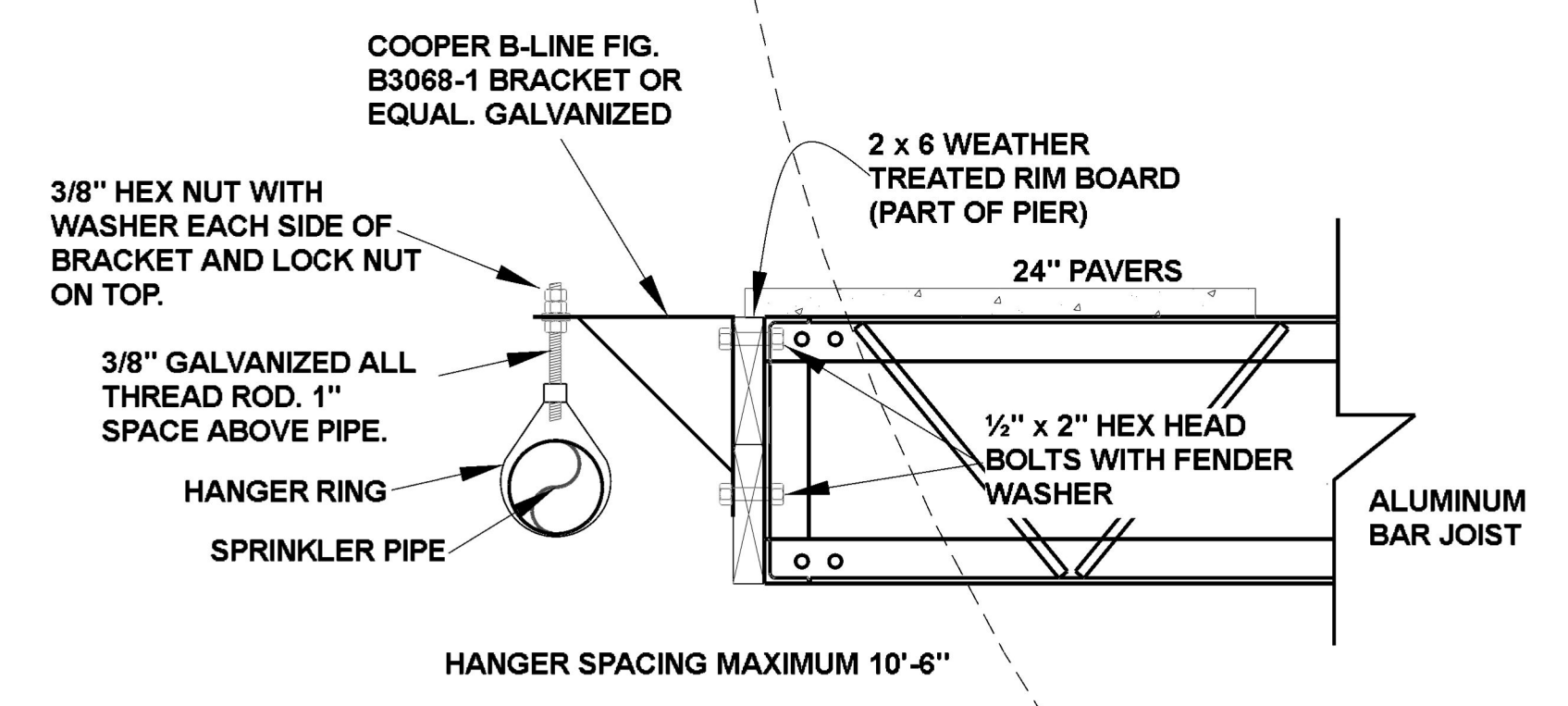


HANGER DETAIL #1
NOT TO SCALE



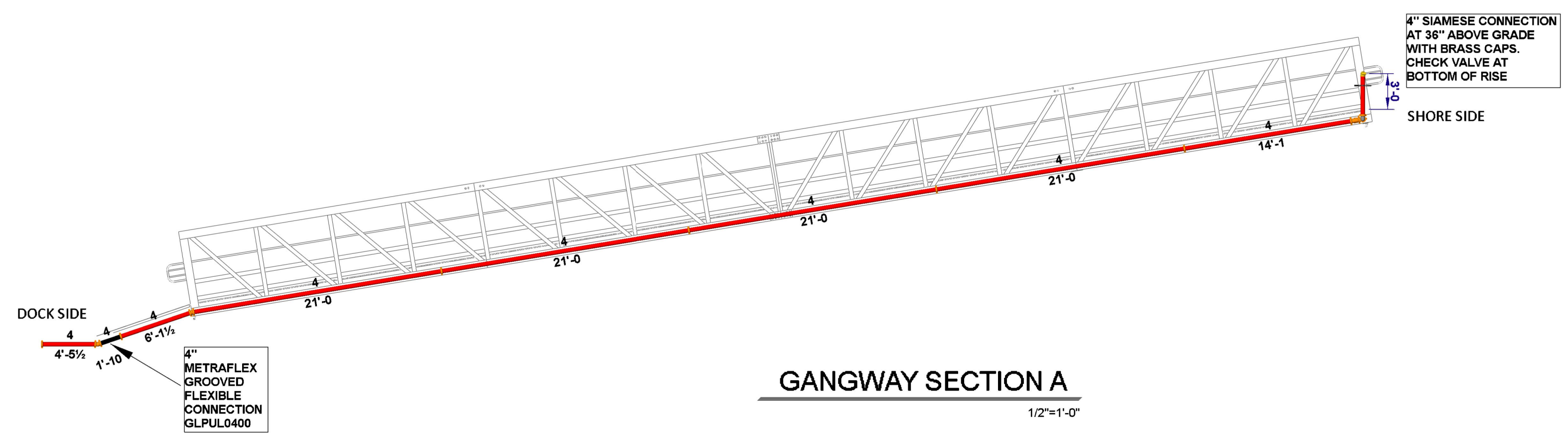
HANGER DETAIL #2
NOT TO SCALE

Design Notes

1. A manual dry standpipe system is required by IFC 3604.2 with hose connections located such that no point on the dock is more than 150 ft. from a hose connection.
2. Hose connections have been spaced on the permanent sections of the dock in compliance with this requirement as well as firefighter operations so that hose connections may be made and the line charged prior to passing by a boat fire.
3. The slips on the pier containing the fuel dock are permanent and the others are relocated seasonally.
4. Hose connections for the removable piers are located on the permanent section to avoid seasonal disassembly/reassembly of the standpipe system. As such, the total distance from the hose connection to the end of the pier is approximately 186 feet at the longest dock.
5. Fire department personnel will need to carry enough hose to reach the end of the pier as part of operations for this location.
6. The system has been designed to flow 300 gpm (2016 NFPA 303 Section 6.3.5) from the most remote hose connection. This requires 300 GPM at 143 psi at the Fire Department Connection.
7. The system has also been calculated to flow 500 gpm (per local FD requirements) from the two most remote hose connections. This requires 500 GPM at 196 psi at the Fire Department Connection.

INSTALLATION NOTES

1. All design to be per NFPA 14, 303 latest edition, Summit Fire & EMS, and Owner requirements.
2. All material to be U.L. listed for fire protection use.
3. All installation to conform to NFPA 14 and 303 latest editions..
4. All piping and fittings to be externally galvanized.
5. All hanger material to be galvanized.
6. All grooved couplings to be flexible type with flush seal gasket.
7. 1/2" automatic ball drip to be installed at low points determined during installation.
8. Entire installation to be hydrostatically tested at 200 psi for two hours.
9. No portion of the system is to be removed for any purpose.
10. Yearly flushing is required prior to seasonal service.
11. No devices, systems, or attachments are allowed on piping.
12. Owner is responsible for warning markings on pipe.

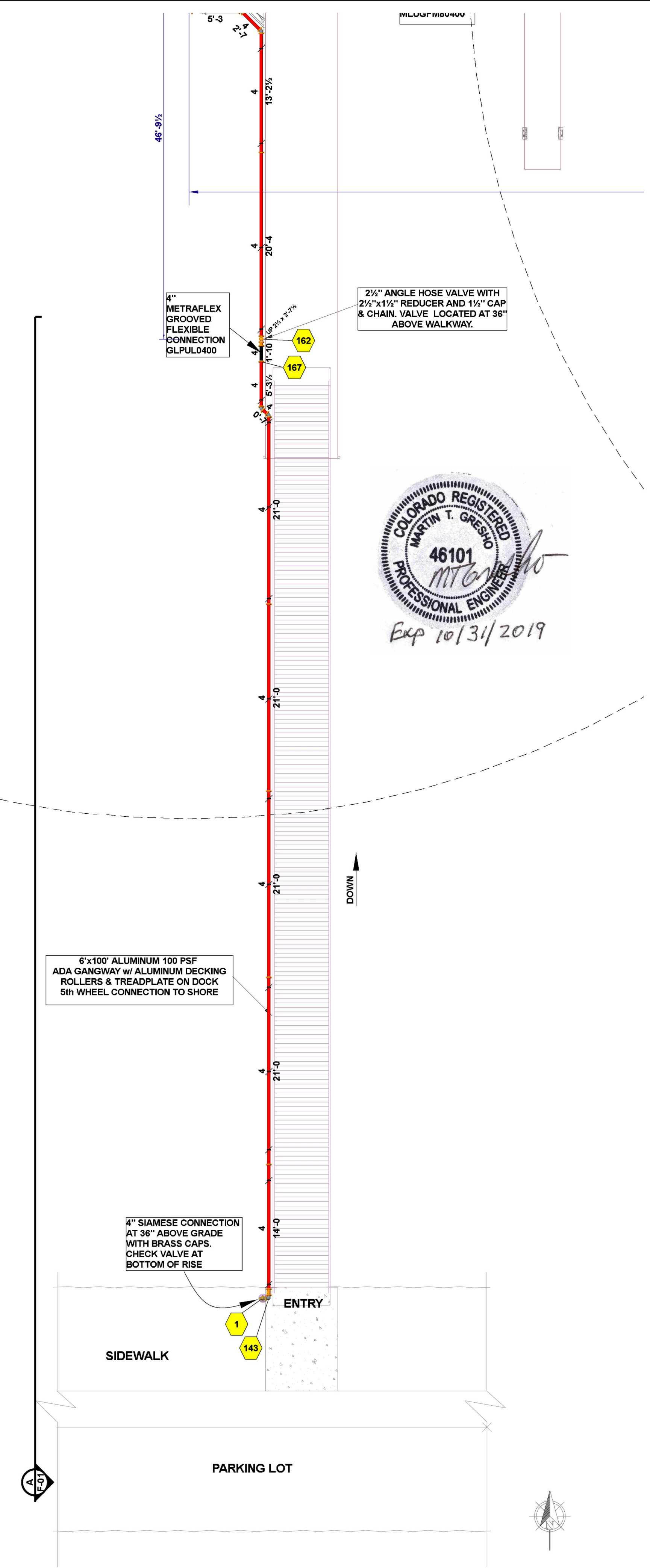


GANGWAY SECTION A
1/2"=1'-0"

Design Disclaimer

The information contained herein is the result of a compilation of drawings and information from various sources. FP2 Fire makes no guarantee of the accuracy of information from those sources. It is represented here to facilitate the design as shown on this set of drawings.

The installing contractor is responsible for a complete and functional design and installation set of drawing to obtain permit in every aspect of the project. A site visit for verification of existing conditions is required prior to providing a proposal. FP2 Fire will not be held liable for changes driven by job conditions requiring additional design, permit, coordination, labor, materials, or fabrication costs.



FP2
FP2 FIRE, INC.
303-642-3547 fp2fire.com
1140 Indian Peak Golden, CO 80403

ENGINEER OF RECORD
MARTIN T. GRESHO
FP2FIRE
1140 INDIAN PEAK RD
GOLDEN, CO 80403
303-642-3547
REGISTRATION #46101
EXPIRES: 10-31-2019

DRAWN BY: AWB
CHECKED BY: MTG

FRISCO BAY MARINA
267 MARINA ROAD
FRISCO, CO 80443

4' 2' 0' 10'
SCALE: 1/8" = 1'-0"

REVISION NO./DATE	DESCRIPTION OF CHANGES

DATE: JUNE 28, 2019
SCALE: 1/8" = 1'-0"

DRY STANDPIPE PLAN GANGWAY

FP-01
OF 8

ENGINEER OF RECORD
MARTIN T. GRESHO
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EXPIRES: 10-31-2019

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267 MARINA ROAD
FRISCO, CO 80443

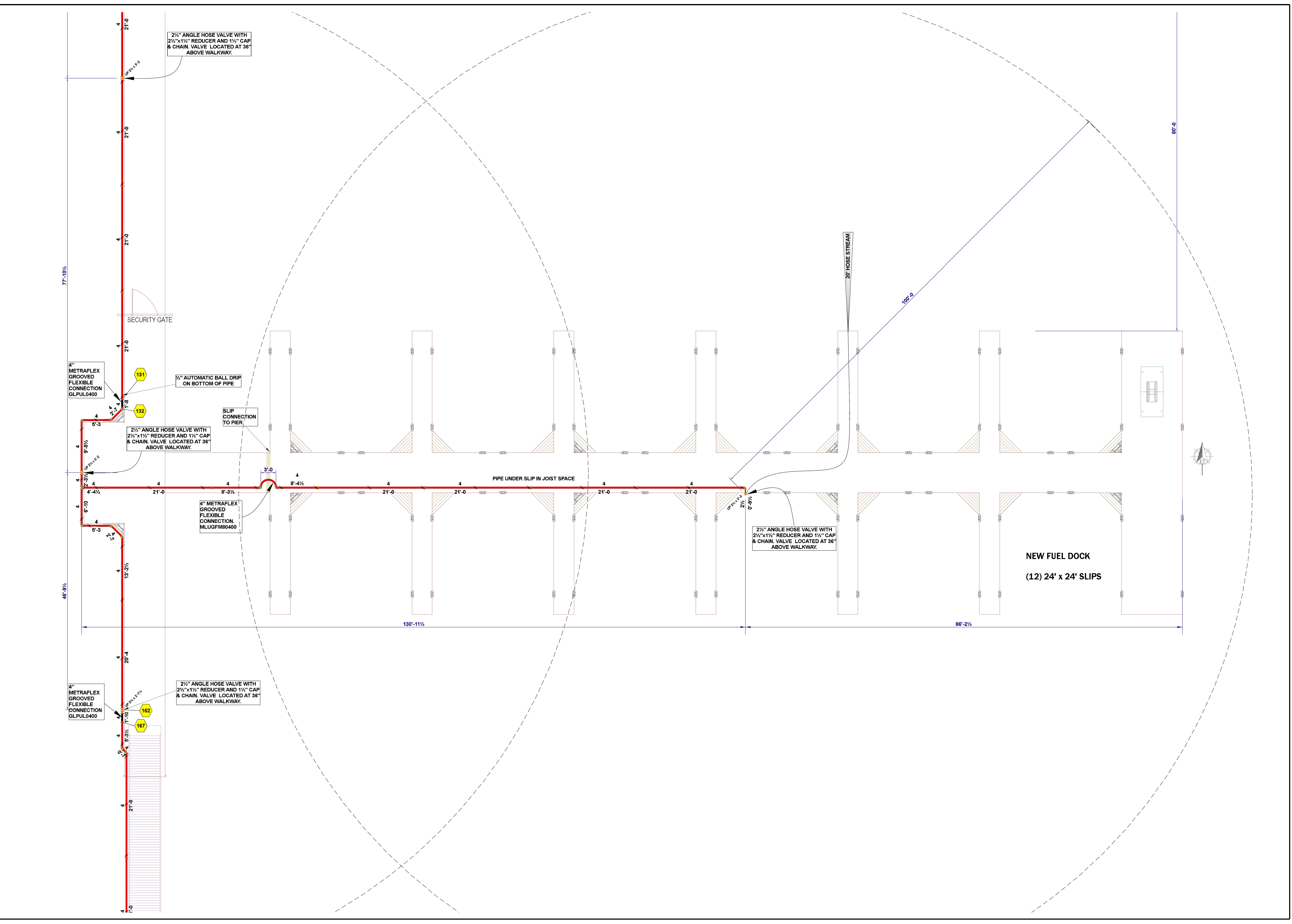
4' 2' 0' 10'
SCALE: 1/8" = 1'-0"

REVISION NO./DATE	DESCRIPTION OF CHANGES

DATE: JUNE 28, 2019
SCALE: 1/8" = 1'-0"

DRY
STANDPIPE
PLAN
FUEL DOCK

FP-02
OF 8





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REGISTRATION #46101
EXPIRES: 10-31-2019

DRAWN BY: AWB
CHECKED BY: MTG

FRISCO BAY MARINA
267 MARINA ROAD
FRISCO, CO 80443

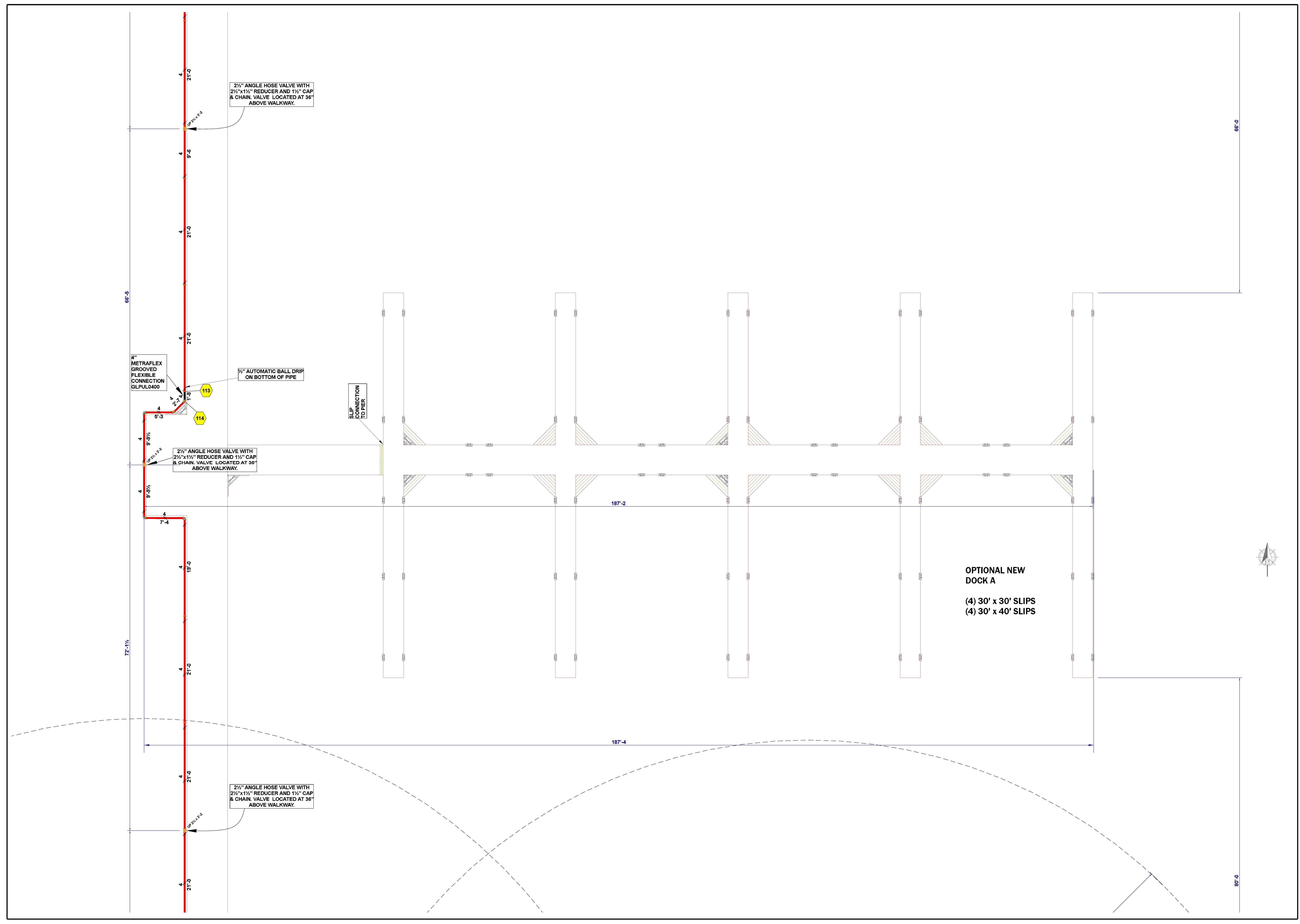
4' 2' 0' 10'
SCALE: 1/8" = 1'-0"

REVISION NO./DATE	DESCRIPTION OF CHANGES

DATE: JUNE 28, 2019
SCALE: 1/8" = 1'-0"

DRY STANDPIPE PLAN DOCK A

FP-03
OF 8



2 1/2" ANGLE HOSE VALVE WITH 2 1/2"x1 1/2" REDUCER AND 1 1/2" CAP & CHAIN. VALVE LOCATED AT 36" ABOVE WALKWAY.

4" METRAFLEX GROOVED FLEXIBLE CONNECTION GLPUL0400

1/2" AUTOMATIC BALL DRIP ON BOTTOM OF PIPE

SLIP CONNECTION TO PIER

2 1/2" ANGLE HOSE VALVE WITH 2 1/2"x1 1/2" REDUCER AND 1 1/2" CAP & CHAIN. VALVE LOCATED AT 36" ABOVE WALKWAY.

OPTIONAL NEW DOCK A
(4) 30' x 30' SLIPS
(4) 30' x 40' SLIPS

2 1/2" ANGLE HOSE VALVE WITH 2 1/2"x1 1/2" REDUCER AND 1 1/2" CAP & CHAIN. VALVE LOCATED AT 36" ABOVE WALKWAY.



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ENGINEER OF RECORD
MARTIN T. GRESHO
FP2FIRE
1140 INDIAN PEAK RD
GOLDEN, CO 80403
303-642-3547
REGISTRATION #46101
EXPIRES: 10-31-2019

DRAWN BY: AWB
CHECKED BY: MTG

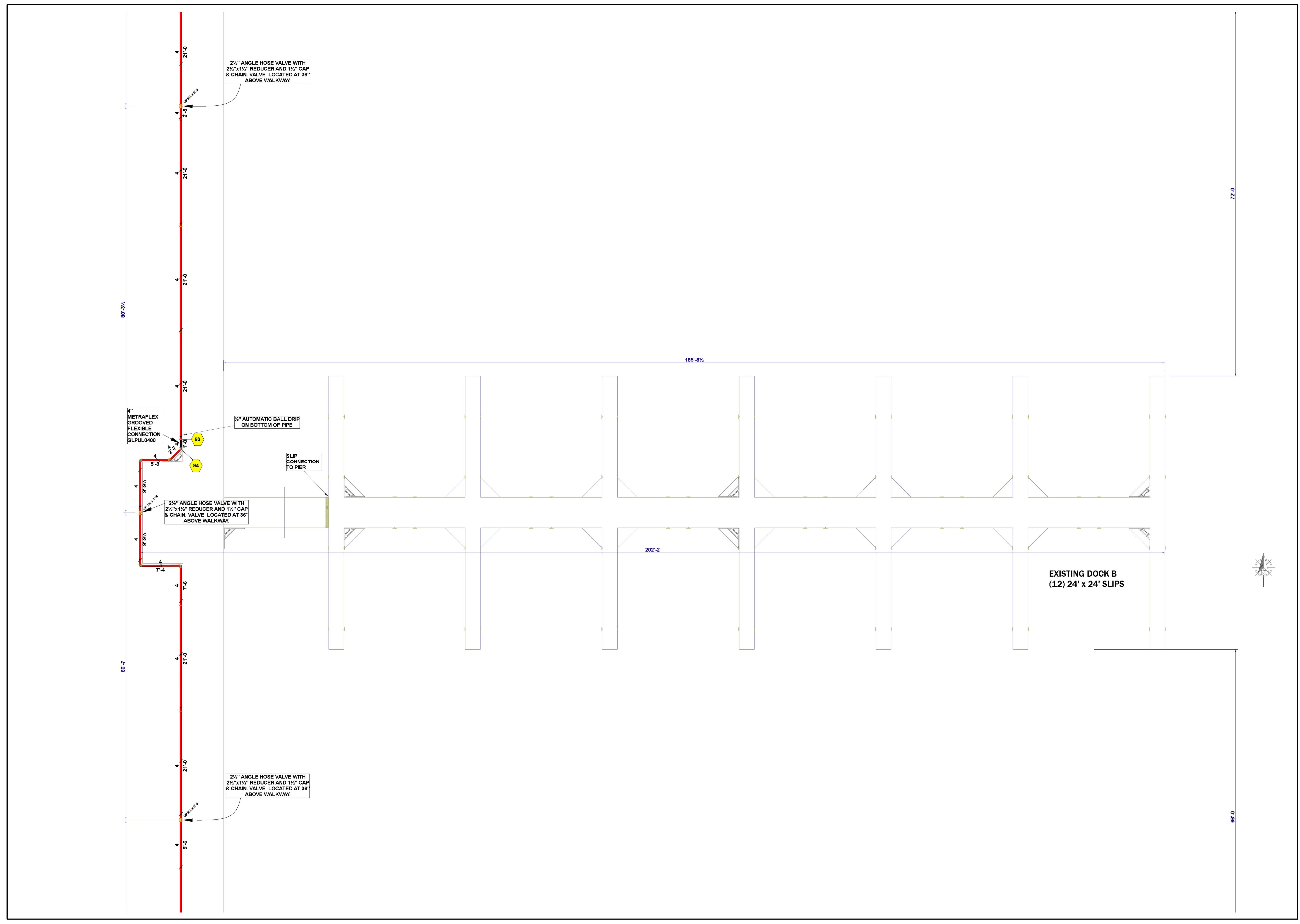
FRISCO BAY MARINA
267 MARINA ROAD
FRISCO, CO 80443

REVISION NO./DATE	DESCRIPTION OF CHANGES

DATE: JUNE 28, 2019
SCALE: 1/8" = 1'-0"

**DRY
STANDPIPE
PLAN
DOCK B**

FP-04
OF 8





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FP2FIRE
1140 INDIAN PEAK RD
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303-642-3547
REGISTRATION #46101
EXPIRES: 10-31-2019

DRAWN BY: AWB
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FRISCO BAY MARINA
267 MARINA ROAD
FRISCO, CO 80443

EXISTING DOCK C
(12) 24' x 24' SLIPS

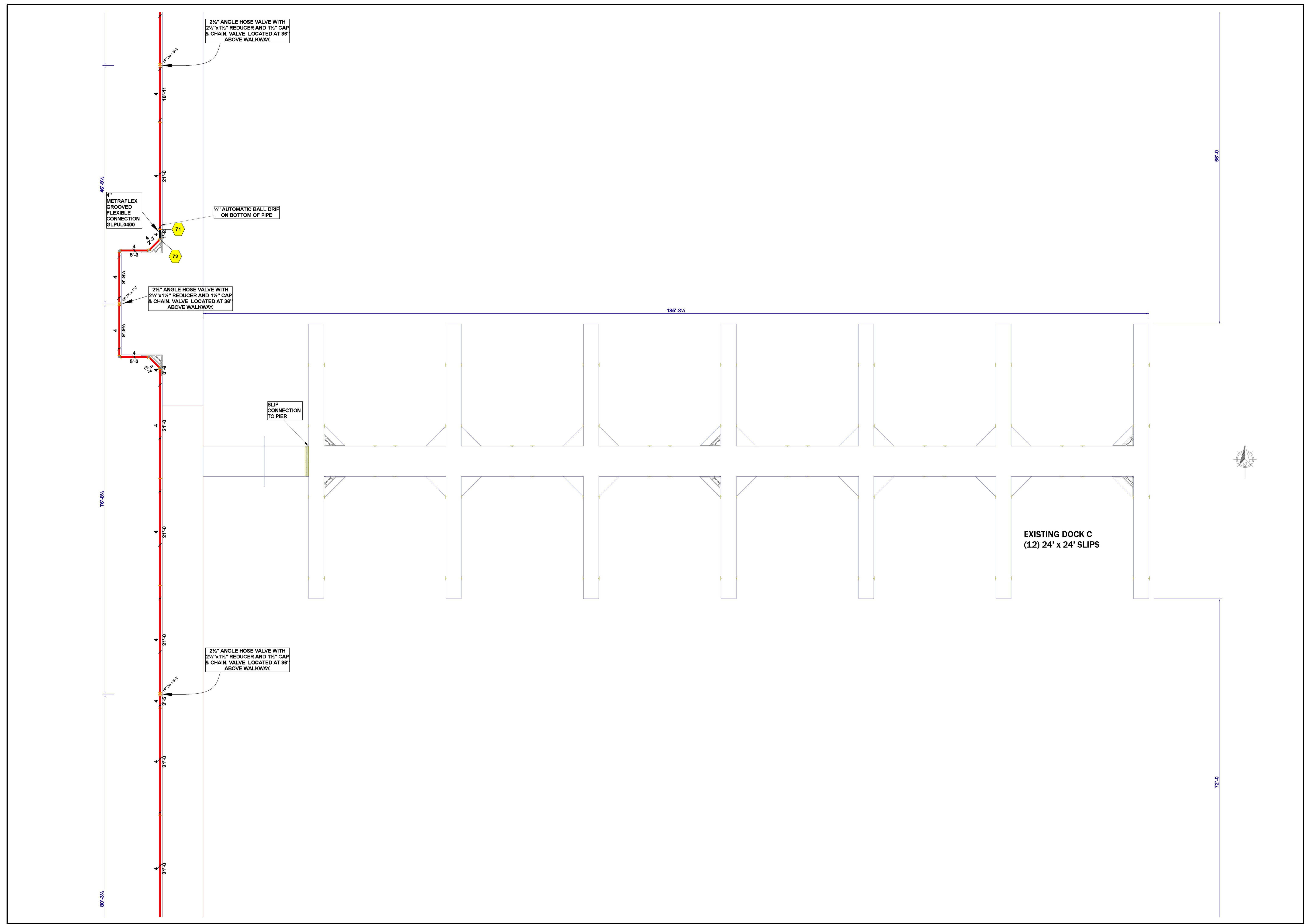
4' 2' 0" 10'
SCALE: 1/8" = 1'-0"

REVISION NO./DATE	DESCRIPTION OF CHANGES

DATE: JUNE 28, 2019
SCALE: 1/8" = 1'-0"

**DRY
STANDPIPE
PLAN
DOCK C**

FP-05
OF 8





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 1140 Indian Peak Golden, CO 80403

ENGINEER OF RECORD
MARTIN T. GRESHO
 FP2FIRE
 1140 INDIAN PEAK RD
 GOLDEN, CO 80403
 303-642-3547
 REGISTRATION #46101
 EXPIRES: 10-31-2019

DRAWN BY: AWB
 CHECKED BY: MTG

FRISCO BAY MARINA
 267 MARINA ROAD
 FRISCO, CO 80443

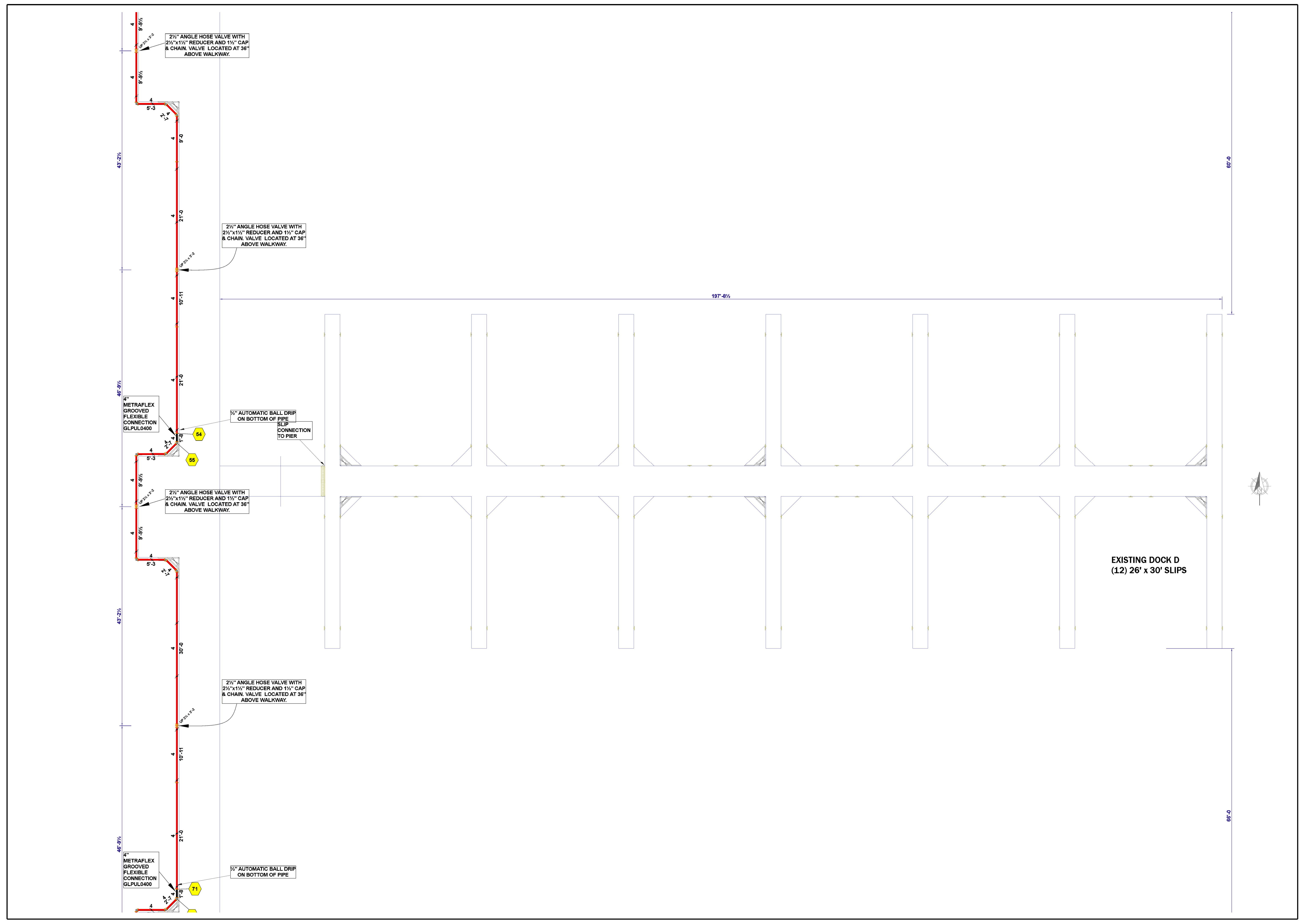
4' 2' 0' 10'
 SCALE: 1/8" = 1'-0"

REVISION NO./DATE	DESCRIPTION OF CHANGES

DATE: JUNE 28, 2019
 SCALE: 1/8" = 1'-0"

**DRY
 STANDPIPE
 PLAN
 DOCK D**

FP-06
 OF 8





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303-642-3547
REGISTRATION #46101
EXPIRES: 10-31-2019

DRAWN BY: AWB
CHECKED BY: MTG

FRISCO BAY MARINA
267 MARINA ROAD
FRISCO, CO 80443

REVISION NO./DATE	DESCRIPTION OF CHANGES

DATE: JUNE 28, 2019
SCALE: 1/8" = 1'-0"

**DRY
STANDPIPE
PLAN
DOCK E**

FP-07
OF 8





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FP2FIRE
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GOLDEN, CO 80403
303-642-3547
REGISTRATION #46101
EXPIRES: 10-31-2019

DRAWN BY: AWB
CHECKED BY: MTG

FRISCO BAY MARINA
267 MARINA ROAD
FRISCO, CO 80443

4' 2' 0' 10'
SCALE: 1/8" = 1'-0"

REVISION NO./DATE	DESCRIPTION OF CHANGES

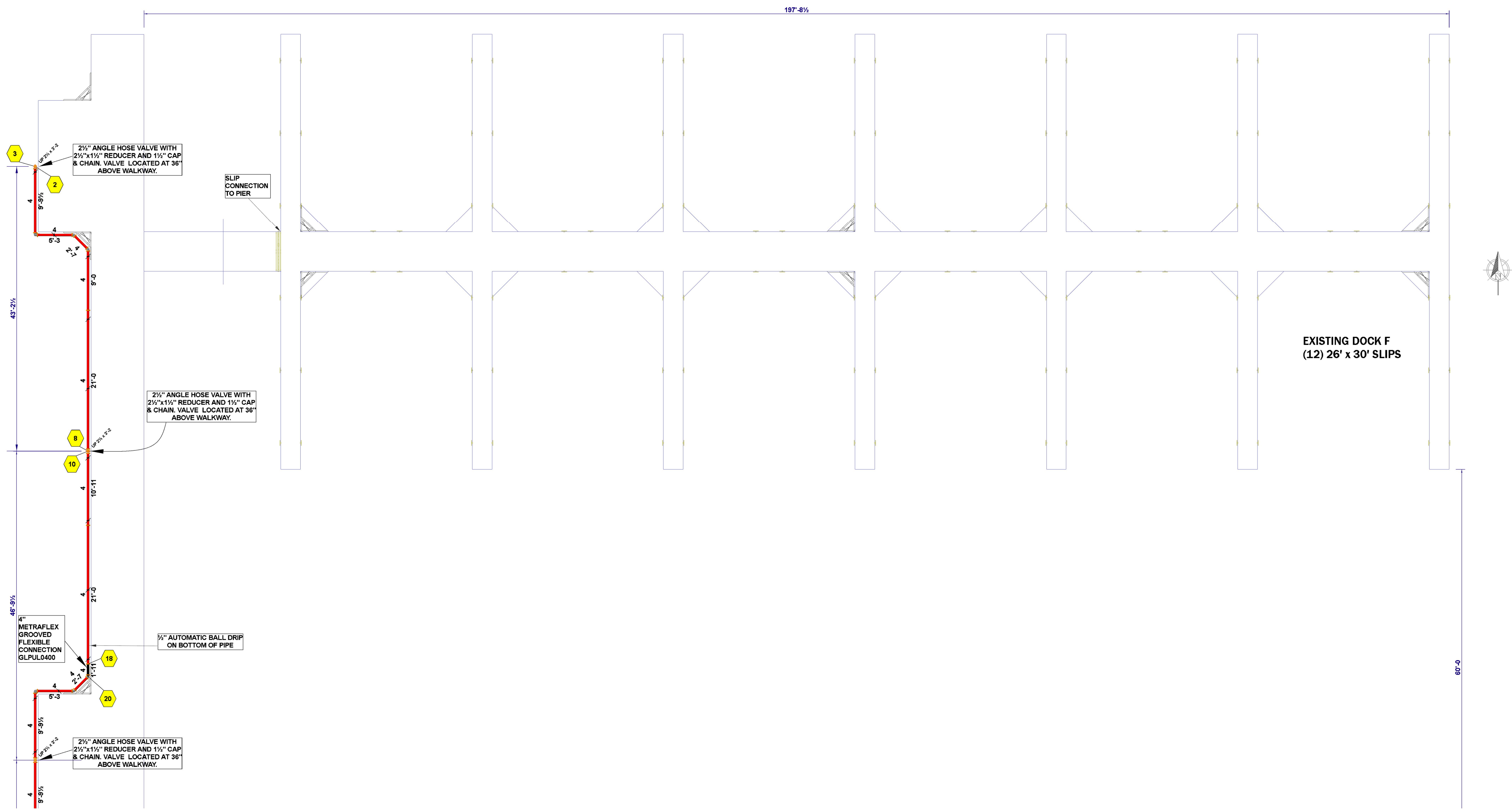
DATE: JUNE 28, 2019
SCALE: 1/8" = 1'-0"

**DRY
STANDPIPE
PLAN
DOCK F**

FP-08
OF 8

Hydraulic Information	
OCCUPANCY CLASSIFICATION	Manual Wet Standpipe
DESIGN GPM	300 1st STP
DESIGN PSI	100
FDC (gpm)	300
FDC (psi)	143
FIRE DEPT. PSI ASSIST	143
PER NFPA 303	

Hydraulic Information	
OCCUPANCY CLASSIFICATION	Manual Wet Standpipe
DESIGN GPM	250 1st STP + 250 2nd STP
DESIGN PSI	100
FDC (gpm)	500
FDC (psi)	196
FIRE DEPT. PSI ASSIST	196
PER FIRE DEPARTMENT	





Hydraulic Overview

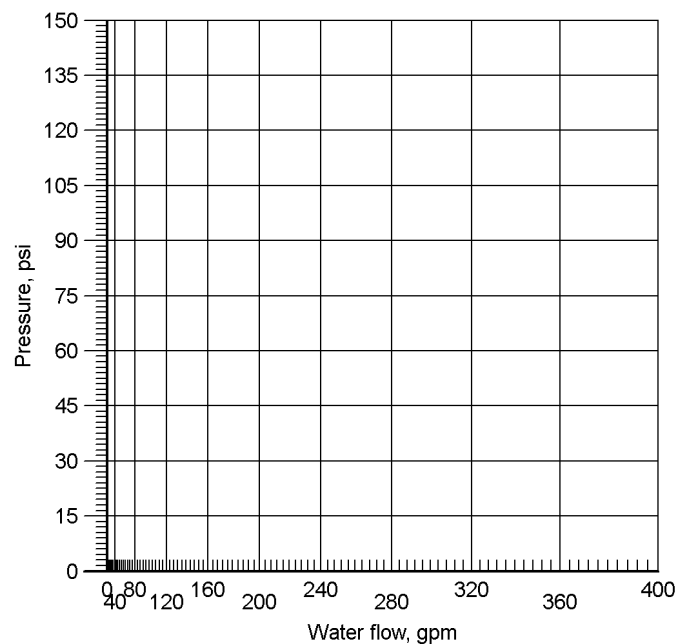
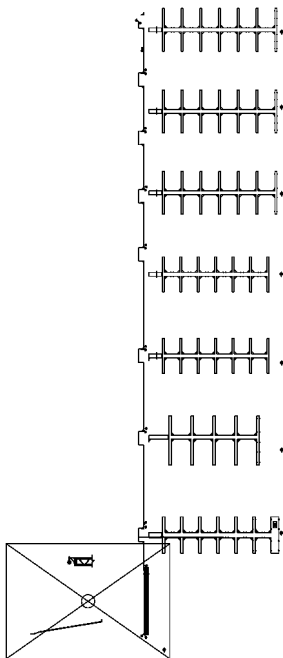
Job Number: 1
Report Description:

Job	
Job Number 1	Design Engineer AL BRUCH
Job Name: FRISCO BAY MARINA	Phone 720-227-3331
Address 1 267 MARINA ROAD	FAX
Address 2 FRISCO, CO	State Certification/License Number
Address 3	AHJ
	Job Site/Building CALCULATION PER NFPA 303

System	
Density NA	Area of Application NA
Most Demanding Sprinkler Data K-Factor at	Hose Streams 300.00
Coverage Per Sprinkler NA	Number Of Sprinklers Calculated 0
System Pressure Demand 142.521	System Flow Demand 300.00
Total Demand 300.00 @ 142.521	Pressure Result -142.521 (-100.0%)

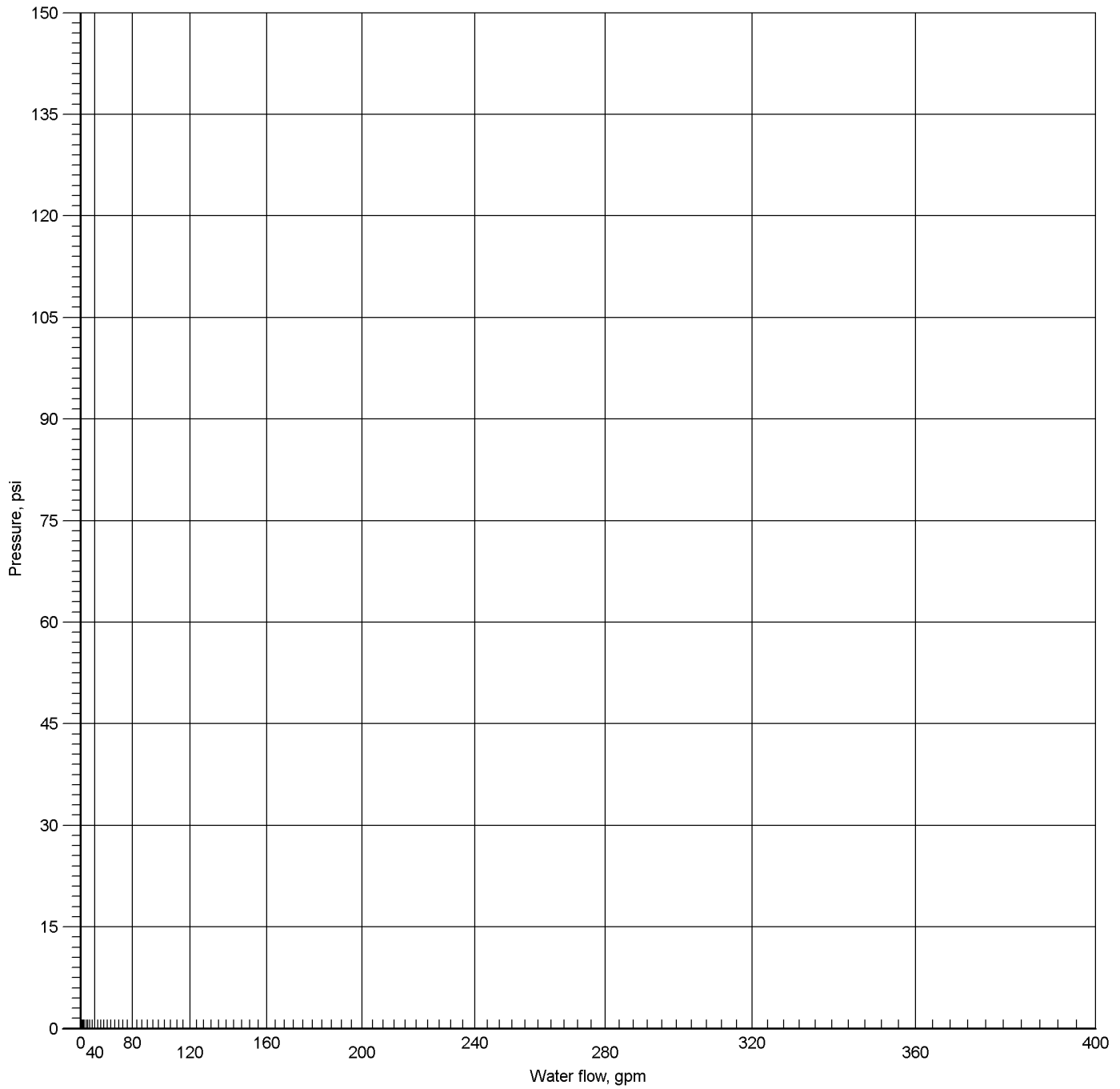
Supplies						Check Point Gauges			
<u>Node</u>	<u>Name</u>	<u>Flow(gpm)</u>	<u>Hose Flow(gpm)</u>	<u>Static(psi)</u>	<u>Residual(psi)</u>	<u>Identifier</u>	<u>Pressure(psi)</u>	<u>K-Factor(K)</u>	<u>Flow(gpm)</u>
1	Water Supply	0.00		0.000	0.000				

FRISCO BAY MARINA Water Supply at Node 1 (0.00, 0.00, 0.000, 0.000)





Water Supply at Node 1



Hydraulic Graph

Water Supply at Node 1

Static: Pressure

0.000

Residual: Pressure

0.000 @ 0.00

Available Pressure at Time of Test

-0.000 @ 300.00

System Demand

142.521 @ 300.00

System Demand (Including Hose Allowance at Source)

142.521 @ 300.00



Summary Of Outflowing Devices

Job Number: 1
Report Description:

Device		Actual Flow (gpm)	Minimum Flow (gpm)	K-Factor (K)	Pressure (psi)		
Hose	2	300.00	300.00	30	100.000		
⇒ Most Demanding Sprinkler Data							



Node Analysis

Job Number: 1
Report Description:

Node	Elevation(Foot)	Fittings	Pressure(psi)	Discharge(gpm)
1	22'-8	S, FDC	142.521	300.00
2	3'-6	Hose(-100.000)(31'-0)	100.000	300.00
3	0'-0	fE(6'-9½)	113.983	
8	0'-0	fT(16'-0)	115.868	
18	0'-0		116.825	
20	0'-0	fEE(3'-5)	116.938	
36	0'-0		120.658	
37	0'-0	fEE(3'-5)	120.771	
54	0'-0		124.491	
55	0'-0	fEE(3'-5)	124.604	
71	0'-0		128.324	
72	0'-0	fEE(3'-5)	128.437	
93	0'-0		134.146	
94	0'-0	fEE(3'-5)	134.259	
113	0'-0		139.116	
114	0'-0	fEE(3'-5)	139.229	
131	0'-0		144.768	
132	0'-0	fEE(3'-5)	144.880	
143	18'-10	fE(6'-9½)	143.880	
162	0'-0	fT(16'-0)	147.744	
167	0'-8		147.622	



Hydraulic Analysis

Job Number: 1
Report Description:

Pipe Type	Diameter	Flow	Velocity	HWC	Friction Loss	Length	Pressure
Downstream	Elevation	Discharge	K-Factor	Pt	Fittings	Eq. Length	Summary
Upstream				Pn		Total Length	
..... Route 1							
FR	2.4690	300.00	20.10	120	0.301821	3'-6"	Pf 12.465
2	3'-6"	300.00		100.000	Hose(-100.000)(31'-0")	37'-9½"	Pe 1.517
3	0'-0"			113.983	fE(6'-9½")	41'-3½"	Pv
CM	4.2600	300.00	6.75	100	0.029688	49'-11"	Pf 1.886
3	0'-0"			113.983		13'-7"	Pe -0.000
8	0'-0"			115.868	fE(6'-9½"), 2fEE(3'-5")	63'-6"	Pv
CM	4.2600	300.00	6.75	100	0.029688	32'-3"	Pf 0.957
8	0'-0"			115.868			Pe 0.000
18	0'-0"			116.825		32'-3"	Pv
CM	4.2600	300.00	6.75	120	0.021189	1'-11"	Pf 0.113
18	0'-0"			116.825		3'-5"	Pe -0.000
20	0'-0"			116.938	fEE(3'-5")	5'-4"	Pv
CM	4.2600	300.00	6.75	100	0.029688	101'-6"	Pf 3.720
20	0'-0"			116.938		23'-9½"	Pe 0.000
36	0'-0"			120.658	3fEE(3'-5"), 2fE(6'-9½")	125'-3½"	Pv
CM	4.2600	300.00	6.75	120	0.021189	1'-11"	Pf 0.113
36	0'-0"			120.658		3'-5"	Pe -0.000
37	0'-0"			120.771	fEE(3'-5")	5'-4"	Pv
CM	4.2600	300.00	6.75	100	0.029688	101'-6"	Pf 3.720
37	0'-0"			120.771		23'-9½"	Pe 0.000
54	0'-0"			124.491	3fEE(3'-5"), 2fE(6'-9½")	125'-3½"	Pv
CM	4.2600	300.00	6.75	120	0.021189	1'-11"	Pf 0.113
54	0'-0"			124.491		3'-5"	Pe -0.000
55	0'-0"			124.604	fEE(3'-5")	5'-4"	Pv
CM	4.2600	300.00	6.75	100	0.029688	101'-6"	Pf 3.720
55	0'-0"			124.604		23'-9½"	Pe 0.000
71	0'-0"			128.324	3fEE(3'-5"), 2fE(6'-9½")	125'-3½"	Pv
CM	4.2600	300.00	6.75	120	0.021189	1'-11"	Pf 0.113
71	0'-0"			128.324		3'-5"	Pe -0.000
72	0'-0"			128.437	fEE(3'-5")	5'-4"	Pv
CM	4.2600	300.00	6.75	100	0.029688	168'-6"	Pf 5.709
72	0'-0"			128.437		23'-9½"	Pe -0.000
93	0'-0"			134.146	3fEE(3'-5"), 2fE(6'-9½")	192'-3½"	Pv
CM	4.2600	300.00	6.75	120	0.021189	1'-11"	Pf 0.113
93	0'-0"			134.146		3'-5"	Pe -0.000
94	0'-0"			134.259	fEE(3'-5")	5'-4"	Pv
CM	4.2600	300.00	6.75	100	0.029688	139'-9½"	Pf 4.857
94	0'-0"			134.259		23'-9½"	Pe 0.000
113	0'-0"			139.116	fEE(3'-5"), 3fE(6'-9½")	163'-7½"	Pv
CM	4.2600	300.00	6.75	120	0.021189	1'-11"	Pf 0.113
113	0'-0"			139.116		3'-5"	Pe -0.000
114	0'-0"			139.229	fEE(3'-5")	5'-4"	Pv
CM	4.2600	300.00	6.75	100	0.029688	162'-9½"	Pf 5.539
114	0'-0"			139.229		23'-9½"	Pe 0.000
131	0'-0"			144.768	fEE(3'-5"), 3fE(6'-9½")	186'-7"	Pv
CM	4.2600	300.00	6.75	120	0.021189	1'-11"	Pf 0.113
131	0'-0"			144.768		3'-5"	Pe -0.000
132	0'-0"			144.880	fEE(3'-5")	5'-4"	Pv
CM	4.2600	300.00	6.75	100	0.029688	72'-10"	Pf 2.869
132	0'-0"			144.880		23'-9½"	Pe -0.006
162	0'-0"			147.744	3fEE(3'-5"), 2fE(6'-9½")	96'-7½"	Pv
CM	4.2600	300.00	6.75	120	0.021189	2'-0½"	Pf 0.155
162	0'-0"			147.744		5'-3"	Pe -0.276
167	0'-8"			147.622	Ee2(5'-3")	7'-4"	Pv
CM	4.2600	300.00	6.75	100	0.029688	105'-2½"	Pf 4.141
167	0'-8"			147.622		34'-3"	Pe -7.883
143	18'-10"			143.880	2fEE(3'-5"), CV(20'-8"), fE(6'-9½")	139'-5½"	Pv
CM	4.0260	300.00	7.56	120	0.027899	3'-10"	Pf 0.296
143	18'-10"			143.880		6'-9½"	Pe -1.656
1	22'-8"			142.521	fE(6'-9½"), S, FDC	10'-7½"	Pv

Equivalent Pipe Lengths of Valves and Fittings (C=120 only)

C Value Multiplier

$$\left(\frac{\text{Actual Inside Diameter}}{\text{Schedule 40 Steel Pipe Inside Diameter}} \right)^{4.87} = \text{Factor}$$

Value Of C	100	130	140	150
Multiplying Factor	0.713	1.16	1.33	1.51



Hydraulic Analysis

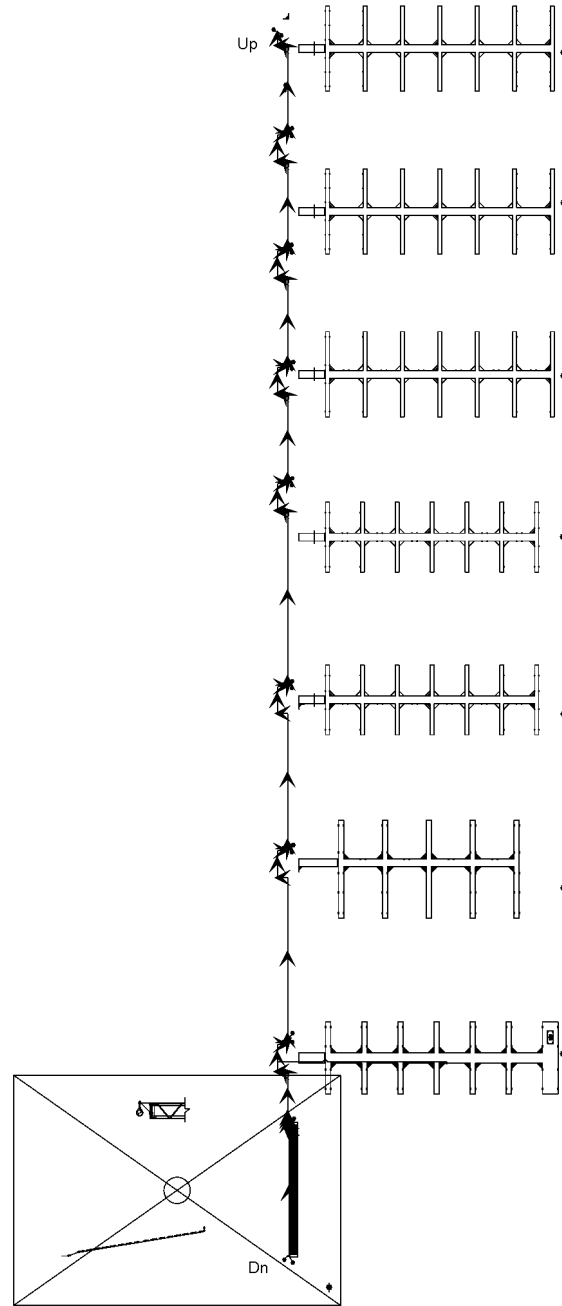
Job Number: 1
Report Description:

Pipe Type	Diameter	Flow	Velocity	HWC	Friction Loss		Length	Pressure
Downstream	Elevation	Discharge	K-Factor	Pt	Pn	Fittings	Eq. Length	Summary
Upstream							Total Length	

Pipe Type Legend	
AO	Arm-Over
BL	Branch Line
CM	Cross Main
DN	Drain
DR	Drop
DY	Dynamic
FM	Feed Main
FR	Feed Riser
MS	Miscellaneous
OR	Outrigger
RN	Riser Nipple
SP	Sprig
ST	Stand Pipe
UG	Underground

Units Legend	
Diameter	Inch
Elevation	Foot
Flow	gpm
Discharge	gpm
Velocity	fps
Pressure	psi
Length	Foot
Friction Loss	psi/Foot
HWC	Hazen-Williams Constant
Pt	Total pressure at a point in a pipe
Pn	Normal pressure at a point in a pipe
Pf	Pressure loss due to friction between points
Pe	Pressure due to elevation difference between indicated points
Pv	Velocity pressure at a point in a pipe

Fittings Legend	
ALV	Alarm Valve
AngV	Angle Valve
b	Bushing
BalV	Ball Valve
BFP	Backflow Preventer
BV	Butterfly Valve
C	Cross Flow Turn 90°
cplg	Coupling
Cr	Cross Run
CV	Check Valve
DeV	Deluge Valve
DPV	Dry Pipe Valve
E	90° Elbow
EE	45° Elbow
Ee1	11¼° Elbow
Ee2	22½° Elbow
f	Flow Device
fd	Flex Drop
FDC	Fire Department Connection
fE	90° FireLock(TM) Elbow
fEE	45° FireLock(TM) Elbow
flg	Flange
FN	Floating Node
fT	FireLock(TM) Tee
g	Gauge
GloV	Globe Valve
GV	Gate Valve
Ho	Hose
Hose	Hose
HV	Hose Valve
Hyd	Hydrant
LtE	Long Turn Elbow
mecT	Mechanical Tee
Noz	Nozzle
P1	Pump In
P2	Pump Out
PIV	Post Indicating Valve
PO	Pipe Outlet
PrV	Pressure Relief Valve
PRV	Pressure Reducing Valve
red	Reducer/Adapter
S	Supply
sCV	Swing Check Valve
SFx	Seismic Flex
Spr	Sprinkler
St	Strainer
T	Tee Flow Turn 90°
Tr	Tee Run
U	Union
WirF	Wirsbo
WMV	Water Meter Valve
Z	Cap





Hydraulic Overview

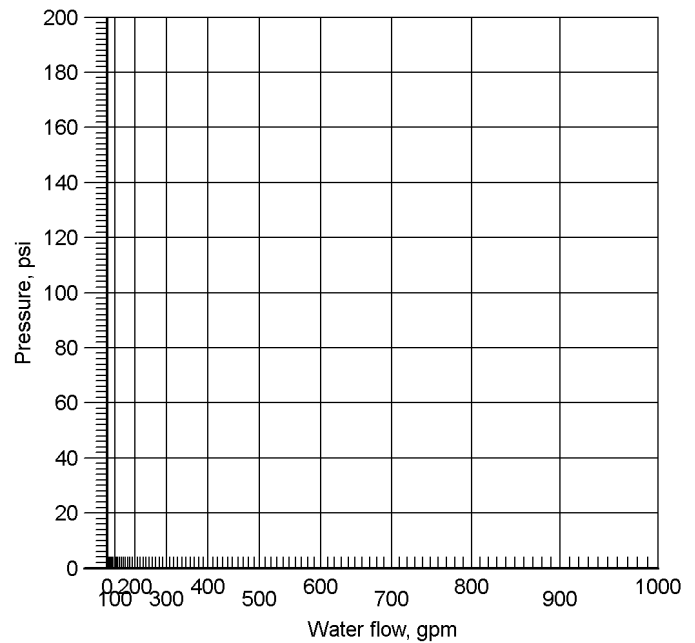
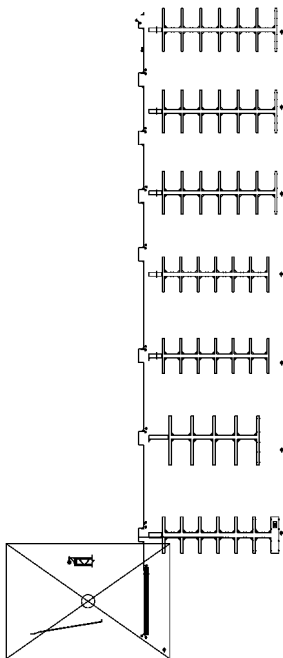
Job Number: 1
Report Description:

Job	
Job Number 1	Design Engineer AL BRUCH
Job Name: FRISCO BAY MARINA	Phone 720-227-3331
Address 1 267 MARINA ROAD	State Certification/License Number
Address 2 FRISCO, CO	AHJ
Address 3	Job Site/Building CALCULATION PER FIRE DEPARTMENT

System	
Density NA	Area of Application NA
Most Demanding Sprinkler Data K-Factor at	Hose Streams 500.00
Coverage Per Sprinkler NA	Number Of Sprinklers Calculated 0
System Pressure Demand 195.780	System Flow Demand 500.00
Total Demand 500.00 @ 195.780	Pressure Result -195.780 (-100.0%)

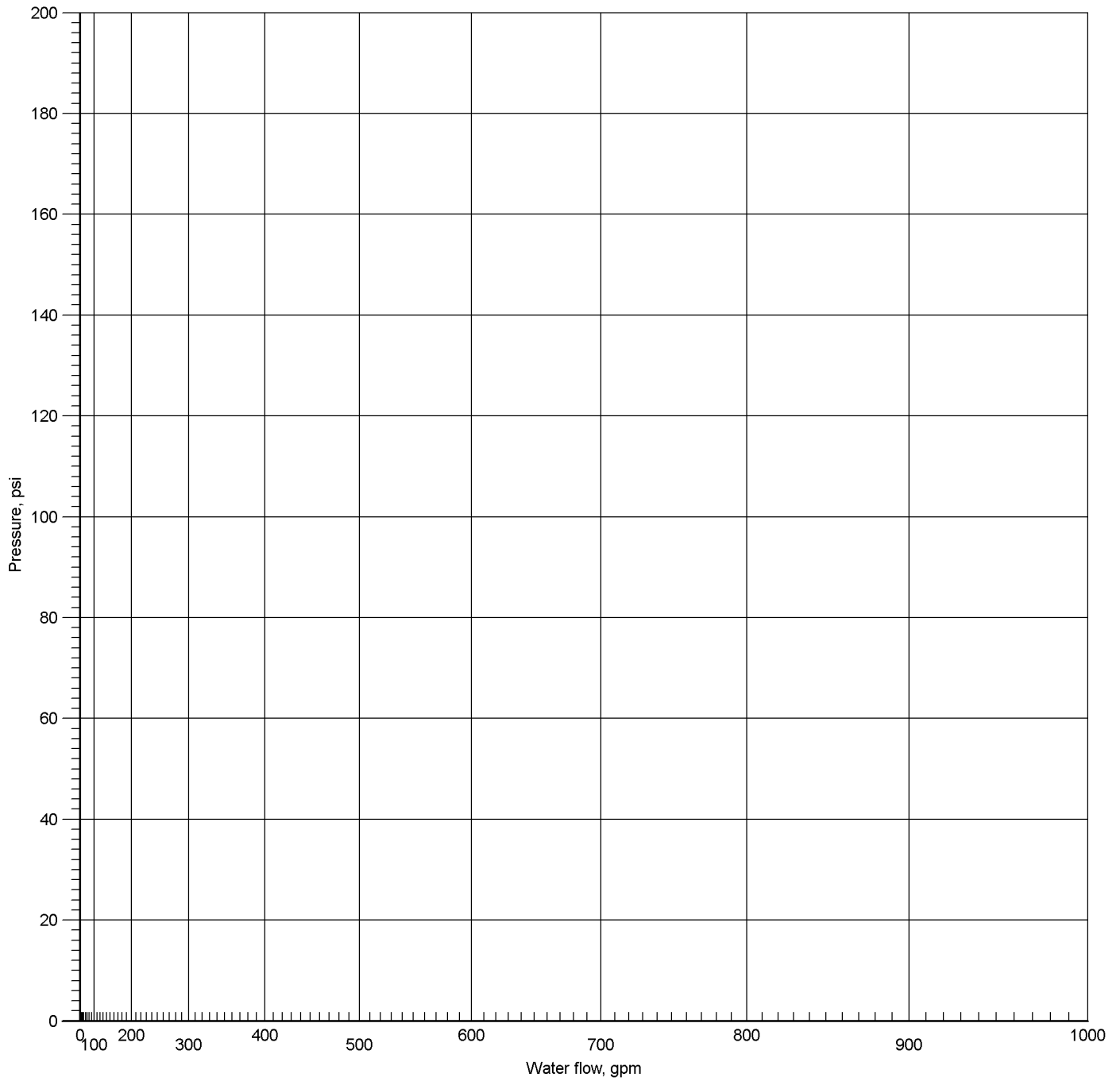
Supplies						Check Point Gauges			
<u>Node</u>	<u>Name</u>	<u>Flow(gpm)</u>	<u>Hose Flow(gpm)</u>	<u>Static(psi)</u>	<u>Residual(psi)</u>	<u>Identifier</u>	<u>Pressure(psi)</u>	<u>K-Factor(K)</u>	<u>Flow(gpm)</u>
1	Water Supply	0.00		0.000	0.000				

FRISCO BAY MARINA Water Supply at Node 1 (0.00, 0.00, 0.000, 0.000)





Water Supply at Node 1



Hydraulic Graph

Water Supply at Node 1

Static: Pressure

0.000

Residual: Pressure

0.000 @ 0.00

Available Pressure at Time of Test

-0.000 @ 500.00

System Demand

195.780 @ 500.00

System Demand (Including Hose Allowance at Source)

195.780 @ 500.00



Summary Of Outflowing Devices

Job Number: 1
Report Description:

Device		Actual Flow (gpm)	Minimum Flow (gpm)	K-Factor (K)	Pressure (psi)		
Hose	2	250.00	250.00	25	100.000		
Hose	10	250.00	250.00	0	99.364		

⇒ Most Demanding Sprinkler Data



Node Analysis

Job Number: 1
Report Description:

Node	Elevation(Foot)	Fittings	Pressure(psi)	Discharge(gpm)
1	22'-8	S, FDC	195.780	500.00
2	3'-6	Hose(-100.000)(31'-0)	100.000	250.00
10	3'-6	Hose(31'-0)	99.364	250.00
3	0'-0	fE(6'-9½)	110.414	
8	0'-0	fT(16'-0)	111.760	
18	0'-0		114.222	
20	0'-0	fEE(3'-5)	114.511	
36	0'-0		124.083	
37	0'-0	fEE(3'-5)	124.373	
54	0'-0		133.945	
55	0'-0	fEE(3'-5)	134.235	
71	0'-0		143.807	
72	0'-0	fEE(3'-5)	144.096	
93	0'-0		158.786	
94	0'-0	fEE(3'-5)	159.076	
113	0'-0		171.573	
114	0'-0	fEE(3'-5)	171.863	
131	0'-0		186.115	
132	0'-0	fEE(3'-5)	186.405	
143	18'-10	fE(6'-9½)	196.674	
162	0'-0	fT(16'-0)	193.781	
167	0'-8		193.903	



Hydraulic Analysis

Job Number: 1
Report Description:

Pipe Type	Diameter	Flow	Velocity	HWC	Friction Loss	Length	Pressure
Downstream	Elevation	Discharge	K-Factor	Pt	Fittings	Eq. Length	Summary
Upstream				Pn		Total Length	
Route 1							
FR	2.4690	250.00	16.75	120	0.215409	3'-6"	Pf 8.896
2	3'-6"	250.00		100.000	Hose(-100.000)(31'-0)	37'-9½"	Pe 1.517
3	0'-0"			110.414	fE(6'-9½")	41'-3½"	Pv
CM	4.2600	250.00	5.63	100	0.021189	49'-11"	Pf 1.346
3	0'-0"			110.414		13'-7"	Pe -0.000
8	0'-0"			111.760	fE(6'-9½"), 2fEE(3'-5)	63'-6"	Pv
CM	4.2600	500.00	11.25	100	0.076385	32'-3"	Pf 2.462
8	0'-0"	250.00		111.760	Flow (q) from Route 2		Pe 0.000
18	0'-0"			114.222		32'-3"	Pv
CM	4.2600	500.00	11.25	120	0.054516	1'-11"	Pf 0.290
18	0'-0"			114.222		3'-5"	Pe -0.000
20	0'-0"			114.511	fEE(3'-5)	5'-4"	Pv
CM	4.2600	500.00	11.25	100	0.076385	101'-6"	Pf 9.572
20	0'-0"			114.511		23'-9½"	Pe 0.000
36	0'-0"			124.083	3fEE(3'-5), 2fE(6'-9½")	125'-3½"	Pv
CM	4.2600	500.00	11.25	120	0.054516	1'-11"	Pf 0.290
36	0'-0"			124.083		3'-5"	Pe -0.000
37	0'-0"			124.373	fEE(3'-5)	5'-4"	Pv
CM	4.2600	500.00	11.25	100	0.076385	101'-6"	Pf 9.572
37	0'-0"			124.373		23'-9½"	Pe 0.000
54	0'-0"			133.945	3fEE(3'-5), 2fE(6'-9½")	125'-3½"	Pv
CM	4.2600	500.00	11.25	120	0.054516	1'-11"	Pf 0.290
54	0'-0"			133.945		3'-5"	Pe -0.000
55	0'-0"			134.235	fEE(3'-5)	5'-4"	Pv
CM	4.2600	500.00	11.25	100	0.076385	101'-6"	Pf 9.572
55	0'-0"			134.235		23'-9½"	Pe 0.000
71	0'-0"			143.807	3fEE(3'-5), 2fE(6'-9½")	125'-3½"	Pv
CM	4.2600	500.00	11.25	120	0.054516	1'-11"	Pf 0.290
71	0'-0"			143.807		3'-5"	Pe -0.000
72	0'-0"			144.096	fEE(3'-5)	5'-4"	Pv
CM	4.2600	500.00	11.25	100	0.076385	168'-6"	Pf 14.690
72	0'-0"			144.096		23'-9½"	Pe -0.000
93	0'-0"			158.786	3fEE(3'-5), 2fE(6'-9½")	192'-3½"	Pv
CM	4.2600	500.00	11.25	120	0.054516	1'-11"	Pf 0.290
93	0'-0"			158.786		3'-5"	Pe -0.000
94	0'-0"			159.076	fEE(3'-5)	5'-4"	Pv
CM	4.2600	500.00	11.25	100	0.076385	139'-9½"	Pf 12.497
94	0'-0"			159.076		23'-9½"	Pe 0.000
113	0'-0"			171.573	fEE(3'-5), 3fE(6'-9½")	163'-7½"	Pv
CM	4.2600	500.00	11.25	120	0.054516	1'-11"	Pf 0.290
113	0'-0"			171.573		3'-5"	Pe -0.000
114	0'-0"			171.863	fEE(3'-5)	5'-4"	Pv
CM	4.2600	500.00	11.25	100	0.076385	162'-9½"	Pf 14.251
114	0'-0"			171.863		23'-9½"	Pe 0.000
131	0'-0"			186.115	fEE(3'-5), 3fE(6'-9½")	186'-7"	Pv
CM	4.2600	500.00	11.25	120	0.054516	1'-11"	Pf 0.290
131	0'-0"			186.115		3'-5"	Pe -0.000
132	0'-0"			186.405	fEE(3'-5)	5'-4"	Pv
CM	4.2600	500.00	11.25	100	0.076385	72'-10"	Pf 7.382
132	0'-0"			186.405		23'-9½"	Pe -0.006
162	0'-0"			193.781	3fEE(3'-5), 2fE(6'-9½")	96'-7½"	Pv
CM	4.2600	500.00	11.25	120	0.054516	2'-0½"	Pf 0.399
162	0'-0"			193.781		5'-3"	Pe -0.276
167	0'-8"			193.903	Ee2(5'-3)	7'-4"	Pv
CM	4.2600	500.00	11.25	100	0.076385	105'-2½"	Pf 10.653
167	0'-8"			193.903		34'-3"	Pe -7.883
143	18'-10"			196.674	2fEE(3'-5), CV(20'-8), fE(6'-9½")	139'-5½"	Pv
CM	4.0260	500.00	12.60	120	0.071781	3'-10"	Pf 0.762
143	18'-10"			196.674		6'-9½"	Pe -1.656
1	22'-8"			195.780	fE(6'-9½"), S, FDC	10'-7½"	Pv
		0.00			Hose Allowance At Source		
1		500.00					
Route 2							
FR	2.4690	250.00	16.75	120	0.215409	3'-6"	Pf 10.878
10	3'-6"	250.00		99.364	Hose(31'-0)	47'-0"	Pe 1.517
8	0'-0"			111.760	fT(16'-0)	50'-6"	Pv



Hydraulic Analysis

Job Number: 1
Report Description:

Pipe Type	Diameter	Flow	Velocity	HWC	Friction Loss	Length	Pressure
Downstream	Elevation	Discharge	K-Factor	Pt	Pn	Eq. Length	Summary
Upstream					Fittings	Total Length	

Equivalent Pipe Lengths of Valves and Fittings (C=120 only)	C Value Multiplier
$\left(\frac{\text{Actual Inside Diameter}}{\text{Schedule 40 Steel Pipe Inside Diameter}} \right)^{4.87} = \text{Factor}$	Value Of C
	100 130 140 150
	Multiplying Factor 0.713 1.16 1.33 1.51

Pipe Type Legend	Units Legend	Fittings Legend
AO Arm-Over	Diameter Inch	ALV Alarm Valve
BL Branch Line	Elevation Foot	AngV Angle Valve
CM Cross Main	Flow gpm	b Bushing
DN Drain	Discharge gpm	BalV Ball Valve
DR Drop	Velocity fps	BFP Backflow Preventer
DY Dynamic	Pressure psi	BV Butterfly Valve
FM Feed Main	Length Foot	C Cross Flow Turn 90°
FR Feed Riser	Friction Loss psi/Foot	cplg Coupling
MS Miscellaneous	HWC Hazen-Williams Constant	Cr Cross Run
OR Outrigger	Pt Total pressure at a point in a pipe	CV Check Valve
RN Riser Nipple	Pn Normal pressure at a point in a pipe	DeV Deluge Valve
SP Sprig	Pf Pressure loss due to friction between points	DPV Dry Pipe Valve
ST Stand Pipe	Pe Pressure due to elevation difference between indicated points	E 90° Elbow
UG Underground	Pv Velocity pressure at a point in a pipe	EE 45° Elbow
		Ee1 11¼° Elbow
		Ee2 22½° Elbow
		f Flow Device
		fd Flex Drop
		FDC Fire Department Connection
		fE 90° FireLock(TM) Elbow
		fEE 45° FireLock(TM) Elbow
		flg Flange
		FN Floating Node
		ft FireLock(TM) Tee
		g Gauge
		GloV Globe Valve
		GV Gate Valve
		Ho Hose
		Hose Hose
		HV Hose Valve
		Hyd Hydrant
		LtE Long Turn Elbow
		mecT Mechanical Tee
		Noz Nozzle
		P1 Pump In
		P2 Pump Out
		PIV Post Indicating Valve
		PO Pipe Outlet
		PrV Pressure Relief Valve
		PRV Pressure Reducing Valve
		red Reducer/Adapter
		S Supply
		sCV Swing Check Valve
		SFx Seismic Flex
		Spr Sprinkler
		St Strainer
		T Tee Flow Turn 90°
		Tr Tee Run
		U Union
		WirF Wirsbo
		WMV Water Meter Valve
		Z Cap

