CASNE
ASSOCIATES INCORPORATED
Water, Wastewater, Subdivision Design and Environmental Solutions

Casne & Associates, Inc.

1663 Logan
Helena, MT 59601
P.O. Box 1123
Helena, MT 59624-1123

(406) 443-1656
FAX (406) 443-1656

www.casneinc.com

March 6, 2015

Greg McNalley
Lewis & Clark County Planning Department
316 N. Park Avenue Room 230
Helena, MT 59623

RE: Engineered Fire Suppression System Plans
Heron Creek Subdivision, Phases I - III

Dear Greg:

Per your request during our meeting on Monday, we have enclosed engineered plans, material specifications, and pump performance curves for the Herron Creek Fire Suppression System. The system shown on these plans will replace much of an existing fire pumping system currently constructed at the site. The existing system was designed by Great West Engineering to produce 1000 GPM @ 20PSI; however testing of the system has resulted in pump cavitation issues and a flow of approximately 500 GPM at the nearest hydrant.

We have attached the original fire system construction plans as well as a 2007 signed agreement with Chief Drake that approved the current system configuration. These documents have been attached only to provide the peer reviewer with a history of the system.

The proposed fire suppression system must satisfy Condition of Final Plat Approval #9 of Phase I:

"The Applicant and the County must agree, prior to final plat approval, on fire protection measures that minimize the risk of fire and that permit the effective and efficient suppression of fires"

The fire protection system proposed consists of the following:

- Fire water storage will consist of an existing, lined, open-water pond; approximately 6 – 8 feet deep with a liquid capacity of approximately 200,000 gallons. The pond will contain the required volume 365 days/year regardless of ice buildup.
- New 10" PVC piping installed level between a self cleaning intake strainer (in the pond) and a new wet well.
- A Clemons® Clearwater self-cleaning suction screen (10" diameter, Model CW1000) will be utilized to mitigate pump intake clogging due to debris. The unit will be pressurized and fed water using the same fire pump that feeds the hydrants and therefore will operate when a pump is activated. The self-cleaning suction screen feed line will also function to "exercise" the fire pump periodically (every 2 weeks); therefore the screen will be cleaned regularly regardless of hydrant flow.
- The wet well will contain one (1) line-shaft vertical turbine pump.

- The pump motor (50 HP, 460v, 3 phase) and soft start controller (pressure activated) will be housed directly atop the wet well in a heated, insulated, and ventilated stick-built structure with concrete foundation.
- The structure will also contain the required pressure tank, transducers, valves, etc.
- The pumping system is setup to be pressure-controlled; however it can also be controlled manually via the control panel.
- The discharge from the fire pump will be conveyed within a new 8" diameter C900 PVC water line to a connection with the existing 6" diameter SCH 40 PVC fire distribution lines.
- The pump control panel will "exercise" the pump regularly to ensure the motor does not seize due to infrequent use. The control panel will also be linked to an exterior warning light that will alert residents of system warnings.
- When the pump is exercised it will also serve to periodically clean the intake screen.
- The pond will continually be refilled as needed by a dedicated 40 GPM well (GWIC #261710). The well will fill the pond when commanded by a pressure transducer located within the wet well. Because the refill piping is located within a heated structure, the refill system will function 365 days/year.
- Per the request of Chief Drake, we have also added a dry hydrant with separate intake strainer to the pond design. The dry hydrant will be available independent of the pumping system and lends redundancy to the system design.

Proposed System Performance:

1) The system shall provide a flow of 1000 GPM at a minimum of 20PSI, continuously for a minimum of two hours.

2) The system shall contain two (2) hydrants. The hydrants shall be located within 1000' of each home within the Herron Creek Subdivision.

System Maintenance & Funding:

The fire water system shall be maintained without funding from an RID. Responsibility for maintenance and funding for such shall be by the Herron Creek HOA as required within the Declaration of Covenants.

The Declaration of Covenants shall require a joint account be created for the sole purpose of fire system maintenance. Five percent (5%) of the annual HOA dues will be diverted into this account until the balance reaches $20,000.00. The fund will then be maintained at this amount until maintenance is needed. The five percent (5%) contribution shall resume each time the account balance falls below $20,000.00. The covenants will be written so that the future HOA cannot vote the fire suppression funding mechanism out.

Easements will be recorded on the final plat to ensure the fire pumping system, pond, piping, and all related appurtenances can be maintained and/or replaced when needed.

System Testing:

The completed system will be tested to ensure it can reliably supply 1000 GPM for two hours @ 20 PSI to the hydrants. Testing will be conducted jointly by the Tri-Lakes VFD and Casne & Associates. Flow measurements will be made at the furthest hydrant from the pumping system.

Please feel free to call if you have any questions.

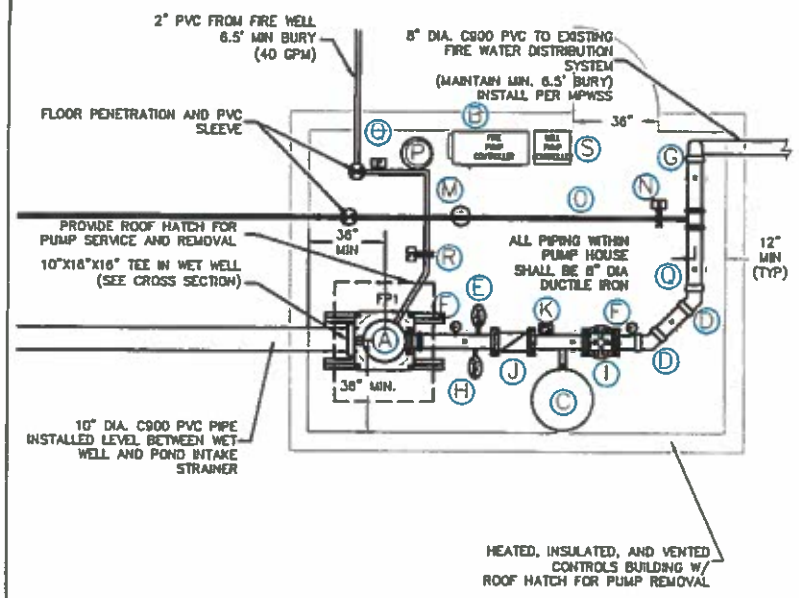
Sincerely,
CASNE & ASSOCIATES, INC

By: Ryan E. Casne, P.E.
Senior Engineer, Principal

C.C.: Ron Bartsch, Owner, Sussex Development
File

Enclosed: Current Fire System Plans (2)

PROPOSED FIRE SYSTEM PLANS



PLUMBING LEGEND

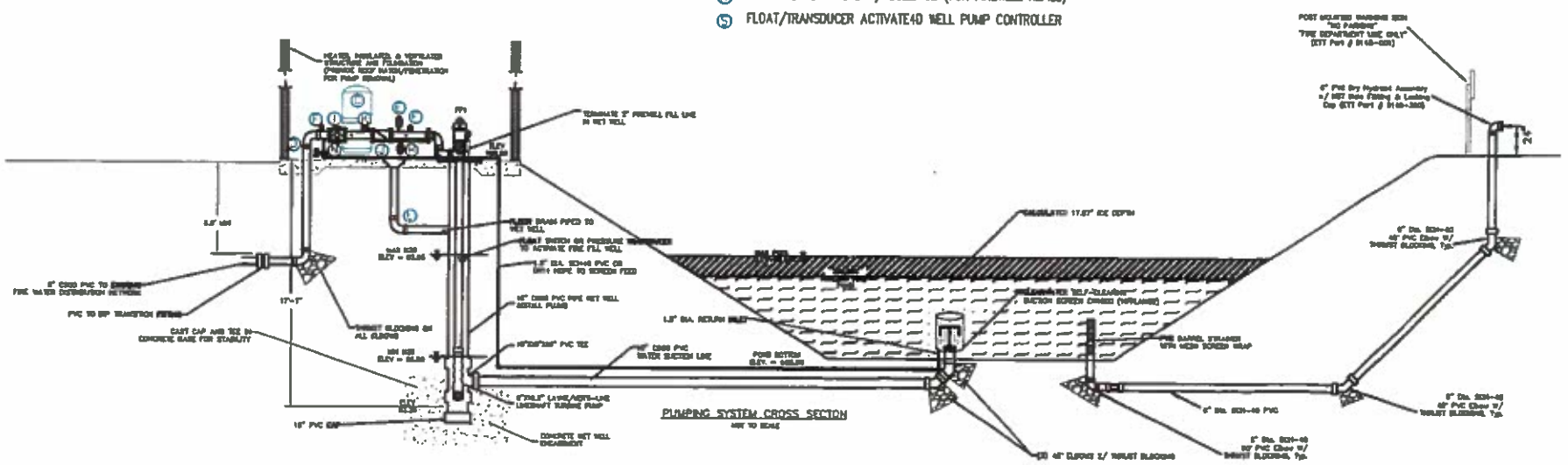
- (A) SEE PUMP SCHEDULE
- (B) PUMP CONTROLLER: ORENCO MVP-S640 -50HP W/ SOFT MOTOR START
- (C) WELL-X-TROL WX350 HYDROPNEUMATIC PRESSURE TANK
- (D) 45° DIP ELBOW W/ MECHANICAL RESTRAINTS
- (E) 1" AIR RELIEF VALVE – CRISPIN OR APPROVED EQUAL
- (F) 0-200 PSI PRESSURE GUAGE
- (G) 90° DIP ELBOW W/ MECHANICAL RESTRAINTS
- (H) 1" PRESSURE RELIEF VALVE (SET AT 100PSI); DISCHARGE PIPED TO WET WELL OR BUILDING EXTERIOR
- (I) 6" RESILIENT WEDGE GATE VALVE (MUELLER OR EQUAL)
- (J) 6" SWING CHECK VALVE; KENNEDY OR EQUAL
- (K) PRESSURE TRANSDUCER (PER CONTROL PANEL MANUFACTURER'S REC.)
- (L) 6" DIA. FLOOR DRAIN PIPED TO WET WELL
- (M) PIPESTAND & RESTRAINT 1"ø, BOLT TO FLOOR W/ (4) DRILLED ANCHOR BOLTS, 2 HEX BOLTS, & LOCK WASHERS.
- (N) 1-1/2" BUTTERFLY VALVE W/ SOLENOID (FOR BYPASS PUMPING TO RIVER SCREEN INLET)
- (O) 1-1/2" SCH40 PVC OR DR11 HDPE LINE FROM BUTTERFLY VALVE TO SELF CLEANING INTAKE SCREEN (6.5' MIN BURY)
- (P) WX250 HYDROPNEUMATIC PRESSURE TANK
- (Q) PRESSURE SWITCH
- (R) 2" BUTTERFLY VALVE W/ SOLENOID (FOR FIREWELL REFILL)
- (S) FLOAT/TRANSDUCER ACTIVATE4D WELL PUMP CONTROLLER

GENERAL SPECIFICATIONS & CONSTRUCTION NOTES:

1. ALL WORK TO BE PERFORMED FOR THE INSTALLATION OF THE FIRE WATER SUPPRESSION SYSTEM SHALL BE IN ACCORDANCE WITH ALL APPLICABLE ELECTRICAL AND COMMERCIAL PLUMBING CODES.
2. ALL MATERIALS USED SHALL BE NSF OR AWWA APPROVED. A FULL MATERIALS SUBMITTAL PACKAGE IS REQUIRED PRIOR TO PROCEEDING WITH THE WORK.
3. PLUMBER SHALL PROVIDE ENGINEER WITH AS-BUILT DRAWINGS UPON COMPLETION OF INSTALLATION.
4. PLUMBER SHALL PROVIDE ENGINEER WITH MANUFACTURER'S DATA SHEETS, WARRANTY SLIPS, OWNER'S MANUALS, ETC. FOR ALL EQUIPMENT INSTALLED.

FIRE PUMP SCHEDULE

UNIT	TYPE	GPM	TDH	RPM	HP	PUMP START (PSI)	PUMP STOP (PSI)	ELECTRICAL V	PH	HZ
FP-1	ELECTRIC DRIVE, LINESHAFT TURBINE PUMP NSTRC LAKE/AQUIFUGE	1000	130 FEET (65 PSI)	1800	50	30	60	460	3	60



Casne & Associates, Inc.
PO Box 1123
Helena, Montana 59624
(406) 443-1656
ryan@casneinc.com

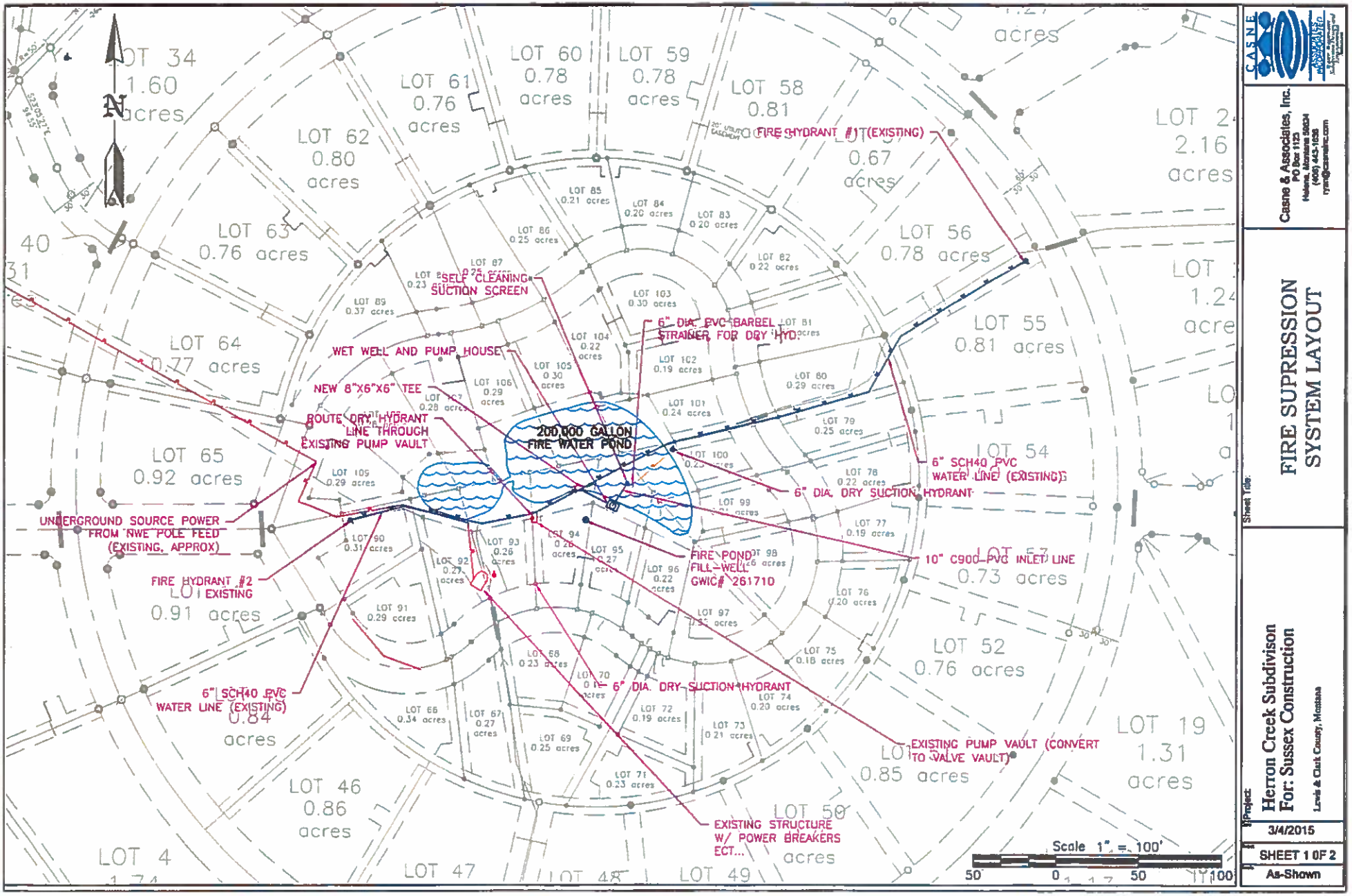
Fire Water Pumping System

Herron Creek Subdivison
For: Eco Development LLC
Lewis & Clark County, Montana

3/6/2015

Sheet 2 of 2

Not to Scale



CASNE

Casne & Associates, Inc.
PO Box 1123
Helena, Montana 59624
(406) 443-1638
ryan@casneinc.com

Sheet Title:
FIRE SUPRESSION SYSTEM LAYOUT

Project:
Herron Creek Subdivison
For: Sussex Construction
Lewis & Clark County, Montana

3/4/2015

SHEET 1 0F 2

As-Shown

EXISTING SYSTEM CONSTRUCTION PLANS (BY OTHERS)

2030 11th Ave • PO Box 4817
Helena, MT 59604
(406) 449 8627 • Fax (406) 449 8631
www.greatwesteng.com

GreatWest engineering

May 9, 2007

Bob Drake
Tri-Lakes Volunteer Fire Department
3200 Spokane Creek Road
East Helena, MT 59635

COPY

RE: Fire Protection Plan, Heron Creek Subdivision

Dear Mr. Drake:

Thank you for meeting with us last Tuesday to discuss the many options for fire mitigation at the proposed Heron Creek Subdivision. Please consider this letter a proposed "Fire Protection Plan". Below is a list of the preferred and agreed upon mitigation measures for the proposed Heron Creek Subdivision.

1. The owner will install two fire hydrants capable of flowing 1,000 gallons per minute for a period of two hours at a minimum pressure of 20 psi. One of the hydrants will be located at the parking area near the entrance to the condominium/multi family unit lot in the center of the proposed development. The second hydrant will be located on the east side of Fire Weed Street near where the trail/emergency access, creek crosses. As a result of the placement of these two hydrants and the emergency access provisions, there will be a hydrant within 1000 ft of all structures.
2. Roadways and parking areas will be designed to help ensure emergency access to fire hydrants.
3. The water storage will be supplied with adequate capacity to provide the required 1,000 gallons per minute fire flow for a period of two hours year around. Make up water will be supplied through a combination of sources and controlled by pressure transducers or other acceptable controls ensuring adequate capacity year around. The water structure will operate year around, which will reduce the amount of ice buildup by keeping the water moving. The storage will be sized with consideration of reasonable ice buildup. The storage level will be controlled via subsurface controls so they will work during cold weather. It is likely that the majority of the ponds and stream will be shut down during the winter months. The water feature used for fire storage will continue to operate and makeup water will be supplied by a well drilled for fire protection. This project anticipates full time maintenance personnel for the community, therefore helping to ensure the fire fill station remain in good operational condition.
4. We discussed the challenges related to using ponds to store and supply the water for

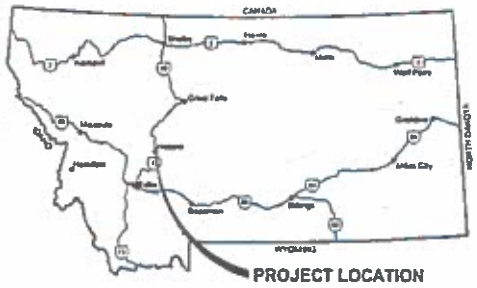
fire protection. In order to mitigate some of these challenges, the water feature supplying the fire water will be designed to minimize silting of the water storage capacity. This will be accomplished through a combination of settling basins and possibly other technologies prior to the water entering the storage area.

5. By providing the two hydrants within 1,000 feet of the condominiums, the emergency access route at the east side of the condominium units, providing "no parking signs", the off-street parking pads in front of each garage, and designating one way traffic, the reduced driving surface width within the condominium lot will be acceptable to the fire department. As a result of all these provisions, the fire department will be able to easily reach the condiminiums with hose lays and not have to tanker-shuttle water on this interior road.
6. Removable bollards will be provided for the emergency access route on the east side of the condominium lot between lot #55 and lot #56, and the access to the drain field area located between lot #1 and lot #2.
7. As part of the maintenance of the community and in compliance with the proposed Vegetation Management Plan, the parks and wastewater facility areas will be maintained as parkland. The grasses will be mowed and trees maintained. All lots will be required to maintain mowed grass or landscaping on the entire lot. Specific details will be worked out with the fire chief and included in the covenants.

This letter of understanding covers the major issues discussed in the meeting. This letter does not limit additional measures or safeguards to be negotiated between Tri-Lakes Volunteer Fire Department and the owner.

Ron Bartsch, Owner

Bob Drake, Fire Chief



FIREFLOW SYSTEM
HERON CREEK SUBDIVISION

CONSTRUCTION PLANS

SECTION 12, TOWNSHIP 10N, AND RANGE 2W

NOT TO SCALE

SHEET INDEX

PROJECT
DATE MARCH 2019

PLANS PREPARED FOR:

HERON CREEK SUBDIVISION

APPROVED BY:

SHAWN BRYANT, P.E.
GREAT WEST ENGINEERING

QA/QC BY:

NAME, P.E.
GREAT WEST ENGINEERING

PLANS PREPARED BY:

CARRIE GARDNER

GreatWest engineering
2301 BELT VIEW DRIVE
HELENA, MT 59601
(406)449-8627

NO	REVISION DESCRIPTION	BY	DATE

SHEET NO
1

ABBREVIATIONS

@	AT	LPG	LIQUID PROPANE GAS
Δ	ANGLE OF DEFLECTION, DELTA ANGLE	LT	LEFT
APT	ANGLE POINT		
		MAX	MAXIMUM
AB	ANCHOR BOLT	MD	MEASURE DOWN
ABDN	ABANDON	MFD	MANUFACTURED
AC	ASBESTOS CONCRETE	MFR	MANUFACTURE, MANUFACTURER
ADDN	ADDITIONAL	MH	MANHOLE
ADJ	ADJACENT	MIN	MINIMUM
AFF	ABOVE FINISHED FLOOR	MISC	MISCELLANEOUS
ALT	ALTERNATE	MJ	MECHANICAL JOINT
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE	MOV	MOTOR OPERATED VALVE
APPROX	APPROXIMATE	MPWSS	MONTANA PUBLIC WORKS STANDARD SPECIFICATIONS
APVD	APPROVED		
ARCH	ARCHITECTURE, ARCHITECTURAL	N	NORTH
ASPH	ASPHALT	NE	NORTHEAST
AVE	AVENUE	NG	NATURAL GAS
AVG	AVERAGE	NIC	NOT IN CONTRACT
		NO	NUMBER
BFV	BUTTERFLY VALVE	NOM	NOMINAL
BLDG	BUILDING	NTS	NOT TO SCALE
BLK	BLOCK	NW	NORTHWEST
BLVD	BOULEVARD		
BM	BEAM, BENCHMARK	OC	ON CENTER
BOT	BOTTOM	OD	OUTSIDE DIAMETER
BRG	BEARING	OF	OVERFLOW
BRKT	BRACKET	OH	OVERHEAD
BVC	BEGIN VERTICAL CURVE	OHP	OVERHEAD POWER
		OHT	OVERHEAD TELEPHONE
C-C	CENTER TO CENTER	OPNG	OPENING
CHAN	CHANNEL		
CHK	CHECK	PC	POINT OF CURVATURE
CI	CAST IRON	PCC	POINT OF COMPOUND CURVATURE
CIPC	CAST-IN-PLACE CONCRETE	PE	PLAIN END, POLYETHYLENE
CIRC	CIRCULAR	PERP	PERPENDICULAR
CJ	CONSTRUCTION JOINT, CONTROL JOINT	PI	POINT OF INTERSECTION
℄	CENTER LINE	℄	PROPERTY LINE
CLR	CLEAR, CLEARANCE	PNL	PANEL
CMP	CORRUGATED METAL PIPE	PRC	POINT OF REVERSE CURVATURE
CMU	CONCRETE MASONRY UNITS	PRETAB	PRETABRICATED
CO	CLEANOUT	PRELIM	PRELIMINARY
COL	COLUMN	PREP	PREPARE, PREPARATION
CONC	CONCRETE	PROP	PROPERTY
CONSTR	CONSTRUCTION	PRV	PRESSURE REDUCING VALVE
CONT	CONTINUE, CONTINUED, CONTINUOUS	PSF	POUNDS PER SQUARE FOOT
CONTR	CONTRACTOR	PSI	POUNDS PER SQUARE INCH
COORD	COORDINATE	PT	POINT, POINT OF TANGENCY
CP	CONTROL PANEL, CONTROL POINT	PVC	POLYVINYL CHLORIDE
CPLG	COUPLING	PVI	POINT OF VERTICAL INTERSECTION
CSW	CIDEWALK	PVMT	PAVEMENT
CTV	CABLE TELEVISION		
Cu	CUBIC, COPPER	R, RAD	RADIUS
CY	CUBIC FEET	RC	REINFORCED CONCRETE
CULV	CULVERT	RCP	REINFORCED CONCRETE PIPE
CY	CUBIC YARD	RD	ROAD
		RDCR	REDUCER
DET	DETAIL	REBAR	REINFORCEMENT BAR
DI	DUCTILE IRON, DRAIN INLET	REF	REFERENCE
DIA, ⌀	DIAMETER	REINF	REINFORCE
DIAG	DIAGONAL	REQD	REQUIRED
DIM	DIMENSION	RR	RAILROAD
DN	DRIVE	RST	REINFORCING STEEL
DWG	DRAWING	RT	RIGHT
		R/W	RIGHT-OF-WAY
E	EAST		
EA	EACH	S	SOUTH, SANITARY SEWER
EL, ELEV	ELEVATION	SAN	SANITARY
ELB	ELBOW	SCH	SCHEDULE
ELEC	ELECTRIC, ELECTRICAL	SD	STORM DRAIN
ENCL	ENCLOSE	SDWK	SIDEWALK
ENGR	ENGINEER	SE	SOUTHEAST
EOP	EDGE OF PAVEMENT	SECT	SECTION
EQ	EQUAL, EQUALLY	SF	SQUARE FOOT
EQ SP	EQUALLY SPACED	SHT	SHEET
EQUIP	EQUIPMENT	SIM	SIMILAR
EQUIV	EQUIVALENT	SLP	SLOPE
EVC	END VERTICAL CURVE	SPEC	SPECIFICATION
EW	EACH WAY	SQ	SQUARE
EXC	EXCAVATE	SSTL	STAINLESS STEEL
EXP	EXPANSION	STA	STATION
EXP JT	EXPANSION JOINT	SS	SANITARY SEWER SERVICE
EXST	EXISTING	STD	STANDARD
		ST	STREET
FCV	FLOW CONTROL VALVE	STL	STEEL
FD	FLOOR DRAIN	STRUCT	STRUCTURE
FDN	FOUNDATION	SW	SOUTHWEST
FES	FLARED END SECTION	SYM	SYMMETRICAL
FET	FLARED END TERMINAL		
FF	FINISHED FLOOR	TB	THRUST BLOCK
FG	FINISH GRADE	TBC	TOP BACK OF CURB
FHYD	FIRE HYDRANT	TBM	TEMPORARY BENCH MARK
FJ	FLANGE JOINT	TEL	TELEPHONE
FL	FLOW LINE	TEMP	TEMPORARY
FLEX	FLEXIBLE	THRU	THROUGH
FM	FORCEMAIN	TYP	TYPICAL
FT	FOOT, FEET		
FO	FIBER OPTIC	UC	UNDERGROUND
FPC	FOOTING, FITTING	UCP	UNDERGROUND POWER
		UGT	UNDERGROUND TELEPHONE
G	NATURAL GAS	UTIL	UTILITY
GA	GAGE, GAUGE		
GAL	GALLON	V	VALVE, VOLT
GALV	GALVANIZED	VB	VALVE BOX
GND	GROUND	VERT	VERTICAL
GVL	GRAVEL	VOL	VOLUME
HB	HOSE BIB	W	WEST, WATER
HDPE	HIGH DENSITY POLYETHYLENE	WTR	WATER
HOR, HORIZ	HORIZONTAL	WD	WOOD
HWY	HIGHWAY	W/	WITH
HYD	HYDRANT	W/O	WITHOUT
		WL	WETLANDS
ID	INSIDE DIAMETER	WM	WIRE MESH, WATER METER
IE	INVERT ELEVATION	WS	WATERSHED, WATER SURFACE, WATER SERVICE
IN	INCH	WT	WEIGHT
INV	INVERT	WV	WATER VALVE
		WWF	WELDED WIRE FABRIC
JB	JUNCTION BOX	WWM	WELDED WIRE MESH
JT	JOINT		
		XFMR	TRANSFORMER
K	RATE OF VERTICAL CURVATURE	X-ING	CROSSING
		XS	CROSS SECTION
LBS	POUNDS		
LF	LINEAR FEET	YD	YARD
LM	LAMC		

LEGEND

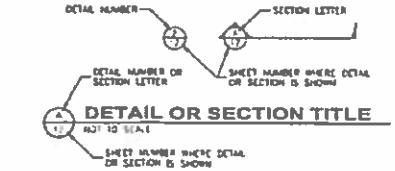
EXISTING	PROPOSED	DESCRIPTION	EXISTING	PROPOSED	DESCRIPTION
		MAJOR CONTOUR			STUMP
		MINOR CONTOUR			SHRUB/BUSH
OHT	OHT	OVERHEAD TELEPHONE			TREE - CONIFER
UGT	UGT	UNDERGROUND TELEPHONE			TREE - DECIDUOUS
CTV	CTV	CABLE TELEVISION			TREE LINE
FO	FO	FIBER OPTIC			COMMUNICATION MANHOLE
G	G	NATURAL GAS			COMMUNICATION VAULT
OHP	OHP	OVERHEAD POWER			TELEPHONE RISER
UGP	UGP	UNDERGROUND POWER			CABLE TV RISER
S	S	SANITARY SEWER			NATURAL GAS METER
SS	SS	SANITARY SEWER SERVICE			NATURAL GAS RISER
FM	FM	SANITARY SEWER FORCEMAIN			NATURAL GAS VALVE
SD	SD	STORM DRAIN			LIGHT POLE
		STORM CULVERT			STREET LIGHT POLE
W	W	WATER			POWER RISER
WS	WS	WATER SERVICE			PAD MOUNTED TRANSFORMER
		CHAINLINK FENCE			POWER VAULT
		BARBED WIRE FENCE			UTILITY POLE
		WOOD FENCE			GUY WIRE
		PAVED ROAD			SANITARY MANHOLE
		GRAVEL ROAD			SANITARY CLEANOUT
		PROPERTY/LOT LINE			SANITARY LAMPHOLE
		PROPERTY EASEMENT			STORM MANHOLE
		PROPERTY SETBACK			STORM ROUND INLET
		RIGHT-OF-WAY			STORM SQUARE INLET
		CITY LIMIT/DISTRICT BOUNDARY			STORM CATCH BASIN
		RAILROAD			11.25° ELBOW
		DITCH			22.50° ELBOW
		WATER EDGE			45° ELBOW
		WETLAND			90° ELBOW
		BUILDING			TEE
		BENCHMARK			CROSS
		CONTROL POINT			CAP
		PROPERTY PIN			FIRE HYDRANT
		BORING			GATE VALVE
		MONITORING WELL			REDUCER
		TEST PIT			WATER METER
		BOLLARD			WELL
		MAIL BOX			CURB STOP
		SIGN			FROST FREE HYDRANT

GENERAL NOTES:

1. THIS IS A STANDARD LEGEND AND ABBREVIATION LIST. THEREFORE, NOT ALL SYMBOLS AND ABBREVIATIONS MAY BE USED ON THIS PROJECT.
2. UNLESS MODIFIED BY THE CONTRACT DOCUMENTS, ALL WORK WILL CONFORM TO THE MONTANA PUBLIC WORKS STANDARD SPECIFICATIONS, FIFTH EDITION, MARCH 2003 & 2008 ADDENDUM (REFERRED TO COLLECTIVELY AS MPWSS).
3. EXISTING UNDERGROUND UTILITIES SHOWN ARE FROM THE BEST INFORMATION AVAILABLE. THIS INFORMATION IS APPROXIMATE AND MAY BE INCOMPLETE. FOR ACCURATE LOCATION, THE CONTRACTOR SHALL CONTACT, PRIOR TO EXCAVATION, THE UTILITIES UNDERGROUND LOCATION CENTER AT 1-800-424-5555.

PROJECT NOTES:

GENERAL DESIGN DESIGNATIONS:



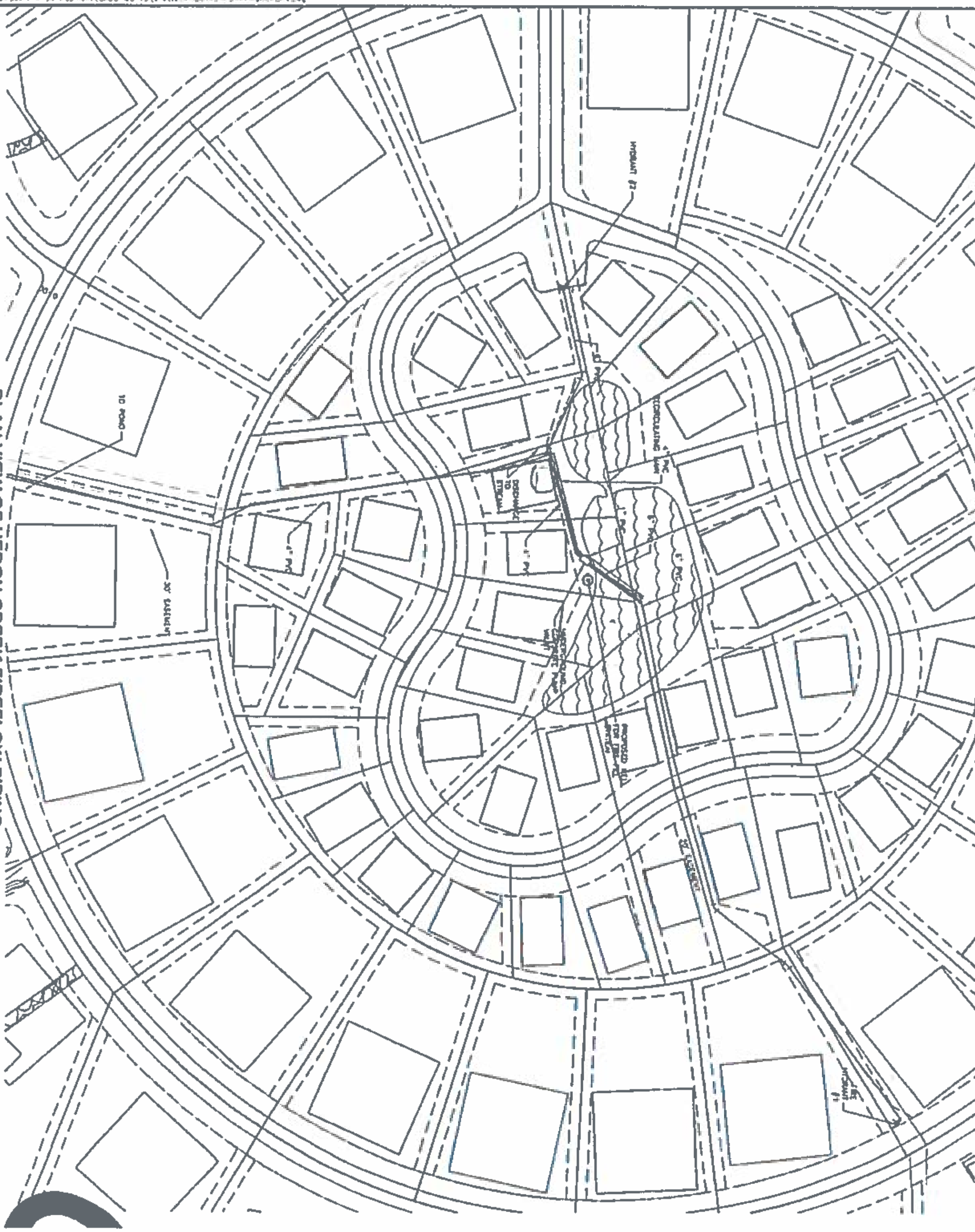
NO	REVISION DESCRIPTION	BY	DATE

PROJECT MGR
DESIGNED GAS
DRAWN GAS
CHECKED SM
APPROVED —
DATE MARCH 2011

GreatWest engineering

FIREFLOW SYSTEM
HERON CREEK SUBDIVISION
LEGEND-NOTES-ABBREVIATIONS

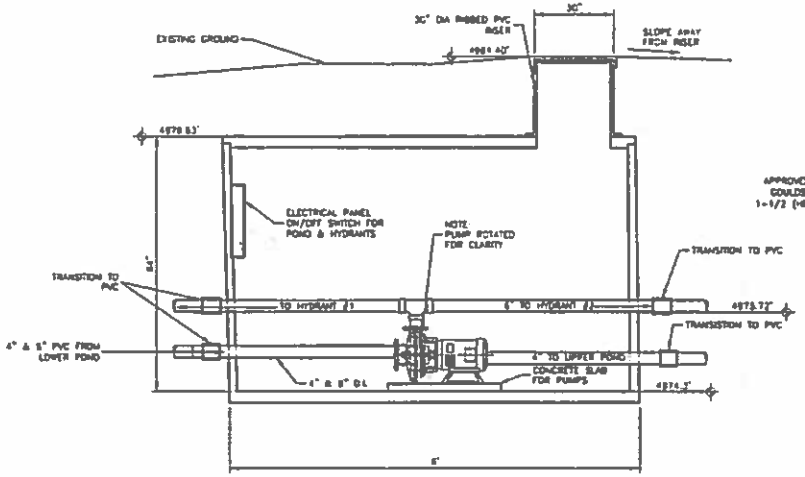
SHEET NO
2
OF 4



PLAN VIEW OF HERON CREEK FIREFLOW PIPING

NOTE
ALL BENDS IN FIRE HYDRANT SUPPLY PIPING MUST HAVE THRUST BLOCKING & MEGA LUGS

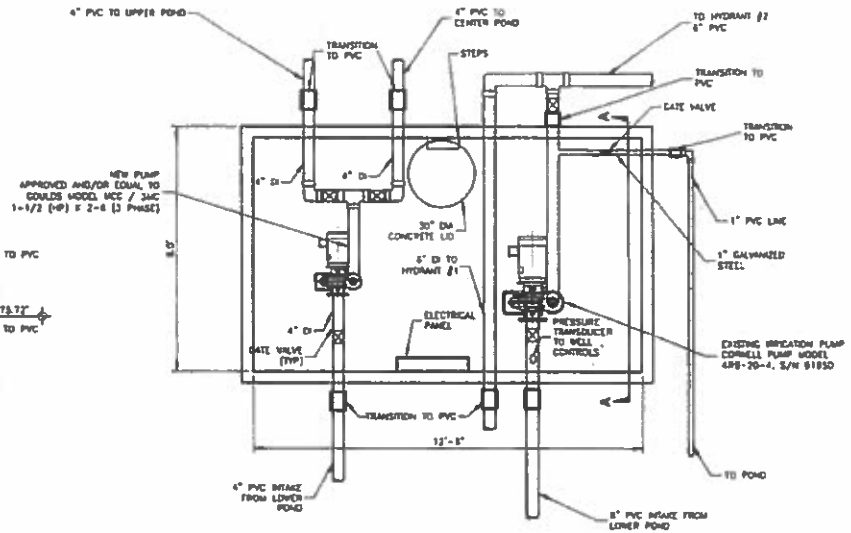
SHEET NO. 3 OF 4	FIREFLOW SYSTEM HERON CREEK SUBDIVISION SITE PLAN	GreatWest engineering		PROJECT 1-08170	NO	REVISION DESCRIPTION	BY / DATE
				DESIGNED CAO	△		
				DRAWN CAO	△		
				CHECKED ED	△		
				APPROVED —	△		
				DATE MARCH 2011	△		



1/4 PROFILE VIEW OF PUMP VAULT A-A

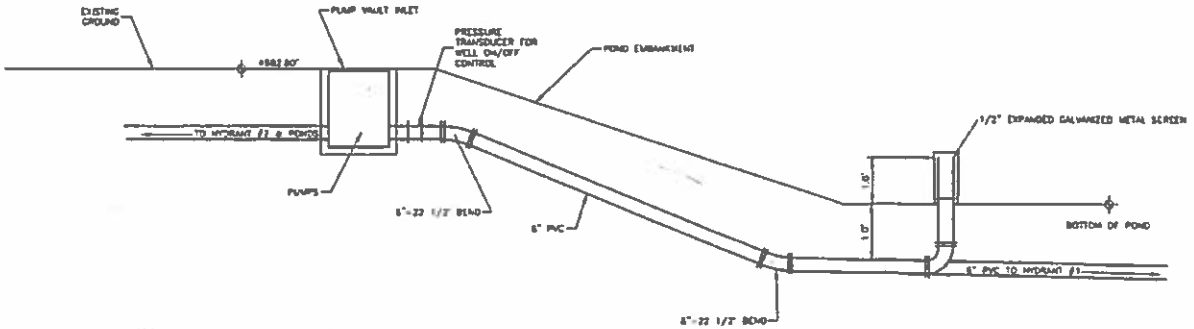
NOT TO SCALE

NOTE
1. PUMP VAULT SHALL BE THE SAME DIMENSION AS A STANDARD 1500 GALLON SEPTIC TANK
2. ALL PIPING WITHIN PUMP VAULT TO BE DUCTILE IRON PIPING



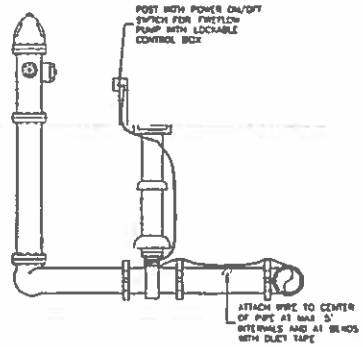
2/4 PLAN VIEW OF PUMP VAULT

NOT TO SCALE



3/4 PROFILE DETAIL OF POND PIPING EMBANKMENT

NOT TO SCALE



4/4 HYDRANT POWER DETAIL

NOT TO SCALE

NOTE
1. BOTH HYDRANT POWER SWITCHES MUST HAVE THE CAPABILITY TO TURN ON OR OFF FIREFLOW PUMP AT HYDRANT

NO.	REVISION DESCRIPTION	BY	DATE

PROJECT MGR: TP
DESIGNED: CAG
DRAWN: CAG
CHECKED: MB
APPROVED: —
DATE: MARCH 2011

GreatWest engineering

FIREFLOW SYSTEM
HERON CREEK SUBDIVISION
DETAILS

SHEET NO
4
OF 4

PUMPING SYSTEM MATERIALS

APE
Advanced Pump & Equipment
1408 Gold Ave Ste 6, Bozeman, MT 59718
Phone 406-586-1700 Fax 406-586-1710
orders@advpump.com

QUOTE

QUOTE #	AAAQ1646
DATE	Mar 24, 2014

To

Ship To

Phone

SALESPERSON	P.O. Number	PAYMENT TERMS	DUE DATE
		50% deposit / 50 % at shipment	

QTY	MPN	DESCRIPTION	UNIT PRICE	TOTAL PRICE
1		10THC Layne/ Verti-Line Lineshaft Turbine		
		8" x 16 1/2" Layne / Verti-Line Water Lube Discharge Head -1-3/16" Packing Box -8" x 1 3/16" x Length Needed Water Lube T&C Column Complete w/ 5' Bearings Spacing -4 Stage 10THC Layne/ Verti-Line W/L Bowl Assembly -Cast-Iron Bronze Fitted: 8" x 1 3/16" x Bell -Standard shop coat enamel paint -16" ID x 176' Deep Casing Required*** -30' Submergance Over Bell Lip Required***		
		Removable Steel Sole Plate (1" Thick)		
		Galvanized Steel Basket Strainer		
		50 HP USEM VHS Motor w/ 1 3/16" NRR 3/60/460/WP-1 Type RU Standard Eff		
		Orenco Control Panel MVP-S460 3Ø CV RVSS TR 50HP Panel Includes: • NEMA 3R Steel Wall-Mount Enclosure • Enclosure Heater & Fan • Orenco MVP (Logo) Controller o Programmed As Required Per Functional Description Provided • Soft Starter w/ Overload For One 460VAC 50HP Pump • Isolation & Shorting Contactors • Motor Circuit Breaker, 100A • Control Transformer With Primary Fusing, 350VA, 460-115V • Controls Circuit Breaker • Valve Circuit Breaker (115VAC valve) • HOA Switches (one for pump, one for valve) • General Alarm Beacon Light (loose for site installation by others) • Terminal Blocks as required • Input For Up To Two Pressure Switches • Control Relays As Required • Remote Alarm Contact • Labeling & Documentation • UL508a Listed		
		Freight		

Pump Data Sheet - Layne/Verti-Line

Company: Advanced Pump & Equipment
Name:
Date: 2/25/2014

PENTAIR

AURORA LAYNE VERTI-LINE SERIES

Pump:

Size: 10THC (4 stage)

Type: Vertical Turbine
Synch speed: 1800 rpm

Speed: 1750 rpm
Dia: 7.96 in

Curve:

Impeller:

Specific Speeds:

Ns: —
Nss: —

Dimensions:

Suction: 8 in
Discharge: —

Vertical Turbine:

Bowl size: 9.88 in
Max lateral: —
Thrust K factor: 10 lb/ft

Pump Limits:

Temperature: 150 °F
Pressure: 450 psi g
Sphere size: 0.94 in

Power: —
Eye area: 16.5 in²

Search Criteria:

Flow: 1000 US gpm
Head: 136 ft

Fluid:

Water
Density: 62.32 lb/ft³
Viscosity: 0.9946 cP

Temperature: 68 °F
Vapor pressure: 0.3391 psi a
Atm pressure: 14.7 psi a

NPSHa: —

Motor:

Standard: NEMA
Enclosure: TEFC

Size: 50 hp
Speed: 1800
Frame: 326T

Sizing criteria: Max Power on Design Curve

— Data Point —

Flow:	1000 US gpm
Head:	137 ft
Eff:	81.2%
Power:	42.5 hp
NPSHr:	15.4 ft

— Design Curve —

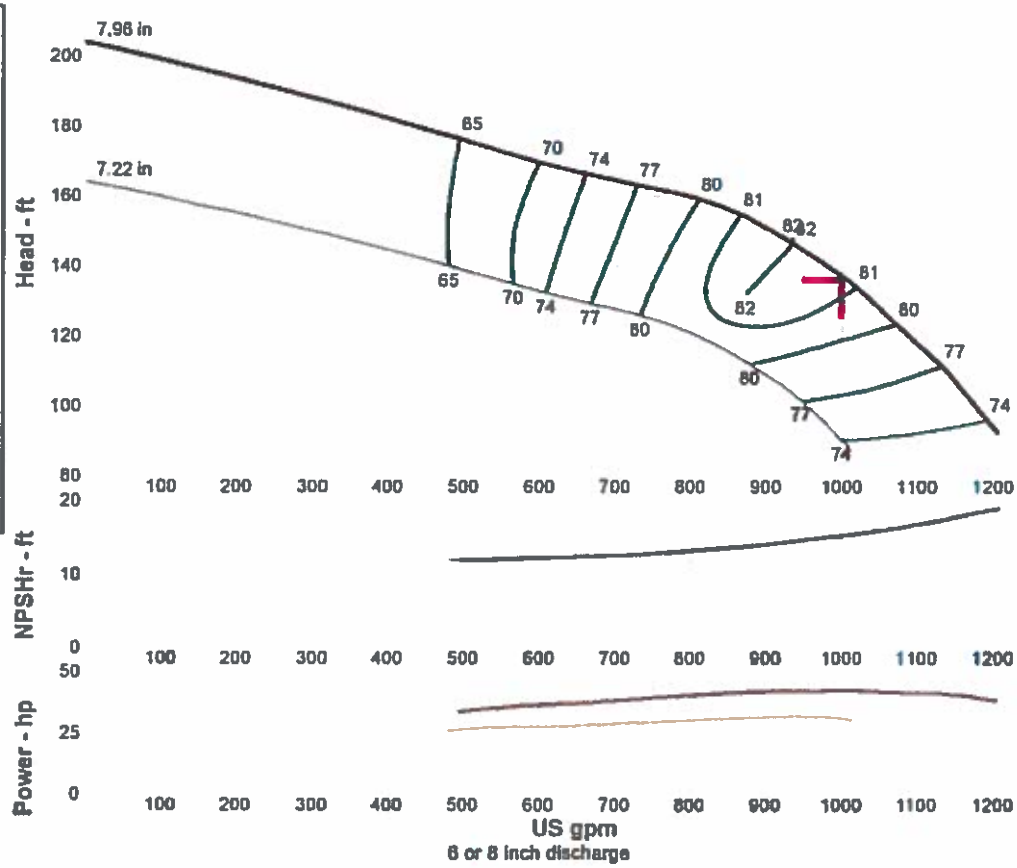
Shutoff head:	204 ft
Shutoff dP:	88.3 psi
Min flow:	—

BEP: 82% @ 935 US gpm

NOL power:
42.6 hp @ 1019 US gpm

— Max Curve —

Max power:
42.6 hp @ 1019 US gpm



Performance Evaluation:

Flow US gpm	Speed rpm	Head ft	Efficiency %	Power hp	NPSHr ft
1200	1750	94.2	73.7	38.7	18.9
1000	1750	137	81.2	42.5	15.4
800	1750	160	79.6	40.5	13.3
600	1750	170	70.1	36.7	12.3
400	1750	—	—	—	—

SUCTION CAN SELECTION CHART

Layne/Verti-Line Model	Column Size	Flange O.D.	Max. Bowl O.D.	Clearance (A)	Allowable Capacity (GPM) at a Velocity of 5 Ft./Sec.										
					Can O.D. (D1)										
					8.625	10.75	12.75	14	16	18	20	24	30	36	42
6DRELC	4	6.63	5.63	4			1250								
6DRMC	4	6.63	5.63	4			1250								
6RKLC	4	6.63	5.63	4			1250								
6RKHC	4	6.63	5.63	4			1250								
6EM	4	6.63	5.50	3			1250								
6GM	4	6.63	5.50	4			1250								
6GH	4	6.63	5.50	4			1250								
7EM	4	6.63	6.60	3			1250								
7CL	6	9.25	7.50	3.75				1100							
7CM	6	9.25	7.50	3.75				1100							
7CEH	8	9.25	7.50	3.75				1100							
8URHC	4	6.63	7.75	4.5				1400							
	5	7.63	7.75	4.5				1400							
	6	9.25	7.75	4.5				1100							
8RL	6	9.25	9.50	5					1740						
8RM	6	9.25	9.50	5					1740						
8RH	6	9.25	9.50	5					1740						
8EM	4	6.63	8.00	6				1360							
	6	9.25	8.00	6				1100	1790						
8TM	6	9.25	7.50	4.5				1100	1790						
8TH	6	9.25	7.50	4.5				1100	1790						
10RKLC	5	7.63	9.63	5.5					1700						
	6	9.25	9.63	5.5					1700						
	8	11.75	9.63	5.5					1150						
10RKHC	6	9.25	9.63	5.5					1700						
	8	11.75	9.63	5.5					1150	1950					
10RKEH	6	9.25	9.63	5.5					1700						
	8	11.75	9.63	5.5					1150	1950					
10RKHS	6	9.25	9.63	5.5					1700						
	8	11.75	9.63	5.5					1150						
10EM	4	6.63	10.00	7					1600						
	6	9.25	10.00	7					1600						
10TLC	6	9.25	9.75	5					1680						
	8	11.75	9.75	5					1150	1950					
10THC	6	9.25	9.75	5					1680						
	8	11.75	9.75	5					1150	1950					
10FHM	8	11.75	11.50	7						1950					
10FHH	8	11.75	11.50	7						1950					
11EM	6	9.25	11.38	7						2050					
	8	11.75	11.38	7						1950					
11EH	6	9.25	11.48	7						2000					
	8	11.75	11.48	7						1950					
12RKBL	6	9.25	11.50	6.25						2000					
	8	11.75	11.50	6.25						1950					
	10	13.88	11.50	6.25						1275	2175				
12RKBM	8	11.75	11.75	6.25						1950					
	10	13.88	11.75	6.25						1275	2175				
12RKBH	8	11.75	11.75	6.25						1950					
	10	13.88	11.75	6.25						1275	2175				
12RKBEH	8	11.75	11.75	6.25						1950					
	10	13.88	11.75	6.25						1275	2175				
12TLC	8	11.75	11.75	5.75						1950					
	10	13.88	11.75	5.75						1275	2175				

SUCTION CAN SELECTION CHART

Layne/ Verti-Line Model	Column Size	Flange O.D.	Max. Bowl O.D.	Clearance (A)	Allowable Capacity (GPM) at a Velocity of 5 Ft /Sec.										
					Can O.D. (D1)										
					8.625	10.75	12.75	14	16	18	20	24	30	36	42
12THC	8	11.75	11.75	5.75						1950	2800				
	10	13.88	11.75	5.75						1275	2175	4250			
12EM	6	9.25	13.00	8							2450				
	8	11.75	13.00	8							2450				
12RL	8	11.75	13.00	6.5							2450				
	10	13.88	13.00	6.5							2175				
12RM	8	11.75	13.00	6.5							2450				
	10	13.88	13.00	6.5							2175				
12RH	8	11.75	13.00	6.5							2450				
	10	13.88	13.00	6.5							2175				
12FHL	8	11.75	13.00	7							2450				
	10	13.88	13.00	7							2175				
	12	16.38	13.00	7							1250	3330			
12FHM	8	11.75	13.00	7							2450	4500			
	10	13.88	13.00	7							2175	4250			
	12	16.38	13.00	7							1250	3330			
12FHH	8	11.75	13.00	7							2450	4500			
	10	13.88	13.00	7							2175	4250			
	12	16.38	13.00	7							1250	3330			
12DEH	10	13.88	11.75	6							2175	4250			
13CL	8	11.75	12.50	6							2600				
	10	13.88	12.50	6							2175				
13CM	8	11.75	12.50	6							2600				
	10	13.88	12.50	6							2175				
13EH	8	11.75	13.00	6							2450	2990			
	10	13.88	13.00	6							2175	4250			
14RL	12	16.38	17.00	8.5							990	3075			
14RM	12	16.38	17.00	8.5							990	3075			
14RH	12	16.38	17.00	8.5							990	3075			
14EM	10	13.88	14.75	9								3950			
14FHM	12	16.38	17.00	8.5								3075	6930		
14FHH	12	16.38	17.00	8.5								3075	6930		
15EH	10	13.88	15.00	9								3860	7700		
	12	16.38	15.00	9								3330	7180		
16GM	12	16.38	17.25	8.5								2970	6800		
	14	17.63	17.25	8.5								2810	6650		
17EH	12	16.38	16.92	10								3110			
	14	17.63	16.92	10								2810	6980	11650	
17EM	12	16.38	18.00	10								2650	6502		
	14	17.63	18.00	10								2650	6502		
18GL	12	16.38	17.25	8.12								2970	6825		
	14	17.63	17.25	8.12								2810	6825		
18GM	12	16.38	17.25	8.12								2970	6825		
	14	17.63	17.25	8.12								2810	6664		
19GM	14	17.63	17.25	8.75								2810	6664	11390	
	16	20.00	17.25	8.75								1710	2990	10307	
19GH	14	17.63	17.25	8.75								2810	6664	11390	
	16	20.00	17.25	8.75								1710	2990	10307	
20TML	14	17.63	21.50	11									5190	9930	15500
	16	20.00	21.50	11									5190	9930	15500

SUCTION CAN SELECTION CHART

Layne/Verti-Line Model	Column Size	Flange O.D.	Max. Bowl O.D.	Clearance (A)	Allowable Capacity (GPM) at a Velocity of 5 Ft./Sec.										
					Can O.D. (D1)										
					30	36	42	48	54	60	72	84	96		
21EH	14	17.63	20.75	10	5190	9930	15500								
	16	20.00	20.75	10	5190	9930	15500								
22GM	14	17.63	22.50	11.25	4270	9000									
	16	20.00	22.50	11.25	4270	9000									
22GH	14	17.63	22.50	11.25	4270	9000									
	16	20.00	22.50	11.25	4270	9000									
23EHL	16	20.00	29.00	14		4918	10523	17016							
	18	22.00	29.00	14		4918	10523	17016							
	20	24.50	29.00	14		4918	10523	17016							
23EHM	16	20.00	29.00	14		4918	10523	17016							
	18	22.00	29.00	14		4918	10523	17016							
	20	24.50	29.00	14		4918	10523	17016							
23EHH	16	20.00	29.00	14		4918	10523	17016							
	18	22.00	29.00	14		4918	10523	17016							
	20	24.50	29.00	14		4918	10523	17016							
24GM	16	20.00	24.00	11.25	3418	8150	13923								
	18	22.00	24.00	11.25	3418	8150	13923								
27EM	18	22.00	28.11	14		5532	11145	17638							
	20	24.25	28.11	14		5532	11145	17638							
27EML	18	22.00	28.11	14		5532	11145	17638							
	20	24.25	28.11	14		5532	11145	17638							
30GM	20	24.25	27.75	13.50		5775	11390	17884							
	24	28.50	27.75	13.50		5262	10875	17368							
30GH	20	24.25	27.75	13.50		5775	11390	17884							
	24	28.50	27.75	13.50		5262	10875	17368							
31EM	20	24.25	31.30	15			8629	15499	22957						
	24	28.50	31.30	15			8629	15499	22957						
33EHH	24	28.50	41.50	21				6240	13771	21868					
	30	34.50	41.50	21				6240	13771	21868					
34EH	24	28.50	34.75	16			6110	12679	20138						
	30	34.50	34.75	16			6110	12679	20138						
36GM	24	28.50	40	20				7824	15283	23633	43005				
	30	34.50	40	20				7824	15283	23633	43005				
36GH	24	28.50	40	20				7824	15283	23633	43005				
	30	34.50	40	20				7824	15283	23633	43005				
38HH	20	24.25	34.25	17.13			6537	13106	20564						
	24	28.50	34.25	17.13			6537	13106	20564						
38HOH	20	24.25	34.25	17.13			6537	13106	20564						
	24	28.50	34.25	17.13			6537	13106	20564						
42RKHC	24	28.50	43	20				4690	12064	20318	39468				
	30	34.50	43	20				4690	12064	20318	39468				
44GM	30	34.50	43	21.5				4690	12064	20318	39468				
	36	40.50	43	21.5				4690	12064	20318	39468				
44GH	30	34.50	43	21.5				4690	12064	20318	39468				
	36	40.50	43	21.5				4690	12064	20318	39468				
57EH	30	34.50	55	27							25087	47759	73953		
	36	40.50	55	27							25087	47759	73953		

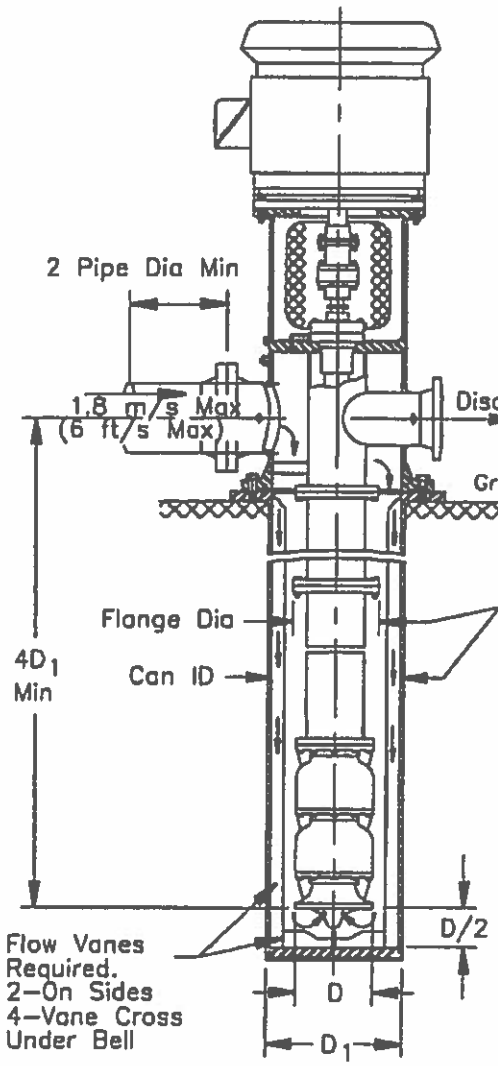
SUCTION INLET SIZE LIMITATION

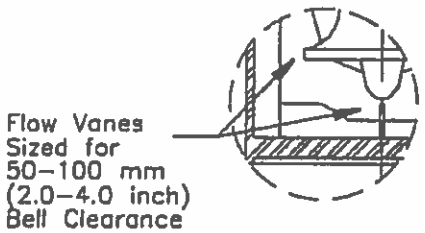
SIZE	MAXIMUM FLOW (GPM)	
	"L" AND CAST IRON HEADS	"T" HEADS
4"	159	238
6"	361	540
8"	625	935
10"	986	1474
12"	1414	2114
14"	1724	2577
16"	2283	3414
18"	2921	4368
20"	3638	5440
24"	5307	7936
30"	8399	12560
36"	12723	19026
42"	16705	24980
48"	21918	34177
54"	27838	41627
60"	34350	51525
72"	49675	74510

SUCTION CAN DESIGN STANDARD

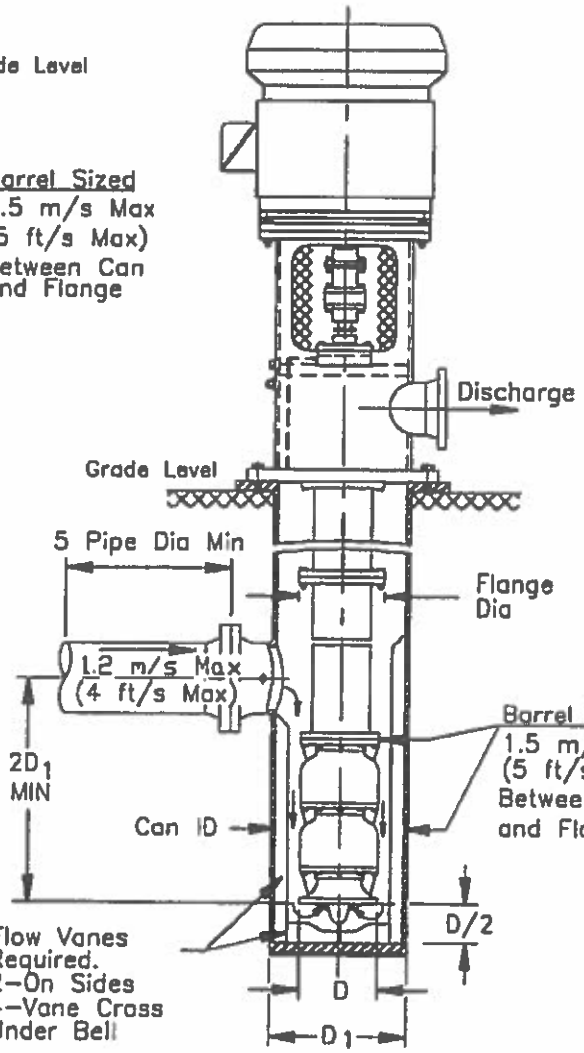
NOTE:
1–Care must be taken during installation of the can to assure concentricity of pump to can and that an out of level condition does not exist for the pump mounting surface. When cans are cast in concrete, the buoyancy forces placed on the can must be restrained to avoid having the can "move" out of level. Before installing the pump, the pump mounting surface must be checked to verify that the surface is level within 3 mm/mm (0.003 in/in) in all directions and that the pump will be centered in the can (to avoid rotational flow being generated by non–uniform flow around a non–concentric pump).

2–Internal flow straightening vanes are requirded. A pair of vanes should be centered on the inlet to the barrel and extended to above the normal liquid level or to the top of the barrel, as applicable. A set of vanes in the form of a cross should be provided under the pump bell. These flow straightening vanes must be designed to provide for 50–100mm (2.0–4.0 in) clearance to the suction bell.

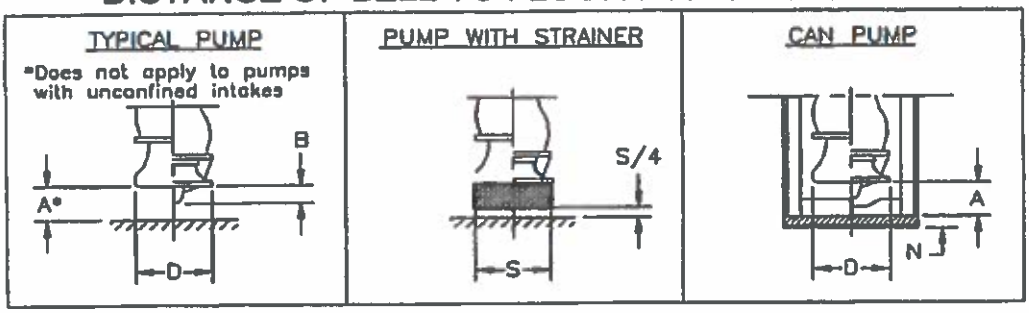




D = Pump Suction Bell Dia
D_1 = Can Outside Dia



DISTANCE OF BELL TO FLOOR FOR TURBINE PUMPS



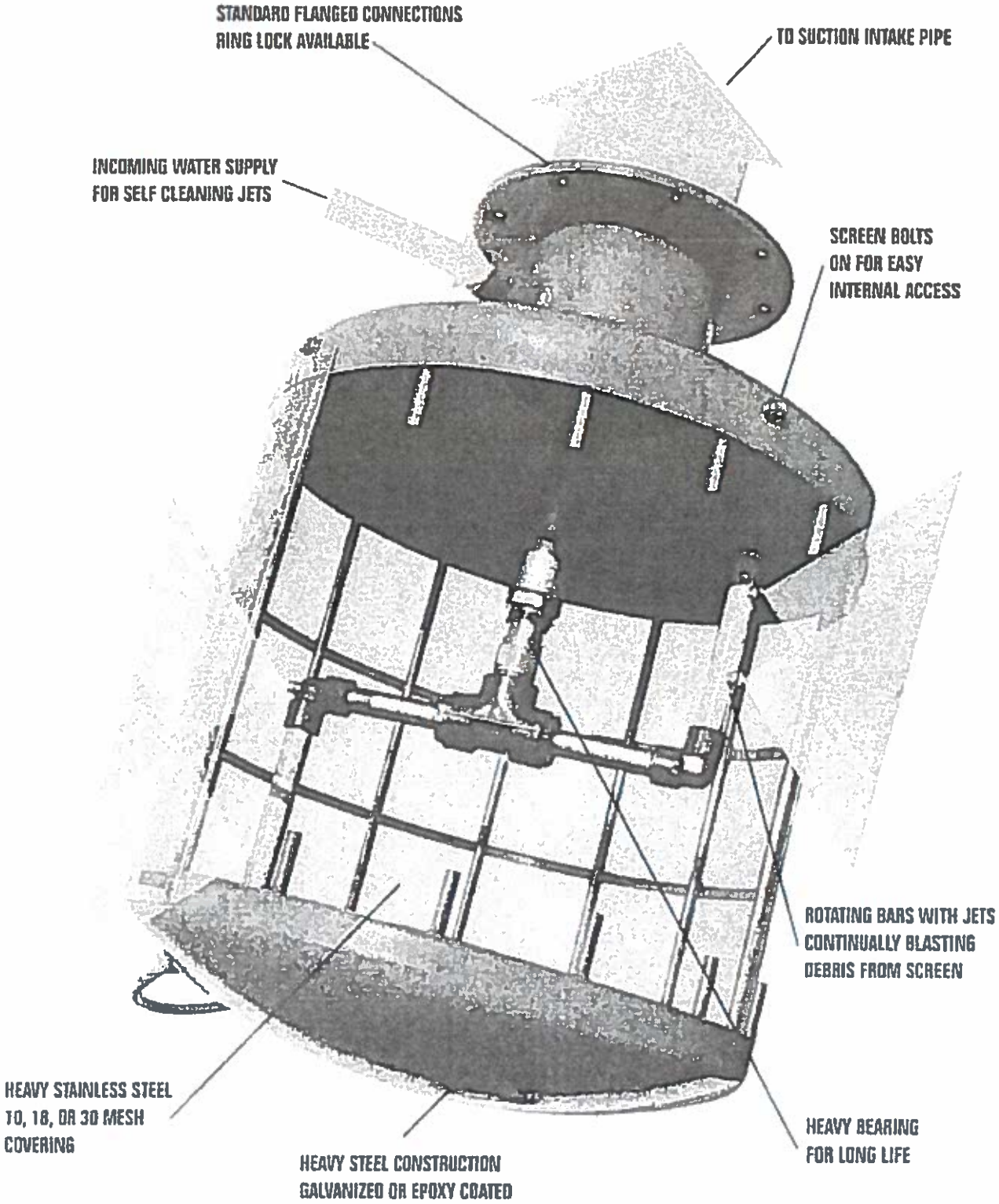
PUMP	A	B	D	S	PUMP	A	B	D	S
6DRELC, 6DRMC	4	3.25	5.50	6.00	14RL, 14RH, 14RM	8.5	8.00	17.00	18.00
6EM	3	N/A	5.50	N/A	15EH	9	7.19	14.75	14.75
6RKLC, 6RKHC	4	3.25	5.50	6.00	16GM	8.5	3.00	17.25	18.00
6GM, 6GH	4	3.25	5.50	6.00	17EM	10	7.37	18.00	18.00
7EM	3	N/A	5.75	N/A	17EH	10	7.94	18.75	18.75
7CL, 7CEH, 7CM	3.75	0.75	7.50	8.00	18GL, 18GM	8.12	4.00	17.25	18.00
8EM	6	3.82	8.00	8.00	19GM, 19GH	8.75	2.75	17.25[1]	18.00[2]
8RL, 8RM, 8RH	5	4.25	9.50	10.00	20TML	11	1.20	21.50	RTF
8URHC	4.5	3.88	7.50	8.00	21EH	10	5.19	20.75	20.75
8TM, 8TH	4.5	3.88	7.50	8.00	22GM, 22GH	11.25	6.25	22.5	23.00
10FHM, 10FHH	7	6.00	11.50	12.00	23EHH	14	2.50	29.00	29.00
10EM	7	4.93	10.00	10.00	23EHM	14	2.50	29.00	29.00
10RKLC, 10RKHC, 10RKEH, 10RKHS	5.5	4.00	9.50	10.00	23EHL	14	2.50	29.00	29.00
10TLC, 10THC	5	4.18	9.50	10.00	24GM	11.25	6.25	22.5	23.00
11EM	7	5.45	11.38	11.50	27EM, 27EMC	14	5.99	28.11	28.00
11EH	7	5.34	11.38	11.50	30GM, 30GH	13.5	4.75	27.00	27.50
12DEH	6	3.25	11.50	12.00	31EM	15	12.19	31.30	31.00
12FHL, 12FHM, 12FHH	7	6.50	13.00	13.62	33EHH	21	3.25	41.50	RTF
12EM	8	6.13	13.00	13.00	33HM	21	3.25	41.50	RTF
12RL, 12RM, 12RH	6.5	6.00	13.00	14.00	33HL	21	3.25	41.50	RTF
12RKBL, 12RKBM, 12RKBH, 12RKBEH	6.25	5.30	11.50	12.00	34EH	16	N/A	32.00	31.00
12TLC, 12THC	5.75	4.80	11.50	12.00	36GM, 36GH	20	6.25	40.00	40.50
13CL, 13CM	6	3.00	11.50	12.00	38HH, 38HOH	17.13	3.00	34.25	34.75
13EH	6	4.13	13.00	13.00	42RKHC	20	6.00	40.00	40.50
14FHM, 14FHH	8.5	6.75	17.00	18.00	44GM, 44GHC	21.5	4.00	43.00	RTF
14EM	9	6.85	14.75	14.75	57EH	27	N/A	54.00	54.00

[1]Bell Diameter for wells or barrels. Bell diameter for sumps is 22.5".
[2]Basket diameter for wells or barrels. Basket diameter for sumps is 23".

Suction Pot	
Size	N
12	1.25
14	1.25
16	1.50
18	1.50
20	1.75
24	2.50
30	3.00
36	3.75
42	4.25
48	RTF
54	RTF
60	RTF
72	RTF
84	RTF
96	RTF

INTAKE SCREEN SPECIFICATIONS

Clearwater Self-Cleaning Suction Screen



If you irrigate, you know how important it is to keep equipment running smoothly and water flowing freely. Whether you are pumping water from a waste treatment facility, manure lagoon, stream, canal, river, irrigation ditch, pit or sump, or a golf course pond, you need the water to be free of trash and debris that could block water flow and damage the pump or clog water-distribution equipment.

The Clearwater Self-Cleaning Suction Screen is galvanized or epoxy coated and utilizes a heavy 10, 18, or 30 mesh stainless steel screen designed to increase pump efficiency. The screen continuously removes trash and debris from irrigation water that costs time and money in fuel, pumping efficiency and maintenance costs. And it can be used for agricultural, turf, industrial, centrifugal or turbine pump applications.

The suction screen is attached to the end of the pump in the water source. All water pulled in must go through the screen before entering the intake pipe. The screen stops trash and debris from entering, plugging lines and causing costly maintenance repairs. The pump discharge return line drives two spray bars that continually rotate, jet water at the screen and blast debris away from the screen at 35 to 100 PSI Operating Range.

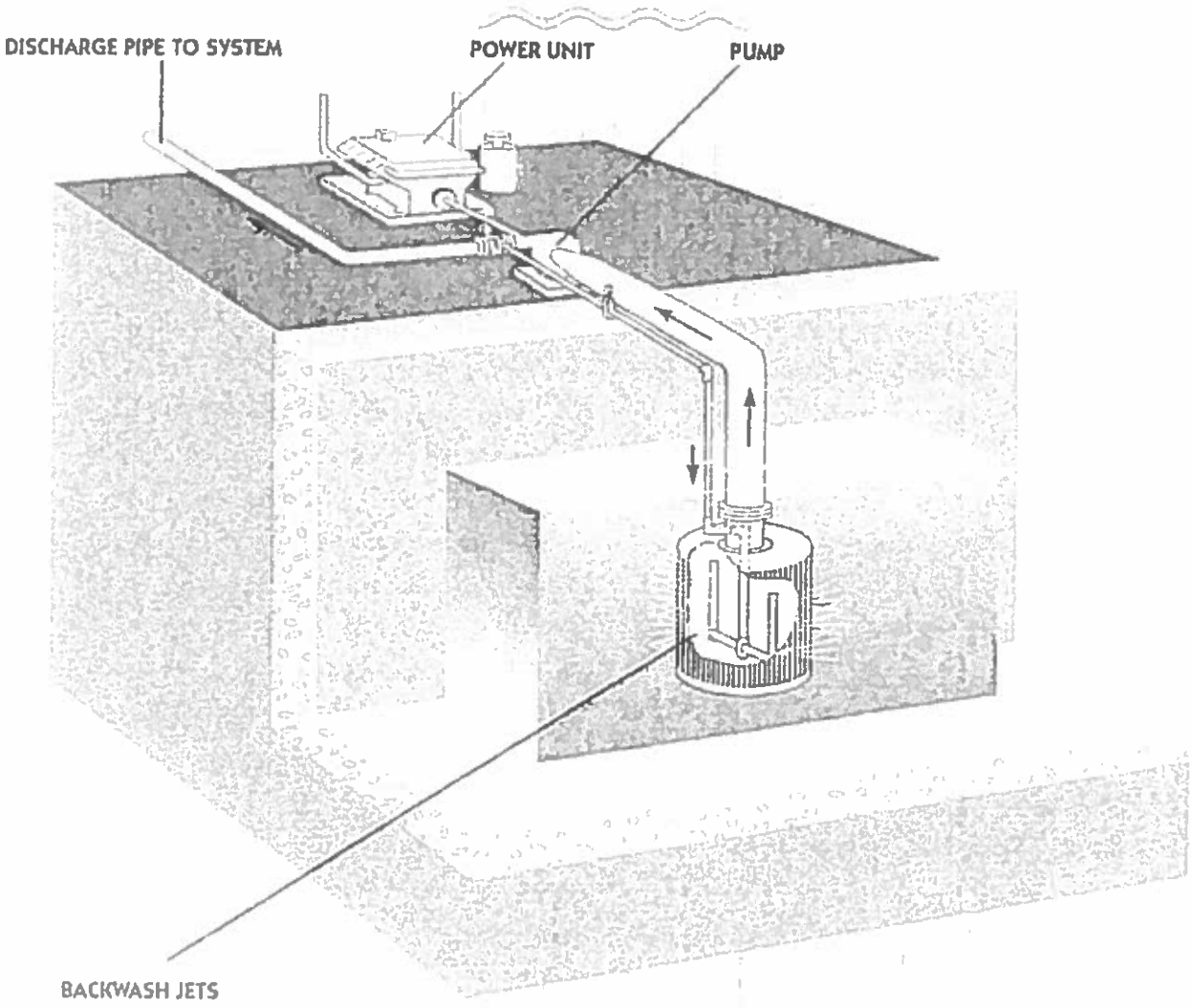
The Clearwater screen — has no exterior moving parts that can break down or need repair. It can be installed at any attitude without the operation being affected and is uncollapsible and corrosion resistant. It also has a standard flanged connection, and other connections are available upon request. The Y Strainer or Mini Filter — an essential extra — provides easy access for cleaning and prevents the supply line to the screen and the spray nozzle from plugging.

Let Clearwater clear your water for worry free irrigating!

Model	Flow U.S. GPM 10.18m	30M	Screen Length	Total Length	Diameter	Flange Size	Return Inlet	Minimum Operate. Pressure	Weight Lbs.	GPM Used To Operate
CW200	325	225	11"	25"	16"	4"	1 1/2"	35	58	20
CW400	550	400	15"	28.8"	16"	6"	1 1/2"	40	62	20
CW600	750	525	16"	32.5"	24"	8"	1 1/2"	40	102	20
CW800	950	700	18"	34.5"	24"	10"	1 1/2"	45	115	20
CW1000	1350	950	23"	39.5"	24"	10"	1 1/2"	50	123	28
CW1400	1650	1200	26"	42.5"	24"	12"	1 1/2"	55	131	28
CW1700	1950	1400	28"	44.5"	26"	12"	1 1/2"	55	148	28
CW2000	2350	1650	32"	48.5"	26"	14"	1 1/2"	60	160	36
CW2400	2600	1800	35"	52.5"	30"	16"	1 1/2"	65	220	36

SPECIFICATIONS

Typical Application



METRIC SPECIFICATIONS

Model	Flow M³/Hour 10.18M	Flow M³/Hour 30M	Screen Length MM	Total Length MM	Diameter MM	Flange Size MM	Return Inlet MM	Min. Operate Pressure Bars	Weight KG	Flow M³/Hour Used to Oper
CW280	74	51	279	615	406	102	38	2.4	27	4.5
CW480	125	91	381	732	406	152	38	2.7	29	4.5
CW600	170	120	406	826	609	203	38	2.7	47	4.5
CW800	216	160	457	878	609	254	38	3.1	53	4.5
CW1000	307	216	584	1003	609	254	38	3.4	56	6.4
CW1400	375	273	660	1080	609	305	38	3.8	60	6.4
CW1700	444	319	711	1130	660	305	38	3.8	69	6.4
CW2000	504	375	810	1232	660	356	38	4.1	73	9.2
CW2100	591	409	889	1334	762	406	38	4.5	102	9.2

"We won't sell it if we can't guarantee it!"

TRIANGLE FILTRATION
& IRRIGATION
17 Hinkler Rd, Mordialloc
Vic. 3195 Australia

CLEARWATER SELF-CLEANING SUCTION SCREEN

Price Information

Effective January 1, 2012

Clearwater Self-Cleaning Suction Screen

Clearwater Screens Operate In Any Position

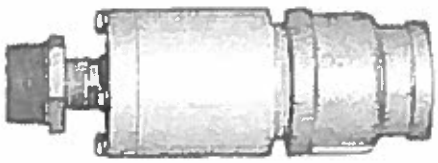
MODEL	FLOW U.S. GPM 12/18M	24M	FISH SCREEN MAX. GPM FOR .4 FT. PER SEC. 12 MESH	SCREEN LENGTH	TOTAL LENGTH	DIAMETER	FLANGE SIZE	RETURN INLET	GALLONS USED TO OPERATE	STD. BRASS BEARING REC. OPERATING PRESSURE	SEALED BEARING REC. OPERATING PRESSURE	WEIGHT LBS.	OPTION VORTEX LIST PRICE	LIST PRICE
CW100	200	165	180	9"	19.5"	12"	3"	1/2"	12	40-60	N/A	30	$ N/A	$ 678.83
CW200	325	225	355	11"	25"	16"	4"	1 1/2"	20	40-60	40-100	58	104.60	960.57
CW400	550	400	485	15"	28.8"	16"	6"	1 1/2"	20	40-60	40-100	62	134.49	1206.63
CW600	750	525	775	16"	32.5"	24"	8"	1 1/2"	20	40-60	40-100	102	165.31	1432.41
CW800	950	700	875	18"	34.5"	24"	10"	1 1/2"	20	40-60	40-100	115	188.53	1482.29
CW1000	1350	950	1115	23"	39.5"	24"	10"	1 1/2"	28	40-60	40-100	123	215.49	1615.63
CW1400	1550	1075	1265	26"	42.5"	24"	12"	1 1/2"	28	40-60	40-100	131	267.00	1748.36
CW1700	1800	1250	1475	28"	44.5"	26"	12"	1 1/2"	28	40-60	40-100	148	283.07	1932.43
CW2000	2100	1450	1685	32"	48.5"	26"	14"	1 1/2"	36	40-60	40-100	160	331.94	2081.72
CW2400	2600	1800	2125	35"	52.5"	30"	16"	1 1/2"	36	40-65	40-100	223	412.91	2257.09
CW3000	3000	2075	2430	40"	57.5"	30"	16"	1 1/2"	44	40-65	40-100	236	449.74	2784.34
CW3500	3500	2420	2750	40"	59.5"	36"	18"	1 1/2"	44	40-65	40-100	283	491.90	3536.28
CW4000	4000	2765	3150	40"	63.5"	42"	18"	1 1/2"	44	40-65	40-100	258	491.90	4417.53
Mini Inline Filter – Model M150														449.83
Stainer (Clear) 1 1/2" Solvent Weld 60 to 70 GPM } Purging Without Removing Screen														101.39
Strainer (Clear) 2" Solvent Weld 70 to 100 GPM														143.01

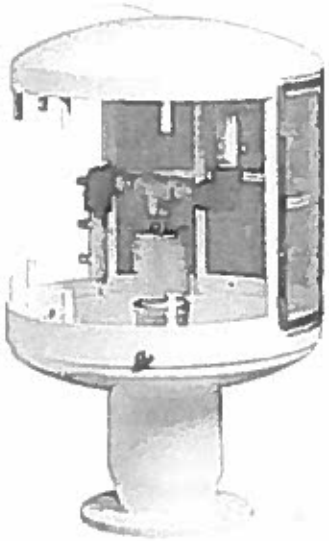
New Flow Entry Control Vortex Tube Option

Brass and Sealed Bearings Come In One Size – Fits All Models

NEW HIGH PRESSURE SEALED BEARING 40 - 100 P.S.I.

***Models 3000, 3500, and 4000 Offered Only with Sealed Bearing**





Mesh Sizes Available
4, 8, 12, 18, and 24

SEALED BEARING

Trouble free operation under the worst conditions.
40 P.S.I. required to operate sealed bearing. Add $239.02 list to each C.W. for sealed bearing.
100 P.S.I. maximum operating pressure.

Manufacturers and Distributors of Irrigation and Industrial Equipment
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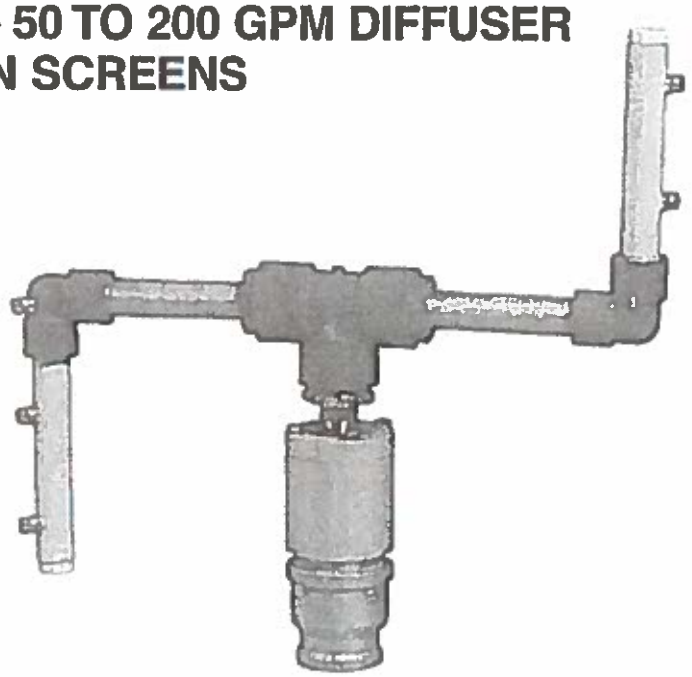
(208) 345-2525 / Toll Free 1-800-635-5975
FAX 1-208-345-2143
www. clemonssales.net
e-mail sales@clemonssales.net

CLEMONS SALES CORPORATION

CLEARWATER PARTS – 50 TO 200 GPM DIFFUSER SUCTION SCREENS



Parts – Accessories

	LIST PRICE
Replacement Bearing Brass	$228.29
Replacement Vee Jets	8.27
Replacement Vee Jets S.S.	20.01
Sealed Heavy Duty Bearing	439.85
Sealed Bearing Repair Kit	139.33
Sled Plates CW200 - 400	140.76
Sled Plates CW600 - 1700	279.48
Sled Plates CW2000 - 3000	372.30

MODEL	REPLACEMENT SPRAY ASSEMBLY LESS BEARING LIST PRICE	REPLACEMENT 12 MESH SCREEN LIST PRICE	REPLACEMENT 18 & 24 MESH SCREEN LIST PRICE
CW200	$158.08	$ 56.88	$ 80.01
CW400	161.68	72.05	101.30
CW600	165.53	117.21	164.77
CW800	169.26	130.41	183.35
CW1000	182.57	163.68	228.48
CW1400	186.60	182.02	255.88
CW1700	190.45	211.07	296.73
CW2000	203.81	238.97	335.90
CW2400	207.50	299.14	420.53
CW3000	212.70	351.73	493.66
CW3500	253.52	421.84	590.59
CW4000	294.34	492.01	688.82

50 To 200 GPM Diffuser Style Suction Screen

MODEL	MAX. GPM RATING	INLET CONNECTION	OVERALL LENGTH	DIAMETER	STANDARD S.S. SCREEN	WEIGHT	LIST PRICE
DS50	0-50	2" FPT	15 3/4"	6"	3/32" Perf.	11	$259.65
DS100	50-100	3" FPT	18 1/4"	8"	3/32" Perf.	15	329.82
DS200	100-200	4" FPT	25"	10"	3/32" Perf.	24	406.80

No. DS400

	LIST PRICE
2" Threaded Brass Check Valve	$ 58.12
3" Threaded Brass Check Valve	168.16
4" Threaded Brass Check Valve	268.89

CLEMONS SALES CORPORATION

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Installation and Operating Instructions for Clearwater Self-Cleaning Suction Screen

1. Before installing a CW Screen, check pumping system's pressure. If pumping with very low pressure, a booster pump may be required. Booster pump not supplied by Clemons. Consult specifications in CW brochure for recommended operation pressure. Higher pressure may be required for certain applications. Consult our factory.

2. Do not install a backwash line smaller than 1 ½". If your CW Screen will be located more than 100 feet from the pump a somewhat larger line may be necessary to overcome friction loss.

3. Check your CW specifications to be sure you don't exceed CW's maximum flow range. It may be less with some applications with excessive debris. For fisheries consult our factory.

4. Thoroughly flush the backwash line before attaching it to you CW screen. Failure to do this could result in plugging spray jets inside the screen.

5. Your CW Screen should not be located any closer than 6 inches to any object.

6. Install your CW Screen's flanged outlet to pump's suction/inlet pipe. If other adapter is desired instead of flange, please contact the factory. Plumb the backwash line into your pump's discharge pipe. It is not recommended to use the threaded plug holes in the pump case because there may not be enough pressure or water volume to operate the screen.

7. Backwash line should be plumbed ahead of the main line's butterfly valve. The butterfly can be partially closed to create sufficient back pressure during start-up.

8. These items are to be installed on the backwash line (starting from the pump discharge to the CW screen) in the following order: One properly sized gate or ball valve (at least 1-1/2" or larger), One inline 18 mesh strainer (at least 1-1/2" or larger) and one pressure gauge (liquid filled recommended).

9. If necessary, access to the internal parts of your CW Screen is very simple. Three bolts remove the entire screened area for complete access to all internal parts. Special access plate upon request.

10. Your CW Screen does not need more than 7 inches of submergence because the self-cleaning action breaks up any vortex that might form.

Over

11. Your CW Screen with internal rotation spray bars lets you avoid complicated set-ups. Your CW Screen is rugged steel galvanized or epoxy coated body with heavy gauge stainless steel mesh screen. The CW Screen is versatile and affordable for self cleaning pump suction applications.

12. Some extreme applications conditions could be too harsh for the Clearwater screens to work properly. In extreme moss or dairy applications consult the factory.

SPECIFICATIONS

Model	Flow U.S. GPM 12/18m	30M	Screen Length	Total Length	Diameter	Flange Size	Return Inlet	Operate. Pressure	Weight Lbs.	GPM Used To Operate	Fish Screen Max GP For .4ft Per Sec
CW200	325	225	11"	25"	16"	4"	1 ½"	40-60	58	20	355
CW400	550	400	15"	28.8"	16"	6"	1 ½"	40-60	62	20	485
CW600	750	525	16"	32.5"	24"	8"	1 ½"	40-60	102	20	775
CW800	950	700	18"	34.5"	24"	10"	1 ½"	40-60	115	20	875
CW1000	1350	950	23"	39.5"	24"	10"	1 ½"	40-60	123	28	1115
CW1400	1550	1075	26"	42.5"	24"	12"	1 ½"	40-60	131	28	1265
CW1700	1800	1250	28"	44.5"	26"	12"	1 ½"	40-60	148	28	1475
CW2000	2100	1450	32"	48.5"	26"	14"	1 ½"	40-60	160	36	1685
CW2400	2600	1800	35"	52.5"	30"	16"	1 ½"	40-65	223	36	2125
CW3000	3000	2075	40"	57.5"	30"	16"	1 ½"	40-65	236	44	2430
CW3500	3500	2420	40"	59.5"	36"	18"	1 ½"	40-65	283	44	2750
CW4000	4000	2765	40"	63.5"	42"	18"	1 ½"	40-65	358	44	3150

METRIC SPECIFICATIONS

Model	Flow M3/Hour 12/18m	30M	Screen Length MM	Total Length MM	Diameter MM	Flange Size MM	Return Inlet MM	Min. Operate Pressure Bars	Weight KG	Flow M3/Hour Used To Oper.
CW200	74	51	279	635	406	102	38	2.4	27	4.5
CW400	125	91	381	732	406	152	38	2.7	29	4.5
CW600	170	120	406	826	609	203	38	2.7	47	4.5
CW800	216	160	457	876	609	254	38	3.1	53	4.5
CW1000	307	216	584	1003	609	254	38	3.4	56	6.4
CW1400	352	247	660	1080	609	305	38	3.8	60	6.4
CW1700	409	288	711	1130	660	305	38	3.8	68	6.4
CW2000	477	336	813	1232	660	356	38	4.1	73	8.2
CW2400	591	409	889	1134	762	406	38	4.5	102	8.2
CW3000	682	480	1016	1461	762	406	38	4.5	105	10.0
CW3500	795	550	1016	1511	915	457	38	4.5	127	10.0
CW4000	909	628	1016	1613	1067	457	38	4.5	160	10.0

MAXIMUM ICE DEPTH CALCULATIONS

Calculation of Ice Thickness for

Herron Creek Fire H_20 Pond

This projection has been calculated based upon 2013 Helena Montana weather data provided by Weather Underground [1], a website that specializes in current, future, and past weather conditions.

Method:

Stefan's Equation

$$t_i = C(AFDD)^{.5}$$

where t_i is the expected thickness of ice, C is the coefficient of growth, and AFDD is the accumulated freezing degree days from FDD(0) to FDD(e). FDD(0) is 11/16/2013 and FDD(e) is 3/2/2014. A freezing degree day is defined to be FDD=(32-T_a), where T_a is the average temperature within a 24 hour period. The AFDD for Helena is calculated at 887 from FDD(0) to FDD(e). The expected ice thickness is shown on the table below with various values of C.

C	Ti (ICE THICKNESS IN INCHES)	
0.12	3.573905427	
0.15	4.467381784	
0.21	6.254334497	
0.41	12.21084354	
0.5	14.89127261	
0.6	17.86952713	Recommended Design Thickness
0.7	20.84778166	
0.8	23.82603618	

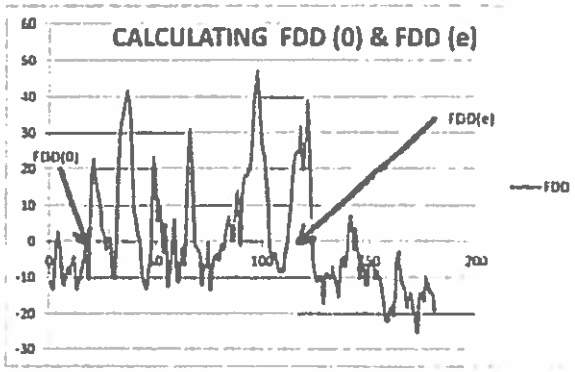
It should be noted that snow overtop of the ice will form an insulation which will cause the value of C to lower. Conversely, if ice cover growth is affected by underturning, shoving, or frazil deposition, the value of C will increase [2]. The range of "C" for an average lake with snow is 0.5-0.7. We recommend a design ice thickness of 17.87" at C=0.60.

1. http://www.wunderground.com/history/airport/KHLN/2014/4/2/MonthlyHistory.html?

2. *Ice Engineering*, 2004. Us Army Corps of Engineers, Cold Regions Research & Engineering Laboratory.

Date	Max Temperaturef	Mean Temperaturef	Min Temperaturef	FDD (FREEZING DEGREE DAY)
11/1/2013	55	43	30	-11
11/2/2013	60	45	30	-13
11/3/2013	42	35	28	-3
11/4/2013	37	29	20	3
11/5/2013	42	33	23	-1
11/6/2013	47	39	31	-7
11/7/2013	53	44	34	-12
11/8/2013	46	41	36	-9
11/9/2013	46	39	31	-7
11/10/2013	50	41	31	-9
11/11/2013	42	36	29	-4
11/12/2013	51	36	21	-4
11/13/2013	56	45	34	-13
11/14/2013	50	43	36	-11
11/15/2013	45	41	37	-9
11/16/2013	44	38	32	-6
11/17/2013	41	34	26	-2
11/18/2013	51	38	25	-6
11/19/2013	58	42	25	-10
11/20/2013	25	13	1	19
11/21/2013	22	9	-4	23
11/22/2013	29	15	1	17
11/23/2013	31	18	4	14
11/24/2013	33	21	9	11
11/25/2013	41	28	15	-4
11/26/2013	41	30	18	2
11/27/2013	44	34	24	-2
11/28/2013	40	29	17	3
11/29/2013	45	31	17	1
11/30/2013	47	41	35	-9
12/1/2013	48	42	36	-10
12/2/2013	42	27	11	5
12/3/2013	11	7	2	25
12/4/2013	7	0	-7	32
12/5/2013	6	-3	-12	35
12/6/2013	3	-7	-11	39
12/7/2013	-4	-10	-17	42
12/8/2013	3	-6	-15	38
12/9/2013	25	7	-11	25
12/10/2013	28	23	18	9
12/11/2013	35	26	17	6
12/12/2013	38	30	21	2
12/13/2013	43	32	21	0
12/14/2013	47	41	34	-9
12/15/2013	54	43	32	-11
12/16/2013	51	45	38	-13
12/17/2013	52	40	27	-8
12/18/2013	51	33	14	-1
12/19/2013	14	9	4	23
12/20/2013	20	12	4	20
12/21/2013	33	26	19	6
12/22/2013	32	20	7	12
12/23/2013	39	26	13	6
12/24/2013	39	35	30	-3
12/25/2013	39	27	14	5
12/26/2013	50	44	38	-12
12/27/2013	50	40	30	-8

NET FDD	FDD(0)	FDD(e)	C	Te (ICE THICKNESS IN INCHES)	
887	11/16/2013	3/2/2014	0.12	3.573905427	
887			0.15	4.467381784	
887			0.21	6.254334497	
887			0.41	12.21084354	
887			0.5	14.89127261	
887			0.6	17.86952713	Conditions Used
887			0.7	20.84778166	
887			0.8	23.82603618	



12/24/2013	49	33	16	-1
12/25/2013	38	26	13	6
12/26/2013	45	38	30	-6
12/27/2013	47	43	38	-11
12/28/2013	42	36	29	-4
12/29/2013	42	33	23	-1
12/30/2013	53	38	23	-6
12/31/2013	25	16	6	16
1/1/2014	7	1	-6	31
1/2/2014	17	7	-4	25
1/3/2014	28	22	16	10
1/4/2014	41	33	25	-1
1/5/2014	42	34	26	-2
1/6/2014	45	35	25	-3
1/7/2014	55	44	32	-12
1/8/2014	41	36	30	-4
1/9/2014	48	39	29	-7
1/10/2014	47	32	17	0
1/11/2014	58	45	39	-13
1/12/2014	50	39	28	-7
1/13/2014	52	36	20	-4
1/14/2014	49	35	20	-3
1/15/2014	54	37	20	-5
1/16/2014	45	33	20	-1
1/17/2014	47	34	20	-2
1/18/2014	34	30	26	2
1/19/2014	33	25	16	7
1/20/2014	39	25	10	7
1/21/2014	46	31	15	1
1/22/2014	41	31	20	1
1/23/2014	28	19	9	13
1/24/2014	35	18	1	14
1/25/2014	41	33	25	-1
1/26/2014	25	18	10	14
1/27/2014	22	14	6	18
1/28/2014	23	14	4	18
1/29/2014	19	12	4	20
1/30/2014	17	9	1	23
1/31/2014	2	-4	-11	36
2/1/2014	-2	-11	-21	43
2/2/2014	-5	-15	-26	47
2/3/2014	-6	-6	-18	38
2/4/2014	13	5	-3	27
2/5/2014	13	8	2	24
2/6/2014	21	14	6	18
2/7/2014	40	22	4	10
2/8/2014	50	35	19	-3
2/9/2014	45	37	28	-5
2/10/2014	42	35	28	-3
2/11/2014	46	37	28	-5
2/12/2014	47	40	32	-8
2/13/2014	51	40	28	-8
2/14/2014	48	40	32	-8
2/15/2014	44	35	26	-3
2/16/2014	35	32	24	0
2/17/2014	34	26	18	6
2/18/2014	23	18	12	14
2/19/2014	15	10	4	22

2/24/2014	11	7	3	25
2/25/2014	19	7	5	25
2/26/2014	12	0	-12	32
2/27/2014	25	12	-1	20
2/28/2014	20	9	-3	23
3/1/2014	-3	-7	-12	39
3/2/2014	6	3	-12	35
3/3/2014	42	22	2	10
3/4/2014	48	37	26	5
3/5/2014	52	41	30	-9
3/6/2014	50	43	36	-11
3/7/2014	48	47	35	-10
3/8/2014	51	41	30	-9
3/9/2014	62	43	36	-17
3/10/2014	45	39	33	-7
3/11/2014	48	40	31	-8
3/12/2014	53	43	31	-10
3/13/2014	53	38	23	-6
3/14/2014	53	42	31	-10
3/15/2014	50	44	37	-12
3/16/2014	65	47	29	-15
3/17/2014	44	38	31	-6
3/18/2014	42	36	30	-4
3/19/2014	50	39	27	-7
3/20/2014	41	34	27	-2
3/21/2014	32	25	18	7
3/22/2014	36	25	13	7
3/23/2014	46	34	22	-2
3/24/2014	34	28	22	4
3/25/2014	50	35	19	-3
3/26/2014	53	42	30	-10
3/27/2014	41	34	26	-2
3/28/2014	56	39	22	-7
3/29/2014	51	44	36	-12
3/30/2014	48	35	30	-7
3/31/2014	47	38	28	-6
4/1/2014	47	37	26	-5
4/2/2014	52	42	32	-10
4/3/2014	55	40	25	-8
4/4/2014	56	42	27	-10
4/5/2014	52	44	35	-12
4/6/2014	56	48	39	-16
4/7/2014	63	53	42	-21
4/8/2014	73	54	35	-22
4/9/2014	61	50	38	18
4/10/2014	60	49	38	-17
4/11/2014	66	52	38	-20
4/12/2014	48	38	27	-6
4/13/2014	44	34	23	-2
4/14/2014	42	41	19	-9
4/15/2014	53	44	34	-12
4/16/2014	54	45	36	-13
4/17/2014	63	50	37	-18
4/18/2014	54	47	39	-15
4/19/2014	67	46	34	-14
4/20/2014	62	51	40	-19
4/21/2014	71	52	32	-20
4/22/2014	73	57	41	-25

4/23/2014	52	45	38	-13
4/24/2014	57	46	35	-14
4/25/2014	60	48	35	-16
4/26/2014	46	41	35	-9
4/27/2014	57	44	30	-12
4/28/2014	54	46	37	-14
4/29/2014	60	46	31	-14
4/30/2014	68	51	33	-19

FIRE FILL WELL

MONTANA WELL LOG REPORT

This well log reports the activities of a licensed Montana well driller, serves as the official record of work done within the borehole and casing, and describes the amount of water encountered. This report was completed online by the driller. Acquiring water rights is the well owner's responsibility and is NOT accomplished by the filing of this report.

Site Name: SUSSEX DEVELOPMENT
GWIC Id: 261710

Section 1: Well Owner

Owner Name
SUSSEX DEVELOPMENT
Mailing Address
3130 SADDLE DR. STE #5

City	State	Zip Code
HELENA	MT	59601

Well Address
N/A

City	State	Zip Code
N/A	N/A	N/A

Section 2: Location

Township	Range	Section	Quarter Sections
10N	02W	12	

County: LEWIS AND CLARK
Geocode:

Latitude	Longitude	Geomethod	Datum
46.643056	-111.803889	NAV-GPS	NAD83

Addition: HERON CREEK
Block:
Lot:

Section 3: Proposed Use of Water

IRRIGATION (1)

Section 4: Type of Work

Drilling Method: ROTARY

Section 5: Well Completion Date

Date well completed: Tuesday, April 26, 2011

Section 6: Well Construction Details

Borehole dimensions

From	To	Diameter
0	200	6

Casing

From	To	Diameter	Wall Thickness	Pressure Rating	Joint	Type
-2	200	6	0.250		WELDED	A53B STEEL

Completion (Perf/Screen)

From	To	Diameter	# of Openings	Size of Openings	Description
200	200	6			OPEN BOTTOM

Annular Space (Seal/Grout/Packer)

From	To	Description	Cont. Fed?
0	200	BENTONITE	Y

Section 7: Well Test Data

Total Depth: 200
Static Water Level: 40
Water Temperature:

Air Test *

40 gpm with drill stem set at 200 feet for 1 hours.
Time of recovery 0.1 hours.
Recovery water level 40 feet.

** During the well test the discharge rate shall be as uniform as possible. This rate may or may not be the sustainable yield of the well. Sustainable yield does not include the reservoir of the well casing.*

Section 8: Remarks

Section 9: Well Log

From	To	Description
0	110	BROWN CLAY
110	112	MED/FINE GRAVEL
112	195	SILTY BROWN CLAY
195	200	MED/FINE GRAVEL & CRS SAND

Driller Certification

All work performed and reported in this well log is in compliance with the Montana well construction standards. This report is true to the best of my knowledge.

Name: SHAWN TONEY
Company: H & L DRILLING
Address: PO BOX 919
City: EAST HELENA MT 59635
License No: WWC-447
Date Certified: 6/16/2011

From:	"Ryan Casne, PE" <ryan@casneinc.com> <ryan@casneinc.com> 17-Mar-2015 15:41
To:	bdreyer@dowl.com <bdreyer@dowl.com>
CC:	Greg McNally <gmcnally@lccountymt.gov>, 'Ron Bartsch - Sussex' <rbartsch@sussexconstruction.com>
Subject:	Updated Herron Creek Fire System Detail Plan
Attachments:	INTERNET (1763 bytes) MESSAGE HTML (6707 bytes) MESSAGE TEXT (1812 bytes) Herron CreekFire Supression Sy (282208 bytes) Mime.822 (408142 bytes) image002.jpg (7116 bytes)

Hi Bill,

It was a pleasure talking to you this morning about the Herron Creek fire suppression system and your subsequent review. Iâ€™ve updated the attached drawing to reflect your suggestions. The changes are summarized as follows:

The dry hydrant has been changed to a standard Mueller Centurion or Super Centurion; painted yellow.

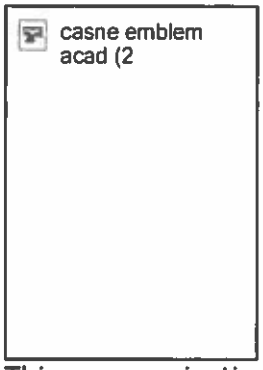
A 2â€ diameter SCH40 PVC circulation line has been shown at the hydrant and terminates within the pond near the dry hydrant strainer.

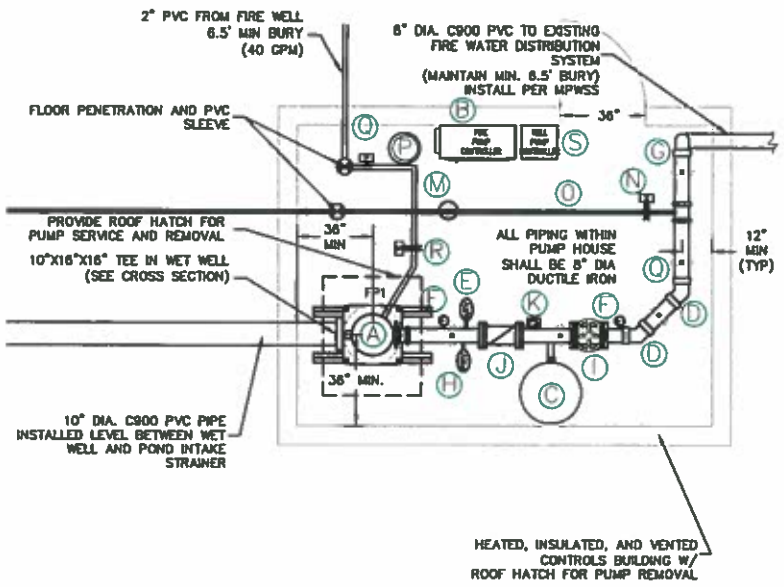
The self-cleaning intake strainer has been detailed to show a minimum 18â€ of separation between the pond bottom and the bottom on the strainer/intake. The purpose is to allow for silting of the pond.

You had suggested installing the intake strainer horizontally rather than vertically. I spoke with the strainer manufacturer (Clemmons) and although the strainer is rated for installation at any attitude they recommend it be installed vertically for the best self-cleaning performance.

Please let me know if you have any further questions. Thanks again Bill,

Ryan Casne, PE
Senior Engineer, Principal
CASNE & ASSOCIATES INC.
ryan@casneinc.com
(406) 443-1656





PLUMBING LEGEND

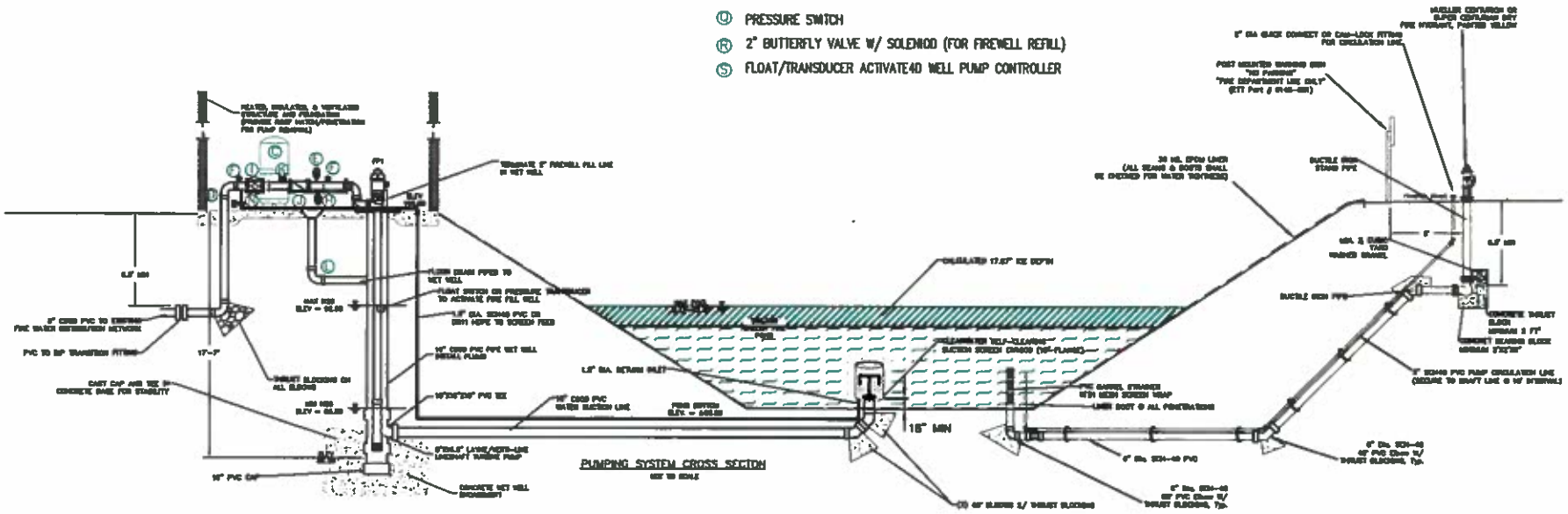
- Ⓐ SEE PUMP SCHEDULE
- Ⓑ PUMP CONTROLLER: ORENCO MVP-S640 -50HP W/ SOFT MOTOR START
- Ⓒ WELL-X-TROL WX350 HYDROPNEUMATIC PRESSURE TANK
- Ⓓ 45° DIP ELBOW W/ MECHANICAL RESTRAINTS
- Ⓔ 1" AIR RELIEF VALVE - CRISPIN OR APPROVED EQUAL
- Ⓕ 0-200 PSI PRESSURE GUAGE
- Ⓖ 90° DIP ELBOW W/ MECHANICAL RESTRAINTS
- Ⓗ 1" PRESSURE RELIEF VALVE (SET AT 100PSI); DISCHARGE PIPED TO WET WELL OR BUILDING EXTERIOR
- Ⓘ 8" RESILIENT WEDGE GATE VALVE (MUELLER OR EQUAL)
- Ⓙ 8" SWING CHECK VALVE; KENNEDY OR EQUAL
- Ⓚ PRESSURE TRANSDUCER (PER CONTROL PANEL MANUFACTURER'S REC.)
- Ⓛ 8" DIA. FLOOR DRAIN PIPED TO WET WELL
- Ⓜ PIPESTAND & RESTRAINT 1"ø, BOLT TO FLOOR W/ (4) DRILLED ANCHOR BOLTS, 2 HEX BOLTS, & LOCK WASHERS.
- Ⓝ 1-1/2" BUTTERFLY VALVE W/ SOLENOID (FOR BYPASS PUMPING TO RIVER SCREEN INLET)
- Ⓞ 1-1/2" SCH40 PVC OR DR11 HDPE LINE FROM BUTTERFLY VALVE TO SELF CLEANING INTAKE SCREEN (6.5' MIN BURY)
- Ⓟ WX250 HYDROPNEUMATIC PRESSURE TANK
- Ⓠ PRESSURE SWITCH
- Ⓡ 2" BUTTERFLY VALVE W/ SOLENOID (FOR FIREWELL REFILL)
- Ⓢ FLOAT/TRANSDUCER ACTIVATE40 WELL PUMP CONTROLLER

GENERAL SPECIFICATIONS & CONSTRUCTION NOTES:

1. ALL WORK TO BE PERFORMED FOR THE INSTALLATION OF THE FIRE WATER SUPPRESSION SYSTEM SHALL BE IN ACCORDANCE WITH ALL APPLICABLE ELECTRICAL AND COMMERCIAL PLUMBING CODES.
2. ALL MATERIALS USED SHALL BE NSF OR AWWA APPROVED. A FULL MATERIALS SUBMITTAL PACKAGE IS REQUIRED PRIOR TO PROCEEDING WITH THE WORK.
3. PLUMBER SHALL PROVIDE ENGINEER WITH AS-BUILT DRAWINGS UPON COMPLETION OF INSTALLATION.
4. PLUMBER SHALL PROVIDE ENGINEER WITH MANUFACTURER'S DATA SHEETS, WARRANTY SLIPS, OWNER'S MANUALS, ETC. FOR ALL EQUIPMENT INSTALLED.

FIRE PUMP SCHEDULE

UNIT	TYPE	GPM	TDH	RPM	HP	PUMP START (PSI)	PUMP STOP (PSI)	ELECTRICAL V	PH	HZ
FP-1	ELECTRIC DRIVE, LINESHAFT TURBINE PUMP NITRIC LAYNE/VERTILINE	1000	150 FEET (35 PSI)	1800	50	30	80	460	3	60



Casne & Associates, Inc.
PO Box 1123
Helena, Montana 59624
(406) 443-1556
ryan@casneinc.com

Sheet Title: Fire Water Pumping System

Project: Herron Creek Subdivison
For: Eco Development LLC
Lewis & Clark County, Montana

Date: 3/17/2015
Sheet: Sheet 2 of 2
Scale: Not to Scale

FIRE OUT
CONSULTING
PEOPLE OUT • FUEL OUT • FIRE OUT

March 27, 2015

Greg McNally, Planner II
Lewis and Clark County
Community Development and Planning
316 N. Park Avenue
Helena, MT 59601

Subject: Heron Creek Subdivision Review

I have conducted a review of the Heron Creek Subdivision's water supply proposal for compliance with the "effective and efficient" language. The documents used are:

- Heron Creek Fire Protection 3-6-15.pdf
- Herron Creek Fire Suppression System REV3-17-2015.pdf
- The National Fire Protection Association *Uniform Fire Code* and Standard 1142 – *Standard on Water Supplies for Suburban and Rural Fire Fighting*.

Heron Creek Fire Protection/Suppression System

The "central fire protection system with hydrants" agreement utilizes a fire pond as water storage, two pressurized hydrants, and one draft hydrant. It appears to include all items of design and maintenance that would be standard for this application, including performance testing criteria.

Recommendation: The connections from the draft hydrant and the recirculation line be standard fire service connections and are reviewed and approved by the Tri-Lakes Fire Department.

NFPA 1/*Uniform Fire Code* and NFPA 1142

At the time of application, the adopted Fire Code for Montana, NFPA 1/*Uniform Fire Code* (2003 ed.), requires a water supply in §18.3.1 and §18.3.2. Annex A provides further explanatory material specifically in §A.18.3.2 which states:

"The following documents can serve as a reference for additional water supply and fire flow information: NFPA 1141, *Standard for Fire Protection in Planned Building Groups* and NFPA 1142, *Standard on Water Supplies for Suburban and Rural Fire Fighting.* "

In my opinion, the above proposal meets the intent of the Fire Code in both delivery and duration of the water supply.

Conclusion

It is my opinion that the proposed "central fire protection system with hydrants", as submitted, does appear to be in compliance with the "effective and efficient" language.

Bryan Connelley,
Fire Out Consulting, PLLC
PO Box 407
Belgrade, MT 59714
(406) 570-0506
Bryan@Fireoutconsulting.com

DOWL

March 24, 2015

Director of Community Development & Planning
Attn: George Thebarge, AICP
316 North Park Ave.
Helena, MT 59623

RE: Heron Creek Subdivision Review

Dear George:

The plans and supplemental information relating to the Heron Creek Subdivision's Fire Water Pumping System have been reviewed as requested by Lewis Clark County and have been found to be appropriate and adequate to supply a sufficient and reliable fire protection water facility for the proposed subdivision.

DOWL's review consisted of:

1. Fire pond volume requirements.
2. Pond freezing thickness and sediment depth requirements.
3. Pump sizing requirements.
4. Draft Hydrant Requirements (Please note; suction head requirements for the fire department's trucks are not known. Flow rates for the draft hydrant may vary based on fire department pump sizes).

Please feel free to call at your convenience if you have any questions.

Sincerely,
DOWL

William Dreyer

William Dreyer, P.E.
Senior Civil Engineer
bdreyer@dowl.com
Ph. 406-586-8834

Tri-Lakes Volunteer Fire Department
3200 Spokane Creek Road
East Helena, MT 59635 Phone & Fax: 406.475.3552

June 23, 2015

Greg McNally
Lewis & Clark County
Community Development and Planning
316 N. Park Ave.
Helena, MT 59623

Dear Greg:

The purpose of this letter is to provide comments related to the Heron Creek Subdivision as requested by your letter dated June 18, 2015.

I have reviewed the information about the fire suppression system dated March 6, 2015 from Casne & Associates, Inc. The information and specifications are consistent with the discussions that we had with Mr. Bartsch, Mr. Bartsch's attorney – Cherche Prezeau, and Mr. Casne on Monday, March 2nd.

The plans call for 1,000 gpm pressurized to a minimum of 20 psi from two fire hydrants that provide access points within 1,000 ft. of every house in the subdivision. The fire water is provided from two man-made lined ponds, the first of which is a settling pond to minimize sediment and debris from the main pond. The developer and the engineer have responded to our concerns about debris by proposing a self-cleaning strainer. A dry hydrant connection was also added for redundancy in case of electrical outage since there is no direct vehicle access to the pond. The current proposal has brought the open water storage concept's reliability as high as it reasonably can. In addition a funding mechanism has been outlined for the homeowners association to own and maintain the installation.

However, the one concern we have voiced consistently in the process for the last 8 years is the density of the center oval. The original design had 22 duplex condos in the oval which was then changed in 2011 to 43 single family lots with the smallest lot at 0.16 acres. The density simply cannot be protected given Tri-Lakes Volunteer Fire Department's capabilities and limitations of our all-volunteer force. The developer proposed on November 26, 2014 to install fire sprinklers in the inhabited structures on all lots less than one acre. We loved the idea but legal ruled that any sprinkler provisions would be unenforceable.

Our concern still exists in the current plan since it does not address our "gentlemen's agreement" that was made at the March meeting between Tri-Lakes Fire and Mr. Bartsch that Mr. Bartsch will install or make sure that all builders will install NFPA 13D fire sprinklers in all of the inhabited structures built on lots 66 through 109. There is no mention of it anywhere in the application. We believe written documentation and the covenants on lots 66 through 109 should reflect that the gentlemen's agreement has been made and its provisions. Legal took the position the County could not force the developer to put the sprinklers in and probably could not enforce

the covenants if they were not complied with but that should not preclude the developer from stating his intention and putting the resulting covenants on lots 66 through 109 voluntarily.

As far as we are concerned the application is not complete without the provisions needed to document to all purchasers and builders the voluntary requirements placed on those lots by the developer.

Without those voluntary provisions, we are back to the same place we have been all along – We cannot protect the center of the subdivision given our current capabilities. The risk of fire spreading from house to house in the center oval is too great and we CANNOT say we can protect them when we believe we cannot.

We have been consistent in our alarm about protecting the center of this subdivision. I am enclosing the developer proposed sprinkler provisions from November 2014, our response to the request for comments in April 2014, and our response to comments in January 2012. The developer already provided the original agreement between us in 2007 although it is not very relevant given the substantial changes from the original subdivision since 2007.

Thank you for the opportunity to comment again. We would certainly like to get the subdivision done after 8 years of work but we will not shirk our responsibilities to those residents that will someday occupy those 43 houses or the our volunteer firefighters that must protect them.

Sincerely,
TRI-LAKE VOLUNTEER FIRE DEPARTMENT

Robert J. Drake, Fire Chief

November 26, 2014

Chief Bob Drake
Tri-Lakes VFD
3020 Spokane Creek Rd
East Helena, MT 59635

RE: Fire Suppression Improvements Agreement
Heron Creek Subdivision

Dear Bob:

This letter has been written in follow-up to our meeting with Ron Bartsch on November 11th. Below is a list of the agreed upon fire protection improvements that will be implemented within the Herron Creek subdivision to comply with the Lewis & Clark County conditions of final plat approval which read: "The Applicant and the County must agree, prior to final plat approval, on fire protection measures that minimize the risk of fire and that permit the effective and efficient suppression of fires."

1) There will be a total of 109 Lots within Herron Creek Subdivision 66 Lots will contain gross acreage of less than 1.00 Acre.

2) All inhabited structures on lots of less than 1.00 Acre shall be sprinkled in accordance with NFPA 13D (2013 edition).

3) The structure sprinkling requirement shall be reflected in the Herron Creek restrictive covenants, filed with the Lewis & Clark County Clerk and Recorder. The covenants will be written so that the future HOA cannot vote the sprinkling requirement out.

4) The existing home located on Lot 65-Phase I (0.92 Acres) shall be exempted from the sprinkling requirements.

5) In addition to the NFPA 13D fire sprinkler requirements listed above, Herron Creek shall also contain a central fire protection system with hydrants.

6) The system shall provide a flow of 500 GPM at a minimum of 20PSI, continuously for a minimum of two hours.

7) The system shall contain two (2) hydrants. The hydrants shall be located within 1000' of each home within the Herron Creek Subdivision.

8) Fire water storage will consist of an existing, lined, open-water pond. The pond will contain the required volume 365 days/year regardless of ice buildup.

9) The pumping system will consist of a centrifugal pump, pressure transducer, and valving located within a heated below-grade pump vault. The pumping system will be functional 365days/year.

10) A Clemons® Clearwater self-cleaning suction screen (10" diameter, Model CW1000) will be added to the existing intake strainer to mitigate pump intake clogging due to debris. The unit will be pressurized and fed water using the same fire pump that feeds the hydrants and therefore will operate simultaneously and automatically when a pump is activated.

11) The pond will continually be refilled as needed by a dedicated well. The well will fill the pond when commanded by a pressure transducer located within the pump vault. The refill system will function 365 days/year.

12) The fire water pump will be activated via switches located at each fire hydrant.

13) The fire water system shall be maintained without funding from an RID. Responsibility for maintenance and funding for such shall be by the Herron Creek HOA as required within the Declaration of Covenants.

14) The Declaration of Covenants shall require a joint account be created for the sole purpose of fire system maintenance. Five percent (5%) of the annual HOA dues will be diverted into this account until the balance reaches $20,000.00. The fund will then be maintained at this amount until maintenance is needed. The five percent (5%) contribution shall resume each time the account balance falls below $20,000.00. The covenants will be written so that the future HOA cannot vote the fire suppression funding mechanism out.

15) Easements will be recorded on the final plat to ensure the fire pumping system, pond, piping, and all related appurtenances can be maintained and/or replaced when needed.

16) Roadways and parking areas will be designed to help ensure emergency access to fire hydrants.

17) If bollards are installed within the emergency access route between Lots 55 & 56 and the access to the drainfield area located between Lots 1 & 2, they shall be removable.

18) As part of the maintenance of the community and in compliance with the Vegetation Management Plan, the parks and wastewater facility areas will be maintained as parkland. The grasses will be mowed and the trees maintained. All lots will be required to maintain mowed grass or landscaping on the entire lot.

lrl

This proposal and agreement represents the entire and integrated agreement between the parties and shall supersede all prior agreements and/or negotiations whether written or oral.

Tri-Lakes Vol. Fire Dept by
Robt J Drake, Chief

Ron Bartsch, Owner

Bob Drake, Fire Chief

bd

Tri-Lakes Volunteer Fire Department
3200 Spokane Creek Road
East Helena, MT 59635 Phone & Fax: 406.475.3552

April ~~28~~ 30, 2014 Actually sent on 4/30/14

Greg McNally
Lewis & Clark County
Community Development and Planning
316 N. Park Ave.
Helena, MT 59623

Dear Greg:

The purpose of this letter is to provide comments related to the Heron Creek Subdivision fire protection provisions.

We have been dealing with this concept and the first installed system for some time. We have tested the existing system twice with dismal results and realized early on that the developer was not taking the fire suppression system seriously. We are heartened to see the first proposed pump system has been completely replaced with a larger system but our ongoing concerns related to reliability and future maintenance costs still have not been addressed. The following are our comments about the proposed system:

1. We have continually voiced our concerns about the open pond proposed by the developer. It has gone from a concrete water feature in early designs to a fabric lined pond in the current proposal. The open pond design increases maintenance costs and reduces the reliability of the system due to its susceptibility to debris, ice, moss, aquatic vegetation, and the substantial number of orchestrated parts that are need to make it work.
2. The developer has tried to mitigate some of these factors by doing two ponds with the first pond being a sediment pond to catch some of the debris before it flows into the pond with the pump intake. The creek system built into the subdivision that runs pretty little water ways may add to the ambiance of the neighborhood but does nothing but degrade the reliability of the fire protection system. If you want babbling brooks by all means put them in but don't tie them to a life safety system.
3. Ice will be a major factor and we cannot see on the plans how the system to keep the pond full during the winter months has addressed the icing questions we have voiced in the past. The first proposal and the only one we have seen had a simple surface mechanical float that would freeze in the ice and be nonfunctional unless some system was used to keep the water clear around the float. After repeated questions about how it would work, we still do not have an answer and there is nothing in this proposal that addresses the question. Unfortunately, we have to fight fire no matter the weather and this system must address how we get water out during extreme cold weather conditions and how the pond will automatically refill so it is ready for the next fire. They are still

guessing about how much ice will be on the surface of the pond. The pond has existed for at least two winters, why are they still guessing? Why wasn't the ice measured already?

4. The screen on the intake for the pump must be easily cleanable. It will plug and hiring a scuba diver to clean it each time is not practical, in our opinion. The cleaning method needs to be practical from the surface.
5. Also, in their proposal, they talk about chemically treating a pond in the middle of a subdivision designed for families. We are concerned about the toxicity of the water treatment, the durability of the liner, the ongoing cost of the maintenance, who is going to do the maintenance, the density of the inner circle not allowing enough space for the cranes, backhoes, draglines, etc. needed to perform maintenance.
6. The congested area in the center area makes tender operations, in the event of a water system failure, all but impossible providing for adequate safety.

Bottom line – this proposed fire water system is poorly thought out, completely ignores longevity and maintenance issues, was conceived around a constantly changing water feature which may be enhance lot sales and aesthetic values but severely degrades the reliability of a fire water delivery system where reliability is paramount. The lives of our firefighters are dependent on the delivery of that water and with lot sizes of 0.18 acres, so are the lives housed in those homes built on lots 66 through lot 109. These lot sizes are representative of an urban setting without the benefit of a multimillion dollar water main and hydrant system to protect it. Fire spreading from structure to structure is a very real possibility with lot sizes of 0.18 acres. We request the current design be rejected and that a system built around reliability be required.

We believe a system with the pumps and controls currently proposed attached to an underground tank built on the space provided by the parking area and lots 90 and 109 would provide the reliability required and minimize the ongoing maintenance costs. The underground tank eliminates the reliability questions and ongoing maintenance relating to icing, sediment, chemicals, pond liners, pump screens, and access for maintenance.

We certainly realize the cost of an enclosed underground tank is not inconsequential. We have subdivisions currently with only 40 lots in them with underground tanks similar to what would be required for Heron Creek's 100+ lots. In our opinion the finite upfront costs measured in dollars of an underground tank are far less than the ongoing maintenance costs and reliability issues surrounding the developers proposal which will not only be measured in dollars passed on to the unsuspecting residents but may also be paid in lives when the system does not deliver when needed.

"Lewis and Clark County has a fiduciary responsibility to ensure fire danger is mitigated. At this time an effective and efficient means to mitigate fire dangers has not been reviewed due to recent decision by Judge Sherlock of Montana First Judicial District Court, Cause No. BVD-2005-418. The Applicant and Lewis and Clark County must agree, prior to final plat approval, on fire protection measures that minimize the risk of fire and that permit the effective and efficient suppression of fires."

The proposed system does not provide an effective and efficient means to mitigate fire dangers and we, Tri-Lakes Fire Service Area, will not be fiduciarily responsible for saying it does.

Sincerely,
TRI-LAKE VOLUNTEER FIRE DEPARTMENT

Robert J. Drake, Fire Chief

Tri-Lakes Volunteer Fire Department
3200 Spokane Creek Road
East Helena, MT 59635 Phone & Fax: 406.475.3552

January 11, 2012

Greg McNally
L&C County Planning
316 N. Park Ave
Helena, MT 59623

Dear Greg:

The purpose of this letter is to provide comments on the proposed modification of approval for the Heron Creek Subdivision dated December 15, 2011.

There are several changes being requested that are interrelated from a public safety perspective and are addressed in the following comments:

1. We have dealt with several large subdivisions in the past that rolled out development in a phased approach to make the economics work. We are not opposed to the phased approach to this subdivision provided the proposed water system that is described in the attached letter from the engineering firm is installed and fully functional in PHASE I. The economics that are driving many of the changes also increase the risk that the subdivision may never be finished. The first home built has an expectation that promised fire protection infrastructure will be there to protect their family and property.

2. The water supply for the fire hydrants is described in the attached letter. In every discussion we have had with the developer and the engineer we have voiced our experience and our concern over the open design of the water supply. The engineer has drawn several modifications to reduce the effect of silt, surface litter, and ice from performance of the water system, however, we continue to have serious concerns about the ongoing maintenance.

   The designs that use surface water from ponds, lakes, etc. are maintenance intensive and fail at a higher rate than closed loop systems (i.e. underground tanks, wells, etc.) As outlined in point #3 in the engineer's letter dated May 9, 2007 "This project anticipates full time maintenance personnel for the community, therefore helping to ensure the fire fill station remain in good operational condition." What happens now that the condo units proposed in the center are now all signal family dwellings? How are the "full time maintenance personnel" funded now?

   Ongoing maintenance of the fire suppression infrastructure cannot be left to chance. We request that a Rural Improvement District (RID) we required from the beginning to insure funding of ongoing maintenance of the fire protection systems including the "water feature" that stores the water and all associated systems that maintain the level of the water, ice management features, silt management, security, etc.

3. The reconfiguration of the center to single family residences and the variance request to remove the requirement of utility easements drastically increases the fire safety concerns compared to the previous design. Proposed lot sizes of 0.16 acres or 6,922 sq. ft. forces the houses so close together that a fire could easily spread from house to house to house. The utility easements at least force space between the houses to reduce this risk. This reconfiguration makes these houses so dense that they are even smaller than some of the smallest lots in Helena. As proud as I am of our volunteer fire department, we do not compare to the City of Helena's Fire Department with six firefighters sitting at the stations waiting for an alarm. We provide protection with volunteers that have to respond from wherever they are when the emergency happens. Given our longer response times, available equipment, distance to travel, etc., we do not believe we can reasonably provide protection for the people who will live in these houses. We are absolutely OPPOSED to this density of structures given our level of capability. We are OPPOSED to the variance request for the removal of utility easements.

4. In the original design of this subdivision we had significant concerns and several discussions about the congestion in the core section of the subdivision. With the reconfiguration of the green phase in the developer's map, we are once again concerned about the narrow road width proposed, the lack of short-term and long-term parking for the residents and their numerous cars, boats, campers, jet skis, snow mobiles, etc. People have to have a place to park and if they can't find a legal one, they will park on the street. This new design heightens our concern for access for fire trucks and ambulances in this congested area. Space for designated parking has to be provided for residents and visitors on the street or off the street or reasonable access cannot be assured.

We understand the pressure that the current economic times must be putting on developers of current subdivisions, however, public safety should not be what is sacrificed. We believe that it has been with the reconfiguration of the core of this subdivision. The plan proposes a density that we simply do not believe we can adequately support.

Sincerely,
TRI-LAKE VOLUNTEER FIRE DEPARTMENT

Robt J Drake

Robert J. Drake, Chief

FIRE CONDITION AGREEMENT

This AGREEMENT ("Agreement") is entered into by and between Ron Bartsch ("Developer"), whose address is 3130 Saddle Drive Suite 5, Helena Montana 59601 and Lewis & Clark County ("County"), a political subdivision of the State of Montana and a body politic and corporate, with its principal place of business located at 316 North Park, Helena, Montana 59601.

RECITALS

WHEREAS, the Developer obtained preliminary approval to divide the property, which is known as Lot A-1A Amended of the H.W. Smith Minor Subdivision otherwise known as the *Heron Creek* Subdivision, on September 18, 2007 with 27 conditions of approval;

WHEREAS, the Developer requested modifications to the preliminary plat and conditions of approval on two occasions and was granted modifications to the preliminary plat and conditions of approval on November 6, 2008 and February 28, 2012 by the Lewis and Clark Commission;

WHEREAS, the modifications granted on February 28, 2012 included a six phase preliminary plat and additional conditions for each phase;

WHEREAS, condition numbers 9 (Phase I), 7 (Phase II), 7 (Phase III), 7 (Phase IV), 7 (Phase V), and 7 (Phase VI) of that preliminary approval state that the Developer and County "must agree, prior to final site plan approval, on fire protection measures that minimize the risk of fire and that permit the effective and efficient suppression of fires"; and

WHEREAS, the Developer's representative, Ryan Casne P.E. with Casne and Associates, Inc., has submitted fire suppression plans and supplemental information for the Heron Creek Subdivision, Phases I-III, attached to this Agreement as Exhibit A, to demonstrate a plan for fire protection measures that minimize the risk of fire and that permit the effective and efficient suppression of fires;

WHEREAS, the Developer's representative, Ryan Casne P.E. has acknowledged that the fire suppression plans and supplemental information shown in Exhibit A are for all 6 phases of the Heron Creek Subdivision as shown on the preliminary plat, attached to this Agreement as Exhibit B;

NOW, THEREFORE, County and the Developer agree as follows:

AGREEMENT

1. Condition Satisfied. The Parties agree that the fire suppression plans shown in Exhibit A are adequate to minimize the risk of fire and will permit the effective and efficient suppression of fires in the subdivision. As a result, the Parties agree that condition numbers 9 (Phase I), 7 (Phase II), 7 (Phase III), 7 (Phase IV), 7 (Phase V), and 7 (Phase VI) of the County's subdivision approval has been satisfied.

2. Third Party Rights: No person or entity, who is not a party to this Agreement, shall have any right of action under this Agreement.

3. Scope: This Agreement constitutes the entire agreement between the parties and no statement, promise, or inducement not contained in this Agreement shall be binding on the parties.

4. Governing Law and Venue: This Agreement shall be construed under and governed by the laws of the State of Montana. In the event of litigation concerning this Agreement, venue is in the First Judicial District Court, Lewis & Clark County, State of Montana.

5. Severability: If any part, term or provision of this Agreement is held by the courts to be illegal, the illegality shall not affect the validity of any other part, term, or provision, and the rights of the parties shall be construed as if the illegal part, term, or provision were never part of the Agreement.

Date: _____

_____
Andy Hunthausen, Chairman
Board of County Commissioners
Lewis and Clark County

ATTEST:

_____ Paulette J. DeHart, Clerk and Recorder

(Seal)

_____
Approved as to form and content
(Deputy County Attorney)

Date: _____

_____
Ron Bartsch, Developer

State of Montana
County of _____

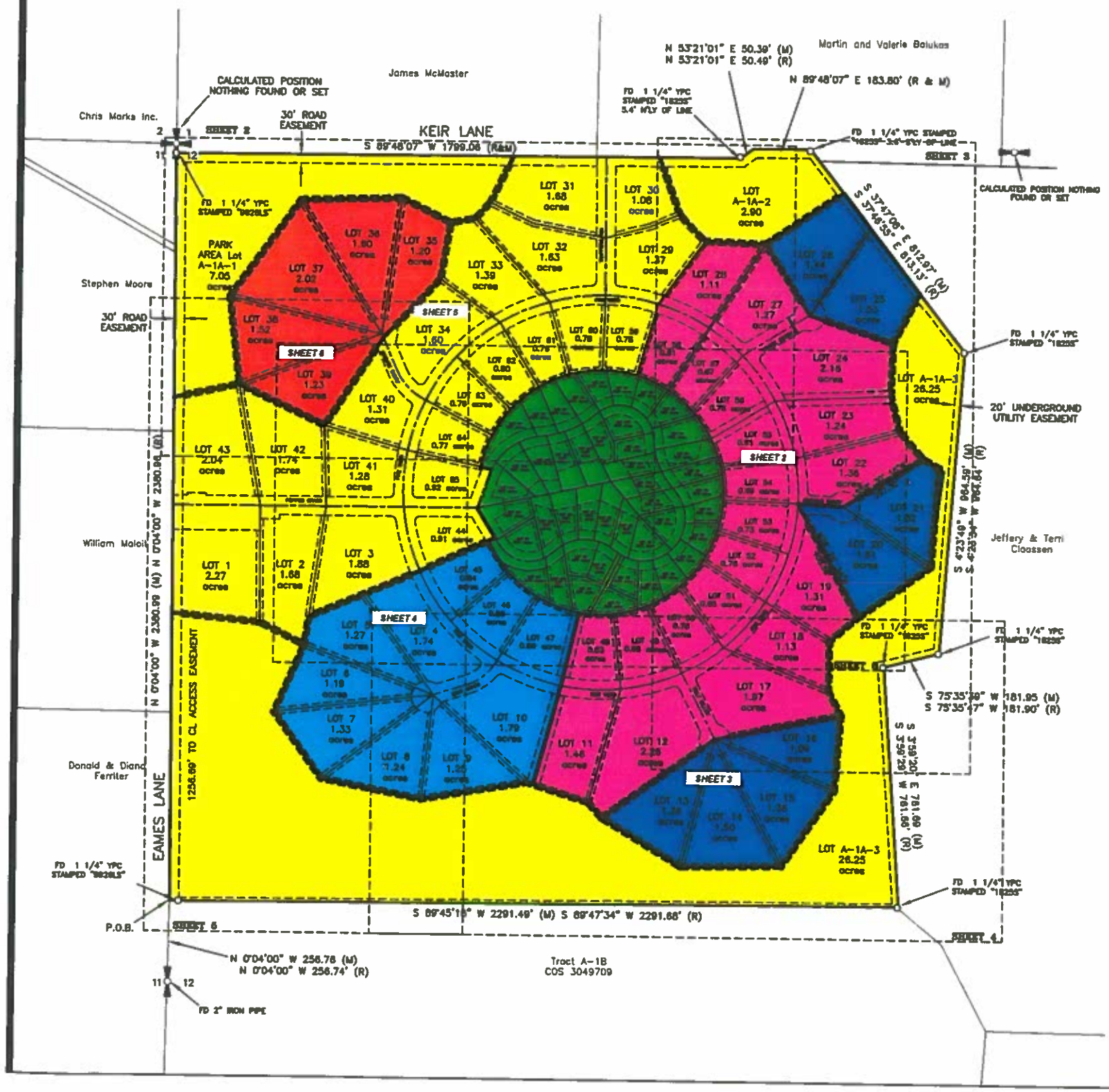
This instrument was acknowledged before me on _____ by Ron Bartsch.

_____
(Signature of notarial officer)

(Seal)

HERON CREEK SUBDIVISION, PRELIMINARY, ALL PHASES

BEING LOT A-1A, H.W. SMITH SUBDIVISION, COS 3049709
LOCATED WITHIN THE NORTHWEST 1/4 OF SECTION 12 T. 10 N., R. 2 W., P.M.M.
LEWIS & CLARK COUNTY, MONTANA
SHEET 1 of 12

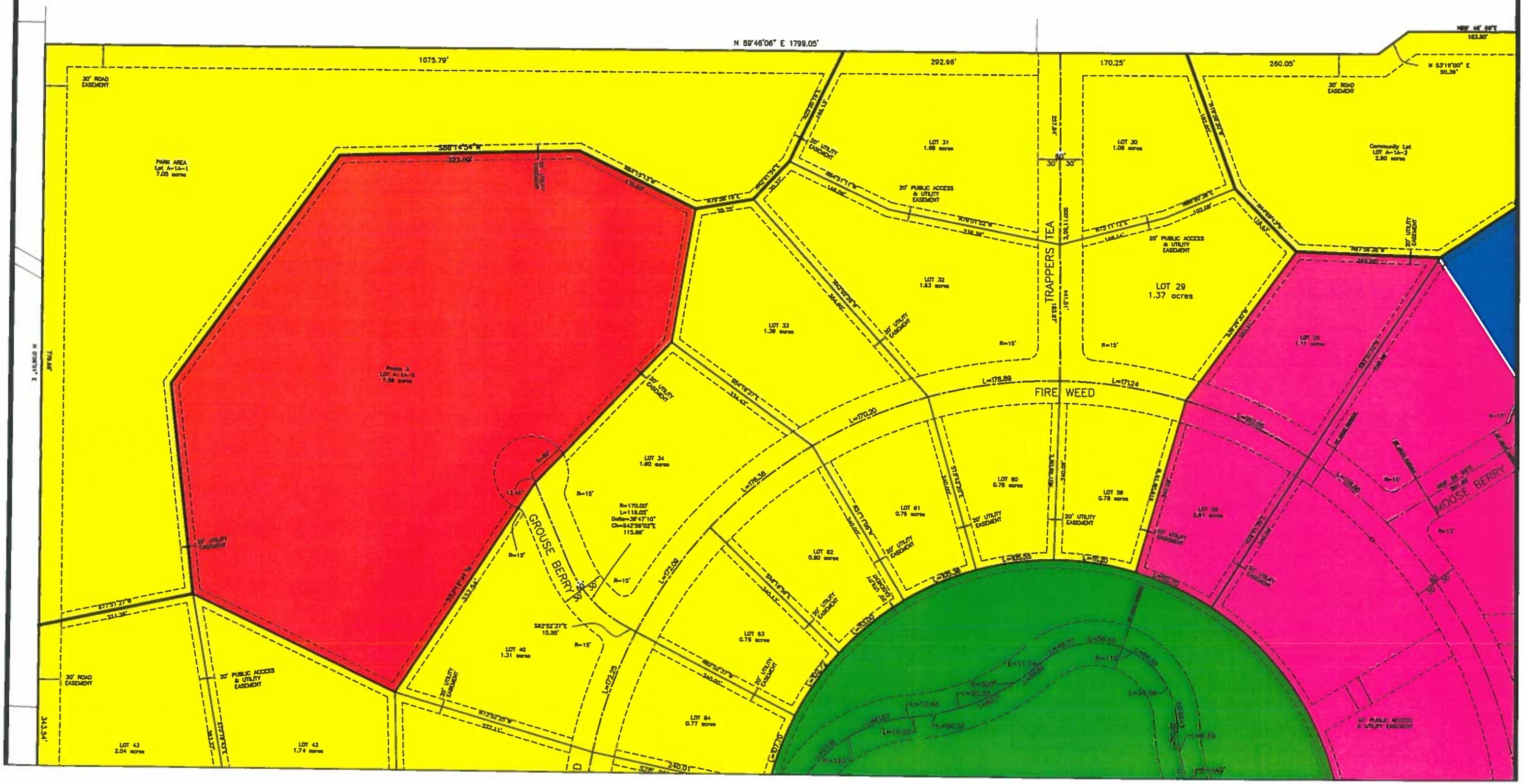


HERON CREEK SUBDIVISION, PRELIMINARY PLAT
PHASE 1

BEING TRACT A-1A COS 3049709
LOCATED WITHIN THE NORTHWEST 1/4 OF SECTION 12 T. 10 N., R. 2 W., P.M.M.
LEWIS & CLARK COUNTY, MONTANA
SHEET 2 of 12

DESCRIPTIVE DATA

28	Number of Lots
129.62	Total acres being reviewed
36.20	Acres in Park/Common Facilities
4.64	Acres in Road Easements
0.76	Acres Minimum Lot size
33.06	Acres Maximum Lot Size



HERON CREEK SUBDIVISION, PRELIMINARY PLAT
PHASE 1

BEING TRACT A-1A COS 3049709
LOCATED WITHIN THE NORTHWEST 1/4 OF SECTION 12 T. 10 N., R. 2 W., P.M.M.
LEWIS & CLARK COUNTY, MONTANA
SHEET 3 of 12

HERON CREEK SUBDIVISION, PRELIMINARY PLAT
PHASE 1

BEING TRACT A-1A COS 3049709
LOCATED WITHIN THE NORTHWEST 1/4 OF SECTION 12 T. 10 N., R. 2 W., P.M.M.
LEWIS & CLARK COUNTY, MONTANA
SHEET 4 of 12

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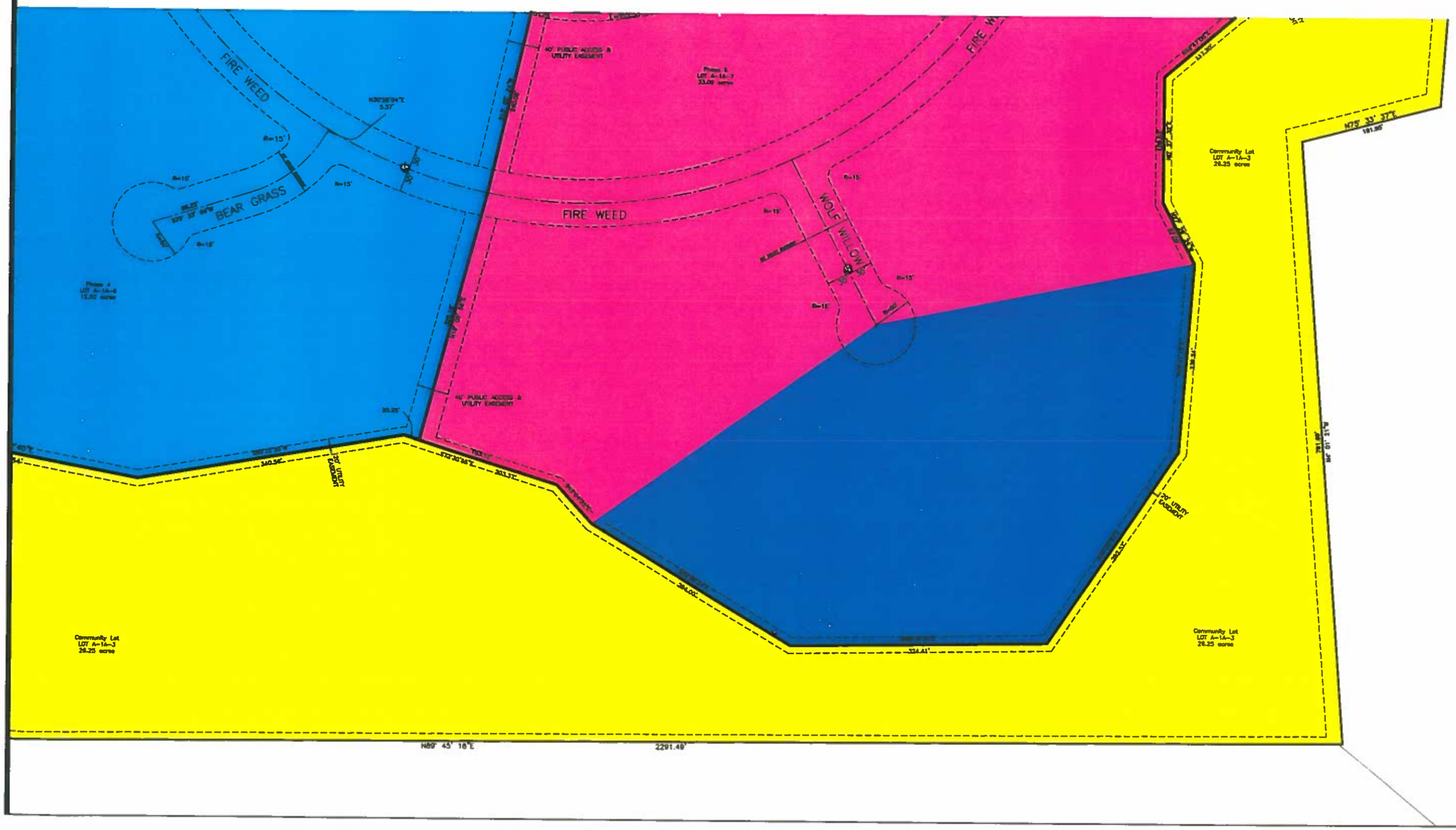
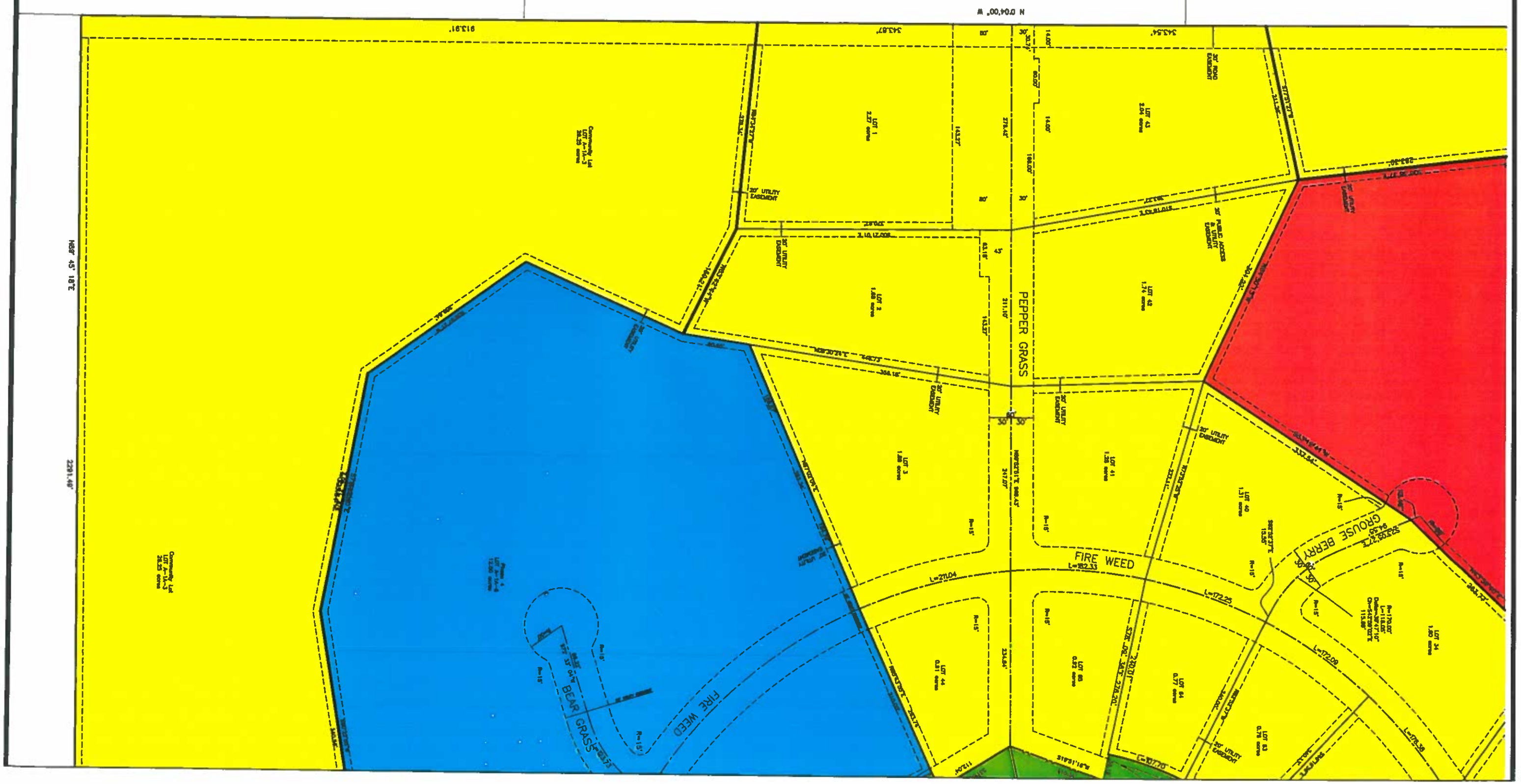
1 inch = 60 ft.



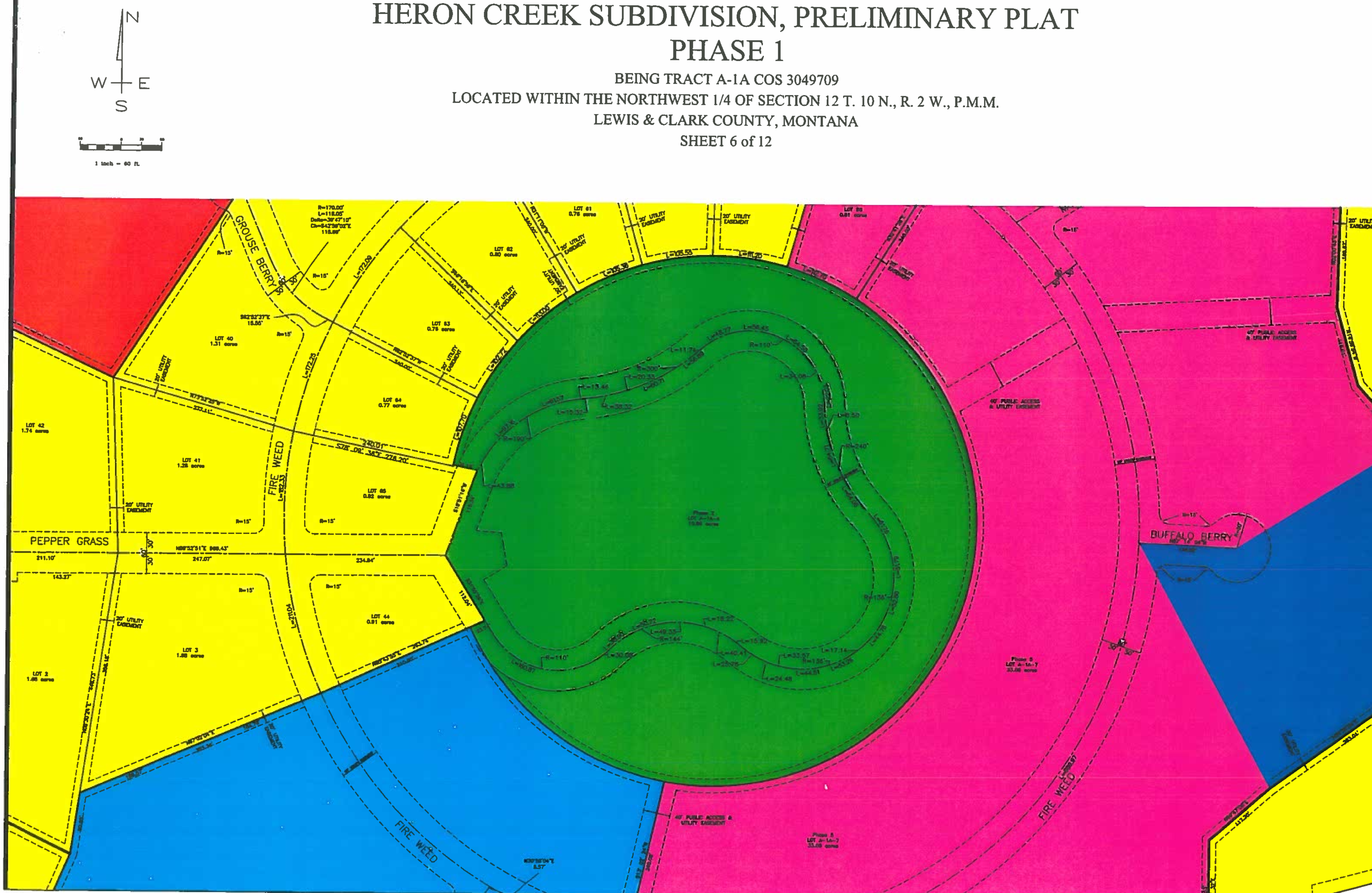
HERON CREEK SUBDIVISION, PRELIMINARY PLAT
PHASE 1

BEING TRACT A-1A COS 3049709
LOCATED WITHIN THE NORTHWEST 1/4 OF SECTION 12 T. 10 N., R. 2 W., P.M.M.
LEWIS & CLARK COUNTY, MONTANA
SHEET 5 of 12



HERON CREEK SUBDIVISION, PRELIMINARY PLAT
PHASE 1

BEING TRACT A-1A COS 3049709
LOCATED WITHIN THE NORTHWEST 1/4 OF SECTION 12 T. 10 N., R. 2 W., P.M.M.
LEWIS & CLARK COUNTY, MONTANA
SHEET 6 of 12



HERON CREEK SUBDIVISION, PHASE 2
PRELIMINARY

BEING TRACT A-1A-4, H.W. SMITH MINOR SUBDIVISION
LOCATED WITHIN THE NORTHWEST 1/4 OF SECTION 12 T. 10 N., R. 2 W., P.M.M.
LEWIS & CLARK COUNTY, MONTANA
SHEET 7 of 12

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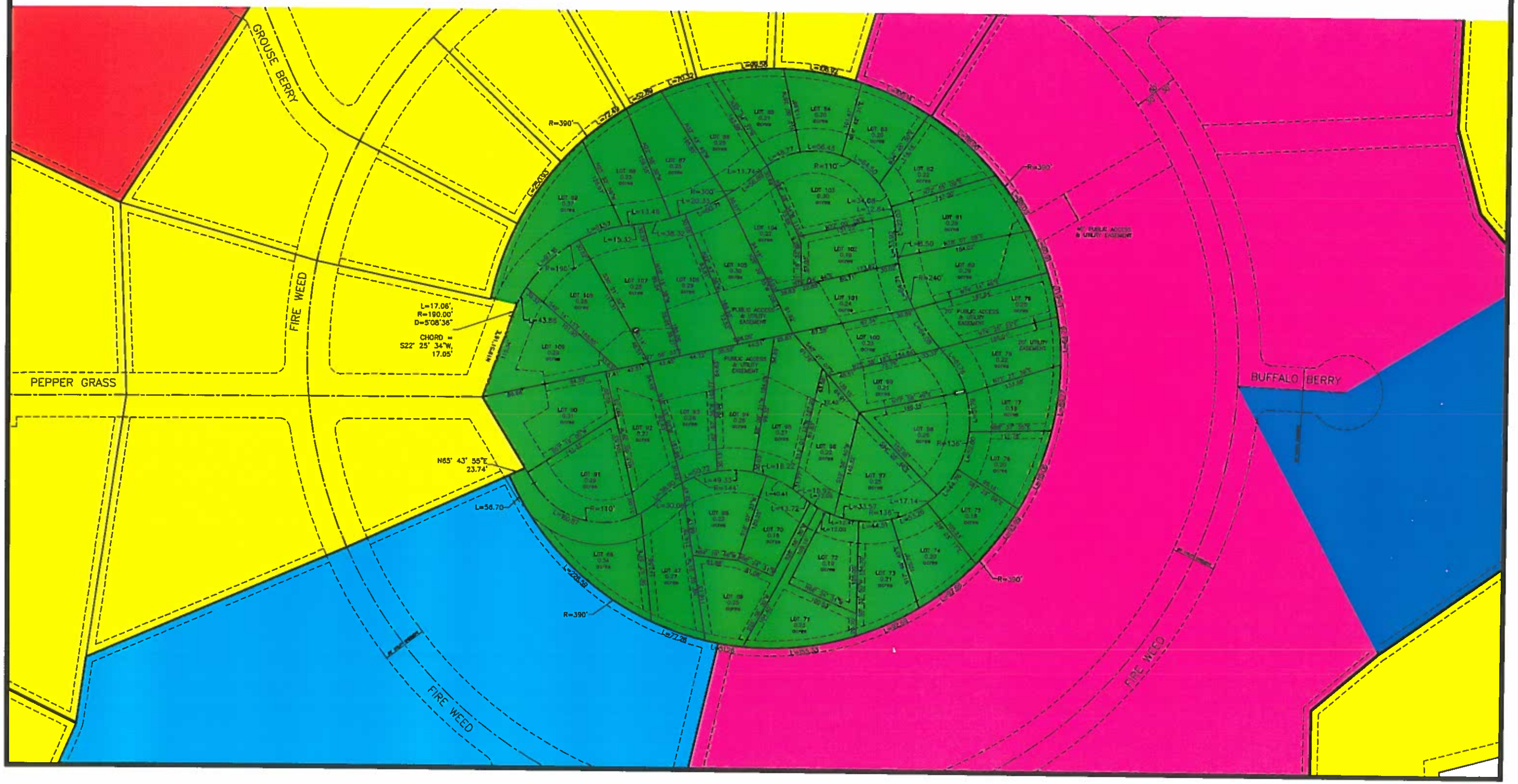
1 inch = 60 ft.

DESCRIPTIVE DATA

44	Number of Lots
10.87	Total acres being reviewed
0	Acres in Park/Common Facilities
2.43	Acres in Road Easements
0.16	Acres Minimum Lot size
0.37	Acres Maximum Lot Size

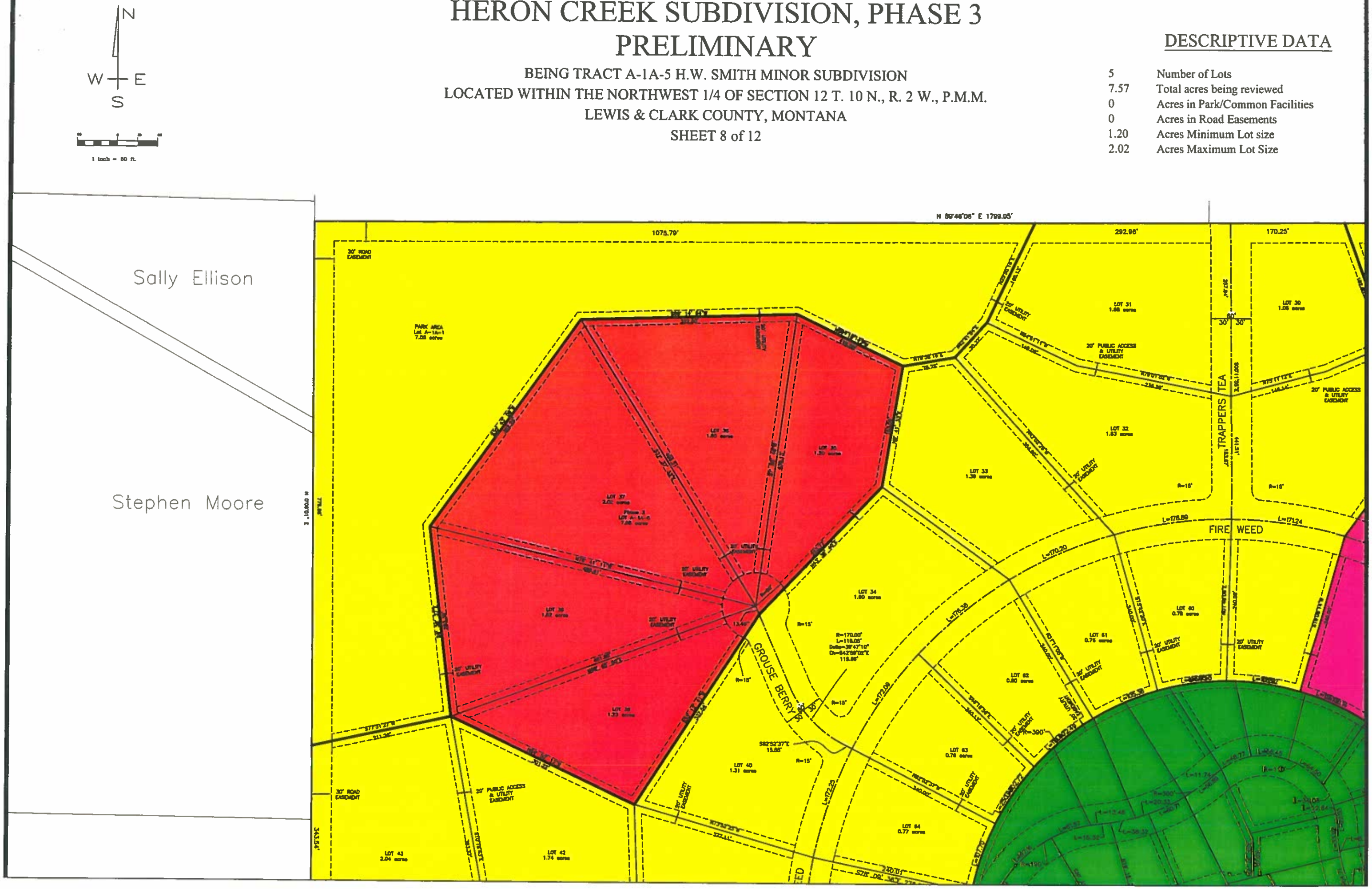


HERON CREEK SUBDIVISION, PHASE 3
PRELIMINARY

BEING TRACT A-1A-5 H.W. SMITH MINOR SUBDIVISION
LOCATED WITHIN THE NORTHWEST 1/4 OF SECTION 12 T. 10 N., R. 2 W., P.M.M.
LEWIS & CLARK COUNTY, MONTANA
SHEET 8 of 12

DESCRIPTIVE DATA

5	Number of Lots
7.57	Total acres being reviewed
0	Acres in Park/Common Facilities
0	Acres in Road Easements
1.20	Acres Minimum Lot size
2.02	Acres Maximum Lot Size



HERON CREEK SUBDIVISION, PHASE 4
PRELIMINARY

BEING TRACT A-1A -6 H. W. SMITH MINOR SUBDIVISION
LOCATED WITHIN THE NORTHWEST 1/4 OF SECTION 12 T. 10 N., R. 2 W., P.M.M.
LEWIS & CLARK COUNTY, MONTANA
SHEET 9 of 12

DESCRIPTIVE DATA

10	Number of Lots
12.5	Total acres being reviewed
0	Acres in Park/Common Facilities
1.26	Acres in Road Easements
0.84	Acres Minimum Lot size
1.79	Acres Maximum Lot Size

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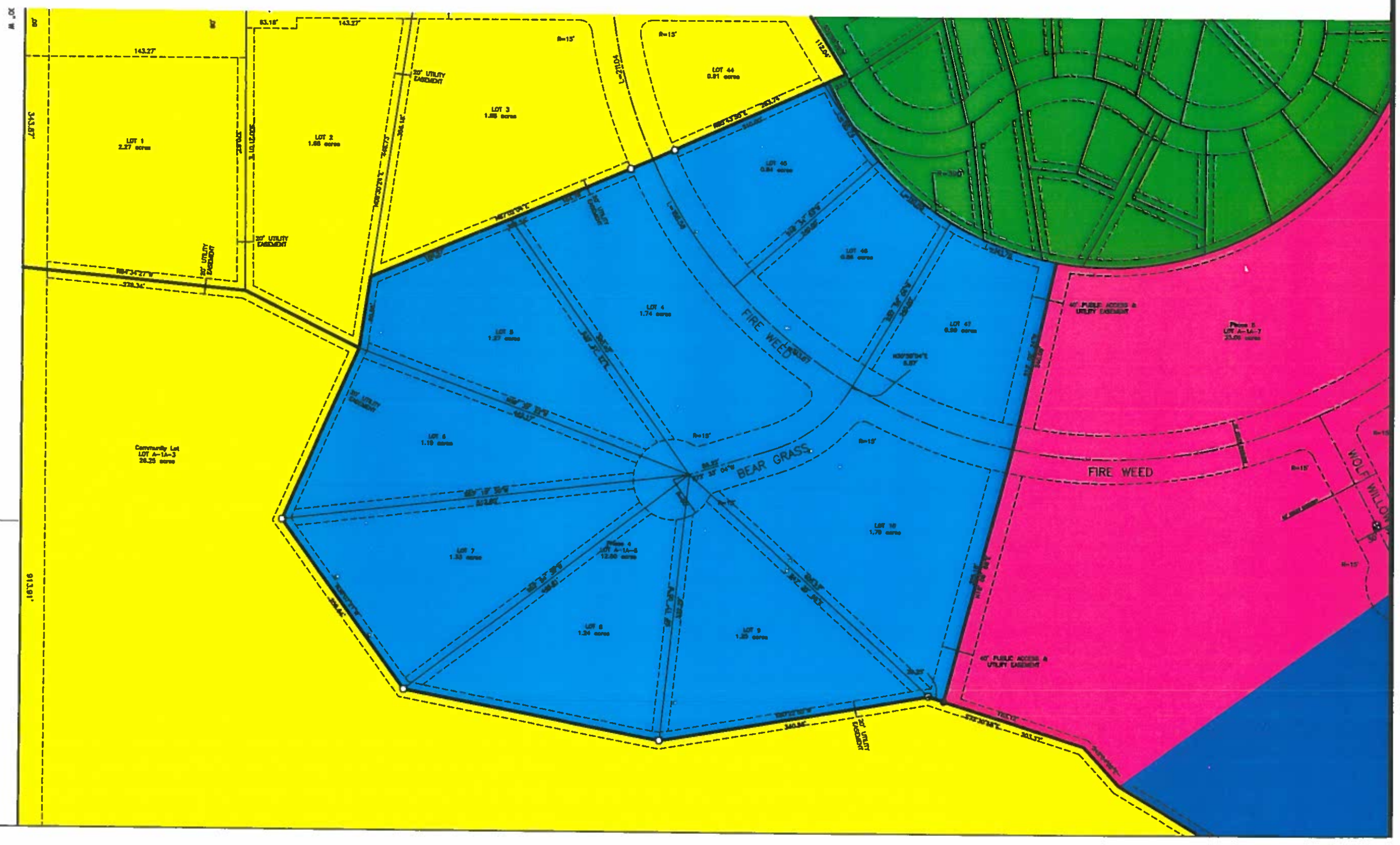
1 inch = 60 ft.

William Maloit

onald & Diana
Ferriter



HERON CREEK SUBDIVISION, PHASE 5
PRELIMINARY

BEING TRACT A-1A-7, H. W. SMITH MINOR SUBDIVISION
LOCATED WITHIN THE NORTHWEST 1/4 OF SECTION 12 T. 10 N., R. 2 W., P.M.M.
LEWIS & CLARK COUNTY, MONTANA
SHEET 10 of 12

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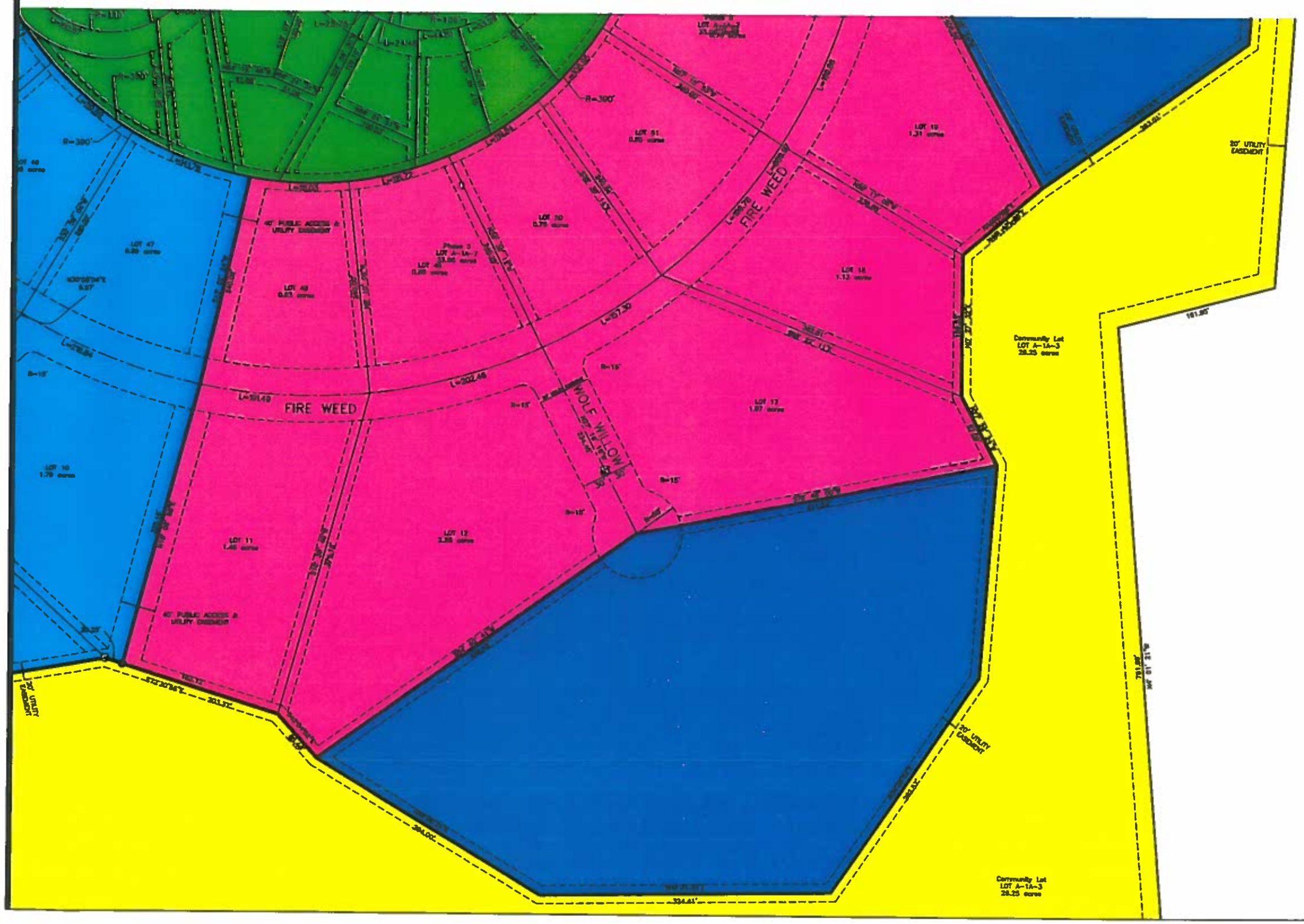
1 inch = 60 ft.

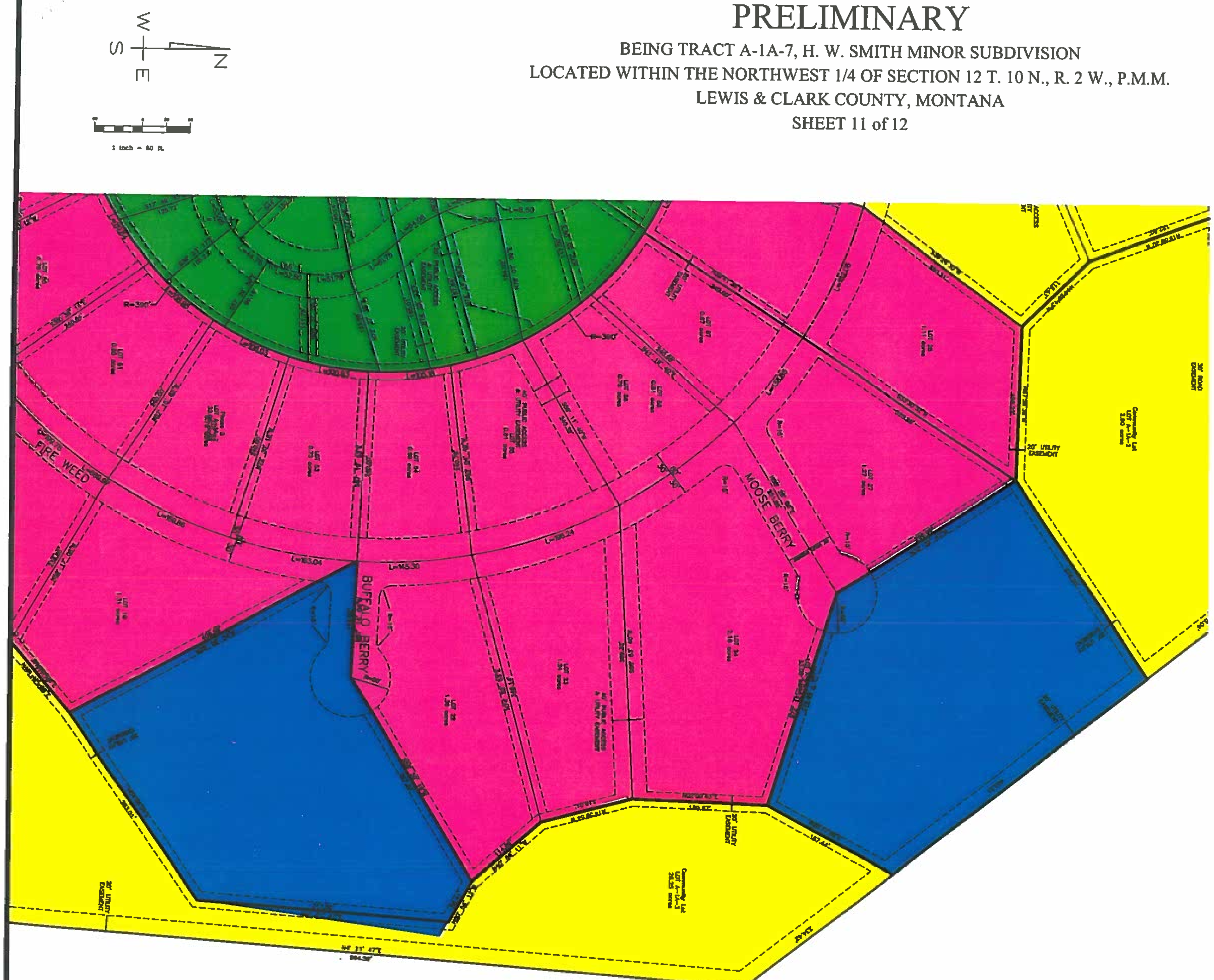
DESCRIPTIVE DATA

24	Number of Lots
24.88	Total acres being reviewed
0	Acres in Park/Common Facilities
3.75	Acres in Road Easements
0.67	Minimum Lot size
5.31	Maximum Lot Size



HERON CREEK SUBDIVISION, PHASE 5
PRELIMINARY

BEING TRACT A-1A-7, H. W. SMITH MINOR SUBDIVISION
LOCATED WITHIN THE NORTHWEST 1/4 OF SECTION 12 T. 10 N., R. 2 W., P.M.M.
LEWIS & CLARK COUNTY, MONTANA
SHEET 11 of 12



HERON CREEK SUBDIVISION, PHASE 6
PRELIMINARY

BEING TRACT A-1A-7A, A-1A-7B, & A-1A-7CH.W. SMITH MINOR SUBDIVISION
LOCATED WITHIN THE NORTHWEST 1/4 OF SECTION 12 T. 10 N., R. 2 W., P.M.M.
LEWIS & CLARK COUNTY, MONTANA
SHEET 12 of 12

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1 inch = 80 ft.

DESCRIPTIVE DATA

8	Number of Lots
11.21	Total acres being reviewed
0	Acres in Park/Common Facilities
0	Acres in Road Easements
1.09	Acres Minimum Lot size
1.53	Acres Maximum Lot Size