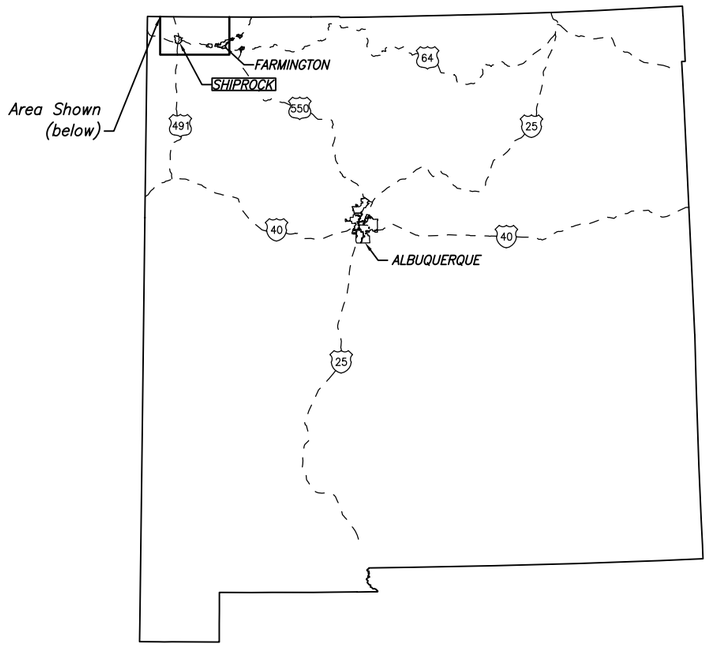
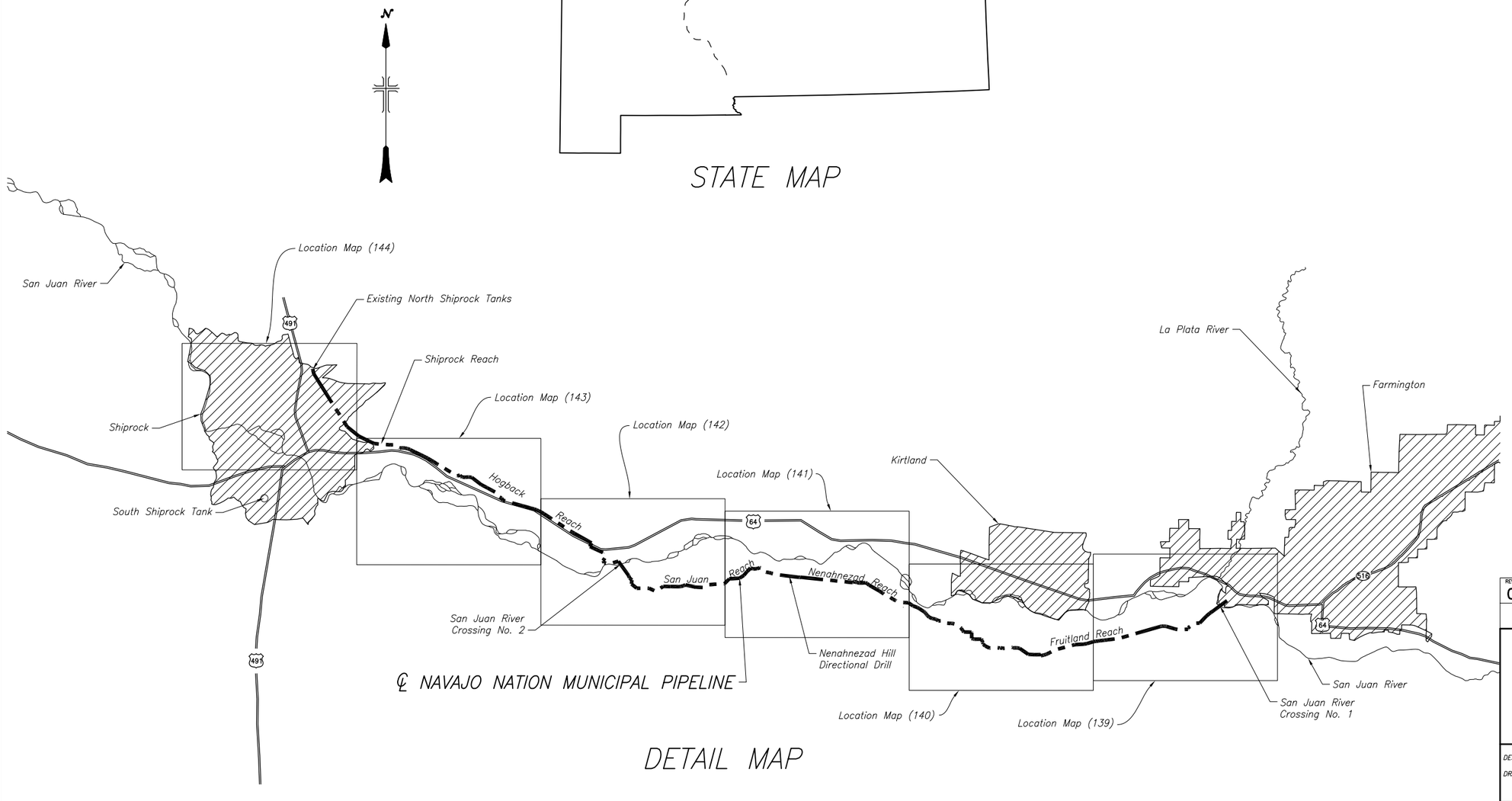
69-529-172



STATE MAP



INDEX MAP



DETAIL MAP

REV NO		
01	2009-10-08 FCCF-413 JED	ADDED SOUTH SHIPROCK TANK.

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DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

ANIMAS - LA PLATA PROJECT COLORADO - NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

GENERAL MAP

DESIGNED _ DARRYL GOOD _ _ _ _ CHECKED _ _ S/JAYE E. DECKER _ _ _ _ _ _ _

DRAWN _ _ _ DARRYL GOOD _ _ _ _ _ TECH. APPR. _ S/DOUG DOCKTER _ _ _ _ _ _ _

APPROVED _ _ _ S/RICK EHAT _ _ _ _ _ _ _ _ _

FARMINGTON, NEW MEXICO SHEET 1 OF 1 2005-3-22

69-529-172

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OCTOBER 8, 2010 12:19
PLOTTED BY
JDECKER

CAD SYSTEM
AutoCAD Rel. 17.2s
CAD FILENAME
I 69-529-172 REV1.DWG

69-529-139



1000 0 1000 2000 3000
SCALE OF FEET

T.29 N., R.13 W. & R.14 W.

NOTES

1. Using USGS Quadrangle Maps Kirtland, N. Mex. and Farmington South, N. Mex. Photorevised 1979

10-23-07	ADDED FEATURE NAMES
ECCE-410	AND SPECIFIC STATIONS

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ANIMAS - LA PLATA PROJECT COLORADO - NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

FRUITLAND REACH

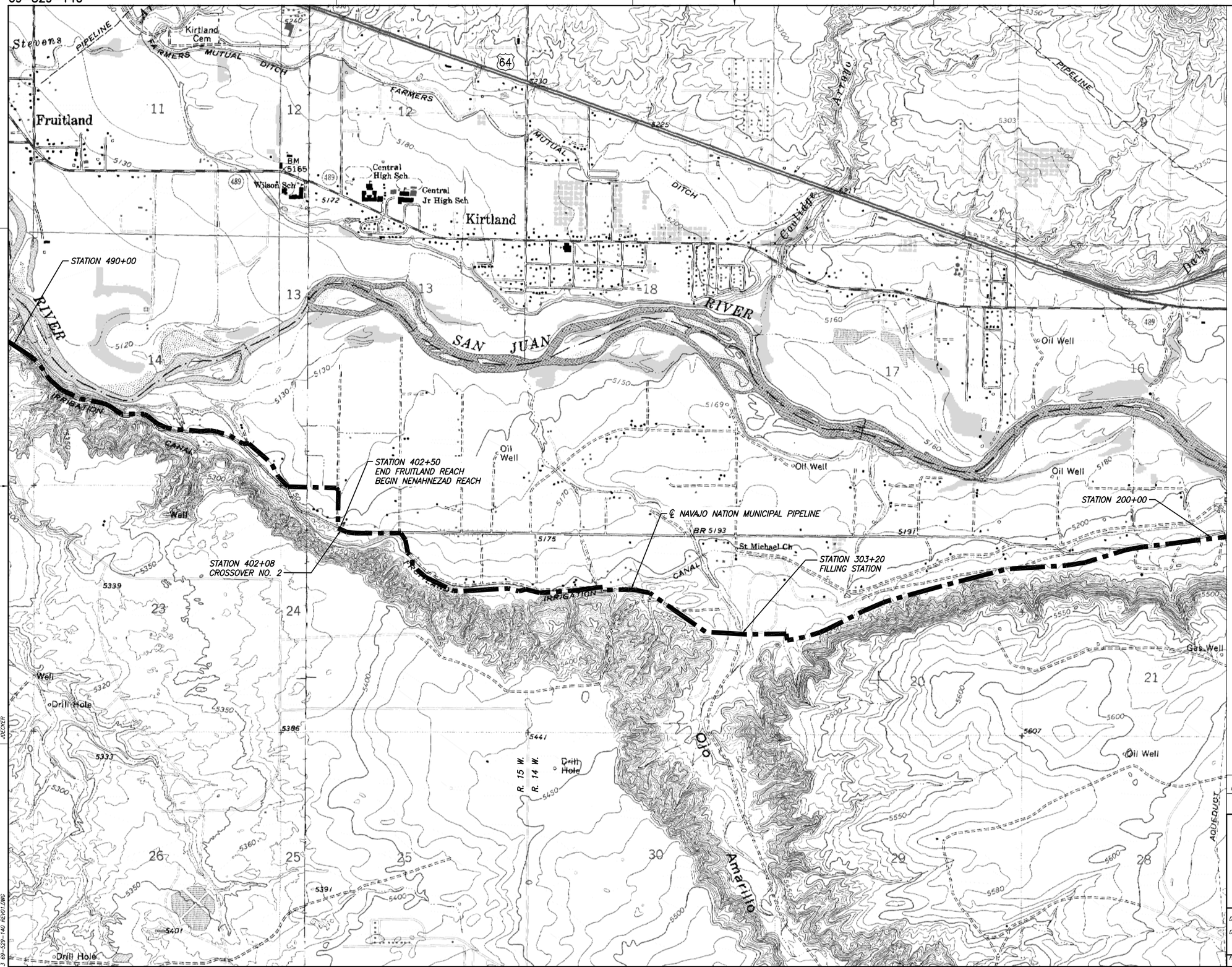
LOCATION MAP

BEGINNING TO STATION 200+00

DESIGNED - CHERYL GOOD - CHECKED - KATHY S. DECKER
DRAWN - CHERYL GOOD - TECH. APPR. - KATHY S. DECKER
APPROVED - REGION DIRECTOR

FARMINGTON, NEW MEXICO 2004-10-111

DATE AND TIME PLOTTED
MAY 21, 2008 15:04
ACCESS 8"
DGN FILENAME
69-529-139.dgn



1000 0 1000 2000 3000
SCALE OF FEET

T.29 N., R.14 W. & R.15 W.

NOTES

1. Using USGS Quadrangle Maps Kirtland, N. Mex. and Fruitland, N. Mex. Photorevised 1979

10-23-07 FCCF-410	ADDED FEATURE NAMES AND SPECIFIC STATIONS

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ANIMAS - LA PLATA PROJECT COLORADO - NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

FRUITLAND AND NENAHNEZAD REACHES

LOCATION MAP

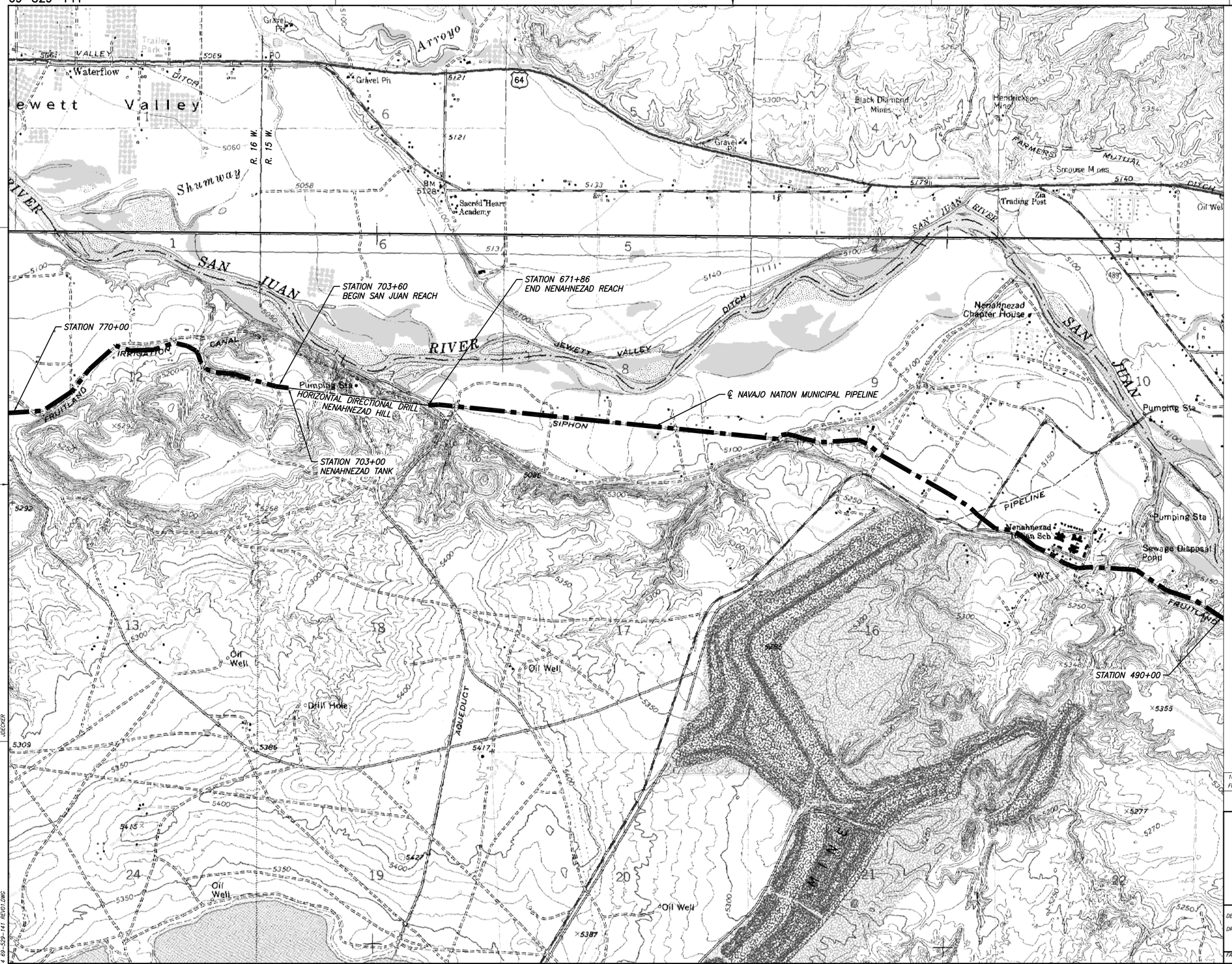
STATION 200+00 TO 490+00

DESIGNED DARRYL GOOD CHECKED S/JAYE E. DECKER
DRAWN DARRYL GOOD TECH. APPR. S/JAYE E. DECKER
APPROVED S/DOUG DOCKTER

FARMINGTON, NEW MEXICO 2005-02-07 SHEET 2 OF 6

69-529-140

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CAD SYSTEM: AutoCAD Rel. 17.2s
CAD FILENAME: 3 69-529-140 REV01.DWG



N

1000 0 1000 2000 3000
SCALE OF FEET

T.29 N., R.15 W. & R.16 W.

NOTE

1. Using USGS Quadrangle Maps Fruitland, N. Mex. and Waterflow, N. Mex. Photorevised 1979

10-23-07	ADDED FEATURE NAMES AND SPECIFIC STATIONS
FSCF-410	MINOR ALIGNMENT REVISIONS

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ANIMAS - LA PLATA PROJECT COLORADO - NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

FRUITLAND, NENAHNEZAD AND SAN JUAN REACHES

LOCATION MAP

STATION 490+00 TO 770+00

DESIGNED _DARRYL GOOD_ CHECKED _s/JAYE E. DECKER_
DRAWN _DARRYL GOOD_ TECH. APPR. _s/DOUG DOCKTER_
APPROVED _s/RICK EHAT_

FARMINGTON, NEW MEXICO 2005-02-07
SHEET 3 OF 6

69-529-141

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AutoCAD Rel. 17.2s
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4 69-529-141 REVDLDWG

STATION 1085+00

STATION 960+00
BEGIN HOGBACK REACH

STATION 950+00
END SAN JUAN REACH

HORIZONTAL DIRECTIONAL DRILL SAN JUAN RIVER CROSSING #2

STATION 928+50
CROSSOVER NO. 3

STATION 922+00
FILLING STATION

STATION 770+00

℄ NAVAJO NATION MUNICIPAL PIPELINE

T. 30 N.
T. 29 N.

HOGBACK CANAL

FRUITLAND IRRIGATION CANAL

JEWETT VALLEY DITCH

SAN JUAN RIVER

NAVAJO INDIAN RESERVATION

Jewett Valley Cem.

Oil Wells

Gravel Pit

Drill Hole

GRAVEL PIT

PIPELINE

N

1000 0 1000 2000 3000
SCALE OF FEET

T.29 N., R.16 W.

NOTE

1. Using USGS Quadrangle Maps Fruitland, Waterflow, Hogback North, N. Mex., Photorevised 1979, and Chimney Rock N. Mex. 1983

10-23-07 FCCF-410	ADDED FEATURE NAMES AND SPECIFIC STATIONS

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ANIMAS - LA PLATA PROJECT COLORADO - NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

SAN JUAN AND HOGBACK REACHES

LOCATION MAP

STATION 770+00 TO 1085+00

DESIGNED DARRYL GOOD CHECKED s/JAYE E. DECKER
DRAWN DARRYL GOOD TECH. APPR. s/DOUG DOCKTER
APPROVED s/RICK EHAT

FARMINGTON, NEW MEXICO 2005-02-07
SHEET 4 OF 6

69-529-142

DATE AND TIME PLOTTED
OCTOBER 8, 2010 10:11
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JDECKER

CAD SYSTEM
AutoCAD RM 17.2s
CAD FILENAME
S 69-529-142 REV01.DWG

INDIAN RESERV

Arroyo

STATION 1370+00

HOGBACK

CANAL

PIPELINE

RIVER

STATION 1239+00
END HOGBACK REACH
START SHIPROCK REACH

℄ NAVAJO NATION MUNICIPAL PIPELINE

STATION 1238+30
CROSSOVER NO. 4

STATION 1173+00
FILLING STATION

STATION 1085+00

JUAN

SAN JUAN RIVER

Chaco River

Eagle

Well

Drill Hole

Oil Wells

MC

T. 30 N.

T. 29 N.

R. 17 W.

R. 16 W.

N

1000 0 1000 2000 3000
SCALE OF FEET

T.29 N. & T.30 N., R.16 W. & R.17 W.

NOTE

1. Using USGS Quadrangle Maps Chimney Rock, N. Mex. and Shiprock, N. Mex. 1983

10-23-07 FCCF-410	ADDED FEATURE NAMES AND SPECIFIC STATIONS

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ANIMAS - LA PLATA PROJECT COLORADO - NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

HOGBACK AND SHIPROCK REACH

LOCATION MAP

STATION 1085+00 TO 1370+00

DESIGNED DARRYL GOOD CHECKED s/JAYE E. DECKER

DRAWN DARRYL GOOD TECH. APPR. s/DOUG DOCKTER

APPROVED s/RICK EHAT

FARMINGTON, NEW MEXICO SHEET 5 OF 6 2005-02-07

69-529-143

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OCTOBER 8, 2010 10:21
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AutoCAD Rel. 17.2s
CAD FILENAME
6 69-529-143 REV01.DWG

69-529-144

7



NOTE

1. Using USGS Quadrangle Map Shiprock, N. Mex. 1983

REV NO		
02	2009-11-06 FCCF-413 JED	ADDED CROSSOVER NO. 5. ADDED NNMP TERMINATION. DELETED NORTH SHIPROCK TANK.
REV NO 01	2007-10-23 FCCF-410 JED	ADDED FEATURE NAMES ADDED SPECIFIC STATIONS

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ANIMAS - LA PLATA PROJECT COLORADO - NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

SHIPROCK REACH

LOCATION MAP

STATION 1370+00 TO 1497+93 (E.O.L.)

DESIGNED DARRYL GOOD CHECKED S/JAYE E. DECKER

DRAWN DARRYL GOOD TECH. APPR. S/DOUG DOCKTER

APPROVED S/RICK EHAT

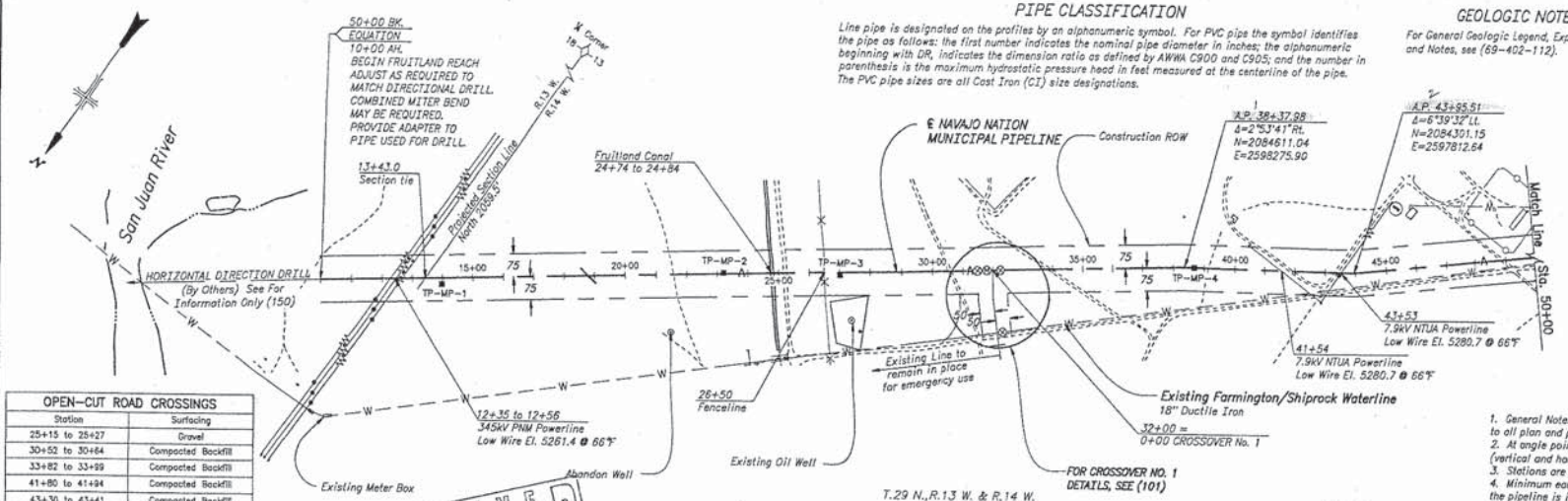
FARMINGTON, NEW MEXICO 2005-02-07
SHEET 6 OF 6

69-529-144

DATE AND TIME PLOTTED
OCTOBER 8, 2010 10:32
PLOTTED BY
JDECKER

CAD SYSTEM
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CAD FILENAME
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69-529-102



PIPE CLASSIFICATION

Line pipe is designated on the profiles by an alphanumeric symbol. For PVC pipe the symbol identifies the pipe as follows: the first number indicates the nominal pipe diameter in inches; the alphanumeric beginning with DR, indicates the dimension ratio as defined by AWWA C900 and C905; and the number in parenthesis is the maximum hydrostatic pressure head in feet measured at the centerline of the pipe. The PVC pipe sizes are all Cast Iron (CI) size designations.

GEOLOGIC NOTE

For General Geologic Legend, Explanation, and Notes, see (69-402-112).

SYMBOLS

- NNMP Pipeline
- Construction ROW
- Sectionalizing Valve
- Air Valve
- Blowoff
- Filling Station
- Paved Road
- Dirt Road
- Field Fence
- Chain Link Fence
- Ditch
- Canal
- Apparent Formation Contact Line
- Powerline
- Waterline
- Sewerline
- Natural Gas pipeline
- Telephone
- USG4 ROW Monument
- Storage Tank
- Flow Meter

OPEN-CUT ROAD CROSSINGS	
Station	Surfacing
25+15 to 25+27	Gravel
30+52 to 30+64	Compacted Backfill
33+82 to 33+99	Compacted Backfill
41+80 to 41+94	Compacted Backfill
43+30 to 43+41	Compacted Backfill
48+83 to 48+97	Compacted Backfill

NOTE: Open cut roads require compacted backfill per specifications. See (169) for details.

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NOTES

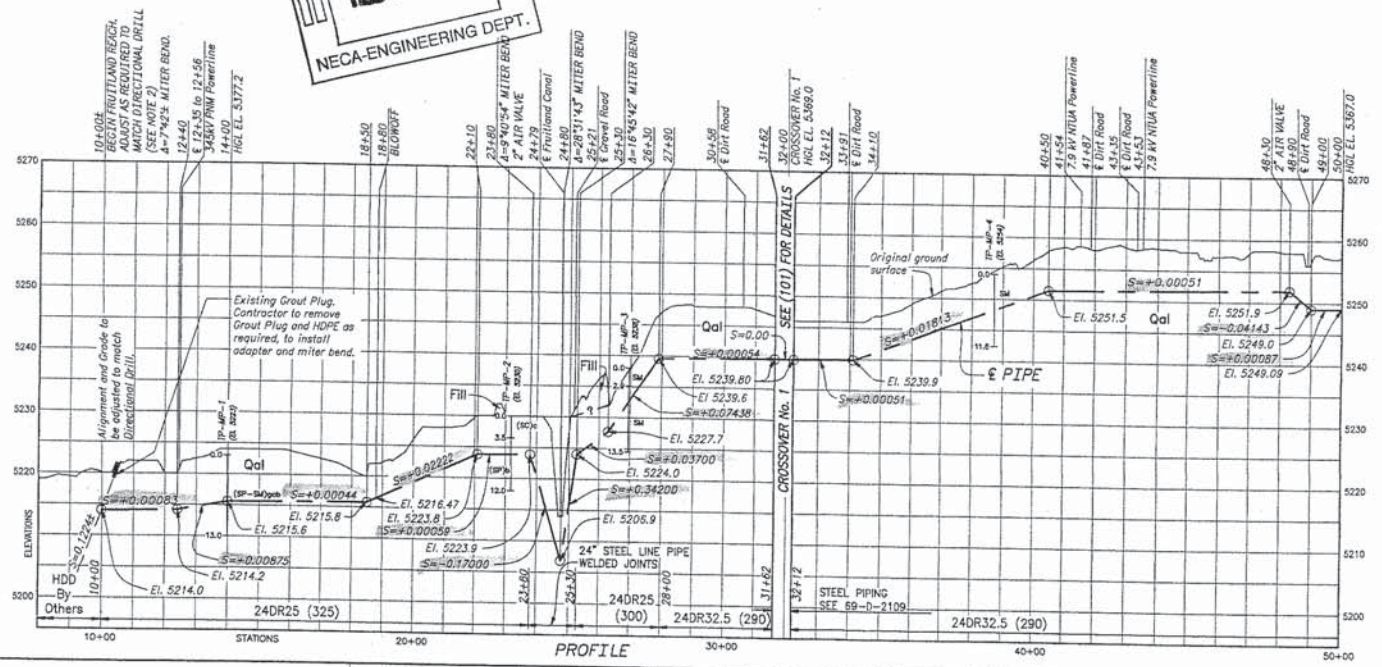
1. For Fruitland Canal crossing see (174).
2. Field verify HDD pipe location before fabricating miter bend at 10+00 AH.

GENERAL NOTES

1. General Notes, Symbols, Abbreviations and Pipe Classification apply to all plan and profile drawings.
2. At angle points that do not require miter bends, long radius curves (vertical and horizontal) shall be constructed by pulling joints.
3. Stations are approximate and may be varied as directed.
4. Minimum earth cover over the top of the pipe shall be 3 feet unless the pipeline is inside an irrigated field, at an existing wash, or at a roadway, and then the minimum cover is 5 feet, unless otherwise noted.
5. Where the NNMP pipeline crosses an existing pipe, a minimum clear distance of 2 feet outside to outside between NNMP pipeline and existing pipe shall be provided unless otherwise directed. The backfill between the crossing pipelines shall be compacted as stated in the specifications.
6. Hydraulic grade line elevations (H.G.L. EL.) shown are for the design Q of 12.92 cfs to 32+00 and 9.05 cfs after 32+00 at steady state and are based on 70 psi at 14+00 and a water surface at El. 5244.5 at the Nenahnezad Tank.
7. Air valve offsets may be adjusted in the field, but shall be approximately as shown on (171).
8. Unknown elevations and diameters of existing utilities shall be determined by the contractor and reported to the COR in time to allow adjustment of grades and design if required before scheduled construction.
9. For limits on excavation near gaslines, see specifications.
10. Grid based on New Mexico State Coordinate System West Zone.
11. Ground to grid conversion factor is 0.9996963.
12. Drawings with contours on plan views are available upon request.
13. Steel pipe joints shall be welded or restrained when on slope greater than 0.20.

ABBREVIATIONS

AC	– Asbestos Cement
AP	– Angle Point
APS	– Arizona Public Service Company
CR	– County Road
DI	– Ductile Iron
HB	– Horizontal Bore
HDD	– Horizontal Directional Drill
HDPE	– High Density Polyethylene
HGL	– Hydraulic Grade Line
NNMP	– Navajo Nation Municipal Pipeline
NTUA	– Navajo Tribal Utility Authority
OH	– Over Head
PE	– Polyethylene
PNM	– Public Service Company of New Mexico
PVC	– Polyvinyl Chloride
ROW	– Right-of-Way
TP	– Test Pit



REV NO	DATE	DESCRIPTION
9	2008-8-19 FCCP-410	EXISTING LINE TO REMAIN IN PLACE FOR EMERGENCY USE.
8	2008-7-11 FCCP-410	ADDED "NOT BY CONTRACT" ON PIPE TYPES. ADDED EQUATION "50+00 BK. EQUALS 10+00 AH." ADDED STATION 10+00 TO MATCH DIRECTIONAL DRILL.
7	2008-6-18 FCCP-410	CHANGED STATION 21+12 TO 31+62 ON PIPE TYPES.

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ANIMAS–LA PLATA PROJECT COLORADO – NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

FRUITLAND REACH

BEGINNING TO STATION 50+00

PLAN AND PROFILE

GEOLOGY Date 11/13/07 — K. K. CHRISTIANSON

TECHNICAL APPROVAL — J.G.S. SMITH

SUBMITTED — J.G.S. SMITH

APPROVED — [illegible]

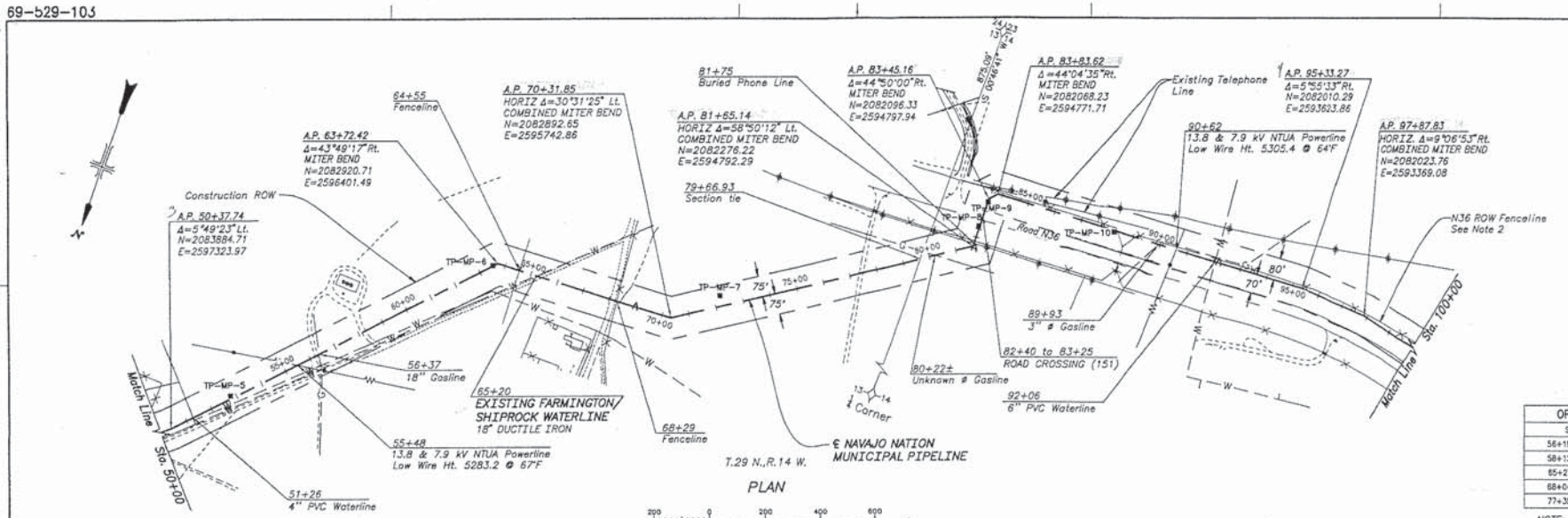
DESIGNED — J. G. SMITH — CHECKED — JAMES E. DECKER

DRAWN — B. B. STOOL/ SHOLOM — TECH. APPR. — LINDA M. BOWLES, P.E. LINDA M. BOWLES P.E.

APPROVED — TODD B. CALHOUN, P.E. PEER REVIEWER – TODD B. CALHOUN, P.E.

FARMINGTON, NEW MEXICO — 2004-05-13 — SHEET 1 OF 1

69-529-102

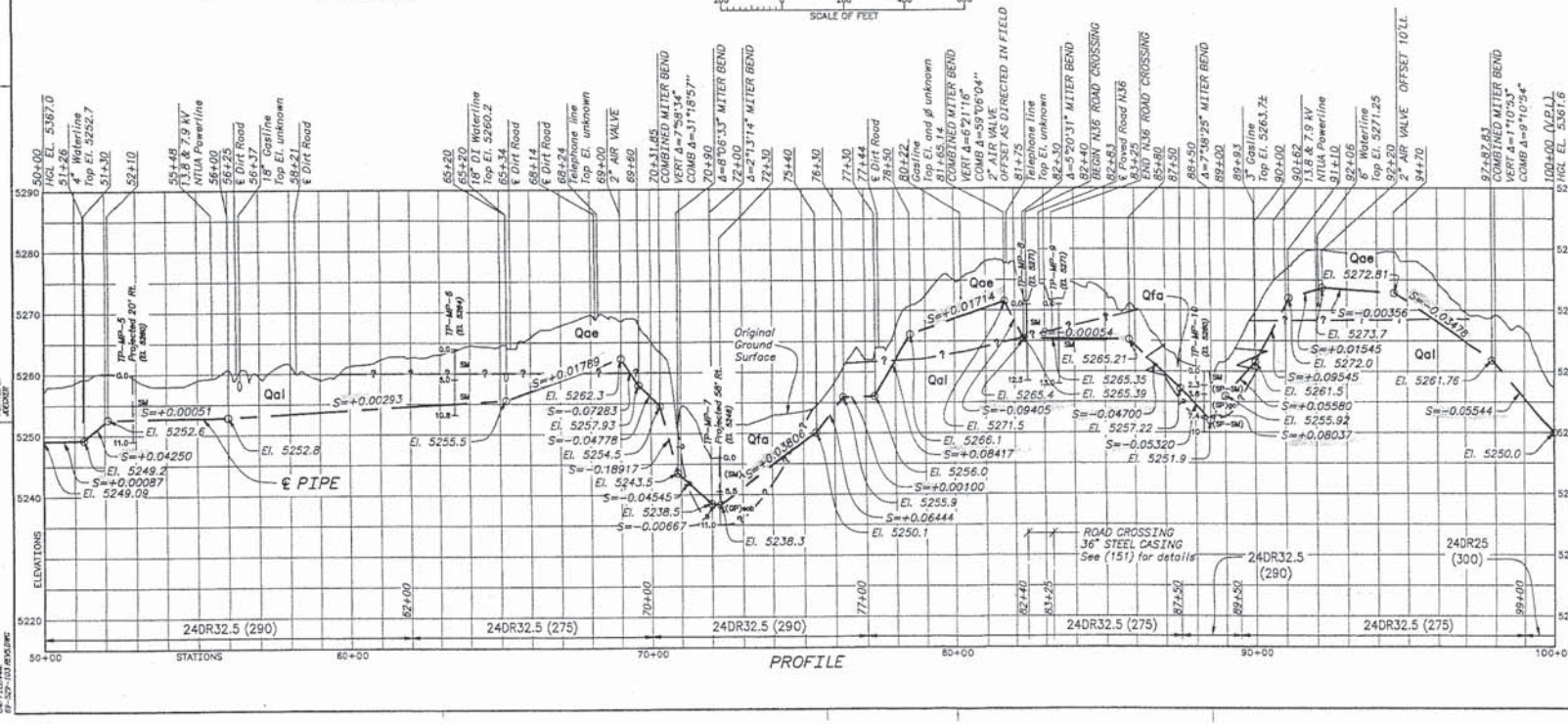


PLAN

SCALE OF FEET 200 0 200 400 600

OPEN-CUT ROAD CROSSINGS	
Station	Surfacing
56+19 to 56+30	Compacted Backfill
58+12 to 58+30	Compacted Backfill
65+27 to 65+41	Compacted Backfill
68+04 to 68+23	Compacted Backfill
77+35 to 77+52	Compacted Backfill

NOTE: Open cut roads require compacted backfill per specifications. See (169) for details.



NOTES

1. For General Notes, Abbreviations, Symbols and Pipe Classifications, see (102).
2. Remove and replace Road N36 right-of-way fence from stations 83+83 to 171+00.
3. For construction limitations near gaslines, see specifications.

REV NO		
5	2009-03-06 FDCF-413 JED	LOWER VERTICAL GRADE FROM STATION 69+00 TO 75+40. ADDED ELEVATION FOR BEGIN N36 ROAD CROSSING. CORRECTED END N36 ROAD CROSSING ELEVATION.
4	2009-02-24 FDCF-413 JED	OFFSET ALIGNMENT 5' NORTH FROM 83+45.16 TO 231+60.08. VERTICAL GRADE ADJUSTED FOR GAS PIPELINE AT 89+98 AND FOR HORIZONTAL MOVE.
3	2008-09-29 FDCF-412 DRG	CHANGED ROAD CROSSINGS TO SHOW STEEL CASING AND OTHER CHANGES ASSOCIATED WITH THE NEW ROAD CROSSING

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ANIMAS-LA PLATA PROJECT COLORADO - NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

FRUITLAND REACH

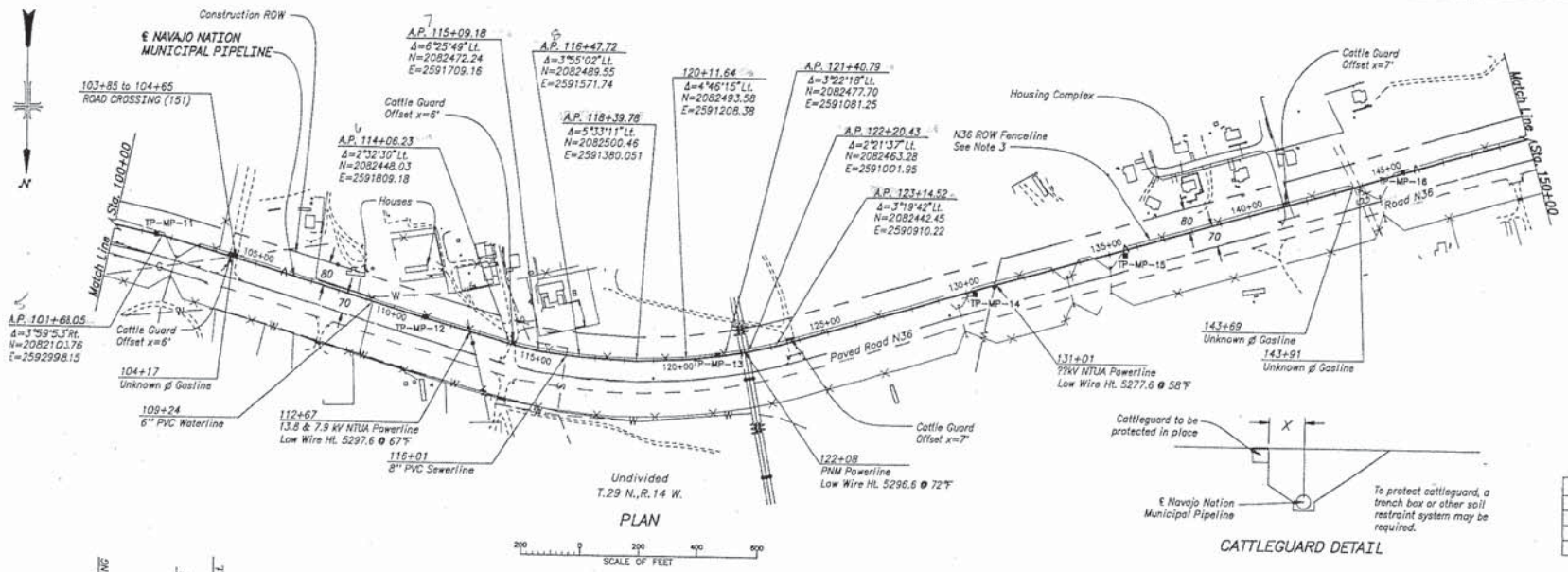
STATION 50+00 TO 100+00

PLAN AND PROFILE

DESIGNED J.S. PAPIS CHECKED MATT E. BRICKER
DRAWING S.SPOOR/D.SPOR QA TECH. APPR. LINDA M. BOWLES, P.E.
APPROVED TODD R. CALHOUN, P.E. PEER REVIEWER - TODD R. CALHOUN, P.E.

FARMINGTON, NEW MEXICO 2004-05-11

69-529-103



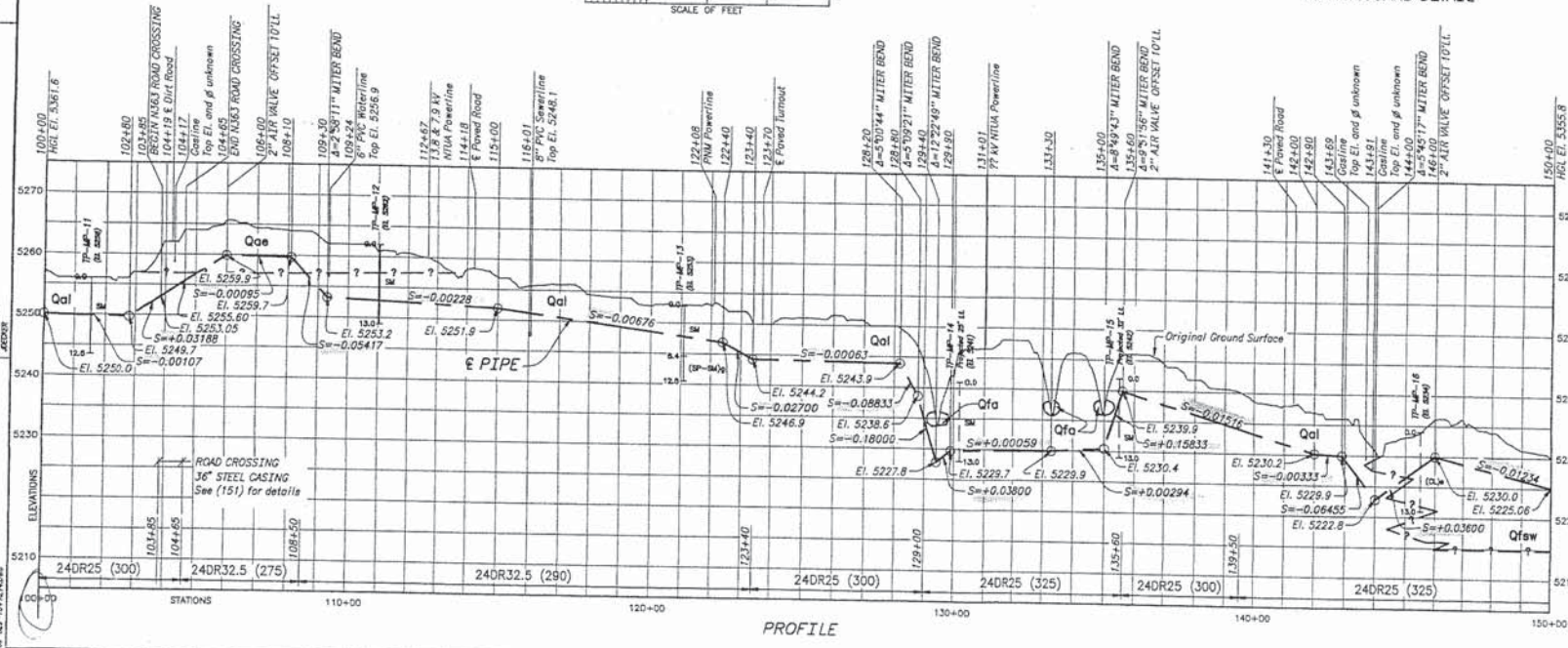
CATTLEGUARD DETAIL

OPEN-CUT ROAD CROSSINGS	
Station	Surfacing
114+10 to 114+25	Asphalt
123+56 to 123+83	Asphalt
141+20 to 141+42	Asphalt

NOTE: Open cut roads require compacted backfill per specifications. See (169) for details.

NOTES

1. For General Notes, Abbreviations, Symbols and Pipe Classifications, see (102).
2. Pipeline is within ten feet of existing sewer line at station 116+06. Pipeline shall be protected as stated in the specifications.
3. Remove and replace right-of-way fence from stations 83+90 to 171+00.
4. For construction limitations near gaslines, see specifications.
5. Adjust air valve offsets as needed and directed, to insure air valve is outside of road right-of-way fence.



PROFILE

REV NO		
4	2009-02-25 FCOF-413 JED	OFFSET ALIGNMENT 5' NORTH FROM 83+45.18 TO 231+80.08. ADDED NOTE 5 ABOUT AIR VALVE OFFSETS. REVISED OPEN CUT ROAD STATIONS. NO ADJUSTMENT OF VERTICAL GRADE REQUIRED.
3	2008-09-30 DPC FCOF-412	CHANGED ROAD CROSSINGS TO SHOW STEEL CASING AND OTHER CHANGES ASSOCIATED WITH THE NEW ROAD CROSSING
2	2008-05-01 FCOF-410/412 JED/DPC	ADDED POWERLINE VOLTAGES. ADDED POWERLINE AT 131+03.
1	2008-02-05 FCOF-410 JED	ADDED STEEL LINE PIPE CALLOUT TO ROAD CROSSING ON PROFILE.

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ANIMAS-LA PLATA PROJECT COLORADO - NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

FRUITLAND REACH

STATION 100+00 TO 150+00

PLAN, PROFILE AND DETAIL

DESIGNED ___ J.S. JAMES ___ CHECKED ___ NEIL E. LEDGER ___

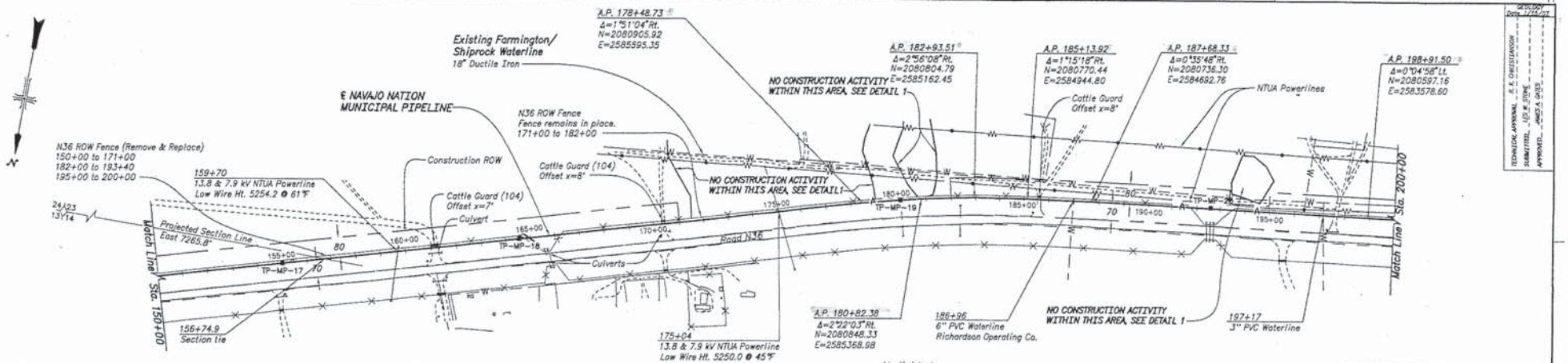
DRAWN G. S. GOOD/ D.P.C./J.R.Y. ___ TECH. APPR. ___ LINDA M. BOWLES, P.E. ___

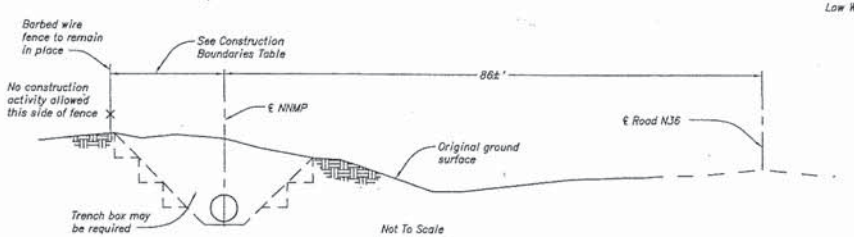
APPROVED ___ TEDD R. CALHOUN, P.E. ___ LINDA M. BOWLES, P.E.

PEER REVIEWER - TEDD R. CALHOUN, P.E.

FARMINGTON, NEW MEXICO SHEET 1 OF 1 2004-06-13

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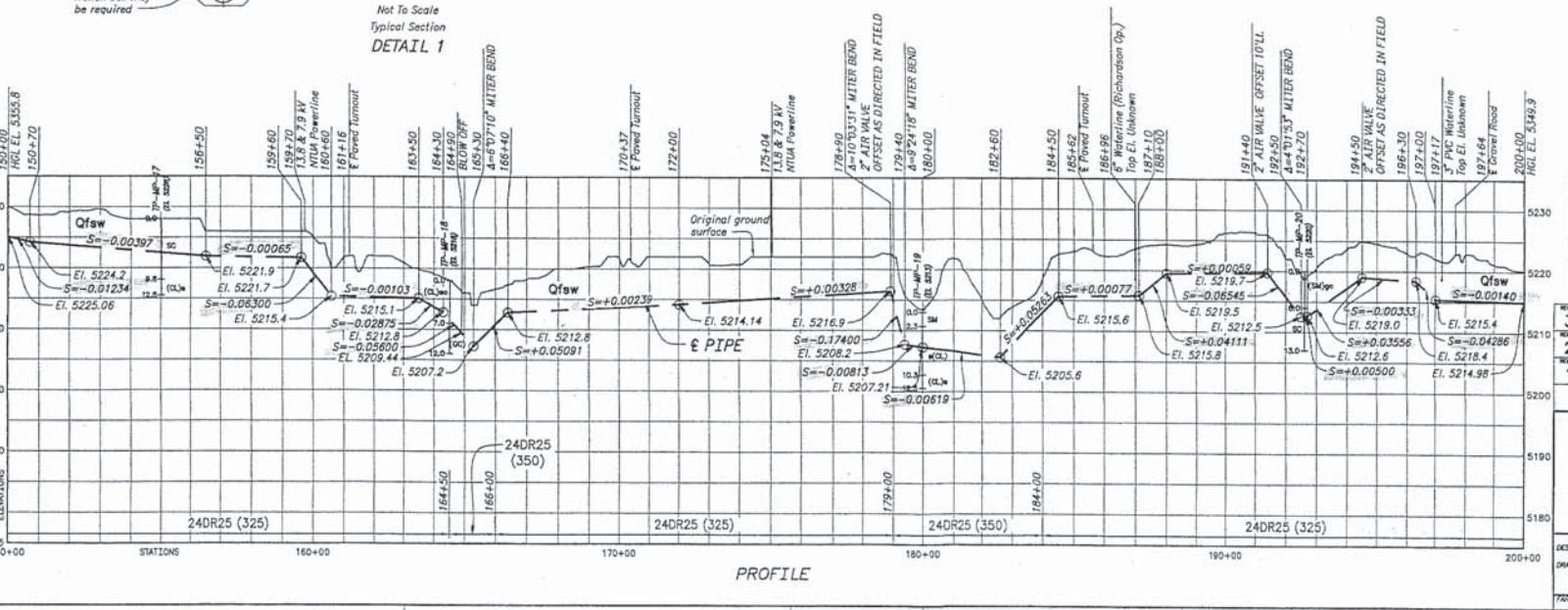




CONSTRUCTION BOUNDARIES	
Stations	Distance from ℄ NNMP to Construction Boundary
171+00 to 182+00	11'± Left (Road N36 ROW Fence)
193+40 to 195+00	25' Left

OPEN-CUT ROAD CROSSINGS	
Station	Surfacing
161+03 to 161+29	Asphalt
170+30 to 170+43	Asphalt
185+55 to 185+69	Asphalt
197+57 to 197+70	Gravel

NOTE: Open cut roads require compacted backfill per specifications. See (169) for details.



NOTES

1. For General Notes, Abbreviations, Symbols and Pipe Classifications, see (102).
2. Remove and replace right-of-way fence from stations 83+90 to 171+00, 182+00 to 193+40, and 195+00 to 211+00.
3. For Cattle Guard Detail, see (104).
4. Adjust air valve offsets as needed and directed, to insure valve is outside of road right-of-way fence.

REV NO	DATE	DESCRIPTION
3	2009-02-25 FDCF-413 JED	OFFSET ALIGNMENT 5' NORTH FROM 83+45.18 TO 231+80.08 ADDED NOTE 4 ABOUT AIR VALVE OFFSET. REVISED TABLES VALUES. ADJUSTED VERTICAL GRADE AS NECESSARY TO MAINTAIN COVER.
2	2008-03-31 FDCF-410 JED	ADDED POWERLINE VOLTAGES.
1	2007-02-05 D L. BOWLES	CORRECTED ROW FENCE STATIONS ON PLAN AND IN NOTES.

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ANIMAS - LA PLATA PROJECT COLORADO - NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

FRUITLAND REACH

STATION 150+00 TO 200+00

PLAN, PROFILE AND DETAIL

DESIGNED L. S. BARNS CHECKED JESS E. BECKER

DRAWN S. S. SOOD/ SHOLISHA TECH. APPR. LINDA M. BOWLES, P.E.

APPROVED TEDD R. CALHOUN, P.E. LINDA M. BOWLES P.E.

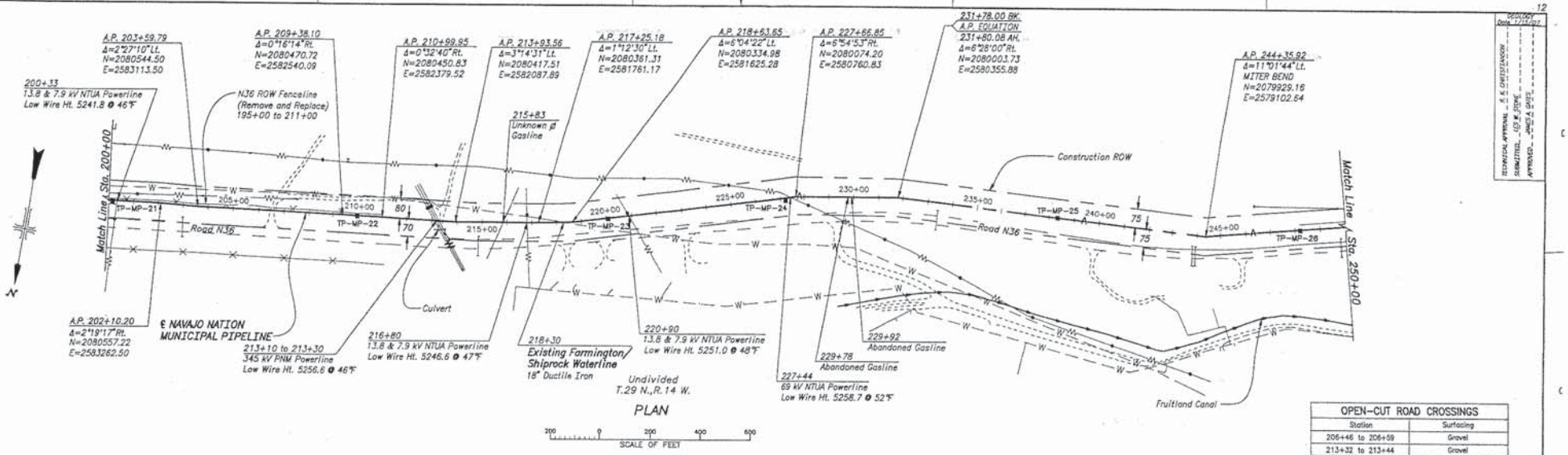
PEER REVIEWER - TEDD R. CALHOUN, P.E.

FARMINGTON, NEW MEXICO 2004-05-13 SHEET 1 OF 1

69-529-105

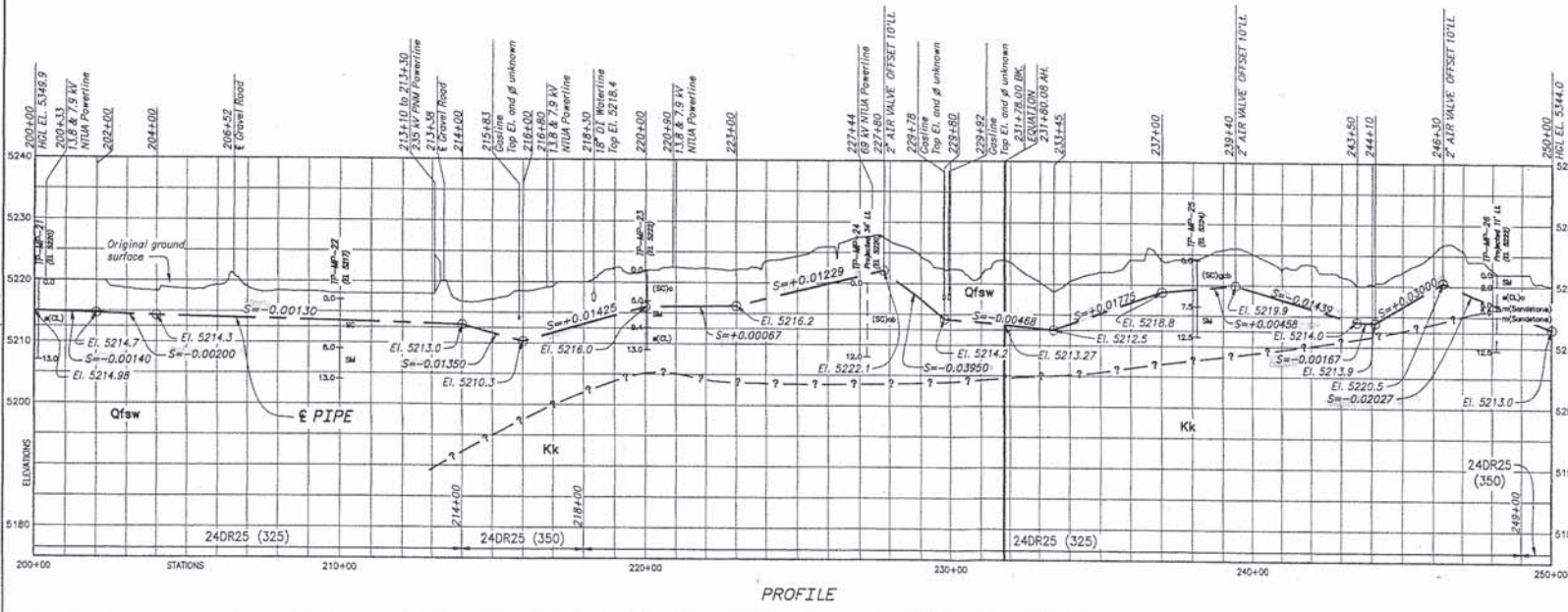
DATE AND TIME PLOTTED MARCH 4, 2009 15:18 BY JESSER
CAD SYSTEM AUTOCAD RELEASE 17.2s DRAWING NO. 69-529-105 REVISIONS

69-529-106



OPEN-CUT ROAD CROSSINGS	
Station	Surfacing
206+46 to 206+59	Gravel
213+32 to 213+44	Gravel

NOTE: Open cut roads require compacted backfill per specifications. See (169) for details.



NOTES

1. For General Notes, Abbreviations, Symbols and Pipe Classifications, see (102).
2. For construction limitations near gaslines, see specifications.
3. Adjust air valve offsets as needed and directed, to insure valve is outside of road right-of-way fence.

REV NO	DATE / BY	DESCRIPTION
5	2009-03-06 FCCF-413 JSD	REVISED EXISTING GROUND AND LOWERED VERTICAL GRADE FROM STATION 229+80 TO 237+00.
4	2009-02-26 FCCF-413 JSD	OFFSET ALIGNMENT 5' NORTH FROM 83+45.18 TO 231+80.08 ADDED NOTE 3 ABOUT AIR VALVE OFFSET. REVISED TABLE VALUES. ADJUSTED VERTICAL GRADE AS NECESSARY TO MAINTAIN COVER.
3	2008-06-16 FCCF-410 JSD	DELETED 249+50 CALLOUT ON PROFILE.

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BUREAU OF RECLAMATION

ANIMAS - LA PLATA PROJECT COLORADO - NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

FRUITLAND REACH

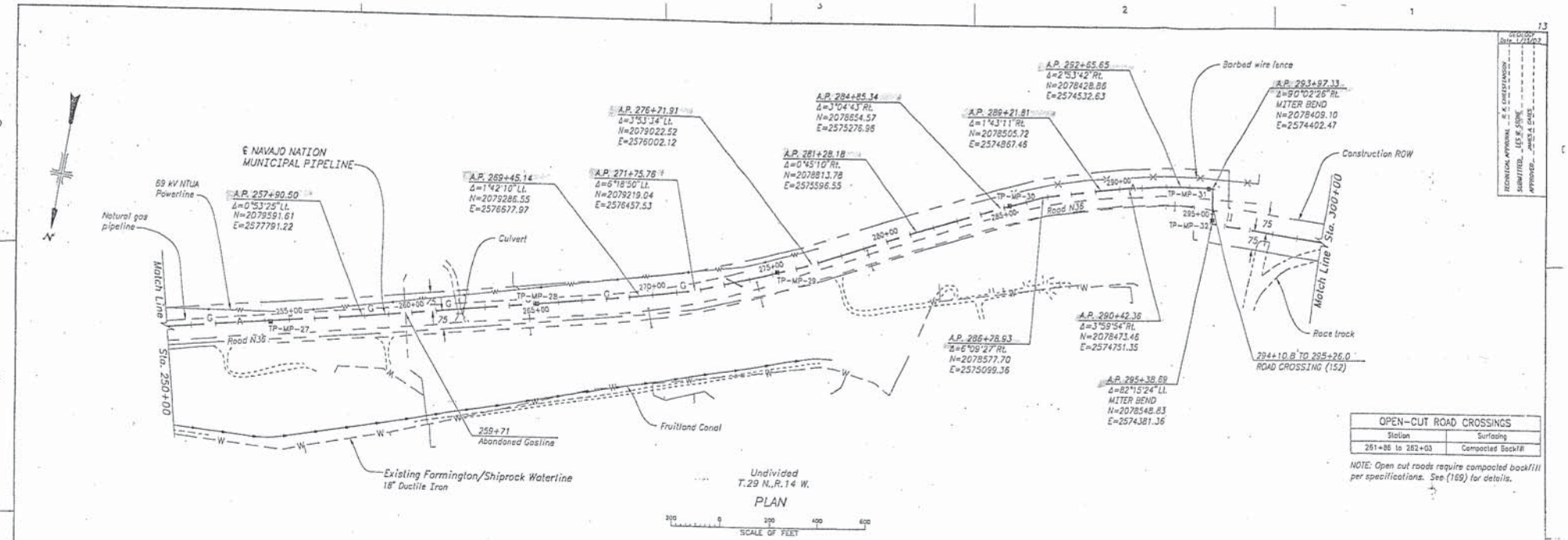
STATION 200+00 TO 250+00

PLAN AND PROFILE

DESIGNED — J. S. BARRS — CHECKED — JESS E. DEDRICK
DRAWN — D. S. SPOOR/ CHERLISA — TECH. APPR. — LINDA M. BOWLES, P.E.
APPROVED — TEDD R. CALHOUN, P.E. — LINDA M. BOWLES P.E.
PEER REVIEWER - TEDD R. CALHOUR, P.E.

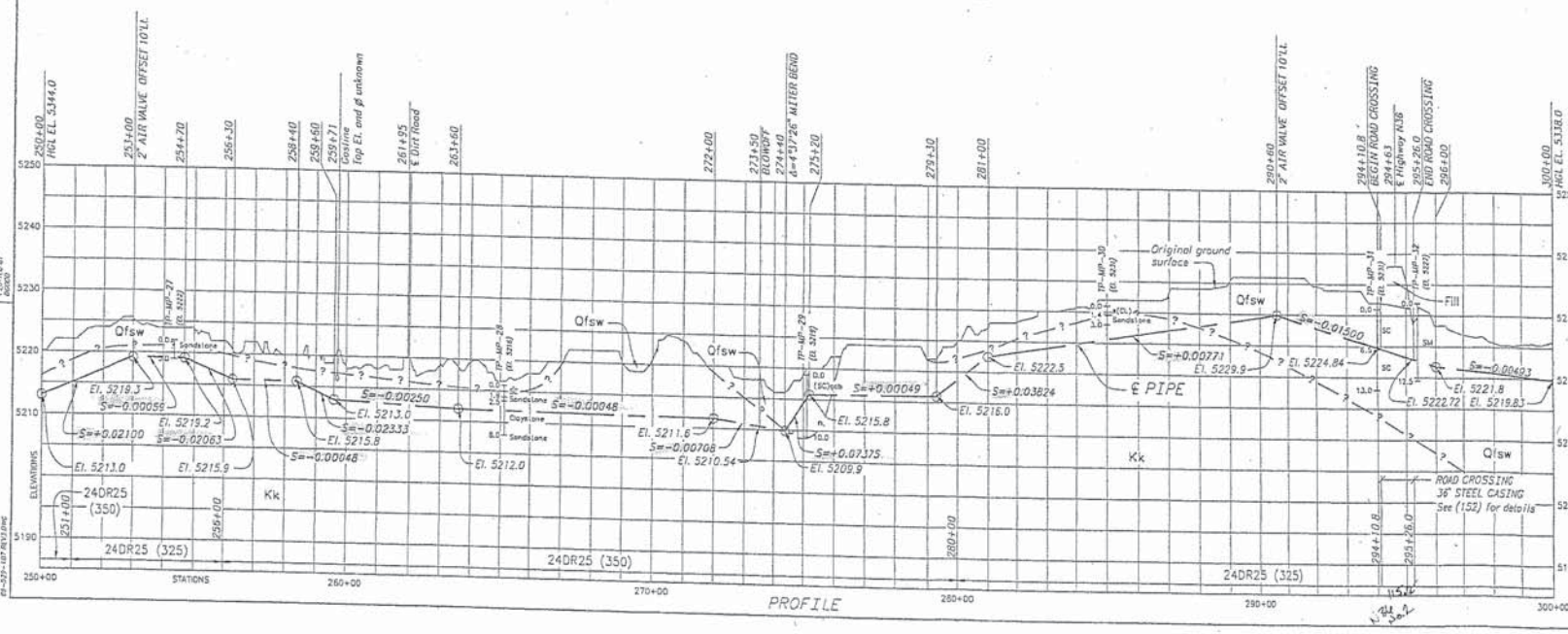
FARMINGTON, NEW MEXICO — 2004-10-13 — SHEET 1 OF 1

69-529-106



OPEN-CUT ROAD CROSSINGS	
Station	Surfacing
261+86 to 262+03	Compacted Backfill

NOTE: Open cut roads require compacted backfill per specifications. See (169) for details.



NOTES

1. For General Notes, Abbreviations, Symbols and Pipe Classifications, see (102).
2. For construction limitation near race track, see specifications.
3. For construction limitation near gaslines, see specifications.

REV NO		
3	2006-03-30 FCCF-412 DRO	CHANGED ROAD CROSSINGS TO SHOW STEEL CASING AND GIVER CHANGES ASSOCIATED WITH THE NEW ROAD CROSSING
REV NO 2	2003-04-01 FCCF-410 JED	ADDED VOLTAGE AND OWNER TO POWERLINE.
REV NO 1	2002-02-05 FCCF-410 JED	ADDED STEEL LINE PIPE CALLOUT TO ROAD CROSSING ON PROFILE.

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ANIMAS - LA PLATA PROJECT COLORADO - NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

FRUITLAND REACH

STATION 250+00 TO 300+00

PLAN AND PROFILE

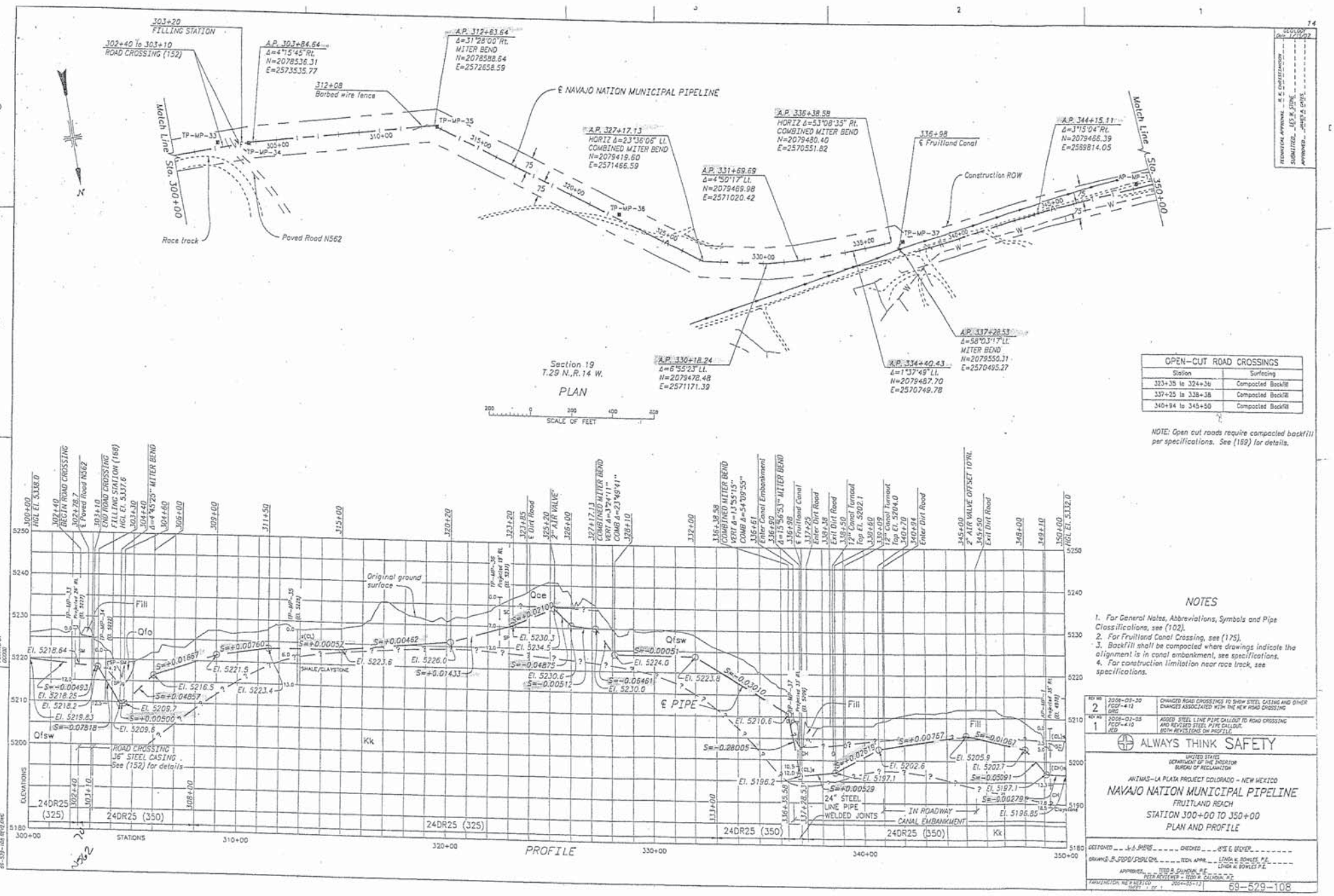
DESIGNED J.S. SIMPS CHECKED KYE L. BEEVER

DRAWN B. SEPDI/SIMPLOT TECH. APPR. LINDA M. BOWLES, P.E.

APPROVED TODD R. CALHOUN, P.E. PEER REVIEWED - TODD R. CALHOUN, P.E.

FARMINGTON, NEW MEXICO SHEET 1 OF 1 2004-03-11

69-529-107



OPEN-CUT ROAD CROSSINGS	
Station	Surfacing
323+35 to 324+36	Compacted Backfill
337+25 to 338+38	Compacted Backfill
340+94 to 345+50	Compacted Backfill

NOTE: Open cut roads require compacted backfill per specifications. See (169) for details.

NOTES

1. For General Notes, Abbreviations, Symbols and Pipe Classifications, see (102).
2. For Fruitland Canal Crossing, see (175).
3. Backfill shall be compacted where drawings indicate the alignment is in canal embankment, see specifications.
4. For construction limitation near race track, see specifications.

REV NO		
2	2008-07-30 PCCF-413 DRC	CHANGED ROAD CROSSINGS TO SHOW STEEL CASING AND OTHER CHANGES ASSOCIATED WITH THE NEW ROAD CROSSING
1	2008-02-05 PCCF-410 JED	ADDED STEEL LINE PIPE CALLOUT TO ROAD CROSSING AND REVISED STEEL PIPE CALLOUT. BOTH REVISIONS ON PROFILE

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BUREAU OF RECLAMATION

ANIMAS-LA PLATA PROJECT COLORADO - NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

FRUITLAND REACH

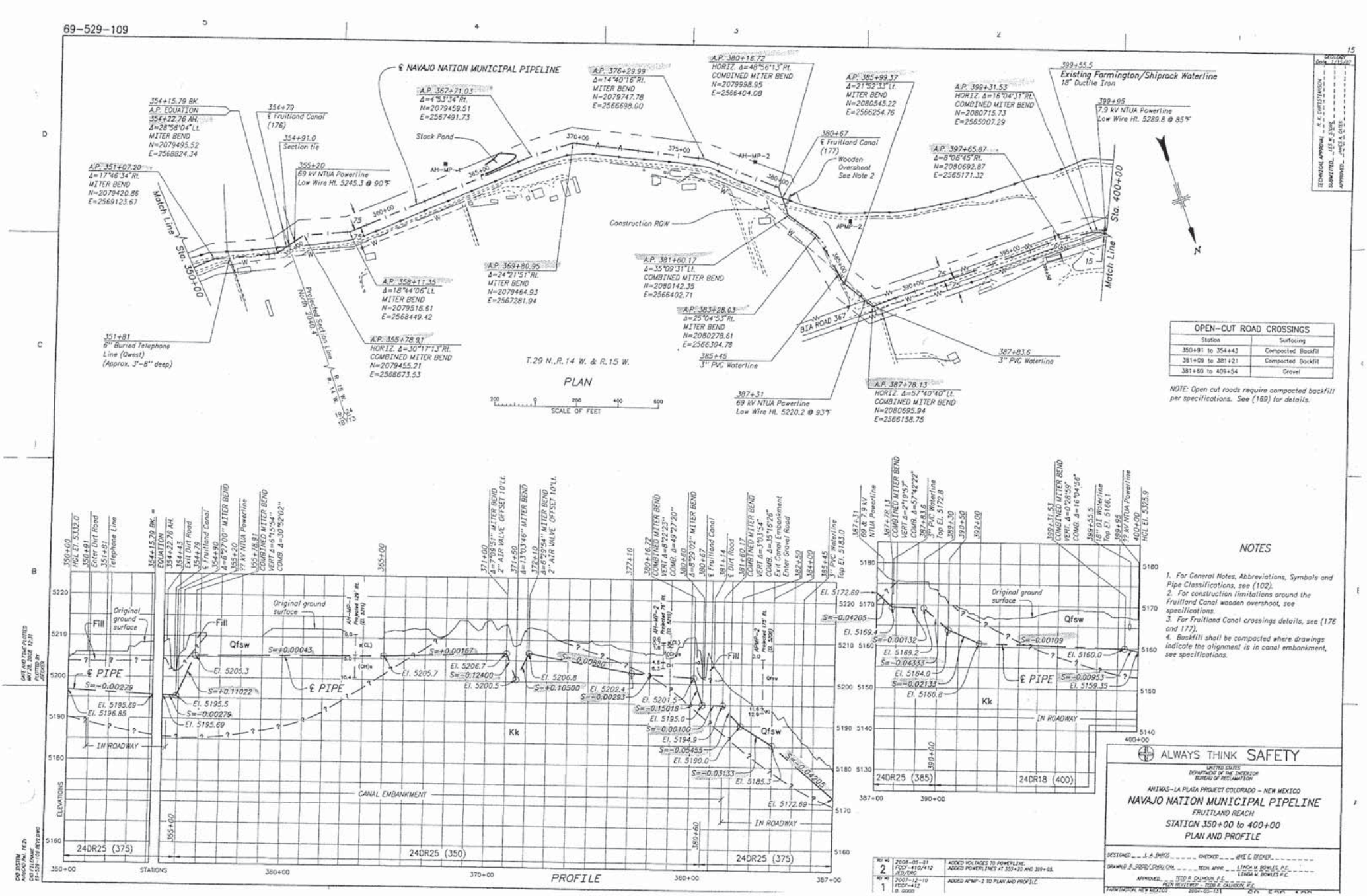
STATION 300+00 TO 350+00

PLAN AND PROFILE

DESIGNED - L.L. BARNES — CHECKED - GENE C. VALVERDE
DRAWN - B. FOOD/SPIDLE/CML — TECH. APPR. - LYNDA K. BOWLES, P.E.
APPROVED - TODD R. SALMONS, P.E.
PEER REVIEWED - TODD R. SALMONS, P.E.
TRANSMITTED, NEW MEXICO — 2004-05-13

69-529-108

69-529-109



OPEN-CUT ROAD CROSSINGS	
Station	Surfacing
350+91 to 354+43	Compacted Backfill
381+09 to 381+21	Compacted Backfill
381+60 to 409+54	Gravel

NOTE: Open cut roads require compacted backfill per specifications. See (169) for details.

NOTES

1. For General Notes, Abbreviations, Symbols and Pipe Classifications, see (102).
2. For construction limitations around the Fruitland Canal wooden overshoot, see specifications.
3. For Fruitland Canal crossings details, see (176 and 177).
4. Backfill shall be compacted where drawings indicate the alignment is in canal embankment, see specifications.

REV NO		
2	2008-05-21 FCCF-410/412 AEG/DBG	ADDED VOLTAGES TO POWERLINE. ADDED POWERLINES AT 355+20 AND 399+95.
1	2007-12-10 FCCF-412 D. GOOD	ADDED APMP-2 TO PLAN AND PROFILE.

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ANIMAS-LA PLATA PROJECT COLORADO - NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

FRUITLAND REACH

STATION 350+00 to 400+00

PLAN AND PROFILE

DESIGNED _ J. B. SMITH _ CHECKED _ JAMES L. DECKER

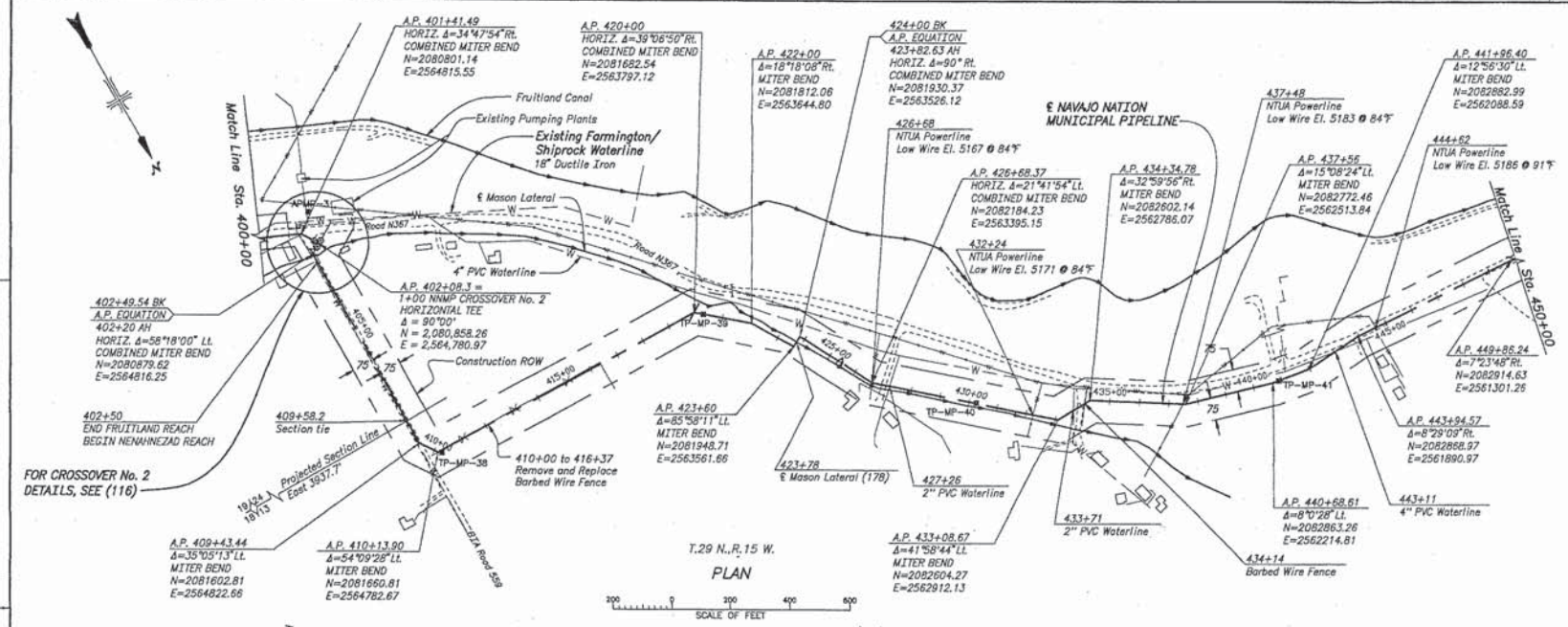
DRAWN B. SMITH/SMITH CPH _ TECH. APPR. _ LINDA M. BOWLES, P.E.

APPROVED _ TODD R. CALHOUN, P.E. _ PEER REVIEWER - TODD R. CALHOUN, P.E.

FARMINGTON, NEW MEXICO 2004-05-121

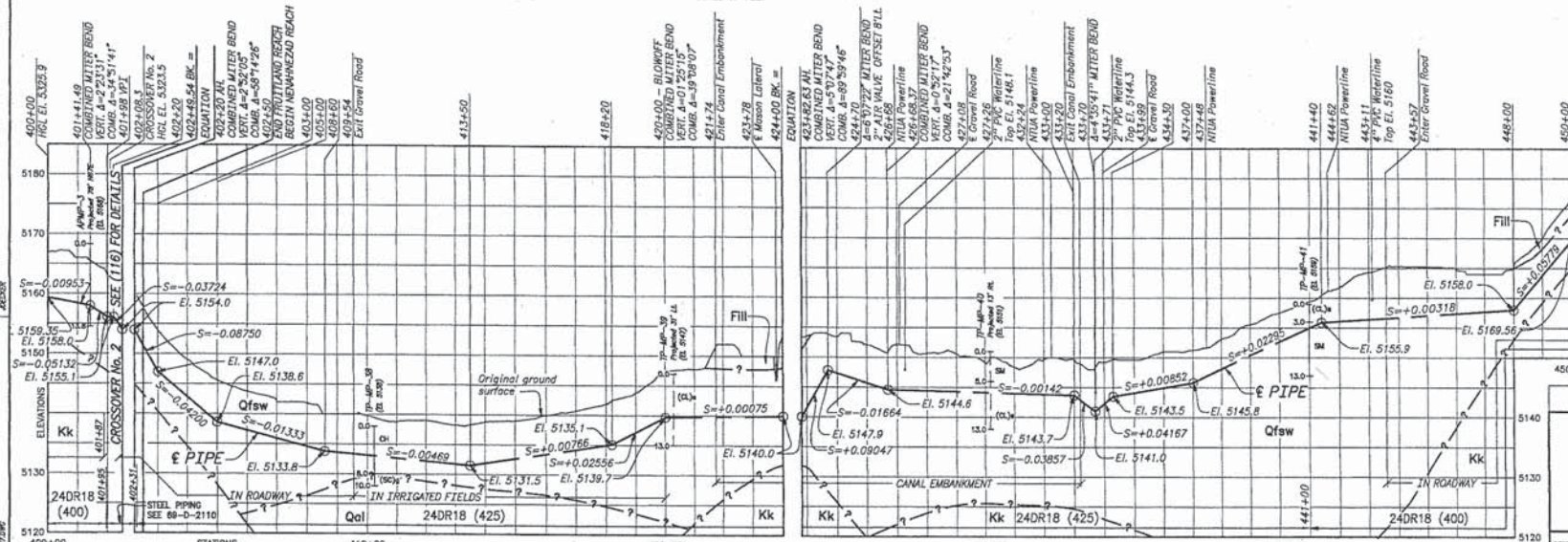
DATE AND TIME PLOTTED MAY 08, 2008 12:31 PLOTTED BY JACKSON

DGN SYSTEM ANACAD Rel. 16.2b DGN FILE NAME 69-529-109.DWG



OPEN-CUT ROAD CROSSINGS	
Station	Surfacing
381+60 to 401+87	Gravel
402+39 BK. to 409+54	Gravel
427+01 to 427+16	Gravel
433+85 to 434+12	Gravel
443+57 to 495+70	Gravel

NOTE: Open cut roads require compacted backfill per specifications. See (169) for details.



NOTES

1. For General Notes, Abbreviations, Symbols and Pipe Classifications, see (102).
2. For Mason Canal Lateral crossing details, see (178).
3. Backfill shall be compacted where the profile indicates the alignment is in canal embankment, see specifications.
4. Pipeline alignment is in irrigated fields from 409+54 to 420+00, except for road crossings, and backfill shall be compacted. See specification paragraphs.
5. VPI equals Vertical point of intersection at STA 401+98, See 69-D-2110 Section A-A.
6. ***If powerline voltage is not given, contractor is determine voltage and maintain required clearances. The contractor shall notify the COR of the powerline voltage two days befors work commences in the area.***

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BUREAU OF RECLAMATION

ANIMAS-LA PLATA PROJECT COLORADO - NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

FRUITLAND AND NENAHNEZAD REACHES

STATION 400+00 TO 450+00

PLAN AND PROFILE

REV NO	DATE	DESCRIPTION	REV NO	DATE	DESCRIPTION
7	2009-10-02 FCCF-413 JED	ADDED POWERLINES TO PLAN AND PROFILE. ADDED NOTE 6.	5	2008-05-01 FCCF-410 JED	DELETED POWERLINE AT STATION 400+62.
6	2009-05-29 FCCF-413 JED	MOVED BLOWOFF TO STATION 420+00. MOVED VPI FROM 419+70 TO 420+00. MADE MITER BEND AT 420+00 A COMBINED BEND.	4	2008-02-22 FCCF-410 JED	REVISED STEEL PIPING CALLOUT IN PROFILE. REVISED TRANSITION COUPLING LOCATION FROM 402+28 TO 402+31 TO MATCH DRAWING 69-D-2110.

DESIGNED L.A. DAVIS CHECKED JEFF S. DECKER
DRAWN D.B. GOOD/J.DIAZ QA TECH. APPR. LINDA M. BOWLES, P.E.
APPROVED TODD R. CALHOUN, P.E. PROJ. ENGINEER - TODD R. CALHOUN, P.E.

FARMINGTON, NEW MEXICO SHEET 1 OF 1 2004-05-11

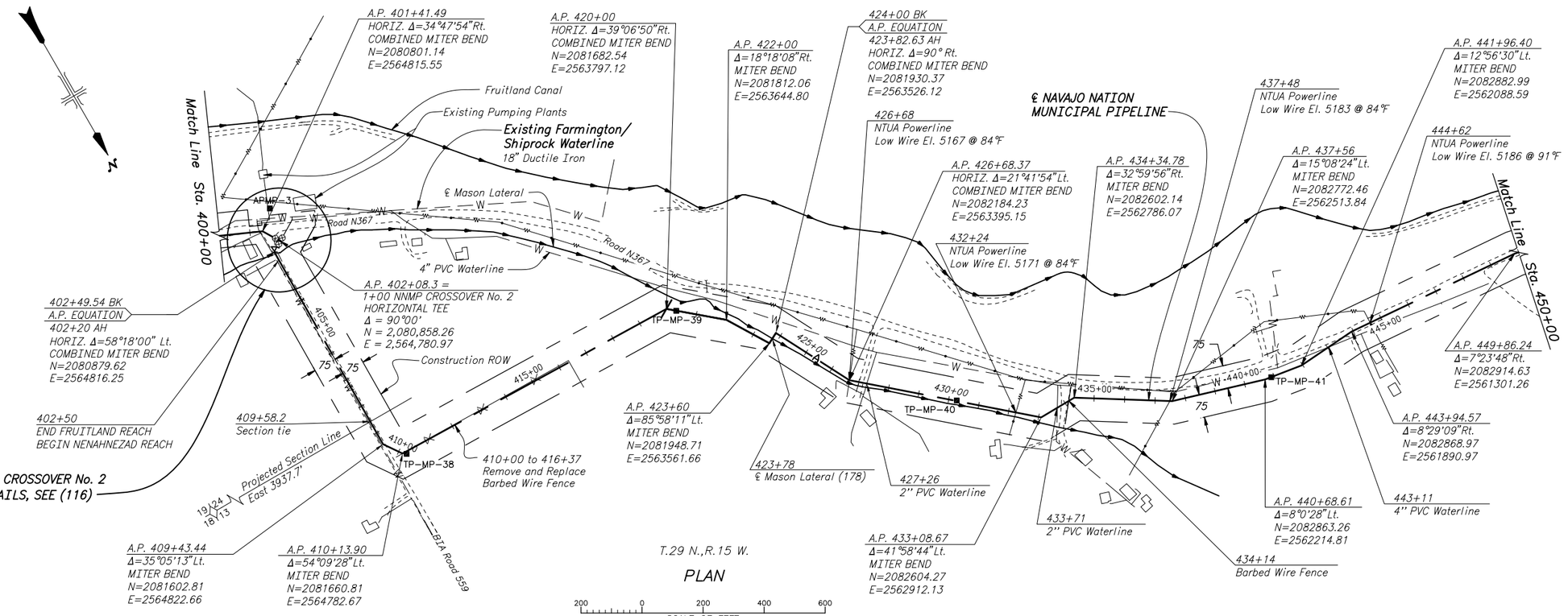
69-529-110

DATE AND TIME PLOTTED 2009/10/29 14:54
PLOTTED BY JDECKER

CAD SYSTEM MICROSTATION V8 17.2a
CAD FILENAME 69-529-110 REV7.DWG

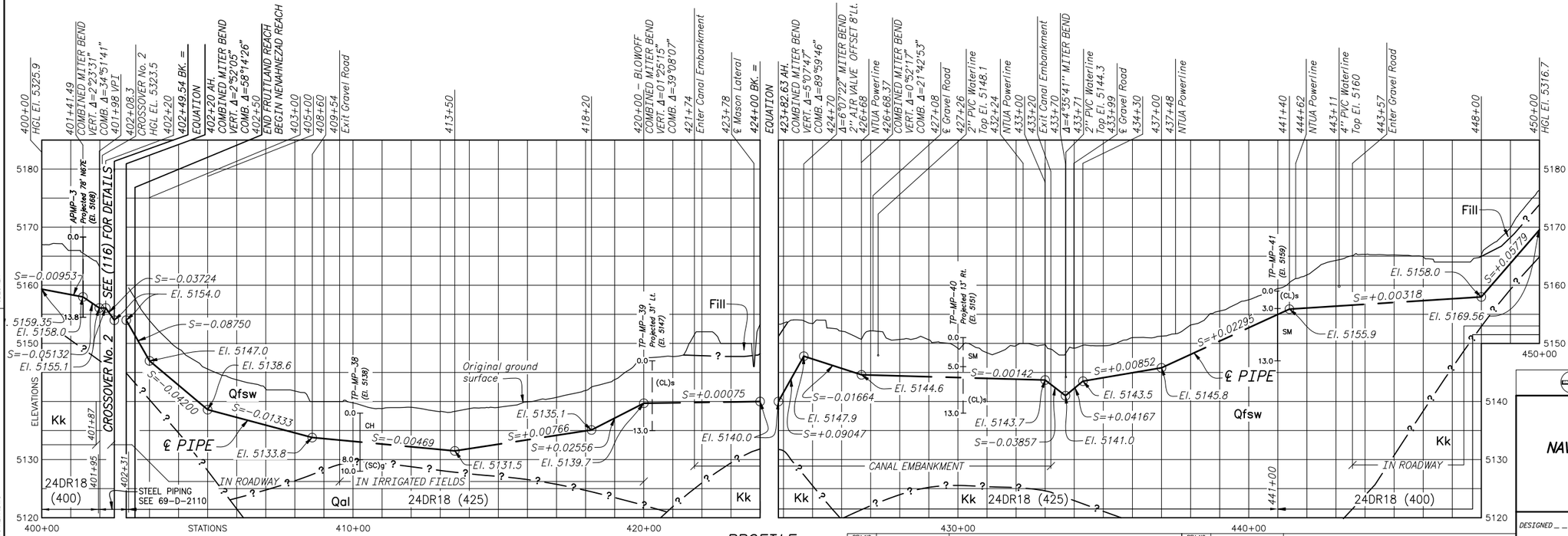
GEOLOGY Date 1/15/07

TECHNICAL APPROVAL _ R. K. CHRISTIANSON _ _ _
SUBMITTED _ LES W. STONE _ _ _
APPROVED _ JAMES A. GATES _ _ _



OPEN-CUT ROAD CROSSINGS	
Station	Surfacing
381+60 to 401+87	Gravel
402+39 BK. to 409+54	Gravel
427+01 to 427+16	Gravel
433+85 to 434+12	Gravel
443+57 to 495+70	Gravel

NOTE: Open cut roads require compacted backfill per specifications. See (169) for details.



NOTES

1. For General Notes, Abbreviations, Symbols and Pipe Classifications, see (102).
2. For Mason Canal Lateral crossing details, see (178).
3. Backfill shall be compacted where the profile indicates the alignment is in canal embankment, see specifications.
4. Pipeline alignment is in irrigated fields from 409+54 to 420+00, except for road crossings, and backfill shall be compacted. See specification paragraphs.
5. VPI equals Vertical point of intersection at STA 401+98, See 69-D-2110 Section A-A.

6. If powerline voltage is not given, contractor is determine voltage and maintain required clearances. The contractor shall notify the COR of the powerline voltage two days before work commences in the area.

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ANIMAS-LA PLATA PROJECT COLORADO - NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

FRUITLAND AND NENAHNEZAD REACHES

STATION 400+00 TO 450+00

PLAN AND PROFILE

DESIGNED _ L. A. BAROS _ CHECKED _ JAYE E. DECKER _
DRAWN _ D. R. GOOD/ CHOU CHA _ TECH. APPR. _ LINDA M. BOWLES, P.E. / LINDA M. BOWLES P.E.
APPROVED _ TEDD R. CALHOUN, P.E. _
PEER REVIEWER - TEDD R. CALHOUN, P.E.

FARMINGTON, NEW MEXICO 2004-05-13
SHEET 1 OF 1

69-529-110

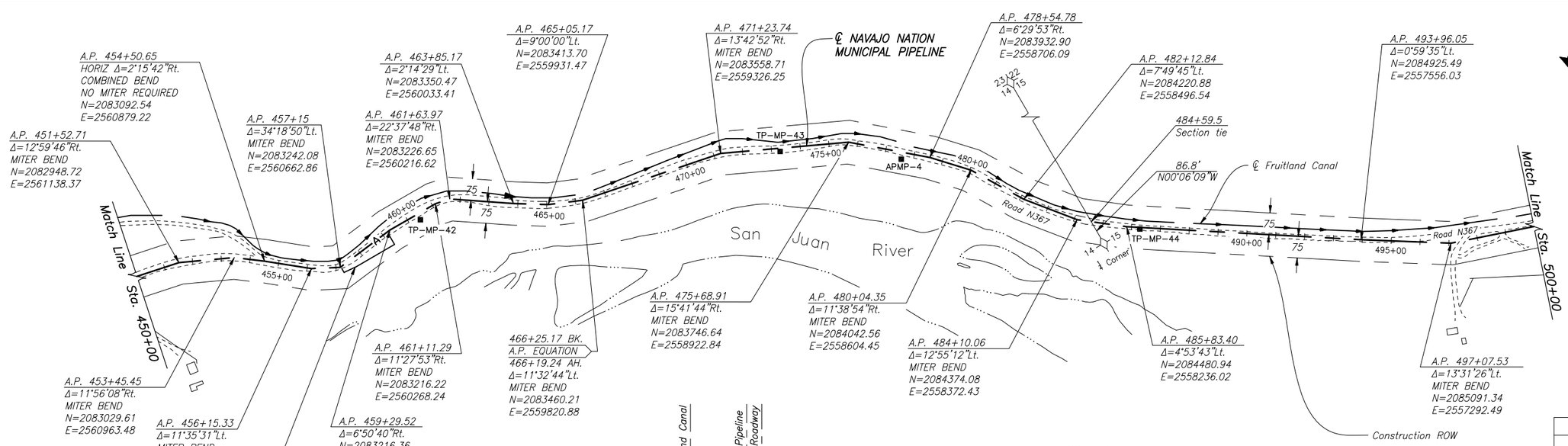
REV NO		
7	2009-10-02 FCCF-413 JED	ADDED POWERLINES TO PLAN AND PROFILE. ADDED NOTE 6.
6	2009-05-29 FCCF-413 JED	MOVED BLOWOFF TO STATION 420+00. MOVED VP1 FROM 419+70 TO 420+00. MADE MITER BEND AT 420+00 A COMBINED BEND.
5	2008-05-01 FCCF-410 JED	DELETED POWERLINE AT STATION 400+92.
4	2008-02-22 FCCF-410 JED	REVISED STEEL PIPING CALLOUT IN PROFILE. REVISED TRANSITION COUPLING LOCATION FROM 402+28 TO 402+31 TO MATCH DRAWING 69-D-2110.

DATE AND TIME PLOTTED
OCTOBER 6, 2010 15:09
PLOTTED BY
JDECKER

CAD SYSTEM
AutoCAD Rel. 17.2s
CAD FILENAME
16 69-529-110 REV7.DWG

GEOLOGY
Date 1/15/07

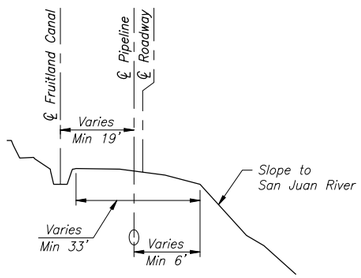
TECHNICAL APPROVAL — R. K. CHRISTIANSON
SUBMITTED — LES W. STONE
APPROVED — JAMES A. DAVES



T.29 N.,R.15 W.

PLAN

200 0 200 400 600
SCALE OF FEET



TYPICAL SECTION

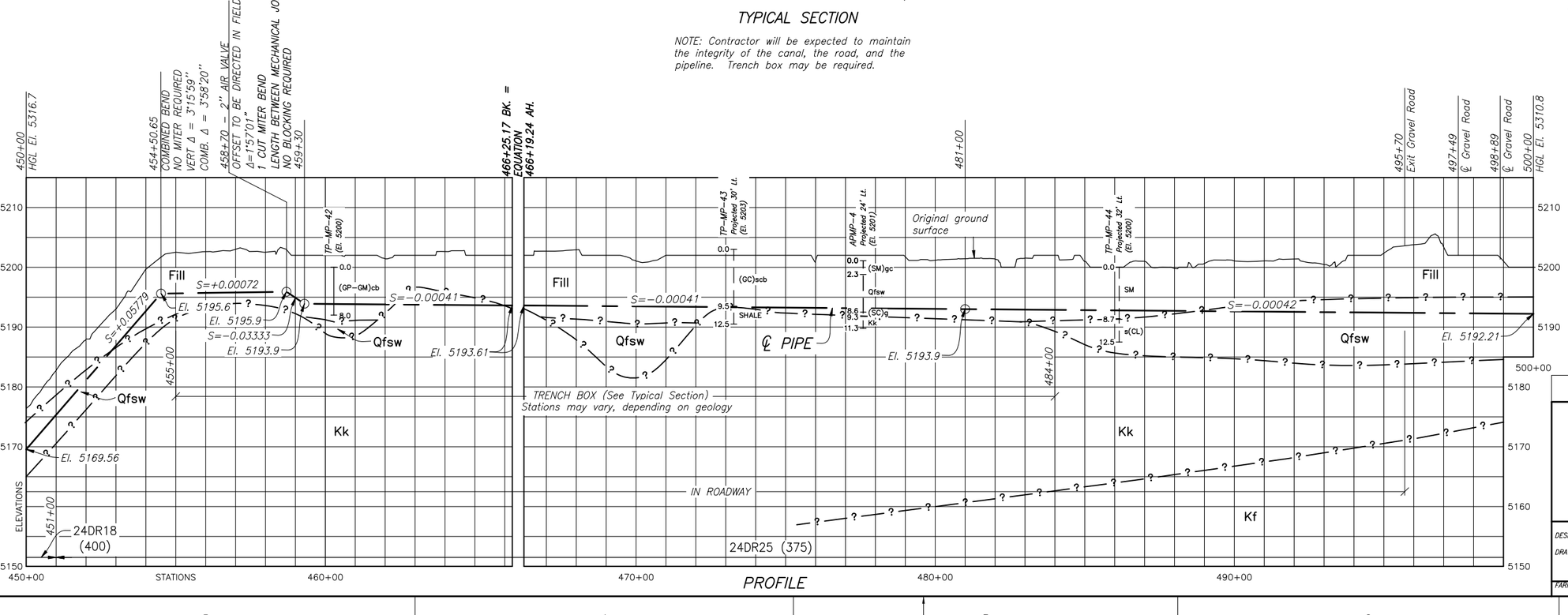
NOTE: Contractor will be expected to maintain the integrity of the canal, the road, and the pipeline. Trench box may be required.

OPEN-CUT ROAD CROSSINGS	
Station	Surfacing
443+57 to 495+70	Gravel
497+36 to 497+60	Gravel
498+78 to 498+98	Gravel

NOTE: Open cut roads require compacted backfill per specifications. See (169) for details.

NOTES

1. For General Notes, Abbreviations, Symbols and Pipe Classifications, see (102).
2. Special Access Area – Contractor shall have a Government assigned archeologist present during construction.



REV NO		
5	2010-08-12 FCF-233 JED	REVISED HORZ. ALIGN., STA. 456+15.33 TO STATION 471+23.74 ADDED TP-MP-43 AT STATION 466+19.24 AH. ADDED VPI AT STATION 481+00 TO MAKE MINOR ADJUSTMENT.
4	2009-08-26 FCF-413 JED	ADDED "NO MITER REQUIRED" ON PLAN AND PROFILE AT STATION 454+50.65.
3	2009-06-23 FCF-413 JED	MADE VPI AT 458+70 A MITER BEND TO MATCH DRAWING 69-529-156.

DATE AND TIME PLOTTED: OCTOBER 6, 2010 15:15
PLOTTED BY: JDECKER

CAD SYSTEM: AutoCAD Rel. 17.2s
CAD FILENAME: 17 69-529-111 REVS.DWG

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ANIMAS-LA PLATA PROJECT COLORADO – NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

NENAHNEZAD REACH

STATION 450+00 TO 500+00

PLAN AND PROFILE, AND SECTION

DESIGNED L. A. BAROS CHECKED JAYE E. DECKER
DRAWN R. GOOD/ CHOU CHA TECH. APPR. LINDA M. BOWLES, P.E.
APPROVED TEDD R. CALHOUN, P.E. LINDA M. BOWLES P.E.
PEER REVIEWER – TEDD R. CALHOUN, P.E.

FARMINGTON, NEW MEXICO 2004-05-13
SHEET 1 OF 1

69-529-111

GEOLOGY
Date 1/15/07
TECHNICAL APPROVAL — R. K. CHRISTIANSON
SUBMITTED — LES. W. STONE
APPROVED — JAMES A. CATES

A.P. 503+33.24
Δ=15°30'22"Rt.
MITER BEND
N=2085291.46
E=2556699.85

503+70 to 504+50
ROAD CROSSING (153)

Existing Farmington/Shiprock Waterline
18" Ductile Iron

℄ NAVAJO NATION MUNICIPAL PIPELINE

507+41
2" PVC Waterline

500+18
NTUA Powerline
Low Wire El. 5230 @ 82°F

A.P. 511+17.22
Δ=30°52'37"Lt.
MITER BEND
N=2085731.59
E=2556051.36

511+84
4" AC Waterline
see Note 2

A.P. 521+30
HORIZ. Δ=13°38'43"Lt.
COMBINED MITER BEND
N=2085789.63
E=2555040.56

A.P. 523+68.12
Δ=15°44'44"Rt.
MITER BEND
N=2085767.45
E=2554804.22

A.P. 526+30.96
Δ=6°53'50"Rt.
N=2085856.25
E=2554558.16

528+21 NTUA Powerline
Low Wire El. 5216± @ 82°F

532+22
CMP Culvert

532+16
Gasline

A.P. 533+97.39
Δ=16°24'57"Rt.
MITER BEND
N=2086194.56
E=2553873.92

Road N36

A.P. 535+12.43
Δ=6°37'06"Rt.
N=2086265.77
E=2553783.60

A.P. 537+63.80
Δ=3°56'53"Lt.
N=2086436.54
E=2553599.51

A.P. 539+28.76
Δ=24°42'44"Lt.
MITER BEND
N=2086534.58
E=2553466.91

A.P. 540+82.50
Δ=6°27'38"Lt.
N=2086565.92
E=2553316.45

A.P. 543+24.80
Δ=32°11'08"Rt.
MITER BEND
N=2086588.32
E=2553075.25

543+60.20 BK
EQUATION
543+52.23 AH

546+80 to 547+40
ROAD CROSSING (153)

549+24 and 549+68
Gaslines

Match Line Sta. 500+00

TP-MP-45

TP-MP-46

TP-MP-47

TP-MP-48

TP-MP-49

502+43
NTUA Powerline
Low Wire El. 5224 @ 75°F

503+15
48" CMP Culvert

Construction ROW

Road N365

524+85
Waterline

A.P. 524+91.87
Δ=10°49'33"Rt.
MITER BEND
N=2085797.62
E=2554684.24

A.P. 522+31.80
Δ=8°43'36"Rt.
N=2085771.32
E=2554940.44

Nenahnezad BIA
School Complex

Chain Link Fence

527+85
NTUA Powerline
Low Wire El. 5216 @ 82°F

A.P. 529+73.97
Δ=10°00'00"Lt.
N=2086037.12
E=2554266.85

A.P. 536+49.50
Δ=4°26'40"Lt.
N=2086362.44
E=2553686.49

NO CONSTRUCTION ACTIVITY INSIDE OF FENCES

543+55 BK
FILLING STATION

543+58.5 AH
2" DATA LINE

546+89
3" PVC Waterline

546+96
NTUA Powerline
Low Wire El. 5201 @ 86°F

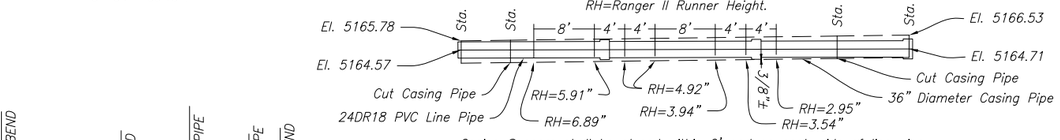
Paved Road

A.P. 548+33.56
Δ=6°50'50"Rt.
N=2086902.72
E=2552665.38

Match Line Sta. 550+00

CR 6675 DETAIL

Casing Slope=+0.01269
Pipe Slope=+0.00237
RH=Ranger II Runner Height.



Casing Spacers shall be placed within 2' and on each side of line pipe joints.

Detail shown as an example. Contractor shall determine which spacers are actually needed to maintain grade shown.

Undivided
T.29 N.,R.15 W.
PLAN
SCALE OF FEET
200 0 200 400 600

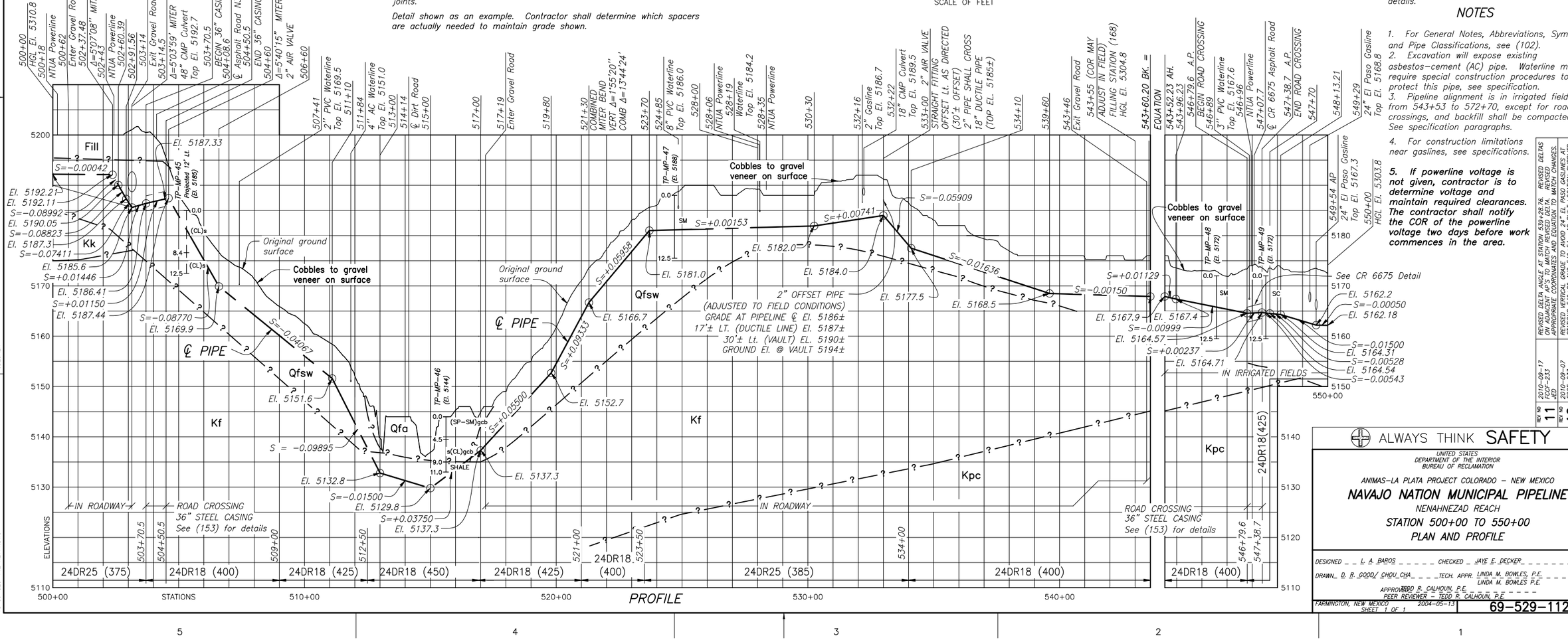
OPEN CUT ROAD CROSSINGS	
Station	Surfacing
500+62 to 503+14	Gravel
513+99 to 514+26	Compacted Backfill
517+19 to 543+46	Gravel

NOTE: Open cut roads require compacted backfill per specifications. See (169) for details.

NOTES

1. For General Notes, Abbreviations, Symbols and Pipe Classifications, see (102).
2. Excavation will expose existing asbestos-cement (AC) pipe. Waterline may require special construction procedures to protect this pipe, see specification.
3. Pipeline alignment is in irrigated fields from 543+53 to 572+70, except for road crossings, and backfill shall be compacted. See specification paragraphs.
4. For construction limitations near gaslines, see specifications.

5. If powerline voltage is not given, contractor is to determine voltage and maintain required clearances. The contractor shall notify the COR of the powerline voltage two days before work commences in the area.



REV NO	DATE	DESCRIPTION
11	2010-09-17 FCF-233 JED	REVISED DELTA ANGLE AT STATION 539+28.76. REVISED ALIGNMENT AND PROFILE TO MATCH CHANGES. APPROPRIATE COORDINATES AND EQUATION TO MATCH CHANGES.
10	2010-09-07 FCF-233 JED	REVISED VERTICAL GRADE TO AVOID 24" EL PASO GASLINES AT STATIONS 549+29 AND 549+54. AS BUILT LOCATION SUPPLIED BY CONTRACTOR.
9	2010-08-30 FCF-233 JED	REVISED HORIZONTAL AND VERTICAL ALIGNMENT STATION 521+30. TO 543+46 TO AVOID CONTRACTOR AS-BUILTS OF UTILITIES. REVISED ALL UTILITIES TO CONTRACTOR AS-BUILTS. MOVED EQ.

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ANIMAS-LA PLATA PROJECT COLORADO - NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

NENAHNEZAD REACH

STATION 500+00 TO 550+00

PLAN AND PROFILE

DESIGNED L. A. BARROS CHECKED JAYE E. DECKER
DRAWN D. R. GOOD/ CHOU CHA TECH. APPR. LINDA M. BOWLES, P.E.
APPROVED TEDD R. CALHOUN, P.E. LINDA M. BOWLES P.E.
PEER REVIEWER - TEDD R. CALHOUN, P.E.

FARMINGTON, NEW MEXICO 2004-05-13
SHEET 1 OF 1

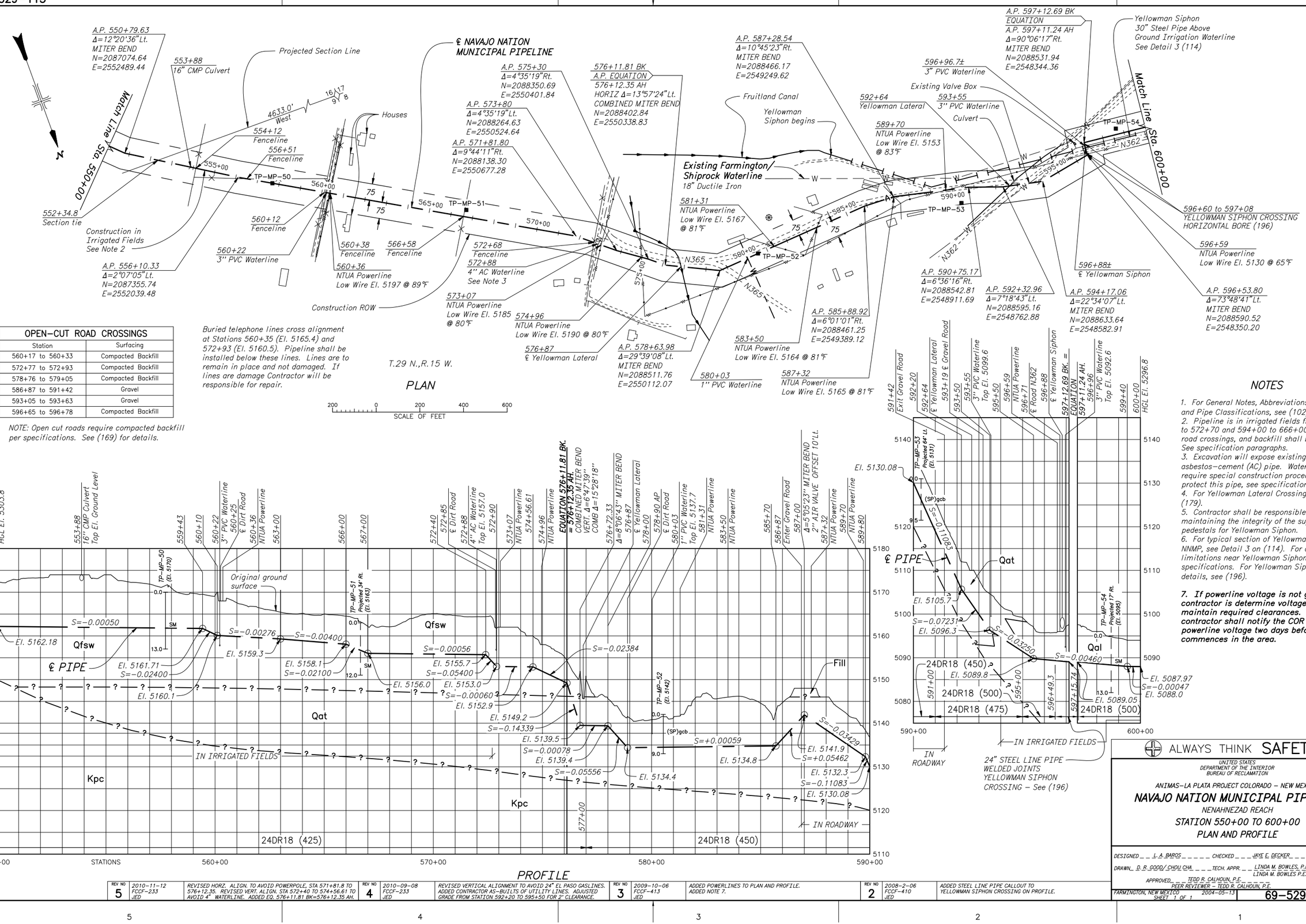
69-529-112

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JDECKER

CAD SYSTEM
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CAD FILENAME
18 69-529-112 REV11.DWG

GEOLOGY Date 1/15/07

TECHNICAL APPROVAL — R. K. CHRISTIANSON —
SUBMITTED — LES W. STONE —
APPROVED — JAMES A. GILES —



OPEN-CUT ROAD CROSSINGS	
Station	Surfacing
560+17 to 560+33	Compacted Backfill
572+77 to 572+93	Compacted Backfill
578+76 to 579+05	Compacted Backfill
586+87 to 591+42	Gravel
593+05 to 593+63	Gravel
596+65 to 596+78	Compacted Backfill

NOTE: Open cut roads require compacted backfill per specifications. See (169) for details.

PROFILE

NOTES

1. For General Notes, Abbreviations, Symbols and Pipe Classifications, see (102).
2. Pipeline is in irrigated fields from 543+53 to 572+70 and 594+00 to 666+00, except for road crossings, and backfill shall be compacted. See specification paragraphs.
3. Excavation will expose existing asbestos-cement (AC) pipe. Waterline may require special construction procedures to protect this pipe, see specification.
4. For Yellowman Lateral Crossing details, see (179).
5. Contractor shall be responsible for maintaining the integrity of the support pedestals for Yellowman Siphon.
6. For typical section of Yellowman Siphon and NNMP, see Detail 3 on (114). For construction limitations near Yellowman Siphon, see specifications. For Yellowman Siphon Crossing details, see (196).

7. If powerline voltage is not given, contractor is determine voltage and maintain required clearances. The contractor shall notify the COR of the powerline voltage two days before work commences in the area.

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ANIMAS-LA PLATA PROJECT COLORADO - NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

NENAHNEZAD REACH

STATION 550+00 TO 600+00

PLAN AND PROFILE

DESIGNED L. A. BAROS CHECKED JAYE E. DECKER
DRAWN D. R. GOOD/CHOU CHA TECH. APPR. LINDA M. BOWLES, P.E.
LINDA M. BOWLES P.E.
APPROVED TEDD R. CALHOUN, P.E.
PEER REVIEWER - TEDD R. CALHOUN, P.E.

FARMINGTON, NEW MEXICO 2004-05-13
SHEET 1 OF 1

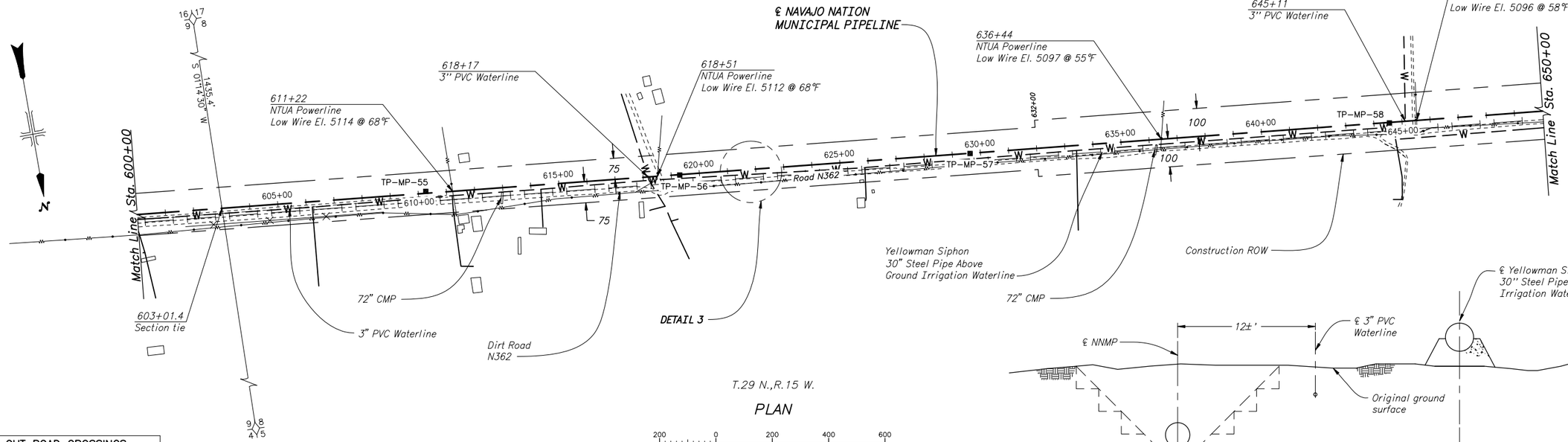
69-529-113

REV NO			REV NO			REV NO			REV NO		
5	2010-11-12 FCCF-233 JED	REVISED HORZ. ALIGN. TO AVOID POWERPOLE, STA 571+81.8 TO 576+12.35. REVISED VERT. ALIGN. STA 572+40 TO 574+56.61 TO AVOID 4" WATERLINE. ADDED EQ. 576+11.81 BK=576+12.35 AH.	4	2010-09-08 FCCF-233 JED	REVISED VERTICAL ALIGNMENT TO AVOID 24" EL PASO GASLINES. ADDED CONTRACTOR AS-BUILTS OF UTILITY LINES. ADJUSTED GRADE FROM STATION 592+20 TO 595+50 FOR 2' CLEARANCE.	3	2009-10-06 FCCF-413 JED	ADDED POWERLINES TO PLAN AND PROFILE. ADDED NOTE 7.	2	2008-2-06 FCCF-410 JED	ADDED STEEL LINE PIPE CALLOUT TO YELLOWMAN SIPHON CROSSING ON PROFILE.

DATE AND TIME PLOTTED
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CAD SYSTEM
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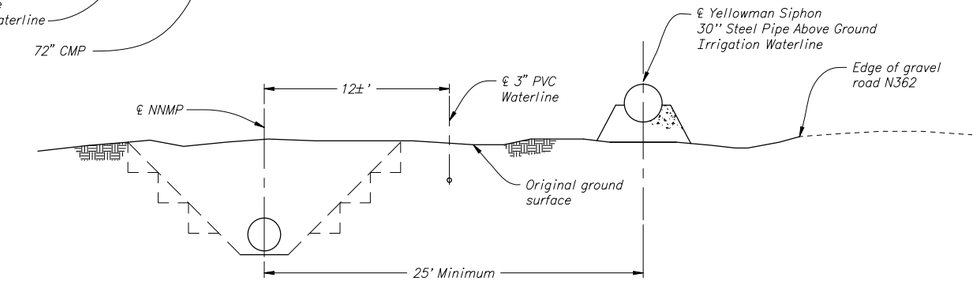
GEOLOGY Date 1/15/07
TECHNICAL APPROVAL — R. K. CHRISTIANSON
SUBMITTED — LES W. STONE
APPROVED — JAMES S. GATES



T.29 N.,R.15 W.

PLAN

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SCALE OF FEET

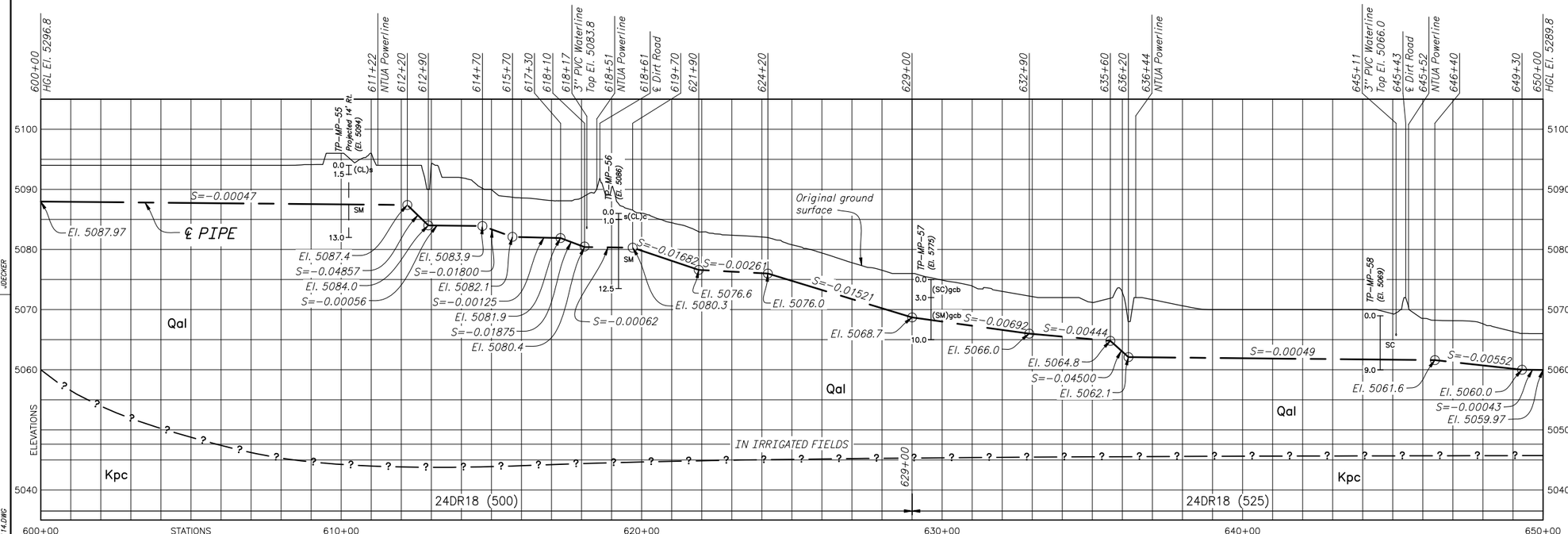


DETAIL 3

Typical Section, 597+10 to 670+00

OPEN-CUT ROAD CROSSINGS	
Station	Surfacing
618+55 to 618+66	Compacted Backfill
645+38 to 645+48	Compacted Backfill

NOTE: Open cut roads require compacted backfill per specifications. See (169) for details.



PROFILE

NOTES

1. For General Notes, Abbreviations, Symbols and Pipe Classifications, see (102).
2. For construction limitations near Yellowman Siphon, see specifications.
3. Pipeline alignment is in irrigated fields from 594+00 to 666+00, except for road crossings, and backfill shall be compacted. See specification paragraphs.
4. **If powerline voltage is not given, contractor is to determine voltage and maintain required clearances. The contractor shall notify the COR of the powerline voltage two days before work commences in the area.**

REV NO		
2	2009-10-07 fccf-413 JED	ADDED POWERLINES TO PLAN AND PROFILE. ADDED NOTE 4.
1	2007-12-10 FCCF-412 D. GOOD	CHANGED FOUNDATION ROCK TYPE ON PROFILE.

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BUREAU OF RECLAMATION

ANIMAS-LA PLATA PROJECT COLORADO - NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

NENAHNEZAD REACH

STATION 600+00 to 650+00

PLAN, PROFILE, AND DETAIL

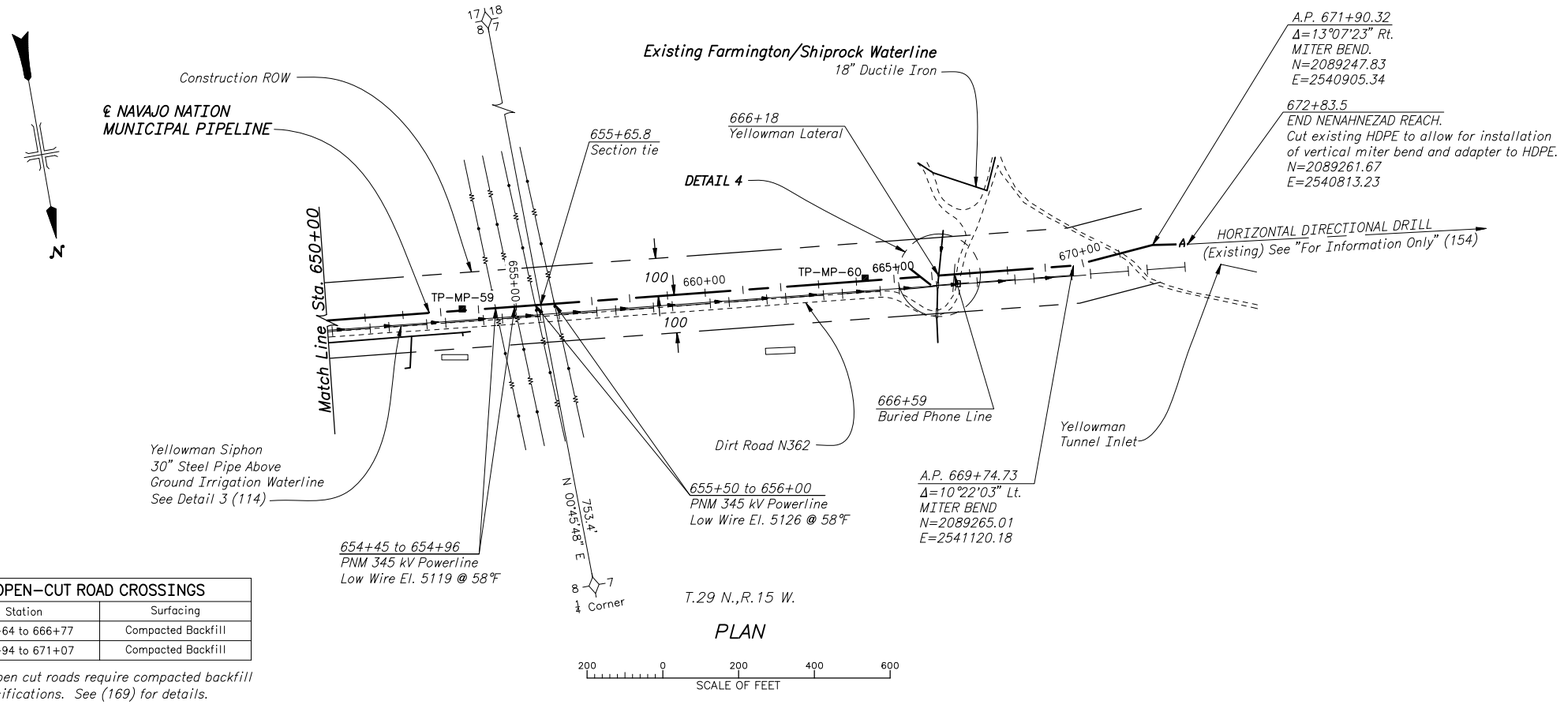
DESIGNED L. A. BAROS CHECKED JAYE E. DECKER
DRAWN D. R. GOOD/ CHOU CHA TECH. APPR. LINDA M. BOWLES, P.E.
APPROVED TEDD R. CALHOUN, P.E. LINDA M. BOWLES P.E.
PEER REVIEWER - TEDD R. CALHOUN, P.E.

FARMINGTON, NEW MEXICO 2004-05-13
SHEET 1 OF 1

69-529-114

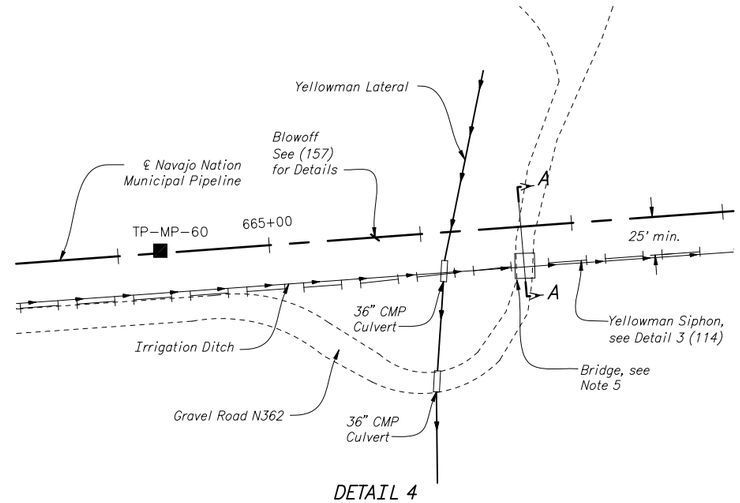
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JDECKER

CAD SYSTEM
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CAD FILENAME
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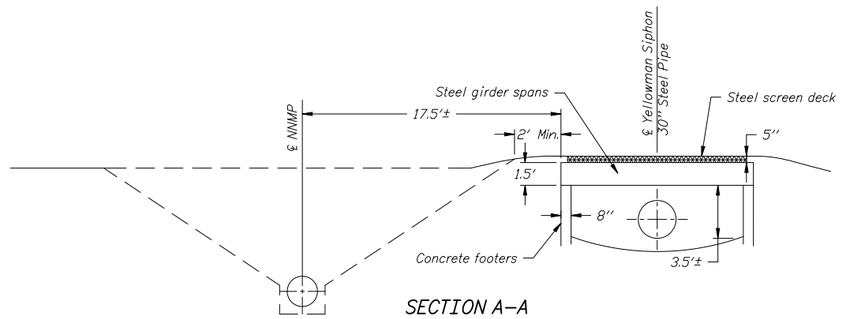


OPEN-CUT ROAD CROSSINGS	
Station	Surfacing
666+64 to 666+77	Compacted Backfill
670+94 to 671+07	Compacted Backfill

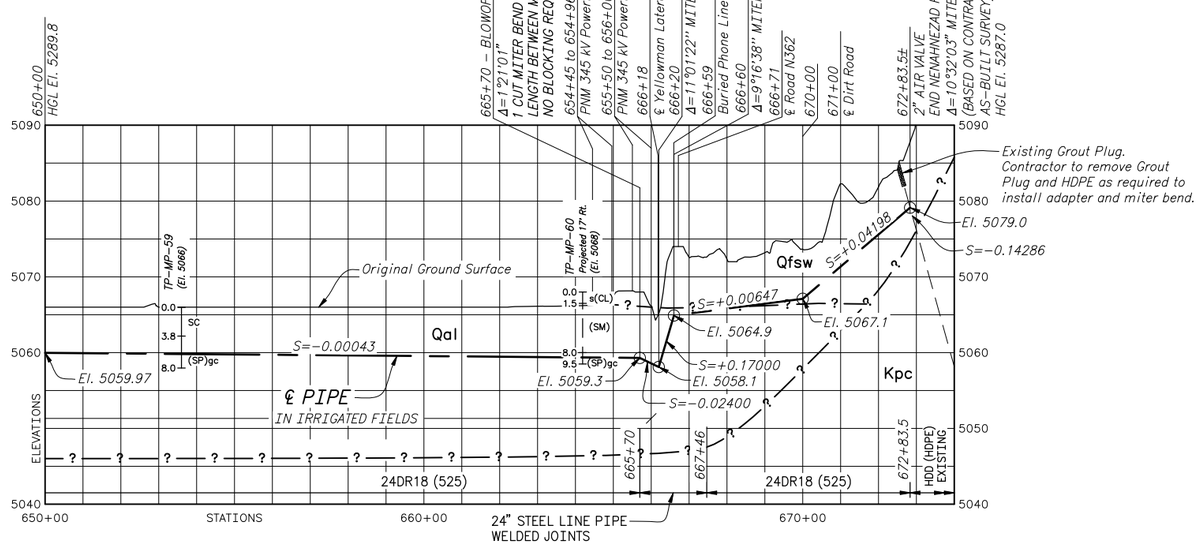
NOTE: Open cut roads require compacted backfill per specifications. See (169) for details.



DETAIL 4



SECTION A-A



PROFILE

NOTES

1. For General Notes, Abbreviations, Symbols and Pipe Classifications, see (102).
2. Adjustment based on Contractor As-Built Surveys. Pulling of joints may be required for minor adjustments.
3. For Yellowman Lateral crossing details, see (180).
4. For construction limitations near Yellowman Siphon, see specifications.
5. Weight limitation on the bridge is unknown. Contact the owner before crossing the bridge.
6. Pipeline alignment is in irrigated fields from 594+00 to 666+00, except for road crossings, and backfill shall be compacted. See specification paragraphs.

REV NO		
8	2010-07-19 FCCF-233 JED	ADJUSTED HORIZONTAL AND VERTICAL ALINGMENTS TO MATCH AS-BUILT SURVEY OF HDD. CHANGED NOTE 2 AND REMOVED ± FROM STATIONS AND ELEVATIONS
7	2009-10-07 FCCF-413 JED	ADDED POWERLINES TO PLAN AND PROFILE.
6	2009-05-29 FCCF-413 JED	MOVED VPI FROM STA. 665+60 TO 665+70 & ADJUSTED GRADES. ADDED MITER BEND AT STATION 665+70. REVISED Δ ON MITER BEND AT STATION 666+20.
5	2009-03-20 FCCF-413 JED	CHANGED END STATION FOR 24DR18 PIPE.

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GEOLOGY
Date 1/15/07
TECHNICAL APPROVAL _ R. K. CHRISTIANSON
SUBMITTED _ LES W. STONE
APPROVED _ JAMES A. GATES

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

ANIMAS-LA PLATA PROJECT COLORADO - NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

NENAHNEZAD REACH

STATION 650+00 TO 672+83.5

PLAN, PROFILE, DETAIL, AND SECTION

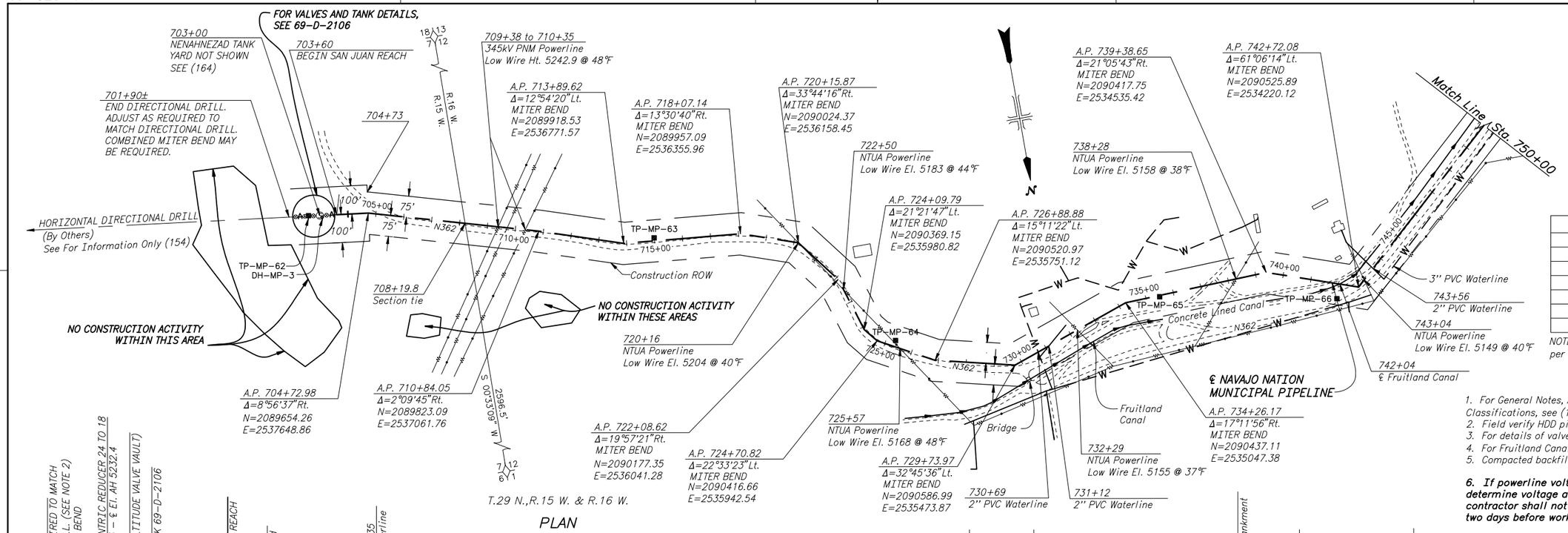
DESIGNED _ L. A. BAROS _ CHECKED _ JAYE E. DECKER
DRAWN _ D. R. GOOD/ CHOU CHA _ TECH. APPR. _ LINDA M. BOWLES, P.E.
LINDA M. BOWLES P.E.
APPROVED _ TEDD R. CALHOUN, P.E.
PEER REVIEWER - TEDD R. CALHOUN, P.E.

FARMINGTON, NEW MEXICO 2004-05-13
SHEET 1 OF 1

69-529-115

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21 69-529-115 REV8.DWG

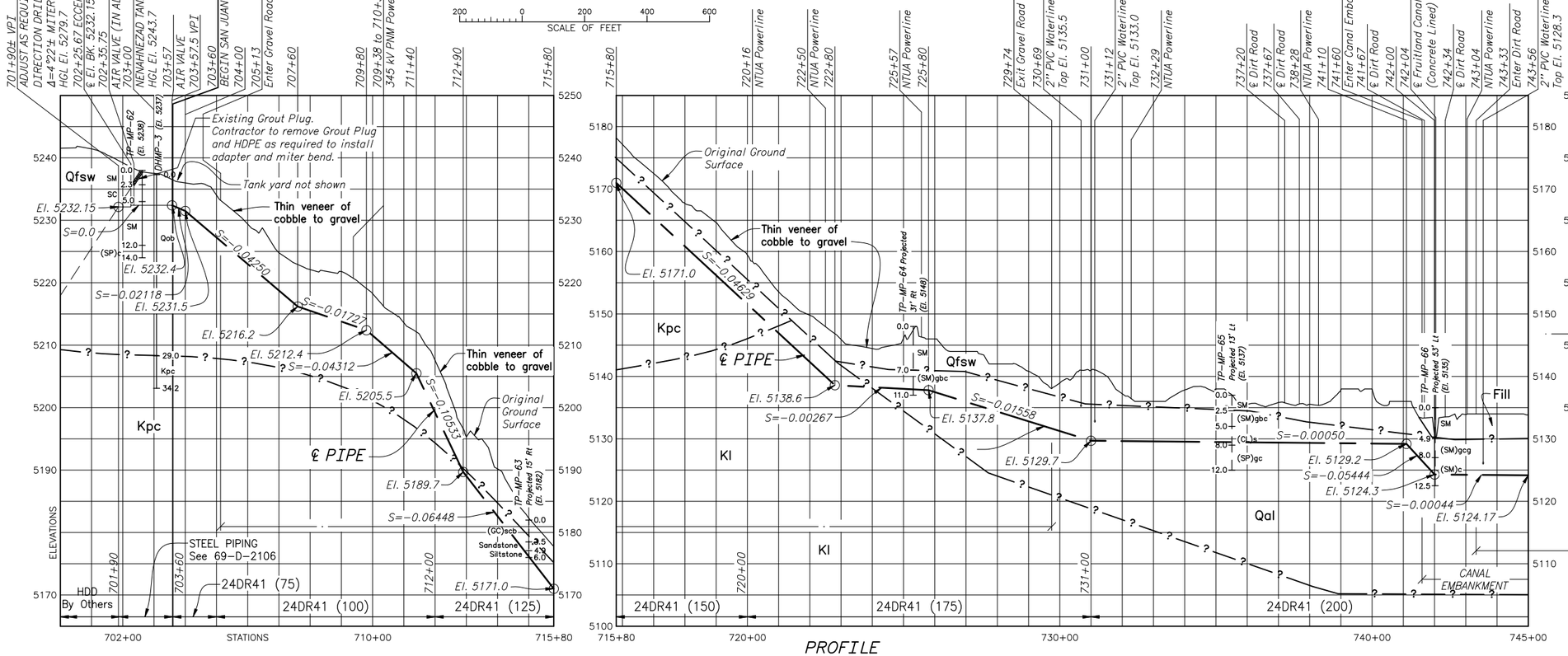


OPEN-CUT ROAD CROSSINGS	
Station	Surfacing
705+13 to 729+74	Gravel
737+07 to 737+30	Compacted Backfill
737+61 to 737+72	Compacted Backfill
741+60 to 741+74	Compacted Backfill
742+22 to 742+45	Compacted Backfill
743+33 to 747+32	Compacted Backfill

NOTE: Open cut roads require compacted backfill per specifications. See (169) for details.

NOTES

1. For General Notes, Abbreviations, Symbols and Pipe Classifications, see (102).
2. Field verify HDD pipe location before fabricating miter bend.
3. For details of valves at the Storage Tank, see 69-D-2106.
4. For Fruitland Canal Crossing details, see (180).
5. Compacted backfill required in canal embankment.
6. **If powerline voltage is not given, contractor is to determine voltage and maintain required clearances. The contractor shall notify the COR of the powerline voltage two days before work commences in the area.**



GEOLOGY Date 1/15/07

TECHNICAL APPROVAL – R. K. CHRISTIANSON
SUBMITTED – LES W. STONE
APPROVED – JAMES A. GATES

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DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

ANIMAS-LA PLATA PROJECT COLORADO – NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

SAN JUAN REACH AND NENAHNEZAD TANK

STATION 701+90 TO 750+00

PLAN AND PROFILE

DESIGNED L. A. BAROS CHECKED JAYE E. DECKER
DRAWN D. R. GOOD/ CHOU CHA TECH. APPR. LINDA M. BOWLES, P.E.
LINDA M. BOWLES P.E.
APPROVED TEDD R. CALHOUN, P.E.
PEER REVIEWER – TEDD R. CALHOUN, P.E.

FARMINGTON, NEW MEXICO 2004-05-13
SHEET 1 OF 1

69-529-117

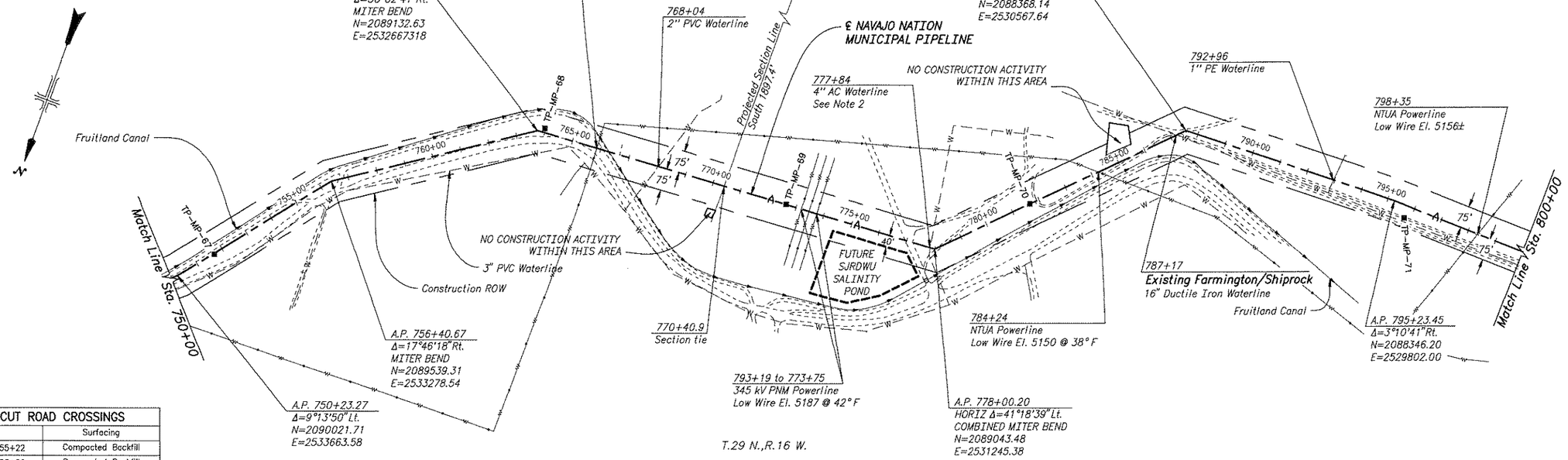
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7	2010-10-05 FCCF-233 JED	CORRECTED AIR VALVE STATION TO 703+57 TO MATCH OTHER DRAWINGS	6	2009-10-21 FCCF-413 JED	ADDED POWERLINES TO PLAN AND PROFILE ADDED NOTE 6.	5	2009-02-12 FCCF-413 JED	CHANGED TANK YARD DRW REF. ADD VPI ON PROFILE STATIONS. REVISED TITLE BLOCK TO INCLUDE NENAHNEZAD TANK. MOVED AIR VALVE TO 703+56. CHANGE STATION RANGE IN TITLE BLOCK.	4	2008-07-09 FCCF-410 JED	ADDED GROUT PLUG AND HDD PIPE EXTENDING TO OG. ADDED REQUIREMENT TO REMOVE GROUT PLUG AND HDPE PIPE. CHANGED STATION ON TIE TO HDD AND AIR VALVE U/S OF TANK.

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OCTOBER 6, 2010 15:29
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22 69-529-117 REV7.DWG

GEOLOGY
Date 1/15/07

TECHNICAL APPROVAL — R. K. CHRISTENSON
SUBMITTED — LES W. STONE
APPROVED — JAMES A. GILES



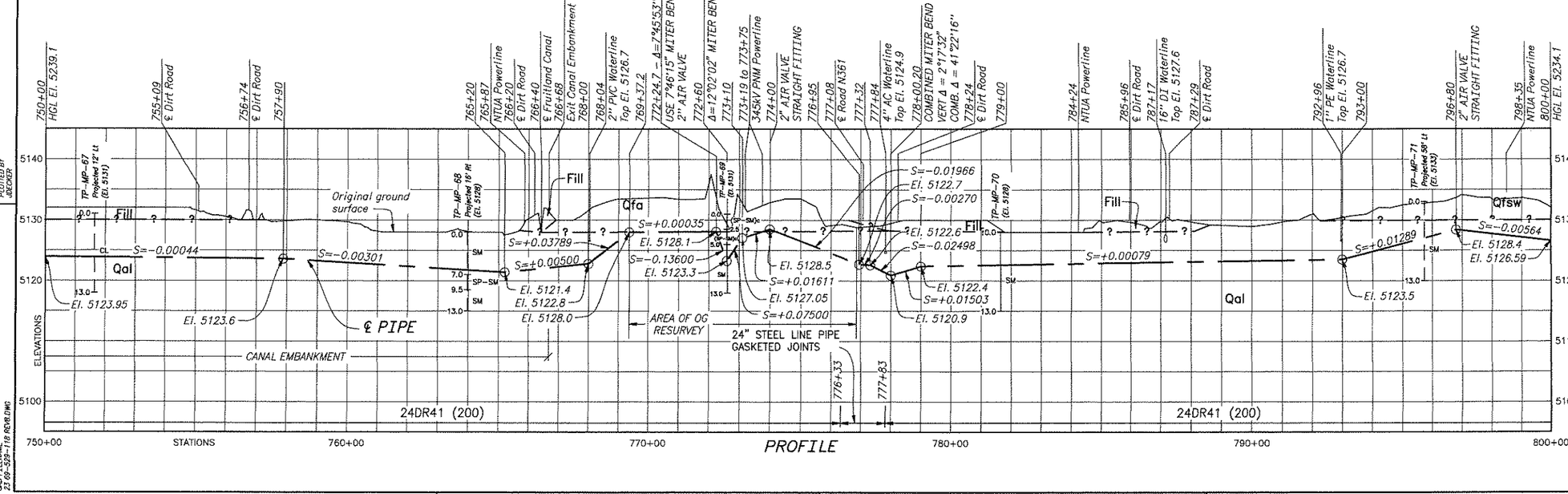
OPEN-CUT ROAD CROSSINGS	
Station	Surfacing
754+95 to 755+22	Compacted Backfill
756+65 to 756+82	Compacted Backfill
766+11 to 766+68	Compacted Backfill
776+95 to 777+21	Compacted Backfill
778+06 to 778+42	Compacted Backfill
781+84 to 781+93	Compacted Backfill
785+62 to 786+14	Compacted Backfill
787+19 to 787+36	Compacted Backfill

NOTE: Open cut roads require compacted backfill per specifications. See (169) for details.

NOTES

1. For General Notes, Abbreviations, Symbols and Pipe Classifications, see (102).
2. Excavation will expose existing asbestos-cement (AC) pipe. Waterline may require special construction procedures to protect this pipe, see specification.
3. For details of Fruitland Canal crossing, see (181).
4. Backfill shall be compacted where drawings indicate the alignment is in canal embankment, see specifications.

5. If powerline voltage is not given, contractor is to determine voltage and maintain required clearances. The contractor shall notify the COR of the powerline voltage two days before work commences in the area.



REV NO		
8	2011-11-15 FCCF-233 JED	REV HORZ ALIGN BACK TO REV 6 VERSION. DELETED EQ ADDED IN REV 7. REV. OG 769+90 TO 776+87. MOVED AIR VALVE TO 774+00. REVISED REV 7 VERT ALIGN STA. 772+60 TO 778+00.2.
7	2011-11-03 FCCF-232 DRG	REVISED HORIZONTAL ALIGNMENT STATION 756+73 TO 763+75 AND VERTICAL ALIGNMENT STATION 769+37.2 TO 778+00.2. ADDED EQUATION AT 756+73.44 BK = 756+69.19 AH.
6	2010-09-22 FCCF-233 JED	REVISED HORIZONTAL AND VERTICAL ALIGNMENT STATION 785+23.45 TO 808+71.09 AH. TO AVOID SHEEP DIP RESTRICTIVE USE AREA.
5	2010-02-11 FCCF-413 JED	REVISED AIR VALVE CALLS ON PROFILE AT STATION 775+20 AND STATION 796+80.
4	2009-10-30 FCCF-413 JED	ADDED FUTURE DINE WATER USERS SALINITY POND.
3	2009-09-30 FCCF-413 JED	ADDED POWERLINES TO PLAN AND PROFILE ADDED NOTE 5.

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DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

ANIMAS-LA PLATA PROJECT COLORADO - NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

SAN JUAN REACH

STATION 750+00 TO 800+00

PLAN AND PROFILE

DESIGNED L. A. BARROS CHECKED JAYE E. DECKER
DRAWN R. GOOD/ CHOU CHA TECH. APPR. LINDA M. BOWLES, P.E.
APPROVED TEDD R. CALHOUN, P.E. LINDA M. BOWLES P.E.
PEER REVIEWER - TEDD R. CALHOUN, P.E.

FARMINGTON, NEW MEXICO 2004-05-13
SHEET 1 OF 1

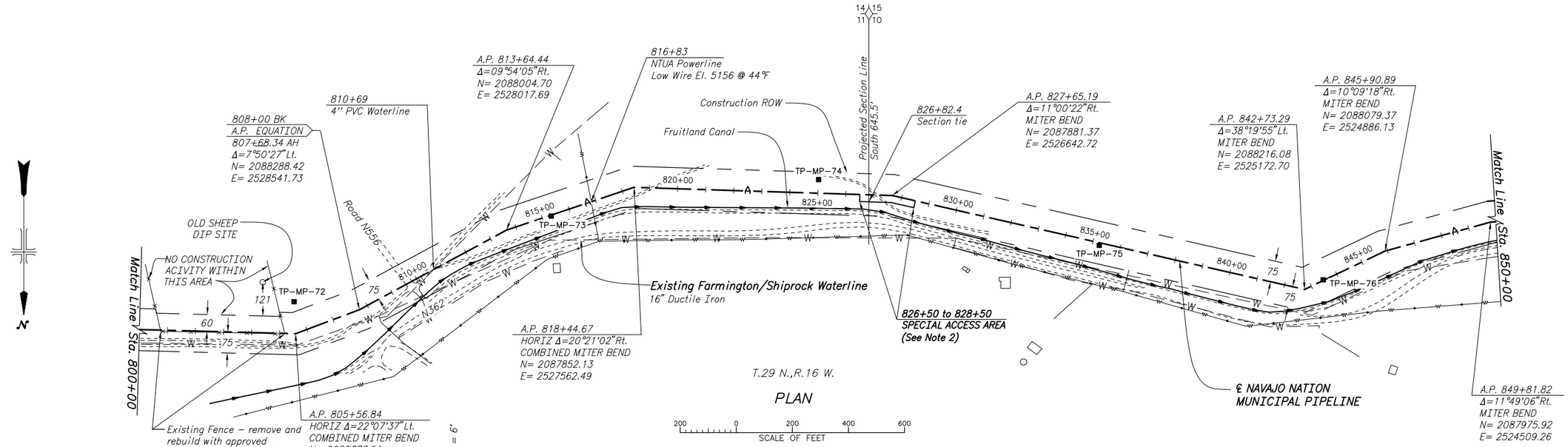
69-529-118

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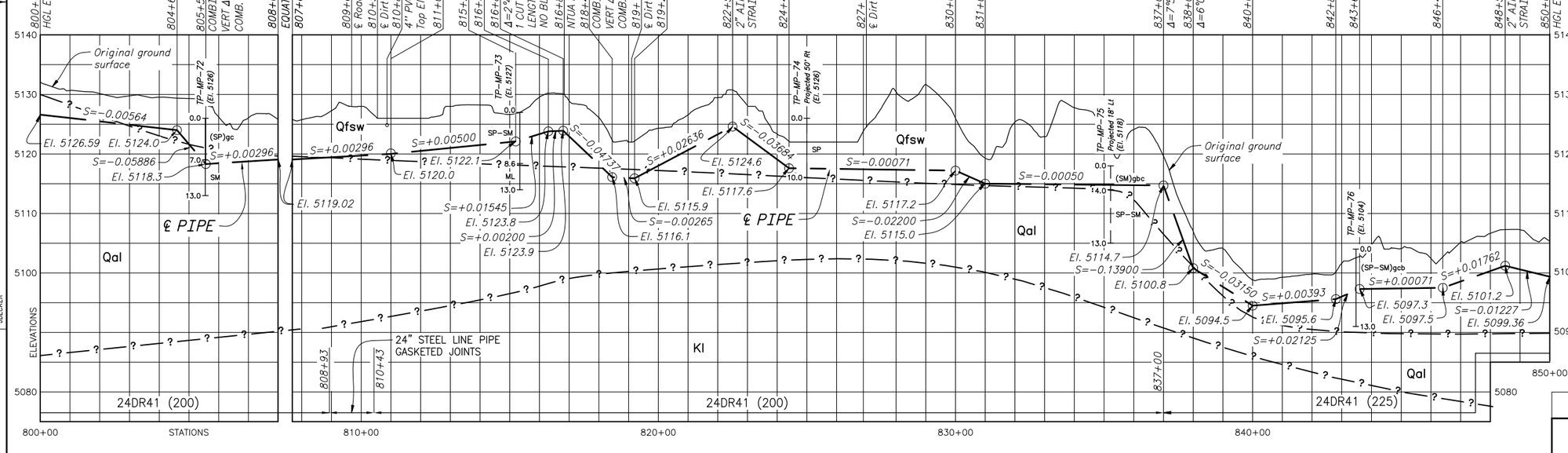
GEOLOGY Date 1/15/07

TECHNICAL APPROVAL — R. K. CHRISTIANSON —
SUBMITTED — LES W. STONE —
APPROVED — JAMES L. GATES —



OPEN-CUT ROAD CROSSINGS	
Station	Surfacing
809+56 to 809+81	Gravel
810+36 to 810+75	Compacted Backfill
819+03 to 819+16	Compacted Backfill
827+04 to 827+15	Compacted Backfill

NOTE: Open cut roads require compacted backfill per specifications. See (169) for details.



PROFILE

NOTES

1. For General Notes, Abbreviations, Symbols and Pipe Classifications, see (102).
2. Special Access Area – Contractor shall have a Government assigned or approved archeologist present during construction in these areas.

3. If powerline voltage is not given, contractor is to determine voltage and maintain required clearances. The contractor shall notify the COR of the powerline voltage two days before work commences in the area.

REV NO		
8	2011-03-03 FCCF-233 JED	CORRECT NORTHING COORDINATE AT STATION 805+56.84.
7	2010-12-01 FCCF-233 JED	ADDED SHEEP DIP LOCATION ON PLAN VIEW. ADDED DIMENSION FROM SHEEP DIP TO ACCESS RESTRICTED LINE.
6	2010-09-22 FCCF-233 JED	REVISED HORIZONTAL AND VERTICAL ALIGNMENT STATION 795+23.45 TO 813+64.44 TO AVOID SHEEP DIP RESTRICTIVE USE AREA.

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ANIMAS – LA PLATA PROJECT COLORADO – NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

SAN JUAN REACH

STATION 800+00 TO 850+00

PLAN AND PROFILE

DESIGNED L. A. BAROS CHECKED JAYE E. DECKER
DRAWN R. GOOD/ CHOU CHA TECH. APPR. LINDA M. BOWLES, P.E.
APPROVED TEDD R. CALHOUN, P.E. LINDA M. BOWLES P.E.
PEER REVIEWER – TEDD R. CALHOUN, P.E.

FARMINGTON, NEW MEXICO 2004-05-13
SHEET 1 OF 1

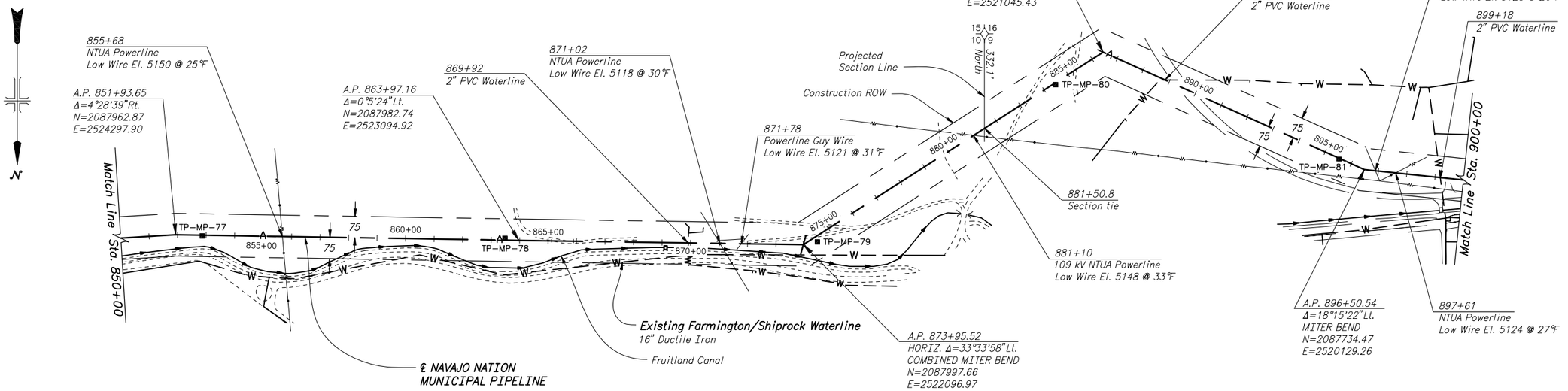
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CAD FILENAME 24 69-529-119 REV8.DWG

GEOLOGY Date 1/15/07

TECHNICAL APPROVAL — R. K. CHRISTIANSON
SUBMITTED — LES W. STONE
APPROVED — JAMES A. GATES



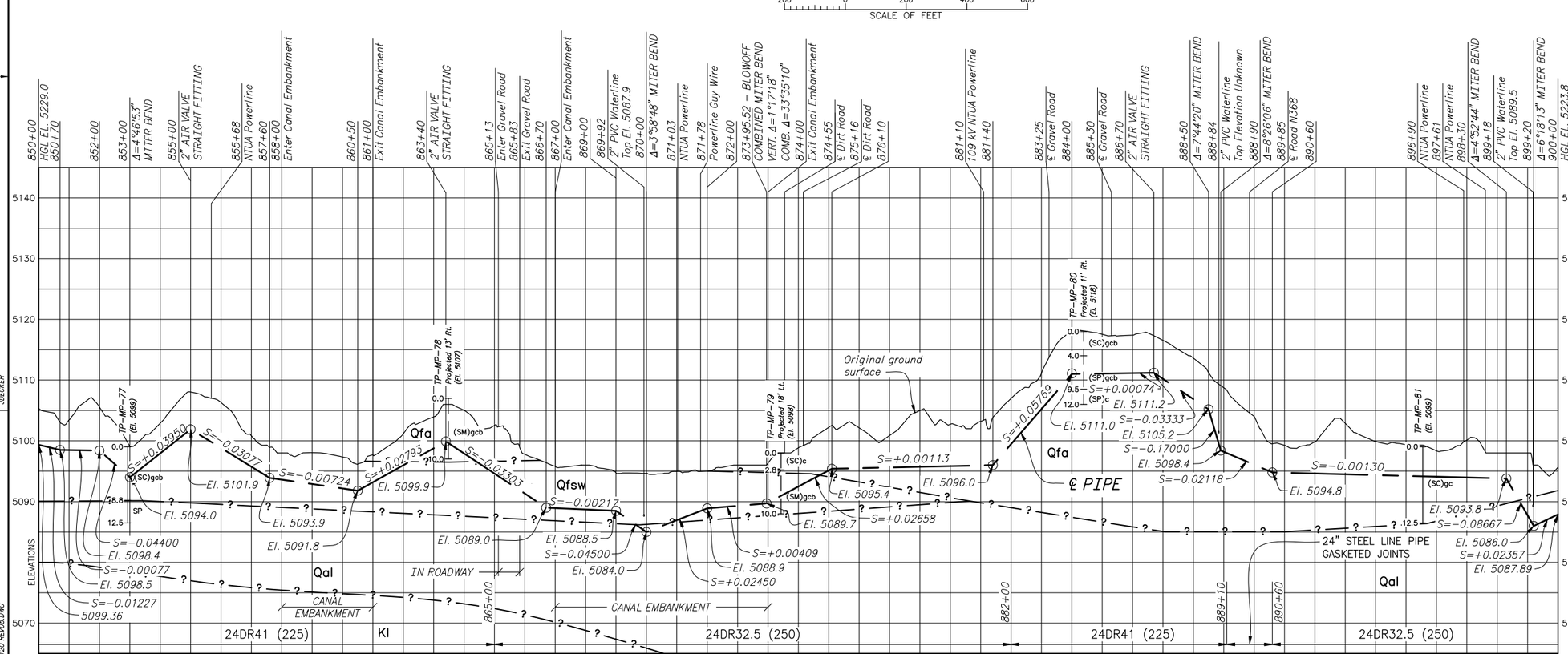
T.29 N.,R.16 W.

PLAN

200 0 200 400 600
SCALE OF FEET

OPEN-CUT ROAD CROSSINGS	
Station	Surfacing
865+13 to 865+83	Gravel
874+43 to 874+64	Compacted Backfill
875+08 to 875+23	Compacted Backfill
883+13 to 883+36	Gravel
885+22 to 885+37	Gravel
888+90 to 891+40	Gravel

NOTE: Open cut roads require compacted backfill per specifications. See (169) for details.



NOTES

1. For General Notes, Abbreviations, Symbols and Pipe Classifications, see (102).
2. Backfill shall be compacted where drawings indicate the alignment is in canal embankment, see specifications.

3. If powerline voltage is not given, contractor is to determine voltage and maintain required clearances. The contractor shall notify the COR of the powerline voltage two days before work commences in the area.

REV NO		
5	2010-02-11 FCCF-413 JED	REVISED AIR VALVE CALLS ON PROFILE AT STATION 855+00, STATION 863+40, AND STATION 886+70.
4	2009-10-22 FCCF-413 JED	ADDED POWERLINES TO PLAN AND PROFILE. ADDED NOTE 3.
3	2009-06-04 FCCF-413 JED	MADE VPI'S AT 855+00, 863+40, 886+70 MITER BENDS TO MATCH DRAWING 69-529-156.

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UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

ANIMAS - LA PLATA PROJECT COLORADO - NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

SAN JUAN REACH

STATION 850+00 TO 900+00

PLAN AND PROFILE

DESIGNED L. A. BAROS CHECKED JAYE E. DECKER
DRAWN D. R. GOOD/ CHOU CHA TECH. APPR. LINDA M. BOWLES, P.E.
APPROVED TEDD R. CALHOUN, P.E.
PEER REVIEWER - TEDD R. CALHOUN, P.E.

FARMINGTON, NEW MEXICO 2004-05-13
SHEET 1 OF 1

69-529-120

DATE AND TIME PLOTTED OCTOBER 6, 2010 15:55
PLOTTED BY JDECKER

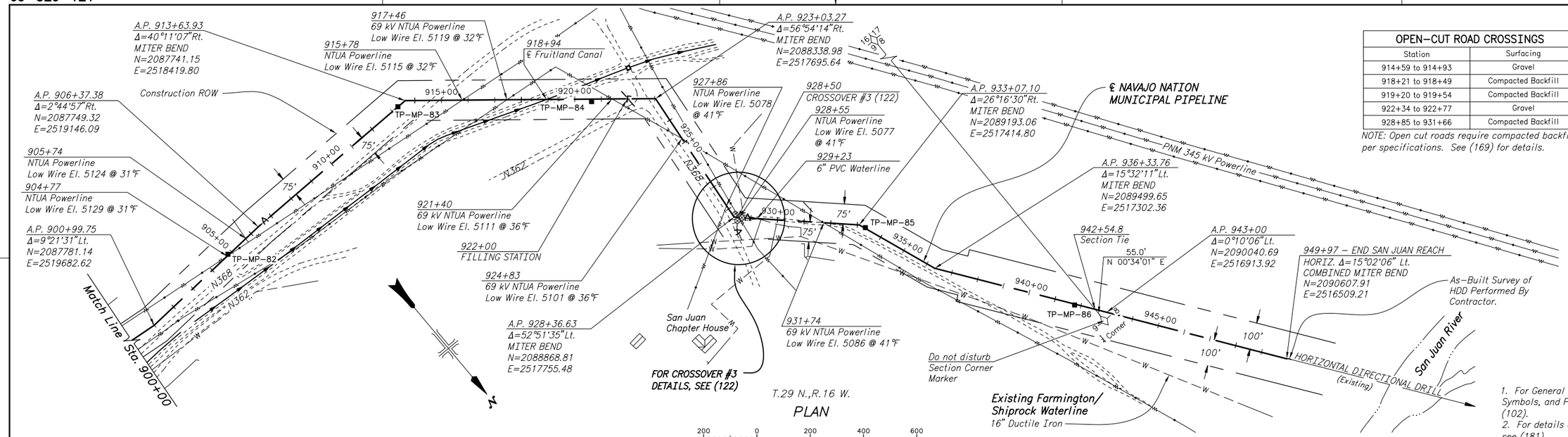
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GEOLOGY Date 1/15/07

TECHNICAL APPROVAL — R. K. CHRISTIANSON —
SUBMITTED — LES W. STONE —
APPROVED — JAMES A. GATES —

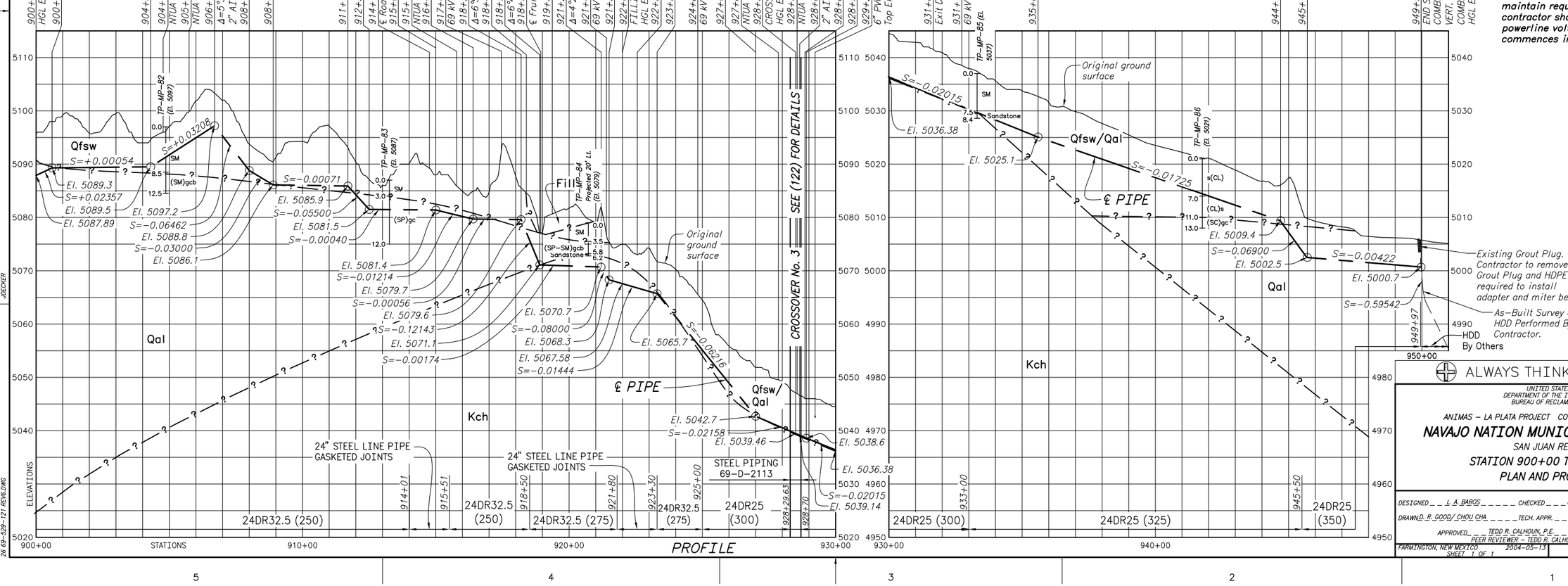
OPEN-CUT ROAD CROSSINGS	
Station	Surfacing
914+59 to 914+93	Gravel
918+21 to 918+49	Compacted Backfill
919+20 to 919+54	Compacted Backfill
922+34 to 922+77	Gravel
928+85 to 931+66	Compacted Backfill

NOTE: Open cut roads require compacted backfill per specifications. See (169) for details.



NOTES

1. For General Notes, Abbreviations Symbols, and Pipe Classifications, see (102).
2. For details of Fruitland Canal Crossing, see (181).
3. Field verify HDD pipe location before fabricating miter bend at 950+10.1.
4. Existing survey 1/4 Section Corner within construction ROW shall not be disturbed without prior written approval from BLM.
5. **If powerline voltage is not given, contractor is to determine voltage and maintain required clearances. The contractor shall notify the COR of the powerline voltage two days before work commences in the area.**



REV NO		
6	2010-09-17 FCCP-233 JED	REVISED PLAN AND PROFILE TO MATCH CONTRACTOR AS-BUILT OF HDD. REMOVED TEST PIT TMP-87 AND DRILL HOLE DMP-9.
5	2009-10-23 FCCP-413 JED	ADDED MISSING POWERLINES TO PLAN AND PROFILES. ADDED NOTE 5. ADDED NOTE TO NOT DISTURB SECTION CORNER.
4	2008-07-10 FCCP-410 JED	ADDED GROUT PLUG AND HDD PIPE EXTENDING TO OG. ADDED REQUIREMENT TO REMOVE GROUT PLUG AND HDPE PIPE. CHANGED STATION ON TIE TO HDD.
3	2008-04-01 FCCP-410 JED	ADDED VOLTAGES TO POWERLINES.

DATE AND TIME PLOTTED: OCTOBER 6, 2010 10:59
PLOTTED BY: JDECKER

CAD SYSTEM: AutoCAD Rel. 17.2s
CAD FILENAME: 26 69-529-121 REVE.DWG

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DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

ANIMAS – LA PLATA PROJECT COLORADO – NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

SAN JUAN REACH

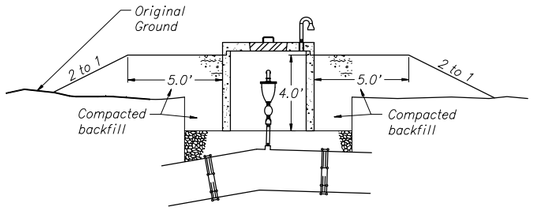
STATION 900+00 TO 950+10.1

PLAN AND PROFILE

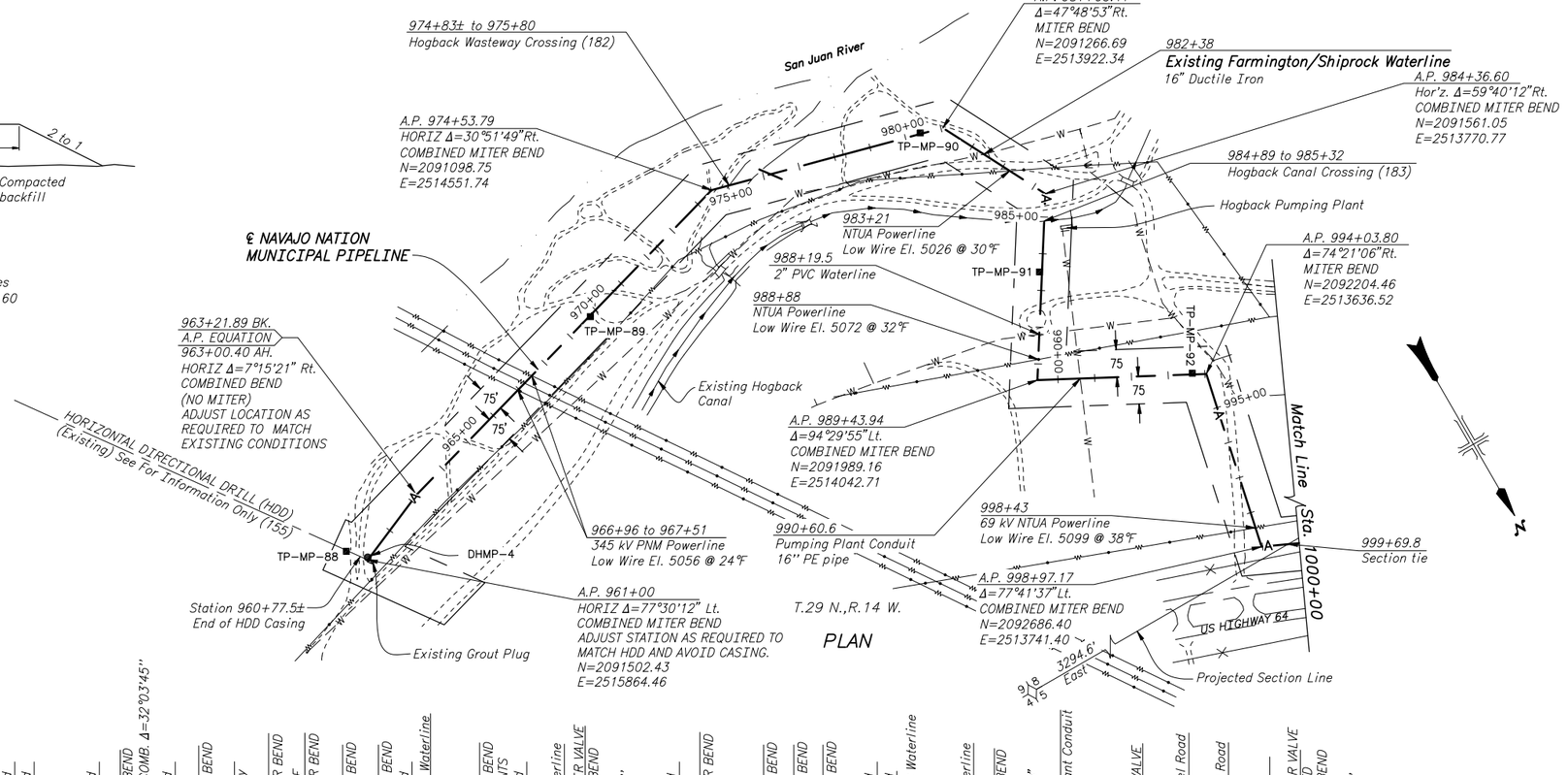
DESIGNED L. A. BAROS CHECKED JAYE E. DECKER
DRAWN R. GOOD/ CHOU CHA TECH. APPR. LINDA M. BOWLES, P.E. LINDA M. BOWLES P.E.
APPROVED TEDD R. CALHOUN, P.E.
PEER REVIEWER – TEDD R. CALHOUN, P.E.

FARMINGTON, NEW MEXICO 2004-05-13
SHEET 1 OF 1

69-529-121

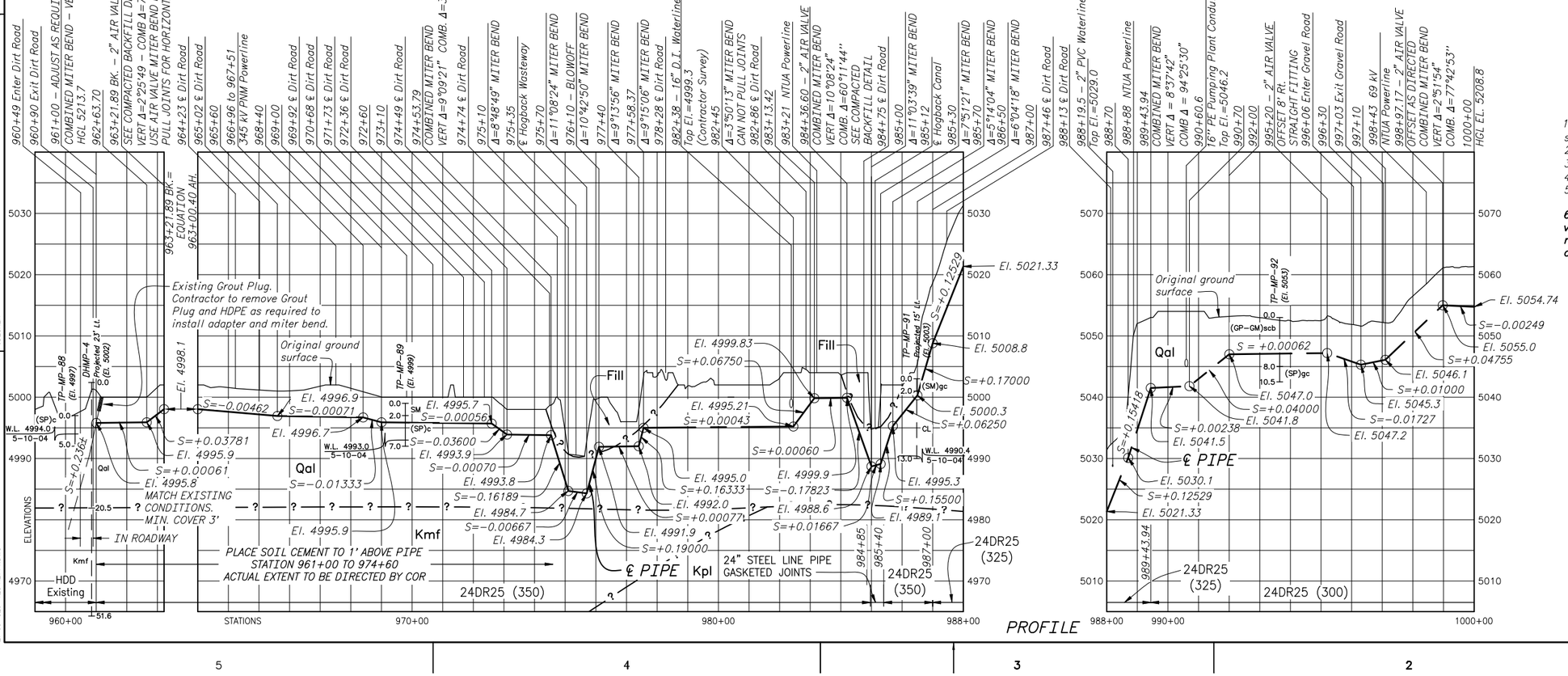


Compacted Backfill Detail for Air Valves at Stations 963+21.89 BK. and 984+36.60



OPEN-CUT ROAD CROSSINGS	
Station	Surfacing
960+49 to 960+90	Compacted Backfill
964+15 to 964+30	Compacted Backfill
964+96 to 965+07	Compacted Backfill
969+86 to 970+02	Compacted Backfill
970+61 to 970+74	Compacted Backfill
971+68 to 971+77	Compacted Backfill
972+30 to 972+41	Compacted Backfill
974+45 to 974+53	Compacted Backfill
974+68 to 974+80	Compacted Backfill
978+23 to 978+32	Compacted Backfill
982+58 to 983+14	Compacted Backfill
984+69 to 984+81	Compacted Backfill
987+37 to 987+55	Compacted Backfill
988+02 to 988+24	Compacted Backfill
996+06 to 997+03	Gravel

NOTE: Open cut roads require compacted backfill per specifications. See (169) for details.



NOTES

1. For General Notes, Abbreviations, Symbols and Pipe Classifications, see (102).
2. Field verify HDD pipe location before fabricating miter bend.
3. For details of Hogback Wasteway Crossing, see (182).
4. For details of Hogback Canal Crossing, see (183).
5. For construction limitations near US Highway 64, see specifications.
6. **If powerline voltage is not given, contractor is to determine voltage and maintain required clearances. The contractor shall notify the COR of the powerline voltage two days before work commences in the area.**

REV NO		
14	2011-12-07 FCCF-233 JED	CORRECTED ELEVATION FOR TOP OF 16" PIPE AT STATION 982+38. REVISED VERTICAL GRADE – STATION 977+58.37 TO 983+13.42. REMOVED DRILL HOLE TP-MP-70 FROM PROFILE FOR CLARITY.
REV NO 13	2011-11-03 FCCF-233 JED	CONTRACTOR AS BUILT SURVEYED 16" WATER LINE (982+38) CORRECTED WATERLINE LOCATION ON PLAN VIEW. REVISED VERTICAL ALIGNMENT STA. 982+00 TO 982+70.
REV NO 12	2010-10-05 FCCF-233 JED	CORRECTED STATION 963+21.89 BK ON COMPACTED BACKFILL DETAIL FOR AIR VALVES.

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ANIMAS – LA PLATA PROJECT COLORADO – NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

HOGBACK REACH

STATION 960+70.22 TO 1000+00

PLAN AND PROFILE

DESIGNED L. A. BAROS CHECKED JAYE E. DECKER
DRAWN D. R. GOOD/ CHOU CHA TECH. APPR. LINDA M. BOWLES, P.E.
LINDA M. BOWLES P.E.
APPROVED TEDD R. CALHOUN, P.E.
PEER REVIEWER – TEDD R. CALHOUN, P.E.

FARMINGTON, NEW MEXICO 2004-05-13 SHEET 1 OF 1

69-529-123

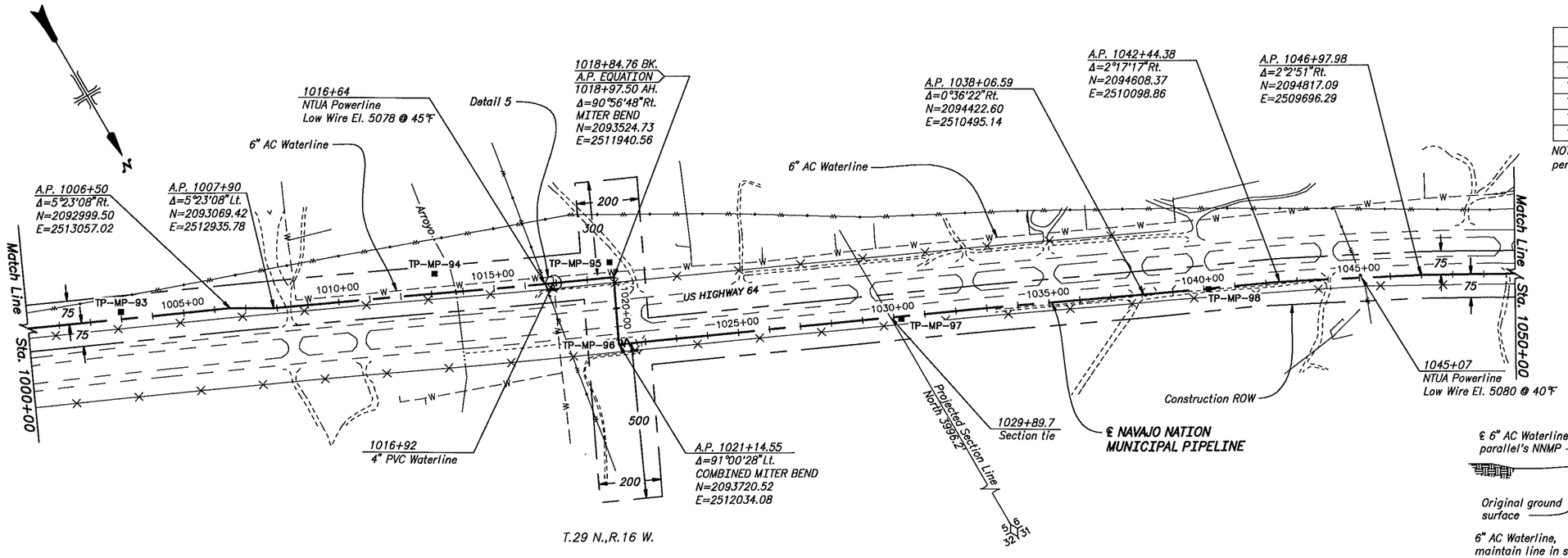
GEOLOGY Date 1/15/07
TECHNICAL APPROVAL – R. K. CHRISTIANSON –
SUBMITTED – LES W. STONE –
APPROVED – JAMES A. GATES –

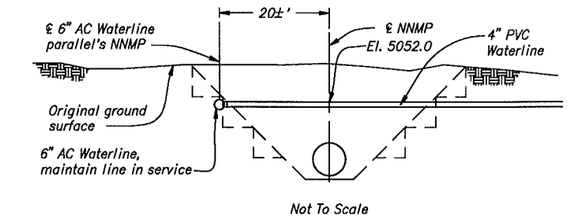
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GEOLOGY Date 1/15/07
TECHNICAL APPROVAL — R. K. CHRISTIANSON
SUBMITTED — LES W. STONE
APPROVED — JAMES A. CATES

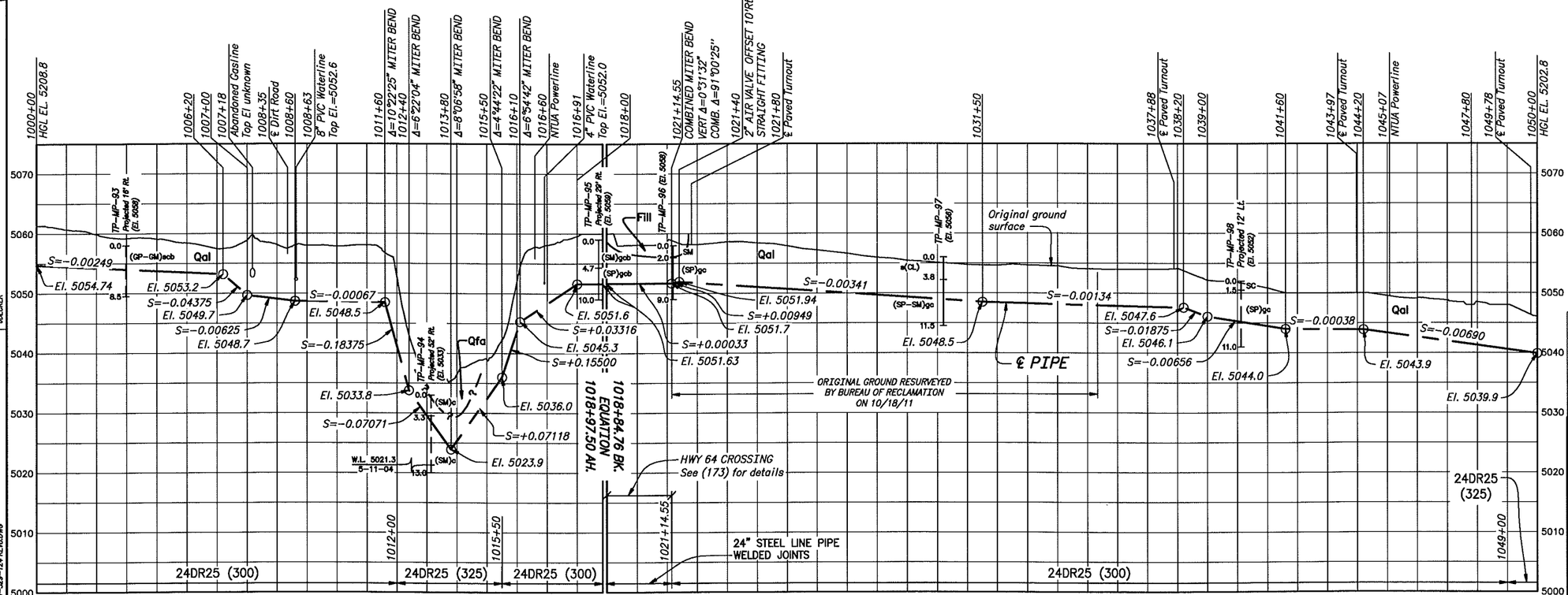
OPEN-CUT ROAD CROSSINGS	
Station	Surfacing
1008+24 to 1008+45	Compacted Backfill
1021+72 to 1021+87	Asphalt
1037+71 to 1038+04	Asphalt
1043+86 to 1044+07	Asphalt
1049+71 to 1049+85	Asphalt

NOTE: Open cut roads require compacted backfill per specifications. See (169) for details.





DETAIL 5
STA. 1016+91



NOTES

1. For General Notes, Abbreviations, Symbols and Pipe Classifications, see (102).
2. For US Highway 64 crossing details, see (173). For construction limitations near US Highway 64, see specifications.
3. For construction limitations near gasline, see specifications.
4. **If powerline voltage is not given, contractor is to determine voltage and maintain required clearances. The contractor shall notify the COR of the powerline voltage two days before work commences in the area.**

REV NO		
8	2011-12-28 FCCF-233 JED	MOVED AP 1018+84.36 TO EQ. 1018+84.76 BK/1018+97.5 AH. ADDED AP'S 1006+50 & 1007+90. CORRECTED PL XING STA'S. REVISED DETAIL 5 AND CORRECTED WATERLINE CALLOUT (6" AC)
7	2011-10-21 FCCF-233 JED	REVISED VERTICAL ALIGNMENT STA 1021+14.55 TO 1050+00. MOVED AIR VALVE TO STATION 1021+40. CHANGES DUE TO NEW GROUND SURFACE SURVEY.
6	2010-02-11 FCCF-413 JED	REVISED AIR VALVE CALL ON PROFILE AT STATION 1022+20.

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BUREAU OF RECLAMATION

ANIMAS – LA PLATA PROJECT COLORADO – NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

HOGBACK REACH

STATION 1000+00 TO 1050+00

PLAN, PROFILE, AND DETAIL

DESIGNED L. A. BARROS CHECKED JAYE E. DECKER
DRAWN D. R. GOOD/ CHOU CHA TECH. APPR. LINDA M. BOWLES, P.E.
APPROVED TEDD R. CALHOUN, P.E. LINDA M. BOWLES, P.E.
PEER REVIEWER – TEDD R. CALHOUN, P.E.

FARMINGTON, NEW MEXICO 2004-05-13
SHEET 1 OF 1

69-529-124

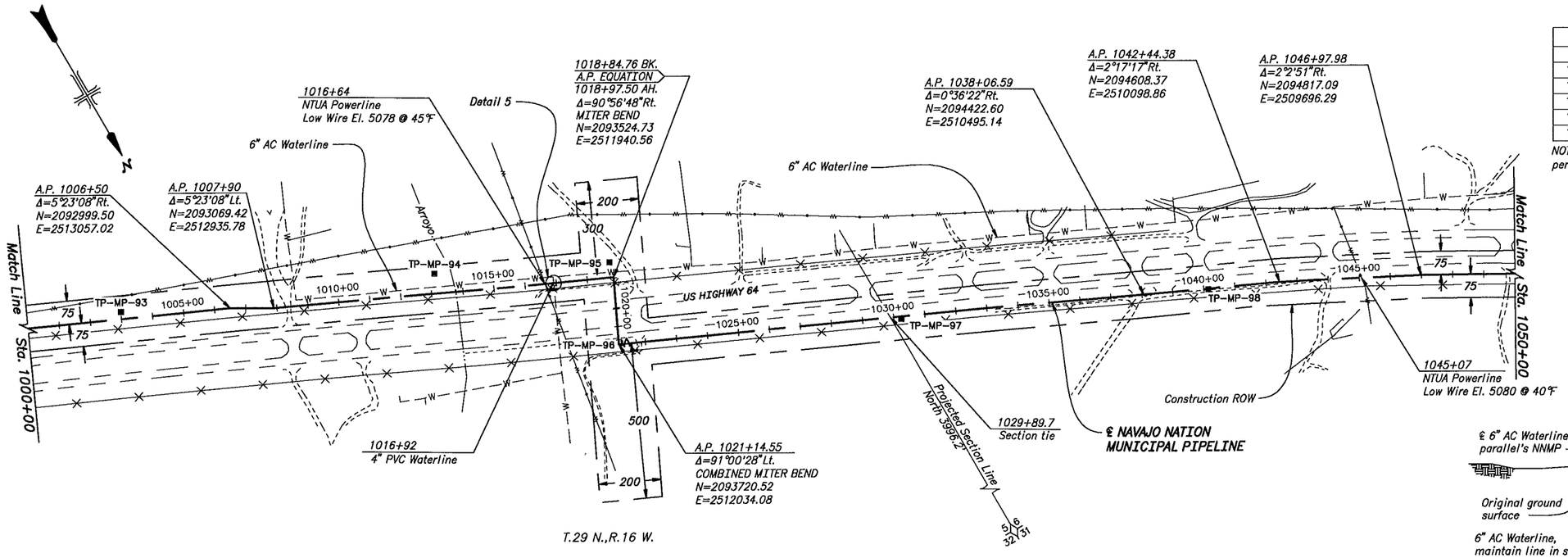
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PLOTTED BY: JDECKER

CAD SYSTEM: AutoCAD Civil 3D 2010
CAD DRAWING: 28 69-529-124 REVISING

GEOLOGY Date 1/15/07
TECHNICAL APPROVAL _ R. K. CHRISTIANSON
SUBMITTED _ LES W. STONE
APPROVED _ JAMES A. CATES

OPEN-CUT ROAD CROSSINGS	
Station	Surfacing
1008+24 to 1008+45	Compacted Backfill
1021+72 to 1021+87	Asphalt
1037+71 to 1038+04	Asphalt
1043+86 to 1044+07	Asphalt
1049+71 to 1049+85	Asphalt

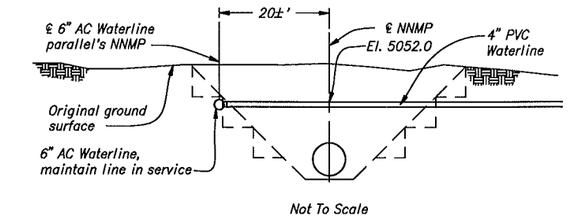
NOTE: Open cut roads require compacted backfill per specifications. See (169) for details.



T.29 N.,R.16 W.

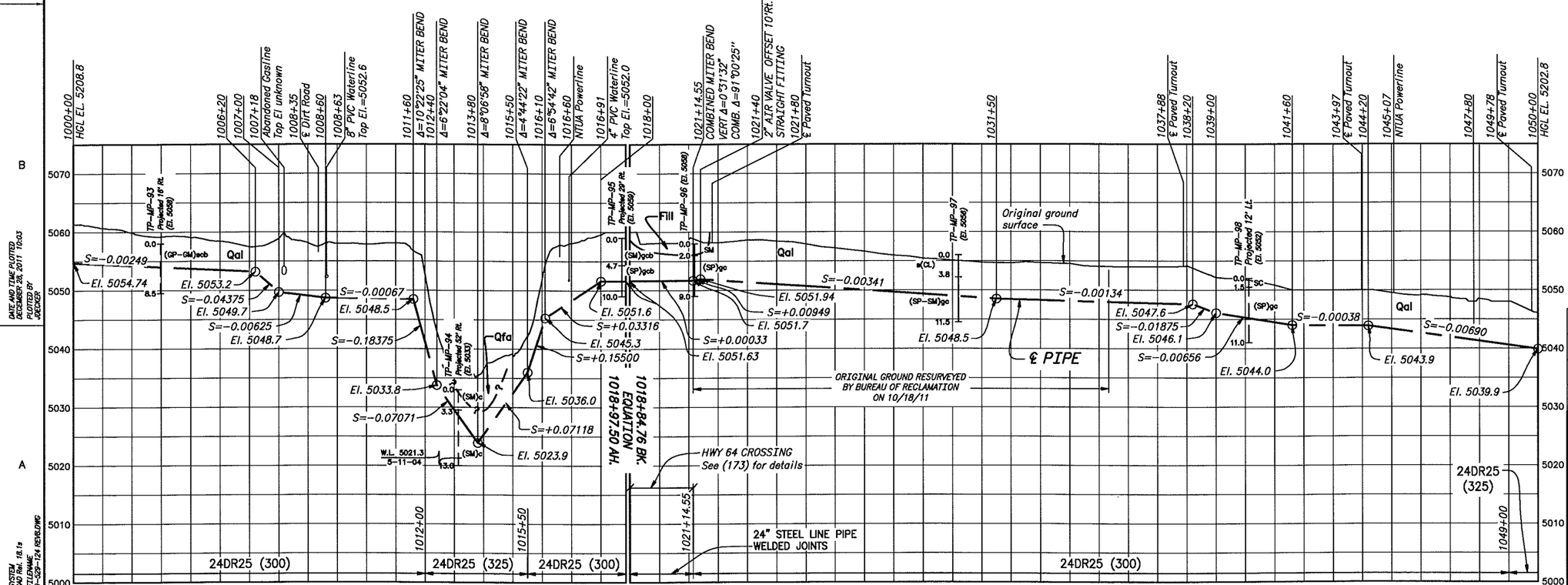
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Not To Scale

DETAIL 5
STA. 1016+91



NOTES

1. For General Notes, Abbreviations, Symbols and Pipe Classifications, see (102).
2. For US Highway 64 crossing details, see (173). For construction limitations near US Highway 64, see specifications.
3. For construction limitations near gasline, see specifications.
4. **If powerline voltage is not given, contractor is to determine voltage and maintain required clearances. The contractor shall notify the COR of the powerline voltage two days before work commences in the area.**

REV NO		
8	2011-12-28 FCDF-233 JED	MOVED AP 1018+84.36 TO EQ. 1018+84.76 BK/1018+97.5 AH. ADDED AP'S 1006+50 & 1007+90. CORRECTED PL XING STA'S. REVISED DETAIL 5 AND CORRECTED WATERLINE CALLOUT (6" AC)
7	2011-10-21 FCDF-233 JED	REVISED VERTICAL ALIGNMENT STA 1021+14.55 TO 1050+00. MOVED AIR VALVE TO STATION 1021+40. CHANGES DUE TO NEW GROUND SURFACE SURVEY.
6	2010-02-11 FCDF-413 JED	REVISED AIR VALVE CALL ON PROFILE AT STATION 1022+20.

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ANIMAS – LA PLATA PROJECT COLORADO – NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

HOGBACK REACH

STATION 1000+00 TO 1050+00

PLAN, PROFILE, AND DETAIL

DESIGNED _ L. A. BARROS _ CHECKED _ JAYE F. DECKER
DRAWN _ D. R. GOOD/ C.HOU CHA _ TECH. APPR. _ LINDA M. BOWLES, P.E. / LINDA M. BOWLES, P.E.
APPROVED _ TEDD R. CALHOUN, P.E. / TEDD R. CALHOUN, P.E.
PEER REVIEWER – TEDD R. CALHOUN, P.E.

FARMINGTON, NEW MEXICO 2004-05-13
SHEET 1 OF 1

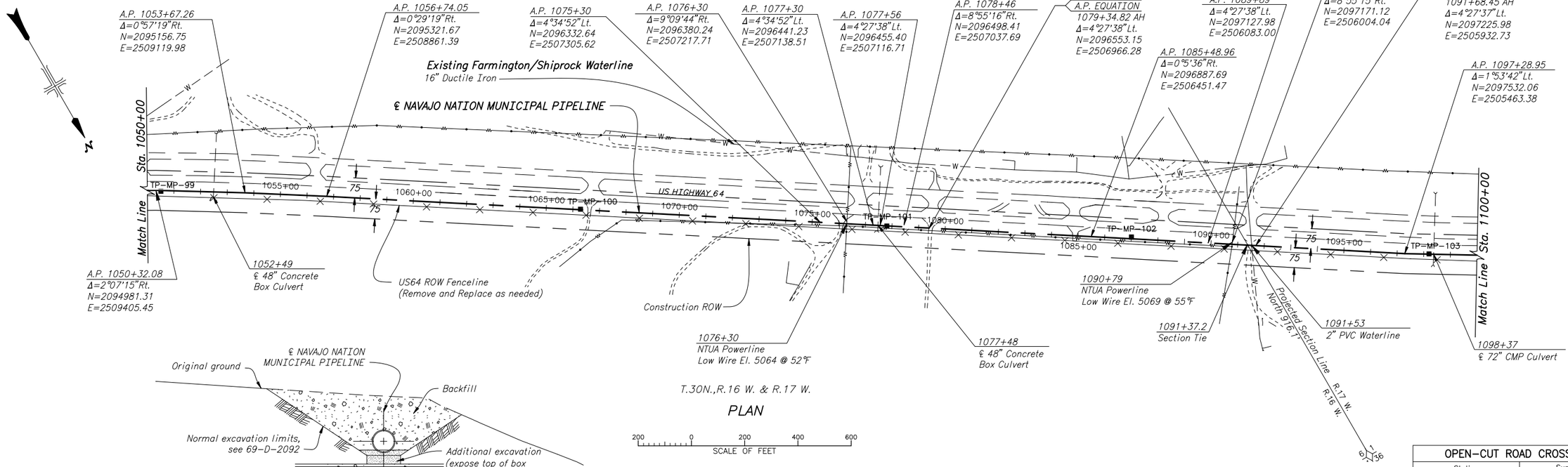
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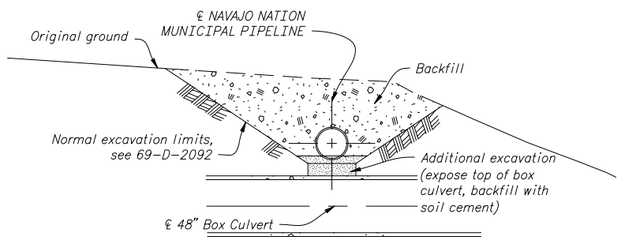
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PLOTTED BY
JDECKER

CAD SYSTEM
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CAD DRAWING
28 69-529-124 REVISING

GEOLOGY
Date 1/15/07

TECHNICAL APPROVAL — R. K. CHRISTIANSON
SUBMITTED — LES W. STONE
APPROVED — JAMES A. GILES

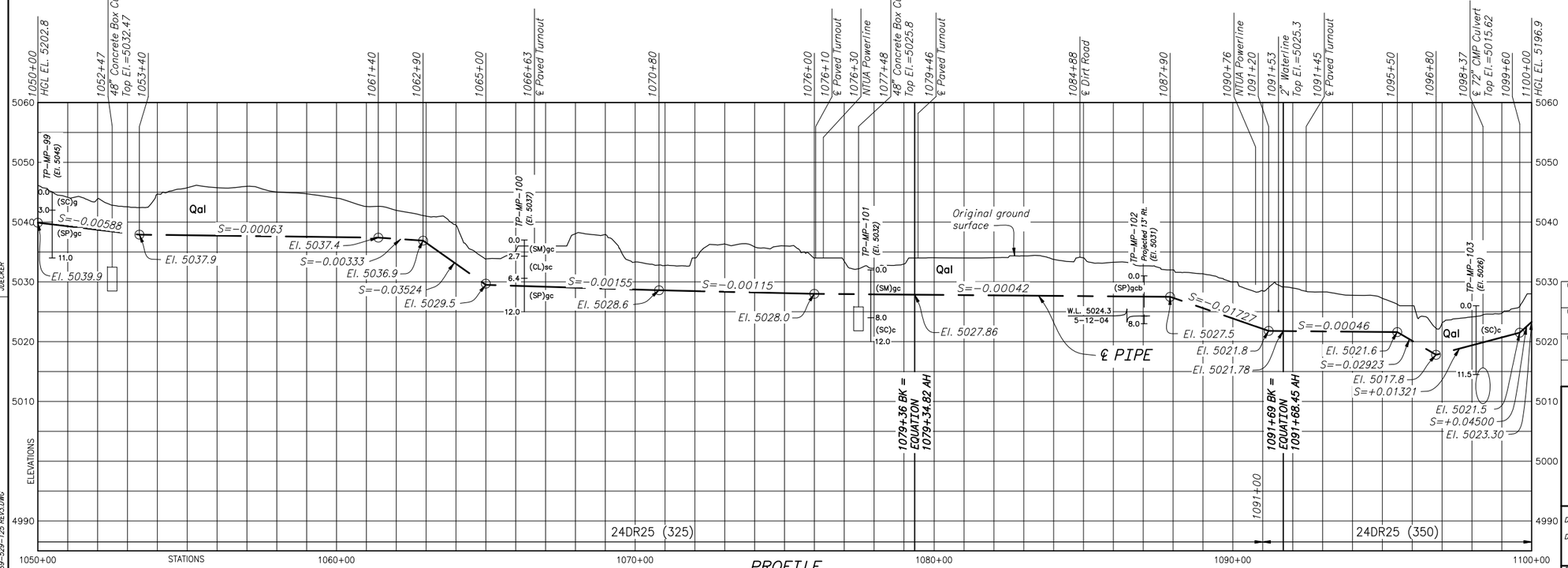




1077+48 BOX CULVERT CROSSING

OPEN-CUT ROAD CROSSINGS	
Station	Surfacing
1066+56 to 1066+68	Asphalt
1076+02 to 1076+18	Asphalt
1079+38 to 1079+53	Asphalt
1084+79 to 1084+96	Compacted Backfill
1091+38 to 1091+52	Asphalt

NOTE: Open cut roads require compacted backfill per specifications. See (169) for details.



NOTES

1. For General Notes, Abbreviations, Symbols and Pipe Classifications, see (102).
2. For construction limitations near US Highway 64, see specifications.

3. If powerline voltage is not given, contractor is to determine voltage and maintain required clearances. The contractor shall notify the COR of the powerline voltage two days before work commences in the area.

REV NO		
3	2010-09-09 FCCF-233 JED	REV. HORZ. ALIGN. STA. 1077+56-1079+36 & 1089+89-1091+69 ADDED EQ.1079+36/1079+34.82 & 1091+69/1091+68.45. CHANGES REQUIRED TO AVOID POWERLINE POLES.
2	2009-10-28 FCCF-413 JED	ADDED POWERLINES TO PLAN AND PROFILE. ADDED NOTE 3.
1	2007-02-07 D L. BOWLES	REMOVED EXTRA AIR VALVE SYMBOL IN PLAN.

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ANIMAS - LA PLATA PROJECT COLORADO - NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

HOGBACK REACH

STATION 1050+00 TO 1100+00

PLAN AND PROFILE

DESIGNED L. A. BAROS CHECKED JAYE E. DECKER
DRAWN D. R. GOOD/ CHOU CHA TECH. APPR. LINDA M. BOWLES, P.E.
LINDA M. BOWLES P.E.
APPROVED TEDD R. CALHOUN, P.E.
PEER REVIEWER - TEDD R. CALHOUN, P.E.

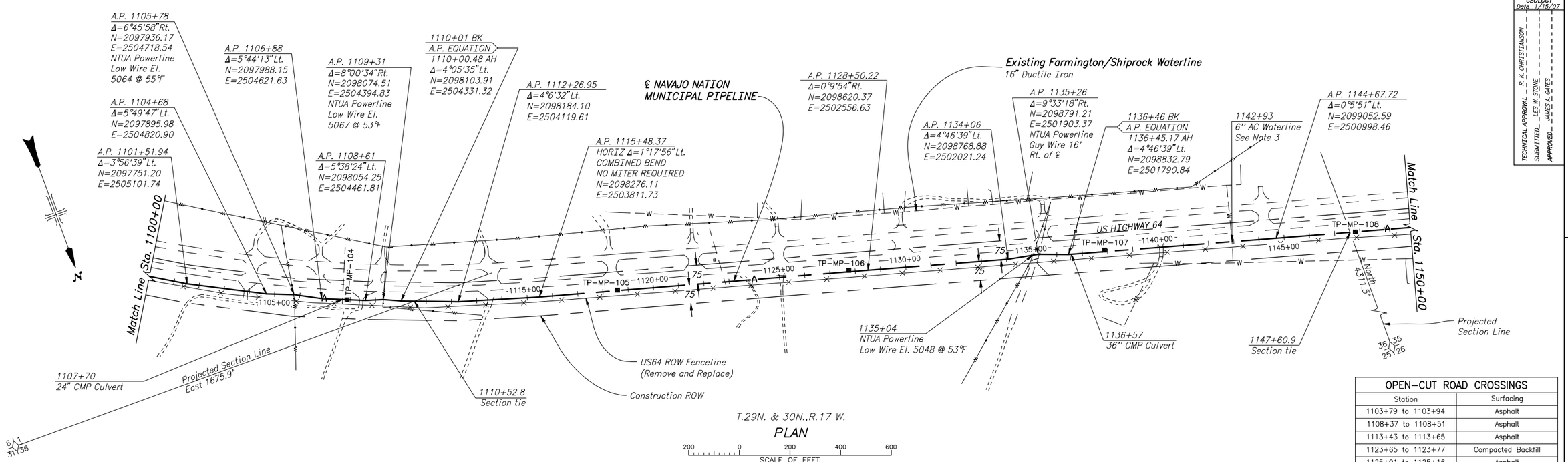
FARMINGTON, NEW MEXICO 2004-05-13
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69-529-125

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JDECKER

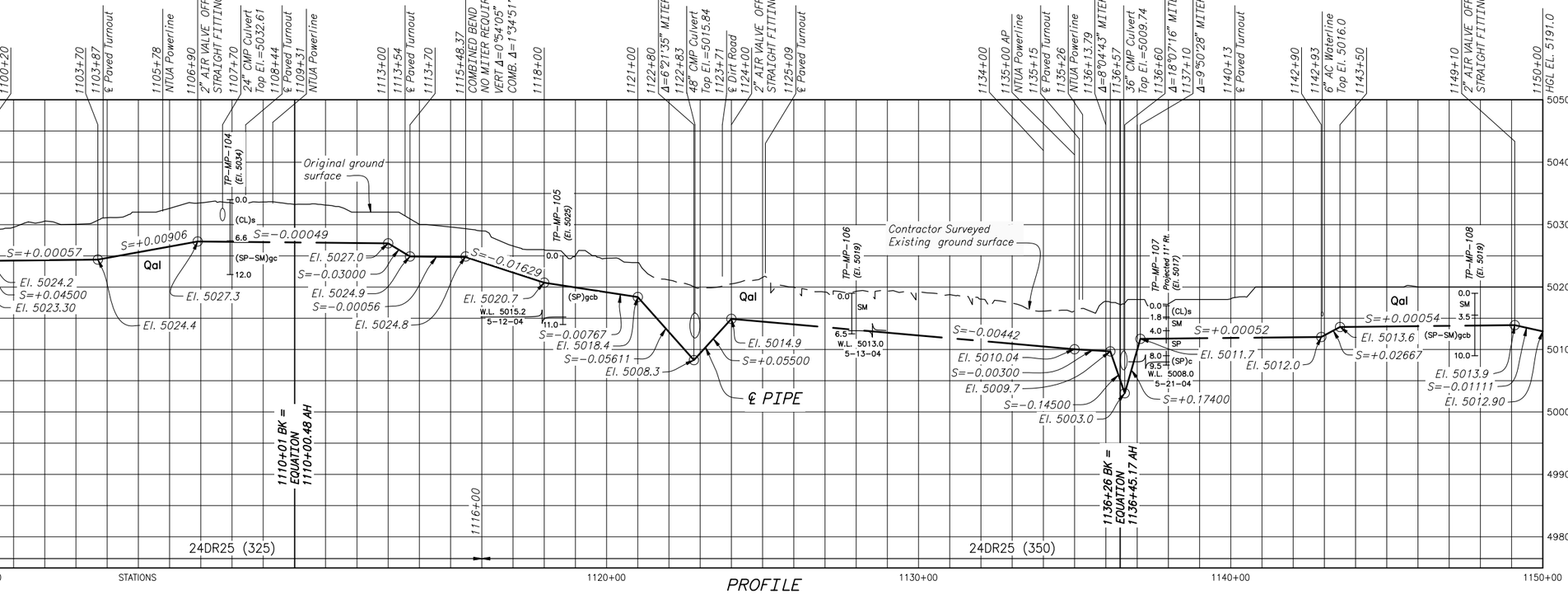
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29 69-529-125 REV3.DWG

GEOLOGY
Date 1/15/07
TECHNICAL APPROVAL — R. K. CHRISTIANSON
SUBMITTED — LES W. STONE
APPROVED — JAMES L. GATES



OPEN-CUT ROAD CROSSINGS	
Station	Surfacing
1103+79 to 1103+94	Asphalt
1108+37 to 1108+51	Asphalt
1113+43 to 1113+65	Asphalt
1123+65 to 1123+77	Compacted Backfill
1125+01 to 1125+16	Asphalt
1135+05 to 1135+25	Asphalt
1140+05 to 1140+20	Asphalt

NOTE: Open cut roads require compacted backfill per specifications. See (169) for details.



NOTES

1. For General Notes, Abbreviations, Symbols and Pipe Classifications, see (102).
2. Excavation will expose existing asbestos-cement (AC) pipe. Waterline may require special construction procedures to protect this pipe, see specification.
3. For construction limitations near US Highway 64, see specifications.

4. If powerline voltage is not given, contractor is to determine voltage and maintain required clearances. The contractor shall notify the COR of the powerline voltage two days before work commences in the area.

REV NO		
7	2011-09-23 FCCF-233 JED	CONTRACTOR SURVEYED EXISTING GROUND 1121+13 TO 1135+67. MOVED AIR VALVE FROM 1126+80 TO 1124+00. LOWERED PIPELINE GRADE 1124+00 TO 1136+13.79.
6	2011-03-04 FCCF-233 JED	CORRECT EASTING COORDINATE AT STATION 1106+88.
5	2010-09-10 FCCF-233 JED	REV. HORZ. ALIGN. STA. 1104+68-1110+01 & 1134+06-1136+46 ADDED EQ. 1110+01/1110+00.48 & 1136+46/113645.17. CHANGES REQUIRED TO AVOID POWER POLES OR GUYS.

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ANIMAS - LA PLATA PROJECT COLORADO - NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

HOGBACK REACH

STATION 1100+00 TO 1150+00

PLAN AND PROFILE

DESIGNED L. A. BAROS CHECKED JAYE E. DECKER
DRAWN D. R. GOOD/ CHOU CHA TECH. APPR. LINDA M. BOWLES, P.E.
LINDA M. BOWLES P.E.
APPROVED TEDD R. CALHOUN, P.E.
PEER REVIEWER - TEDD R. CALHOUN, P.E.

FARMINGTON, NEW MEXICO 2004-05-13
SHEET 1 OF 1

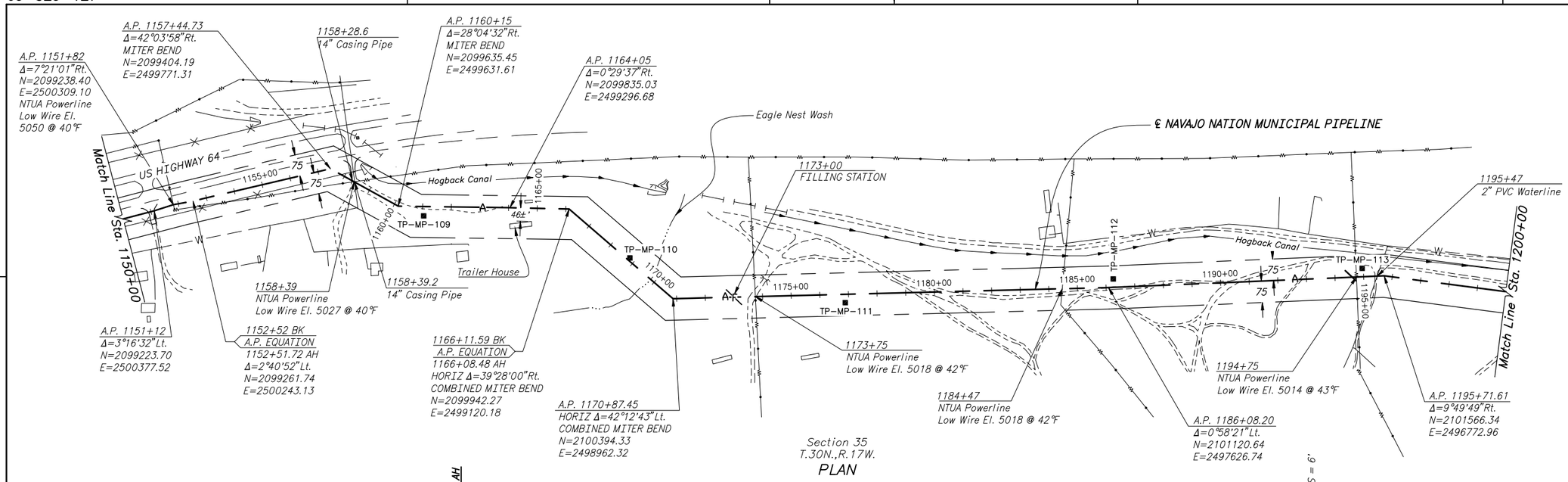
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JDECKER

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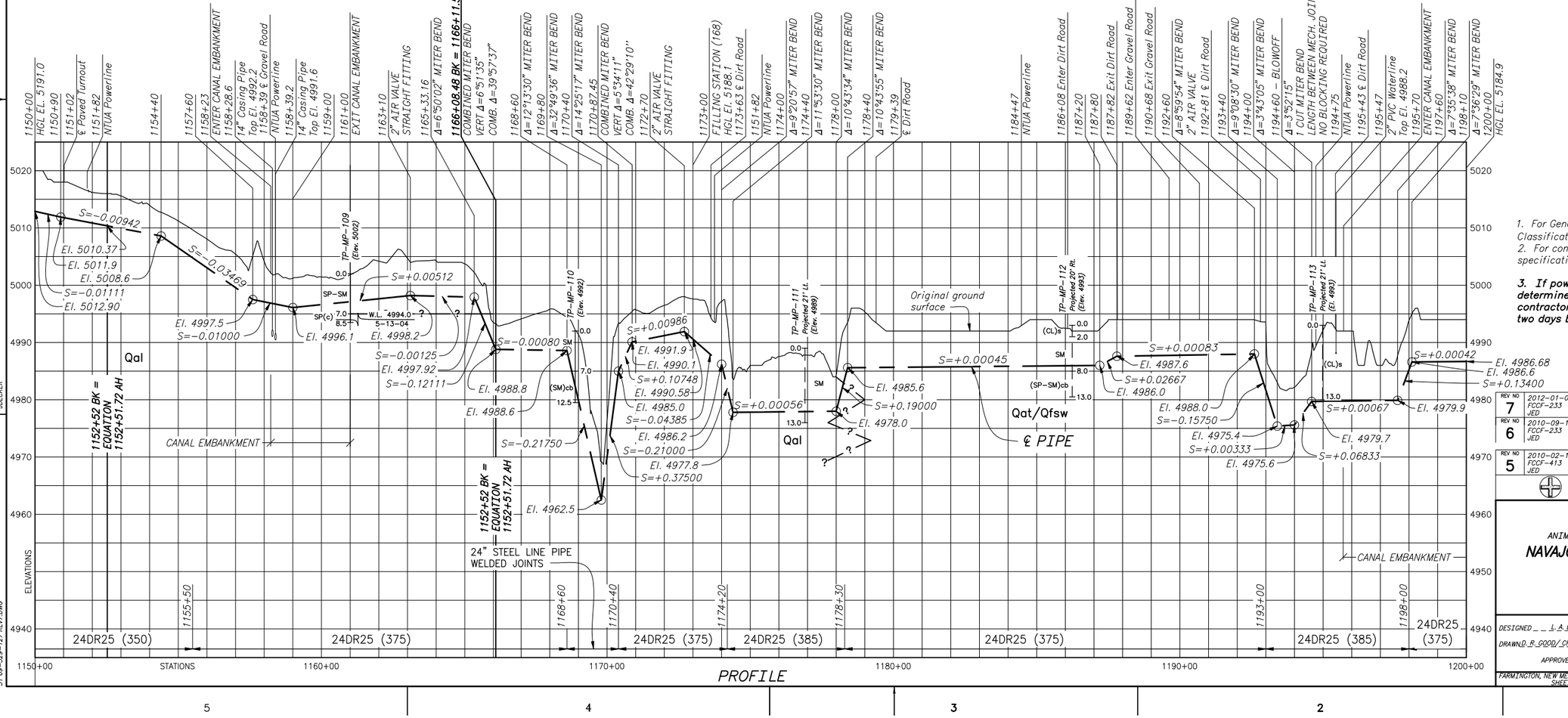
GEOLOGY
Date 1/15/07

TECHNICAL APPROVAL — R. K. CHRISTIANSON
SUBMITTED — LES W. STONE
APPROVED — JAMES A. GATES



Section 35
T.30N.,R.17W.

PLAN



OPEN-CUT ROAD CROSSINGS	
Station	Surfacing
1150+91 to 1151+12	Asphalt
1158+29 to 1158+49	Gravel
1173+53 to 1173+78	Compacted Backfill
1179+26 to 1180+51	Compacted Backfill
1186+08 to 1187+82	Compacted Backfill
1189+62 to 1190+68	Gravel
1192+77 to 1192+85	Compacted Backfill
1195+39 to 1195+47	Compacted Backfill

NOTE: Open cut roads require compacted backfill per specifications. See (169) for details.

NOTES

1. For General Notes, Abbreviations, Symbols and Pipe Classifications, see (102).
2. For construction limitations near US Highway 64, see specifications.
3. **If powerline voltage is not given, contractor is to determine voltage and maintain required clearances. The contractor shall notify the COR of the powerline voltage two days before work commences in the area.**

REV NO		
7	2012-01-03 FCCF-233 JED	PER CONTRACTOR SURVEY – DELETED PIPELINE AT 1158+40.8. ADDED 14" CASING PIPES AT 1158+28.6 AND 1158+39.2. DELETED VPI AND MITER BEND AT STATION 1158+40.
6	2010-09-15 FCCF-233 JED	REV. ALIGN. STA. 1151+12–1152+51.72 & 1160+15–1166+11.59. ADDED EQ. 1152+52/1152+51.72 & 1166+08.48/1166+11.59. REV. VERT ALIGN 1160+15–1166+11.59. DEL. VERT. MITER BEND @ 1166+10. COMB. BEND AT 1166+08.48 BK (HORZ. 1166+57.12).
5	2010-02-11 FCCF-413 JED	REVISED AIR VALVE CALLS ON PROFILE AT STATION 1163+60 AND STATION 1172+70.

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DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

ANIMAS – LA PLATA PROJECT COLORADO – NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

HOGBACK REACH

STATION 1150+00 TO 1200+00

PLAN AND PROFILE

DESIGNED L. A. BAROS — CHECKED JAYE E. DECKER
DRAWN R. GOOD/ CHOU CHA — TECH. APPR. LINDA M. BOWLES, P.E.
LINDA M. BOWLES P.E.
APPROVED TEDD R. CALHOUN, P.E.
PEER REVIEWER – TEDD R. CALHOUN, P.E.

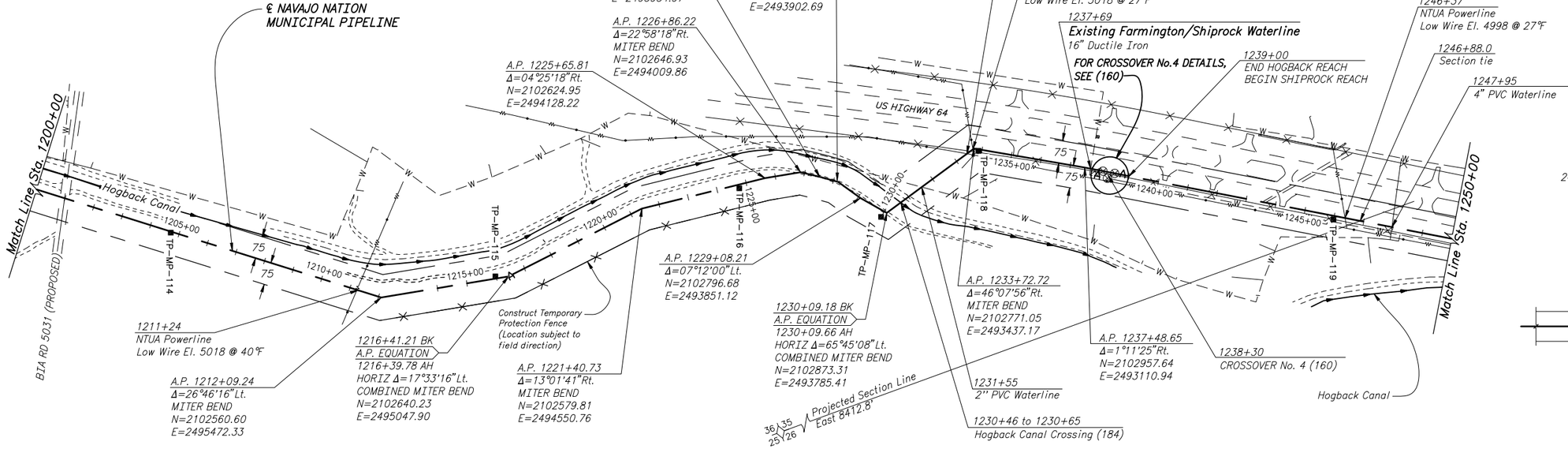
FARMINGTON, NEW MEXICO 2004-05-13
SHEET 1 OF 1

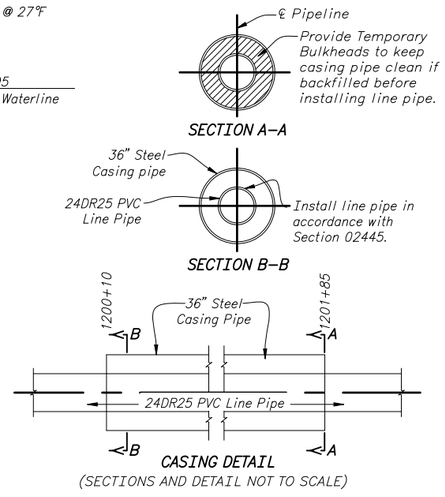
69-529-127

DATE AND TIME PLOTTED
JANUARY 3, 2012 11:12
PLOTTED BY
JDECKER

CAD SYSTEM
AutoCAD Rel. 18.1s
CAD FILENAME
31 69-529-127 REV7.DWG

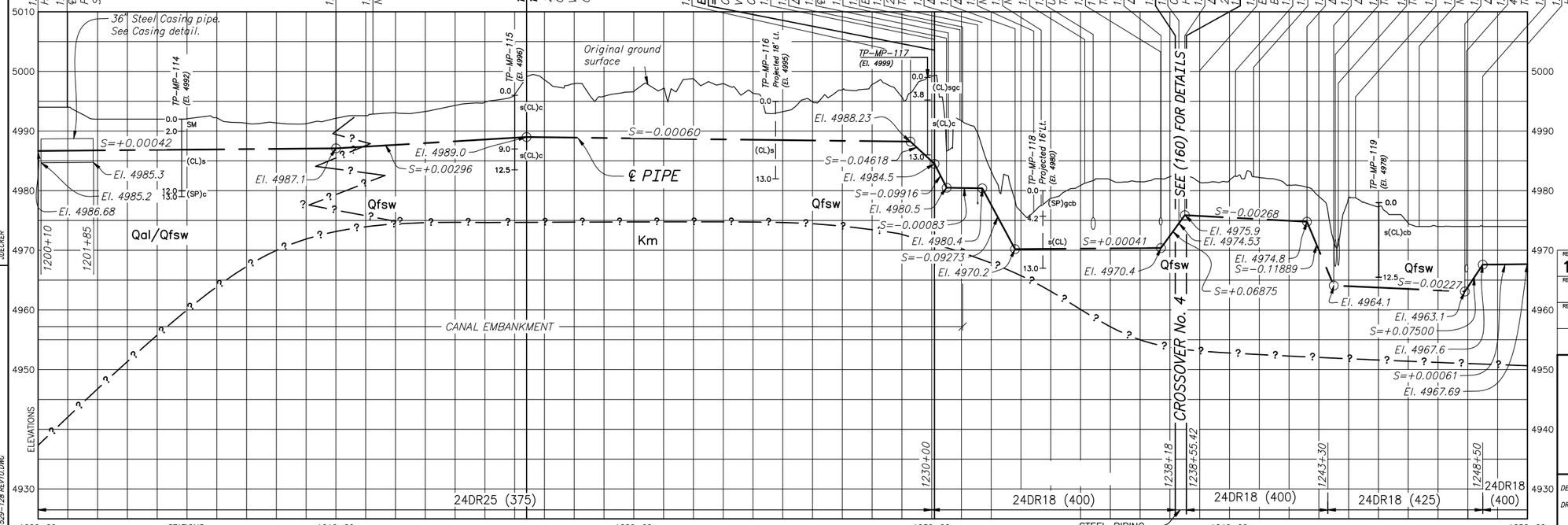
TECHNICAL APPROVAL R. K. CHRISTIANSON
SUBMITTED LES W. STONE
APPROVED JAMES A. GATES
DATE 7/15/04





OPEN-CUT ROAD CROSSINGS	
Station	Surfacing
1230+04 to 1230+15	Compacted Backfill
1230+86 to 1231+04	Compacted Backfill
1235+06 to 1235+21	Asphalt
1240+12 to 1240+27	Asphalt
1241+74 to 1241+87	Asphalt
1244+13 to 1244+32	Asphalt

NOTE: Open cut roads require compacted backfill per specifications. See (169) for details.



NOTES

1. For General Notes, Abbreviations, Symbols and Pipe Classifications, see (102).
2. For construction limitations near US Highway 64, see specifications.
3. For Hogback Canal crossing details, see (184).
4. Backfill shall be compacted where drawings indicate the alignment is in canal embankment, see specifications.
5. Due to the Hogback Canal, the 2 foot minimum clearance is being waived for the 2" PVC waterline at 1231+55. Extreme caution should be used during construction.

6. If powerline voltage is not given, contractor is to determine voltage and maintain required clearances. The contractor shall notify the COR of the powerline voltage two days before work commences in the area.

REV NO		
10	2011-12-05 FCCF-233 JED	CORRECTED COORDINATES ON AP 1221+40.73.
9	2011-07-26 FCCF-233 JED	MOVED PROTECTION FENCE TO NORTH CONSTRUCTION ROW.
8	2011-05-20 FCCF-233 JED	REVISED HORIZONTAL AND VERTICAL ALINGMENT - STATION 1225+42.91 TO 1230+09.66 TO AVOID CACTUS. ADDED PROTECTION FENCE.

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ANIMAS - LA PLATA PROJECT COLORADO - NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

HOGBACK REACH AND SHIPROCK REACH

STATION 1200+00 TO 1250+00

PLAN AND PROFILE

DESIGNED L. A. BAROS CHECKED JAYE E. DECKER
DRAWN D. R. GOOD/ CHOU CHA TECH. APPR. LINDA M. BOWLES, P.E.
APPROVED TEDD R. CALHOUN, P.E. PEER REVIEWER - TEDD R. CALHOUN, P.E.

FARMINGTON, NEW MEXICO 2004-05-13
SHEET 1 OF 1

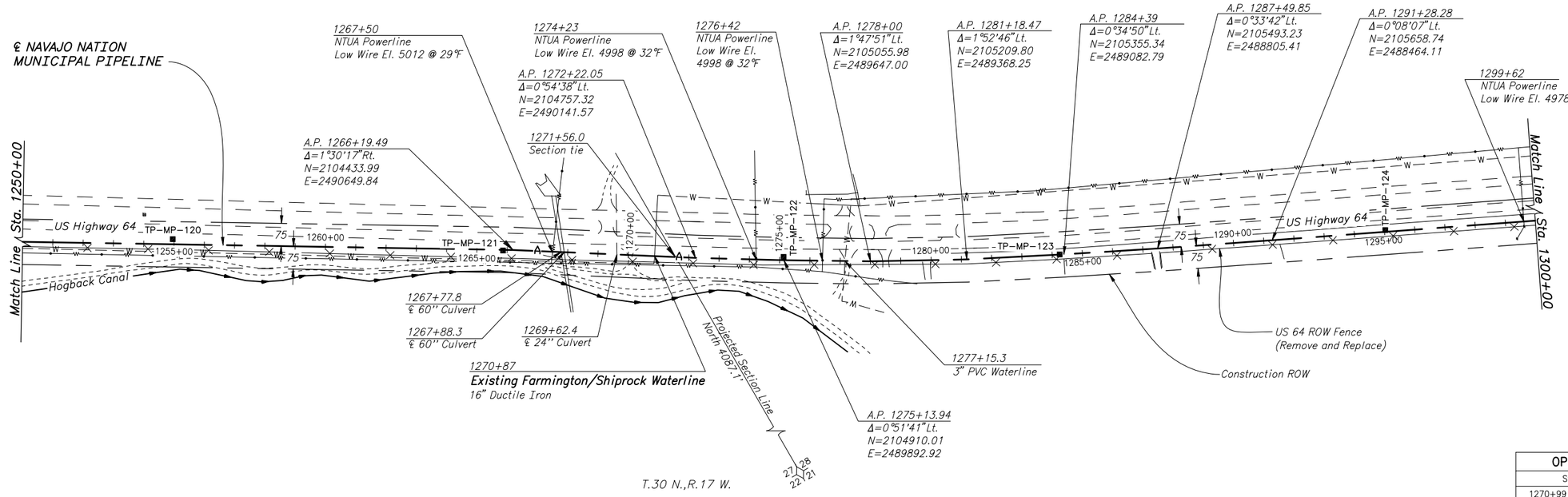
69-529-128

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PLOTTED BY: JDECKER

CAD SYSTEM: AutoCAD Rel. 18.1s
CAD FILENAME: X:\69-529-128 REV10.DWG

GEOLOGY Date 12/15/07

TECHNICAL APPROVAL — R. K. CHRISTIANSON
SUBMITTED — LES W. STONE
APPROVED — JAMES E. GATES

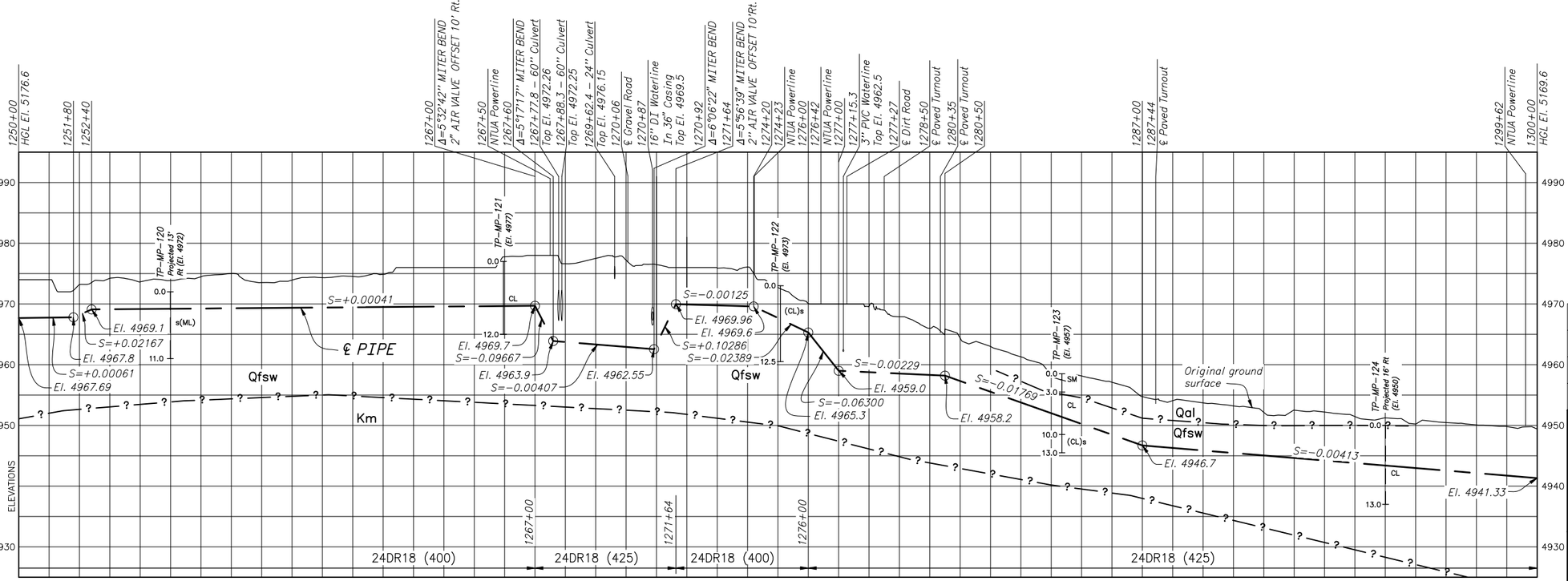


PLAN

200 0 200 400 600
SCALE OF FEET

OPEN-CUT ROAD CROSSINGS	
Station	Surfacing
1270+99 to 1271+13	Gravel
1277+18 to 1277+36	Compacted Backfill
1278+40 to 1278+61	Asphalt
1280+27 to 1280+43	Asphalt
1287+34 to 1287+54	Asphalt

NOTE: Open cut roads require compacted backfill per specifications. See (169) for details.



NOTES

1. For General Notes, Abbreviations, Symbols and Pipe Classifications, see (102).
2. For construction limitations near US Highway 64, see specifications.

3. If powerline voltage is not given, contractor is to determine voltage and maintain required clearances. The contractor shall notify the COR of the powerline voltage two days before work commences in the area.

REV NO		
3	2010-10-12 FCCF-233 JED	CORRECTED 16" DI PIPE LOCATION FROM 1270+19 TO 1270+87 AND CORRECTED CASING SIZE AND ELEV. REVISED VERT ALIGN FROM STA 1270+30 TO 1271+64. MOVED AIR VALVE TO 1271+64.
2	2010-09-27 FCCF-233 JED	OFFSET HORIZONTAL ALIGNMENT 10 FEET SOUTH FROM STATION 1278+00 TO 1307+50.
1	2009-11-02 FCCF-413 JED	ADDED OR CORRECTED POWERLINES ON PLANE AND PROFILE. ADDED NOTE 3.

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ANIMAS-LA PLATA PROJECT COLORADO – NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

SHIPROCK REACH

STATION 1250+00 TO 1300+00

PLAN AND PROFILE

DESIGNED L. A. BARROS CHECKED JAYE E. DECKER
DRAWN D. R. GOOD/ CHOU CHA TECH. APPR. LINDA M. BOWLES, P.E.
APPROVED TEDD R. CALHOUN, P.E. LINDA M. BOWLES P.E.
PEER REVIEWER – TEDD R. CALHOUN, P.E.

FARMINGTON, NEW MEXICO 2004-05-13
SHEET 1 OF 1

69-529-129

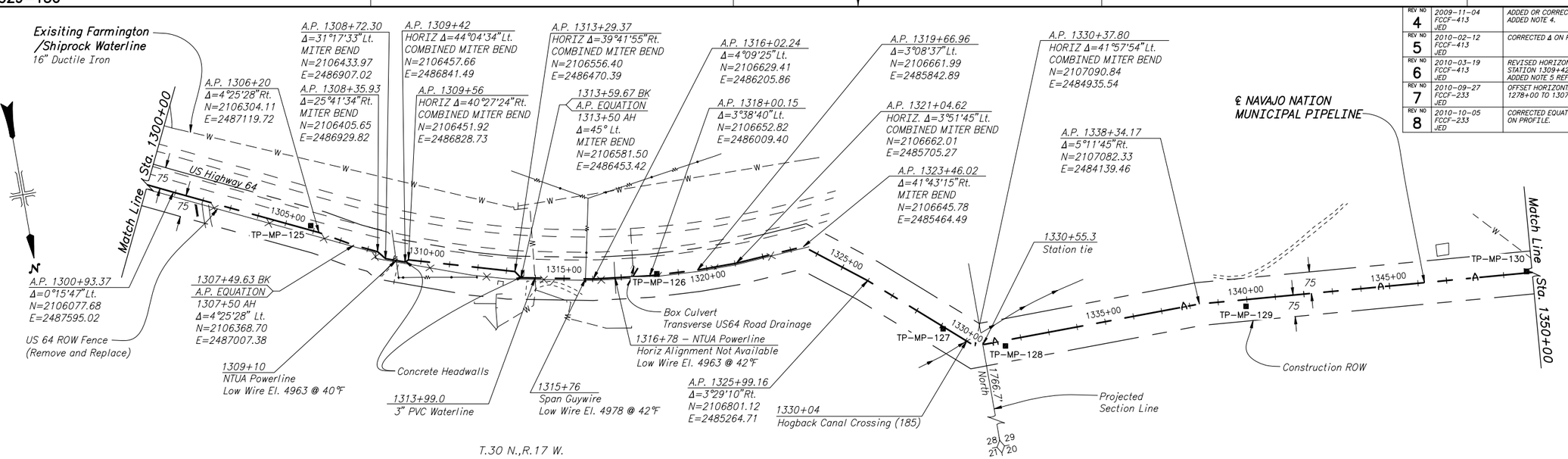
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PLOTTED BY JDECKER

CAD SYSTEM AutoCAD Rel. 17.2s
CAD FILENAME 33 69-529-129 REV03.DWG

REV NO		
4	2009-11-04 FCCF-413 JED	ADDED OR CORRECTED POWERLINES ON PLAN AND PROFILE. ADDED NOTE 4.
5	2010-02-12 FCCF-413 JED	CORRECTED Δ ON PROFILE AT STATION 1324+30.
6	2010-03-19 FCCF-413 JED	REVISED HORIZONTAL AND VERTICAL ALINGMENT FROM STATION 1309+42 TO 1313+50. ADDED NOTE 5 REFERENCING DETAILED DRAWING 69-529-222.
7	2010-09-27 FCCF-233 JED	OFFSET HORIZONTAL ALIGNMENT 10 FEET SOUTH FROM STATION 1278+00 TO 1307+50.
8	2010-10-05 FCCF-233 JED	CORRECTED EQUATION 1307+49.63 BK.=1307+50 AH. ON PROFILE.

GEOLOGY Date 1/15/07

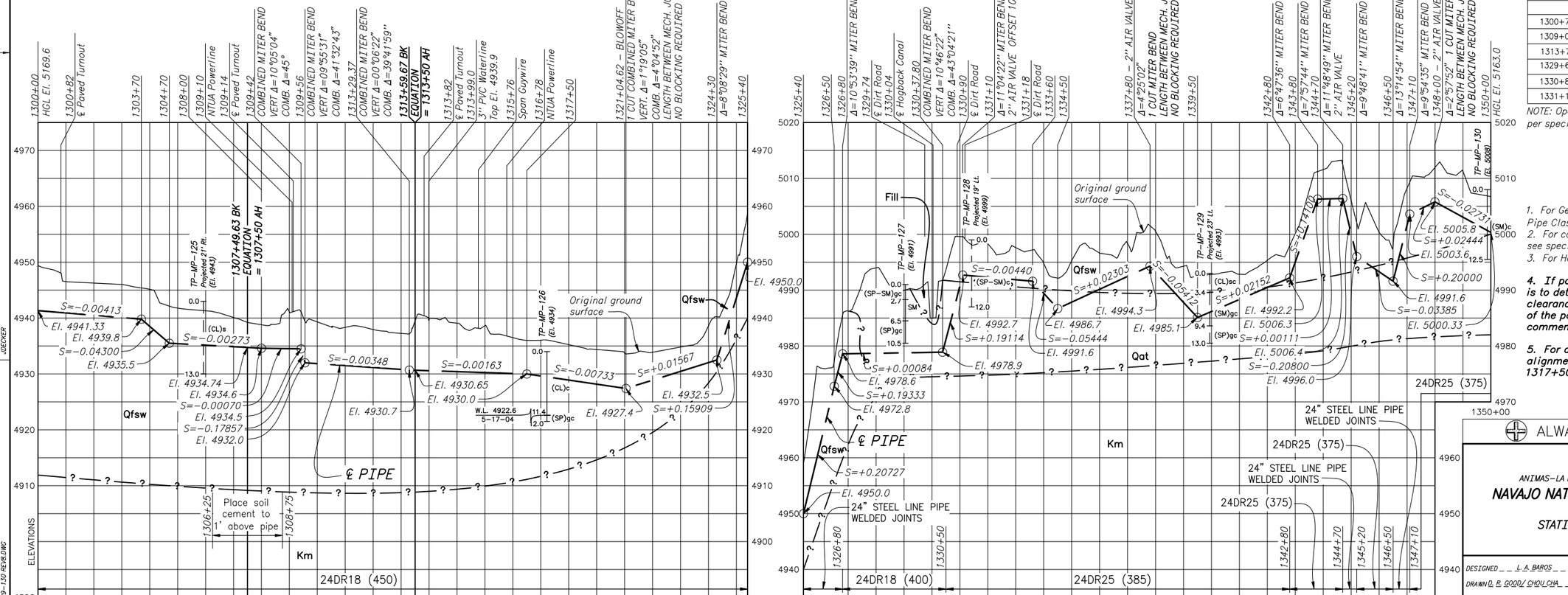
TECHNICAL APPROVAL — R. K. CHRISTIANSON —
SUBMITTED — LES W. STONE —
APPROVED — JAMES L. GATES —



T.30 N.,R.17 W.

PLAN

SCALE OF FEET 200 0 200 400 600



OPEN-CUT ROAD CROSSINGS	
Station	Surfacing
1300+75 to 1300+90	Asphalt
1309+05 to 1309+24	Asphalt
1313+72 to 1313+91	Asphalt
1329+67 to 1329+82	Compacted Backfill
1330+85 to 1330+94	Compacted Backfill
1331+14 to 1331+23	Compacted Backfill

NOTE: Open cut roads require compacted backfill per specifications. See (169) for details.

NOTES

1. For General Notes, Abbreviations, Symbols and Pipe Classifications, see (102).
2. For construction limitations near US Highway 64, see specifications.
3. For Hogback Canal crossing details, see (185).
4. **If powerline voltage is not given, contractor is to determine voltage and maintain required clearances. The contractor shall notify the COR of the powerline voltage two days before work commences in the area.**
5. **For detailed plan and profile of revised alignment and grade from station 1308+00 to 1317+50 see drawing 809-529-222.**

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ANIMAS-LA PLATA PROJECT COLORADO – NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

SHIPROCK REACH

STATION 1300+00 TO 1350+00

PLAN AND PROFILE

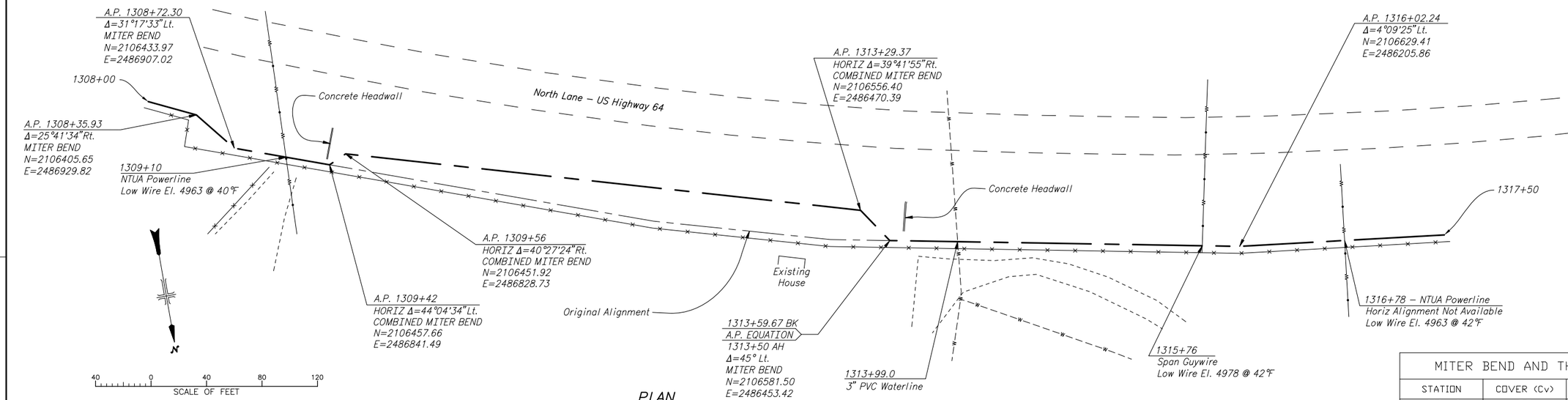
DESIGNED L. A. BAROS CHECKED JAYE E. DECKER
DRAWN R. GOOD/ CHOU CHA TECH. APPR. LINDA M. BOWLES, P.E. LINDA M. BOWLES P.E.
APPROVED TEDD R. CALHOUN, P.E. PEER REVIEWER – TEDD R. CALHOUN, P.E.

FARMINGTON, NEW MEXICO 2004-05-13
SHEET 1 OF 1

69-529-130

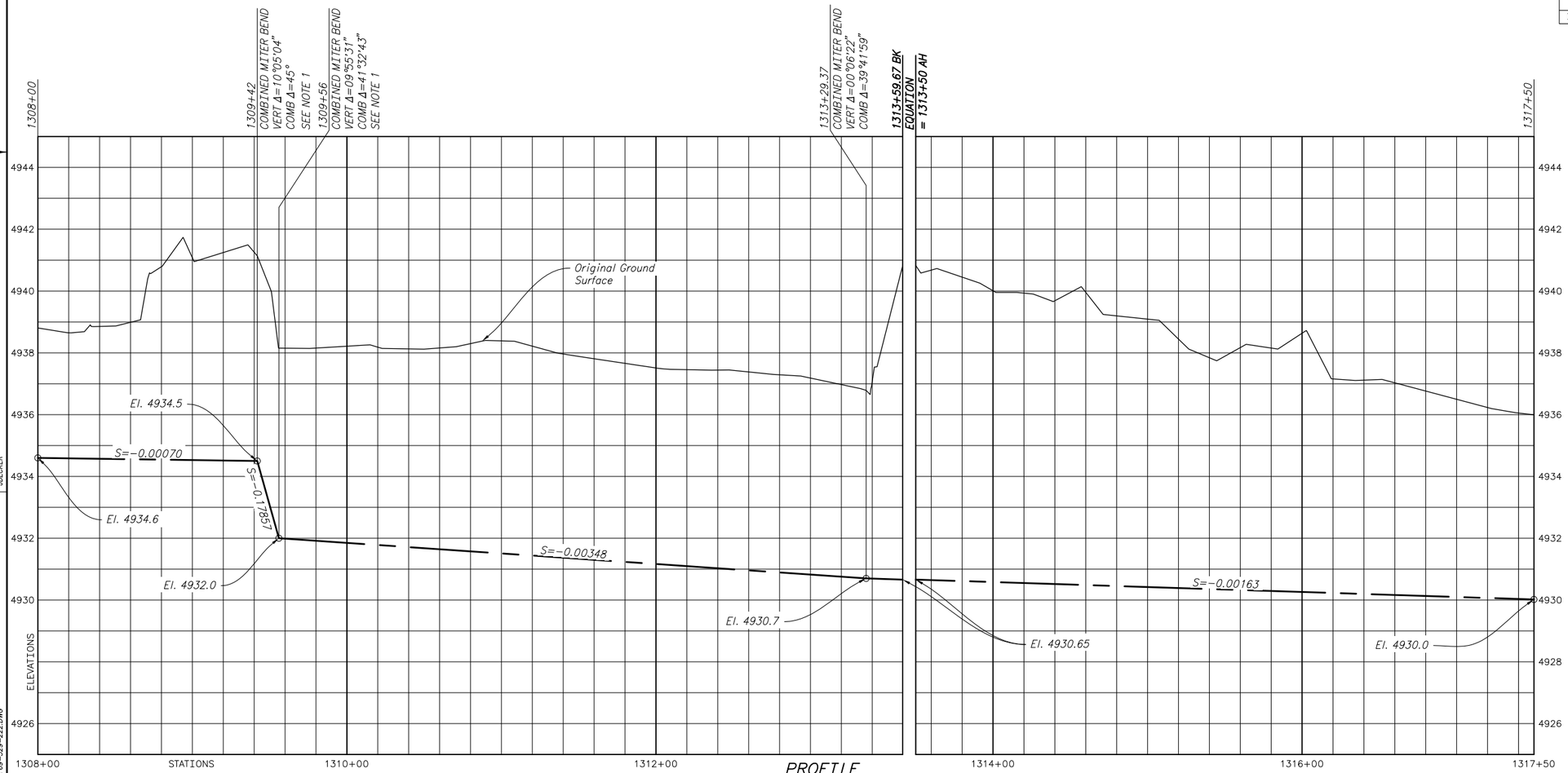
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OCTOBER 6, 2010 10:59
PLOTTED BY
JDECKER

CAD SYSTEM
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CAD FILENAME
34 69-529-130 REV8.DWG



PLAN

MITER BEND AND THRUST BLOCK DATA			
STATION	COVER (Cv)	BLOCKING LENGTH (C)	RADIUS
1309+42	5.5	14	18
1309+56	5	14	19
1313+29.37	5	14	20
1313+59.68 BK	9	9	11



PROFILE

NOTES:

1. Combined Bends at stations 1309+42 and 1309+56 shall be installed as one unit. The concrete encasement shall be continuous from station 1309+35 to 1309+63.

2. See Drawing 69-529-130 for Utilities, Roads, etc. not shown on this drawing.

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ANIMAS-LA PLATA PROJECT COLORADO – NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

SHIPROCK REACH

STATION 1308+00 TO 1317+50

REVISED PLAN AND PROFILE

DESIGNED JAYE F. DECKER CHECKED DARRYL GOOD

DRAWN JAYE F. DECKER TECH. APPR. BRIAN WAGNER

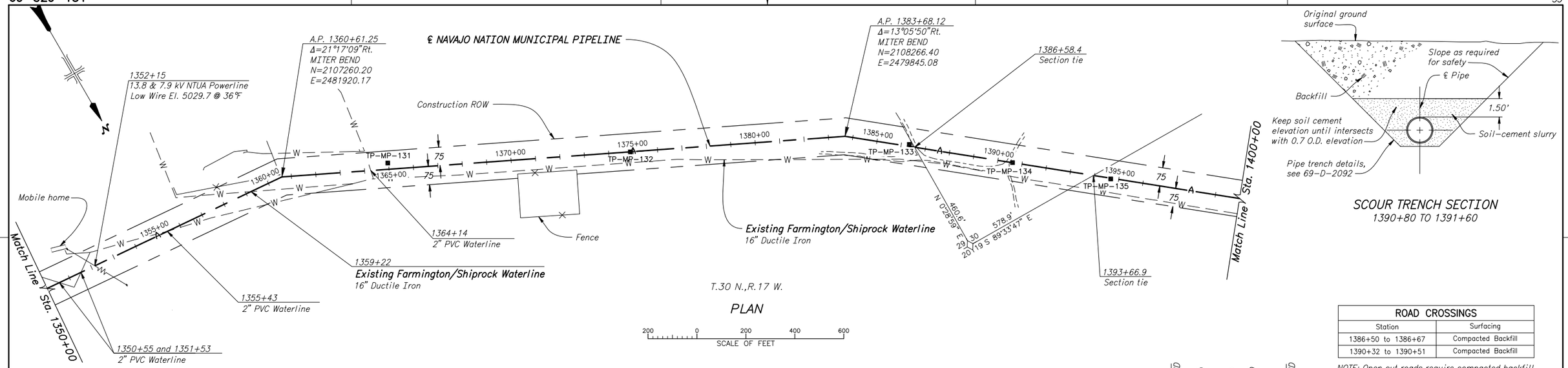
APPROVED DOUG DOCKTER, PE

FARMINGTON, NEW MEXICO 2010-03-11
SHEET 1 OF 1

69-529-222

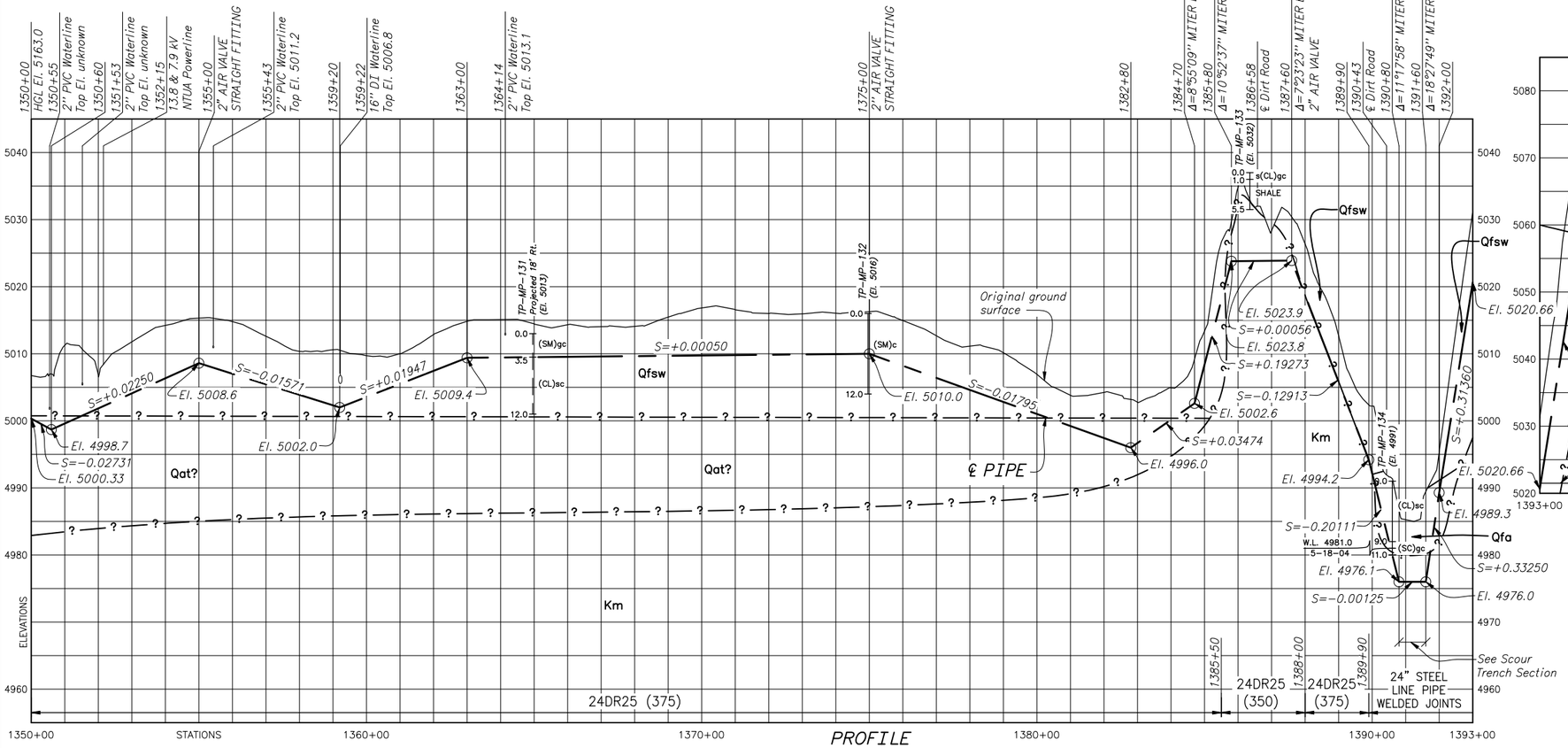
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OCTOBER 6, 2010 16:01
PLOTTED BY
JDECKER

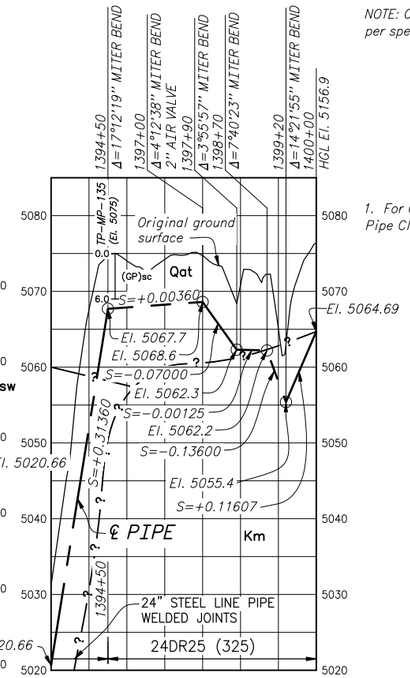
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CAD FILENAME
34A 69-529-222.DWG



ROAD CROSSINGS	
Station	Surfacing
1386+50 to 1386+67	Compacted Backfill
1390+32 to 1390+51	Compacted Backfill

NOTE: Open cut roads require compacted backfill per specifications. See (169) for details.





NOTES

1. For General Notes, Abbreviations, Symbols and Pipe Classifications, see (102).

REV NO	DATE	BY	DESCRIPTION
4	2010-02-11	FCCF-413 JED	REVISED AIR VALVE CALLS ON PROFILE AT STATION 1355+00 AND STATION 1375+00.
3	2009-06-04	FCCF-413 JED	MADE VPI'S AT 1355+00 AND 1375+00 MITER BENDS TO MATCH DRAWING 69-529-196.
2	2008-04-01	FCCF-410 JED	ADDED VOLTAGE TO POWERLINE.
1	2008-02-08	FCCF-410 JED	REVISED STEEL PIPE CALLOUTS ON PROFILE.

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ANIMAS-LA PLATA PROJECT COLORADO - NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

SHIPROCK REACH

STATION 1350+00 TO 1400+00

PLAN AND PROFILE

GEOLOGY Date 1/15/07

TECHNICAL APPROVAL - R. K. CHRISTIANSON
SUBMITTED - LES W. STONE
APPROVED - JAMES A. CATES

DESIGNED - L. A. BAROS - CHECKED - JAYE E. DECKER
DRAWN - R. GOOD/ CHOU CHA - TECH. APPR. - LINDA M. BOWLES, P.E.
APPROVED - TEDD R. CALHOUN, P.E. - LINDA M. BOWLES P.E.
PEER REVIEWER - TEDD R. CALHOUN, P.E.

FARMINGTON, NEW MEXICO 2004-05-13
SHEET 1 OF 1

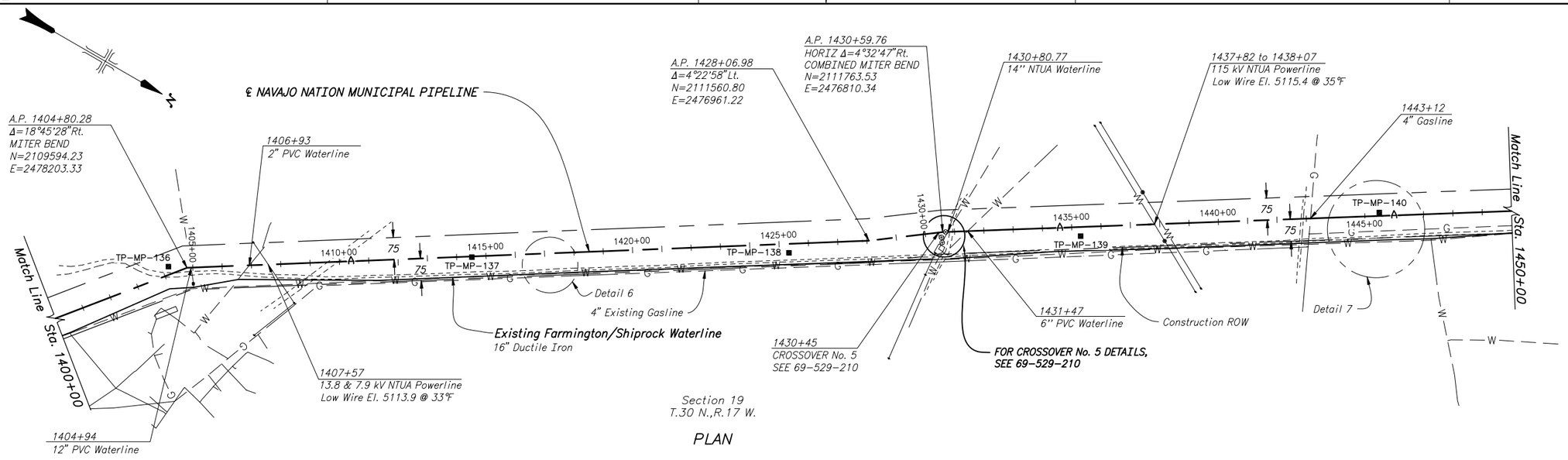
69-529-131

DATE AND TIME PLOTTED: OCTOBER 6, 2010 16:08
PLOTTED BY: JDECKER

CAD SYSTEM: AutoCAD Rel. 17.2s
CAD FILENAME: 35 69-529-131 REV04.DWG

GEOLOGY Date 1/15/07

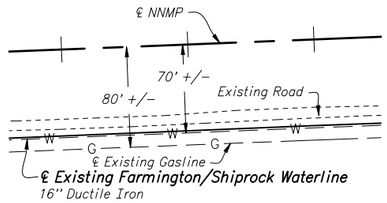
TECHNICAL APPROVAL — R. K. CHRISTIANSON
SUBMITTED — LES W. STONE
APPROVED — JAMES A. GATES



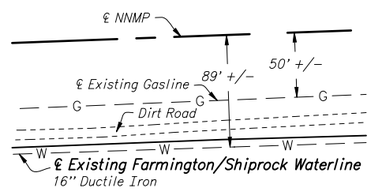
Section 19
T.30 N.,R.17 W.

PLAN

200 0 200 400 600
SCALE OF FEET



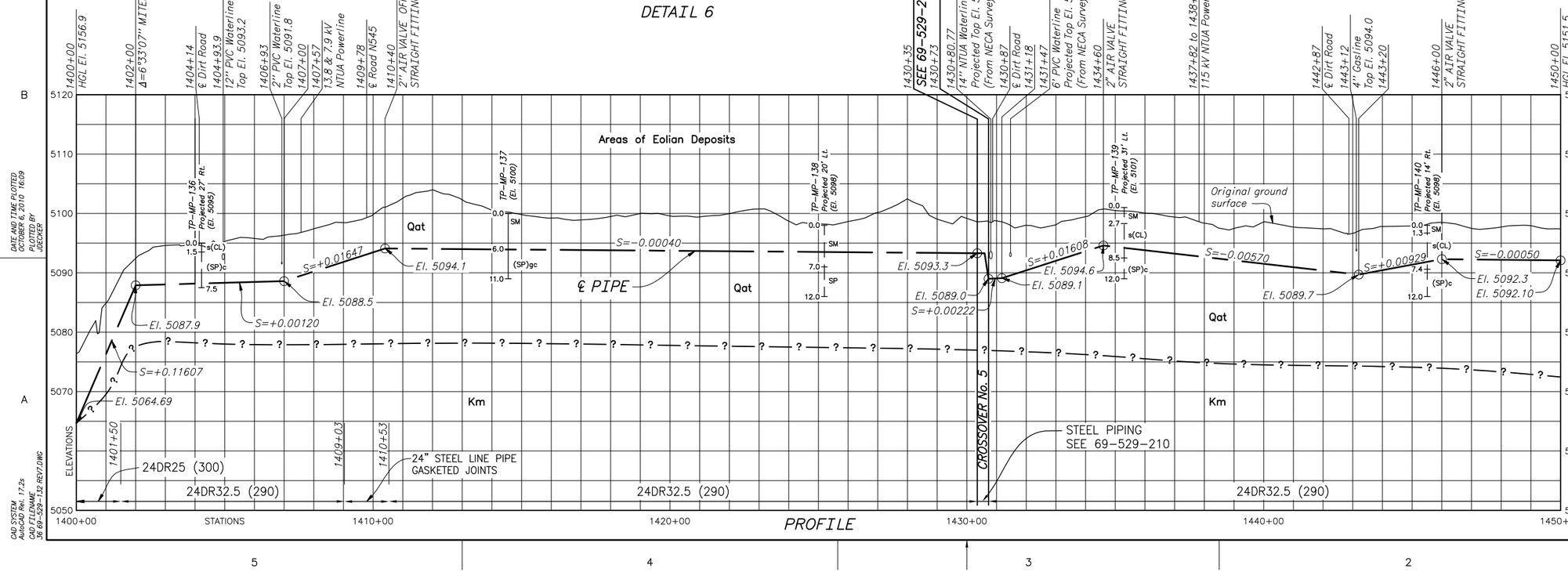
DETAIL 6



DETAIL 7

OPEN-CUT ROAD CROSSINGS	
Station	Surfacing
1403+94 to 1404+33	Compacted Backfill
1409+56 to 1409+96	Compacted Backfill
1430+79 to 1430+94	Compacted Backfill
1442+82 to 1442+90	Compacted Backfill

NOTE: Open cut roads require compacted backfill per specifications. See (169) for details.



NOTES

1. For General Notes, Abbreviations, Symbols and Pipe Classifications, see (102).
2. For construction limitations near gasline, see specifications.
3. **Location of 14-inch Ductile Iron water line at station 1430+80.77 is based on contractor survey. The contractor will be responsible for any misalignments due to locations given for this water line.**

REV NO		
7	2010-05-10 FCCF-413 JED	REVISED DRAWING TO MATCH SURVEYED LOCATION OF 14-INCH DUCTILE IRON PIPELINE. REVISED NOTE 3.
6	2010-02-11 FCCF-413 JED	REVISED AIR VALVE CALLS ON PROFILE AT STATION 1410+40, STATION 1434+60, AND STATION 1446+00.
5	2009-09-04 FCCF-413 JED	ADDED CROSSOVER NO. 5 AND NOTE 3. REMOVED SECTION TIE CALL FROM PLAN VIEW. CORRECTED WATERLINE PIPE SIZES AND LOCATIONS.
4	2009-06-05 FCCF-413 JED	MADE VPI's AT 1410+40, 1434+60, AND 1446+00 MITER BENDS TO MATCH DRAWING 69-529-156.

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ANIMAS-LA PLATA PROJECT COLORADO - NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

SHIPROCK REACH

STATION 1400+00 TO 1450+00

PLAN, PROFILE, AND DETAILS

DESIGNED L. A. BAROS CHECKED JAYE E. DECKER
DRAWN D. R. GOOD/ CHOU CHA TECH. APPR. LINDA M. BOWLES, P.E.
LINDA M. BOWLES P.E.
APPROVED TEDD R. CALHOUN, P.E.
PEER REVIEWER - TEDD R. CALHOUN, P.E.

FARMINGTON, NEW MEXICO 2004-05-13
SHEET 1 OF 1

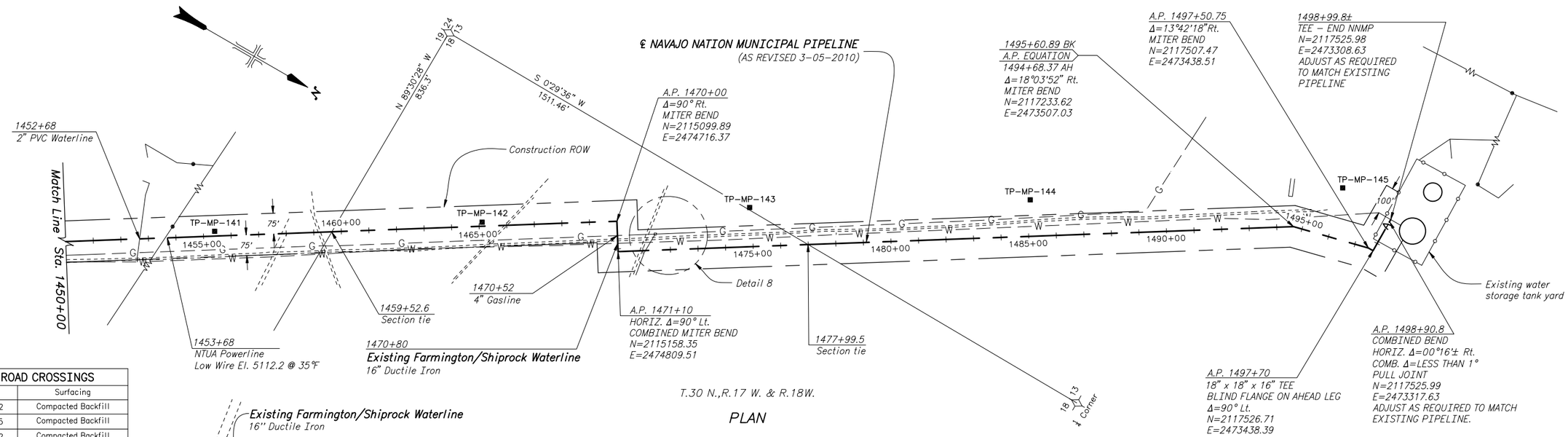
69-529-132

DATE AND TIME PLOTTED
OCTOBER 6, 2010 16:09
PLOTTED BY
JDECKER

CAD SYSTEM
AutoCAD Rel. 17.2s
CAD FILENAME
36 69-529-132 REV7.DWG

GEOLOGY Date 1/15/07

TECHNICAL APPROVAL — R. K. CHRISTIANSON —
SUBMITTED — LES W. STONE —
APPROVED — JAMES L. GATES —



T.30 N.,R.17 W. & R.18W.

PLAN

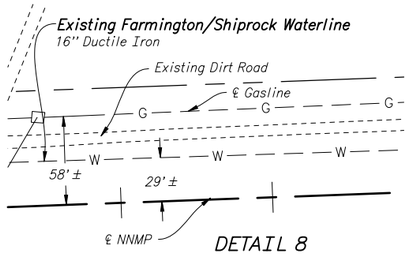
200 0 200 400 600
SCALE OF FEET

OPEN-CUT ROAD CROSSINGS	
Station	Surfacing
1457+82 to 1458+02	Compacted Backfill
1459+16 to 1459+25	Compacted Backfill
1465+92 to 1466+02	Compacted Backfill
1470+64 to 1470+72	Compacted Backfill
1471+89 to 1471+99	Compacted Backfill
1497+50 to 1498+08 *	Compacted Backfill
1498+08 to End **	Gravel

NOTE: Open cut roads require compacted backfill per specifications. See (169) for details.

* Future Tank Yard

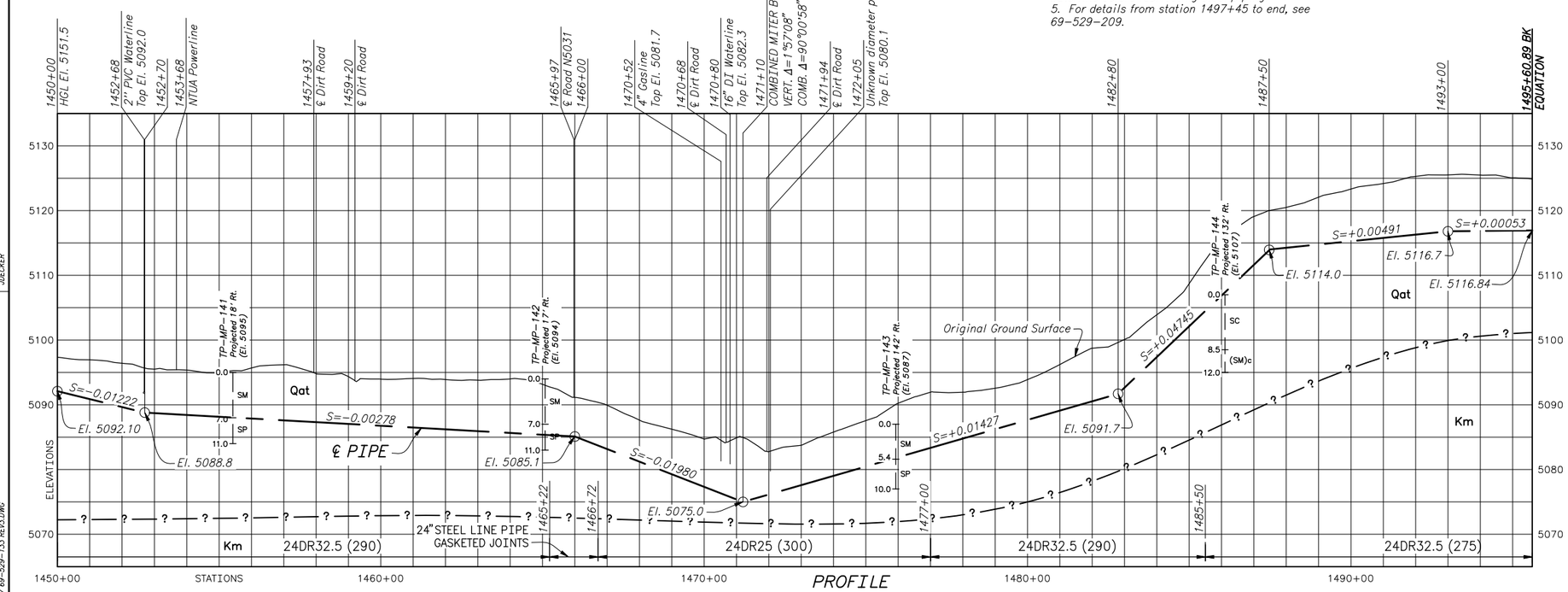
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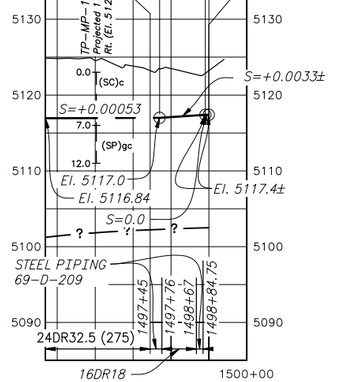


DETAIL 8

NOTES

1. For General Notes, Abbreviations, Symbols and Pipe Classifications, see (102).
2. For Information Only drawings, see (58 and 59) for Tank Site Layout and Pipe Manifold Location.
3. For construction limitations near gasline, see specifications.
4. Contractor to verify location of existing waterline before fabricating steel piping.
5. For details from station 1497+45 to end, see 69-529-209.





REV NO	DATE	DESCRIPTION
3	2010-03-08 JED	REVISED HORIZONTAL AND VERTICAL ALIGNMENT CORRECTED ALL CALLS TO NEW ALIGNMENT.
2	2009-04-10 JED	DELETED FUTURE STORAGE TANK. ADDED TIE INTO EXISTING PIPELINE. ADDED NOTE 4 AND 5.
1	2008-02-12 JED	REVISED STEEL PIPE CALLOUT ON PROFILE.

DATE AND TIME PLOTTED OCTOBER 6, 2010 16:11
PLOTTED BY JDECKER

CAD SYSTEM AutoCAD Rel. 17.2s
CAD FILENAME 37 69-529-133 REV3.DWG

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ANIMAS-LA PLATA PROJECT COLORADO - NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

SHIPROCK REACH

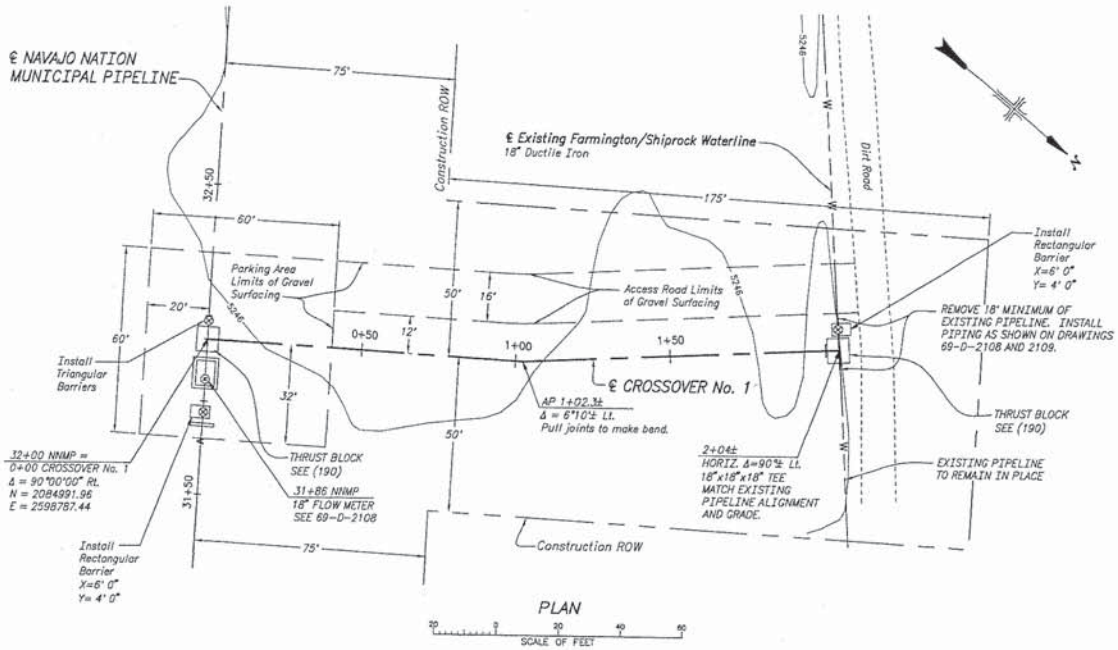
STATION 1450+00 TO END

PLAN, PROFILE, AND DETAIL

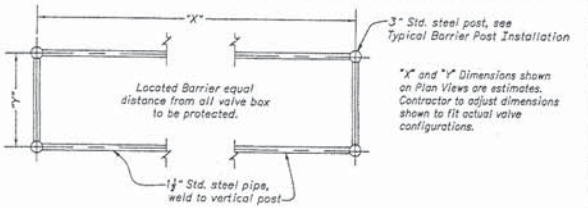
DESIGNED L. A. BAROS CHECKED JAYE E. DECKER
DRAWN R. GOOD/ CHOU CHA TECH. APPR. LINDA M. BOWLES, P.E.
LINDA M. BOWLES P.E.
APPROVED TEDD R. CALHOUN, P.E.
PEER REVIEWER - TEDD R. CALHOUN, P.E.

FARMINGTON, NEW MEXICO 2004-05-13
SHEET 1 OF 1

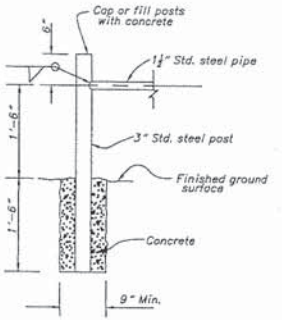
69-529-133



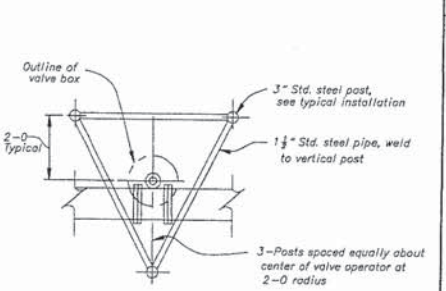
PLAN



WELDED RECTANGULAR BARRIER



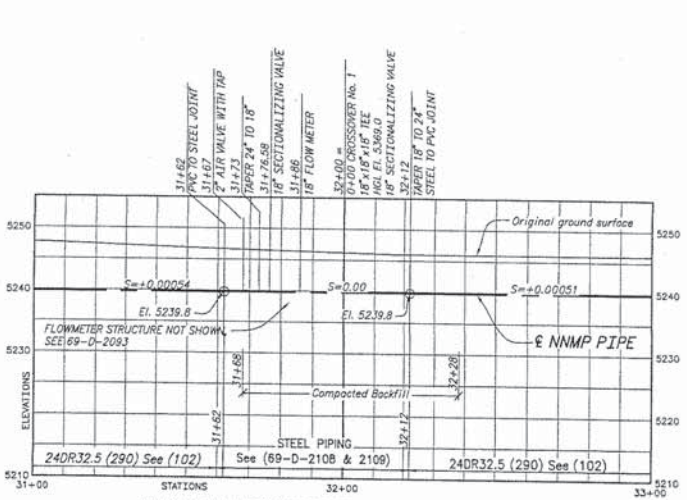
TYPICAL BARRIER POST INSTALLATION



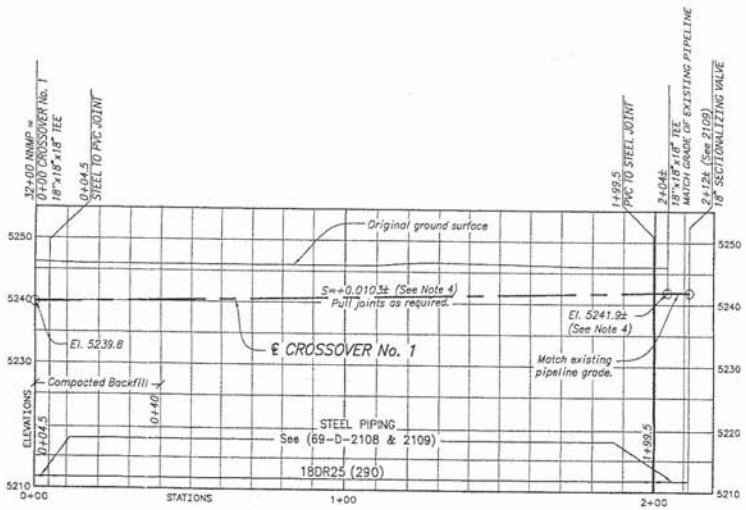
WELDED TRIANGULAR BARRIER
(FOR VALVES WITHOUT BYPASS)

NOTES

1. For General Notes, Abbreviations, Symbols and Pipe Classifications, see (102).
2. For the Plan and Profile of the Navajo Nation Municipal Pipeline (Fruitland Reach), see (102).
3. For valves, flow meters and mechanical details, see 69-D-2108 or 69-D-2109.
4. Existing pipe locations and elevations shall be verified by contractor before equipment submittals.
5. Excavation and trench construction as shown on 69-D-2092.
6. Flowmeter Vault details shown on 69-D-2093.
7. Grade Access Road and Parking Area to smooth surface, that provides for drainage, before gravel surfacing is placed. Place minimum of 4-inches of gravel surfacing.



NAVAJO NATION MUNICIPAL PIPELINE PROFILE



CROSSOVER No. 1 PROFILE

REV. NO.	DATE / BY	DESCRIPTION
4	2008-09-18 FCC/410 JED	REPLACED METER BEND AT EXISTING LINE WITH TEE. ADDED FLANGED WITH PLATE FOR FUTURE EMERGENCY TIE IN. MOVED VALVE ON CROSSOVER TO DOWNSTREAM OF TEE.
3	2008-08-18 FCC/410 JED	REMOVED PIPE SIZES FROM STEEL PIPING CALLOUTS. REVISED DRAWING CALLOUTS ON STEEL PIPING. REVISED PIPE PLUG CALLOUT TO MATCH 69-D-2108.
2	2008-05-28 FCC/410 JED	ADDED BARRIER DETAILS AND LOCATIONS.
1	2008-05-02 FCC/410 JED	REVISED CROSSOVER PIPING. ADDED 18DR25 PIPE. DELETED ONE FLOW METER. CHANGED LOCATION OF REMAINING FLOWMETER. REVISED PARKING AREA LAYOUT.

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ANIMAS – LA PLATA PROJECT COLORADO – NEW MEXICO

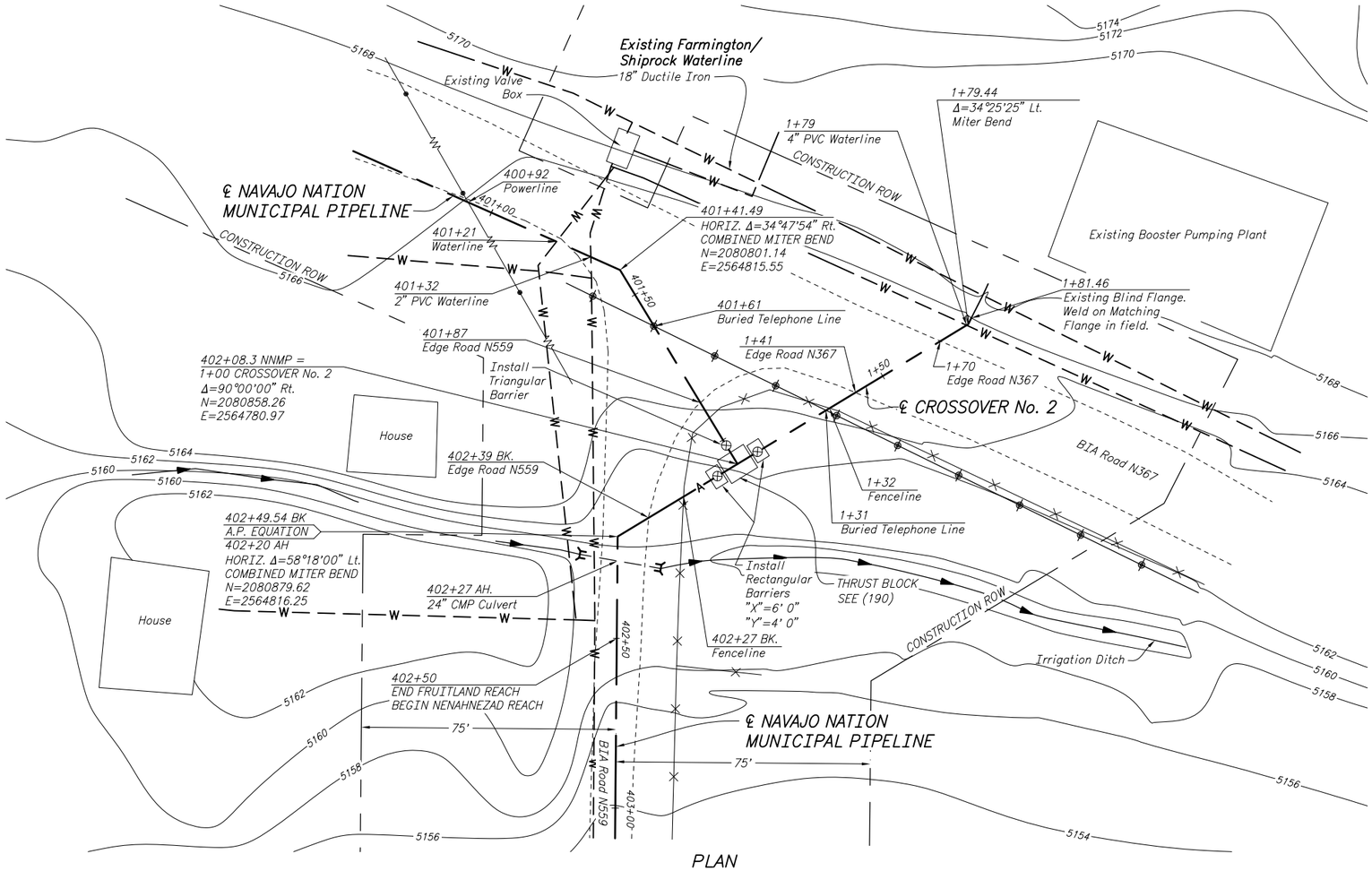
NAVAJO NATION MUNICIPAL PIPELINE
FRUITLAND REACH
CROSSOVER No. 1
PLAN AND PROFILES

DESIGNED L. A. BARROS CHECKED KYLE E. GEIGER
DRAWN L. A. BARROS/ZQU 2/18 TECH. APPR. LYNDA M. BOWLES P.E.
APPROVED TEDD R. CALHOUN, P.E. PEER REVIEWERS – TEDD R. CALHOUN, P.E.
FARMINGTON, NEW MEXICO 2008-05-19
SHEET 1 OF 1

69-529-101

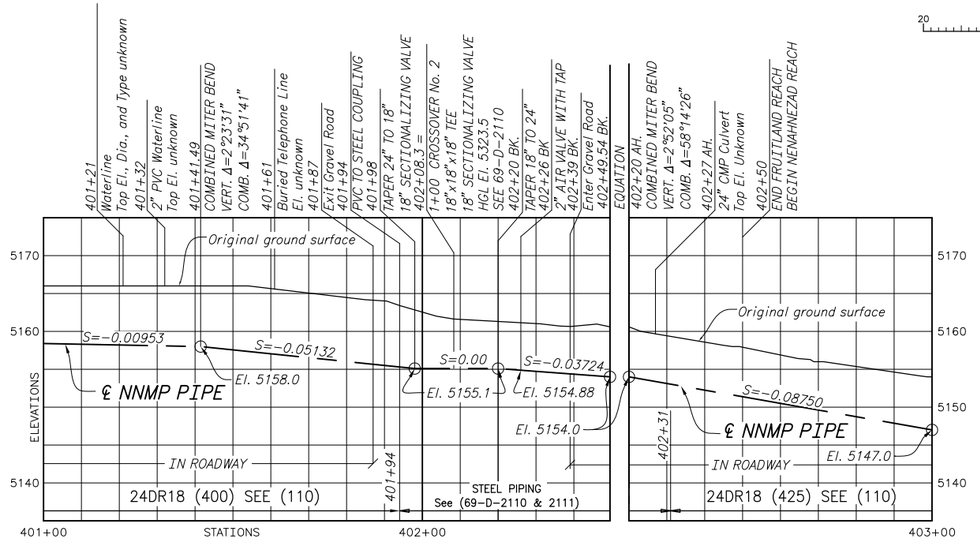
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CAD FILENAME 69-529-101 REV4.DWG

DATE AND TIME PLOTTED 2008/09/18 08:08:38
PLOTTED BY JKEDKOR

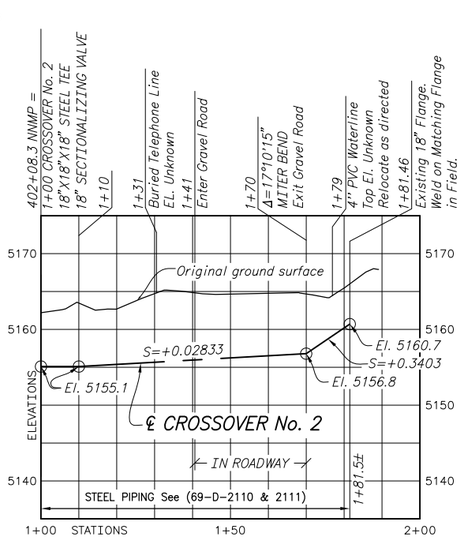


PLAN

20 0 20 40 60
SCALE OF FEET



NAVAJO NATION MUNICIPAL PIPELINE PROFILE



CROSSOVER No. 2 PROFILE

NOTES

1. For General Notes, Abbreviations, Symbols and Pipe Classifications, see (102).
2. For the Plan and Profile of the Navajo Nation Municipal Pipeline (Fruitland and Nenahnezad Reaches), see (110).
3. For valve and mechanical details, see 69-D-2110 and 69-D-2111.
4. Existing pipe locations and elevations shall be verified by contractor before equipment submittals.
5. Excavation and trench construction as shown on 69-D-2092.
6. For barrier details see 69-529-101.
7. USBR as-built survey used for adjustments.

REV NO 6	2010-07-14 FCCF-233 JED	REVISED CROSSOVER TIE IN TO EXISTING LINE TO FIT AS-BUILT SURVEY.
REV NO 5	2008-06-19 FCCF-410 JED	REMOVED PIPE SIZES FROM STEEL PIPING CALLOUTS. REVISED DRAWING CALLOUTS ON STEEL PIPING.
REV NO 4	2008-05-28 FCCF-410 JED	ADDED BARRIERS AND NOTE 6.
REV NO 3	2008-04-17 FCCF-410 JED	REVISED PVC TO STEEL COUPLING STATION ON PROFILE TO MATCH PIPING DRAWINGS.

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ANIMAS - LA PLATA PROJECT COLORADO - NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

FRUITLAND AND NENAHNEZAD REACHES

CROSSOVER No. 2
PLAN AND PROFILES

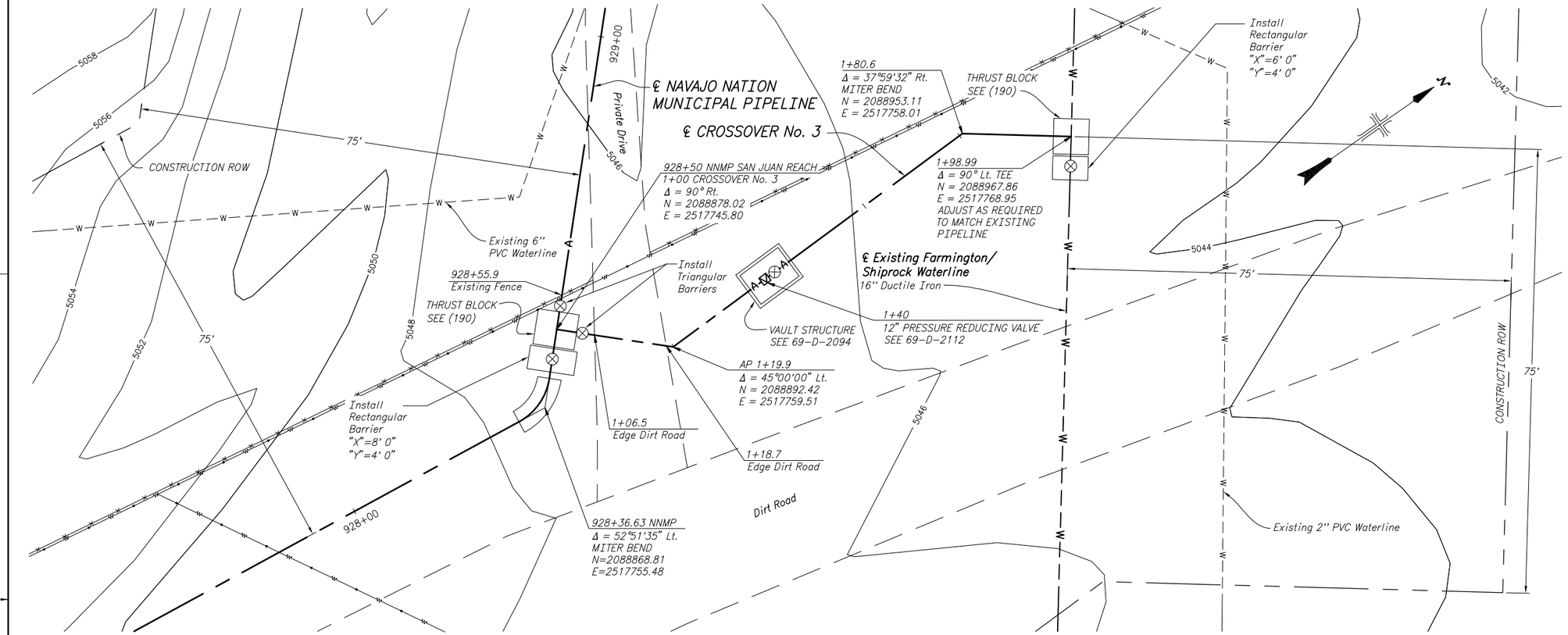
DESIGNED L. A. BAROS CHECKED JAYE E. DECKER
DRAWN L. A. BAROS/CHOU CHA TECH. APPR. LINDA M. BOWLES, P.E.
LINDA M. BOWLES P.E.
APPROVED TEDD R. CALHOUN, P.E.
PEER REVIEWER - TEDD R. CALHOUN, P.E.

FARMINGTON, NEW MEXICO 2005-03-22
SHEET 1 OF 1

69-529-116

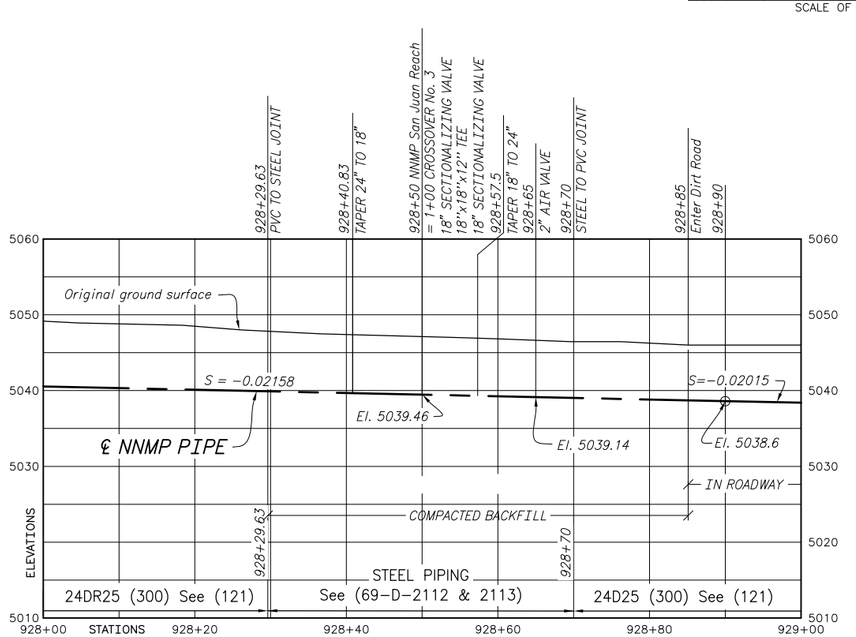
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JDECKER

CAD SYSTEM
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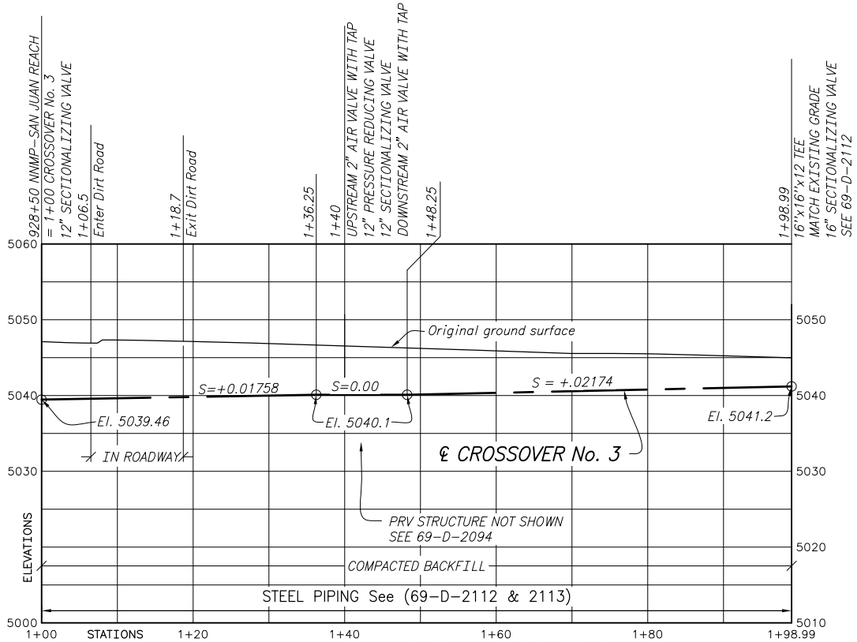


PLAN

SCALE OF FEET



NAVAJO NATION MUNICIPAL PIPELINE PROFILE



CROSSOVER No. 3 PROFILE

NOTES

1. For General Notes, Abbreviations, Symbols and Pipe Classifications, see (102).
2. For the Plan and Profile of the Navajo Nation Municipal Pipeline (San Juan Reach), see (121).
3. For valves and mechanical details, see 69-D-2112.
4. Existing pipe locations and elevations shall be verified by contractor before equipment submittals.
5. Excavation and trench construction as shown on 69-D-2092.
6. For PRV structure details, see 69-D-2094.
7. For barrier details see 69-529-101.
8. Powerline voltage, low wire elevations, and centerline stations shown on (121).

REV NO 6	2009-10-23 FCCF-413 JED	REVISED POWERLINE LOCATIONS TO MATCH DRAWING 69-529-121. ADDED NOTE 8.
REV NO 5	2009-03-25 FCCF-413 JED	ADDED DOWNSTREAM AIR VALVE IN PRESSURE REDUCING VAULT.
REV NO 4	2008-06-16 FCCF-410 JED	REMOVED PIPE SIZES FROM STEEL PIPING CALLOUTS. REVISED DRAWING CALLOUTS ON STEEL PIPING.

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NAVAJO NATION MUNICIPAL PIPELINE

SAN JUAN REACH

CROSSOVER No. 3

PLAN AND PROFILES

DESIGNED L. A. BAROS CHECKED JAYE E. DECKER

DRAWN D. R. GOOD/ CHOU CHA TECH. APPR. LINDA M. BOWLES, P.E. LINDA M. BOWLES P.E.

APPROVED TEDD R. CALHOUN, P.E.

PEER REVIEWER – TEDD R. CALHOUN, P.E.

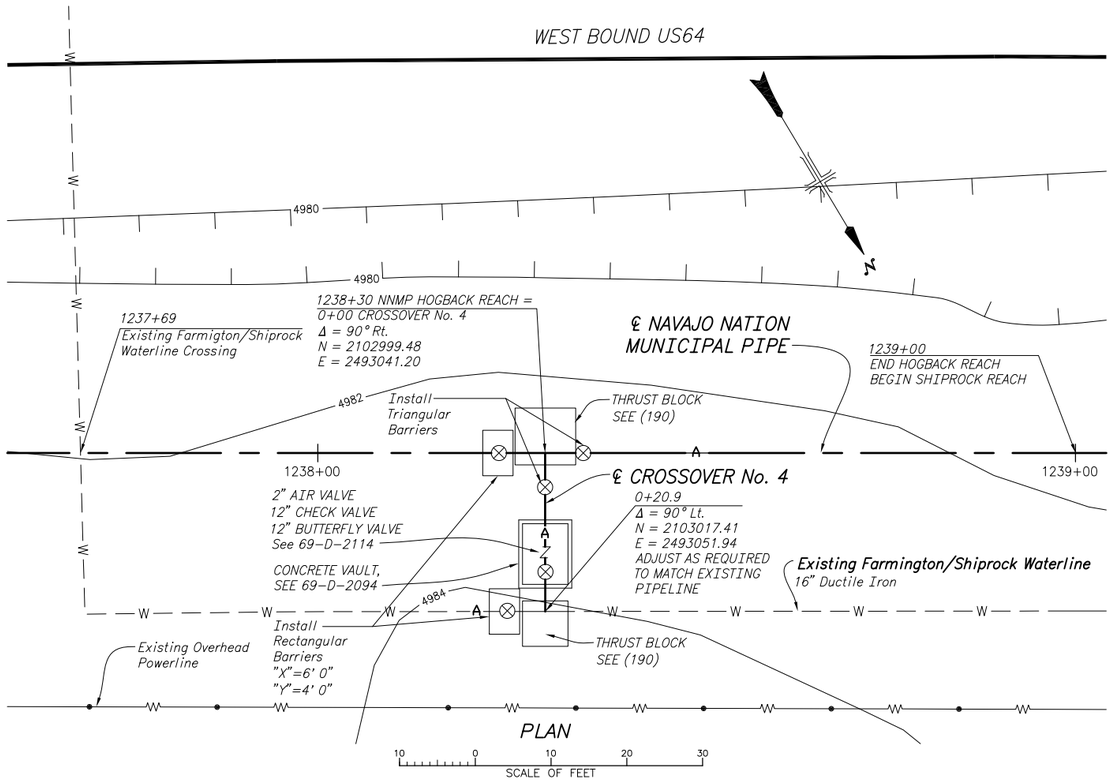
FARMINGTON, NEW MEXICO 2005-05-18

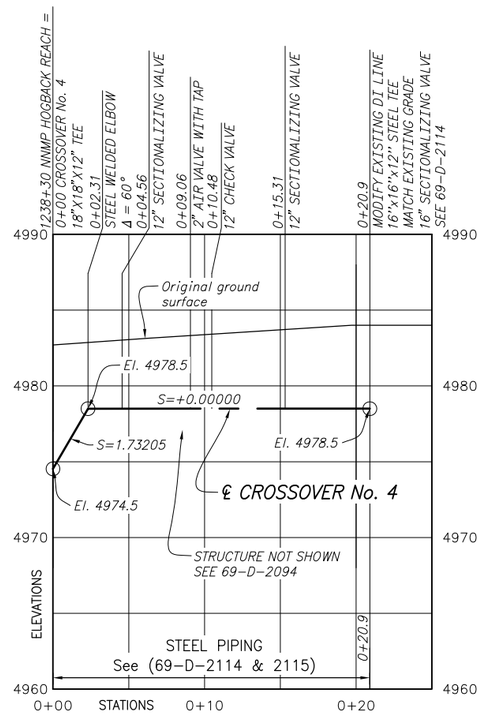
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69-529-122

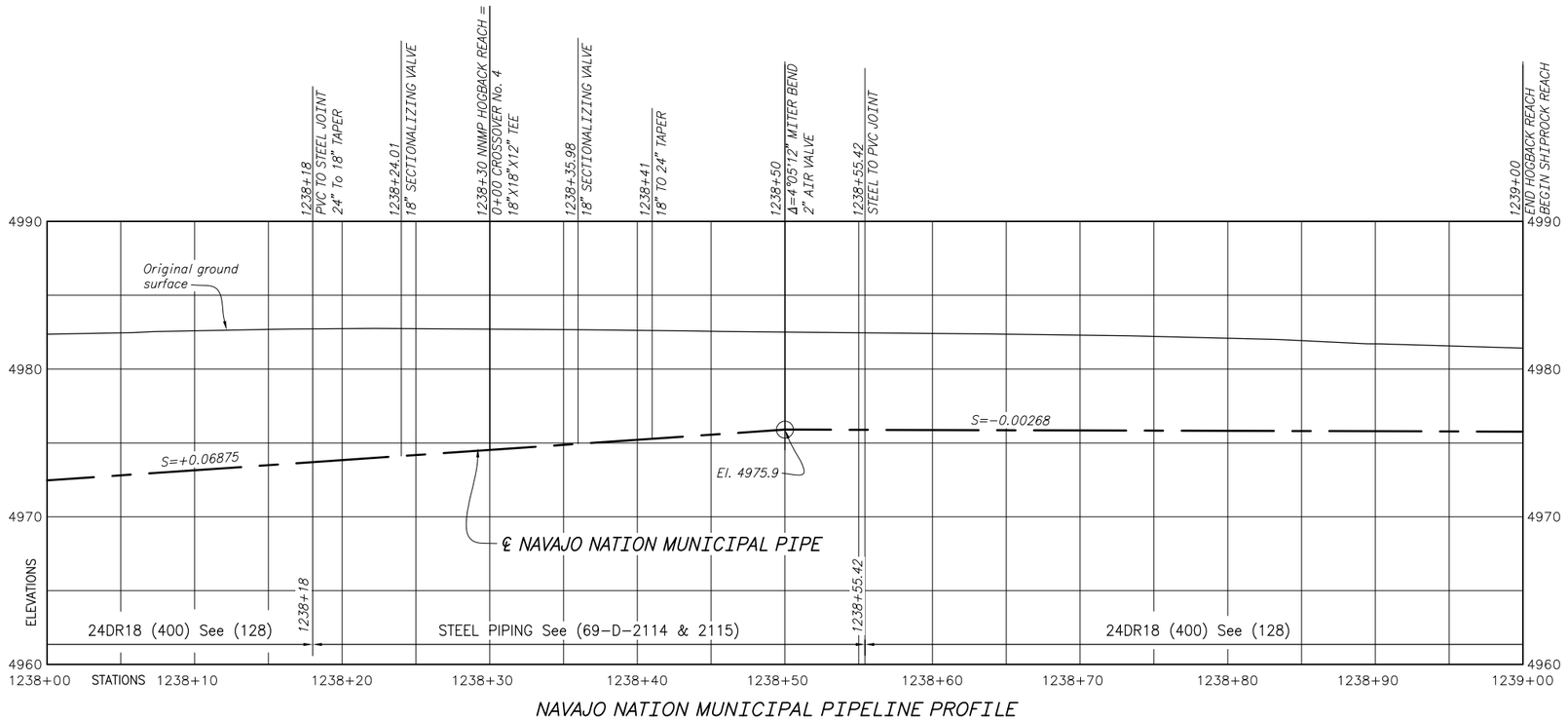
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PLOTTED BY
JDECKER

CAD SYSTEM
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CAD FILENAME
40 69-529-122 REV6.DWG





CROSSOVER No. 4 PROFILE



NAVAJO NATION MUNICIPAL PIPELINE PROFILE

NOTES

1. For General Notes, Abbreviations, Symbols and Pipe Classifications, see (102).
2. For the Plan and Profile of the Navajo Nation Municipal Pipeline (Hogback Reach), see (128).
3. For valves and mechanical details, see 69-D-2114.
4. Existing pipe locations and elevations shall be verified by contractor before equipment submittals.
5. Excavation and trench construction as shown on 69-D-2092.
6. For Check valve structure, see 69-D-2094.
7. For barrier details see 69-529-101.

REV NO		
4	2009-03-16 FCCF-413 JED	ADDED AIR VALVE ON EXISTING PIPELINE.
3	2008-06-16 FCCF-410 JED	REMOVED PIPE SIZES FROM STEEL PIPING CALLOUTS. REVISED DRAWING CALLOUTS ON STEEL PIPING.
2	2008-05-28 FCCF-410 JED	ADDED BARRIERS AND NOTE 7.
1	2007-10-26 FCCF-410 JED	CORRECTED Δ ANGLE ON CROSSOVER PROFILE AT STATION 0+02.31

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ANIMAS - LA PLATA PROJECT COLORADO - NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

HOGBACK REACH

CROSSOVER No. 4

PLAN AND PROFILES

DESIGNED L. A. BAROS CHECKED JAYE E. DECKER

DRAWN D. R. GOOD/ CHOU CHA TECH. APPR. LINDA M. BOWLES, P.E. LINDA M. BOWLES P.E.

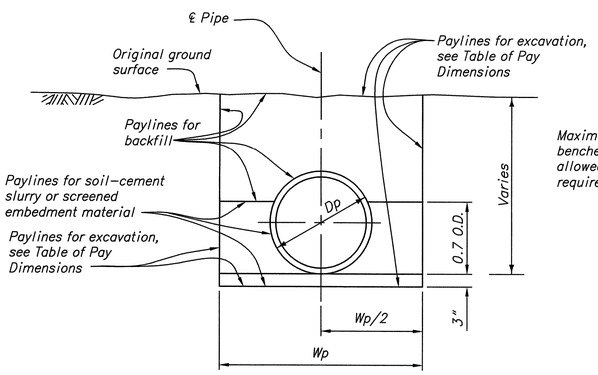
APPROVED TEDD R. CALHOUN, P.E.
PEER REVIEWER - TEDD R. CALHOUN, P.E.

FARMINGTON, NEW MEXICO 2005-05-18
SHEET 1 OF 1

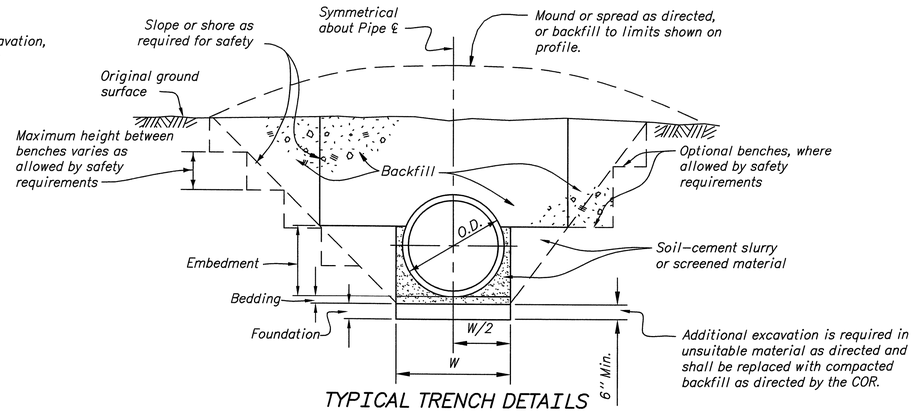
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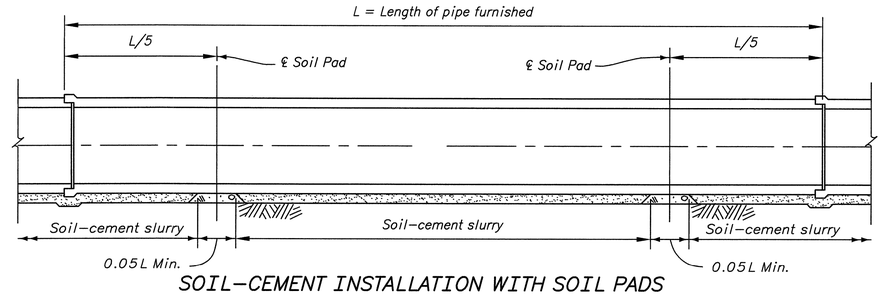
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41 69-529-160 REV04.DWG



TRENCH FOR PAYLINES ONLY



TYPICAL TRENCH DETAILS



SOIL-CEMENT INSTALLATION WITH SOIL PADS

TYPICAL FOR STEEL AND PVC

TABLE OF PAY DIMENSIONS

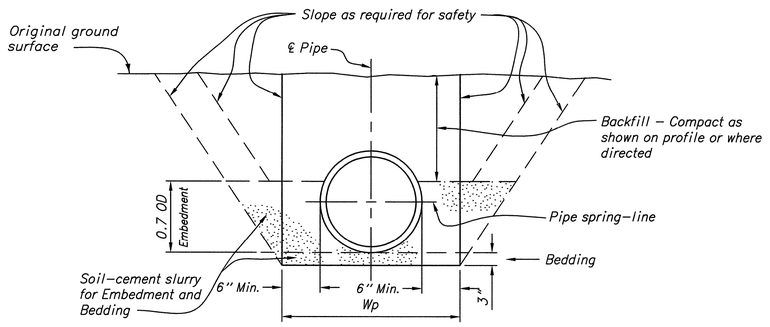
PIPE NOMINAL DIAMETER	Dp	Wp
12"	14"	2'-2"
16"	18"	2'-6"
18"	20"	2'-8"
24"	26"	3'-2"

MINIMUM INSTALLATION WIDTH

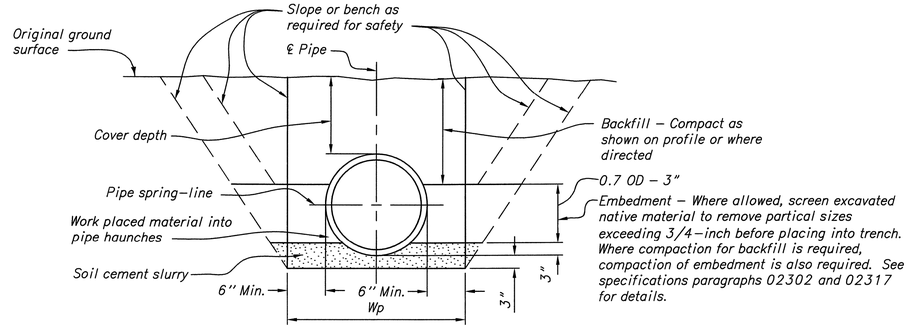
PIPE NOMINAL DIAMETER	W
12"	2'-2"
16"	2'-6"
18"	2'-8"
24"	3'-2"

NOTES

1. Drawing not to scale
2. Dp and Wp are used for calculating pay quantities for all pipe and trenches. Calculations are based on vertical trench walls.
3. Soil pads allow for observation of the soil-cement slurry flowing from one side of the pipe to the other.
4. Paylines for compacted backfill where shown on the Plan and Profiles or where directed will be the same as the paylines for backfill.
5 Instability of the native material may cause difficulties when excavating trench slopes around the pipe. Trench boxes may be required in some reaches, especially between 455+00 and 484+00 and near cattle guards. See Geology paragraphs 00320.
6. O.D. is outside diameter of the pipe actually installed.
7. Where pipe slope exeeds 0.3, see specifications paragraphs, Materials for Backfill in Pipe Trench Earthwork, 02317.
8. Sloping, shoring, and benching shall be in accordance with Reclamation Construction Safety Standards.
9. Warning tape not shown, but is required, see specification paragraphs, Pipeline General Requirements 02511.
10. Borrow areas will be located in the field if necessary.
11. Where pipe alignment follows the side of road embankment the minimum width of the embankment on the outside of the pipe shall be at least 6 feet at springline of pipe.
12. Restricted backfill particle size is required within one foot of the outside of the pipe. See Pipe Trench Earthwork paragraphs 02317 for details.
13. Where road surface materials are required, see (169) and (173) for details.
14. For concrete pipe trench details, see 69-529-194.



TYPICAL TRENCH WITH SOIL CEMENT SLURRY



TYPICAL TRENCH USING SCREENED MATERIAL

ALLOWABLE SCREENED EMBEDMENT MATERIAL LOCATIONS		
Pipe Material	Pipe Size/Class	Max. Cover Depth
PVC	24DR41	Not allowed
PVC	24DR32.5	Not allowed
PVC	24DR25	7 feet or Less*
PVC	24DR18	20 feet or Less
PVC	16DR41	Not allowed
Steel	24" Dia	Not allowed*
Steel	18" Dia	7 feet or Less*
Steel	16" Dia	10 feet or Less*
Steel	≤ 12" Dia	20 feet or Less

Steel pipe is assumed to have a wall thickness of $\frac{1}{4}$".

*The maximum cover allowed may be increased based on trench side wall strength as approved by the contracting officer and based on input from the design engineer.

REV NO		
1	2009-02-11 D Bowles P.E.	ADDED 16-INCH PVC PIPE TO TABLES. ADDED NOTE 14 ON CONCRETE PIPE TRENCH LOCATION. ADDED SPECIFICATION NUMBER.

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ANIMAS - LA PLATA PROJECT COLORADO - NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

PRESSURE PIPE TRENCH INSTALLATION

SECTIONS AND DETAILS

DESIGNED LINDA M BOWLES CHECKED STEVE ROBERTSON
DRAWN LINDA M BOWLES TECH. APPR. LINDA M. BOWLES, P.E.
APPROVED TEDD R CALHOUN, P.E. PEER REVIEWER - TEDD R. CALHOUN P.E.

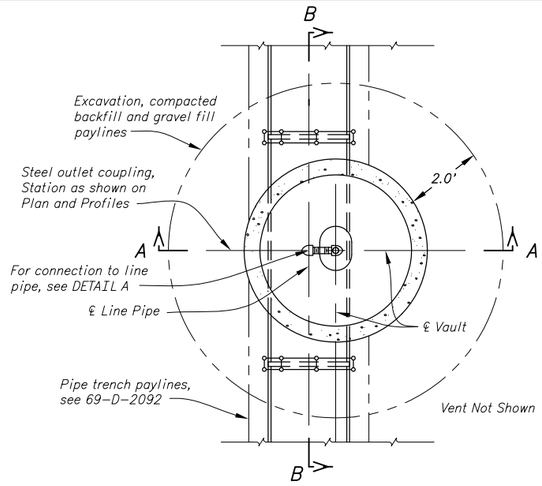
DENVER, COLORADO 2005-04-19
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69-D-2092

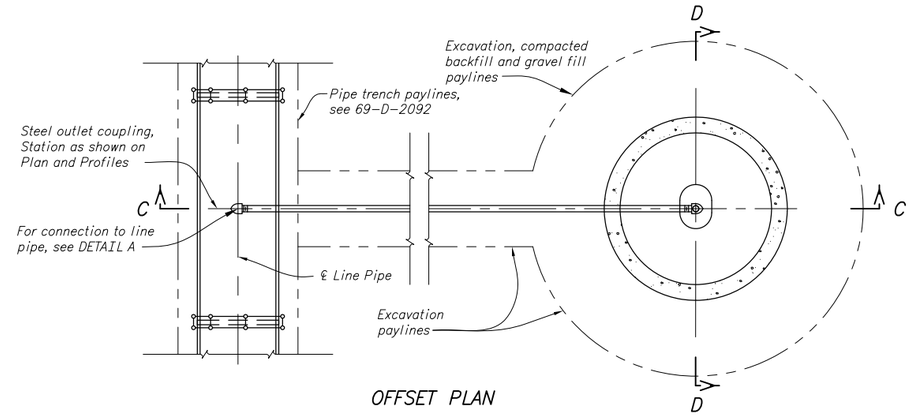
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LBOWLES

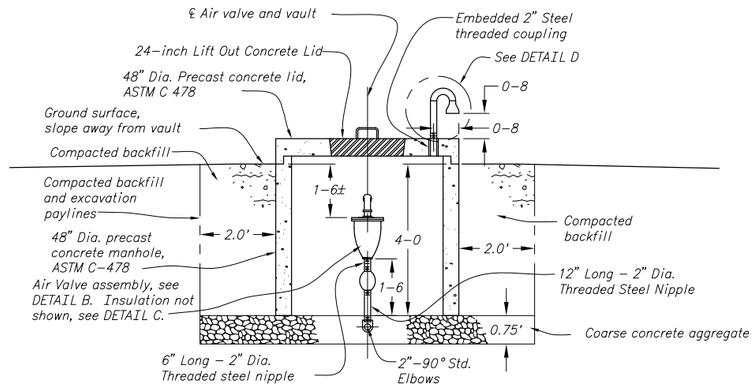
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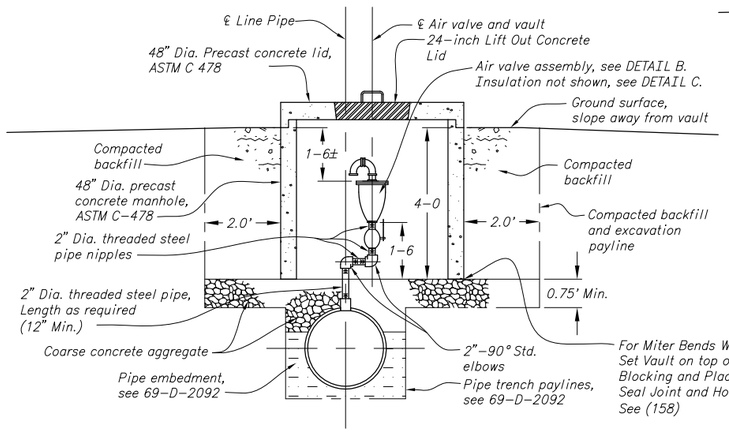
VERTICAL PLAN



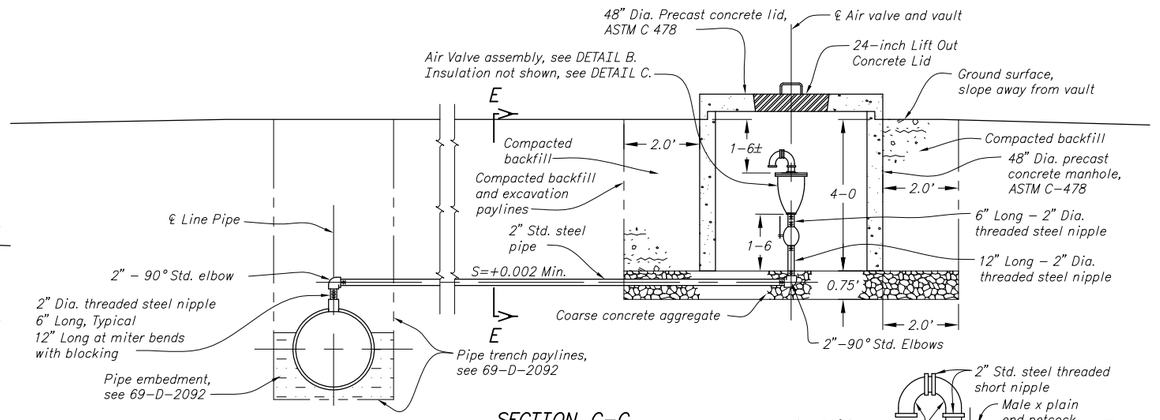
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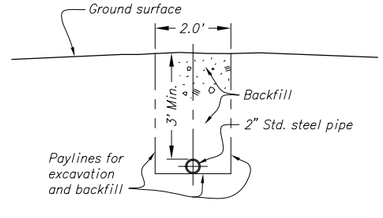
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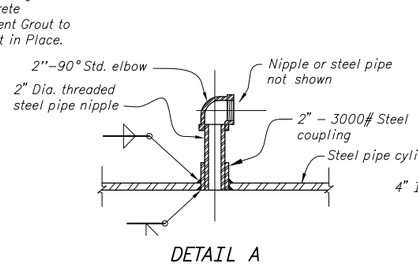
SECTION A-A



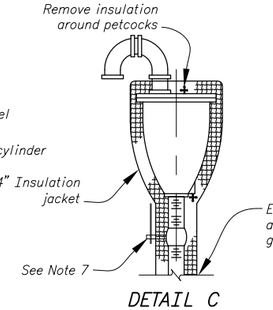
SECTION C-C



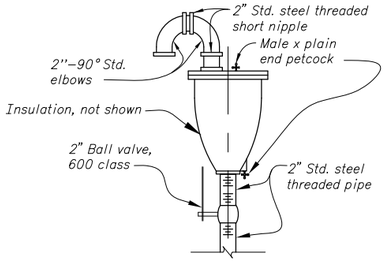
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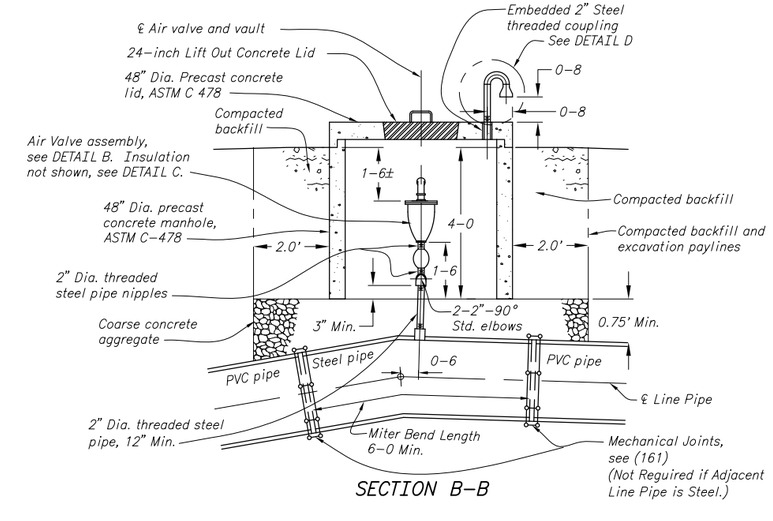
DETAIL A



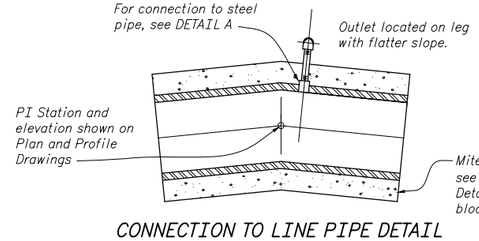
DETAIL C
4" INSULATION



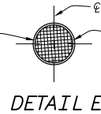
DETAIL B
AIR VALVE ASSEMBLY



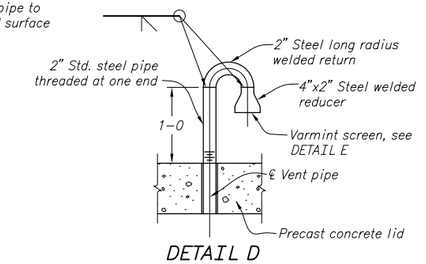
SECTION B-B



CONNECTION TO LINE PIPE DETAIL



DETAIL E



DETAIL D

NOTES

1. Drawing not to scale.
2. Construct air valve vertical.
3. Earthwork paylines are shown. Actual slope will depend on soil conditions.
4. For coating and lining requirements for 2" standard steel pipe and fittings, see specification paragraphs.
5. Install three guardposts around each vault as directed in the field. See Typical Guard Post Installation detail on (157).
6. For air valve with tap, see 69-D-2116.
7. Keep ball valve operator free to move outside of insulation jacket.

REV NO		
2	2008-05-28 FCCF-410 JED	RAISED ELBOWS TO 3" MINIMUM ABOVE CONCRETE OR GRAVEL.
1	2008-04-15 FCCF-410 JED	MECHANICAL JOINT NOT REQUIRED IF ADJACENT LINE PIPE IS STEEL.

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ANIMAS - LA PLATA PROJECT COLORADO - NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

TYPICAL 2-INCH AIR VALVE INSTALLATIONS

PLANS, SECTIONS, AND DETAILS

DESIGNED CHOU CHA CHECKED JAYE E. DECKER

DRAWN CHOU CHA TECH. APPR. LINDA M. BOWLES, P.E.

APPROVED TEDD R. CALHOUN, P.E. LINDA M. BOWLES P.E.

PEER REVIEWER - TEDD R. CALHOUN, P.E.

FARMINGTON, NEW MEXICO 2005-4-12

SHEET 1 OF 1

69-529-156

DATE/TIME PLOTTED
OCTOBER 8, 2010 11:59
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JDECKER

CAD SYSTEM
AutoCAD R14 17.2s
CAD FILENAME
43 69-529-156 REV02.DWG

AIR VALVE AND OFFSET DATA

FRUITLAND REACH

P.I. STATION	HEAD CLASS	AIR VALVE SEAT RATING PSI	OFFSET (FT)
23+80	325	141	0'
31+67	290	126	0'
48+30	290	126	0'
69+00	275	119	0'
81+65.14	275	119	*
92+20	275	119	10' Left
106+00	275	119	10' Left
135+60	325	141	10' Left
146+00	325	141	10' Left
178+90	325	141	*
191+40	325	141	10' Left
194+50	325	141	*
227+80	325	141	10' Left
239+40	325	141	10' Left
246+30	325	141	10' Left
253+00	325	141	10' Left
290+60	325	141	10' Left
325+20	325	141	0'
345+00	350	152	10' Right
371+00	350	152	10' Left
372+10	350	152	10' Left
402+26 BK	425	184	0'

AIR VALVES WITH SAMPLING TAPS

LOCATION	STATION
Fruitland Reach (CO#1)	31+67
Fruitland Reach (CO#2)	402+26 BK
Before Nenahnezad Tank	Altitude Valve Vault
After Nenahnezad Tank	703+57
San Juan Reach (CO#3)	928+65
Crossover #3 Vault	1+39
Crossover #3 Vault	1+46±
Hogback Reach (CO#4)	1238+50
Crossover #4 Vault	0+09.06
Crossover #4 Existing	Downhill from valve

Sampling tap details are shown in DETAILS 1 and 2 on 69-D-2116.

NENAHNEZAD REACH

P.I. STATION	HEAD CLASS	AIR VALVE SEAT RATING PSI	OFFSET (FT)
424+70	425	184	8' Left
458+70	375	163	*
533+00	385	167	*
587+00	450	195	10' Left
672+83.5±	525	227	0'

TANK TABLE

P.I. STATION	HEAD CLASS	AIR VALVE SEAT RATING PSI	OFFSET (FT)
Altitude Valve Vault	350	152	0'
703+57	75	33	0'
PRV Valve Vault	350	152	0'

SAN JUAN REACH

P.I. STATION	HEAD CLASS	AIR VALVE SEAT RATING PSI	OFFSET (FT)
772+10	200	87	0'
775+20	200	87	0'
796+80	200	87	0'
816+80	200	87	0'
822+50	200	87	0'
848+50	225	98	0'
855+00	225	98	0'
863+40	225	98	0'
886+70	225	98	0'
906+70	250	108	0'
928+65	300	130	0'

HOGBACK REACH

P.I. STATION	HEAD CLASS	AIR VALVE SEAT RATING PSI	OFFSET (FT)
963+21.89BK	350	152	0'
984+36.60	350	152	0'
995+20	300	130	8' Right
998+97.17	300	130	*
1022+20	300	130	10' Right
1106+90	325	141	10' Right
1126+80	350	152	10' Right
1149+10	350	152	10' Right
1163+10	375	163	0'
1172+70	375	163	0'
1192+60	375	163	0'
1216+41.21BK	375	163	0' ***
1238+50	400	173	0'

**** Due to depth of pipe, compact backfill between blocking and aggregate.*

SHIPROCK REACH

P.I. STATION	HEAD CLASS	AIR VALVE SEAT RATING PSI	OFFSET (FT)
1267+00	425	184	10' Right
1271+64	425	184	10' Right
1331+10	385	167	10' Right
1337+80	385	167	0'
1344+70	375	163	0'
1348+00	375	163	0'
1355+00	375	163	0'
1375+00	375	163	0'
1387+60	350	152	0'
1397+00	325	141	0'
1410+40	290	126	10' Right
1434+60	290	126	0'
1446+00	290	126	0'
1498+90.8	275	119	18' Left

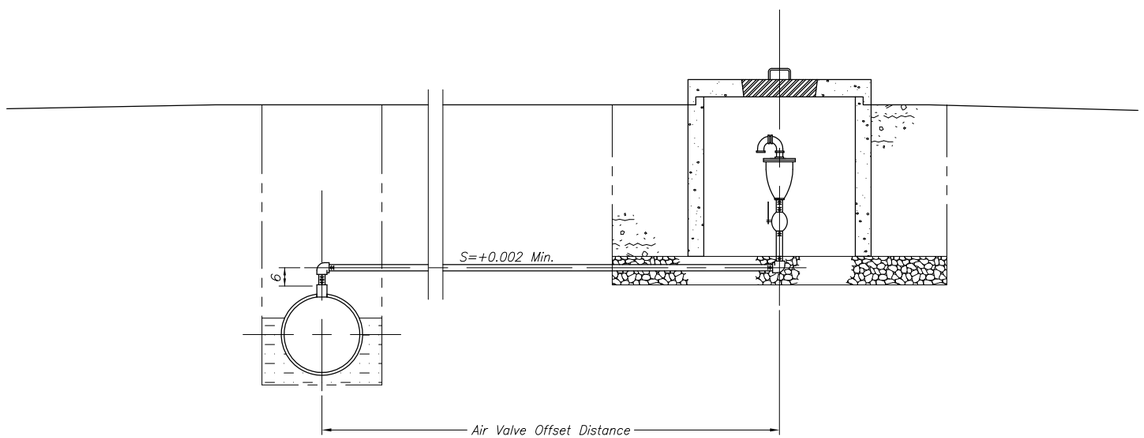
CROSSOVER #3 VAULT

P.I. STATION	HEAD CLASS	AIR VALVE SEAT RATING PSI	OFFSET (FT)
1+39±	300	130	0'
1+46±	375	162	0'

CROSSOVER #4 VAULT

P.I. STATION	HEAD CLASS	AIR VALVE SEAT RATING PSI	OFFSET (FT)
0+09.06	400	173	0'
Existing**	425	184	6'

***Air valve shown on (2114)*



NOTES

1. *For air valve details, see 69-529-156 and 69-529-158.*
2. *Air valve offsets may be adjusted in the field. Air valves marked with an asterisk (*) are approximately 10 feet, but the exact location shall be determined in the field.*
3. *For ball valves, see specification paragraphs.*

REV NO		
8	2010-10-18 D-LBOWLES, PE	REVISED AIR VALVE LOCATION FROM 1271+00 TO 1271+64.
7	2010-09-30 D-LBOWLES, PE	REVISED 530+10, 0' OFFSET TO 533+00, * OFFSET, 503+56 to 503+57 SAMPLING TAP TABLE, 962+80 TO 963+21.89BK, AND 1163+60 TO 1163+10, AS PER MARKED PRINT FROM JED 9/29/10.
6	2010-01-08 D-LBOWLES, P.E.	REVISED AIR VALVE STATION 1215+20 TO 1216+41.21 BK. ADDED NOTE TO HOGBACK REACH TABLE.
5	2009-07-17 D-LBOWLES, P.E.	REVISED AIR VALVE STATION 703+56 TO 703+57. ADDED PRV VAULT AIR VALVE AT TANK. REVISED FIRST TWO AIR VALVES ON HOGBACK REACH. ADDED LAST AIR VALVE ON SHIPROCK REACH.
4	2009-04-07 D-LBOWLES P.E.	AT CROSSOVER #3, CORRECTED HEAD CLASS OF VALVE (1+46).
3	2009-03-19 D-LBOWLES P.E.	AT CROSSOVER #3, CORRECTED AIR VALVE STATION AND ADDED AIR VALVE. AT CROSSOVER #4, ADDED AIR VALVE. ADDED AIR VALVE AT END OF NENAHNEZAD REACH.
2	2008-05-22 D-L. BOWLES P.E.	ADJUSTED AIR VALVE STATION AT CROSSOVER #1.
1	2008-04-25 D-L. BOWLES P.E.	MOVED AIR VALVE INTO ALTITUDE VALVE VAULT AND ADDED SAMPLING TAP. MODIFIED AIR VALVE SAMPLING TAPS TABLE. MOVED AIR VALVE AT CROSSOVER #1.

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ANIMAS - LA PLATA PROJECT COLORADO - NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

AIR VALVE DATA

DATA AND DETAIL

DESIGNED DAVID L. GESUNDHEIT CHECKED JOE M. GEMPERLINE

DRAWN DAVID L. GESUNDHEIT TECH. APPR. LINDA M. BOWLES, P.E.

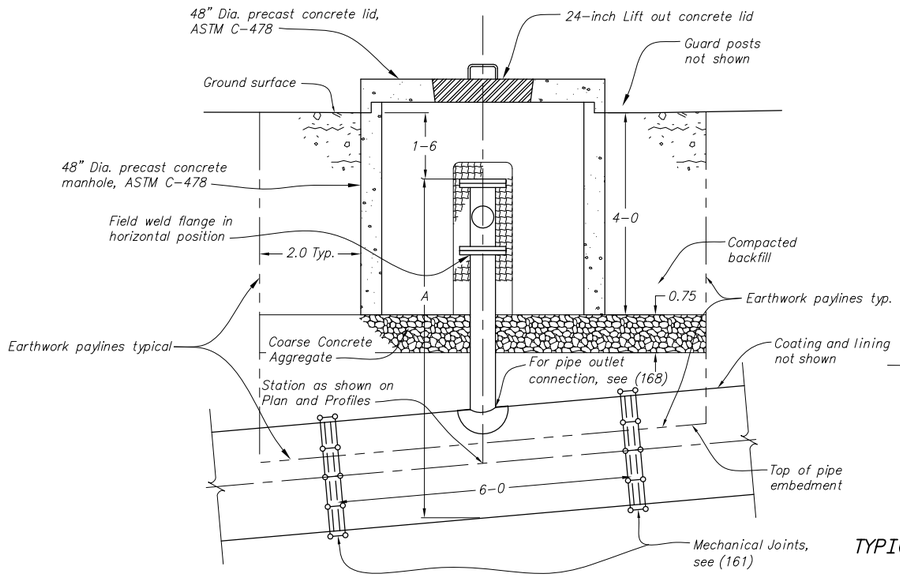
APPROVED TEDD R. CALHOUN, P.E.
PEER REVIEWER - TEDD R. CALHOUN P.E.

FARMINGTON, NEW MEXICO 2005-8-10
SHEET 1 OF 1

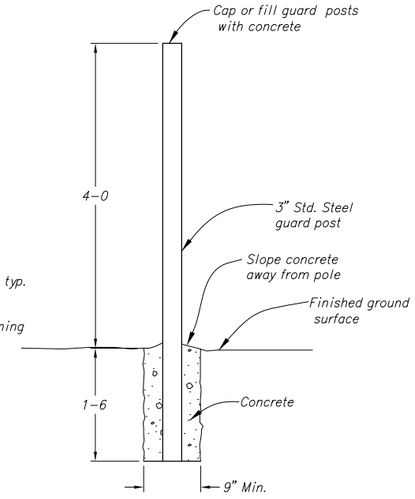
69-D-2120

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OCTOBER 21, 2010 08:31
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LBOWLES

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AutoCAD RM 17.2s
CAD FILENAME
69-D-2120 REVB.DWG



LONGITUDINAL SECTION

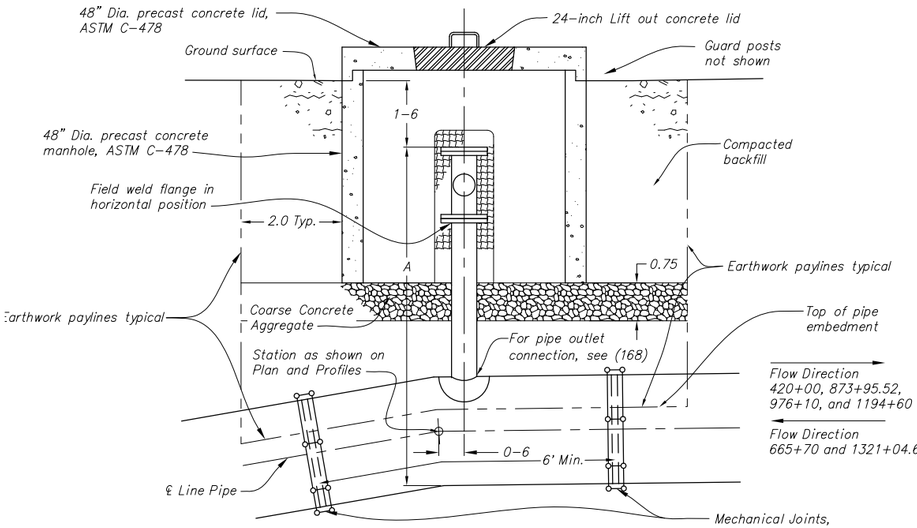


TYPICAL GUARD POST INSTALLATION

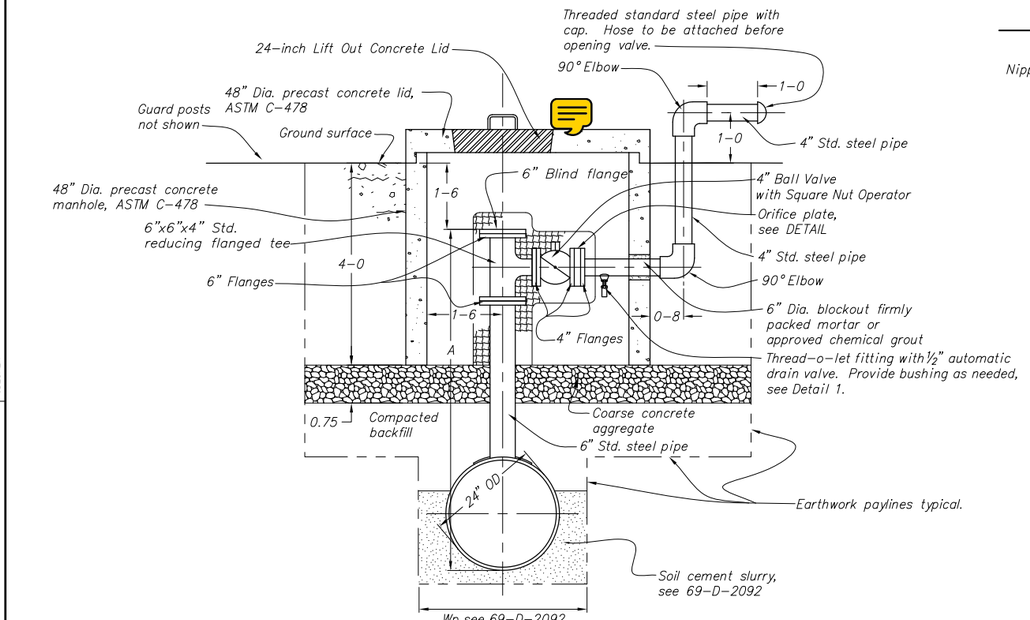
BLOWOFF DATA TABLE

STATION	PIPELINE REACH	HEAD CLASS (FEET)	AWWA FLANGE RATING	ORIFICE PLATE # HOLES	ANSI BALL VALVE TYPE	GROUND SURFACE ELEVATION (FEET)	PIPE ℄ ELEVATION (FEET)	Distance A (FEET)	
18+80	FRUITLAND	325	CLASS E	9	CLASS 150	5222.0	5216.47	5.0	
164+90	FRUITLAND	350	CLASS E	9	CLASS 150	5216.3	5209.44	6.3	
273+50	FRUITLAND	350	CLASS E	9	CLASS 150	5218.0	5210.54	6.9	
420+00	NENAHNEZAD	425	CLASS E	8	CLASS 150	5147.6	5139.7	7.4	
665+70	NENAHNEZAD	525	CLASS E	7	CLASS 150	5068.0	5059.30	8.2	
873+95.52	SAN JUAN	250	CLASS E	10	CLASS 150	5096.0	5089.7	5.8	*
976+10	HOGBACK	350	CLASS E	8	CLASS 150	4999.9	4991.9	7.5	
1194+60	HOGBACK	385	CLASS E	8	CLASS 150	4988.6	4979.7	8.4	
1321+04.62	SHIPROCK	450	CLASS E	7	CLASS 150	4933.6	4927.4	5.7	

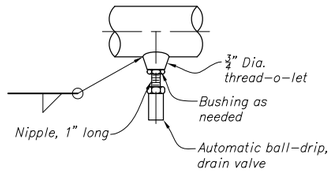
* Set Vault on top of miter bend concrete blocking. See 69-529-158.



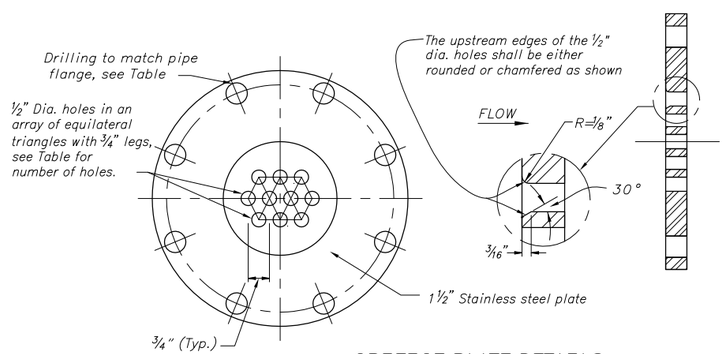
LONGITUDINAL SECTION
AT MITER BENDS



TRANSVERSE SECTION



DETAIL 1
Not to Scale



ORIFICE PLATE DETAILS

NOTES

1. Provide ball valves with AWWA Class E, or ANSI Class 150 flanges.
2. Earthwork paylines shall be similar to that shown on 69-D-2092.
3. Install three guard post around each vault as directed by COR. Install posts in accordance with Typical Guard Post Installation Detail shown.
4. Keep ball valve operator free to move outside of insulation jacket.

REV NO		
02	2009-05-29 FCCF-413 JED	SCHEDULES 2 THRU 6 RELOCATED BLOWOFFS TO VP1. ADDED LONGITUDINAL SECTION AT MITER BENDS. UPDATED TABLE TO BLOWOFF MOVES AND CHANGES ON OTHER DWGS.
01	2009-03-24 FCCF-413 JED	CORRECTED FONT PROBLEM ON ORIFICE PLATE DETAILS.

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NAVAJO NATION MUNICIPAL PIPELINE

TYPICAL BLOWOFF INSTALLATIONS

SECTIONS AND DETAILS

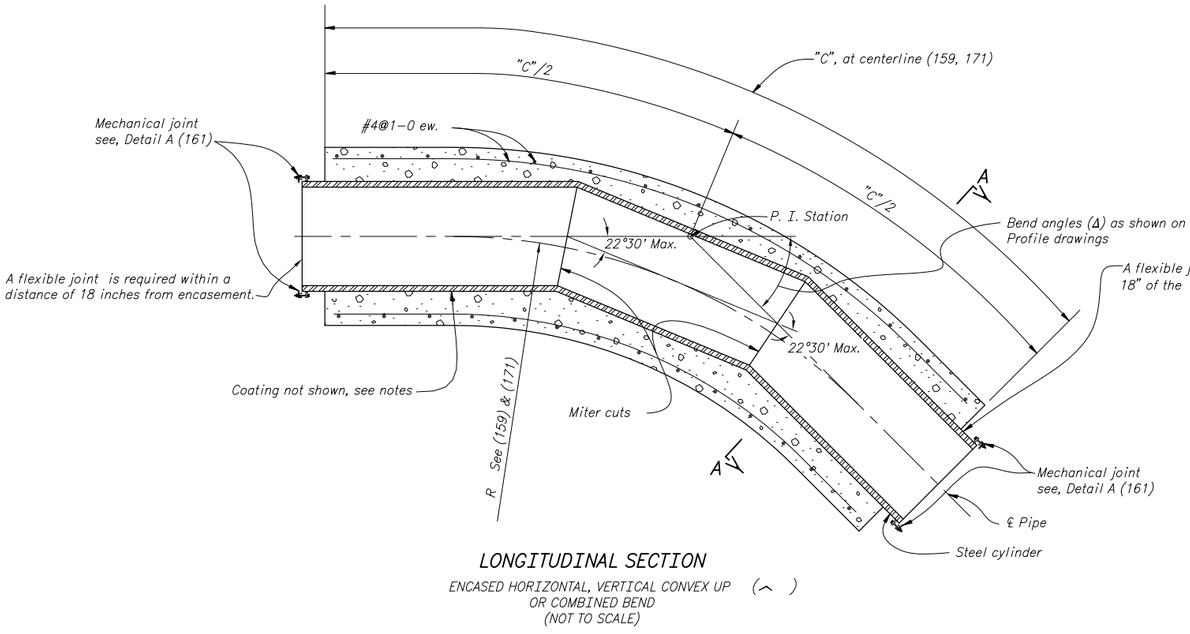
DESIGNED CHOU CHA CHECKED JAYE E. DECKER
DRAWN CHOU CHA TECH. APPR. LINDA M. BOWLES, P.E.
LINDA M. BOWLES P.E.
APPROVED TEDD R. CALHOUN, P.E.
PEER REVIEWER - TEDD R. CALHOUN, P.E.

FARMINGTON, NEW MEXICO 2005-3-22
SHEET 1 OF 1

69-529-157

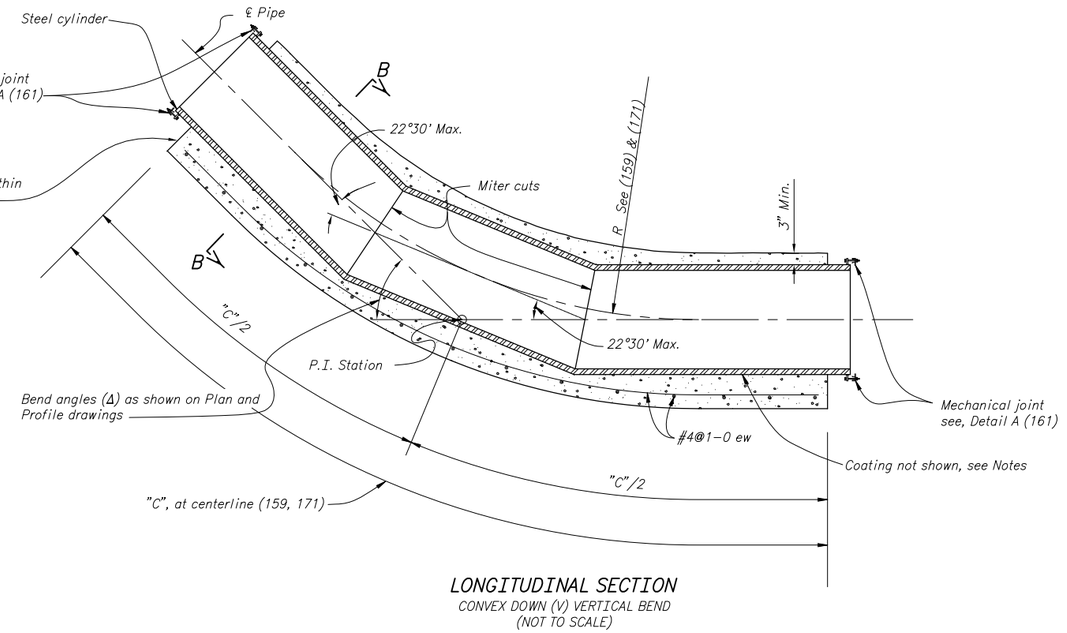
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OCTOBER 8, 2010 12:59
PLOTTED BY
JDECKER

CAD SYSTEM
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CAD FILENAME
45 69-529-157 REV02.DWG



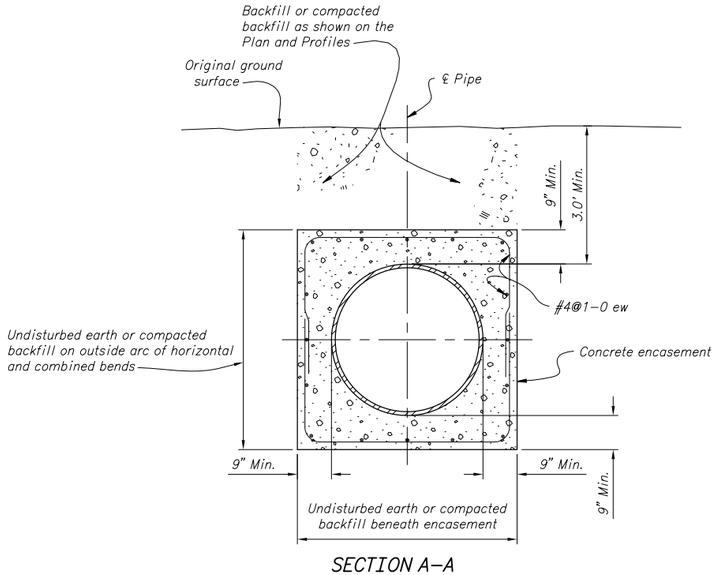
LONGITUDINAL SECTION

ENCASED HORIZONTAL, VERTICAL CONVEX UP OR COMBINED BEND (NOT TO SCALE)



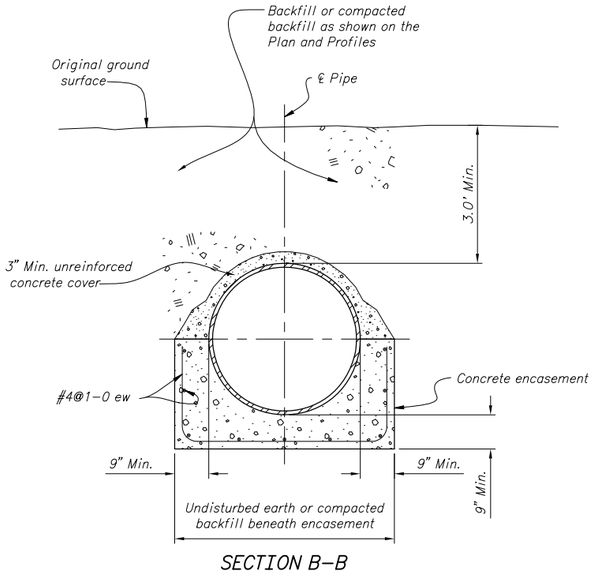
LONGITUDINAL SECTION

CONVEX DOWN (V) VERTICAL BEND (NOT TO SCALE)



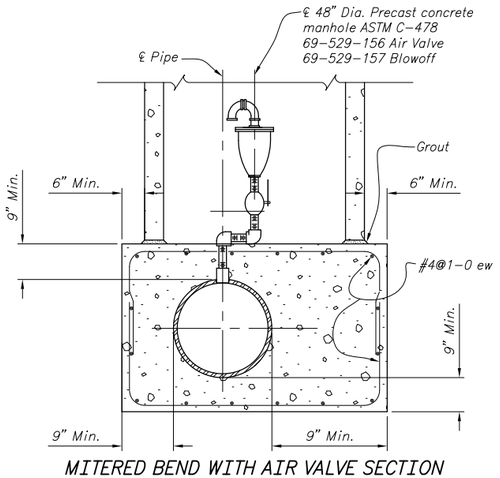
SECTION A-A

(NOT TO SCALE)



SECTION B-B

(NOT TO SCALE)



MITERED BEND WITH AIR VALVE SECTION

BLOWOFF AT 873+95.52 SIMILIAR

For Details of Air Valve see, 69-529-156

For Details of Blowoff see, 69-529-157

OPERATING CRITERIA

1. Excavation around the encasement shall not occur when the pipeline is under hydrostatic pressure.

NOTES

1. Drawing not to scale.
2. No flexible rubber gasketed joints will be allowed within the concrete encasement.
3. For general notes and minimum requirements for detailing reinforcement, see 40-D-6263. For concrete, f'c=4000 pounds per square inch and for reinforcement steel, fy=60,000 pounds per square inch.
4. For general concrete outline notes, see 40-D-7012.
5. All linings and coatings shall be continuous through blocking.
6. The minimum steel cylinder thickness for the bend shall be 0.25 inches.
7. D is nominal pipe diameter which is 24 inches for all Navajo Nation Municipal Pipeline reaches and 18 inches at Crossovers #1 and #2 and 12" at Crossover #3.
8. Contractor may submit alternative designs for approval.
9. For pressure pipe trench installation details, see 69-D-2092.
10. For thrust restraint using welded joints, see (171). Concrete blocking is not required when the weld joint method is used.

REV. NO		
1	2009-06-03 FCCF-413 JED	ADDED BLOWOFF ON SPECIAL SECTION.

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ANIMAS - LA PLATA PROJECT COLORADO - NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

CONCRETE ENCASED MITER BENDS

SECTIONS AND DETAILS

DESIGNED D. L. GESUNDHEIT CHECKED JAYE E. DECKER

DRAWN D. L. GESUNDHEIT TECH. APPR. LINDA M. BOWLES, P.E.

APPROVED TEDD R. CALHOUN, P.E. PEER REVIEWER - TEDD R. CALHOUN P.E.

FARMINGTON, NEW MEXICO SHEET 1 OF 1 2005-4-19

69-529-158

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CAD FILENAME
46 69-529-158 REV01.DWG

FRUITLAND REACH

P.I. STATION	HEAD (ft.)	ANGLE	DIRECTION	Cv (ft.)	R (ft.)	C (ft.)	W (ft.)
10+00	325	7°42'\±	Convex Up	4.5			2
23+80	325	9°40'54"	Convex Up	5			3
24+80	325	28°31'43"	Convex Down	6.5	6	3	
25+30	325	16°45'42"	Convex Up	6.5	25	8	
63+72.42	275	43°49'17"	Horizontal	7.5	8	7	
70+31.85	290	31°18'57"	Combined	6	10	6	
70+90	290	8°06'33"	Convex Down	5.5			2
72+00	290	2°13'14"	Convex Down	5			1
81+65.14	275	59°06'04"	Combined	5	12	13	
82+30	275	5°20'31"	Convex Down	6			1
83+45.16	275	44°50'00"	Horizontal	5	12	10	
83+83.62	275	44°04'35"	Horizontal	9	6	5	
88+50	290	7°38'25"	Convex Down	5.5			2
97+87.83	275	9°10'54"	Combined	5			3
109+30	290	2°58'11"	Convex Down	8			1
128+20	300	5°00'44"	Convex Up	5			1
128+80	300	5°09'21"	Convex Up	7.5			1
129+40	325	12°22'49"	Convex Down	6	6	2	
135+00	325	8°49'43"	Convex Down	5.5			3
135+60	325	9°51'56"	Convex Up	5			3
144+00	325	5°45'17"	Convex Down	7.5			1
165+30	350	6°07'10"	Convex Down	6			2
178+90	325	10°03'31"	Convex Up	5	30	6	
179+40	350	9°24'18"	Convex Down	7			3
192+50	325	4°01'53"	Convex Down	6			1

FRUITLAND REACH (CONTINUED)

P.I. STATION	HEAD (ft.)	ANGLE	DIRECTION	Cv (ft.)	R (ft.)	C (ft.)	W (ft.)
244+35.92	325	11°01'44"	Horizontal	4.5	15	3	
274+40	350	4°37'26"	Convex Down	5.5			1
293+97.33	325	90°02'26"	Horizontal	6	12	19	
295+38.69	325	82°15'24"	Horizontal	5.5	13	19	
304+40	350	4°45'25"	Convex Down	6.5			1
312+63.64	325	31°28'00"	Horizontal	3.5	19	11	
327+17.13	325	23°49'41"	Combined	4	17	8	
336+38.58	350	54°09'55"	Combined	3.5	21	20	
336+90	350	15°56'53"	Convex Down	5.5	6	2	
337+28.53	350	58°03'17"	Horizontal	10	8	9	
351+07.20	375	17°46'34"	Horizontal	8	10	4	
354+22.76 AH	375	28°58'04"	Horizontal	12	7	4	
354+90	375	6°27'00"	Convex Down	6.5			2
355+78.91	350	30°52'02"	Combined	4	18	10	
358+11.35	350	18°44'06"	Horizontal	3.5	21	7	
369+80.95	350	24°21'51"	Horizontal	5	15	7	
371+00	350	7°09'51	Convex Up	5.5			2
371+50	350	13°03'46"	Convex Down	7.5	6	2	
372+10	350	6°29'54"	Convex Up	5			2
376+29.99	350	14°40'16"	Horizontal	4	18	5	
380+16.72	350	49°27'20"	Combined	8.5	9	8	
380+60	350	8°29'02"	Convex Down	6			3
381+60.17	375	35°16'26"	Combined	5	16	10	
383+28.03	375	25°04'53"	Horizontal	6	14	7	
385+99.37	375	21°52'33"	Horizontal	5	16	7	
387+78.13	385	57°42'22"	Combined	5	17	18	
399+31.53	400	16°04'56"	Combined	6	15	5	
401+41.49	400	34°51'41"	Combined	6	15	10	
402+20 AH	425	58°14'26"	Combined	4.5	20	21	

CROSSOVER #1

P.I. STATION	HEAD (ft.)	ANGLE	DIRECTION	Cv (ft.)	R (ft.)	C (ft.)	W (ft.)
2+04.1	290	90°\±	Horizontal	3	13	21	

The nominal diameter for Crossover #1 is 18 inches.

CROSSOVER #2

P.I. STATION	HEAD (ft.)	ANGLE	DIRECTION	Cv (ft.)	R (ft.)	C (ft.)	W (ft.)
1+70	400	21°\±	Convex Down	7	4	2	
1+80'±	400	31°45'±	Horizontal	3	19	11	

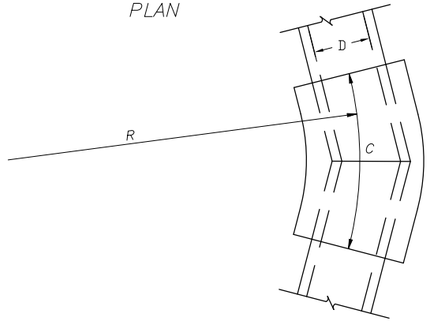
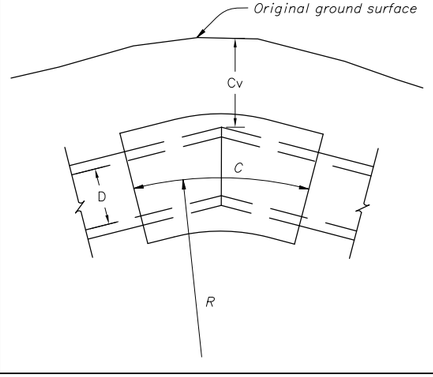
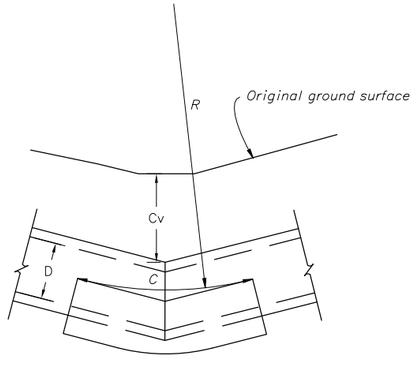
The nominal diameter for Crossover #2 is 18 inches.

NENAHNEZAD REACH

P.I. STATION	HEAD (ft.)	ANGLE	DIRECTION	Cv (ft.)	R (ft.)	C (ft.)	W (ft.)
409+43.44	425	35°05'13"	Horizontal	5.5	18	11	
410+13.90	425	54°09'28"	Horizontal	5	19	18	
420+00	425	39°08'07"	Combined	6.5	16	11	
422+00	425	18°18'08"	Horizontal	10.5	9	3	
423+60	425	85°58'11"	Horizontal	8.5	11	17	
423+82.63 AH	425	89°59'47"	Combined	12	8	13	
424+70	425	6°07'22"	Convex Up	8			3 *
426+68.37	425	21°42'53"	Combined	5	21	8	
433+08.67	425	41°58'44"	Horizontal	4.5	20	15	
433+70	425	4°35'41"	Convex Down	7			1
434+34.78	425	32°59'56"	Horizontal	5	19	11	
437+56	425	15°08'24"	Horizontal	3.5	26	7	
441+96.40	400	12°56'30"	Horizontal	4.5	22	5	
451+52.71	375	12°59'46"	Horizontal	6	18	4	
453+45.45	375	11°56'08"	Horizontal	5.5	19	4	
456+15.33	375	11°35'31"	Horizontal	5.5	20	4	
457+15	375	34°18'50"	Horizontal	7	13	8	
458+70	375	1°57'01"	Convex Up	6			3 *
461+11.29	375	11°27'53"	Horizontal	7	15	3	
461+63.97	375	22°37'48"	Horizontal	6	15	6	

NENAHNEZAD REACH (CONTINUED)

P.I. STATION	HEAD (ft.)	ANGLE	DIRECTION	Cv (ft.)	R (ft.)	C (ft.)	W (ft.)
466+19.24 AH	375	11°32'44"	Horizontal	7	15	3	
471+23.74	375	13°42'52"	Horizontal	7.5	13	3	
475+68.91	375	15°41'44"	Horizontal	7.5	15	4	
480+04.35	375	11°38'54"	Horizontal	7	15	3	
484+10.06	375	12°55'12"	Horizontal	7	13	3	
497+07.53	375	13°31'26"	Horizontal	8.5	13	3	
502+37.48	375	5°07'08"	Convex Up	6.5			1
503+14.50	375	5°03'59"	Convex Down	12.5			1
503+33.24	375	15°30'22"	Horizontal	12.5	7	2	
511+17.22	425	30°52'37"	Horizontal	6	17	9	
521+30	400	13°44'24"	Combined	5.5	17	4	
523+68.12	400	15°45'44"	Horizontal	6	18	5	
524+91.87	400	10°49'33"	Horizontal	6	16	3	
533+00	385	Straight Pipe	Convex Up	5			3 *
533+97.39	400	16°24'57"	Horizontal	5.5	17	5	
539+28.76	400	24°42'44"	Horizontal	5.9	16	7	
543+24.80	400	32°11'08"	Horizontal	6.5	14	8	
550+79.63	425	12°20'36"	Horizontal	7.5	14	3	
576+12.35	425	15°28'18"	Combined	4	26	7	
576+80	425	8°06'43"	Convex Down	7.5			2
578+63.98	450	29°39'08"	Horizontal	5	21	11	
587+00	450	5°05'23"	Convex Up	5			3 *
587+28.54	450	10°45'23"	Horizontal	5	21	4	
594+17.06	475	22°34'07"	Horizontal	5	23	9	
596+53.80	500	73°48'41"	Horizontal	Special Design, see (196)			
597+11.24AH	500	90°06'17"	Horizontal	Special Design, see (196)			
665+70	525	1°21'01"	Convex Up	7.5			3 *
666+20	525	11°01'12"	Convex Down	6	16	3	
666+60	525	9°16'38"	Convex Up	7.5			4
669+74.73	525	10°22'03"	Horizontal	6.5	22	4	
671+86.17	525	11°40'22"	Horizontal	5	29	5	
672+83.5	525	10°32'03"	Convex Up	7.5	38	7	

EQUATION FOR "R" (Radius)	$R = \frac{98(H_C)D^2 - P_E(C_v + D/2)(D^2+3D+2.25)}{P_E(C_v+D/2)(2D+3)}$	$R = \frac{147D^2H_C - E_CY(C_vD+C_v^2-0.75D-0.5625)}{Y(E_C(2C_v-1.5)+300D+450)-137.6D^2}$	$R = \frac{98D^2H_C - Y(B_EY+E_C(D/2+C_v)^2-112.5D-37.5D^2-84.4)}{98.3D^2+Y(2B_E-150D-225)-E_CY(D+2C_v)}$
EQUATION VARIABLES	P_E = 200 psf/ft. (factored) C_v = varies	E_C = 100 pcf cover earth weight C_v = varies	B_E = 3000 psf allowable bearing pressure E_C = 100 pcf cover earth weight C_v = varies
BEND TYPE FOR CONCRETE ENCASEMENT METHOD OF THRUST RESTRAINT	HORIZONTAL AND COMBINED PLAN 	CONVEX UP PROFILE 	CONVEX DOWN PROFILE 

EQUATION PARAMETERS

D = Nominal diameter, feet
H = Head class, feet of water
YC = Outside Diameter (ft.) + 1.5, feet
P = Passive earth pressure, psf/ft.
EE = Weight of earth cover, pcf
BC = Allowable bearing earth pressure, psf
CE = Cover of earth over pipe used for design, feet
Cv = Circumferential length of blocking at ℄, feet
R = Radius of curvature of miter bend at ℄, feet

$C = \frac{R\,\pi\,ANGLE}{180}$ (where ANGLE is in decimal degrees)

Cmin. = 1ft.
Rmin. = 1.5 D
W = (See 171)

* Indicates length required for Air Valves and Blowoffs. See drawings 69-529-156 and 69-529-157.

NOTES

1. For construction details of concrete blocking, see 69-529-158.
2. A miter bend is required for horizontal bends greater than 10 degrees; vertical bends, convex up or convex down of greater than 5 degrees; and at bends of lesser angles where the bends cannot be done by pulling the joints or are required for installation of Air Valve or Blowoff, as indicated on the plan and profiles or as directed by the COR.
3. Where concrete data is not shown, no blocking is required. The total bend length shall be a minimum of 2W. (mechanical joint to mechanical joint)
4. Except for fittings covered by Note 8 below, if a miter bend is shown on this drawing or drawing 529-69-171 then pulling joints will not be allowed without the written approval of the COR.
5. See 69-529-171 for bends not shown on this drawing.
6. The nominal diameter (D) is 24-inches unless otherwise indicated.
7. The "C" values given in the table should be used for fabrication of the miter bends. The "R" values shown are based on the "C" value shown. The formulas are shown for reference only.
8. If angle states "Straight Pipe" a miter bend is not required. The Air Valve or Blowoff fitting shall be made with straight pipe and pipe joints shall be pulled to make grade or alignment change.

REV NO		
10	2010-09-29 FCCF-233 JED	CORRECTED Cv AND C VALUES FOR 539+28.76 MITER BEND.
9	2010-09-22 FCCF-233 JED	REVISED DRAWING TO MATCH REVISIONS MADE ON OTHER DRAWINGS AND CORRECTED ERRORS.
8	2010-02-11 FCCF-413 JED	CHANGED ANGLE TO "STRAIGHT PIPE" FOR AIR VALVE LOCATIONS AGREED DURING FEBRUARY 10, 2010 MEETING AND ALSO AT LOCATIONS WITH ANGLE LESS THAN 2°. REVISED NOTE 8.

ALWAYS THINK SAFETY

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

ANIMAS - LA PLATA PROJECT COLORADO - NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

MITER BENDS

DATA TABLES

DESIGNED D. R. GOOD/D. L. GESUNDHEIT CHECKED _ _ _ JAYE E. DECKER _ _ _ _ _ _ _ _
DRAWN D. R. GOOD/D. L. GESUNDHEIT _ TECH. APPR. _ _ _ LINDA M. BOWLES, P.E. _ _ _ _ _
LINDA M. BOWLES P.E.
APPROVED _ _ _ TEDD R. CALHOUN, P.E.
PEER REVIEWER = TEDD R. CALHOUN P.E.

FARMINGTON, NEW MEXICO 2005-4-19
SHEET 1 OF 1

69-529-159

DATE AND TIME PLOTTED
OCTOBER 8, 2010 12:18
PLOTTED BY
JDECKER

CAD SYSTEM
AutoCAD Rel. 17.2s
CAD FILENAME
N:\69-529-159 REV10.DWG

MITER BEND AND THRUST BLOCK DATA (CONTINUED)

SAN JUAN REACH

P.I. STATION	HEAD (ft.)	ANGLE	DIRECTION	Cv (ft.)	R (ft.)	C (ft.)	W (ft.)
713+89.62	125	12°54'20"	Horizontal	6			2
718+07.14	150	13°30'40"	Horizontal	5.5			3
720+15.87	175	33°44'16"	Horizontal	6	7	4	
722+08.62	175	19°57'21"	Horizontal	6.5	6	2	
724+09.79	175	21°21'47"	Horizontal	5	8	3	
724+70.82	175	22°33'23"	Horizontal	5.5	8	3	
726+88.88	175	15°11'22"	Horizontal	7			3
729+73.97	175	32°45'36"	Horizontal	5	9	5	
734+26.17	200	17°11'56"	Horizontal	7.5	7	2	
739+38.65	200	21°05'43"	Horizontal	7.5	5	2	
742+72.08	200	61°06'14"	Horizontal	7.5	6	6	
756+40.67	200	17°46'18"	Horizontal	5	10	3	
763+75.16	200	30°02'41"	Horizontal	5.5	8	4	
772+10	200	7°46'15"	Convex Up	6			3 *
772+60	200	12°02'02"	Convex Down	5.5			3
775+20	200	Straight Pipe	Convex Up	5			3 *
778+00.20	200	41°22'16"	Combined	8	6	4	
787+57.26	200	43°15'26"	Horizontal	5.5	8	6	
796+80	200	Straight Pipe	Convex Up	5			3 *
805+56.84	200	22°23'45"	Combined	9	10	4	
816+80	200	2°49'36"	Convex Up	5			3 *
818+44.67	200	20°30'10"	Combined	5	8	3	
822+50	200	Straight Pipe	Convex Up	4.5			3 *
827+65.19	200	11°00'22"	Horizontal	10.5			2
837+00	200	7°53'05"	Convex Up	3.5			2
838+00	225	6°06'33"	Convex Down	5			1
842+73.29	225	38°19'55"	Horizontal	3	15	10	
845+90.89	225	10°09'18"	Horizontal	4			3
848+50	225	Straight Pipe	Convex Up	5			3 *
849+81.82	225	11°49'06"	Horizontal	5			3
853+00	225	4°46'53"	Convex Down	4.5			1
855+00	225	Straight Pipe	Convex Up	5			3 *
863+40	225	Straight Pipe	Convex Up	5			3 *
870+00	250	3°58'48"	Convex Down	9.5			1
873+95.52	250	33°35'10"	Combined	5	10	6	
886+45.62	225	56°55'50"	Horizontal	5.5	8	8	
886+70	225	Straight Pipe	Convex Up	5			3 *
888+50	225	7°44'20"	Convex Up	5			2
888+90	225	8°26'06"	Convex Down	10			1
896+50.54	250	18°15'22"	Horizontal	3.5	16	5	
898+30	250	4°52'44"	Convex Up	3			1
899+20	250	6°18'13"	Convex Down	9			1
906+70	250	5°32'05"	Convex Up	5			3 *
913+63.93	250	40°11'07"	Horizontal	7	7	5	
918+20	250	6°53'30"	Convex Up	4.5			2
918+90	275	6°49'26"	Convex Down	5			2
921+20	275	4°28'27"	Convex Up	10			1
923+03.27	275	56°54'14"	Horizontal	6.5	9	9	
928+36.63	300	52°51'35"	Horizontal	6.5	11	10	
933+07.10	325	26°16'30"	Horizontal	6.5	13	6	
936+33.76	325	15°32'11"	Horizontal	6	15	4	
949+97	350	33°43'56"	Combined	4	19	11	

CROSSOVER #3

P.I. STATION	HEAD (ft.)	ANGLE	DIRECTION	Cv (ft.)	R (ft.)	C (ft.)	W (ft.)
1+19.9	300	45°±	Horizontal	6.5	4	3	
1+80.6	300	37°59'32"	Horizontal	3.5	8	5	

The nominal diameter for Crossover #3 is 12 inches.

CROSSOVER #5

P.I. STATION	HEAD (ft.)	ANGLE	DIRECTION	Cv (ft.)	R (ft.)	C (ft.)	W (ft.)
1430+45 11.83 Rt.	290	56°24'56"	Combined	4.5	6	6	

The nominal diameter for Crossover #5 is 14 inches.

SHIPROCK REACH (TERMINATION PIPING)

P.I. STATION	HEAD (ft.)	ANGLE	DIRECTION	Cv (ft.)	R (ft.)	C (ft.)	W (ft.)
1497+50.75	275	13°42'18"	Horizontal	5	8	2	

The nominal diameter for miter bend at station 1497+50.75 is 18 inches.

HOGBACK REACH

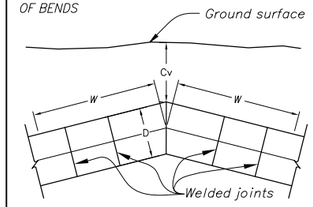
P.I. STATION	HEAD (ft.)	ANGLE	DIRECTION	Cv (ft.)	R (ft.)	C (ft.)	W (ft.)
961+00	350	77°50'	Combined	4	18	25	
962+80	350	2°25'49"	Convex Up	3 **			3 *
974+53.79	350	32°03'45"	Combined	3.5	21	12	
975+10	350	8°48'49"	Convex Down	5.5	13	2	****
975+70	350	11°08'24"	Convex Down	7.5	10	2	****
976+10	350	10°42'50"	Convex Up	7			3 *
977+40	350	9°13'56"	Convex Down	5	12	2	****
977+70	350	9°15'06"	Convex Up	6	31	5	****
981+05.41	350	47°48'53"	Horizontal	3	24	20	
982+30	350	3°50'13"	Convex Down	5.5			1
984+36.60	350	60°11'44"	Combined	3 **	24	25	
985+00	350	11°03'39"	Convex Down	5	10	2	
985+30	350	7°51'21"	Convex Down	10.5			2
985+70	350	5°14'04"	Convex Up	5			1
986+50	350	6°04'18"	Convex Down	4.5			2
989+43.94	325	94°25'30"	Combined	10	7	12	
994+03.80	300	74°21'06"	Horizontal	4	16	21	
995+20	300	Straight Pipe	Convex Up	5			3 *
998+97.17	300	77°42'53"	Combined	4.5	14	19	
1011+60	300	10°22'26"	Convex Up	4.5	33	6	
1012+40	325	6°22'01"	Convex Down	5			2
1013+80	325	8°06'58"	Convex Down	5.5			2
1015+50	325	4°44'22"	Convex Down	5.5			1
1016+10	300	6°54'42"	Convex Up	6.5			2
1018+84.36	300	90°56'48"	Horizontal	6.5	10	16	
1021+14.55	300	91°00'25"	Combined	6	11	18	
1022+20	300	Straight Pipe	Convex Up	5			3 *
1106+90	325	Straight Pipe	Convex Up	5			3 *
1122+80	350	6°21'35"	Convex Down	11.5			1
1126+80	350	Straight Pipe	Convex Up	5			3 *
1136+00	350	8°04'43"	Convex Up	5			3
1136+60	350	18°07'16"	Convex Down	13.5	6	2	
1137+10	350	9°50'28"	Convex Up	5	35	6	
1149+10	350	Straight Pipe	Convex Up	5			3 *
1157+44.73	375	42°03'58"	Horizontal	3	26	19	
1158+40	375	9°20'15"	Convex Down	10			2
1160+85.17	375	28°04'32"	Horizontal	3	27	13	
1163+60	375	Straight Pipe	Convex Up	5			3 *
1165+20	375	6°50'02"	Convex Up	3			3
1166+08.48 AH	375	39°57'37"	Combined	3	26	18	
1168+60	375	12°13'30"	Convex Up	4.5	37	8	
1169+80	400	32°49'36"	Convex Down	6.5	9	5	
1170+40	400	14°25'17"	Convex Up	7	32	8	
1170+87.45	375	42°29'10"	Combined	4	20	15	
1172+70	375	Straight Pipe	Convex Up	5			3 *
1174+00	375	9°20'57"	Convex Up	9.5			2
1174+40	385	11°53'30"	Convex Down	6	10	2	
1178+00	385	10°43'34"	Convex Down	5.5	11	2	
1178+40	375	10°43'55"	Convex Up	6.5	32	6	
1192+60	375	8°59'54"	Convex Up	4.5	38	6	
1193+40	385	9°08'30"	Convex Down	7	13	2	****
1194+00	385	3°43'05"	Convex Down	6			1
1194+60	385	3°52'15"	Convex Up	7.5			3 *
1197+60	385	7°35'38"	Convex Down	7			2
1198+10	375	7°36'29"	Convex Up	7			2
1212+09.24	375	26°46'16"	Horizontal	4	21	10	
1216+41.21	375	17°33'20"	Combined	9	13	4 ***	
1221+40.73	375	13°01'41"	Horizontal	6.5	13	3	
1225+42.91	375	20°03'41"	Horizontal	4.5	20	7	
1227+43.87	375	22°58'18"	Horizontal	5.5	17	7	
1229+72.35	375	65°37'13"	Combined	10.5	9	10	
1230+50	400	5°36'55"	Convex Down	7.5			1
1231+70	400	5°15'00"	Convex Up	5.5			1
1232+80	400	5°19'16"	Convex Down	7.5			1
1233+72.72	400	46°07'56"	Horizontal	6	16	13	
1237+70	400	3°54'34"	Convex Down	10.5			1
1238+50	400	4°05'12"	Convex Up	5.5			3 *

*** Cover shown is to original ground. Compacted backfill is placed to 4.75'± above pipe. See detail on drawing 69-529-123.*
**** Length from mechanical joint to mechanical joint shall be 6 feet as required by minimum length shown on drawing 69-529-128. "C" distance shown is for miter bend blocking.*
***** If the contractor furnishes 6 foot minimum miter bend lengths (mechanical joint to mechanical joint) no concrete blocking will be required at the indicated locations.*

SHIPROCK REACH

P.I. STATION	HEAD (ft.)	ANGLE	DIRECTION	Cv (ft.)	R (ft.)	C (ft.)	W (ft.)
1242+60	400	6°37'35"	Convex Up	4.5			2
1243+50	425	6°38'59"	Convex Down	6.5			2
1247+90	425	4°25'10"	Convex Down	10			1
1267+00	400	5°32'42"	Convex Up	7			1
1267+60	425	5°17'17"	Convex Down	13.5			1
1270+30	425	6°6'22"	Convex Down	12.5			1
1271+00	425	5°56'39"	Convex Up	5			2
1308+35.93	450	25°41'34"	Horizontal	3	36	16	
1308+72.30	450	31°17'33"	Horizontal	4.5	24	13	
1309+42	450	45°	Combined	5.5	18	14	INSTALL AS ONE UNIT
1309+56	450	41°32'43"	Combined	5	19	14	
1313+29.37	450	39°41'59"	Combined	5	20	14	
1313+50 AH	450	45°	Horizontal	9	11	9	
1321+04.62	450	4°04'52"	Combined	5			3 *
1323+46.02	450	41°43'15"	Horizontal	3	30	22	
1324+30	450	8°08'29"	Convex Down	6.5			3
1326+80	450	10°53'39"	Convex Up	5.5	42	8	
1330+37.80	400	43°04'21"	Combined	11.5	9	7	
1331+10	385	11°04'22"	Convex Up	5	36	7	
1337+80	385	4°25'02"	Convex Up	6			3 *
1342+80	385	6°47'36"	Convex Down	5			2
1343+80	375	7°57'44"	Convex Up	3.5			3
1344+70	375	11°48'49"	Convex Up	4.5	39	8	
1345+20	375	9°48'41"	Convex Down	5.5	12	2	
1346+50	375	13°14'54"	Convex Down	6.5	9	2	
1347+10	375	9°54'35"	Convex Up	4.5	40	7	
1348+00	375	2°57'52"	Convex Up	5			3 *
1355+00	375	Straight Pipe	Convex Up	5.5			3 *
1360+61.25	375	21°17'09"	Horizontal	3	27	10	
1375+00	375	Straight Pipe	Convex Up	5			3 *
1383+68.12	375	13°05'50"	Horizontal	4	22	5	
1384+70	375	8°55'09"	Convex Down	5.5			3
1385+80	350	10°52'37"	Convex Up	5	37	7	
1387+60	350	7°23'23"	Convex Up	5			3 *
1390+80	400	11°17'58"	Convex Down	10			3
1391+60	400	18°27'49"	Convex Down	12.5	6	2	
1394+50	325	17°12'19"	Convex Up	5.5	30	9	
1397+00	325	4°12'38"	Convex Up	4.5			3 *
1397+90	325	3°55'57"	Convex Down	5.5			1
1398+70	325	7°40'23"	Convex Up	8			2
1399+20	325	14°21'56"	Convex Down	7	8	2	
1402+00	290	6°33'07"	Convex Up	3			2
1404+80.28	290	18°45'28"	Horizontal	5.5	12	4	
1410+40	290	Straight Pipe	Convex Up	6			3 *
1430+59.76	290	22°30'00"	Combined	4	15	6	
1430+70.42	290	22°30'00"	Convex Down	8.5	5	2	
1434+60	290	Straight Pipe	Convex Up	5			3 *
1446+00	290	Straight Pipe	Convex Up	5			3 *
1470+00	300	90°	Horizontal	7.5	9	14	
1471+10	300	90°	Combined	10	6	10	
1494+68.37 AH	275	18°03'52"	Horizontal	6	13	4	

** Indicates length required for Air Valves And Blowoffs.*
See drawings 69-529-156 and 69-529-157.

EQUATION FOR "W" (Length of Welded Pipe)	$W = \frac{49(H_C)D^2(1-\cos\Delta)}{\mu(W_E + W_W + W_P)}$
EQUATION VARIABLES	$W_E = D(C_V)E_C$ $W_W = 49\ (D^2)$ $W_P = 128.28(D)t - 10.69t^2$ $\mu = 0.25$ $t = 0.25$ inches $E_C = 100$ pcf cover earth weight C_V = varies
WELD METHOD OF THRUST RESTRAINT	ALL DIRECTIONS OF BENDS  NOTE: Miter cuts not shown, see (158) for details.

EQUATION PARAMETERS

D = Nominal diameter, feet
H_C = Head class, feet of water
E_C = Weight of earth cover, pcf
C_V = Minimum required cover of earth over pipe, feet
W_E = Weight of earth, lbs/ft
W_W = Weight of water, lbs/ft
W_P = Weight of pipe, lbs/ft
μ = Coefficient of Friction
t = Thickness of pipe, inches
Δ = ANGLE in decimal degrees

NOTES

1. *For construction details of concrete blocking, see 69-529-158.*
2. *A miter bend is required for horizontal bends greater than 10 degrees; vertical bends, convex up or convex down of greater than 5 degrees; and at bends of lesser angles where the bends cannot be done by pulling the joints or are required for installation of Air Valve or Blowoff, as indicated on the plan and profiles or as directed by the COR.*
3. *Where concrete data is not shown, no blocking is required. The total bend length shall be a minimum of 2W. (mechanical joint to mechanical joint)*
4. *Except for fittings covered by Note 8 below, if a miter bend is shown on this drawing or drawing 529-69-159 then pulling joints will not be allowed without the written approval of the COR.*
5. *See 69-529-159 for bends not shown on this drawing.*
6. *The nominal diameter (D) is 24-inches unless otherwise indicated.*
7. *The "C" values given in the table should be used for fabrication of the miter bends. The "R" values shown are based on the "C" value shown. The formulas are shown for reference only.*
8. *If angle states "Straight Pipe" a miter bend is not required. The Air Valve or Blowoff fitting shall be made with straight pipe and pipe joints shall be pulled to make grade or alignment change.*

REV NO.		
14	2010-09-27 FCCF-233 JED	REVISED TO MATCH CONTRACTOR HDD AS-BUILT SURVEYS. AND OTHER MITER BEND REVISIONS DUE TO PLAN AND PROFILE REVISION MADE BEFORE REVISION DATE.
13	2010-05-10 FCCF-413 JED	CORRECTED FOR CONTRACTOR'S LOCATION OF EXISTING LINES AT CROSSOVER NO. 5
12	2010-04-19 FCCF-413 JED	ADDED NEW MITER BENDS SHOWN ON DRAWING 69-529-222 AND NEW MITER BENDS SHOWN ON REVISION 3 OF DRAWING 69-529-133.
11	2010-02-12 FCCF-413 JED	CORRECTED Δ AT STATION 1324+30.

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NAVAJO NATION MUNICIPAL PIPELINE

MITER BEND, AND THRUST BLOCK

DATA AND DETAILS

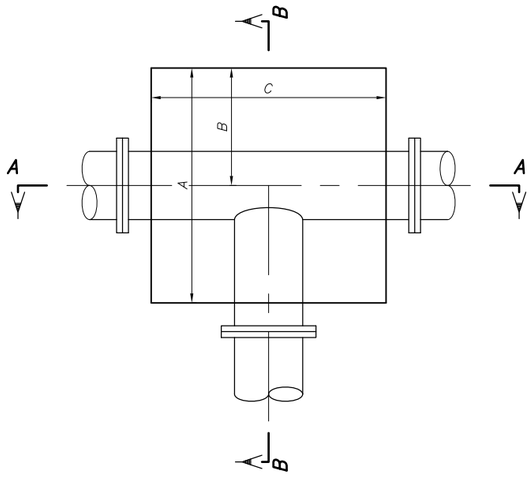
DESIGNED D. R. GOOD/D.L. GESUNDHEIT CHECKED JAYE E. DECKER
DRAWN D. R. GOOD/D.L. GESUNDHEIT TECH. APPR. LINDA M. BOWLES, P.E.
APPROVED TEDD R. CALHOUN P.E.
PEER REVIEWER - TEDD R. CALHOUN P.E.

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SHEET 1 OF 1

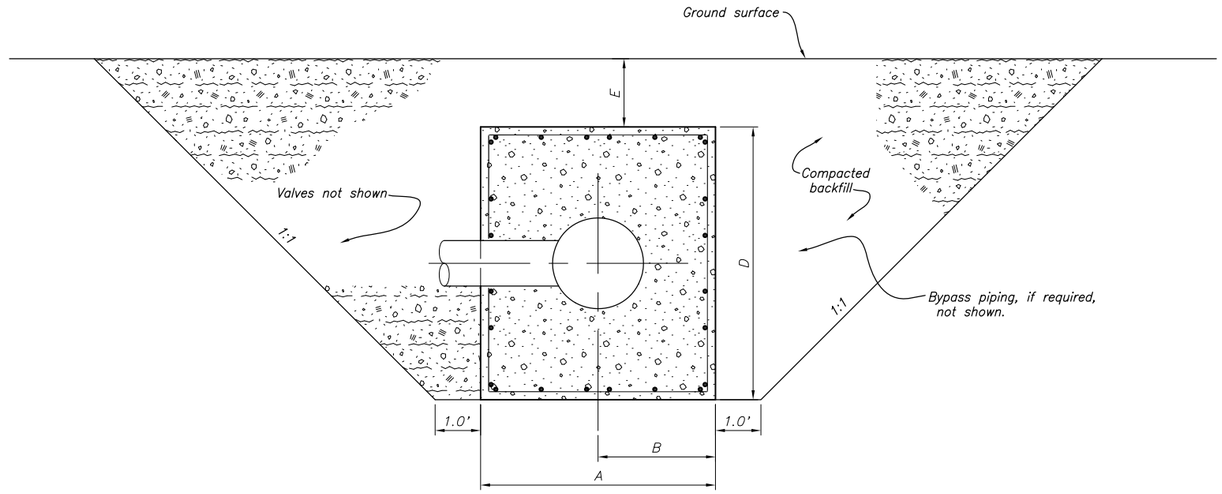
69-529-171

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48 69-529-171 REV14.DWG



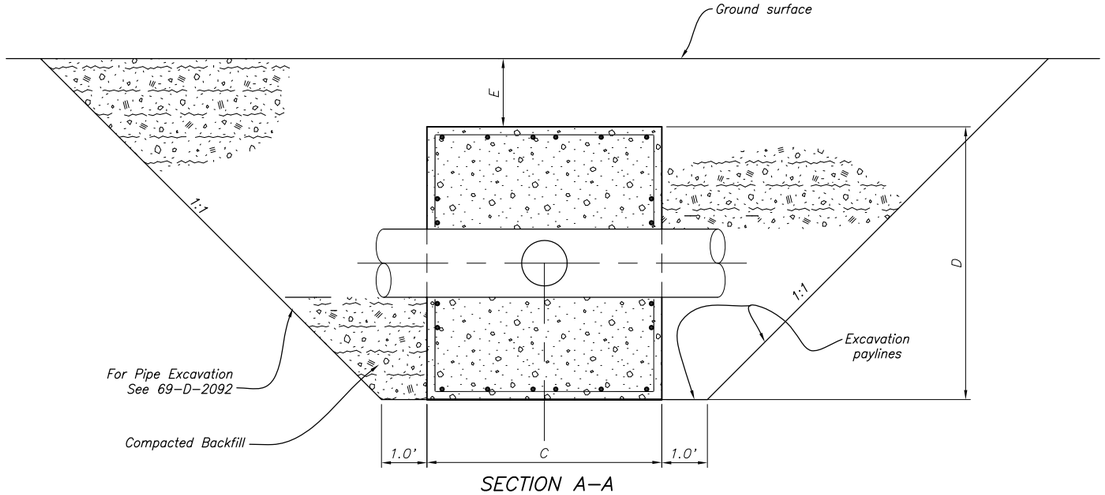
PLAN



SECTION B–B

THRUST BLOCK DIMENSIONS

Station	Reach	Tee Size $D_1xD_2xD_3$	Head Class	A (ft)	B (ft)	C (ft)	D (ft)	E (ft)	Reference Drawings	
									Civil	Mechanical
32+00	FRUITLAND	18x18x18	290	7–0	3–6	8–0	6–0	3–5	69–529–101	69–D–2108
CO1 – 2+04	FRUITLAND	18x18x18	290	7–0	3–6	8–0	6–0	3–5	69–529–101	69–D–2108
402+08.3	FRUITLAND	18x18x18	400	8–0	4–0	9–0	7–0	2–8	69–529–116	69–D–2110
703+46	NENAHNEZAD TANK	18x18x12	75	8–0	4–0	9–0	7–0	2–11	69–529–117	69–529–207
928+50	SAN JUAN	18x18x12	300	7–0	3–6	6–0	6–0	4–4	69–529–122	69–D–2112
CO3 –1+98.99	SAN JUAN	16x16x12	300	6–0	3–0	6–0	4–0	1–9	69–529–122	69–D–2112
1238+30	HOGBACK	18x18x12	400	8–0	6–3	8–0	6–0	7–3	69–529–160	69–D–2114 *
CO4 – 0+20.9	HOGBACK	16x16x12	400	6–0	4–6	6–0	5–0	3–0	69–529–160	69–D–2114 *
1430+45	SHIPROCK	18x18x14	290	7–0	3–6	6–0	6–0	2–4	69–529–132	69–529–210
CO5	SHIPROCK	14x14x14	290	6–0	3–0	6–0	6–0	2–0±	69–529–210	69–529–210
1497+70	SHIPROCK	18x18x16	275	7–0	3–6	8–0	6–0	3–6	69–529–133	69–529–209
1498+99.8	SHIPROCK	16x16x16	275	7–0	3–6	8–0	6–0	2–10	69–529–133	69–529–209
1498+99.8 12.8 Lt	SHIPROCK	16x16x16	275	7–0	3–6	8–0	6–0	2–10	69–529–133	69–529–209



SECTION A–A
(TYPICAL)

NOTES

1. For general notes and minimum requirements for detailing reinforcement, see 40–D–6263.
2. For general concrete outline notes, see 40–D–7012.
3. Structural design is based on a concrete compressive strength of 4,000 psi at 28 days and reinforcement strength of 60,000 psi.
4. All reinforcement is #5@1–0 unless stated otherwise.
5. * Blocking at 1238+30 and Crossover 4 are not centered on pipe. Refer to dimension "B".

REV NO 4	2009–11–09 FCCF–413 JED	ADDED BLOCKING REQUIRED FOR NEW CROSSOVER NO. 5
REV NO 3	2009–06–02 FCCF–413 JED	ADDED BLOCKING AT STATIONS 703+46, 1497+70, 1498+99.8 AND 1498+99.8 – 12.8 Lt.
REV NO 2	2008–08–19 FCCF–410 JED	ADDED BLOCKING AT CROSSOVER NO. 1 – STATION 2+04.
REV NO 1	2007–10–31 FCCF–410 JED	ADDED NOTE 5 ABOUT BLOCKING FOR 1238+30 AND CROSSOVER 4.

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NAVAJO NATION MUNICIPAL PIPELINE

TEE THRUST BLOCKING

PLAN AND SECTIONS

DESIGNED L.A. BAROS/D.L. GESUNDHEIT CHECKED JAYE E. DECKER

DRAWN L.A. BAROS/D.L. GESUNDHEIT TECH. APPR. LINDA M. BOWLES, P.E.
LINDA M. BOWLES P.E.

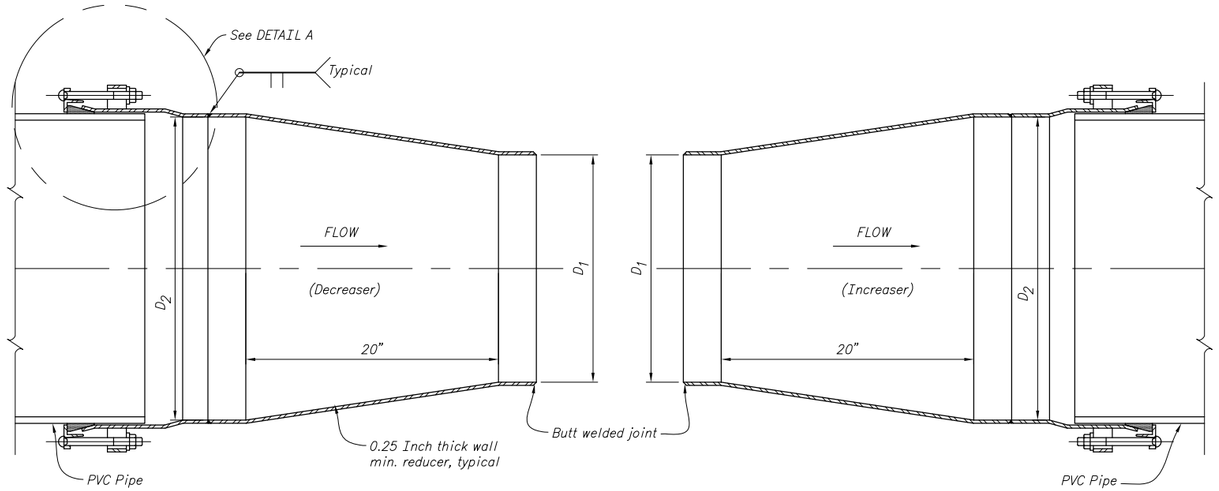
APPROVED TEDD R. CALHOUN, P.E.
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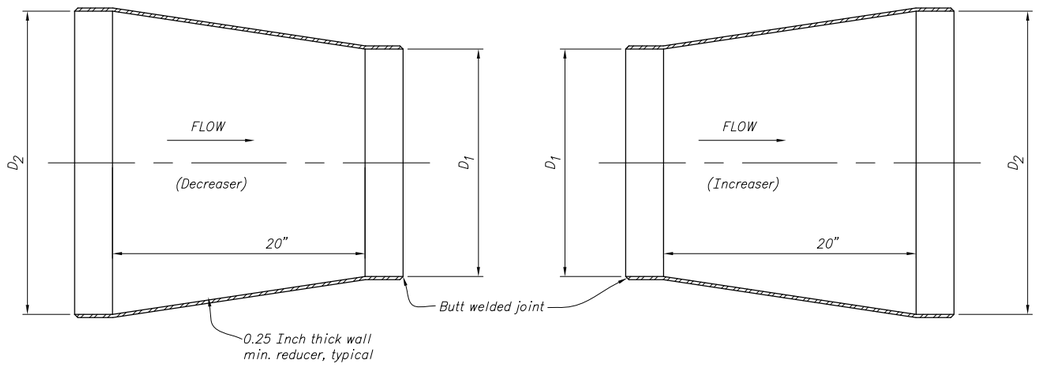
69–529–190

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JDECKER

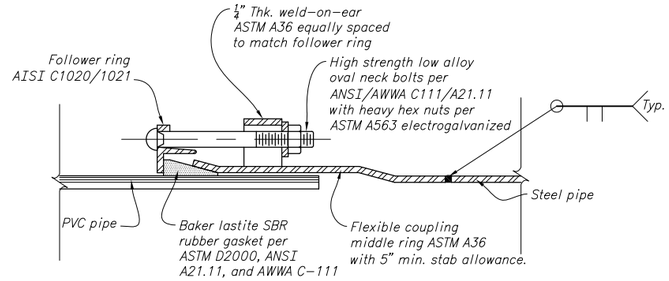
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COUPLER-WELDED TAPERS



WELDED TAPERS



DETAIL A
Typical

TABLE 1
PIPELINE TAPERS

GENERAL LOCATION STATION	PIPELINE REACH	TAPER D_2 x D_1	CONNECTION TYPE	TAPER TYPE
31+76.58*	FRUITLAND	24X18	COUPLER-WELDED	DECREASER
32+12	FRUITLAND	24X18	WELDED-COUPLER	INCREASER
401+97	FRUITLAND	24X18	COUPLER-WELDED	DECREASER
402+21	FRUITLAND	24X18	WELDED-WELDED	INCREASER
702+24	NENAHNEZAD TANK	24X18	WELDED-WELDED	ECCENTRIC DECREASER
BYPASS	NENAHNEZAD TANK	18X12	FLANGED-WELDED	ECCENTRIC DECREASER
703+54	NENAHNEZAD TANK	24X18	WELDED-COUPLER	INCREASER
928+42	SAN JUAN	24X18	WELDED-WELDED	DECREASER
928+58	SAN JUAN	24X18	WELDED-WELDED	INCREASER
1238+20	HOGBACK	24X18	COUPLER-WELDED	DECREASER
1238+40	HOGBACK	24X18	WELDED-WELDED	INCREASER
1430+35	SHIPROCK	24X18	COUPLER-WELDED	DECREASER
1430+70	SHIPROCK	24X18	WELDED-COUPLER	INCREASER
1497+45	SHIPROCK	24X18	COUPLER-WELDED	DECREASER

* See Note 4.

NOTES

1. Drawing not to scale.
2. For coating and lining, see specification paragraphs.
3. Contractor may submit alternative plans for approval.
4. Taper at 31+76.58 has a concrete thrust block and steel thrust ring. See 69-D-2093.

REV NO		
3	2009-11-12 FCCF-413 JED	ADDED TAPERS AT STATION 1430+35 AND 1430+70 AND NENAHNEZAD TANK BYPASS. MADE TAPER AT 702+24 ECCENTRIC. CHANGED STATION 702+51 TO 703+54.
2	2009-08-24 FCCF-413 JED	ADDED TAPER AT STATION 1497+45.
1	2008-05-02 FCCF-410 JED	TABLE 1 - CORRECTED PIPELINE REACH NAME FOR TAPER AT STATION 1238+40. MODIFIED TAPER STATIONS 31+76.58 AND 32+12. ADDED NOTE #4.

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ANIMAS - LA PLATA PROJECT COLORADO - NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

TAPERS

DETAILS

DESIGNED L. A. BAROS/ CHOU CHA CHECKED JAYE E. DECKER

DRAWN L. A. BAROS/ CHOU CHA TECH. APPR. LINDA M. BOWLES, P.E.

APPROVED TEDD R. CALHOUN, P.E. LINDA M. BOWLES P.E.

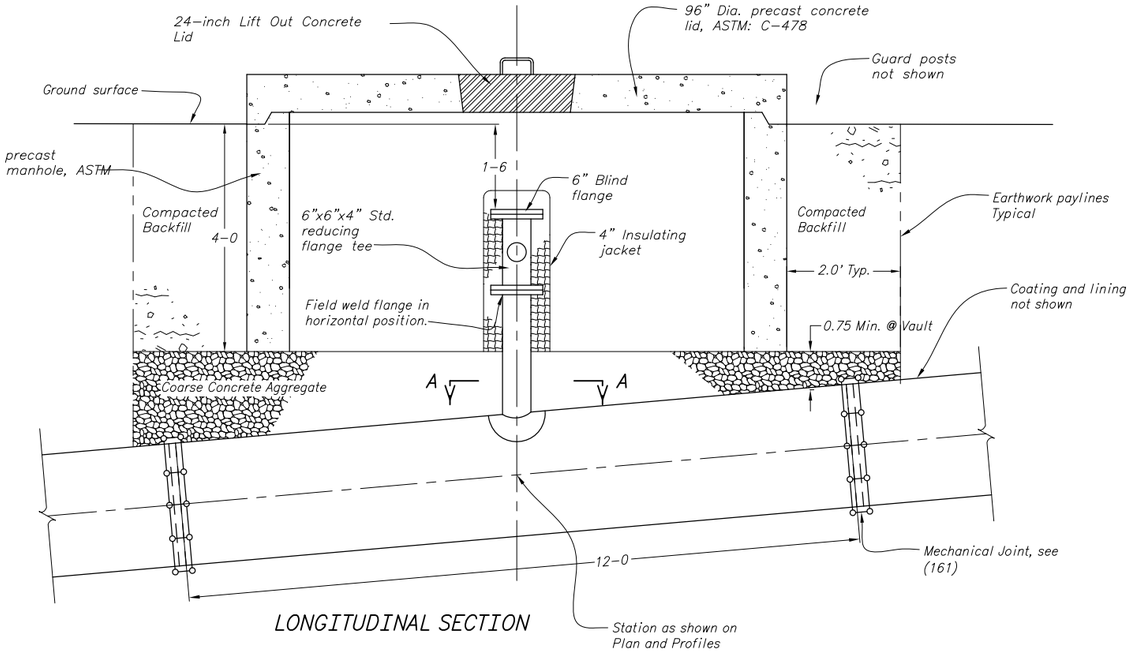
PEER REVIEWER - TEDD R. CALHOUN, P.E.

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SHEET 1 OF 1

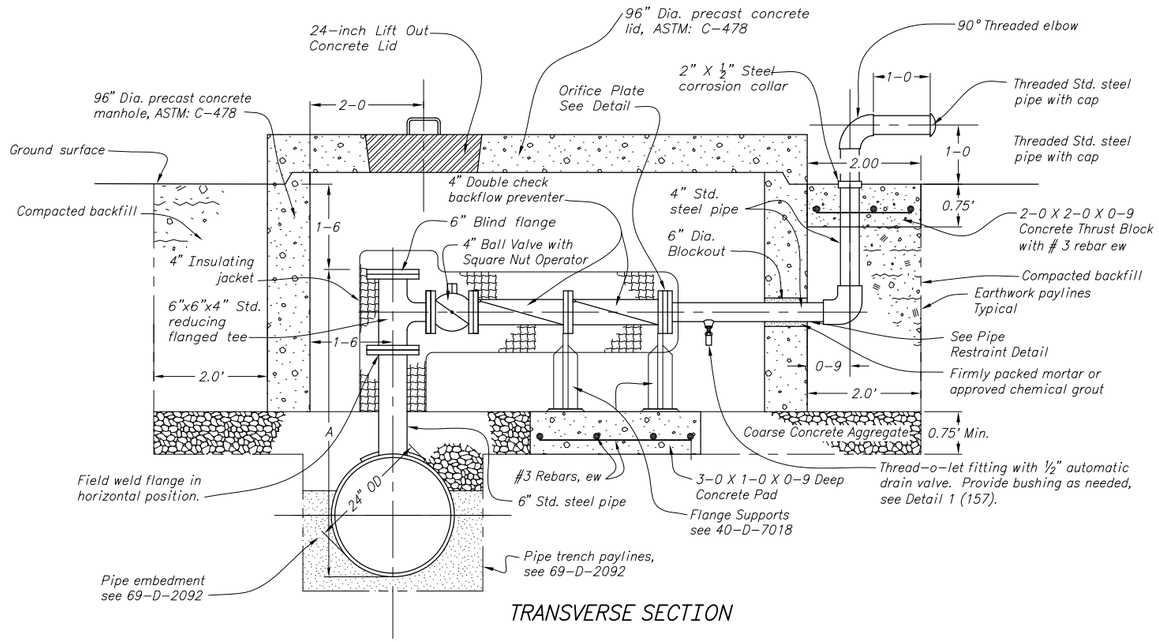
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LONGITUDINAL SECTION

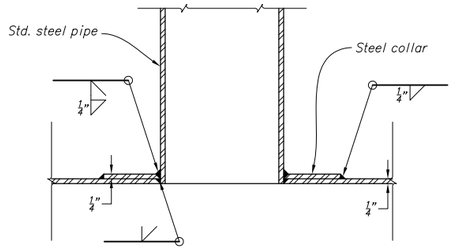


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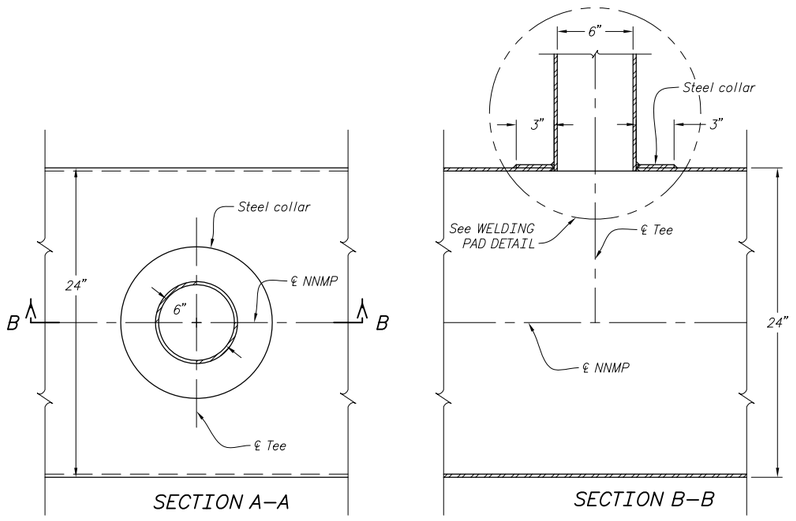
FILLING STATION DATA TABLE

STATION	REACH	HEAD CLASS (FEET)	AWWA FLANGE RATING	ANSI BALL VALVE TYPE	PIPE ℄ El. (FEET)	ORIGINAL GROUND El. (FEET)	HYDRAULIC GRADE LINE (FEET)	Distance A (FEET)
302+30	FRUITLAND	350	CLASS E	CLASS 150	5218.10	5227.4	5337.7	7.8 *
543+55	NEHAHNEZAD	400	CLASS E	CLASS 150	5167.91	5176.0	5307.9	9.1 **
922+00	SAN JUAN	275	CLASS E	CLASS 150	5067.58	5075.0	5253.6	6.9
1173+00	HOGBACK	375	CLASS E	CLASS 150	4990.58	4997.6	5220.1	6.5

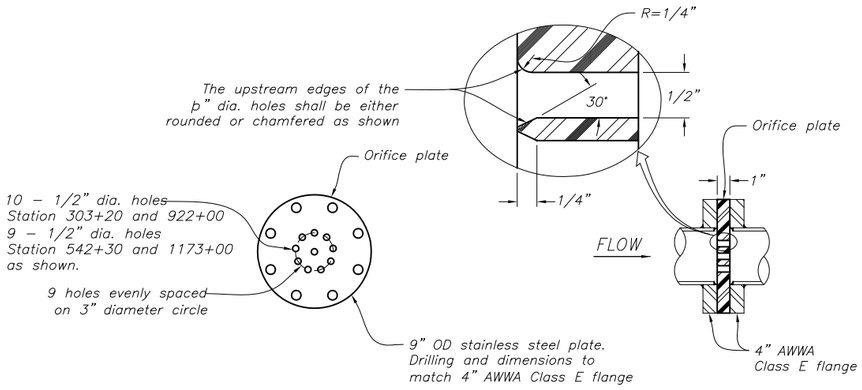
* Contractor to provide 2'± long spool between approved fitting and flanged tee to meet revised A distance.
** Contractor to provide 3'± long spool between fitting and flanged tee to meet revised A distance.



WELDING PAD DETAIL
Not to Scale



Not To Scale



ORIFICE PLATE ASSEMBLY

NOTES

1. Drawing is not to scale.
2. For coating and lining requirements for standard steel pipe and fittings, see specification paragraphs.
3. Flanges shall meet the same head requirements as designated for the pipe as noted, and flange drilling shall match mating flange.
4. Provide double check backflow preventers for filling stations. Recommended manufacturer: Cla-Val model D-4 or equal.
5. Install three guard post around each vault as directed in the field. See Typical Guard Post Installation on (157).
6. Keep valve operators free to move outside of insulation jacket on ball valve and backflow preventer.

REV NO 04	2010-09-29 FCCF-233 JED	CHANGED STATION 543+20 TO 543+55 AND ADJUSTED CHART DATA. ADDED REQUIREMENT FOR 3 FOOT LONG SPOOL.
REV NO 03	2009-11-04 FCCF-413 JED	ADDED ORIFICE PLATE. ADDED THRUST BLOCK OUTSIDE OF VAULT. ADDED CORROSION COLLAR.
REV NO 02	2009-10-19 FCCF-413 JED	REVISED LOCATION AND VALUES OF FILLING STATION IN FRUITLAND REACH. ADDED REQUIREMENT TO FURNISH A 2 FOOT LONG SPOOL TO MEET NEW VALUES.

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FILLING STATION
SECTIONS AND DETAIL

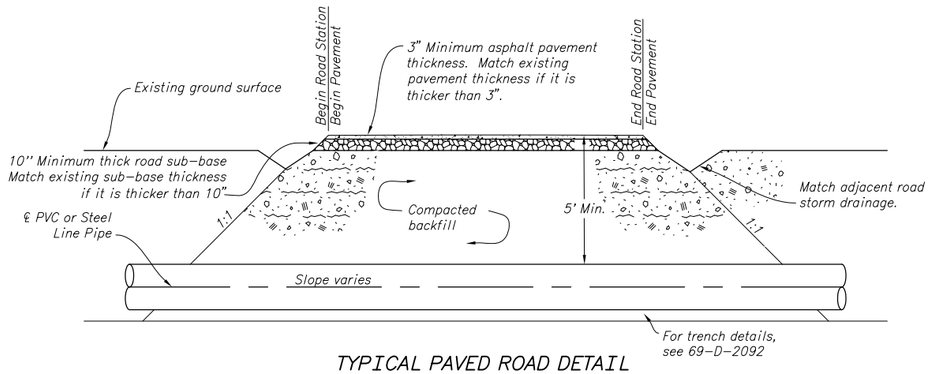
DESIGNED CHOU CHA _____ CHECKED JAYE E. DECKER _____
DRAWN CHOU CHA _____ TECH. APPR. LINDA M. BOWLES, P.E. _____
LINDA M. BOWLES P.E.
APPROVED TEDD R. CALHOUN, P.E. _____
PEER REVIEWER - TEDD R. CALHOUN, P.E.

FARMINGTON, NEW MEXICO 2005-3-22
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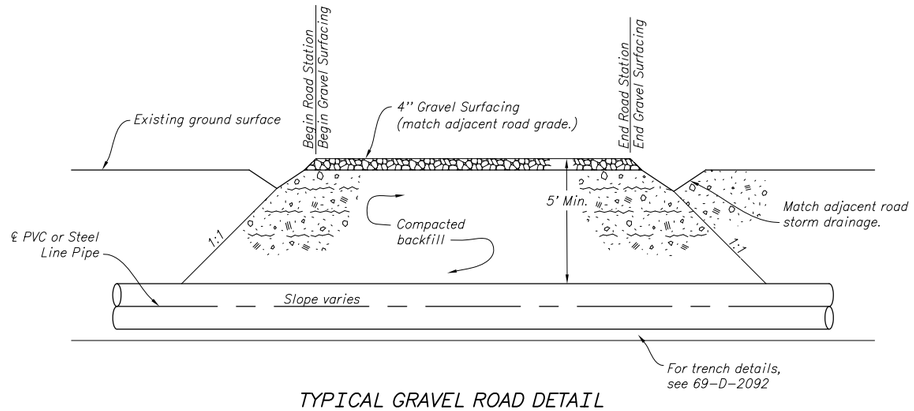
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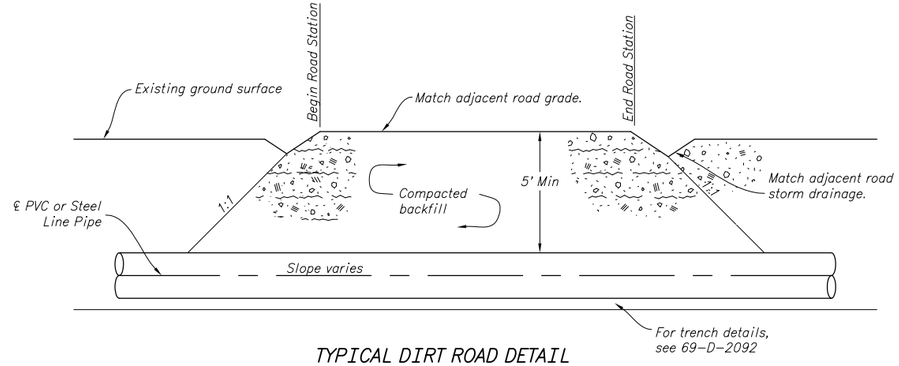
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TYPICAL PAVED ROAD DETAIL



TYPICAL GRAVEL ROAD DETAIL



TYPICAL DIRT ROAD DETAIL
(Compacted Backfill)

NOTES

1. For pipe details, road surfacing material type, and stations, see Open Cut Road Crossings Table on Plans and Profiles (101) to (115), (117) to (121), and (123) to (133).
2. When pipe alignment is in the roadway, details are similar.
3. Asphalt mix shall be approved by BIA Roads.
4. For Highway 64 Road Section, see (173).
5. Sawcut existing pavement surfaces 5-feet beyond trench daylight excavation lines on either side.
6. Side Slopes shown are perpendicular to road centerline.

REV NO		
1	2008-04-15 FCCF-410 JED	CORRECTED SPELLING ERROR AND ADDED NOTE 6.

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NAVAJO NATION MUNICIPAL PIPELINE

TYPICAL OPEN CUT ROAD CROSSINGS

DETAILS

DESIGNED D. R. GOOD CHECKED JAYE E. DECKER

DRAWN D. R. GOOD/ANNE PAVOL TECH. APPR. LINDA M. BOWLES, P.E.
LINDA M. BOWLES P.E.

APPROVED TEDD R. CALHOUN, P.E.
PEER REVIEWER - TEDD R. CALHOUN, P.E.

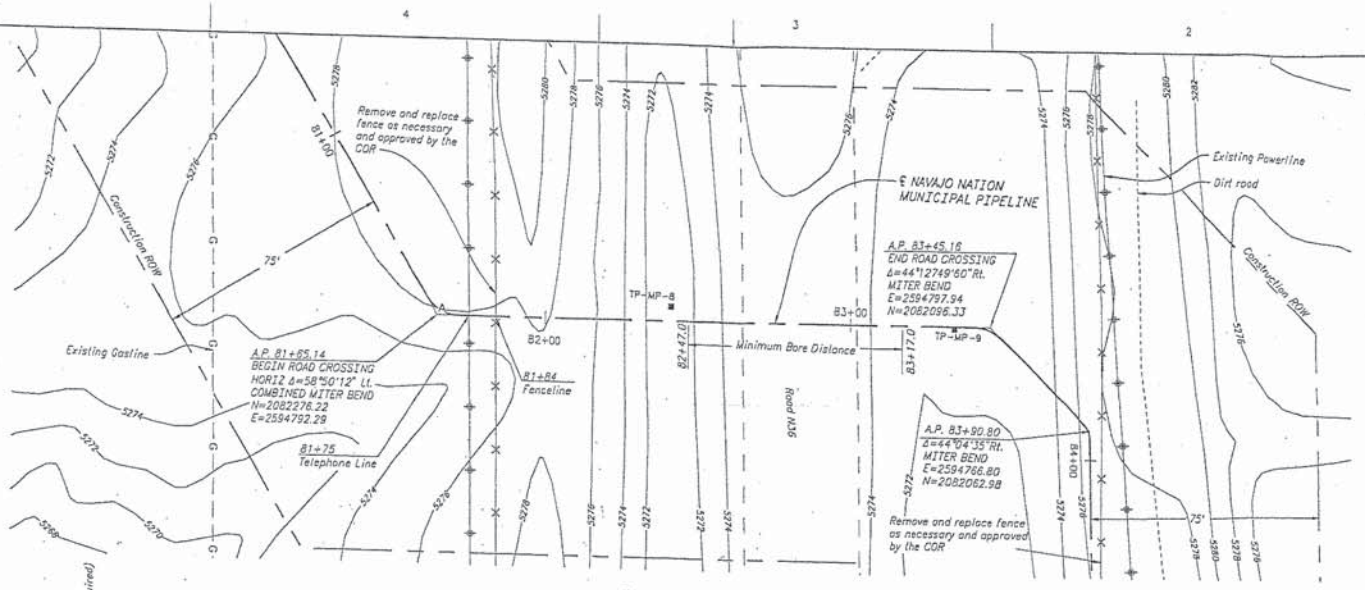
FARMINGTON, NEW MEXICO 2005-3-22
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69-529-169

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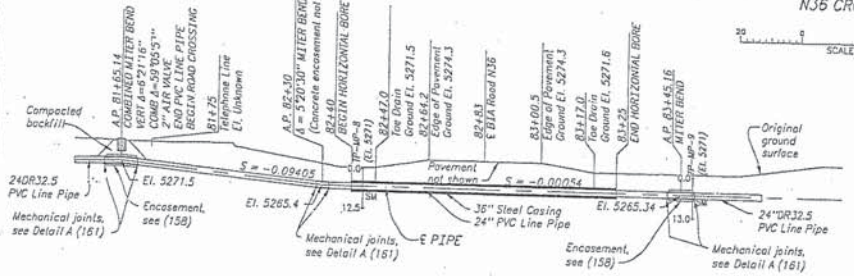
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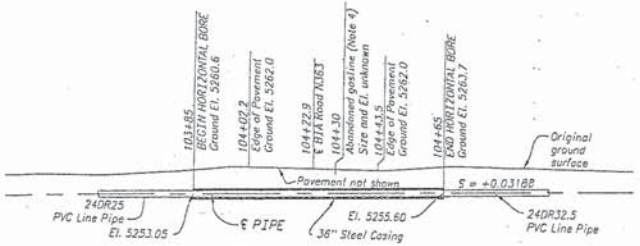


PLAN
N36 CROSSING #1

SCALE OF FEET

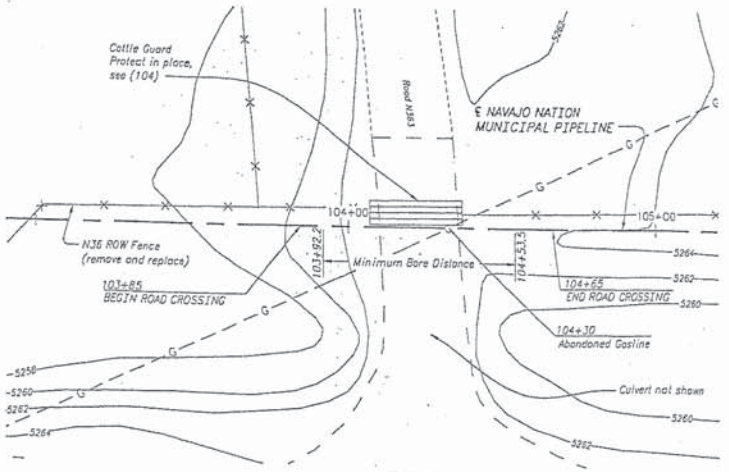


PROFILE
N36 CROSSING #1



PROFILE
N363 ROAD CROSSING

SCALE OF FEET



PLAN
N363 ROAD CROSSING

NOTES

1. General Notes, Abbreviations, Symbols, and Pipe Classification, see (102).
2. For Plans and Profiles on NNMP Fruitland Reach, see (103) and (104).
3. Existing cattle guards shall be protected in place. For additional information, see (104).
4. Obtain size and elevation at gasline from owner before starting boring operation.
5. Boring distances are minimum boring distances only. Longer boring lengths shall be submitted for approval.
6. For concrete encased miter bends, see (158).

REV NO.	DATE	DESCRIPTION
2	2008-09-29 TO07+12 D. GOOD	CHANGED ROAD CROSSINGS TO INCLUDE STEEL CASING AND MADE OTHER CHANGES ASSOCIATED WITH THE NEW CROSSING.
1	2007-02-05 D. L. BOWLES	CORRECTED PROFILE SLOPE AND ELEVATIONS.

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ANIMAS-LA PLATA PROJECT COLORADO - NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

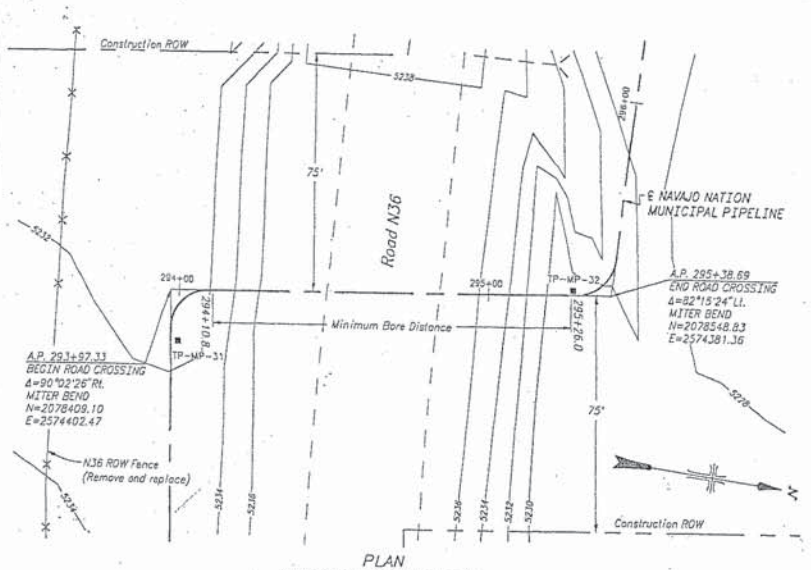
BORE ROAD CROSSINGS
N36 (82+83) AND N363 (104+22.9)
PLANS AND PROFILES

DESIGNED L. L. BAROS CHECKED G. E. STOVER
DRAWN E. S. SOTO/ JVB TECH. APPR. LINDA M. BOWLES, P.E.
APPROVED TODD R. CALHOUN, P.E. LINDA M. BOWLES P.E.
PEER REVIEWER TODD R. CALHOUN, P.E.

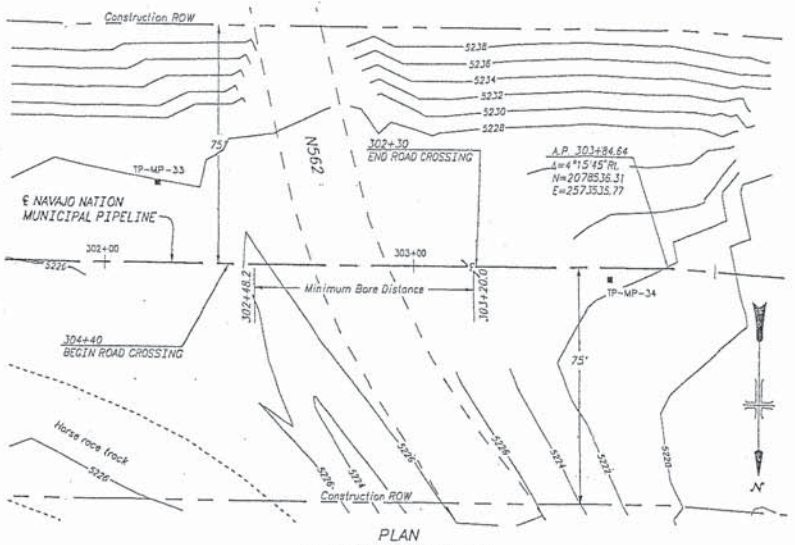
FARMINGTON, NEW MEXICO

DGN SYSTEM 4&2s
DGN FILENAME 69-529-151 REV2.DWG

DATE AND TIME PLOTTED OCTOBER 1, 2008 @9:01 PLOTTED BY GOOD



PLAN
N36 ROAD CROSSING #2

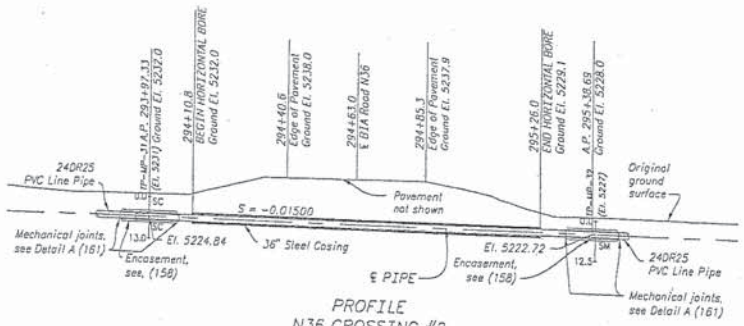


PLAN
N562 ROAD CROSSING

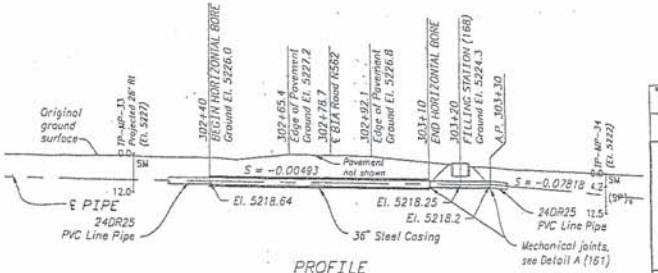
SCALE OF FEET
20 0 20 40 60

NOTES

1. For General Notes, Abbreviations, Symbols and Pipe Classifications, see (102).
2. For Plans and Profiles on NNMP Fruitland Reach, see (107) and (108).
3. For construction limitations near the race track, see specifications.
4. Boring distances are minimum boring distances only. Longer lengths shall be submitted for approval.
5. For concrete encased miter bends, see (158).



PROFILE
N36 CROSSING #2



PROFILE
N562 ROAD CROSSING

NO.	DATE	DESCRIPTION
1	2008-09-29 FCDT-412 & CCOD	CHANGED ROAD CROSSINGS TO INCLUDE STEEL CASING AND MADE OTHER CHANGES ASSOCIATED WITH THE NEW CROSSING.

ALWAYS THINK SAFETY

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

ANIMAS-LA PLATA PROJECT COLORADO - NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

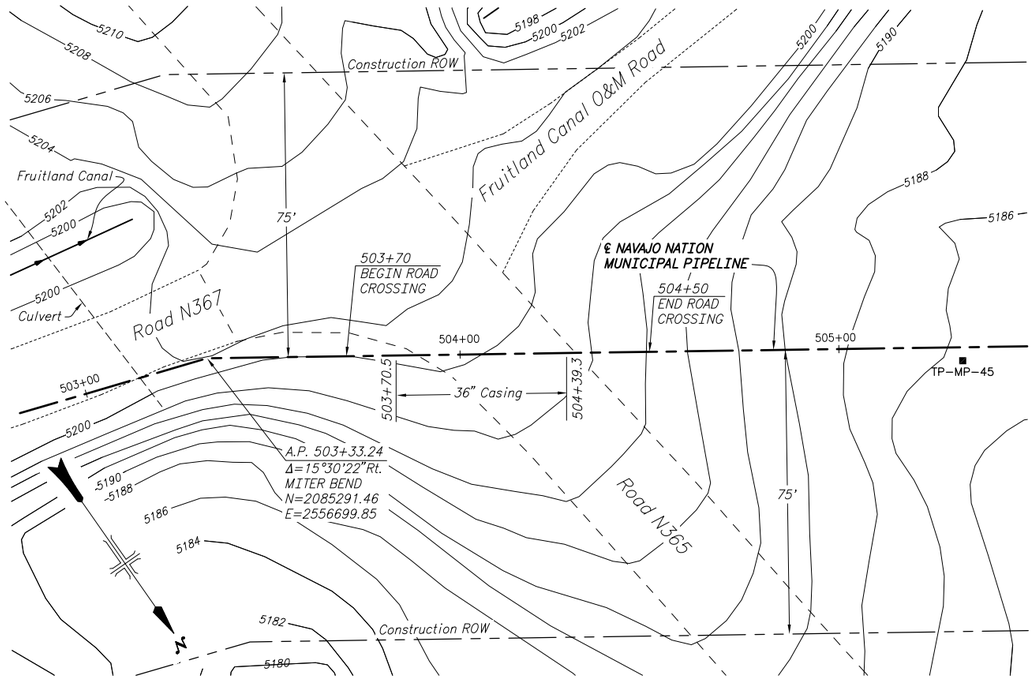
BORE ROAD CROSSINGS
N36 (294+63) AND N562 (302+78.7)
PLANS AND PROFILES

DESIGNED J. J. B. 8/2008 CHECKED JAMES E. BECKER
DRAWN D. B. STOOP 1/08 TECH. APPR. LINDA W. BOWLES, P.E.
APPROVED TODD R. CALHOUN, P.E. PEER REVIEWER - TODD R. CALHOUN, P.E.

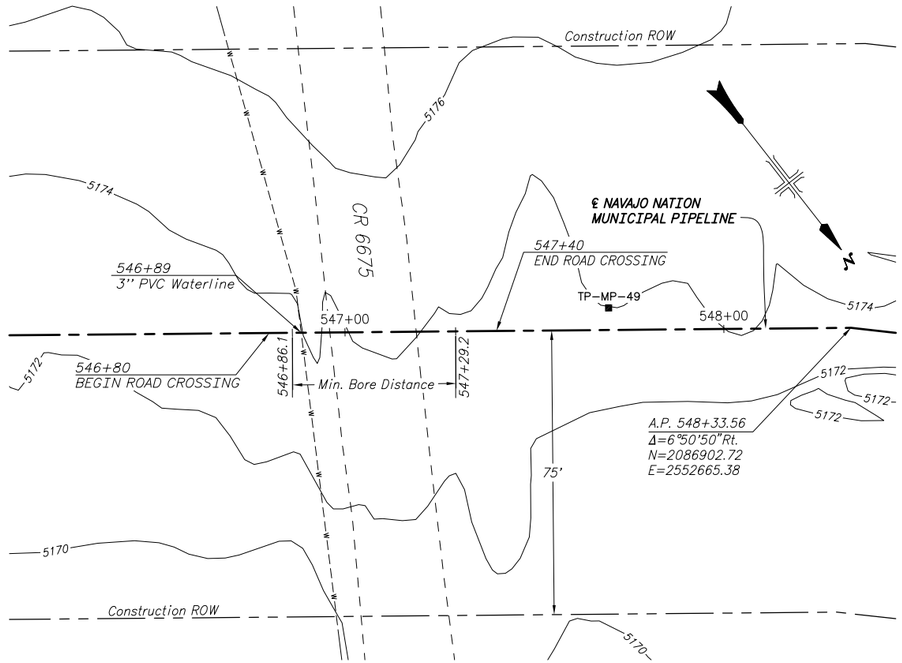
FARMINGTON, NEW MEXICO SHEET 1 OF 1 2008-9-29

69-529-152

DATE AND TIME PLOTTED
OCTOBER 7, 2008 08:31
PLOTTED BY
CCOOP
CAD SYSTEM
AutoCAD 14.0
DGN FILENAME
69-529-152 REVI.DWG

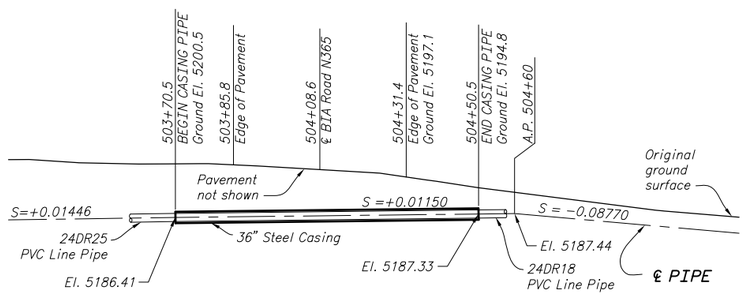


PLAN
N365 ROAD CROSSING

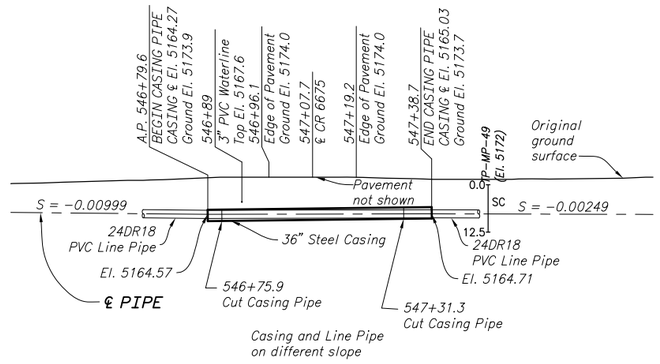


PLAN
CR 6675 ROAD CROSSING

20 0 20 40 60
SCALE OF FEET



PROFILE
N365 ROAD CROSSING



PROFILE
CR 6675 ROAD CROSSING

20 0 20 40 60
SCALE OF FEET

NOTES

1. For General Notes, Abbreviations, Symbols and Pipe Classifications, see (102).
2. For Plan and Profiles on NNMP San Juan Reach, see (112).
3. Boring distances are minimum boring lengths only. Longer boring lengths shall be submitted for approval.

GEOLOGY
Date 1/15/07

R. K. CHRISTIANSEN
LES W. STONE
JAMES A. GATES

TECHNICAL APPROVAL
SUBMITTED
APPROVED

REV NO		
2	2010-09-30 FCCF-233 JED	REVISED PLAN AND PROFILE TO MATCH AS-BUILT OF CONTRACTOR INSTALLED CASING PIPES.
1	2008-09-29 FCCF-412 D. GOOD	CHANGED ROAD CROSSINGS TO INCLUDE STEEL CASING AND MADE OTHER CHANGES ASSOCIATED WITH THE NEW CROSSING.

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UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

ANIMAS - LA PLATA PROJECT COLORADO - NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

BORE ROAD CROSSINGS

N365 (504+08.6) AND CR 6675 (547+07.7)

PLANS AND PROFILES

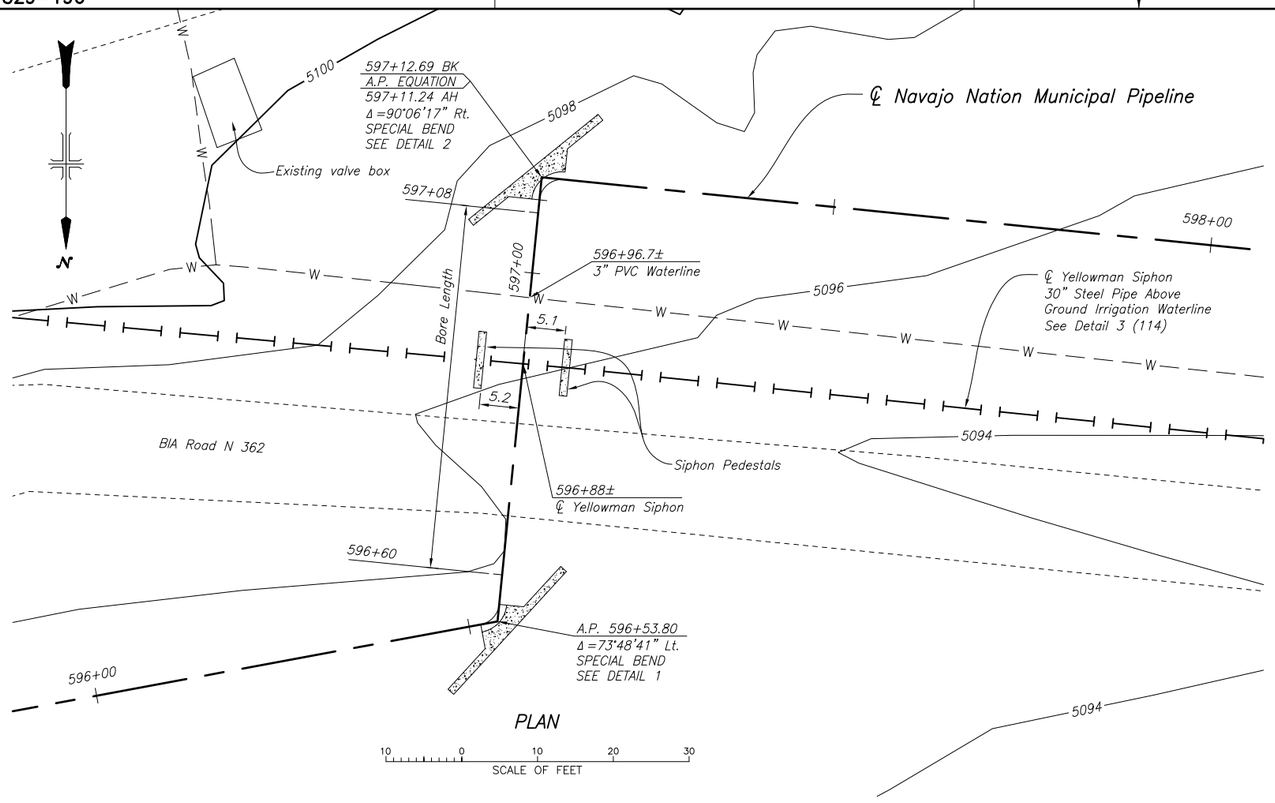
DESIGNED L. A. BAROS CHECKED JAYE E. DECKER
DRAWN D. R. GOOD/ LMB TECH. APPR. LINDA M. BOWLES, P.E.
LINDA M. BOWLES P.E.
APPROVED TEDD R. CALHOUN, P.E.
PEER REVIEWER - TEDD R. CALHOUN, P.E.

FARMINGTON, NEW MEXICO 2005-7-6
SHEET 3 OF 3

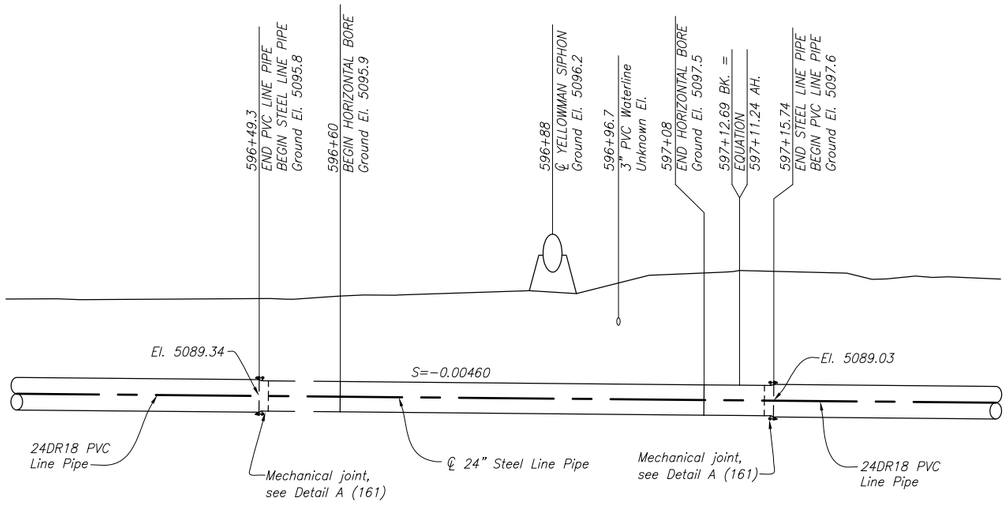
69-529-153

DATE AND TIME PLOTTED
OCTOBER 8, 2010 14:16
PLOTTED BY
JDECKER

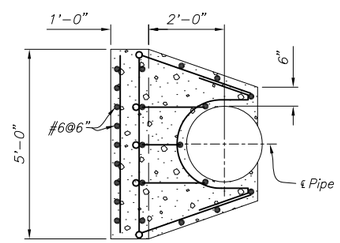
CAD SYSTEM
AutoCAD LDM 17.2s
CAD FILENAME
55 69-529-153 REV02.DWG



PLAN

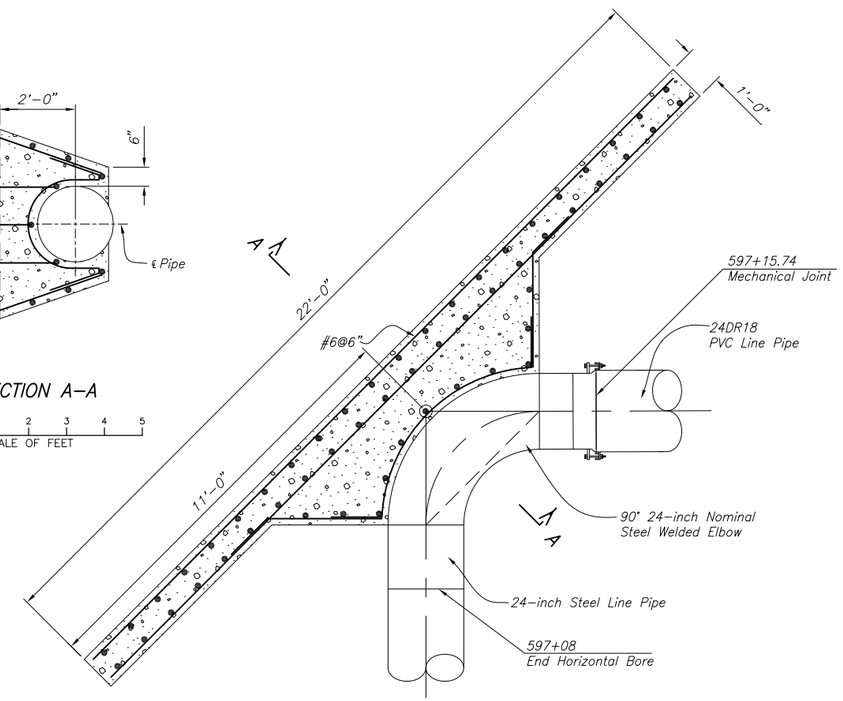


PROFILE



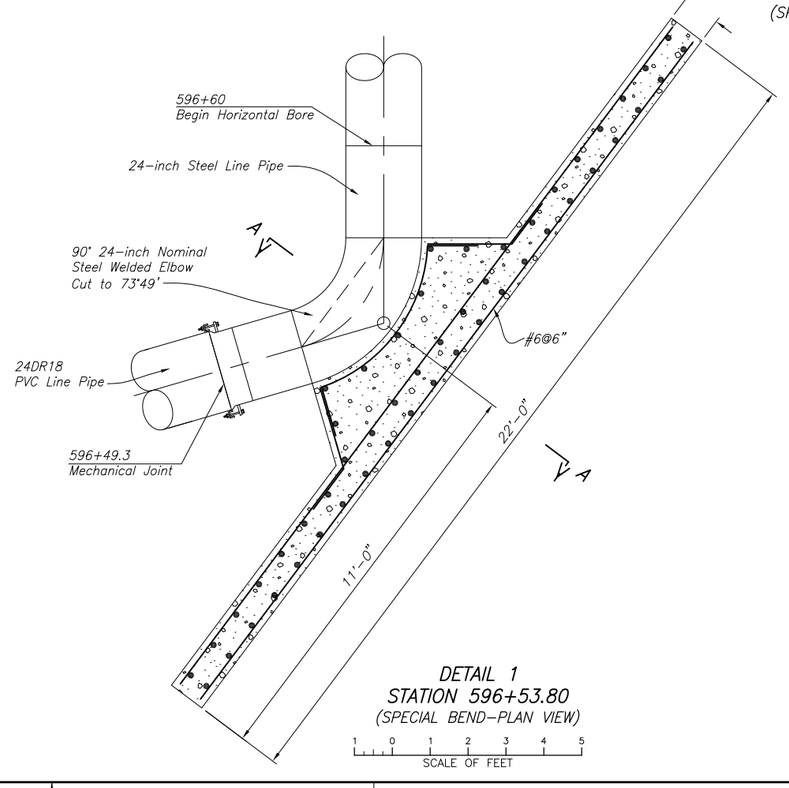
SECTION A-A

1 0 1 2 3 4 5
SCALE OF FEET



DETAIL 2
STATION 597+12.69 BK.
(SPECIAL BEND-PLAN VIEW)

1 0 1 2 3 4 5
SCALE OF FEET



DETAIL 1
STATION 596+53.80
(SPECIAL BEND-PLAN VIEW)

1 0 1 2 3 4 5
SCALE OF FEET

NOTES

1. For the Plan and Profile of the Navajo Nation Municipal Pipeline (Nenahnezad Reach), see (113).
2. For general concrete outline notes, see 40-D-7012.
3. For general notes and minimum requirements for detailing reinforcement, see Drawing, 40-D-6263.
4. Structural design of concrete is based on a specified minimum concrete strength (f'c) at 28 days of 4,000 psi and reinforcement with a specified minimum yield strength (fy) of 60,000 psi.
5. The thrust blocks were designed for a minimum cover of 5 feet for the bend at Station 596+53.80 and 6 feet for the bend at Station 597+12.69 BK.
6. All Reinforcement is #6@1'-0" except #6@6" at locations shown on Section A-A, Detail 1 and Detail 2.

REV NO		
1	2010-02-16 D- DGESUNDHEIT, P.E.	INCREASED WIDTH FROM 20 FEET TO 22 FEET. INCREASED BAR SIZE FROM #5 TO #6 SPACING REMAINS THE SAME.

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BUREAU OF RECLAMATION

ANIMAS - LA PLATA PROJECT COLORADO - NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

HORIZONTAL BORE

YELLOWMAN SIPHON CROSSING (596+88)

PLAN, PROFILE, AND DETAILS

DESIGNED DLG CHECKED CHOU CHA

DRAWN DLG TECH. APPR. LINDA M. BOWLES, P.E.
LINDA M. BOWLES, P.E.

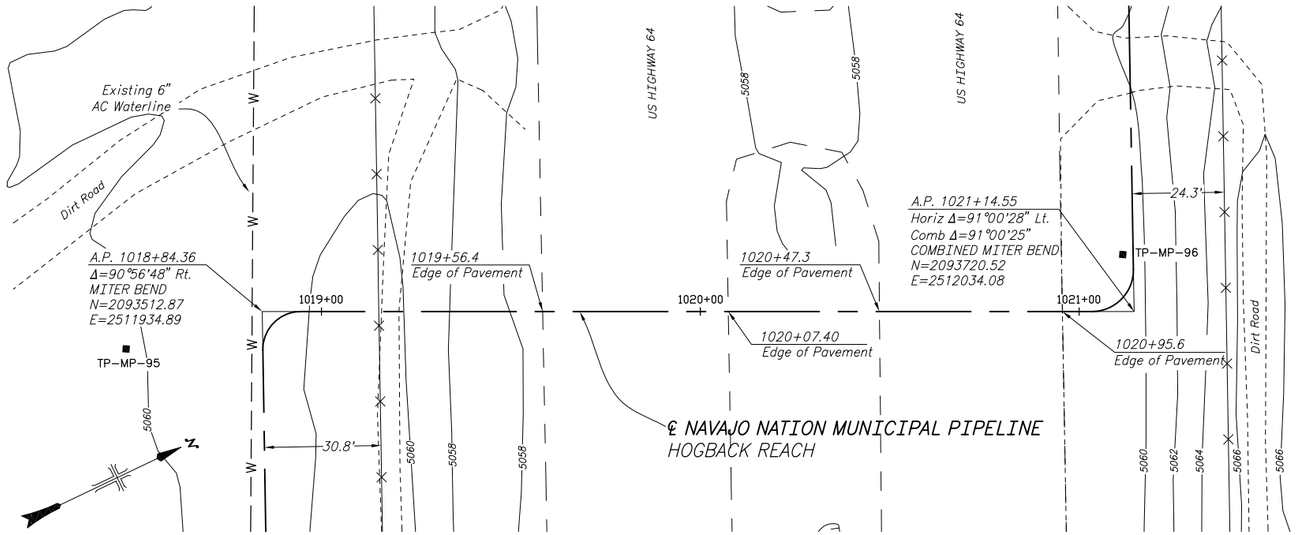
APPROVED TEDD R. CALHOUN, P.E.
PEER REVIEWER - TEDD R. CALHOUN, P.E.

FARMINGTON, NEW MEXICO 2007-01-18
SHEET 1 OF 1

69-529-196

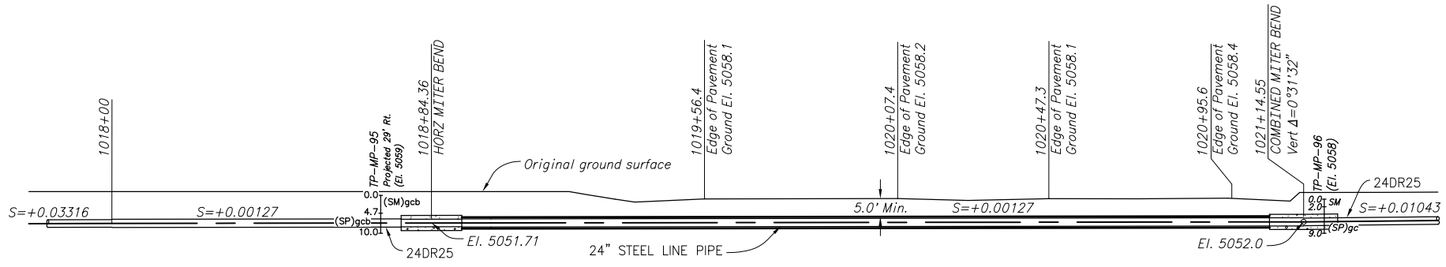
DATE AND TIME PLOTTED
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PLOTTED BY
JDECKER

CAD SYSTEM
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CAD FILENAME
56 69-529-196 REV01.DWG

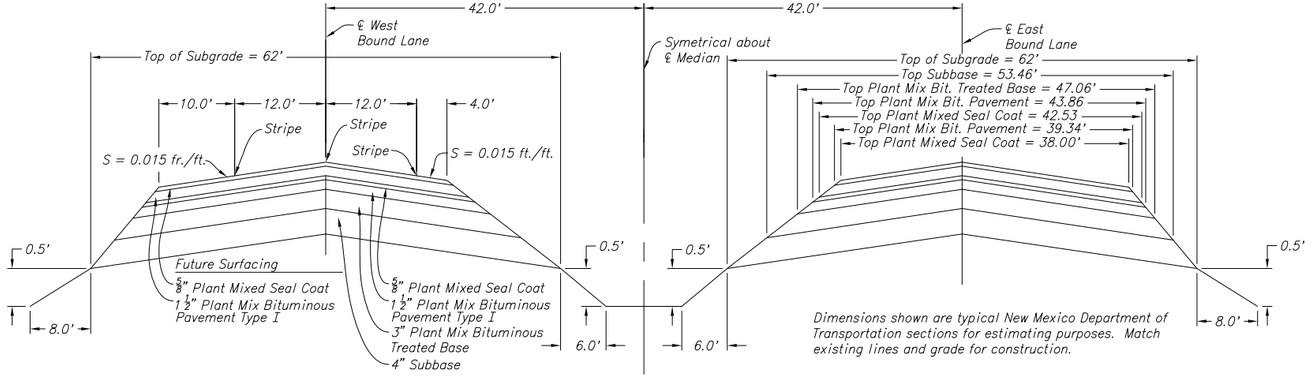


PLAN

20 0 20 40 60
SCALE OF FEET



PROFILE



NM DOT – TYPICAL ROAD SECTION

(Not to Scale)

NOTES

1. For General Notes, Symbols and Pipe Classifications, see (102).
2. For Plan, Profile, and Construction ROW, see (124).
3. For additional utility line details, see (124).
4. HWY 64 Road Surface Section detail is based on drawing F.H.W.A. Reg. No. – 6, State – New Mexico, N.M.P. F–032–1(16), Sheet 2 of 56 and are shown for estimating purposes. Actual Highway reconstruction shall match existing lines and grades.
5. Asphalt mix shall be approved by NM State Highway Department.
6. Saw cut existing pavement surfaces 5 feet beyond trench daylight excavation lines on both sides.

REV NO		
01	2010-10-08 FCCF-233 JED	ADDED HIGHWAY ROW FENCE AND OFFSET DISTANCE TO IT.

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UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
ANIMAS – LA PLATA PROJECT COLORADO – NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

HOGBACK REACH

US HWY 64 ROAD CROSSING
STATION 1018+84.36 TO 1021+14.55
PLAN AND PROFILE

DESIGNED DARRYL R. GOOD CHECKED JAYE E. DECKER

DRAWN DARRYL R. GOOD TECH. APPR. BRIAN WAGNER
BRIAN WAGNER, P.E.

APPROVED DOUG DOCKTER
PEER REVIEWER – DOUG DOCKTER, P.E.

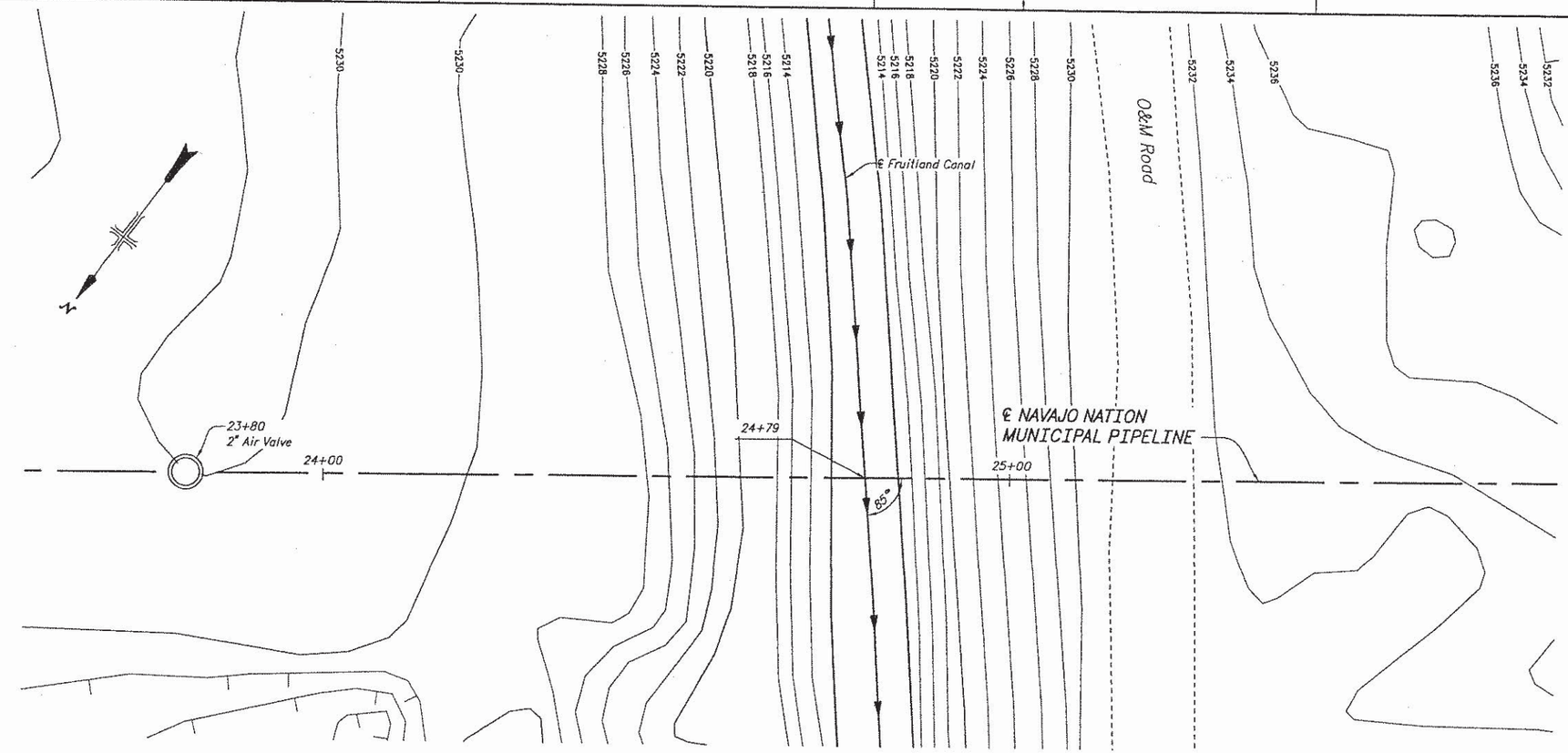
FARMINGTON, NEW MEXICO 2005-07-06
SHEET 1 OF 1

69-529-173

DATE AND TIME PLOTTED
OCTOBER 8, 2010 13:43
PLOTTED BY
JDECKER

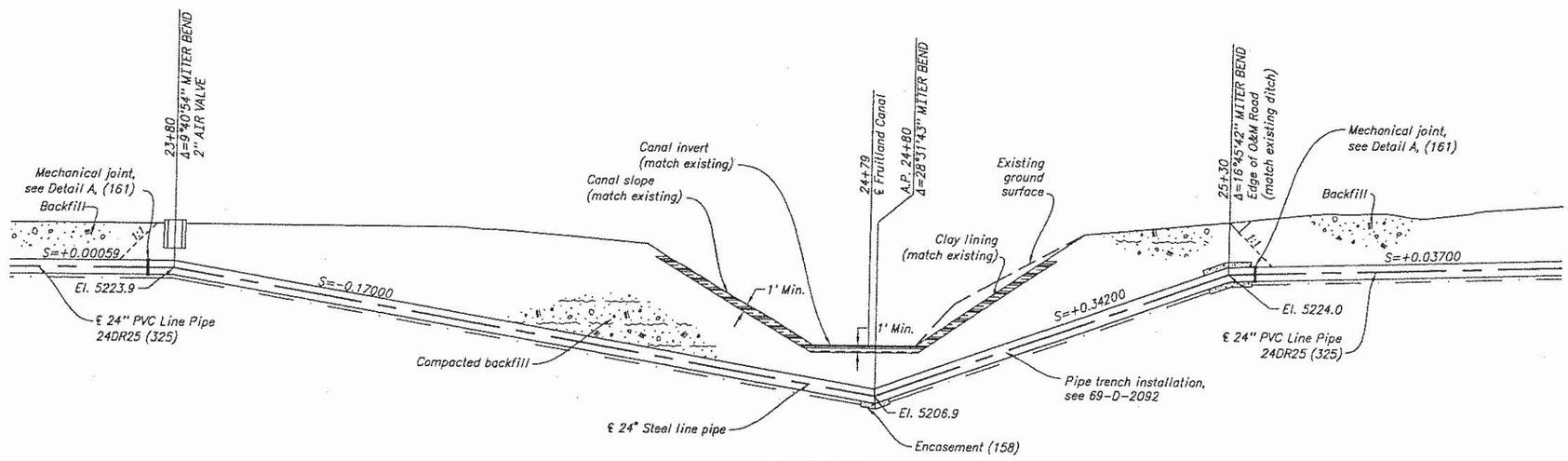
CAD SYSTEM
AutoCAD Rel. 17.2s
CAD FILENAME
S7 69-529-173 REV01.DWG

69-529-174



PLAN

10 0 10 20 30
SCALE OF FEET



PROFILE

NOTES

1. For the Plan and Profile, see (102).
2. For pressure pipe trench installation, see 69-D-2092.
3. For concrete encased miter bend, see (158).
4. For 2-inch air valve installation, see (156).
5. For road crossing details, see (169).

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BUREAU OF RECLAMATION

ANIMAS - LA PLATA PROJECT COLORADO - NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

FRUITLAND CANAL CROSSING

PLAN AND PROFILE

STATION 24+79

DESIGNED D. R. GOOD CHECKED JAYE E. DECKER

DRAWN D. R. GOOD/ANNE PAVOL TECH. APPR. LINDA M. BOWLES, P.E.

APPROVED TEDD R. CALHOUN, P.E. LINDA M. BOWLES P.E.

PEER REVIEWER - TEDD R. CALHOUN, P.E.

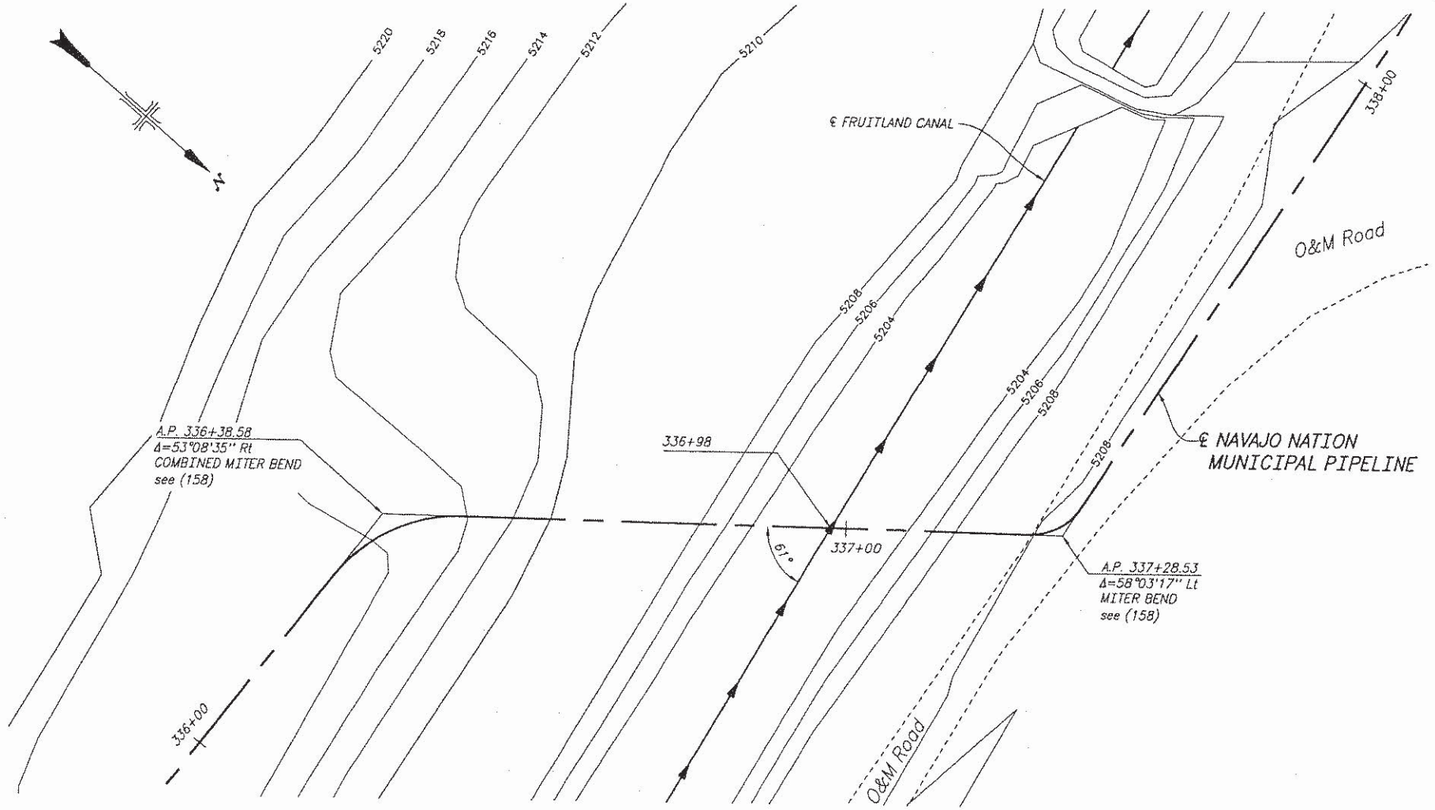
FARMINGTON, NEW MEXICO 2005-03-22

69-529-174

DATE AND TIME PLOTTED
MAY 19, 2006 11:32
PLOTTED BY
JDECKER

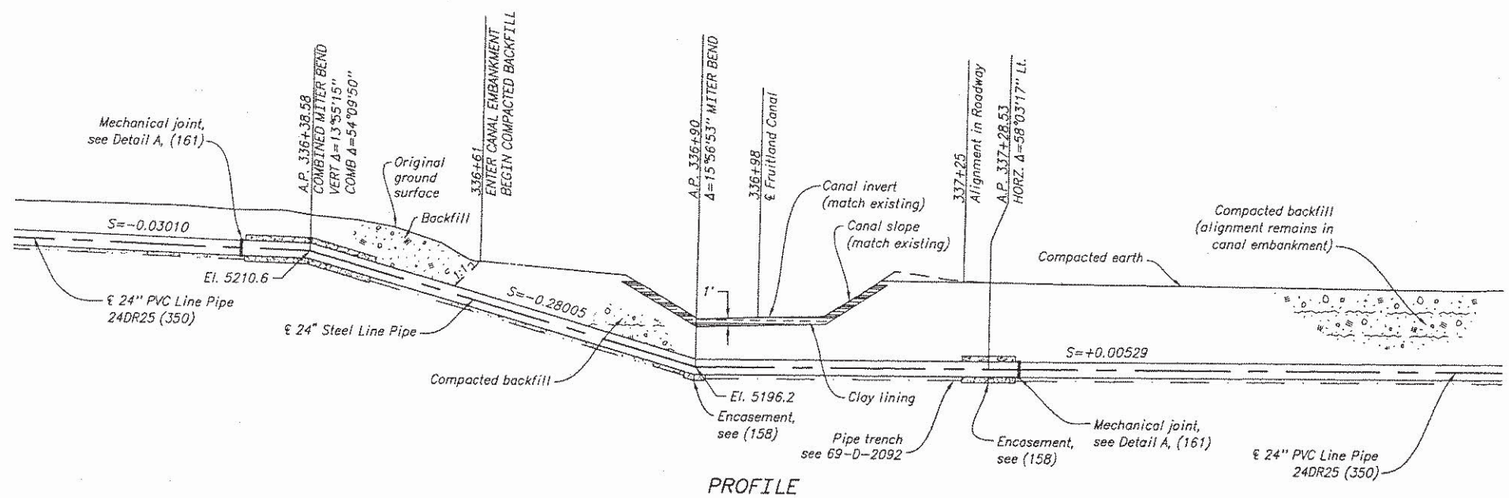
CAD SYSTEM
AutoCAD Rel. 16.2s
CAD FILENAME
69-529-174.DWG

69-529-175



PLAN

10 0 10 20 30
SCALE OF FEET



PROFILE

NOTES

1. For Plan and Profile, see (108).
2. For pressure pipe trench installation, see (69-D-2092).
3. For concrete encased miter bends, see (158).
4. For road crossing details, see (169).

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UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

ANIMAS – LA PLATA PROJECT COLORADO – NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

FRUITLAND CANAL CROSSING

PLAN AND PROFILE

STATION 336+98

DESIGNED D. R. GOOD CHECKED JAY F. DECKER

DRAWN D. R. GOOD/ANNE PAVOL TECH. APPR. LINDA M. BOWLES, P.E.
LINDA M. BOWLES P.E.

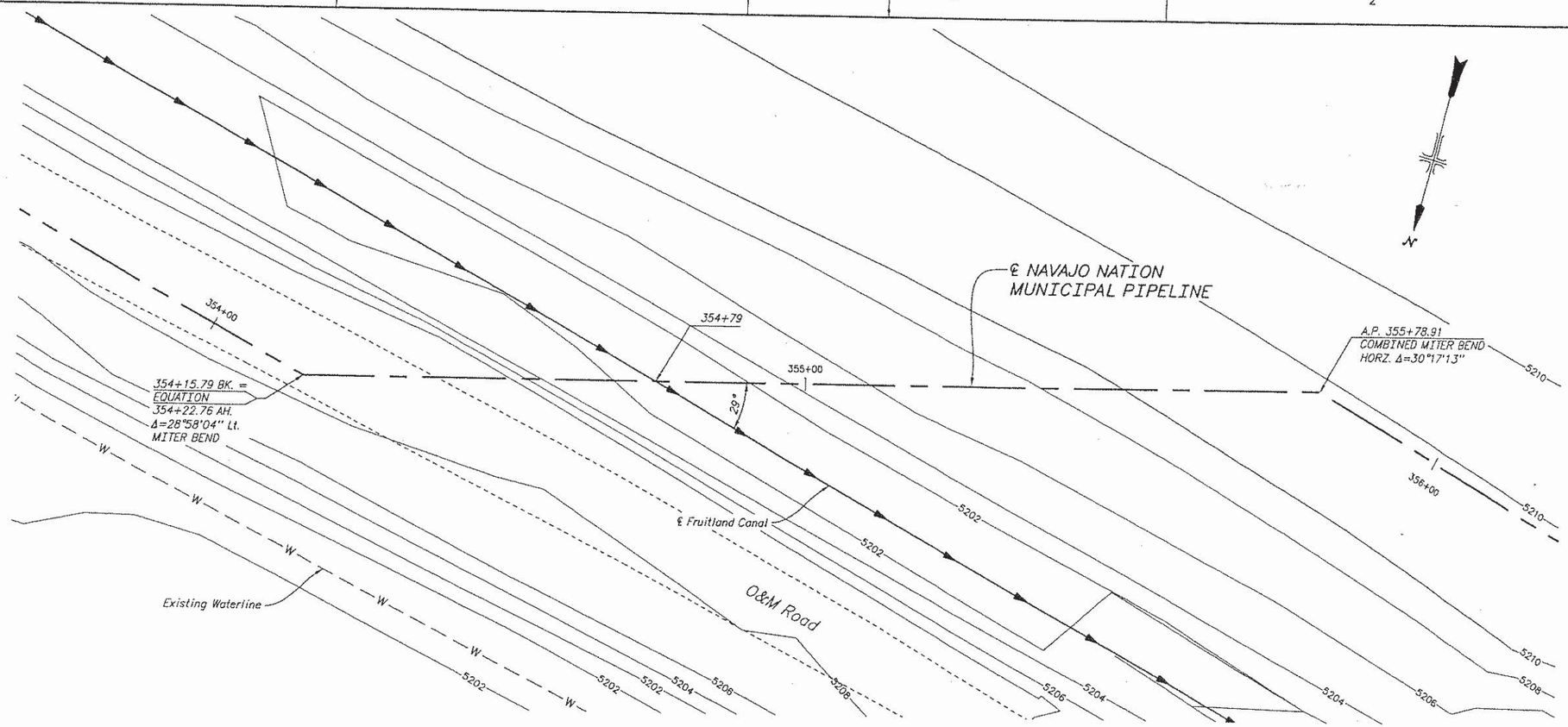
APPROVED TEDD R. CALHOUN, P.E.
PEER REVIEWER – TEDD R. CALHOUN, P.E.

FARMINGTON, NEW MEXICO 2005-03-22 69-529-175

DATE AND TIME PLOTTED
MAY 29, 2008 11:35
PLOTTED BY
JDECKER

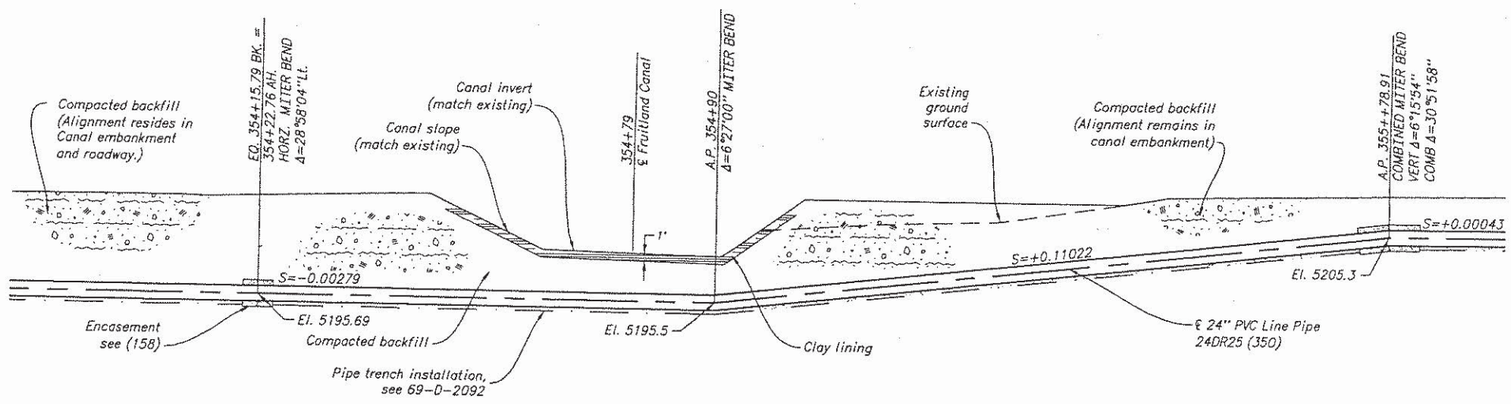
CAD SYSTEM
AutoCAD Rel. 16.2s
CAD FILENAME
69-529-175.DWG

69-529-176



PLAN

10 0 10 20 30
SCALE OF FEET



PROFILE

NOTES

1. For Plan and Profile, see (109).
2. For pressure pipe trench installation, see 69-0-2092.
3. For concrete encased miter bend, see (158).
4. For 2-inch air valve installation, see (156).
5. For road crossing details, see (169).
6. Mechanical joints in Profile not shown, but required on either side of miter bends, see (158) & (161).

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BUREAU OF RECLAMATION

ANIMAS - LA PLATA PROJECT COLORADO - NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

FRUITLAND CANAL CROSSING

PLAN AND PROFILE

STATION 354+79

DESIGNED D. R. GOOD CHECKED JAYS E. DECKER

DRAWN D. R. GOOD/ANNE PAVIO TECH. APPR. LINDA M. BOWLES, P.E. LINDA M. BOWLES P.E.

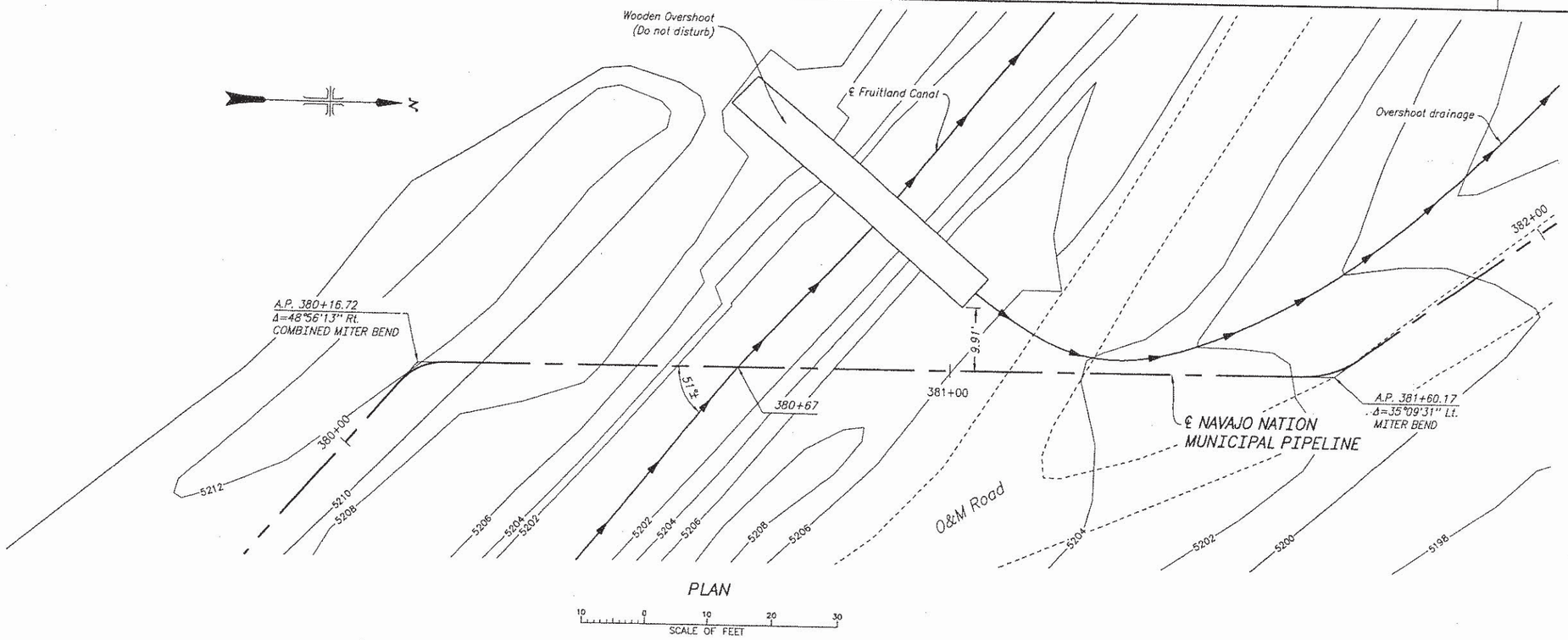
APPROVED TEDD R. CALHOUN, P.E. PEER REVIEWER - TEDD R. CALHOUN, P.E.

FARMINGTON, NEW MEXICO 2005-03-22 SHEET 1 OF 8 69-529-176

DATE AND TIME PLOTTED MAY 29, 2008 11:35
PLOTTED BY DECKER

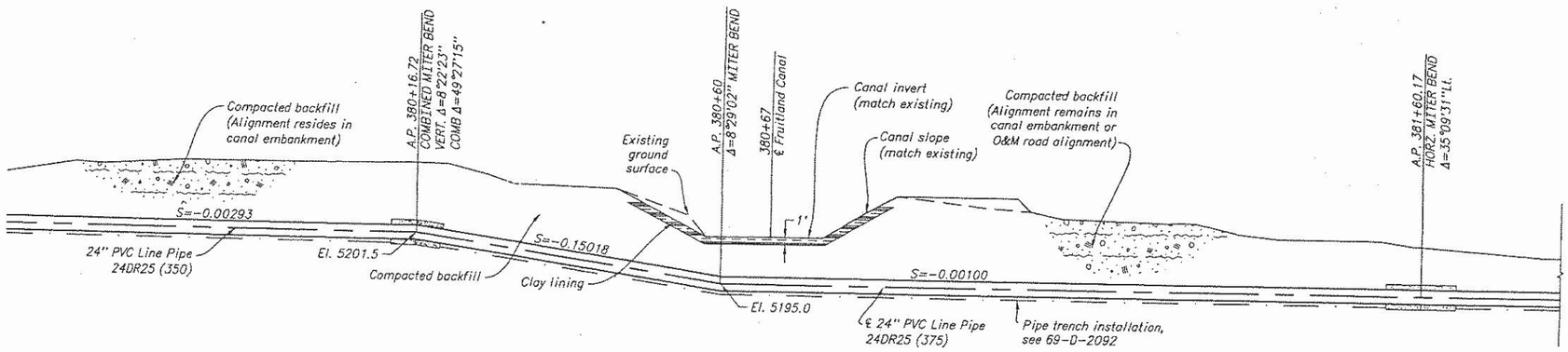
CAD SYSTEM AutoCAD Rel. 16.2s
CAD FILENAME 69-529-176.DWG

69-529-177



PLAN

SCALE OF FEET



PROFILE

NOTES

1. For Plan and Profile, see (109).
2. For pressure pipe trench installation, see 69-D-2092.
3. For concrete encased miter bend, see (158).
4. For road crossing details, see (169).
5. See specifications for construction limitations around the wooden overshoot.
6. Mechanical joints in Profile, not shown, but required on either side of miter bends, see (158) & (161).

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BUREAU OF RECLAMATION

ANIMAS – LA PLATA PROJECT COLORADO – NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

FRUITLAND CANAL CROSSING

PLAN AND PROFILE

STATION 380+67

DESIGNED B. R. GOOD CHECKED JAYE E. BECKER

DRAWN D. R. GOOD/ANNE PAYOL TECH. APPR. LINDA M. BOWLES, P.E.

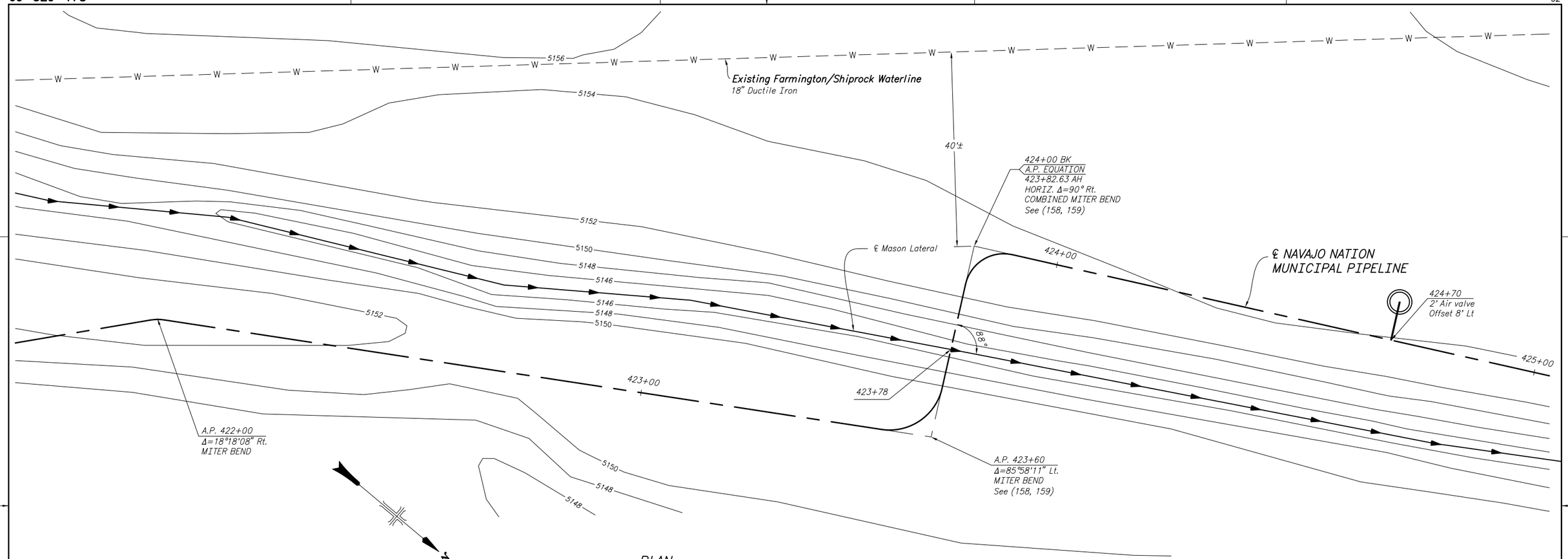
APPROVED TEDD R. CALHOUN, P.E. LINDA M. BOWLES P.E.

PEER REVIEWER – TEDD R. CALHOUN, P.E.

FARMINGTON, NEW MEXICO 2009-11-23

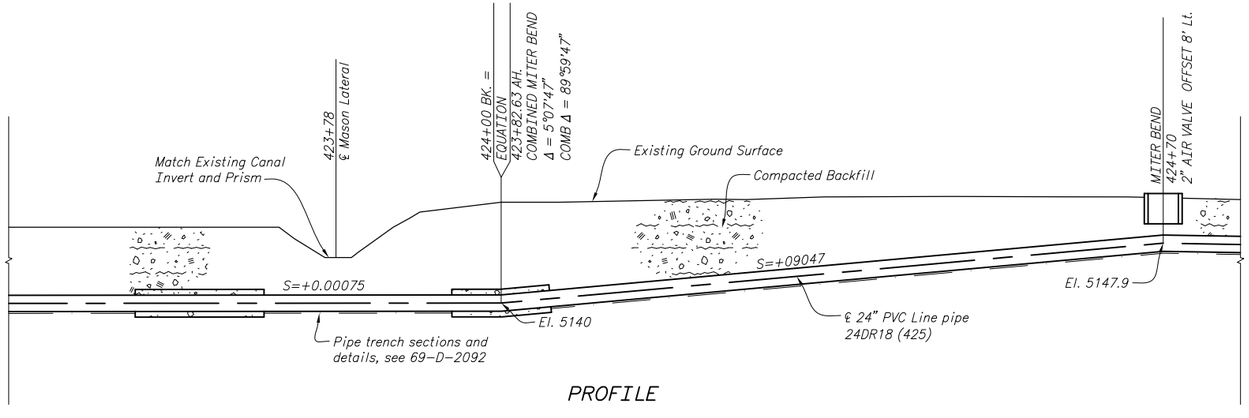
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PLOTTED BY
JOECKER

CAD SYSTEM
AutoCAD Rel. 16.2s
DWG TEMPLATE
69-52X-T2.DWG



PLAN

10 0 10 20 30
SCALE OF FEET



PROFILE

NOTES

1. For Plan and Profile, see (110).
2. For pressure pipe trench installation, see 69-D-2092.
3. Mechanical joints in Profile, not shown, but are required on either side of miter bends, see (158) and (161).

REV NO		
2	2009-11-06 FCCF-413 JED	REVISED UPSTREAM SLOPE TO MATCH DRAWING 69-529-110, REVISION 6.
1	2007-10-29 FCCF-410 JED	CORRECTED AHEAD STATION TO 423+82.63. CORRECTED STATION IN TITLE BLOCK.

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UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

ANIMAS - LA PLATA PROJECT COLORADO - NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

MASON LATERAL CROSSING

PLAN AND PROFILE
STATION 423+78

DESIGNED D. R. GOOD CHECKED JAYE E. DECKER

DRAWN D. R. GOOD/ANNE PAVOL TECH. APPR. LINDA M. BOWLES, P.E.
LINDA M. BOWLES P.E.

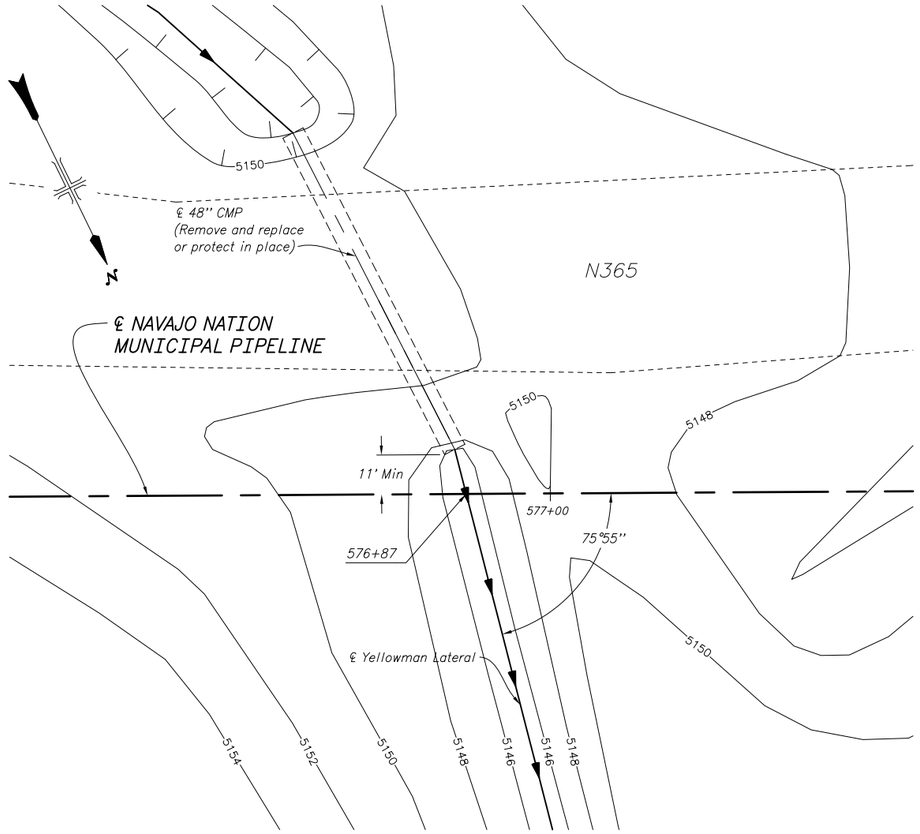
APPROVED TEDD R. CALHOUN P.E.
PEER REVIEWER - TEDD R. CALHOUN P.E.

FARMINGTON, NEW MEXICO 2005-03-22
SHEET 5 OF 8

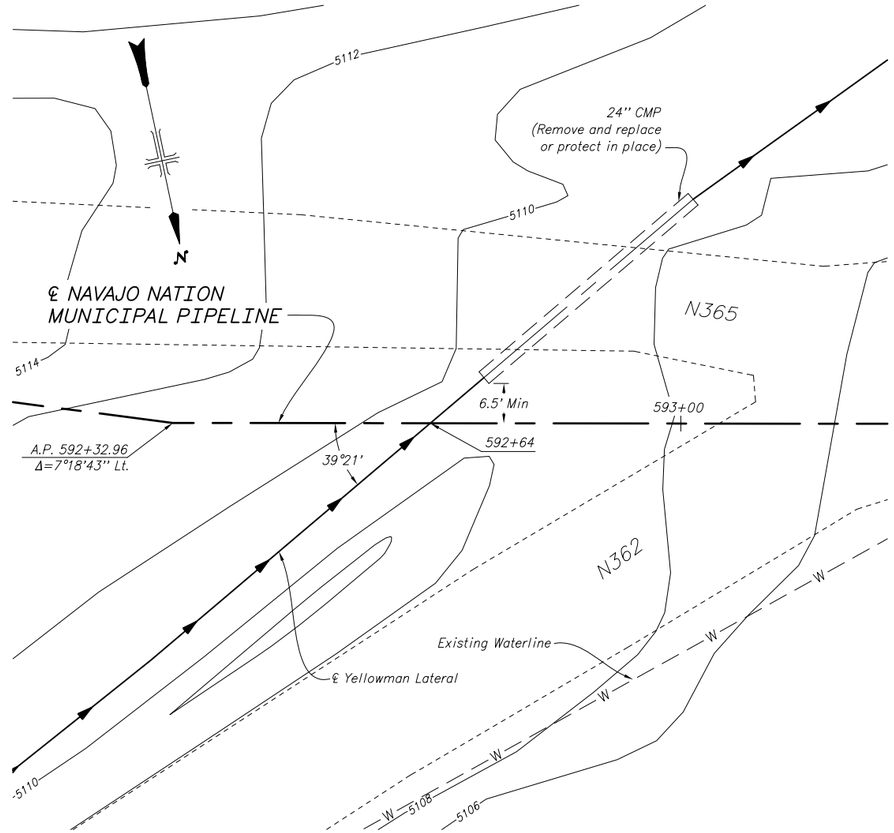
69-529-178

DATE AND TIME PLOTTED
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PLOTTED BY
JDECKER

CAD SYSTEM
AutoCAD Rel. 17.2s
CAD FILENAME
62 69-529-178 REV02.DWG

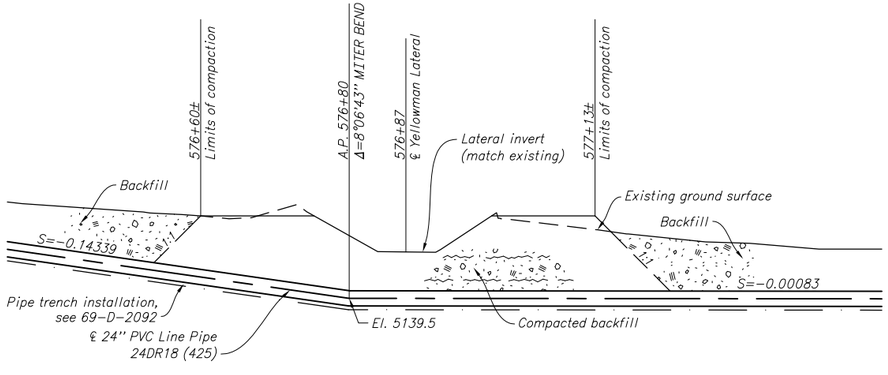


PLAN
(576+87)

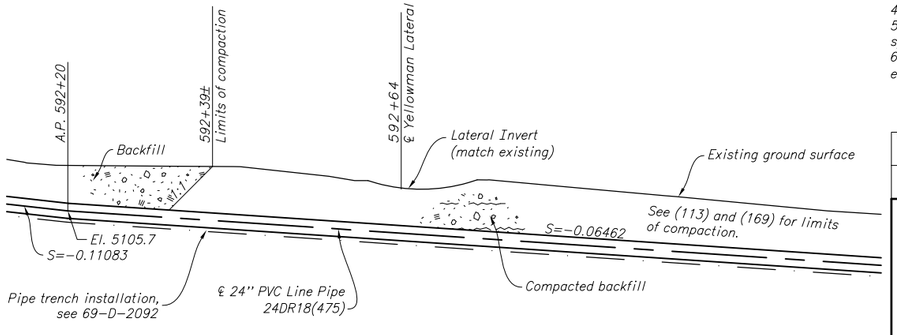


PLAN
(592+86)

10 0 10 20 30
SCALE OF FEET



PROFILE
(576+87)



PROFILE
(592+86)

NOTES

1. For Plan and Profile, see (113).
2. For pressure pipe trench installation, see 69-D-2092.
3. For concrete encased miter bend, see (158).
4. For road crossing details, see (169).
5. For construction limitations on the Yellowman Lateral, see specifications.
6. Mechanical joints in Profile, not shown, but required on either side of miter bends, see (158) & (161).

REV NO		
1	2007-10-04 529 FCCF-410	ADDED NOTE FOR DOWNSTREAM LIMITS OF COMPACTION FOR YELLOWMAN LATERAL CROSSING AT STATION 592+64

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ANIMAS - LA PLATA PROJECT COLORADO - NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

YELLOWMAN LATERAL CROSSINGS

PLANS AND PROFILES

STATION 576+87 AND 592+64

DESIGNED D. R. GOOD CHECKED JAYE E. DECKER

DRAWN D. R. GOOD/ANNE PAVOL TECH. APPR. LINDA M. BOWLES, P.E.
LINDA M. BOWLES P.E.

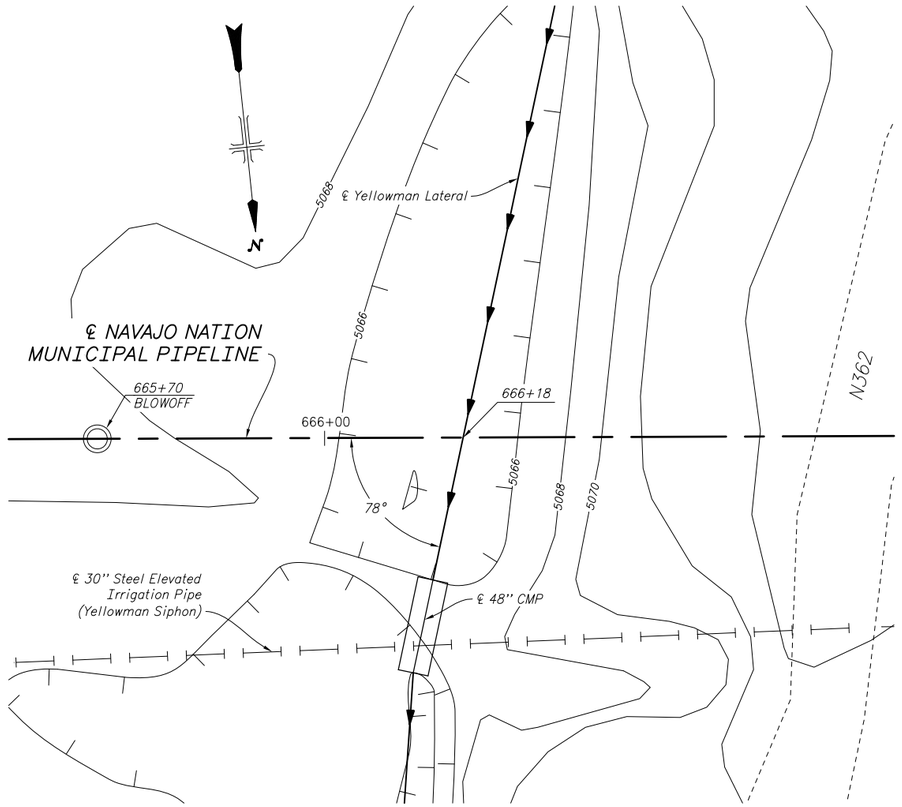
APPROVED TEDD R. CALHOUN, P.E.
PEER REVIEWER - TEDD R. CALHOUN, P.E.

FARMINGTON, NEW MEXICO 2005-03-22
SHEET 6 OF 8

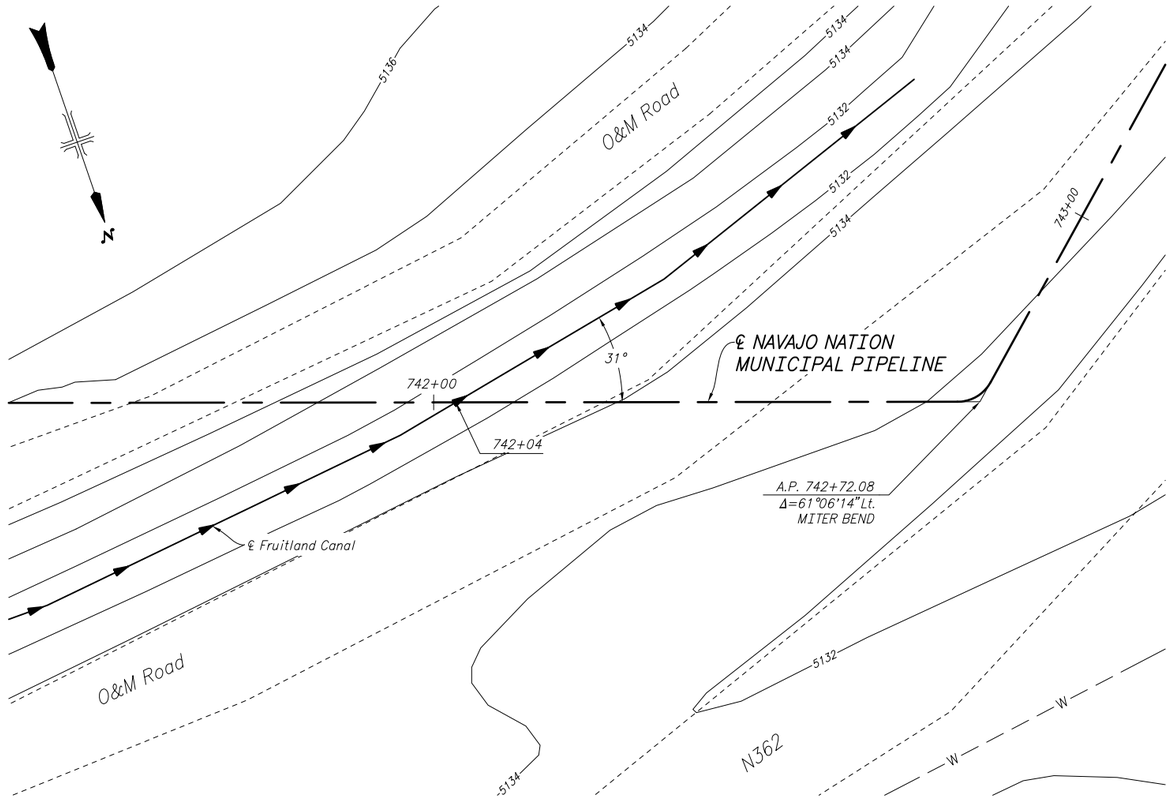
69-529-179

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PLOTTED BY
JDECKER

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AutoCAD Rel. 17.2s
CAD FILENAME
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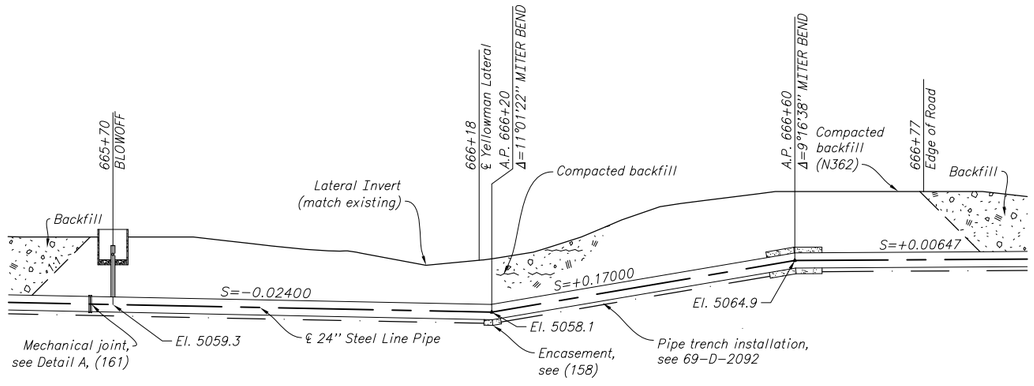


PLAN
(666+18)

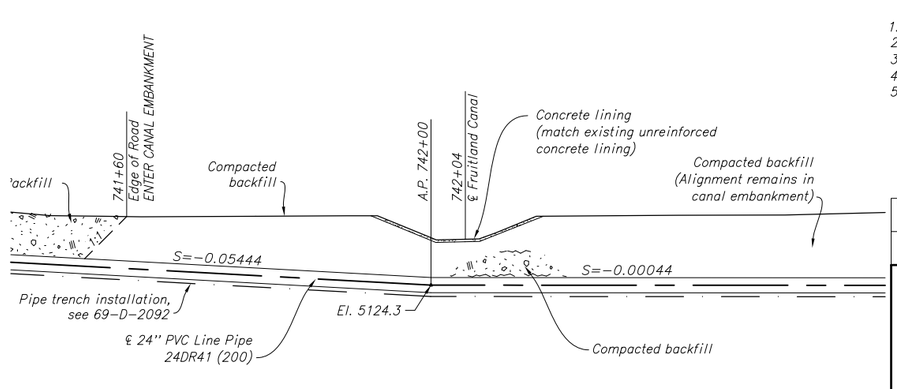


PLAN
(742+04)

10 0 10 20 30
SCALE OF FEET



PROFILE
(666+18)



PROFILE
(742+04)

NOTES

1. For Plan and Profiles, see (115) and (117).
2. For pressure pipe trench installation, see 69-D-2092.
3. For concrete encased miter bend, see (158).
4. For road crossing details, see (169).
5. For Construction limitation around Yellowman Siphon, see specifications.

REV NO		
01	2009-05-29 FCCF-413 JED	MOVED VPI FROM STATION 665+60 TO 665+70. REVISED Δ ON MITER BEND AT 666+20. REVISED SLOPE STATION 665+70 TO 666+20.

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ANIMAS - LA PLATA PROJECT COLORADO - NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

YELLOWMAN LATERAL AND FRUITLAND CANAL CROSSING

PLAN AND PROFILE

STATION 666+18 AND 742+04

DESIGNED D. R. GOOD CHECKED JAYE E. DECKER

DRAWN D. R. GOOD TECH. APPR. LINDA M. BOWLES, P.E.
LINDA M. BOWLES P.E.

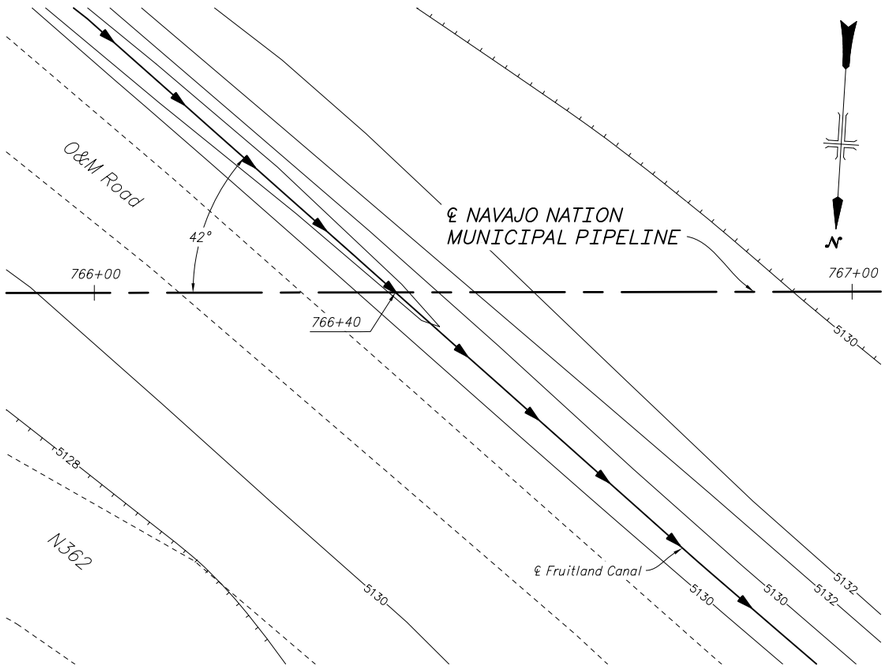
APPROVED TEDD R. CALHOUN, P.E.
PEER REVIEWER - TEDD R. CALHOUN, P.E.

FARMINGTON, NEW MEXICO 2005-03-22
SHEET 7 OF 8

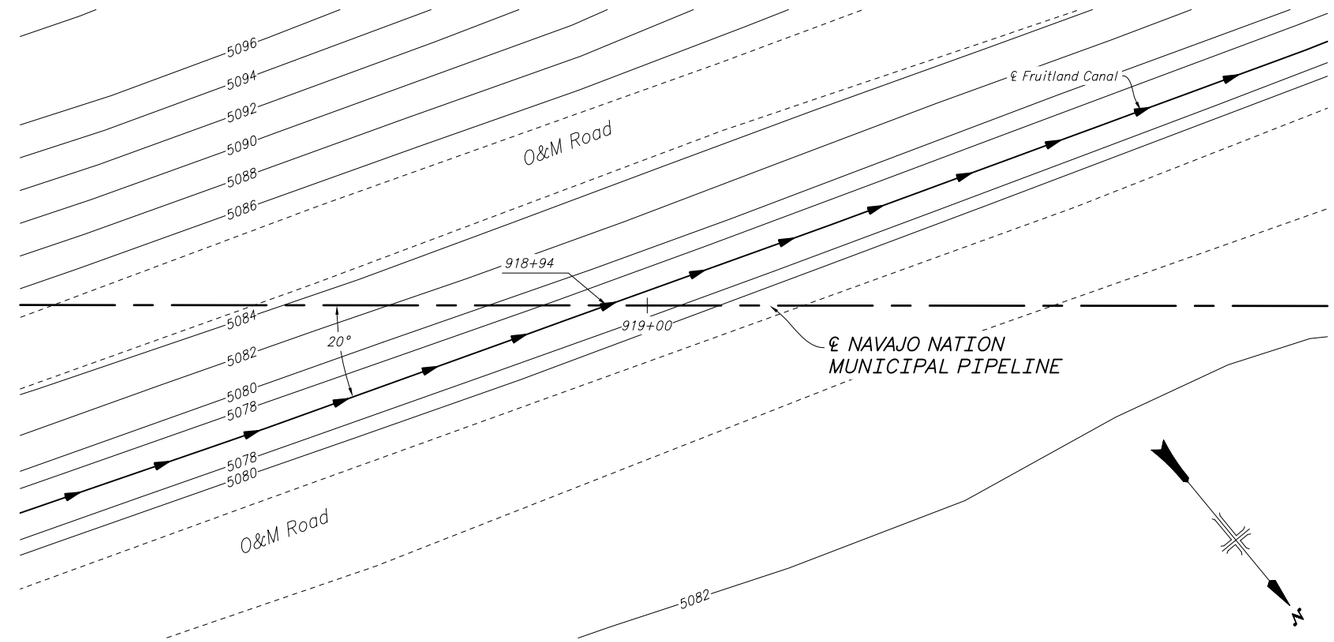
69-529-180

DATE AND TIME PLOTTED
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PLOTTED BY
JDECKER

CAD SYSTEM
AutoCAD Rel. 17.2s
CAD FILENAME
64 69-529-180 REV01.DWG

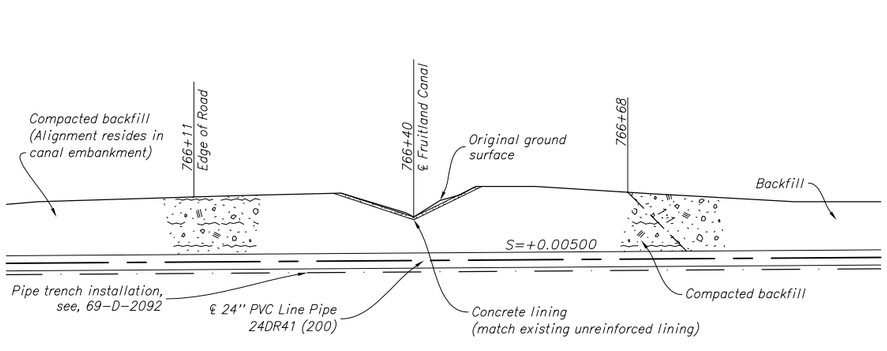


PLAN
(766+40)

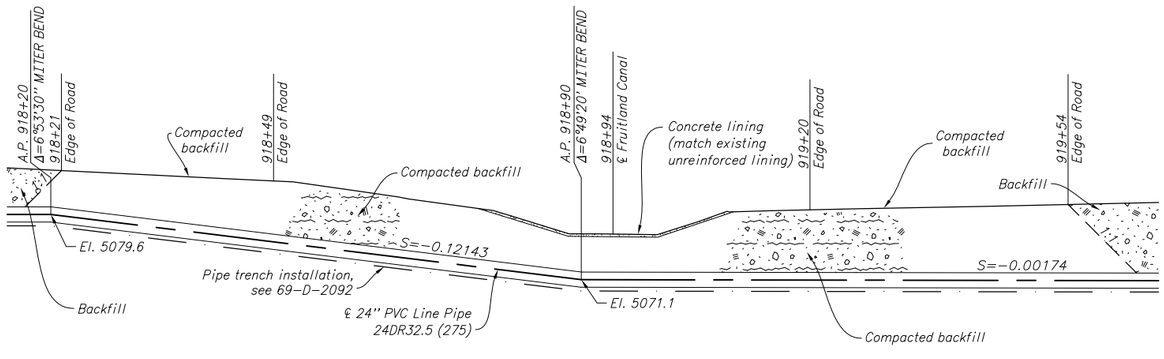


PLAN
(918+94)

SCALE OF FEET
10 0 10 20 30



PROFILE
(766+40)



PROFILE
(918+94)

NOTES

1. For Plan and Profile, see (118) and (121).
2. For pressure pipe trench installation, see 69-D-2092.
3. For concrete encased miter bend, see (158).
4. For road crossing details, see (169).
5. Canal concrete thickness is estimated to be 4". Actual thickness will be directed by COR.
6. Mechanical joints in Profile, not shown, but required on either side of miter bends, see (158) & (161).

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NAVAJO NATION MUNICIPAL PIPELINE

FRUITLAND CANAL CROSSINGS

PLAN AND PROFILE

STATION 766+40 AND 918+94

DESIGNED D. R. GOOD CHECKED JAYE E. DECKER

DRAWN D. R. GOOD/ANNE PAVOL TECH. APPR. LINDA M. BOWLES, P.E.
LINDA M. BOWLES P.E.

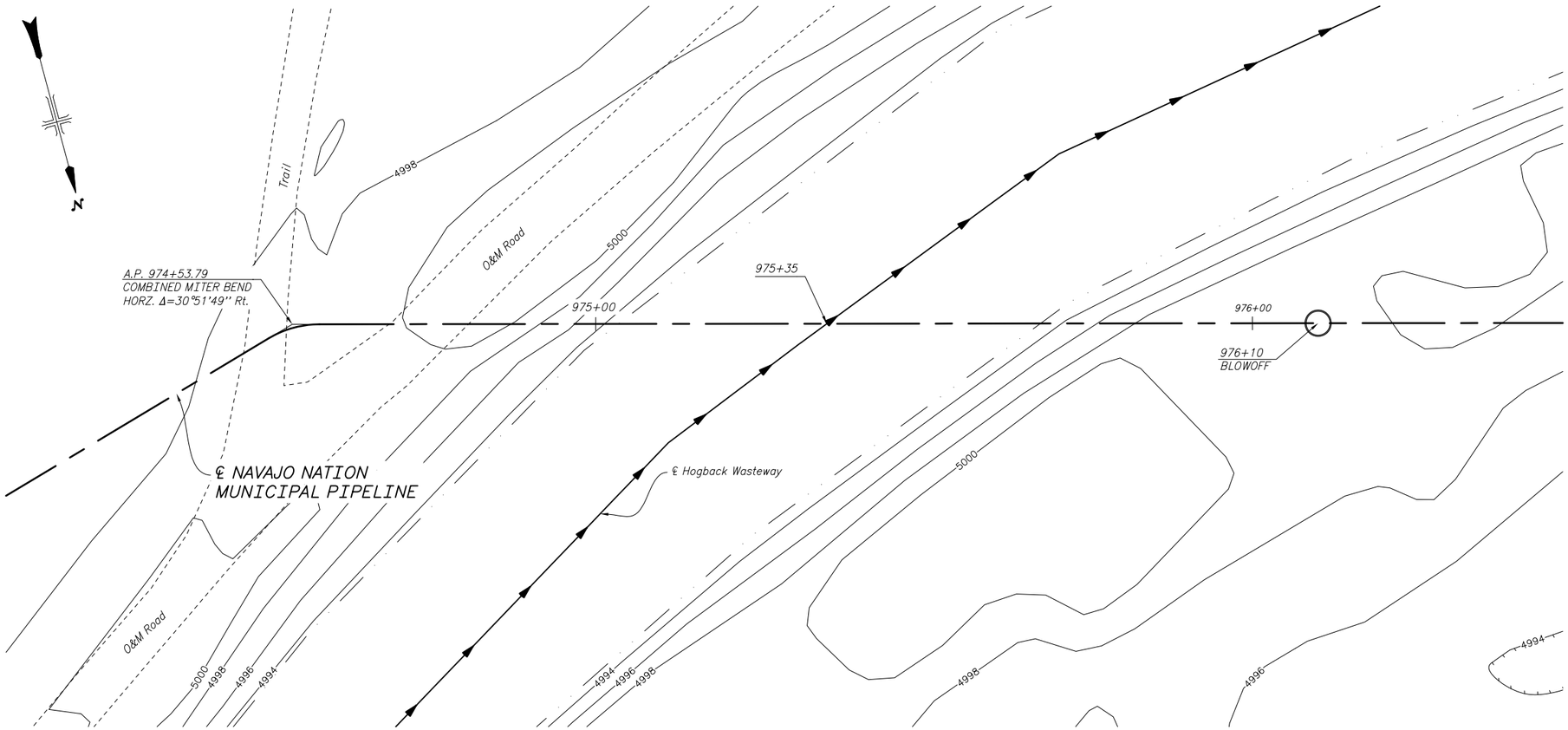
APPROVED TEDD R. CALHOUN, P.E.
PEER REVIEWER - TEDD R. CALHOUN, P.E.

FARMINGTON, NEW MEXICO 2005-03-22
SHEET 8 OF 8

69-529-181

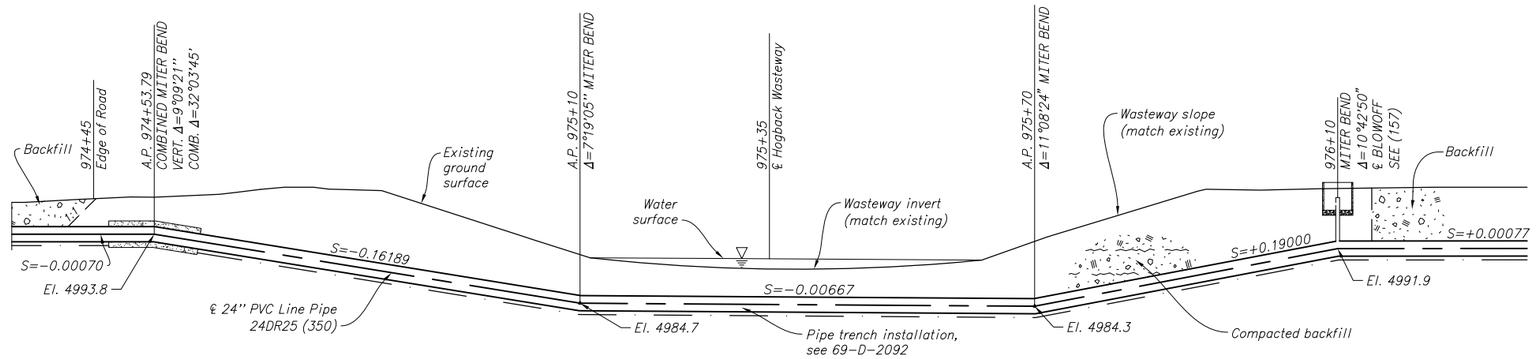
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PLOTTED BY
JDECKER

CAD SYSTEM
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CAD FILENAME
65 69-529-181.DWG



PLAN

10 0 10 20 30
SCALE OF FEET



PROFILE

NOTES

1. For Plan and Profile, see (123).
2. For pressure pipe trench installation, see 69-D-2092.
3. For concrete encased miter bends, see (158).
4. For road crossing details, see (169).
5. A cofferdam or other method of unwatering may be required for construction. Submittal required.
6. Mechanical joints in Profile, not shown, but required on either side of miter bends, see (158) & (161).

REV NO		
2	2009-07-20 FCCF-413 JED	REVISED VERTICAL ALIGNMENT. MOVED BLOWOFF TO STATION 976+10 AND ADDED MITER BEND.
1	2007-10-04 529 FCCF-410	REVISED COMPACTED BACKFILL LIMITS TO MATCH DRAWING 69-529-157.

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ANIMAS - LA PLATA PROJECT COLORADO - NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

HOGBACK WASTEWAY CROSSING

PLAN AND PROFILE

STATION 975+35

DESIGNED D. R. GOOD CHECKED JAYE E. DECKER

DRAWN D. R. GOOD/ANNE PAVOL TECH. APPR. LINDA M. BOWLES, P.E.
LINDA M. BOWLES P.E.

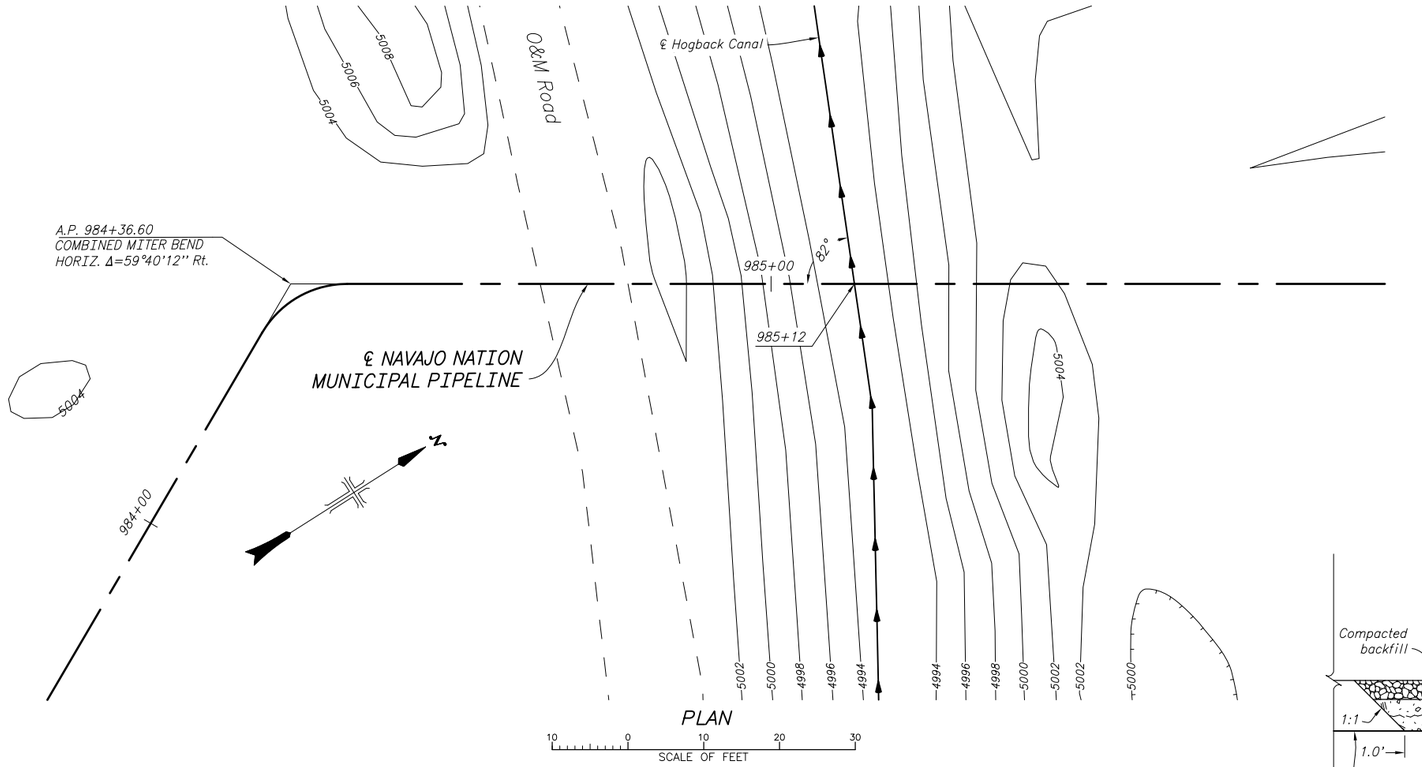
APPROVED TEDD R. CALHOUN, P.E.
PEER REVIEWER - TEDD R. CALHOUN, P.E.

FARMINGTON, NEW MEXICO 2005-03-22
SHEET 1 OF 4

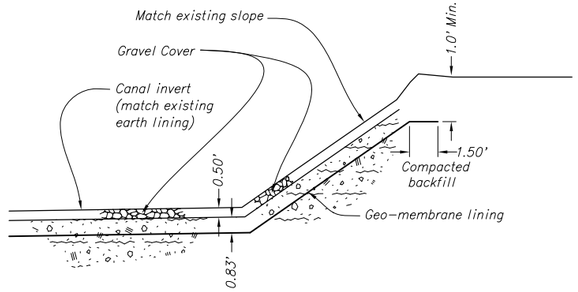
69-529-182

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OCTOBER 13, 2010 14:48
PLOTTED BY
JDECKER

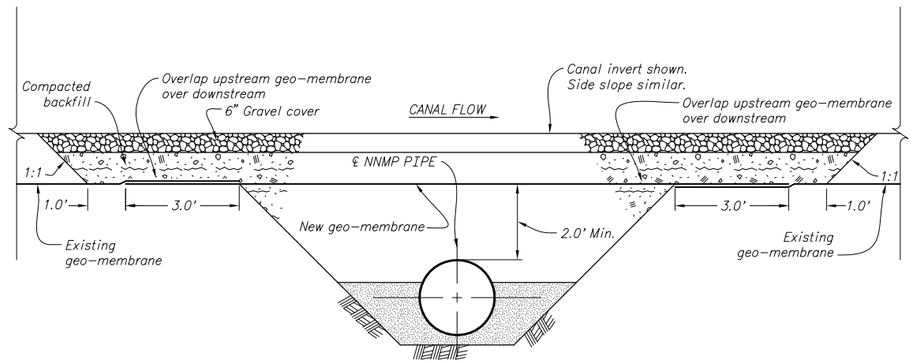
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66 69-529-182 REV02.DWG



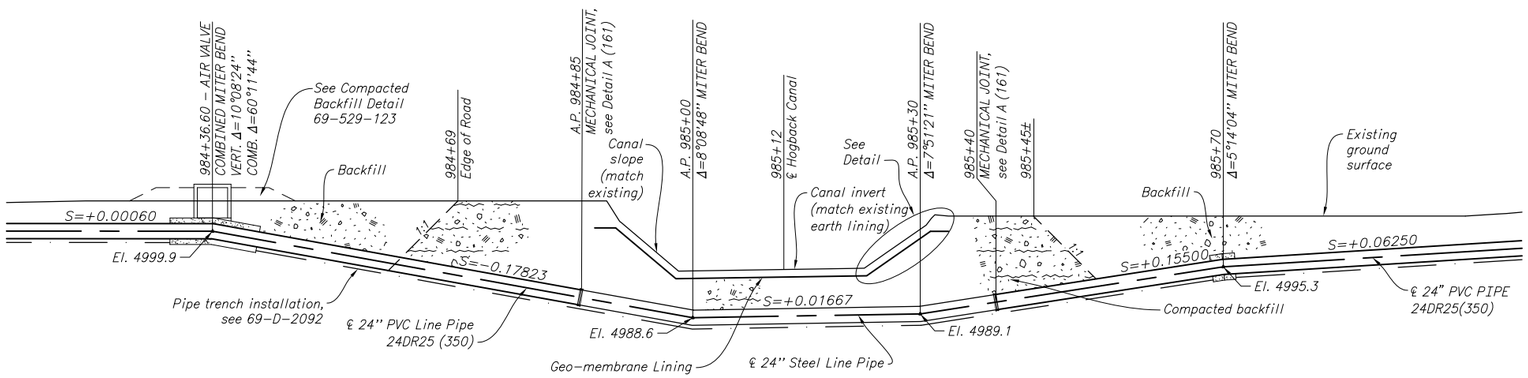
PLAN



GEO-MEMBRANE LINING DETAIL



TRANSVERSE SECTION (TYPICAL)



NNMP PROFILE

NOTES

1. For Plan and Profile, see (123).
2. For pressure pipe trench installation, see 69-D-2092.
3. For concrete encased miter bend, see (158).
4. For road crossing details, see (169).
5. Not all mechanical joints are shown in the profile that are required. Contractor may submit alternative locations for mechanical joints shown further from the Hogback Canal prism.

REV NO		
2	2009-11-06 FCCF-413 JED	REVISED TO MATCH DRAWING 69-529-123, REVISION 6.
1	2008-11/20 FCCF-412 DRG	CORRECTED DIMENSION FOR DEPTH OF MATERIAL BETWEEN PIPE AND GEOMEMBRANE IN TRANSVERSE SECTION (TYPICAL).

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ANIMAS - LA PLATA PROJECT COLORADO - NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

HOGBACK CANAL CROSSING

PLAN, PROFILE, SECTION, AND DETAIL
STATION 985+12

DESIGNED D. R. GOOD CHECKED JAYE E. DECKER

DRAWN D. R. GOOD/ANNE PAVOL TECH. APPR. LINDA M. BOWLES, P.E.
LINDA M. BOWLES P.E.

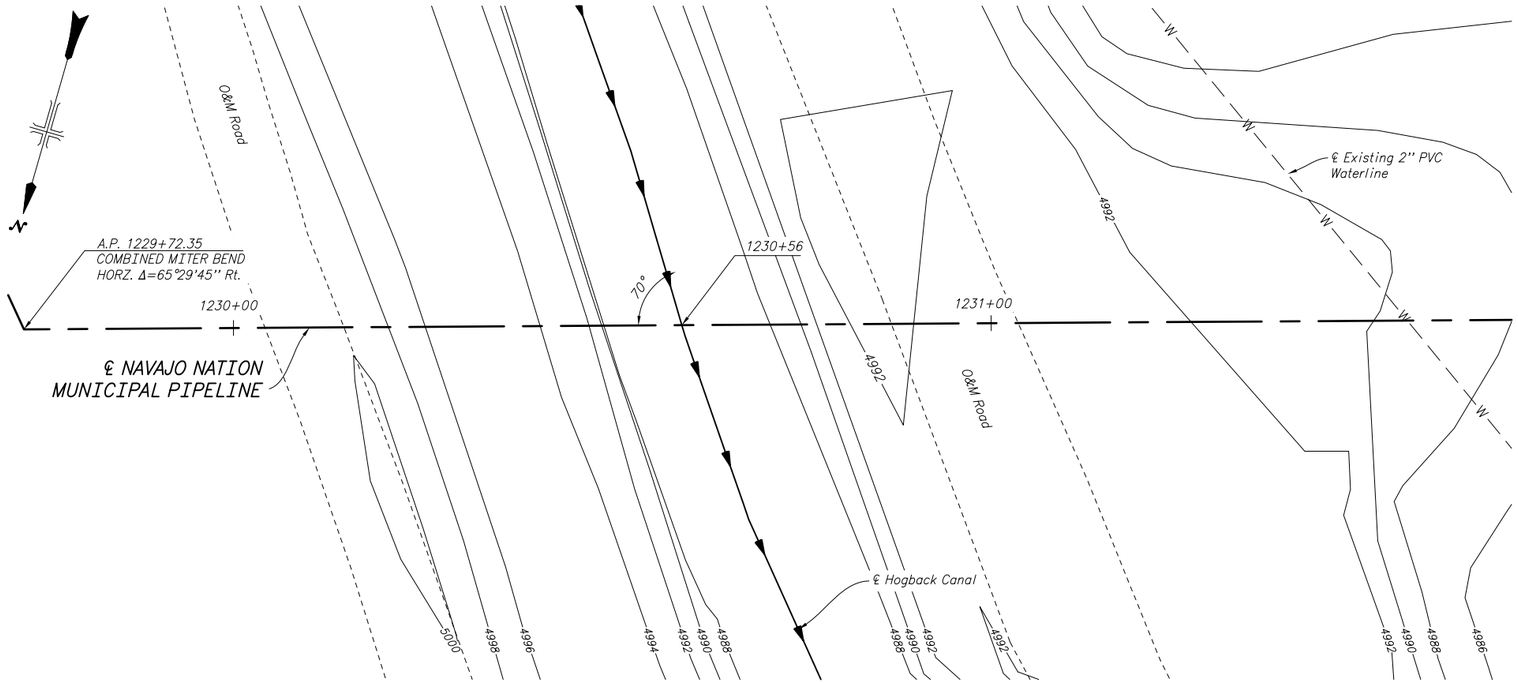
APPROVED TEDD R. CALHOUN, P.E.
PEER REVIEWER - TEDD R. CALHOUN, P.E.

FARMINGTON, NEW MEXICO 2005-03-22
SHEET 2 OF 4

69-529-183

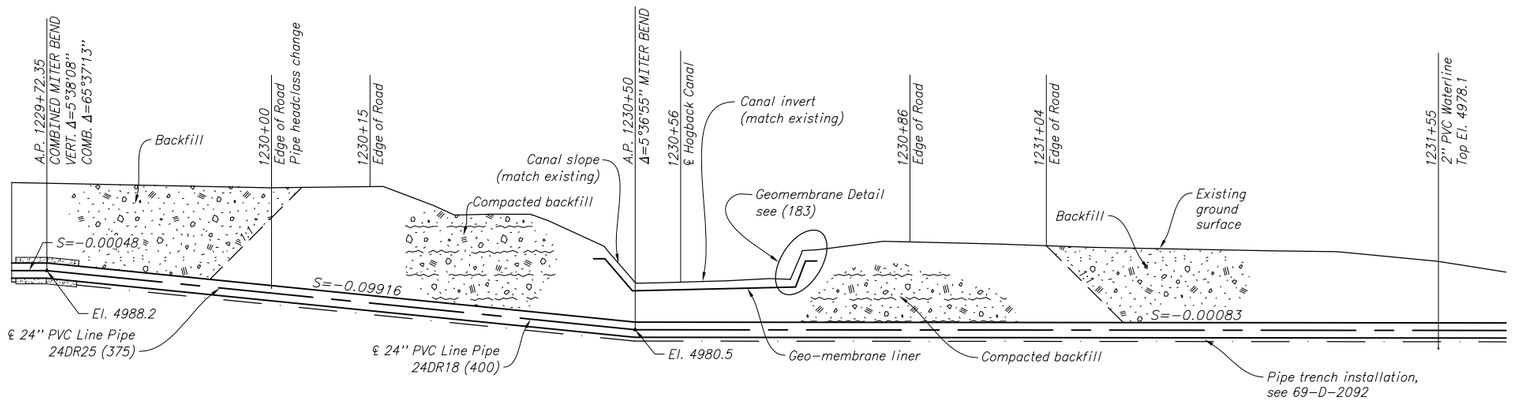
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PLOTTED BY:
JDECKER

CAD SYSTEM:
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CAD FILENAME:
67 69-529-183 REV02.DWG



PLAN

10 0 10 20 30
SCALE OF FEET



PROFILE

NOTES

1. For Plan and Profile, see (128).
2. For pressure pipe trench installation, see 69-D-2092.
3. For concrete encased miter bend, see (158).
4. For road crossing details, see (169).
5. Mechanical joints in Profile, not shown, but required on either side of miter bends, see (158) & (161).

REV NO		
01	2009-07-20 FCCF-413 JED	CORRECTED COMBINED Δ AT STATION 1229+72.35.

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ANIMAS - LA PLATA PROJECT COLORADO - NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

HOGBACK CANAL CROSSING

PLAN AND PROFILE

STATION 1230+56

DESIGNED D. R. GOOD CHECKED JAYE E. DECKER

DRAWN D. R. GOOD/ANNE PAVOL TECH. APPR. LINDA M. BOWLES, P.E.
LINDA M. BOWLES P.E.

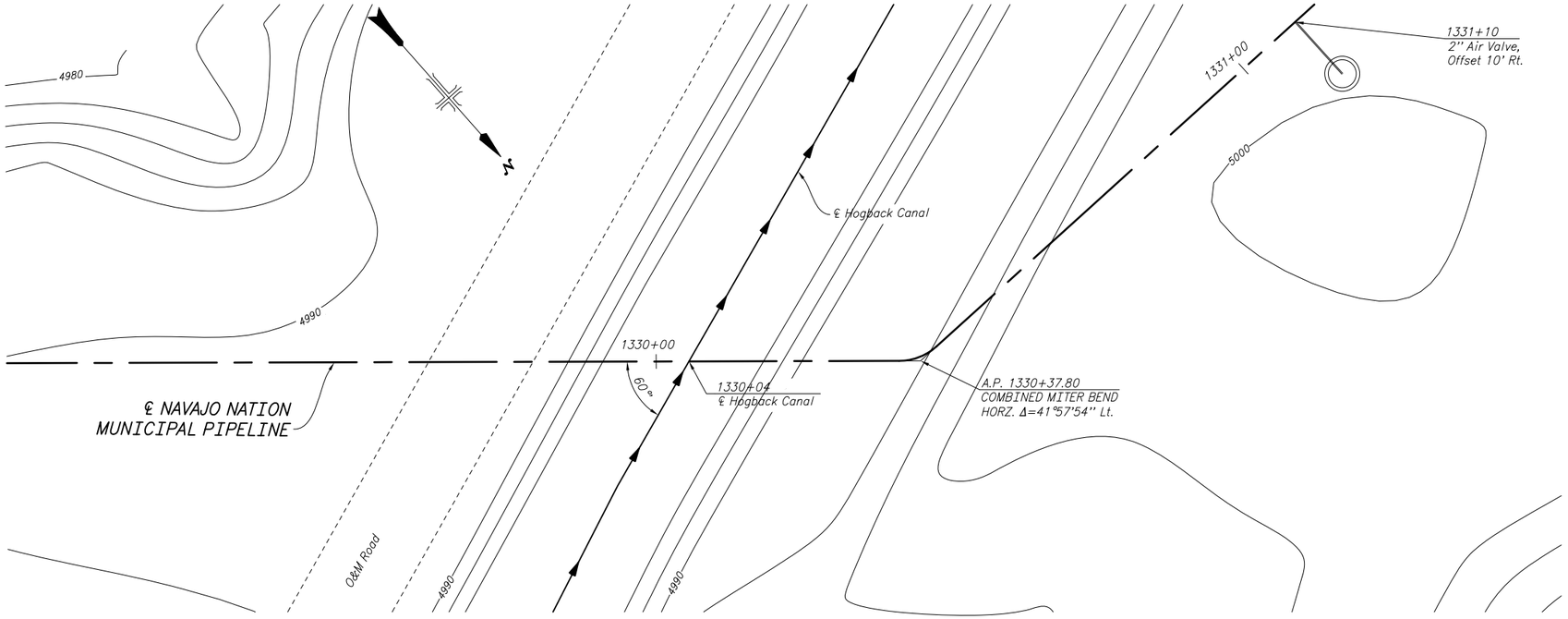
APPROVED TEDD R. CALHOUN, P.E.
PEER REVIEWER - TEDD R. CALHOUN, P.E.

FARMINGTON, NEW MEXICO 2005-03-22
SHEET 3 OF 4

69-529-184

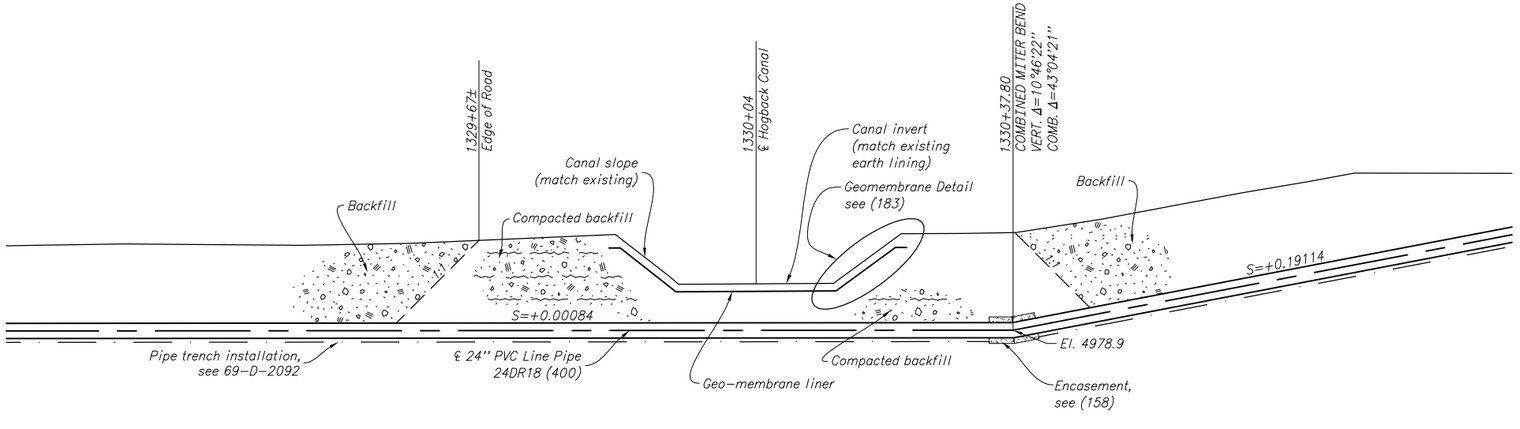
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PLOTTED BY
JDECKER

CAD SYSTEM
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CAD FILENAME
68 69-529-184 REV01.DWG



PLAN

10 0 10 20 30
SCALE OF FEET



PROFILE

NOTES

1. For Plan and Profile, see (130).
2. For pressure pipe trench installation, see 69-D-2092.
3. For concrete encased miter bend, see (158).
4. For road crossing details, see (169).
5. For air valve details, see (156).
6. Mechanical joints in Profile, not shown, but required on either side of miter bends, see (158) & (161).

REV NO		
01	2009-07-20 FCCF-413 JED	CLEANED UP ELECTRONIC VERSION OF DRAWING. SHOWED AIR VALVE AT OFFSET LOCATION. CORRECTED COMBINED Δ AT STATION 1330+37.80.

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NAVAJO NATION MUNICIPAL PIPELINE

HOGBACK CANAL CROSSING

PLAN AND PROFILE

STATION 1330+04

DESIGNED D. R. GOOD CHECKED JAYE E. DECKER

DRAWN D. R. GOOD/ANNE PAVOL TECH. APPR. LINDA M. BOWLES, P.E.
LINDA M. BOWLES P.E.

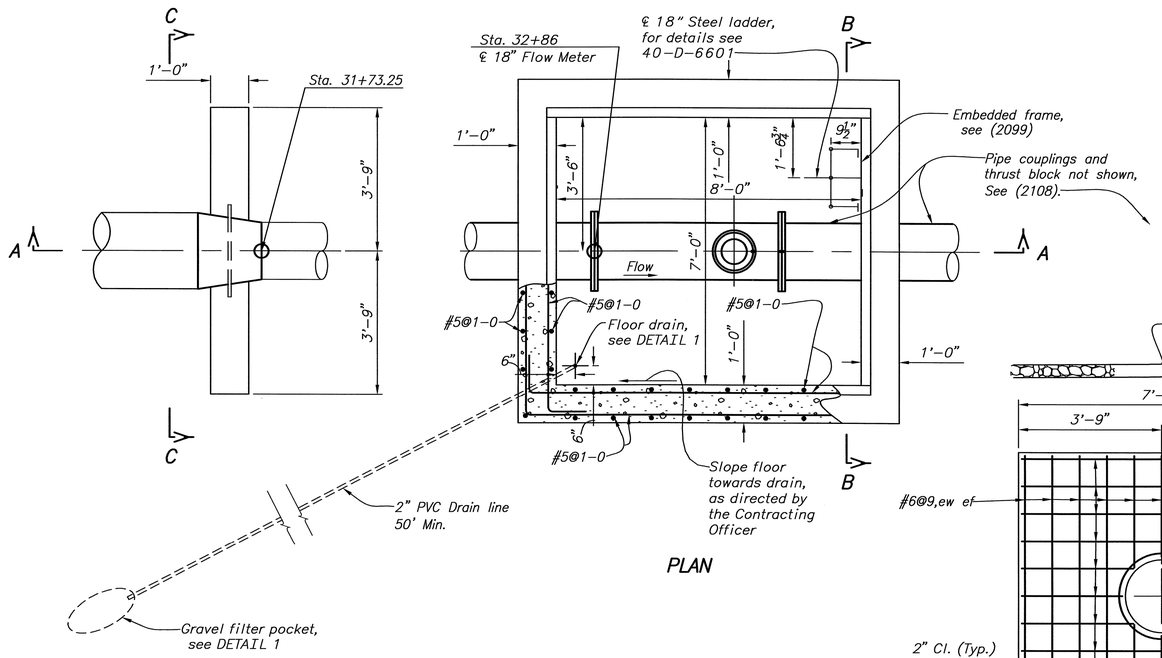
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PEER REVIEWER - TEDD R. CALHOUN, P.E.

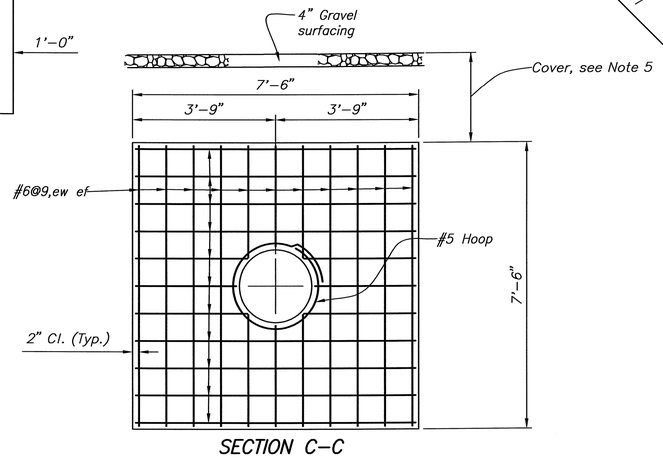
FARMINGTON, NEW MEXICO 2005-03-22
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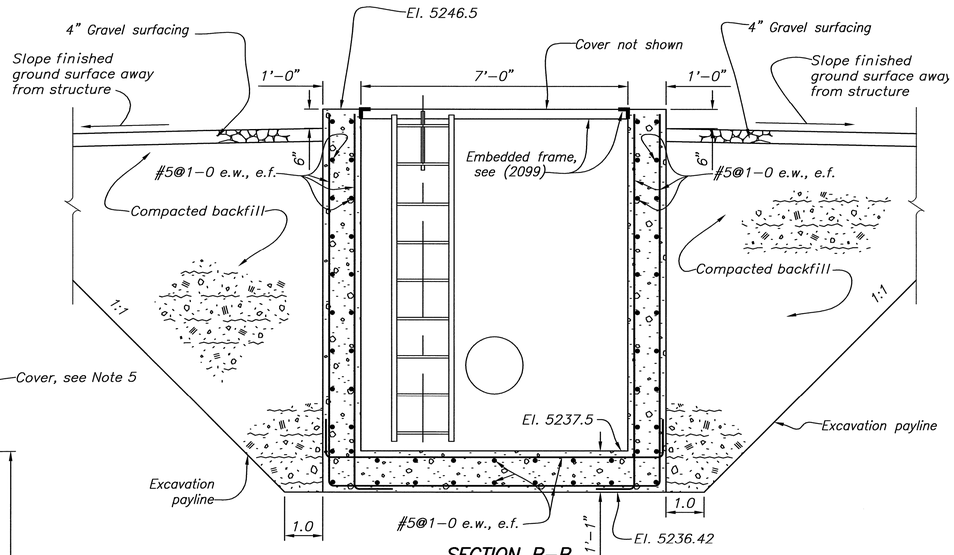
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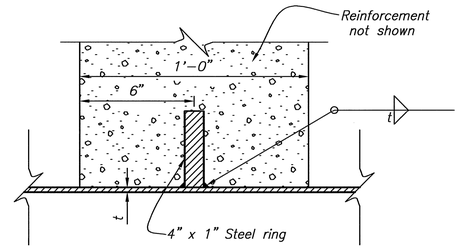
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JDECKER

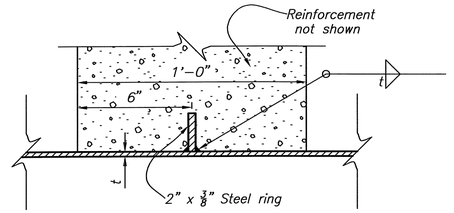
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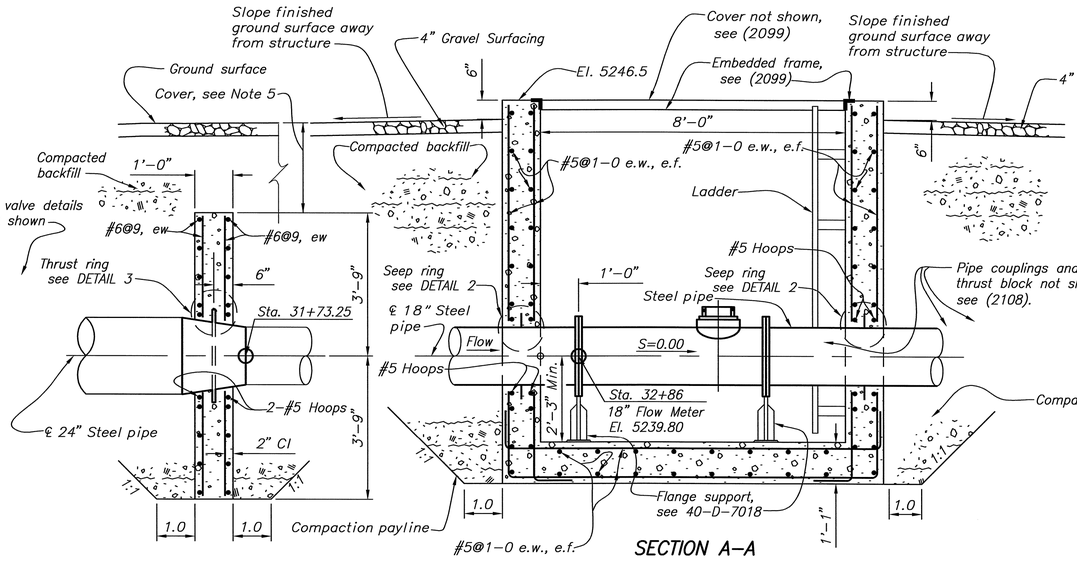


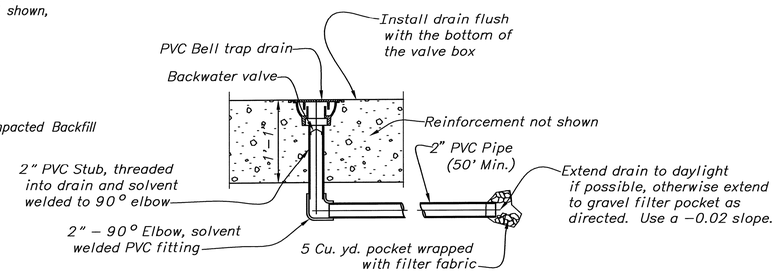












NOTES

1. For general concrete notes, see 40-D-7012.
2. For general notes and minimum requirements for detailing reinforcement, see 40-D-6263.
3. Backfill shall not be placed until the concrete has reached its 28-day compressive strength.
4. Structural design is based on a concrete compressive strength f'c of 4,000 psi. at 28 days and reinforcement yield strength fy of 60,000 psi.
5. The collar is designed with a minimum cover of 2.0 ft. The cover may be greater than, but not less than 2.0 ft.
6. For details on vault cover and embedded frame, see (2099).
7. Drawing not to scale.
8. For Plan and Profile see 69-529-101.
9. For steel piping and valves see, (2108) and (2109).

REV NO		
2	08-05-22 D- L. Bowles P.E.	MODIFIED STATION TO 31+73.25 AND 32+86. MODIFIED THE TITLE BLOCK.
1	08-04-25 D- L. Bowles P.E.	ELIMINATED ONE FLOW METER AND REVISED LOCATION OF THE OTHER. ADDED CONCRETE THRUST COLLAR ON UPSTREAM TAPER. OTHER MINOR ADJUSTMENTS.

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ANIMAS - LA PLATA PROJECT COLORADO - NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

FLOW METER VAULT

PLAN, SECTIONS, AND DETAILS

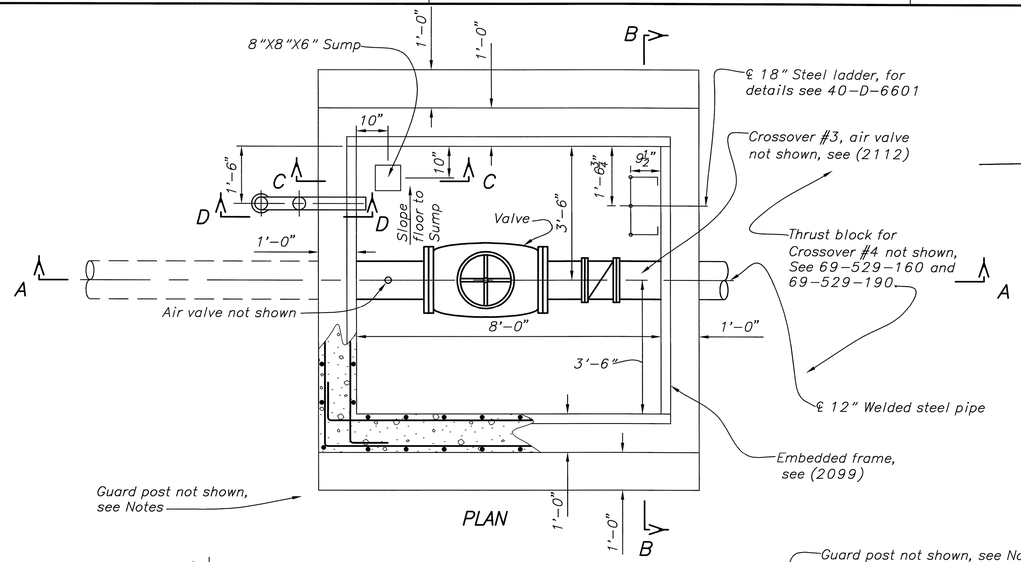
DESIGNED DAVID L. GESUNDHEIT CHECKED STEVE ROBERTSON
DRAWN DAVID L. GESUNDHEIT TECH. APPR. LINDA M. BOWLES, P.E.
APPROVED TEDD R. CALHOUN, P.E. LINDA M. BOWLES, P.E.
PEER REVIEWER - TEDD R. CALHOUN P.E.

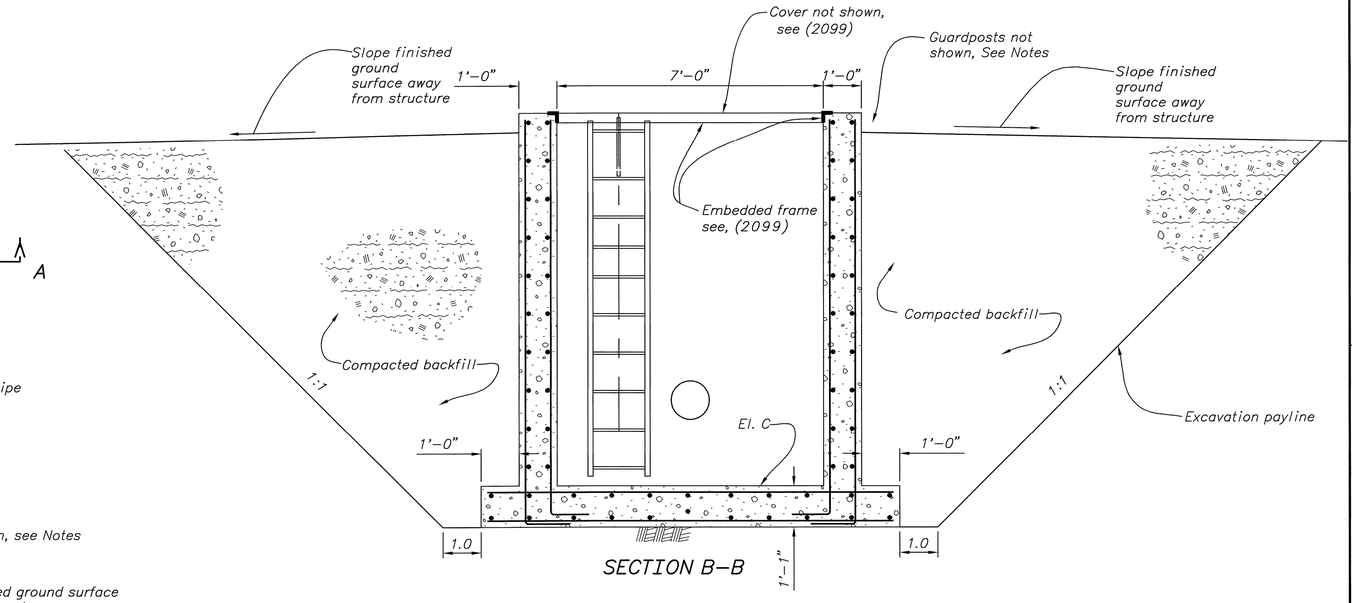
DENVER, COLORADO 2006-1-17
SHEET 1 OF 1

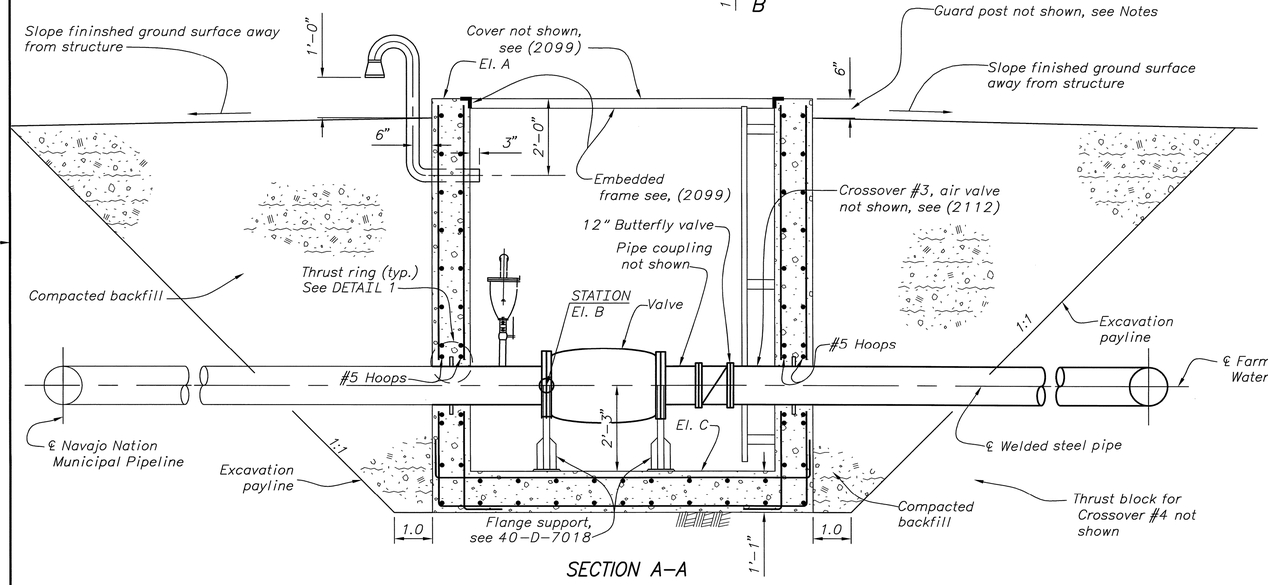
69-D-2093

DATE AND TIME PLOTTED
MAY 23, 2008 13:15
PLOTTED BY
LBOWLES

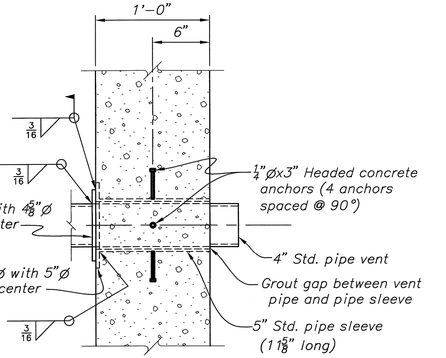
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CAD FILENAME
69-D-2093 REV1.DWG







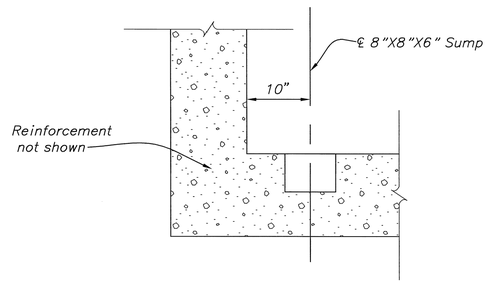
CROSSOVER #	EL. A	STATION	EL. B	EL. C	VALVE TYPE	REFERENCE DRAWINGS	
						CIVIL	MECHANICAL
3	5047.0	1+40.0	5040.10	5037.85	PRV	69-529-122	69-D-2112
4	4983.5	0+10.48	4978.50	4976.25	CHECK	69-529-160	69-D-2114



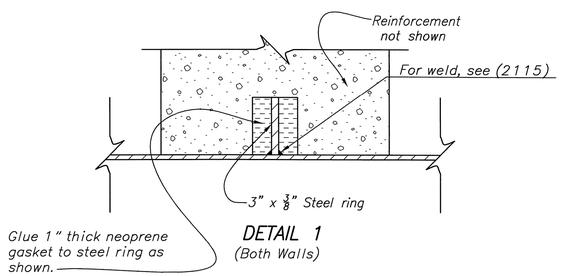
DETAIL 2

NOTES

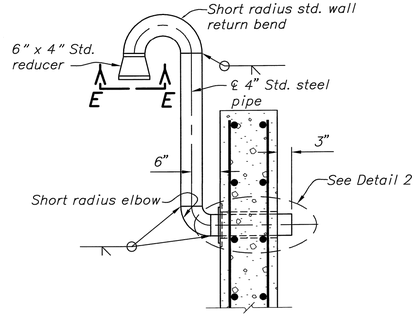
1. For general concrete notes, see 40-D-7012.
2. For general notes and minimum requirements for detailing reinforcement, see 40-D-6263.
3. All reinforcement shall be #5@1-0 unless stated otherwise.
4. Backfill shall not be placed until the concrete has reached its 28-day compressive strength.
5. Structural design is based on a concrete compressive strength f'c of 4,000 psi. at 28 days and reinforcement yield strength fy of 60,000 psi.
6. Flanges shall meet the same head requirements as designated for the pipe, and flange drilling shall match mating flange.
7. PRV shall be located to provide pressure reduction from the existing pipeline to the new pipeline.
8. Drawing not to scale.
9. For details of valve vault cover and embedded frame, see (2099).
10. Locate 4 guard posts around structure as directed by COR. See 69-529-157 for details.



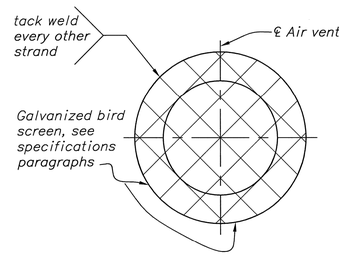
SECTION C-C



DETAIL 1
(Both Walls)



SECTION D-D
Air Vent



SECTION E-E

REV NO		
2	2009-06-08 D- L Bowles PE	ADDED NOTE TO DETAIL 1 (BOTH WALLS).
1	2009-03-24 D - D. GESUNDHEIT, PE	ADDED 4" AIR VENT AND CROSSOVER #3 AIR VALVE NOTE. ADDED GUARD POSTS NOTES.

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ANIMAS - LA PLATA PROJECT COLORADO - NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

CROSSOVER #3 AND #4 VAULTS

PLAN, SECTIONS AND DETAILS

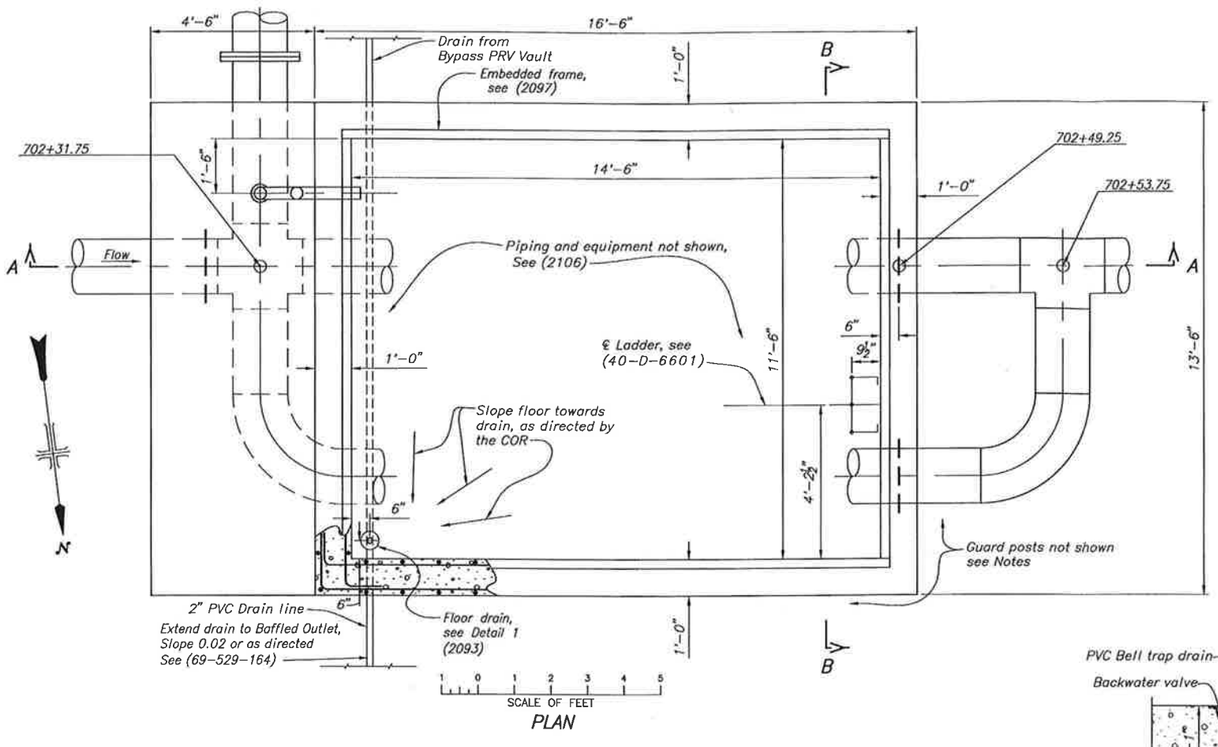
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DRAWN DAVID L. GESUNDHEIT TECH. APPR. LINDA M. BOWLES, P.E.
APPROVED TEDD R. CALHOUN, P.E.
PEER REVIEWER - TEDD R. CALHOUN P.E.

DENVER, COLORADO 2006-05-05
SHEET 1 OF 1

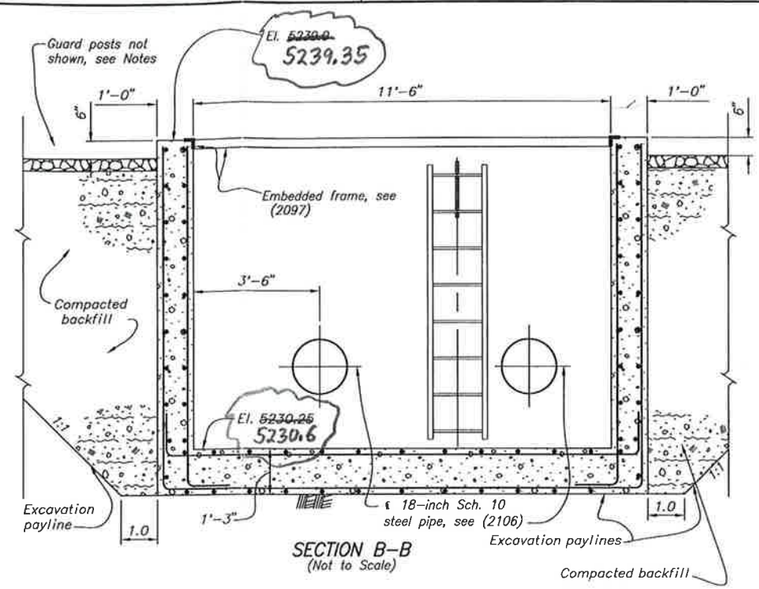
69-D-2094

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JUNE 8, 2009 08:53
PLOTTED BY
DGESUNDHEIT

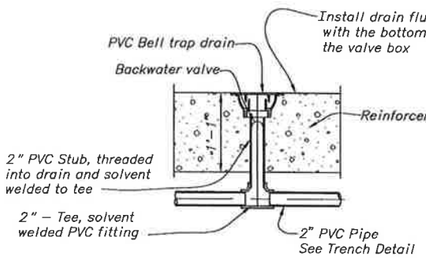
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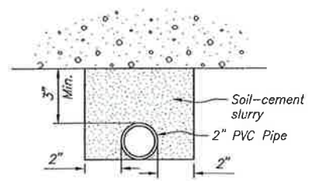
PLAN



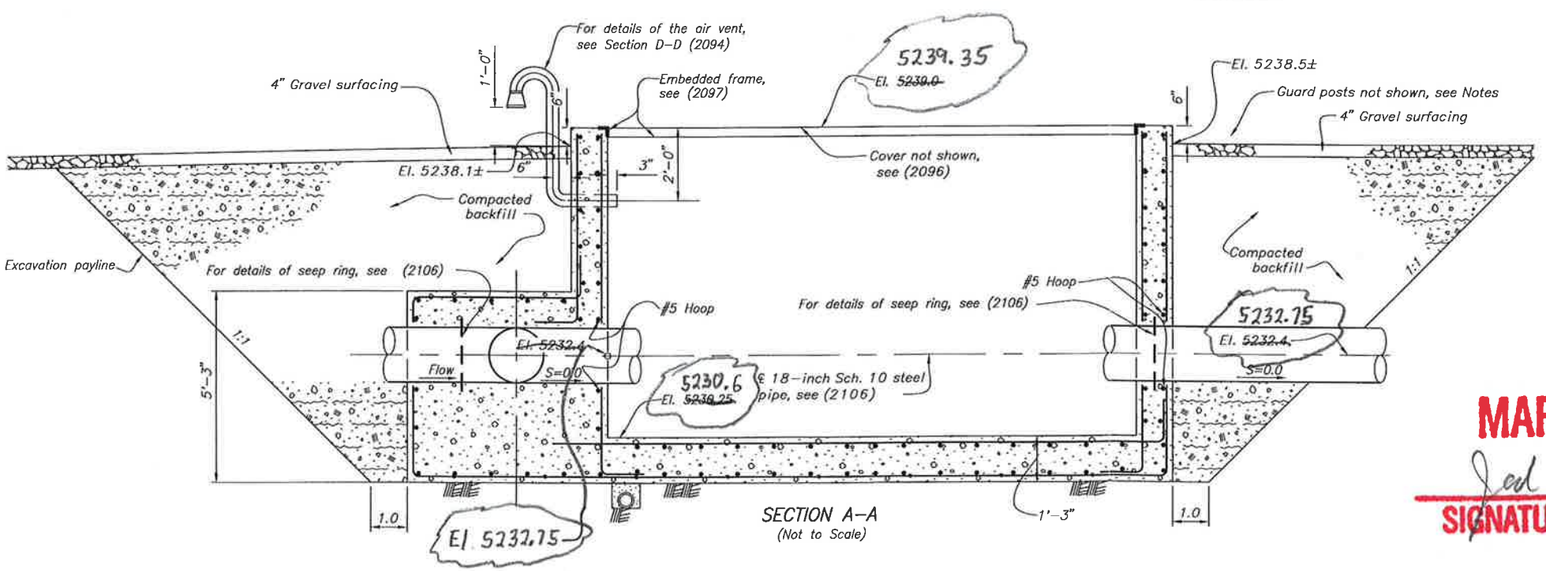
SECTION B-B
(Not to Scale)



DETAIL 1



TRENCH DETAIL



SECTION A-A
(Not to Scale)

NOTES

1. For general concrete notes, see 40-D-7012.
2. For general notes and minimum requirements for detailing reinforcement, see 40-D-6263.
3. Backfill shall not be placed until the concrete has reached its 28-day compressive strength.
4. All reinforcement shall be #5@1-0 unless specified otherwise.
5. Structural design is based on a concrete compressive strength f'c of 4,000 psi. at 28 days and reinforcement yield strength fy of 60,000 psi.
6. For details on vault cover and embedded frame, see (2096) and (2097).
7. For details of steel piping and structure location, see (2106).
8. Locate 6 guard posts around structure as directed by COR. See 69-529-157 for details.

MARKED PRINT

Jed — SIGNATURE

6/15/10 — DATE

REV NO		
4	2009-09-02 D- Linda W. B.	ADDED DRAIN FROM BYPASS PRV VAULT, ADDED DETAIL 1, AND AND TRENCH DETAIL.
3	2009-04-07 D- D. GESUNDHEIT, P.E.	CHANGED ELEVATIONS OF FLOOR AND WALLS.
2	2009-03-19 D- LBOWLES P.E.	ADDED CROSS, ADDED 4" AIR VENT, ADDED GUARD POSTS CALLOUTS, AND MODIFIED NOTES 7 AND 8.
1	2008-04-25 D- L. BOWLES P.E.	REVISED THRUST RING LABELS TO SEEP RING. ADDED NOTE TO SLOPE FLOOR TO DRAIN IN PLAN. ADDED PIPE SIZE CALLOUTS. MOVED FLOOR ELEVATION CALLOUT. OTHER MINOR CHANGES.

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ANIMAS - LA PLATA PROJECT COLORADO - NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

ALTITUDE VALVE VAULT

PLAN, SECTIONS, AND DETAILS

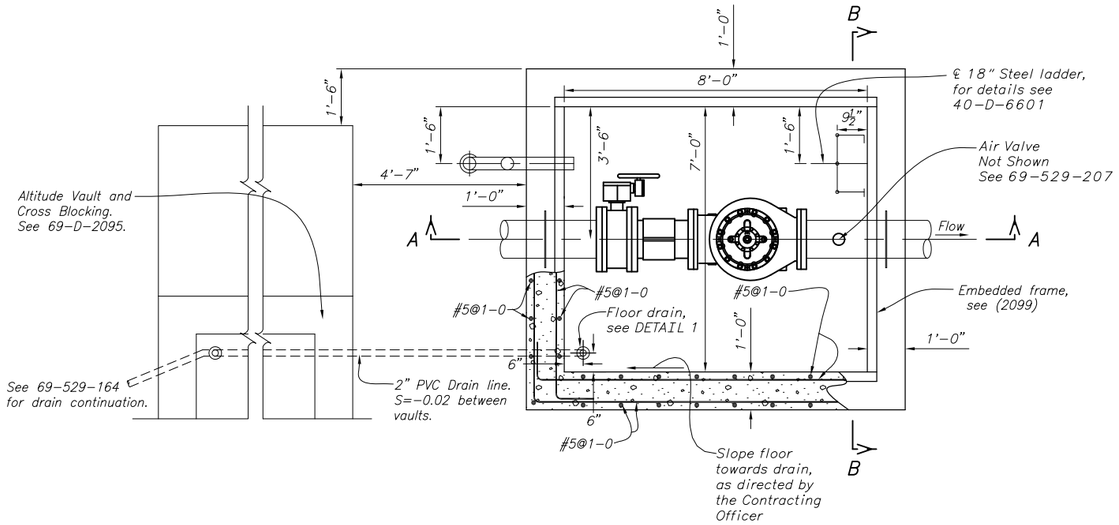
DESIGNED DAVID L. GESUNDHEIT — CHECKED STEVE ROBERTSON
DRAWN DAVID L. GESUNDHEIT — TECH. APPR. LINDA W. BOWLES, P.E.
APPROVED TEDD R. CALHOUN, P.E.
PEER REVIEWER - TEDD R. CALHOUN P.E.

DENVER, COLORADO 2006-1-11 SHEET 1 OF 1

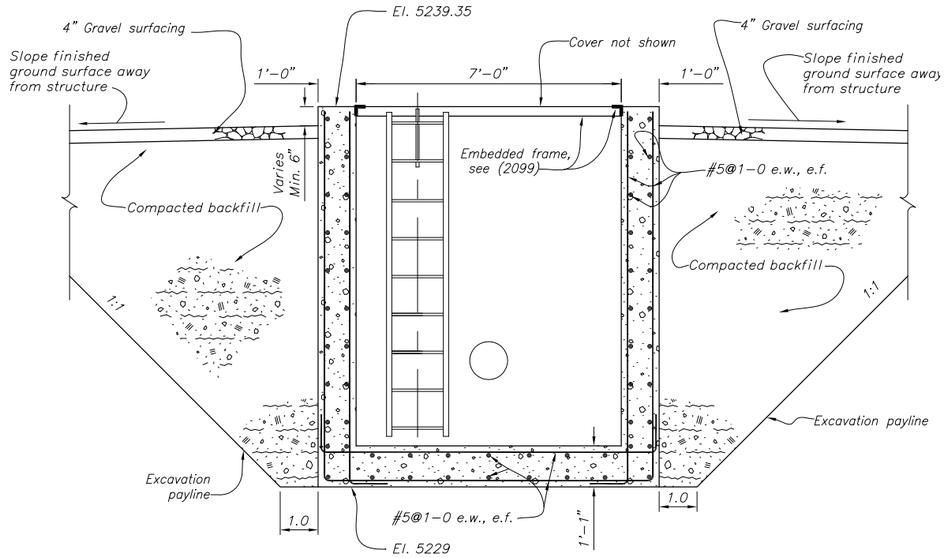
69-D-2095

DATE AND TIME PLOTTED SEPTEMBER 2, 2009 12:59
PLOTTED BY LBOWLES

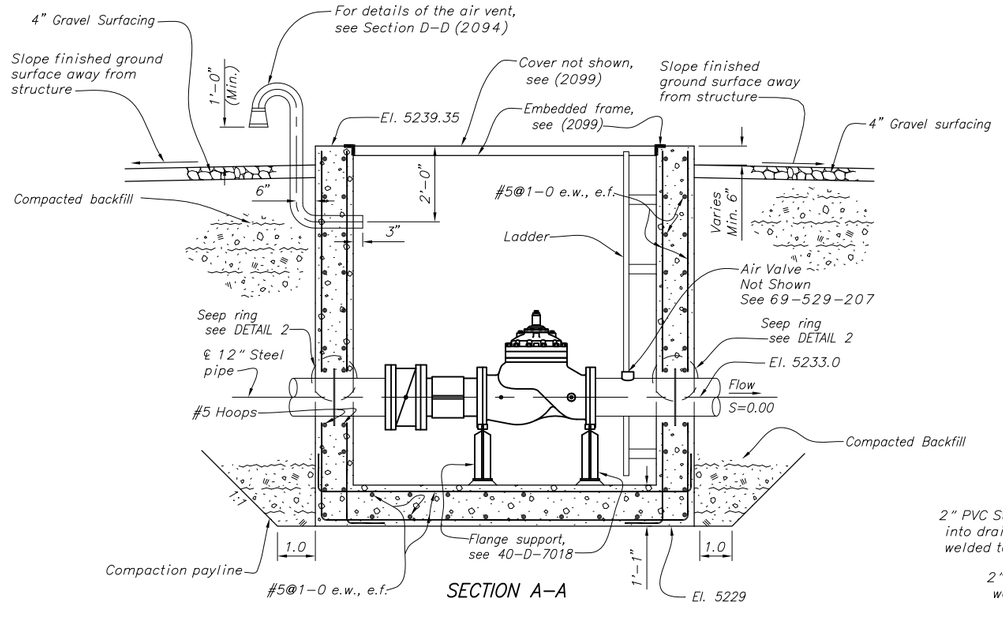
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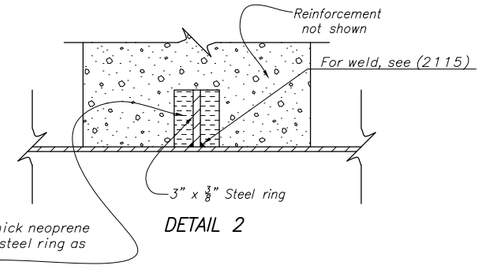
PLAN



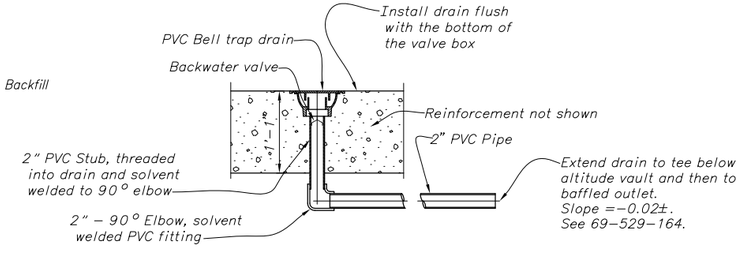
SECTION B-B



SECTION A-A



DETAIL 2



DETAIL 1

NOTES

1. For general concrete notes, see 40-D-7012.
2. For general notes and minimum requirements for detailing reinforcement, see 40-D-6263.
3. Backfill shall not be placed until the concrete has reached its 28-day compressive strength.
4. Structural design is based on a concrete compressive strength f'c of 4,000 psi. at 28 days and reinforcement yield strength fy of 60,000 psi.
5. For details on vault cover and embedded frame, see (2099).
6. Drawing not to scale.
7. For steel piping and valves see, 69-529-207.
8. Locate 2 guard posts near south corners, as directed by COR. See 69-529-157 for details.

REV NO		
1	2010-06-15 FCCF-233 JED	RAISED VAULT TO MATCH PIPING REVISION MADE TO MATCH HDPE AS-BUILT ELEVATION.

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ANIMAS - LA PLATA PROJECT COLORADO - NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

NENAHNEZAD TANK

TANK BYPASS

PRESSURE REDUCING VALVE VAULT

PLAN, SECTIONS, AND DETAILS

DESIGNED _ JAYE E. DECKER _ CHECKED _ s/DARRYL GOOD

DRAWN _ JAYE E. DECKER _ TECH. APPR. _ s/THOMAS M. ROE PE

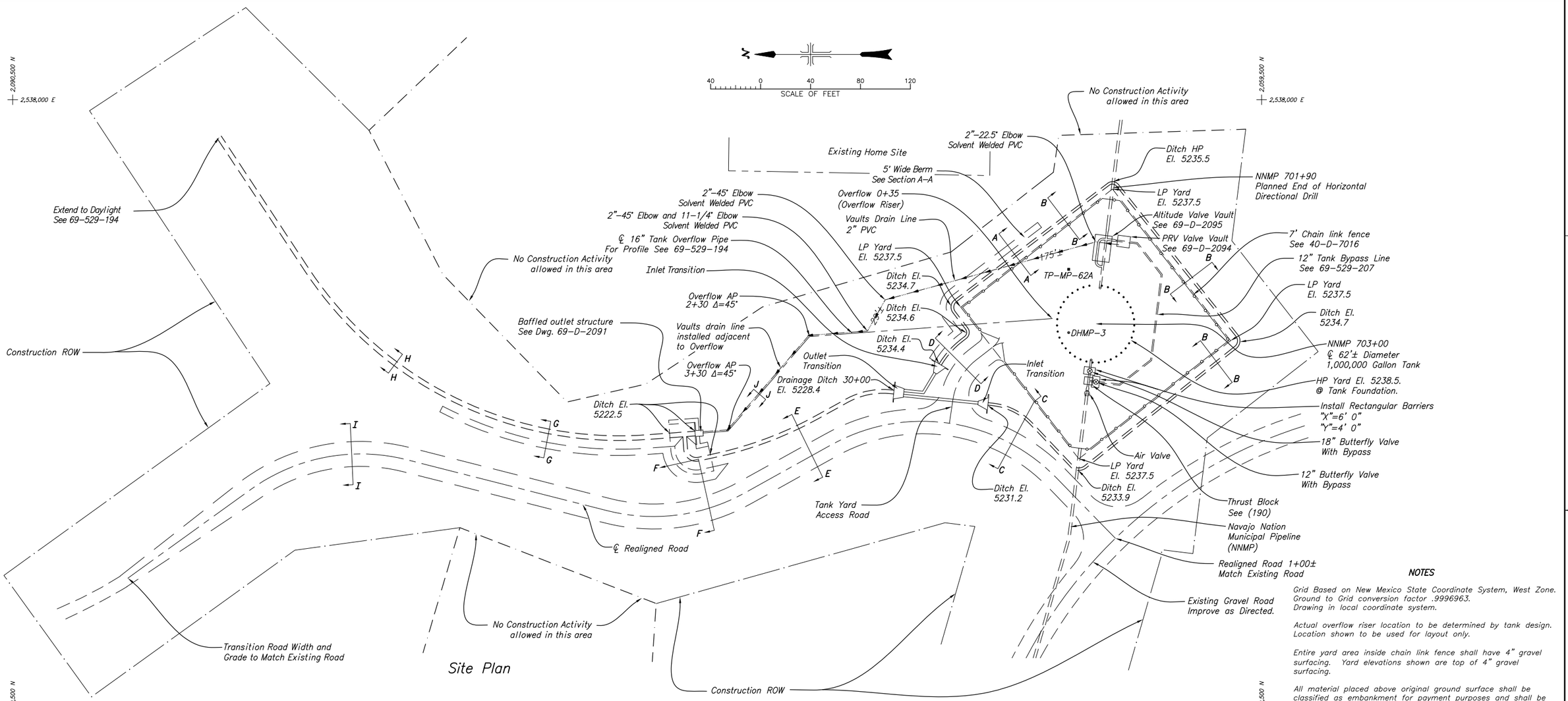
APPROVED _ s/DOUG DOCKTER PE

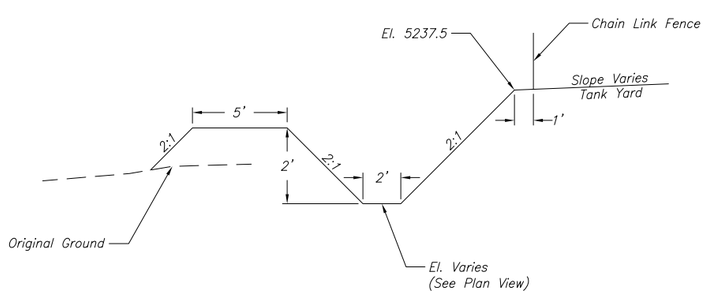
FARMINGTON, NEW MEXICO 2009-04-03
SHEET 1 OF 1

69-529-208

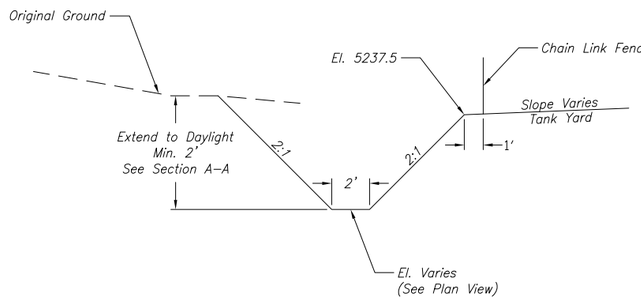
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PLOTTED BY
JDECKER

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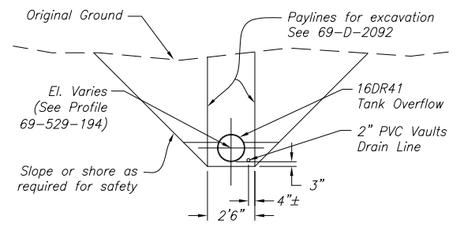




Section A-A
Vertical Scale Exaggerated



Section B-B
Vertical Scale Exaggerated



Section J-J

NOTES

Grid Based on New Mexico State Coordinate System, West Zone. Ground to Grid conversion factor .9996963. Drawing in local coordinate system.

Actual overflow riser location to be determined by tank design. Location shown to be used for layout only.

Entire yard area inside chain link fence shall have 4" gravel surfacing. Yard elevations shown are top of 4" gravel surfacing.

All material placed above original ground surface shall be classified as embankment for payment purposes and shall be compacted in accordance with the specifications.

Drawing with contours is available upon request.

For Sections C-C through I-I see drawing 69-529-203.

For Horizontal Layout see drawing 69-529-202.

For Profiles see drawing 69-529-194.

REV NO		
02	2009-03-09 FCCF-413 JED	ADDED BARRIER AROUND DOWNSTREAM BUTTERFLY VALVE.
01	2009-02-10 FCCF-413 JED	REVISED REACH NAME IN TITLE BLOCK.
03	2009-05-04 FCCF-413 JED	ADDED TANK BYPASS LINE AND TEE BLOCK. MOVED DOWNSTREAM BUTTERFLY VALVE. MOVED ALTITUDE VAULT TO CORRECT LOCATION. ADDED VAULTS DRAIN LINE AND SECTION J-J.

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BUREAU OF RECLAMATION
ANIMAS - LA PLATA PROJECT COLORADO - NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

NENAHNEZAD TANK

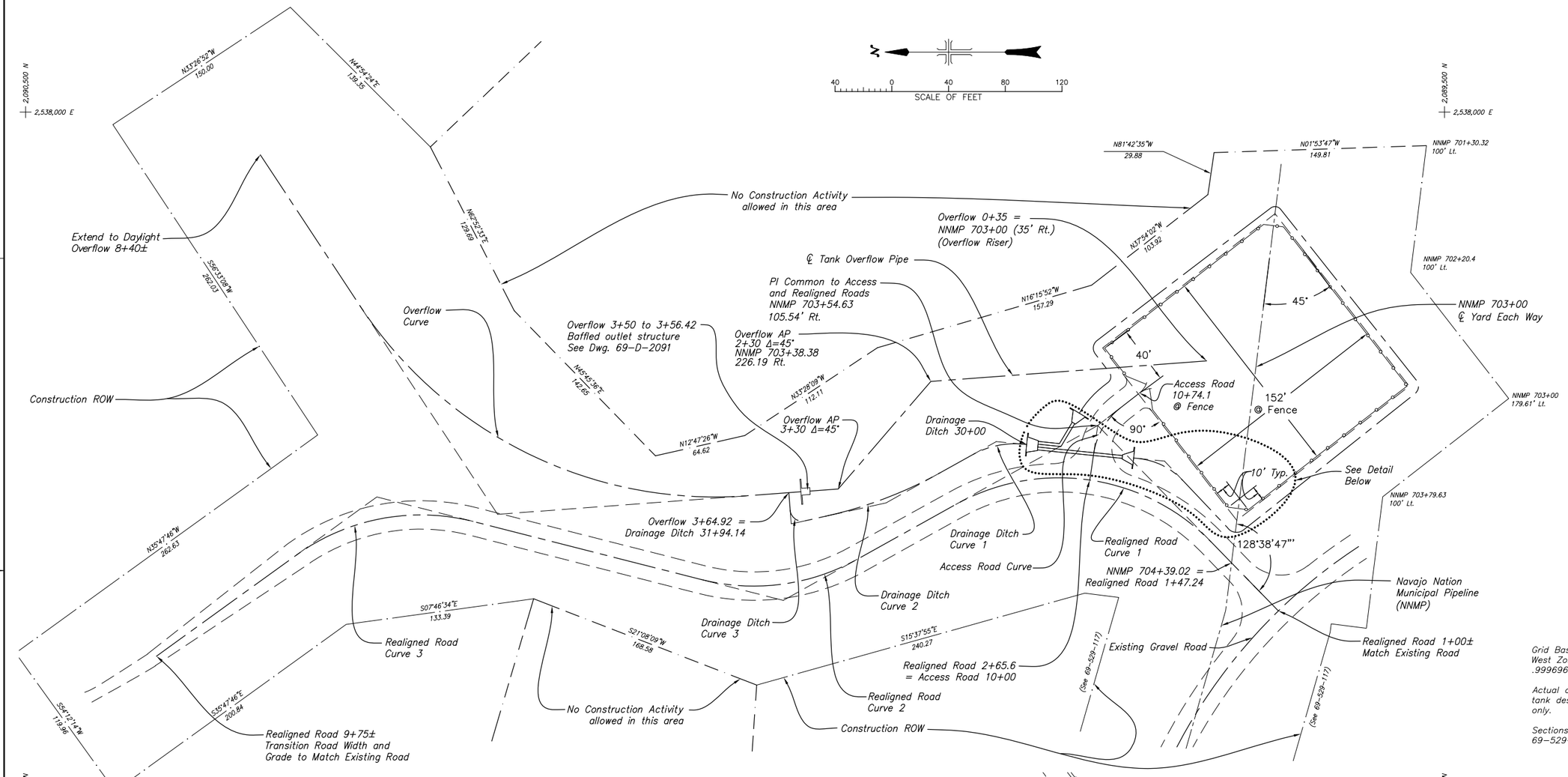
SITE PLAN
VERTICAL AND GENERAL LAYOUT

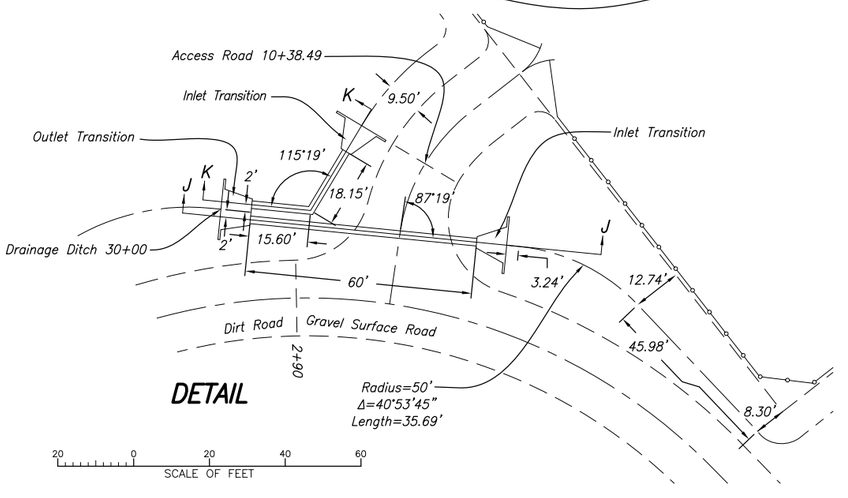
DESIGNED JAYE E. DECKER CHECKED s/BRIAN WAGNER P.E.
DRAWN JAYE E. DECKER TECH. APPR. s/DAVID K. EDWARDS P.E.
DAVID K. EDWARDS P.E.
APPROVED s/DOUG DOCKTER P.E.
PEER REVIEWER - MANAGER, FARMINGTON ENGINEERING DIV.
FARMINGTON, NEW MEXICO 2006-06-05
SHEET 1 OF 5

69-529-164

DATE AND TIME PLOTTED
OCTOBER 14, 2010 15:23
PLOTTED BY
JDECKER

CAD SYSTEM
AutoCAD RM 17.2s
CAD FILENAME
T:\ 69-529-164 REV03.DWG





NOTES

Grid Based on New Mexico State Coordinate System, West Zone. Ground to Grid conversion factor .9996963. Drawing in local coordinate system.

Actual overflow riser location to be determined by tank design. Location shown to be used for layout only.

Sections J-J and K-K shown on Drawing 69-529-194.

Realigned Road Curve 1
Radius=150'
Δ=74°48'01"
PC 1+67.69
PT 3+63.51

Realigned Road Curve 2
Radius=150'
Δ=43°19'26"
PC 4+42.95
PT 5+56.37

Realigned Road Curve 3
Radius=150'
Δ=50°05'50"
PC 7+22.33
PT 8+53.48

Drainage Ditch Curve 1
Radius=60'
Δ=34°43'00"
PC 30+02.73
PT 30+24.48

Drainage Ditch Curve 2
Radius=300'
Δ=16°35'11"
PC 30+65.56
PT 31+52.41

Drainage Ditch Curve 3
Radius=8.5'
Δ=98°13'01"
PC 31+67.34
PT 31+81.91

Overflow Curve
Radius=300'
Δ=60°48'12"
PC 3+94.81
PT 7+13.18

Access Road Curve
Radius=50'
Δ=43°45'13"
PC 10+18.74
PT 10+56.92

REV NO		
02	2009-03-05 FCCF-413 JED	CORRECTED DIMENSION TEXT SIZE.
01	2009-02-10 FCCF-413 JED	REVISED REACH NAME IN TITLE BLOCK.

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ANIMAS - LA PLATA PROJECT COLORADO - NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

NENAHNEZAD TANK

SITE PLAN

HORIZONTAL LAYOUT

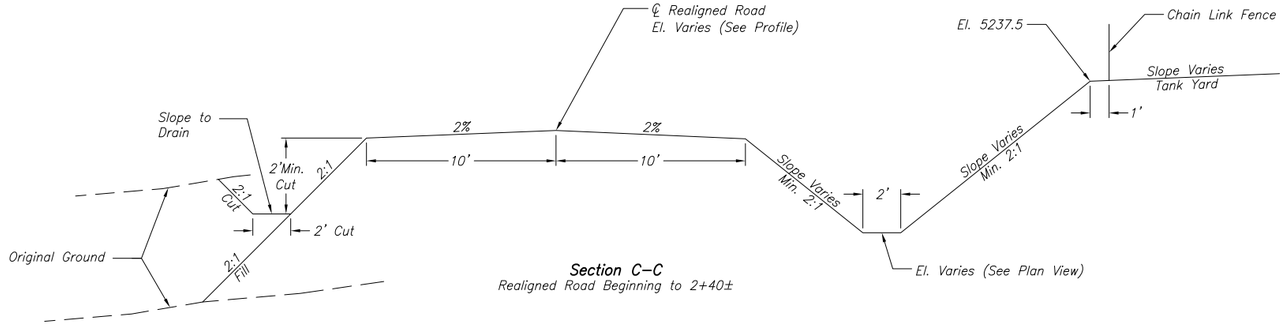
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DRAWN _ JAYE E. DECKER _ TECH. APPR. _ s/DAVID K. EDWARDS, P.E. _ DAVID K. EDWARDS P.E.
APPROVED _ s/DOUG DOCKTER P.E. _ PEER REVIEWER - MANAGER, FARMINGTON ENGINEERING DIV.

FARMINGTON, NEW MEXICO 2007-11-28
SHEET 2 OF 5

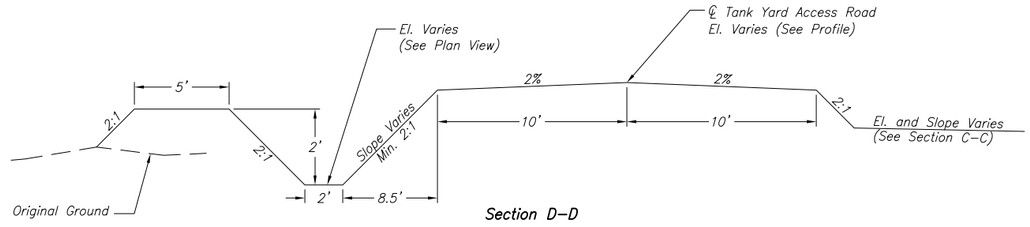
69-529-202

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JDECKER

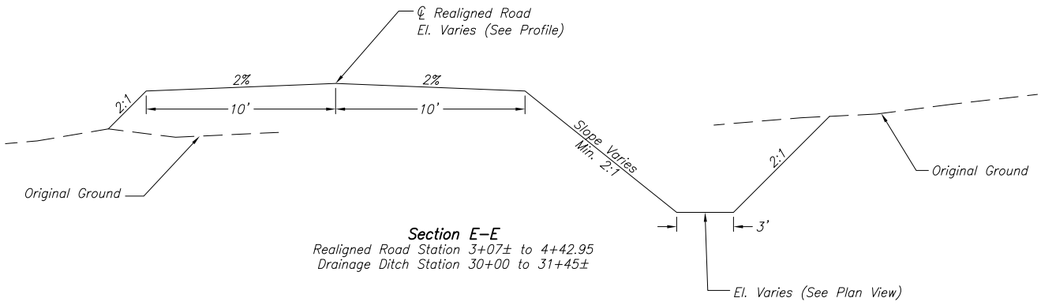
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74 69-529-202 REV02.DWG



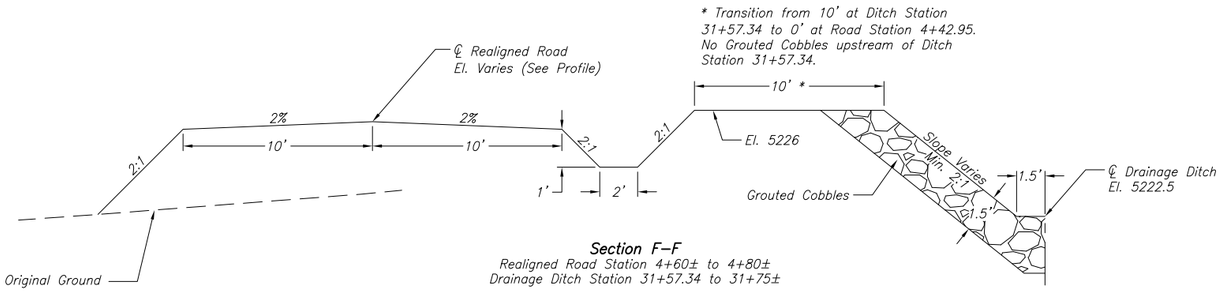
Section C–C
Realigned Road Beginning to 2+40±



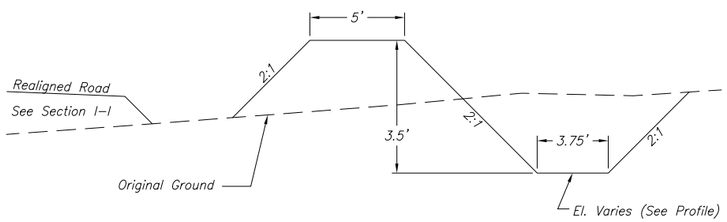
Section D–D



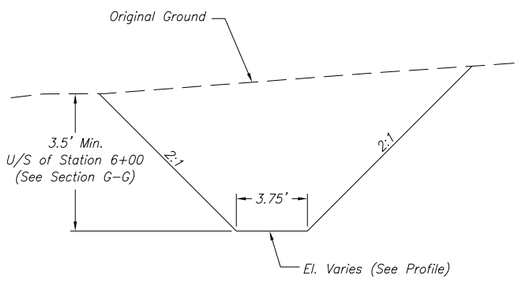
Section E–E
Realigned Road Station 3+07± to 4+42.95
Drainage Ditch Station 30+00 to 31+45±



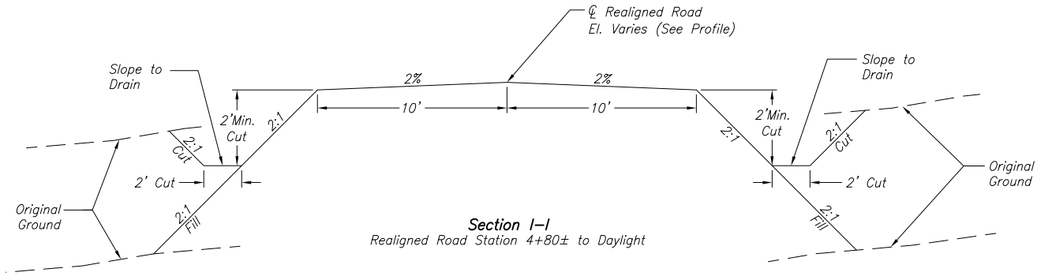
Section F–F
Realigned Road Station 4+60± to 4+80±
Drainage Ditch Station 31+57.34 to 31+75±



Section G–G
Overflow Ditch Station 3+76.77 to 5+60±



Section H–H
Overflow Ditch Station 5+60± to Daylight



Section I–I
Realigned Road Station 4+80± to Daylight

NOTES

For Section locations and plan view see Drawing 69–529–164.

Profiles shown on Drawing 69–529–194.

REV NO		
01	2009–02–10 FCCF–413 JED	REVISED REACH NAME IN TITLE BLOCK.

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BUREAU OF RECLAMATION

ANIMAS – LA PLATA PROJECT COLORADO – NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

NENAHNEZAD TANK

SITE PLAN

SECTIONS

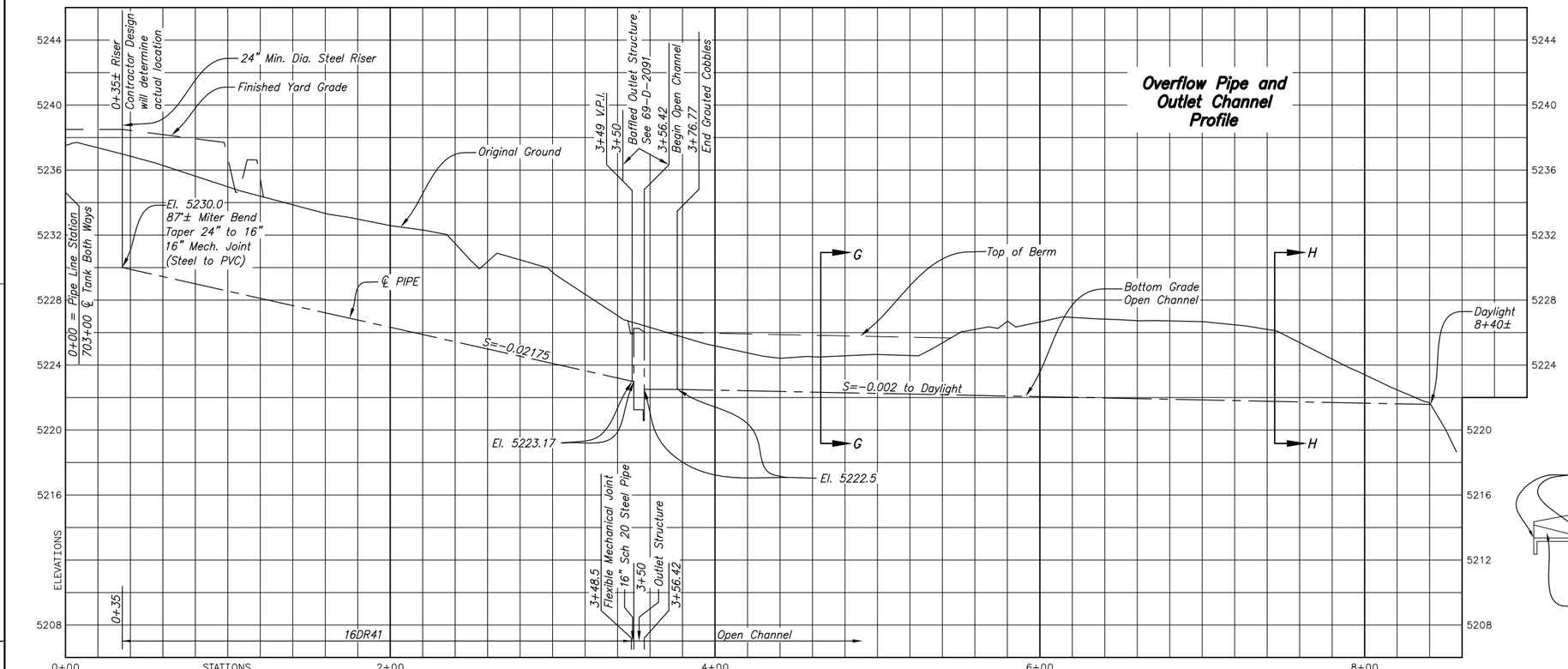
DESIGNED JAYE E. DECKER CHECKED s/BRIAN WAGNER P.E.
DRAWN JAYE E. DECKER TECH. APPR. s/DAVID K. EDWARDS P.E.
DAVID K. EDWARDS P.E.
APPROVED s/DOUG DOCKTER P.E.
PEER REVIEWER – MANAGER, FARMINGTON ENGINEERING DIV.

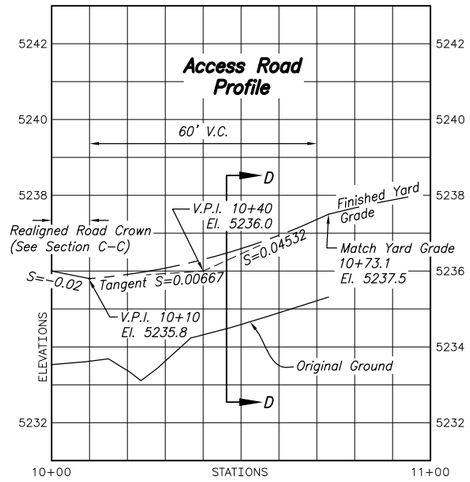
FARMINGTON, NEW MEXICO 2007–11–28
SHEET 3 OF 5

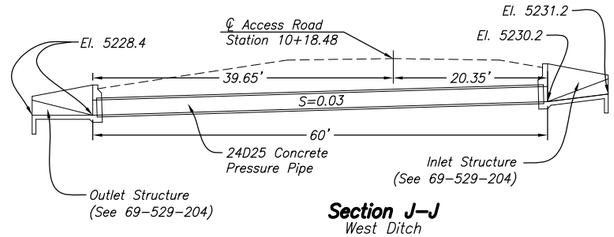
69–529–203

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OCTOBER 14, 2010 15:32
PLOTTED BY
JDECKER

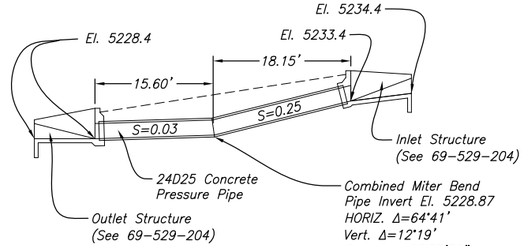
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CAD FILENAME
75 69–529–203 REV01.DWG



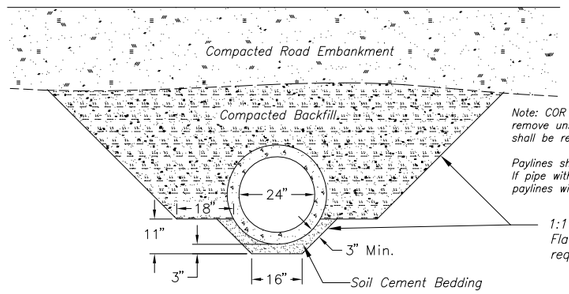




Section J-J
West Ditch



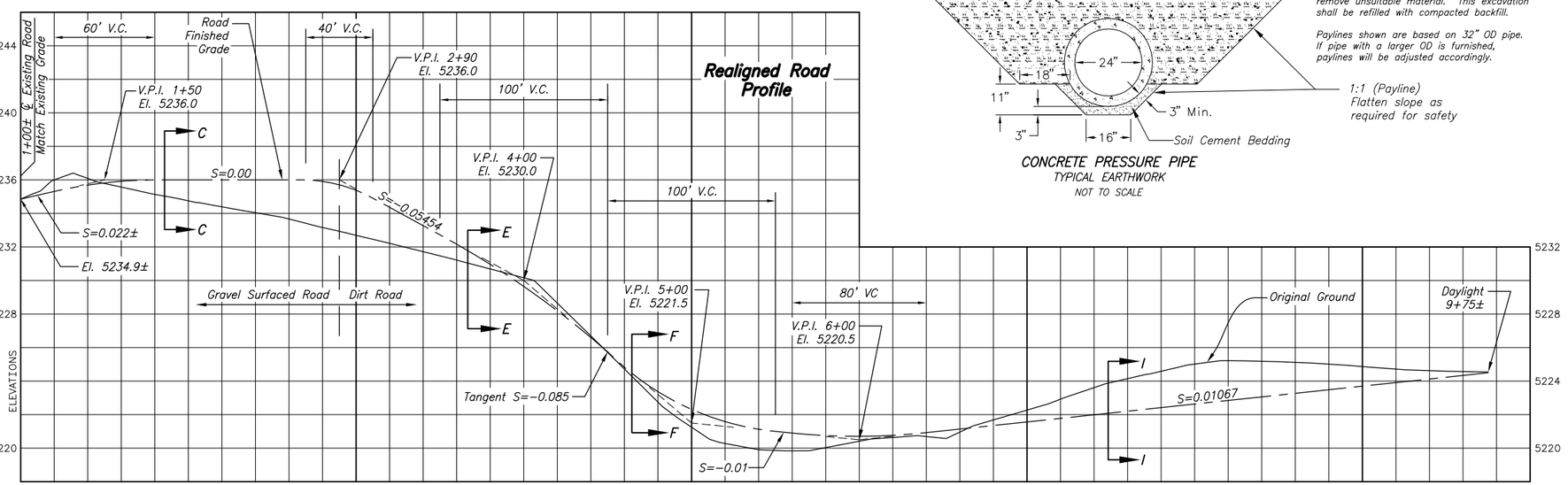
Section K-K
East Ditch



Note: COR may direct addition excavation to remove unsuitable material. This excavation shall be refilled with compacted backfill.

Paylines shown are based on 32" OD pipe. If pipe with a larger OD is furnished, paylines will be adjusted accordingly.

CONCRETE PRESSURE PIPE
TYPICAL EARTHWORK
NOT TO SCALE



NOTES

1. For General Notes, Abbreviations, Symbols, and Pipe Classifications, see (102).
2. Contractor shall coordinate necessary changes, due to tank design, with COR.
3. Baffled Outlet structure shall be constructed in accordance with Dwg. 69-D-2091.

REV NO		
01	2009-02-10 FCCF-413 JED	ADDED CONCRETE PRESSURE PIPE TRENCH DETAIL. REVISED REACH NAME ON TITLE BLOCK. REVISED DETAILS IN TITLE BLOCK.
02	2009-03-12 FCCF-413 JED	REVISED OVERFLOW PIPE GRADE STATION 3+49 TO 3+50. REVISED OVERFLOW PIPE SLOPE. CHANGED "GROUTED RIPRAP" TO "GROUTED COBBLES."

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BUREAU OF RECLAMATION
ANIMAS - LA PLATA PROJECT COLORADO - NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

NENAHNEZAD TANK

SITE PLAN
PROFILES AND CULVERT DETAILS

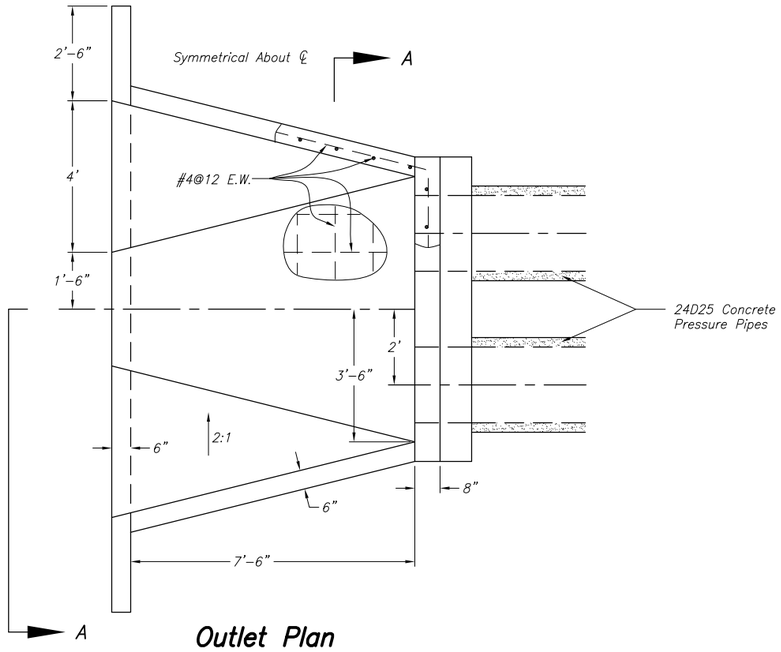
DESIGNED JAYE E. DECKER CHECKED s/BRIAN WAGNER P.E.
DRAWN JAYE E. DECKER TECH. APPR. s/DAVID K. EDWARDS P.E.
DAVID K. EDWARDS P.E.
APPROVED s/DOUG DOCKTER P.E.
PEER REVIEWER - MANAGER, FARMINGTON ENGINEERING DIV.

FARMINGTON, NEW MEXICO 2007-11-30
SHEET 4 OF 5

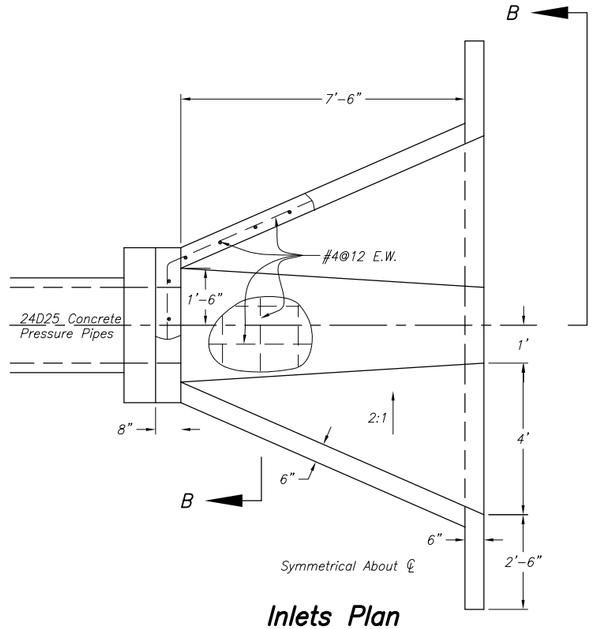
69-529-194

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OCTOBER 14, 2010 15:47
PLOTTED BY
JDECKER

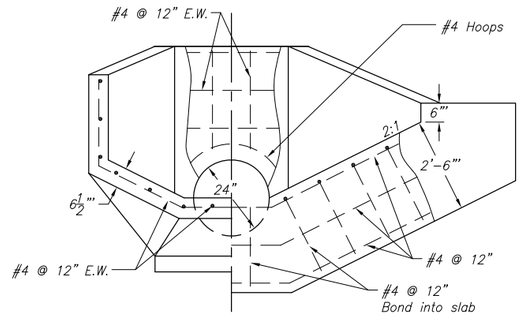
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76 69-529-194 REV02.DWG



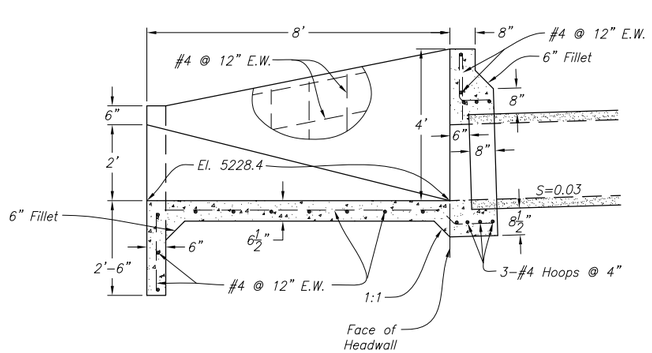
Outlet Plan



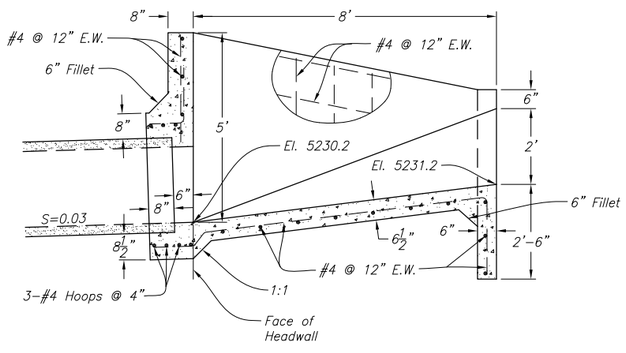
Inlets Plan



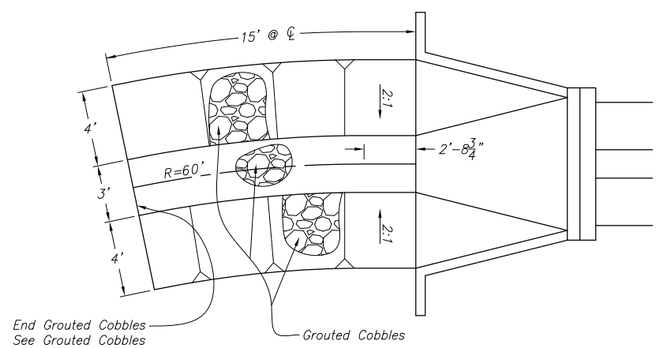
Section B-B



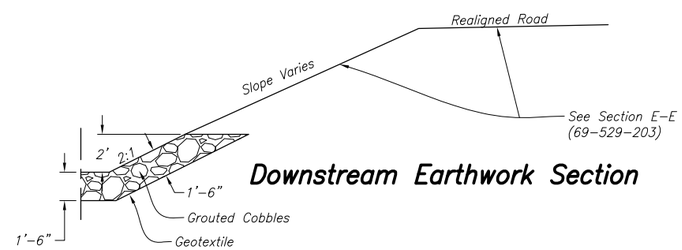
Outlet Profile



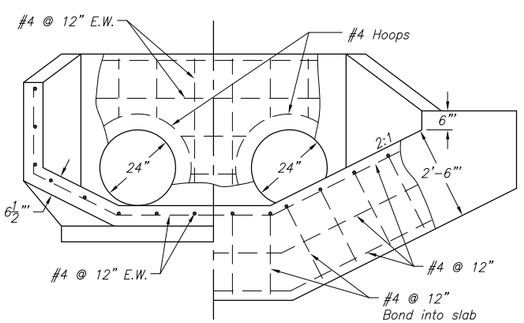
West Inlet Profile



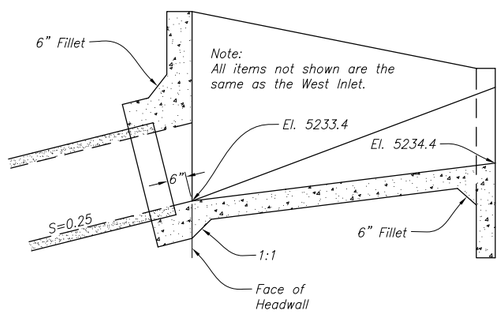
Downstream Plan View



Downstream Earthwork Section



Section A-A



East Inlet Profile

REV NO		
01	2009-02-10 FCCF-413 JED	REVISED REACH NAME IN TITLE BLOCK

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BUREAU OF RECLAMATION

ANIMAS - LA PLATA PROJECT COLORADO - NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

NENAHNEZAD TANK

SITE PLAN

CULVERT INLETS AND OUTLET

DESIGNED _ JAYE E. DECKER _ CHECKED _ s/BRIAN WAGNER P.E. _

DRAWN _ JAYE E. DECKER _ TECH. APPR. _ s/DAVID K. EDWARDS, P.E. _
DAVID K. EDWARDS P.E.

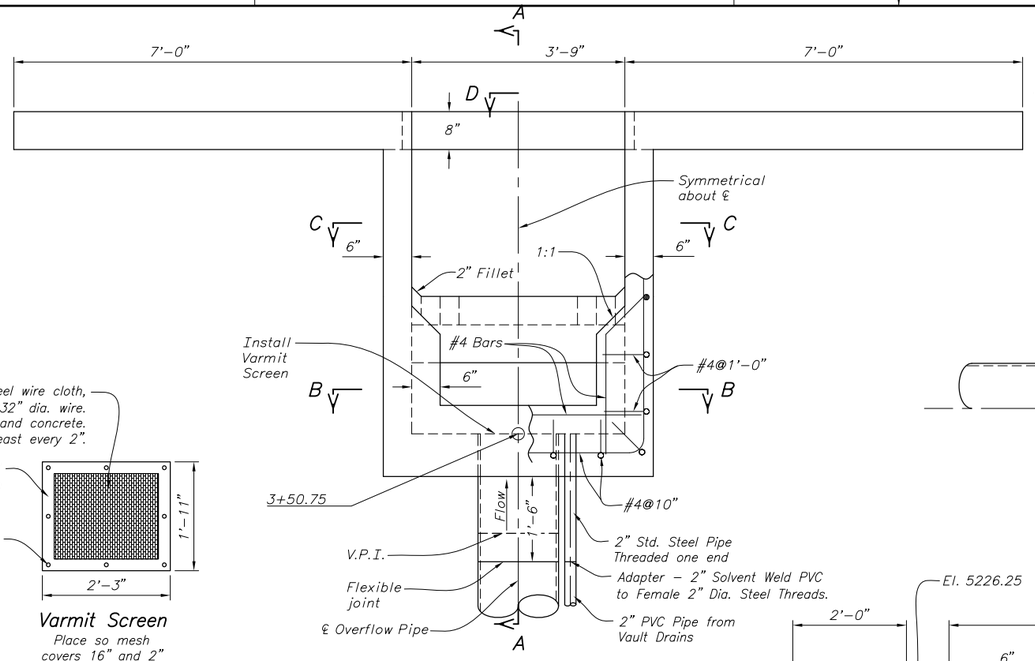
APPROVED _ s/DOUG DOCKTER P.E. _
PEER REVIEWER - MANAGER, FARMINGTON ENGINEERING DIV.

FARMINGTON, NEW MEXICO 2007-12-06
SHEET 5 OF 5

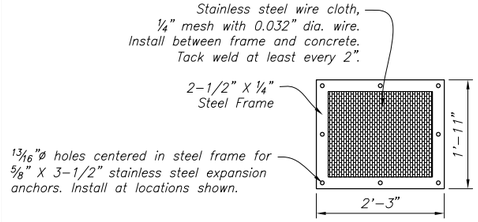
69-529-204

DATE AND TIME PLOTTED
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PLOTTED BY
JDECKER

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77 69-529-204 REV01.DWG

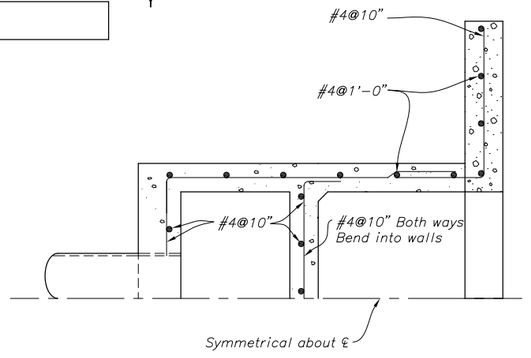


STRUCTURE PLAN VIEW

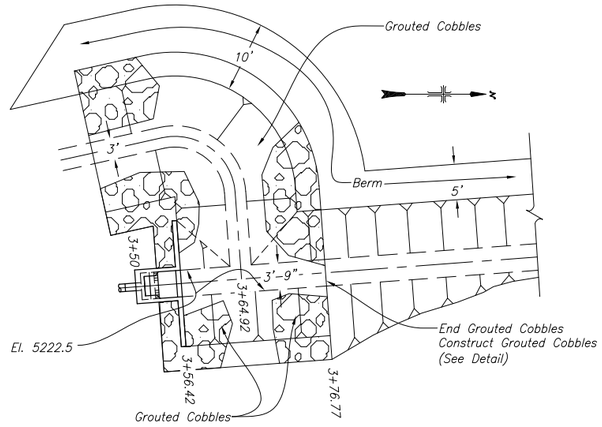


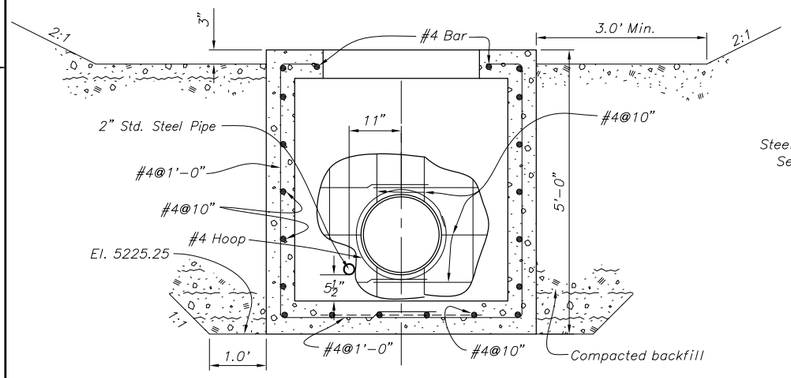
Varmit Screen

Place so mesh covers 16" and 2" pipe ends.

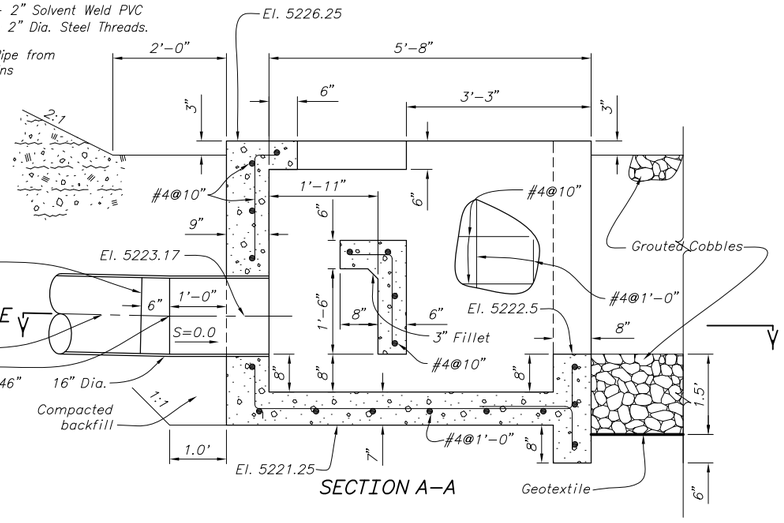


SECTION E-E

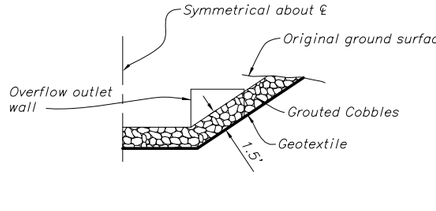




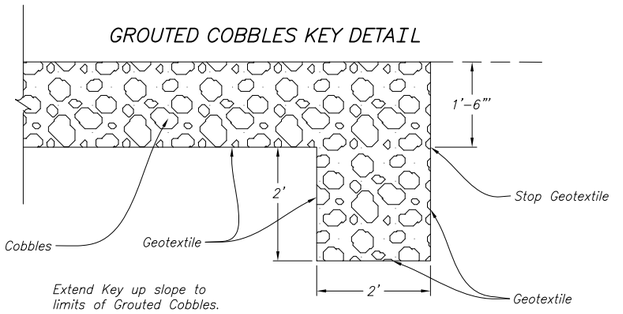
SECTION B-B

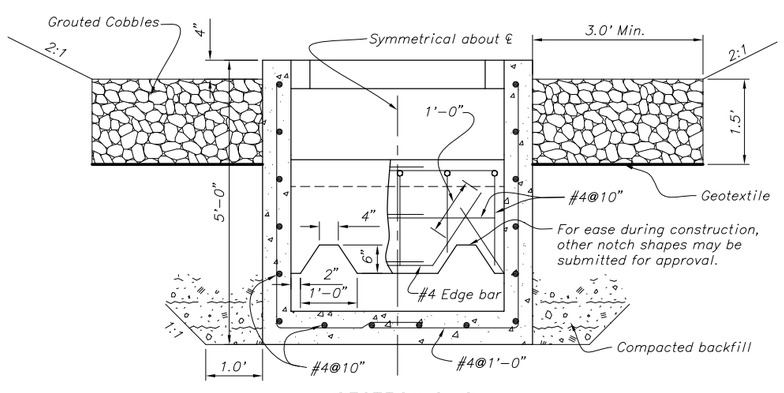


SECTION A-A

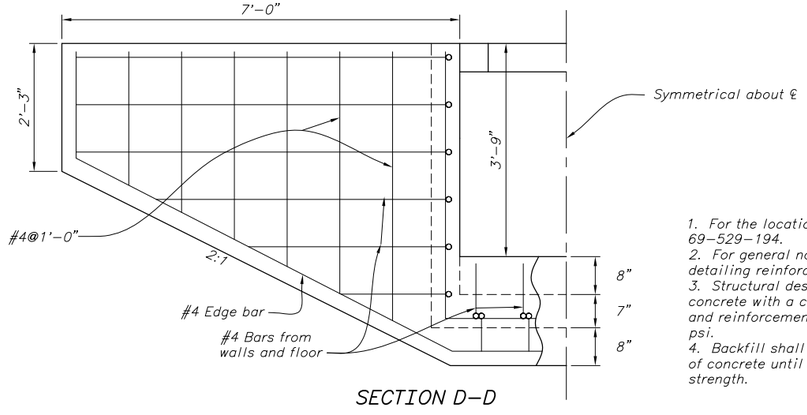


EARTHWORK DETAILS
SECTION





SECTION C-C



SECTION D-D

NOTES

1. For the location and details of the overflow pipes, see 69-529-194.
2. For general notes and minimum requirements for detailing reinforcement, see 40-D-6263
3. Structural design of the overflow outlet is based on concrete with a compressive strength of 4,000 psi at 28 days and reinforcement with a minimum yield strength of 60,000 psi.
4. Backfill shall not be placed against the outside surfaces of concrete until concrete has obtained 28 day compressive strength.

REV NO		
02	2009-05-27 FCCF-413 JED	ADDED VAULT DRAIN PIPE OUTLET. ADDED VARMIT SCREEN DETAIL.
01	2009-03-11 FCCF-413 JED	REVISED SIDE SLOPES TO 2:1 – REVISED GEOMETRY TO MATCH. CHANGED TO GROUTED COBBLES. ADDED SIDE CHANNEL. CHANGED PIPE TO 16" DIAMETER. DELETED SLOPE ON WALLS.

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ANIMAS – LA PLATA PROJECT – COLORADO-NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

NENAHNEZAD TANK

BAFFLED PIPE OUTLET STRUCTURE
PLAN, SECTIONS, AND DETAILS

DESIGNED JOE M. GEMPERLINE CHECKED LINDA M. BOWLES D.L.G.

DRAWN JOE M. GEMPERLINE TECH. APPR. LINDA M. BOWLES, P.E.
LINDA M. BOWLES - P.E.

APPROVED TEDD R. CALHOUN, P.E.
PEER REVIEWER TEDD R. CALHOUN, P.E.

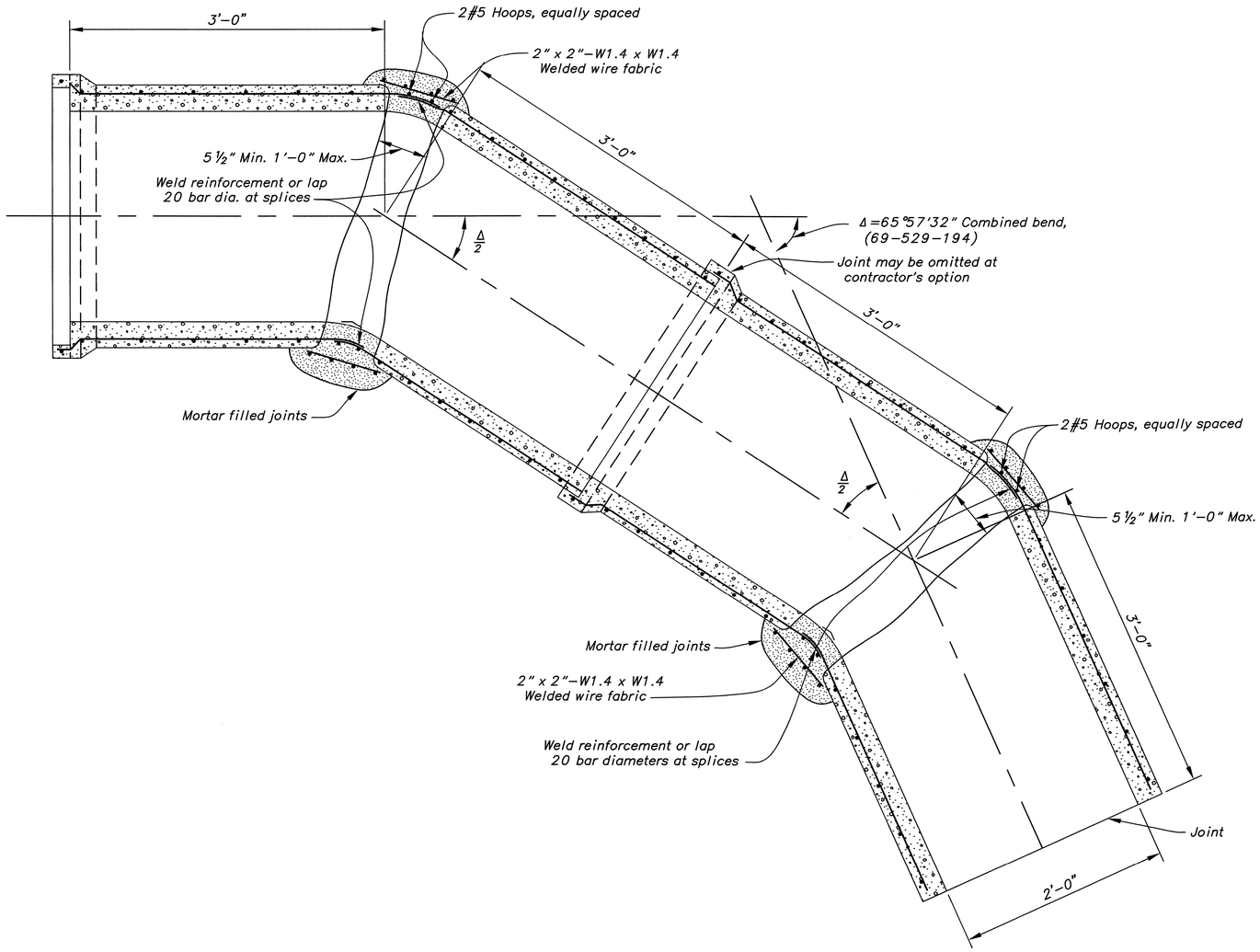
DENVER, COLORADO 2006-12-01
SHEET 1 OF 1

69-D-2091

DATE AND TIME PLOTTED
OCTOBER 14, 2010 15:16
PLOTTED BY
JDECKER

CAD SYSTEM
AutoCAD RM 17.2s
CAD FILENAME
78 69-D-2091 REV02.DWG

RECLAMATION
Managing Water in the West



DEVELOPED PLAN-BEND FABRICATION DETAIL

65°57'32" COMBINED BEND

NOTES

1. For location of concrete pipe bend, see Drawing 69-529-194.
2. For general notes and minimum requirements for detailing reinforcement, see drawing 40-D-6263.
3. Contractor may submit alternative design for approval.
4. Splices in welded wire fabric shall include a minimum of 3 transverse wires.

REV NO		
1	2009-02-17 D. Bowles P.E.	CORRECTED TITLE BLOCK TITLES.

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BUREAU OF RECLAMATION

ANIMAS-LA PLATA PROJECT - COLORADO - NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

NENAHNEZAD TANK

CONCRETE PIPE BEND

DEVELOPED PLAN-BEND FABRICATION DETAIL

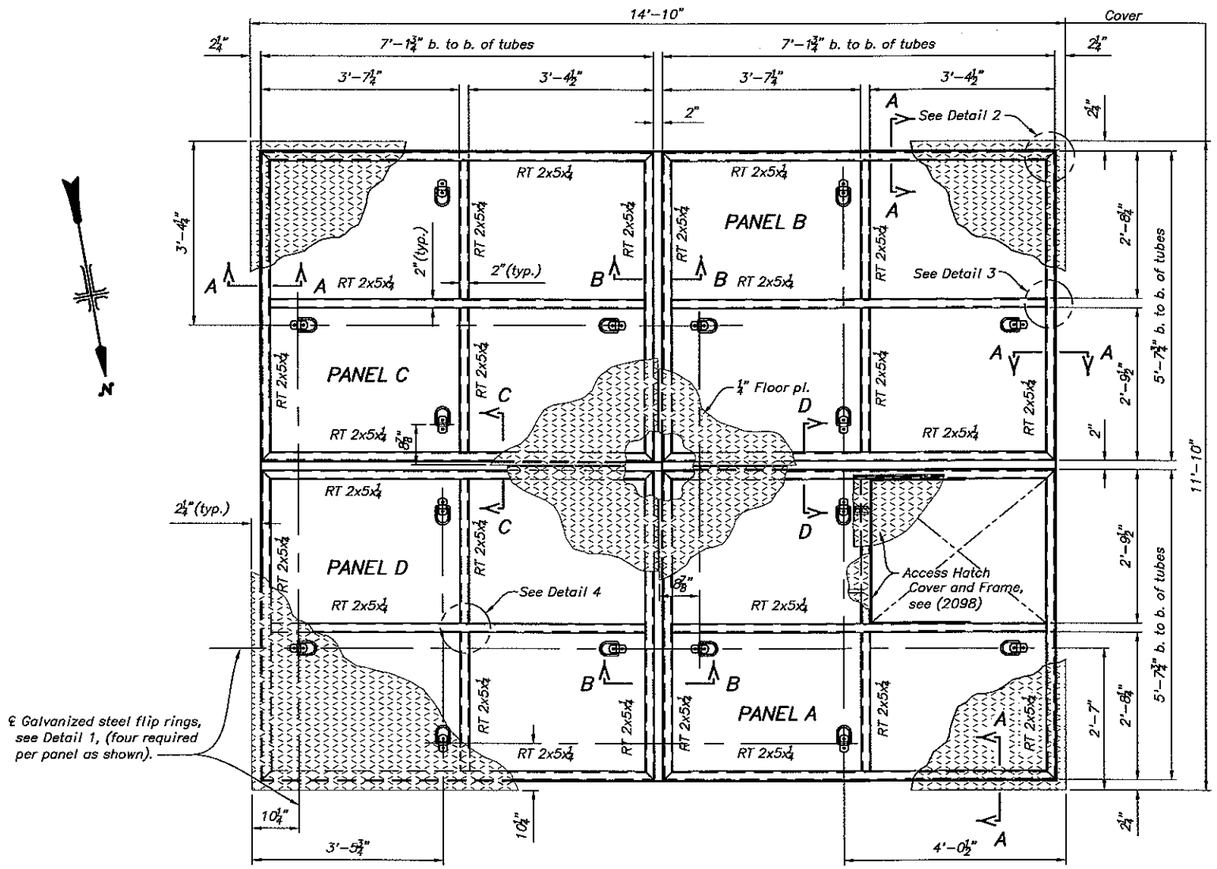
DESIGNED K. A. SAYER CHECKED LINDA M. BOWLES
DRAWN CHARLIE JOYCE TECH. APPR. STEVEN J ROBERTSON P.E.
STEVEN J. ROBERTSON, P.E.
APPROVED DAVID K EDWARDS P.E.
DAVID K. EDWARDS, P.E.

DENVER, COLORADO 2009-02-04
SHEET 1 OF 1

69-D-2121

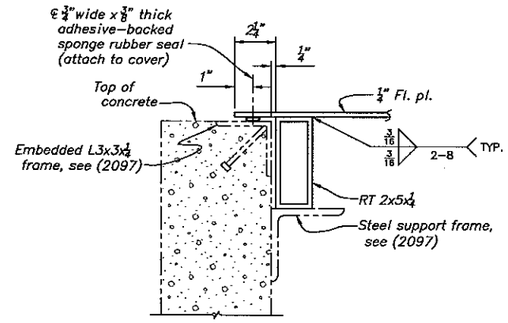
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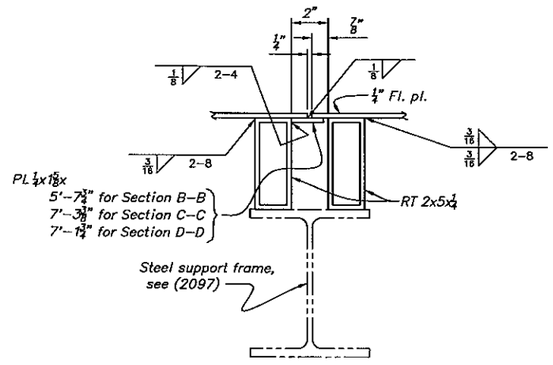


PLAN – ALUMINUM COVER FOR ALTITUDE VALVE VAULT

Design live load: 50 LBS/SQ. FT.
ONE ASSEMBLY REQ'D.



SECTION A–A



SECTION B–B
SECTION C–C
SECTION D–D

GENERAL NOTES

Details, welds, and other connections shown are typical for similar conditions.

Dimensions not shown are the same as dimensions for identical or similar details shown elsewhere on the drawings.

Galvanize all ferrous metalwork after fabrication.

Aluminum in contact with concrete shall be coated in accordance with specifications paragraphs.

Grind smooth all burred edges of covers. Grind smooth raised pattern of floor plate under flip rings.

NOTES

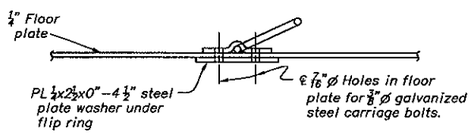
1. All material is aluminum unless noted otherwise.
2. Floor plate for cover panel may be spliced over interior tube sections. Provide continuous complete penetration welds at splice locations.
3. For embedded frame and support frames, see (2097).
4. Cover removal sequence: Panel A, Panel B, Panel C, then Panel D. To reinstall cover, reverse sequence and place panels as shown.

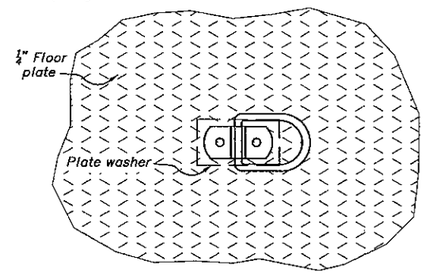
REFERENCE DRAWINGS

ALTITUDE VALVE VAULT
PLAN, SECTIONS, AND DETAILS _____ 69-D-2095

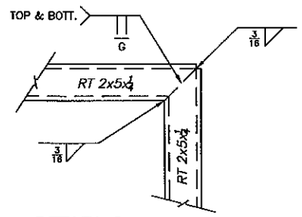
MISCELLANEOUS METALWORK
SUPPORT FRAMES _____ 69-D-2097

STEEL PIPING
PLAN, SECTION, AND DETAIL _____ 69-D-2106

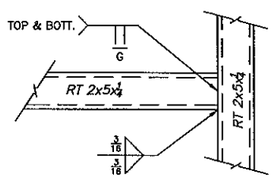




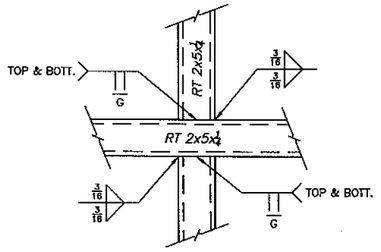
DETAIL 1
FLIP RING



DETAIL 2



DETAIL 3



DETAIL 4

REV NO		
1	2008-05-21 D - 8120 2 sh. 2 req.	TYPED IN SIGNATURES. ADDED DETAIL 4, MADE MINOR REVISIONS.

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UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

ANIMAS – LA PLATA PROJECT COLORADO – NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

MISCELLANEOUS METALWORK

ALUMINUM COVER – PLAN, SECTIONS, AND DETAILS

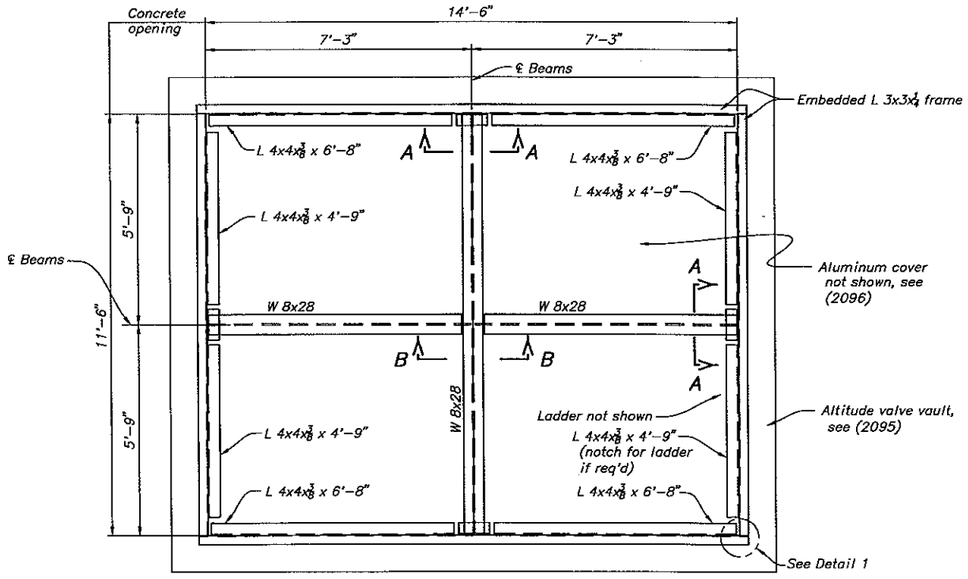
DESIGNED Bernard Lajimodiere CHECKED S. M. Clement
DRAWN Bernard Lajimodiere TECH. APPR. Okoff G. Huerto, P.E.
APPROVED R. W. LaFond, P.E. STRUCTURAL AND ARCHITECTURAL GROUP

DENVER, COLORADO 2007-01-11
SHEET 1 OF 1

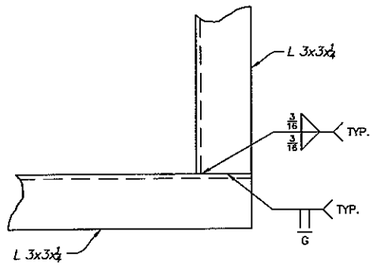
69-D-2096

CAD SYSTEM AUTOCAD
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DATE AND TIME PLOTTED DEC 18, 2006
PLOTTED BY B. LAJIMODIERE





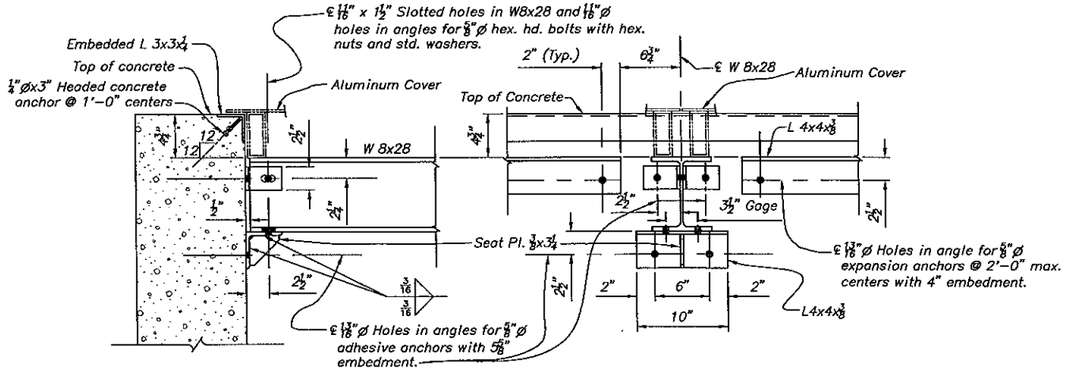
PLAN – STEEL SUPPORT FRAMES FOR COVER
ONE ASSEMBLY REQ'D.



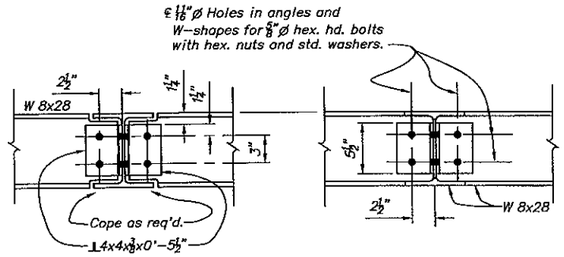
DETAIL 1

NOTES

1. For General Notes, see (2096).
2. All material is steel unless noted otherwise.
3. For aluminum cover, see (2096).
4. For ladder location, see (2097).



SECTION A–A



SECTION B–B

REV NO		
1	2008-05-21 D-8120 Rev? P.G.	TYPED IN SIGNATURES. REMOVED GUARD POST, MADE MINOR REVISIONS.

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ANIMAS – LA PLATA PROJECT COLORADO – NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

MISCELLANEOUS METALWORK

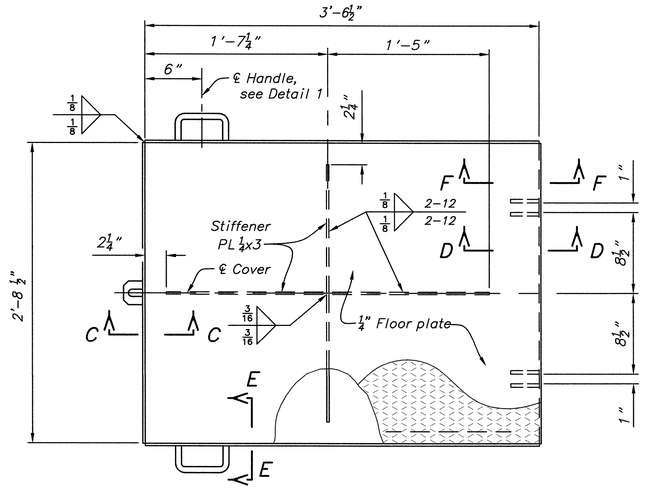
STEEL SUPPORT FRAMES AND GUARDPOSTS

DESIGNED Bernard Lajimodiere CHECKED S. M. Clement
DRAWN Bernard Lajimodiere TECH. APPR. Cliff G. Huerta, P.E.
APPROVED R. W. LaFond, P.E. STRUCTURAL AND ARCHITECTURAL GROUP

DENVER, COLORADO SHEET 1 OF 1 2007-01-11

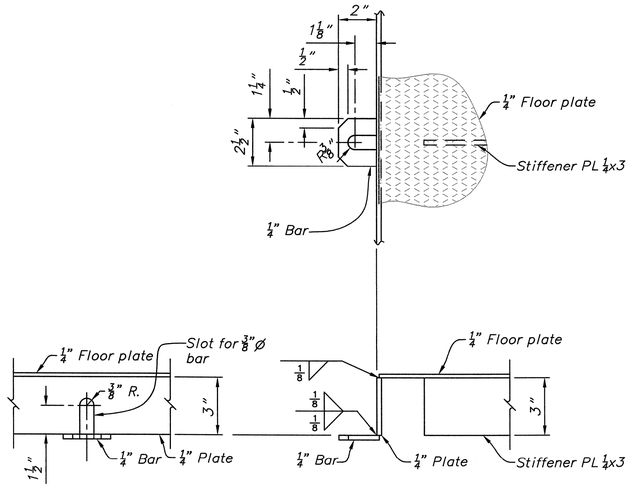
69-D-2097

CAD SYSTEM AUTOCAD
CAD FILENAME 69-D-2097_Large Cover Support Frame
DATE AND TIME PLOTTED DEC 18, 2008
PLOTTED BY R. LAMBRECHT

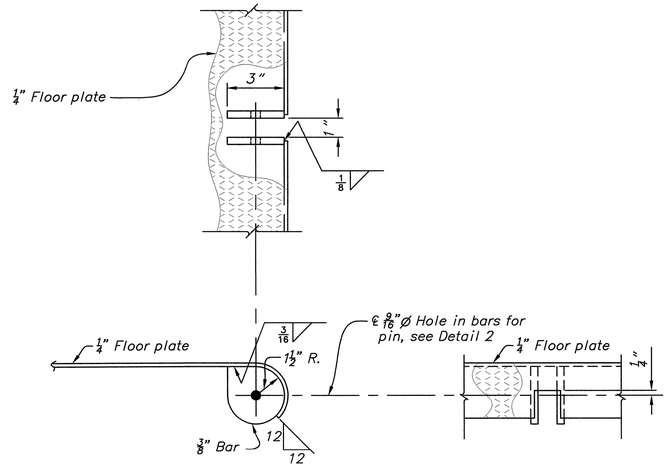


ACCESS HATCH COVER

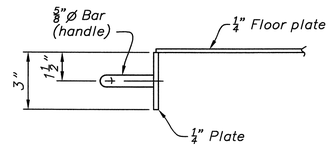
ALUMINUM
5 REQ'D.
Design Live Load = 50 LBS/FT. SQ.



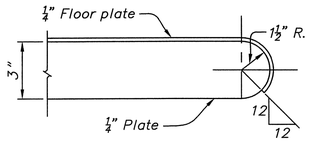
SECTION C–C



SECTION D–D



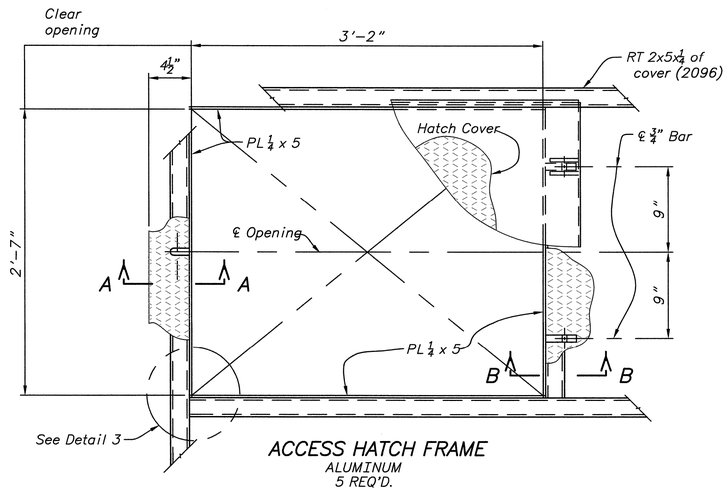
SECTION E–E



SECTION F–F

NOTES

1. For General Notes, see (2096).
2. All material is aluminum unless otherwise noted.

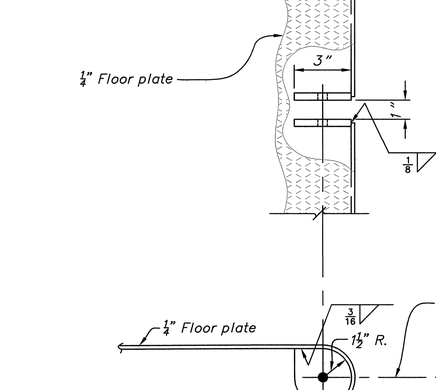


ACCESS HATCH FRAME

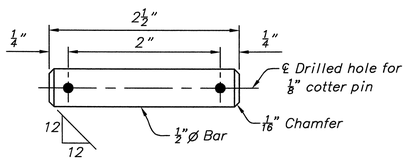
ALUMINUM
5 REQ'D.

DETAIL 1

HANDLE
ALUMINUM

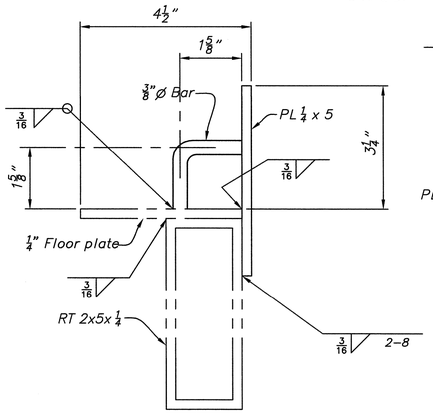


DETAIL 3

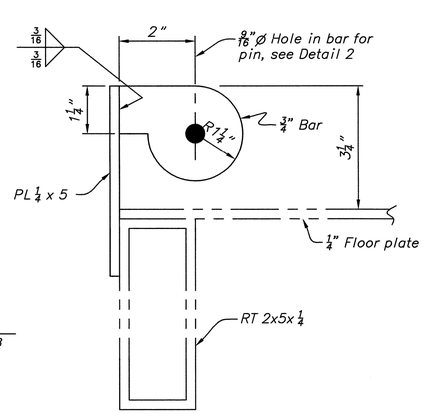


DETAIL 2

PIN
BRASS



SECTION A–A



SECTION B–B

REV NO		
3	2009-06-12 D-8120 GGH, P.E.	ACCESS HATCH COVER AND FRAME, CHANGED 4 REQ'D TO 5 REQ'D.
2	2008-05-22 D-8120 RWL, P.E.	MADE MINOR REVISIONS.
1	2008-04-23 D-8120 OGH, P.E.	ACCESS HATCH COVER AND FRAME, CHANGED 5 REQ'D TO 4 REQ'D. TYPED IN SIGNATURES.

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BUREAU OF RECLAMATION

ANIMAS – LA PLATA PROJECT COLORADO – NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

MISCELLANEOUS METALWORK

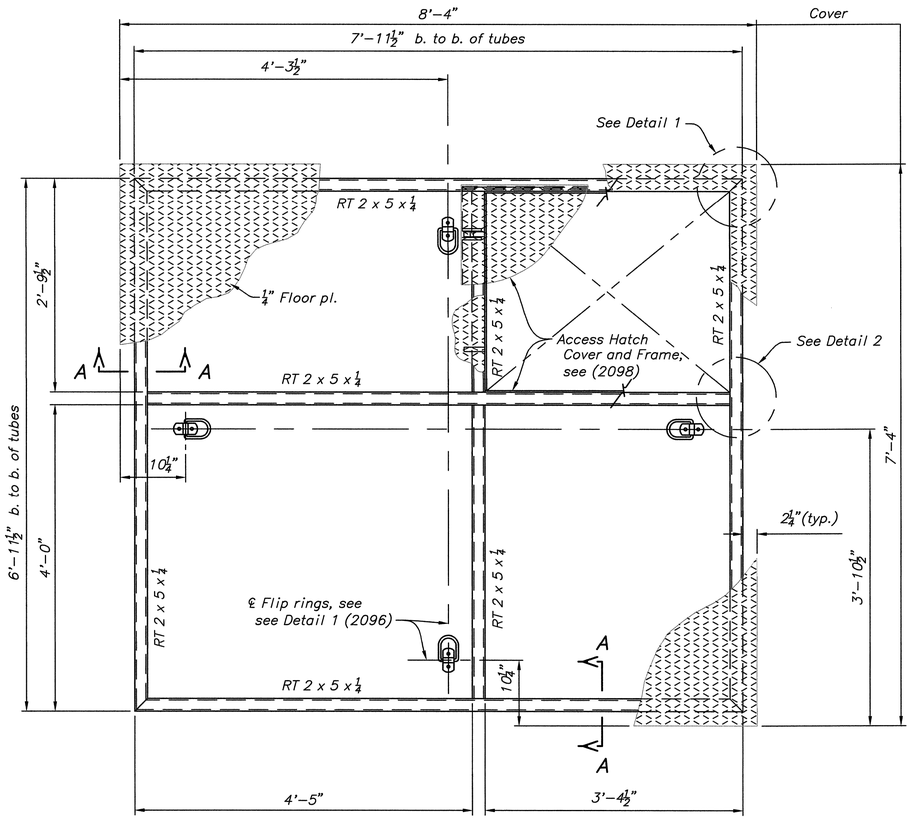
ACCESS HATCH COVER

DESIGNED Bernard Lajimodiere CHECKED S. M. Clement
DRAWN Bernard Lajimodiere TECH. APPR. Olaff G. Huerta, P.E.
APPROVED R. W. LaFond, P.E.
STRUCTURAL AND ARCHITECTURAL GROUP

DENVER, COLORADO SHEET 1 OF 1 2007-01-11

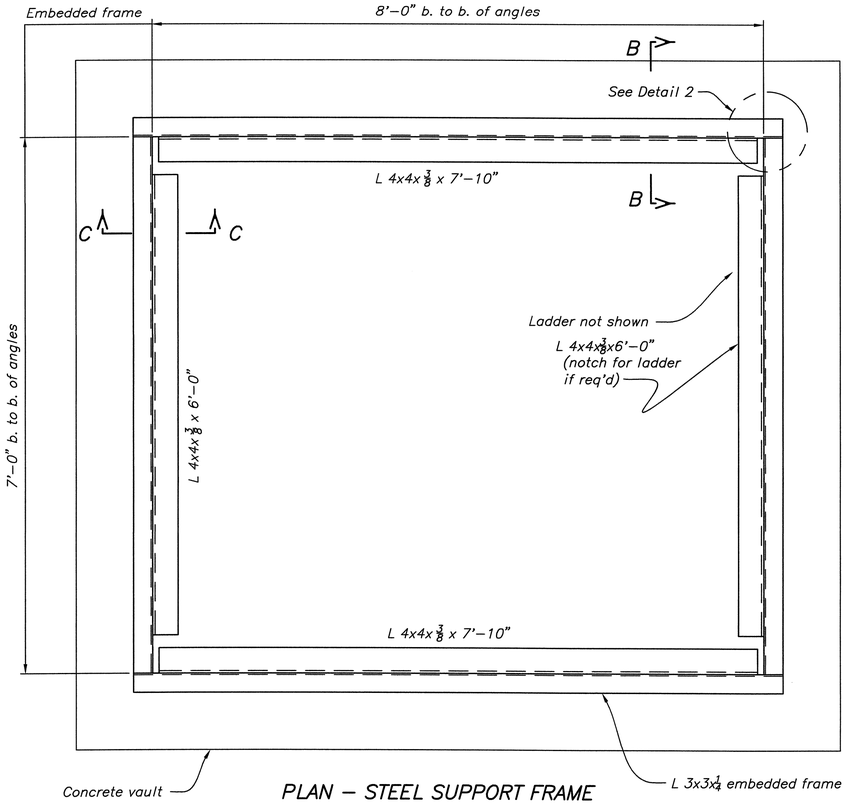
69-D-2098

CAD SYSTEM AUTOCAD
CAD FILENAME 69d2098_Access Hatch.dwg
DATE AND TIME PLOTTED DEC 18, 2008
PLOTTED BY B. LAJIMODIERE



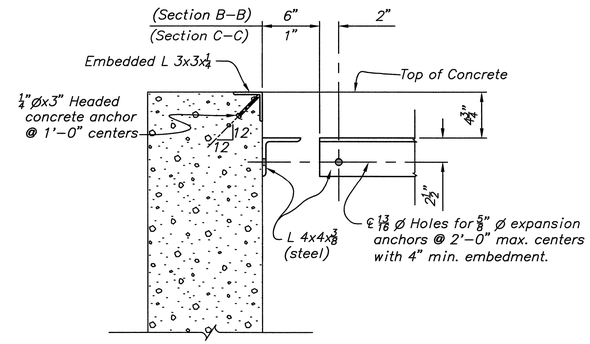
PLAN – ALUMINUM COVER

Design live load: 50 LBS./SQ. FT.
ONE REQ'D – CROSSOVER NO. 1
ONE REQ'D – NENAHNEZAD TANK
ONE REQ'D – CROSSOVER NO. 3
ONE REQ'D – CROSSOVER NO. 4



PLAN – STEEL SUPPORT FRAME

ONE ASSEMBLY REQ'D – CROSSOVER NO. 1
ONE ASSEMBLY REQ'D – NENAHNEZAD TANK
ONE ASSEMBLY REQ'D – CROSSOVER NO. 3
ONE ASSEMBLY REQ'D – CROSSOVER NO. 4



SECTION B–B (AS SHOWN AND NOTED)
SECTION C–C (SIMILAR AND AS NOTED)

NOTES

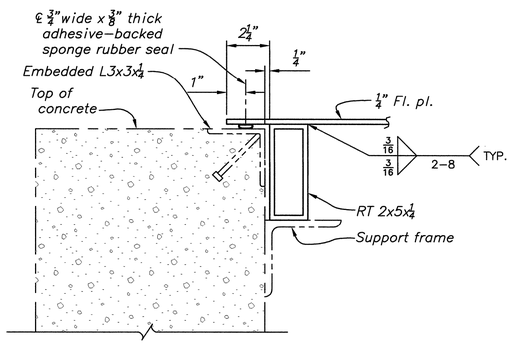
1. For General Notes, see (2096).
2. All material is aluminum unless noted otherwise.
3. For ladder location, see (2093), (2094) and (69–529–208).

REFERENCE DRAWINGS

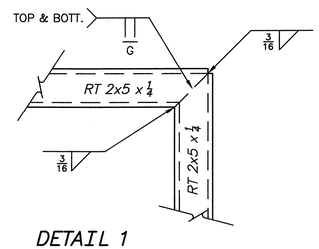
FLOW METER VAULT
PLAN, SECTIONS, AND DETAILS _ _ _ _ _ _ _ _ _ _ 69–D–2093

CROSSOVER NO. 3 AND NO. 4 VAULTS
PLAN, SECTIONS, AND DETAILS _ _ _ _ _ _ _ _ _ _ 69–D–2094

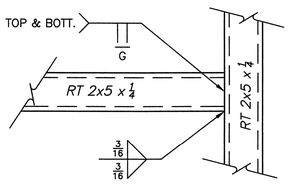
PRESSURE REDUCING VALVE VAULT
PLAN, SECTIONS, AND DETAILS _ _ _ _ _ _ _ _ _ _ 69–529–208



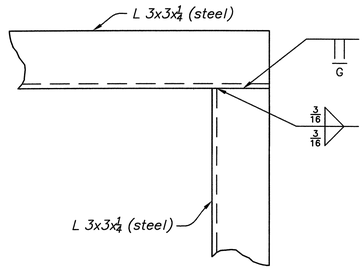
SECTION A–A



DETAIL 1



DETAIL 2



DETAIL 3

REV NO		
2	2009–06–12 D – 8120 OGH, P.E.	ALUMINUM COVER AND STEEL SUPPORT FRAME, ADDED ONE REQ'D FOR NENAHNEZAD TANK BYPASS VAULT. ADDED REFERENCE DRAWING 69–529–208.
REV NO 1	2008–04–23 D – 8120 OGH, P.E.	COVER AND SUPPORT FRAME FOR CROSSOVER NO. 1, CHANGED TWO REQ'D TO ONE REQ'D. REFERENCE DRAWING (2093) IS FOR SINGLE FLOW METER VAULT. TYPED IN SIGNATURES.

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BUREAU OF RECLAMATION

ANIMAS – LA PLATA PROJECT COLORADO – NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

MISCELLANEOUS METALWORK

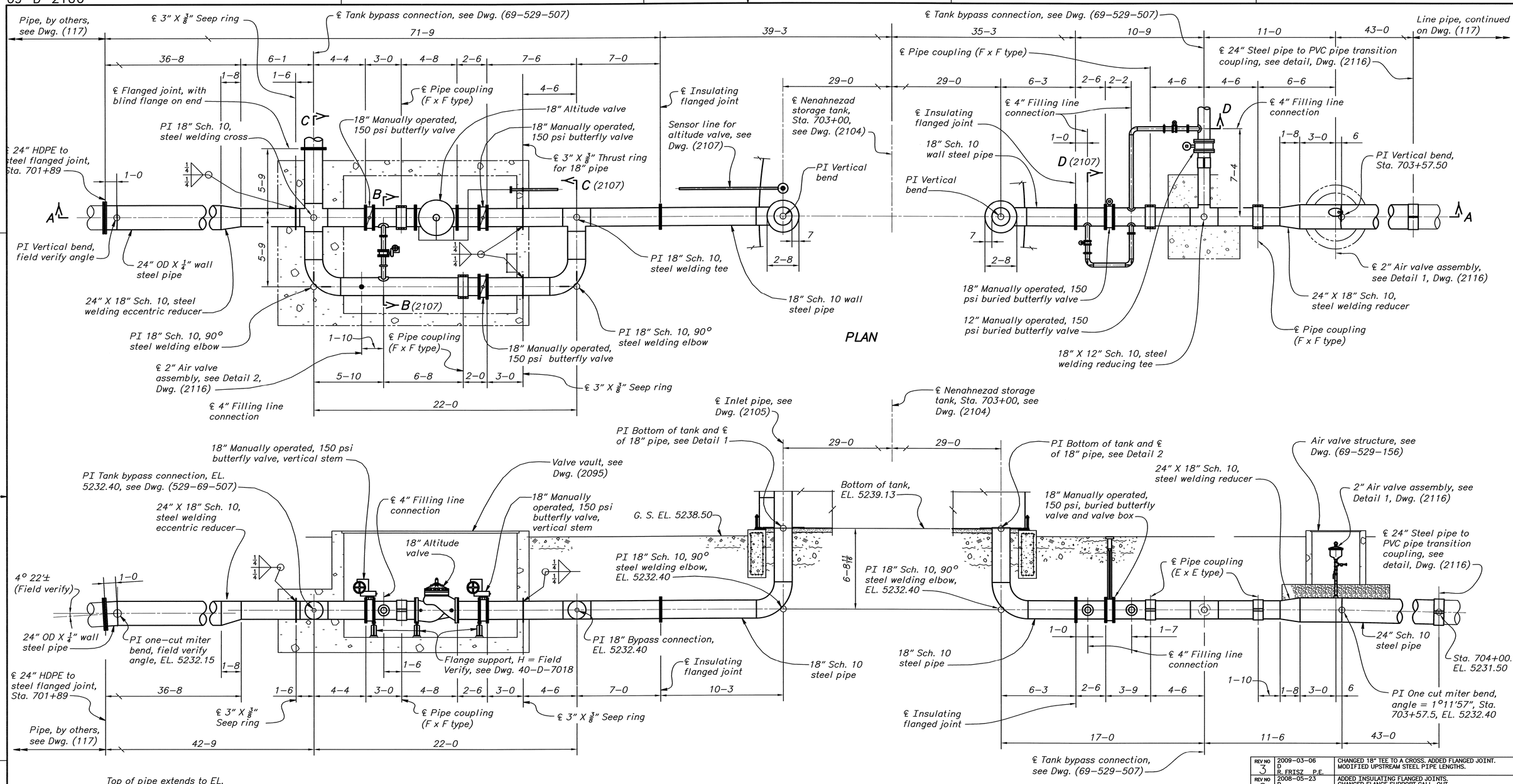
ALUMINUM COVER AND STEEL SUPPORT FRAME

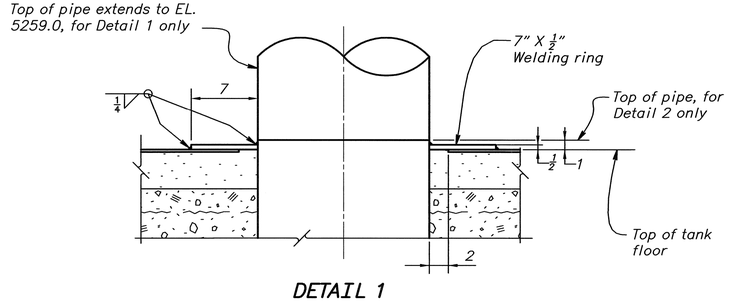
DESIGNED Bernard Lajimodiere CHECKED S. M. Clement
DRAWN Bernard Lajimodiere TECH. APPR. Olaff G. Huerta, P.E.
APPROVED R. W. LaFond, P.E. STRUCTURAL AND ARCHITECTURAL GROUP

DENVER, COLORADO SHEET 1 OF 1 2007–01–11

69–D–2099

CAD SYSTEM AUTOCAD
CAD FILENAME 69–D–2099_Small Vault Covers.dwg
DATE AND TIME PLOTTED DEC 19, 2008
PLOTTED BY B. LAJIMODIERE





DETAIL 1

(DETAIL 2 SIMILAR EXCEPT AS SHOWN)

SECTION A-A

NOTES

For General Notes and reference drawings, see Dwg. (2108).
All butterfly valves: 150 psi, see specificatons.
Furnish all butterfly valves with flanged ends.
All flanges shall be AWWA Class D, except as shown.

REV NO		
4	2009-04-30 D R.V.F. P.E.	MODIFIED PIPING UPSTREAM AND DOWNSTREAM OF TANK TO ACCOMMODATE TANK BYPASS PIPING.
3	2009-03-06 D R. FRISZ P.E.	CHANGED 18" TEE TO A CROSS. ADDED FLANGED JOINT. MODIFIED UPSTREAM STEEL PIPE LENGTHS.
2	2008-05-23 D R. FRISZ P.E.	ADDED INSULATING FLANGED JOINTS. CHANGED FLANGE SUPPORT CALL-OUT.
1	2008-02-08 D R. FRISZ P.E.	ADDED MITER BEND, CORRECTED PIPE LENGTH, ADDED ECCENTRIC REDUCER, AND ADDED AIR VALVE IN THE VALVE VAULT.

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ANIMAS - LA PLATA PROJECT
COLORADO - NEW MEXICO

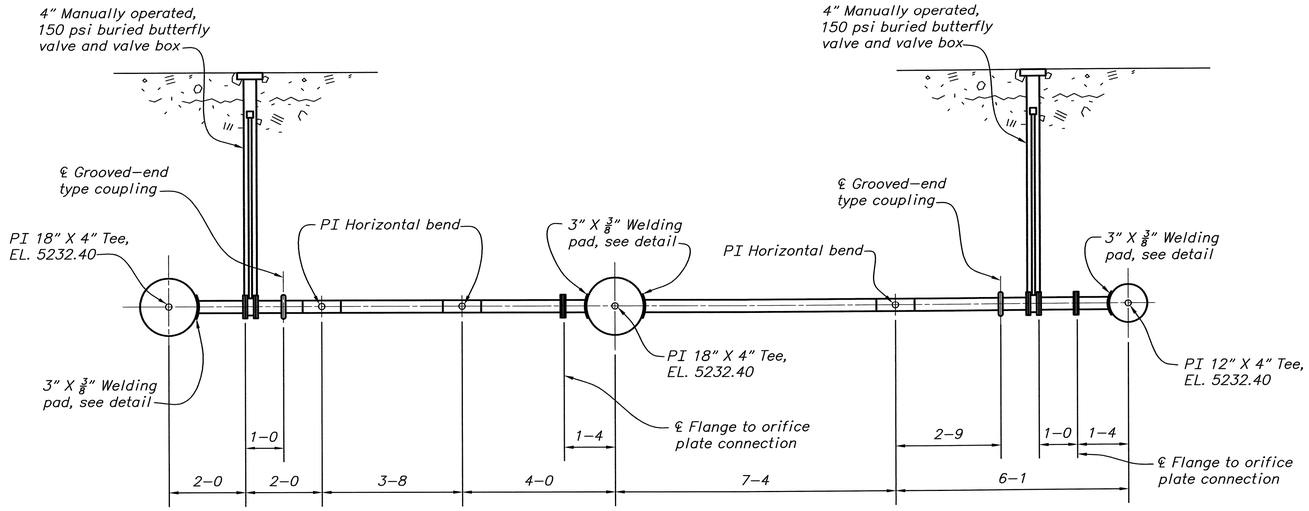
NAVAJO NATION MUNICIPAL PIPELINE

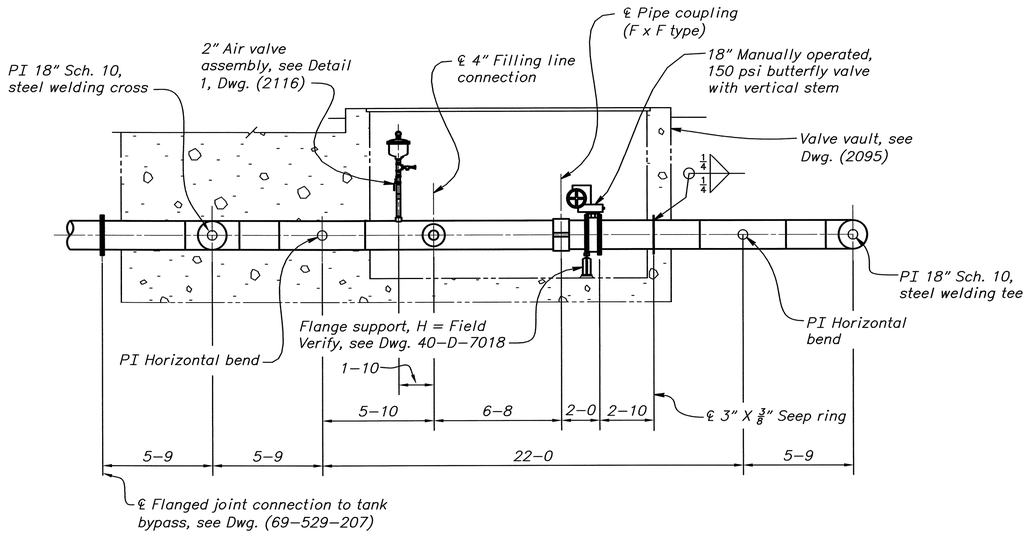
NENAHNEZAD TANK
STEEL PIPING
PLAN, SECTION, AND DETAIL

DESIGNED R.V.FRISZ CHECKED N. NAKAMOTO
DRAWN R.V.FRISZ TECH. APPR. K.R.SMITH P.E.
APPROVED D. DRAKE P.E.
MANAGER, HYDRAULIC EQUIPMENT GROUP

CADD SYSTEM	CADD FILENAME	DATE AND TIME PLOTTED
AutoCAD Rel. 17.1s	69-D-2106_REV 4.DWG	APRIL 20, 2009 14:27
DENVER, COLORADO	OCTOBER 31, 2008	69-D-2106

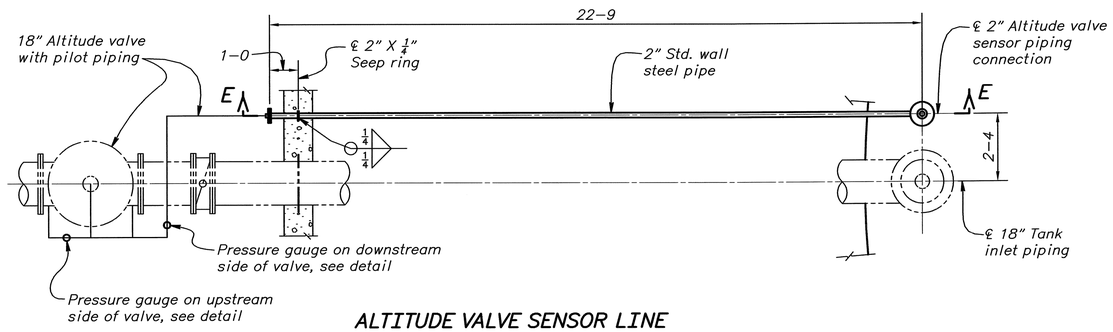
SHEET 1 OF 2



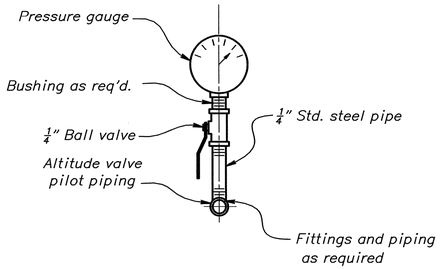


SECTION C-C
(2106)

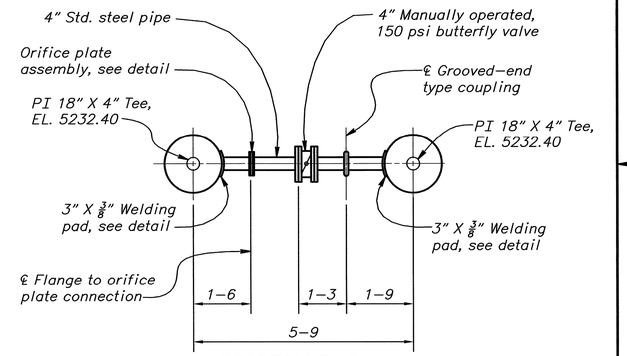
SECTION D-D
(2106)



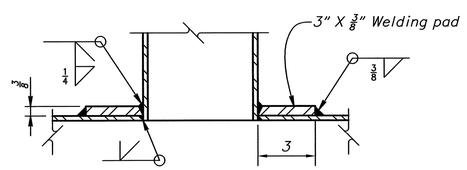
ALTITUDE VALVE SENSOR LINE
(2106)



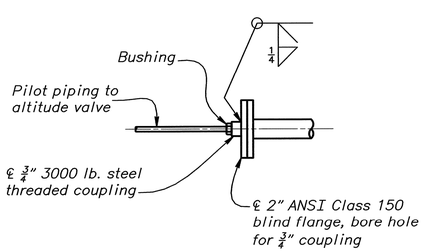
PRESSURE GAUGE ASSEMBLY
(PROVIDE 2 GAUGES FOR THE ALTITUDE VALVE)



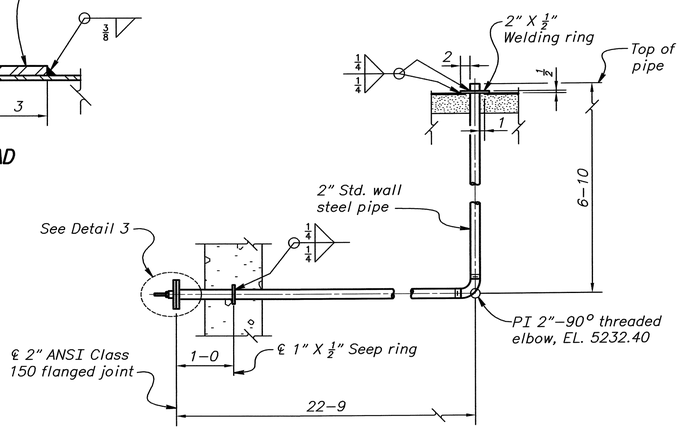
SECTION B-B
(2106)



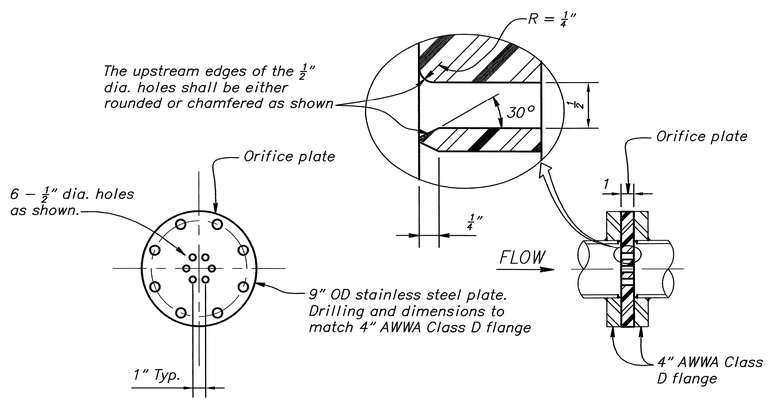
WELDING PAD



DETAIL 3



SECTION E-E



ORIFICE PLATE ASSEMBLY

NOTE

See Notes on Dwg. (2106).

REV NO 4	2009-04-30 D R.V.F. P.E.	MODIFIED PIPING IN SECTION D-D. SHOWED CONNECTION TO TANK BYPASS IN SECTION C-C.
REV NO 3	2009-03-06 D R. FRISZ P.E.	CHANGED 18" TEE TO A CROSS. ADDED FLANGED JOINT.
REV NO 2	2008-05-23 D R. FRISZ P.E.	CHANGED FLANGE SUPPORT CALL-OUT.
REV NO 1	2008-02-08 D R. FRISZ P.E.	ADDED AIR VALVE IN THE VALVE VAULT.

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ANIMAS - LA PLATA PROJECT
COLORADO - NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

NENAHNEZAD TANK
STEEL PIPING

SECTIONS AND DETAILS

DESIGNED B.V. FRISZ CHECKED N. NAKAMOTO
DRAWN B.V. FRISZ TECH. APPR. K.B. SMITH P.E.
APPROVED D. DRAKE P.E.
MANAGER, HYDRAULIC EQUIPMENT GROUP

CADD SYSTEM AutoCAD Rel. 17.1s DENVER, COLORADO	CADD FILENAME 69-D-2107_REV 4.DWG OCTOBER 31, 2006 SHEET 2 OF 2	DATE AND TIME PLOTTED APRIL 20, 2009 14:34 69-D-2107

69'

45°

PI 12" Sch. 20, 45° steel welding elbow

12" Sch. 20, steel pipe

PI 12" Sch. 20, 45° steel welding elbow

45°

32'

32'

PI 12" Sch. 20, 45° steel welding elbow

45°

PI 12" Sch. 20, 45° steel welding elbow

Valve Vault, see 69-529-208

12" pilot operated, pressure reducing valve

12" Class 150 butterfly valve

NNMP Station 702+31.75

18" X 12" Sch. 10, steel welding eccentric reducer

25'

NNMP Station 703+00
℄ Nenahnezad storage tank
See 69-D-2104

See 69-D-2106 and 2107
For detailed Bypass
Plan and Section

25'

45°

6' X 4' Rectangular barriers

12" Class 150 buried butterfly valve

NNMP Station 703+46

A

A

See 69-D-2106 for Main Line Piping

PLAN

4 0 4 8 12 16 20
SCALE OF FEET

N

Notes

For General Notes see 809-D-2108.
All butterfly valves: 150 psi, see specifications.
Furnish all butterfly valves with flanged ends.
All flanges shall be AWWA Class D, unless shown otherwise.

Air valve pressure ratings: Head Class: 75 feet.
Air Valve Seat Rating: 33 psi.

12" Manually operated, 150 psi butterfly valve with vertical stem

12" Pilot operated pressure reducing valve

18" Sch. 10 steel pipe

Valve Vault, see 69-529-208

℄ 2" Air valve assembly see Detail 2, Dwg. (2116) No tap required

12" Buried – 150 psi, butterfly valve and valve box

El. 5233.0

El. 5233.0

PI 45° Welded Elbows

℄ Navajo Nation Municipal Pipeline

El. 5233.0

℄ Flanged Joint

℄ Pipe coupling, F X F ends

℄ Pipe coupling, E X E ends

℄ Pipe coupling, F X F ends

℄ Pipe coupling, F X F ends

S=-0.00382
Angle = 0°13'08"

18" X 12" steel welded reducing tee. ¼" minimum wall thickness.

El. 5232.75

1'-6"

1'

1'-6"

1'-3"

1'-6"

1'

1'-7"

1'-6"

2'

El. 5232.4

℄ Navajo Nation Municipal Pipelihe

12" Sch. 20 steel pipe

℄ 3" X ⅜" steel ring

5'-9"

9'

20'-4"

4'-8"

32'

69'

32'

19'-6"

1'

4'-6"

℄ 4" Filling Line connection

Flange support, H= "Field Verify" see Dwg. 40-D-7018

18"X12" Sch. 10, steel welding eccentric reducer

SECTION A-A

1 0 1 2 3 4 5
SCALE OF FEET

REV NO		
1	2010-06-15 FCCF-233 JED	RAISED UPSTREAM PIPING OF NENAHNEZAD TANK. ADJUSTED SLOPE AND ANGLE OF BYPASS PIPING TO MATCH CHANGES.

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ANIMAS - LA PLATA PROJECT COLORADO - NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

NENAHNEZAD TANK

TANK BYPASS STEEL PIPING PLAN AND SECTION

DESIGNED JAYE E. DECKER CHECKED s/DARRYL GOOD

DRAWN JAYE E. DECKER TECH. APPR. s/THOMAS M. ROE PE
Technical

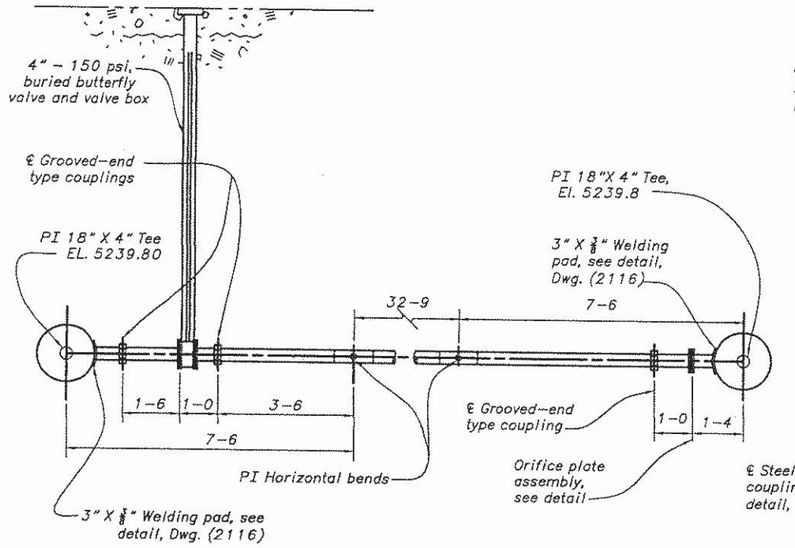
APPROVED s/DOUG DOCKTER PE
PEER REVIEWER

FARMINGTON, NEW MEXICO MARCH 19, 2009
SHEET 1 OF 1

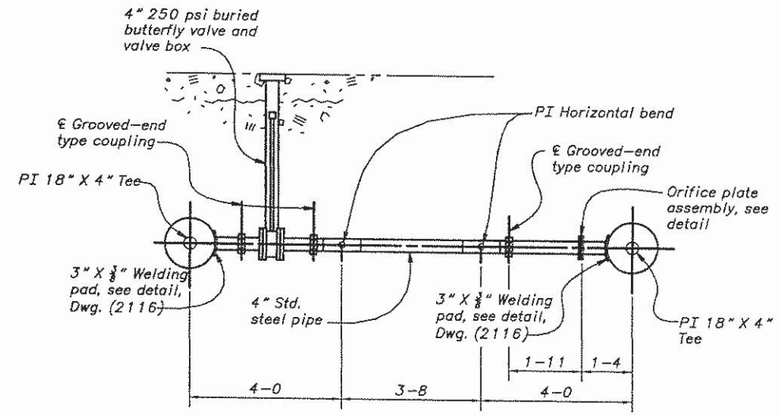
69-529-207

DATE AND TIME PLOTTED
OCTOBER 14, 2010 17:12
PLOTTED BY
JDECKER

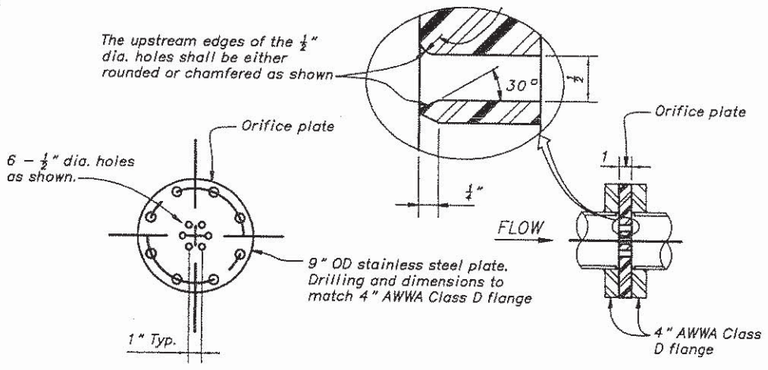
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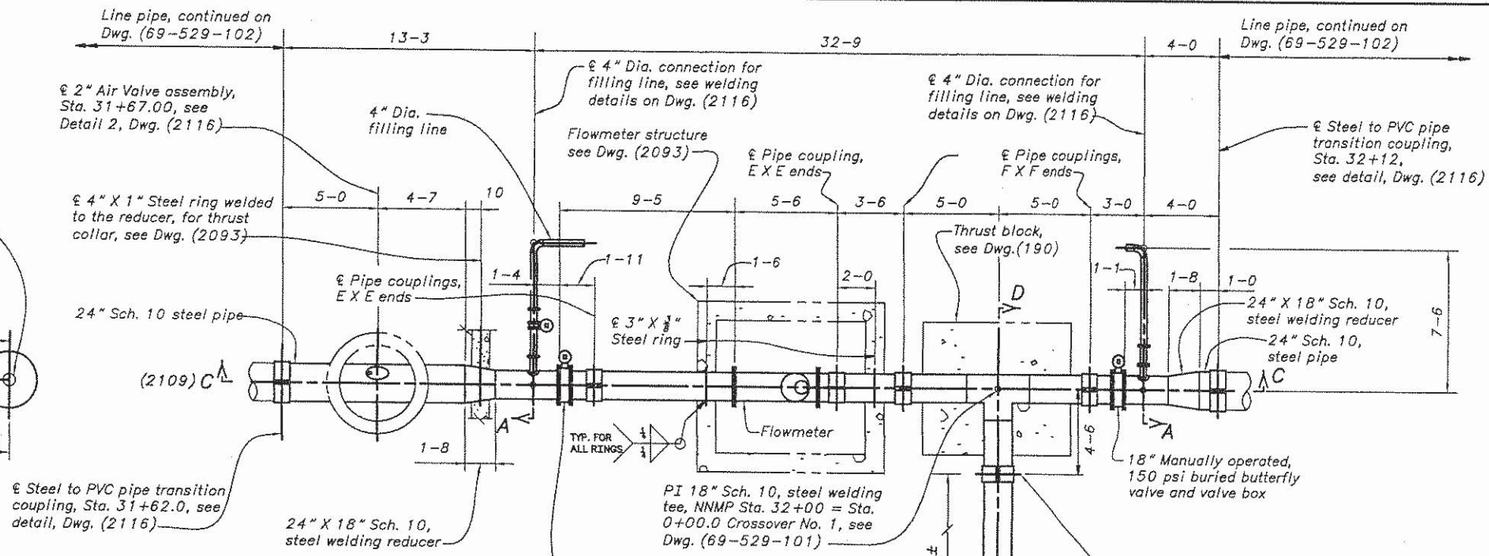
SECTION A–A



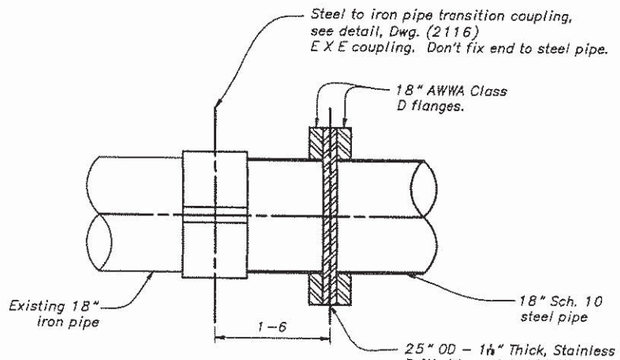
SECTION E–E



ORIFICE PLATE ASSEMBLY



PLAN



CAP DETAIL

NOTES

Crossover No. 1:
All butterfly valves shall be AWWA Class 150B.
All flanges shall be AWWA Class D.
See Dwg. (2120) for air valve pressure ratings.
Pipe spool dimensions marked "field verify" shall be verified in the field before fabrication of the spool.
Hydrostatic test pressure = 150 psig.

GENERAL NOTES

Provide nuts, bolts, and gaskets suitable for cold water service for all flanged joints.
Threaded pipe fittings shall be 150 Lb. M.I. and galvanized, unless otherwise noted.
Additional fittings or flanged joints may be added at the contractor's option to facilitate installation of piping.
Field verify heights of flange supports before fabrication.
All F X F and E X E couplings shall be the 2–segment type.
Field verify locations and elevations of the existing piping before fabricating the new piping that connects to the existing piping.

REV NO		
3	2008–08–18 FCQF–410 JED	REPLACED MITER BEND AT EXISTING LINE WITH TEE. ADDED FLANGES WITH PLATE FOR FUTURE EMERGENCY TIE IN. MOVED VALVE ON CROSSOVER TO DOWNSTREAM OF TEE.
2	2008–05–23 D R. FRISZ P.E.	MODIFIED DIMENSIONS
1	2008–04–29 D R. FRISZ P.E.	REMOVED ONE FLOWMETER AND RELOCATED THE OTHER. MODIFIED PIPING AND VALVE LOCATIONS.

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COLORADO – NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

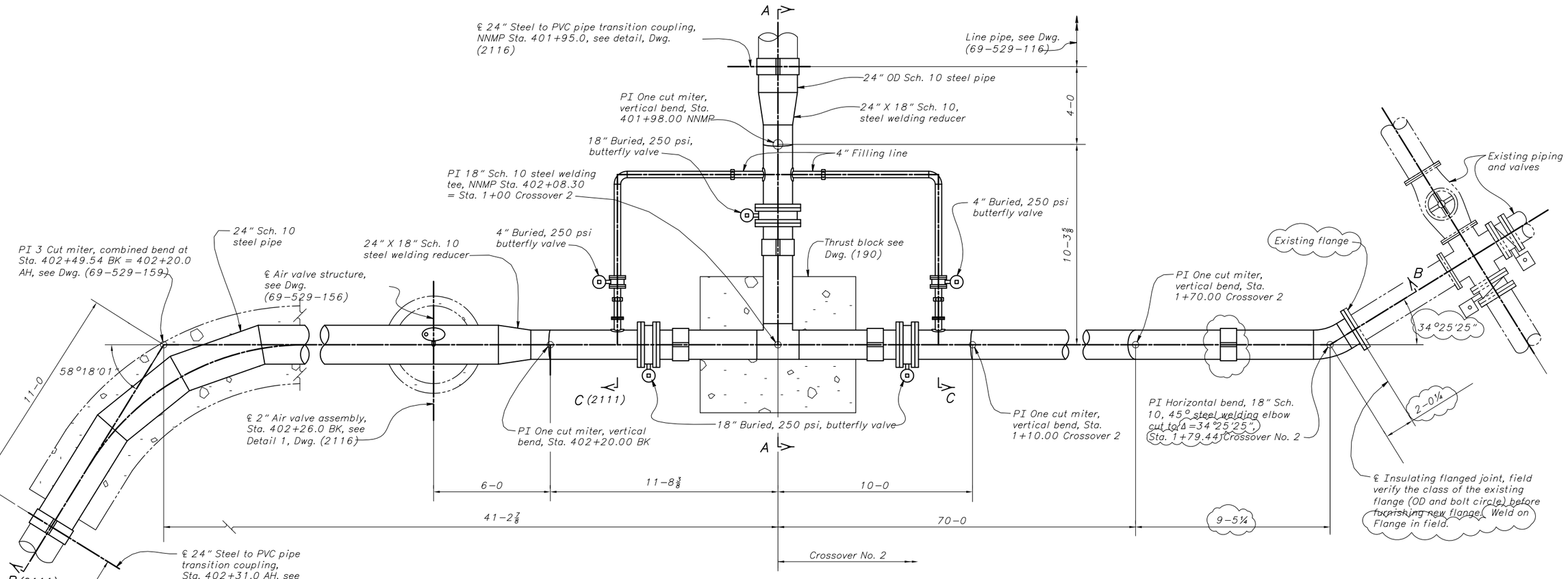
CROSSOVER NO. 1
STEEL PIPING
PLAN, SECTION, AND DETAIL

DESIGNED R. V. FRISZ CHECKED N. NAKAMOTO
DRAWN R. V. FRISZ TECH. APPR. K. B. SMITH P.E.
APPROVED Q. DRAKE, P.E.
MANAGER, HYDRAULIC EQUIPMENT GROUP

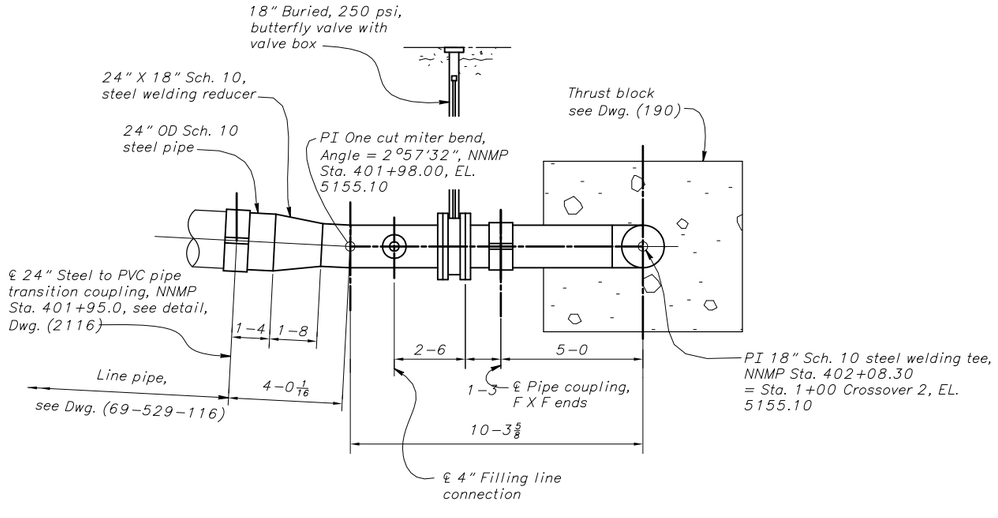
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AutoCAD Rel. 17.2s DENVER, COLORADO	69–D–2108.DWG OCTOBER 31, 2008	FEBRUARY 17, 2009 14:16

SHEET 1 OF 2

69–D–2108



PLAN



SECTION A-A

NOTES

For General Notes and reference drawings, see Dwg. (2108).

Crossover No. 2:
All butterfly valves shall be 250 psi., see specifications.
Flanges connecting to the butterfly valves shall be AWWA Class F.
Pipe spool dimensions marked "field verify" shall be verified in the field before fabrication of the spool.
For air valve pressure ratings, see Dwg. (2120).
Hydrostatic test pressure shall be 276 psig.

USBR as-built survey used to make adjustments.

REV NO		
3	2010-07-15 FCCF-233 JED	REVISED CONNECTION TO EXISTING PIPING TO MATCH AS-BUILT OF EXISTING PIPING. ADDED COUPLING AND WELDING ON FLANGE TO ADJUST IN FIELD.
2	2009-04-06 D R. FRISZ P.E.	ADDED INSULATING FLANGE GASKET FOR FLANGED JOINT CONNECTION TO EXISTING PIPE
1	2008-02-08 D R. FRISZ P.E.	CORRECTED CALLOUTS AND CHANGED COUPLING LOCATION IN SECTION B-B.

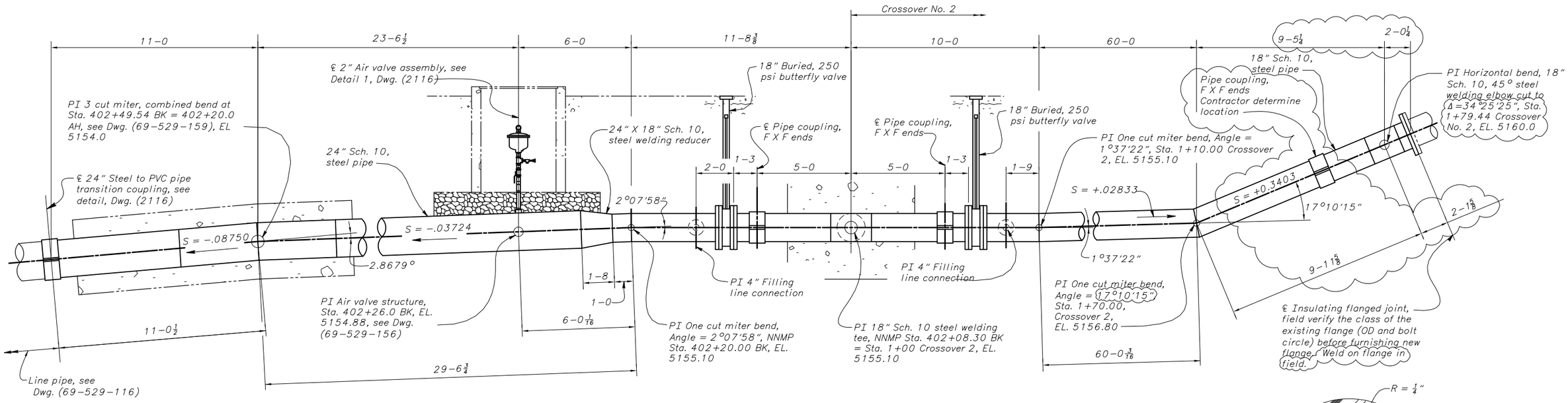
ALWAYS THINK SAFETY

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
ANIMAS - LA PLATA PROJECT
COLORADO - NEW MEXICO

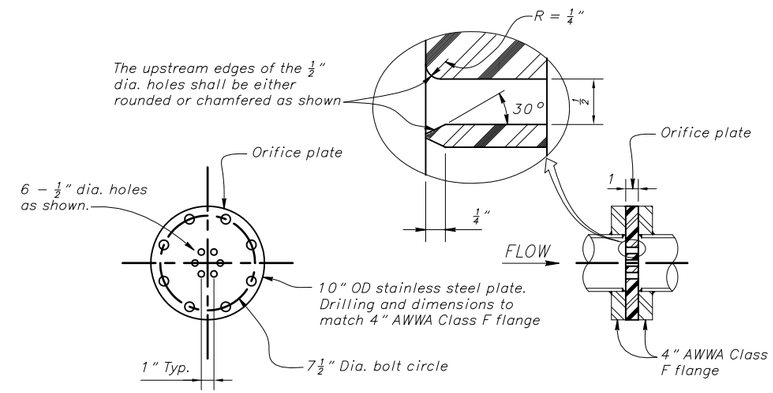
NAVAJO NATION MUNICIPAL PIPELINE
CROSSOVER NO. 2
STEEL PIPING
PLAN AND SECTION

DESIGNED R.V.FRISZ CHECKED N. NAKAMOTO
DRAWN R.V.FRISZ TECH. APPR. K.R.SMITH P.E.
APPROVED D. DRAKE P.E.
MANAGER, HYDRAULIC EQUIPMENT GROUP

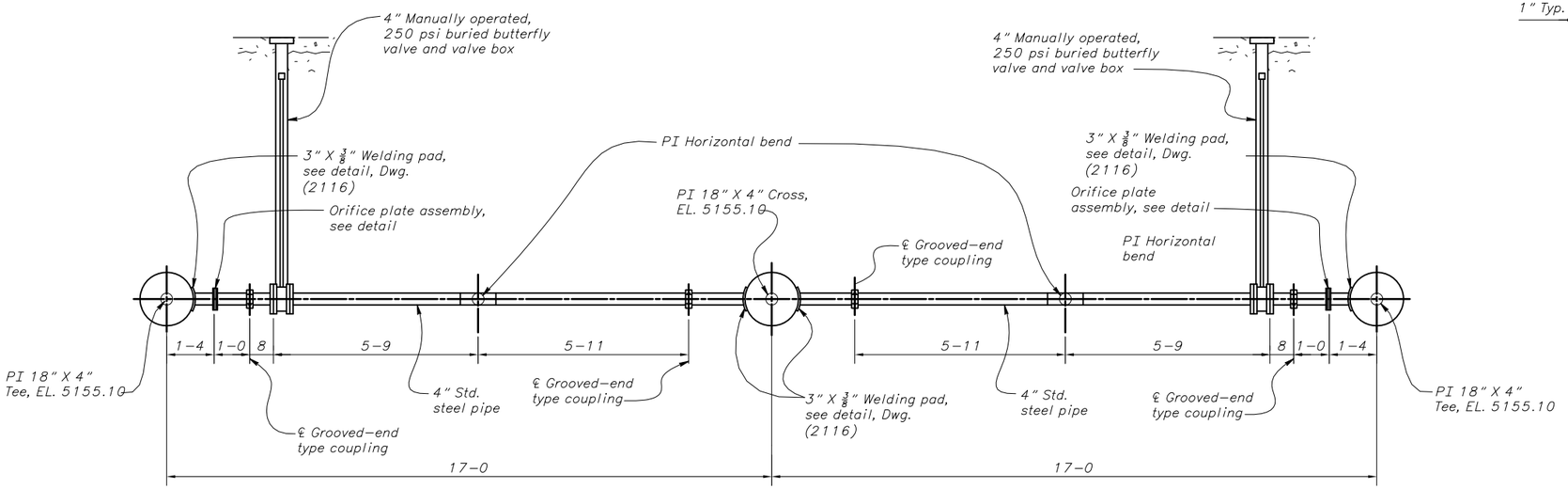
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DENVER, COLORADO	OCTOBER 31, 2006	69-D-2110
SHEET 1 OF 2		



SECTION B-B
(2110)



ORIFICE PLATE ASSEMBLY



SECTION C-C
(2110)

NOTE

See Notes on Dwg. (2110).

REV NO		
3	2010-07-14 FCCF-233 JED	REVISED CONNECTION TO EXISTING PIPING TO MATCH AS-BUILT OF EXISTING PIPING ADDED COUPLING AND WELDING ON FLANGE TO ADJUST IN FIELD.
2	2009-04-06 D R. FRISZ P.E.	ADDED INSULATING FLANGE GASKET FOR FLANGED JOINT CONNECTION TO EXISTING PIPE.
1	2008-02-29 D R. FRISZ P.E.	CORRECTED PIPE ANGLE, PIPE LENGTH, COUPLING LOCATION, AND CALLOUTS.

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COLORADO - NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

CROSSOVER NO. 2

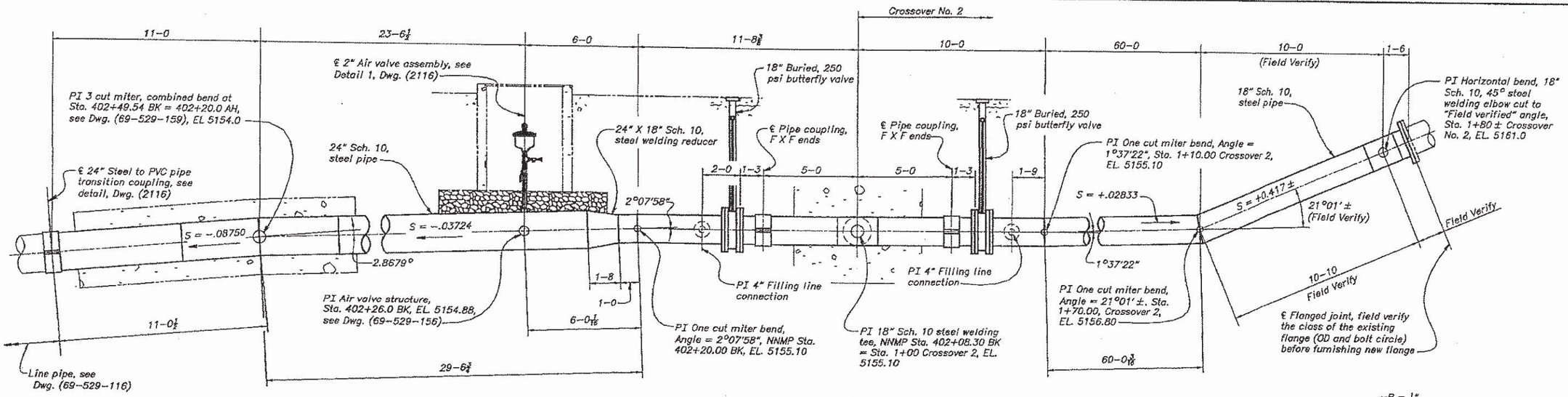
STEEL PIPING

SECTIONS AND DETAIL

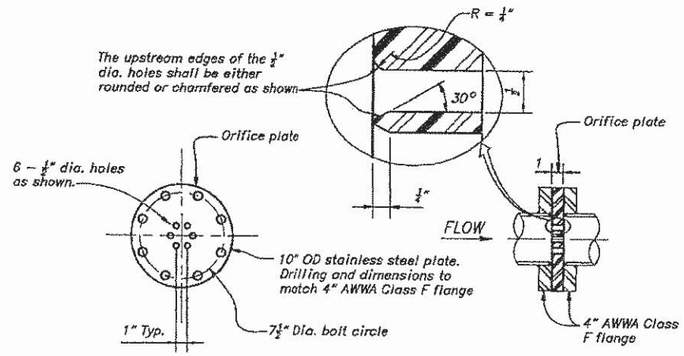
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DRAWN R. V. FRISZ TECH. APPR. K. R. SMITH P.E.
APPROVED O. DRAKE P.E.
MANAGER, HYDRAULIC EQUIPMENT GROUP

CADD SYSTEM	CADD FILENAME	DATE AND TIME PLOTTED
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DENVER, COLORADO	OCTOBER 31, 2006	69-D-2111

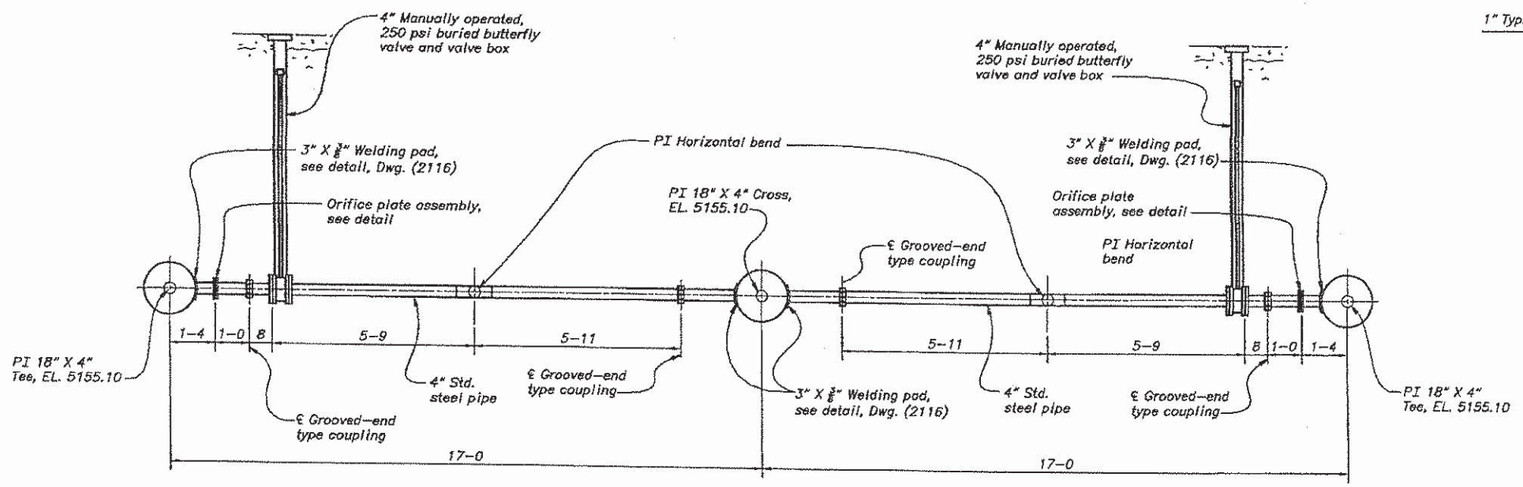
SHEET 2 OF 2



SECTION B-B
(2110)



ORIFICE PLATE ASSEMBLY



SECTION C-C
(2110)

NOTE

See Notes on Dwg. (2110).

REV NO	DATE	DES	CHK	APP	DESCRIPTION
1	2008-07-29	D	R.K.K.	P.E.	CORRECTED PIPE ANGLE, PIPE LENGTH, COUPLING LOCATION, AND CALLOUTS.

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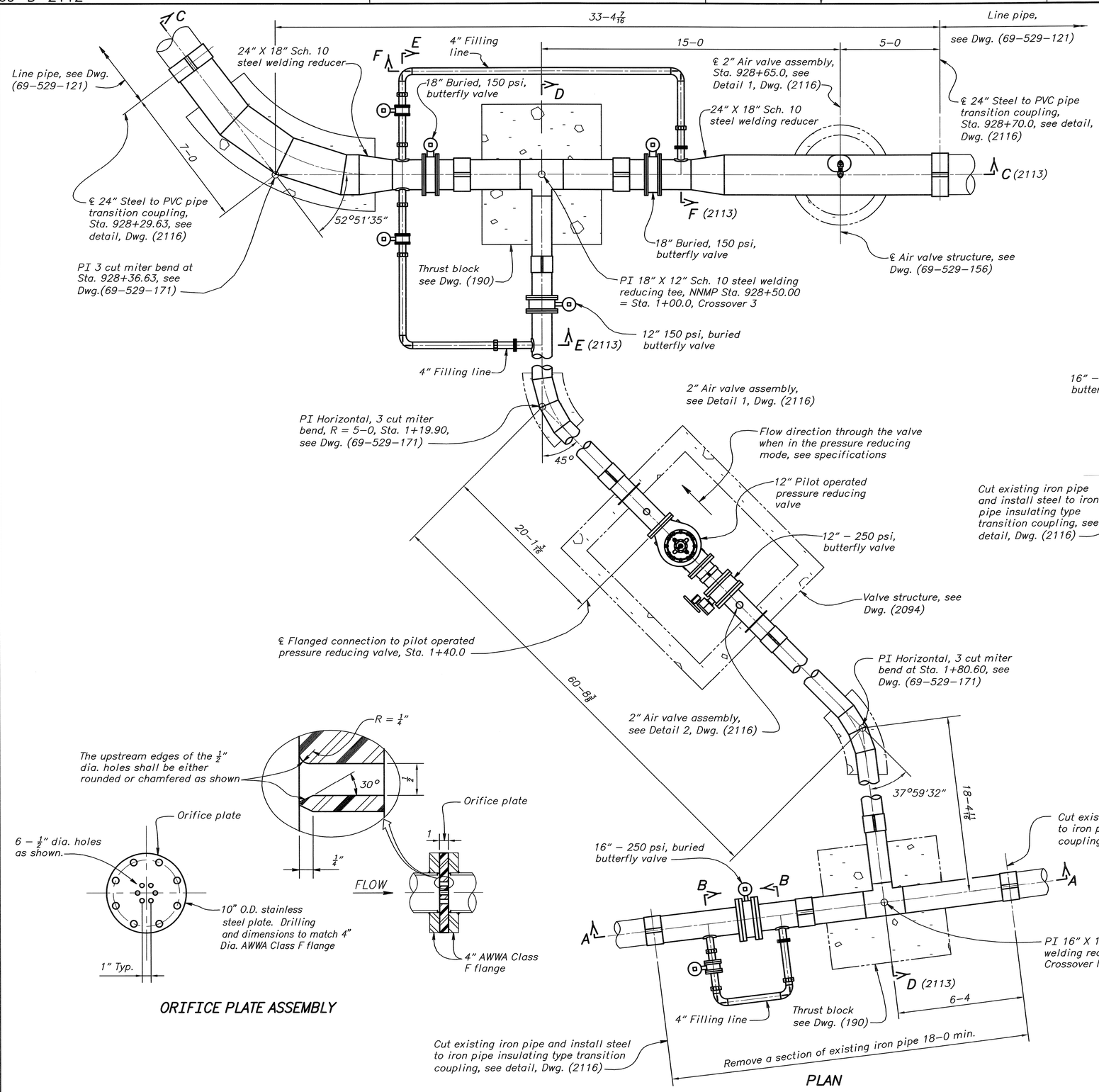
NAVAJO NATION MUNICIPAL PIPELINE

CROSSOVER NO. 2
STEEL PIPING
SECTIONS AND DETAIL

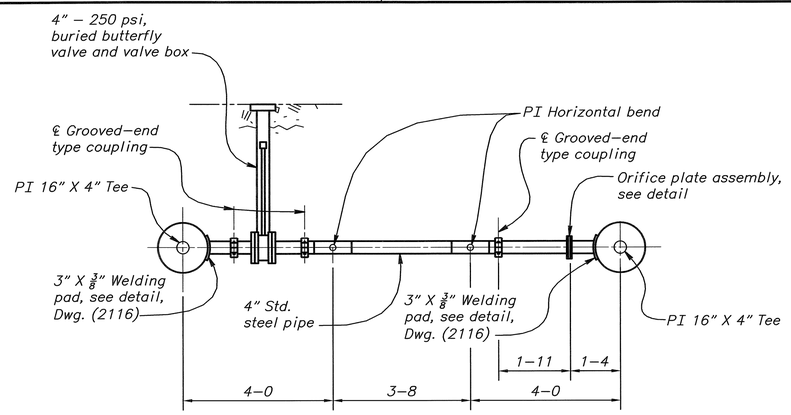
DESIGNED E. V. ERISZ CHECKED R. NAKAMOTO
DRAWN E. V. ERISZ TECH. APPR. K. B. SMITH P.E.
APPROVED D. VARNS P.E.

CADD SYSTEM	CADD FILENAME	DATE AND TIME PLOTTED
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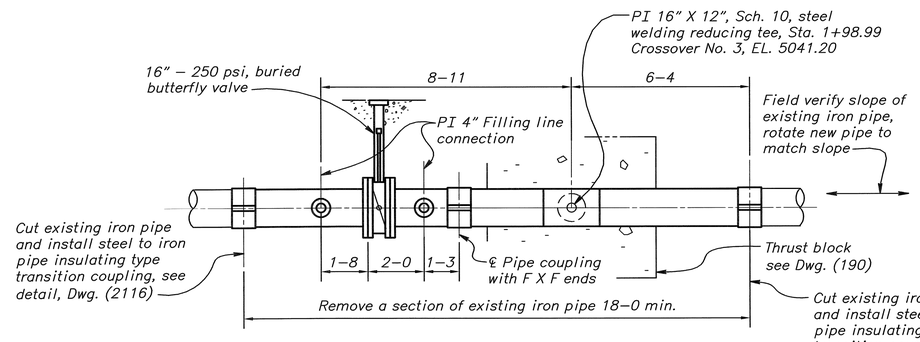
WATER RESOURCES TECHNICAL PUBLICATION
69-D-2111



PLAN



SECTION B–B



SECTION A–A

ORIFICE PLATE ASSEMBLY

NOTES

For General Notes and reference drawings, see Dwg. (2108).
Crossover 3:
The pressure rating for the pressure reducing valve: see specifications.
The pressure ratings for the butterfly valves are marked on the drawings.
Flanges connecting to the 250 psi butterfly valves shall be AWWA Class F.
Flanges connecting to the 150 psi butterfly valves shall be AWWA Class D.
Flanges connecting to the pressure reducing valve shall be AWWA Class E.
For air valve pressure ratings, see Dwg. (2120).
Pipe spool dimensions marked "field verify" shall be verified in the field before fabrication of the spool.
Hydrostatic test pressure shall be 200 psig.

REV NO 3	2009–04–06 D R. FRISZ P.E.	ADDED INSULATING COUPLINGS FOR CONNECTIONS TO EXISTING IRON PIPING.
REV NO 2	2009–03–06 D R. FRISZ P.E.	ADDED 2" AIR VALVE ASSEMBLY IN VALVE STRUCTURE. CORRECTED STATION CALLOUT.
REV NO 1	2008–02–08 D R. FRISZ P.E.	CORRECTED CALLOUTS.

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NAVAJO NATION MUNICIPAL PIPELINE

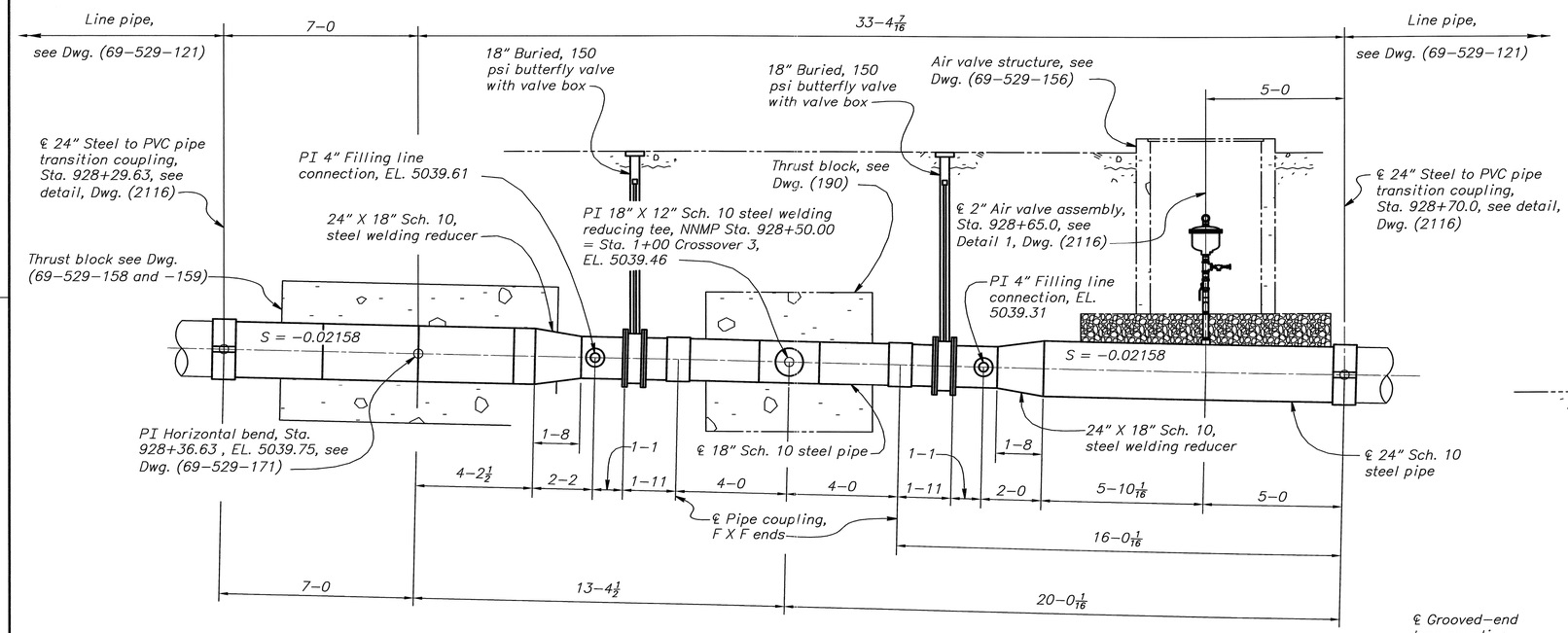
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STEEL PIPING

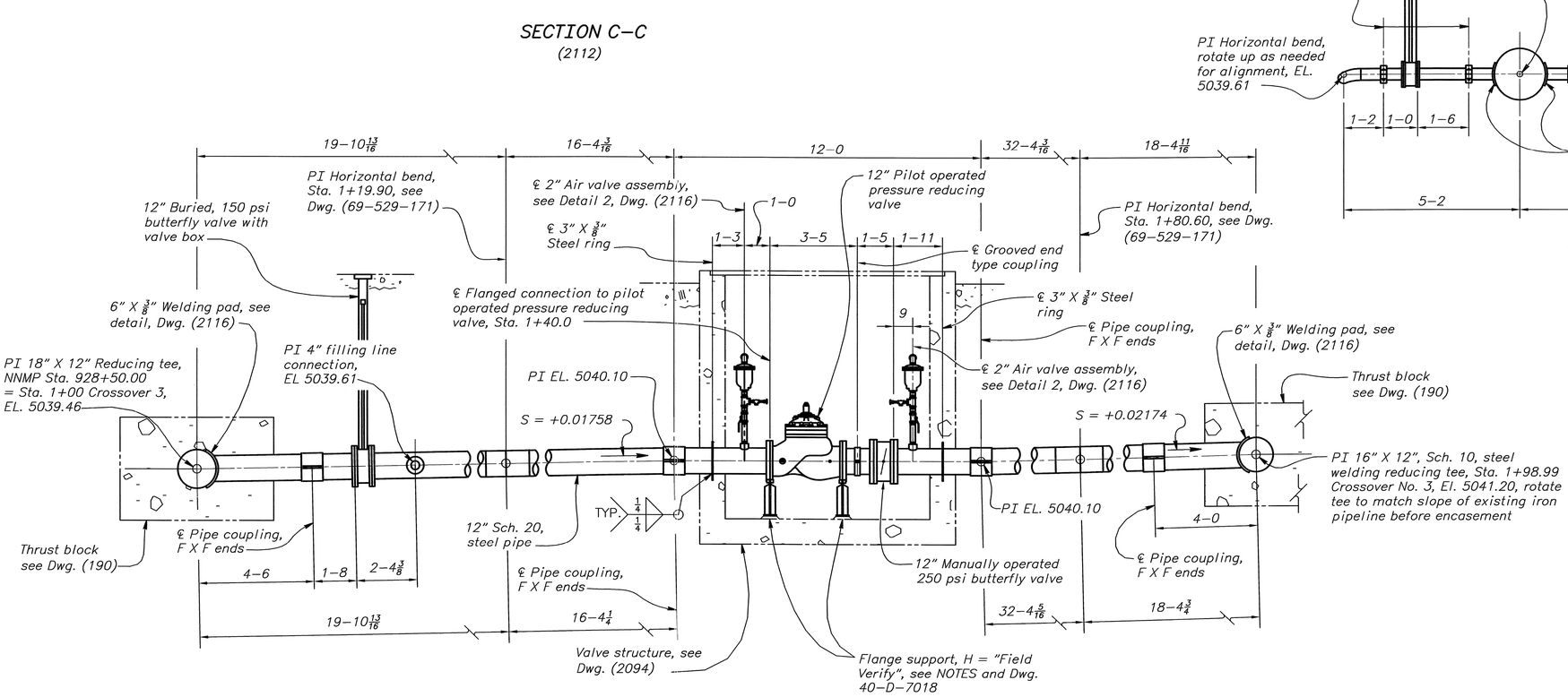
PLAN, SECTIONS, AND DETAIL

DESIGNED R.V. FRISZ CHECKED N. NAKAMOTO
DRAWN R.V. FRISZ TECH. APPR. K.R. SMITH P.E.
APPROVED D. DRAKE P.E.
MANAGER, HYDRAULIC EQUIPMENT GROUP

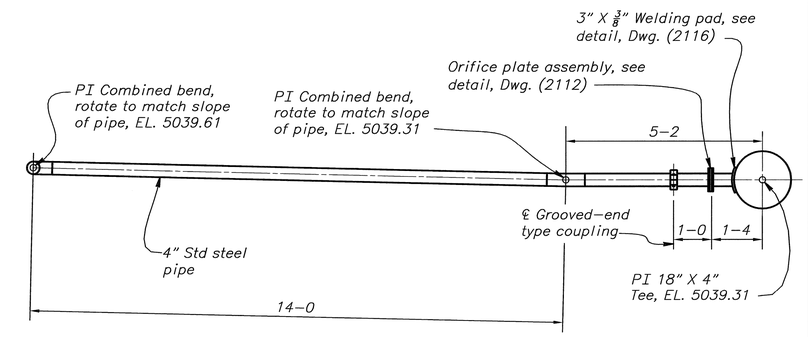
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DENVER, COLORADO OCTOBER 31, 2006 SHEET 1 OF 2		69-D-2112



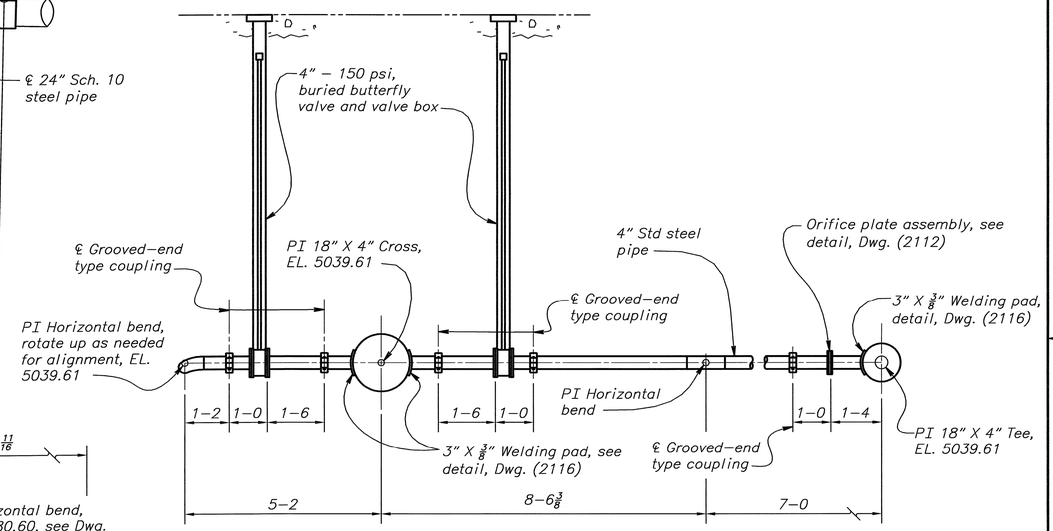
SECTION C-C
(2112)



SECTION D-D
(2112)



SECTION F-F
(2112)



SECTION E-E
(2112)

NOTES

For General Notes, see Dwg. (2108).
See NOTES on Dwg. (2112).

REV NO			
2	2009-03-06 D R. V. FRISZ P.E.		ADDED 2" AIR VALVE ASSEMBLY NEAR BUTTEFLY VALVE IN THE VALVE STRUCTURE. ADJUSTED DIMENSIONS OF PIPING IN THE VALVE STRUCTURE. CORRECTED STATION CALLOUT.
1	2008-02-29 D R. FRISZ P.E.		CORRECTED CALLOUTS.

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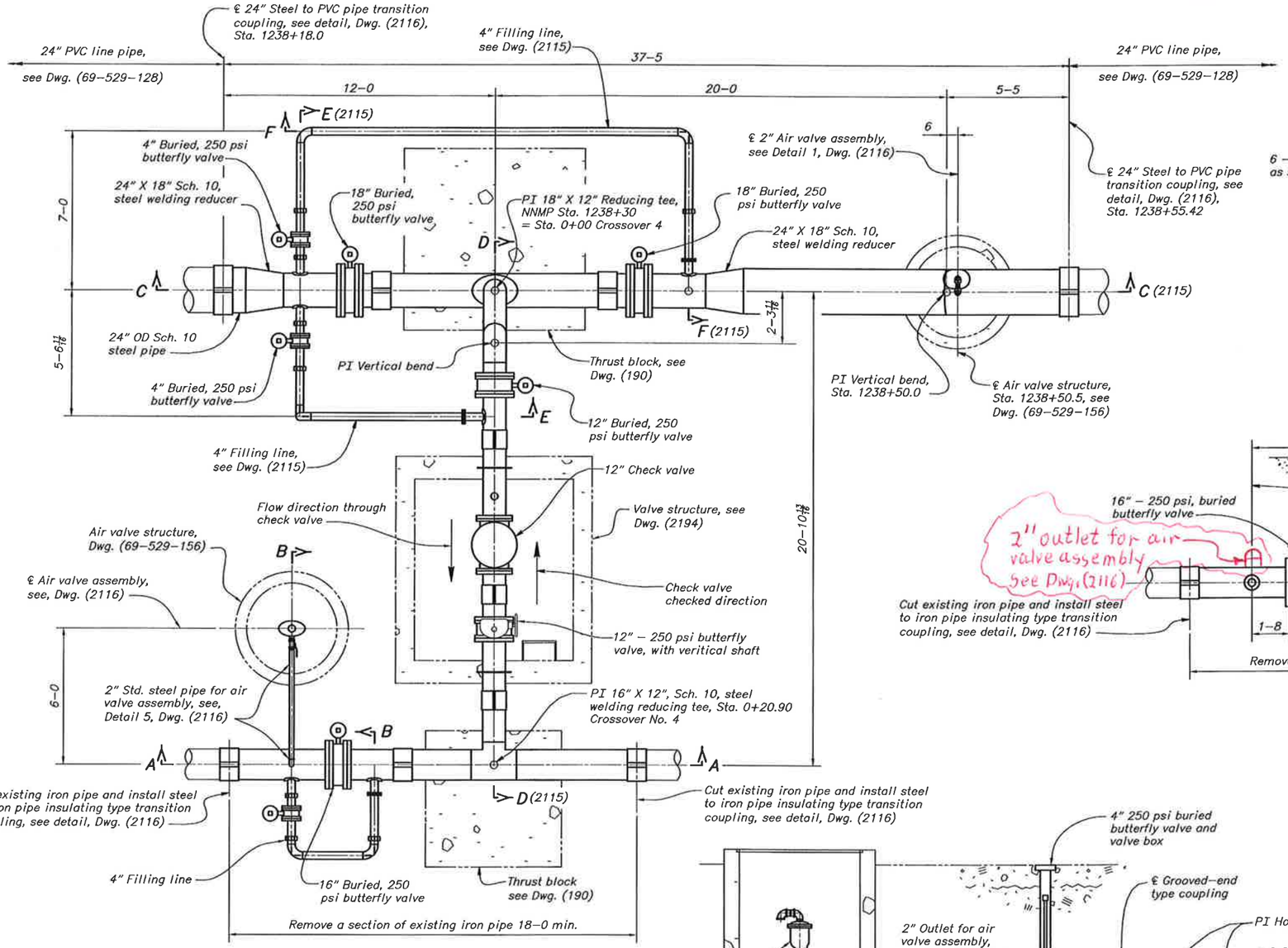
NAVAJO NATION MUNICIPAL PIPELINE

CROSSOVER NO. 3
STEEL PIPING
SECTIONS

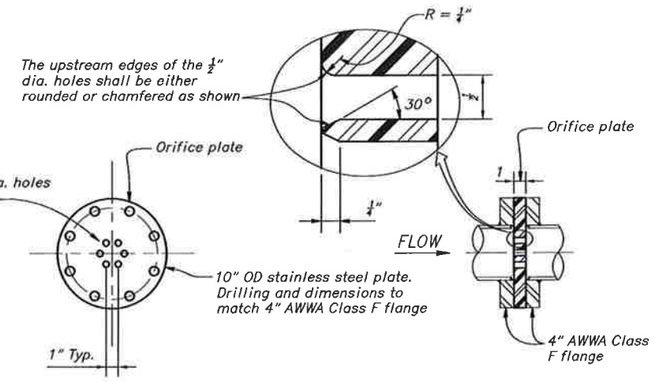
DESIGNED R. V. FRISZ CHECKED N. NAKAMOTO
DRAWN R. V. FRISZ TECH. APPR. K. R. SMITH P.E.
APPROVED D. DRAKE P.E.
MANAGER, HYDRAULIC EQUIPMENT GROUP

CADD SYSTEM	CADD FILENAME	DATE AND TIME PLOTTED
AutoCAD Rel. 16.2s	69-D-2113_REV 1.DWG	APRIL 23, 2008 14:17
DENVER, COLORADO	OCTOBER 31, 2006	69-D-2113

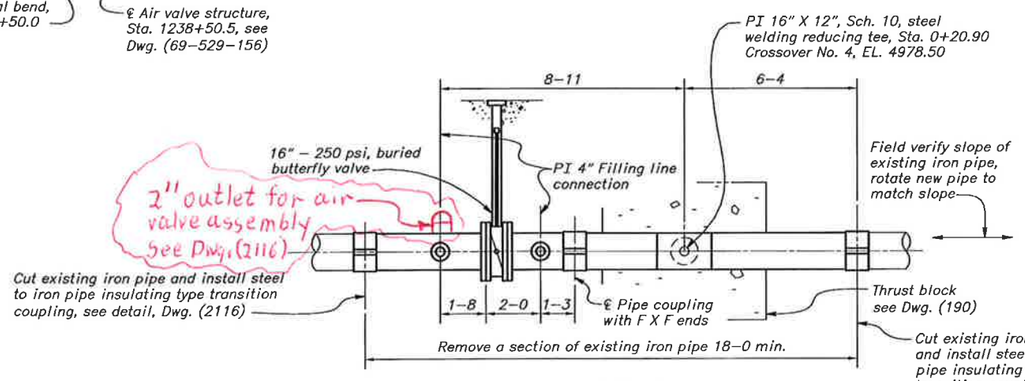
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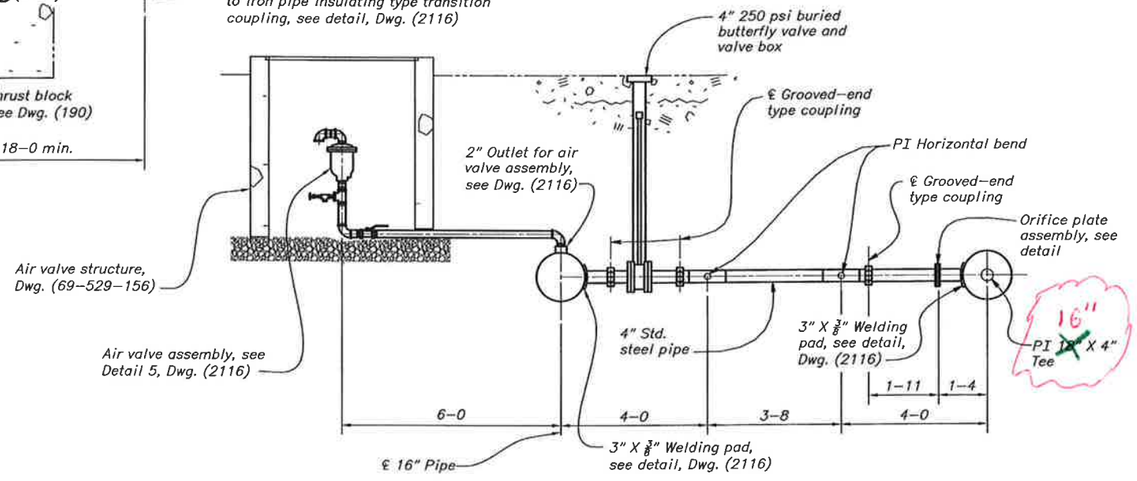
PLAN



ORIFICE PLATE ASSEMBLY



SECTION A-A



SECTION B-B

MARKED PRINT

Jed
SIGNATURE

4/20/10
DATE

NOTES

For General Notes, see Dwg. (2108).
Crossover No. 4:
All butterfly valves shall be 250 psi, see specifications.
Pressure rating for the check valve: see specifications.
For air valve pressure ratings, see Dwg. (2120).
Flanges connecting to the butterfly valves shall be AWWA Class F.
Flanges connecting to the check valve shall be AWWA Class E.
Pipe spool dimensions marked "field verify" shall be verified in the field before fabrication of the spool.
Hydrostatic test pressure shall be = 270 psig.

REV NO 3	2009-04-06 D RVF P.E.	ADDED INSULATING COUPLINGS FOR CONNECTIONS TO EXISTING IRON PIPING.
REV NO 2	2009-03-13 D R. FRISZ P.E.	ADDED AIR VALVE IN PLAN AND SECTION B-B. ADDED "VERTICAL SHAFT" CALL-OUT FOR BUTTERFLY VALVE IN THE VALVE VAULT.
REV NO 1	2008-05-23 B R. FRISZ P.E.	MODIFIED FILLING LINE.

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NAVAJO NATION MUNICIPAL PIPELINE

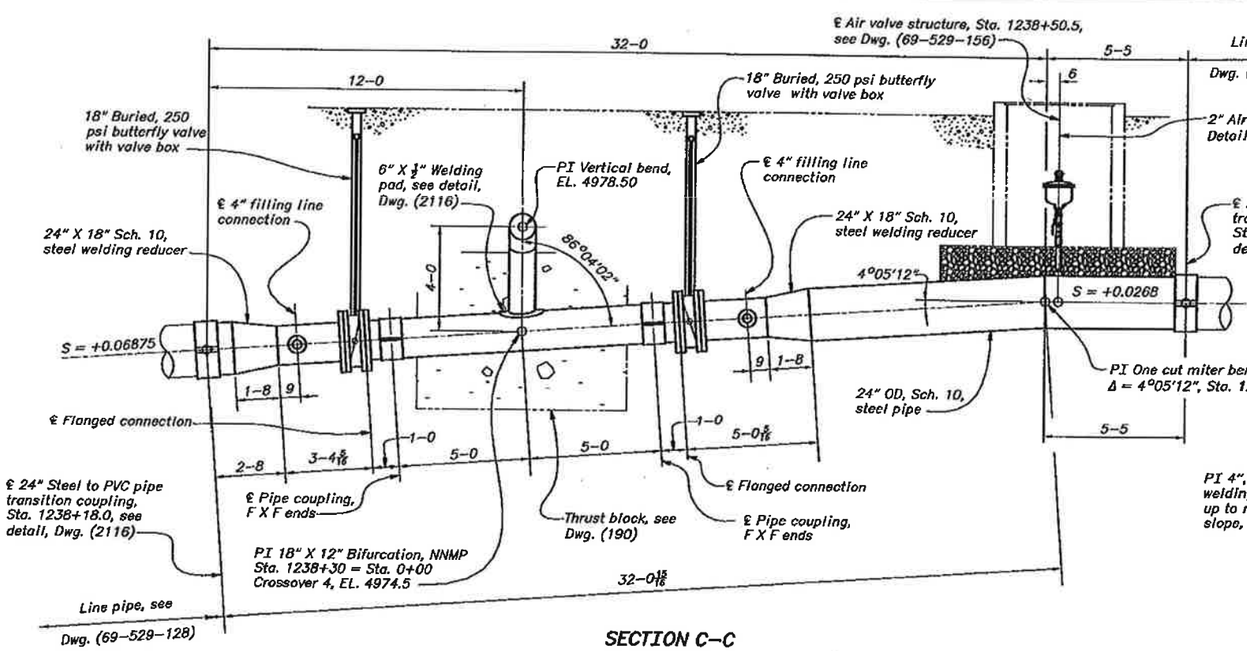
CROSSOVER NO. 4
STEEL PIPING
PLAN, SECTIONS, AND DETAIL

DESIGNED R. V. FRISZ CHECKED N. NAKAMOTO
DRAWN R. V. FRISZ TECH. APPR. K. B. SMITH P.E.
APPROVED D. DRAKE P.E. MANAGER, HYDRAULIC EQUIPMENT GROUP

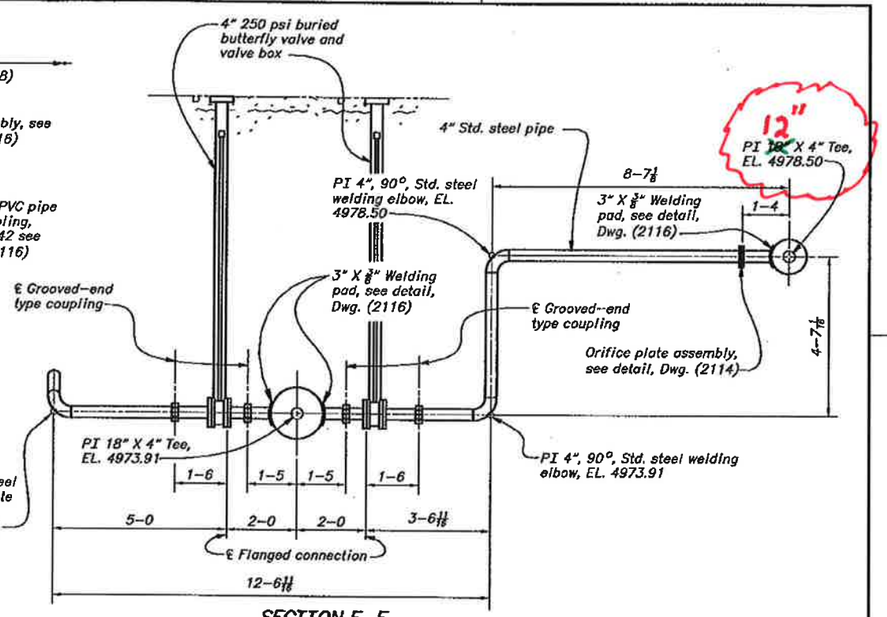
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AutoCAD Rel. 17.1s DENVER, COLORADO	69-D-2114 REV 3.DWG OCTOBER 31, 2006	APRIL 6, 2009 08:53

SHEET 1 OF 2

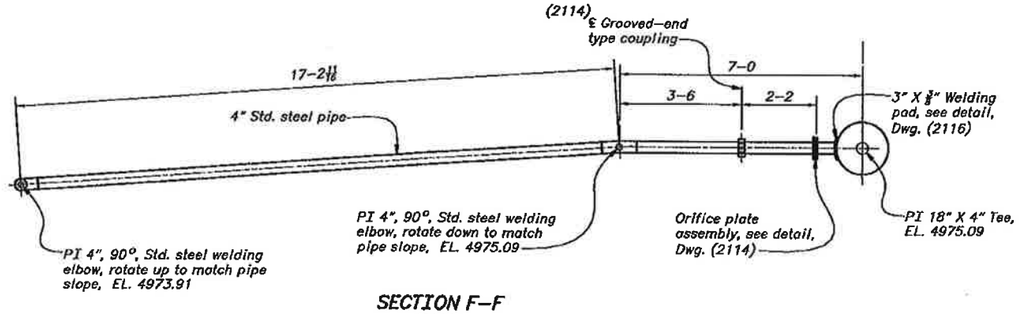
69-D-2114



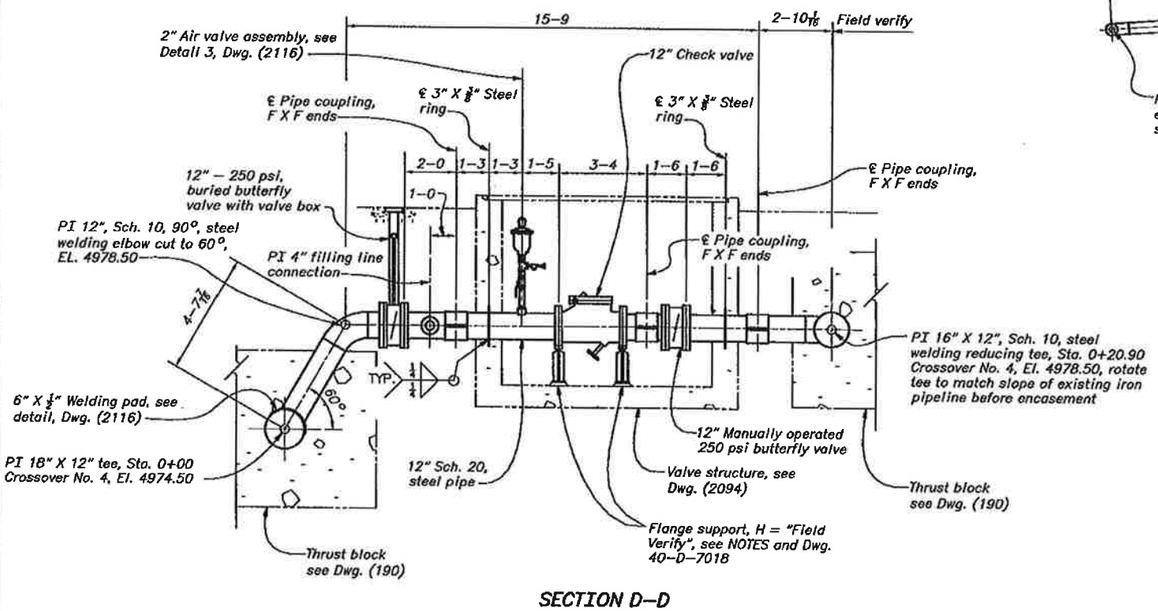
SECTION C-C
(2114)



SECTION E-E
(2114)



SECTION F-F
(2114)



SECTION D-D
(2114)

NOTES

See NOTES on Dwg. (2114).

MARKED PRINT

Jed 4/20/10

SIGNATURE DATE

REV NO	DATE / BY	DESCRIPTION
2	2008-05-23 D ERTSZ P.E.	MODIFIED FILLING LINE.
1	2008-02-29 D R. FRISZ P.E.	ADDED MITER BEND, CORRECTED PIPE LENGTH, AND ADDED AIR VALVE INSIDE OF VAULT.

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ANIMAS - LA PLATA PROJECT
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NAVAJO NATION MUNICIPAL PIPELINE

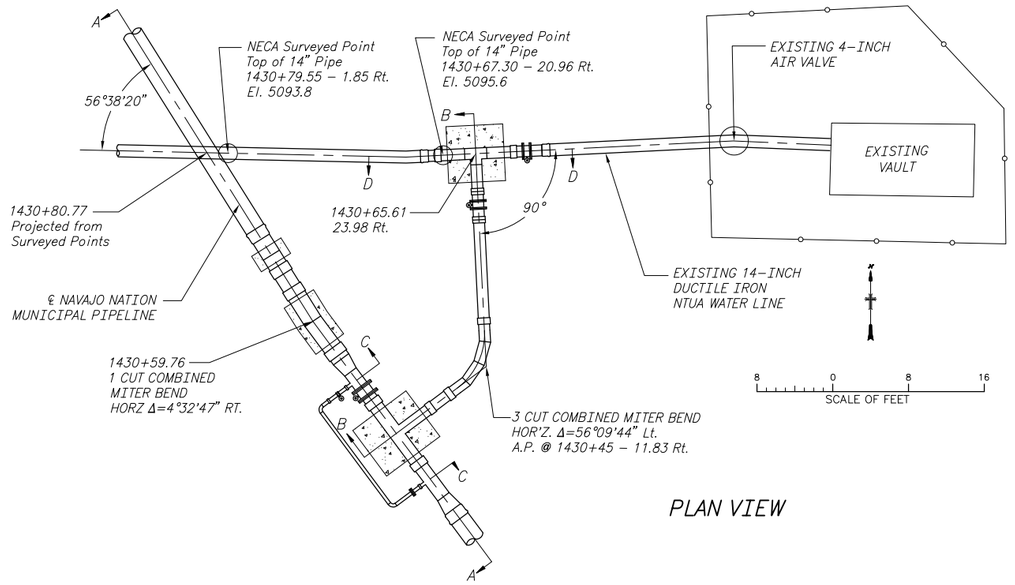
CROSSOVER NO. 4
STEEL PIPING
SECTIONS

DESIGNED B.V. ERTSZ CHECKED M. NUKAMOTO
DRAWN B.V. ERTSZ TECH. APPR. K.B. SMITH P.E.
APPROVED D. DRAKE P.E.

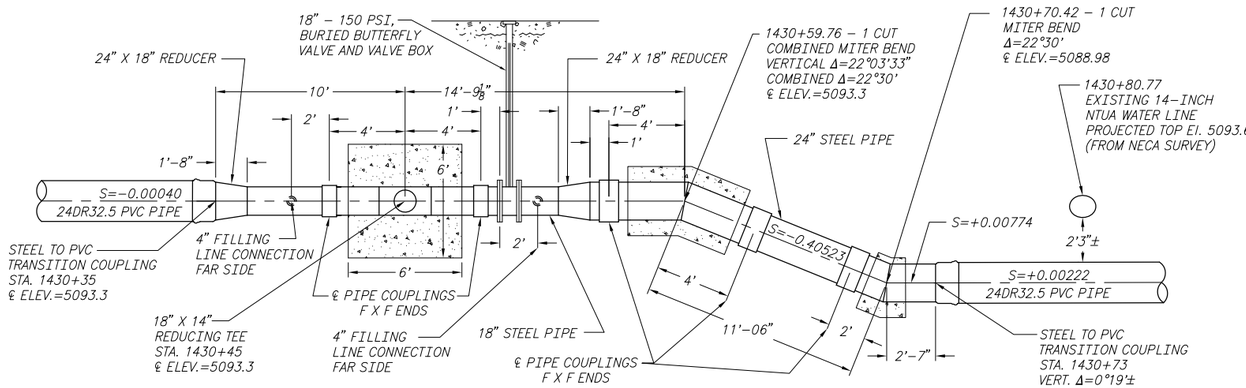
MANAGER, NORTH AS TEATMENT GROUP

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OCTOBER 31, 2002
DATE AND TIME PLOTTED: MAY 20, 2008 14:35
SHEET 2 OF 2

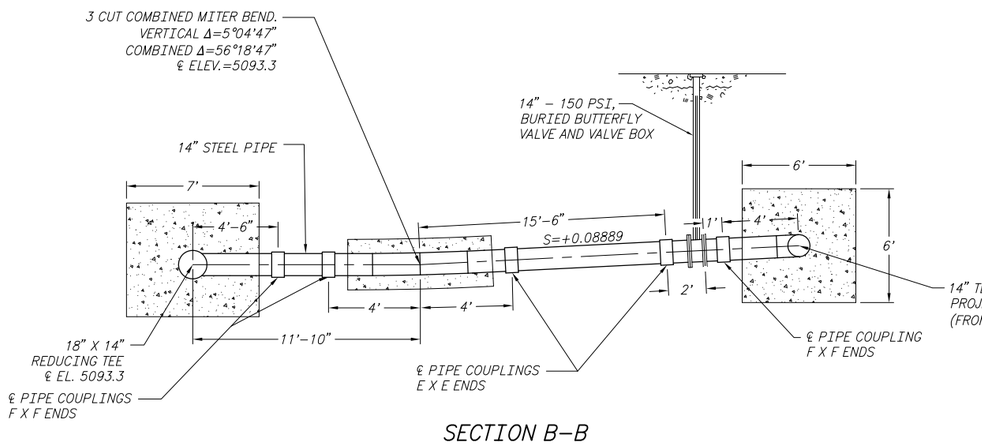
69-D-2115



PLAN VIEW

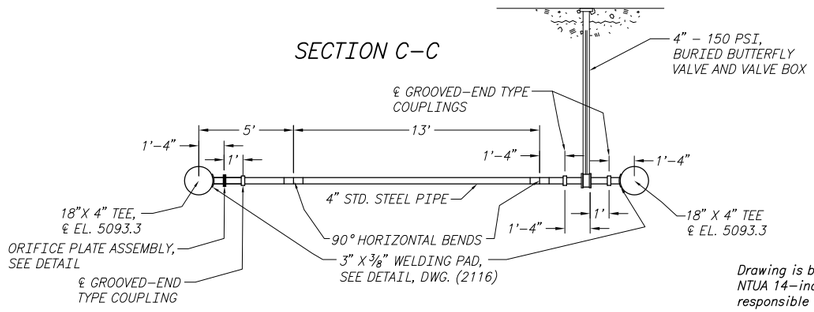


SECTION A–A

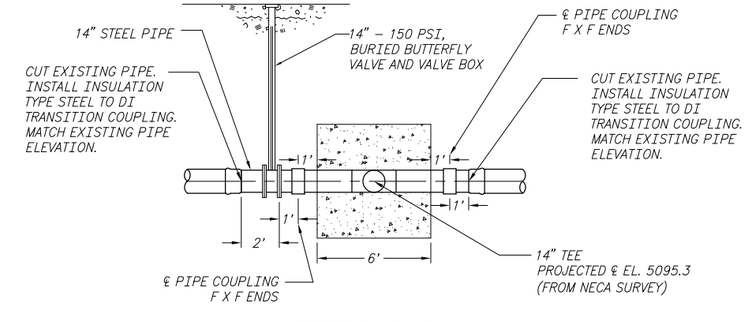


SECTION B–B

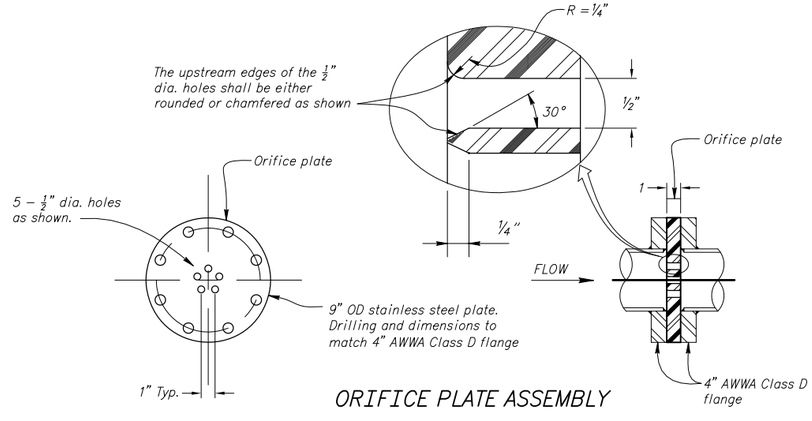
SECTIONS ARE NOT TO SCALE



SECTION C–C



SECTION D–D



ORIFICE PLATE ASSEMBLY

NOTES

Drawing is based on Contractor's surveyed locations of existing NTUA 14–inch ductile iron pipeline. The contractor will be responsible for any misalignments due to locations given.

For miter bend values and blocking details see drawing 69–529–171.

For the Plan and Profile of the Navajo Nation Municipal Pipeline (Shiprock Reach see Drawing 69–529–132.)

For General Notes see Drawing 69–D–2108.
Flanges shall be AWWA Class D.
Hydrostatic test pressure shall be 200 psig.

REV NO		
2	2010–05–10 FCCF–413 JED	REVISED DRAWING TO MATCH SURVEYED LOCATION OF 14–INCH DUCTILE IRON PIPELINE. REVISED NOTES. CORRECTED MINOR DRAFTING ERRORS.
1	2010–01–11 FCCF–413 JED	ADDED STATION AND OFFSET OF TIE IN AT 14" WATER LINE ON PLAN VIEW.

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COLORADO – NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

SHIPROCK REACH

CROSSOVER NO. 5
PLAN VIEW AND STEEL PIPING DETAILS AND SECTIONS

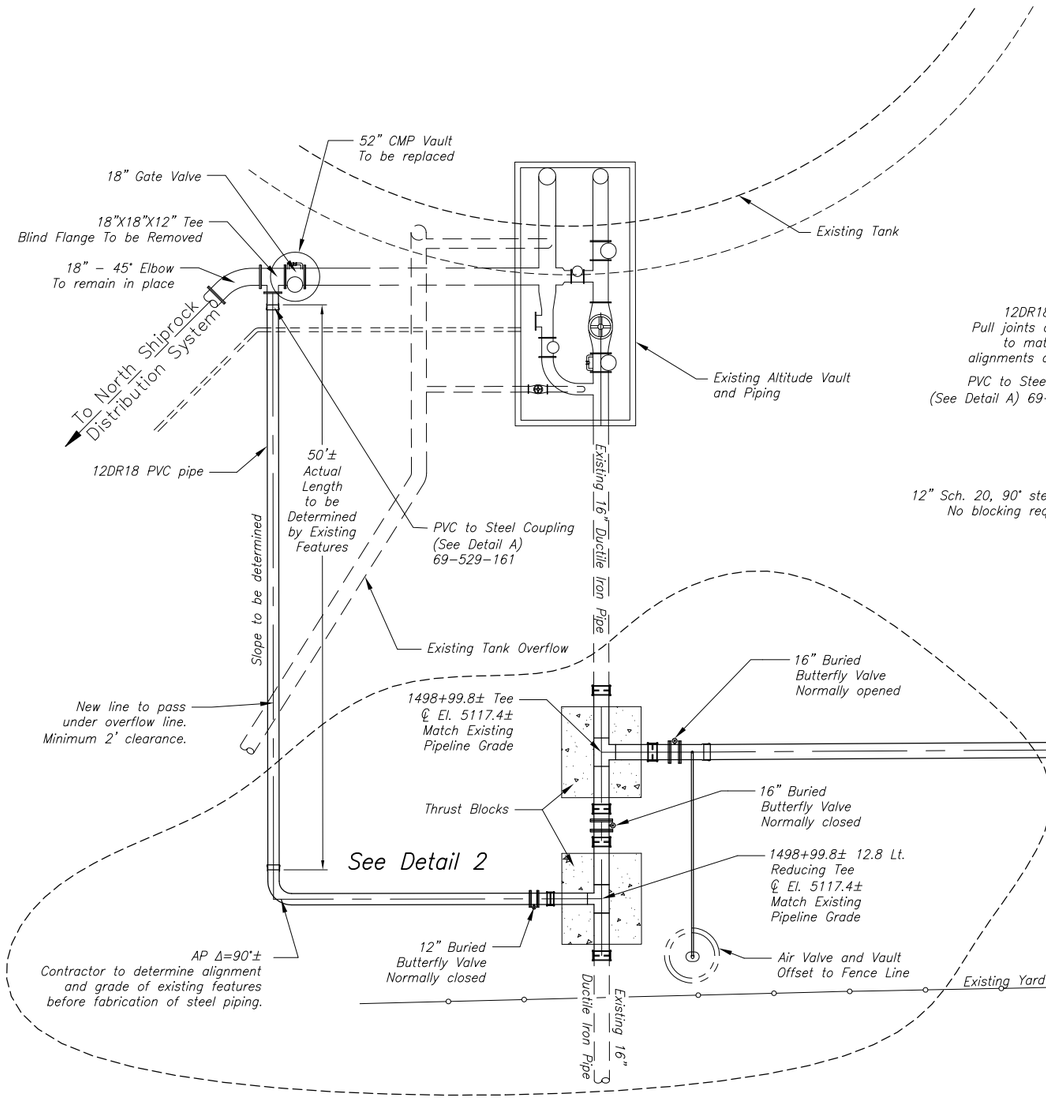
DESIGNED JAYE E. DECKER CHECKED s/THOMAS M. ROE
DRAWN JAYE E. DECKER TECH. APPR. s/BRIAN C. WAGNER
APPROVED s/DOUG DOCKTER P.E.

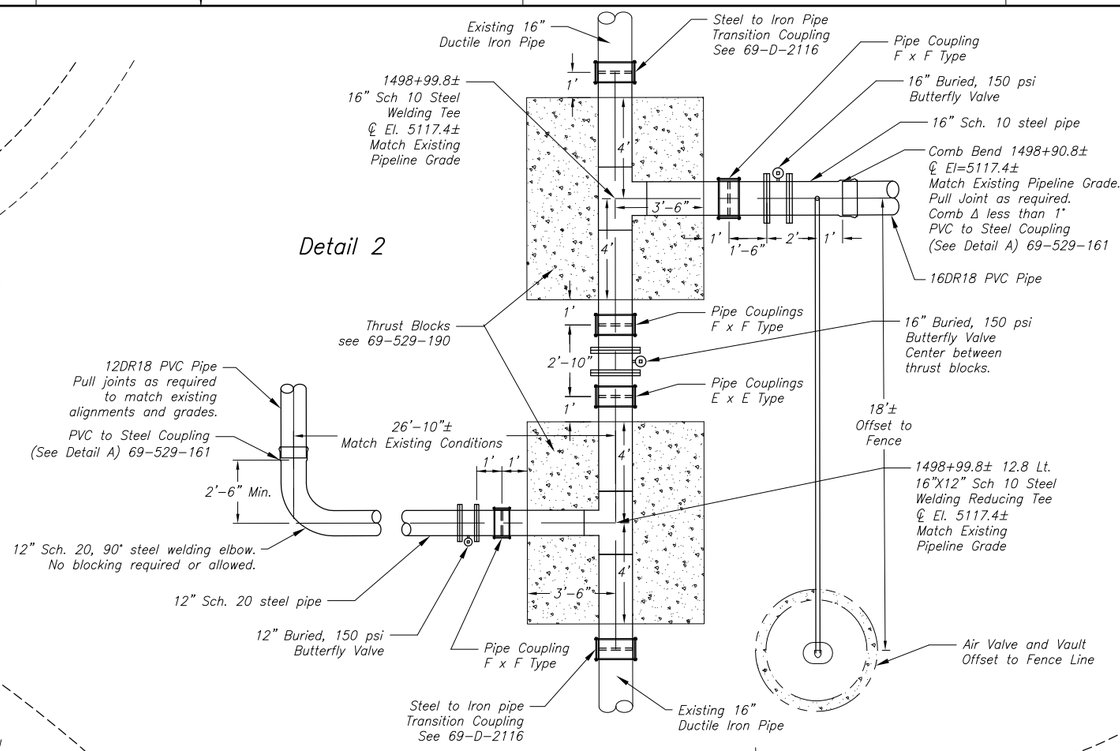
FARMINGTON, NEW MEXICO 2009–12–04
SHEET 1 OF 1

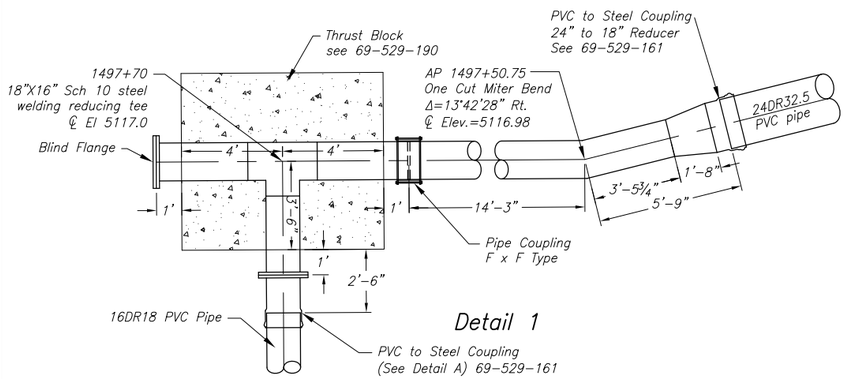
69–529–210

DATE AND TIME PLOTTED
OCTOBER 14, 2010 17:29
PLOTTED BY
JDECKER

CAD SYSTEM
AutoCAD Rel. 17.2s
CAD FILENAME
93A 69–529–210 REV02.DWG







NOTES

1. For air valve, see drawing 69-529-156 for installation details.
2. Air valve pressure ratings:
   Head Class: 275 feet.
   Air Valve Seat Rating: 119 psi.
3. Buried butterfly valves shall be installed with valve box. Lid shall be flush with yard gravel surfacing. Do not install barriers in yard area.
4. For plan and profile, see drawing 69-529-133.
5. Field verify location and grade of existing pipeline before submittal and fabrication of piping. Exact alignment and elevations will be based on existing pipeline.

REV NO		
01	2010-03-04 FCCF-413 JED	ADDED ± LENGTH ON NORTH/SOUTH 12DR18 PVC PIPE.

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BUREAU OF RECLAMATION

ANIMAS - LA PLATA PROJECT COLORADO - NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

TERMINATION PIPING

PLAN VIEW AND DETAILS

DESIGNED _ JAYE E. DECKER _ CHECKED _ S/DARRYL GOOD _

DRAWN _ JAYE E. DECKER _ TECH. APPR. S/THOMAS M. ROE PE _

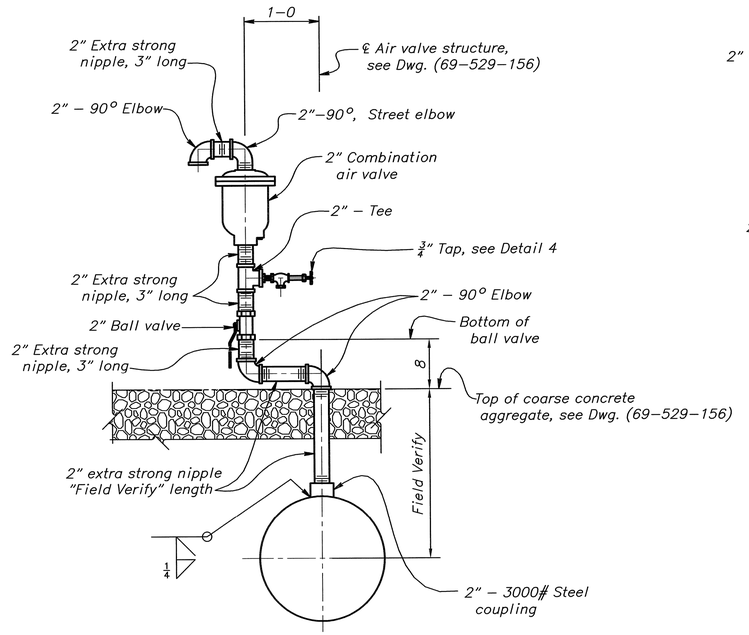
APPROVED _ S/DOUG DOCKTER PE _

FARMINGTON, NEW MEXICO 2009-04-15
SHEET 1 OF 1

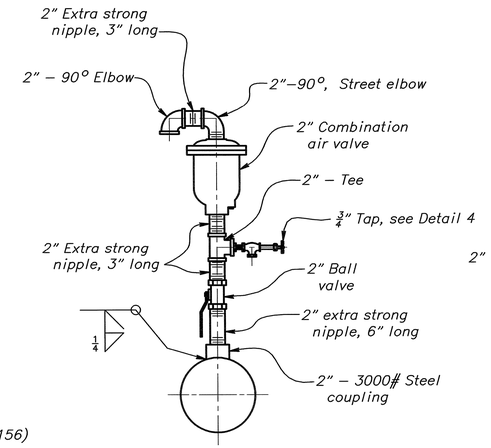
69-529-209

DATE AND TIME PLOTTED
OCTOBER 14, 2010 17:23
PLOTTED BY
JDECKER

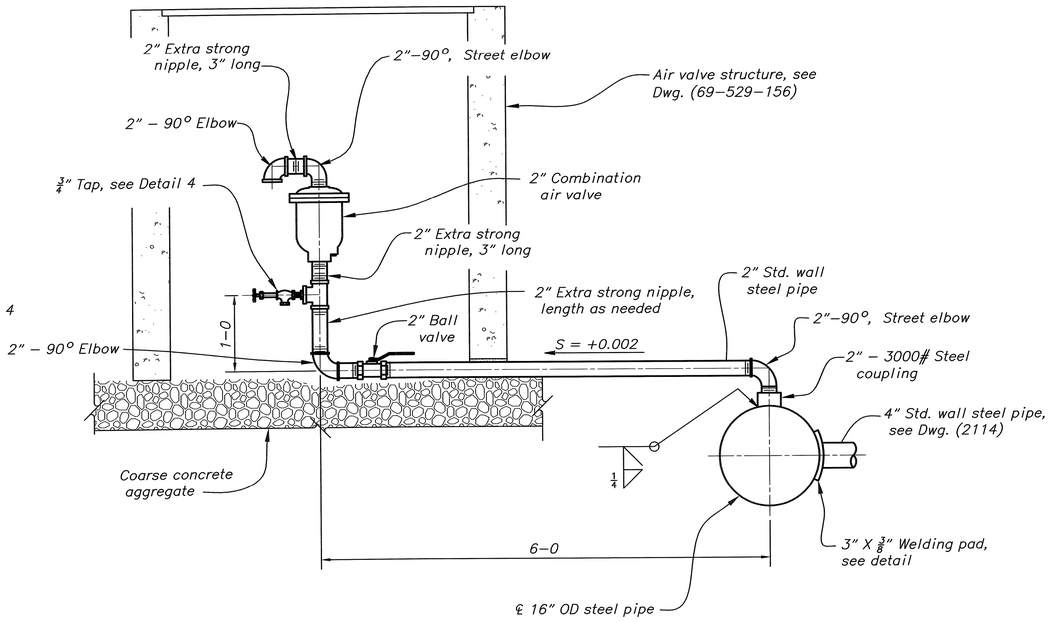
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CAD FILENAME
93B 69-529-209 REV01.DWG



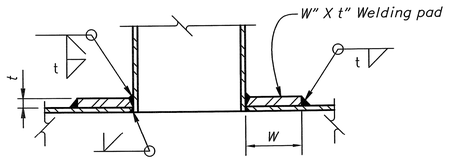
DETAIL 1



DETAIL 2



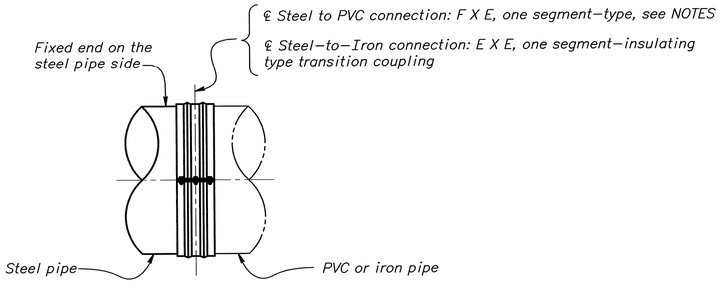
DETAIL 5
(2114)



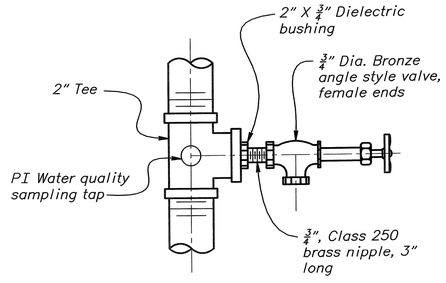
WELDING PAD

NOTES

For General Notes see Dwg. (2108).
For air valve pressure ratings, see Dwg. (2120).
Steel pipes with mechanical joint bell-type ends, as shown on Dwg. (69-529-161), may be substituted for the F X E transition couplings that connect to the PVC pipe. They are subject to Government approval.
All threaded fittings shall be 150 lb. M.I., except as indicated.



TRANSITION COUPLING



DETAIL 4

REV NO 4	2009-04-06 D RVF P.E.	CHANGED CALL-OUT FOR THE TRANSITION COUPLING.
REV NO 3	2009-03-13 D R. FRISZ P.E.	ADDED DETAIL 5.
REV NO 2	2008-05-23 D R. FRISZ P.E.	CHANGED TRANSITION COUPLING CALL-OUT.
REV NO 1	2008-02-08 D R. FRISZ P.E.	CORRECTED CALLOUTS.

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NAVAJO NATION MUNICIPAL PIPELINE

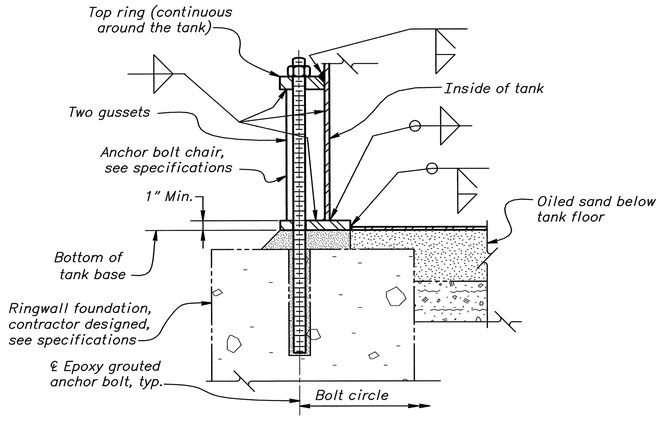
STEEL PIPING

MISCELLANEOUS DETAILS

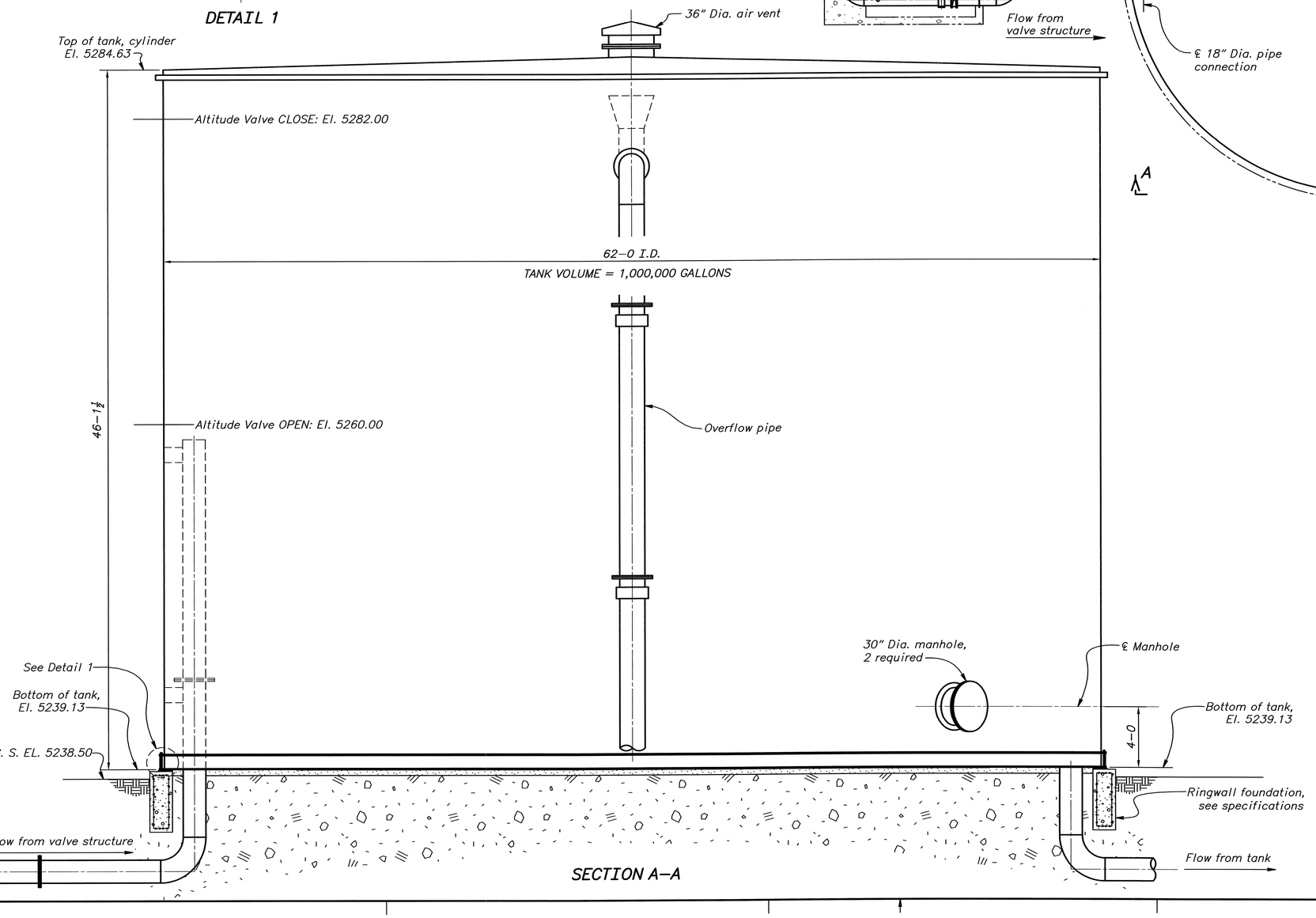
DESIGNED R. V. FRISZ CHECKED N. NAKAMOTO
DRAWN R. V. FRISZ TECH. APPR. K. R. SMITH P.E.
APPROVED D. DRAKE P.E.
MANAGER, HYDRAULIC EQUIPMENT GROUP

CADD SYSTEM AutoCAD Rel. 17.1s DENVER, COLORADO	CADD FILENAME 69-D-2116_REV 4.DWG OCTOBER 31, 2006 SHEET 1 OF 1	DATE AND TIME PLOTTED APRIL 6, 2009 09:11

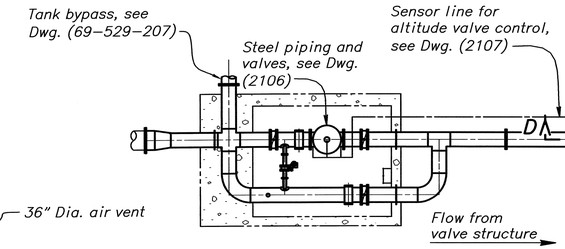
69-D-2116

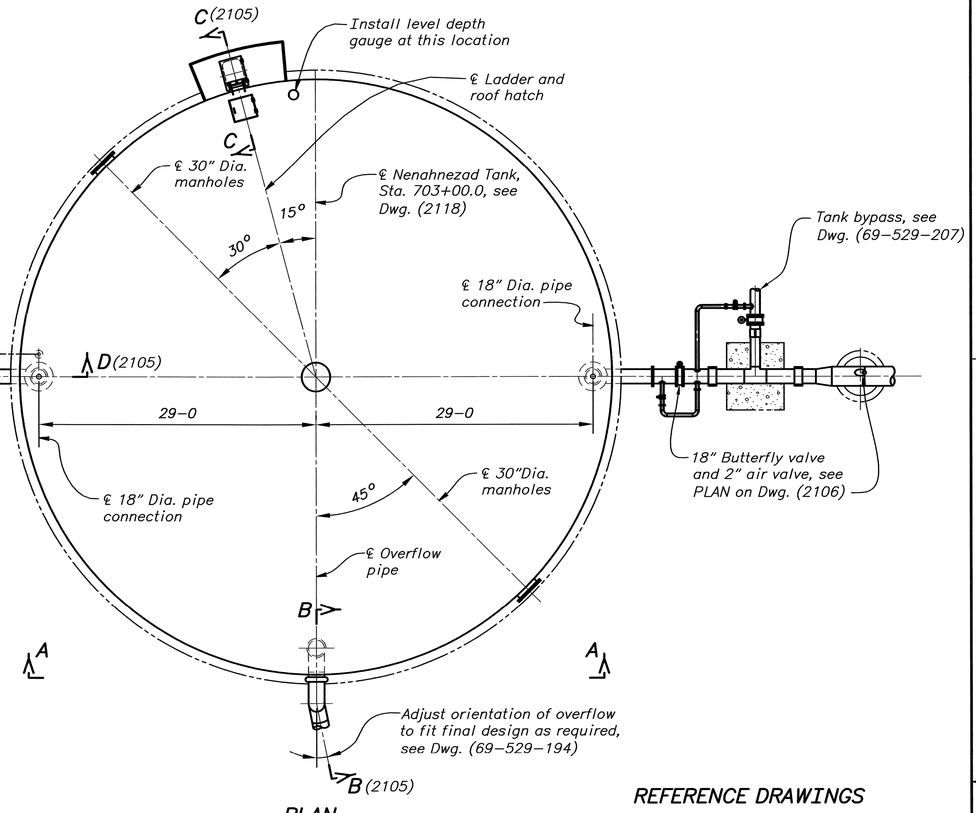


DETAIL 1



SECTION A-A





PLAN

REFERENCE DRAWINGS

2-INCH AIR VALVE INSTALLATIONS_____69-529-156
ALTITUDE VALVE VAULT_____69-D-2095

GENERAL NOTES

Provide nuts, bolts, and gaskets suitable for cold water service for all flanged joints.
Threaded pipe fittings shall be 150 Lb. M.I. and galvanized, unless otherwise noted.
Additional fittings or flanged joints may be added at the contractor's option to facilitate installation of piping.
Furnish all valves with flanged ends suitable for connection to AWWA Class D pipe flanges.
All flanges shall be AWWA Class D unless otherwise noted.

REV NO 3	2009-04-21 D R.V.F P.E.	MODIFIED STEEL PIPING UPSTREAM AND DOWNSTREAM OF THE TANK FOR THE TANK BYPASS.
REV NO 2	2008-05-23 D R. FRISZ P.E.	MODIFIED ANCHOR BOLT DETAIL.
REV NO 1	2008-04-29 D R. FRISZ P.E.	MODIFIED TANK HEIGHT.

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COLORADO - NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

NENAHNEZAD STEEL TANK

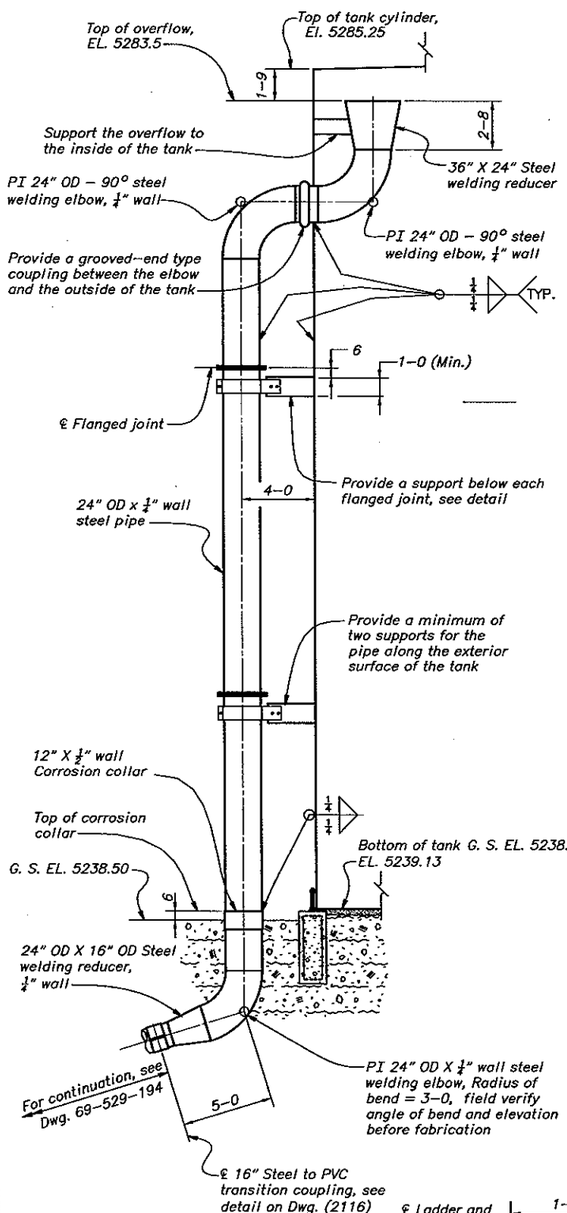
PLAN, SECTION, AND DETAIL

DESIGNED R. V. FRISZ CHECKED N. NAKAMOTO
DRAWN R. V. FRISZ TECH. APPR. K. R. SMITH P.E.
APPROVED D. DRAKE P.E.
MANAGER, HYDRAULIC EQUIPMENT GROUP

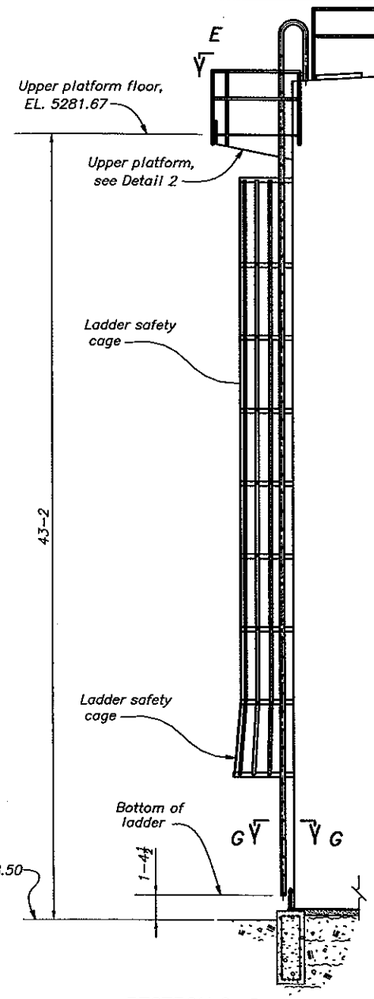
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SHEET 1 OF 2

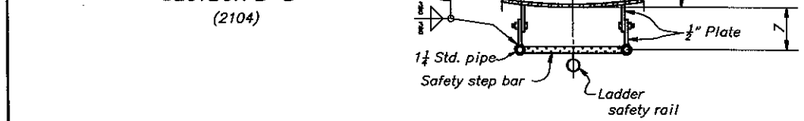
69-D-2104



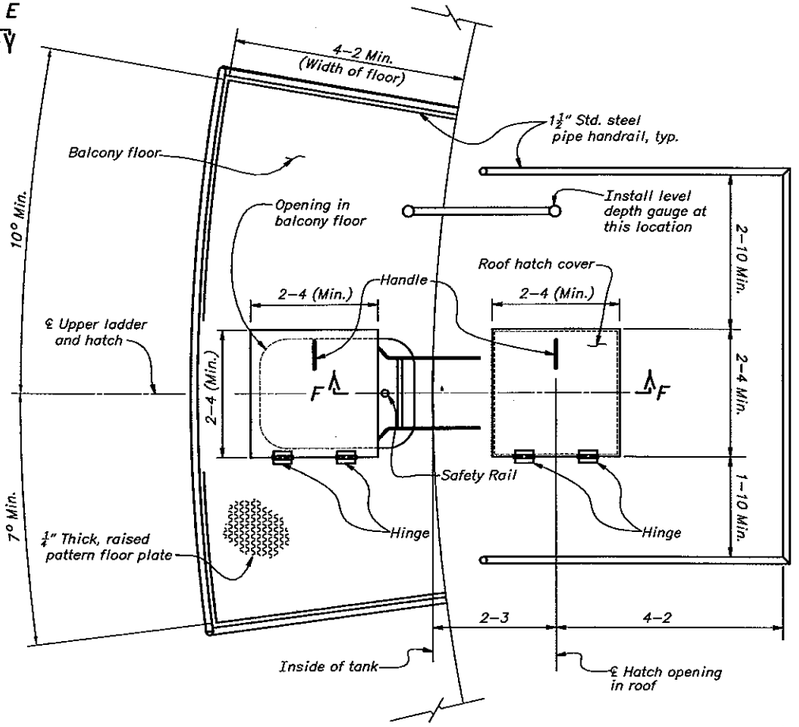
SECTION B-B
(2104)



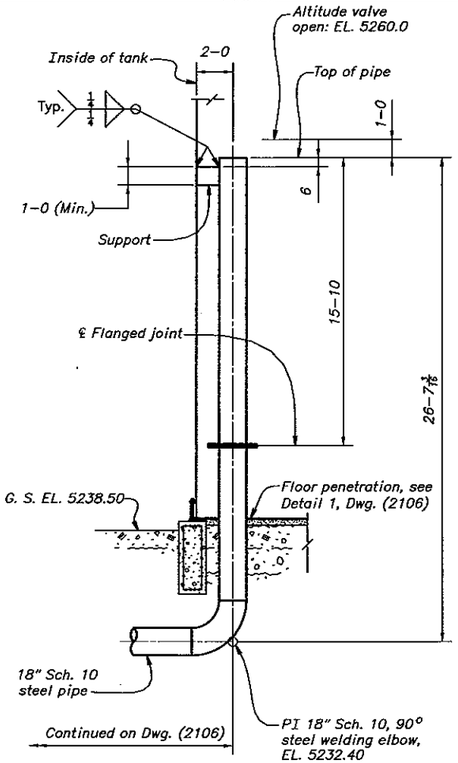
SECTION C-C
(2104)



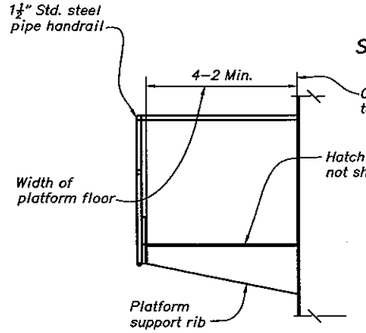
SECTION G-G



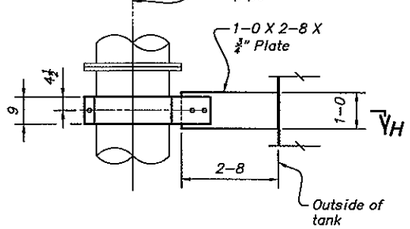
SECTION E-E



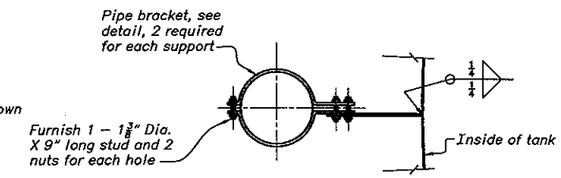
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(2104)



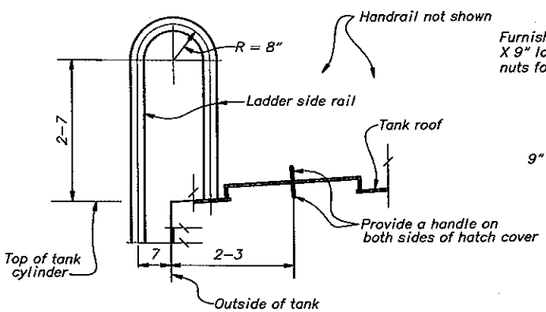
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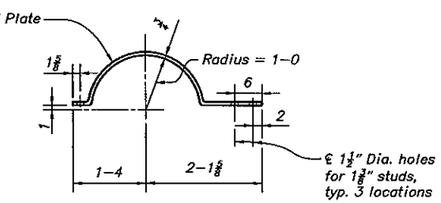
SECTION H-H



SECTION H-H



SECTION F-F



PIPE BRACKET

NOTE

For General Notes and reference drawings, see Dwg. (2104).

REV NO	DATE	DESCRIPTION
2	2008-05-23 D R.V.F. P.E.	MODIFIED OVERFLOW PIPE SUPPORT.
1	2008-04-29 D R. ERISZ P.E.	LOWERED THE INLET TO THE OVERFLOW PIPE.

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NAVAJO NATION MUNICIPAL PIPELINE

NENAHNEZAD STEEL TANK

SECTIONS, AND DETAIL

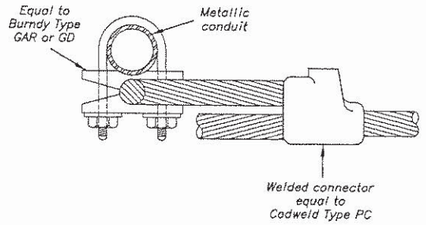
DESIGNED R. V. ERISZ CHECKED N. NAKAMOTO
DRAWN R. V. ERISZ TECH. APPR. K. G. SMITH P.E.
APPROVED O. DRAKE P.E.
MANAGER, HYDRAULIC EQUIPMENT GROUP

CADD SYSTEM	CADD FILENAME	DATE AND TIME PLOTTED
AutoCAD Rel. 16.2a DENVER, COLORADO	69-D-2105 REV 2.DWG SHEET 2 OF 2	MAY 21, 2008 07:36 OCTOBER 31, 2005

69-D-2105

FIGURE 1

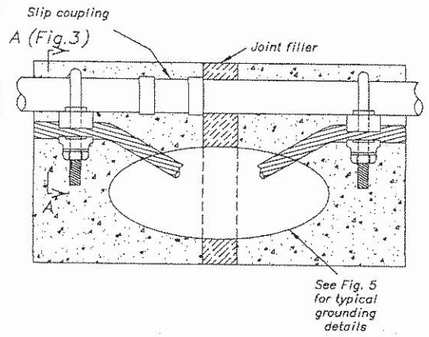
GROUNDING METAL CONDUITS



METAL CONDUIT GROUNDING TABLE			
CONDUIT SIZE	MINIMUM SIZE OF GROUND CABLE	NUMBER OF TAPS	CLAMP SIMILAR TO BURNDY TYPE
½" to 1½"	No.4 A.W.G.	1	GAR
2" to 3"	No.1 A.W.G.	1	GAR
Above 3"	No.1 A.W.G.	2	GD

FIGURE 2

BONDING CONDUITS AT EXPANSION JOINTS

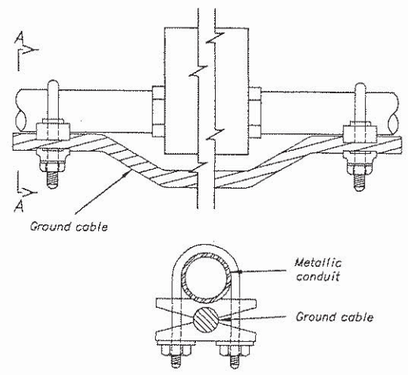


NOTE

CLAMPS SHALL BE EQUAL TO BURNDY TYPE GAR OR GD AND BARE COPPER CABLE IN ACCORDANCE WITH THE TABLE IN FIGURE 1 OR A BONDING JUMPER EQUAL TO O.Z. TYPE BJ (WITH BRONZE FITTINGS) MAY BE USED.

FIGURE 3

BONDING CONDUITS AROUND JUNCTION BOXES



SECTION A–A

NOTE

CLAMPS SHALL BE EQUAL TO BURNDY TYPE GAR OR GD AND BARE COPPER CABLE IN ACCORDANCE WITH THE TABLE IN FIGURE 1 OR A BONDING JUMPER EQUAL TO O.Z. TYPE BJ (WITH BRONZE FITTINGS) MAY BE USED.

NOTES

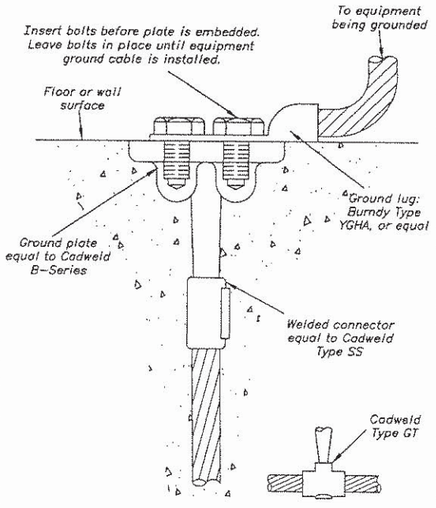
1. Ground cables for connection to equipment shall be of sufficient length to bolt to equipment when ultimately installed. Terminations as shown in Figure 4 Dwg 40-D-4334 shall be used in lieu of stubouts. Approximate locations only are shown on drawings. Exact locations to be determined in field.
2. Refer to conduit drawings or general arrangement drawings whenever available, for more exact location of equipment.
3. Metal conduits shall be grounded at both ends. If a break occurs in a run of metal conduit, the conduit shall be bonded across the break. In case the above is not feasible, the each section shall be grounded separately. Each contractor shall ground each metal conduit run, or portion therof, that he installs. Junction or pull boxes not containing protective equipment in which the conduits are installed with a locknut and bondnut shall not be considered a break when the voltage is below 240 volts to ground, but shall be so considered for higher voltages. All junction or pull boxes in runs of non-metallic conduit shall be individually grounded. All boxes containing overload protective devices shall be individually grounded.
4. Ground cable shall be No.4 A.W.G. or larger.
5. All paint, enamel, and scale shall be removed from point of contact on metal surfaces before applying ground connections.
6. All bolts, machine screws, nuts and washers used in making grounding connections shall be silicon bronze.
7. Cable shields and one conductor of multiconductor cable shall be grounded at both ends.
8. Thermoweld, Cadweld, or an approved equivalent process shall be used in making connections between cables where embedded in concrete, direct buried, or under plant superstructure.
9. Where Thermoweld, Cadweld, or an approved equivalent process is used it shall be performed with heavy duty welding equipment in accordance with manufacturer's instructions and the material shall be new fresh stock.
10. All ground connectors shall be UL listed. All below grade connectors to be in accordance with IEEE 837.

REFERENCE DRAWINGS

TYPICAL GROUNDING DETAILS (SHT 2 OF 2)	40-D-4335
SWITCHYARDS & SUBSTATIONS – GROUNDING DETAILS	40-D-4753
PLATFORM GROUNDING DETAILS	40-D-4874
CABLE TRENCH GROUNDING	40-D-6182
GROUNDING SUPPORTS ON TUBULAR STEEL STRUCTURES	40-D-6309
FENCE GROUNDING DETAILS	40-D-6376

FIGURE 4

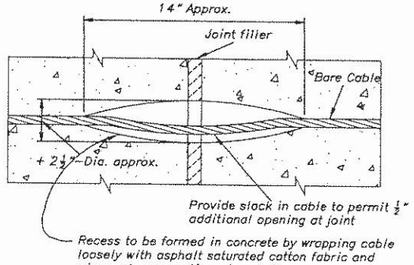
EMBEDDED GROUND CONNECTOR WITH EQUIPMENT GROUND CABLE



SIDE VIEWS

FIGURE 5

CROSSING EXPANSION AND CONTRACTION JOINTS WITH GROUNDING CABLE



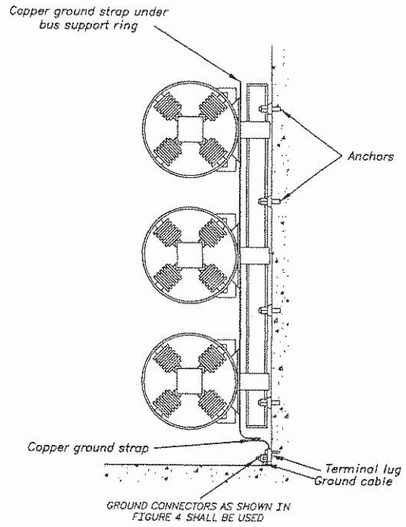
+ This dimension is approximate for No. 4/0 cable only. For larger cables, increase diameter of wrapping accordingly

NOTE

THE CROSSING OF EXPANSION JOINTS WITH EMBEDDED GROUND CABLE SHOULD BE AVOIDED WHENEVER POSSIBLE. THE EMBEDDED GROUNDING SYSTEM FOR EACH UNIT OR BLOCK SHOULD BE SELF CONTAINED.

FIGURE 6

GROUNDING OF THREE PHASE BUS STRUCTURE



GROUND CONNECTORS AS SHOWN IN FIGURE 4 SHALL BE USED

REV. NO.		
3	2004-07-06 D – J. R. Z.	CHANGED NOTE 10, ADDED FIG.4 CONNECTOR REF., ADDED REF. DRAWINGS, OTHER MINOR REVISIONS.
3 – 10 – 00 D – L.G.		REDRAWN IN AUTOCAD R.14 FORMAT
12 – 2 –85 D – G.D.D.		REVISED TO SHOW CURRENT PRODUCTS OR PRACTICES.

THIS DRAWING SUPERSEDES IN PART DRAWING 40-D-4336, 01-14-2003

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UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

STANDARD DESIGNS

ELECTRICAL INSTALLATION

TYPICAL GROUNDING DETAILS

DRAWN R.Y.N. – S.J.S. SUBMITTED D. CLARK

TRACED J. M. H. RECOMMENDED H. H. PLUMB

CHECKED V.N.P. – R.E.H. – T.J.L. APPROVED L. N. McCLELLAN
ACTING CHIEF ENGINEER

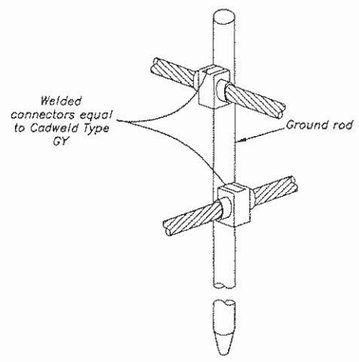
DENVER, COLORADO MAY 1, 1947
SHEET 1 OF 2

40-D-4334

CAD SYSTEM
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CAD FILENAME
40_D4334.dwg
DATE AND TIME PLOTTED
JULY 2, 2004 13:07
PLOTTED BY
DENVER

FIGURE 1

GROUND MATS



GROUND ROD DETAILS

FIGURE 2

GROUND MATS

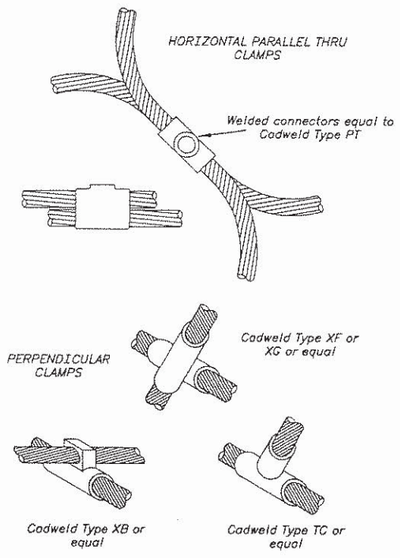
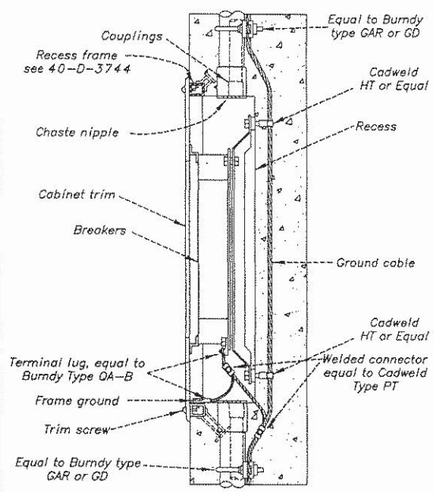


FIGURE 3

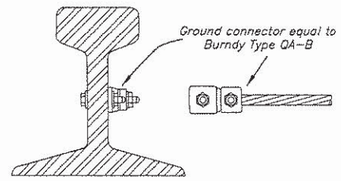
LIGHTING OR MISC POWER CABINETS



SECTIONAL ELEVATION

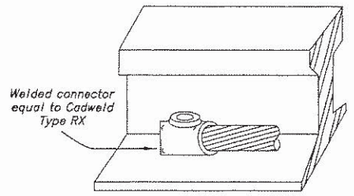
FIGURE 4

RAILS



EXPOSED INSTALLATION

CONNECTION TO RAIL



EMBEDDED INSTALLATION

CONNECTION TO RAIL

NOTES

1. See drawing 40-D-4334 for notes and list of reference drawings.

GROUND SYMBOLS

(Used on Plan Drawings)

- Indicates ground cable embedded in concrete
- Indicates ground cable concealed but not embedded in concrete
- Indicates ground cable exposed
- Indicates ground rod
- Indicates ground connection
- Indicates ground cable riser
- Indicates embedded ground plate

FIGURE 5

FLOOR FRAMES

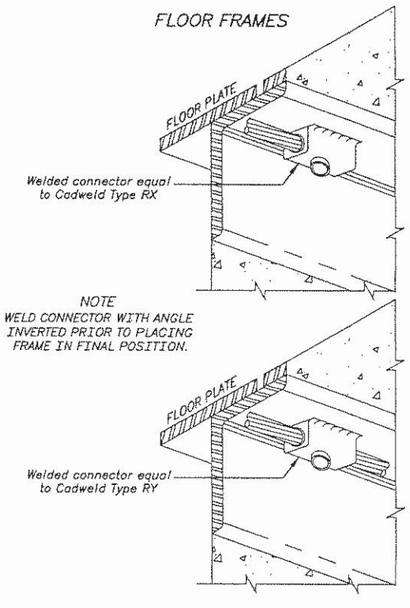
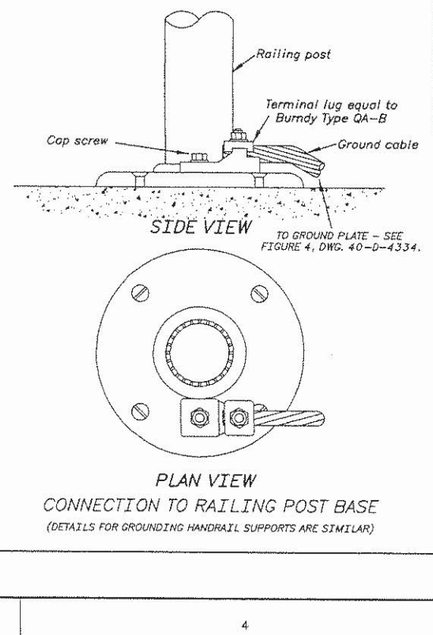


FIGURE 6

RAILING POST BASES AND HANDRAIL SUPPORTS



SIDE VIEW

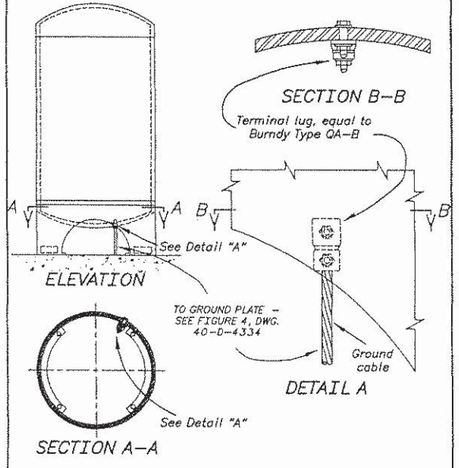
PLAN VIEW

CONNECTION TO RAILING POST BASE

(DETAILS FOR GROUNDING HANDRAIL SUPPORTS ARE SIMILAR)

FIGURE 7

OIL TANK GROUNDING DETAILS



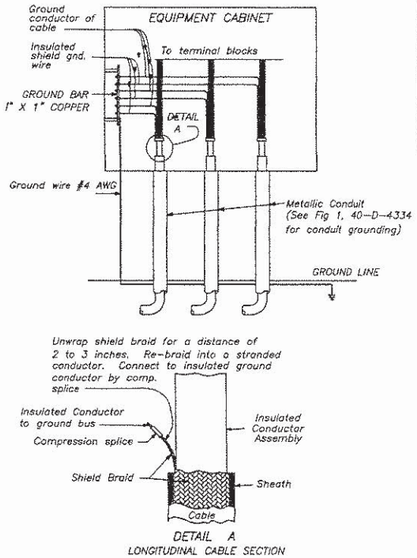
ELEVATION

DETAIL A

SECTION A-A

FIGURE 8

CONTROL CABLE SHIELD



DETAIL A

LONGITUDINAL CABLE SECTION

REFERENCE DRAWINGS

ELECTRICAL INSTALLATION - TYPICAL GROUNDING DETAILS (SHT 1 OF 2) 40-D-4334

PRIV NO		
3	2004-07-08 D - J. R. Z.	MINOR REVISIONS; ADDED FIG.'S 2 AND 6.
	3 - 10 - 00 D - L.G.	REDRAWN IN AUTOCAD R.14 FORMAT.
	12 - 2 -85 D - G.D.O.	REVISED TO SHOW CURRENT PRODUCTS OR PRACTICES.

THIS DRAWING SUPERSEDES DRAWING 40-D-4336 IN PART (2003-01-14); AND DRAWING 104-D-944 (2004-07-06)

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STANDARD DESIGNS

ELECTRICAL INSTALLATION

TYPICAL GROUNDING DETAILS

DRAWN R.Y.N. - S.J.S. SUBMITTED D. CLARK

TRACED J. M. H. RECOMMENDED H. M. PLUMB

CHECKED V.M.P. - R.F.H. - T.J.I. APPROVED L. N. McCLELLAN
ACTING CHIEF ENGINEER

DENVER, COLORADO APRIL 24, 1947

SHEET 2 OF 2

40-D-4335

CAD SYSTEM AutoCAD Rel. 16.0s
CAD FILENAME
40-D-4335.dwg
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FIGURE 1

GROUNDING TO FLAT SURFACE

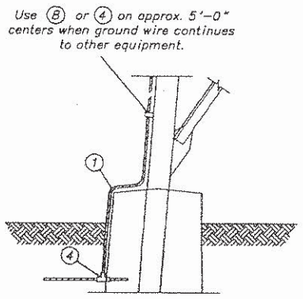
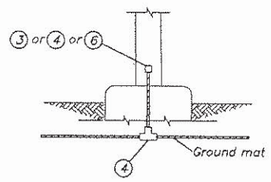
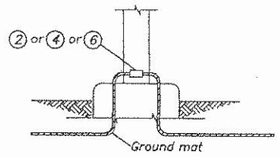


FIGURE 2

GROUNDING TO FENCE POST OR PIPE-TYPE SWITCHYARD LIGHTING POLE



OPTION A



OPTION B

FIGURE 3

GROUNDING TO CABLE TRENCH OR RACK

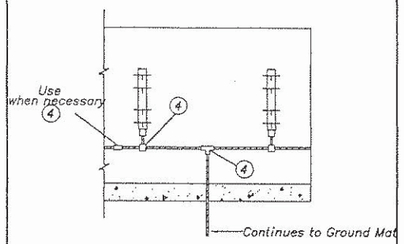
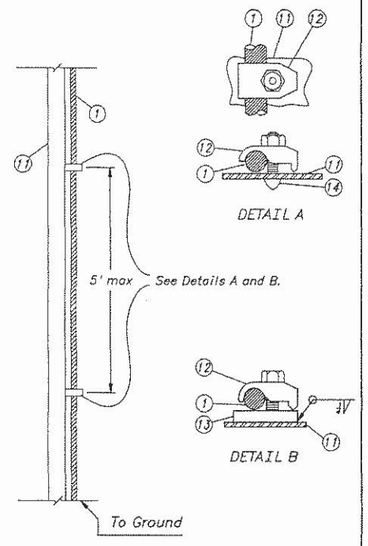


FIGURE 4

GROUNDING TO TUBULAR STEEL STRUCTURE



LIST OF MATERIALS

ITEM NO.	DESCRIPTION
1	Copper cable, bare, 4/0 AWG minimum
2	Bolted ground connector similar to Burndy type GB
3	Bolted ground clamp similar to Penn-Union type GWL
4	Exothermic welded ground connector similar to Cadweld or ThermOweld
5	Bolt: $\frac{1}{2}$" silicon-bronze with nut and lock washer. Length as required for Item B.
6	Bolted ground connector similar to Burndy type GAR
7	Compression-type ground connector
8	Cable to flat bar connector similar to Burndy QA or GB
9	Ground rod, 10'x3/4", copper-clad steel
10	Copper-clad steel stranded cable, bare, 7 No. 5
11	Tubular steel structure
12	Bolted ground connector similar to Burndy type GBM
13	Steel plate, 1-inch thick (Notes 5, 7)
14	3/8" stud, power driven (Note 6)
15	Copper-clad steel stranded cable, bare, 7 No. 9

NOTES

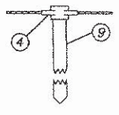
1. See drawing 40-D-4334 for general notes and list of reference drawings.
2. See drawing 40-D-4335 for typical ground system symbols.
3. All ground cables to be stubbed out approx. where indicated on plan drawings and be of sufficient length to bolt to equipment.
4. Ground all metal gates or each half of all double gates to the gate post with flexible metal braid installed across gate hinges.
5. Steel plate size to be larger than projected area of clamp.
6. Power driven stud equal to Ramset Fastening System as manufactured by Illinois Tool Works, Wood Dale, IL.
7. Plate to be welded to structure and be drilled and tapped for a $\frac{3}{8}$" US standard bolt.
8. All grounding connections shall be as close as possible to the fence post.
9. Weave ground cable thru fencing and attach to fence with at least three (3) connectors.

REFERENCE DRAWINGS

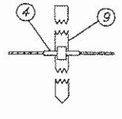
TYPICAL GROUNDING DETAILS (SHT 1 OF 2) . . 40-D-4334
TYPICAL GROUNDING DETAILS (SHT 2 OF 2) . . 40-D-4335

FIGURE 5

GROUND ROD CONNECTIONS



OPTION A



OPTION B

FIGURE 6

GROUNDING TO CABLE TUNNEL CABLE TRAYS

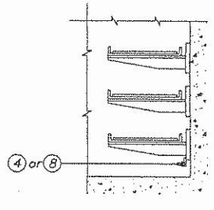
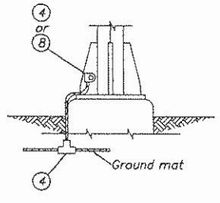
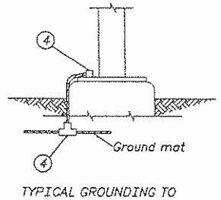


FIGURE 7

GROUNDING TO STRUCTURE BASES



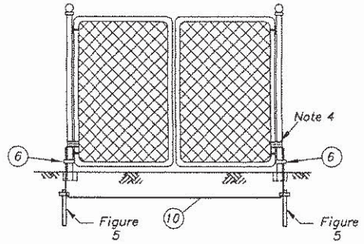
TYPICAL PIPE BUS SUPPORT OR PIPE TIE DOWN CONNECTION



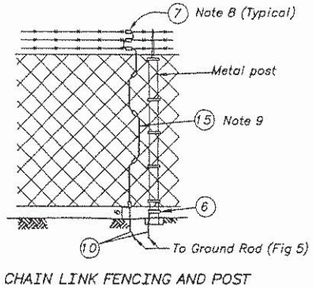
TYPICAL GROUNDING TO TUBULAR STRUCTURE

FIGURE 8

FENCE GROUNDING



GATE AND FENCE POSTS



CHAIN LINK FENCING AND POST

THIS DRAWING SUPERSEDES DRAWING 40-D-6309, 2004-09-30 IN PART

REV NO		
4	2004-09-30 D - J. R. Z.	ADDED FIGURES 4 AND 8; RENUMBERED FIGURES ACCORDINGLY; ADDED NOTES 8 & 9; ADDED ITEMS 7 & 15.
3	2004-07-06 D - J. R. Z.	ADDED ITEMS 2 & 3 TO FIG. 2 AND GROUND CABLE SIZE (ITEM 1); REPLACED 'DETAIL' VIEWS w/ 'FIGURES'; OTHER MINOR REVISIONS.
3 - 8 - 00 D - L. G.		REDRAWN IN AUTOCAD R.14 FORMAT
04-20-70 D - G. W. C.		ADDED DETAIL H

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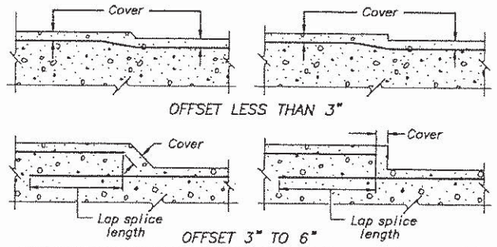
TYPICAL GROUNDING DETAILS FOR SWITCHYARDS AND SUBSTATIONS

DRAWN - J.L.L. - P.J.S. CHECKED - H.H. PLUMB
TRACED - L.M.G. RECOMMENDED - Q.L. RICE
CHECKED - J.A.W. - D.C.M. - M.H.K. APPROVED - L.N. McCLELLAN
CHIEF ENGINEER

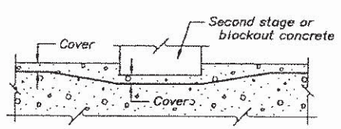
DENVER, COLORADO SHEET 1 OF 1 APRIL 5, 1949

40-D-4753

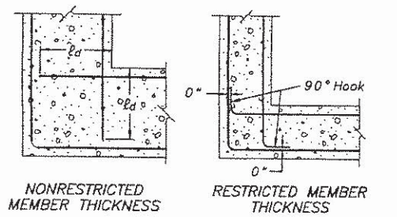
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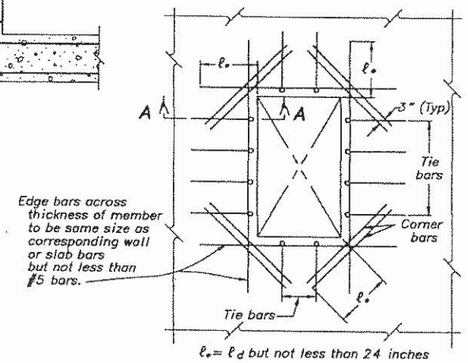
TYPICAL OFFSET DETAILS



TYPICAL BLOCKOUT RECESS DETAILS
(Second stage concrete shown)



TYPICAL CORNER DETAILS



SECTION A-A

OPENINGS :

TABLE FOR ADDITIONAL REINFORCEMENT

MEMBER THICKNESS	TIE BARS	EDGE BARS	CORNER BARS
Less than 9"	None	1 - ctr.	2 - #4 ctr.
9" thru 1'-6"	None	2 - (1 ef)	4 - #4 (2 ef)
1'-7" thru 3'-0"	#4 @ 1-0	3 - eq. spc.	4 - #4 (2 ef)
Over 3'-0"	#6 @ 1-0	Spc. @ 1-0	4 - #5 (2 ef)

Omit edge and tie bars along sides of openings where dimension is less than 1'-6".

Omit corner bars at sides of openings adjacent to floors, walls, or beams.

Omit corner bars if both dimensions of opening are less than 1'-6".

RECESSES :

Use corner bars in face of recesses deeper than 4" if either dimension of recess is equal to or greater than 1'-6".

ADDITIONAL REINFORCEMENT AROUND OPENINGS AND RECESSES

GENERAL NOTES 1/

UNLESS OTHERWISE SHOWN ON THE REINFORCEMENT SPECIFICATIONS DRAWINGS, THE DETAILS AND NOTES SHOWN ARE MINIMUM REQUIREMENTS AND TYPICAL FOR ALL REINFORCEMENT DRAWINGS THAT REFER TO THIS DRAWING

ABBREVIATIONS :

bf = bottom face	br = bottom row	bl = bottom layer
tf = top face	tr = top row	tl = top layer
nf = near face	nr = near row	ml = middle layer
ff = far face	fr = far row	ns = near side
ef = each face	er = each row	fs = far side
if = inside face	ir = inside row	es = each side
of = outside face	or = outside row	ew = each way
	mr = middle row	ec = each corner

spc. = space or spaces
eq. spc. = equally spaced, equal spaces
d_b = nominal diameter of reinforcing bar
uv = uniformly varying lengths of bars between lengths shown
cl. = clear
ctr. = center or centers
add'l = additional
ℓ_d = development length

SYMBOLS :

Bars shown thus #8@1-0 or #6@8 indicate a group of the same size bars equally spaced.
An open circle at the end of a bar indicates a bend with the bar turned away from the observer.
A closed circle at the end of a bar indicates a bend with the bar turned towards the observer.
Splices shown thus indicate a lap splice, not a bend in the bar.
Mechanical splice

DIMENSIONS :

Dimensions are to the centerline of the bars except for embedment of hooks, which are dimensioned to the outside of the bar.

Clear cover dimensions are marked "cl." and are dimensioned to the outside of the bar.

COVER :

Place the reinforcement so that the clear distance between face of concrete and nearest reinforcement is 1½" for #5 bars and smaller, 2" for #6 bars through #8 bars and 3" for #9 bars through #11 bars. Provide 3" clear distance from face of concrete for all bars when the concrete is placed against earth or rock. Clear distance is to the design dimension line.

Reinforcement parallel to construction joints shall have a minimum of 2" clear cover.

PLACING :

Reinforcement at small openings (max 1'-6") in walls and slabs may be spread apart not more than 1.50 times the bar spacing.

Reinforcement shall be adjusted laterally to maintain a clear distance of at least 1" between the reinforcement and keys, waterstops, anchor bolts, form ties, conduits, and other embedded materials. In heavily reinforced areas, relocation of the embedded material or cutting of reinforcement must be approved.

When bars are bent due to offsets less than 3" and recesses less than 3" deep, the slope of the inclined portion must not exceed 6 to 1.

Reinforcement parallel to anchor bolts or other embedded material shall be placed to maintain a clear distance of at least 1.33 times the maximum size aggregate.

SPACING :

The first and last bars in walls and slabs, stirrups in beams, and ties in columns are to start and end at a maximum of one half of the adjacent bar spacing. The minimum edge spacing shall be the smaller of either $2.5d_b$ or 0.5 of the adjacent bar spacing. For #9 through #11 bars where minimum centerline bar spacing is 6" and the lap splice lengths requiring staggered placement shown in Tables 3-60 and 4-60 are used, the minimum edge spacing shall be 3".

ACCESSORIES :

Bar supports, spacers, and other accessories are not shown on the design drawings. The recommendations of the ACI Detailing Manual-2004 (SP-66), or other approved supporting systems may be used.

DRAWING REFERENCES :

Numerals in parentheses ( ) following notes and section letters or numbers indicate the number of the drawing upon which the section or detail is shown; for example (524) denotes Drawing No. 557-D-524.

STANDARD HOOKS :

1. 180-degree bend plus $4d_b$ extension, but not less than 2½" at the free end of the bar.
2. 90-degree bend plus $12d_b$ extension at free end of the bar.

STIRRUP AND TIE HOOKS :

1. #5 bar and smaller, 90-degree bend plus $6d_b$ extension at the free end of the bar.
2. #6, #7, and #8 bars, 90-degree bend plus $12d_b$ extension at the free end of the bar.
3. #8 bars and smaller, 135-degree bend plus $6d_b$ extension at the free end of the bar.

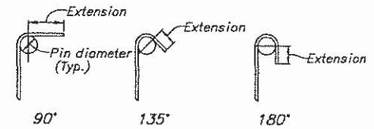


TABLE OF PIN DIAMETERS IN INCHES

BAR NO.	3	4	5	6	7	8	9	10	11
Standard bends	2½	3	3½	4½	5½	6	9½	10¾	12
Stirrup and tie bends	1½	2	2½	4½	5½	6			

REINFORCEMENT DOWELS :

Dowels indicated on the drawing, such as #8(d), shall be embedded a length equal to ℓ_d and shall have a projection equal to that required for lap splicing to a bar of the same diameter.

PLAIN DOWELS :

Plain dowels across contraction joints shall be smooth bars uniformly coated with a film of oil before concrete placement. Viscosity of the oil shall have a SAE rating of not less than 250.

CODE AND DETAILING REFERENCES :

ACI Building Code Requirements for Structural Concrete (ACI 318-05).
ACI Detailing Manual - 2004 (SP-66)

NOTES TO DESIGNERS AND DETAILERS :

Splice lengths shown in the tables on this drawing are for Class B tension lap splices in accordance with ACI 318-05. Assumed conditions for these tables in addition to the requirements shown on this drawing are uncoated reinforcement, normal weight concrete, and the transverse reinforcement index (K_{tr}) equal to zero. Splices or development lengths other than those shown in the tables must be detailed on the reinforcement specifications drawings.

Some factors which require additional consideration are: Beams or columns with ties, lightweight aggregate concrete, epoxy-coated reinforcement, excess reinforcement, bars in compression, bundled bars, and special seismic provisions per ACI 318-05 (Chapter 21 - Special Provisions For Seismic Design).

The centerline to centerline spacing requirements shown in TABLES 3-60 and 4-60 shall not be used when using crack control criteria for beams and one-way slabs described in ACI 318-05, Section 10.6.4. The spacing requirements shall be calculated using Eq. 10-4.

Recalculation of lap splice lengths and development lengths may be required for changes in combinations of controlling variables per ACI 318-05, Section 12.2.

Lap splices and development lengths for horizontal bars in walls are designated as top bar splices and development lengths unless otherwise noted or detailed on the reinforcement specifications drawings.

Development lengths for deformed bars in tension terminating in a standard hook shall be calculated in accordance with ACI 318-05, Section 12.5. In cases where a restricted member thickness does not allow for the full development length, the designer shall use a reduced tensile capacity

1/ Unless otherwise shown on the reinforcement specifications drawings or this drawing, follow the recommendations established by the ACI Detailing Manual - 2004 (SP-66).

SPLICES :

The minimum length of lap for splicing parallel bars shall be as given in TABLES 3-60 and 4-60.
Staggered splices shall be separated to give 12 inches clear between ends of adjacent splices.
Bars spliced by noncontact lap splices shall not be spaced transversely farther apart than one-fifth the required lap splice length, nor 6" on centers.
When reinforcing bars of different size are to be spliced, the length of lap shall be governed by the smaller diameter bar.
Splices are to be made so that the required clear distances to face of concrete will be maintained.

f'c = 3000 psi		TABLE 3 - 60		fy = 60,000 psi	
Bar size No. *** IP (SM)	MINIMUM ℄ to ℄ BAR SPACING (INCHES)	LAP SPLICE LENGTH (INCHES)		DEVELOPMENT LENGTH ℓ_d (INCHES)	
		TOP BARS *	OTHER BARS	TOP BARS *	OTHER BARS
3 (10)	3	17	16	13	12
4 (13)	3	23	18	18	14
5 (16)	4	28	22	22	17
6 (19)	5	34	26	26	20
7 (22)	6	49	38	38	29
8 (25)	6	56	43	43	33
9 (29)	7	63	49	49	38
10 (32)	8	71	55	55	42
11 (36)	9	79	61	61	47
9 (29)	6	63 **	49 **	49	38
10 (32)	6	75 **	58 **	58	45
11 (36)	6	93 **	71 **	71	55

f'c = 4000 psi		TABLE 4 - 60		fy = 60,000 psi	
Bar size No. *** IP (SM)	MINIMUM ℄ to ℄ BAR SPACING (INCHES)	LAP SPLICE LENGTH (INCHES)		DEVELOPMENT LENGTH ℓ_d (INCHES)	
		TOP BARS *	OTHER BARS	TOP BARS *	OTHER BARS
3 (10)	3	16	16	12	12
4 (13)	3	20	16	15	12
5 (16)	4	25	19	19	15
6 (19)	5	29	23	23	18
7 (22)	6	43	33	33	25
8 (25)	6	49	37	37	29
9 (29)	7	55	42	42	33
10 (32)	8	62	47	47	37
11 (36)	9	68	53	53	41
9 (29)	6	55 **	42 **	42	33
10 (32)	6	65 **	50 **	50	39
11 (36)	6	80 **	62 **	62	48

TABLES 3-60 and 4-60 generated using ACI 318-05 Eq. 12-1

* Top bars are all horizontal bars so placed that more than 12 inches of fresh concrete is cast below the development length or splice. (See NOTES TO DESIGNERS AND DETAILERS)
** Splices must be staggered.
*** IP = Inch-Pound Bar Size Designation.
SM = Soft Metric Bar Size Designation.

7-23-07 D-BSB, PSF	REVISED TO CONFORM TO ACI 318-05. ADDED THREE NOTES TO NOTES TO DESIGNERS AND DETAILERS. OTHER MINOR REVISIONS
6-1-03 D-ATB, PE	REVISED TO CONFORM TO ACI 318-99. REVISED SYMBOLS, SPACING, NOTES TO DESIGNERS AND DETAILERS. ADDED SOFT METRIC BAR SIZES IN TABLES. MINOR REVISIONS.
6-1-97 D-GPG	CONVERTED TO AUTOCADD DRAWING. REVISED TO CONFORM TO ACI 318-95. OTHER MINOR REVISIONS.
2-29-92 D-R.O.A.	TOP BAR DEFINITION REVISED AND MINOR PUNCTUATION REVISION IN PLACING NOTE.
12-7-90 D-J.D.S.	REDRAWN TO NEW DRAFTING STANDARDS. REVISED CONCRETE COVER, NOTES TO DESIGNERS, TABLES, REINFORCEMENT AROUND OPENINGS, AND OTHER MINOR REVISIONS. REVISED TO CONFORM TO ACI 318-89.
9-27-84 D-NFP DG	REVISED PIN DIAMETER TABLE, REFERENCED THE ACI DETAILING MANUAL 1980. ADDED NOTES UNDER PLACING AND STANDARD HOOKS.
12-8-76 D-WRW	MINOR REVISIONS

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STANDARD DESIGNS

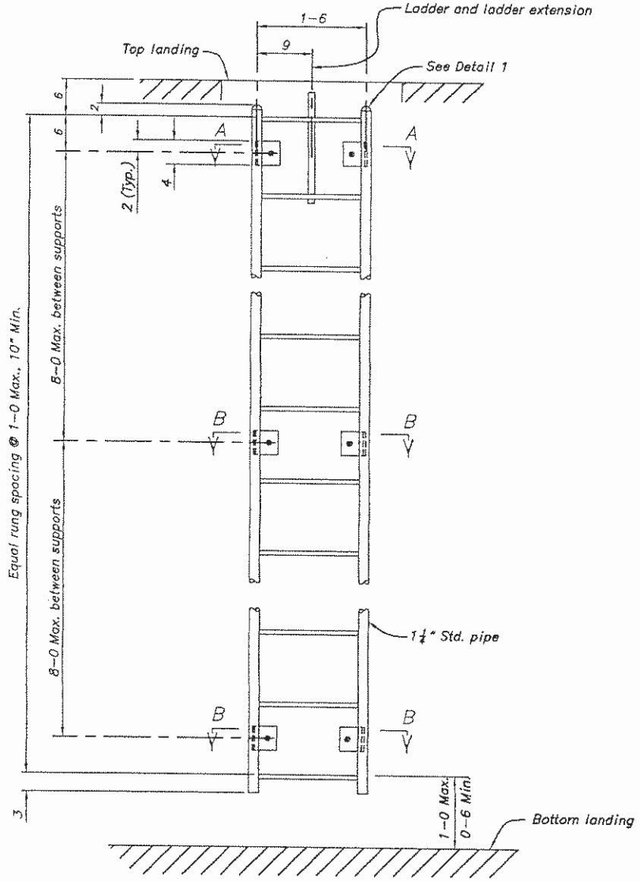
GENERAL NOTES AND MINIMUM REQUIREMENTS FOR DETAILING REINFORCEMENT

DESIGNED M. F. WARD J. G. STARBUCK TECHNICAL APPROVAL E. D. MORGAN
DRAWN M. CAMPBELL SUBMITTED JACK W. HILF
CHECKED GAYLE A. ERICKSON APPROVED H. G. ARTHUR, ACTING DIRECTOR, DESIGN AND CONSTRUCTION

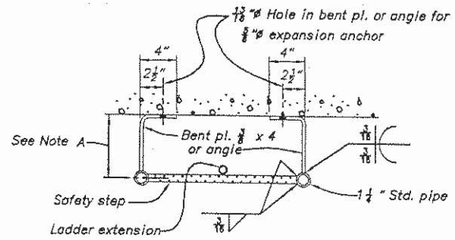
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DENVER, COLORADO | JUNE 12, 1972 | 40-D-6263

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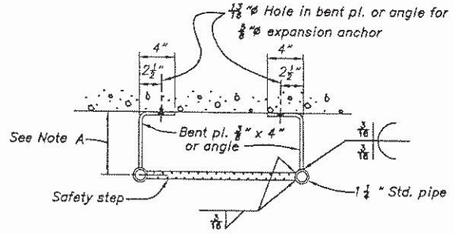
Note A: 7 inches unless noted otherwise on structure drawing.



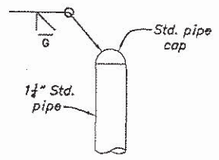
LADDER – TYPE 2



SECTION A–A



SECTION B–B



DETAIL 1

NOTES

All material is steel unless otherwise noted.
Details, welds and other connections shown are typical fo all similar conditions.
Dimensions shown are typical for similar details.
Galvanize all ferrous metalwork after fabrication. Provide vent holes as required.
Contractor determines length of ladders and rung spacings bosed of elevation difference. See structure drawings.
Grind all welds smooth.

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STANDARD DESIGN

MISCELLANEOUS METALWORK

LADDER – TYPE 2

DESIGN A. M. TUCKER	TECH. APPR. T. C. GRABER
DRAWN A. M. TUCKER	SUBMITTED JAMES W. HILL
CHECKED I. E. SADUSKY/DCD	APPROVED JOHN D. SMART, CHIEF, CIVIL ENG. DIVISION

CADD SYSTEM	CADD FILENAME	DATE AND TIME PLOTTED
AutoCAD Rel. 15.05	40-D-6601.DWG	DECEMBER 20, 2001 11:25
DENVER, COLORADO	JANUARY 8, 1993	40-D-6601

GENERAL NOTES

UNLESS OTHERWISE SHOWN, THESE NOTES ARE TYPICAL FOR ALL DRAWINGS THAT REFER TO THIS DRAWING.

ABBREVIATIONS

El. = Elevation
HP = High point
LP = Low point
WP = Working point
bf = bottom face
ef = each face
ff = far face
nf = near face
tf = top face
SP = Sewer pipe
TW = Tailwater
WS = Water surface, waterstop
CJ = Construction joint
EJ = Expansion joint
OCJ = Optional construction joint
VCJ = Vertical construction joint
Cr.J = Contraction joint
Ct.J = Control joint

WSA = Waterstop---Type A
WSB = Waterstop---Type B
WSD = Waterstop---Type D
WSE = Waterstop---Type E
WSF = Waterstop---Type F
WSG = Waterstop---Type G
WSH = Waterstop---Type H
MSN1 = Metal seal---Type N1
MSN2 = Metal seal---Type N2
MSZ = Metal seal---Type Z

CHAMFER

Chamfer edges of permanantly exposed concrete surfaces with a 45° bevel, $\frac{3}{4}$" x $\frac{3}{4}$".

CONCRETE PLACEMENT

Before placing concrete, see all drawings released to the contractor as suitable for construction, including manufacturer's drawings, for all embedded material which is required in the placement.

CONCRETE SYMBOLS

The different concrete placements are indicated by the following symbols:

Concrete --- First stage
Concrete --- Second stage
Concrete --- Blockout
Existing concrete or concrete in adjacent structures
Grout

DIMENSIONS

All dimensions to a joint are to the centerline of the joint unless otherwise shown.
Dimensions to beams, columns, and walls are from reference lines or other control points.
Dimensions in parentheses ( ) on plans are beam depths.
Beam and slab depths shall be measured from the top of the structural slab. Dimensions given for the depth of recesses are from the surface of the structural concrete.
Thicknesses shown for walls and slabs placed against soil or rock are minimum dimensions.

EMBEDDED MATERIALS

Before placing concrete, care shall be taken that all embedded items are in position and securely fastened in place. Anchor bolt locations and settings are shown on the structural steel, miscellaneous metal, concrete, and equipment drawings. Conduits and grounding cables are shown on the manufacturer's drawings and the electrical drawings. All projecting waterstops and metal seals shall be supported and protected from damage and exposure.

FINISHES

For location and classes of finishes for formed and unformed concrete surfaces, see the specifications drawings and/or paragraphs.

JOINTS

All construction joints, identified as CJ, shall be provided where shown on the drawings. All optional construction joints, identified as OCJ, are to reduce the volume of placements or to facilitate construction. If optional joints are provided they shall be only at the locations shown. Additional construction joints may be used subject to approval.

REFERENCES

Numerals in parentheses that follow notes, details and section letters or numbers indicate the number of the drawing upon which the section or detail is indicated or shown. For example, (524) denotes Drawing No. XXX-D-524. The letters XXX shown here will be numbers denoting the project.

THIS DRAWING SUPERSEDES DRAWING 40-D-7006

REV NO	BOR/ - 12 -05 / D - R.S.D.	REDRAWN IN AUTOCAD.
1		

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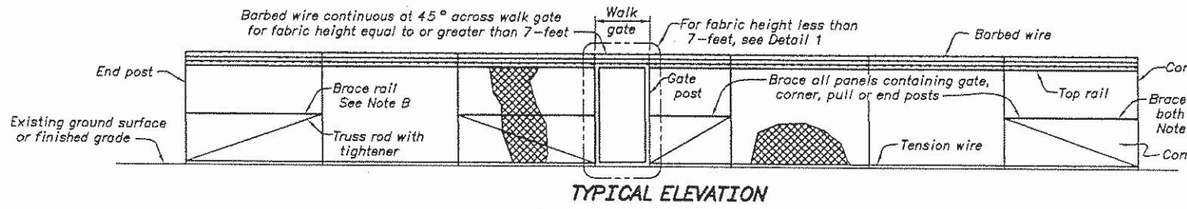
UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

STANDARD DESIGN

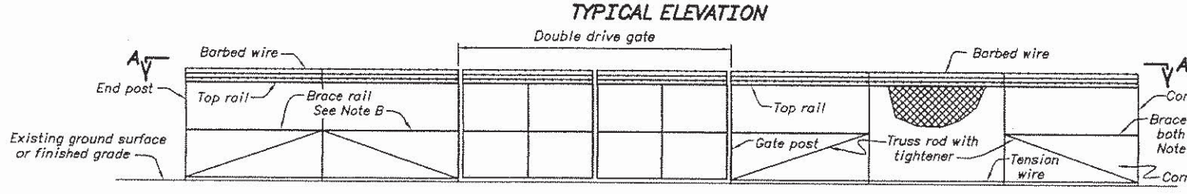
GENERAL CONCRETE OUTLINE NOTES

DESIGNED DL BORING	TECH. APPR.	
DRAWN DL BORING		
CHECKED GARY SNYDER	APPROVED	STRUCTURAL AND ARCHITECTURAL GROUP
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40-D-7012



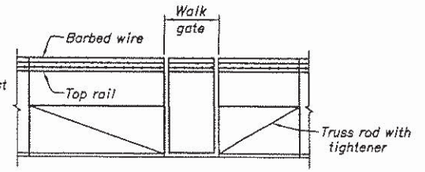
TYPICAL ELEVATION



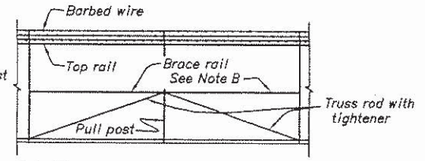
TYPICAL ELEVATION



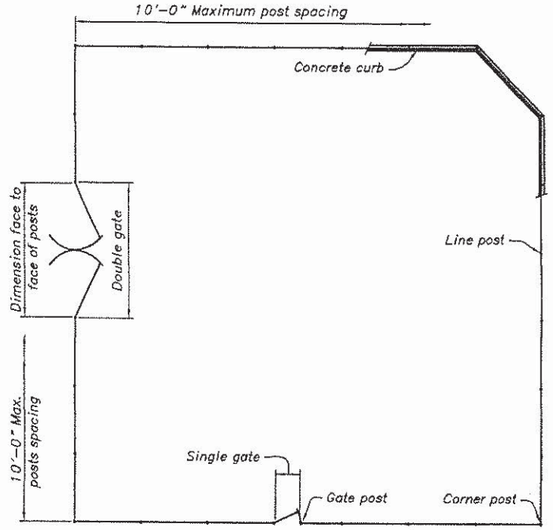
VIEW A-A



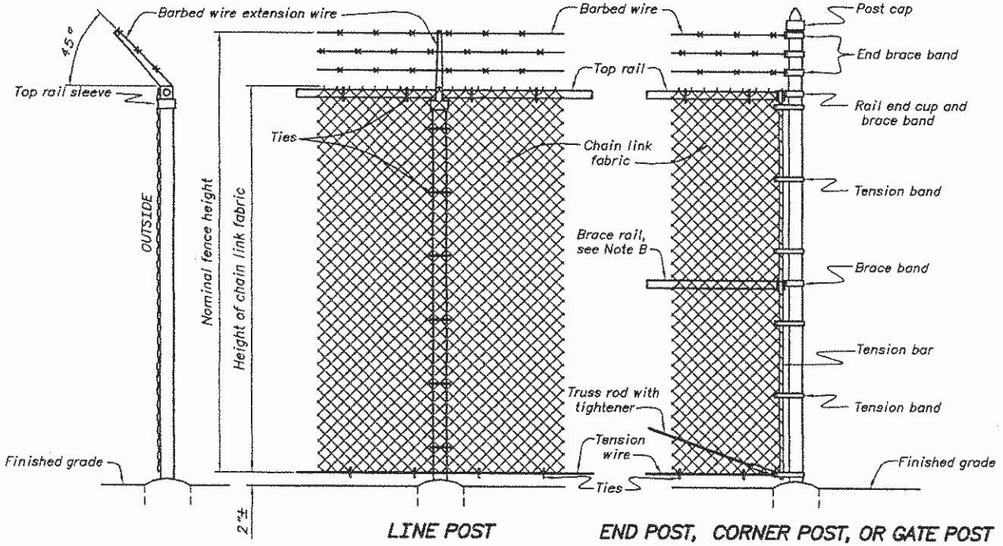
DETAIL 1



PANELS ADJOINING PULL POST

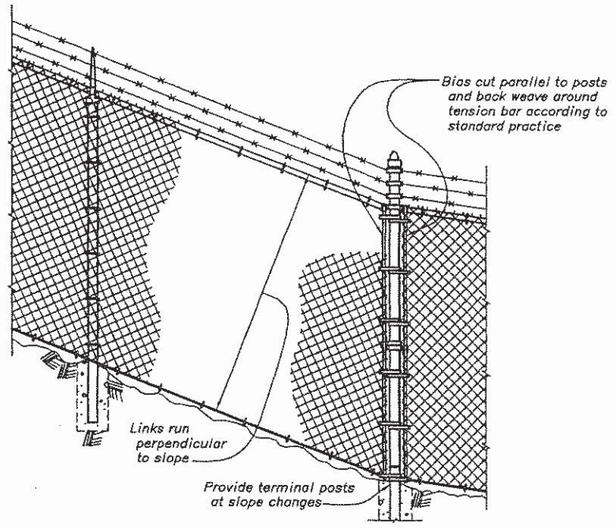


TYPICAL FENCING PLAN

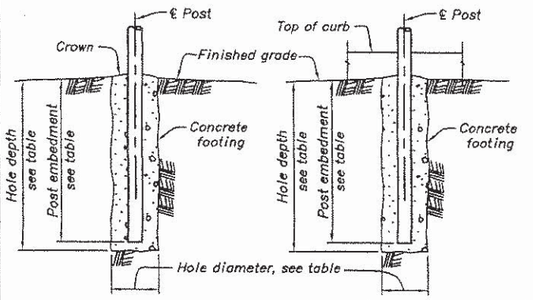


LINE POST

END POST, CORNER POST, OR GATE POST

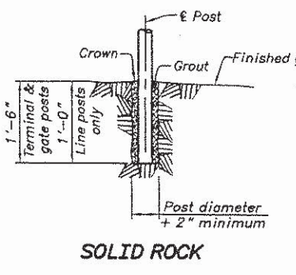


FENCE INSTALLATION ON STEEP SLOPES

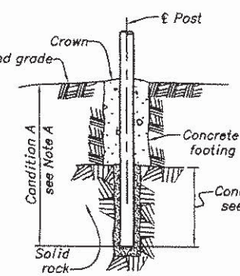


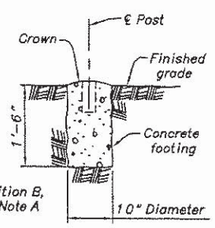
SOIL OR LOOSE ROCK

POST FOOTING UNDER CURB



SOLID ROCK





GATE STOP FOOTING

POST FOOTING IN SOLID ROCK WITH OVERBURDEN OF SOIL OR LOOSE ROCK

POST FOOTING SIZES IN SOIL OR LOOSE ROCK				
POST	FABRIC HEIGHT OR GATE LEAF WIDTH	HOLE DIAMETER	HOLE DEPTH	POST EMBEDMENT
Line	3 ft. to 4 ft.	6 inches	24 inches	22 inches
Line	5 ft.	8 inches	30 inches	28 inches
Line	6 ft. to 12 ft.	9 inches	38 inches	36 inches
Terminal	3 ft. to 5 ft.	10 inches	32 inches	30 inches
Terminal	6 ft. to 12 ft.	12 inches	38 inches	36 inches
Gate	≤ 6 ft.	12 inches	38 inches	36 inches
Gate	6 ft. to 13 ft.	16 inches	44 inches	42 inches
Gate	> 13 ft.	26 inches	50 inches	48 inches

Condition A: Depth required for footing in soil or loose rock.
Condition B: Depth required for embedment in rock.
Note A: Satisfy the minimum requirements for Condition A or Condition B.
Note B: Brace rails and truss rods are not required for fabric height of 6 feet or less.

NOTES

See specific site plan for overall fence dimensions and size, location and swing of gates.

Install pull posts at the end of each run, at maximum intervals of 500 feet, and at vertical and horizontal changes in alignment greater than 30 degrees.

Weld all joints between tubular gate frame members or use heavy fittings to provide rigid and watertight connections.

Gate dimensions are face to face of gate posts.

Provide latches, stops and keepers for all gates as specified.

End post, corner posts, and pull posts, are designated as terminal posts.

See site plans for curb details and locations where curb is required.

Chain link fabric shall be attached to fence framework in accordance with the Chain Link Fence Manufacturer's Institute (CLFMI) Product Manual.

Chain link fences are 6 foot high fabric unless otherwise noted on specific site plans.

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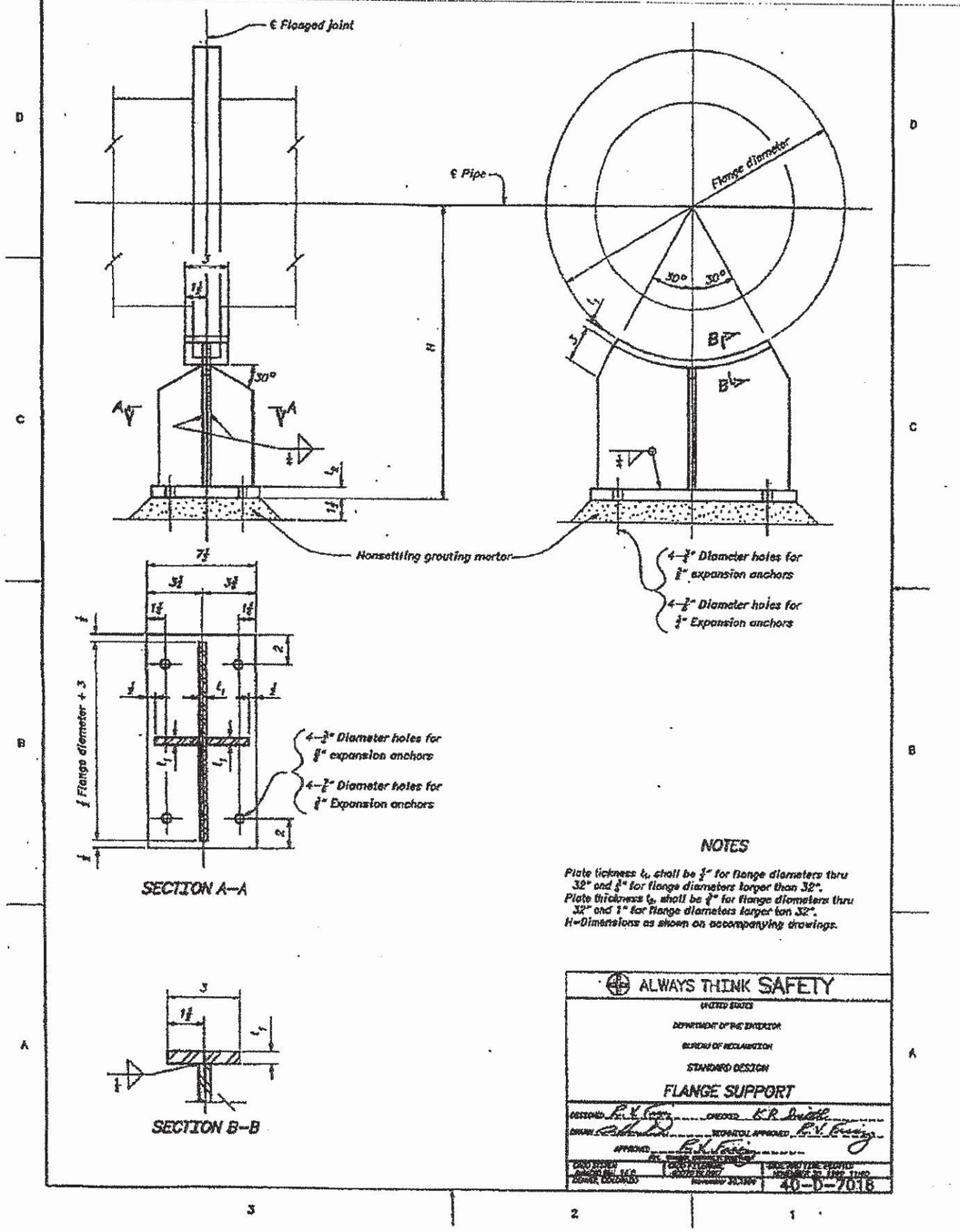
CHAIN LINK FENCING

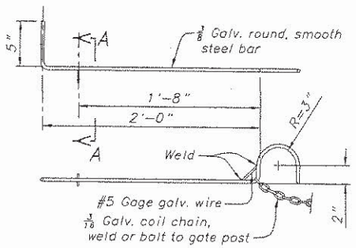
CHAIN LINK FENCING REQUIREMENTS SOIL INSTALLATION

DESIGNED G E SHERARD TECH. APPR.
DRAWN DL BORING
CHECKED TC GRABER APPROVED
STRUCTURAL AND ARCHITECTURAL GROUP

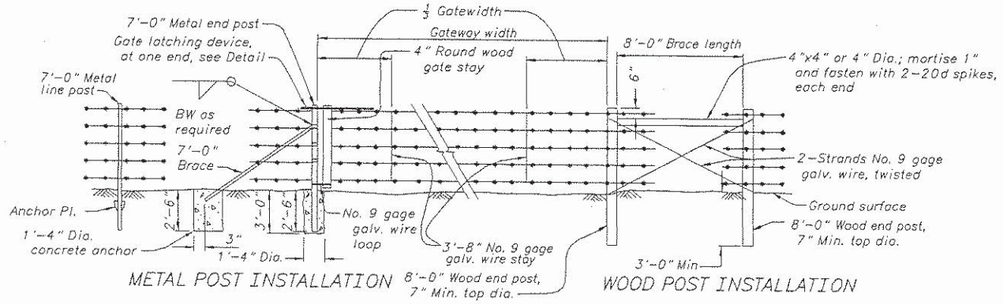
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DATE AND TIME PLOTTED NOVEMBER 20, 2001 13:57
MAY 1, 1998
40-D-7016

DRAFTING


℄ Flanged joint
℄ Pipe
Flange diameter
30°
30°
H
Nonsettling grouting mortar
4—¾" Diameter holes for ⅝" expansion anchors
4—¾" Diameter holes for ⅝" Expansion anchors
4—¾" Diameter holes for ⅝" expansion anchors
4—¾" Diameter holes for ⅝" Expansion anchors
½" Flange diameter + 3
SECTION A—A
SECTION B—B
NOTES
Plate thickness t_1 shall be ½" for flange diameters thru 32" and ⅝" for flange diameters larger than 32".
Plate thickness t_2 shall be ⅝" for flange diameters thru 32" and 1" for flange diameters larger ton 32".
H—Dimensions as shown on accompanying drawings.
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STANDARD DESIGN
FLANGE SUPPORT
DESIGNED R.K. Cox CHECKED E.R. Smith
DRAWN C.H.D. MATERIAL APPROVED R.V. Young
APPROVED R.K. Cox
40-D-7018



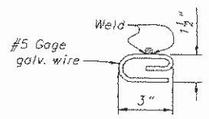
DETAIL OF GATE LATCHING DEVICE



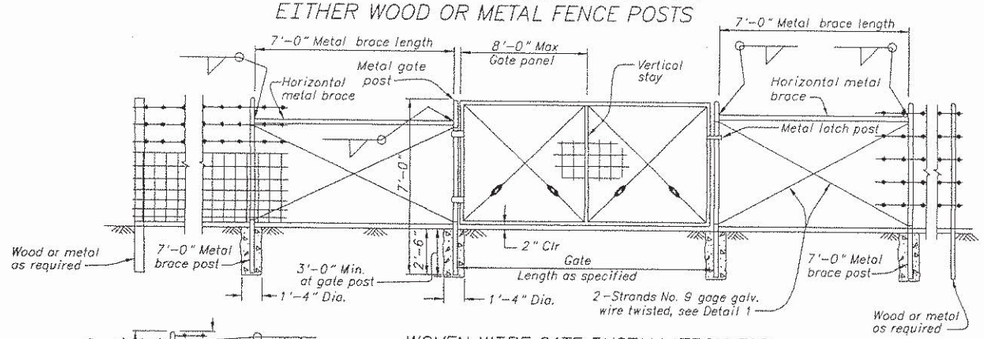
METAL POST INSTALLATION

WOOD POST INSTALLATION

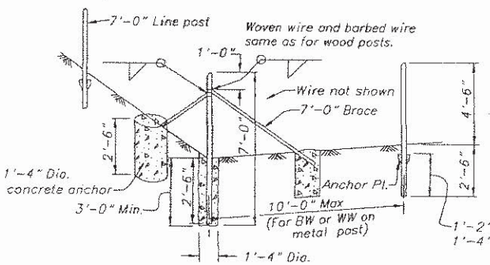
BARBED WIRE GATE INSTALLATION FOR EITHER WOOD OR METAL FENCE POSTS



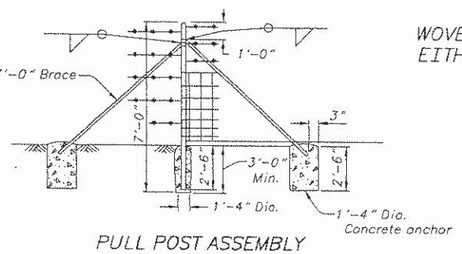
SECTION A-A



WOVEN WIRE GATE INSTALLATION FOR EITHER WOOD OR METAL POST FENCES



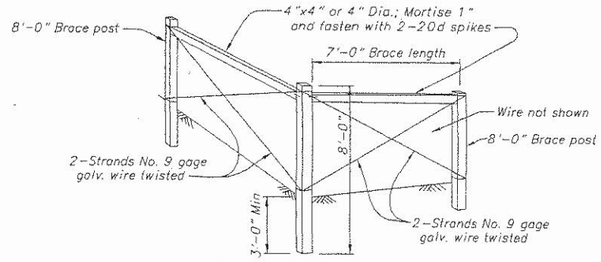
END, CURVE AND CORNER POST ASSEMBLY



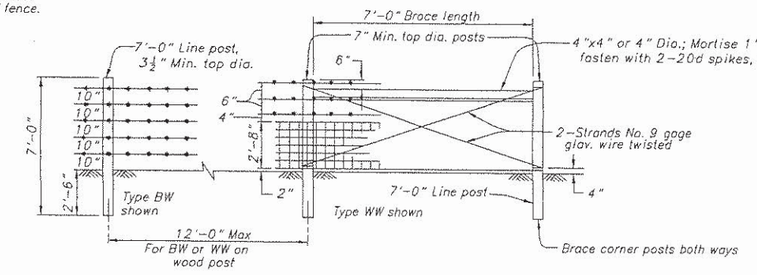
PULL POST ASSEMBLY

At 660' maximum intervals for WW fence.
At 1320' maximum intervals for BW fence.

METAL POST INSTALLATION



END, CURVE, AND CORNER POST ASSEMBLY

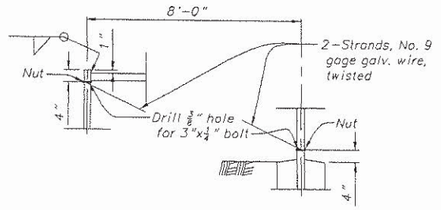


PANEL ADJOINING CORNER PANEL CORNER PANEL

PULL POST ASSEMBLY

At 660' maximum intervals for WW fence.
At 1320' maximum intervals for BW fence.

WOOD POST INSTALLATION



DETAIL 1
BRACE DETAILS FOR METAL POSTS

NOTES

Type BW = 5 lines of barbed wire. Type WW = woven wire and 3 lines of barbed wire.

Maximum length of fence without a corner post, end post, gate post, or brace post shall be 660 ft. for WW and 1320 ft. for BW. Additional pull posts shall be placed where directed by the contracting officer.

Fence on curve shall have brace posts spaced as follows:
- Curve radius less than 500 ft., every 2nd post.
- Curve radius 500-1000 ft., every 5th post.
- Curve radius over 1000 ft., every 7th post.

All metal gate posts for barbed-wire gates shall be 2½-inch dia. standard weight pipe.

All corner, end, and brace metal posts and post braces shall be 2-inch dia. standard weight pipe.

For gate post size for tubular metal frame gate, see specifications paragraphs.

For woven wire fencing sizes and spacing, see specifications paragraphs.

All wood posts to be placed with butt end down. Backfill hole with compacted fill.

Line post spacing for wood posts equals 12'-0" maximum. Line post spacing for metal posts equals 10'-0" maximum.

Standard fittings may be used in place of welding joints on braces.

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STANDARD DESIGN

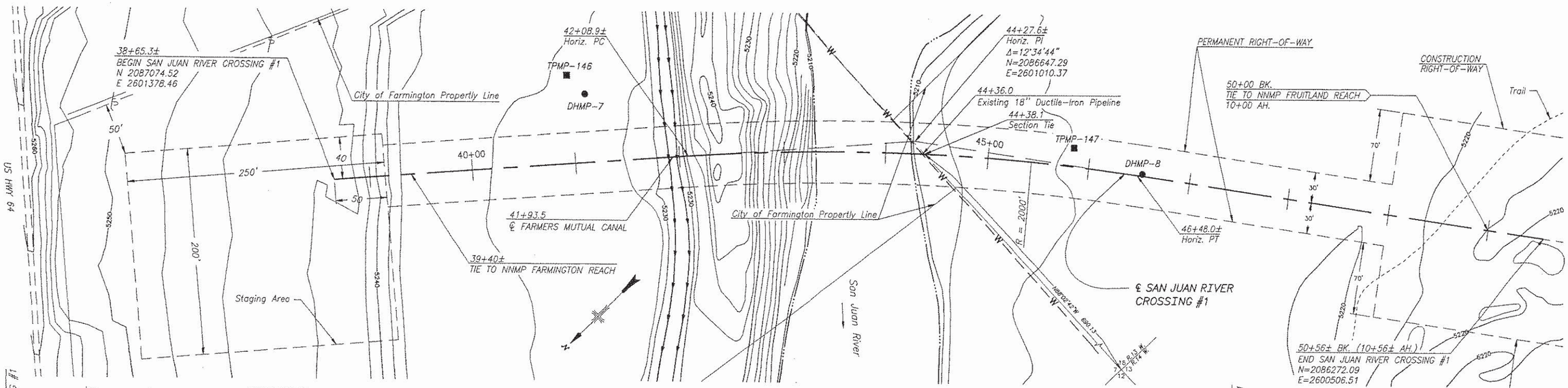
STOCK FENCING

BARBED WIRE AND WIRE MESH FENCES STEEL OR WOOD POSTS

DESIGNED G. E. SHERARD	TECH. APPR.	
DRAWN K. M. TUCKER		
CHECKED T. C. GRABER	APPROVED	STRUCTURAL AND ARCHITECTURAL GROUP
CADD SYSTEM AutoCAD Rel. 15.05 DENVER, COLORADO	CADD FILENAME 40-D-7020.DWG MARCH 8, 2000	DATE AND TIME PLOTTED NOVEMBER 20, 2001 14:02

40-D-7020

ATKOCKER

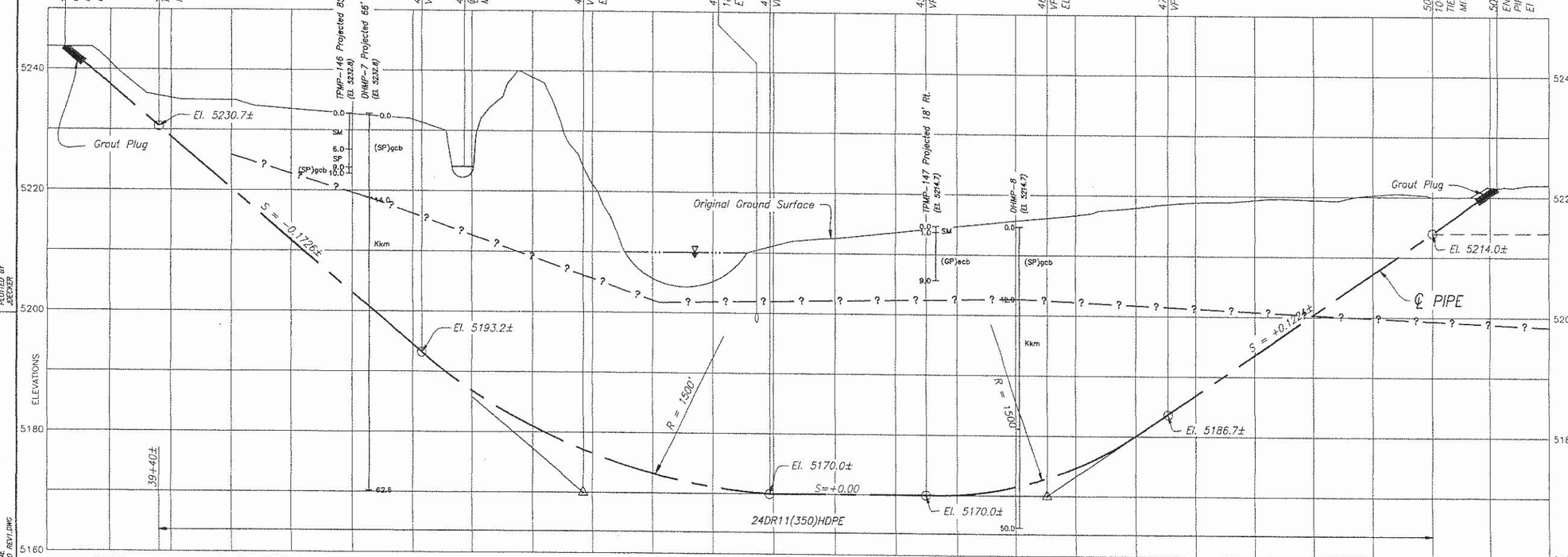


SYMBOLS

- Pipeline
- Air Valve
- Dirt Road
- Fence
- Ditch
- Canal
- Powerline
- Waterline
- Gasline
- River Waterline
- Sewer Line

PIPE CLASSIFICATION

Line pipe is designated on the profiles by an alphanumeric symbol. For HDPE pipe the symbol identifies the pipe as follows: the first number indicates the nominal pipe diameter in inches; the alphanumeric beginning with DR, indicates the dimension ratio as defined by AWWA C900 and C905; and the number in parenthesis is the maximum hydrostatic pressure head in feet measured at the centerline of the pipe. The HDPE pipe sizes are all Cast Iron (CI) size designations.



GENERAL NOTES

1. General Notes, Symbols, and Pipe Classification apply to all plan and profile drawings.
2. Stations are approximate and may be varied as directed.
3. For details on the NNMP Fruitland reach see For Information Only drawing (102).
4. Grid based on New Mexico State Coordinate System West Zone.
5. Ground to grid conversion factor 0.9996963.
6. Contour interval is equal to 2 feet.
7. Information is based on BLM Datum.
8. Directional Drill Contractor should use Back Stations.

ABBREVIATIONS

- DI – Ductile Iron
- AC – Asbestos Cement
- PVC – Polyvinyl Chloride
- PE – Polyethlene
- HDPE – High Density Polyethylene
- HB – Horizontal Bore
- TP – Top of Pipe
- HDD – Horizontal Directional Drill
- OH – Over Head
- DR – Dimension Ratio

GEOLOGY Date

REV NO	DESCRIPTION	DATE
1	ADDED PIPE CLASSIFICATION NOTE	2008-05-24

TECHNICAL APPROVAL SUBMITTED APPROVED

ALWAYS THINK SAFETY

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

ANIMAS-LA PLATA PROJECT COLORADO NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

HORIZONTAL DIRECTIONAL DRILL OPERATIONS

SAN JUAN RIVER CROSSING NO. 1

STATION 38+50 TO 50+00

PLAN AND PROFILE

FOR INFORMATION ONLY

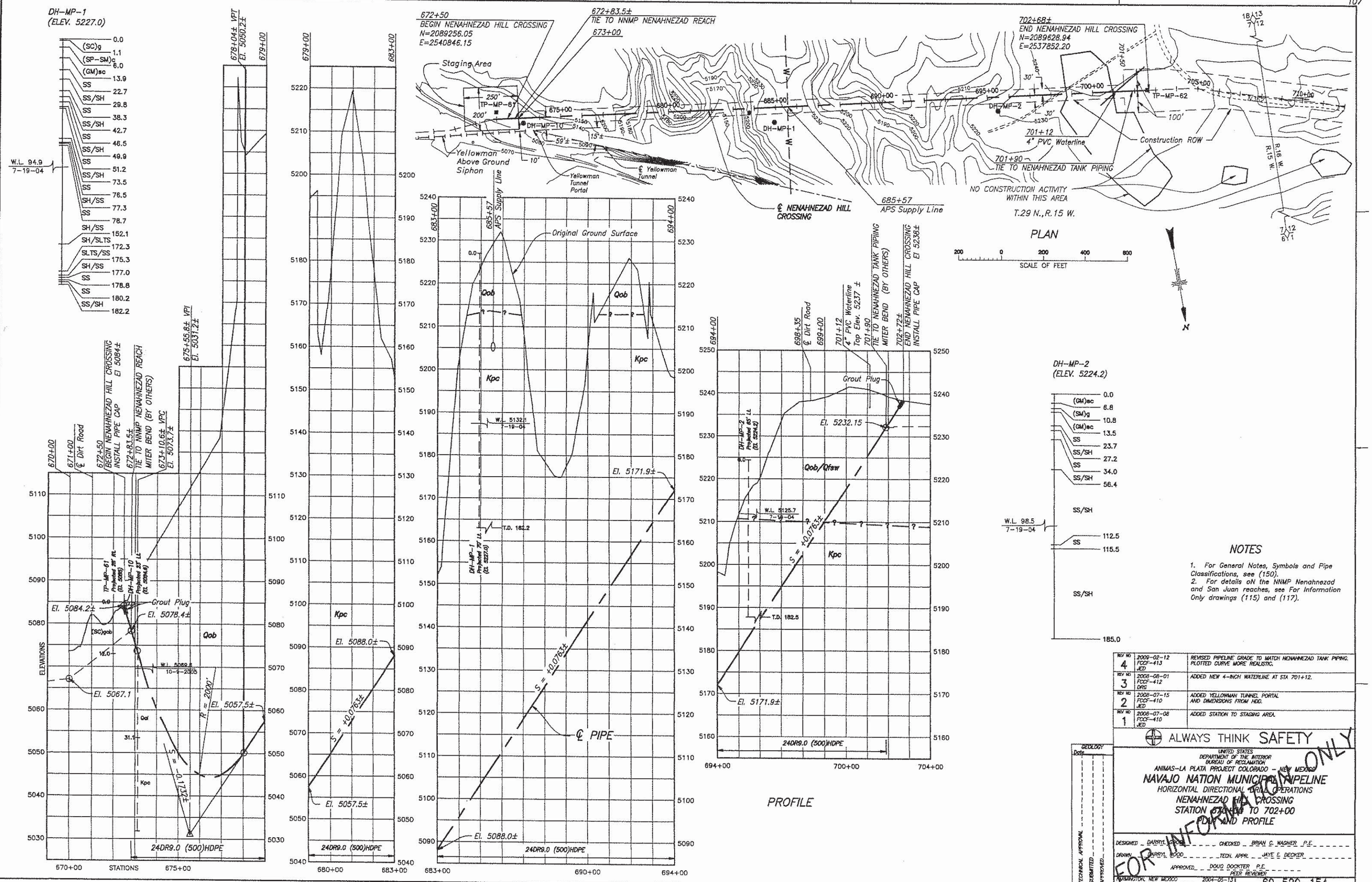
DESIGNED _ DARRYL BOOD _ CHECKED _ BRIAN C. WAGNER P.E.
DRAWN _ DARRYL BOOD _ TECH. APPR. _ JAYE E. DECKER
APPROVED _ DOUG DOCKTER P.E. PEER REVIEWER

FARMINGTON, NEW MEXICO SHEET 1 OF 1 2008-06-02

69-529-150

DATE AND TIME PLOTTED: FEBRUARY 17, 2009 15:40
PLOTTED BY: JDECKER

CAD SYSTEM: AutoCAD Rel. 17.2s
CAD FILENAME: 69-529-150 REV1.DWG



DATE AND TIME PLOTTED: FEBRUARY 17, 2009 15:41
PLOTTED BY: JDECKER

CAD SYSTEM: AutoCAD Rel. 17.2s
CAD FILENAME: 69-529-154 REVLOWG

NOTES

1. For General Notes, Symbols and Pipe Classifications, see (150).
2. For details on the NNMP Nenahnezad and San Juan reaches, see For Information Only drawings (115) and (117).

REV NO		
4	2009-02-12 FCCF-413 JED	REVISED PIPELINE GRADE TO MATCH NENAHNEZAD TANK PIPING. PLOTTED CURVE MORE REALISTIC.
3	2008-08-01 FCCF-412 DRG	ADDED NEW 4-INCH WATERLINE AT STA 701+12.
2	2008-07-15 FCCF-410 JED	ADDED YELLOWMAN TUNNEL PORTAL AND DIMENSIONS FROM HDD.
1	2008-07-08 FCCF-410 JED	ADDED STATION TO STAGING AREA.

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UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
ANIMAS-LA PLATA PROJECT COLORADO - NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

HORIZONTAL DIRECTIONAL DRILL OPERATIONS
NENAHNEZAD HILL CROSSING
STATION 670+00 TO 702+00
PLAN AND PROFILE

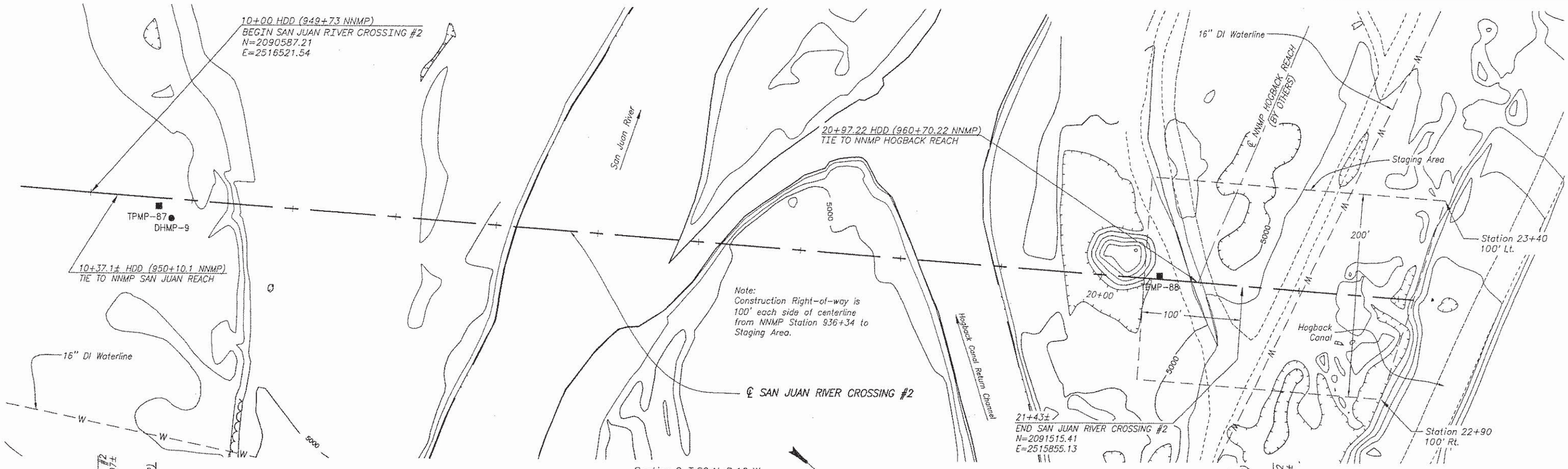
FOR INFORMATION ONLY

GEOLOGY Date
TECHNICAL APPROVAL SUBMITTED
APPROVED

DESIGNED DARRYL LOOD CHECKED BRIAN C. WAGNER P.E.
DRAWN DARRYL LOOD TECH. APPR. JAYE E. DECKER
APPROVED DOUG DOCKTER P.E.
PEER REVIEWER

FARMINGTON, NEW MEXICO 2004-05-13
SHEET 1 OF 1

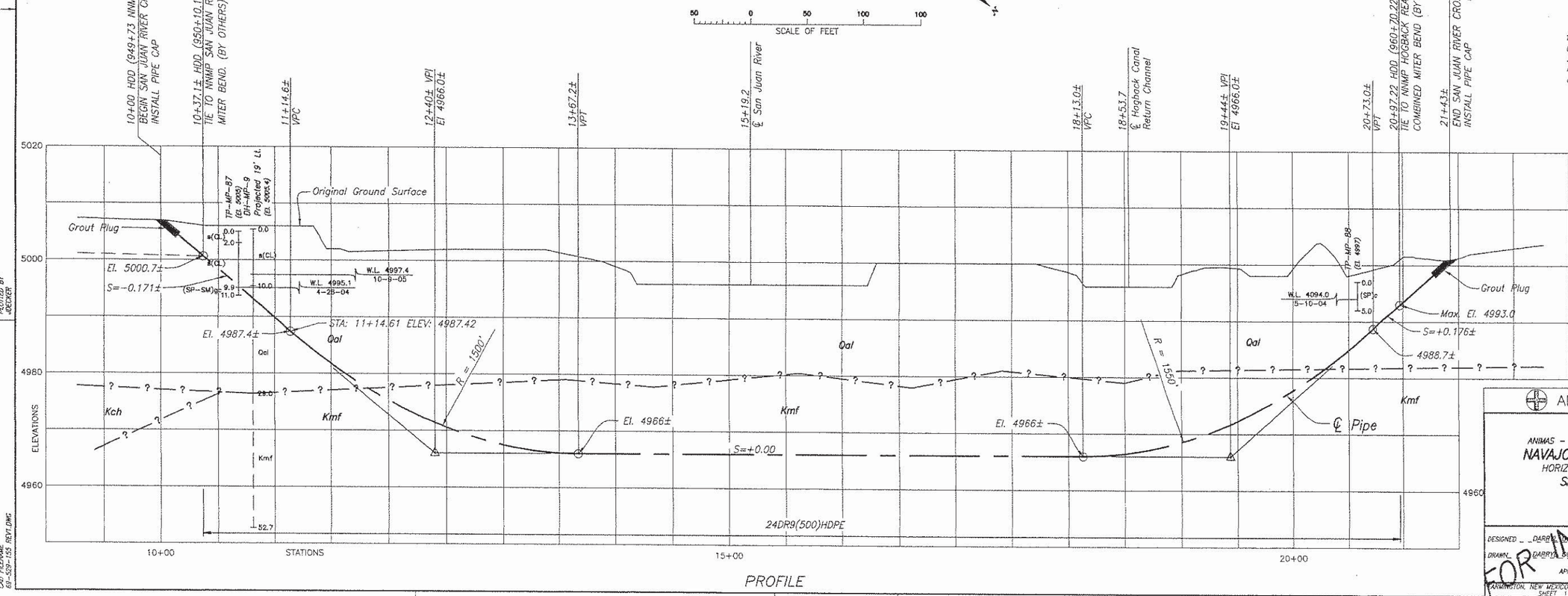
69-529-154



Section 8, T.29 N., R.16 W.

PLAN

50 0 50 100 100
SCALE OF FEET



PROFILE

NOTES

1. For General Notes, Symbols and Pipe Classifications, see (150).
2. For details on the NNMP San Juan and Hogback reaches, see For Information Only drawings (121) and (123).

REV. NO.	DATE	DESCRIPTION	APP'D
1	2005-06-24	CORRECTED NUMEROUS DRAFTING ERRORS ON PROFILE.	
	2004-10		

GEOLOGY Date
TECHNICAL APPROVAL
SUBMITTED
APPROVED

ALWAYS THINK SAFETY

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
ANIMAS - LA PLATA PROJECT COLORADO - NEW MEXICO

NAVAJO NATION MUNICIPAL PIPELINE

HORIZONTAL DIRECTIONAL DRILL OPERATIONS
SAN JUAN RIVER CROSSING #2
STATION 10+00 TO 21+43
PLAN AND PROFILE

FOR INFORMATION ONLY

DESIGNED DARRYL BOOD CHECKED BRIAN C. WAGNER P.E.
DRAWN DARRYL BOOD TECH. APPR. JAYE E. DECKER
APPROVED DOUG DOCKTER P.E.
PEER REVIEWER

FARMINGTON, NEW MEXICO 2004-05-13 SHEET 1 OF 1

69-529-155

DATE AND TIME PLOTTED FEBRUARY 17, 2009 15:42
PLOTTED BY JDECKER
CAD SYSTEM AutoCAD Rel. 17.2s
CAD FILENAME 69-529-155 REV1.DWG

F.H.W.A. Proj. No.	STATE		SHEET NO.	TOTAL SHEETS
6	NEW MEXICO	N.M.P. F-032-1(15)	2	56

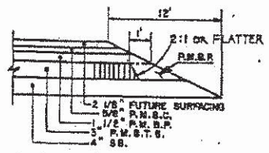
No.	DESCRIPTION	DATE	BY
1	"DR FLETTER" & CONC BARRIER	9-8	TLS

REVISIONS (OR CHANGE NOTICES)

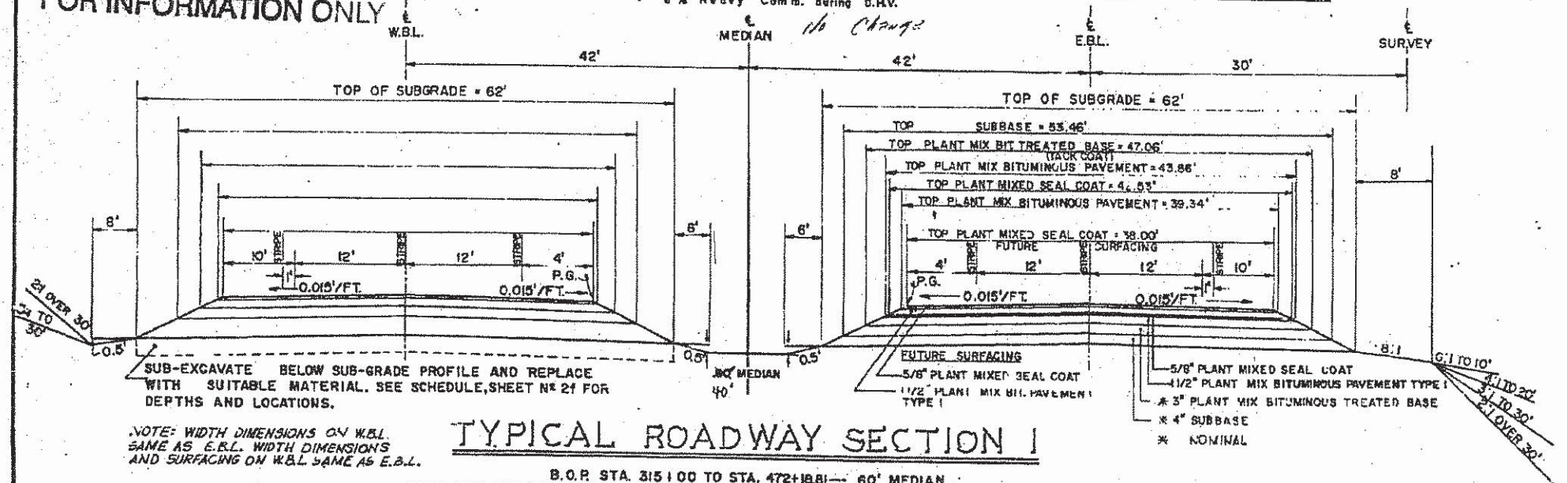
DESIGN SPEED 70 MPH

1975 Average Daily Traffic 5830 Vehicles
1995 Average Daily Traffic 13350 Vehicles
1995 Design Hour Volume = 1735
ADL 405 (Flexible) Assume 97% H.C. on E.B.L.
1975 Heavy Comm. (7.0)
1995 Heavy Comm. (7.0)
6 % Heavy Comm. during D.H.V.

FOR INFORMATION ONLY



SHOULDER SECTION DETAIL

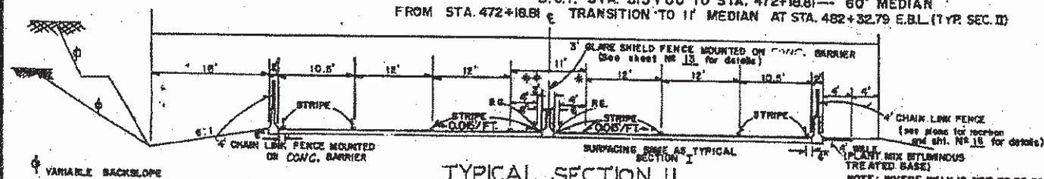


SUB-EXCAVATE BELOW SUB-GRADE PROFILE AND REPLACE WITH SUITABLE MATERIAL. SEE SCHEDULE, SHEET Nº 21 FOR DEPTHS AND LOCATIONS.

NOTE: WIDTH DIMENSIONS ON W.B.L. SAME AS E.B.L. WIDTH DIMENSIONS AND SURFACING ON W.B.L. SAME AS E.B.L.

TYPICAL ROADWAY SECTION I

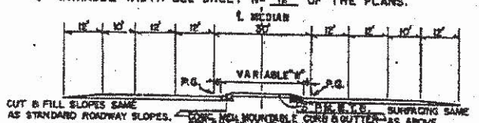
B.O.P. STA. 315+00 TO STA. 472+18.81 — 60' MEDIAN
FROM STA. 472+18.81 ℄ TRANSITION TO 11' MEDIAN AT STA. 482+32.79 E.B.L. (TYP. SEC. II)



NOTE: WHERE WALK IS NOT TO BE CONSTRUCTED USE 2' BERM TO HINGE POINT.

TYPICAL SECTION II

STA. 482+32.79 E.B.L. TO STA. 489+29.22 E.B.L. -- 11' MEDIAN.
FROM STA. 489+29.22 E.B.L. TRANSITION TO 30' MEDIAN AT STA. 502+64.75 BK. = 14+38.83 AH.
◆ VARIABLE WIDTH SEE SHEET Nº 18 OF THE PLANS.
◆ VARIABLE WIDTH SEE SHEET Nº 18 OF THE PLANS.

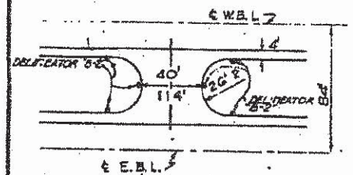


CUT & FILL SLOPES SAME AS STANDARD ROADWAY SLOPES.

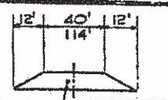
◆ SEE SHEET Nº 18 OF THE PLANS

TYPICAL SECTION III

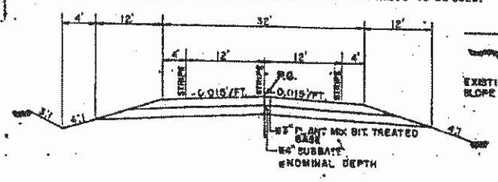
STA. 1+56.83 TO STA. 2+03.63 -- 30' MEDIAN.
STA. 2+03.63 TO STA. 3+30.40 SAME AS ABOVE, EXCEPT THAT NO RAISED MEDIAN IS REQUIRED. SAME SURFACING THICKNESS TO BE USED.



MEDIAN CROSSOVERS

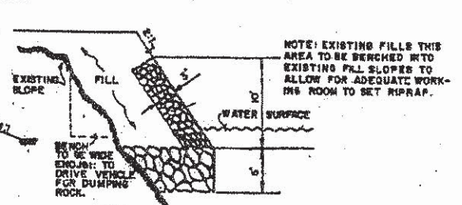


MEDIAN CROSSOVERS SECTION



TYPICAL SECTION PARTICIPATING CONNECTION

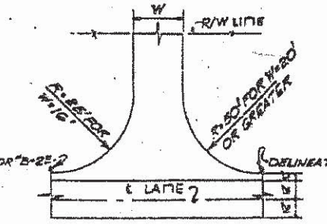
STATION 307+03.38 TO STATION 315+00



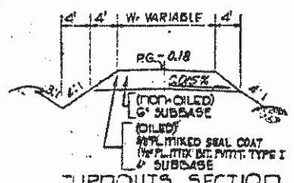
NOTE: EXISTING FILLS THIS AREA TO BE BENCHED INTO EXISTING FILL SLOPES TO ALLOW FOR ADEQUATE WORKING ROOM TO SET RIPRAP.

DERRICK STONE DETAIL

RT. FROM STATION 487+65 TO STATION 491+60 ℄ E.B.L.



TURNOUTS



TURNOUTS SECTION

(SEE SHEET Nº 8d FOR LOCATION, WIDTH & RADII)

SUBGRADE: USE FLAT BACKSLOPES AT THE END OF ALL CUTS AND EXTEND CUT DITCH FAR ENOUGH TO CARRY ALL WATER CLEAR OF ROADWAY EMBANKMENT. WHERE CUT AND FILL SLOPES MERGE, SAME SHALL BE WARPED TO ELIMINATE ANY ABRUPT CHANGE IN SLOPE.

MOISTURE AND DENSITY CONTROL, AS PROVIDED IN THE STANDARD SPECIFICATIONS FOR ROADBED EMBANKMENTS, SHALL ALSO APPLY TO THE CONSTRUCTION OF EMBANKMENT FOR THE ENTIRE WIDTH OF THE MEDIAN IN ADDITION TO THE ARES DESIGNATED FOR SUCH CONTROL IN THE STANDARD SPECIFICATIONS.

SURFACING: IF SAMPLES LIFTED FROM THE FINISHED SUBGRADE INDICATE THAT MORE OR LESS SUPPORT IS NECESSARY, SURFACING SHALL BE INCREASED OR DECREASED IN ACCORDANCE WITH THE WRITTEN RECOMMENDATION FROM THE MATERIALS AND TESTING LABORATORY. AMOUNTS OF ASPHALT MATERIALS SHOWN ON ESTIMATED QUANTITIES ARE FOR ESTIMATING PURPOSES ONLY. CORRECT AMOUNTS WILL BE DETERMINED BY THE MATERIALS AND TESTING LABORATORY.

IF A TACK COAT IS FOUND TO BE NECESSARY AT TIME OF CONSTRUCTION SAME SHALL BE APPLIED BETWEEN PLANT MIX BITUMINOUS TREATED BASE COURSE AND BOTTOM OF PLANT MIX BITUMINOUS PAVEMENT TYPE I AT THE RATE RECOMMENDED IN THE "ESTIMATED FACTORS". AT THE DIRECTION OF THE PROJECT ENGINEER, EACH APPLICATION OF THE TACK COAT SHALL BE ROLLED WITH A PNEUMATIC TIRED ROLLER TO SECURE UNIFORM DISTRIBUTION. THERE WILL BE NO DIRECT PAYMENT FOR THIS WORK. AMOUNTS OF ASPHALTIC MATERIAL ARE FOR ESTIMATING PURPOSES ONLY. CORRECT AMOUNTS WILL BE DETERMINED BY THE MATERIALS AND TESTING LABORATORY

LENGTH OF PROJECT

STATION	TO	STATION	LIN. FT.	MILES	REMARKS
		"NAVAJO RESERVATION"			
415+00	#	459+15.76 BK.	4415.76		
458+38.30 AHD.	#	417+55.69 BK.	5961.99		
417+46.15 AHD.	#	458+05.19 BK.	4057.04		
458+10.49 AHD.	#	478+70.10 BK.	2059.41		
			16374.20	3.101	
478+65 AHD.	#	487+64.62	898.62		E.B.L.
478+65 AHD.	#	487+56.53	891.53		W.B.L.
		AVG. SUB-TOTAL	895.575	0.169	
		TOTAL NAVAJO RESERVATION	17269.775	3.270	
		ROADWAY (NON-INDIAN)			
~~487+66.62~~	~~SOUTH BOUND~~	~~502+64.75 = 1438.83 AHD~~	~~1598.13~~		~~E.B.L.~~
~~487+56.53~~	~~SOUTH BOUND~~	~~502+51.19 = 1438.83 AHD~~	~~1474.66~~		~~W.B.L.~~
		AVG SUB-TOTAL	1487.365		
~~1438.83 AHD.~~		~~3+30.40 AHD.~~	~~191.57~~		~~E.B.L. & W.B.L.~~
		TOTAL OUTSIDE RESERVATION	1678.94	0.318	
		PROJ. GRAND TOTAL	18948.71	3.588	
			18973.92	3.593	+ 0.005 ~
		PARTICIPATING CONNECTION B.O.P.			
306+97.46	#	316+00	802.84	0.151	
		PARTICIPATING CONNECTION E.O.P.			
3+30.40	#	13+10.608	980.208	0.185	

+ DUE TO ALIGNMENT CHANGE AROUND HOCKELL MOUNTAIN 4972 AHD.

ESTIMATED FACTORS	ASPHALT MATERIAL TYPE B5-100	WEIGHT OF MATERIAL	
PLANT MIXED SEAL COAT	7%	3850 LBS. PER. CU. YD.	
PLANT MIX BITUMINOUS PAVEMENT-TYPE-I	5.5%	3850 LBS. PER. CU. YD.	
TACK - COAT	0.01 TO 0.05 GALS. PER SQ.YD.		
PLANT MIX BITUMINOUS TREATED BASE COURSE	5%	3930 LBS. PER. CU. YD.	
SUB-BASE		3930 LBS. PER. CU. YD.	

NOTE:

~~THE CONTRACTOR SHALL USE STRIPING AT B.O.P. AND PARTICIPATING CONNECTION AT E.O.P.~~

FOR INFORMATION ONLY

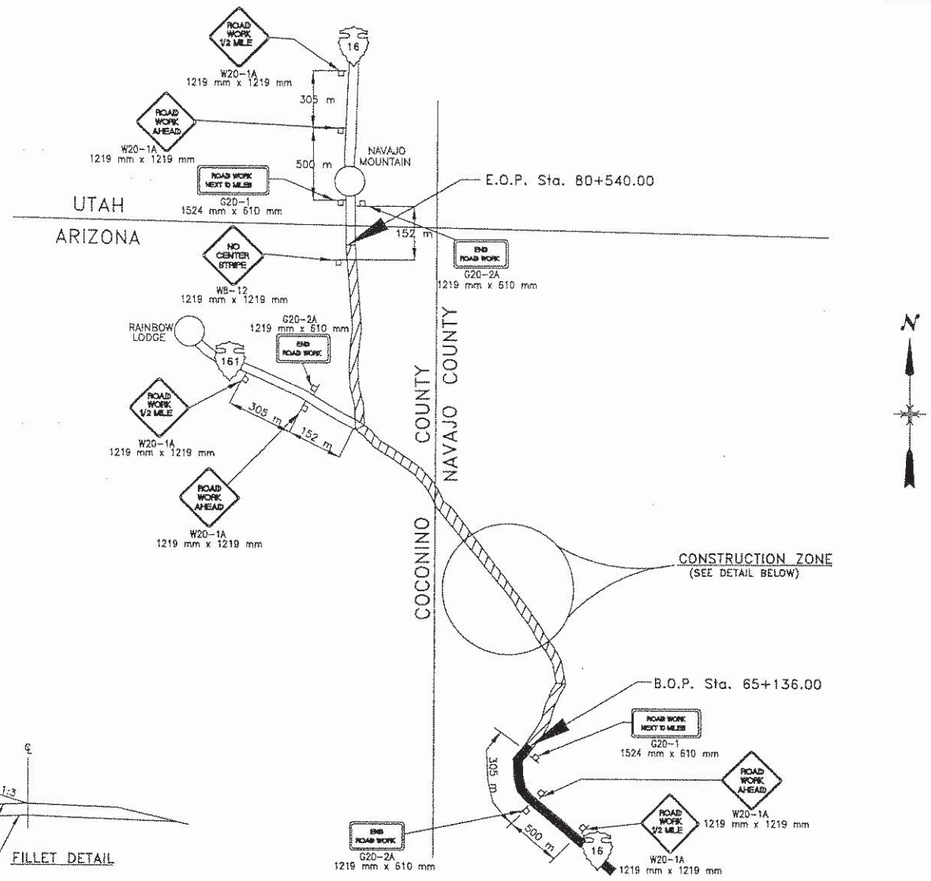
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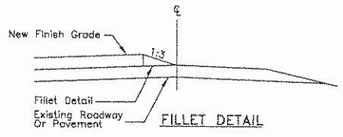
MARPOC-HORNE and ASSOCIATES Consulting Engineers Santa Fe, Las Cruces, New Mexico

N.M.P. no. F-032-1(15) SHEET NO. 2

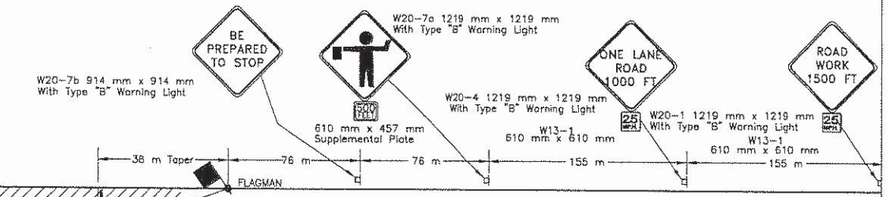
CONSTRUCTION PLANS APPROVED
DATE: 08-30-2004

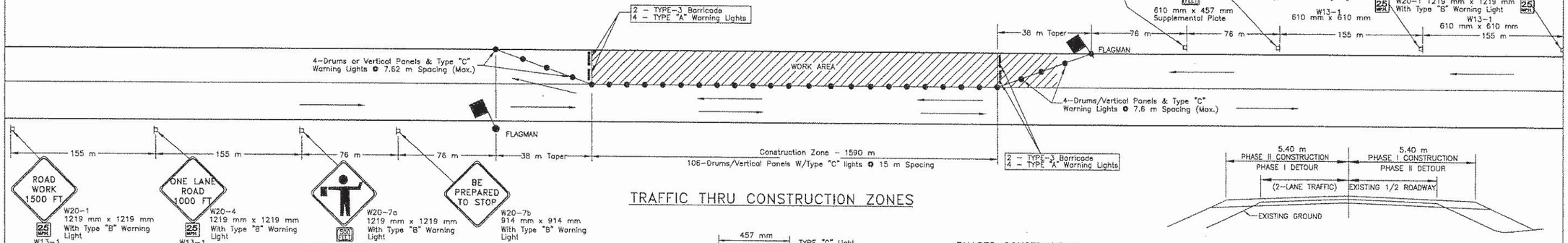
REGION	STATE	RESERVATION	ROUTE	PROJECT NO.	SHEET	TOTAL SHEETS
NAVAJO	ARIZONA	NAVAJO	N16	N16(5)2&4	29	59

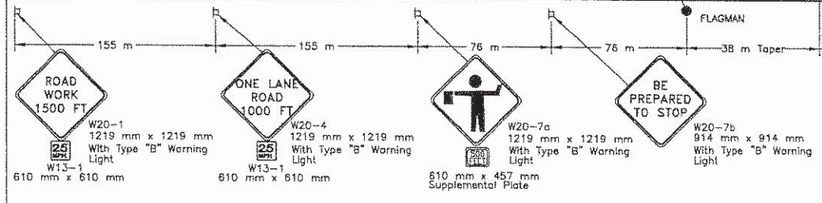




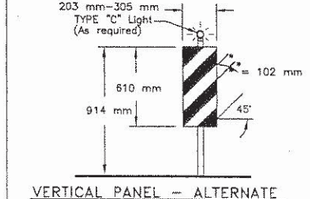
FILLET DETAIL



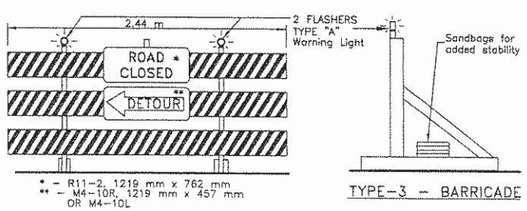




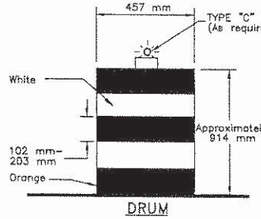
TRAFFIC THRU CONSTRUCTION ZONES



VERTICAL PANEL – ALTERNATE



TYPE–3 – BARRICADE



DRUM

PHASED CONSTRUCTION

1. THE CONTRACTOR MAY CONSTRUCT ½ THE NEW ROADWAY (UNDER THE PHASE CONSTRUCTION PLAN SHOWN) WHILE DETOURING TWO–WAY TRAFFIC ON THE OTHER (EXISTING) HALF ONCE THE FIRST ½ OF ROADWAY IS BUILT UP TO THE NEW GRADES, THEN TRAFFIC CAN BE CHANNELED TO THE NEW HALF OF ROADWAY WHILE THE OTHER (EXISTING) HALF IS CONSTRUCTED.

2. ALL (NEW) DRAINAGE PIPE INSTALLATION SHALL BE IN ACCORDANCE WITH THE PHASED CONSTRUCTION PLAN ABOVE, AS WELL AS REMOVAL OF EXISTING PIPES. THIS MAY REQUIRED REMOVING ½ OF ALL EXISTING PIPE LENGTHS AT ONE TIME. ALL PIPE INSTALLATION & REMOVAL UNDER A PHASED CONSTRUCTION PLAN SHALL BE CONSIDERED INCIDENTAL TO THE PIPE ITEMS SHOWN IN THE BID SCHEDULE AND NO ADDITIONAL PAYMENT WILL BE MADE.

3. THIS PHASED CONSTRUCTION SHALL BE CONSIDERED INCIDENTAL TO THE TCP SHOWN AND NO ADDITIONAL PAYMENT SHALL BE MADE.

4. THE CONTRACTOR'S CONSTRUCTION SEQUENCE AND STORM WATER POLLUTION PREVENTION PLAN SHALL REFLECT THIS PHASE CONSTRUCTION.

GENERAL NOTES

1. ALL TRAFFIC CONTROL DEVICES SHALL BE IN ACCORDANCE WITH THE MUTCD MANUAL (LATEST EDITION AND AMENDMENTS) AND THE SUPPLEMENTAL SPECIFICATION FOR THIS PROJECT.

2. THE TRAFFIC CONTROL DETAILS SHOWN ARE ONLY A GUIDE. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR PREPARING AND IMPLEMENTING A TRAFFIC CONTROL PLAN (TCP) IN ACCORDANCE WITH THESE DETAILS, SECTION 635, AND THE MUTCD UNDER CONTRACT ITEM 63501. ANY ADDITIONAL TRAFFIC CONTROL DEVICES CALLED FOR ON THE CONTRACTOR'S TCP WILL NOT BE MEASURED FOR PAYMENT BUT SHALL BE CONSIDERED INCIDENTAL TO THE BID ITEMS FOR TRAFFIC CONTROL SHOWN IN THE BID SCHEDULE. SEE SUPPLEMENTAL SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.

3. SIGNS (G20–1, W20–1A, G20–2A AND W8–12) SHALL BE PLACED AT THE PROJECT LIMITS AND REMAIN IN PLACE THROUGH THE DURATION OF THE PROJECT.

4. FLAGGERS SHALL BE STATIONED LEFT & RIGHT AS SHOWN WHEN EQUIPMENT IS CROSSING OR WORKING WITHIN EXISTING ROADWAY PRISM.

5. IN AREAS OF EXISTING ROADWAY WIDENING, THE CONTRACTOR SHALL ENSURE THAT NO PAVEMENT DROP–OFFS ARE LEFT EXPOSED DURING NON–WORKING HOURS. THE CONTRACTOR SHALL INITIATE CORRECTIVE MEANS TO ACHIEVE A MINIMUM 1:3 SLOPE AS SHOWN ON FILLET DETAIL.

6. AT THE END OF EACH WORKING DAY, IT WILL BE THE CONTRACTOR'S RESPONSIBILITY TO PROVIDE A DRIVING SURFACE FREE OF OBSTRUCTIONS AS SHOWN ON THE PHASED AND FILLET CONSTRUCTION DETAILS. ACCESS TO ALL ADJOINING PROPERTIES AND BIA SYSTEM ROUTES SHALL BE MAINTAINED AT ALL TIMES DAY AND NIGHT.

7. ALL TRAFFIC CONTROL DEVICES (EXCEPT AT DETOUR ROAD LOCATIONS) SUCH AS CONSTRUCTION SIGNS, DRUMS, BARRICADES, ETC., SHALL BE REMOVED TO A LOCATION AT LEAST NINE (9) METERS FROM EDGE OF THE SHOULDER WHEN CONSTRUCTION IS NOT IN PROGRESS.

8. DURING CONSTRUCTION OPERATIONS, TRAFFIC SHALL BE MOVED THROUGH THE WORK ZONE USING PILOT CARS (AS REQUIRED). APPLICABLE SIGNS AND OTHER ITEMS (TWO–WAY RADIO CONTACT) RELATED TO THE USE OF THE PILOT CARS SHALL BE USED AND SHALL BE CONSIDERED INCIDENTAL OBLIGATIONS OF THE CONTRACTOR.

9. THE CONTRACTOR HAS THE OPTION TO EITHER USE DRUMS OR VERTICAL PANELS; BUT SHALL NOT USE A COMBINATION OF BOTH. CONES ARE NOT ALLOWED TO BE USED ON THIS PROJECT.

10. THE CONTRACTOR HAS THE OPTION TO UTILIZE DETOUR ROADS IN ACCORDANCE WITH THE MUTCD MANUAL IN CONJUNCTION WITH OR IN LIEU OF THE PHASE CONSTRUCTION DETAILS SHOWN AND IN ACCORDANCE WITH SECTION 107 AND 204. THE COST OF ANY DETOUR ROADS (INCLUDING ALL DETOUR RELATED EARTHWORK AND MAINTENANCE) SHALL BE CONSIDERED INCIDENTAL TO THE TEMPORARY TRAFFIC CONTROL BID ITEMS. THE CONTRACTOR IS RESPONSIBLE FOR ALL NECESSARY PERMITS AND CLEARENCES FOR ANY DETOUR ROADS.

11. AT LOCATIONS WHERE NEW ROAD CONSTRUCTION CROSSES EXISTING ROADWAY AND AT TIE–INS WITH EXISTING ROADS AT THE END OF THE NEW CONSTRUCTION, SPECIAL TRAFFIC CONTROL PROCEDURES SHALL BE INCLUDED IN THE CONTRACTOR'S TCP. THESE INCLUDE BUT ARE NOT NECESSARILY LIMITED TO THE FOLLOWING: TYPE III BARRICADES WITH "ROAD CLOSE"; DETOUR; SIGNS; FLAG MEN; DRUMS; AND/OR DETOURS.

12. THE CONTRACTOR SHALL COORDINATE CONSTRUCTION ACTIVITIES WITH THE LOCAL SCHOOL TO ENSURE THAT DAILY SCHEDULED BUS ARRIVAL AND DEPARTURE TIMES ARE MAINTAINED TO THE FULLEST EXTENT POSSIBLE. SCHOOL BUSES SHALL NOT BE DELAYED OVER 5 MINUTES. THE CONTRACTOR'S TCP SHALL REFLECT THIS COORDINATION.

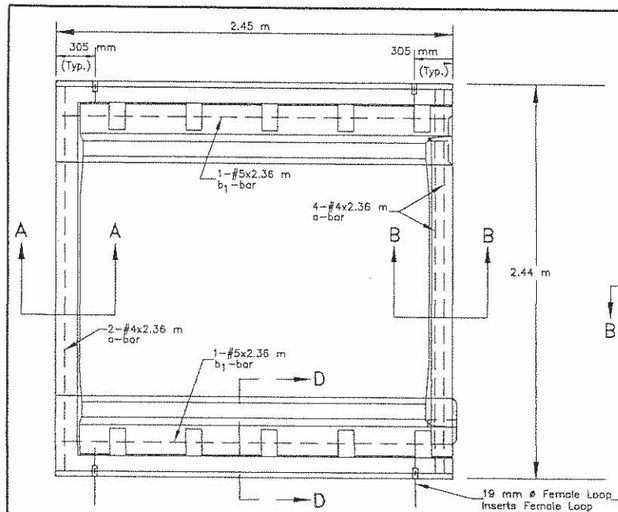
UNITED STATES
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NAVAJO REGIONAL OFFICE * DIVISION OF TRANSPORTATION

TEMPORARY TRAFFIC CONTROL DETAILS

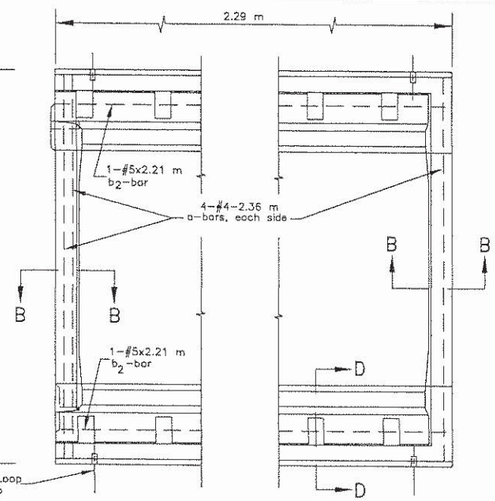
DRAWN BY: J.L.B.	DATE: 2/2004		
DESIGNED BY: B.O.P.	DATE: 2/2004		
REVISED: 8/2004	FILENAME: N16TCP		
BY: DESIGN 1	SCALE: NTS		

REGION	STATE	RESERVATION	ROUTE	PROJECT NO.	SHEET	TOTAL SHEETS
NAVAJO	ARIZONA	NAVAJO	N16	N16(5)2&4	40	59

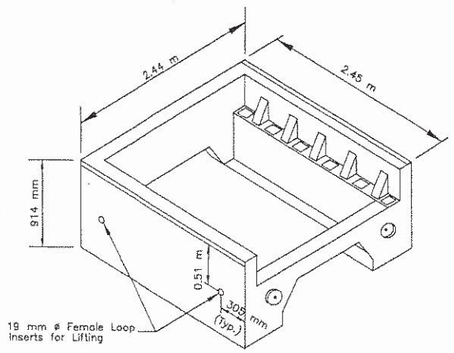
CONSTRUCTION PLANS APPROVED
DATE: 08-30-2004



PLAN - END UNIT



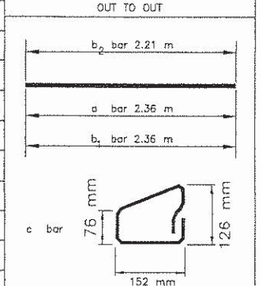
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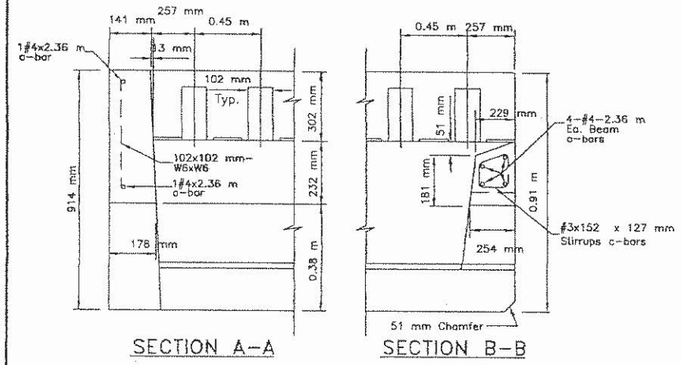


ISOMETRIC VIEW - END UNIT

REINFORCING STEEL SCHEDULE

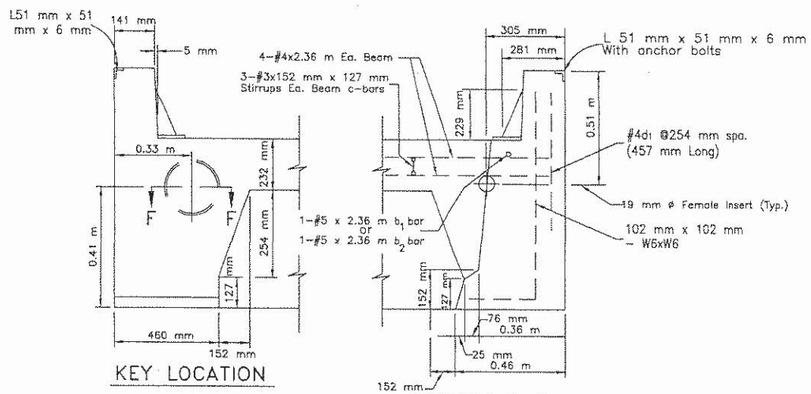
STRAIGHT BARS				BENT BARS				BENDING DIAGRAMS
MARK	NO.	SIZE	LENGTH	MARK	NO.	SIZE	LENGTH	ALL DIMENSIONS ARE OUT TO OUT
END UNIT								
a	6	4	2.36 m					
b_1	2	5	2.36 m					
				c	3	3	0.61 m	
D_1	20	4	0.46 m					
INTERMEDIATE UNIT								
a	8	4	2.36 m					
b_2	2	5	2.21 m					
				c	6	3	0.61 m	
D_1	18	4	0.46 m					





SECTION A-A

SECTION B-B



KEY LOCATION

SECTION D-D

GENERAL NOTES

1. PRECAST CONCRETE SHALL ATTAIN A MINIMUM 28-DAY COMPRESSIVE STRENGTH OF 27.6 MPa, IN ACCORDANCE WITH AASHTO T22 (ASTM C-39). THE CONCRETE SHALL BE CLASS A(AE) CONFORMING TO SECTION 552 OF THE FP-96.

2. REINFORCING STEEL SHALL CONFORM TO ASTM SPECIFICATION A615, GRADE 300. ALL STRUCTURAL STEEL SHALL CONFORM TO AASHTO M-183.

3. EACH UNIT SHALL CONFORM TO THE AASHTO MS-18 HIGHWAY LOADING REQUIREMENTS.

4. EACH UNIT SHALL BE FABRICATED TO CONFORM TO THE ROADWAY CROWN AS SHOWN ON THE PLANS, OR AS DESIGNATED BY THE C.O.R..

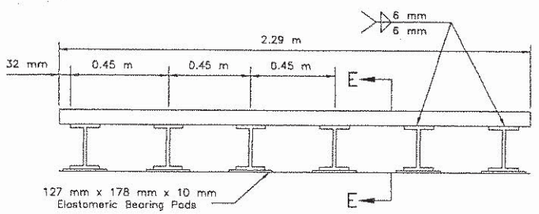
5. BOLTS, WASHER, AND NUTS, SHALL BE GALVANIZED IN ACCORDANCE WITH AASHTO M-111.

6. ALL TRAFFIC GRILL UNIT, INCLUDING STEEL ANGLES SHALL BE SHOP PAINTED ITH ONE (1) PRIMER COAT, ONE (1) INTERMEDIATE COAT, AND ONE (1) FINISH COAT IN ACCORDANCE WITH SECTION 563, PAINT SYSTEM 2 OF FP-96.

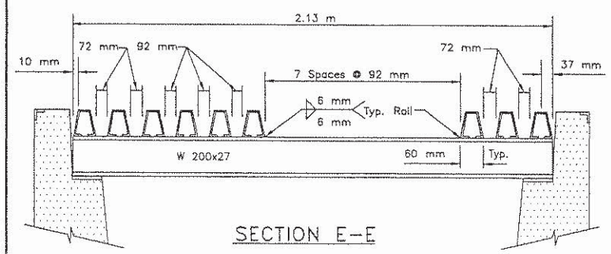
7. WING BRACES SHALL BE CONSIDERED SUBSIDIARY ITEMS TO THE CATTLEGUARD UNIT.

8. THE CONTRACTOR HAS THE OPTION TO USE STEEL CATTLEGUARDS IN LIEU OF PRECAST. THE CONTRACTOR SHALL SUBMIT SHOP DRAWINGS AND INSTALLATION DETAILS TO THE C.O.R. FOR APPROVAL. THE CONTRACTOR SHALL ASSUME RESPONSIBILITY FOR PATENT PROTECTION RIGHTS.

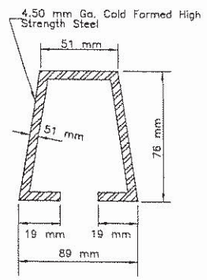
9. ELASTOMETRIC BEARING PADS SHALL BE SEALED WITH EPOXY ADHESIVE PRIOR TO INSTALLATION OF TRAFFIC GRILL UNITS.



TRAFFIC GRILLE UNIT

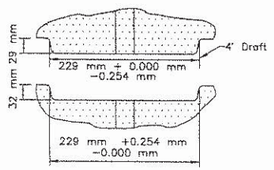


SECTION E-E

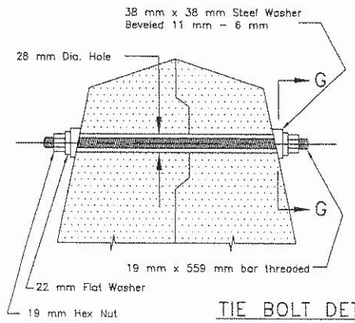


STEEL CROSSBAR SECTION

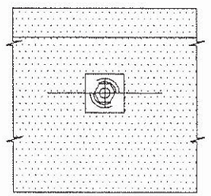
15 Req'd for 1 Grid



SECTION F-F



TIE BOLT DETAIL



SECTION G-G

UNITED STATES
DEPARTMENT OF THE INTERIOR
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NAVAJO REGIONAL OFFICE * DIVISION OF TRANSPORTATION

PRECAST CONCRETE CATTLEGUARD DETAILS

DRAWN BY:	B.O.R.	DATE:	4/2003
DESIGNED BY:	B.O.R.	DATE:	4/2003
REVISED:		FILENAME:	N16PCCG
BY:		SCALE:	NTS

INFORMATION ONLY

CONSTRUCTION PLANS APPROVED
DATE: 08-30-2004

REGION	STATE	RESERVATION	ROUTE	PROJECT NO.	SHEET	TOTAL SHEETS
NAVAJO	ARIZONA	NAVAJO	N16	N16(5)2&4	39	59

ESTIMATED MATERIAL LIST

PART NO.	MATERIAL	SIZE AND THICKNESS	LENGTH	QUANTITY
1	Structural Steel Pipe	64 mm ø Nominal	4.23 m	2
2	Structural Steel Pipe	32 mm ø Nominal	4.19 m	2
3	Steel Angle (See Note 6 & 7)	L 64 x 64 x 9.5 mm	2.29 m	2
4	Steel Plate	89 mm x 10 mm	178 mm	2
5	Steel Angle	L 152 x 89 x 9.5 mm	89 mm	4
6	Bar	25 mm x 6 mm	1.68 m	2
	Bolts, Nuts and Washers	As Shown		

GENERAL NOTES

1. STRUCTURAL PIPE SHALL CONFORM TO ASTM A53 - 93A, GRADE B. ALL OTHER STRUCTURAL STEEL SHALL CONFORM TO ASTM-A36.

2. BOLTS, NUTS, AND WASHERS SHALL BE GALVANIZED IN ACCORDANCE WITH AASHTO M111 (ASTM A123).

3. ALL WING-BRACE STRUCTURAL STEEL PIPE SHALL RECEIVE ONE (1) PRIMER COAT, ONE (1) INTERMEDIATE COAT AND ONE (1) FINISH COAT IN ACCORDANCE WITH SECTION 563, PAINT SYSTEM 2, OF THE FP-96.

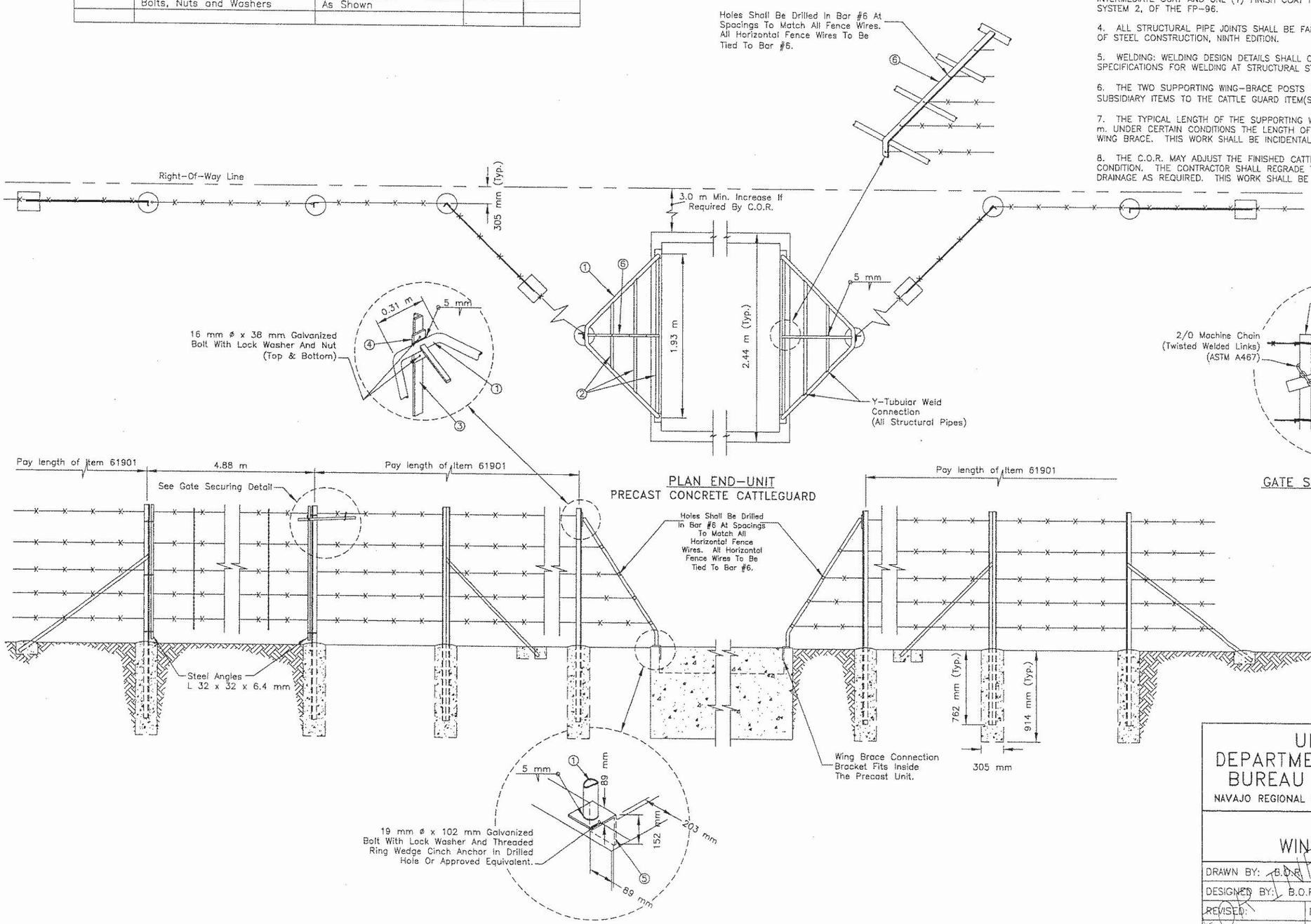
4. ALL STRUCTURAL PIPE JOINTS SHALL BE FABRICATED IN ACCORDANCE WITH AISC MANUAL OF STEEL CONSTRUCTION, NINTH EDITION.

5. WELDING: WELDING DESIGN DETAILS SHALL CONFORM TO AASHTO STANDARD SPECIFICATIONS FOR WELDING AT STRUCTURAL STEEL HIGHWAY BRIDGES, 1983. SECTION 1.7.21.

6. THE TWO SUPPORTING WING-BRACE POSTS (PART NO. 3) AND THE TYPE-II GATE SHALL BE SUBSIDIARY ITEMS TO THE CATTLE GUARD ITEM(S).

7. THE TYPICAL LENGTH OF THE SUPPORTING WING BRACE POSTS (PART NO. 3) SHALL BE 2.3 m. UNDER CERTAIN CONDITIONS THE LENGTH OF THE POST MAY VARY TO FULLY SUPPORT THE WING BRACE. THIS WORK SHALL BE INCIDENTAL TO CATTLE-GUARD ITEM.

8. THE C.O.R. MAY ADJUST THE FINISHED CATTLEGUARD ELEVATIONS AS NEEDED TO FIT FIELD CONDITION. THE CONTRACTOR SHALL REGRADE THE ADJOINING TURNOUT APPROACHES AND DRAINAGE AS REQUIRED. THIS WORK SHALL BE CONSIDERED INCIDENTAL TO ITEM 61903.



PLAN END-UNIT
PRECAST CONCRETE CATTLEGUARD

GATE SECURING DETAIL

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF INDIAN AFFAIRS
NAVAJO REGIONAL OFFICE * DIVISION OF TRANSPORTATION

CATTLEGUARD WING BRACE DETAILS

DRAWN BY: B.O.R.	DATE: 3/2003		
DESIGNED BY: B.O.R.	DATE: 3/2003		
REVISED:	FILENAME: N16CTLGRD		
BY:	SCALE: NTS		

APPROVED FOR CONSTRUCTION ONLY