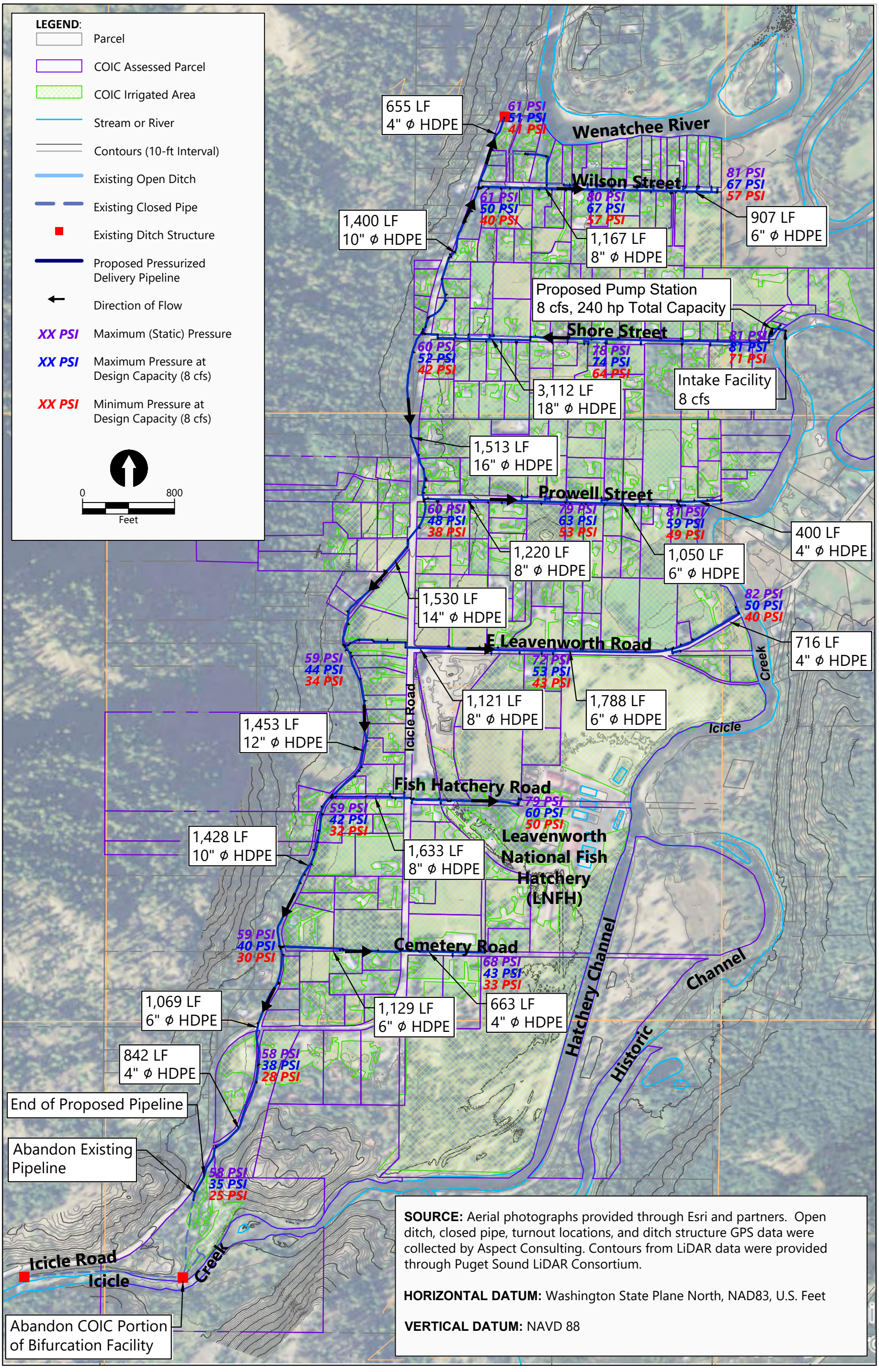


Nov 30, 2021 10:39pm drice L:\Projects\Washington_Water_Trust\Cascade_Orchards_Detailed_Design_(181019-01.01)\CAD\181019-RP-003-PROP SYSTEM MAP.dwg Figure D-1

Publish Date: 2021/11/30 10:39 PM | User: drice
Filepath: L:\Projects\Washington_Water_Trust\Cascade_Orchards_Detailed_Design_(181019-01.01)\CAD\181019-RP-003-PROP SYSTEM MAP.dwg Figure D-1

ANCHOR QEA

Figure D-1
Hydraulic Analysis Results of System Pressures

Basis of Design Report
COIC Improvement Project

SYSTEM CURVE CALCULATION
PROJECT: COIC FLOW RESTORATION
ITERATION: DETAILED DESIGN - ICICLE CREEK SHORE STREET PUMP STATION, 8 CFS PEAK DESIGN FLOW RATE

Input
Calculation
Output

BY: Josh Sexton

SUCTION WATER SURFACE ELEVATIONS (ICICLE CREEK):			
ELEV	1,119.7	feet	PS Elevation
HWL	1,113.2	feet	Seasonal High Water
LWL	1,105.4	feet	Seasonal Low Water

DISCHARGE HGL/PRESSURE (AT DISCHARGE HEADER):				
ELEV	1,121.2	feet	Discharge Header Invert Elev.	
HIGH	1,307.3	feet =	**80.6**	psi
LWL	1,284.2	feet =	**70.6**	psi

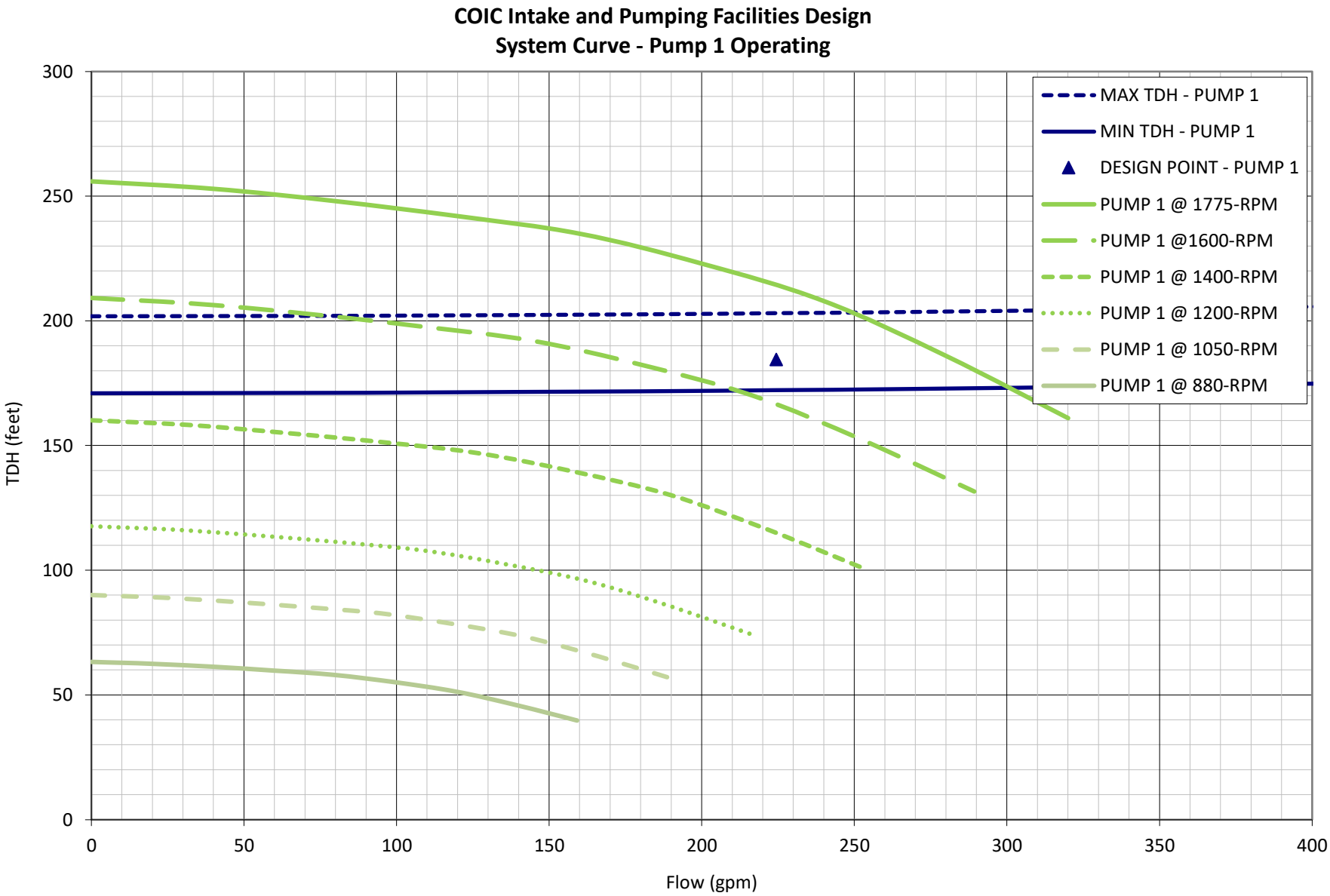
PIPE PROPERTIES	PUMP 1		PUMP 2		PUMP 3		PUMP 4	
	SUCT	DISCH	SUCT	DISCH	SUCT	DISCH	SUCT	DISCH
NOM. DIAM. (in)		6.00		8.00		10.00		10.00
O.D. (in)		6.63		8.63		10.75		10.75
I.D. (in)		6.07		7.98		10.02		10.02
MATERIAL		STEEL		STEEL		STEEL		STEEL
C		110		110		110		110
LENGTH (feet)		7		7		7		7
K		12		12		12		12

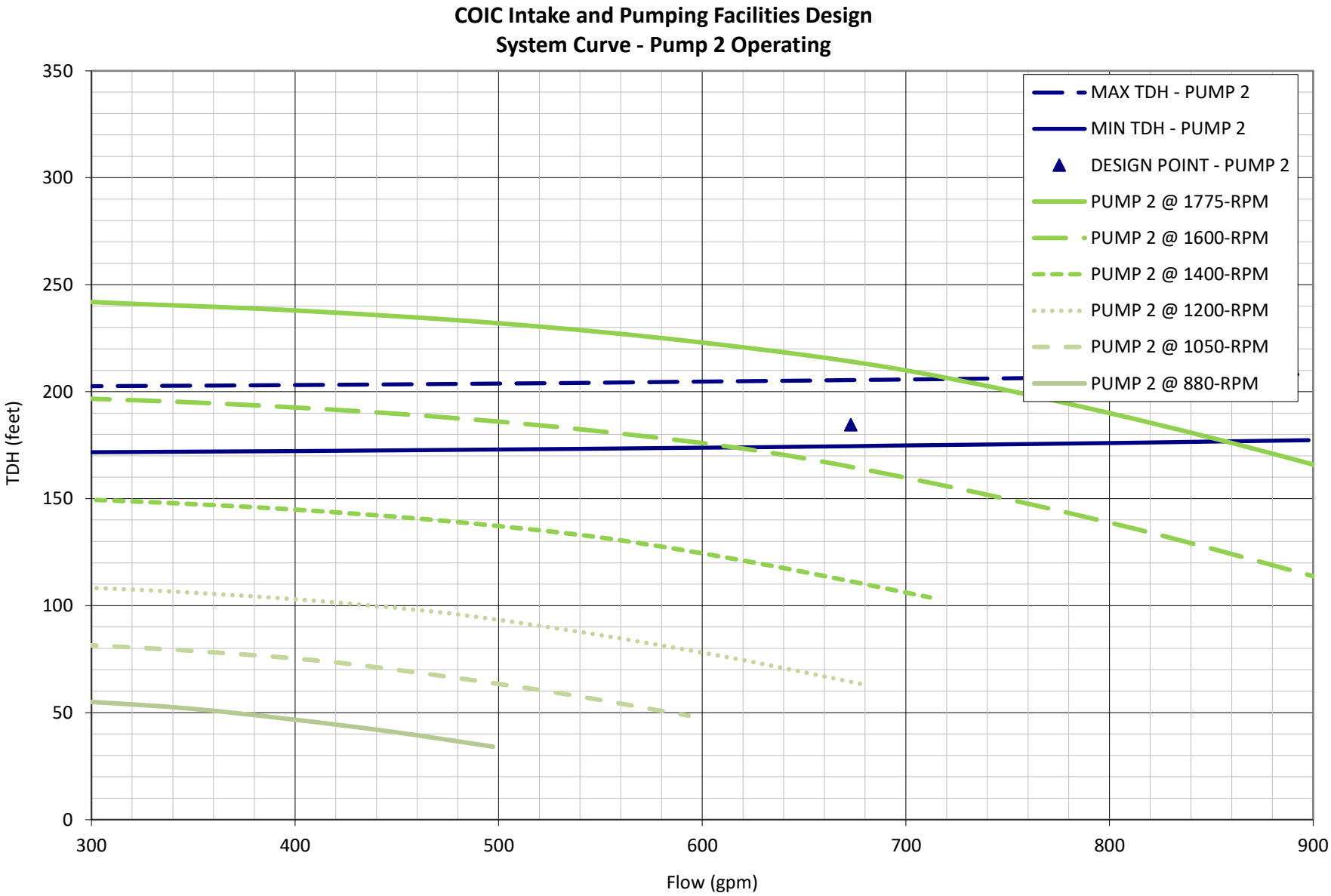
PROPOSED DESIGN POINTS:

PUMP OPERATING	FLOW (GPM)	FLOW (CFS)	TDH (FT)	POWER (HP)*
1	**224**	**0.5**	**185**	**15**
2	**673**	**1.5**	**185**	**45**
3	**1347**	**3.0**	**185**	**90**
4	**1347**	**3.0**	**185**	**90**

**Assumes 70% Efficiency*

TOTAL FLOW		VELOCITIES				LOSSES - PUMP 1		LOSSES - PUMP 2		LOSSES - PUMP 3		LOSSES - PUMP 4		TOTAL DYNAMIC HEAD - PUMP 1			TOTAL DYNAMIC HEAD - PUMP 2			TOTAL DYNAMIC HEAD - PUMP 3			TOTAL DYNAMIC HEAD - PUMP 4		
(gpm)	(cfs)	6-inch (fps)	8-inch (fps)	10-inch (fps)	10-inch (fps)	Minor (feet)	Friction (feet)	Minor (feet)	Friction (feet)	Minor (feet)	Friction (feet)	Minor (feet)	Friction (feet)	MIN (feet)	MAX (feet)	DESIGN (feet)	MIN (feet)	MAX (feet)	DESIGN (feet)	MIN (feet)	MAX (feet)	DESIGN (feet)	MIN (feet)	MAX (feet)	DESIGN (feet)
0	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**171.0**	**201.9**	**178.8**									
90	**0.20**	**1.00**	**0.58**	**0.37**	**0.37**	**0.18**	**0.01**	**0.06**	**0.00**	**0.02**	**0.00**	**0.02**	**0.00**	**171.2**	**202.1**	**179.0**									
180	**0.40**	**1.99**	**1.15**	**0.73**	**0.73**	**0.74**	**0.03**	**0.25**	**0.01**	**0.10**	**0.00**	**0.10**	**0.00**	**171.8**	**202.7**	**179.6**									
224	**0.50**	**2.49**	**1.44**	**0.91**	**0.91**	**1.15**	**0.04**	**0.39**	**0.01**	**0.16**	**0.00**	**0.16**	**0.00**	**172.2**	**203.1**	**180.0**									
269	**0.60**	**2.99**	**1.73**	**1.10**	**1.10**	**1.66**	**0.06**	**0.56**	**0.02**	**0.22**	**0.01**	**0.22**	**0.01**	**172.8**	**203.6**	**180.5**	**171.6**	**202.5**	**179.4**						
359	**0.80**	**3.98**	**2.30**	**1.46**	**1.46**	**2.95**	**0.10**	**0.99**	**0.03**	**0.40**	**0.01**	**0.40**	**0.01**	**174.1**	**204.9**	**181.9**	**172.1**	**202.9**	**179.8**						
449	**1.00**	**4.98**	**2.88**	**1.83**	**1.83**	**4.61**	**0.15**	**1.54**	**0.04**	**0.62**	**0.01**	**0.62**	**0.01**	**175.8**	**206.7**	**183.6**	**172.6**	**203.5**	**180.4**						
539	**1.20**	**5.97**	**3.45**	**2.19**	**2.19**	**6.64**	**0.21**	**2.22**	**0.06**	**0.89**	**0.02**	**0.89**	**0.02**				**173.3**	**204.2**	**181.1**						
628	**1.40**	**6.97**	**4.03**	**2.56**	**2.56**	**9.04**	**0.28**	**3.03**	**0.08**	**1.22**	**0.02**	**1.22**	**0.02**				**174.1**	**205.0**	**181.9**						
673	**1.50**	**7.46**	**4.32**	**2.74**	**2.74**	**10.37**	**0.32**	**3.47**	**0.09**	**1.40**	**0.03**	**1.40**	**0.03**				**174.6**	**205.5**	**182.4**						
718	**1.60**	**7.96**	**4.61**	**2.92**	**2.92**	**11.81**	**0.36**	**3.95**	**0.10**	**1.59**	**0.03**	**1.59**	**0.03**				**175.1**	**205.9**	**182.9**	**172.7**	**203.5**	**180.4**	**172.7**	**203.5**	**180.4**
808	**1.80**	**8.96**	**5.18**	**3.29**	**3.29**	**14.95**	**0.45**	**5.00**	**0.12**	**2.01**	**0.04**	**2.01**	**0.04**				**176.2**	**207.0**	**183.9**	**173.1**	**203.9**	**180.9**	**173.1**	**203.9**	**180.9**
898	**2.00**	**9.95**	**5.76**	**3.65**	**3.65**	**18.46**	**0.55**	**6.18**	**0.15**	**2.49**	**0.05**	**2.49**	**0.05**				**177.4**	**208.2**	**185.1**	**173.6**	**204.4**	**181.4**	**173.6**	**204.4**	**181.4**
987	**2.20**	**10.95**	**6.33**	**4.02**	**4.02**	**22.33**	**0.66**	**7.48**	**0.17**	**3.01**	**0.06**	**3.01**	**0.06**							**174.1**	**205.0**	**181.9**	**174.1**	**205.0**	**181.9**
1,077	**2.40**	**11.94**	**6.91**	**4.38**	**4.38**	**26.58**	**0.77**	**8.90**	**0.20**	**3.58**	**0.07**	**3.58**	**0.07**							**174.7**	**205.5**	**182.5**	**174.7**	**205.5**	**182.5**
1,167	**2.60**	**12.94**	**7.49**	**4.75**	**4.75**	**31.19**	**0.89**	**10.44**	**0.24**	**4.20**	**0.08**	**4.20**	**0.08**							**175.3**	**206.2**	**183.1**	**175.3**	**206.2**	**183.1**
1,257	**2.80**	**13.93**	**8.06**	**5.11**	**5.11**	**36.17**	**1.02**	**12.11**	**0.27**	**4.87**	**0.09**	**4.87**	**0.09**							**176.0**	**206.9**	**183.8**	**176.0**	**206.9**	**183.8**
1,347	**3.00**	**14.93**	**8.64**	**5.48**	**5.48**	**41.52**	**1.16**	**13.90**	**0.31**	**5.59**	**0.10**	**5.59**	**0.10**							**176.7**	**207.6**	**184.5**	**176.7**	**207.6**	**184.5**
1,436	**3.20**	**15.92**	**9.21**	**5.84**	**5.84**	**47.25**	**1.31**	**15.82**	**0.35**	**6.36**	**0.11**	**6.36**	**0.11**							**177.5**	**208.4**	**185.3**	**177.5**	**208.4**	**185.3**
1,526	**3.40**	**16.92**	**9.79**	**6.21**	**6.21**	**53.34**	**1.47**	**17.86**	**0.39**	**7.18**	**0.13**	**7.18**	**0.13**							**178.3**	**209.2**	**186.1**	**178.3**	**209.2**	**186.1**
1,616	**3.60**	**17.91**	**10.36**	**6.57**	**6.57**	**59.80**	**1.63**	**20.02**	**0.43**	**8.05**	**0.14**	**8.05**	**0.14**							**179.2**	**210.1**	**187.0**	**179.2**	**210.1**	**187.0**
1,706	**3.80**	**18.91**	**10.94**	**6.94**	**6.94**	**66.62**	**1.80**	**22.30**	**0.48**	**8.97**	**0.16**	**8.97**	**0.16**												
1,795	**4.00**	**19.90**	**11.52**	**7.30**	**7.30**	**73.82**	**1.98**	**24.71**	**0.52**	**9.94**	**0.17**	**9.94**	**0.17**												
1,885	**4.20**	**20.90**	**12.09**	**7.67**	**7.67**	**81.39**	**2.17**	**27.25**	**0.57**	**10.96**	**0.19**	**10.96**	**0.19**												
1,975	**4.40**	**21.89**	**12.67**	**8.03**	**8.03**	**89.32**	**2.36**	**29.90**	**0.62**	**12.03**	**0.21**	**12.03**	**0.21**												
2,065	**4.60**	**22.89**	**13.24**	**8.40**	**8.40**	**97.63**	**2.57**	**32.68**	**0.68**	**13.15**	**0.22**	**13.15**	**0.22**												


COIC Intake and Pumping Facilities Design
System Curve - Pump 1 Operating
TDH (feet)
Flow (gpm)
0
50
100
150
200
250
300
350
400
MAX TDH - PUMP 1
MIN TDH - PUMP 1
DESIGN POINT - PUMP 1
PUMP 1 @ 1775-RPM
PUMP 1 @1600-RPM
PUMP 1 @ 1400-RPM
PUMP 1 @ 1200-RPM
PUMP 1 @ 1050-RPM
PUMP 1 @ 880-RPM


COIC Intake and Pumping Facilities Design
System Curve - Pump 2 Operating
TDH (feet)
Flow (gpm)
0
50
100
150
200
250
300
350
300
400
500
600
700
800
900
MAX TDH - PUMP 2
MIN TDH - PUMP 2
DESIGN POINT - PUMP 2
PUMP 2 @ 1775-RPM
PUMP 2 @ 1600-RPM
PUMP 2 @ 1400-RPM
PUMP 2 @ 1200-RPM
PUMP 2 @ 1050-RPM
PUMP 2 @ 880-RPM

COIC Intake and Pumping Facilities Design
System Curve - Pump 3 Operating