

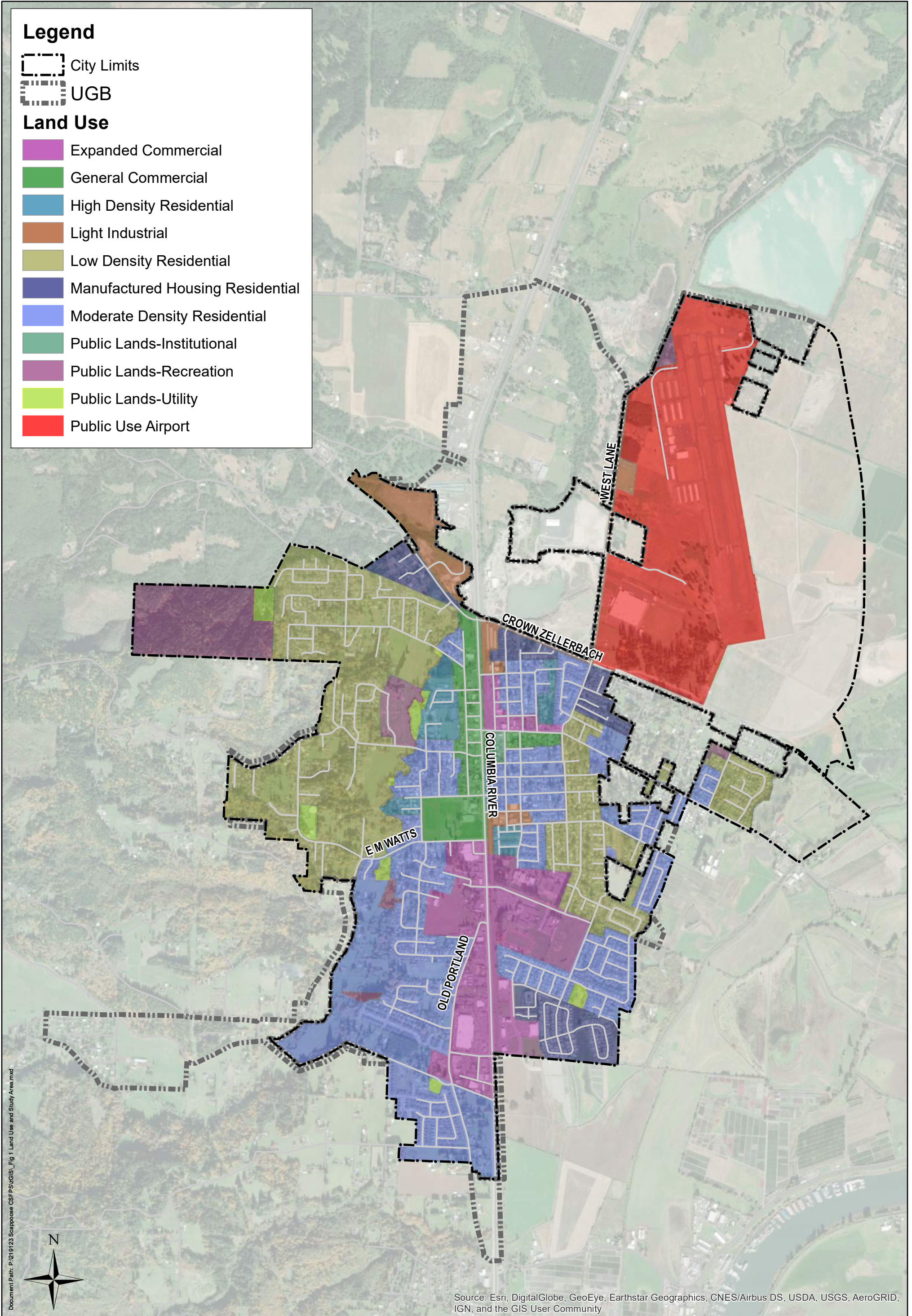


Report Appendices

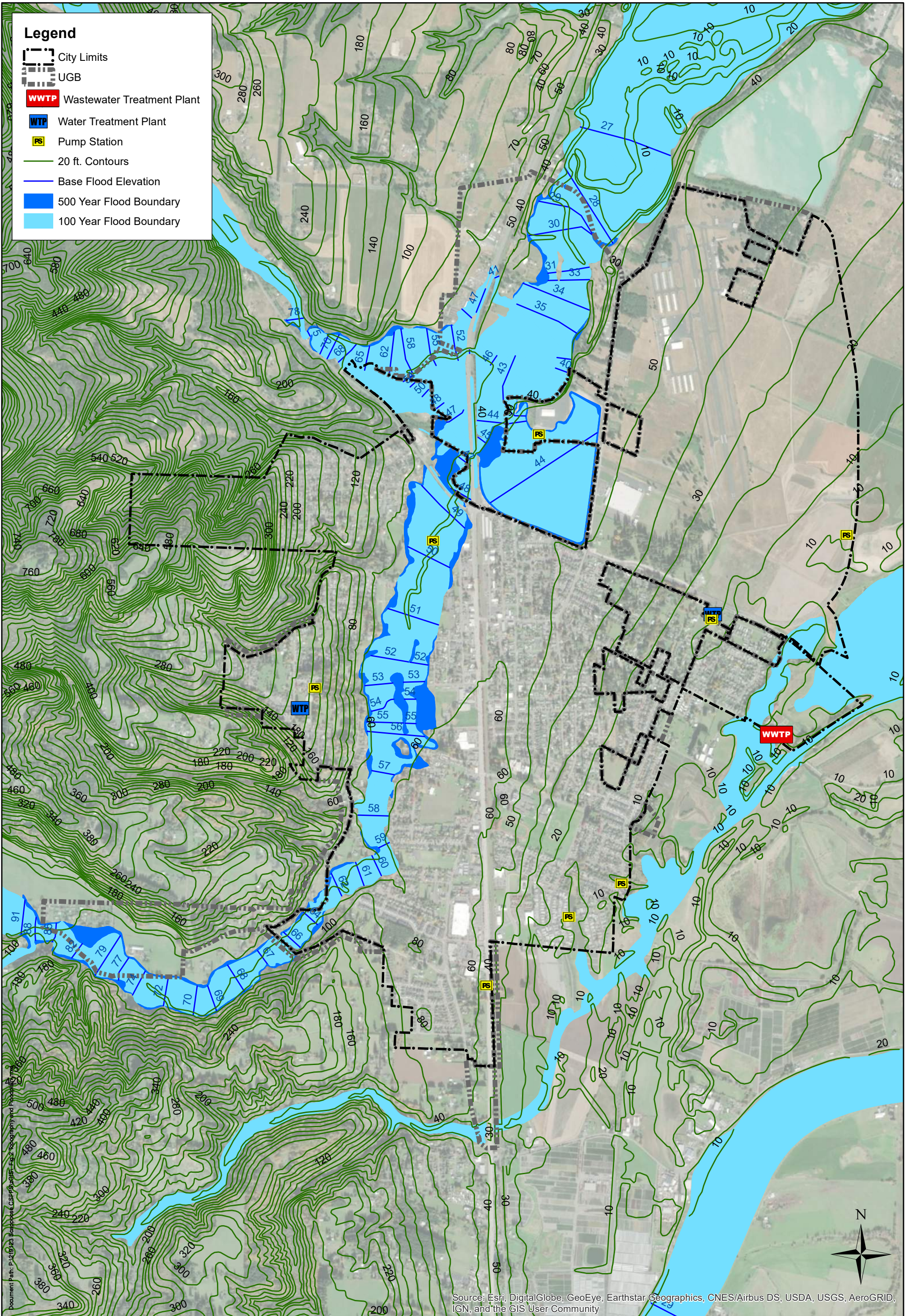


Appendix A

Figures

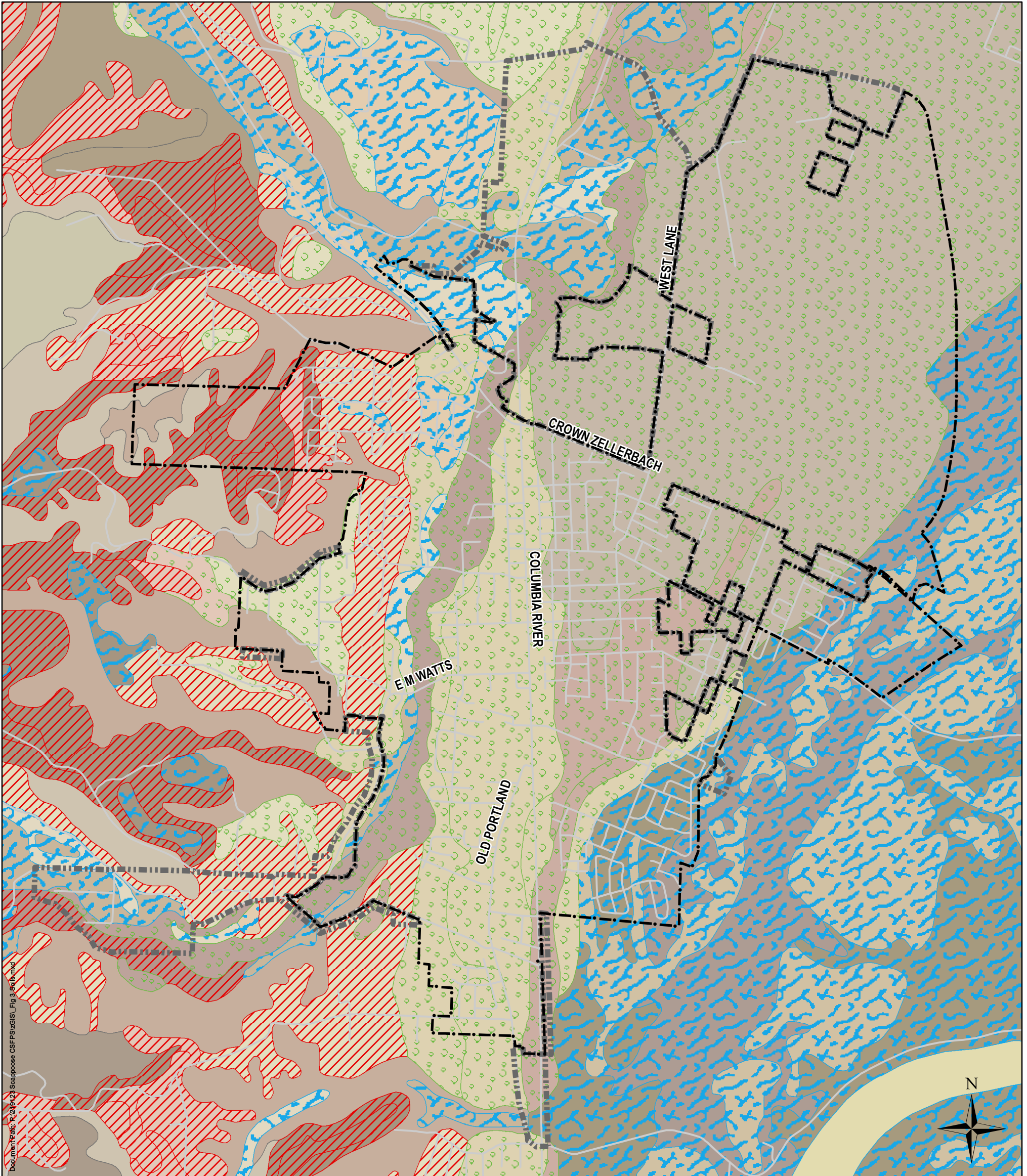


Document Path: P:\21\23 Scappoose CSF\GIS\Fig 1 Land Use and Study Area.mxd

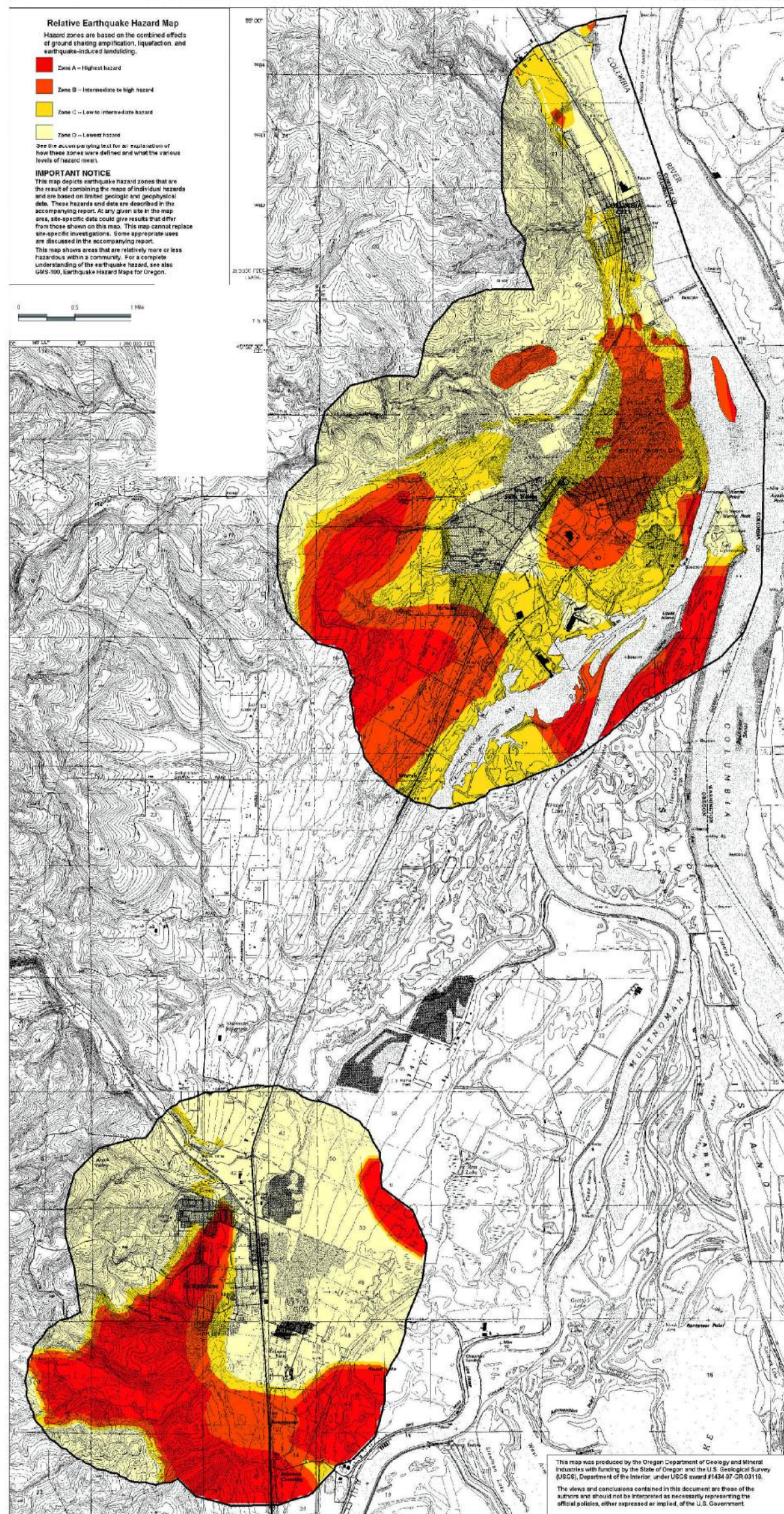


Legend

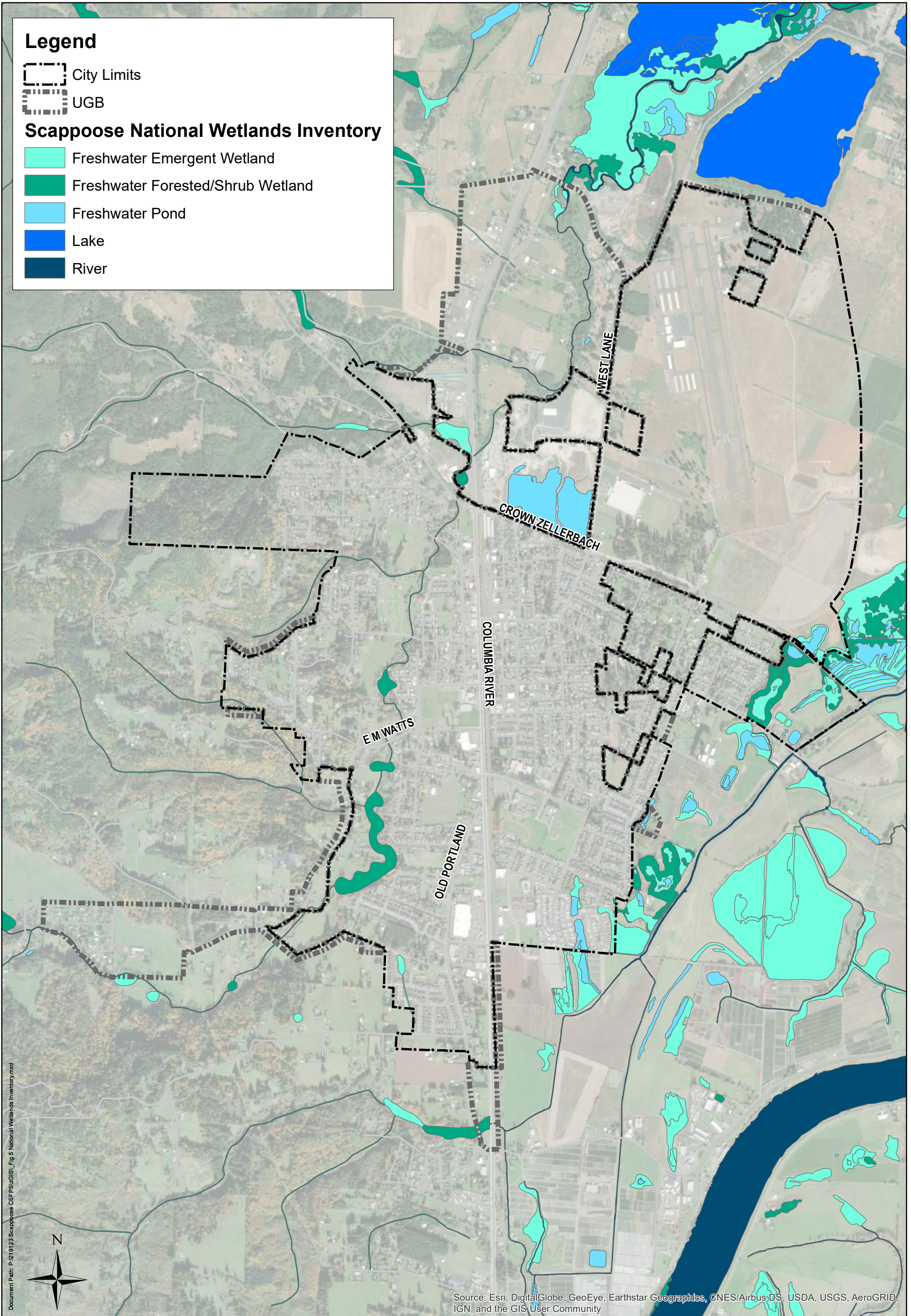
City Limits	Bacona silt loam	Latourell silt loam	Sifton gravelly loam
UGB	Cascade silt loam	McBee silt loam	Sifton loam
Streets	Cloquato silt loam	Quafeno loam	Vernonia silt loam
Streets	Cornelius silt loam	Quatama silt loam	Wapato silt loam
Farmland	Crims silt loam	Rafton silt loam	Water
Prime	Dayton silt loam	Rafton-Sauvie-Moag complex	Wauld very gravelly loam
Statewide Importance	Dowde silt loam	Sauvie silt loam	Xerochrepts, steep
If Drained	Goble silt loam	Sauvie silty clay loam	
Aloha silt loam	Hapludalfs-Udifluvents complex	Scaponia-Braun silt loams	

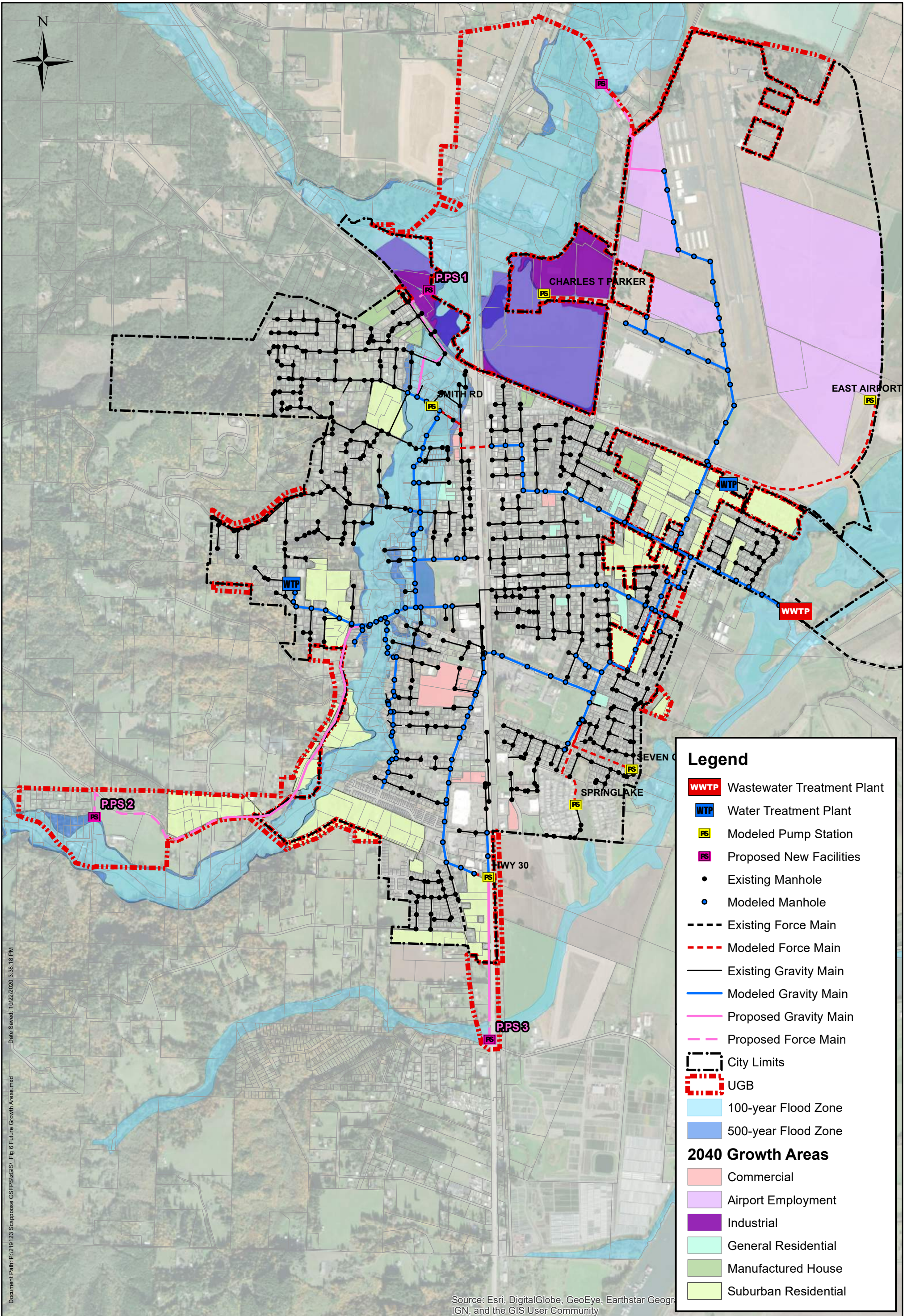


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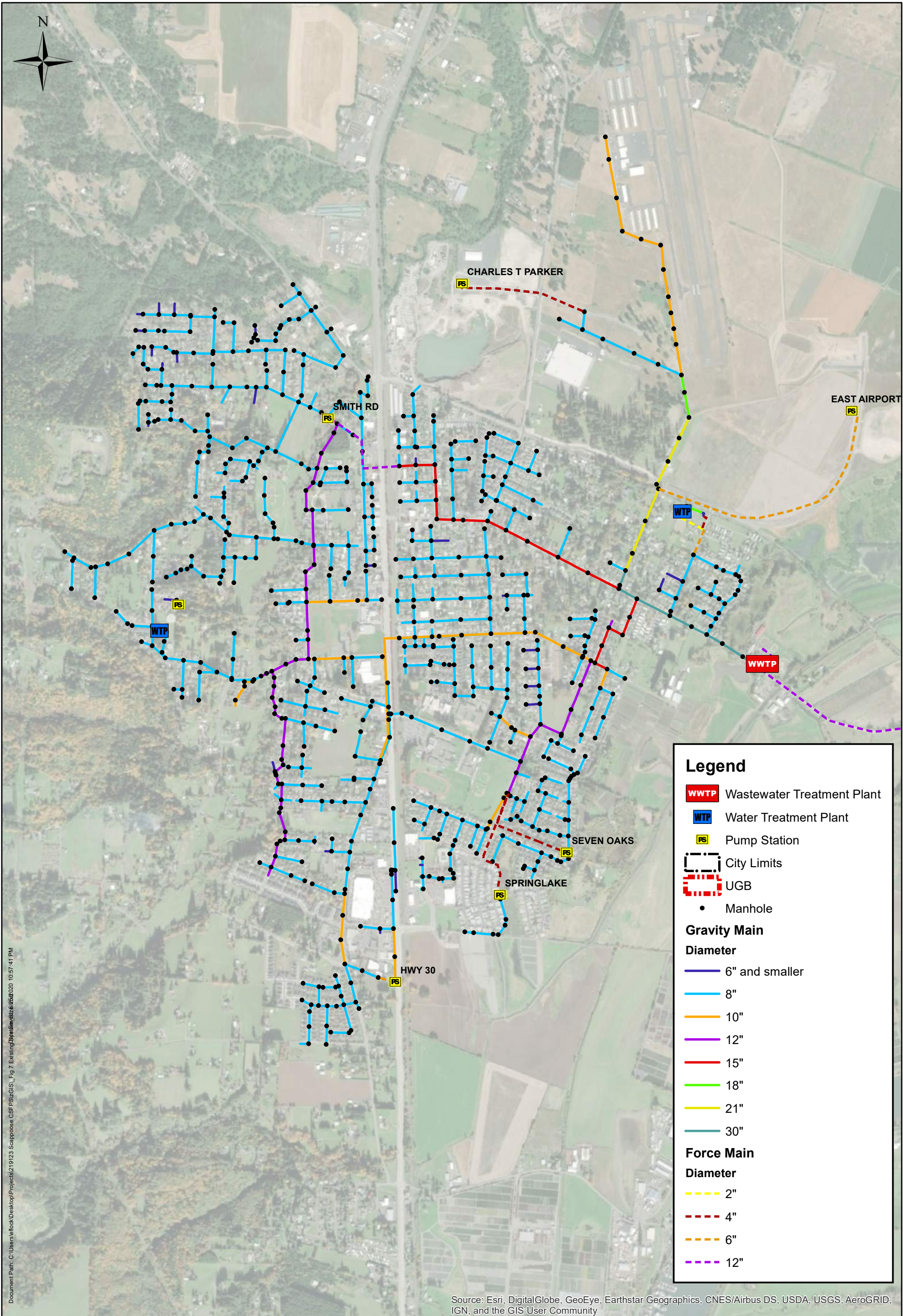


Document Path: P:\21\19\23 Scappoose CSF\PS\GIS\Fig 4 Relative Earthquake Hazard.mxd



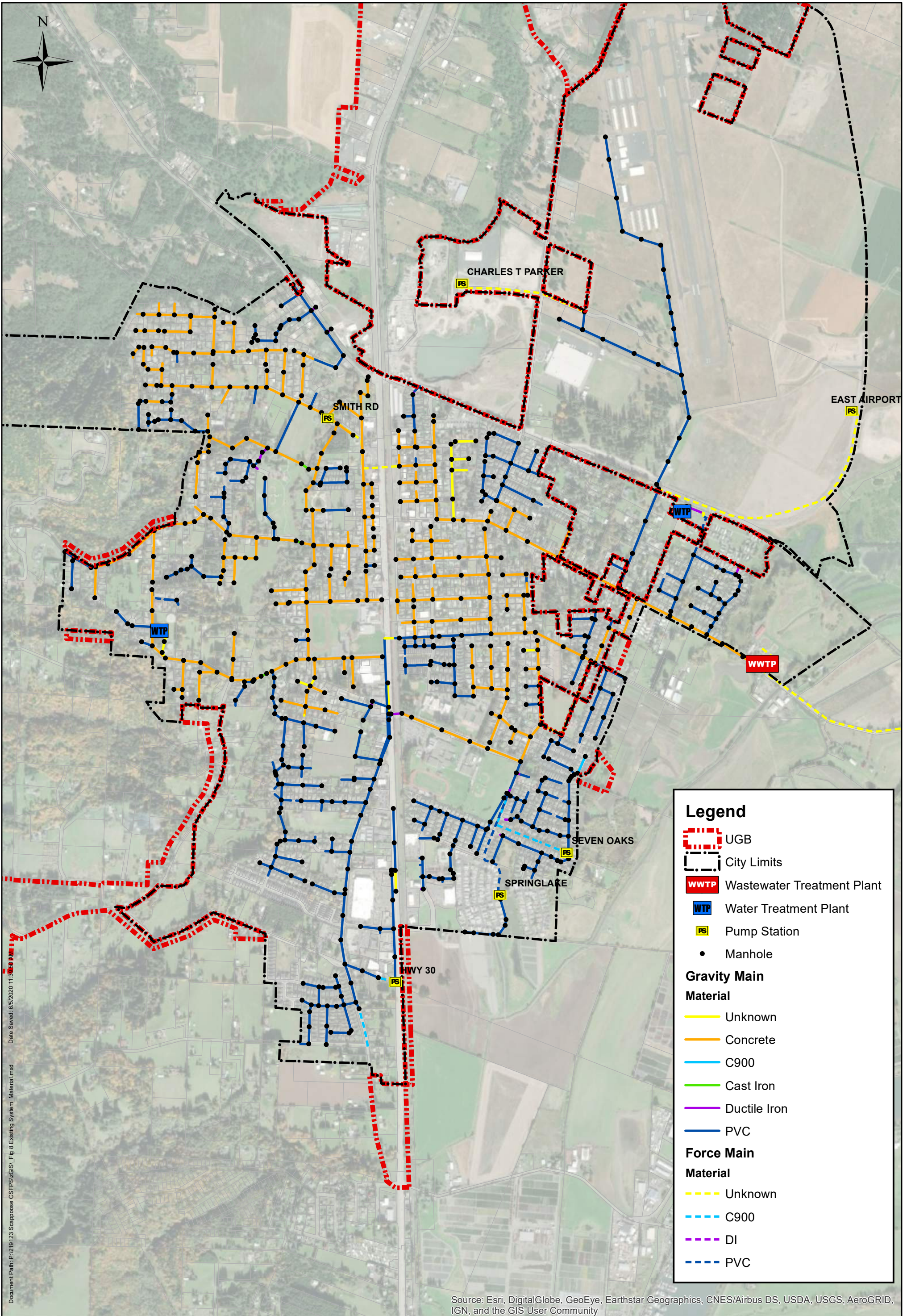


Document Path: P:\21\19\23 Scappoose CSFPPS\GIS\Fig 6 Future Growth Areas.mxd
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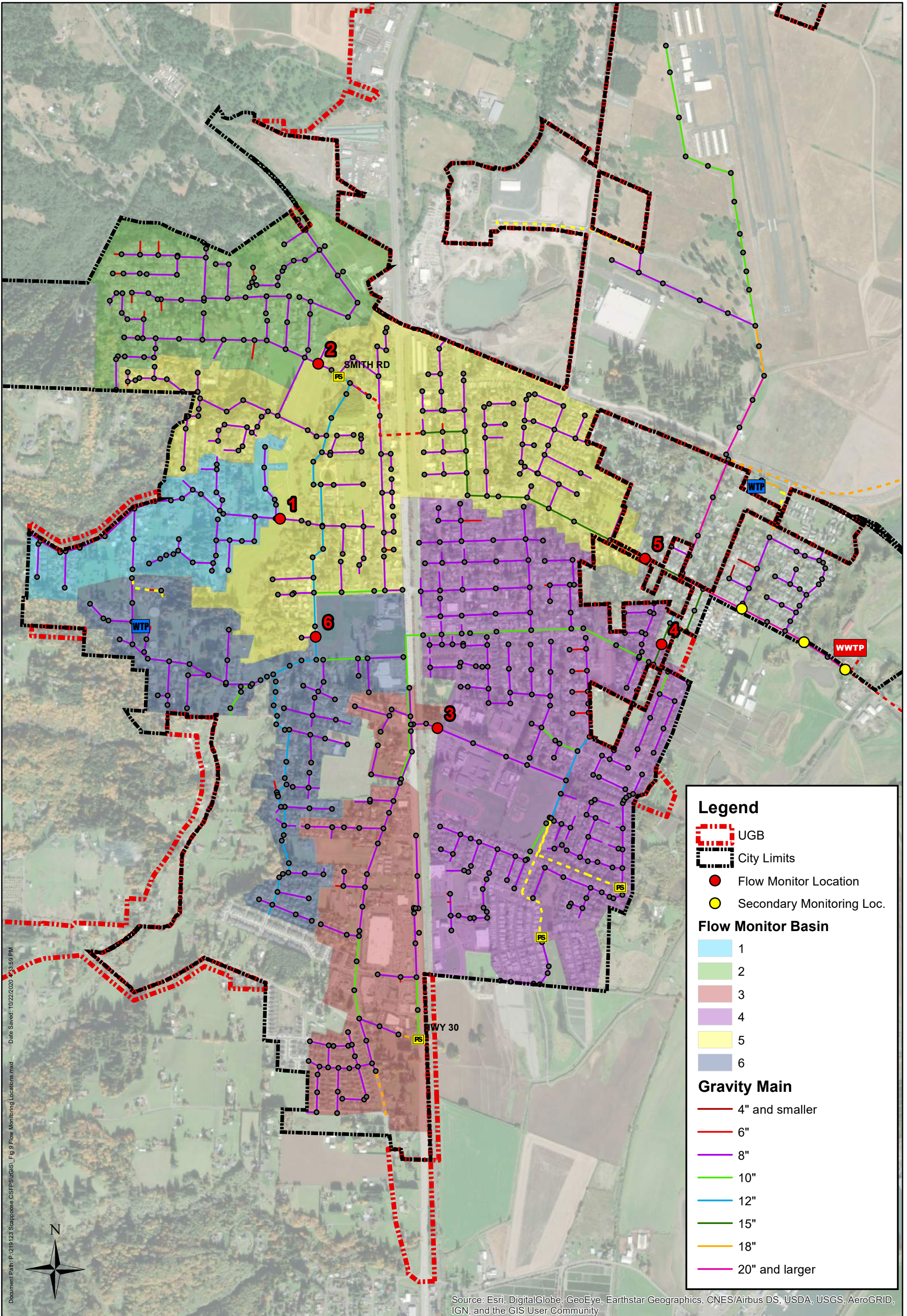


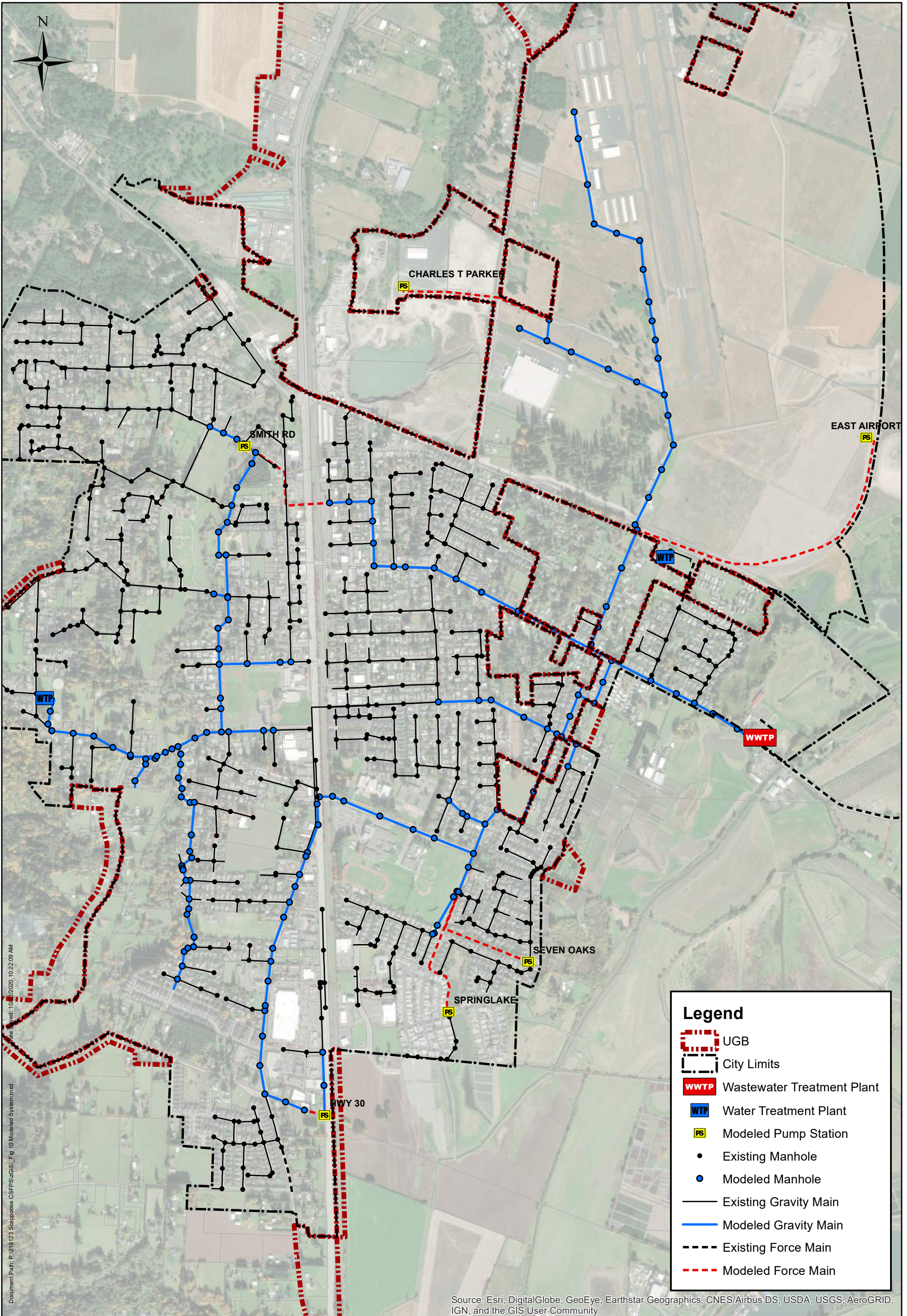
Document Path: C:\Users\jeford\Desktop\Projects\219123 Scappoose CSF\PS\GIS\Fig 7 Existing\By\Sam\sh61662020 10:57:41 PM

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community














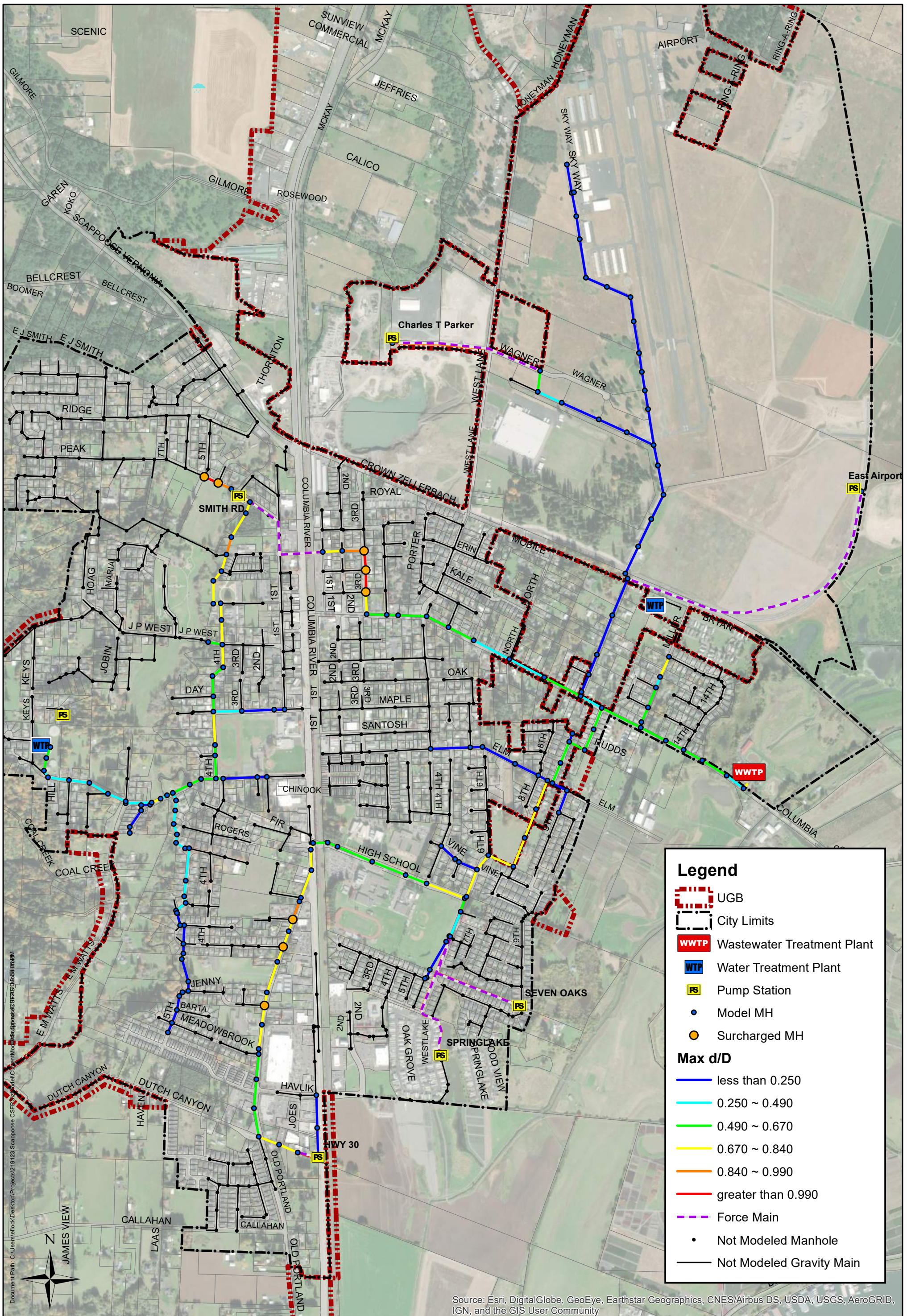
Document Path: P:\2121\23 Scappoose CSFPS\GIS\Fig 8 Existing System_Material.mxd
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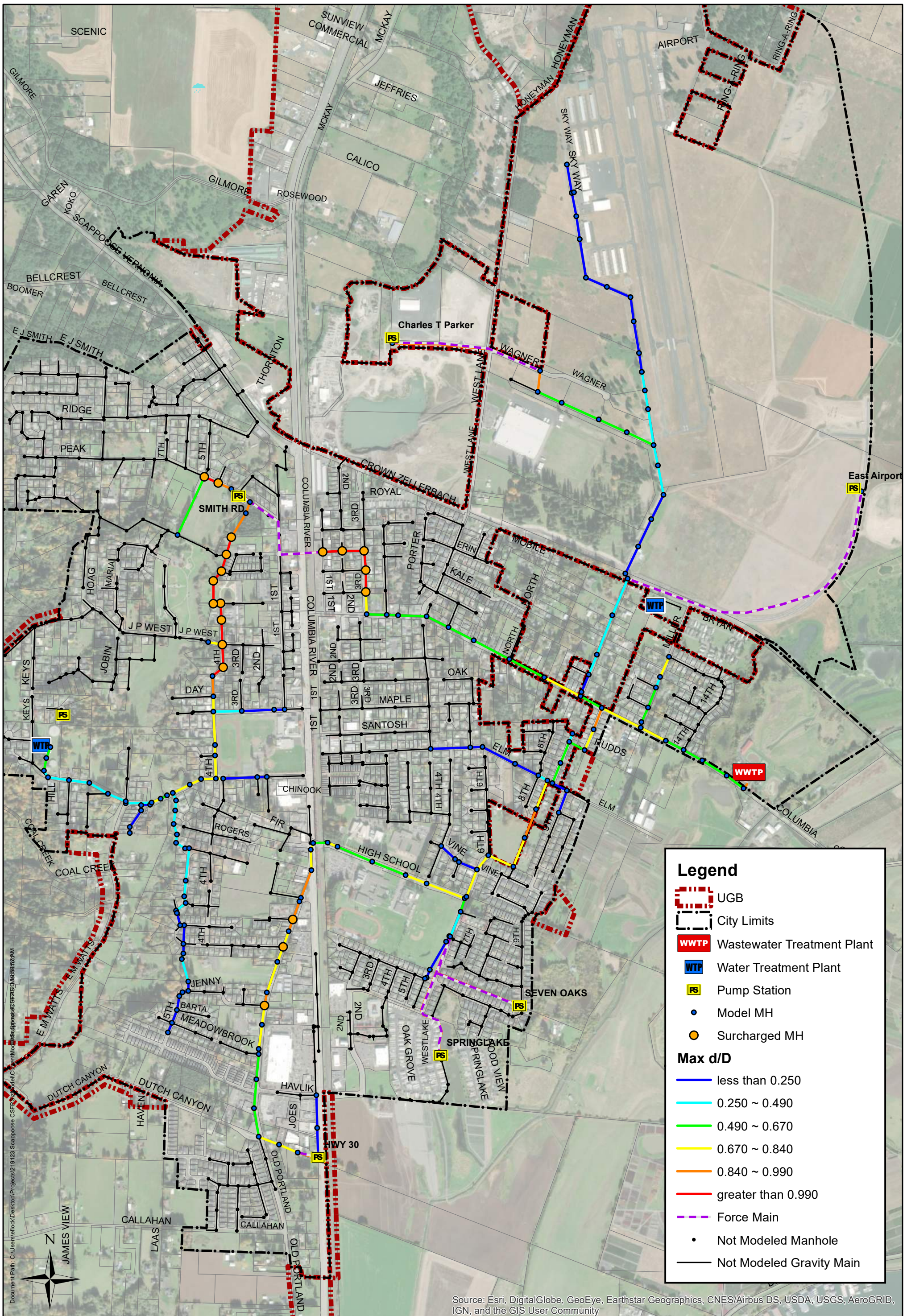


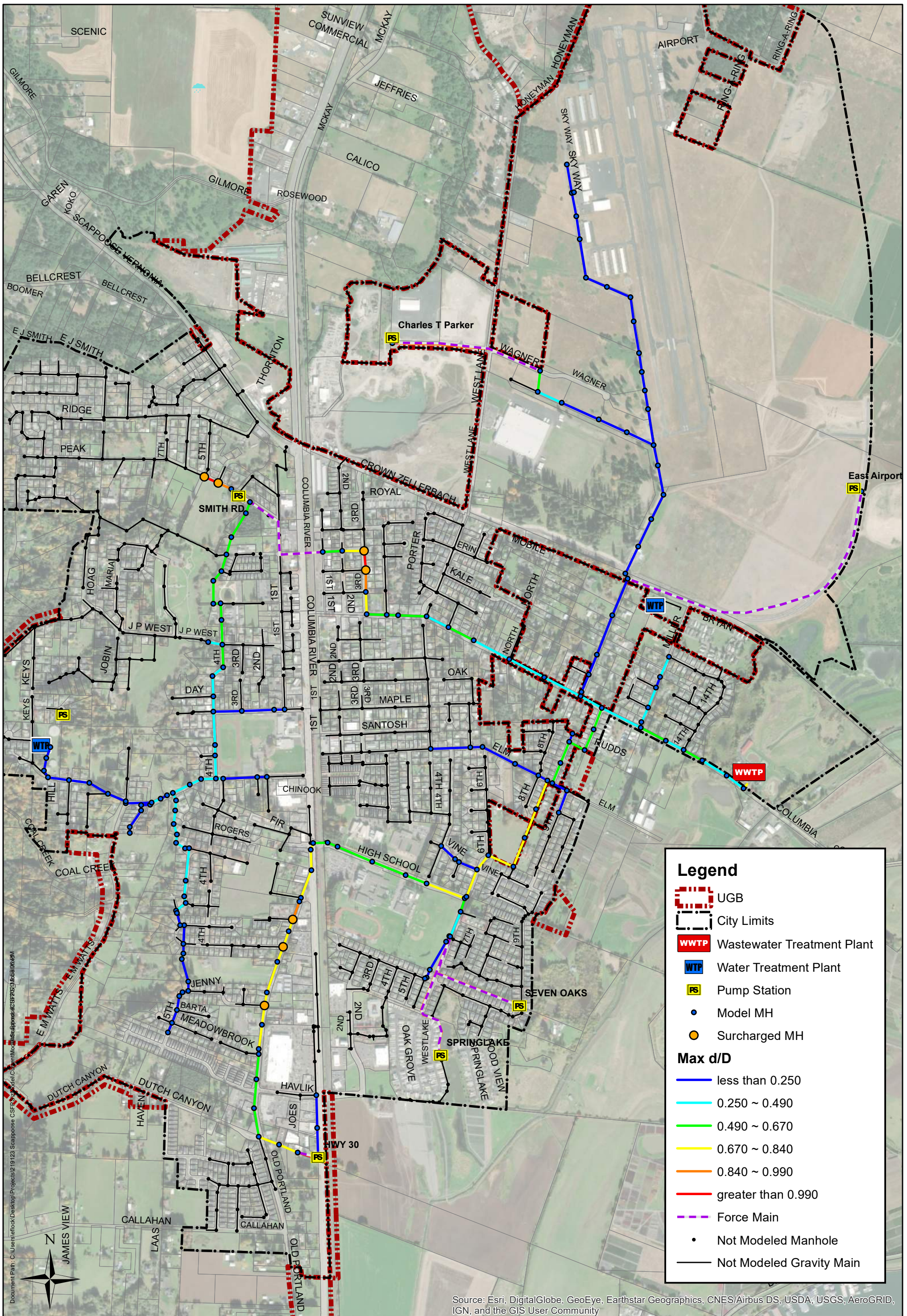


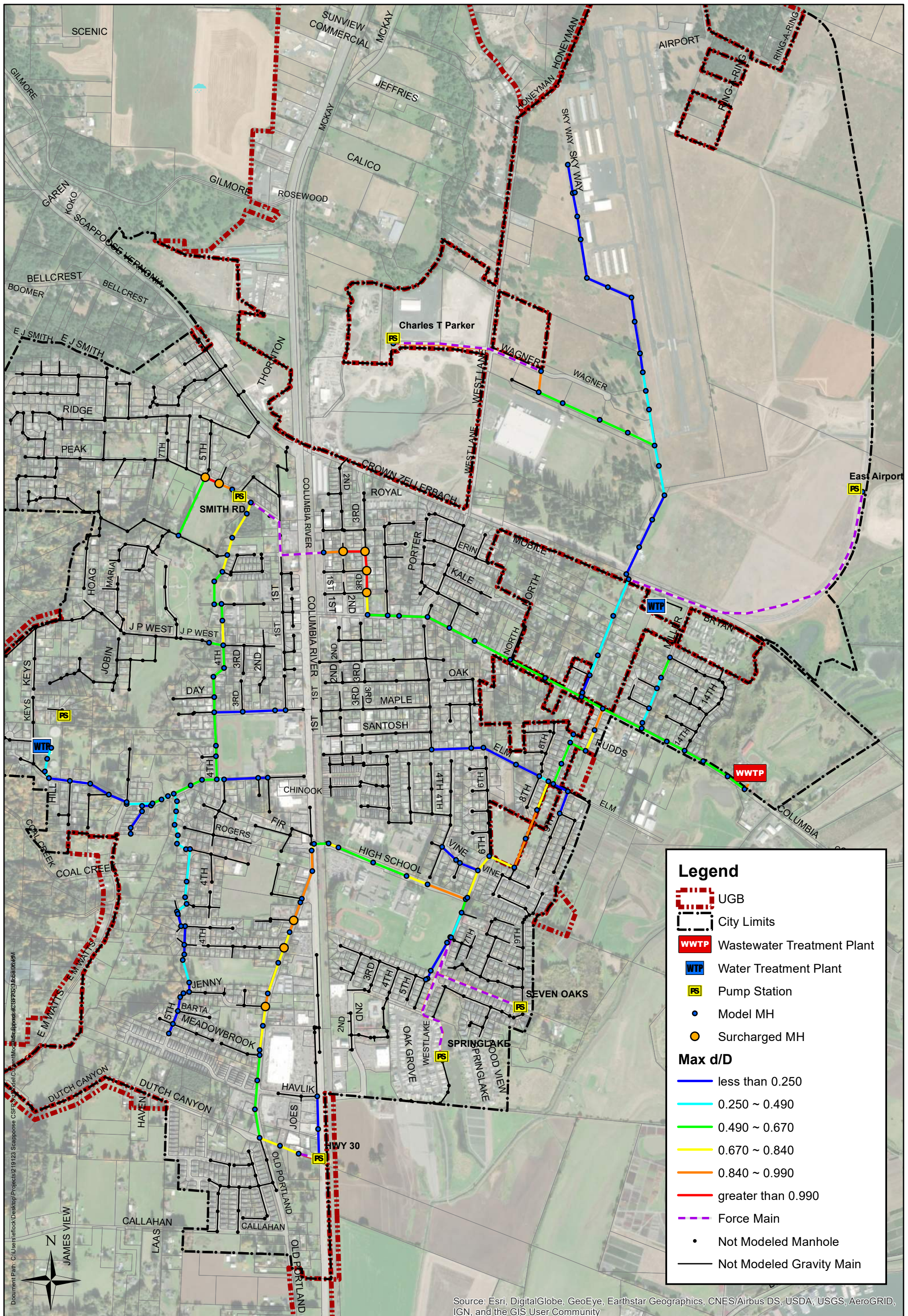
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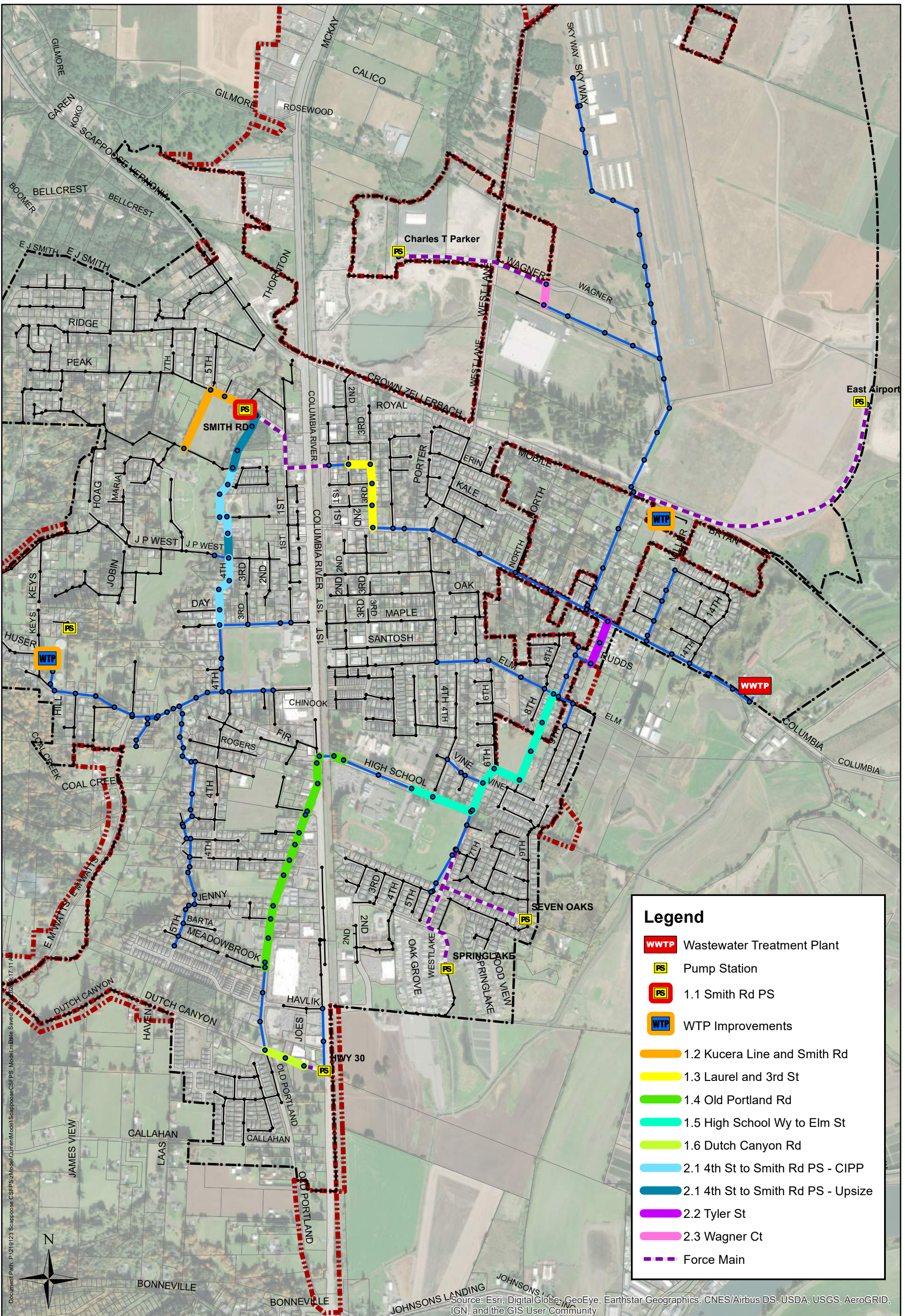
-  UGB
-  City Limits
-  Wastewater Treatment Plant
-  Water Treatment Plant
-  Modeled Pump Station
-  Existing Manhole
-  Modeled Manhole
-  Existing Gravity Main
-  Modeled Gravity Main
-  Existing Force Main
-  Modeled Force Main









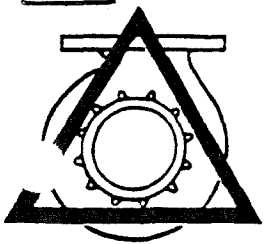




Appendix B

Pump Information

Smith Road Pump Station



52-7
225

TRIANGLE PUMP AND EQUIPMENT INC.

Equipment Approval Data

Date 7/13/99

Project Smith Rd Wastewater Pump Station/Scappoose

Customer Emerald Construction Order No _____

Engineer KCM

Equipment Ref 15140 Pumps

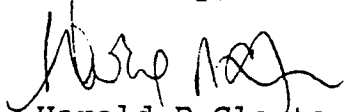
We request your approval to supply the following described equipment for the above referenced project:

Three (3) Crane Deming figure 7196, size 4 x 4 x 12 x 3, vertical, frame mounted, flexible coupled, dry pit, non clog sewage pumps with floor mounting stands, 6" x 4" suction elbows, motor mounting stands, couplings, 15 HP, 1150 RPM, 3/60/460 VAC TEFC inverter duty rated motors, factory certified tests, spare parts & start up service.

Proposed pumps will have the standard double mechanical seal (with carbon verses ceramic faces) with seal flush/lubrication system including tap from pump discharge through filter to feed stuffing box.

May we have your approval?

Cordially,


Harold R Clayton
President

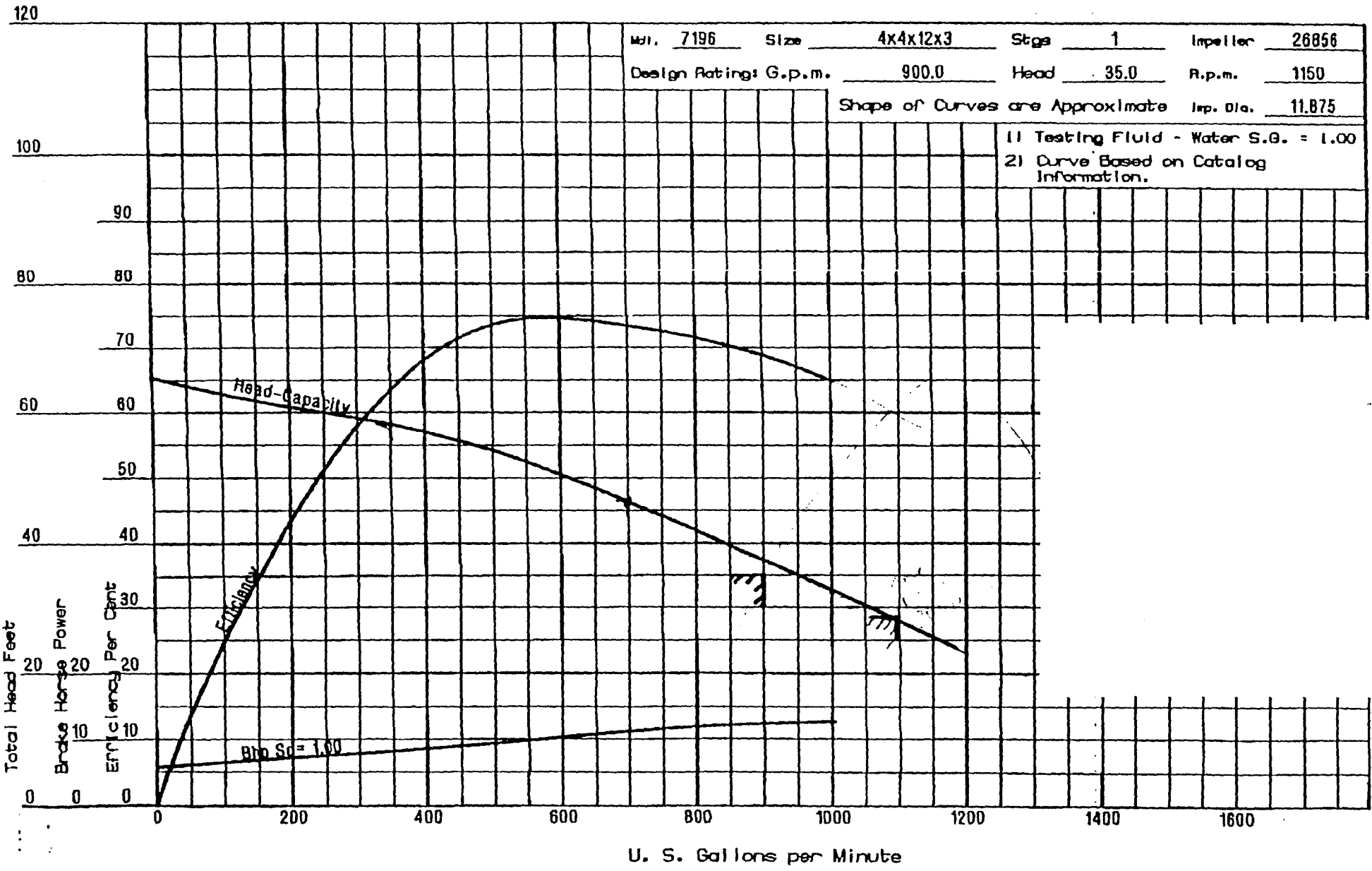
attachments

/lc

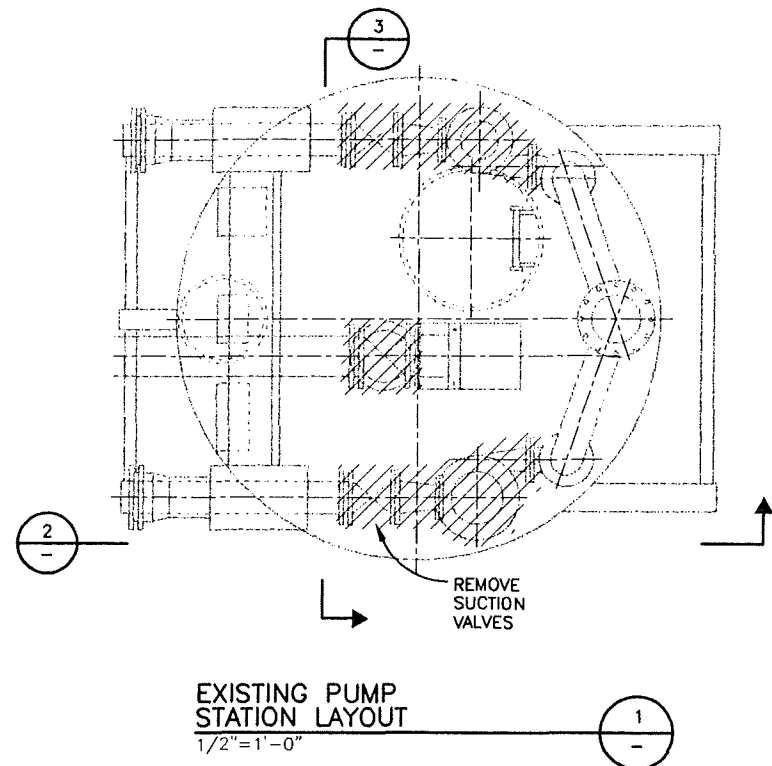
JUL 14 1999 08:31 PM CRANE DEMING PUMPS 330 337 8122 TO 15036562037 P.02/02

Eng: <u>KCM</u>	Proj: <u>SMITH RD RMP STA</u>	No:
Contr: <u>EMERSON CONST.</u>	Tag:	S.O.: <u>***</u>
Owner: <u>CITY of SHELTON</u>	Rep.: <u>TRIANGLE PUMP</u>	P.O.: <u>19398</u>

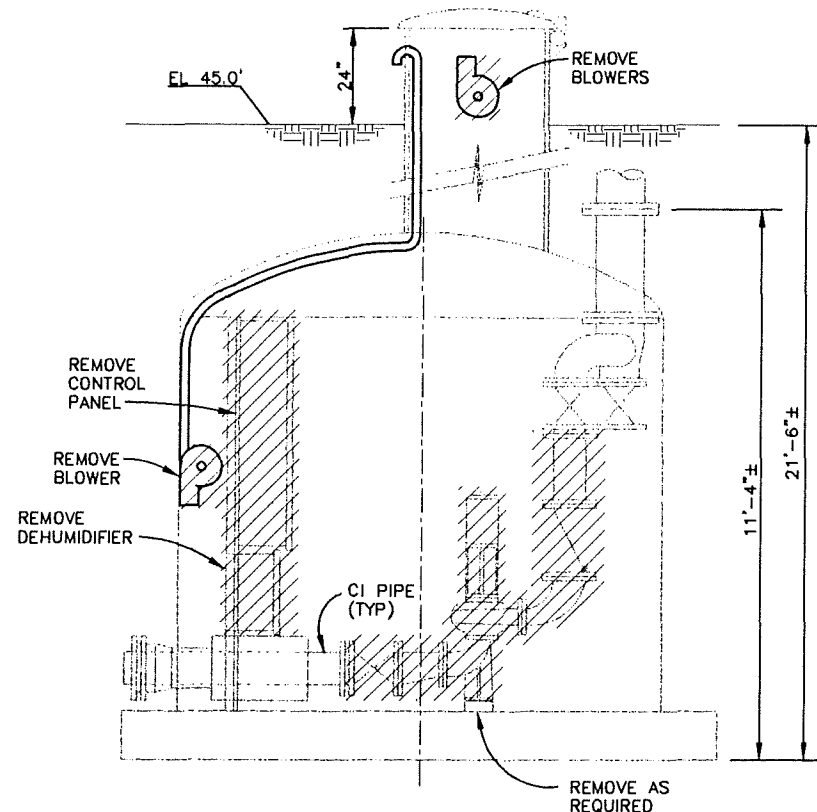
CRANE DEMING PUMP DIV.
Salem, Ohio, U.S.A.



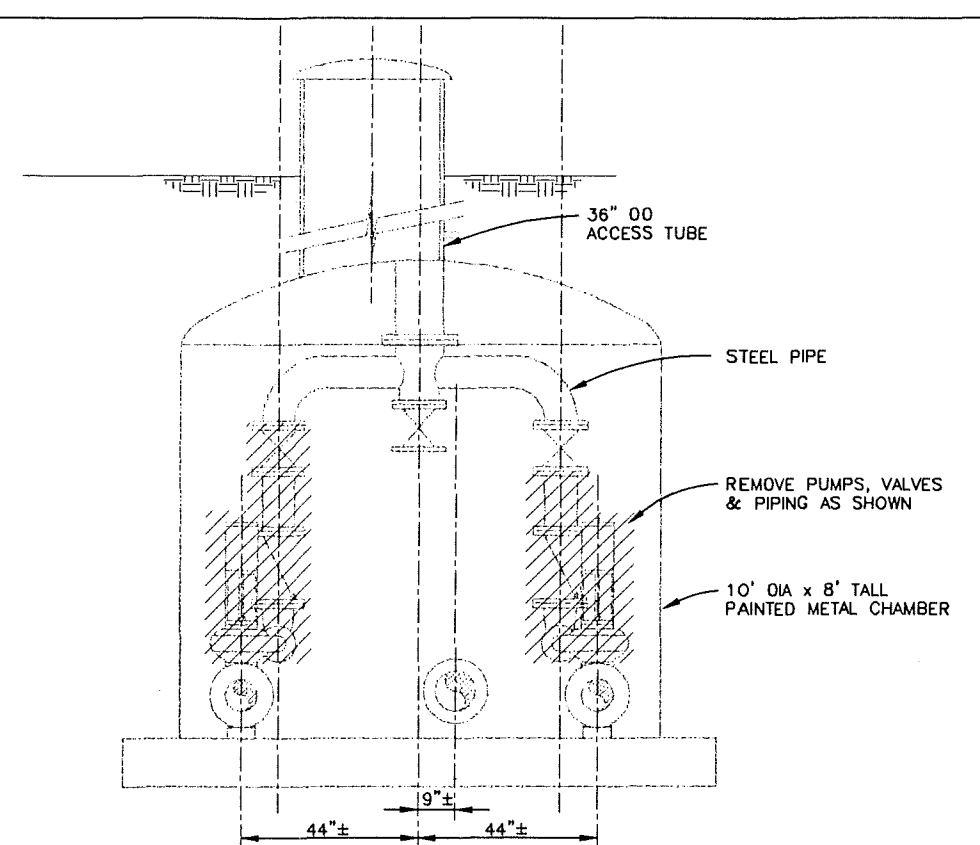
Submitted By:	Date:	Submitted: <u>***</u>	Date: <u>07/02/99</u>
---------------	-------	-----------------------	-----------------------



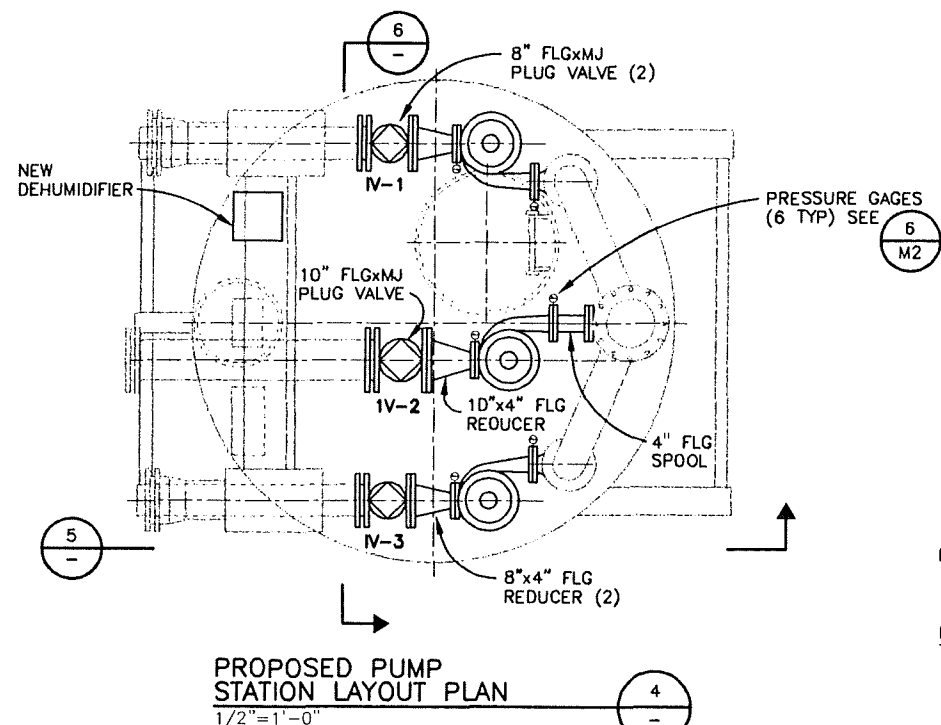
EXISTING PUMP STATION LAYOUT
1/2"=1'-0"



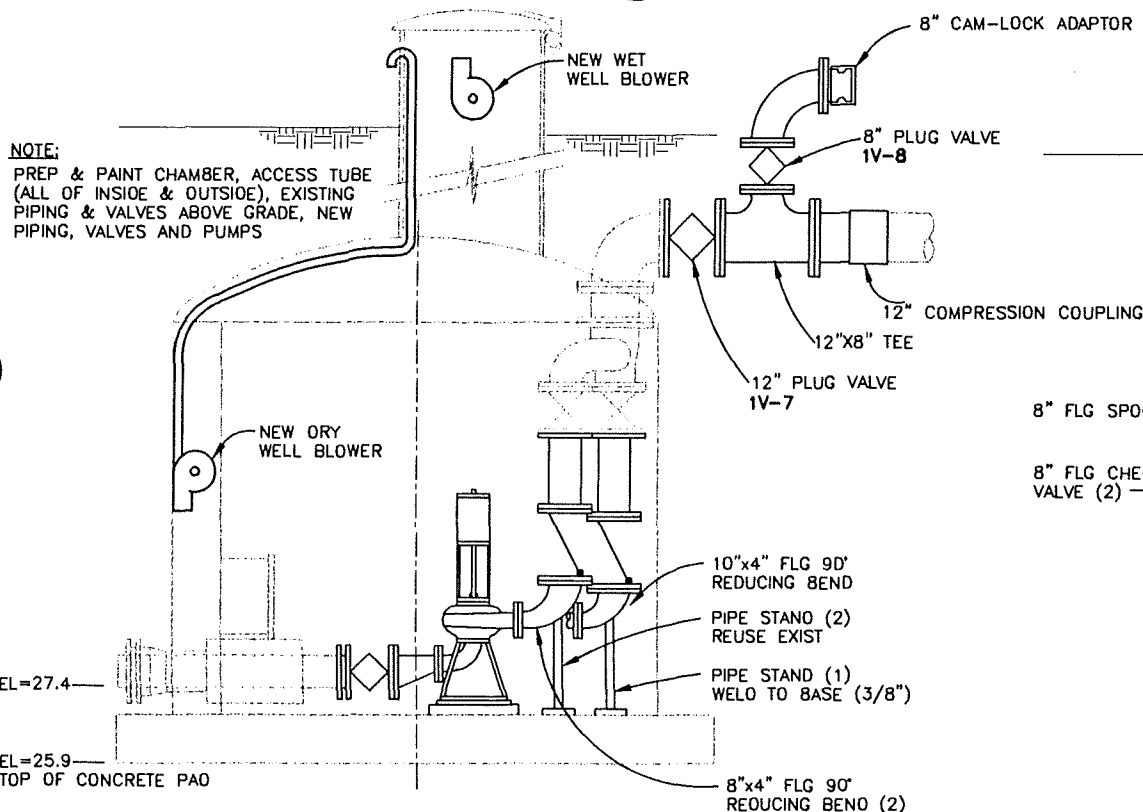
EXISTING PUMP STATION ELEVATION
1/2"=1'-0"



EXISTING PUMP STATION SECTION
1/2"=1'-0"

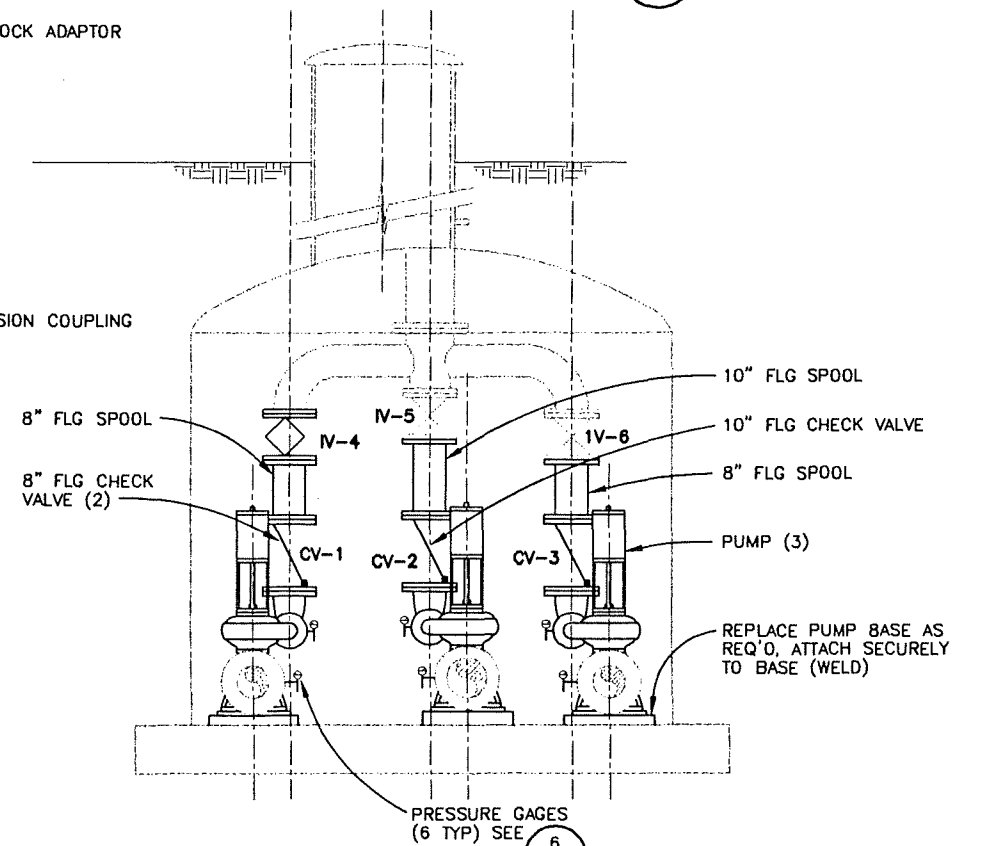


PROPOSED PUMP STATION LAYOUT
1/2"=1'-0"



NOTE:
PREP & PAINT CHAMBER, ACCESS TUBE (ALL OF INSIDE & OUTSIDE), EXISTING PIPING & VALVES ABOVE GRADE, NEW PIPING, VALVES AND PUMPS

PROPOSED PUMP STATION ELEVATION
1/2"=1'-0"



PROPOSED PUMP STATION SECTION
1/2"=1'-0"

2-20/CAD/DESIGN/M1.dwg 01-24-04/7/22/02

This drawing is full size when 22 x 34" or is reduced to half size when 11 x 17"

KCM KCM, Inc.
7080 SW Fir Loop
Portland, Oregon 97223

date	designed by
MAY 1999	drawn by
scale	checked by
AS NOTED	approved by

RECORD DRAWING
ORIGINAL DRAWING REVISED BY KCM BASED ON INFORMATION PROVIDED BY GENERAL CONSTRUCTION. KCM CANNOT VERIFY THE ACCURACY OR COMPLETENESS OF THIS INFORMATION AND SHALL NOT BE RESPONSIBLE FOR ANY ERRORS OR OMISSIONS INCORPORATED HEREIN AS A RESULT

revisions
KCM NO. 1882-D20

City of Scappoose, Oregon
SMITH ROAD
PUMP STATION

MECHANICAL
EXISTING DRY WELL PIPING MODIFICATIONS

drawing number	M1
sheet number	9 of 14

Springlake Pump Station

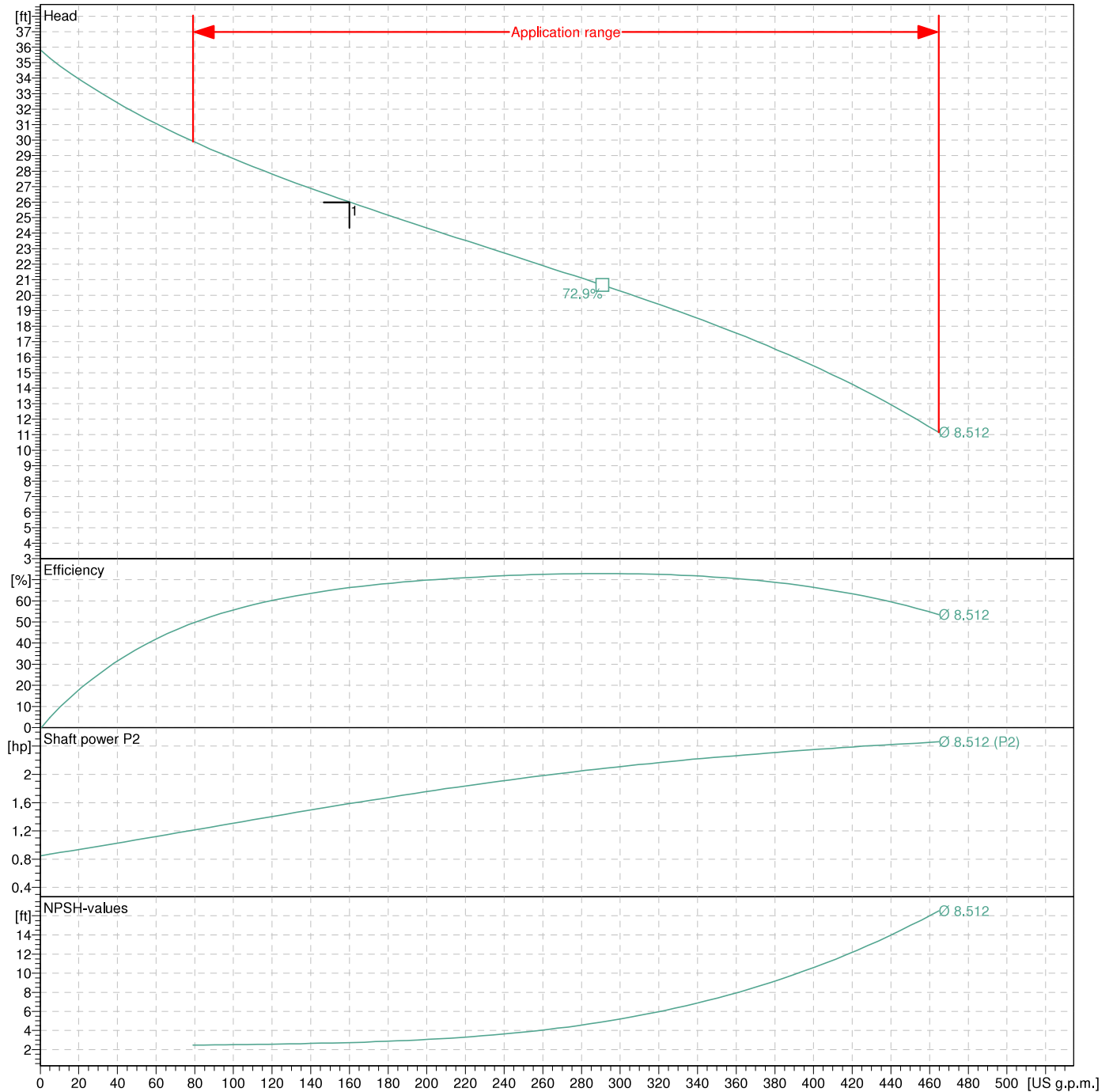


Performance curves
 Submersible sewage pump

FA 10.33E

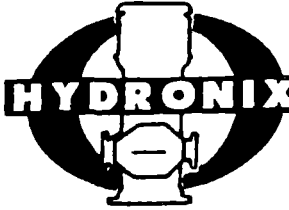
with motor
 FK 17.1-6/8KEx

Power data referred to: Water, pure [100%] ; 68 °F; 62.315lb/ft³; 1.0768E-5ft²/s
 Tolerance as per ISO 9906 / Annex A.2



Pump				Duty point data		
Impeller Ø	designed	8½	inch	Volume flow	160	US g.p.m.
Nominal speed		1140	rpm	Head	26	ft
Frequency		60	Hz	Shaft power	P ₂ 1.59	hp
Impeller type		Single-channel		Pump efficiency	66.2	%
				Power input	P ₁ 2.6	hp
Rated power		2.85	hp	Required pump NPSH	2.7	ft

Keys Landing Pump Station



HYDRONIX Inc.

2425 S. E. OCHOCO STREET

PORTLAND, OREGON 97202

503-659-6230

PUMP STATION DATA SHEET

LOCATION KEYS LANDING SERIAL NO. _____

OWNER SCAPOOSE, OR ENGINEER DAVE WINSWIP

CONTRACTOR MERRILL STROBT (INST) DISTRIBUTOR HYDRONIX

STATION TYPE 183 Wet Well 6' Dia. X 13' Deep ~~Wet Well Cover~~

DATE INSTALLED _____

PUMP

STATION

PIPING: Suction 4, Disch. 4; Suction 4, Disch. 4

CONDITIONS OF SERVICE

Design Duty: 120 GPM, 46 T.D.H., 13' Suction Lift; Liquid RAW

Solids 3", N.P.S.H. (AVL.) _____, (REQ.) _____.

PUMP DATA

Pump Model: 40MPV Imp. Dia. 9 5/32 Priming: Self, Vacuum,
 Flooded. Stuffing Box Type MFC-H, Lubrication OIL

Rotation of Pump #1 CW, #2 CW, #3 _____.

MOTOR DATA

Brand CHOICE, Enclosure ODP, Horsepower 5,

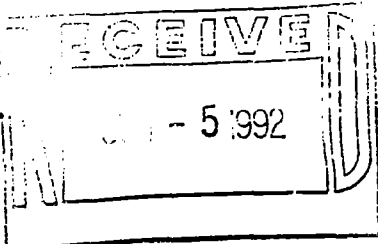
RPM 1750, Phase 3, Cycle 60, Volt 230, Starting Code _____,

Modification _____ Frame _____.

ELECTRICAL DATA

3 Phase, 60 Cycle, 230 Volts, 4 Wire, 120V Control Voltage.

Transformer Required: () YES, NO. Size _____.



QUOTATION # 91172
 Date 5-28-92 Page # 1 of 2 pages
 2425 SE Ochoco
 Portland, OR 97222
 503-659-6230 FAX 503-659-8718
 1-800-547-9708
 Project Name: Keys Landing
 Contact Person: Merrill Strobel
 Phone: H-543-2581 FAX: _____
M-936-4303

TO: Merrill Strobel Construction
 54444 Kalberer Rd.
 Scappoose, OR 97056

QTY.	DESCRIPTION	
1	<p>HYDRONIX Model 183, 4" x 4", prefabricated, hot-dipped, galvanized, surface mounted, self-priming sewage lift station with fiberglass access hoods. Installed, in the chamber, will be pumps, motors, valving, piping, control panel, and appurtenances. The equipment will be factory assembled, tested, and ready for operation, for mounting over a 7'0" diameter x 13'0" deep wet well. by others.</p> <p>MAIN CHAMBER SIZE: 78"W x 67"L x 51" high ENTRANCE: Fiberglass hinged hoods PUMPS: Hydromatic Model 40 MPV MOTORS: 5 HP, 1750 RPM V-BELT DRIVE RPM: 1750 / 1370 POWER SERVICE: 3 phase, 60 hertz, 230 volts, 4 wire PUMP CAPACITY: 120 GPM @ 46' T.D.H. CONTROLLER: Nema 1. duplex, alternating LEVEL SENSOR: Mercury float switch ALARM: Local light</p> <p>ACCESSORIES</p> <p>1. Suction pipes 6. Spare parts kit 2. 4 circuit lighting panel 7. O & M manuals 3. Duplex GFI receptacle 8. T.D. no flow limit switches 4. 60 watt drop light 9. 156 CFM blower 5. 13/15 M watt heaters</p> <p>Estimated shipping weight is 2,500 pounds Start up included</p> <p>Total Price</p>	

Above quoted price good for: 30 days
 Delivery in Approximately 6 WKS • Terms C.O.D. • FOB:Portland, Oregon FFA

THIS QUOTATION AND ANY AGREEMENT TO SELL RESULTING FROM THE QUOTATION IS SUBJECT TO HYDRONIX GENERAL TERMS AND CONDITIONS OF SALE SUBMITTED WITH THIS QUOTE. TERMS AND CONDITIONS ON BACK SIDE.

Co. Name Merrill Strobel Construction
 Accepted by: Merrill Strobel Date 6/1/92
 SIGNATURE

Hydronix, Inc.
 Proposed by: M. Wauferson
 SIGNATURE

Please print name Merrill Strobel Michael Watterson, Sales Engineer



2425 S.E. OCHOCO STREET

PORTLAND, OREGON 97222

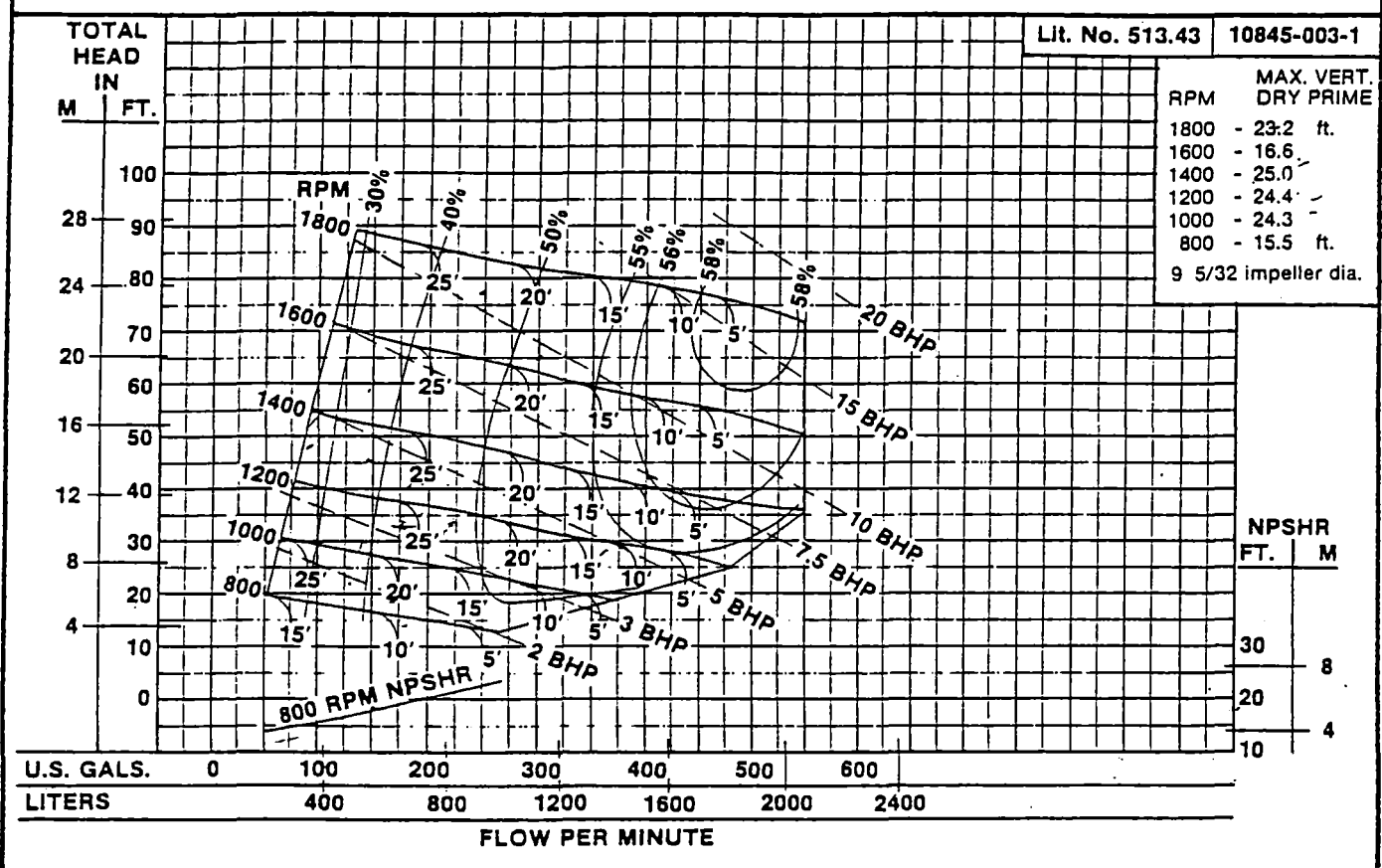
503-659-6230

HYDROMATIC PUMPS

HYDROMATIC
PUMPS

SECTION 510
PERFORMANCE DATA

MODEL: 40MPV - 40MPSFV SELF PRIMER - MAX. SOLIDS: 3" SPHERE - VAR. RPM



GPM 120

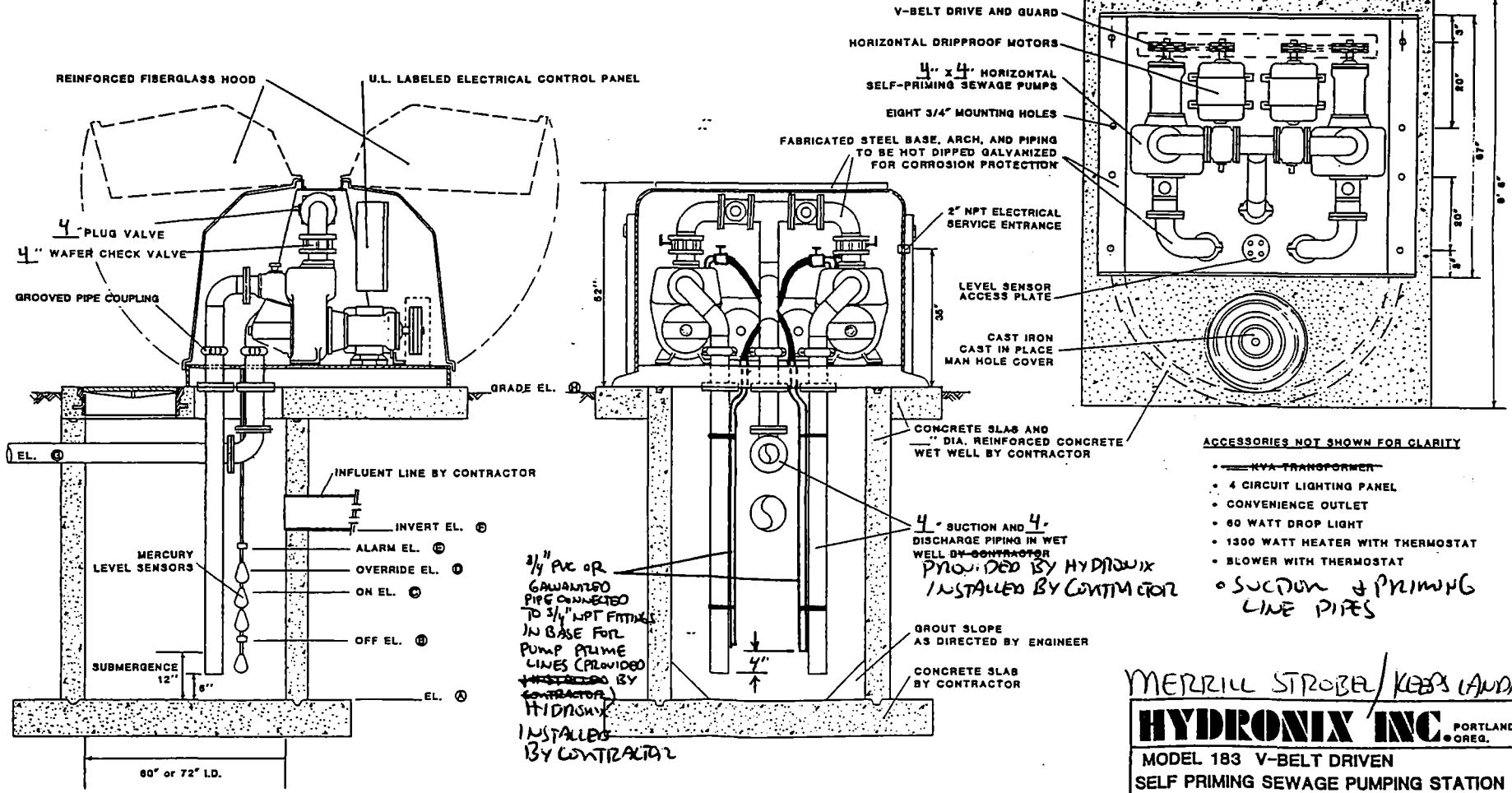
TDH 46'

EFF. 35

BHP 3.9

NPSHR 10'

STATION	G.P.M.	T.D.H.	H.P.	R.P.M.	PHASE	VOLTS	ELEVATIONS									
							A	B	C	D	E	F	G	H		
183-T	120	46	5	1370	3	230										



- ACCESSORIES NOT SHOWN FOR CLARITY**
- NVA TRANSFORMER
 - 4 CIRCUIT LIGHTING PANEL
 - CONVENIENCE OUTLET
 - 60 WATT DROP LIGHT
 - 1300 WATT HEATER WITH THERMOSTAT
 - BLOWER WITH THERMOSTAT
 - SUCTION & PRIMING LINE PIPES

3/4" PVC OR GALVANIZED PIPE CONNECTED TO 3/4" NPT FITTINGS IN BASE FOR PUMP PRIME LINES (PROVIDED BY CONTRACTOR) **HYDRONIX** **INSTALLER BY CONTRACTOR**

4" SUCTION AND 4" DISCHARGE PIPING IN WET WELL BY CONTRACTOR **PROVIDED BY HYDRONIX** **INSTALLER BY CONTRACTOR**

MERRILL STROBE/KEESLAND

HYDRONIX INC PORTLAND, OREG.

MODEL 183 V-BELT DRIVEN SELF PRIMING SEWAGE PUMPING STATION

DATE: 2/83	DWG. BY: JWR
SCALE: NONE	REVISIONS: DWG# 31-01-3604

Highway 30 Pump Station

Pump Station Data Sheet

Location: Scappoose, Oregon

Serial No. 48698

Owner: City of Scappoose

Engineer: _____

Contractor: Clearwater Construction

Distributor: Hydronix, Inc.

Station Type 183 Wet Well 8' Dia. x 19' Deep Wet Well Cover

Date Installed June, 1996

Pump

Station

Piping: Suction 4", Disch. 4"; Suction 4", Disch. 4"

Conditions of Service

Design Duty: 300 GPM, 42' TDH, Suction Lift; Liquid Sewage

Solids 3", NPSH (avl) _____, (req) _____.

Driven RPM 1400

Sheave 4.75x2 Groove, Bushing SH 1-3/8, Belt 3VX475

Pump Data:

Serial No.: _____

Pump Model: 40MP, Imp. Dia. 9-5/32" Priming: (X)self, ()vacuum

()flooded. Stuffing Box Type _____, Lubrication: Media

Rotation of Pump #1 CW, #2 CW, #3 _____.

Motor Data

Brand Baldor, Enclosure ODP, Horsepower 7.5
RPM 1800, Phase 3, Cycle 60, Volt 230, Starting Code
Modification , Frame 213T
Sheave 3V6.0x2 Groove, Bushing SH 1-1/2, Belt 3VX475

Electrical Data

Phase 3, Cycle 60, Volts 230, Wire 4, Control Voltage 120
Transformer Required: (X)Yes, () No. Size E180-3PB

Control Panel

Location Inside Station NEMA Type 4

Service Entrance Size ___ Amps	<u>Pump #1</u>	<u>Pump #2</u>	<u>Pump #3</u>
Circuit Breaker-Trip Rating/AMPS	<u>30</u>	<u>30</u>	<u></u>
Magnetic Starter-NEMA size	<u>1</u>	<u>1</u>	<u></u>
Overload Heater size	<u>2013B-3</u>	<u>2013B-3</u>	<u></u>

Alternator Type 67C-1COA Mfg Warrick Coil Voltage 110

Alarm Functions: Pump 1 & 2 fail, High wet well, Compressor fail

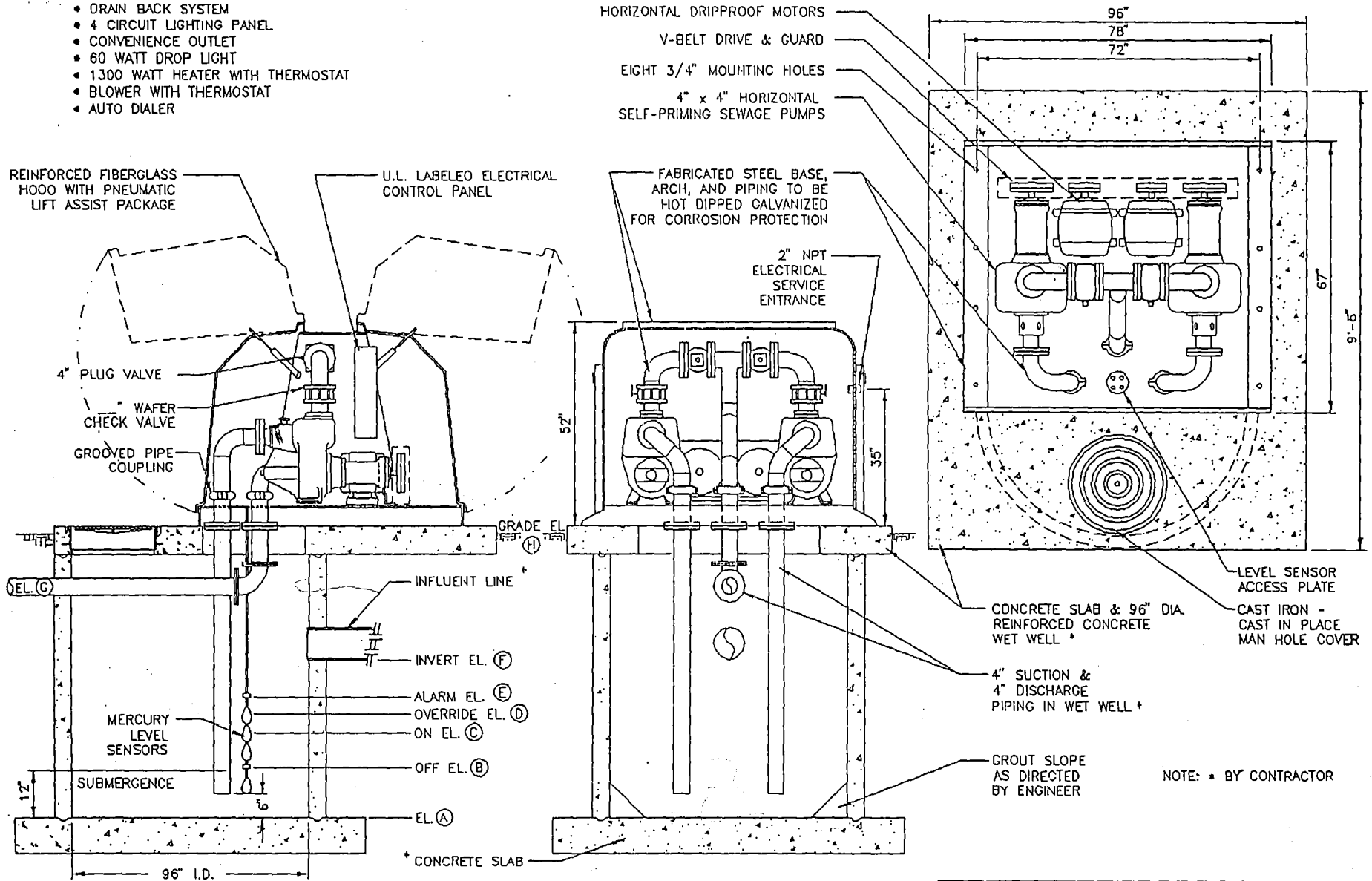
Level Control: Intrinsically Safe Floats

Elevations:

Ground Level	<u>46.6</u>	Low Water	<u></u>
Station Disch.	<u>42.0</u>	Pump Off	<u>28.5</u>
Station Floor	<u>26.0</u>	Lead Pump On	<u>33.45</u>
WW Invert	<u>34.45</u>	2 Pump Overload	<u>33.95</u>
WW Floor	<u></u>	High Water	<u>34.45</u>

ACCESSORIES NOT SHOWN FOR CLARITY

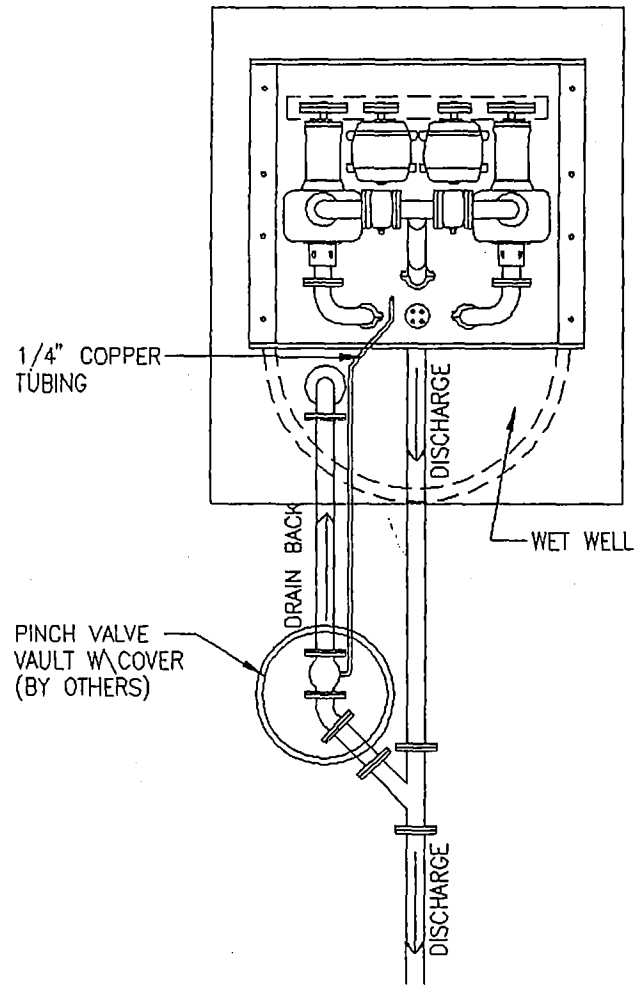
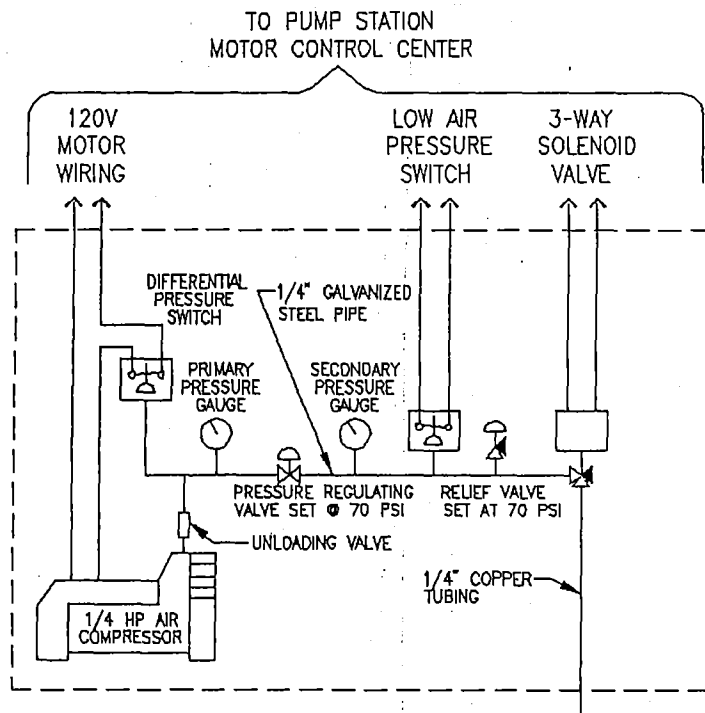
- DRAIN BACK SYSTEM
- 4 CIRCUIT LIGHTING PANEL
- CONVENIENCE OUTLET
- 60 WATT DROP LIGHT
- 1300 WATT HEATER WITH THERMOSTAT
- BLOWER WITH THERMOSTAT
- AUTO DIALER



SCALES & DIMENSIONS ARE FOR REFERENCE ONLY, DRAWINGS MUST BE CERTIFIED CORRECT FOR CONSTRUCTION PURPOSES

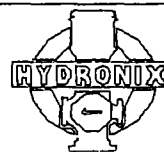
STATION	G.P.M.	T.D.H.	H.P.	R.P.M.	PHASE	VOLTS	ELEVATIONS							
							A	B	C	D	E	F	G	H
183	300	42	7.5	1400	3	230	26.00	28.5	33.45	39.95	45	4	46.0	

	SCAPOOSE FRED MEYER SEWAGE PUMP STATION SCAPOOSE, OREGON		
	MODEL # 183-017	Des By MW	Date 2-5-96
	DWG # 183-017	Drri By BT	Job # 48698
	1	Rev. v	Dat X

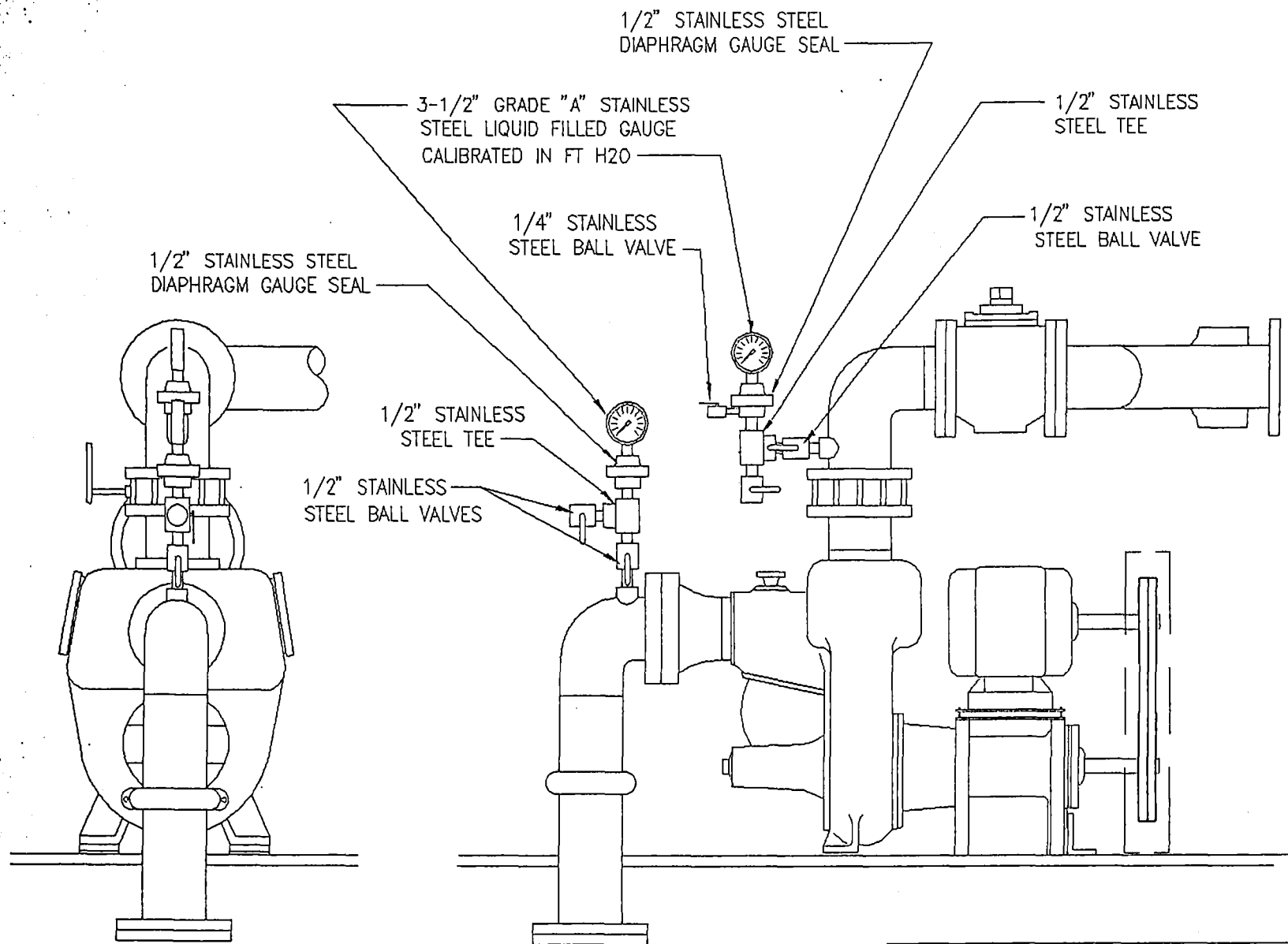


H2S DRAINBACK CONTROL SCHEMATIC

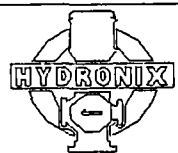
H2S TREATMENT
DRAINBACK SYSTEM



JOB #	N/A	DATE	3-10-95
Des By	MW	Dwg #	DEQ-0002
Drn By	SM	Sheet	1 of 1
Chk By	MW	Rev: 1	2-5-96 Chk: MW



SUCTION AND DISCHARGE GAUGE KIT



JOB #	N/A	DATE	9-13-95
Des By	MW	Dwg #	DEQ-0007
Drn By	SM	Sheet	1 of 1
Chk By	MW	Rev: 1	2-5-96 Chk: MW

MODEL: 40MPV - 40MPSFV SELF PRIMER - MAX. SOLIDS: 3" SPHERE - VAR. RPM

TOTAL HEAD
IN
M | FT.

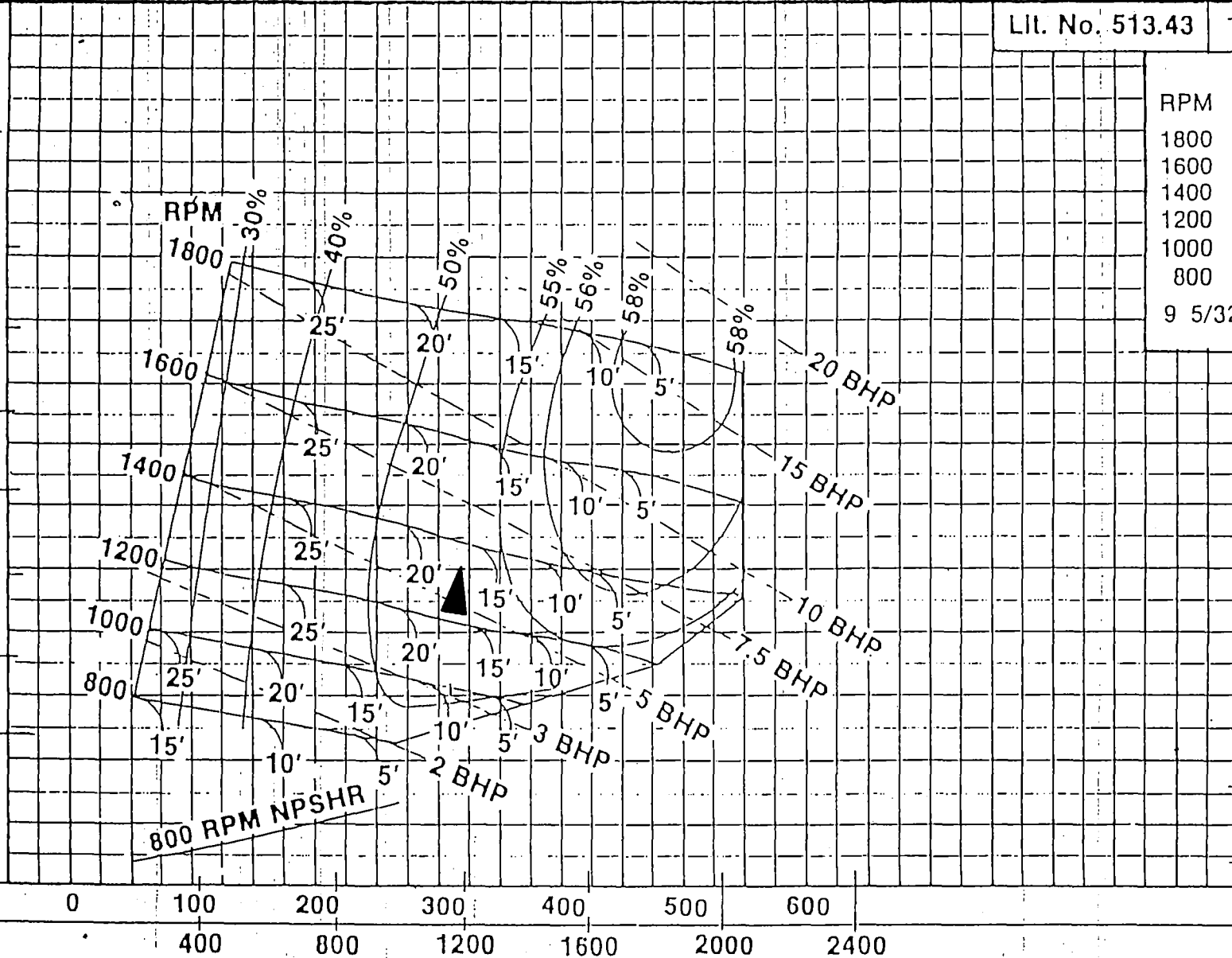
100
28 90
24 80
20 70
16 60
12 50
8 40
4 30
0 20
10
0

Lit. No. 513.43

10845-003-1

RPM	MAX. VERT. DRY PRIME
1800	- 23.2 ft.
1600	- 16.6
1400	- 25.0
1200	- 24.4
1000	- 24.3
800	- 15.5 ft.

9 5/32 impeller dia.



NPSHR	
FT.	M
30	8
20	4
10	

U.S. GALS.
LITERS

0 100 200 300 400 500 600
400 800 1200 1600 2000 2400

FLOW PER MINUTE

Seven Oaks Pump Station

Pump Station Data Sheet

Location: Scappoose, Oregon

Serial No. 48526

Owner: City of Scappoose

Engineer: Koss-Brod-Goodrich & Assoc.

Contractor: Bones Construction

Distributor: Hydronix

Station Type 183 Wet Well 84 Dia. x 16' Deep Wet Well Cover

Date Installed 4/96

Pump

Station

Piping: Suction 4", Disch. 4"; Suction 4", Disch. 4"

Conditions of Service

Design Duty: 150GPM, 45 TDH, Suction Lift; Liquid Sewage

Solids 3", NPSH (avl) _____, (req) _____.

Driven RPM 1350

Sheave 3V5.3x2 Gr., Bushing SH 1-1/2, Belt 3VX400

Pump Data:

Serial No.: _____

Pump Model: 40MP, Imp. Dia. 9 5/32 Priming: (X)self, ()vacuum

()flooded. Stuffing Box Type _____, Lubrication: Media

Rotation of Pump #1 CW, #2 CW, #3 _____.

Motor Data

Brand Baldor, Enclosure ODP, Horsepower 7.5

RPM 1750, Phase 3, Cycle 60, Volt 230, Starting Code

Modification , Frame

Sheave 3V4.12x2 Gr., Bushing SH 1 3/8, Belt 3VX400

Electrical Data

Phase 3, Cycle 60, Volts 230, Wire 4, Control Voltage 120

Transformer Required: () Yes, () No. Size E180-3PB

Control Panel

Location Inside Station NEMA Type 1

Service Entrance Size <u> </u> Amps	<u>Pump #1</u>	<u>Pump #2</u>
Circuit Breaker-Trip Rating/AMPS	<u>50</u>	<u>50</u>
Magnetic Starter-NEMA size	<u>AE16FNSOAC</u>	<u>AE16FNSOAC</u>
Overload Heater size	<u>H2013B-3</u>	<u>H2013B-3</u>

Alternator Type 67C1COA Mfg Warrick Coil Voltage

Alarm Functions: Controlled by CB-4 AutoDialer

Level Control: Mercury Float Switches

Elevations:

Ground Level <u>13.91</u>	Low Water <u> </u>
Station Disch. <u>8.91</u>	Pump Off <u>-0.5</u>
Station Floor <u>-3.0</u>	Lead Pump On <u>3.07</u>
WW Invert <u>4.56</u>	2 Pump Overload <u>3.57</u>
WW Floor <u> </u>	High Water <u>4.07</u>
	OVERFLOW <u>10.96</u>

Station Options

(X) 1500 Watt Heater, (X) Station Blower, () Wet Well Blower, () P.P.D.
Dehumidifier, (X) Station Light, (X) Trouble Light, () Vacuum Pumps,
(X) Convenience Outlet, () KVA Transformer, () Sump Pump,
() Ladder, (X) Elapsed Time Meters, () VDC Battery and Charger,
(X) Light/Horn/Bell/Dim Glow Alarm, () Dry Alarm Contacts,
() Telemetry Included/By Others, (X) Air Compressor, (X) Pinch Valve,
(X) 4 O&M Manual, (X) Spare Parts Kit.

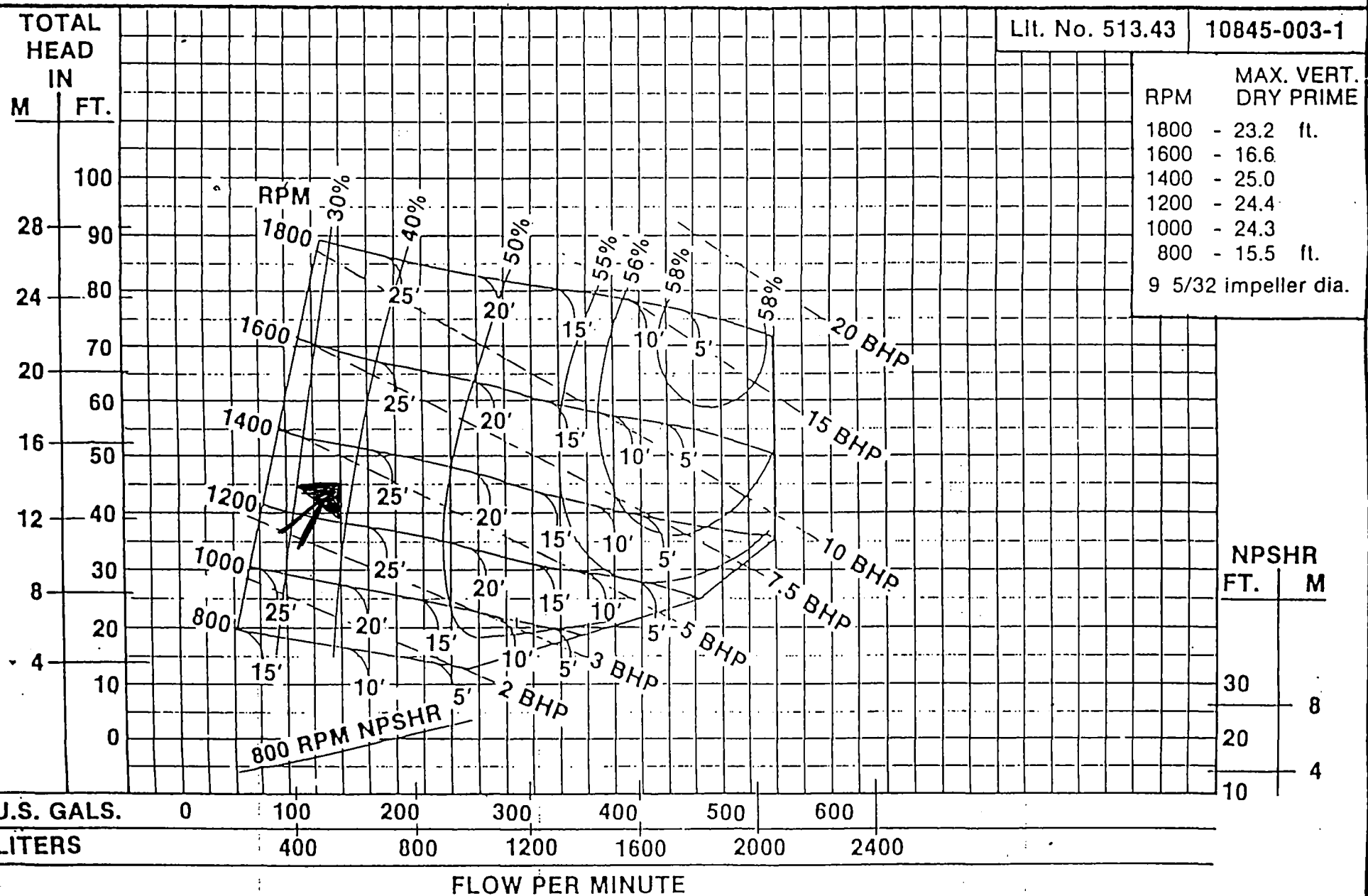
Notes: System has DEQ approved 4" Pinch Valve on discharge line

Application Engineering

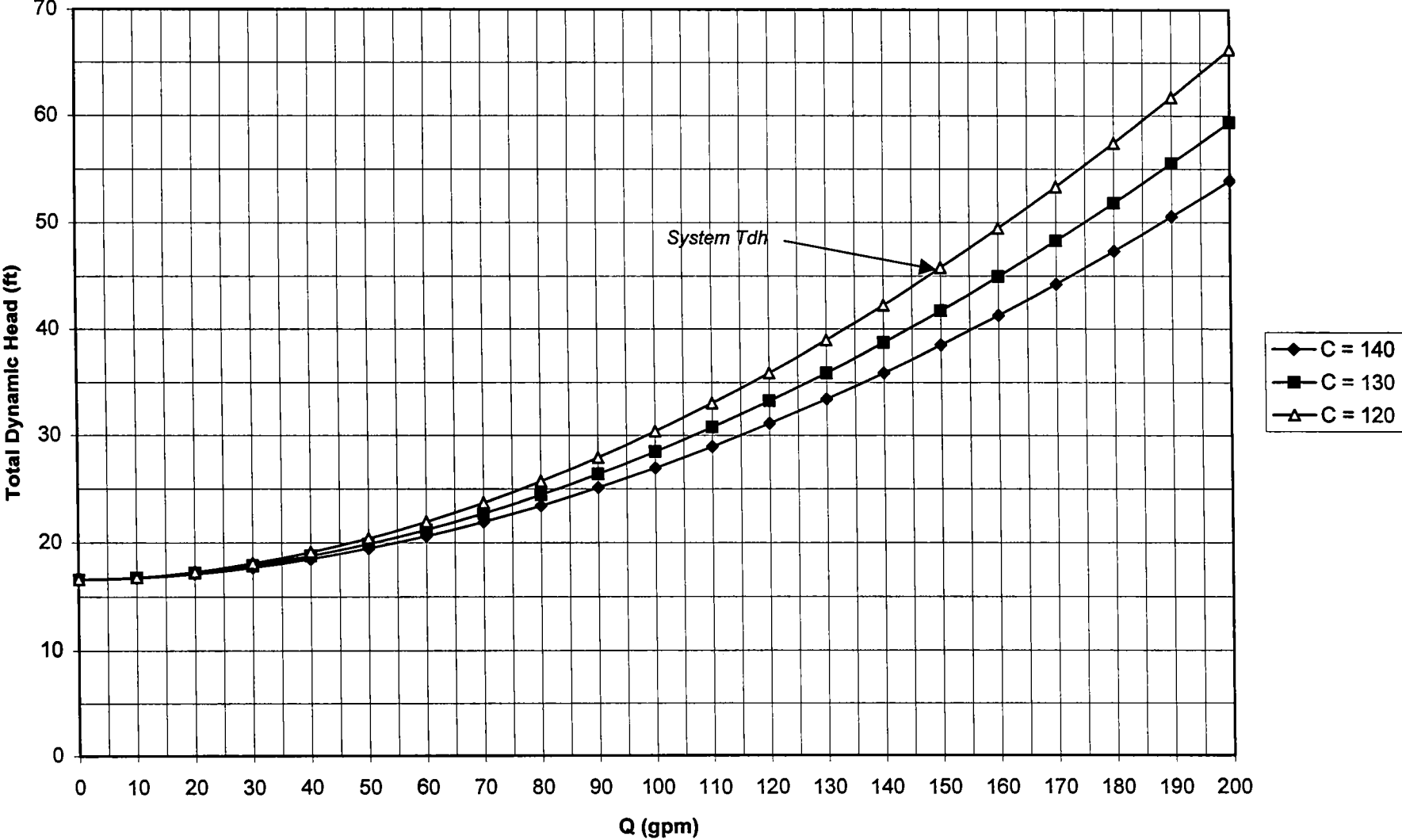
Prepared By Butch Kline Date 4/22/96

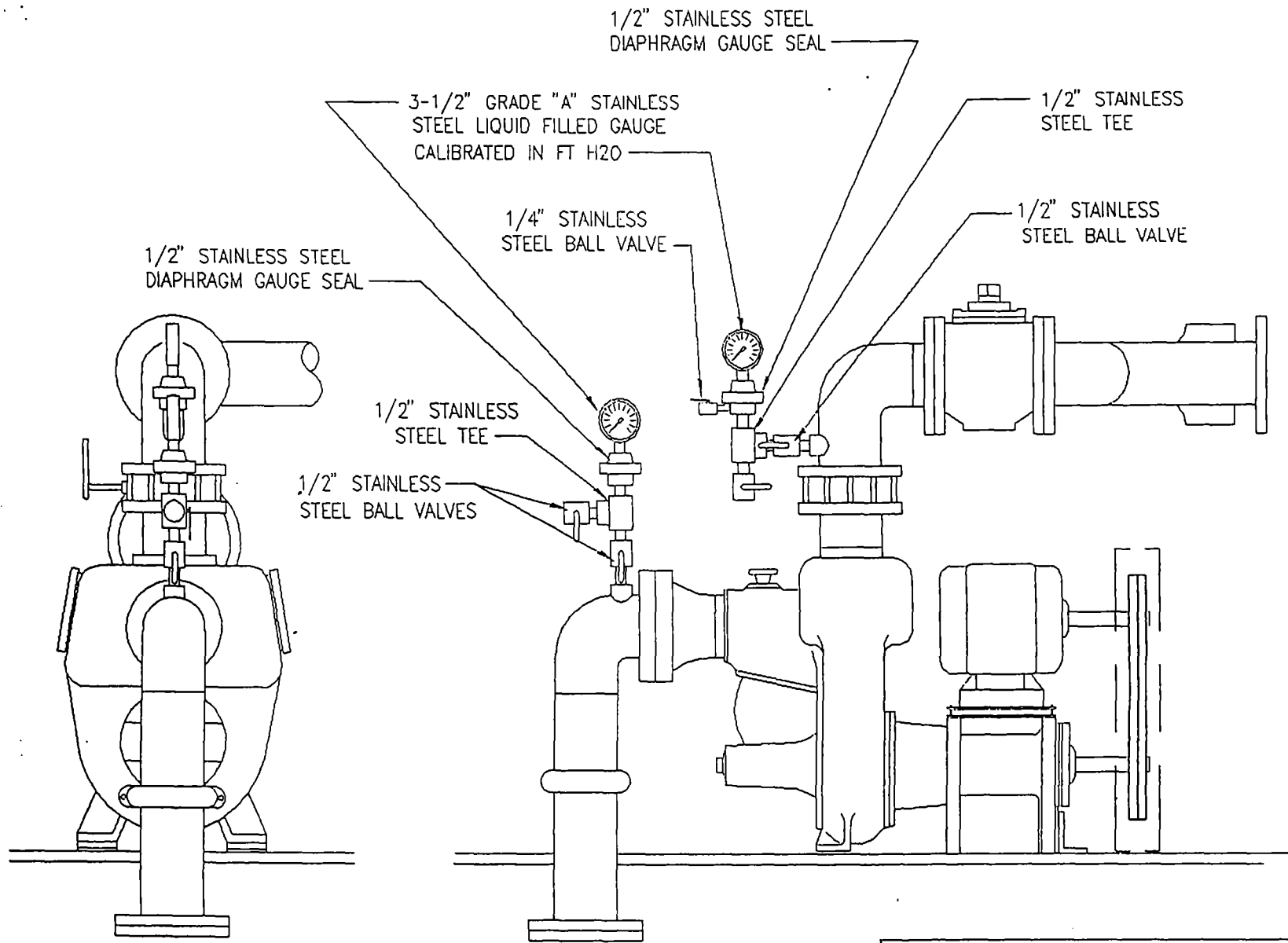
145 G.P.M. @ 45 T.D.H.

MODEL: 40MPV - ~~70MPSEV~~ SELF PRIMER - MAX. SOLIDS: 3" SPHERE - VAR. RPM



System Curves for Varies C Values





SUCTION AND DISCHARGE GAUGE KIT



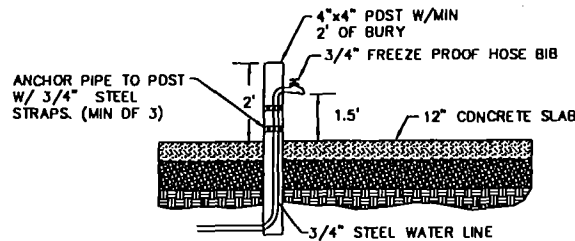
JOB #	N/A	DATE	9-13-95
Des By	MW	Dwg #	DEQ-007
Drn By	SM	Sheet	1
Chk By	MW	Rev: 1	2-5-96 Chk: MW

CONTROL PANEL NOTES:

- ALL ELECTRICAL INSTALLATIONS WILL BE IN CONFORMANCE WITH THE NATIONAL ELECTRICAL CODE AND STATE AND LOCAL REQUIREMENTS.
- ELECTRIC COMPONENTS SHOULD BE SIZED TO ACCOMMODATE ACTUAL HORSEPOWER REQUIREMENTS. CLEARLY LABEL ALL CONTACTS AND COMPONENTS.
- THE ELECTRICAL CONTROL PANEL ENCLOSURE SHALL BE NEMA 4DUR WITH MATERIAL BEING FIBERGLASS TO PREVENT PREMATURE CORROSION.
- THE PANEL WILL CONTAIN TWO CIRCUIT BREAKERS (ONE FOR EACH PUMP), ELECTRIC ALTERNATOR, CONTROL POWER TRANSFORMER, TERMINAL STRIP FOR CONNECTING FOUR (4) FLOAT SWITCHES, REMOTE ALARM AND TELEMETRY HOUR METERS FOR EACH PUMP EXTERNAL FLASHING ALARM LIGHT TO BE LOCATED ON OUTSIDE ON ELECTRICAL PANEL.
- ALARM SYSTEM SHALL INCLUDE A SILENCING RESET ON THE PANEL.
- THE PANEL SHALL HAVE A LOCKABLE DEAD FRONT DOOR WITH RUN LIGHTS AND H.O.A. SWITCHES INSIDE FOR EASY OPERATION.
- PROVIDE CONNECTION FOR PORTABLE GENERATOR.
- PUMP CONTROL SYSTEM SHALL BE FLOATS UNLESS OTHERWISE APPROVED BY CITY OF SCAPPOOSE.

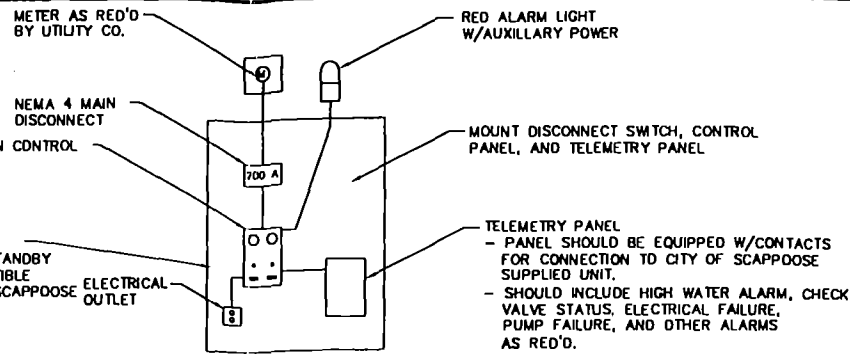
NOTES:

- ALL ELECTRICAL INSTALLATIONS WILL BE IN CONFORMANCE WITH THE NATIONAL ELECTRICAL CODE AND STATE AND LOCAL REQUIREMENTS. ELECTRICAL COMPONENTS SHOULD BE SIZED TO ACCOMMODATE ACTUAL HORSEPOWER REQUIREMENTS.
- CLEARLY LABEL ALL CONTACTS AND COMPONENTS



WATER SERVICE
N.T.S.

INSTALL ELECTRICAL CONNECTION FOR STANDBY GENERATOR COMPATIBLE WITH THE CITY OF SCAPPOOSE EQUIPMENT.



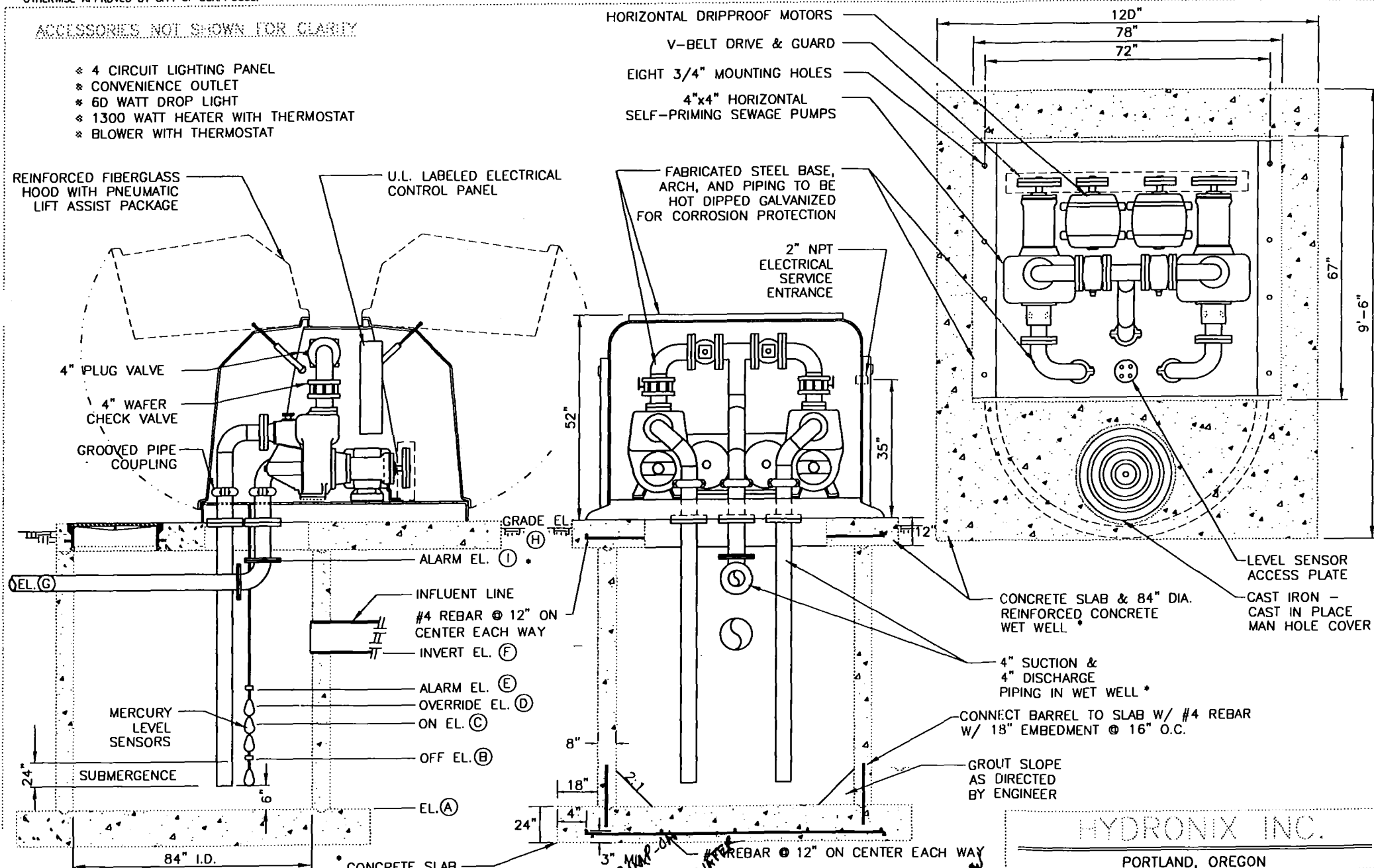
CONTROL PANEL
N.T.S.

PUMP STATION NOTES:

- THE CONTRACTOR SHALL FURNISH AND INSTALL TWO SURFACE MOUNTED SELF PRIMING SEWAGE PUMPS AS INDICATED ON THE DRAWINGS AND SPECIFIED HEREIN. PUMP SYSTEM SHALL BE SUPPLIED BY HYDRONIX PUMP SERVICE OR APPROVED EQUAL.
- PUMP DESIGN: THE PUMPS SHALL BE V-BELT DRIVEN SELF PRIMING SEWAGE PUMPS FOR SURFACE MOUNTED INSTALLATION.
- THE PUMP MOTOR SHALL BE HOUSED IN AN AIR-FILLED WATER-TIGHT CASING WITH CLASS F INSULATION AND A 1.20 SERVICE FACTOR. BUILT IN MOTOR PROTECTION SHALL CONSIST OF ONE BY METALLIC MICRO SWITCH IN EACH PHASE OF THE WINDING. MOTORS SHALL BE NON-OVERLOADING THROUGHOUT THE ENTIRE PUMP OPERATING RANGE. THE MOTOR MUST BE SUITABLE FOR USE IN CLASS I, DIVISION 1, GROUPS C&D AREAS. OIL FILLED MOTORS SHALL NOT BE CONSIDERED EQUAL OR ACCEPTABLE.
- ALL CABLE ENTRY JUNCTION BOXES SHALL BE SEPARATED FROM THE MOTOR BY A TERMINAL BOARD AND THE CABLE ENTRY WATER SEAL SHALL NOT REQUIRE EPDM'S, SILICONES, OR OTHER SECONDARY SEALING SYSTEMS.
- SYSTEM REQUIREMENTS: EACH PUMP SHALL HAVE THE FOLLOWING CHARACTERISTICS:
CAPACITY 150 (GPM) ^{100-130 (FT)} _{38 (FT)}
- PUMP WARRANTY: THE PUMPS ARE TO HAVE A ONE-YEAR NON-PRORATED WARRANTY WHICH COVERS DEFECTS IN MATERIALS AND WORKMANSHIP.
- SEE ATTACHED SPECIFICATION PACKET FOR MORE INFORMATION.
- PIPING AROUND STRUCTURES AND MACHINERY SHOULD BE D.I. PIPE. PVC IS NOT ACCEPTABLE.
- A DELAY TIMER WILL BE SET TO OPEN THE PINCH VALVE ON THE DRAIN BACK LINE. THE TIME WILL BE CHANGEABLE BY THE CITY WITH A 30 MINUTE MAXIMUM TIME.
- THE DISCHARGE MANHOLE WILL BE COATED WITH A LINER TO PROTECT FROM DAMAGE FROM HYDROGEN SULFIDE.
- A 12' WIDE GRAVEL ROAD ALONG THE FUTURE RIGHT-OF-WAY WILL PROVIDE ALL-WEATHER ACCESS TO THE PUMP STATION UNTIL PHASE II HAS BEEN COMPLETED.
- PRESSURE GAGES WILL BE PROVIDED ON THE SUCTION AND DISCHARGE SIDE OF THE EACH PUMP WITH THE APPROPRIATE VALVING TO ISOLATE EACH GAGE.
- THE WETWELL NEEDS TO BE PLACED ON 12" OF 3/4"-D CRUSHED ROCK COMPACTED TO 95% OF AASHTO T-100. AND THE WETWELL WILL BE BACKFILLED WITH 3/4"-D CRUSHED ROCK.
- PROVIDE A POWER METER, MAIN DISCONNECT AND MANUAL TRANSFER SWITCH.
- EQUIP LIFT STATION WITH A 60W CAGE LIGHT ON BOTH SIDES OF THE CENTRAL SUPPORT, A 1300W HEATER AND A DUAL WEATHER PROOF DUPLEX OUTLET.
- BASE OF WETWELL WILL BE TIED TO SIDES OF WETWELL WITH #4 REBAR AT 12" ON CENTER. TO KEEP THE BASE FROM SEPERATING FOR THE SIDES.

ACCESSORIES NOT SHOWN FOR CLARITY

- 4 CIRCUIT LIGHTING PANEL
- CONVENIENCE OUTLET
- 60 WATT DROP LIGHT
- 1300 WATT HEATER WITH THERMOSTAT
- BLOWER WITH THERMOSTAT



SCALES & DIMENSIONS ARE FOR REFERENCE ONLY. DRAWINGS MUST BE CERTIFIED CORRECT FOR CONSTRUCTION PURPOSES

STATION	G.P.M.	T.D.H.	H.P.	R.P.M.	PHASE	VOLTS	A	B	C	D	E	F	G	H	I
7 OAKS	150	45	7.5	1300	3Ø	120-240	-3.00	-0.50	3.07	3.57	4.07	4.56	8.91	13.91	10.96

HYDRONIX INC.
PORTLAND, OREGON
MODEL 183 V-BELT DRIVEN SELF PRIMING SEWAGE PUMPING STATION
SCALE: N.T.S. DRAWING NUMBER: 183V01.DWG

MNWRP
PLANNERS ENGINEERS LANDSCAPE ARCHITECTS
233 SW FRONT PORTLAND, OR 97204
503|225|0822
503|273|8353

REGISTERED PROFESSIONAL ENGINEER 15,190
OREGON OCT 2, 1999
DAREN MARK WELBORN

SEVEN OAKS SUBMERSION PUMP STATION DETAILS
KOSS-BROD-GOODRICH AND ASSOCIATES
22586 DAY RD. WEST LINN, OREGON 97068

REV.	DATE	BY
1	11/1/95	SR

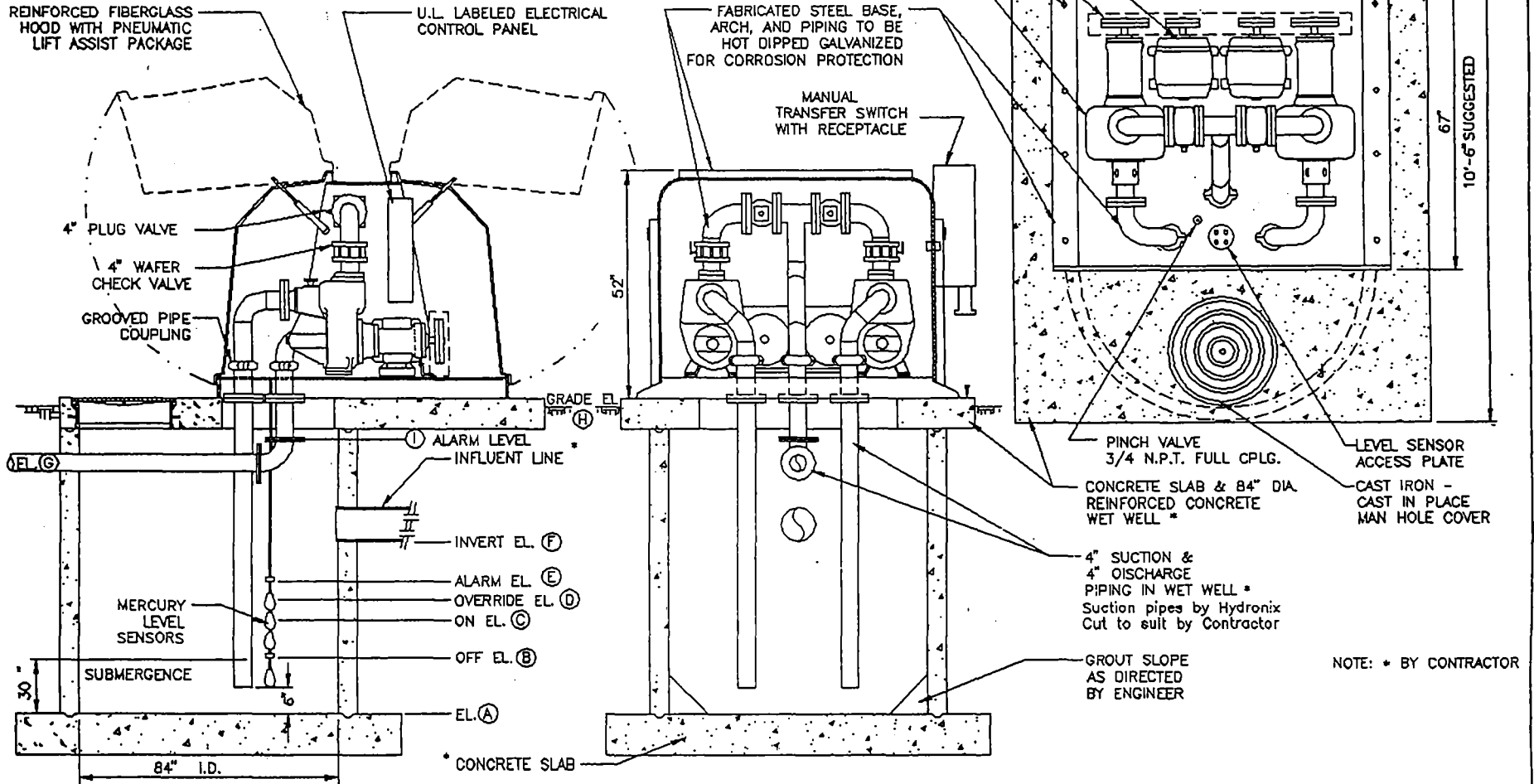
PROJECT NO. **KBG001**
DATE 10/19/95
DESIGNED: K. ACKERMAN
ENGINEER: D. WELBORN
CHECKED: J. REIMANN

SHEET TITLE: **DETAILS**
SHEET NUMBER: **C13A**

ACCESSORIES NOT SHOWN FOR CLARITY

- TRANSFER SWITCH W/ RECEPTACLE
- 6 CIRCUIT LIGHTING PANEL
- CONVENIENCE OUTLET
- 60 WATT DROP LIGHT
- 1300 WATT HEATER WITH THERMOSTAT
- BLOWER WITH THERMOSTAT
- 4" PINCH VALVE W/ADJ. TIMER
- AUTO-DIALER
- EXTRA ALARM FLOAT
- SUCTION AND DISCH. GAGES W/STOP CLOCK
- TWO CAGED STATION LIGHTS
- GFCI DUPLEX OUTLET

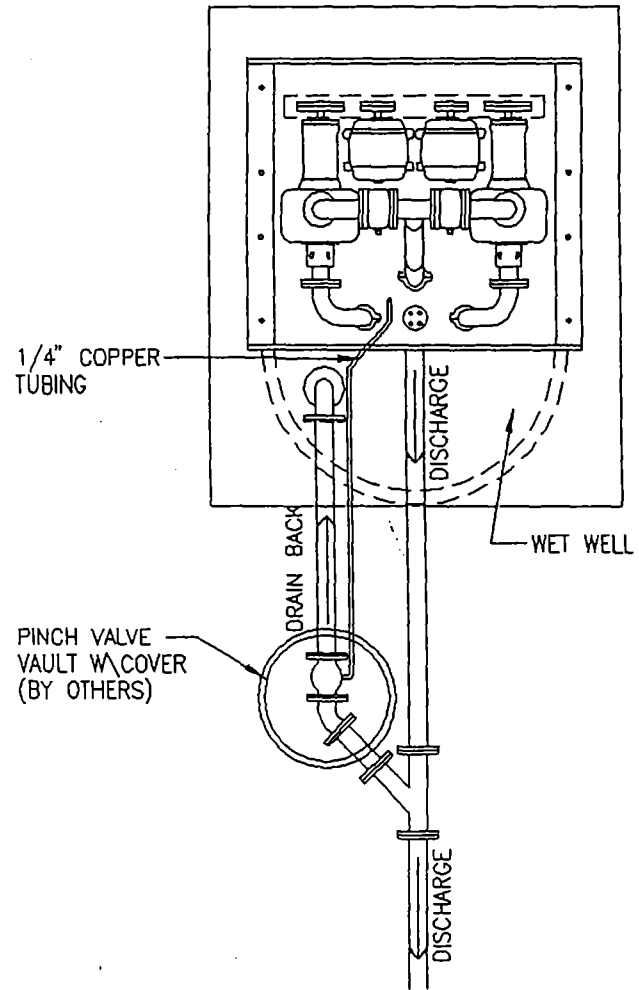
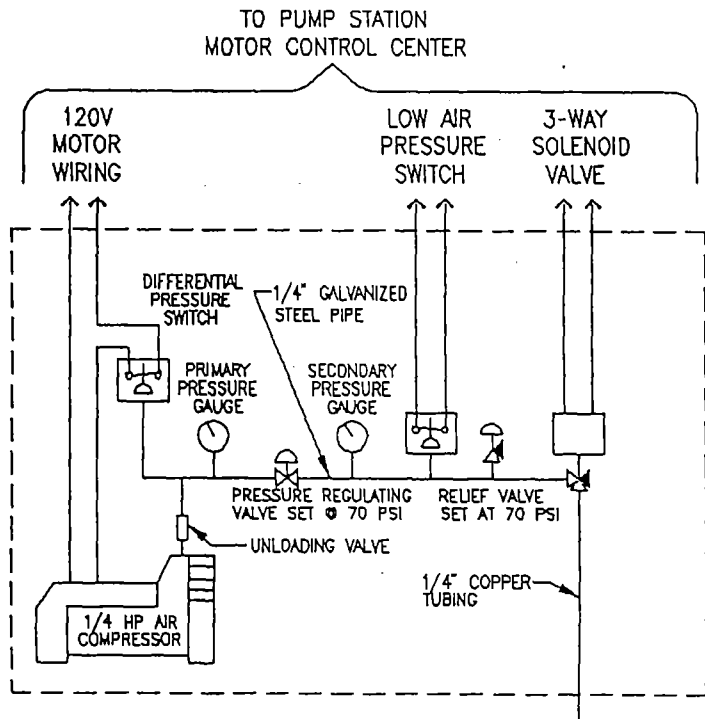
- HORIZONTAL DRIPPROOF MOTORS
- V-BELT DRIVE & GUARD
- EIGHT 3/4" MOUNTING HOLES
- 4" x 4" HORIZONTAL SELF-PRIMING SEWAGE PUMPS



		SEVEN OAKS PUMP STATION SCAPOOSE, OREGON			
		MODEL # 183-010	JOB # 48526		
DWG # 183-010	Des By	JH	D	2-6-95	
	Drn By	BT			
	Chk By	JH		Sheet 1 of 1	

SCALES & DIMENSIONS ARE FOR REFERENCE ONLY, DRAWINGS MUST BE CERTIFIED CORRECT FOR CONSTRUCTION PURPOSES

STATION	T.D.H.	H.P.	R.P.M.	PHASE	VOLTS	ELEVATIONS									
						A	B	C	D	E					
7 OAKS	150	45	7.5	1750	3	230	-3.0	-0.5	+3.07	+3.57	+4.07	+4.56	+8.91	+13.91	+10.91



H2S DRAINBACK CONTROL SCHEMATIC

H2S TREATMENT
DRAINBACK SYSTEM



JOB #	N/A	DATE	3-10
Des By	MW	Dwg #	DEQ-01
Drn By	SM	Sheet	1 of 1

SEWAGE PUMP STATION DESIGN DATA

PUMP STATION

TYPE
PUMP TYPE
CAPACITY
PUMP HP
LEVEL CONTROL
OVERFLOW POINT
OVERFLOW DISCHARGE
AVG. TIME TO OVERFLOW
AUXILIARY POWER TYPE
LOCATION
OUTPUT
FUEL CAPACITY
TRANSFER SWITCH
ALARM TELEMETRY TYPE
EPA RELIABILITY CLASS

LOCATED - SOUTH END OF 9TH STREET

SURFACE MOUNTED SELF PRIMING
CONSTANT-SPEED NON-CLOG
150 GPM @ 45FT TDH
7.5 HP
FLDATS
SSMH#9 ELEV=10.96 (INT. OF SEVEN OAKS OR. & 9TH STREET)
STORM SYSTEM ON SITE
15.75 HRS
3# GENERATOR
CITY SHOPS
N/A
N/A
MANUAL
AUTODIALER
#

FORCE MAIN

LENGTH, TYPE
PROFILE
DISCHARGE MANHOLE
VACUUM RELEASE VALVE
AVERAGE DETENTION
SULFIDE CONTROL SYSTEM

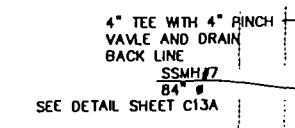
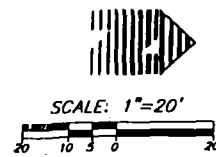
1,565LF OF C900
ASCENDING TO STA. 4+30 THEN CONTINUOUS DESCENDING
SIXTH STREET
ONE AT HIGH POINT (STA 4+30)
85 MIN
BACKDRAIN

BACKDRAIN SYSTEM

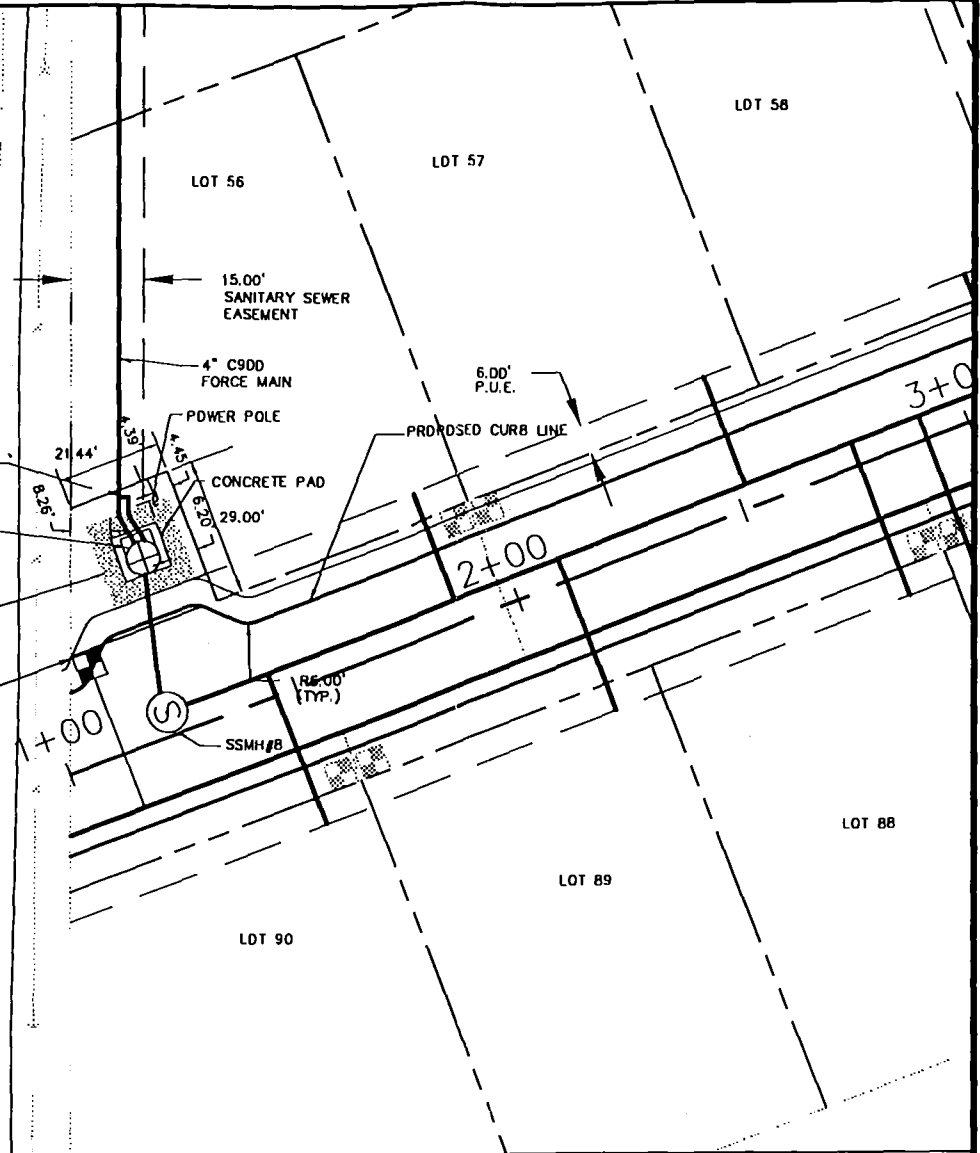
CONTROL VALVE TYPE
VALVE SIZE

PNUMATIC PINCH
4"

NOTE:
BEFORE INSTALLATION, THE SIZE AND MATERIAL
OF THE PINCH VALVE VAULT AND COVER NEEDS
TO BE REVIEWED BY THE CITY OF SCAPPOOSE.

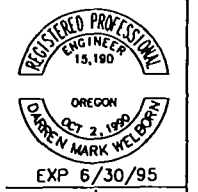


- NOTE:
1. TURN OUT TO BE SIGNED "CITY PARKING ONLY" AND CURB TO BE PAINTED RED THE ENTIRE LENGTH OF THE TURNOUT.
 2. FORCE MAIN TO HAVE A MINIMUM OF 36" OF COVER.
 3. SIDEWALK TO BE PLACED BEHIDE CURB EVEN IN TURN OUT.
 4. FIBERGLASS LID TO OPEN TO THE EAST AND WEST WITH THE MOTOR ACCESS BEING ON THE EAST SIDE.



MNWR|P
PLANNERS
ENGINEERS
LANDSCAPE ARCHITECTS

233 SW FRONT
PORTLAND, OR
97204
☎ 503|225|0822
FAX: 503|273|8353



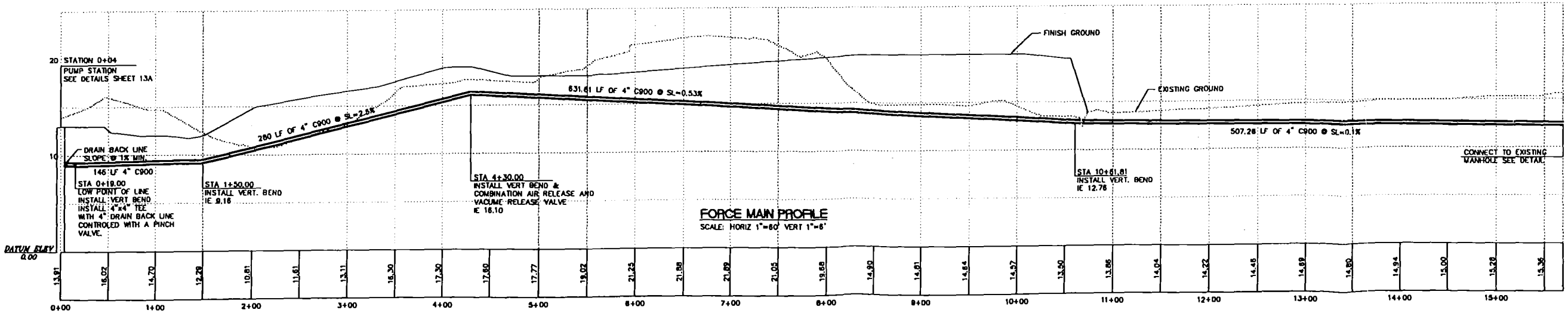
**SEVEN OAKS SUBDIVISION
FORCE MAIN PROFILE / PUMP STATION PLAN**
KOSS-BROD-GOODRICH AND ASSOCIATES
22585 DAY RD. WEST LINN, OREGON 97068

REV.	DATE	BY

PROJECT NO.
KBG001
DATE: 10/26/95
DESIGNED: K. ACKERMAN
ENGINEER: D. WELBORN
CHECKED: J. REIMANN

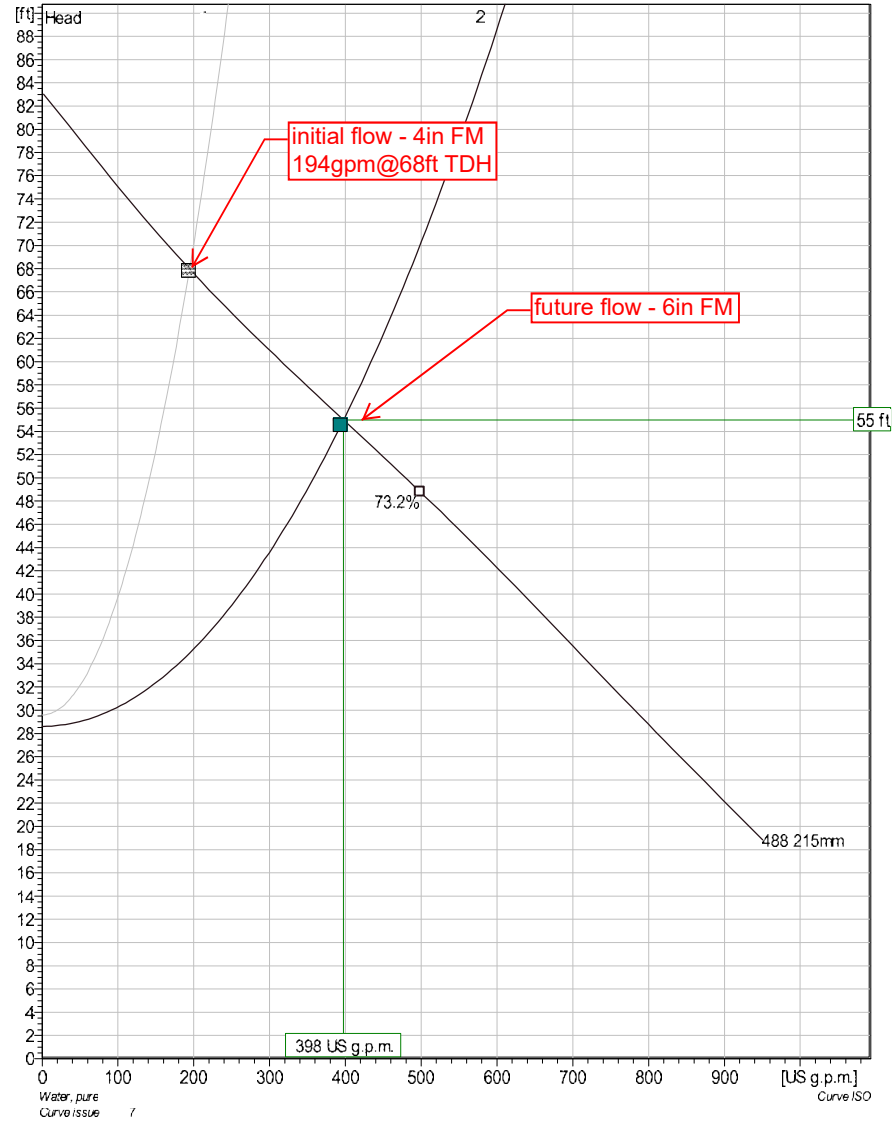
SHEET TITLE
PROFILE
SHEET NUMBER

C13



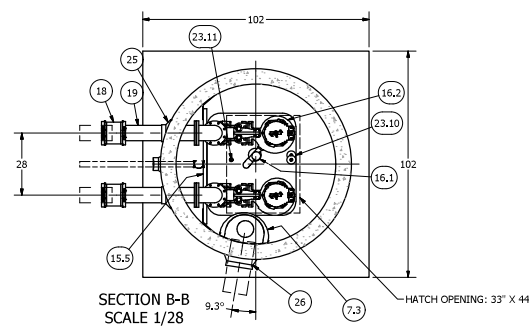
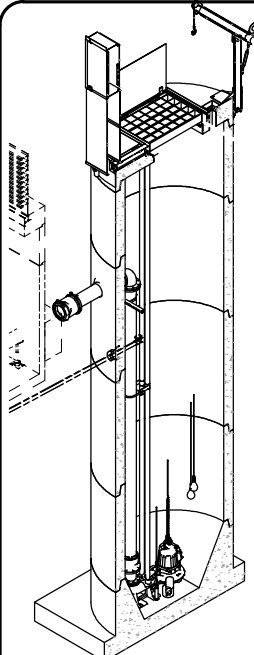
Charles T Parker (CTP) Pump Station

NP 3127 HT 3~ Adaptive 488 Duty Analysis

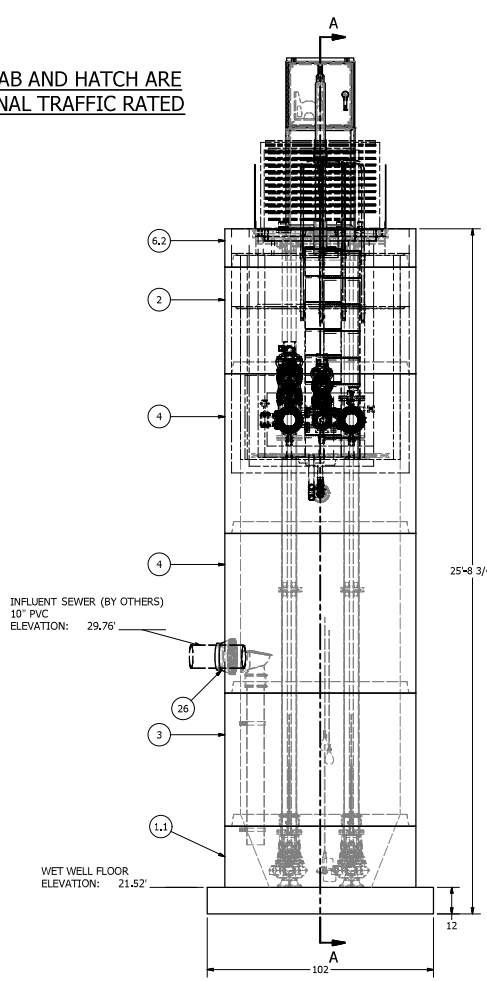
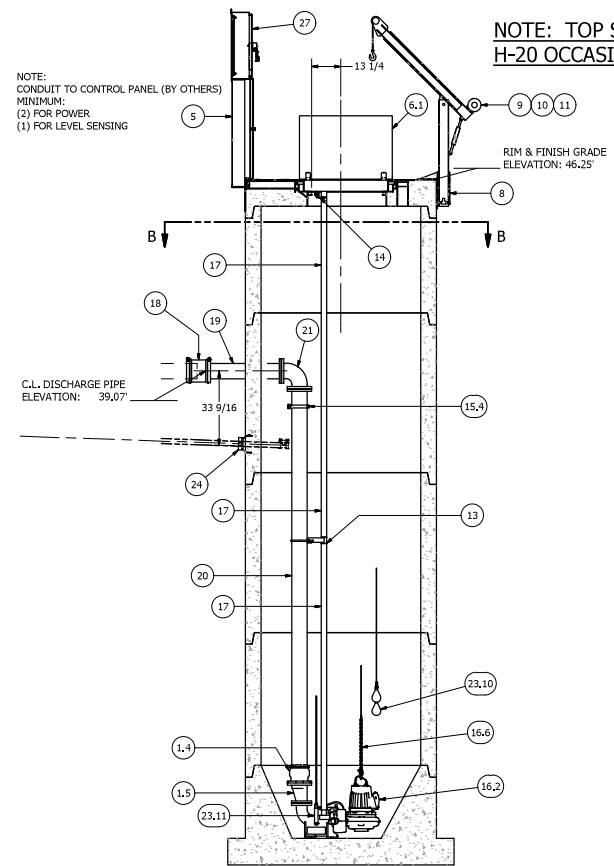


Pumps running /System	Individual pump			Total					
	Flow	Head	Shaft power	Flow	Head	Shaft power	Pump eff.	Specific energy	NPSHre
2	398 US g.p.m.	55 ft	7.75 hp	398 US g.p.m.	55 ft	7.75 hp	71.3%	290WWUSMG	12.7 ft
1	194 US g.p.m.	68 ft	6.39 hp	194 US g.p.m.	68 ft	6.39 hp	52.3%	488WWUSMG	14.2 ft

Project	Project ID	Created by	Created on	Last update
			4/25/2018	



SENSOR AND ELEVATION TABLE		
LEVEL ELEVATION	DISTANCE BETWEEN POINTS	SET POINT DESCRIPTION
29.76		INVERT IN
28.65		BACK UP PUMPS START
		SENSOR SPACING
N/A		BACK UP PUMPS STOP
		SENSOR SPACING
27.65		BACK UP HL ALARM
27.15		HIGH LEVEL ALARM
	0.50	SENSOR SPACING
26.65		LAG PUMP START
	1.00	SENSOR SPACING
25.65		LEAD PUMP START
	1.40	SENSOR SPACING
24.25		PUMP STOP
	2.73	DISTANCE TO FLOOR
21.52		FLOOR ELEVATION



PARTS LIST			
ITEM	QTY	STOCK NUMBER	DESCRIPTION
1	1	10-CB000000	BASE SLAB ASSEMBLY
1.1	1	10-CB068HSQ	BASE - MW - 6ft DIA - RU DESIGN - SQUARE
1.2	2	31-EL0400FL	DISCHARGE ELBOW - 4in - FLYGT
1.3	2	31-HW0AKS6	ANCHOR KIT - 316SS - DISCHARGE ELBOW
1.4	2	44-AD06PAL	FLANGE ADAPTER - 6in - ALPHA
1.5	2	48-RO06AD0E	REDUCER - DI - 6in x 4in - ECCENTRIC
1.6	2	49-GS040000	GASKET - FLANGE - 4in
2	1	12-CR064800	BARREL - 6ft DIA x 4ft H
3	1	12-CR066000	BARREL - 6ft DIA x 5ft H
4	2	12-CR067200	BARREL - 6ft DIA x 6ft H
5	1	13-DS3030S5	DISCONNECT STAND - SS - 30in x 30in x 8in
6	1	14-CT000000	TOP SLAB ASSEMBLY
6.1	1	13-HH06HDCV	HATCH - 6ft - H20 - W/ CABLE TRAY & VENT
6.2	1	14-CT06HD00	TOP SLAB - 6ft DIA - H20
7	1	15-DB999999	DROP BOWL ASSEMBLY
7.1	2	15-BR085535	BRACKET - PIPE - 8in - SS35 - SDR35
7.2	1	15-CP080000	COUPLING - FERNCO - 8in
7.3	1	15-DB810868	DROP BOWL - 8in thru 10in INLET x 8in
7.4	6.0 ft	70-PP0800DR	OUTLET - 6ft - 8ft WET WELL
8	1	16-BB2PC0BW	PIPE - PVC SDR35 - 8in DIA
9	1	16-CC2000PC	CRANE BASE - SIDE MOUNT - 6ft RU DESIGN
10	1	16-WN0000E2	CRANE - 2000lb - POWDERCOAT
11	1	16-WR1Q45E0	WINCH - ELECTRIC - 6ft PENDANT - ENAMEL
12	2	17-AC38000B	WIRE ROPE - SS - 0.25in x 45ft
13	2	17-IG2654FL	BOLT KIT - UPPER GUIDE BAR BRACKET
14	2	17-UG0200FL	BRACKET - 304SS - INTERMEDIATE GUIDE BAR
15	1	18-BR000000	BRACKET - 316SS - UPPER GUIDE BAR - 2in
15.1	2	18-AC00000B	BRACKET ASSEMBLY - 316SS - DISCHARGE SUPPORT
15.2	2	18-AC00001B	BOLT KIT - 316SS - WALL BRACKET
15.3	2	18-AC010HSB	WALL BRACKET - DISCHARGE SUPPORT
15.4	2	18-AC06CLS6	BOLT KIT - DISCHARGE CLAMP - BOLT, WASHER, LOCK NUT
15.5	4.3 ft	50-US0000S6	DISCHARGE CLAMP - 316SS - 6in - STRUTMOUNT
16	1	30-PU000000	UNISTRUT - 316SS - SLOTTED
16.1	1	30-MFVFLYGT	PUMP SHIPPING CRATE
16.2	2	30-PU0000FL	MIX FLUSH VALVE - FLYGT
16.3	2	32-B50H00S5	PUMP - FLYGT NP312HT
16.4	2	32-B53000S5	BOW SHACKLE - 316SS - 1-2in
16.5	2	32-CG0000S5	BOW SHACKLE - 316SS - 3-8in
16.6	4.0 ft	32-PL9320S6	CORD GRIP - .750in - .990 - SS
16.7	1	32-PLGE0000	CHAIN - 316SS - 9-32in SS
16.8	2	32-PLSANVYL	GRIP EYE UNIT
17	92.0 ft	40-PP0200S4	LIFTING SLING ASSEMBLY - COATED CABLE x 27ft TOTAL LENGTH
18	2	44-CP060AD0	PIPE - 304SS SCH40 - 2in DIA (4 @ 10ft & 4 @ 13ft)
19	2	45-FP060360	COUPLING - 6in - ALPHA
20	2	45-FP061800	SPOOL - DI - 6in DIA x 36in - FLGxPE
21	2	46-EL0690DI	SPOOL - DI - 6in DIA x 180in - FLGxPE
22	4	49-GS060000	ELBOW - DI - 6in x 90deg - FLGxFLG
23	1	50-AC000000	GASKET - FLANGE - 6in
23.1	5	12-GS000001	WELL SHIPPING CRATE
23.2	1	13-KY000000	BARREL - GASKET
23.3	3	18-AC000H00	HATCH KEY
23.4	4	18-HD040000	CABLE HANGER ASSEMBLY
23.5	1	51-AC00N5TB	LIFTING CLUTCH - 4 TON
23.6	115	51-BT060000	NEVER SIZE - TUBE
23.7	145	51-SE0101SL	JOINT WRAP - 6in - BOA TAPE
23.8	1	80-BR00PT00	JOINT SEALANT - 1in - CONSEAL CS-202
23.9	1	80-FI00PT00	BRACKET - PRESSURE TRANSDUCER
23.10	2	80-FS20MSNL	DESSICANT FILTER - PRESSURE TRANSDUCER
23.11	1	80-PT1500EH	FLOAT - 20m - MS1 - NOLTA
24	1	59-KB080400	PRESSURE TRANSDUCER - 0-15PSI - 60ft CABLE - E & H
25	2	59-KB1206DI	KOR-N-SEAL - 8in CORE - 4in thru 1.5in PIPE
26	1	59-KB161800	KOR-N-SEAL - 12in CORE x 6in DIPS PIPE
27	1	61-EP3000DC	KOR-N-SEAL - 16in CORE x 10in PIPE
			DISCONNECT PANEL - 15-30FLA

6" DIAMETER WET WELL
6" DISCHARGE PIPING
FLYGT NP 3127 PUMPS
6" - 687 VALVE VAULT

ALL MATERIALS SHOWN ON THIS SHEET WILL BE SUPPLIED BY ROMTEC UTILITIES AND DELIVERED TO THE SITE AFTER THE HOLE HAS BEEN EXCAVATED AND SHORED. THE CONTRACTOR SHALL SUPPLY A CRANE OF SUFFICIENT SIZE TO LOWER ALL THE CONCRETE PIECES INTO THE HOLE SAFELY. THE CONTRACTOR SHALL INSTALL THE WET WELL (AND VALVE VAULT AND METERING VAULT IF APPLICABLE). ROMTEC UTILITIES WILL PROVIDE A REPRESENTATIVE FOR TECHNICAL ASSISTANCE ON THE DAY OF INSTALLATION TO ANSWER ANY QUESTIONS THAT MAY ARISE. THE CONTRACTOR IS RESPONSIBLE FOR ALL PLUMBING AND ELECTRICAL CONNECTIONS AND INSTALLATION. ITEMS NOTED AS "BY OTHERS" WILL BE PROVIDED AND INSTALLED BY THE CONTRACTOR. ROMTEC UTILITIES WILL NOT INSTALL ANY OF THE COMPONENTS SHOWN ON THIS PAGE.

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FOR CONSTRUCTION

NOTE: CONTRACTOR TO SEAL ALL CONCRETE JOINTS AND PIPE PENETRATIONS WITH NON-SHRINK GROUT

NOTE: ALL DIMENSIONS AND ELEVATIONS SHOWN ARE NOMINAL DIMENSIONS. IT IS THE RESPONSIBILITY OF THE ON-SITE CONTRACTOR OR ROMTEC UTILITIES CUSTOMER (NOT ROMTEC UTILITIES) TO VERIFY THE ACCURACY OF ANY CRITICAL DIMENSIONS OR ELEVATIONS PRIOR TO SETTING OR INSTALLING ANY EQUIPMENT.

REV	DATE	DESCRIPTION
1	11/20/2018	REVISIONS FOR PRODUCTION LAUNCH
2	8/20/2018	REVISED PER COMMENTS
3	11/27/2018	REVISIONS FOR PRODUCTION LAUNCH

DATE: 4-26-18

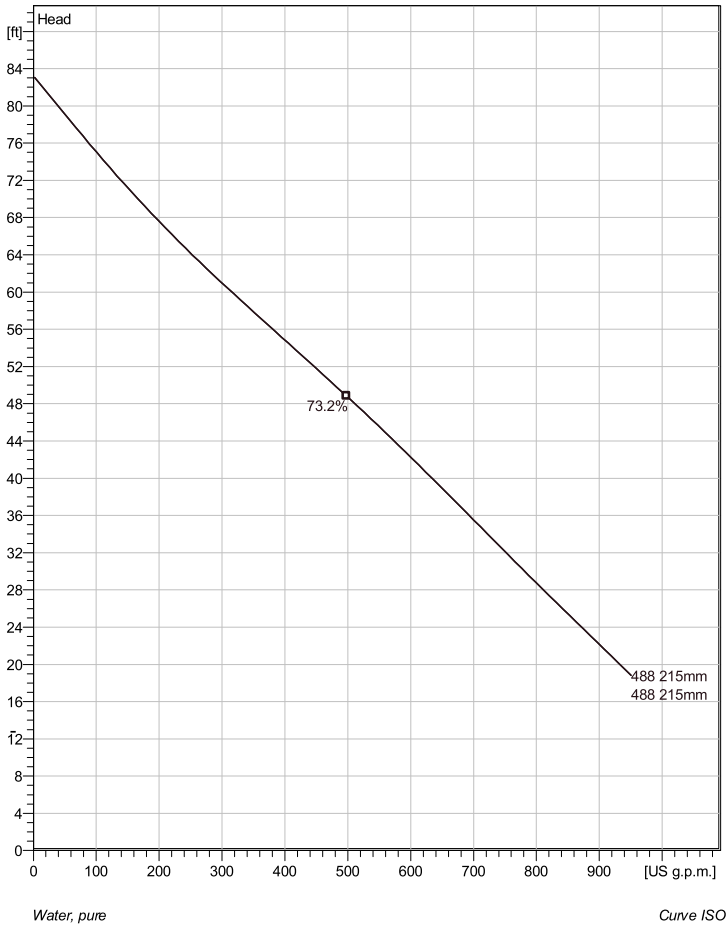
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18240 NORTH BANK ROAD
ROSEBURG, OREGON 97470
PHONE: (541) 995-9678
WWW.ROMTECUTILITIES.COM

CHARLES T PARKER WAY
SCAPPOOSE, OR
6ft WET WELL & 6in PIPING

East Airport Pump Station

NP 3127 HT 3~ Adaptive 488

Technical specification



Note: Picture might not correspond to the current configuration.

General

Patented self cleaning semi-open channel impeller, ideal for pumping in waste water applications. Possible to be upgraded with Guide-pin® for even better clogging resistance. Modular based design with high adaptation grade.

Impeller

Impeller material	Hard-Iron™
Discharge Flange Diameter	3 15/16 inch
Suction Flange Diameter	3 15/16 inch
Impeller diameter	215 mm
Number of blades	2

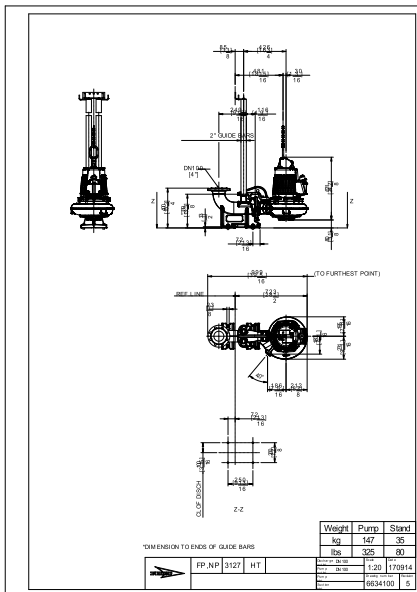
Motor

Motor #	N3127.070 21-12-4AL-W 10hp
Stator variant	FM
Frequency	60 Hz
Rated voltage	460 V
Number of poles	4
Phases	3~
Rated power	10 hp
Rated current	13 A
Starting current	68 A
Rated speed	1720 rpm
Power factor	
1/1 Load	0.85
3/4 Load	0.83
1/2 Load	0.75
Motor efficiency	
1/1 Load	82.1 %
3/4 Load	83.6 %
1/2 Load	83.1 %

Configuration

50' pump power cables

Installation: P - Semi permanent, Wet



NP 3127 HT 3~ Adaptive 488

Performance curve



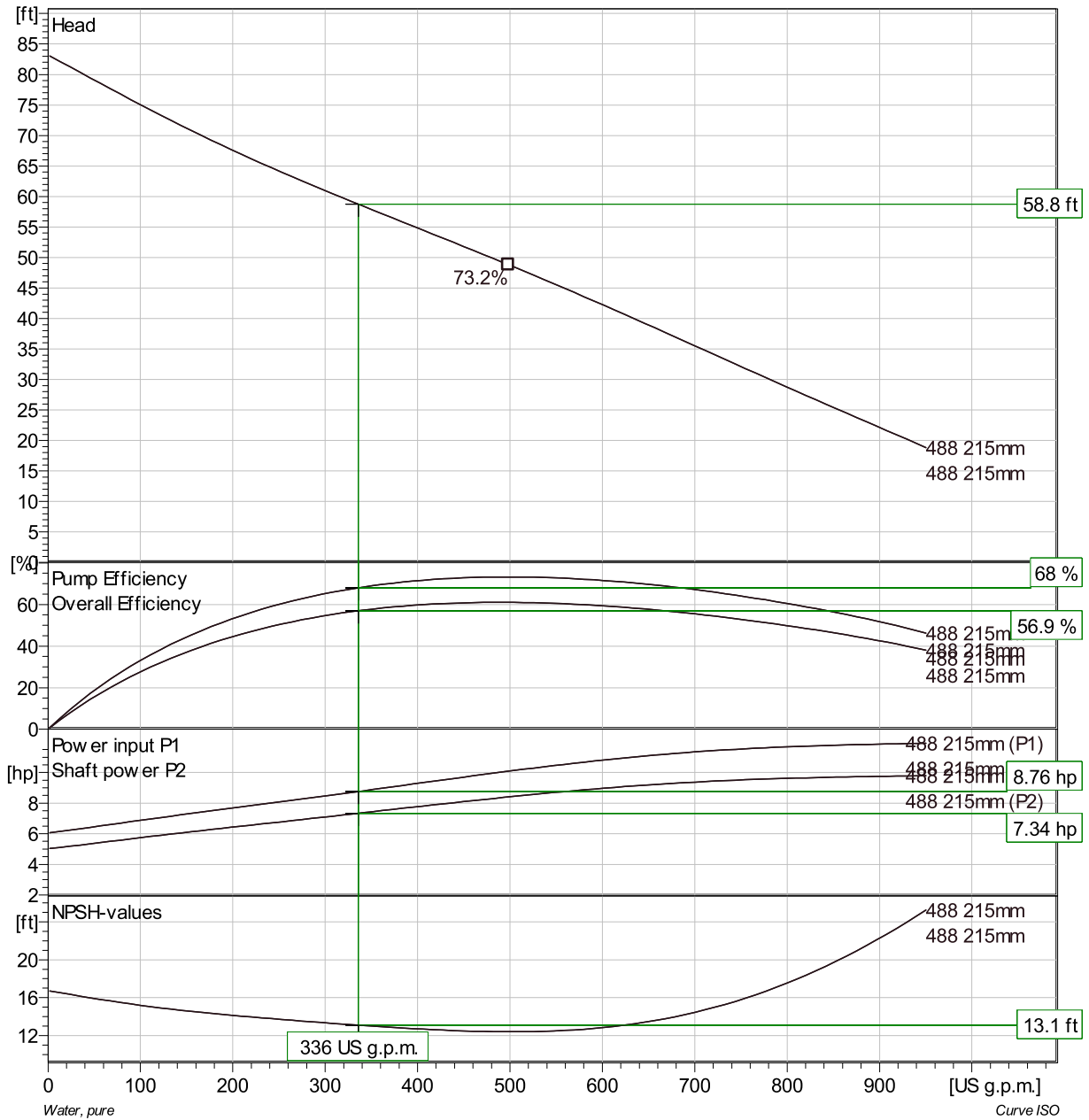
Pump

Discharge Flange Diameter 3 15/16 inch
 Suction Flange Diameter 100 mm
 Impeller diameter 8 7/16"
 Number of blades 2

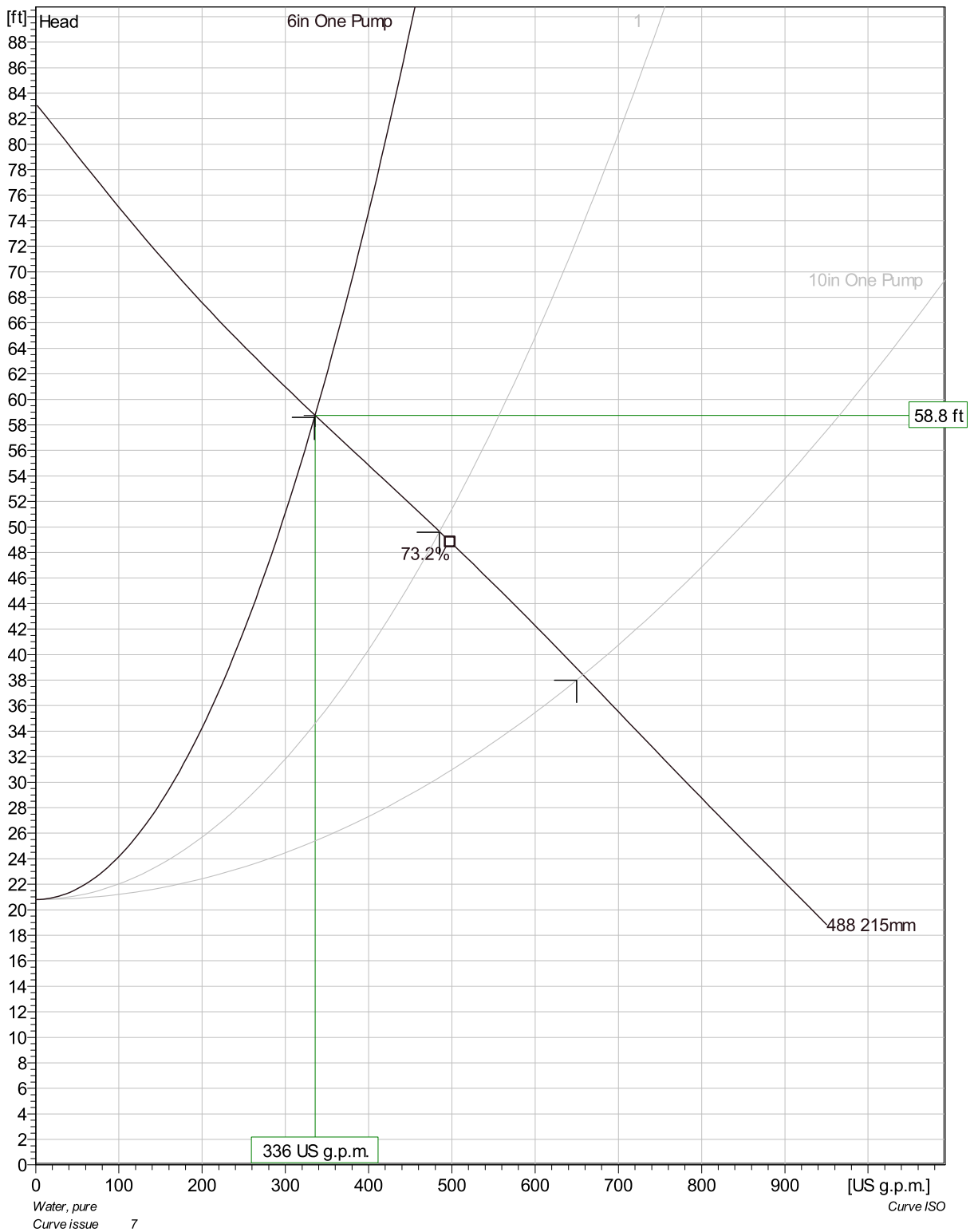
Motor

Motor # N3127.070 21-12-4AL-W 10hp
 Stator variant 12
 Frequency 60 Hz
 Rated voltage 460 V
 Number of poles 4
 Phases 3~
 Rated power 10 hp
 Rated current 13 A
 Starting current 68 A
 Rated speed 1720 rpm

Power factor
 1/1 Load 0.85
 3/4 Load 0.83
 1/2 Load 0.75
 Motor efficiency
 1/1 Load 82.1 %
 3/4 Load 83.6 %
 1/2 Load 83.1 %



NP 3127 HT 3~ Adaptive 488 Duty Analysis



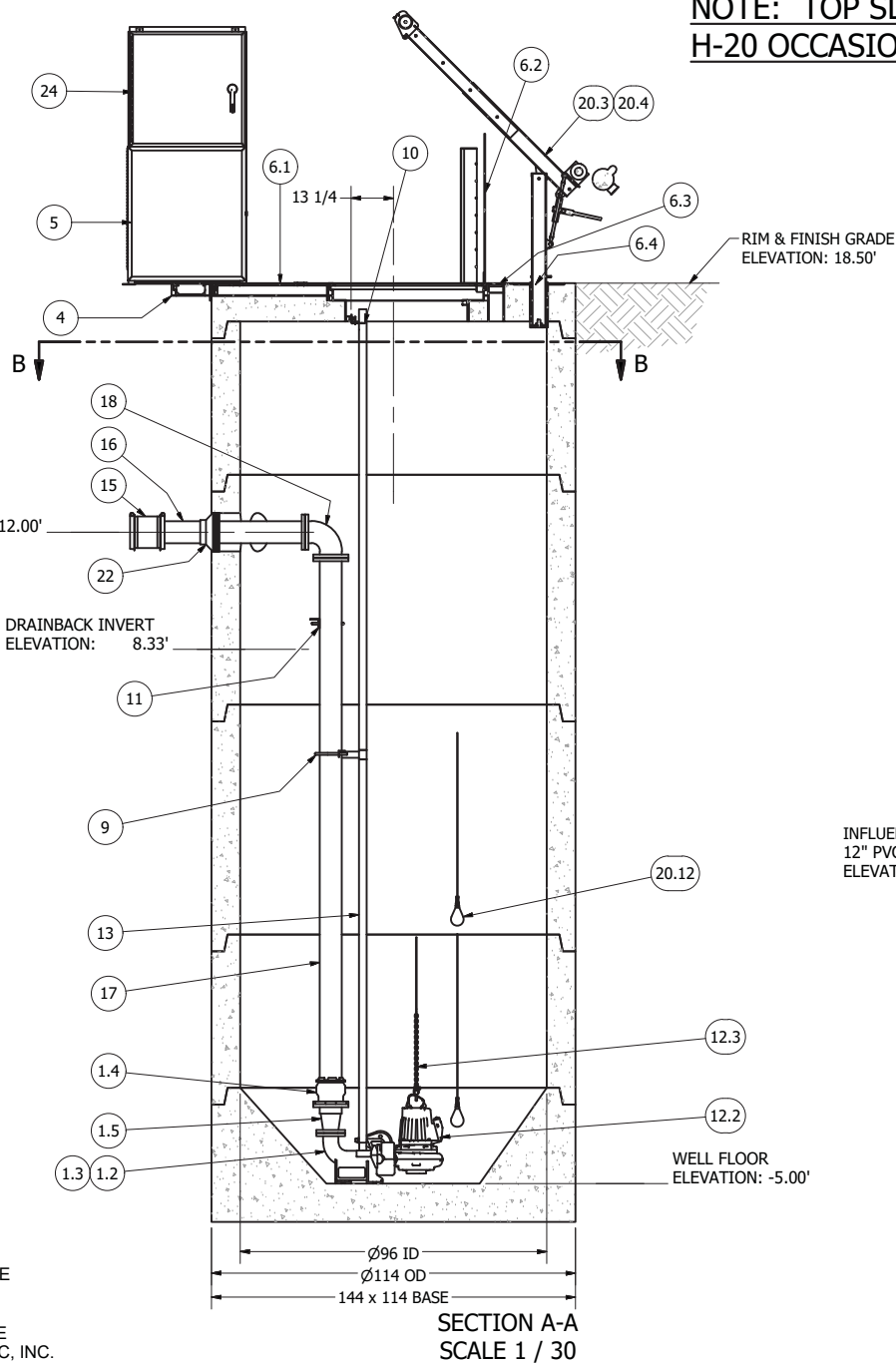
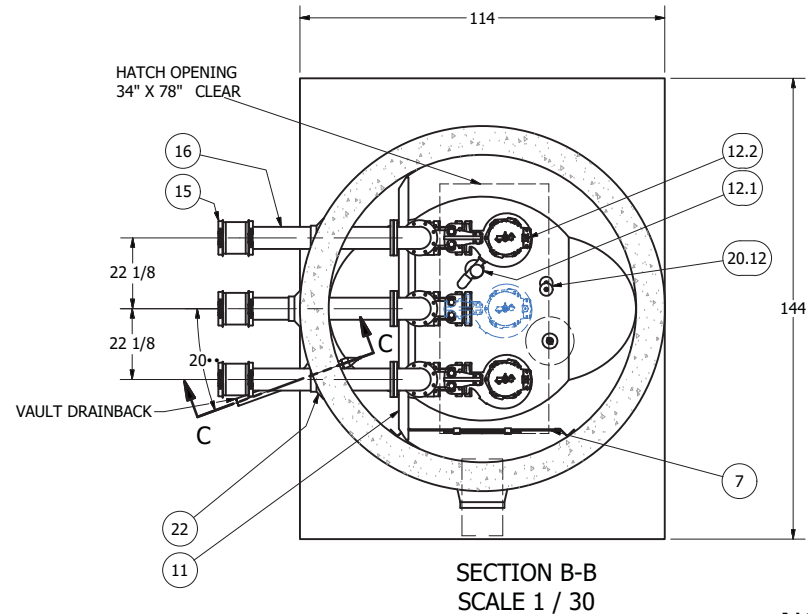
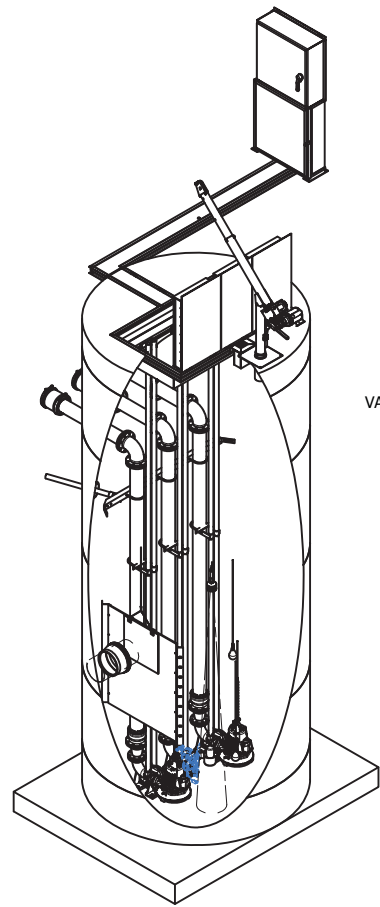
Pumps running /System	Individual pump			Total			Pump eff.	Specific energy	NPSHre
	Flow	Head	Shaft power	Flow	Head	Shaft power			
6in One Pump	336 US g.p.m.	58.8 ft	7.34 hp	336 US g.p.m.	58.8 ft	7.34 hp	68 %	324 kWh/US MG	13.1 ft
10in One Pump	658 US g.p.m.	38.4 ft	9.22 hp	658 US g.p.m.	38.4 ft	9.22 hp	69.3 %	211 kWh/US MG	13.6 ft
1	485 US g.p.m.	49.6 ft	8.32 hp	485 US g.p.m.	49.6 ft	8.32 hp	73.2 %	256 kWh/US MG	12.4 ft

Project	Project ID	Created by	Created on 4/25/2018	Last update
---------	------------	------------	--------------------------------	-------------

1.02 DESIGN CRITERIA

Romtec Utilities has created this SSDS based solely on the design criteria listed below that the customer and/or customer's representative has provided. It is the responsibility of the customer as well as any other reviewing entities, to verify that the stated design criteria is accurate. Romtec Utilities has not verified the design criteria and does not have responsibility for confirming its accuracy.

Project Name:	<u>Scappoose Industrial</u>
Information here in provided by:	<u>Otak</u>
CAD site plan available at this time?	Yes
Final Project Owner and/or Operator:	<u>City of Scappoose</u>
Governing Sewer or Water Authority:	<u>City of Scappoose</u>
Does this project require "Buy America" materials?	No
Source of Water:	<u>Commercial Development</u>
Water Type:	<u>Wastewater</u>
Influent sewer elevation:	<u>2.99 ft.</u>
Finish grade elevation at wet well:	<u>18.5 ft.</u>
Force Main is:	New
Force main length:	<u>3955 ft.</u>
Force main discharge elevation:	<u>18 ft.</u>
Force main diameter:	<u>6 & 10</u> in. inside diameter
Force main material (PVC, DI, etc.):	<u>PVC C900 DR18</u>
Peak design inflow (max flow to lift station):	<u>336 g.p.m. at initial phases</u>
	<u>916 g.p.m. at full build-out</u>
System Total Dynamic Head (TDH)	<u>53 ft.</u>
Pumping Rate:	<u>336 g.p.m. (1 pump in 10")</u>
Pumping rate as compared to peak inflow is:	Equal
Power Supply Voltage:	480V
Power Supply Phase:	Three-Phase
Is the lift station a classified space thus requiring the pumps to be explosion proof?	Yes

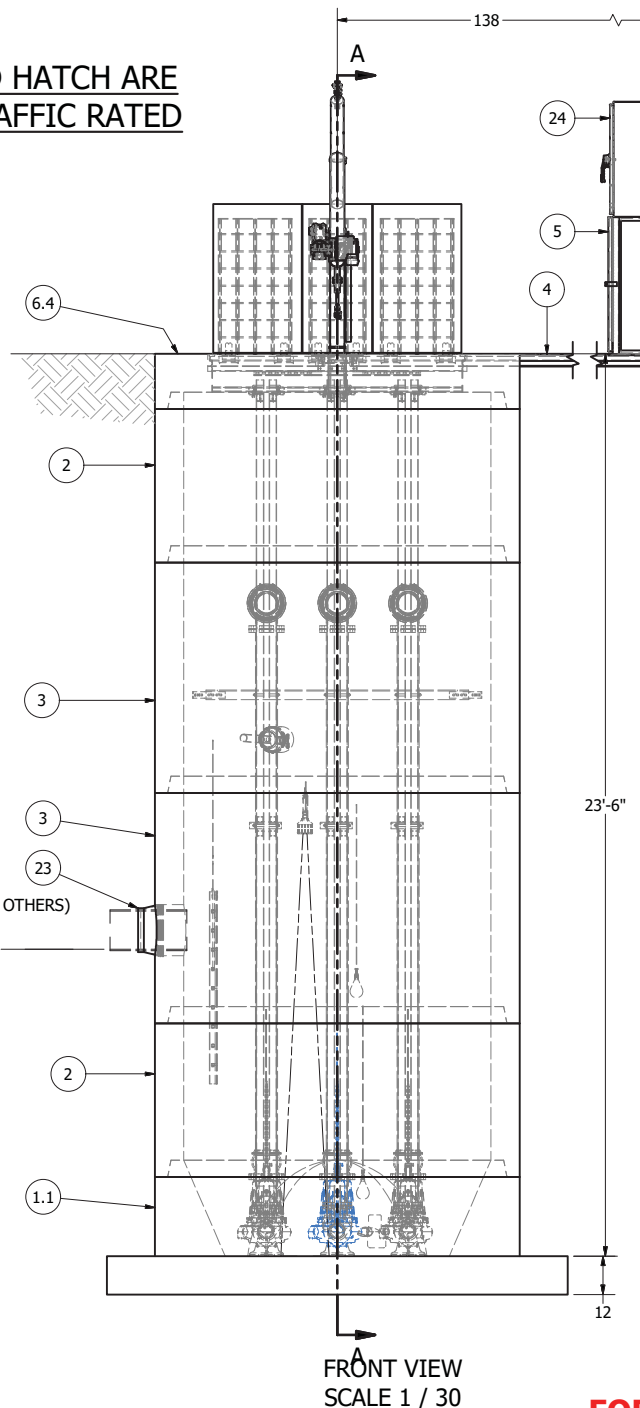


NOTE: TOP SLAB AND HATCH ARE H-20 OCCASIONAL TRAFFIC RATED

MISC. ELEVATION TABLE	
DESCRIPTION	ELEVATION
FLOAT - HIGH LEVEL	2.25'
FLOAT - LOW LEVEL	-3.00'

10" FORCE MAIN OPERATION	
PRIMARY SENSOR ELEVATION TABLE	
DESCRIPTION	ELEVATION
INFLUENT INVERT	2.99
HIGH LEVEL ALARM	0.00
LAG PUMP START	-0.25'
LEAD PUMP START	-0.75
PUMP STOP	-2.75'
WELL FLOOR	-5.00'

6" FORCE MAIN OPERATION	
PRIMARY SENSOR ELEVATION TABLE	
DESCRIPTION	ELEVATION
INFLUENT INVERT	2.99
HIGH LEVEL ALARM	-0.50
LAG PUMP START	-0.75'
LEAD PUMP START	-1.25'
PUMP STOP	-2.75'
WELL FLOOR	-5.00'



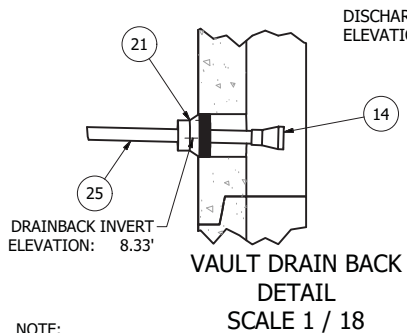
		PARTS LIST	
ITEM	QTY	STOCK NUMBER	DESCRIPTION
1	1	10-CB000000	BASE SLAB ASSEMBLY
1.1	1	10-CB0800RU	BASE - WW - 8ft DIA - RU DESIGN
1.2	3	31-EL0400FL	DISCHARGE ELBOW - 4in - FLYGT
1.3	3	31-HW00AKS6	ANCHOR KIT - 316SS - DISCHARGE ELBOW
1.4	3	44-AD06RMAL	FLANGE ADAPTER - 6in - ALPHA
1.5	3	48-RD0604DC	REDUCER - DI - 6in x 4in - CONCENTRIC
1.6	3	49-GS040000	GASKET - FLANGE - 4in
2	2	12-CR084800	BARREL - 8ft DIA x 4ft H
3	2	12-CR087200	BARREL - 8ft DIA x 6ft H
4	1	13-CARH143	CABLE TRAY EXTENSION - RH - 9in x 143in
5	1	13-DS3636SS	DISCONNECT STAND - SS - 36in X 36in X 12in
6	1	14-CT000000	TOP SLAB ASSEMBLY
6.1	1	13-CA080000	CABLE TRAY - 8ft TRIPLEX TOP SLAB
6.2	1	13-HH08PDTE	HATCH - H20 - 8ft - TRIPLEX
6.3	1	13-VT0000AL	VENT - ALUMINUM - FLUSH
6.4	1	14-CT08HDT0	TOP SLAB - 8ft DIA - H20 - TRIPLEX
6.6	3.0 ft	50-US0000S6	UNISTRUT - 316SS - SLOTTED
6.9	1	16-BB2PC0BF	CRANE BASE - 5BF20 - 2000lb
7	1	15-DP080500	DEFLECTOR PANEL ASSEMBLY - 8ft DIA x 5ft
7.1	2	15-BR00SSGU	BRACKET - SS GUILLOTINE SET
7.2	1	15-DB00CAGU	GUILLOTINE CABLE ASSEMBLY
7.3	1	50-AC00HDPE	HDPE - 4ft X 8ft X 1-2in - BLACK
7.4	1	50-AC00HDPE	HDPE - 24in X 24in X 1/2in - BLACK
7.5	10 ft	50-AN0808GS6	ANGLE - 316SS - 8ft - 11G FORMED
8	3	17-AC38000B	BOLT KIT - UPPER GUIDE BAR BRACKET
9	3	17-IG2654FL	BRACKET - 304SS - INTERMEDIATE GUIDE BAR
10	3	17-UG0200FL	BRACKET - 304SS - UPPER GUIDE - 2in
11	1	18-BR999999	DISCHARGE PIPE BRACKET - 8ft WW - 6in DI PIPE
12	1	30-PU000000	PUMP SHIPPING CRATE
12.1	1	30-MFVFLYGT	MIX FLUSH VALVE - FLYGT
12.2	2	30-PU0000FL	PUMP - FLYGT NP3127HT
12.3	2	32-AC0000FL	PUMP LIFTING SLING - 316SS - FLYGT
12.4	2	32-CGS5000D	CABLE SUPPORT GRIP - 304SS - 0.75in-0.99in
12.5	1	32-PLGE0000	GRIP EYE UNIT
13	129.0 ft	40-PP0200S4	PIPE - 304SS SCH40 - 2in DIA
14	1	42-TF020000	CHECK VALVE - TIDEFLEX - 2in
15	3	44-CP060AD0	COUPLING - 6in - ALPHA
16	3	45-FP060480	SPOOL - DI - 6in DIA x 48in - FLGxPE
17	3	45-FP061740	SPOOL - DI - 6in DIA x 174in - FLGxPE
18	3	46-EL0690DI	ELBOW - DI - 6in x 90deg - FLGxFLG
19	6	49-GS060000	GASKET - FLANGE - 6in
20	1	50-AC000000	WELL SHIPPING CRATE
20.1	5	12-GS000001	BARREL - GASKET
20.2	1	13-KY000000	HATCH KEY
20.3	1	16-CC2PC0E2	CRANE - 5PT20-E2 - 2000lb
20.4	1	16-WR1Q45E0	WIRE ROPE - SS - 0.25in x 45ft
20.5	4	18-AC00CH00	CABLE HANGER ASSEMBLY - 316SS
20.6	4	18-HD040000	LIFTING CLUTCH - 4 TON
20.7	4	18-HD080000	LIFTING CLUTCH - 8 TON
20.8	1	51-AC00NSTB	NEVER SIEZE - TUBE
20.9	150 ft	51-BT060000	JOINT WRAP - 6in - BOA TAPE
20.10	174 ft	51-SE0101SL	JOINT SEALANT - 1in x 1in - CS-202
20.11	1	80-BR00UT00	BRACKET - ULTRASONIC TRANSDUCER
20.12	2	80-FS20MSNL	FLOAT - 20m - MS1 - NOLTA
20.13	1	80-UT0015XP	ULTRASONIC TRANSDUCER - XPS-15
21	1	59-KB080400	KOR-N-SEAL - 8in CORE - 4in thru 1.5in PIPE
22	3	59-KB1206DI	KOR-N-SEAL - 12in CORE x 6in DIPS PIPE
23	1	59-KB1612P0	KOR-N-SEAL - 16in CORE x 12in DIPS PIPE
24	1	61-EP5036DC	PNL DISCONNECT 31-50FLA (36x36)
25	3.0 ft	70-PP0200P4	PIPE - PVC SCH40 - 2in DIA

SPECIAL NOTE: THE LIFT STATION IS BEING PROVIDED WITH DUPLEX PUMPS FOR PHASES 1 & 2. A THIRD PUMP (SHOWN IN BLUE) IS TO BE ADDED FOR PHASE 3 FOR TRIPLEX CONFIGURATION. THE WET WELL, VALVE VAULT, AND CONTROL PANEL HAVE ALL BEEN SIZED TO ACCOMMODATE THE TRIPLEX PUMP CONFIGURATION.

NOTE: CONTRACTOR TO SEAL ALL CONCRETE JOINTS AND PIPE PENETRATIONS WITH NON-SHRINK GROUT

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**8' DIAMETER WET WELL
6" DISCHARGE PIPING
NP3127 FLYGT PUMPS
6" - 8' X 16' VALVE VAULT**



NOTE:
CONDUIT TO CONTROL PANEL (BY OTHERS)
MINIMUM:
(3) FOR POWER
(1) FOR LEVEL SENSING

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AD	REVISION HISTORY
AD	REVISION MAKE AND MODEL PER COMMENTS
AD	MINOR REVISION PER NEW SITE PLAN
AD	ADDED VAULT DRAIN DETAIL & CABLE TRAY EXT
AD	REVISED PER 1-29-19 COMMENTS
AD	REVISED PER 8-9-18 COMMENTS
AD	ADJUSTED DEPTH, CHANGED PUMPS
AD	DESCRIPTION
BY	DATE

DATE: 3-28-18

VERIFICATION SCALE: 1" = 0'

DSN: AD
DRN: AD
CKD: KB

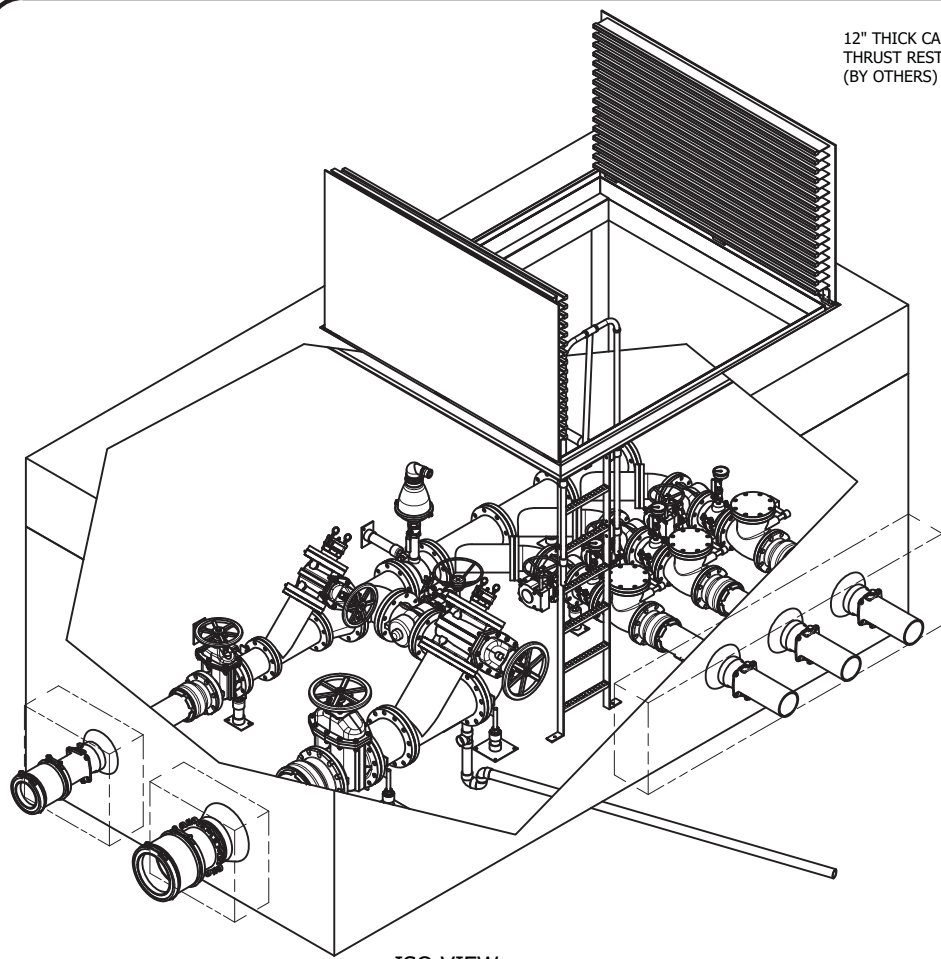
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SCAPOOSE INDUSTRIAL
SCAPOOSE, OR
WET WELL ASSEMBLY
COMPONENT DRAWING

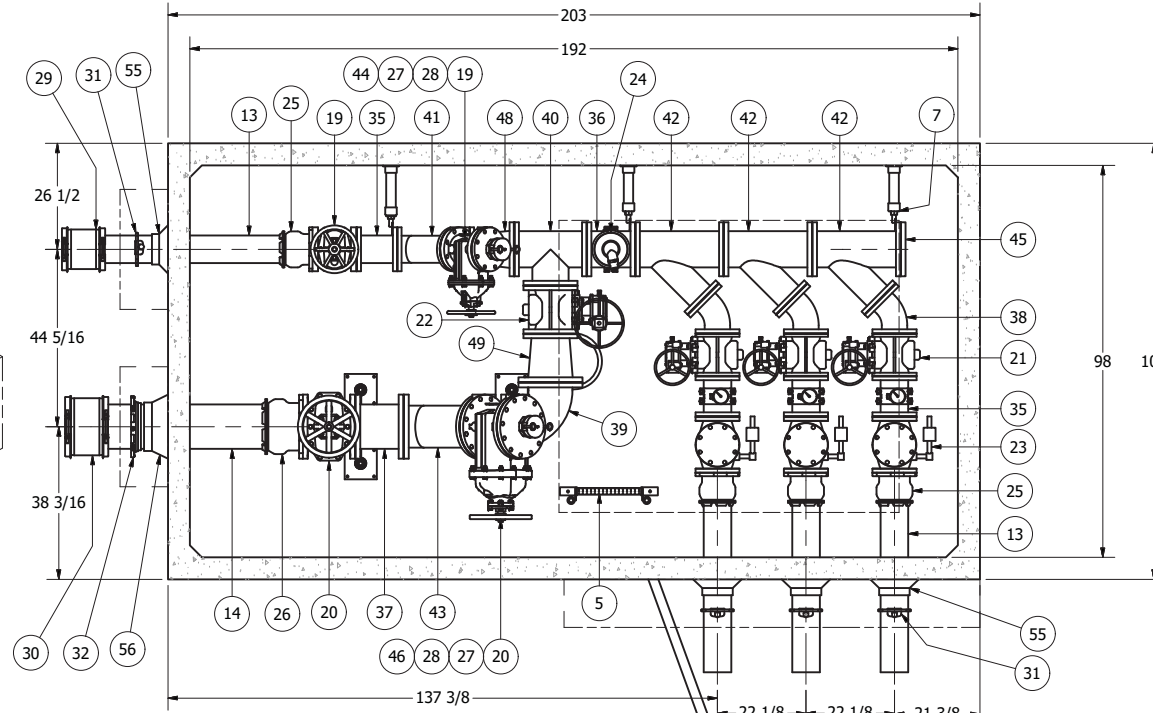
MECHANICAL SHEET
4 OF 6

FOR DESIGN REVIEW

12" THICK CAST-IN-PLACE CONCRETE THRUST RESTRAINT COLLAR ON EACH END. (BY OTHERS)



ISO VIEW
SCALE 1/24



SECTION L-L
SCALE 1/24

NOTE: TOP SLAB AND HATCH ARE H-20 OCCASIONAL TRAFFIC RATED

ITEM	QTY	STOCK NUMBER	PARTS LIST DESCRIPTION
2	1	20-CB816000	BASE - VV - 816
3	1	23-HH8100HE	HATCH - VV - 810 - H20
4	1	24-CT816HD0	TOP SLAB - VV - 816 - H20
5	1	25-LD061000	LADDER - 6ft-10in
6	5	25-PS00BASE	PIPE STAND - BASE
7	9	25-PS06S89F	PIPE STAND - FLANGE - 6in
8	4	25-PS06S92S	PIPE STAND - 304SS - 6in SADDLE
9	13	25-PS00BASE	PIPE STAND BASE - 304SS - 2in - 2 BOLT
10	4	25-PS10S89F	PIPE STAND - 10in FLANGE
11	1	25-PS10S92S	PIPE STAND - SAD S92 - 10in - NO BASE
12	9.4 ft	40-PP0200S4	PIPE - 304SS SCH40 - 2in DIA
13	16.5	40-PP0600D0	PIPE - DI - 6in DIA - CL52 - (3 @ 48in, 1 @ 54in)
14	4.3 ft	40-PP1000D0	PIPE - DI - 10in DIA
15	1	40-TT0208S4	NIPPLE - 304SS - 2in DIA x 8in
16	6	40-TT0802S4	NIPPLE - 304SS - 0.5in DIA x 2in
17	1	41-BV0200S6	BALL VALVE - 316SS - 2in
18	3	41-BV0800S6	BALL VALVE - 316SS - 0.5in
19	2	41-GV060HD0	GATE VALVE - 6in - HANDWHEEL
20	2	41-GV100HD0	GATE VALVE - 10in - HANDWHEEL
21	3	41-PV060HD0	PLUG VALVE - 6in - GEARED HANDWHEEL
22	1	41-PV080HD0	PLUG VALVE - 8in - GEARED HANDWHEEL
23	3	42-LW0600D0	CHECK VALVE - LEVER & WEIGHT - 6in
24	1	43-AV020ARI	VALVE - AIR VACUUM RELEASE - 2in - ARI
25	4	44-AD06RML	FLANGE ADAPTER - 6in - ALPHA
26	1	44-AD10RML	FLANGE ADAPTER - 10in - ALPHA
27	2	44-CL04ACAP	CAM LOCK - ALUM - 4in - SOCKET CAP
28	2	44-CL0404DM	CAM LOCK - ALUM - 4in - PLUG x MNPT
29	1	44-CP060AD0	COUPLING - 6in - ALPHA
30	1	44-CP10AD0	COUPLING - 10in - ROMAC ALPHA
31	4	44-RG060STR	RETAINER GLAND - 6in - HEAVY DUTY
32	1	44-RG100STR	HEAVY DUTY RETAINER GLAND - 10in
33	3	44-TS060H00	TAPPING SADDLE - 6in x .5in
34	1	44-TS080200	TAPPING SADDLE - 8in x 2in
35	4	45-FF060120	SPOOL - DI - 6in DIA x 12in - FLGXFLG
36	1	45-FF080120	SPOOL - DI - 8in DIA x 12in - FLGXFLG
37	1	45-FF100120	SPOOL - DI - 10in DIA x 12in - FLGXFLG
38	3	46-EL0645DI	ELBOW - DI - 6in x 45deg - FLGXFLG
39	1	46-EL1090DI	ELBOW - DI - 10in x 90deg - FLGXFLG
40	1	46-TE0808DI	TEE - DI - 8in x 8in - FLG x FLG
41	1	46-YL0606DI	WYE - DI - 6in - FLGXFLG
42	3	46-YL0806DI	WYE - DI - 8in x 6in - 45deg - FLGXFLG
43	1	46-YL1010DI	WYE - DI - 10in x 10in - FLG x FLG
44	1	48-FL0604D0	FLANGE - DI - 6in - BLIND - 4" FNPT TAP
45	1	48-FL0808D0	FLANGE - DI - 8in - BLIND
46	1	48-FL1004D0	FLANGE - DI - 10in - BLIND - 4in TAP
47	3	48-PL0000HX	PLUG - 304SS - .25in NPT - HEX SOCKET
48	1	48-RD0806DE	REDUCER - DI - ECCENTRIC - 8in X 6in
49	1	48-RD1008DE	REDUCER - DI - 10in x 8in - ECCENTRIC
50	17	49-GS060000	GASKET - FLANGE - 6in
51	8	49-GS080000	GASKET - FLANGE - 8in
52	6	49-GS100000	GASKET - FLANGE - 10in
53	53	51-BT060000	JOINT WRAP - 6in - BOA TAPE
54	58	51-SE0101SL	JOINT SEALANT - 1in - CONSEAL CS-202
55	4	59-KB1206DI	KOR-N-SEAL - 12in CORE x 6in DIPS PIPE
56	1	59-KB161000	KOR-N-SEAL - 16in CORE x 10in PIPE
57	10.0 ft	70-PP0200P4	PIPE - PVC SCH40 - 2in DIA
58	1	76-EL029040	ELBOW - PVC SCH40 - 2in x 90deg - SLIP
59	2	76-EL02904S	ELBOW - PVC SCH40 - 2in x 90deg - SLIP x SPIG
60	1	76-TE020240	TEE - PVC SCH40 - 2in x 2in - SLIP
61	3	81-PG3H00QB	PRESSURE GAUGE - 3.5in DIA x .25in MNPT BACK - xxx#
62	3	83-GI0HF0QF	DIAPHRAGM SEAL - 0.5in FNPT x 0.25in FNPT
63	3	84-PX0000TR	PROXIMITY SWITCH - TURCK
64	3	84-PX00CCTR	PROXIMITY SWITCH - CONNECTING CABLE - TURCK

NOTE: CONTRACTOR TO SEAL ALL CONCRETE JOINTS AND PIPE PENETRATIONS WITH NON-SHRINK GROUT

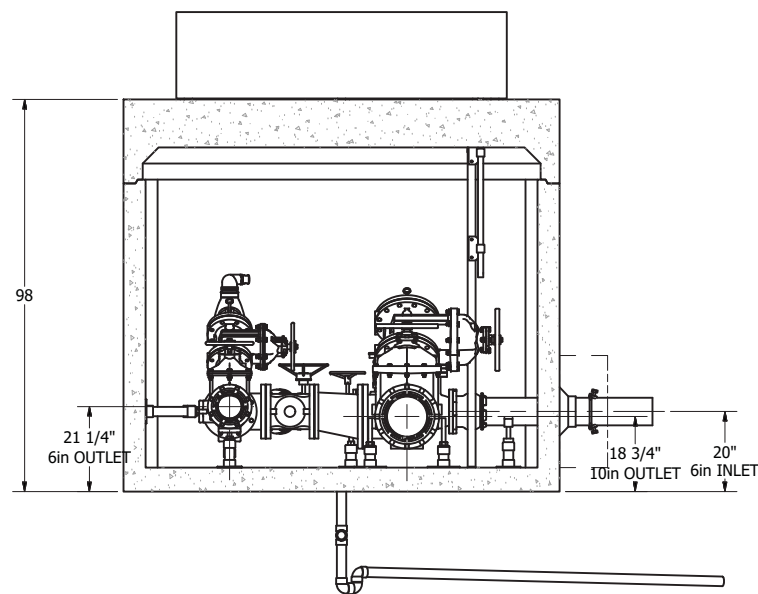
FOR DESIGN REVIEW

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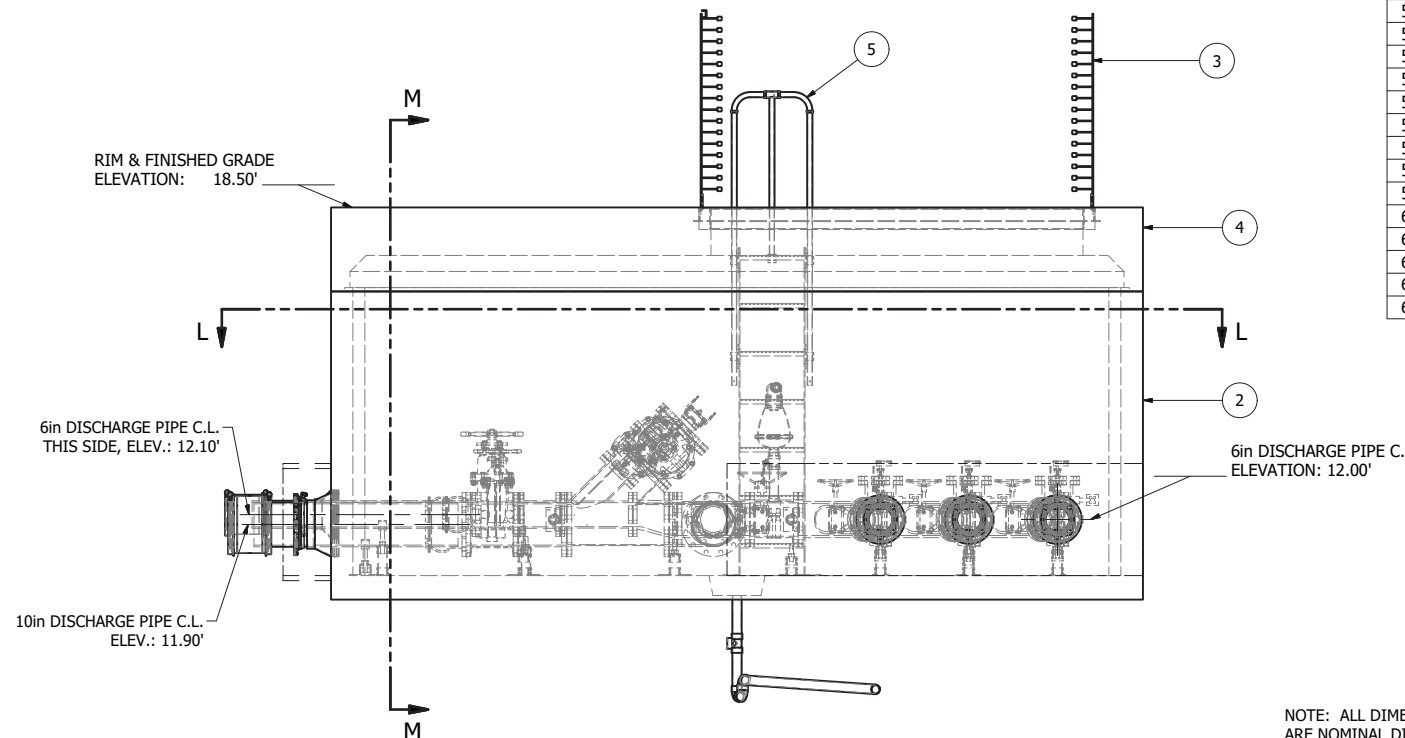
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FORCE MAIN (BY OTHERS)
SIZE: 6" & 10"
TYPE: PVC C900 DR18

**816 VALVE VAULT
6" & 10" PIPING AND VALVES
WITH PUMPING PORT & ARV**



SECTION M-M
SCALE 1/24



RIM & FINISHED GRADE
ELEVATION: 18.50'

6in DISCHARGE PIPE C.L.
THIS SIDE, ELEV.: 12.10'

10in DISCHARGE PIPE C.L.
ELEV.: 11.90'

6in DISCHARGE PIPE C.L.
ELEVATION: 12.00'

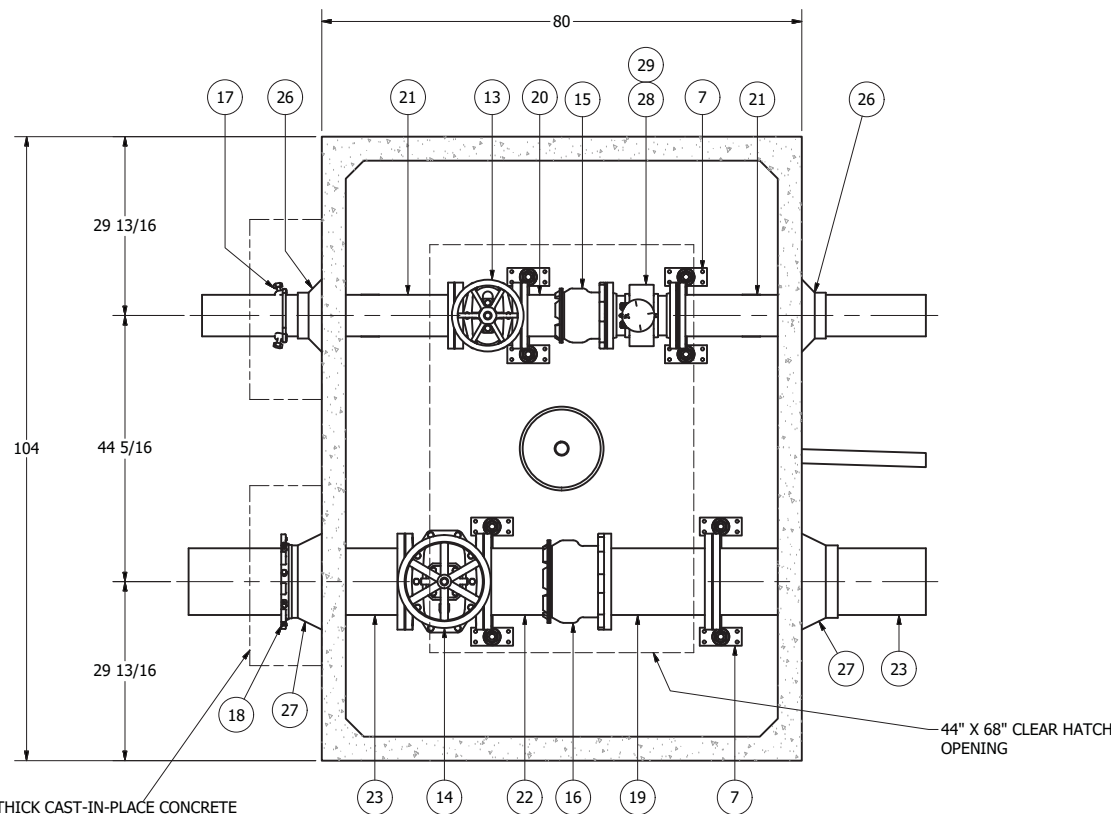
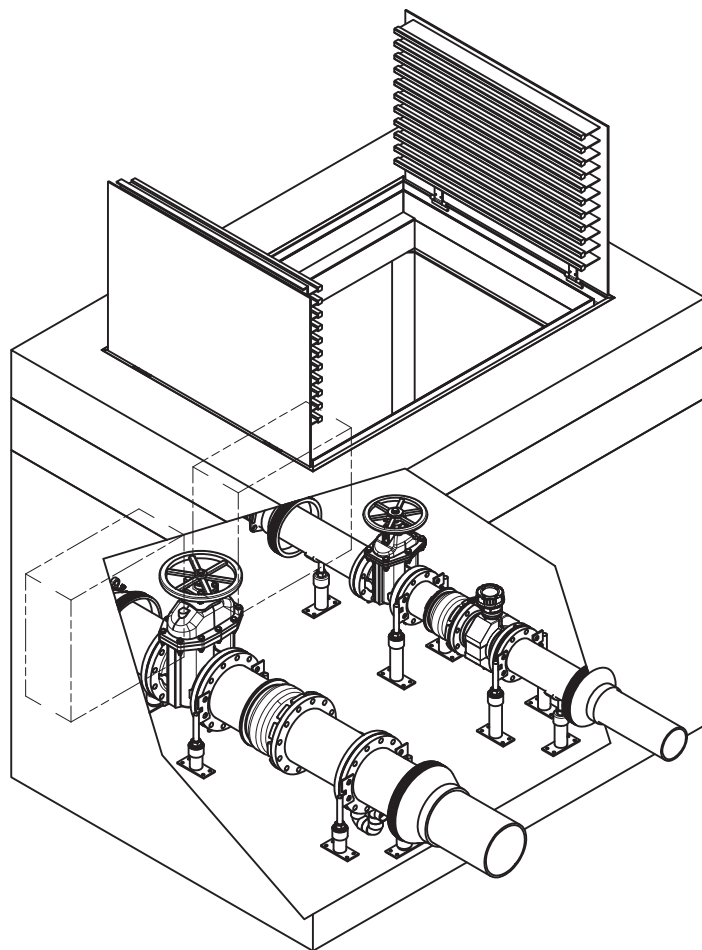
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AD	AD	AD	BY
6/7/2019	3/20/2019	1	REV
REMOVED HOIST SOCKET			
REVISED PER 1-29-19 COMMENTS			
REVISED PER 8-9-18 COMMENTS			
DESCRIPTION			
REVISION HISTORY			

VERIFY SCALE
0 1"
DATE: 3-28-18

ROMTEC UTILITIES
18240 NORTH BANK ROAD
ROSEBURG, OREGON 97470
PHONE: (541) 496-9678
WWW.ROMTECUTILITIES.COM

SCAPOOSE INDUSTRIAL
SCAPOOSE, OR
**VALVE VAULT ASSEMBLY
COMPONENT DRAWING**



12" THICK CAST-IN-PLACE CONCRETE THRUST RESTRAINT COLLAR ON EACH END. (BY OTHERS)

SECTION T-T
SCALE 1 / 16

NOTE: TOP SLAB AND HATCH ARE H-20 OCCASIONAL TRAFFIC RATED

		PARTS LIST		
ITEM	QTY	STOCK NUMBER	DESCRIPTION	
2	1	20-CB687000	BASE - VV - 687	
3	1	22-CB687012	RISER - VV - 687 x 1ft	
4	1	23-HH6870HE	HATCH - VV - 687 - H20	
5	1	24-CT687HD0	TOP SLAB - VV - 687 - H20	
6	1	25-DR999999	DRAIN - VALVE VAULT	
6.1	17.8 ft	70-PP0200P4	PIPE - PVC SCH40 - 2in DIA	
6.2	3	76-EL029040	ELBOW - PVC SCH40 - 2in x 90deg - SLIP	
7	12	25-PS00BAPL	PIPE STAND BASE PLATE - 304SS	
8	4	25-PS06S89F	PIPE STAND - FLANGE - 6in	
9	2	25-PS06S92S	PIPE STAND - 304SS - 6in SADDLE	
10	4	25-PS10S89F	PIPE STAND - 10in FLANGE	
11	2	25-PS10S92S	PIPE STAND - SAD S92 - 10in - NO BASE	
12	6.5 ft	40-PP0200S4	PIPE - 304SS SCH40 - 2in DIA	
13	1	41-GV060HD0	GATE VALVE - 6in - HANDWHEEL	
14	1	41-GV100HD0	GATE VALVE - 10in - HANDWHEEL	
15	1	44-AD06RMAL	FLANGE ADAPTER - 6in - ALPHA	
16	1	44-AD10RMAL	FLANGE ADAPTER - 10in - ALPHA	
17	1	44-RG060STR	RETAINER GLAND - 6in - HEAVY DUTY	
18	1	44-RG100STR	HEAVY DUTY RETAINER GLAND - 10in	
19	1	45-FF100180	SPOOL - DI - 10in DIA x 18in - FLGxFLG	
20	1	45-FP060120	SPOOL - DI - 6in DIA x 12in - FLGxPE	
21	2	45-FP060420	SPOOL - DI - 6in DIA x 42in - FLGxPE	
22	1	45-FP100180	SPOOL - DI - 10in DIA x 18in - FLGxPE	
23	2	45-FP100360	SPOOL - DI - 10in DIA x 36in - FLGxPE	
24	5	49-GS060000	GASKET - FLANGE - 6in	
25	3	49-GS100000	GASKET - FLANGE - 10in	
26	2	59-KB120DI	KOR-N-SEAL - 12in CORE x 6in DIPS PIPE	
27	2	59-KB161000	KOR-N-SEAL - 16in CORE x 10in PIPE	
28	1	82-FM060LEH	FLOWMETER - 6in - ENDRESS HAUSER - 5L4C1F DN150	
29	2	82-GR060000	GROUNDING RING - 6in	
30	72.5	51-SE0101SL	JOINT SEALANT - 1in - CONSEAL CS-202	
31	62	51-BT060000	JOINT WRAP - 6in - BOA TAPE	

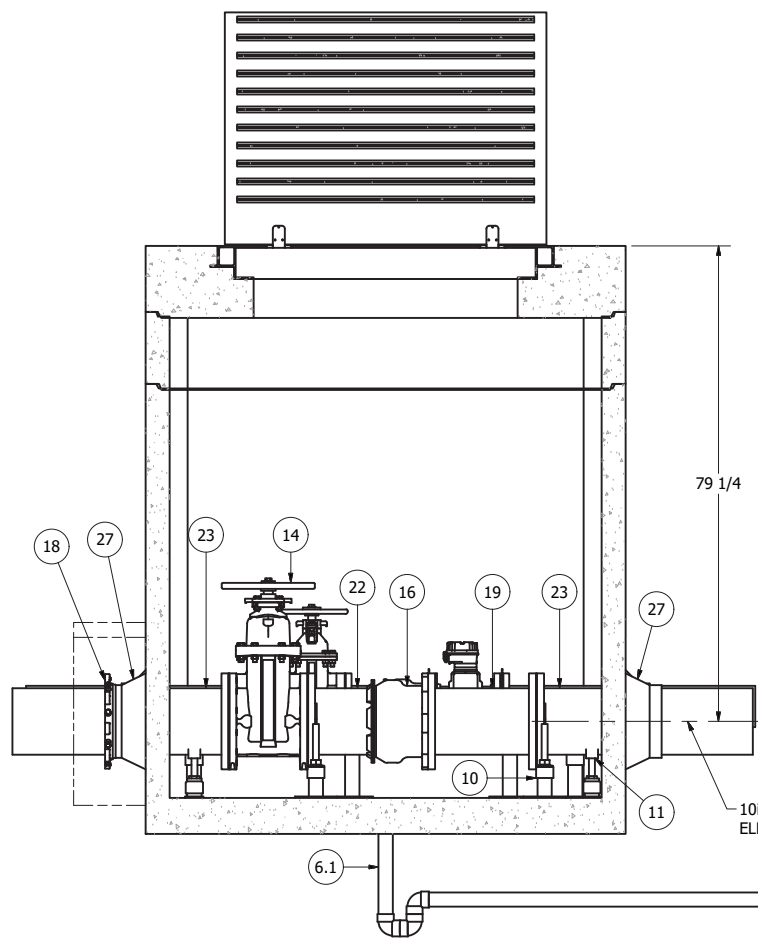
NOTE: CONTRACTOR TO SEAL ALL CONCRETE JOINTS AND PIPE PENETRATIONS WITH NON-SHRINK GROUT

VERIFY SCALE

0 1"

DATE: 6/7/2019

REVISION HISTORY



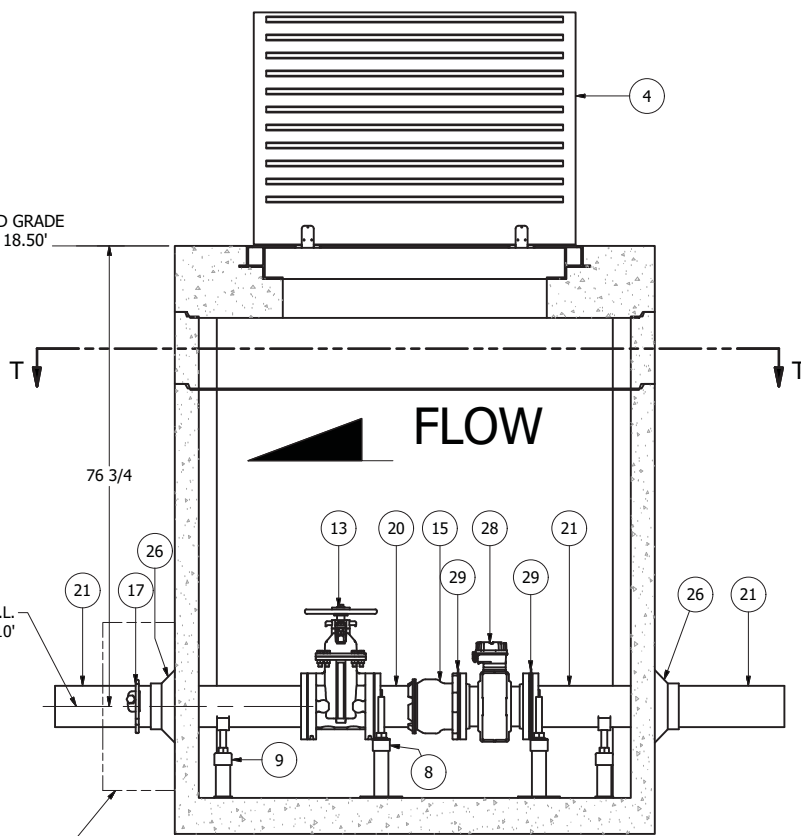
SECTION P-P
SCALE 1 / 16

12" THICK CAST-IN-PLACE CONCRETE THRUST RESTRAINT COLLAR ON EACH END. (BY OTHERS)

RIM & FINISHED GRADE ELEVATION: 18.50'

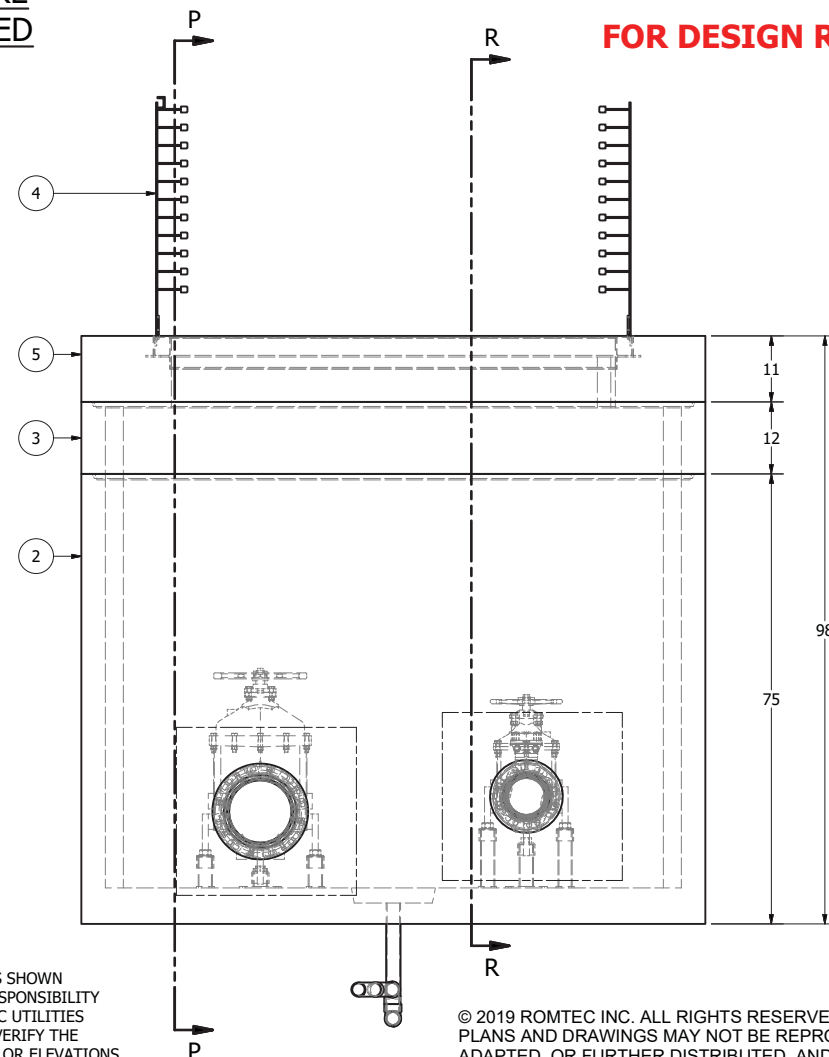
6in DISCHARGE C.L. ELEV.: 12.10'

10in DISCHARGE C.L. ELEV.: 11.90'



SECTION R-R
SCALE 1 / 16

NOTE: ALL DIMENSIONS AND ELEVATIONS SHOWN ARE NOMINAL DIMENSIONS. IT IS THE RESPONSIBILITY OF THE ON-SITE CONTRACTOR OR ROMTEC UTILITIES CUSTOMER (NOT ROMTEC UTILITIES) TO VERIFY THE ACCURACY OF ANY CRITICAL DIMENSIONS OR ELEVATIONS PRIOR TO SETTING OR INSTALLING ANY EQUIPMENT.



FOR DESIGN REVIEW

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SCAPOOSE INDUSTRIAL

SCAPOOSE, OR

FLOW METER VAULT

6" METER & SPACE FOR 10"



Appendix C

Smoke Testing

Picture ID	Date	MH Tested	Address	Defect Type	Recommended Action	Photo
1	7/20/2016	0355	32849 NW Bella Vista Dr	open C/O	Notify property owner, seal C/O	Y
2	7/20/2016	0386	53094 NW 11th St	no smoke	Investigate, notify property owner	N
3	7/20/2016	0386	32969 NW Bella Vista Dr	no smoke	Investigate, notify property owner	N
4	7/20/2016	0438	52828 NW Five Peak Ter	open C/O	Notify property owner, seal C/O	Y
5	7/20/2016	0225	52811 NE View Ter	indoor (toilet)	Notify property owner	N
6	7/20/2016	0410	52780 NW Willow Ln	open C/O	Notify property owner, seal C/O	Y
7	7/20/2016	0410	52770 NW Willow Ln	leaking C/O	Notify property owner, seal C/O	Y
8	7/20/2016	0410	52895 NE 7th St	cross connection (downspout)	Notify property owner, remove cross connection	Y
9	7/21/2016	0391	52859 NW 1st St	no smoke	Investigate, notify property owner	N
10	7/21/2016	0391	33349 NW Wickstrom St	indoor (dry P-trap)	Notify property owner	N
11	7/21/2016	0108	52122 Hoag Ter	cross connection (downspout)	Notify property owner, remove cross connection	Y
12	7/21/2016	0109	33114 Felisha Wy	cross connection (driveway drain)	Notify property owner, remove cross connection	Y
13	7/21/2016	0050	Ashley Ct and JP West Rd	open C/O	Under construction, in future check is sealed	Y
14	7/21/2016	0462	32676 JP West Rd	open C/O	Notify property owner, seal C/O	Y
15	7/21/2016	0472	MH 0469	MH	Re-grout or replace MH rim	Y
16	7/21/2016	0472	MH 0479	MH	Re-grout or replace MH rim	N
17	7/26/2016	0632	52239 SW Keys Rd	indoor (dry P-trap)	Notify property owner	N
18	7/26/2016	0346	33343 SW Rogers Rd	cross connection (downspout)	Notify property owner, remove cross connection	Y
19	7/26/2016	0428	52844 NE 2nd St	open C/O	Notify property owner, seal C/O	Y
20	7/26/2016	0425	52657 NE 3rd St	open C/O	Notify property owner, seal C/O	Y
21	7/26/2016	0425	33318 Royal Dr	open C/O	Notify property owner, seal C/O	Y
22	7/26/2016	0607	MH 0614	MH	Re-grout or replace MH rim	Y
23	7/26/2016	0292	33264 Julie Ct	broken C/O	Notify property owner, seal C/O	Y
24	7/26/2016	0594	52313 Columbia River Hwy	indoor (bathroom)	Notify property owner	N
25	7/26/2016	0594	334019 SW Maple St	open C/O (and indoor, washer)	Notify property owner, seal C/O	N
26	7/27/2016	0042	52753 NE Kern Ct	open C/O	Notify property owner, seal C/O	Y
27	7/27/2016	0042	33790 NE Kern Ct	open C/O	Notify property owner, seal C/O	Y
28	7/27/2016	0042	MH 0041	MH	Re-grout or replace MH rim	Y
29	7/27/2016	0174	34371 Egret Ln	open C/O	Notify property owner, seal C/O	Y
30	7/27/2016	0140	51704 SE 4th St	broken C/O	Notify property owner, seal C/O	Y

1. 32849 NW Bella Vista Dr
Open C/O



2. 53094 NW 11th St
No smoke out of vents

No Picture

3. 32969 NW Bella Vista Dr
No smoke out of vents

No Picture

4. 52828 NW Five Peak Ter
Open C/O (around back of house)



5. 52811 NE View Ter

Indoor; toilet smoking from at connection with floor

No Picture

6. 52780 NW Willow Ln
Open C/O



7. 52770 NW Willow Ln
Leaking C/O cap



8. 52895 NE 7th St

Cross connection; downspout on front porch smoking



9. 52859 NW 1st St

No smoke out of vents

No Picture

10. 33349 NW Wickstrom St
Indoor; dry P-trap in bathroom

No Picture

11. 52122 Hoag Ter

Cross connection; downspout, driveway drain smoking



12. 33114 Felisha Way

Cross connection; driveway drain connected to sewer line



13. Ashley Ct and JP West Rd (SE corner house)

Open C/O in front; under construction, will most likely be sealed later on



14. 32676 JP West Rd (SW Taylor St side of house)
Open C/O



15. MH0469
MH rim smoking



16. MH0479

MH rim looks to be smoking; in field

No Picture

17. 52239 SW Keys Rd
Indoor; dry P-trap

No Picture

18. 33343 SW Rogers Rd

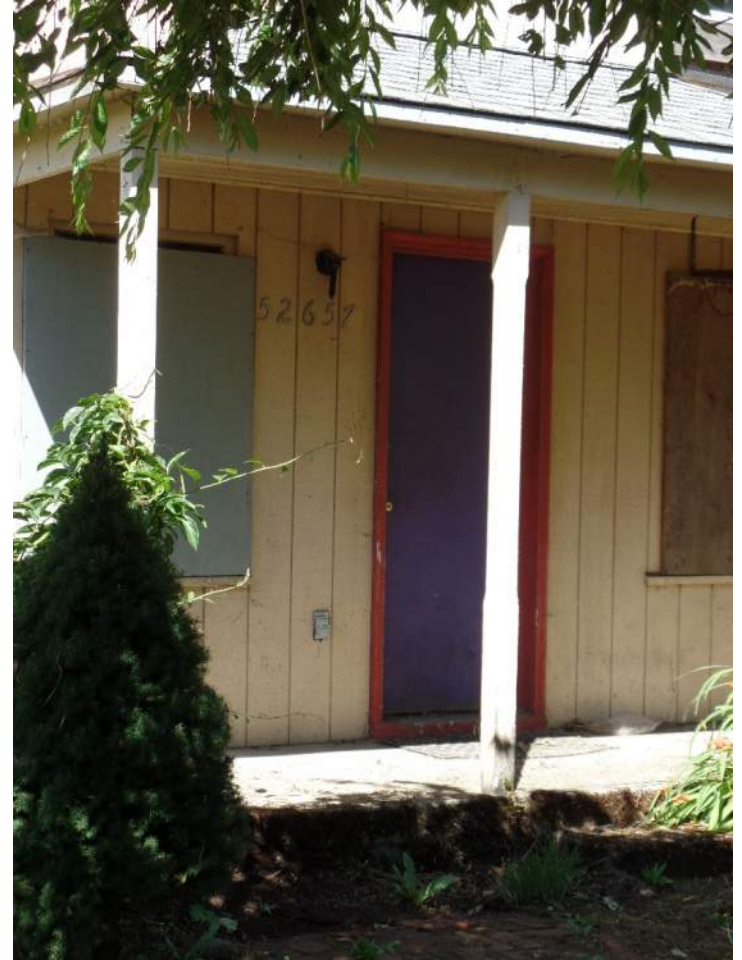
Cross connection; downspout over garage smoking



19. 52844 NE 2nd St
Open C/O



20. 52657 NE 3rd St (around back side of house)
Open C/O



21. 33318 Royal Dr
Open C/O



22. MH0614
MH rim smoking



23. 33264 Julie Ct
Broken C/O



24. 52313 Columbia River Hwy (US Bank)
Indoor; light smoke in the bathroom

No Picture

25. 334019 SW Maple St
Open C/O; indoor, washer drain smoking

No Picture

26. 52753 NE Kern Ct

Open C/O (in metal valve can, but uncapped inside can)



27. 33790 NE Kern Ct
Open C/O



28. MH0041

MH rim smoking (in addition to smoking from holes in lid)

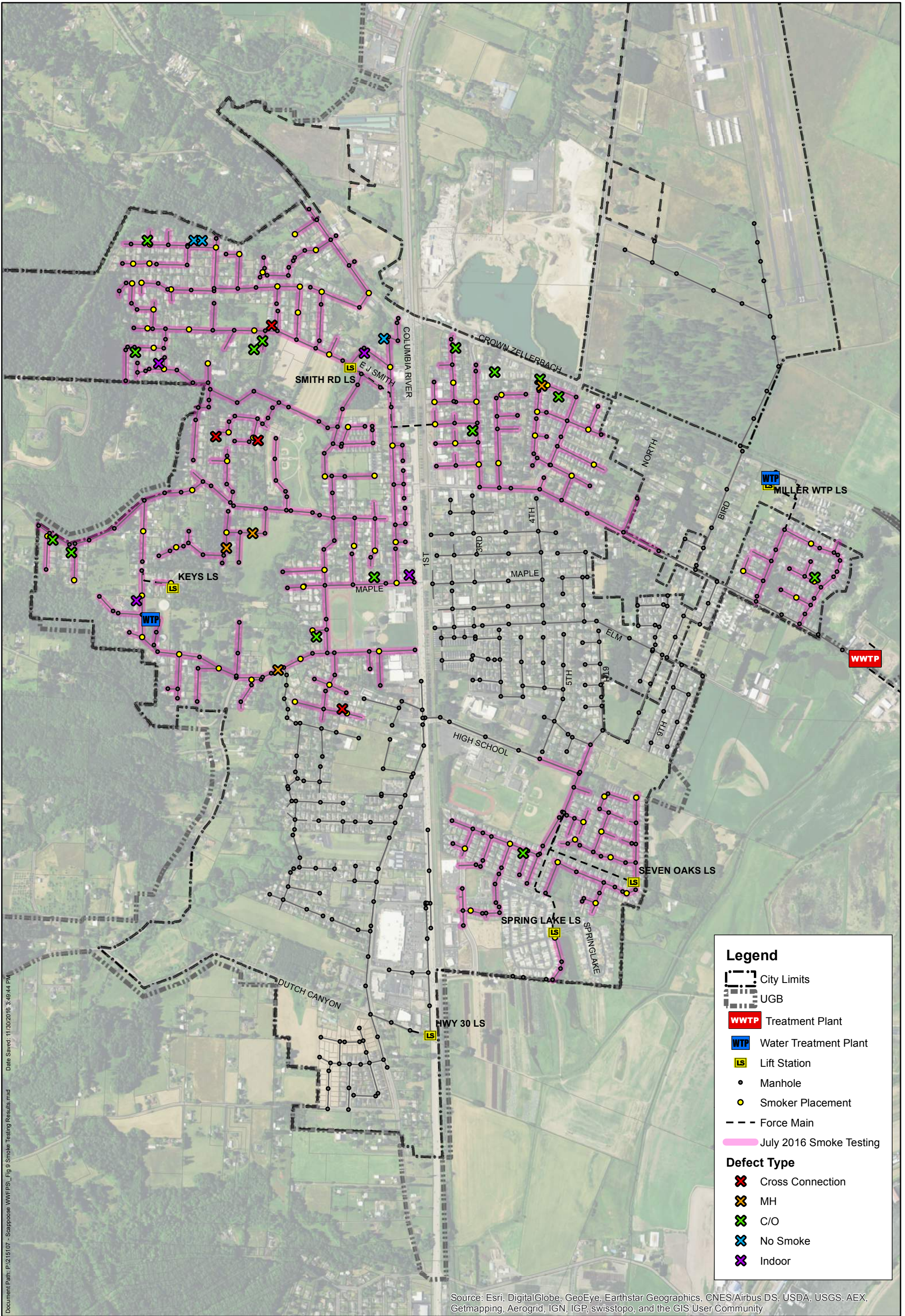


29. 34371 Egret Ln
Open C/O



30. 51704 SE 4th St
Broken C/O





Date Saved: 11/30/2016 3:49:44 PM
Document Path: P:\215107 - Scappoose WWFPS - Fig 9 Smoke Testing Results.mxd

Legend

- City Limits
- UGB
- Treatment Plant
- Water Treatment Plant
- Lift Station
- Manhole
- Smoker Placement
- Force Main
- July 2016 Smoke Testing

Defect Type

- Cross Connection
- MH
- C/O
- No Smoke
- Indoor

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Figure: X	Title: SMOKE TESTING Completed in 2016	Project: WWFPS	Prepared for: CITY OF SCAPOOSE, OR		
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Appendix D

Model Data

Existing (2020) System

Existing (2020) System Manholes: 5-yr, 24-hr Storm Event

Inputs			Outputs					
Manhole ID	Invert Elevation (ft)	Rim Elevation (ft)	Max. Depth (ft)	Max. HGL (ft)	Freeboard (ft)	Max. Inflow (gpm)	Max. Surcharge Height Above Crown (ft)	Total Flood Vol. (MG)
AIRPORTEA_JUNC	12.00	18.50	-	15.9	-	661	3.4	0.0
CHARLES_JUNC	39.07	46.25	-	90.0	-	429	50.5	0.0
MH0018	24.82	30.70	0.3	25.1	5.6	238	0.0	0.0
MH0019	16.11	22.50	0.2	16.3	6.2	232	0.0	0.0
MH0020	17.89	23.70	0.2	18.1	5.6	232	0.0	0.0
MH0021	19.52	25.00	0.2	19.7	5.3	232	0.0	0.0
MH0022	22.11	26.20	0.2	22.3	3.9	232	0.0	0.0
MH0023	23.73	27.90	0.3	24.0	3.9	237	0.0	0.0
MH0024	29.94	36.10	0.1	30.1	6.0	48	0.0	0.0
MH0025	32.48	38.60	0.1	32.6	6.0	45	0.0	0.0
MH0026	35.05	40.22	0.1	35.2	5.1	43	0.0	0.0
MH0027	37.31	42.61	0.1	37.4	5.2	40	0.0	0.0
MH0028	30.24	36.20	0.1	30.4	5.8	83	0.0	0.0
MH0029	36.28	42.30	0.1	36.4	5.9	90	0.0	0.0
MH0030	41.45	47.50	0.2	41.6	5.9	129	0.0	0.0
MH0031	44.88	51.00	0.2	45.1	5.9	192	0.0	0.0
MH0033	45.39	53.00	0.5	45.9	7.1	423	0.0	0.0
MH0048	55.13	62.73	0.7	55.8	6.9	378	0.0	0.0
MH0049	56.35	67.27	0.5	56.8	10.5	375	0.0	0.0
MH0059	6.60	15.34	0.1	6.7	8.7	14	0.0	0.0
MH0061	7.90	15.78	0.1	8.0	7.8	11	0.0	0.0
MH0098	55.11	62.41	0.6	55.7	6.7	380	0.0	0.0
MH0099	53.89	62.35	0.4	54.3	8.0	381	0.0	0.0
MH0125	46.10	52.50	0.1	46.2	6.3	19	0.0	0.0
MH0126	46.77	55.20	0.1	46.9	8.3	16	0.0	0.0
MH0127	47.25	56.50	0.1	47.3	9.2	12	0.0	0.0
MH0128	48.42	55.60	0.1	48.5	7.1	8	0.0	0.0
MH0130	12.35	18.18	0.3	12.7	5.5	78	0.0	0.0
MH0131	12.66	20.62	0.2	12.9	7.8	75	0.0	0.0
MH0132	13.76	21.50	0.1	13.9	7.6	16	0.0	0.0
MH0133	47.73	59.93	0.9	48.6	11.3	399	0.1	0.0
MH0136	13.91	17.27	0.1	14.1	3.2	13	0.0	0.0
MH0137	14.13	17.76	0.1	14.2	3.6	10	0.0	0.0
MH0154	7.24	17.70	0.1	7.4	10.4	41	0.0	0.0
MH0173	1.34	12.70	1.4	2.7	10.0	3070	0.0	0.0
MH0182	35.42	46.90	0.2	35.6	11.3	93	0.0	0.0
MH0184	37.22	47.01	0.2	37.4	9.6	72	0.0	0.0
MH0198	54.48	65.09	0.2	54.7	10.4	77	0.0	0.0
MH0202	54.05	60.80	0.2	54.2	6.6	81	0.0	0.0
MH0203	53.47	59.50	0.2	53.7	5.8	85	0.0	0.0
MH0204	52.93	58.50	0.2	53.1	5.4	93	0.0	0.0

Existing (2020) System Manholes: 5-yr, 24-hr Storm Event

Inputs			Outputs					
Manhole ID	Invert Elevation (ft)	Rim Elevation (ft)	Max. Depth (ft)	Max. HGL (ft)	Freeboard (ft)	Max. Inflow (gpm)	Max. Surcharge Height Above Crown (ft)	Total Flood Vol. (MG)
MH0205	53.21	59.40	0.2	53.4	6.0	87	0.0	0.0
MH0206	52.53	60.07	0.2	52.7	7.3	96	0.0	0.0
MH0207	51.70	59.44	0.3	52.0	7.4	99	0.0	0.0
MH0212	15.29	22.20	0.2	15.5	6.7	238	0.0	0.0
MH0214	36.76	46.96	0.8	37.6	9.4	729	0.0	0.0
MH0215	11.48	16.84	0.3	11.8	5.0	348	0.0	0.0
MH0251	52.36	61.66	1.0	53.4	8.3	385	0.4	0.0
MH0254	49.80	57.40	0.2	50.0	7.4	113	0.0	0.0
MH0255	49.40	58.00	0.2	49.6	8.4	116	0.0	0.0
MH0256	51.14	62.00	0.2	51.3	10.7	106	0.0	0.0
MH0257	51.52	61.40	0.5	52.0	9.4	102	0.0	0.0
MH0262	49.00	61.60	1.2	50.2	11.4	393	0.5	0.0
MH0284	57.40	69.80	0.5	57.9	11.9	372	0.0	0.0
MH0285	58.36	68.49	0.5	58.8	9.7	368	0.0	0.0
MH0286	59.55	64.60	0.5	60.1	4.5	364	0.0	0.0
MH0287	60.55	63.00	0.5	61.0	2.0	358	0.0	0.0
MH0290	10.54	17.30	0.7	11.2	6.1	701	0.0	0.0
MH0291	12.19	16.50	0.5	12.7	3.8	384	0.0	0.0
MH0293	41.23	53.03	0.5	41.7	11.3	535	0.0	0.0
MH0304	45.35	56.93	0.6	45.9	11.0	402	0.0	0.0
MH0305	43.76	58.93	0.4	44.1	14.8	403	0.0	0.0
MH0306	44.24	58.93	0.5	44.8	14.2	400	0.0	0.0
MH0307	46.91	59.81	0.6	47.5	12.3	402	0.0	0.0
MH0308	47.07	59.77	0.6	47.7	12.1	403	0.0	0.0
MH0309	48.77	61.37	0.4	49.2	12.2	396	0.0	0.0
MH0310	50.47	61.37	0.4	50.9	10.5	390	0.0	0.0
MH0311	52.17	61.77	0.5	52.7	9.1	389	0.0	0.0
MH0318	44.20	51.90	0.3	44.5	7.4	161	0.0	0.0
MH0319	44.48	50.40	0.3	44.8	5.6	158	0.0	0.0
MH0320	44.85	53.00	0.3	45.2	7.8	154	0.0	0.0
MH0321	45.16	53.00	0.3	45.5	7.5	151	0.0	0.0
MH0322	45.40	51.30	0.3	45.7	5.6	148	0.0	0.0
MH0323	45.68	57.30	0.3	46.0	11.3	145	0.0	0.0
MH0324	45.80	57.80	0.3	46.1	11.7	142	0.0	0.0
MH0325	46.78	59.20	0.3	47.1	12.1	135	0.0	0.0
MH0326	47.22	58.00	0.3	47.5	10.5	130	0.0	0.0
MH0327	47.39	58.20	0.3	47.7	10.5	126	0.0	0.0
MH0328	47.73	60.90	0.3	48.0	12.9	122	0.0	0.0
MH0329	47.80	61.00	0.3	48.1	12.9	119	0.0	0.0
MH0373	41.05	56.81	0.4	41.5	15.3	418	0.0	0.0
MH0376	45.30	53.72	0.7	46.0	7.7	1648	0.0	0.0

Existing (2020) System Manholes: 5-yr, 24-hr Storm Event

Inputs			Outputs					
Manhole ID	Invert Elevation (ft)	Rim Elevation (ft)	Max. Depth (ft)	Max. HGL (ft)	Freeboard (ft)	Max. Inflow (gpm)	Max. Surcharge Height Above Crown (ft)	Total Flood Vol. (MG)
MH0393	32.07	44.96	0.8	32.9	12.0	1410	0.0	0.0
MH0395	32.47	44.63	0.9	33.3	11.3	804	0.0	0.0
MH0400	38.60	50.54	1.4	40.0	10.6	442	0.7	0.0
MH0401	37.80	48.36	0.8	38.6	9.8	445	0.0	0.0
MH0402MTR2	36.60	49.66	0.3	36.9	12.8	448	0.0	0.0
MH0421	34.22	40.38	0.9	35.1	5.3	787	0.0	0.0
MH0422	33.73	41.96	0.9	34.6	7.4	788	0.0	0.0
MH0423	32.88	39.96	0.8	33.7	6.2	800	0.0	0.0
MH0431	48.61	57.33	2.3	51.0	6.4	1637	1.0	0.0
MH0473	37.47	47.96	0.8	38.3	9.7	728	0.0	0.0
MH0474	38.50	47.96	0.3	38.8	9.2	127	0.0	0.0
MH0483	36.26	46.96	0.8	37.0	9.9	731	0.0	0.0
MH0484MTR1	35.97	42.17	0.8	36.8	5.4	733	0.0	0.0
MH0485	35.25	44.96	0.8	36.0	8.9	736	0.0	0.0
MH0486	34.80	44.96	0.8	35.6	9.4	772	0.0	0.0
MH0487	39.20	49.16	0.7	39.9	9.3	602	0.0	0.0
MH0488	38.56	48.50	0.7	39.2	9.3	604	0.0	0.0
MH0489	38.10	48.50	0.7	38.8	9.7	609	0.0	0.0
MH0506	47.46	57.10	0.7	48.2	8.9	1649	0.0	0.0
MH0507	47.87	57.17	1.4	49.3	7.9	1645	0.2	0.0
MH0510	48.24	56.83	1.9	50.2	6.6	1642	0.7	0.0
MH0513	50.55	57.97	1.1	51.7	6.3	1763	0.0	0.0
MH0514	52.19	61.43	0.8	53.0	8.5	1966	0.0	0.0
MH0525	44.12	53.30	0.7	44.8	8.5	1650	0.0	0.0
MH0526	40.43	50.20	0.5	41.0	9.2	1744	0.0	0.0
MH0530	32.47	46.37	0.7	33.2	13.2	1752	0.0	0.0
MH0533	29.26	40.00	0.6	29.8	10.2	1757	0.0	0.0
MH0534	19.11	32.37	0.6	19.7	12.7	1760	0.0	0.0
MH0536	11.19	20.49	0.6	11.8	8.7	1763	0.0	0.0
MH0537MTR5	2.69	15.50	1.2	3.9	11.6	2122	0.0	0.0
MH0549	30.96	41.05	0.1	31.0	10.0	23	0.0	0.0
MH0561	14.01	22.83	0.1	14.1	8.8	5	0.0	0.0
MH0565	20.91	30.81	0.1	21.0	9.8	30	0.0	0.0
MH0566	18.40	30.50	0.1	18.5	12.0	34	0.0	0.0
MH0567	10.03	19.96	0.1	10.1	9.8	38	0.0	0.0
MH0568	5.24	16.66	0.7	5.9	10.7	722	0.0	0.0
MH0569	5.04	15.78	0.7	5.8	10.0	736	0.0	0.0
MH0570	6.33	16.71	0.8	7.1	9.6	703	0.0	0.0
MH0571	7.16	16.71	0.8	7.9	8.8	708	0.0	0.0
MH0572	4.11	15.92	0.7	4.9	11.1	743	0.0	0.0
MH0573	3.68	13.48	0.7	4.4	9.1	745	0.0	0.0

Existing (2020) System Manholes: 5-yr, 24-hr Storm Event

Inputs			Outputs					
Manhole ID	Invert Elevation (ft)	Rim Elevation (ft)	Max. Depth (ft)	Max. HGL (ft)	Freeboard (ft)	Max. Inflow (gpm)	Max. Surcharge Height Above Crown (ft)	Total Flood Vol. (MG)
MH0574	2.41	14.50	1.3	3.7	10.8	2847	0.0	0.0
MH0575MTR4	4.64	15.60	0.8	5.4	10.2	739	0.0	0.0
MH0576	3.26	11.86	0.8	4.0	7.8	748	0.0	0.0
MH0577	1.89	14.17	1.4	3.3	10.9	3044	0.0	0.0
MH0578	1.05	12.34	1.4	2.4	9.9	3079	0.0	0.0
MH0579	0.77	13.82	1.3	2.0	11.8	3095	0.0	0.0
MH0580	0.19	12.82	1.1	1.3	11.5	3096	0.0	0.0
MH0581	1.58	14.95	1.4	3.0	12.0	3055	0.0	0.0
MH0591	39.31	52.41	0.3	39.6	12.8	425	0.0	0.0
MH0594	46.00	57.96	0.0	46.0	11.9	3	0.0	0.0
MH0595	45.46	58.02	0.1	45.5	12.5	8	0.0	0.0
MH0597	43.86	54.12	0.1	43.9	10.2	12	0.0	0.0
MH0598	39.79	50.94	0.7	40.5	10.5	598	0.0	0.0
MH0603	40.70	52.00	0.7	41.4	10.6	585	0.0	0.0
MH0604	41.61	53.03	0.8	42.4	10.7	532	0.0	0.0
MH0605	42.05	53.03	0.3	42.4	10.7	24	0.0	0.0
MH0606	42.11	52.71	0.8	42.9	9.8	519	0.0	0.0
MH0607	42.57	52.83	0.6	43.2	9.7	516	0.0	0.0
MH0608	43.08	51.78	0.6	43.7	8.1	513	0.0	0.0
MH0609	43.25	53.73	0.1	43.3	10.4	7	0.0	0.0
MH0610	43.61	56.03	0.0	43.7	12.4	3	0.0	0.0
MH0614	43.20	51.20	0.6	43.8	7.4	354	0.0	0.0
MH0615	44.20	52.70	0.3	44.5	8.2	351	0.0	0.0
MH0616	45.12	52.60	0.5	45.6	7.0	349	0.0	0.0
MH0634	26.77	39.43	0.4	27.1	12.3	427	0.0	0.0
MH0635	8.00	15.71	0.7	8.7	7.0	667	0.0	0.0
MH0636	8.85	20.71	0.8	9.6	11.1	667	0.0	0.0
MH0637MTR3	9.45	20.49	0.7	10.2	10.3	680	0.0	0.0
MH0638	10.49	17.78	0.7	11.2	6.6	680	0.0	0.0
MH0639	12.85	21.91	0.1	12.9	9.0	11	0.0	0.0
MH0640	13.11	21.91	0.1	13.2	8.7	9	0.0	0.0
MH0642	16.30	22.79	0.4	16.7	6.1	432	0.0	0.0
MH0643	19.43	30.44	0.4	19.9	10.6	430	0.0	0.0
MH0663	10.88	18.50	0.5	11.4	7.1	360	0.0	0.0
MH0664	12.91	20.20	0.3	13.2	7.0	237	0.0	0.0
MH0665	8.24	19.00	0.2	8.5	10.5	367	0.0	0.0
MH0674	10.58	18.50	0.3	10.9	7.6	364	0.0	0.0
MH1	51.21	57.72	0.1	51.3	6.5	5	0.0	0.0
MH2	50.99	57.12	0.1	51.0	6.1	8	0.0	0.0
MH3	49.44	56.96	0.1	49.5	7.4	16	0.0	0.0
MH4	47.81	56.65	0.1	47.9	8.7	21	0.0	0.0

Existing (2020) System Manholes: 5-yr, 24-hr Storm Event

Inputs			Outputs					
Manhole ID	Invert Elevation (ft)	Rim Elevation (ft)	Max. Depth (ft)	Max. HGL (ft)	Freeboard (ft)	Max. Inflow (gpm)	Max. Surcharge Height Above Crown (ft)	Total Flood Vol. (MG)
MH5	46.33	54.25	0.1	46.4	7.8	27	0.0	0.0
MH6	44.04	52.07	0.1	44.2	7.9	30	0.0	0.0
MH7	42.58	50.51	0.1	42.7	7.8	32	0.0	0.0
MH8	41.12	46.05	0.1	41.3	4.8	35	0.0	0.0
MH9	39.31	43.98	0.1	39.4	4.5	37	0.0	0.0
MILLER_WTP_INFL	6.28	10.40	0.6	6.9	3.5	148	0.0	0.0
MMH0001	4.99	15.00	0.0	5.0	10.0	4	0.0	0.0
MMH0003	54.83	63.00	0.2	55.0	8.0	72	0.0	0.0
MMH0004	48.94	56.60	0.0	49.0	7.6	4	0.0	0.0
NODE451	32.00	45.00	-	187.9	-	2203	154.9	0.0
NODE452	33.93	52.93	-	68.5	-	153	34.1	0.0
NODE455	8.91	13.91	-	83.2	-	153	73.9	0.0
NODE456	8.00	18.40	-	46.5	-	463	38.2	0.0
NODE461	54.33	67.50	0.3	54.6	12.9	329	0.0	0.0
NODE462	54.96	69.50	0.3	55.2	14.3	327	0.0	0.0
NODE463	89.83	105.50	0.2	90.0	15.5	324	0.0	0.0
NODE464	124.48	153.50	0.2	124.7	28.8	320	0.0	0.0
NODE465	153.99	177.50	0.2	154.2	23.3	317	0.0	0.0
NODE466	176.97	184.00	0.2	177.2	6.8	313	0.0	0.0
NODE467	178.05	192.00	0.4	178.4	13.6	305	0.0	0.0
NODE468	179.87	194.00	0.4	180.2	13.8	302	0.0	0.0
NODE469	181.77	192.00	0.3	182.1	9.9	266	0.0	0.0
NODE471	3.74	12.63	0.4	4.2	8.5	208	0.0	0.0
NODE472	4.49	13.51	0.4	4.9	8.6	196	0.0	0.0
NODE473	5.51	13.01	0.4	5.9	7.1	182	0.0	0.0
NODE474	6.21	13.26	0.4	6.6	6.7	166	0.0	0.0

Existing (2020) System Pipes: 5-yr, 24-hr Storm Event

Inputs						Outputs					
Pipe ID	Length (ft)	Manning's N	US Invert (ft)	DS Invert (ft)	Diameter (ft)	Full Flow (gpm)	Slope (%)	Max. Flow (gpm)	Max. Velocity (ft/s)	Max.Flow/Full Flow	Max.Depth/Full Depth
FM_AIRPORTEA	500.0	-	12.00	15.50	0.50	327.0	0.70	2.8	0.06	0.01	0.54
FM_CHARLES	1915.0	-	39.07	47.30	0.50	251.3	0.43	420.6	4.83	1.67	0.96
GM0048	201.2	0.011	6.60	5.80	1.25	2160.6	0.40	13.9	1.17	0.01	0.06
GM0050	292.2	0.011	7.90	6.60	0.83	774.3	0.45	11.0	1.08	0.01	0.09
GM00554	180.5	0.014	37.80	36.70	0.67	393.7	0.61	445.2	3.12	1.13	0.85
GM0057	367.1	0.01	30.24	25.28	0.67	819.6	1.35	75.8	3.27	0.09	0.21
GM0058	449.8	0.013	29.94	25.49	0.83	978.1	0.99	47.9	2.07	0.05	0.15
GM0059	241.0	0.013	32.48	30.09	0.83	979.3	0.99	45.3	2.04	0.05	0.15
GM0060	255.4	0.013	24.82	23.93	1.50	2783.3	0.35	234.0	2.25	0.08	0.19
GM0061	390.0	0.013	23.73	22.36	1.50	2794.4	0.35	229.5	2.24	0.08	0.19
GM0062	331.9	0.011	22.11	19.77	2.50	18269.0	0.71	229.8	2.86	0.01	0.08
GM0063	375.2	0.011	19.52	18.09	2.50	13432.8	0.38	229.3	2.31	0.02	0.09
GM0064	374.5	0.011	17.89	16.16	1.75	5712.6	0.46	229.8	2.59	0.04	0.14
GM0065	235.0	0.013	35.05	32.58	0.83	1008.2	1.05	42.7	2.05	0.04	0.14
GM0066	235.2	0.013	37.31	35.15	0.83	942.4	0.92	40.1	1.91	0.04	0.14
GM0067	379.9	0.01	36.28	30.39	0.67	878.0	1.55	80.2	3.49	0.09	0.20
GM0068	501.2	0.01	41.45	36.48	0.67	702.2	0.99	87.7	3.06	0.13	0.24
GM0069	324.7	0.01	44.88	41.65	0.67	703.2	1.00	126.9	3.41	0.18	0.29
GM0071	258.4	0.01	45.39	45.03	0.67	263.2	0.14	189.0	2.10	0.72	0.58
GM0140	76.0	0.011	48.94	48.62	0.83	753.3	0.42	4.0	0.87	0.01	0.05
GM0141	242.3	0.011	48.42	47.45	0.83	734.6	0.40	8.1	1.05	0.01	0.07
GM0142	65.0	0.011	47.25	46.97	0.83	762.3	0.43	12.3	1.20	0.02	0.09
GM0143	33.1	0.011	46.10	45.97	0.83	727.3	0.39	18.7	1.33	0.03	0.11
GM0144	118.6	0.011	46.77	46.50	0.83	554.0	0.23	15.9	1.10	0.03	0.11
GM0161	23.0	0.011	14.13	14.01	0.83	838.2	0.52	9.5	1.17	0.01	0.07
GM0162	104.0	0.011	13.91	13.86	0.83	254.6	0.05	13.2	0.71	0.05	0.13
GM0163	400.0	0.011	13.76	12.76	0.83	580.5	0.25	15.9	1.04	0.03	0.12
GM0164	79.2	0.011	12.66	12.46	0.83	583.5	0.25	75.8	1.79	0.13	0.24
GM0165	20.0	0.012	12.35	12.30	0.83	532.1	0.25	90.9	1.84	0.17	0.40
GM01_AIRPARK	379.0	0.013	51.21	49.64	0.83	632.9	0.41	5.5	0.87	0.01	0.06
GM0224	362.6	0.011	35.42	33.93	0.83	744.2	0.41	92.1	2.09	0.12	0.24
GM0225	405.3	0.011	37.22	35.62	0.83	729.5	0.40	69.8	1.91	0.10	0.21
GM0237	71.1	0.011	51.70	51.52	1.00	950.9	0.25	99.3	0.69	0.10	0.43
GM0238	290.2	0.011	52.53	51.80	1.00	947.8	0.25	96.4	1.59	0.10	0.23
GM0239	118.2	0.011	52.93	52.63	1.00	952.1	0.25	93.3	1.85	0.10	0.20
GM0241	71.2	0.011	53.21	53.03	1.00	950.1	0.25	87.1	1.83	0.09	0.19
GM0242	62.0	0.011	53.47	53.31	1.00	960.2	0.26	84.6	1.83	0.09	0.19
GM0243	175.4	0.011	54.05	53.57	1.00	988.5	0.27	81.4	1.80	0.08	0.19
GM0244	170.8	0.011	54.48	54.05	1.00	948.3	0.25	76.8	1.59	0.08	0.20
GM0245	126.8	0.011	54.83	54.51	1.00	949.6	0.25	72.0	1.71	0.08	0.18
GM0276	206.3	0.013	36.76	36.36	1.00	704.1	0.19	728.3	2.61	1.03	0.74
GM02_AIRPARK	27.4	0.013	50.99	50.72	0.67	538.4	0.99	7.9	1.24	0.02	0.09
GM0374	120.3	0.011	51.84	51.34	1.00	1218.3	0.42	102.5	2.10	0.08	0.20
GM0375	228.4	0.011	51.14	50.00	1.00	1335.1	0.50	106.4	2.27	0.08	0.19
GM0376	155.3	0.011	49.40	48.75	1.00	1222.7	0.42	116.0	2.19	0.10	0.21
GM0377	49.0	0.011	49.80	49.60	1.00	1207.0	0.41	112.7	2.15	0.09	0.21
GM03_AIRPARK	303.0	0.013	49.44	48.01	0.83	675.6	0.47	16.0	1.22	0.02	0.10

Existing (2020) System Pipes: 5-yr, 24-hr Storm Event

Inputs						Outputs					
Pipe ID	Length (ft)	Manning's N	US Invert (ft)	DS Invert (ft)	Diameter (ft)	Full Flow (gpm)	Slope (%)	Max. Flow (gpm)	Max. Velocity (ft/s)	Max.Flow/Full Flow	Max.Depth/Full Depth
GM0409	250.0	0.011	60.55	59.55	0.67	405.9	0.40	358.6	3.05	0.88	0.76
GM0410	272.7	0.011	59.55	58.53	0.67	392.6	0.37	362.3	3.04	0.92	0.71
GM0411	354.2	0.011	58.36	57.40	0.83	604.4	0.27	367.9	2.62	0.61	0.56
GM0412	358.3	0.011	57.40	56.35	0.83	628.4	0.29	372.0	2.72	0.59	0.55
GM0413	63.8	0.011	55.25	55.20	0.83	325.1	0.08	376.5	2.28	1.16	0.67
GM0414	312.3	0.011	56.35	55.35	0.83	657.0	0.32	374.5	2.71	0.57	0.57
GM0417	329.7	0.011	12.19	11.54	1.00	839.2	0.20	344.6	2.49	0.41	0.42
GM0418	179.1	0.011	11.48	10.54	1.00	1369.3	0.53	343.4	2.35	0.25	0.50
GM0419	21.4	0.013	10.54	10.49	1.00	773.5	0.23	677.2	2.78	0.88	0.67
GM0446	88.8	0.011	44.24	43.86	0.67	419.8	0.43	400.1	3.32	0.95	0.72
GM0447	254.5	0.011	45.35	44.34	0.67	404.4	0.40	397.0	3.14	0.98	0.75
GM0448	362.8	0.011	46.91	45.45	0.67	407.2	0.40	398.9	3.13	0.98	0.76
GM0449	49.7	0.011	47.07	46.93	0.67	340.7	0.28	399.6	2.93	1.17	0.85
GM0450	155.7	0.011	48.77	47.83	0.67	498.7	0.60	396.0	3.33	0.79	0.84
GM0451	203.5	0.011	49.00	48.87	0.67	162.2	0.06	392.9	2.82	2.42	0.83
GM0452	197.3	0.011	50.47	49.00	0.67	554.1	0.75	389.2	2.85	0.70	0.81
GM0453	400.5	0.011	52.17	50.57	0.67	405.7	0.40	384.7	3.11	0.95	0.74
GM0454	162.4	0.011	52.36	52.27	0.67	151.1	0.06	385.3	2.77	2.55	0.83
GM0455	300.0	0.011	55.19	53.99	0.67	405.9	0.40	378.5	3.12	0.93	0.72
GM0456	242.5	0.011	53.89	52.36	0.67	509.8	0.63	381.3	2.76	0.75	0.82
GM0466	96.5	0.013	44.20	43.99	1.00	746.0	0.22	161.1	1.95	0.22	0.28
GM0467	126.2	0.013	44.48	44.20	1.00	753.2	0.22	158.1	1.65	0.21	0.32
GM0468	166.3	0.013	44.85	44.48	1.00	754.4	0.22	154.2	1.67	0.20	0.31
GM0469	136.4	0.013	45.16	44.85	1.00	762.4	0.23	151.3	1.67	0.20	0.30
GM0470	104.0	0.013	45.40	45.16	1.00	768.2	0.23	148.1	1.67	0.19	0.30
GM0471	126.2	0.013	45.68	45.40	1.00	753.2	0.22	145.4	1.65	0.19	0.30
GM0472	53.7	0.013	45.80	45.68	1.00	756.3	0.22	142.4	1.63	0.19	0.30
GM0473	402.8	0.011	46.78	45.90	1.00	883.4	0.22	134.6	1.95	0.15	0.25
GM0474	195.6	0.011	47.22	46.78	1.00	896.3	0.23	129.5	1.72	0.15	0.27
GM0475	84.9	0.011	47.39	47.22	1.00	845.9	0.20	126.2	1.74	0.15	0.26
GM0476	153.1	0.011	47.73	47.39	1.00	890.6	0.22	122.0	1.71	0.14	0.26
GM0477	29.9	0.013	47.80	47.73	1.00	774.1	0.23	118.6	1.67	0.15	0.26
GM04_AIRPARK	284.0	0.013	47.81	46.53	0.83	660.2	0.45	21.3	1.30	0.03	0.12
GM0503	65.8	0.012	0.10	0.00	1.50	2745.6	0.29	3096.0	5.05	1.13	0.72
GM0531	185.0	0.012	43.76	41.12	0.67	702.9	1.43	403.4	4.62	0.57	0.55
GM0553	187.9	0.013	38.60	37.90	0.67	331.1	0.37	442.9	3.02	1.34	1.00
GM0555	100.0	0.015	36.60	32.40	0.83	1745.5	4.20	448.3	4.56	0.26	0.48
GM0556	178.0	0.013	32.47	32.07	1.00	758.0	0.23	804.0	2.50	1.06	0.86
GM0563	225.0	0.013	34.22	33.73	1.00	746.2	0.22	785.6	2.41	1.05	0.87
GM0564	348.0	0.013	33.73	32.96	1.00	752.2	0.22	787.9	2.56	1.05	0.82
GM0565	143.0	0.013	32.88	32.57	1.00	744.5	0.22	799.1	2.63	1.07	0.81
GM05_AIRPARK	464.0	0.013	46.33	44.24	0.83	660.0	0.45	26.5	1.38	0.04	0.13
GM0640	176.4	0.013	38.50	37.80	0.67	341.7	0.40	127.2	2.11	0.37	0.58
GM0646	213.4	0.013	34.80	34.22	1.00	833.6	0.27	771.7	2.51	0.93	0.82
GM0647	158.5	0.013	35.25	34.90	1.00	751.4	0.22	735.6	2.70	0.98	0.72
GM0648	282.0	0.013	35.97	35.35	1.00	749.8	0.22	733.2	2.60	0.98	0.75
GM0649	83.7	0.013	36.26	36.07	1.00	761.8	0.23	730.8	2.64	0.96	0.73

Existing (2020) System Pipes: 5-yr, 24-hr Storm Event

Inputs						Outputs					
Pipe ID	Length (ft)	Manning's N	US Invert (ft)	DS Invert (ft)	Diameter (ft)	Full Flow (gpm)	Slope (%)	Max. Flow (gpm)	Max. Velocity (ft/s)	Max.Flow/Full Flow	Max.Depth/Full Depth
GM0650	303.8	0.013	37.47	36.86	1.00	716.6	0.20	725.9	2.46	1.01	0.78
GM0652	282.4	0.013	38.10	37.47	1.00	755.3	0.22	608.6	2.13	0.81	0.76
GM0653	166.6	0.013	38.56	38.20	1.00	743.3	0.22	604.4	2.57	0.81	0.63
GM0654	251.7	0.013	39.20	38.66	1.00	740.7	0.22	601.4	2.51	0.81	0.64
GM0675	276.2	0.013	50.55	48.71	1.25	2366.6	0.67	1625.2	3.34	0.69	0.94
GM0676	238.9	0.013	52.19	50.55	1.25	2402.4	0.69	1657.6	4.63	0.69	0.74
GM0678	239.9	0.013	48.61	48.24	1.25	1138.6	0.15	1637.6	2.97	1.44	1.00
GM0682	268.3	0.013	48.24	47.87	1.25	1076.7	0.14	1641.3	2.98	1.52	1.00
GM0686	276.3	0.013	47.87	47.46	1.25	1116.9	0.15	1645.9	3.58	1.47	0.78
GM0687	241.6	0.013	47.46	45.30	1.25	2741.8	0.89	1645.4	5.14	0.60	0.56
GM06_AIRPARK	280.0	0.013	44.04	42.78	0.83	659.7	0.45	29.7	1.43	0.05	0.14
GM0708	506.4	0.013	11.19	3.29	1.25	3621.6	1.56	1763.0	6.53	0.49	0.49
GM0709	486.5	0.013	19.11	11.19	1.25	3699.6	1.63	1760.3	6.58	0.48	0.49
GM0710	528.4	0.013	29.26	19.11	1.25	4018.7	1.92	1756.7	6.83	0.44	0.47
GM0711	349.2	0.013	32.47	29.26	1.25	2780.1	0.92	1751.5	5.94	0.63	0.53
GM0712	298.9	0.013	40.43	32.47	1.25	4732.5	2.66	1743.5	6.23	0.37	0.51
GM0713	353.6	0.013	44.12	40.80	1.25	2809.4	0.94	1649.5	5.30	0.59	0.55
GM0714	140.8	0.013	45.30	44.12	1.25	2654.8	0.84	1647.4	5.18	0.62	0.56
GM0724	494.5	0.013	30.96	20.91	0.83	1400.6	2.03	23.0	1.92	0.02	0.10
GM0725	149.8	0.013	20.91	18.40	0.83	1271.7	1.68	29.6	2.11	0.02	0.11
GM0726	452.8	0.013	18.40	10.03	0.83	1335.7	1.85	33.5	1.97	0.03	0.12
GM0727	320.1	0.013	10.03	7.30	0.83	907.3	0.85	37.5	1.83	0.04	0.14
GM0728	130.7	0.013	7.24	5.65	0.83	1083.4	1.22	40.6	2.08	0.04	0.22
GM0729	66.1	0.013	5.24	5.14	1.25	1127.7	0.15	721.6	2.44	0.64	0.53
GM0730	280.4	0.013	4.64	4.22	1.25	1122.1	0.15	736.4	2.35	0.66	0.56
GM0731	222.6	0.013	4.11	3.78	1.25	1116.4	0.15	742.1	2.37	0.67	0.56
GM0732	277.7	0.013	3.68	3.26	1.25	1127.6	0.15	743.4	2.17	0.66	0.60
GM0733	285.5	0.013	3.26	2.83	1.25	1125.2	0.15	744.5	2.02	0.66	0.66
GM0734	536.5	0.013	2.41	1.99	2.50	5151.1	0.08	2841.3	2.44	0.55	0.52
GM0735	299.7	0.013	2.69	2.51	2.50	4511.6	0.06	2125.3	2.06	0.47	0.49
GM0747	380.5	0.013	7.16	6.33	1.00	746.9	0.22	699.3	2.39	0.94	0.79
GM0748	382.4	0.013	6.33	5.49	1.00	749.4	0.22	688.1	2.73	0.92	0.67
GM0752	268.4	0.013	5.04	4.64	1.25	1119.2	0.15	735.4	2.15	0.66	0.60
GM0757	350.0	0.013	1.05	0.87	2.50	4174.9	0.05	3078.5	2.70	0.74	0.51
GM0758	261.6	0.013	1.34	1.15	2.50	4961.0	0.07	3068.5	2.58	0.62	0.53
GM0759	248.7	0.013	1.58	1.44	2.50	4368.4	0.06	3053.4	2.60	0.70	0.53
GM0760	349.9	0.013	1.89	1.68	2.50	4510.2	0.06	3042.5	2.55	0.68	0.53
GM0761	268.0	0.013	0.77	0.61	2.50	4498.2	0.06	3093.3	3.43	0.69	0.43
GM0778	180.5	0.013	42.11	42.05	1.00	291.6	0.03	518.8	2.18	1.78	0.64
GM0779	85.7	0.013	42.05	41.81	0.83	519.9	0.28	16.9	0.85	0.03	0.53
GM0782	119.5	0.013	43.61	43.25	0.83	539.2	0.30	3.0	0.61	0.01	0.08
GM0783	426.7	0.013	43.25	42.15	0.83	498.8	0.26	9.2	0.79	0.02	0.18
GM0785	129.7	0.013	41.23	40.70	1.00	1022.1	0.41	534.9	2.48	0.52	0.59
GM0786	283.9	0.013	41.61	41.23	1.00	585.1	0.13	531.9	2.24	0.91	0.64
GM0787	413.8	0.013	40.70	39.79	1.00	749.9	0.22	584.4	2.31	0.78	0.67
GM0792	186.2	0.013	39.79	39.38	1.00	750.5	0.22	597.6	2.69	0.80	0.60
GM0793	126.8	0.013	41.05	39.80	0.67	539.2	0.99	417.5	3.80	0.77	0.66

Existing (2020) System Pipes: 5-yr, 24-hr Storm Event

Inputs						Outputs					
Pipe ID	Length (ft)	Manning's N	US Invert (ft)	DS Invert (ft)	Diameter (ft)	Full Flow (gpm)	Slope (%)	Max. Flow (gpm)	Max. Velocity (ft/s)	Max.Flow/Full Flow	Max.Depth/Full Depth
GM0798	131.8	0.013	46.00	45.46	0.83	628.7	0.41	3.4	0.67	0.01	0.07
GM0799	402.4	0.013	45.46	43.86	0.83	619.4	0.40	7.5	0.87	0.01	0.08
GM07_AIRPARK	280.0	0.013	42.58	41.32	0.83	659.7	0.45	32.3	1.47	0.05	0.15
GM0800	341.4	0.013	43.86	40.11	0.83	1030.7	1.10	12.0	1.29	0.01	0.25
GM0805	113.7	0.013	45.12	44.60	0.67	367.3	0.46	348.5	2.95	0.95	0.71
GM0806	91.5	0.015	44.20	43.20	1.00	1448.9	1.09	351.1	2.26	0.24	0.45
GM0807	80.0	0.013	43.20	43.08	1.00	619.4	0.15	353.6	1.65	0.57	0.59
GM0808	229.8	0.013	43.08	42.57	1.00	753.3	0.22	513.2	2.29	0.68	0.61
GM0809	160.4	0.013	42.57	42.21	1.00	757.7	0.23	515.5	2.06	0.68	0.67
GM0823	438.8	0.013	26.77	19.58	0.67	695.3	1.64	427.0	4.66	0.61	0.57
GM0824	277.6	0.013	19.43	16.65	0.67	543.5	1.00	429.2	3.84	0.79	0.67
GM0825	512.2	0.013	16.30	10.54	0.67	575.9	1.13	431.8	3.36	0.75	0.82
GM0829	232.8	0.013	14.01	13.11	0.83	610.8	0.39	5.5	0.65	0.01	0.08
GM0830	63.9	0.013	13.11	12.85	0.83	626.7	0.41	8.6	0.95	0.01	0.08
GM0831	240.5	0.013	12.85	10.28	0.83	1015.5	1.07	11.3	1.38	0.01	0.07
GM0832	359.7	0.013	10.49	9.45	1.00	859.8	0.29	666.7	2.57	0.78	0.70
GM0833	230.1	0.013	9.45	8.95	1.00	745.4	0.22	663.9	2.55	0.89	0.70
GM0836	335.2	0.013	8.85	8.10	1.00	756.4	0.22	664.8	2.61	0.88	0.69
GM0837	381.1	0.013	8.00	7.16	1.00	750.7	0.22	662.0	2.40	0.88	0.75
GM0838	475.2	0.013	39.31	26.93	0.67	876.7	2.61	424.5	5.54	0.48	0.49
GM0848	69.2	0.011	16.11	15.64	1.75	6928.7	0.68	232.3	2.97	0.03	0.13
GM0849	236.1	0.011	47.73	47.17	0.67	312.6	0.24	399.8	2.83	1.28	0.87
GM0878	111.2	0.011	4.99	4.40	1.00	1376.8	0.53	3.6	0.90	0.00	0.25
GM0880	483.8	0.011	15.29	13.06	1.75	5706.5	0.46	234.7	2.60	0.04	0.14
GM0881	526.8	0.011	12.91	10.88	1.75	5217.6	0.39	236.4	1.50	0.05	0.21
GM0882	53.8	0.011	8.24	7.86	2.50	18287.1	0.71	366.5	3.31	0.02	0.10
GM0883	265.8	0.011	10.88	10.68	1.75	2305.4	0.08	358.8	1.93	0.16	0.23
GM0893	502.7	0.011	10.58	8.44	2.50	14195.7	0.43	363.9	2.74	0.03	0.11
GM08_AIRPARK	358.0	0.013	41.12	39.51	0.83	659.5	0.45	34.9	1.50	0.05	0.15
GM09_AIRPARK	360.0	0.013	39.31	37.46	0.83	705.0	0.51	37.5	1.58	0.05	0.15
LINK295_SMITHLS	1529.8	-	32.00	52.19	1.00	2773.0	1.32	1961.9	6.40	0.71	0.88
LINK298	28.9	0.014	32.07	32.00	1.17	1102.9	0.24	1409.6	4.09	1.28	0.68
LINK300_HWY30_F	256.5	-	33.93	60.55	0.50	755.4	10.43	156.5	2.45	0.21	0.99
LINK303	1563.3	-	8.91	12.50	0.33	62.7	0.23	157.3	4.06	2.51	1.00
LINK306	1726.0	-	8.00	15.50	0.33	88.4	0.44	149.3	3.86	1.69	0.96
LINK307	24.5	0.014	185.00	181.77	0.27	166.2	13.28	263.3	10.18	1.58	1.00
LINK308	142.4	0.014	181.77	179.87	0.67	582.5	1.33	265.8	3.35	0.46	0.50
LINK309	159.1	0.014	179.87	178.05	0.67	539.4	1.14	301.8	3.41	0.56	0.55
LINK310	94.1	0.014	178.05	176.97	0.67	540.4	1.15	304.7	4.59	0.56	0.44
LINK311	264.9	0.014	176.97	154.40	0.67	1474.6	8.55	312.1	7.45	0.21	0.31
LINK312	252.0	0.014	153.99	124.48	0.67	1731.9	11.79	316.7	8.43	0.18	0.29
LINK313	271.7	0.014	124.48	89.83	0.67	1808.4	12.86	319.9	8.79	0.18	0.28
LINK314	233.7	0.014	89.83	56.00	0.67	1929.0	14.63	323.2	9.11	0.17	0.28
LINK315	21.5	0.014	54.96	54.33	0.67	862.6	2.93	326.6	4.99	0.38	0.44
LINK316	323.1	0.014	54.33	45.97	0.67	811.3	2.59	328.8	4.90	0.41	0.44
LINK317	268.8	0.014	6.28	6.21	0.67	81.4	0.03	148.4	1.26	1.82	0.73
LINK318	146.6	0.014	6.21	5.63	0.67	317.2	0.40	165.6	2.23	0.52	0.48

Existing (2020) System Pipes: 5-yr, 24-hr Storm Event

Inputs						Outputs					
Pipe ID	Length (ft)	Manning's N	US Invert (ft)	DS Invert (ft)	Diameter (ft)	Full Flow (gpm)	Slope (%)	Max. Flow (gpm)	Max. Velocity (ft/s)	Max.Flow/Full Flow	Max.Depth/Full Depth
LINK319	264.0	0.014	5.51	4.59	0.67	297.7	0.35	182.2	2.12	0.61	0.55
LINK320	202.0	0.014	4.49	3.84	0.67	286.1	0.32	195.7	2.13	0.68	0.57
LINK321	64.7	0.014	3.74	3.54	0.67	280.3	0.31	208.0	2.33	0.74	0.55

Future (2040) System

Future (2040) System Manholes: 5-yr, 24-hr Storm Event

Inputs			Outputs					
Manhole ID	Invert Elevation (ft)	Rim Elevation (ft)	Max. Depth (ft)	Max. HGL (ft)	Freeboard (ft)	Max. Inflow (gpm)	Max. Surcharge Height Above Crown (ft)	Total Flood Vol. (MG)
AIRPORTEA_JUNC	12.00	18.50	-	56.4	-	661	43.9	0.0
CHARLES_JUNC	39.07	46.25	-	259.9	-	429	220.3	0.0
MH0018	24.82	30.70	0.5	25.4	5.3	736	0.0	0.0
MH0019	16.11	22.50	0.4	16.5	6.0	746	0.0	0.0
MH0020	17.89	23.70	0.4	18.3	5.4	744	0.0	0.0
MH0021	19.52	25.00	0.4	19.9	5.1	742	0.0	0.0
MH0022	22.11	26.20	0.3	22.5	3.7	739	0.0	0.0
MH0023	23.73	27.90	0.5	24.3	3.6	738	0.0	0.0
MH0024	29.94	36.10	0.2	30.2	5.9	173	0.0	0.0
MH0025	32.48	38.60	0.2	32.7	5.9	170	0.0	0.0
MH0026	35.05	40.22	0.2	35.3	4.9	168	0.0	0.0
MH0027	37.31	42.61	0.2	37.5	5.1	99	0.0	0.0
MH0028	30.24	36.20	0.3	30.6	5.6	442	0.0	0.0
MH0029	36.28	42.30	0.3	36.6	5.7	439	0.0	0.0
MH0030	41.45	47.50	0.4	41.8	5.7	436	0.0	0.0
MH0031	44.88	51.00	0.4	45.3	5.7	434	0.0	0.0
MH0033	45.39	53.00	1.1	46.5	6.5	431	0.0	0.0
MH0048	55.13	62.73	0.7	55.8	6.9	378	0.0	0.0
MH0049	56.35	67.27	0.5	56.8	10.5	375	0.0	0.0
MH0059	6.60	15.34	0.1	6.7	8.7	14	0.0	0.0
MH0061	7.90	15.78	0.1	8.0	7.8	11	0.0	0.0
MH0098	55.11	62.41	0.6	55.7	6.7	381	0.0	0.0
MH0099	53.89	62.35	0.4	54.3	8.0	387	0.0	0.0
MH0125	46.10	52.50	0.2	46.3	6.2	64	0.0	0.0
MH0126	46.77	55.20	0.2	47.0	8.2	61	0.0	0.0
MH0127	47.25	56.50	0.2	47.4	9.1	57	0.0	0.0
MH0128	48.42	55.60	0.2	48.6	7.0	53	0.0	0.0
MH0130	12.35	18.18	0.3	12.7	5.5	79	0.0	0.0
MH0131	12.66	20.62	0.2	12.9	7.8	75	0.0	0.0
MH0132	13.76	21.50	0.1	13.9	7.6	16	0.0	0.0
MH0133	47.73	59.93	0.9	48.6	11.3	409	0.1	0.0
MH0136	13.91	17.27	0.1	14.1	3.2	13	0.0	0.0
MH0137	14.13	17.76	0.1	14.2	3.6	10	0.0	0.0
MH0154	7.24	17.70	0.1	7.4	10.3	45	0.0	0.0
MH0173	1.34	12.70	1.7	3.0	9.7	4486	0.0	0.0
MH0182	35.42	46.90	0.2	35.6	11.3	93	0.0	0.0
MH0184	37.22	47.01	0.2	37.4	9.6	72	0.0	0.0
MH0198	54.48	65.09	0.2	54.7	10.4	119	0.0	0.0
MH0202	54.05	60.80	0.2	54.3	6.5	124	0.0	0.0

Future (2040) System Manholes: 5-yr, 24-hr Storm Event

Inputs			Outputs					
Manhole ID	Invert Elevation (ft)	Rim Elevation (ft)	Max. Depth (ft)	Max. HGL (ft)	Freeboard (ft)	Max. Inflow (gpm)	Max. Surcharge Height Above Crown (ft)	Total Flood Vol. (MG)
MH0203	53.47	59.50	0.2	53.7	5.8	127	0.0	0.0
MH0204	52.93	58.50	0.3	53.2	5.3	136	0.0	0.0
MH0205	53.21	59.40	0.2	53.5	5.9	130	0.0	0.0
MH0206	52.53	60.07	0.3	52.8	7.3	139	0.0	0.0
MH0207	51.70	59.44	0.4	52.1	7.4	142	0.0	0.0
MH0212	15.29	22.20	0.6	15.9	6.3	1524	0.0	0.0
MH0214	36.76	46.96	1.2	38.0	9.0	846	0.1	0.0
MH0215	11.48	16.84	0.3	11.8	5.0	353	0.0	0.0
MH0251	52.36	61.66	1.0	53.4	8.3	391	0.4	0.0
MH0254	49.80	57.40	0.2	50.0	7.4	155	0.0	0.0
MH0255	49.40	58.00	0.2	49.6	8.4	159	0.0	0.0
MH0256	51.14	62.00	0.2	51.4	10.6	149	0.0	0.0
MH0257	51.52	61.40	0.6	52.1	9.3	145	0.0	0.0
MH0262	49.00	61.60	1.2	50.2	11.4	403	0.5	0.0
MH0284	57.40	69.80	0.5	57.9	11.9	372	0.0	0.0
MH0285	58.36	68.49	0.5	58.8	9.7	368	0.0	0.0
MH0286	59.55	64.60	0.5	60.1	4.5	363	0.0	0.0
MH0287	60.55	63.00	0.5	61.0	2.0	358	0.0	0.0
MH0290	10.54	17.30	0.7	11.2	6.1	750	0.0	0.0
MH0291	12.19	16.50	0.5	12.7	3.8	385	0.0	0.0
MH0293	41.23	53.03	0.6	41.8	11.2	655	0.0	0.0
MH0304	45.35	56.93	0.6	46.0	11.0	432	0.0	0.0
MH0305	43.76	58.93	0.4	44.1	14.8	438	0.0	0.0
MH0306	44.24	58.93	0.6	44.8	14.1	435	0.0	0.0
MH0307	46.91	59.81	0.6	47.5	12.3	429	0.0	0.0
MH0308	47.07	59.77	0.7	47.7	12.0	426	0.0	0.0
MH0309	48.77	61.37	0.5	49.2	12.1	406	0.0	0.0
MH0310	50.47	61.37	0.4	50.9	10.5	399	0.0	0.0
MH0311	52.17	61.77	0.6	52.7	9.0	395	0.0	0.0
MH0318	44.20	51.90	0.4	44.6	7.3	218	0.0	0.0
MH0319	44.48	50.40	0.4	44.8	5.6	215	0.0	0.0
MH0320	44.85	53.00	0.4	45.2	7.8	211	0.0	0.0
MH0321	45.16	53.00	0.4	45.5	7.5	208	0.0	0.0
MH0322	45.40	51.30	0.4	45.8	5.5	205	0.0	0.0
MH0323	45.68	57.30	0.4	46.0	11.3	202	0.0	0.0
MH0324	45.80	57.80	0.4	46.2	11.6	200	0.0	0.0
MH0325	46.78	59.20	0.3	47.1	12.1	192	0.0	0.0
MH0326	47.22	58.00	0.3	47.5	10.5	187	0.0	0.0
MH0327	47.39	58.20	0.3	47.7	10.5	184	0.0	0.0

Future (2040) System Manholes: 5-yr, 24-hr Storm Event

Inputs			Outputs					
Manhole ID	Invert Elevation (ft)	Rim Elevation (ft)	Max. Depth (ft)	Max. HGL (ft)	Freeboard (ft)	Max. Inflow (gpm)	Max. Surcharge Height Above Crown (ft)	Total Flood Vol. (MG)
MH0328	47.73	60.90	0.3	48.0	12.9	165	0.0	0.0
MH0329	47.80	61.00	0.3	48.1	12.9	161	0.0	0.0
MH0373	41.05	56.81	0.5	41.5	15.3	447	0.0	0.0
MH0376	45.30	53.72	0.8	46.1	7.6	1991	0.0	0.0
MH0393	32.07	44.96	1.0	33.0	11.9	1771	0.0	0.0
MH0395	32.47	44.63	1.1	33.5	11.1	865	0.0	0.0
MH0400	38.60	50.54	6.5	45.1	5.5	739	5.8	0.0
MH0401	37.80	48.36	3.5	41.3	7.1	742	2.7	0.0
MH0402MTR2	36.60	49.66	0.4	37.0	12.7	746	0.0	0.0
MH0418	51.10	60.03	0.1	51.2	8.8	46	0.0	0.0
MH0421	34.22	40.38	1.2	35.4	5.0	846	0.2	0.0
MH0422	33.73	41.96	1.0	34.8	7.2	849	0.0	0.0
MH0423	32.88	39.96	1.0	33.9	6.1	860	0.0	0.0
MH0431	48.61	57.33	4.5	53.1	4.2	2002	3.2	0.0
MH0473	37.47	47.96	1.3	38.8	9.2	847	0.3	0.0
MH0474	38.50	47.96	0.3	38.8	9.1	127	0.0	0.0
MH0483	36.26	46.96	1.2	37.4	9.5	848	0.1	0.0
MH0484MTR1	35.97	42.17	1.2	37.2	5.0	846	0.1	0.0
MH0485	35.25	44.96	1.2	36.4	8.5	845	0.1	0.0
MH0486	34.80	44.96	1.2	36.0	9.0	853	0.1	0.0
MH0487	39.20	49.16	0.8	40.0	9.1	722	0.0	0.0
MH0488	38.56	48.50	1.1	39.6	8.9	727	0.0	0.0
MH0489	38.10	48.50	1.2	39.3	9.2	727	0.1	0.0
MH0506	47.46	57.10	0.8	48.3	8.9	2043	0.0	0.0
MH0507	47.87	57.17	2.3	50.2	7.0	2034	1.1	0.0
MH0510	48.24	56.83	3.6	51.8	5.0	2020	2.3	0.0
MH0513	50.55	57.97	4.0	54.6	3.4	1976	2.8	0.0
MH0514	52.19	61.43	3.6	55.7	5.7	2004	2.3	0.0
MH0525	44.12	53.30	0.8	44.9	8.4	1991	0.0	0.0
MH0526	40.43	50.20	0.6	41.0	9.2	2076	0.0	0.0
MH0530	32.47	46.37	0.8	33.3	13.1	2087	0.0	0.0
MH0533	29.26	40.00	0.6	29.9	10.1	2095	0.0	0.0
MH0534	19.11	32.37	0.7	19.8	12.6	2132	0.0	0.0
MH0536	11.19	20.49	0.7	11.9	8.6	2125	0.0	0.0
MH0537MTR5	2.69	15.50	1.6	4.3	11.2	3527	0.0	0.0
MH0549	30.96	41.05	0.1	31.0	10.0	24	0.0	0.0
MH0561	14.01	22.83	0.1	14.1	8.8	6	0.0	0.0
MH0565	20.91	30.81	0.1	21.0	9.8	31	0.0	0.0
MH0566	18.40	30.50	0.1	18.5	12.0	35	0.0	0.0

Future (2040) System Manholes: 5-yr, 24-hr Storm Event

Inputs			Outputs					
Manhole ID	Invert Elevation (ft)	Rim Elevation (ft)	Max. Depth (ft)	Max. HGL (ft)	Freeboard (ft)	Max. Inflow (gpm)	Max. Surcharge Height Above Crown (ft)	Total Flood Vol. (MG)
MH0567	10.03	19.96	0.1	10.2	9.8	42	0.0	0.0
MH0568	5.24	16.66	0.7	6.0	10.7	798	0.0	0.0
MH0569	5.04	15.78	0.8	5.8	10.0	813	0.0	0.0
MH0570	6.33	16.71	0.9	7.2	9.5	763	0.0	0.0
MH0571	7.16	16.71	0.8	8.0	8.7	770	0.0	0.0
MH0572	4.11	15.92	0.8	4.9	11.0	821	0.0	0.0
MH0573	3.68	13.48	0.9	4.5	8.9	822	0.0	0.0
MH0574	2.41	14.50	1.7	4.1	10.4	4273	0.0	0.0
MH0575MTR4	4.64	15.60	0.8	5.4	10.2	815	0.0	0.0
MH0576	3.26	11.86	1.0	4.3	7.6	826	0.0	0.0
MH0577	1.89	14.17	1.8	3.6	10.5	4465	0.0	0.0
MH0578	1.05	12.34	1.7	2.8	9.6	4494	0.0	0.0
MH0579	0.77	13.82	1.6	2.3	11.5	4509	0.0	0.0
MH0580	0.19	12.82	1.6	1.8	11.0	4509	0.0	0.0
MH0581	1.58	14.95	1.7	3.3	11.6	4474	0.0	0.0
MH0591	39.31	52.41	0.3	39.7	12.8	454	0.0	0.0
MH0594	46.00	57.96	0.0	46.0	11.9	3	0.0	0.0
MH0595	45.46	58.02	0.1	45.5	12.5	8	0.0	0.0
MH0597	43.86	54.12	0.1	43.9	10.2	12	0.0	0.0
MH0598	39.79	50.94	0.8	40.6	10.4	719	0.0	0.0
MH0603	40.70	52.00	0.8	41.5	10.5	705	0.0	0.0
MH0604	41.61	53.03	0.9	42.5	10.5	652	0.0	0.0
MH0605	42.05	53.03	0.4	42.5	10.5	31	0.0	0.0
MH0606	42.11	52.71	0.9	43.0	9.7	639	0.0	0.0
MH0607	42.57	52.83	0.7	43.3	9.5	635	0.0	0.0
MH0608	43.08	51.78	0.7	43.8	8.0	633	0.0	0.0
MH0609	43.25	53.73	0.1	43.3	10.4	7	0.0	0.0
MH0610	43.61	56.03	0.0	43.7	12.4	3	0.0	0.0
MH0614	43.20	51.20	0.7	43.9	7.3	418	0.0	0.0
MH0615	44.20	52.70	0.4	44.6	8.1	416	0.0	0.0
MH0616	45.12	52.60	0.6	45.8	6.8	414	0.0	0.0
MH0634	26.77	39.43	0.4	27.2	12.3	457	0.0	0.0
MH0635	8.00	15.71	0.8	8.8	6.9	730	0.0	0.0
MH0636	8.85	20.71	0.8	9.7	11.1	730	0.0	0.0
MH0637MTR3	9.45	20.49	0.8	10.2	10.3	722	0.0	0.0
MH0638	10.49	17.78	0.7	11.2	6.6	721	0.0	0.0
MH0639	12.85	21.91	0.1	12.9	9.0	12	0.0	0.0
MH0640	13.11	21.91	0.1	13.2	8.7	9	0.0	0.0
MH0642	16.30	22.79	0.5	16.8	6.0	462	0.0	0.0

Future (2040) System Manholes: 5-yr, 24-hr Storm Event

Inputs			Outputs					
Manhole ID	Invert Elevation (ft)	Rim Elevation (ft)	Max. Depth (ft)	Max. HGL (ft)	Freeboard (ft)	Max. Inflow (gpm)	Max. Surcharge Height Above Crown (ft)	Total Flood Vol. (MG)
MH0643	19.43	30.44	0.5	19.9	10.5	459	0.0	0.0
MH0663	10.88	18.50	0.9	11.8	6.7	1558	0.0	0.0
MH0664	12.91	20.20	0.6	13.5	6.7	1466	0.0	0.0
MH0665	8.24	19.00	0.5	8.7	10.3	1436	0.0	0.0
MH0674	10.58	18.50	0.5	11.1	7.4	1456	0.0	0.0
MH1	51.21	57.72	0.2	51.4	6.3	66	0.0	0.0
MH2	50.99	57.12	0.1	51.0	6.1	8	0.0	0.0
MH3	49.44	56.96	0.2	49.6	7.3	75	0.0	0.0
MH4	47.81	56.65	0.2	48.0	8.6	80	0.0	0.0
MH5	46.33	54.25	0.2	46.5	7.7	85	0.0	0.0
MH6	44.04	52.07	0.2	44.3	7.8	88	0.0	0.0
MH7	42.58	50.51	0.2	42.8	7.7	91	0.0	0.0
MH8	41.12	46.05	0.2	41.3	4.7	94	0.0	0.0
MH9	39.31	43.98	0.2	39.5	4.5	96	0.0	0.0
MILLER_WTP_INFL	6.28	10.40	0.6	6.9	3.5	148	0.0	0.0
MMH0001	4.99	15.00	0.0	5.0	10.0	4	0.0	0.0
MMH0003	54.83	63.00	0.2	55.1	7.9	115	0.0	0.0
MMH0004	48.94	56.60	0.1	49.1	7.5	49	0.0	0.0
NODE451	32.00	45.00	-	126.2	-	1999	93.2	0.0
NODE452	33.93	52.93	-	69.5	-	153	35.1	0.0
NODE455	8.91	13.91	-	109.8	-	153	100.5	0.0
NODE456	8.00	18.40	-	44.4	-	463	36.0	0.0
NODE461	54.33	67.50	0.3	54.6	12.9	354	0.0	0.0
NODE462	54.96	69.50	0.3	55.3	14.2	351	0.0	0.0
NODE463	89.83	105.50	0.2	90.0	15.5	348	0.0	0.0
NODE464	124.48	153.50	0.2	124.7	28.8	345	0.0	0.0
NODE465	153.99	177.50	0.2	154.2	23.3	341	0.0	0.0
NODE466	176.97	184.00	0.2	177.2	6.8	313	0.0	0.0
NODE467	178.05	192.00	0.4	178.4	13.6	305	0.0	0.0
NODE468	179.87	194.00	0.4	180.2	13.8	302	0.0	0.0
NODE469	181.77	192.00	0.3	182.1	9.9	266	0.0	0.0
NODE471	3.74	12.63	0.4	4.2	8.5	213	0.0	0.0
NODE472	4.49	13.51	0.4	4.9	8.6	201	0.0	0.0
NODE473	5.51	13.01	0.4	5.9	7.1	182	0.0	0.0
NODE474	6.21	13.26	0.4	6.6	6.7	166	0.0	0.0

Future (2040) System Pipes: 5-yr, 24-hr Storm Event

Inputs						Outputs					
Pipe ID	Length (ft)	Manning's N	US Invert (ft)	DS Invert (ft)	Diameter (ft)	Full Flow (gpm)	Slope (%)	Max. Flow (gpm)	Max. Velocity (ft/s)	Max.Flow/Full Flow	Max.Depth/Full Depth
C-10	792.1	-	51.10	38.60	0.67	681.4	1.58	46.2	0.79	0.07	0.59
FM_AIRPORTEA	500.0	-	12.00	15.50	0.50	327.0	0.70	662.8	7.52	2.03	1.00
FM_CHARLES	1915.0	0.01	39.07	47.30	0.50	251.3	0.43	428.6	4.92	1.71	0.97
GM0048	201.2	0.011	6.60	5.80	1.25	2160.6	0.40	13.9	1.17	0.01	0.06
GM0050	292.2	0.011	7.90	6.60	0.83	774.3	0.45	11.0	1.08	0.01	0.09
GM00554	180.5	0.014	37.80	36.70	0.67	393.7	0.61	743.1	4.84	1.89	0.95
GM0057	367.1	0.01	30.24	25.28	0.67	819.6	1.35	441.6	5.33	0.54	0.52
GM0058	449.8	0.013	29.94	25.49	0.83	978.1	0.99	172.7	3.01	0.18	0.28
GM0059	241.0	0.013	32.48	30.09	0.83	979.3	0.99	170.1	3.00	0.17	0.28
GM0060	255.4	0.013	24.82	23.93	1.50	2783.3	0.35	735.1	3.12	0.26	0.34
GM0061	390.0	0.013	23.73	22.36	1.50	2794.4	0.35	736.8	3.12	0.26	0.34
GM0062	331.9	0.011	22.11	19.77	2.50	18269.0	0.71	739.1	4.06	0.04	0.14
GM0063	375.2	0.011	19.52	18.09	2.50	13432.8	0.38	741.3	3.27	0.06	0.16
GM0064	374.5	0.011	17.89	16.16	1.75	5712.6	0.46	743.6	3.65	0.13	0.24
GM0065	235.0	0.013	35.05	32.58	0.83	1008.2	1.05	167.5	3.05	0.17	0.28
GM0066	235.2	0.013	37.31	35.15	0.83	942.4	0.92	98.8	2.50	0.11	0.22
GM0067	379.9	0.01	36.28	30.39	0.67	878.0	1.55	439.0	5.60	0.50	0.50
GM0068	501.2	0.01	41.45	36.48	0.67	702.2	0.99	436.4	4.72	0.62	0.57
GM0069	324.7	0.01	44.88	41.65	0.67	703.2	1.00	433.8	4.72	0.62	0.57
GM0071	258.4	0.01	45.39	45.03	0.67	263.2	0.14	431.2	3.04	1.64	0.85
GM0140	76.0	0.011	48.94	48.62	0.83	753.3	0.42	49.0	1.77	0.07	0.17
GM0141	242.3	0.011	48.42	47.45	0.83	734.6	0.40	53.1	1.78	0.07	0.18
GM0142	65.0	0.011	47.25	46.97	0.83	762.3	0.43	57.3	1.85	0.08	0.18
GM0143	33.1	0.011	46.10	45.97	0.83	727.3	0.39	63.7	1.87	0.09	0.20
GM0144	118.6	0.011	46.77	46.50	0.83	554.0	0.23	60.9	1.63	0.11	0.21
GM0161	23.0	0.011	14.13	14.01	0.83	838.2	0.52	9.5	1.17	0.01	0.07
GM0162	104.0	0.011	13.91	13.86	0.83	254.6	0.05	13.2	0.71	0.05	0.13
GM0163	400.0	0.011	13.76	12.76	0.83	580.5	0.25	15.9	1.04	0.03	0.12
GM0164	79.2	0.011	12.66	12.46	0.83	583.5	0.25	76.0	1.79	0.13	0.24
GM0165	20.0	0.012	12.35	12.30	0.83	532.1	0.25	91.9	1.84	0.17	0.41
GM01_AIRPARK	379.0	0.013	51.21	49.64	0.83	632.9	0.41	65.6	1.75	0.10	0.21
GM0224	362.6	0.011	35.42	33.93	0.83	744.2	0.41	92.1	2.09	0.12	0.24
GM0225	405.3	0.011	37.22	35.62	0.83	729.5	0.40	69.8	1.91	0.10	0.21
GM0237	71.1	0.011	51.70	51.52	1.00	950.9	0.25	142.0	0.88	0.15	0.47
GM0238	290.2	0.011	52.53	51.80	1.00	947.8	0.25	139.1	1.81	0.15	0.27
GM0239	118.2	0.011	52.93	52.63	1.00	952.1	0.25	136.0	2.07	0.14	0.24
GM0241	71.2	0.011	53.21	53.03	1.00	950.1	0.25	129.8	2.06	0.14	0.24
GM0242	62.0	0.011	53.47	53.31	1.00	960.2	0.26	127.2	2.06	0.13	0.23
GM0243	175.4	0.011	54.05	53.57	1.00	988.5	0.27	124.1	2.03	0.13	0.23
GM0244	170.8	0.011	54.48	54.05	1.00	948.3	0.25	119.5	1.84	0.13	0.24
GM0245	126.8	0.011	54.83	54.51	1.00	949.6	0.25	114.7	1.95	0.12	0.22
GM0276	206.3	0.013	36.76	36.36	1.00	704.1	0.19	842.4	2.63	1.20	1.00
GM02_AIRPARK	27.4	0.013	50.99	50.72	0.67	538.4	0.99	7.9	1.24	0.02	0.09
GM0374	120.3	0.011	51.84	51.34	1.00	1218.3	0.42	145.1	2.33	0.12	0.23
GM0375	228.4	0.011	51.14	50.00	1.00	1335.1	0.50	149.0	2.50	0.11	0.23
GM0376	155.3	0.011	49.40	48.75	1.00	1222.7	0.42	158.7	2.39	0.13	0.24
GM0377	49.0	0.011	49.80	49.60	1.00	1207.0	0.41	155.3	2.36	0.13	0.24

Future (2040) System Pipes: 5-yr, 24-hr Storm Event

Inputs						Outputs					
Pipe ID	Length (ft)	Manning's N	US Invert (ft)	DS Invert (ft)	Diameter (ft)	Full Flow (gpm)	Slope (%)	Max. Flow (gpm)	Max. Velocity (ft/s)	Max.Flow/Full Flow	Max.Depth/Full Depth
GM03_AIRPARK	303.0	0.013	49.44	48.01	0.83	675.6	0.47	75.5	1.89	0.11	0.22
GM0409	250.0	0.011	60.55	59.55	0.67	405.9	0.40	358.0	3.04	0.88	0.76
GM0410	272.7	0.011	59.55	58.53	0.67	392.6	0.37	362.4	3.04	0.92	0.71
GM0411	354.2	0.011	58.36	57.40	0.83	604.4	0.27	368.1	2.61	0.61	0.56
GM0412	358.3	0.011	57.40	56.35	0.83	628.4	0.29	372.1	2.71	0.59	0.55
GM0413	63.8	0.011	55.25	55.20	0.83	325.1	0.08	377.9	2.26	1.16	0.67
GM0414	312.3	0.011	56.35	55.35	0.83	657.0	0.32	374.7	2.70	0.57	0.57
GM0417	329.7	0.011	12.19	11.54	1.00	839.2	0.20	347.6	2.50	0.41	0.42
GM0418	179.1	0.011	11.48	10.54	1.00	1369.3	0.53	350.1	2.29	0.26	0.51
GM0419	21.4	0.013	10.54	10.49	1.00	773.5	0.23	718.6	2.81	0.93	0.70
GM0446	88.8	0.011	44.24	43.86	0.67	419.8	0.43	434.7	3.39	1.04	0.76
GM0447	254.5	0.011	45.35	44.34	0.67	404.4	0.40	431.5	3.16	1.07	0.82
GM0448	362.8	0.011	46.91	45.45	0.67	407.2	0.40	429.0	3.13	1.05	0.85
GM0449	49.7	0.011	47.07	46.93	0.67	340.7	0.28	426.1	2.94	1.25	0.93
GM0450	155.7	0.011	48.77	47.83	0.67	498.7	0.60	406.0	3.32	0.81	0.84
GM0451	203.5	0.011	49.00	48.87	0.67	162.2	0.06	402.9	2.88	2.48	0.84
GM0452	197.3	0.011	50.47	49.00	0.67	554.1	0.75	399.2	2.86	0.72	0.83
GM0453	400.5	0.011	52.17	50.57	0.67	405.7	0.40	394.1	3.11	0.97	0.75
GM0454	162.4	0.011	52.36	52.27	0.67	151.1	0.06	391.3	2.78	2.59	0.85
GM0455	300.0	0.011	55.19	53.99	0.67	405.9	0.40	381.3	3.12	0.94	0.73
GM0456	242.5	0.011	53.89	52.36	0.67	509.8	0.63	387.2	2.80	0.76	0.83
GM0466	96.5	0.013	44.20	43.99	1.00	746.0	0.22	218.1	2.14	0.29	0.33
GM0467	126.2	0.013	44.48	44.20	1.00	753.2	0.22	215.2	1.82	0.29	0.37
GM0468	166.3	0.013	44.85	44.48	1.00	754.4	0.22	211.3	1.82	0.28	0.36
GM0469	136.4	0.013	45.16	44.85	1.00	762.4	0.23	208.4	1.83	0.27	0.36
GM0470	104.0	0.013	45.40	45.16	1.00	768.2	0.23	205.2	1.83	0.27	0.36
GM0471	126.2	0.013	45.68	45.40	1.00	753.2	0.22	202.5	1.82	0.27	0.35
GM0472	53.7	0.013	45.80	45.68	1.00	756.3	0.22	199.5	1.80	0.26	0.35
GM0473	402.8	0.011	46.78	45.90	1.00	883.4	0.22	191.7	2.15	0.22	0.30
GM0474	195.6	0.011	47.22	46.78	1.00	896.3	0.23	186.8	1.93	0.21	0.32
GM0475	84.9	0.011	47.39	47.22	1.00	845.9	0.20	183.5	1.94	0.22	0.31
GM0476	153.1	0.011	47.73	47.39	1.00	890.6	0.22	164.6	1.82	0.19	0.30
GM0477	29.9	0.013	47.80	47.73	1.00	774.1	0.23	161.3	1.83	0.21	0.30
GM04_AIRPARK	284.0	0.013	47.81	46.53	0.83	660.2	0.45	80.4	1.90	0.12	0.23
GM0503	65.8	0.012	0.10	0.00	1.50	2745.6	0.29	4507.1	5.96	1.64	0.91
GM0531	185.0	0.012	43.76	41.12	0.67	702.9	1.43	437.9	4.65	0.62	0.58
GM0553	187.9	0.013	38.60	37.90	0.67	331.1	0.37	739.8	4.72	2.24	1.00
GM0555	100.0	0.015	36.60	32.40	0.83	1745.5	4.20	745.7	5.38	0.43	0.61
GM0556	178.0	0.013	32.47	32.07	1.00	758.0	0.23	864.5	2.46	1.14	0.99
GM0563	225.0	0.013	34.22	33.73	1.00	746.2	0.22	846.0	2.44	1.13	1.00
GM0564	348.0	0.013	33.73	32.96	1.00	752.2	0.22	848.5	2.55	1.13	0.97
GM0565	143.0	0.013	32.88	32.57	1.00	744.5	0.22	859.5	2.54	1.15	0.98
GM05_AIRPARK	464.0	0.013	46.33	44.24	0.83	660.0	0.45	85.3	1.93	0.13	0.24
GM0640	176.4	0.013	38.50	37.80	0.67	341.7	0.40	127.0	1.85	0.37	0.74
GM0646	213.4	0.013	34.80	34.22	1.00	833.6	0.27	846.0	2.58	1.02	1.00
GM0647	158.5	0.013	35.25	34.90	1.00	751.4	0.22	836.2	2.77	1.11	1.00
GM0648	282.0	0.013	35.97	35.35	1.00	749.8	0.22	842.8	2.63	1.12	1.00

Future (2040) System Pipes: 5-yr, 24-hr Storm Event

Inputs						Outputs					
Pipe ID	Length (ft)	Manning's N	US Invert (ft)	DS Invert (ft)	Diameter (ft)	Full Flow (gpm)	Slope (%)	Max. Flow (gpm)	Max. Velocity (ft/s)	Max.Flow/Full Flow	Max.Depth/Full Depth
GM0649	83.7	0.013	36.26	36.07	1.00	761.8	0.23	843.2	2.67	1.11	1.00
GM0650	303.8	0.013	37.47	36.86	1.00	716.6	0.20	842.7	2.50	1.18	1.00
GM0652	282.4	0.013	38.10	37.47	1.00	755.3	0.22	721.5	2.18	0.96	1.00
GM0653	166.6	0.013	38.56	38.20	1.00	743.3	0.22	721.2	2.60	0.97	1.00
GM0654	251.7	0.013	39.20	38.66	1.00	740.7	0.22	723.9	2.56	0.98	0.89
GM0675	276.2	0.013	50.55	48.71	1.25	2366.6	0.67	1988.5	3.61	0.84	1.00
GM0676	238.9	0.013	52.19	50.55	1.25	2402.4	0.69	1872.2	4.68	0.78	1.00
GM0678	239.9	0.013	48.61	48.24	1.25	1138.6	0.15	2015.5	3.66	1.77	1.00
GM0682	268.3	0.013	48.24	47.87	1.25	1076.7	0.14	2030.2	3.69	1.89	1.00
GM0686	276.3	0.013	47.87	47.46	1.25	1116.9	0.15	2039.3	4.30	1.83	0.82
GM0687	241.6	0.013	47.46	45.30	1.25	2741.8	0.89	1987.8	5.37	0.73	0.64
GM06_AIRPARK	280.0	0.013	44.04	42.78	0.83	659.7	0.45	88.4	1.95	0.13	0.24
GM0708	506.4	0.013	11.19	3.29	1.25	3621.6	1.56	2117.4	6.42	0.59	0.68
GM0709	486.5	0.013	19.11	11.19	1.25	3699.6	1.63	2121.9	6.91	0.57	0.55
GM0710	528.4	0.013	29.26	19.11	1.25	4018.7	1.92	2087.1	7.10	0.52	0.53
GM0711	349.2	0.013	32.47	29.26	1.25	2780.1	0.92	2082.8	6.18	0.75	0.59
GM0712	298.9	0.013	40.43	32.47	1.25	4732.5	2.66	2075.4	6.50	0.44	0.56
GM0713	353.6	0.013	44.12	40.80	1.25	2809.4	0.94	1982.4	5.53	0.71	0.62
GM0714	140.8	0.013	45.30	44.12	1.25	2654.8	0.84	1986.9	5.46	0.75	0.63
GM0724	494.5	0.013	30.96	20.91	0.83	1400.6	2.03	24.1	1.95	0.02	0.10
GM0725	149.8	0.013	20.91	18.40	0.83	1271.7	1.68	30.7	2.13	0.02	0.11
GM0726	452.8	0.013	18.40	10.03	0.83	1335.7	1.85	34.7	1.92	0.03	0.13
GM0727	320.1	0.013	10.03	7.30	0.83	907.3	0.85	41.9	1.89	0.05	0.15
GM0728	130.7	0.013	7.24	5.65	0.83	1083.4	1.22	45.0	1.97	0.04	0.26
GM0729	66.1	0.013	5.24	5.14	1.25	1127.7	0.15	796.9	2.47	0.71	0.57
GM0730	280.4	0.013	4.64	4.22	1.25	1122.1	0.15	813.1	2.40	0.73	0.59
GM0731	222.6	0.013	4.11	3.78	1.25	1116.4	0.15	819.2	2.34	0.73	0.62
GM0732	277.7	0.013	3.68	3.26	1.25	1127.6	0.15	820.4	2.05	0.73	0.76
GM0733	285.5	0.013	3.26	2.83	1.25	1125.2	0.15	821.0	1.92	0.73	0.92
GM0734	536.5	0.013	2.41	1.99	2.50	5151.1	0.08	4262.5	2.71	0.83	0.67
GM0735	299.7	0.013	2.69	2.51	2.50	4511.6	0.06	3519.1	2.38	0.78	0.64
GM0747	380.5	0.013	7.16	6.33	1.00	746.9	0.22	759.4	2.42	1.02	0.86
GM0748	382.4	0.013	6.33	5.49	1.00	749.4	0.22	750.4	2.78	1.00	0.72
GM0752	268.4	0.013	5.04	4.64	1.25	1119.2	0.15	811.9	2.21	0.73	0.64
GM0757	350.0	0.013	1.05	0.87	2.50	4174.9	0.05	4492.2	3.03	1.08	0.64
GM0758	261.6	0.013	1.34	1.15	2.50	4961.0	0.07	4482.8	2.88	0.90	0.67
GM0759	248.7	0.013	1.58	1.44	2.50	4368.4	0.06	4469.9	2.88	1.02	0.67
GM0760	349.9	0.013	1.89	1.68	2.50	4510.2	0.06	4461.4	2.82	0.99	0.68
GM0761	268.0	0.013	0.77	0.61	2.50	4498.2	0.06	4506.0	3.78	1.00	0.55
GM0778	180.5	0.013	42.11	42.05	1.00	291.6	0.03	638.4	2.36	2.19	0.72
GM0779	85.7	0.013	42.05	41.81	0.83	519.9	0.28	18.7	0.84	0.04	0.67
GM0782	119.5	0.013	43.61	43.25	0.83	539.2	0.30	3.0	0.61	0.01	0.07
GM0783	426.7	0.013	43.25	42.15	0.83	498.8	0.26	8.6	0.77	0.02	0.24
GM0785	129.7	0.013	41.23	40.70	1.00	1022.1	0.41	654.5	2.58	0.64	0.68
GM0786	283.9	0.013	41.61	41.23	1.00	585.1	0.13	651.5	2.36	1.11	0.73
GM0787	413.8	0.013	40.70	39.79	1.00	749.9	0.22	705.0	2.41	0.94	0.77
GM0792	186.2	0.013	39.79	39.38	1.00	750.5	0.22	718.3	2.74	0.96	0.70

Future (2040) System Pipes: 5-yr, 24-hr Storm Event

Inputs						Outputs					
Pipe ID	Length (ft)	Manning's N	US Invert (ft)	DS Invert (ft)	Diameter (ft)	Full Flow (gpm)	Slope (%)	Max. Flow (gpm)	Max. Velocity (ft/s)	Max.Flow/Full Flow	Max.Depth/Full Depth
GM0793	126.8	0.013	41.05	39.80	0.67	539.2	0.99	446.9	3.84	0.83	0.70
GM0798	131.8	0.013	46.00	45.46	0.83	628.7	0.41	3.4	0.67	0.01	0.07
GM0799	402.4	0.013	45.46	43.86	0.83	619.4	0.40	7.5	0.87	0.01	0.08
GM07_AIRPARK	280.0	0.013	42.58	41.32	0.83	659.7	0.45	91.0	1.97	0.14	0.24
GM0800	341.4	0.013	43.86	40.11	0.83	1030.7	1.10	12.0	1.29	0.01	0.31
GM0805	113.7	0.013	45.12	44.60	0.67	367.3	0.46	413.3	3.01	1.13	0.82
GM0806	91.5	0.015	44.20	43.20	1.00	1448.9	1.09	415.8	2.28	0.29	0.51
GM0807	80.0	0.013	43.20	43.08	1.00	619.4	0.15	418.2	1.64	0.68	0.68
GM0808	229.8	0.013	43.08	42.57	1.00	753.3	0.22	632.5	2.34	0.84	0.72
GM0809	160.4	0.013	42.57	42.21	1.00	757.7	0.23	634.8	2.15	0.84	0.78
GM0823	438.8	0.013	26.77	19.58	0.67	695.3	1.64	456.5	4.73	0.66	0.59
GM0824	277.6	0.013	19.43	16.65	0.67	543.5	1.00	458.8	3.88	0.84	0.71
GM0825	512.2	0.013	16.30	10.54	0.67	575.9	1.13	461.4	3.48	0.80	0.83
GM0829	232.8	0.013	14.01	13.11	0.83	610.8	0.39	6.4	0.70	0.01	0.08
GM0830	63.9	0.013	13.11	12.85	0.83	626.7	0.41	9.5	0.98	0.02	0.08
GM0831	240.5	0.013	12.85	10.28	0.83	1015.5	1.07	12.2	1.41	0.01	0.08
GM0832	359.7	0.013	10.49	9.45	1.00	859.8	0.29	708.7	2.62	0.82	0.74
GM0833	230.1	0.013	9.45	8.95	1.00	745.4	0.22	714.0	2.56	0.96	0.75
GM0836	335.2	0.013	8.85	8.10	1.00	756.4	0.22	726.9	2.64	0.96	0.75
GM0837	381.1	0.013	8.00	7.16	1.00	750.7	0.22	723.7	2.44	0.96	0.81
GM0838	475.2	0.013	39.31	26.93	0.67	876.7	2.61	453.9	5.64	0.52	0.51
GM0848	69.2	0.011	16.11	15.64	1.75	6928.7	0.68	746.2	4.20	0.11	0.22
GM0849	236.1	0.011	47.73	47.17	0.67	312.6	0.24	408.7	2.76	1.31	0.92
GM0878	111.2	0.011	4.99	4.40	1.00	1376.8	0.53	3.6	0.90	0.00	0.27
GM0880	483.8	0.011	15.29	13.06	1.75	5706.5	0.46	1463.0	4.47	0.26	0.35
GM0881	526.8	0.011	12.91	10.88	1.75	5217.6	0.39	1405.1	3.09	0.27	0.44
GM0882	53.8	0.011	8.24	7.86	2.50	18287.1	0.71	1437.6	4.95	0.08	0.19
GM0883	265.8	0.011	10.88	10.68	1.75	2305.4	0.08	1452.0	3.08	0.63	0.45
GM0893	502.7	0.011	10.58	8.44	2.50	14195.7	0.43	1433.5	4.13	0.10	0.22
GM08_AIRPARK	358.0	0.013	41.12	39.51	0.83	659.5	0.45	93.6	1.98	0.14	0.25
GM09_AIRPARK	360.0	0.013	39.31	37.46	0.83	705.0	0.51	96.2	2.06	0.14	0.25
LINK295_SMITHLS	1529.8	-	32.00	52.19	1.00	2773.0	1.32	1999.2	6.41	0.72	1.00
LINK298	28.9	0.014	32.07	32.00	1.17	1102.9	0.24	1770.2	4.47	1.61	0.77
LINK300_HWY30_F	256.5	-	33.93	60.55	0.50	755.4	10.43	157.0	2.50	0.21	0.99
LINK303	1563.3	-	8.91	12.50	0.33	62.7	0.23	163.5	4.18	2.61	1.00
LINK306	1726.0	-	8.00	15.50	0.33	88.4	0.44	149.5	3.86	1.69	0.96
LINK307	24.5	0.014	185.00	181.77	0.27	166.2	13.28	263.3	10.18	1.58	1.00
LINK308	142.4	0.014	181.77	179.87	0.67	582.5	1.33	265.8	3.35	0.46	0.50
LINK309	159.1	0.014	179.87	178.05	0.67	539.4	1.14	301.8	3.41	0.56	0.55
LINK310	94.1	0.014	178.05	176.97	0.67	540.4	1.15	304.7	4.59	0.56	0.44
LINK311	264.9	0.014	176.97	154.40	0.67	1474.6	8.55	312.2	7.45	0.21	0.31
LINK312	252.0	0.014	153.99	124.48	0.67	1731.9	11.79	341.1	8.62	0.20	0.30
LINK313	271.7	0.014	124.48	89.83	0.67	1808.4	12.86	344.2	8.98	0.19	0.29
LINK314	233.7	0.014	89.83	56.00	0.67	1929.0	14.63	347.6	9.30	0.18	0.29
LINK315	21.5	0.014	54.96	54.33	0.67	862.6	2.93	351.0	5.09	0.41	0.45
LINK316	323.1	0.014	54.33	45.97	0.67	811.3	2.59	353.1	4.99	0.44	0.46
LINK317	268.8	0.014	6.28	6.21	0.67	81.4	0.03	148.4	1.26	1.82	0.73

Future (2040) System Pipes: 5-yr, 24-hr Storm Event

Inputs						Outputs					
Pipe ID	Length (ft)	Manning's N	US Invert (ft)	DS Invert (ft)	Diameter (ft)	Full Flow (gpm)	Slope (%)	Max. Flow (gpm)	Max. Velocity (ft/s)	Max.Flow/Full Flow	Max.Depth/Full Depth
LINK318	146.6	0.014	6.21	5.63	0.67	317.2	0.40	165.6	2.23	0.52	0.48
LINK319	264.0	0.014	5.51	4.59	0.67	297.7	0.35	182.2	2.11	0.61	0.55
LINK320	202.0	0.014	4.49	3.84	0.67	286.1	0.32	200.5	2.14	0.70	0.58
LINK321	64.7	0.014	3.74	3.54	0.67	280.3	0.31	212.8	2.35	0.76	0.56

CIP System

CIP System Manholes: 5-yr, 24-hr Storm Event

Inputs			Outputs					
Manhole ID	Invert Elevation (ft)	Rim Elevation (ft)	Max. Depth (ft)	Max. HGL (ft)	Freeboard (ft)	Max. Inflow (gpm)	Max. Surcharge Height Above Crown (ft)	Total Flood Vol. (MG)
AIRPORTEA_JUNC	12.00	18.50	-	48.3	-	661	35.8	0.0
CHARLES_JUNC	39.07	46.25	-	90.6	-	429	51.1	0.0
MH0018	24.82	30.70	0.5	25.4	5.3	735	0.0	0.0
MH0019	16.11	22.50	0.4	16.5	6.0	745	0.0	0.0
MH0020	17.89	23.70	0.4	18.3	5.4	743	0.0	0.0
MH0021	19.52	25.00	0.4	19.9	5.1	741	0.0	0.0
MH0022	22.11	26.20	0.3	22.5	3.7	739	0.0	0.0
MH0023	23.73	27.90	0.5	24.3	3.6	737	0.0	0.0
MH0024	29.94	36.10	0.2	30.2	5.9	173	0.0	0.0
MH0025	32.48	38.60	0.2	32.7	5.9	170	0.0	0.0
MH0026	35.05	40.22	0.2	35.3	4.9	168	0.0	0.0
MH0027	37.31	42.61	0.2	37.5	5.1	99	0.0	0.0
MH0028	30.24	36.20	0.3	30.6	5.6	442	0.0	0.0
MH0029	36.28	42.30	0.3	36.6	5.7	439	0.0	0.0
MH0030	41.45	47.50	0.4	41.8	5.7	436	0.0	0.0
MH0031	44.88	51.00	0.4	45.3	5.7	434	0.0	0.0
MH0033	45.39	53.00	1.1	46.5	6.5	431	0.0	0.0
MH0048	55.13	62.73	0.6	55.8	7.0	386	0.0	0.0
MH0049	56.35	67.27	0.5	56.8	10.5	384	0.0	0.0
MH0059	6.60	15.34	0.1	6.7	8.7	14	0.0	0.0
MH0061	7.90	15.78	0.1	8.0	7.8	11	0.0	0.0
MH0098	55.11	62.41	0.5	55.6	6.8	388	0.0	0.0
MH0099	53.89	62.35	0.4	54.3	8.0	394	0.0	0.0
MH0125	46.10	52.50	0.2	46.3	6.2	64	0.0	0.0
MH0126	46.77	55.20	0.2	47.0	8.2	61	0.0	0.0
MH0127	47.25	56.50	0.2	47.4	9.1	57	0.0	0.0
MH0128	48.42	55.60	0.2	48.6	7.0	53	0.0	0.0
MH0130	12.35	18.18	0.3	12.7	5.5	78	0.0	0.0
MH0131	12.66	20.62	0.2	12.9	7.8	75	0.0	0.0
MH0132	13.76	21.50	0.1	13.9	7.6	16	0.0	0.0
MH0133	47.73	59.93	0.5	48.3	11.7	417	0.0	0.0
MH0136	13.91	17.27	0.1	14.1	3.2	13	0.0	0.0
MH0137	14.13	17.76	0.1	14.2	3.6	10	0.0	0.0
MH0154	7.24	17.70	0.1	7.4	10.3	45	0.0	0.0
MH0173	1.34	12.70	1.6	3.0	9.7	4240	0.0	0.0
MH0182	35.42	46.90	0.2	35.6	11.3	93	0.0	0.0
MH0184	37.22	47.01	0.2	37.4	9.6	72	0.0	0.0
MH0198	54.48	65.09	0.2	54.7	10.4	119	0.0	0.0
MH0202	54.05	60.80	0.2	54.3	6.5	124	0.0	0.0

CIP System Manholes: 5-yr, 24-hr Storm Event

Inputs			Outputs					
Manhole ID	Invert Elevation (ft)	Rim Elevation (ft)	Max. Depth (ft)	Max. HGL (ft)	Freeboard (ft)	Max. Inflow (gpm)	Max. Surcharge Height Above Crown (ft)	Total Flood Vol. (MG)
MH0203	53.47	59.50	0.2	53.7	5.8	127	0.0	0.0
MH0204	52.93	58.50	0.3	53.2	5.3	136	0.0	0.0
MH0205	53.21	59.40	0.2	53.5	5.9	130	0.0	0.0
MH0206	52.53	60.07	0.3	52.8	7.3	139	0.0	0.0
MH0207	51.70	59.44	0.4	52.1	7.4	142	0.0	0.0
MH0212	15.29	22.20	0.6	15.9	6.3	1523	0.0	0.0
MH0214	36.76	46.96	0.7	37.5	9.5	626	0.0	0.0
MH0215	11.48	16.84	0.3	11.8	5.0	353	0.0	0.0
MH0251	52.92	61.66	0.4	53.4	8.3	397	0.0	0.0
MH0254	49.80	57.40	0.2	50.0	7.4	155	0.0	0.0
MH0255	49.40	58.00	0.2	49.6	8.4	159	0.0	0.0
MH0256	51.14	62.00	0.2	51.4	10.6	149	0.0	0.0
MH0257	51.52	61.40	0.6	52.1	9.3	145	0.0	0.0
MH0262	49.68	61.60	0.4	50.1	11.5	410	0.0	0.0
MH0284	57.40	69.80	0.5	57.9	11.9	379	0.0	0.0
MH0285	58.36	68.49	0.5	58.8	9.7	375	0.0	0.0
MH0286	59.55	64.60	0.4	60.0	4.6	372	0.0	0.0
MH0287	60.55	63.00	0.4	61.0	2.0	371	0.0	0.0
MH0290	10.54	17.30	0.6	11.2	6.1	788	0.0	0.0
MH0291	12.19	16.50	0.5	12.7	3.8	387	0.0	0.0
MH0293	41.23	53.03	0.4	41.7	11.4	413	0.0	0.0
MH0304	45.35	56.93	0.5	45.8	11.1	444	0.0	0.0
MH0305	43.76	58.93	0.4	44.1	14.8	453	0.0	0.0
MH0306	44.24	58.93	0.5	44.7	14.2	448	0.0	0.0
MH0307	46.91	59.81	0.5	47.4	12.4	441	0.0	0.0
MH0308	47.07	59.77	0.5	47.5	12.2	438	0.0	0.0
MH0309	48.77	61.37	0.4	49.2	12.2	414	0.0	0.0
MH0310	50.47	61.37	0.4	50.9	10.5	405	0.0	0.0
MH0311	52.17	61.77	0.4	52.6	9.2	401	0.0	0.0
MH0318	44.20	51.90	0.4	44.6	7.3	218	0.0	0.0
MH0319	44.48	50.40	0.4	44.8	5.6	215	0.0	0.0
MH0320	44.85	53.00	0.4	45.2	7.8	211	0.0	0.0
MH0321	45.16	53.00	0.4	45.5	7.5	208	0.0	0.0
MH0322	45.40	51.30	0.4	45.8	5.5	205	0.0	0.0
MH0323	45.68	57.30	0.4	46.0	11.3	202	0.0	0.0
MH0324	45.80	57.80	0.4	46.2	11.6	200	0.0	0.0
MH0325	46.78	59.20	0.3	47.1	12.1	192	0.0	0.0
MH0326	47.22	58.00	0.3	47.5	10.5	187	0.0	0.0
MH0327	47.39	58.20	0.3	47.7	10.5	184	0.0	0.0

CIP System Manholes: 5-yr, 24-hr Storm Event

Inputs			Outputs					
Manhole ID	Invert Elevation (ft)	Rim Elevation (ft)	Max. Depth (ft)	Max. HGL (ft)	Freeboard (ft)	Max. Inflow (gpm)	Max. Surcharge Height Above Crown (ft)	Total Flood Vol. (MG)
MH0328	47.73	60.90	0.3	48.0	12.9	165	0.0	0.0
MH0329	47.80	61.00	0.3	48.1	12.9	161	0.0	0.0
MH0373	41.05	56.81	0.4	41.5	15.4	471	0.0	0.0
MH0376	45.30	53.72	0.7	46.0	7.7	1778	0.0	0.0
MH0393	32.07	44.96	0.9	32.9	12.0	1570	0.0	0.0
MH0395	32.47	44.63	0.6	33.1	11.5	675	0.0	0.0
MH0400	34.90	49.00	0.6	35.5	13.5	739	0.0	0.0
MH0401	34.40	48.20	0.8	35.2	13.0	742	0.0	0.0
MH0402MTR2	33.40	46.20	0.5	33.9	12.3	745	0.0	0.0
MH0418	51.10	60.03	0.1	51.2	8.8	46	0.0	0.0
MH0421	34.22	40.38	0.6	34.8	5.5	654	0.0	0.0
MH0422	33.73	41.96	0.6	34.4	7.6	656	0.0	0.0
MH0423	32.88	39.96	0.6	33.5	6.5	670	0.0	0.0
MH0431	48.61	57.33	1.0	49.6	7.7	1848	0.0	0.0
MH0473	37.47	47.96	0.6	38.1	9.9	623	0.0	0.0
MH0474	38.50	47.96	0.3	38.8	9.2	127	0.0	0.0
MH0483	36.26	46.96	0.7	36.9	10.0	632	0.0	0.0
MH0484MTR1	35.97	42.17	0.7	36.7	5.5	634	0.0	0.0
MH0485	35.25	44.96	0.7	36.0	9.0	637	0.0	0.0
MH0486	34.80	44.96	0.7	35.5	9.5	654	0.0	0.0
MH0487	39.20	49.16	0.6	39.8	9.3	488	0.0	0.0
MH0488	38.56	48.50	0.6	39.2	9.3	491	0.0	0.0
MH0489	38.10	48.50	0.6	38.7	9.8	497	0.0	0.0
MH0506	47.46	57.10	0.7	48.2	8.9	1776	0.0	0.0
MH0507	47.87	57.17	1.0	48.9	8.3	1777	0.0	0.0
MH0510	48.24	56.83	1.0	49.3	7.5	1789	0.0	0.0
MH0513	50.55	57.97	0.7	51.3	6.7	1899	0.0	0.0
MH0514	52.19	61.43	0.8	53.0	8.4	1986	0.0	0.0
MH0525	44.12	53.30	0.7	44.8	8.5	1782	0.0	0.0
MH0526	40.43	50.20	0.5	41.0	9.2	1878	0.0	0.0
MH0530	32.47	46.37	0.8	33.2	13.1	1891	0.0	0.0
MH0533	29.26	40.00	0.6	29.9	10.1	1903	0.0	0.0
MH0534	19.11	32.37	0.6	19.8	12.6	1951	0.0	0.0
MH0536	11.19	20.49	0.7	11.8	8.6	1953	0.0	0.0
MH0537MTR5	2.69	15.50	1.6	4.3	11.2	3395	0.0	0.0
MH0549	30.96	41.05	0.1	31.0	10.0	24	0.0	0.0
MH0561	14.01	22.83	0.1	14.1	8.8	6	0.0	0.0
MH0565	20.91	30.81	0.1	21.0	9.8	31	0.0	0.0
MH0566	18.40	30.50	0.1	18.5	12.0	35	0.0	0.0

CIP System Manholes: 5-yr, 24-hr Storm Event

Inputs			Outputs					
Manhole ID	Invert Elevation (ft)	Rim Elevation (ft)	Max. Depth (ft)	Max. HGL (ft)	Freeboard (ft)	Max. Inflow (gpm)	Max. Surcharge Height Above Crown (ft)	Total Flood Vol. (MG)
MH0567	10.03	19.96	0.1	10.2	9.8	42	0.0	0.0
MH0568	5.24	16.66	0.7	6.0	10.7	826	0.0	0.0
MH0569	5.04	15.78	0.8	5.8	9.9	842	0.0	0.0
MH0570	6.33	16.71	0.7	7.1	9.7	793	0.0	0.0
MH0571	7.16	16.71	0.7	7.8	8.9	802	0.0	0.0
MH0572	4.11	15.92	0.8	4.9	11.0	848	0.0	0.0
MH0573	3.68	13.48	0.7	4.4	9.1	850	0.0	0.0
MH0574	2.41	14.50	1.7	4.1	10.4	4147	0.0	0.0
MH0575MTR4	4.64	15.60	0.8	5.5	10.1	844	0.0	0.0
MH0576	3.26	11.86	0.9	4.1	7.7	853	0.0	0.0
MH0577	1.89	14.17	1.7	3.6	10.6	4215	0.0	0.0
MH0578	1.05	12.34	1.7	2.7	9.6	4249	0.0	0.0
MH0579	0.77	13.82	1.5	2.3	11.6	4265	0.0	0.0
MH0580	0.19	12.82	1.1	1.2	11.6	4265	0.0	0.0
MH0581	1.58	14.95	1.7	3.2	11.7	4225	0.0	0.0
MH0591	39.31	52.41	0.4	39.7	12.7	478	0.0	0.0
MH0594	46.00	57.96	0.0	46.0	11.9	3	0.0	0.0
MH0595	45.46	58.02	0.1	45.5	12.5	8	0.0	0.0
MH0597	43.86	54.12	0.1	43.9	10.2	12	0.0	0.0
MH0598	39.79	50.94	0.6	40.4	10.6	484	0.0	0.0
MH0603	40.70	52.00	0.6	41.3	10.7	469	0.0	0.0
MH0604	41.61	53.03	0.7	42.3	10.8	410	0.0	0.0
MH0605	42.05	53.03	0.2	42.3	10.8	14	0.0	0.0
MH0606	42.11	52.71	0.7	42.8	9.9	397	0.0	0.0
MH0607	42.57	52.83	0.5	43.1	9.7	393	0.0	0.0
MH0608	43.08	51.78	0.5	43.6	8.2	391	0.0	0.0
MH0609	43.25	53.73	0.1	43.3	10.4	7	0.0	0.0
MH0610	43.61	56.03	0.0	43.7	12.4	3	0.0	0.0
MH0614	43.20	51.20	0.5	43.7	7.5	248	0.0	0.0
MH0615	44.20	52.70	0.3	44.5	8.2	245	0.0	0.0
MH0616	45.12	52.60	0.4	45.5	7.1	243	0.0	0.0
MH0634	26.77	39.43	0.4	27.2	12.3	480	0.0	0.0
MH0635	8.00	15.71	0.7	8.7	7.0	767	0.0	0.0
MH0636	8.85	20.71	0.7	9.5	11.2	766	0.0	0.0
MH0637MTR3	9.45	20.49	0.7	10.1	10.4	762	0.0	0.0
MH0638	10.49	17.78	0.6	11.1	6.7	759	0.0	0.0
MH0639	12.85	21.91	0.1	12.9	9.0	12	0.0	0.0
MH0640	13.11	21.91	0.1	13.2	8.7	9	0.0	0.0
MH0642	16.30	22.79	0.4	16.7	6.1	485	0.0	0.0

CIP System Manholes: 5-yr, 24-hr Storm Event

Inputs			Outputs					
Manhole ID	Invert Elevation (ft)	Rim Elevation (ft)	Max. Depth (ft)	Max. HGL (ft)	Freeboard (ft)	Max. Inflow (gpm)	Max. Surcharge Height Above Crown (ft)	Total Flood Vol. (MG)
MH0643	19.43	30.44	0.4	19.8	10.6	482	0.0	0.0
MH0663	10.88	18.50	0.9	11.8	6.7	1561	0.0	0.0
MH0664	12.91	20.20	0.6	13.5	6.7	1467	0.0	0.0
MH0665	8.24	19.00	0.5	8.7	10.3	1438	0.0	0.0
MH0674	10.58	18.50	0.5	11.1	7.4	1459	0.0	0.0
MH1	51.21	57.72	0.2	51.4	6.3	66	0.0	0.0
MH2	50.99	57.12	0.1	51.0	6.1	8	0.0	0.0
MH3	49.44	56.96	0.2	49.6	7.3	75	0.0	0.0
MH4	47.81	56.65	0.2	48.0	8.6	80	0.0	0.0
MH5	46.33	54.25	0.2	46.5	7.7	85	0.0	0.0
MH6	44.04	52.07	0.2	44.3	7.8	88	0.0	0.0
MH7	42.58	50.51	0.2	42.8	7.7	91	0.0	0.0
MH8	41.12	46.05	0.2	41.3	4.7	94	0.0	0.0
MH9	39.31	43.98	0.2	39.5	4.5	96	0.0	0.0
MILLER_WTP_INFL	6.28	10.40	0.5	6.8	3.6	113	0.0	0.0
MMH0001	4.99	15.00	0.0	5.0	10.0	4	0.0	0.0
MMH0003	54.83	63.00	0.2	55.1	7.9	115	0.0	0.0
MMH0004	48.94	56.60	0.1	49.1	7.5	49	0.0	0.0
NODE451	32.00	45.00	-	83.7	-	1983	50.7	0.0
NODE452	33.93	52.93	-	67.4	-	153	33.0	0.0
NODE455	8.91	13.91	-	71.0	-	153	61.8	0.0
NODE456	8.00	18.40	-	41.4	-	463	33.1	0.0
NODE461	54.33	67.50	0.2	54.6	12.9	220	0.0	0.0
NODE462	54.96	69.50	0.2	55.2	14.3	218	0.0	0.0
NODE463	89.83	105.50	0.2	90.0	15.5	216	0.0	0.0
NODE464	124.48	153.50	0.2	124.6	28.9	214	0.0	0.0
NODE465	153.99	177.50	0.2	154.1	23.4	211	0.0	0.0
NODE466	176.97	184.00	0.2	177.1	6.9	200	0.0	0.0
NODE467	178.05	192.00	0.3	178.3	13.7	195	0.0	0.0
NODE468	179.87	194.00	0.3	180.1	13.9	192	0.0	0.0
NODE469	181.77	192.00	0.3	182.0	10.0	178	0.0	0.0
NODE471	3.74	12.63	0.4	4.1	8.5	166	0.0	0.0
NODE472	4.49	13.51	0.4	4.9	8.6	156	0.0	0.0
NODE473	5.51	13.01	0.3	5.9	7.2	141	0.0	0.0
NODE474	6.21	13.26	0.3	6.5	6.7	127	0.0	0.0

CIP System Pipes: 5-yr, 24-hr Storm Event

Inputs						Outputs					
Pipe ID	Length (ft)	Manning's N	US Invert (ft)	DS Invert (ft)	Diameter (ft)	Full Flow (gpm)	Slope (%)	Max. Flow (gpm)	Max. Velocity (ft/s)	Max.Flow/Full Flow	Max.Depth/Full Depth
C-10	792.1	-	51.10	38.60	0.67	681.4	1.58	46.1	2.48	0.07	0.18
FM_AIRPORTEA	500.0	-	12.00	15.50	0.50	327.0	0.70	660.8	7.50	2.02	1.00
FM_CHARLES	1915.0	0.01	39.07	47.30	0.50	251.3	0.43	428.6	4.92	1.71	0.97
GM0048	201.2	0.011	6.60	5.80	1.25	2160.6	0.40	13.9	1.17	0.01	0.06
GM0050	292.2	0.011	7.90	6.60	0.83	774.3	0.45	11.0	1.08	0.01	0.09
GM00554	180.5	0.014	34.40	34.20	1.25	896.2	0.11	741.8	2.52	0.83	0.53
GM0057	367.1	0.01	30.24	25.28	0.67	819.6	1.35	441.6	5.33	0.54	0.52
GM0058	449.8	0.013	29.94	25.49	0.83	978.1	0.99	172.7	3.01	0.18	0.28
GM0059	241.0	0.013	32.48	30.09	0.83	979.3	0.99	170.1	3.00	0.17	0.28
GM0060	255.4	0.013	24.82	23.93	1.50	2783.3	0.35	734.4	3.12	0.26	0.34
GM0061	390.0	0.013	23.73	22.36	1.50	2794.4	0.35	736.1	3.12	0.26	0.34
GM0062	331.9	0.011	22.11	19.77	2.50	18269.0	0.71	738.4	4.06	0.04	0.14
GM0063	375.2	0.011	19.52	18.09	2.50	13432.8	0.38	740.6	3.27	0.06	0.16
GM0064	374.5	0.011	17.89	16.16	1.75	5712.6	0.46	742.9	3.65	0.13	0.24
GM0065	235.0	0.013	35.05	32.58	0.83	1008.2	1.05	167.5	3.05	0.17	0.28
GM0066	235.2	0.013	37.31	35.15	0.83	942.4	0.92	98.8	2.50	0.11	0.22
GM0067	379.9	0.01	36.28	30.39	0.67	878.0	1.55	439.0	5.60	0.50	0.50
GM0068	501.2	0.01	41.45	36.48	0.67	702.2	0.99	436.4	4.72	0.62	0.57
GM0069	324.7	0.01	44.88	41.65	0.67	703.2	1.00	433.8	4.72	0.62	0.57
GM0071	258.4	0.01	45.39	45.03	0.67	263.2	0.14	431.2	3.04	1.64	0.85
GM0140	76.0	0.011	48.94	48.62	0.83	753.3	0.42	49.0	1.77	0.07	0.17
GM0141	242.3	0.011	48.42	47.45	0.83	734.6	0.40	53.1	1.78	0.07	0.18
GM0142	65.0	0.011	47.25	46.97	0.83	762.3	0.43	57.3	1.85	0.08	0.18
GM0143	33.1	0.011	46.10	45.97	0.83	727.3	0.39	63.7	1.87	0.09	0.20
GM0144	118.6	0.011	46.77	46.50	0.83	554.0	0.23	60.9	1.63	0.11	0.21
GM0161	23.0	0.011	14.13	14.01	0.83	838.2	0.52	9.5	1.17	0.01	0.07
GM0162	104.0	0.011	13.91	13.86	0.83	254.6	0.05	13.2	0.71	0.05	0.13
GM0163	400.0	0.011	13.76	12.76	0.83	580.5	0.25	15.9	1.04	0.03	0.12
GM0164	79.2	0.011	12.66	12.46	0.83	583.5	0.25	75.0	1.79	0.13	0.24
GM0165	20.0	0.012	12.35	12.30	0.83	532.1	0.25	90.5	1.84	0.17	0.41
GM01_AIRPARK	379.0	0.013	51.21	49.64	0.83	632.9	0.41	65.6	1.75	0.10	0.21
GM0224	362.6	0.011	35.42	33.93	0.83	744.2	0.41	92.1	2.09	0.12	0.24
GM0225	405.3	0.011	37.22	35.62	0.83	729.5	0.40	69.8	1.91	0.10	0.21
GM0237	71.1	0.011	51.70	51.52	1.00	950.9	0.25	142.0	0.88	0.15	0.47
GM0238	290.2	0.011	52.53	51.80	1.00	947.8	0.25	139.1	1.81	0.15	0.27
GM0239	118.2	0.011	52.93	52.63	1.00	952.1	0.25	136.0	2.07	0.14	0.24
GM0241	71.2	0.011	53.21	53.03	1.00	950.1	0.25	129.8	2.06	0.14	0.24
GM0242	62.0	0.011	53.47	53.31	1.00	960.2	0.26	127.2	2.06	0.13	0.23
GM0243	175.4	0.011	54.05	53.57	1.00	988.5	0.27	124.1	2.03	0.13	0.23
GM0244	170.8	0.011	54.48	54.05	1.00	948.3	0.25	119.5	1.84	0.13	0.24
GM0245	126.8	0.011	54.83	54.51	1.00	949.6	0.25	114.7	1.95	0.12	0.22
GM0276	206.3	0.013	36.76	36.36	1.00	704.1	0.19	626.3	2.55	0.89	0.66
GM02_AIRPARK	27.4	0.013	50.99	50.72	0.67	538.4	0.99	7.9	1.24	0.02	0.09
GM0374	120.3	0.011	51.84	51.34	1.00	1218.3	0.42	145.1	2.33	0.12	0.23
GM0375	228.4	0.011	51.14	50.00	1.00	1335.1	0.50	149.0	2.50	0.11	0.23
GM0376	155.3	0.011	49.40	48.75	1.00	1222.7	0.42	158.7	2.39	0.13	0.24
GM0377	49.0	0.011	49.80	49.60	1.00	1207.0	0.41	155.3	2.36	0.13	0.24

CIP System Pipes: 5-yr, 24-hr Storm Event

Inputs						Outputs					
Pipe ID	Length (ft)	Manning's N	US Invert (ft)	DS Invert (ft)	Diameter (ft)	Full Flow (gpm)	Slope (%)	Max. Flow (gpm)	Max. Velocity (ft/s)	Max.Flow/Full Flow	Max.Depth/Full Depth
GM03_AIRPARK	303.0	0.013	49.44	48.01	0.83	675.6	0.47	75.5	1.89	0.11	0.22
GM0409	250.0	0.011	60.55	59.55	0.83	734.3	0.40	367.2	3.15	0.50	0.51
GM0410	272.7	0.011	59.55	58.53	0.83	710.1	0.37	368.9	3.03	0.52	0.50
GM0411	354.2	0.011	58.36	57.40	0.83	604.4	0.27	375.3	2.65	0.62	0.57
GM0412	358.3	0.011	57.40	56.35	0.83	628.4	0.29	381.5	2.75	0.61	0.56
GM0413	63.8	0.011	55.25	55.20	1.00	529.2	0.08	385.0	2.38	0.73	0.47
GM0414	312.3	0.011	56.35	55.35	0.83	657.0	0.32	382.7	2.92	0.58	0.53
GM0417	329.7	0.011	12.19	11.54	1.00	839.2	0.20	347.9	2.50	0.42	0.42
GM0418	179.1	0.011	11.48	10.54	1.00	1369.3	0.53	350.5	2.50	0.26	0.47
GM0419	21.4	0.013	10.54	10.49	1.25	1402.4	0.23	755.8	2.86	0.54	0.49
GM0446	88.8	0.011	44.24	43.86	0.83	759.4	0.43	448.0	3.32	0.59	0.54
GM0447	254.5	0.011	45.35	44.34	0.83	731.4	0.40	443.5	3.23	0.61	0.55
GM0448	362.8	0.011	46.91	45.45	0.83	736.5	0.40	439.9	3.23	0.60	0.55
GM0449	49.2	0.011	47.07	46.93	1.00	1007.7	0.28	438.1	2.85	0.44	0.45
GM0450	155.7	0.011	48.77	47.83	0.83	902.0	0.60	413.9	3.39	0.46	0.51
GM0451	203.5	0.011	49.68	48.87	0.83	733.4	0.40	408.8	3.17	0.56	0.52
GM0452	197.3	0.011	50.47	49.68	0.83	733.7	0.40	404.9	3.06	0.55	0.53
GM0453	400.5	0.011	52.17	50.57	0.83	733.8	0.40	400.0	3.14	0.55	0.52
GM0454	162.4	0.011	52.92	52.27	0.83	734.5	0.40	397.1	3.15	0.54	0.51
GM0455	300.0	0.011	55.19	53.99	0.83	734.2	0.40	387.9	3.12	0.53	0.51
GM0456	242.5	0.011	53.89	52.92	0.83	734.2	0.40	393.7	3.05	0.54	0.52
GM0466	96.5	0.013	44.20	43.99	1.00	746.0	0.22	218.2	2.14	0.29	0.33
GM0467	126.2	0.013	44.48	44.20	1.00	753.2	0.22	215.2	1.82	0.29	0.37
GM0468	166.3	0.013	44.85	44.48	1.00	754.4	0.22	211.3	1.82	0.28	0.36
GM0469	136.4	0.013	45.16	44.85	1.00	762.4	0.23	208.4	1.83	0.27	0.36
GM0470	104.0	0.013	45.40	45.16	1.00	768.2	0.23	205.2	1.83	0.27	0.36
GM0471	126.2	0.013	45.68	45.40	1.00	753.2	0.22	202.5	1.82	0.27	0.35
GM0472	53.7	0.013	45.80	45.68	1.00	756.3	0.22	199.5	1.80	0.26	0.35
GM0473	402.8	0.011	46.78	45.90	1.00	883.4	0.22	191.7	2.15	0.22	0.30
GM0474	195.6	0.011	47.22	46.78	1.00	896.3	0.23	186.8	1.93	0.21	0.32
GM0475	84.9	0.011	47.39	47.22	1.00	845.9	0.20	183.5	1.94	0.22	0.31
GM0476	153.1	0.011	47.73	47.39	1.00	890.6	0.22	164.6	1.82	0.19	0.30
GM0477	29.9	0.013	47.80	47.73	1.00	774.1	0.23	161.3	1.83	0.21	0.30
GM04_AIRPARK	284.0	0.013	47.81	46.53	0.83	660.2	0.45	80.4	1.90	0.12	0.23
GM0503	65.8	0.012	0.10	0.00	2.50	10721.1	0.29	4265.3	4.90	0.40	0.42
GM0531	185.0	0.012	43.76	41.12	0.67	702.9	1.43	452.6	4.76	0.64	0.58
GM0553	187.9	0.013	34.90	34.40	1.25	1495.8	0.27	739.4	2.28	0.49	0.57
GM0555	100.0	0.015	33.40	32.40	1.00	1385.9	1.00	744.9	4.00	0.54	0.53
GM0556	178.0	0.013	32.47	32.07	1.25	1374.4	0.23	675.3	2.14	0.49	0.60
GM0563	225.0	0.013	34.22	33.73	1.25	1353.0	0.22	653.6	2.39	0.48	0.50
GM0564	348.0	0.013	33.73	32.96	1.25	1363.8	0.22	656.2	2.58	0.48	0.47
GM0565	143.0	0.013	32.88	32.57	1.25	1349.9	0.22	669.7	2.71	0.50	0.46
GM05_AIRPARK	464.0	0.013	46.33	44.24	0.83	660.0	0.45	85.3	1.93	0.13	0.24
GM0640	176.4	0.013	38.50	37.80	0.67	341.7	0.40	127.1	2.15	0.37	0.41
GM0646	213.4	0.013	34.80	34.22	1.00	833.6	0.27	653.7	2.72	0.78	0.64
GM0647	158.5	0.013	35.25	34.90	1.00	751.4	0.22	636.9	2.67	0.85	0.64
GM0648	282.0	0.013	35.97	35.35	1.00	749.8	0.22	634.3	2.55	0.85	0.67

CIP System Pipes: 5-yr, 24-hr Storm Event

Inputs						Outputs					
Pipe ID	Length (ft)	Manning's N	US Invert (ft)	DS Invert (ft)	Diameter (ft)	Full Flow (gpm)	Slope (%)	Max. Flow (gpm)	Max. Velocity (ft/s)	Max.Flow/Full Flow	Max.Depth/Full Depth
GM0649	83.7	0.013	36.26	36.07	1.00	761.8	0.23	631.8	2.60	0.83	0.65
GM0650	303.8	0.013	37.47	36.86	1.25	1299.3	0.20	623.3	2.27	0.48	0.50
GM0652	282.4	0.013	38.10	37.47	1.00	755.3	0.22	496.5	2.25	0.66	0.60
GM0653	166.6	0.013	38.56	38.20	1.00	743.3	0.22	491.2	2.49	0.66	0.55
GM0654	251.7	0.013	39.20	38.66	1.00	740.7	0.22	488.1	2.41	0.66	0.56
GM0675	276.2	0.013	50.55	48.71	1.50	3848.4	0.67	1834.4	4.11	0.48	0.55
GM0676	238.9	0.013	52.19	50.55	1.25	2402.4	0.69	1801.9	5.11	0.75	0.62
GM0678	239.9	0.013	48.61	48.24	1.75	2792.9	0.15	1785.1	2.70	0.64	0.59
GM0682	268.3	0.013	48.24	47.87	1.75	2641.0	0.14	1772.5	2.69	0.67	0.59
GM0686	276.3	0.013	47.87	47.46	1.75	2739.5	0.15	1772.2	3.30	0.65	0.50
GM0687	241.6	0.013	47.46	45.30	1.25	2741.8	0.89	1774.6	5.22	0.65	0.59
GM06_AIRPARK	280.0	0.013	44.04	42.78	0.83	659.7	0.45	88.4	1.95	0.13	0.24
GM0708	506.4	0.013	11.19	3.29	1.25	3621.6	1.56	1952.0	6.46	0.54	0.65
GM0709	486.5	0.013	19.11	11.19	1.25	3699.6	1.63	1950.0	6.75	0.53	0.52
GM0710	528.4	0.013	29.26	19.11	1.25	4018.7	1.92	1902.8	6.91	0.47	0.50
GM0711	349.2	0.013	32.47	29.26	1.25	2780.1	0.92	1890.1	6.04	0.68	0.55
GM0712	298.9	0.013	40.43	32.47	1.25	4732.5	2.66	1877.7	6.33	0.40	0.53
GM0713	353.6	0.013	44.12	40.80	1.25	2809.4	0.94	1781.6	5.40	0.63	0.58
GM0714	140.8	0.013	45.30	44.12	1.25	2654.8	0.84	1777.4	5.27	0.67	0.59
GM0724	494.5	0.013	30.96	20.91	0.83	1400.6	2.03	24.1	1.95	0.02	0.10
GM0725	149.8	0.013	20.91	18.40	0.83	1271.7	1.68	30.7	2.13	0.02	0.11
GM0726	452.8	0.013	18.40	10.03	0.83	1335.7	1.85	34.7	1.92	0.03	0.13
GM0727	320.1	0.013	10.03	7.30	0.83	907.3	0.85	41.9	1.89	0.05	0.15
GM0728	130.7	0.013	7.24	5.65	0.83	1083.4	1.22	45.0	1.99	0.04	0.27
GM0729	66.1	0.013	5.24	5.14	1.25	1127.7	0.15	825.5	2.49	0.73	0.58
GM0730	280.4	0.013	4.64	4.22	1.25	1122.1	0.15	840.4	2.41	0.75	0.61
GM0731	222.6	0.013	4.11	3.78	1.25	1116.4	0.15	846.8	2.61	0.76	0.57
GM0732	277.7	0.013	3.68	3.26	1.50	1833.6	0.15	847.8	2.12	0.46	0.53
GM0733	285.5	0.013	3.26	2.83	1.75	2760.0	0.15	858.0	1.58	0.31	0.60
GM0734	536.5	0.013	2.41	1.99	2.50	5151.1	0.08	4131.8	2.73	0.80	0.65
GM0735	299.7	0.013	2.69	2.51	2.50	4511.6	0.06	3383.7	2.38	0.75	0.63
GM0747	380.5	0.013	7.16	6.33	1.25	1354.1	0.22	789.4	2.51	0.58	0.56
GM0748	382.4	0.013	6.33	5.49	1.25	1358.8	0.22	779.4	2.85	0.57	0.50
GM0752	268.4	0.013	5.04	4.64	1.25	1119.2	0.15	840.1	2.23	0.75	0.65
GM0757	350.0	0.013	1.05	0.87	2.50	4174.9	0.05	4248.3	3.02	1.02	0.61
GM0758	261.6	0.013	1.34	1.15	2.50	4961.0	0.07	4238.3	2.85	0.85	0.64
GM0759	248.7	0.013	1.58	1.44	2.50	4368.4	0.06	4222.8	2.84	0.97	0.64
GM0760	349.9	0.013	1.89	1.68	2.50	4510.2	0.06	4211.9	2.78	0.93	0.65
GM0761	268.0	0.013	0.77	0.61	2.50	4498.2	0.06	4262.7	3.84	0.95	0.50
GM0778	180.5	0.013	42.11	42.05	1.00	291.6	0.03	396.0	1.96	1.36	0.56
GM0779	85.7	0.013	42.05	41.81	0.83	519.9	0.28	21.0	0.80	0.04	0.40
GM0782	119.5	0.013	43.61	43.25	0.83	539.2	0.30	3.0	0.61	0.01	0.07
GM0783	426.7	0.013	43.25	42.15	0.83	498.8	0.26	8.6	0.77	0.02	0.11
GM0785	129.7	0.013	41.23	40.70	1.00	1022.1	0.41	412.9	2.34	0.40	0.51
GM0786	283.9	0.013	41.61	41.23	1.00	585.1	0.13	409.6	2.08	0.70	0.55
GM0787	413.8	0.013	40.70	39.79	1.00	749.9	0.22	468.9	2.19	0.63	0.59
GM0792	186.2	0.013	39.79	39.38	1.00	750.5	0.22	483.4	2.62	0.64	0.52

CIP System Pipes: 5-yr, 24-hr Storm Event

Inputs						Outputs					
Pipe ID	Length (ft)	Manning's N	US Invert (ft)	DS Invert (ft)	Diameter (ft)	Full Flow (gpm)	Slope (%)	Max. Flow (gpm)	Max. Velocity (ft/s)	Max.Flow/Full Flow	Max.Depth/Full Depth
GM0793	126.8	0.013	41.05	39.80	0.83	975.4	0.99	470.7	3.95	0.48	0.49
GM0798	131.8	0.013	46.00	45.46	0.83	628.7	0.41	3.4	0.67	0.01	0.07
GM0799	402.4	0.013	45.46	43.86	0.83	619.4	0.40	7.5	0.87	0.01	0.08
GM07_AIRPARK	280.0	0.013	42.58	41.32	0.83	659.7	0.45	91.0	1.97	0.14	0.24
GM0800	341.4	0.013	43.86	40.11	0.83	1030.7	1.10	12.0	1.28	0.01	0.20
GM0805	113.7	0.013	45.12	44.60	0.67	367.3	0.46	242.9	2.69	0.66	0.56
GM0806	91.5	0.015	44.20	43.20	1.00	1448.9	1.09	245.4	2.12	0.17	0.37
GM0807	80.0	0.013	43.20	43.08	1.00	619.4	0.15	247.6	1.68	0.40	0.49
GM0808	229.8	0.013	43.08	42.57	1.00	753.3	0.22	390.4	2.16	0.52	0.51
GM0809	160.4	0.013	42.57	42.21	1.00	757.7	0.23	392.8	1.91	0.52	0.57
GM0823	438.8	0.013	26.77	19.58	0.67	695.3	1.64	479.7	4.78	0.69	0.61
GM0824	277.6	0.013	19.43	16.65	0.83	983.0	1.00	482.0	4.00	0.49	0.49
GM0825	512.2	0.013	16.30	10.54	0.83	1041.8	1.13	484.5	3.41	0.47	0.61
GM0829	232.8	0.013	14.01	13.11	0.83	610.8	0.39	6.4	0.70	0.01	0.08
GM0830	63.9	0.013	13.11	12.85	0.83	626.7	0.41	9.5	0.98	0.02	0.08
GM0831	240.5	0.013	12.85	10.28	0.83	1015.5	1.07	12.2	1.41	0.01	0.08
GM0832	359.7	0.013	10.49	9.45	1.25	1558.9	0.29	747.9	2.66	0.48	0.51
GM0833	230.1	0.013	9.45	8.95	1.25	1351.5	0.22	753.0	2.69	0.56	0.51
GM0836	335.2	0.013	8.85	8.10	1.25	1371.4	0.22	764.6	2.78	0.56	0.50
GM0837	381.1	0.013	8.00	7.16	1.25	1361.1	0.22	756.3	2.52	0.56	0.54
GM0838	475.2	0.013	39.31	26.93	0.67	876.7	2.61	477.4	5.71	0.55	0.53
GM0848	69.2	0.011	16.11	15.64	1.75	6928.7	0.68	745.5	4.19	0.11	0.22
GM0849	236.1	0.011	47.73	47.17	0.83	565.4	0.24	415.3	2.81	0.73	0.58
GM0878	111.2	0.011	4.99	4.40	1.00	1376.8	0.53	3.6	0.90	0.00	0.28
GM0880	483.8	0.011	15.29	13.06	1.75	5706.5	0.46	1464.8	4.47	0.26	0.35
GM0881	526.8	0.011	12.91	10.88	1.75	5217.6	0.39	1408.0	3.10	0.27	0.44
GM0882	53.8	0.011	8.24	7.86	2.50	18287.1	0.71	1439.3	4.95	0.08	0.19
GM0883	265.8	0.011	10.88	10.68	1.75	2305.4	0.08	1454.1	3.08	0.63	0.45
GM0893	502.7	0.011	10.58	8.44	2.50	14195.7	0.43	1435.2	4.14	0.10	0.22
GM08_AIRPARK	358.0	0.013	41.12	39.51	0.83	659.5	0.45	93.6	1.98	0.14	0.25
GM09_AIRPARK	360.0	0.013	39.31	37.46	0.83	705.0	0.51	96.2	2.06	0.14	0.25
LINK295_SMITHLS	1529.8	-	32.00	52.19	1.00	2773.0	1.32	1982.4	6.40	0.72	0.91
LINK298	28.9	0.014	32.07	32.00	1.25	1325.7	0.24	1569.9	4.16	1.18	0.65
LINK300_HWY30_F	256.5	-	33.93	60.55	0.50	755.4	10.43	156.3	2.51	0.21	0.92
LINK303	1563.3	-	8.91	12.50	0.33	62.7	0.23	157.5	4.06	2.51	0.97
LINK306	1726.0	-	8.00	15.50	0.33	88.4	0.44	149.4	3.86	1.69	0.96
LINK307	24.5	0.014	185.00	181.77	0.27	166.2	13.28	0.0	0.00	0.00	0.47
LINK308	142.4	0.014	181.77	179.87	0.67	582.5	1.33	177.6	3.82	0.31	0.40
LINK309	159.1	0.014	179.87	178.05	0.67	539.4	1.14	192.2	3.11	0.36	0.43
LINK310	94.1	0.014	178.05	176.97	0.67	540.4	1.15	194.8	4.07	0.36	0.35
LINK311	264.9	0.014	176.97	154.40	0.67	1474.6	8.55	198.6	6.55	0.14	0.25
LINK312	252.0	0.014	153.99	124.48	0.67	1731.9	11.79	210.7	7.51	0.12	0.24
LINK313	271.7	0.014	124.48	89.83	0.67	1808.4	12.86	212.7	7.83	0.12	0.23
LINK314	233.7	0.014	89.83	56.00	0.67	1929.0	14.63	214.7	8.10	0.11	0.23
LINK315	21.5	0.014	54.96	54.33	0.67	862.6	2.93	217.7	4.72	0.25	0.35
LINK316	323.1	0.014	54.33	45.97	0.67	811.3	2.59	218.9	4.39	0.27	0.36
LINK317	268.8	0.014	6.28	6.21	0.67	81.4	0.03	112.7	1.17	1.38	0.62

CIP System Pipes: 5-yr, 24-hr Storm Event

Inputs						Outputs					
Pipe ID	Length (ft)	Manning's N	US Invert (ft)	DS Invert (ft)	Diameter (ft)	Full Flow (gpm)	Slope (%)	Max. Flow (gpm)	Max. Velocity (ft/s)	Max.Flow/Full Flow	Max.Depth/Full Depth
LINK318	146.6	0.014	6.21	5.63	0.67	317.2	0.40	126.7	2.07	0.40	0.41
LINK319	264.0	0.014	5.51	4.59	0.67	297.7	0.35	140.6	2.00	0.47	0.46
LINK320	202.0	0.014	4.49	3.84	0.67	286.1	0.32	154.8	2.04	0.54	0.49
LINK321	64.7	0.014	3.74	3.54	0.67	280.3	0.31	166.2	2.18	0.59	0.49



Appendix E

Energy Audit

Energy Smart Industrial Strategic Energy Management

Energy Model Report Version 1

Presented to:

Scappoose Wastewater Treatment Plant
34485 E. Columbia Avenue
Scappoose, OR 97056

Sponsored by:



and



TrakSmart ID: SEM_000065

September 23, 2019

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DISCLAIMER

The intent of this Energy Smart Industrial Energy Model Report is to document the energy baseline model used to estimate energy savings during Scappoose Wastewater Treatment Plant's Strategic Energy Management (SEM) engagement, barring any significant changes to the facility or process. This report is believed to be reasonably accurate, but actual results may vary. As a result, Columbia River PUD and the Bonneville Power Administration (BPA) are not liable if estimated savings or economics are not actually achieved during the SEM engagement. The contents of this document are for informational purposes and are not to be construed as a design document or as guarantees.

Scappoose Wastewater Treatment Plant should independently evaluate any advice or direction provided in this report. In no event will Columbia River PUD and/or BPA Energy Smart Industrial be liable for the failure to achieve a specified amount of energy savings and any incidental or consequential damages of any kind in connection with this report or the installation of recommended measures.

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1.0 BACKGROUND

The Scappoose Wastewater Treatment Plant (Scappoose) operates using the aerobic digester tank/activated sludge recycling process, treating between 0.6 and 1.4 million gallons per day (MGD) of wastewater.

This report outlines the development of the baseline energy model and how it will be used to measure energy savings for this multi-year Strategic Energy Management (SEM) engagement at the Scappoose WWTP Wastewater Treatment Plant located in Scappoose, Oregon. SEM was offered by Columbia River PUD as part of the Bonneville Power Administration's (BPA) Energy Smart Industrial (ESI) program. This SEM engagement provides Scappoose WWTP with two annual periods to address operations and maintenance (O&M) opportunities and improve the effectiveness of previously implemented action items.

1.1 VERSION HISTORY

This is the initial version release as part of the SEM process and reflects the energy and production data available up to June 1, 2019.

Table 1. Version History

Version Number	Version Date	Reason for Revision
1	9/23/2019	First version energy model.

1.2 BASELINE PERIOD

In June 2017, a step change in electrical energy use occurred, which coincides with the installation of the screw press drying system. Also, in October and November 2017, an upset condition in the treatment process occurred, and additional pumping was required. This event was exacerbated by two concurrent periods of heavy rainfall. The added operations resolved the condition by December 2017.

The selected baseline period was chosen to avoid the June 2017 step change and the upset/rainfall events in the fall of 2017. The most recent full-year period was selected to most accurately reflect current operations.

The baseline for this model is defined as the twelve month period before the Energy Scan that occurred on June 4, 2019.

- Baseline period: **5/24/2018 – 5/23/2019**
- Baseline energy: **1.5 million kWh/yr**

1.3 OPERATING HOURS

The facility operates year-round and the system operates 24 hours a day. Remote logging and reporting allow for reduced staffing in the overnight and weekend periods. Shutdowns are typically not scheduled, and system redundancy is utilized to ensure that no equipment failures create an inoperable condition.

1.4 PROCESS DESCRIPTION

The facility processes all domestic and business wastewater for the Scappoose region. The wastewater treatment process pre-filters non-digestible trash and grit before entering an aeration basin. The sewage is then fed to two primary clarifiers which allow the waste activated sludge

(WAS) to settle. The sludge is then pumped to an aerobic digestion tank to undergo further biologic decomposition. After this, it is pumped into an aerated biosolids storage lagoon for final settling. One additional unaerated lagoon serves to hold water for additional processing. Clarified water outflow is pumped to UV light banks and discharged by pumping into the Columbia River. The digested sludge is dredged from the lagoons and dried in a screw auger press. Dried sludge is spread over city-owned land during the growing season and stored in a covered building (not visible in Figure 1) during the winter .

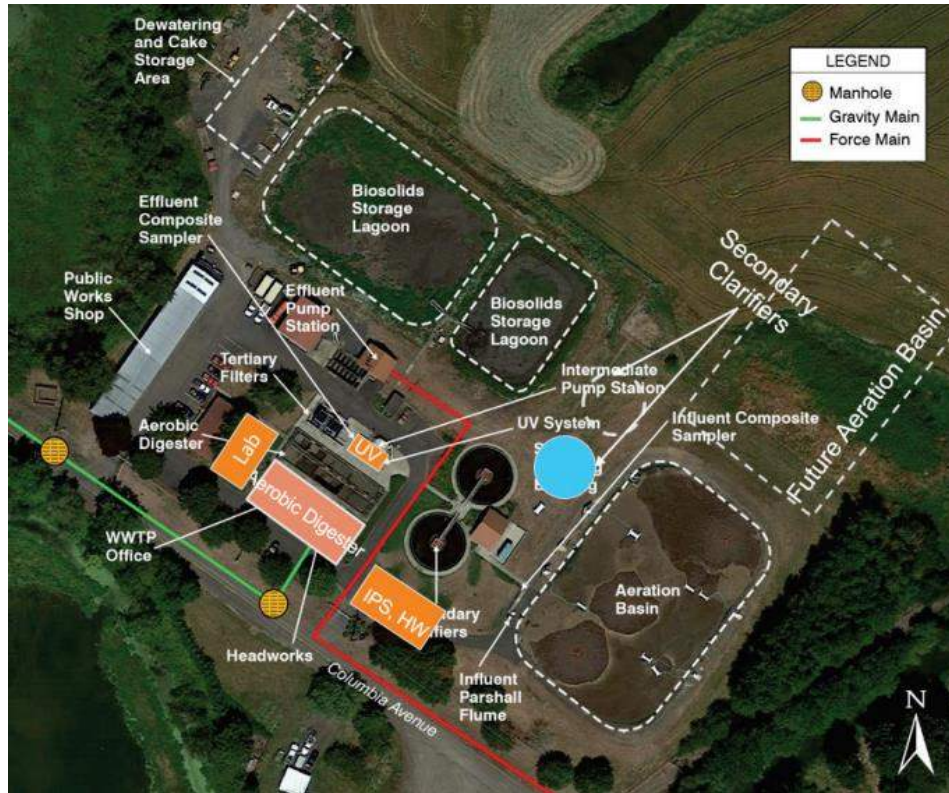


Figure 1. Scappoose WWTP Aerial Photo.

The energy demands from the process are largely from the pumps required at the headworks, circulation and aeration at the digester bins, aeration and circulation at the lagoons, discharge pumps for the effluent, recirculation for activated sludge, and the UV disinfection system. The pumps are installed with VFDs and are installed in sets for redundancy.

Additional energy use is present in facility lighting, HVAC for work areas, driving the clarifiers, and system controls. The primary pumps are detailed in Table 2.

Table 2. Pump Schedule

Function	Qty. × hp
Headworks	4 × 25 hp
Screening and grit	2 × 40 hp 3 × 40 hp 1 × 7 hp
Digester	40 hp Aeration
Sludge Pond	3 × 20 hp Circulation 3 × 4 hp Aeration
Filter Pumps	2 × 25 hp
Screw Press	10 hp
Effluent Discharge	4 × 40 hp

Five additional lift stations are in the collection system but will not be included in the energy model.

1.4.1 EXPLANATION OF PROCESS VARIABLES

The facility operates by using the activated sludge recycling process, measuring influent, effluent, total suspended solids (TSS) and biological oxygen demand (BOD) in concentration and total weight. Other measurements track nitrification, dissolved oxygen, pH, and effluent temperature.

The process variables obtained for model evaluation are shown in Table 3.

Table 3. Summary of Process Variables

Meter Description	Date Available	Variable	Interval	Units	Source	Aggregation
Process SCADA	2/1/2016	Influent Flow	Daily	MGD	Site	Sum
		Effluent Flow				Sum
		Influent BOD	3xweekly	mg/l		Average
		Influent TSS		mg/l		Average
		UV Light Intensity	Daily	Relative		Average
Weather	2/1/2106	Site Rainfall	Daily	Inches	Site	Sum
	1/1/2016	Dry Bulb Temperature	Daily	°F	Dark Sky via SENSEI*	Average

* Weather data location is KPDX, 45.5886°N, 122.5975°W

In aggregating the variables for the monthly intervals, some values were totalized (summed) and others required averaging. Influent and Effluent flow were summed to allow comparison to the total energy required. TSS and BOD Density measurements (mg/l) and temperatures were averaged to account for an irregular sampling cycle.

Aggregating according to the semi-regular energy billing cycle allowed better alignment of data than following a calendar month schedule.

1.4.2 EXPLANATION OF WEATHER VARIABLES

Wastewater treatment process efficiency can sometimes be correlated to process or environment temperature and may show a seasonal fluctuation. The weather data for Scappoose WWTP (shown in Table 3) were evaluated for this model. Dry-bulb ambient temperature is collected from SENSEI Dark Sky data, and rainfall is collected as part of the site data and returned within the monthly DMR.

Weather had only a slight effect on the model performance and did not improve the model sufficiently to be included. As the operators continue to improve performance, a model incorporating elements of the environment may better show the dependencies and can be considered as an opportunity for later development. Refer to Appendix A 4.0 for further information on weather in the regression model.

1.5 METERING BOUNDARY

The facility has one single electrical service, and the metering boundary for this facility has been defined as Meter #14147852. Electricity is fed from the Columbia River PUD distribution network.

An additional five lift stations and meters are located around the Scappoose area, but these are outside of the metering boundary for this model. The meter and the total energy use for this model are shown in Table 4.

Table 4. Summary of Electrical Energy Meters

Meter Description	Availability Date	Time Interval	Units	Service Location	Baseline Totals (kWh)	% of Total
14147852	1/22/2016	Monthly	kWh	Facility Entrance	1,529,800	100%

2.0 DEVELOPMENT OF THE MODEL

2.1 ENERGY ADJUSTMENTS DURING THE BASELINE PERIOD

Scappoose had no incentivized capital improvements that were incorporated during the baseline period and would need to be included in the model adjustments.

Scappoose has identified that a return activated sludge (RAS) pump upgrade will be completed before 12/31/2019, and the ultraviolet (UV) light system upgrades are being pushed out to 2020. Energy reductions from any future incentivized projects will be documented in annual completion reports. Savings from the incentivized projects will be subtracted from the gross energy savings, and the net result will be used for the O&M based savings.

2.2 SELECTION OF TIME INTERVAL

Electrical energy consumption data are available only on a monthly basis and thus this limited the time interval of the model to monthly. Process data are available on a daily basis. Billing months are used to create the model, as correlating the daily process data to the monthly billing cycles provided the best success in correlating the data.

2.3 MISSING AND ERRONEOUS DATA

No missing or erroneous data were identified in the baseline data. All observations were accepted without any modifications or corrections.

2.4 OUTLIERS OF RESIDUALS

All model residuals (actual energy use minus predicted energy use) remained within $\pm 4\sigma$. All observations during the baseline period were included in the final model, as shown in Figure 2.

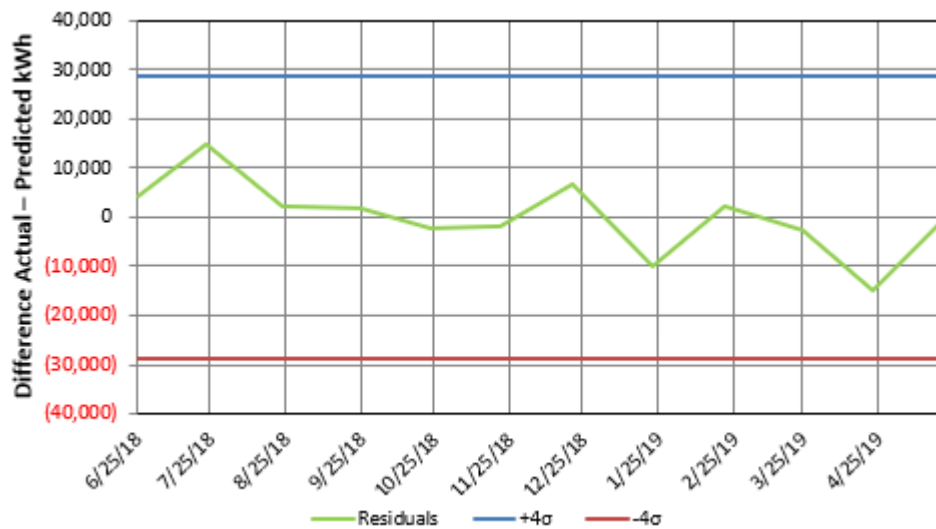


Figure 2. Time series of model residuals.

2.5 MODEL SELECTION

Based on the available monthly electrical data, Scappoose’s energy consumption is relatively constant. Due to this relatively flat energy profile, no statistically significant correlation was found for common energy drivers including influent flow, BOD, ambient and effluent temperature, and effluent flow.

Since no significant energy drivers could be identified, a mean model is recommended. For mean models, predicted energy use is equal to the average daily energy use during the twelve-month baseline period. Monthly energy use will be predicted by multiplying this average by the number of days in that billing cycle:

$$\text{Predicted Energy Use} \left(\frac{\text{kWh}}{\text{month}} \right) = 4,191.233 \frac{\text{kWh}}{\text{day}} \times N \left(\frac{\text{days}}{\text{month}} \right)$$

Influent flow will be tracked to ensure that operation of the facility does not deviate too far from the baseline conditions. Table 5 shows the valid range for the average daily flows per period. The model will be checked for validity if influent flows fall outside this range. At the end of each year of the performance period, average flows for the whole year will also be compared against the baseline period to ensure that savings calculated by the model are not the result of a significant reduction in flow, for example.

Table 5. Coefficients and Valid Range

Variable Name	Units	Obs Min	Obs Max	Valid Min	Valid Max
Influent Flow	MGD	0.63	1.01	0.59	1.05

Because it is a mean model the coefficient of determination (R^2) is poor. However the ability of the model to identify savings may be sufficient given its low coefficient of variation (CV) and low fractional savings uncertainty (FSU) The statistical fitness of the model is summarized by Table 6.

Table 6. Summary of Model Statistics

Description	Value	Description	Value
$R^2 (\geq 0.75)$	0.381	CV ($\leq 20\%$)	6.19%
R^2 Adjusted	0.319	Observations ($\geq 6 \times n$ coef.)	12
Net Det. Bias ($< \pm 5.0 \times 10^{-5}$)	-3.67×10^{-12}	Autocorrelation	0.045
Est. Project Savings	5%	FSU at 80% Conf. ($\leq 50\%$)	9.8%

3.0 USE OF THE MODEL

3.1 TRACKING ENERGY SAVINGS

Energy performance data will be available via an online energy management system called SENSEI. Scappoose's data manager will send daily process data (daily DMRs) to ESI on a monthly basis. ESI will arrange for energy data to be delivered from either the utility or the end user. Daily process and monthly energy data will be loaded to SENSEI, and the Energy Champion at Scappoose will be notified that the data have been updated.

To incorporate incentivized projects and any adjustments required, energy savings for annual completion reports will be calculated using ESI's tracking sheet as the official tool. The tracking sheet is a customized Excel workbook specific to this energy model.

3.2 ENERGY PERFORMANCE

A performance plot for this SEM engagement is provided in the tracking sheet. This plot shows *Actual Energy Use* and *Predicted Energy Use* (from the energy model) on the left y-axis and *Gross CUSUM* and *Net CUSUM* on the right y-axis. The CUSUM is the cumulative sum of energy savings. The Gross CUSUM is the energy savings for the entire measurement boundary, including previously incentivized projects, while the Net CUSUM is the energy savings achieved through this engagement. While this engagement is just beginning, the most recent performance plot is shown in Figure 3 below.

Scappoose WWTP Energy Performance Tracking

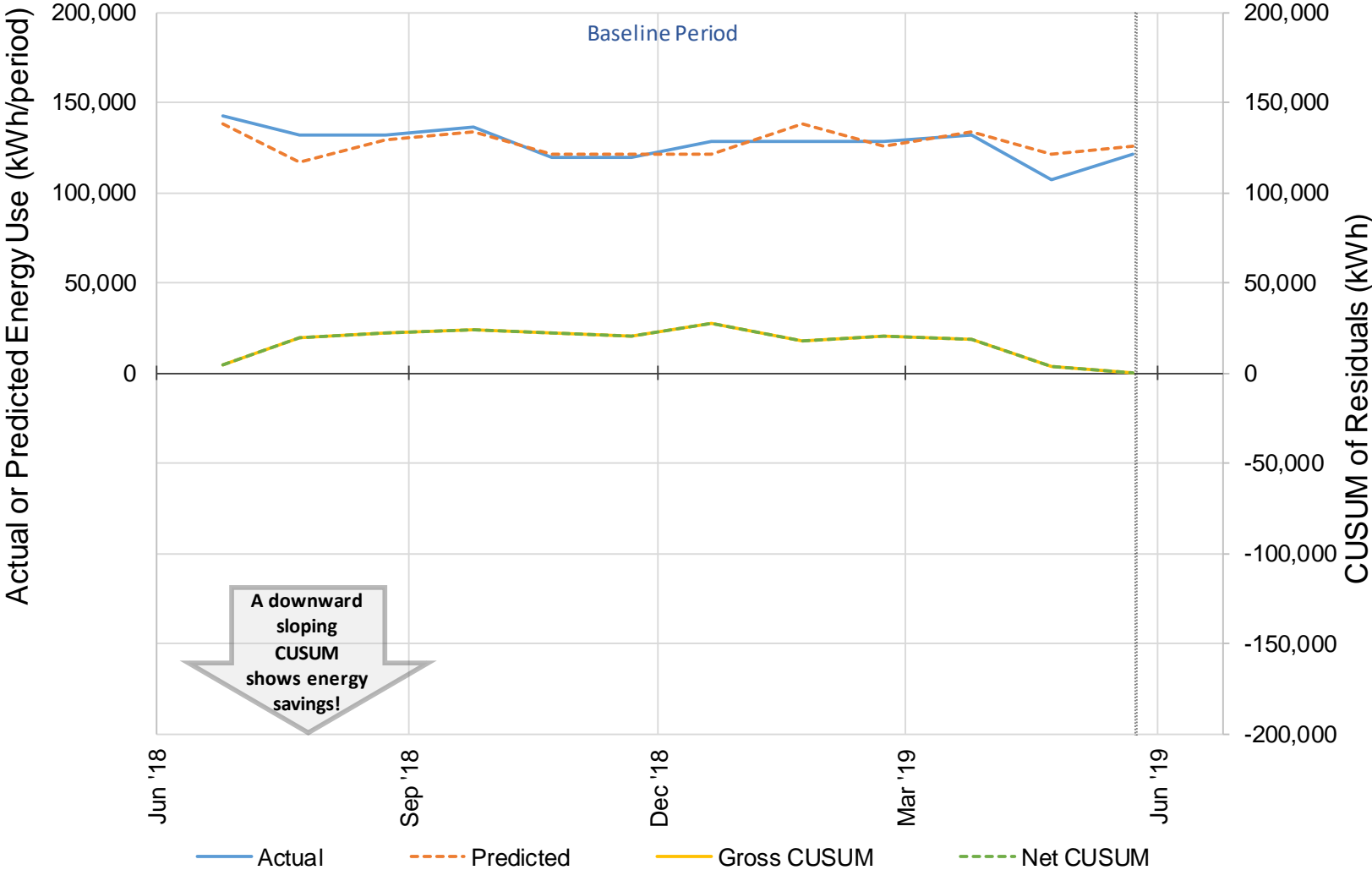


Figure 3. Example of performance plot.

A 1.0 MODEL SUMMARY

In all of the modeling (including evaluation of longer baseline periods not reported here), the relatively flat energy use restricted the ability to correlate process tracking variables with actual energy used. Energy use remained relatively constant, even as influent flows varied between average levels of 0.6 to 1.0 MGD. Several competing models predicted *lower* energy use for *higher* flow rates, which is contrary to the known relationship between flow and energy. Since no other significant energy driver could be identified, a mean model was selected for the final model.

The following comments correspond to each of the competing models summarized in Table 7 below.

1. Influent only model, showing negative correlation to energy consumption. T-stat is also low, indicating that Influent only is not a strong predictor of energy. The negative correlation will increase the predicted energy as the flow decreases.
2. Common influent and temperature model. Ambient temperature has a weak positive correlation to energy, but neither T-statistic shows a strong predictive pattern.
3. Models 3 and 4 included solids to evaluate whether tracking the incoming biological matter can improve the model. TSS tracks the total solids in the Influent and represents the mass of matter to be removed at the clarifier. TSS in this period has a moderate positive statistical presence, but only contributes a small portion of the energy prediction. TSS has not been shown to be a reliable predictor in other system models and use of it would require strong justification.
4. BOD represents the level of carbon-based matter that will require aeration and digestion to decompose and flocculate in the digestion tanks and lagoons. BOD has both a small contribution and weak prediction of energy in this model.
5. Test of Effluent flow, verifying that it is not a predictor of energy. Influent and Effluent flows typically are within 10% of each other at Scappoose WWTP.
6. The SCADA system also tracks the relative intensity of the UV sterilization system which reports back the daily average of the light intensity. Because this metric only reflects the relative process energy for removal of pathogens, it does not reflect overall energy use.
7. **FINAL MODEL:** The mean model indicated statistics are somewhat less than the flow and temperature related models, but this model is preferred to versions with negative coefficients on the flow. The average daily energy is derived from summing the energy used over the 365 days in the baseline period.

Table 7. Competing Model Summary

Trial	Period	R ²	Adj. R ²	CV-RMSE (%)	Auto-correl. coef.	FSU (5.0% savings, 80% CL)	Variables	Coefficients	T-value	% of Baseline kWh	Aggregation Type
1	5/24/2018	43.3%	37.7%	5.9%	4.7%	12.2%	Constant	4,721.133	10.38	112.6%	—
	to						INF Flow, MGD	-705.219	-1.18	-12.6%	Total
	5/23/2019										
2	5/24/2018	44.6%	32.3%	6.1%	7.0%	13.0%	Constant	4,197.218	3.1936	100.1%	—
	to						Dry Bulb Temperature [°F]	4.954	0.4275	6.5%	Avg
	5/23/2019						INF Flow, MGD	-372.601	-0.374	-6.7%	Total
3	5/24/2018	57.6%	41.6%	5.7%	5.2%	11.8%	Constant	2,524.661	1.5729	60.2%	—
	to						Dry Bulb Temperature [°F]	10.779	0.9526	14.2%	Avg
	5/23/2019						INF Flow, MGD	143.276	0.1467	2.6%	Total
							Average TSS, mg/L	3.682	1.5937	23.0%	Avg
4	5/24/2018	46.2%	26.0%	6.4%	11.3%	14.6%	Constant	4,541.992	2.7619	108.4%	—
	to						Dry Bulb Temperature [°F]	3.217	0.2478	4.2%	Avg
	5/23/2019						INF Flow, MGD	-598.279	-0.499	-10.7%	Total
							Average BOD mg/L	-0.265	-0.386	-1.9%	Avg
5	5/24/2018	48.6%	43.5%	5.6%	12.2%	12.9%	Constant	4,859.151	11.216	115.9%	—
	to						EFF Flow MGD	-895.640	-1.562	-15.9%	Total
	5/23/2019										
6	5/24/2018	51.4%	40.6%	5.7%	6.6%	12.1%	Constant	4,348.072	5.5688	103.7%	—
	to						EFF Flow MGD	-406.208	-0.478	-7.2%	Total
	5/23/2019						UV Intensity	235.791	0.7936	3.5%	Avg
7	5/24/2018	38.1%	31.9%	6.2%	4.5%	9.8%	Constant	0.000	0	0.0%	—
	to 5/23/2019						Mean Model	4,191.233	0.5158	100.0%	Avg

A 2.0 DATA REVIEW

A 2.1 INFLUENT TIME SERIES PLOT

Using the regression model, the baseline time series plot compares the predicted energy and the Influent Flow. Energy use is relatively flat in this period. (Figure 4). This variable is not used in the model but will be tracked to identify and major deviations from baseline conditions.

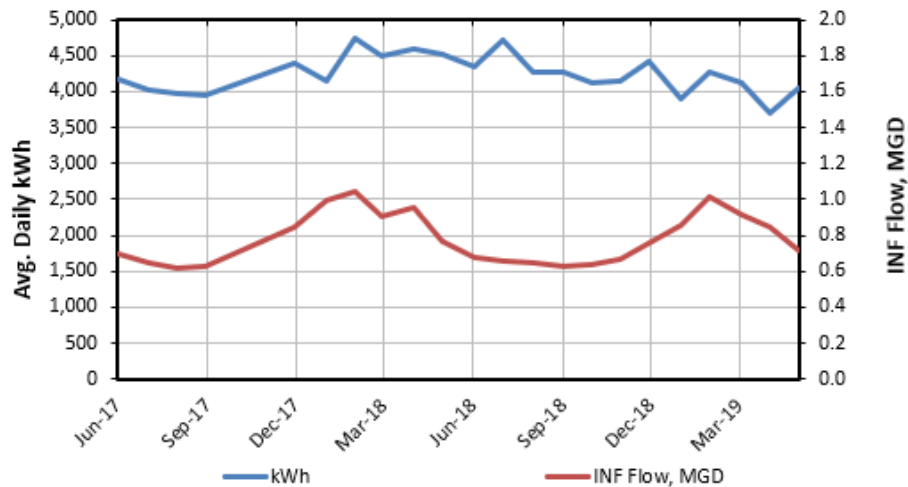


Figure 4. Plot of influent flow and daily kWh.

A 2.2 VARIABLE XY PLOTS

Figure 5 shows the limited effect of influent flow on energy use, which is relatively flat for a significant range of flow. If included in the model, influent flow would have a negative coefficient. As a result, predicted energy use would decrease for an increase in flow.

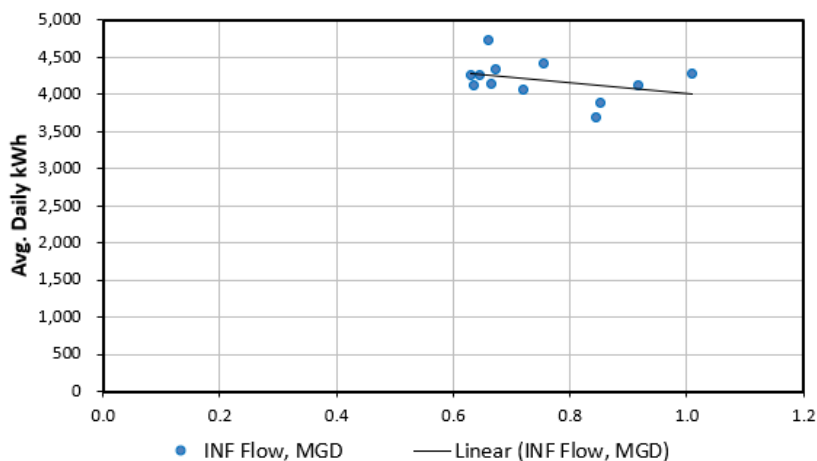


Figure 5. Influent flow vs energy use.

A 3.0 DIAGNOSTIC PLOTS

Mean model residuals fall within +12 and -14%. Figure 6 shows the relatively flat energy use.

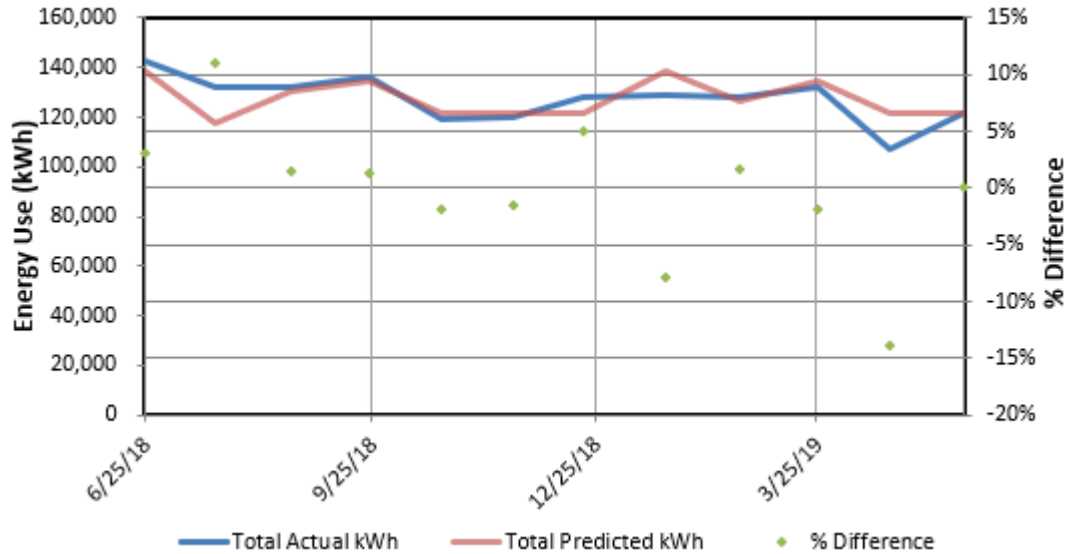


Figure 6. Residuals (actual – predicted energy).

The CUSUM for the baseline period shows no significant inflection points. The maximum value of the CUSUM is 1.6%, as shown in Figure 7.

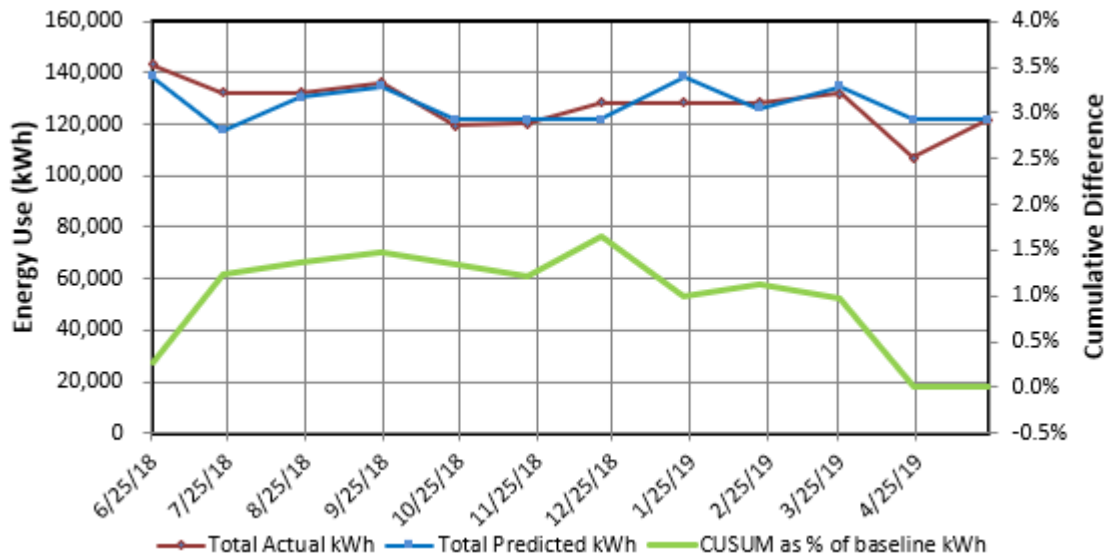


Figure 7. Predicted and actual energy with CUSUM as percent.

Model residuals are normally distributed with no outliers, as shown in Figure 8.

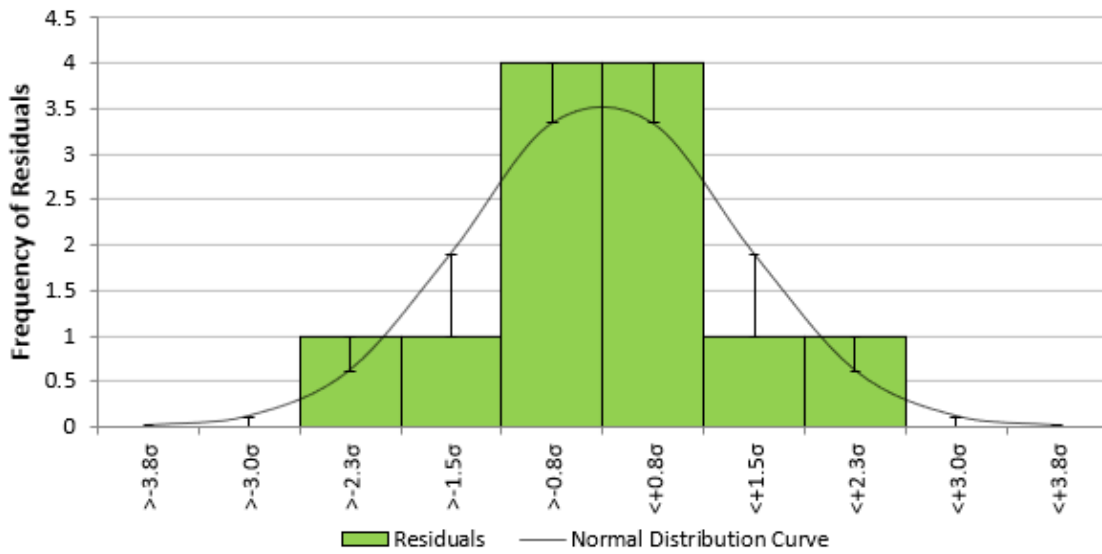


Figure 8. Distribution of Residuals.

The regression model is limited in that a small range of energy is used, resulting in a low R^2 . Figure 9 shows the relationship between predicted and actual energy.

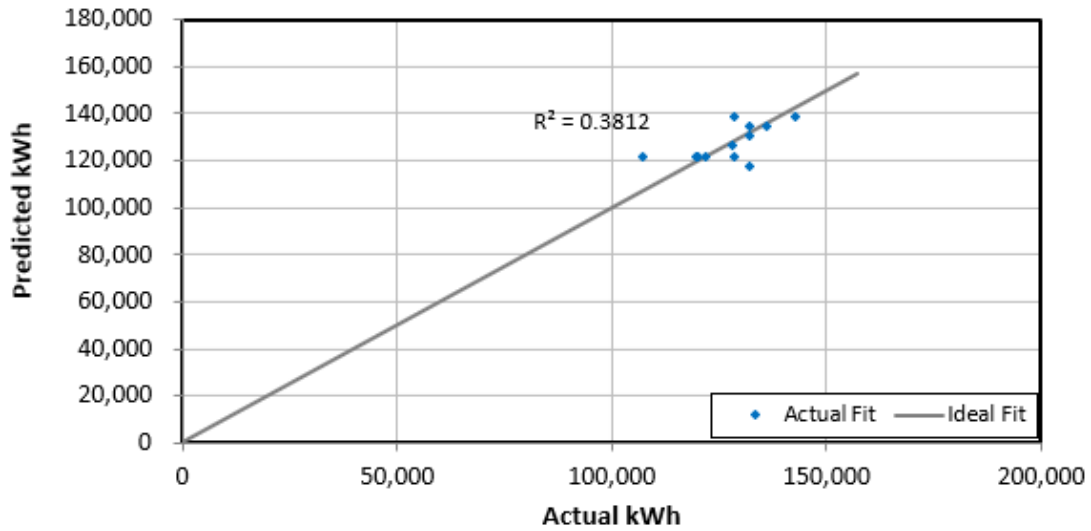


Figure 9. Scatter plot of predicted vs. actual energy.

A 4.0 REVIEW OF WEATHER DATA

In creating the model, the full data set was evaluated to discern if any weather trends were present in the energy consumption. The plots below include the time frame from February 2016 until May 2019. As shown in Figure 10, the energy consumption did not vary in a manner that can be predicted by the ambient air temperature.

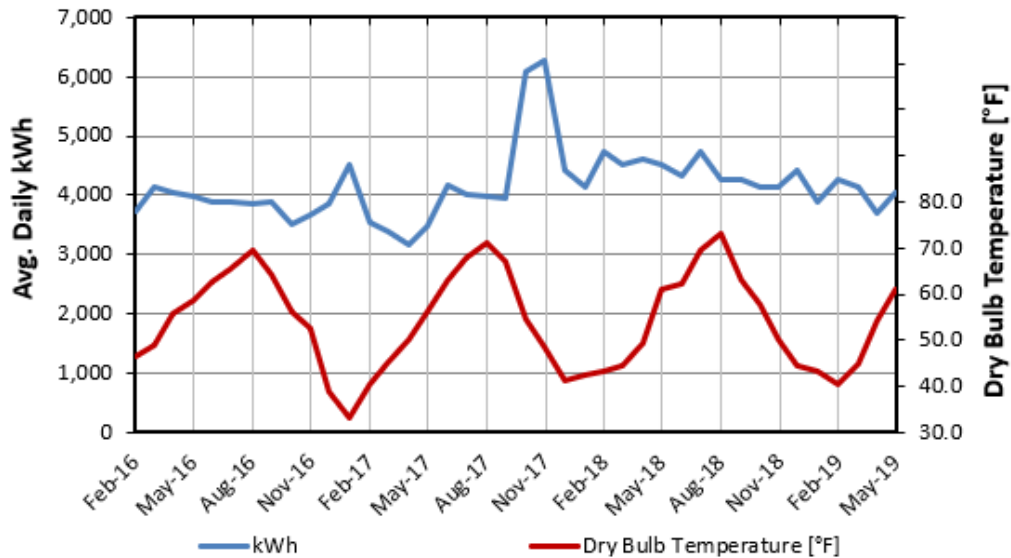


Figure 10. Energy and ambient temperature from 2016–2019.

Total rainfall also followed a seasonal trend but did not translate into an energy pattern. Figure 11 shows the time plot of energy and rainfall (Monthly total converted to a daily mean value).

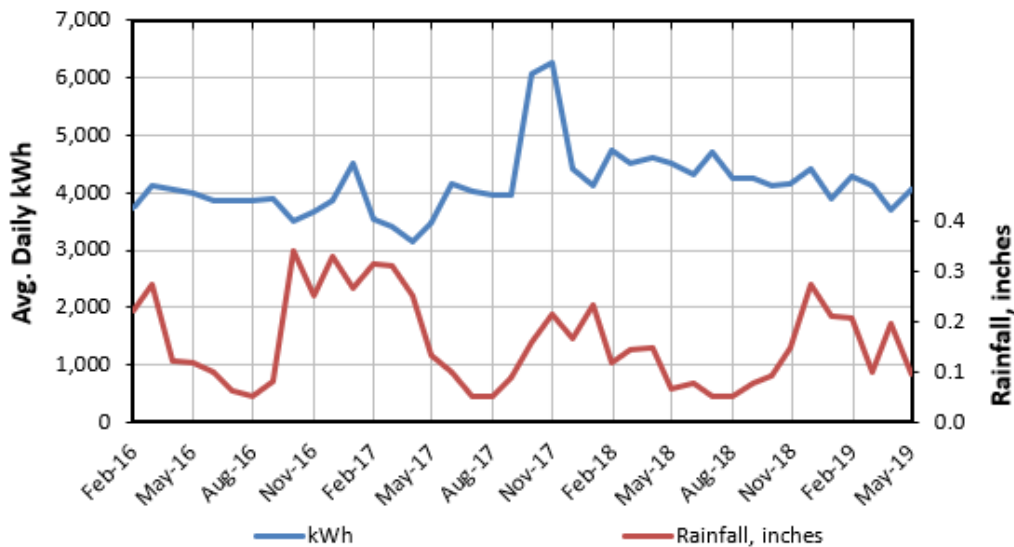


Figure 11. Energy and average daily rainfall from 2016–2019.

A 5.0 RESPONSE TO FEEDBACK

Negative coefficients for influent and effluent flows is odd. One tends to wonder what flow meter type these are, and how frequently they are calibrated?

Distribution of data and energy use may be creating the impression of negative correlation.

The T stat is very weak in Flow models 2,3,4,5,and 6

Task created to discuss the design and calibration of meters with Scappoose.

Please consider collecting Process SCADA and weather data if it's not inconvenient to do so.

*Tracking sheets and completion reports will include daily data. **Figure 12** shows a sample of the daily tracking.*

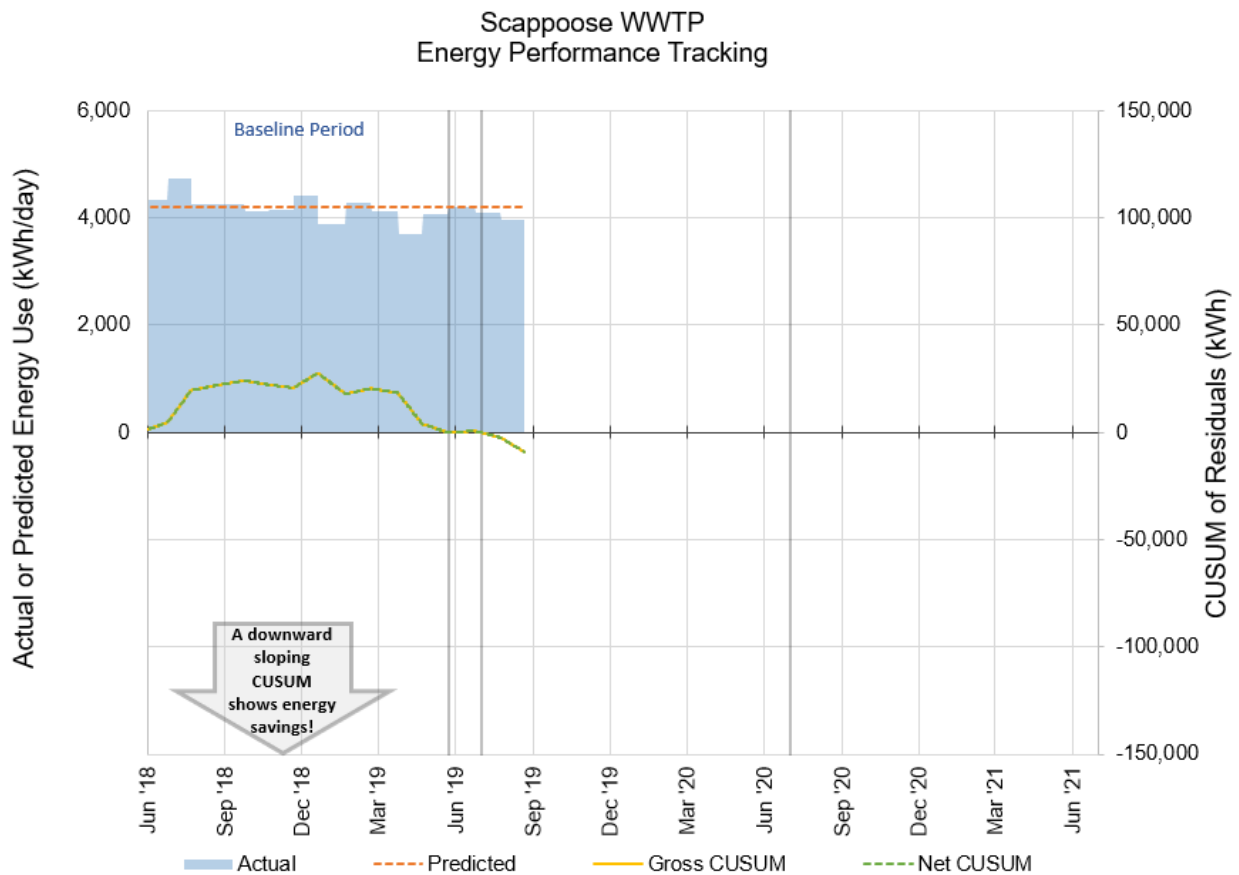


Figure 12. Daily performance tracking



Appendix F

Detailed Opinion of Probable Cost

Alternative 1 - West Line Improvements (with Daytime Keys WTP Flows)				
GENERAL LINE ITEM	EST. QTY	UNIT	UNIT PRICE	AMOUNT
Smith Road				
8" PVC Pipe (Gravity) - Excavation, Backfill	750	LF	\$ 100	\$ 75,000
15" PVC Pipe (Gravity) - Excavation, Backfill	500	LF	\$ 140	\$ 70,000
Creek Boring	50	LF	\$ 900	\$ 45,000
Reconnect Services	250	LF	\$ 15	\$ 3,750
Connect to Pump Station	1	LS	\$ 5,000	\$ 5,000
Manhole (48")	7	EA	\$ 5,000	\$ 35,000
Native Surface Repair	750	LF	\$ 5	\$ 3,750
Full Lane Pavement Repair	500	LF	\$ 60	\$ 30,000
Abandon Line	1	LS	\$ 15,000	\$ 15,000
Bypass Pumping	1	LS	\$ 15,000	\$ 15,000
Traffic Control	1	LS	\$ 10,000	\$ 10,000
Em Watts, 4th Street to Smith Rd PS				
10" PVC Pipe (Gravity) - Excavation, Backfill	150	LF	\$ 110	\$ 16,500
15" PVC Pipe (Gravity) - Excavation, Backfill	4,400	LF	\$ 140	\$ 616,000
18" PVC Pipe (Gravity) - Excavation, Backfill	200	LF	\$ 155	\$ 31,000
Reconnect Services	3,000	LF	\$ 15	\$ 45,000
Manhole (48")	25	EA	\$ 5,000	\$ 125,000
Native Surface Repair	1,600	LF	\$ 5	\$ 8,000
Half Lane Pavement Repair	3,150	LF	\$ 30	\$ 94,500
Bypass Pumping	1	LS	\$ 25,000	\$ 25,000
Traffic Control (without Flagging)	3,500	LF	\$ 4	\$ 14,000
Creek bank stabilization	1	LS	\$ 300,000	\$ 300,000
OHP & Mobilization	1	LS	20%	\$ 317,000
Contingency and Allowances	1	LS	30%	\$ 570,000
Construction Subtotal (rounded)				\$ 2,470,000
Engineering and CMS	1	LS	30%	\$ 741,000
Legal, Admin, and Permitting	1	LS	2%	\$ 50,000
Total Project Cost (rounded)				\$ 3,261,000
The cost estimate herein is based on our perception of current conditions at the project location. This estimate reflects our professional opinion of accurate costs at this time and is subject to change as the project design matures. Keller Associates has no control over variances in the cost of labor, materials, equipment, services provided by others, contractor's methods of determining prices, competitive bidding or market conditions, practices or bidding strategies. Keller Associates cannot and does not warrant or guarantee that proposals, bids or actual construction costs will not vary from the costs presented herein.				

Alternative 2 - West Line Improvements (with Nighttime WTP Flows)				
GENERAL LINE ITEM	EST. QTY	UNIT	UNIT PRICE	AMOUNT
WTP Automated Valve, Valve Structure, Controls	1	LS	\$ 100,000	\$ 100,000
Smith Road				
8" PVC Pipe (Gravity) - Excavation, Backfill	750	LF	\$ 100	\$ 75,000
15" PVC Pipe (Gravity) - Excavation, Backfill	500	LF	\$ 140	\$ 70,000
18" PVC Pipe (Gravity) - Excavation, Backfill	200	LF	\$ 155	\$ 31,000
Creek Boring	50	LF	\$ 900	\$ 45,000
Reconnect Services	250	LF	\$ 15	\$ 3,750
Connect to Pump Station	1	LS	\$ 5,000	\$ 5,000
Manhole (48")	7	EA	\$ 5,000	\$ 35,000
Native Surface Repair	950	LF	\$ 5	\$ 4,750
Full Lane Pavement Repair	500	LF	\$ 60	\$ 30,000
Abandon Line	1	LS	\$ 15,000	\$ 15,000
Bypass Pumping	1	LS	\$ 15,000	\$ 15,000
Traffic Control	1	LS	\$ 10,000	\$ 10,000
OHP & Mobilization	1	LS	20%	\$ 88,000
Contingency and Allowances	1	LS	30%	\$ 159,000
WTP & Smith Road Construction Subtotal (rounded)				\$ 687,000
Engineering and CMS	1	LS	30%	\$ 207,000
Legal, Admin, and Permitting	1	LS	2%	\$ 14,000
WTP & Smith Road Total Project Cost (rounded)				\$ 908,000

4th Street to Smith Rd PS				
15" PVC Pipe (Gravity) - Excavation, Backfill	2,050	LF	\$ 140	\$ 287,000
12" Cured-in-place-pipe (CIPP)	900	LF	\$ 110	\$ 99,000
Reconnect Services	600	LF	\$ 15	\$ 9,000
Manhole (48")	6	EA	\$ 5,000	\$ 30,000
Native Surface Repair	1,750	LF	\$ 5	\$ 8,750
Half Lane Pavement Repair	300	LF	\$ 30	\$ 9,000
Bypass Pumping	1	LS	\$ 20,000	\$ 20,000
Traffic Control (without Flagging)	300	LF	\$ 4	\$ 1,200
OHP & Mobilization	1	LS	20%	\$ 93,000
Contingency and Allowances	1	LS	30%	\$ 168,000
4th Street to Smith PS Construction Subtotal (rounded)				\$ 725,000
Engineering and CMS	1	LS	30%	\$ 218,000
Legal, Admin, and Permitting	1	LS	2%	\$ 15,000
4th Street to Smith PS Total Project Cost (rounded)				\$ 958,000
Total Project Cost (rounded)				\$ 1,866,000

The cost estimate herein is based on our perception of current conditions at the project location. This estimate reflects our professional opinion of accurate costs at this time and is subject to change as the project design matures. Keller Associates has no control over variances in the cost of labor, materials, equipment, services provided by others, contractor's methods of determining prices, competitive bidding or market conditions, practices or bidding strategies. Keller Associates cannot and does not warrant or guarantee that proposals, bids or actual construction costs will not vary from the costs presented herein.

Alternative 3 - New HWY 30 Crossing at Maple Street (with Nighttime WTP Flows)				
GENERAL LINE ITEM	EST. QTY	UNIT	UNIT PRICE	AMOUNT
WTP Automated Valve, Valve Structure, Controls	1	LS	\$ 100,000	\$ 100,000
Smith Road				
8" PVC Pipe (Gravity) - Excavation, Backfill	750	LF	\$ 100	\$ 75,000
12" PVC Pipe (Gravity) - Excavation, Backfill	500	LF	\$ 120	\$ 60,000
Reconnect Services	500	LF	\$ 15	\$ 7,500
Manhole (48")	5	EA	\$ 5,000	\$ 25,000
Native Surface Repair	750	LF	\$ 5	\$ 3,750
Full Lane Pavement Repair	500	LF	\$ 60	\$ 30,000
Abandon Line	1	LS	\$ 15,000	\$ 15,000
Bypass Pumping	1	LS	\$ 15,000	\$ 15,000
Traffic Control	1	LS	\$ 10,000	\$ 10,000
OHP & Mobilization	1	LS	20%	\$ 69,000
Contingency and Allowances	1	LS	30%	\$ 124,000
WTP & Smith Road Construction Subtotal (rounded)				\$ 535,000
Engineering and CMS	1	LS	30%	\$ 161,000
Legal, Admin, and Permitting	1	LS	2%	\$ 11,000
WTP & Smith Road Total Project Cost (rounded)				\$ 707,000
Maple Street Crossing				
12" PVC Pipe (Gravity) - Excavation, Backfill	5,000	LF	\$ 120	\$ 600,000
HWY/RR Crossing	200	LF	\$ 900	\$ 180,000
Reconnect Services	3,100	LF	\$ 15	\$ 46,500
Manhole (48")	17	EA	\$ 5,000	\$ 85,000
Full Lane Pavement Repair	5,000	LF	\$ 60	\$ 300,000
Bypass Pumping	1	LS	\$ 20,000	\$ 20,000
Traffic Control	1	LS	\$ 30,000	\$ 30,000
Easement (non-commercial)	900	LF	\$ 30	\$ 27,000
OHP & Mobilization	1	LS	20%	\$ 258,000
Contingency and Allowances	1	LS	30%	\$ 464,000
Maple St Crossing Construction Subtotal (rounded)				\$ 2,011,000
Engineering and CMS	1	LS	30%	\$ 604,000
Legal, Admin, and Permitting	1	LS	2%	\$ 41,000
Maple St Crossing Total Project Cost (rounded)				\$ 2,656,000
12" Cured-in-place-pipe (CIPP)				
12" Cured-in-place-pipe (CIPP)	3,100	LF	\$ 110	\$ 341,000
OHP & Mobilization	1	LS	20%	\$ 69,000
Contingency and Allowances	1	LS	30%	\$ 123,000
South Scappoose Creek CIPP Construction Subtotal (rounded)				\$ 533,000
Engineering and CMS	1	LS	20%	\$ 107,000
Legal, Admin, and Permitting	1	LS	2%	\$ 11,000
South Scappoose Creek CIPP Total Project Cost (rounded)				\$ 651,000
Total Project Cost (rounded)				\$ 4,014,000
The cost estimate herein is based on our perception of current conditions at the project location. This estimate reflects our professional opinion of accurate costs at this time and is subject to change as the project design matures. Keller Associates has no control over variances in the cost of labor, materials, equipment, services provided by others, contractor's methods of determining prices, competitive bidding or market conditions, practices or bidding strategies. Keller Associates cannot and does not warrant or guarantee that proposals, bids or actual construction costs will not vary from the costs presented herein.				

Old Portland Road Improvements				
GENERAL LINE ITEM	EST. QTY	UNIT	UNIT PRICE	AMOUNT
10" PVC Pipe (Gravity) - Excavation, Backfill	2,750	LF	\$ 110	\$ 302,500
12" PVC Pipe (Gravity) - Excavation, Backfill	150	LF	\$ 120	\$ 18,000
Reconnect Services	2,900	LF	\$ 15	\$ 43,500
Manhole (48")	16	EA	\$ 5,000	\$ 80,000
Native Surface Repair	1,150	LF	\$ 5	\$ 5,750
Full Lane Pavement Repair	1,250	LF	\$ 60	\$ 75,000
Highway Repair	500	LF	\$ 225	\$ 112,500
Bypass Pumping	1	LS	\$ 20,000	\$ 20,000
Traffic Control	1	LS	\$ 20,000	\$ 20,000
OHP & Mobilization	1	LS	20%	\$ 136,000
Contingency and Allowances	1	LS	30%	\$ 244,000
Construction Subtotal (rounded)				\$ 1,058,000
Engineering and CMS	1	LS	30%	\$ 318,000
Legal, Admin, and Permitting	1	LS	2%	\$ 22,000
Total Project Cost (rounded)				\$ 1,398,000
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High School Wy to Elm St Improvements				
GENERAL LINE ITEM	EST. QTY	UNIT	UNIT PRICE	AMOUNT
10" PVC Pipe (Gravity) - Excavation, Backfill	800	LF	\$ 110	\$ 88,000
15" PVC Pipe (Gravity) - Excavation, Backfill	2,100	LF	\$ 140	\$ 294,000
Reconnect Services	2,900	LF	\$ 15	\$ 43,500
Manhole (48")	10	EA	\$ 5,000	\$ 50,000
Full Lane Pavement Repair	2,900	LF	\$ 60	\$ 174,000
Bypass Pumping	1	LS	\$ 20,000	\$ 20,000
Traffic Control	1	LS	\$ 15,000	\$ 15,000
OHP & Mobilization	1	LS	20%	\$ 137,000
Contingency and Allowances	1	LS	30%	\$ 247,000
Construction Subtotal (rounded)				\$ 1,069,000
Engineering and CMS	1	LS	30%	\$ 321,000
Legal, Admin, and Permitting	1	LS	2%	\$ 22,000
Total Project Cost (rounded)				\$ 1,412,000
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Dutch Canyon Rd Improvements				
GENERAL LINE ITEM	EST. QTY	UNIT	UNIT PRICE	AMOUNT
10" PVC Pipe (Gravity) - Excavation, Backfill	550	LF	\$ 110	\$ 60,500
Reconnect Services	550	LF	\$ 15	\$ 8,250
Manhole (48")	3	EA	\$ 5,000	\$ 15,000
Full Lane Pavement Repair	550	LF	\$ 60	\$ 33,000
Bypass Pumping	1	LS	\$ 10,000	\$ 10,000
Traffic Control	1	LS	\$ 10,000	\$ 10,000
OHP & Mobilization	1	LS	20%	\$ 28,000
Contingency and Allowances	1	LS	30%	\$ 50,000
Construction Subtotal (rounded)				\$ 215,000
Engineering and CMS	1	LS	30%	\$ 65,000
Legal, Admin, and Permitting	1	LS	2%	\$ 5,000
Total Project Cost (rounded)				\$ 285,000

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Laurel and 3rd Street Improvements				
GENERAL LINE ITEM	EST. QTY	UNIT	UNIT PRICE	AMOUNT
18" PVC Pipe (Gravity) - Excavation, Backfill	600	LF	\$ 155	\$ 93,000
21" PVC Pipe (Gravity) - Excavation, Backfill	250	LF	\$ 170	\$ 42,500
24" PVC Pipe (Gravity) - Excavation, Backfill	300	LF	\$ 185	\$ 55,500
Reconnect Services	1,150	LF	\$ 15	\$ 17,250
Manhole (48")	5	EA	\$ 5,000	\$ 25,000
Half Lane Pavement Repair	1,150	LF	\$ 30	\$ 34,500
Bypass Pumping	1	LS	\$ 15,000	\$ 15,000
Traffic Control (without Flagging)	1,150	LF	\$ 4	\$ 4,600
OHP & Mobilization	1	LS	20%	\$ 58,000
Contingency and Allowances	1	LS	30%	\$ 104,000
Construction Subtotal (rounded)				\$ 450,000
Engineering and CMS	1	LS	30%	\$ 135,000
Legal, Admin, and Permitting	1	LS	2%	\$ 9,000
Total Project Cost (rounded)				\$ 594,000

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Tyler Street Improvements				
GENERAL LINE ITEM	EST. QTY	UNIT	UNIT PRICE	AMOUNT
18" PVC Pipe (Gravity) - Excavation, Backfill	300	LF	\$ 155	\$ 46,500
21" PVC Pipe (Gravity) - Excavation, Backfill	300	LF	\$ 170	\$ 51,000
Reconnect Services	600	LF	\$ 15	\$ 9,000
Manhole (48")	3	EA	\$ 5,000	\$ 15,000
Half Lane Pavement Repair	600	LF	\$ 30	\$ 18,000
Bypass Pumping	1	LS	\$ 10,000	\$ 10,000
Traffic Control (without Flagging)	600	LF	\$ 4	\$ 2,400
OHP & Mobilization	1	LS	20%	\$ 31,000
Contingency and Allowances	1	LS	30%	\$ 55,000
Construction Subtotal (rounded)				\$ 238,000
Engineering and CMS	1	LS	25%	\$ 60,000
Legal, Admin, and Permitting	1	LS	2%	\$ 5,000
Total Project Cost (rounded)				\$ 303,000
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Wagner Court Improvements				
GENERAL LINE ITEM	EST. QTY	UNIT	UNIT PRICE	AMOUNT
10" PVC Pipe (Gravity) - Excavation, Backfill	300	LF	\$ 110	\$ 33,000
Reconnect Services	300	LF	\$ 15	\$ 4,500
Manhole (48")	2	EA	\$ 5,000	\$ 10,000
Half Lane Pavement Repair	300	LF	\$ 30	\$ 9,000
Bypass Pumping	1	LS	\$ 5,000	\$ 5,000
Traffic Control (without Flagging)	300	LF	\$ 4	\$ 1,200
OHP & Mobilization	1	LS	20%	\$ 13,000
Contingency and Allowances	1	LS	30%	\$ 23,000
Construction Subtotal (rounded)				\$ 99,000
Engineering and CMS	1	LS	25%	\$ 25,000
Legal, Admin, and Permitting	1	LS	2%	\$ 2,000
Total Project Cost (rounded)				\$ 126,000
The cost estimate herein is based on our perception of current conditions at the project location. This estimate reflects our professional opinion of accurate costs at this time and is subject to change as the project design matures. Keller Associates has no control over variances in the cost of labor, materials, equipment, services provided by others, contractor's methods of determining prices, competitive bidding or market conditions, practices or bidding strategies. Keller Associates cannot and does not warrant or guarantee that proposals, bids or actual construction costs will not vary from the costs presented herein.				

Springlake and HWY 30 PS Improvements				
GENERAL LINE ITEM	EST. QTY	UNIT	UNIT PRICE	AMOUNT
Springlake PS				
Test for air lock in force main	1	LS	\$ 8,400	\$ 8,400
Clean and coat piping in wet well and valves	1	LS	\$ 9,500	\$ 9,500
Perform engineering review of electrical system	1	LS	\$ 3,900	\$ 3,900
OHP & Mobilization	1	LS	20%	\$ 5,000
Contingency and Allowances	1	LS	30%	\$ 9,000
Construction Subtotal (rounded)				\$ 36,000
Engineering and CMS	1	LS	25%	\$ 9,000
Legal, Admin, and Permitting	1	LS	2%	\$ 1,000
Springlake Total Project Cost (rounded)				\$ 46,000
HWY 30 PS				
Install bollards to protect station from traffic	1	LS	\$ 3,900	\$ 3,900
Clean and coat piping in wet well and valves	1	LS	\$ 9,500	\$ 9,500
Perform engineering review of electrical system	1	LS	\$ 3,900	\$ 3,900
OHP & Mobilization	1	LS	20%	\$ 4,000
Contingency and Allowances	1	LS	30%	\$ 7,000
HWY 30 Construction Subtotal (rounded)				\$ 29,000
Engineering and CMS	1	LS	25%	\$ 8,000
Legal, Admin, and Permitting	1	LS	2%	\$ 1,000
Total Project Cost (rounded)				\$ 38,000
Springlake and HWY 30 Total Project Cost (rounded)				\$ 84,000
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Smith Road PS Improvements				
GENERAL LINE ITEM	EST. QTY	UNIT	UNIT PRICE	AMOUNT
Smith Road PS Improvements				
New wet well	1	LS	\$ 100,000	\$ 100,000
Replace pumps (includes VFD)	3	EA	\$ 65,000	\$ 195,000
Electrical/Controls	1	LS	\$ 150,000	\$ 150,000
OHP & Mobilization	1	LS	20%	\$ 89,000
Contingency and Allowances	1	LS	30%	\$ 161,000
Construction Subtotal (rounded)				\$ 695,000
Engineering and CMS	1	LS	25%	\$ 174,000
Legal, Admin, and Permitting	1	LS	2%	\$ 14,000
Total Project Cost (rounded)				\$ 883,000
The cost estimate herein is based on our perception of current conditions at the project location. This estimate reflects our professional opinion of accurate costs at this time and is subject to change as the project design matures. Keller Associates has no control over variances in the cost of labor, materials, equipment, services provided by others, contractor's methods of determining prices, competitive bidding or market conditions, practices or bidding strategies. Keller Associates cannot and does not warrant or guarantee that proposals, bids or actual construction costs will not vary from the costs presented herein.				

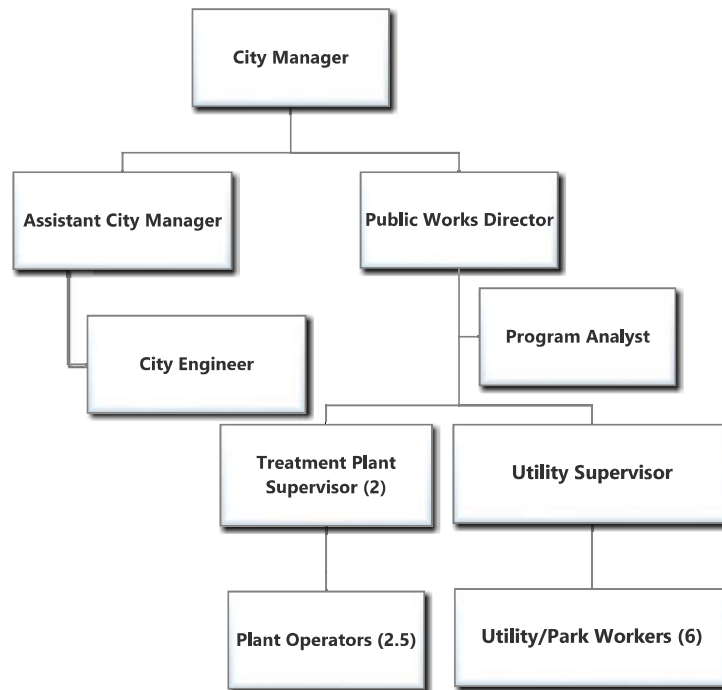
Keys Landing and Seven Oaks PS Improvements				
GENERAL LINE ITEM	EST. QTY	UNIT	UNIT PRICE	AMOUNT
Keys Landing PS				
Address odor control so overflow can be opened	1	LS	\$ 8,000	\$ 8,000
Clean and coat piping in wet well and valves	1	LS	\$ 9,500	\$ 9,500
Install standby power from the WTP to the LS	1	LS	\$ 26,600	\$ 26,600
Repair clamshell door so it remains open without support	1	LS	\$ 3,600	\$ 3,600
Perform engineering review of electrical system	1	LS	\$ 3,900	\$ 3,900
OHP & Mobilization	1	LS	20%	\$ 11,000
Contingency and Allowances	1	LS	30%	\$ 19,000
Construction Subtotal (rounded)				\$ 82,000
Engineering and CMS	1	LS	25%	\$ 21,000
Legal, Admin, and Permitting	1	LS	2%	\$ 2,000
Total Project Cost (rounded)				\$ 105,000
Seven Oaks PS				
Repair bottom clam shell insulation	1	LS	\$ 7,600	\$ 7,600
Clean and coat piping in wet well and valves	1	LS	\$ 9,500	\$ 9,500
Perform engineering review of electrical system	1	LS	\$ 3,900	\$ 3,900
OHP & Mobilization	1	LS	20%	\$ 5,000
Contingency and Allowances	1	LS	30%	\$ 8,000
Construction Subtotal (rounded)				\$ 34,000
Engineering and CMS	1	LS	25%	\$ 9,000
Legal, Admin, and Permitting	1	LS	2%	\$ 1,000
Total Project Cost (rounded)				\$ 44,000
				\$ 149,000
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Appendix G

Financial Data

UTILITY WASTEWATER FUND 41



PURPOSE:

The Utility Wastewater Fund is a dedicated “Enterprise” fund. The City of Scappoose operates and maintains a 1.58 M.G.D. activated sludge wastewater treatment plant with tertiary treatment, 36 miles of sewer lines and five pumping stations. The purpose of these facilities is to protect public health and public use of the Columbia River and Multnomah Channel by providing secondary effluent treatment. Treatment plant and staff is responsible for the operation of the wastewater facility to ensure proper treatment of all raw wastewater at all times. The operator is ultimately responsible to ensure all state and federal regulations are met. The City was issued a new permit in March 2009 and will be required to monitor influent, effluent and process control. This monitoring will require the treatment plant operator to sample and test many functions within the treatment plant process as well as sampling of the receiving stream.

VISION FOR THE YEAR:

The Wastewater Fund will focus on long term upgrades as identified in the 2018 Facilities Master Plan. Engineering of Wastewater Master Plan Amendment Phase I upgrades along with a Facility Plan Amendment are priority projects for the year.

COMPLIANCE WITH COUNCIL GOALS:

- | | |
|--|--------------------------------------|
| Address I & I within Collections System | Update Public Works Design Standards |
| Capacity Upgrades – Wastewater Treatment and Collections | Update SDC’s/Fees |
| Develop 5-year Capital Improvement Plan | |

Wastewater SDC Fund Objectives	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Complete Collections Master Plan												
Phase I Facility Improvement Design												
Capacity Upgrades-Treatment & Collections												
Update SDC's/Fees												
Develop 5-year Capital Improvement Plan												

BUDGET NOTES:

The Wastewater fund will begin the year with a \$1,650,005 beginning cash position and anticipates revenue of \$3,415,125. Total operating revenue in this fund is projected to be \$5,065,130. Expenditures within the department

include \$1,023,869 for personnel services and \$688,153 for materials and services. For capital outlay the projected budget is \$1,361,396 for pump replacements, UV upgrades, a vehicle purchase, completion of the Springlake pump station and engineering for Phase I of the Treatment Plant improvements. The fund budgets \$119,803 for two principal and interest payments for loan R06809 which matures in 2031 and a US Bank loan which matures in 2021. The fund budgets \$173,565 for transfers and has budgeted a contingency of \$898,344 and a balance of \$800,000 in unappropriated funds.

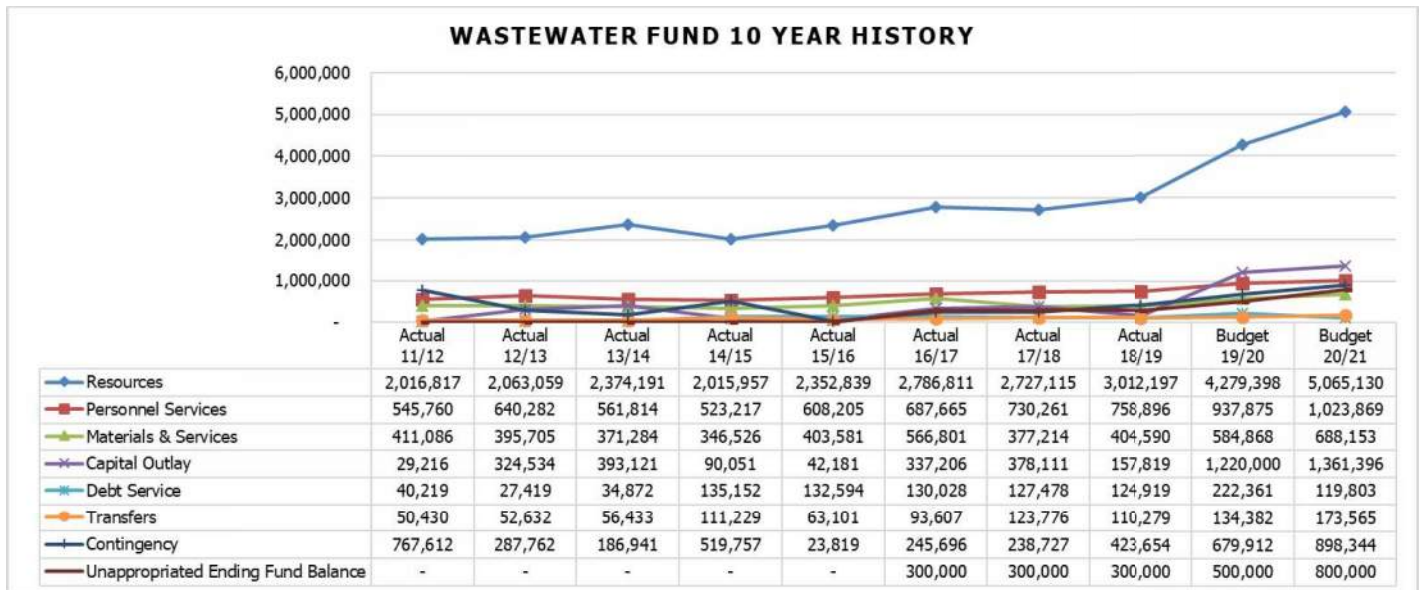
PERCENTAGE OF TIME ALLOCATION:

Wastewater Fund	17-18	18-19	19-20	20-21	Minimum Salary	Maximum Salary
Public Works Director	30%	35%	35%	35%	37.79	58.61
Utility Supervisor	30%	35%	35%	35%	29.30	45.45
Treatment Plant Supervisor	100%	100%	100%	100%	29.30	45.45
Operator I	0%	50%	50%	50%	23.39	29.85
Operator II	0%	0%	0%	0%	25.77	32.89
Operator III	100%	100%	100%	100%	28.43	36.28
Utility/Parks Worker I	40%	35%	70%	70%	19.64	25.07
Utility/Parks Worker II	60%	60%	35%	35%	23.39	29.85
Utility/Parks Worker III	40%	35%	70%	70%	25.77	32.89
Office Administrator CDC	14%	0%	0%	0%	21.14	26.98
Planning Supervisor	13%	0%	0%	0%	29.30	45.45
Program Analyst				30%	20.44	31.68
City Engineer	34%	30%	30%	30%	32.68	50.70
Engineer Assistant PW	33%	0%	0%	0%	25.27	38.58
City Manager	22%	22%	23%	23%	42.92	66.57
City Recorder	20%	22%	22%	22%	26.31	40.80
Finance Administrator/Office Manager	22%	22%	22%	22%	37.79	58.61
Assistant City Manager	22%	22%	23%	23%	29.30	45.45
Office Administrator Finance	44%	44%	44%	44%	21.14	26.98
TOTAL FTE'S	6.24	6.12	6.59	6.89		

Wastewater Fund 41							
	Actual	Actual	Budget	Estimated	Proposed	Approved	Adopted
Resources	FY 17-18	FY 18-19	FY 19-20	FY 19-20	Budget	Budget	Budget
					FY 20-21	FY 20-21	FY 20-21
Working capital carryover	\$ 971,504	\$ 990,275	\$ 1,405,124	\$ 1,455,694	\$ 1,650,005	\$ 1,650,005	\$ 1,650,005
Current year resources							
Interest	\$ 14,829	\$ 31,793	\$ 30,000	\$ 36,000	\$ 44,000	\$ 44,000	\$ 44,000
Charges for services	1,730,782	1,990,030	2,054,274	2,109,700	2,171,125	2,171,125	2,171,125
Intergovernmental	10,000	99				1,200,000	1,200,000
Long term debt proceeds			790,000	2,550	1,200,000		
Miscellaneous							
Total current year resources	\$ 1,755,611	\$ 2,021,922	\$ 2,874,274	\$ 2,148,250	\$ 3,415,125	\$ 3,415,125	\$ 3,415,125
Total resources	\$ 2,727,115	\$ 3,012,197	\$ 4,279,398	\$ 3,603,944	\$ 5,065,130	\$ 5,065,130	\$ 5,065,130
Expenditures	Actual	Actual	Budget	Estimated	Proposed	Approved	Adopted
	FY 17-18	FY 18-19	FY 19-20	FY 19-20	Budget	Budget	Budget
					FY 20-21	FY 20-21	FY 20-21
Personnel services	\$ 730,261	\$ 758,896	\$ 937,875	\$ 873,076	\$ 1,023,869	\$ 1,023,869	\$ 1,023,869
Materials & services	377,214	404,590	584,868	469,046	688,153	688,153	688,153
Capital outlay	378,111	157,819	1,220,000	354,985	1,361,396	1,361,396	1,361,396
Debt service							
2009 Principal CWSRF R06809 3/01 & 9/01	17,642	17,642	17,642	17,642	17,642	17,642	17,642
2009 Interest CWSRF R06809 9/01	1,191	1,103	1,014	1,103	926	926	926
2013 Principal USNB 12/01	100,000	100,000	100,000	100,000	100,000	100,000	100,000
2013 Interest USNB 6/01 & 12/01	8,645	6,174	3,705	3,705	1,235	1,235	1,235
2020 Principal R808831 4/01 & 10/01			100,000				
2020 Interest R809831 4/01 & 10/01							
Transfers	123,776	110,279	134,382	134,382	173,565	173,565	173,565
Contingency			679,912		898,344	898,344	898,344
Total expenditures	\$ 1,736,840	\$ 1,556,503	\$ 3,779,398	\$ 1,953,939	\$ 4,265,130	\$ 4,265,130	\$ 4,265,130
Other requirements							
Unappropriated ending fund balance	\$ -	\$ -	\$ 500,000	\$ 500,000	\$ 800,000	\$ 800,000	\$ 800,000
Ending working capital	\$ 990,275	\$ 1,455,694	\$ -	\$ 1,150,005	\$ -	\$ -	\$ -

Utility Wastewater Fund Line Item Detail		Actual	Actual	Budget	Estimated	Budget
Account	Description	FY 17-18	FY 18-19	FY 19-20	FY 19-20	FY 20-21
41-000-003	Interest Earned	14,829	31,793	30,000	36,000	44,000
41-000-100	Miscellaneous	-	98	-	2,550	-
41-000-150	Intergovernmental Revenue	10,000	-	-	-	-
41-000-151	Long Term Debt Proceeds	-	-	790,000	-	1,200,000
41-000-220	User Fees	1,721,771	1,870,199	2,023,149	2,085,700	2,150,000
41-000-240	Hookup Fees	4,650	1,100	1,125	2,000	1,125
41-000-260	Infrastructure Insp Fees	4,361	118,731	30,000	22,000	20,000
	Total Revenue	1,755,611	2,021,922	2,874,274	2,148,250	3,415,125
41-410-100	City Manager	31,503	32,258	35,530	35,530	36,803
41-410-102	Public Works Director	28,817	35,861	39,698	39,698	43,321
41-410-104	Planning Supervisor	8,592	-	-	-	-
41-410-106	Finance/Office Manager	22,017	22,377	24,672	24,672	27,429
41-410-107	Assistant to City Manager	13,620	14,596	19,057	19,057	21,133
41-410-108	Office Administrator Finance	19,027	20,949	23,623	23,623	25,539
41-410-109	Program Analyst	-	-	-	-	17,204
41-410-110	City Recorder	15,891	17,833	18,720	18,720	19,457
41-410-113	City Engineer	32,902	30,319	31,838	31,838	33,076
41-410-114	Treatment Plant Supervisor	88,194	90,072	94,827	94,827	98,536
41-410-118	Field Services Supervisor	21,784	27,221	30,150	30,150	32,905
41-410-120	Operators	75,368	85,351	112,556	112,556	120,093
41-410-121	Utility Workers	78,253	95,519	102,780	102,780	112,105
41-410-123	Engineering Assistant PW	6,339	-	-	-	-
41-410-132	Office Administrator CDC	7,371	-	-	-	-
41-410-142	Overtime	3,256	2,509	15,347	5,000	16,242
41-410-146	Health Insurance	122,389	122,031	167,685	138,000	177,013
41-410-148	Retirement Benefits	105,735	112,405	155,539	145,000	171,603
41-410-150	Social Security	33,879	35,386	43,904	40,000	48,307
41-410-152	Workers Compensation	15,325	14,209	21,949	11,625	23,103
41-410-155	Taxable Fringe Benefits	-	-	-	-	-
	Total Personnel Services	730,261	758,896	937,875	873,076	1,023,869
41-410-200	Building/Facilities Maintenance	3,785	1,232	3,500	2,500	15,500
41-410-202	Equipment Maintenance	6,430	25,548	51,000	35,000	32,500
41-410-203	Maintenance Agreements	1,690	1,335	1,860	1,200	1,720
41-410-204	Vehicle Maintenance	16,857	1,512	8,500	7,500	8,500
41-410-205	Small Equipment	8,552	9,096	22,250	15,000	19,550
41-410-206	Fuel/Oil/Lube	7,509	8,887	6,840	9,500	8,153
41-410-216	Office Supplies	9,426	10,574	13,000	9,000	12,000
41-410-218	Operational Supplies	8,662	11,346	19,500	10,000	30,375
41-410-222	Lab Supplies	5,729	5,571	9,358	6,700	8,063
41-410-224	Chemicals	36,404	23,051	34,875	35,000	34,875
41-410-227	Electrical Operations	100,464	99,318	102,000	96,000	99,000
41-410-228	Utilities	6,079	5,832	6,480	5,800	6,360
41-410-229	Electrical Operations Pumps	6,682	5,603	6,600	5,300	7,740
41-410-230	Contractual/Professional	115,206	153,660	234,250	175,000	336,500
41-410-234	Miscellaneous	-	-	-	-	-
41-410-235	Property Tax	1,685	1,370	2,000	1,384	2,000
41-410-238	Insurance	-	-	-	-	-
41-410-240	Travel/Training	3,605	3,687	8,300	4,000	8,500
41-410-242	Dues/Fees/Subscriptions	14,221	18,833	23,580	22,000	23,342
41-410-244	Publications/Notices/Advertise	841	41	3,000	1,000	3,000
41-410-252	Uniforms/Safety	1,078	2,540	3,975	3,975	6,475
41-410-253	Sludge Disposal	4,350	15,237	15,000	14,187	15,000
41-410-254	Equipment Rental	17,960	315	9,000	9,000	9,000
	Total Materials & Services	377,214	404,590	584,868	469,046	688,153

Account	Description	Actual FY 17-18	Actual FY 18-19	Budget FY 19-20	Estimated FY 19-20	Budget FY 20-21
41-410-300	Equipment	378,111	157,819	140,000	100,000	90,000
41-410-310	Infrastructure Upgrades	-	-	1,040,000	210,000	1,236,396
41-410-311	Equipment Replacement	-	-	40,000	44,985	35,000
	Total Capital Outlay	378,111	157,819	1,220,000	354,985	1,361,396
41-410-510	Principal USNB	100,000	100,000	100,000	100,000	100,000
41-410-511	Interest USNB	8,645	6,174	3,705	3,705	1,235
41-410-560	Principal CWSRF R80930	17,642	17,642	17,642	17,642	17,642
41-410-561	Interest CWSRF R80930	1,191	1,103	1,014	1,103	926
41-410-562	Principal DEQ Loan	-	-	-	-	-
41-410-564	Interest DEQ Loan	-	-	100,000	-	-
	Total Debt Services	127,478	124,919	222,361	122,450	119,803
41-410-418	Transfer to Unemployment Fund	-	-	-	-	-
41-410-419	Transfer to General Fund ISF	123,776	110,279	134,382	134,382	173,565
	Total Transfers	123,776	110,279	134,382	134,382	173,565
41-410-600	Contingency	-	-	679,912	-	898,344
41-410-900	Unappropriated Ending Fund Balance	-	-	500,000	-	800,000
	Total Expenditures	1,736,840	1,556,503	4,279,398	1,953,939	5,065,130





WASTEWATER SDC FUND 55

PURPOSE:

The Wastewater System Development Charge fund is a dedicated fund and is the mechanism by which the City of Scappoose collects funds from developers to pay both for previous and new capacity improvements. It makes funds available to pay for future improvement needs generated by development. Wastewater SDC'S are calculated based on the size of the water meter needed for the development. This account includes both the revenue and the capital outlay for those projects.

VISION FOR THE YEAR:

Engineering for Phase I improvements will be the top priority for this fiscal year.

COMPLIANCE WITH COUNCIL GOALS:

Address aging infrastructure	Capacity Upgrades- Treatment & Collections
Update SDC's/Fees	Create a 5-year Capital Improvement Plan
Update Public Works Design Standards	

Wastewater SDC Fund Objectives	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Complete Collections Master Plan												
Phase I Facility Improvement Design												
Capacity Upgrades-Treatment & Collections												
Update SDC's/Fees												
Develop 5-year Capital Improvement Plan												

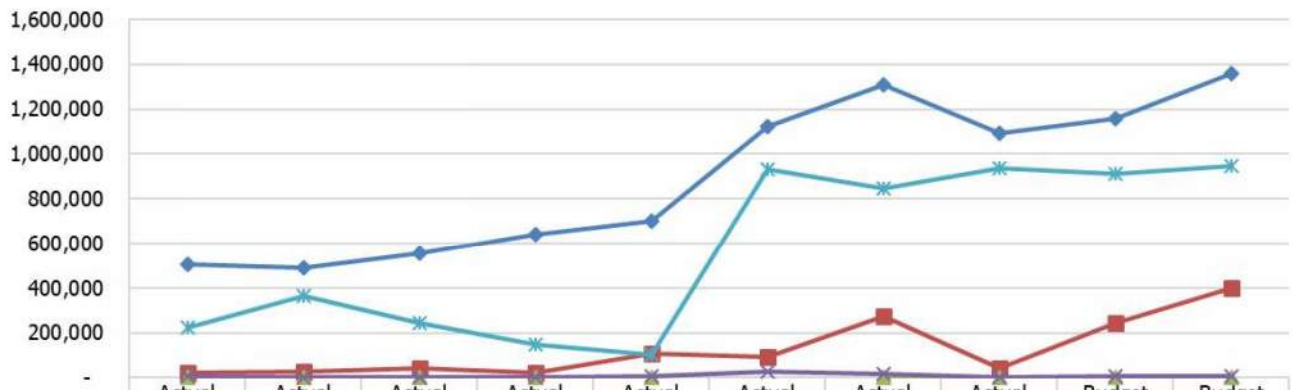
BUDGET NOTES:

The Wastewater SDC fund has a beginning cash position of \$1,174,761. The City anticipates receiving \$26,000 in interest income and \$155,189 in SDC fees. Total resources for the fund are \$1,355,950. Projects proposed for FY 20-21 include \$400,000 in extra capacity improvements for Phase I Design and Engineering of the Treatment Plant, along with additional Wastewater capacity upgrades. The fund contains a transfer to the General Fund of \$7,759 for administrative costs and a contingency of \$948,191.

<i>Wastewater SDC 55</i>							
Resources	Actual FY 17-18	Actual FY 18-19	Budget FY 19-20	Estimated FY 19-20	Proposed Budget FY 20-21	Approved Budget FY 20-21	Adopted Budget FY 20-21
Working capital carryover	\$ 1,000,306	\$ 1,017,487	\$ 1,003,885	\$ 1,052,147	\$ 1,174,761	\$ 1,174,761	\$ 1,174,761
Current year resources							
Interest	\$ 16,703	\$ 26,119	\$ 27,000	\$ 25,400	\$ 26,000	\$ 26,000	\$ 26,000
System development charges - reimbursement		10,156	25,724	27,530	31,038	31,038	31,038
System development charges - extra capacity	290,202	40,621	102,898	110,115	124,151	124,151	124,151
Total current year resources	\$ 306,905	\$ 76,896	\$ 155,622	\$ 163,045	\$ 181,189	\$ 181,189	\$ 181,189
Total resources	\$ 1,307,211	\$ 1,094,383	\$ 1,159,507	\$ 1,215,192	\$ 1,355,950	\$ 1,355,950	\$ 1,355,950
Expenditures	Actual FY 17-18	Actual FY 18-19	Budget FY 19-20	Estimated FY 19-20	Proposed Budget FY 20-21	Approved Budget FY 20-21	Adopted Budget FY 20-21
Capital outlay	\$ 271,953	\$ 40,159	\$ 243,000	\$ 34,000	\$ 400,000	\$ 400,000	\$ 400,000
Transfers	17,771	2,077	6,431	6,431	7,759	7,759	7,759
Contingency			910,076		948,191	948,191	948,191
Total expenditures	\$ 289,724	\$ 42,236	\$ 1,159,507	\$ 40,431	\$ 1,355,950	\$ 1,355,950	\$ 1,355,950
Ending working capital	\$ 1,017,487	\$ 1,052,147	\$ -	\$ 1,174,761	\$ -	\$ -	\$ -

Wastewater SDC Fund Line Item Detail		Actual	Actual	Budget	Estimated	Budget
Account	Description	FY 17-18	FY 18-19	FY 19-20	FY 19-20	FY 20-21
55-000-003	Interest Earned	16,703	26,119	27,000	25,400	26,000
55-000-992	Sewer SDC Reimbursements	51,050	10,155	25,724	27,530	31,038
55-000-993	Sewer SDC Extra Capacity Improvements	239,151	40,621	102,898	110,115	124,151
55-000-994	Long Term Debt Proceeds	-	-	-	-	-
	Total Revenue	306,905	76,896	155,622	163,045	181,189
55-550-314	Wastewater Extra Capacity Improvement	77,003	40,159	243,000	34,000	100,000
55-550-316	Wastewater Reimbursement Improvements	-	-	-	-	-
55-550-326	Council Approved Projects	194,950	-	-	-	300,000
	Total Capital Outlay	271,953	40,159	243,000	34,000	400,000
55-550-409	Transfer to GF SDC Admin.	17,771	2,077	6,431	6,431	7,759
	Total Transfers	17,771	2,077	6,431	6,431	7,759
55-550-600	Contingency	-	-	910,076	-	948,191
	Total Expenditures	289,724	42,236	1,159,507	40,431	1,355,950

WASTEWATER SDC FUND 10 YEAR HISTORY



	Actual 11/12	Actual 12/13	Actual 13/14	Actual 14/15	Actual 15/16	Actual 16/17	Actual 17/18	Actual 18/19	Budget 19/20	Budget 20/21
Resources	506,316	489,421	554,366	641,694	700,163	1,121,205	1,307,211	1,094,383	1,159,507	1,355,950
Capital Outlay	22,865	28,253	43,660	21,022	107,254	94,174	271,953	40,159	243,000	400,000
Debt Service	-	-	-	-	-	-	-	-	-	-
Transfers	5,177	581	1,443	3,682	7,458	26,725	17,771	2,077	6,431	7,759
Contingency	222,116	363,725	244,241	148,310	100,532	929,636	844,364	935,443	910,076	948,191

**City of Scappoose
Schedule of Projected Long-term Debt**

	Interest Rates	Date of Issue	Fiscal Year of Maturity	Outstanding July 1, 2020	Issued	Paid	Outstanding June 30, 2021	Due Within One Year
PRINCIPAL TRANSACTIONS								
General Obligations								
Capital Leases	5.20%	2018	2022	\$ 34,293	-	\$ 16,630	17,663	\$ 17,663
Enterprise Obligations								
Dutch Canyon Waterline Loan	3.68%	2010	2031	665,902	-	56,934	608,968	59,029
Water Plant Phase 1 & 2	4.43%	2002	2028	795,070	-	84,278	710,792	89,949
Water Storage Reservoirs	1.00%	2004	2036	2,196,829	-	135,833	2,060,996	137,192
Wastewater DEQ Loan	0.00%	2011	2031	185,231	-	17,642	167,589	17,642
Wastewater US Bank Loan	2.47%	2014	2020	100,000	-	100,000	-	-
Capital Leases	3.65%	2015	2022	256,655	-	45,783	210,872	102,118
Subtotal				\$ 4,233,980	\$ -	\$ 457,100	\$ 3,776,880	\$ 423,593
INTEREST TRANSACTIONS								
General Obligations								
Capital Leases	5.20%	2018	2022	3,227	-	2,130	1,097	1,097
Enterprise Obligations								
Dutch Canyon Waterline Loan	3.68%	2010	2031	140,895	-	24,505	116,390	22,410
Water Plant Phase 1 & 2	4.43%	2002	2028	178,588	-	37,724	140,864	33,763
Water Storage Reservoirs	1.00%	2004	2036	180,635	-	21,969	158,666	20,610
Wastewater DEQ Loan	0.00%	2011	2031	-	-	-	-	-
Wastewater US Bank Loan	2.47%	2014	2020	1,235	-	1,235	-	-
Capital Leases	3.65%	2017	2021	7,390	-	4,885	2,505	2,505
Subtotal				\$ 511,970	\$ -	\$ 92,448	\$ 419,522	\$ 80,385
Grand Total				\$ 4,745,950	\$ -	\$ 549,548	\$ 4,196,402	\$ 503,978

City of Scappoose
Wastewater Facilities Planning Study
User Rate Impacts

Existing Budget is Balanced	
FY 2020-2021 Revenue	\$ 2,171,125

After SDCs, Priority 1 Improvements	
Priority 1 Improvement Costs	\$ 4,961,000
Less Available SDC Funds / Reserves	\$ 1,031,000
Amount to Finance	\$ 3,930,000
Annual Payment (20yr, 1.6%)	\$ 231,169
Annual O&M Increase	\$ -
Payment % of FY 2020-2021 Revenue	11%
<i>Additional Monthly Cost Per User (2600 EDUs)</i>	\$ 7.41



Appendix H

Project Emphasis Sheets

Collection System Project:**Smith Road Pump Station****Project Identifier:**

1.1

Objective:

Major upgrades to the pump station to address pump station conditions, nearing capacity limitations, and small operating volume. Includes new wet well, pumps with VFD controls, and electrical and controls upgrades.

Project Location: Smith Road Pump Station

Item	Cost (2020)	
New wet well	\$	100,000
Replace pumps (includes VFD)	\$	195,000
Electrical/Controls	\$	150,000
OHP & Mobilization	\$	89,000
Contingency and Allowances	\$	161,000
Construction Subtotal (rounded)	\$	695,000
Engineering and CMS	\$	174,000
Legal, Admin, and Permitting	\$	14,000
Total Project Cost (rounded)	\$	883,000

The cost estimate herein is based on our perception of current conditions at the project location. This estimate reflects our professional opinion of accurate costs at this time and is subject to change as the project design matures. Keller Associates has no control over variances in the cost of labor, materials, equipment, services provided by others, contractor's methods of determining prices, competitive bidding or market conditions, practices or bidding strategies. Keller Associates cannot and does not warrant or guarantee that proposals, bids or actual construction costs will not vary from the costs presented herein.

Collection System Project:

WTP Improvements and Smith Road

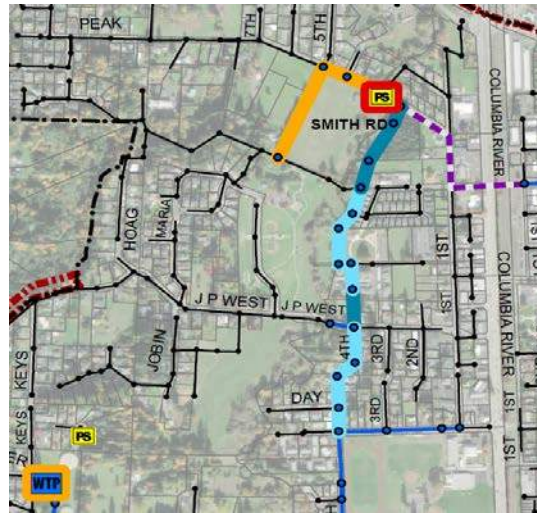
Project Identifier:

1.2

Objective:

Automate Keys WTP backwash operations to operate during night flows. Install new Kucera line to eliminate creek crossing and re-direct flows; upsize existing Smith Road pipeline to alleviate surcharging.

Project Location: Keys WTP, Smith Road and North of Veterans Park (orange highlights below)



Item	Cost (2020)
WTP Automated Valve, Valve Structure, Controls	\$ 100,000
Smith Road & Kucera Line	
8" PVC Pipe (Gravity) - Excavation, Backfill	\$ 75,000
15" PVC Pipe (Gravity) - Excavation, Backfill	\$ 70,000
18" PVC Pipe (Gravity) - Excavation, Backfill	\$ 31,000
Creek Boring	\$ 45,000
Reconnect Services	\$ 3,750
Connect to Pump Station	\$ 5,000
Manhole (48")	\$ 35,000
Native Surface Repair	\$ 4,750
Full Lane Pavement Repair	\$ 30,000
Abandon Line	\$ 15,000
Bypass Pumping	\$ 15,000
Traffic Control	\$ 10,000
OHP & Mobilization	\$ 88,000
Contingency and Allowances	\$ 159,000
Construction Subtotal (rounded)	\$ 687,000
Engineering and CMS	\$ 207,000
Legal, Admin, and Permitting	\$ 14,000
Total Project Cost (rounded)	\$ 908,000

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Collection System Project:

Laurel and 3rd St

Project Identifier:

1.3

Objective:

Upsize Laurel and 3rd Streets pipeline to alleviate surcharging.

Project Location: Laurel and 3rd St

Item	Cost (2020)
18" PVC Pipe (Gravity) - Excavation, Backfill	\$ 93,000
21" PVC Pipe (Gravity) - Excavation, Backfill	\$ 42,500
24" PVC Pipe (Gravity) - Excavation, Backfill	\$ 55,500
Reconnect Services	\$ 17,250
Manhole (48")	\$ 25,000
Half Lane Pavement Repair	\$ 34,500
Bypass Pumping	\$ 15,000
Traffic Control (without Flagging)	\$ 4,600
OHP & Mobilization	\$ 58,000
Contingency and Allowances	\$ 104,000
Construction Subtotal (rounded)	\$ 450,000
Engineering and CMS	\$ 135,000
Legal, Admin, and Permitting	\$ 9,000
Total Project Cost (rounded)	\$ 594,000

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Collection System Project:

Old Portland Road

Project Identifier:

1.4

Objective:

Upsize existing Old Portland Road pipeline to alleviate surcharging.

Project Location: Old Portland Road



Item	Cost (2020)
10" PVC Pipe (Gravity) - Excavation, Backfill	\$ 302,500
12" PVC Pipe (Gravity) - Excavation, Backfill	\$ 18,000
Reconnect Services	\$ 43,500
Manhole (48")	\$ 80,000
Native Surface Repair	\$ 5,750
Full Lane Pavement Repair	\$ 75,000
Highway Repair	\$ 112,500
Bypass Pumping	\$ 20,000
Traffic Control	\$ 20,000
OHP & Mobilization	\$ 136,000
Contingency and Allowances	\$ 244,000
Construction Subtotal (rounded)	\$ 1,058,000
Engineering and CMS	\$ 318,000
Legal, Admin, and Permitting	\$ 22,000
Total Project Cost (rounded)	\$ 1,398,000

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Collection System Project:
Project Identifier:

High School Way to Elm St
1.5

Objective:

Upsize existing High School Way pipeline to Elm Street to alleviate surcharging.

Project Location: High School Way to Elm Street



Item	Cost (2020)
10" PVC Pipe (Gravity) - Excavation, Backfill	\$ 88,000
15" PVC Pipe (Gravity) - Excavation, Backfill	\$ 294,000
Reconnect Services	\$ 43,500
Manhole (48")	\$ 50,000
Full Lane Pavement Repair	\$ 174,000
Bypass Pumping	\$ 20,000
Traffic Control	\$ 15,000
OHP & Mobilization	\$ 137,000
Contingency and Allowances	\$ 247,000
Construction Subtotal (rounded)	\$ 1,069,000
Engineering and CMS	\$ 321,000
Legal, Admin, and Permitting	\$ 22,000
Total Project Cost (rounded)	\$ 1,412,000

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Collection System Project:

Dutch Canyon Road

Project Identifier:

1.6

Objective:

Upsize existing Dutch Canyon Road pipeline to alleviate surcharging.

Project Location: Dutch Canyon Road



Item	Cost (2020)
10" PVC Pipe (Gravity) - Excavation, Backfill	\$ 60,500
Reconnect Services	\$ 8,250
Manhole (48")	\$ 15,000
Full Lane Pavement Repair	\$ 33,000
Bypass Pumping	\$ 10,000
Traffic Control	\$ 10,000
OHP & Mobilization	\$ 28,000
Contingency and Allowances	\$ 50,000
Construction Subtotal (rounded)	\$ 215,000
Engineering and CMS	\$ 65,000
Legal, Admin, and Permitting	\$ 5,000
Total Project Cost (rounded)	\$ 285,000

The cost estimate herein is based on our perception of current conditions at the project location. This estimate reflects our professional opinion of accurate costs at this time and is subject to change as the project design matures. Keller Associates has no control over variances in the cost of labor, materials, equipment, services provided by others, contractor's methods of determining prices, competitive bidding or market conditions, practices or bidding strategies. Keller Associates cannot and does not warrant or guarantee that proposals, bids or actual construction costs will not vary from the costs presented herein.

Collection System Project:

Short-Term Pump Station Improvements

Project Identifier:

1.7

Objective:

Investigate air lock in Springlake force main and perform general pipe and valve maintenance. Install bollards and perform general pipe and valve maintenance at Highway 30 PS.

Project Location: Springlake and Highway 30 Pump Stations



Item	Cost (2020)
Springlake PS	
Test for air lock in force main	\$ 8,400
Clean and coat piping in wet well and valves	\$ 9,500
Perform engineering review of electrical system	\$ 3,900
OHP & Mobilization	\$ 5,000
Contingency and Allowances	\$ 9,000
Construction Subtotal (rounded)	\$ 36,000
Engineering and CMS	\$ 9,000
Legal, Admin, and Permitting	\$ 1,000
Springlake Total Project Cost (rounded)	\$ 46,000
HWY 30 PS	
Install bollards to protect station from traffic	\$ 3,900
Clean and coat piping in wet well and valves	\$ 9,500
Perform engineering review of electrical system	\$ 3,900
OHP & Mobilization	\$ 4,000
Contingency and Allowances	\$ 7,000
HWY 30 Construction Subtotal (rounded)	\$ 29,000
Engineering and CMS	\$ 8,000
Legal, Admin, and Permitting	\$ 1,000
Total Project Cost (rounded)	\$ 38,000
Springlake and HWY 30 Total Project Cost (rounded)	\$ 84,000

The cost estimate herein is based on our perception of current conditions at the project location. This estimate reflects our professional opinion of accurate costs at this time and is subject to change as the project design matures. Keller Associates has no control over variances in the cost of labor, materials, equipment, services provided by others, contractor's methods of determining prices, competitive bidding or market conditions, practices or bidding strategies. Keller Associates cannot and does not warrant or guarantee that proposals, bids or actual construction costs will not vary from the costs presented herein.