Released

SAN JUAN LATERAL INTAKE/
WATER TREATMENT PLANT
REACH 3
Pumping Plant No. 1
SHIPROCK CONNECTION
Shiprock Turnout
REACH 4A
Pumping Plant No. 2
REACH 4B
Pumping Plant No. 3
REACH 4C
Sanostee/Burnham Turnout
REACH 6
Newcomb Turnout
REACH 7
Sheep Springs N Turnout
Pumping Plant No. 4
REACH 8
Naschitti Turnout
REACH 9A
REACH 9B
REACH 10.1
Coyote Canyon TO
Crownpoint Turnout
REACH 10
REACH 10.2
Pumping Plant No.12
REACH 10.3
Standing Rock Turnout
Pumping Plant No. 13
Dalton Pass Turnout
Pumping Plant No. 7
Tohatchi/Buffalo Springs TO
REACH 11
Window Rock Turnout
Twin Lakes Turnout
REACH 12.2
REACH 12A
Tohlakai Hill Pumping Plant (8,9,10)
REACH 12B
REACH 12.1
Rock Springs Turnout
REACH 13
14.3a Pumping Plant (284gpm)
REACH 27
(GALLUP REGIONAL)
14.1 Pumping Plant
14.2 Pumping Plant
14.6 Pumping Plant
REACH 14.6A
14.7a Pumping Plant
REACH 14.8A
REACH 22A
CUTTER RESERVOIR
Pumping Plant No. 1(c)
Pumping Plant No. 2(c)
REACH 22B
CUTTER LATERAL WATER
TREATMENT PLANT
NAPI TO
REACH 21
Pumping Plant No. 3(c)
Huerfano Turnout
ENWP PHASE 3
Phase 3 Booster Station
Phase 2 Booster Station
LYBROOK CONNECTION
Nageezi Turnout
Jicarilla Apache Nation Turnout
ENWP PHASE 2
JAN STUB
Counselor Turnout
REACH 24.1
Reach 25 Booster Station
REACH 25
REACH 24.1
Ojo-Encino North Turnout
REACH 26.1
REACH 26.3
Torreon Turnout
REACH 26.2
Pueblo Pintado Turnout

CUDEI
HOGBACK
TEECHOSPOS
BECLAIBITO
SWEETWATER
SHIPROCK
SAN JUAN RIVER
AZTEC
FARMINGTON
NAVAJO RESERVOIR
ANIMAS RIVER
BLOOMFIELD
MORGAN LAKE
RED VALLEY
FRUITLAND UPPER
Navajo Indian Irrigation Project
Navajo Indian Main Canal
NEZAHNEZAD
COVE
SANOSTEE
ROUND ROCK
LUKACHUKAI
NEWCOMB
BURNHAM
TWO GREY HILLS
TSAILE/WHEATFIELDS
SHEEP SPRINGS
CHINLE
CRYSTAL
WHITEROCK
LAKE VALLEY
NAGEEZI
COUNSELOR
JICARILLA APACHE INDIAN RESERVATION
HUERFANO
SAWMILL
NASCHITTI
San Juan
McKinley
NAZLINI
RED LAKE
MEXICAN SPRINGS
TOHATCHI
BECENTI
STANDING ROCK
WHITE HORSE LAKE
OJO ENCINO
PUEBLO PINTADO
TORREON
NAKAIBITO
FORT DEFIANCE
KINLICHEE
TWIN LAKES
COYOTE CANYON
NAHODISHGISH
CROWNPOINT
Sandoval
SAINT MICHAELS
ROCK SPRINGS
LITTLEWATER
MARIANO LAKE
CHURCH ROCK
TSAYATCH
GALLUP
TIANBITO
CASAMERA LAKE
SMITH LAKE
OAKS SPRINGS
THOREAU
RED ROCK
MANUEITO
BACA/HAYSTACK
HOUCK
BREADSPRINGS
LUPTON
Cibola
CHICHILTAH
NAHATA DZIIL
CANONCITO
ARIZONA
NEW MEXICO
Apache

0 3 6 12 Miles
1:380000



KEY MAP



LEGEND

- Pipeline (Varied by Reach)
- Water Treatment Plant
- Pumping Plant Location
- Turnout Location
- Jicarilla Indian Reservation
- Navajo Nation Indian Reservation (Chapters)
- Highway (as desiginated)
- County Line

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NAVAJO-GALLUP WATER SUPPLY PROJECT
NEW MEXICO

SAN JUAN LATERAL

GENERAL MAP

Jaye Decker
DESIGNED
D. THORNBURG
DRAWN
Michael Braman
CHECKED
Deming, Bart W P.E.
TECH. APPR.
Page, Patrick J P.E.
APPROVED
ADMIN APPROVAL - FCCO Deputy Construction Engineer

FARMINGTON, NM 2017-03-14

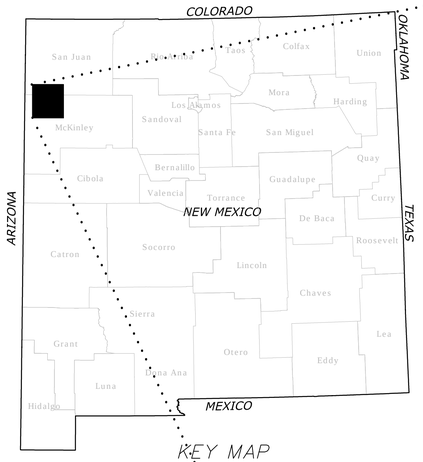
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1695-529-60145

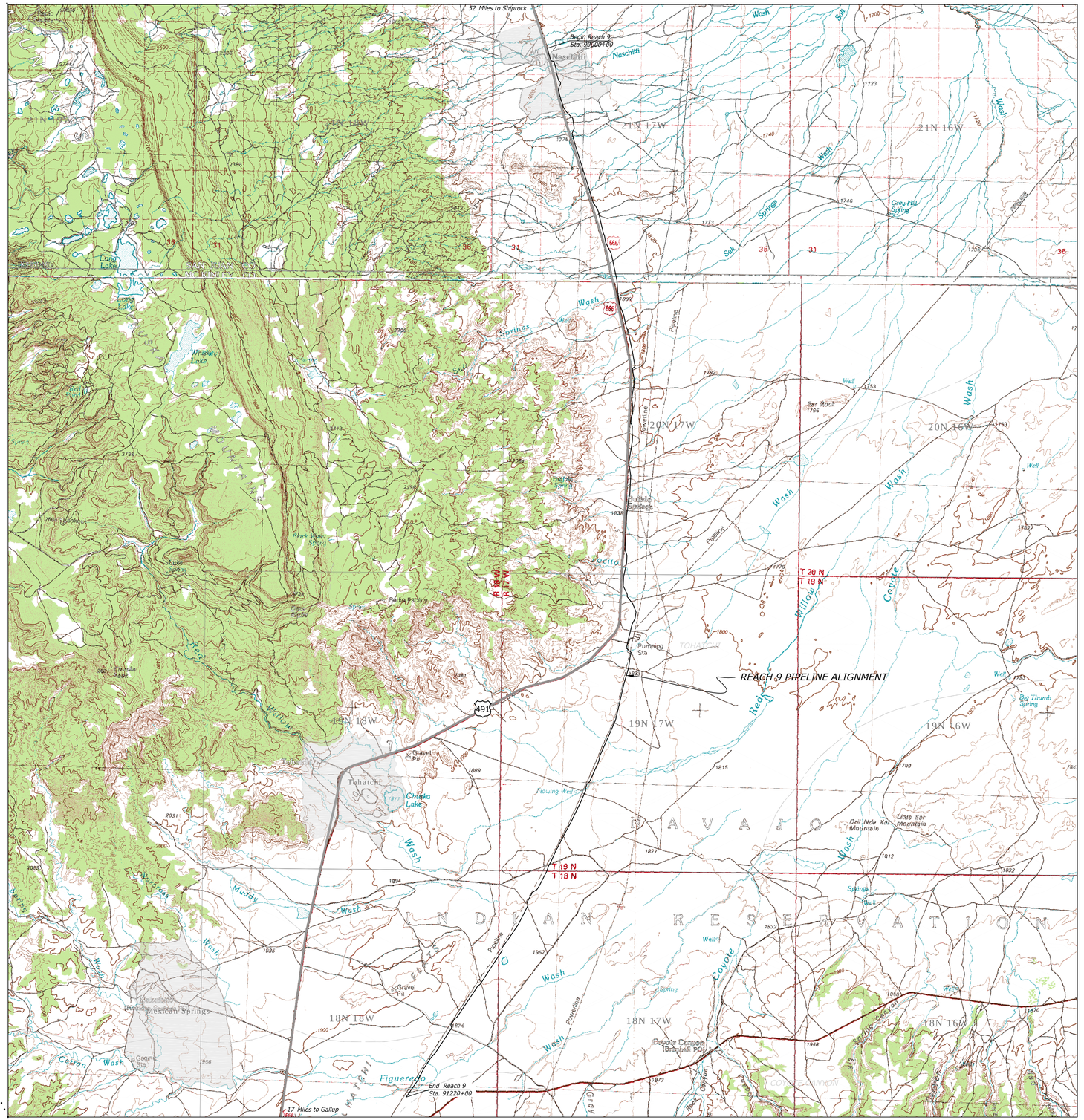
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PLOTTED BY
DTHORNBURG

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KEY MAP



NOTE

All Reach 9 Right-of-Way lies within Navajo Tribal Trust Lands.

LEGEND

- *State Highway*
- *Navajo Nation Chapter*
- *County Boundary Line*
- *Township, Range and Section Lines*

N

0 6000 12000 24000 Feet
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DATE AND TIME PLOTTED
JUNE 16, 2017 09:56
PLOTTED BY
RGLADDEN

CAD SYSTEM
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1695-529-60098-RD-1.DWG

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NAVAJO-GALLUP WATER SUPPLY PROJECT
NEW MEXICO

SAN JUAN LATERAL - REACH 9

LINE PIPE

REV NO	DATE	DESCRIPTION
2	2017-03-14	529 UPDATED ALIGNMENT
	Deming, Bart W P.E.	
1	2016-09-30	529 REFORMATTED MAP LAYOUT

RYAN GLADDEN
DESIGNED
RYAN GLADDEN
DRAWN
CHICO QUINTANA
CHECKED
Deming, Bart W P.E.
TECH. APPR.
Page, Patrick J P.E.
APPROVED
ADMIN APPROVAL - FCCO Deputy Construction Engineer

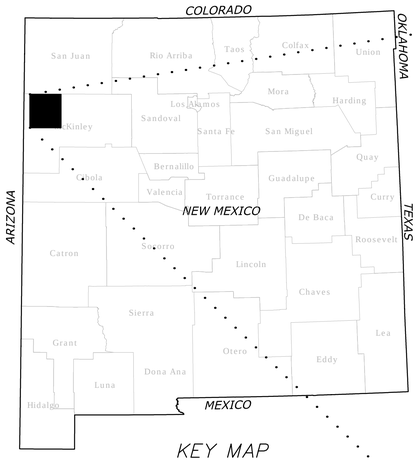
FARMINGTON, NM 2016-09-30

LOCATION MAP

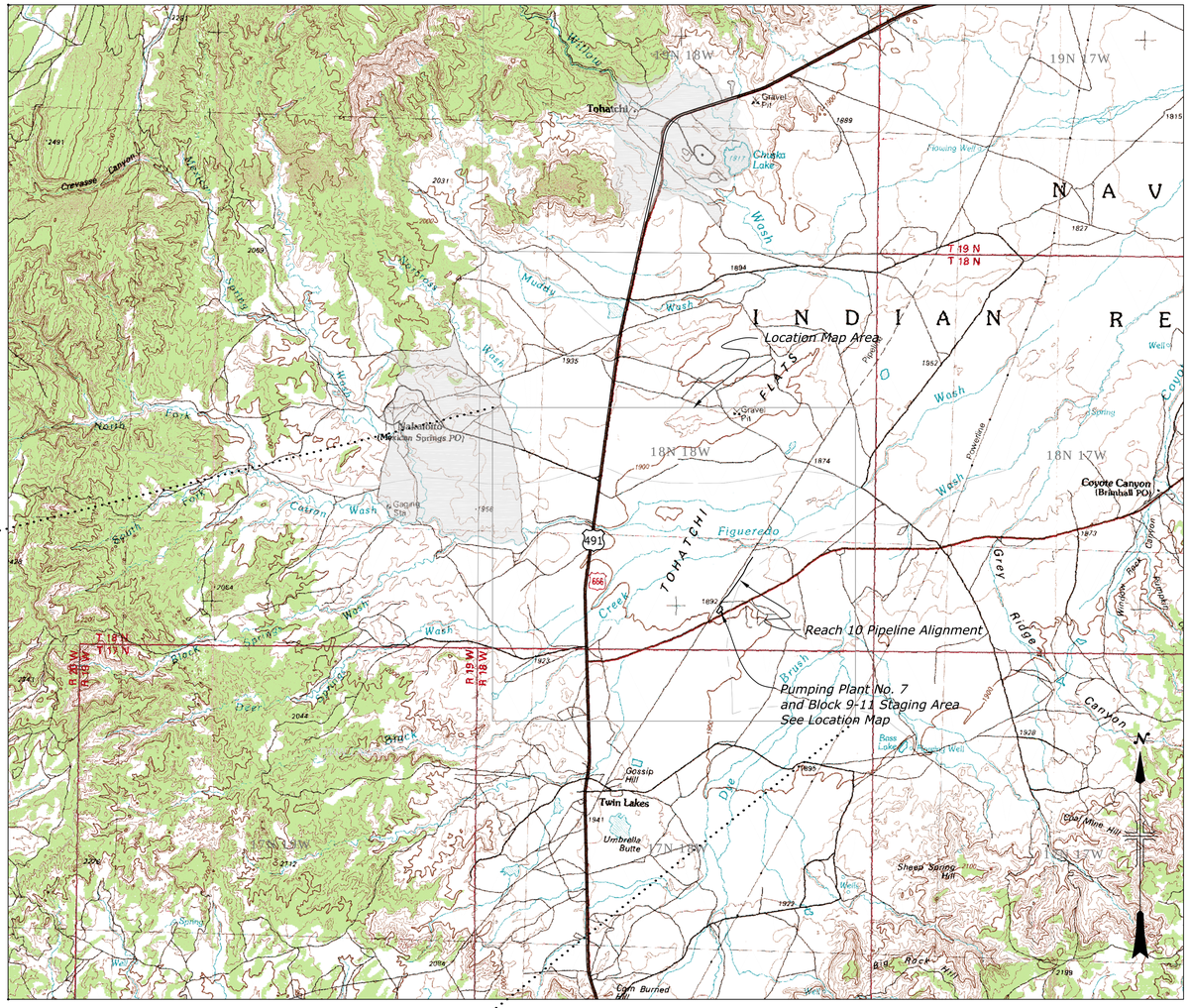
1695-529-60098

SHEET 1

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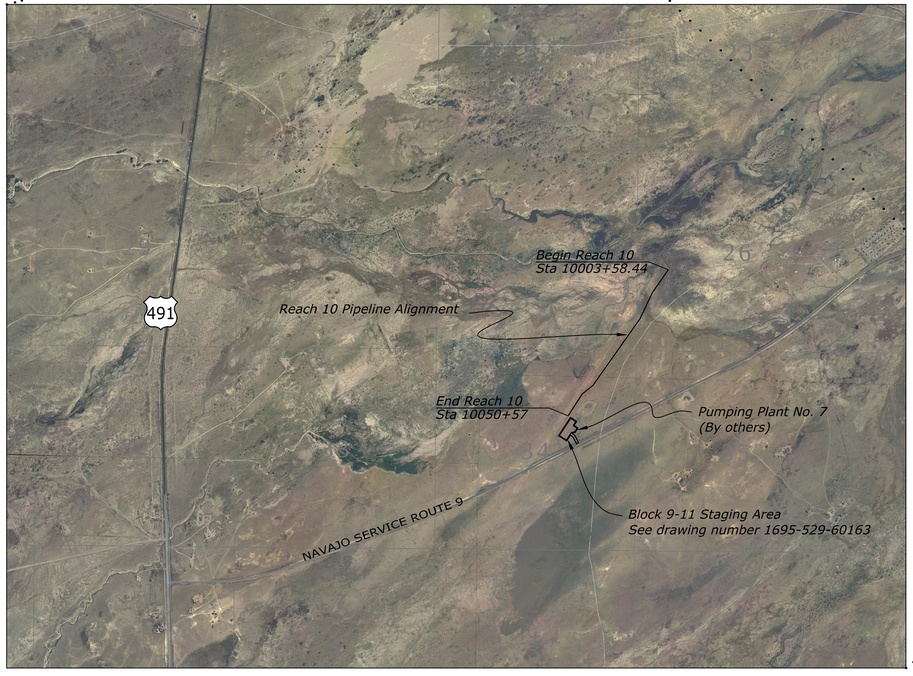
KEY MAP



VICINITY MAP

0 6000 12000 24000 Feet

1:72000



LOCATION MAP

0 6000 12000 24000 Feet

1:24000

NOTE

All Reach 10 Right-of-Way lies within Navajo Tribal Trust Lands.

LEGEND

- State Highway
- Navajo Nation Chapter
- County Boundary Line
- Township, Range and Section Lines

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NEW MEXICO

SAN JUAN LATERAL - REACH 10

LINE PIPE

REV NO	DATE	DESCRIPTION
3	2017-05-22	529 ADDED LOCATION OF PUMPING PLANT NO. 7
2	2017-03-15	529 UPDATED ALIGNMENT
1	2016-09-30	529 REFORMATTED MAP LAYOUT

RYAN GLADDEN
DESIGNED
RYAN GLADDEN
DRAWN
CHICO QUINTANA
CHECKED
Deming, Bart W P.E.
TECH. APPR.
Page, Patrick J P.E.
APPROVED
ADMIN APPROVAL - FCCO Deputy Construction Engineer

FARMINGTON, NM *2016-09-30*

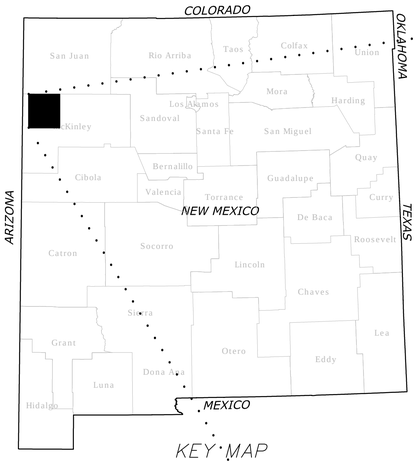
LOCATION MAP

1695-529-60099

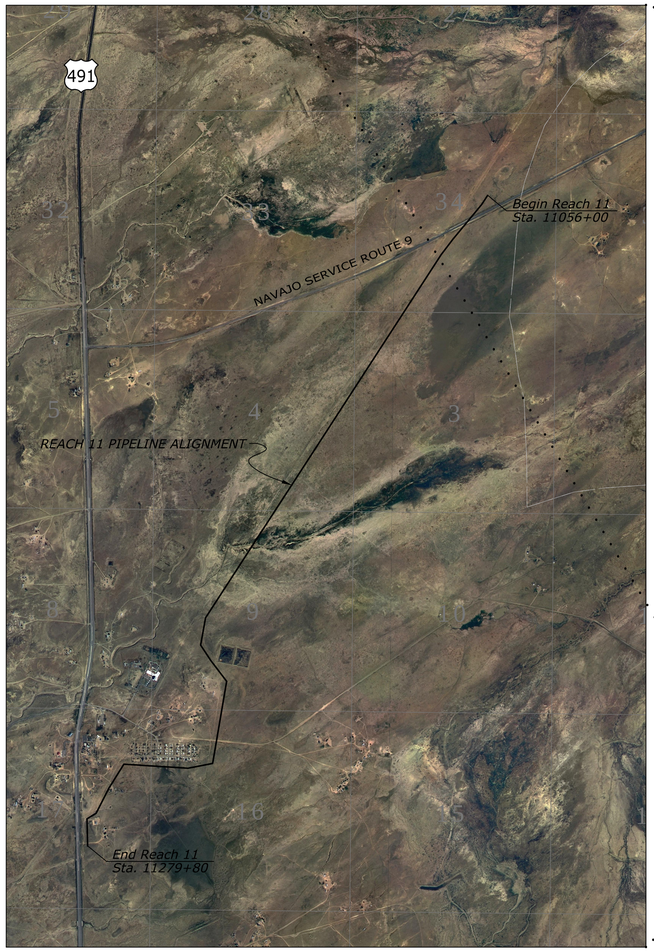
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DTHORNBURG

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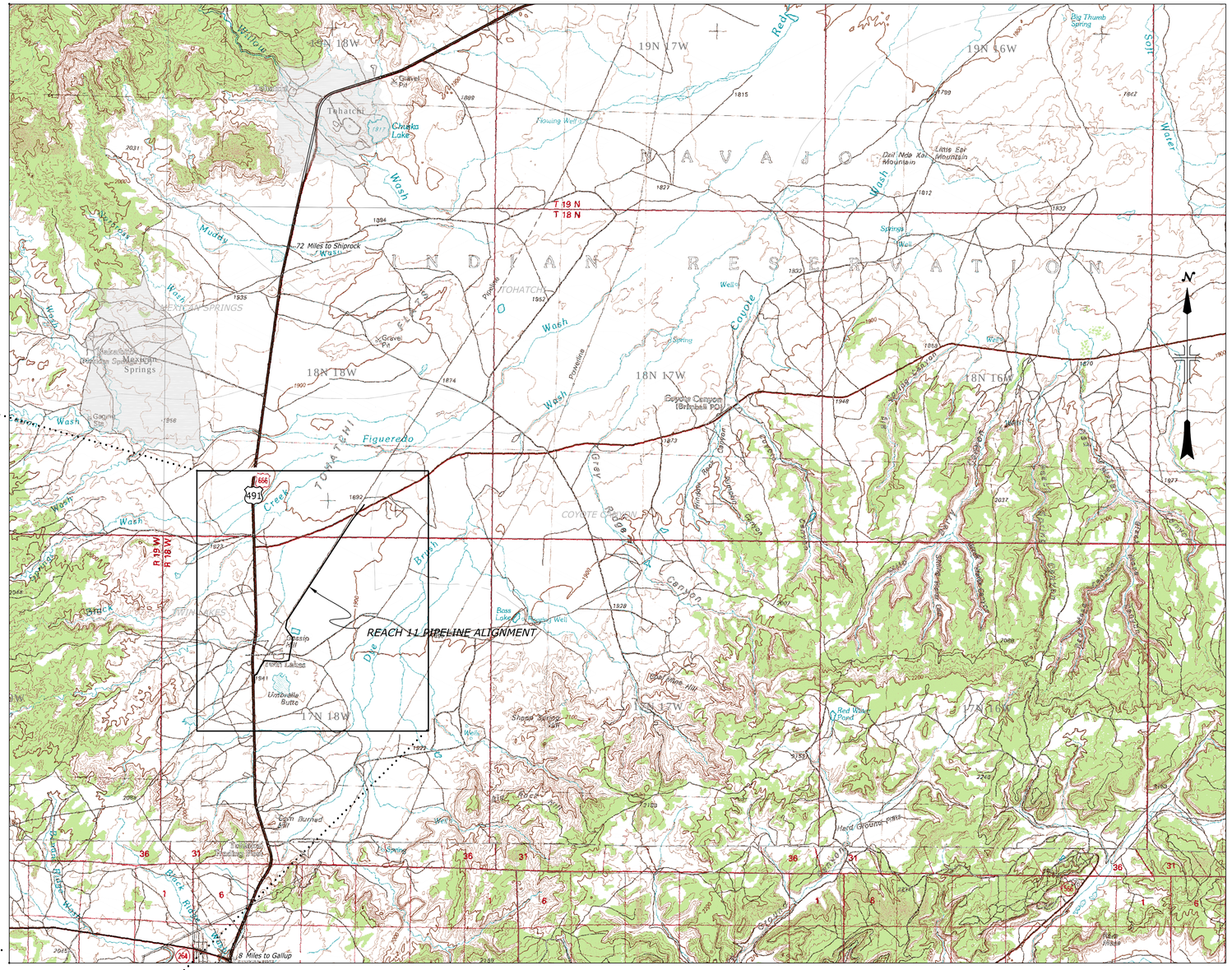


KEY MAP



LOCATION MAP

0 6000 12000 24000 Feet
1:24000



VICINITY MAP

0 6000 12000 24000 Feet
1:72000

NOTE

All Reach 11 Right-of-Way lies within Navajo Tribal Trust Lands.

LEGEND

- State Highway
- Navajo Nation Chapter
- County Boundary Line
- Township, Range and Section Lines

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NAVAJO-GALLUP WATER SUPPLY PROJECT
NEW MEXICO

SAN JUAN LATERAL - REACH 11

LINE PIPE

REV NO	DATE	DESCRIPTION
2	2017-03-15	529 UPDATED ALIGNMENT
	Deming, Bart W P.E.	
1	2016-09-30	529 REFORMATTED MAP LAYOUT

X
DESIGNED
X
DRAWN
X
CHECKED
Deming, Bart W P.E.
TECH. APPR.
Page, Patrick J P.E.
APPROVED
ADMIN APPROVAL - FCCO Deputy Construction Engineer

FARMINGTON, NM *2016-09-30*

LOCATION MAP

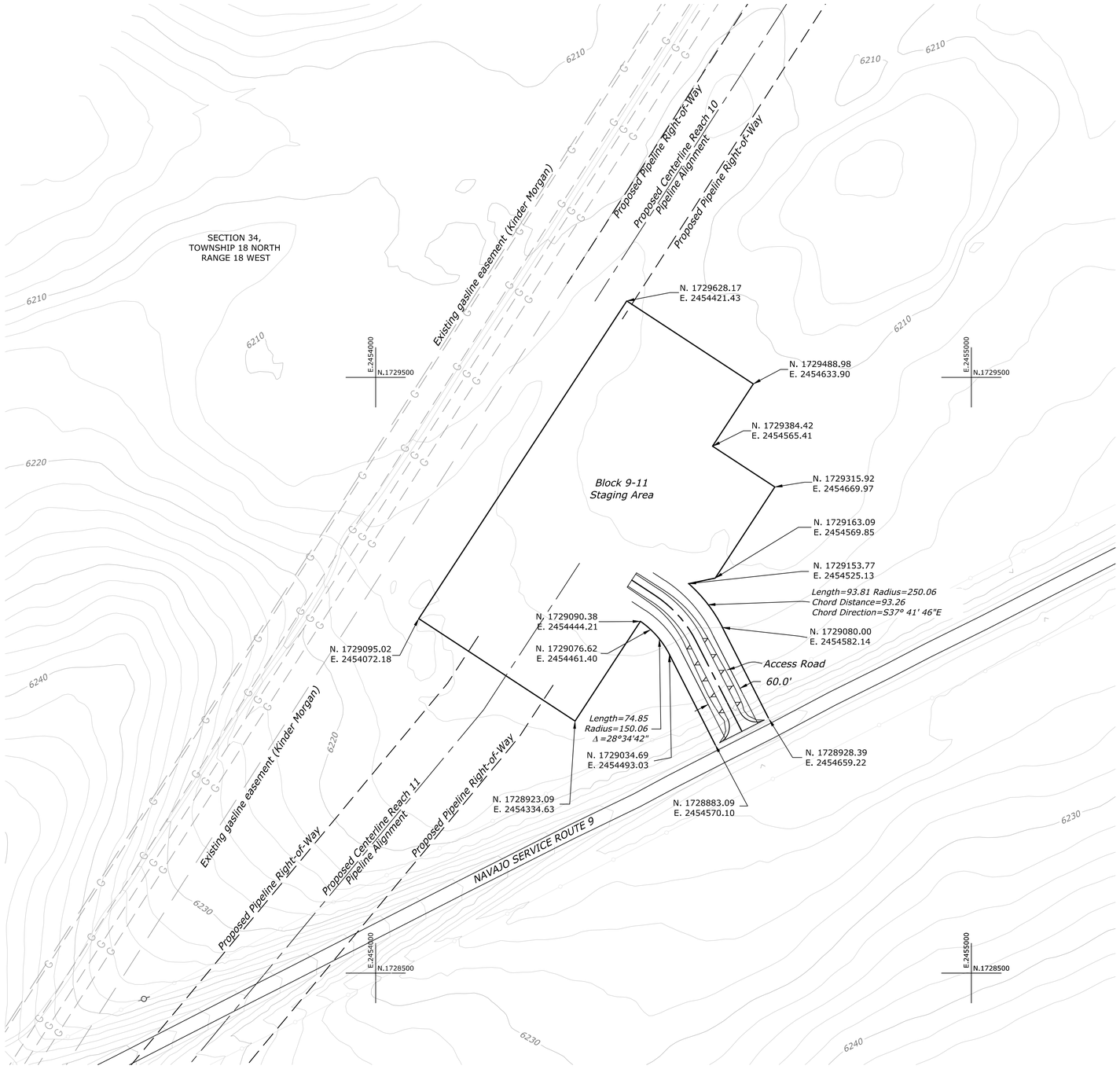
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PLOTTED BY
RGLADDEN

CAD SYSTEM
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CAD FILENAME
1695-529-60100-RD-1.DWG

Released



GENERAL NOTES

1. Coordinates based on New Mexico State Plane West Zone, feet. (NAD83).

2. The Ground to New Mexico State Plane West Zone Grid conversion factor is 0.999703693004.

3. Contour interval is 2 feet.

REFERENCE DRAWINGS

General Map.....1695-529-60145.

Location Map.....1695-529-60099.

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NEW MEXICO

SAN JUAN LATERAL

BLOCK 9-11

Ryan Gladden	DESIGNED
D. Thornburg	DRAWN
Ryan Gladden	CHECKED
Deming, Bart W P.E.	TECH. APPR.
Longwell, Barry D	APPROVED
ADMIN APPROVAL - Project Construction Engineer	
FARMINGTON, NM	2017-06-01

STAGING AREA

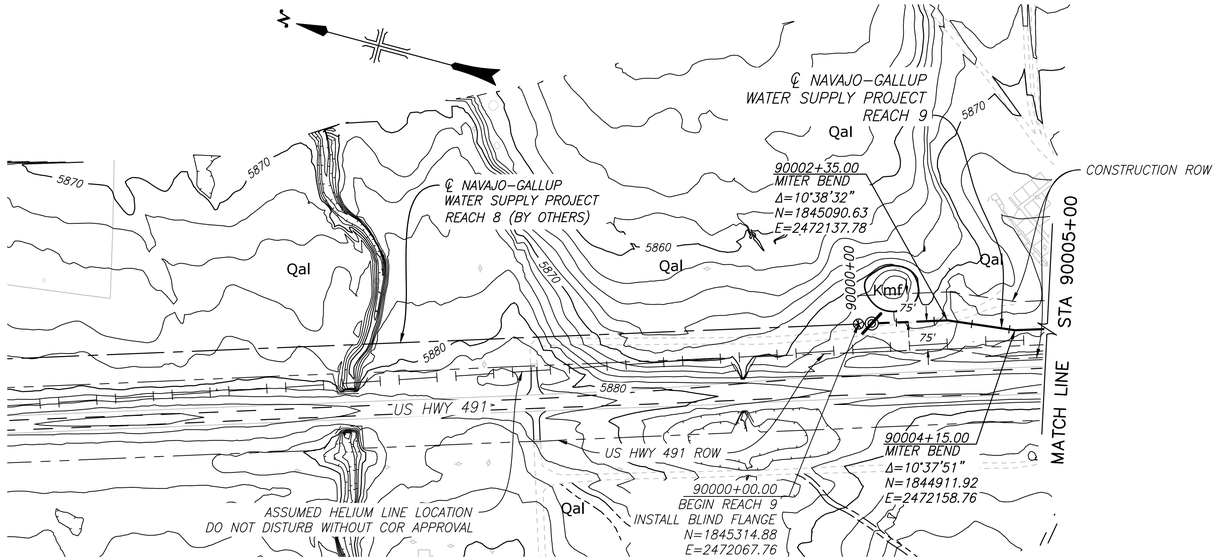
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DTHORNBURG

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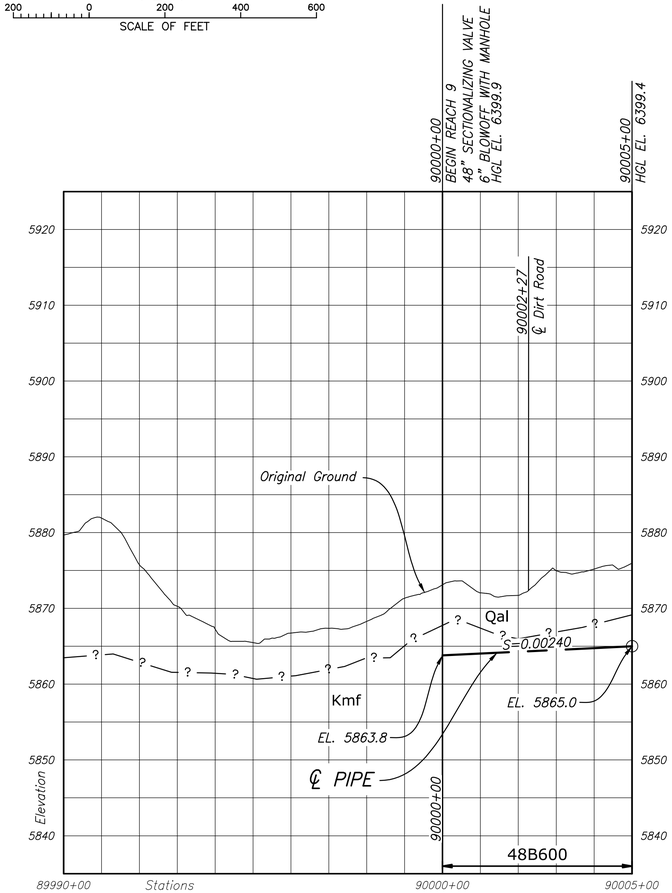
Released



PLAN

200 0 200 400 600
SCALE OF FEET

OPEN–CUT CROSSINGS		
Station	Road / Wash	% Compaction
90002+02 TO 90002+52	Maintained Road	95%



PROFILE

GENERAL NOTES

1. General Notes, Symbols, Abbreviations, and Pipe Classification apply to all plan and profile drawings.
2. Contractor shall determine the voltage at all power lines and share this information with the COR.
3. At angle points that do not require miter bends, long radius curves (vertical and horizontal) shall be constructed by pulling joints.
4. Stations are approximate and may be varied as directed.
5. Minimum earth cover over the top of the pipe shall be 3.5 feet unless the line pipe is at an existing wash, or at a roadway, and then the minimum cover is 5 feet, unless otherwise noted.
6. All joints are to be restrained under wash crossings between the stations identified in the tables on the plan and profiles.
7. Where the line pipe crosses an existing pipe, a minimum clear distance of 2 feet outside to outside between line pipe and existing pipe shall be provided unless otherwise directed. The backfill between the crossing pipelines shall be controlled low strength material (CLSM) as stated in the specifications.
8. Hydraulic grade line elevations (H.G.L. El.) shown are for the design Q of 47.7 cfs at steady state for Reach 9 and Reach 10, and 40.4 cfs for Reach 11.
9. 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 contractor submits pipe, fittings, and miter bends for approval.
10. For limits on excavation near gas lines, see specifications.
11. Grid based on New Mexico State Coordinate System West Zone.
12. Reach 9 Ground to grid conversion factor is 0.999691831997. Reach 10 Ground to grid conversion factor is 0.999703693004. Reach 11 Ground to grid conversion factor is 0.999703150995.
13. Metallic pipe is required, and joints shall be restrained when on slopes greater than 0.20. See (60333) for additional steep pipe details.
14. Open cut roads require CLSM and compacted backfill per specifications. Maintained roads require gravel surfacing per specifications. See (60329) for details.
15. CAUTION: Call New Mexico One Call 811 before you dig.

GEOLOGIC NOTE

For General Geologic Legend Explanation, and Notes, see 1695–529–60076.

ABBREVIATIONS

CR – County Road
HGL – Hydraulic Grade Line
NTUA – Navajo Tribal Utility Authority
OH – Over Head
PNM – Public Service Company of New Mexico
ROW – Right–of–Way
RTE – Route
TP – Test Pit

PIPE CLASSIFICATIONS

The line pipe is designated as 48B600, 42C350 etc. The 48 and 42 indicate the nominal pipe diameter in inches. The letters B, C, and D denote cover class of 10, 15, and 20 feet respectively, of design earth cover over the top of the pipe. The letter K denotes steep pipe sections. The number 600, 350, etc. denotes the maximum allowable hydrostatic pressure head, in feet, measured at the centerline of the pipe.

SYMBOLS

- Air Valve
- Blowoff
- ℄ Line Pipe
- Chain Link Fence
- Construction ROW
- Dirt Road
- Field Fence
- Geologic Unit Contact
- Geologic Unit Approx Contact
- Geologic Unit Queried Where Inferred
- Helium Line(abandoned)
- Manhole
- Manhole with Air Valve
- Manhole with Blowoff
- Natural Gas Pipeline
- Paved Road
- Powerline
- Sectionalizing Valve
- Sewerline
- Telephone
- US Hwy 491 ROW
- Waterline

NOTE

1. For details at 90000+00, see (60325).

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NAVAJO–GALLUP WATER SUPPLY PROJECT
NEW MEXICO

SAN JUAN LATERAL - REACH 9

LINE PIPE

REV. NO.	DATE	DESCRIPTION
1	2017-06-07	D Revised Note 13 to require metallic pipe on slopes greater than 0.20.
	Bowles, Linda M P.E.	

Andrew Marner — DESIGNED
Andrew Marner — DRAWN
D.L. Gesundheit — CHECKED
Bowles, Linda M P.E. — TECH. APPR.
Duke, Wylie C (Chris) P.E. — APPROVED
PEER REVIEWER - Manager - Water Conveyance Group
DENVER, CO 2017-03-30

GEOLOGY

TECH. APPR. JUSTIN GILBERT
SUBMITTED PAUL GARDNER
JUSTIN GILBERT Supervisory Geologist
APPROVED

PLAN AND PROFILE

BEGINNING TO STA 90005+00

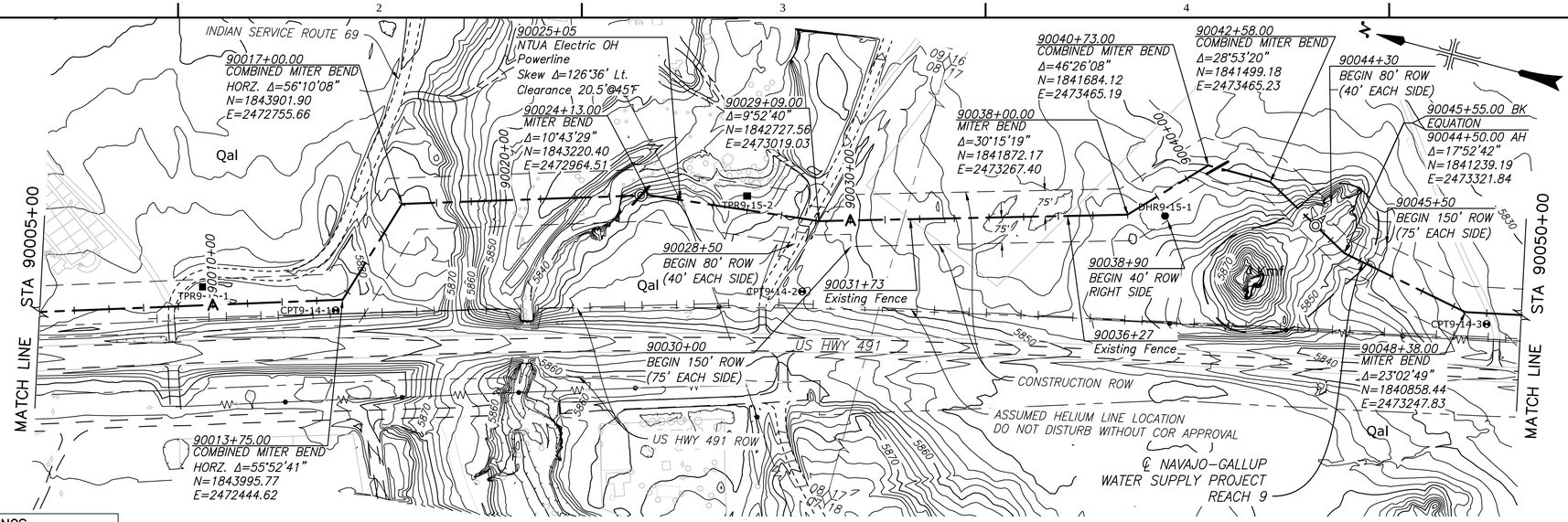
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SHEET 1 OF 26

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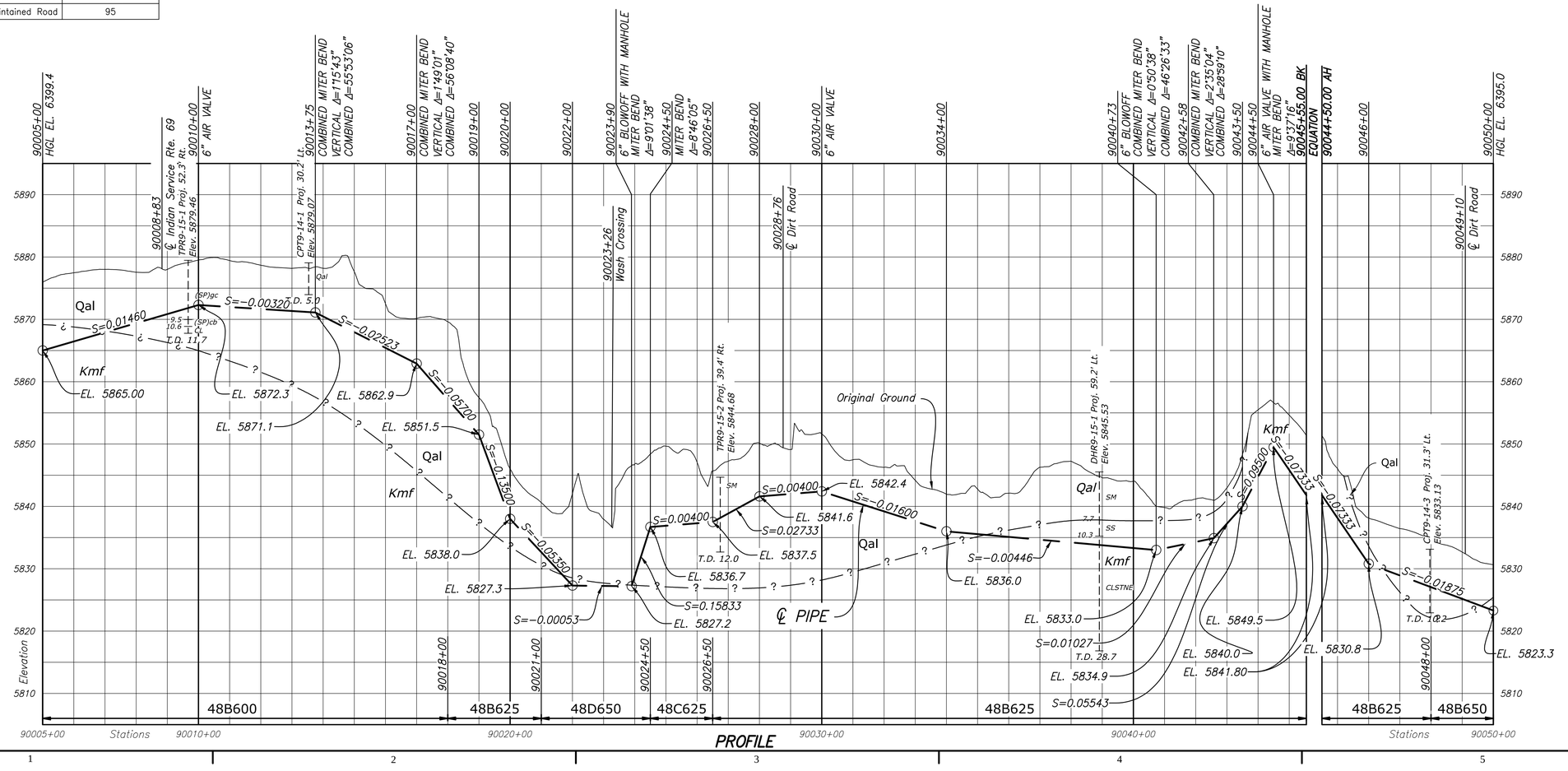
PLAN

200 0 200 400 600
SCALE OF FEET

OPEN-CUT CROSSINGS		
Station	Road / Wash	% Compaction
90008+73 TO 90008+93	Maintained Road	95
90020+60 TO 90024+02	Wash	85
90028+52 TO 90029+00	Maintained Road	95
90048+90 TO 90049+25	Maintained Road	95

NOTES

1. For General Notes, Symbols, Abbreviations, and Pipe Classification, see (60281).
2. For wash crossing details at 90023+26, see (60337).



PROFILE

GEOLOGY	
TECH. APPR.	JUSTIN GILBERT
SUBMITTED	PAUL GARDNER
APPROVED	JUSTIN GILBERT Supervisory Geologist

REVNO	DATE	DESCRIPTION
1	2017-05-22	Added Construction ROW width labels.
D	Marner, Andrew (Andy) I P.E.	

Andrew Marner — DESIGNED
Andrew Marner — DRAWN
D. L. Gesundheit — CHECKED
Bowles, Linda M P.E. — TECH. APPR.
Duke, Wylie C (Chris) P.E. — APPROVED
PEER REVIEWER - Manager - Water Conveyance Group
DENVER, CO 2017-03-30

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NEW MEXICO

SAN JUAN LATERAL - REACH 9

LINE PIPE

PLAN AND PROFILE

STA. 90005+00
TO
STA. 90050+00

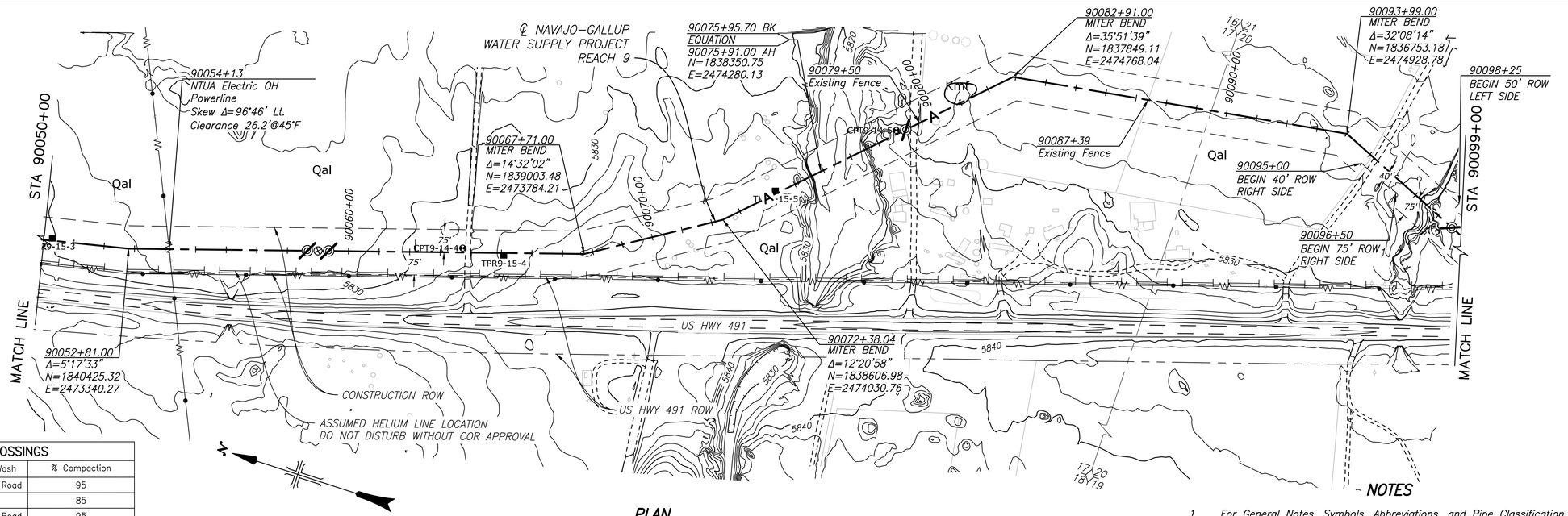
1695-D-60282

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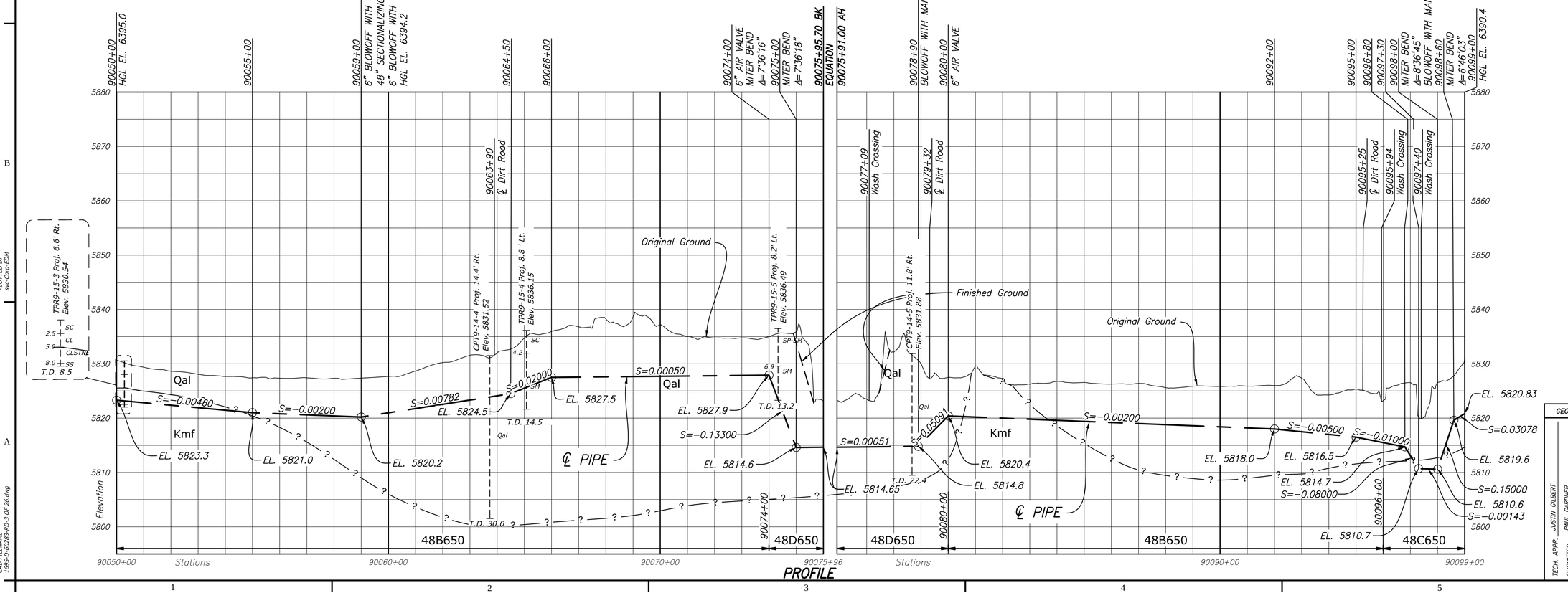
PLAN

200 0 200 400 600
SCALE OF FEET

OPEN CUT CROSSINGS		
Station	Road / Wash	% Compaction
90063+70 TO 90064+10	Maintained Road	95
90074+50 TO 90078+00	Wash	85
90079+10 TO 90079+55	Maintained Road	95
90095+10 TO 90095+40	Maintained Road	95
90095+50 TO 90098+00	Wash	85

NOTES

1. For General Notes, Symbols, Abbreviations, and Pipe Classification, see (60281).
2. For wash crossing details at 90077+09, see (60338).
3. For wash crossing details at 90097+40, see (60339).



PROFILE

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NAVAJO-GALLUP WATER SUPPLY PROJECT
NEW MEXICO

SAN JUAN LATERAL - REACH 9

LINE PIPE

REV NO	DATE	DESCRIPTION
1	2017-05-22	D Added Construction ROW width labels. Marner, Andrew (Andy) J P.E.

Andrew Marner — DESIGNED
Andrew Marner — DRAWN
D. L. Gesundheit — CHECKED
Bowles, Linda M P.E. — TECH. APPR.
Duke, Wylie C (Chris) P.E. — APPROVED
PEER REVIEWER - Manager - Water Conveyance Group
DENVER, CO 2017-03-30

GEOLOGY
TECH. APPR. JUSTIN GILBERT
SUBMITTED PAUL GARDNER
APPROVED JUSTIN GILBERT Supervisory Geologist

PLAN AND PROFILE

STA. 90050+00
TO
STA. 90099+00

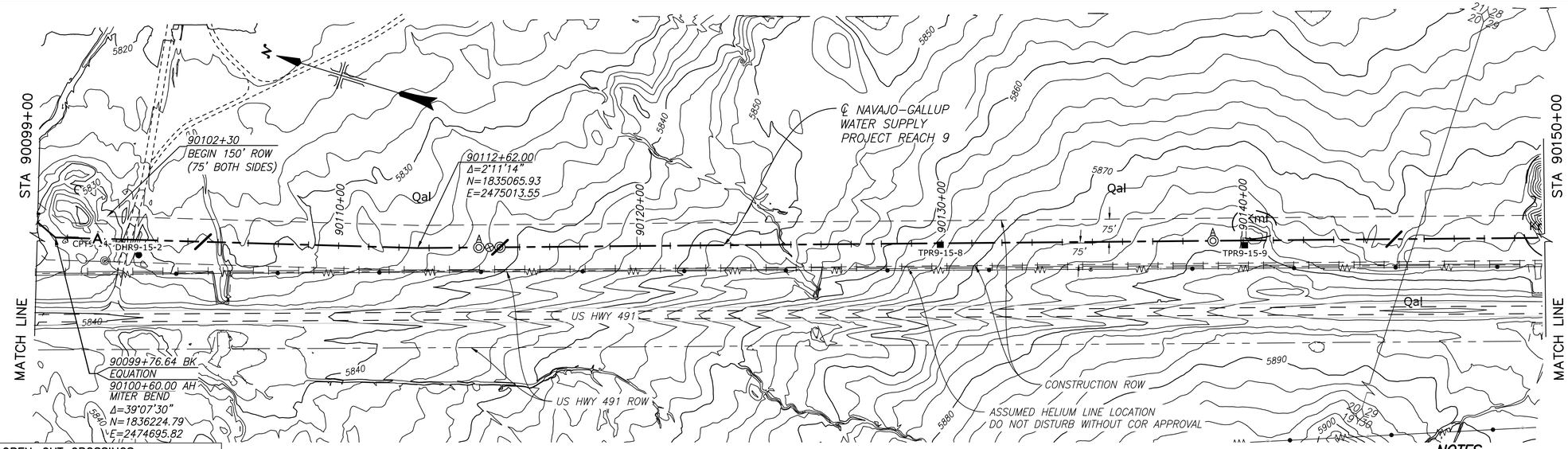
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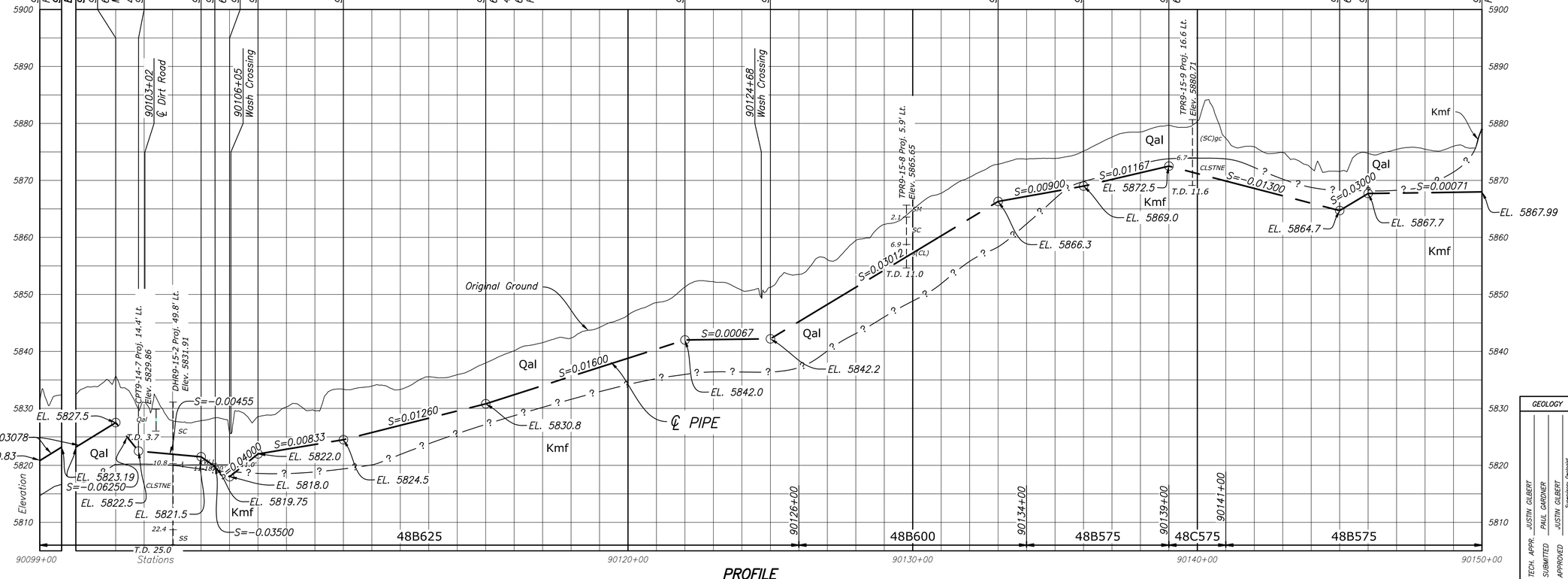


OPEN–CUT CROSSINGS		
Station	Road / Wash	% Compaction
90102+85 TO 90103+20	Maintained Road	95
90105+90 TO 90106+20	Wash	85
90124+48 TO 90124+92	Wash	85

PLAN

200 0 200 400 600
SCALE OF FEET

1. For General Notes, Symbols, Abbreviations, and Pipe Classification, see (60281).
2. For wash crossing details at 90106+05 and 90124+68, see (60340).
3. Water was encountered in DHR9–15–2 at a depth of 11 feet.



BLV NO	DATE	BY	DESCRIPTION
1	2017-06-08	Bowles, Linda M P.E.	D Added Construction ROW width labels. Added Miter Bend label at station equation.

GEOLOGY	
TECH. APPR.	JUSTIN GILBERT
SUBMITTED	PAUL GARDNER
APPROVED	JUSTIN GILBERT Supervisory Geologist

Andrew Marner — DESIGNED
Andrew Marner — DRAWN
D. L. Gesundheit — CHECKED
Bowles, Linda M P.E. — TECH. APPR.
Duke, Wylie C (Chris) P.E. — APPROVED
PEER REVIEWER - Manager - Water Conveyance Group
DENVER, CO 2017-03-30

RECLAMATION
Managing Water in the West

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U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
NAVAJO–GALLUP WATER SUPPLY PROJECT
NEW MEXICO

SAN JUAN LATERAL - REACH 9

LINE PIPE

PLAN AND PROFILE

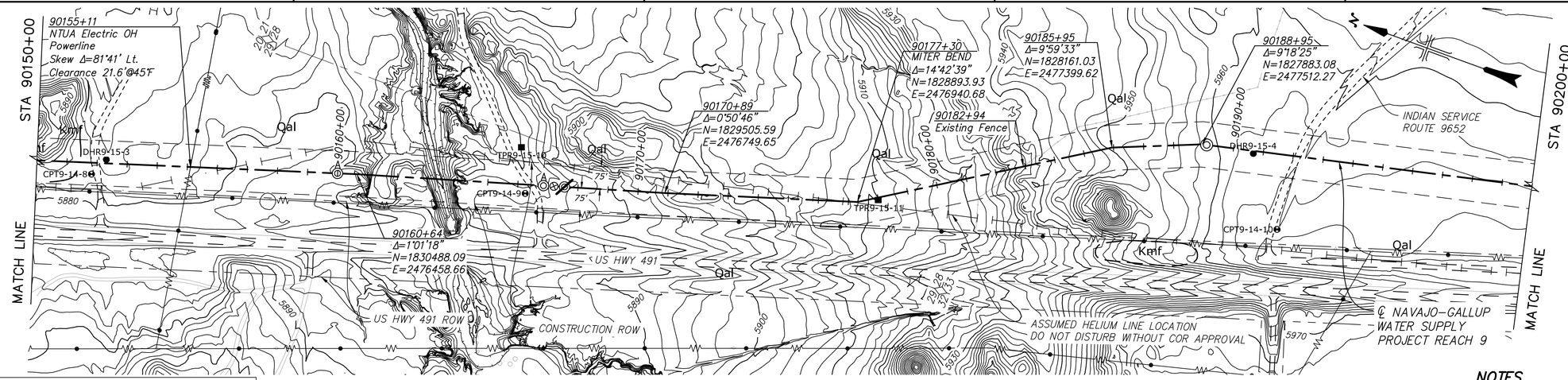
STA. 90099+00
TO
STA. 90150+00

1695-D-60284

SHEET 4 OF 26

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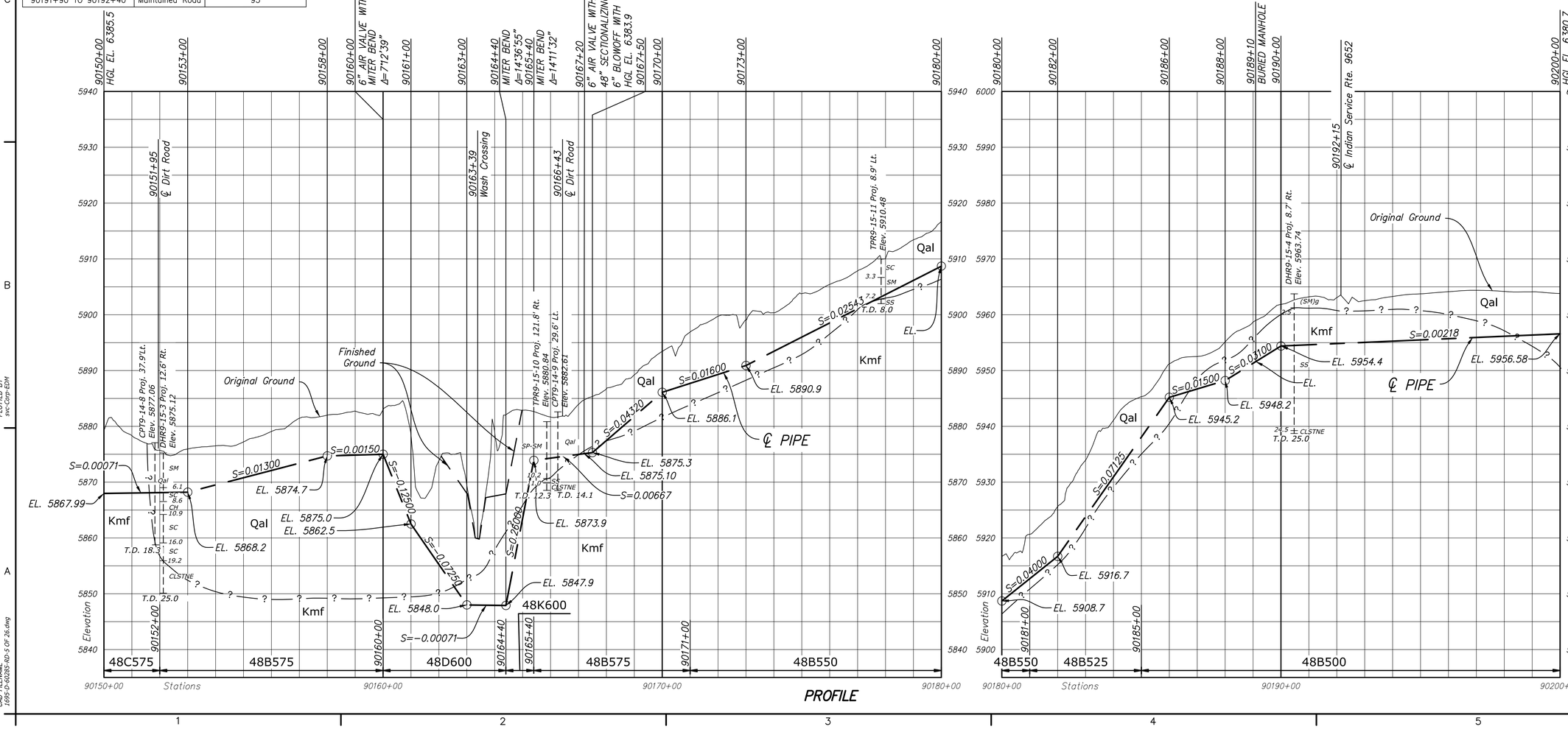
OPEN-CUT CROSSINGS		
Station	Road / Wash	% Compaction
90151+72 TO 90152+18	Maintained Road	95
90160+00 TO 90165+00	Wash	85
90166+21 TO 90166+65	Maintained Road	95
90191+90 TO 90192+40	Maintained Road	95

PLAN

200 0 200 400 600
SCALE OF FEET

NOTES

1. For General Notes, Symbols, Abbreviations, and Pipe Classification, see (60281).
2. For wash crossing details at 90163+39, see (60342).



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BUREAU OF RECLAMATION
NAVAJO-GALLUP WATER SUPPLY PROJECT
NEW MEXICO

SAN JUAN LATERAL - REACH 9

LINE PIPE

DESIGNED	Andrew Marner
DRAWN	Andrew Marner
CHECKED	D. L. Gesundheit
TECH. APPR.	Bowles, Linda M P.E.
APPROVED	Duke, Wylie C (Chris) P.E.
PEER REVIEWER -	Manager - Water Conveyance Group

GEOLOGY

TECH. APPR.	JUSTIN GILBERT
SUBMITTED	PAUL GARDNER
APPROVED	JUSTIN GILBERT Supervisory Geologist

DENVER, CO 2017-03-30

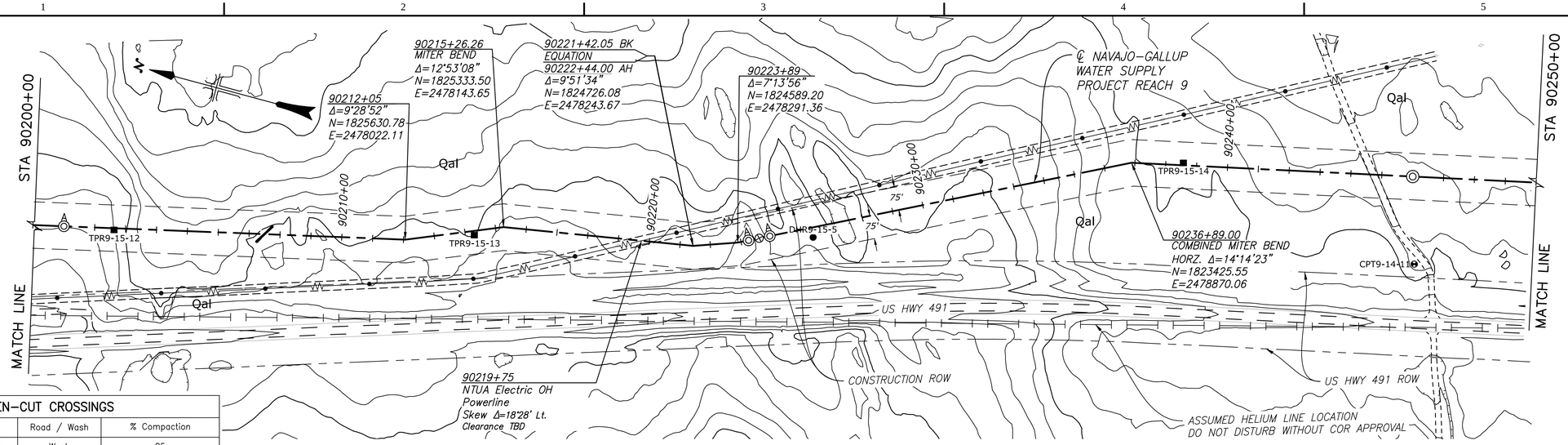
PLAN AND PROFILE

STA. 90150+00
TO
STA. 90200+00

1695-D-60285

SHEET 5 OF 26

Released



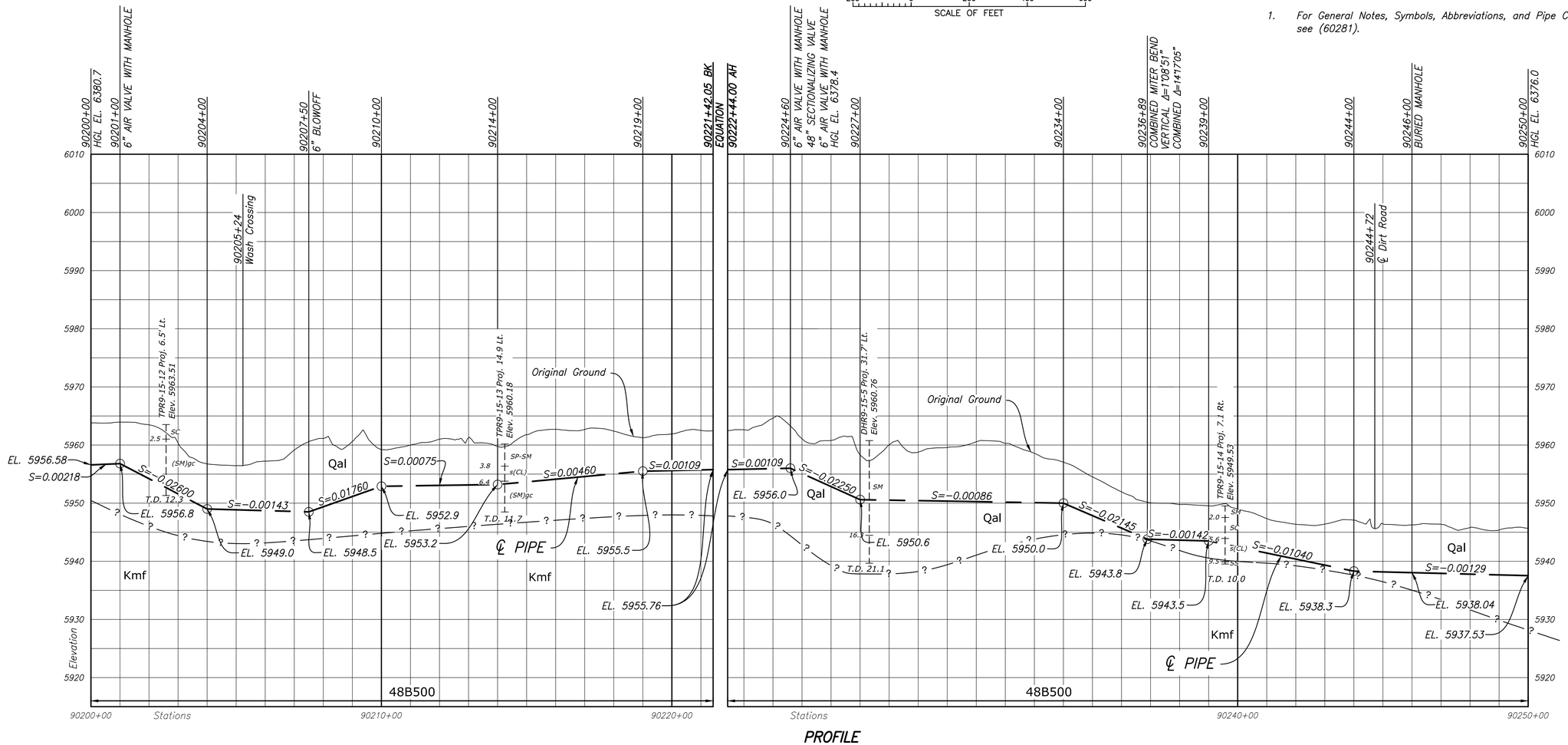
PLAN

200 0 200 400 600
SCALE OF FEET

OPEN–CUT CROSSINGS		
Station	Road / Wash	% Compaction
90203+00 TO 90206+00	Wash	85
90244+50 TO 90244+95	Maintained Road	95

NOTE

1. For General Notes, Symbols, Abbreviations, and Pipe Classification, see (60281).



PROFILE

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NAVAJO-GALLUP WATER SUPPLY PROJECT
NEW MEXICO

SAN JUAN LATERAL - REACH 9

LINE PIPE

GEOLOGY	
TECH. APPR.	JUSTIN GILBERT
SUBMITTED	PAUL GARDNER
APPROVED	JUSTIN GILBERT Supervisory Geologist

Andrew Marner
DESIGNED
Andrew Marner
DRAWN
D. L. Gesundheit
CHECKED
Bowles, Linda M P.E.
TECH. APPR.
Duke, Wylie C (Chris) P.E.
APPROVED
PEER REVIEWER - Manager - Water Conveyance Group

DENVER, CO 2017-03-30

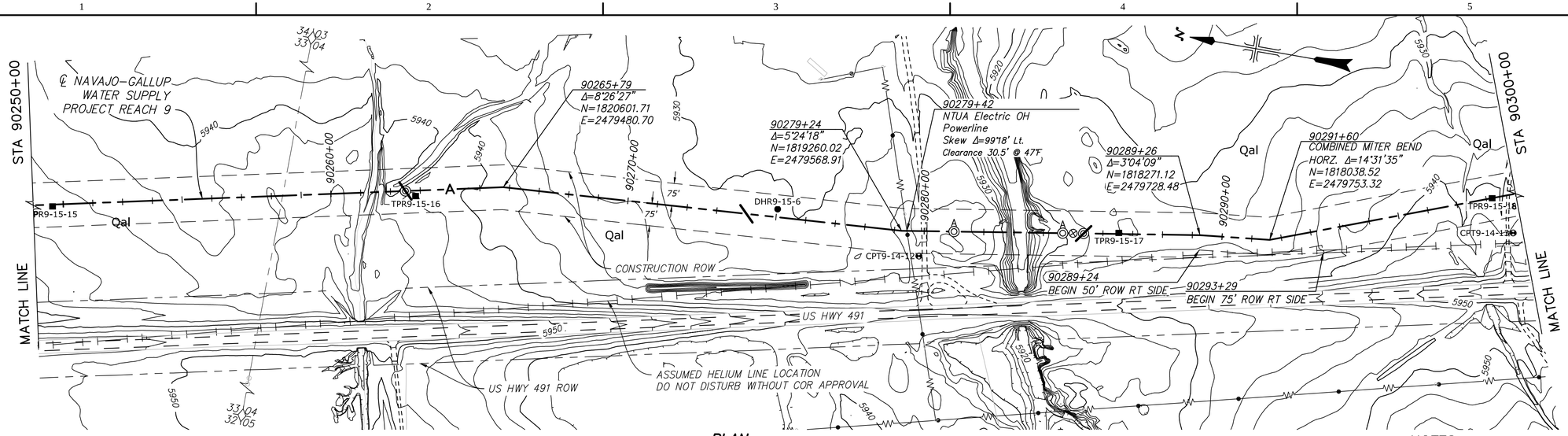
PLAN AND PROFILE

STA. 90200+00
TO
STA. 90250+00

1695-D-60286

SHEET 6 OF 26

Released



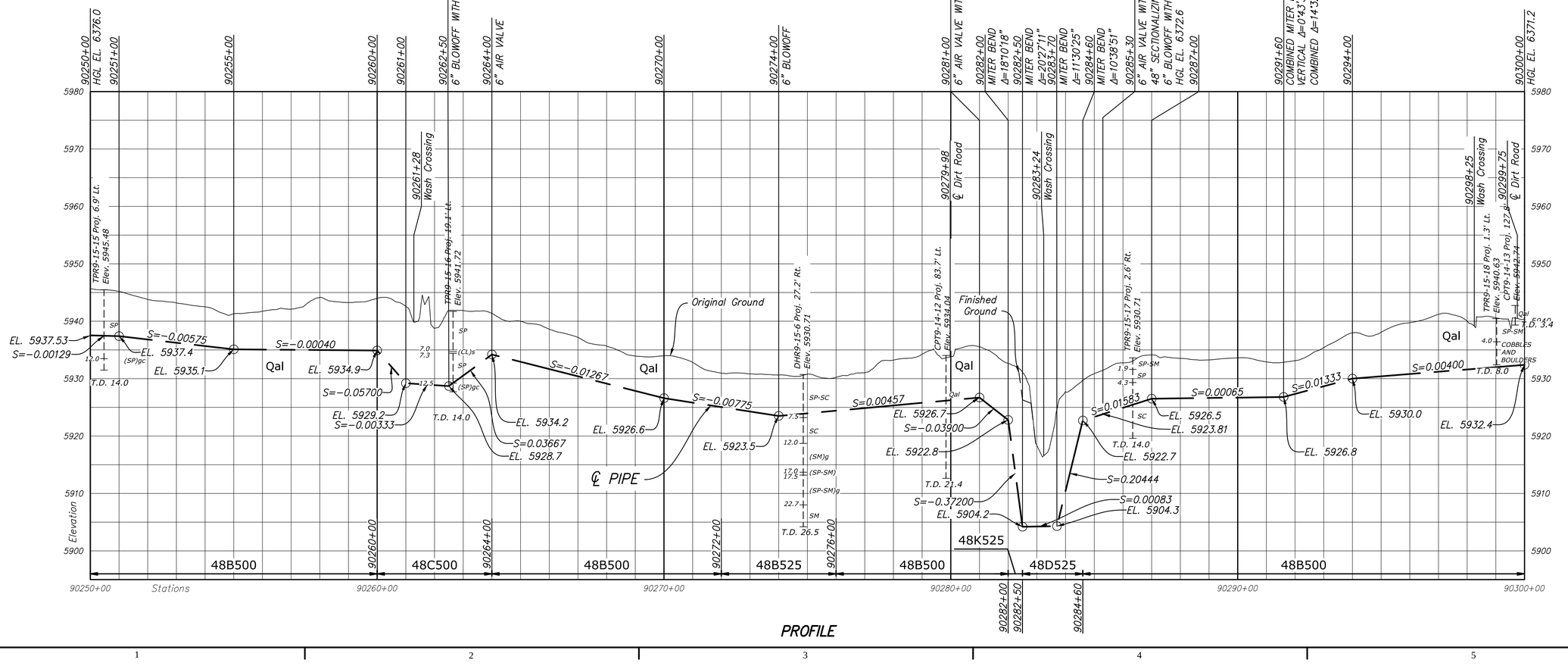
PLAN

200 0 200 400 600
SCALE OF FEET

OPEN–CUT CROSSINGS		
Station	Road / Wash	% Compaction
90261+00 TO 90262+50	Wash	85
90279+81 TO 90280+15	Maintained Road	95
90282+00 TO 90284+60	Wash	85
90298+00 TO 90298+45	Wash	85
90299+60 TO 90299+90	Maintained Road	95

NOTES

1. For General Notes, Symbols, Abbreviations, and Pipe Classification, see (60281).
2. For wash crossing details at 90261+28, see (60343).
3. For wash crossing details at 90283+24, see (60344).
4. For wash crossing details at 90298+25, see (60345).



PROFILE

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U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
NAVAJO-GALLUP WATER SUPPLY PROJECT
NEW MEXICO

SAN JUAN LATERAL - REACH 9

LINE PIPE

Andrew Marner — DESIGNED
Andrew Marner — DRAWN
D. L. Gesundheit — CHECKED
Bowles, Linda M P.E. — TECH. APPR.
Duke, Wylie C (Chris) P.E. — APPROVED
PEER REVIEWER - Manager - Water Conveyance Group

GEOLOGY

TECH. APPR. JUSTIN GILBERT
SUBMITTED PAUL GARDNER
APPROVED JUSTIN GILBERT Supervisory Geologist

DENVER, CO 2017-03-30

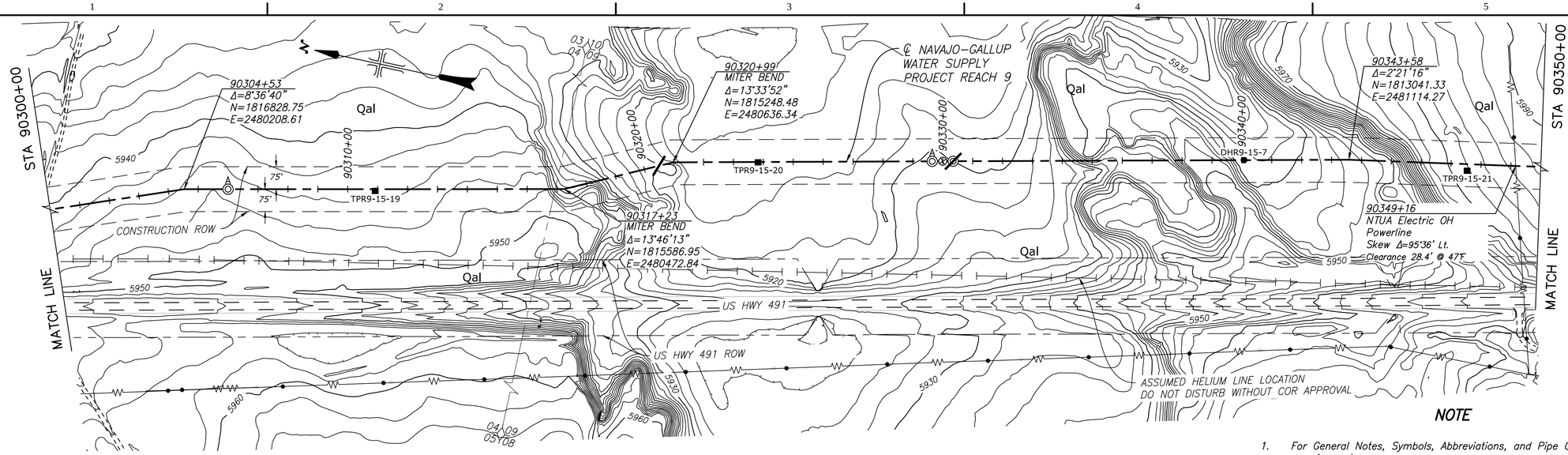
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STA. 90250+00
TO
STA. 90300+00

1695-D-60287

SHEET 7 OF 26

Released

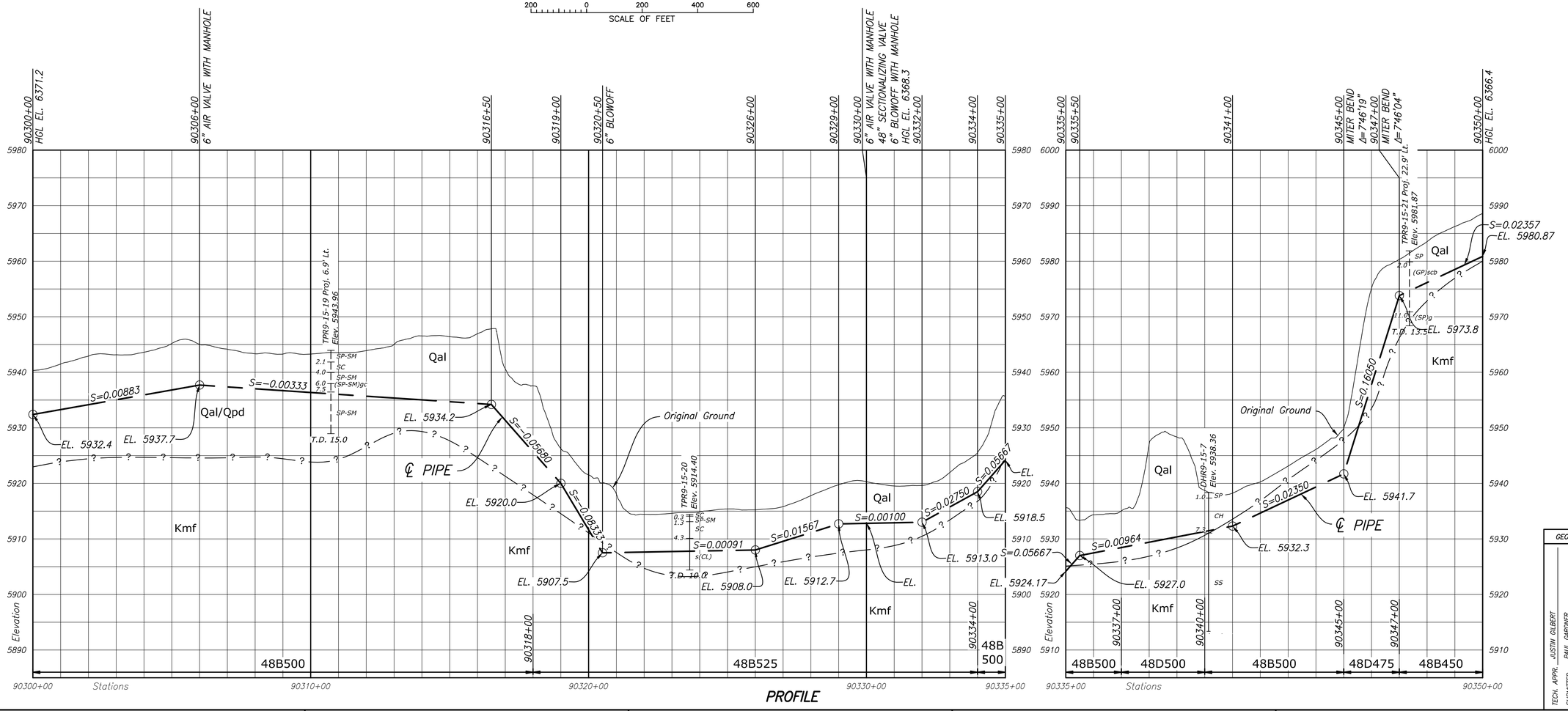


PLAN

200 0 200 400 600
SCALE OF FEET

NOTE

1. For General Notes, Symbols, Abbreviations, and Pipe Classification, see (60281).



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NAVAJO-GALLUP WATER SUPPLY PROJECT
NEW MEXICO

SAN JUAN LATERAL - REACH 9

LINE PIPE

GEOLOGY	
TECH. APPR.	JUSTIN GILBERT
SUBMITTED	PAUL GARDNER
APPROVED	JUSTIN GILBERT Supervisory Geologist

Andrew Marner
DESIGNED
Andrew Marner
DRAWN
D. L. Gesundheit
CHECKED
Bowles, Linda M P.E.
TECH. APPR.
Duke, Wylie C (Chris) P.E.
APPROVED
PEER REVIEWER - Manager - Water Conveyance Group

DENVER, CO 2017-03-30

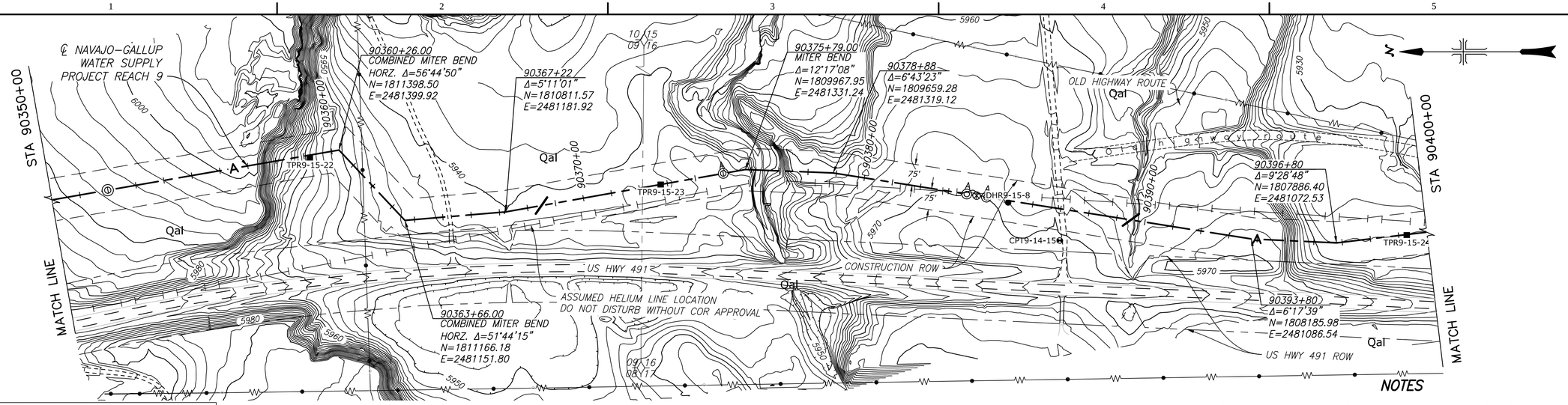
PLAN AND PROFILE

STA. 90300+00
TO
STA. 90350+00

1695-D-60288

SHEET 8 OF 26

Released



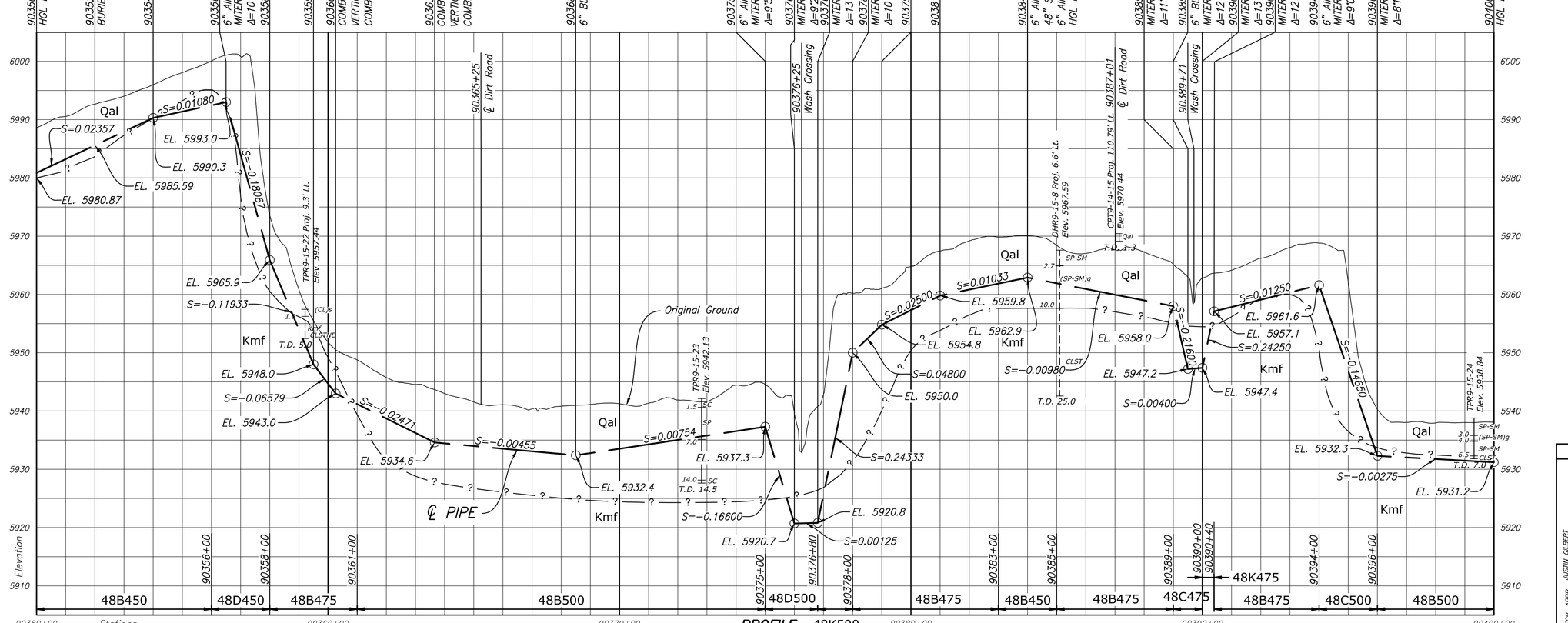
PLAN

SCALE OF FEET: 200 0 200 400 600

OPEN–CUT CROSSINGS		
Station	Road / Wash	% Compaction
90365+10 TO 90365+40	Maintained Road	95
90375+90 TO 90376+80	Wash	85
90386+82 TO 90387+20	Maintained Road	95
90389+50 TO 90389+90	Wash	85

NOTES

1. For General Notes, Symbols, Abbreviations, and Pipe Classification, see (60281).
2. For wash crossing details at 90376+25, see (60346).
3. For wash crossing details at 90389+71, see (60347).



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NEW MEXICO

SAN JUAN LATERAL - REACH 9

LINE PIPE

SO	NO	DATE	BY	DESCRIPTION
D	1	2017-06-07	Bowles, Linda M P.E.	Added 48K475 and 48K500 class pipe to profile.

Andrew Marner — DESIGNED
Andrew Marner — DRAWN
D. L. Gesundheit — CHECKED
Bowles, Linda M P.E. — TECH. APPR.
Duke, Wylie C (Chris) P.E. — APPROVED
PER REVIEWER - Manager - Water Conveyance Group
DENVER, CO 2017-03-30

GEOLOGY

TECH. APPR. JUSTIN GILBERT
SUBMITTED PAUL GARDNER
APPROVED JUSTIN GILBERT Supervisory Geologist

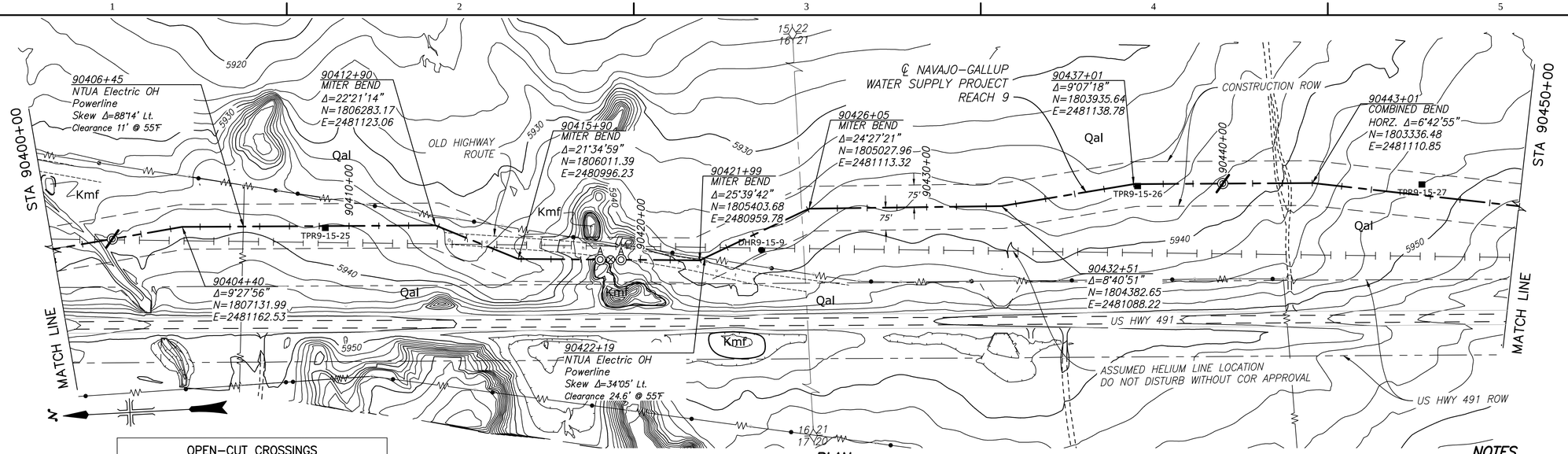
PLAN AND PROFILE

STA. 90350+00
TO
STA. 90400+00

1695-D-60289

SHEET 9 OF 26

Released



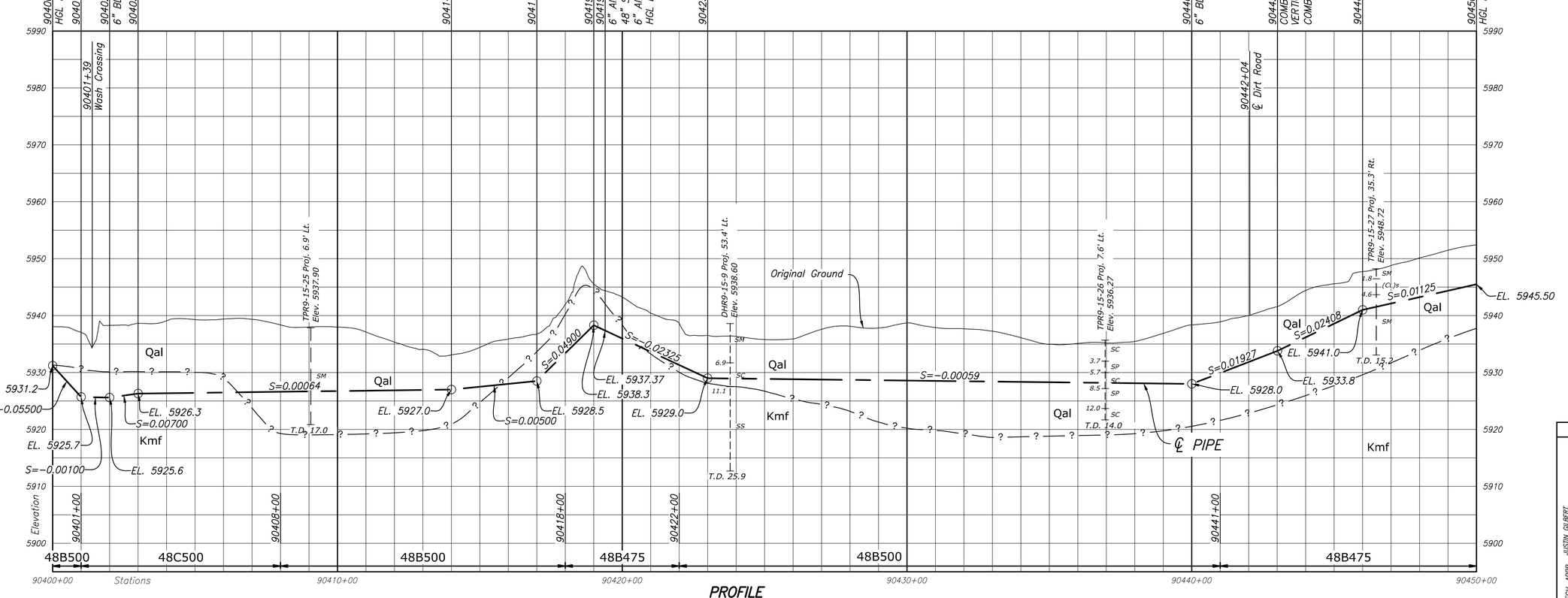
PLAN

200 0 200 400 600
SCALE OF FEET

OPEN–CUT CROSSINGS		
Station	Road / Wash	% Compaction
90401+00 TO 90401+65	Wash	85
90441+70 TO 90442+38	Maintained Road	95

NOTES

1. For General Notes, Symbols, Abbreviations, and Pipe Classification, see (60281).
2. For wash crossing details at 90401+39, see (60348).



PROFILE

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NEW MEXICO

SAN JUAN LATERAL - REACH 9

LINE PIPE

GEOLOGY	
TECH. APPR.	JUSTIN GILBERT
SUBMITTED	PAUL GARDNER
APPROVED	JUSTIN GILBERT Supervisory Geologist

Andrew Marner
DESIGNED
Andrew Marner
DRAWN
D. L. Gesundheit
CHECKED
Bowles, Linda M P.E.
TECH. APPR.
Duke, Wylie C (Chris) P.E.
APPROVED
PEER REVIEWER - Manager - Water Conveyance Group

DENVER, CO 2017-03-30

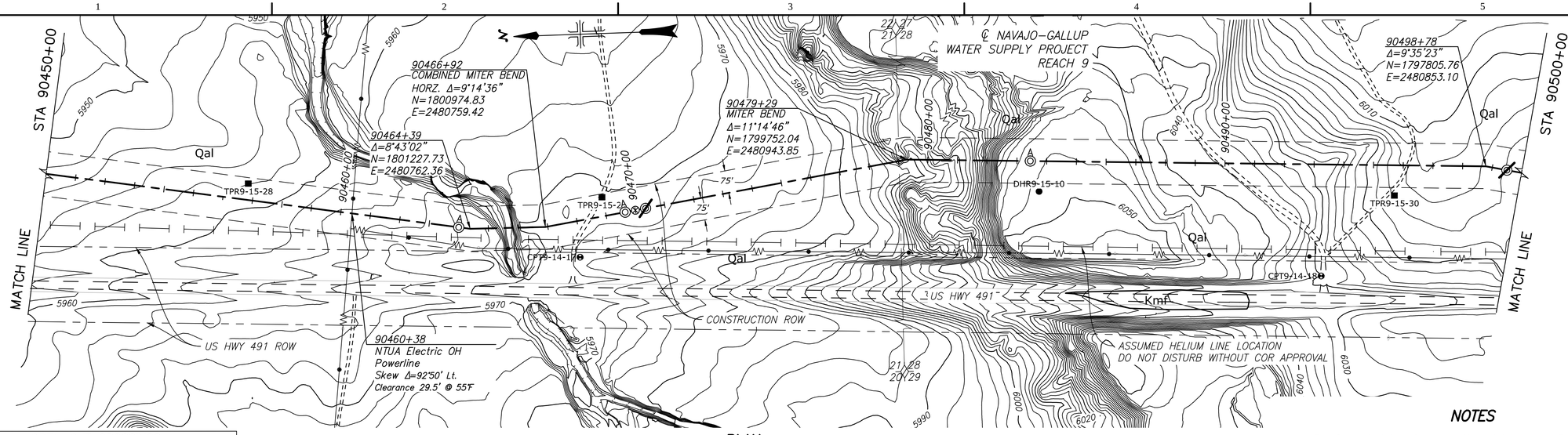
PLAN AND PROFILE

STA. 90400+00
TO
STA. 90450+00

1695-D-60290

SHEET 10 OF 26

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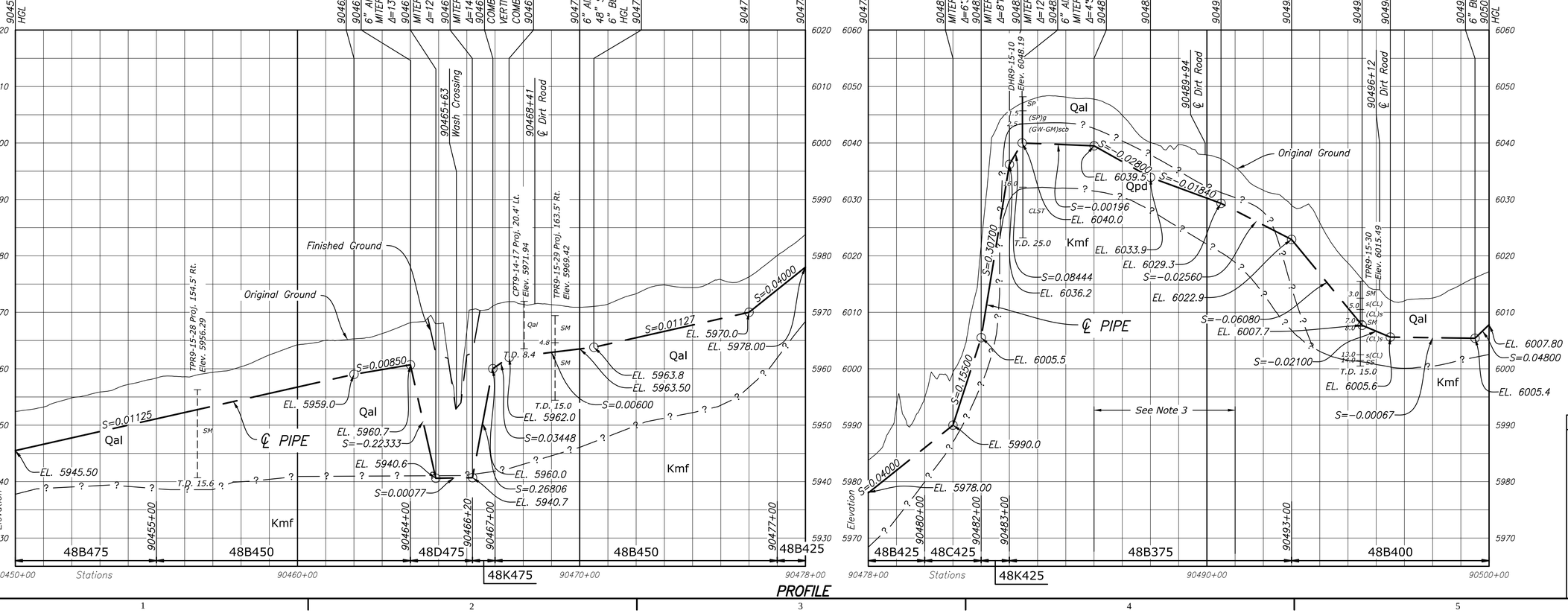
PLAN

200 0 200 400 600
SCALE OF FEET

OPEN–CUT CROSSINGS		
Station	Road / Wash	% Compaction
90464+85 TO 90466+22	Wash	85
90468+22 TO 90468+60	Maintained Road	95
90489+72 TO 90490+15	Maintained Road	95
90496+00 TO 90496+25	Maintained Road	95

NOTES

1. For General Notes, Symbols, Abbreviations, and Pipe Classification, see (60281).
2. For wash crossing details at 90465+63, see (60349).
3. Topography between Station 90486+00 and 90491+00 may be different than shown.



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NAVAJO-GALLUP WATER SUPPLY PROJECT
NEW MEXICO

SAN JUAN LATERAL - REACH 9

LINE PIPE

Andrew Marner	DESIGNED
Andrew Marner	DRAWN
D. L. Gesundheit	CHECKED
Bowles, Linda M P.E.	TECH. APPR.
Duke, Wylie C (Chris) P.E.	APPROVED
PEER REVIEWER - Manager - Water Conveyance Group	
DENVER, CO	2017-03-30

GEOLOGY

TECH. APPR.	JUSTIN GILBERT
	PAUL GARDNER
SUBMITTED	JUSTIN GILBERT
APPROVED	Supervisory Geologist

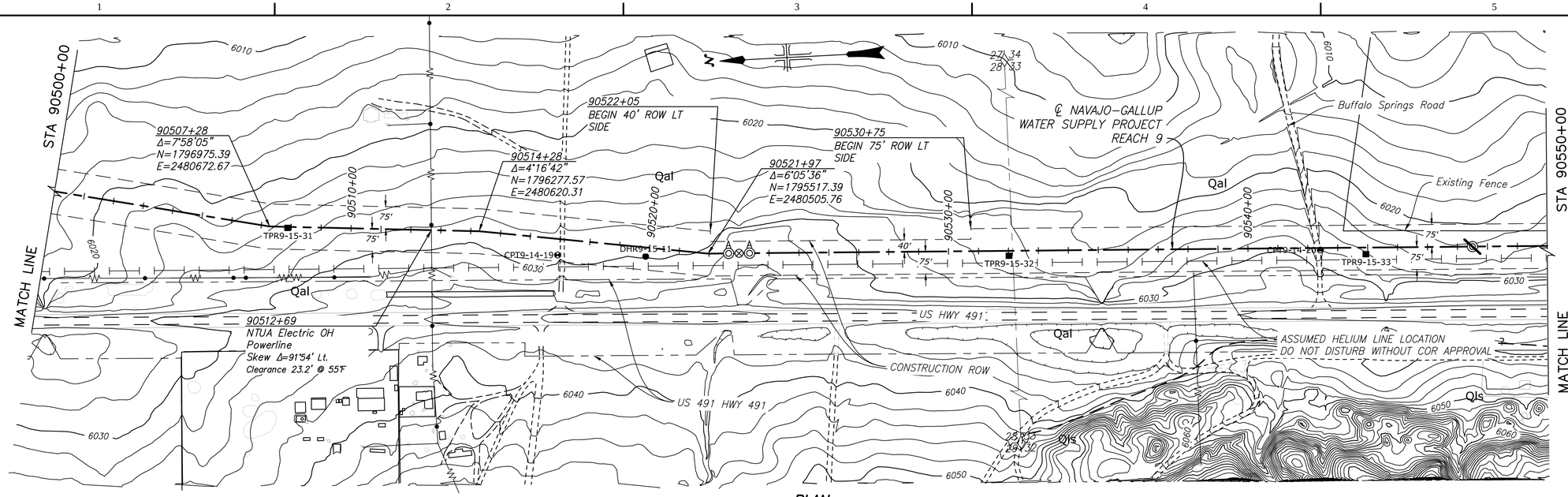
PLAN AND PROFILE

STA. 90450+00
TO
STA. 90500+00

1695-D-60291

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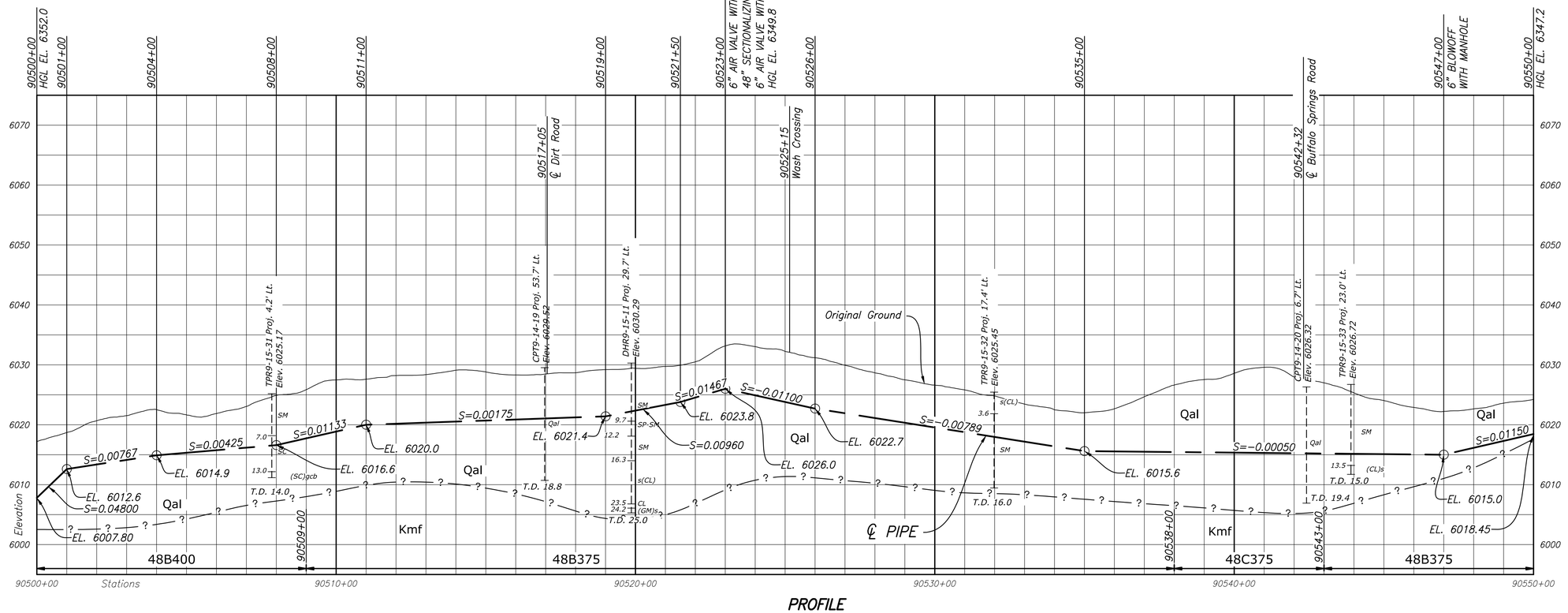
PLAN

SCALE OF FEET: 200 0 200 400 600

OPEN–CUT CROSSINGS		
Station	Road / Wash	% Compaction
90516+90 TO 90517+20	Maintained Road	95
90524+70 TO 90525+60	Wash	85
90542+15 TO 90542+50	Maintained Road	95

NOTE

1. For General Notes, Symbols, Abbreviations, and Pipe Classification, see (60281).



PROFILE

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NAVAJO-GALLUP WATER SUPPLY PROJECT
NEW MEXICO

SAN JUAN LATERAL - REACH 9

LINE PIPE

Andrew Marner	DESIGNED
Andrew Marner	DRAWN
D. L. Gesundheit	CHECKED
Bowles, Linda M P.E.	TECH. APPR.
Duke, Wylie C (Chris) P.E.	APPROVED PER REVIEWER - Manager - Water Conveyance Group
DENVER, CO	2017-03-30

GEOLOGY

TECH. APPR.	JUSTIN GILBERT
SUBMITTED	PAUL GARDNER
APPROVED	JUSTIN GILBERT Supervisory Geologist

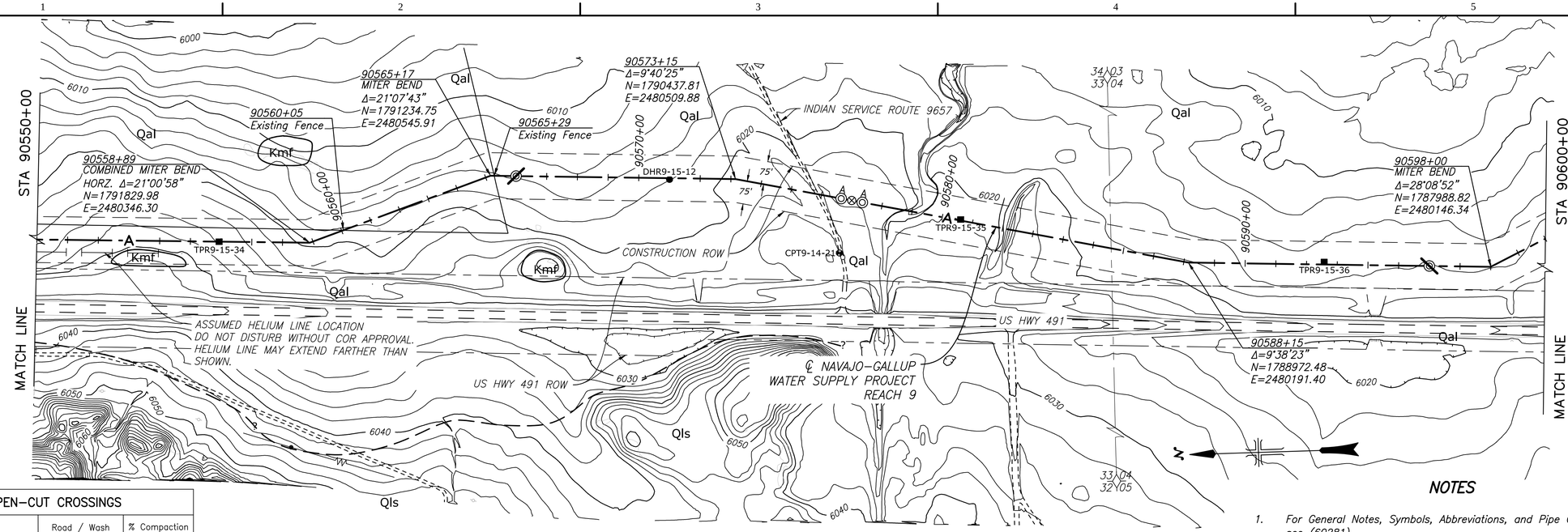
PLAN AND PROFILE

STA. 90500+00
TO
STA. 90550+00

1695-D-60292

SHEET 12 OF 26

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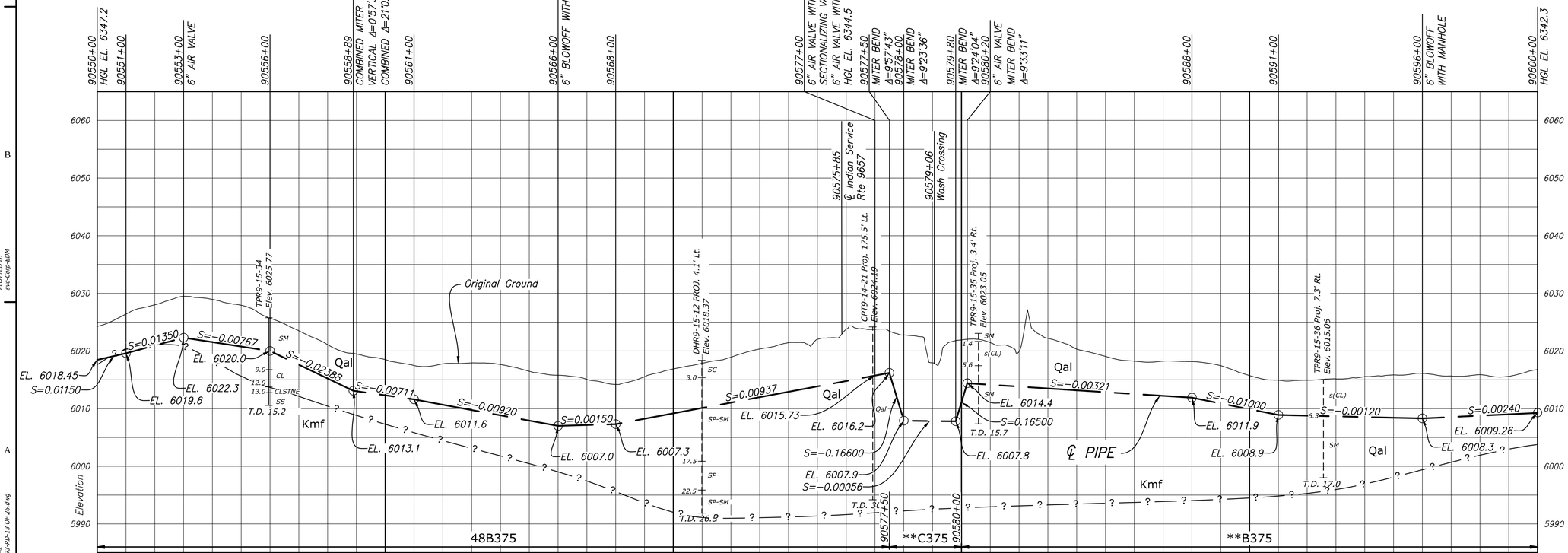
PLAN

SCALE OF FEET 200 0 200 400 600

OPEN–CUT CROSSINGS		
Station	Road / Wash	% Compaction
90575+70 TO 90576+00	Maintained Road	95
90578+25 TO 90579+75	Wash	85

NOTES

1. For General Notes, Symbols, Abbreviations, and Pipe Classification, see (60281).
2. For wash crossing details at 90579+06, see (60351).
3. Diameters with ** designation are dependent on pipe material type, see Line Pipe Material and Diameter Table (60306). Sectionalizing valve size to match Line Pipe diameter.



PROFILE

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BUREAU OF RECLAMATION
NAVAJO-GALLUP WATER SUPPLY PROJECT
NEW MEXICO

SAN JUAN LATERAL - REACH 9

LINE PIPE

DESIGNED	Andrew Marner
DRAWN	Andrew Marner
CHECKED	D. L. Gesundheit
TECH. APPR.	Bowles, Linda M P.E.
APPROVED	Duke, Wylie C (Chris) P.E.
PEER REVIEWER -	Manager - Water Conveyance Group
	DENVER, CO 2017-03-30

GEOLOGY

TECH. APPR.	JUSTIN GILBERT
SUBMITTED	PAUL GARDNER
APPROVED	JUSTIN GILBERT Supervisory Geologist

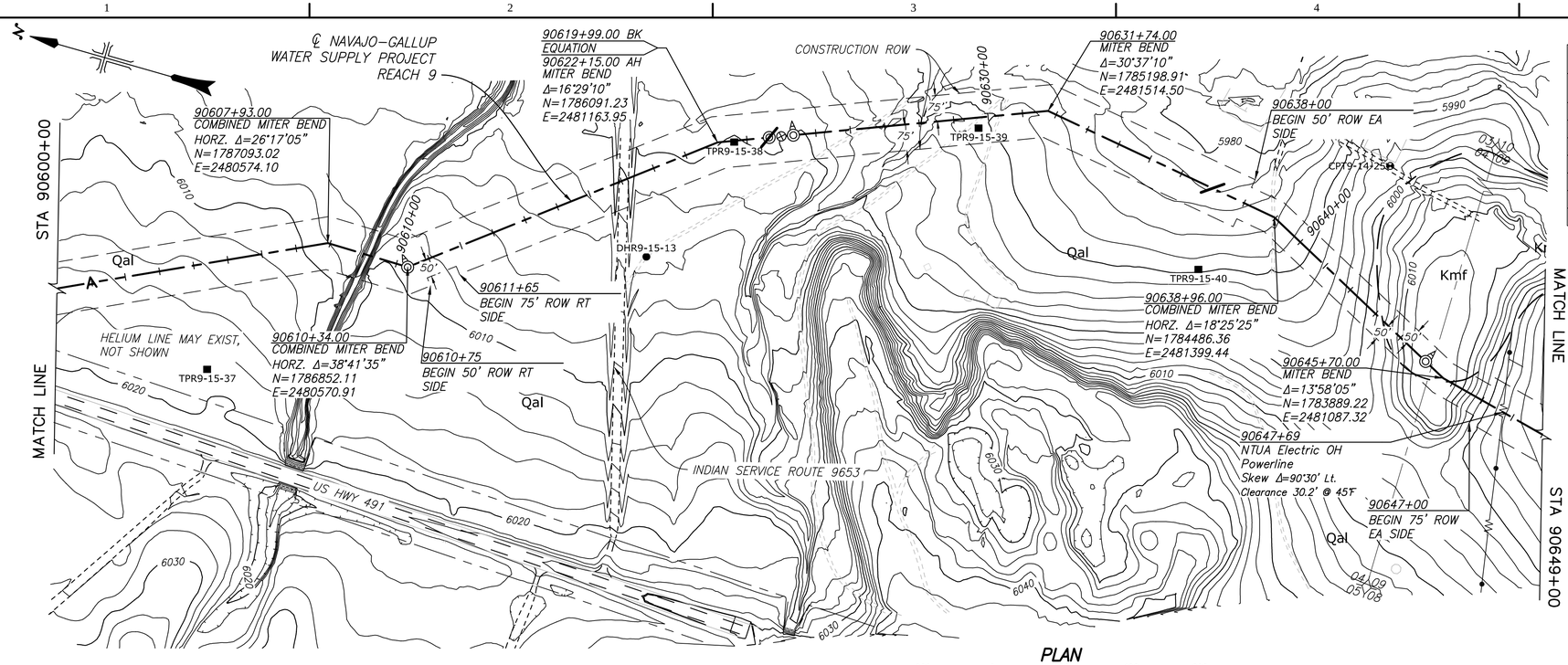
PLAN AND PROFILE

STA. 90550+00
TO
STA. 90600+00

1695-D-60293

SHEET 13 OF 26

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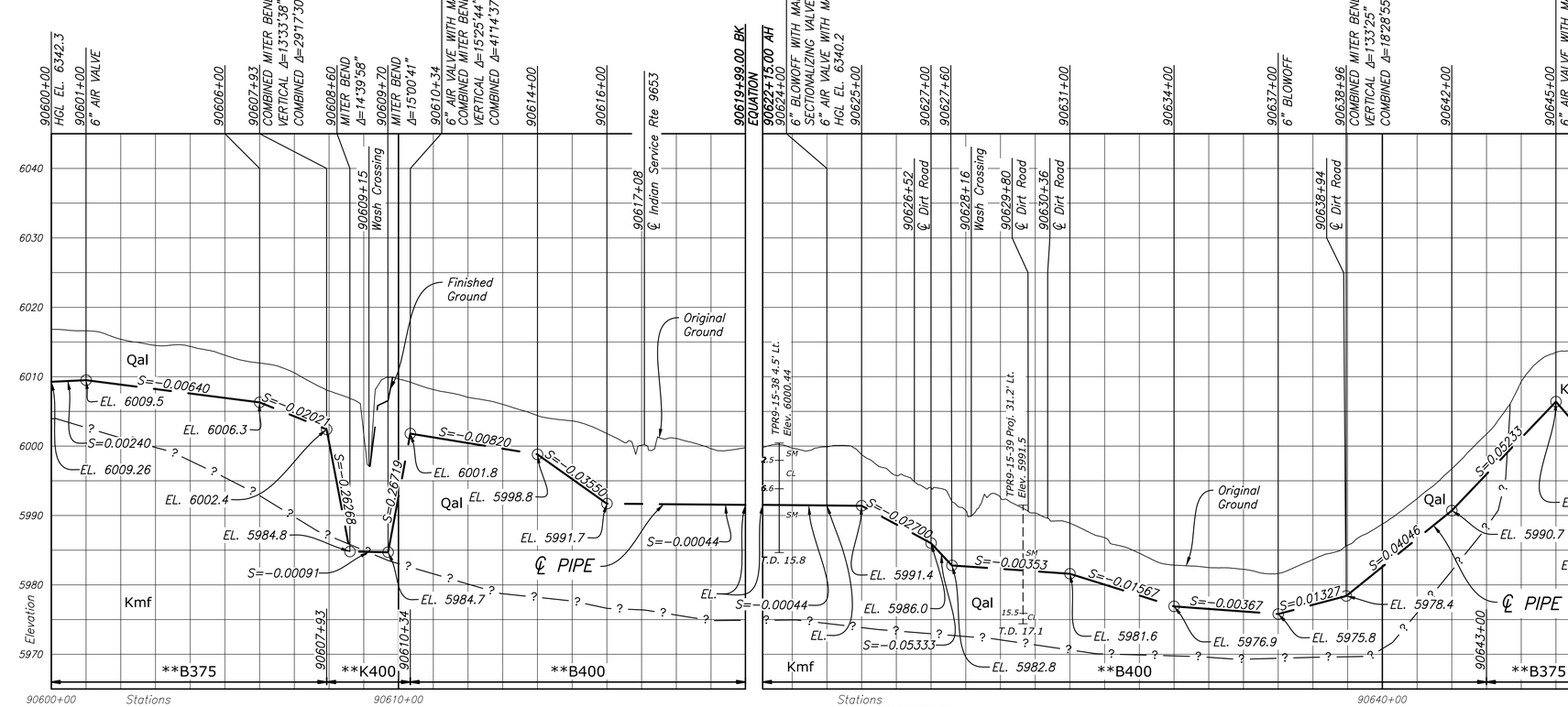
PLAN

SCALE OF FEET: 200 0 200 400 600

OPEN–CUT CROSSINGS		
Station	Road / Wash	% Compaction
90607+93 TO 90610+34	Wash	85
90616+92 TO 90617+22	Maintained Road	95
90626+40 TO 90626+62	Unmaintained Road	95
90627+00 TO 90628+50	Wash	85
90629+73 TO 90629+87	Unmaintained Road	95
90630+32 TO 90630+40	Unmaintained Road	95
90638+89 TO 90638+98	Unmaintained Road	95

NOTES

1. For General Notes, Symbols, Abbreviations, and Pipe Classification, see (60281).
2. For wash crossing details at 90609+15, see (60352).
3. For wash crossing details at 90628+16, see (60345).
4. Diameters with ** designation are dependent on pipe material type, see Line Pipe Material and Diameter Table (60306). Sectionalizing valve size to match Line Pipe diameter.



PROFILE

Stations 90600+00 90610+00 90640+00 90649+00

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BUREAU OF RECLAMATION
NAVAJO-GALLUP WATER SUPPLY PROJECT
NEW MEXICO

SAN JUAN LATERAL - REACH 9

LINE PIPE

DESIGNED	Andrew Marner
DRAWN	Andrew Marner
CHECKED	D. L. Gesundheit
TECH. APPR.	Bowles, Linda M P.E.
APPROVED PEER REVIEWER - Manager - Water Conveyance Group	Duke, Wylie C (Chris) P.E.
DENVER, CO	2017-03-30

GEOLOGY

TECH. APPR.	JUSTIN GILBERT
SUBMITTED	PAUL GARDNER
APPROVED	JUSTIN GILBERT Supervisory Geologist

PLAN AND PROFILE

STA. 90600+00
TO
STA. 90649+00

1695-D-60294

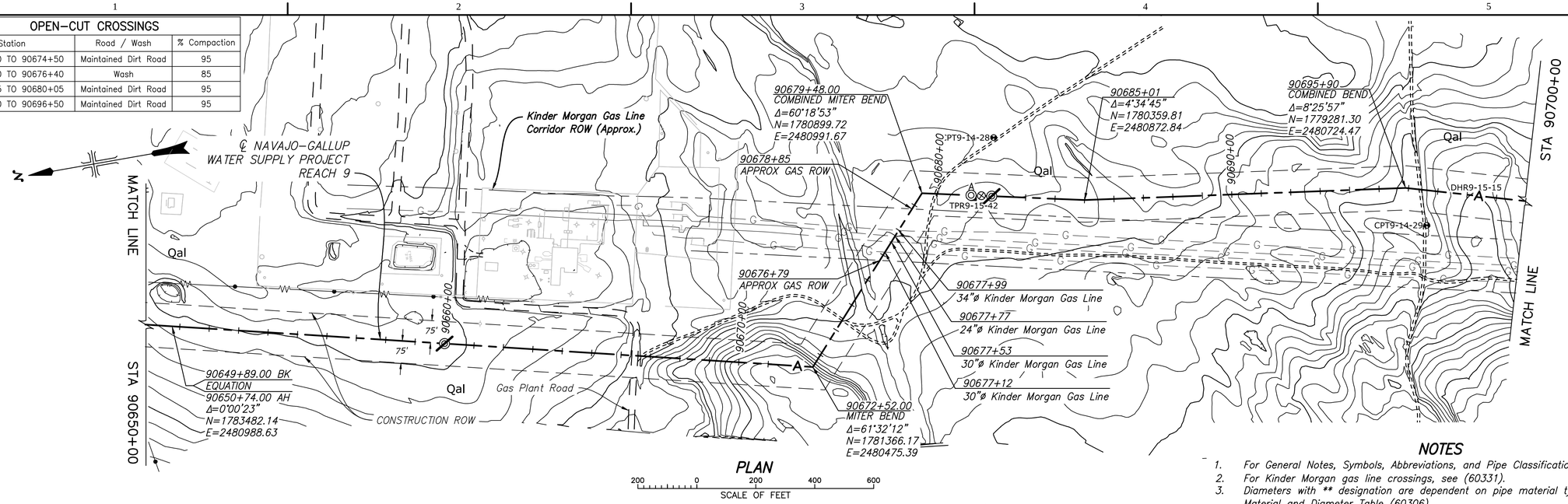
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OPEN–CUT CROSSINGS		
Station	Road / Wash	% Compaction
90674+30 TO 90674+50	Maintained Dirt Road	95
90675+70 TO 90676+40	Wash	85
90679+85 TO 90680+05	Maintained Dirt Road	95
90696+30 TO 90696+50	Maintained Dirt Road	95

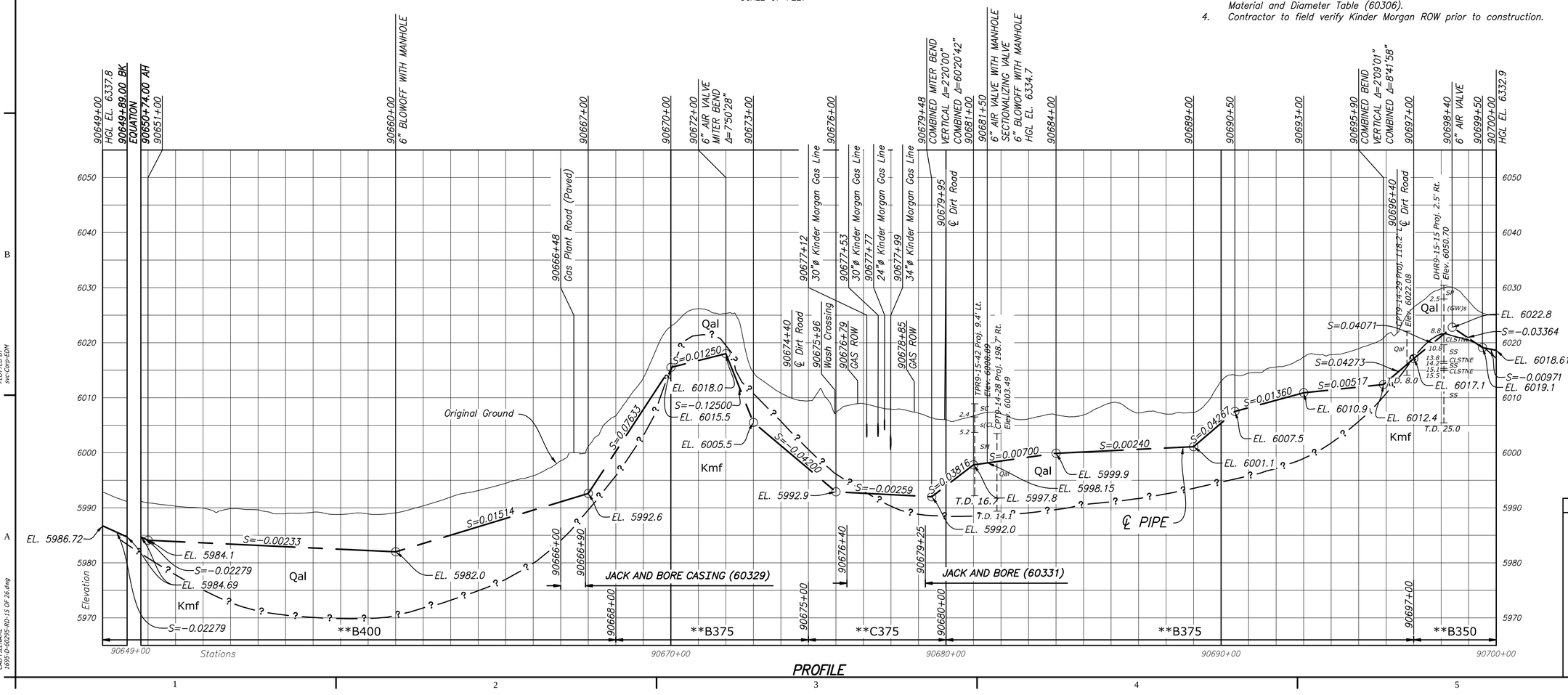


PLAN

SCALE OF FEET: 200 0 200 400 600

NOTES

1. For General Notes, Symbols, Abbreviations, and Pipe Classification, see (60281).
2. For Kinder Morgan gas line crossings, see (60331).
3. Diameters with ** designation are dependent on pipe material type, see Line Pipe Material and Diameter Table (60306).
4. Contractor to field verify Kinder Morgan ROW prior to construction.



PROFILE

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NAVAJO–GALLUP WATER SUPPLY PROJECT
NEW MEXICO

SAN JUAN LATERAL - REACH 9

LINE PIPE

Andrew Marner	DESIGNED
Andrew Marner	DRAWN
D. L. Gesundheit	CHECKED
Bowles, Linda M P.E.	TECH. APPR.
Duke, Wylie C (Chris) P.E.	APPROVED
PEER REVIEWER - Manager - Water Conveyance Group	
DENVER, CO	2017-03-30

GEOLOGY

TECH. APPR. JUSTIN GILBERT
SUBMITTED PAUL GARDNER
APPROVED JUSTIN GILBERT Supervisory Geologist

PLAN AND PROFILE

STA. 90649+00
TO
STA. 90700+00

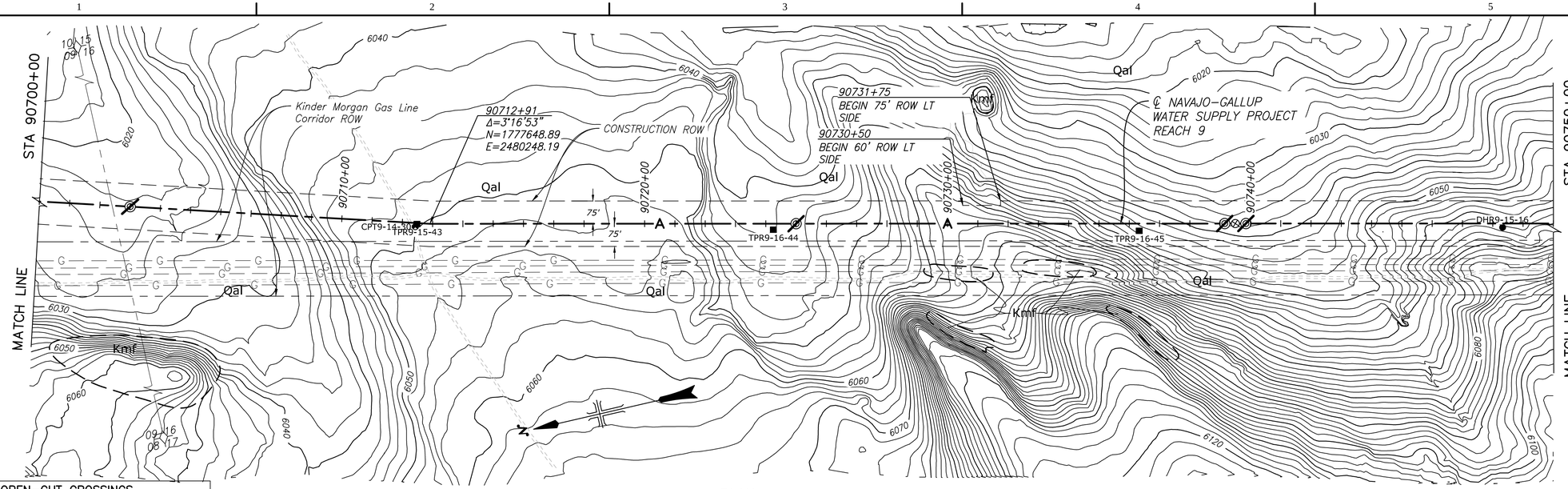
1695-D-60295

SHEET 15 OF 26

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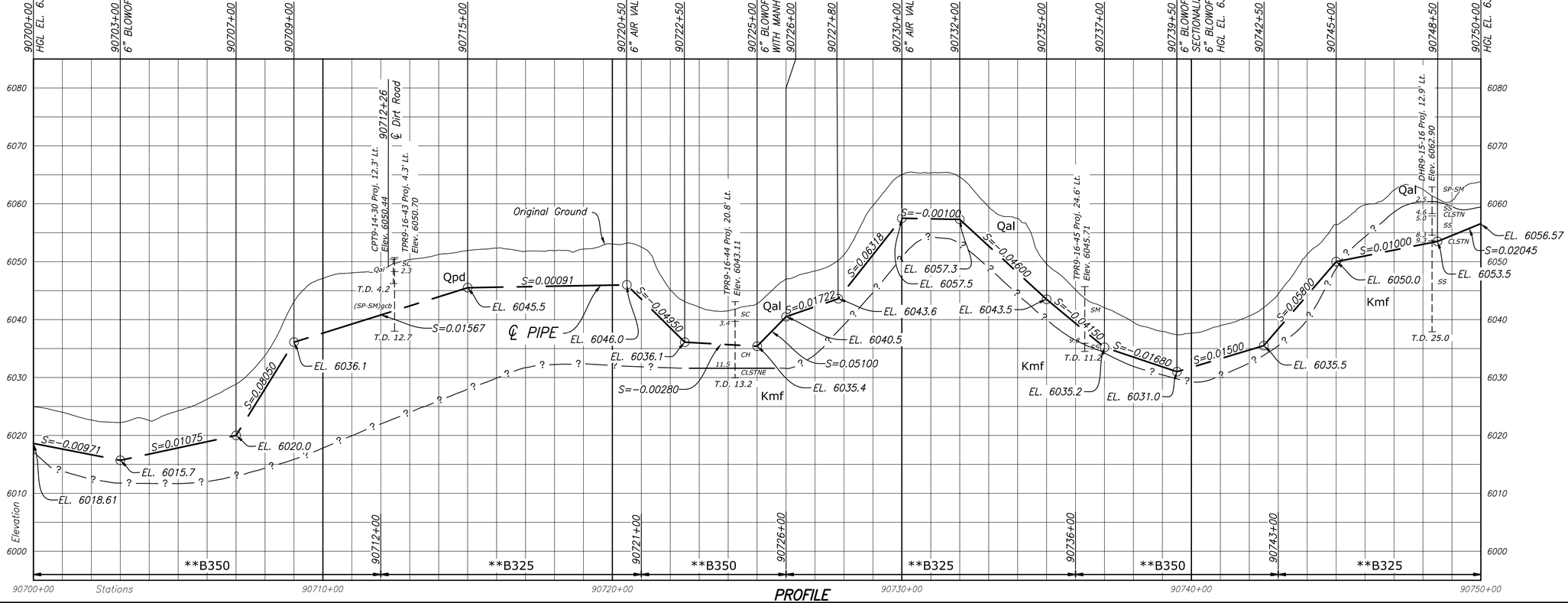
PLAN

200 0 200 400 600
SCALE OF FEET

OPEN–CUT CROSSINGS		
Station	Road / Wash	% Compaction
90712+12 TO 90712+40	Unmaintained Road	95

NOTES

1. For General Notes, Symbols, Abbreviations, and Pipe Classification, see (60281).
2. Diameters with ** designation are dependent on pipe material type, see Line Pipe Material and Diameter Table (60306). Sectionalizing valve size to match Line Pipe diameter.



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BUREAU OF RECLAMATION
NAVAJO-GALLUP WATER SUPPLY PROJECT
NEW MEXICO

SAN JUAN LATERAL - REACH 9

LINE PIPE

DESIGNED	Andrew Marner
DRAWN	Andrew Marner
CHECKED	D. L. Gesundheit
TECH. APPR.	Bowles, Linda M P.E.
APPROVED	Duke, Wylie C (Chris) P.E.
PEER REVIEWER -	Manager - Water Conveyance Group
GEOLOGY	DENVER, CO 2017-03-30
TECH. APPR.	JUSTIN GILBERT
SUBMITTED	PAUL GARDNER
APPROVED	JUSTIN GILBERT Supervisory Geologist

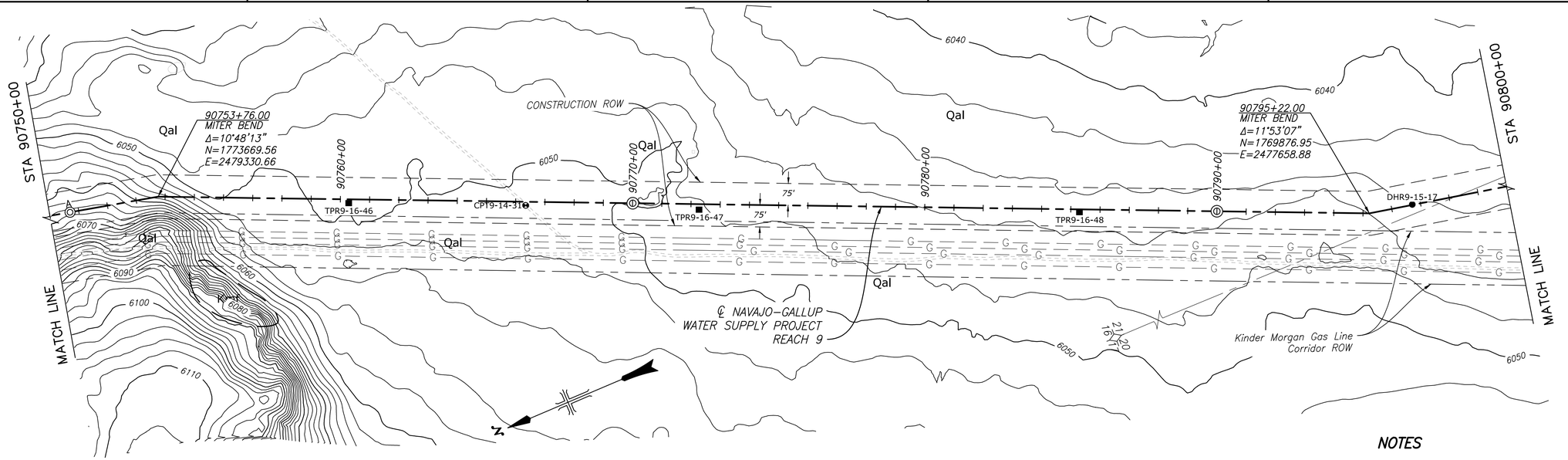
PLAN AND PROFILE

STA. 90700+00
TO
STA. 90750+00

1695-D-60296

SHEET 16 OF 26

Released



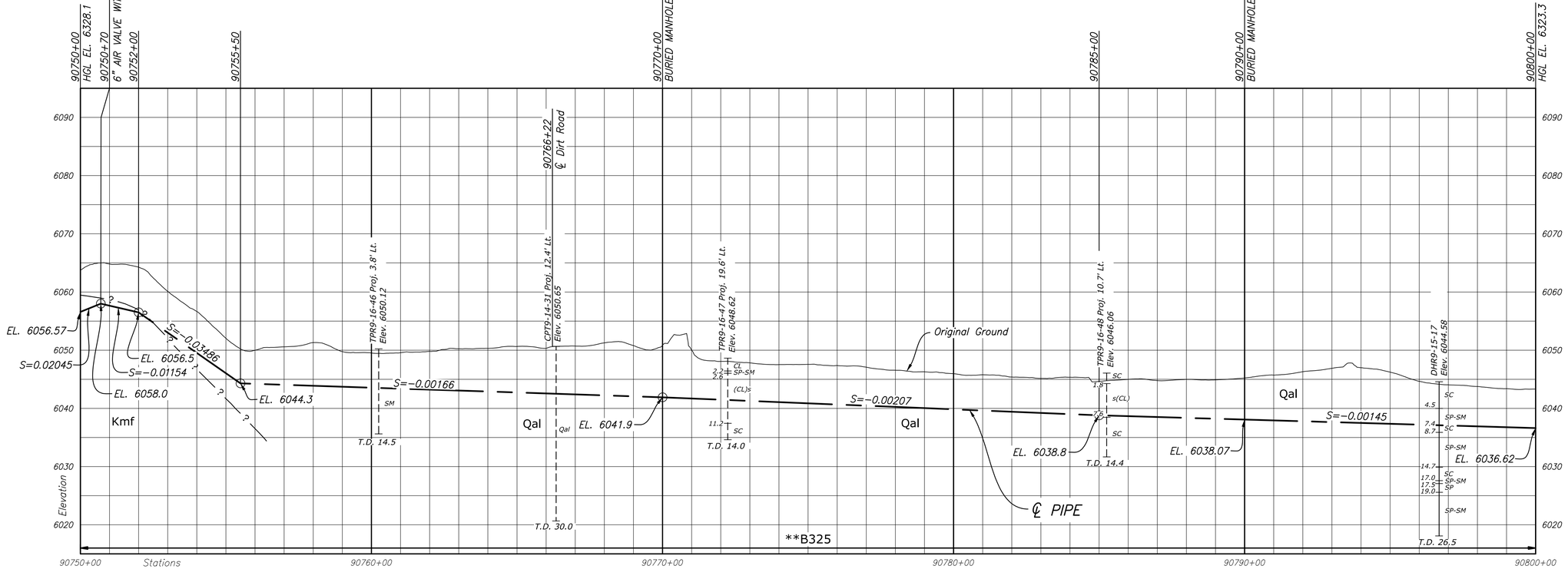
OPEN-CUT CROSSINGS		
Station	Road / Wash	% Compaction
90766+10 TO 90766+35	Unmaintained Road	95

PLAN

200 0 200 400 600
SCALE OF FEET

NOTES

1. For General Notes, Symbols, Abbreviations, and Pipe Classification, see (60281).
2. Diameters with ** designation are dependent on pipe material type, see Line Pipe Material and Diameter Table (60306).



PROFILE

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NAVAJO-GALLUP WATER SUPPLY PROJECT
NEW MEXICO

SAN JUAN LATERAL - REACH 9

LINE PIPE

GEOLOGY	
TECH. APPR.	JUSTIN GILBERT
SUBMITTED	PAUL GARDNER
APPROVED	JUSTIN GILBERT Supervisory Geologist

Andrew Marner
DESIGNED
Andrew Marner
DRAWN
D. L. Gesundheit
CHECKED
Bowles, Linda M P.E.
TECH. APPR.
Duke, Wylie C (Chris) P.E.
APPROVED
PEER REVIEWER - Manager - Water Conveyance Group
DENVER, CO 2017-03-30

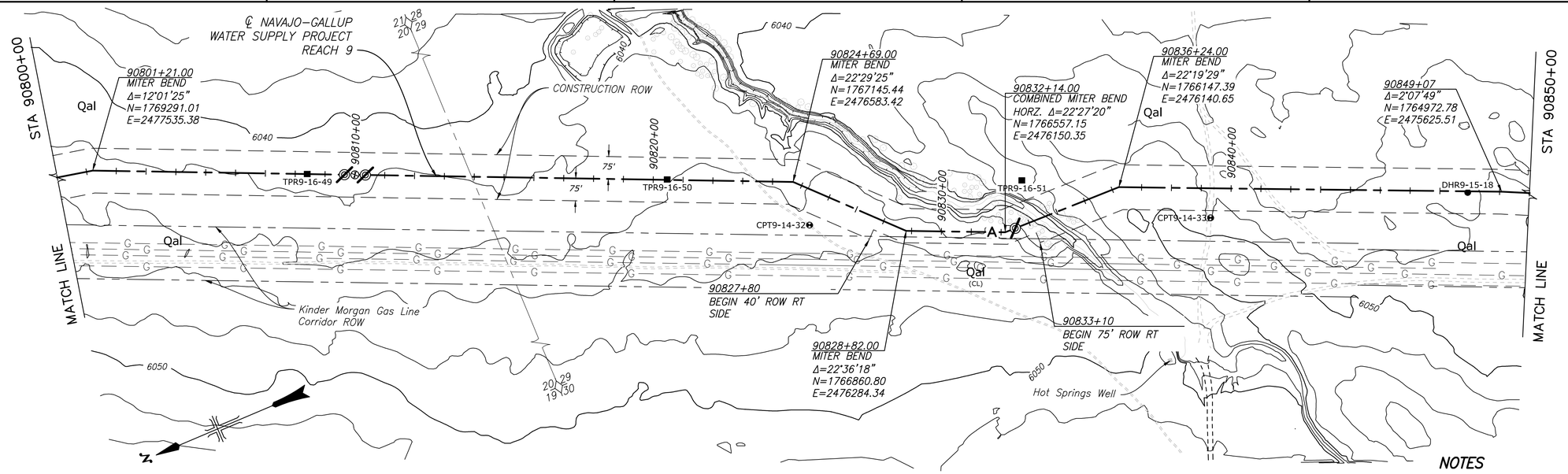
PLAN AND PROFILE

STA. 90750+00
TO
STA. 90800+00

1695-D-60297

SHEET 17 OF 26

Released



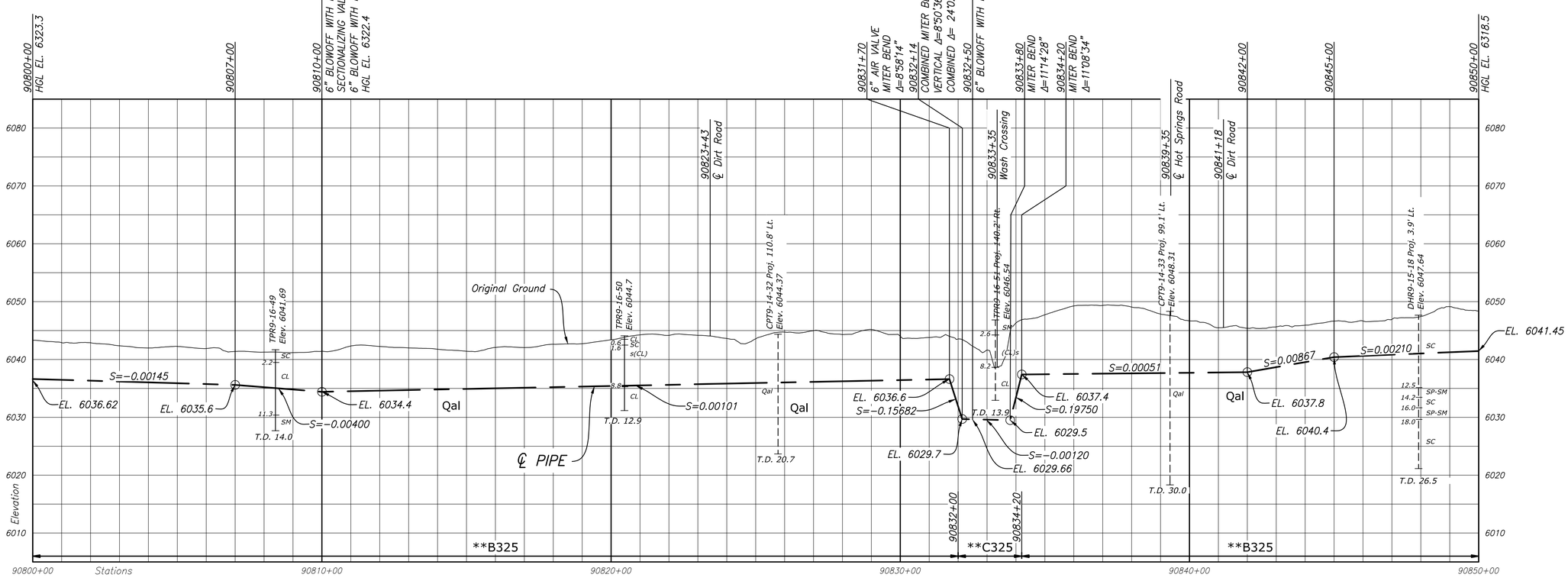
PLAN

200 0 200 400 600
SCALE OF FEET

OPEN–CUT CROSSINGS		
Station	Road / Wash	% Compaction
90823+30 TO 90823+55	Unmaintained Road	95
90832+25 TO 90833+80	Wash	85
90839+20 TO 90839+50	Maintained Road	95
90841+05 TO 90841+30	Unmaintained Road	95

NOTES

1. For General Notes, Symbols, Abbreviations, and Pipe Classification, see (60281).
2. For wash crossing details at 90833+35, see (60355). Base flow is anticipated at this location, contractor to submit dewatering plan to COR.
3. Diameters with ** designation are dependent on pipe material type, see Line Pipe Material and Diameter Table (60306). Sectionalizing valve size to match Line Pipe diameter.



PROFILE

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NAVAJO-GALLUP WATER SUPPLY PROJECT
NEW MEXICO

SAN JUAN LATERAL - REACH 9

LINE PIPE

GEOLOGY	
TECH. APPR.	JUSTIN GILBERT
SUBMITTED	PAUL GARDNER
APPROVED	JUSTIN GILBERT Supervisory Geologist

Andrew Marner
DESIGNED
Andrew Marner
DRAWN
D. L. Gesundheit
CHECKED
Bowles, Linda M P.E.
TECH. APPR.
Duke, Wylie C (Chris) P.E.
APPROVED
PEER REVIEWER - Manager - Water Conveyance Group

DENVER, CO 2017-03-30

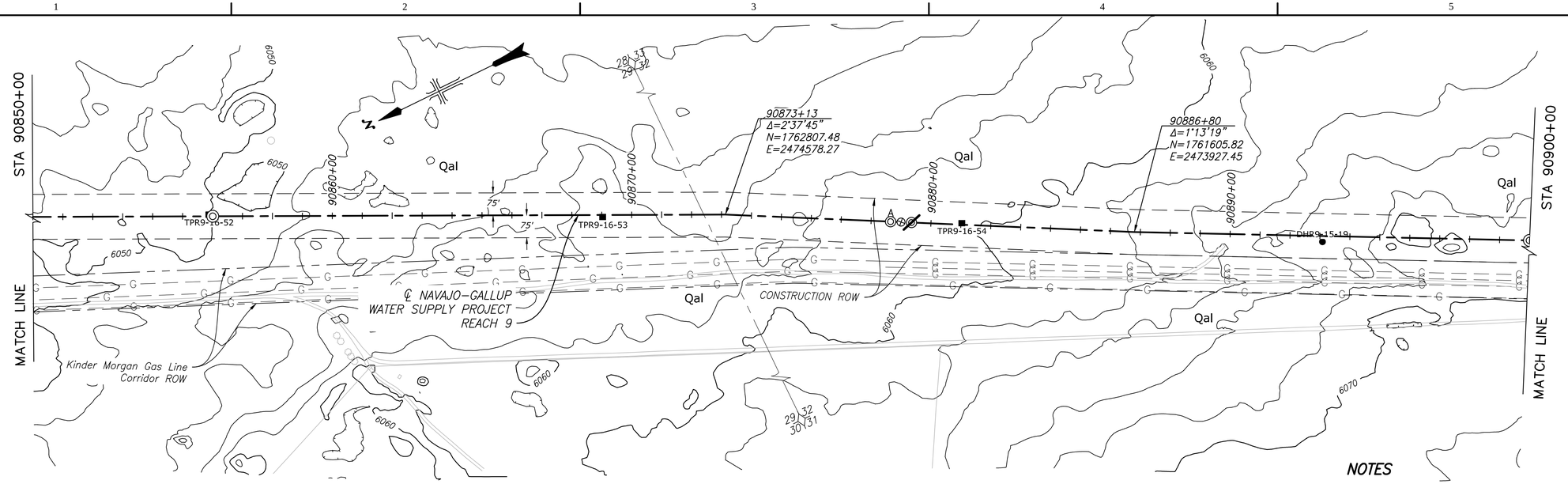
PLAN AND PROFILE

STA. 90800+00
TO
STA. 90850+00

1695-D-60298

SHEET 18 OF 26

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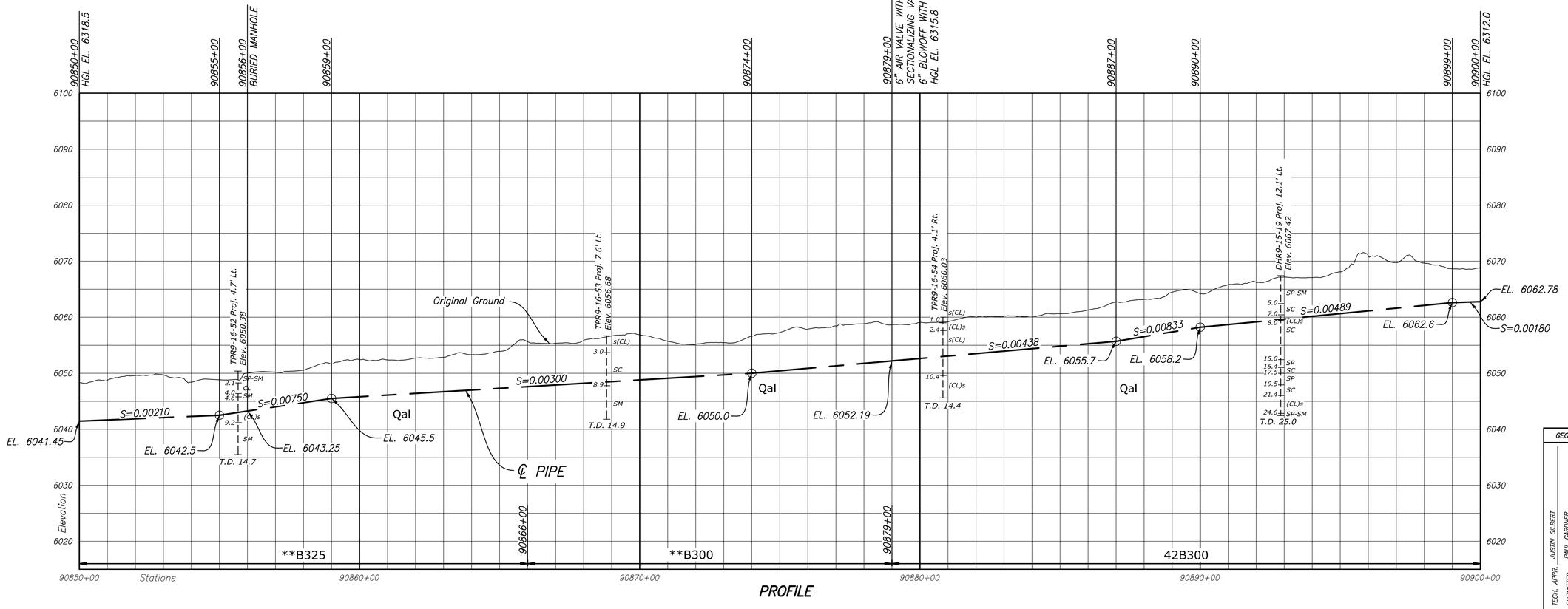


PLAN

200 0 200 400 600
SCALE OF FEET

NOTES

1. For General Notes, Symbols, Abbreviations, and Pipe Classification, see (60281).
2. Diameters with ** designation are dependent on pipe material type, see Line Pipe Material and Diameter Table (60306).



PROFILE

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BUREAU OF RECLAMATION
NAVAJO-GALLUP WATER SUPPLY PROJECT
NEW MEXICO

SAN JUAN LATERAL - REACH 9

LINE PIPE

Andrew Marner	DESIGNED
Andrew Marner	DRAWN
D. L. Gesundheit	CHECKED
Bowles, Linda M P.E.	TECH. APPR.
Duke, Wylie C (Chris) P.E.	APPROVED
PEER REVIEWER - Manager - Water Conveyance Group	
DENVER, CO	2017-03-30

GEOLOGY	
TECH. APPR.	JUSTIN GILBERT
	PAUL GARDNER
SUBMITTED	JUSTIN GILBERT Supervisory Geologist
APPROVED	

PLAN AND PROFILE

STA. 90850+00
TO
STA. 90900+00

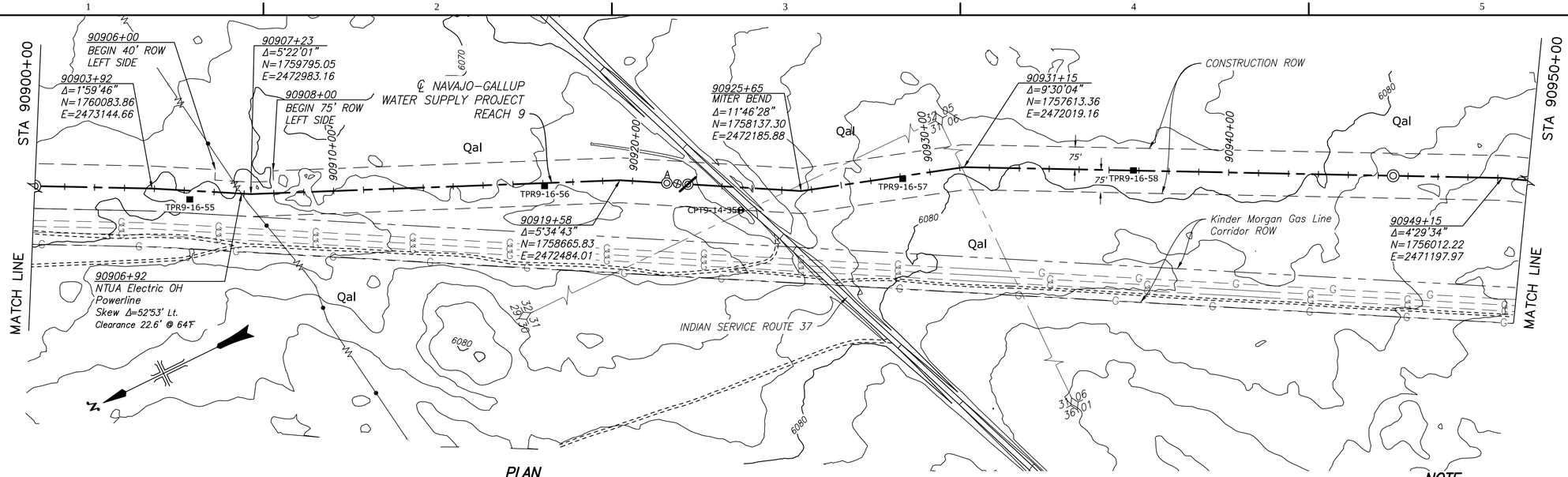
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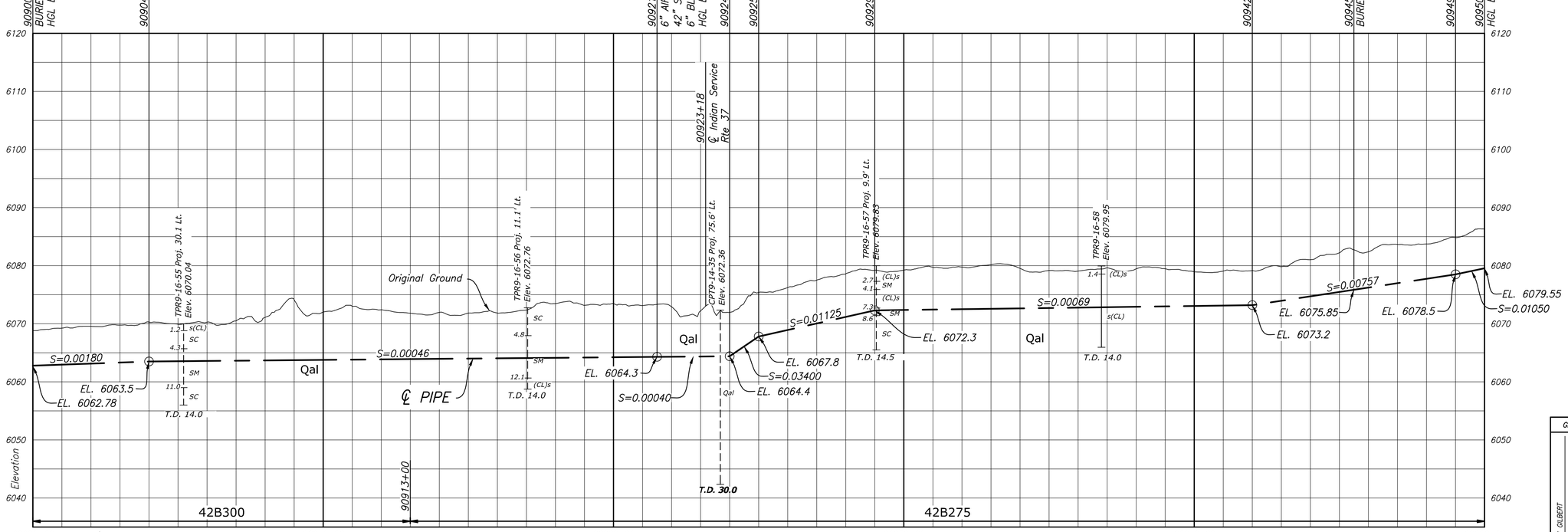
PLAN

SCALE OF FEET 200 0 200 400 600

OPEN–CUT CROSSINGS		
Station	Road / Wash	% Compaction
90922+90 TO 90923+45	Maintained Road	95

NOTE

1. For General Notes, Symbols, Abbreviations, and Pipe Classification, see (60281).



PROFILE

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NAVAJO-GALLUP WATER SUPPLY PROJECT
NEW MEXICO

SAN JUAN LATERAL - REACH 9

LINE PIPE

REV NO	DATE	DESCRIPTION
1	2017-05-22	D Added Construction ROW width labels. Marner, Andrew (Jesse) I P.E.

Andrew Marner	DESIGNED
Andrew Marner	DRAWN
D. L. Gesundheit	CHECKED
Bowles, Linda M P.E.	TECH. APPR.
Duke, Wylie C (Chris) P.E.	APPROVED PEER REVIEWER - Manager - Water Conveyance Group
DENVER, CO	2017-03-30

GEOLOGY	
TECH. APPR.	JUSTIN GILBERT
SUBMITTED	PAUL GARDNER
APPROVED	JUSTIN GILBERT Supervisory Geologist

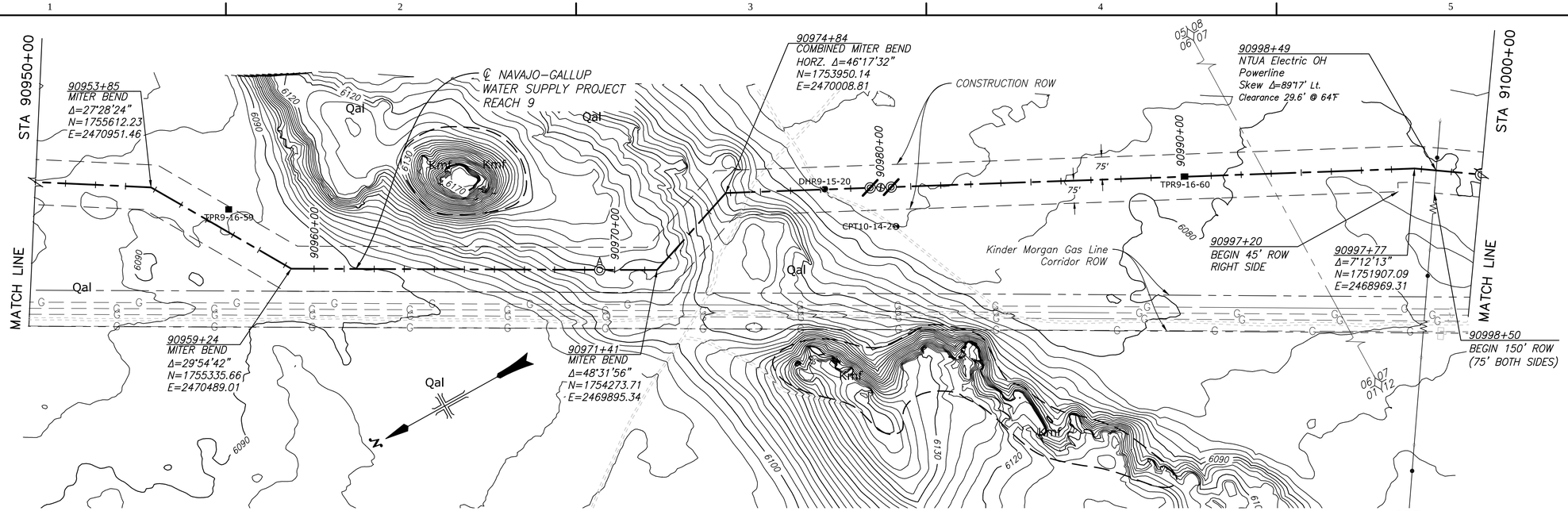
PLAN AND PROFILE

STA. 90900+00
TO
STA. 90950+00

1695-D-60300

SHEET 20 OF 26

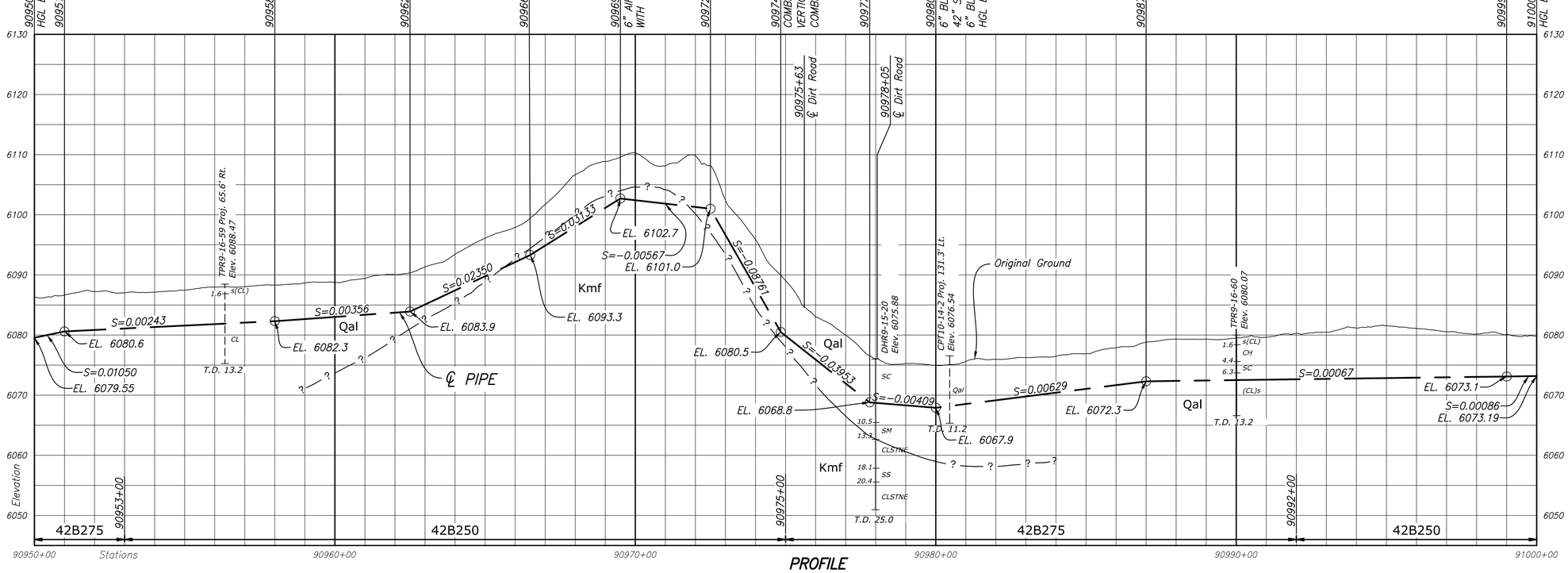
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OPEN–CUT CROSSINGS		
Station	Road / Wash	% Compaction
90975+50 TO 90975+75	Unmaintained Road	95
90977+95 TO 90978+15	Unmaintained Road	95

PLAN

200 0 200 400 600
SCALE OF FEET



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NAVAJO-GALLUP WATER SUPPLY PROJECT
NEW MEXICO

SAN JUAN LATERAL - REACH 9

LINE PIPE

REV NO		
D	2017-05-22	Added Construction ROW width labels.
1		Marner, Andrew (Andy) J P.E.

Andrew Marner	DESIGNED
Andrew Marner	DRAWN
D. L. Gesundheit	CHECKED
Bowles, Linda M P.E.	TECH. APPR.
Duke, Wylie C (Chris) P.E.	APPROVED
PEER REVIEWER - Manager - Water Conveyance Group	
DENVER, CO	2017-03-30

GEOLOGY
TECH. APPR. JUSTIN GILBERT
SUBMITTED PAUL GARDNER
APPROVED JUSTIN GILBERT Supervisory Geologist

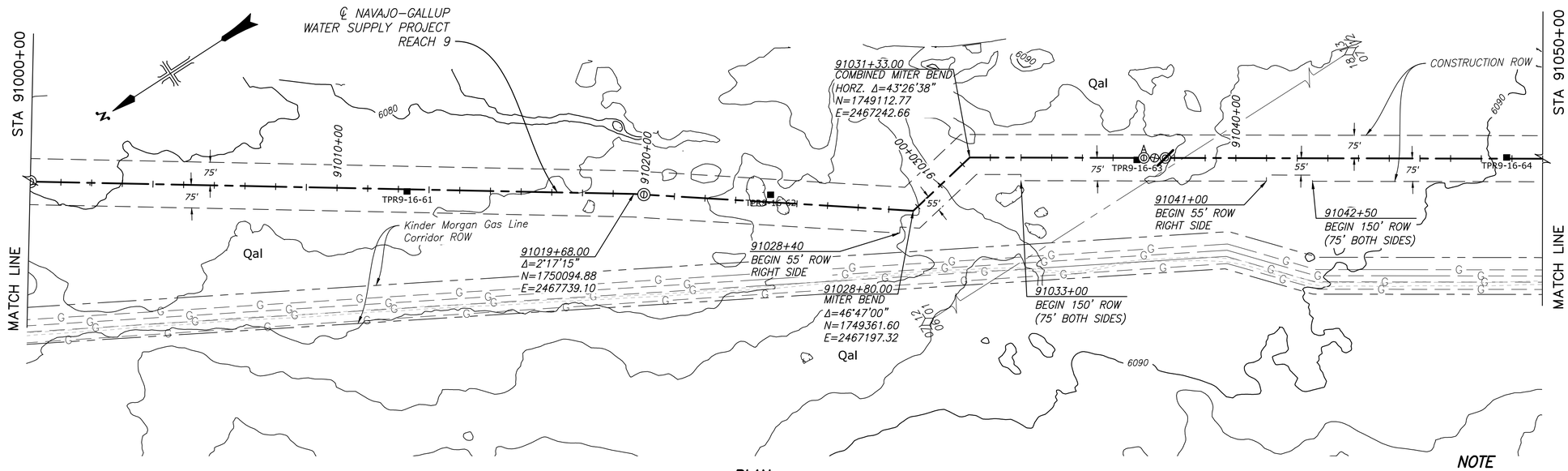
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STA. 90950+00
TO
STA. 91000+00

1695-D-60301

SHEET 21 OF 26

Released

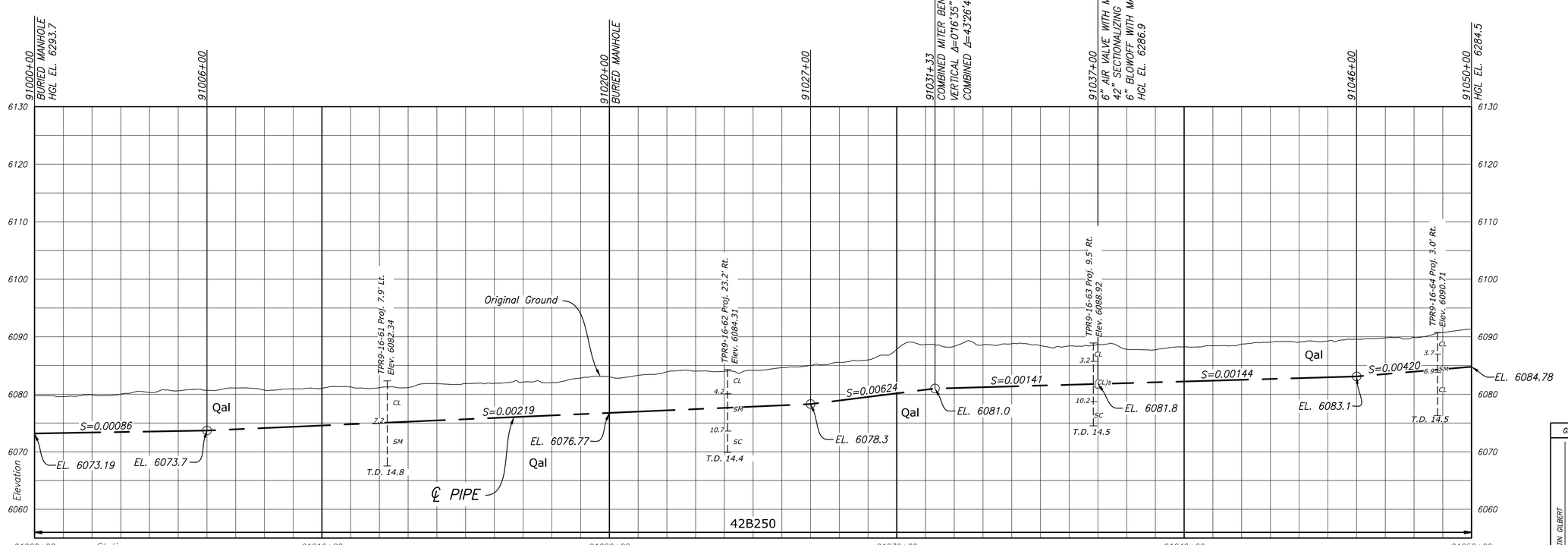


PLAN

SCALE OF FEET: 200 0 200 400 600

NOTE

1. For General Notes, Symbols, Abbreviations, and Pipe Classification, see (60281).



PROFILE

GEOLOGY	
TECH. APPR.	JUSTIN GILBERT
SUBMITTED	PAUL GARDNER
APPROVED	JUSTIN GILBERT Supervisory Geologist

RECLAMATION
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U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
NAVAJO-GALLUP WATER SUPPLY PROJECT
NEW MEXICO

SAN JUAN LATERAL - REACH 9

LINE PIPE

REV NO	DATE	
D	2017-05-22	Added Construction ROW width labels.
1		Marner, Andrew (Andy) I P.E.

Andrew Marner	DESIGNED
Andrew Marner	DRAWN
D. L. Gesundheit	CHECKED
Bowles, Linda M P.E.	TECH. APPR.
Duke, Wylie C (Chris) P.E.	APPROVED
PEER REVIEWER - Manager - Water Conveyance Group	
DENVER, CO	2017-03-30

PLAN AND PROFILE

STA. 91000+00
TO
STA. 91050+00

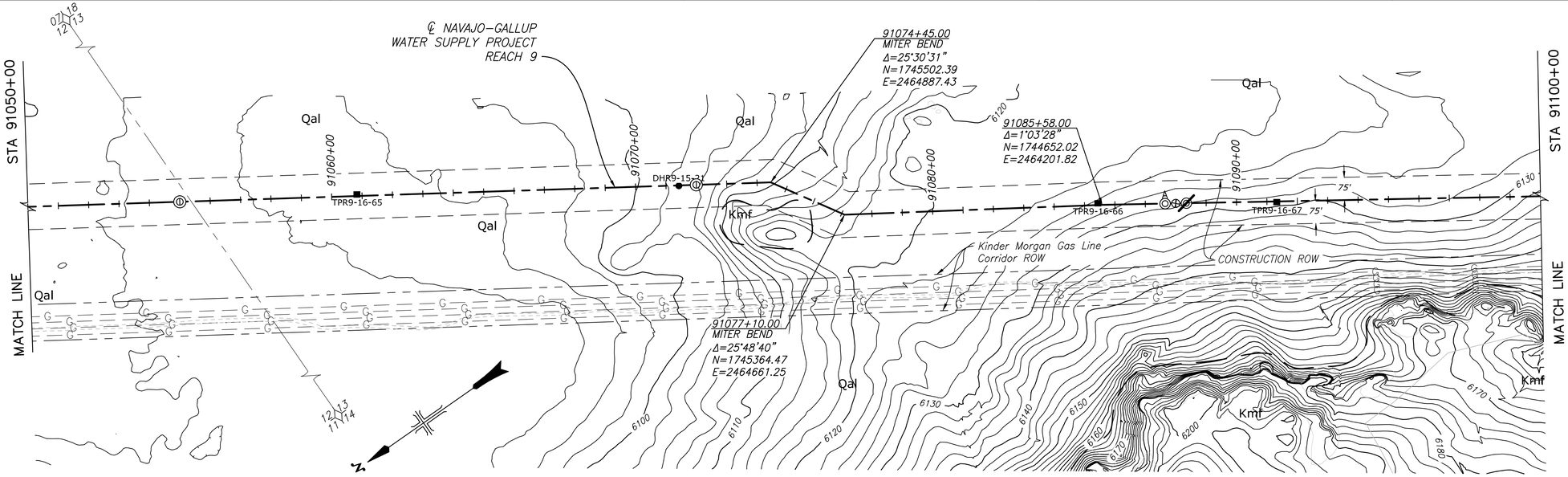
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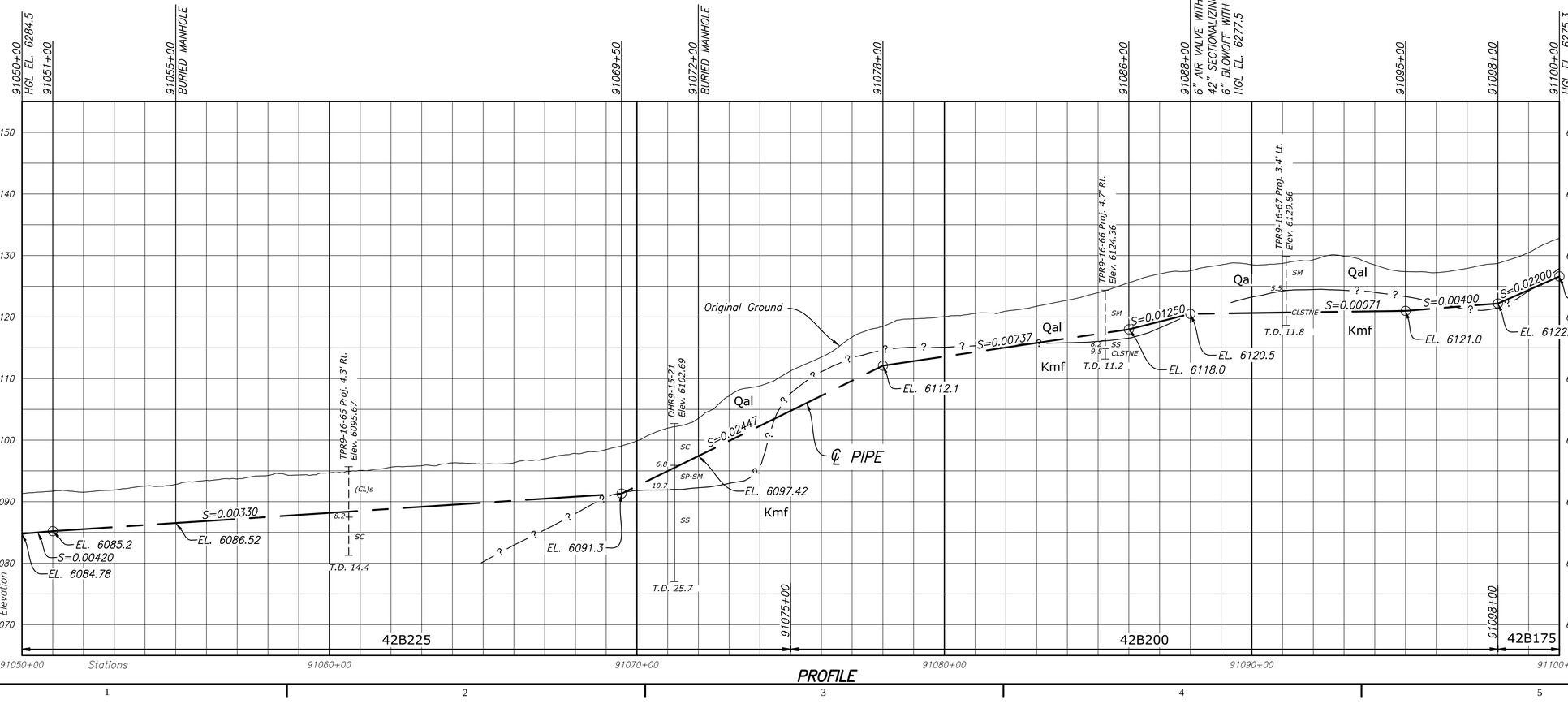


NOTE

1. For General Notes, Symbols, Abbreviations, and Pipe Classification, see (60281).

PLAN

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SCALE OF FEET



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NAVAJO-GALLUP WATER SUPPLY PROJECT
NEW MEXICO

SAN JUAN LATERAL - REACH 9

LINE PIPE

Andrew Marner	DESIGNED
Andrew Marner	DRAWN
D. L. Gesundheit	CHECKED
Bowles, Linda M P.E.	TECH. APPR.
Duke, Wylie C (Chris) P.E.	APPROVED
PEER REVIEWER - Manager - Water Conveyance Group	
DENVER, CO	2017-03-30

GEOLOGY

TECH. APPR. JUSTIN GILBERT
SUBMITTED PAUL GARDNER
APPROVED JUSTIN GILBERT Supervisory Geologist

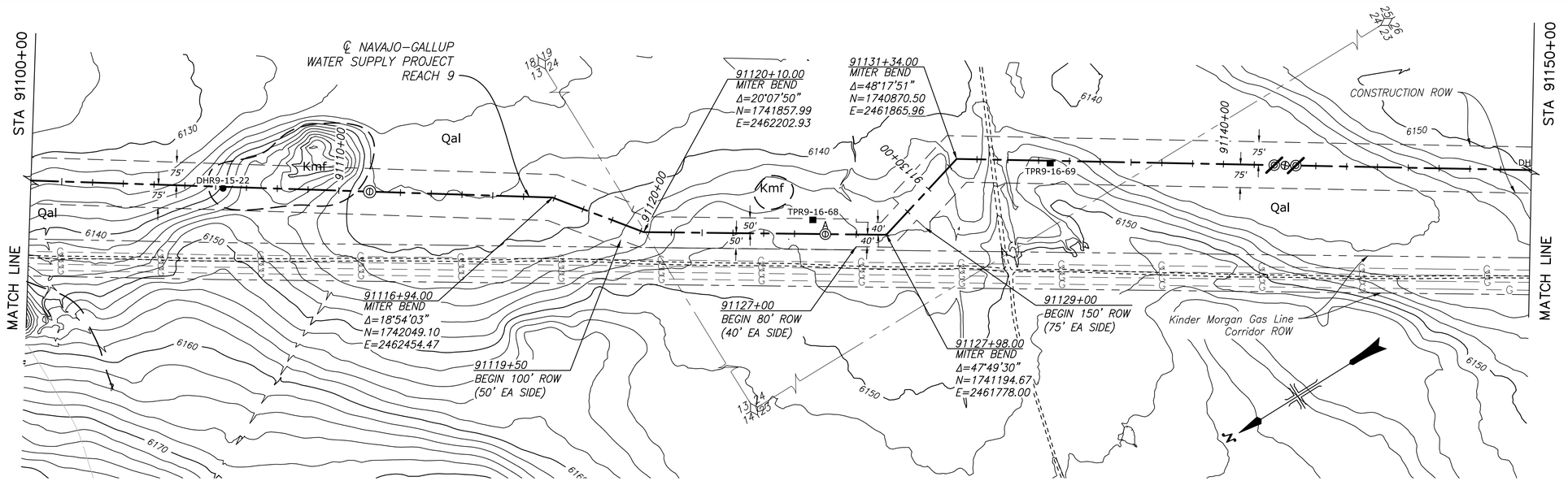
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TO
STA. 91100+00

1695-D-60303

SHEET 23 OF 26

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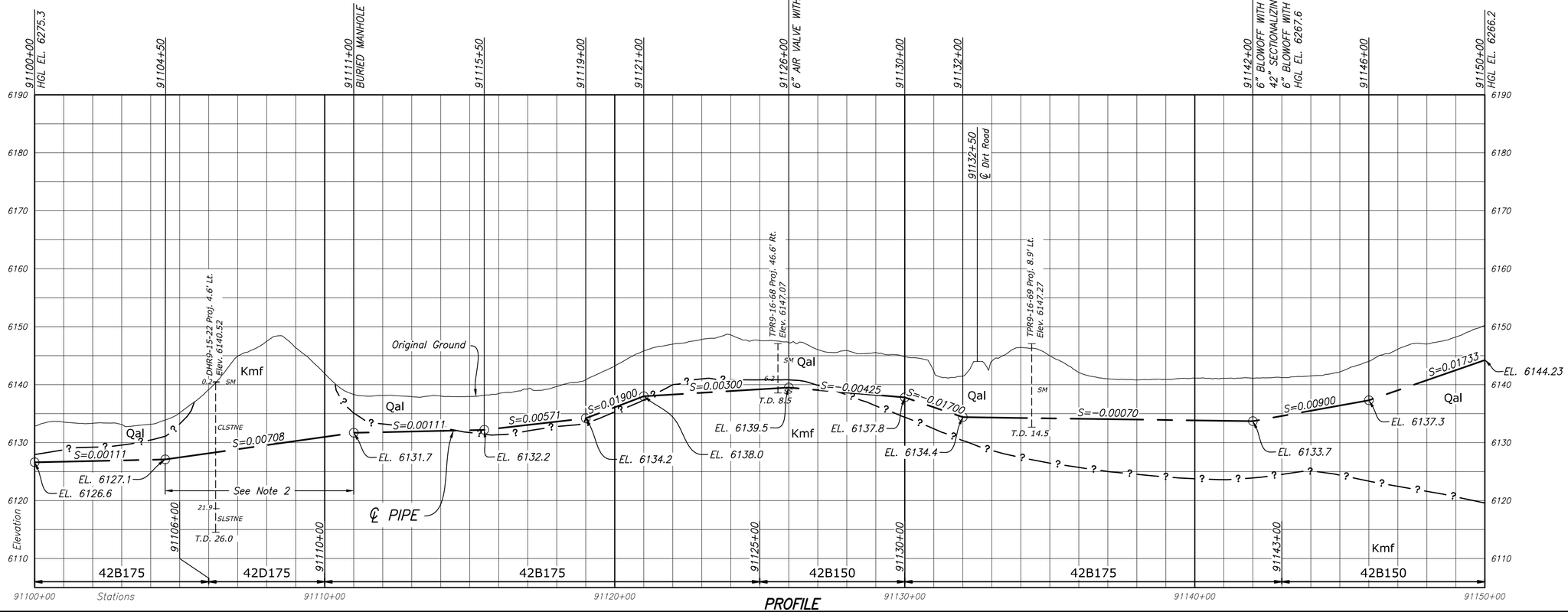
PLAN

200 0 200 400 600
SCALE OF FEET

OPEN–CUT CROSSINGS		
Station	Road / Wash	% Compaction
91132+35 TO 91132+65	Unmaintained Road	95

NOTES

1. For General Notes, Symbols, Abbreviations, and Pipe Classification, see (60281).
2. Line pipe elevations from 91104+50 to 91111+00 are required to be at depth shown to maintain a minimum 5 psi pressure during transient event.



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NAVAJO–GALLUP WATER SUPPLY PROJECT
NEW MEXICO

SAN JUAN LATERAL - REACH 9

LINE PIPE

REVNO	DATE	BY	DESCRIPTION
1	2017-06-07	Bowles, Linda M P.E.	D Added existing road crossing information and data.

GEOLOGY	
TECH. APPR.	JUSTIN GILBERT
SUBMITTED	PAUL GARDNER
APPROVED	JUSTIN GILBERT Supervisory Geologist

Andrew Marner
DESIGNED
Andrew Marner
DRAWN
D. L. Gesundheit
CHECKED
Bowles, Linda M P.E.
TECH. APPR.
Duke, Wylie C (Chris) P.E.
APPROVED
PEER REVIEWER - Manager - Water Conveyance Group
DENVER, CO 2017-03-30

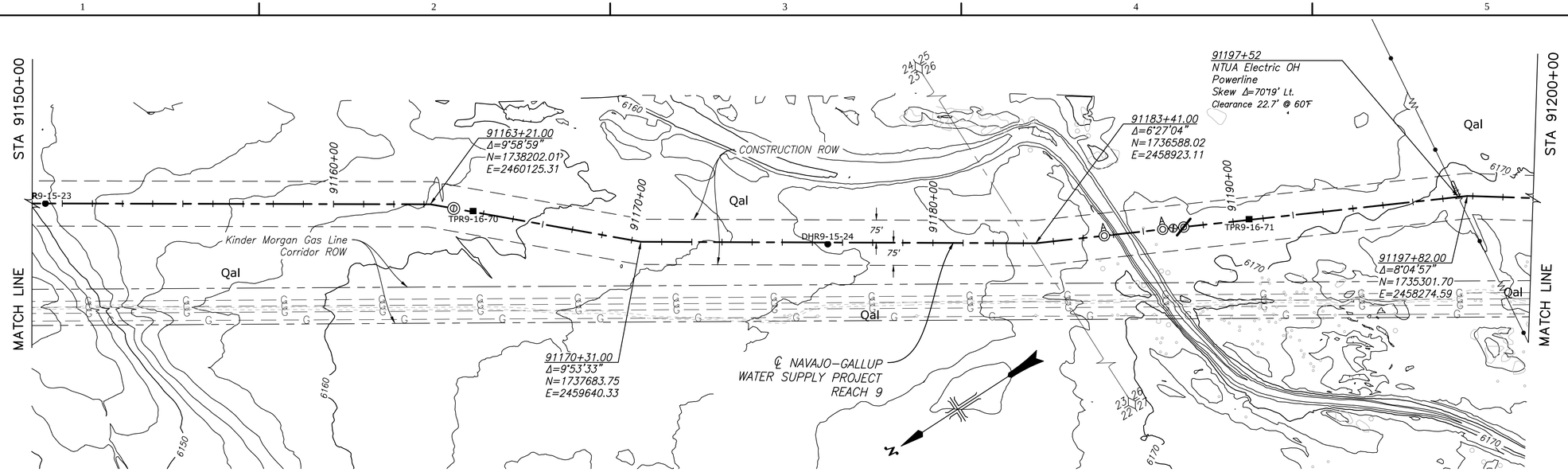
PLAN AND PROFILE

STA. 91100+00
TO
STA. 91150+00

1695-D-60304

SHEET 24 OF 26

Released



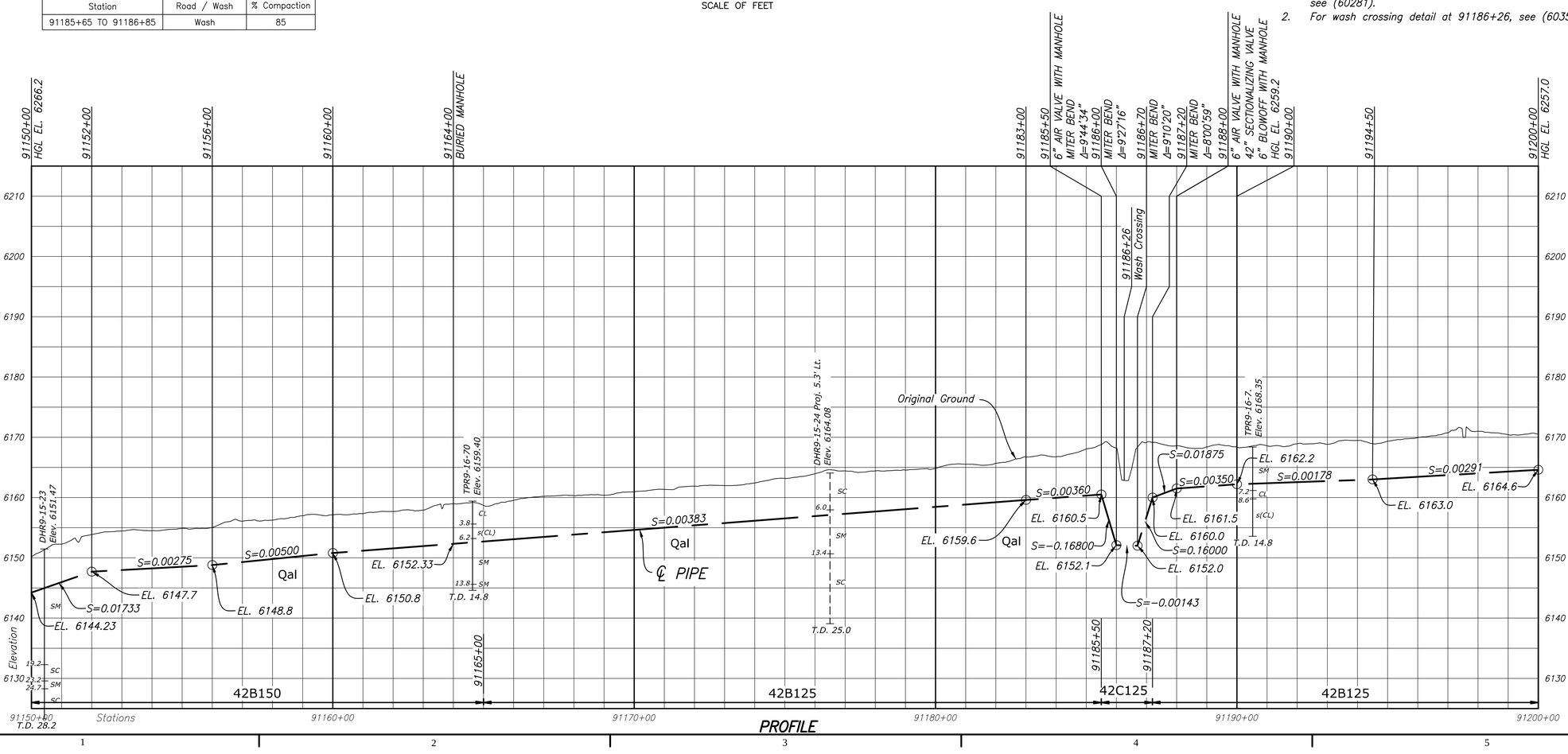
PLAN

200 0 200 400 600
SCALE OF FEET

OPEN-CUT CROSSINGS		
Station	Road / Wash	% Compaction
91185+65 TO 91186+85	Wash	85

NOTES

1. For General Notes, Symbols, Abbreviations, and Pipe Classification, see (60281).
2. For wash crossing detail at 91186+26, see (60356).



GEOLOGY	
TECH. APPR.	JUSTIN GILBERT
SUBMITTED	PAUL GARDNER
APPROVED	JUSTIN GILBERT Supervisory Geologist

RECLAMATION
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U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
NAVAJO-GALLUP WATER SUPPLY PROJECT
NEW MEXICO

SAN JUAN LATERAL - REACH 9

LINE PIPE

Andrew Marner	DESIGNED
Andrew Marner	DRAWN
D. L. Gesundheit	CHECKED
Bowles, Linda M P.E.	TECH. APPR.
Duke, Wylie C (Chris) P.E.	APPROVED PEER REVIEWER - Manager - Water Conveyance Group
DENVER, CO	2017-03-30

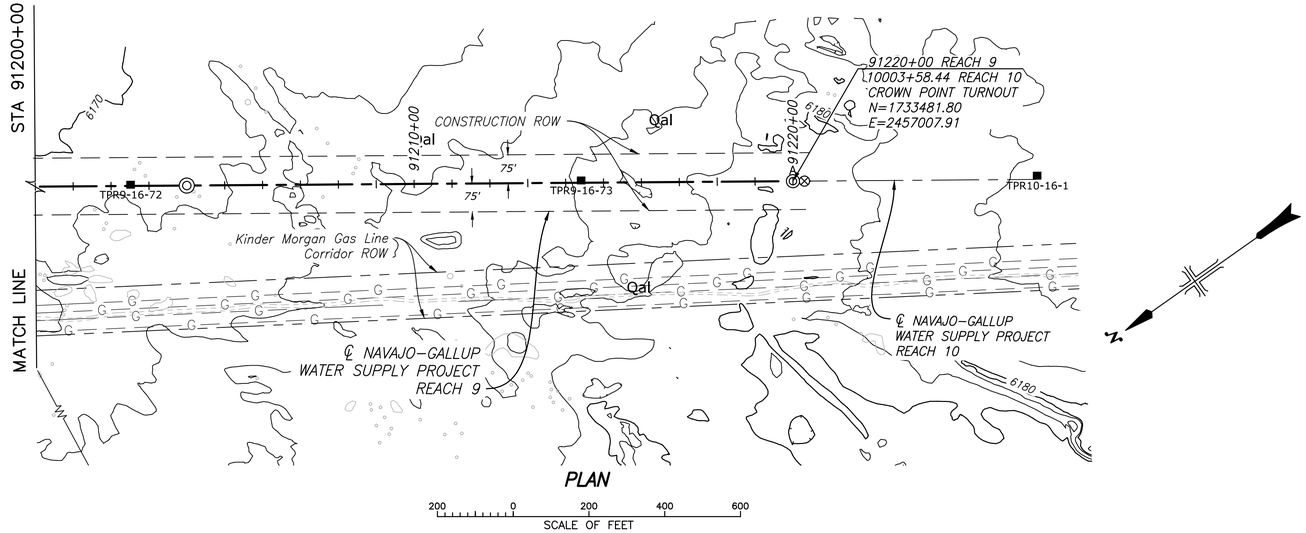
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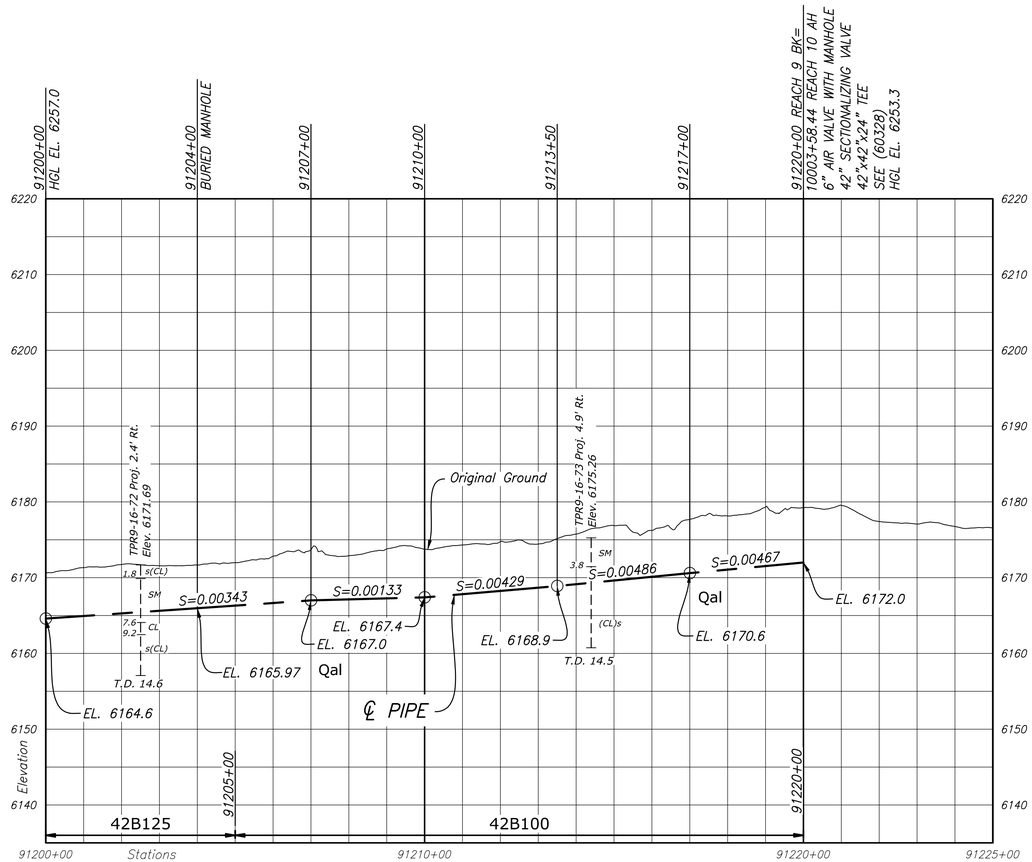
STA. 91150+00
TO
STA. 91200+00

1695-D-60305

SHEET 25 OF 26

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PROFILE

LINE PIPE MATERIAL AND DIAMETER TABLE			
Pipe Material		Station	
Upstream	Downstream	Material Change	48 (in) to 42 (in) Nominal Diameter Change
Steel	Steel	NA	90879+00
Steel	PVC	90523+00	90879+00
Steel	HDPE	90879+00	*
Ductile Iron	Ductile Iron	NA	90681+50
Ductile Iron	PVC	90523+00	90810+00
Ductile Iron	HDPE	90879+00	*
Fiberglass	Fiberglass	NA	90577+00

*For HDPE pipe material, line pipe diameter will be 48-inch nominal, which provides an inside diameter of close to 42-inches. Other pipe material type combinations can be submitted for approval.

NOTES

1. For General Notes, Symbols, Abbreviations, and Pipe Classification, see (60281).
2. For Crownpoint Turnout Details see (60328).

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NEW MEXICO

SAN JUAN LATERAL - REACH 9

LINE PIPE

Andrew Marner
DESIGNED
Andrew Marner
DRAWN
D. L. Gesundheit
CHECKED
Bowles, Linda M P.E.
TECH. APPR.
Duke, Wylie C (Chris) P.E.
APPROVED
PEER REVIEWER - Manager - Water Conveyance Group
DENVER, CO 2017-03-30

GEOLOGY
TECH. APPR. JUSTIN GILBERT
SUBMITTED PAUL GARDNER
APPROVED JUSTIN GILBERT Supervisory Geologist

PLAN AND PROFILE

STA. 91200+00
TO
END

1695-D-60306

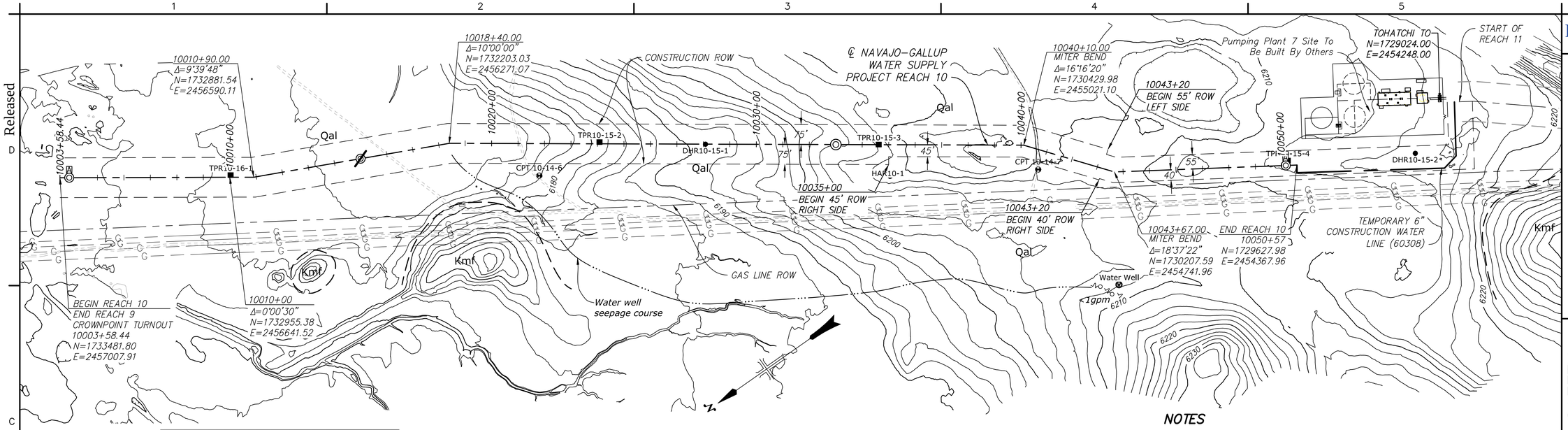
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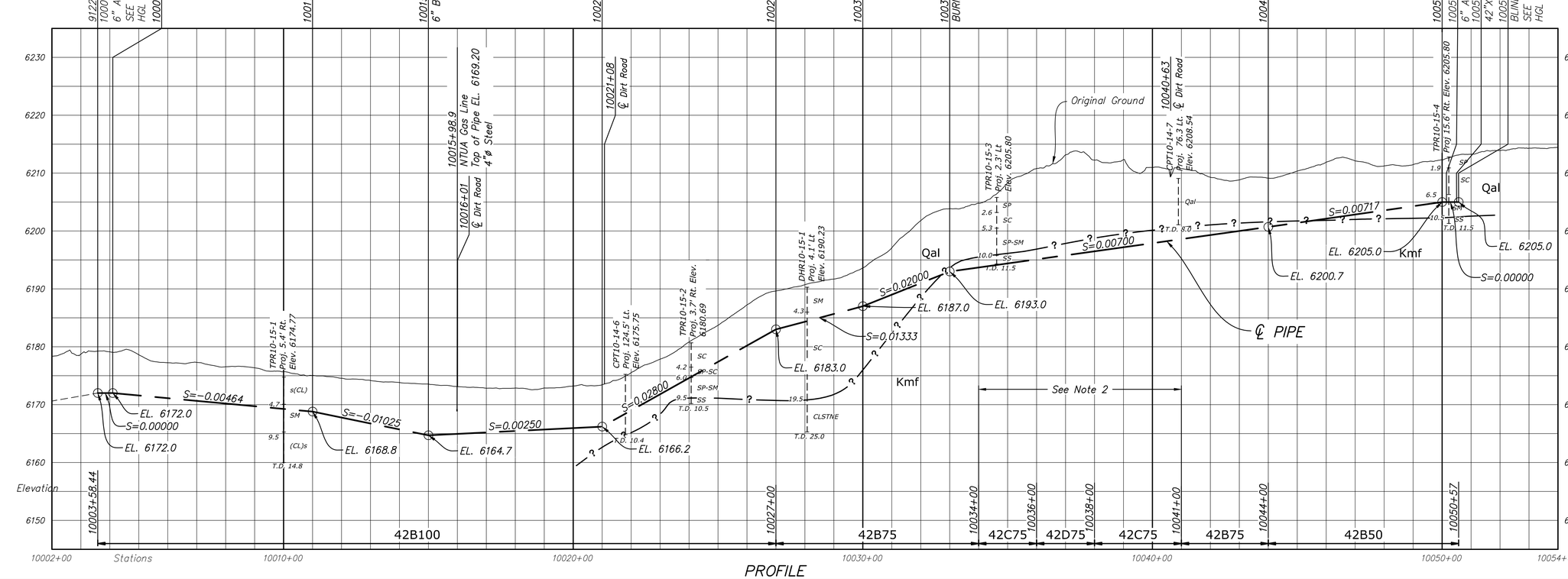
OPEN–CUT CROSSINGS		
Station	Road / Wash	% Compaction
10015+95 TO 10016+07	Unmaintained Road	95
10021+00 TO 10021+17	Unmaintained Road	95
10040+55 TO 10040+74	Unmaintained Road	95

PLAN

200 0 200 400 600
SCALE OF FEET

NOTES

1. For General Notes, Symbols, Abbreviations, and Pipe Classification, see (60281).
2. Line pipe elevations from 10034+00 to 10041+00 are required to be at depth shown to maintain a 5 psi minimum pressure during transient event.
3. For Temporary 6" Construction Water Line, see (60308).
4. Pipe diameter size for HDPE option is 48".



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NEW MEXICO

SAN JUAN LATERAL – REACH 10

LINE PIPE

REV NO	DATE	DESCRIPTION
1	2017-05-19	D Revised Construction ROW widths.
		Bowles, Linda M P.E.

DESIGNED	Andrew Marner
DRAWN	Andrew Marner
CHECKED	D.L. Gesundheit
TECH. APPR.	Bowles, Linda M P.E.
APPROVED	Duke, Wylie C (Chris) P.E.
	PEER REVIEWER – Manager – Water Conveyance Group
	DENVER, CO 2017-03-30

GEOLOGY	
TECH. APPR.	JUSTIN GILBERT
SUBMITTED	PAUL GARDNER
APPROVED	JUSTIN GILBERT
	Supervisory Geologist

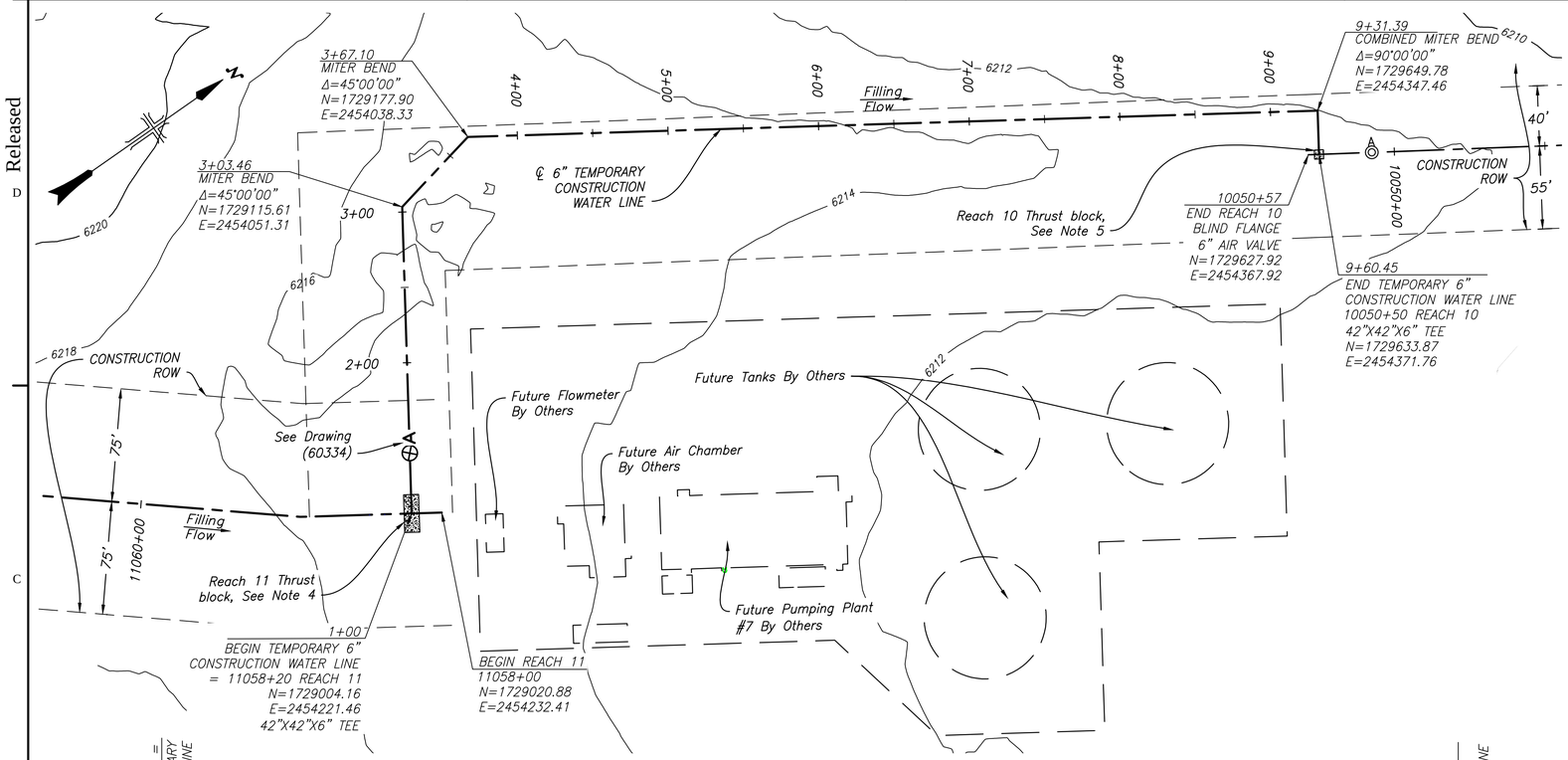
PLAN AND PROFILE

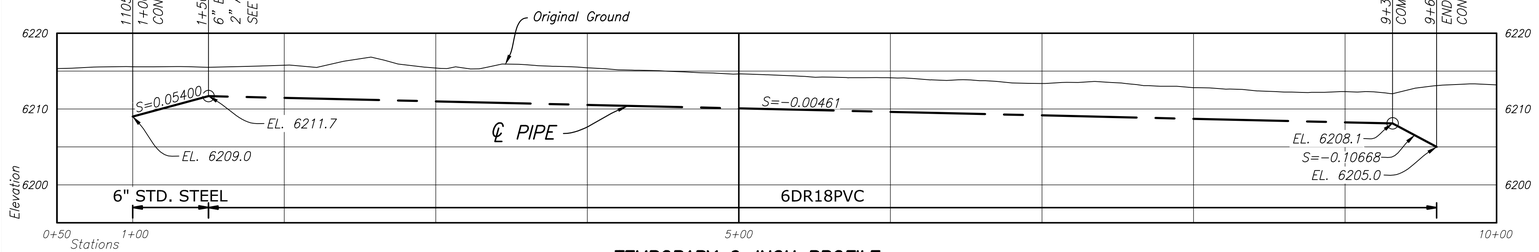
BEGINNING TO END
(STATION 10003+58)

1695–D–60307

SHEET 1 OF 2

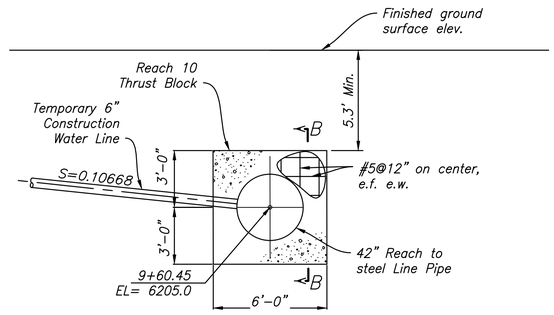
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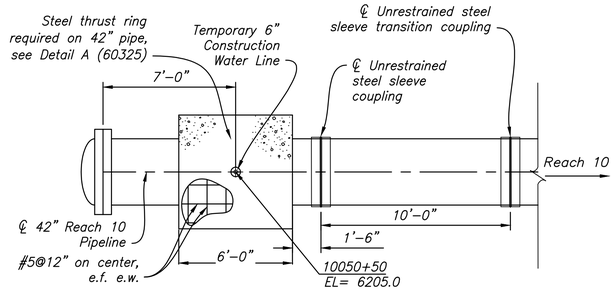


TEMPORARY 6-INCH PROFILE

MITER BEND DATA TABLE		
P.I. Station	Angle	Restrained Length (ft)
3+03.46	45°00'00"	19
3+67.10	45°00'00"	19
9+31.39	90°00'00"	Unrestrained



REACH 10 THRUST BLOCK PROFILE



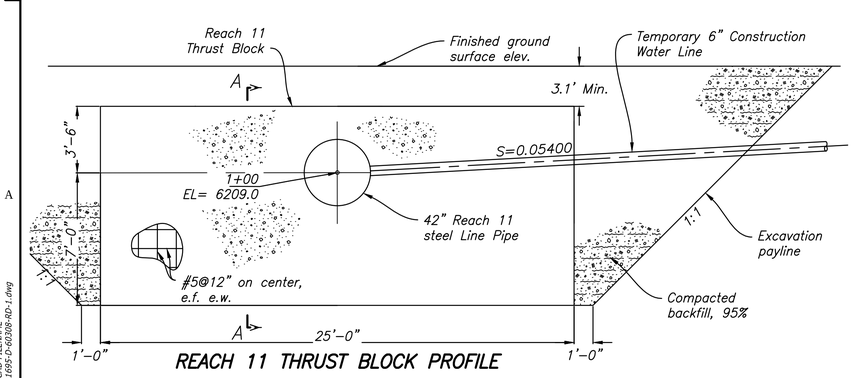
REACH 10 SECTION B–B

OPERATION

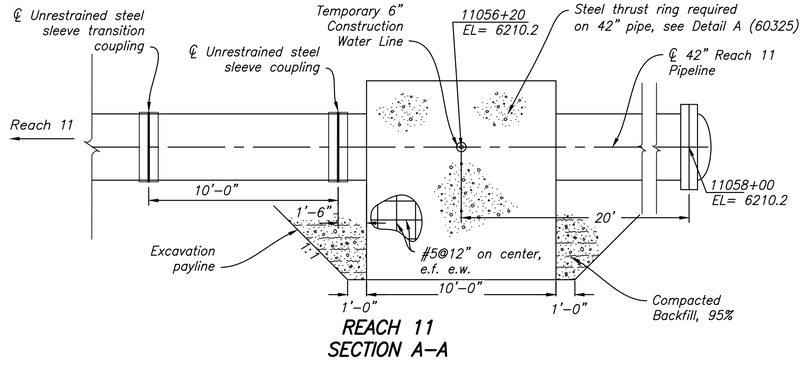
1. Filling operations are to be performed by Bureau of Reclamation personnel ONLY. Contractor must request water from COR and provide a minimum 72 hour notice.
2. Valve on Reach 12A (Sta 12011+35) must be closed, see sheet 1695-D-1.
3. The 6" Valve at 1+50 must be closed and valve operator locked at all times when not filling Reaches 9 and 10.
4. Air valve at Station 10050+15 of Reach 10 shall be REMOVED prior to and during filling operations to provide an air vent for the pipe.
5. A pressure gauge installed on 6" air valve at the beginning of Reach 10 (Station 10003+58.44, Sheet 60307) to be used to estimate filling level in Reach 10.
6. A pressure gauge installed on 6" air valve at the beginning of Reach 9 (Station 90010+00, Sheet 60282) to be used to estimate filling level in Reach 9.
7. The operation of the valve and temporary 6" construction water line must be monitored at all times while the valves are open.
8. 6" Valve to be slowly closed prior to water level exceeding the 6" Air valve stem at Station 10050+57.07.
9. The pressure in the Reach 10 line should be monitored periodically when not in use.

NOTES

1. For Reach 10 Plan and Profile, see (60306).
2. For Reach 11 Plan and Profile, see (60309).
3. See, 40-D-60003 and 40-D-60004 for general notes for concrete outline and reinforcement.
4. For Reach 11's blind flange thrust block, 410' of restrained joints on Reach 11 42"ø line pipe can be used in lieu of concrete. Steel pipe joint shall be butt welded. Fiberglass pipe joint restraint not allowed.
5. For Reach 10's blind flange thrust block, 40' of restrained joints on Reach 10 42"ø line pipe can be used in lieu of concrete.



REACH 11 THRUST BLOCK PROFILE



REACH 11 SECTION A–A

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SAN JUAN LATERAL - REACH 10

LINE PIPE

SEQNO		
1	D	2017-06-08 Bowles, Linda M P.E. — Revised Construction ROW widths, Added a pressure gage to Reach 9 with Note 6.

Kylie Fink — DESIGNED
Kylie Fink — DRAWN
Andrew Marner — CHECKED
Bowles, Linda M P.E. — TECH. APPR.
Duke, Wylie C (Chris) P.E. — APPROVED
PER KP/LEWER - Manager - Water Conveyance Group
DENVER, CO 2017-03-30

PLAN AND PROFILE

TEMPORARY 6-INCH CONSTRUCTION WATER LINE

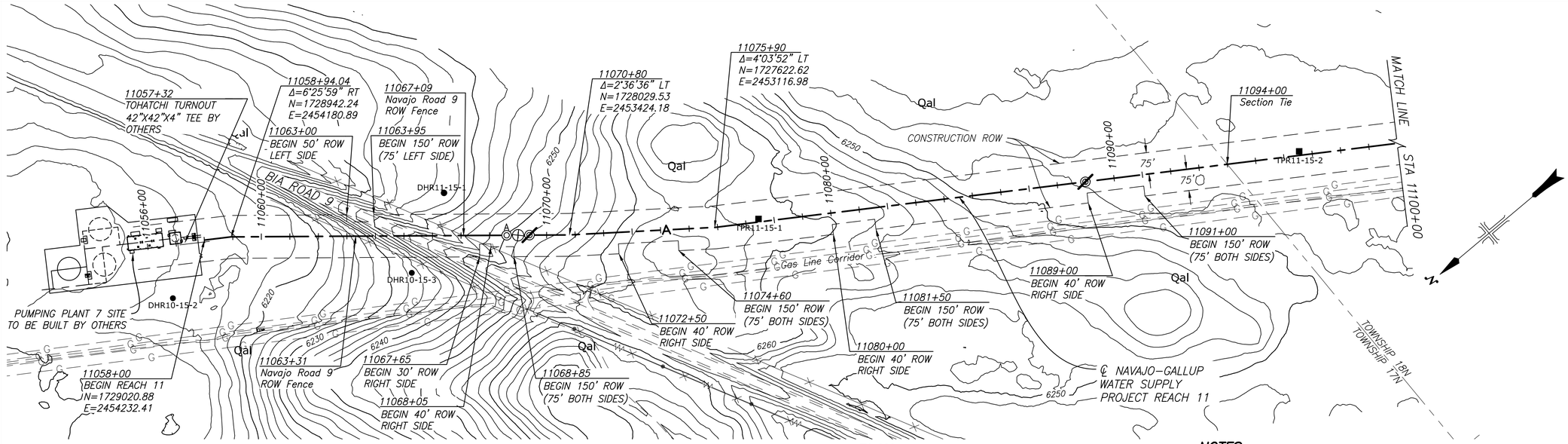
1695-D-60308

SHEET 2 OF 2

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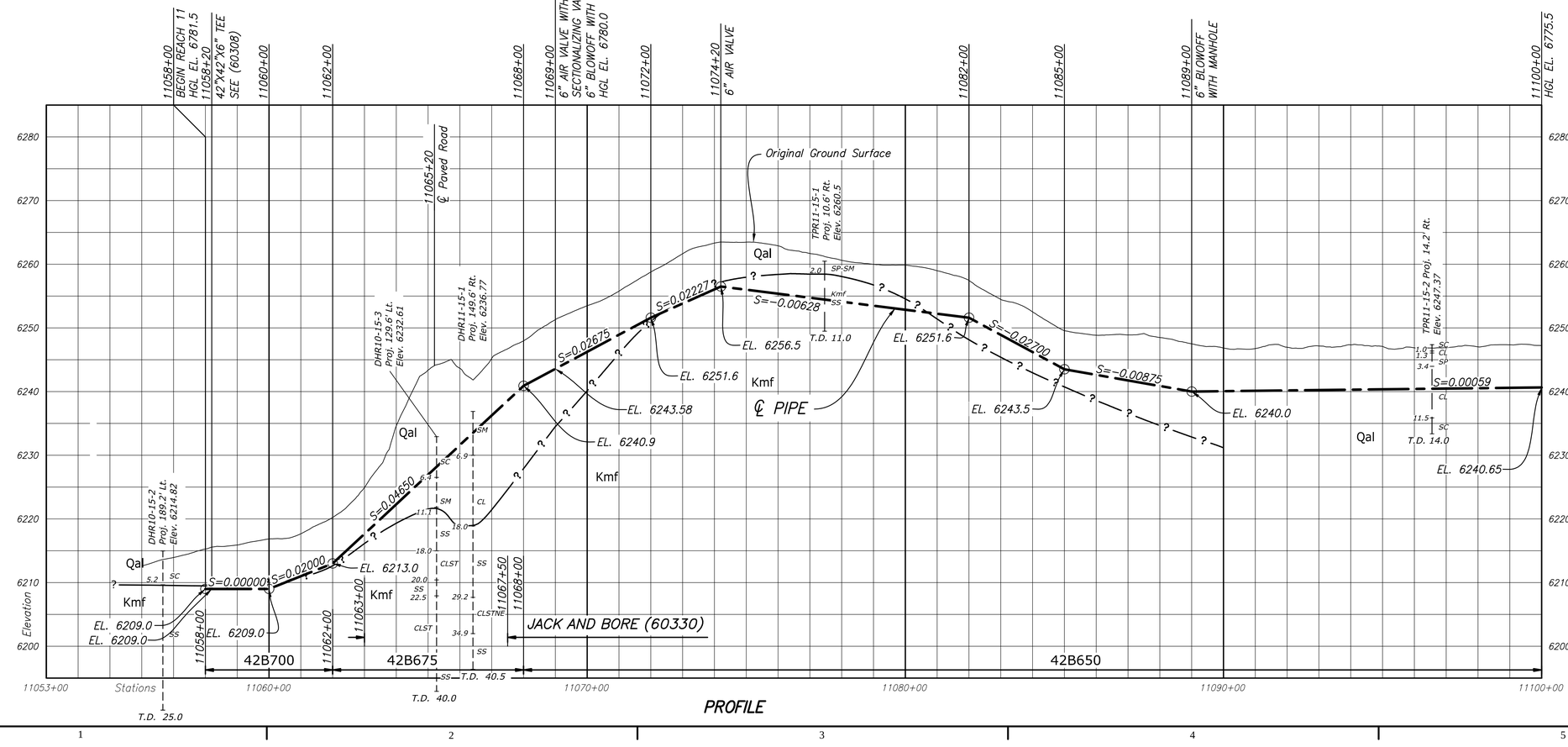


PLAN

SCALE OF FEET: 200 0 200 400 600

NOTES

1. For General Notes, Symbols, Abbreviations, and Pipe Classification, see (60281).
2. For Temporary 6" Construction Water Line, see (60308).
3. For BIA Road 9 Crossing, see (60330).



PROFILE

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NEW MEXICO

SAN JUAN LATERAL - REACH 11

LINE PIPE

REV NO	DATE	BY	DESCRIPTION
1	2017-05-19	Bowles, Linda M P.E.	D. Revised Construction ROW widths.

Andrew Marner — DESIGNED
Andrew Marner — DRAWN
D. L. Gesundheit — CHECKED
Bowles, Linda M P.E. — TECH. APPR.
Duke, Wylie C (Chris) P.E. — APPROVED
PEER REVIEWER - Manager - Water Conveyance Group
DENVER, CO 2017-03-30

GEOLOGY
TECH. APPR. JUSTIN GILBERT
SUBMITTED PAUL GARDNER
APPROVED JUSTIN GILBERT Supervisory Geologist

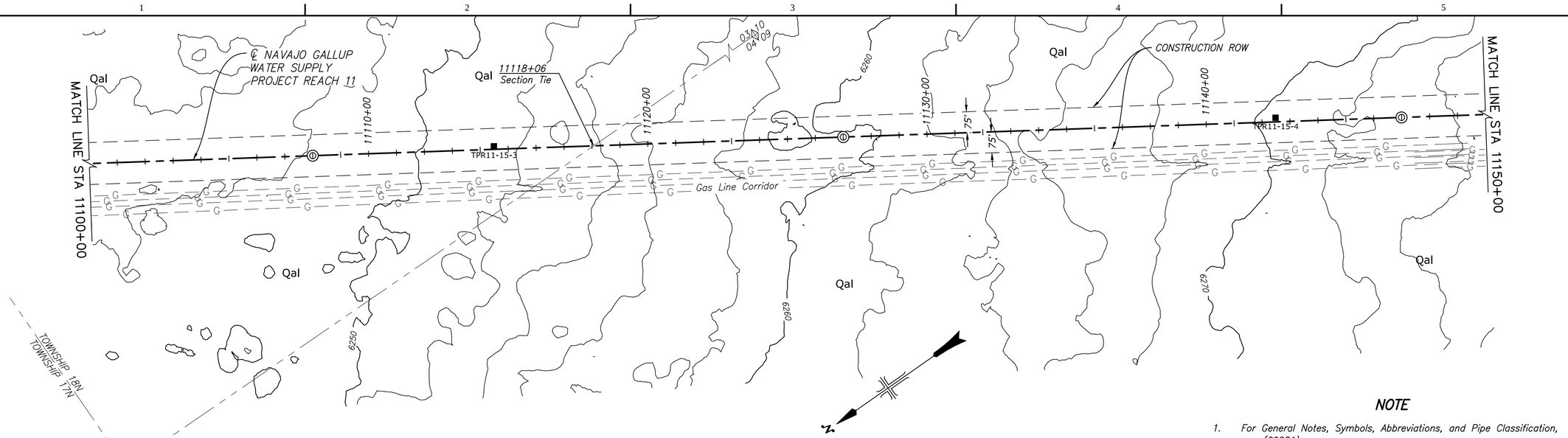
PLAN AND PROFILE

BEGINNING
TO
STA. 11100+00

1695-D-60309

SHEET 1 OF 5

Released

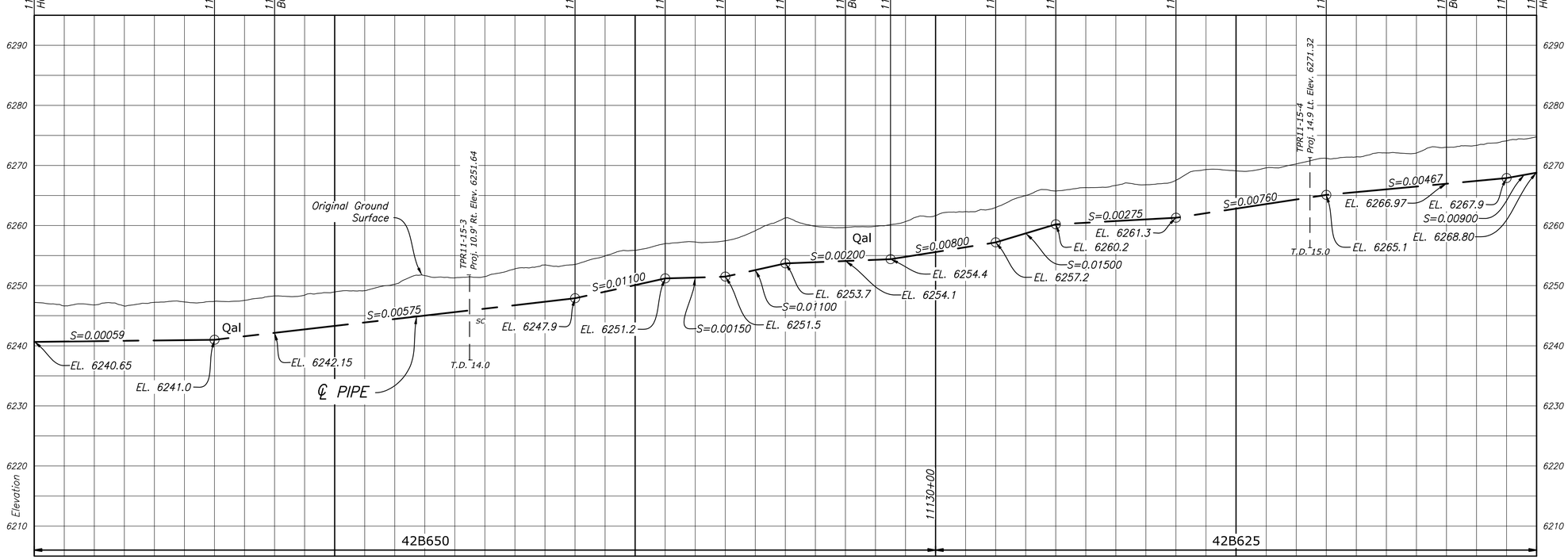


NOTE

1. For General Notes, Symbols, Abbreviations, and Pipe Classification, see (60281).

PLAN

200 0 200 400 600
SCALE OF FEET



PROFILE

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NAVAJO-GALLUP WATER SUPPLY PROJECT
NEW MEXICO

SAN JUAN LATERAL - REACH 11

LINE PIPE

DESIGNED	Andrew Marner
DRAWN	Andrew Marner
CHECKED	D. L. Gesundheit
TECH. APPR.	Bowles, Linda M P.E.
APPROVED	Duke, Wylie C (Chris) P.E.
PEER REVIEWER -	Manager - Water Conveyance Group
	DENVER, CO 2017-03-30

GEOLOGY

TECH. APPR.	JUSTIN GILBERT
SUBMITTED	PAUL GARDNER
APPROVED	JUSTIN GILBERT Supervisory Geologist

PLAN AND PROFILE

STA. 11100+00
TO
STA. 11150+00

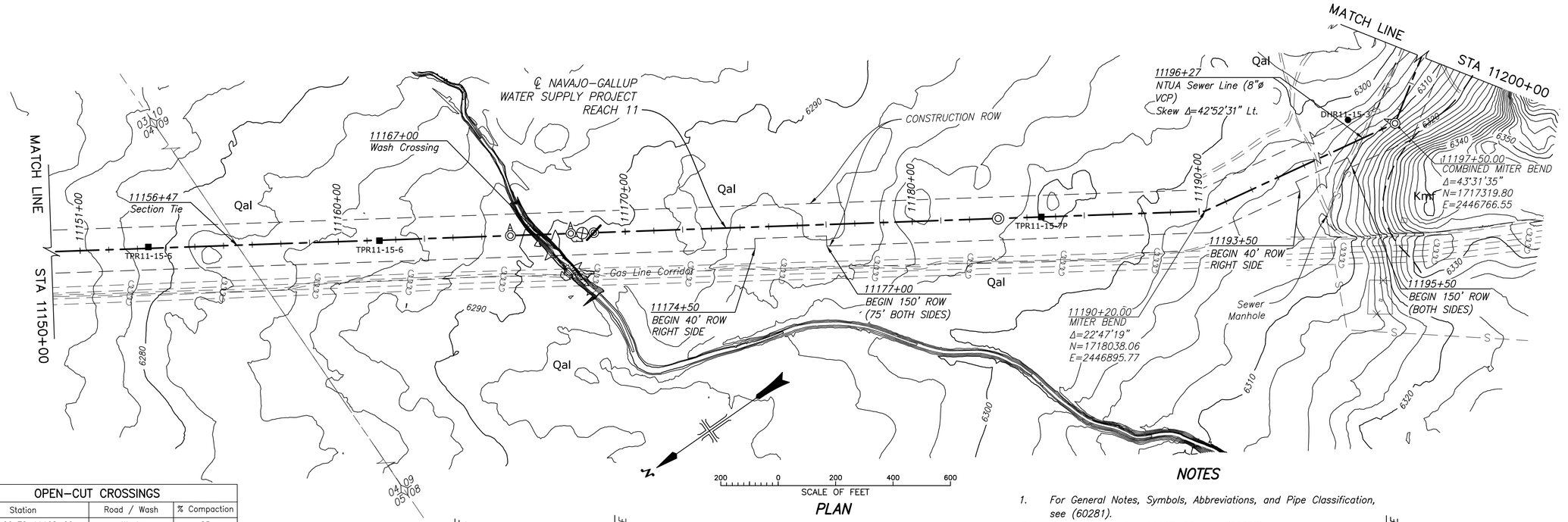
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SHEET 2 OF 5

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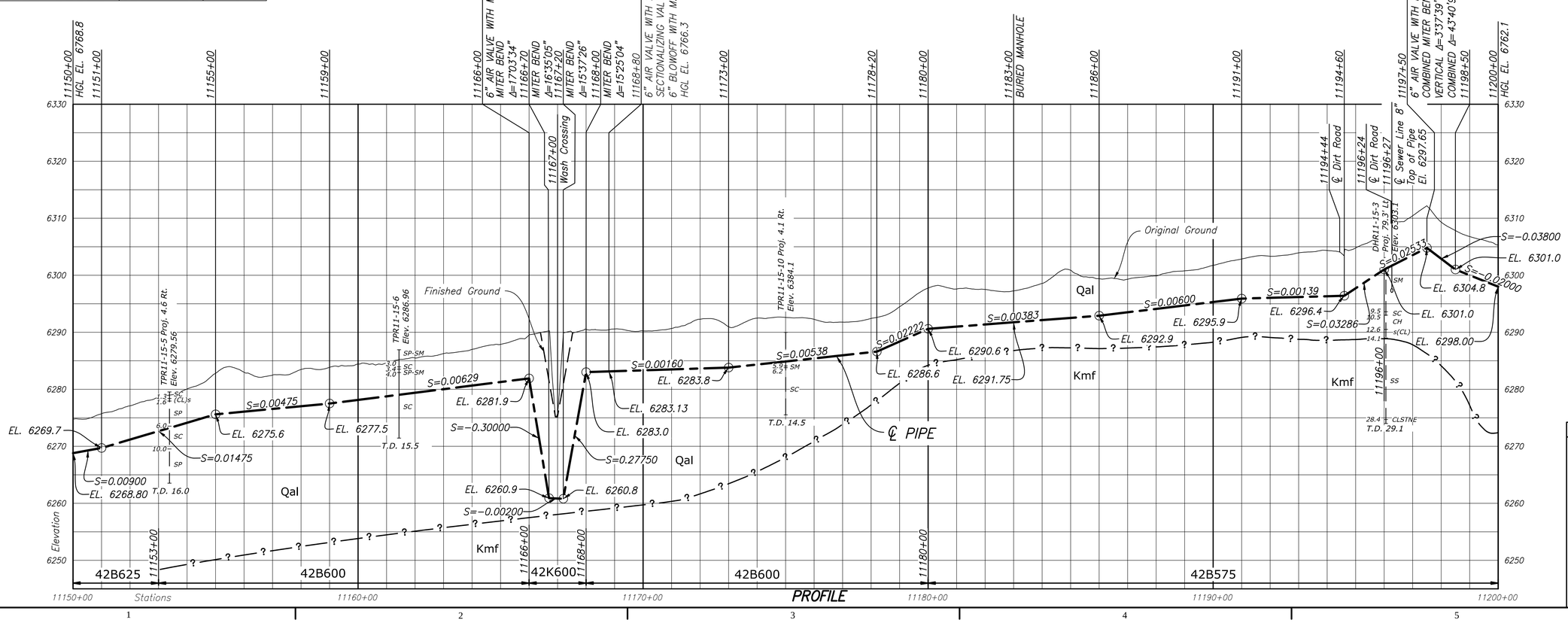


PLAN

OPEN–CUT CROSSINGS		
Station	Road / Wash	% Compaction
11166+00 TO 11168+00	Wash	85
11194+29 TO 11194+59	Unmaintained Road	95
11196+09 TO 11196+39	Unmaintained Road	95

NOTES

1. For General Notes, Symbols, Abbreviations, and Pipe Classification, see (60281).
2. For wash crossing 11167+00, see (60357).
3. Sewer line crossings, see specifications.



PROFILE

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DATE AND TIME PLOTTED 3/22/2017 3:00 PM
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BUREAU OF RECLAMATION
NAVAJO–GALLUP WATER SUPPLY PROJECT
NEW MEXICO

SAN JUAN LATERAL - REACH 11

LINE PIPE

SURVEY NO.	DATE	DESCRIPTION
1	2017-05-19	D Revised Construction ROW widths. Bowles, Linda M P.E.

Andrew Marner DESIGNED
Andrew Marner DRAWN
D. L. Gesundheit CHECKED
Bowles, Linda M P.E. TECH. APPR.
Duke, Wylie C (Chris) P.E. APPROVED PEER REVIEWER - Manager - Water Conveyance Group
DENVER, CO 2017-03-30

GEOLOGY
TECH. APPR. JUSTIN GILBERT
SUBMITTED PAUL GARDNER
APPROVED JUSTIN GILBERT Supervisory Geologist

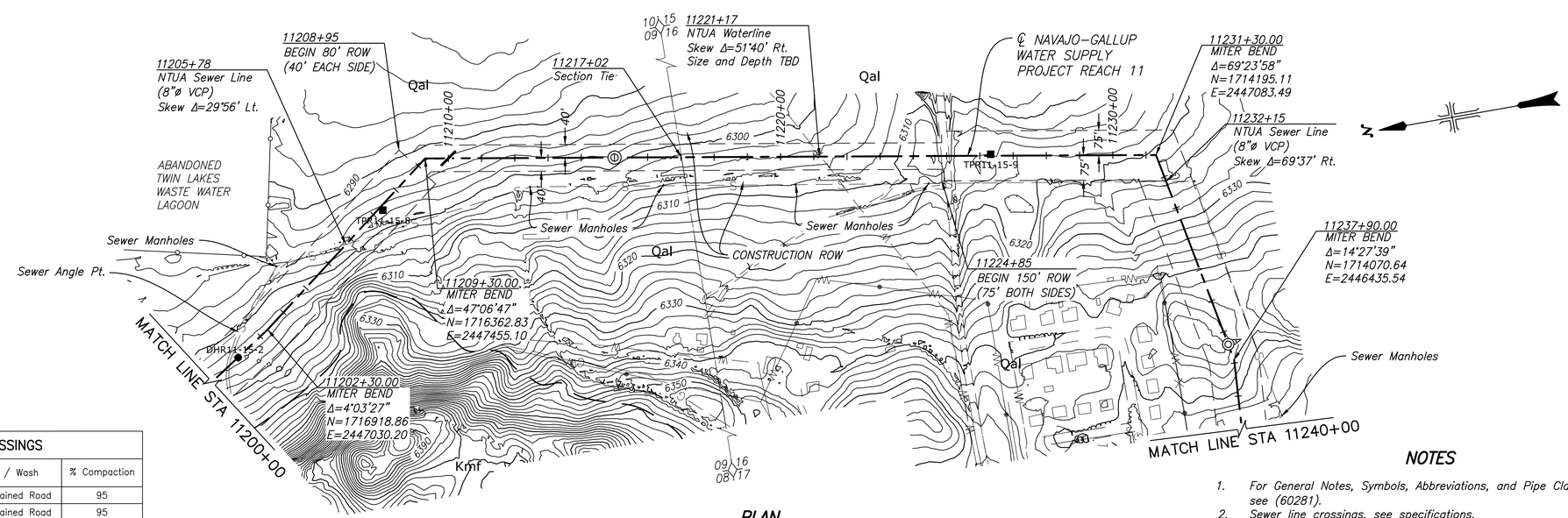
PLAN AND PROFILE

STA. 11150+00
TO
STA. 11200+00

1695-D-60311

SHEET 3 OF 5

Released



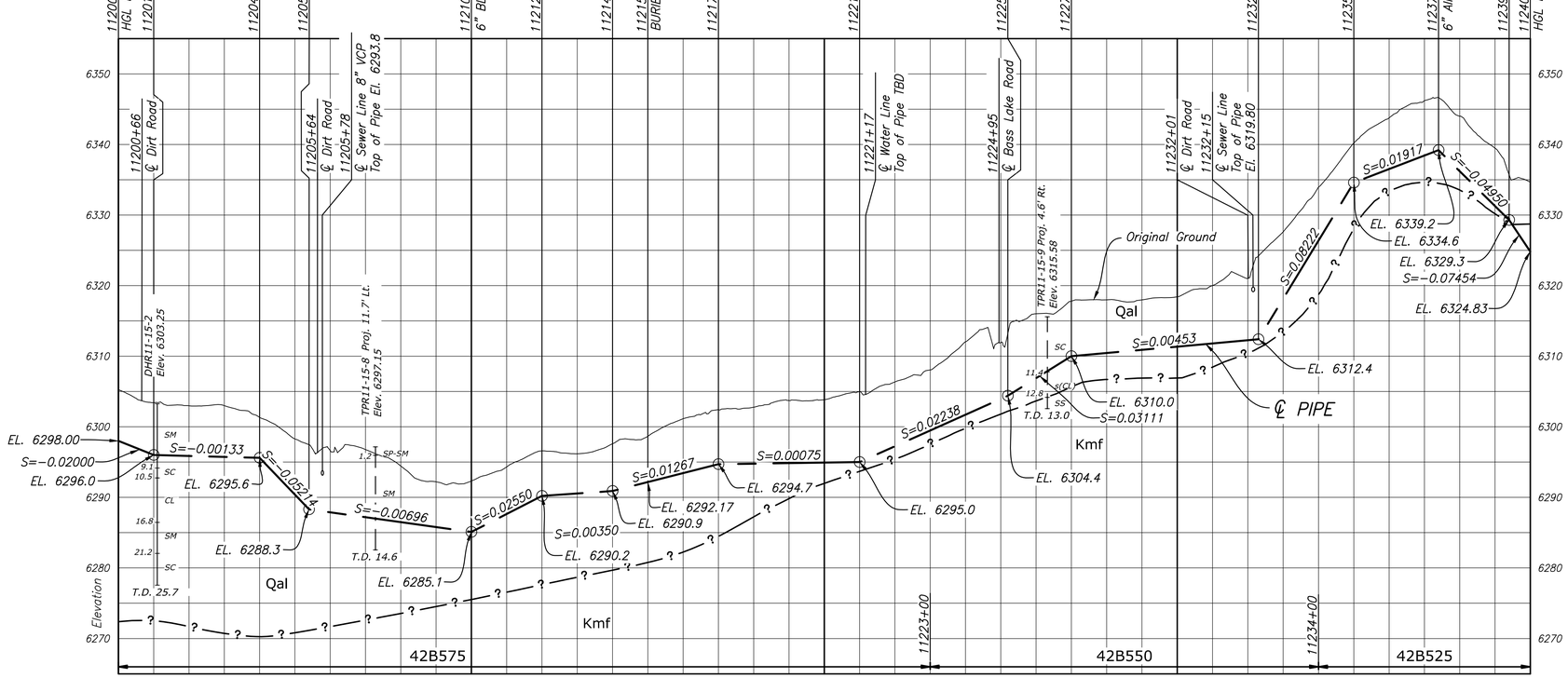
PLAN

200 0 200 400 600
SCALE OF FEET

OPEN–CUT CROSSINGS		
Station	Road / Wash	% Compaction
11200+51 TO 11200+81	Unmaintained Road	95
11205+49 TO 11206+26	Unmaintained Road	95
11224+80 TO 11225+10	Maintained Road	95
11231+86 TO 11232+16	Unmaintained Road	95

NOTES

1. For General Notes, Symbols, Abbreviations, and Pipe Classification, see (60281).
2. Sewer line crossings, see specifications.



PROFILE

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U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
NAVAJO-GALLUP WATER SUPPLY PROJECT
NEW MEXICO

SAN JUAN LATERAL - REACH 11

LINE PIPE

REV NO	DATE	BY	DESCRIPTION
1	2017-05-19	Bowles, Linda M P.E.	D Revised Construction ROW widths.

DESIGNED	Andrew Marner
DRAWN	Andrew Marner
CHECKED	D. L. Gesundheit
TECH. APPR.	Bowles, Linda M P.E.
APPROVED	Duke, Wylie C (Chris) P.E.
PEER REVIEWER	Manager - Water Conveyance Group

GEOLOGY	
TECH. APPR.	JUSTIN GILBERT
SUBMITTED	PAUL GARDNER
APPROVED	JUSTIN GILBERT Supervisory Geologist

DENVER, CO 2017-03-30

PLAN AND PROFILE

STA. 11200+00
TO
STA. 11240+00

1695-D-60312

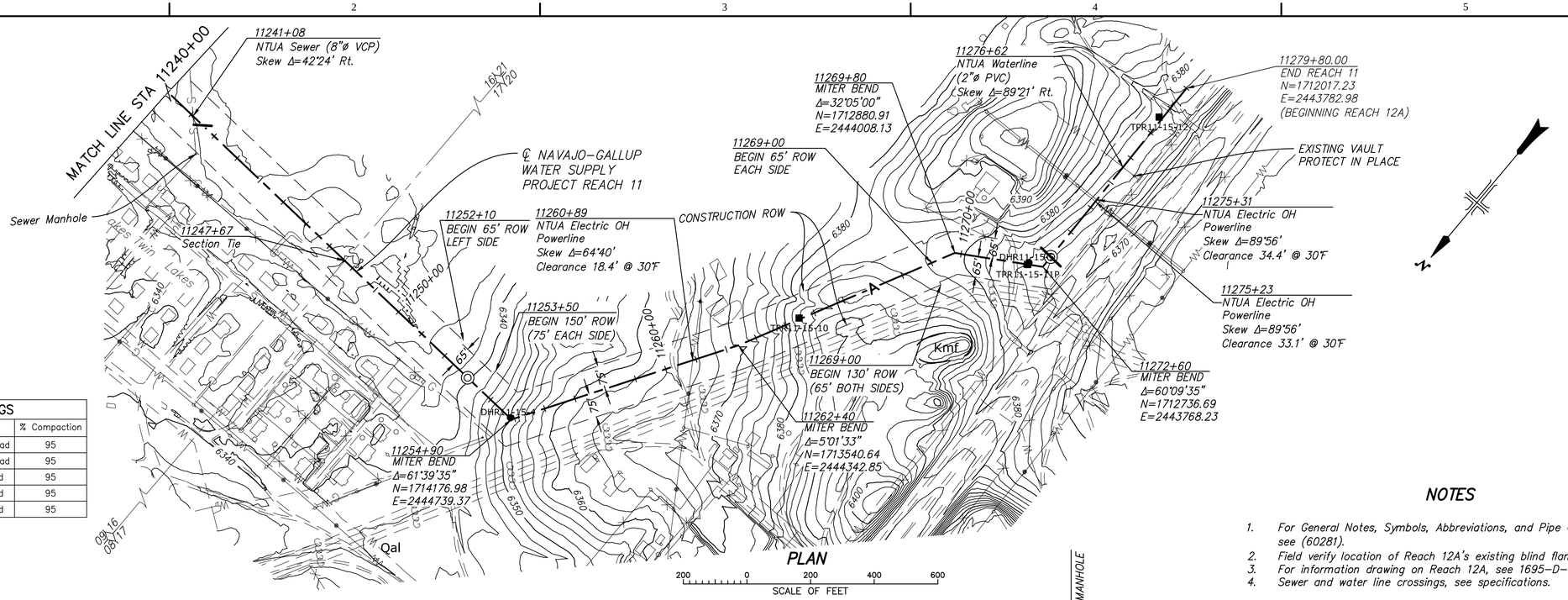
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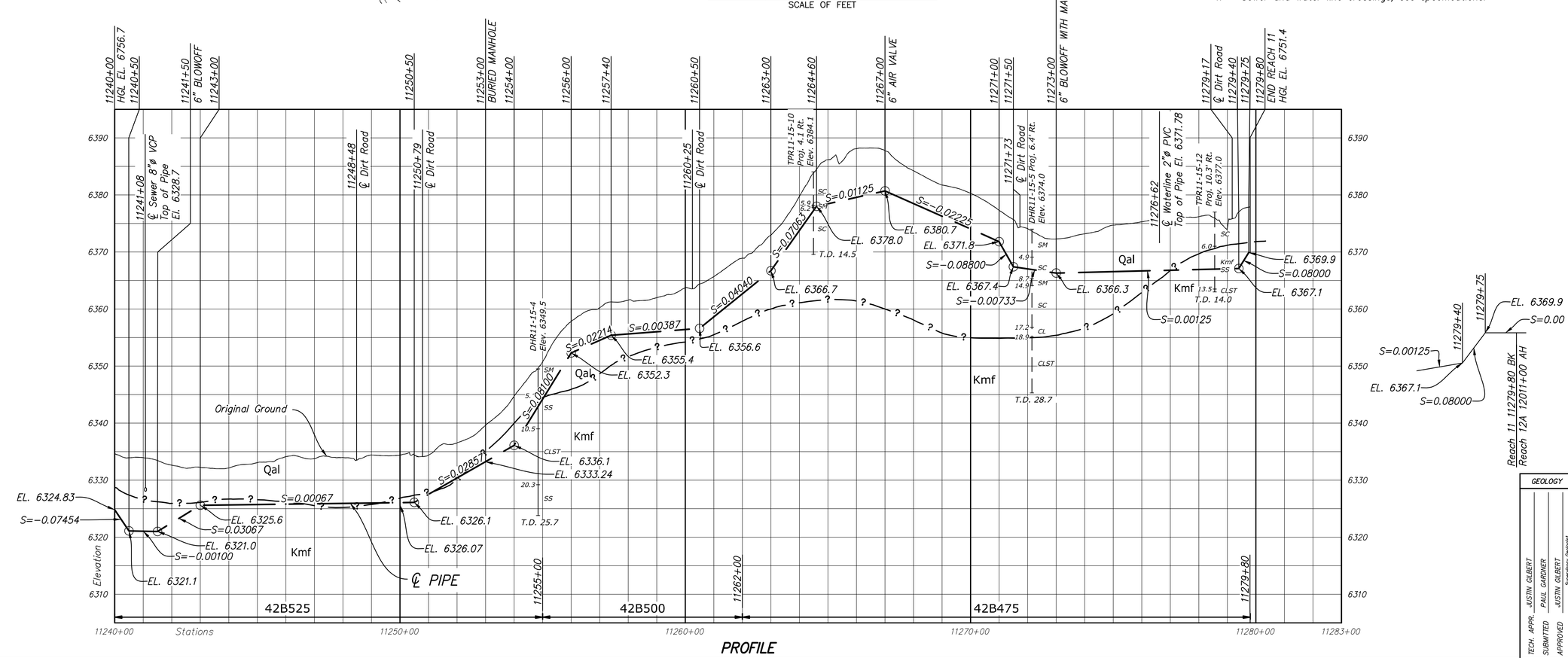
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OPEN–CUT CROSSINGS		
Station	Road / Wash	% Compaction
11248+33 TO 11248+63	Unmaintained Road	95
11250+64 TO 11250+94	Unmaintained Road	95
11260+10 TO 11260+40	Maintained Road	95
11271+58 TO 11271+88	Maintained Road	95
11278+57 TO 11279+37	Maintained Road	95



NOTES

1. For General Notes, Symbols, Abbreviations, and Pipe Classification, see (60281).
2. Field verify location of Reach 12A's existing blind flange and pipe.
3. For information drawing on Reach 12A, see 1695–D–1.
4. Sewer and water line crossings, see specifications.



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NEW MEXICO

SAN JUAN LATERAL - REACH 11

LINE PIPE

REV NO	DATE	DESCRIPTION
1	2017-05-19	D Revised Construction ROW widths. Bowles, Linda M P.E.

Andrew Marner — DESIGNED
Andrew Marner — DRAWN
D. L. Gesundheit — CHECKED
Bowles, Linda M P.E. — TECH. APPR.
Duke, Wylie C (Chris) P.E. — APPROVED
PEER REVIEWER - Manager - Water Conveyance Group
DENVER, CO 2017-03-30

GEOLOGY

TECH. APPR. JUSTIN GILBERT
SUBMITTED PAUL GARDNER
APPROVED JUSTIN GILBERT Supervisory Geologist

PLAN AND PROFILE

STA. 11240+00
TO
END (STA. 11279+60)

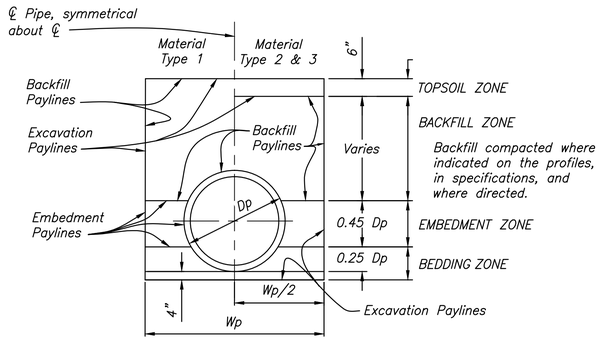
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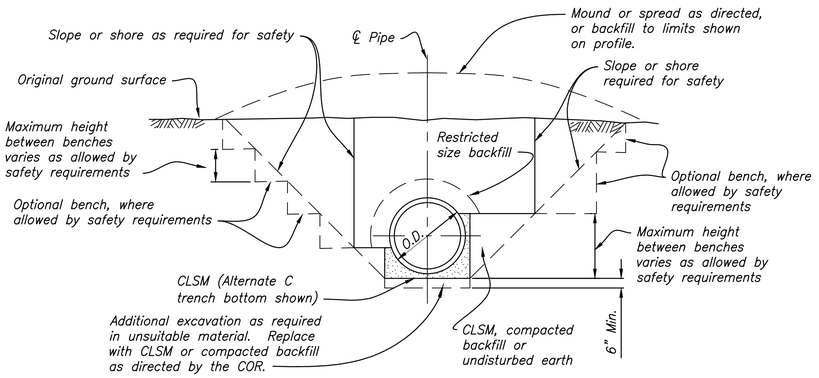
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TRENCH FOR PAYLINES ONLY

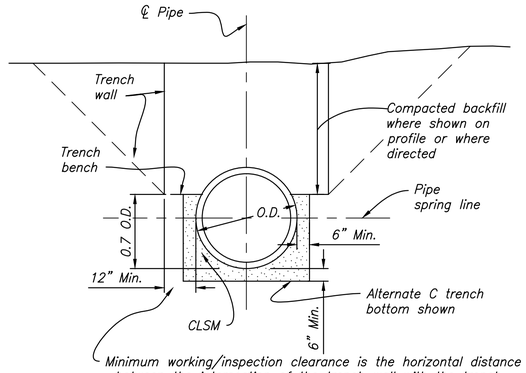
ALL TYPES OF PIPE

TABLE OF PAY DIMENSIONS		
PIPE Dn (inches)	Dp (inches)	Wp (feet)
6	Dn + 2	2.0
42, 48	1.167 Dn	½ (1.167 Dn+36)

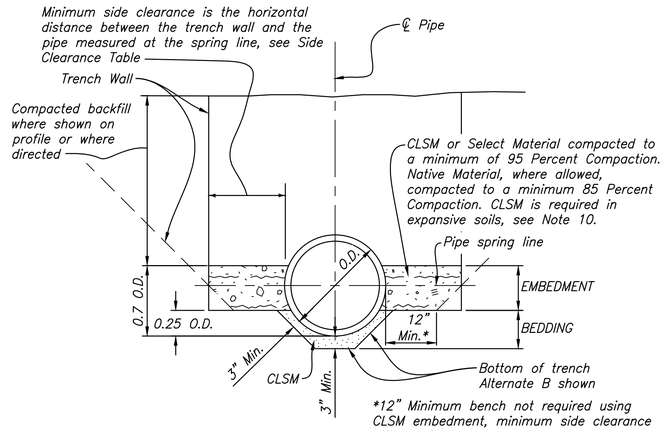


TYPICAL TRENCH DETAILS

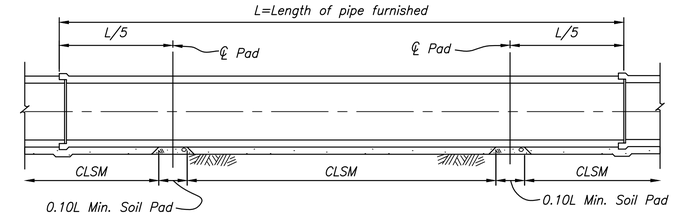
NOTE: Instability of the native material may cause difficulties when excavating trench slopes around the pipe.



MATERIAL TYPE 1 TRENCH



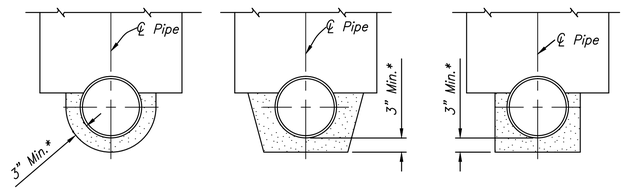
MATERIAL TYPE 2 AND 3 TRENCH



NOTE: Soil pads allow observation of the CLSM flowing from one side of the pipe to the other. See Note 9.

CLSM INSTALLATION WITH SOIL PADS

TYPICAL FOR ALL PIPE TYPES



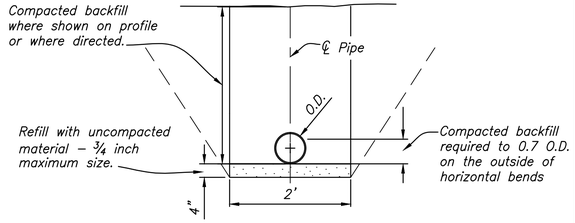
ALTERNATE A ALTERNATE B ALTERNATE C

ACCEPTABLE TRENCH BOTTOMS FOR CLSM

* 6" Min required between bottom of pipe and rock surfaces

SELECT MATERIAL GRADATION LIMITS	
Size *	Percent by Weight
Passing No. 200 sieve	12 or less
Passing No. 50 sieve	25 or less

* Maximum size shall not exceed ¾–inch



TEMPORARY CONSTRUCTION PIPE TRENCH

6" PVC DR18

SIDE CLEARANCE TABLE

Height of Cover	STEEL				DUCTILE IRON				FIBERGLASS		PVC DR25		PVC DR32.5		PVC DR41		PVC DR51		HDPE	
	42"		48"		42"		48"		42" & 48"		42" & 48"		42"		42"		42"		48"	
	Material Type 2	Material Type 3	Material Type 2	Material Type 3	Material Type 2	Material Type 3	Material Type 2	Material Type 3	Material Type 2	Material Type 3	Material Type 2	Material Type 3	Material Type 2	Material Type 3	Material Type 2	Material Type 3	Material Type 2	Material Type 3	Material Type 2	Material Type 3
<=10'	12	15	15	18	6	9	6	15	6	6	6	6	6	9	6	9	6	9	6	6
<=15'	18	24	21	27	12	18	18	21	6	12	6	9	6	12	9	12	9	12	6	15
<=20'	24	30	30	33	21	27	24	30	9	18	9	15	9	15	12	18	12	18	12	18

1. Backfill can not exceed 5' until CLSM embedment obtains an unconfined compressive strength of 30 psi.
2. Any dimension less than 12" must use CLSM embedment. Select and native material embedment requires minimum of 12" side clearance.
3. For compacted backfill side clearances, see (60329)

Steel – Mortar lined, flexible coated.
Ductile Iron – Special thickness class.
Fiberglass – Stiffness factor of 18 or greater.
HDPE – Only DR ratios 32.5, 26, 21, 19, and 17 allowed.

NATIVE MATERIAL PROPERTIES

MATERIAL TYPE 1 – Typical trench wall materials would be rock; materials described as claystone, mudstone, or siltstone; highly cemented soils even if low density; sands and gravels; and silty or clayey material with inplace densities 95% Standard Proctor or higher.

MATERIAL TYPE 2 – Typical trench wall materials would include silty or clayey material or sands and gravels with inplace densities between 85% Standard Proctor or higher, but less than 95%.

MATERIAL TYPE 3 – Typical trench wall materials would include elastic silts, low density silty or clayey soils, or low–density cohesionless soils with a density below 85% Standard Proctor.

Trench Material Type locations, based on the above Native Material Properties and geology investigation, have been identified and correspond to minimum side clearance widths listed in the Side Clearance Table. Material Type 1's inferred bedrock surface is shown in the profile on drawings (60281) to (60313). Material Types 2 and 3 locations are listed in Table 31 23 22A in the specifications.

NATIVE MATERIAL EMBEDMENT

PIPE MATERIAL TYPE	MAX COVER DEPTH
Steel Pipe	Not Allowed
Ductile Iron Pipe	Not Allowed
PVC Pipe DR41, DR51	Not Allowed
PVC Pipe DR32.5	7 feet or less
PVC Pipe DR25	10 feet or less
HDPE Pipe DR32.5, DR26, DR21, DR19, DR17	7 feet or less
Fiberglass Pipe, Stiffness Class 36 or greater	10 feet or less

Screened excavated native material is allowed for the embedment zone for Material Types 2 and 3 based on the following conditions:

1. Particle sizes greater than ¾–inch are removed
2. Compacted backfill to 95% is not required above pipe
3. Native material embedment is compacted to 85%
4. Side clearance is 12" minimum
5. Restraint joints are not required for thrust.

NOTES

1. Drawing not to scale
2. Dp and Wp are used for calculating pay quantities for all pipe and trench types. Calculations are based on vertical walls.
3. O.D is the outside diameter, in inches, of the pipe actually installed.
4. Dn is the nominal pipe diameter.
5. CLSM is Controlled Low Strength Material. See specifications for details.
6. Sloping, shoring, and benching shall be in accordance with Reclamation Safety and Health Standards.
7. CLSM is required in the bedding for all pipe types.
8. Warning tape and tracer wire not shown, but are required. See specifications for details.
9. Other material may be submitted in lieu of soil pads for approval. Soil pad materials must not exceed the compressive strength of the CLSM.
10. CLSM is required for the embedment when there is expansive soils and the native trench material's plastic index exceeds 25 as listed in Table 1.2 of Reclamation's Earth Manual.
11. CLSM is required for the embedment when saturated soil is encountered in the pipe trench.
12. Install pipe based on these specifications or pipe manufacturer's, whichever is more stringent.

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NEW MEXICO

SAN JUAN LATERAL

BLOCK 9-11 - LINE PIPE

Linda M. Bowles
DESIGNED
Michelle Norris
DRAWN
W. Chris Duke
CHECKED
Bowles, Linda M P.E.
TECH. APPR.
Brown, Timothy P P.E.
APPROVED
PEER REVIEWER - Manager, Civil Structures

DENVER, CO 2017-03-30

PRESSURE PIPE TRENCH INSTALLATION

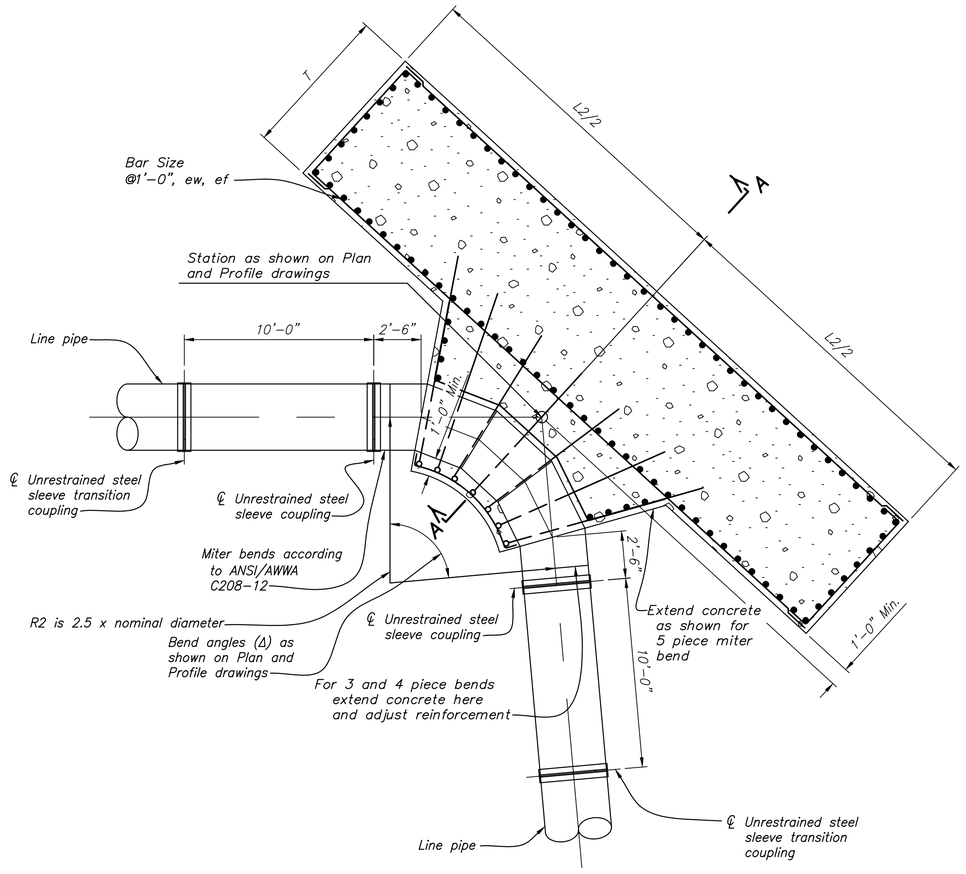
SECTIONS AND DETAILS

1695-D-60314

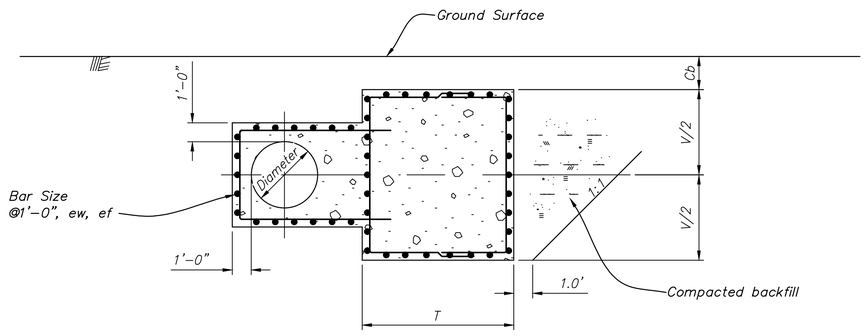
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PLAN



SECTION A-A

Reach 9 Structural Thrust Blocks

Station	Deflection Angle	Type of Bend	Head (ft)	Cover (ft)	Diameter (in)	R2 (ft)	L2 (ft)	V	T	CB (ft)	Bar Size	Restrained Length From Sta.*	Restrained Length To Sta.*
90013+75.00	55°53'06"	Combined	600	5.0	48	10	39	10'-0"	7'-0"	2.00	7	90011+79.00	90013+75.00
90017+00.00	56°08'40"	Combined	600	5.0	48	10	40	10'-0"	7'-0"	2.00	7	90013+75.00	90018+98.00
90040+73.00	46°26'33"	Combined	625	5.0	48	10	37	9'-0"	7'-0"	2.50	7	90039+21.00	90043+63.00
90360+26.00	56°43'43"	Combined	475	5.0	48	10	32	11'-0"	7'-6"	1.50	5	90358+20.00	90360+26.00
90363+66.00	51°44'37"	Combined	500	7.0	48	10	23	12'-0"	8'-0"	3.00	5	90360+26.00	90365+25.00
90672+52.00	61°32'12"	Horizontal	375	9.5	48	10	30	16'-0"	6'-6"	3.50	5	90671+78.00	90673+26.00
90679+48.00	60°20'42"	Combined	375	12.0	48	10	25	16'-0"	7'-0"	6.00	5	Not Allowed	Not Allowed
90971+41.00	48°31'56"	Horizontal	250	5.0	42	8.75	26	7'-6"	4'-0"	3.00	5	90970+91.00	90971+91.00
90974+84.00	46°16'14"	Combined	250	7.5	42	8.75	27	16'-0"	4'-6"	1.25	5	90974+52.00	90975+16.00
91028+80.00	46°47'00"	Horizontal	250	4.5	42	8.75	27	10'-0"	4'-6"	1.25	5	91028+29.00	91029+31.00
91127+98.00	47°49'30"	Horizontal	150	5.5	42	8.75	25	10'-0"	3'-6"	2.25	5	91127+71.00	91128+25.00
91131+34.00	48°17'51"	Horizontal	175	3.5	42	8.75	24	7'-6"	4'-0"	1.50	5	91130+87.00	91131+81.00

* Length of restrained joints in leiu of concrete thrust restraint, See Note 4.

Reach 11 Structural Thrust Blocks

Station	Deflection Angle	Type of Bend	Head (ft)	Cover (ft)	Diameter (in)	R2 (ft)	L2 (ft)	V	T	CB (ft)	Bar Size	Restrained Length From Sta.*	Restrained Length To Sta.*
11209+30.00	47°06'47"	Horizontal	575	4.0	42	8.75	32	8'-0"	6'-0"	1.75	7	11208+00.00	11210+60.00
11231+30.00	69°23'58"	Horizontal	550	7.0	42	8.75	39	14'-0"	7'-0"	1.75	6	11229+74.00	11232+86.00
11254+90.00	61°39'35"	Horizontal	525	4.5	42	8.75	34	8'-0"	6'-0"	2.25	6	11253+13.00	11256+67.00
11272+60.00	60°09'35"	Horizontal	475	4.0	42	8.75	40	8'-0"	5'-6"	1.75	8	11270+91.00	11274+29.00

* Length of restrained joints in leiu of concrete thrust restraint, See Note 4.

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 rubber gasketed joints will be allowed within the concrete encasement.
3. Connections shown are for steel line pipe. Contractor may submit alternative couplings for approval.
4. Restrained distance shown on table is for metallic pipe only. See specifications for limitations on other pipe types.
5. For general notes and minimum requirements for detailing reinforcement, see 40-D-60003 and 40-D-60004.
6. Structural design of concrete encasement is based on a specified minimum concrete strength (f'c) at 28 days of 4,500 psi and reinforcement with a specified minimum yield strength (fy) of 60,000 psi.
7. All coatings shall be continuous through blocking.
8. The minimum steel cylinder thickness, t, shall be the correlating pipe thickness for pipe designation shown on the drawings.
9. D is nominal pipe diameter.
10. For pressure pipe trench installation, see (60314).

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BLOCK 9-11 - LINE PIPE

REV NO	DATE	DESCRIPTION
1	2017-05-17	D Added Restrained Distance columns to Structural Thrust Block Tables, clarified Notes

D.L. Gesundheit — DESIGNED
D.L. Gesundheit — DRAWN
Daniel Gibas / Kylie Fink — CHECKED
Bowles, Linda M P.E. — TECH. APPR.
Duke, Wylie C (Chris) P.E. — APPROVED
PEER REVIEWER - Manager - Water Conveyance Group

DENVER, CO 2017-03-30

CONCRETE ENCASED MITER BENDS

SECTIONS AND DETAIL

1695-D-60315

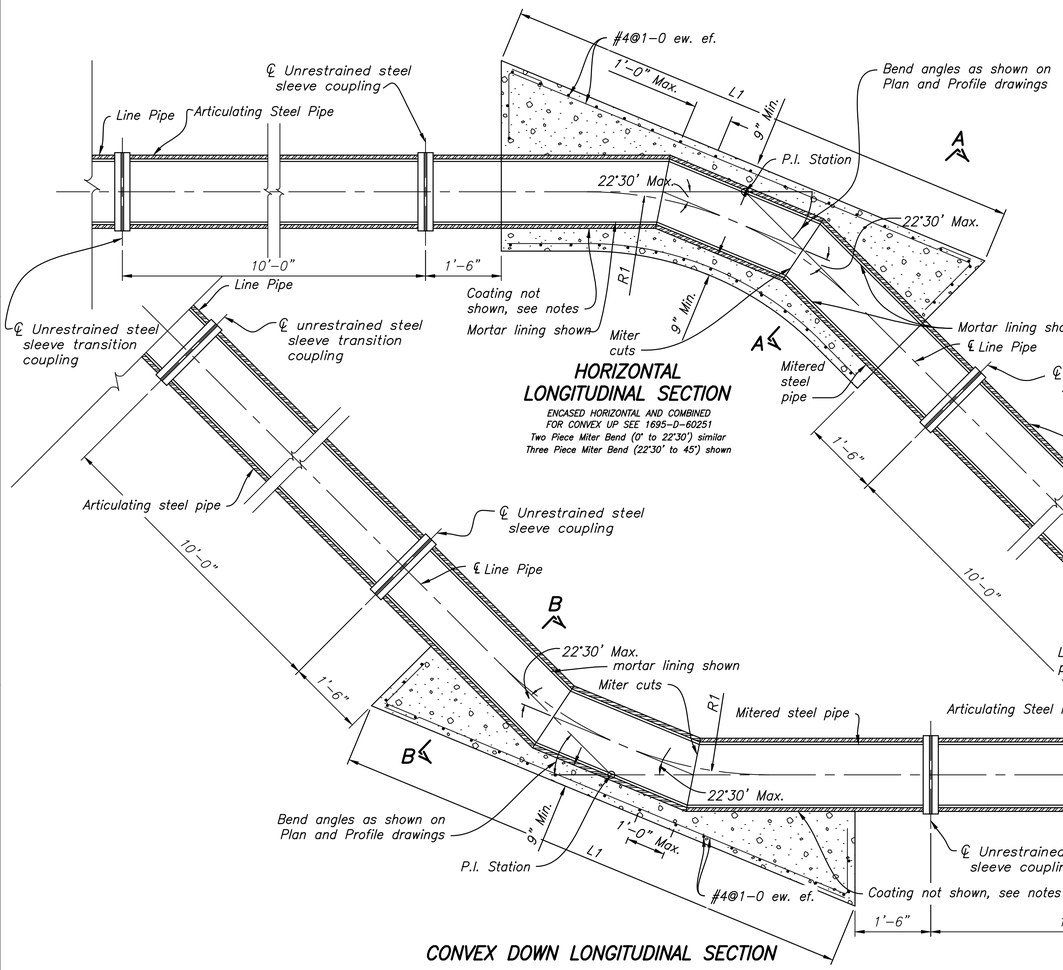
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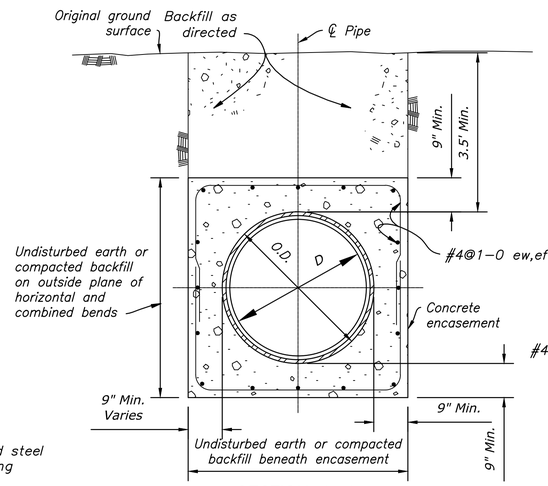
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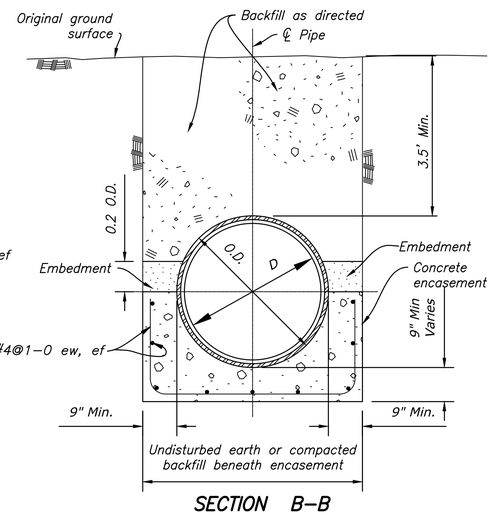
HORIZONTAL LONGITUDINAL SECTION

ENCASED HORIZONTAL AND COMBINED
FOR CONVEX UP SEE 1695–D–60251
Two Piece Miter Bend (0° to 22°30') similar
Three Piece Miter Bend (22°30' to 45°) shown

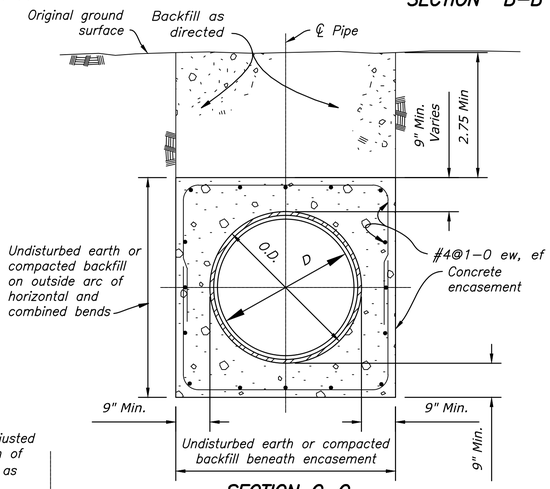
CONVEX DOWN LONGITUDINAL SECTION



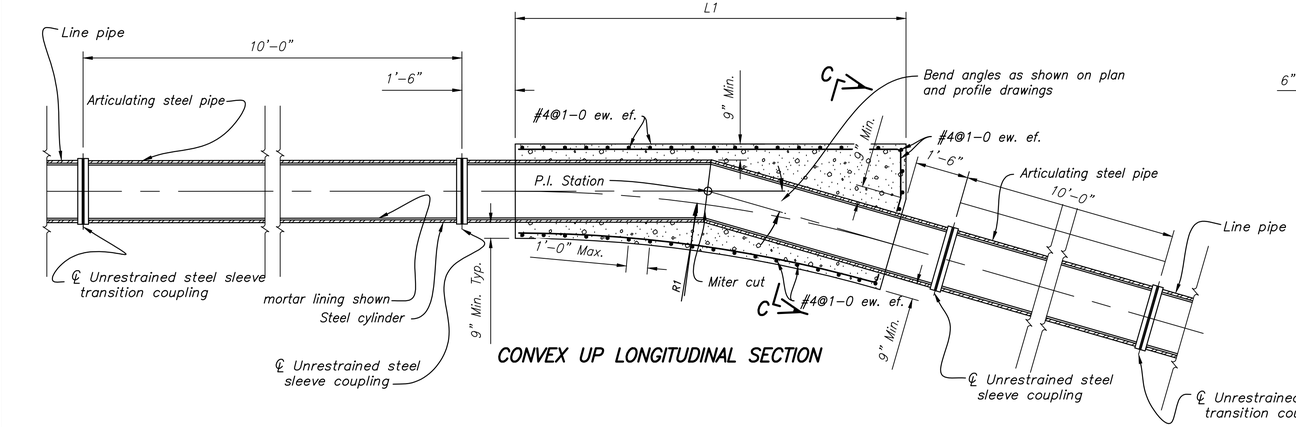
SECTION A–A



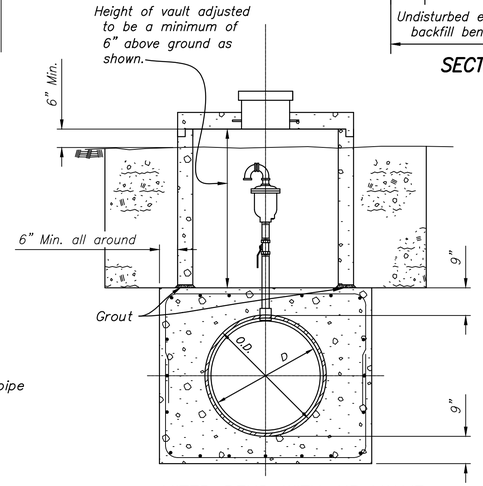
SECTION B–B



SECTION C–C



CONVEX UP LONGITUDINAL SECTION



MITER BEND WITH AIR VALVE

(MITER BEND WITH AIR VALVE WITH MANHOLE SIMILAR)

NOTES

1. Drawing not to scale.
2. No rubber gasketed joints will be allowed within the concrete encasement, except for the bell encased at the face of the structure.
3. Connections shown are for steel line pipe. Contractor may submit alternative couplings for approval.
4. For general notes and minimum requirements for detailing reinforcement, see 40–D–60003 and 40–D–60004.
5. Structural design of concrete encasement is based on a specified minimum concrete strength (f'c) at 28 days of 4,500 psi and reinforcement with a specified minimum yield strength (fy) of 60,000 psi.
6. All coatings shall be continuous through blocking.
7. The minimum steel cylinder thickness, t, shall be the correlating pipe thickness for pipe designation shown on the drawings.
8. D is nominal pipe diameter.
9. For pressure pipe trench installation, see (60314).
10. Two flexible sleeve couplings are required. One coupling is to be 1'–6" from the concrete encasement face. The second joint is 10'–0" from the first joint.

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BLOCK 9-11 - LINE PIPE

D.L. Gesundheit
DESIGNED
D.L. Gesundheit
DRAWN
Andrew Marner
CHECKED
Bowles, Linda M P.E.
TECH. APPR.
Duke, Wylie C (Chris) P.E.
APPROVED
PEER REVIEWER - Manager - Water Conveyance Group
DENVER, CO 2017-03-30

CONCRETE ENCASED MITER BENDS

SECTIONS AND DETAILS

1695-D-60316

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MJNORRIS

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Reach 9 Nonstructural Thrust Blocks

P.I. Station	Head (ft)	Angle	Direction	D (inches)	Cv (ft)	R1 (ft)	L1 (ft)	W (ft)
90002+35.00	600	10°38'32"	Horizontal	48	6.0	67	13	21
90004+15.00	600	10°37'51"	Horizontal	48	8.5	51	10	16
90023+90.00	650	9°01'38"	Convex Down	48	17.0	N/A	N/A	8
90024+13.00	650	10°43'29"	Horizontal	48	13.5	N/A	N/A	12
90024+50.00	650	8°46'05"	Convex Up	48	9.5	82	13	13
90038+00.00	625	30°15'19"	Horizontal	48	11.0	44	25	38
90042+58.00	625	28°59'10"	Combined	48	4.0	N/A	N/A	*
90044+50.00	625	9°37'16"	Convex Up	48	5.0	117	20	24
90045+55.00	625	17°52'42"	Horizontal	48	7.5	57	19	24
90048+38.00	650	23°02'49"	Horizontal	48	5.5	79	33	53
90067+71.00	650	14°32'02"	Horizontal	48	8.5	56	15	23
90072+38.04	650	12°20'58"	Horizontal	48	4.5	89	20	33
90074+00.00	650	7°36'16"	Convex Up	48	5.0	124	17	19
90075+00.00	650	7°36'18"	Convex Down	48	19.0	147	20	6
90082+91.00	650	35°51'39"	Horizontal	48	4.0	86	59	105
90093+99.00	650	32°08'14"	Horizontal	48	5.0	78	47	80
90098+00.00	650	8°36'45"	Convex Down	48	13.5	130	20	10
90098+60.00	650	6°46'03"	Convex Up	48	6.0	112	13	15
90099+76.64	625	39°07'30"	Horizontal	48	7.0	56	43	73
90102+00.00	625	5°20'22"	Convex Up	48	6.0	110	11	11
90160+00.00	600	7°12'39"	Convex Up	48	5.5	N/A	N/A	15
90164+40.00	600	14°36'55"	Convex Down	48	32.0	N/A	N/A	7
90165+40.00	600	14°11'32"	Convex Up	48	6.5	N/A	N/A	25
90177+30.00	550	14°42'39"	Horizontal	48	4.5	74	20	33
90215+26.26	500	12°53'08"	Horizontal	48	6.0	54	13	21
90236+89.00	500	14°17'05"	Combined	48	4.0	72	19	32
90282+00.00	525	18°10'18"	Convex Up	48	7.5	N/A	N/A	26
90282+50.00	525	20°27'11"	Convex Down	48	24.5	N/A	N/A	11
90283+70.00	525	11°30'25"	Convex Down	48	18.0	N/A	N/A	8
90284+60.00	525	10°38'51"	Convex Up	48	5.0	N/A	N/A	21
90291+60.00	500	14°32'39"	Combined	48	4.0	75	20	32
90317+23.00	500	13°46'13"	Horizontal	48	6.5	55	14	21
90320+99.00	525	13°33'52"	Horizontal	48	8.5	43	11	18
90345+00.00	500	7°46'19"	Convex Down	48	6.0	71	10	12
90347+00.00	475	7°46'04"	Convex Up	48	4.5	90	13	14
90356+50.00	450	10°51'35"	Convex Up	48	6.0	77	15	16
90375+00.00	500	9°51'25"	Convex Up	48	5.0	94	17	19
90375+79.00	500	12°17'08"	Horizontal	48	16.0	N/A	N/A	9
90376+00.00	500	9°29'48"	Convex Down	48	16.5	N/A	N/A	7
90376+80.00	500	13°36'16"	Convex Down	48	18.0	N/A	N/A	9
90378+00.00	500	10°55'41"	Convex Up	48	8.0	N/A	N/A	14
90389+00.00	475	11°37'38"	Convex Up	48	5.0	88	18	30
90389+50.00	475	12°25'04"	Convex Down	48	13.5	N/A	N/A	10
90390+00.00	475	13°24'07"	Convex Down	48	13.0	N/A	N/A	11
90390+40.00	475	12°54'54"	Convex Up	48	4.5	N/A	N/A	25
90394+00.00	500	9°03'03"	Convex Up	48	5.0	95	15	17
90396+00.00	500	8°10'37"	Convex Down	48	5.5	67	10	15
90412+90.00	500	22°21'14"	Horizontal	48	5.0	62	26	42
90415+90.00	500	21°34'59"	Horizontal	48	5.5	57	23	38
90421+99.00	475	25°39'42"	Horizontal	48	5.0	61	29	46
90426+05.00	500	24°27'21"	Horizontal	48	5.0	65	29	46
90464+00.00	475	13°04'35"	Convex Up	48	5.0	87	20	23
90464+90.00	475	12°38'01"	Convex Down	48	25.0	N/A	N/A	6
90466+20.00	475	14°57'42"	Convex Down	48	27.5	N/A	N/A	7
90466+92.00	475	15°54'20"	Combined	48	9.0	N/A	N/A	18
90479+29.00	425	11°14'46"	Horizontal	48	6.0	48	10	16
90481+00.00	425	6°31'12"	Convex Down	48	7.0	85	10	8
90482+00.00	425	8°15'21"	Convex Down	48	14.0	N/A	N/A	6
90483+00.00	425	12°14'23"	Convex Up	48	7.5	N/A	N/A	13
90483+45.00	375	4°56'21"	Convex Up	48	5.0	73	7	7
90558+89.00	375	21°02'07"	Combined	48	4.5	50	20	32
90565+17.00	375	21°07'43"	Horizontal	48	6.0	39	16	26
90577+50.00	375	9°57'43"	Convex Up	48	5.0	71	13	14
90578+00.00	375	9°23'36"	Convex Down	48	12.5	70	12	7
90579+80.00	375	9°24'04"	Convex Down	48	12.0	58	10	7
90580+20.00	375	9°33'11"	Convex Up	48	5.5	68	12	13
90598+00.00	375	28°08'52"	Horizontal	48	5.0	50	26	40

Reach 9 Nonstructural Thrust Blocks

P.I. Station	Head (ft)	Angle	Direction	D (inches)	Cv (ft)	R1 (ft)	L1 (ft)	W (ft)
90607+93.00	400	29°17'30"	Combined	48	3.5	N/A	N/A	58
90608+60.00	400	14°39'58"	Convex Down	48	20.0	N/A	N/A	7
90609+70.00	400	15°00'41"	Convex Down	48	23.0	N/A	N/A	7
90610+34.00	400	41°14'37"	Combined	48	5.0	N/A	N/A	66
90619+99.00	400	16°29'10"	Horizontal	48	6.0	45	14	22
90631+74.00	400	30°37'10"	Horizontal	48	4.5	54	31	51
90638+96.00	400	18°28'55"	Combined	48	5.0	49	17	28
90645+00.00	375	6°18'55"	Convex Up	48	5.0	73	8	9
90645+70.00	375	13°58'05"	Horizontal	48	9.0	30	8	13
90672+00.00	375	7°50'28"	Convex Up	48	5.0	72	10	11
90753+76.00	325	10°48'13"	Horizontal	48	4.5	45	9	15
90795+22.00	325	11°53'07"	Horizontal	48	6.5	35	8	12
90801+21.00	325	12°01'25"	Horizontal	48	4.0	49	11	18
90824+69.00	325	22°29'25"	Horizontal	48	4.5	42	18	30
90828+82.00	325	22°36'18"	Horizontal	48	6.5	36	15	23
90831+70.00	325	8°58'14"	Convex Up	48	5.0	62	10	14
90832+14.00	325	24°02'53"	Combined	48	11.5	22	10	15
90833+80.00	325	11°14'28"	Convex Down	48	13.0	N/A	N/A	7
90834+20.00	325	11°08'34"	Convex Up	48	7.0	N/A	N/A	11
90836+24.00	325	22°19'29"	Horizontal	48	9.5	25	11	17
90925+65.00	275	11°46'28"	Horizontal	42	5.0	31	7	11
90953+85.00	250	27°28'24"	Horizontal	42	4.0	33	17	28
90959+24.00	250	29°54'42"	Horizontal	42	4.0	34	19	31
91031+33.00	250	43°26'40"	Combined	42	5.5	25	22	37
91074+45.00	225	25°30'31"	Horizontal	42	4.0	32	15	24
91077+10.00	200	25°48'40"	Horizontal	42	5.0	23	11	18
91116+94.00	175	18°54'03"	Horizontal	42	4.0	21	8	14
91120+10.00	175	20°07'50"	Horizontal	42	5.0	20	8	12
91185+50.00	125	9°44'34"	Convex Up	42	6.5	18	3	4
91186+00.00	125	9°27'16"	Convex Down	42	14.0	N/A	N/A	2
91186+70.00	125	9°10'20"	Convex Down	42	14.5	N/A	N/A	2
91187+20.00	125	8°00'59"	Convex Up	42	7.0	17	3	3

N/A – Not Allowed, restrained joints are required.

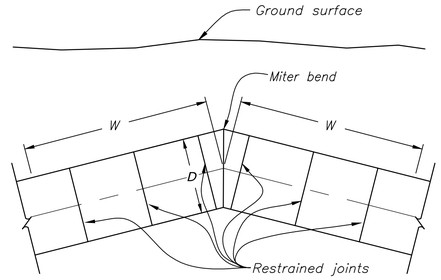
* See table on (60315) for restrained joint distance.

Reach 10 Nonstructural Thrust Blocks

P.I. Station	Head (ft)	Angle	Direction	D (inches)	Cv (ft)	R1 (ft)	L1 (ft)	W(ft)
10040+10.00	75	16°16'20"	Horizontal	42	11.0	4	2	3
10043+67.00	75	18°37'22"	Horizontal	42	7.0	7	3	4

Reach 11 Nonstructural Thrust Blocks

P.I. Station	Head (ft)	Angle	Direction	D (inches)	Cv (ft)	R1 (ft)	L1 (ft)	W(ft)
11166+00.00	600	17°03'34"	Convex Up	42	5.5	N/A	N/A	32
11166+70.00	600	16°35'05"	Convex Down	42	27.5	N/A	N/A	8
11167+20.00	600	15°37'26"	Convex Down	42	27.0	N/A	N/A	8
11168+00.00	600	15°25'04"	Convex Up	42	5.5	N/A	N/A	29
11190+20.00	575	22°47'19"	Horizontal	42	4.5	70	29	49
11197+50.00	575	43°40'09"	Combined	42	5.5	53	46	86
11237+90.00	525	14°27'39"	Horizontal	42	5.5	56	15	24
11269+80.00	475	32°05'00"	Horizontal	42	4.0	59	36	62



MITER RESTRAINED JOINT PIPE DETAIL

DESIGN PARAMETERS

1. Passive Earth Pressure, Pe = 148 psf/ft. (factored), in rock, Pe = 200 psf / ft. (factored).
2. Cover of Earth over Pipe, Cv = 3.5 feet.
3. Weight of Earth Cover, Ec = 100 pcf.
4. Allowable bearing earth pressure, Be = 3000 psf.

NOTES

1. For construction details of concrete blocking, see (60316).
2. See specification for limitations concerning W length and the different pipe material type options, in lieu of concrete thrust restraint.

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NAVAJO-GALLUP WATER SUPPLY PROJECT
NEW MEXICO

SAN JUAN LATERAL

BLOCK 9-11 - LINE PIPE

REV NO	DATE	BY	DESCRIPTION
1	2017-06-07	Bowles, Linda M P.E.	Added Restrained Joint Note for different Pipe Material options. Revised meter bends where restrained joints are required.

D.L. Gesundheit
DESIGNED
D.L. Gesundheit
DRAWN
Daniel Gibas / Kylie Fink
CHECKED
Bowles, Linda M P.E.
TECH. APPR.
Duke, Wylie C (Chris) P.E.
APPROVED
PEER REVIEWER - Manager - Water Conveyance Group

DENVER, CO 2017-03-30

CONCRETE ENCASED MITER BENDS

DATA TABLES

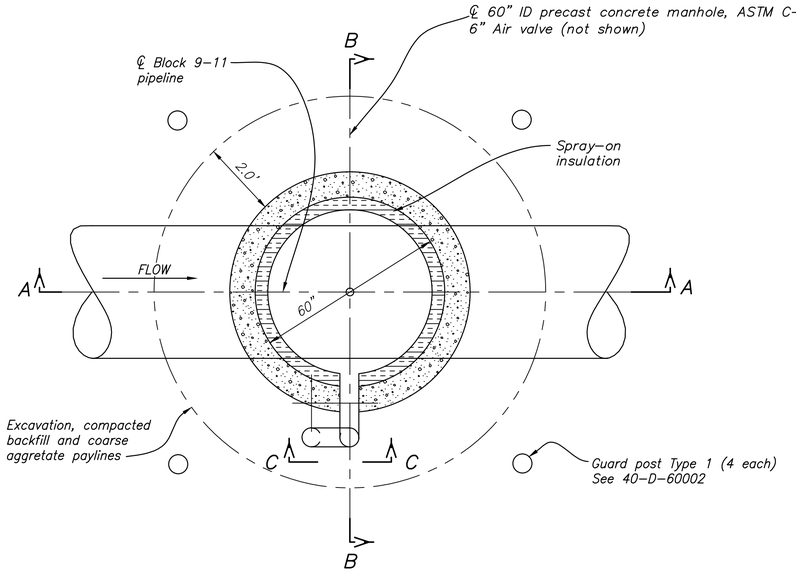
1695-D-60317

SHEET 1

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6/7/2017 3:47 PM
PLOTTED BY
svc-Corp-EDM

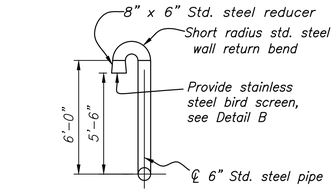
CAD SYSTEM
AutoCAD Rel. 20.0s
CAD FILENAME
1695-D-60317-ND-1.dwg

Released

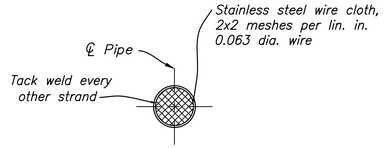


PLAN

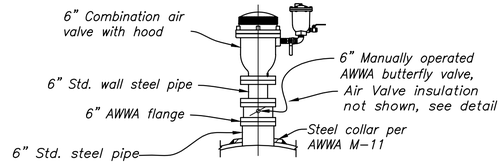
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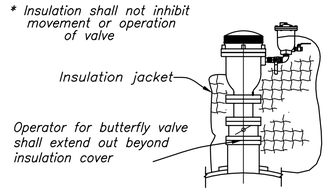
SECTION C-C



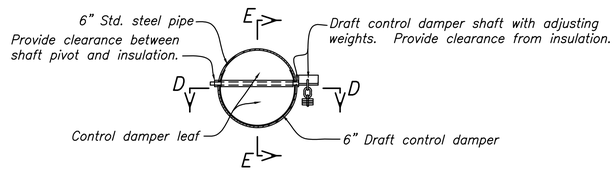
DETAIL B
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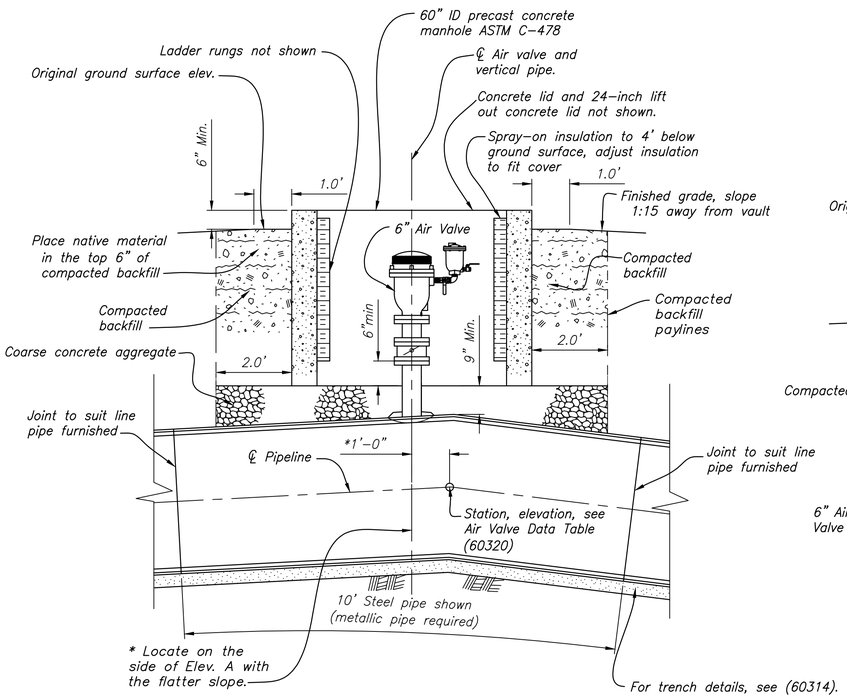
AIR VALVE ASSEMBLY DETAIL



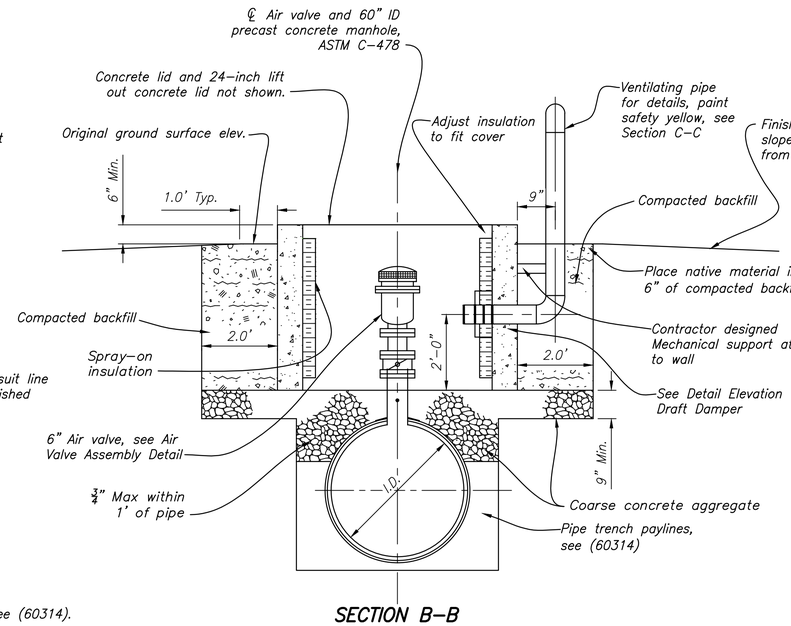
AIR VALVE INSULATION DETAIL



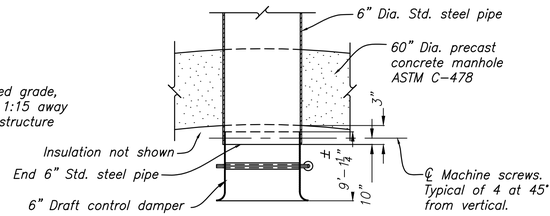
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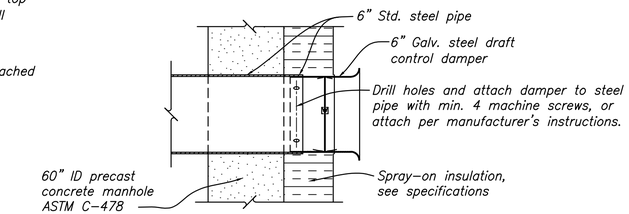
SECTION A-A



SECTION B-B



SECTION D-D



SECTION E-E

NOTES

1. For Air Valve Data Table, see (60320)
2. Contractor may submit alternative design of inlet/outlet details for approval.
3. Construct air valve vertical.
4. For connections to line pipe other than steel, submit connection for approval.
5. Earthwork paylines are shown. Actual trench slopes will depend on soil conditions.
6. Keep butterfly valve operator free to move outside of insulation jacket.
7. The height of 6" vertical pipe shall be high enough to allow enough clearance between the top of the air valve and the bottom of the insulation on the cover as per the air valve manufacturer's recommendations.
8. For ventilating pipe paragraphs, see Air Outlet and Inlet in the specifications paragraphs.
9. Match all mating flanges with highest rated flanges. For additional flange details, see (60319).
10. For air valves on miter bends encased in concrete, see (60316).
11. Drawing not to scale.

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BLOCK 9-11 - LINE PIPE

Andrew Marner	DESIGNED
Derek Kosakowski	DRAWN
D.L. Gesundheit	CHECKED
Bowles, Linda M P.E.	TECH. APPR.
Duke, Wylie C (Chris) P.E.	APPROVED
PER REVIEWER - Manager - Water Conveyance Group	
DENVER, CO	2017-03-30

AIR VALVE INSTALLATION

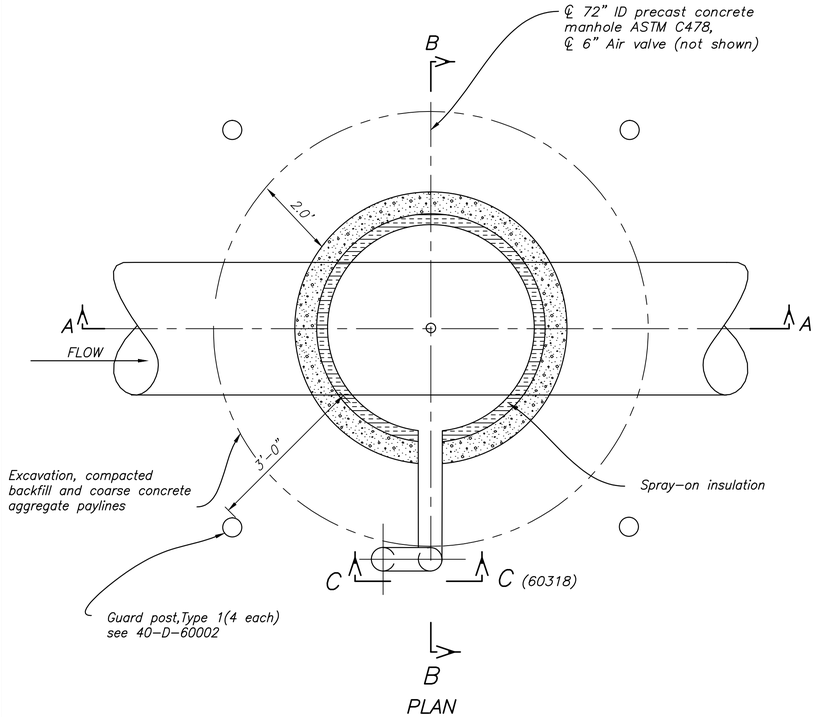
SECTIONS AND DETAILS

1695-D-60318

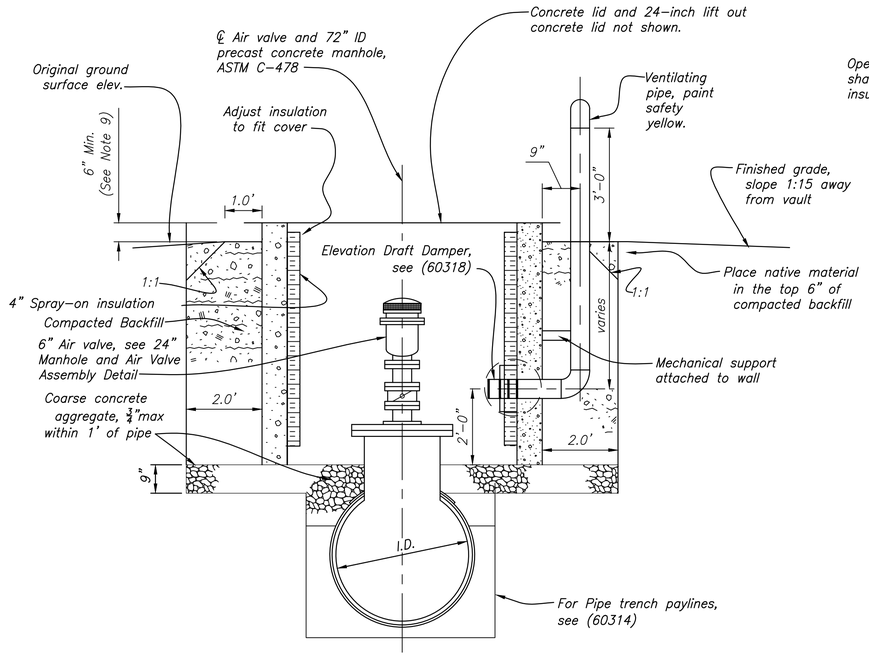
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PLOTTED BY svc-Corp-EDM
CAD SYSTEM AutoCAD Rel. 20.0s
CAD FILENAME 1695-D-60318-RD-1.dwg

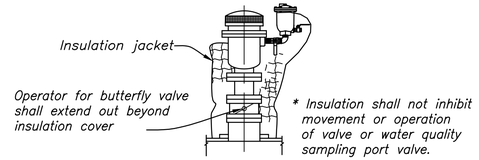
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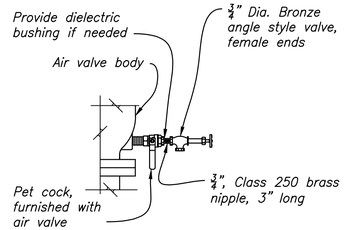
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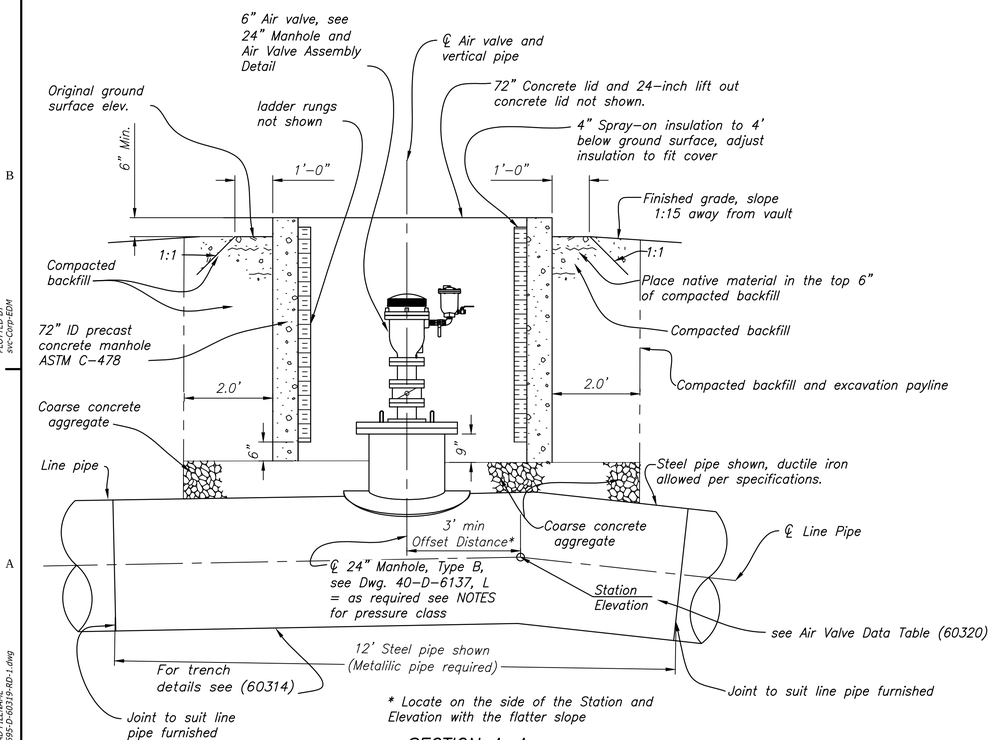
SECTION B-B



AIR VALVE INSULATION DETAIL

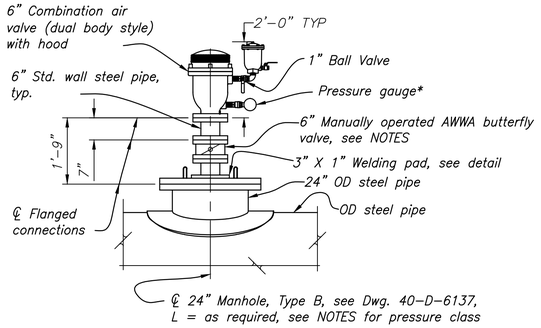


WATER QUALITY SAMPLING PORT DETAIL
For locations, see Air Valve Data Tables (60320)



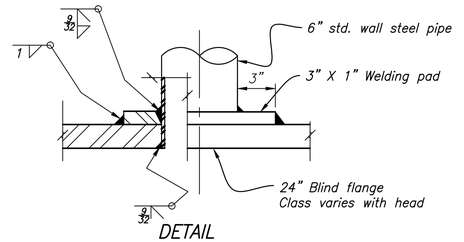
* Locate on the side of the Station and Elevation with the flatter slope

SECTION A-A



24" MANHOLE AND AIR VALVE ASSEMBLY

* Pressure gauge to be installed at air valve assembly for the following locations only:
Station 90044+50 (Reach 9)
Station 10003+58.44 (Reach 10)



DETAIL
3" X 1" WELDING PAD

NOTES

1. For Air valve data table, see (60320)
2. Flanges should be AWWA class D when the head class is less than or equal to 346 ft, AWWA class E when the head class is less than or equal to 635 ft and AWWA class F when the head class is less than or equal to 692 ft.
3. The butterfly valve shall be AWWA class 150B when the head class is less than or equal to 346 ft, AWWA class 250B when the head class is less than or equal to 577 ft. See specifications for butterfly valves with head classes greater than 577 ft.
4. The air valve inlet flange shall be ANSI B16.1 class 125 or ANSI B16.5 class 150 when the head class of the pipe is less than 346 ft and ANSI B16.1 class 250 or ANSI B16.5 class 350 for a head class of pipe greater than or equal to 692 ft.
5. The Manhole class shall be Class 150 when the head class of the pipe is less than 346 feet and Class 300 for a head class of pipe less than or equal to 692 ft.
6. Drawing not to scale.
7. Construct air valve vertical.
8. Earthwork paylines are shown. Actual slope will depend on soil conditions.
9. The height of 72" vertical pipe shall be high enough to allow enough clearance between the top of the air valve and the bottom of the insulation on the cover as per the air valve manufacturer's recommendations.
10. Match all mating flanges with highest rated flanges.

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NEW MEXICO

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BLOCK 9-11 - LINE PIPE

REV NO	DATE	DESCRIPTION
1	2017-06-09	D Added Water Quality Sampling Port Detail. Corrected weld sizes for 3"X1" welding pad.

Andrew Marner	DESIGNED
Derek Kosakowski	DRAWN
D.L. Gesundheit	CHECKED
Bowles, Linda M P.E.	TECH. APPR.
Duke, Wylie C (Chris) P.E.	APPROVED
PEER REVIEWER - Manager - Water Conveyance Group	
DENVER, CO	2017-03-30

AIR VALVES WITH MANHOLES

SECTIONS AND DETAILS

1695-D-60319

SHEET 1

DATE AND TIME PLOTTED 3/27/2017 5:59 PM
PLOTTED BY svc-Corp-EDM
CAD SYSTEM AutoCAD Rel. 20.0s
CAD FILENAME 1695-D-60319-RD-1.dwg

AIR VALVE DATA TABLE–REACH 9

PI STATION	HEAD CLASS (FT)	AIR VALVE SEAT RATING (PSI)	PI ELEVATION (FT)	GROUND SURFACE ELEVATION (FT)	DEPTH OF COVER +/– (FT)	MANHOLE?	SAMPLING PORT?	MITER?
90010+00	600	260.0	5872.30	5879.5	5.2	NO	NO	NO
90030+00	625	270.8	5842.40	5851.6	7.2	NO	NO	NO
90044+50	625	270.8	5849.50	5856.6	5.1	YES	NO	YES
90074+00	650	281.7	5827.90	5835.0	5.1	NO	NO	YES
90080+00	650	281.7	5820.40	5827.5	5.1	NO	NO	NO
90102+00	625	270.8	5827.50	5835.7	6.2	NO	NO	YES
90115+00	625	270.8	5830.80	5838.0	5.2	YES	NO	NO
90139+00	575	249.2	5872.50	5879.7	5.2	YES	NO	NO
90160+00	600	260.0	5875.00	5883.0	6.0	YES	YES	YES
90167+20	575	249.2	5875.10	5884.7	7.6	YES	NO	NO
90201+00	500	216.7	5956.80	5963.9	5.1	YES	NO	NO
90224+60	500	216.7	5956.00	5963.3	5.3	YES	NO	NO
90224+60	500	216.7	5956.00	5963.3	5.3	YES	NO	NO
90264+00	500	216.7	5934.20	5941.4	5.2	NO	NO	NO
90281+00	500	216.7	5926.70	5935.6	6.9	YES	NO	NO
90285+30	500	216.7	5923.81	5931.4	5.6	YES	NO	NO
90306+00	500	216.7	5937.70	5945.0	5.3	YES	YES	NO
90330+00	525	227.5	5912.80	5920.3	5.5	YES	NO	NO
90356+50	450	195.0	5993.00	6001.1	6.1	NO	NO	YES
90375+00	500	216.7	5937.30	5944.5	5.2	YES	NO	YES
90384+00	450	195.0	5962.90	5970.1	5.2	YES	NO	NO
90384+00	450	195.0	5962.90	5970.1	5.2	YES	NO	NO
90394+00	475	205.8	5961.60	5968.8	5.2	NO	NO	YES
90419+40	475	205.8	5937.37	5944.4	5.0	YES	NO	NO
90419+40	475	205.8	5937.37	5944.4	5.0	YES	NO	NO
90464+00	475	205.8	5960.70	5968.1	5.4	YES	YES	YES
90470+00	450	195.0	5963.50	5970.9	5.4	YES	NO	NO
90483+45	375	162.5	6040.00	6047.1	5.1	YES	NO	YES
90523+00	375	162.5	6026.00	6033.2	5.2	YES	NO	NO
90523+00	375	162.5	6026.00	6033.2	5.2	YES	NO	NO
90553+00	375	162.5	6022.30	6029.5	5.2	NO	NO	NO
90577+00	375	162.5	6015.73	6023.8	6.1	YES	NO	NO
90577+00	375	162.5	6015.73	6023.8	6.1	YES	NO	NO
90580+20	375	162.5	6014.40	6022.0	5.6	NO	NO	YES
90601+00	375	162.5	6009.50	6016.6	5.1	NO	NO	NO
90610+34	400	173.3	6001.80	6009.2	5.4	YES	YES	YES
90624+00	400	173.3	5991.44	5999.9	6.5	YES	NO	NO
90645+00	375	162.5	6006.40	6013.5	5.1	YES	NO	YES
90672+00	375	162.5	6018.00	6025.3	5.3	NO	NO	YES
90681+50	375	162.5	5998.15	6007.3	7.2	YES	NO	NO
90698+40	350	151.7	6022.80	6030.1	5.3	NO	NO	NO
90720+50	325	140.8	6046.00	6053.2	5.2	NO	NO	NO
90730+00	325	140.8	6057.50	6065.1	5.6	NO	NO	NO
90750+70	325	140.8	6058.00	6065.0	5.0	YES	YES	NO
90831+70	325	140.8	6036.60	6044.0	5.4	NO	NO	YES
90879+00	300	130.0	6052.19	6058.7	4.8	YES	NO	NO
90921+50	275	119.2	6064.30	6073.3	7.3	YES	YES	NO
90969+50	250	108.3	6102.70	6109.6	5.2	YES	NO	NO
91037+00	250	108.3	6081.80	6088.7	5.1	YES	NO	NO
91088+00	200	86.7	6120.50	6127.3	5.1	YES	YES	NO
91126+00	150	65.0	6139.50	6147.3	6.1	YES	NO	NO
91185+50	125	54.2	6160.50	6168.8	6.6	YES	NO	YES
91188+00	125	54.2	6161.50	6168.5	5.3	YES	NO	NO
91220+00	100	43.3	6172.00	6179.2	5.4	YES	NO	NO

AIR VALVE DATA TABLE–REACH 10

PI STATION	HEAD CLASS (FT)	AIR VALVE SEAT RATING (PSI)	PI ELEVATION (FT)	GROUND SURFACE ELEVATION (FT)	DEPTH OF COVER +/– (FT)	MANHOLE?	SAMPLING PORT?	MITER?
10003+58.44	100	43.3	6172.0	6179.2	5.4	YES	YES	NO
10050+57	50	21.7	6205.0	6213.9	7.1	YES	NO	NO

AIR VALVE DATA TABLE–REACH 11

PI STATION	HEAD CLASS (FT)	AIR VALVE SEAT RATING (PSI)	PI ELEVATION (FT)	GROUND SURFACE ELEVATION (FT)	DEPTH OF COVER +/– (FT)	MANHOLE?	SAMPLING PORT?	MITER?
11069+00	650	281.7	6243.58	6251.3	6.0	YES	NO	NO
11074+20	650	281.7	6256.50	6263.5	5.3	NO	NO	NO
11166+00	600	260.0	6281.90	6289.5	5.9	YES	YES	YES
11168+80	600	260.0	6283.13	6290.4	5.5	YES	NO	NO
11197+50	575	249.2	6304.80	6312.2	5.6	YES	NO	NO
11237+40	525	227.5	6339.20	6346.7	5.8	YES	YES	NO
11267+00	475	205.8	6380.70	6387.7	5.3	NO	NO	NO

NOTE

1. For air valve details see (60318) and (60319).

Released

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MARCH 28, 2017 15:53
PLOTTED BY
KLNORRIS

CAD SYSTEM
AutoCAD Rel. 19.1s
CAD FILENAME
1695-D-60320-RD-1.DWG

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BLOCK 9-11 - LINE PIPE

REV NO		
1	2017-05-19	D Added water quality sampling port column to tables
	Bowles, Linda M P.E.	

Andrew Marner
DESIGNED
Derek Kosakowski
DRAWN
D.L. Gesundheit
CHECKED
Bowles, Linda M P.E.
TECH. APPR.
Duke, Wylie C (Chris) P.E.
APPROVED
PEER REVIEWER - Manager - Water Conveyance Group

DENVER, CO 2017-03-30

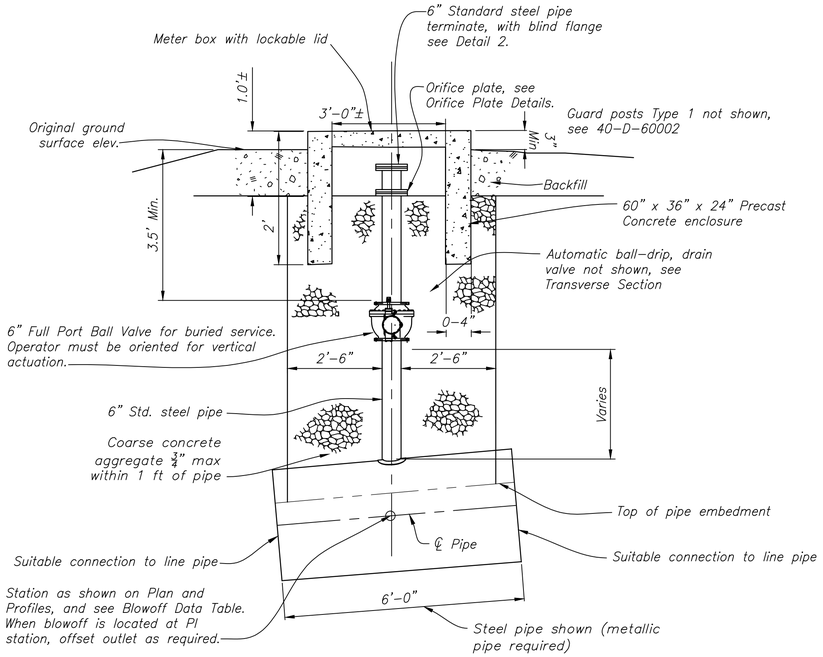
AIR VALVES

DATA TABLES

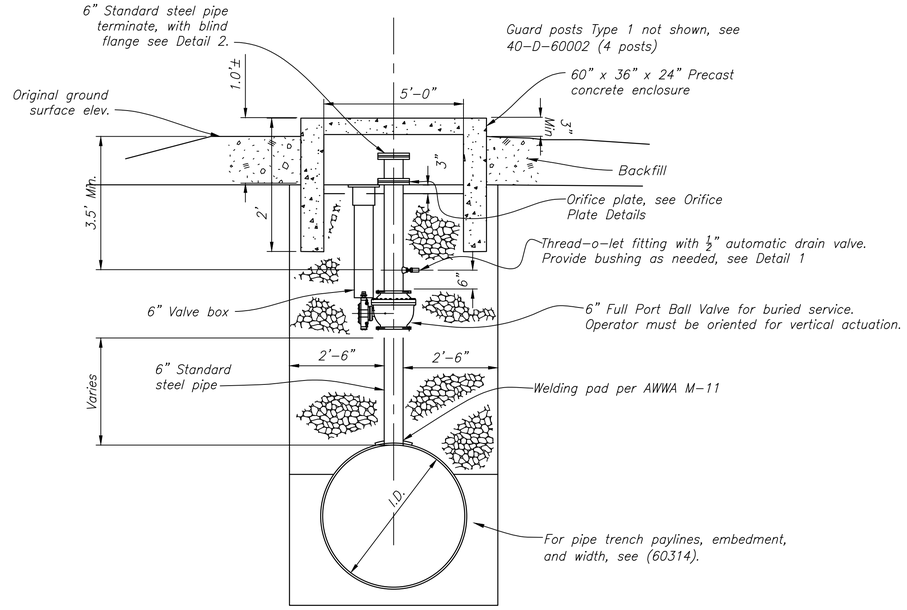
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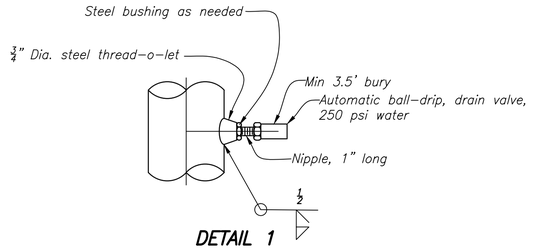
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LONGITUDINAL SECTION

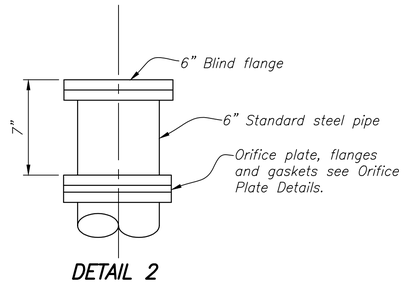


TRANSVERSE SECTION

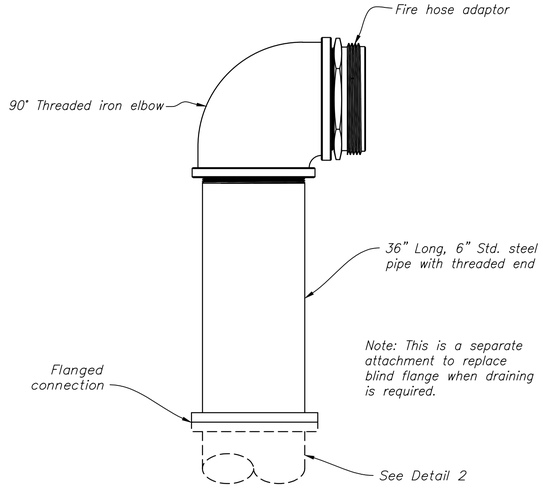


DETAIL 1

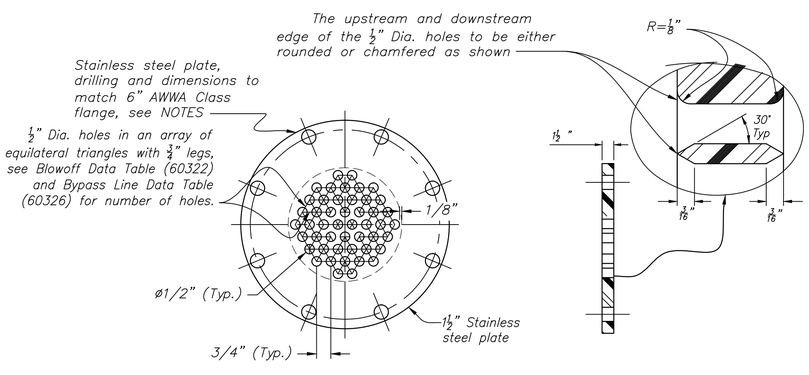
Not to Scale



DETAIL 2



DETAIL 3



ORIFICE PLATE DETAILS

NOTES

1. The minimum steel cylinder thickness for the section of line pipe with the blowoff outlet shall be the thickness of the steel line pipe. For the steel line pipe thickness see the specification.
2. For coating and lining requirements, see specification paragraphs.
3. Install three Guard posts Type 1 around each blowoff as directed by the COR. Install posts in accordance with 40-D-60002.
4. See Plan and Profile drawings for location of blowoff stations.
5. I.D. is inside diameter.
6. Meter box is approximately 60" x 36" x 24".
7. For Flange ratings, see Notes (60319).
8. Match all mating flanges with highest rated flange.

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BLOCK 9-11 - LINE PIPE

REVNO		
0	2017-06-08	Corrected the title block text. Corrected valve key callout
1	Bowles, Linda M P.E.	

Andrew Marner
DESIGNED
Derek Kosakowski
DRAWN
D. L. Gesundheit
CHECKED
Bowles, Linda M P.E.
TECH. APPR.
Duke, Wylie C (Chris) P.E.
APPROVED
PEER REVIEWER - Manager - Water Conveyance Group

DENVER, CO 2017-03-30

BLOWOFF

SECTIONS AND DETAILS

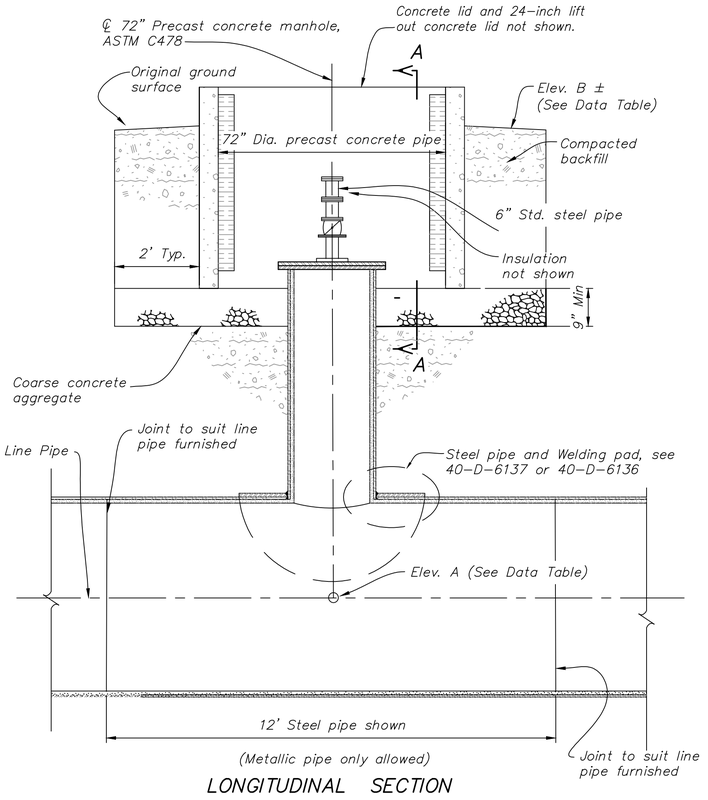
1695-D-60321

SHEET 1

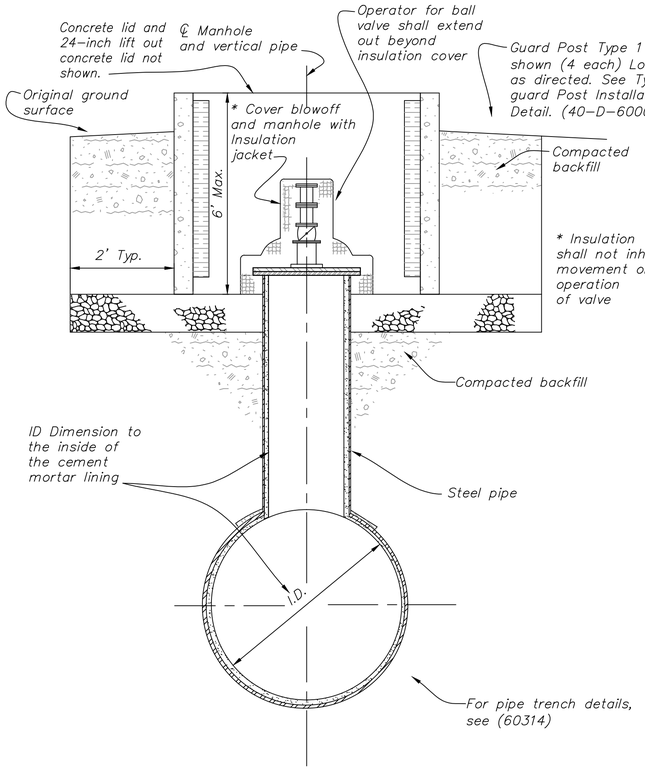
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6/8/2017 2:10 PM
PLOTTED BY
svc-Corp-EDM

CAD SYSTEM
AutoCAD Rel. 19.1s
CAD FILENAME
1695-D-60321-RD-1.dwg

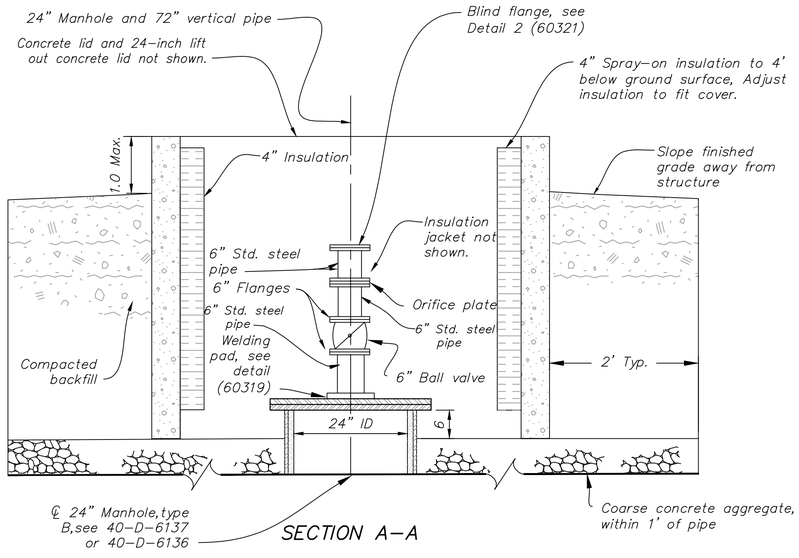
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LONGITUDINAL SECTION



TRANSVERSE SECTION



SECTION A–A

NOTES

1. For blowoff locations, see Plan and Profiles (60281 to 60313).
2. For coating and lining requirements for std. steel pipe and fittings, see specification paragraphs.
3. For 6" flange ratings, see Table. Match all mating flanges with highest rated flange.
4. For orifice plate, see Blowoff tables (60321).
5. Any welding to be completed prior to CML application.

BLOWOFF DATA TABLE–REACH 9

STATION	HEAD CLASS (FT)	LINE PIPE DIAMETER (IN)	BALL VALVE TYPE	ORIFICE PLATE NO. HOLES	PIPE CL ELEV A (FT)	GROUND SURFACE ELEV B (FT)	DEPTH OF COVER +/– (FT)	MANHOLE?
90000+00	600	48	CLASS 300	NR	5863.80	5873.1	7.3	YES
90023+90	625	48	CLASS 300	38	5827.20	5846.5	17.3	YES
90040+73	625	48	CLASS 300	35	5833.00	5840.0	5.0	NO
90059+00	650	48	CLASS 300	31	5820.20	5827.4	5.2	YES
90059+00	650	48	CLASS 300	NR	5820.20	5827.4	5.2	YES
90078+90	650	48	CLASS 300	NR	5814.80	5830.6	13.8	YES
90098+00	650	48	CLASS 300	NR	5810.60	5826.5	13.9	YES
90105+50	625	48	CLASS 300	NR	5819.75	5828.3	6.6	NO
90115+00	625	48	CLASS 300	33	5830.80	5838.0	5.2	YES
90145+00	575	48	CLASS 300	NR	5864.70	5871.6	4.9	NO
90167+20	575	48	CLASS 300	25	5875.10	5884.7	7.6	YES
90207+50	500	48	CLASS 300	NR	5948.50	5960.6	10.1	NO
90262+50	500	48	CLASS 300	46	5928.70	5942.9	12.2	YES
90274+00	525	48	CLASS 300	38	5923.50	5930.6	5.1	NO
90285+30	525	48	CLASS 300	48	5923.81	5931.4	5.6	YES
90320+50	525	48	CLASS 300	43	5907.50	5920.0	10.5	NO
90330+00	525	48	CLASS 300	25	5912.80	5920.3	5.5	YES
90368+50	500	48	CLASS 300	29	5932.40	5941.0	6.6	NO
90389+50	475	48	CLASS 300	NR	5947.20	5963.0	13.8	NO
90402+00	500	48	CLASS 300	38	5925.60	5938.3	10.7	YES
90440+00	500	48	CLASS 300	38	5928.00	5938.7	8.7	YES
90470+00	450	48	CLASS 300	26	5963.50	5970.9	5.4	YES
90499+50	400	48	CLASS 300	39	6005.40	6016.1	8.7	YES
90547+00	375	48	CLASS 300	NR	6015.00	6022.2	5.2	YES
90566+00	375	48	CLASS 300	48	6007.00	6015.8	6.8	YES
90596+00	375	**	CLASS 300	NR	6008.30	6016.1	5.8	YES
90624+00	400	**	CLASS 300	44	5991.44	6000.0	6.6	YES
90637+00	400	**	CLASS 300	33	5975.80	5981.6	3.8	NO
90660+00	400	**	CLASS 300	36	5982.00	5989.1	5.1	YES
90681+50	375	**	CLASS 300	29	5998.15	6007.3	7.2	YES
90703+00	350	**	CLASS 300	33	6015.70	6022.3	4.6	YES
90725+00	350	**	CLASS 300	46	6035.40	6042.0	4.6	YES
90739+50	350	**	CLASS 300	41	6031.00	6037.4	4.4	YES
90739+50	350	**	CLASS 300	41	6031.00	6037.4	4.4	YES
90810+00	325	**	CLASS 150	44	6034.40	6041.4	5.0	YES
90810+00	325	**	CLASS 150	48	6034.40	6041.4	5.0	YES
90832+50	325	**	CLASS 150	48	6029.66	6042.3	10.6	YES
90879+00	300	42	CLASS 150	48	6052.19	6058.7	4.8	YES
90921+50	275	42	CLASS 150	36	6064.30	6073.3	7.3	YES
90980+00	275	42	CLASS 150	37	6067.90	6075.0	5.4	YES
90980+00	275	42	CLASS 150	48	6067.90	6075.0	5.4	YES
91037+00	250	42	CLASS 150	35	6081.80	6088.7	5.1	YES
91088+00	200	42	CLASS 150	48	6120.50	6127.5	5.3	YES
91142+00	175	42	CLASS 150	NR	6133.70	6141.1	5.7	YES
91142+00	175	42	CLASS 150	41	6133.70	6141.1	5.7	YES
91188+00	125	42	CLASS 150	NR	6161.50	6168.6	5.4	YES

** Denotes where diameter is determined by Pipe Material Type, see (60306)
NR: Not Required

BLOWOFF DATA TABLE–REACH 10

STATION	HEAD CLASS (FT)	LINE PIPE DIAMETER (IN)	BALL VALVE TYPE	ORIFICE PLATE NO. HOLES	PIPE CL ELEV A (FT)	GROUND SURFACE ELEV B (FT)	DEPTH OF COVER +/– (FT)	MANHOLE?
10015+00	100	42	CLASS 150	35	6164.7	6173.5	7.1	YES

BLOWOFF DATA TABLE–REACH 11

STATION	HEAD CLASS (FT)	LINE PIPE DIAMETER (IN)	BALL VALVE TYPE	ORIFICE PLATE NO. HOLES	PIPE CL ELEV A (FT)	GROUND SURFACE ELEV B (FT)	DEPTH OF COVER +/– (FT)	MANHOLE?
11069+00	650	42	CLASS 300	35	6243.58	6251.3	6.0	YES
11089+00	650	42	CLASS 300	33	6240.00	6247.5	5.8	YES
11168+80	600	42	CLASS 300	23	6283.13	6290.4	5.5	YES
11210+00	575	42	CLASS 300	23	6285.10	6292.3	5.4	NO
11241+50	525	42	CLASS 300	30	6321.00	6333.4	10.6	NO
11273+00	475	42	CLASS 300	48	6366.30	6372.3	4.3	YES

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NEW MEXICO

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BLOCK 9-11 - LINE PIPE

REV NO	DATE	DESCRIPTION
1	2017-05-22	D Corrected the title block text. Marner, Andrew (Andy) J P.E.

DESIGNED	Andrew Marner
DRAWN	Derek Kosakowski
CHECKED	D.L. Gesundheit
TECH. APPR.	Bowles, Linda M P.E.
APPROVED	Duke, Wylie C (Chris) P.E.
PEER REVIEWER - Manager - Water Conveyance Group	
DENVER, CO	2017-03-30

MANHOLE WITH BLOWOFF

SECTIONS, DETAILS, AND TABLES

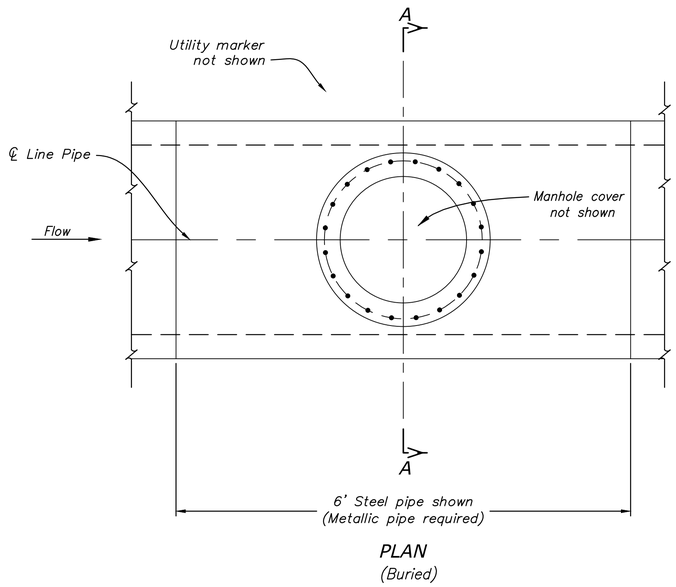
1695-D-60322

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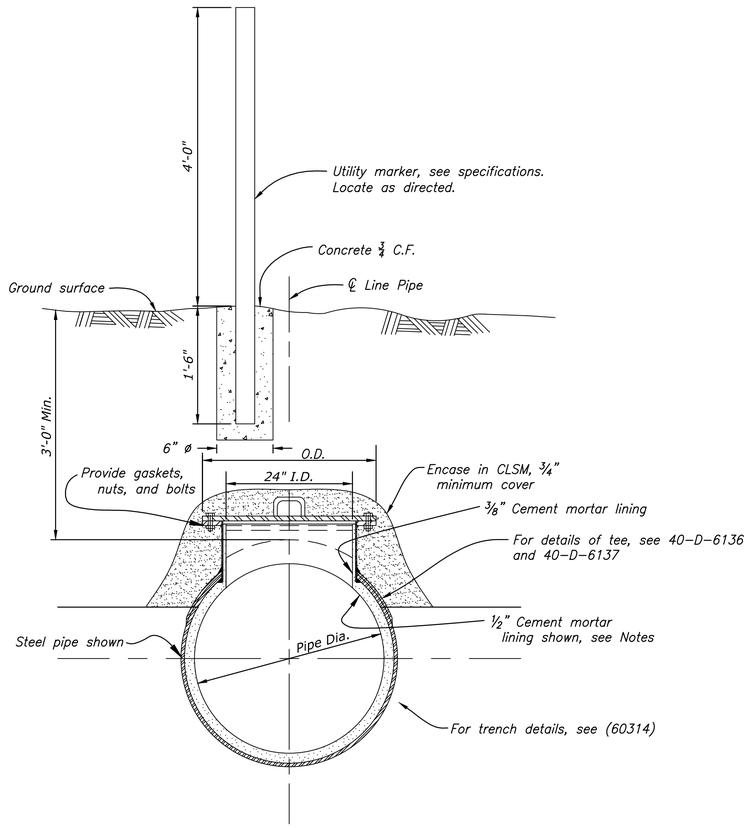
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SvcCorp-EDM

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AutoCAD Rel. 19.1s
CAD FILENAME
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PLAN
(Buried)



SECTION A-A

BURIED MANHOLE DATA TABLE–REACH 9

STATION	HEAD CLASS (FT)	PIPE CL ELEVATION (FT)	GROUND SURFACE ELEVATION (FT)
90189+10	500	5951.61	5959.0
90246+00	500	5938.04	5946.3
90352+00	450	5985.59	5992.7
90770+00	325	6041.90	6050.8
90790+00	325	6038.07	6045.2
90856+00	325	6043.25	6050.0
90900+00	300	6062.78	6068.8
90945+50	275	6075.85	6082.7
91000+00	250	6073.19	6079.8
91020+00	250	6076.77	6083.1
91055+00	225	6086.52	6092.8
91072+00	225	6097.42	6103.5
91111+00	175	6131.70	6138.3
91164+00	150	6152.33	6159.0
91204+00	125	6165.97	6171.7

BURIED MANHOLE DATA TABLE–REACH 10

STATION	HEAD CLASS (FT)	PIPE CL ELEVATION (FT)	GROUND SURFACE ELEVATION (FT)
10033+00	75	6193.00	6203.9

BURIED MANHOLE DATA TABLE–REACH 11

STATION	HEAD CLASS (FT)	PIPE CL ELEVATION (FT)	GROUND SURFACE ELEVATION (FT)
11108+00	650	6242.15	6248.3
11127+00	650	6254.10	6259.7
11147+00	625	6266.97	6273.0
11183+00	575	6291.75	6297.2
11215+00	575	6292.17	6298.7
11253+00	525	6333.24	6339.6

NOTES

1. Drawing not to scale.
2. For manhole dimensions and details, see 40–D–6136 and 40–D–6137. Manhole cover shall be Type C.
3. Flanges shall meet the same head requirements as designated by the classification of the adjacent lateral pipe and flange drilling shall match mating flange.
4. Any welding to be completed prior to cement–mortar lining application.

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NEW MEXICO

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BLOCK 9-11 - LINE PIPE

Andrew Marner
DESIGNED
Derek Kosakowski
DRAWN
D.L. Gesundheit
CHECKED
Bowles, Linda M P.E.
TECH. APPR.
Duke, Wylie C (Chris) P.E.
APPROVED
PEER REVIEWER - Manager - Water Conveyance Group

DENVER, CO 2017-03-30

TYPICAL BURIED MANHOLE

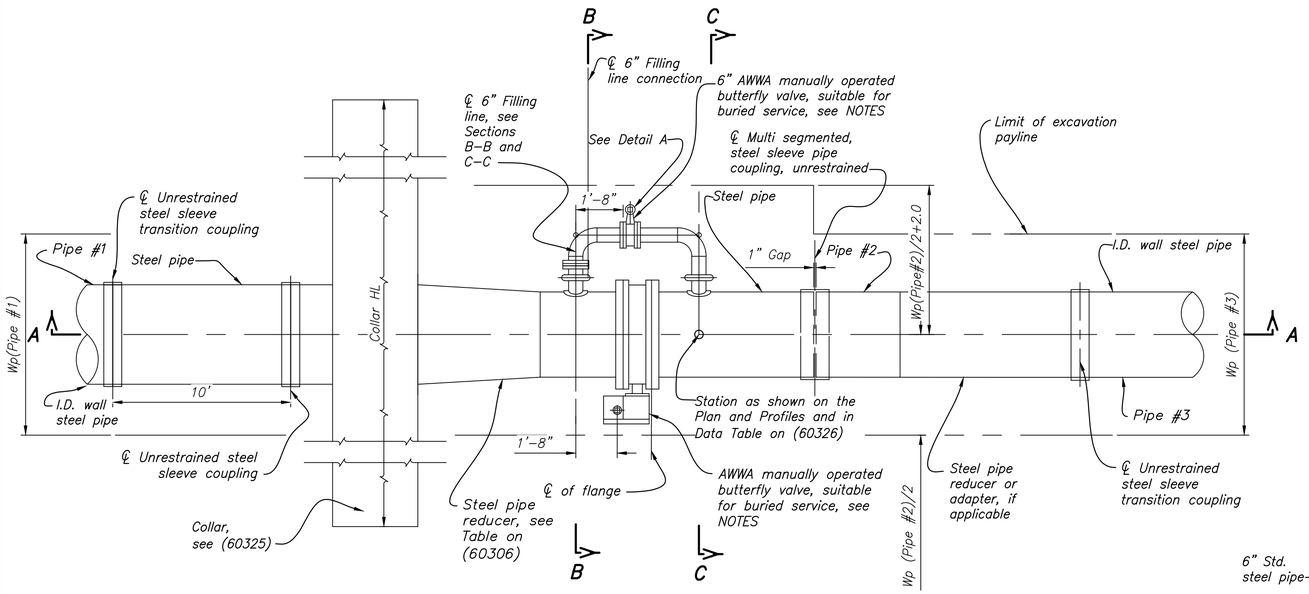
PLAN, SECTIONS AND TABLE

1695-D-60323

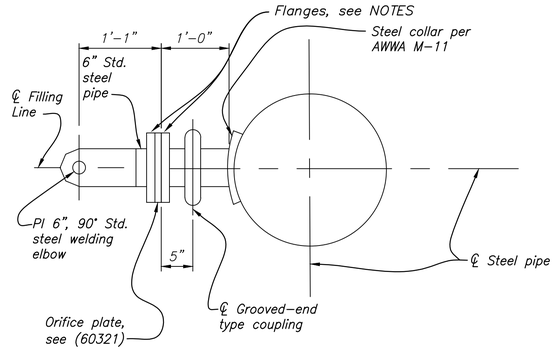
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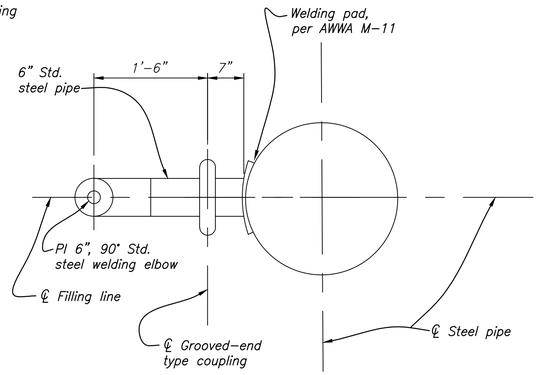
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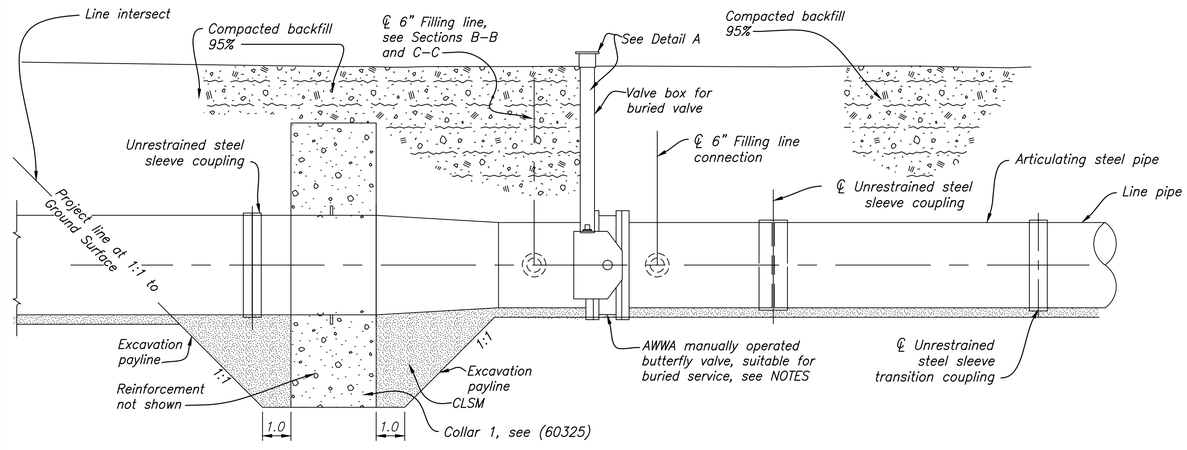
PLAN



SECTION B–B



SECTION C–C



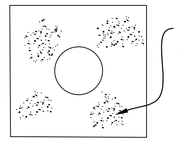
SECTION A–A

OPERATING CRITERIA

1. High performance Bypass butterfly valve shall be fully open when operated.
2. Excavation around blocking shall not occur when the pipeline is under hydrostatic pressure.

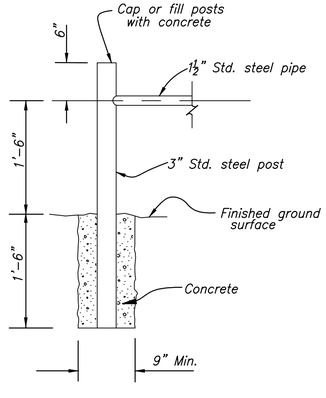
NOTES

1. Drawing not to scale.
2. All sectionalizing valves will require a bypass.
3. For Wp and pipe trench earthwork details, see (60314).
4. The minimum steel cylinder thickness for the section of line pipe with the valve outlet shall be the thickness of the steel line pipe. For the steel line pipe thickness see the specification.
5. Piping next to butterfly valves may require 1" oversizing so that the applied interior lining will not reduce the inside dimension to a smaller size which could prevent the butterfly valve from opening. Valve bypass piping shall be epoxy lined.
6. For details of tapers, adaptors and collars, see (60325).
7. Flange class shall meet pressure requirement designated by adjacent line pipe. Flange drilling shall match mating flange.
8. For Flange and Valve ratings, see notes (60319).

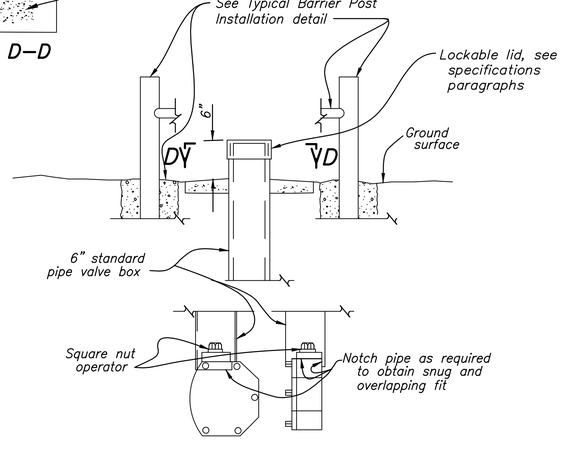


SECTION D–D

WELDED RECTANGULAR BARRIER



TYPICAL BARRIER POST INSTALLATION DETAIL



DETAIL A
(PROFILE VIEW)

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BLOCK 9-11 - LINE PIPE

REV NO	DATE	DESCRIPTION
1	2017-06-09	D Corrected distances shown on Section B-B and Section C-C. Revised limits of backfill compacting.
	Bowles, Linda M P.E.	

Andrew Marner
DESIGNED
Derek Kosakowski
DRAWN
David Gesundheit
CHECKED
Bowles, Linda M P.E.
TECH. APPR.
Duke, Wylie C (Chris) P.E.
APPROVED
PEER REVIEWER - Manager - Water Conveyance Group
DENVER, CO 2017-03-30

SECTIONALIZING VALVE INSTALLATION

PLAN, SECTIONS AND DETAILS

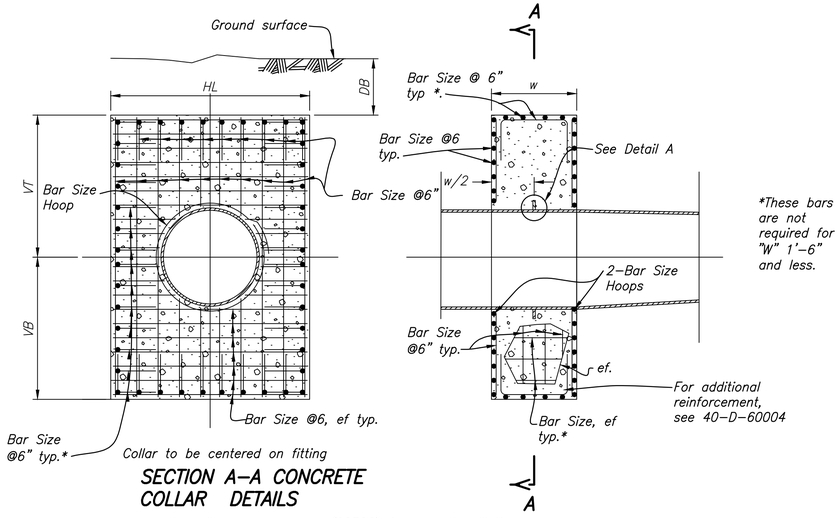
1695-D-60324

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3/28/2017 5:43 PM
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SECTION A–A CONCRETE COLLAR DETAILS

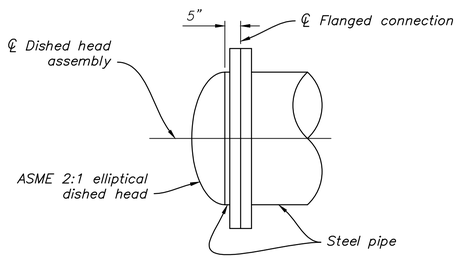
Locate collars as shown on (60326) for valve installations.
For Collar reinforcement and thickness, see Collar Table.
Earthwork not shown, see (60324).

COLLAR TABLE REACH 9

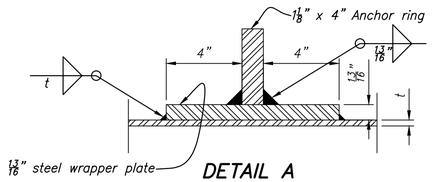
SECTIONALIZING VALVE STATION	DESIGN HEAD (FT)	PIPE DIAMETER (IN)	HL	VT	VB	DB (FT)	W	BAR SIZE
90000+00	375	48	25'–0"	5'–0"	9'–0"	4.1	2'–6"	7
90059+00	418	48	25'–0"	5'–0"	10'–0"	2.1	2'–9"	7
90115+00	408	48	25'–0"	5'–0"	9'–0"	2.1	2'–9"	7
90167+20	363	48	25'–0"	6'–6"	8'–0"	3.1	2'–6"	7
90224+60	282	48	20'–0"	7'–0"	8'–0"	0.1	2'–3"	7
90285+30	315	48	25'–0"	6'–0"	7'–0"	1.6	2'–3"	7
90330+00	326	48	25'–0"	5'–6"	8'–0"	2.1	2'–3"	7
90384+00	276	48	25'–0"	5'–6"	7'–0"	1.6	2'–0"	8
90419+40	301	48	25'–0"	5'–6"	7'–0"	1.6	2'–3"	8
90470+00	275	48	25'–0"	5'–0"	6'–3"	2.1	2'–0"	8
90523+00	212	48	20'–0"	5'–6"	6'–0"	1.6	1'–9"	7
90577+00	223	48	20'–0"	5'–6"	7'–0"	2.6	1'–9"	7
90624+00	247	48	20'–0"	6'–0"	7'–0"	2.1	2'–0"	6
90681+50	240	48	20'–0"	5'–0"	6'–0"	4.1	2'–0"	7
90739+50	207	48	20'–0"	4'–0"	7'–0"	2.1	1'–9"	7
90810+00	204	48	20'–0"	5'–0"	6'–0"	2.1	1'–9"	7
90879+00	186	48	20'–0"	5'–0"	6'–6"	1.1	1'–9"	7
90921+50	174	42	15'–0"	5'–0"	5'–0"	3.8	1'–6"	6
90980+00	171	42	15'–0"	5'–0"	6'–0"	1.8	1'–6"	6
91037+00	157	42	15'–0"	5'–0"	5'–0"	1.8	1'–6"	6
91088+00	118	42	10'–0"	5'–0"	6'–0"	1.8	1'–3"	5
91142+00	105	42	10'–0"	5'–0"	5'–0"	2.3	1'–3"	5
91188+00	77	42	10'–0"	4'–0"	4'–0"	2.8	1'–0"	5

COLLAR TABLE REACH 11

SECTIONALIZING VALVE STATION	DESIGN HEAD (FT)	PIPE DIAMETER (IN)	HL	VT	VB	DB (FT)	W	BAR SIZE
11069+00	482	42	29'–0"	5'–6"	7'–0"	1.8	2'–9"	8
11168+00	442	42	25'–0"	5'–6"	8'–0"	1.8	2'–6"	7



ASME ELLIPTICAL DISHED HEAD ASSEMBLY



DETAIL A

OPERATING CRITERIA

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

NOTES

1. Drawing not to scale.
2. Flange class shall meet pressure requirement designated by adjacent symbol line pipe. Flange drilling shall match mating flange. See Notes on (60319).
3. Steel plate minimum thickness, t, shall not be less than specification requirements.
4. Concrete compressive strength, f'c, is 4,500 psi and specified yield point for reinforcement, fy, is 60,000 psi.
5. For general concrete outline notes and for minimum requirements for detailing reinforcement, see 40–D–60003, and 40–D–60004.
6. For coating and lining options, see specification paragraphs.

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BUREAU OF RECLAMATION
NAVAJO-GALLUP WATER SUPPLY PROJECT
NEW MEXICO

SAN JUAN LATERAL

BLOCK 9-11 - LINE PIPE

Andrew Marner
DESIGNED
Derek Kosakowski
DRAWN
D.L. Gesundheit
CHECKED
Bowles, Linda M P.E.
TECH. APPR.
Duke, Wylie C (Chris) P.E.
APPROVED
PEER REVIEWER - Manager - Water Conveyance Group
DENVER, CO 2017-03-30

SECTIONALIZING VALVE INSTALLATION

TAPERS, ADAPTORS, AND COLLARS

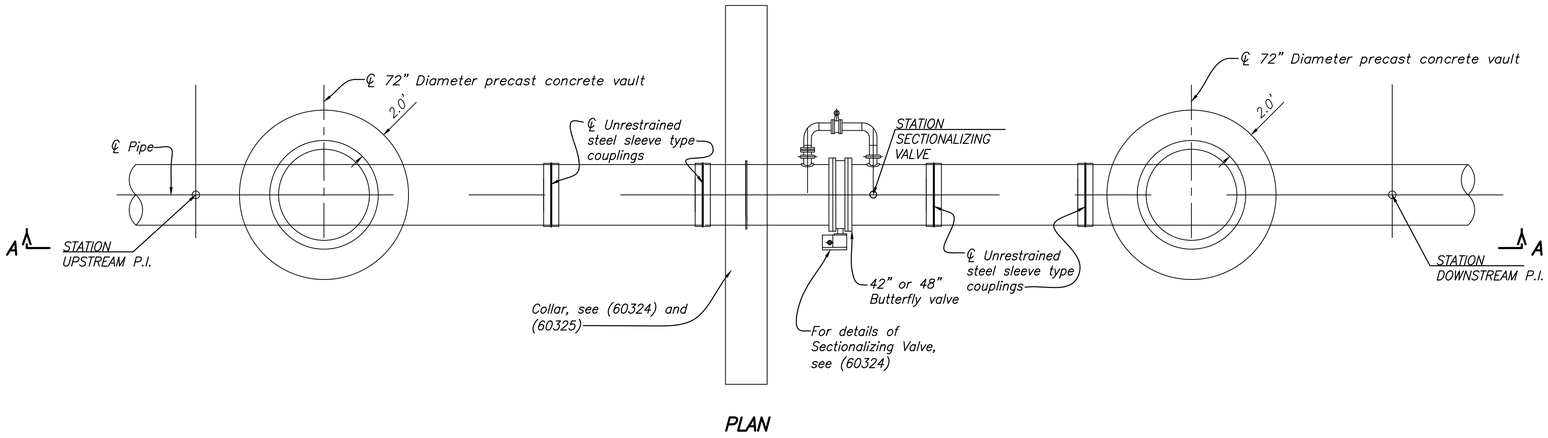
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svc-Corp-EDM

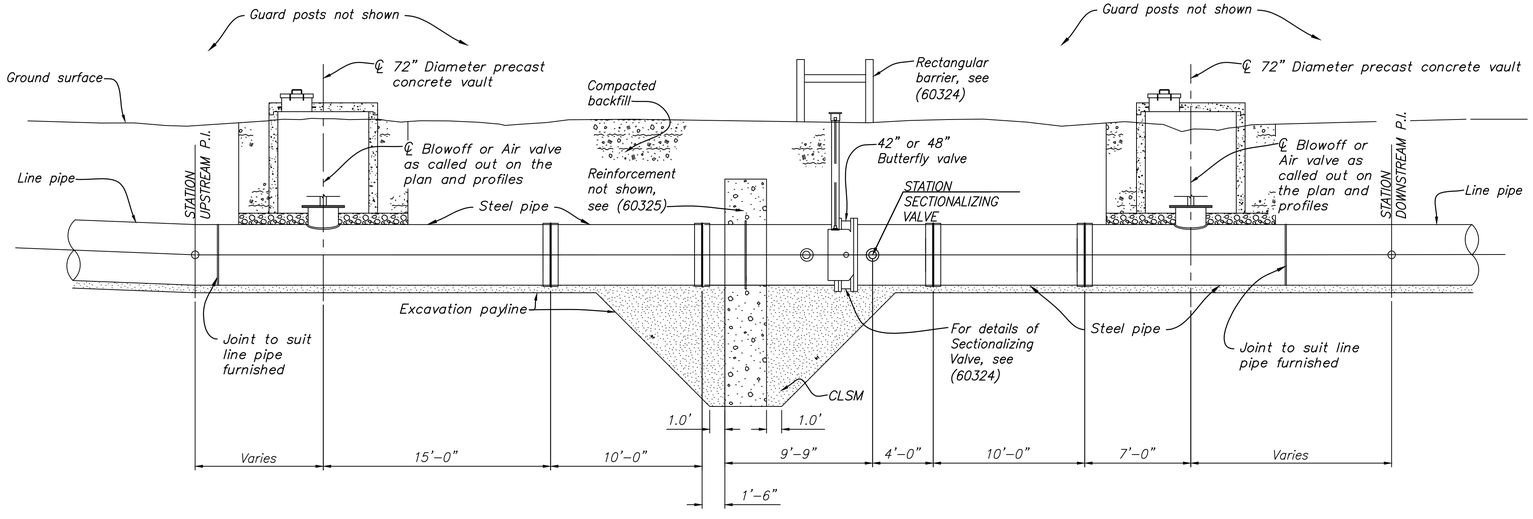
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CAD FILENAME
1695-D-60325-RD-1.dwg

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PLAN

SECTIONALIZING VALVE DATA TABLE—REACH 9			
SECTIONALIZING VALVE STATION	VALVE HEAD CLASS (FT)	ORIFICE DESIGN HEAD (FT)	NUMBER OF ORIFICE HOLES
90000+00	600	381	13
90059+00	650	425	12
90115+00	625	414	12
90167+20	575	370	13
90224+60	500	289	15
90285+30	525	321	14
90330+00	525	332	14
90384+00	450	282	15
90419+40	475	308	14
90470+00	450	282	15
90523+00	375	219	16
90577+00	375	229	16
90624+00	400	254	15
90681+50	375	247	16
90739+50	350	214	17
90810+00	325	211	17
90879+00	300	193	17
90921+50	275	181	18
90980+00	275	177	18
91037+00	250	163	19
91088+00	200	125	21
91142+00	175	111	22
91188+00	125	84	25
91220+00	100	73	27



SECTION A–A

SECTIONALIZING VALVE DATA TABLE—REACH 11			
SECTIONALIZING VALVE STATION	VALVE HEAD CLASS (FT)	ORIFICE DESIGN HEAD (FT)	NUMBER OF ORIFICE HOLES
11069+00	650	496	11
11168+80	600	443	12

NOTES

1. Drawing not to scale.
2. CLSM – Controlled Low Strength Material.
3. For Sectionalizing Valve installation, see (60324).
4. For Tapers, Adaptor and Collars, see (60325).

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NAVAJO-GALLUP WATER SUPPLY PROJECT
NEW MEXICO

SAN JUAN LATERAL

BLOCK 9-11 - LINE PIPE

Andrew Marner
DESIGNED
Derek Kosakowski
DRAWN
D.L. Gesundheit
CHECKED
Bowles, Linda M P.E.
TECH. APPR.
Duke, Wylie C (Chris) P.E.
APPROVED
PEER REVIEWER - Manager - Water Conveyance Group
DENVER, CO 2017-03-30

SECTIONALIZING VALVE INSTALLATION

TYPICAL LAYOUT

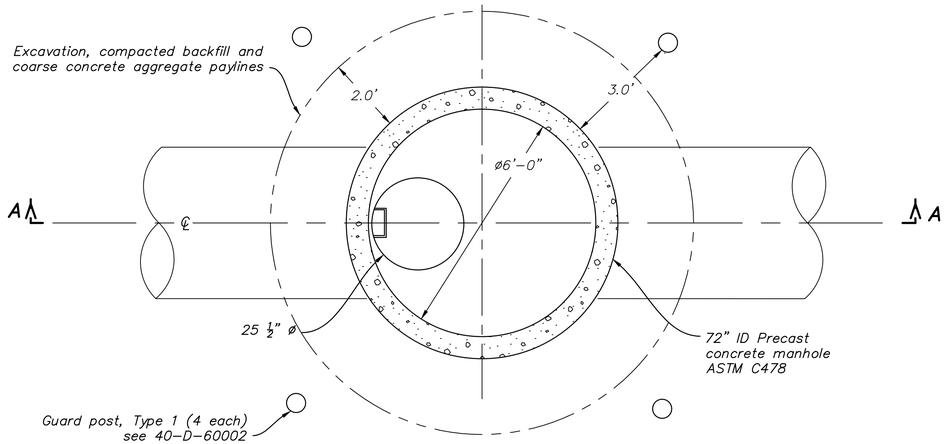
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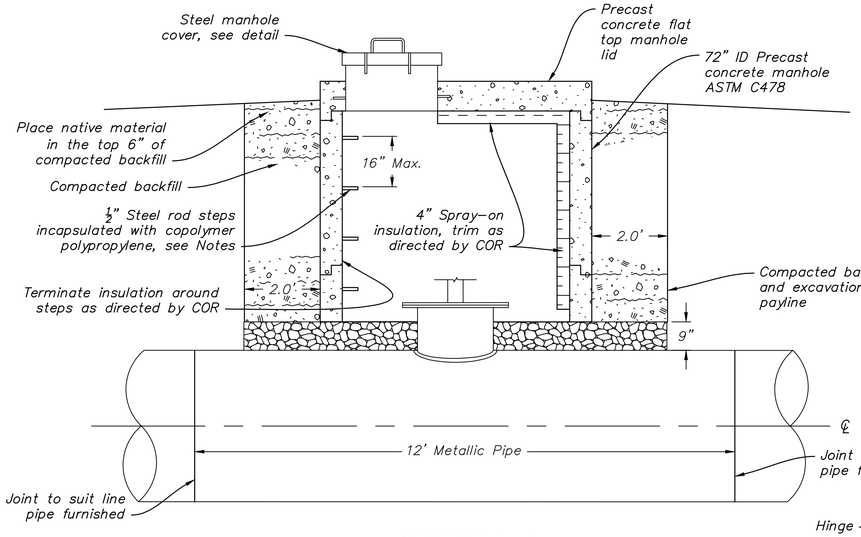
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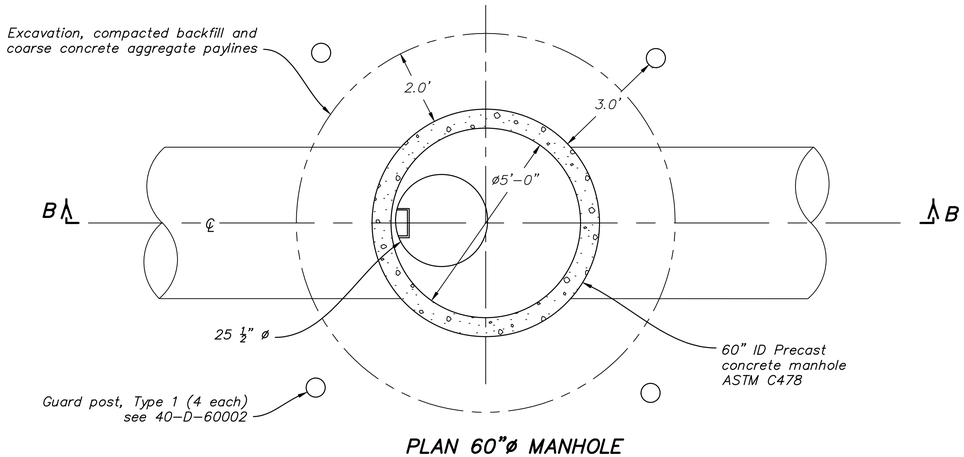
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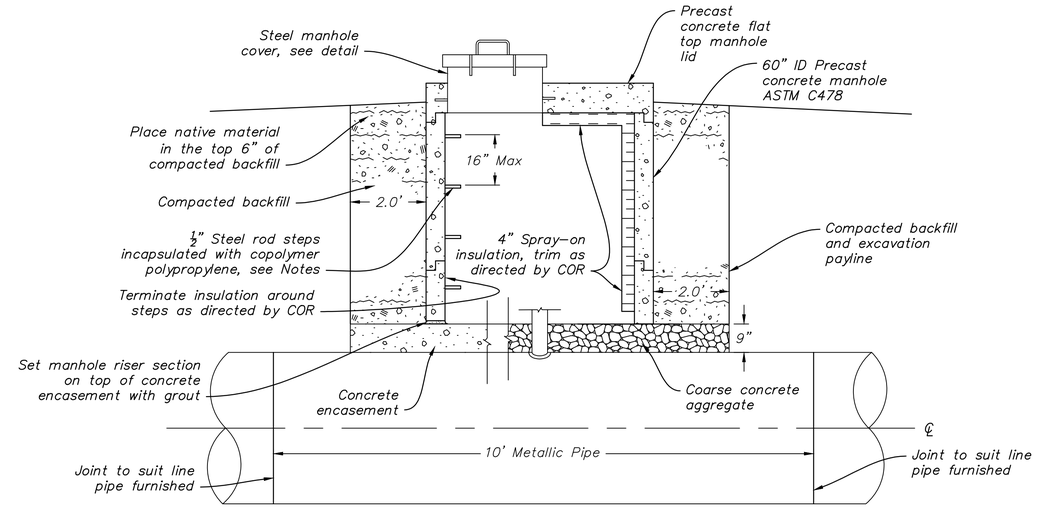
PLAN 72"ø MANHOLE



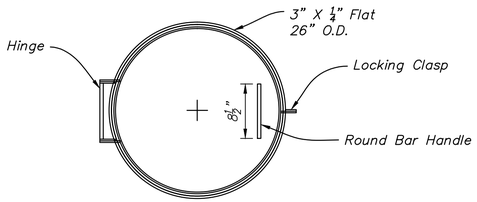
SECTION A–A

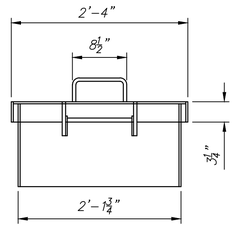


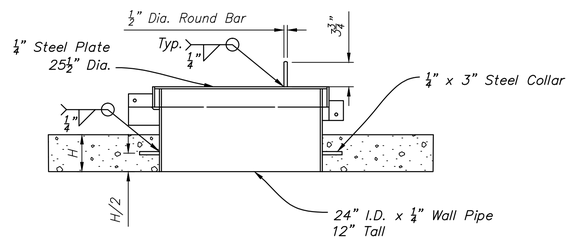
PLAN 60"ø MANHOLE



SECTION B–B







STEEL MANHOLE COVER DETAIL

NOTES

1. Manhole steps shall be made of ½" steel rod encapsulated with copolymer polypropylene or approved equal and shall conform to ASTM C478. Steps shall have minimum projections of 4–inches, spaced no more than 16" apart, minimum overall widths of 14 inches and anchored into the walls at least 3½ inches deep.
2. Drawing not to scale.

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BUREAU OF RECLAMATION
NAVAJO-GALLUP WATER SUPPLY PROJECT
NEW MEXICO

SAN JUAN LATERAL

BLOCK 9-11 - LINE PIPE

Andrew Marner
DESIGNED
Derek Kosakowski
DRAWN
D.L. Gesundheit
CHECKED
Bowles, Linda M P.E.
TECH. APPR.
Duke, Wylie C (Chris) P.E.
APPROVED
PEER REVIEWER - Manager - Water Conveyance Group
DENVER, CO 2017-03-30

PRECAST CONCRETE MANHOLES

DETAILS

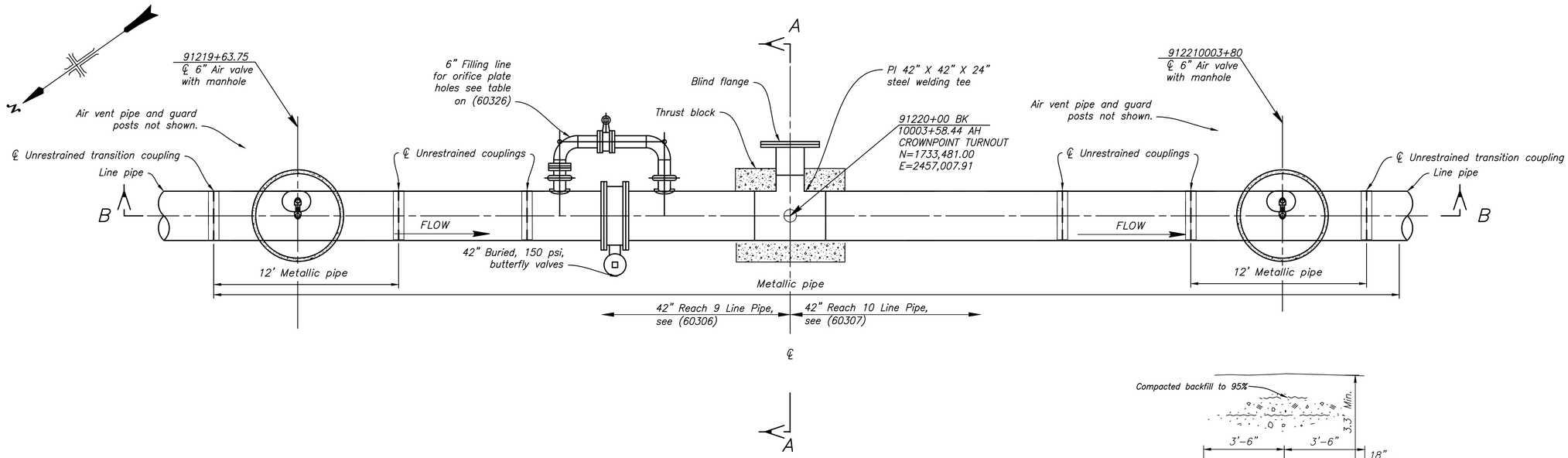
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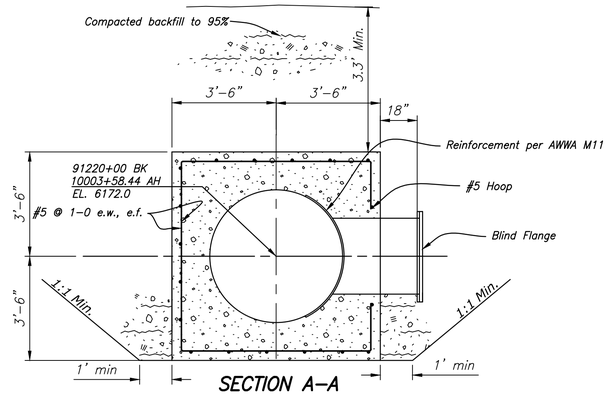
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svc-Corp-EDM

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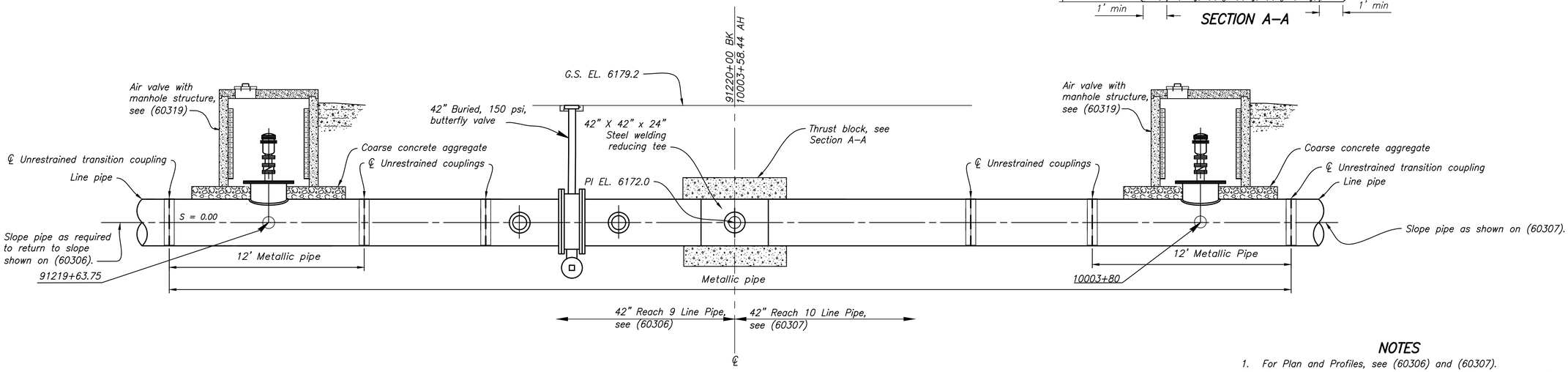
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PLAN



SECTION A–A



SECTION B–B

NOTES

1. For Plan and Profiles, see (60306) and (60307).
2. Concrete compressive strength, f'c, is 4,500 psi and specified yield point for reinforcement fy, is 60,000 psi.
3. For general concrete outline notes and minimum requirements for detailing reinforcement, see 40–D–60003 and 40–D–60004.

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SAN JUAN LATERAL - REACH 9

LINE PIPE

REVNO	DATE	BY	DESCRIPTION
1	2017-06-08	Bowles, Linda M P.E.	Added correct Reach 10 stationing.

Andrew Marner
DESIGNED
Derek Kosakowski
DRAWN
D.L. Gesundheit
CHECKED
Bowles, Linda M P.E.
TECH. APPR.
Duke, Wylie C (Chris) P.E.
APPROVED
PEER REVIEWER - Manager - Water Conveyance Group
DENVER, CO 2017-03-30

CROWNPOINT TURNOUT

PLAN, SECTIONS AND DETAILS

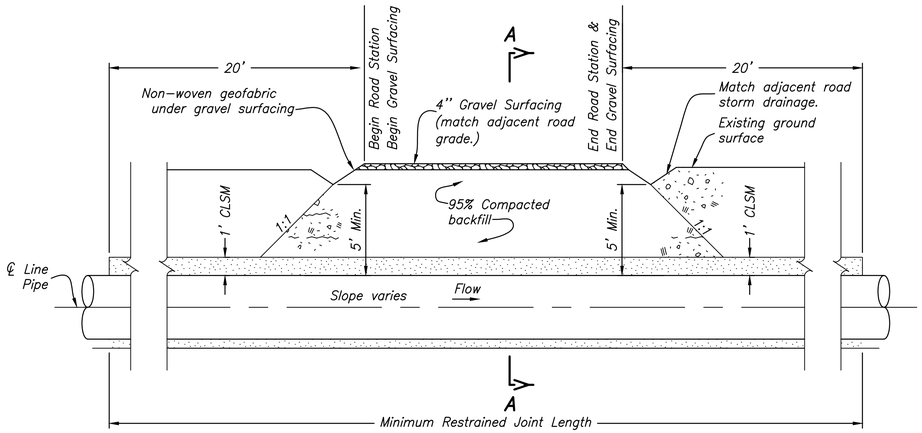
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SHEET 1

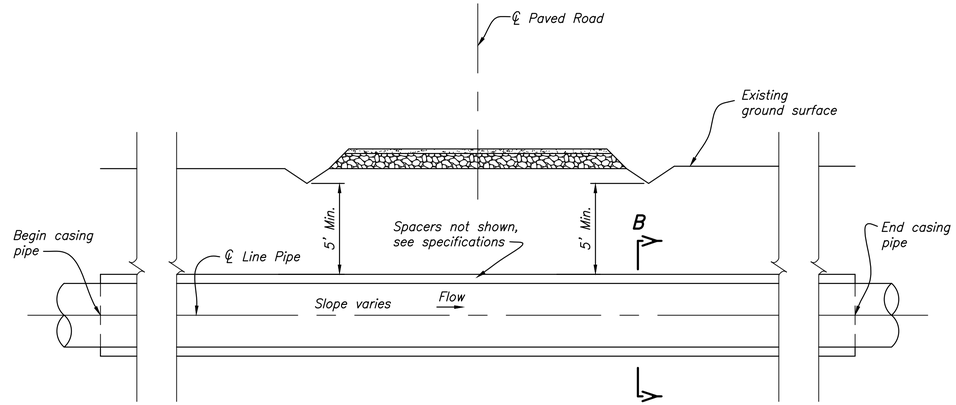
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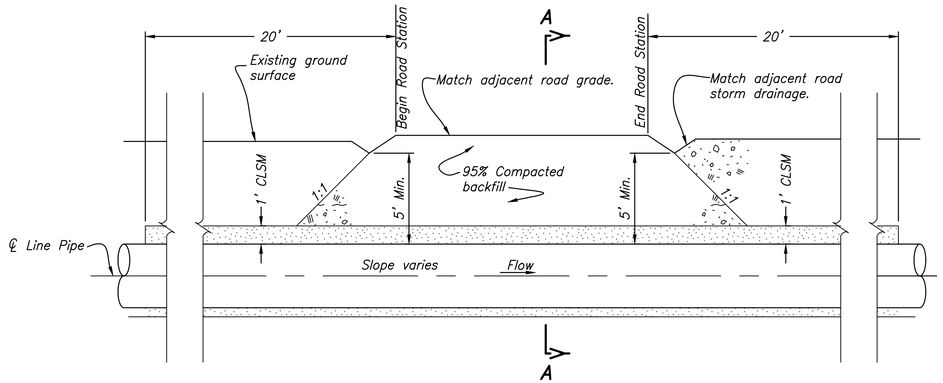


TYPICAL MAINTAINED ROAD DETAIL

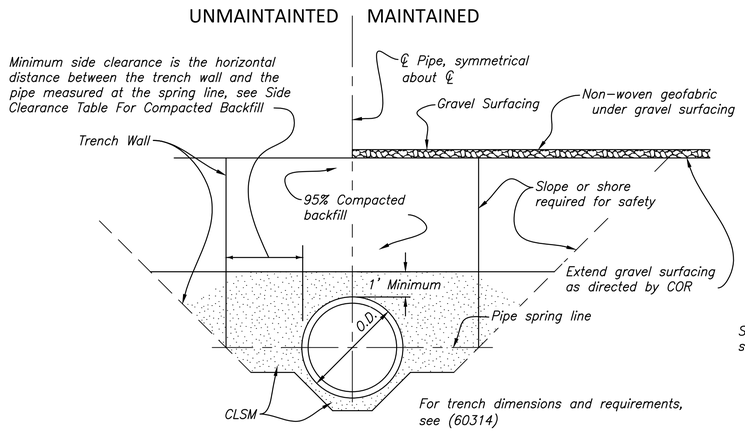


TYPICAL PAVED ROAD DETAIL

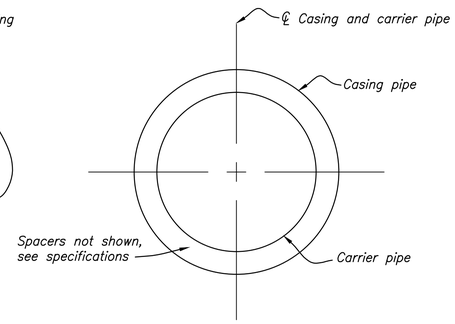
JACK AND BORE PIPE LOCATIONS – ROADS					
℄ ROAD STATION	NAME OF ROAD	SURFACING	CASING PIPE DIAMETER	CARRIER PIPE DIAMETER	REF DWG
90666+48	GAS PLANT ROAD	PAVED	60	48	(60295)
11065+20	BIA ROUTE 9	PAVED	54	42	(60330)



TYPICAL UNMAINTAINED ROAD DETAIL



SECTION A–A



SECTION B–B

SIDE CLEARANCE TABLE FOR COMPACTED BACKFILL

Height of Cover	STEEL				DUCTILE IRON				FIBERGLASS		PVC DR25		PVC DR32.5		PVC DR41		PVC DR51		HDPE	
	42"		48"		42"		48"		42" & 48"		42" & 48"		42"		42"		42"		48"	
	Material Type 2	Material Type 3	Material Type 2	Material Type 3	Material Type 2	Material Type 3	Material Type 2	Material Type 3	Material Type 2	Material Type 3	Material Type 2	Material Type 3	Material Type 2	Material Type 3	Material Type 2	Material Type 3	Material Type 2	Material Type 3	Material Type 2	Material Type 3
<=10'	15	18	18	21	9	12	9	18	6	6	6	6	6	12	6	12	6	12	6	9
<=15'	21	27	24	30	18	21	21	27	6	5	6	12	12	18	12	18	12	18	6	15
<=20'	24	36	30	36	24	27	30	33	12	21	6	18	18	24	18	24	21	24	12	18

1. Backfill can not exceed 5' until CLSM embedment obtains an unconfined compressive strength of 30 psi.

Steel – Mortar lined, flexible coated.
Ductile Iron – Special thickness class.
Fiberglass – Stiffness factor of 18 or greater.
HDPE – Only DR ratios 32.5, 26, 21, 19, and 17 allowed.

NOTES

1. For backfill details, road surfacing material type, and stations, see Open Cut Crossings Table on Plans and Profiles (60281) to (60313).
2. When pipe alignment is in the roadway, details are similar.
3. Side slopes shown are perpendicular to road centerline.
4. Placement of gravel surfacing on other roads not identified on the plan and profile drawings may be directed by COR.
5. Extend gravel surfacing along roadway to construction ROW on each side of pipe centerline.
6. Casing pipe joints are to be single welded lap joints.
7. Avoid pipe joints under roads.
8. Compact backfill to 95% density.

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BUREAU OF RECLAMATION
NAVAJO-GALLUP WATER SUPPLY PROJECT
NEW MEXICO

SAN JUAN LATERAL

BLOCK 9-11 - LINE PIPE

Andrew Marner
DESIGNED
Michelle Norris
DRAWN
D.L. Gesundheit
CHECKED
Bowles, Linda M P.E.
TECH. APPR.
Duke, Wylie C (Chris) P.E.
APPROVED
PEER REVIEWER - Manager - Water Conveyance Group
DENVER, CO 2017-03-30

TYPICAL ROAD CROSSING
- OPEN CUT

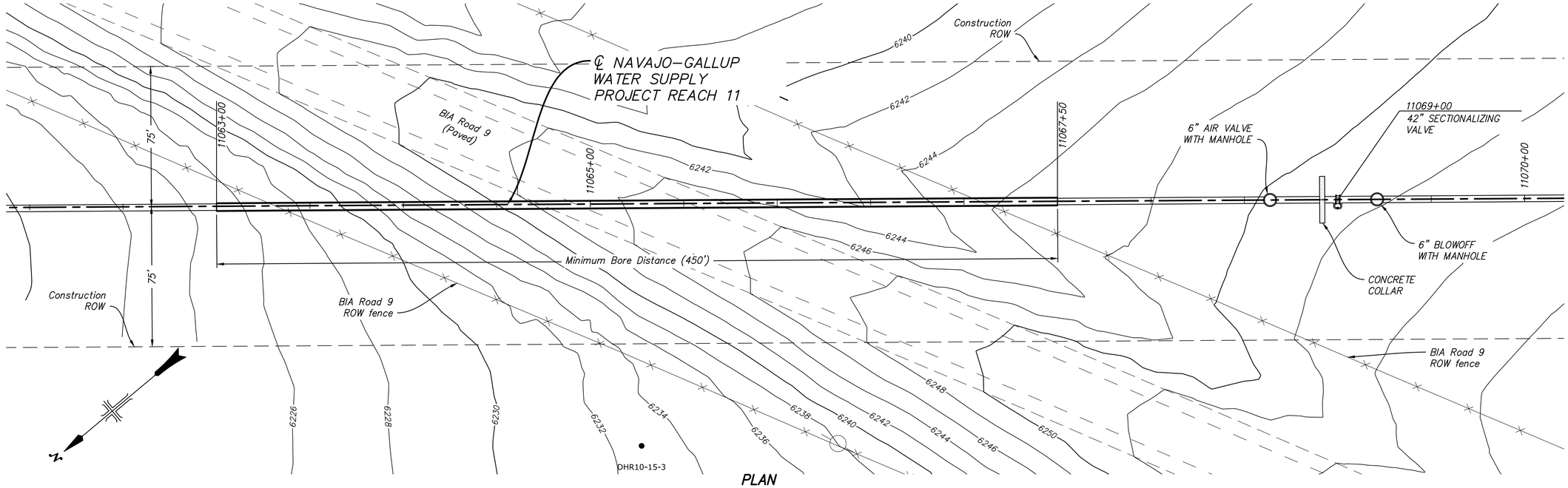
SECTIONS

1695-D-60329

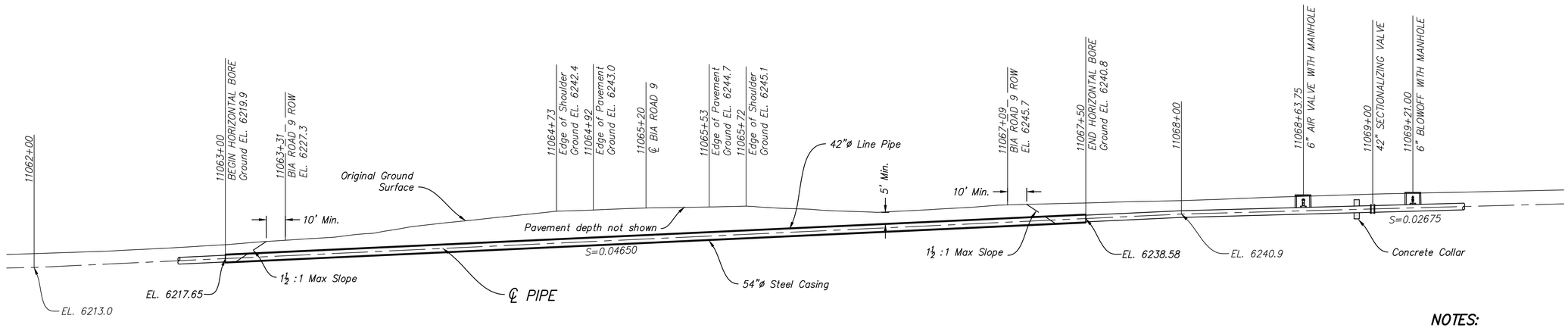
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PLAN
BIA ROAD 9 CROSSING
STA. 11065+20
30 0 30 60 90
SCALE OF FEET



PROFILE
BIA ROAD 9 CROSSING
STA. 11065+20
30 0 30 60 90
SCALE OF FEET

NOTES:

1. General Notes, Abbreviations, Symbols, and Pipe Classification, see (60281).
2. For Plan and Profile on NGWSP Reach 11, see (60309).
3. Boring distances are minimum boring distances only. Longer boring lengths shall be submitted for approval.
4. For concrete collar, see (60325).

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BUREAU OF RECLAMATION
NAVAJO-GALLUP WATER SUPPLY PROJECT
NEW MEXICO

SAN JUAN LATERAL - REACH 11

LINE PIPE

Andrew Marner
DESIGNED
Andrew Marner
DRAWN
D.L. Gesundheit
CHECKED
Bowles, Linda M P.E.
TECH. APPR.
Duke, Wylie C (Chris) P.E.
APPROVED
PEER REVIEWER - Manager - Water Conveyance Group

DENVER, CO 2017-03-30

ROAD CROSSING

BIA ROAD 9
STA 11065+20

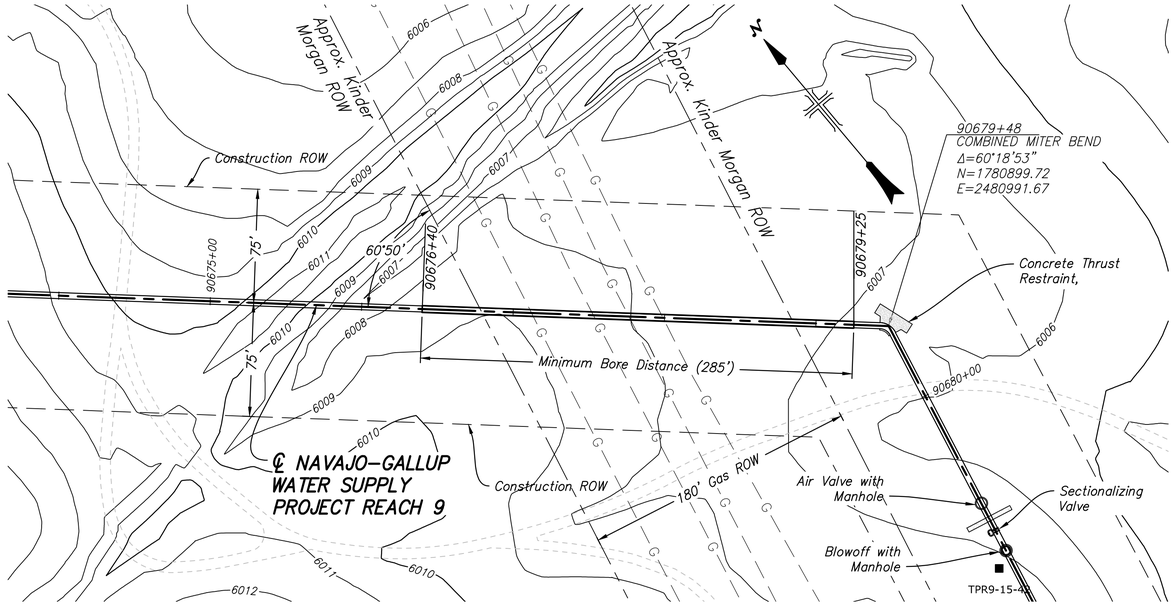
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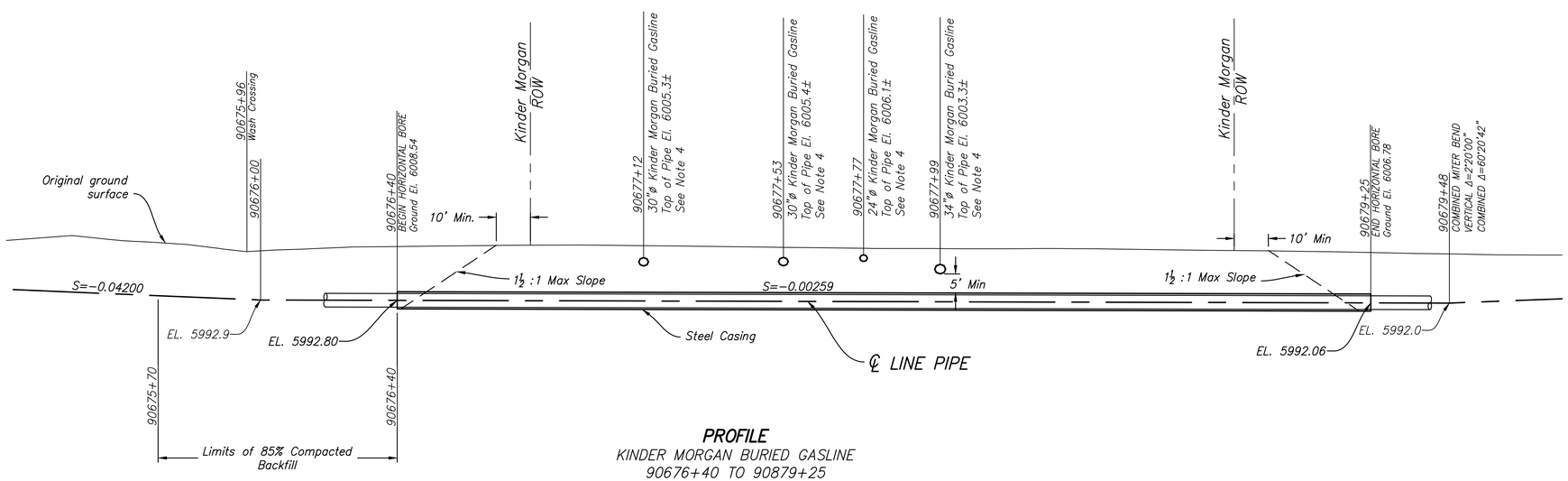
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PLAN
KINDER MORGAN BURIED GASLINE
90676+40 TO 90879+25

50 0 50 100 150
SCALE OF FEET



PROFILE
KINDER MORGAN BURIED GASLINE
90676+40 TO 90879+25

20 0 20 40 60
SCALE OF FEET

NOTES:

1. General Notes, Abbreviations, Symbols, and Pipe Classification, see (60281).
2. For Plan and Profile on NGWSP Reach 9, see (60295).
3. Minimum clearance of 5' required between all crossing utilities and line pipe.
4. ROW shown for Kinder Morgan Gas pipeline is approximate and based on information provided by Kinder Morgan Gas. Contractor to field verify Kinder Morgan Gas ROW prior to construction.
5. Boring distances are minimum boring distances only. Longer boring lengths shall be submitted for approval.
6. For concrete thrust restraint, see (60315).
7. For casing details, see (60329).

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NAVAJO-GALLUP WATER SUPPLY PROJECT
NEW MEXICO

SAN JUAN LATERAL - REACH 9

LINE PIPE

Andrew Marner — DESIGNED
Andrew Marner — DRAWN
D.L. Gesundheit — CHECKED
Bowles, Linda M P.E. — TECH. APPR.
Duke, Wylie C (Chris) P.E. — APPROVED
PEER REVIEWER - Manager - Water Conveyance Group
DENVER, CO 2017-03-30

PLAN AND PROFILE

GAS LINE CROSSINGS

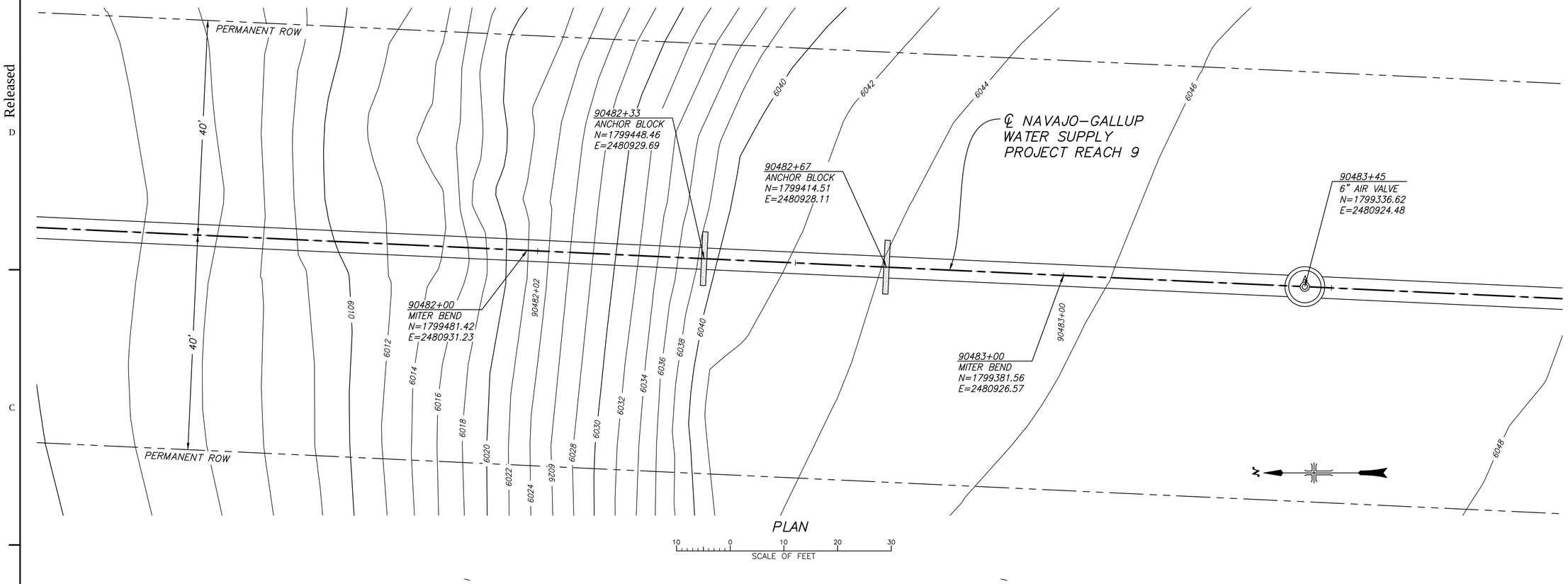
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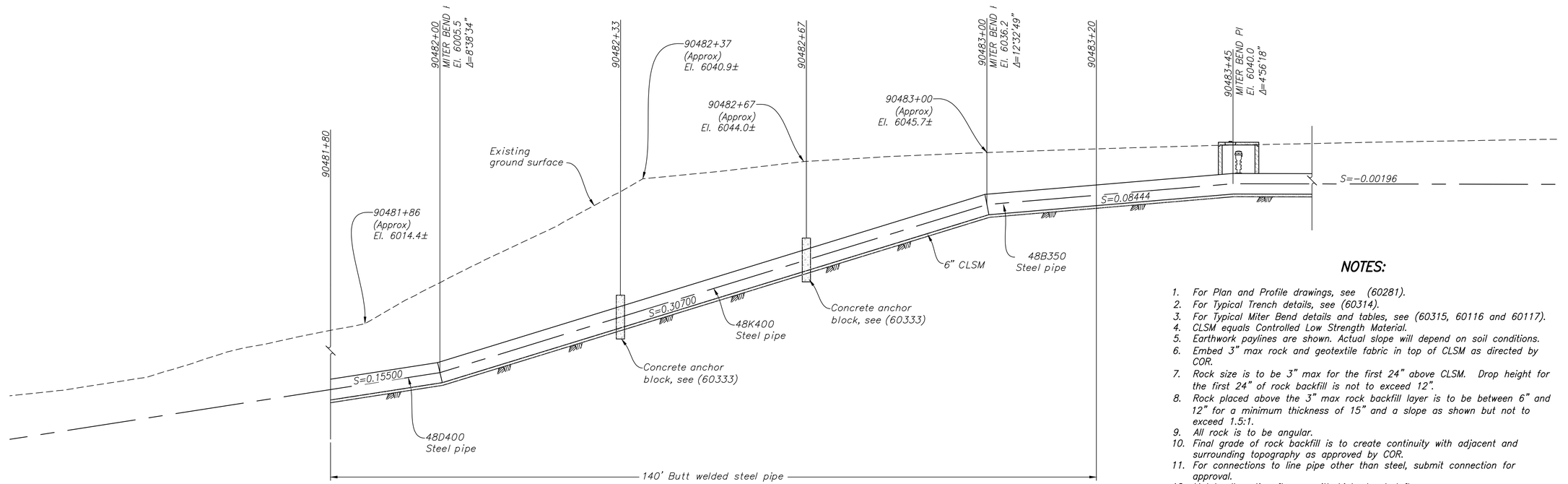
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PLAN

10 0 10 20 30
SCALE OF FEET



PROFILE – STA. 90481+80 TO 90483+20

10 0 10 20 30
SCALE OF FEET

NOTES:

1. For Plan and Profile drawings, see (60281).
2. For Typical Trench details, see (60314).
3. For Typical Miter Bend details and tables, see (60315, 60116 and 60117).
4. CLSM equals Controlled Low Strength Material.
5. Earthwork paylines are shown. Actual slope will depend on soil conditions.
6. Embed 3" max rock and geotextile fabric in top of CLSM as directed by COR.
7. Rock size is to be 3" max for the first 24" above CLSM. Drop height for the first 24" of rock backfill is not to exceed 12".
8. Rock placed above the 3" max rock backfill layer is to be between 6" and 12" for a minimum thickness of 15" and a slope as shown but not to exceed 1.5:1.
9. All rock is to be angular.
10. Final grade of rock backfill is to create continuity with adjacent and surrounding topography as approved by COR.
11. For connections to line pipe other than steel, submit connection for approval.
12. Match all mating flanges with highest rated flanges.

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BUREAU OF RECLAMATION
NAVAJO-GALLUP WATER SUPPLY PROJECT
NEW MEXICO

SAN JUAN LATERAL - REACH 9

LINE PIPE

Amy Latham	DESIGNED
Andrew Marner	DRAWN
D.L. Gesundheit	CHECKED
Bowles, Linda M P.E.	TECH. APPR.
Duke, Wylie C (Chris) P.E.	APPROVED
PEER REVIEWER - Manager - Water Conveyance Group	
DENVER, CO	2017-03-30

PLAN AND PROFILE

STEEP PIPE ANCHOR BLOCKS

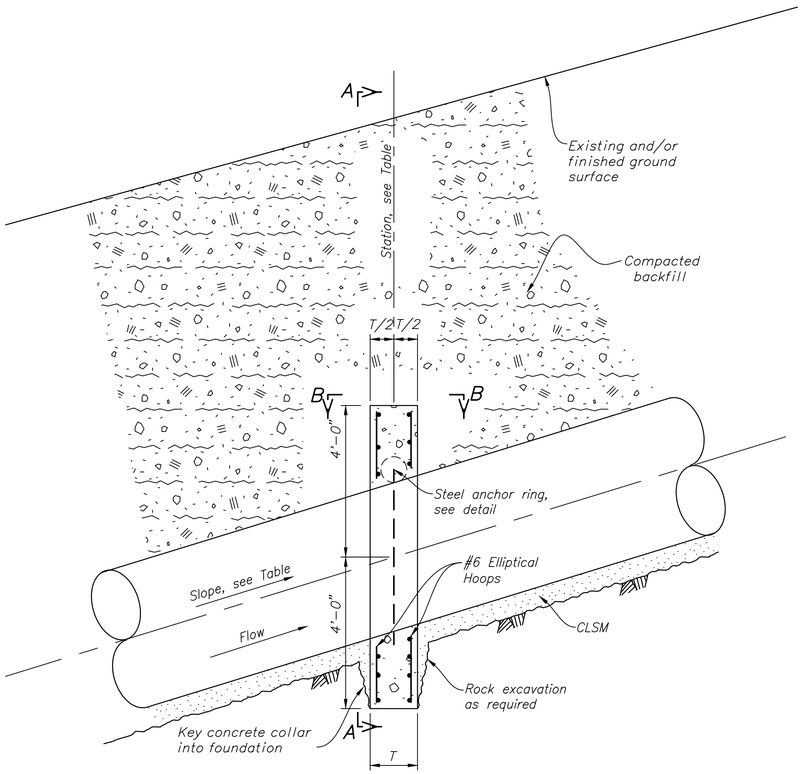
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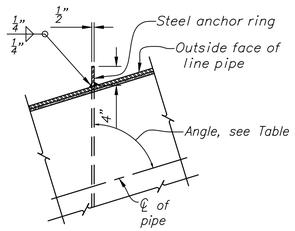
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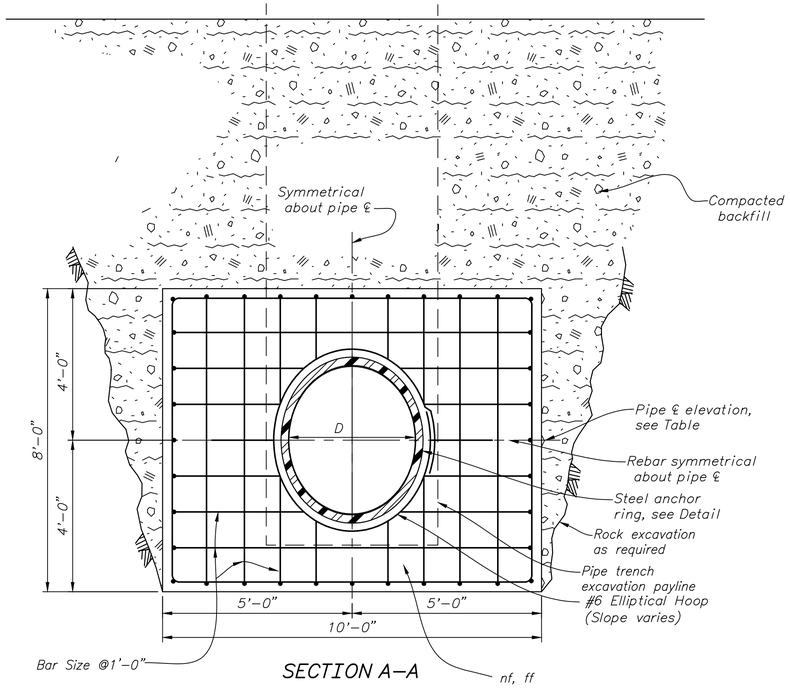
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PROFILE

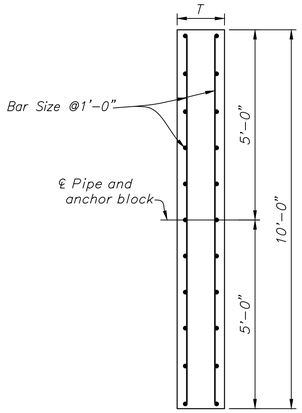


STEEL ANCHOR RING DETAIL
TYPICAL
(NOT TO SCALE)



SECTION A–A

BUTT WELDED STEEL PIPE	
Beginning Station	Ending Station
90164+40	90165+40
90282+00	90282+50
90376+80	90378+00
90390+00	90390+40
90466+20	90466+92
90482+00	90483+00
90607+93	90608+60
90609+70	90610+34
11166+00	11166+70
11167+20	11168+00



SECTION B–B

ANCHOR BLOCK DATA						
Station	Pipe CL EL	Slope	Angle	D (in)	T (ft–in)	Bar Size
90164+90.00	5,860.90	0.26000	75.4	48	1'–0"	7
90282+17.00	5,916.48	–0.37200	69.6	48	1'–3"	7
90282+33.00	5,910.52	–0.37200	69.6	48	1'–3"	7
90377+40.00	5,935.40	0.24333	76.3	48	1'–0"	5
90390+20.00	5,952.25	0.24250	76.4	48	1'–0"	5
90466+56.00	5,950.35	0.26806	75.0	48	1'–0"	7
90482+33.00	6,015.63	0.30700	72.9	48	1'–0"	8
90482+67.00	6,026.07	0.30700	72.9	48	1'–0"	8
90608+27.00	5,993.47	–0.26269	75.3	48	1'–0"	6
90610+02.00	5,993.25	0.26719	75.0	48	1'–0"	6
11166+35.00	6,271.40	–0.30000	73.3	42	1'–3"	7
11167+60.00	6,271.90	0.27750	74.5	42	1'–0"	7

GENERAL NOTES FOR CAST–IN–PLACE CONCRETE

1. For general notes and minimum requirements for detailing reinforcement, see 40–D–60003, 40–D–60004.
2. Structural design is based upon 4,500 psi concrete compressive strength at 28 days and reinforcement with a specified minimum yield strength of 60,000 psi.
3. Unless otherwise shown, all exposed concrete edges are to be chamfered $\frac{3}{4}$".

NOTES

1. For Plan and Profile drawings, see (60281) through (60313).
2. For Typical Trench details, see (60314).
3. CLSM equals controlled low strength material.
4. All backfill shall be compacted to 85%.

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NEW MEXICO

SAN JUAN LATERAL

BLOCK 9-11

REV NO	DATE	DESCRIPTION
1	2017-06-07	Bowles, Linda M P.E. — Revise title text for tables, added note for elliptical shape for reinforcement.

Amy Latham — DESIGNED
Amy Latham — DRAWN
D.L. Gesundheit — CHECKED
Bowles, Linda M P.E. — TECH. APPR.
Duke, Wylie C (Chris) P.E. — APPROVED
PEER REVIEWER - Manager - Water Conveyance Group

DENVER, CO 2017-03-30

STEEP PIPE ANCHOR BLOCKS

PROFILE, SECTIONS, AND DETAILS

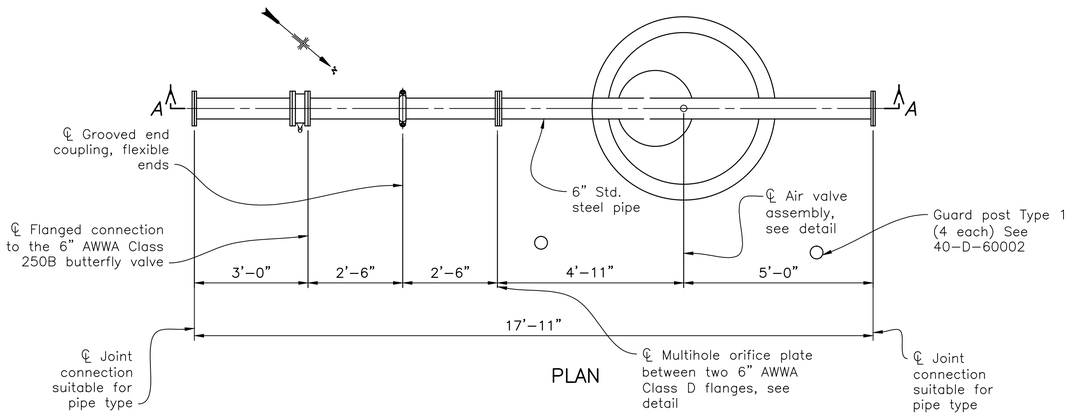
1695-D-60333

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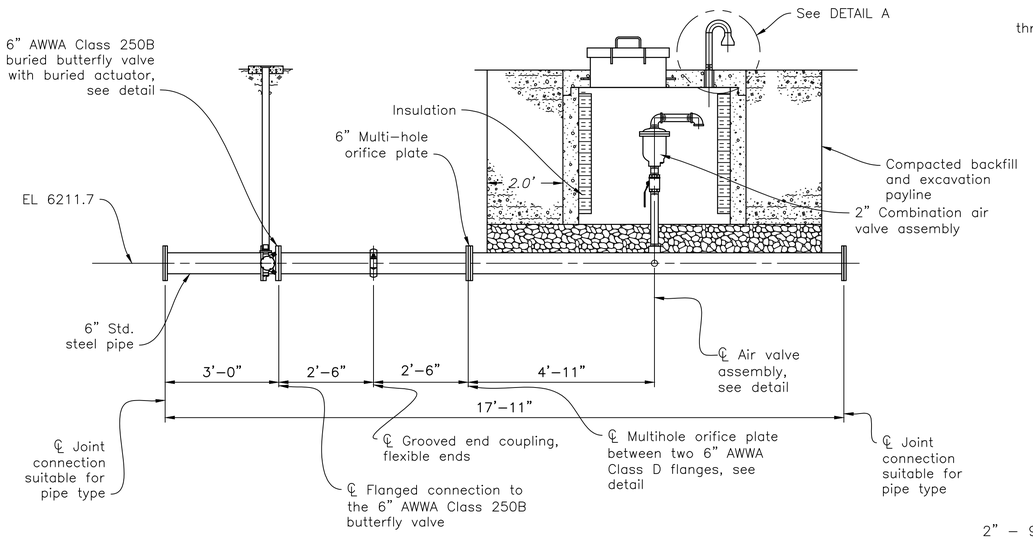
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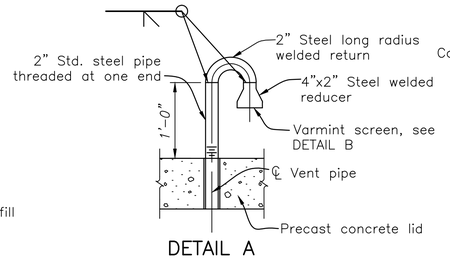
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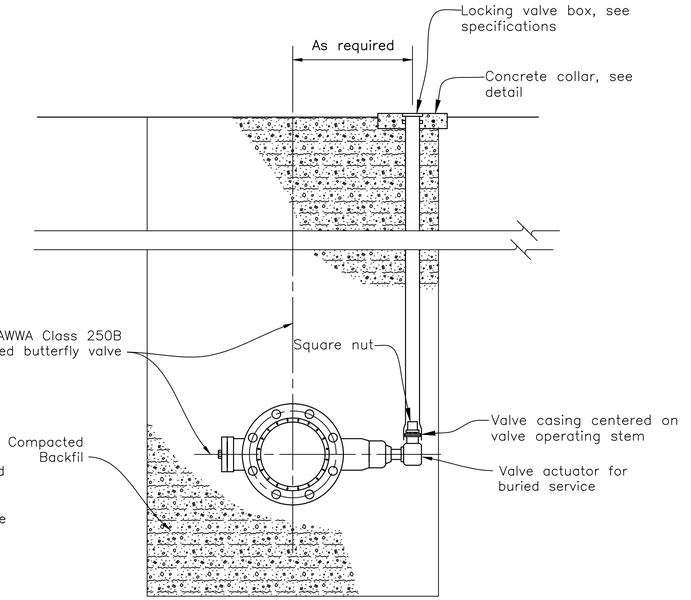
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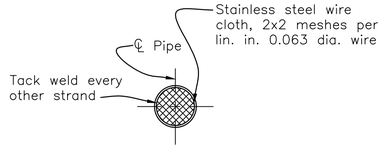
SECTION A-A



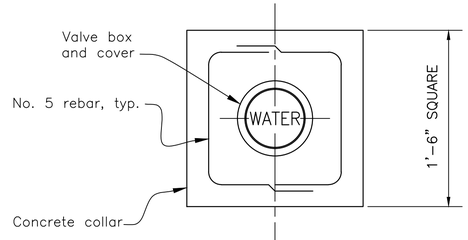
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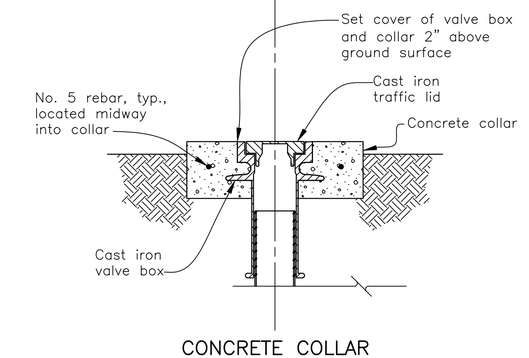


BURIED VALVE ACTUATOR
(BUTTERFLY VALVE SHOWN)

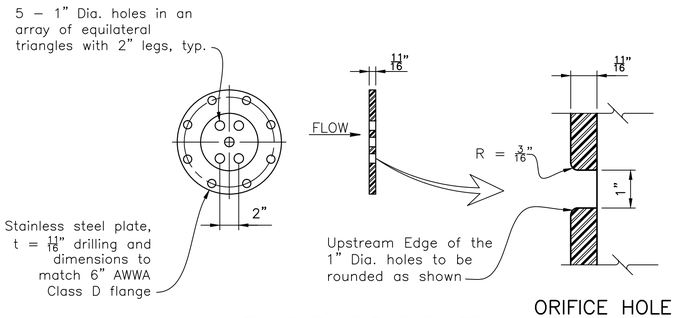


DETAIL B



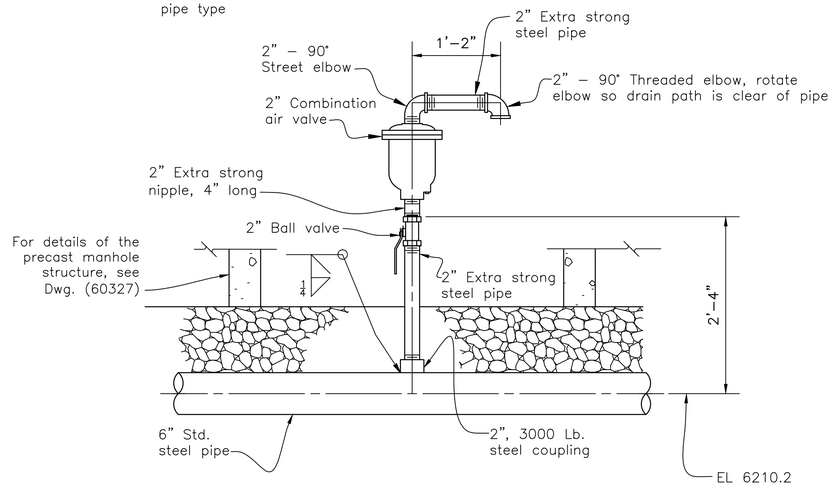


CONCRETE COLLAR



MULTI HOLE ORIFICE PLATE

ORIFICE HOLE



AIR VALVE ASSEMBLY

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NEW MEXICO

SAN JUAN LATERAL - REACH 10

LINE PIPE

Lucas Adams	DESIGNED
Lucas Adams	DRAWN
Andrew Marner	CHECKED
Bowles, Linda M P.E.	TECH. APPR.
Duke, Wylie C (Chris) P.E.	APPROVED
PEER REVIEWER - Manager - Water Conveyance Group	
DENVER, CO	2017-03-30

TEMPORARY CONSTRUCTION WATER LINE

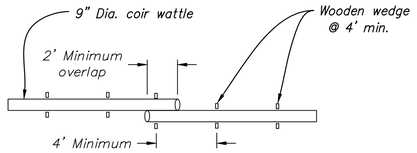
SECTIONS AND DETAILS

1695-D-60334

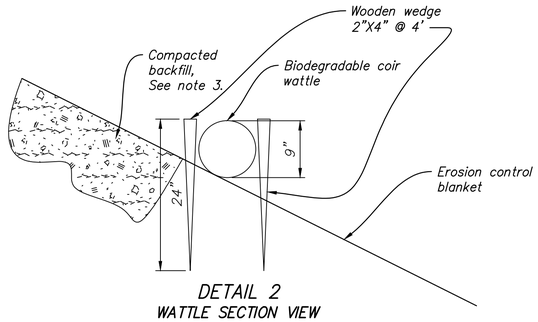
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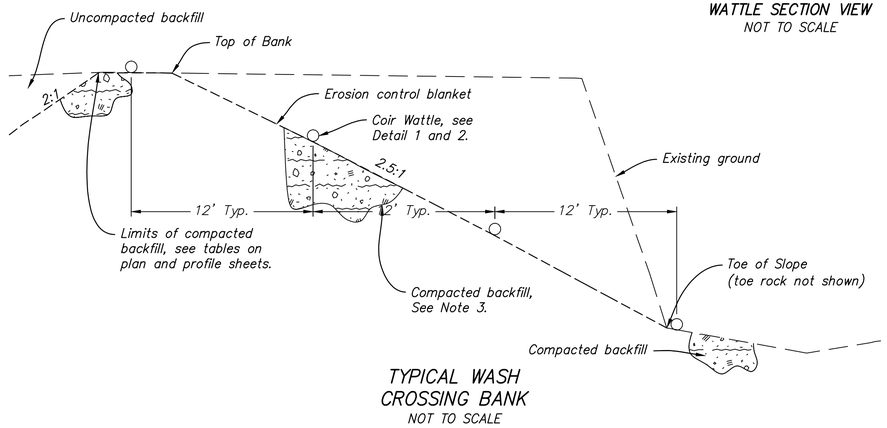
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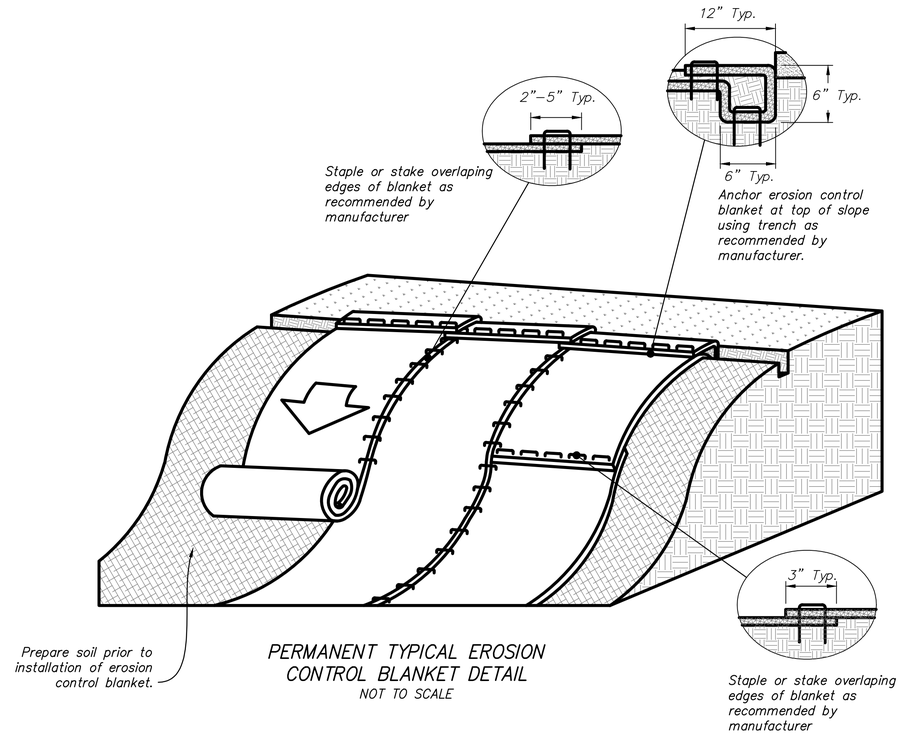
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WATTLE PLAN VIEW
NOT TO SCALE



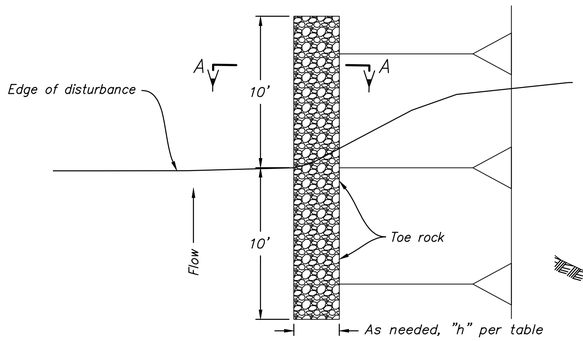
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WATTLE SECTION VIEW
NOT TO SCALE



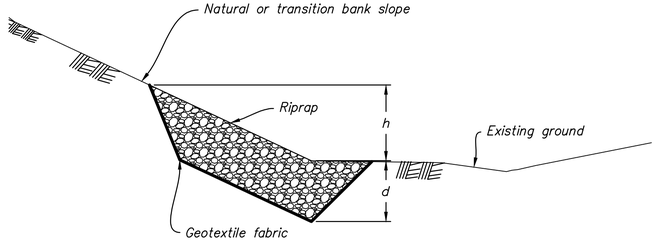
TYPICAL WASH
CROSSING BANK
NOT TO SCALE



PERMANENT TYPICAL EROSION
CONTROL BLANKET DETAIL
NOT TO SCALE



PLAN VIEW
TYPICAL TOE ROCK
NOT TO SCALE



SECTION A–A
TYPICAL TOE ROCK DETAIL
NOT TO SCALE

WASH CROSSING TOE ROCK TABLE		
STATION	d (ft)	h (ft)
90023+26	3.5	2.5
90077+09	3	2
90097+40	3.5	1.5
90163+39	3.5	3.5
90261+28	4	5
90283+24	5	4
90298+25	3	2
90376+25	3.5	2
90389+71	3	1.5
90465+63	5	3.5
90525+15	3	2
90609+15	5	3.5
11167+00	6.5	5

NOTES

1. All slopes 3:1 and steeper will have erosion control blankets where directed by COR between the top of bank and bottom of bank stations. Erosion control blanket shall extend 5' onto undisturbed ground.
2. All stabilization backfill between the Left Top of Bank and Right Top of Bank will be compacted backfill.
3. Wash bank backfill shall be compacted to 85% standard proctor at a 2.5:1V slope between top of bank trench excavation daylight lines.
4. Upstream and downstream of the top of bank daylight lines, the 2.5:1V compacted bank slope shall be smoothly transitioned to the natural bank slope by excavating and grading the natural bank.
5. Place 9" diameter coir wattle at bank toe and at 12' intervals up the compacted backfill bank, on top of the erosion control blanket. Extend 5' beyond disturbed area.

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SAN JUAN LATERAL

BLOCK 9-11 - LINE PIPE

REV NO	DATE	BY	DESCRIPTION
1	2017-05-16	Sixta, Michael P.E.	D Additional toe rock plan view details.

JOEL SHOLTES — DESIGNED
SHANNON MONAHAN — DRAWN
ANDREW MARNER — CHECKED
Sixta, Michael P.E. — TECH. APPR.
Bowles, Linda M P.E. — APPROVED
PEER REVIEWER - Technical Approve

DENVER, CO 2017-03-30

WASH CROSSING

EROSION CONTROL DETAILS

1695-D-60335

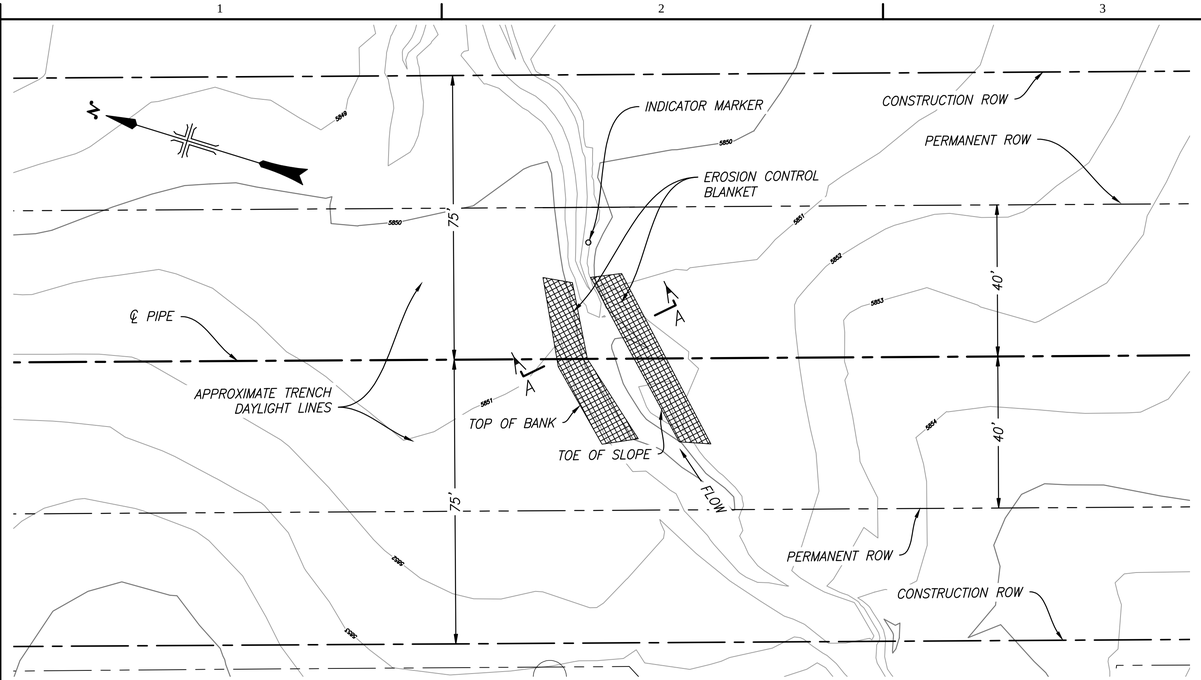
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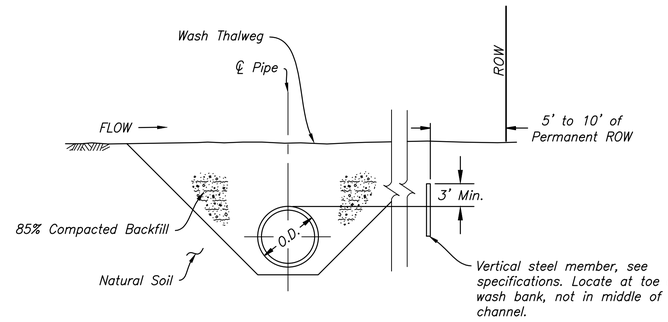
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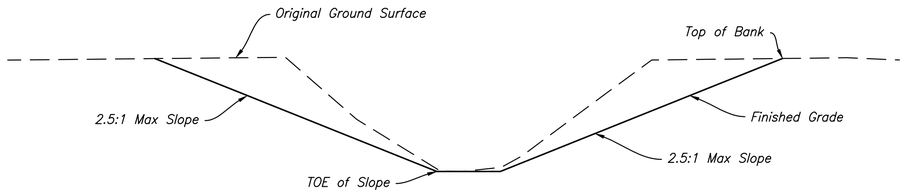


TYPICAL WASH CROSSING PLAN

20 0 20 40 60
SCALE OF FEET

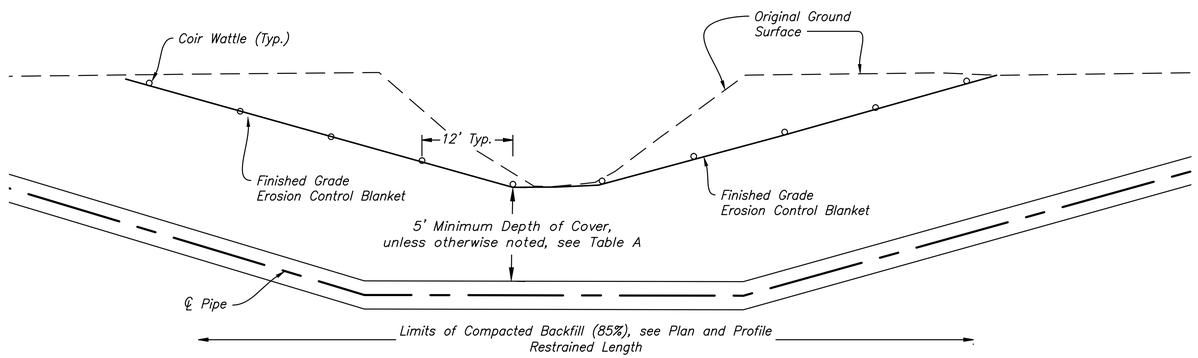


INDICATOR MARKER DETAIL



SECTION A–A

10 0 10 20 30
SCALE OF FEET



PROFILE ALONG PIPE

10 0 10 20 30
SCALE OF FEET

TABLE A	
Wash Crossing Alignment Station	Minimum Cover Depth (ft)
90023+26	7
90077+09	6
90095+94	5
90097+40	7
90106+05	5
90124+68	5
90163+39	10
90261+28	8
90283+24	10
90298+25	5
90376+25	10
90389+71	9
90401+39	6.5
90465+63	10
90525+15	6
90579+06	7.5
90609+15	10
90628+16	5
90675+96	6
90833+35	7
91186+26	9
11167+00	12

NOTES

1. For General Notes, Symbols, Abbreviations, and Pipe Classification, see (60281).
2. For mild wash slopes, (flatter than 3:1) bank treatment consists of compaction of trench backfill to in–situ density, shaped to the same slope as natural grade. Erosion control blanket not required.
3. Erosion control blanket will be placed on compacted backfill and extended 5 feet beyond trench excavation daylight, all disturbed area, top of bank and toe of slope.
4. For limits of compacted backfill and restrained joints, see table on Plan and Profile sheets.
5. Adjust extents of erosion control blanket as directed by COR.
6. Minimum cover depths shown on Table A are based on assumed channel elevation data at the time of analysis. Contractor to field verify actual cover depths and notify COR if actual cover depths vary by more than 10%.

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NEW MEXICO

SAN JUAN LATERAL

BLOCK 9-11 - LINE PIPE

JOEL SHOLTES
DESIGNED
SHANNON MONAHAN
DRAWN
ANDREW MARNER
CHECKED
Sixta, Michael P.E.
TECH. APPR.
Bowles, Linda M P.E.
APPROVED
PEER REVIEWER – Technical Approve
DENVER, CO 2017-03-30

WASH CROSSING

EROSION CONTROL DETAILS

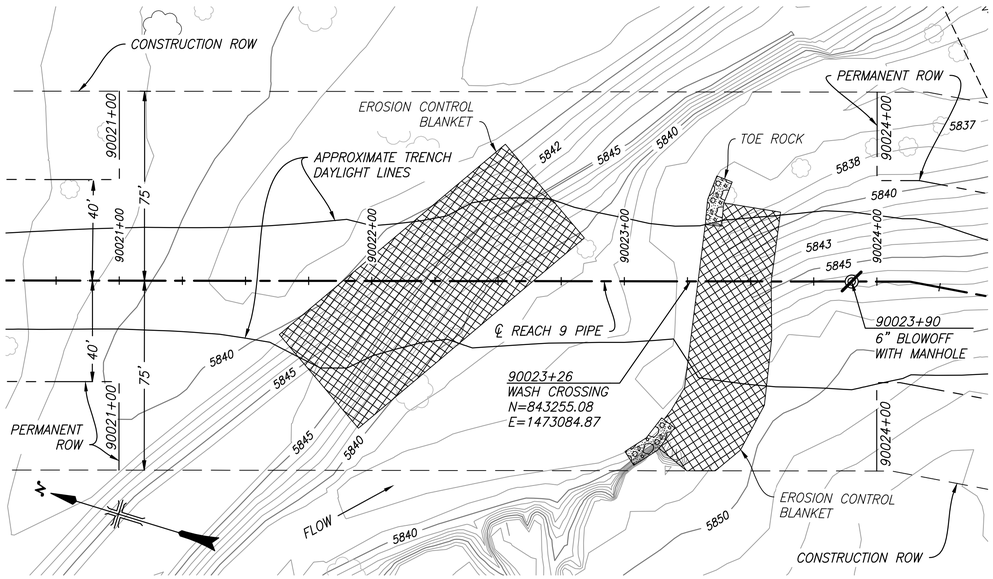
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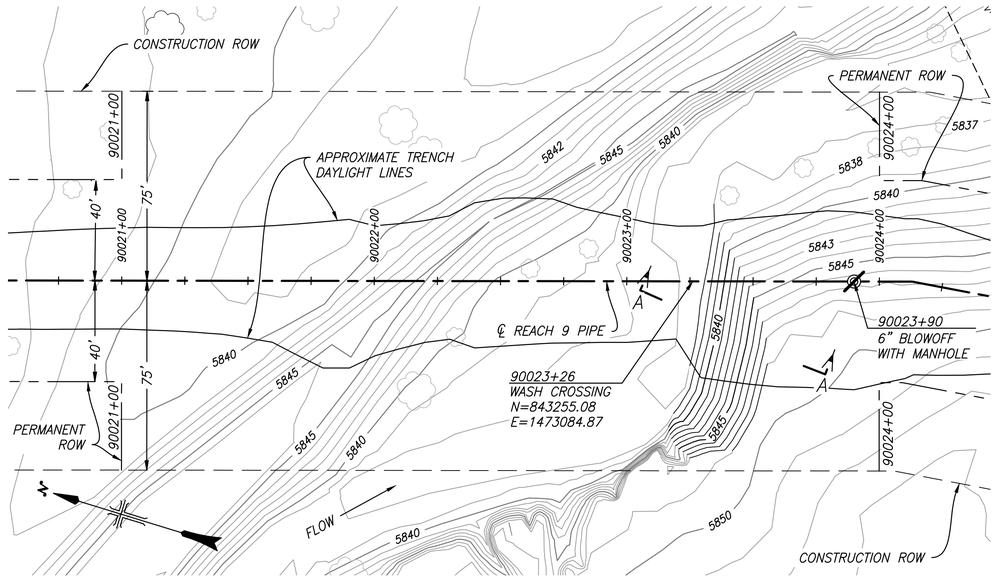
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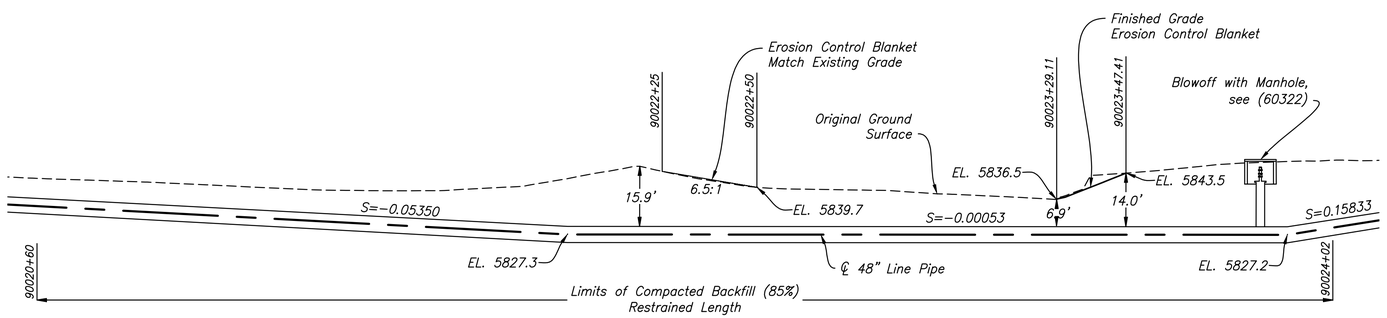
SITE PLAN

SCALE OF FEET 30 0 30 60 90



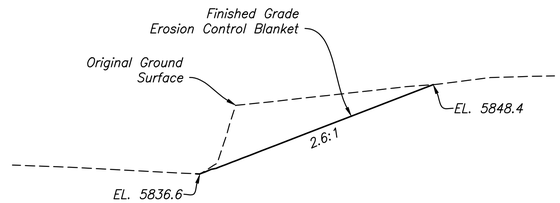
GRADING PLAN

SCALE OF FEET 30 0 30 60 90



PROFILE ALONG PIPE

SCALE OF FEET 20 0 20 40 60



WASH CROSSING SECTION A–A

SCALE OF FEET 10 0 10 20 30

NOTES

1. For General Notes, Symbols, Abbreviations, and Pipe Classification, see (60281).
2. For Plan and Profile, see (60282).
3. Adjust extents of erosion control blanket as directed by COR.
4. For typical wash crossing details, see (60335 & 60336).
5. For blowoff with manhole, see (60322).

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SAN JUAN LATERAL - REACH 9

LINE PIPE

JOEL SHOLTES	DESIGNED
SHANNON MONAHAN	DRAWN
ANDREW MARNER	CHECKED
Sixta, Michael P.E.	TECH. APPR.
Bowles, Linda M P.E.	APPROVED
PEER REVIEWER – Technical Approve	
DENVER, CO	2017-03-30

WASH CROSSING

STA. 90023+26

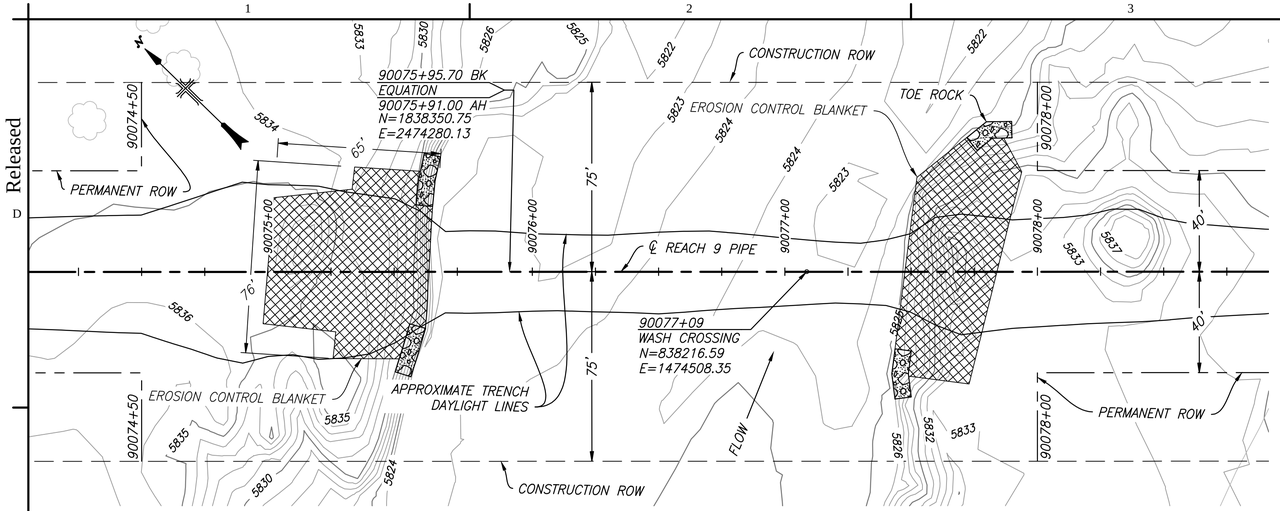
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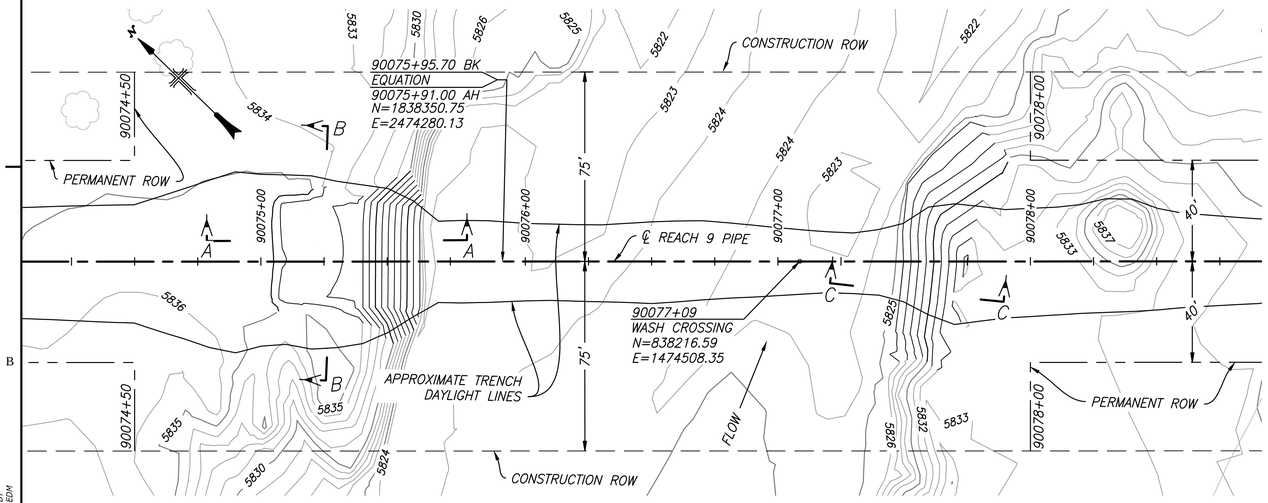
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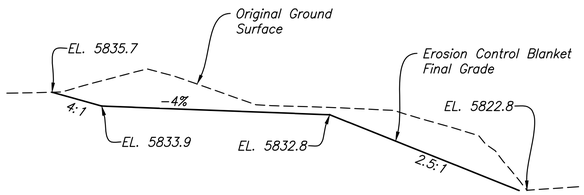
SITE PLAN

30 0 30 60 90
SCALE OF FEET



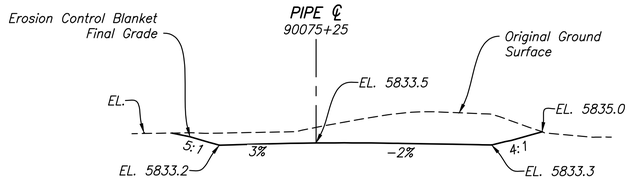
GRADING PLAN

30 0 30 60 90
SCALE OF FEET



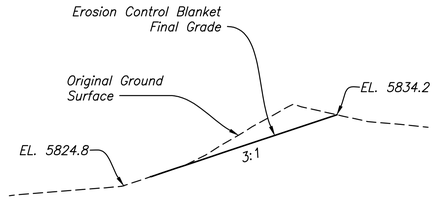
WASH CROSSING SECTION A–A

10 0 10 20 30
SCALE OF FEET



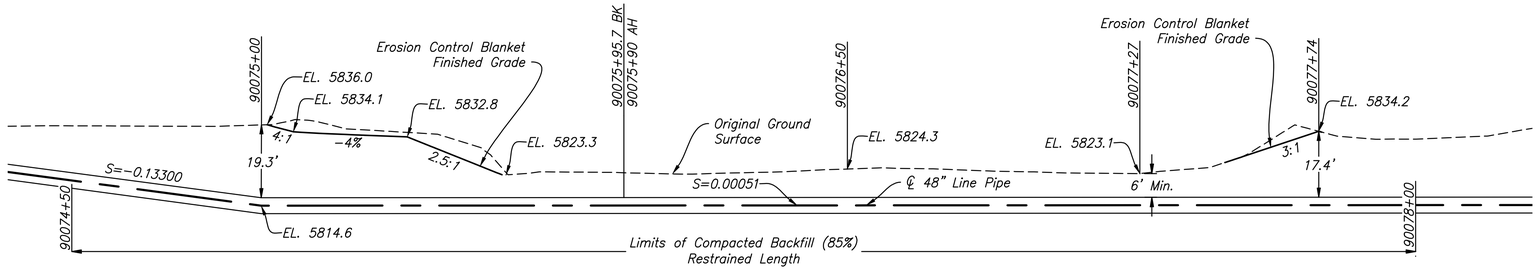
WASH CROSSING SECTION B–B

10 0 10 20 30
SCALE OF FEET



WASH CROSSING SECTION C–C

10 0 10 20 30
SCALE OF FEET



PROFILE ALONG PIPE

20 0 20 40 60
SCALE OF FEET

NOTES

1. For General Notes, Symbols, Abbreviations, and Pipe Classification, see (60281).
2. For Plan and Profile, see (60283).
3. Adjust extents of erosion control blanket as directed by COR.
4. For typical wash crossing details, see (60335 & 60336).

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BUREAU OF RECLAMATION
NAVAJO-GALLUP WATER SUPPLY PROJECT
NEW MEXICO

SAN JUAN LATERAL - REACH 9

LINE PIPE

JOEL SHOLTES
DESIGNED
SHANNON MONAHAN
DRAWN
ANDREW MARNER
CHECKED
Sixta, Michael P.E.
TECH. APPR.
Bowles, Linda M P.E.
APPROVED
PEER REVIEWER – Technical Approve

DENVER, CO 2017-03-30

WASH CROSSING

STA. 90077+09

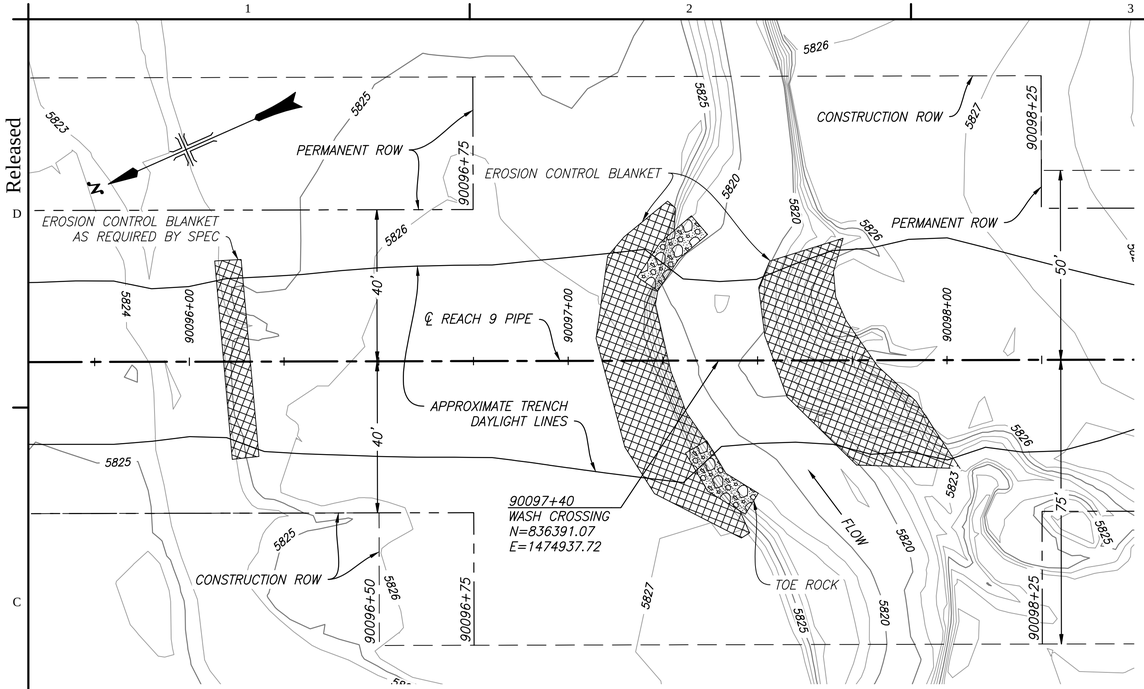
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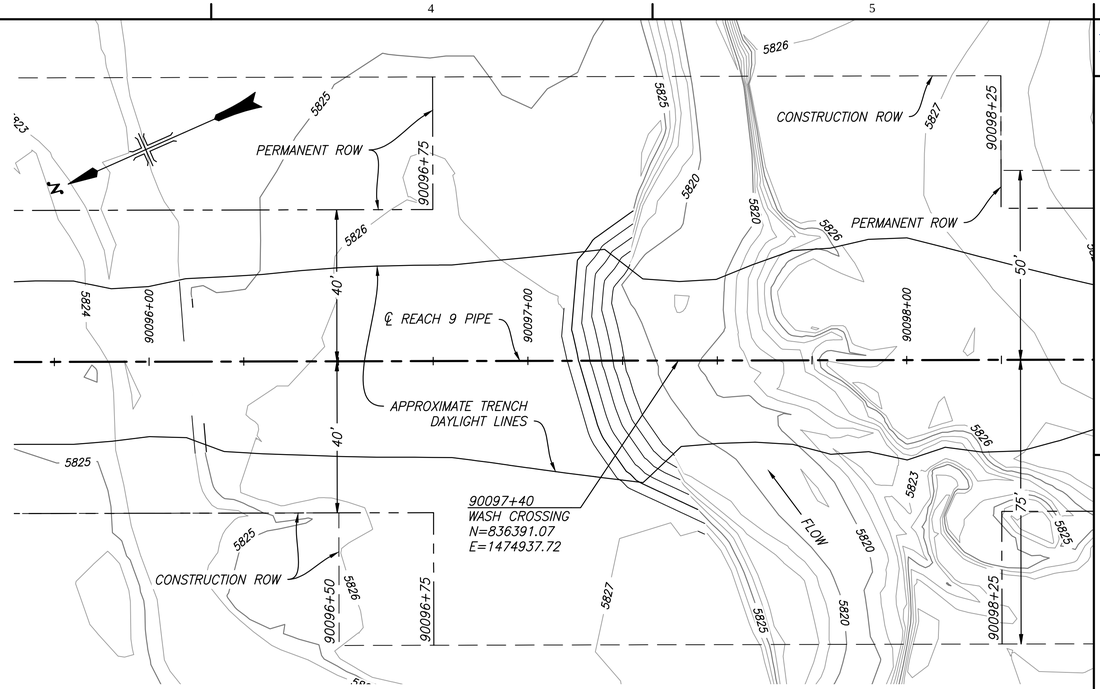
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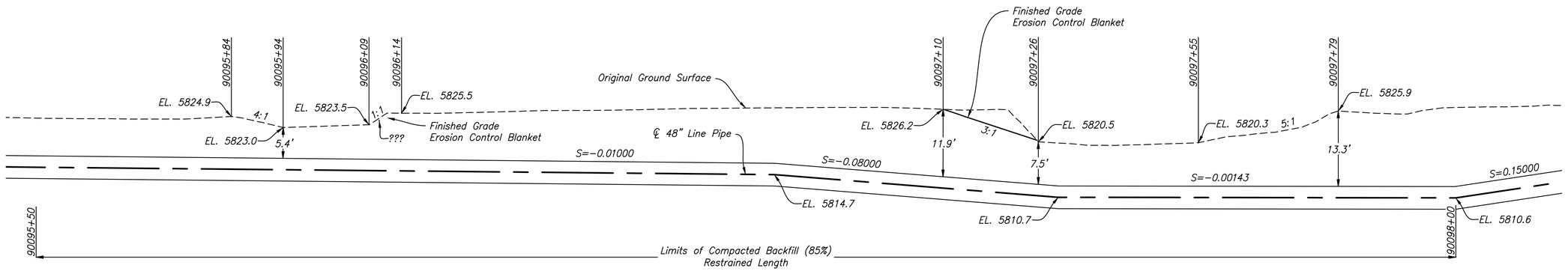
SITE PLAN

SCALE OF FEET 20 0 20 40 60



GRADING PLAN

SCALE OF FEET 20 0 20 40 60



PROFILE ALONG PIPE

SCALE OF FEET 20 0 20 40 60

NOTES

1. For General Notes, Symbols, Abbreviations, and Pipe Classification, see (60281).
2. For Plan and Profile, see (60283).
3. Adjust extents of erosion control blanket as directed by COR.
4. For typical wash crossing details, see (60335 & 60336).

RECLAMATION
Managing Water in the West

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U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
NAVAJO-GALLUP WATER SUPPLY PROJECT
NEW MEXICO

SAN JUAN LATERAL - REACH 9

LINE PIPE

DESIGNED	JOEL SHOLTES
DRAWN	SHANNON MONAHAN
CHECKED	ANDREW MARNER
TECH. APPR.	Sixta, Michael P.E.
APPROVED	Bowles, Linda M P.E.
	PEER REVIEWER – Technical Approve
DENVER, CO	2017-03-30

WASH CROSSING

STA. 90097+40

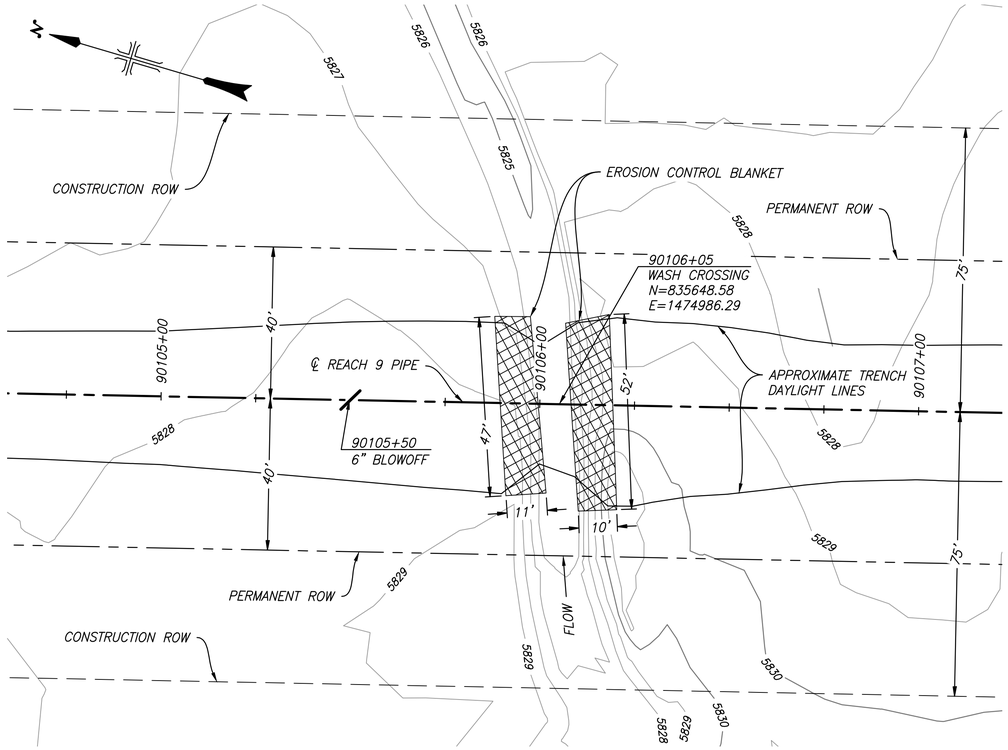
1695-D-60339

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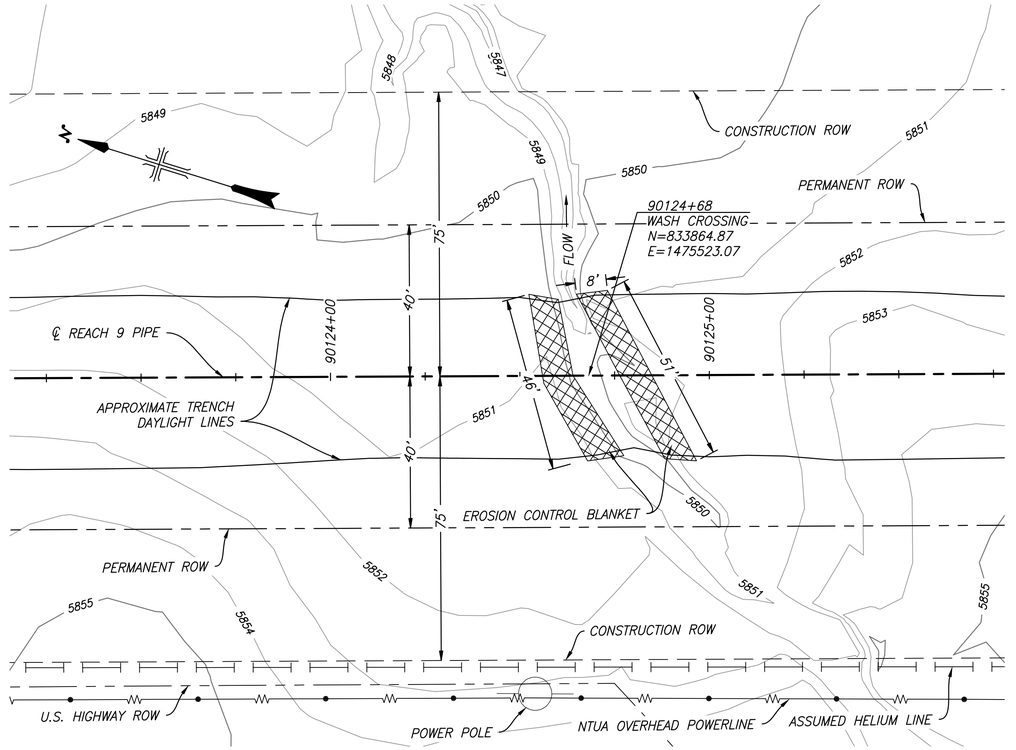
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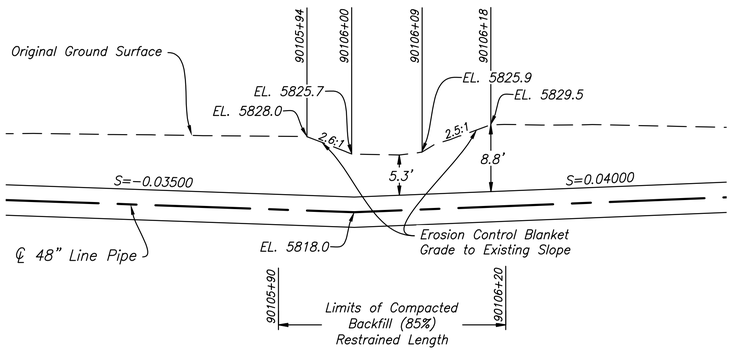
SITE PLAN STA. 90106+05

20 0 20 40 60
SCALE OF FEET



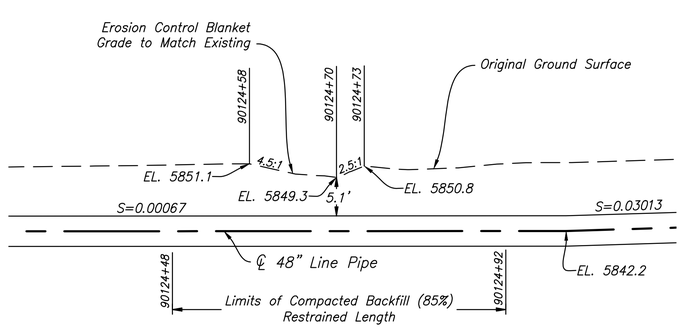
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20 0 20 40 60
SCALE OF FEET



PROFILE ALONG PIPE STA. 90106+05

10 0 10 20 30
SCALE OF FEET



PROFILE ALONG PIPE STA. 90124+68

10 0 10 20 30
SCALE OF FEET

NOTES

1. For General Notes, Symbols, Abbreviations, and Pipe Classification, see (60281).
2. For Plan and Profile, see (60284).
3. Adjust extents of erosion control blanket as directed by COR.
4. For typical wash crossing details, see (60335 & 60336).

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U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
NAVAJO-GALLUP WATER SUPPLY PROJECT
NEW MEXICO

SAN JUAN LATERAL - REACH 9

LINE PIPE

JOEL SHOLTES — DESIGNED
SHANNON MONAHAN — DRAWN
ANDREW MARNER — CHECKED
Sixta, Michael P.E. — TECH. APPR.
Bowles, Linda M P.E. — APPROVED
PEER REVIEWER – Technical Approve
DENVER, CO 2017-03-30

WASH CROSSING

STA. 90106+05
&
STA. 90124+68

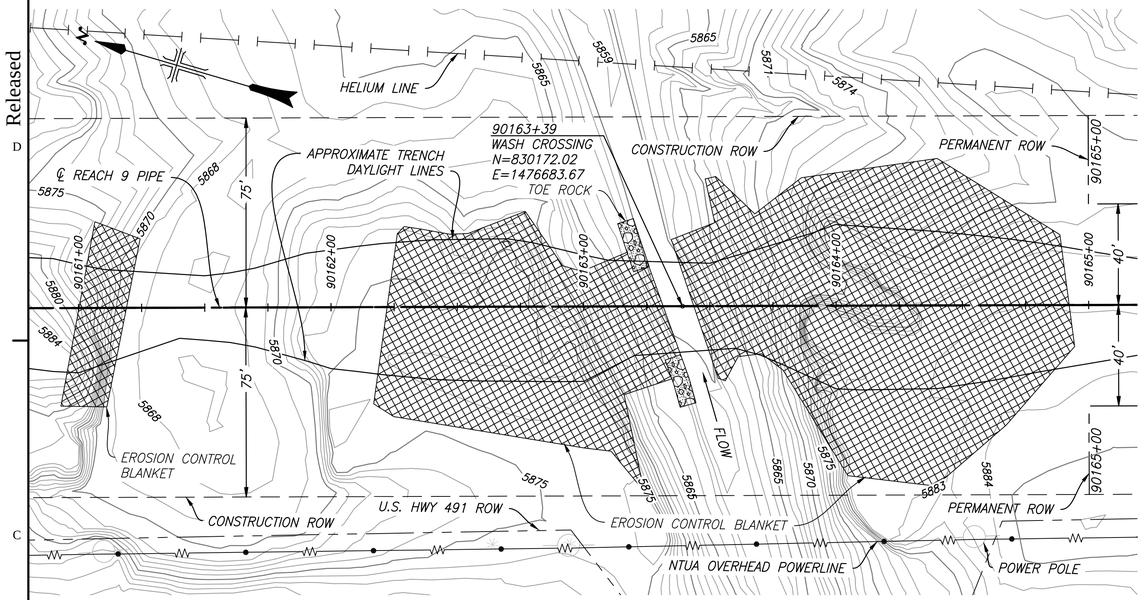
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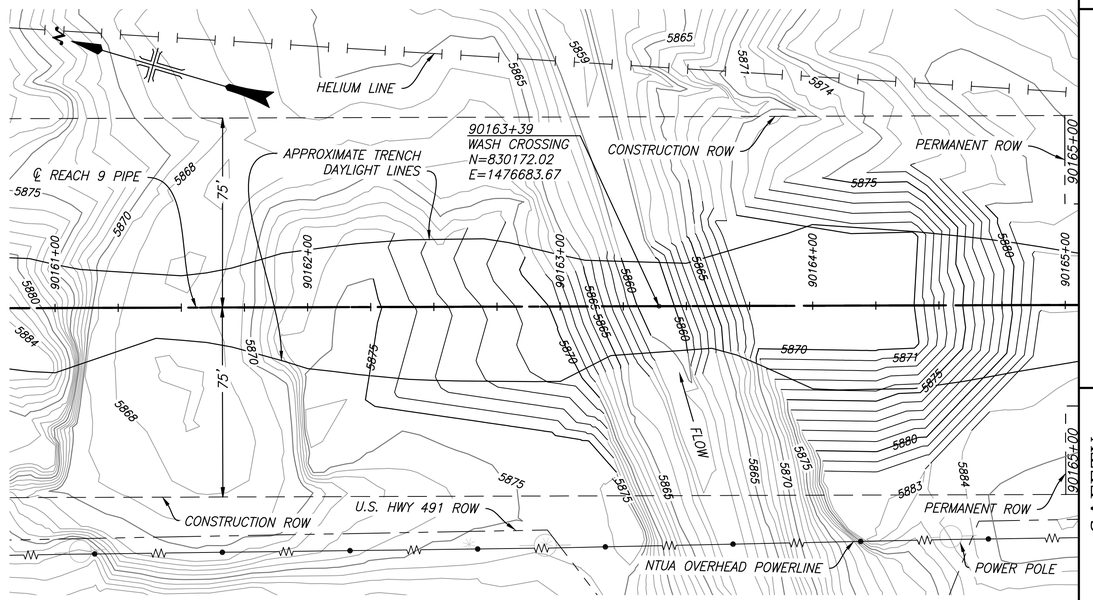
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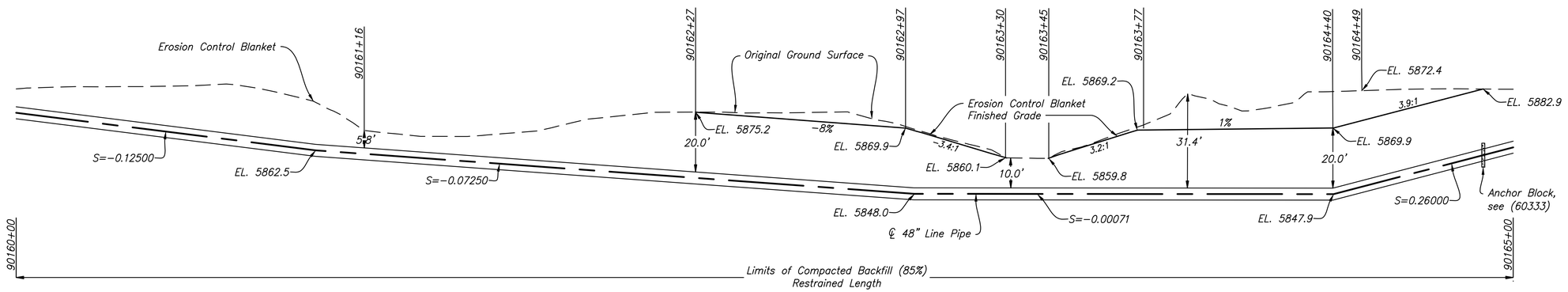
SITE PLAN

30 0 30 60 90
SCALE OF FEET



GRADING PLAN

30 0 30 60 90
SCALE OF FEET



PROFILE ALONG PIPE

10 0 10 20 30
SCALE OF FEET

NOTES

1. For General Notes, Symbols, Abbreviations, and Pipe Classification, see, (60281).
2. For Plan and Profile, see (60285).
3. Adjust extents of erosion control blanket as directed by COR.
4. For typical wash crossing details, see (60335 & 60336).
5. For steep pipe details, see (60333).

RECLAMATION
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NAVAJO-GALLUP WATER SUPPLY PROJECT
NEW MEXICO

SAN JUAN LATERAL - REACH 9

LINE PIPE

JOEL SHOLTES
DESIGNED
SHANNON MONAHAN
DRAWN
ANDREW MARNER
CHECKED
TECH. APPR.
APPROVED
PEER REVIEWER –
DENVER, CO 2017-03-30

WASH CROSSING

STA. 90163+39

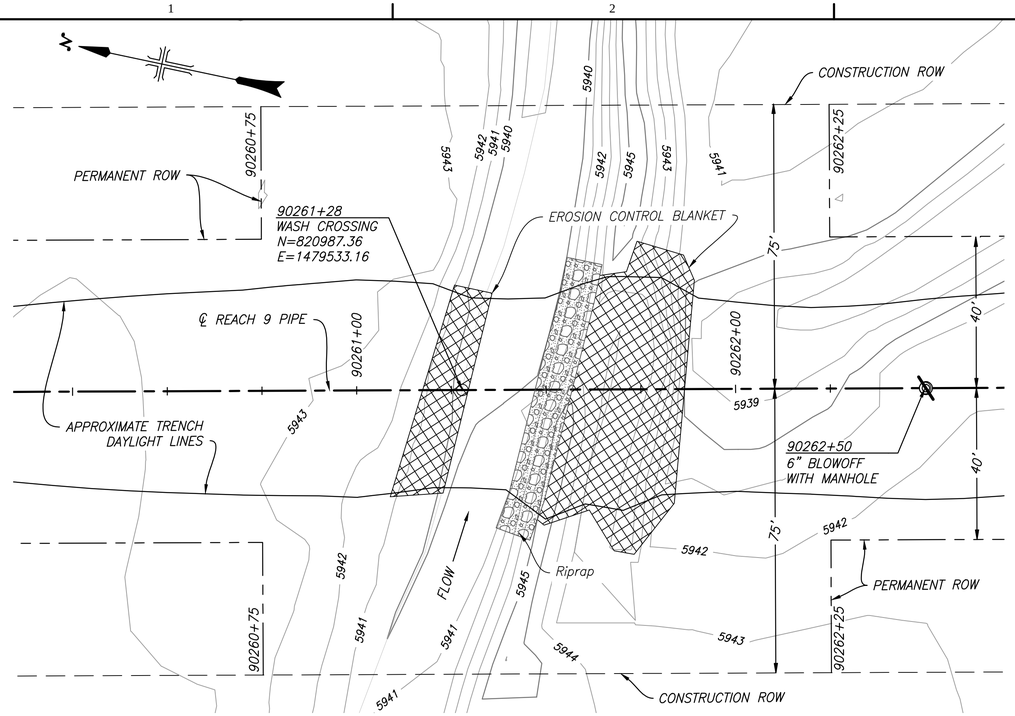
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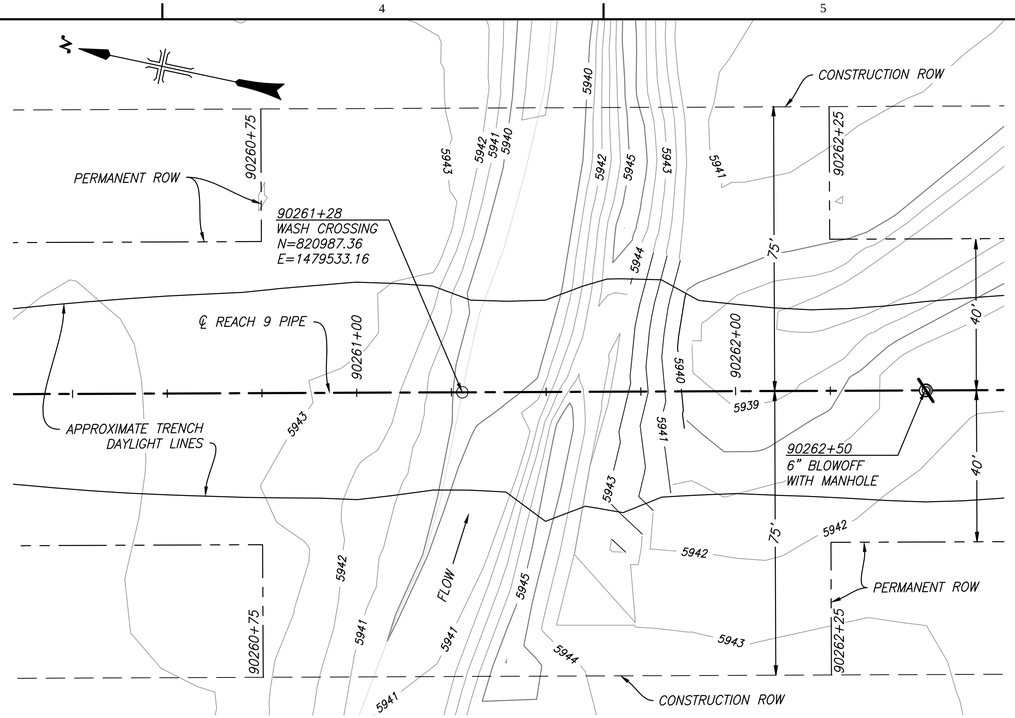
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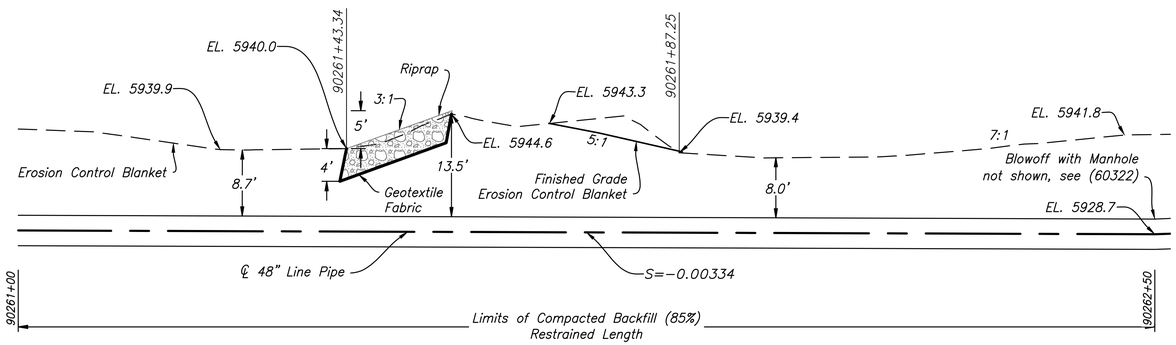
SITE PLAN

20 0 20 40 60
SCALE OF FEET



GRADING PLAN

20 0 20 40 60
SCALE OF FEET



PROFILE ALONG PIPE

10 0 10 20 30
SCALE OF FEET

NOTES

1. For General Notes, Symbols, Abbreviations, and Pipe Classification, see, (60281).
2. For Plan and Profile, see (60287).
3. Adjust extents of erosion control blanket as directed by COR.
4. For typical wash crossing details, see (60335 & 60336).
5. For Blowoff with Manhole, see (60322).

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NAVAJO-GALLUP WATER SUPPLY PROJECT
NEW MEXICO

SAN JUAN LATERAL - REACH 9

LINE PIPE

JOEL SHOLTES
DESIGNED
SHANNON MONAHAN
DRAWN
ANDREW MARNER
CHECKED
Sixta, Michael P.E.
TECH. APPR.
Bowles, Linda M P.E.
APPROVED
PEER REVIEWER – Technical Approve

DENVER, CO 2017-03-30

WASH CROSSING

STA. 90261+28

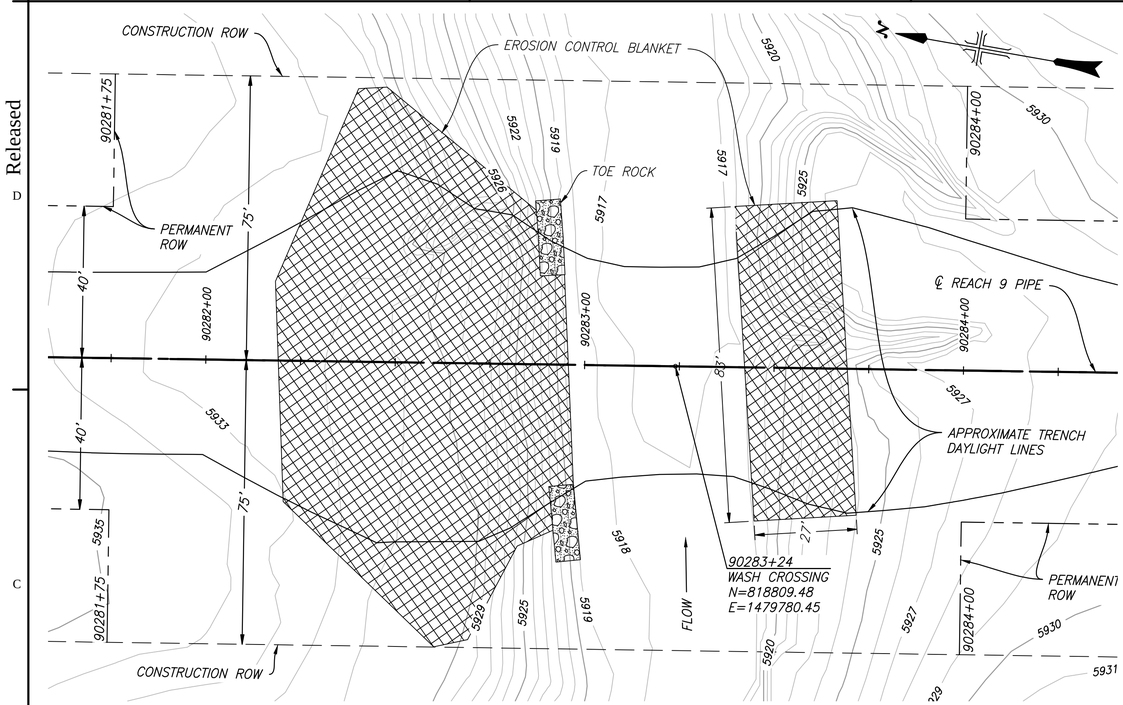
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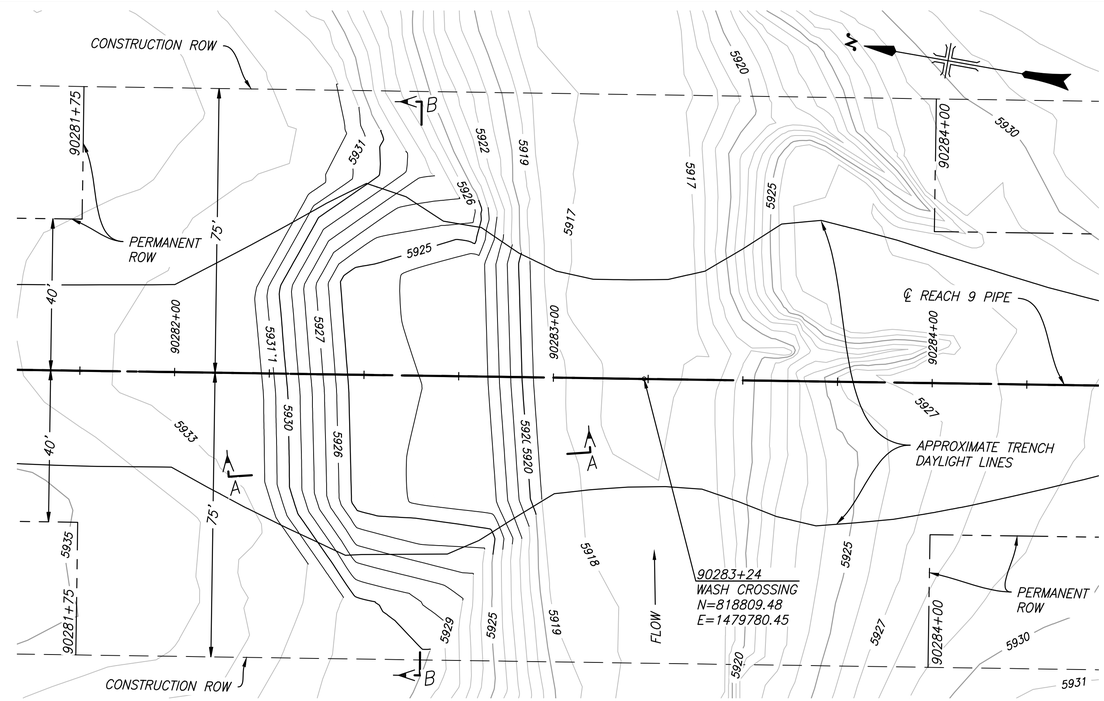
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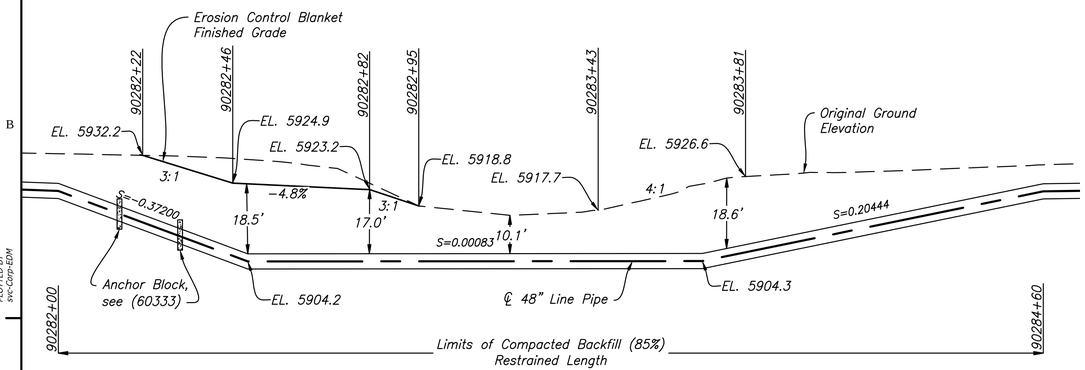
SITE PLAN

20 0 20 40 60
SCALE OF FEET



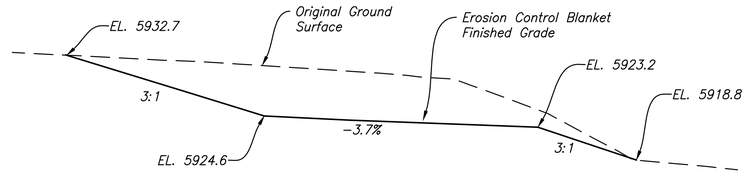
GRADING PLAN

20 0 20 40 60
SCALE OF FEET



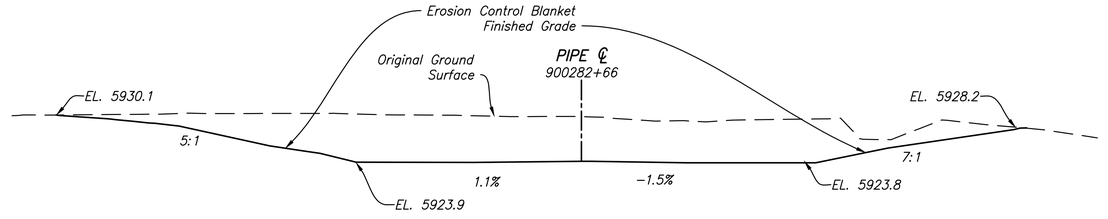
PROFILE ALONG PIPE

20 0 20 40 60
SCALE OF FEET



WASH CROSSING SECTION A–A

10 0 10 20 30
SCALE OF FEET



WASH CROSSING SECTION B–B

10 0 10 20 30
SCALE OF FEET

NOTES

1. For General Notes, Symbols, Abbreviations, and Pipe Classification, see (60281).
2. For Plan and Profile, see (60287).
3. Adjust extents of erosion control blanket as directed by COR.
4. Typical wash crossing details, see (60335 & 60336).
5. For steep pipe details, see (60333).

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BUREAU OF RECLAMATION
NAVAJO-GALLUP WATER SUPPLY PROJECT
NEW MEXICO

SAN JUAN LATERAL - REACH 9

LINE PIPE

JOEL SHOLTES
DESIGNED
SHANNON MONAHAN
DRAWN
ANDREW MARNER
CHECKED
Sixta, Michael P.E.
TECH. APPR.
Bowles, Linda M P.E.
APPROVED
PEER REVIEWER – Technical Approve

DENVER, CO 2017-03-30

WASH CROSSING

STA. 90283+24

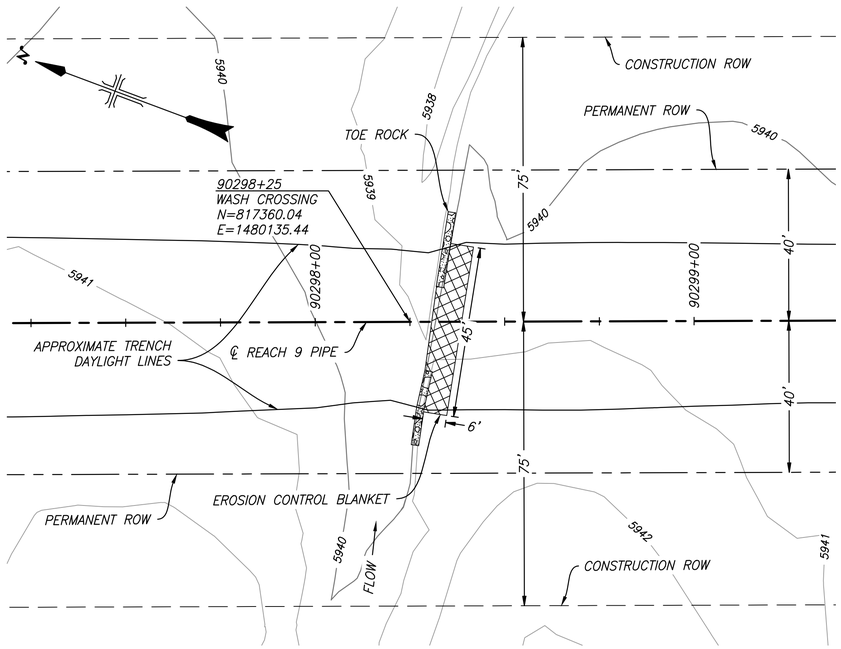
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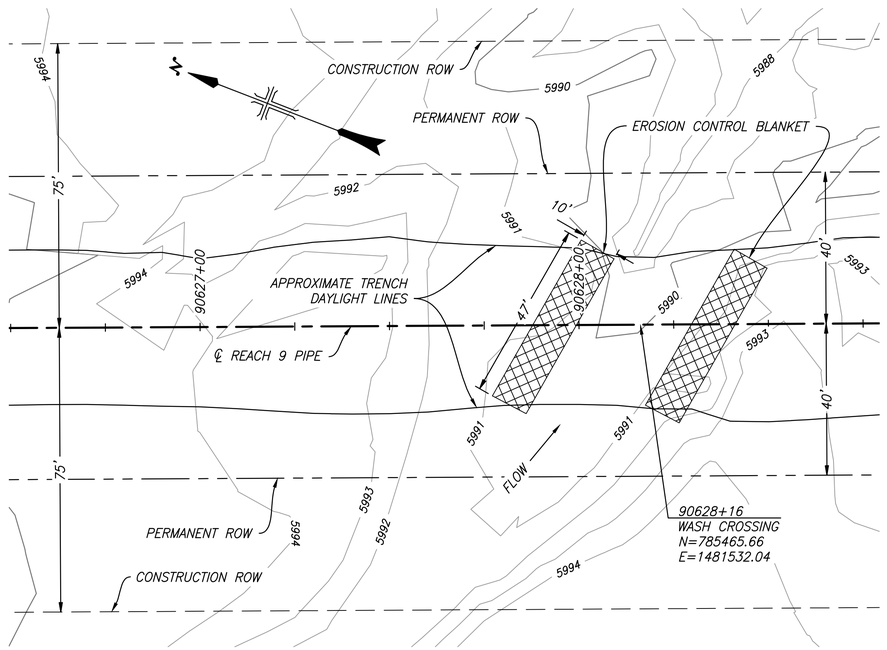
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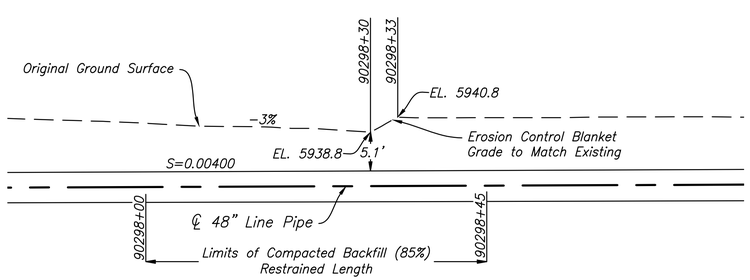
SITE PLAN STA. 90298+25

SCALE OF FEET



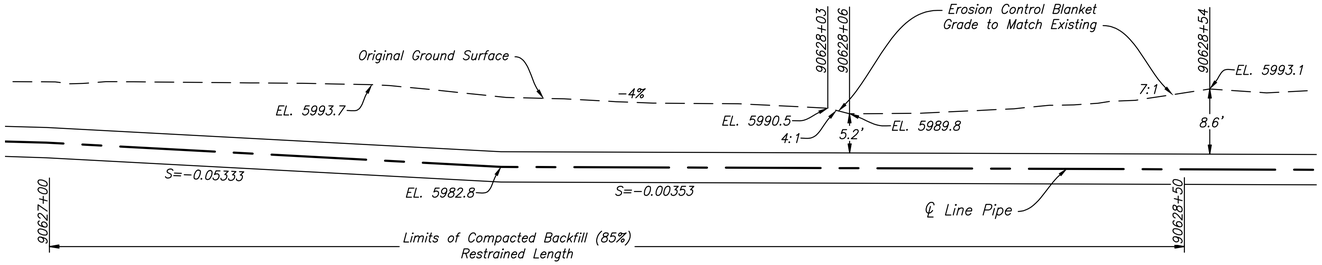
SITE PLAN STA. 90628+16

SCALE OF FEET



PROFILE ALONG PIPE STA. 90298+25

SCALE OF FEET



PROFILE ALONG PIPE STA. 90628+16

SCALE OF FEET

NOTES

1. For General Notes, Symbols, Abbreviations, and Pipe Classification, see, (60281).
2. For Wash Crossing at 90298+25, see (60287) for Plan and Profile.
3. For Wash Crossing at 90628+16, see (60294) for Plan and Profile.
4. Adjust extents of erosion control blanket as directed by COR.
5. For typical wash crossing details, see (60335 & 60336).

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BUREAU OF RECLAMATION
NAVAJO-GALLUP WATER SUPPLY PROJECT
NEW MEXICO

SAN JUAN LATERAL - REACH 9

LINE PIPE

DESIGNED	JOEL SHOLTES
DRAWN	SHANNON MONAHAN
CHECKED	ANDREW MARNER
TECH. APPR.	Sixta, Michael P.E.
APPROVED	Bowles, Linda M P.E.
	PEER REVIEWER – Technical Approve
DENVER, CO	2017-03-30

WASH CROSSING

STA. 90298+25
&
STA. 90628+16

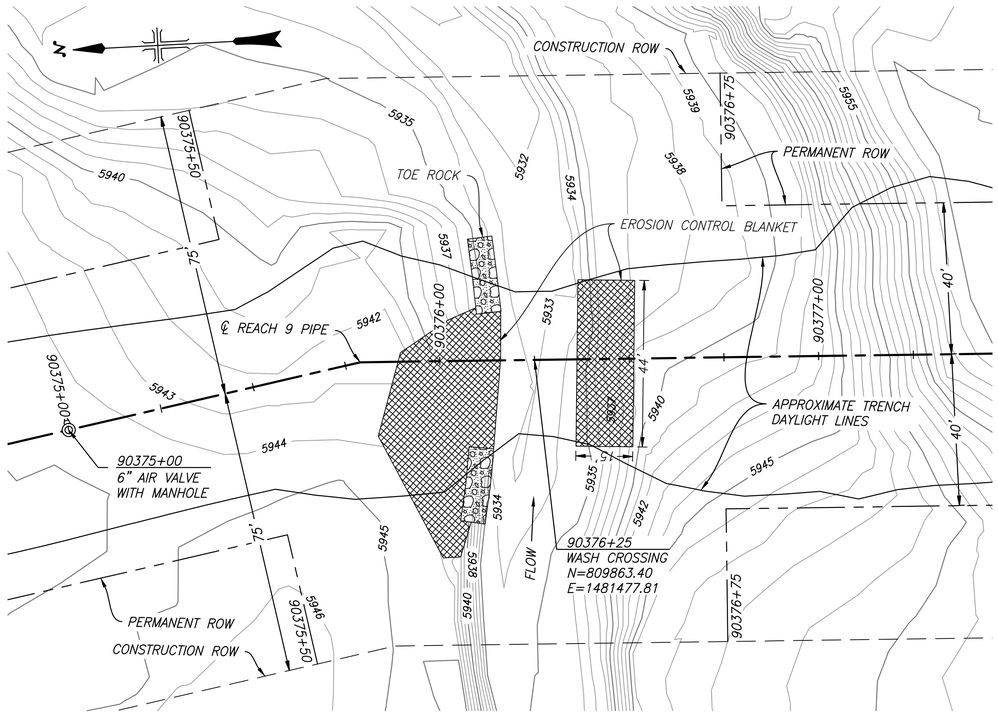
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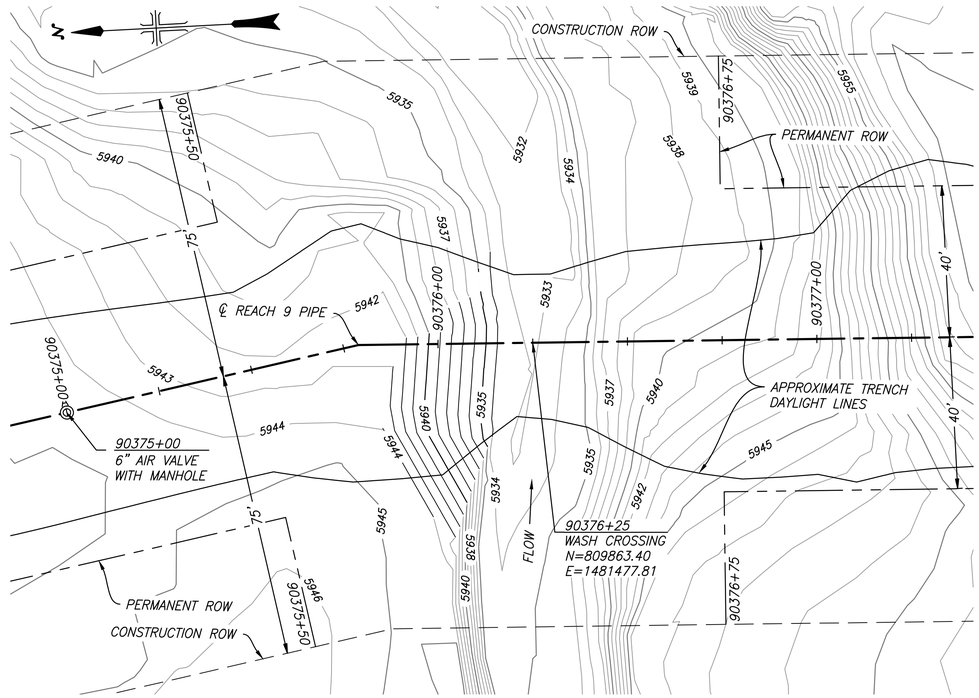
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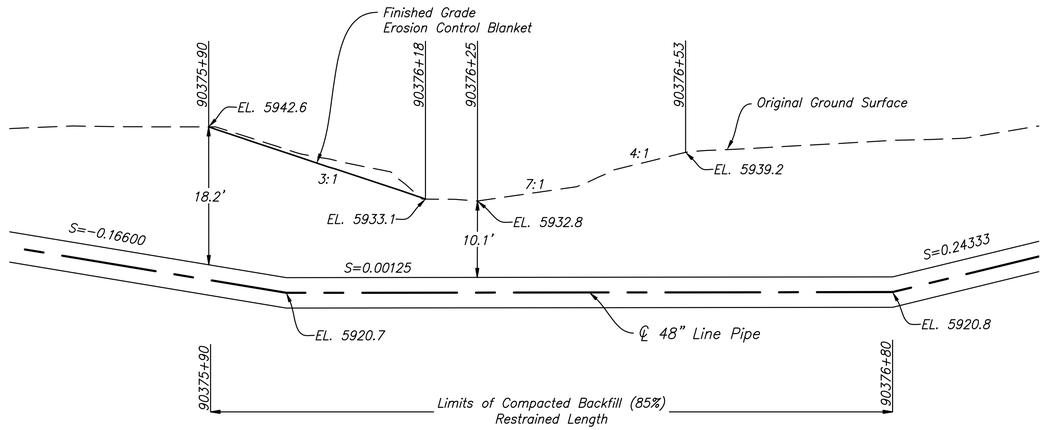
SITE PLAN

SCALE OF FEET 20 0 20 40 60



GRADING PLAN

SCALE OF FEET 20 0 20 40 60



PROFILE ALONG PIPE

SCALE OF FEET 10 0 10 20 30

NOTES

1. For General Notes, Symbols, Abbreviations, and Pipe Classification, see (60281).
2. For Plan and Profile, see (60289).
3. Adjust extents of erosion control blanket as directed by COR.
4. For typical wash crossing details, see (60335 & 60336).

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BUREAU OF RECLAMATION
NAVAJO-GALLUP WATER SUPPLY PROJECT
NEW MEXICO

SAN JUAN LATERAL - REACH 9

LINE PIPE

JOEL SHOLTES
DESIGNED
SHANNON MONAHAN
DRAWN
ANDREW MARNER
CHECKED
Sixta, Michael P.E.
TECH. APPR.
Bowles, Linda M P.E.
APPROVED
PEER REVIEWER – Technical Approve

DENVER, CO 2017-03-30

WASH CROSSING

STA. 90376+25

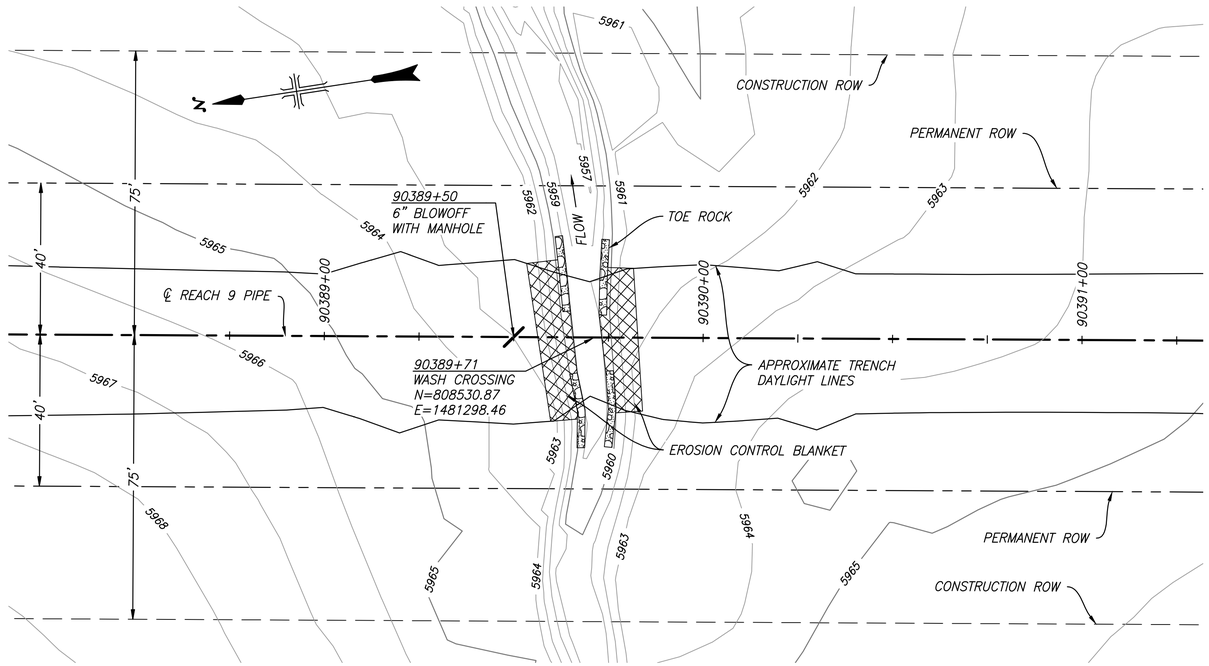
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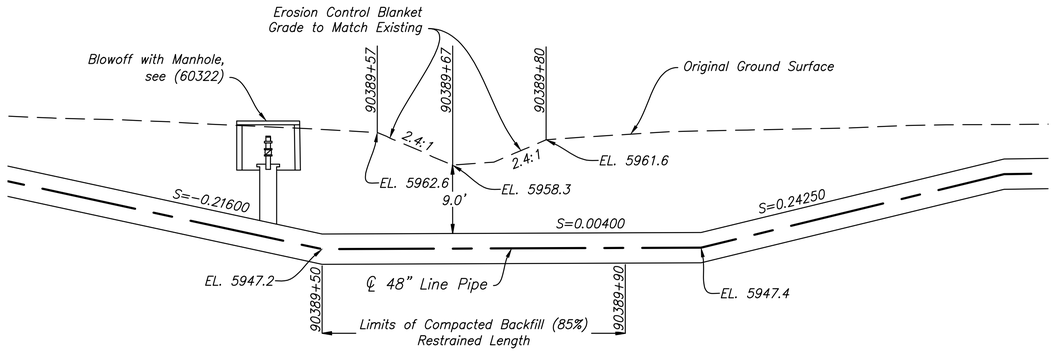
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SITE PLAN

20 0 20 40 60
SCALE OF FEET



PROFILE ALONG PIPE

10 0 10 20 30
SCALE OF FEET

NOTES

1. For General Notes, Symbols, Abbreviations, and Pipe Classification, see (60281).
2. For Plan and Profile, see (60289).
3. Adjust extents of erosion control blanket as directed by COR.
4. For typical wash crossing details, see (60335 & 60336).
5. For Bowoff with Manhole, see (60322).

RECLAMATION
Managing Water in the West

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U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
NAVAJO-GALLUP WATER SUPPLY PROJECT
NEW MEXICO

SAN JUAN LATERAL - REACH 9

LINE PIPE

DESIGNED	JOEL SHOLTES
DRAWN	SHANNON MONAHAN
CHECKED	ANDREW MARNER
TECH. APPR.	Sixta, Michael P.E.
APPROVED	Bowles, Linda M P.E.
	PEER REVIEWER – Technical Approve
DENVER, CO	2017-03-30

WASH CROSSING

STA. 90389+71

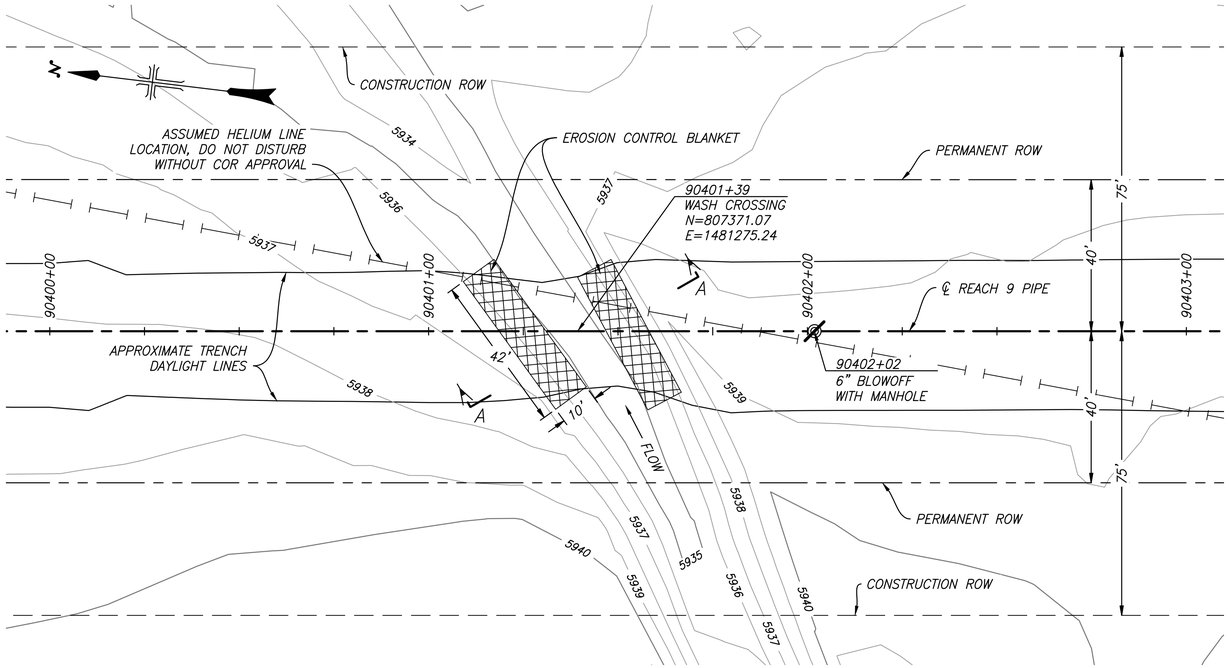
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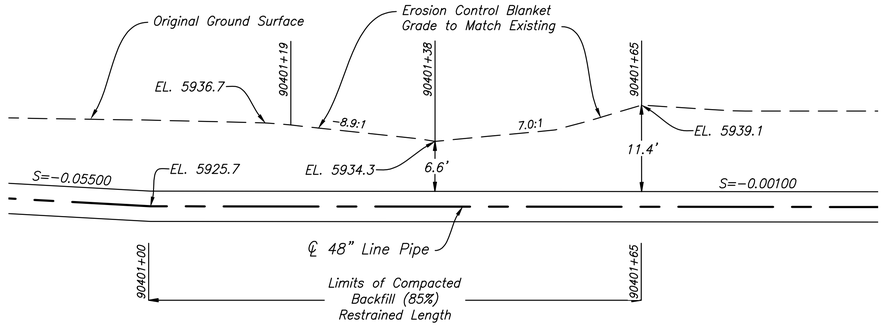
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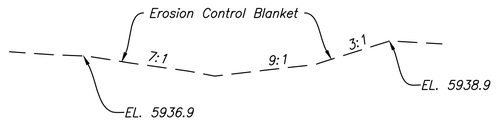
SITE PLAN

20 0 20 40 60
SCALE OF FEET



PROFILE ALONG PIPE

10 0 10 20 30
SCALE OF FEET



WASH CROSSING SECTION A–A

10 0 10 20 30
SCALE OF FEET

NOTES

1. For General Notes, Symbols, Abbreviations, and Pipe Classification, see (60281).
2. For Plan and Profile, see (60290).
3. Adjust extents of erosion control blanket as directed by COR.
4. For typical wash crossing details, see (60335 & 60336).

RECLAMATION
Managing Water in the West

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U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
NAVAJO-GALLUP WATER SUPPLY PROJECT
NEW MEXICO

SAN JUAN LATERAL - REACH 9

LINE PIPE

JOEL SHOLTES
DESIGNED
SHANNON MONAHAN
DRAWN
ANDREW MARNER
CHECKED
Sixta, Michael P.E.
TECH. APPR.
Bowles, Linda M P.E.
APPROVED
PEER REVIEWER – Technical Approve

DENVER, CO 2017-03-30

WASH CROSSING

STA. 90401+39

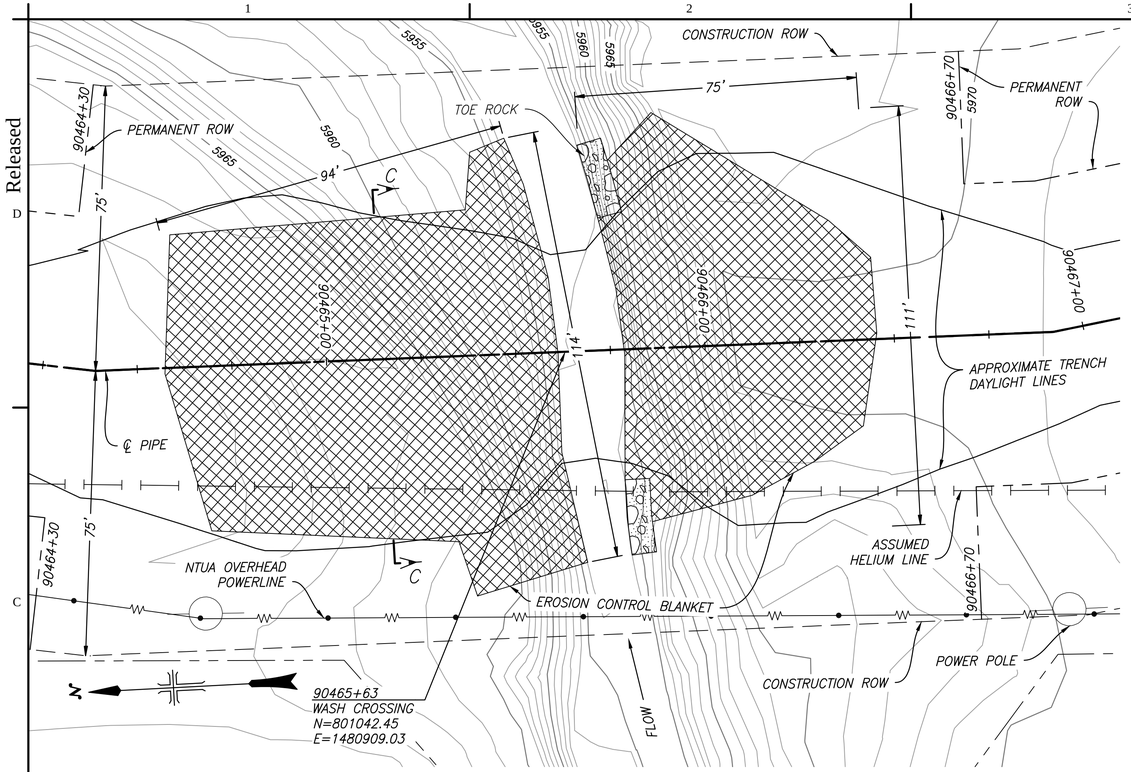
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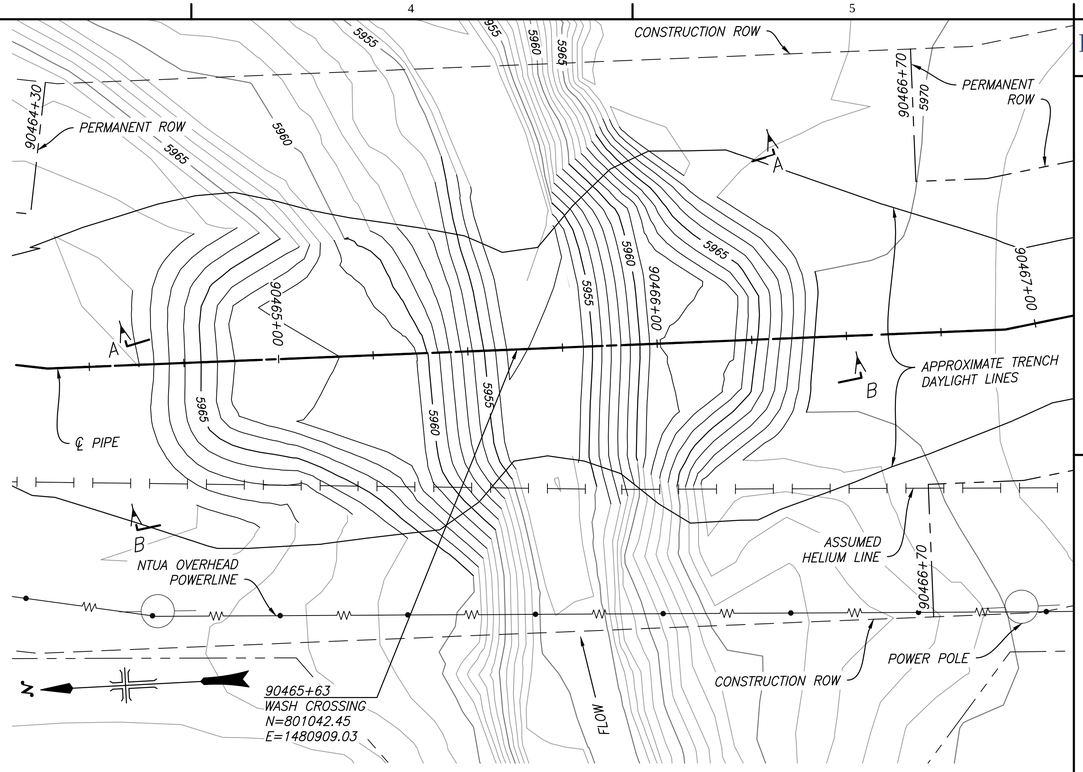
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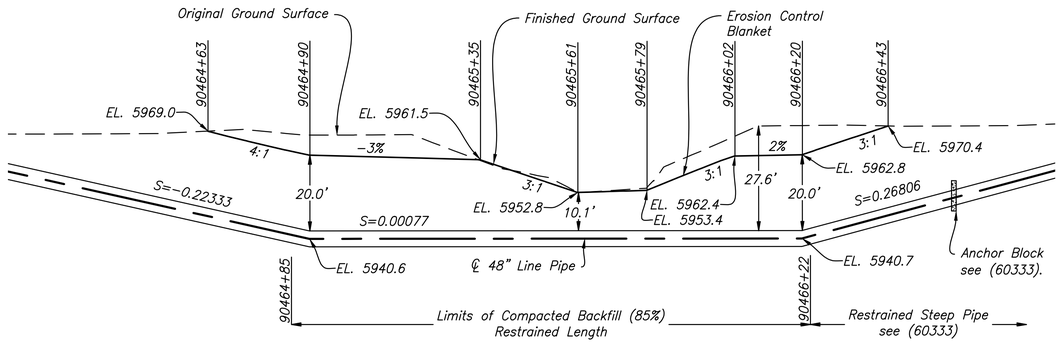
SITE PLAN

SCALE OF FEET



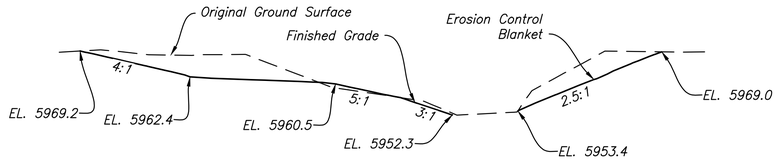
GRADING PLAN

SCALE OF FEET



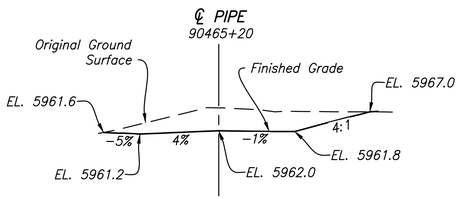
PROFILE ALONG PIPE

SCALE OF FEET



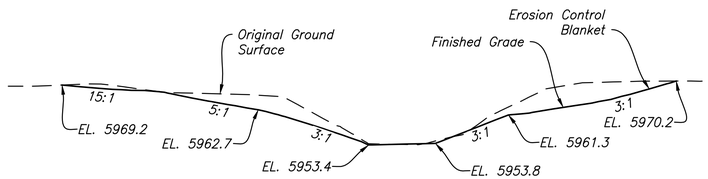
WASH CROSSING SECTION A–A

SCALE OF FEET



WASH CROSSING SECTION C–C

SCALE OF FEET



WASH CROSSING SECTION B–B

SCALE OF FEET

NOTES

1. For General Notes, Symbols, Abbreviations, and Pipe Classification, see (60281).
2. For Plan and Profile, see (60291).
3. Adjust extents of erosion control blanket as directed by COR.
4. For typical wash crossing details, see (60335 & 60336).
5. For steep pipe details, see (60333).

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Managing Water in the West

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BUREAU OF RECLAMATION
NAVAJO-GALLUP WATER SUPPLY PROJECT
NEW MEXICO

SAN JUAN LATERAL - REACH 9

LINE PIPE

JOEL SHOLTES
DESIGNED
SHANNON MONAHAN
DRAWN
ANDREW MARNER
CHECKED
Sixta, Michael P.E.
TECH. APPR.
Bowles, Linda M P.E.
APPROVED
PEER REVIEWER – Technical Approve
DENVER, CO 2017-03-30

WASH CROSSING

STA. 90465+63

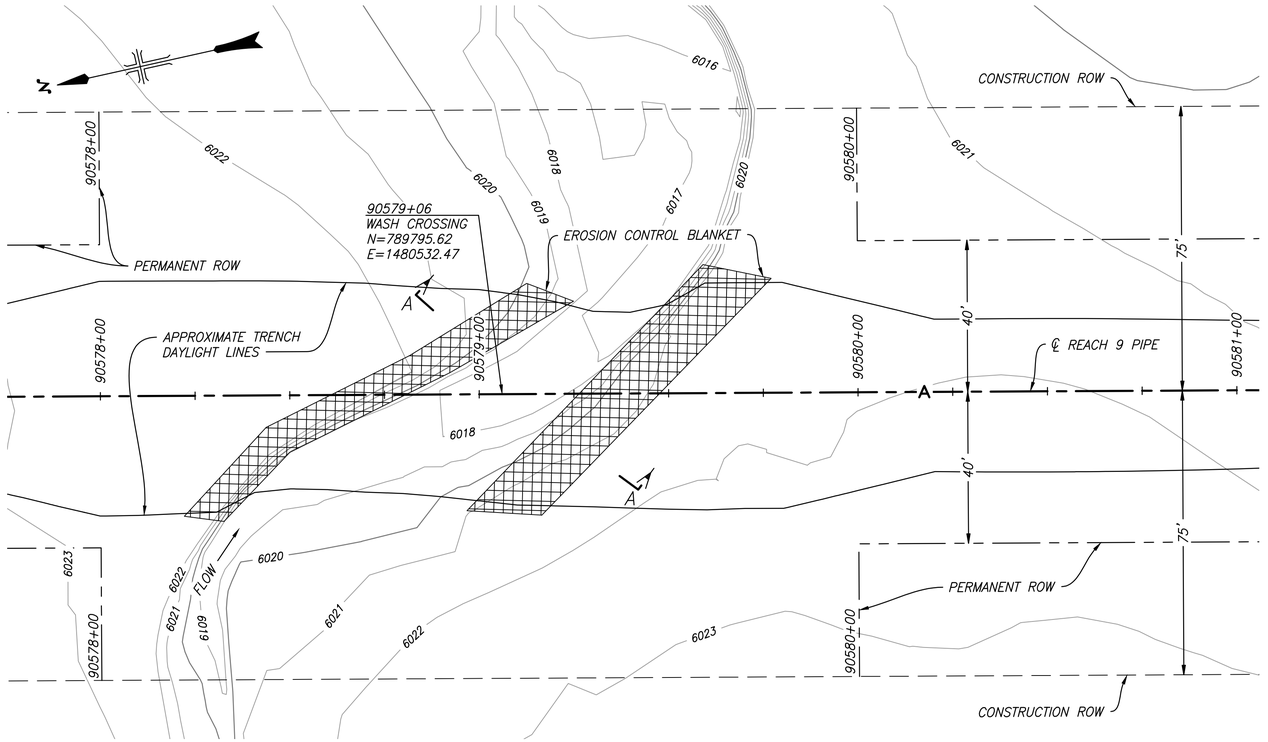
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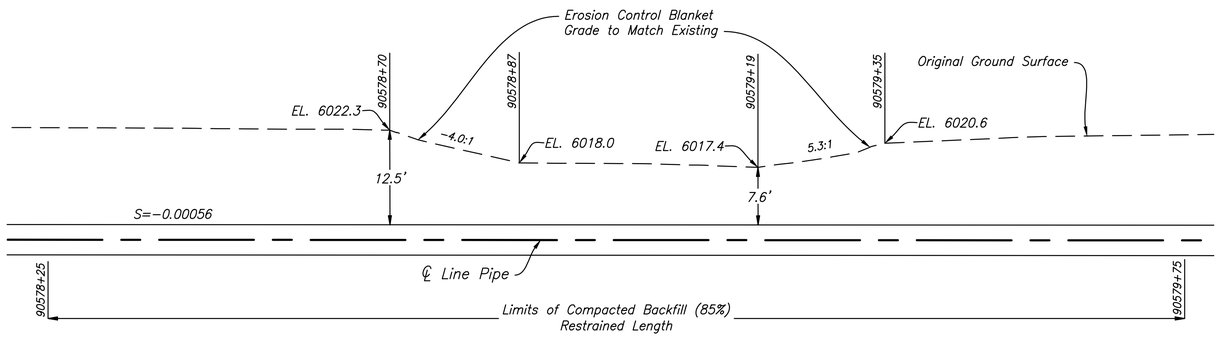
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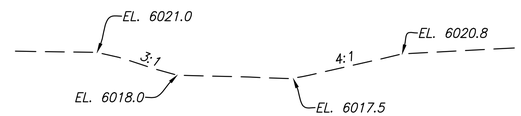
SITE PLAN

SCALE OF FEET



PROFILE ALONG PIPE

SCALE OF FEET



WASH CROSSING SECTION A–A

SCALE OF FEET

NOTES

1. For General Notes, Symbols, Abbreviations, and Pipe Classification, see (60281).
2. For Plan and Profile, see (60293).
3. Adjust extents of erosion control blanket as directed by COR.
4. For typical wash crossing details, see (60335 & 60336).

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NEW MEXICO

SAN JUAN LATERAL - REACH 9

LINE PIPE

JOEL SHOLTES
DESIGNED
SHANNON MONAHAN
DRAWN
ANDREW MARNER
CHECKED
Sixta, Michael P.E.
TECH. APPR.
Bowles, Linda M P.E.
APPROVED
PEER REVIEWER – Technical Approve

DENVER, CO 2017-03-30

WASH CROSSING

STA. 90579+06

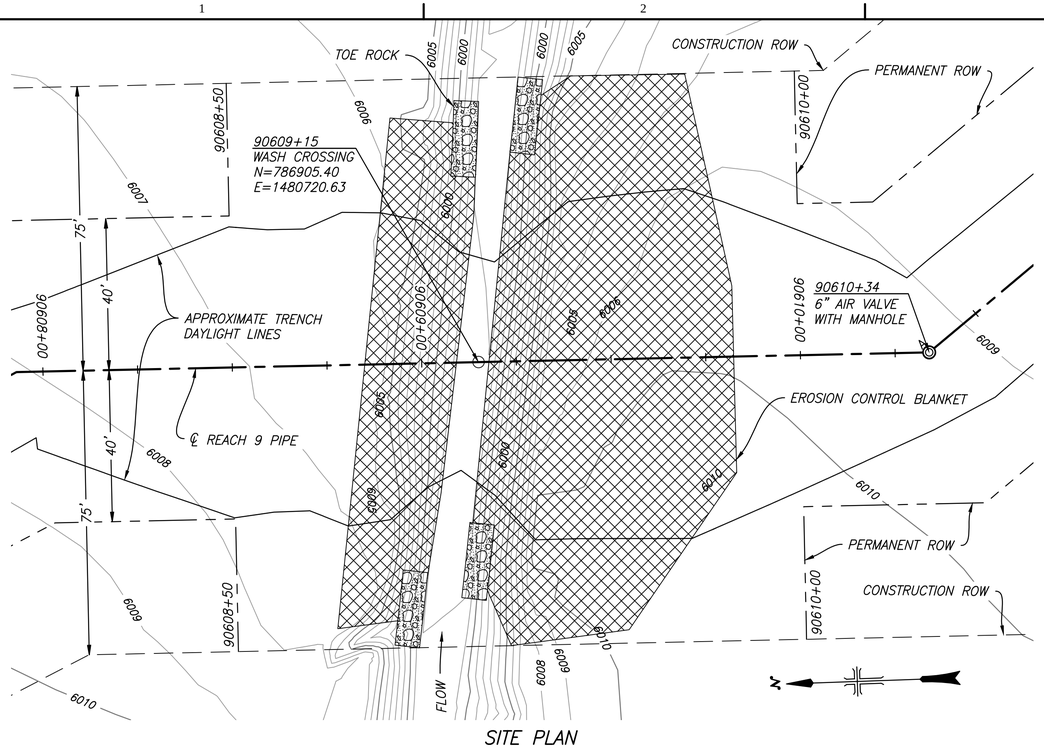
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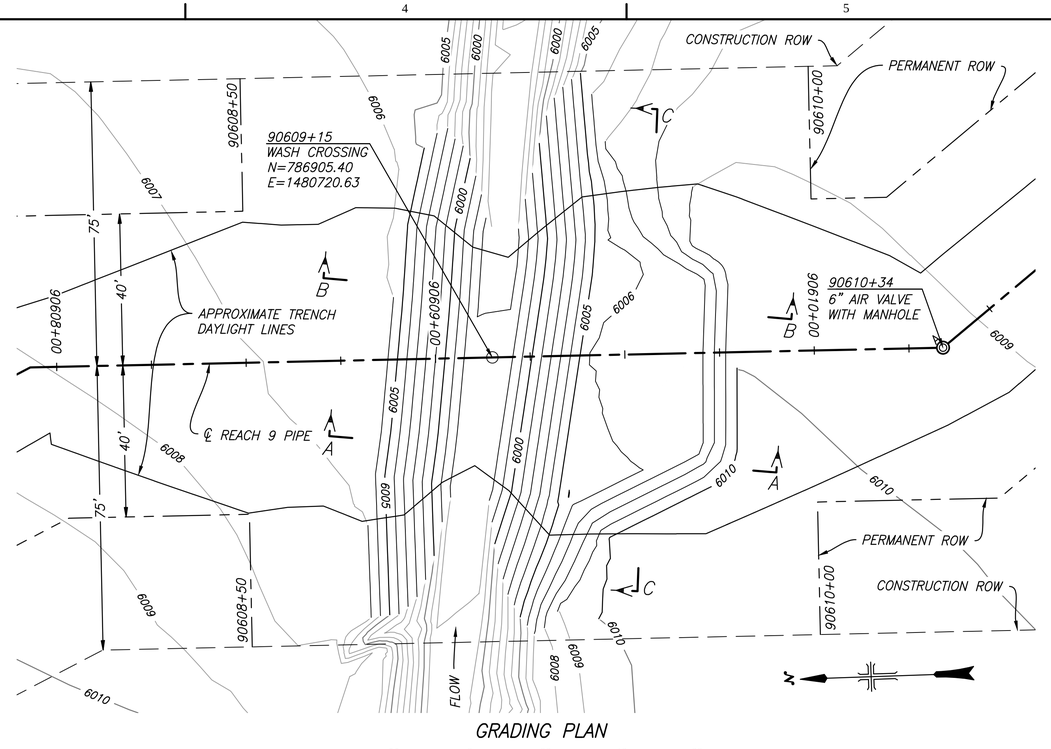
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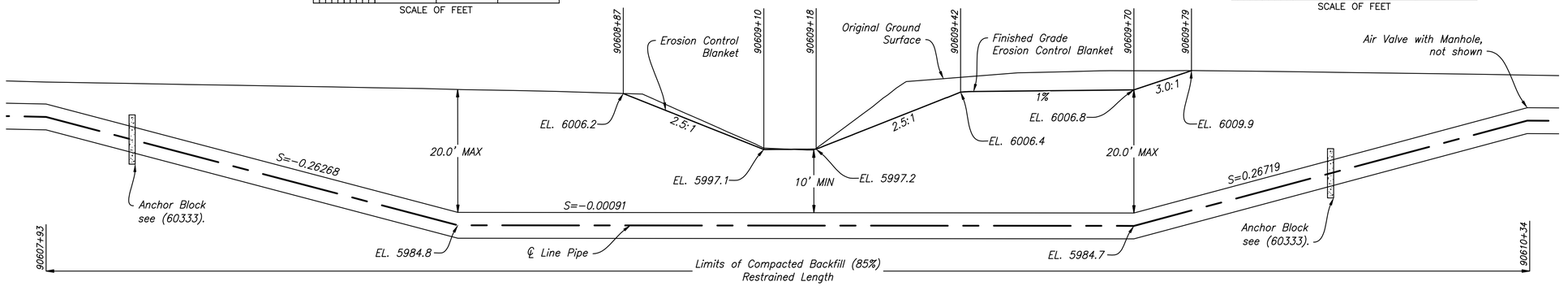
SITE PLAN

SCALE OF FEET 20 0 20 40 60



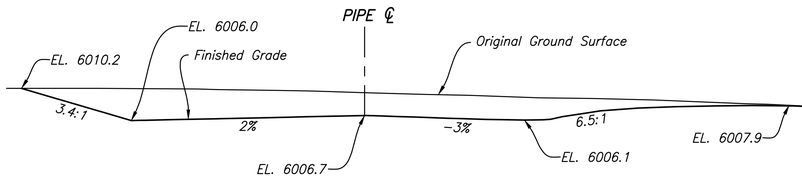
GRADING PLAN

SCALE OF FEET 20 0 20 40 60



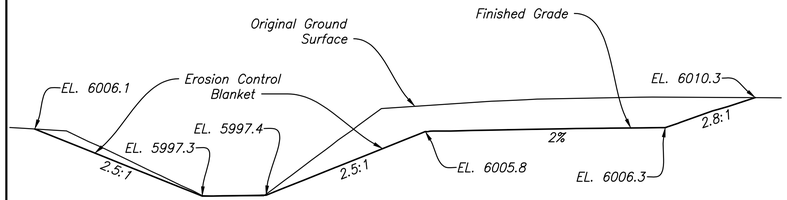
PROFILE ALONG PIPE

SCALE OF FEET 10 0 10 20 30



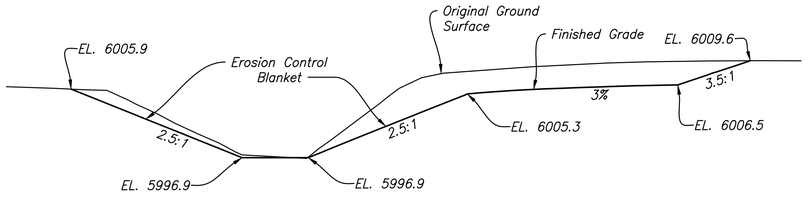
WASH CROSSING SECTION C–C

SCALE OF FEET 10 0 10 20 30



WASH CROSSING SECTION A–A

SCALE OF FEET 10 0 10 20 30



WASH CROSSING SECTION B–B

SCALE OF FEET 10 0 10 20 30

NOTES

1. For General Notes, Symbols, Abbreviations, and Pipe Classification, see (60281).
2. For Plan and Profile, see (60294).
3. Adjust extents of erosion control blanket as directed by COR.
4. For typical wash crossing details, see (60335 & 60336).
5. For steep pipe details, see (60333).
6. For air valve details, see (60318 & 60320).

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NAVAJO-GALLUP WATER SUPPLY PROJECT
NEW MEXICO

SAN JUAN LATERAL - REACH 9

LINE PIPE

JOEL SHOLTES
DESIGNED
SHANNON MONAHAN
DRAWN
ANDREW MARNER
CHECKED
Sixta, Michael P.E.
TECH. APPR.
Bowles, Linda M P.E.
APPROVED
PEER REVIEWER – Technical Approve
DENVER, CO 2017-03-30

WASH CROSSING

STA. 90609+15

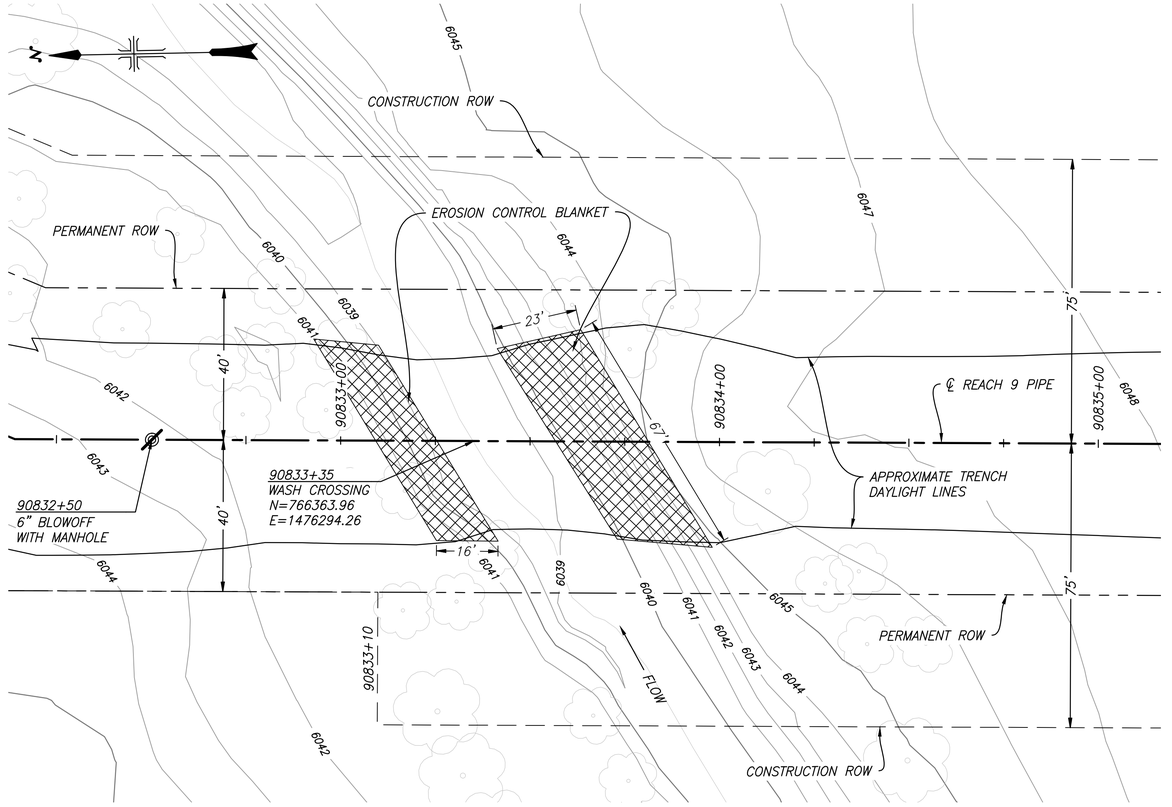
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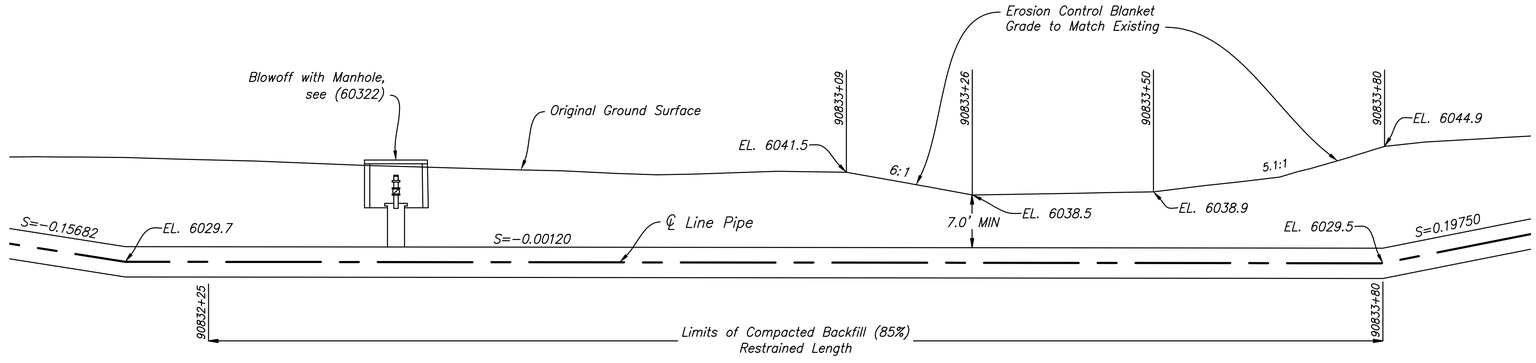
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SITE PLAN

20 0 20 40 60
SCALE OF FEET



PROFILE ALONG PIPE

10 0 10 20 30
SCALE OF FEET

NOTES

1. For General Notes, Symbols, Abbreviations, and Pipe Classification, see (60281).
2. For Plan and Profile, see (60298).
3. Adjust extents of erosion control blanket as directed by COR.
4. Dewatering expected at this crossing. Contractor to submit dewatering plan.
5. For typical wash crossing details, see (60335 & 60336).
6. For blowoff with manhole, see (60322).

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NAVAJO-GALLUP WATER SUPPLY PROJECT
NEW MEXICO

SAN JUAN LATERAL - REACH 9

LINE PIPE

DESIGNED	JOEL SHOLTES
DRAWN	SHANNON MONAHAN
CHECKED	ANDREW MARNER
TECH. APPR.	Sixto, Michael P.E.
APPROVED	Bowles, Linda M P.E.
	PEER REVIEWER – Technical Approve
DENVER, CO	2017-03-30

WASH CROSSING

STA. 90833+35

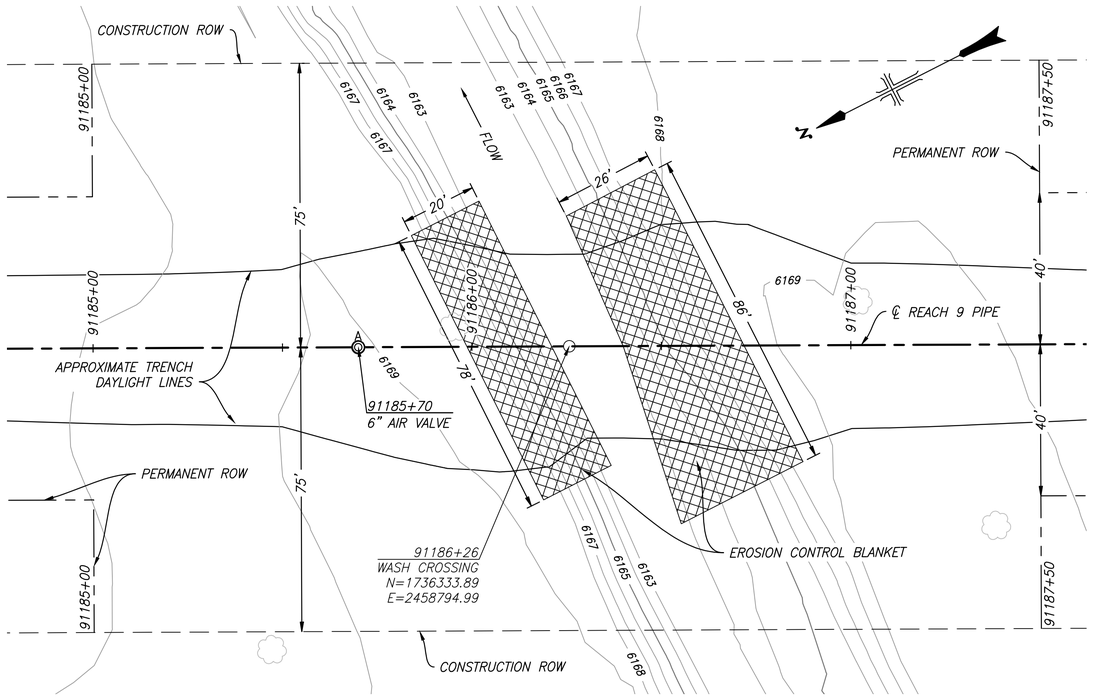
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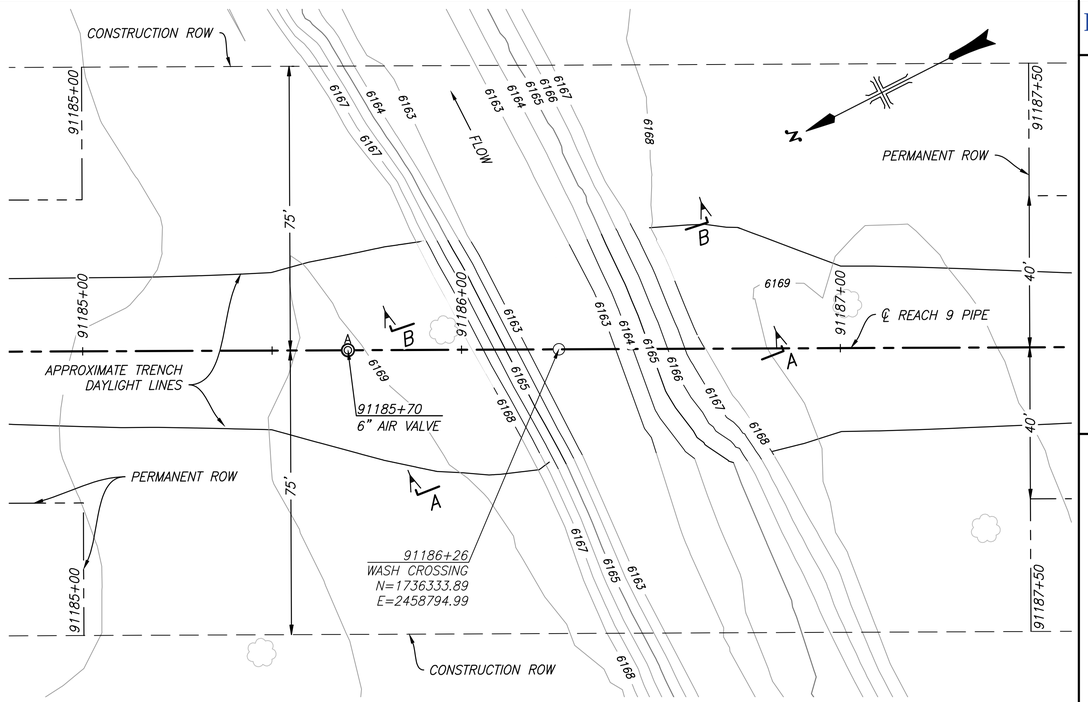
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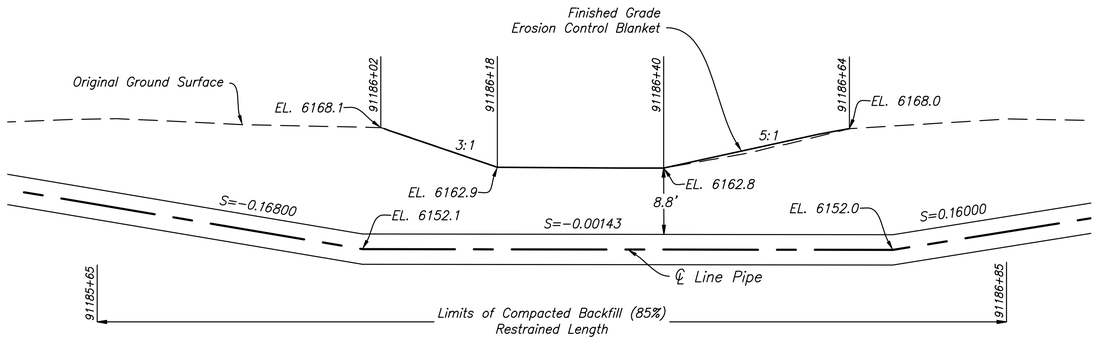
SITE PLAN

SCALE OF FEET: 20 0 20 40 60



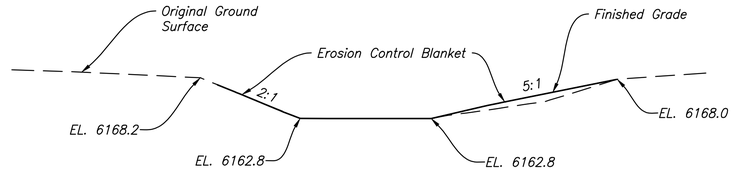
GRADING PLAN

SCALE OF FEET: 20 0 20 40 60



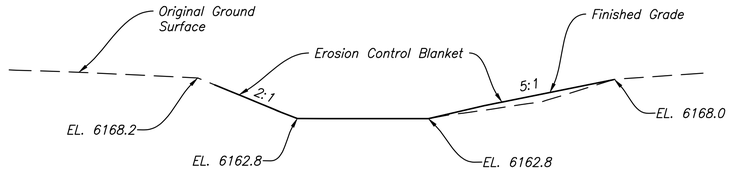
PROFILE ALONG PIPE

SCALE OF FEET: 10 0 10 20 30



WASH CROSS SECTION B–B

SCALE OF FEET: 20 0 20 40 60



WASH CROSS SECTION A–A

SCALE OF FEET: 10 0 10 20 30

NOTES

1. For General Notes, Symbols, Abbreviations, and Pipe Classification, see (60281).
2. For Plan and Profile, see (60305).
3. Adjust extents of erosion control blanket as directed by COR.
4. For typical wash crossing details, see (60335 & 60336).

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NEW MEXICO

SAN JUAN LATERAL - REACH 9

LINE PIPE

JOEL SHOLTES
DESIGNED
SHANNON MONAHAN
DRAWN
ANDREW MARNER
CHECKED
Sixta, Michael P.E.
TECH. APPR.
Bowles, Linda M P.E.
APPROVED
PEER REVIEWER – Technical Approve

DENVER, CO 2017-03-30

WASH CROSSING

STA. 91186+26

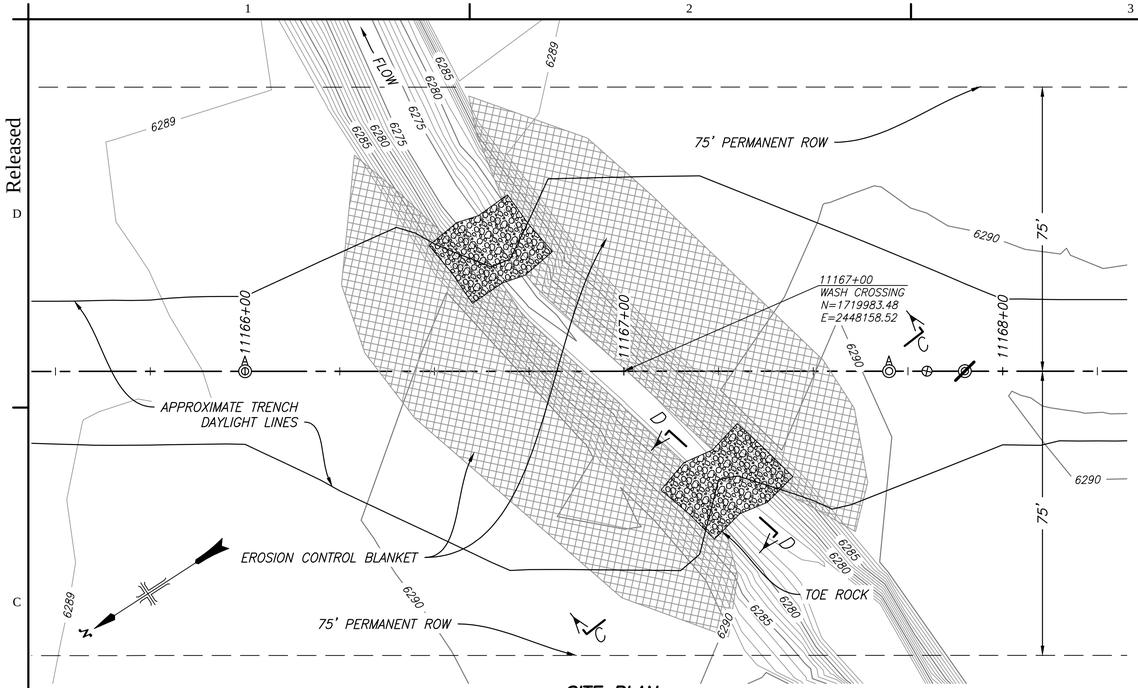
1695-D-60356

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svc-Corp-EDM

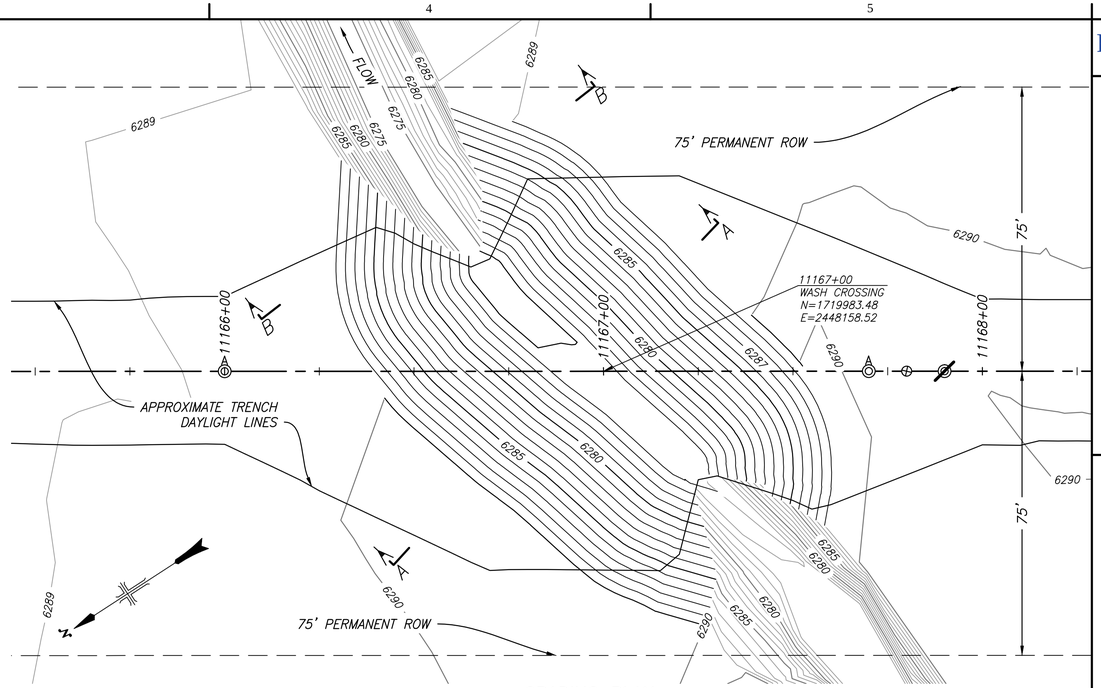
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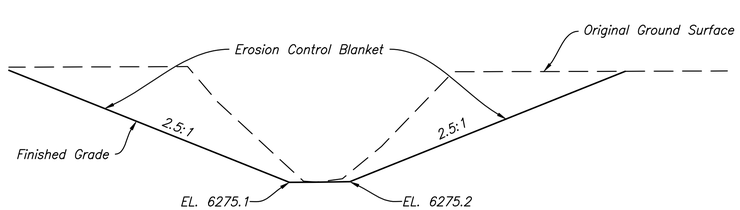
SITE PLAN

SCALE OF FEET: 20 0 20 40 60



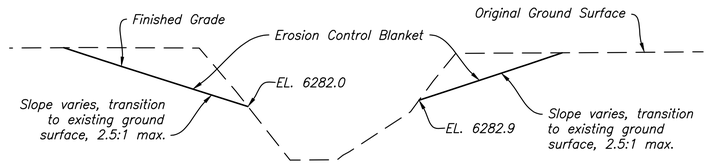
GRADING PLAN

SCALE OF FEET: 20 0 20 40 60



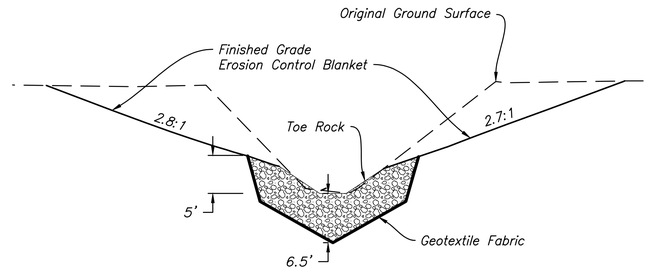
SECTION A–A

SCALE OF FEET: 10 0 10 20 30



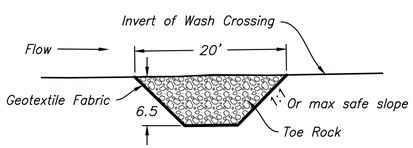
SECTION B–B

SCALE OF FEET: 10 0 10 20 30



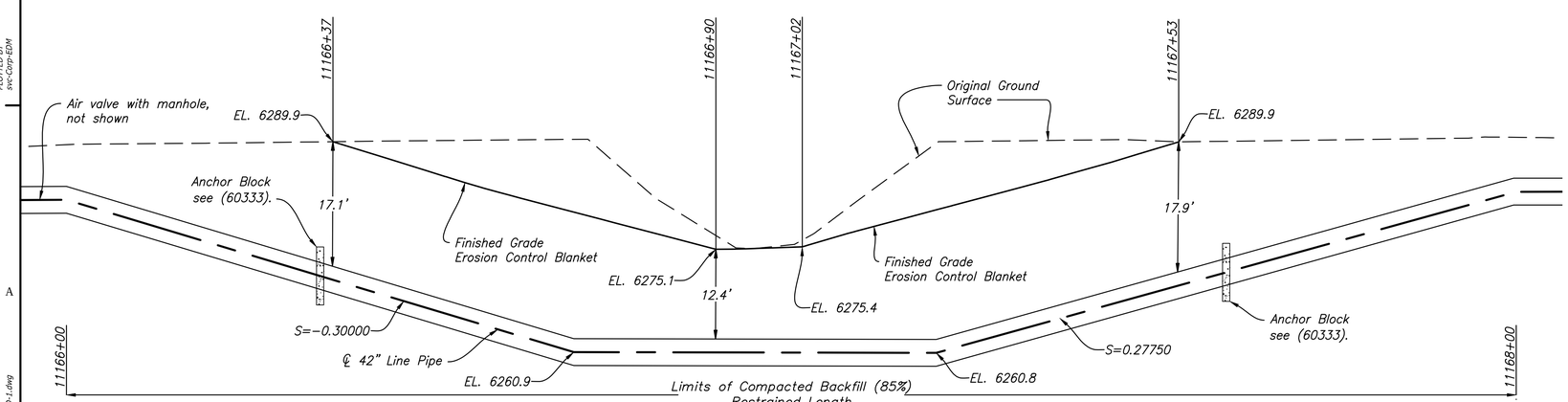
SECTION C–C

SCALE OF FEET: 10 0 10 20 30



SECTION D–D

SCALE OF FEET: 10 0 10 20 30



PIPE PROFILE

SCALE OF FEET: 10 0 10 20 30

NOTES

1. For General Notes, Symbols, Abbreviations, and Pipe Classification, see, (60281).
2. For Plan and Profile, see (60311).
3. Adjust extents of erosion control blanket as directed by COR.
4. For typical wash crossing details, see (60335 & 60336).
5. For steep pipe details, see (60333).

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NEW MEXICO

SAN JUAN LATERAL - REACH 11

LINE PIPE

REV NO	DATE	DESCRIPTION
1	2017-05-16	Sixta, Michael P.E.	D Added Section D-D

JOEL SHOLTES
DESIGNED
SHANNON MONAHAN
DRAWN
ANDREW MARNER
CHECKED
Sixta, Michael P.E.
TECH. APPR.
Bowles, Linda M P.E.
APPROVED
PEER REVIEWER - Technical Approve
DENVER, CO 2017-03-30

WASH CROSSING

STA. 11167+00

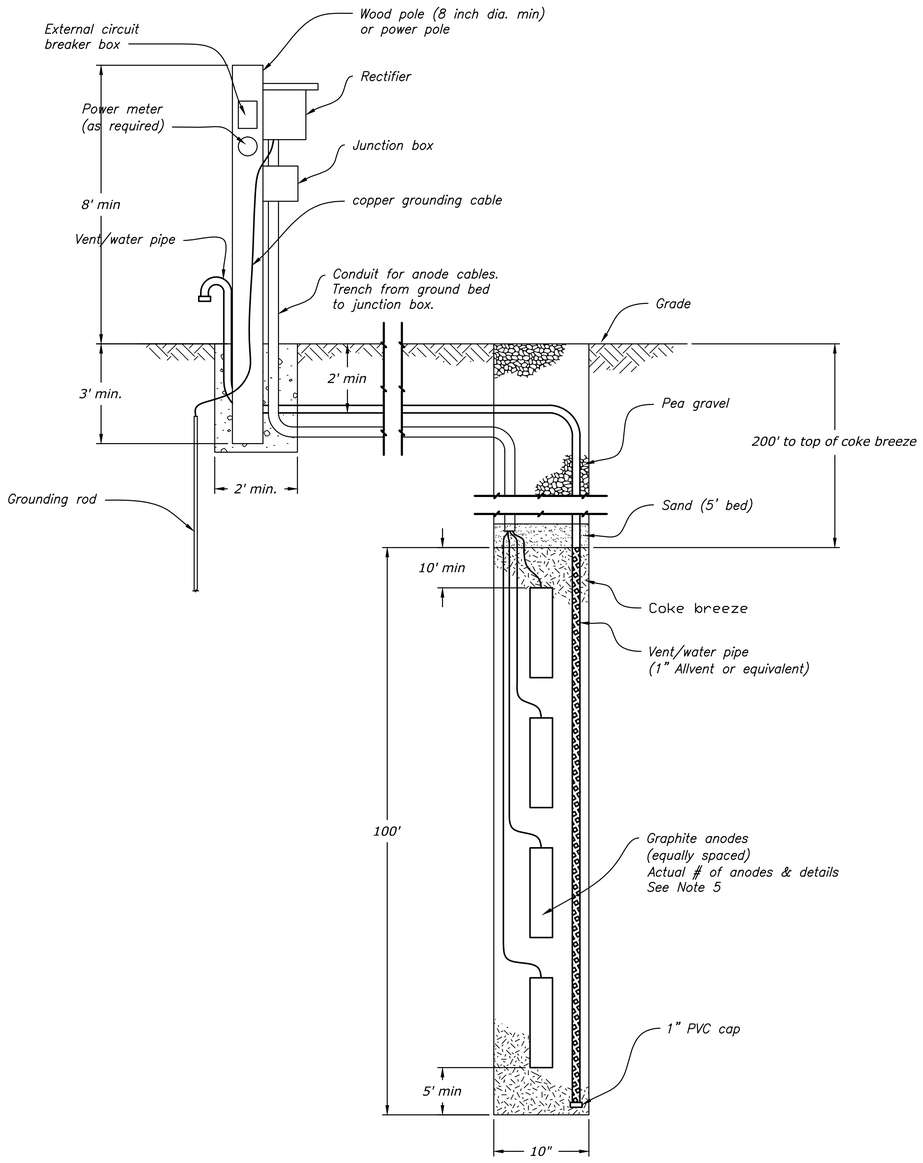
1695-D-60357

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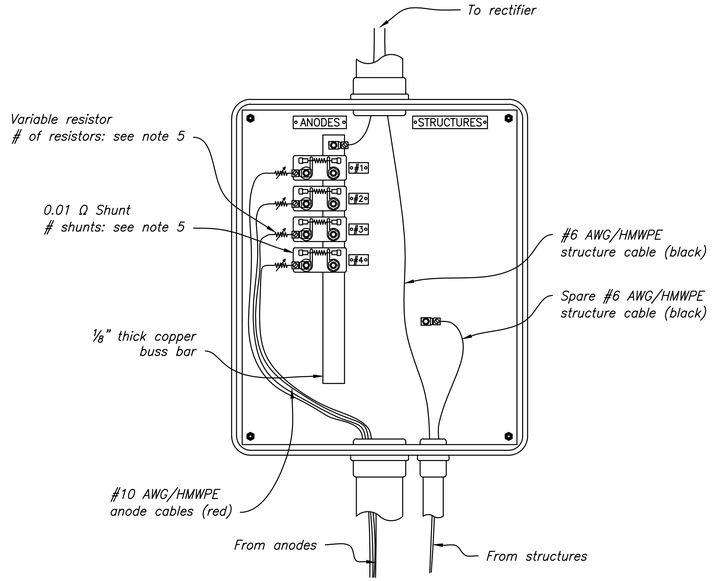
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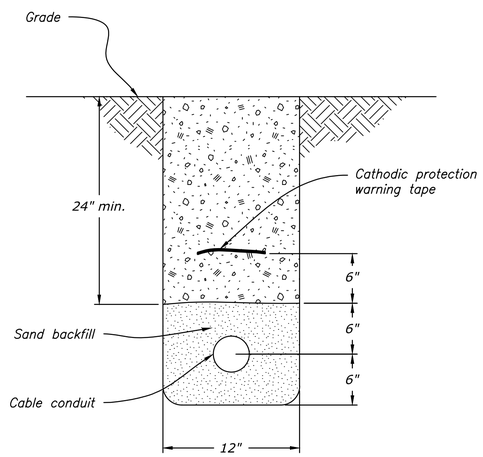
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CATHODIC PROTECTION DEEP WELL ANODE BED
(Not to scale)



DEEP WELL ANODE JUNCTION BOX
(Not to scale)



CABLE CONDUIT TRENCH DETAIL
(Not to scale)

NOTES

1. The required HMWPE insulation is black for structure and test cables and red (if available) for anode cables.
2. Junction box mounted directly to pole.
3. Vent/water pipes for deep well impressed current anode beds located against fence near junction box.
4. Anodes centered in hole using centralizers.
5. Anode bed and anode junction box details listed in Table 26 42 10–A in Specification section 26 42 10.
6. Anode bed locations listed in Table 26 42 10–A in Specification section 26 42 10.
7. Polyethylene or polypropylene rope used to lower anodes into anode bed.
8. Rigid conduit/pipe from anode bed shall be sch. 40 PVC below grade.
9. Trench details to be used for all horizontal segments of conduit.
10. Trench details to be used for all horizontal segments of cable.

REFERENCE DRAWINGS

CORROSION PROTECTION BOND DETAILS_____1695-D-60363
CORROSION PROTECTION TEST STATION DETAILS___1695-D-60361

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NAVAJO-GALLUP WATER SUPPLY PROJECT
NEW MEXICO

SAN JUAN LATERAL

BLOCK 9-11 - LINE PIPE

Chrissy Henderson — DESIGNED
Chrissy Henderson — DRAWN
Daryl Little — CHECKED
Little, Daryl A — TECH. APPR.
Sears, Lee E P.E. — APPROVED
ADMIN APPROVAL - Materials Engineer

DENVER, CO 2017-03-31

CORROSION PROTECTION

IMPRESSED CURRENT DEEP WELL ANODE BED

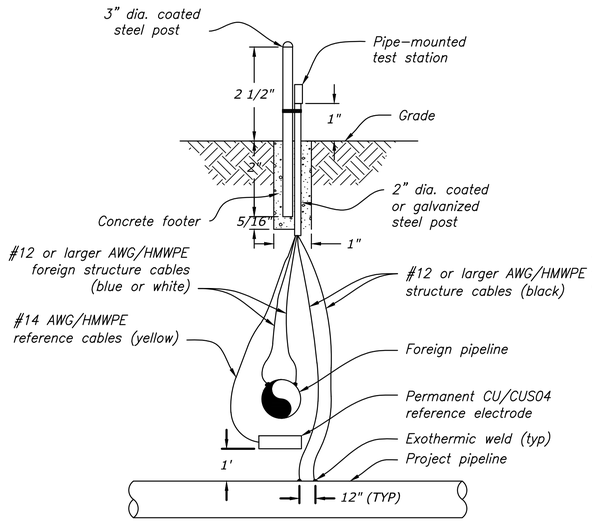
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SHEET 1

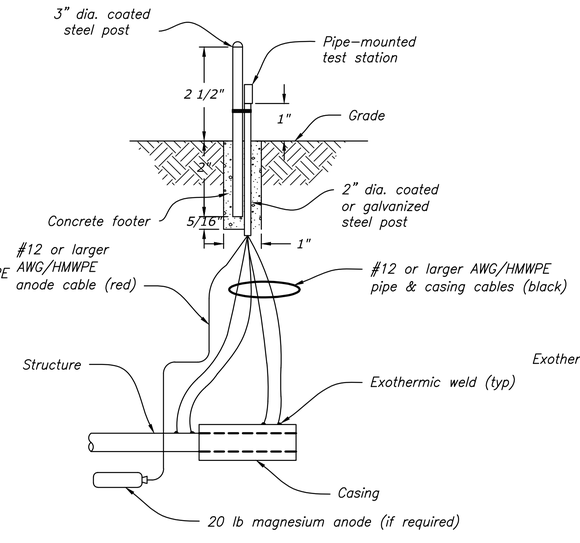
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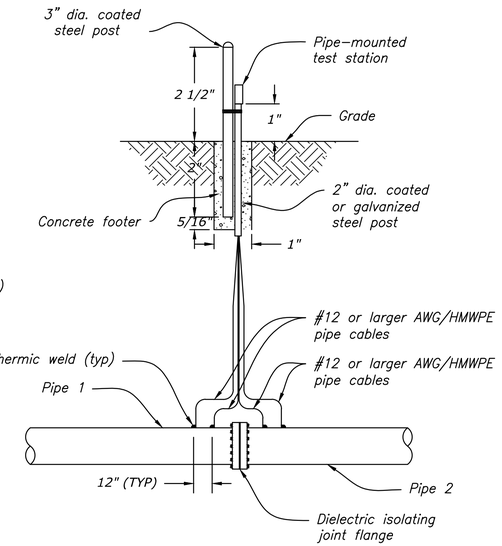
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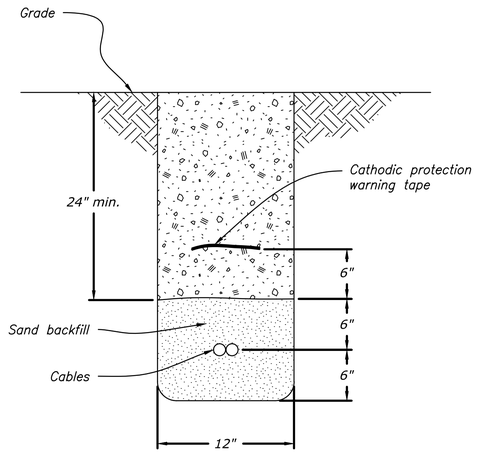
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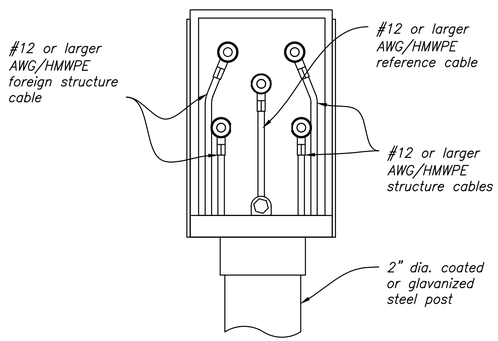
Casing Anode Test Station (Not to scale)



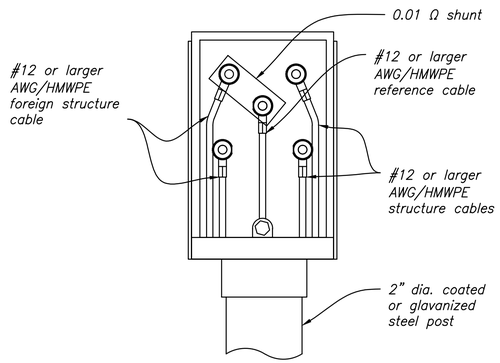
Isolation Joint Test Station (Not to scale)



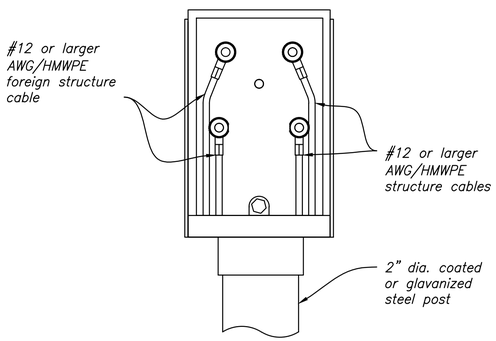
Cable Trench Detail (Not to scale)



Test Board – Foreign Pipe (Not to scale)



Test Board – Casing Anode (Not to scale)



Test Board – Isolating Joint (Not to scale)

NOTES

1. Place anode at the same depth as the bottom of the structure.
2. Anodes are to be installed a minimum distance of 30 feet from the structure.
3. Minimum of one anode length from non–metallic pipe.
4. One shunt for each anode installed at location.
5. Number of anodes at each structure in accordance with Specification Section 26 42 10.
6. The required HMWPE insulation is black for structure and test cables and red (if available) for anode cables.
7. Trench details to be used for all horizontal segments of conduit.
8. Install reference electrode one foot away from project pipeline in between project pipeline and reference pipeline.
9. Obtain permission from pipeline owner before installing test cables on foreign pipeline.
10. Exothermic welds of foreign pipeline shown rotated. Wels cables to top center of pipe min 12" apart.

REFERENCE DRAWINGS

CATHODIC PROTECTION BONDING AND CABLE I.D. DETAILS_____1695–D–60363

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NAVAJO-GALLUP WATER SUPPLY PROJECT
NEW MEXICO

SAN JUAN LATERAL

BLOCK 9-11 - LINE PIPE

Chrissy Henderson	DESIGNED
Chrissy Henderson	DRAWN
Daryl Little	CHECKED
Little, Daryl A	TECH. APPR.
Sears, Lee E P.E.	APPROVED
ADMIN APPROVAL - Materials Engineer	
DENVER, CO	2017-03-31

CORROSION PROTECTION

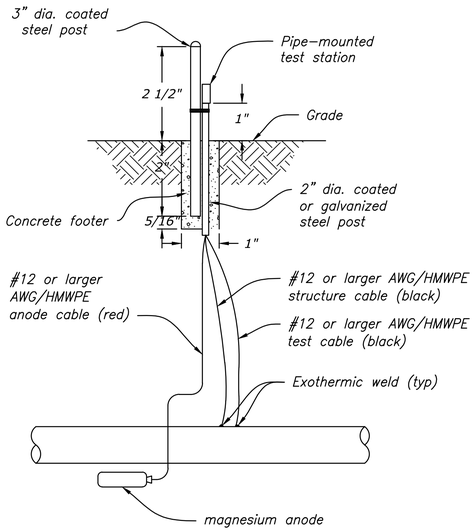
TEST STATION DETAILS 1 OF 2

1695-D-60361

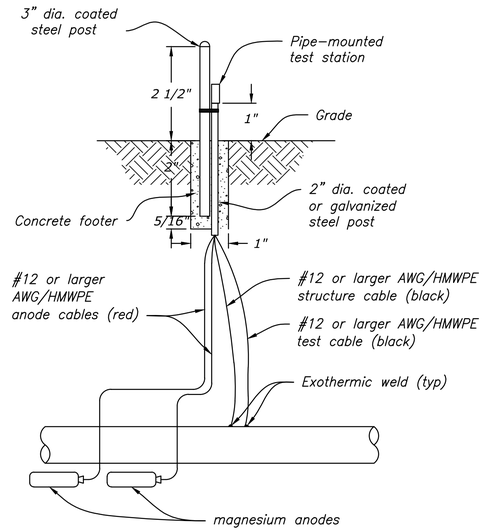
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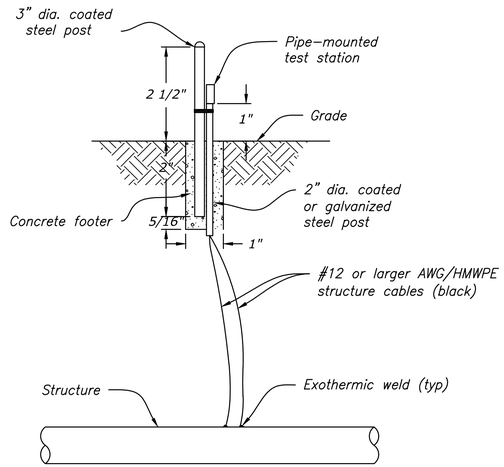
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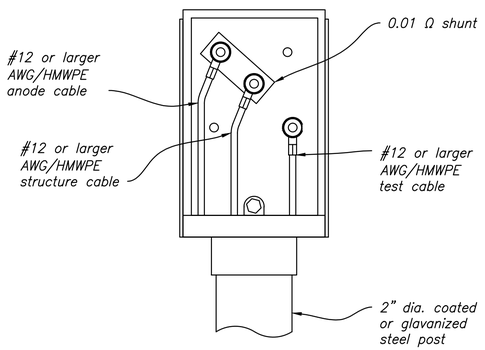
Anode Test Station – Single Anode
(Not to scale)



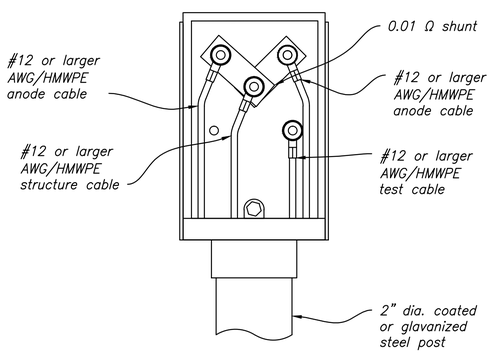
Anode Test Station– Multiple Anodes
(Not to scale)



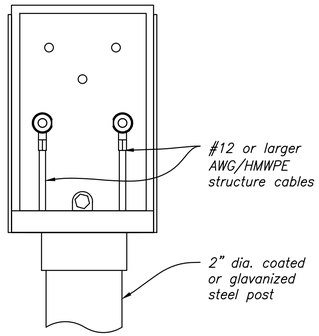
Corrosion Monitoring Station
(Not to scale)



Test Board – Single Anode
(Not to scale)



Test Board – Multiple Anodes
(Not to scale)



Test Board – Corrosion Monitoring
(Not to scale)

NOTES

1. Place anode at the same depth as the bottom of the structure.
2. Anodes are to be installed a minimum distance of 30 feet from the structure.
3. Minimum of one anode length from non–metallic pipe.
4. One shunt for each anode installed at location.
5. Number of anodes at each structure in accordance with Specification Section 26 42 10.
6. The required HMWPE insulation is black for structure and test cables and red (if available) for anode cables.
7. Trench details to be used for all horizontal segments of cable.

REFERENCE DRAWINGS

CORROSION PROTECTION BOND DETAILS_____1695–D–60363
CORROSION PROTECTION TEST STATION DETAILS_____1695–D–60361

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NEW MEXICO

SAN JUAN LATERAL

BLOCK 9-11 - LINE PIPE

Chrissy Henderson
DESIGNED
Chrissy Henderson
DRAWN
Daryl Little
CHECKED
Little, Daryl A
TECH. APPR.
Sears, Lee E P.E.
APPROVED
ADMIN APPROVAL - Materials Engineer

DENVER, CO 2017-03-31

CORROSION PROTECTION

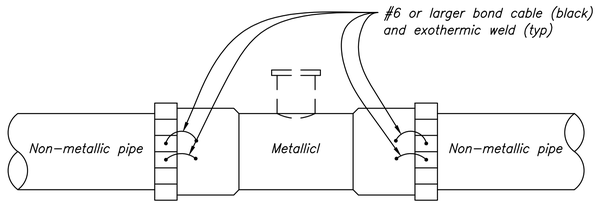
TEST STATION DETAILS 2 OF 2

1695-D-60362

SHEET 3

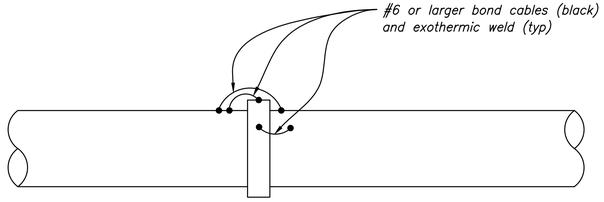
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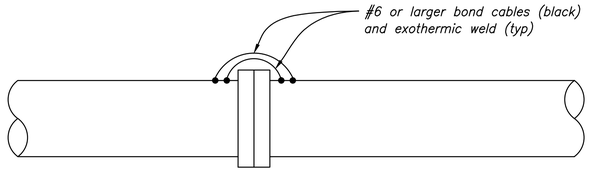
NON-METALLIC TO METALLIC BOND DETAIL

(NOT-TO-SCALE)



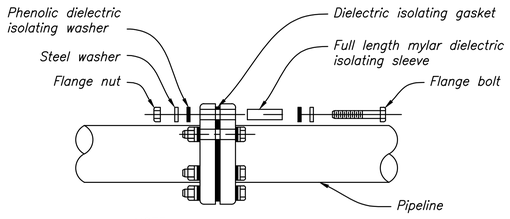
VICTAULIC BOND DETAIL

(NOT-TO-SCALE)



FLANGE-FLANGE BOND DETAIL

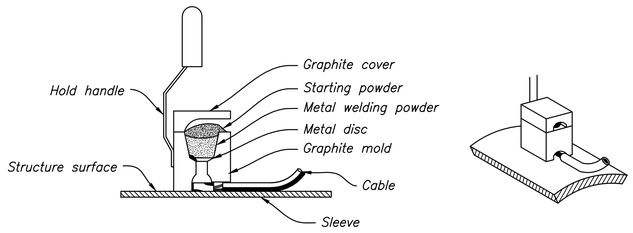
(NOT-TO-SCALE)



NOTE:
If flange is buried, coat flange w/ wax tape wrap system.

IJFK - DIELECTRIC ISOLATING JOINT FLANGE KIT

(NOT-TO-SCALE)



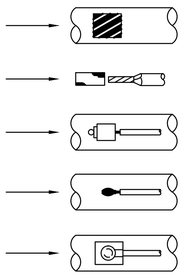
STEP 1. Grind structure connection area (3"x3") to bare shiny metal and clean.

STEP 2. Strip insulation from wire. Attach sleeve.

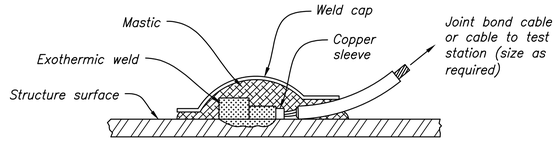
STEP 3. Hold mold firmly with opening away from operator & ignite with flint gun.

STEP 4. Remove slag from connection and peen weld for soundness.

STEP 5. Cover connection and exposed structure surface with a bituminuus coating compound.

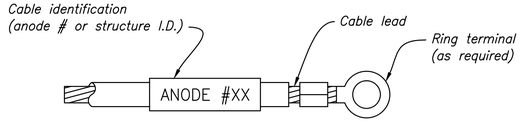


NOTE:
Procedure shown above is to be used as a general guide only. Consult manufacturer's literature for specific installation instructions.



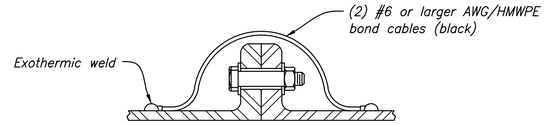
EXOTHERMIC WELDING

(NOT-TO-SCALE)

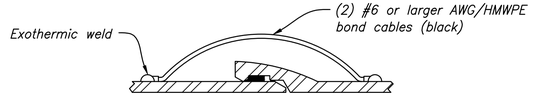


CABLE IDENTIFICATION

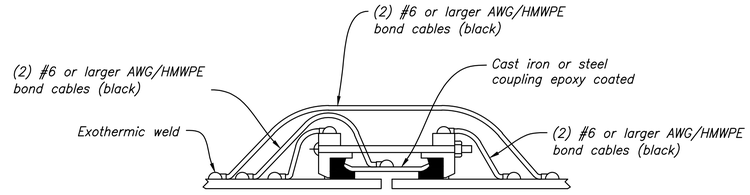
(NOT-TO-SCALE)



FLANGED JOINT (NON-ISOLATING)



PUSH-ON JOINT



NOTE:
Bond each individual metallic component.

FLEXIBLE COUPLING (MULTIPLE COMPONENT COUPLING)

BONDING JUMPER INSTALLATION

(NOT-TO-SCALE)

NOTES

1. All pipe joints are to be electrically bonded with cables, exothermically welded to the top portion of the pipe.
2. Number and size of bond cables in accordance with Specification Section 26 42 10, article 3.01D.
3. Do not install joint bonds on welded joints and/or joints called out to be electrically isolated.
4. Cover cable I.D. with piece of clear heat shrink tubing.
5. Any non-welded, non-isolating joints, valves & fittings require bonding to achieve electrical continuity.
6. Coat exposed copper, weld nugget, and ferrous material at weld with approved dielectric coating.

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NAVAJO-GALLUP WATER SUPPLY PROJECT
NEW MEXICO

SAN JUAN LATERAL

BLOCK 9-11 - LINE PIPE

Chrissy Henderson
DESIGNED
Chrissy Henderson
DRAWN
Daryl Little
CHECKED
Little, Daryl A
TECH. APPR.
Sears, Lee E P.E.
APPROVED
ADMIN APPROVAL - Materials Engineer

DENVER, CO 2017-03-31

CORROSION PROTECTION

BOND DETAILS

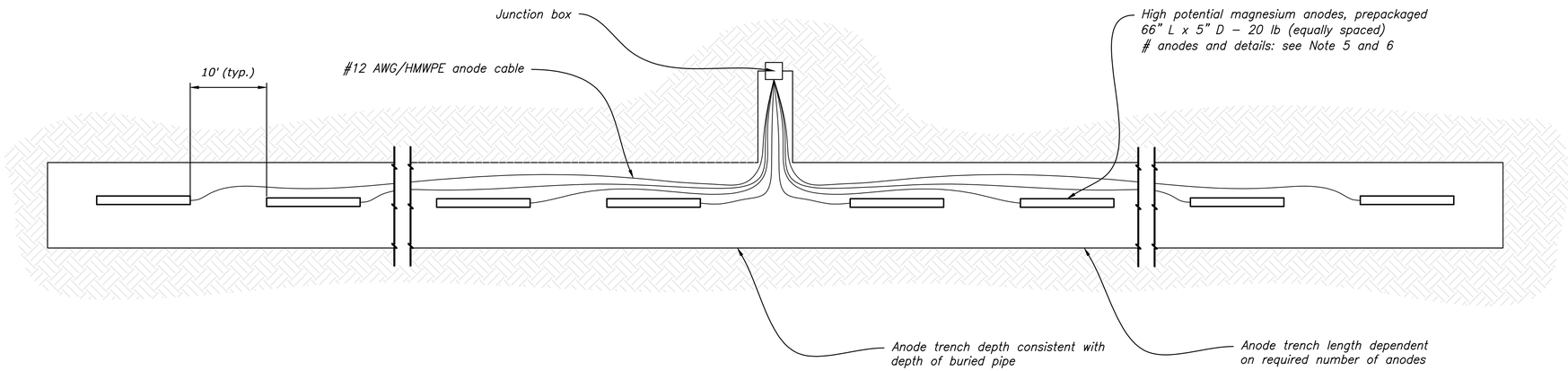
1695-D-60363

SHEET 4

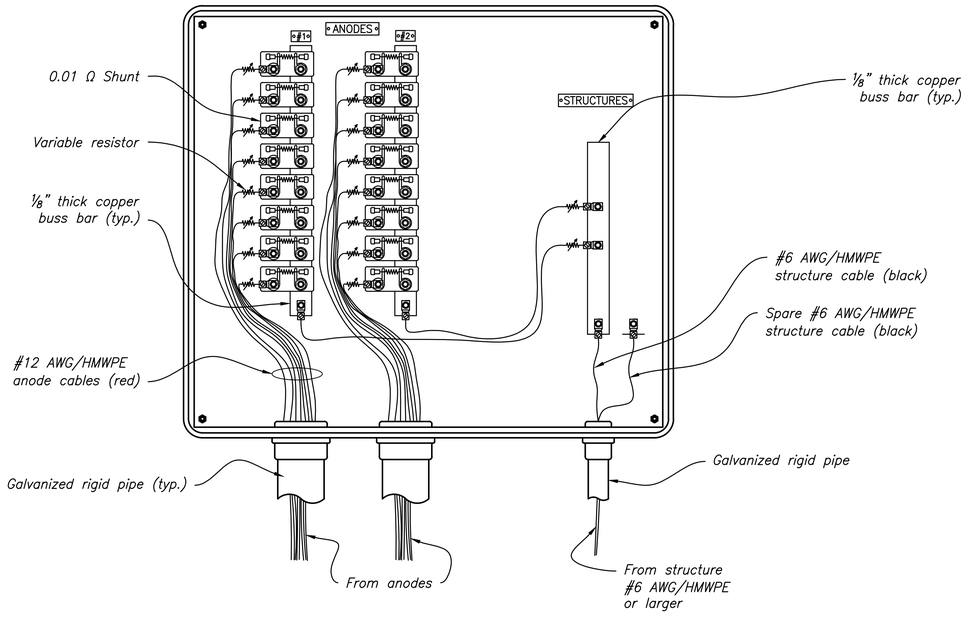
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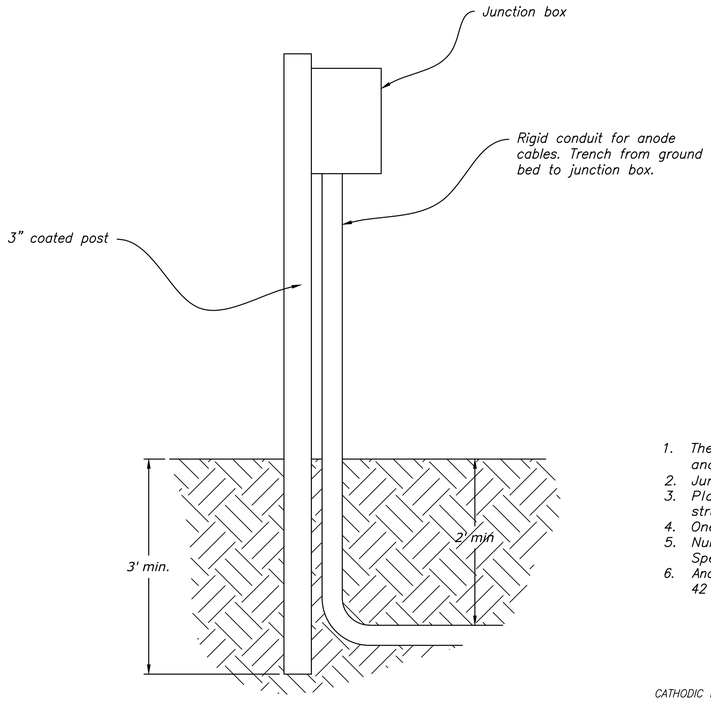
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PLAN – GALVANIC ANODE BED DETAIL
(NOT–TO–SCALE)



DETAIL – ANODE JUNCTION BOX
(NOT–TO–SCALE)



ANODE JUNCTION BOX MOUNT
(NOT–TO–SCALE)

NOTES

1. The required HMWPE insulation is black for structure and test cables and red (if available) for anode cables.
2. Junction box mounted directly to pole or bracket.
3. Place anode at the same depth as the bottom of the structure.
4. One shunt for each anode installed at location.
5. Number of anodes at each structure in accordance with Specification Section 26 42 10.
6. Anode bed and anode junction box details listed in Table 26 42 10–B in Specification section 26 42 10.

REFERENCE DRAWINGS

CATHODIC PROTECTION CABLE TRENCH DETAIL_____1695–D–60361
CATHODIC PROTECTION CABLE I.D. DETAIL_____1695–D–60363

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BUREAU OF RECLAMATION
NAVAJO–GALLUP WATER SUPPLY PROJECT
NEW MEXICO

SAN JUAN LATERAL

BLOCK 9–11 - LINE PIPE

Chrissy Henderson
DESIGNED
Chrissy Henderson
DRAWN
Daryl Little
CHECKED
Little, Daryl A
TECH. APPR.
Sears, Lee E P.E.
APPROVED
ADMIN APPROVAL - Materials Engineer

DENVER, CO 2017-03-31

CORROSION PROTECTION

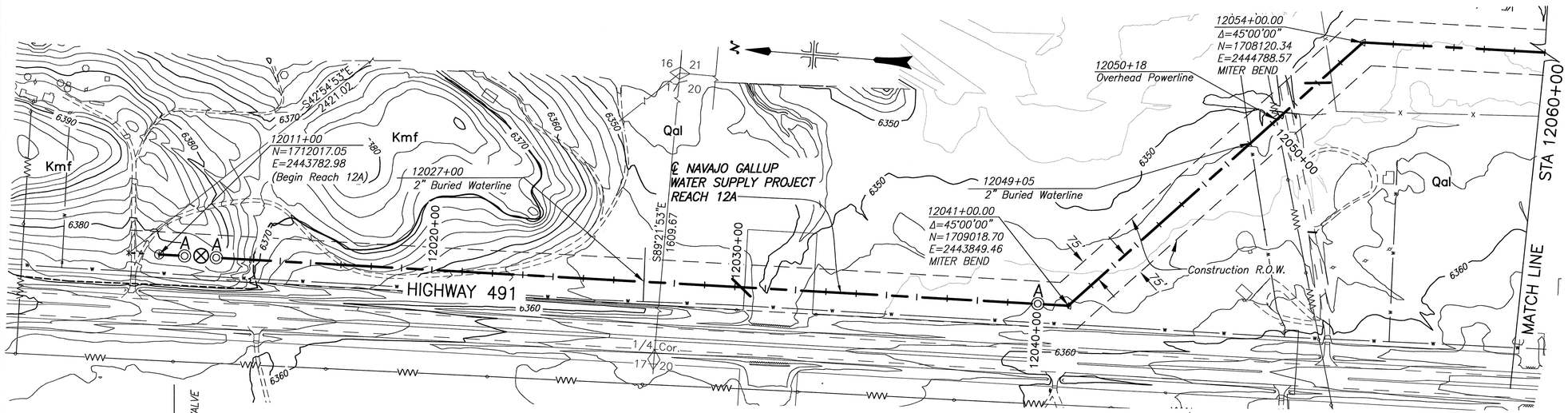
GALVANIC ANODE
CATHODIC PROTECTION
ANODE BED

1695-D-60364

SHEET 5

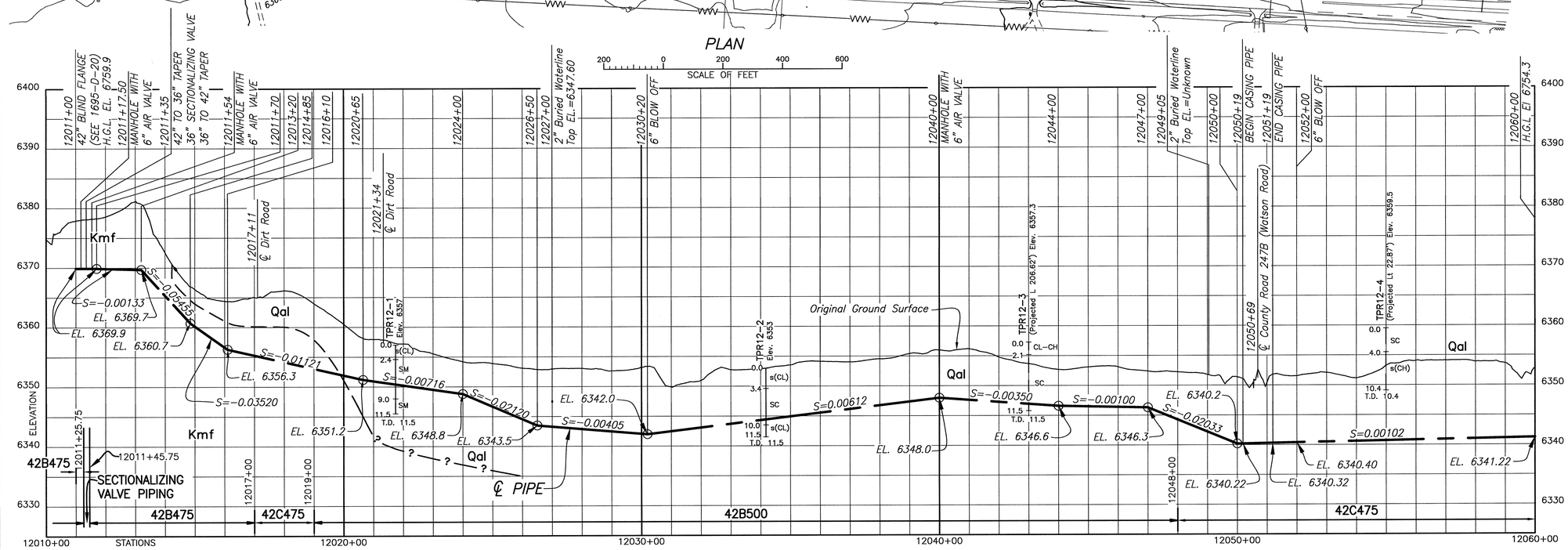
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PLAN

SCALE OF FEET 200 0 200 400 600



PROFILE

SYMBOLS

- Air Valve
- Apparent Formation Contact Line
- Blowoff
- ℄ Linepipe
- Chain Link Fence
- Construction ROW
- Dirt Road
- Field Fence
- Manhole
- Manhole with Air Valve
- Natural Gas Pipeline
- Paved Road
- Powerline
- Sectionalizing Valve
- Sewerline
- Storage Tank
- Telephone
- Waterline

GEOLOGIC NOTE

For General Geologic Legend Explanation, and Notes, see (1695-529-513)

ABBREVIATIONS

CR – County Road
DI – Ductile Iron
HGL – Hydraulic Grade Line
NTUA – Navajo Tribal Utility Authority
OH – Over Head
PNM – Public Service Company of New Mexico
ROW – Right-of-Way
TP – Test Pit

OPEN-CUT ROAD CROSSING		
Station		Surfacing
12016+97	12021+85	Compacted Backfill
12050+55	12050+83	Asphalt Pavement

NOTE

Open cut roads require compacted backfill and/or gravel surfacing per specifications. See (1695-D-15) for details.

PIPE CLASSIFICATIONS

The line pipe is designated as 42B75, 42C350 etc. The 42 indicates the nominal pipe diameter in inches. The letters B, C, D and E denote cover class of 10, 15, 20 and 25 feet respectively of design earth cover over the top of the pipe. The number 475, 350, etc. denotes the maximum allowable hydrostatic pressure head in feet measured at the centerline of the pipe.

GENERAL NOTES

1. General Notes, Symbols, Abbreviations, and Pipe Classification apply to all plan and profile drawings.
2. Contractor shall determine the voltage at all power lines and share this information with the COR.
3. At angle points that do not require miter bends, long radius curves (vertical and horizontal) shall be constructed by pulling joints.
4. Stations are approximate and may be varied as directed.
5. Minimum earth cover over the top of the pipe shall be 3.5 feet unless the line pipe is at an existing wash, or at a roadway, and then the minimum cover is 5 feet, unless otherwise noted.
6. Where the line pipe crosses on existing pipe, a minimum clear distance of 2 feet outside to outside between line pipe and existing pipe shall be provided unless otherwise directed. The backfill between the crossing pipelines shall be compacted as stated in the specifications.
7. Hydraulic grade line elevations (H.G.L. El.) shown are for the design Q at steady state.
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 contractor submits pipe, fittings, and miter bends for approval.
9. For limits on excavation near gas lines, see specifications.
10. Grid based on New Mexico State Coordinate System West Zone.
11. Ground to grid conversion factor is 0.999694573004.
12. Steel pipe is required, and joints shall be butt welded or restrained when on slopes greater than 0.20, unless otherwise noted. See (1695-D-17) for restraint details.
13. For encasements under washes see (1695-D-7) and (1695-D-8).
14. CAUTION: Call New Mexico One Call 1-800-321-ALERT before you dig.

GEOLOGY Date 8-3-11

TECHNICAL APPROVAL s/ Justin Gilbert
SUBMITTED s/ Casey Hall
APPROVED s/ James Bates

FOR INFORMATION ONLY

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BUREAU OF RECLAMATION

NAVAJO GALLUP WATER SUPPLY PROJECT – NEW MEXICO

SAN JUAN LATERAL – REACH 12A
TWIN LAKES TO TOHLAKAI HILL
STA 12011+00 TO 12060+00
PLAN AND PROFILE

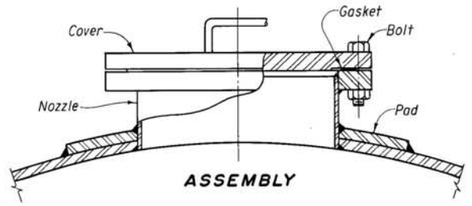
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2	2011-11-28	DAVID GESUNDHEIT, PE.	REMOVAL OF SECTIONALIZING VALVE STRUCTURE AT STATION 12011+18.17. ADD MANHOLE WITH AIR VALVE AT STATION 12011+35. ADD 12011+54. ADD SECTIONALIZING VALVE AT STATION 12011+35.
1	2011-09-02	DAVID GESUNDHEIT, PE.	HORIZONTAL REALIGNMENT FROM STATION 12041+00 TO 12060+00. CHANGED HGL ELEVATIONS. CHANGED OPEN CUT ROAD CROSSING TABLE.

DESIGNED D. L. Gesundheit
DRAWN D. L. Gesundheit
CHECKED Linda M. Bowles
TECH. APPR. Tedd R. Calhoun P.E. TEDD R. CALHOUN, P.E.
APPROVED David K. Edwards P.E. DAVID K. EDWARDS, PE; MANAGER, Water Conveyance Group
DENVER, COLORADO 2011-03-25

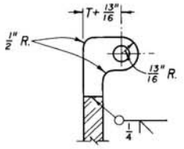
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PLOTTED BY DGESUNDHEIT

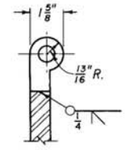
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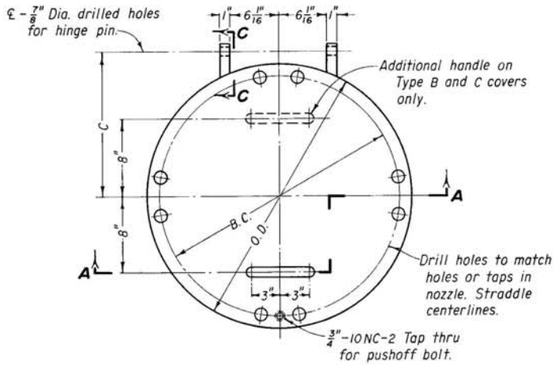
ASSEMBLY



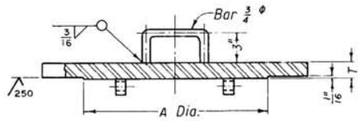
SECTION C-C



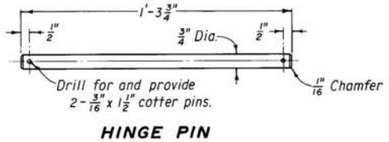
SECTION D-D



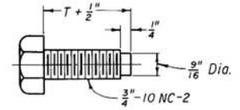
COVER



SECTION A-A

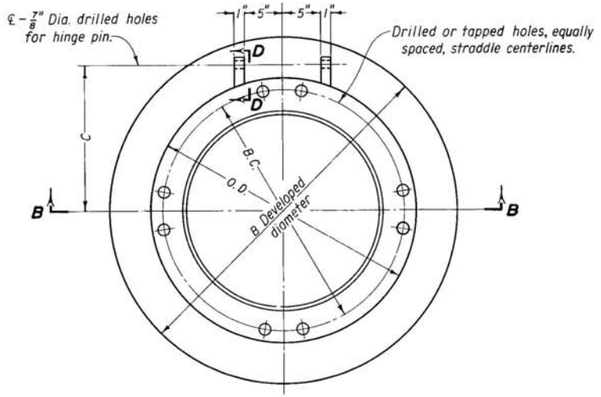


HINGE PIN

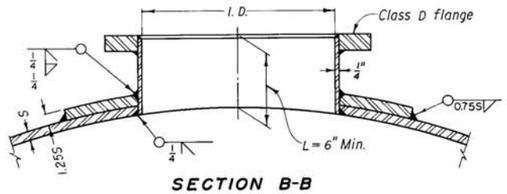


PUSHOFF BOLT

DESCRIPTION	20" I.D.	24" I.D.
B.C.	25"	29 1/2"
O.D.	27 1/2"	32"
A	19 1/2"	23 1/2"
B	36"	40"
C	1'-3"	1'-5 1/2"
T	1 1/8"	1 1/4"
Gasket	20" I.D. x 23 7/8" O.D. x 1/16" Thick	24" I.D. x 28 1/4" O.D. x 1/16" Thick
Bolts (Type A and B)	20-1 1/8" x 3 3/4"	20-1 1/4" x 4"
Studs (Type C)	20-1 1/8" x 3 3/4"	20-1 1/4" x 4"



NOZZLE



SECTION B-B

NOTES

Nozzle shall be shaped to fit the specified pipe or vessel diameter.
S Function dimensions that do not yield 1/16" increments shall be increased to the next larger 1/16" increment.
Type A manholes shall conform to the dimensions and details indicated hereon.
Type B manholes shall be similar to Type A except that the hinges shall be omitted.
Type C manholes shall be similar to Type A except that the hinges shall be omitted and the nozzles shall be drilled and tapped for studs.
Bolt holes shall be drilled and tapped as required for bolts or studs furnished.
S = Shell thickness of specified pipe or vessel.
Class D flanges shall conform to AWWA Standard C207.
Gaskets shall be cloth inserted rubber.
See specifications drawing for orientation of hinges.

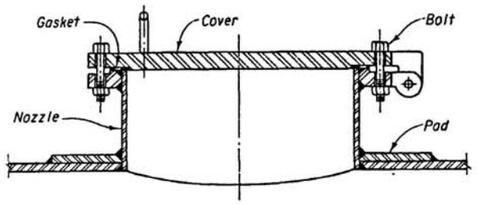
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UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
STANDARD DESIGNS

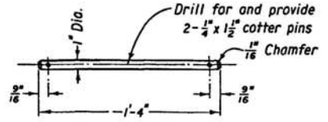
MANHOLES
CLASS 125 LB.
PLATE STEEL

DRAWN D.J.C. SUBMITTED H.E. Sheela
TRACED R.E.G. RECOMMENDED T.P. Hollenbeck
CHECKED MCL - REG APPROVED Chief Engineer
DENVER, COLORADO, DEC. 15, 1967

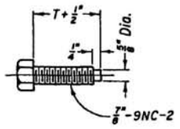
40-D-6136



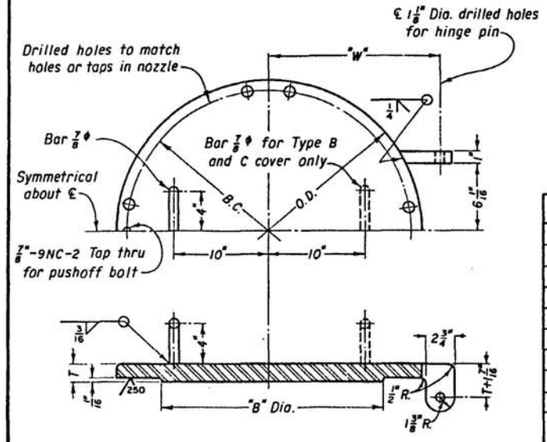
ASSEMBLY



HINGE PIN

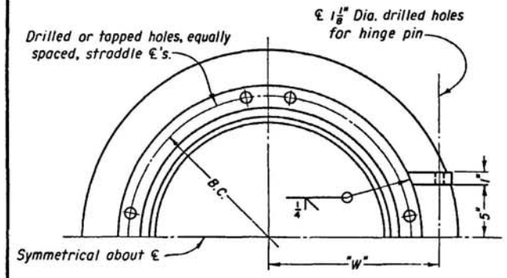


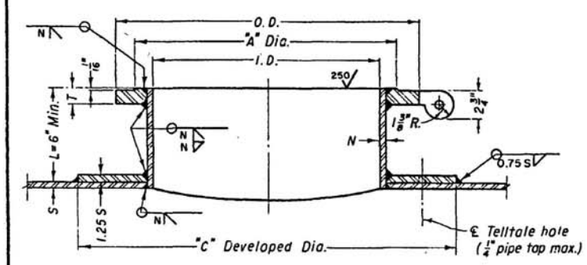
PUSHOFF BOLT



COVER

CLASS	150 LB.		300 LB.	
I. D.	20"	24"	20"	24"
B.C.	25"	29½"	27"	32"
O.D.	27½"	32"	30½"	36"
A	23"	27¼"	23"	27¼"
B	19½"	23½"	19½"	23½"
W	1'-3"	1'-5½"	1'-5"	1'-7½"
C	36"	40"	36"	40"
T	1 11/16"	1⅞"	2½"	2¾"
N	¼"	¼"	⅜"	⅜"
Gaskets	20" I.D. x 23⅞" O.D. x 1/16" Thick	24" I.D. x 28¼" O.D. x 1/16" Thick	20" I.D. x 25¾" O.D. x 1/16" Thick	24" I.D. x 30½" O.D. x 1/16" Thick
Bolts (Type A and B)	20-1⅛" x 4¾"	20-1¼" x 5¼"	24-1¼" x 6½"	24-1½" x 7¼"
Studs (Type C)	20-1⅛" x 4¾"	20-1¼" x 5¼"	24-1¼" x 6½"	24-1½" x 7¼"





NOZZLE

NOTES

Nozzles shall be shaped to fit the specified pipe or vessel diameter.
Type A manholes shall conform to the dimensions and details indicated hereon.
Type B manholes shall be similar to Type A except that the hinges shall be omitted.
Type C manholes shall be similar to Type A except that the hinges shall be omitted and the nozzles shall be drilled and tapped for studs.
Bolt holes shall be drilled and tapped as required for bolts or studs furnished.
S = Shell thickness of specified pipe or vessel.
S Function dimensions that do not yield 1/16" increments shall be increased to the next larger 1/16" increment.
Gaskets shall be cloth inserted rubber.
See specifications drawing for orientation of hinges.

8-6-69 D-N.C.P.	ADDED TELLTALE HOLE.

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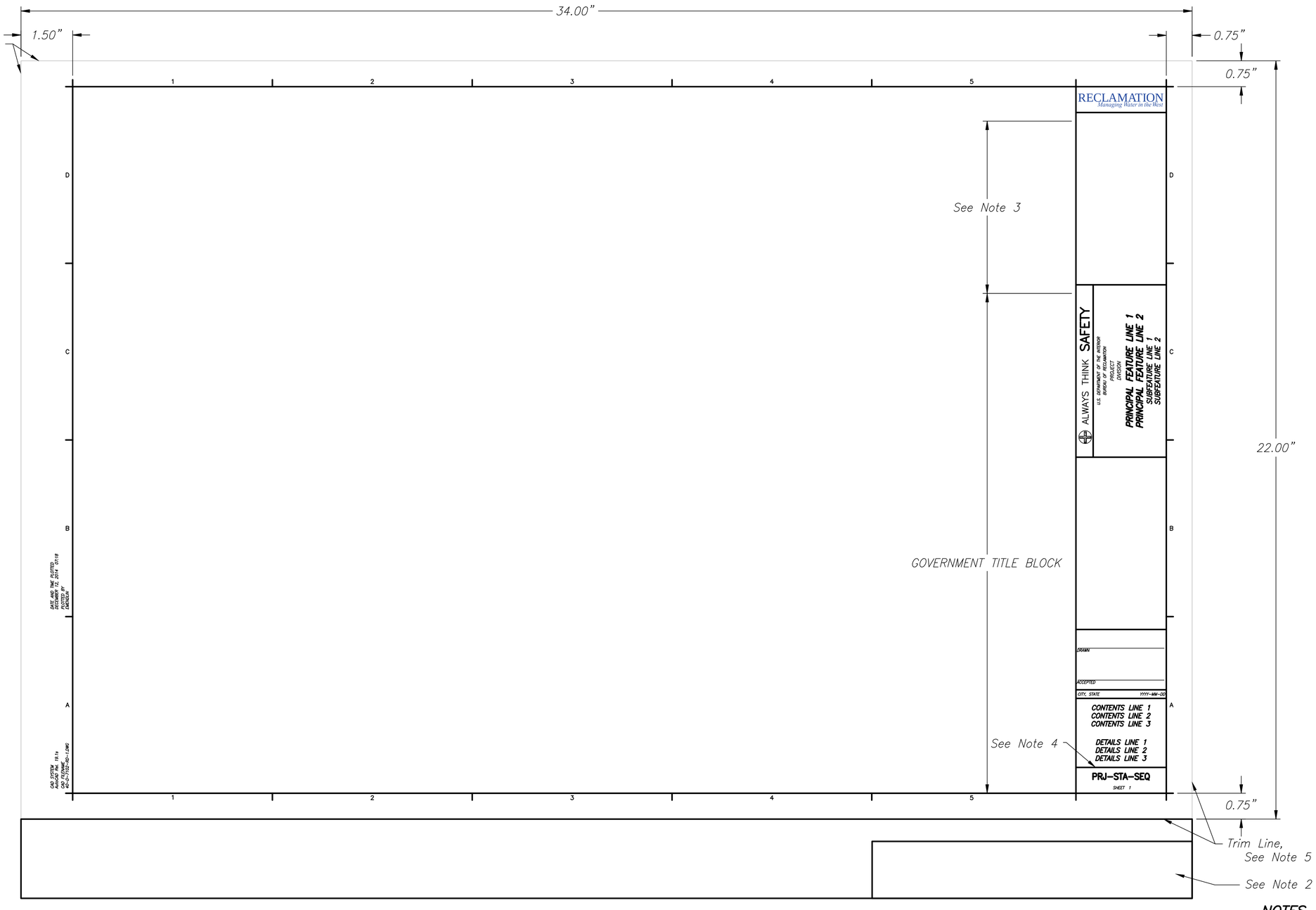
UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
STANDARD DESIGNS

MANHOLES
CLASS 150 LB. AND 300 LB.
PLATE STEEL

DRAWN N.G.B. SUBMITTED H.E. Hale
TRACED R.A.D. RECOMMENDED H.O. Arthur
CHECKED P.P.L.W. APPROVED Wm. H. Wolf, CHIEF ENGINEER

DENVER, COLORADO, DEC. 15, 1967. 40-D-6137

Released



DRAWING BORDER

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U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
YAKIMA PROJECT
KENNEWICK DIVISION

CHANDLER PUMPING PLANT

SWITCHYARD

SAMPLE TITLE

MANUFACTURER OR CONTRACTOR
DRAWN
ACCEPTED

SAMPLE SIGNATURE LINES

NOTES

1. Government will provide contractor with an electronic AutoCAD template to be used by manufacturer for submittal of manufacturer's/contractors drawing in Government format.
2. The manufacturer's title block and drawing revisions as a result of the submittal process, may be located anywhere outside of the trim lines. The location shown on this drawing is the Government's preferred area.
3. The manufacturer shall show the Government solicitation/specification number, the manufacturer's name, drawing and sheet number in this area.
4. Government drawing number(s) will be issued at the end of the submittal process and drawing will be entered into the Government's electronic drawing system by the Government.
5. Trim lines shall be shown on all submitted drawings.

RECLAMATION
Managing Water in the West

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BUREAU OF RECLAMATION
STANDARD DRAWINGS

STANDARD AND TYPICAL DESIGNS

GOVERNMENT DRAWING FORMAT

REV NO		
2	2015-03-25	D UPDATED TITLE BLOCK AND SIGNATURE LINES
	Barthel, Rodney J P.E.	
1	2014-12-17	D UPDATED TITLE BLOCK AND SIGNATURE LINES
	E. MENDLIN	

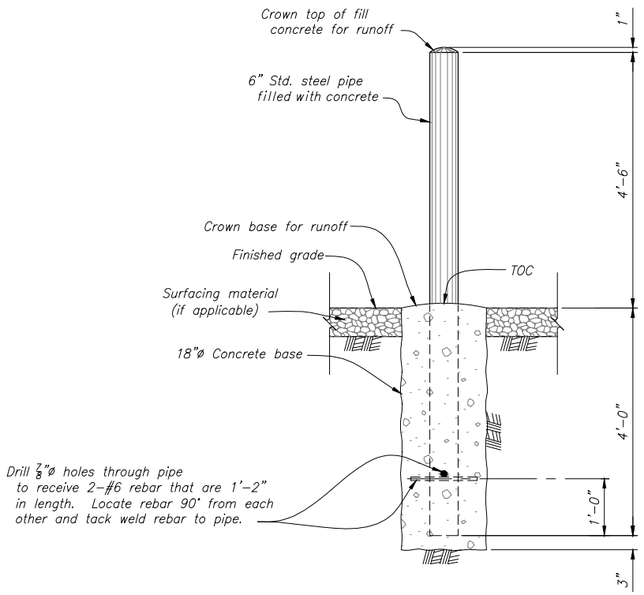
S. NITA
DESIGNED
S. NITA
DRAWN
D. CRAWFORD
CHECKED
R. BARTHEL, P.E.
TECH. APPR.
R. W. LAFOND, P.E.
APPROVED
ADMIN APPROVAL -
DENVER, CO

DRAWING BORDER, SAMPLE TITLE BLOCK, AND SIGNATURE LINES

40-D-7102

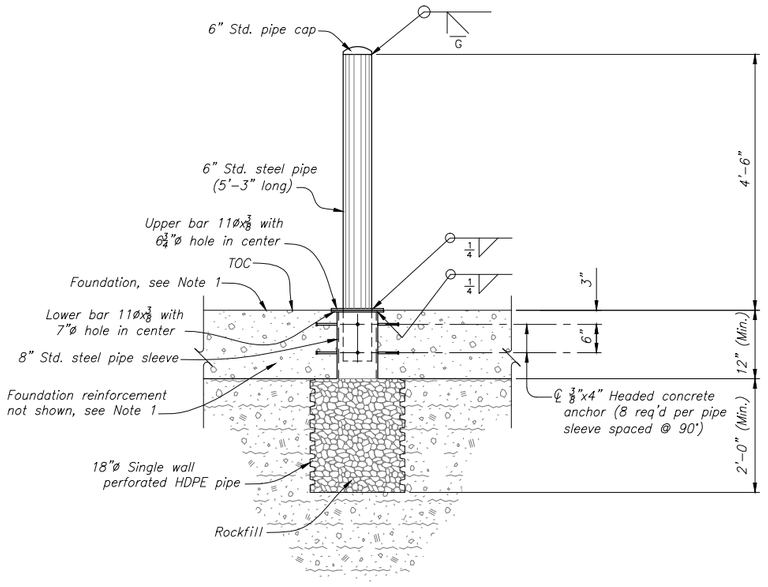
SHEET 1

Released



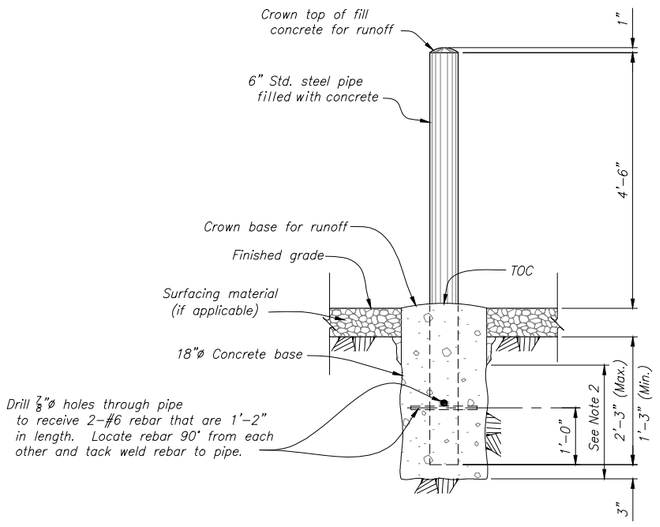
GUARD POST, TYPE I

FOR FOUNDATION EMBEDDED IN COMMON SOIL CONDITION
DO NOT GALVANIZE STEEL PIPE



GUARD POST, TYPE III

REMOVABLE GUARD POST AND SLEEVE FOR SLAB-ON-GRADE CONDITION
GALVANIZE PIPE SLEEVE
DO NOT GALVANIZE STEEL PIPE



GUARD POST, TYPE II

FOR FOUNDATION EMBEDDED IN ROCK CONDITION
DO NOT GALVANIZE STEEL PIPE

GENERAL NOTES

ASTM denotes American Society for Testing and Materials.

AWS denotes American Welding Society.

AWWA denotes American Water Works Association.

COR denotes Contracting Officer's Representative.

HDPE denotes high density polyethylene.

Max. denotes maximum.

Min. denotes minimum.

psi denotes pounds per square inch.

Rebar denotes concrete reinforcement.

Std. denotes standard.

TOC denotes top of concrete.

Typ. denotes typical.

All welds, sections and details are typical for all similar conditions.

Coat steel guard post and upper bar per specifications or as directed by COR.

Unless noted otherwise, galvanize pipe sleeve and lower bar after fabrication per ASTM A385.

Fabricated Metalwork:
Bars _____ ASTM A36
Std. Steel Pipe _____ ASTM A53, Grade B
Rebar _____ ASTM A615

HDPE Pressure Pipe: ASTM F405.

Unless noted otherwise, make all welds continuous and in the shop.

Unless noted otherwise, fabricator shall determine edge preparation and root opening for groove welds.

Arc-Welding Electrodes: Filler metal and required shielding gases or fluxes shall be per AWS D1.1 with filler metal for steel having a minimum tensile strength of 70,000 psi.

Rockfill per ASTM C33, Coarse Aggregate, Size No. 57.

Unless noted otherwise, concrete structural design is based on concrete with a minimum compressive strength of 2,500 psi at 28 days and reinforcement with a minimum yield strength of 60,000 psi.

NOTES

1. Foundation design engineer shall verify foundation stability and the concrete and reinforcement strength requirements.
2. 12" Embedment in moderately weathered or less weathered rock and 24" embedment in intensely-to-moderately weathered or more weathered rock. Rock weathering classifications are defined within drawing 40-D-7022.
3. Install guard posts at locations shown on specifications drawings and/or as directed by COR.

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BUREAU OF RECLAMATION
STANDARD DRAWINGS

STANDARD AND TYPICAL DESIGNS

MISCELLANEOUS METALWORK

REV NO		
1	2015-04-14	D MINOR MODIFICATIONS.
	Barthel, Rodney J P.E.	

Bernard Lajimodiere
DESIGNED
RBarthel
DRAWN
Olaff G. Huerta
CHECKED
Barthel, Rodney J P.E.
TECH. APPR.
Bernstein, Alfred I P.E.
APPROVED
PEER REVIEWER - Plant Structures Group

DENVER, CO 2015-03-23

TYPICAL GUARD POSTS

NON-SECURITY APPLICATION

40-D-60002

SHEET 1 1

DATE AND TIME PLOTTED
APRIL 14, 2015 09:43
PLOTTED BY
RBARTHEL

CAD SYSTEM
AutoCAD Rel. 19.0s
CAD FILENAME
40-D-60002-RD-1.DWG

Released

ABBREVIATIONS

add'l = additional
bf = bottom face
bl = bottom layer
br = bottom row
CJ = Construction joint
℄ = Centerline
CL. = Centerline
clr. = clear
Cr.J = Contraction joint
Ct.J = Control joint
ctr. = center or centers
d_b = nominal diameter of reinforcing bar
Dwg. = Drawing
ec = each corner
ef = each face
EJ = Expansion joint
El. = Elevation
eq. = equal or equally
eq. spc. = equally spaced, equal spaces
er = each row
es = each side
ew = each way
ff = far face
fr = far row
fs = far side
HP = High point
if = inside face
ir = inside row
ℓ_d = development length
ℓ_{dh} = development length of standard hook
LP = Low point
ml = middle layer
mr = middle row
nf = near face
nr = near row
ns = near side
OCJ = Optional construction joint
of = outside face
or = outside row
spc. = spaced or spaces
Std. = Standard
tf = top face
tl = top layer
TOC = Top of concrete
tr = top row
TW = Tailwater
Typ. = Typical
uv = uniformly varying lengths of bars between lengths shown
VCJ = Vertical construction joint
WP = Working point
WS = Water surface, Waterstop

CONCRETE SYMBOLS

The different concrete placements are indicated by the following symbols:

Concrete - First stage
Concrete - Second stage
Concrete - Blockout
Concrete - Existing or in adjacent structures
Grout

NOTES TO DESIGNERS AND DETAILERS

1. Splice lengths shown in TABLES 3.0-60 thru 5.0-60 on 40-D-60004 are for Class B tension lap splices in accordance with ACI 318 and ACI 350. 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.
2. 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.
3. The minimum centerline to centerline bar spacing requirements shown in TABLES 3.0-60 thru 5.0-60 on 40-D-60004 may not be applicable when using the provisions of ACI 350 Section 10.6 for distribution of flexural reinforcement to control flexural cracking.
4. Recalculation of lap splice lengths and development lengths by the designer may be required for changes in combinations of controlling variables per ACI 318 Section 25.4, or ACI 350 Section 12.2.
5. 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.
6. Development lengths for deformed bars in tension terminating in a standard hook shall be calculated by the designer in accordance with ACI 318 Section 25.4.3.1 or ACI 350 Section 12.5. In cases where a restricted member thickness does not allow for the full development length of a standard hook, the designer shall use a reduced tensile capacity.

CONCRETE OUTLINE GENERAL NOTES

CHAMFER :
Chamfer edges of permanently exposed concrete surfaces, except slabs and top edges of curbs, with a 45° bevel, $\frac{3}{4}$" x $\frac{3}{4}$", unless otherwise shown on the specifications drawings.

CONCRETE PLACEMENT :
Before placing concrete, see specifications and manufacturer's drawings, for all embedded material which is required in the placement.

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.
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 items, including waterstops, 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. Relocation, addition, or elimination of construction joints will be subject to approval.

TOOLED EDGES :
Tool exposed edges of slabs and top edges of curbs to a radius of $\frac{1}{4}$", unless otherwise shown on the specifications drawings.

REINFORCEMENT GENERAL NOTES *(See Note 4)*

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 shall be used.

CODE AND DETAILING REFERENCES :
ACI Building Code Requirements for Structural Concrete (ACI 318-14).
ACI Detailing Manual-2004 (SP-66).
ACI Code Requirements for Environmental Engineering Concrete Structures (ACI 350-06).

COVER :
Place the reinforcement so that the clear distance between face of concrete and nearest reinforcement is 2" for #8 bars and smaller, and 3" for #9 bars thru #11 bars, unless otherwise shown on specifications drawings. Provide 3" clear distance from face of concrete for all bars when concrete exposure is cast against and permanently in contact with the ground. For corner bars cover, see ADDITIONAL REINFORCEMENT OPENINGS AND RECESSES, SECTION A-A on 40-D-60004. Clear distance is to the design dimension line.
Reinforcement parallel to construction joints shall have a minimum of 2" clear cover.

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 "clr." and are dimensioned to the outside of the bar.

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.

PLAIN DOWELS :
Plain dowels across contraction joints shall be smooth bars uniformly coated with a film of oil before concrete placement.

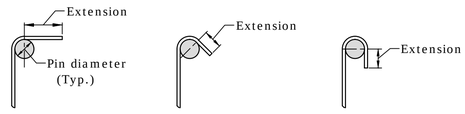
REINFORCEMENT DOWELS :
Unless otherwise shown, dowels indicated on the drawing, such as #8(d), shall be embedded a length equal to ℓ_d and shall have a projection equal to that required for lap splicing to a bar of the same diameter.

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 $2.5d_b$. For #9 thru #11 bars where minimum centerline bar spacing is 6" and the lap splice lengths requiring staggered placement shown in TABLES 3.0-60 thru 5.0-60 on 40-D-60004 are used, the minimum edge spacing shall be 3".

SPLICES :
The minimum length of lap for splicing parallel bars in tension shall be as given in TABLES 3.0-60 thru 5.0-60 on 40-D-60004.
Staggered lap 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, splice length shall be the larger of ℓ_d of larger bar and tension lap splice length of smaller bar.
Splices are to be made so that the required clear distances to face of concrete will be maintained.

STANDARD HOOKS FOR DEVELOPMENT OF DEFORMED BARS IN TENSION :
90-degree bend plus $12d_b$ extension at free end of the bar.
180-degree bend plus $4d_b$ extension, but not less than $2\frac{1}{2}$", at the free end of the bar.

STANDARD HOOKS FOR STIRRUPS, TIES, AND HOOPS :
#5 bar and smaller, 90-degree bend plus $6d_b$ extension, but not less than 3", at the free end of the bar.
#6, #7, and #8 bars, 90-degree bend plus $12d_b$ extension at the free end of the bar.
#8 bars and smaller, 135-degree bend plus $6d_b$ extension, but not less than 3", at the free end of the bar.
#8 bars and smaller, 180-degree bend plus $4d_b$ extension, but not less than 2.5", at the free end of the bar.

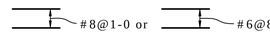


90-degree *135-degree* *180-degree*

TABLE OF PIN DIAMETERS (INCHES)

BAR NO.	3	4	5	6	7	8	9	10	11
Standard bends	$2\frac{1}{4}$	3	$3\frac{3}{4}$	$4\frac{1}{2}$	$5\frac{1}{4}$	6	$9\frac{1}{2}$	$10\frac{3}{4}$	12
Stirrups, tie bends and hoops	$1\frac{1}{2}$	2	$2\frac{1}{2}$	$4\frac{1}{2}$	$5\frac{1}{4}$	6			

SYMBOLS :
Bars shown thus:



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
Headed deformed bar

NOTES

1. This drawing shall be used in conjunction with 40-D-60004.
2. For Minimum Requirements For Detailing Reinforcement, see 40-D-60004.
3. Unless otherwise shown on the concrete outline and/or reinforcement specifications drawings, the notes shown are minimum requirements and typical for all drawings that refer to this drawing.
4. Unless otherwise shown on the reinforcement specifications drawings or 40-D-60004, follow the recommendations established by the ACI Detailing Manual - 2004 (SP-66).
5. # Denotes reinforcement bar number.
6. Numerals in parentheses ( ) following 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 (60524) denotes drawing XXX-D-60524. The letters XXX shown here will be numbers denoting the project.

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U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
STANDARD DRAWINGS

STANDARD AND TYPICAL DESIGNS
CONCRETE OUTLINE AND REINFORCEMENT

R. BARTHEL
DESIGNED
R. RODRIGUEZ
DRAWN
J. WAGNER
CHECKED
McGovern, Robert K P.E.
TECH. APPR.
Bernstein, Alfred I
APPROVED
PEER REVIEWER - Plant Structures Group

DENVER, CO *2016-09-23*

GENERAL NOTES FOR CONCRETE OUTLINE AND REINFORCEMENT

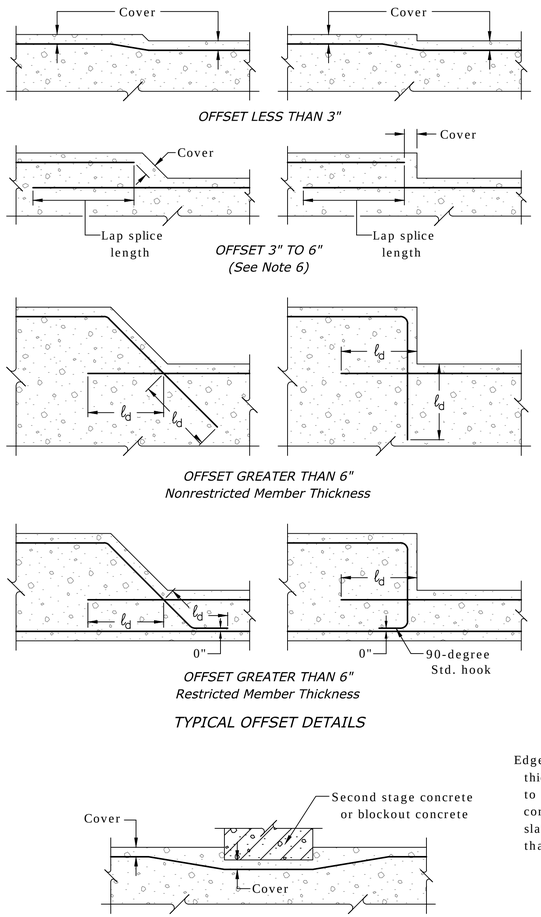
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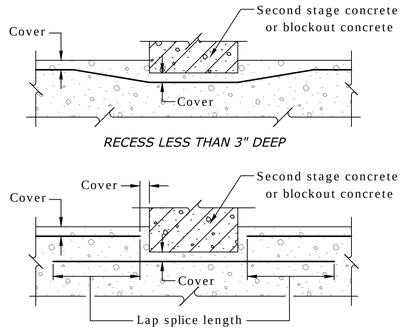
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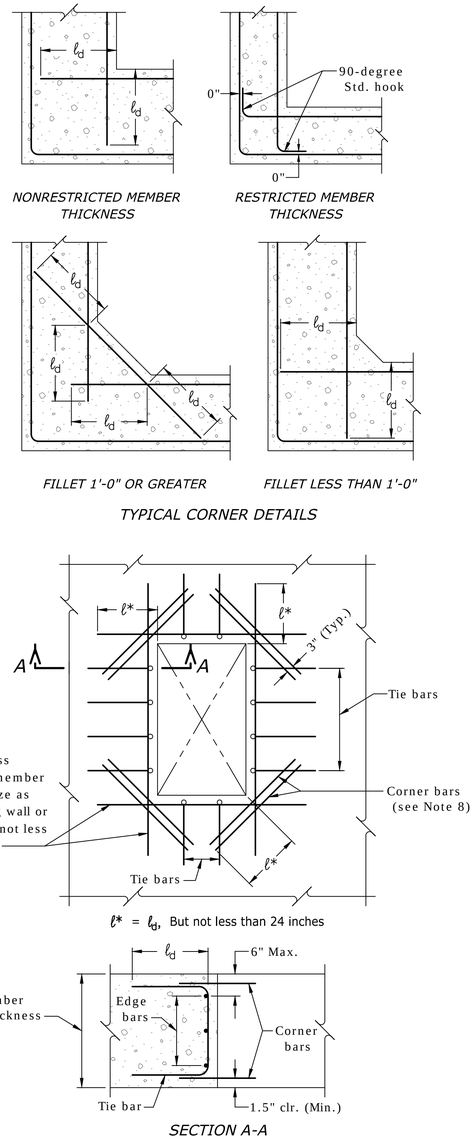
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SEPTEMBER 23, 2016 07:26
PLOTTED BY
RRODRIGUEZ

CAD SYSTEM
AutoCAD Rel. 20.0s
CAD FILENAME
40-D-60003-RD-1.DWG

Released







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'-5"	None	2 - (1 ef)	4 - #4 (2 ef)
1'-6" thru 3'-0"	#4@1'-0"	3 - eq. spc.	4 - #4 (2 ef)
Over 3'-0"	#6@1'-0"	Spc. @ 1'-0"	4 - #4 (2 ef)

Omit edge and tie bars along sides of openings where opening 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".

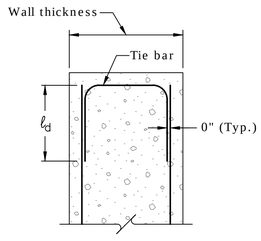
ADDITIONAL REINFORCEMENT AROUND OPENINGS AND RECESSES

f'c = 3,000 psi TABLE 3.0-60 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	13	13	12
4 (13)	3	23	18	18	14
5 (16)	3.5	28	22	22	17
6 (19)	4	34	26	26	20
7 (22)	4.5	49	38	38	29
8 (25)	5	56	43	43	33
9 (29)	6	63	49	49	38
10 (32)	6.5	71	55	55	42
11 (36)	7.5	79	61	61	47
10 (32)	6	75**	58**	58	45
11 (36)	6	93**	71**	71	55

f'c = 4,000 psi TABLE 4.0-60 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	15	12	12	12
4 (13)	3	20	15	15	12
5 (16)	3.5	25	19	19	15
6 (19)	4	29	23	23	18
7 (22)	4.5	43	33	33	25
8 (25)	5	49	37	37	29
9 (29)	6	55	42	42	33
10 (32)	6.5	62	47	47	37
11 (36)	7.5	68	53	53	41
10 (32)	6	65**	50**	50	39
11 (36)	6	80**	62**	62	48



TYPICAL TOP OF WALL DETAIL

For wall thickness less than 1'-6", tie bars not required.
For wall thickness 1'-6" and larger, tie bars to be #6@1'-0" unless otherwise shown on reinforcement specifications drawings.

f'c = 3,500 psi TABLE 3.5-60 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	12	12	12
4 (13)	3	21	16	16	13
5 (16)	3.5	26	20	20	16
6 (19)	4	31	24	24	19
7 (22)	4.5	45	35	35	27
8 (25)	5	52	40	40	31
9 (29)	6	59	45	45	35
10 (32)	6.5	66	51	51	39
11 (36)	7.5	73	56	56	43
10 (32)	6	70**	54**	54	41
11 (36)	6	86**	66**	66	51

f'c = 4,500 psi TABLE 4.5-60 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	14	12	12	12
4 (13)	3	19	14	14	12
5 (16)	3.5	23	18	18	14
6 (19)	4	28	21	21	17
7 (22)	4.5	40	31	31	24
8 (25)	5	46	35	35	27
9 (29)	6	52	40	40	31
10 (32)	6.5	58	45	45	35
11 (36)	7.5	64	50	50	38
10 (32)	6	61**	47**	47	37
11 (36)	6	76**	58**	58	45

f'c = 5,000 psi TABLE 5.0-60 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	13	12	12	12
4 (13)	3	18	14	14	12
5 (16)	3.5	22	17	17	13
6 (19)	4	26	20	20	16
7 (22)	4.5	38	29	29	23
8 (25)	5	44	34	34	26
9 (29)	6	49	38	38	29
10 (32)	6.5	55	43	43	33
11 (36)	7.5	61	47	47	36
10 (32)	6	58**	45**	45	35
11 (36)	6	72**	55**	55	43

* Top bars are defined as horizontal reinforcement with a casting position of more than 12 inches of fresh concrete placed below the bar (see NOTES TO DESIGNERS AND DETAILERS, Note 5 on 40-D-60003).
** Splices must be staggered.
*** IP = Inch-pound bar size designation.
SM = Soft metric bar size designation.

NOTES

1. This drawing shall be used in conjunction with 40-D-60003.
2. For Concrete Outline General Notes and Reinforcement General Notes, see 40-D-60003.
3. For ABBREVIATIONS and CONCRETE SYMBOLS, see 40-D-60003.
4. For NOTES TO DESIGNERS AND DETAILERS, see 40-D-60003.
5. Unless otherwise shown on the reinforcement specifications drawings, the details shown are minimum requirements and typical for all reinforcement drawings that refer to this drawing.
6. This detail may not be appropriate for tension areas of shallow structural members. If in doubt, use detail for recess greater than 6".
7. TABLES 3.0-60 thru 5.0-60 generated using ACI 318 Eq. 25.4.2.3a and ACI 350 Eq. 12-1.
8. Development of diagonal corner bars in close proximity to another opening, wall or slab, will require bends or hooks.

RECLAMATION
Managing Water in the West

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U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
STANDARD DRAWINGS

STANDARD AND TYPICAL DESIGNS
CONCRETE OUTLINE AND REINFORCEMENT

SIZE	NO.	DESCRIPTION	BY	DATE
D	1	MINOR REVISION	McGovern, Robert K P.E.	2016-12-08

R. BARTHEL DESIGNED
R. RODRIGUEZ DRAWN
L. NGUYEN CHECKED
McGovern, Robert K P.E. TECH. APPR.
Bernstein, Alfred I APPROVED
PER REVIEWER - Plant Structures Group
DENVER, CO 2016-09-23

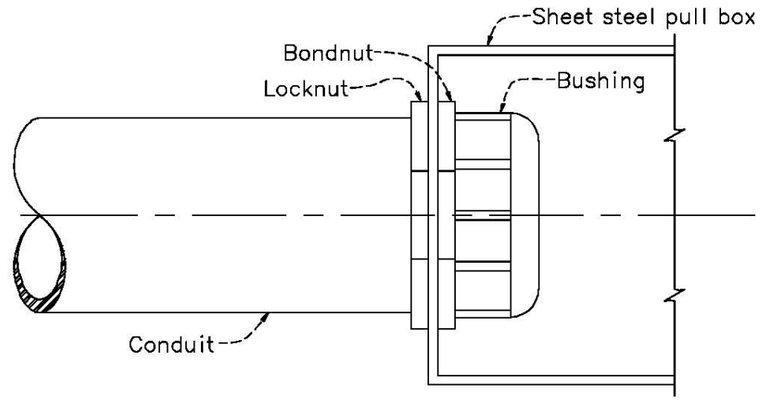
MINIMUM REQUIREMENTS FOR DETAILING REINFORCEMENT

40-D-60004
SHEET 2 OF 2

DATE AND TIME PLOTTED
SEPTEMBER 23, 2016 07:27
PLOTTED BY
RRODRIGUEZ

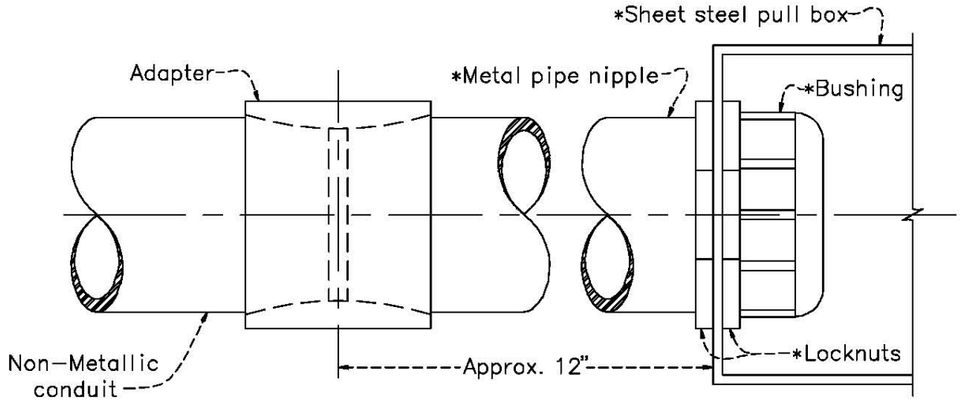
CAD SYSTEM
AutoCAD Rel. 20.0s
CAD FILENAME
40-D-60004-RD-2.DWG

BOX TERMINATION



DETAIL "C"

TERMINATING METAL CONDUIT IN SHEET STEEL PULL BOXES



DETAIL "D"

TERMINATING NON–METALLIC CONDUIT IN SHEET STEEL PULL BOXES

*Use aluminum or brass and slot steel box between knockouts for single phase.

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REV. 3–25–46
REV. 4–1–42

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DENVER, COLO. 6–14–38 | 104–D–254