 0.00 |
| 137 | 0.835000 | 50.00 | 1.334 | 3 | 89.000 | 89.000 | 2 | 0.00000 | 136 | 138 | 0 | 4000.00 | 0.00 |
| 138 | 0.835000 | 5.00 | 5.676 | 4 | 89.000 | 89.000 | 2 | 0.00000 | 137 | 139 | 0 | 4000.00 | 0.00 |
| 139 | 0.835000 | 5.00 | 4.340 | 3 | 89.000 | 89.000 | 2 | 0.00000 | 138 | 140 | 0 | 4000.00 | 0.00 |
| 140 | 0.835000 | 55.00 | 1.000 | 4 | 89.000 | 89.000 | 2 | 0.00000 | 139 | 141 | 0 | 4000.00 | 0.00 |
| 141 | 0.835000 | 25.00 | 1.668 | 3 | 89.000 | 89.000 | 2 | 0.00000 | 140 | 142 | 0 | 4000.00 | 0.00 |
| 142 | 0.835000 | 15.00 | 2.882 | 4 | 89.000 | 91.940 | 2 | 0.00000 | 141 | 143 | 0 | 4000.00 | 0.00 |
| 143 | 0.835000 | 25.00 | 1.668 | 3 | 91.940 | 91.940 | 2 | 0.00000 | 142 | 144 | 0 | 4000.00 | 0.00 |
| 144 | 0.835000 | 5.00 | 5.676 | 3 | 91.940 | 91.940 | 2 | 0.00000 | 143 | 145 | 0 | 4000.00 | 0.00 |
| 145 | 0.835000 | 5.00 | 4.340 | 3 | 91.940 | 91.940 | 2 | 0.00000 | 144 | 146 | 0 | 4000.00 | 0.00 |
| 146 | 0.835000 | 10.00 | 3.338 | 4 | 91.940 | 96.200 | 2 | 0.00000 | 145 | 147 | 0 | 4000.00 | 0.00 |
| 147 | 0.835000 | 5.00 | 3.338 | 4 | 96.200 | 96.200 | 2 | 0.00000 | 146 | 148 | 0 | 4000.00 | 0.00 |
| 148 | 0.835000 | 145.00 | 1.000 | 4 | 96.200 | 96.200 | 2 | 0.00000 | 147 | 149 | 0 | 4000.00 | 0.00 |
| 149 | 0.835000 | 10.00 | 2.670 | 4 | 96.200 | 96.200 | 2 | 0.00000 | 148 | 150 | 0 | 4000.00 | 0.00 |
| 150 | 0.835000 | 90.00 | 1.186 | 3 | 96.200 | 96.200 | 2 | 0.00000 | 149 | 151 | 0 | 4000.00 | 0.00 |
| 151 | 0.835000 | 5.00 | 5.676 | 4 | 96.200 | 94.530 | 2 | 0.00000 | 150 | 152 | 0 | 4000.00 | 0.00 |
| 152 | 0.835000 | 15.00 | 2.664 | 3 | 94.530 | 94.530 | 2 | 0.00000 | 151 | 153 | 0 | 4000.00 | 0.00 |
| 153 | 0.835000 | 5.00 | 2.336 | 4 | 94.530 | 94.530 | 2 | 0.00000 | 152 | 154 | 0 | 4000.00 | 0.00 |
| 154 | 0.835000 | 5.00 | 4.340 | 3 | 94.530 | 94.540 | 2 | 0.00000 | 153 | 155 | 0 | 4000.00 | 0.00 |
| 155 | 0.835000 | 15.00 | 2.559 | 3 | 94.540 | 94.540 | 2 | 0.00000 | 154 | 156 | 0 | 4000.00 | 0.00 |
| 156 | 0.835000 | 5.00 | 4.340 | 3 | 94.540 | 94.540 | 2 | 0.00000 | 155 | 157 | 0 | 4000.00 | 0.00 |
| 157 | 0.835000 | 5.00 | 3.338 | 4 | 94.540 | 94.540 | 2 | 0.00000 | 156 | 158 | 0 | 4000.00 | 0.00 |
| 158 | 0.835000 | 5.00 | 3.338 | 3 | 94.540 | 94.500 | 2 | 0.00000 | 157 | 159 | 0 | 4000.00 | 0.00 |
| 159 | 0.835000 | 5.00 | 4.340 | 4 | 94.500 | 94.500 | 2 | 0.00000 | 158 | 160 | 0 | 4000.00 | 0.00 |
| 160 | 0.835000 | 55.00 | 1.425 | 3 | 94.500 | 94.500 | 2 | 0.00000 | 159 | 161 | 0 | 4000.00 | 0.00 |

# CALCULATION SHEET

| | | | |
|---|---|---|---|
| Project: | HOPE CREEK GENERATING STATION | Job Number: | 8038 |
| Calc No. | 8038-P0004 | Sheet No. | 285 |
| By: | A. Arastu Date: 9/14/18 | Rev. No. | 1 |
| Subject: | Water Hammer Analysis of the HCGS Fire Protection System | | |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 161 | 0.835000 | 175.00 | 1.286 | 4 | 94.500 | 96.200 | 2 | 0.00000 | 160 | 162 | 0 | 4000.00 | 0.00 |
| 162 | 0.835000 | 100.00 | 1.568 | 3 | 96.200 | 96.200 | 2 | 0.00000 | 161 | 47 | 1 | 4000.00 | 0.00 |
| 163 | 0.835000 | 10.00 | 3.338 | 4 | 94.500 | 91.750 | 2 | 0.00000 | 160 | 164 | 0 | 4000.00 | 0.00 |
| 164 | 0.835000 | 40.00 | 1.413 | 4 | 91.750 | 89.580 | 2 | 0.00000 | 163 | 165 | 0 | 4000.00 | 0.00 |
| 165 | 0.835000 | 25.00 | 3.071 | 4 | 89.580 | 89.580 | 2 | 0.00000 | 164 | 166 | 0 | 4000.00 | 0.00 |
| 166 | 0.835000 | 5.00 | 4.340 | 3 | 89.580 | 89.580 | 2 | 0.00000 | 165 | 167 | 0 | 4000.00 | 0.00 |
| 167 | 0.835000 | 5.00 | 1.000 | 16 | 89.580 | 89.580 | 2 | 0.00000 | 166 | 0 | 0 | 4000.00 | 0.00 |
| 168 | 0.835000 | 5.00 | 13.358 | 4 | 89.000 | 91.000 | 2 | 0.00000 | 141 | 169 | 0 | 4000.00 | 0.00 |
| 169 | 0.835000 | 35.00 | 2.002 | 3 | 91.000 | 91.000 | 2 | 0.00000 | 168 | 170 | 0 | 4000.00 | 0.00 |
| 170 | 0.835000 | 10.00 | 4.340 | 3 | 91.000 | 91.000 | 2 | 0.00000 | 169 | 171 | 0 | 4000.00 | 0.00 |
| 171 | 0.835000 | 75.00 | 1.312 | 4 | 91.000 | 91.000 | 2 | 0.00000 | 170 | 172 | 0 | 4000.00 | 0.00 |
| 172 | 0.835000 | 45.00 | 2.002 | 3 | 91.000 | 91.000 | 2 | 0.00000 | 171 | 173 | 0 | 4000.00 | 0.00 |
| 173 | 0.835000 | 5.00 | 3.338 | 4 | 91.000 | 91.000 | 2 | 0.00000 | 172 | 174 | 0 | 4000.00 | 0.00 |
| 174 | 0.835000 | 15.00 | 1.779 | 4 | 91.000 | 96.040 | 2 | 0.00000 | 173 | 175 | 0 | 4000.00 | 0.00 |
| 175 | 0.835000 | 15.00 | 2.559 | 4 | 96.040 | 96.000 | 2 | 0.00000 | 174 | 176 | 0 | 4000.00 | 0.00 |
| 176 | 0.835000 | 95.00 | 1.176 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 175 | 177 | 0 | 4000.00 | 0.00 |
| 177 | 0.835000 | 55.00 | 1.213 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 176 | 178 | 0 | 4000.00 | 0.00 |
| 178 | 0.835000 | 5.00 | 3.338 | 4 | 96.000 | 91.000 | 2 | 0.00000 | 177 | 179 | 0 | 4000.00 | 0.00 |
| 179 | 0.835000 | 50.00 | 1.795 | 4 | 91.000 | 93.000 | 2 | 0.00000 | 178 | 180 | 0 | 4000.00 | 0.00 |
| 180 | 0.835000 | 80.00 | 1.146 | 4 | 93.000 | 93.000 | 2 | 0.00000 | 179 | 181 | 0 | 4000.00 | 0.00 |
| 181 | 0.835000 | 25.00 | 3.472 | 3 | 93.000 | 93.000 | 2 | 0.00000 | 180 | 29 | 1 | 4000.00 | 0.00 |
| 182 | 0.336000 | 45.00 | 1.866 | 3 | 91.000 | 96.000 | 2 | 0.00000 | 169 | 183 | 0 | 4000.00 | 0.00 |
| 183 | 0.336000 | 120.00 | 1.482 | 4 | 96.000 | 149.000 | 2 | 0.00000 | 182 | 184 | 0 | 4000.00 | 0.00 |
| 184 | 0.256000 | 205.00 | 1.092 | 16 | 149.000 | 142.500 | 2 | 0.00000 | 183 | 0 | 0 | 4000.00 | 0.00 |
| 185 | 0.256000 | 60.00 | 1.674 | 16 | 96.000 | 59.000 | 2 | 0.00000 | 182 | 0 | 0 | 4000.00 | 0.00 |
| 186 | 0.336000 | 10.00 | 4.427 | 3 | 91.000 | 94.800 | 2 | 0.00000 | 170 | 187 | 0 | 4000.00 | 0.00 |
| 187 | 0.336000 | 55.00 | 1.586 | 3 | 94.800 | 113.000 | 2 | 0.00000 | 186 | 188 | 0 | 4000.00 | 0.00 |
| 188 | 0.336000 | 230.00 | 1.231 | 4 | 113.000 | 146.000 | 2 | 0.00000 | 187 | 189 | 0 | 4000.00 | 0.00 |
| 189 | 0.256000 | 105.00 | 1.111 | 16 | 146.000 | 143.000 | 2 | 0.00000 | 188 | 0 | 0 | 4000.00 | 0.00 |
| 190 | 0.256000 | 100.00 | 1.297 | 16 | 94.800 | 83.700 | 2 | 0.00000 | 186 | 0 | 0 | 4000.00 | 0.00 |
| 191 | 0.256000 | 75.00 | 1.416 | 16 | 113.000 | 107.000 | 2 | 0.00000 | 187 | 0 | 0 | 4000.00 | 0.00 |
| 192 | 0.336000 | 5.00 | 7.854 | 4 | 91.000 | 95.000 | 2 | 0.00000 | 172 | 193 | 0 | 4000.00 | 0.00 |
| 193 | 0.336000 | 240.00 | 1.316 | 4 | 95.000 | 150.000 | 2 | 0.00000 | 192 | 194 | 0 | 4000.00 | 0.00 |
| 194 | 0.256000 | 180.00 | 1.105 | 16 | 150.000 | 142.000 | 2 | 0.00000 | 193 | 0 | 0 | 4000.00 | 0.00 |
| 195 | 0.665000 | 15.00 | 4.015 | 4 | 96.500 | 96.500 | 2 | 0.00000 | 54 | 196 | 0 | 4000.00 | 0.00 |
| 196 | 0.665000 | 11.00 | 2.197 | 4 | 96.500 | 94.500 | 2 | 0.00000 | 195 | 197 | 0 | 4400.00 | 0.00 |
| 197 | 0.665000 | 20.00 | 1.658 | 4 | 94.500 | 96.600 | 2 | 0.00000 | 196 | 198 | 0 | 4000.00 | 0.00 |
| 198 | 0.665000 | 115.00 | 1.000 | 4 | 96.600 | 96.600 | 2 | 0.00000 | 197 | 199 | 0 | 4000.00 | 0.00 |
| 199 | 0.665000 | 220.00 | 1.120 | 3 | 96.600 | 94.000 | 2 | 0.00000 | 198 | 200 | 0 | 4000.00 | 0.00 |
| 200 | 0.665000 | 20.00 | 2.862 | 4 | 94.000 | 94.750 | 2 | 0.00000 | 199 | 201 | 0 | 4000.00 | 0.00 |
| 201 | 0.665000 | 20.00 | 1.000 | 4 | 94.750 | 94.750 | 2 | 0.00000 | 200 | 202 | 0 | 4000.00 | 0.00 |
| 202 | 0.665000 | 20.00 | 2.197 | 4 | 94.750 | 94.750 | 2 | 0.00000 | 201 | 203 | 0 | 4000.00 | 0.00 |
| 203 | 0.665000 | 15.00 | 1.000 | 4 | 94.750 | 94.750 | 2 | 0.00000 | 202 | 204 | 0 | 4000.00 | 0.00 |
| 204 | 0.665000 | 30.00 | 1.973 | 3 | 94.750 | 84.100 | 2 | 0.00000 | 203 | 205 | 0 | 4000.00 | 0.00 |
| 205 | 0.665000 | 15.00 | 1.621 | 4 | 84.100 | 69.500 | 2 | 0.00000 | 204 | 206 | 0 | 4000.00 | 0.00 |
| 206 | 0.665000 | 15.00 | 1.887 | 3 | 69.500 | 69.500 | 2 | 0.00000 | 205 | 207 | 0 | 4000.00 | 0.00 |
| 207 | 0.665000 | 20.00 | 1.465 | 4 | 69.500 | 69.500 | 2 | 0.00000 | 206 | 208 | 0 | 4000.00 | 0.00 |
| 208 | 0.665000 | 20.00 | 4.125 | 3 | 69.500 | 61.750 | 2 | 0.00000 | 207 | 209 | 0 | 4000.00 | 0.00 |
| 209 | 0.665000 | 70.00 | 1.454 | 4 | 61.750 | 62.750 | 2 | 0.00000 | 208 | 210 | 0 | 4000.00 | 0.00 |
| 210 | 0.665000 | 5.00 | 6.320 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 209 | 211 | 0 | 4000.00 | 0.00 |
| 211 | 0.665000 | 50.00 | 1.293 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 210 | 212 | 0 | 4000.00 | 0.00 |
| 212 | 0.665000 | 20.00 | 2.330 | 3 | 62.750 | 62.750 | 2 | 0.00000 | 211 | 213 | 0 | 4000.00 | 0.00 |
| 213 | 0.665000 | 25.00 | 2.277 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 212 | 214 | 0 | 4000.00 | 0.00 |
| 214 | 0.665000 | 20.00 | 1.665 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 213 | 215 | 0 | 4000.00 | 0.00 |
| 215 | 0.665000 | 45.00 | 1.414 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 214 | 216 | 0 | 4000.00 | 0.00 |
| 216 | 0.665000 | 20.00 | 1.665 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 215 | 217 | 0 | 4000.00 | 0.00 |
| 217 | 0.665000 | 85.00 | 2.033 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 216 | 218 | 0 | 4000.00 | 0.00 |
| 218 | 0.665000 | 5.00 | 3.660 | 3 | 62.750 | 62.750 | 2 | 0.00000 | 217 | 219 | 0 | 4000.00 | 0.00 |
| 219 | 0.665000 | 25.00 | 2.649 | 3 | 62.750 | 66.000 | 2 | 0.00000 | 218 | 220 | 0 | 4000.00 | 0.00 |
| 220 | 0.665000 | 30.00 | 1.749 | 4 | 66.000 | 96.000 | 2 | 0.00000 | 219 | 221 | 0 | 4000.00 | 0.00 |
| 221 | 0.665000 | 20.00 | 1.329 | 4 | 96.000 | 96.000 | 2 | 0.00000 | 220 | 222 | 0 | 4000.00 | 0.00 |
| 222 | 0.665000 | 5.00 | 4.977 | 4 | 96.000 | 94.400 | 2 | 0.00000 | 221 | 223 | 0 | 4000.00 | 0.00 |
| 223 | 0.665000 | 95.00 | 1.139 | 4 | 94.400 | 97.000 | 2 | 0.00000 | 222 | 224 | 0 | 4000.00 | 0.00 |
| 224 | 0.665000 | 35.00 | 1.646 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 223 | 225 | 0 | 4000.00 | 0.00 |
| 225 | 0.665000 | 65.00 | 1.614 | 4 | 97.000 | 96.500 | 2 | 0.00000 | 224 | 226 | 0 | 4000.00 | 0.00 |
| 226 | 0.665000 | 35.00 | 1.000 | 4 | 96.500 | 96.500 | 2 | 0.00000 | 225 | 227 | 0 | 4000.00 | 0.00 |
| 227 | 0.665000 | 35.00 | 1.830 | 4 | 96.500 | 94.200 | 2 | 0.00000 | 226 | 228 | 0 | 4000.00 | 0.00 |
| 228 | 0.665000 | 35.00 | 1.266 | 4 | 94.200 | 96.200 | 2 | 0.00000 | 227 | 229 | 0 | 4000.00 | 0.00 |
| 229 | 0.665000 | 120.00 | 1.377 | 3 | 96.200 | 95.800 | 2 | 0.00000 | 228 | 69 | 1 | 4000.00 | 0.00 |
| 230 | 0.665000 | 10.00 | 6.453 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 12 | 231 | 0 | 4000.00 | 0.00 |
| 231 | 0.665000 | 25.00 | 1.372 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 230 | 232 | 0 | 4000.00 | 0.00 |
| 232 | 0.665000 | 150.00 | 1.062 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 231 | 233 | 0 | 4000.00 | 0.00 |
| 233 | 0.665000 | 135.00 | 1.069 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 232 | 234 | 0 | 4000.00 | 0.00 |
| 234 | 0.665000 | 45.00 | 1.146 | 4 | 96.900 | 96.900 | 2 | 0.00000 | 233 | 235 | 0 | 4000.00 | 0.00 |
| 235 | 0.665000 | 20.00 | 1.658 | 4 | 96.900 | 95.000 | 2 | 0.00000 | 234 | 236 | 0 | 4000.00 | 0.00 |
| 236 | 0.665000 | 35.00 | 1.564 | 4 | 95.000 | 95.500 | 2 | 0.00000 | 235 | 237 | 0 | 4000.00 | 0.00 |
| 237 | 0.665000 | 15.00 | 1.621 | 4 | 95.500 | 96.000 | 2 | 0.00000 | 236 | 238 | 0 | 4000.00 | 0.00 |
| 238 | 0.665000 | 30.00 | 1.621 | 4 | 96.000 | 72.000 | 2 | 0.00000 | 237 | 239 | 0 | 4000.00 | 0.00 |
| 239 | 0.665000 | 5.00 | 3.660 | 3 | 72.000 | 67.000 | 2 | 0.00000 | 238 | 240 | 0 | 4000.00 | 0.00 |
| 240 | 0.665000 | 75.00 | 1.497 | 4 | 67.000 | 64.250 | 2 | 0.00000 | 239 | 241 | 0 | 4000.00 | 0.00 |
| 241 | 0.665000 | 35.00 | 1.000 | 4 | 64.250 | 64.250 | 2 | 0.00000 | 240 | 242 | 0 | 4000.00 | 0.00 |
| 242 | 0.665000 | 65.00 | 1.286 | 4 | 64.250 | 61.750 | 2 | 0.00000 | 241 | 243 | 0 | 4000.00 | 0.00 |
| 243 | 0.665000 | 20.00 | 2.995 | 3 | 61.750 | 61.750 | 2 | 0.00000 | 242 | 244 | 0 | 4000.00 | 0.00 |
| 244 | 0.665000 | 5.00 | 2.064 | 4 | 61.750 | 61.750 | 2 | 0.00000 | 243 | 245 | 0 | 4000.00 | 0.00 |
| 245 | 0.665000 | 20.00 | 2.260 | 4 | 61.750 | 62.750 | 2 | 0.00000 | 244 | 246 | 0 | 4000.00 | 0.00 |
| 246 | 0.665000 | 15.00 | 1.887 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 245 | 247 | 0 | 4000.00 | 0.00 |
| 247 | 0.665000 | 10.00 | 2.330 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 246 | 248 | 0 | 4000.00 | 0.00 |
| 248 | 0.665000 | 15.00 | 1.887 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 247 | 249 | 0 | 4000.00 | 0.00 |
| 249 | 0.665000 | 35.00 | 1.380 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 248 | 250 | 0 | 4000.00 | 0.00 |
| 250 | 0.665000 | 100.00 | 1.000 | 4 | 62.750 | 62.750 | 2 | 0.00000 | 249 | 251 | 0 | 4000.00 | 0.00 |
| 251 | 0.665000 | 10.00 | 3.647 | 4 | 62.750 | 62.500 | 2 | 0.00000 | 250 | 252 | 0 | 4000.00 | 0.00 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 252 | 0.665000 | 30.00 | 1.749 | 4 | 62.500 | 67.900 | 2 | 0.00000 | 251 | 253 | 0 | 4000.00 | 0.00 |
| 253 | 0.665000 | 30.00 | 1.310 | 4 | 67.900 | 96.000 | 2 | 0.00000 | 252 | 254 | 0 | 4000.00 | 0.00 |
| 254 | 0.665000 | 20.00 | 2.317 | 4 | 96.000 | 97.000 | 2 | 0.00000 | 253 | 255 | 0 | 4000.00 | 0.00 |
| 255 | 0.665000 | 145.00 | 1.000 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 254 | 256 | 0 | 4000.00 | 0.00 |
| 256 | 0.665000 | 35.00 | 1.752 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 255 | 257 | 0 | 4000.00 | 0.00 |
| 257 | 0.665000 | 60.00 | 1.110 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 256 | 258 | 0 | 4000.00 | 0.00 |
| 258 | 0.665000 | 40.00 | 1.165 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 257 | 259 | 0 | 4000.00 | 0.00 |
| 259 | 0.665000 | 5.00 | 3.660 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 258 | 260 | 0 | 4000.00 | 0.00 |
| 260 | 0.665000 | 45.00 | 1.118 | 4 | 97.000 | 97.000 | 2 | 0.00000 | 259 | 261 | 0 | 4000.00 | 0.00 |
| 261 | 0.665000 | 15.00 | 4.538 | 3 | 97.000 | 95.500 | 2 | 0.00000 | 260 | 71 | 1 | 4000.00 | 0.00 |
| 262 | 0.505000 | 20.00 | 2.315 | 4 | 61.750 | 63.000 | 2 | 0.00000 | 243 | 263 | 0 | 4000.00 | 0.00 |
| 263 | 0.505000 | 10.00 | 3.318 | 4 | 63.000 | 56.000 | 2 | 0.00000 | 262 | 264 | 0 | 4000.00 | 0.00 |
| 264 | 0.505000 | 30.00 | 2.380 | 4 | 56.000 | 61.750 | 2 | 0.00000 | 263 | 265 | 0 | 4000.00 | 0.00 |
| 265 | 0.505000 | 5.00 | 3.020 | 3 | 61.750 | 62.900 | 2 | 0.00000 | 264 | 266 | 0 | 4000.00 | 0.00 |
| 266 | 0.505000 | 5.00 | 10.494 | 4 | 62.900 | 67.000 | 2 | 0.00000 | 265 | 267 | 0 | 4000.00 | 0.00 |
| 267 | 0.505000 | 5.00 | 3.828 | 4 | 67.000 | 67.000 | 2 | 0.00000 | 266 | 268 | 0 | 4000.00 | 0.00 |
| 268 | 0.505000 | 65.00 | 1.155 | 3 | 67.000 | 67.000 | 2 | 0.00000 | 267 | 269 | 0 | 4000.00 | 0.00 |
| 269 | 0.505000 | 15.00 | 1.000 | 4 | 67.000 | 67.000 | 2 | 0.00000 | 268 | 270 | 0 | 4000.00 | 0.00 |
| 270 | 0.505000 | 35.00 | 1.866 | 3 | 67.000 | 67.000 | 2 | 0.00000 | 269 | 271 | 0 | 4000.00 | 0.00 |
| 271 | 0.256000 | 25.00 | 1.143 | 4 | 67.000 | 67.000 | 2 | 0.00000 | 270 | 272 | 0 | 4000.00 | 0.00 |
| 272 | 0.256000 | 10.00 | 3.099 | 4 | 67.000 | 65.000 | 2 | 0.00000 | 271 | 273 | 0 | 4000.00 | 0.00 |
| 273 | 0.256000 | 55.00 | 1.289 | 16 | 65.000 | 94.500 | 2 | 0.00000 | 272 | 0 | 0 | 4000.00 | 0.00 |
| 274 | 0.505000 | 15.00 | 1.000 | 3 | 62.900 | 63.900 | 2 | 0.00000 | 265 | 275 | 0 | 4000.00 | 0.00 |
| 275 | 0.505000 | 15.00 | 1.741 | 3 | 63.900 | 68.200 | 2 | 0.00000 | 274 | 276 | 0 | 4000.00 | 0.00 |
| 276 | 0.336000 | 135.00 | 1.170 | 4 | 68.200 | 71.500 | 2 | 0.00000 | 275 | 277 | 0 | 4000.00 | 0.00 |
| 277 | 0.336000 | 40.00 | 1.773 | 16 | 71.500 | 61.500 | 2 | 0.00000 | 276 | 0 | 0 | 4000.00 | 0.00 |
| 278 | 0.336000 | 20.00 | 2.518 | 16 | 68.200 | 61.500 | 2 | 0.00000 | 275 | 0 | 0 | 4000.00 | 0.00 |
| 279 | 0.505000 | 85.00 | 2.305 | 4 | 69.500 | 68.750 | 2 | 0.00000 | 206 | 280 | 0 | 4000.00 | 0.00 |
| 280 | 0.505000 | 10.00 | 2.010 | 3 | 68.750 | 68.750 | 2 | 0.00000 | 279 | 281 | 0 | 4000.00 | 0.00 |
| 281 | 0.505000 | 45.00 | 1.382 | 4 | 68.750 | 68.750 | 2 | 0.00000 | 280 | 282 | 0 | 4000.00 | 0.00 |
| 282 | 0.505000 | 10.00 | 1.707 | 4 | 68.750 | 68.750 | 2 | 0.00000 | 281 | 283 | 0 | 4000.00 | 0.00 |
| 283 | 0.505000 | 70.00 | 1.447 | 3 | 68.750 | 68.750 | 2 | 0.00000 | 282 | 284 | 0 | 4000.00 | 0.00 |
| 284 | 0.505000 | 20.00 | 1.354 | 4 | 68.750 | 68.750 | 2 | 0.00000 | 283 | 285 | 0 | 4000.00 | 0.00 |
| 285 | 0.505000 | 5.00 | 2.414 | 4 | 68.750 | 65.500 | 2 | 0.00000 | 284 | 286 | 0 | 4000.00 | 0.00 |
| 286 | 0.505000 | 25.00 | 1.404 | 3 | 65.500 | 65.500 | 2 | 0.00000 | 285 | 287 | 0 | 4000.00 | 0.00 |
| 287 | 0.336000 | 65.00 | 1.868 | 4 | 65.500 | 113.000 | 2 | 0.00000 | 286 | 288 | 0 | 4000.00 | 0.00 |
| 288 | 0.336000 | 35.00 | 2.150 | 3 | 113.000 | 147.000 | 2 | 0.00000 | 287 | 289 | 0 | 4000.00 | 0.00 |
| 289 | 0.256000 | 55.00 | 1.419 | 4 | 147.000 | 178.000 | 2 | 0.00000 | 288 | 290 | 0 | 4000.00 | 0.00 |
| 290 | 0.256000 | 10.00 | 1.000 | 16 | 178.000 | 178.000 | 2 | 0.00000 | 289 | 0 | 0 | 4000.00 | 0.00 |
| 291 | 0.256000 | 35.00 | 1.247 | 16 | 147.000 | 159.750 | 2 | 0.00000 | 288 | 0 | 0 | 4000.00 | 0.00 |
| 292 | 0.256000 | 115.00 | 1.686 | 16 | 67.000 | 128.500 | 2 | 0.00000 | 239 | 0 | 0 | 4000.00 | 0.00 |
| 293 | 0.336000 | 5.00 | 7.451 | 4 | 65.710 | 62.500 | 2 | 0.00000 | 219 | 294 | 0 | 4000.00 | 0.00 |
| 294 | 0.336000 | 60.00 | 1.112 | 4 | 62.500 | 62.500 | 2 | 0.00000 | 293 | 295 | 0 | 4000.00 | 0.00 |
| 295 | 0.336000 | 40.00 | 1.907 | 4 | 62.500 | 93.500 | 2 | 0.00000 | 294 | 296 | 0 | 4000.00 | 0.00 |
| 296 | 0.336000 | 45.00 | 1.729 | 3 | 93.500 | 126.800 | 2 | 0.00000 | 295 | 297 | 0 | 4000.00 | 0.00 |
| 297 | 0.336000 | 45.00 | 1.149 | 3 | 126.800 | 142.000 | 2 | 0.00000 | 296 | 298 | 0 | 4000.00 | 0.00 |
| 298 | 0.336000 | 40.00 | 1.571 | 3 | 142.000 | 154.500 | 2 | 0.00000 | 297 | 299 | 0 | 4000.00 | 0.00 |
| 299 | 0.256000 | 95.00 | 1.107 | 16 | 154.500 | 155.500 | 2 | 0.00000 | 298 | 0 | 0 | 4000.00 | 0.00 |
| 300 | 0.256000 | 100.00 | 1.623 | 16 | 142.000 | 143.000 | 2 | 0.00000 | 297 | 0 | 0 | 4000.00 | 0.00 |
| 301 | 0.336000 | 25.00 | 2.452 | 3 | 154.500 | 156.300 | 2 | 0.00000 | 298 | 302 | 0 | 4000.00 | 0.00 |
| 302 | 0.336000 | 45.00 | 1.893 | 4 | 156.300 | 172.300 | 2 | 0.00000 | 301 | 303 | 0 | 4000.00 | 0.00 |
| 303 | 0.256000 | 55.00 | 1.304 | 4 | 172.300 | 178.000 | 2 | 0.00000 | 302 | 304 | 0 | 4000.00 | 0.00 |
| 304 | 0.256000 | 10.00 | 1.000 | 16 | 178.000 | 178.000 | 2 | 0.00000 | 303 | 0 | 0 | 4000.00 | 0.00 |
| 305 | 0.336000 | 5.00 | 6.376 | 4 | 156.300 | 156.300 | 2 | 0.00000 | 301 | 306 | 0 | 4000.00 | 0.00 |
| 306 | 0.256000 | 130.00 | 1.405 | 16 | 156.300 | 156.300 | 2 | 0.00000 | 305 | 0 | 0 | 4000.00 | 0.00 |
| 307 | 0.336000 | 105.00 | 1.914 | 4 | 126.800 | 155.000 | 2 | 0.00000 | 296 | 308 | 0 | 4000.00 | 0.00 |
| 308 | 0.256000 | 130.00 | 1.287 | 19 | 155.000 | 206.300 | 2 | 0.00000 | 307 | 309 | 0 | 4000.00 | 0.00 |
| 309 | 0.256000 | 20.00 | 1.000 | 16 | 206.300 | 203.000 | 2 | 0.00000 | 308 | 0 | 0 | 4000.00 | 0.00 |
| 310 | 0.336000 | 10.00 | 5.301 | 3 | 62.750 | 71.500 | 2 | 0.00000 | 212 | 311 | 0 | 4000.00 | 0.00 |
| 311 | 0.336000 | 65.00 | 1.424 | 3 | 71.500 | 133.500 | 2 | 0.00000 | 310 | 312 | 0 | 4000.00 | 0.00 |
| 312 | 0.256000 | 15.00 | 1.439 | 4 | 133.500 | 147.300 | 2 | 0.00000 | 311 | 313 | 0 | 4000.00 | 0.00 |
| 313 | 0.256000 | 60.00 | 1.281 | 4 | 147.300 | 165.100 | 2 | 0.00000 | 312 | 314 | 0 | 4000.00 | 0.00 |
| 314 | 0.256000 | 30.00 | 1.527 | 16 | 165.100 | 160.000 | 2 | 0.00000 | 313 | 0 | 0 | 4000.00 | 0.00 |
| 315 | 0.256000 | 25.00 | 1.407 | 16 | 71.500 | 81.500 | 2 | 0.00000 | 310 | 0 | 0 | 4000.00 | 0.00 |
| 316 | 0.336000 | 10.00 | 3.688 | 4 | 133.500 | 133.500 | 2 | 0.00000 | 311 | 317 | 0 | 4000.00 | 0.00 |
| 317 | 0.256000 | 80.00 | 1.717 | 16 | 133.500 | 141.500 | 2 | 0.00000 | 316 | 0 | 0 | 4000.00 | 0.00 |
| 318 | 0.336000 | 10.00 | 6.443 | 4 | 68.750 | 66.700 | 2 | 0.00000 | 283 | 319 | 0 | 4000.00 | 0.00 |
| 319 | 0.336000 | 100.00 | 1.672 | 3 | 66.700 | 120.000 | 2 | 0.00000 | 318 | 320 | 0 | 4000.00 | 0.00 |
| 320 | 0.336000 | 15.00 | 2.792 | 3 | 120.000 | 132.000 | 2 | 0.00000 | 319 | 321 | 0 | 4000.00 | 0.00 |
| 321 | 0.336000 | 15.00 | 1.448 | 4 | 132.000 | 146.000 | 2 | 0.00000 | 320 | 322 | 0 | 4000.00 | 0.00 |
| 322 | 0.256000 | 55.00 | 1.604 | 16 | 146.000 | 163.500 | 2 | 0.00000 | 321 | 0 | 0 | 4000.00 | 0.00 |
| 323 | 0.256000 | 25.00 | 1.492 | 16 | 120.000 | 128.500 | 2 | 0.00000 | 319 | 0 | 0 | 4000.00 | 0.00 |
| 324 | 0.336000 | 45.00 | 1.806 | 3 | 132.000 | 132.000 | 2 | 0.00000 | 320 | 325 | 0 | 4000.00 | 0.00 |
| 325 | 0.256000 | 30.00 | 2.263 | 16 | 132.000 | 157.500 | 2 | 0.00000 | 324 | 0 | 0 | 4000.00 | 0.00 |
| 326 | 0.256000 | 35.00 | 1.188 | 16 | 132.000 | 141.500 | 2 | 0.00000 | 324 | 0 | 0 | 4000.00 | 0.00 |
| 327 | 0.336000 | 30.00 | 2.456 | 4 | 63.900 | 68.100 | 2 | 0.00000 | 274 | 328 | 0 | 4000.00 | 0.00 |
| 328 | 0.336000 | 90.00 | 1.939 | 3 | 68.100 | 134.000 | 2 | 0.00000 | 327 | 329 | 0 | 4000.00 | 0.00 |
| 329 | 0.336000 | 30.00 | 1.694 | 4 | 134.000 | 132.000 | 2 | 0.00000 | 328 | 330 | 0 | 4000.00 | 0.00 |
| 330 | 0.336000 | 15.00 | 1.448 | 3 | 132.000 | 132.000 | 2 | 0.00000 | 329 | 331 | 0 | 4000.00 | 0.00 |
| 331 | 0.256000 | 90.00 | 1.181 | 16 | 132.000 | 141.500 | 2 | 0.00000 | 330 | 0 | 0 | 4000.00 | 0.00 |
| 332 | 0.256000 | 15.00 | 2.980 | 16 | 132.000 | 141.500 | 2 | 0.00000 | 330 | 0 | 0 | 4000.00 | 0.00 |
| 333 | 0.336000 | 15.00 | 3.554 | 4 | 134.000 | 147.000 | 2 | 0.00000 | 328 | 334 | 0 | 4000.00 | 0.00 |
| 334 | 0.256000 | 15.00 | 1.451 | 19 | 147.000 | 159.750 | 2 | 0.00000 | 333 | 335 | 0 | 4000.00 | 0.00 |
| 335 | 0.256000 | 50.00 | 1.000 | 16 | 159.750 | 159.750 | 2 | 0.00000 | 334 | 0 | 0 | 4000.00 | 0.00 |
| 336 | 0.336000 | 10.00 | 6.712 | 4 | 67.000 | 65.000 | 2 | 0.00000 | 268 | 337 | 0 | 4000.00 | 0.00 |
| 337 | 0.336000 | 90.00 | 1.538 | 3 | 65.000 | 115.200 | 2 | 0.00000 | 336 | 338 | 0 | 4000.00 | 0.00 |
| 338 | 0.336000 | 40.00 | 1.403 | 3 | 115.200 | 133.800 | 2 | 0.00000 | 337 | 339 | 0 | 4000.00 | 0.00 |
| 339 | 0.336000 | 50.00 | 2.423 | 3 | 133.800 | 133.300 | 2 | 0.00000 | 338 | 340 | 0 | 4000.00 | 0.00 |
| 340 | 0.336000 | 10.00 | 3.016 | 3 | 133.300 | 133.300 | 2 | 0.00000 | 339 | 341 | 0 | 4000.00 | 0.00 |
| 341 | 0.256000 | 45.00 | 1.340 | 16 | 133.300 | 141.500 | 2 | 0.00000 | 340 | 0 | 0 | 4000.00 | 0.00 |
| 342 | 0.256000 | 15.00 | 1.678 | 16 | 133.300 | 141.500 | 2 | 0.00000 | 340 | 0 | 0 | 4000.00 | 0.00 |

# CALCULATION SHEET

| | | | |
|---|---|---|---|
| Project: | HOPE CREEK GENERATING STATION | Job Number: | 8038 |
| Calc No. | 8038-P0004 | Sheet No. | 287 |
| By: | A. Arastu Date: 9/14/18 | Rev. No. | 1 |
| Subject: | Water Hammer Analysis of the HCGS Fire Protection System | | |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 343 | 0.256000 | 10.00 | 1.300 | 16 | 133.800 | 141.500 | 2 | 0.00000 | 338 | 0 | 0 | 4000.00 | 0.00 |
| 344 | 0.256000 | 35.00 | 1.644 | 16 | 133.300 | 128.500 | 2 | 0.00000 | 339 | 0 | 0 | 4000.00 | 0.00 |
| 345 | 0.256000 | 5.00 | 5.813 | 3 | 115.200 | 115.200 | 2 | 0.00000 | 337 | 346 | 0 | 4000.00 | 0.00 |
| 346 | 0.256000 | 80.00 | 1.288 | 3 | 115.200 | 116.500 | 2 | 0.00000 | 345 | 347 | 0 | 4000.00 | 0.00 |
| 347 | 0.256000 | 55.00 | 1.726 | 16 | 116.500 | 141.500 | 2 | 0.00000 | 346 | 0 | 0 | 4000.00 | 0.00 |
| 348 | 0.256000 | 15.00 | 2.601 | 16 | 116.500 | 128.500 | 2 | 0.00000 | 346 | 0 | 0 | 4000.00 | 0.00 |
| 349 | 0.256000 | 50.00 | 1.594 | 16 | 115.200 | 106.500 | 2 | 0.00000 | 345 | 0 | 0 | 4000.00 | 0.00 |
| 350 | 0.505000 | 175.00 | 1.669 | 4 | 68.750 | 140.000 | 2 | 0.00000 | 280 | 351 | 0 | 4000.00 | 0.00 |
| 351 | 0.336000 | 50.00 | 1.000 | 16 | 140.000 | 138.000 | 2 | 0.00000 | 350 | 0 | 0 | 4000.00 | 0.00 |
| 352 | 0.336000 | 10.00 | 4.226 | 4 | 67.000 | 65.000 | 2 | 0.00000 | 270 | 353 | 0 | 4000.00 | 0.00 |
| 353 | 0.336000 | 80.00 | 1.285 | 4 | 65.000 | 105.700 | 2 | 0.00000 | 352 | 354 | 0 | 4000.00 | 0.00 |
| 354 | 0.336000 | 80.00 | 1.630 | 3 | 105.700 | 130.500 | 2 | 0.00000 | 353 | 355 | 0 | 4000.00 | 0.00 |
| 355 | 0.256000 | 30.00 | 1.458 | 4 | 130.500 | 147.500 | 2 | 0.00000 | 354 | 356 | 0 | 4000.00 | 0.00 |
| 356 | 0.256000 | 25.00 | 1.225 | 4 | 147.500 | 141.500 | 2 | 0.00000 | 355 | 357 | 0 | 4000.00 | 0.00 |
| 357 | 0.162000 | 50.00 | 1.843 | 16 | 141.500 | 141.500 | 2 | 0.00000 | 356 | 0 | 0 | 4000.00 | 0.00 |
| 358 | 0.336000 | 5.00 | 5.570 | 4 | 130.500 | 130.500 | 2 | 0.00000 | 354 | 359 | 0 | 4000.00 | 0.00 |
| 359 | 0.162000 | 35.00 | 1.759 | 16 | 130.500 | 132.200 | 2 | 0.00000 | 358 | 0 | 0 | 4000.00 | 0.00 |
| 360 | 0.336000 | 45.00 | 2.343 | 4 | 94.500 | 115.800 | 2 | 0.00000 | 152 | 361 | 0 | 4000.00 | 0.00 |
| 361 | 0.336000 | 15.00 | 1.448 | 3 | 115.800 | 130.600 | 2 | 0.00000 | 360 | 362 | 0 | 4000.00 | 0.00 |
| 362 | 0.256000 | 50.00 | 1.510 | 19 | 130.600 | 176.000 | 2 | 0.00000 | 361 | 363 | 0 | 4000.00 | 0.00 |
| 363 | 0.256000 | 15.00 | 1.000 | 16 | 176.000 | 176.000 | 2 | 0.00000 | 362 | 0 | 0 | 4000.00 | 0.00 |
| 364 | 0.362000 | 145.00 | 1.539 | 16 | 130.600 | 129.600 | 2 | 0.00000 | 361 | 0 | 0 | 4000.00 | 0.00 |
| 365 | 0.336000 | 65.00 | 1.940 | 3 | 92.000 | 118.400 | 2 | 0.00000 | 145 | 366 | 0 | 4000.00 | 0.00 |
| 366 | 0.336000 | 20.00 | 1.544 | 3 | 118.400 | 118.400 | 2 | 0.00000 | 365 | 367 | 0 | 4000.00 | 0.00 |
| 367 | 0.256000 | 15.00 | 1.239 | 16 | 118.400 | 115.000 | 2 | 0.00000 | 366 | 0 | 0 | 4000.00 | 0.00 |
| 368 | 0.256000 | 20.00 | 1.947 | 16 | 118.400 | 127.000 | 2 | 0.00000 | 365 | 0 | 0 | 4000.00 | 0.00 |
| 369 | 0.336000 | 30.00 | 2.275 | 4 | 118.400 | 133.500 | 2 | 0.00000 | 366 | 370 | 0 | 4000.00 | 0.00 |
| 370 | 0.256000 | 35.00 | 1.232 | 3 | 133.500 | 166.000 | 2 | 0.00000 | 369 | 371 | 0 | 4000.00 | 0.00 |
| 371 | 0.256000 | 10.00 | 1.000 | 19 | 166.000 | 176.000 | 2 | 0.00000 | 370 | 372 | 0 | 4000.00 | 0.00 |
| 372 | 0.256000 | 20.00 | 2.970 | 16 | 176.000 | 175.000 | 2 | 0.00000 | 371 | 0 | 0 | 4000.00 | 0.00 |
| 373 | 0.256000 | 55.00 | 1.521 | 16 | 166.000 | 141.000 | 2 | 0.00000 | 370 | 0 | 0 | 4000.00 | 0.00 |
| 374 | 0.336000 | 5.00 | 6.914 | 3 | 92.000 | 94.200 | 2 | 0.00000 | 144 | 375 | 0 | 4000.00 | 0.00 |
| 375 | 0.336000 | 50.00 | 1.605 | 3 | 94.200 | 113.250 | 2 | 0.00000 | 374 | 376 | 0 | 4000.00 | 0.00 |
| 376 | 0.256000 | 30.00 | 1.100 | 16 | 113.250 | 141.750 | 2 | 0.00000 | 375 | 0 | 0 | 4000.00 | 0.00 |
| 377 | 0.256000 | 30.00 | 1.751 | 16 | 94.200 | 74.000 | 2 | 0.00000 | 374 | 0 | 0 | 4000.00 | 0.00 |
| 378 | 0.256000 | 20.00 | 2.380 | 16 | 113.300 | 111.000 | 2 | 0.00000 | 375 | 0 | 0 | 4000.00 | 0.00 |
| 379 | 0.336000 | 10.00 | 4.898 | 4 | 89.000 | 94.330 | 2 | 0.00000 | 137 | 380 | 0 | 4000.00 | 0.00 |
| 380 | 0.336000 | 5.00 | 2.344 | 3 | 94.330 | 95.000 | 2 | 0.00000 | 379 | 381 | 0 | 4000.00 | 0.00 |
| 381 | 0.336000 | 100.00 | 1.322 | 4 | 95.000 | 130.700 | 2 | 0.00000 | 380 | 382 | 0 | 4000.00 | 0.00 |
| 382 | 0.256000 | 65.00 | 1.598 | 19 | 130.700 | 176.000 | 2 | 0.00000 | 381 | 383 | 0 | 4000.00 | 0.00 |
| 383 | 0.256000 | 20.00 | 1.000 | 16 | 176.000 | 175.000 | 2 | 0.00000 | 382 | 0 | 0 | 4000.00 | 0.00 |
| 384 | 0.336000 | 50.00 | 1.859 | 3 | 95.000 | 96.500 | 2 | 0.00000 | 380 | 385 | 0 | 4000.00 | 0.00 |
| 385 | 0.256000 | 75.00 | 1.252 | 3 | 96.500 | 98.000 | 2 | 0.00000 | 384 | 386 | 0 | 4000.00 | 0.00 |
| 386 | 0.256000 | 40.00 | 1.269 | 16 | 98.000 | 71.000 | 2 | 0.00000 | 385 | 0 | 0 | 4000.00 | 0.00 |
| 387 | 0.256000 | 15.00 | 2.741 | 16 | 96.500 | 103.000 | 2 | 0.00000 | 384 | 0 | 0 | 4000.00 | 0.00 |
| 388 | 0.256000 | 40.00 | 1.922 | 16 | 98.000 | 94.500 | 2 | 0.00000 | 385 | 0 | 0 | 4000.00 | 0.00 |
| 389 | 0.336000 | 45.00 | 1.567 | 3 | 89.000 | 127.750 | 2 | 0.00000 | 135 | 390 | 0 | 4000.00 | 0.00 |
| 390 | 0.256000 | 20.00 | 1.688 | 16 | 127.750 | 141.750 | 2 | 0.00000 | 389 | 0 | 0 | 4000.00 | 0.00 |
| 391 | 0.256000 | 110.00 | 1.335 | 16 | 127.750 | 141.750 | 2 | 0.00000 | 389 | 0 | 0 | 4000.00 | 0.00 |
| 392 | 0.336000 | 5.00 | 7.854 | 3 | 94.500 | 96.800 | 2 | 0.00000 | 155 | 393 | 0 | 4000.00 | 0.00 |
| 393 | 0.256000 | 215.00 | 1.316 | 16 | 96.800 | 65.000 | 2 | 0.00000 | 392 | 0 | 0 | 4000.00 | 0.00 |
| 394 | 0.256000 | 125.00 | 1.470 | 16 | 96.800 | 141.750 | 2 | 0.00000 | 392 | 0 | 0 | 4000.00 | 0.00 |
| 395 | 0.336000 | 150.00 | 1.531 | 3 | 94.500 | 130.400 | 2 | 0.00000 | 156 | 396 | 0 | 4000.00 | 0.00 |
| 396 | 0.256000 | 155.00 | 1.264 | 4 | 130.400 | 182.000 | 2 | 0.00000 | 395 | 397 | 0 | 4000.00 | 0.00 |
| 397 | 0.256000 | 35.00 | 1.512 | 19 | 182.000 | 179.000 | 2 | 0.00000 | 396 | 398 | 0 | 4000.00 | 0.00 |
| 398 | 0.256000 | 10.00 | 1.000 | 16 | 179.000 | 178.000 | 2 | 0.00000 | 397 | 0 | 0 | 4000.00 | 0.00 |
| 399 | 0.505000 | 120.00 | 1.538 | 3 | 94.500 | 90.500 | 2 | 0.00000 | 158 | 400 | 0 | 4000.00 | 0.00 |
| 400 | 0.336000 | 5.00 | 8.007 | 4 | 90.500 | 90.500 | 2 | 0.00000 | 399 | 401 | 0 | 4000.00 | 0.00 |
| 401 | 0.256000 | 60.00 | 1.349 | 16 | 90.500 | 141.750 | 2 | 0.00000 | 400 | 0 | 0 | 4000.00 | 0.00 |
| 402 | 0.336000 | 130.00 | 1.496 | 3 | 90.500 | 65.300 | 2 | 0.00000 | 399 | 403 | 0 | 4000.00 | 0.00 |
| 403 | 0.336000 | 50.00 | 1.228 | 4 | 65.300 | 94.700 | 2 | 0.00000 | 402 | 404 | 0 | 4000.00 | 0.00 |
| 404 | 0.256000 | 55.00 | 1.315 | 16 | 94.700 | 141.750 | 2 | 0.00000 | 403 | 0 | 0 | 4000.00 | 0.00 |
| 405 | 0.336000 | 40.00 | 2.260 | 3 | 65.300 | 77.500 | 2 | 0.00000 | 402 | 406 | 0 | 4000.00 | 0.00 |
| 406 | 0.256000 | 30.00 | 1.458 | 16 | 77.500 | 103.500 | 2 | 0.00000 | 405 | 0 | 0 | 4000.00 | 0.00 |
| 407 | 0.256000 | 125.00 | 1.180 | 16 | 77.500 | 75.000 | 2 | 0.00000 | 405 | 0 | 0 | 4000.00 | 0.00 |
| 408 | 0.336000 | 135.00 | 1.552 | 4 | 79.000 | 142.000 | 2 | 0.00000 | 139 | 409 | 0 | 4000.00 | 0.00 |
| 409 | 0.336000 | 20.00 | 1.000 | 16 | 142.000 | 141.750 | 2 | 0.00000 | 408 | 0 | 0 | 4000.00 | 0.00 |
| 410 | 0.256000 | 95.00 | 1.334 | 19 | 96.200 | 174.000 | 2 | 0.00000 | 150 | 411 | 0 | 4000.00 | 0.00 |
| 411 | 0.256000 | 10.00 | 1.358 | 4 | 174.000 | 183.500 | 2 | 0.00000 | 410 | 412 | 0 | 4000.00 | 0.00 |
| 412 | 0.107000 | 60.00 | 1.439 | 4 | 183.500 | 197.500 | 2 | 0.00000 | 411 | 413 | 0 | 4000.00 | 0.00 |
| 413 | 0.107000 | 25.00 | 1.000 | 16 | 197.500 | 197.500 | 2 | 0.00000 | 412 | 0 | 0 | 4000.00 | 0.00 |
| 414 | 0.505000 | 100.00 | 2.373 | 3 | 91.940 | 138.300 | 2 | 0.00000 | 143 | 415 | 0 | 4000.00 | 0.00 |
| 415 | 0.505000 | 5.00 | 5.848 | 2 | 138.300 | 142.000 | 2 | 0.00000 | 414 | 416 | 0 | 4000.00 | 0.00 |
| 416 | 0.336000 | 5.00 | 1.000 | 4 | 142.000 | 142.000 | 2 | 0.00000 | 415 | 417 | 0 | 4000.00 | 0.00 |
| 417 | 0.336000 | 50.00 | 1.000 | 4 | 142.000 | 160.000 | 2 | 0.00000 | 416 | 418 | 0 | 4000.00 | 0.00 |
| 418 | 0.336000 | 50.00 | 1.000 | 16 | 160.000 | 160.000 | 2 | 0.00000 | 417 | 0 | 0 | 4000.00 | 0.00 |
| 419 | 0.505000 | 85.00 | 2.031 | 4 | 94.500 | 131.500 | 2 | 0.00000 | 154 | 420 | 0 | 4000.00 | 0.00 |
| 420 | 0.505000 | 50.00 | 1.443 | 4 | 131.500 | 130.750 | 2 | 0.00000 | 419 | 421 | 0 | 4000.00 | 0.00 |
| 421 | 0.505000 | 30.00 | 1.909 | 4 | 130.750 | 130.750 | 2 | 0.00000 | 420 | 422 | 0 | 4000.00 | 0.00 |
| 422 | 0.505000 | 40.00 | 2.361 | 4 | 130.750 | 128.750 | 2 | 0.00000 | 421 | 423 | 0 | 4000.00 | 0.00 |
| 423 | 0.505000 | 35.00 | 1.491 | 3 | 128.750 | 132.170 | 2 | 0.00000 | 422 | 424 | 0 | 4000.00 | 0.00 |
| 424 | 0.256000 | 10.00 | 1.505 | 4 | 132.170 | 138.000 | 2 | 0.00000 | 423 | 425 | 0 | 4000.00 | 0.00 |
| 425 | 0.162000 | 105.00 | 1.580 | 16 | 138.000 | 169.500 | 2 | 0.00000 | 424 | 0 | 0 | 4000.00 | 0.00 |
| 426 | 0.336000 | 40.00 | 1.843 | 3 | 132.170 | 132.170 | 2 | 0.00000 | 423 | 427 | 0 | 4000.00 | 0.00 |
| 427 | 0.256000 | 10.00 | 1.000 | 4 | 132.170 | 138.000 | 2 | 0.00000 | 426 | 428 | 0 | 4000.00 | 0.00 |
| 428 | 0.162000 | 100.00 | 1.632 | 16 | 138.000 | 169.500 | 2 | 0.00000 | 427 | 0 | 0 | 4000.00 | 0.00 |
| 429 | 0.256000 | 40.00 | 1.165 | 4 | 132.170 | 138.000 | 2 | 0.00000 | 426 | 430 | 0 | 4000.00 | 0.00 |
| 430 | 0.162000 | 155.00 | 1.548 | 16 | 138.000 | 169.500 | 2 | 0.00000 | 429 | 0 | 0 | 4000.00 | 0.00 |
| 431 | 0.256000 | 40.00 | 1.934 | 4 | 65.500 | 69.000 | 2 | 0.00000 | 286 | 432 | 0 | 4000.00 | 0.00 |
| 432 | 0.256000 | 105.00 | 1.020 | 4 | 69.000 | 171.000 | 2 | 0.00000 | 431 | 433 | 0 | 4000.00 | 0.00 |
| 433 | 0.162000 | 10.00 | 1.227 | 19 | 171.000 | 181.000 | 2 | 0.00000 | 432 | 434 | 0 | 4000.00 | 0.00 |

```
   434   0.162000    40.00    1.332  16    181.000   180.000     2     0.00000 433   0     0   4000.00      0.00
   435   0.665000    15.00    5.522   3     89.600    83.800     2     0.00000 166 436     0   4000.00      0.00
   436   0.665000     5.00    3.660   3     83.800    83.800     2     0.00000 435 437     0   4000.00      0.00
   437   0.665000     5.00   14.300   3     83.800    83.800     2     0.00000 436 438     0   4000.00      0.00
   438   0.505000     5.00    4.652  13     83.800    88.000     2     0.00000 437 439     0   4000.00      0.00
   439   0.505000     5.00    6.050   2     88.000    89.000     2     0.00000 438 440     0   4000.00      0.00
   440   0.336000    60.00    5.000   1     89.000   113.000     2     0.00000 439   0     0   4000.00      0.00
   441   0.665000    10.00    9.911   3     83.800    91.500     2     0.00000 437 442     0   4000.00      0.00
   442   0.665000    80.00    1.865   3     91.500   102.800     2     0.00000 441 443     0   4000.00      0.00
   443   0.665000    50.00    1.106  16    102.800   130.000     2     0.00000 442   0     0   4000.00      0.00
   444   0.336000    10.00    5.435  16    102.800   107.800     2     0.00000 442   0     0   4000.00      0.00
   445   0.665000    40.00    2.658  16     91.500    86.000     2     0.00000 441   0     0   4000.00      0.00
   446   0.505000     5.00    7.868  13     83.800    88.000     2     0.00000 435 447     0   4000.00      0.00
   447   0.505000     5.00    1.000   2     88.000    89.000     2     0.00000 446 448     0   4000.00      0.00
   448   0.505000    45.00    2.301   4     89.000   103.000     2     0.00000 447 449     0   4000.00      0.00
   449   0.336000    20.00    2.613   4    103.000   112.000     2     0.00000 448 450     0   4000.00      0.00
   450   0.336000   110.00    2.307   1    112.000   113.000     2     0.00000 449   0     0   4000.00      0.00
   451   0.336000   160.00    1.474   4     83.800   141.000     2     0.00000 436 452     0   4000.00      0.00
   452   0.336000     5.00    1.000   2    141.000   141.000     2     0.00000 451 453     0   4000.00      0.00
   453   0.256000    50.00    1.000   1    141.000   141.000     2     0.00000 452   0     0   4000.00      0.00
   454   0.665000    30.00    4.979   3     84.100    93.500     2     0.00000 204 455     0   4000.00      0.00
   455   0.665000    10.00    2.862   2     93.500   103.500     2     0.00000 454 456     0   4000.00      0.00
   456   0.505000    50.00    5.000   1    103.500   103.500     2     0.00000 455   0     0   4000.00      0.00
   457   0.505000    20.00    2.414   4     93.500    80.300     2     0.00000 454 458     0   4080.00      0.00
   458   0.505000    50.00    1.000  16     80.300    80.300     2     0.00000 457   0     0   4000.00      0.00
   459   0.336000    20.00    3.318   4     62.750    62.750     2     0.00000 218 460     0   4000.00      0.00
   460   0.336000    10.00    2.210   4     62.750    63.750     2     0.00000 459 461     0   4000.00      0.00
   461   0.336000    30.00    1.762   4     63.750    86.250     2     0.00000 460 462     0   4000.00      0.00
   462   0.336000    40.00    1.286   4     86.250   125.000     2     0.00000 461 463     0   4000.00      0.00
   463   0.336000   130.00    1.233   4    125.000   125.000     2     0.00000 462 464     0   4000.00      0.00
   464   0.336000    30.00    1.587   4    125.000   155.000     2     0.00000 463 465     0   4000.00      0.00
   465   0.256000    60.00    1.171  19    155.000   208.000     2     0.00000 464 466     0   4000.00      0.00
   466   0.001000    10.00    1.000  16    208.000   205.000     2     0.00000 465   0     0   4000.00      0.00
   467   0.336000    20.00    2.378   4     94.000    94.000     2     0.00000 199 468     0   4000.00      0.00
   468   0.336000    20.00    1.000   4     94.000    94.000     2     0.00000 467 469     0   4000.00      0.00
   469   0.336000     5.00    1.538   4     94.000    94.000     2     0.00000 468 470     0   4000.00      0.00
   470   0.336000    25.00    2.680   4     94.000   113.000     2     0.00000 469 471     0   4000.00      0.00
   471   0.336000    75.00    1.340   4    113.000   122.000     2     0.00000 470 472     0   4000.00      0.00
   472   0.336000    45.00    1.881   3    122.000   151.800     2     0.00000 471 473     0   4000.00      0.00
   473   0.336000    30.00    2.994   3    151.800   169.500     2     0.00000 472 474     0   4000.00      0.00
   474   0.336000    50.00    1.540   4    169.500   187.000     2     0.00000 473 475     0   4000.00      0.00
   475   0.256000    15.00    1.580   3    187.000   187.800     2     0.00000 474 476     0   4000.00      0.00
   476   0.256000   115.00    1.169  19    187.800   205.300     2     0.00000 475 477     0   4000.00      0.00
   477   0.256000    10.00    1.000  16    205.300   204.300     2     0.00000 476   0     0   4000.00      0.00
   478   0.256000    40.00    1.870  16    169.500   166.000     2     0.00000 473   0     0   4000.00      0.00
   479   0.336000    15.00    3.517   4    151.800   153.300     2     0.00000 472 480     0   4000.00      0.00
   480   0.256000    65.00    1.287  16    153.300   149.300     2     0.00000 479   0     0   4000.00      0.00
   481   0.505000     5.00   14.146   4     61.750    57.700     2     0.00000 208 482     0   4000.00      0.00
   482   0.505000    20.00    3.323   4     57.700    71.000     2     0.00000 481 483     0   4000.00      0.00
   483   0.505000    10.00    1.000   2     71.000    71.000     2     0.00000 482 484     0   4000.00      0.00
   484   0.505000    50.00    5.000   1     71.000    71.000     2     0.00000 483   0     0   4000.00      0.00
   485   0.505000     5.00   13.184   4    138.300   138.300     2     0.00000 414 486     0   4000.00      0.00
   486   0.336000    90.00    1.157   4    138.300   143.500     2     0.00000 485 487     0   4000.00      0.00
   487   0.336000    15.00    1.627   4    143.500   147.400     2     0.00000 486 488     0   4000.00      0.00
   488   0.336000    75.00    1.314   4    147.400   165.800     2     0.00000 487 489     0   4000.00      0.00
   489   0.336000    70.00    1.355   4    165.800   164.000     2     0.00000 488 490     0   4000.00      0.00
   490   0.336000    10.00    3.486   4    164.000   164.000     2     0.00000 489 491     0   4000.00      0.00
   491   0.336000    10.00    1.416   4    164.000   164.000     2     0.00000 490 492     0   4000.00      0.00
   492   0.256000    10.00    1.251   4    164.000   164.000     2     0.00000 491 493     0   4000.00      0.00
   493   0.206000    10.00    3.225   4    164.000   166.000     2     0.00000 492 494     0   4000.00      0.00
   494   0.206000    75.00    1.549   4    166.000   166.000     2     0.00000 493 495     0   4000.00      0.00
   495   0.172000    20.00    1.757  19    166.000   166.000     2     0.00000 494 496     0   4000.00      0.00
   496   0.087000    10.00    2.409  16    166.000   168.000     2     0.00000 495   0     0   4000.00      0.00
   497   0.256000    20.00    3.406  16    187.800   205.300     2     0.00000 475   0     0   4000.00      0.00
   498   0.256000    40.00    1.653  16    130.400   141.000     2     0.00000 395   0     0   4000.00      0.00
@EOR
    91 570.3   0  18
        20.00   .000     -0.022     -0.033    -0.045    -0.056    -0.067    -0.078
       -0.089  -.100     -0.111     -0.123    -0.134    -0.145    -0.156    -0.167
       -0.200   -100.0
        570.3  570.3     587.3      590.3     587.3     580.3     568.3     558.3
        542.3  520.3     490.3      460.3     420.3     370.3     310.3     240.3
       170.3  170.3

    99 495.3   0  18
      20.00   .000     -0.557     -1.114    -1.671    -2.228    -2.785    -3.342
     -3.899  -4.46     -5.013     -5.570    -6.127    -6.684    -7.241    -8.912
     -13.4   -100.0
      495.3  495.3     494.3      492.3     491.3     488.3     485.3     481.3
      477.3  472.3     466.3      459.3     448.3     436.3     423.3     375.3
      170.3  170.3

   117 512.1  0 17
      20.00  -.000     -0.557     -1.114    -1.671    -2.228    -2.785    -3.342
     -3.899  -4.46     -5.013     -5.57     -6.127    -6.684    -7.241    -8.912
     -13.37
      512.1  512.1     510.1      507.1     505.1     502.1     500.1     498.1
      495.1  492.1     487.8      481.1     476.1     467.1     457.1     412.1
      160.1

   123 512.1  0 17
```

```
   20.00  -.000     -0.557    -1.114    -1.671    -2.228    -2.785    -3.342
  -3.899  -4.46     -5.013    -5.57     -6.127    -6.684    -7.241    -8.912
  -13.37
   512.1  512.1     510.1     507.1     505.1     502.1     500.1     498.1
   495.1  492.1     487.8     481.1     476.1     467.1     457.1     412.1
   160.1

129 482.1   0  16
   20.00   .000     -0.022     -0.033    -0.045    -0.056    -0.067    -0.078
  -0.089  -.100     -0.111     -0.123    -0.134    -0.145    -0.156    -100.0
  482.1  482.1     478.1     473.1     463.1     448.1     428.1     403.1
  374.1  343.1     308.1     268.1     233.1     198.1     168.1     168.1

440 147.0   0   0

450 147.0   0   0

453 175.0   0   0

456 137.5   0   0

484 105.0   0   0

  4 0  100.  100. 1.0E+20   2  9  4  0  .01   416.4
0     .56   2.36    100
100.  100.  100.    100.
0     50.0   90.0  92.5   95.3   97.5      99.0      99.7        100.0
0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

 90 0  100  100  1.0E+20    2  9  3  0  .01  570.3
  0       1.01  100
  100     0    0
  0     50.0   90.0  92.5   95.3   97.5      99.0      99.7        100.0
0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

 96 0  100  100  1.0E+20   2  9  4  0  .01  495.3
  0      .63   3.43   100
  100.   100.  100.   100.
  0     50.0   90.0  92.5   95.3   97.5      99.0      99.7        100.0
0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

114 0  100  100  1.0E+20    2  9  4  0  .01  512.1
0       2.51  5.61   100
100     100   0.     0.
0     50.0   90.0  92.5   95.3   97.5      99.0      99.7        100.0
0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

121 0  100  100  1.0E+20    2  9  4  0  .01  512.1
0       21.93 27.13 100
100     100   100   100
0     50.0   90.0  92.5   95.3   97.5      99.0      99.7        100.0
0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

126 0  100  100  1.0E+20    2  9  3  0  .01  482.1
  0       1.01  100
  100     0    0
  0     50.0   90.0  92.5   95.3   97.5      99.0      99.7        100.0
0.01  2000.  4000. 7093   18062  203570   1596000  0.49259E+08  0.1E+21

415  0  100  100  1.0E+20   2  16  3  0  1.79  194.
0 0.1    100
100     100    100
0   11.1   16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
97.5     99.0     99.7  100.0
10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
203570   1596000  0.49259E+08  0.1E+21

439  0  100  100  1.0E+20   2  16  3  0  1.79  147.
0       0.1    100
100     100    100
0    11.1  16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
97.5     99.0     99.7  100.0
10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
203570   1596000  0.49259E+08  0.1E+21

447  0  100  100  1.0E+20   2  16  3  0  1.79  147.
0       0.01    100
100     100     100
0    11.1  16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
97.5     99.0     99.7  100.0
10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
203570   1596000  0.49259E+08  0.1E+21

452  0  100  100  1.0E+20   2  16  3  0  1.785  175.
0       0.01   100
100     100    100
0    11.1  16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
97.5     99.0     99.7  100.0
10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
203570   1596000  0.49259E+08  0.1E+21
```

# CALCULATION SHEET

| | | | |
|---|---|---|---|
| Project: | HOPE CREEK GENERATING STATION | Job Number: | 8038 |
| Calc No. | 8038-P0004 | Sheet No. | 290 |
| By: | A. Arastu Date: 9/14/18 | Rev. No. | 1 |
| Subject: | Water Hammer Analysis of the HCGS Fire Protection System | | |

```
455  0  100  100  1.0E+20   2  16  3  0  0.695  137.5
  0       0.01   100
  100     100    100
  0    11.1  16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
  97.5     99.0     99.7  100.0
  10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
203570   1596000  0.49259E+08  0.1E+21


483  0  100  100  1.0E+20  2  16  3  0  0.99  105.0
0       1.1   100
100     0     0
0    11.1  16.2   33.3  44.4  55.5  66.6   77.7  88.8   90.0  92.5   95.3
97.5     99.0     99.7  100.0
10.4  11.   12.    20.   25.   40.   80.   480   2759   3990  7093   18062
203570   1596000  0.49259E+08  0.1E+21


  5  2  0.650  0.01 0.7850 0.0  ID 1.0000
438  2  0.750  0.01 0.2003 0.0  ID 0.5050
446  2  0.750  0.01 0.2003 0.0  ID 0.5050

465   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102

476   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102


308   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102


410   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102


433   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102

397   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102

362   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102

371   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102

334   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102

382   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102


495   0.00136     0.0006      1.5     0.
0.0         1.0       0.     0.083
0.21       14.7      0.02    68.0
53.3   2        .102

 1.          1.
 6     2
 476   4
 477   22
 478   8
 480   12
 @EOR
 467      1      469     2          1
 470      1      470     2          2
 470      1      470     5          3
```

```
470     5     470     6       4
471     1     471     13      5
471     13    471     15      6
471     15    471     16      7
471     15    472     2       8
472     2     472     4       9
472     4     472     5       10
472     5     472     7       11
472     6     472     7       12
472     7     472     10      13
473     1     473     2       14
473     2     473     3       15
473     2     473     4       16
473     4     473     6       17
473     5     473     6       18
473     6     473     7       19
473     6     473     7       20
474     1     474     5       21
474     4     474     5       22
474     5     474     6       23
474     6     474     7       24
474     7     475     4       25
476     1     476     9       26
476     8     476     10      27
476     10    476     16      28
476     16    476     18      29
476     18    476     24      30
478     1     478     2       31
478     1     478     5       32
478     5     478     8       33
478     8     478     9       34
479     1     479     2       35
479     2     479     3       36
479     3     480     9       37
480     9     480     11      38
480     10    480     12      39
480     11    480     12      40
480     12    480     13      41
497     1     497     2       42
497     2     497     3       43
497     3     497     5       44

@EOR
0     3.0  1000  1
3.0  30.0   500  1
30.0 888.  1000  1
```

**Figure G-4: USLAM Input Data for Riser # RB2**

# CALCULATION SHEET

| | | | |
|---|---|---|---|
| Project: | HOPE CREEK GENERATING STATION | Job Number: | 8038 |
| Calc No. | 8038-P0004 | Sheet No. | 292 |
| By: | A. Arastu Date: 9/14/18 | Rev. No. | 1 |
| Subject: | Water Hammer Analysis of the HCGS Fire Protection System | | |

## Summary of Peak Pressures for Risers With Vacuum Breakers

| | | | | | | <------ Hope Creek Pumps ----> | | | | <------- Salem Pumps --------> | | | | HC Pump |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Gothic** | **Bldg** | **USLAM** | **Valve ID** | **Elev.** | **Dia** | **Maximum Pressures (psia) for Cases** | | | | | | | | |
| **Riser #** | | **Link** | | **ft** | **in** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** |
| 18 | AB DG | 308 | V044 | 206.3 | 3 | 176.9 | 160.9 | 151.4 | 394.7 | 193.8 | 90.8 | 238.8 | 107.2 | 230.2 |
| 15 | AB RW | 334 | V180 | 159.75 | 3 | 187.6 | 181.5 | 170.2 | 285.8 | 351.2 | 114.4 | 346.4 | 145.1 | 185.0 |
| 4 | TB | 362 | V060 | 176 | 3 | 164.9 | 177.9 | 156.7 | 301.7 | 239.4 | 103.9 | 216.5 | 130.7 | 173.6 |
| 5 | TB | 371 | V058 | 176 | 3 | 162.3 | 177.1 | 157.6 | 210.0 | 253.2 | 103.9 | 221.2 | 136.8 | 201.7 |
| 7 | TB | 382 | V054 | 176 | 3 | 164.9 | 172.7 | 159.3 | 217.3 | 282.3 | 103.9 | 324.7 | 134.6 | 200.9 |
| 10 | TB | 396 | V059 | 182 | 3 | 161.5 | 182.7 | 155.0 | 467.5 | 456.7 | 119.9 | 322.5 | 188.7 | 225.5 |
| 26 | TB | 411 | V011 | 197.4 | 3 | 154.4 | 168.7 | 146.6 | 231.0 | 196.8 | 94.6 | 231.4 | 134.0 | 181.2 |
| 36 | AB RW | 433 | V062 | 181 | 3 | 171.9 | 175.8 | 163.6 | 326.0 | 258.9 | 101.7 | 223.8 | 122.1 | 345.9 |
| RB1 | RB | 465 | V038 | 208 | 3 | N/A | N/A | N/A | N/A | N/A | N/A | 285.7 | 115.2 | 305.6 |
| RB2 | RB | 476 | V212 | 205 | 3 | N/A | N/A | N/A | N/A | N/A | N/A | 292.2 | 102.2 | 332.0 |
| 33 | AB RW | 495 | V430 | 168 | 2 | 170.6 | 184.8 | 166.2 | 286.1 | 219.9 | 127.7 | 252.8 | 179.2 | 232.9 |

AB RW refers to the Auxiliary Building Radwaste Area

AB DG refers to the Auxiliary Building Diesel Area

For cases 1 thru 6 RB is valved out

**Table G-1: USLAM Calculated Peak Pressure on Risers with Vacuum Breakers**

# CALCULATION SHEET

| | | | |
|---|---|---|---|
| Project: | HOPE CREEK GENERATING STATION | Job Number: | 8038 |
| Calc No. | 8038-P0004 | Sheet No. | 293 |
| By: | A. Arastu Date: 9/14/18 | Rev. No. | 1 |
| Subject: | Water Hammer Analysis of the HCGS Fire Protection System | | |

| Summary of Peak Pressures for Risers Without Vacuum Breakers | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Gothic | Bldg | USLAM | Valve ID | Elev. | Dia | <---- Hope Creek Pumps ----------> | | | | <--------- Salem Pumps ---------- | | | | HC Pump |
| Riser # | | Link | | ft | in | Peak Pressure (psia) for Case | | | | | | | | |
| | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 13 | AB RW | 289 | V181 | 178 | 3 | 172.3 | 176.6 | 165.4 | 194.8 | 168.4 | 108.2 | 182.7 | 267.1 | 231.2 |
| 13 | AB RW | 291 | V181 | 159.75 | 3 | 179.8 | 184.5 | 172.4 | 208.8 | 173.3 | 126.5 | 187.1 | 235.2 | 231.7 |
| 18 | AB DG | 299 | V044 | 155.5 | 3 | 198.1 | 182.5 | 173.4 | 317.5 | 172.9 | 118.4 | 238.7 | 201.1 | 226.6 |
| 18 | AB DG | 304 | V044 | 177 | 3 | 189.2 | 174.0 | 165.8 | 314.3 | 165.8 | 165.4 | 224.2 | 209.5 | 226.0 |
| 18 | AB DG | 306 | V044 | 156.3 | 3 | 201.2 | 184.7 | 174.8 | 338.8 | 180.8 | 155.3 | 234.1 | 203.3 | 251.8 |
| 19 | AB W | 314 | V041 | 160 | 3 | 181.0 | 182.3 | 171.4 | 197.8 | 259.7 | 240.3 | 176.2 | 146.8 | 165.4 |
| 14 | AB RW | 322 | V183 | 163.5 | 3 | 179.9 | 183.8 | 173.4 | 209.3 | 167.7 | 117.1 | 195.0 | 214.9 | 217.5 |
| 14 | AB RW | 325 | V183 | 157.5 | 3 | 182.5 | 185.9 | 175.1 | 221.4 | 170.8 | 111.9 | 194.6 | 202.4 | 219.7 |
| 15 | AB RW | 332 | V180 | 159.75 | 3 | 186.7 | 181.1 | 167.6 | 264.2 | 317.0 | 114.0 | 327.8 | 150.3 | 186.7 |
| 5 | TB | 372 | V058 | 175 | 3 | 163.6 | 177.9 | 158.9 | 222.1 | 267.1 | 108.7 | 233.3 | 145.0 | 207.8 |
| 7 | TB | 383 | V054 | 175 | 3 | 176.2 | 185.3 | 226.0 | 226.8 | 292.2 | 104.3 | 289.2 | 145.9 | 205.2 |
| 29 | TB | 425 | V004 | 169.5 | 2 | 173.8 | 183.8 | 163.9 | 196.3 | 337.4 | 222.3 | 256.1 | 222.7 | 182.0 |
| 28 | TB | 428 | V005 | 169.5 | 2 | 174.2 | 182.9 | 165.2 | 205.8 | 348.7 | 293.3 | 217.5 | 266.9 | 189.0 |
| 27 | TB | 430 | V006 | 169.5 | 2 | 173.4 | 184.6 | 164.7 | 237.0 | 471.6 | 332.3 | 228.4 | 234.4 | 200.2 |
| RB2 | RB | 478 | V212 | 166 | 3 | N/A | N/A | N/A | N/A | N/A | N/A | 221.2 | 130.3 | 284.0 |
| RB2 | RB | 480 | V212 | 149.3 | 3 | N/A | N/A | N/A | N/A | N/A | N/A | 219.8 | 138.4 | 296.0 |

AB RW refers to the Auxiliary Building Radwaste Area
AB DG refers to the Auxiliary Building Diesel Area
AB W refers to the Auxiliary Building Wng Area

**Table G-2: USLAM Calculated Peak Pressure on Risers without Vacuum Breakers**

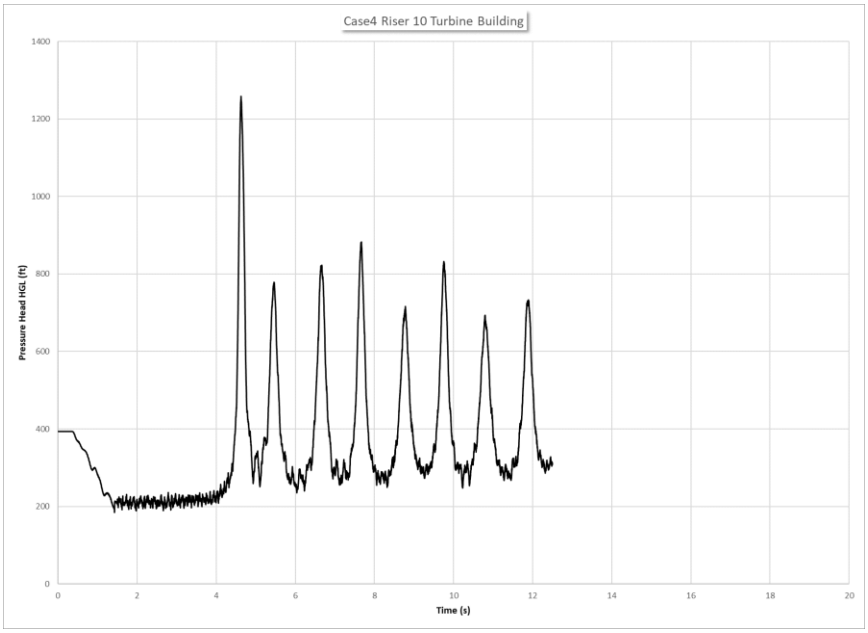



**Figure G-5: Case 4 Pressure Time History Plot for Riser # 10**

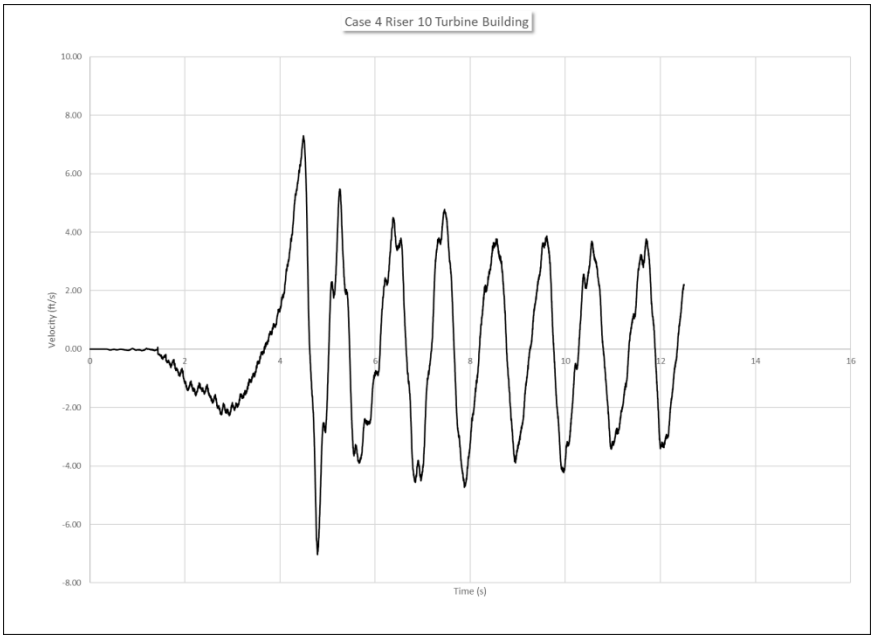



**Figure G-6: Case 4 Velocity Time History Plot for Riser # 10**

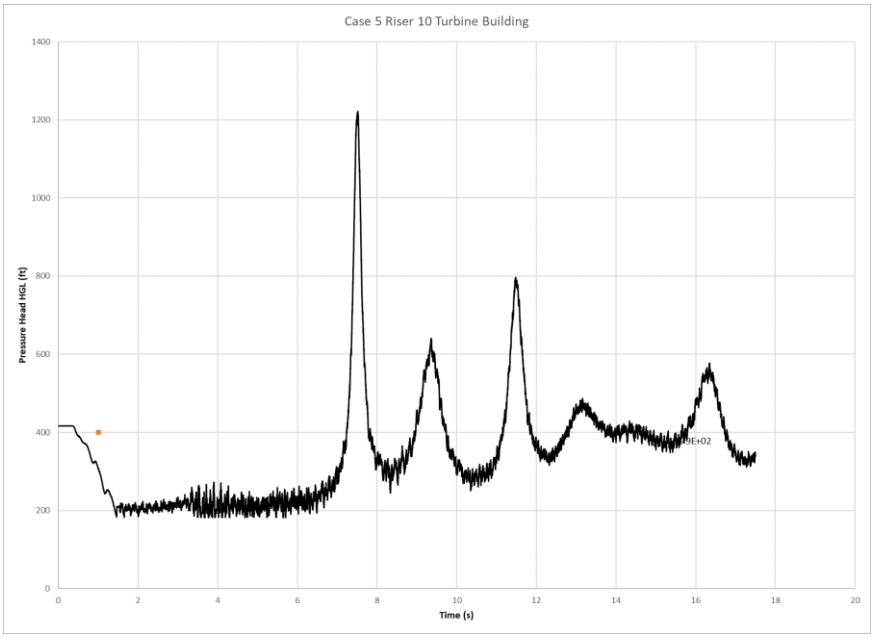



**Figure G-7: Case 5 Pressure Time History Plot for Riser # 10**

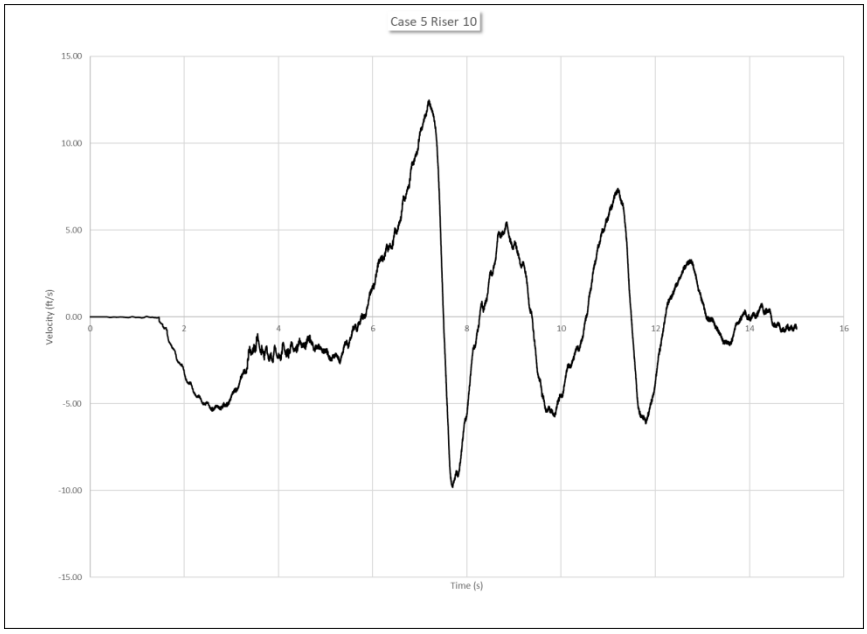



**Figure G-8: Case 4 Velocity Time History Plot for Riser # 10**

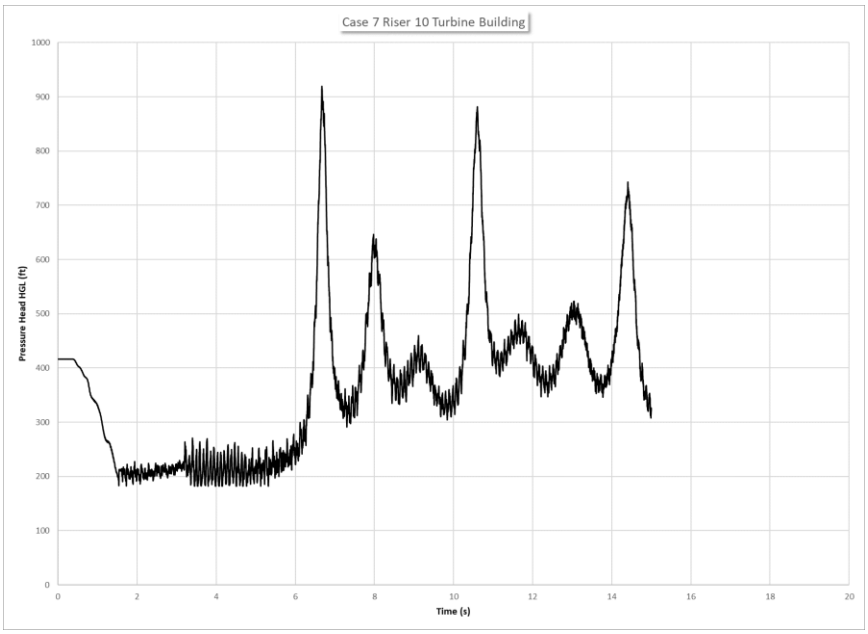



**Figure G-9: Case 7 Pressure Time History Plot for Riser # 10**

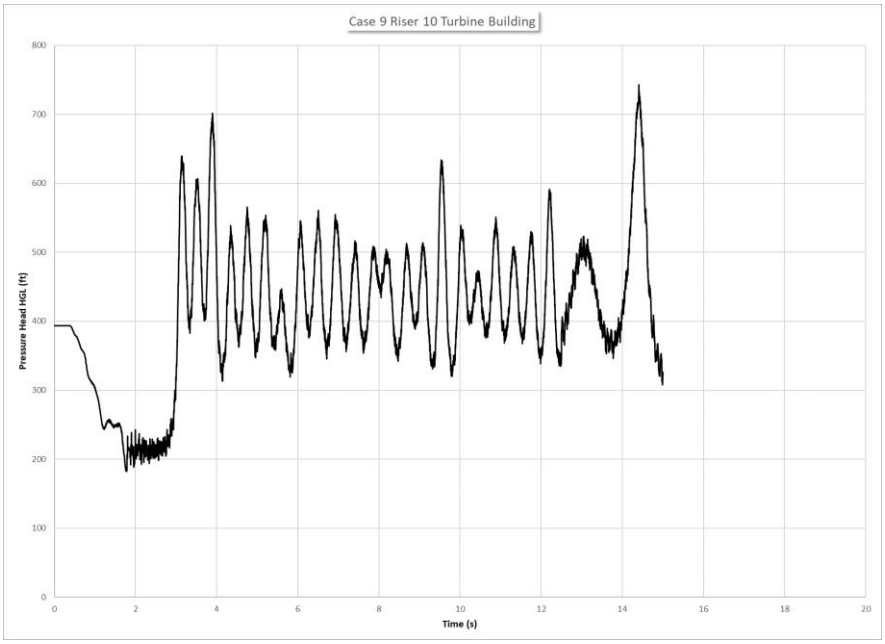



**Figure G-10: Case 9 Pressure Time History Plot for Riser # 10**

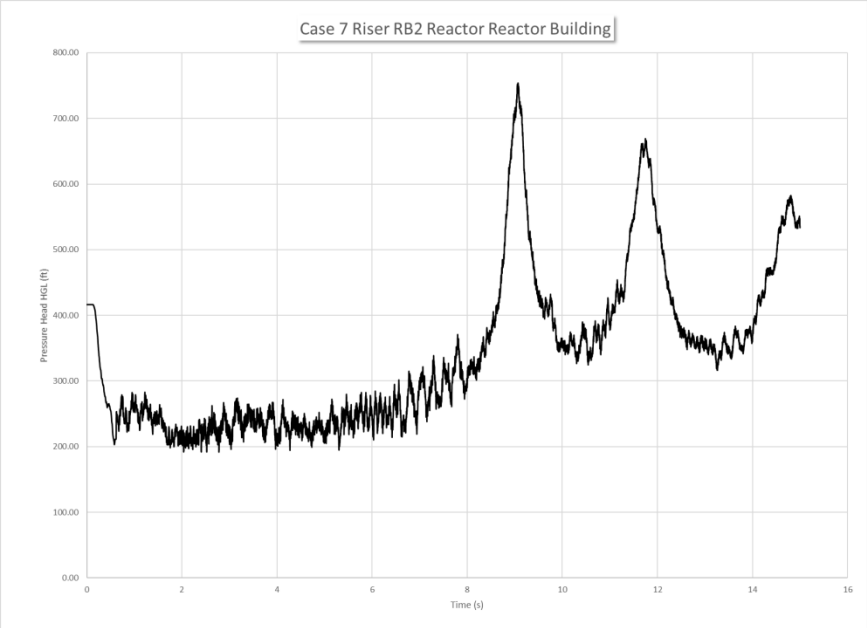



**Figure G-11: Case 7 Pressure Time History Plot for Riser # RB2**

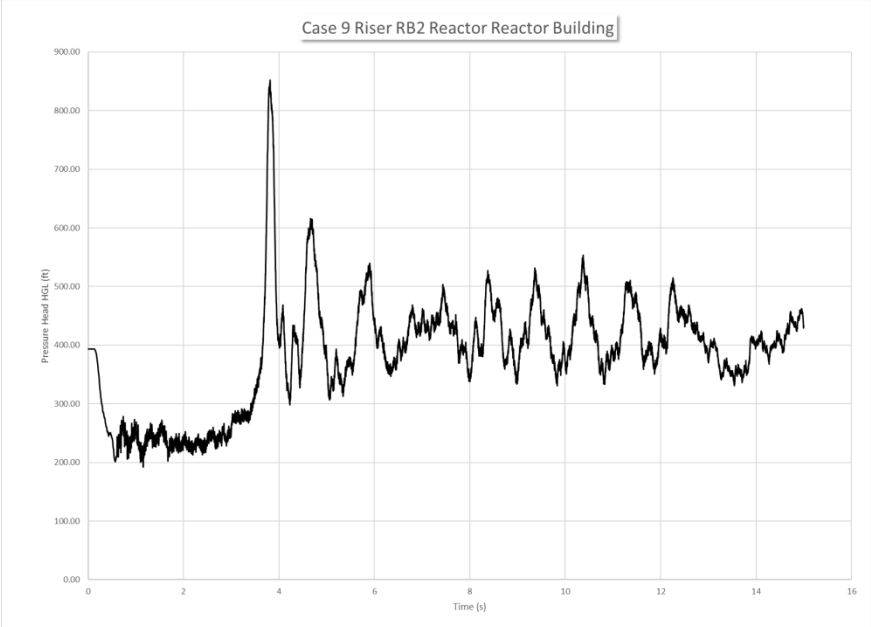



**Figure G-12: Case 9 Pressure Time History Plot for Riser # RB2**

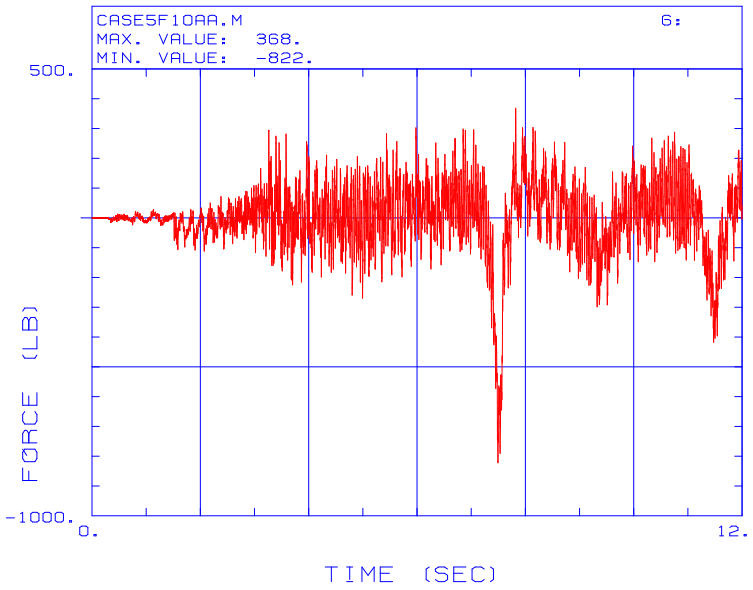



**Figure G-13: Case 5 Force Time History Plot for Riser # 10 Segment 6**

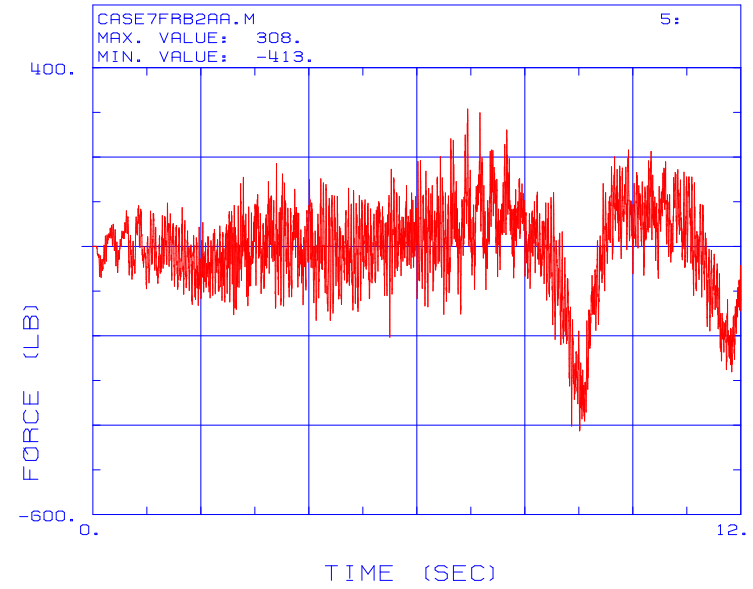



**Figure G-14: Case 7 Force Time History Plot for Riser # RB2 Segment 5**

# APPENDIX H: Deluge Valve Data



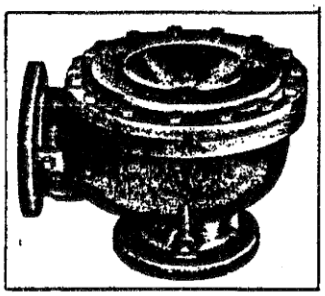
VIKING TECHNICAL DATA DELUGE VALVE MODEL D-5 (XV)

## 1. PRODUCT NAME

VIKING DELUGE VALVE
Model D-5
2" Manufactured 1979 —
3", 4", [illegible] Manufactured 1975 — Current

## 2. MANUFACTURER

THE VIKING CORPORATION
210 North Industrial Park Road
Hastings, Michigan U.S.A. 49058
Telephone (616)945-9501
Telex 22-6400



## 3. PRODUCT DESCRIPTION

The Deluge Valve is a quick-opening flood valve having only one moving part. It is kept closed by a water-pressure differential. The valve may be activated by a manual, hydraulic, pneumatic, or electric release system. The system piping remains dry until a release is activated.

## 4. TECHNICAL DATA

a. U.L. listed, Guide No. VLFT
b. U.L. of Canada No. 2245-1
c. FM Approved
d. FOC approval 3, 4, [illegible]

| Sizes | Shipping Weights | Part No. |
|---|---|---|
| 2" ( 50mm) | 36 lbs. ( 16,3kg) | 04341C |
| 3" ( 75mm) | 78 lbs ( 35 33kg) | 02489C |
| 4" (100mm) | 145 lbs. ( 65,68kg) | 02374C |
| ~~6" (150mm)~~ | ~~365 lbs. (165,84kg)~~ | ~~02334C~~ |

90° pattern (inlet and outlet).
Standard flanged connection ANSI B16. 1-1967 (except the 2", which has 2" NPT female pipe threads) ANSI B2.1-1968.
Valve differential 2:1 (top chamber to inlet pressure chamber).
Hydrostatically tested to 350 psi (2413 kPa).
Working water-pressure rated to 175 psi (1206,6 kPa).

**Material Standards**
Body and Cover: Gray iron casting, ASTM A 126, Class B.
Clapper: Cast Bronze, UNS-C84400.
Clamp Ring: Cast Bronze UNS-C84400.
Valve Seat: Cast Bronze, UNS-C84400.
Seat Rubber Retaining Ring: UNS-S30200, Stainless Steel.
Diaphragm Rubber:* 70 Durometer EPDM, ASTM D-2000.
Seat Rubber:* 70 Durometer EPDM, ASTM D-2000.
Screws: UNS-S30200, Stainless Steel.
*EPDM Rubber will meet seismic requirements of IEEE Standard 344-1975 and radiation exposure in containment of nuclear power plants.
*Ethylene Propylene Diene

| FRICTION LOSS (Expressed in equivalent length of pipe) | | | | |
|---|---|---|---|---|
| | 2" (50mm) | 3" (75mm) | 4" (100mm) | ~~6" (150mm)~~ |
| | 18 Feet | 29 Feet | 35 Feet | ~~33 Feet~~ |
| C 120 | (5,48m) | (8,34m) | (10,67m) | ~~(10,06m)~~ |

| Valve Size | Priming-line & Restricted Orifice Size | Recommended Flow Rates |
|---|---|---|
| 2" (50mm) | 0.046" (1,17mm) | 0 gpm (0 l/min. to 250 gpm (948 l/min.) |
| 3" (75mm) | 0.046 (1,17mm) | 125 gpm (474 l/min ) to 500 gpm (1895 l/min ) |
| 4" (100mm) | 0.125" (3,18mm) | 250 gpm (948 l/min.) to 1000 gpm (3790 l/min ) |
| ~~6" (150mm)~~ | ~~0.438" (3,10mm)~~ | ~~750 gpm (2842 l/min ) to 3000 gpm (11 220 l/min )~~ |

## 5. FEATURES

A. Replaceable diaphragm rubber and seat rubber [2" (50mm), 3" (75mm), 4" (100mm), and 6" (150mm)].
B. Designed for installation in any position. Trim either right or left.

**Optional Equipment**
A trim package which includes:
One Model C-1 Emergency Release
Required galvanized piping and fittings.
A ¼" (6,35mm), ½" (12,7mm) and a ¾" (19,05 mm) check valves.
A ¼" (6,35mm) ball valve for the priming line.
Two angle valves of proper size.
Two ¼" (6,35mm) three-port gauge valves.
Ball valves for the alarm line.
A priming-line strainer.
A drip check and drain cup.
A restricted orifice.
Pressure Operated Relief Valve (PORV).

**Accessories** (See the system description for the required accessories.) Depending on the configuration of the system, select from and order separately the appropriate accessories from among the following:

Diaphragm By-pass
Pressure Operated Relief Valve (PORV)
Pressure Relief Device (Anti-water columning)
Magnetic By-Pass
Water Gauges
Thermostatic Release
Emergency Release
Release-Line Accelerator
Release-Line Hangers
Deluge Panel
Dehydrator
Air Compressor
Air Maintenance Device
Position Indicator
Alarm Device

## 6. OPERATION

The Deluge Valve has three chambers, top (pressurized), outlet (normally dry) and inlet (containing incoming water supply). The chambers are normally separated by the valve clapper. In the SET position, water pressure is transmitted through an external by-pass, check valve and restriction orifice from the inlet chamber to the top chamber. The pressure trapped in the top chamber holds the clapper on the seat because of the two-to-one area differential design. The center chamber remains dry. When a system release is opened, the pressurized water in the top chamber is allowed to escape more rapidly than it can be supplied through the by-pass restricted orifice. The water pressure in the lower chamber then raises the clapper and allows water to enter the center chamber, alarm line and piping system. The valve remains open until the flow from the top chamber is stopped manually and the water supply is turned off.

## 7. AVAILABILITY

The Viking Deluge Valve is available through a network of domestic and international distributors. See the Yellow Pages of the telephone directory for closest distributor (listed under "Sprinklers-Automatic-Fire"), or write The Viking Corporation, Hastings, Michigan U.S.A. 49058. Attention: Sales Department.

## 8. GUARANTEES

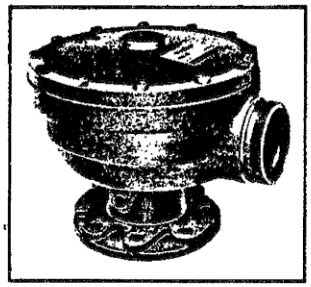
Viking agrees to repair or replace goods found to be defective in material and workmanship for a period of one year from date of shipment. For details of warranty refer to price list.

March 1984 219

VIKING **TECHNICAL DATA** DELUGE VALVE MODEL E-1 (XV)

**1. PRODUCT NAME**
VIKING DELUGE VALVE
Model E-1
~~2" (50mm), 3" (75mm),~~
~~4" (100mm),~~ 6" (150mm)

**2. MANUFACTURER**
THE VIKING CORPORATION
210 N. Industrial Park Road
Hastings, Michigan U.S.A. 49058
Telephone: (616) 945-9501
Telex: 22-6400



**3. PRODUCT DESCRIPTION**
The Viking Deluge Valve is a quick-opening, differential diaphragm, flood valve having one moving part. The valve is used to control water flow in deluge and pre-action systems. When held closed, by water pressure differential, the system piping remains dry until a release is activated.

**4. TECHNICAL DATA**
a. **Approvals**
U.L. Listed, Guide No. VLFT
FM Approved
b. 90 Degree Pattern (inlet to outlet)
c. **Connections**
~~2" - 2" female NPT inlet and outlet~~
~~3"-4"~~, 6" - Standard flanged inlet and outlet ~~or standard flanged inlet and grooved outlet~~.
d. Valve differential over 2:1 (top chamber to inlet chamber)
e. Rated to 175 psi (1206.6 KPA) Water working pressure.
f. Hydrostatically tested to 350 psi (2413 KPA)
g. **Material Standards**
Body and Cover: Ductile Iron 60-40-18
Clapper: Cast Bronze UNS-C84400
Clamp Ring: Cast Bronze UNS-C84400
Valve Seat: Cast Bronze UNS-C84400
Seat Rubber Retaining Ring: Stainless Steel UNS-S30400
Diaphragm Rubber: *EPDM 70 Durometer ASTM D-2000
Seat Rubber: *EPDM 70 Durometer ASTM D-2000
Screws: Stainless Steel UNS-S30400

*Ethylene Propylene Diene Monomer (EPDM) Rubber will meet Seismic requirements of IEEE Standard 344-1975 and radiation exposure requirements for containment areas of nuclear power plants.

Note: Inquire with manufacturer prior to using this valve with fluids other than water.

| Size and Outlet Type | Shipping Weights | Friction Loss* | Part No. |
|---|---|---|---|
| ~~2" threaded ( 50mm)~~ | ~~35 lbs. (16 kg)~~ | ~~18 feet ( 5.5m)~~ | ~~05852C~~ |
| ~~3" flanged ( 75mm)~~ | ~~72 lbs. (33 kg)~~ | ~~29 feet ( 8.8m)~~ | ~~05912C~~ |
| ~~3" grooved ( 75mm)~~ | ~~66 lbs. ( 30 kg)~~ | ~~29 feet ( 8.8m)~~ | ~~05835C~~ |
| ~~4" flanged (100mm)~~ | ~~120 lbs. ( 54 kg)~~ | ~~35 feet (10.7m)~~ | ~~05909C~~ |
| ~~4" grooved (100mm)~~ | ~~112 lbs. (51 kg)~~ | ~~35 feet (10.7m)~~ | ~~05839C~~ |
| 6" flanged (150mm) | 220 lbs. (100 kg) | 33 feet (10.1m) | 05906C |
| ~~6" grooved (150mm)~~ | ~~210 lbs. (95 kg)~~ | ~~33 feet (10.1m)~~ | ~~05458C~~ |

*Expressed in equivalent length of pipe C = 120

| Valve Size | Orifice Size For Strainer-Orifice Check Valve | Recommended Flow Rates |
|---|---|---|
| 2" ( 50mm) | 0.046" (1.17mm) | 0 GPM to 250 GPM (0 L/Min to 946 L/Min) |
| 3" ( 75mm) | 0.046" (1.17mm) | 125 GPM to 500 GPM (473 L/Min to 1892 L/Min) |
| 4" (100mm) | 0.125" (3.18mm) | 250 GPM to 1000 GPM (946 L/Min to 3785 L/Min) |
| 6" (150mm) | 0.125" (3.18mm) | 750 GPM to 3000 GPM (2839 L/Min to 11354 L/Min) |

**5. FEATURES AND ACCESSORIES**
a. Field Replaceable Diaphragm and Seat Rubbers.
b. Designed for installation in any position.
c. Designed to be reset without opening the valve.
d. Compatible with Hydraulic, Pneumatic and/or Electric Detection Systems.
e. **Accessories**
1. The following accessories are required and are included in the valve accessory package.
a. Emergency Release
b. Strainer Orifice Check Valve
c. Pressure Operated Relief Valve (PORV)
d. Drip Check and Drain Cup
2. A standard trim package is available. It includes the valve accessory package and the fittings and nipples shown on the valve trim chart.
3. Additional Accessories are available and may be required for operation or supervision. Refer to the system description for complete operating trim requirements.

**6. OPERATION**
The deluge valve has an inlet, outlet and priming chamber. The inlet and outlet are separated from the priming chamber by the valve clapper and diaphragm. In the SET position, pressure is applied to the priming chamber through a restricted prime line. The pressure is trapped in the priming chamber and holds the clapper on the seat due to the area differential design. In the set position the clapper separates the inlet from the outlet keeping the system piping dry. When the pressure is released from the priming chamber faster then it is supplied through the restricted priming line the clapper moves and allows the inlet supply water to flow through the outlet into the system and alarm devices.

**7. AVAILABILITY AND SERVICE**
The Viking Deluge Valve is available through a network of domestic and international distributors. See the yellow pages of the telephone directory for closest distributor (listed under "Sprinklers-Automatic-Fire"), or write: The Viking Corporation, Hastings, Michigan USA 49058. Telephone (616) 945 9501. Attention: Sales Department.

**8. GUARANTEES**
Viking agrees to repair or replace goods found to be defective in material and workmanship for a period of one year from date of shipment. For details of warranty refer to price list.

**9. MAINTENANCE**
**Warning**
Any system maintenance or testing which involves placing a control valve or detection system out of service may eliminate the Fire Protection of that system. Prior to proceeding notify all authorities having jurisdiction. Consideration should be given to employment of a Fire Patrol in the affected area.

March 1984 automatic sprinklers



**Figure G-15: Deluge Valve Technical Data**

# ATTACHMENT 1: UEI Response to PSEG Comments on Calculation

Comments on UNISONT Report Entitled "Phase 3 Water Hammer Analysis of the HCGS Fire Protection System"
prepared by
Vijay Chandra
Jan 10, 2017

**UEI RESPONSES IN RED (BOLD)**

1. Sheet 43, Table 7: This table shows forces on various pipe segments. Are we supposed to compare these results with Table 9 forces of Phase I, II report to see the effect of vacuum breakers**? (No, these are for information only. However, a discussion of the effect of vacuum breakers is added in the calculation.)** Are the forces of these two tables plotted anywhere? **(Yes, for selected pipe segments).** If not would you include a plot of forces whose peaks are shown in Table 7, sheet 43 of phase 3 report. **(Additional plots of force time histories at selected locations are included in the main text and in Appendix C)**. Please include a table similar to Table 8 of Phase I, II report that shows peak pressures with vacuum breakers installed**. (Okay. Two tables included – one for risers with vacuum breakers and the other for risers taller than 150 ft elevation but not having vacuum breakers)**

2. Section 6, Conclusions, Sheet 52: Eight vacuum breakers are proposed here. Please note that Riser Numbers are not described in any of the Hope Creek drawings. In addition to specifying rise numbers, please include the identifying number of nearest equipment, P&ID number and coordinates on the drawings {e.g. for riser # 26, include P&ID M-22-0, sheet 2, coordinate (B,3) top of piping in the elevator 11-02 machine room; and for riser RB2, include P&ID M-22-0, sheet 3, coordinate (C,3), near PI3429}. **(Okay – The number of vacuum breaker are increased to eleven. Table 1 lists/describes all risers with valve numbers. Elevation diagrams for all risers with vacuum breakers are included in the calculation. These have the P&ID numbers & equipment nearby and are referred to from Table 10 which describes the locations of the vacuum breakers).**

3. Sheet 233, Figure C-1: This figure shows segments 1 through 11. I am comparing this figure with Figure C-1 of Phase I, II report. In phase I, II report, the segments 6 and higher are missing. Please explain the difference. **(Segments 4 through 11 are not the same between phase I/II and Phase III reports. Force plots for these higher segments in riser # 26 were not generated and they are for other risers not evaluated for structural analysis. The best way to compare is to look at the peak forces in phase I/II and Phase III reports - Table 9).**

4. Sheet 237, Figure C-8: I am comparing this figure with Figure C2 of Phase I, II report (both of them pertain to Case 7, Riser 26, segment 1). The two force time histories are nearly same. I was expecting the forces of phase 3 report to be much less because of vacuum breakers. Also, in Phase I, II report Figure C-2, there is no force for first 7.5 seconds. Please explain**. (The Phase I/II plot (Fig. C-2) had the first 7.5 seconds not plotted due to a plot filter that should not have been there. The peak force during the first 7.5 sec is 4.5 kips. The force on this segment is now less 0.12 kips with vacuum breaker. Note that we moved the vacuum breaker in riser # 26 to below valve V011, i.e. in the 3-inch diameter pipe and it is much more effective now. Before, it was in the 1 ¼-inch pipe at the top and was not pulling enough air.)**

5. Sheet 238, Figure C-10: I am comparing this figure with Figure C4 of Phase I, II report (both of them pertain to Case 7, Riser 26, segment 3). The two force time histories are nearly same. I was expecting the forces of phase 3 report to be much less because of vacuum breakers. Also, in Phase I, II report Figure C-4, there is no force for first 7.5 seconds. Please explain. **(See response to item 4.)**

6. Comments similar to comments 4 and 5 apply to Figures C-9, C-11, and C-12**. (See Response to item 4. Also, note that the pipe segment designations were changed)**

7. Figures C-3 through C-17: All of these figures show force time histories. However, the phrase "force time history" is missing from the Figure titles. Please include it. **(Incorporated)**

8. Figures C-13 through C-17: The case number is missing from the Figure titles. Please include it**. (Incorporated).**

9. I would like to bring your attention to the high points listed in Table 1 below.

Table 1. High Points for further Consideration

| Seq. No. | P&ID and sheet No. | Coordinates | Nearest Equipment | High Point Elevation (ft) |
|---|---|---|---|---|
| 1 | M-22-0, sheet 3 | (C,4) | 1RHR 401 and 1QHR401 **(Modeled as Riser 18, 2nd branch)** | 182.5 |
| 2 | M-22-0, sheet 3 | (H,5) | PI3409 **(Modeled as Riser 13)** | 185 |
| 3 | M-22-0, sheet 2 | (C,3) | PI3394 **(Modeled as Riser 4)** | 182 |
| 4 | M-22-0, sheet 2 | (B,5) | Piping downstream of valve 1V430, shown on PSBP 320059 **(Riser was not modeled in the draft calculation. It is now modeled as Riser # 33)** | 170 **(grade line is at 167 ft,)** |

Table 1 lists the high points in piping which is not included in the eight locations where vacuum breakers are proposed. Do we need vacuum breakers at these locations? **(No, for item 1 VB is already considered for riser 18 at higher elevation 197 ft. Thus, for the second branch, item 1, vacuum breaker is not needed. For item 2 vacuum breaker is not needed. For items 3 and 4, vacuum breakers are now installed)**

10. Table 4, sheet 21: In cases 7, 8, and 9, valve XV3408M was opened to determine waterhammer forces. The lowest elevation served by this valve is elevation 136 ft. It seems to me that to maximize voiding in Risers RB1 and RB2, hose station 1BHR200 located at floor elevation 54 ft should be opened. Please explain the reason for opening valve XV3408M for waterhammer analysis. **(valve XV3408M is an 8-inch valve. The hose valve 1BHR200 is 2-inch. The larger valve opening creates a larger outflow and is, therefore, more conservative.)**

11. You have proposed half inch size vacuum breakers. Would a larger size (say ¾ inch) be better to cover uncertainties? **(The ½-inch vacuum breakers are more than adequate for the pipe sizing where they are installed. If the piping was larger, say 10-12 inches, the large vacuum breakers would cover uncertainties).**

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# CALCULATION SHEET

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|---|---|---|---|
| Project: | HOPE CREEK GENERATING STATION | Job Number: | 8038 |
| Calc No. | 8038-P0004 | Sheet No. | 303 |
| By: | A. Arastu Date: 9/14/18 | Rev. No. | 1 |
| Subject: | Water Hammer Analysis of the HCGS Fire Protection System | | |

2nd Set of Comments on UNISONT Report Entitled "Phase 3 Water Hammer Analysis of the HCGS Fire Protection System", Calculation No. 8038-P0004, dated 3/7/17
Comments submitted by
Vijay Chandra
Apr 27, 2017

**UEI Responses in Red Bold**

1. Sheet 6, Figure 1: This Figure shows only 11 of the risers that were included in the waterhammer analysis model. According to Table 1, about 37 risers were modeled. Please explain what does this figure represent?

   **[UEI]This figure is used to show the risers where some of the vacuum breakers are to be installed (figure caption changed to reflect this). Figure 1 will be too crowded if all risers are shown.**

2. Section 3.2, 4th bullet, sheet 22: It is stated that valve V087 is one of the four valves assumed to remain closed. Please note that valve V087 shown in P&ID M-22-0, sheet 3, coordinate (F, 3) is a drain valve and it is not a valve that supplies water to the reactor building. Is this the valve number that was meant to be specified here? Please correct it if this is a typographical error. Also, all the four valves that are mentioned here are outside the reactor building and not inside as mentioned here. There is another V087 valve shown on drawing M-22-0, sheet 2, coordinate (H, 8) that is locked open.

   **[UEI] Valve V087 is meant to be V046. Comment incorporated.**

3. Section 3.2, 7th bullet, page 23: Pre-action system (1D3) is mentioned here. Should this be "1PD3"? Valve V087 is also mentioned here which appears to be incorrect.

   **[UEI] We have corrected this.**

4. Sheet 27, three bullets: Nine cases analyzed are described here. Please make these descriptions consistent with transient descriptions on sheets 22 and 23. Please specify the actuating system designation along with its associated valve in both places.

   **[UEI]Comment incorporated.**

5. Section 3.4, General Assumptions: 6 assumptions are stated here. I am assuming that these assumptions are for liquid phase only. Since, USLAM code also models air, the assumption of constant density would not apply to air.

   **[UEI] That is correct. Comment incorporated.**

6. Sheet 43, item 4: Please note that all valves supplying water to the reactor building are not valved out (e.g. reactor building systems 1PS15 and 1PS16 are not valved out). Therefore, please qualify this statement to apply to only those parts of piping that are valved out.

   **[UEI] That is correct. Comment incorporated.**

7. Sheet 17, Table 1: Table 1 lists all the risers that were modeled for waterhammer analysis. Please note that term "AB" by itself is ambiguous because various sheets of the fire protection system P&ID's M-22-~~1~~0 describe the following buildings:

   a. Auxiliary Building Control Area
   b. Auxiliary Building Radwaste Area
   c. Auxiliary Building Wing Area
   d. Auxiliary Building Diesel Area

Therefore, please replace the term "AB" by a more descriptive term that describes the complete name of the building.

**[UEI]Comment incorporated.**

8. Sheet 17, Table 1: Risers 27, 28, and 29 are lumped in one row. Please list one riser per row so that that the relationship between the riser and the supply valve is clear. Same comment applies to risers 33 and 34.

   **[UEI]Comment incorporated.**

9. Table 1, page 17 and Table 7, page 45: In Table 1 Riser 36 is stated to be in "AB" while Table 7 says it is in "RW". Please correct this inconsistency. This comment will be automatically resolved after comment 7 is addressed.

   **[UEI]Comment incorporated. Inconsistency removed.**

10. Table 1, page 17 and Table 7, page 45: In Table 1 Riser 13 is stated to be in "RW" while Table 7 says it is in "TB". Please correct this inconsistency. This comment will be automatically resolved after comment 7 is addressed.

    **[UEI]Comment incorporated.**

11. Table 1, page 17 and Table 7, page 45: In Table 1 Riser 18 is stated to be in "AB Diesel Area" while Table 7 says it is in "AB". Please correct this inconsistency. This comment will be automatically resolved after comment 7 is addressed.

    **[UEI]Comment incorporated. Tables 1 and 8 revised..**

12. Please show riser numbers and proposed vacuum breaker locations on P&ID's to avoid any confusion. The riser numbers and elevation diagrams are not available to other departments within Hope Creek but every department understands P&ID's.

    **[UEI]Comment incorporated. Added Figures 52 through 59 that show the proposed vacuum breaker locations. Text revised accordingly.**

13. Figures 3 and 4: Please include complete name of the building in the figure caption, as described in comment 7, to avoid confusion.

    **[UEI]The building and area for each are already identified at the top of the figure.**

14. Section 4, sheet 4: The location of vacuum breaker 4 is proposed "just before V011". Is it meant to be just upstream of V011. Please clarify.

    **[UEI]Comment incorporated. Proposed vacuum breaker 4 location in Figure 53.**

15. Figures 2 through 10 show 14 risers. However, only 11 of these risers have vacuum breakers. What is the significance of these 3 other risers that are shown here?

    **[UEI]This is to show that pressure on these high risers are not significant and will not be beneficial by adding vacuum breakers.**

16. UEI response to my comment 4 dated Jan 10, 2017: It is written that that force on Segment 1, Riser 26, Case 7 is now 0.12 kips. I could not find a plot for this force. Was it removed?

    **[UEI]This plot can be found in the structural calculation for riser 26. In this calculation, we are only showing select locations where forces are highest. For riser 26, the highest force is located at segment #3.**

17. Sheet 243, Figures C-24, C-25, and C-26: Figures C-24 and C-16 are for segments of Riser RB2 but segments of riser RB2 are not identified in any figure. Is there a reason for presenting Riser RB2 forces here?

    **[UEI]Riser RB2 was not analyzed for structural effects. The forces shown are for comparison basis only.**

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# CALCULATION SHEET

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|---|---|---|---|
| Project: | HOPE CREEK GENERATING STATION | Job Number: | 8038 |
| Calc No. | 8038-P0004 | Sheet No. | 305 |
| By: | A. Arastu Date: 9/14/18 | Rev. No. | 1 |
| Subject: | Water Hammer Analysis of the HCGS Fire Protection System | | |

3rd Set of Comments on UNISONT Report Entitled "Phase 3 Water Hammer Analysis of the HCGS Fire Protection System", Calculation No. 8038-P0004, dated 5/19/17
Comments submitted by
Vijay Chandra
June 27, 2017

1. Section 3.2, 7th Bullet, sheet 24: Please note that valve V087 is a drain valve and should not be included in this list. Also, valves V038, V212 and V046 are outside the reactor building and not inside. You corrected this error in bullet 4 but it is still present in bullet 7.

   **[UEI]Yes, we will make the correction.**

2. Sheet 18, Table 1: Riser No. 33 description appears incorrect because it is described to be in TB and Radwaste area which is impossible. Systems 1D5 and 1D7 are at elevation 137 ft while the riser supplied by valve V430 is at elevation 167. Riser No. 34 description has the same problem. Please correct it.

   **[UEI]We will update Table 1 and add a note as follows.**

| Riser No. | Location | Valve ID | Max. Elev. | Pipe Dia. |
|---|---|---|---|---|
| 33 (1) | Deluge System 1D5 in TB and Wet Sprinkler in AB Radwaste Area | V014 & V430 | 167’ | 6” & 4” |
| 34 | Deluge System 1D6 in TB | V015 | 137’ | 6” |

**Note:**

1. **Previously, Riser 33 was only for the deluge system 1D5. The wet sprinkler in AB Radwaste Area via V430 (see Figure 7) was added later as a temporary measure, but then made permanent afterward. This new system is included as part of riser 33 in this report.**

2. Figures C-24 and C-26: The caption of these figures states that forces are for riser RB2. Please verify that this caption is correct.

   **[UEI]These are correct, the forces are for RB2 pipe segments. The intent of this appendix is to show the forces for various risers at critical pipe segments.**

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# CALCULATION SHEET

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|---|---|---|---|
| Project: | HOPE CREEK GENERATING STATION | Job Number: | 8038 |
| Calc No. | 8038-P0004 | Sheet No. | 306 |
| By: | A. Arastu Date: 9/14/18 | Rev. No. | 1 |
| Subject: | Water Hammer Analysis of the HCGS Fire Protection System | | |

4th set of Comments on UNISONT Calculation P0004, Rev. 1, Waterhammer Analysis of the Fire Protection System"
Provided by
Vijay Chandra, PSEG Nuclear
Sep. 9, 2018

1. Figures G-1 and G-2: Please shows the positive direction of forces on each segment just like shown in Figures C-1 and C-2.

   **[UEI] Agreed, correction made. Positive fluid force directions shown in Figures G-1 and G-2.**