

Helix Technologies Pty Ltd

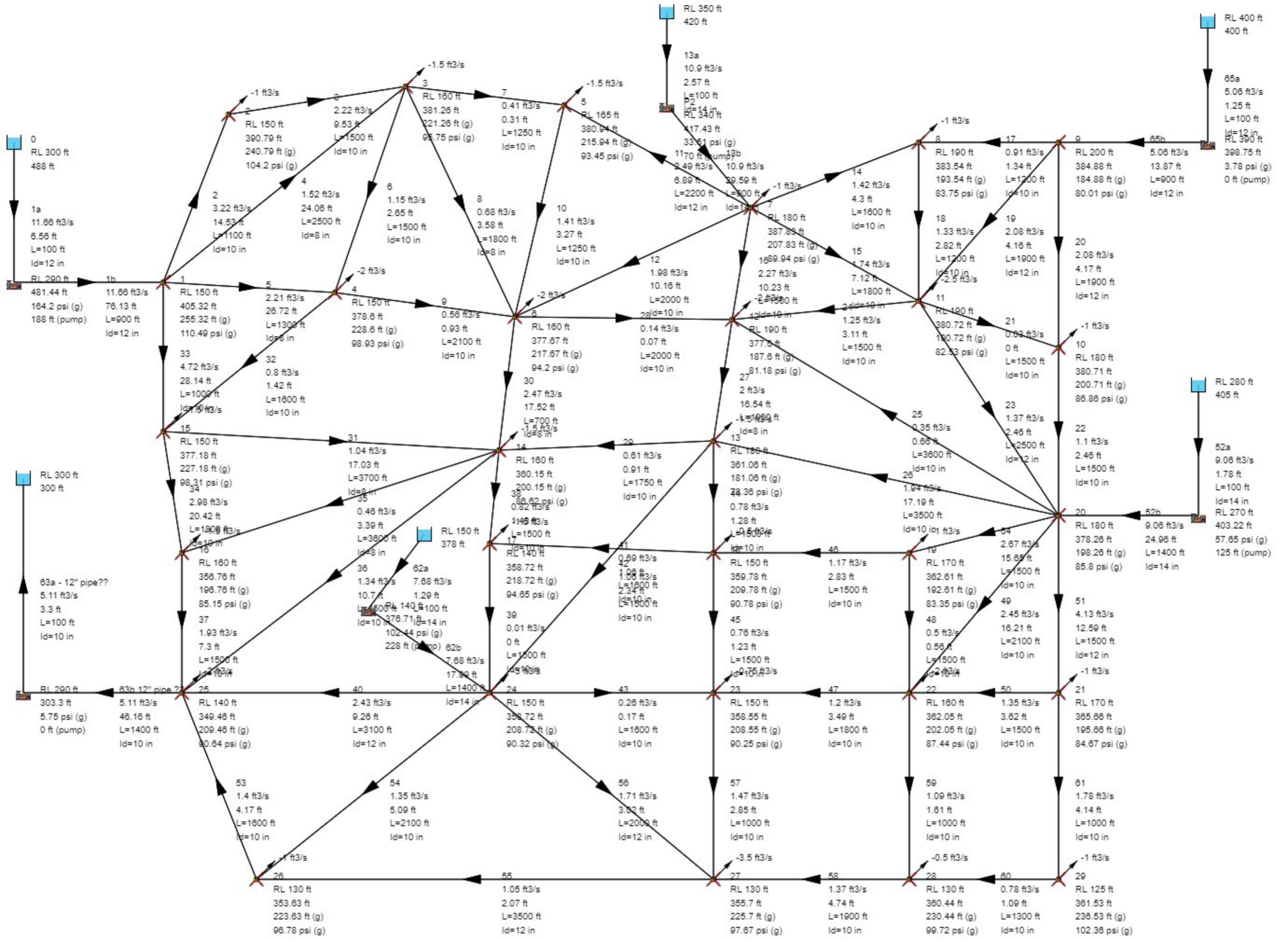
Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Network Type	Liquid	Calc. Method	Darcy
Description	Pipe Network with 65 pipes		

Analysis of Flow in Pipe Networks, 1976, Published by Ann Arbor Science, Rowland W. Jeppson, Example problem 9 page 102 -105

Solve the 65 pipe network for the flow rates in all pipes, the head losses in all pipes, the elevation of the HGL at all junctions and the pressure at all junctions. All pipes have roughness = 0.0102". Published results and Helix results compare very well. Helix requires a manual input of the pump head and the final pumps heads applied in the model were arrived at by trial calculation to give the results shown here which closely match the published results. If variable pump heads are applied there are many correct solutions to this type of network as a low head in one pump means a lower head is required in another pump in order to satisfy flow continuity at junctions. In real systems it is unlikely that a network of this type would be fed from as many sources.

Project Helix QA
 Project No. 4567
 Category Demo Liquid Water
 Description Pipe Network with 65 pipes

Client Helix QA
 Design Date 17/03/2017
 Atmos. Press 100.19 psi



Pipe Network with 65 pipes

Helix Technologies Pty Ltd

Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Pipe No	31	From node to node	0 - 1
Description	1a	Equipment No	
Liquid	Water	Viscosity	1.002 cp
Temperature	20 C	Density	998.2 kg/m3
Vapour Pressure	2.34 psi		
Pipe Description	Steel Pipes 10" AS1836 (ANSI B36.10)	Pipe Class	Sch 20
Nominal Diameter	12 in	Inside Diameter	12 in
Outside Diameter	13 in	Pipe Length	100 ft
Pipe Roughness	0.0102 in	Allowable Press.	150 psi
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	0	Total Fittings kf	0
Flow Rate	11.66 ft ³ /s	Velocity	14.85 ft/s
Friction Loss	6.56 ft	Fitting Losses	0 ft
Slurry Losses	0 ft	Orifice Losses	0 ft
Fixed Head Loss	0 ft	Booster Pump Head	0 ft
Total Head Loss	6.56 ft	Total Pressure Drop	2.84 psi
Entry Total Head	300 ft	Exit Total Head	293.44 ft
Entry Gauge Head	188 ft	Exit Gauge Head	191.44 ft
Reynolds No.	1374101.41	Friction Factor	0.01914 (Darcy f)

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Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Pipe No	32	From node to node	1 - 2
Description	1b	Equipment No	
Liquid	Water	Viscosity	1.002 cp
Temperature	20 C	Density	998.2 kg/m3
Vapour Pressure	2.34 psi		
Pipe Description	Steel Pipes 10" AS1836 (ANSI B36.10)	Pipe Class	Sch 20
Nominal Diameter	12 in	Inside Diameter	12 in
Outside Diameter	13 in	Pipe Length	900 ft
Pipe Roughness	0.0102 in	Allowable Press.	150 psi
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	5	Total Fittings kf	0
Flow Rate	11.66 ft3/s	Velocity	14.85 ft/s
Friction Loss	59 ft	Fitting Losses	17.13 ft
Slurry Losses	0 ft	Orifice Losses	0 ft
Fixed Head Loss	0 ft	Booster Pump Head	0 ft
Total Head Loss	76.13 ft	Total Pressure Drop	32.94 psi
Entry Total Head	481.44 ft	Exit Total Head	405.32 ft
Entry Gauge Head	191.44 ft	Exit Gauge Head	255.32 ft
Reynolds No.	1374101.41	Friction Factor	0.01914 (Darcy f)

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Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Pipe No	33	From node to node	2 - 3
Description	2	Equipment No	
Liquid	Water	Viscosity	1.002 cp
Temperature	20 C	Density	998.2 kg/m3
Vapour Pressure	2.34 psi		
Pipe Description	Steel Pipes 10" AS1836 (ANSI B36.10)	Pipe Class	Sch 20
Nominal Diameter	10 in	Inside Diameter	10 in
Outside Diameter	10.8 in	Pipe Length	1100 ft
Pipe Roughness	0.0102 in	Allowable Press.	150 psi
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	0	Total Fittings kf	0
Flow Rate	3.22 ft3/s	Velocity	5.9 ft/s
Friction Loss	14.53 ft	Fitting Losses	0 ft
Slurry Losses	0 ft	Orifice Losses	0 ft
Fixed Head Loss	0 ft	Booster Pump Head	0 ft
Total Head Loss	14.53 ft	Total Pressure Drop	6.29 psi
Entry Total Head	405.32 ft	Exit Total Head	390.79 ft
Entry Gauge Head	255.32 ft	Exit Gauge Head	240.79 ft
Reynolds No.	454675.25	Friction Factor	0.02038 (Darcy f)

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Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Pipe No	34	From node to node	3 - 4
Description	3	Equipment No	
Liquid	Water	Viscosity	1.002 cp
Temperature	20 C	Density	998.2 kg/m3
Vapour Pressure	2.34 psi		
Pipe Description	Steel Pipes 10" AS1836 (ANSI B36.10)	Pipe Class	Sch 20
Nominal Diameter	10 in	Inside Diameter	10 in
Outside Diameter	10.8 in	Pipe Length	1500 ft
Pipe Roughness	0.0102 in	Allowable Press.	150 psi
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	0	Total Fittings kf	0
Flow Rate	2.22 ft3/s	Velocity	4.06 ft/s
Friction Loss	9.53 ft	Fitting Losses	0 ft
Slurry Losses	0 ft	Orifice Losses	0 ft
Fixed Head Loss	0 ft	Booster Pump Head	0 ft
Total Head Loss	9.53 ft	Total Pressure Drop	4.12 psi
Entry Total Head	390.79 ft	Exit Total Head	381.26 ft
Entry Gauge Head	240.79 ft	Exit Gauge Head	221.26 ft
Reynolds No.	313267.61	Friction Factor	0.02065 (Darcy f)

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Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Pipe No	35	From node to node	2 - 4
Description	4	Equipment No	
Liquid	Water	Viscosity	1.002 cp
Temperature	20 C	Density	998.2 kg/m3
Vapour Pressure	2.34 psi		
Pipe Description	Steel Pipes 10" AS1836 (ANSI B36.10)	Pipe Class	Sch 20
Nominal Diameter	8 in	Inside Diameter	8 in
Outside Diameter	9 in	Pipe Length	2500 ft
Pipe Roughness	0.0102 in	Allowable Press.	150 psi
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	0	Total Fittings kf	0
Flow Rate	1.52 ft3/s	Velocity	4.36 ft/s
Friction Loss	24.06 ft	Fitting Losses	0 ft
Slurry Losses	0 ft	Orifice Losses	0 ft
Fixed Head Loss	0 ft	Booster Pump Head	0 ft
Total Head Loss	24.06 ft	Total Pressure Drop	10.41 psi
Entry Total Head	405.32 ft	Exit Total Head	381.26 ft
Entry Gauge Head	255.32 ft	Exit Gauge Head	221.26 ft
Reynolds No.	268729.72	Friction Factor	0.02176 (Darcy f)

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Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Pipe No	36	From node to node	2 - 5
Description	5	Equipment No	
Liquid	Water	Viscosity	1.002 cp
Temperature	20 C	Density	998.2 kg/m3
Vapour Pressure	2.34 psi		
Pipe Description	Steel Pipes 10" AS1836 (ANSI B36.10)	Pipe Class	Sch 20
Nominal Diameter	8 in	Inside Diameter	8 in
Outside Diameter	9 in	Pipe Length	1300 ft
Pipe Roughness	0.0102 in	Allowable Press.	150 psi
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	1	Total Fittings kf	0
Flow Rate	2.21 ft3/s	Velocity	6.33 ft/s
Friction Loss	26.09 ft	Fitting Losses	0.62 ft
Slurry Losses	0 ft	Orifice Losses	0 ft
Fixed Head Loss	0 ft	Booster Pump Head	0 ft
Total Head Loss	26.72 ft	Total Pressure Drop	11.56 psi
Entry Total Head	405.32 ft	Exit Total Head	378.6 ft
Entry Gauge Head	255.32 ft	Exit Gauge Head	228.6 ft
Reynolds No.	390519.99	Friction Factor	0.02149 (Darcy f)

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Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Pipe No	37	From node to node	5 - 4
Description	6	Equipment No	
Liquid	Water	Viscosity	1.002 cp
Temperature	20 C	Density	998.2 kg/m3
Vapour Pressure	2.34 psi		
Pipe Description	Steel Pipes 10" AS1836 (ANSI B36.10)	Pipe Class	Sch 20
Nominal Diameter	10 in	Inside Diameter	10 in
Outside Diameter	10.8 in	Pipe Length	1500 ft
Pipe Roughness	0.0102 in	Allowable Press.	150 psi
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	0	Total Fittings kf	0
Flow Rate	1.15 ft3/s	Velocity	2.11 ft/s
Friction Loss	2.65 ft	Fitting Losses	0 ft
Slurry Losses	0 ft	Orifice Losses	0 ft
Fixed Head Loss	0 ft	Booster Pump Head	0 ft
Total Head Loss	2.65 ft	Total Pressure Drop	1.15 psi
Entry Total Head	381.26 ft	Exit Total Head	378.6 ft
Entry Gauge Head	228.6 ft	Exit Gauge Head	215.95 ft
Reynolds No.	162438.91	Friction Factor	0.02139 (Darcy f)

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Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Pipe No	38	From node to node	4 - 6
Description	7	Equipment No	
Liquid	Water	Viscosity	1.002 cp
Temperature	20 C	Density	998.2 kg/m3
Vapour Pressure	2.34 psi		
Pipe Description	Steel Pipes 10" AS1836 (ANSI B36.10)	Pipe Class	Sch 20
Nominal Diameter	10 in	Inside Diameter	10 in
Outside Diameter	10.8 in	Pipe Length	1250 ft
Pipe Roughness	0.0102 in	Allowable Press.	150 psi
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	0	Total Fittings kf	0
Flow Rate	0.41 ft ³ /s	Velocity	0.75 ft/s
Friction Loss	0.31 ft	Fitting Losses	0 ft
Slurry Losses	0 ft	Orifice Losses	0 ft
Fixed Head Loss	0 ft	Booster Pump Head	0 ft
Total Head Loss	0.31 ft	Total Pressure Drop	0.14 psi
Entry Total Head	381.26 ft	Exit Total Head	380.94 ft
Entry Gauge Head	221.26 ft	Exit Gauge Head	215.94 ft
Reynolds No.	58093.6	Friction Factor	0.02361 (Darcy f)

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Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Pipe No	39	From node to node	7 - 4
Description	8	Equipment No	
Liquid	Water	Viscosity	1.002 cp
Temperature	20 C	Density	998.2 kg/m3
Vapour Pressure	2.34 psi		
Pipe Description	Steel Pipes 10" AS1836 (ANSI B36.10)	Pipe Class	Sch 20
Nominal Diameter	8 in	Inside Diameter	8 in
Outside Diameter	9 in	Pipe Length	1800 ft
Pipe Roughness	0.0102 in	Allowable Press.	150 psi
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	0	Total Fittings kf	0
Flow Rate	0.68 ft3/s	Velocity	1.94 ft/s
Friction Loss	3.58 ft	Fitting Losses	0 ft
Slurry Losses	0 ft	Orifice Losses	0 ft
Fixed Head Loss	0 ft	Booster Pump Head	0 ft
Total Head Loss	3.58 ft	Total Pressure Drop	1.55 psi
Entry Total Head	381.26 ft	Exit Total Head	377.67 ft
Entry Gauge Head	217.67 ft	Exit Gauge Head	214.09 ft
Reynolds No.	119509.28	Friction Factor	0.02275 (Darcy f)

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Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Pipe No	40	From node to node	5 - 7
Description	9	Equipment No	
Liquid	Water	Viscosity	1.002 cp
Temperature	20 C	Density	998.2 kg/m3
Vapour Pressure	2.34 psi		
Pipe Description	Steel Pipes 10" AS1836 (ANSI B36.10)	Pipe Class	Sch 20
Nominal Diameter	10 in	Inside Diameter	10 in
Outside Diameter	10.8 in	Pipe Length	2100 ft
Pipe Roughness	0.0102 in	Allowable Press.	150 psi
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	0	Total Fittings kf	0
Flow Rate	0.56 ft3/s	Velocity	1.02 ft/s
Friction Loss	0.93 ft	Fitting Losses	0 ft
Slurry Losses	0 ft	Orifice Losses	0 ft
Fixed Head Loss	0 ft	Booster Pump Head	0 ft
Total Head Loss	0.93 ft	Total Pressure Drop	0.4 psi
Entry Total Head	378.6 ft	Exit Total Head	377.67 ft
Entry Gauge Head	228.6 ft	Exit Gauge Head	217.67 ft
Reynolds No.	78577.91	Friction Factor	0.02279 (Darcy f)

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Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Pipe No	41	From node to node	7 - 6
Description	10	Equipment No	
Liquid	Water	Viscosity	1.002 cp
Temperature	20 C	Density	998.2 kg/m3
Vapour Pressure	2.34 psi		
Pipe Description	Steel Pipes 10" AS1836 (ANSI B36.10)	Pipe Class	Sch 20
Nominal Diameter	10 in	Inside Diameter	10 in
Outside Diameter	10.8 in	Pipe Length	1250 ft
Pipe Roughness	0.0102 in	Allowable Press.	150 psi
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	0	Total Fittings kf	0
Flow Rate	1.41 ft3/s	Velocity	2.58 ft/s
Friction Loss	3.27 ft	Fitting Losses	0 ft
Slurry Losses	0 ft	Orifice Losses	0 ft
Fixed Head Loss	0 ft	Booster Pump Head	0 ft
Total Head Loss	3.27 ft	Total Pressure Drop	1.41 psi
Entry Total Head	380.94 ft	Exit Total Head	377.67 ft
Entry Gauge Head	217.67 ft	Exit Gauge Head	209.4 ft
Reynolds No.	198725.69	Friction Factor	0.02112 (Darcy f)

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Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Pipe No	42	From node to node	8 - 6
Description	11	Equipment No	
Liquid	Water	Viscosity	1.002 cp
Temperature	20 C	Density	998.2 kg/m3
Vapour Pressure	2.34 psi		
Pipe Description	Steel Pipes 10" AS1836 (ANSI B36.10)	Pipe Class	Sch 20
Nominal Diameter	12 in	Inside Diameter	12 in
Outside Diameter	13 in	Pipe Length	2200 ft
Pipe Roughness	0.0102 in	Allowable Press.	150 psi
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	0	Total Fittings kf	0
Flow Rate	2.49 ft3/s	Velocity	3.18 ft/s
Friction Loss	6.89 ft	Fitting Losses	0 ft
Slurry Losses	0 ft	Orifice Losses	0 ft
Fixed Head Loss	0 ft	Booster Pump Head	0 ft
Total Head Loss	6.89 ft	Total Pressure Drop	2.98 psi
Entry Total Head	387.83 ft	Exit Total Head	380.94 ft
Entry Gauge Head	207.83 ft	Exit Gauge Head	215.94 ft
Reynolds No.	293952.96	Friction Factor	0.01998 (Darcy f)

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Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Pipe No	43	From node to node	8 - 7
Description	12	Equipment No	
Liquid	Water	Viscosity	1.002 cp
Temperature	20 C	Density	998.2 kg/m3
Vapour Pressure	2.34 psi		
Pipe Description	Steel Pipes 10" AS1836 (ANSI B36.10)	Pipe Class	Sch 20
Nominal Diameter	10 in	Inside Diameter	10 in
Outside Diameter	10.8 in	Pipe Length	2000 ft
Pipe Roughness	0.0102 in	Allowable Press.	150 psi
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	0	Total Fittings kf	0
Flow Rate	1.98 ft3/s	Velocity	3.62 ft/s
Friction Loss	10.16 ft	Fitting Losses	0 ft
Slurry Losses	0 ft	Orifice Losses	0 ft
Fixed Head Loss	0 ft	Booster Pump Head	0 ft
Total Head Loss	10.16 ft	Total Pressure Drop	4.4 psi
Entry Total Head	387.83 ft	Exit Total Head	377.67 ft
Entry Gauge Head	207.83 ft	Exit Gauge Head	217.67 ft
Reynolds No.	279435.47	Friction Factor	0.02075 (Darcy f)

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Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Pipe No	45	From node to node	8 - 9
Description	14	Equipment No	
Liquid	Water	Viscosity	1.002 cp
Temperature	20 C	Density	998.2 kg/m3
Vapour Pressure	2.34 psi		
Pipe Description	Steel Pipes 10" AS1836 (ANSI B36.10)	Pipe Class	Sch 20
Nominal Diameter	10 in	Inside Diameter	10 in
Outside Diameter	10.8 in	Pipe Length	1600 ft
Pipe Roughness	0.0102 in	Allowable Press.	150 psi
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	0	Total Fittings kf	0
Flow Rate	1.42 ft ³ /s	Velocity	2.61 ft/s
Friction Loss	4.3 ft	Fitting Losses	0 ft
Slurry Losses	0 ft	Orifice Losses	0 ft
Fixed Head Loss	0 ft	Booster Pump Head	0 ft
Total Head Loss	4.3 ft	Total Pressure Drop	1.86 psi
Entry Total Head	387.83 ft	Exit Total Head	383.54 ft
Entry Gauge Head	207.83 ft	Exit Gauge Head	193.54 ft
Reynolds No.	201483.23	Friction Factor	0.0211 (Darcy f)

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Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Pipe No	46	From node to node	8 - 12
Description	15	Equipment No	
Liquid	Water	Viscosity	1.002 cp
Temperature	20 C	Density	998.2 kg/m3
Vapour Pressure	2.34 psi		
Pipe Description	Steel Pipes 10" AS1836 (ANSI B36.10)	Pipe Class	Sch 20
Nominal Diameter	10 in	Inside Diameter	10 in
Outside Diameter	10.8 in	Pipe Length	1800 ft
Pipe Roughness	0.0102 in	Allowable Press.	150 psi
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	0	Total Fittings kf	0
Flow Rate	1.74 ft3/s	Velocity	3.19 ft/s
Friction Loss	7.12 ft	Fitting Losses	0 ft
Slurry Losses	0 ft	Orifice Losses	0 ft
Fixed Head Loss	0 ft	Booster Pump Head	0 ft
Total Head Loss	7.12 ft	Total Pressure Drop	3.08 psi
Entry Total Head	387.83 ft	Exit Total Head	380.72 ft
Entry Gauge Head	207.83 ft	Exit Gauge Head	190.72 ft
Reynolds No.	245801.43	Friction Factor	0.02088 (Darcy f)

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Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Pipe No	47	From node to node	8 - 13
Description	16	Equipment No	
Liquid	Water	Viscosity	1.002 cp
Temperature	20 C	Density	998.2 kg/m3
Vapour Pressure	2.34 psi		
Pipe Description	Steel Pipes 10" AS1836 (ANSI B36.10)	Pipe Class	Sch 20
Nominal Diameter	10 in	Inside Diameter	10 in
Outside Diameter	10.8 in	Pipe Length	1500 ft
Pipe Roughness	0.0102 in	Allowable Press.	150 psi
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	1	Total Fittings kf	0
Flow Rate	2.27 ft3/s	Velocity	4.15 ft/s
Friction Loss	9.96 ft	Fitting Losses	0.27 ft
Slurry Losses	0 ft	Orifice Losses	0 ft
Fixed Head Loss	0 ft	Booster Pump Head	0 ft
Total Head Loss	10.23 ft	Total Pressure Drop	4.43 psi
Entry Total Head	387.83 ft	Exit Total Head	377.6 ft
Entry Gauge Head	207.83 ft	Exit Gauge Head	187.6 ft
Reynolds No.	320455.85	Friction Factor	0.02063 (Darcy f)

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Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Pipe No	48	From node to node	9 - 10
Description	17	Equipment No	
Liquid	Water	Viscosity	1.002 cp
Temperature	20 C	Density	998.2 kg/m3
Vapour Pressure	2.34 psi		
Pipe Description	Steel Pipes 10" AS1836 (ANSI B36.10)	Pipe Class	Sch 20
Nominal Diameter	10 in	Inside Diameter	10 in
Outside Diameter	10.8 in	Pipe Length	1200 ft
Pipe Roughness	0.0102 in	Allowable Press.	150 psi
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	0	Total Fittings kf	0
Flow Rate	0.91 ft3/s	Velocity	1.66 ft/s
Friction Loss	1.34 ft	Fitting Losses	0 ft
Slurry Losses	0 ft	Orifice Losses	0 ft
Fixed Head Loss	0 ft	Booster Pump Head	0 ft
Total Head Loss	1.34 ft	Total Pressure Drop	0.58 psi
Entry Total Head	384.88 ft	Exit Total Head	383.54 ft
Entry Gauge Head	193.54 ft	Exit Gauge Head	182.19 ft
Reynolds No.	128034.85	Friction Factor	0.02177 (Darcy f)

Helix Technologies Pty Ltd

Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Pipe No	49	From node to node	9 - 12
Description	18	Equipment No	
Liquid	Water	Viscosity	1.002 cp
Temperature	20 C	Density	998.2 kg/m3
Vapour Pressure	2.34 psi		
Pipe Description	Steel Pipes 10" AS1836 (ANSI B36.10)	Pipe Class	Sch 20
Nominal Diameter	10 in	Inside Diameter	10 in
Outside Diameter	10.8 in	Pipe Length	1200 ft
Pipe Roughness	0.0102 in	Allowable Press.	150 psi
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	0	Total Fittings kf	0
Flow Rate	1.33 ft3/s	Velocity	2.44 ft/s
Friction Loss	2.82 ft	Fitting Losses	0 ft
Slurry Losses	0 ft	Orifice Losses	0 ft
Fixed Head Loss	0 ft	Booster Pump Head	0 ft
Total Head Loss	2.82 ft	Total Pressure Drop	1.22 psi
Entry Total Head	383.54 ft	Exit Total Head	380.72 ft
Entry Gauge Head	193.54 ft	Exit Gauge Head	190.72 ft
Reynolds No.	188110.47	Friction Factor	0.02119 (Darcy f)

Helix Technologies Pty Ltd

Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Pipe No	50	From node to node	10 - 12
Description	19	Equipment No	
Liquid	Water	Viscosity	1.002 cp
Temperature	20 C	Density	998.2 kg/m3
Vapour Pressure	2.34 psi		
Pipe Description	Steel Pipes 10" AS1836 (ANSI B36.10)	Pipe Class	Sch 20
Nominal Diameter	12 in	Inside Diameter	12 in
Outside Diameter	13 in	Pipe Length	1900 ft
Pipe Roughness	0.0102 in	Allowable Press.	150 psi
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	0	Total Fittings kf	0
Flow Rate	2.08 ft3/s	Velocity	2.64 ft/s
Friction Loss	4.16 ft	Fitting Losses	0 ft
Slurry Losses	0 ft	Orifice Losses	0 ft
Fixed Head Loss	0 ft	Booster Pump Head	0 ft
Total Head Loss	4.16 ft	Total Pressure Drop	1.8 psi
Entry Total Head	384.88 ft	Exit Total Head	380.72 ft
Entry Gauge Head	184.88 ft	Exit Gauge Head	190.72 ft
Reynolds No.	244667.08	Friction Factor	0.02018 (Darcy f)

Helix Technologies Pty Ltd

Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Pipe No	51	From node to node	10 - 11
Description	20	Equipment No	
Liquid	Water	Viscosity	1.002 cp
Temperature	20 C	Density	998.2 kg/m3
Vapour Pressure	2.34 psi		
Pipe Description	Steel Pipes 10" AS1836 (ANSI B36.10)	Pipe Class	Sch 20
Nominal Diameter	12 in	Inside Diameter	12 in
Outside Diameter	13 in	Pipe Length	1900 ft
Pipe Roughness	0.0102 in	Allowable Press.	150 psi
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	0	Total Fittings kf	0
Flow Rate	2.08 ft ³ /s	Velocity	2.64 ft/s
Friction Loss	4.17 ft	Fitting Losses	0 ft
Slurry Losses	0 ft	Orifice Losses	0 ft
Fixed Head Loss	0 ft	Booster Pump Head	0 ft
Total Head Loss	4.17 ft	Total Pressure Drop	1.8 psi
Entry Total Head	384.88 ft	Exit Total Head	380.71 ft
Entry Gauge Head	184.88 ft	Exit Gauge Head	200.71 ft
Reynolds No.	244748.44	Friction Factor	0.02018 (Darcy f)

Helix Technologies Pty Ltd

Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Pipe No	52	From node to node	12 - 11
Description	21	Equipment No	
Liquid	Water	Viscosity	1.002 cp
Temperature	20 C	Density	998.2 kg/m3
Vapour Pressure	2.34 psi		
Pipe Description	Steel Pipes 10" AS1836 (ANSI B36.10)	Pipe Class	Sch 20
Nominal Diameter	10 in	Inside Diameter	10 in
Outside Diameter	10.8 in	Pipe Length	1500 ft
Pipe Roughness	0.0102 in	Allowable Press.	150 psi
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	0	Total Fittings kf	0
Flow Rate	0.03 ft ³ /s	Velocity	0.05 ft/s
Friction Loss	0 ft	Fitting Losses	0 ft
Slurry Losses	0 ft	Orifice Losses	0 ft
Fixed Head Loss	0 ft	Booster Pump Head	0 ft
Total Head Loss	0 ft	Total Pressure Drop	0 psi
Entry Total Head	380.72 ft	Exit Total Head	380.71 ft
Entry Gauge Head	190.72 ft	Exit Gauge Head	200.71 ft
Reynolds No.	3698.07	Friction Factor	0.04184 (Darcy f)

Helix Technologies Pty Ltd

Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Pipe No	54	From node to node	44 - 53
Description	13a	Equipment No	
Liquid	Water	Viscosity	1.002 cp
Temperature	20 C	Density	998.2 kg/m3
Vapour Pressure	2.34 psi		
Pipe Description	Steel Pipes 10" AS1836 (ANSI B36.10)	Pipe Class	Sch 20
Nominal Diameter	14 in	Inside Diameter	14 in
Outside Diameter	15 in	Pipe Length	100 ft
Pipe Roughness	0.0102 in	Allowable Press.	150 psi
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	0	Total Fittings kf	0
Flow Rate	10.9 ft3/s	Velocity	10.2 ft/s
Friction Loss	2.57 ft	Fitting Losses	0 ft
Slurry Losses	0 ft	Orifice Losses	0 ft
Fixed Head Loss	0 ft	Booster Pump Head	0 ft
Total Head Loss	2.57 ft	Total Pressure Drop	1.11 psi
Entry Total Head	350 ft	Exit Total Head	347.43 ft
Entry Gauge Head	70 ft	Exit Gauge Head	77.43 ft
Reynolds No.	1100948.02	Friction Factor	0.01856 (Darcy f)

Helix Technologies Pty Ltd

Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Pipe No	55	From node to node	53 - 8
Description	13b	Equipment No	
Liquid	Water	Viscosity	1.002 cp
Temperature	20 C	Density	998.2 kg/m3
Vapour Pressure	2.34 psi		
Pipe Description	Steel Pipes 10" AS1836 (ANSI B36.10)	Pipe Class	Sch 20
Nominal Diameter	14 in	Inside Diameter	14 in
Outside Diameter	15 in	Pipe Length	900 ft
Pipe Roughness	0.0102 in	Allowable Press.	150 psi
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	4	Total Fittings kf	0
Flow Rate	10.9 ft3/s	Velocity	10.2 ft/s
Friction Loss	23.13 ft	Fitting Losses	6.46 ft
Slurry Losses	0 ft	Orifice Losses	0 ft
Fixed Head Loss	0 ft	Booster Pump Head	0 ft
Total Head Loss	29.59 ft	Total Pressure Drop	12.81 psi
Entry Total Head	417.43 ft	Exit Total Head	387.83 ft
Entry Gauge Head	77.43 ft	Exit Gauge Head	207.83 ft
Reynolds No.	1100947.99	Friction Factor	0.01856 (Darcy f)

Helix Technologies Pty Ltd

Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Pipe No	56	From node to node	11 - 21
Description	22	Equipment No	
Liquid	Water	Viscosity	1.002 cp
Temperature	20 C	Density	998.2 kg/m3
Vapour Pressure	2.34 psi		
Pipe Description	Steel Pipes 10" AS1836 (ANSI B36.10)	Pipe Class	Sch 20
Nominal Diameter	10 in	Inside Diameter	10 in
Outside Diameter	10.8 in	Pipe Length	1500 ft
Pipe Roughness	0.0102 in	Allowable Press.	150 psi
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	0	Total Fittings kf	0
Flow Rate	1.1 ft3/s	Velocity	2.02 ft/s
Friction Loss	2.46 ft	Fitting Losses	0 ft
Slurry Losses	0 ft	Orifice Losses	0 ft
Fixed Head Loss	0 ft	Booster Pump Head	0 ft
Total Head Loss	2.46 ft	Total Pressure Drop	1.06 psi
Entry Total Head	380.71 ft	Exit Total Head	378.26 ft
Entry Gauge Head	200.71 ft	Exit Gauge Head	198.26 ft
Reynolds No.	155987.16	Friction Factor	0.02145 (Darcy f)

Helix Technologies Pty Ltd

Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Pipe No	57	From node to node	21 - 12
Description	23	Equipment No	
Liquid	Water	Viscosity	1.002 cp
Temperature	20 C	Density	998.2 kg/m3
Vapour Pressure	2.34 psi		
Pipe Description	Steel Pipes 10" AS1836 (ANSI B36.10)	Pipe Class	Sch 20
Nominal Diameter	12 in	Inside Diameter	12 in
Outside Diameter	13 in	Pipe Length	2500 ft
Pipe Roughness	0.0102 in	Allowable Press.	150 psi
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	0	Total Fittings kf	0
Flow Rate	1.37 ft3/s	Velocity	1.75 ft/s
Friction Loss	2.46 ft	Fitting Losses	0 ft
Slurry Losses	0 ft	Orifice Losses	0 ft
Fixed Head Loss	0 ft	Booster Pump Head	0 ft
Total Head Loss	2.46 ft	Total Pressure Drop	1.06 psi
Entry Total Head	380.72 ft	Exit Total Head	378.26 ft
Entry Gauge Head	198.26 ft	Exit Gauge Head	185.8 ft
Reynolds No.	161603.79	Friction Factor	0.02074 (Darcy f)

Helix Technologies Pty Ltd

Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Pipe No	58	From node to node	13 - 12
Description	24	Equipment No	
Liquid	Water	Viscosity	1.002 cp
Temperature	20 C	Density	998.2 kg/m3
Vapour Pressure	2.34 psi		
Pipe Description	Steel Pipes 10" AS1836 (ANSI B36.10)	Pipe Class	Sch 20
Nominal Diameter	10 in	Inside Diameter	10 in
Outside Diameter	10.8 in	Pipe Length	1500 ft
Pipe Roughness	0.0102 in	Allowable Press.	150 psi
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	0	Total Fittings kf	0
Flow Rate	1.25 ft ³ /s	Velocity	2.29 ft/s
Friction Loss	3.11 ft	Fitting Losses	0 ft
Slurry Losses	0 ft	Orifice Losses	0 ft
Fixed Head Loss	0 ft	Booster Pump Head	0 ft
Total Head Loss	3.11 ft	Total Pressure Drop	1.35 psi
Entry Total Head	380.72 ft	Exit Total Head	377.6 ft
Entry Gauge Head	187.6 ft	Exit Gauge Head	184.49 ft
Reynolds No.	176372.08	Friction Factor	0.02127 (Darcy f)

Helix Technologies Pty Ltd

Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Pipe No	59	From node to node	21 - 13
Description	25	Equipment No	
Liquid	Water	Viscosity	1.002 cp
Temperature	20 C	Density	998.2 kg/m3
Vapour Pressure	2.34 psi		
Pipe Description	Steel Pipes 10" AS1836 (ANSI B36.10)	Pipe Class	Sch 20
Nominal Diameter	10 in	Inside Diameter	10 in
Outside Diameter	10.8 in	Pipe Length	3600 ft
Pipe Roughness	0.0102 in	Allowable Press.	150 psi
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	0	Total Fittings kf	0
Flow Rate	0.35 ft3/s	Velocity	0.64 ft/s
Friction Loss	0.66 ft	Fitting Losses	0 ft
Slurry Losses	0 ft	Orifice Losses	0 ft
Fixed Head Loss	0 ft	Booster Pump Head	0 ft
Total Head Loss	0.66 ft	Total Pressure Drop	0.28 psi
Entry Total Head	378.26 ft	Exit Total Head	377.6 ft
Entry Gauge Head	198.26 ft	Exit Gauge Head	187.6 ft
Reynolds No.	49028.93	Friction Factor	0.02414 (Darcy f)

Helix Technologies Pty Ltd

Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Pipe No	60	From node to node	21 - 14
Description	26	Equipment No	
Liquid	Water	Viscosity	1.002 cp
Temperature	20 C	Density	998.2 kg/m3
Vapour Pressure	2.34 psi		
Pipe Description	Steel Pipes 10" AS1836 (ANSI B36.10)	Pipe Class	Sch 20
Nominal Diameter	10 in	Inside Diameter	10 in
Outside Diameter	10.8 in	Pipe Length	3500 ft
Pipe Roughness	0.0102 in	Allowable Press.	150 psi
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	0	Total Fittings kf	0
Flow Rate	1.94 ft3/s	Velocity	3.56 ft/s
Friction Loss	17.19 ft	Fitting Losses	0 ft
Slurry Losses	0 ft	Orifice Losses	0 ft
Fixed Head Loss	0 ft	Booster Pump Head	0 ft
Total Head Loss	17.19 ft	Total Pressure Drop	7.44 psi
Entry Total Head	378.26 ft	Exit Total Head	361.06 ft
Entry Gauge Head	198.26 ft	Exit Gauge Head	181.06 ft
Reynolds No.	274670.65	Friction Factor	0.02077 (Darcy f)

Helix Technologies Pty Ltd

Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Pipe No	61	From node to node	13 - 14
Description	27	Equipment No	
Liquid	Water	Viscosity	1.002 cp
Temperature	20 C	Density	998.2 kg/m3
Vapour Pressure	2.34 psi		
Pipe Description	Steel Pipes 10" AS1836 (ANSI B36.10)	Pipe Class	Sch 20
Nominal Diameter	8 in	Inside Diameter	8 in
Outside Diameter	9 in	Pipe Length	1000 ft
Pipe Roughness	0.0102 in	Allowable Press.	150 psi
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	0	Total Fittings kf	0
Flow Rate	2 ft3/s	Velocity	5.74 ft/s
Friction Loss	16.54 ft	Fitting Losses	0 ft
Slurry Losses	0 ft	Orifice Losses	0 ft
Fixed Head Loss	0 ft	Booster Pump Head	0 ft
Total Head Loss	16.54 ft	Total Pressure Drop	7.16 psi
Entry Total Head	377.6 ft	Exit Total Head	361.06 ft
Entry Gauge Head	187.6 ft	Exit Gauge Head	181.06 ft
Reynolds No.	353977.69	Friction Factor	0.02155 (Darcy f)

Helix Technologies Pty Ltd

Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Pipe No	62	From node to node	13 - 7
Description	28	Equipment No	
Liquid	Water	Viscosity	1.002 cp
Temperature	20 C	Density	998.2 kg/m3
Vapour Pressure	2.34 psi		
Pipe Description	Steel Pipes 10" AS1836 (ANSI B36.10)	Pipe Class	Sch 20
Nominal Diameter	10 in	Inside Diameter	10 in
Outside Diameter	10.8 in	Pipe Length	2000 ft
Pipe Roughness	0.0102 in	Allowable Press.	150 psi
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	0	Total Fittings kf	0
Flow Rate	0.14 ft ³ /s	Velocity	0.26 ft/s
Friction Loss	0.07 ft	Fitting Losses	0 ft
Slurry Losses	0 ft	Orifice Losses	0 ft
Fixed Head Loss	0 ft	Booster Pump Head	0 ft
Total Head Loss	0.07 ft	Total Pressure Drop	0.03 psi
Entry Total Head	377.67 ft	Exit Total Head	377.6 ft
Entry Gauge Head	187.6 ft	Exit Gauge Head	217.53 ft
Reynolds No.	20140.62	Friction Factor	0.02795 (Darcy f)

Helix Technologies Pty Ltd

Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Pipe No	63	From node to node	14 - 15
Description	29	Equipment No	
Liquid	Water	Viscosity	1.002 cp
Temperature	20 C	Density	998.2 kg/m3
Vapour Pressure	2.34 psi		
Pipe Description	Steel Pipes 10" AS1836 (ANSI B36.10)	Pipe Class	Sch 20
Nominal Diameter	10 in	Inside Diameter	10 in
Outside Diameter	10.8 in	Pipe Length	1750 ft
Pipe Roughness	0.0102 in	Allowable Press.	150 psi
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	0	Total Fittings kf	0
Flow Rate	0.61 ft3/s	Velocity	1.11 ft/s
Friction Loss	0.91 ft	Fitting Losses	0 ft
Slurry Losses	0 ft	Orifice Losses	0 ft
Fixed Head Loss	0 ft	Booster Pump Head	0 ft
Total Head Loss	0.91 ft	Total Pressure Drop	0.39 psi
Entry Total Head	361.06 ft	Exit Total Head	360.15 ft
Entry Gauge Head	181.06 ft	Exit Gauge Head	200.15 ft
Reynolds No.	85651.28	Friction Factor	0.02258 (Darcy f)

Helix Technologies Pty Ltd

Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Pipe No	64	From node to node	7 - 15
Description	30	Equipment No	
Liquid	Water	Viscosity	1.002 cp
Temperature	20 C	Density	998.2 kg/m3
Vapour Pressure	2.34 psi		
Pipe Description	Steel Pipes 10" AS1836 (ANSI B36.10)	Pipe Class	Sch 20
Nominal Diameter	8 in	Inside Diameter	8 in
Outside Diameter	9 in	Pipe Length	700 ft
Pipe Roughness	0.0102 in	Allowable Press.	150 psi
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	0	Total Fittings kf	0
Flow Rate	2.47 ft3/s	Velocity	7.08 ft/s
Friction Loss	17.52 ft	Fitting Losses	0 ft
Slurry Losses	0 ft	Orifice Losses	0 ft
Fixed Head Loss	0 ft	Booster Pump Head	0 ft
Total Head Loss	17.52 ft	Total Pressure Drop	7.58 psi
Entry Total Head	377.67 ft	Exit Total Head	360.15 ft
Entry Gauge Head	217.67 ft	Exit Gauge Head	200.15 ft
Reynolds No.	436738.33	Friction Factor	0.02143 (Darcy f)

Helix Technologies Pty Ltd

Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Pipe No	65	From node to node	15 - 16
Description	31	Equipment No	
Liquid	Water	Viscosity	1.002 cp
Temperature	20 C	Density	998.2 kg/m3
Vapour Pressure	2.34 psi		
Pipe Description	Steel Pipes 10" AS1836 (ANSI B36.10)	Pipe Class	Sch 20
Nominal Diameter	8 in	Inside Diameter	8 in
Outside Diameter	9 in	Pipe Length	3700 ft
Pipe Roughness	0.0102 in	Allowable Press.	150 psi
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	0	Total Fittings kf	0
Flow Rate	1.04 ft ³ /s	Velocity	2.99 ft/s
Friction Loss	17.03 ft	Fitting Losses	0 ft
Slurry Losses	0 ft	Orifice Losses	0 ft
Fixed Head Loss	0 ft	Booster Pump Head	0 ft
Total Head Loss	17.03 ft	Total Pressure Drop	7.37 psi
Entry Total Head	377.18 ft	Exit Total Head	360.15 ft
Entry Gauge Head	200.15 ft	Exit Gauge Head	193.13 ft
Reynolds No.	184216.85	Friction Factor	0.02214 (Darcy f)

Helix Technologies Pty Ltd

Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Pipe No	66	From node to node	16 - 5
Description	32	Equipment No	
Liquid	Water	Viscosity	1.002 cp
Temperature	20 C	Density	998.2 kg/m3
Vapour Pressure	2.34 psi		
Pipe Description	Steel Pipes 10" AS1836 (ANSI B36.10)	Pipe Class	Sch 20
Nominal Diameter	10 in	Inside Diameter	10 in
Outside Diameter	10.8 in	Pipe Length	1600 ft
Pipe Roughness	0.0102 in	Allowable Press.	150 psi
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	0	Total Fittings kf	0
Flow Rate	0.8 ft3/s	Velocity	1.47 ft/s
Friction Loss	1.42 ft	Fitting Losses	0 ft
Slurry Losses	0 ft	Orifice Losses	0 ft
Fixed Head Loss	0 ft	Booster Pump Head	0 ft
Total Head Loss	1.42 ft	Total Pressure Drop	0.61 psi
Entry Total Head	378.6 ft	Exit Total Head	377.18 ft
Entry Gauge Head	227.18 ft	Exit Gauge Head	225.76 ft
Reynolds No.	113461.7	Friction Factor	0.02199 (Darcy f)

Helix Technologies Pty Ltd

Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Pipe No	67	From node to node	2 - 16
Description	33	Equipment No	
Liquid	Water	Viscosity	1.002 cp
Temperature	20 C	Density	998.2 kg/m3
Vapour Pressure	2.34 psi		
Pipe Description	Steel Pipes 10" AS1836 (ANSI B36.10)	Pipe Class	Sch 20
Nominal Diameter	10 in	Inside Diameter	10 in
Outside Diameter	10.8 in	Pipe Length	1000 ft
Pipe Roughness	0.0102 in	Allowable Press.	150 psi
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	0	Total Fittings kf	0
Flow Rate	4.72 ft3/s	Velocity	8.65 ft/s
Friction Loss	28.14 ft	Fitting Losses	0 ft
Slurry Losses	0 ft	Orifice Losses	0 ft
Fixed Head Loss	0 ft	Booster Pump Head	0 ft
Total Head Loss	28.14 ft	Total Pressure Drop	12.18 psi
Entry Total Head	405.32 ft	Exit Total Head	377.18 ft
Entry Gauge Head	255.32 ft	Exit Gauge Head	227.18 ft
Reynolds No.	666846.67	Friction Factor	0.02018 (Darcy f)

Helix Technologies Pty Ltd

Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Pipe No	68	From node to node	16 - 17
Description	34	Equipment No	
Liquid	Water	Viscosity	1.002 cp
Temperature	20 C	Density	998.2 kg/m3
Vapour Pressure	2.34 psi		
Pipe Description	Steel Pipes 10" AS1836 (ANSI B36.10)	Pipe Class	Sch 20
Nominal Diameter	10 in	Inside Diameter	10 in
Outside Diameter	10.8 in	Pipe Length	1800 ft
Pipe Roughness	0.0102 in	Allowable Press.	150 psi
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	0	Total Fittings kf	0
Flow Rate	2.98 ft3/s	Velocity	5.46 ft/s
Friction Loss	20.42 ft	Fitting Losses	0 ft
Slurry Losses	0 ft	Orifice Losses	0 ft
Fixed Head Loss	0 ft	Booster Pump Head	0 ft
Total Head Loss	20.42 ft	Total Pressure Drop	8.84 psi
Entry Total Head	377.18 ft	Exit Total Head	356.76 ft
Entry Gauge Head	227.18 ft	Exit Gauge Head	196.76 ft
Reynolds No.	420823.44	Friction Factor	0.02043 (Darcy f)

Helix Technologies Pty Ltd

Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Pipe No	69	From node to node	15 - 17
Description	35	Equipment No	
Liquid	Water	Viscosity	1.002 cp
Temperature	20 C	Density	998.2 kg/m3
Vapour Pressure	2.34 psi		
Pipe Description	Steel Pipes 10" AS1836 (ANSI B36.10)	Pipe Class	Sch 20
Nominal Diameter	8 in	Inside Diameter	8 in
Outside Diameter	9 in	Pipe Length	3600 ft
Pipe Roughness	0.0102 in	Allowable Press.	150 psi
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	0	Total Fittings kf	0
Flow Rate	0.46 ft ³ /s	Velocity	1.31 ft/s
Friction Loss	3.39 ft	Fitting Losses	0 ft
Slurry Losses	0 ft	Orifice Losses	0 ft
Fixed Head Loss	0 ft	Booster Pump Head	0 ft
Total Head Loss	3.39 ft	Total Pressure Drop	1.47 psi
Entry Total Head	360.15 ft	Exit Total Head	356.76 ft
Entry Gauge Head	200.15 ft	Exit Gauge Head	196.76 ft
Reynolds No.	80908.28	Friction Factor	0.02349 (Darcy f)

Helix Technologies Pty Ltd

Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Pipe No	70	From node to node	26 - 15
Description	36	Equipment No	
Liquid	Water	Viscosity	1.002 cp
Temperature	20 C	Density	998.2 kg/m3
Vapour Pressure	2.34 psi		
Pipe Description	Steel Pipes 10" AS1836 (ANSI B36.10)	Pipe Class	Sch 20
Nominal Diameter	10 in	Inside Diameter	10 in
Outside Diameter	10.8 in	Pipe Length	4500 ft
Pipe Roughness	0.0102 in	Allowable Press.	150 psi
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	0	Total Fittings kf	0
Flow Rate	1.34 ft3/s	Velocity	2.45 ft/s
Friction Loss	10.7 ft	Fitting Losses	0 ft
Slurry Losses	0 ft	Orifice Losses	0 ft
Fixed Head Loss	0 ft	Booster Pump Head	0 ft
Total Head Loss	10.7 ft	Total Pressure Drop	4.63 psi
Entry Total Head	360.15 ft	Exit Total Head	349.46 ft
Entry Gauge Head	209.46 ft	Exit Gauge Head	178.76 ft
Reynolds No.	189167.98	Friction Factor	0.02118 (Darcy f)

Helix Technologies Pty Ltd

Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Pipe No	71	From node to node	17 - 26
Description	37	Equipment No	
Liquid	Water	Viscosity	1.002 cp
Temperature	20 C	Density	998.2 kg/m3
Vapour Pressure	2.34 psi		
Pipe Description	Steel Pipes 10" AS1836 (ANSI B36.10)	Pipe Class	Sch 20
Nominal Diameter	10 in	Inside Diameter	10 in
Outside Diameter	10.8 in	Pipe Length	1500 ft
Pipe Roughness	0.0102 in	Allowable Press.	150 psi
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	0	Total Fittings kf	0
Flow Rate	1.93 ft3/s	Velocity	3.55 ft/s
Friction Loss	7.3 ft	Fitting Losses	0 ft
Slurry Losses	0 ft	Orifice Losses	0 ft
Fixed Head Loss	0 ft	Booster Pump Head	0 ft
Total Head Loss	7.3 ft	Total Pressure Drop	3.16 psi
Entry Total Head	356.76 ft	Exit Total Head	349.46 ft
Entry Gauge Head	196.76 ft	Exit Gauge Head	209.46 ft
Reynolds No.	273438.6	Friction Factor	0.02077 (Darcy f)

Helix Technologies Pty Ltd

Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Pipe No	72	From node to node	15 - 18
Description	38	Equipment No	
Liquid	Water	Viscosity	1.002 cp
Temperature	20 C	Density	998.2 kg/m3
Vapour Pressure	2.34 psi		
Pipe Description	Steel Pipes 10" AS1836 (ANSI B36.10)	Pipe Class	Sch 20
Nominal Diameter	10 in	Inside Diameter	10 in
Outside Diameter	10.8 in	Pipe Length	1500 ft
Pipe Roughness	0.0102 in	Allowable Press.	150 psi
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	1	Total Fittings kf	0
Flow Rate	0.82 ft3/s	Velocity	1.51 ft/s
Friction Loss	1.4 ft	Fitting Losses	0.04 ft
Slurry Losses	0 ft	Orifice Losses	0 ft
Fixed Head Loss	0 ft	Booster Pump Head	0 ft
Total Head Loss	1.43 ft	Total Pressure Drop	0.62 psi
Entry Total Head	360.15 ft	Exit Total Head	358.72 ft
Entry Gauge Head	200.15 ft	Exit Gauge Head	218.72 ft
Reynolds No.	116409.37	Friction Factor	0.02194 (Darcy f)

Helix Technologies Pty Ltd

Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Pipe No	73	From node to node	18 - 25
Description	39	Equipment No	
Liquid	Water	Viscosity	1.002 cp
Temperature	20 C	Density	998.2 kg/m3
Vapour Pressure	2.34 psi		
Pipe Description	Steel Pipes 10" AS1836 (ANSI B36.10)	Pipe Class	Sch 20
Nominal Diameter	10 in	Inside Diameter	10 in
Outside Diameter	10.8 in	Pipe Length	1500 ft
Pipe Roughness	0.0102 in	Allowable Press.	150 psi
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	1	Total Fittings kf	0
Flow Rate	0.01 ft ³ /s	Velocity	0.02 ft/s
Friction Loss	0 ft	Fitting Losses	0 ft
Slurry Losses	0 ft	Orifice Losses	0 ft
Fixed Head Loss	0 ft	Booster Pump Head	0 ft
Total Head Loss	0 ft	Total Pressure Drop	0 psi
Entry Total Head	358.72 ft	Exit Total Head	358.72 ft
Entry Gauge Head	218.72 ft	Exit Gauge Head	208.72 ft
Reynolds No.	1698.77	Friction Factor	0.03767 (Darcy f)

Helix Technologies Pty Ltd

Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Pipe No	74	From node to node	26 - 25
Description	40	Equipment No	
Liquid	Water	Viscosity	1.002 cp
Temperature	20 C	Density	998.2 kg/m3
Vapour Pressure	2.34 psi		
Pipe Description	Steel Pipes 10" AS1836 (ANSI B36.10)	Pipe Class	Sch 20
Nominal Diameter	12 in	Inside Diameter	12 in
Outside Diameter	13 in	Pipe Length	3100 ft
Pipe Roughness	0.0102 in	Allowable Press.	150 psi
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	0	Total Fittings kf	0
Flow Rate	2.43 ft ³ /s	Velocity	3.1 ft/s
Friction Loss	9.26 ft	Fitting Losses	0 ft
Slurry Losses	0 ft	Orifice Losses	0 ft
Fixed Head Loss	0 ft	Booster Pump Head	0 ft
Total Head Loss	9.26 ft	Total Pressure Drop	4.01 psi
Entry Total Head	358.72 ft	Exit Total Head	349.46 ft
Entry Gauge Head	209.46 ft	Exit Gauge Head	190.2 ft
Reynolds No.	286882.09	Friction Factor	0.02 (Darcy f)

Helix Technologies Pty Ltd

Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Pipe No	75	From node to node	18 - 19
Description	41	Equipment No	
Liquid	Water	Viscosity	1.002 cp
Temperature	20 C	Density	998.2 kg/m3
Vapour Pressure	2.34 psi		
Pipe Description	Steel Pipes 10" AS1836 (ANSI B36.10)	Pipe Class	Sch 20
Nominal Diameter	10 in	Inside Diameter	10 in
Outside Diameter	10.8 in	Pipe Length	1600 ft
Pipe Roughness	0.0102 in	Allowable Press.	150 psi
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	0	Total Fittings kf	0
Flow Rate	0.69 ft3/s	Velocity	1.26 ft/s
Friction Loss	1.06 ft	Fitting Losses	0 ft
Slurry Losses	0 ft	Orifice Losses	0 ft
Fixed Head Loss	0 ft	Booster Pump Head	0 ft
Total Head Loss	1.06 ft	Total Pressure Drop	0.46 psi
Entry Total Head	359.78 ft	Exit Total Head	358.72 ft
Entry Gauge Head	218.72 ft	Exit Gauge Head	207.66 ft
Reynolds No.	97376.33	Friction Factor	0.0223 (Darcy f)

Helix Technologies Pty Ltd

Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Pipe No	76	From node to node	25 - 14
Description	42	Equipment No	
Liquid	Water	Viscosity	1.002 cp
Temperature	20 C	Density	998.2 kg/m3
Vapour Pressure	2.34 psi		
Pipe Description	Steel Pipes 10" AS1836 (ANSI B36.10)	Pipe Class	Sch 20
Nominal Diameter	10 in	Inside Diameter	10 in
Outside Diameter	10.8 in	Pipe Length	1500 ft
Pipe Roughness	0.0102 in	Allowable Press.	150 psi
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	1	Total Fittings kf	0
Flow Rate	1.06 ft3/s	Velocity	1.95 ft/s
Friction Loss	2.28 ft	Fitting Losses	0.06 ft
Slurry Losses	0 ft	Orifice Losses	0 ft
Fixed Head Loss	0 ft	Booster Pump Head	0 ft
Total Head Loss	2.34 ft	Total Pressure Drop	1.01 psi
Entry Total Head	361.06 ft	Exit Total Head	358.72 ft
Entry Gauge Head	208.72 ft	Exit Gauge Head	176.38 ft
Reynolds No.	150280.82	Friction Factor	0.02151 (Darcy f)

Helix Technologies Pty Ltd

Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Pipe No	77	From node to node	25 - 24
Description	43	Equipment No	
Liquid	Water	Viscosity	1.002 cp
Temperature	20 C	Density	998.2 kg/m3
Vapour Pressure	2.34 psi		
Pipe Description	Steel Pipes 10" AS1836 (ANSI B36.10)	Pipe Class	Sch 20
Nominal Diameter	10 in	Inside Diameter	10 in
Outside Diameter	10.8 in	Pipe Length	1600 ft
Pipe Roughness	0.0102 in	Allowable Press.	150 psi
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	0	Total Fittings kf	0
Flow Rate	0.26 ft3/s	Velocity	0.47 ft/s
Friction Loss	0.17 ft	Fitting Losses	0 ft
Slurry Losses	0 ft	Orifice Losses	0 ft
Fixed Head Loss	0 ft	Booster Pump Head	0 ft
Total Head Loss	0.17 ft	Total Pressure Drop	0.07 psi
Entry Total Head	358.72 ft	Exit Total Head	358.55 ft
Entry Gauge Head	208.72 ft	Exit Gauge Head	208.55 ft
Reynolds No.	36158.09	Friction Factor	0.02524 (Darcy f)

Helix Technologies Pty Ltd

Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Pipe No	78	From node to node	19 - 14
Description	44	Equipment No	
Liquid	Water	Viscosity	1.002 cp
Temperature	20 C	Density	998.2 kg/m3
Vapour Pressure	2.34 psi		
Pipe Description	Steel Pipes 10" AS1836 (ANSI B36.10)	Pipe Class	Sch 20
Nominal Diameter	10 in	Inside Diameter	10 in
Outside Diameter	10.8 in	Pipe Length	1500 ft
Pipe Roughness	0.0102 in	Allowable Press.	150 psi
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	1	Total Fittings kf	0
Flow Rate	0.78 ft3/s	Velocity	1.42 ft/s
Friction Loss	1.25 ft	Fitting Losses	0.03 ft
Slurry Losses	0 ft	Orifice Losses	0 ft
Fixed Head Loss	0 ft	Booster Pump Head	0 ft
Total Head Loss	1.28 ft	Total Pressure Drop	0.55 psi
Entry Total Head	361.06 ft	Exit Total Head	359.78 ft
Entry Gauge Head	209.78 ft	Exit Gauge Head	178.5 ft
Reynolds No.	109809.23	Friction Factor	0.02205 (Darcy f)

Helix Technologies Pty Ltd

Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Pipe No	79	From node to node	24 - 19
Description	45	Equipment No	
Liquid	Water	Viscosity	1.002 cp
Temperature	20 C	Density	998.2 kg/m3
Vapour Pressure	2.34 psi		
Pipe Description	Steel Pipes 10" AS1836 (ANSI B36.10)	Pipe Class	Sch 20
Nominal Diameter	10 in	Inside Diameter	10 in
Outside Diameter	10.8 in	Pipe Length	1500 ft
Pipe Roughness	0.0102 in	Allowable Press.	150 psi
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	1	Total Fittings kf	0
Flow Rate	0.76 ft3/s	Velocity	1.39 ft/s
Friction Loss	1.2 ft	Fitting Losses	0.03 ft
Slurry Losses	0 ft	Orifice Losses	0 ft
Fixed Head Loss	0 ft	Booster Pump Head	0 ft
Total Head Loss	1.23 ft	Total Pressure Drop	0.53 psi
Entry Total Head	359.78 ft	Exit Total Head	358.55 ft
Entry Gauge Head	208.55 ft	Exit Gauge Head	207.33 ft
Reynolds No.	107302.95	Friction Factor	0.0221 (Darcy f)

Helix Technologies Pty Ltd

Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Pipe No	80	From node to node	19 - 20
Description	46	Equipment No	
Liquid	Water	Viscosity	1.002 cp
Temperature	20 C	Density	998.2 kg/m3
Vapour Pressure	2.34 psi		
Pipe Description	Steel Pipes 10" AS1836 (ANSI B36.10)	Pipe Class	Sch 20
Nominal Diameter	10 in	Inside Diameter	10 in
Outside Diameter	10.8 in	Pipe Length	1500 ft
Pipe Roughness	0.0102 in	Allowable Press.	150 psi
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	1	Total Fittings kf	0
Flow Rate	1.17 ft3/s	Velocity	2.15 ft/s
Friction Loss	2.75 ft	Fitting Losses	0.07 ft
Slurry Losses	0 ft	Orifice Losses	0 ft
Fixed Head Loss	0 ft	Booster Pump Head	0 ft
Total Head Loss	2.83 ft	Total Pressure Drop	1.22 psi
Entry Total Head	362.61 ft	Exit Total Head	359.78 ft
Entry Gauge Head	209.78 ft	Exit Gauge Head	186.96 ft
Reynolds No.	165573.89	Friction Factor	0.02136 (Darcy f)

Helix Technologies Pty Ltd

Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Pipe No	81	From node to node	23 - 24
Description	47	Equipment No	
Liquid	Water	Viscosity	1.002 cp
Temperature	20 C	Density	998.2 kg/m3
Vapour Pressure	2.34 psi		
Pipe Description	Steel Pipes 10" AS1836 (ANSI B36.10)	Pipe Class	Sch 20
Nominal Diameter	10 in	Inside Diameter	10 in
Outside Diameter	10.8 in	Pipe Length	1800 ft
Pipe Roughness	0.0102 in	Allowable Press.	150 psi
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	0	Total Fittings kf	0
Flow Rate	1.2 ft3/s	Velocity	2.21 ft/s
Friction Loss	3.49 ft	Fitting Losses	0 ft
Slurry Losses	0 ft	Orifice Losses	0 ft
Fixed Head Loss	0 ft	Booster Pump Head	0 ft
Total Head Loss	3.49 ft	Total Pressure Drop	1.51 psi
Entry Total Head	362.05 ft	Exit Total Head	358.55 ft
Entry Gauge Head	202.05 ft	Exit Gauge Head	208.55 ft
Reynolds No.	170343.65	Friction Factor	0.02132 (Darcy f)

Helix Technologies Pty Ltd

Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Pipe No	82	From node to node	20 - 23
Description	48	Equipment No	
Liquid	Water	Viscosity	1.002 cp
Temperature	20 C	Density	998.2 kg/m3
Vapour Pressure	2.34 psi		
Pipe Description	Steel Pipes 10" AS1836 (ANSI B36.10)	Pipe Class	Sch 20
Nominal Diameter	10 in	Inside Diameter	10 in
Outside Diameter	10.8 in	Pipe Length	1500 ft
Pipe Roughness	0.0102 in	Allowable Press.	150 psi
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	1	Total Fittings kf	0
Flow Rate	0.5 ft3/s	Velocity	0.92 ft/s
Friction Loss	0.55 ft	Fitting Losses	0.01 ft
Slurry Losses	0 ft	Orifice Losses	0 ft
Fixed Head Loss	0 ft	Booster Pump Head	0 ft
Total Head Loss	0.56 ft	Total Pressure Drop	0.24 psi
Entry Total Head	362.61 ft	Exit Total Head	362.05 ft
Entry Gauge Head	192.61 ft	Exit Gauge Head	202.05 ft
Reynolds No.	71093.93	Friction Factor	0.02304 (Darcy f)

Helix Technologies Pty Ltd

Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Pipe No	83	From node to node	21 - 23
Description	49	Equipment No	
Liquid	Water	Viscosity	1.002 cp
Temperature	20 C	Density	998.2 kg/m3
Vapour Pressure	2.34 psi		
Pipe Description	Steel Pipes 10" AS1836 (ANSI B36.10)	Pipe Class	Sch 20
Nominal Diameter	10 in	Inside Diameter	10 in
Outside Diameter	10.8 in	Pipe Length	2100 ft
Pipe Roughness	0.0102 in	Allowable Press.	150 psi
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	0	Total Fittings kf	0
Flow Rate	2.45 ft3/s	Velocity	4.49 ft/s
Friction Loss	16.21 ft	Fitting Losses	0 ft
Slurry Losses	0 ft	Orifice Losses	0 ft
Fixed Head Loss	0 ft	Booster Pump Head	0 ft
Total Head Loss	16.21 ft	Total Pressure Drop	7.02 psi
Entry Total Head	378.26 ft	Exit Total Head	362.05 ft
Entry Gauge Head	198.26 ft	Exit Gauge Head	202.05 ft
Reynolds No.	345979.22	Friction Factor	0.02057 (Darcy f)

Helix Technologies Pty Ltd

Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Pipe No	84	From node to node	22 - 23
Description	50	Equipment No	
Liquid	Water	Viscosity	1.002 cp
Temperature	20 C	Density	998.2 kg/m3
Vapour Pressure	2.34 psi		
Pipe Description	Steel Pipes 10" AS1836 (ANSI B36.10)	Pipe Class	Sch 20
Nominal Diameter	10 in	Inside Diameter	10 in
Outside Diameter	10.8 in	Pipe Length	1500 ft
Pipe Roughness	0.0102 in	Allowable Press.	150 psi
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	0	Total Fittings kf	0
Flow Rate	1.35 ft3/s	Velocity	2.47 ft/s
Friction Loss	3.62 ft	Fitting Losses	0 ft
Slurry Losses	0 ft	Orifice Losses	0 ft
Fixed Head Loss	0 ft	Booster Pump Head	0 ft
Total Head Loss	3.62 ft	Total Pressure Drop	1.57 psi
Entry Total Head	365.66 ft	Exit Total Head	362.05 ft
Entry Gauge Head	195.66 ft	Exit Gauge Head	202.05 ft
Reynolds No.	190592.36	Friction Factor	0.02117 (Darcy f)

Helix Technologies Pty Ltd

Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Pipe No	85	From node to node	21 - 22
Description	51	Equipment No	
Liquid	Water	Viscosity	1.002 cp
Temperature	20 C	Density	998.2 kg/m3
Vapour Pressure	2.34 psi		
Pipe Description	Steel Pipes 10" AS1836 (ANSI B36.10)	Pipe Class	Sch 20
Nominal Diameter	12 in	Inside Diameter	12 in
Outside Diameter	13 in	Pipe Length	1500 ft
Pipe Roughness	0.0102 in	Allowable Press.	150 psi
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	0	Total Fittings kf	0
Flow Rate	4.13 ft3/s	Velocity	5.25 ft/s
Friction Loss	12.59 ft	Fitting Losses	0 ft
Slurry Losses	0 ft	Orifice Losses	0 ft
Fixed Head Loss	0 ft	Booster Pump Head	0 ft
Total Head Loss	12.59 ft	Total Pressure Drop	5.45 psi
Entry Total Head	378.26 ft	Exit Total Head	365.66 ft
Entry Gauge Head	198.26 ft	Exit Gauge Head	195.66 ft
Reynolds No.	486231.66	Friction Factor	0.01957 (Darcy f)

Helix Technologies Pty Ltd

Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Pipe No	88	From node to node	86 - 87
Description	52a	Equipment No	
Liquid	Water	Viscosity	1.002 cp
Temperature	20 C	Density	998.2 kg/m3
Vapour Pressure	2.34 psi		
Pipe Description	Steel Pipes 10" AS1836 (ANSI B36.10)	Pipe Class	Sch 20
Nominal Diameter	14 in	Inside Diameter	14 in
Outside Diameter	15 in	Pipe Length	100 ft
Pipe Roughness	0.0102 in	Allowable Press.	150 psi
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	0	Total Fittings kf	0
Flow Rate	9.06 ft3/s	Velocity	8.48 ft/s
Friction Loss	1.78 ft	Fitting Losses	0 ft
Slurry Losses	0 ft	Orifice Losses	0 ft
Fixed Head Loss	0 ft	Booster Pump Head	0 ft
Total Head Loss	1.78 ft	Total Pressure Drop	0.77 psi
Entry Total Head	280 ft	Exit Total Head	278.22 ft
Entry Gauge Head	125 ft	Exit Gauge Head	133.22 ft
Reynolds No.	915229.3	Friction Factor	0.01863 (Darcy f)

Helix Technologies Pty Ltd

Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Pipe No	89	From node to node	87 - 21
Description	52b	Equipment No	
Liquid	Water	Viscosity	1.002 cp
Temperature	20 C	Density	998.2 kg/m3
Vapour Pressure	2.34 psi		
Pipe Description	Steel Pipes 10" AS1836 (ANSI B36.10)	Pipe Class	Sch 20
Nominal Diameter	14 in	Inside Diameter	14 in
Outside Diameter	15 in	Pipe Length	1400 ft
Pipe Roughness	0.0102 in	Allowable Press.	150 psi
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	0	Total Fittings kf	0
Flow Rate	9.06 ft3/s	Velocity	8.48 ft/s
Friction Loss	24.96 ft	Fitting Losses	0 ft
Slurry Losses	0 ft	Orifice Losses	0 ft
Fixed Head Loss	0 ft	Booster Pump Head	0 ft
Total Head Loss	24.96 ft	Total Pressure Drop	10.8 psi
Entry Total Head	403.22 ft	Exit Total Head	378.26 ft
Entry Gauge Head	133.22 ft	Exit Gauge Head	198.26 ft
Reynolds No.	915228.96	Friction Factor	0.01863 (Darcy f)

Helix Technologies Pty Ltd

Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Pipe No	90	From node to node	26 - 27
Description	53	Equipment No	
Liquid	Water	Viscosity	1.002 cp
Temperature	20 C	Density	998.2 kg/m3
Vapour Pressure	2.34 psi		
Pipe Description	Steel Pipes 10" AS1836 (ANSI B36.10)	Pipe Class	Sch 20
Nominal Diameter	10 in	Inside Diameter	10 in
Outside Diameter	10.8 in	Pipe Length	1600 ft
Pipe Roughness	0.0102 in	Allowable Press.	150 psi
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	0	Total Fittings kf	0
Flow Rate	1.4 ft3/s	Velocity	2.57 ft/s
Friction Loss	4.17 ft	Fitting Losses	0 ft
Slurry Losses	0 ft	Orifice Losses	0 ft
Fixed Head Loss	0 ft	Booster Pump Head	0 ft
Total Head Loss	4.17 ft	Total Pressure Drop	1.81 psi
Entry Total Head	353.63 ft	Exit Total Head	349.46 ft
Entry Gauge Head	209.46 ft	Exit Gauge Head	215.29 ft
Reynolds No.	198446.98	Friction Factor	0.02112 (Darcy f)

Helix Technologies Pty Ltd

Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Pipe No	91	From node to node	27 - 25
Description	54	Equipment No	
Liquid	Water	Viscosity	1.002 cp
Temperature	20 C	Density	998.2 kg/m3
Vapour Pressure	2.34 psi		
Pipe Description	Steel Pipes 10" AS1836 (ANSI B36.10)	Pipe Class	Sch 20
Nominal Diameter	10 in	Inside Diameter	10 in
Outside Diameter	10.8 in	Pipe Length	2100 ft
Pipe Roughness	0.0102 in	Allowable Press.	150 psi
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	0	Total Fittings kf	0
Flow Rate	1.35 ft ³ /s	Velocity	2.48 ft/s
Friction Loss	5.09 ft	Fitting Losses	0 ft
Slurry Losses	0 ft	Orifice Losses	0 ft
Fixed Head Loss	0 ft	Booster Pump Head	0 ft
Total Head Loss	5.09 ft	Total Pressure Drop	2.2 psi
Entry Total Head	358.72 ft	Exit Total Head	353.63 ft
Entry Gauge Head	223.63 ft	Exit Gauge Head	198.54 ft
Reynolds No.	191048.35	Friction Factor	0.02117 (Darcy f)

Helix Technologies Pty Ltd

Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Pipe No	92	From node to node	27 - 28
Description	55	Equipment No	
Liquid	Water	Viscosity	1.002 cp
Temperature	20 C	Density	998.2 kg/m3
Vapour Pressure	2.34 psi		
Pipe Description	Steel Pipes 10" AS1836 (ANSI B36.10)	Pipe Class	Sch 20
Nominal Diameter	12 in	Inside Diameter	12 in
Outside Diameter	13 in	Pipe Length	3500 ft
Pipe Roughness	0.0102 in	Allowable Press.	150 psi
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	0	Total Fittings kf	0
Flow Rate	1.05 ft ³ /s	Velocity	1.34 ft/s
Friction Loss	2.07 ft	Fitting Losses	0 ft
Slurry Losses	0 ft	Orifice Losses	0 ft
Fixed Head Loss	0 ft	Booster Pump Head	0 ft
Total Head Loss	2.07 ft	Total Pressure Drop	0.9 psi
Entry Total Head	355.7 ft	Exit Total Head	353.63 ft
Entry Gauge Head	223.63 ft	Exit Gauge Head	221.56 ft
Reynolds No.	124005.22	Friction Factor	0.02121 (Darcy f)

Helix Technologies Pty Ltd

Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Pipe No	93	From node to node	25 - 28
Description	56	Equipment No	
Liquid	Water	Viscosity	1.002 cp
Temperature	20 C	Density	998.2 kg/m3
Vapour Pressure	2.34 psi		
Pipe Description	Steel Pipes 10" AS1836 (ANSI B36.10)	Pipe Class	Sch 20
Nominal Diameter	12 in	Inside Diameter	12 in
Outside Diameter	13 in	Pipe Length	2000 ft
Pipe Roughness	0.0102 in	Allowable Press.	150 psi
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	0	Total Fittings kf	0
Flow Rate	1.71 ft3/s	Velocity	2.18 ft/s
Friction Loss	3.02 ft	Fitting Losses	0 ft
Slurry Losses	0 ft	Orifice Losses	0 ft
Fixed Head Loss	0 ft	Booster Pump Head	0 ft
Total Head Loss	3.02 ft	Total Pressure Drop	1.31 psi
Entry Total Head	358.72 ft	Exit Total Head	355.7 ft
Entry Gauge Head	208.72 ft	Exit Gauge Head	225.7 ft
Reynolds No.	201759.06	Friction Factor	0.02042 (Darcy f)

Helix Technologies Pty Ltd

Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Pipe No	94	From node to node	24 - 28
Description	57	Equipment No	
Liquid	Water	Viscosity	1.002 cp
Temperature	20 C	Density	998.2 kg/m3
Vapour Pressure	2.34 psi		
Pipe Description	Steel Pipes 10" AS1836 (ANSI B36.10)	Pipe Class	Sch 20
Nominal Diameter	10 in	Inside Diameter	10 in
Outside Diameter	10.8 in	Pipe Length	1000 ft
Pipe Roughness	0.0102 in	Allowable Press.	150 psi
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	0	Total Fittings kf	0
Flow Rate	1.47 ft3/s	Velocity	2.69 ft/s
Friction Loss	2.85 ft	Fitting Losses	0 ft
Slurry Losses	0 ft	Orifice Losses	0 ft
Fixed Head Loss	0 ft	Booster Pump Head	0 ft
Total Head Loss	2.85 ft	Total Pressure Drop	1.23 psi
Entry Total Head	358.55 ft	Exit Total Head	355.7 ft
Entry Gauge Head	208.55 ft	Exit Gauge Head	225.7 ft
Reynolds No.	207749.02	Friction Factor	0.02106 (Darcy f)

Helix Technologies Pty Ltd

Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Pipe No	95	From node to node	28 - 29
Description	58	Equipment No	
Liquid	Water	Viscosity	1.002 cp
Temperature	20 C	Density	998.2 kg/m3
Vapour Pressure	2.34 psi		
Pipe Description	Steel Pipes 10" AS1836 (ANSI B36.10)	Pipe Class	Sch 20
Nominal Diameter	10 in	Inside Diameter	10 in
Outside Diameter	10.8 in	Pipe Length	1900 ft
Pipe Roughness	0.0102 in	Allowable Press.	150 psi
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	0	Total Fittings kf	0
Flow Rate	1.37 ft3/s	Velocity	2.51 ft/s
Friction Loss	4.74 ft	Fitting Losses	0 ft
Slurry Losses	0 ft	Orifice Losses	0 ft
Fixed Head Loss	0 ft	Booster Pump Head	0 ft
Total Head Loss	4.74 ft	Total Pressure Drop	2.05 psi
Entry Total Head	360.44 ft	Exit Total Head	355.7 ft
Entry Gauge Head	225.7 ft	Exit Gauge Head	220.97 ft
Reynolds No.	193873.11	Friction Factor	0.02115 (Darcy f)

Helix Technologies Pty Ltd

Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Pipe No	96	From node to node	23 - 29
Description	59	Equipment No	
Liquid	Water	Viscosity	1.002 cp
Temperature	20 C	Density	998.2 kg/m3
Vapour Pressure	2.34 psi		
Pipe Description	Steel Pipes 10" AS1836 (ANSI B36.10)	Pipe Class	Sch 20
Nominal Diameter	10 in	Inside Diameter	10 in
Outside Diameter	10.8 in	Pipe Length	1000 ft
Pipe Roughness	0.0102 in	Allowable Press.	150 psi
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	0	Total Fittings kf	0
Flow Rate	1.09 ft3/s	Velocity	2 ft/s
Friction Loss	1.61 ft	Fitting Losses	0 ft
Slurry Losses	0 ft	Orifice Losses	0 ft
Fixed Head Loss	0 ft	Booster Pump Head	0 ft
Total Head Loss	1.61 ft	Total Pressure Drop	0.7 psi
Entry Total Head	362.05 ft	Exit Total Head	360.44 ft
Entry Gauge Head	202.05 ft	Exit Gauge Head	230.44 ft
Reynolds No.	154506.58	Friction Factor	0.02146 (Darcy f)

Helix Technologies Pty Ltd

Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Pipe No	97	From node to node	29 - 30
Description	60	Equipment No	
Liquid	Water	Viscosity	1.002 cp
Temperature	20 C	Density	998.2 kg/m3
Vapour Pressure	2.34 psi		
Pipe Description	Steel Pipes 10" AS1836 (ANSI B36.10)	Pipe Class	Sch 20
Nominal Diameter	10 in	Inside Diameter	10 in
Outside Diameter	10.8 in	Pipe Length	1300 ft
Pipe Roughness	0.0102 in	Allowable Press.	150 psi
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	0	Total Fittings kf	0
Flow Rate	0.78 ft3/s	Velocity	1.43 ft/s
Friction Loss	1.09 ft	Fitting Losses	0 ft
Slurry Losses	0 ft	Orifice Losses	0 ft
Fixed Head Loss	0 ft	Booster Pump Head	0 ft
Total Head Loss	1.09 ft	Total Pressure Drop	0.47 psi
Entry Total Head	361.53 ft	Exit Total Head	360.44 ft
Entry Gauge Head	230.44 ft	Exit Gauge Head	234.35 ft
Reynolds No.	110070.35	Friction Factor	0.02205 (Darcy f)

Helix Technologies Pty Ltd

Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Pipe No	98	From node to node	22 - 30
Description	61	Equipment No	
Liquid	Water	Viscosity	1.002 cp
Temperature	20 C	Density	998.2 kg/m3
Vapour Pressure	2.34 psi		
Pipe Description	Steel Pipes 10" AS1836 (ANSI B36.10)	Pipe Class	Sch 20
Nominal Diameter	10 in	Inside Diameter	10 in
Outside Diameter	10.8 in	Pipe Length	1000 ft
Pipe Roughness	0.0102 in	Allowable Press.	150 psi
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	0	Total Fittings kf	0
Flow Rate	1.78 ft3/s	Velocity	3.26 ft/s
Friction Loss	4.14 ft	Fitting Losses	0 ft
Slurry Losses	0 ft	Orifice Losses	0 ft
Fixed Head Loss	0 ft	Booster Pump Head	0 ft
Total Head Loss	4.14 ft	Total Pressure Drop	1.79 psi
Entry Total Head	365.66 ft	Exit Total Head	361.53 ft
Entry Gauge Head	195.66 ft	Exit Gauge Head	236.53 ft
Reynolds No.	251477.99	Friction Factor	0.02085 (Darcy f)

Helix Technologies Pty Ltd

Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Pipe No	101	From node to node	99 - 100
Description	62a	Equipment No	
Liquid	Water	Viscosity	1.002 cp
Temperature	20 C	Density	998.2 kg/m3
Vapour Pressure	2.34 psi		
Pipe Description	Steel Pipes 10" AS1836 (ANSI B36.10)	Pipe Class	Sch 20
Nominal Diameter	14 in	Inside Diameter	14 in
Outside Diameter	15 in	Pipe Length	100 ft
Pipe Roughness	0.0102 in	Allowable Press.	150 psi
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	0	Total Fittings kf	0
Flow Rate	7.68 ft ³ /s	Velocity	7.18 ft/s
Friction Loss	1.29 ft	Fitting Losses	0 ft
Slurry Losses	0 ft	Orifice Losses	0 ft
Fixed Head Loss	0 ft	Booster Pump Head	0 ft
Total Head Loss	1.29 ft	Total Pressure Drop	0.56 psi
Entry Total Head	150 ft	Exit Total Head	148.71 ft
Entry Gauge Head	228 ft	Exit Gauge Head	236.71 ft
Reynolds No.	775603.92	Friction Factor	0.0187 (Darcy f)

Helix Technologies Pty Ltd

Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Pipe No	102	From node to node	100 - 25
Description	62b	Equipment No	
Liquid	Water	Viscosity	1.002 cp
Temperature	20 C	Density	998.2 kg/m3
Vapour Pressure	2.34 psi		
Pipe Description	Steel Pipes 10" AS1836 (ANSI B36.10)	Pipe Class	Sch 20
Nominal Diameter	14 in	Inside Diameter	14 in
Outside Diameter	15 in	Pipe Length	1400 ft
Pipe Roughness	0.0102 in	Allowable Press.	150 psi
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	0	Total Fittings kf	0
Flow Rate	7.68 ft ³ /s	Velocity	7.18 ft/s
Friction Loss	17.99 ft	Fitting Losses	0 ft
Slurry Losses	0 ft	Orifice Losses	0 ft
Fixed Head Loss	0 ft	Booster Pump Head	0 ft
Total Head Loss	17.99 ft	Total Pressure Drop	7.79 psi
Entry Total Head	376.71 ft	Exit Total Head	358.72 ft
Entry Gauge Head	236.71 ft	Exit Gauge Head	208.72 ft
Reynolds No.	775602.64	Friction Factor	0.0187 (Darcy f)

Helix Technologies Pty Ltd

Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Pipe No	105	From node to node	103 - 104
Description	63a - 12" pipe??	Equipment No	
Liquid	Water	Viscosity	1.002 cp
Temperature	20 C	Density	998.2 kg/m3
Vapour Pressure	2.34 psi		
Pipe Description	Steel Pipes 10" AS1836 (ANSI B36.10)	Pipe Class	Sch 20
Nominal Diameter	10 in	Inside Diameter	10 in
Outside Diameter	11 in	Pipe Length	100 ft
Pipe Roughness	0.0102 in	Allowable Press.	150 psi
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	0	Total Fittings kf	0
Flow Rate	5.11 ft3/s	Velocity	9.37 ft/s
Friction Loss	3.3 ft	Fitting Losses	0 ft
Slurry Losses	0 ft	Orifice Losses	0 ft
Fixed Head Loss	0 ft	Booster Pump Head	0 ft
Total Head Loss	3.3 ft	Total Pressure Drop	1.43 psi
Entry Total Head	303.3 ft	Exit Total Head	300 ft
Entry Gauge Head	0 ft	Exit Gauge Head	6.7 ft
Reynolds No.	722496.79	Friction Factor	0.02015 (Darcy f)

Helix Technologies Pty Ltd

Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Pipe No	106	From node to node	104 - 26
Description	63b 12" pipe ??	Equipment No	
Liquid	Water	Viscosity	1.002 cp
Temperature	20 C	Density	998.2 kg/m3
Vapour Pressure	2.34 psi		
Pipe Description	Steel Pipes 10" AS1836 (ANSI B36.10)	Pipe Class	Sch 20
Nominal Diameter	10 in	Inside Diameter	10 in
Outside Diameter	11 in	Pipe Length	1400 ft
Pipe Roughness	0.0102 in	Allowable Press.	150 psi
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	0	Total Fittings kf	0
Flow Rate	5.11 ft3/s	Velocity	9.37 ft/s
Friction Loss	46.16 ft	Fitting Losses	0 ft
Slurry Losses	0 ft	Orifice Losses	0 ft
Fixed Head Loss	0 ft	Booster Pump Head	0 ft
Total Head Loss	46.16 ft	Total Pressure Drop	19.98 psi
Entry Total Head	349.46 ft	Exit Total Head	303.3 ft
Entry Gauge Head	13.3 ft	Exit Gauge Head	117.14 ft
Reynolds No.	722496.78	Friction Factor	0.02015 (Darcy f)

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Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Pipe No	107	From node to node	21 - 20
Description	64	Equipment No	
Liquid	Water	Viscosity	1.002 cp
Temperature	20 C	Density	998.2 kg/m3
Vapour Pressure	2.34 psi		
Pipe Description	Steel Pipes 10" AS1836 (ANSI B36.10)	Pipe Class	Sch 20
Nominal Diameter	10 in	Inside Diameter	10 in
Outside Diameter	10.8 in	Pipe Length	1500 ft
Pipe Roughness	0.0102 in	Allowable Press.	150 psi
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	5	Total Fittings kf	0
Flow Rate	2.67 ft3/s	Velocity	4.9 ft/s
Friction Loss	13.78 ft	Fitting Losses	1.87 ft
Slurry Losses	0 ft	Orifice Losses	0 ft
Fixed Head Loss	0 ft	Booster Pump Head	0 ft
Total Head Loss	15.65 ft	Total Pressure Drop	6.77 psi
Entry Total Head	378.26 ft	Exit Total Head	362.61 ft
Entry Gauge Head	198.26 ft	Exit Gauge Head	192.61 ft
Reynolds No.	378075.46	Friction Factor	0.0205 (Darcy f)

Helix Technologies Pty Ltd

Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Pipe No	110	From node to node	108 - 109
Description	65a	Equipment No	
Liquid	Water	Viscosity	1.002 cp
Temperature	20 C	Density	998.2 kg/m3
Vapour Pressure	2.34 psi		
Pipe Description	Steel Pipes 10" AS1836 (ANSI B36.10)	Pipe Class	Sch 20
Nominal Diameter	12 in	Inside Diameter	12 in
Outside Diameter	13 in	Pipe Length	100 ft
Pipe Roughness	0.0102 in	Allowable Press.	150 psi
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	0	Total Fittings kf	0
Flow Rate	5.06 ft ³ /s	Velocity	6.44 ft/s
Friction Loss	1.25 ft	Fitting Losses	0 ft
Slurry Losses	0 ft	Orifice Losses	0 ft
Fixed Head Loss	0 ft	Booster Pump Head	0 ft
Total Head Loss	1.25 ft	Total Pressure Drop	0.54 psi
Entry Total Head	400 ft	Exit Total Head	398.75 ft
Entry Gauge Head	0 ft	Exit Gauge Head	8.75 ft
Reynolds No.	596110.79	Friction Factor	0.01945 (Darcy f)

Helix Technologies Pty Ltd

Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Pipe No	111	From node to node	109 - 10
Description	65b	Equipment No	
Liquid	Water	Viscosity	1.002 cp
Temperature	20 C	Density	998.2 kg/m3
Vapour Pressure	2.34 psi		
Pipe Description	Steel Pipes 10" AS1836 (ANSI B36.10)	Pipe Class	Sch 20
Nominal Diameter	12 in	Inside Diameter	12 in
Outside Diameter	13 in	Pipe Length	900 ft
Pipe Roughness	0.0102 in	Allowable Press.	150 psi
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	4	Total Fittings kf	0
Flow Rate	5.06 ft3/s	Velocity	6.44 ft/s
Friction Loss	11.29 ft	Fitting Losses	2.58 ft
Slurry Losses	0 ft	Orifice Losses	0 ft
Fixed Head Loss	0 ft	Booster Pump Head	0 ft
Total Head Loss	13.87 ft	Total Pressure Drop	6 psi
Entry Total Head	398.75 ft	Exit Total Head	384.88 ft
Entry Gauge Head	8.75 ft	Exit Gauge Head	184.88 ft
Reynolds No.	596111.24	Friction Factor	0.01945 (Darcy f)

Helix Technologies Pty Ltd

Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		

Node No	0	Node Type	Tank
Description	0	Equipment No	
Rel. Level (RL)	300 ft	Pressure Input	0 psi
Nozzle K value	-	Ext Flow (+In/-Out)	-
Int.(Gauge) Head	-	Int.(Gauge) Pressure	-
Total Node Head	488 ft		

Helix Technologies Pty Ltd

Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Node No	1	Node Type	Pump
Description		Equipment No	
Rel. Level (RL)	290 ft	Pressure Input	0 psi
Nozzle K value	-	Ext Flow (+In/-Out)	-
Int.(Gauge) Head	-	Int.(Gauge) Pressure	-
Total Node Head	481.44 ft		
Pump Head	188 ft	Pump Flow Rate	11.66 ft ³ /s
Pump / Fan Efficiency	70 %	Pump Absorbed Power	354.83 hp
Casing Pressure	164.2 psi		
Pump NPSH required	0 ft	Pump NPSH available	229.56 ft

Helix Technologies Pty Ltd

Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Node No	2	Node Type	Junction
Description	1	Equipment No	
Rel. Level (RL)	150 ft	Pressure Input	0 psi
Nozzle K value	-	Ext Flow (+In/-Out)	0 ft ³ /s
Int.(Gauge) Head	255.32 ft	Int.(Gauge) Pressure	110.49 psi
Total Node Head	405.32 ft		

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Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Node No	3	Node Type	Junction
Description	2	Equipment No	
Rel. Level (RL)	150 ft	Pressure Input	0 psi
Nozzle K value	-	Ext Flow (+In/-Out)	-1 ft ³ /s
Int.(Gauge) Head	240.79 ft	Int.(Gauge) Pressure	104.2 psi
Total Node Head	390.79 ft		

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Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Node No	4	Node Type	Junction
Description	3	Equipment No	
Rel. Level (RL)	160 ft	Pressure Input	0 psi
Nozzle K value	-	Ext Flow (+In/-Out)	-1.5 ft ³ /s
Int.(Gauge) Head	221.26 ft	Int.(Gauge) Pressure	95.75 psi
Total Node Head	381.26 ft		

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Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Node No	5	Node Type	Junction
Description	4	Equipment No	
Rel. Level (RL)	150 ft	Pressure Input	0 psi
Nozzle K value	-	Ext Flow (+In/-Out)	-2 ft ³ /s
Int.(Gauge) Head	228.6 ft	Int.(Gauge) Pressure	98.93 psi
Total Node Head	378.6 ft		

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Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Node No	6	Node Type	Junction
Description	5	Equipment No	
Rel. Level (RL)	165 ft	Pressure Input	0 psi
Nozzle K value	-	Ext Flow (+In/-Out)	-1.5 ft ³ /s
Int.(Gauge) Head	215.94 ft	Int.(Gauge) Pressure	93.45 psi
Total Node Head	380.94 ft		

Helix Technologies Pty Ltd

Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Node No	7	Node Type	Junction
Description	6	Equipment No	
Rel. Level (RL)	160 ft	Pressure Input	0 psi
Nozzle K value	-	Ext Flow (+In/-Out)	-2 ft ³ /s
Int.(Gauge) Head	217.67 ft	Int.(Gauge) Pressure	94.2 psi
Total Node Head	377.67 ft		

Helix Technologies Pty Ltd

Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Node No	8	Node Type	Junction
Description	7	Equipment No	
Rel. Level (RL)	180 ft	Pressure Input	0 psi
Nozzle K value	-	Ext Flow (+In/-Out)	-1 ft3/s
Int.(Gauge) Head	207.83 ft	Int.(Gauge) Pressure	89.94 psi
Total Node Head	387.83 ft		

Helix Technologies Pty Ltd

Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Node No	9	Node Type	Junction
Description	8	Equipment No	
Rel. Level (RL)	190 ft	Pressure Input	0 psi
Nozzle K value	-	Ext Flow (+In/-Out)	-1 ft3/s
Int.(Gauge) Head	193.54 ft	Int.(Gauge) Pressure	83.75 psi
Total Node Head	383.54 ft		

Helix Technologies Pty Ltd

Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		

Node No	10	Node Type	Junction
Description	9	Equipment No	
Rel. Level (RL)	200 ft	Pressure Input	0 psi
Nozzle K value	-	Ext Flow (+In/-Out)	0 ft ³ /s
Int.(Gauge) Head	184.88 ft	Int.(Gauge) Pressure	80.01 psi
Total Node Head	384.88 ft		

Helix Technologies Pty Ltd

Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Node No	11	Node Type	Junction
Description	10	Equipment No	
Rel. Level (RL)	180 ft	Pressure Input	0 psi
Nozzle K value	-	Ext Flow (+In/-Out)	-1 ft3/s
Int.(Gauge) Head	200.71 ft	Int.(Gauge) Pressure	86.86 psi
Total Node Head	380.71 ft		

Helix Technologies Pty Ltd

Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Node No	12	Node Type	Junction
Description	11	Equipment No	
Rel. Level (RL)	190 ft	Pressure Input	0 psi
Nozzle K value	-	Ext Flow (+In/-Out)	-2.5 ft ³ /s
Int.(Gauge) Head	190.72 ft	Int.(Gauge) Pressure	82.53 psi
Total Node Head	380.72 ft		

Helix Technologies Pty Ltd

Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Node No	13	Node Type	Junction
Description	12	Equipment No	
Rel. Level (RL)	190 ft	Pressure Input	0 psi
Nozzle K value	-	Ext Flow (+In/-Out)	-2 ft ³ /s
Int.(Gauge) Head	187.6 ft	Int.(Gauge) Pressure	81.18 psi
Total Node Head	377.6 ft		

Helix Technologies Pty Ltd

Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Node No	14	Node Type	Junction
Description	13	Equipment No	
Rel. Level (RL)	180 ft	Pressure Input	0 psi
Nozzle K value	-	Ext Flow (+In/-Out)	-1.5 ft ³ /s
Int.(Gauge) Head	181.06 ft	Int.(Gauge) Pressure	78.36 psi
Total Node Head	361.06 ft		

Helix Technologies Pty Ltd

Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Node No	15	Node Type	Junction
Description	14	Equipment No	
Rel. Level (RL)	160 ft	Pressure Input	0 psi
Nozzle K value	-	Ext Flow (+In/-Out)	-1.5 ft ³ /s
Int.(Gauge) Head	200.15 ft	Int.(Gauge) Pressure	86.62 psi
Total Node Head	360.15 ft		

Helix Technologies Pty Ltd

Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Node No	16	Node Type	Junction
Description	15	Equipment No	
Rel. Level (RL)	150 ft	Pressure Input	0 psi
Nozzle K value	-	Ext Flow (+In/-Out)	-1.5 ft ³ /s
Int.(Gauge) Head	227.18 ft	Int.(Gauge) Pressure	98.31 psi
Total Node Head	377.18 ft		

Helix Technologies Pty Ltd

Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Node No	17	Node Type	Junction
Description	16	Equipment No	
Rel. Level (RL)	160 ft	Pressure Input	0 psi
Nozzle K value	-	Ext Flow (+In/-Out)	-1.5 ft ³ /s
Int.(Gauge) Head	196.76 ft	Int.(Gauge) Pressure	85.15 psi
Total Node Head	356.76 ft		

Helix Technologies Pty Ltd

Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Node No	18	Node Type	Junction
Description	17	Equipment No	
Rel. Level (RL)	140 ft	Pressure Input	0 psi
Nozzle K value	-	Ext Flow (+In/-Out)	-1.5 ft ³ /s
Int.(Gauge) Head	218.72 ft	Int.(Gauge) Pressure	94.65 psi
Total Node Head	358.72 ft		

Helix Technologies Pty Ltd

Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Node No	19	Node Type	Junction
Description	18	Equipment No	
Rel. Level (RL)	150 ft	Pressure Input	0 psi
Nozzle K value	-	Ext Flow (+In/-Out)	-0.5 ft ³ /s
Int.(Gauge) Head	209.78 ft	Int.(Gauge) Pressure	90.78 psi
Total Node Head	359.78 ft		

Helix Technologies Pty Ltd

Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Node No	20	Node Type	Junction
Description	19	Equipment No	
Rel. Level (RL)	170 ft	Pressure Input	0 psi
Nozzle K value	-	Ext Flow (+In/-Out)	-1 ft3/s
Int.(Gauge) Head	192.61 ft	Int.(Gauge) Pressure	83.35 psi
Total Node Head	362.61 ft		

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Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Node No	21	Node Type	Junction
Description	20	Equipment No	
Rel. Level (RL)	180 ft	Pressure Input	0 psi
Nozzle K value	-	Ext Flow (+In/-Out)	0 ft ³ /s
Int.(Gauge) Head	198.26 ft	Int.(Gauge) Pressure	85.8 psi
Total Node Head	378.26 ft		

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Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Node No	22	Node Type	Junction
Description	21	Equipment No	
Rel. Level (RL)	170 ft	Pressure Input	0 psi
Nozzle K value	-	Ext Flow (+In/-Out)	-1 ft3/s
Int.(Gauge) Head	195.66 ft	Int.(Gauge) Pressure	84.67 psi
Total Node Head	365.66 ft		

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Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Node No	23	Node Type	Junction
Description	22	Equipment No	
Rel. Level (RL)	160 ft	Pressure Input	0 psi
Nozzle K value	-	Ext Flow (+In/-Out)	-2 ft3/s
Int.(Gauge) Head	202.05 ft	Int.(Gauge) Pressure	87.44 psi
Total Node Head	362.05 ft		

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Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Node No	24	Node Type	Junction
Description	23	Equipment No	
Rel. Level (RL)	150 ft	Pressure Input	0 psi
Nozzle K value	-	Ext Flow (+In/-Out)	-0.75 ft ³ /s
Int.(Gauge) Head	208.55 ft	Int.(Gauge) Pressure	90.25 psi
Total Node Head	358.55 ft		

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Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Node No	25	Node Type	Junction
Description	24	Equipment No	
Rel. Level (RL)	150 ft	Pressure Input	0 psi
Nozzle K value	-	Ext Flow (+In/-Out)	-3 ft3/s
Int.(Gauge) Head	208.72 ft	Int.(Gauge) Pressure	90.32 psi
Total Node Head	358.72 ft		

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Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Node No	26	Node Type	Junction
Description	25	Equipment No	
Rel. Level (RL)	140 ft	Pressure Input	0 psi
Nozzle K value	-	Ext Flow (+In/-Out)	-2 ft ³ /s
Int.(Gauge) Head	209.46 ft	Int.(Gauge) Pressure	90.64 psi
Total Node Head	349.46 ft		

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Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Node No	27	Node Type	Junction
Description	26	Equipment No	
Rel. Level (RL)	130 ft	Pressure Input	0 psi
Nozzle K value	-	Ext Flow (+In/-Out)	-1 ft ³ /s
Int.(Gauge) Head	223.63 ft	Int.(Gauge) Pressure	96.78 psi
Total Node Head	353.63 ft		

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Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Node No	28	Node Type	Junction
Description	27	Equipment No	
Rel. Level (RL)	130 ft	Pressure Input	0 psi
Nozzle K value	-	Ext Flow (+In/-Out)	-3.5 ft ³ /s
Int.(Gauge) Head	225.7 ft	Int.(Gauge) Pressure	97.67 psi
Total Node Head	355.7 ft		

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Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Node No	29	Node Type	Junction
Description	28	Equipment No	
Rel. Level (RL)	130 ft	Pressure Input	0 psi
Nozzle K value	-	Ext Flow (+In/-Out)	-0.5 ft ³ /s
Int.(Gauge) Head	230.44 ft	Int.(Gauge) Pressure	99.72 psi
Total Node Head	360.44 ft		

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Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Node No	30	Node Type	Junction
Description	29	Equipment No	
Rel. Level (RL)	125 ft	Pressure Input	0 psi
Nozzle K value	-	Ext Flow (+In/-Out)	-1 ft3/s
Int.(Gauge) Head	236.53 ft	Int.(Gauge) Pressure	102.36 psi
Total Node Head	361.53 ft		

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Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Node No	44	Node Type	Tank
Description		Equipment No	
Rel. Level (RL)	350 ft	Pressure Input	0 psi
Nozzle K value	-	Ext Flow (+In/-Out)	-
Int.(Gauge) Head	-	Int.(Gauge) Pressure	-
Total Node Head	420 ft		

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Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Node No	53	Node Type	Pump
Description	P2	Equipment No	
Rel. Level (RL)	340 ft	Pressure Input	0 psi
Nozzle K value	-	Ext Flow (+In/-Out)	-
Int.(Gauge) Head	-	Int.(Gauge) Pressure	-
Total Node Head	417.43 ft		
Pump Head	70 ft	Pump Flow Rate	10.9 ft ³ /s
Pump / Fan Efficiency	70 %	Pump Absorbed Power	123.5 hp
Casing Pressure	33.51 psi		
Pump NPSH required	0 ft	Pump NPSH available	233.54 ft

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Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Node No	86	Node Type	Tank
Description		Equipment No	
Rel. Level (RL)	280 ft	Pressure Input	0 psi
Nozzle K value	-	Ext Flow (+In/-Out)	-
Int.(Gauge) Head	-	Int.(Gauge) Pressure	-
Total Node Head	405 ft		

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Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Node No	87	Node Type	Pump
Description		Equipment No	
Rel. Level (RL)	270 ft	Pressure Input	0 psi
Nozzle K value	-	Ext Flow (+In/-Out)	-
Int.(Gauge) Head	-	Int.(Gauge) Pressure	-
Total Node Head	403.22 ft		
Pump Head	125 ft	Pump Flow Rate	9.06 ft ³ /s
Pump / Fan Efficiency	70 %	Pump Absorbed Power	183.33 hp
Casing Pressure	57.65 psi		
Pump NPSH required	0 ft	Pump NPSH available	234.33 ft

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Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Node No	99	Node Type	Tank
Description		Equipment No	
Rel. Level (RL)	150 ft	Pressure Input	0 psi
Nozzle K value	-	Ext Flow (+In/-Out)	-
Int.(Gauge) Head	-	Int.(Gauge) Pressure	-
Total Node Head	378 ft		

Helix Technologies Pty Ltd

Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Node No	100	Node Type	Pump
Description		Equipment No	
Rel. Level (RL)	140 ft	Pressure Input	0 psi
Nozzle K value	-	Ext Flow (+In/-Out)	-
Int.(Gauge) Head	-	Int.(Gauge) Pressure	-
Total Node Head	376.71 ft		
Pump Head	228 ft	Pump Flow Rate	7.68 ft ³ /s
Pump / Fan Efficiency	70 %	Pump Absorbed Power	283.38 hp
Casing Pressure	102.44 psi		
Pump NPSH required	0 ft	Pump NPSH available	234.83 ft

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Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Node No	103	Node Type	Tank
Description		Equipment No	
Rel. Level (RL)	300 ft	Pressure Input	0 psi
Nozzle K value	-	Ext Flow (+In/-Out)	-
Int.(Gauge) Head	-	Int.(Gauge) Pressure	-
Total Node Head	300 ft		

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Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Node No	104	Node Type	Pump
Description		Equipment No	
Rel. Level (RL)	290 ft	Pressure Input	0 psi
Nozzle K value	-	Ext Flow (+In/-Out)	-
Int.(Gauge) Head	-	Int.(Gauge) Pressure	-
Total Node Head	303.3 ft		
Pump Head	0 ft	Pump Flow Rate	5.11 ft ³ /s
Pump / Fan Efficiency	70 %	Pump Absorbed Power	0 hp
Casing Pressure	5.75 psi		
Pump NPSH required	0 ft	Pump NPSH available	236.11 ft

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Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Node No	108	Node Type	Tank
Description		Equipment No	
Rel. Level (RL)	400 ft	Pressure Input	0 psi
Nozzle K value	-	Ext Flow (+In/-Out)	-
Int.(Gauge) Head	-	Int.(Gauge) Pressure	-
Total Node Head	400 ft		

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Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	17/03/2017
Category	Demo Liquid Water	Atmos. Press	100.19 psi
Description	Pipe Network with 65 pipes		
Node No	109	Node Type	Pump
Description		Equipment No	
Rel. Level (RL)	390 ft	Pressure Input	0 psi
Nozzle K value	-	Ext Flow (+In/-Out)	-
Int.(Gauge) Head	-	Int.(Gauge) Pressure	-
Total Node Head	398.75 ft		
Pump Head	0 ft	Pump Flow Rate	5.06 ft ³ /s
Pump / Fan Efficiency	70 %	Pump Absorbed Power	0 hp
Casing Pressure	3.78 psi		
Pump NPSH required	0 ft	Pump NPSH available	234.86 ft