

Water Renovations Sam A. Baker State Park Patterson, Missouri

OWNER: STATE OF MISSOURI
MICHAEL L. PARSON,
GOVERNOR

DEPARTMENT OF NATURAL RESOURCES
DIVISION OF STATE PARKS

PROJECT
MANAGEMENT: OFFICE OF ADMINISTRATION
DIVISION OF FACILITIES MANAGEMENT,
DESIGN AND CONSTRUCTION

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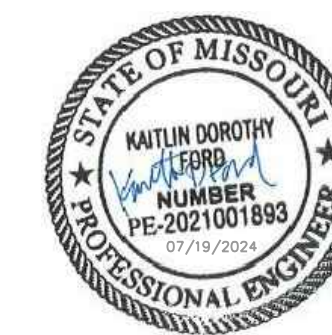


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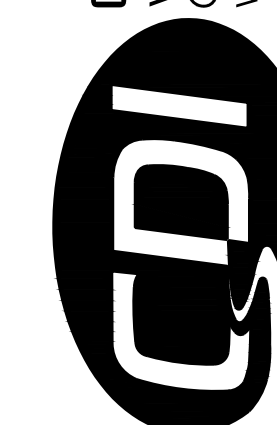
DESIGNER: CIVIL DESIGN, INC

PROJECT NUMBER: X2335-01

SITE NUMBER: 5218
FACILITY NUMBER: 7815218040



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Civil Engineering #2002006804
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WATER RENOVATIONS

SAM A. BAKER STATE PARK
5580 MO-143
PATTERSON, MISSOURI 63956

PROJECT # X2335-01
CDI PROJECT # 6376

SITE # 5218
ASSET # 7815218040

REVISION: _____
DATE: _____
REVISION: _____
DATE: _____
REVISION: _____
DATE: _____

ISSUE DATE: _____

CAD DWG FILE: X2335_SP_C-100.dwg
DRAWN BY: KDF
CHECKED BY: WMK
DESIGNED BY: KDF

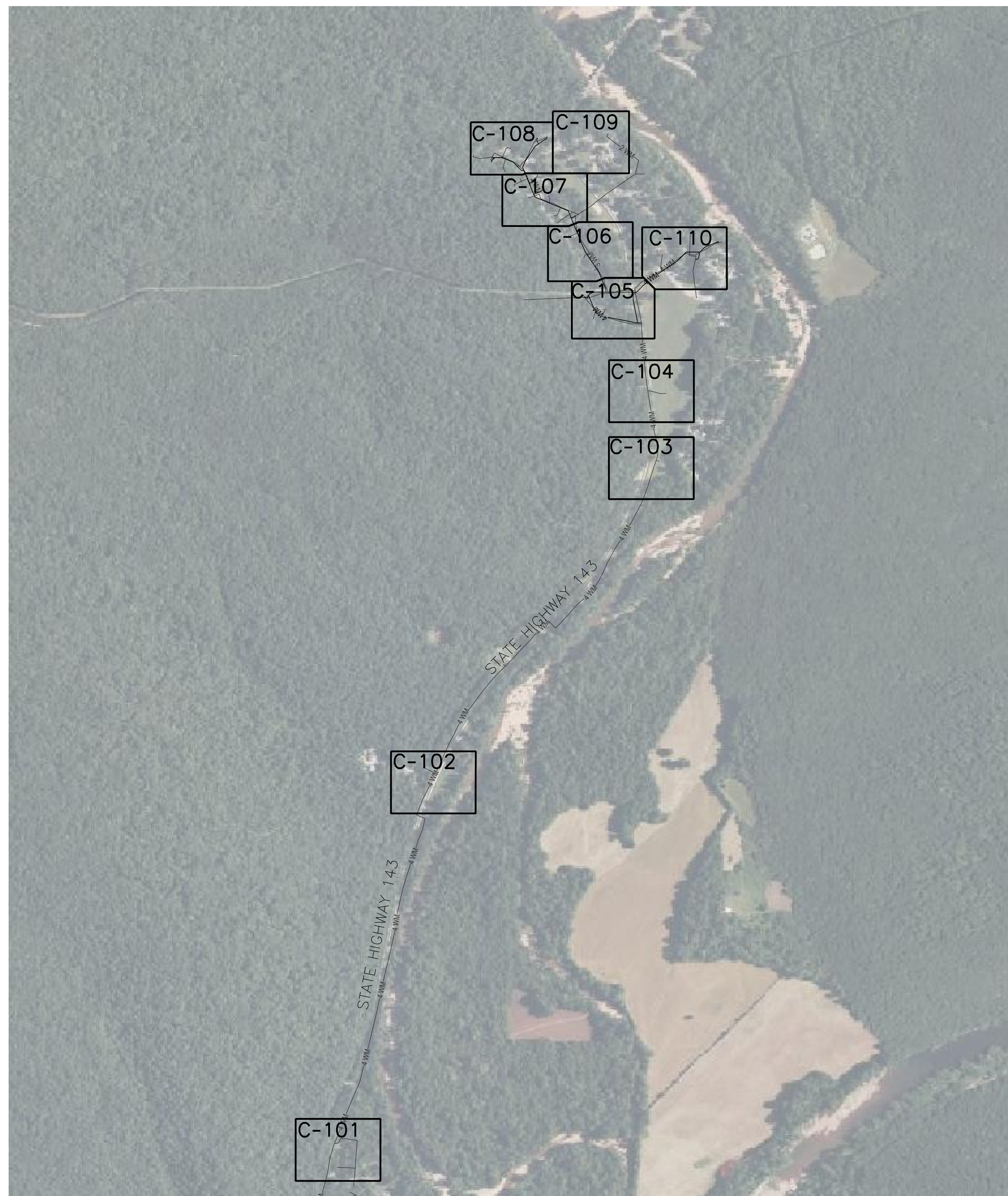
SHEET TITLE:

**OVERALL SITE
PLAN**

SHEET NUMBER:

C-100

SHEET 2 OF 21
JULY 19, 2024



LEGEND

EXISTING		PROPOSED
—2 WM—	WATER MAIN	—4 WM—
—SRV—	WATER SERVICE LINE	—SRV—
▲ WV	WATER VALVE	▲ WV
—	HORIZONTAL BEND	—
□	CAP WATER MAIN	□
◆ FH	FIRE HYDRANT	◆ FH
△	REDUCER	△
⊥	TEE	⊥
□	PRESSURE REDUCER	■
▲ WM	WATER METER	▲ WM
	TAPPING SLEEVE) (
PP ●	POWER POLE	PP ●
10' ⊕	TREE	10' ⊕
18' ⊕	STUMP	18' ⊕
—○—	SIGN	—○—
—x—	FENCE	—x—
	PAVEMENT REMOVAL	▨
	WATER MAIN ENCASEMENT	■

ABBREVIATIONS

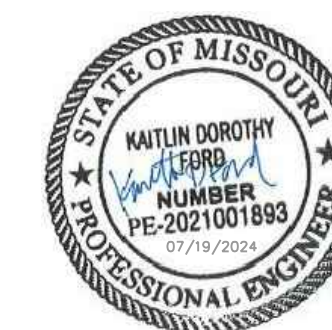
ASPH	ASPHALT
ATC	ADJUST TO GRADE
CONC	CONCRETE
ESMT	EASEMENT
EX	EXISTING
FL	FLOWLINE
LAB	LEFT ASCENDING BANK
PL	PROPERTY LINE
PROP	PROPOSED
PVMT	PAVEMENT
RAB	RIGHT ASCENDING BANK
SAN	SANITARY SEWER
STM	STORM SEWER
SWPPP	STORMWATER POLLUTION PREVENTION PLAN
TCE	TEMPORARY CONSTRUCTION EASEMENT
TBR	TO BE REMOVED
TBR&R	TO BE REMOVED AND REPLACED
TBA	TO BE ABANDONED
TBA&F	TO BE ABANDONED AND FILLED
UIP	USE IN PLACE

NOTES:

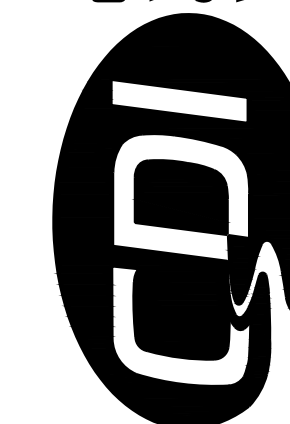
- LOCATIONS OF WATER SERVICE LATERALS ARE APPROXIMATE AND SHALL BE FIELD VERIFIED BY THE CONTRACTOR. RECONCILE ANY CONFLICTS AS NEEDED.
- UNDERGROUND FACILITIES, STRUCTURES, AND UTILITIES HAVE BEEN PLOTTED FROM AVAILABLE RECORDS. THEREFORE, THE LOCATIONS OF ANY UNDERGROUND FACILITIES SHOWN HEREON MUST BE CONSIDERED APPROXIMATE. PRIOR TO BEGINNING WORK ON THE SITE, IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO DETERMINE THE EXACT LOCATION OF THESE FACILITIES ALONG WITH ANY IN EXISTENCES THAT ARE NOT SHOWN.
- CONTRACTOR SHALL REMOVE TREES FOR CONSTRUCTION ONLY AS NECESSARY. CONTRACTOR SHALL PROTECT TREES TO THE MAXIMUM EXTENT PRACTICAL.

0 250 500
SCALE: 1"=500'





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DESIGNED BY: **KDF**

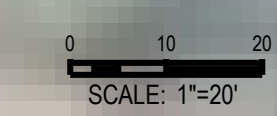
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SITE PLAN

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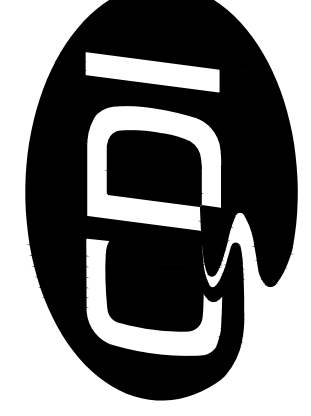
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SHEET 3 OF 21
JULY 19, 2024





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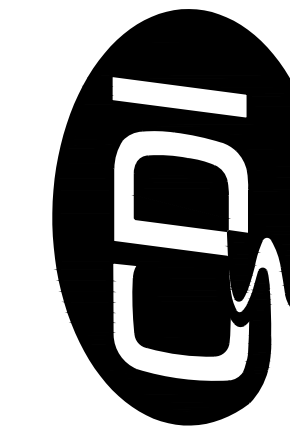
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SHEET 4 OF 21
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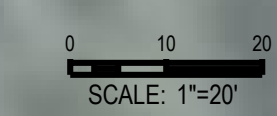
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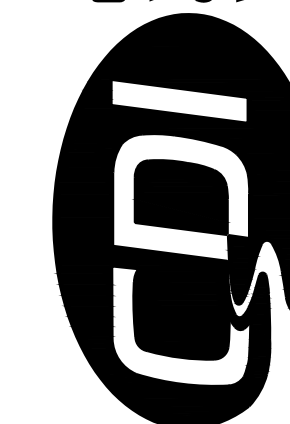
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SITE PLAN

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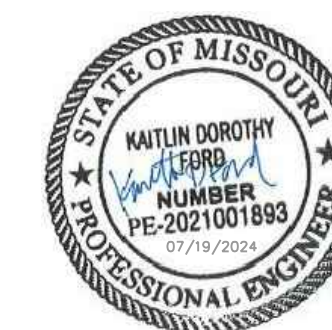
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SHEET 6 OF 21
JULY 19, 2024

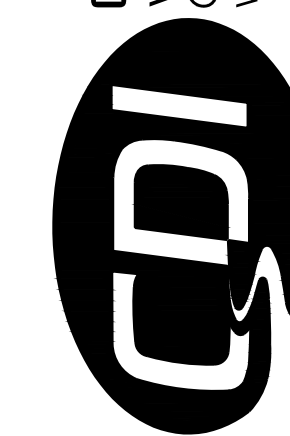


0 10 20
SCALE: 1"=20'





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DESIGNED BY: **KDF**

SHEET TITLE:

SITE PLAN

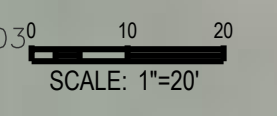
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SHEET 7 OF 21
JULY 19, 2024

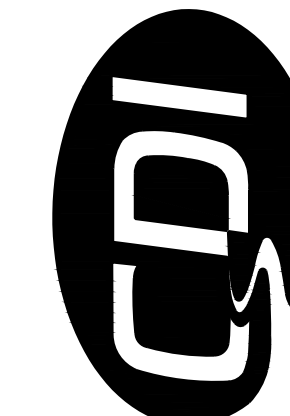


NOTES:
1. REMOVE STONES WITHIN EXISTING STONE WALK AS NEEDED FOR CONSTRUCTION. PROTECT AND PLACE STONES BACK IN ORIGINAL LOCATION AFTER CONSTRUCTION HAS BEEN COMPLETED. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO REPLACE ANY STONES DAMAGED DURING CONSTRUCTION. ANY NEW STONE SHALL BE APPROVED BY THE OWNER PRIOR TO PLACEMENT.





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DRAWN BY: **KDF**
CHECKED BY: **WMK**
DESIGNED BY: **KDF**

SHEET TITLE:

SITE PLAN

SHEET NUMBER:

C-106

SHEE 8 OF 21
JULY 19, 2024

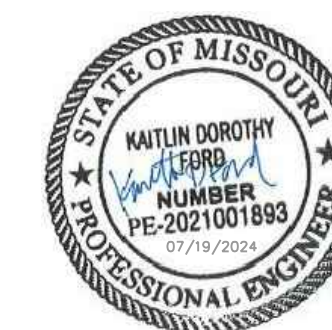
MATCHLINE 2 ALIGNMENT "C" STA 5+60

MATCHLINE 1 ALIGNMENT "C" STA 1+00

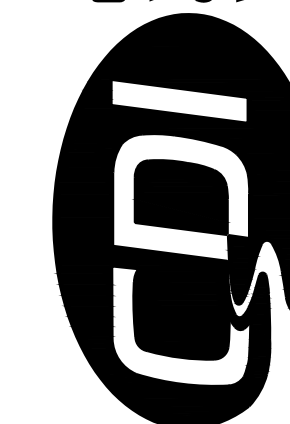
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0 10 20
SCALE: 1"=20'





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CAD DWG FILE: X2335_SP_C-100.dwg
DRAWN BY: **KDF**
CHECKED BY: **WMK**
DESIGNED BY: **KDF**

SHEET TITLE:

SITE PLAN

SHEET NUMBER:

C-107

SHEET 9 OF 21
JULY 19, 2024

MATCHLINE 3 ALIGNMENT "C" STA 11+00



MATCHLINE 2 ALIGNMENT "C" STA 5+60

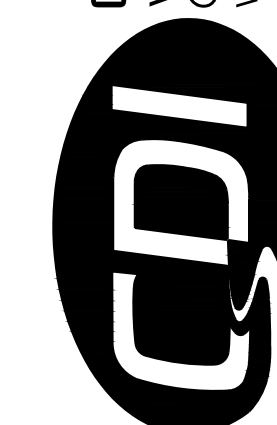
NOTES:
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0 10 20
SCALE: 1"=20'





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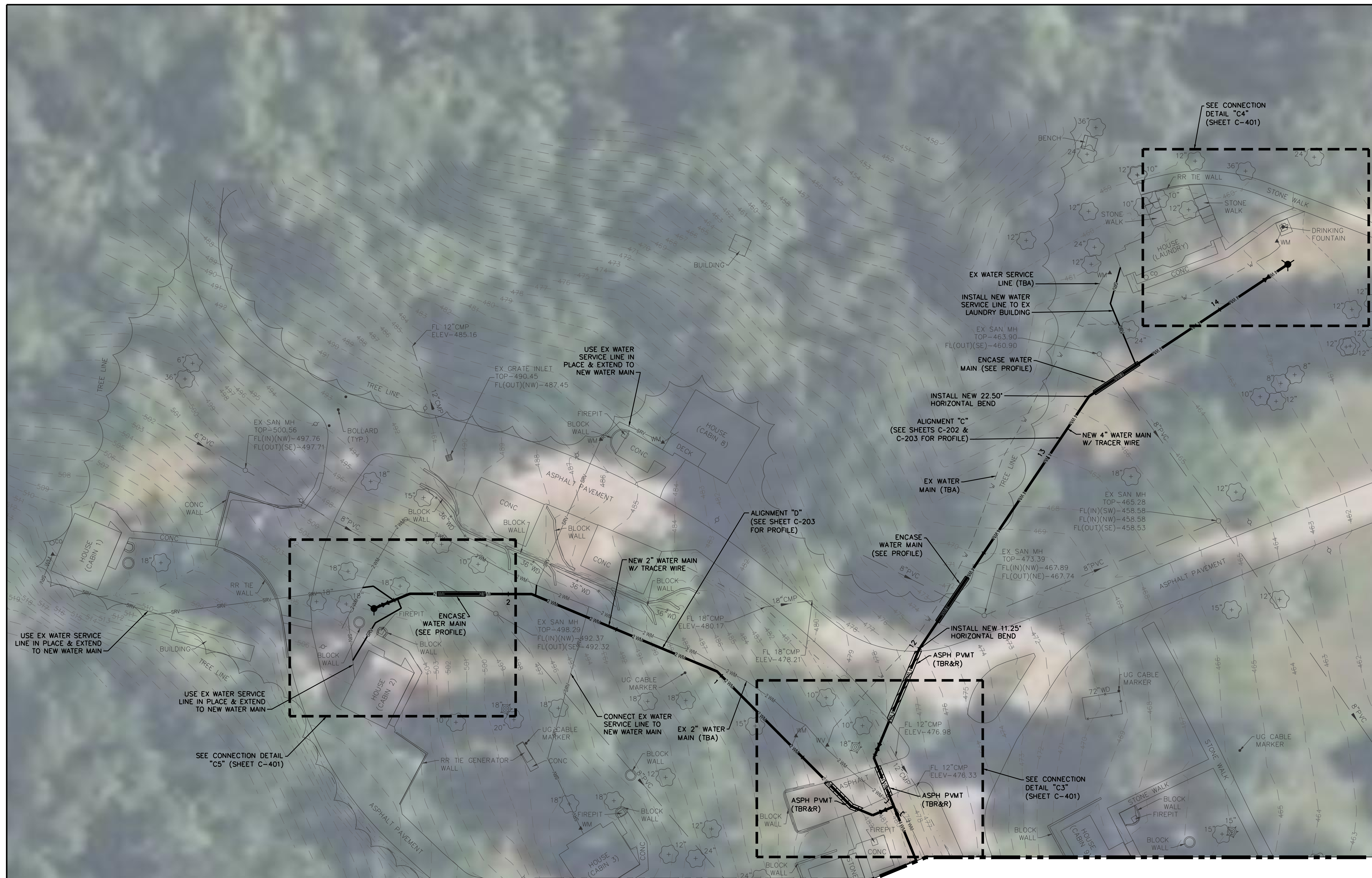
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DRAWN BY: **KDF**
CHECKED BY: **WMK**
DESIGNED BY: **KDF**

SHEET TITLE:
SITE PLAN

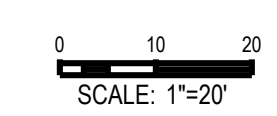
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SHEET 10 OF 21
JULY 19, 2024

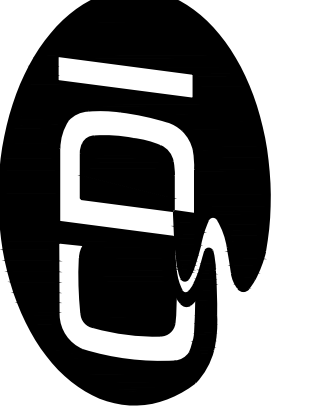


MATCHLINE 3 ALIGNMENT "C" STA 11+00





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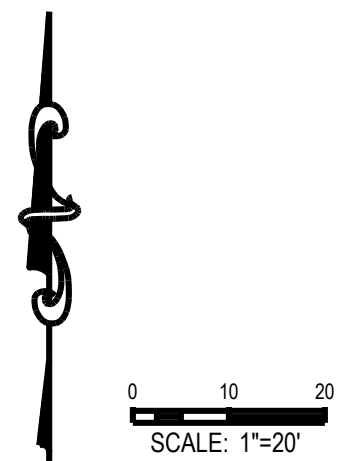
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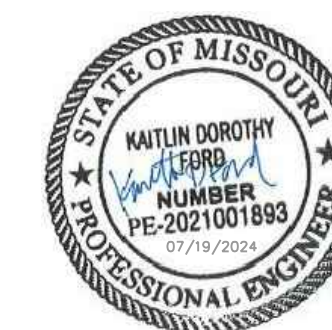
SITE PLAN

SHEET NUMBER:

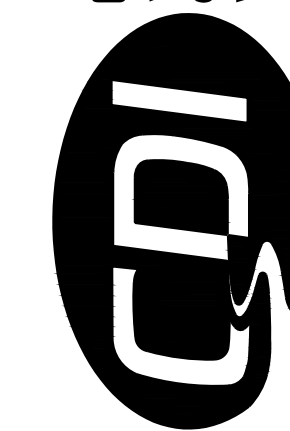
C-109

SHEET 11 OF 21
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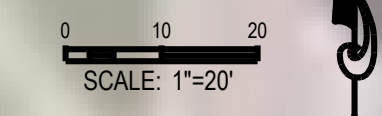
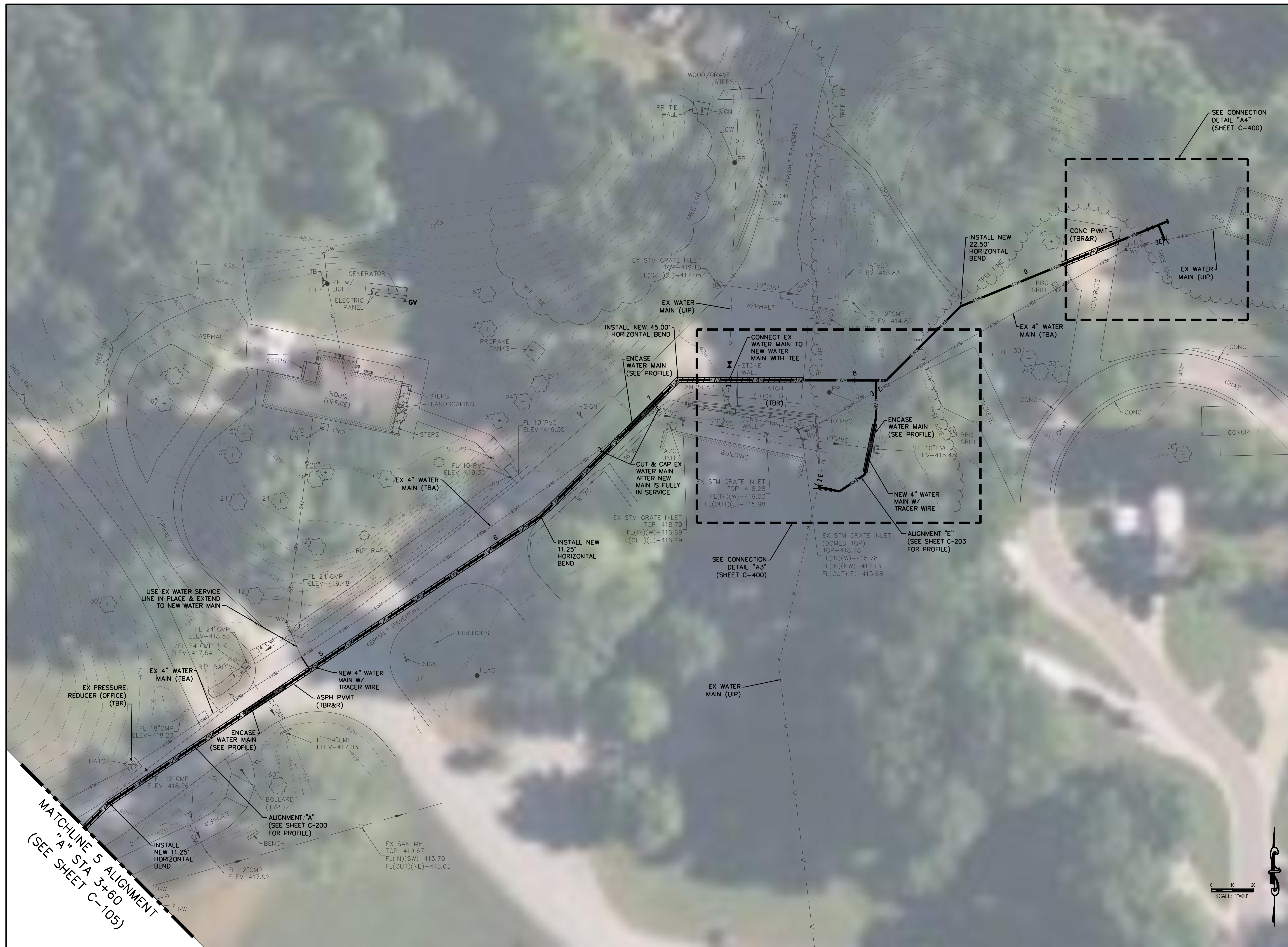
SHEET TITLE:

SITE PLAN

SHEET NUMBER:

C-110

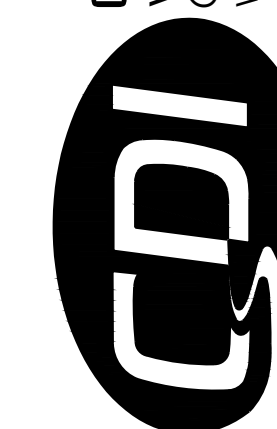
SHEET 12 OF 21
JULY 19, 2024



MATCHLINE 5 ALIGNMENT
"A" STA 3+60
(SEE SHEET C-105)



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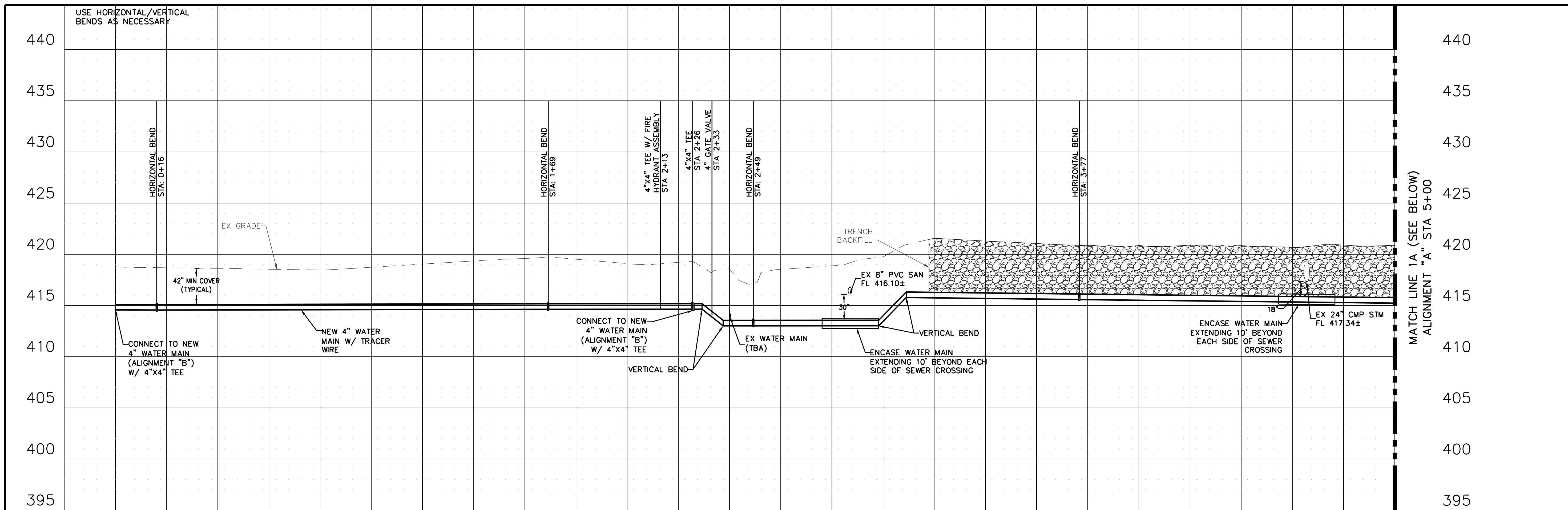
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**WATER MAIN
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SHEET NUMBER:

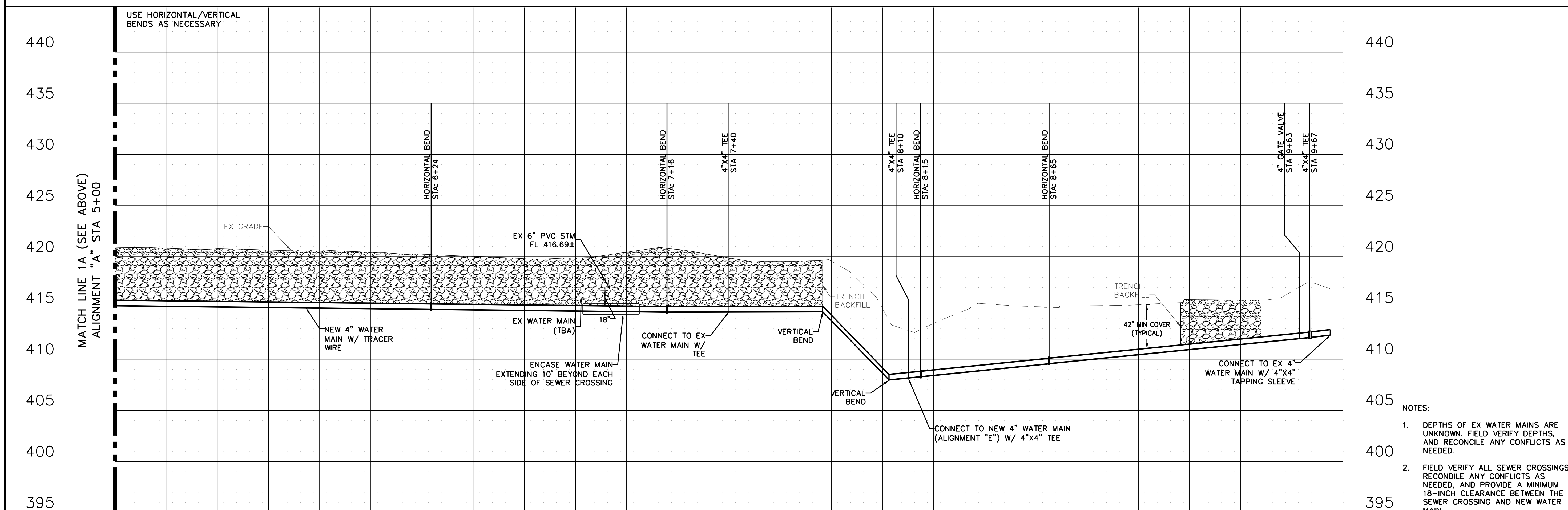
C-200

SHEET 13 OF 21
JULY 19, 2024



MATCH LINE 1A (SEE BELOW)
ALIGNMENT "A" STA 5+00

SCALE: 1"=20' HORIZONTAL
1"=5' VERTICAL



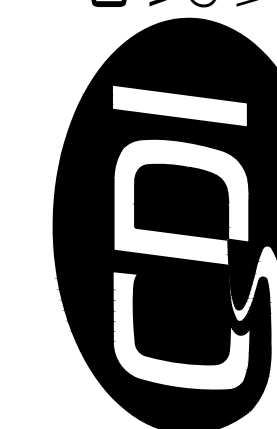
MATCH LINE 1A (SEE ABOVE)
ALIGNMENT "A" STA 5+00

NOTES:
1. DEPTHS OF EX WATER MAINS ARE UNKNOWN. FIELD VERIFY DEPTHS, AND RECONCILE ANY CONFLICTS AS NEEDED.
2. FIELD VERIFY ALL SEWER CROSSINGS, RECONCILE ANY CONFLICTS AS NEEDED, AND PROVIDE A MINIMUM 18-INCH CLEARANCE BETWEEN THE SEWER CROSSING AND NEW WATER MAIN.

SCALE: 1"=20' HORIZONTAL
1"=5' VERTICAL



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WATER RENOVATIONS

SAM A. BAKER STATE PARK
5580 MO-143
PATTERSON, MISSOURI 63956

PROJECT # X2335-01
CDI PROJECT # 6376

SITE # 5218
ASSET # 7815218040

REVISION: _____
DATE: _____
REVISION: _____
DATE: _____
REVISION: _____
DATE: _____
ISSUE DATE: _____

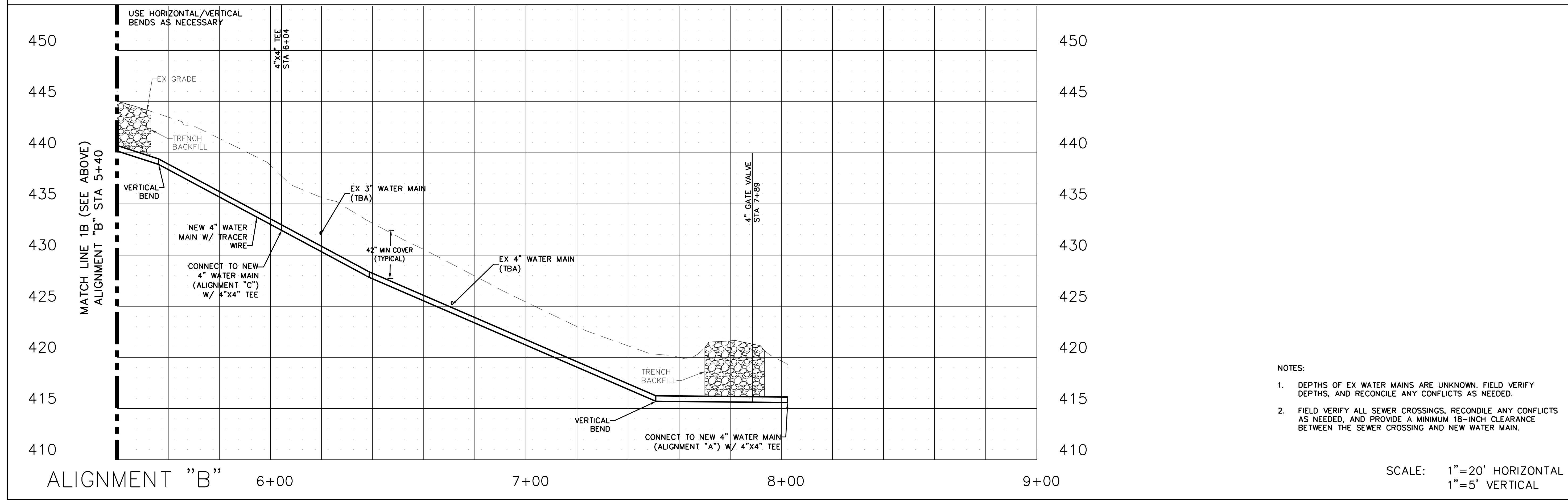
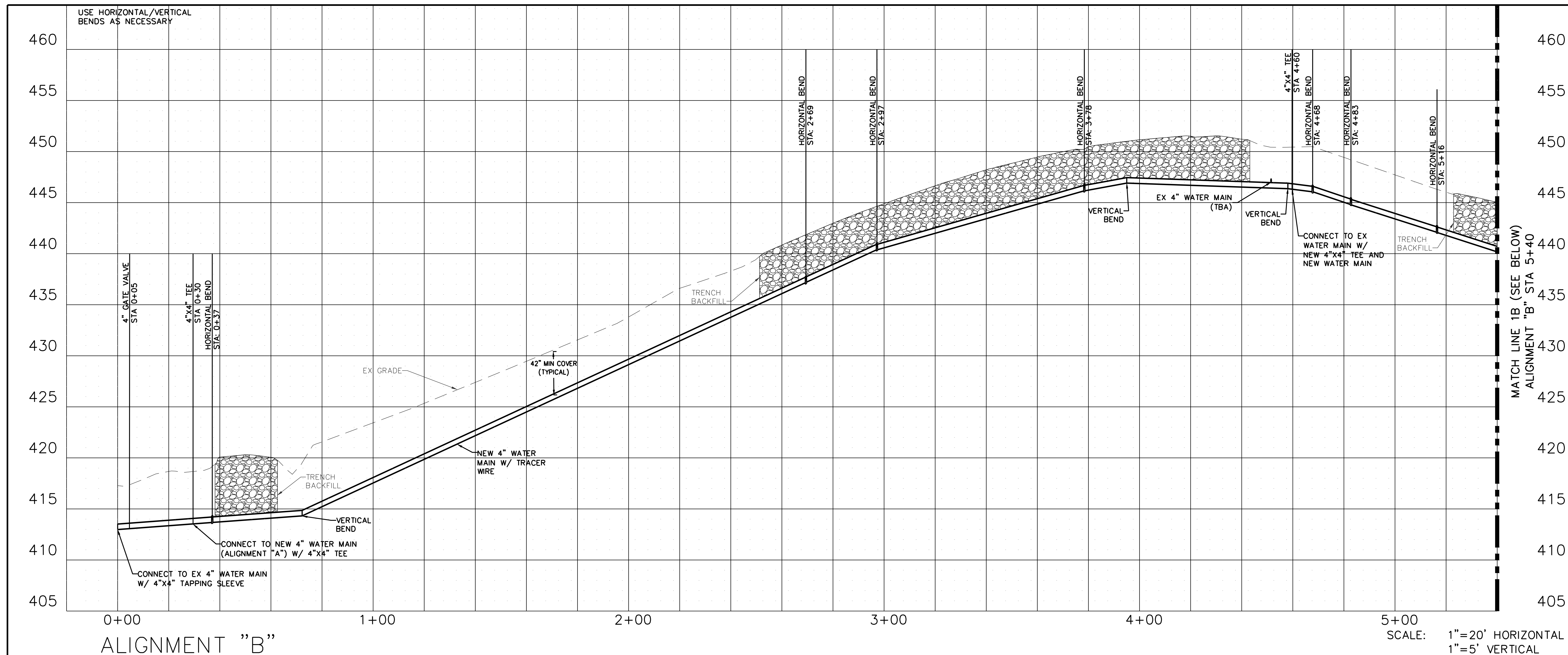
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DRAWN BY: KDF
CHECKED BY: WMK
DESIGNED BY: KDF

SHEET TITLE:
**WATER MAIN
PROFILE**

SHEET NUMBER:

C-201

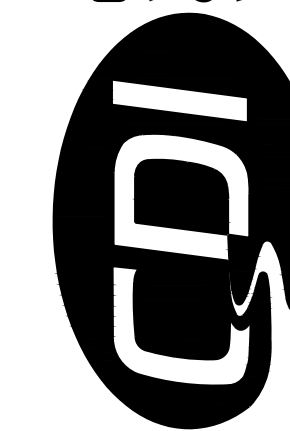
SHEET 14 OF 21
JULY 19, 2024



- NOTES:
1. DEPTHS OF EX WATER MAINS ARE UNKNOWN. FIELD VERIFY DEPTHS, AND RECONCILE ANY CONFLICTS AS NEEDED.
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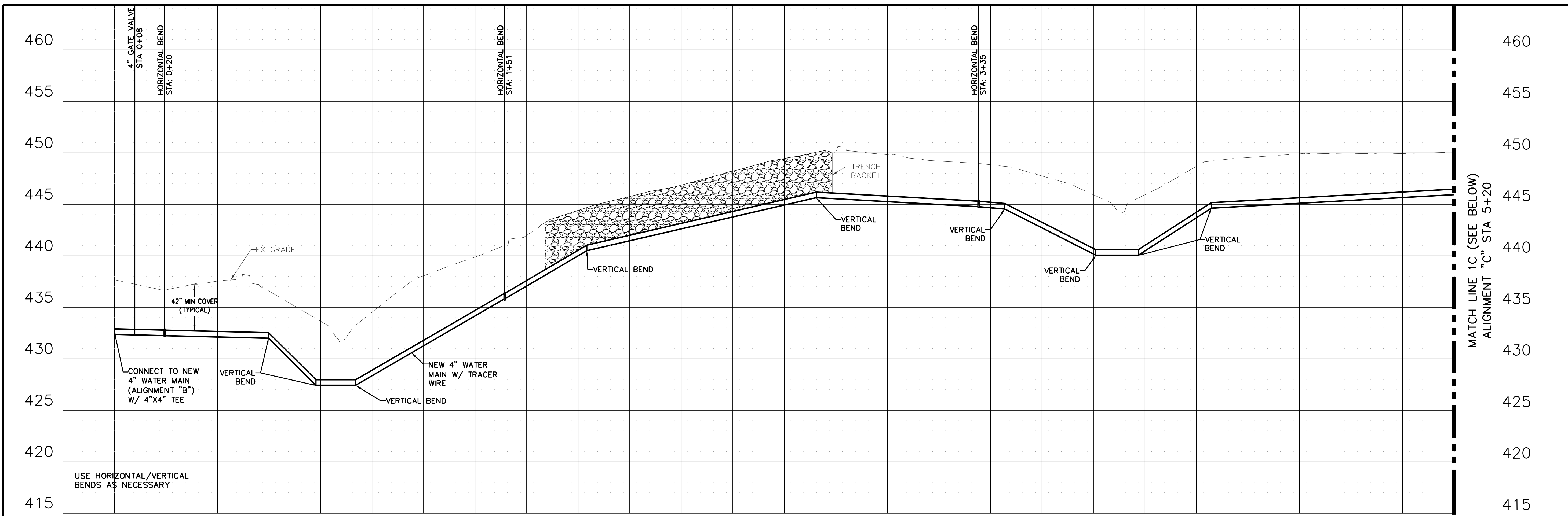
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CHECKED BY: WMK
DESIGNED BY: KDF

SHEET TITLE:
**WATER MAIN
PROFILE**

SHEET NUMBER:

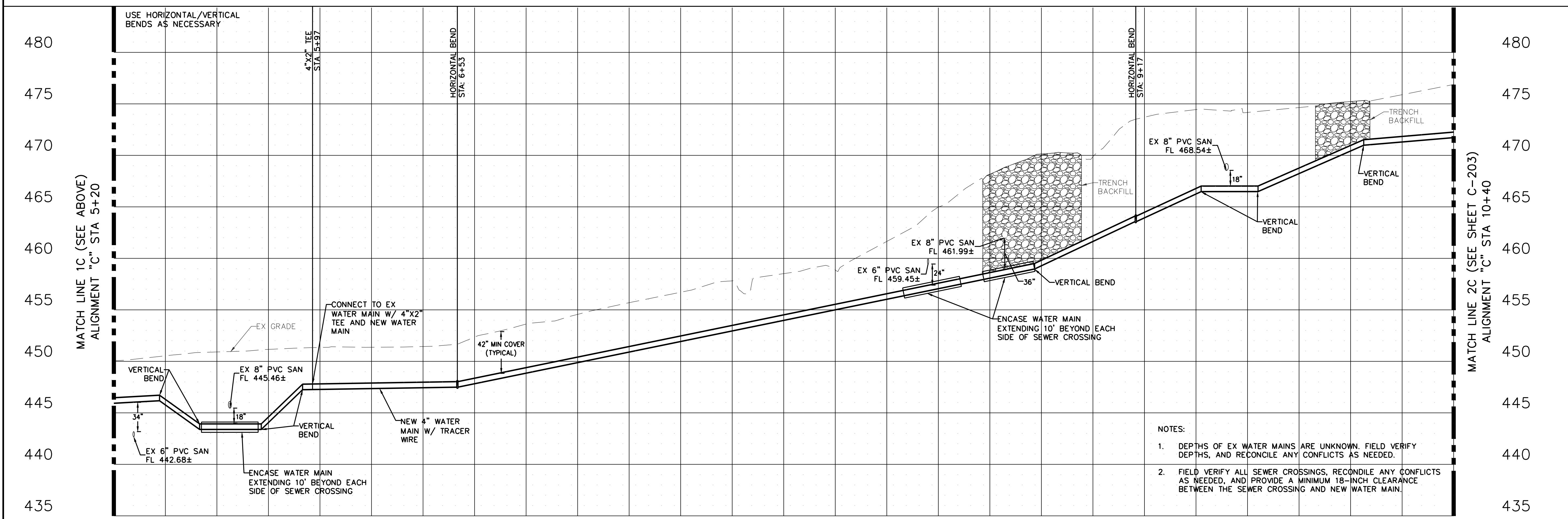
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SHEET 15 OF 21
JULY 19, 2024



ALIGNMENT "C"

SCALE: 1"=20' HORIZONTAL
1"=5' VERTICAL



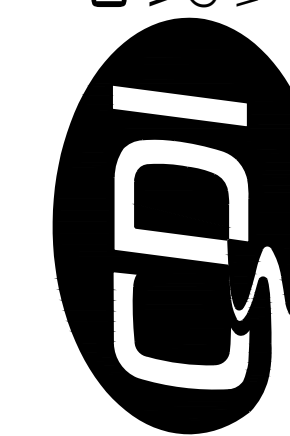
ALIGNMENT "C"

SCALE: 1"=20' HORIZONTAL
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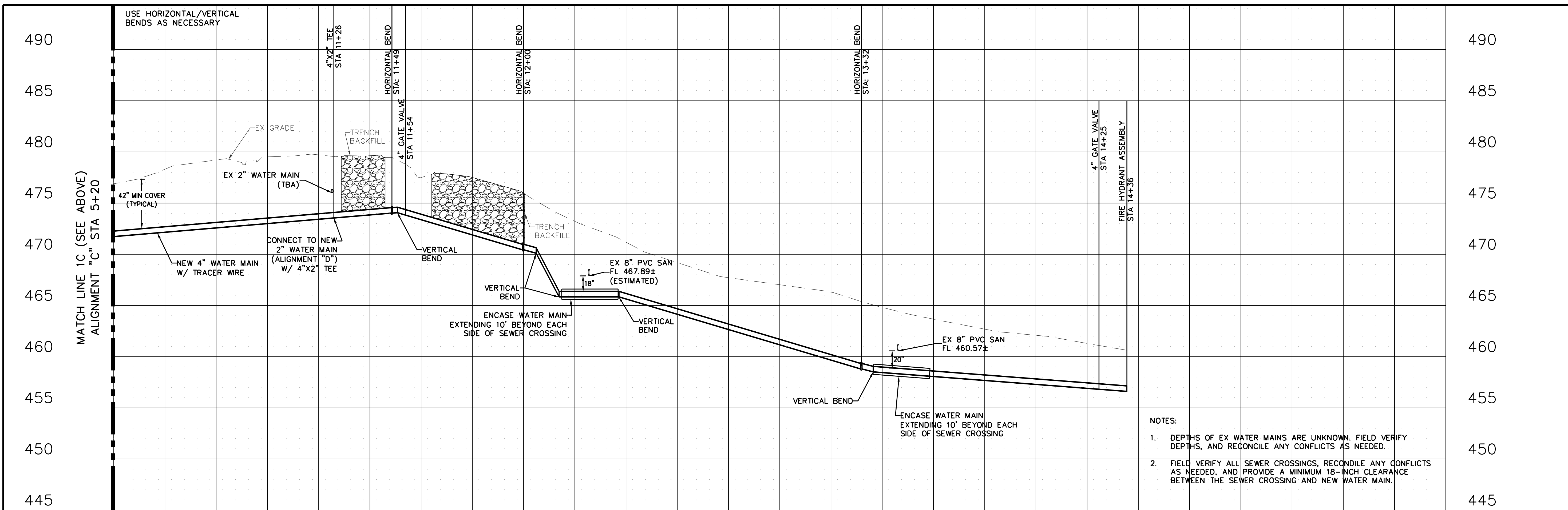
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DRAWN BY: KDF
CHECKED BY: WMK
DESIGNED BY: KDF

SHEET TITLE:
**WATER MAIN
PROFILE**

SHEET NUMBER:

C-203

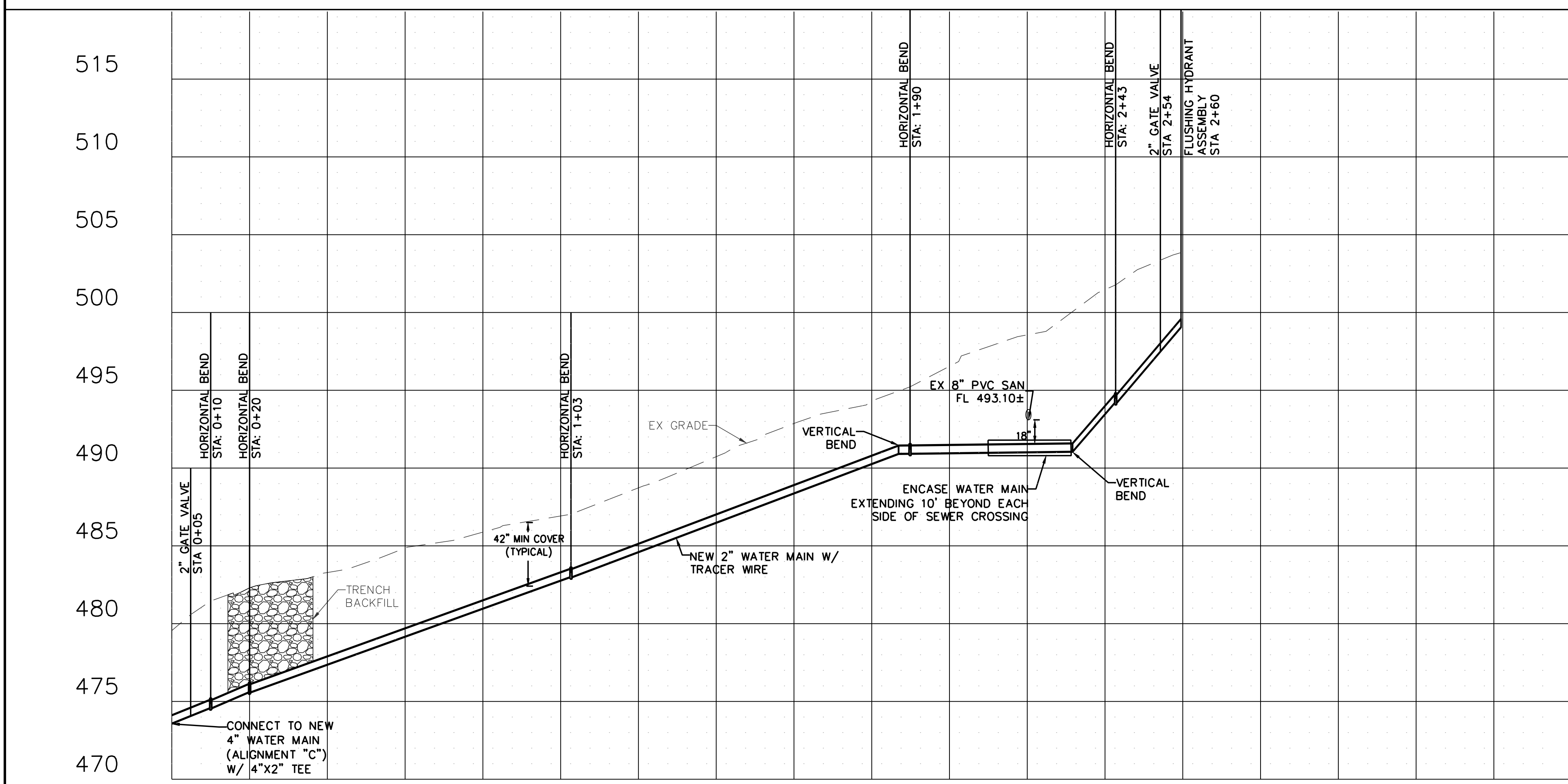
SHEET 16 OF 21
JULY 19, 2024



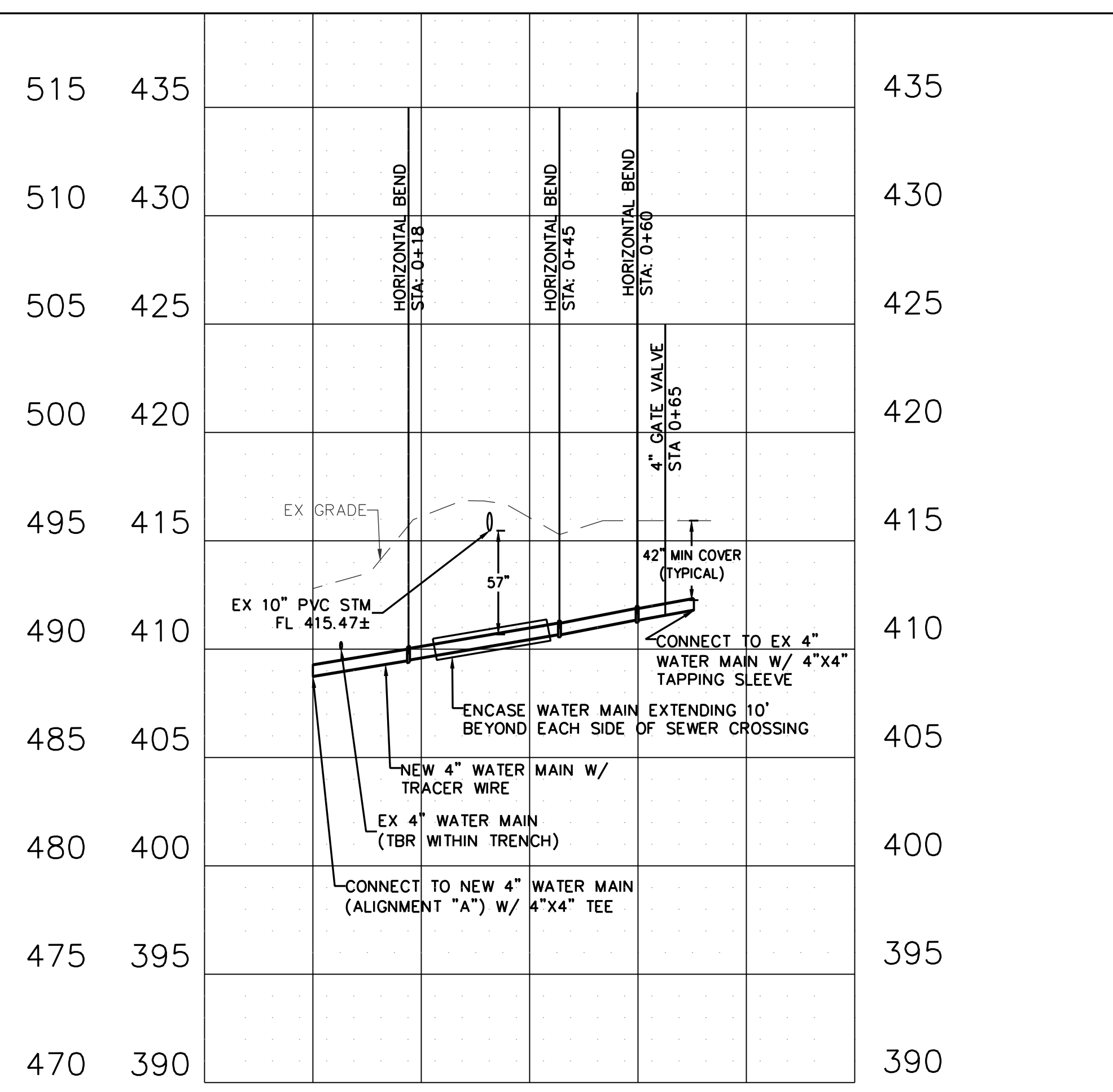
- NOTES:
1. DEPTHS OF EX WATER MAINS ARE UNKNOWN. FIELD VERIFY DEPTHS, AND RECONCILE ANY CONFLICTS AS NEEDED.
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ALIGNMENT "C"

SCALE: 1"=20' HORIZONTAL
1"=5' VERTICAL



ALIGNMENT "D"

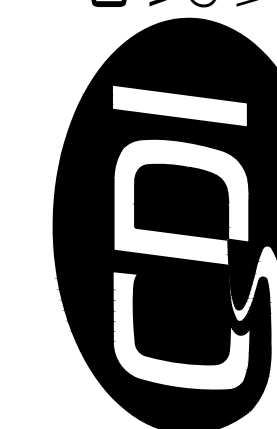


ALIGNMENT "E"

SCALE: 1"=20' HORIZONTAL
1"=5' VERTICAL



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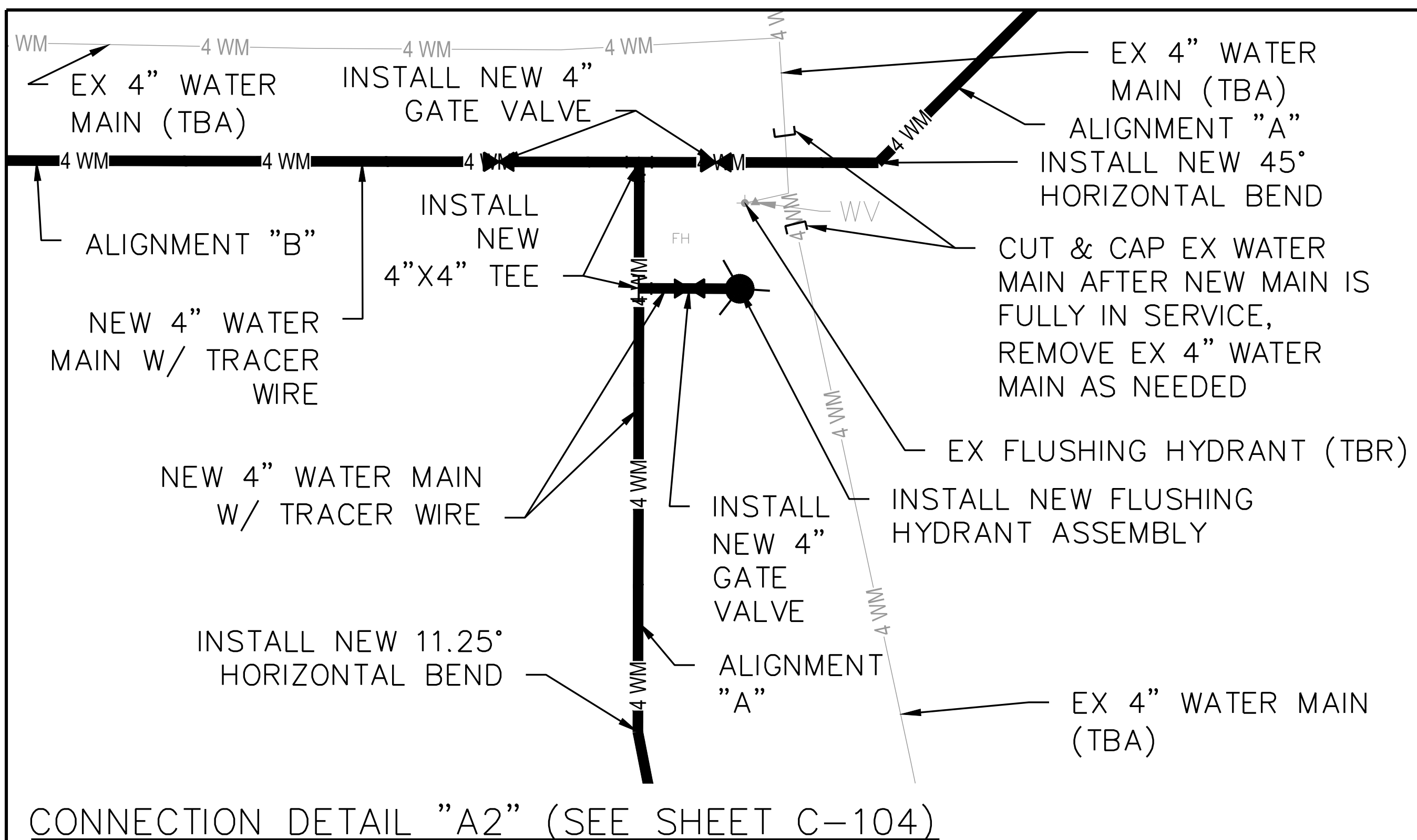
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DRAWN BY: KDF
CHECKED BY: WMK
DESIGNED BY: KDF

SHEET TITLE:
**CONNECTION
DETAILS**

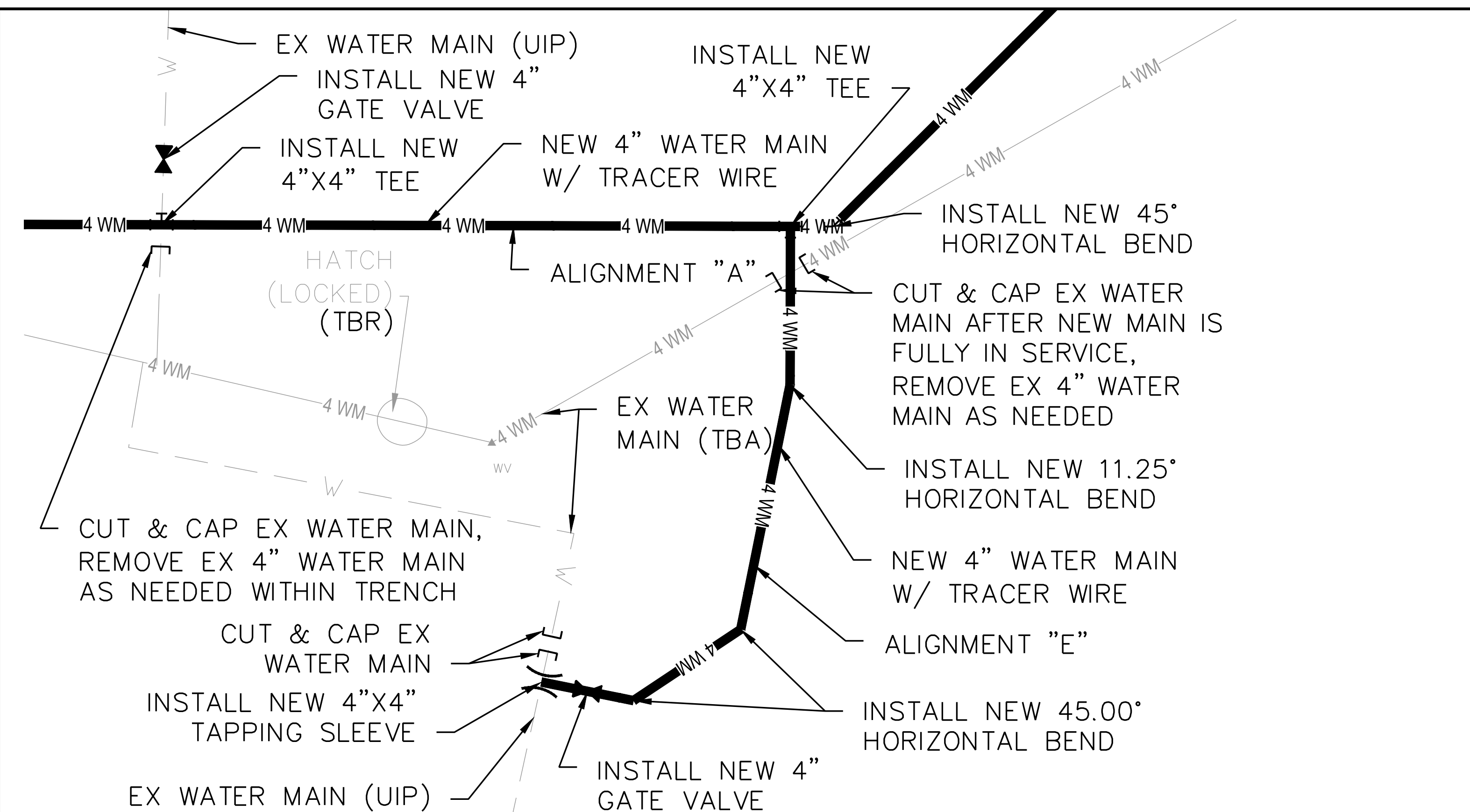
SHEET NUMBER:

C-400

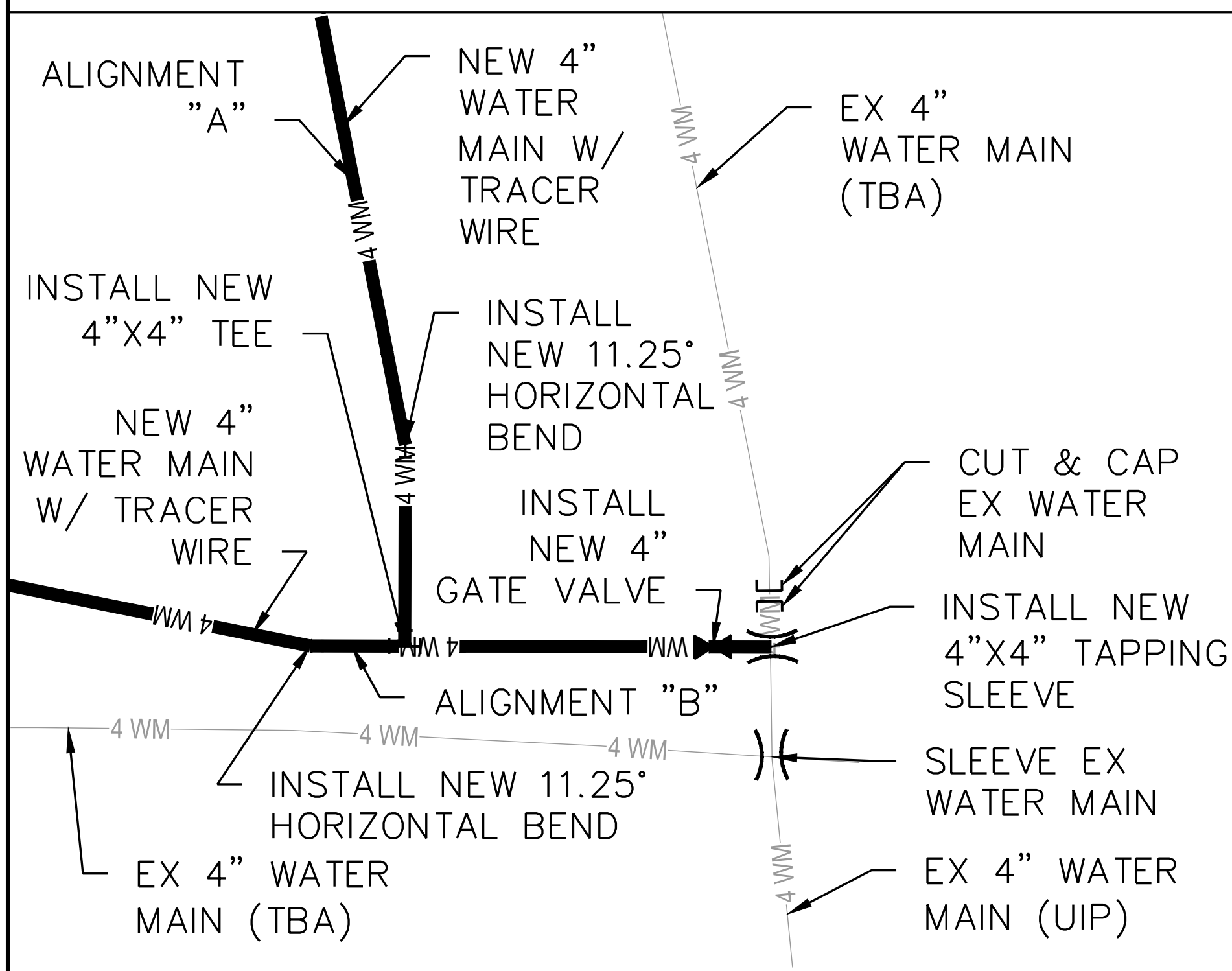
SHEET 17 OF 21
JULY 19, 2024



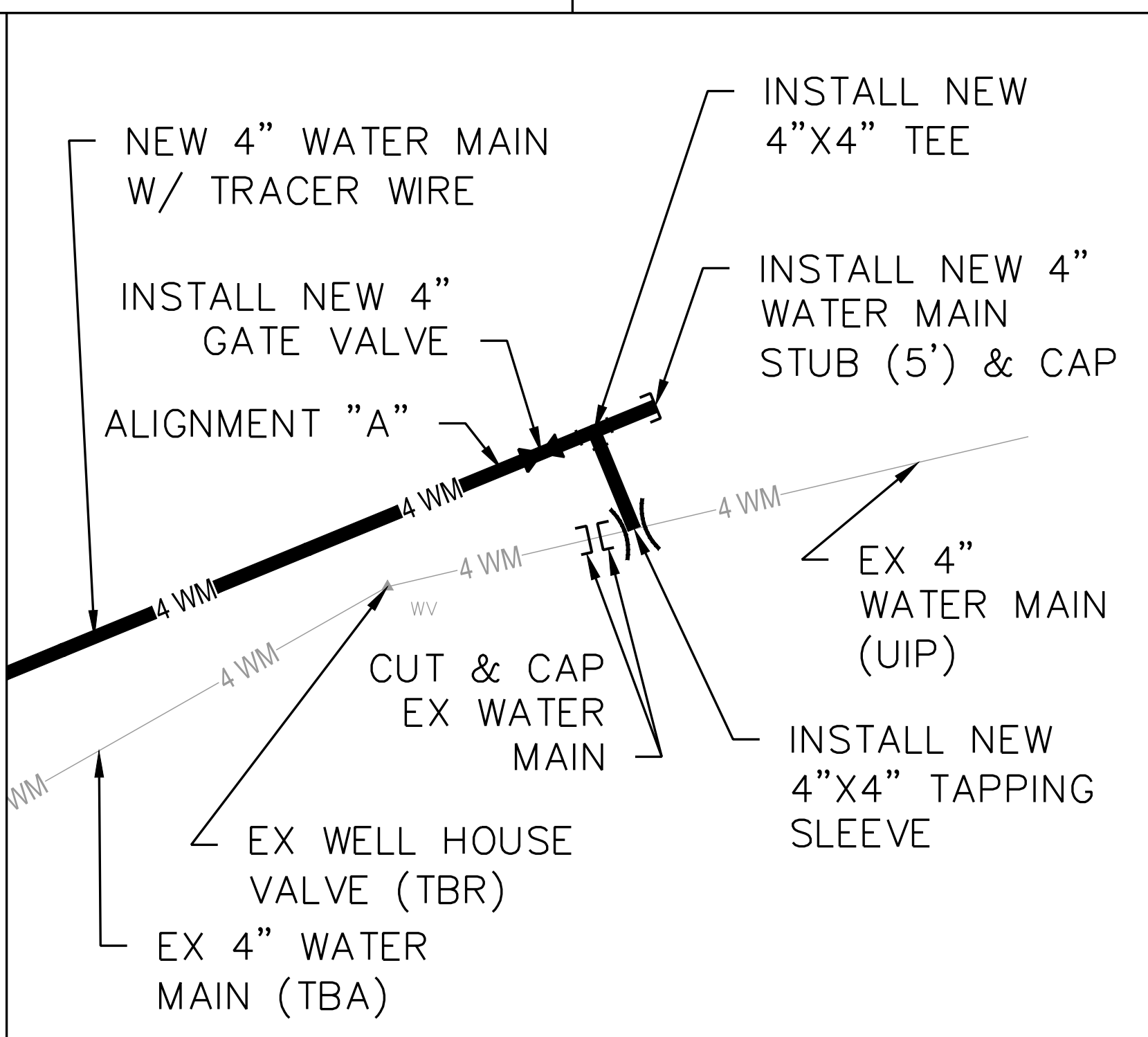
CONNECTION DETAIL "A2" (SEE SHEET C-104)



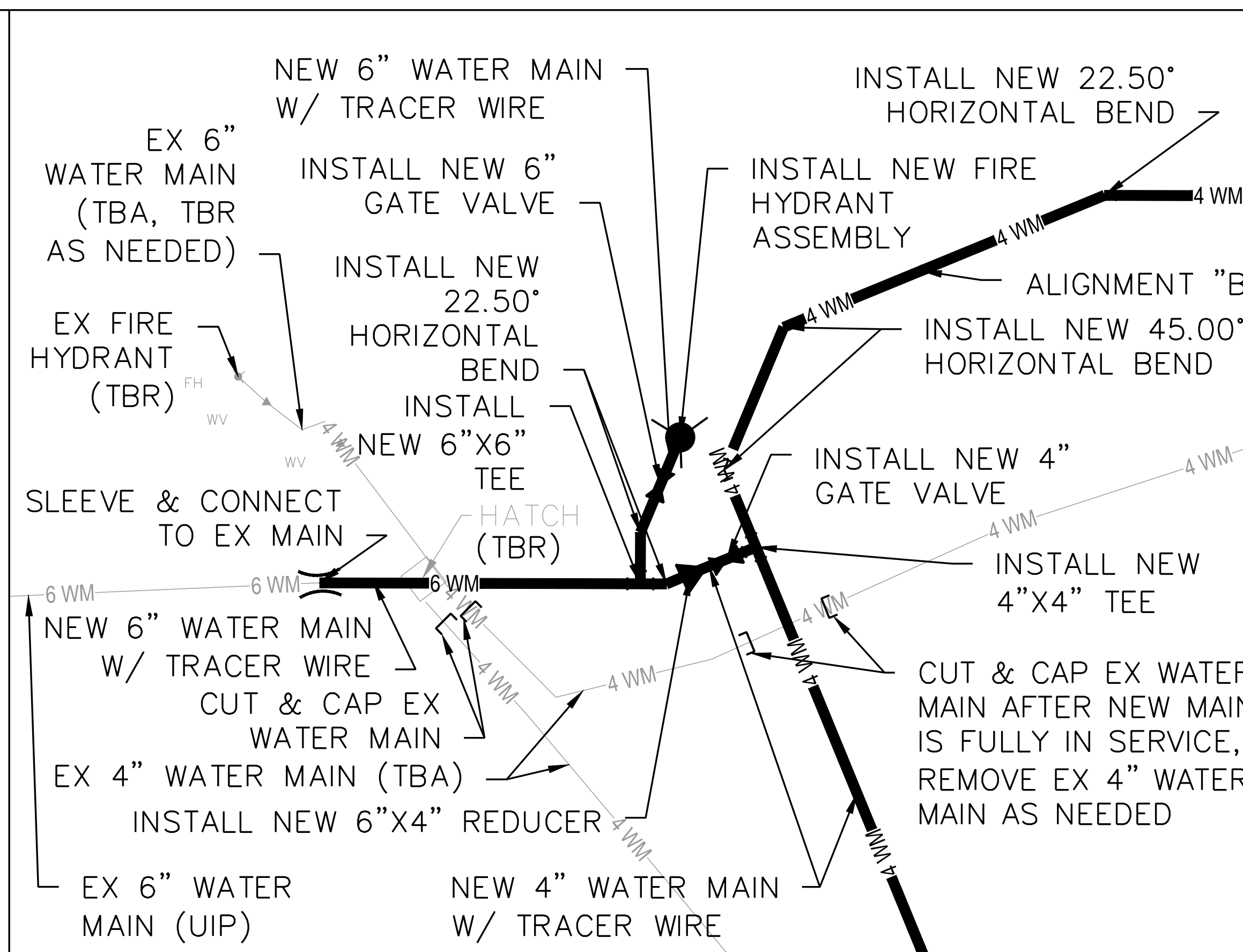
CONNECTION DETAIL "A3" (SEE SHEET C-104)



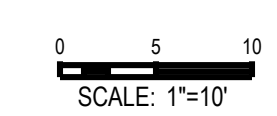
CONNECTION DETAIL "A1" (SEE SHEET C-104)



CONNECTION DETAIL "A4" (SEE SHEET C-104)

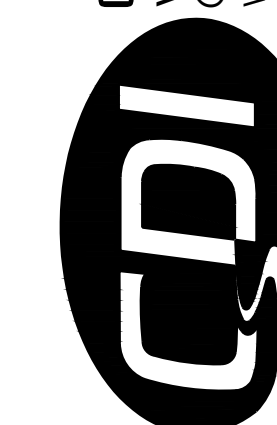


CONNECTION DETAIL "B1" (SEE SHEET C-104)





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CAD DWG FILE: X2335_DT-C-400.dwg
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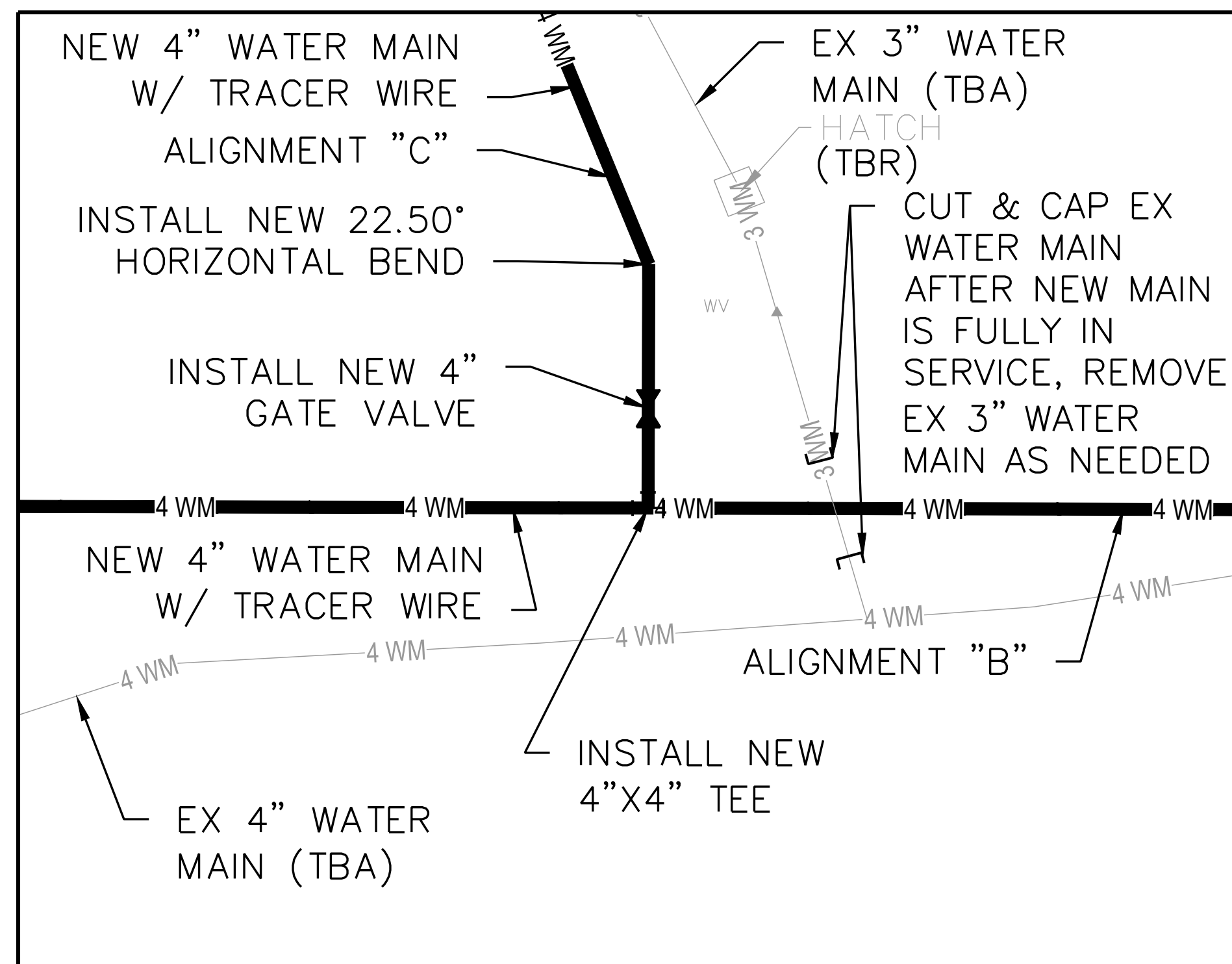
SHEET TITLE:

**CONNECTION
DETAILS**

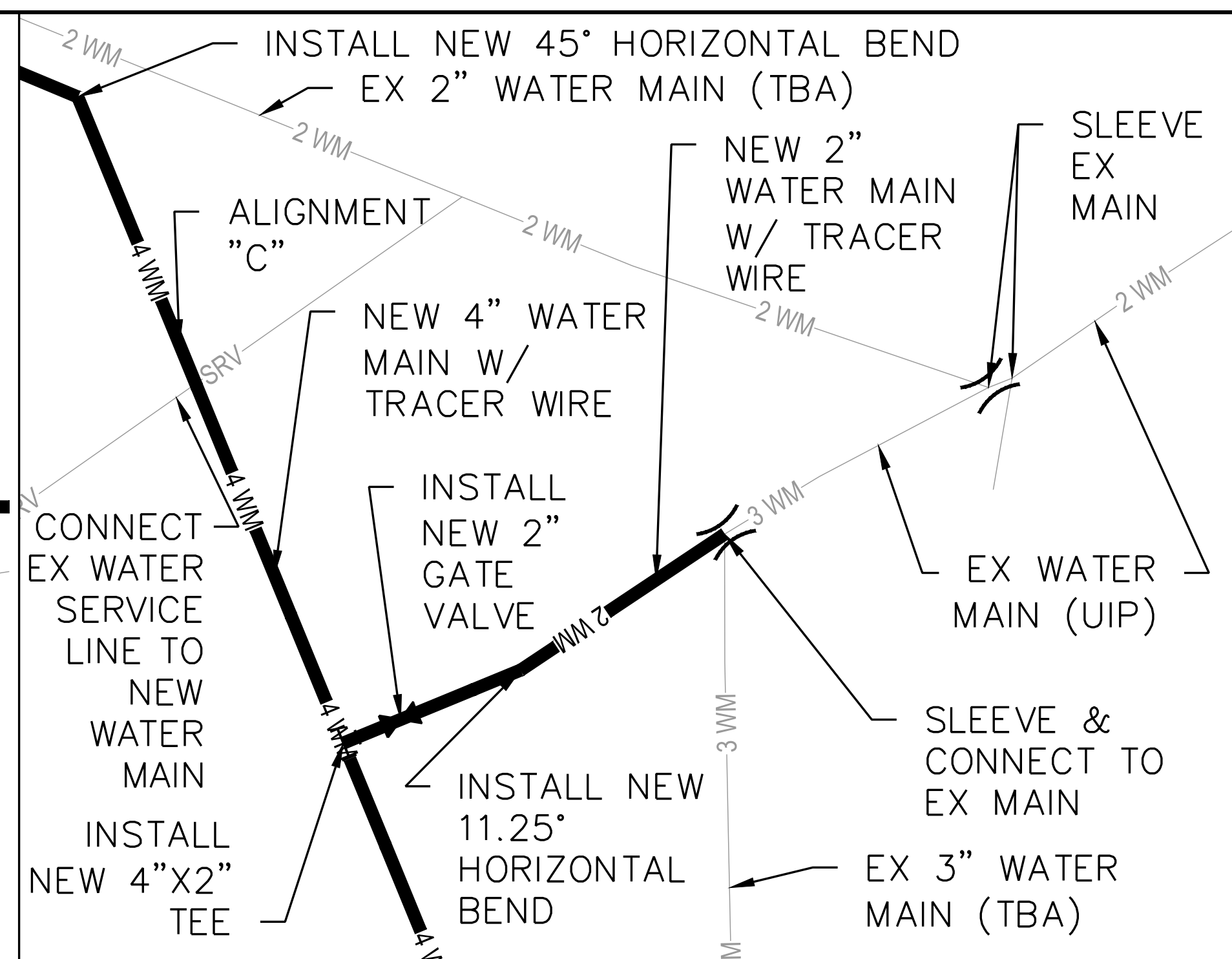
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C-401

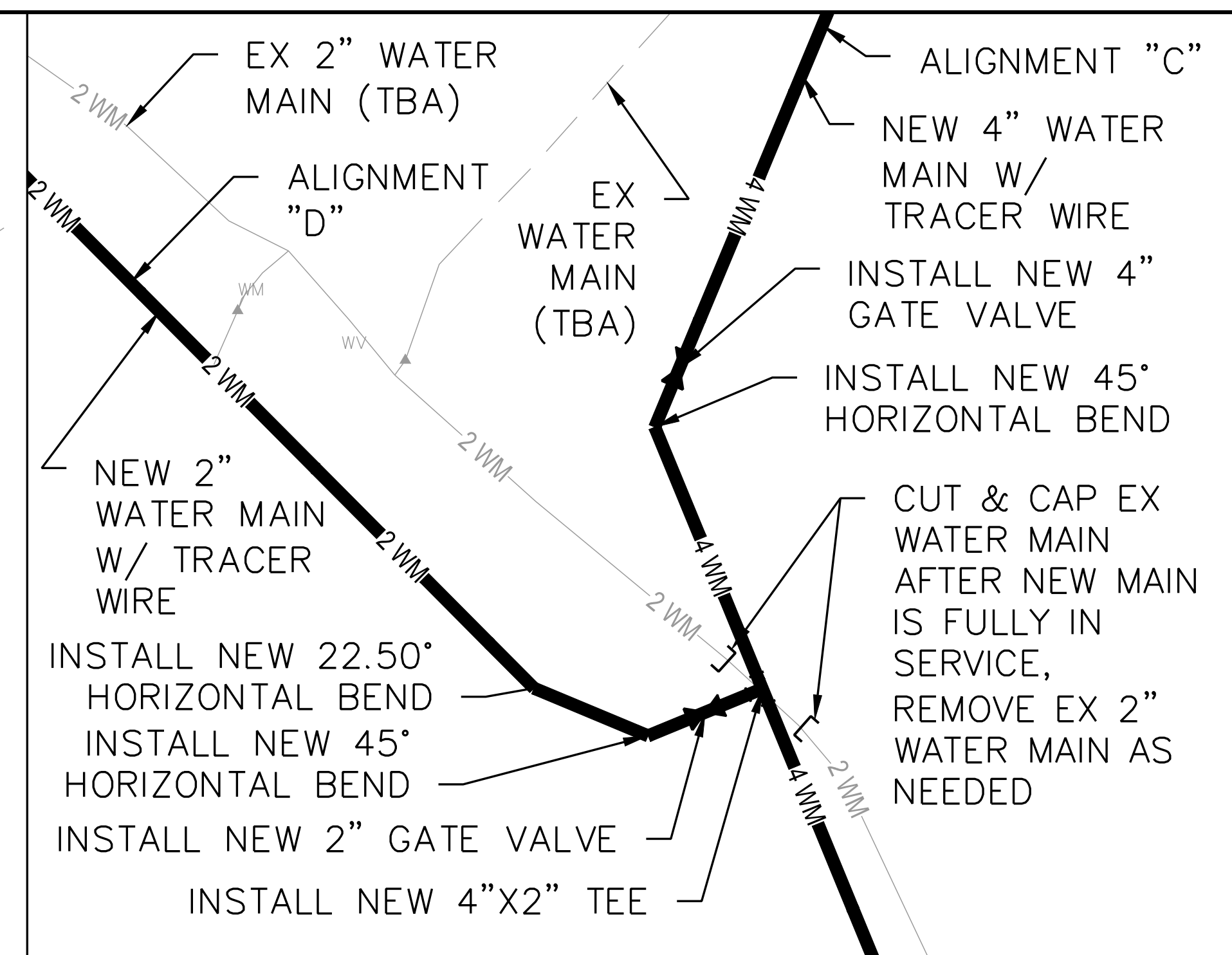
SHEET 18 OF 21
JULY 19, 2024



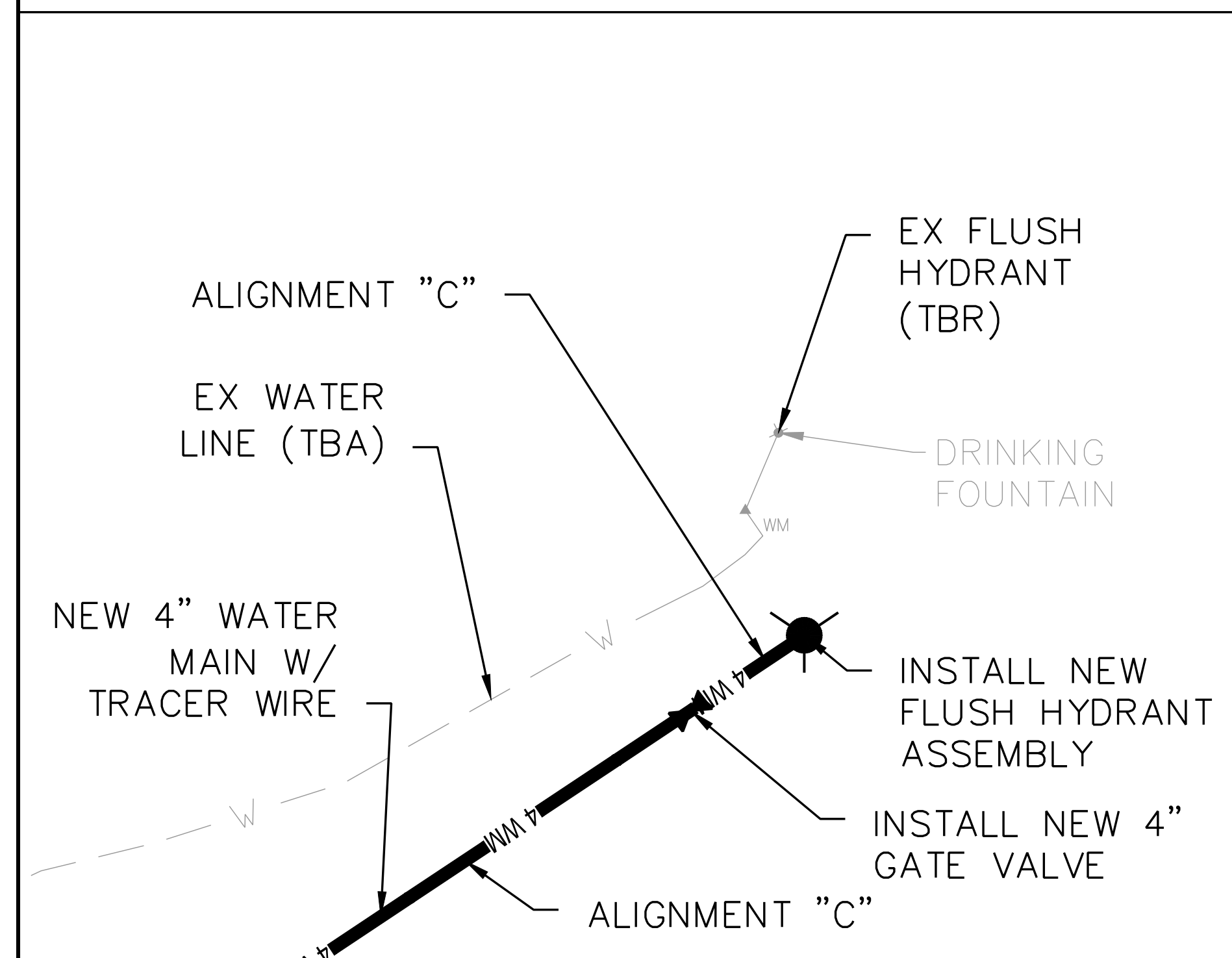
CONNECTION DETAIL "C1" (SEE SHEET C-104)



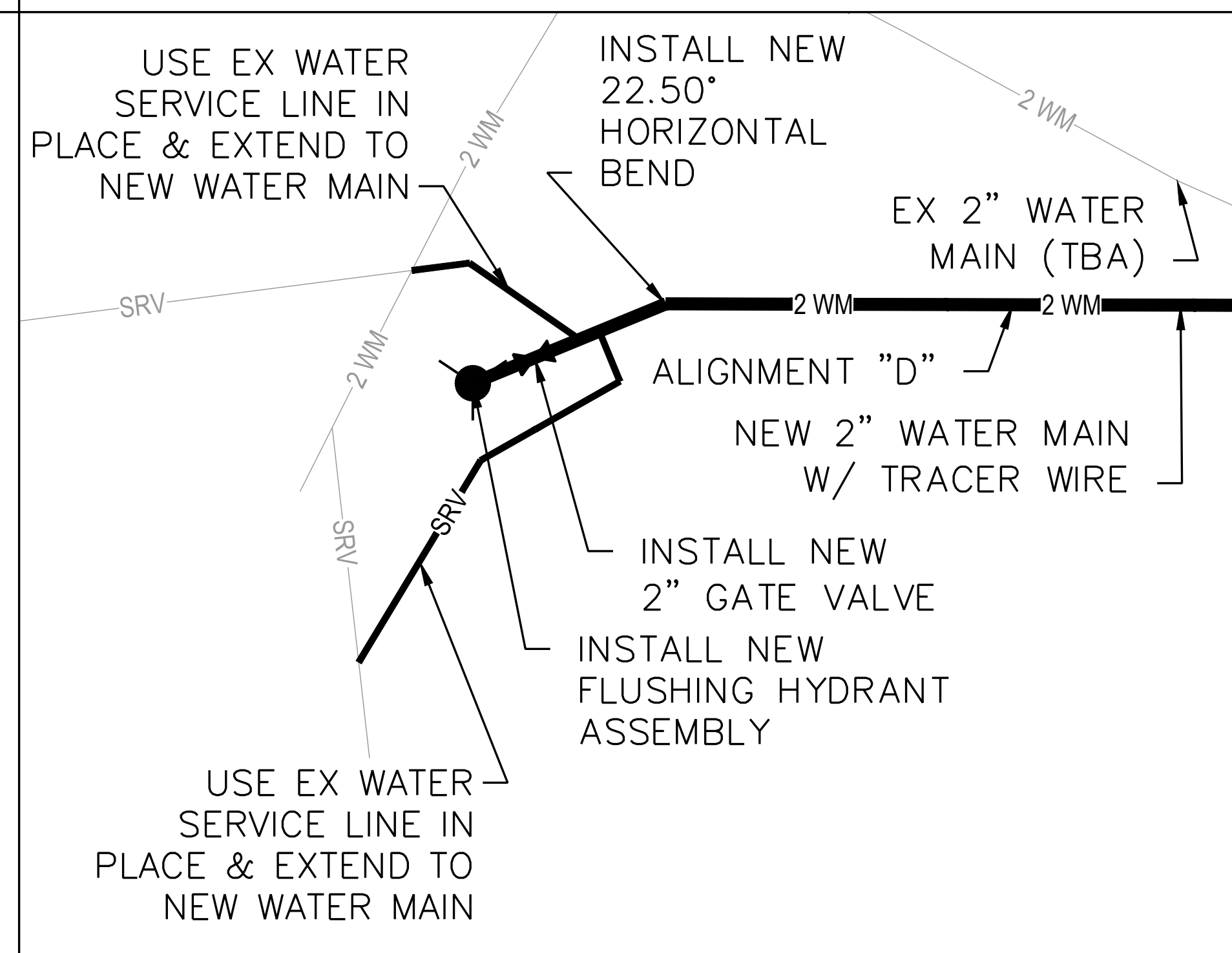
CONNECTION DETAIL "C2" (SEE SHEET C-105)



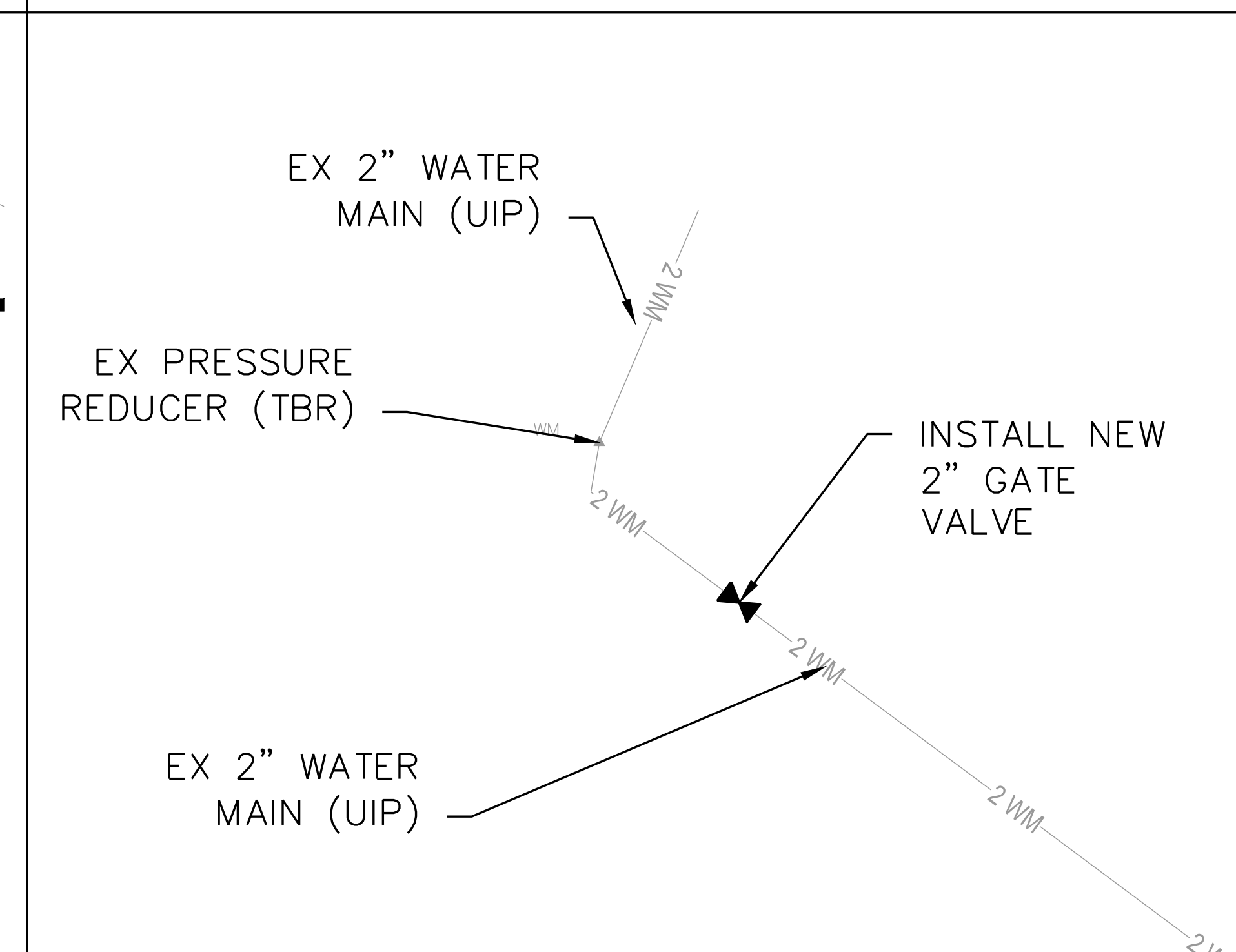
CONNECTION DETAIL "C3" (SEE SHEET C-105)



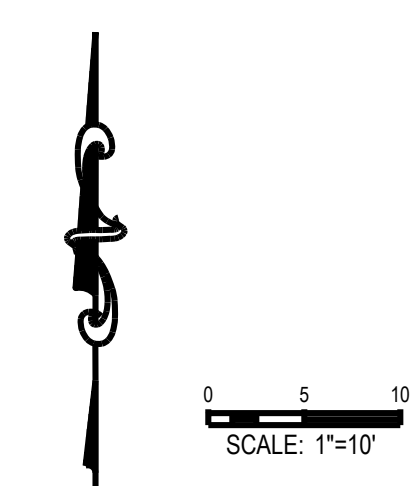
CONNECTION DETAIL "C4" (SEE SHEET C-105)



CONNECTION DETAIL "C5" (SEE SHEET C-105)

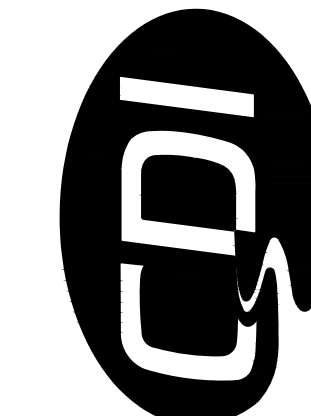


CONNECTION DETAIL "X1" (SEE SHEET C-105)





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CAD DWG FILE: X2335-DT-C-400.dwg
DRAWN BY: KDF
CHECKED BY: WMK
DESIGNED BY: KDF

SHEET TITLE:
**STANDARD
DETAILS**

SHEET NUMBER:

C-402

SHEET 19 OF 21
JULY 19, 2024

MAXIMUM JOINT DEFLECTION FULL-LENGTH PIPE-PUSH-ON TYPE JOINT PIPE

NOTES:
1. PIPE JOINT DEFLECTION ALLOWED ON DUCTILE IRON PIPE ONLY. PIPE JOINT DEFLECTION NOT ALLOWED ON PVC PIPE.

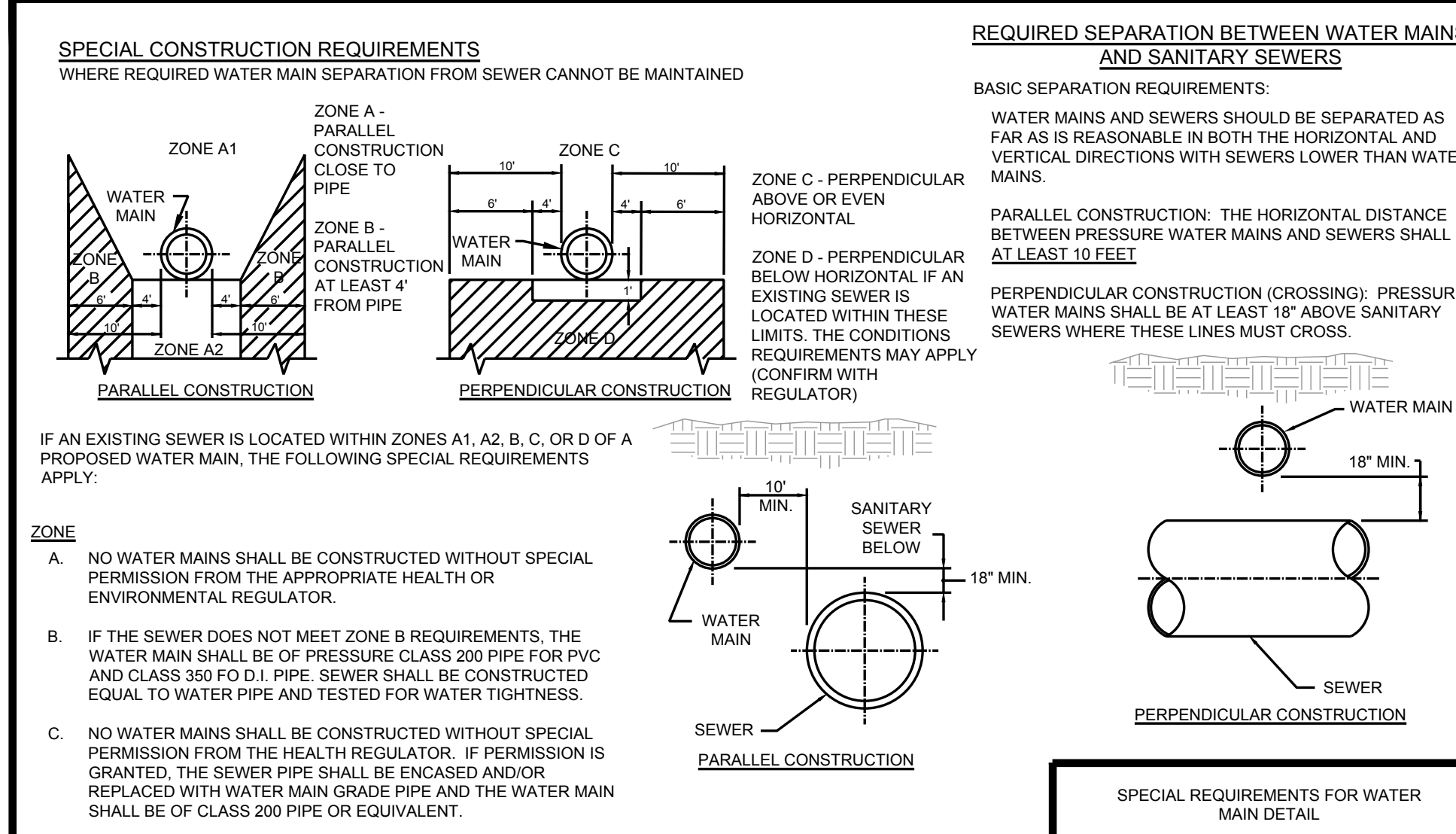
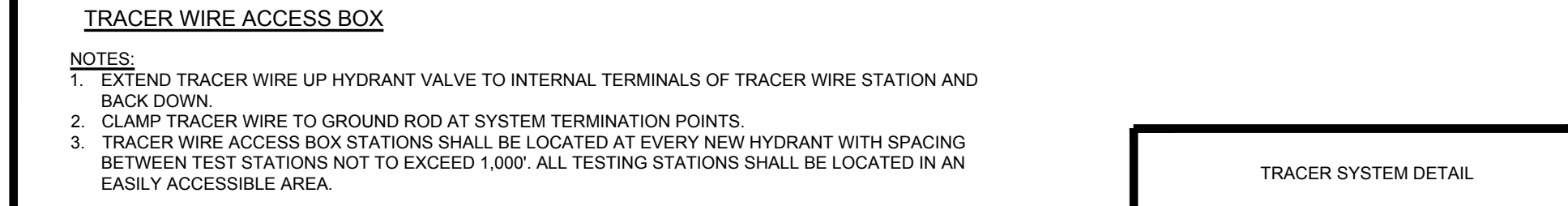
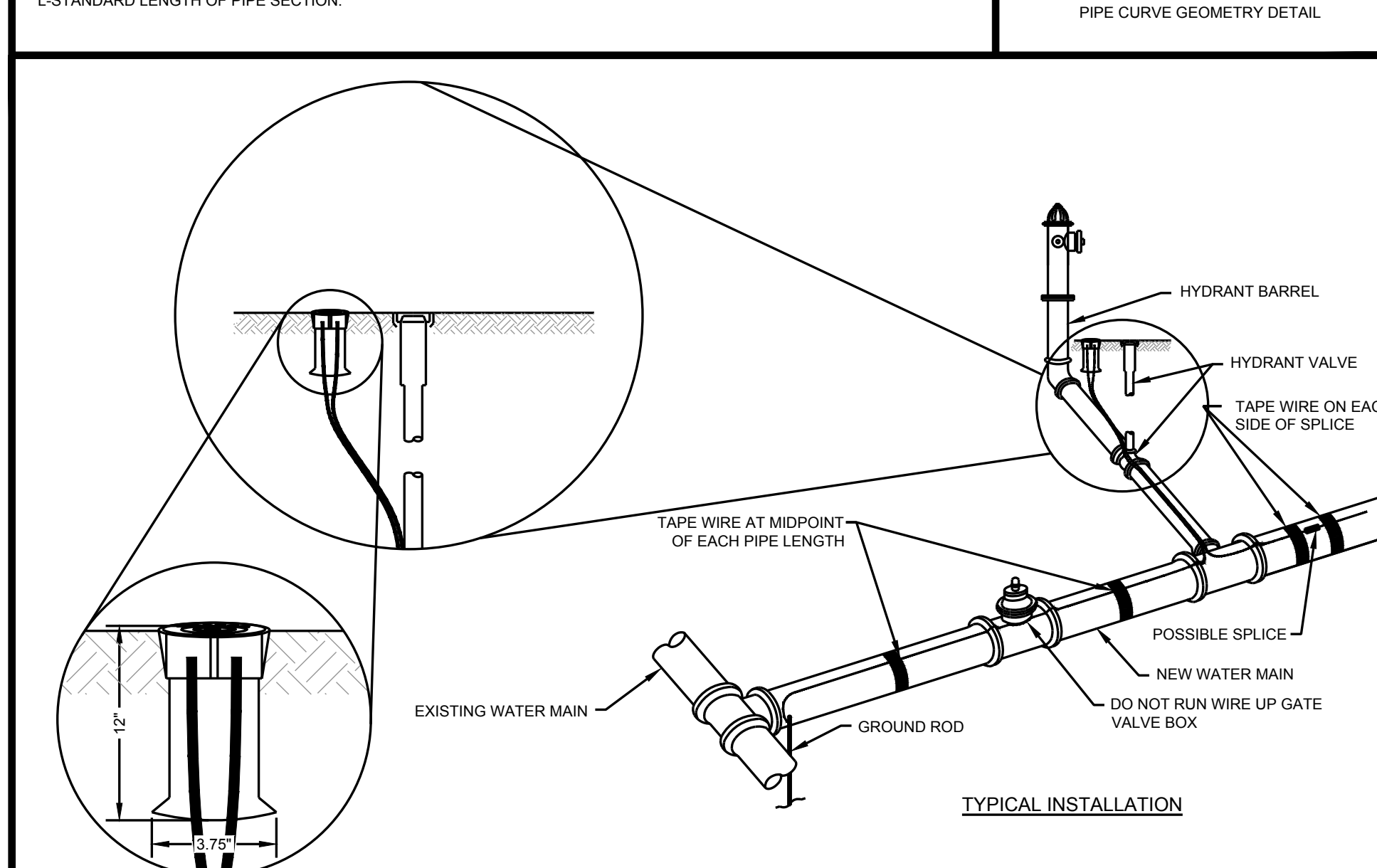
NOMINAL PIPE SIZE INCHES	DEFLECTION ANGLE DEGREES	MAX OFFSET - S		APPROXIMATE RADIUS OF CURVATURE - R PRODUCED BY SUCCESSION OF ANGLED JOINTS	
		INCHES	FEET	INCHES	FEET
3	4	L=18 FT	L=20 FT	L=18 FT	L=20 FT
4	4	15	17	256	285
6	4	15	17	256	285
8	4	15	17	256	285
10	4	15	17	256	285
12	4	15	17	256	285
14	4	9	10	256	285
16	2.5	9	10	429	476
18	2.5	9	10	429	476
20	2.5	9	10	429	476
24	2.5	9	10	429	476

θ = DEFLECTION ANGLE
S = JOINT DEFLECTION OFFSET
L = LAYING LENGTH
R = RADIUS OF CURVE
 $R = L / (2 \tan(\theta/2))$

MAXIMUM JOINT DEFLECTION DUCTILE IRON PUSH ON PIPE

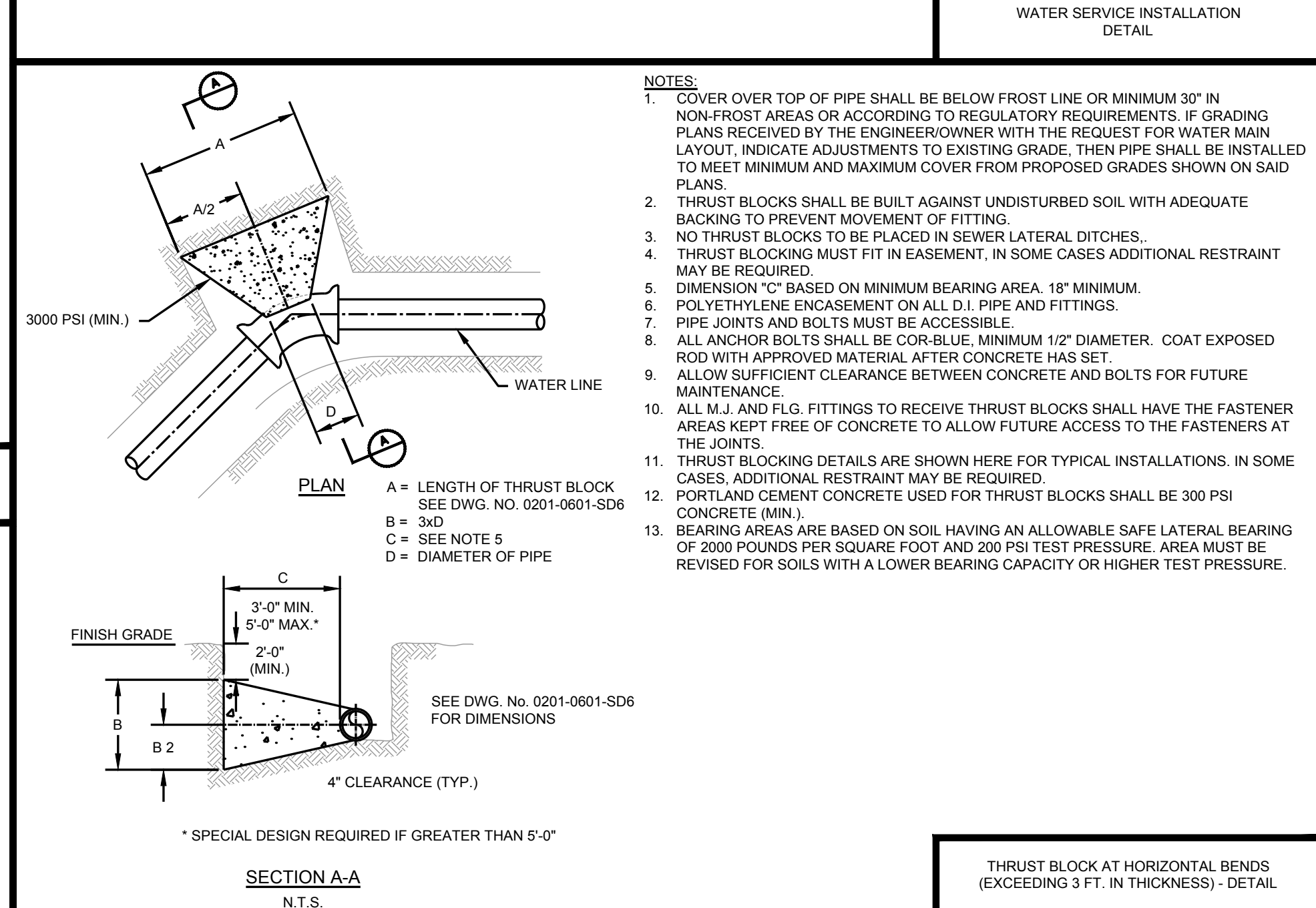
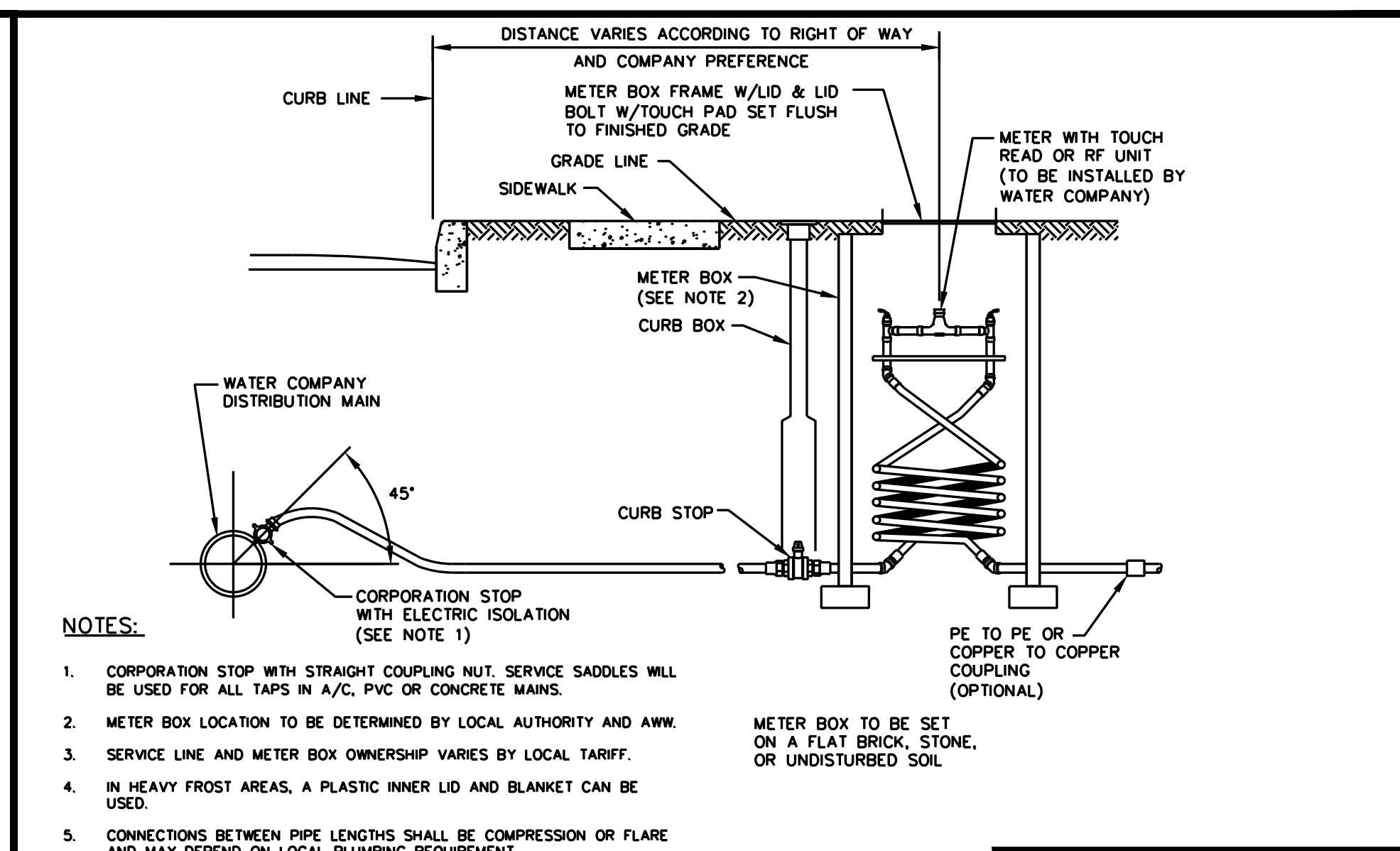
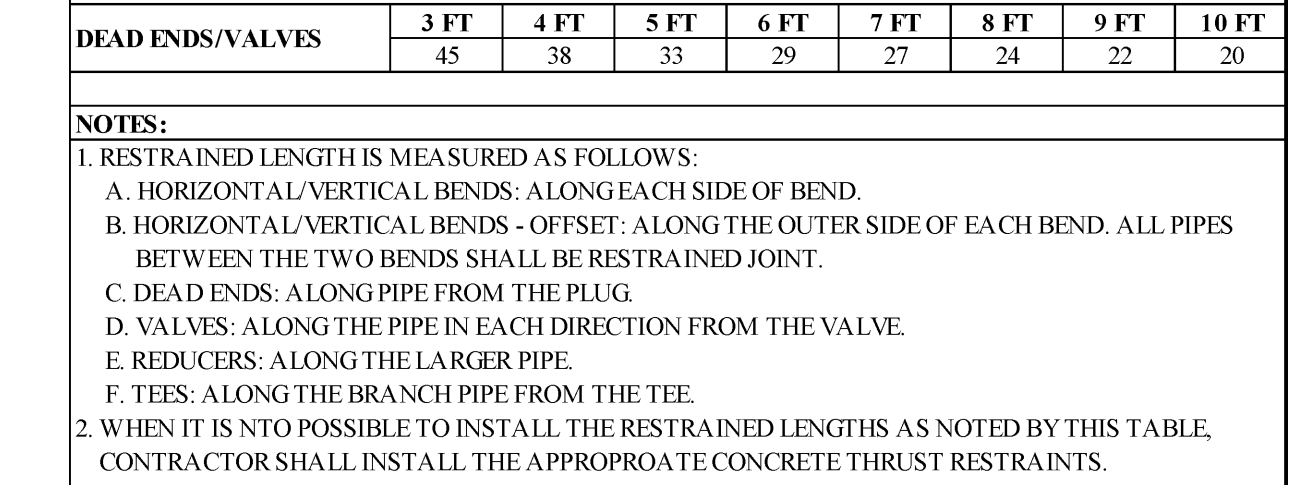
NOMINAL PIPE SIZE INCHES	DEFLECTION ANGLE DEGREES	MAX OFFSET - S		APPROXIMATE RADIUS OF CURVATURE - R PRODUCED BY SUCCESSION OF ANGLED JOINTS	
		INCHES	FEET	INCHES	FEET
3	4	L=18 FT	L=20 FT	L=18 FT	L=20 FT
4	4	15	17	256	285
6	4	15	17	256	285
8	4	15	17	256	285
10	4	15	17	256	285
12	4	15	17	256	285
14	4	9	10	256	285
16	2.5	9	10	429	476
18	2.5	9	10	429	476
20	2.5	9	10	429	476
24	2.5	9	10	429	476

*L-STANDARD LENGTH OF PIPE SECTION.



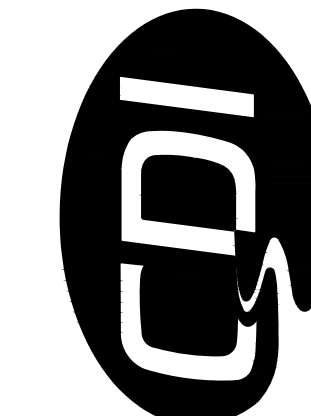
RESTRAINED JOINT TABLE FOR PVC PIPE

FITTINGS	REQUIRED RESTRAINED LENGTH (FT) OF PVC PIPE BY DEPTH OF COVER							
	3 FT	4 FT	5 FT	6 FT	7 FT	8 FT	9 FT	10 FT
HORIZONTAL BENDS								
11.25 DEG	2	2	2	1	1	1	1	1
22.5 DEG	4	3	3	3	2	2	2	2
45 DEG	7	6	5	5	4	4	4	3
90 DEG	16	14	12	11	10	9	8	7
VERTICAL DOWN BENDS								
11.25 DEG	6	5	4	4	3	3	3	3
22.5 DEG	12	10	8	7	6	6	5	5
45 DEG	24	20	17	15	13	12	11	10
VERTICAL UP BENDS								
11.25 DEG	2	2	2	1	1	1	1	1
22.5 DEG	4	3	3	3	2	2	2	2
45 DEG	7	6	5	5	4	4	4	3
DEAD ENDS/VALVES								
	45	38	33	29	27	24	22	20





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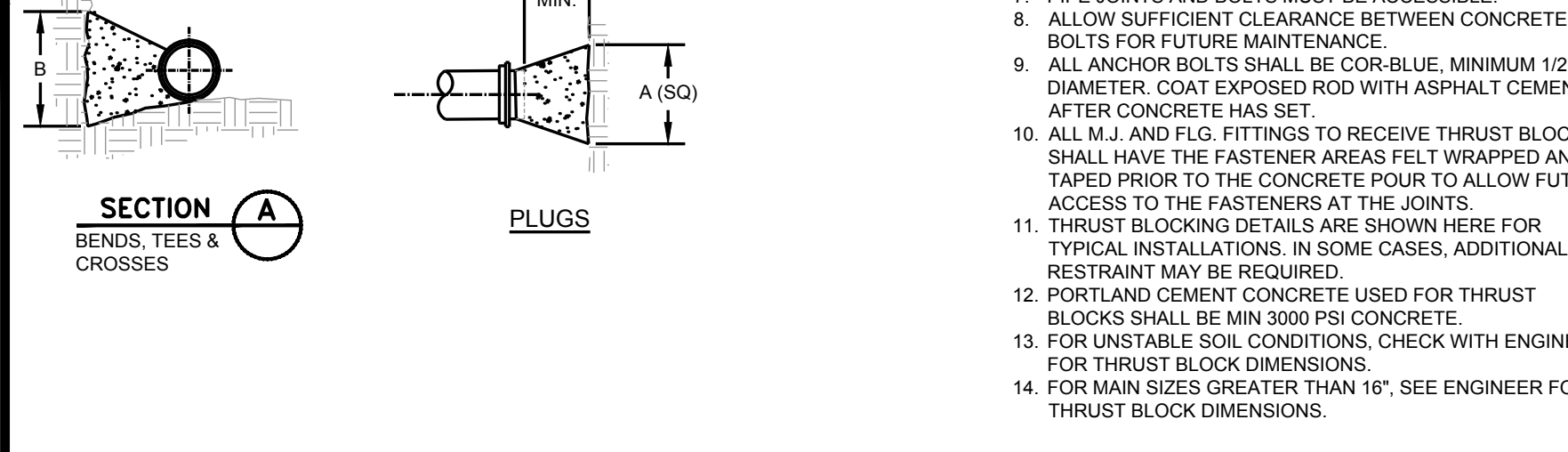
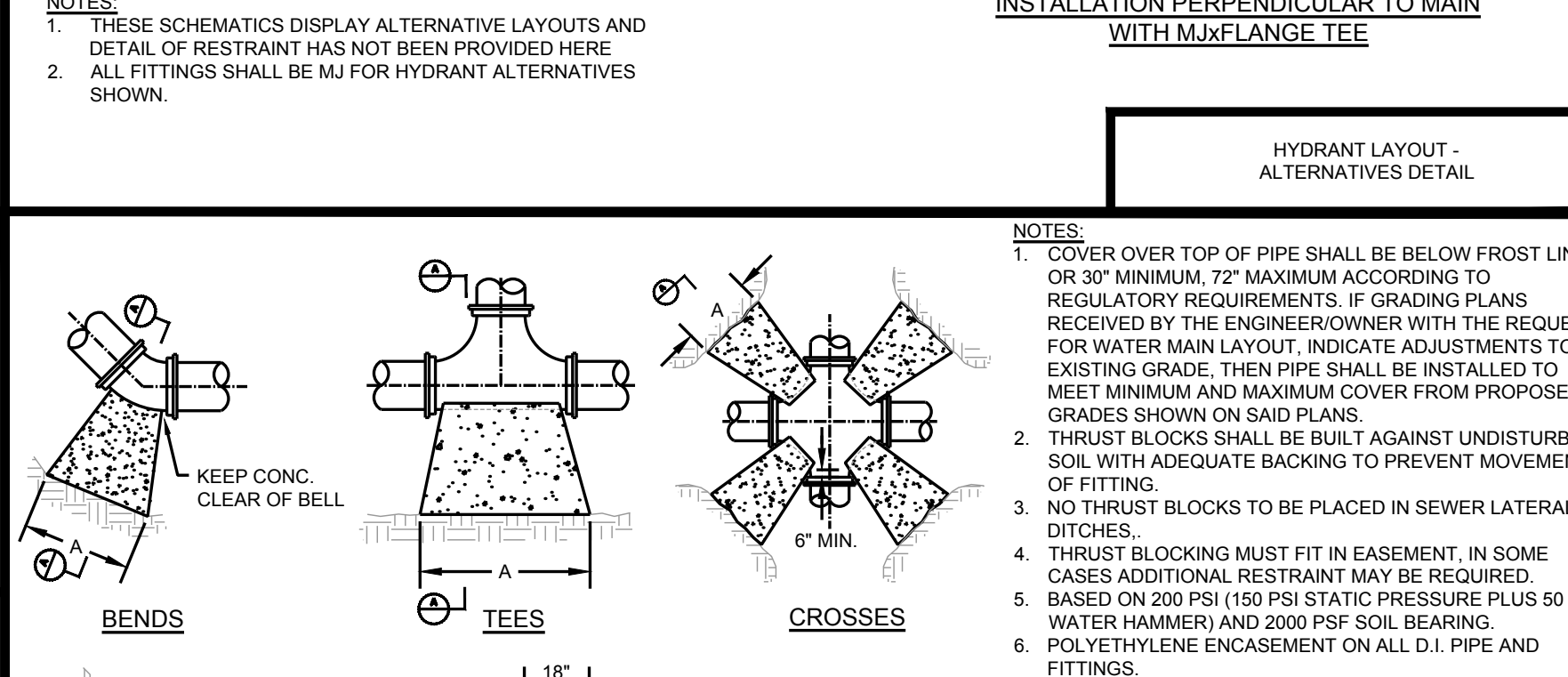
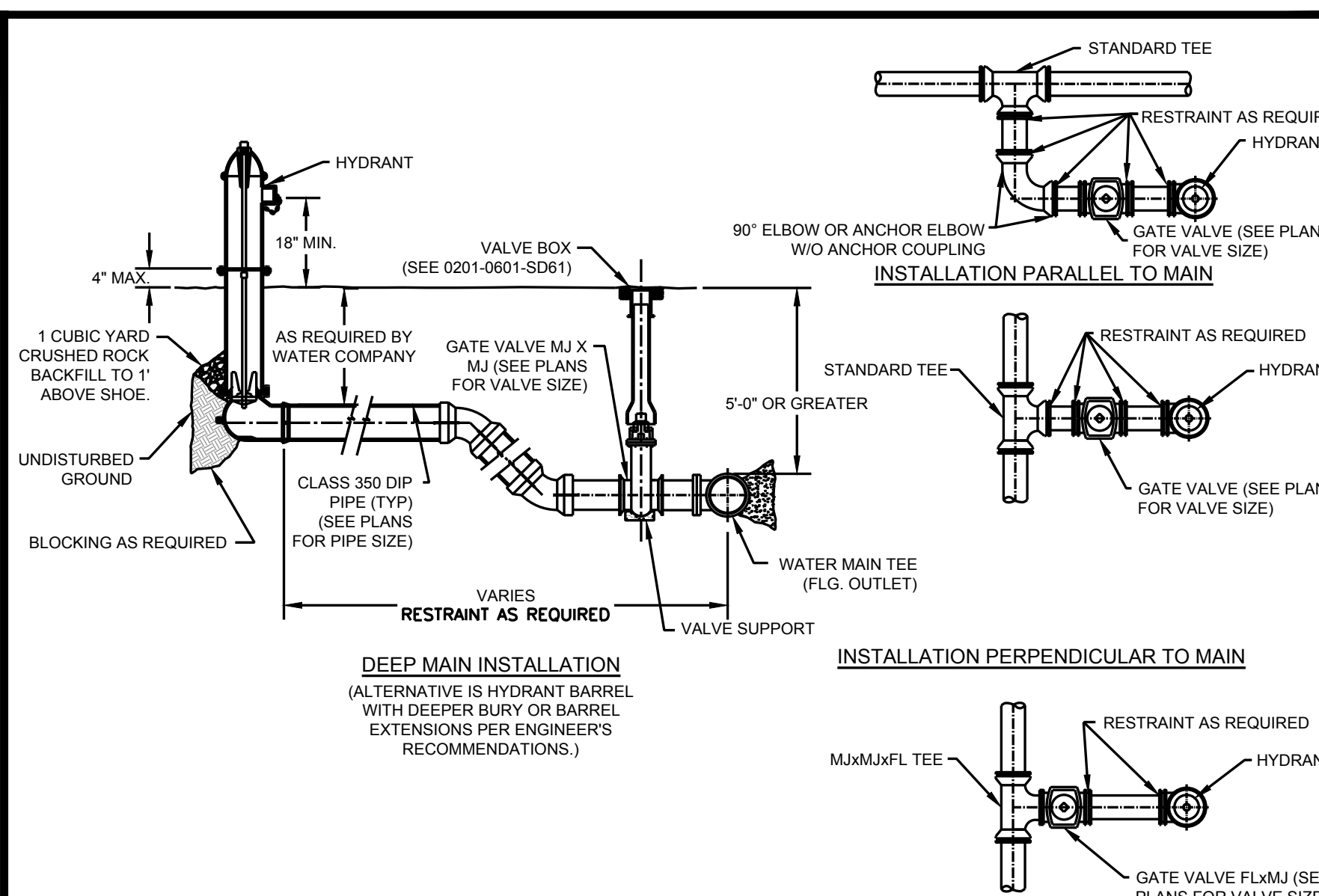
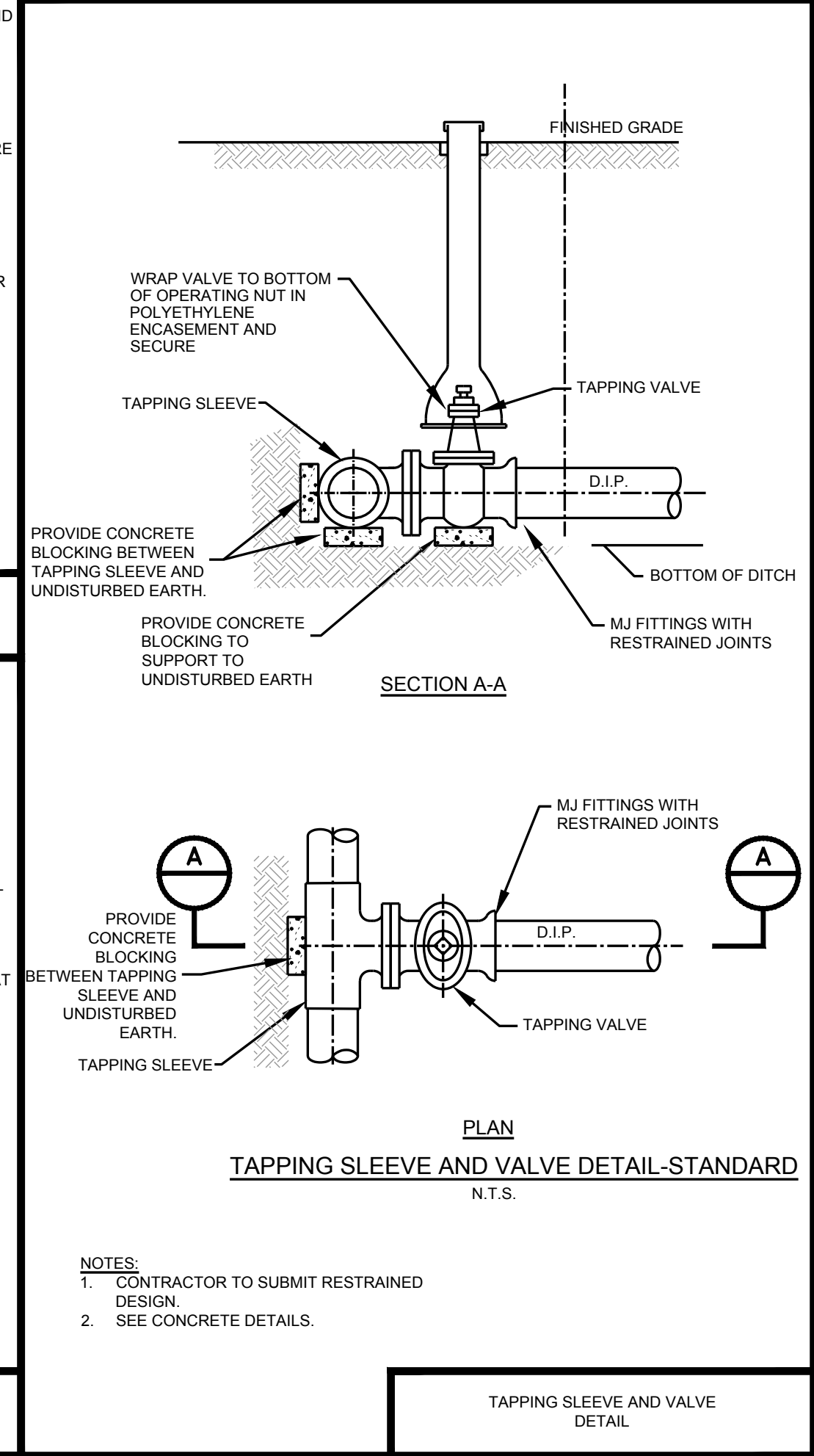
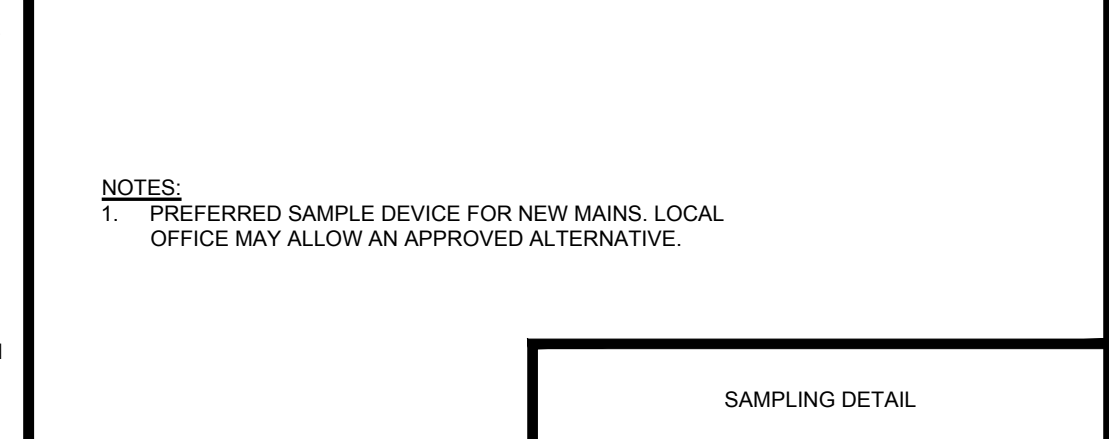
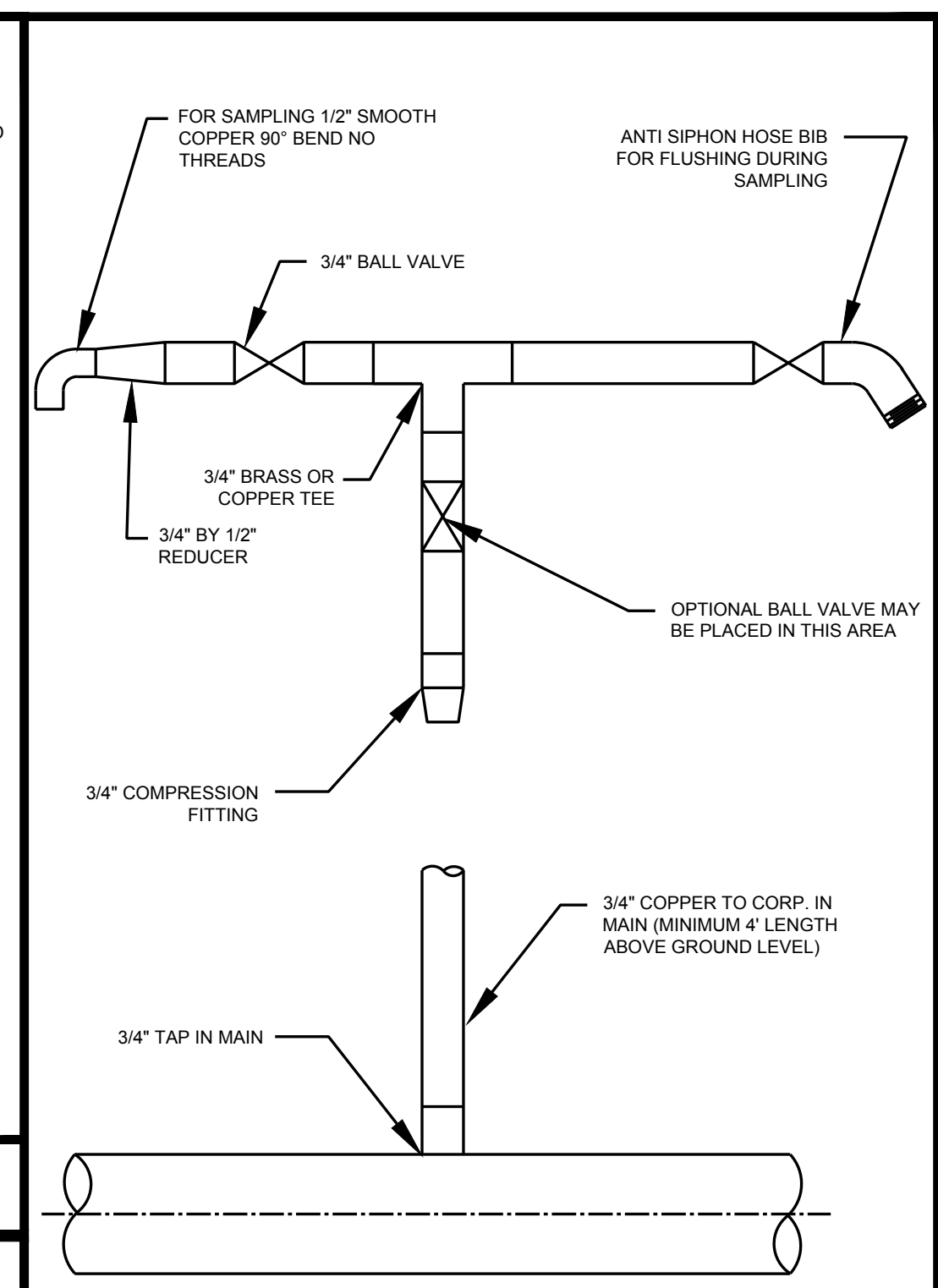
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CHECKED BY: WMK
DESIGNED BY: KDF

SHEET TITLE:
**STANDARD
DETAILS**

SHEET NUMBER:

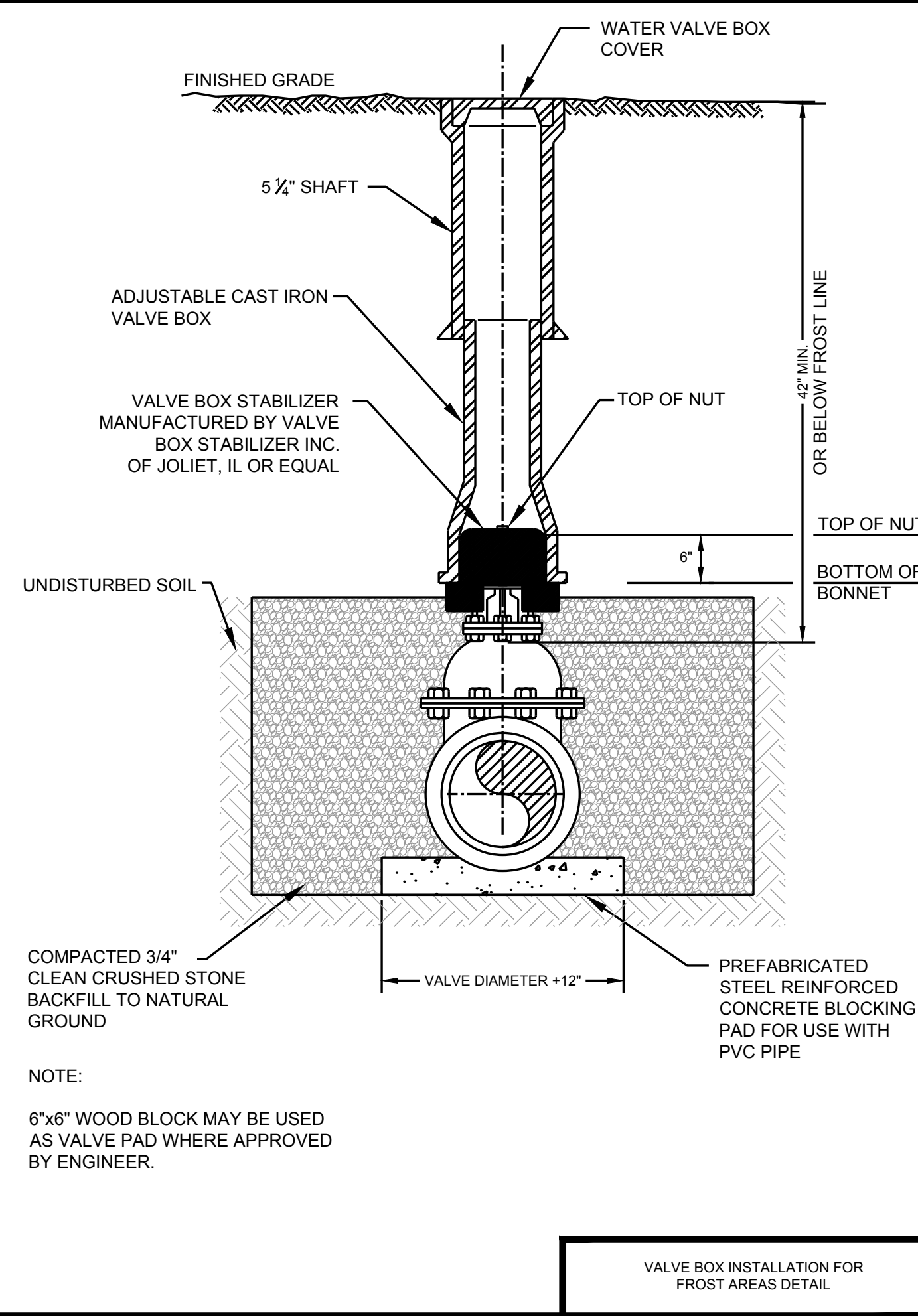
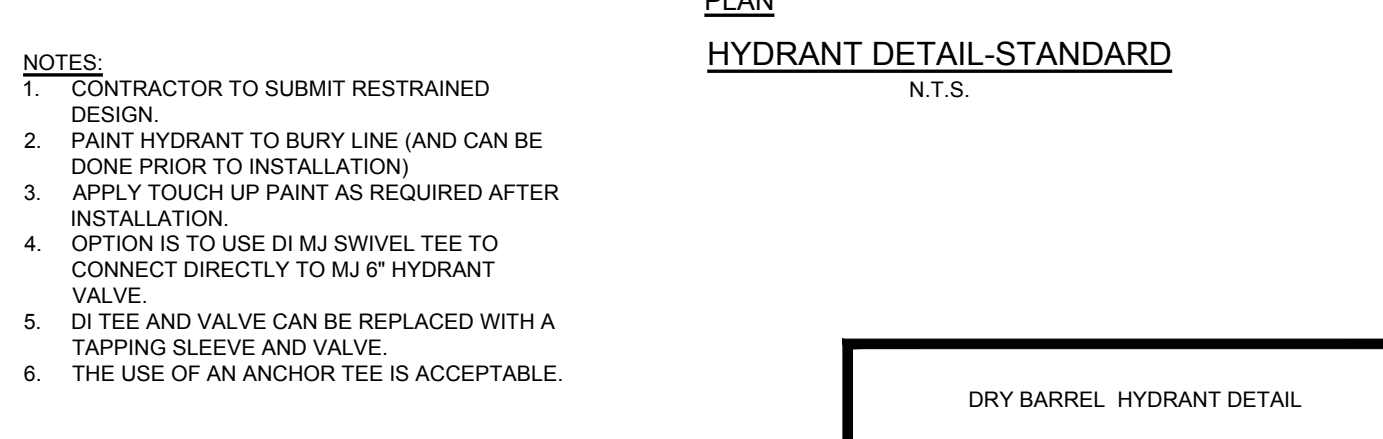
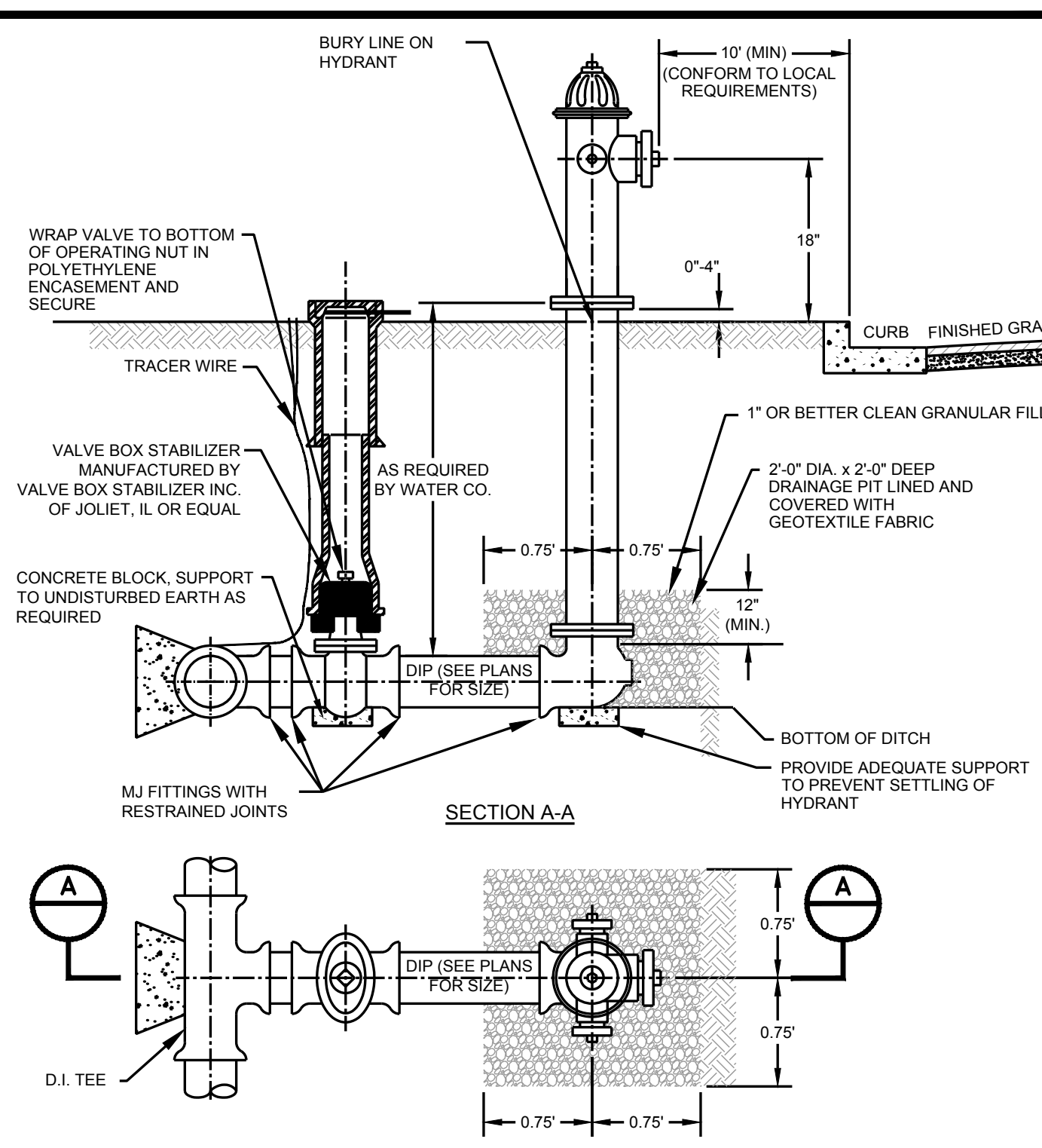
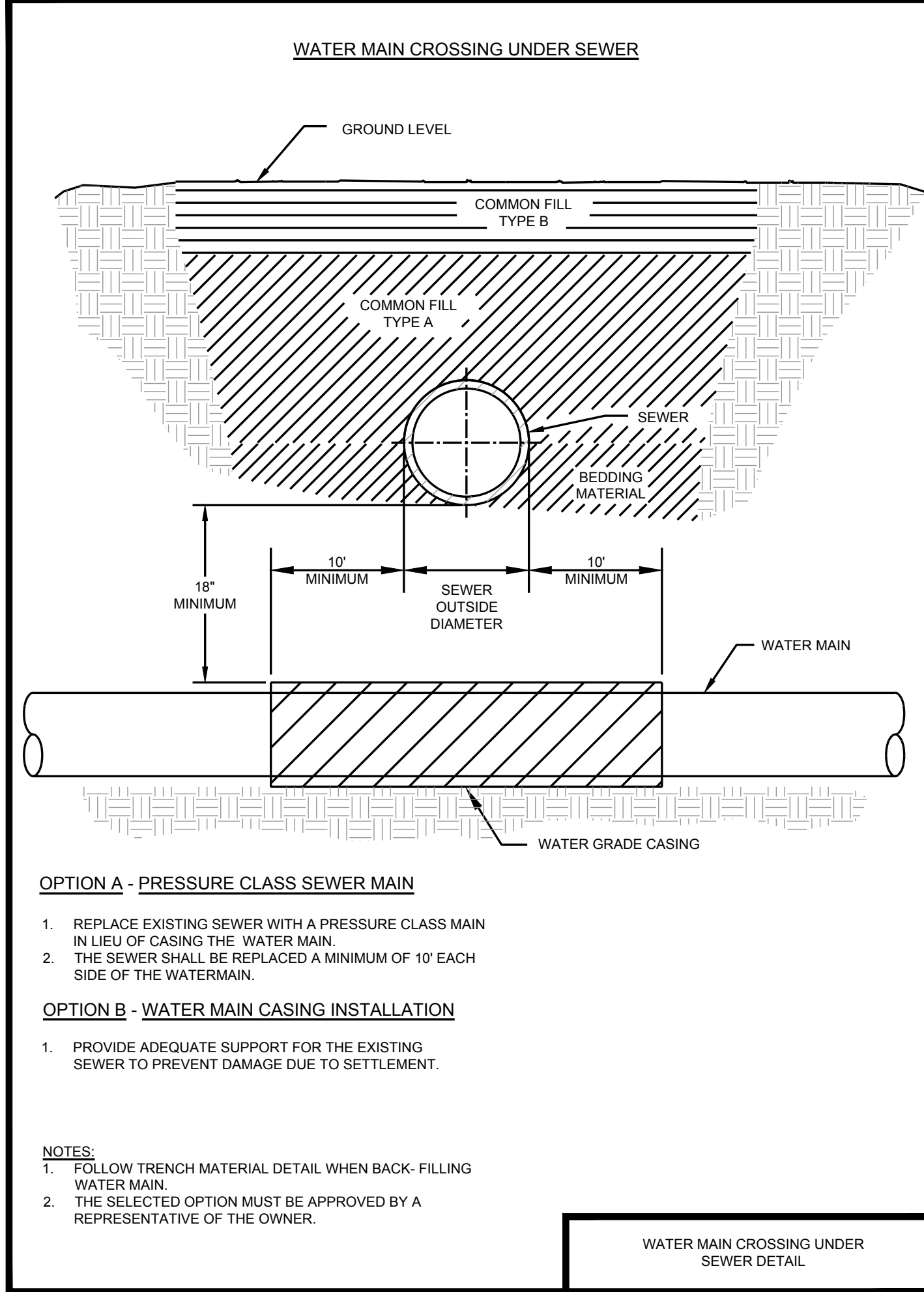
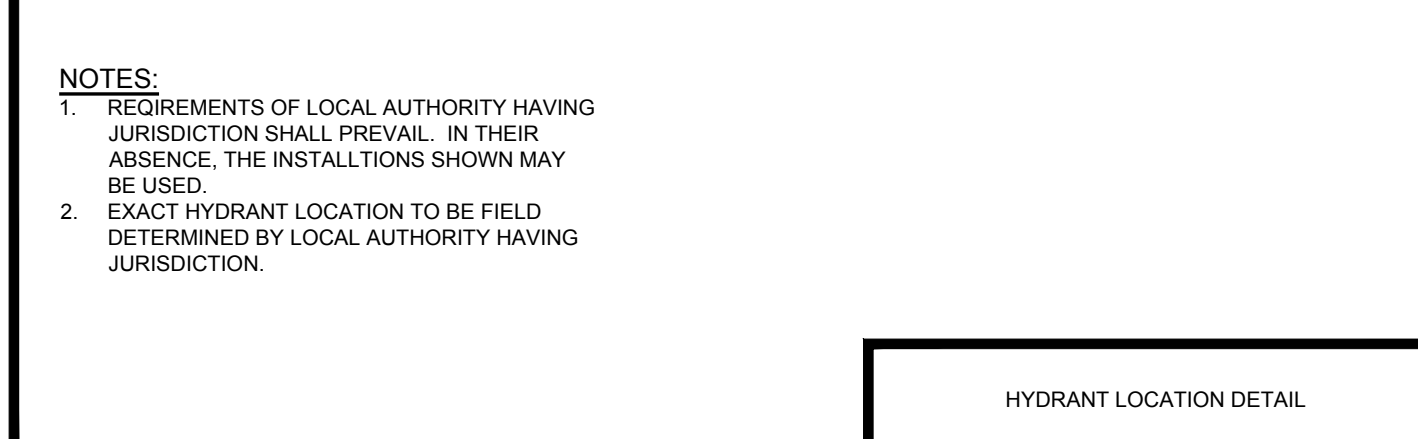
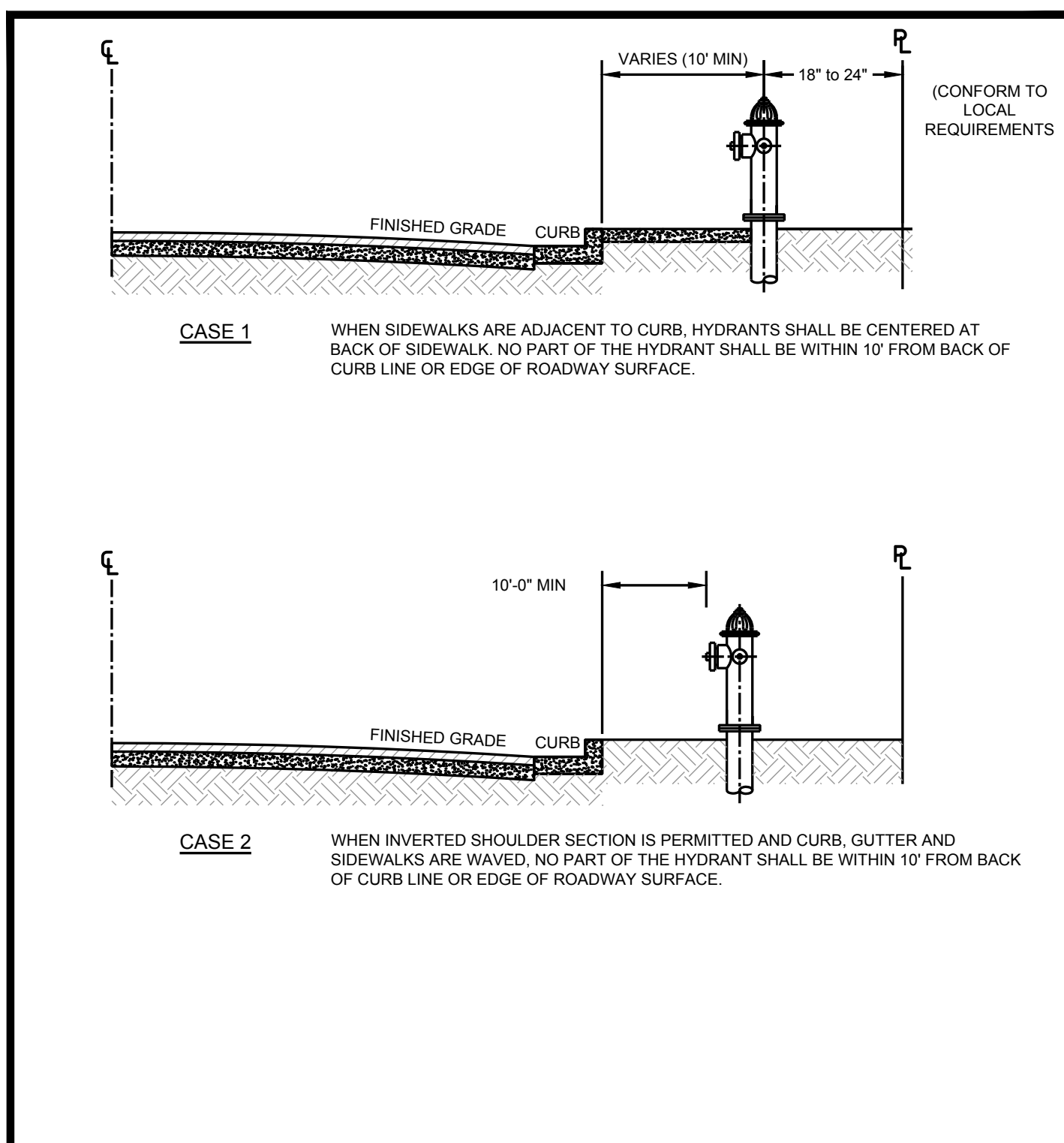
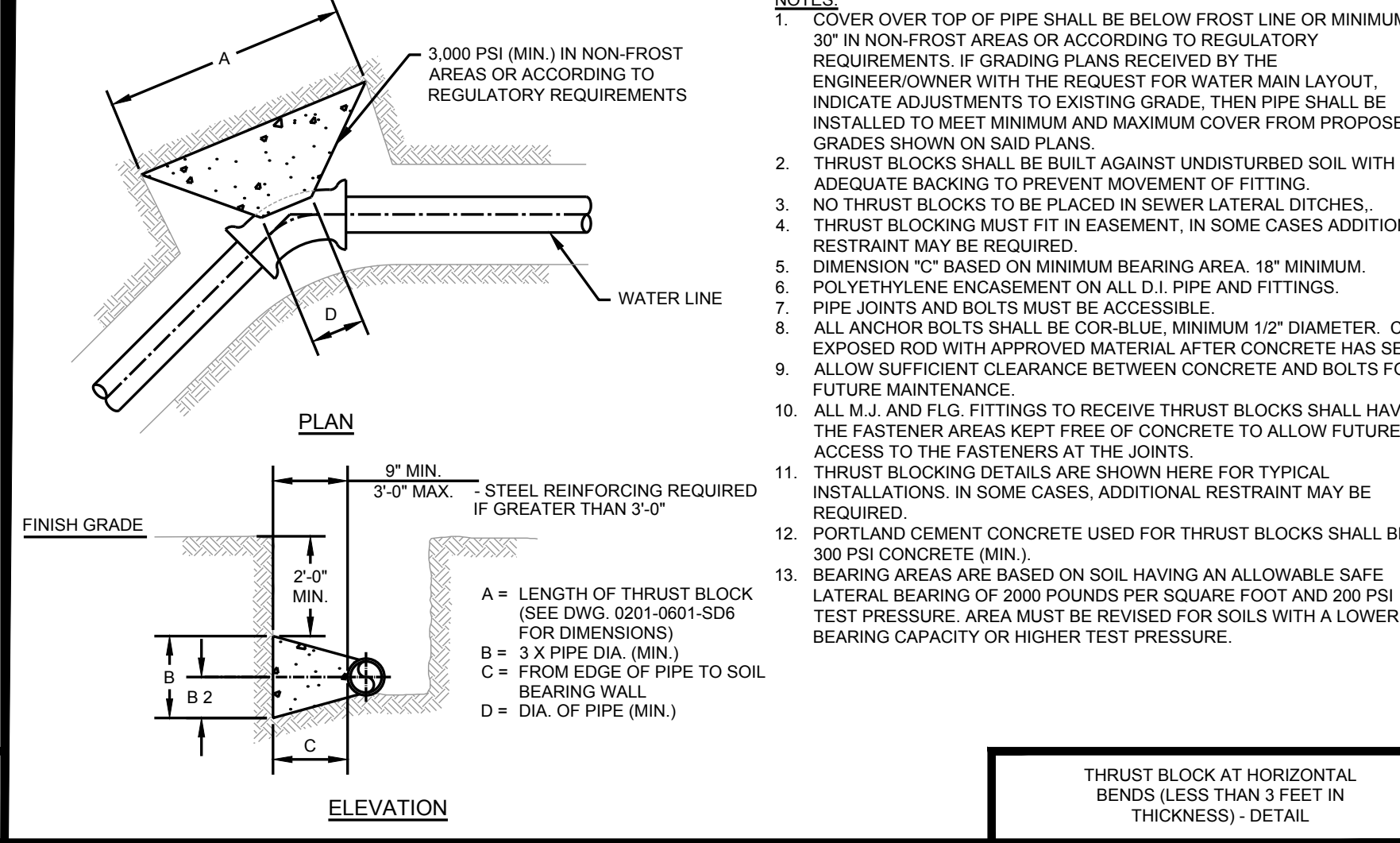
C-403

SHEET 20 OF 21
JULY 19, 2024



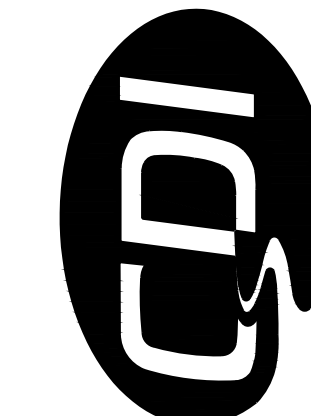
REQUIRED BEARING AREA ON UNDISTURBED SOIL AND TYPICAL DIMENSIONS

Area in square feet "A" and "B" in inches
Bearing table area is based on 2000 psi maximum with soil bearing capacity of 2000 lbs/square foot.
For higher water pressure or lower soil pressures, consult Engineer for adjustments.
Bearing table area does not include a safety factor.
A safety factor and additional bearing area may be required as directed by the Engineer.





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OFFICE OF ADMINISTRATION
DIVISION OF FACILITIES
MANAGEMENT,
DESIGN AND CONSTRUCTION

DEPARTMENT OF NATURAL
RESOURCES
DIVISION OF STATE PARKS

WATER RENOVATIONS

SAM A. BAKER STATE PARK
5580 MO-143
PATTERSON, MISSOURI 63956

PROJECT # X2335-01
CDI PROJECT # 6376

SITE # 5218
ASSET # 7815218040

REVISION: _____
DATE: _____
REVISION: _____
DATE: _____
REVISION: _____
DATE: _____
ISSUE DATE: _____

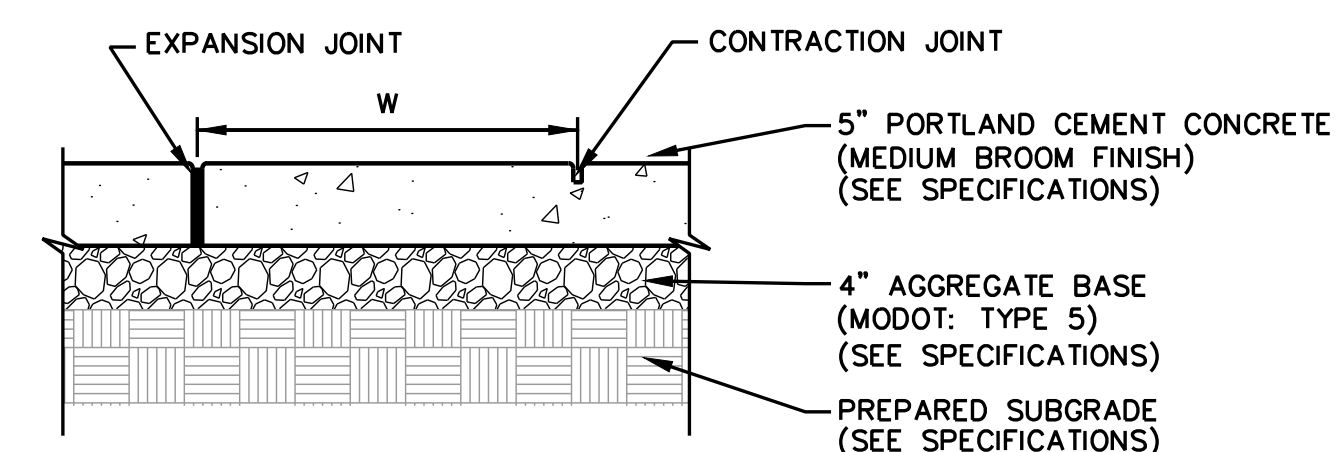
CAD DWG FILE: X2335_DT-C-400.dwg
DRAWN BY: KDF
CHECKED BY: WMK
DESIGNED BY: KDF

SHEET TITLE:
**STANDARD
DETAILS**

SHEET NUMBER:

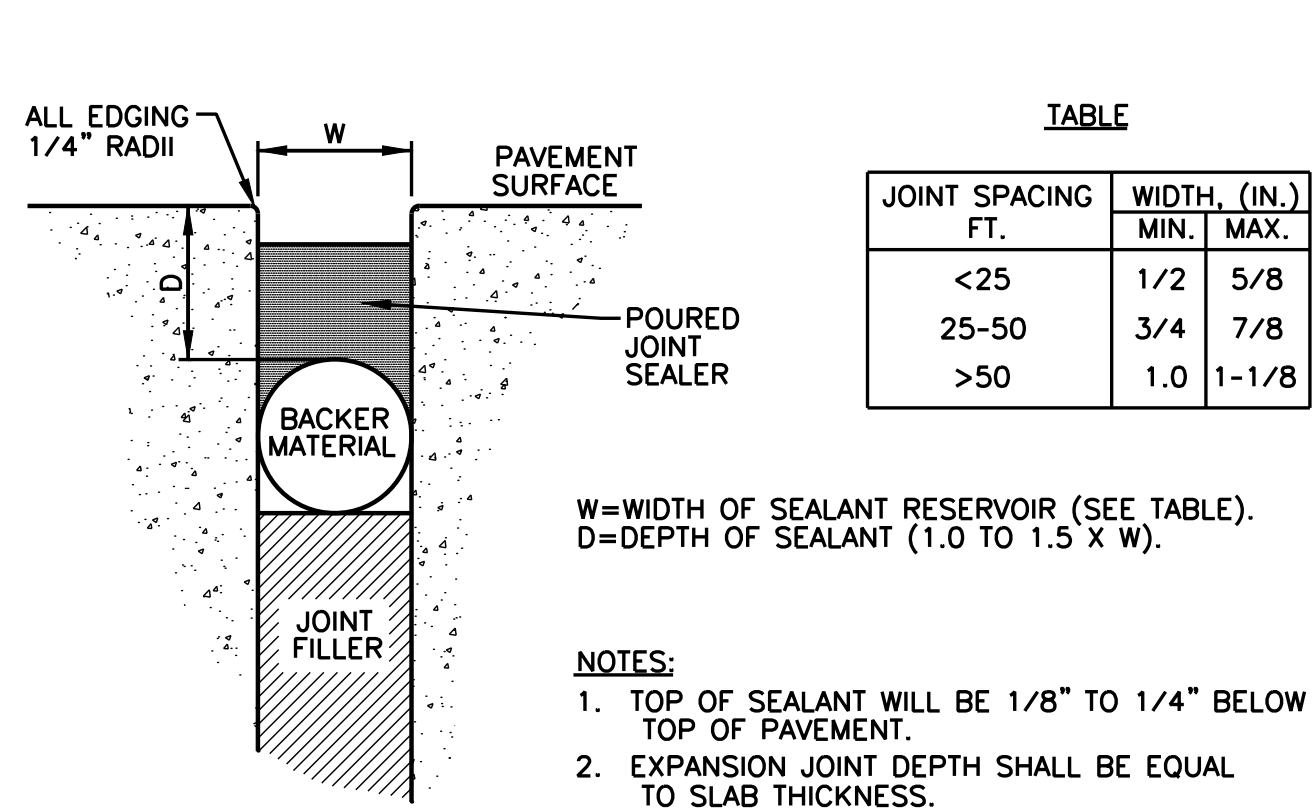
C-404

SHEET 21 OF 21
JULY 19, 2024



- NOTES:
1. W=WIDTH OF SIDEWALK ; VARIES-SEE PLANS
 2. SPACE CONTRACTION JOINTS AT W WHERE APPLICABLE- SEE PLAN. PLACE EXPANSION JOINTS AT 3xW.
 3. EXPANSION JOINT SHALL BE PLACED THROUGH THE FULL DEPTH OF THE SIDEWALK.

A CONCRETE PAVEMENT-PEDESTRIAN
NOT TO SCALE

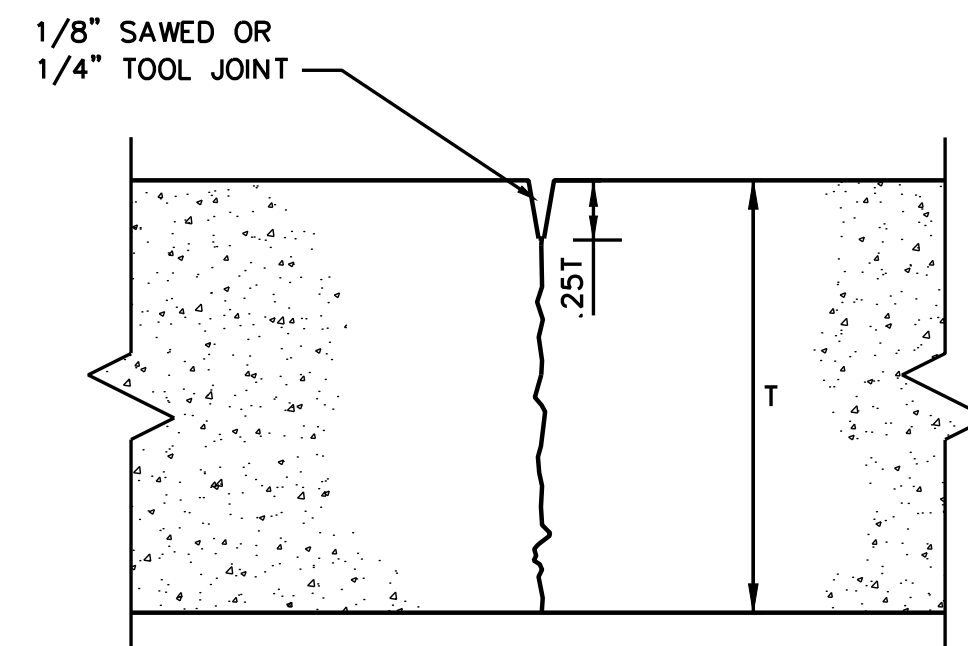


TABLE

JOINT SPACING FT.	WIDTH, (IN.)	
	MIN.	MAX.
<25	1/2	5/8
25-50	3/4	7/8
>50	1.0	1-1/8

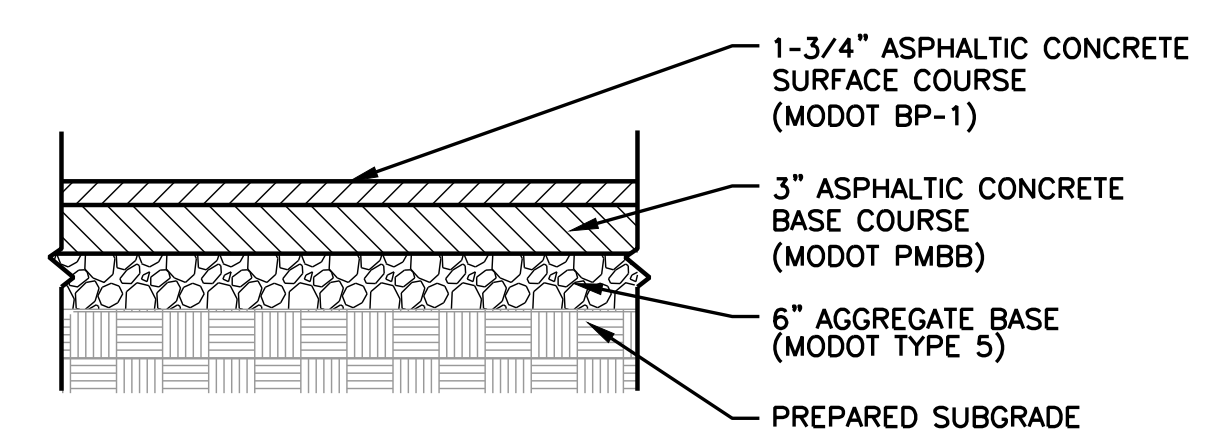
- W=WIDTH OF SEALANT RESERVOIR (SEE TABLE).
D=DEPTH OF SEALANT (1.0 TO 1.5 X W).
- NOTES:
1. TOP OF SEALANT WILL BE 1/8\"/>

B EXPANSION JOINT
NOT TO SCALE

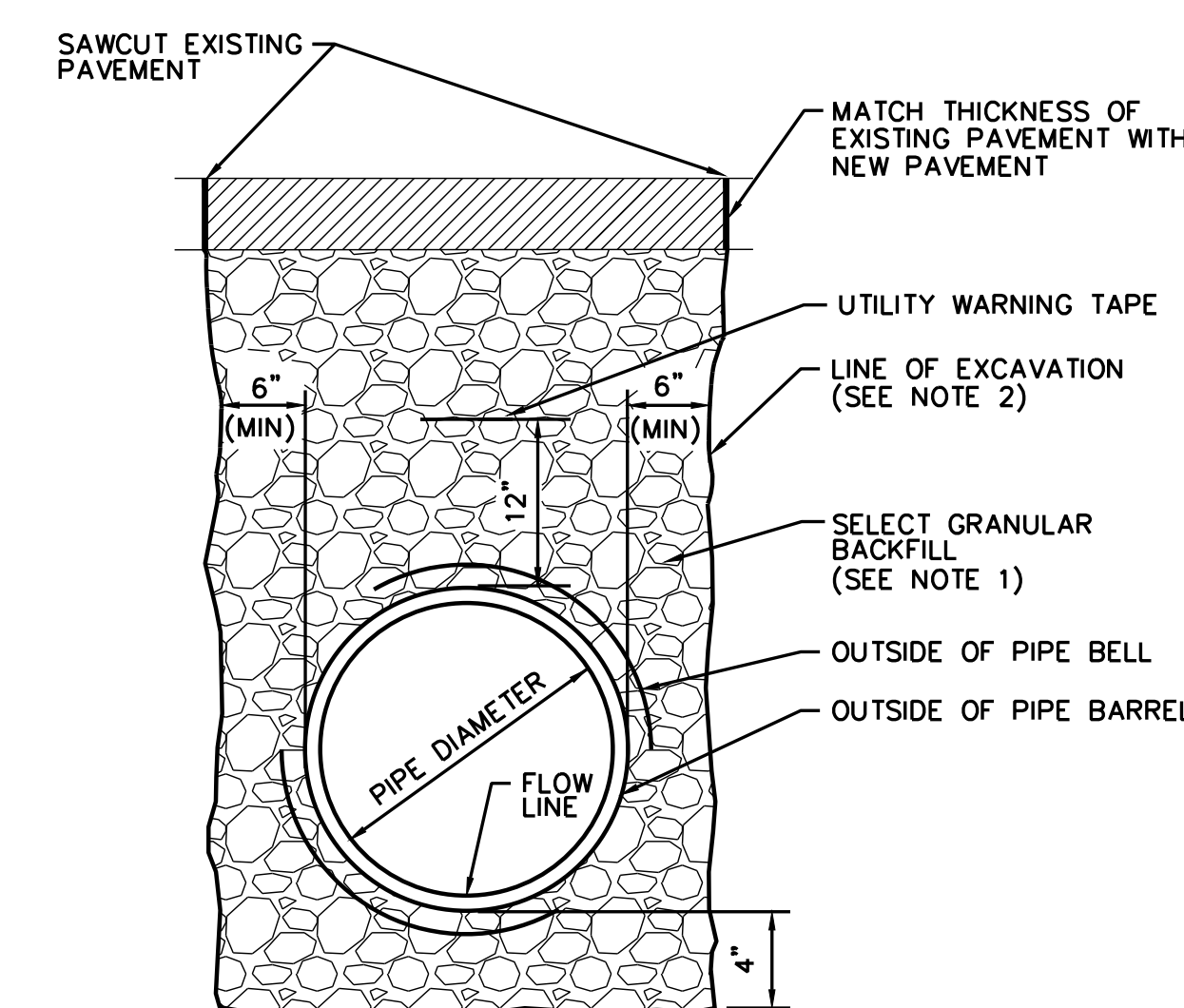


- NOTES:
1. "T" DENOTES CONCRETE THICKNESS (SEE PAVEMENT SECTIONS)
 2. SAWCUT JOINTS WITHIN 16 HOURS OF PLACEMENT.
 3. USE ONLY IN CONCRETE WALKS.

C CONTRACTION JOINT
NOT TO SCALE

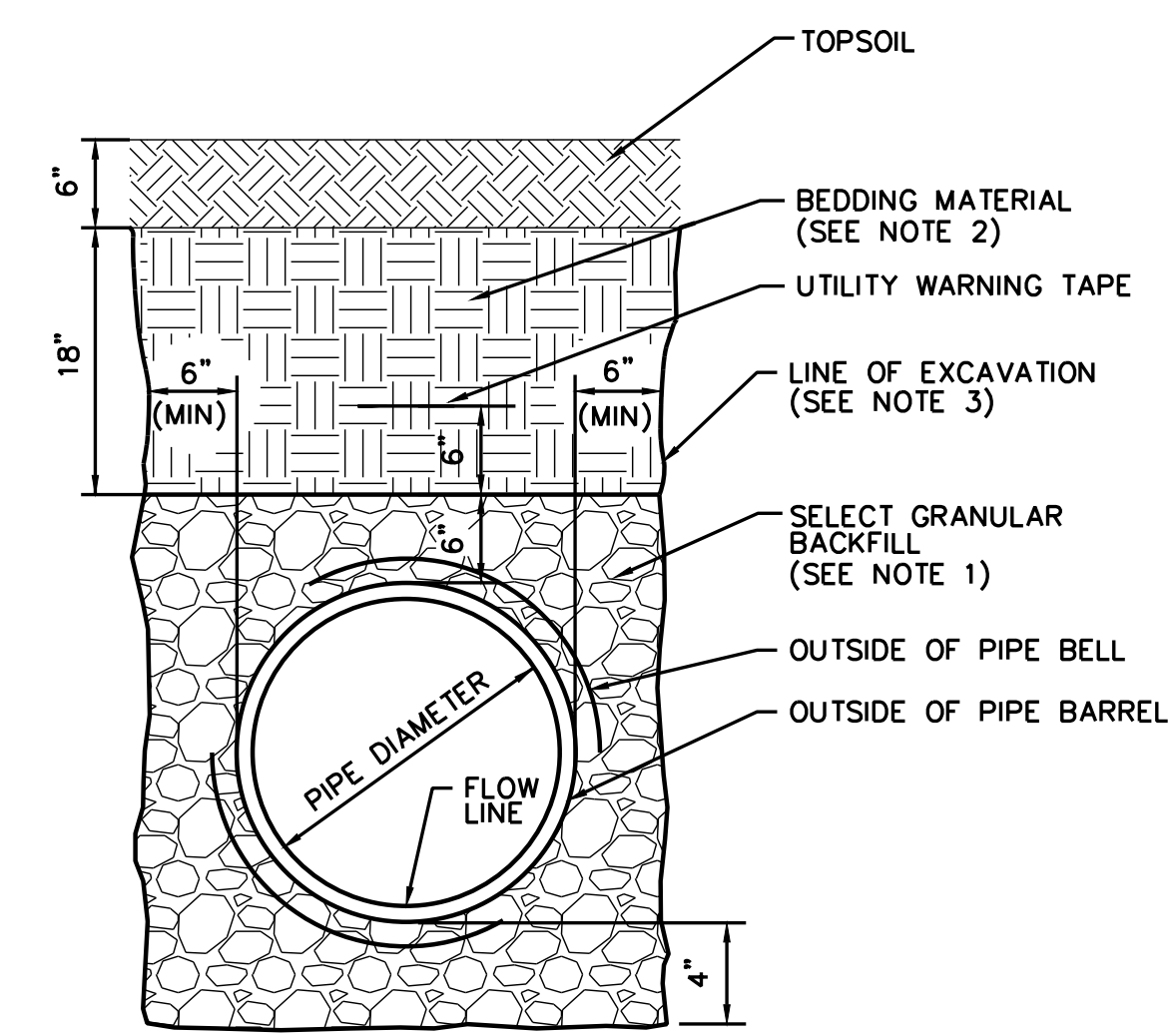


D ASPHALT PAVEMENT
NOT TO SCALE



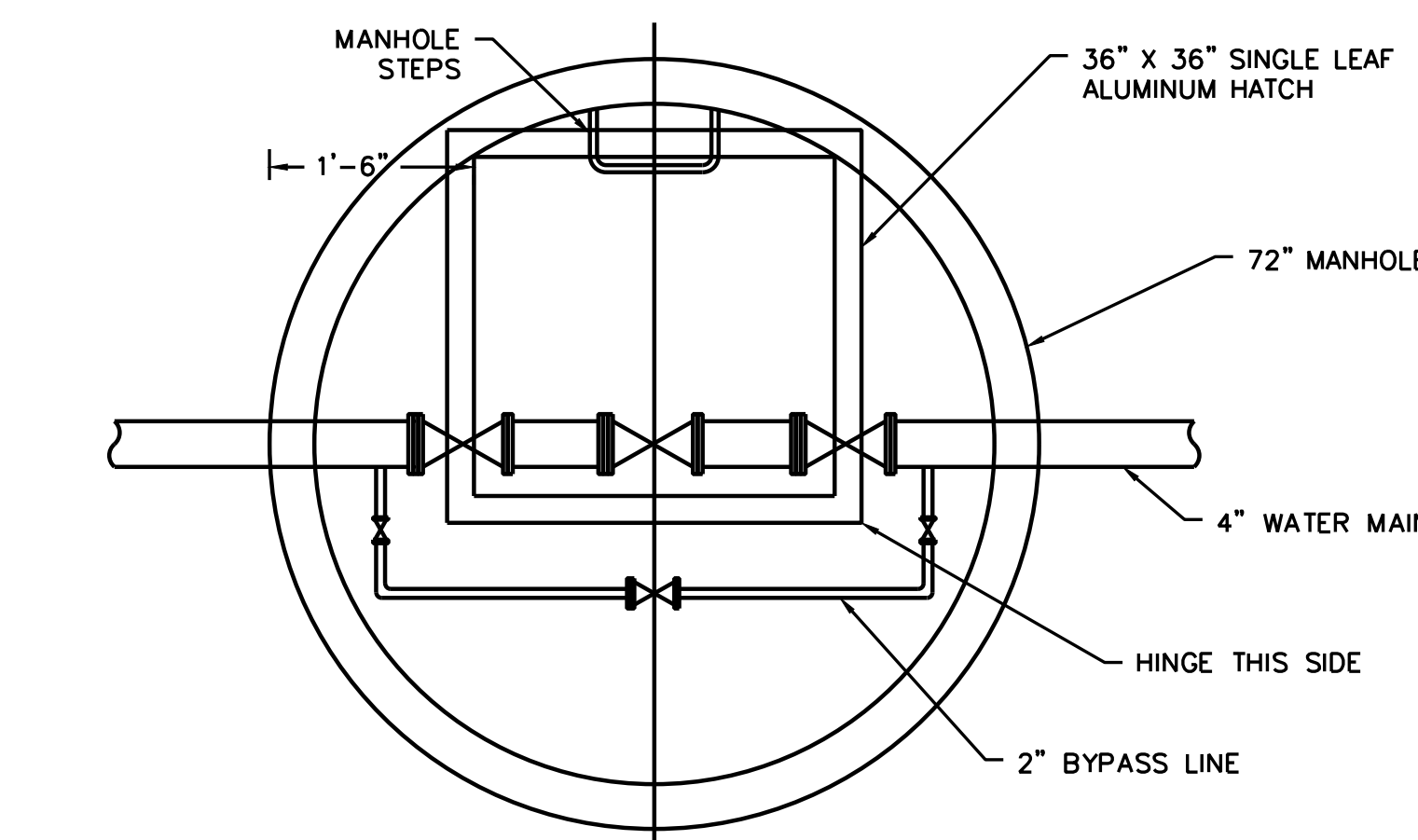
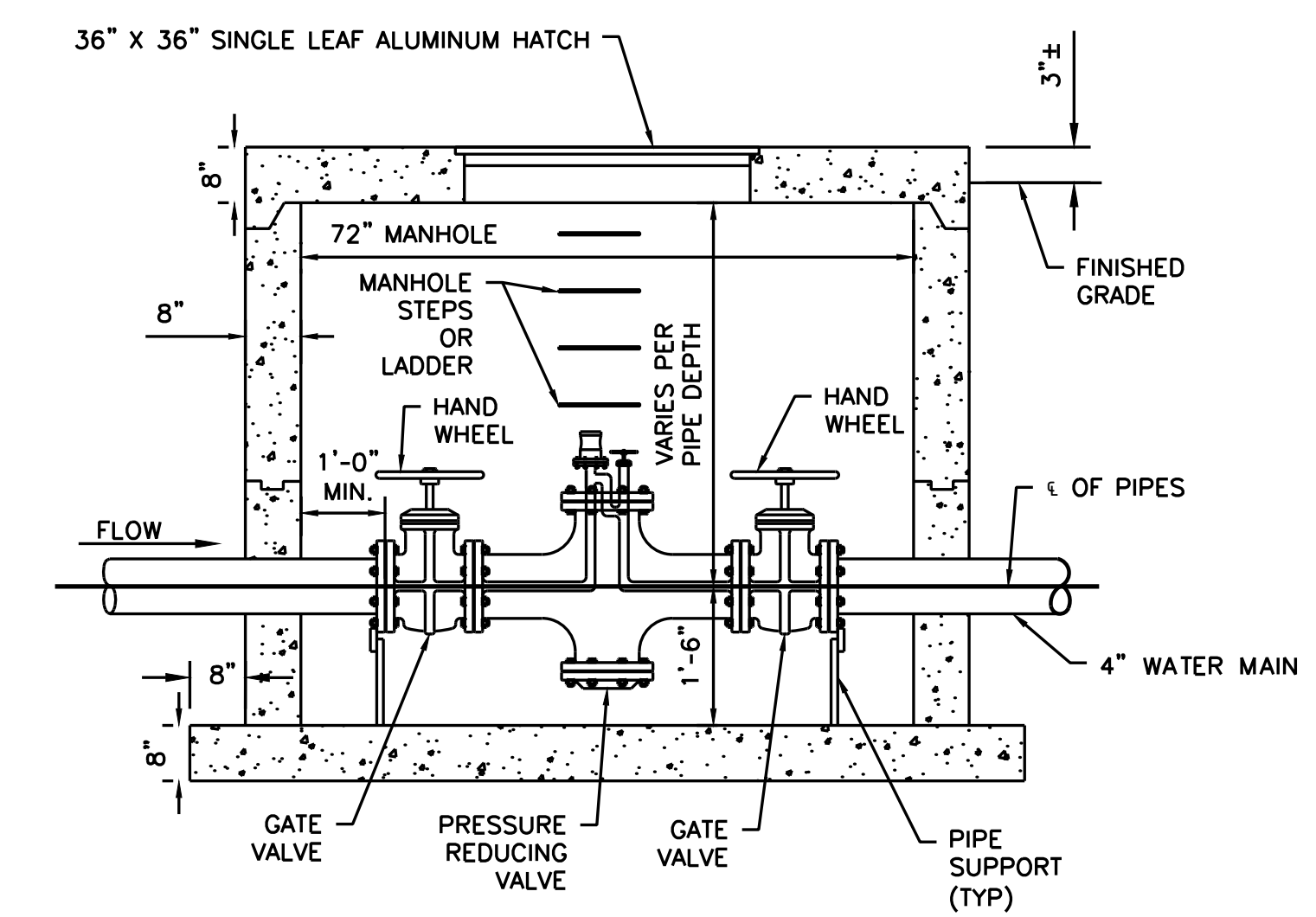
- NOTES:
1. SELECT GRANULAR BACKFILL SHALL CONSIST OF CRUSHED LIMESTONE AND SCREENINGS. COMPACT BACKFILL TO 95% MAXIMUM DENSITY AS DETERMINED BY THE MODIFIED PROCTOR COMPACTION TEST. (ASTM D 1557)
 2. CONTRACTOR SHALL BE RESPONSIBLE FOR SHORING AND BENCHING TRENCH EXCAVATIONS IN ACCORDANCE WITH ALL LOCAL, STATE, FEDERAL AND OSHA REQUIREMENTS.

E UTILITY TRENCH - UNDER PAVEMENT
NOT TO SCALE



- NOTES:
1. SELECT GRANULAR BACKFILL SHALL CONSIST OF CRUSHED LIMESTONE AND SCREENINGS. COMPACT BACKFILL TO 95% MAXIMUM DENSITY AS DETERMINED BY THE MODIFIED PROCTOR COMPACTION TEST. (ASTM D 1557)
 2. COMPACT BEDDING MATERIAL UNDER LAWNS TO 85% MAXIMUM DENSITY AS DETERMINED BY THE MODIFIED PROCTOR COMPACTION TEST. (ASTM D 1557)
 3. CONTRACTOR SHALL BE RESPONSIBLE FOR SHORING AND BENCHING TRENCH EXCAVATIONS IN ACCORDANCE WITH ALL LOCAL, STATE, FEDERAL AND OSHA REQUIREMENTS.

F UTILITY TRENCH - UNDER LAWN
NOT TO SCALE



- NOTES:
1. CONTRACTOR SHALL FOLLOW MANUFACTURER SPECIFICATIONS FOR THE INSTALLATION OF PRESSURE REDUCER VALVE AND OTHER APPURTENANCES. THIS INCLUDES BUT IS NOT LIMITED TO PIPE MATERIALS AND ANY ADDITIONAL COUPLINGS, SEALANTS, BALL VALVES, BLOWDOWN VALVES, AIR VALVES, AND SUPP DRAINS.
 2. CONTRACTOR SHALL COORDINATE WITH OWNER AND MANUFACTURER TO CALIBRATE PRESSURE TO THE DESIRED PRESSURE.
 3. WHEN REMOVING AND REPLACING A PRESSURE REDUCER STATION, THE CONTRACTOR SHALL CALIBRATE THE STATION TO REPLICATE EXISTING PRESSURES UNLESS OTHERWISE SPECIFIED BY OWNER.

G PRESSURE REDUCER STATION & VAULT
NOT TO SCALE