NAVAJO TRIBAL UTILITY AUTHORITY

WATER & WASTEWATER ENGINEERING DIVISION

NTUA DESIGN & CONSTRUCTION DOCUMENTS

RED ROCK DAY SCHOOL
WATERLINE EXTENSION PROJECT

LOCATION: RED VALLEY, AZ

YEAR: 2022/2023

APPROVED CONSTRUCTION DESIGN
N.T.S.

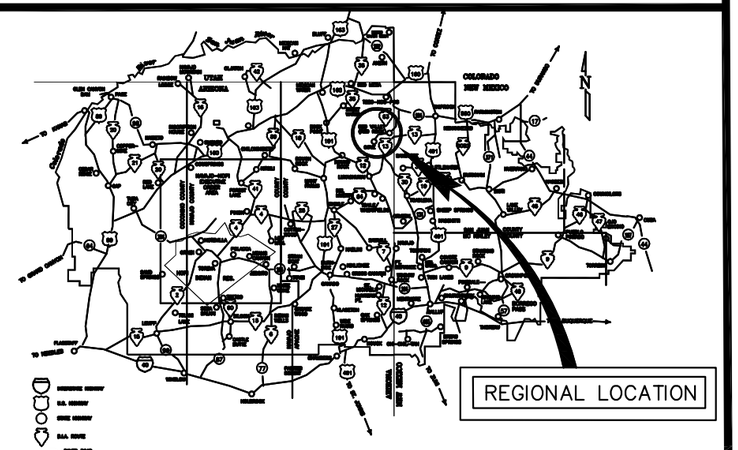
PROJECT I.D. N0. 322230001
DOCUMENT DATE: 02/08/2023

P.O. BOX 170
FT. DEFIANCE, ARIZONA 86504
PH: (928) 729-5721 FAX: (928) 729-2135

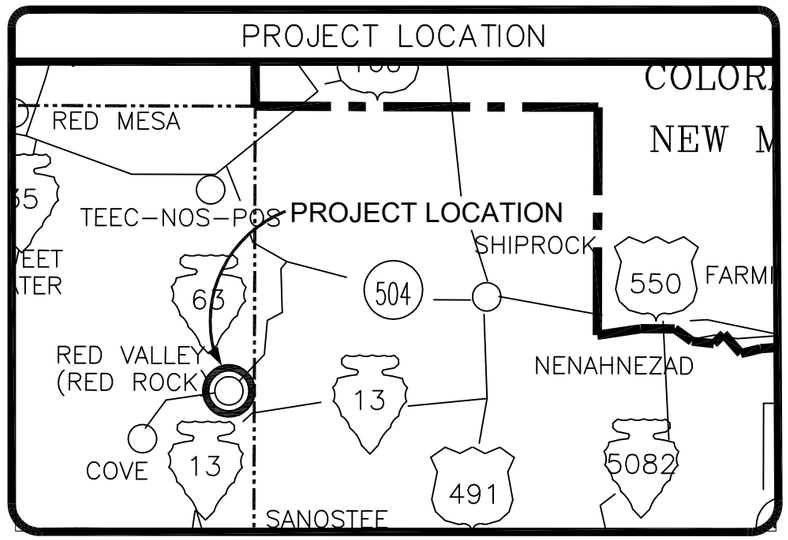
H2OH SPLASH

H2OH SPLASH

NAVAJO NATION LOCATION MAP



PROJECT LOCATION



SHEET INDEX

NTUA WATER CONSTRUCTION NOTES

1	All materials and workmanship shall comply with the NTUA Technical Specifications for Materials and Workmanship for Water and Wastewater Facilities, March 2002.
2	Utility Locates: The Contractor shall contact the local NTUA District Office to request for Utility Line Locates prior to construction. The utility provider shall identify their utility lines and mark locations of the underground utilities.
3	Permission to Tap: The Contractor shall obtain approval from NTUA the permission to tap (PTT) application prior to tapping existing water and sewer mains.
4	The Contractor shall coordinate with NTUA present at the site to verify location, depth, size and type of underground utilities.
5	The Contractor is to coordinate with NTUA regarding water shut off with at least 3 days advance notice to isolate line(s), to notify affected customers and to minimize outage time prior to connection of new water service.
6	Unless otherwise directed, only authorized NTUA staff will be allowed to close/open water valves for any connections to existing lines and for the usage of water.
7	Coordinate with local utility providers for any removal of existing facilities prior to construction.
8	The Contractor shall protect existing utilities in place. The Contractor shall restore at own expense any damage to existing utilities.
9	Submittals: The Contractor is to submit data/specifications on pipe materials, make, pipe fittings, valves, hydrants and accessories and backflow prevention assemblies to NTUA for review and acceptance.
10	Rough grading shall be completed within 1/10 of a foot of plan grade prior to installing water and wastewater utilities. The utility lines shall be clearly staked and marked with offsets as needed by a surveyor.
11	Protect trenches at all times to prevent danger to public, traffic, livestock and environment. The Contractor is responsible for safety of all open trenches.
12	Pipes: All water mains shall be Polyvinyl Chloride (PVC) pressure pipe; ASTM D2241, IPS Gasketed Pipe, NSF approved, with a minimum of 200 psi pressure class unless specified otherwise.
13	MJ Joints: Any abrupt change in line are grade shall require MJ fittings, conforming to ANSI/AWWA C111/A21.11. All fittings and valves 3" or greater in size shall be made from ductile iron furnished with mechanical joint ends and shall have a pressure rating of 350 psi. All materials and coatings shall meet ANSI/NSF-61 and AWWA C151, cement mortar lining. All MJ ends shall install EBAA "megalug" mechanical restraints with concrete thrust block per STD DTL WS-19.
14	Flanged Joints: Shall not be used in underground installations except within approved underground structures such as concrete vaults. MJ joints shall be used for underground pipe fitting installations.
15	Polyethylene wrapping (8 mils minimum thickness in accordance with AWWA Standard C-105) shall be installed around ductile iron fittings, and valves, fire hydrant barrels and rods and clamps.
16	Deflection (vertical or horizontal) of pipes at joints is permitted and shall conform to American Water Works Association (AWWA) Joint Deflection for AWWA Pressure Pipe, and at 80% of manufacturer's recommended maximum deflection, whichever is more stringent. A copy of the manufacturer's recommendation shall be submitted to NTUA. NTUA shall inspect the pipe joints prior to backfill.

NTUA WATER CONSTRUCTION NOTES

17	Trenches shall not be backfilled (including bedding material above spring line of the pipe) until the pipe laying has been inspected and approved for backfilling by a NTUA Representative.
18	UG Utility Marking Tape: A warning marking tape shall be installed at 12" minimum and 18" maximum above the water and sewer pipe. Marking tape shall consist of one layer of aluminum foil laminated between two colored layers of inert plastic film. The tape shall be a minimum of 5 mils thick and 3 inches wide. Tape shall bear a continuous, printed message every 16 to 36 inches warning of the installation buried below.
19	AG Utility Marking: Carsonite marker posts, blue or green, shall be installed by the contractor per the drawings, at tap points, tees, valves and at 500 feet apart.
20	Water Testing: All new water lines shall be tested. Hydrostatic testing, disinfection, flushing and bacteriological testing (shall be conducted in accordance with NTUA Technical Specifications for Materials and Workmanship for Water and Wastewater Facilities, March 2002) shall be coordinated with NTUA at least 3 days in advance. NTUA Representative shall be present to record the information and to certify the testing. 160 psi shall be the minimum test pressure and shall not exceed the manufacturer's recommended safe test pressure for the pipe.
21	Sewer Testing: All new sewer mains shall be flushed and tested. Sewer line: hydrostatic or air testing and lamp test for pipe alignment; and manholes: hydrostatic or vacuum testing shall be done in accordance with NTUA Technical Specifications for Materials and Workmanship for Water and Wastewater Facilities, March 2002. NTUA Representative shall be present to record the information and to certify the testing.
22	Backflow Preventer: All backflow prevention assemblies shall be inspected by NTUA. Once the inspection has passed, and the meter installed, the backflow preventer shall be tested by a Navajo EPA certified tester.
23	Meter: The Contractor is to purchase AMI water meter(s) with module(s) at the local NTUA District Office.
24	As-built: The Contractor shall provide AS-BUILT drawings of all utilities to the Owner and NTUA in hard copy and digital format. The sewer line manholes with invert elevations shall be surveyed by a registered land surveyor.
25	Utility Construction Acceptance and Utility Transfer: The Contractor shall schedule a Final Inspection with NTUA HQ Engineering and local District Office, Owner and General Contractor at the end of construction. The Contractor shall provide following documents: As-built drawing, cost of plant, Approved PTT, hydrostatic testing results, bacteriological testing results and approved materials submittals. Please follow the NTUA Technical Specifications for Materials and Workmanship for Water and Wastewater Facilities, March 2002, Section TP 5.0.
26	Warranty: The Contractor/Engineer shall provide warranty on all new water and wastewater facilities against defects in materials, workmanship and for any design deficiencies, errors and omissions for the period of one year when the facilities were inspected, accepted and approved. Information will be entered on the Final Inspection form.

REVISIONS

NO.	DATE	BRIEF	BY
-	-	-	-

NAVAJO TRIBAL UTILITY AUTHORITY
WATER & WASTE WATER ENGINEERING DIVISION

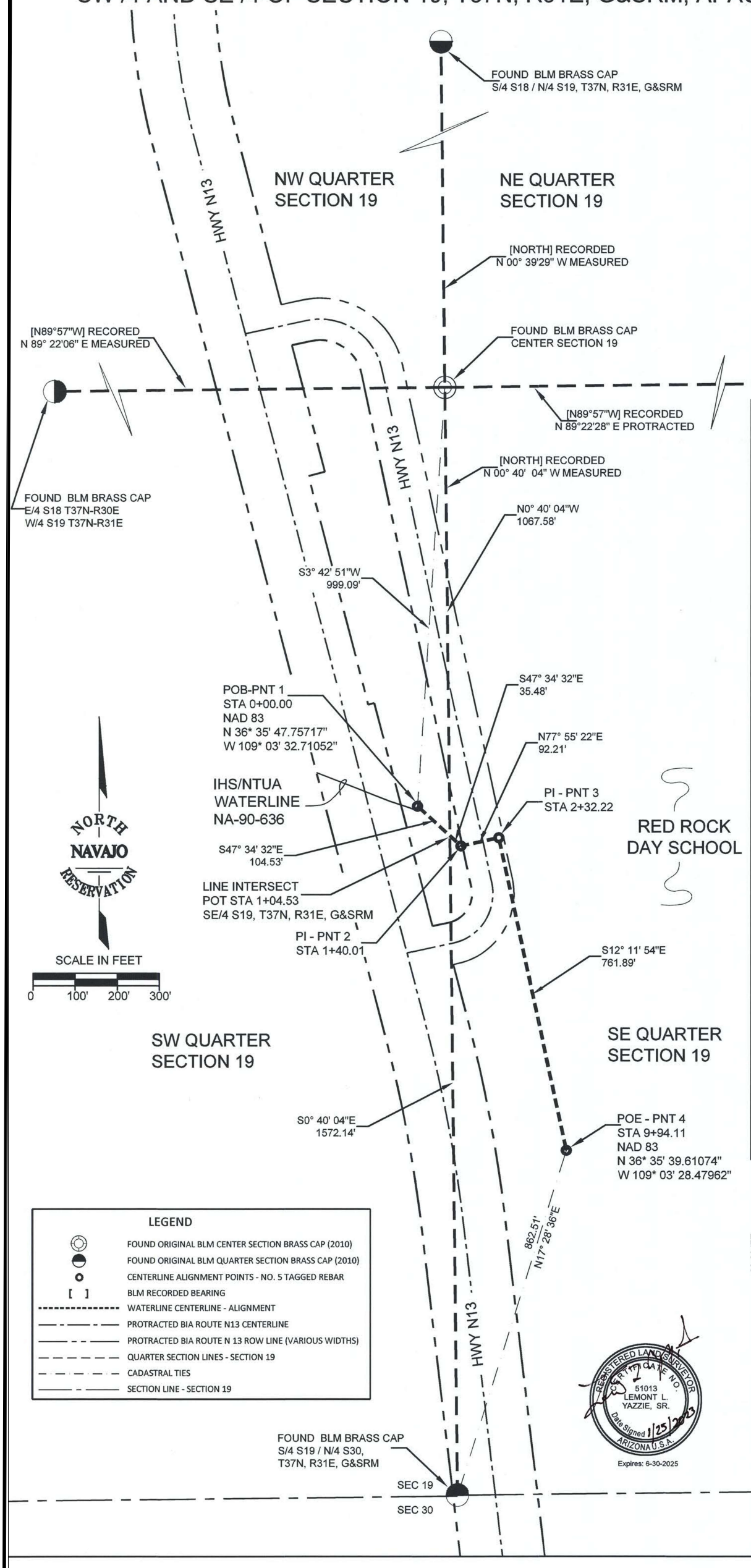
WATERLINE EXTENSION PROJECT
RED ROCK DAY SCHOOL
LOCATION: RED VALLEY , AZ

CONSTRUCTION DOCUMENTS

DESIGNED BY:	LARRY M.
SURVEYED BY:	LARRY M.
DRAFTER BY:	LARRY M.
APPROVED BY:	GARY Y.
DATE:	12/29/2022
PROJECT NO.	322230001
SCALE:	N.T.S.
ACAD FILENAME:	N/A

SHEET NO.
2 of 12

PLAT OF SURVEY
SHOWING THE RIGHT OF WAY FOR THE RED ROCK DAY SCHOOL WATERLINE PROJECT
LOCATED IN RED VALLEY, ARIZONA
SW /4 AND SE /4 OF SECTION 19, T37N, R31E, G&SRM, APACHE COUNTY, ARIZONA



REGISTERED LAND SURVEYOR
CERTIFICATE NO.
51013
LEMONT L.
YAZZIE, SR.
Date Signed 1/25/2023
ARIZONA U.S.A.
Expires: 6-30-2025

NOTES:

1. THE BASIS OF BEARING IS GRID BEARINGS DERIVED FROM REAL TIME KINEMATIC GPS TECHNOLOGY. HELD NGS CONTROL POINT "NN12 07" AS THE CENTER PIVOT OF SURVEYED MEASUREMENTS. CONTROL POINT "NN12 07" (PID DR6939) IS A BRASS CAP SET IN CONCRETE, APPROXIMATELY 600 FEET SOUTH OF RED VALLEY TRADING POST STORE AND WITHIN THE BIA HIGHWAY N13 RIGHT OF WAY CORRIDOR.
   NGS PUBLISHED DATA AS FOLLOWS:
   NAD 83 (2011) DATUM: N 36° 36' 07.92078" W 109° 03' 40.65034"
   NAVD 88 ELLIPSOIDAL HEIGHT = 1749.862 (m) 5741.017 (iFT)
   NAVD 88 ORTHOMETRIC HEIGHT = 1770.00(m) 5807.087 (iFT)
   CONVERGENCE: +00° 39' 32.9"
   ARIZONA STATE PLANE GRID SYSTEM: (0201 EAST ZONE) N = 2,040,347.60 (iFT) E = 1,024,453.25 (iFT)
2. SURVEY CONSIST OF MULTIPLE CONTROLS STAKED AND SET BY GPS REAL TIME PROCEDURES, 180 EPOCHS. PRECISION ACCURACY IS 1:5000 OR BETTER - THIRD ORDER
3. ALL DISTANCES AND BEARINGS ARE MEASURED AND COMPUTED IN GRID. NO COMBINED SCALE FACTOR WAS COMPUTED FOR THIS SURVEY.
4. SURVEY COMMENCED ON NOVEMBER 2022 AND COMPLETED ON TO DECEMBER 2022.
5. THE RECORD CADASTRAL FOR TOWNSHIP 37 NORTH, RANGE 31 EAST, G&SRM, HEREIN SHOWN WERE OBTAINED FROM THE BUREAU OF LAND MANAGEMENT, PHOENIX, AZ; RESURVEY AND SURVEY PLAT APPROVED JUNE 20, 2010.
8. PROJECT WATERLINE CONNECTS TO IHS WATER PROJECT NA-90-686, EASEMENT NO. AZ-3061-0291-(636). RECORDS FOR OTHER OVERHEAD BURIED UTILITIES WERE UNAVAILABLE DURING SURVEY.
9. RIGHT OF WAY MONUMENTS ALONG BIA HIGHWAY N13 WERE FOUND DURING TIME OF SURVEY. ENCUMBRANCE DOCUMENTS REFERENCING BIA ROUTE N13(5)2&4 RIGHT OF WAY SURVEY PLAT WERE NOT AVAILABLE DURING TIME OF SURVEY.
10. ENCUMBRANCE DOCUMENTS REFERENCING RED ROCK DAY SCHOOL BOUNDARY AS SHOWN IN BLM RESURVEY AND SURVEY DATED JUNE 10, 2010 WERE UNAVAILABLE DURING SURVEY. FOUND MONUMENTS WERE NOT INCLUDED IN THIS SURVEY. SCHOOL BOUNDARY(S) IS SUBJECT TO BIA ADMINISTRATION DETERMINATION.

LEGAL DESCRIPTION
FOR THE RED ROCK DAY SCHOOL WATERLINE EASEMENT
LOCATED IN RED VALLEY, ARIZONA
SW /4 AND SE /4 OF SECTION 19, T37N, R31E, G&SRM, APACHE COUNTY, ARIZONA

A STRIP OF LAND WITH A THIRTY FEET WIDE CORRIDOR AND HAVING 10.00 FEET LEFT AND 20.00 FEET RIGHT WIDE ALONG THE FOLLOWING DESCRIBED CENTERLINE ALIGNMENT AND LYING WITHIN THE 1953 ORIGINAL SURVEY AND 2010 RESURVEY OF SURVEYED SECTION 19, IN TOWNSHIP 37 NORTH, RANGE 31 EAST, G&SRM, APACHE COUNTY, ARIZONA AND MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BEGINNING AT ENGINEER'S SURVEYED CENTERLINE POINT OF BEGINNING (P.O.B) STATION 0+00.00 ON THE RED ROCK DAY SCHOOL WATERLINE ALIGNMENT, SET A TAGGED NO. 5 REBAR, SAID POINT HAVING NAD83 (2011) DATUM GEODETIC COORDINATES VALUES OF N=36° 35' 47.75717", W=109°03'32.71052" AND NAD 83 (2011) ARIZONA STATE PLANE, EAST ZONE GRID COORDINATES VALUES OF N=2,038,315.959 iFT AND E=1,025,124.148 iFT, WHENCE A CADASTRAL TIE IS MADE FROM A FOUND CENTER CORNER MONUMENT OF SECTION 19, TOWNSHIP 37 NORTH, RANGE 31 EAST, G&SRM, APACHE COUNTY WHICH BEARS S 03°42'51" W, A GRID DISTANCE OF 999.09 iFT;

THENCE, S 47°34'32" E, ALONG THE CENTERLINE OF THE RED ROCK DAY SCHOOL WATERLINE, A GRID DISTANCE OF 104.53 iFT TO POT STATION 1+04.53; WHENCE SAID POINT BEING ON THE EAST LINE OF THE SOUTHWEST QUARTER QUADRANT AND COMMON TO WEST LINE OF THE SOUTH EAST QUARTER QUADRANT OF SECTION 19, TOWNSHIP 37 NORTH, RANGE 31 EAST, G&SRM, APACHE COUNTY, ARIZONA WHICH BEARS N00°40'04"W, A GRID DISTANCE OF 1067.58 iFT TO AFOREMENTIONED CENTER SECTION 19;

THENCE, S 47°34'32" E, ALONG THE CENTERLINE OF THE RED ROCK DAY SCHOOL WATERLINE, A GRID DISTANCE OF 35.48 iFT TO POT STATION 1+40.01, SET A TAGGED NO. 5 REBAR;

THENCE, N 77°55'22" E, ALONG THE CENTERLINE OF THE RED ROCK DAY SCHOOL WATERLINE, A GRID DISTANCE OF 92.21 iFT TO POT STATION 2+32.22, SET A TAGGED NO. 5 REBAR;

THENCE, S 12°11'54" E, ALONG THE CENTERLINE OF THE RED ROCK DAY SCHOOL WATERLINE, A DISTANCE OF 761.89 iFT TO POINT OF ENDING PI STATION 9+94.11, SET A TAGGED NO. 5 REBAR; SAID POINT HAVING NAD83 (2011) DATUM GEODETIC COORDINATES VALUES OF N=36°35'39.61074", W=109°03'28.47962" AND NAD 83 (2011) ARIZONA STATE PLANE EAST ZONE GRID COORDINATES VALUES OF N=2,037,496.111 iFT AND E=1,025,478.854 iFT, AND WHENCE A CADASTRAL TIE IS MADE FROM A FOUND SOUTH QUARTER MONUMENT OF SECTION 19, COMMON TO NORTH QUARTER OF SECTION 30, TOWNSHIP 37 NORTH, RANGE 31 EAST, G&SRM, APACHE COUNTY AND BEARS N 17°28'36" E, A GRID DISTANCE OF 862.51 iFT;

THE RED ROCK DAY SCHOOL WATERLINE PROJECT CONTAINS 29,678.5451 SQUARE iFT, A PERIMETER OF 2038.5607 iFT, A LINEAR LENGTH OF 994.11 iFT AND ± 0.681 ACRES, MORE OR LESS.

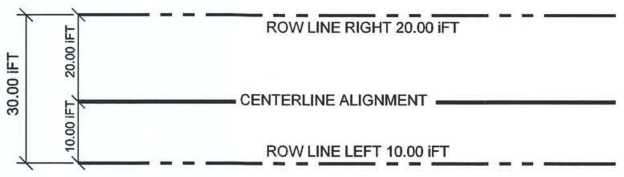
RIGHT OF WAY TAKINGS BY SECTION QUADRANTS

SECTION	TRACT	PERIMETER	AREA (iFT²)	LENGTH (iFT)	WIDTH (iFT) LEFT	WIDTH (iFT) RIGHT	ACRES
19	SW/4	289.4950	3,276.2020	104.53	10.00	20.00	0.07
19	SE/4	1,831.2377	26,402.3431	889.58	10.00	20.00	0.61
TOTALS			29,678.5451	994.11			0.68

RIGHT OF WAY TAKINGS BY STATIONS

STATION	STATION	PERIMETER	AREA (iFT²)	LENGTH (iFT)	WIDTH (iFT) LEFT	WIDTH (iFT) RIGHT	ACRES
0+00.00	9+94.11	2,038.5607	29,678.5451	994.11	10.00	20.00	0.68
TOTALS			29,678.5451	994.11			0.68

TYPICAL ROW WIDTH DETAIL



Surveyed by: Calvin Murphy Surveyed Date: December 21, 2022

I Lemont L. Yazzie Sr., a duly qualified Registered Professional Land Surveyor under the laws of the State of Arizona and the Navajo Nation do hereby certify that this plat shown hereon was prepared from a bona fide land survey conducted by me or under my direct supervision.

SHEET NO. 3 of 12

DESIGNED BY:	LARRY M.
SURVEYED BY:	LARRY M.
DRAFTER BY:	LARRY M.
APPROVED BY:	GARY Y.
DATE:	12/29/2022
PROJECT NO.	322230001
SCALE:	N.T.S.
ACAD FILENAME:	N/A

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WATER & WASTE WATER ENGINEERING DIVISION

WATERLINE EXTENSION PROJECT
RED ROCK DAY SCHOOL
LOCATION: RED VALLEY , AZ

CONSTRUCTION DOCUMENTS

REVISIONS

NO.	DATE	BRIEF	BY
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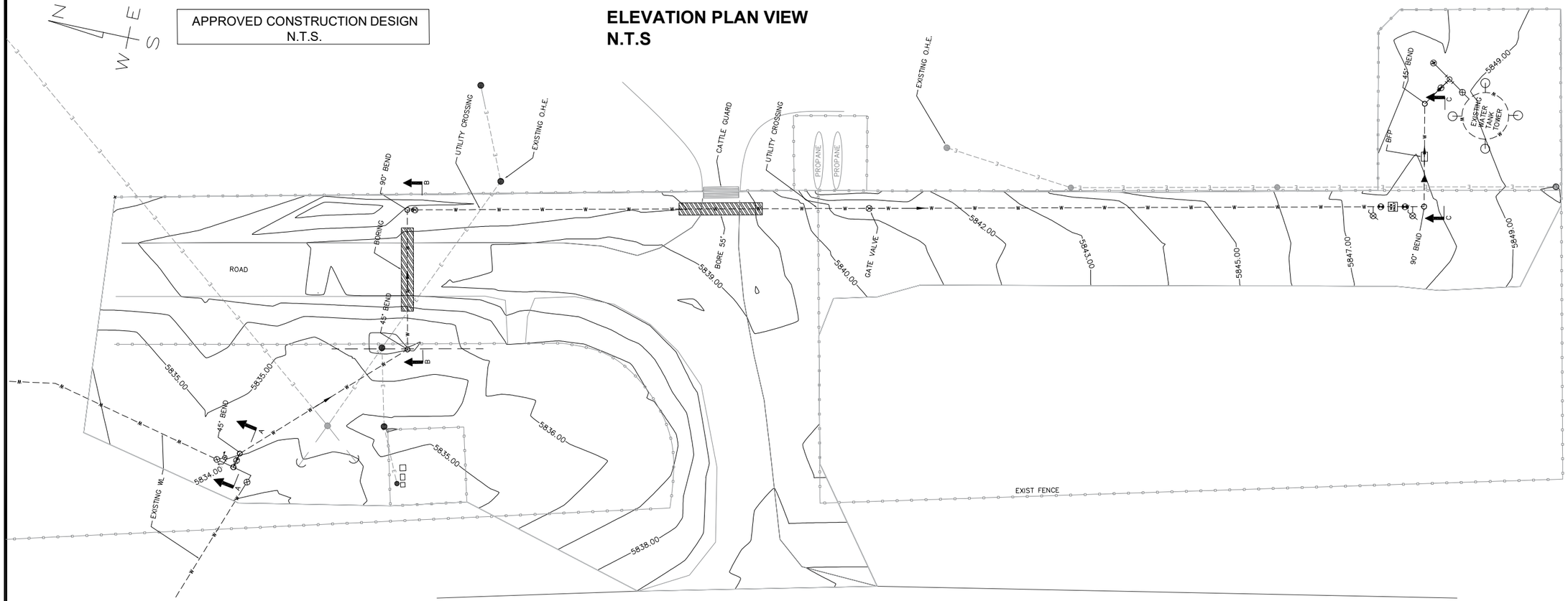
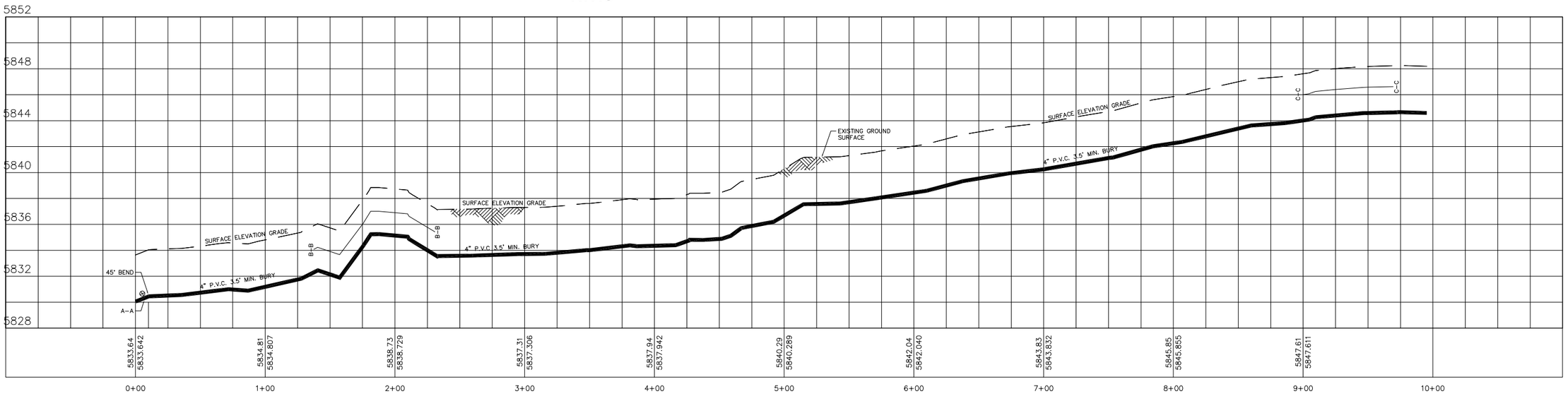
APPROVED CONSTRUCTION DESIGN
N.T.S.

ELEVATION PLAN VIEW
N.T.S



ELEVATION PROFILE VIEW
N.T.S



REVISIONS			
NO.	DATE	BRIEF	BY
–	–	–	–

NAVAJO TRIBAL UTILITY AUTHORITY
WATER & WASTE WATER ENGINEERING DIVISION

WATERLINE EXTENSION PROJECT
RED ROCK DAY SCHOOL
LOCATION: RED VALLEY, AZ

CONSTRUCTION DOCUMENTS

DESIGNED BY:	GARY.Y
SURVEYED BY:	LARRY.M
DRAWN BY:	DWIGHT.L
APPROVED BY:	GARY .Y.
DATE:	1/20/23
PROJECT NO.	322230001
SCALE:	N.T.S.
ACAD FILENAME:	N/A

SHEET NO.
4 of **12**

N

W E

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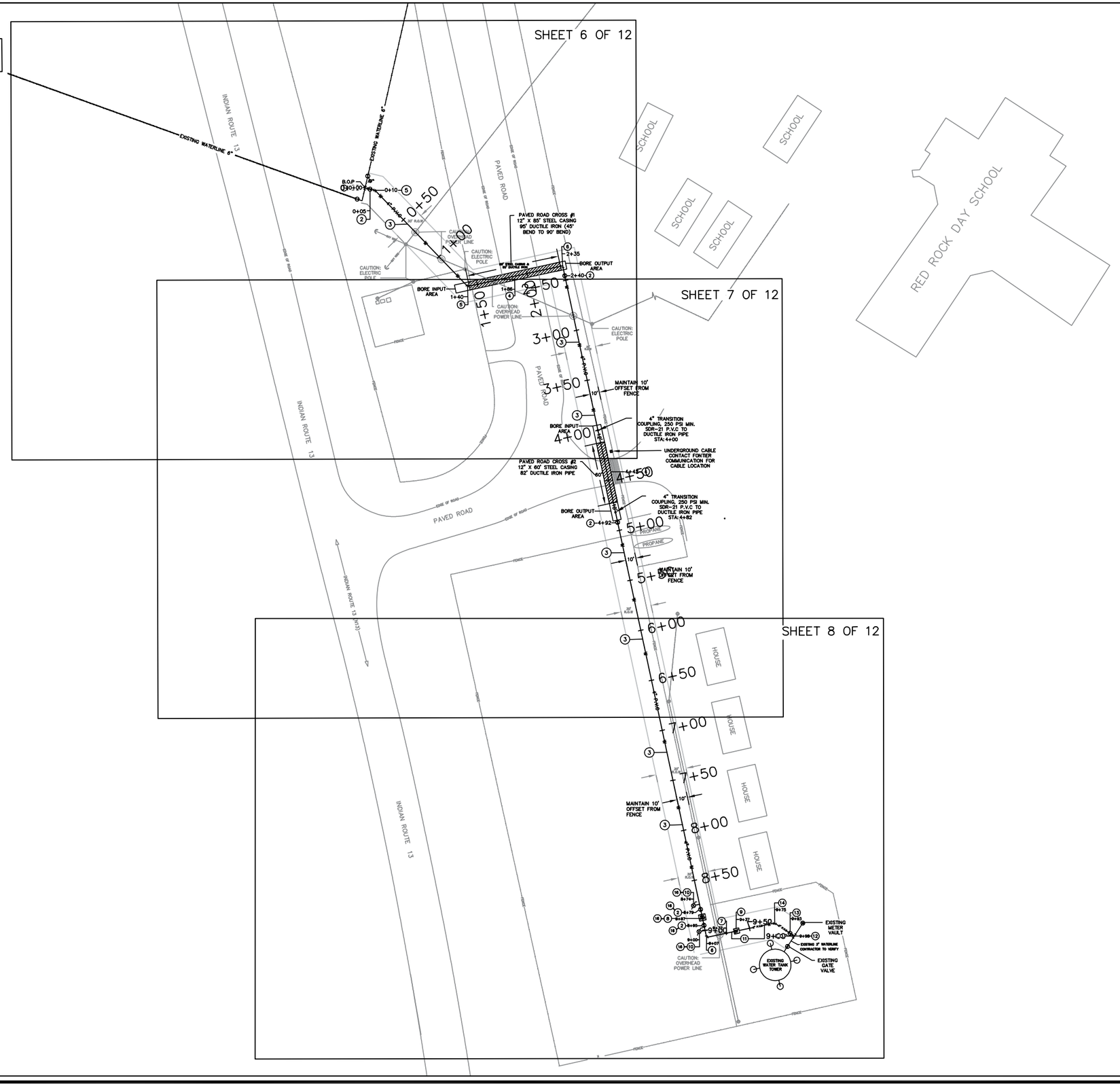
APPROVED CONSTRUCTION DESIGN
N.T.S.

SHEET 6 OF 12

SHEET 7 OF 12

SHEET 8 OF 12



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DESIGNED BY:	LARRY M.
SURVEYED BY:	LARRY M.
DRAFTED BY:	LARRY M.
APPROVED BY:	GARY Y.
DATE:	12/29/2022
PROJECT NO.	322230001
SCALE:	N.T.S.
ACAD FILENAME:	N/A

SHEET NO.
5 of **12**

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W E

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APPROVED CONSTRUCTION DESIGN
N.T.S.

INDIAN ROUTE 13

EXISTING WATERLINE 6"

6"

DETAIL #1

B.O.P
1 0+00
0+10 5
4" P.V.C.
0+50
0+05 2
3
30' R.O.W
GUY WIRE
FENCE

DETAIL #1 NOTES

1	CONNECT TO EXISTING 6" PVC WATERLINE USING 6" X 6" X 4" D.I. TEE, WITH MJ MEGALUG RESTRAINT AND THRUST BLOCK PER NTUA STD. DETAILS WS-16, WS-19 AND WS-19A.
2	INSTALL 4" GATE VALVE, MJ X MJ WITH RESTRAINT AND THRUST BLOCK PER NTUA STD. DETAILS WS-16, WS-19 AND WS-19A.
3	INSTALL 4" SDR-21 PVC CLASS 200 PSI WATER SERVICE LINE PER NTUA STD. DETAILS WS-15.
4	INSTALL 4" DUCTILE IRON PIPE, 350 PSI WITH FIELD LOK GASKET RESTRAINED JOINTS THROUGH 12" STEEL CASING PER NTUA STD. DETAILS WS-17A, AND WS-18. CONTRACTOR SHALL VERIFY IN THE FIELD.
5	INSTALL 4" 45° BEND, DI, (MJ X MJ) WITH THRUST BLOCK AND RESTRAINT. PER NTUA STD. DETAILS WS-19, AND WS-19A.

SEE SHEET 9 OF 12
FOR PLAN & PROFILE
DETAILS OF ROAD
CROSSING #1

DETAIL #2

PAVED ROAD

EDGE OF ROAD

PAVED ROAD CROSS #1
12" X 85' STEEL CASING
95' DUCTILE IRON (45°
BEND TO 90° BEND)

CAUTION:
OVERHEAD
POWER LINE

CAUTION:
ELECTRIC
POLE

85' STEEL CASING &
95' DUCTILE IRON

BORE OUTPUT
AREA

BORE INPUT
AREA

1+00
1+40 5
1+50
1+86 4
2+00
2+35 6
2+40 2
2+50
3+00 3
3+50
4" P.V.C.
10'
4+00
4+25
30' R.O.W

MAINTAIN
OFFSET
FENCE

DETAIL #2 NOTES

1	CONNECT TO EXISTING 6" PVC WATERLINE USING 6" X 6" X 4" D.I. TEE, WITH MJ MEGALUG RESTRAINT AND THRUST BLOCK PER NTUA STD. DETAILS WS-16, WS-19 AND WS-19A.
2	INSTALL 4" GATE VALVE, MJ X MJ WITH RESTRAINT AND THRUST BLOCK PER NTUA STD. DETAILS WS-16, WS-19 AND WS-19A.
3	INSTALL 4" SDR-21 PVC CLASS 200 PSI WATER SERVICE LINE PER NTUA STD. DETAILS WS-15.
4	INSTALL 4" DUCTILE IRON PIPE, 350 PSI WITH FIELD LOK GASKET RESTRAINED JOINTS THROUGH 12" STEEL CASING PER NTUA STD. DETAILS WS-17A, AND WS-18. CONTRACTOR SHALL VERIFY IN THE FIELD.
5	INSTALL 4" 45° BEND, DI, (MJ X MJ) WITH THRUST BLOCK AND RESTRAINT. PER NTUA STD. DETAILS WS-19, AND WS-19A.

REVISIONS

NO.	DATE	BRIEF	BY
-	-	-	-
-	-	-	-
-	-	-	-

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ACAD FILENAME:	N/A

SHEET NO.
6 of 12

N

W E

S

APPROVED CONSTRUCTION DESIGN
N.T.S.

DETAIL #4 NOTES	
2	INSTALL 4" GATE VALVE, MJ X MJ WITH RESTRAINT AND THRUST BLOCK PER NTUA STD. DETAILS WS-16, WS-19 AND WS-19A.
3	INSTALL 4" SDR-21 PVC CLASS 200 PSI WATER SERVICE LINE PER NTUA STD. DETAILS WS-15.
4	INSTALL 4" DUCTILE IRON PIPE, 350 PSI WITH FIELD LOK GASKET RESTRAINED JOINTS THROUGH 12" STEEL CASING PER NTUA STD. DETAILS WS-17A, AND WS-18. CONTRACTOR SHALL VERIFY IN THE FIELD.
5	INSTALL 4" 45° BEND, DI, (MJ X MJ) WITH THRUST BLOCK AND RESTRAINT. PER NTUA STD. DETAILS WS-19, AND WS-19A.
6	INSTALL 4" 90° BEND D.I. (MJ X MJ) WITH RESTRAINT AND THRUST BLOCK PER NTUA STD. DETAILS WS-19, WS-19A.
7	4" X 2" REDUCER D.I., M.J. X THREAD, WITH RESTRAINT AND THRUST BLOCK.
8	INSTALL 2" WATER METER , ELSTER MAG METER WITH MODULE PER NTUA STD. DETAILS WS-2.
9	INSTALL 2" REDUCED PRESSURE BACKFLOW PREVENTION ASSEMBLY PER NTUA STD.DETAILS WS-22.
10	INSTALL 2" FLUSH VALVE WITH THRUST BLOCK PER NTUA STD. DETAILS WS-19, WS-11.
11	INSTALL 2" SDR-21 PVC CLASS 200 PSI WATER SERVICE LINE PER NTUA STD. DETAILS WS-2, WS-2A, AND WS-15.
12	CONNECT TO EXISTING 3" PVC SCHOOL LINE USING 2" X 3" D.I., MJ TEE X THREAD TEE, MJ X THREAD INCREASER, PER NTUA STD. DETAILS WS-19, WS-19A WS-2, AND WS-2A.
13	2" GATE VALVE SLIP X SLIP OR THREADED WITH THRUST BLOCK PER NTUA STD. DETAIL WS-2.
14	2" – 45° BEND, SDR-21 PVC SLIP X SLIP WITH THRUST BLOCK PER NTUA STD. DETAILS WS-19, AND WS-19A.
15	INSTALL 4" X 4" X 2" TEE, D.I. MJ TEE X THREAD WITH RESTRAINT AND THRUST BLOCK PER NTUA STD. DETAILS WS-16, WS-19 AND WS-19A.
16	2" PRESSURE REDUCING WITH 2" WATER METER IN A CONCRETE VAULT PER NTUA STD. DETAILS WS-4 & WS-4a.

DETAIL #5 NOTES	
9	INSTALL 2" REDUCED PRESSURE BACKFLOW PREVENTION ASSEMBLY PER NTUA STD.DETAILS WS-22.
10	INSTALL 2" FLUSH VALVE WITH THRUST BLOCK PER NTUA STD. DETAILS WS-19, WS-11.
11	INSTALL 2" SDR-21 PVC CLASS 200 PSI WATER SERVICE LINE PER NTUA STD. DETAILS WS-2, WS-2A, AND WS-15.
12	CONNECT TO EXISTING 3" PVC SCHOOL LINE USING 2" X 3" D.I., MJ TEE X THREAD TEE, MJ X THREAD INCREASER, PER NTUA STD. DETAILS WS-19, WS-19A WS-2, AND WS-2A.
13	2" GATE VALVE SLIP X SLIP OR THREADED WITH THRUST BLOCK PER NTUA STD. DETAIL WS-2.
14	2" – 45° BEND, SDR-21 PVC SLIP X SLIP WITH THRUST BLOCK PER NTUA STD. DETAILS WS-19, AND WS-19A.

(N13)

FENCE

HOUSE

6+00

6+50

4" P.V.C

7+00

7+50

30' R.O.W

10'

MAINTAIN 10' OFFSET FROM FENCE

8+00

8+50

DETAIL #4

16 10 8+74

16 2 8+79

16 8 8+87

NEW VAULT

16 2 8+95

9+00

9+32

9+07

16 10 6

7

CAUTION: OVERHEAD POWER LINE

DETAIL #5

9 9+37

9+50

2" P.V.C

W

14 9+75

13 9+93

M

EXISTING METER VAULT

BF

11

E.O.P

9+98 12

EXISTING 3" WATERLINE CONTRACTOR TO VERIFY

EXISTING WATER TANK TOWER

EXISTING GATE VALVE

DETAIL #5

DETAIL #4

DETAIL #5

FENCE

REVISIONS			
NO.	DATE	BRIEF	BY
-	-	-	-

NAVAJO TRIBAL UTILITY AUTHORITY
WATER & WASTE WATER ENGINEERING DIVISION
WATERLINE EXTENSION PROJECT
RED ROCK DAY SCHOOL
LOCATION: RED VALLEY , AZ
CONSTRUCTION DOCUMENTS

DESIGNED BY:	LARRY M.
SURVEYED BY:	LARRY M.
DRAFTER BY:	LARRY M.
APPROVED BY:	GARY Y.
DATE:	12/29/2022
PROJECT NO.	322230001
SCALE:	N.T.S.
ACAD FILENAME:	N/A

SHEET NO.
8 of 12

N

W E

S

APPROVED CONSTRUCTION DESIGN
N.T.S.

BORE INPUT AREA

1+40 (5)

1+50

1+86 (4)

2+00

2+50

CAUTION: OVERHEAD POWER LINE

(1)

CAUTION: ELECTRIC POLE

3+00 (3)

30' R.O.W

EDGE OF ROAD

PAVED ROAD

FENCE

DETAIL #3

3+50

MAINTAIN 10' OFFSET FROM FENCE

10'

(3)

BORE INPUT AREA

4+00

4" TRANSITION COUPLING, 250 PSI MIN. SDR–21 P.V.C TO DUCTILE IRON PIPE STA: 4+00

UNDERGROUND CABLE CONTACT FONTIER COMMUNICATION FOR CABLE LOCATION

PAVED ROAD CROSS #2
12" X 60' STEEL CASING
82' DUCTILE IRON PIPE

60'

4+42 (4)

4+50

4" TRANSITION COUPLING, 250 PSI MIN. SDR–21 P.V.C TO DUCTILE IRON PIPE STA: 4+82

BORE OUTPUT AREA

(2) 4+92

5+00

PROPANE

PROPANE

(3)

10'

MAINTAIN 10' OFFSET FROM FENCE

5+50

30' R.O.W

6+00

(3)

6+50

HOUSE

DETAIL #3

SEE SHEET 10 OF 12 FOR PLAN & PROFILE DETAILS OF ROAD CROSSING #2

DETAIL #3 NOTES	
2	INSTALL 4" GATE VALVE, MJ X MJ WITH RESTRAINT AND THRUST BLOCK PER NTUA STD. DETAILS WS–16, WS–19 AND WS–19A.
3	INSTALL 4" SDR–21 PVC CLASS 200 PSI WATER SERVICE LINE PER NTUA STD. DETAILS WS–15.
4	INSTALL 4" DUCTILE IRON PIPE, 350 PSI WITH FIELD LOK GASKET RESTRAINED JOINTS THROUGH 12" STEEL CASING PER NTUA STD. DETAILS WS–17A, AND WS–18. CONTRACTOR SHALL VERIFY IN THE FIELD.

REVISIONS			
NO.	DATE	BRIEF	BY
-	-	-	-
-	-	-	-

NAVAJO TRIBAL UTILITY AUTHORITY
WATER & WASTE WATER ENGINEERING DIVISION
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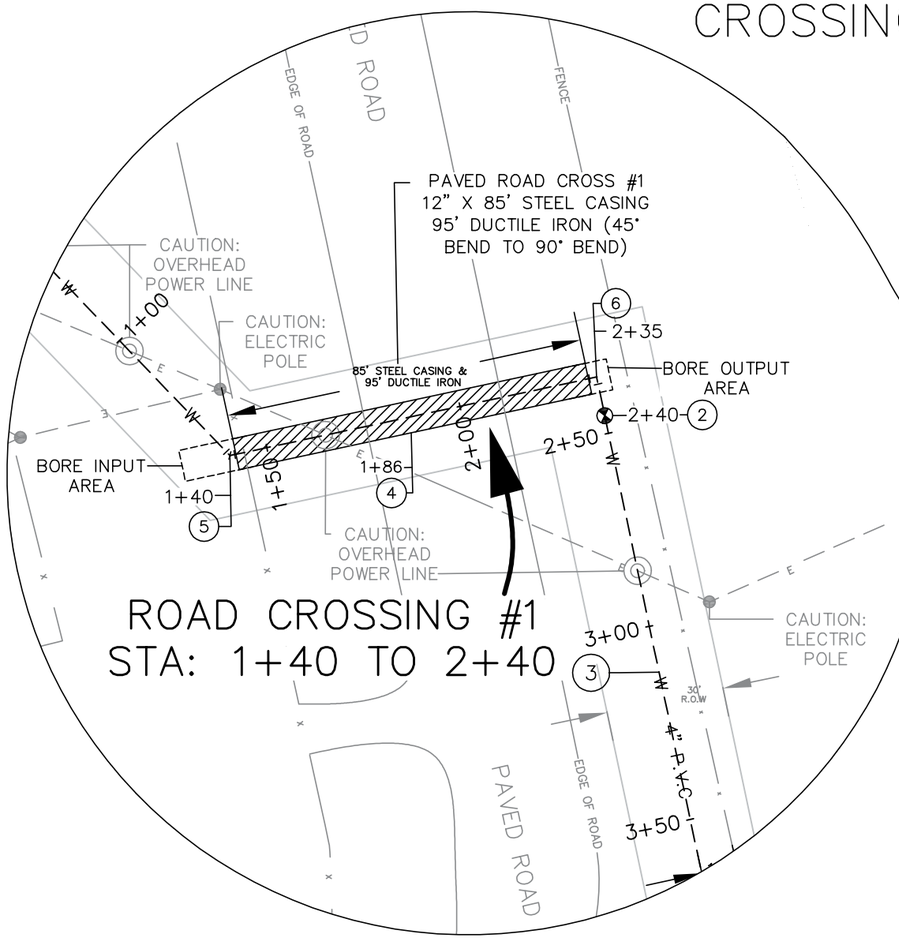
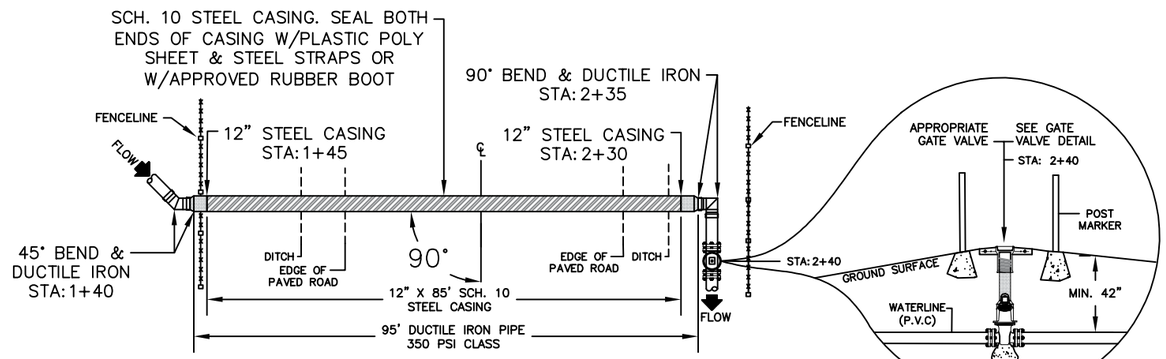
SCALE:	N.T.S.
ACAD FILENAME:	N/A

SHEET NO.
7 of 12

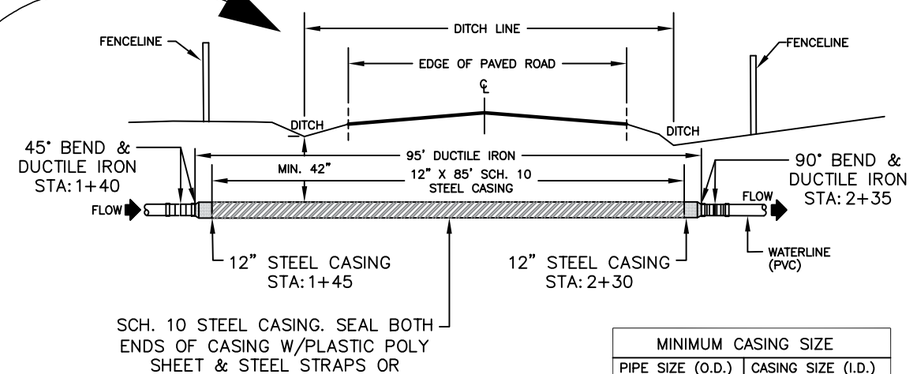
APPROVED CONSTRUCTION DESIGN
N.T.S.

DETAILS: ROAD CROSSING #1





PLAN VIEW



PROFILE VIEW

MINIMUM CASING SIZE	
PIPE SIZE (O.D.)	CASING SIZE (I.D.)
4"	12"
6"	14"
8"	16"
10"	18"
12"	20"
14"	22"

ROAD CROSSING #1 DETAIL NOTES	
2	INSTALL 4" GATE VALVE, MJ X MJ WITH RESTRAINT AND THRUST BLOCK PER NTUA STD. DETAILS WS-16, WS-19 AND WS-19A.
3	INSTALL 4" SDR-21 PVC CLASS 200 PSI WATER SERVICE LINE PER NTUA STD. DETAILS WS-15.
4	INSTALL 4" DUCTILE IRON PIPE, 350 PSI WITH FIELD LOK GASKET RESTRAINED JOINTS THROUGH 12" STEEL CASING PER NTUA STD. DETAILS WS-17A, AND WS-18. CONTRACTOR SHALL VERIFY IN THE FIELD.
5	INSTALL 4" 45° BEND, DI, (MJ X MJ) WITH THRUST BLOCK AND RESTRAINT. PER NTUA STD. DETAILS WS-19, AND WS-19A.
6	INSTALL 4" 90° BEND D.I. (MJ X MJ) WITH RESTRAINT AND THRUST BLOCK PER NTUA STD. DETAILS WS-19, WS-19A.

PLAN & PROFILE VIEW NOTES			
1	ALL CASINGS WILL TYPICALLY RUN FROM ROW TO ROW UNLESS OTHERWISE SPECIFIED.	6	DUCTILE IRON ROAD CROSSING IN B.I.A. RURAL AREAS SHALL BE FROM 10' BEYOND DITCH LINE UNLESS OTHERWISE SPECIFIED.
2	BACKFILL SHALL BE 95% OF STANDARD PROCTOR DENSITY – TESTED IN 6" LIFTS.	7	JOINT RESTRAINTS SHALL BE INSTALLED ON DUCTILE IRON CARRIER PIPE.
3	ROAD SHALL BE BORED UNDER EXISTING PAVEMENT AND OPEN TRENCH ON REMAINDER, UNLESS OTHERWISE SPECIFIED.	8	SEE NTUA STANDARD DETAIL WS-18 FOR CASING SPACER DETAIL. SPECIFICATIONS AND DETAILS.
4	IF SYSTEM IS LOOPED FOR A ROAD BORING APPLICATION, INSTALL GATE VALVE ON UPSTREAM AND DOWNSTREAM SIDES OF ROADWAYS.		
5	DUCTILE IRON SHALL BE CLASS 350.		

REVISIONS

NO.	DATE	BRIEF	BY
1	-	-	-

NAVAJO TRIBAL UTILITY AUTHORITY
WATER & WASTE WATER ENGINEERING DIVISION
WATERLINE EXTENSION PROJECT
RED ROCK DAY SCHOOL
LOCATION: RED VALLEY, AZ
CONSTRUCTION DOCUMENTS

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APPROVED BY:	GARY Y.
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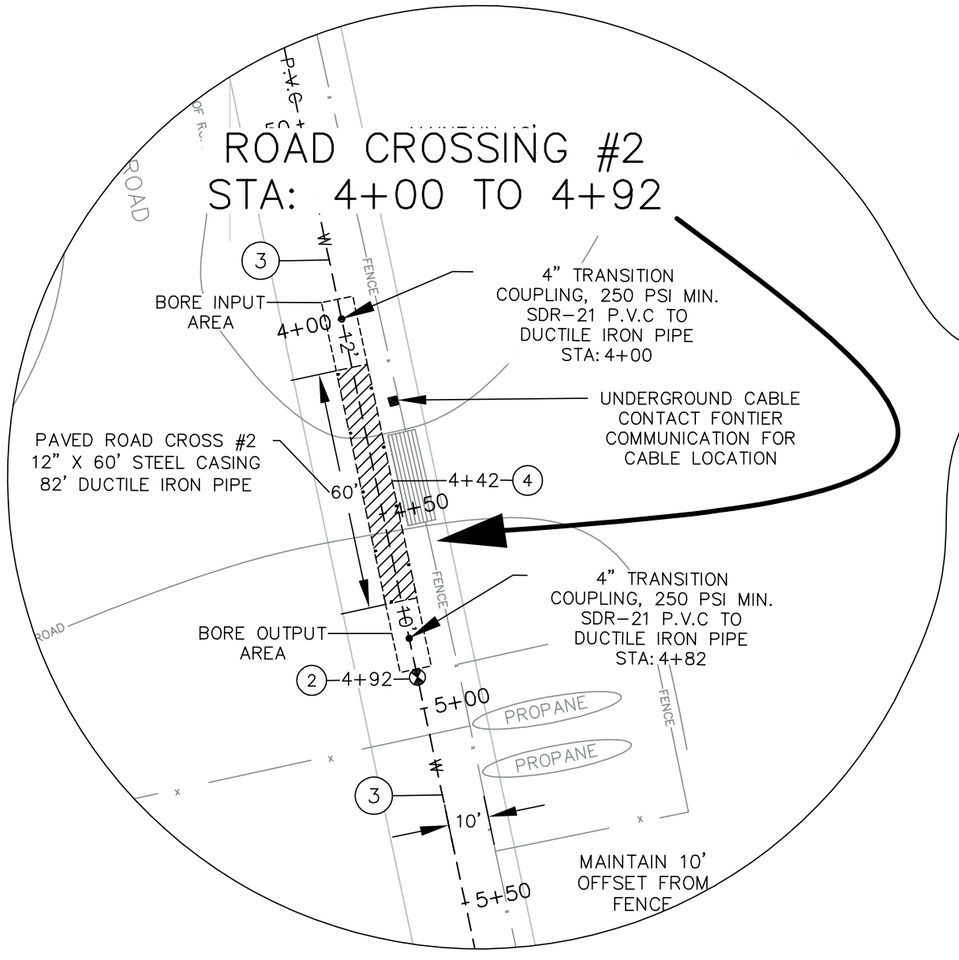
PROJECT NO.	322230001
SCALE:	N.T.S.
ACAD FILENAME:	N/A

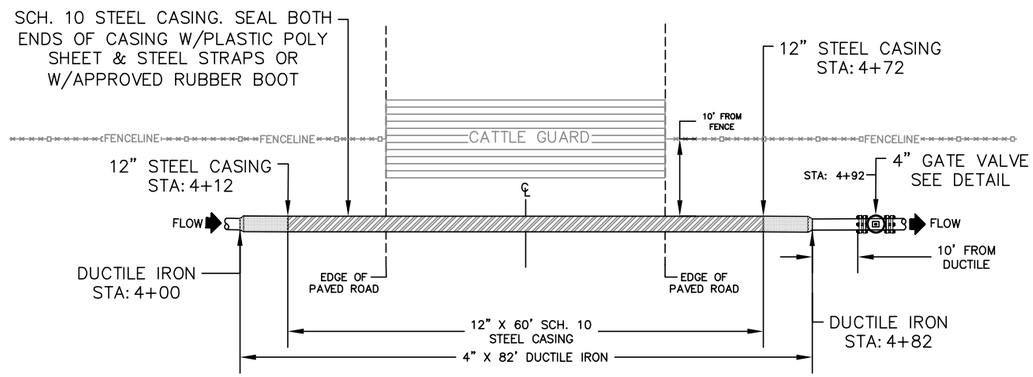
SHEET NO.
9 of 12

APPROVED CONSTRUCTION DESIGN
N.T.S.

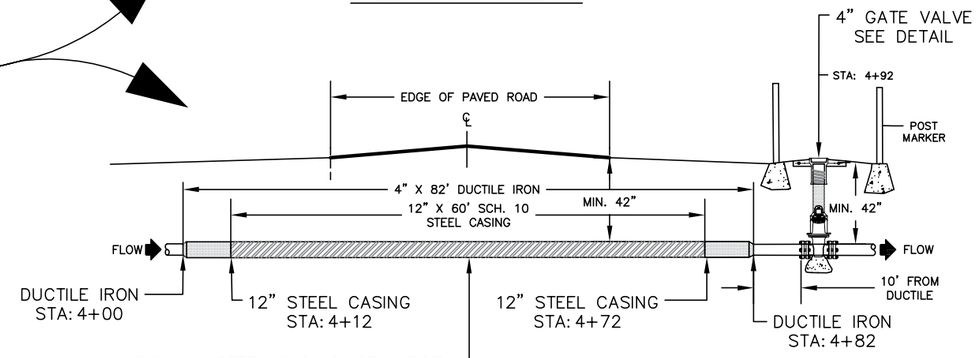
DETAILS: ROAD CROSSING #2



ROAD CROSSING #2 DETAIL NOTES	
2	INSTALL 4" GATE VALVE, MJ X MJ WITH RESTRAINT AND THRUST BLOCK PER NTUA STD. DETAILS WS-16, WS-19 AND WS-19A.
3	INSTALL 4" SDR-21 PVC CLASS 200 PSI WATER SERVICE LINE PER NTUA STD. DETAILS WS-15.
4	INSTALL 4" DUCTILE IRON PIPE, 350 PSI WITH FIELD LOK GASKET RESTRAINED JOINTS THROUGH 12" STEEL CASING PER NTUA STD. DETAILS WS-17A, AND WS-18. CONTRACTOR SHALL VERIFY IN THE FIELD.



PLAN VIEW



PROFILE VIEW

MINIMUM CASING SIZE	
PIPE SIZE (O.D.)	CASING SIZE (I.D.)
4"	12"
6"	14"
8"	16"
10"	18"
12"	20"
14"	22"

PLAN & PROFILE VIEW NOTES			
1	ALL CASINGS WILL TYPICALLY RUN FROM ROW TO ROW UNLESS OTHERWISE SPECIFIED.	5	DUCTILE IRON SHALL BE CLASS 350.
2	BACKFILL SHALL BE 95% OF STANDARD PROCTOR DENSITY – TESTED IN 6" LIFTS.	6	DUCTILE IRON ROAD CROSSING IN B.I.A. RURAL AREAS SHALL BE FROM 10' BEYOND DITCH LINE UNLESS OTHERWISE SPECIFIED.
3	ROAD SHALL BE BORED UNDER EXISTING PAVEMENT AND OPEN TRENCH ON REMAINDER, UNLESS OTHERWISE SPECIFIED.	7	JOINT RESTRAINTS SHALL BE INSTALLED ON DUCTILE IRON CARRIER PIPE.
4	IF SYSTEM IS LOOPED FOR A ROAD BORING APPLICATION, INSTALL GATE VALVE ON UPSTREAM AND DOWNSTREAM SIDES OF ROADWAYS.	8	SEE NTUA STANDARD DETAIL WS-18 FOR CASING SPACER DETAIL. SPECIFICATIONS AND DETAILS.

REVISIONS

NO.	DATE	BRIEF	BY
-	-	-	-

NAVAJO TRIBAL UTILITY AUTHORITY
WATER & WASTE WATER ENGINEERING DIVISION
WATERLINE EXTENSION PROJECT
RED ROCK DAY SCHOOL
LOCATION: RED VALLEY, AZ
CONSTRUCTION DOCUMENTS

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DRAWTER BY:	LARRY M.
APPROVED BY:	GARY Y.
DATE:	12/29/2022
PROJECT NO.	322230001
SCALE:	N.T.S.
ACAD FILENAME:	N/A

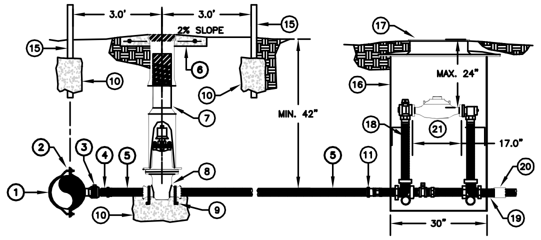
SHEET NO.
10 of 12

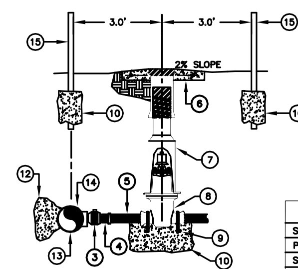
STANDARD DETAILS

NTUA STANDARD LEGEND

- —W—W— PROPOSED WATER MAIN W/ LINE SIZE, TYPE, & PSI RATING INDICATED
- EX. WATERLINE W/ SIZE TYPE, & PSI RATING INDICATED
- —S—S— PROPOSED SEWER MAIN W/ SIZE, TYPE, SLOPE & LENGTH INDICATED
- EX. SEWER MAIN W/ SIZE, TYPE, SLOPE, & LENGTH INDICATED
- —OHE—OHE— EX. OVERHEAD ELECTRIC POWER LINE
- —UGE—UGE— UNDERGROUND ELECTRIC POWER LINE
- —G—G— EX. UNDERGROUND GAS LINE
- —T—T— EX. TELECOMMUNICATIONS LINE
- FIRE HYDRANT W/ VALVE
- NEW GATE VALVE
- EX. GATE VALVE
- WATER METER
- METER W/ INDIVIDUAL PRV
- C.S. CURB STOP
- D.S. DOMESTIC STOP
- FLUSH VALVE
- AIR RELEASE VALVE
- SANITARY YARD HYDRANT
- REDUCER
- PRESSURE REDUCING VALVE (VAULT)
- BF BACKFLOW PREVENTION ASSEMBLY
- M MASTER METER VAULT
- SEPTIC TANK
- EX. SEWERLINE & MANHOLE W/ FLOW DIRECTION
- PROPOSED SEWER LINE & MANHOLE W/ FLOW DIRECTION
- C.O. SEWER CLEANOUT
- SEPTIC INFILTRATORS W/ INSPECTION PORT
- FENCELINE
- PAVED OR GRADED ROAD
- UNIMPROVED ROAD (DIRT)
- UTILITY LINE CROSSING
- HOUSE W/ CUSTOMER NAME AND/OR HOUSE NUMBER
- ARCHAEOLOGICAL SITE
- WASH OR ARROYO
- UTILITY MARKER, TEE POST OR CARSONITE MARKER

WS-0





AS-BUILT LOCATION OF TAP	
SYSTEM NAME	
PROJECT NO.	
SHEET NO.	
LINE NO.	
STATION NO.	

NOTES:

1. TEST DURATION SHALL BE FOR 2 HOURS.

DATE PERFORMED: __________. LAB SAMPLE NO.: ______. INITIALED (NTUA): _____.

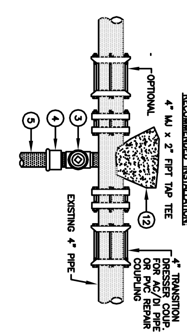
WS-2

MATERIAL LIST		
ITEM	QUAN	DESCRIPTION
1	–	PIPE, 6" OR LARGER, EXISTING
2	1	SADDLE, BRASS, PIPE SIZE & TYPE x 2" FIPT TAP, 6" AND LARGER
3	1	CORPORATION STOP, 2" MIPT x 2" FIPT, MUELLER B-20046
4	1	ADAPTER, PVC, CL 200, SDR-21, 2" GASKET x 2" MIPT
5	A.R.	PIPE, 2" PVC, SDR-21, BELL & SPIGOT
6	A.R.	CONCRETE COLLAR, 24" SQUARE x 4" THICK, W/ #4 REBARS, E.W.O.C., INSCRIBED W/ LINE SIZE AND FLOW DIRECTION
7	1	VALVE BOX, C.I., 2-PIECE, 5.25" SHAFT, SCREW TYPE, TYLER 6850 SERIES W/ LID
8	1	GATE VALVE, 2", RESILIENT SEAT WEDGE, S x S, NRS, RHT, 2" OPERATING NUT-MUELLER A2360-37
9	A.R.	REBAR, #4, CUT & SHAPE AS NEEDED
10	A.R.	CONCRETE ANCHOR BLOCK, 1.5 C.F. MIN. (DO NOT COVER JOINTS OR BOLTS)
11	1	ADAPTER, PVC, CL 200, SDR 21, 2" GASKET x 2" FIPT
12	A.R.	CONCRETE THRUST BLOCK, 1.5 C.F. MIN. (DO NOT COVER JOINTS OR BOLTS)
13	–	PIPE, 4" OR LESS, EXISTING
14	1	TEE, 4" MJ x 2" FIPT TAP W/ 2" BRASS CORP. STOP (FIG. 2-1) OR 2" TEE, PVC, CL 200
15	A.R.	BLUE CARSONITE MARKER POST W/ "WATERLINE WARNING" DECAL
16	1	METER CAN, 30" O.D. x 36" HT., DFW PLASTIC, DFW 3036 B SERIES "T" TOP
17	1	MONITOR RING & COVER, FORD MC-30-MB
18	1	COPPERSETTER, 2", FORD VBHH77-18B-11-77, OAE
19	2	NIPPLE, BRASS, 2" x 8"
20	1	ADAPTER, 2" FIPT x PIPE SIZE & TYPE
21	1	METER, 2", W-160 DRS SENSUS, W/ 2-BOLT FLANGE, GALLONS

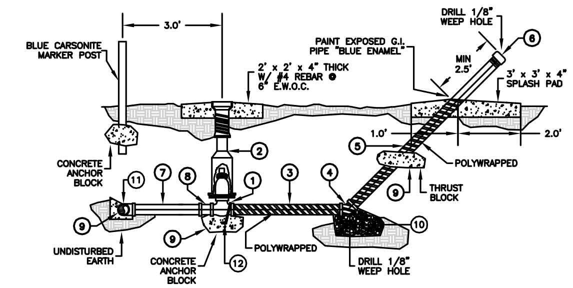
NOTES:

1. A.R. = AS REQUIRED
2. DECAL TO BE AFFIXED TO ITEM NO. 15
3. ASSEMBLE AND INSTALL AS ONE UNIT
4. WATER METER SERIAL NUMBER:________

FIGURE 2-1
RECOMMENDED INSTALLATION:
4" MJ x 2" FIPT TAP TEE

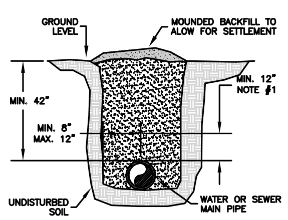


WS-2a



MATERIAL LIST		
ITEM	QUAN	DESCRIPTION
1	1	2' GATE VALVE, C.I., FIPT, RW, NRS, RHT, W/ 2' OPERATING NUT, MUELLER A-2360-37
2	1	VALVE BOX, SCREW-TYPE, C.I., 2 PIECE, 5 1/4" SHAFT, TYLER 6850
3	1	2" x 3' PIPE (MIN.), G.I., COATED OR POLYWRAPPED
4	1	2" x 45° ELBOW, G.I., W/ 1/8" WEEP HOLE
5	1	2" PIPE, G.I. x CUT TO LENGTH AS NEEDED
6	1	2" CAP, G.I. W/ 1/8" VENT HOLE
7	1	2" PIPE, PVC CUT TO LENGTH AS NEEDED
8	1	2" ADAPTER, PVC, SLIP-GASKET x MIPT, SDR-21
9	A.R.	CONCRETE THRUST BLOCK, (DO NOT COVER JOINTS OR BOLTS), MIN. 1.5 CUBIC FEET
10	1.5 FT^3	CLEAN GRAVEL
11	1	MAIN LINE SADDLE OR TEE
12	A.R.	#4 REBAR

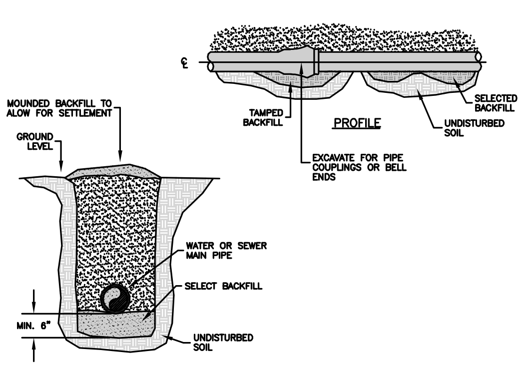
WS-11



TYPICAL TRENCH DETAIL

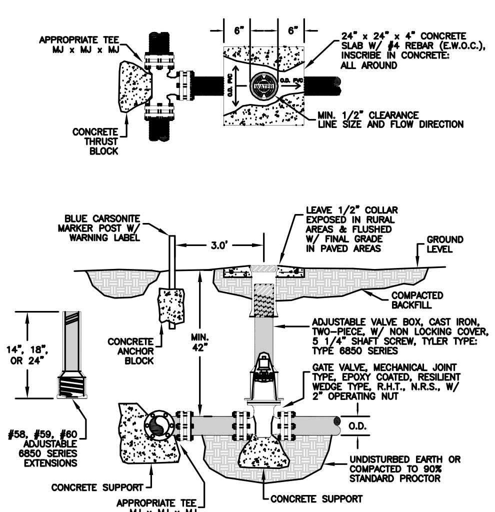
NOTES:

1. HAND COMPACTED IN 6" LIFTS FROM BOTTOM OF TRENCH TO 12" ABOVE PIPE CROWN.
2. OPEN CUT OR PAVED OR GRAVEL ROADS (IF REQUIRED), BACK FILL MINIMUM COMPACTION 95% OPTIMUM DENSITY IN LIFTS.
3. REPAVING AND REGRAVELING WILL BE DONE TO ROAD OWNER'S REQUIREMENTS.
4. KEEP LOWER 5' OF TRENCH WALL VERTICAL IF POSSIBLE. UPPER PART OF THE TRENCH WILL VARY IN WIDTH TO COMPENSATE FOR UNSTABLE SOIL. APPLICABLE O.S.H.A. REQUIREMENTS SHALL BE MET.



ALTERNATE TRENCH DETAIL

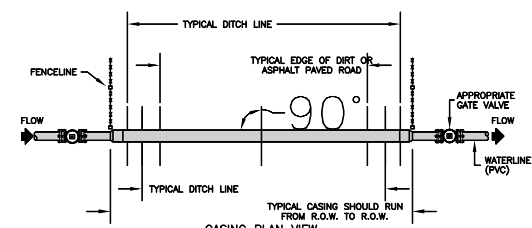
WS-15



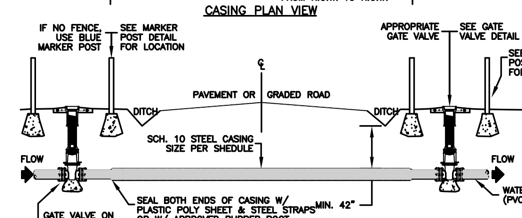
NOTES:

1. IF APPROPRIATE, USE SERIES 2000 PV MEGALUG GLANDS FOR SDR-21, PVC TO SECURE GATE VALVE(S) TO OTHER FITTINGS/PIPE, USE OTHER MEGALUGS FOR DIFFERENT OUTSIDE DIAMETER PIPE/TYPE.
2. DO NOT COVER JOINTS AND BOLTS WITH CONCRETE.
3. SEE WS-13 FOR APPROPRIATE LOCATION OF MARKER POST.

WS-16



CASING PLAN VIEW



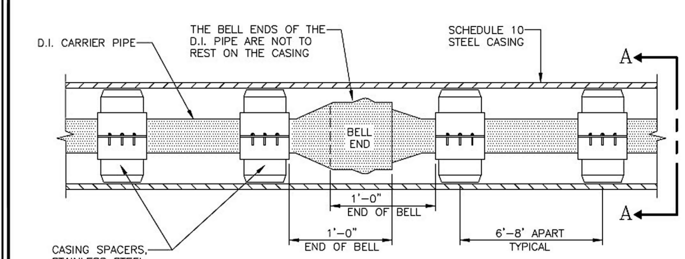
CASING PROFILE VIEW

MINIMUM CASING SIZE	
PIPE SIZE (O.D.)	CASING SIZE (I.D.)
4"	12"
6"	14"
8"	16"
10"	18"
12"	20"
14"	22"

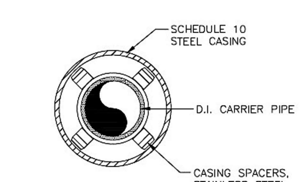
NOTES:

1. ALL CASINGS WILL TYPICALLY RUN FROM ROW TO ROW UNLESS OTHERWISE SPECIFIED.
2. BACKFILL SHALL BE 95% OF STANDARD PROCTOR DENSITY – TESTED IN 6" LIFTS.
3. ALL WOOD SKIDS ARE TO BE REDWOOD GRADE OR APPROVED EQUAL (OAE)
4. ALL SKIDS WILL BE SECURELY FASTENED TO PIPE WITH STAINLESS STEEL STRAPS.
5. ROAD SHALL BE BORED UNDER EXISTING PAVEMENT AND OPEN TRENCH ON REMAINDER, UNLESS OTHERWISE SPECIFIED.
6. IF SYSTEM IS LOOPED FOR A ROAD BORING APPLICATION, INSTALL GATE VALVE ON UPSTREAM AND DOWNSTREAM SIDES OF ROADWAY.
7. DUCTILE IRON SHALL BE CLASS 50.
8. DUCTILE IRON ROAD CROSSING IN B.I.A. RURAL AREAS SHALL BE FROM 10' BEYOND DITCH LINE UNLESS OTHERWISE SPECIFIED.

WS-17a



PLAN VIEW



SECTION A–A
CENTERED & RESTRAINED

WS-18

GENERAL NOTES:

1. ALL CASING SPACERS SHALL BE #304 STAINLESS STEEL CASING SPACERS, MODEL CSS, 8" OR 12" WIDTH, CCI PIPELINE SYSTEMS.
2. THE BELL AND SPIGOT ENDS OF THE D.I. PIPE SHALL BE INSTALLED DIRECTLY WITHIN THE CASING ON SPACERS AND SHALL NOT BE RESTING ON THE CASING ITSELF.
3. RECOMMENDED POSITIONING OF THE CASING SPACERS IS ONE PLACED 1-2 FEET ON EITHER SIDE OF THE BELL JOINT AND ONE EVERY 6-8 FEET APART THEREAFTER FOR A TOTAL OF THREE CASING SPACERS PER JOINT.
4. SEAL ENDS OF CASING W/ PLASTIC POLY SHEET AND STAINLESS STEEL STRAPS OR AN APPROVED RUBBER BOOT.

MINIMUM CASING SIZE CHART	
PIPE SIZE (O.D.)	CASING SIZE (I.D.)
4"	12"
6"	14"
8"	16"
10"	18"
12"	20"
14"	22"

DESIGNED BY:	NTUA
SURVEYED BY:	–
DRAFTED BY:	NTUA
APPROVED BY:	NTUA
DATE:	08/2017
PROJECT NO.	–
SCALE:	NTS
DETAIL NO.	WS-18

NAVAJO TRIBAL UTILITY AUTHORITY
ENGINEERING & CONSTRUCTION OPERATIONS DIVISION
INSTALLATION OF CASING SPACERS INSIDE STEEL CASING
NTUA HEADQUARTERS FT.DEFIANCE, AZ

REVISIONS			
No.	Date	Brief	By
01	04/08	Revised	L.H.
02	08/17	2017 Update	A.S.
03			
04			
05			

43

REVISIONS			
NO.	DATE	BRIEF	BY
-	-	-	-

NAVAJO TRIBAL UTILITY AUTHORITY
WATER & WASTE WATER ENGINEERING DIVISION

WATERLINE EXTENSION PROJECT
RED ROCK DAY SCHOOL
LOCATION: RED VALLEY , AZ

CONSTRUCTION DOCUMENTS

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SURVEYED BY:	LARRY M.
DRAFTER BY:	LARRY M.
APPROVED BY:	GARY Y.
DATE:	12/29/2022
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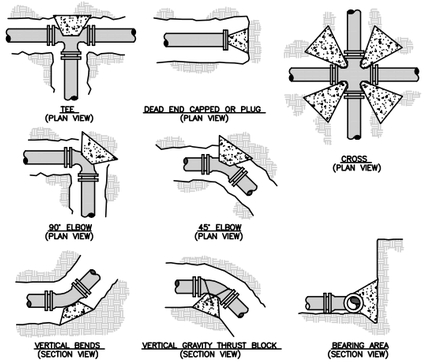
SCALE:	N.T.S.
ACAD FILENAME:	N/A

STANDARD DETAILS



NOTES:

1. DO NOT COVER GASKETED JOINTS AND NUTS/BOLTS.

MINIMUM BEARING AREAS IN SQUARE FEET

PIPE SIZE	TEE & PLUG	90° ELBOW	45° OR 22 1/2° ELBOW	CROSS
2"	0.5	0.5	0.5	0.5
4"	1.5	2.0	1.5	1.0
6"	3.0	4.5	2.5	2.0
8"	5.0	7.5	4.0	4.0
10"	8.0	11.0	6.5	5.5
12"	11.0	15.5	9.0	8.0
14"	15.0	21.0	12.0	10.5
16"	19.0	27.0	15.5	13.5
18"	24.0	34.0	19.0	17.0

WS-19

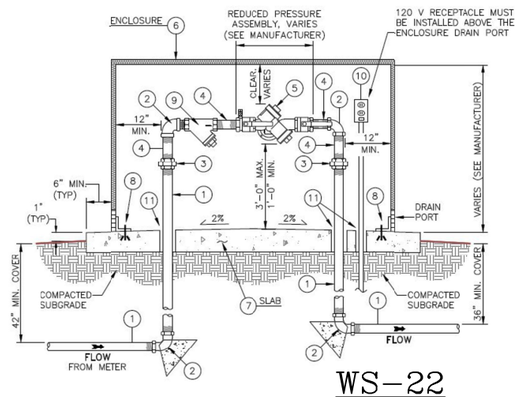
GRAVITY THRUST BLOCK
(ALSO TO BE USED IN UNSTABLE TRENCH CONDITIONS)
RESULTANT THRUST IN POUNDS OF FITTINGS AT 100 PSI WATER PRESSURE

TOTAL POUNDS					
PIPE SIZE	DEAD END	90° ELBOW	45° ELBOW	22 1/2° ELBOW	11 1/4° ELBOW
3"	1,232	1,742	943	481	241
4"	1,810	2,559	1,385	706	355
6"	3,739	5,288	2,862	1,459	733
8"	6,433	9,097	4,923	2,510	1,261
10"	9,677	13,685	7,406	3,776	1,897
12"	13,685	19,353	10,474	5,340	2,683
14"	18,385	26,001	14,072	7,174	3,604
16"	23,799	33,628	18,199	9,278	4,661
18"	29,865	42,235	22,858	11,653	5,855
20"	36,644	51,822	28,046	14,298	7,183
24"	52,279	73,934	40,013	20,398	10,249
30"	80,425	113,738	61,554	31,380	15,766
36"	115,209	162,931	88,177	44,952	22,585
42"	155,528	219,950	119,036	60,684	30,489
48"	202,683	286,637	155,127	79,083	39,733
54"	260,214	367,999	199,160	101,531	51,011
60"	298,121	421,606	228,172	116,321	58,442
64"	338,707	479,004	259,235	132,157	66,398

NOTES:

1. THE THRUST (IN TOTAL POUNDS) IN THE CHART IS BASED ON DUCTILE IRON OUTSIDE DIAMETER PIPE DIMENSION. SURGES SHOULD BE CONSIDERED AT TWICE THE NORMAL OPERATING PRESSURE. THE VOLUME OF THE GRAVITY THRUST BLOCK IS BASED ON CONRETE AT 150 LBS./FT3.
2. TO OBTAIN VOLUME OF CONCRETE REQUIRED, USE:
   VOLUME OF CONRETE(FT3)= THRUST(LBS.) x SYSTEM PRESSURE(PSI)/100 PSI // 150 LBS./FT3.
   E.G.: CALCULATE THE VOLUME OF THE GRAVITY THRUST BLOCK FOR AN 8" x 45° BEND AT AN OPERATING PRESSURE OF 80 PSI.
   ANSWER: 4923 LBS. x 160 PSI/100 PSI DIVIDED BY 150 LBS./CUBIC FT. = 52.5 CUBIC FEET OR 2 CUBIC YARDS.

WS-19a



WS-22

GENERAL NOTES:

1. REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTION ASSEMBLY SHALL COMPLY WITH ASSE 1013, AWWA C511 & USC-FCCCHR.
2. NO WATERLINE CONNECTIONS ARE ALLOWED BETWEEN THE METER AND BACKFLOW PREVENTION ASSEMBLY.
3. BACKFLOW PREVENTION ASSEMBLY SHALL BE INSTALLED WITHIN 5-FT OF THE METER BOX.
4. BACKFLOW PREVENTION ASSEMBLY SHALL BE CENTERED ON CONCRETE PAD AND COVERED WITH AN ENCLOSURE.
5. MINIMUM INSULATED CLASS II, ASSE 1060 WEATHERPROOF ENCLOSURE REQUIRED.
6. PROTECT PIPES & BACKFLOW PREVENTION ASSEMBLY FROM FREEZING WITH INSULATION AND OPTIONAL HEATING SOURCE.
7. OPTIONAL 120V GFCI ELECTRICAL RECEPTACLE TO BE INSTALLED IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE FOR OUTDOOR AND DAMP ENCLOSURE OPERATION.
8. PIPE MATERIAL SHALL BE CLASS 350 OR BETTER COPPER (TYPE K) OR BRASS (ASTM B43).
9. INSTALLATION SHALL BE IN COMPLIANCE WITH ALL APPLICABLE SPECIFICATIONS.
10. PROPERTY OWNER SHALL BE RESPONSIBLE FOR MAINTENANCE AND OPERATION OF BACKFLOW PREVENTION ASSEMBLY AND COMPLIANCE WITH REPORTING AND TESTING REQUIREMENTS.
11. MINIMUM 24" CLEARANCE FROM WALL ON THE TEST PORTS SIDE OF THE ASSEMBLY FOR TESTING.
12. CLEARANCE FOR TOP OF ENCLSURE TO ASSEMBLY VARIES PER ASSEMBLY MODEL AND ENCLOSURE MANUFACTURER.

SHEET 1 OF 2

DESIGNED BY:	NTUA
SURVEYED BY:	--
DRAFTED BY:	NTUA
APPROVED BY:	NTUA
DATE:	09/2017
PROJECT NO.	--
SCALE:	NTS
ACAD FILENAME:	207 ASA St. Dtl. for Rite-Way
DETAIL NO.	WS-22

NAVAJO TRIBAL UTILITY AUTHORITY
ENGINEERING & CONSTRUCTION OPERATIONS DIVISION
1" - 2-1/2" OUTDOOR, REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTION ASSEMBLY
NTUA HEADQUARTERS FT.DEFIANCE, AZ

REVISIONS			
No.	Date	Brief	By
01	01/10	2010 Addition	A.S.
02	08/17	2017 Update	A.S.
03			
04			
05			
06			

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1" - 2-1/2" OUTDOOR, REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTION ASSEMBLY

MATERIAL LIST

ITEM	QTY	DESCRIPTION
1	A.R.	TYPE K COPPER OR BRASS (ASTM B-43) PIPE
2	4	TYPE K COPPER 90 DEGREE ELBOW OR BRASS 90 DEGREE THREADED ELBOWS
3	2	TYPE K COPPER OR BRASS THREADED UNIONS
4	A.R.	TYPE K COPPER OR BRASS THREADED PIPE NIPPLES
5	1	BACKFLOW PREVENTION ASSEMBLY, REDUCED PRESSURE PRINCIPLE
6	1	CLASS II, ASSE 1060 INSULATED WEATHERPROOF ENCLOSURE W/ DRAIN OUTLETS, ANCHORED TO CONCRETE MOUNTING PAD
7	1	4" - 3,000 PSI CONCRETE MOUNTING PAD, DIMENSIONS PER ENCLOSURE MANUFACTURER SPECIFICATION
8	A.R.	ANCHOR SYSTEM FOR ENCLOSURE (HARDWARE)
9	1	BRONZE WYE STRAINER (THREADED), WILKINS MODEL 'S' SERIES, OAE (OPTIONAL)
10	1	GFCI ELECTRICAL RECEPTACLE (OPTIONAL)
11	A.R.	MINIMUM 1" ANNULAR AREA AROUND PIPE & ELECTRICAL CONDUIT W/ PIPE SLEEVE

GENERAL NOTES:

1. A.R. = AS REQUIRED
2. OAE = OR APPROVED EQUAL

WS-22a

SHEET 2 OF 2

DESIGNED BY:	NTUA
SURVEYED BY:	--
DRAFTED BY:	NTUA
APPROVED BY:	NTUA
DATE:	09/2017
PROJECT NO.	--
SCALE:	NTS
ACAD FILENAME:	WS-22a
DETAIL NO.	

NAVAJO TRIBAL UTILITY AUTHORITY
ENGINEERING & CONSTRUCTION OPERATIONS DIVISION
MATERIAL LIST:
1" - 2-1/2" OUTDOOR, REDUCED PRESSURE PRINCIPLE
NTUA HEADQUARTERS FT.DEFIANCE, AZ

REVISIONS			
No.	Date	Brief	By
01	01/10	2010 Addition	A.S.
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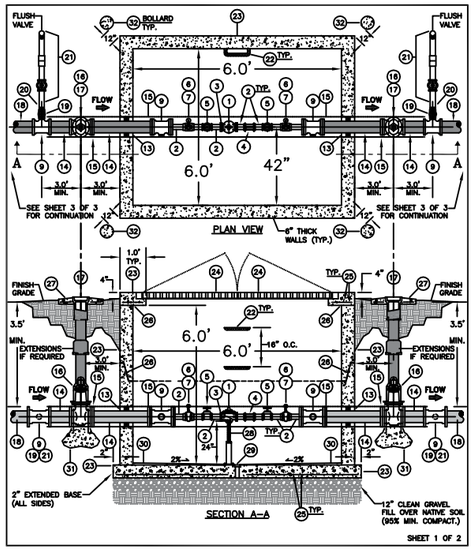

SHEET 1 OF 2

WS-4 MODIFIED

2" P.R.V. WITH 2" METER

ITEM	QTY	DESCRIPTION
1	2	2" CLA-VAL, PRESSURE REDUCING VALVE, THREADED ENDS, STAINLESS STEEL (S.S.) TRIM & PILOT TUBING, 90 SERIES W/ OPTIONS A, B, C, D, V & M
2	A.R.	2" S.S. PIPE, THREADED, CUT AS NEEDED
3	1	2" ELSTER EVO CH MAG METER, FLANGED W/EA WATER METER
4	2	2" DRESSER COUPLING (6" LONG FOR S.S. PIPE)
5	4	2" GATE VALVE, F.I.P.T., N.R.S., R.H.T., HAND WHEEL
6	2	PRESSURE GAUGE W/ 1/4" BRASS SHUTOFF VALVE
7	2	2" S.S. TEE W/ 2" x 3/4" BUSHING AND 3/4" x 1/4" BUSHING FOR PRESSURE GAGE
8	4	4" S.S. BLIND FLANGE, TAPPED 2" THREADED
9	1	4" x 4" x 2" D.I., M.J. TAPPED TEE, CLASS 350 FLANGED, BLIND FLANGED ON 2" BRANCH INSIDE VAULT
10	--	NOT USED
11	--	NOT USED
12	--	NOT USED
13	2	VAULT BORE DONUT, 6" W/ 4" HOLE
14	A.R.	4" DUCTILE IRON (D.I.) PIPE, CLASS 350, PLAIN END, CUT AS NEEDED
15	2	4" D.I. "E-Z" FLANGED ADAPTER, CLASS 350
16	2	4" GATE VALVE, M.J., RESILIENT SEAT, FLANGED, N.R.S., R.H.T., W/ 2" OPERATING NUT
17	4	VALVE BOX, 2-PIECE SCREW TYPE, 5-1/4" SHAFT W/ CAST IRON DROP LID
18	--	4" SDR-21 PVC PIPE -OR- EXISTING WATER LINE
19	2	2" CORPORATION STOP, MIPT x FIPT
20	1	4" X 2" REDUCER, D.I. MJ X THREAD W/ THRUST BLOCK
21	2	INSTALL 2" FLUSH VALVE PER NTUA STD. DTL. WS-11 (AFTER THE CORP. STOP)
22	A.R.	PLASTIC COATED STEEL OR ALUMINUM STEP @ 16" O.C., INSTALL TO 12" ABOVE VAULT FLOOR
23	1	6' x 6' x 6' (INT. DIM.) PRECAST CONCRETE VAULT (4,000 PSI MIN.), 6" THICK WALLS W/ 6" THICK REINFORCED CONCRETE TOP (NON-TRAFFIC RATED) AND 6" REINFORCED CONCRETE BASE
24	1	5' x 5' SQ., INSULATED, DOUBLE DOOR COVER AND SAFETY GRATE, ALUMINUM CHANNEL FRAME W/ T-HANDLE SLAM LOCK AND COVERED PADLOCK CLIP
25	--	NOT USED
26	A.R.	VAULT JOINTS TO BE SEALED WITH BITUMASTIC GASKET
27	4	24" x 24" x 4" CONCRETE COLLAR W/ #4 REBAR, E.W., INDICATE PIPE SIZE & FLOW DIRECTION
28	2	ADJUSTABLE METAL PIPE SUPPORT (UNDER BOTH PRV'S INSIDE VAULT)
29	1	2" FLOOR DRAIN W/ SCREEN, DRAIN TO 5' CLEAN GRAVEL (ADJUST PER FIELD CONDITIONS)
30	A.R.	CEMENT, NON-SHRINK GROUT, SLOPE FINISH @ 2% (0.02%) TOWARD VAULT DRAIN
31	A.R.	CONCRETE ANCHOR BLOCK PER NTUA STD. DTL. WS-19 & WS-19a
32	4	6" DIA. BOLLARDS AT 12" MIN. FROM VAULT CORNERS PER MAG. STD. 140, TYPE 1

GENERAL NOTES:

1. PROVIDE ADEQUATE CLEARANCE BETWEEN FLANGE BOLTS AND VAULT WALLS FOR MAINTENANCE.
2. GATE VALVES TO BE SUPPORTED ON 95% STANDARD PROCTOR.
3. ALL PIPES AND FITTINGS 4" OR LESS TO BE STAINLESS STEEL.
4. HEX HEAD BOLTS/NUTS TO BE STAINLESS STEEL, TYPE 304.
5. A.R. = AS REQUIRED.

WS-4a MODIFIED

2" P.R.V. WITH 2" METER

NTUA

REVISIONS

NO.	DATE	BRIEF	BY
-	-	-	-

NAVAJO TRIBAL UTILITY AUTHORITY
WATER & WASTE WATER ENGINEERING DIVISION

WATERLINE EXTENSION PROJECT
RED ROCK DAY SCHOOL
LOCATION: RED VALLEY, AZ

CONSTRUCTION DOCUMENTS

DESIGNED BY:	LARRY M.
SURVEYED BY:	LARRY M.
DRAFTED BY:	LARRY M.
APPROVED BY:	GARY Y.
DATE:	12/29/2022
PROJECT NO.	322230001
SCALE:	N.T.S.
ACAD FILENAME:	N/A

SHEET NO.
12 of 12