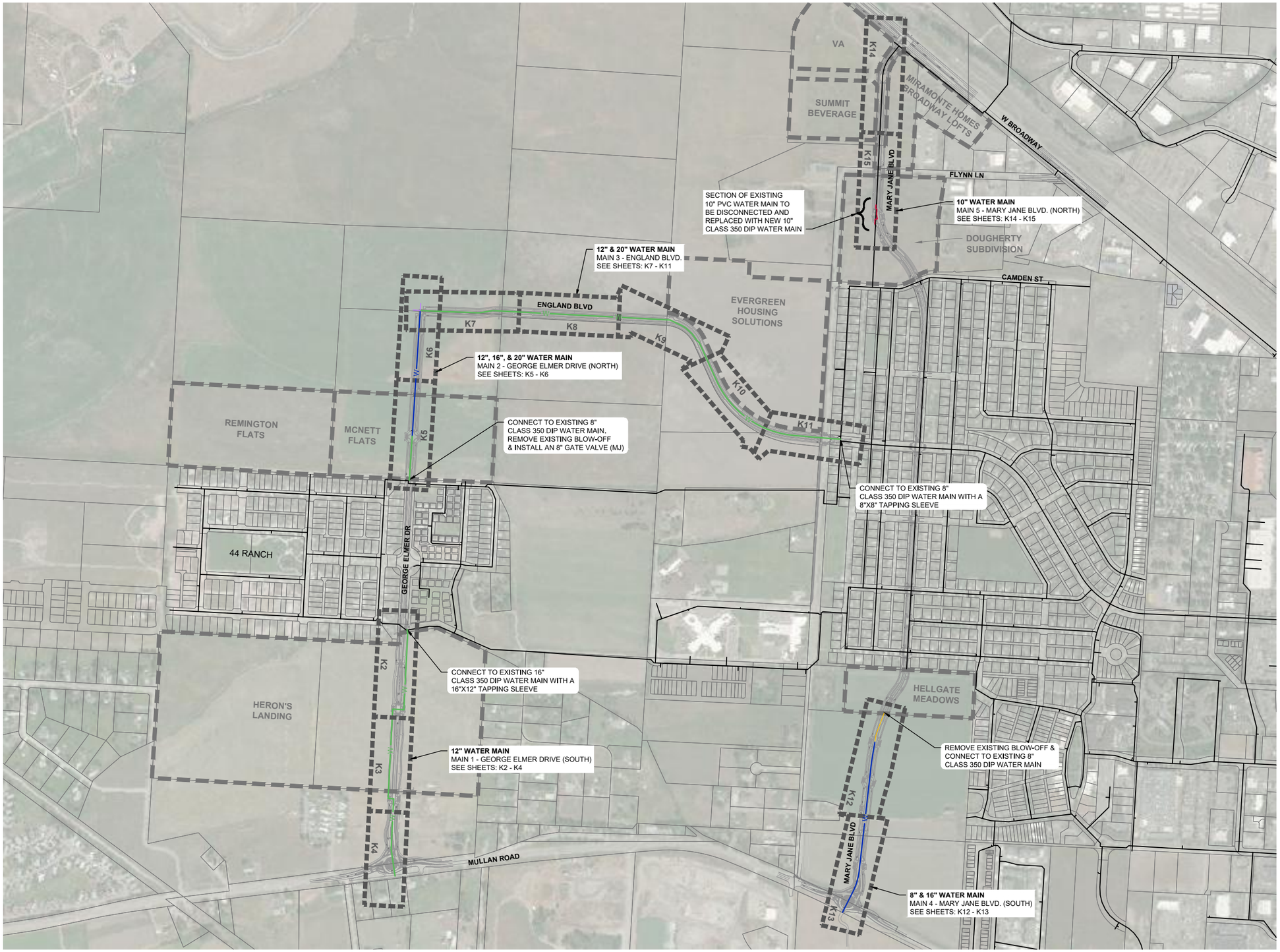


0 400 800
SCALE IN FEET

CALL UTILITY NOTIFICATION CENTER OF MONTANA
811
CALL FOR THE MARKING OF UNDERGROUND UTILITIES **2 BUSINESS DAYS BEFORE** YOU DIG, GRADE, OR EXCAVATE

SHEET INDEX

K1 COVER SHEET & SHEET INDEX
K2 MAIN 1 - GEORGE ELMER DRIVE (SOUTH)
K3 MAIN 1 - GEORGE ELMER DRIVE (SOUTH)
K4 MAIN 1 - GEORGE ELMER DRIVE (SOUTH)
K5 MAIN 2 - GEORGE ELMER DRIVE (NORTH)
K6 MAIN 2 - GEORGE ELMER DRIVE (NORTH)
K7 MAIN 3 - ENGLAND BLVD.
K8 MAIN 3 - ENGLAND BLVD.
K9 MAIN 3 - ENGLAND BLVD.
K10 MAIN 3 - ENGLAND BLVD.
K11 MAIN 3 - ENGLAND BLVD.
K12 MAIN 4 - MARY JANE BLVD. (SOUTH)
K13 MAIN 4 - MARY JANE BLVD. (SOUTH)
K14 MAIN 5 - MARY JANE BLVD. (NORTH)
K15 MAIN 5 - MARY JANE BLVD. (NORTH)
K16 STANDARD WATER DETAILS - 1
K17 STANDARD WATER DETAILS - 2

LEGEND

- 8" WATER
- 10" WATER
- 12" WATER
- 16" WATER
- 20" WATER
- EXISTING

WATER CONSTRUCTION NOTES:

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE CITY OF MISSOULA PUBLIC WORKS STANDARDS & SPECIFICATIONS (MCPWSS) AND MULLAN BUILD SPECIFICATIONS, IF ANY.
2. STATIONS ARE PROVIDED FROM CENTER OF BEND, TEE, OR CONNECTION, UNLESS NOTED OTHERWISE.
3. WATER SERVICES SHALL BE CONSTRUCTED AND INSPECTED PER INTERNATIONAL PLUMBING CODE, AND CITY OF MISSOULA STANDARDS FOR DESIGN AND CONSTRUCTION.
4. 2" THICKNESS CLOSED CELL INSULATION BOARD PER AASHTO M230-70 SHALL BE USED WHERE COVER OVER THE WATER MAIN IS LESS THAN 6'. INSULATION MUST BE LAID AT SAME WIDTH OF EXCAVATED TRENCH.

MONTANA DANIEL J. HAYNOR No. 8101 PE REGISTERED PROFESSIONAL ENGINEER

REVISION	DATE	DESCRIPTION
-	-	-

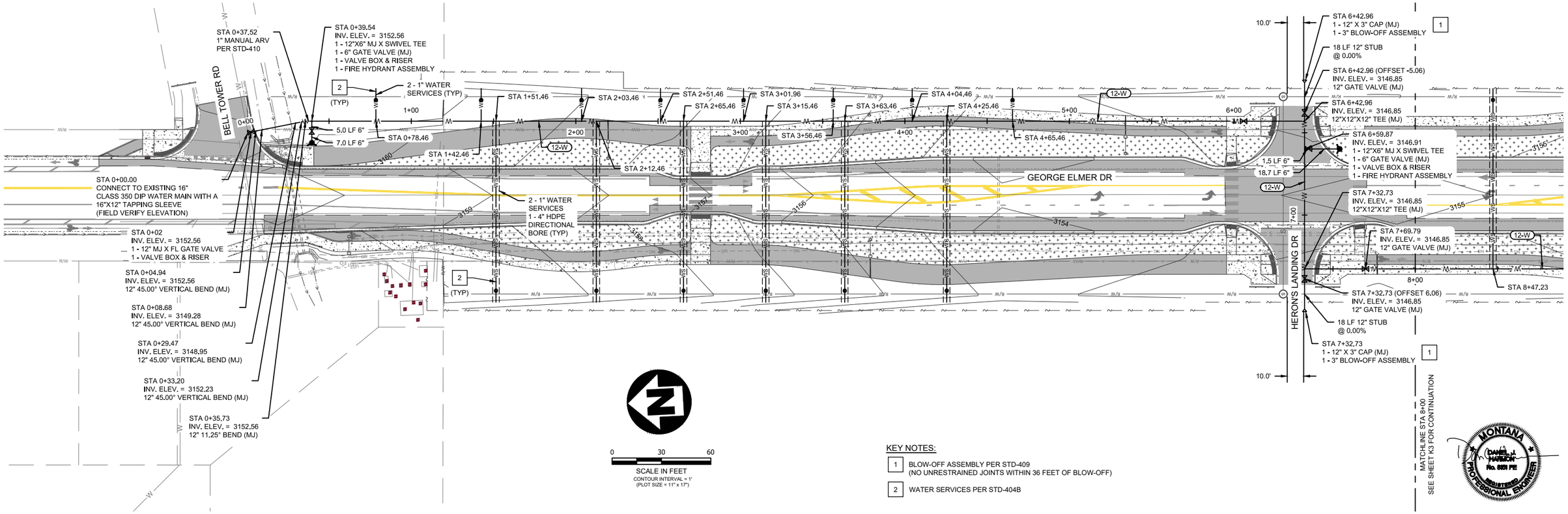
DESIGNER DH PROJ. NO. 7065
DRAWN JW DATE 04/12/2021
CHECKED CC SURVEYED DJ&A, P.C.

HDR

MULLAN BUILD - WATER UTILITY
100% - BID PLANS

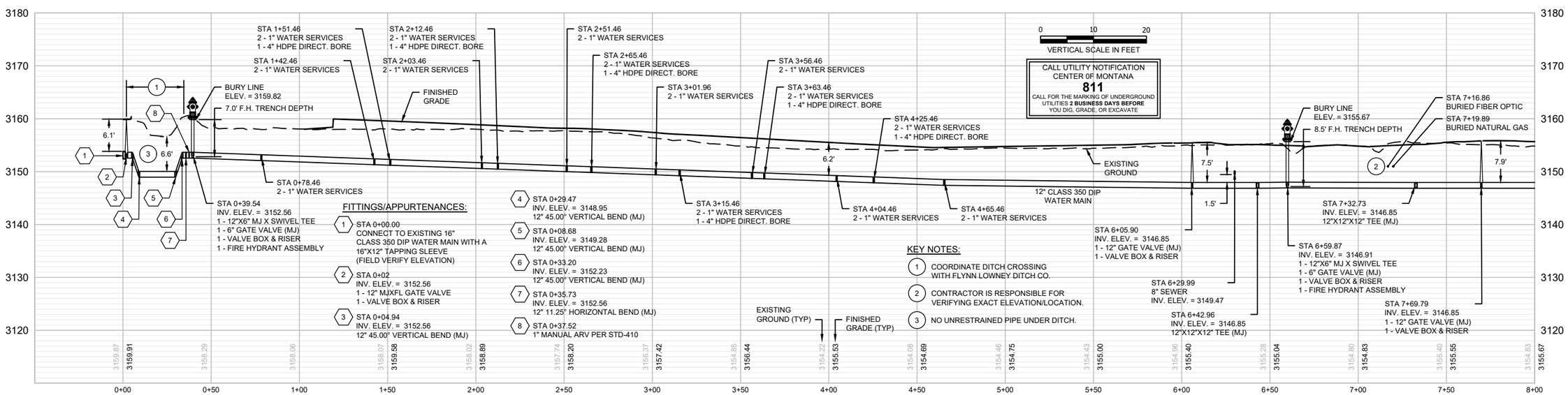
COVER SHEET & SHEET INDEX

SHEET K1 OF K17



KEY NOTES:

1. BLOW-OFF ASSEMBLY PER STD-409 (NO UNRESTRAINED JOINTS WITHIN 36 FEET OF BLOW-OFF)
2. WATER SERVICES PER STD-404B



FITTINGS/APPURTENANCES:

1. STA 0+00.00
CONNECT TO EXISTING 16"
CLASS 350 DIP WATER MAIN WITH A
16"X12" TAPPING SLEEVE
(FIELD VERIFY ELEVATION)
2. STA 0+02
INV. ELEV. = 3152.56
1 - 12" MJXFL GATE VALVE
1 - VALVE BOX & RISER
3. STA 0+04.94
INV. ELEV. = 3152.56
12" 45.00° VERTICAL BEND (MJ)
4. STA 0+29.47
INV. ELEV. = 3148.95
12" 45.00° VERTICAL BEND (MJ)
5. STA 0+08.68
INV. ELEV. = 3149.28
12" 45.00° VERTICAL BEND (MJ)
6. STA 0+33.20
INV. ELEV. = 3152.23
12" 45.00° VERTICAL BEND (MJ)
7. STA 0+35.73
INV. ELEV. = 3152.56
12" 11.25° HORIZONTAL BEND (MJ)
8. STA 0+37.52
1" MANUAL ARV PER STD-410

KEY NOTES:

1. COORDINATE DITCH CROSSING WITH FLYNN LOWNEY DITCH CO.
2. CONTRACTOR IS RESPONSIBLE FOR VERIFYING EXACT ELEVATION/LOCATION.
3. NO UNRESTRAINED PIPE UNDER DITCH.

REVISION	DATE	DESCRIPTION
-	-	-

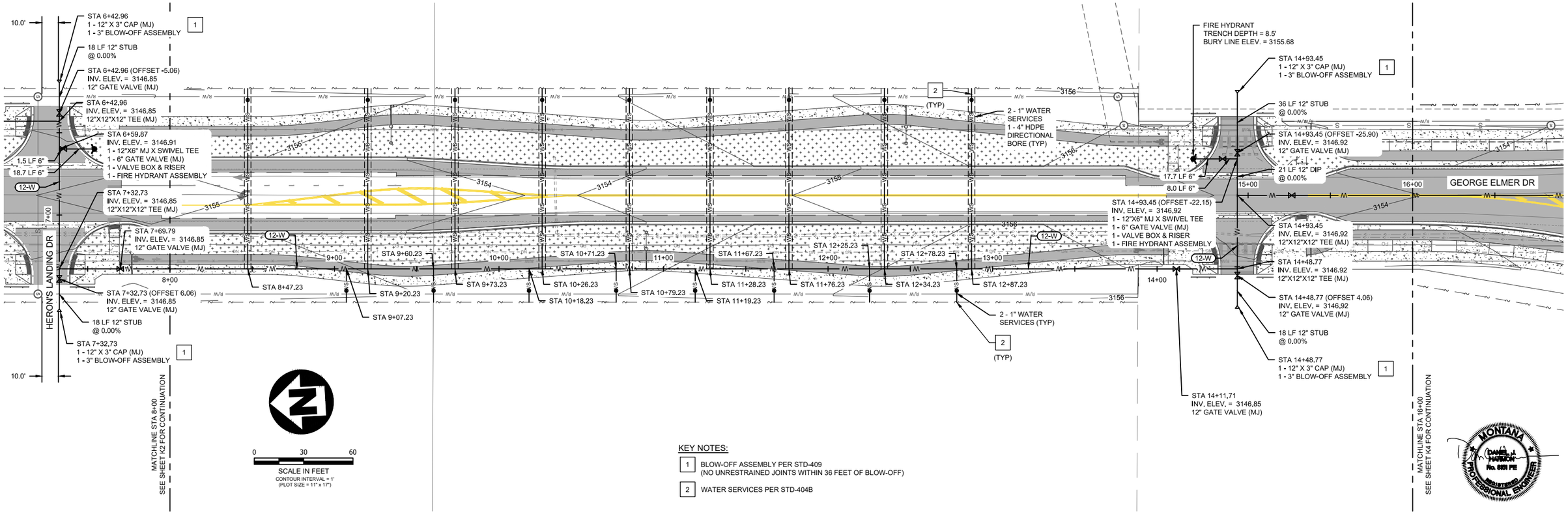
DESIGNER DH PROJ. NO. 7065
DRAWN JW DATE 04/12/2021
CHECKED CC SURVEYED DJ&A, P.C.

HDR

MULLAN BUILD - WATER UTILITY
100% - BID PLANS

MAIN 1 - GEORGE ELMER DRIVE (SOUTH)

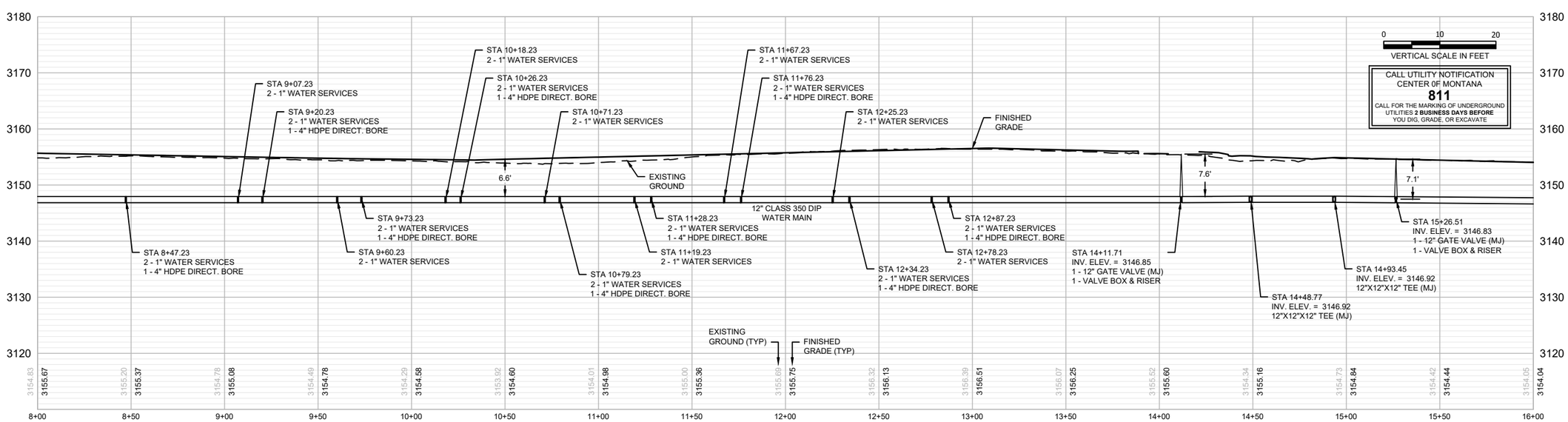
SHEET K2 OF K17



KEY NOTES:

1 BLOW-OFF ASSEMBLY PER STD-409
(NO UNRESTRAINED JOINTS WITHIN 36 FEET OF BLOW-OFF)

2 WATER SERVICES PER STD-404B



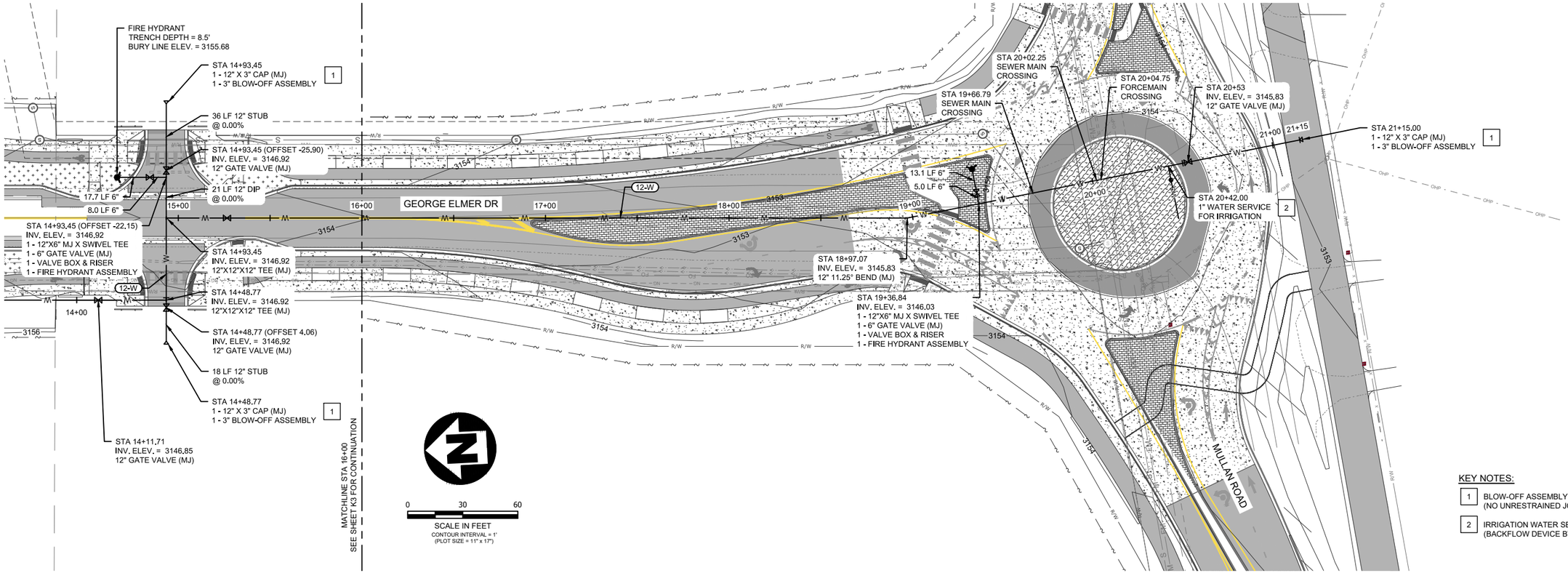
REVISION	DATE	DESCRIPTION
-	-	-

DESIGNER DH PROJ. NO. 7065
DRAWN JW DATE 04/12/2021
CHECKED CC SURVEYED DJ&A, P.C.

MULLAN BUILD - WATER UTILITY
100% - BID PLANS

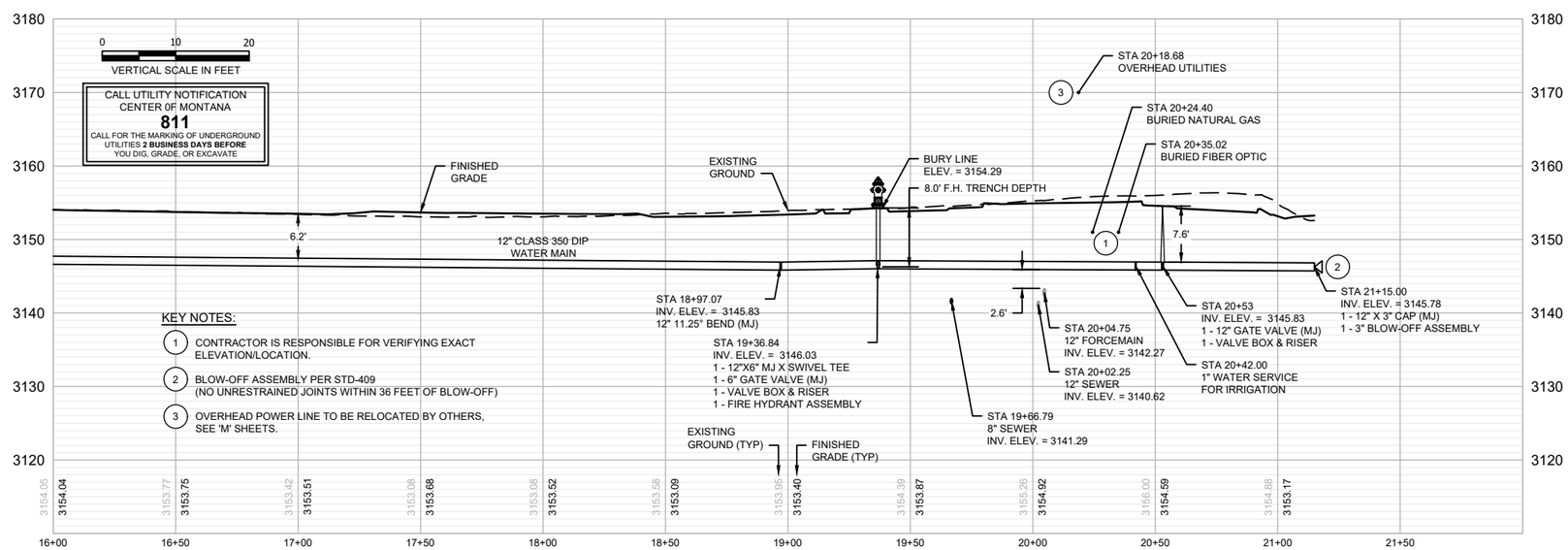
MAIN 1 - GEORGE ELMER DRIVE (SOUTH)

SHEET K3 OF K17



KEY NOTES:

1. BLOW-OFF ASSEMBLY PER STD-409 (NO UNRESTRAINED JOINTS WITHIN 36 FEET OF BLOW-OFF)
2. IRRIGATION WATER SERVICE PER STD-404B (BACKFLOW DEVICE BY OTHERS)



KEY NOTES:

1. CONTRACTOR IS RESPONSIBLE FOR VERIFYING EXACT ELEVATION/LOCATION.
2. BLOW-OFF ASSEMBLY PER STD-409 (NO UNRESTRAINED JOINTS WITHIN 36 FEET OF BLOW-OFF)
3. OVERHEAD POWER LINE TO BE RELOCATED BY OTHERS, SEE 'M' SHEETS.

MONTANA DANIEL HANSON No. 9251 PE REGISTERED PROFESSIONAL ENGINEER

REVISION	DATE	DESCRIPTION
-	-	-

DESIGNER DH PROJ. NO. 7065
DRAWN JW DATE 04/12/2021
CHECKED CC SURVEYED DJ&A, P.C.

HDR

MULLAN BUILD - WATER UTILITY
100% - BID PLANS

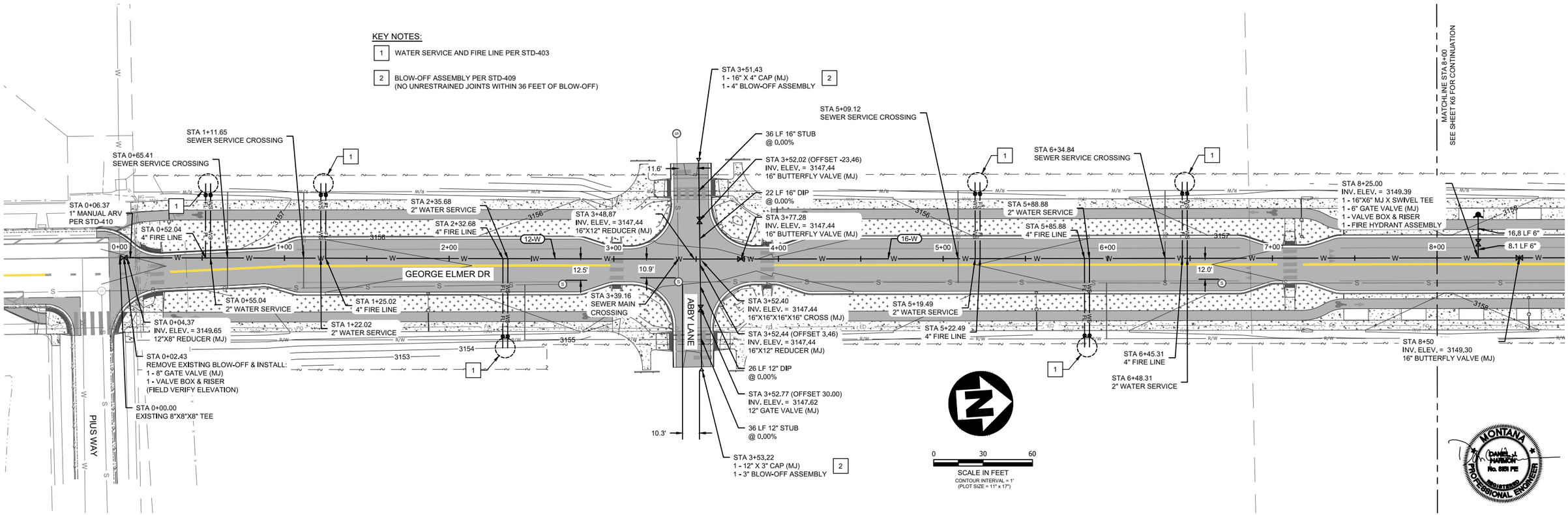
MAIN 1 - GEORGE ELMER DRIVE (SOUTH)

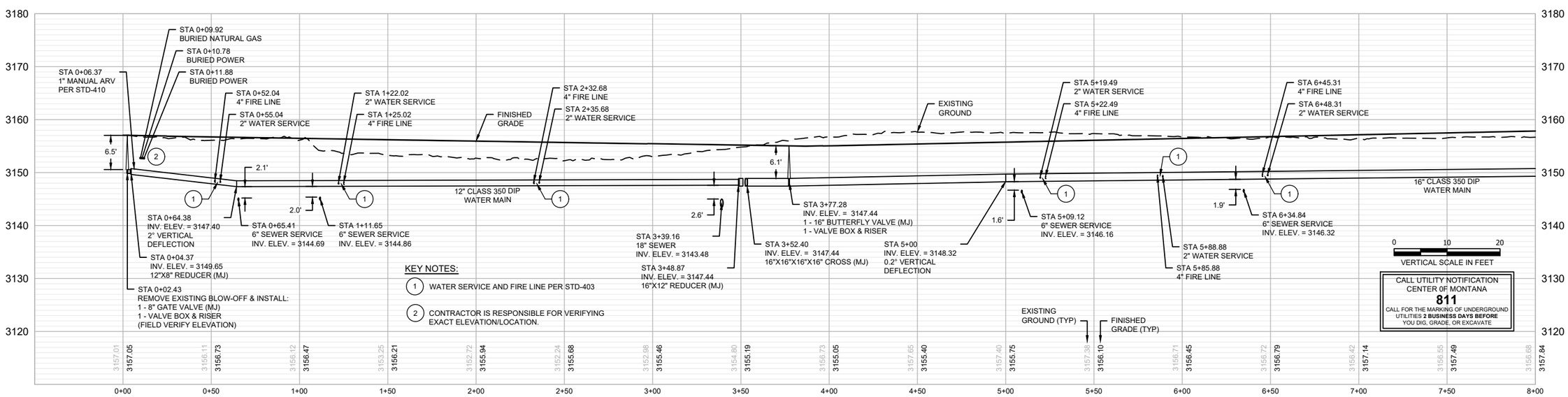
SHEET K4 OF K17

KEY NOTES:

1 WATER SERVICE AND FIRE LINE PER STD-403

2 BLOW-OFF ASSEMBLY PER STD-409
(NO UNRESTRAINED JOINTS WITHIN 36 FEET OF BLOW-OFF)





KEY NOTES:

1 WATER SERVICE AND FIRE LINE PER STD-403

2 CONTRACTOR IS RESPONSIBLE FOR VERIFYING EXACT ELEVATION/LOCATION.

MONTANA
DANIEL HARDIN
No. 9801 PE
REGISTERED
PROFESSIONAL ENGINEER

REVISION	DATE	DESCRIPTION
-	-	-

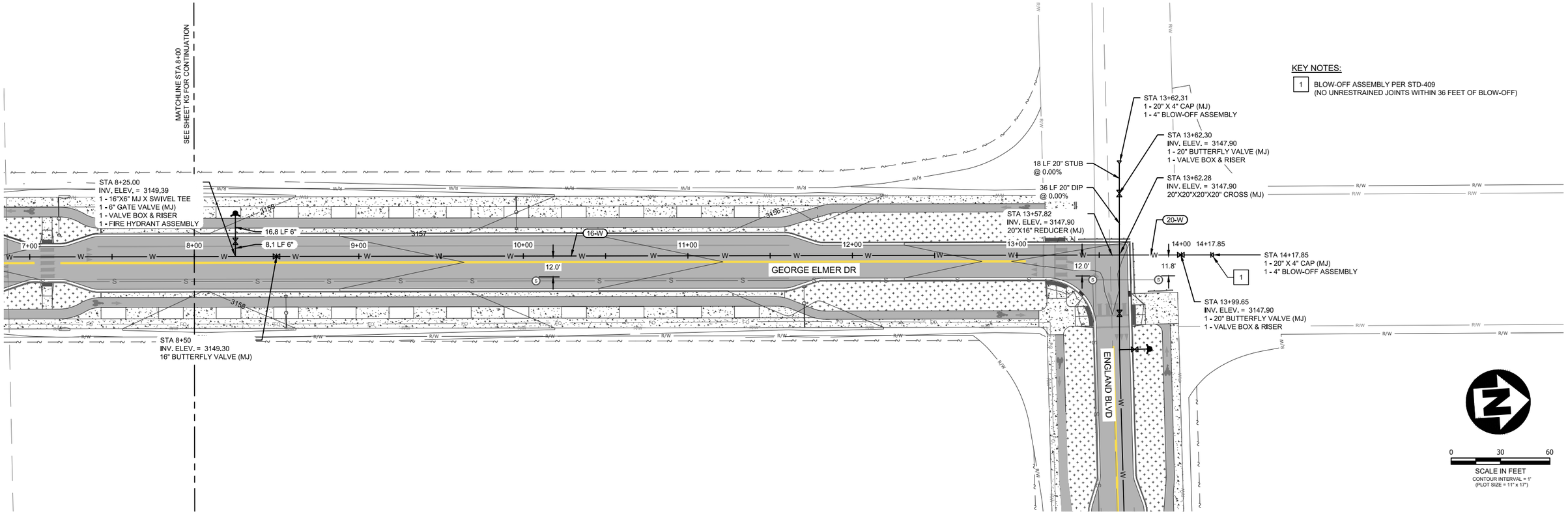
DESIGNER DH PROJ. NO. 7065
DRAWN JW DATE 04/12/2021
CHECKED CC SURVEYED DJ&A, P.C.

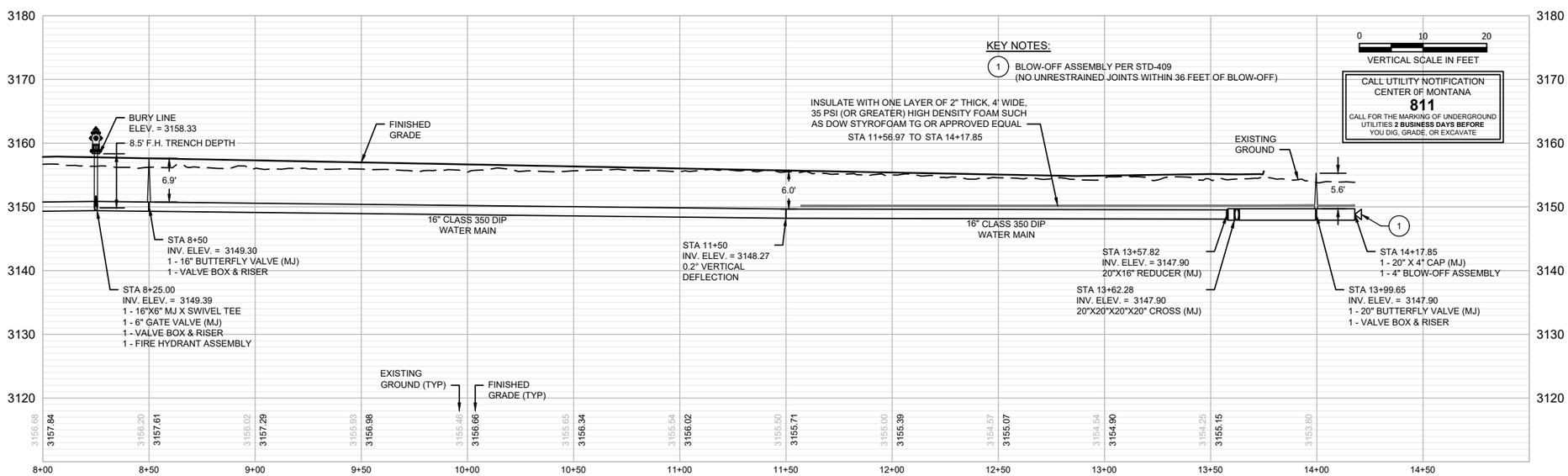
HDR

MULLAN BUILD - WATER UTILITY
100% - BID PLANS

MAIN 2 - GEORGE ELMER DRIVE (NORTH)

SHEET K5 OF K17





REVISION	DATE	DESCRIPTION
-	-	-

DESIGNER DH PROJ. NO. 7065
DRAWN JW DATE 04/12/2021
CHECKED CC SURVEYED DJ&A, P.C.

HDR

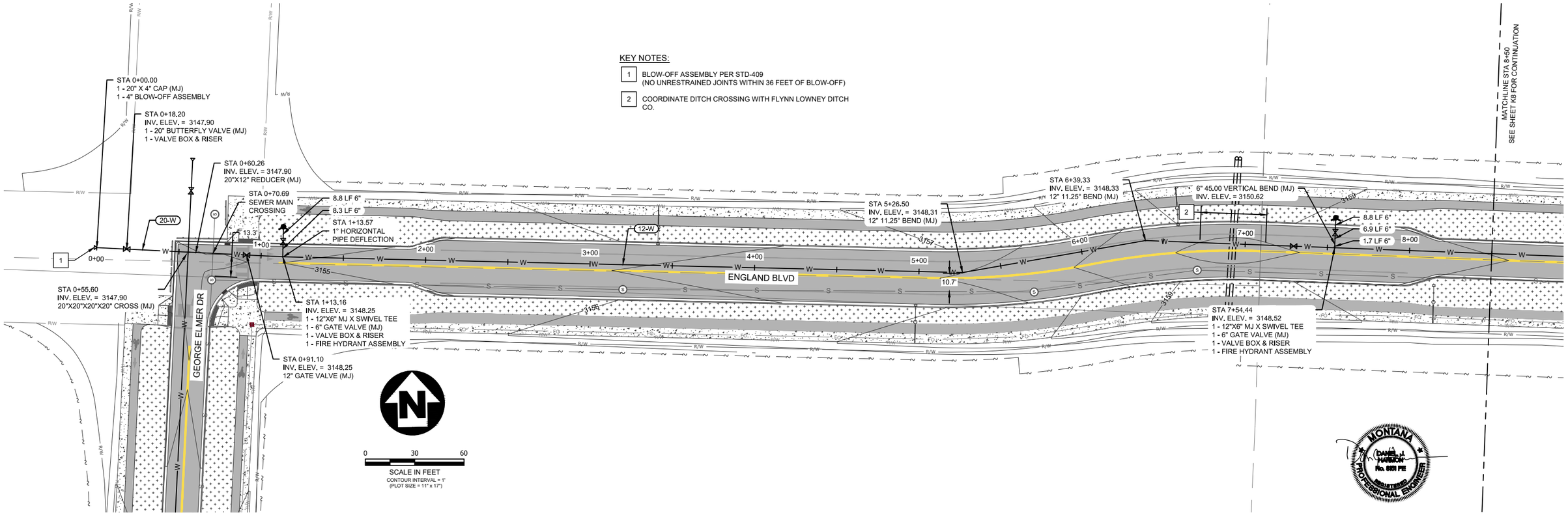
MULLAN BUILD - WATER UTILITY
100% - BID PLANS

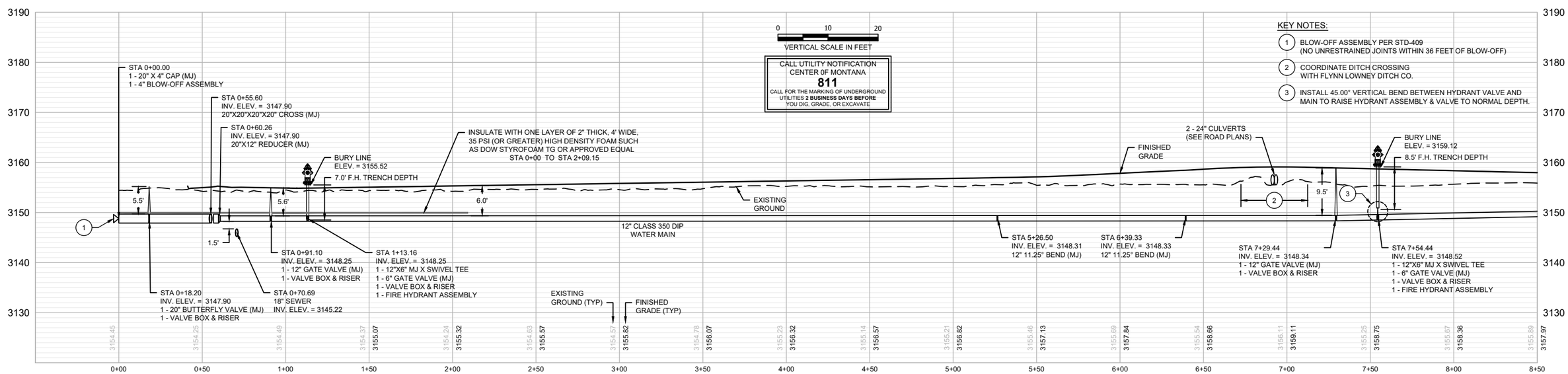
MAIN 2 - GEORGE ELMER DRIVE (NORTH)

SHEET K6 OF K17

KEY NOTES:

1. BLOW-OFF ASSEMBLY PER STD-409 (NO UNRESTRAINED JOINTS WITHIN 36 FEET OF BLOW-OFF)
2. COORDINATE DITCH CROSSING WITH FLYNN LOWNEY DITCH CO.





REVISION	DATE	DESCRIPTION
-	-	-

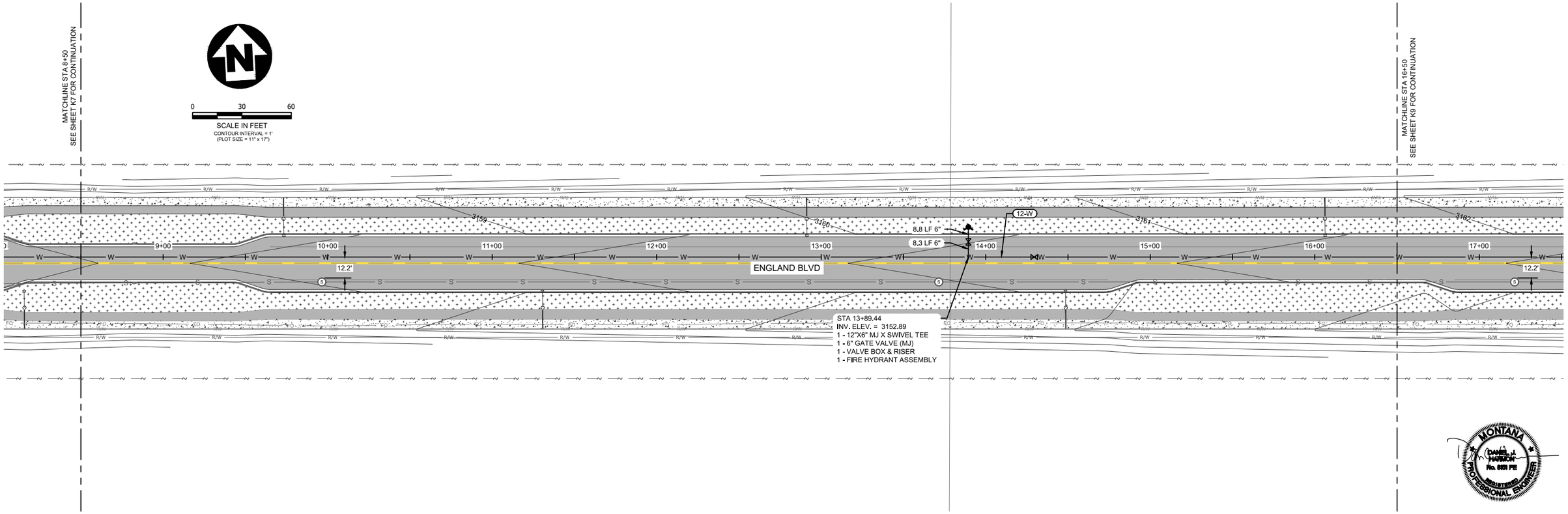
DESIGNER DH PROJ. NO. 7065
DRAWN JW DATE 04/12/2021
CHECKED CC SURVEYED DJ&A, P.C.

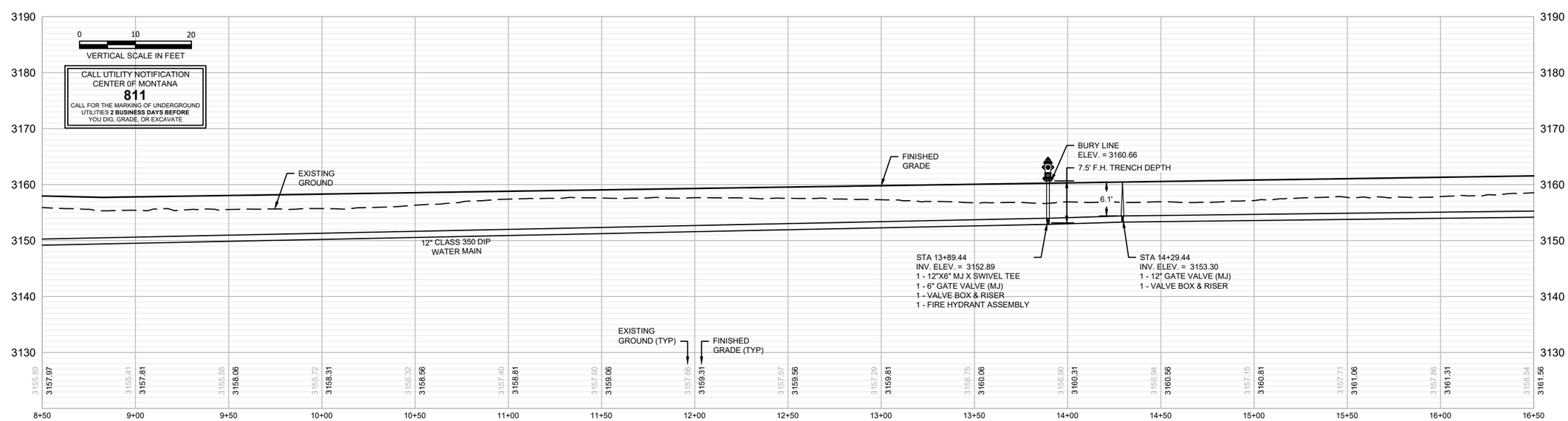
HDR

MULLAN BUILD - WATER UTILITY
100% - BID PLANS

MAIN 3 - ENGLAND BLVD.

SHEET K7 OF K17





REVISION	DATE	DESCRIPTION
-	-	-

DESIGNER DH PROJ. NO. 7065
DRAWN JW DATE 04/12/2021
CHECKED CC SURVEYED DJ&A, P.C.

HDR

MULLAN BUILD - WATER UTILITY
100% - BID PLANS

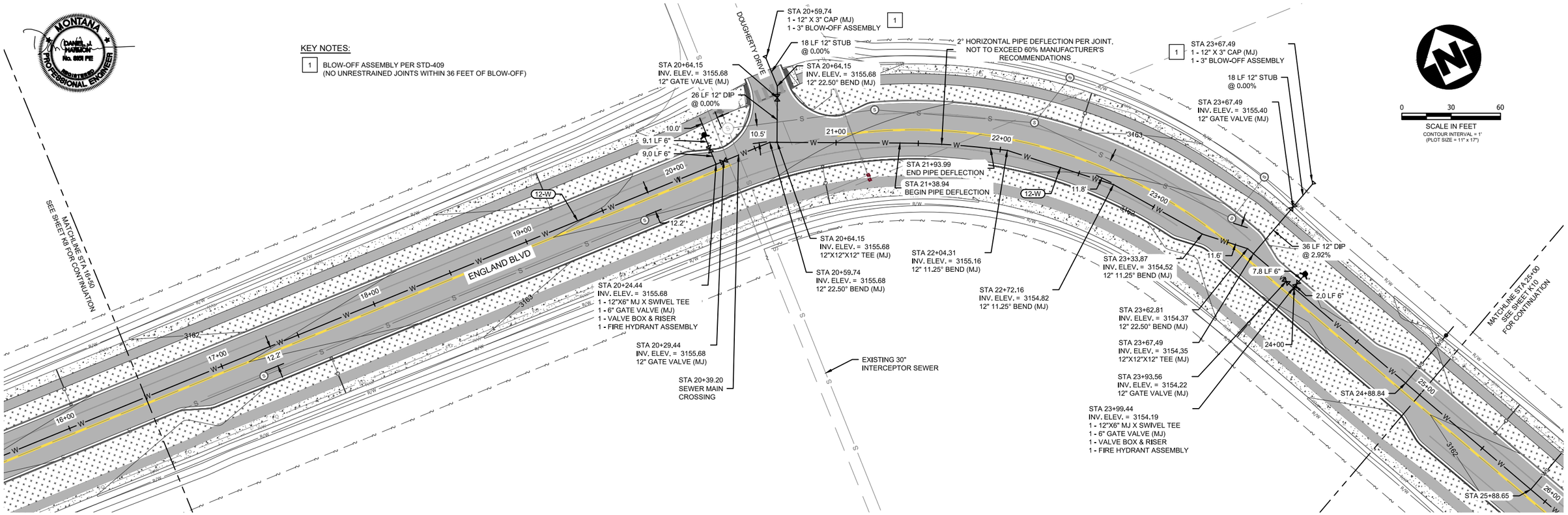
MAIN 3 - ENGLAND BLVD.

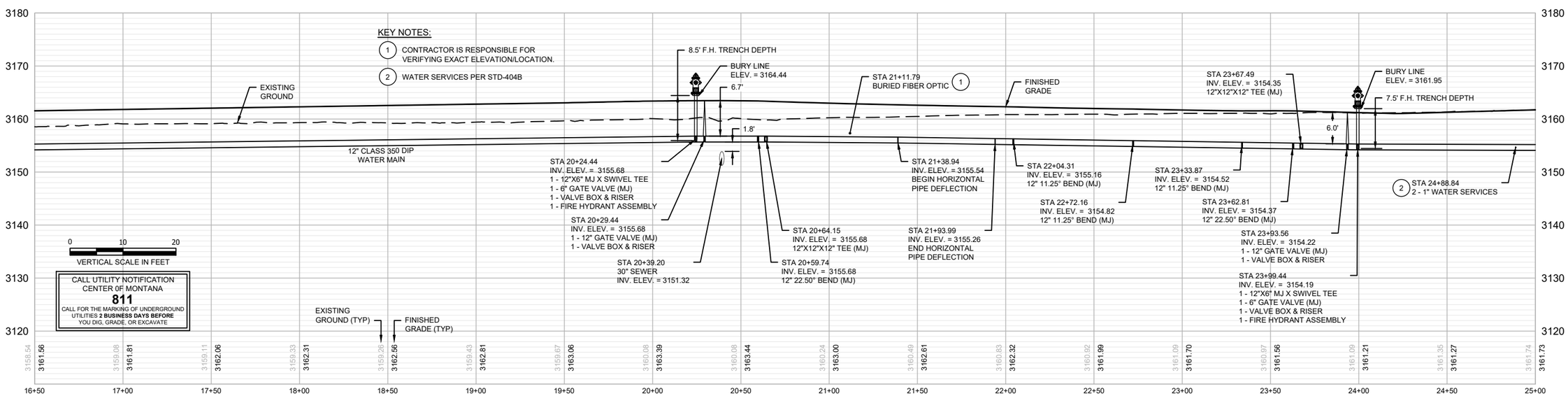
SHEET K8 OF K17

MONTANA
DANIEL J. HARMON
No. 9821 PE
REGISTERED
PROFESSIONAL ENGINEER

KEY NOTES:

1 BLOW-OFF ASSEMBLY PER STD-409
(NO UNRESTRAINED JOINTS WITHIN 36 FEET OF BLOW-OFF)





REVISION	DATE	DESCRIPTION
-	-	-

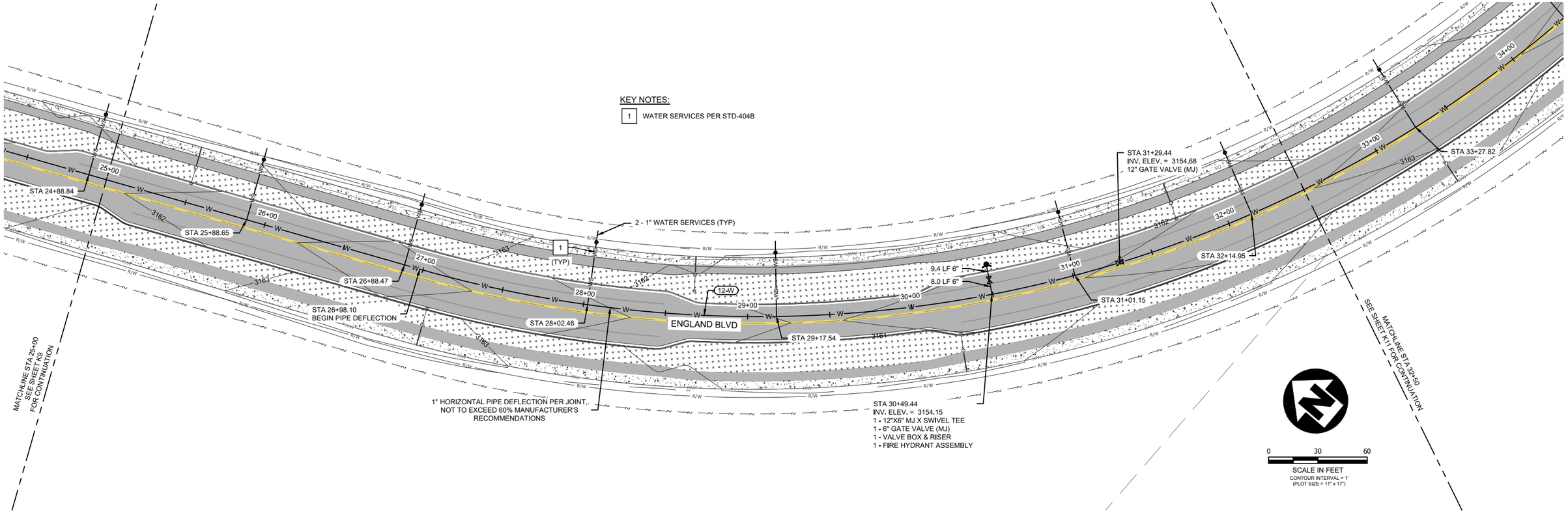
DESIGNER DH PROJ. NO. 7065
DRAWN JW DATE 04/12/2021
CHECKED CC SURVEYED DJ&A, P.C.

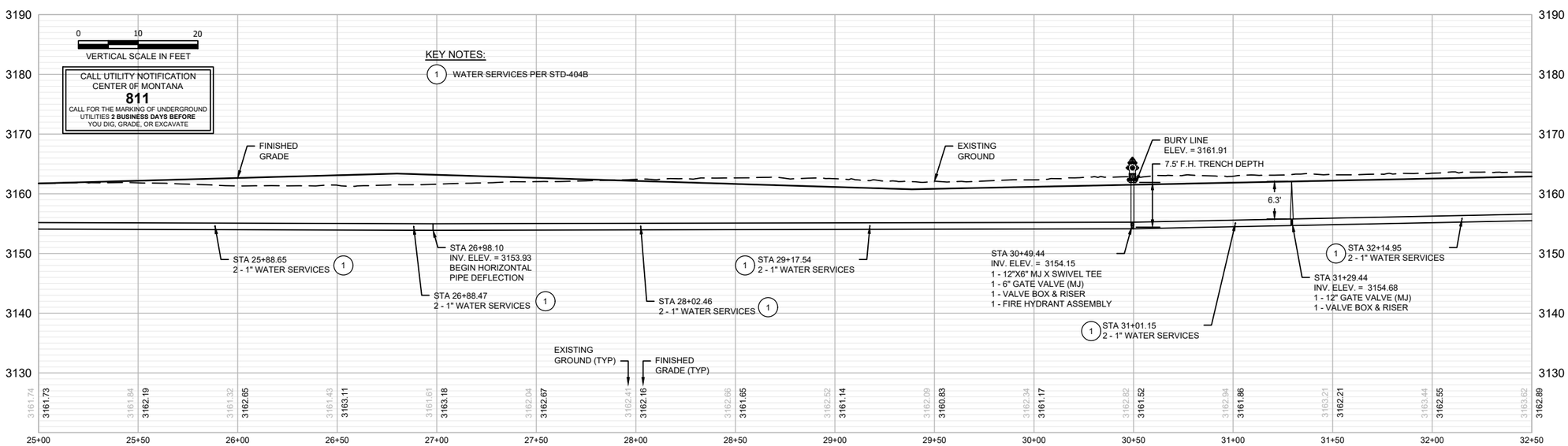
HDR

MULLAN BUILD - WATER UTILITY
100% - BID PLANS

MAIN 3 - ENGLAND BLVD.

SHEET K9 OF K17





REVISION	DATE	DESCRIPTION
-	-	-

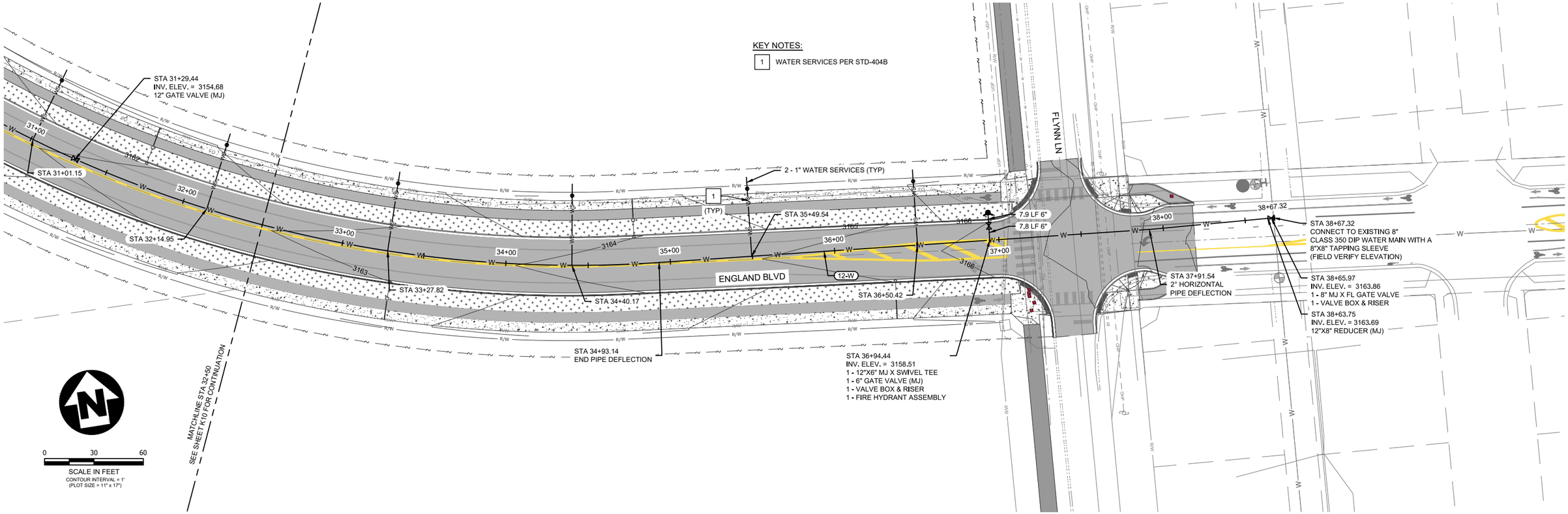
DESIGNER DH PROJ. NO. 7065
DRAWN JW DATE 04/12/2021
CHECKED CC SURVEYED DJ&A, P.C.

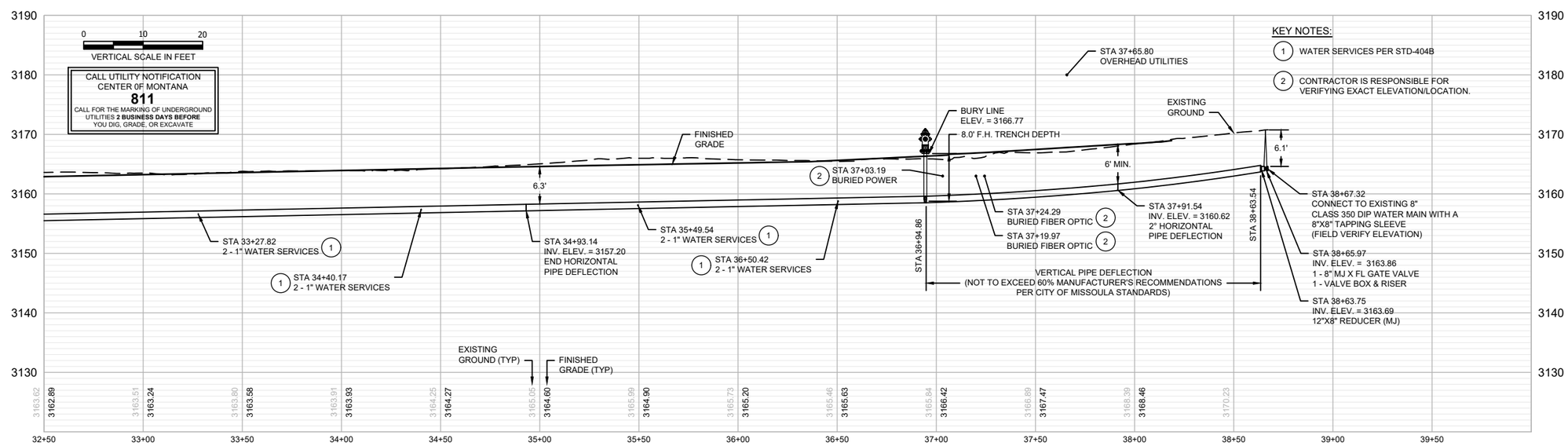
HDR

MULLAN BUILD - WATER UTILITY
100% - BID PLANS

MAIN 3 - ENGLAND BLVD.

SHEET K10 OF K17





MONTANA
DANIEL HARMON
No. 8101 PE
RESTRICTED
PROFESSIONAL ENGINEER

REVISION	DATE	DESCRIPTION
-	-	-

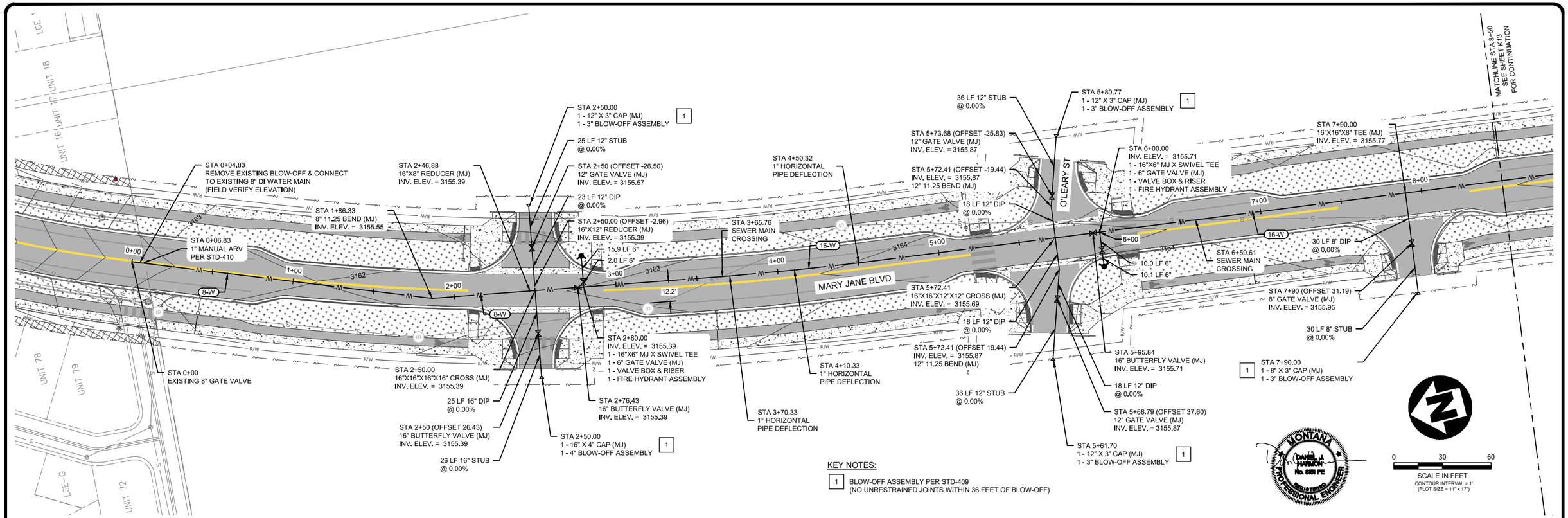
DESIGNER DH PROJ. NO. 7065
DRAWN JW DATE 04/12/2021
CHECKED CC SURVEYED DJ&A, P.C.

HDR

MULLAN BUILD - WATER UTILITY
100% - BID PLANS

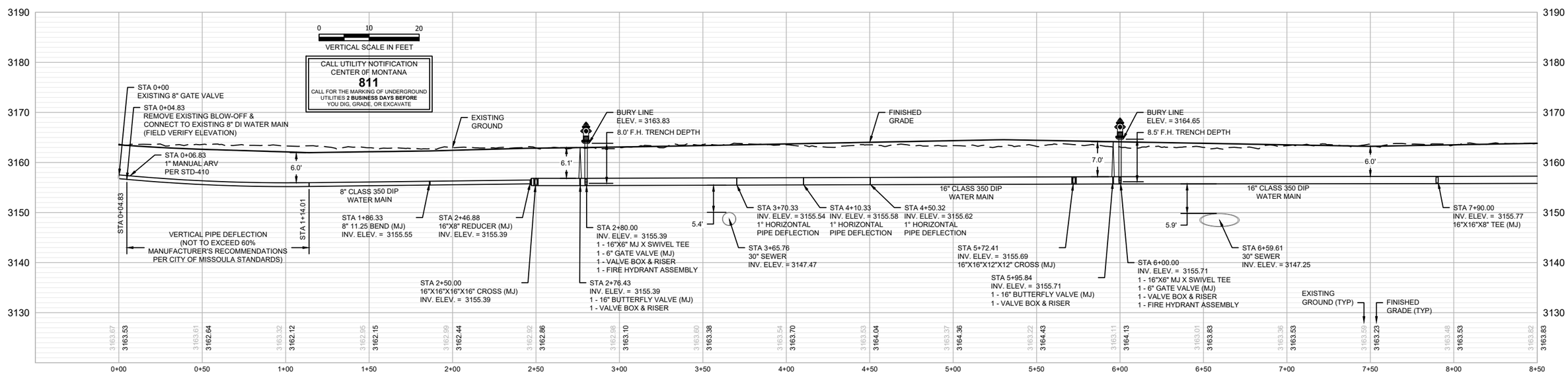
MAIN 3 - ENGLAND BLVD.

SHEET K11 OF K17



KEY NOTES:

1 BLOW-OFF ASSEMBLY PER STD-409
(NO UNRESTRAINED JOINTS WITHIN 36 FEET OF BLOW-OFF)



REVISION	DATE	DESCRIPTION
-	-	-

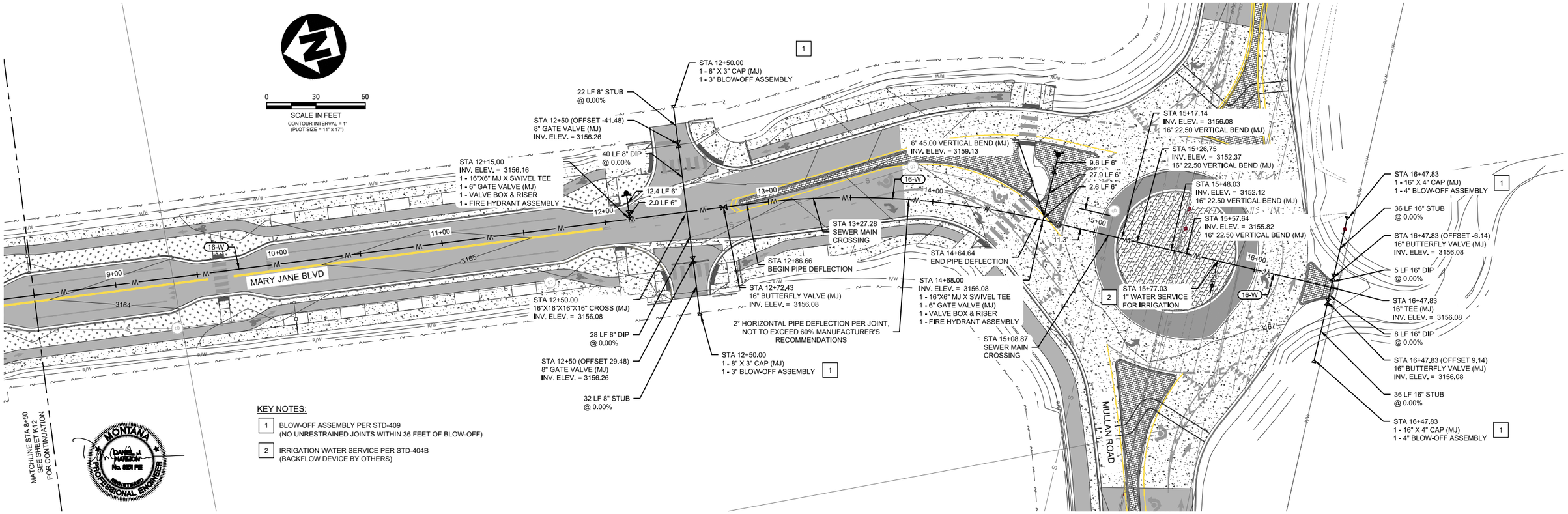
DESIGNER DH PROJ. NO. 7065
DRAWN JW DATE 04/12/2021
CHECKED CC SURVEYED DJ&A, P.C.

HDR

MULLAN BUILD - WATER UTILITY
100% - BID PLANS

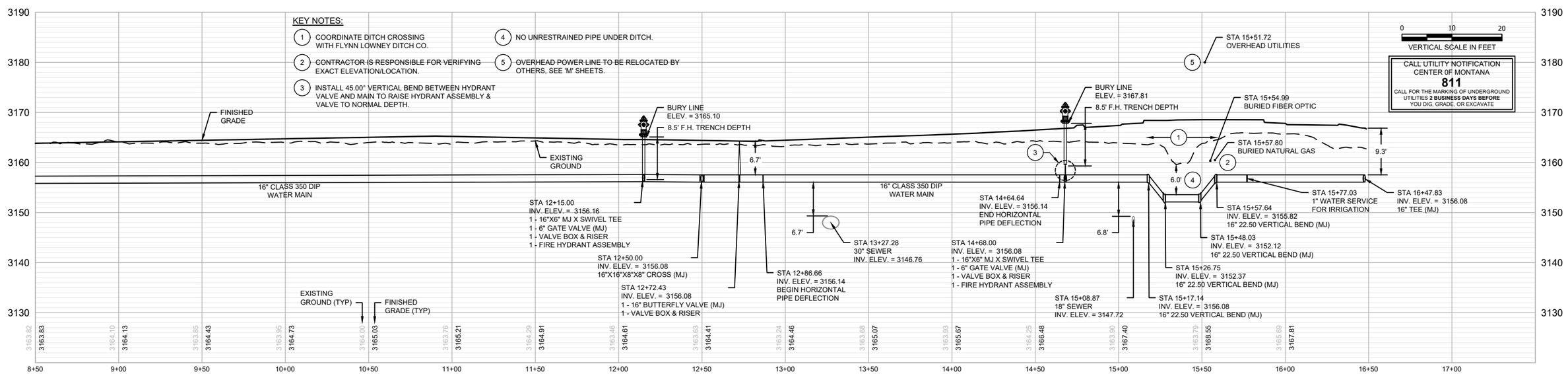
MAIN 4 - MARY JANE BLVD. (SOUTH)

SHEET K12 OF K17



KEY NOTES:

1. BLOW-OFF ASSEMBLY PER STD-409 (NO UNRESTRAINED JOINTS WITHIN 36 FEET OF BLOW-OFF)
2. IRRIGATION WATER SERVICE PER STD-404B (BACKFLOW DEVICE BY OTHERS)



REVISION	DATE	DESCRIPTION
-	-	-

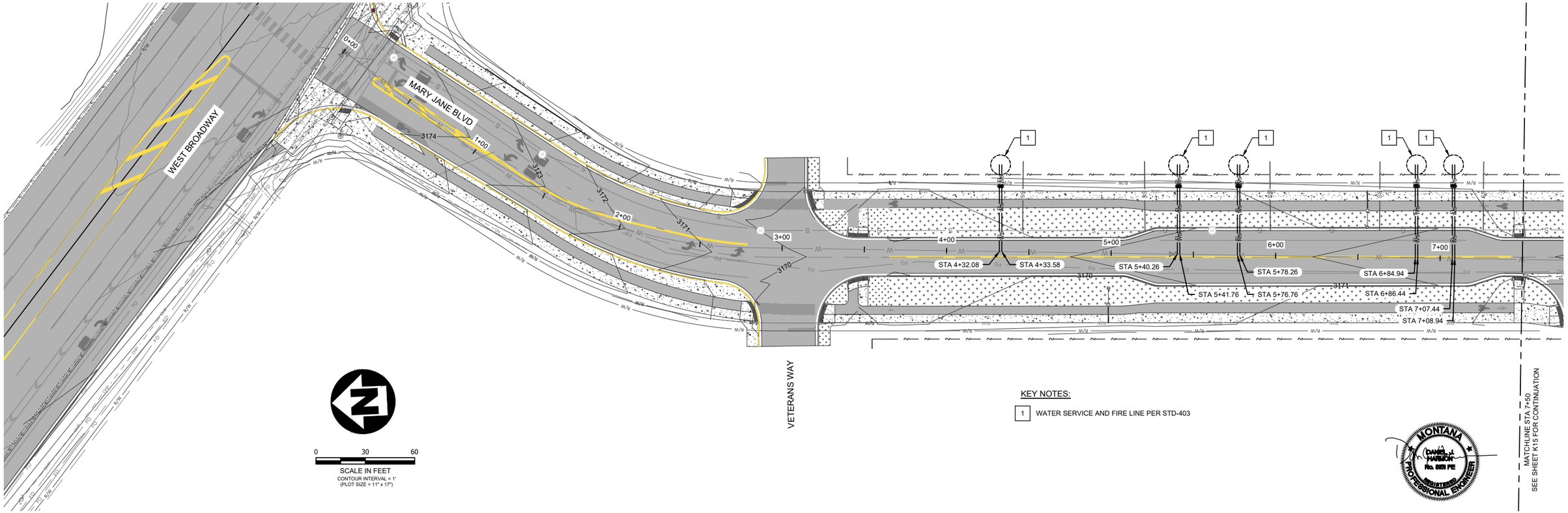
DESIGNER DH PROJ. NO. 7065
DRAWN JW DATE 04/12/2021
CHECKED CC SURVEYED DJ&A, P.C.

HDR

MULLAN BUILD - WATER UTILITY
100% - BID PLANS

MAIN 4 - MARY JANE BLVD. (SOUTH)

SHEET K13 OF K17

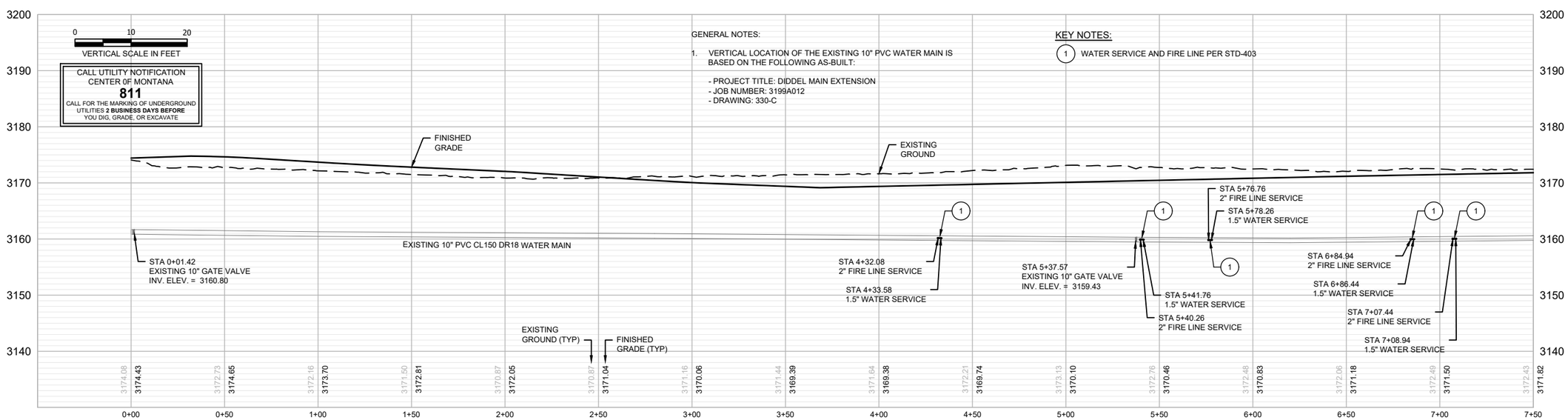


0 30 60
SCALE IN FEET
CONTOUR INTERVAL = 1'
(PLOT SIZE = 11" x 17")

KEY NOTES:

1 WATER SERVICE AND FIRE LINE PER STD-403

MONTANA
DANIEL HARMON
No. 5101 PE
REGISTERED
PROFESSIONAL ENGINEER



GENERAL NOTES:

1. VERTICAL LOCATION OF THE EXISTING 10" PVC WATER MAIN IS BASED ON THE FOLLOWING AS-BUILT:

   - PROJECT TITLE: DIDDEL MAIN EXTENSION
   - JOB NUMBER: 3199A012
   - DRAWING: 330-C

KEY NOTES:

1 WATER SERVICE AND FIRE LINE PER STD-403

REVISION	DATE	DESCRIPTION
-	-	-

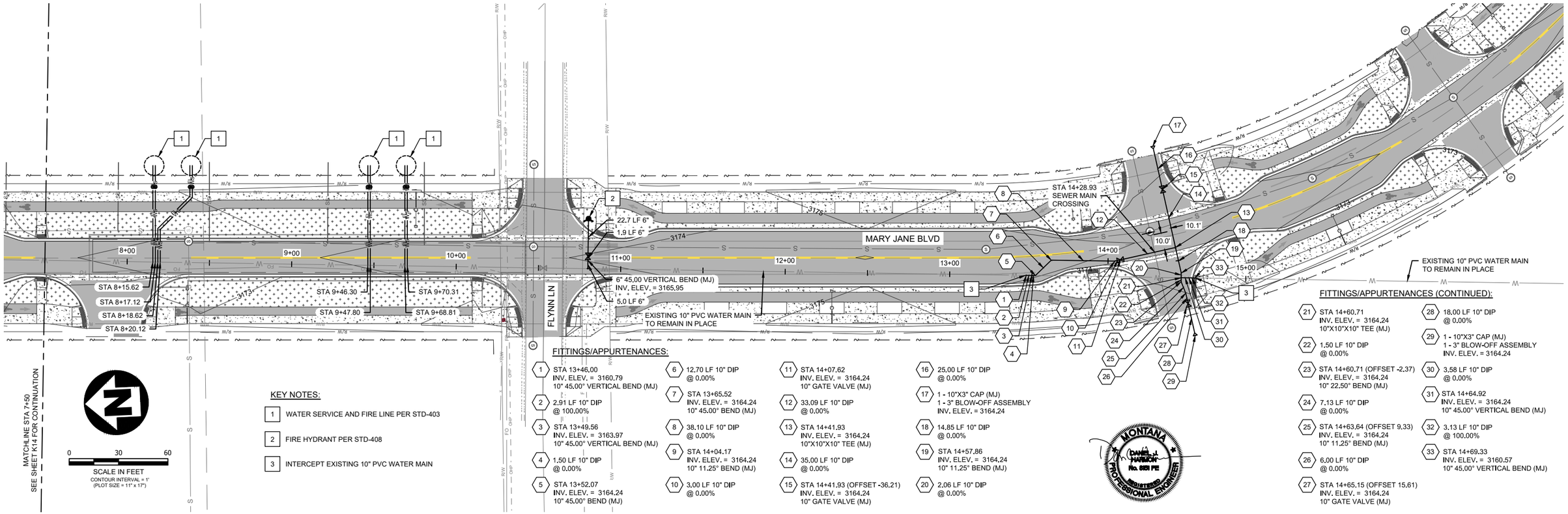
DESIGNER DH PROJ. NO. 7065
DRAWN JW DATE 04/12/2021
CHECKED CC SURVEYED DJ&A, P.C.

HDR

MULLAN BUILD - WATER UTILITY
100% - BID PLANS

MAIN 5 - MARY JANE BLVD. (NORTH)

SHEET K14 OF K17



KEY NOTES:

1. WATER SERVICE AND FIRE LINE PER STD-403
2. FIRE HYDRANT PER STD-408
3. INTERCEPT EXISTING 10" PVC WATER MAIN

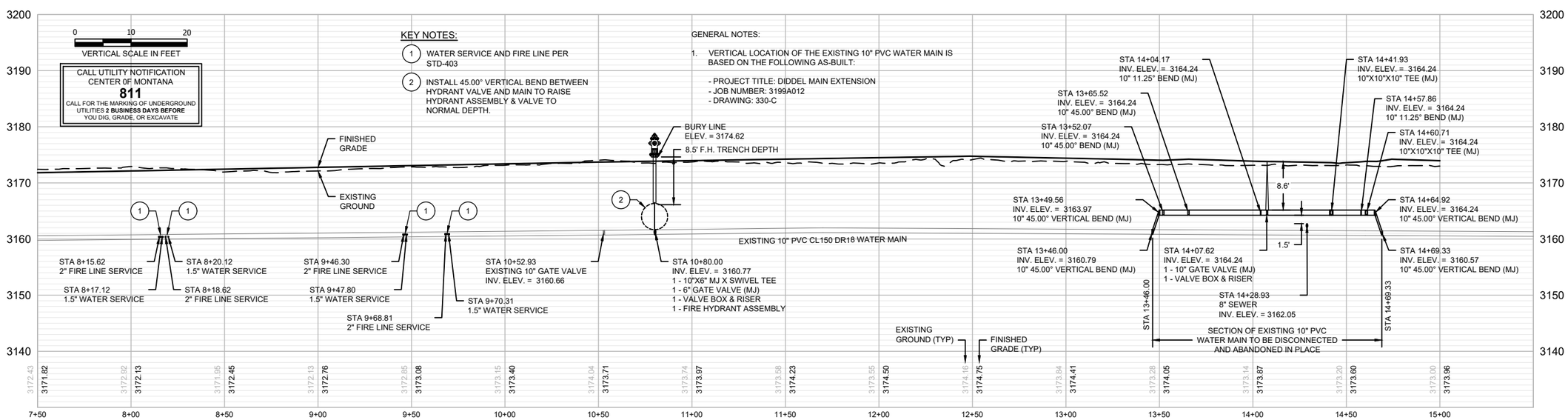
FITTINGS/APPURTENANCES:

1. STA 13+46.00 INV. ELEV. = 3160.79 10" 45.00° VERTICAL BEND (MJ)
2. 2.91 LF 10" DIP @ 100.00%
3. STA 13+49.56 INV. ELEV. = 3163.97 10" 45.00° VERTICAL BEND (MJ)
4. 1.50 LF 10" DIP @ 0.00%
5. STA 13+52.07 INV. ELEV. = 3164.24 10" 45.00° BEND (MJ)
6. 12.70 LF 10" DIP @ 0.00%
7. STA 13+65.52 INV. ELEV. = 3164.24 10" 45.00° BEND (MJ)
8. 38.10 LF 10" DIP @ 0.00%
9. STA 14+04.17 INV. ELEV. = 3164.24 10" 11.25° BEND (MJ)
10. 3.00 LF 10" DIP @ 0.00%
11. STA 14+07.62 INV. ELEV. = 3164.24 10" GATE VALVE (MJ)
12. 33.09 LF 10" DIP @ 0.00%
13. STA 14+41.93 INV. ELEV. = 3164.24 10"X10"X10" TEE (MJ)
14. 35.00 LF 10" DIP @ 0.00%
15. STA 14+41.93 (OFFSET -36.21) INV. ELEV. = 3164.24 10" GATE VALVE (MJ)
16. 25.00 LF 10" DIP @ 0.00%
17. 1 - 10"X3" CAP (MJ) 1 - 3" BLOW-OFF ASSEMBLY INV. ELEV. = 3164.24
18. 14.85 LF 10" DIP @ 0.00%
19. STA 14+57.86 INV. ELEV. = 3164.24 10" 11.25° BEND (MJ)
20. 2.06 LF 10" DIP @ 0.00%

MONTANA DANIEL HARBOR No. 9811PE REGISTERED PROFESSIONAL ENGINEER

FITTINGS/APPURTENANCES (CONTINUED):

21. STA 14+60.71 INV. ELEV. = 3164.24 10"X10"X10" TEE (MJ)
22. 1.50 LF 10" DIP @ 0.00%
23. STA 14+60.71 (OFFSET -2.37) INV. ELEV. = 3164.24 10" 22.50° BEND (MJ)
24. 7.13 LF 10" DIP @ 0.00%
25. STA 14+63.64 (OFFSET 9.33) INV. ELEV. = 3164.24 10" 11.25° BEND (MJ)
26. 6.00 LF 10" DIP @ 0.00%
27. STA 14+65.15 (OFFSET 15.61) INV. ELEV. = 3164.24 10" GATE VALVE (MJ)
28. 18.00 LF 10" DIP @ 0.00%
29. 1 - 10"X3" CAP (MJ) 1 - 3" BLOW-OFF ASSEMBLY INV. ELEV. = 3164.24
30. 3.58 LF 10" DIP @ 0.00%
31. STA 14+64.92 INV. ELEV. = 3164.24 10" 45.00° VERTICAL BEND (MJ)
32. 3.13 LF 10" DIP @ 100.00%
33. STA 14+69.33 INV. ELEV. = 3160.57 10" 45.00° VERTICAL BEND (MJ)



KEY NOTES:

1. WATER SERVICE AND FIRE LINE PER STD-403
2. INSTALL 45.00° VERTICAL BEND BETWEEN HYDRANT VALVE AND MAIN TO RAISE HYDRANT ASSEMBLY & VALVE TO NORMAL DEPTH.

GENERAL NOTES:

1. VERTICAL LOCATION OF THE EXISTING 10" PVC WATER MAIN IS BASED ON THE FOLLOWING AS-BUILT:
   - PROJECT TITLE: DIDDEL MAIN EXTENSION
   - JOB NUMBER: 3199A012
   - DRAWING: 330-C

REVISION	DATE	DESCRIPTION
-	-	-

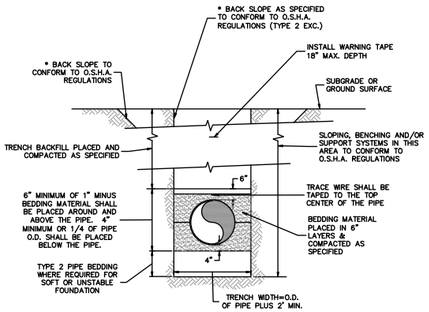
DESIGNER DH PROJ. NO. 7065
DRAWN JW DATE 04/12/2021
CHECKED CC SURVEYED DJ&A, P.C.

HDR

MULLAN BUILD - WATER UTILITY
100% - BID PLANS

MAIN 5 - MARY JANE BLVD. (NORTH)

SHEET K15 OF K17

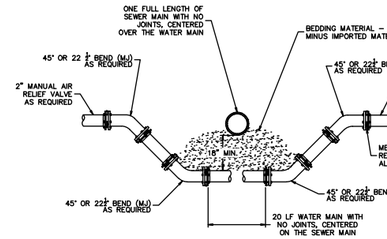


* SEE O.S.H.A. CONSTRUCTION STANDARDS FOR EXCAVATIONS, SECTION 1926, SUBPART P.

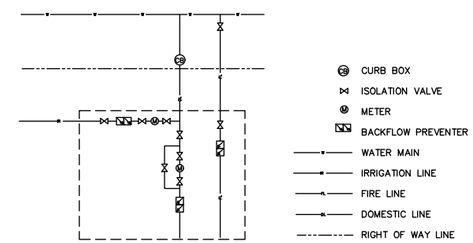
NOTE:

CASING PIPE (IF ANY) INSTALLED BY TRENCH CONSTRUCTION METHODS SHALL BE BEDDED AS SHOWN IN THIS DETAIL.

Engineering Division	Typical Utility Trench Detail	Approved By Utilities Engineer Logan McInnis, PE	Revised: 09/28/2020	STD - 401



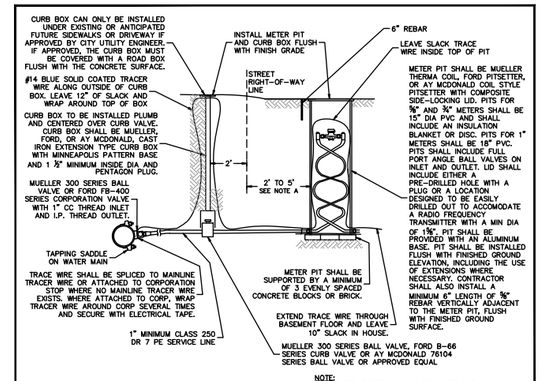
Engineering Division	Typical Water Line Crossing @ Sewer Mains	Approved By Utilities Engineer Logan McInnis, PE	Revised: 09/28/2020	STD - 402



GENERAL NOTES:

1. ALL COMMERCIAL AND MULTIFAMILY (GREATER THAN 3 UNITS) SERVICES REQUIRE BACKFLOW PREVENTION DEVICES INSTALLED IN ACCORDANCE WITH MISSOULA WATER'S BACKFLOW RULES, INCLUDING PROVIDING ADEQUATE DRAINAGE IN THE EVENT OF DISCHARGE FROM THE BACKFLOW PREVENTER. IN MOST CASES, REDUCED PRESSURE PRINCIPLE BACKFLOW DEVICES WILL BE REQUIRED ON BOTH DOMESTIC AND FIRE LINES.
2. COMMERCIAL OR MULTIFAMILY BUILDINGS WITH A FIRE LINE MUST HAVE SEPARATE FIRE AND DOMESTIC LINES TO THE WATER MAIN, EACH WITH A SHUTOFF VALVE IN THE RIGHT-OF-WAY.
3. IF MULTIPLE UNITS IN A BUILDING WILL BE METERED SEPARATELY, EACH UNIT MUST HAVE A SEPARATE OUTSIDE SHUTOFF VALVE LOCATED IN THE RIGHT-OF-WAY.
4. COMMERCIAL METERS MUST BE INSTALLED IN A BUILDING MECHANICAL ROOM WITH A MINIMUM CEILING HEIGHT OF 6 FEET.
5. A 1/2-INCH PVC CONDUIT WITH A PULL WIRE MUST BE INSTALLED FROM THE WATER METER ALL THE WAY THROUGH AN EXTERIOR WALL OF THE BUILDING WITHIN 2-5 FEET OF GROUND SURFACE, FOR INSTALLATION OF A REMOTE TRANSMITTER.
6. METERS LARGER THAN 1-INCH REQUIRED A BYPASS LINE.
7. METERS ARE NOT ALLOWED IN CRAWL SPACES.
8. METERS MUST BE INSTALLED HORIZONTALLY.
9. METERS MUST BE INSTALLED BETWEEN 1-FOOT AND 5-FEET ABOVE FLOOR LEVEL.
10. NO OBSTRUCTIONS ARE ALLOWED WITHIN 12-INCHES ABOVE OR BELOW THE METER.
11. THERE SHALL BE A MINIMUM OF 6-INCHES OF HORIZONTAL CLEARANCE BETWEEN THE METER AND ANY WALL OR OTHER OBSTRUCTION.
12. SUFFICIENT ACCESS SHALL BE PROVIDED TO THE FRONT OF THE METER FOR INSTALLATION AND REMOVAL. THERE SHALL BE A MINIMUM OF 3-FEET OF CLEAR SPACE IN FRONT OF THE METER.

Engineering Division	Typical Commercial & Mult-Family Water Service Detail	Approved By Utilities Engineer Logan McInnis, PE	Revised: 09/28/2020	STD - 403

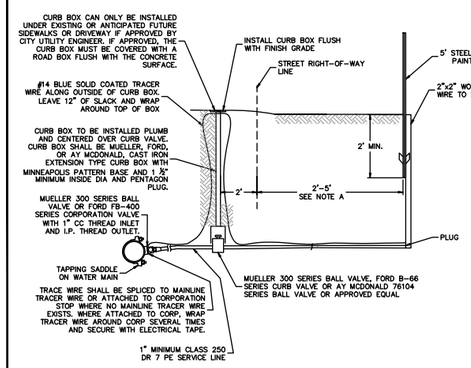


NOTE:
A. WHERE THERE IS A UTILITY EASEMENT ADJACENT TO THE RIGHT-OF-WAY, METER PIT CAN BE LOCATED 2' ON THE HOUSE SIDE OF THE EASEMENT.

GENERAL NOTES:

1. WATER SERVICES SHALL BE BURIED A MINIMUM OF 6' DEEP.
2. THIS DETAIL APPROPRIATE FOR 5/8", 3/4" OR 1" METERS. CONTRACT CITY UTILITY ENGINEER FOR RESIDENTIAL METERS LARGER THAN 1". IRRIGATION METERS LARGER THAN 1" MUST BE INSTALLED IN A CONCRETE PIT PER STD-412 OR OTHER APPROVED DRAWING.
3. PLASTIC METER PITS ARE NOT TRAFFIC RATED. METER PITS ARE NOT ALLOWED IN SIDEWALKS OR IN A TRAFFIC AREA UNLESS APPROVED BY THE CITY UTILITY ENGINEER. IF APPROVED BY THE CITY UTILITY ENGINEER. INSTALLATION SHALL HAVE A FLUSH MOUNTED, TRAFFIC RATED CASTING INSTALLED OVER THE PIT. THE CASTING DIA SHALL BE AT LEAST 3" LARGER THAN THE METER PIT. THE METER TRANSMITTER SHALL BE INSTALLED ON THE BUILDING WALL WITH A 1/2" CONDUIT BETWEEN THE PIT AND THE WALL.
4. NO OBSTRUCTIONS SHALL BE PLACED WITHIN A MIN 4' RADIUS AROUND THE METER PIT TO ENSURE ACCESS TO THE PIT.
5. NO PRV'S, CHECK VALVES, OR BACKFLOW DEVICES ALLOWED IN METER PIT.
6. THIS DIAGRAM IS NOT PROJECT SPECIFIC AND IS NOT INTENDED TO BE A DESIGN DRAWING. THE OWNER IS RESPONSIBLE TO COMPLY WITH ALL APPLICABLE BUILDING CODES. THIS DETAIL MAY CHANGE AT ANY TIME AND IT IS THE OWNER'S RESPONSIBILITY TO OBTAIN THE MOST CURRENT VERSION OF THIS AND OTHER CITY REQUIREMENTS.
7. IF PROPERTY DOES NOT FRONT A STREET WITH A WATER MAIN, CONTACT CITY FOR SPECIFIC REQUIREMENTS RELATED TO EASEMENTS AND METER PIT LOCATIONS.
8. WHERE NEW WATER SERVICE LINE TRANSITIONS TO EXISTING GALVANIZED SERVICE LINE, THE NEW TRACER WIRE SHOULD BE ATTACHED TO THE GALVANIZED PIPE USING A CHRISTY'S OR APPROVED EQUAL UL APPROVED BRONZE GROUNDING CLAMP SUITABLE FOR DIRECT BURIAL.
9. IF METER PIT IS INSTALLED TOO LOW THE CONTRACTOR/DEVELOPER SHALL BE RESPONSIBLE FOR THE PURCHASE AND INSTALLATION OF A METER RESETTER TO BRING TO FINISHED GRADE.

Engineering Division	Typical Residential Water Service Detail	Approved By Utilities Engineer Logan McInnis, PE	Revised: 09/28/2020	STD - 404A

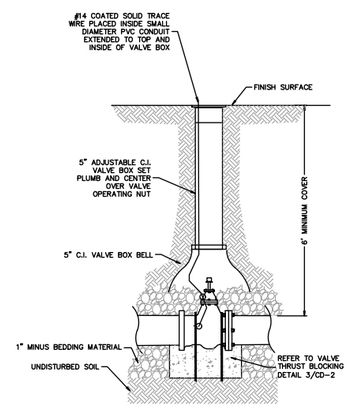


NOTE:
A. WHERE THERE IS A UTILITY EASEMENT ADJACENT TO THE RIGHT-OF-WAY, METER PIT CAN BE LOCATED 2' ON THE HOUSE SIDE OF THE EASEMENT.

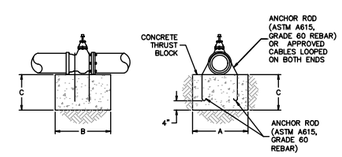
GENERAL NOTES:

1. WATER SERVICES SHALL BE BURIED A MINIMUM OF 6' DEEP.
2. FOR WATER SERVICES STUBS LARGER THAN 2" SEE CITY STANDARD DETAIL STD-413.
3. IF PROPERTY DOES NOT FRONT A STREET WITH A WATER MAIN, CONTACT CITY FOR SPECIFIC REQUIREMENTS RELATED TO EASEMENTS.
4. SERVICE LINE SHALL END AT WOOD POST. NO ABOVE GROUND WHIPS ALLOWED. IT IS THE INSTALLER'S RESPONSIBILITY TO REMOVE AIR FROM THE SERVICE LINES AS NECESSARY.
5. WATER SERVICE STUBS SHALL BE INSTALLED WHERE SHOWN ON THE DRAWINGS OR AS SPECIFIED BY CITY ENGINEERING.

Engineering Division	Typical Residential Water Service Stub Detail	Approved By Utilities Engineer Logan McInnis, PE	Revised: 09/28/2020	STD - 404B



Engineering Division	Valve Detail	Approved By Utilities Engineer Logan McInnis, PE	Revised: 09/28/2020	STD - 405



NOTES:

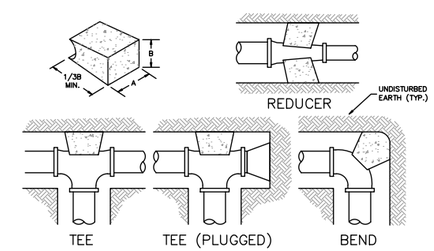
1. DIAGRAM DEPICTS GATE VALVES ONLY, VALVES 12 INCH AND LARGER TO BE BUTTERFLY, AND INSTALLED PER MANUFACTURERS RECOMMENDATIONS WITH BLOCKS CENTERED UNDER LOAD BEARING PORTION OF VALVE.
2. STEEL CABLE (3/4" MINIMUM DIA, OR AS APPROVED BY THE ENGINEER) W/ANCHOR BOLTS MAY BE SUBSTITUTED FOR ANCHOR ROD.

STANDARD THRUST BLOCK DIMENSIONS

ANCHOR ROD SIZE	VALVE SIZE	100 PSI			150 PSI			200 PSI			250 PSI			300 PSI	
		"A"	"B"	"C"	"A"	"B"	"C"	"A"	"B"	"C"	"A"	"B"	"C"	"A"	"B"
3/4"	6" & 8"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"
3/4"	10"	2'-0"	2'-0"	2'-0"	2'-6"	2'-6"	2'-0"	2'-9"	2'-6"	2'-6"	3'-0"	3'-0"	3'-0"	3'-7"	3'-0"
3/4"	12"	2'-3"	2'-0"	2'-0"	3'-0"	3'-0"	2'-8"	3'-5"	3'-0"	3'-0"	4'-3"	3'-0"	3'-0"	5'-1"	3'-0"
1"	14"	2'-3"	2'-0"	2'-4"	3'-5"	3'-0"	3'-0"	4'-6"	3'-0"	3'-0"	4'-0"	4'-0"	4'-0"	4'-9"	4'-0"
1 1/8"	16"	3'-0"	3'-0"	2'-11"	4'-4"	3'-0"	3'-0"	4'-1"	4'-0"	4'-0"	5'-1"	4'-0"	4'-0"	6'-1"	4'-0"
1 1/4"	18"	3'-8"	3'-0"	3'-0"	5'-5"	3'-0"	3'-0"	5'-1"	4'-0"	4'-0"	6'-4"	4'-0"	4'-0"	5'-9"	5'-0"
1 3/8"	24"	4'-4"	4'-0"	4'-0"	6'-5"	4'-0"	4'-0"	6'-6"	5'-0"	5'-0"	6'-5"	6'-0"	6'-0"	7'-8"	6'-0"

NOTE: PRESSURES SHOWN ABOVE ARE MAXIMUM WORKING PRESSURE IN SYSTEM.

Engineering Division	Valve Thrust Blocking Detail	Approved By Utilities Engineer Logan McInnis, PE	Revised: 09/28/2020	STD - 406



DIMENSIONS FOR THRUST BLOCKING

FITTING SIZES	TEES & PLUGS		90° BEND		45° BEND & WYES		REDUCERS & 22 1/2° BEND	
	A	B	A	B	A	B	A	B
4" & 6"	2'-0"	1'-11"	2'-5"	2'-2"	1'-10"	1'-7"	1'-9"	0'-10"
8"	2'-8"	2'-6"	3'-2"	3'-0"	2'-5"	2'-1"	1'-9"	1'-6"
10"	4'-0"	3'-3"	4'-0"	3'-10"	3'-0"	2'-9"	2'-2"	1'-11"
12"	4'-0"	3'-10"	4'-8"	4'-8"	3'-8"	3'-3"	2'-7"	2'-3"
16"	4'-6"	4'-0"	5'-0"	4'-8"	4'-0"	3'-0"	3'-0"	2'-6"
20"	5'-0"	5'-0"	7'-0"	5'-0"	4'-6"	4'-0"	3'-0"	3'-0"
24"	6'-10"	5'-0"	10'-0"	5'-0"	5'-8"	4'-6"	3'-8"	3'-8"

NOTES:

1. THIS TABLE IS BASED ON 2000 PSF SOIL BEARING PRESSURE AND 150 PSI MAIN PRESSURE.
2. WRAP ALL FITTINGS WITH POLYETHLENE PRIOR TO PLACING CONCRETE.

Engineering Division	Thrust Block Detail	Approved By Utilities Engineer Logan McInnis, PE	Revised: 09/28/2020	STD - 407

MONTANA DANIEL HARMON No. 8831 PE REGISTERED PROFESSIONAL ENGINEER

REVISION	DATE	DESCRIPTION
-	-	-

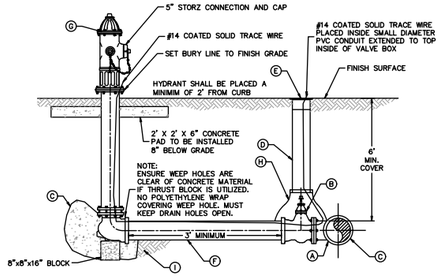
DESIGNER DH PROJ. NO. 7065
DRAWN JW DATE 04/12/2021
CHECKED CC SURVEYED DJ&A, P.C.

HDR

MULLAN BUILD - WATER UTILITY
100% - BID PLANS

STANDARD WATER DETAILS - 1

SHEET K16 OF K17

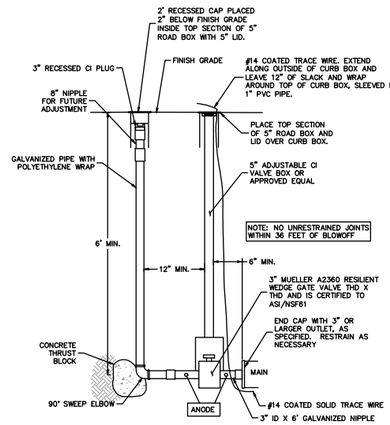


NOTES:

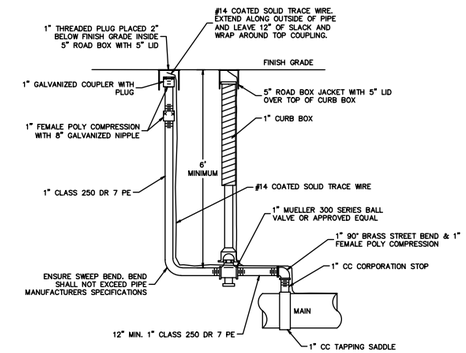
1. IF USED, DUCTILE IRON PIPE SHALL BE WRAPPED WITH 8 MIL POLYETHYLENE
2. IF MAIN IS BELOW OR ABOVE STANDARD DEPTH, USE BENDS AS REQUIRED TO INSURE THAT HYDRANT IS PLACED ABOVE GRADE AS SHOWN. PLACE BENDS BETWEEN HYDRANT VALVE & MAIN TO RAISE VALVE TO NORMAL DEPTH WHEN MAIN IS BELOW DEPTH SHOWN.
3. IF THRUST BLOCK IS NOT USED, PLACE VALVE & HYDRANT ON 4"MINIMUM OF WASHED ROCK.
4. ALL JOINTS ON HYDRANT LEADS SHALL BE RESTRAINED.

(A)	APPROPRIATE SIZE X 6" FLG. OR MJ TEE AS REQUIRED.
(B)	6" FLG. OR MJ (OR COMBINATION) GATE VALVE---MUELLER OR APPROVED EQUAL
(C)	CONCRETE THRUST BLOCK IN ADDITION TO MEGALUG OR TIE-BOLT RESTRAINTS.
(D)	5" ADJUSTABLE C.I. VALVE BOX
(E)	5" VALVE BOX LID
(F)	6" DUCTILE IRON PIPE WITH #14 COATED SOLID TRACE WIRE
(G)	6" MUELLER CENTURION HYDRANT ASSEMBLY---MJ OR FLANGED (AS REQUIRED)
(H)	5" C.I. VALVE BOX BELL
(I)	PROVIDE IN ALL SOILS 1/2YD MIN. OF 3/4" CRUSHED ROCK. IN CLAY SOILS, PROVIDE 1 YD MIN.

Engineering Division | Hydrant Detail | Approved By Utilities Engineer Logan McInnis, PE | Revised: 09/28/2020 | STD - 408



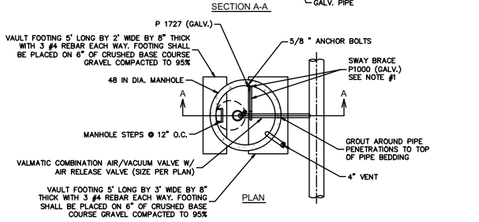
Engineering Division | Typical Blow-Off Assembly | Approved By Utilities Engineer Logan McInnis, PE | Revised: 09/28/2020 | STD - 409



NOTES:

1. WHERE AIR RELIEF VALVES (ARVs) ARE IDENTIFIED ON THE PLANS AS TEMPORARY, TRACER WIRE IS NOT REQUIRED AND ALL MATERIALS CAN BE SALVAGED AFTER THE CORP IS CLOSED. THE LINE IS CAPPED WITH A BRASS CAP AND FITTINGS ARE WRAPPED IN 10-MIL TAPE..

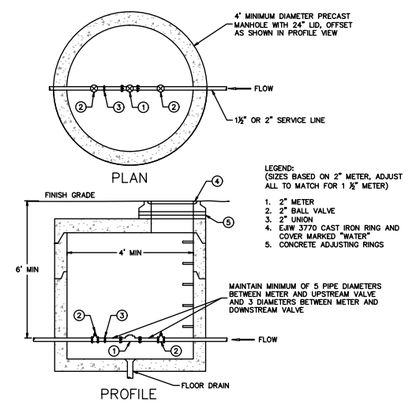
Engineering Division | Manual Air Relief Detail | Approved By Utilities Engineer Logan McInnis, PE | Revised: 09/28/2020 | STD - 410



NOTES:

1. SWAY BRACE PRODUCT NUMBERS ARE UNISTRUT. USE UNISTRUT, KINLINE OR EQUAL. SECURE ARV TO SWAY BRACE w/ 2"x 12 GA. STRAP. USE STRUT MFR'S. BOLTS & NUTS. PAINT GALV. ITEMS PER MANUFACTURER'S RECOMMENDATIONS.

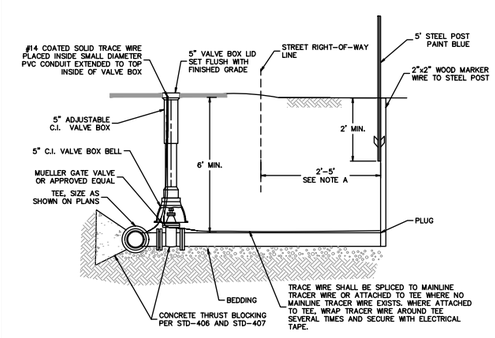
Engineering Division | Air/Vacuum Relief Valve Detail | Approved By Utilities Engineer Logan McInnis, PE | Revised: 09/28/2020 | STD - 411



GENERAL NOTES:

1. MANHOLE BASE IS OPTIONAL. WHERE BASE IS NOT PROVIDED, MANHOLE SHALL BE PLACED ON FOUR STANDARD CMU BLOCKS SPACED EQUAL DISTANCE AROUND MANHOLE.
2. METER PIT SHALL BE INSTALLED 2-5' OUTSIDE THE RIGHT OF WAY.
3. NO OBSTRUCTIONS SHALL BE PLACED WITHIN A MINIMUM 4 FT RADIUS AROUND THE METER PIT TO ALLOW ACCESS TO THE PIT.
4. NO PRV'S, CHECK VALVES OR BACKFLOW DEVICES ALLOWED IN METER PIT.
5. THIS DIAGRAM IS NOT PROJECT SPECIFIC AND IS NOT INTENDED TO BE A DESIGN DRAWING. THE OWNER IS RESPONSIBLE TO COMPLY WITH ALL APPLICABLE BUILDING CODES. THIS DETAIL MAY CHANGE AT ANY TIME AND IT IS THE OWNER'S RESPONSIBILITY TO OBTAIN THE MOST CURRENT VERSION OF THIS AND OTHER CITY REQUIREMENTS.

Engineering Division | Large (1 1/2" and 2") Irrigation Meter Pit Detail | Approved By Utilities Engineer Logan McInnis, PE | Revised: 09/28/2020 | STD - 412



NOTE:
A. WHERE THERE IS A UTILITY EASEMENT ADJACENT TO THE RIGHT-OF-WAY, METER PIT CAN BE LOCATED 2' ON THE BUILDING SIDE OF THE EASEMENT.

GENERAL NOTES:

1. FOR COMMERCIAL SERVICES SMALLER THAN 4", SEE CITY STANDARD DETAIL STD-404B.
2. VALVE SHALL REMAIN CLOSED UNTIL CONNECTION TO THE BUILDING.
3. WATER SERVICES SHALL BE BURIED A MINIMUM OF 6' DEEP.
4. IF PROPERTY DOES NOT FRONT A STREET WITH A WATER MAIN, CONTACT CITY FOR SPECIFIC REQUIREMENTS RELATED TO EASEMENTS.
5. SERVICE LINE SHALL END AT WOOD POST. IT IS THE INSTALLER'S RESPONSIBILITY TO REMOVE AIR FROM THE SERVICE LINES AS NECESSARY.
6. WATER SERVICE STUBS SHALL BE INSTALLED WHERE SHOWN ON THE DRAWINGS OR AS SPECIFIED BY CITY ENGINEERING.

Engineering Division | Typical 4-Inch and Larger Water Service Stub Detail | Approved By Utilities Engineer Logan McInnis, PE | Revised: 09/28/2020 | STD - 413

WATER SUBMITTALS, QUALITY CONTROL & ASSURANCE, INSPECTIONS, AND TESTING

1. ALL WATER MAINS WILL BE OWNED BY THE CITY FOR THIS PROJECT, SO ALL WATER MAINS MUST BE BACKFILLED AS REFERENCED AND SPECIFIED.
2. THE CONTRACTOR SHALL COORDINATE WITH ENGINEER TO OBTAIN SAMPLES OF TRENCH BACKFILL MATERIAL TO BE USED ON-SITE. SELECT TRENCH BACKFILL MATERIAL AND FLOW-ABLE FILL WILL BE REQUIRED IN AREAS AS SPECIFIED OR DIRECTED BY THE ENGINEER.
3. CONTRACTOR WILL BE RESPONSIBLE FOR COORDINATION WITH A MATERIAL TESTING COMPANY OF THE OWNER'S SELECTION TO COMPLETE COMPACTION TESTING OF TRENCH BACKFILL. COORDINATION INCLUDES UPDATING APPROPRIATE PERSONNEL OF THE MATERIAL TESTING COMPANY EVERY DAY AS TO PROGRESS OF WORK SO ADEQUATE TESTING CAN BE COMPLETED.
4. THE CONTRACTOR WILL BE REQUIRED TO PREPARE A SET OF DETAILED AS-BUILT DRAWINGS TO BE PRESENTED TO THE ENGINEER AT THE COMPLETION OF THE PROJECT. THE AS-BUILT DRAWINGS SHALL BE UPDATED DAILY AND REVIEWED WEEKLY BY THE PROJECT ENGINEER. AS-BUILT DRAWINGS SHALL INCLUDE, BUT NOT LIMITED TO LOCATION/DEPTHS OF WATER MAINS AND SERVICES, SEWER MAINS AND SERVICES, UTILITIES, CULVERTS, DRAINAGE STRUCTURES, ETC.
5. CONTRACTOR WILL BE RESPONSIBLE FOR COMPLETING WATER SERVICE DITCH CARDS FOR ALL WATER SERVICES. INFORMATION ON THE DITCH CARDS MUST BE PROVIDED AS DIRECTED BY ENGINEER INCLUDING LOT NUMBER OR BUILDING ADDRESS SERVED; AS-BUILT SERVICE CONNECTION LOCATION ON THE WATER MAIN RELATIVE TO STATIONING ON THE DRAWINGS; CONTRACTOR WHO MADE TAP; DATE TAP WAS MADE; DISTANCE FROM MAIN TO CURB STOP; SIZE OF TAP; SIZE AND MATERIAL OF SERVICE; SIZE AND MATERIAL OF WATER MAIN; DEPTH OF MAIN AT TAP; AND DEPTH OF SERVICE AT CURB STOP. ENGINEER WILL PROVIDE CONTRACTOR WITH EXAMPLE DITCH CARD UPON WRITTEN REQUEST. ONE WATER DITCH CARD SHALL BE COMPLETED FOR EACH WATER SERVICE.
6. TESTING, CLEANING, AND DISINFECTION OF WATER MAINS, VALVES, AND FITTINGS SHALL BE COMPLETED IN ACCORDANCE WITH MPWSS SECTION 02660, PART 3.4. WATER TESTING PROCEDURE SHALL BE AS FOLLOWS:
   a. CHLORINATION
   b. FLUSHING TO REDUCE CHLORINE RESIDUAL TO 0.5 PPM OR LESS, OR AS OTHERWISE APPROVED BY THE ENGINEER
   c. BACTERIOLOGICAL TEST
   d. HYDROSTATIC AND LEAKAGE TESTING
7. WATER TESTING SHALL BE COMPLETED IN THE PRESENCE OF THE ENGINEER. THE CONTRACTOR IS RESPONSIBLE FOR COORDINATING WITH THE ENGINEER TO BE PRESENT FOR WATER TESTING.
8. CONSTRUCTION PHOTOGRAPHS. AT A MINIMUM, CONSTRUCTION PHOTOS SHALL BE TAKEN AT ALL FITTINGS AND VALVES. PHOTOS SHALL BE TAKEN BEFORE THE FITTING IS WRAPPED TO CREATE A RECORD OF THE CONNECTIONS AND AFTER THE TIE DOWNS AND THRUST BLOCKS ARE IN PLACE FOR FUTURE REFERENCE AS TO SIZE AND CONSTRUCTION. ADDITIONAL PHOTOS SHALL BE TAKEN AS NECESSARY TO DOCUMENT CONSTRUCTION. PHOTOS SHALL BE CLEARLY ANNOTATED FOR FUTURE IDENTIFICATION OF LOCATION AND ORIENTATION USING A WHITEBOARD, NOTING THE DATE, STATION AND ITEMS PICTURED.
9. ENGINEERING NOTES AND PHOTOS MUST BE UPLOADED TO MISSOULA WATER ACCESSIBLE CLOUD FILE WEEKLY.
10. DURING CONSTRUCTION IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO PROTECT EXISTING UTILITY LINES.

MONTANA DANIEL J. HARMON No. 9101 PE REGISTERED PROFESSIONAL ENGINEER

REVISION	DATE	DESCRIPTION
-	-	-

DESIGNER DH | PROJ. NO. 7065
DRAWN JW | DATE 04/12/2021
CHECKED CC | SURVEYED DJ&A P.C.

HDR

MULLAN BUILD - WATER UTILITY
100% - BID PLANS

STANDARD WATER DETAILS - 2

SHEET K17 OF K17