NAVAJO DIVISION OF TRANSPORTATION

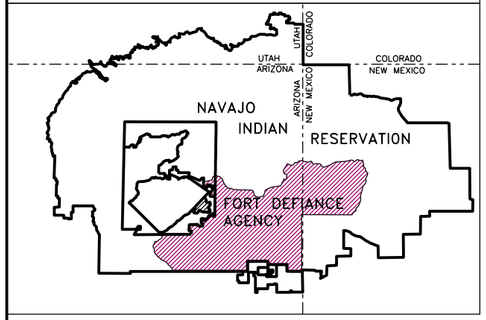
PLANS FOR PROPOSED

N9073(1)1,2&4

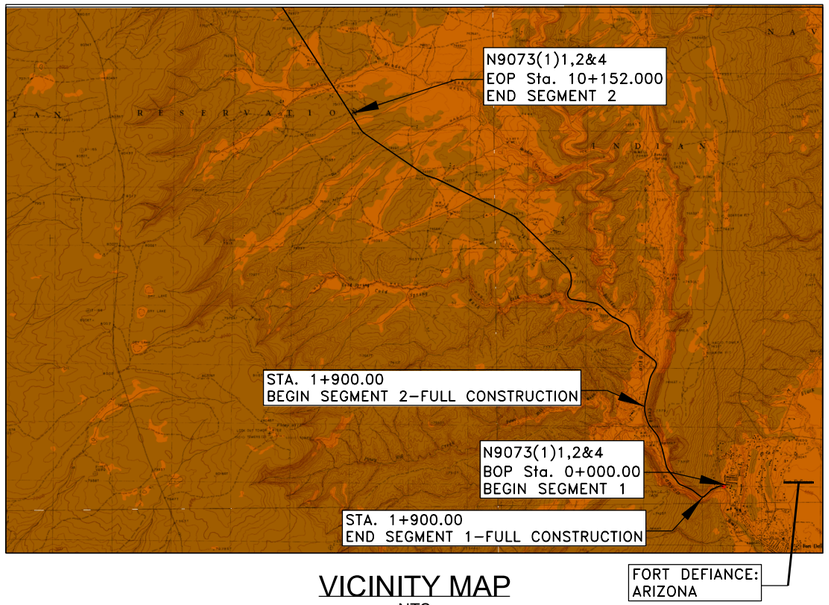
BLUE CANYON ROAD
BRIDGE ID. NO. N36434
FT. DEFIANCE CHAPTER
APACHE COUNTY, AZ

LENGTH 8.635 KM (5.36 MILES)

INDEX MAP



LOCATION MAP
NTS



VICINITY MAP
NTS

LENGTH OF PROJECT			
LOCATION	**STATION**	**LENGTH (m)**	**LENGTH (km)**
BOP BEGIN SEGMENT 1	0+000.000	-	-
END SEGMENT 1	0+383.000	383.000	0.383
BEGIN SEGMENT 2	1+900.000	-	-
EOP, END SEGMENT 2	10+152.000	8252.000	8.252
	TOTAL:	**8635.000**	**8.635**

DESIGN DATA		
STATION TO STATION	**0+000.00 to 1+640.00**	**1+640.00 to 10+152.00**
DESIGN SPEED	40 km/h	80 km/h
MINIMUM RADIUS	43 m	252 m
MAXIMUM GRADIENT	7.0%	7.0%
MINIMUM STOPPING SIGHT DISTANCE	50 m	130 m
MINIMUM PASSING SIGHT DISTANCE	140 m	245 m
AVERAGE DAILY TRAFFIC-ADT (2015)	364 vpd	222 vpd
AVERAGE DAILY TRAFFIC-ADT (2035)	423 vpd	423 vpd
DESIGN HOURLY VOLUME-DVH (2015)	35 vph	24 vph
DESIGN HOURLY VOLUME-DVH (2035)	–	–
MAXIMUM SUPERELEVATION (e max)	6.0%	6.0%

RIGHT-OF-WAY TABLE		
STATION TO STATION	**LEFT OFFSET (m)**	**RIGHT OFFSET (m)**
0+000.000 TO 10+152.000	22.86	22.86

NOTE: ROW VARIES IN SOME AREAS, PLEASE REFER TO FINAL ROW MAPS

METRIC DIMENSIONS:
SLOPES ARE EXPRESSED AS RISE:RUN

SPECIFICATIONS:
"STANDARD SPECIFICATIONS FOR CONSTRUCTION OF ROADS AND BRIDGES ON FEDERAL HIGHWAY PROJECTS, FP-14"

INDEX OF SHEETS	
SHEET No.	**DESCRIPTION**
1	TITLE SHEET
2	TYPICAL SECTIONS
3	GENERAL NOTES
4	HORIZONTAL ALIGNMENT TABLE
5	VERTICAL ALIGNMENT AND CONTROL POINTS TABLE
6	SUPERELEVATION TABLE
7-8B	ESTIMATED QUANTITIES TABLES
9	DRAINAGE STRUCTURE QUANTITY TABLE
10 - 26	PLAN AND PROFILE SHEETS
27	TEMPORARY TRAFFIC CONTROL
28 - 29	PERMANENT & TEMPORARY TRAFFIC CONTROL DETAILS
30	PAVEMENT STRIPING, MARKING & TURNOUT LAYOUT DETAIL
31	SQUARE TUBE STEEL POST SELECTION & SIGN MOUNTING DETAILS
32	POST SELECTION AND SIGN MOUNTING DETAILS
33A	GABION WALL CROSS SECTION TABLE & GENERAL NOTES
33B	GABION RETAINING WALLS
34A	STANDARD PIPE INSTALLATION AND DITCH DETAILS
34B	END SECTION DETAILS
34C	ARTICULATED CONCRETE BLOCK REVETMENT DETAILS
35	RIPRAP STILLING BASIN DETAIL
36A	PLACED AND WIRE ENCLOSED RIPRAP APRON DETAIL
36B	RIPRAP LINED DITCH, DOWNDRAIN & FLAT BOTTOM DITCH DETAILS
37A - 37B	SINGLE CIRCULAR METAL PIPE CONCRETE BLANKET AND CUTOFF WALL 60"-120" DIAMETER PIPE (5' TO 15' SKEW)
37C - 37D	DOUBLE CIRCULAR METAL PIPE CONCRETE BLANKET AND CUTOFF WALL 60"-120" DIAMETER PIPE (5' TO 15' SKEW)
37E - 37F	TRIPLE CIRCULAR METAL PIPE CONCRETE BLANKET AND CUTOFF WALL 60"-120" DIAMETER PIPE (5' TO 15' SKEW)
38	- SHEET NUMBER NOT USED -
39 - 40	STORMWATER POLLUTION AND EROSION/SEDIMENT CONTROL DETAILS
41A - 41F	ROCKFALL PROTECTION FENCE AND CONCRETE WALL BARRIER DETAILS
42 - 43	STANDARD GUARDRAIL DETAIL
44 - 45	GUARDRAIL END TREATMENT MSKT - TL3-8 LAYOUT
46	GUARDRAIL TRANSITION AND THRIE BEAM DETAILS
47	STANDARD FENCING DETAIL
48	PRECAST CONCRETE CATTLEGUARD DETAILS
49	CATTLEGUARD AND WING BRACE DETAILS
50	MILEPOST & SQUARE TUBE POST DETAILS
51	DELINEATOR AND OBJECT MARKER DETAILS
52	DELINEATOR & OBJECT MARKER LAYOUT AND QUANTITY TABLES
53	GLASS FIBER & SQUARE STEEL TUBE POST DETAILS
54	RIGHT-OF-WAY & REFERENCE MARKERS DETAIL
55 - 58	PIPE-CROSS-SECTIONS
59	BRIDGE GENERAL NOTES, QUANTITIES, AND TABLES
60	STA. 3+204.29, CBC PLAN AND PROFILE DETAIL
61	TEMPORARY TRAFFIC CONTROL DETOUR LAYOUT & DETAILS
62A	SOIL PROFILE & BORING PLAN
62B	STA. 3+204.291 CULVERT PLAN AND PROFILE
63 - 64	CONCRETE BOX CULVERT EXAMPLE OF USE OF DRAWINGS
65	CBC TRIPLE AND QUADRUPLE OPENING - DESIGN "A" 0-10 FT STRUCTURAL SECTIONS AND REBAR
66	CBC TRIPLE OPENING - DESIGN "A" 0-10 FT DIMENSIONS AND REBAR SCHEDULE
67	CBC QUADRUPLE OPENING - DESIGN "A" 0-10 FT DIMENSIONS AND REBAR SCHEDULE
68 - 69	CBC HEAD/CUTOFF WALL-ALL DESIGN FILLS - 0o 15o 30o SKEWS STRUCTURAL SECTIONS AND REBAR
70	CONCRETE BOX CULVERT EXTENSION ALL DESIGN FILLS - ALL SKEWS MISCELLANEOUS DETAILS & BACKFILL
71 - 72	CONCRETE BOX CULVERT WINGWALL & OUTLET APRON ALL SKEWS PLAN, PERSPECTIVE & DIMENSIONS
73	GABION WALL AND WIRE ENCLOSED RIP-RAP DETAILS
74 - 76	TURNOUT PROFILES
77 - 78	WATERLINE PLAN AND PROFILES
79 - 80	WATERLINE RELOCATION

TYPE OF CONSTRUCTION

GRADE, DRAIN AND AGGREGATE BASE COURSE, HOT ASPHALTIC CONCRETE PAVEMENT, BRIDGE, & MISCELLANEOUS CONSTRUCTION

PLANS PREPARED BY

WILSON &COMPANY
4401 MASTHEAD ST. N.E.
SUITE 105
ALBUQUERQUE, NEW MEXICO
87109
(505) 348-4000

Registered Professional Engineer (Civil)
CERTIFICATE NO.
53225
MYRA K.
CANDELARIA
Not Signed
ARIZONA, U.S.A.

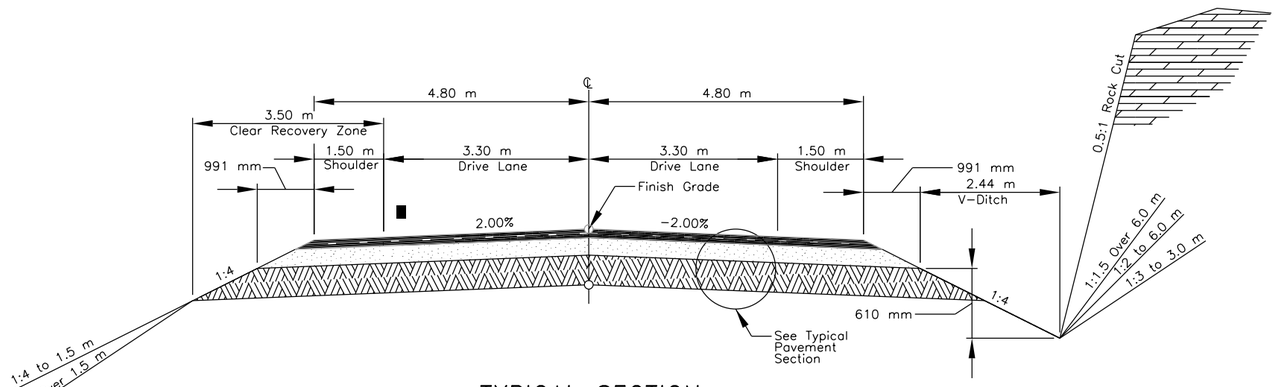
RECOMMENDED:

_____ DATE: _____
PRINCIPAL ENGINEER
NAVAJO DIVISION OF TRANSPORTATION

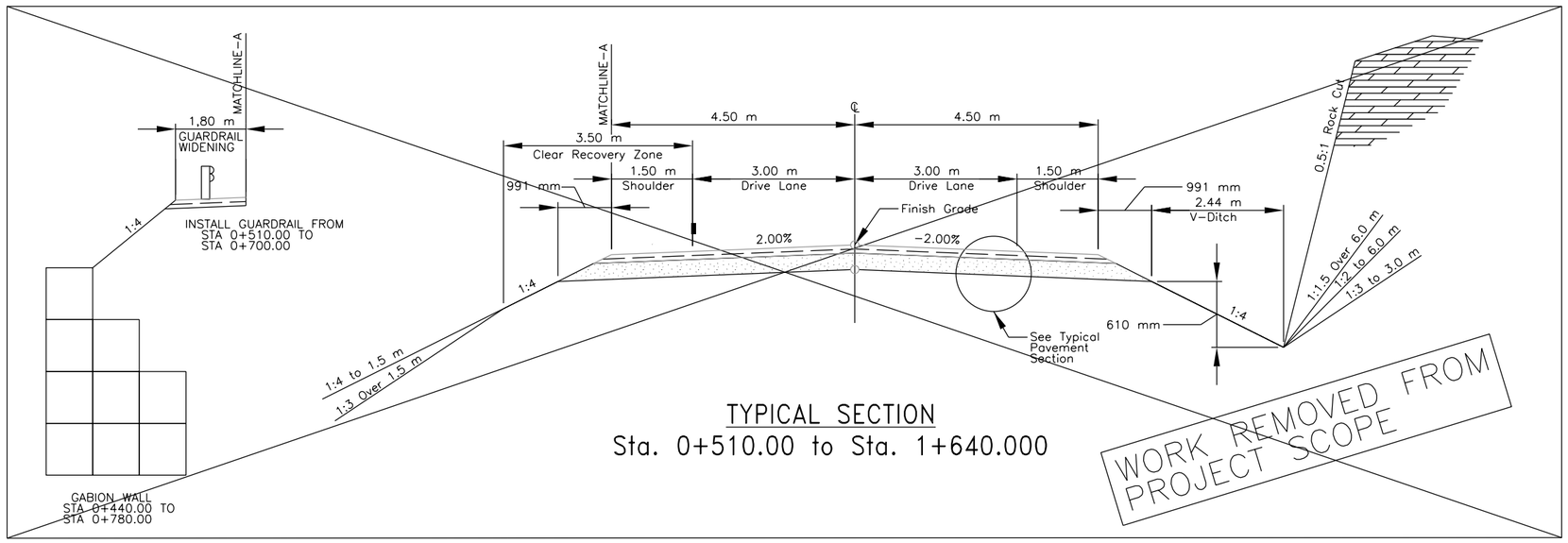
APPROVED:

_____ DATE: _____
DIRECTOR
NAVAJO DIVISION OF TRANSPORTATION

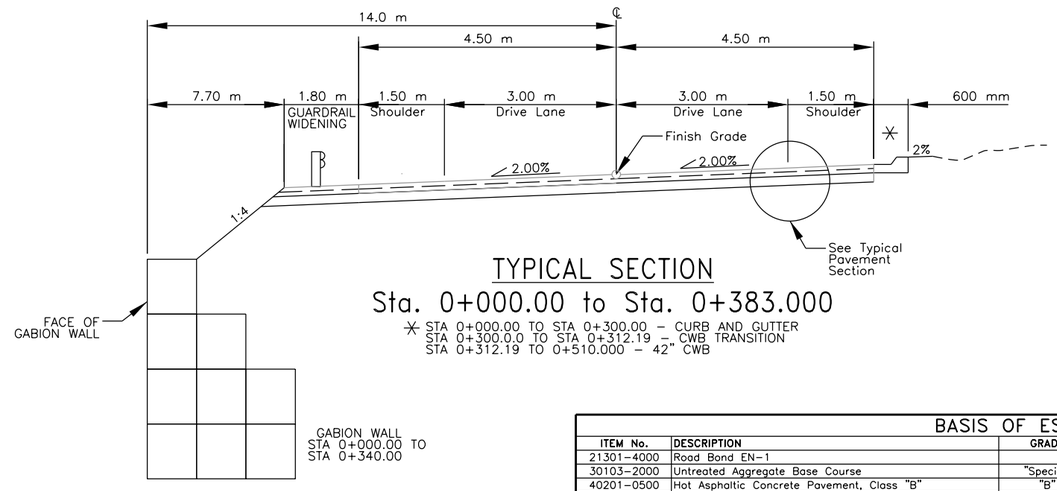
STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	2



TYPICAL SECTION
Sta. 1+900.00 to EOP STA 10+152.00

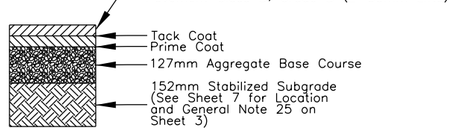


TYPICAL SECTION
Sta. 0+510.00 to Sta. 1+640.000



TYPICAL SECTION
Sta. 0+000.00 to Sta. 0+383.000

✳ STA 0+000.00 TO STA 0+300.00 – CURB AND GUTTER
STA 0+300.0 TO STA 0+312.19 – CWB TRANSITION
STA 0+312.19 TO 0+510.000 – 42" CWB



TYPICAL PAVEMENT SECTION
SCALE: NONE

BASIS OF ESTIMATED QUANTITIES

ITEM No.	DESCRIPTION	GRADE	UNIT WT.	APPLICATION
21301-4000	Road Bond EN-1			Mix Ratio: 1:200, EN-1:Water
30103-2000	Untreated Aggregate Base Course	"Special"	2164 kg/m³	Main Roadway: 152 mm or As Needed, Turnouts: 51 mm
40201-0500	Hot Asphaltic Concrete Pavement, Class "B"	"B"	2324 kg/m³	Main Roadway and Turnouts: 76 mm (2-38 mm Lifts), Turnouts 51 mm
40502-0800	Asphalt Cement	PG 64-22		6.0% By Weight of Total Weight of Mixture
41101-5000	Prime Coat – Penetrating Emulsified Prime, Grade PEP	PEP	1056 L/t	Unit Weight: 1.36 L/sq m Apply on top of ABC
41201-1000	Asphalt Emulsion Tack Coat	SS-1	1.001 L/kg	0.23 L/m² Application Rate

WILSON &COMPANY
4401 MASTHEAD ST. NE. SUITE 150
ALBUQUERQUE, NM 87109
PHONE: 505-348-4000
FAX: 505-348-4072
www.wilsonco.com

Registered Professional Engineer (Civil) CERTIFICATE NO. 53225 MYRA K. CANDELARIA Date Signed 10/31/22 ARIZONA, U.S.A.

	REVISION	BY	DATE
△			

NAVAJO D.O.T.

NAVAJO NATION
DIVISION OF TRANSPORTATION

N9073(1) 1, 2 & 4

TYPICAL SECTIONS

PROJECT MANAGER: DDM	DATE: 1/22	DRAWING	SHEET
LEAD DESIGNER: MLL	DATE: 1/22		
ASBUILT BY:	DATE: XXX		2 OF 84
SCALE: N/A			

STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	3

GENERAL NOTES:

1. ALL WORKMANSHIP AND MATERIALS SHALL CONFORM TO THE STANDARD SPECIFICATIONS FOR CONSTRUCTION OF ROADS AND BRIDGES ON FEDERAL HIGHWAY PROJECTS (FP-14), AND THE SUPPLEMENTAL SPECIFICATIONS FOR THIS PROJECT.
2. ALL PERMANENT AND TEMPORARY ROADSIDE SIGNS, AND PAVEMENT MARKINGS SHALL BE PLACED IN ACCORDANCE WITH THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD) FOR STREETS AND HIGHWAYS (LATEST EDITION) AND IN ACCORDANCE WITH THE DETAILS ON THESE PLANS. PLACEMENT OF "STOP" BAR, PERMANENT TRAFFIC SIGNS AND PAVEMENT MARKINGS SHALL BE FIELD ADJUSTED AS DIRECTED BY THE CONSTRUCTION MANAGER (CM), AT NO ADDITIONAL COST TO THE GOVERNMENT.
3. THE TEMPORARY TRAFFIC CONTROL DETAILS SHOWN REFLECTS GENERAL REQUIREMENTS FOR THIS PROJECT. THE CONTRACTOR IS RESPONSIBLE FOR PREPARING AND SUBMITTING A TRAFFIC CONTROL PLAN IN ACCORDANCE WITH THESE DETAILS, TAKING INTO ACCOUNT THE CONTRACTOR'S CONSTRUCTION SEQUENCING PLAN, MUTCD, AND THE SUPPLEMENTAL SPECIFICATIONS FOR SECTION 635.-TEMPORARY TRAFFIC CONTROL.
4. THE DESIGN FEATURES INCLUDING HORIZONTAL AND VERTICAL ALIGNMENTS, TYPICAL SECTIONS, AND OTHER DESIGN DETAILS SHOWN SHALL NOT BE ALTERED OR MODIFIED IN ANYWAY DURING CONSTRUCTION WITHOUT THE EXPRESSED WRITTEN DIRECTION AND WRITTEN APPROVAL OF THE ENGINEER OF RECORD (EOR) THROUGH THE CONSTRUCTION MANAGER (CM), UNLESS OTHERWISE NOTED IN THESE PLANS OR SPECIFICATIONS. DRAINAGE STRUCTURES AND TURNOUTS SHALL BE INSTALLED AS SHOWN WITH ONLY MINOR CORRECTIONS IN LOCATION, SKEW, AND/OR INVERT ELEVATIONS AS NEEDED TO FIT FIELD CONDITIONS. TURNOUTS MAY NOT BE SHIFTED MORE THAN 5.0 METERS FROM THE LOCATIONS SHOWN ON THE PLANS WITHOUT THE CONSTRUCTION MANAGER'S WRITTEN APPROVAL.
5. THE CONTRACTOR SHALL ASSUME FULL RESPONSIBILITY AND EXPENSE FOR DISPOSAL OF TRASH AND/OR CONSTRUCTION DEBRIS IN ACCORDANCE WITH SECTIONS 107 AND 203 OF THE FP-14 AS WELL AS ANY AND ALL PERMIT REQUIREMENTS. THIS WORK SHALL BE INCIDENTAL OBLIGATIONS OF THE CONTRACTOR.
6. THE BIDDER SHALL READ AND MAKE CAREFUL EXAMINATION OF THE PLANS, SPECIFICATIONS, QUANTITIES, MATERIAL, SURVEYING REQUIREMENTS, AND VISIT THE SITE OF THE PROPOSED CONSTRUCTION TO BECOME FAMILIAR WITH THE SITE CONDITIONS AND LIMITATIONS BEFORE MAKING A PROPOSAL. THE CONTRACTOR WILL BE RESPONSIBLE FOR ANY AND ALL ERRORS RESULTING FROM THE FAILURE TO MAKE SUCH AN EXAMINATION. ANY INFORMATION DERIVED FROM THE MAPS, PLANS, SPECIFICATIONS, PROFILES, DRAWINGS OF THE ENGINEER, SHALL NOT RELIEVE THE CONTRACTOR FROM ANY RISK OR FROM FULFILLING THE TERMS OF THE CONTRACT. THERE ARE SEVERAL AREAS WITH LIMITED WORKING ROOM WITHIN THE PROJECT RIGHT-OF-WAY, AND/OR WITH EXISTING FEATURES WITHIN OR NEAR THE PROJECT RIGHT-OF-WAY, THAT WILL REQUIRE 'SPECIAL' CONSTRUCTION PROCEDURES.
7. THE CONTRACTOR IS REQUIRED TO SUBMIT A REVISED PIPE LIST TO THE CONSTRUCTION MANAGER, BASED ON THE FIELD STAKING IN ACCORDANCE WITH SECTION 152 OF THE CONTRACT SUPPLEMENTAL SPECIFICATION. THE APPROVAL OF ANY AND ALL REVISED PIPE LISTS WITH ACCOMPANYING DRAWINGS IS RENDERED AS A SERVICE ONLY AND IS NOT CONSIDERED A GUARANTEE OF MEASUREMENTS, QUANTITIES, INSTALLATION PROCEDURES, AND/OR DIMENSIONS, NOR SHALL IT BE CONSIDERED AS RELIEVING THE CONTRACTOR FROM COMPLYING WITH THE CONTRACT SPECIFICATIONS AND DESIGN PLANS. THE CONTRACTOR IS HEREBY NOTIFIED THAT UNDER NO CIRCUMSTANCE SHALL ANY DRAINAGE STRUCTURE(S) BE INSTALLED BELOW THE NATURAL FLOW LINE OF THE WASH, CHANNEL, ARROYO, OR DITCH LINE.
8. NO WORK SHALL BE PERFORMED OR GROUND DISTURBED OUTSIDE OF THE DESIGNATED CONSTRUCTION LIMITS IN ACCORDANCE WITH SECTION 107 OF THE FP-14 WITHOUT WRITTEN APPROVAL BY THE CONSTRUCTION MANAGER (CM) UNLESS OTHERWISE SHOWN AND LABELED ON THESE PLANS AS "CONSTRUCTION ZONE". THE CONSTRUCTION LIMIT IS THE CATCH POINT EARTHWORK LIMIT PLUS 3.0 METERS, NOT TO EXCEED THE RIGHT-OF-WAY LIMITS.
9. THE DETAILS SHOWN ON THE STORM WATER POLLUTION AND EROSION/SEDIMENT CONTROL DETAILS ARE GENERAL REQUIREMENTS TO BE USED BY THE CONTRACTOR IN PREPARING A STORM WATER POLLUTION PREVENTION PLAN ALONG WITH THE REQUIREMENTS IN SECTION 157 OF THE SUPPLEMENTAL SPECIFICATION AND SPECIAL CONTRACT REQUIREMENTS. THE SWPPP IS ONLY REQUIRED AT THE DRAINAGE PIPE REPLACEMENT LOCATIONS.THE CONTRACTOR IS REQUIRED TO SUBMIT COURTESY COPY OF THE APPROVED SWPPP TO THE NAVAJO NATION WATER QUALITY EPA OFFICE.
10. THE QUANTITIES SHOWN ARE FOR ESTIMATING PURPOSES ONLY AND TO COMPARE AND CANVAS BIDS. ACTUAL PAY QUANTITIES WILL BE DETERMINED IN THE FIELD FOR AUTHORIZED CHANGES THAT AFFECT THE QUANTITIES.
11. ALL TURNOUT/DRIVEWAYS, AS CALLED FOR ON THESE PLANS, SHALL EITHER BE CONSTRUCTED, REBUILT, RESHAPED AND/OR REMOVED UP TO THE RIGHT-OF-WAY LIMITS. ALL TURNOUTS SHALL BE PAVED TO THE CATTLEGUARD, THEN FROM THE BACK OF CATTLEGUARD TO THE R/W LINE, PLACE AGGREGATE BASE FOR ALL 4.5m WIDE TURNOUTS; PLACE AGGREGATE AND HOT ASPHALTIC CONCRETE FOR TURNOUTS WIDER THAN 4.5m TO MATCH THE STRUCTURAL SECTION. REQUIRED GRADING, SHAPING, AND EARTH COMPACTION OUTSIDE OF THE RIGHT-OF-WAY, TO CONNECT NEW TURNOUTS TO THE EXISTING ROADWAY/DRIVEWAY (AS SHOWN ON THE PLANS OR AS DIRECTED BY THE CM SHALL BE INCIDENTAL TO BID ITEM 20401-0000. ANY REQUIRED AGGREGATE BASE AND/OR ASPHALT MATERIAL SHALL BE PAID FOR UNDER THE APPROPRIATE BID ITEMS FOR THIS WORK AS SHOWN IN THE BID SCHEDULE.
12. THE CONTRACTOR SHALL BE REQUIRED TO OBLITERATE ALL EXISTING ABANDONED TURNOUTS AND ROADWAY WITHIN THE RIGHT-OF-WAY LIMITS, AND ANY EXISTING TURNOUTS/ROADWAY OUTSIDE OF THE RIGHT-OF-WAY THAT ARE DESIGNATED ON THE PLANS FOR OBLITERATION. OBLITERATION SHALL BE AS PER FP-14, METHOD 2. SCARIFICATION SHALL BE TO A DEPTH OF 300mm. THE SCARIFIED SURFACE SHALL BE LEFT ROUGH, WITH 100mm TO 300mm HIGH RIDGES PERPENDICULAR TO THE EXISTING ROAD CENTERLINE. ROADWAY OBLITERATION INCLUDES GRADING DRAINAGE CHANNELS ACROSS THE OLD ROADBED, TO RE-ESTABLISH NATURAL DRAINAGE CHANNELS AND/OR TO OPEN CHANNELS FOR THE NEWLY INSTALLED (IN NEW ROADWAY) DRAINAGE STRUCTURES. THIS WORK TO BE INCLUDED IN THE BID ITEM 21102-2000. PERMANENT SEEDING AND STRAW MULCHING SHALL BE APPLIED TO ALL OBLITERATION AREAS, WITHIN THE CONSTRUCTION LIMITS. SEEDING AND MULCHING TO BE PAID UNDER ITEM 62510-1000.
13. STRUCTURAL EXCAVATION AND BEDDING/BACKFILL OF ALL DRAINAGE STRUCTURES (CULVERTS AND CONCRETE HEAD/WING WALLS) SHALL BE CONSIDERED INCIDENTAL TO THE INSTALLATION OF STRUCTURES. BEDDING AND BACKFILL MATERIAL SHALL MEET ALL REQUIREMENTS OF FP-14, SECTIONS 209 AND 704. APPROVED EXCESS EXCAVATION MATERIAL MAY BE USED TO REBUILD TURNOUTS, EARTHEN DITCH BLOCKS, AND/OR PLACED ALONG ROADWAY SHOULDERS AS EMBANKMENT IN AREAS ADJACENT TO THE REMOVAL AND AS DIRECTED BY THE CM.
14. ALL DRAINAGE DITCHES SHALL BE STAKED AND GRADED TO DRAIN UP TO THE RIGHT-OF-WAY LIMITS. EARTHEN DITCH BLOCKS, DIKES AND DITCHES SHALL BE CONSTRUCTED AS SHOWN ON THESE PLANS AND/OR ADDED AT LOCATIONS DESIGNATED BY THE CM. ALL DITCH BLOCKS, DIKES AND DITCHES SHALL BE PAID FOR UNDER THE APPROPRIATE BID ITEMS FOR THIS WORK AS SHOWN IN THE BID SCHEDULE. AT ALL DRAINAGE PIPE REPLACEMENTS, INSTALLATIONS, EXTENSIONS, AND IN-PLACE PIPE CLEANING LOCATIONS, THE CONTRACTOR SHALL CLEAN, REGRADE, AND RESHAPE THE INLET AND OUTLET CHANNELS TO THE RIGHT-OF-WAY LINE AS DIRECTED BY THE CM. THIS WORK SHALL BE INCIDENTAL TO BID ITEMS FOR SECTIONS 602, 603, AND/OR 607.
15. IMMEDIATELY PRIOR TO PLACING EMBANKMENT, AGGREGATE BASE AND/OR RECYCLED MATERIAL, THE TOP 152 mm OF THE ORIGINAL GROUND, OR FINISHED SUBGRADE (INCLUDING TURNOUTS) SHALL BE CHECKED FOR COMPACTION AND GRADE. IF COMPACTION DOES NOT MEET THE MINIMUM SPECIFIED COMPACTION AND TOLERANCE REQUIREMENTS, THE ORIGINAL GROUND AND/OR SUBGRADE SHALL BE RE-WATERED AND/OR SCARIFIED AS NEEDED AND RE-COMPACTED TO THE REQUIRED DENSITY AND TOLERANCE, AT THE CONTRACTOR'S EXPENSE. IN NO CASE SHALL ANY EMBANKMENT OR SURFACING MATERIAL BE PLACED ON FROZEN, MUDDY OR UNSTABLE NATURAL GROUND OR SUBGRADE. THIS WORK SHALL BE CONSIDERED AN INCIDENTAL OBLIGATION OF THE CONTRACTOR.
16. THE EARTHWORK TABLE SHOWN IS TO ASSIST THE CONTRACTOR IN ESTABLISHING A BID UNDER THE EARTHWORK ITEMS SHOWN IN THE BID SCHEDULE. ANY BORROW MATERIAL CALLED FOR ON THE PLANS SHALL BE TAKEN FROM CONTRACTOR IDENTIFIED SOURCES OUTSIDE THE RIGHT-OF-WAY LIMITS. IT IS THE SOLE RESPONSIBILITY AND EXPENSE OF THE CONTRACTOR TO PROVIDE ANY NECESSARY BORROW MATERIAL FOR THIS PROJECT INCLUDING ALL NECESSARY PERMITS. ALL EXCAVATION, BORROW, WASTE AND EMBANKMENT MATERIAL SHALL BE INCLUDED IN THE UNIT PRICE BID FOR ITEMS 20401-0000 AND 20403-0000. IF MATERIAL IS APPROVED, THE WASTE MATERIAL SHOWN ON THESE PLANS SHALL BE USED AS NECESSARY TO CONSTRUCT TURNOUTS, DITCH BLOCKS, AND/OR BE PLACED AS EMBANKMENT ALONG THE SHOULDERS IN AREAS AS DIRECTED BY THE CM. WASTE MATERIAL NOT USED WITHIN THE PROJECT LIMITS, SHALL BE DISPOSED OF AS PER FP-14, SECTION 204.14.
17. AT ALL TOP EDGES OF CUT SLOPES 3.0 METER OR HIGHER THAN THE DITCH FLOWLINE, THE CONTRACTOR SHALL REMOVE ALL LOOSE AND UNSTABLE ROCK OR ROCK THAT AS DETERMINED BY THE CM, MAY BECOME LOOSE WITHIN 5.0 METER OF THE TOP CUT SLOPE. THIS WORK SHALL BE CONSIDERED INCIDENTAL TO BID ITEM 20401-0000, AND NO ADDITIONAL PAYMENT WILL BE MADE.
18. THE LOCATION OF UTILITIES AS SHOWN IN THESE PLANS ARE APPROXIMATE AND ARE ONLY TO ASSIST THE CONTRACTOR IN COMPLETING THE WORK. THE CONTRACTOR SHALL CONTACT ALL UTILITY OWNERS PRIOR TO STARTING ANY CONSTRUCTION ACTIVITIES. THE CONTRACTOR SHALL CONTACT THE NEW MEXICO ONE-CALL AT (800)-321-2537, NAVAJO TRIBAL UTILITY AUTHORITY (NTUA) AT (928)-729-5721, FRONTIER COMMUNICATION COMPANY AT (928)-871-3748, NAVAJO HOUSING AUTHORITY (NHA) AT (928)-729-6605, AND NAVAJO NATION DIVISION OF NATURAL RESOURCES AT (928)-729-4003, PRIOR TO STARTING ANY CONSTRUCTION ACTIVITIES. THE CONTRACTOR SHALL VERIFY ALL UTILITIES AND THEIR LOCATIONS WITH THE UTILITY OWNERS PRIOR TO CONSTRUCTION. ANY UTILITIES DAMAGED DUE TO NEGLIGENCE OF THE CONTRACTOR SHALL BE RESTORED TO CODE REQUIREMENTS AT THE CONTRACTOR'S EXPENSE.
19. THE CONTRACTOR SHALL REMOVE, CLEAN, AND STOCKPILE ALL SALVAGEABLE EXISTING CULVERTS, GUARDRAIL, CATTLE GUARDS, FENCING MATERIALS, ETC, AS CALLED FOR ON THESE PLANS AND/OR SECTIONS 203 AND 607 IN A DESIGNATED LOCATION ADJACENT TO THE REMOVAL LOCATION BUT OUTSIDE OF THE PROPOSED CONSTRUCTION LIMITS. THE CM SHALL OFFER THIS SALVAGED MATERIALS TO THE COMMUNITY MEMBERS AND/OR PROPERTY OWNERS. ANY PIPE MATERIALS DETERMINED TO BE UNUSEABLE BY THE CM OR UNACCEPTABLE BY THE LAND OWNER/ COMMUNITY MEMBERS SHALL BE DISPOSED OF BY THE CONTRACTOR IN ACCORDANCE WITH SECTIONS 107, AND 203. THE SALVAGE WORK SHALL BE INCLUDED IN THE APPROPRIATE UNIT PRICE BID ITEMS FOR SECTIONS 203 AND/OR 607.
20. THE CONTRACTOR SHALL BE REQUIRED TO REPAIR ALL DENTED, BENT OR OTHERWISE DAMAGED PIPE EDGES FOR THE SECTION AS CALLED FOR REPAIR WORK. THIS WORK SHALL MEET THE APPROVAL OF THE CM, AND IS EXPECTED TO INCLUDE STRAIGHTENING OF DENTED/BENTED CULVERT EDGES, WELDING OF CUTS/TEARS IN THE EXISTING CULVERTS, TRIMMING BACK THE EXISTING CULVERT TO CREATE AN END SUITABLE FOR AN EXTENSION COLLAR, ETC. NO SEPARATE PAYMENT FOR THIS WORK WILL BE MADE. THE CONTRACTOR SHALL CONSIDER THESE REPAIRS INCIDENTAL TO THE DRAINAGE PIPE BID ITEMS UNDER SECTION 602, AND 603.
21. THE ROADWAY TYPICAL SECTION SHOWN IS THE BASIC TEMPLATE TO WHICH THE PROJECT IS TO BE STAKED AND BUILT. HOWEVER, THERE WILL BE LOCATIONS WHERE, DUE TO EXISTING GROUND CONDITIONS, TURNOUTS, CULVERTS OR OTHER STRUCTURES, ETC., THE SHOWN TYPICAL SLOPES CANNOT BE CONSTRUCTED. IN THIS CASE, THE ENGINEER OF RECORD AND CM, SHALL BE CONSULTED FOR CHANGES IN THE TYPICAL SECTIONS, DESIGN SLOPES, AND/OR OTHER ADJUSTMENTS BEFORE PROCEEDING WITH THE WORK UNLESS NOTED OTHERWISE ON THE PLANS. THE FINAL CONSTRUCTED ROAD SECTION SHALL BE BASED ON THE TYPICAL SECTIONS AND CROSS SECTIONS IN THE PLANS. THE CONTRACTOR SHALL STAY WITHIN THE LIMITS OF CONSTRUCTION, UNLESS OTHERWISE APPROVED. IN NO CASE SHALL THE CUT AND FILL BACK SLOPES BE BUILT STEEPER THAN THE MAXIMUM ALLOWED IN THE ROADWAY TYPICAL SECTION SHOWN.
22. THE CONTRACTOR SHALL SAW CUT (FULL DEPTH) THE EXISTING ASPHALT PAVEMENT (INCLUDING TURNOUTS) WHERE NEW ASPHALT IS TO TIE INTO THE OLD ASPHALT PAVEMENT AT THE LOCATIONS NOTED ON THE PLANS. THE CONTRACTOR SHALL MATCH THE NEW ASPHALTIC CONCRETE PAVEMENT SURFACE TO EXISTING PAVEMENT SECTION AT TIE-IN POINTS AND TO PROVIDE FOR A SMOOTH TRANSITION AS DIRECTED BY THE CM. ALL SAWED PAVEMENT EDGES TO RECEIVE ASPHALT TACK COAT. THIS WORK SHALL BE INCIDENTAL TO BID ITEM 40201-0500 AS SHOWN IN THE BID SCHEDULE.
23. THERE ARE MANY ARCHEAOLOGICAL SITES ALONG THE PROJECT CORRIDOR THAT REQUIRE AN ARCHAEOLOGIST PRESENT DURING CONSTRUCTION IN THE AREA AND OTHER SITES REQUIRING TEMPORARY ORANGE SAFETY FENCE TO BE PLACED BEFORE ANY WORK IN THE AREA CAN BEGIN. THE CONTRACTOR & CM SHALL COORDINATE THIS WORK WITH THE NDOT. DEPARTMENT OF PROJECT MANAGEMENT. UNDER NO CIRCUMSTANCE CAN THE CONTRACTOR DO ANY CONSTRUCTION WORK IN AREAS REQUIRING THESE MITIGATION REQUIREMENTS UNTIL THE SAFETY FENCING AND/OR AN NDOT ARCHAEOLOGIST IS PRESENT.
25. THE FINISHED SUBGRADE SOIL CLASSIFICATION AND PI'S WILL BE DETERMINED PRIOR TO SUBGRADE TREATMENT. THE FINAL LOCATIONS FOR SUBGRADE TREATMENT WILL BE DETERMINED BY CM AND PROVIDED TO THE CONTRACTOR PRIOR TO STARTING WORK. PROPOSED DEPTH OF TREATMENT IS 152MM, WITH RESULTING CBR OF 47 OR HIGHER.
26. THE CONTRACTOR WILL INCLUDE THE COST OF WATER NEEDED IN ITEMS 20401, ROADWAY EXCAVATION, 20403 UNCLASSIFIED BORROW, 21301-4000 SUBGRADE STABILIZATION, 30101 AGGREGATE BASE, AND 62510 SEEDING IN THEIR BID COST FOR THE INDIVIDUAL ITEMS. THE COST FOR WATER WHICH IS NEEDED DURING THE COURSE OF THE PROJECT FOR ALL OTHER PURPOSES, INCLUDING DUST CONTROL AND FOUNDATION COMPACTION, WILL ALSO BE INCLUDED IN THE OVERALL BID COST FOR THE PROJECT. THE CONTRACTOR WILL BE RESPONSIBLE FOR COMPUTING HIS OWN WATER QUANTITIES AND THEN BASING HIS BID ON HIS OWN COMPUTED QUANTITIES.

ENVIRONMENTAL MITIGATIONS

1. TCP 1 – SWEAT LODGE (STA 2+120.00 LT) – PER COORDINATION WITH NNH&HPD AND THE COMMUNITY, THIS TCP WILL BE COVERED WITH DIRT PRIOR TO CONSTRUCTION. THIS TCP WILL REQUIRE ARCHAEILOGICAL MONITORING DURING ACTIVITIES TO COVER THE SITE.
2. SITES AZ-P-9-19 AND AZ-P-10-51
   NO TREATMENT REQUIRED.
3. SITES AZ-P-9-23, AZ-P-9-47, AZ-P-9-48, AZ-P-9-49 AND AZ-P-9-50:
   I. AVOIDANCE:
      a. THE SITES WILL BE AVOIDED. IF AVOIDANCE IS NOT POSSIBLE, THEN SITE PROTECTION IS RECOMMENDED.
   II. SITE PROTECTION BARRIER:
      a. A QUALIFIED ARCHAEOLOGIST WILL ERECT A TEMPORARY SITE PROJECTION BARRIER BEFORE CONSTRUCTION. THE BARRIER WILL CONSIST OF FLAGGING SPACED NO MORE THAN 10-FT. APART.
      b. BARRIERS WILL REMAIN IN-PLACE THROUGHOUT THE CONSTRUCTION AND REMOVED AFTER PROJECT COMPLETION.
      c. THERE WILL BE NO SURFACE-DISTURBING ACTIVITIES OR VEHICLE TRAFFIC WITHIN THE BARRIERS.
4. ASBESTOS PIPE – THE DESIGN TEAM HAS LOCATED AND CONFIRMED THAT ABANDONED WATERLINE(S) WITHIN THE ROADWAY LIMITS (FROM STA 0+000 TO 0+450) HAVE TESTED POSITIVE FOR ASBESTOS. THE CONTRACTOR WILL NEED TO REMOVE THIS WATERLINE PIPE ACCORDING TO THE FHWA CE CHECKLIST HAZARDOUS MATERIALS MITIGATION MEASURES UNDER EXHIBIT I OF THE CONTRACT BOOK. THE MEASUREMENT AND PAYMENT FOR THIS WORK SHALL BE INCLUDED IN BID ITEM 20304-1000 REMOVAL OF STRUCTURES & OBSTRUCTIONS.
5. LEAD PAINT – THE DESIGN TEAM HAS CONFIRMED THAT THE EXISTING BRIDGE AT STA 3+200 LT HAS TESTED POSITIVE FOR LEAD PAINT. THE CONTRACTOR WILL NEED TO REMOVE THIS HAZARDOUS MATERIAL ACCORDING TO THE FHWA CE CHECKLIST HAZARDOUS MATERIALS MITIGATION MEASURES UNDER EXHIBIT I OF THE CONTRACT BOOK. THE MEASUREMENT AND PAYMENT FOR THIS WORK SHALL BE INCLUDED IN BID ITEM 20301-0400 REMOVAL OF EXISTING BRIDGE.

WILSON & COMPANY
4401 MASTHEAD ST. NE. SUITE 150
ALBUQUERQUE, NM 87109
PHONE: 505-348-4000
FAX: 505-348-4072
www.wilsonco.com

Registered Professional Engineer (Civil) CERTIFICATE NO. 83225 MYRA K. CANDELARIA Date Signed ARIZONA, U.S.A.

	REVISION	BY	DATE
△			

NAVAJO NATION
DIVISION OF TRANSPORTATION

NAVAJO D.O.T.

N9073(1) 1, 2 & 4

GENERAL NOTES

PROJECT MANAGER: DDM	DATE: 1/22	DRAWING	SHEET
LEAD DESIGNER: MLL	DATE: 1/22		
ASBUILT BY:	DATE: XXX		3 OF 84
SCALE: N/A			

HORIZONTAL ALIGNMENT TABLE

STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	4

	STATION	NORTHING	EASTING
Curve Set Type: Circular			
PI	0+059.131	527606.797	311276.937
PC	0+029.855	527601.514	311305.731
PT	0+086.463	527594.129	311250.544
Radius:	90		
Delta:	36°02'14"		
Length:	56.607		
Tangent:	29.275		
External:	4.642		
Curve Set Type: Circular			
PI	0+229.795	527532.106	311121.326
PC	0+207.254	527541.86	311141.647
PT	0+252.001	527516.81	311104.769
Radius:	150		
Delta:	17°05'31"		
Length:	44.747		
Tangent:	22.541		
External:	1.684		
Curve Set Type: Circular			
PI	0+425.792	527398.88	310977.114
PC	0+383.403	527427.644	311008.25
PT	0+453.723	527424.889	310943.643
Radius:	50		
Delta:	80°34'51"		
Length:	70.32		
Tangent:	42.389		
External:	15.55		
Curve Set Type: Circular			
PI	0+648.000	527544.092	310790.234
PC	0+610.354	527520.993	310819.961
PT	0+685.255	527559.13	310755.722
Radius:	300		
Delta:	14°18'18"		
Length:	74.901		
Tangent:	37.646		
External:	2.353		
Curve Set Type: Circular			
PI	0+879.909	527636.883	310577.271
PC	0+854.518	527626.741	310600.549
PT	0+904.015	527657.696	310562.727
Radius:	90		
Delta:	31°30'38"		
Length:	49.497		
Tangent:	25.392		
External:	3.513		
Curve Set Type: Circular			
PI	0+980.613	527720.483	310518.851
PC	0+972.627	527713.937	310523.425
PT	0+988.590	527726.644	310513.769
Radius:	200		
Delta:	4°34'23"		
Length:	15.963		
Tangent:	7.986		
External:	0.159		
Curve Set Type: Circular			
PI	1+214.074	527900.584	310370.286
PC	1+131.160	527836.624	310423.047
PT	1+293.986	527981.417	310351.826
Radius:	350		
Delta:	26°39'18"		
Length:	162.826		
Tangent:	82.914		
External:	9.687		
Curve Set Type: Circular			
PI	1+551.704	528232.667	310294.447
PC	1+538.064	528219.369	310297.484
PT	1+565.326	528245.634	310290.216
Radius:	300		
Delta:	5°12'24"		
Length:	27.262		
Tangent:	13.64		
External:	0.31		
Curve Set Type: Circular			
PI	1+769.765	528439.989	310226.801
PC	1+716.846	528389.68	310243.216
PT	1+821.606	528481.645	310194.163
Radius:	300		
Delta:	20°00'28"		
Length:	104.761		
Tangent:	52.919		
External:	4.632		

	STATION	NORTHING	EASTING
Curve Set Type: Circular			
PI	2+035.137	528649.729	310062.47
PC	1+984.826	528610.127	310093.499
PT	2+084.520	528697.288	310046.058
Radius:	300		
Delta:	19°02'24"		
Length:	99.693		
Tangent:	50.311		
External:	4.189		
Curve Set Type: Circular			
PI	2+290.721	528892.21	309978.795
PI	2+146.804	528756.165	310025.741
CC		528927.422	310522.023
PT	2+427.737	529033.177	310007.785
Radius:	525		
Delta:	30°39'34"		
Length:	280.933		
Tangent:	143.917		
External:	19.369		
Curve Set Type: Circular			
PI	2+858.993	529455.593	310094.656
PC	2+813.360	529410.895	310085.464
PT	2+903.932	529495.536	310116.723
Radius:	300		
Delta:	17°17'53"		
Length:	90.572		
Tangent:	45.633		
External:	3.451		
Curve Set Type: Circular			
PI	3+122.643	529686.975	310222.486
PC	3+036.388	529611.475	310180.775
PT	3+178.735	529739.316	310153.927
Radius:	100		
Delta:	81°33'32"		
Length:	142.347		
Tangent:	86.255		
External:	32.06		
Curve Set Type: Circular			
PI	3+625.230	530010.259	309799.036
PC	3+483.697	529924.374	309911.532
PT	3+755.765	530147.784	309765.59
Radius:	400		
Delta:	38°58'15"		
Length:	272.068		
Tangent:	141.533		
External:	24.301		
Curve Set Type: Circular			
PI	3+948.366	530334.929	309720.076
PC	3+879.485	530267.999	309736.353
PT	4+008.629	530366.202	309658.704
Radius:	150		
Delta:	49°19'46"		
Length:	129.144		
Tangent:	68.88		
External:	15.059		
Curve Set Type: Circular			
PI	4+261.940	530481.209	309433.005
PC	4+217.022	530460.815	309473.027
PT	4+306.197	530512.43	309400.711
Radius:	300		
Delta:	17°01'52"		
Length:	89.175		
Tangent:	44.919		
External:	3.344		
Curve Set Type: Circular			
PI	4+571.787	530697.034	309209.767
PC	4+475.196	530629.896	309279.21
PT	4+662.090	530711.042	309114.197
Radius:	300		
Delta:	35°41'39"		
Length:	186.894		
Tangent:	96.591		
External:	15.166		
Curve Set Type: Circular			
PI	5+141.618	530780.585	308639.738
PC	5+005.064	530760.781	308774.849
PT	5+190.933	530902.248	308701.748
Radius:	98		
Delta:	108°40'08"		
Length:	185.87		
Tangent:	136.555		
External:	70.081		

	STATION	NORTHING	EASTING
Curve Set Type: Circular			
PI	5+293.538	530993.663	308748.341
PC	5+248.156	530953.23	308727.733
PT	5+337.408	531039.03	308749.481
Radius:	200		
Delta:	25°34'08"		
Length:	89.252		
Tangent:	45.382		
External:	5.084		
Curve Set Type: Circular			
PI	5+530.327	531231.888	308754.324
PC	5+400.032	531101.635	308751.053
PT	5+645.873	531323.191	308661.37
Radius:	300		
Delta:	46°57'08"		
Length:	245.841		
Tangent:	130.295		
External:	27.073		
Curve Set Type: Circular			
PI	6+845.540	532163.848	307805.51
PC	6+796.102	532129.205	307840.78
PT	6+894.096	532185.342	307760.99
Radius:	300		
Delta:	18°42'56"		
Length:	97.994		
Tangent:	49.438		
External:	4.046		
Curve Set Type: Circular			
PI	8+325.631	532807.739	306471.837
PC	8+305.855	532799.141	306489.647
PT	8+345.351	532813.925	306453.053
Radius:	300		
Delta:	7°32'36"		
Length:	39.497		
Tangent:	19.777		
External:	0.651		
Curve Set Type: Circular			
PI	8+534.172	532872.987	306273.707
PC	8+491.253	532859.563	306314.473
PT	8+576.512	532897.304	306238.341
Radius:	300		
Delta:	16°17'00"		
Length:	85.259		
Tangent:	42.919		
External:	3.055		
Curve Set Type: Circular			
PI	9+825.089	533604.704	305209.493
PC	9+764.549	533570.405	305259.378
PT	9+884.025	533655.666	305176.812
Radius:	300		
Delta:	22°49'05"		
Length:	119.475		
Tangent:	60.54		
External:	6.048		
Curve Set Type: Circular			
PI	12+623.733	535961.912	303697.884
PC	12+442.586	535809.426	303795.669
PT	12+798.872	536141.649	303675.325
Radius:	800		
Delta:	25°31'02"		
Length:	356.286		
Tangent:	181.147		
External:	20.253		
Curve Set Type: Circular			
PI	13+519.705	536856.871	303585.558
PC	13+382.080	536720.317	303602.697
PT	13+653.864	536976.773	303517.998
Radius:	700		
Delta:	22°14'45"		
Length:	271.785		
Tangent:	137.626		
External:	13.401		
Curve Set Type: Circular			
PI	14+139.051	537399.476	303279.82
PC	14+122.168	537384.767	303288.108
PT	14+155.900	537415.023	303273.235
Radius:	300		
Delta:	6°26'32"		
Length:	33.732		
Tangent:	16.884		
External:	0.475		

	STATION	NORTHING	EASTING
Curve Set Type: Circular			
PI	15+595.572	538740.667	302711.698
PC	15+521.773	538672.713	302740.483
PT	15+668.634	538813.571	302700.238
Radius:	600		
Delta:	14°01'27"		
Length:	146.861		
urvature(Arc):	9°32'57"		
Tangent:	73.799		
External:	4.522		
Curve Set Type: Circular			
PI	16+204.727	539343.161	302616.993
PC	16+143.454	539282.632	302626.507
PT	16+265.576	539400.518	302595.44
Radius:	600		
Delta:	11°39'42"		
Length:	122.121		
Tangent:	61.272		
External:	3.12		
Curve Set Type: Circular			
PI	16+542.482	539659.727	302498.036
PC	16+386.600	539513.808	302552.868
PT	16+674.125	539788.472	302585.92
Radius:	300		
Delta:	54°54'47"		
Length:	287.525		
Tangent:	155.881		
External:	38.081		
Curve Set Type: Circular			
PI	17+365.779	540359.722	302975.868
PC	17+351.788	540348.167	302967.98
PT	17+379.750	540371.961	302982.646
Radius:	300		
Delta:	5°20'25"		
Length:	27.962		
Tangent:	13.991		
External:	0.326		
Curve Set Type: Circular			
PI	18+188.154	541079.158	303374.298
PC	18+086.457	540990.193	303325.028
CC		540263.481	304637.236
PT	18+289.540	541160.658	303435.124
Radius:	1500		
Delta:	7°45'26"		
Length:	203.083		
Tangent:	101.697		
External:	3.443		
Curve Set Type: Circular			
PI	18+576.429	541390.573	303606.718
PC	18+528.377	541352.064	303577.977
PT	18+624.407	541431.661	303631.634
Radius:	1000		
Delta:	5°30'08"		
Length:	96.03		
Tangent:	48.052		
External:	1.154		
Curve Set Type: Circular			
PI	19+452.866	542140.047	304061.208
PC	19+346.028	542048.693	304005.81
PT	19+554.830	542246.856	304063.677
Radius:	400		
Delta:	29°54'31"		
Length:	208.802		
Tangent:	106.838		
External:	14.022		
Curve Set Type: Circular			
PI	19+919.518	542611.447	304072.106
PC	19+899.477	542591.411	304071.643
PT	19+939.500	542631.366	304069.9
Radius:	300		
Delta:	7°38'38"		
Length:	40.023		
Tangent:	20.041		
External:	0.669		
Curve Set Type: Circular			
PI	20+151.667	542842.245	304046.547
PC	20+117.147	542807.935	304050.347
PT	20+185.885	542876.521	304050.64
Radius:	300		
Delta:	13°07'40"		
Length:	68.738		
Tangent:	34.52		
External:	1.98		

	STATION	NORTHING	EASTING
Curve Set Type: Circular			
PI	20+474.927	543163.525	304084.906
PC	20+403.468	543092.57	304076.435
PT	20+545.203	543228.365	304114.942
Radius:	450		
Delta:	18°02'46"		
Length:	141.734		
Tangent:	71.459		
External:	5.638		

Note:
All Distances, Station, Offsets and Coordinates in Grid Arizona State Planes, NAD83, East Zone, Meter

WILSON &COMPANY
4401 MASTHEAD ST. NE. SUITE 150
ALBUQUERQUE, NM 87109
PHONE: 505-348-4000
FAX: 505-348-4072
www.wilsonco.com

Registered Professional Engineer (Civil) CERTIFICATE NO. 83225 MYRA K. CANDELARIA Date Signed 05/09/2022 ARIZONA, U.S.A.

	REVISION	BY	DATE

NAVAJO NATION
DIVISION OF TRANSPORTATION
NAVAJO D.O.T.

N9073(1) 1, 2 & 4

HORIZONTAL ALIGNMENT TABLE

PROJECT MANAGER: DDM	DATE: 1/22	DRAWING	SHEET
LEAD DESIGNER: MLL	DATE: 1/22		
ASBUILT BY:	DATE: XXX		4 OF 84
SCALE: N/A			

STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	5

VERTICAL ALIGNMENT TABLE

	STATION	ELEVATION
Element: Linear		
POB	0+000.000	2104
PVC	0+127.500	2103.271
Tangent Grade:	-0.571	
Tangent Length:	127.5	
Element: Parabola		
PVC	0+127.500	2103.271
PVI	0+140.000	2103.2
PVT	0+152.500	2103.248
VLOW	0+142.500	2103.229
Length:	25	
Headlight Sight Distance:	118.465	
Entrance Grade:	-0.571	
Exit Grade:	0.381	
r = (g2 - g1) / L:	3.81	
K = l / (g2 - g1):	26.25	
Middle Ordinate:	0.03	
Element: Linear		
PVT	0+152.500	2103.248
PVC	0+337.500	2103.952
Tangent Grade:	0.381	
Tangent Length:	185	
Element: Parabola		
PVC	0+337.500	2103.952
PVI	0+350.000	2104
PVT	0+362.500	2104.049
Length:	25	
Headlight Sight Distance:	11206.068	
Entrance Grade:	0.381	
Exit Grade:	0.389	
r = (g2 - g1) / L:	0.031	
K = l / (g2 - g1):	3191.968	
Middle Ordinate:	0	
Element: Linear		
PVT	0+362.500	2104.049
PVC	0+437.500	2104.34
Tangent Grade:	0.389	
Tangent Length:	75	
Element: Parabola		
PVC	0+437.500	2104.34
PVI	0+450.000	2104.389
PVT	0+462.500	2104.507
Length:	25	
Headlight Sight Distance:	187.017	
Entrance Grade:	0.389	
Exit Grade:	0.942	
r = (g2 - g1) / L:	2.215	
K = l / (g2 - g1):	45.155	
Middle Ordinate:	0.017	
Element: Linear		
PVT	0+462.500	2104.507
PVC	1+172.500	2111.198
Tangent Grade:	0.942	
Tangent Length:	710	
Element: Parabola		
PVC	1+172.500	2111.198
PVI	1+200.000	2111.457
PVT	1+227.500	2112.368
Length:	55	
Headlight Sight Distance:	201.541	
Entrance Grade:	0.942	
Exit Grade:	3.314	
r = (g2 - g1) / L:	4.311	
K = l / (g2 - g1):	23.194	
Middle Ordinate:	0.163	
Element: Linear		
PVT	1+227.500	2112.368
PVC	1+625.000	2125.54
Tangent Grade:	3.314	
Tangent Length:	397.5	
Element: Parabola		
PVC	1+625.000	2125.54
PVI	1+660.000	2126.7
PVT	1+695.000	2127.167
Length:	70	
Stopping Sight Distance:	579.927	
Entrance Grade:	3.314	
Exit Grade:	1.333	
r = (g2 - g1) / L:	-2.829	
K = l / (g2 - g1):	35.347	
Middle Ordinate:	-0.173	
Element: Linear		
PVT	1+695.000	2127.167
PVI	1+720.000	2127.5
Tangent Grade:	1.333	
Tangent Length:	25	
Element: Linear		
PVI	1+720.000	2127.5
PVC	1+972.500	2130.9
Tangent Grade:	1.346	
Tangent Length:	252.5	
Element: Parabola		
PVC	1+972.500	2130.9
PVI	2+000.000	2131.27
PVT	2+027.500	2131.719
Length:	55	
Headlight Sight Distance:	705.606	
Entrance Grade:	1.346	
Exit Grade:	1.632	
r = (g2 - g1) / L:	0.52	
K = l / (g2 - g1):	192.26	
Middle Ordinate:	0.02	
Element: Linear		
PVT	2+027.500	2131.719
PVC	2+200.000	2134.535
Tangent Grade:	1.633	
Tangent Length:	172.5	
Element: Parabola		
PVC	2+200.000	2134.535
PVI	2+400.000	2137.8
PVT	2+600.000	2134.539
VHIGH	2+400.118	2136.168
Length:	400	
Stopping Sight Distance:	530.716	
Entrance Grade:	1.632	
Exit Grade:	-1.631	
r = (g2 - g1) / L:	-0.816	
K = l / (g2 - g1):	122.584	
Middle Ordinate:	-1.632	
Element: Linear		
PVT	2+600.000	2134.539
PVC	2+650.000	2133.724
Tangent Grade:	-1.631	
Tangent Length:	50	

	STATION	ELEVATION
PVC	2+650.000	2133.724
PVI	2+750.000	2132.093
PVT	2+850.000	2132.718
VLOW	2+794.557	2132.545
Length:	200	
Headlight Sight Distance:	564.467	
Entrance Grade:	-1.631	
Exit Grade:	0.625	
r = (g2 - g1) / L:	1.128	
K = l / (g2 - g1):	88.654	
Middle Ordinate:	0.564	
Element: Linear		
PVT	2+850.000	2132.718
PVC	3+384.869	2136.063
Tangent Grade:	0.625	
Tangent Length:	534.869	
Element: Parabola		
PVC	3+384.869	2136.063
PVI	3+400.000	2136.158
PVT	3+415.131	2136.396
Length:	30.262	
Headlight Sight Distance:	139.531	
Entrance Grade:	0.625	
Exit Grade:	1.571	
r = (g2 - g1) / L:	3.125	
K = l / (g2 - g1):	32.002	
Middle Ordinate:	0.036	
Element: Linear		
PVT	3+415.131	2136.396
PVI	3+700.000	2140.871
Tangent Grade:	1.571	
Tangent Length:	284.869	
Element: Linear		
PVI	3+700.000	2140.871
PVC	4+254.000	2148.625
Tangent Grade:	1.4	
Tangent Length:	554	
Element: Parabola		
PVC	4+254.000	2148.625
PVI	4+140.000	2149.879
PVT	4+426.000	2155.641
Length:	172	
Headlight Sight Distance:	139.895	
Entrance Grade:	1.4	
Exit Grade:	6.758	
r = (g2 - g1) / L:	3.115	
K = l / (g2 - g1):	32.102	
Middle Ordinate:	1.152	
Element: Linear		
PVT	4+426.000	2155.641
PVC	5+380.500	2220.142
Tangent Grade:	6.758	
Tangent Length:	954.5	
Element: Parabola		
PVC	5+380.500	2220.142
PVI	5+408.000	2222
PVT	5+435.500	2223.272
Length:	55	
Stopping Sight Distance:	533.326	
Entrance Grade:	6.758	
Exit Grade:	4.624	
r = (g2 - g1) / L:	-3.879	
K = l / (g2 - g1):	25.78	
Middle Ordinate:	-0.147	
Element: Linear		
PVT	5+435.500	2223.272
PVC	5+952.000	2247.155
Tangent Grade:	4.624	
Tangent Length:	516.5	
Element: Parabola		
PVC	5+952.000	2247.155
PVI	6+020.000	2250.5
PVT	6+088.000	2250.465
Length:	136	
Stopping Sight Distance:	314.326	
Entrance Grade:	4.624	
Exit Grade:	0.243	
r = (g2 - g1) / L:	-3.221	
K = l / (g2 - g1):	31.043	
Middle Ordinate:	-0.745	
Element: Linear		
PVT	6+088.000	2250.465
PVC	6+332.500	2251.06
Tangent Grade:	0.243	
Tangent Length:	244.5	
Element: Parabola		
PVC	6+332.500	2251.06
PVI	6+380.000	2251.175
PVT	6+427.500	2253.041
Length:	95	
Headlight Sight Distance:	121.45	
Entrance Grade:	0.243	
Exit Grade:	3.929	
r = (g2 - g1) / L:	3.879	
K = l / (g2 - g1):	25.777	
Middle Ordinate:	0.438	
Element: Linear		
PVT	6+427.500	2253.041
PVC	6+550.000	2257.854
Tangent Grade:	3.929	
Tangent Length:	122.5	
Element: Parabola		
PVC	6+550.000	2257.854
PVI	6+600.000	2259.818
PVT	6+650.000	2262.818
Length:	100	
Headlight Sight Distance:	508.889	
Entrance Grade:	3.929	
Exit Grade:	6	
r = (g2 - g1) / L:	2.071	
K = l / (g2 - g1):	48.276	
Middle Ordinate:	0.259	
Element: Linear		
PVT	6+650.000	2262.818
PVC	6+770.000	2270.018
Tangent Grade:	6	
Tangent Length:	120	
Element: Parabola		
PVC	6+770.000	2270.018
PVI	6+830.000	2273.618
PVT	6+890.000	2273.694
Length:	120	
Stopping Sight Distance:	243.742	
Entrance Grade:	6	
Exit Grade:	0.127	

	STATION	ELEVATION
K = l / (g2 - g1):	20.432	
Middle Ordinate:	-0.881	
Element: Linear		
PVI	6+890.000	2273.694
PVC	7+190.000	2274.074
Tangent Grade:	0.127	
Tangent Length:	300	
Element: Parabola		
PVC	7+190.000	2274.074
PVI	7+240.000	2274.138
PVT	7+290.000	2272.724
VHIGH	7+194.294	2274.077
Length:	100	
Stopping Sight Distance:	415.359	
Entrance Grade:	0.127	
Exit Grade:	-2.827	
r = (g2 - g1) / L:	-2.954	
K = l / (g2 - g1):	33.856	
Middle Ordinate:	-0.369	
Element: Linear		
PVT	7+290.000	2272.724
PVC	7+556.500	2265.191
Tangent Grade:	-2.827	
Tangent Length:	266.5	
Element: Parabola		
PVC	7+556.500	2265.191
PVI	7+634.000	2263
PVT	7+711.500	2265.499
VLOW	7+628.913	2264.167
Length:	155	
Headlight Sight Distance:	116.126	
Entrance Grade:	-2.827	
Exit Grade:	3.224	
r = (g2 - g1) / L:	3.904	
K = l / (g2 - g1):	25.616	
Middle Ordinate:	1.172	
Element: Linear		
PVT	7+711.500	2265.499
PVC	8+000.000	2274.8
Tangent Grade:	3.224	
Tangent Length:	288.5	
Element: Parabola		
PVC	8+000.000	2274.8
PVI	8+050.000	2276.412
PVT	8+100.000	2276.488
Length:	100	
Stopping Sight Distance:	401.223	
Entrance Grade:	3.224	
Exit Grade:	0.152	
r = (g2 - g1) / L:	-3.073	
K = l / (g2 - g1):	32.546	
Middle Ordinate:	-0.384	
Element: Linear		
PVT	8+100.000	2276.488
PVC	8+530.000	2277.139
Tangent Grade:	0.152	
Tangent Length:	430	
Element: Parabola		
PVC	8+530.000	2277.139
PVI	8+570.000	2277.2
PVT	8+610.000	2276.033
VHIGH	8+533.948	2277.142
Length:	80	
Stopping Sight Distance:	391.518	
Entrance Grade:	0.152	
Exit Grade:	-2.918	
r = (g2 - g1) / L:	-3.837	
K = l / (g2 - g1):	26.059	
Middle Ordinate:	-0.307	
Element: Linear		
PVT	8+610.000	2276.033
PVC	8+740.500	2272.224
Tangent Grade:	-2.918	
Tangent Length:	130.5	
Element: Parabola		
PVC	8+740.500	2272.224
PVI	8+803.000	2270.4
PVT	8+865.500	2271.176
VLOW	8+828.197	2270.944
Length:	125	
Headlight Sight Distance:	132.785	
Entrance Grade:	-2.918	
Exit Grade:	1.241	
r = (g2 - g1) / L:	3.328	
K = l / (g2 - g1):	30.049	
Middle Ordinate:	0.65	
Element: Linear		
PVT	8+865.500	2271.176
PVC	9+193.000	2275.241
Tangent Grade:	1.241	
Tangent Length:	327.5	
Element: Parabola		
PVC	9+193.000	2275.241
PVI	9+238.000	2275.8
PVT	9+283.000	2274.802
VHIGH	9+225.306	2275.442
Length:	90	
Stopping Sight Distance:	357.041	
Entrance Grade:	1.241	
Exit Grade:	-2.217	
r = (g2 - g1) / L:	-3.843	
K = l / (g2 - g1):	26.024	
Middle Ordinate:	-0.389	
Element: Linear		
PVT	9+283.000	2274.802
PVC	9+344.000	2273.45
Tangent Grade:	-2.217	
Tangent Length:	61	
Element: Parabola		
PVC	9+344.000	2273.45
PVI	9+450.000	2271.1
PVT	9+556.000	2276.228
VLOW	9+410.621	2272.712
Length:	212	
Headlight Sight Distance:	132.41	
Entrance Grade:	-2.217	
Exit Grade:	4.838	
r = (g2 - g1) / L:	3.328	
K = l / (g2 - g1):	30.05	
Middle Ordinate:	1.87	

	STATION	ELEVATION
Element: Linear		
PVT	9+556.000	2276.228
PVC	9+713.500	2283.848
Tangent Grade:	4.838	
Tangent Length:	157.5	
Element: Parabola		
PVC	9+713.500	2283.848
PVI	9+820.000	2289
PVT	9+926.500	2285.466
VHIGH	9+839.840	2286.904
Length:	213	
Stopping Sight Distance:	238.81	
Entrance Grade:	4.838	
Exit Grade:	-3.318	
r = (g2 - g1) / L:	-3.829	
K = l / (g2 - g1):	26.115	
Middle Ordinate:	-2.172	
Element: Linear		
PVT	9+926.500	2285.466
PVC	9+934.000	2285.217
Tangent Grade:	-3.318	
Tangent Length:	7.5	
Element: Parabola		
PVC	9+934.000	2285.217
PVI	10+043.000	2281.6
PVT	10+152.000	2285.884
VLOW	10+033.805	2283.561
Length:	218	
Headlight Sight Distance:	132.505	
Entrance Grade:	-3.318	
Exit Grade:	3.93	
r = (g2 - g1) / L:	3.325	
K = l / (g2 - g1):	30.076	
Middle Ordinate:	1.975	
Element: Linear		
PVT	10+152.000	2285.884
PVC	10+242.000	2289.42
Tangent Grade:	3.93	
Tangent Length:	90	

N9073 CONTROL POINTS

Station	Offset (m)	Elevation	Northing	Easting	Description
0+012.52	15.791 m Right	2,105.276	527,613.916	311,325.636	SCP6
0+158.65	31.820 m Left	2,099.544	527,534.207	311,199.238	SCP7
0+388.18	28.029 m Left	2,100.192	527,402.265	311,021.560	SCP8
0+541.35	18.211 m Left	2,101.614	527,464.272	310,863.279	SCP9
0+718.46	21.306 m Left	2,103.616	527,552.860	310,716.772	SCP10
0+879.57	29.507 m Left	2,105.619	527,617.028	310,560.491	SCP11
1+081.97	43.587 m Left	2,107.712	527,770.942	310,420.725	SCP12
1+201.44	33.394 m Left	2,109.425	527,879.262	310,354.570	SCP13
1+356.48	25.527 m Right	2,121.123	528,048.027	310,362.798	SCP14
1+503.77	30.317 m Right	2,123.352	528,192.681	310,334.676	SCP15
1+650.41	22.439 m Left	2,124.897	528,319.560	310,242.492	SCP 16
1+790.42	18.912 m Right	2,130.199	528,466.192	310,228.108	SCP17
1+962.63	19.239 m Right	2,134.373	528,604.517	310,122.335	SCP 18
2+096.48	24.605 m Right	2,137.792	528,716.618	310,065.417	SCP19
2+250.37	25.597 m Right	2,138.131	528,860.190	310,027.167	SCP 20
2+412.89	23.678 m Left	2,129.781	529,022.700	309,981.681	SCP21
2+549.33	25.589 m Right	2,142.701	529,147.112	310,057.341	SCP 22
2+703.86	36.166 m Right	2,136.350	529,296.347	310,098.829	SCP23
2+859.50	30.624 m Right	2,137.474	529,444.502	310,126.885	SCP 24
3+000.92	32.420 m Right	2,136.833	529,564.748	310,191.999	SCP25
3+089.55	33.557 m Right	2,135.711	529,663.415	310,226.754	SCP 26
3+269.40	32.025 m Left	2,138.800	529,768.877	310,062.433	SCP27
3+478.77	17.603 m Left	2,138.350	529,907.389	309,904.771	CP28
3+621.74	18.027 m Right	2,137.908	530,035.010	309,833.432	SCP29
3+757.05	33.284 m Right	2,138.512	530,156.895	309,797.628	CP30
3+901.90	32.757 m Right	2,140.553	530,301.689	309,759.777	SCP31
4+053.54	31.849 m Right	2,142.354	530,414.966	309,633.154	CP32
4+201.38	33.809 m Right	2,143.147	530,483.835	309,502.318	SCP33
4+353.81	26.652 m Left	2,156.399	530,526.360	309,347.958	CP34
4+499.87	20.763 m Right	2,159.563	530,662.356	309,273.949	SCP35
4+647.79	28.756 m Right	2,179.998	530,736.852	309,133.815	CP36
4+811.95	24.627 m Left	2,184.002	530,708.407	308,962.359	SCP37
5+027.43	25.782 m Left	2,194.522	530,742.505	308,743.877	CP38
5+161.94	25.480 m Right	2,211.920	530,870.401	308,717.654	SPC39
5+320.22	28.258 m Right	2,219.985	531,018.753	308,776.396	SCP 40
5+474.87	23.335 m Right	2,222.558	531,181.090	308,766.382	SCP41
5+619.72	30.237 m Left	2,229.778	531,284.425	308,656.225	SCP 42
5+814.80	22.243 m Right	2,243.997	531,457.430	308,556.446	SCP43
5+963.23	26.765 m Left	2,246.955	531,526.477	308,416.213	SCP 44
6+111.97	28.686 m Left	2,248.011	531,629.339	308,308.749	SCP45
6+261.33	25.318 m Left	2,248.342	531,736.400	308,204.559	SCP 46
6+411.75	27.643 m Right	2,251.877	531,879.591	308,134.356	SCP47
6+564.95	30.097 m Right	2,258.403	531,988.694	308,026.782	SCP 48
6+712.46	25.857 m Right	2,263.898	532,089.038	307,918.573	SCP49
6+867.27	31.730 m Left	2,269.967	532,145.383	307,768.309	SCP 50
6+966.19	38.098 m Left	2,270.744	532,182.376	307,679.508	SCP51
7+140.74	28.992 m Right	2,268.153	532,318.684	307,551.486	SCP 52
7+308.47	29.552 m Right	2,270.730	532,392.113	307,400.684	SCP53
7+446.70	22.571m Left	2,270.431	532,405.272	307,253.542	SCP 54
7+595.77	26.171m Left	2,266.017	532,466.840	307,117.737	SCP55
7+746.36	24.985 m Left	2,268.466	532,533.384	306,982.636	SCP 56
7+975.97	41.311m Right	2,275.939	532,692.914	306,804.689	SCP57
8+120.50	29.738 m Right	2,278.926	532,745.331	306,669.501	SCP 58
8+277.61	29.372 m Right	2,276.073	532,813.311	306,527.854	SCP59
8+434.30	29.310 m Right	2,278.960	532,869.587	306,377.737	SCP 60
8+593.43	23.260 m Right	2,276.665	532,926.050	306,237.587	CP61
8+741.48	32.713 m Right	2,273.145	533,017.719	306,120.948	CP62
8+897.66	33.657 m Right	2,271.965	533,106.986	305,992.784	CP63
9+031.05	25.023 m Left	2,275.374	533,134.207	305,849.622	CP64
9+185.04	25.522 m Left	2,277.221	533,221.040	305,722.450	CP65
9+319.55	28.406 m Left	2,275.685	533,294.874	305,609.975	CP66
9+476.57	26.524 m Left	2,269.073	533,385.383	305,481.660	CP67
9+622.80	30.819 m Left	2,279.727	533,464.695	305,358.727	CP68
9+718.20	30.805 m Left	2,284.018	533,518.757	305,280.123	CP69
9+867.41	29.728 m Left	2,289.301	533,624.521	305,162.070	CP70
10+025.37	19.170 m Right	2,281.505	533,784.994	305,116.651	CP71
10+137.50	20.377 m Right	2,285.238	533,880.029	305,057.142	CP72
10+255.63	36.231m Left	2,291.689	533,948.916	304,945.719	CP73

Note:
All Distances, Station, Offsets and Coordinates in Grid Arizona State Planes, NAD83, East Zone, Meter

WILSON &COMPANY
4401 MASTHEAD ST. NE. SUITE 150
ALBUQUERQUE, NM 87109
PHONE: 505-348-4000
FAX: 505-348-4072
www.wilsonco.com

Registered Professional Engineer (Civil) CERTIFICATE NO. 83225 MYRA K. CANDELARIA Date Signed 05/10/2022 ARIZONA, U.S.A.

△	REVISION	BY	DATE

NAVAJO NATION
DIVISION OF TRANSPORTATION

NAVAJO D.O.T.

N9073(1) 1, 2 & 4

VERTICAL ALIGNMENT AND CONTROL POINTS TABLE

PROJECT MANAGER: DDM	DATE: 1/22	DRAWING	SHEET
LEAD DESIGNER: MLL	DATE: 1/22		
ASBUILT BY:	DATE: XXX		5 OF 84
SCALE: N/A			

STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	6

SUPERELEVATION TABLE

Station	Lt. Rate	Rt. Rate	Point Type	Remarks
PHASE 1, SEGMENT 1				
0+000.00	-2.00%	2.00%	Reverse Crown	
TURNOUT IMPROVEMENT				
Curve 7				
1+111.78	-2.00%	-2.00%	Runout	DS 40 km/h
1+121.78	0.00%	-2.00%	Runoff	DS 40 km/h
1+131.78	2.00%	-2.00%	Reverse Crown	DS 40 km/h
1+135.78	2.80%	-2.80%	Full Super	DS 40 km/h
1+289.37	2.80%	-2.80%	Full Super	DS 40 km/h
1+293.37	2.00%	-2.00%	Reverse Crown	DS 40 km/h
1+303.37	0.00%	-2.00%	Runoff	DS 40 km/h
1+313.37	-2.00%	-2.00%	Runout	DS 40 km/h
PHASE 1, SEGMENT 2				
Curve 10				
1+941.64	-2.00%	-2.00%	Runout	DS 80 km/h
1+955.99	0.00%	-2.00%	Runoff	DS 80 km/h
1+970.33	2.00%	-2.00%	Reverse Crown	DS 80 km/h
1+999.01	6.00%	-6.00%	Full Super	DS 80 km/h
2+070.32	6.00%	-6.00%	Full Super	DS 80 km/h
2+099.01	2.00%	-2.00%	Reverse Crown	DS 80 km/h
2+113.36	0.00%	-2.00%	Runoff	DS 80 km/h
2+127.71	-2.00%	-2.00%	Runout	DS 80 km/h
Curve 11				
2+109.38	-2.00%	-2.00%	Runout	DS 80 km/h
2+123.73	0.00%	-2.00%	Runoff	DS 80 km/h
2+138.08	2.00%	-2.00%	Reverse Crown	DS 80 km/h
2+158.17	4.80%	-4.80%	Full Super	DS 80 km/h
2+416.37	4.80%	-4.80%	Full Super	DS 80 km/h
2+436.46	2.00%	-2.00%	Reverse Crown	DS 80 km/h
2+450.81	0.00%	-2.00%	Runoff	DS 80 km/h
2+465.16	-2.00%	-2.00%	Runout	DS 80 km/h
Curve 12				
2+770.17	-2.00%	-2.00%	Runout	DS 80 km/h
2+784.52	0.00%	-2.00%	Runoff	DS 80 km/h
2+798.87	2.00%	-2.00%	Reverse Crown	DS 80 km/h
2+827.56	6.00%	-6.00%	Full Super	DS 80 km/h
2+889.73	6.00%	-6.00%	Full Super	DS 80 km/h
2+918.42	2.00%	-2.00%	Reverse Crown	DS 80 km/h
2+932.77	0.00%	-2.00%	Runoff	DS 80 km/h
2+947.12	-2.00%	-2.00%	Runout	DS 80 km/h
Curve 13				
2+993.20	-2.00%	-2.00%	Runout	DS 80 km/h
3+007.20	-2.00%	0.00%	Runoff	DS 80 km/h
3+021.90	-2.00%	2.00%	Reverse Crown	DS 80 km/h
3+050.59	-6.00%	6.00%	Full Super	DS 80 km/h
3+164.53	-6.00%	6.00%	Full Super	DS 80 km/h
3+193.23	-2.00%	2.00%	Reverse Crown	DS 80 km/h
3+207.57	-2.00%	0.00%	Runoff	DS 80 km/h
3+221.92	-2.00%	-2.00%	Runout	DS 80 km/h
Curve 14				
3+443.39	-2.00%	-2.00%	Runout	DS 80 km/h
3+457.74	0.00%	-2.00%	Runoff	DS 80 km/h
3+472.09	2.00%	-2.00%	Reverse Crown	DS 80 km/h
3+496.48	5.40%	-5.40%	Full Super	DS 80 km/h
3+742.98	5.40%	-5.40%	Full Super	DS 80 km/h
3+781.72	2.00%	-2.00%	Reverse Crown	DS 80 km/h
3+767.37	0.00%	-2.00%	Runoff	DS 80 km/h
3+796.07	-2.00%	-2.00%	Runout	DS 80 km/h
Curve 15				
3+836.30	-2.00%	-2.00%	Runout	DS 80 km/h
3+850.65	-2.00%	0.00%	Runoff	DS 80 km/h
3+864.99	-2.00%	2.00%	Reverse Crown	DS 80 km/h
3+893.69	-6.00%	6.00%	Full Super	DS 80 km/h
3+994.43	-6.00%	6.00%	Full Super	DS 80 km/h
4+023.12	-2.00%	2.00%	Reverse Crown	DS 80 km/h
4+037.47	-2.00%	0.00%	Runoff	DS 80 km/h
4+051.82	-2.00%	-2.00%	Runout	DS 80 km/h
Curve 16				
4+173.83	-2.00%	-2.00%	Runout	DS 80 km/h
4+188.18	0.00%	-2.00%	Runoff	DS 80 km/h
4+202.53	2.00%	-2.00%	Reverse Crown	DS 80 km/h
4+231.23	6.00%	-6.00%	Full Super	DS 80 km/h
4+291.99	6.00%	-6.00%	Full Super	DS 80 km/h
4+320.69	2.00%	-2.00%	Reverse Crown	DS 80 km/h
4+335.04	0.00%	-2.00%	Runoff	DS 80 km/h
4+349.38	-2.00%	-2.00%	Runout	DS 80 km/h
Curve 17				
4+432.01	-2.00%	-2.00%	Runout	DS 80 km/h
4+446.36	-2.00%	0.00%	Runoff	DS 80 km/h
4+460.70	-2.00%	2.00%	Reverse Crown	DS 80 km/h
4+489.40	-6.00%	6.00%	Full Super	DS 80 km/h
4+647.89	-6.00%	6.00%	Full Super	DS 80 km/h
4+676.58	-2.00%	2.00%	Reverse Crown	DS 80 km/h
4+690.93	-2.00%	0.00%	Runoff	DS 80 km/h
4+705.58	-2.00%	-2.00%	Runout	DS 80 km/h
Curve 18				
4+961.88	-2.00%	-2.00%	Runout	DS 80 km/h
4+976.22	0.00%	-2.00%	Runoff	DS 80 km/h
4+990.57	2.00%	-2.00%	Reverse Crown	DS 80 km/h
5+019.27	6.00%	-6.00%	Full Super	DS 80 km/h
5+176.73	6.00%	-6.00%	Full Super	DS 80 km/h
5+205.42	2.00%	-2.00%	Reverse Crown	DS 80 km/h
5+219.77	0.00%	0.00%	Runoff	DS 80 km/h
Curve 19				
5+219.77	0.00%	0.00%	Runoff	DS 80 km/h
5+233.66	-2.00%	2.00%	Reverse Crown	DS 80 km/h
5+262.36	-6.00%	6.00%	Full Super	DS 80 km/h
5+323.20	-6.00%	6.00%	Full Super	DS 80 km/h
5+351.90	-2.00%	2.00%	Reverse Crown	DS 80 km/h
5+366.25	0.00%	0.00%	Runoff	DS 80 km/h
Curve 20				
5+366.25	0.00%	0.00%	Runoff	DS 80 km/h
5+385.54	-2.00%	2.00%	Reverse Crown	DS 80 km/h
5+414.24	-6.00%	6.00%	Full Super	DS 80 km/h
5+631.67	-6.00%	6.00%	Full Super	DS 80 km/h
5+660.36	-2.00%	2.00%	Reverse Crown	DS 80 km/h
5+674.71	-2.00%	0.00%	Runoff	DS 80 km/h
5+689.06	-2.00%	-2.00%	Runout	DS 80 km/h
Curve 21				
6+752.92	-2.00%	-2.00%	Runout	DS 80 km/h
6+767.26	-2.00%	0.00%	Runoff	DS 80 km/h
6+781.61	-2.00%	2.00%	Reverse Crown	DS 80 km/h
6+810.31	-6.00%	6.00%	Full Super	DS 80 km/h
6+879.89	-6.00%	6.00%	Full Super	DS 80 km/h
6+908.59	-2.00%	2.00%	Reverse Crown	DS 80 km/h
6+922.94	-2.00%	0.00%	Runoff	DS 80 km/h
6+937.28	-2.00%	-2.00%	Runout	DS 80 km/h
Curve 22				
8+262.67	-2.00%	-2.00%	Runout	DS 80 km/h
8+277.02	-2.00%	0.00%	Runoff	DS 80 km/h
8+291.36	-2.00%	2.00%	Reverse Crown	DS 80 km/h
8+320.06	-6.00%	6.00%	Full Super	DS 80 km/h
8+331.15	-6.00%	6.00%	Full Super	DS 80 km/h
8+359.84	-2.00%	2.00%	Reverse Crown	DS 80 km/h
8+374.19	-2.00%	0.00%	Runoff	DS 80 km/h
8+388.54	-2.00%	-2.00%	Runout	DS 80 km/h
Curve 23				
8+448.07	-2.00%	-2.00%	Runout	DS 80 km/h
8+462.42	0.00%	-2.00%	Runoff	DS 80 km/h
8+476.77	2.00%	-2.00%	Reverse Crown	DS 80 km/h
8+505.46	6.00%	-6.00%	Full Super	DS 80 km/h
8+562.31	6.00%	-6.00%	Full Super	DS 80 km/h
8+591.01	2.00%	-2.00%	Reverse Crown	DS 80 km/h
8+605.36	0.00%	-2.00%	Runoff	DS 80 km/h
8+619.71	-2.00%	-2.00%	Runout	DS 80 km/h
Curve 24				
9+721.37	-2.00%	-2.00%	Runout	DS 80 km/h
9+737.72	0.00%	-2.00%	Runoff	DS 80 km/h
9+750.06	2.00%	-2.00%	Reverse Crown	DS 80 km/h
9+778.76	6.00%	-6.00%	Full Super	DS 80 km/h
9+869.83	6.00%	-6.00%	Full Super	DS 80 km/h
9+898.52	2.00%	-2.00%	Reverse Crown	DS 80 km/h
9+912.87	0.00%	-2.00%	Runoff	DS 80 km/h
9+927.22	-2.00%	-2.00%	Runout	DS 80 km/h
10+52.00	-2.00%	-2.00%	Normal Crown	DS 80 km/h

WILSON &COMPANY
4401 MASTHEAD ST. NE. SUITE 150
ALBUQUERQUE, NM 87109
PHONE: 505-348-4000
FAX: 505-348-4072
www.wilsonco.com

Registered Professional Engineer (Civil) CERTIFICATE NO. 83225 MYRA K. CANDELARIA Date Signed 01/31/2022 ARIZONA, U.S.A.

	REVISION	BY	DATE
△			

NAVAJO D.O.T.

NAVAJO NATION
DIVISION OF TRANSPORTATION

N9073(1) 1, 2 & 4

SUPERELEVATION TABLE

PROJECT MANAGER: DDM	DATE: 1/22	DRAWING	SHEET
LEAD DESIGNER: MLL	DATE: 1/22		
ASBUILT BY:	DATE: XXX		6 OF 84
SCALE: N/A			

STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	7

SUMMARY OF QUANTITIES

ITEM	DESCRIPTION	QUANTITY	Units
10901-0000	Extra & Miscellaneous Work Authorized under Section 109.02(s)	1	Lump Sum
15101-0000	Mobilization	1	Lump Sum
15201-0000	Construction Survey and Staking	1	Lump Sum
15701-0000	Temporary Erosion Control	1	Lump Sum
15708-1000	Temporary Straw Mulching	11.5	ha
20102-0000	Clearing & Grubbing	1	Lump Sum
20301-0400	Removal of Existing Bridge	1	Lump Sum
20304-1000	Removal of Structures & Obstructions	1	Lump Sum
20401-0000	Roadway Excavation	220,000	m^3
21101-2000	Road Obliteration - Method 2	1,900	m^2
21201-0000	Linear Grading	0.75	km
21301-4000	Subgrade Stabilization, 152mm Depth	47,000	m^2
25101-2000	Placed RipRap Class 2	55	m^3
25112-2000	Wire Enclosed Riprap Apron, Class 2	200	m^3
25112-3000	Wire Enclosed Riprap Stilling Basin, Class 2	200	m^3
25127-1020	Articulated Concrete Block Revetment, 140mm Depth, CC45	850	m^2
25302-1000	Gabions, Aluminized Coated, Class 2	14,975	m^3
30103-2000	Untreated Aggregate Base, Grading "D"	29,470	t
40301-0100	Asphalt Concrete Pavement, Type I	16,560	t
41101-5000	Prime Coat - Penetrating Emulsified Prime, Grade PEP	139	t
41201-1000	Tack Coat, Grade SS-1	24	t
55401-1000	Reinforcing Steel	1,230	kg
60101-0000	Concrete	32	m^3
60201-0810	600 mm Corrugated Steel Pipe	520	m
60201-0910	750 mm Corrugated Steel Pipe	250	m
60201-1010	900 mm Corrugated Steel Pipe	430	m
60201-1210	1200 mm Corrugated Steel Pipe	190	m
60201-1410	1500 mm Corrugated Steel Pipe	130	m
60201-1610	1800 mm Corrugated Steel Pipe	130	m
60210-0810	End Section, 600 mm Corrugated Steel Pipe	45	Each
60210-0910	End Section, 750 mm Corrugated Steel Pipe	7	Each
60210-1010	End Section, 900 mm Corrugated Steel Pipe	14	Each
60210-1210	End Section, 1200 mm Corrugated Steel Pipe	8	Each
60222-3150	3000mm span, 2400mm Rise CBC with Headwall, Wingwalls & Footing, Double Barrel	1	Lump Sum
60223-4050	3-Barrel 4.27m Span x 2.44m R x 18.632 m CBC with Headwall, Wingwalls & Footing	1	Lump Sum
60403-0000	Inlet	2	Each
60701-1000	Remove, Clean and Stockpile Pipe	210	m
60902-0500	Curb and gutter, Concrete, 175 mm Depth	230	m
61701-5000	Guardrail System, SGR20B, Type PDE02 With MSKT-TL3-8 End Terminal & Thrie Beam	1,535	m
61801-0000	Concrete Barrier	177	m
61901-1000	Fence, 5-Strand Barb Wire Fencing	17,200	m
61903-0310	Cattleguard 2 Unit, w/ 4900 mm Width, w/ Type 2 Gate	19	Each
61903-0710	Cattleguard 3 Unit, w/ 7190 mm Width, w/ Type 2 Gate	4	Each
61903-1010	Cattleguard 4 Unit, w/ 9480 mm Width, w/ Type 2 Gate	4	Each
62101-0000	Right-Of-Way Monument	70	Each
62102-0000	Reference Marker	70	Each
62510-1000	Seeding, Dry Method	11.5	ha
63302-2001	Sign Installation 1-Post 38 mm X 38 mm, Square Steel Tube	10	m^2
63302-2002	Sign Installation 1-Post 44 mm x 44 mm, Square Steel Tube	21	m^2
63302-2006	Sign Installation 2-Post 50 mm x 50 mm, Square Steel Tube	2	m^2
63302-2012	Sign Installation 4-Post 57 mm x 57 mm, Square Steel Tube	0	m^2
63308-2000	Object Marker, Type 2	48	Each
63308-3000	Object Marker, Type 3	4	Each
63309-0010	Delineator, Type 1a	18	Each
63309-0020	Delineator, Type 1b	125	Each
63318-1000	Milepost	10	Each
63401-1510	Pavement Markings, Type "H" solid yellow	14,700	m
63401-1520	Pavement Markings, Type "H" solid white	16,700	m
63401-1610	Pavement Markings, Type "H" broken yellow	1,600	m
63405-3260	Pavement Markings, Type "H" Stop bar	2	Each
63501-0000	Temporary Traffic Control	1	Lump Sum
64503-1000	Utility Company Compensation	1	CTSM
65102-0000	Rockfall Protection Fence	65	m

SURFACING SCHEDULE

ORIGINAL DESIGN

STATION	STATION	LENGTH (m)	DESCRIPTION	30103-2000 UNTREATED AGGREGATE BASE GRADING "D"				40301-0100 ASPHALT CONCRETE PAVEMENT, TYPE I				41101-5000 ASPHALT PRIME COAT, PENETRATING EMULSIFIED PRIME (PEP)		41201-1000 TACK COAT, GRADE SS-1	
N9073				WIDTH (m)	DEPTH (m)	AREA (m^2)	METRIC TON	WIDTH (m)	DEPTH (m)	AREA (m^2)	METRIC TON	WIDTH (m)	METRIC TON	WIDTH (m)	METRIC TON
PHASE 1, SEGMENT 1															
0+000.00	0+383.00	383.00		11.46	0.127	4389.37	1264.30	10.97	0.076	4199.67	741.76	11.46	5.93	10.97	1.01
0+000.00	0+383.00	-	TURNOUTS	VARIES	0.127	469.54	135.24	VARIES	0.076	469.54	82.93	VARIES	0.63	10.97	0.11
0+383.00	0+493.00	110.00	TIE IN TO EXISTING	11.46	0.127	1260.66	363.11	10.97	0.076	1206.17	213.04	11.46	1.70	10.97	0.29
TURNOUT AT STATION 1+200															
1+200.00	-	-	TURNOUT	VARIES	0.127	1210.00	348.52	14.00	0.076	1210.00	213.72	14.00	1.63	14.00	0.28
PHASE 1, SEGMENT 2															
1+760.00	1+900.00	140.00	TIE IN TO EXISTING	10.92	0.127	1528.94	440.39	9.93	0.076	1390.26	245.55	10.92	2.06	9.93	0.35
1+900.00	10+152.00	8252.00		10.92	0.127	90120.09	25957.83	9.93	0.076	81945.66	14473.57	10.92	121.66	9.93	20.73
1+900.00	10+152.00	-	TURNOUTS	VARIES	0.127	3301.15	950.85	VARIES	0.076	3301.15	583.06	VARIES	4.46	9.93	0.76
						SUBTOTAL	**29460.25**				**16553.63**		**138.08**		**23.52**
						USE	**29470**				**16560**		**139**		**24**
PHASE 2 (FOR REFERENCE ONLY)															
0+383.00	1+200.00	817.00		10.32	0.127	8432.26	2428.79	9.33	0.076	7622.94	1346.39	10.32	11.38	9.33	1.94
0+383.00	1+200.00	-	TURNOUTS	VARIES	0.127	226.59	65.27	VARIES	0.076	226.59	40.02	VARIES	0.31	9.33	0.00
1+200.00	1+640.00	440.00		10.32	0.127	4541.24	1308.04	9.33	0.076	4105.38	725.11	10.32	6.13	9.33	1.04
1+200.00	1+900.00	-	TURNOUTS	VARIES	0.127	226.59	65.27	VARIES	0.076	226.59	40.02	VARIES	0.31	9.33	0.00
1+640.00	1+900.00	260.00		10.32	0.127	2683.46	772.93	9.93	0.076	2581.90	456.03	10.32	3.62	9.33	0.62

ITEM No. 21301-4000: SUBGRADE STABILIZATION 152mm DEPTH

STATION	TO	STATION	LENGTH (m)	WIDTH (m)	AREA (m2)
PHASE 1, SECTION 2					
4+000.00	TO	7+000.00	3000.00	12.6	37800
9+080.00	TO	9+800.00	720.00	12.6	9072
				SUBTOTAL	**46872**
				USE	**47000**

ITEM No. 21201-0000 LINEAR GRADING

STATION	TO	STATION	LENGTH (m)	LENGTH (km)
PHASE 1, SEGMENT 1 TO INTERSECTION				
0+450.00	TO	1+200.00	750.00	0.75
			SUBTOTAL	**0.75**
			USE	**0.75**

WATERLINE RELOCATION: SUMMARY OF QUANTITIES

ITEM	DESCRIPTION	Quantity	Units
27002-0000	GROUT PIPE	1000	M
30210-0000	BEDDING & BACKFILL AGGREGATE	8	CM
61102-0545	25mm WATERLINE	175	M
61100-1700	50mm WATER LINE, PVC	30	M
61102-2950	150mm WATER LINE, PVC, HDPE	156	M
61102-3450	250mm WATER LINE, PVC, HDPE	595	M
61103-1480	500mm WATER LINE, GALVANIZED STEEL	68	M
61104-0300	VALVE, BLOWOFF	1	EACH
61104-0600	VALVE, GATE WITH BOX, 50mm	3	EACH
61104-0800	150mm VALVE, GATE WITH BOX	5	EACH
61104-0950	250mm VALVE, GATE WITH BOX	11	EACH
61109-1000	RELOCATE MANHOLE (See Asbuilts)	1	LPSM
61114-1000	WATER SYSTEM ACCESSORY, BEND	21	EACH
61114-1500	WATER SYSTEM ACCESSORY, TIE-IN	9	EACH
61114-5000	WATER SYSTEM ACCESSORY, CURB STOP, 25mm	5	EACH
61114-6000	WATER SYSTEM ACCESSORY, CONCRETE THRUST COLLAR	5	EACH
61114-8000	WATER SYSTEM ACCESSORY, REDUCER, 150mm X 50mm	1	EACH
61202-0100	100mm SEWER LINE, PLASTIC	30	M
61206-0000	RELOCATE SANITARY SERVICE	5	EACH

WILSON & COMPANY
4401 MASTHEAD ST. NE. SUITE 150
ALBUQUERQUE, NM 87109
PHONE: 505-348-4000
FAX: 505-348-4072
www.wilsonco.com

Registered Professional Engineer (Civil) CERTIFICATE NO. 63225 MYRA K. CANDELARIA Date Signed ARIZONA, U.S.A.

	REVISION	BY	DATE

NAVAJO B.Q.T.

NAVAJO NATION
DIVISION OF TRANSPORTATION

N9073(1) 1, 2 & 4

ESTIMATED QUANTITIES
TABLES

PROJECT MANAGER: DDM	DATE: 1/22	DRAWING	SHEET
LEAD DESIGNER: MLL	DATE: 1/22		
ASBUILT BY:	DATE: XXX		7 OF 84
SCALE: N/A			

STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	8A

TURNOUT LOCATIONS AND CATTLEGUARD SCHEDULE

STATION	LOC.	DESCRIPTION	61903-0310 Cattleguard 2-Unit	61903-0710 Cattleguard 3-Unit	61903-1010 Cattleguard 4-Unit
PHASE 1, SEGMENT 1					
0+033.970	RT	4.5 M WIDE TURNOUT			
0+383.000	CL	INSTALL 4 UNIT CATTLEGUARD ON №073, TYP 2 GATE			1
0+075.000	RT	4.5 M WIDE TURNOUT			
0+180.635	RT	4.5 M WIDE TURNOUT			
0+270.000	RT	4.5 M WIDE TURNOUT			
TURNOUT IMPROVEMENT					
1+200.000	LT	8.0 M WIDE TURNOUT W/4 UNIT CATTLEGUARD, TYP 2 GATE			1
PHASE 1, SEGMENT 2					
1+900.000	CL	INSTALL 4 UNIT CATTLEGUARD ON №073, TYP 2 GATE			1
2+590.230	LT	4.5 M WIDE TURNOUT W/2 UNIT CATTLEGUARD, TYP 2 GATE	1		
3+130.410	RT	8.0 M WIDE TURNOUT W/4 UNIT CATTLEGUARD, TYP 2 GATE			1
4+165.685	RT	4.5 M WIDE TURNOUT W/2 UNIT CATTLEGUARD, TYP 2 GATE	1		
4+278.621	LT	4.5 M WIDE TURNOUT W/2 UNIT CATTLEGUARD, TYP 2 GATE	1		
4+293.512	RT	4.5 M WIDE TURNOUT W/2 UNIT CATTLEGUARD, TYP 2 GATE	1		
4+520.000	RT	7.0 M WIDE TURNOUT W/3 UNIT CATTLEGUARD, TYP 2 GATE		1	
5+819.262	RT	4.5 M WIDE TURNOUT W/2 UNIT CATTLEGUARD, TYP 2 GATE	1		
5+862.827	RT	4.5 M WIDE TURNOUT W/2 UNIT CATTLEGUARD, TYP 2 GATE	1		
5+953.964	LT	7.0 M WIDE TURNOUT W/3 UNIT CATTLEGUARD, TYP 2 GATE		1	
6+190.582	LT	4.5 M WIDE TURNOUT W/2 UNIT CATTLEGUARD, TYP 2 GATE	1		
6+342.119	RT	4.5 M WIDE TURNOUT W/2 UNIT CATTLEGUARD, TYP 2 GATE	1		
6+359.364	LT	7.0 M WIDE TURNOUT W/3 UNIT CATTLEGUARD, TYP 2 GATE		1	
6+610.761	RT	4.5 M WIDE TURNOUT W/2 UNIT CATTLEGUARD, TYP 2 GATE	1		
6+617.343	LT	7.0 M WIDE TURNOUT W/3 UNIT CATTLEGUARD, TYP 2 GATE		1	
6+807.059	RT	4.5 M WIDE TURNOUT W/2 UNIT CATTLEGUARD, TYP 2 GATE	1		
7+169.458	LT	4.5 M WIDE TURNOUT W/2 UNIT CATTLEGUARD, TYP 2 GATE	1		
7+508.779	RT	4.5 M WIDE TURNOUT W/2 UNIT CATTLEGUARD, TYP 2 GATE	1		
7+911.045	LT	4.5 M WIDE TURNOUT W/2 UNIT CATTLEGUARD, TYP 2 GATE	1		
8+238.000	RT	4.5 M WIDE TURNOUT W/2 UNIT CATTLEGUARD, TYP 2 GATE	1		
8+386.730	RT	4.5 M WIDE TURNOUT W/2 UNIT CATTLEGUARD, TYP 2 GATE	1		
8+567.303	LT	4.5 M WIDE TURNOUT W/2 UNIT CATTLEGUARD, TYP 2 GATE	1		
9+367.399	LT	4.5 M WIDE TURNOUT W/2 UNIT CATTLEGUARD, TYP 2 GATE	1		
9+565.040	LT	4.5 M WIDE TURNOUT W/2 UNIT CATTLEGUARD, TYP 2 GATE	1		
9+805.482	LT	4.5 M WIDE TURNOUT W/2 UNIT CATTLEGUARD, TYP 2 GATE	1		
		TOTAL	**19**	**4**	**4**
PHASE 2 (FOR REFERENCE ONLY)					
0+800.000	CL	INSTALL 5 UNIT CATTLEGUARD ON №073, TYP 2 GATE			1
1+450.000	LT	7.0 M WIDE TURNOUT W/3 UNIT CATTLEGUARD, TYP 2 GATE		1	

STRAW MULCHING AND SEEDING, DRY METHOD

STATION TO STATION			LOCATION	ITEM 15708-1000 STRAW MULCHING AREA (ha)	ITEM 62510- 1000 SEEDING AREA (ha)	REMARKS
PHASE 1, SEGMENT 1						
0+000		0+383	Lt./Rt.	0.395	0.395	Area inside subgrade hinge point to catch limits
PHASE 1, SEGMENT 2						
1+900		10+152	Lt./Rt.	10.301	10.301	Area inside subgrade hinge point to catch limits
3+095.11		3+125.96	Rt.	0.030	0.030	Existing Turnout
3+139.50		3+233.39	Lt.	0.031	0.031	Existing Road
4+318.41		4+339.94	Rt.	0.005	0.005	Existing Turnout
4+487.10		4+526.95	Rt.	0.021	0.021	Existing Road
4+746.51		4+850.42	Lt.	0.046	0.046	Existing Road
5+503.62		5+640.80	Lt.	0.069	0.069	Existing Road
5+656.23		5+678.91	Rt.	0.013	0.013	Existing Turnout
5+854.54		6+043.41	Lt.	0.092	0.092	Existing Road
6+067.94		6+079.29	Lt.	0.006	0.006	Existing Turnout
6+311.47		6+355.96	Lt.	0.019	0.019	Existing Turnout
6+720.00		6+735.80	Rt.	0.007	0.007	Existing Turnout
6+833.51		6+860.03	Lt.	0.010	0.010	Existing Turnout
7+883.25		7+900.67	Lt.	0.009	0.009	Existing Turnout
8+222.93		8+239.09	Rt.	0.009	0.009	Existing Turnout
8+504.08		8+565.35	Lt.	0.031	0.031	Existing Turnout
			TOTAL	**11.500**	**11.500**	
PHASE 2 (FOR REFERENCE ONLY)						
0+383		1+900	Lt./Rt.	1.76	1.76	Area inside subgrade hinge point to catch limits
1+114.27		1+114.86	Lt.	0.014	0.014	Existing Turnout
1+344.75		1+397.92	Lt.	0.013	0.013	Existing Turnout
1+622.38		1+786.58	Lt.	0.082	0.082	Existing Road

ITEM No. 61701-5000: GUARDRAIL SYSTEM, SGR20b, TYPE PDE02 w/MSKT-TL3-8

STATION	To	STATION	LOCATION	LENGTH (m)	DESCRIPTION	REMARKS
PHASE 1, SEGMENT 1						
0+000.00	To	0+383.00	Left	383.00	Std. Guardrail SGR04 with End Treatment, MSKT-TL3-8	Along edge of roadway
PHASE 1, SEGMENT 2						
1+900.00	To	2+480.00	Left	580.00	Std. Guardrail SGR04 with End Treatment, MSKT-TL3-8	Left along Bonito Creek Drop-off
3+312.00	To	3+340.00	Left	28.00	Std. Guardrail SGR04 with End Treatment, MSKT-TL3-8	CWB Upstream Approach
3+440.00	To	3+468.00	Left	28.00	Std. Guardrail SGR04 with End Treatment, MSKT-TL3-8	CWB Downstream Approach
4+840.00	To	4+930.00	Left	90.00	Std. Guardrail SGR04 with End Treatment, MSKT-TL3-8	Along edge of roadway
5+160.00	To	5+410.00	Left	250.00	Std. Guardrail SGR04 with End Treatment, MSKT-TL3-8	Along edge of roadway
		TOTAL		**1359**		
PHASE 2 (FOR REFERENCE ONLY)						
0+383.00	To	0+790.00	Left	407.00	Std. Guardrail SGR04 with End Treatment, MSKT-TL3-8	Along edge of roadway
0+520.00	To	0+540.00	Right	20.00	Std. Guardrail SGR04 with End Treatment, MSKT-TL3-8	CWB Downstream Approach
1+072.00	To	1+100.00	Right	28.00	Std. Guardrail SGR04 with End Treatment, MSKT-TL3-8	CWB Upstream Approach
1+320.00	To	1+400.00	Right	80.00	Std. Guardrail SGR04 with End Treatment, MSKT-TL3-8	CWB Downstream Approach
1+652.00	To	1+680.00	Right	28.00	Std. Guardrail SGR04 with End Treatment, MSKT-TL3-8	CWB Upstream Approach
1+800.00	To	1+900.00	Left	100.00	Std. Guardrail SGR04 with End Treatment, MSKT-TL3-8	Left along Bonito Creek Drop-off

*Note: Length given are Station-To-Station Length and does not reflect actual length of the railings and beams

*Note: See Sheet 60 for additional quantity at bridge location

ITEM No. 61801-0000: CONCRETE BARRIER

STATION	To	STATION	LOCATION	LENGTH (m)	REMARKS
PHASE 1, SEGMENT 1					
0+306.19	To	0+312.19	Right	6.000	C&G to CWB TRANSITION (SEE SHEET 41F)
0+312.19	To	0+383.00	Right	70.810	INSTALL ROCKFALL PROTECTION FENCE ON TOP (SEE SHEET 41E)
PHASE 1, SEGMENT 2					
3+340.00	TO	3+440.00	Left	100.000	(SEE SHEET 41E)
			TOTAL	**177**	
PHASE 2 (FOR REFERENCE ONLY)					
0+383.00	To	0+520.00	Right	137.000	
1+100.00	To	1+320.00	Right	220.000	
1+680.00	To	1+840.00	Right	160.000	

ITEM No. 60701-1000: REMOVE, SALVAGE, & STOCKPILE OF EXISTING CULVERTS

STATION	LOCATION	STRUCTURE	LENGTH (m)	REMARKS
PHASE 1, SEGMENT 1				
0+022.94	Cl.	1-1219 mm	42.00	Existing CSP, Remove, Salvage & Stockpile
PHASE 1, SEGMENT 2				
3+211.16	Cl.	1-914 mm	7.10	Existing CSP, Remove, Salvage & Stockpile
3+213.35	Cl.	1-914 mm	7.10	Existing CSP, Remove, Salvage & Stockpile
3+302.96	Cl.	1-762 mm	7.45	Existing CSP, Remove, Salvage & Stockpile
4+212.14	Cl.	1-1219 mm	9.40	Existing CSP, Remove, Salvage & Stockpile
4+214.37	Cl.	1-1219 mm	9.40	Existing CSP, Remove, Salvage & Stockpile
4+216.71	Cl.	1-1219 mm	9.40	Existing CSP, Remove, Salvage & Stockpile
4+219.07	Cl.	1-1219 mm	9.40	Existing CSP, Remove, Salvage & Stockpile
4+677.17	Cl.	1-610 mm	11.56	Existing CSP, Remove, Salvage & Stockpile
4+980.00	Cl.	1-610 mm	9.40	Existing CSP, Remove, Salvage & Stockpile
5+431.33	Cl.	1-762 mm	11.56	Existing CSP, Remove, Salvage & Stockpile
6+236.64	6.38 m Lt.	1-762 mm	10.00	Existing CSP, Remove, Salvage & Stockpile
7+139.18	5.02 m Lt.	1-610 mm	9.74	Existing CSP, Remove, Salvage & Stockpile
7+645.55	Cl.	1-914 mm	9.74	Existing CSP, Remove, Salvage & Stockpile
8+807.51	Cl.	1-914 mm	12.60	Existing CSP, Remove, Salvage & Stockpile
9+360.97	2.94 m Lt.	1-610 mm	9.10	Existing CSP, Remove, Salvage & Stockpiled, Under Turnout Lt.
9+454.50	Cl.	1-610 mm	19.00	Existing CSP, Remove, Salvage & Stockpile
		TOTAL	**210.00**	
PHASE 2 (FOR REFERENE ONLY)				
1+367.76	Cl.	1-1219 mm	18.00	Existing CSP, Remove, Salvage & Stockpile

ITEM No. 65102-0000: ROCKFALL PROTECTION FENCE

STATION	To	STATION	LOC.	LENGTH (m)	REMARKS
PHASE 1, SEGMENT 1					
0+315.19	To	0+380.00	Rt.	64.81	SEE DETAILS ON SHEETS 41B TO 41D
			Total	**65**	

ITEM No. 61901-1000: FENCE, BARBED WIRE, 5-STRAND

STATION	To	STATION	LOC.	LENGTH (m)	REMARKS
PHASE 1, SEGMENT 1					
0+340.00	To	0+383.00	Lt.	43	Connect into End of Rock Gabion Wall and to Cattle Guard
TURNOUT IMPROVEMENT					
1+200.00	To	1+200.00	Lt.	0	Right ROW Fencing
1+200.00	To	1+200.00	Rt.	0	Left ROW Fencing
PHASE 1, SEGMENT 2					
1+900.00	-	-	Lt./Rt.	100	Tie to new Cattleguard
1+900.00	To	4+200.00	Lt.	2300	Right ROW Fencing, break at approx. 4+200 for culvert
4+200.00	To	10+125.00	Lt.	5925	Right ROW Fencing
1+900.00	To	4+200.00	Rt.	2300	Left ROW Fencing, break at approx. 4+200 for culvert
4+200.00	To	10+152.00	Rt.	5952	Left ROW Fencing
10+152.00	To	-	Lt./Rt.	31.24	Tie to new Cattleguard
			Sub-Total	**16651.24**	
			****Total**	**17200**	
PHASE 2 (FOR REFERENCE ONLY)					
0+383.00	To	1+200.00	Lt.	817	Right ROW Fencing
0+383.00	To	1+200.00	Rt.	817	Left ROW Fencing
0+780.00	To	0+800.00	Rt.	20	New Fence to Connect Into Rock Face
0+800.00	To		Lt./Rt.	31.24	Tie to new Cattleguard
1+200.00	To	1+900.00	Lt.	700	Right ROW Fencing
1+200.00	To	1+900.00	Rt.	700	Left ROW Fencing

**3% Added to Account for Terrain

ITEM No. 60902-0500: CURB AND GUTTER, CONCRETE, 175MM DEPTH

STATION	To	STATION	LOCATION	LENGTH (m)	REMARKS
PHASE 1, SEGMENT 1					
0+000.00	To	0+024.89	Right	24.89	
0+046.50	To	0+069.59	Right	23.09	
0+087.69	To	0+169.38	Right	81.69	
0+191.88	To	0+261.59	Right	69.71	
0+282.84	To	0+306.19	Right	23.35	
			TOTAL	**222.730**	
			USE	**230**	

ITEM No. 21101-2000: ROAD OBLITERATION - METHOD 2

STATION	To	STATION	LOCATION	AREA (m^2)	REMARKS
PHASE 1, SEGMENT 2					
5+505.00	To	5+640.00	Left	693.000	
5+650.00	To	5+750.00	Right	1190.000	
			TOTAL	**1883.000**	
			USE	**1900**	

WILSON &COMPANY
4401 MASTHEAD ST, NE, SUITE 150
ALBUQUERQUE, NM 87109
PHONE: 505-348-4000
FAX: 505-348-4072
www.wilsonco.com

Registered Professional Engineer (Civil) CERTIFICATE NO. 83225 MYRA K. CANDELARIA Date Signed 4/22/2022 ARIZONA, U.S.A.

	REVISION	BY	DATE
△			

NAVAJO D.O.T.

NAVAJO NATION
DIVISION OF TRANSPORTATION

N9073(1) 1, 2 & 4

ESTIMATED QUANTITIES
TABLES

PROJECT MANAGER: DDM	DATE: 1/22	DRAWING	SHEET
LEAD DESIGNER: MLL	DATE: 1/22		
ASBUILT BY:	DATE: XXX		8A OF 84
SCALE: N/A			

STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	8B

ITEM No. 20304-1000: REMOVAL OF STRUCTURES & OBSTRUCTIONS

Station to Station			Location	Description	Remarks
0+023.00	to	0+111.00	Rt.	Existing Barbed Wire Fence	To Be Removed
2+660.00	to	2+946.00	Lt.	Existing Barbed Wire Fence	To Be Removed
3+223.00	to	3+924.00	Rt.	Existing Barbed Wire Fence	To Be Removed
3+614.00	to	3+991.00	Lt.	Existing Barbed Wire Fence	To Be Removed
4+022.00	to	4+196.00	Rt.	Existing Barbed Wire Fence	To Be Removed
4+166.00	to	4+555.00	Lt.	Existing Barbed Wire Fence	To Be Removed
5+869.00	to	5+877.00	Rt.	Existing Barbed Wire Fence	To Be Removed
6+358.00	to	6+598.00	Lt.	Existing Barbed Wire Fence	To Be Removed
8+557.00	to	8+567.00	Lt.	Existing Barbed Wire Fence	To Be Removed
8+815.00	to	8+880.00	Lt.	Existing Barbed Wire Fence	To Be Removed
9+927.00	to	10+152.00	Lt.	Existing Barbed Wire Fence	To Be Removed
9+934.00	to	10+152.00	Rt.	Existing Barbed Wire Fence	To Be Removed
Station			Location	Description	Remarks
0+007.34			8.92 m Rt.	Existing Sign	To Be Removed
0+010.81			9.39 m Rt.	Existing Powerpole	To Be Relocated By Owner
0+016.11			5.37 m Rt.	Existing Sewer Manhole	To Be Relocated By Owner
0+028.84			24.123 m Rt.	Existing Tree	To Be Removed
0+029.38			24.977 m Rt.	Existing Tree	To Be Removed
0+029.77			23.659 m Rt.	Existing Tree	To Be Removed
0+037.55			6.62 m Rt.	Existing Sign	To Be Removed
0+077.82			13.101 m Rt.	Existing Tree	To Be Removed
0+084.64			7.35 m Rt.	Existing Powerpole	To Be Relocated By Owner
0+101.35			5.064 m Rt.	Existing Tree	To Be Removed
0+104.72			3.730 m Rt.	Existing Tree	To Be Removed
0+107.39			5.93 m Rt.	Existing Powerpole	To Be Relocated By Owner
0+111.90			5.093 m Rt.	Existing Tree	To Be Removed
0+114.65			3.912 m Rt.	Existing Tree	To Be Removed
0+116.54			6.514 m Rt.	Existing Tree	To Be Removed
0+119.57			5.795 m Rt.	Existing Tree	To Be Removed
0+120.92			4.607 m Rt.	Existing Tree	To Be Removed
0+130.45			4.175 m Rt.	Existing Tree	To Be Removed
0+132.08			4.653 m Rt.	Existing Tree	To Be Removed
0+133.52			7.86 m Rt.	Existing Powerpole	To Be Relocated By Owner
0+138.23			5.705 m Rt.	Existing Tree	To Be Removed
0+150.63			4.95 m Rt.	Existing Powerpole	To Be Relocated By Owner
0+153.47			5.073 m Rt.	Existing Tree	To Be Removed
0+154.28			4.273 m Rt.	Existing Tree	To Be Removed
0+176.83			8.33 m Rt.	Existing Powerpole	To Be Relocated By Owner
0+180.65			9.416 m Rt.	Existing Tree	To Be Removed
0+181.59			11.856 m Rt.	Existing Tree	To Be Removed
0+181.74			14.348 m Rt.	Existing Tree	To Be Removed
0+186.89			3.261 m Rt.	Existing Tree	To Be Removed
0+195.88			4.334 m Rt.	Existing Tree	To Be Removed
0+199.92			6.47 m Rt.	Existing Powerpole	To Be Relocated By Owner
0+200.96			6.317 m Rt.	Existing Tree	To Be Removed
0+207.40			6.031 m Rt.	Existing Tree	To Be Removed
0+208.32			6.107 m Rt.	Existing Tree	To Be Removed
0+211.43			6.802 m Rt.	Existing Tree	To Be Removed
0+213.38			6.498 m Rt.	Existing Tree	To Be Removed
0+219.92			6.554 m Rt.	Existing Tree	To Be Removed
0+222.87			7.79 m Rt.	Existing Powerpole	To Be Relocated By Owner
0+231.61			5.552 m Rt.	Existing Tree	To Be Removed
0+234.34			5.434 m Rt.	Existing Tree	To Be Removed
0+235.68			5.487 m Rt.	Existing Tree	To Be Removed
0+238.51			5.266 m Rt.	Existing Tree	To Be Removed
0+239.47			4.973 m Rt.	Existing Tree	To Be Removed
0+252.60			2.900 m Rt.	Existing Tree	To Be Removed
0+254.47			6.165 m Rt.	Existing Tree	To Be Removed
0+262.93			2.222 m Rt.	Existing Tree	To Be Removed
0+308.50			5.401 m Rt.	Existing Tree	To Be Removed
0+309.55			5.039 m Rt.	Existing Tree	To Be Removed
0+309.79			7.366 m Rt.	Existing Tree	To Be Removed
0+333.46			4.376 m Rt.	Existing Tree	To Be Removed
0+347.00			4.347 m Rt.	Existing Tree	To Be Removed
0+748.25			0.16 m Lt.	Existing Powerpole	To Be Relocated By Owner
0+936.96			0.80 m Rt.	Existing Powerpole	To Be Relocated By Owner
1+043.43			4.38 m Lt.	Existing Powerpole	To Be Relocated By Owner
1+143.44			6.41 m Lt.	Existing Powerpole	To Be Relocated By Owner
1+245.99			3.46 m Lt.	Existing Powerpole	To Be Relocated By Owner
1+289.11			12.50 m Lt.	Existing Powerpole	To Be Relocated By Owner
1+643.62			4.81 m Rt.	Existing Powerpole	To Be Relocated By Owner
1+701.80			4.79 m Rt.	Existing Powerpole	To Be Relocated By Owner
1+757.61			7.25 m Rt.	Existing Powerpole	To Be Relocated By Owner
1+816.79			9.50 m Rt.	Existing Powerpole	To Be Relocated By Owner
2+898.98			8.21 m Rt.	Existing Powerpole	To Be Relocated By Owner

EARTHWORK QUANTITIES			ITEM NO. 20401-0000 ROADWAY EXCAVATION			ITEM NO. 20403-0000 UNCLASSIFIED BORROW
STATION	TO	STATION	CUT (m^3)	WASTE (m^3)	FILL (m^3)	BORROW (m^3)
PHASE 1, SEGMENT 1						
0+000.00	To	0+383.00	5,505		3,299	
TURNOUT IMPROVEMENTS						
1+200.00	To	1+200.00	6		376	
PHASE 1, SEGMENT 2						
1+900.00	To	10+152.00	208,946		101,882	
		PROJECT TOTAL	214,458	108,901	105,557	0
		PROJECT USE	**220,000**	**110,000**	**110,000**	**0**
PHASE 2 (FOR REFERENCE ONLY)						
0+383.00	To	1+200.00	2,872		23,514	
1+200.00	To	1+900.00	18,478		9,394	

Note: 18% Shrinkage Factor Applied to Fill.

Note: 34,000 cubic meters of excess earthwork to be placed in temporary construction easement between STA 1+350 to STA 1+550 per the CM's direction. Any remaining material should be moved off site.

Wasre material can be placed on roadway from STA 0+450 to 1+200

WILSON &COMPANY
4401 MASTHEAD ST. NE. SUITE 150
ALBUQUERQUE, NM 87109
PHONE: 505-348-4000
FAX: 505-348-4072
www.wilsonco.com

Certified Professional Engineer (Civil)
83225
MYRA K. CANDELARIA
Date Signed
ARIZONA, U.S.A.

	REVISION	BY	DATE
△			

NAVAJO D.O.T.

NAVAJO NATION
DIVISION OF TRANSPORTATION

N9073(1) 1, 2 & 4

ESTIMATED QUANTITIES
TABLES

PROJECT MANAGER: DDM	DATE: 1/22	DRAWING	SHEET
LEAD DESIGNER: MLL	DATE: 1/22		
ASBUILT BY:	DATE: XXX		8B OF 84
SCALE: N/A			

STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	9

ESTIMATED STRUCTURE QUANTITIES

						CIRCULAR						CIRCULAR-END SECTION				
						60201-0810	60201-0910	60201-1010	60201-1210	60201-1410	60201-1610	60210-0810	60210-0910	60210-1010	60210-1210	60403-0000
						600mm PIPE CULVERT	750mm PIPE CULVERT	900mm PIPE CULVERT	1200mm PIPE CULVERT	1500mm PIPE CULVERT	1800mm PIPE CULVERT	END SECTION FOR 600mm PIPE CULVERT	END SECTION FOR 750mm PIPE CULVERT	END SECTION FOR 900mm PIPE CULVERT	END SECTION FOR 1200mm PIPE CULVERT	Inlet
MARK	DS ID	STATION	STRUCTURE DESCRIPTION	Type	Skew No.	m	m	m	m	m	m	Each	Each	Each	Each	Each
PHASE 1, SEGMENT 1																
1	DS-01	0+023.00	1-1219 mm x 44.000 m CMP	CMP	81.5				44.00							
2	DS-61P	0+145.00	2-762 mm x 20.504 m CMP	CMP	90		41.01									2
TURNOUT IMPROVEMENT																
5A		1+200.00	2-914 mm x 21.34 m CMP Under Turnout Lt.	CMP	90			36.58						2		
PHASE 1, SEGMENT 2																
7	DS-71P	2+000.00	2-914 mm x 50.000 m CMP	CMP	90			100.00						2		
8A	DS-62P	2+300.00	2-914 mm x 34.798 m CMP	CMP	90			69.60						2		
8B	DS-62PB	2+760.00	1-610 mm x 14.026 m CMP	CMP	90	14.03						1				
9	DS-63P	3+065.00	3-914 mm x 28.290 m CMP	CMP	90		84.87						3			
10	DS-17	3+302.00	1-610 mm x 18.29 m CMP	CMP	90	18.29						1				
11	DS-17A	3+510.00	4-610 mm x 18.29 m CMP	CMP	90	73.16						4				
12	DS-64P	3+740.00	3-610 mm x 21.659 m CMP	CMP	110	64.98						3				
13	DS-65P	3+957.00	3-914 mm x 27.423 m CMP	CMP	135			82.27						3		
14		4+280.00	1-610 mm x 10.00 m CMP Under Turnout Lt.	CMP		10.00						1				
15		4+293.52	1-610 mm x 10.00 m CMP Under Turnout Rt.	CMP		10.00						1				
16A		4+520.00	1-610 mm x 12.0 m CMP Under Turnout Rt.	CMP		12.00						2				
16B	DS-29	4+677.00	2-610 mm x 24.380 m CMP	CMP	90	48.76						2				
17	DS-30	4+961.00	4-610 mm x 26.82 m CMP	CMP	110	107.28						4				
18	DS-34	5+430.00	1-762 mm x 30.480 m CMP	CMP	80		30.48						1			
19A	DS-14B	5+757.00	1-762 mm x 45.72 m CMP	CMP	80		45.72						1			
19B		5+819.26	1-610 mm x 10.00 m CMP Under Turnout Rt.	CMP		10.00						2				
19C		5+880.00	1-610 mm x 10.00 m CMP Under Turnout Rt.	CMP		10.00						2				
20	DS-39	6+012.00	1-762 mm x 23.154 m CMP	CMP	90		23.15						1			
21	DS-41	6+236.00	2-914 mm x 26.213 m CMP	CMP	90			52.43						2		
22	DS-20	6+342.12	1-610 mm x 12.000 m CMP Under Turnout Rt.	CMP		12.00						2				
23	DS-21	6+359.36	1-610 mm x 12.000 m CMP Under Turnout Lt.	CMP		12.00						2				
24	DS-17	6+610.76	1-610 mm x 12.000 m CMP Under Turnout Rt.	CMP		12.00						2				
25	DS-18	6+617.34	1-610 mm x 20.000 m CMP Under Turnout Lt.	CMP		20.00						2				
26	DS-19	6+807.06	1-610 mm x 12.000 m CMP Under Turnout Rt.	CMP		12.00						2				
27	DS-49	7+139.00	1-762 mm x 22.555m CMP	CMP	90		22.56						1			
28	DS-21	7+508.77	1-610 mm x 12.00 m CMP Under Turnout Lt.	CMP		12.00						2				
29	DS-53	7+645.50	3-1.219 mm x 19.507 m CMP	CMP	105				58.52						3	
30A	DS-23	7+911.04	1-610 mm x 12.00 m CMP Under Turnout Lt.	CMP		12.00						2				
30B		8+236.00	1-610 mm x 12.000 m CMP Under Turnout Rt.	CMP		12.00						2				
30C		8+386.73	1-610 mm x 12.000 m CMP Under Turnout Rt.	CMP		12.00						2				
31	DS-60	8+807.50	4-1.219 m x 20.116 m CMP	CMP	90				80.46						4	
32	DS-66P	9+137.00	3-914 mm x 28.038 m CMP	CMP	105			84.13						3		
33A		9+367.40	1-610 mm x 12.00 m CMP Under Turnout Lt.	CMP		12.00						2				
33B	DS-67P	9+455.00	4-1.830 mm x 30.48 m CMP	CMP	100						121.92					
34	DS-27	9+565.04	1-610 mm x 12.00 m CMP Under Turnout Lt.	CMP		12.00						2				
35	DS-68P	10+056.50	5-1525 mm x 24.994 m CMP	CMP	100					124.97						
						520	**250**	**430**	**190**	**130**	**130**	**45**	**7**	**14**	**8**	**2**
PHASE 2 (FOR REFERENCE ONLY)																
3	DS-69P	0+530.00	2-914 mm x 19.378 m CMP	CMP	90			38.76								2
4	DS-70P	1+000.00	1-762 mm x 21.007 m CMP	CMP	90		21.01						3			
5B	DS-07	1+368.00	1-1524 mm x 32.309 m CMP	CMP	74.7					32.31						
6	DS-11	1+545.00	2-914 mm x 36.000 m CMP	CMP	90			72.00						2		

NOTE: SEE SHEET 34A & 34B FOR PIPE INSTALLATION AND END SECTIONDETAILS
SEE SHEET 60 FOR CONCRETE BOX CULVERT QUANTITIES AT STA 3+204.29

CONCRETE SLOPE PAVING/BLANKET (DIMENSIONS & QUANTITIES)

STATION	LOCATION	# OF PIPES	PIPE DIA (D) MM (INCHES)	SKEW NO.	ES	60101-0000 CONCRETE		55401-1000 REINFORCING STEEL	
						CY	M^3	LBS	KG
PHASE 1 SEGMENT 2									
9+455.00	INLET	4	1830 (72)	10^{O}	3	20.5	15.67	1357.6	615.8
10+056.50	INLET	5	1524 (60)	10^{O}	3	20.2	15.44	1341.1	608.3
						TOTAL	31.11		1224.10
						USE	**32**		**1230**
PHASE 2 (FOR REFERENCE ONLY)									
1+368.00	INLET	1	1524 (60)	15^{O}	3	5.7	4.36	366.9	166.4

NOTE 1: STA 1+368, USE 511-26 DETAILS TO BUILD
NOTE 2: STA 9+455, USE 511-30 DETAILS TO BUILD AND ADD ANOTHER PIPE. QUANTITIES SHOWN ARE A TOTAL OF SINGLE PLUS TRIPLE VALUES SHOWN IN STANDARD DRAWINGS.
NOTE 3: STA 10+056.50, USE 511-30 DETAILS TO BUILD AND ADD TWO PIPES. QUANTITIES SHOWN ARE A TOTAL OF DOUBLE PLUS TRIPLE VALUES SHOWN IN STANDARD DRAWINGS.

CBC STRUCTURE QUANTITIES

				60222-3150
				3000mm SPAN, 2400mm RISE CBC with Headwall, Wingwalls & Footing, Double Barrel
STATION	STRUCTURE DESCRIPTION	TYPE	Skew No.	LS
4+215.00	2 - 3.048m x 2.438m x 24.24. CBC	CBC	90.0	1

WILSON &COMPANY
4401 MASTHEAD ST, NE. SUITE 150
ALBUQUERQUE, NM 87109
PHONE: 505-348-4000
FAX: 505-348-4072
www.wilsonco.com

Registered Professional Engineer (Civil) CERTIFICATE NO. 35225 MYRA K. CANDELARIA Date Signed 06/30/22 ARIZONA, U.S.A.

	REVISION	BY	DATE

NAVAJO D.O.T.

NAVAJO NATION
DIVISION OF TRANSPORTATION

N9073(1) 1, 2 & 4

DRAINAGE STRUCTURE QUANTITY TABLE

PROJECT MANAGER: DDM	DATE: 1/22	DRAWING	SHEET
LEAD DESIGNER: MLL	DATE: 1/22		
ASBUILT BY:	DATE: XXX		9 OF 84
SCALE: N/A			

STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	10

BOP Sta. 0+000.00
Elev.= 2104.000

POB 0+000.000

C1
PI 0+059.131
A 36°02'14" Lt
R 90.000
L 56.607
T 29.275
E 4.642
N 527606.797
E 311276.937

C2
PI 0+229.795
A 17°05'31" Lt
R 150.000
L 44.747
T 22.541
E 1.684
N 527532.106
E 311121.326

Sta. 0+000.00 to 0+337.00, Lt. Install Gabion Wall System As Shown. See Sheets ___-___ For Details

Sta. 0+178.05, CL, Existing P/L X-ing Elev: 2112.58

Sta. 0+178.04, CL, Existing P/L X-ing Elev: 2108.87

Sta. 0+011.95, CL, Existing W/L Xing. Elev: 2103.66

Sta. 0+082.92, CL, Existing W/L X-ing Elev: 2103.18

Sta. 0+013.14, CL, Existing W/L Xing. Elev: 2103.65

Sta. 0+000.00 to 0+350.00, Lt. Install Standard Guardrail System As Shown. See Sheet 42-46 For Details

DS-61P

STOP

PC 0+029.855

PT 0+086.463

PC 0+207.254

PAVEMENT ENDS

PAVEMENT ENDS

Proposed Gabion Wall

Proposed Gabion Wall

Proposed Gabion Wall

Sta. 0+000.00-Rt. Begin Curb & Gutter Construction

SCP6 Rebar Cap

SCP7 Rebar Cap

SPEED LIMIT 20

S 79°36'11" W 29.855m

S 64°21'15" W 120.702m

S 47°16'03" W 131.402m

CL OF CONSTRUCTION

Sta 0+300.00 To Sta 0+312.19v Rt Transition C&G To 42" CWB End Curb & Gutter Construction

Sta 0+312.19 To Sta 0+350.00 Rt Begin 42" Concrete Wall Barrier With Drainage Slots

Sta. 00+022.94, CL., Existing 1219 mm x 42 m CSPC Elev.: 2101.89

Sta. 0+065.05, CL, Existing W/L X-ing Elev: 2102.78

Sta. 0+106.11, Rt. Construct New 4.5 m Wide Turnout w/ 2-Unit Cattleguard

Sta. 0+180.64, Rt. Construct New 4.5 m Wide Turnout w/ 2-Unit Cattleguard

Sta. 0+270.00 Rt., Construct New 4.5 m Wide Turnout w/ 2-Unit Cattleguard

Sta. 0+243.95, CL, Existing W/L X-ing Elev: 2103.33

SCALE: Meters
0 10 20 30 40 50

DELINEATORS		TYPE 2	RIGHT-OF-WAY	
TYPE "1a"	TYPE "1b"	OBJECT MARKER	MONUMENTS	MARKERS
⊙	⊡	●	⊕	--NO SYMBOL--
0	13	2	10	10

DRAINAGE STRUCTURE TABLE

Mark	Station	Structure	Skew No.	Area (ha)	Q100 (cms)	Remarks	Outlet Protection
1	0+023.00	1-1219 mm x 44 m CMP	81.5	–	–	Connect to existing structure Rt.	
2	0+145.00	2-762 mm x 20.504 m CMP	90.0	8.269	1.39	Drop inlet RT., Penetrate Gabion Wall Lt	

SCP 6, Rebar with Cap
Sta 0+012.516,
Offset 15.791 m Rt.
EL 2105.276

SCP 7, Rebar with Cap
Sta 0+158.646,
Offset -31.820 m Lt.
EL 2099.544

BOP Sta. 0+000.00
Elev.= 2104.000

Sta. 0+011.950 & 0+013.140, Existing WL X-ings

Sta. 0+023.00 Install New 1-1219 mm x 44m cmp Skew No. 81.82 Inv Elev 2101.448

Sta. 0+022.943 Existing 1-1219 mm CMP Remove, Salvage & Stockpile

Sta. 0+065.916 & 0+082.916 Existing WL X-ings

Finish Grade

FG = -0.5714%

PVI 0+000.000 Elev 2104.000

PVC 0+127.500 Elev 2103.271

L= 25.00 m
K= 26
e= 0.03 m
SD= 118.47 m

PVT 0+152.500 Elev 2103.248

Sta. 0+145.00 Install New 2-750 mm x _____m CMP Skew No. 90 Inv Elev 2100.470 Q100 ____ cms

PVI 0+140.000 Elev 2103.200

LO 0+142.500 Elev 2103.229

Existing Ground

Sta. 0+145.00 Install New 2-762mm x 20.504m cmp Skew No. 110 Inv Elev 2101.124 Q_{100} = 139 cms

Sta. 0+178.051 Existing Powerline X-ing Elev. 2112.584

Sta. 0+178.036 Existing Powerline X-ing Elev. 2108.867

Sta. 0+243.949 Existing WL X-ings

FG = 0.3810%

L= 25.00 m
K= 3192
e= 0.00 m
SD= 11206.07 m

PVC 0+337.500 Elev 2103.952

PVI 0+350.000 Elev 2104.000

2132 2128 2124 2120 2116 2112 2108 2104 2100 2096 2092 2088 2084

0+000 0+050 0+100 0+150 0+200 0+250 0+300 0+350

STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	11

Sta. 0+383.00 to 0+440.00, Lt.
Install Fence line @ 13m Lt.

Sta. 0+440.00 to 0+780.00, Lt.
Install Gabion Wall System As Shown. See Sheet 33 For Details

Sta. 0+383.00 to 0+700.00, Lt.
Install Standard Guardrail System.
See Sheet 42 – 46 For Details

See waterline plans SHEET 77 & 78 this planset

Sta. 0+383.00, CL Construct 4–Unit Cattleguard on N9073, Type 2 Gate

Sta. 0+350.00 to 0+383.00, Lt.
Install Standard Guardrail System.
See Sheet 42 – 46 For Details

STA 0+383.00
END SEGMENT 1 – FULL CONSTRUCTION

Sta. 0+340.00 to 0+383.00, Lt.
Install Fence line @ 13m Lt.

STA. 0+383.00 TO 0+440.00
TRANSITION ROADWAY GRADE AND WIDTH TO MATCH EXISTING

Sta 0+350.00 To Sta 0+383.00 Rt
Build 42" Concrete Wall Barrier
With Drainage Slots

Sta 0+383.00 To Sta 0+520.00 Rt
Build 42" Concrete Wall Barrier
With Drainage Slots

Place waste material from STA 0+450 to 1+200.

Sta 0+520.00 To Sta 0+540.00 Rt
Install Guardrail System See Sheets 42 – 46 for Details

PROPOSED PEDESTIAN HANDRAIL

PROPOSED PEDESTIAN HANDRAIL

PC CONSTRUCTION

C4
PI 0+648,000
A 14°18'18" Lt
R 300.000
L 74.901
T 37.646
E 2.353
N 527544.092
E 310790.234

PC 0+610.354

PT 0+685.255

C3
PI 0+425,792
A 80°34'51" Rt
R 50.000
L 70.320
T 42.389
E 15.550
N 527398.880
E 310977.114

PC 0+383.403

PT 0+453.723

156.688 m
N 52°50'57" W

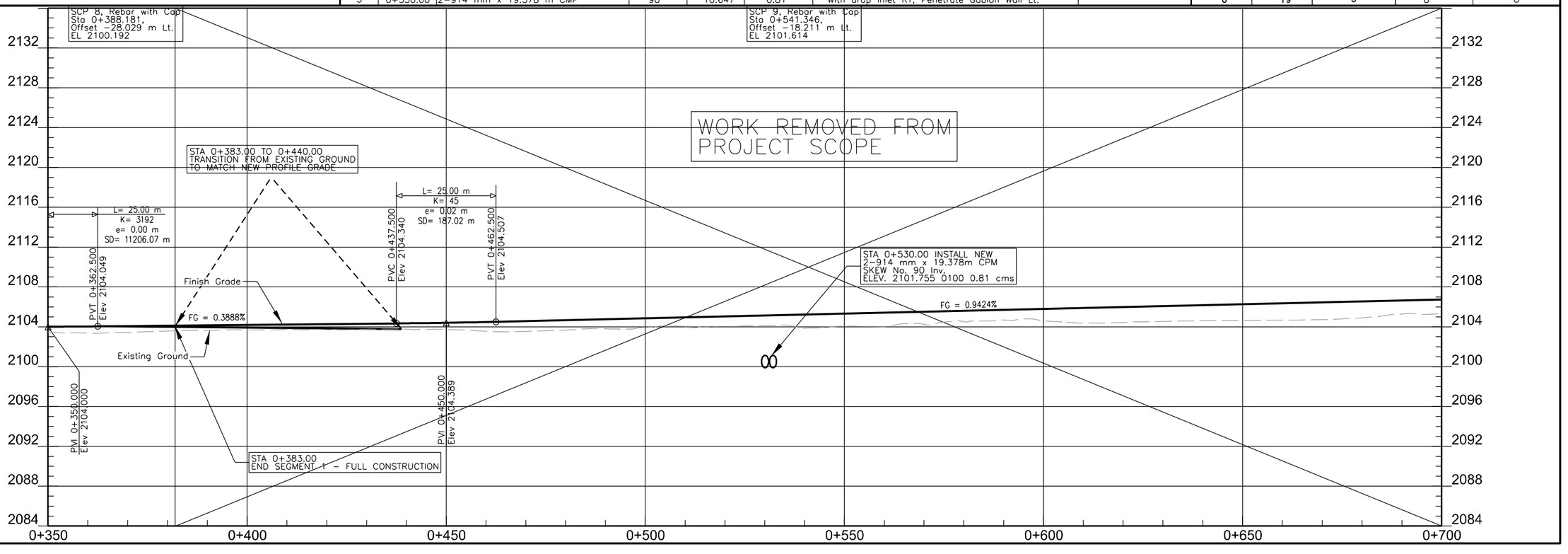
WORK REMOVED FROM PROJECT SCOPE

SCALE: Meters
0 10 20 30 40 50

DRAINAGE STRUCTURE TABLE

Mark	Station	Structure	Skew No.	Area (ha)	Q100 (cms)	Remarks	Outlet Protection
3	0+530.00	2–914 mm x 19.378 m CMP	90	10.647	0.81	With drop inlet RT, Penetrate Gabion Wall Lt.	

DELINEATORS		TYPE 2	RIGHT–OF–WAY	
TYPE "1a"	TYPE "1b"	OBJECT MARKER	MONUMENTS	MARKERS
0	19	0	8	8



STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	12

Sta. 0+700 to 0+790.00, Lt.
Install Standard Guardrail System.
See Sheet 42-46 For Details

Sta. 0+760 to 1+050.00,
Install Fence Line @ 10m Lt.
In Lieu of the ROW Line

WORK REMOVED FROM PROJECT SCOPE

Sta. 0+440.00 to 0+760.00, Lt.
Install Gabion Wall System As
Shown. See Sheet 33 For Details

N

0+700 0+750 0+800 0+850 0+900 0+950 1+000 1+050

SCP10
Rebar Cap

SCP11
Rebar Cap

CL OF CONSTRUCTION

PROPOSED PEDESTRIAN HANDRAIL

N 66°27'24" W
169.263m

N 34°56'36" W
68.614m

C6
PI 0+980.613
A 4°34'23" Lt
R 200.000
L 15.963
T 7.986
E 0.159
N 527720.483
E 310518.851

NO PASSING ZONE

PC 0+972.627

PT 0+988.590

PAVEMENT ENDS

Sta 0+700.000 ML

Sta 1+050.000 ML

Sta 0+780.00
Connect New Fence
Into Rock Face

Sta. 0+780.00 to 0+800.00, Rt.
Connect New Right-Of-Way
Fencing Into Rock Face As Shown.

Sta. 0+800.00, CL, Install New
5-Unit Cattleguard And Connect
New Fencing To New Right-Of-Way
Fence On Left & Right As Shown.

C5
PI 0+879.909
A 31°30'38" Rt
R 90.000
L 49.497
T 25.392
E 3.513
N 527636.883
E 310577.271

PC 0+854.518

PT 0+904.015

DO NOT PASS

WORK REMOVED FROM PROJECT SCOPE

Place waste material from STA
0+450 to 1+200.

SCALE: Meters
0 10 20 30 40 50

Engineer Professional Engineer (Civil)
CERTIFICATE NO.
83225
MYRA K.
CANDELARIA
Date Signed
ARIZONA, U.S.A.

DRAINAGE STRUCTURE TABLE

Mark	Station	Structure	Skew No.	Area (Ha)	Q100 (cms)	Remarks	Outlet Protection
4	1+000.00	1-762 mm x 21.007m CMP	90	3.502	1.88	Metal End Section At Inlet	

DELINEATORS		TYPE 2	RIGHT-OF-WAY	
TYPE "1a"	TYPE "1b"	OBJECT MARKER	MONUMENTS	MARKERS
⊙	⊙	●	⊕	--NO SYMBOL--
0	14	0	8	8

SCP 10, Rebar with Cap
Sta 0+718.458,
Offset -21.306 m Lt.
EL 2103.616

SCP 11, Rebar with Cap
Sta 0+879.575,
Offset -29.507 m Lt.
EL 2105.619

Sta. 0+748.562
Existing Powerline X-ing
Elev. 2120.196

Sta. 0+750.162
Existing Powerline X-ing
Elev. 2113.328

Sta. 0+943.931
Existing Powerline X-ing
Elev. 2118.262

Sta. 0+946.637
Existing Powerline X-ing
Elev. 2116.871

Finish Grade

FG = 0.9424%

Existing Ground

Sta. 1+000.00 Install New
1-762mm x 21.007m CMP
Skew No. 90 Inv
Elev 2107.00 Q100 1.880 cms

2132 2128 2124 2120 2116 2112 2108 2104 2100 2096 2092 2088 2084

0+700 0+750 0+800 0+850 0+900 0+950 1+000 1+050

STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	13

Sta. 1+200.00, Lt. Construct New 7.0 m Wide Paved Turnout with 4–Unit Cattleguard And Type 2 Gate

Sta. 1+050.00 to Sta. 1+190, Install Fence Line @ 10m Lt. In Lieu of the ROW Line.

TEMPORARY CONSTRUCTION EASEMENT

Install 281 sq m Of Articulated Concrete Block Revetment

Install 278 sq m Of Articulated Concrete Block Revetment

Obliterate Road

5A

Protect existing waterline place

Install 6.1m x 6.1m Wire Enclosed Riprap Pad at Outlet

CL OF CONSTRUCTION

BUILD TURNOUT AT STATION 1+200 – SEE SHEET 74 FOR PROFILE

Sta. 1+200.00 Install 2–914 mm CMP with End Sections at Inlet

Sta. 1+260.00 Lt. Tie New Fence Line back to ROW Line

Sta. 1+368.00 Existing 1–610 mm CMP Elev: 2111.807

5B

N 39°31'09" W 142.370m

TURNOUT AT STATION 1+200 AND MARK 5A STRUCTURE IS STILL INCLUDED IN THE WORK ON THIS PROJECT

PT 1+293.986

WORK REMOVED FROM PROJECT SCOPE

Sta. 1+320.00 to 1+400.00, Rt. Install Standard Guardrail System. See Sheet 42–46 For Details

Place waste material from STA 0+450 to 1+200.

Sta. 1+072.00 to 1+100.00, Rt. Install Standard Guardrail System. See Sheet 42–46 For Details

Sta 1+100.00 to Sta 1+320.00 Rt Build 42" Concrete Wall Barrier With Drainage Slots

C7
PI 1+214.074
A 26°39'18"Rt
R 350.000
L 162.826
T 82.914
E 9.687
N 527900.584
E 310370.286

SCALE: Meters
0 10 20 30 40 50

Registered Professional Engineer (Civil)
CERTIFICATE NO.
85225
MYRA K. CANDELARIA
Date Signed
ARIZONA, U.S.A.

DELINEATORS		TYPE 2	RIGHT–OF–WAY	
TYPE "1a"	TYPE "1b"	OBJECT MARKER	MONUMENTS	MARKERS
				--NO SYMBOL--
0	9	0	6	6

DRAINAGE STRUCTURE TABLE

Mark	Station	Structure	Skew No.	Area (ha)	Q100 (cms)	Remarks	Outlet Protection
5A	1+200.00	2–914 mm x 21.34 m CMP Under Turnout Lt.		37.742	3.620	With End Sections at Inlet	Wire Enclosed Riorap
5B	1+368.00	1–1524 mm x 32.309m CMP	74.7	37.742	3.620	With End Sections at Inlet	None

SCP 12, Rebar with Cap
Sta 1+081.970,
Offset –43.587' m Lt.
EL 2107.712

SCP 13, Rebar with Cap
Sta 1+201.437,
Offset –33.394' m Lt.
EL 2109.425

SCP 13, Rebar with Cap
Sta 1+201.437,
Offset –33.394' m Lt.
EL 2109.425

L= 55.00 m
K= 23
e= 0.16 m
SD= 201.54 m

PVC 1+172.500
Elev 2111.198

PVT 1+227.500
Elev 2112.368

PVI 1+200.000
Elev 2111.457

FG = 0.9424%

FG = 3.3137%

Finish Grade

Existing Ground

Sta. 1+166.700
Existing WL X–ing

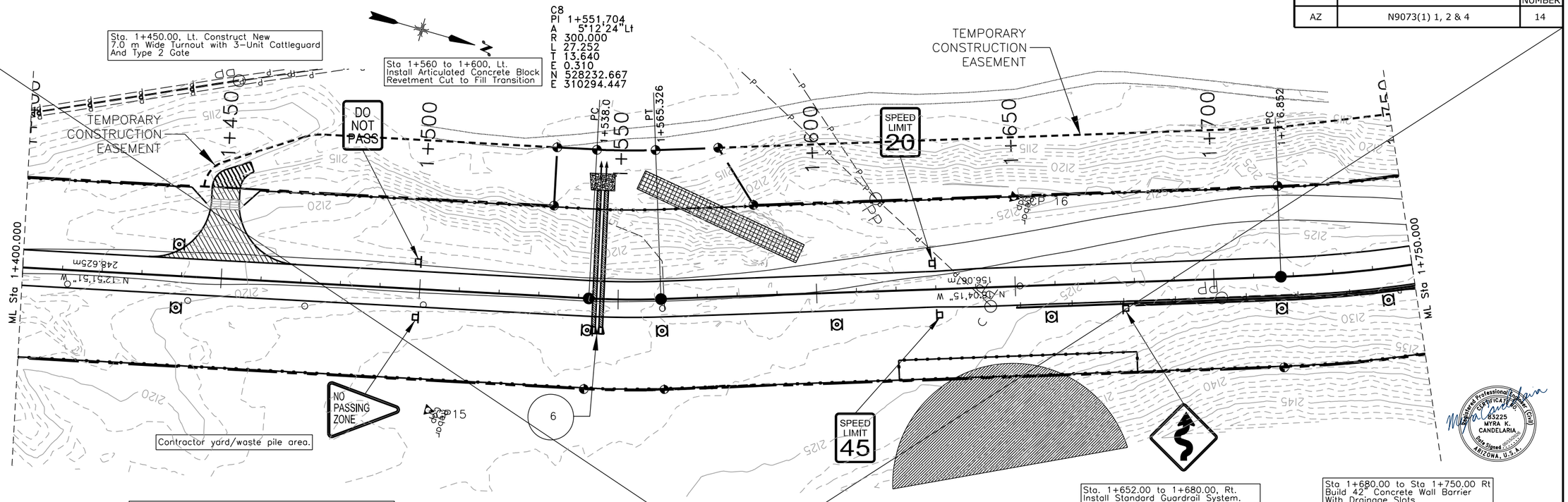
Sta. 1+368.00 Install New
1–1.524 m x 32.309m CSPC
Skew No. 74.69 Inv
Elev 2112.176 Q100 2.585 cms

Sta. 1+368.00
Existing 1–524 mm CMP
Remove, Salvage & Stockpile

2136 2132 2128 2124 2120 2116 2112 2108 2104 2100 2096 2092 2088

1+050 1+100 1+150 1+200 1+250 1+300 1+350 1+400

STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	14



WORK REMOVED FROM PROJECT SCOPE

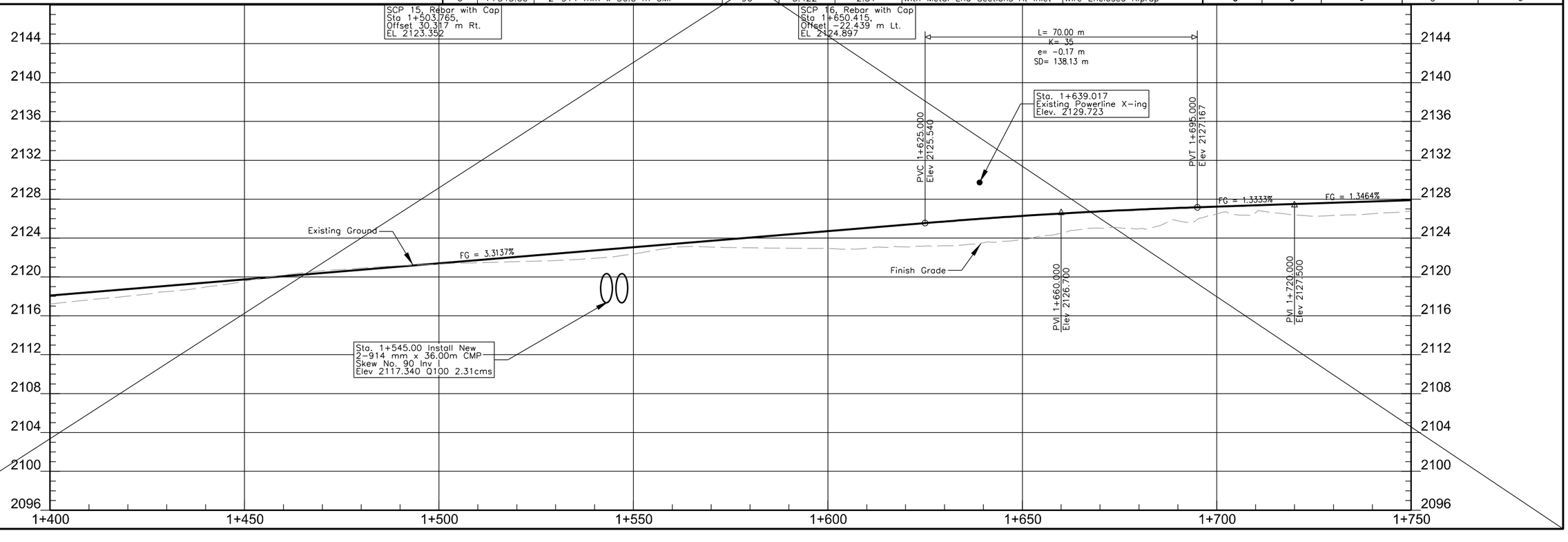
SCALE: Meters

0 10 20 30 40 50

DRAINAGE STRUCTURE TABLE

Mark	Station	Structure	Skew No.	Area (ha)	Q100 (cms)	Remarks	Outlet Protection
6	1+545.00	2-914 mm x 36.0 m CMP	90	5.422	2.31	With Metal End Sections At Inlet	Wire Enclosed Riprap

DELINEATORS		TYPE 2	RIGHT-OF-WAY	
TYPE "1a"	TYPE "1b"	OBJECT MARKER	MONUMENTS	MARKERS
0	9	0	6	6



STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	15

WORK REMOVED FROM PROJECT SCOPE

Sta. 1+800.00 to 1+900.00, Lt. Install Standard Guardrail System. See Sheet 42-46 For Details

Sta. 1+900.00, CL Construct 4 Unit Cattleguard on N9073. Type 2 Grate

Sta. 1+900.00 to 2+100.00, Lt. Install Standard Guardrail System. See Sheet 42-46 For Details

C9
PI 1+769.771
A 20°00'28" Lt
R 300.000
L 104.761
T 52.919
E 4.632
N 528439.989
E 310226.801

TEMPORARY CONSTRUCTION EASEMENT

TEMPORARY CONSTRUCTION EASEMENT

CL OF CONSTRUCTION

NO PASSING ZONE

DO NOT PASS

PT 1+821.612

ML Sta 1+750.000

ML Sta 2+100.000

SCP 17

SCP 18

Sta 1+900.00
Begin Segment 2 – Full Construction

PC 1+984.832

PT 2+084.526

Sta 1+750.00 To Sta 1+840.00 Rt
Build 42" Concrete Wall Barrier
With Drainage Slots

Sta. 1+840.00 to 1+860.00, Rt. Install Standard Guardrail System. See Sheet 42-46 For Details

Sta 1+850.00 to 1+900.00
Transition Roadway Grade and Width to Match Existing

Sta 1+995.00 To Sta 2+055.00 Rt
install Temporary Fence to Restrict Access. See Environmental Mitigation Notes.

SCALE: Meters
0 10 20 30 40 50

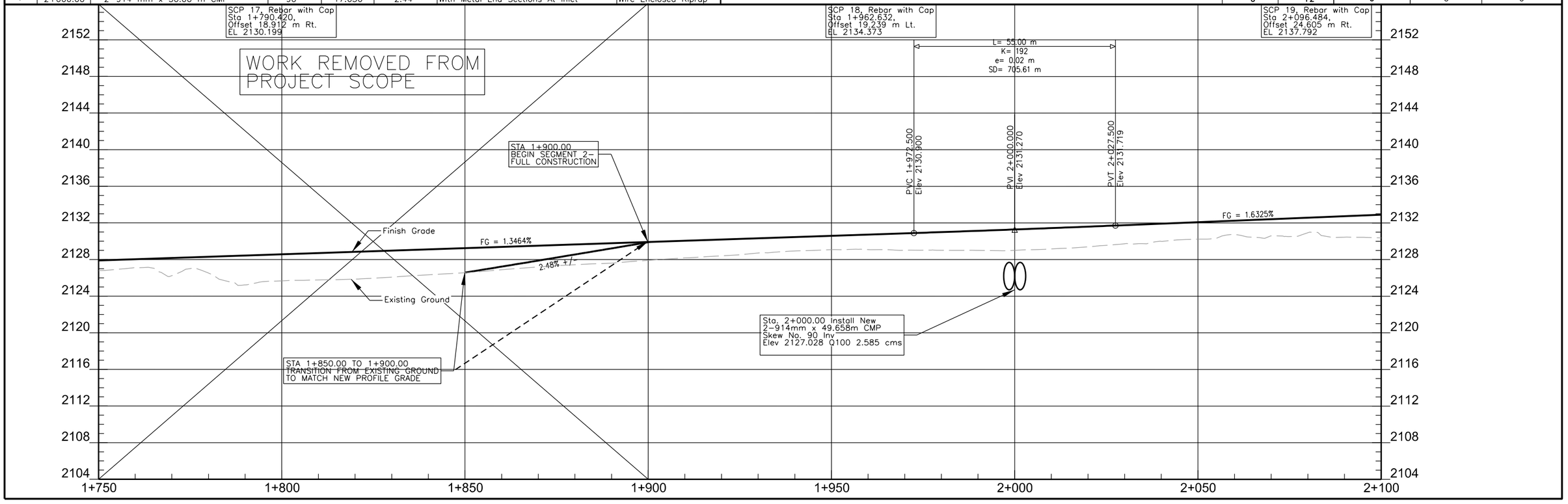
C10
PI 2+035.143
A 19°02'24" Rt
R 300.000
L 99.693
T 50.311
E 4.189
N 528649.729
E 310062.470

Registered Professional Engineer (Civil)
Certified Electronically Signed
83225
MYRA K. CANDELARIA
Date Signed
ARIZONA, U.S.A.

DRAINAGE STRUCTURE TABLE

Mark	Station	Structure	Skew No.	Area (ha)	Q100 (cms)	Remarks	Outlet Protection
7	2+000.00	2–914 mm x 50.00 m CMP	90	17.636	2.44	With Metal End Sections At Inlet	Wire Enclosed Riprap

DELINEATORS		TYPE 2	RIGHT–OF–WAY	
TYPE "1a"	TYPE "1b"	OBJECT MARKER	MONUMENTS	MARKERS
0	12	0	6	6

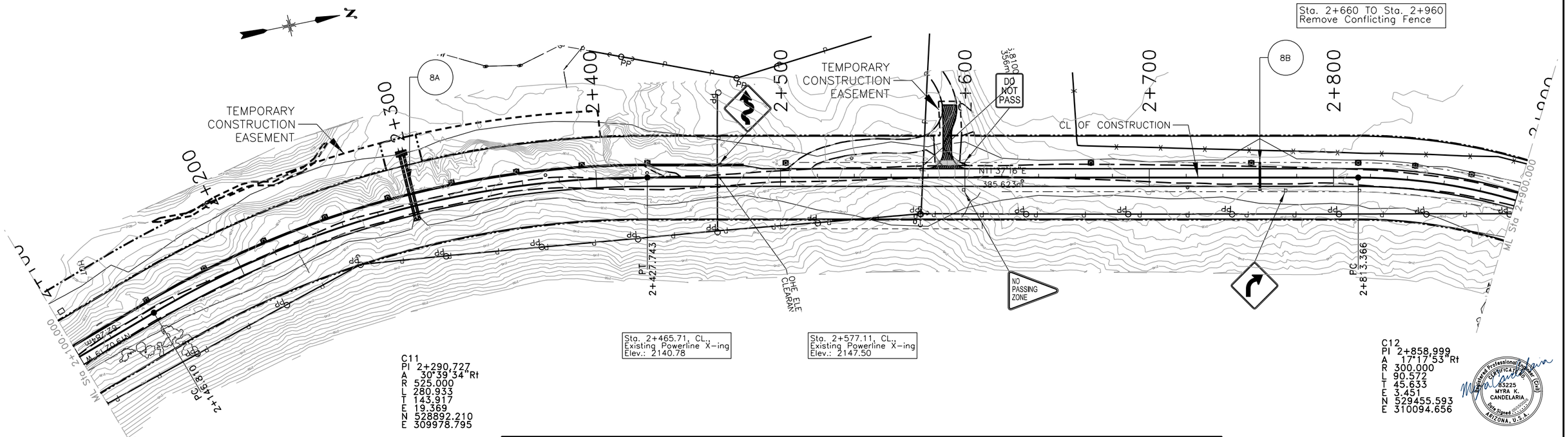


STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	16

Sta. 2+100.00 to 2+480.00, Lt.
Install Standard Guardrail System.
See Sheet 42-46 For Details

Sta. 2+590.47, Lt. Construct New
4.5 Wide Turnout with 2-Unit Flowthrough
Cattleguard And Type 2 Gate.

Sta. 2+660 TO Sta. 2+960
Remove Conflicting Fence



C11
PI 2+290.727
A 30°39'34"Rt
R 525.000
L 280.933
T 143.917
E 19.369
N 528892.210
E 309978.795

C12
PI 2+858.999
A 17°17'53"Rt
R 300.000
L 90.572
T 45.633
E 3.451
N 529455.593
E 310094.656

Registered Professional Engineer (Civil)
CERTIFICATE NO.
83225
MYRA K. CANDELARIA
Date Signed
ARIZONA, U.S.A.

SCALE: Meters
0 20 40 60 80 100

DRAINAGE STRUCTURE TABLE

Mark	Station	Structure	Skew No.	Area (ha)	Q100 (cms)	Remarks	Outlet Protection
8A	2+300.00	2-914 mm x 34.798 m CMP	90	17.636	2.44	With Metal End Sections At Inlet	Wire Enclosed Riprap
8B	2+760.00	1-610 mm x 14.026 m CMP	90	-	-	With Metal End Sections At Inlet	None

DELINEATORS		TYPE 2	RIGHT-OF-WAY	
TYPE "1a"	TYPE "1b"	OBJECT MARKER	MONUMENTS	MARKERS
◻	◻	●	◒	--NO SYMBOL--
0	18	0	6	6

SCP 20, Rebar with Cap
Sta 2+250.366,
Offset 25.59 m Rt
EL 2138.131

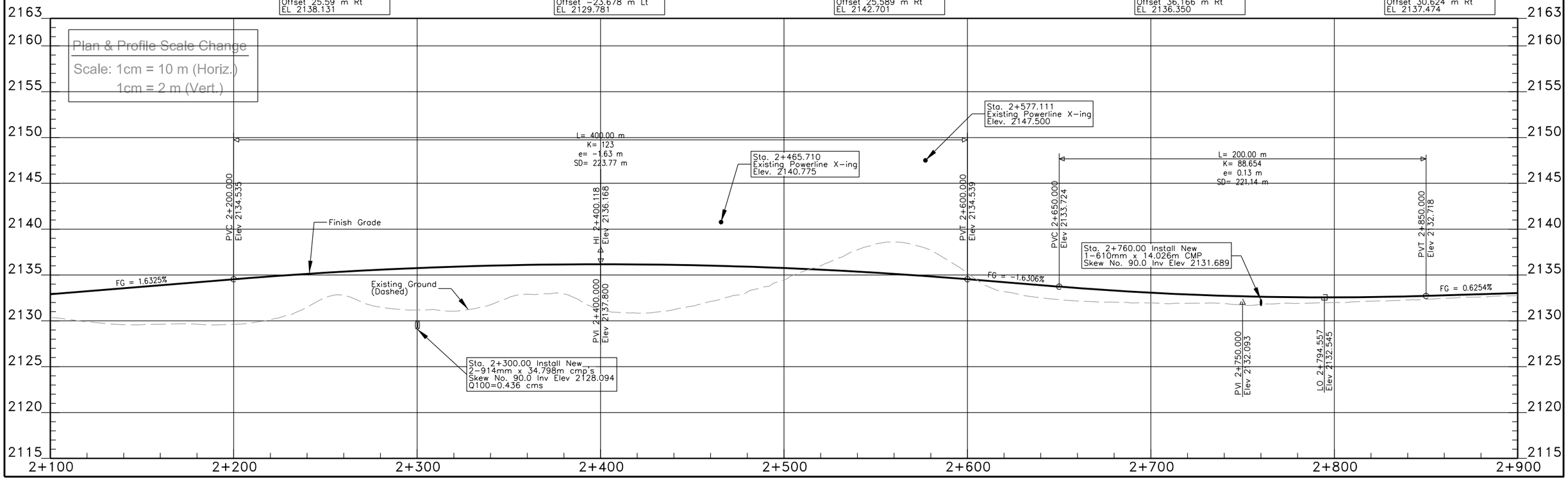
SCP 21, Rebar with Cap
Sta 2+412.891,
Offset -23.678 m Lt
EL 2129.781

SCP 22, Rebar with Cap
Sta 2+549.325,
Offset 25.589 m Rt
EL 2142.701

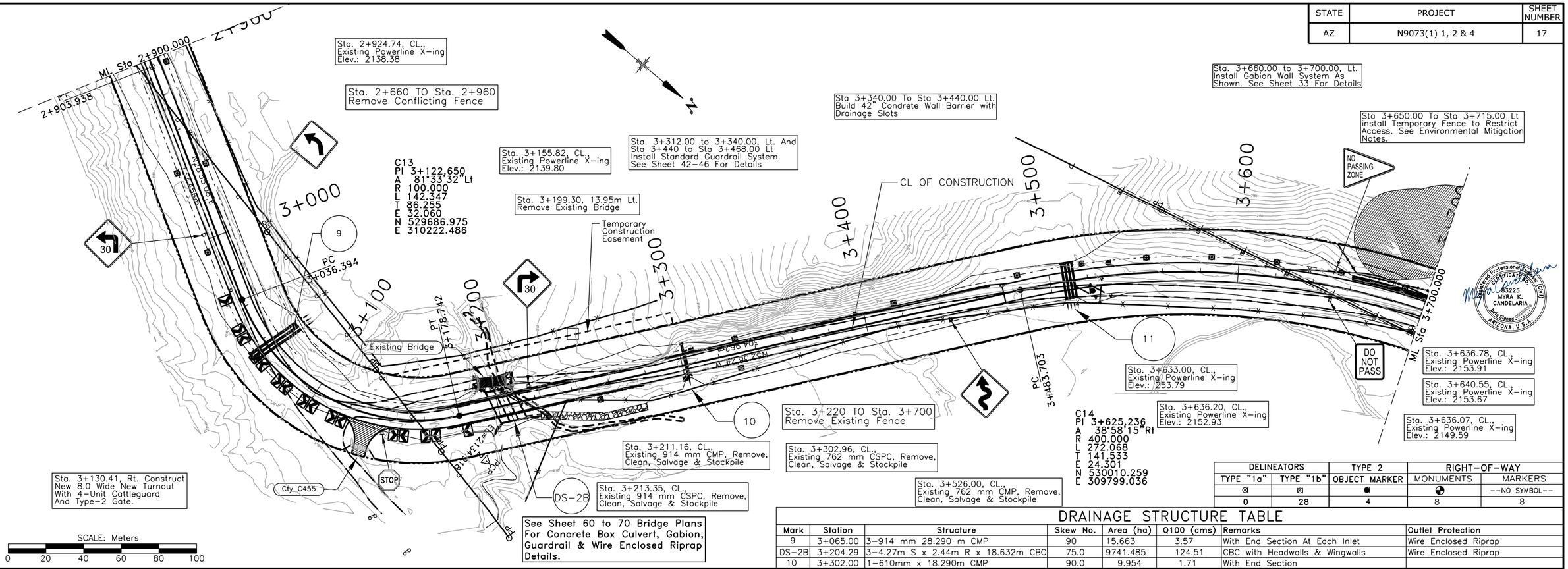
SCP 23, Rebar with Cap
Sta 2+703.858,
Offset 36.166 m Rt
EL 2136.350

SCP 24, Rebar with Cap
Sta 2+859.500,
Offset 30.624 m Rt
EL 2137.474

Plan & Profile Scale Change
Scale: 1cm = 10 m (Horiz.)
1cm = 2 m (Vert.)



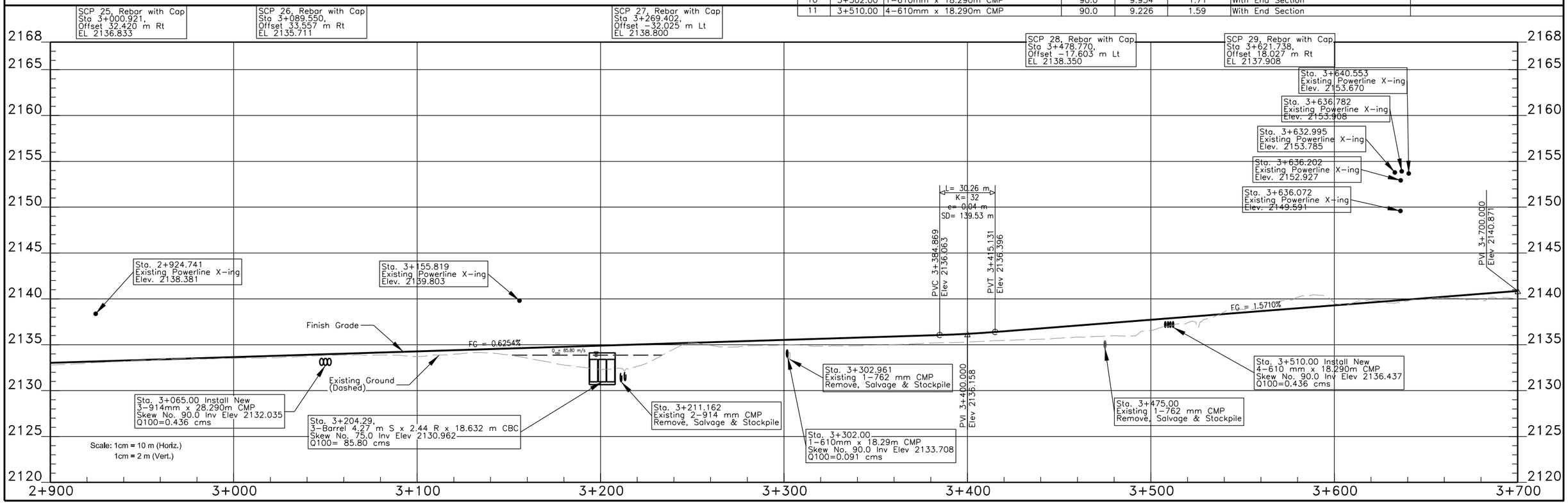
STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	17



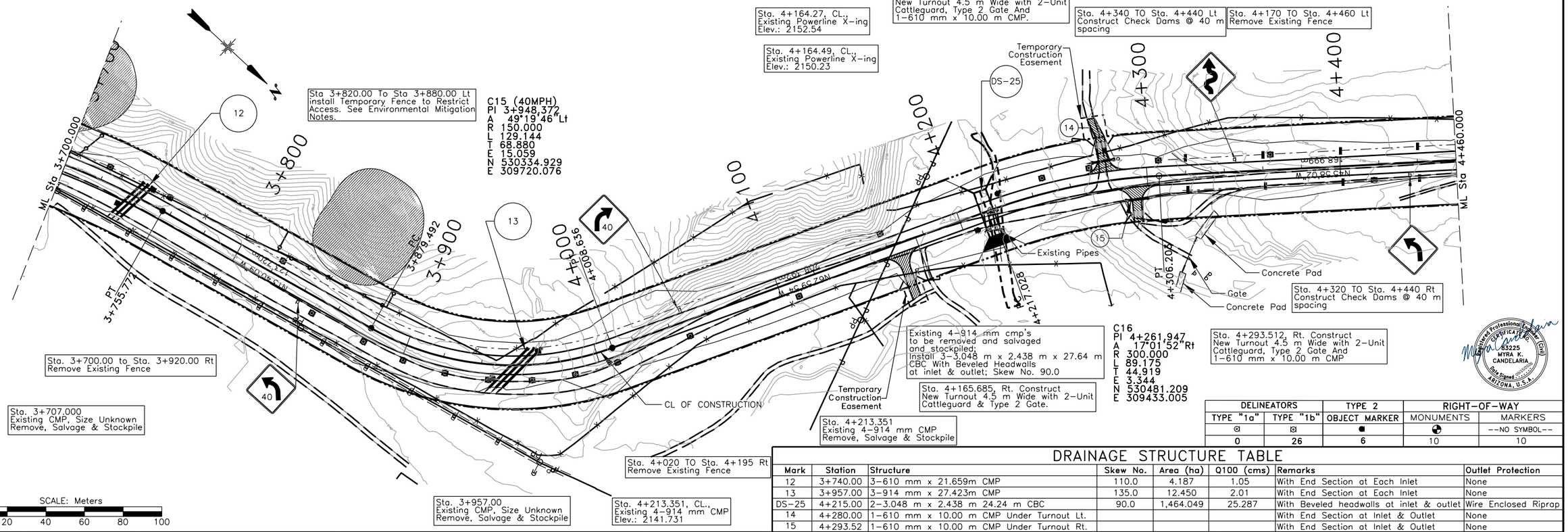
DELINEATORS		TYPE 2	RIGHT-OF-WAY	
TYPE "1a"	TYPE "1b"	OBJECT MARKER	MONUMENTS	MARKERS
⊡	⊡	●	◕	--NO SYMBOL--
0	28	4	8	8

DRAINAGE STRUCTURE TABLE

Mark	Station	Structure	Skew No.	Area (ha)	Q100 (cms)	Remarks	Outlet Protection
9	3+065.00	3-914 mm 28.290 m CMP	90	15.663	3.57	With End Section At Each Inlet	Wire Enclosed Riprap
DS-2B	3+204.29	3-4.27m S x 2.44m R x 18.632m CBC	75.0	9741.485	124.51	CBC with Headwalls & Wingwalls	Wire Enclosed Riprap
10	3+302.00	1-610mm x 18.290m CMP	90.0	9.954	1.71	With End Section	
11	3+510.00	4-610mm x 18.290m CMP	90.0	9.226	1.59	With End Section	



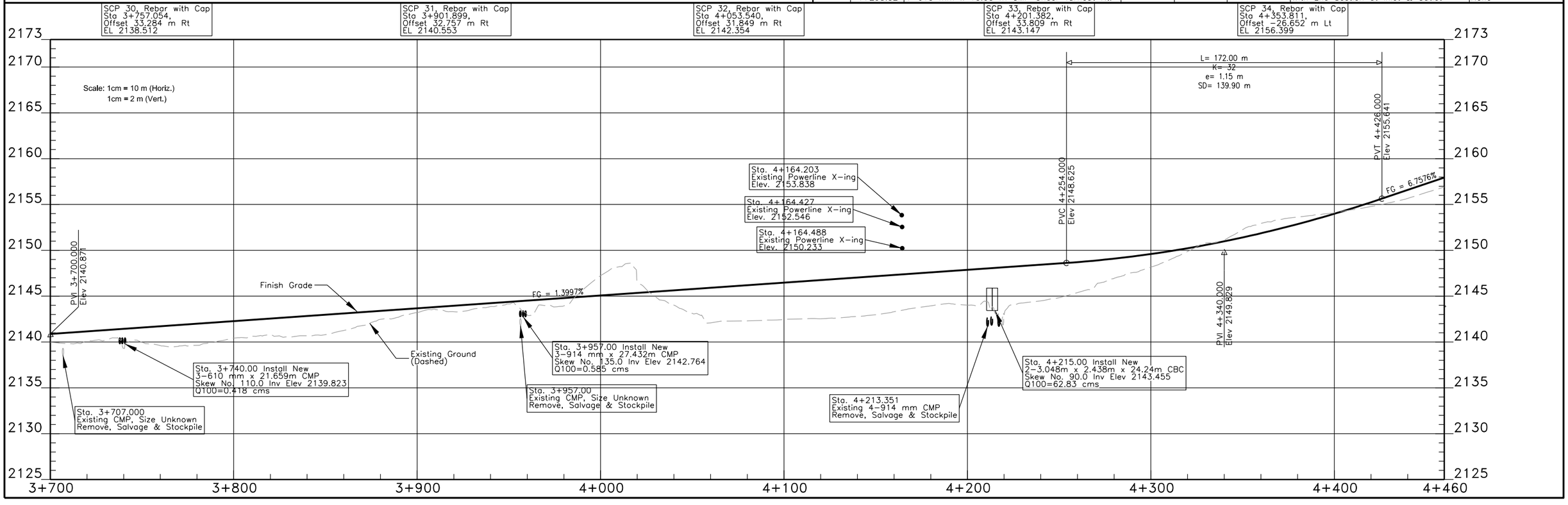
STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	18



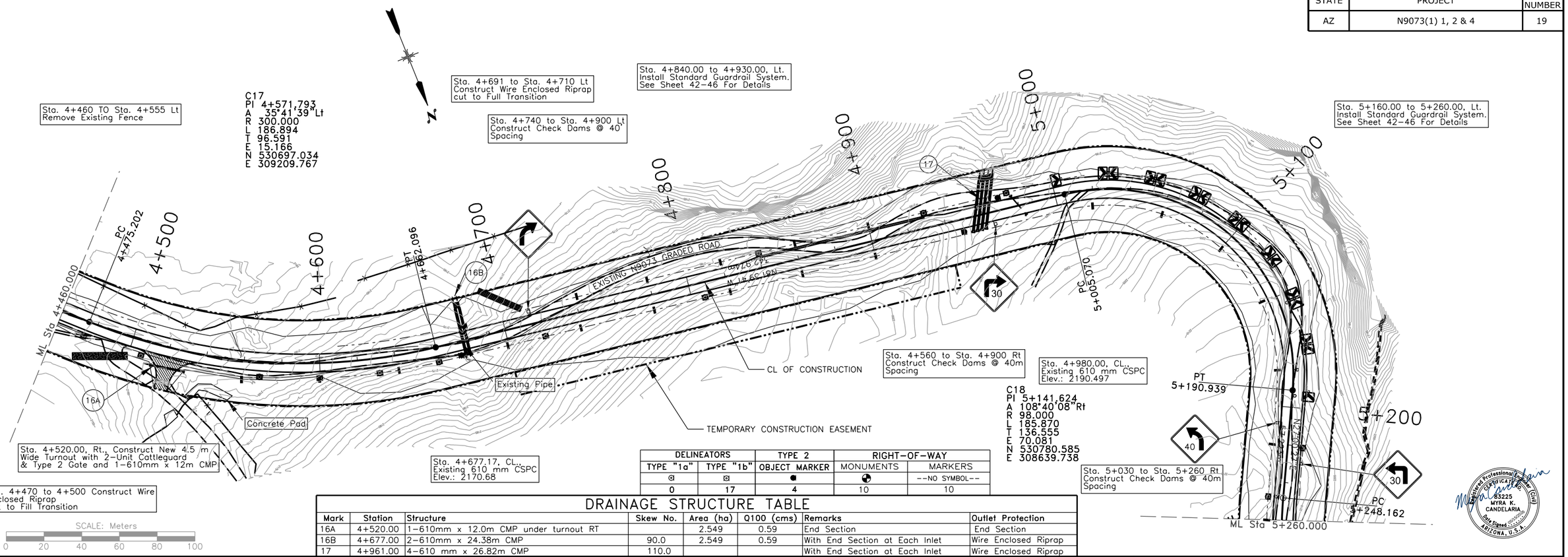
DELINEATORS		TYPE 2	RIGHT-OF-WAY	
TYPE "1a"	TYPE "1b"	OBJECT MARKER	MONUMENTS	MARKERS
⊙	⊙	●	⊕	--NO SYMBOL--
0	26	6	10	10

DRAINAGE STRUCTURE TABLE

Mark	Station	Structure	Skew No.	Area (ha)	Q100 (cms)	Remarks	Outlet Protection
12	3+740.00	3-610 mm x 21.659m CMP	110.0	4.187	1.05	With End Section at Each Inlet	None
13	3+957.00	3-914 mm x 27.423m CMP	135.0	12.450	2.01	With End Section at Each Inlet	None
DS-25	4+215.00	2-3.048 m x 2.438 m 24.24 m CBC	90.0	1,464.049	25.287	With Beveled headwalls at inlet & outlet	Wire Enclosed Riprap
14	4+280.00	1-610 mm x 10.00 m CMP Under Turnout Lt.				With End Section at Inlet & Outlet	None
15	4+293.52	1-610 mm x 10.00 m CMP Under Turnout Rt.				With End Section at Inlet & Outlet	None



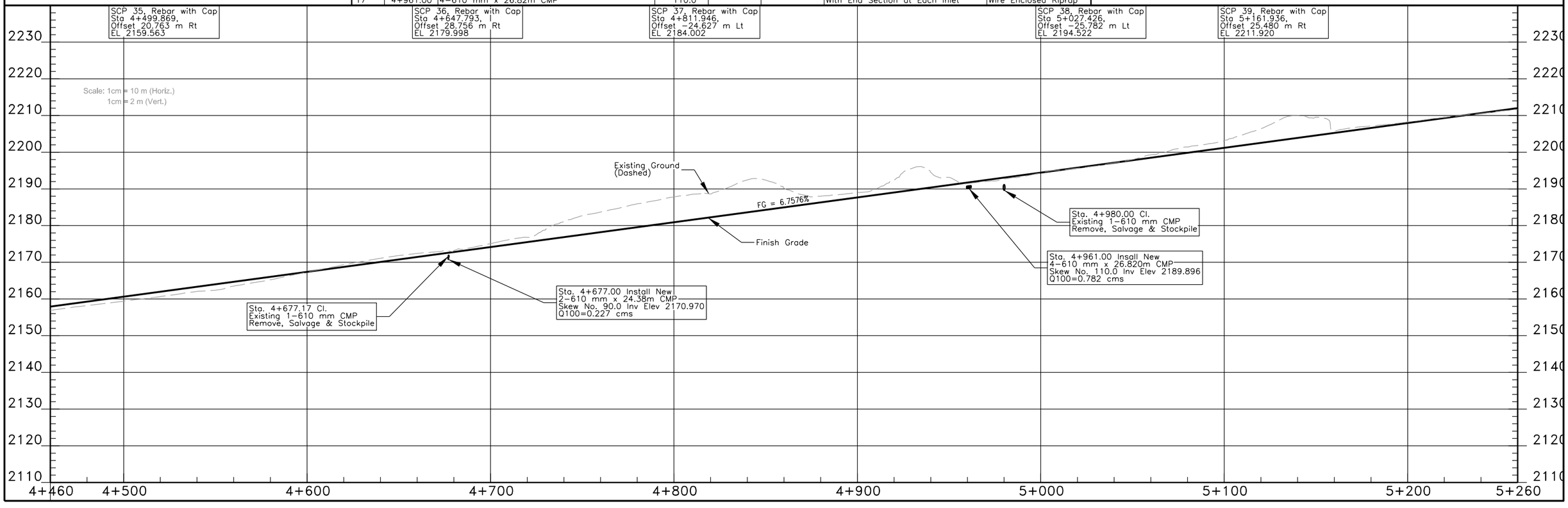
STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	19



DELINEATORS		TYPE 2	RIGHT-OF-WAY	
TYPE "1a"	TYPE "1b"	OBJECT MARKER	MONUMENTS	MARKERS
⊙	⊙	●	⊕	--NO SYMBOL--
0	17	4	10	10

DRAINAGE STRUCTURE TABLE

Mark	Station	Structure	Skew No.	Area (ha)	Q100 (cms)	Remarks	Outlet Protection
16A	4+520.00	1-610mm x 12.0m CMP under turnout RT		2.549	0.59	End Section	End Section
16B	4+677.00	2-610mm x 24.38m CMP	90.0	2.549	0.59	With End Section at Each Inlet	Wire Enclosed Riprap
17	4+961.00	4-610 mm x 26.82m CMP	110.0			With End Section at Each Inlet	Wire Enclosed Riprap



Registered Professional Engineer (Civil)
CERTIFICATE NO.
83225
MYRA K. CANDELARIA
Date Signed
ARIZONA, U.S.A.

STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	20

C19
PI 5+293.544
A 25°34'08"Lt
R 200.000
L 89.252
T 45.382
E 5.084
N 530993.663
E 308748.341

Sta. 5+260.00 to Sta. 5+410.00, Lt. Install Standard Guardrail System. See Sheet 42-46 For Details

Sta. 5+260 to Sta. 5+380 Rt Construct Check Dams @ 40m Spacing

C20
PI 5+530.333
A 46°57'08"Lt
R 300.000
L 245.841
T 130.295
E 27.073
N 531231.888
E 308754.324

Sta 5+505 to 5+640, Lt. Contractor Shall Obliterate, Scarify, & Reseed Existing N9073 Graded Roadway.

Sta. 5+780 to Sta. 5+810 Lt Construct Wire Enclosed Riprap out to Full Transition

Sta. 5+953.964, Lt. Construct New Turnout 7.0 m Wide 3 Unit Cattle Guard With Type 2 Gate.

Sta. 6+029.88 Existing Waterline X-ing Elev.: 2247.20

Sta. 5+880.00, Rt. Construct New Turnout 4.5 m Wide 2 Unit Cattle Guard With Type 2 Gate and 1-610mm x 10.0 CMP

Sta. 5+819.262, Rt. Construct New Turnout 4.5 m Wide 2 Unit Cattle Guard With Type 2 Gate and 1-610mm x 10.0m CMP

Sta 5+650 to 5+750, Rt. Contractor Shall Obliterate, Scarify, & Reseed Existing N9073 Graded Roadway.

Sta. 5+431.33 Existing 762 mm CSPC Elev.: 2220.19

DELINEATORS		TYPE 2	RIGHT-OF-WAY	
TYPE "1a"	TYPE "1b"	OBJECT MARKER	MONUMENTS	MARKERS
⊡	⊡	●	⊕	--NO SYMBOL--
0	18	6	6	6

DRAINAGE STRUCTURE TABLE

Mark	Station	Structure	Skew No.	Area (ha)	Q100 (cms)	Remarks	Outlet Protection
18	5+430.00	1-762 mm x 30.480m CMP	80.0	6.129	1.25	With End Section at Inlet	None
19A	5+757.00	1-762 mm x 45.720m CMP	80.0	3.129	0.490	With End Section at Inlet	None
19B	5+819.26	1-610 mm x 10.0m CMP Under Turnout RT				With End Section at Inlet and Outlet	None
19C	5+880.00	1-610 mm x 10.0m CMP under Turnout Rt		2.329		With End Section at Inlet and Outlet	None
20	6+012.00	1-762 mm x 23.154m CMP	90.0	2.329	0.470	With End Section at Inlet	None

SCP 40, Rebar with Cap
Sta 5+320.224,
Offset 28.258 m Rt
EL 2219.985

SCP 41, Rebar with Cap
Sta 5+474.867,
Offset 23.335 m Rt
EL 2222.558

SCP 42, Rebar with Cap
Sta 5+619.718,
Offset -30.237 m Lt
EL 2229.778

SCP 43, Rebar with Cap
Sta 5+814.800,
Offset 22.243 m Rt
EL 2243.997

SCP 44, Rebar with Cap
Sta 5+963.229,
Offset -26.765 m Lt
EL 2246.955

Scale: 1cm = 10 m (Horiz.)
1cm = 2 m (Vert.)

L= 55.00 m
K= 26
e= -0.15 m
SD= 123.23 m

PVC 5+380.500
Elev 2220.142

PVT 5+435.500
Elev 2223.272

PVI 5+408.000
Elev 2222.000

FG = 6.7576%

FG = 4.6241%

Finished Grade

Existing Ground (Dashed)

Sta. 5+431.33
Existing 1-762 mm CMP
Remove, Salvage & Stockpile

Sta. 5+431.00 Install New
1-762 mm x 30.480m CMP
Skew No. 80.0 Inv Elev 2219.756
Q100=0.670 cms

Sta. 5+757.00 Install New
1-762 mm x 45.720m CMP
Skew No. 80.0 Inv Elev 2231.972
Q100=0.385 cms

Sta. 6+012.00 Install New
1-762 mm x 23.154m CMP
Skew No. 90.0 Inv Elev 2246.992
Q100=0.238 cms

L= 136.00 m
K= 31
e= -0.74 m
SD= 112.61 m

PVC 5+952.000
Elev 2247.155

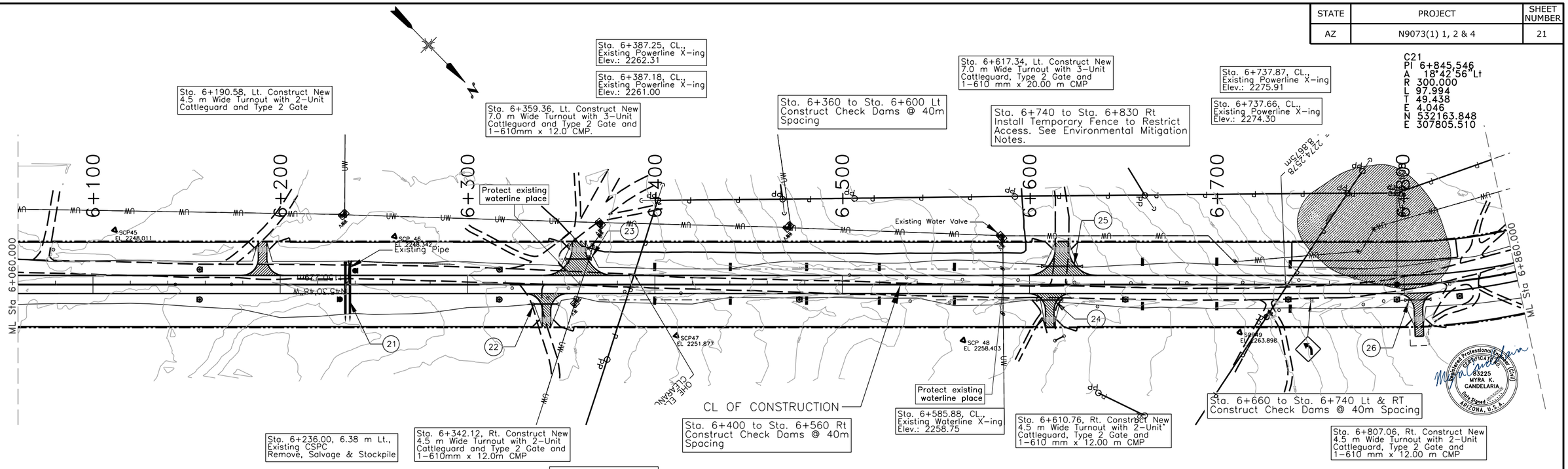
PVI 6+020.000
Elev 2250.300

Sta. 6+029.88
Elev. 2341.695
Existing WL X-ing

2290 2280 2270 2260 2250 2240 2230 2220 2210 2200 2190 2180 2170

5+260 5+300 5+400 5+500 5+600 5+700 5+800 5+900 6+000 6+060

STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	21



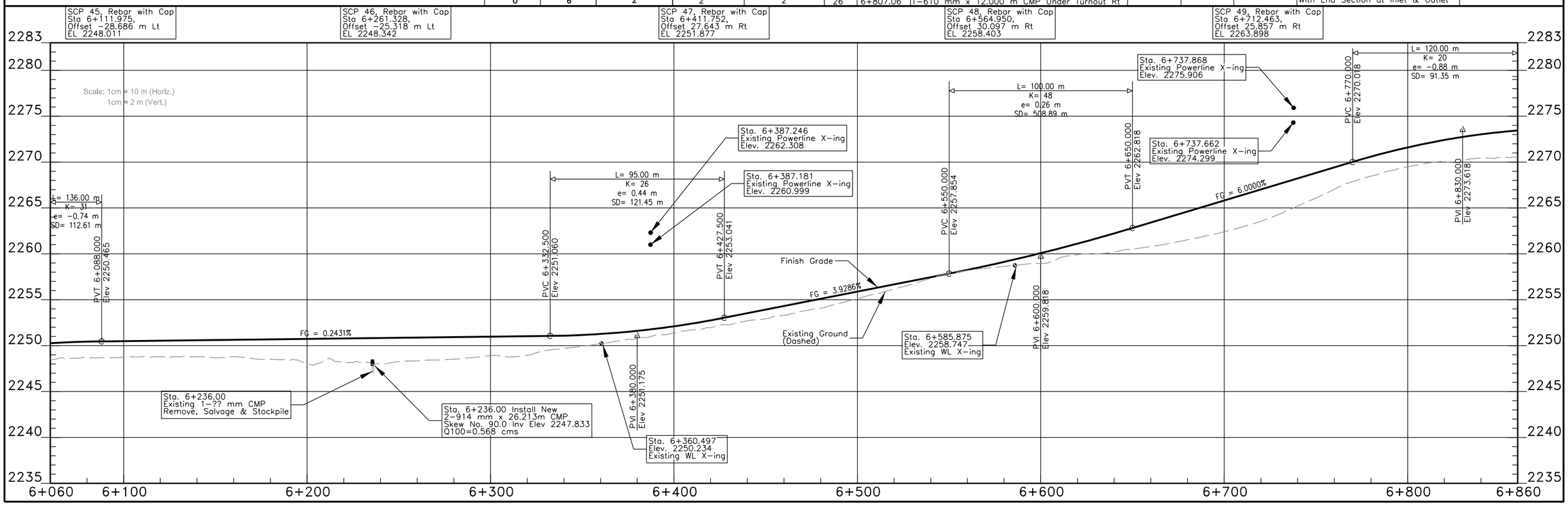
SCALE: Meters

0 20 40 60 80 100

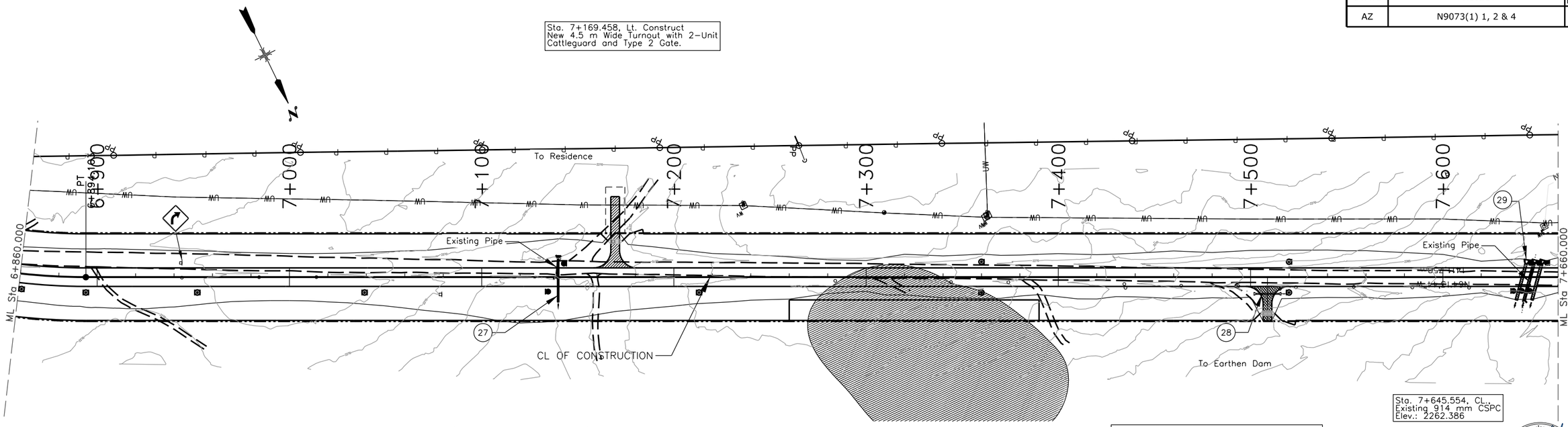
DELINEATORS		TYPE 2	RIGHT–OF–WAY	
TYPE "1a"	TYPE "1b"	OBJECT MARKER	MONUMENTS	MARKERS
⊡	⊡	●	◒	--NO SYMBOL--
0	6	2	2	2

DRAINAGE STRUCTURE TABLE

Mark	Station	Structure	Skew No.	Area (ha)	Q100 (cms)	Remarks	Outlet Protection
21	6+236.00	2–914 mm x 26.213m CMP	90.0	14.463	1.37	With End Section at Each Inlet	None
22	6+342.12	1–610 mm x 12.000 m CMP Under Turnout Rt				With End Section at Inlet & Outlet	
23	6+359.36	1–610 mm x 12.000 m CMP Under Turnout Lt				With End Section at Inlet & Outlet	
24	6+610.76	1–610 mm x 12.000 m CMP Under Turnout Rt				With End Section at Inlet & Outlet	
25	6+617.34	1–610 mm x 20.000 m CMP Under Turnout Lt.				With End Section at Inlet & Outlet	
26	6+807.06	1–610 mm x 12.000 m CMP Under Turnout Rt				With End Section at Inlet & Outlet	



STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	22

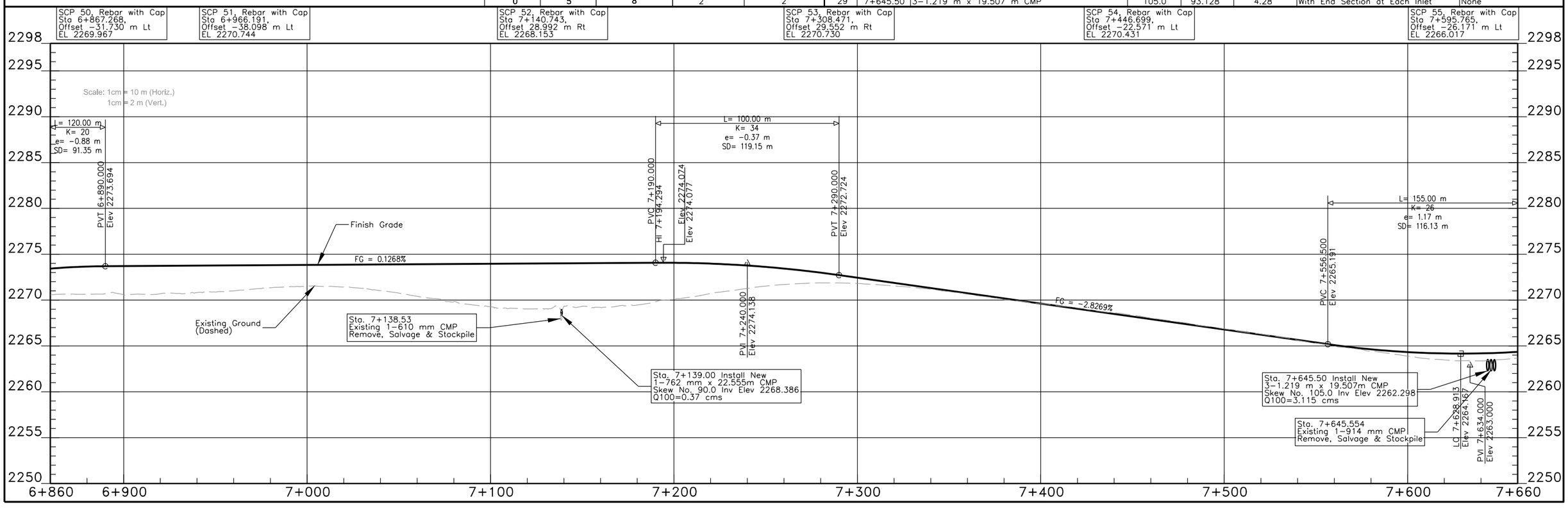


SCALE: Meters
0 20 40 60 80 100

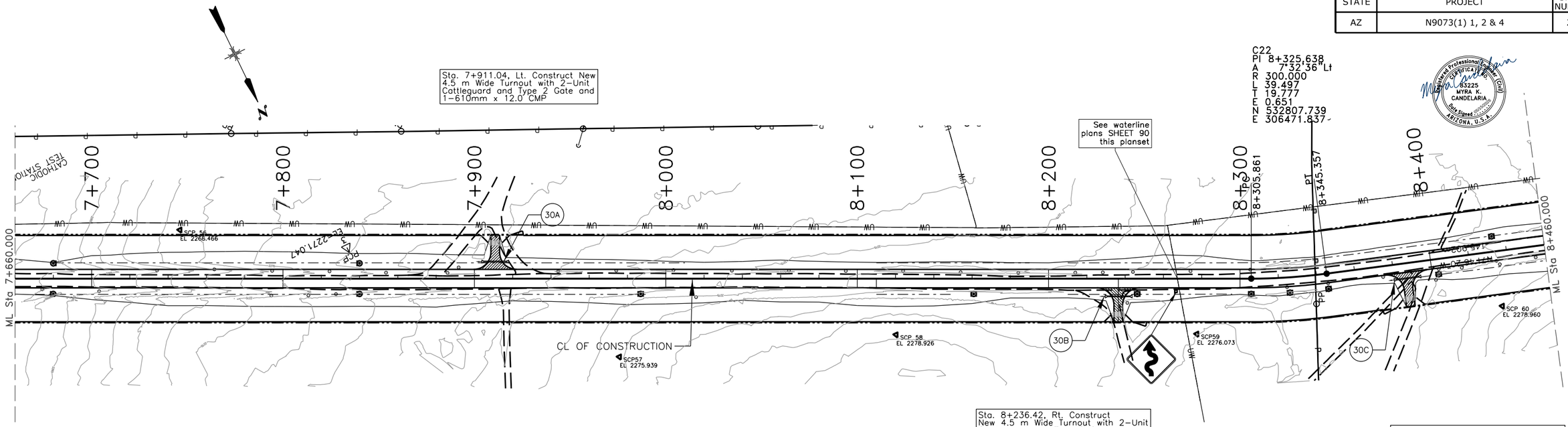
DELINEATORS		TYPE 2	RIGHT-OF-WAY	
TYPE "1a"	TYPE "1b"	OBJECT MARKER	MONUMENTS	MARKERS
				--NO SYMBOL--
0	5	8	2	2

DRAINAGE STRUCTURE TABLE

Mark	Station	Structure	Skew No.	Area (ha)	Q100 (cms)	Remarks	Outlet Protection
27	7+139.00	1-762 mm x 22.555 m CMP	90.0	2.278	0.370	With End Section at Each Inlet	None
28	7+508.77	1-610 mm x 12.000 m CMP Under Turnout Lt.				With End Section at Inlet & outlet	None
29	7+645.50	3-1.219 m x 19.507 m CMP	105.0	93.128	4.28	With End Section at Each Inlet	None



STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	23

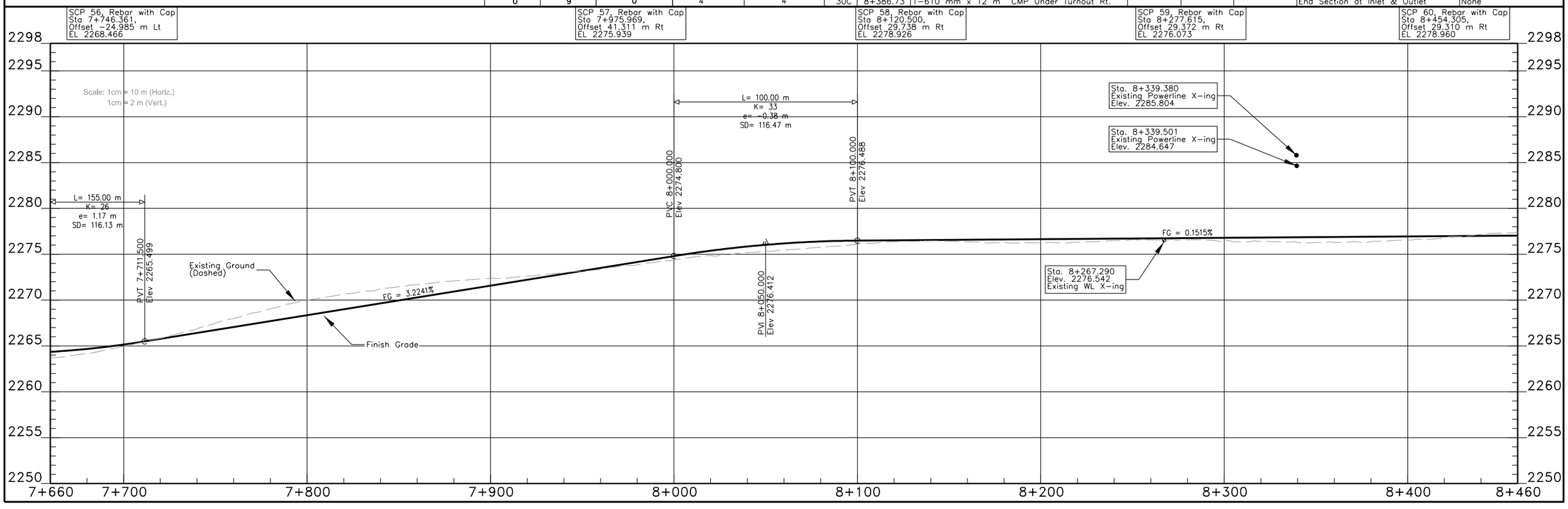


SCALE: Meters
0 20 40 60 80 100

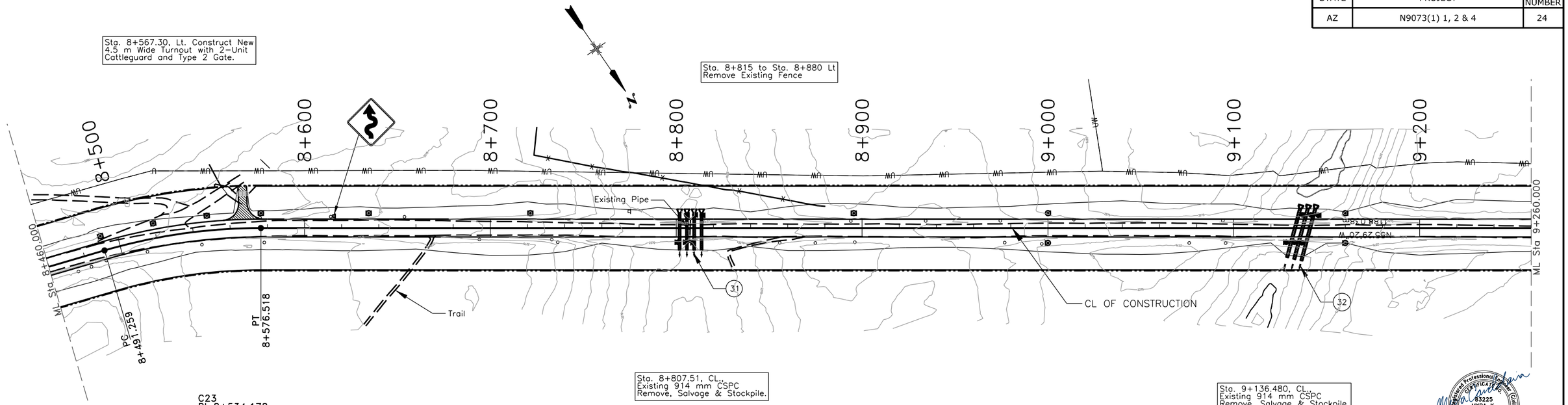
DELINEATORS		TYPE 2	RIGHT–OF–WAY	
TYPE "1a"	TYPE "1b"	OBJECT MARKER	MONUMENTS	MARKERS
⊙	⊡	●	◕	--NO SYMBOL--
0	9	0	4	4

DRAINAGE STRUCTURE TABLE

Mark	Station	Structure	Skew No.	Area (ha)	Q100 (cms)	Remarks	Outlet Protection
30A	7+911.04	1–610 mm x 12 m CMP Under Turnout Lt.				End Section at Inlet & Outlet	None
30B	8+236.00	1–610 mm x 12 m CMP Under Turnout Rt.				End Section at Inlet & Outlet	None
30C	8+386.73	1–610 mm x 12 m CMP Under Turnout Rt.				End Section at Inlet & Outlet	None



STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	24



C23
PI 8+534.178
A 16°17'00"Rt
R 300.000
L 85.259
T 42.919
E 3.055
N 532872.987
E 306273.707

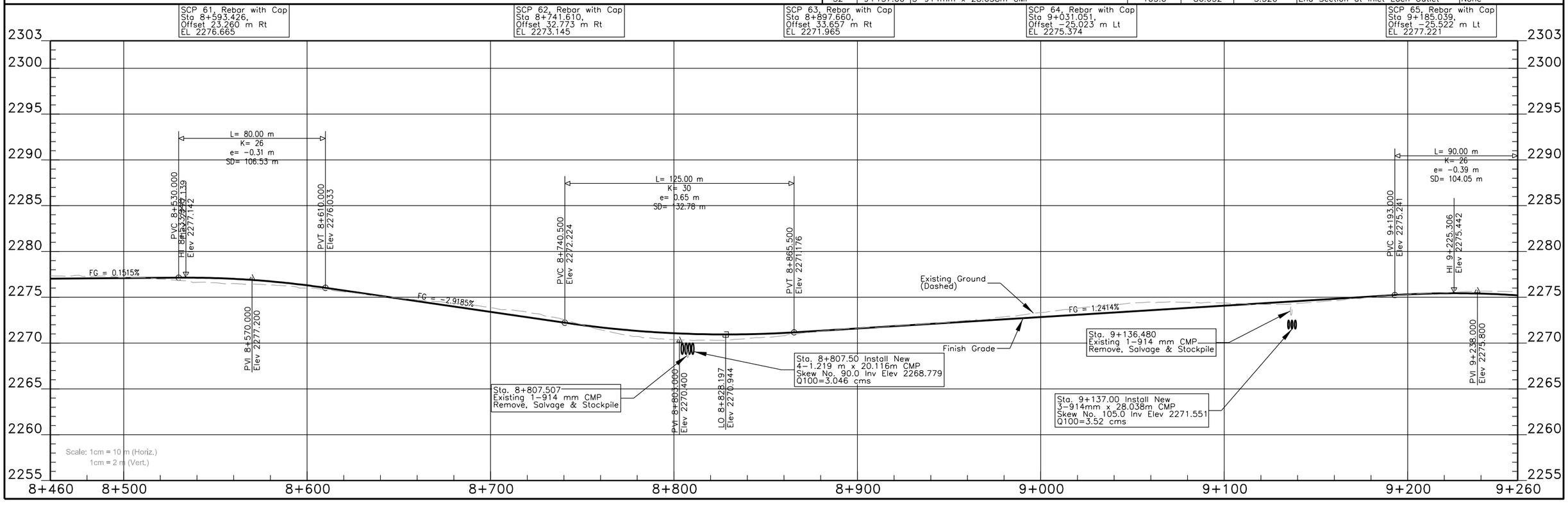
SCALE: Meters
0 20 40 60 80 100

Registered Professional Engineer (Civil)
CERTIFICATE NO.
85225
MYRA K. CANDELARIA
Date Signed
ARIZONA, U.S.A.

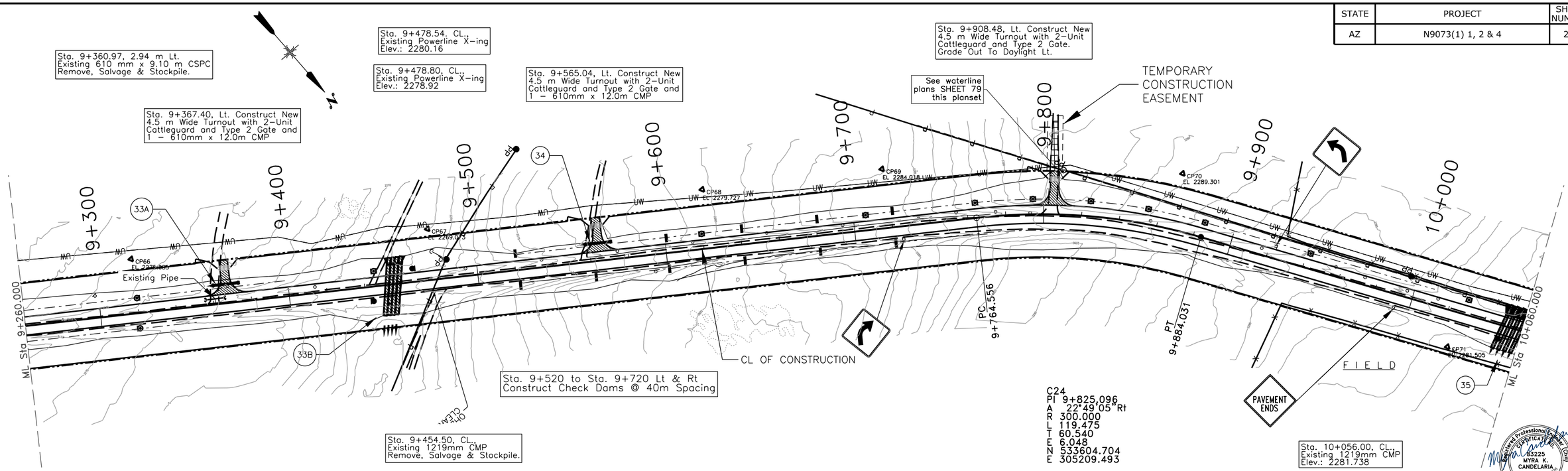
DELINEATORS		TYPE 2	RIGHT-OF-WAY	
TYPE "1a"	TYPE "1b"	OBJECT MARKER	MONUMENTS	MARKERS
⊙	⊙	●	⊕	--NO SYMBOL--
0	7	12	4	4

DRAINAGE STRUCTURE TABLE

Mark	Station	Structure	Skew No.	Area (ha)	Q100 (cms)	Remarks	Outlet Protection
31	8+807.50	4-1.219 m x 20.116m CMP	90.0	96.548	5.48	End Section at Inlet Each Outlet	None
32	9+137.00	3-914mm x 28.038m CMP	105.0	86.032	3.520	End Section at Inlet Each Outlet	None



STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	25

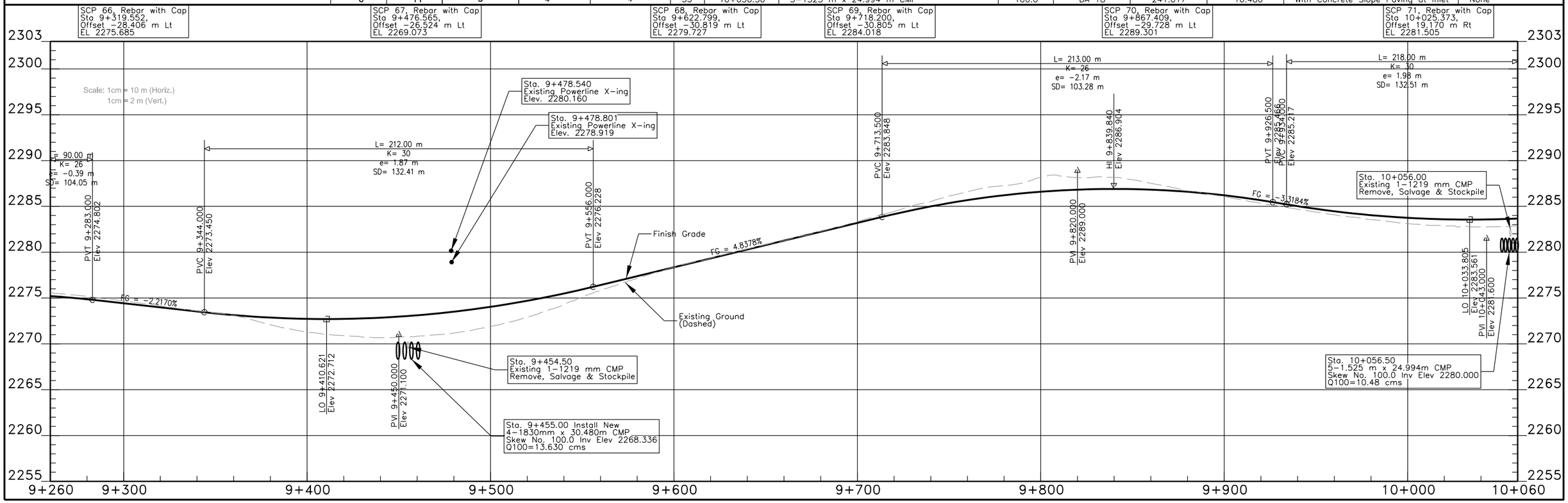


SCALE: Meters
0 20 40 60 80 100

DELINEATORS		TYPE 2	RIGHT-OF-WAY	
TYPE "1a"	TYPE "1b"	OBJECT MARKER	MONUMENTS	MARKERS
⊡	⊠	●	◕	--NO SYMBOL--
0	11	3	4	4

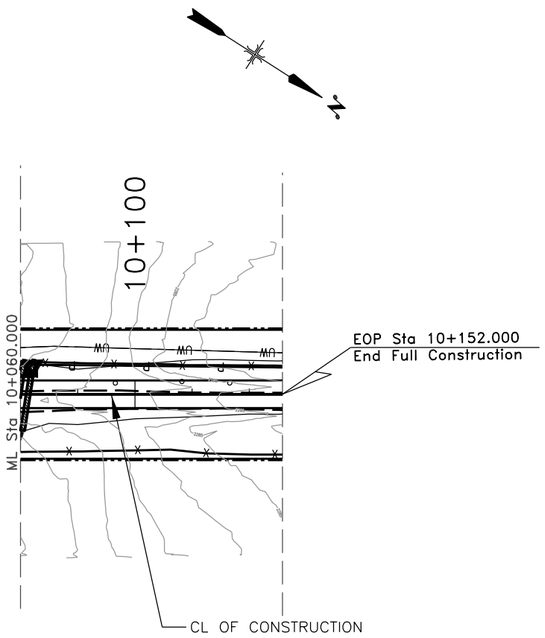
DRAINAGE STRUCTURE TABLE

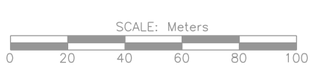
Mark	Station	Structure	Skew No.	Drainage Area	Area (ha)	Q100 (cms)	Remarks	Outlet Protection
33A	9+367.40	1-610 mm x 12 m CMP Under Turnout Lt.					With End Section at Inlet & Out	None
33B	9+455.00	4-1.830 m x 30.48 m CMP	100.0	DA 17	603.922	19.99	With Concrete Slope Paving at Inlet	None
34	9+565.04	1-610 mm x 12 m CMP Under Turnout Lt.					With End Section at Inlet & Out	None
35	10+056.50	5-1525 m x 24.994 m CMP	100.0	DA 18	241.017	10.480	With Concrete Slope Paving at Inlet	None

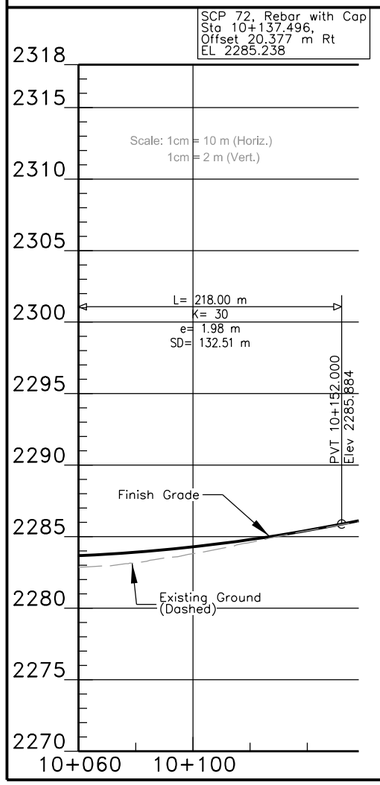


Registered Professional Engineer (Civil)
CERTIFICATE NO.
83225
MYRA K.
CANDELARIA
Date Signed
ARIZONA, U.S.A.

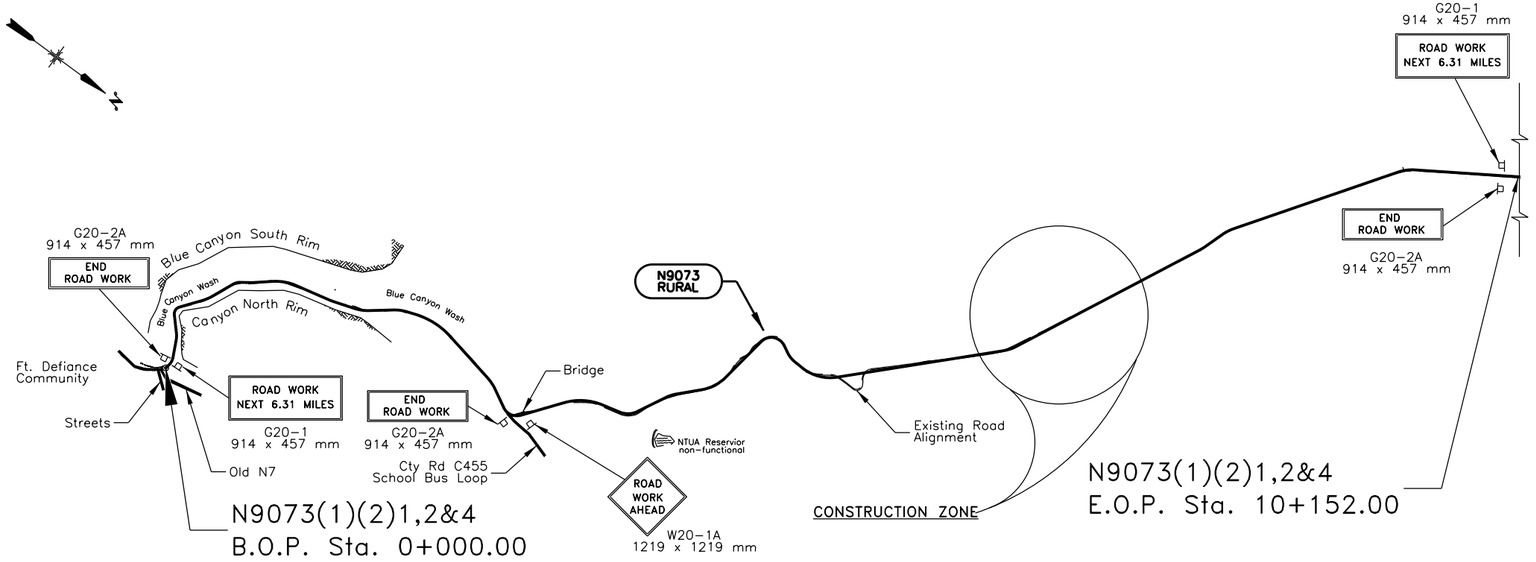
STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	26





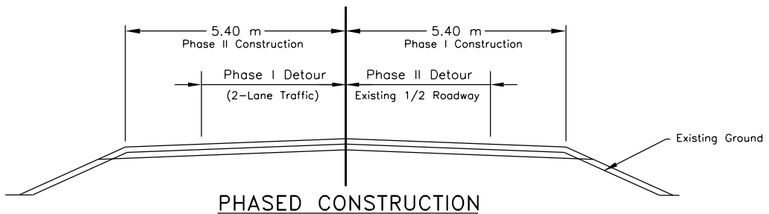


STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	27

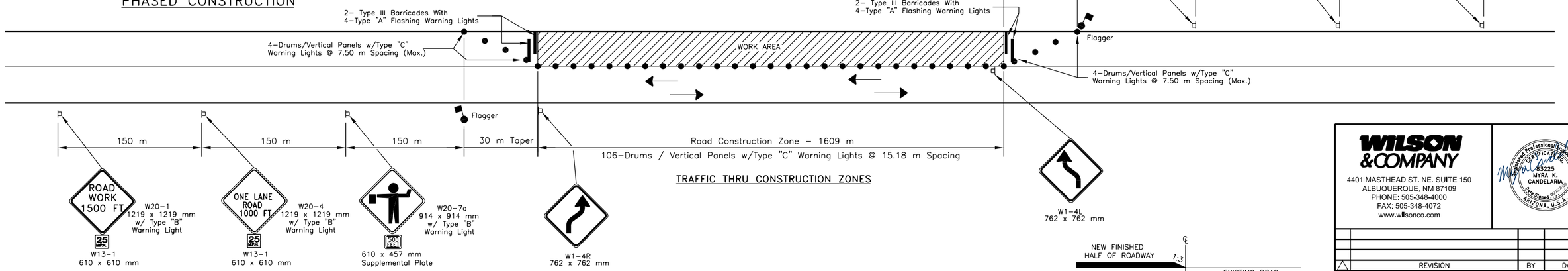


PHASE CONSTRUCTION NOTES:

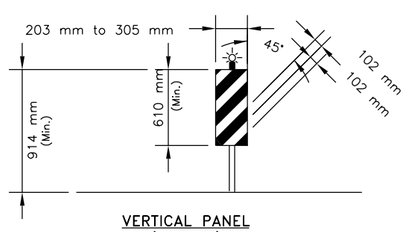
1. THE CONTRACTOR MAY CONSTRUCT 1/2 THE NEW ROADWAY (UNDER THE PHASE CONSTRUCTION PLAN SHOWN) WHILE DETOURING TWO-WAY TRAFFIC ON THE OTHER (EXISTING) HALF ONCE THE FIRST 1/2 OF ROADWAY IS BUILD UP TO THE NEW GRADES; THEN TRAFFIC SHALL BE DIRECTED TO THE NEW HALF OF ROADWAY WHILE THE OTHER (EXISTING) HALF IS CONSTRUCTED.
2. ALL (NEW) DRAINAGE PIPE INSTALLATION SHALL BE IN ACCORDANCE WITH THE PHASED CONSTRUCTION PLAN ABOVE AS WELL AS REMOVAL OF EXISTING PIPES. ALL THIS PIPE INSTALLATION & REMOVAL SHALL BE CONSIDERED INCIDENTAL TO PIPE ITEMS SHOWN AND NO ADDITIONAL PAYMENT SHALL BE MADE.
3. THIS PHASED CONSTRUCTION SHALL BE CONSIDERED INCIDENTAL TO THE TCP AND NO ADDITIONAL PAYMENT SHALL BE MADE.
4. THE CONTRACTOR'S CONSTRUCTION SCHEDULE, CONSTRUCTION SEQUENCING PLAN, AND STORM WATER POLLUTION PREVENTION PLAN SHALL REFLECT THIS PHASED CONSTRUCTION.



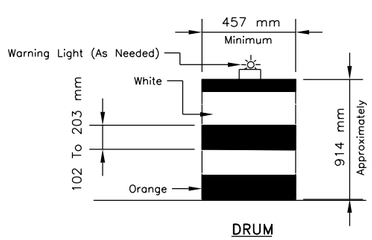
PHASED CONSTRUCTION



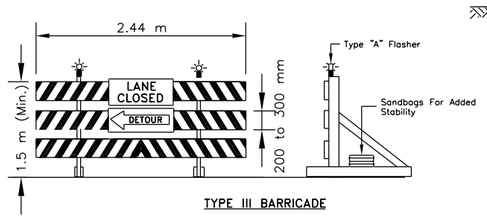
TRAFFIC THRU CONSTRUCTION ZONES



VERTICAL PANEL
(ALTERNATE)



DRUM



TYPE III BARRICADE

FILLET DETAIL

WILSON &COMPANY
4401 MASTHEAD ST. NE. SUITE 150
ALBUQUERQUE, NM 87109
PHONE: 505-348-4000
FAX: 505-348-4072
www.wilsonco.com

Certified Professional Engineer (Civil)
83225
MYRA K. CANDELARIA
Date Signed
ARIZONA, U.S.A.

	REVISION	BY	DATE

NAVAJO B.Q.T.

NAVAJO NATION
DIVISION OF TRANSPORTATION

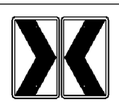
N9073(1) 1, 2 & 4

TEMPORARY TRAFFIC CONTROL

PROJECT MANAGER: DDM	DATE: 1/22	DRAWING	SHEET
LEAD DESIGNER: MLL	DATE: 1/22		
ASBUILT BY:	DATE: XXX		27 OF 84
SCALE: N/A			

STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	28

N9073 PERMANENT SIGNS & HARDWARE

Station	Location	Detail No.	Description	Sign Panel Size (mm)	Area of Sign (m^2)	Number of Square Post	Post Size (mm x mm)	No. of Panel	Total Area of Panel (m^2)
2+600.00 3+650.00	Lt. Rt.	R4-1		610 x 762	0.46	1	44mm x 44mm	2	0.92
2+600.00 3+650.00	Rt. Lt.	W14-3		914 x 1219 1219	0.52	2	50mm x 50mm	2	1.04
3+140.00	Rt.	R1-1		762 x 762	0.58	1	44mm x 44mm	1	0.58
0+010.00	Rt.	R2-1		610 x 762	0.46	1	44mm x 44mm	1	0.46
5+660.00	Rt.	R2-1		610 x 762	0.46	1	44mm x 44mm	1	0.46
2+944.00 4+435.00 6+750.00 9+924.00	Lt. Rt. Rt. Lt.	W1-2L		762 x 762	0.58	1	44mm x 44mm	5	2.90
2+773.00 4+715.00 5+886.00 6+944.00 9+725.00	Rt. Lt. Rt. Lt. Rt.	W1-2R		762 x 762	0.58	1	44mm x 44mm	5	2.90
3+841.00 5+210.00	Rt. Rt.	W1-2L		762 x 762	0.58	1	44mm x 44mm	2	1.16
4+047.00 5+376.00	Lt. Lt.	W1-2R		762 x 762	0.58	1	44mm x 44mm	2	1.16
2+468.00 3+444.00 4+346.00 8+266.00 8+617.00	Lt. Rt. Lt. Rt. Lt.	W1-5		762 x 762	0.58	1	44mm x 44mm	6	3.48
0+330.00	Rt.	W1-1aR		762 x 762	0.58	1	44mm x 44mm	1	0.58
3+219.00 4+965.00	Lt. Rt.	W1-1aR		762 x 762	0.58	1	44mm x 44mm	2	1.16
2+996.00 5+230.00	Rt. Lt.	W1-1aL		762 x 762	0.58	1	44mm x 44mm	2	1.16
6+050.00	Rt.	W11-4		762 x 762	0.58	1	44mm x 44mm	1	0.58
See Sheet 42 of 72 for Location & Quantity Table		W1-8L		457 x 610	0.28	1	38mm x 38mm	3	0.84
		W1-8L & W1-8R		457 x 610	0.28	1	38mm x 38mm	40	11.20
		W1-8R		457 x 610	0.28	1	38mm x 38mm	3	0.84
0+200 0+150 1+000 9+950	Lt. Rt. Lt. Rt.	W8-3		914 x 914	0.84	1	44mm x 44mm	4	3.36
63302-2001 - Sign Installation, 1 Post - 38 x 38 mm								Total	12.88
63302-2002 - Sign Installation, 1 Post - 44 x 44 mm								Total	20.28
63302-2006 - Sign Installation, 2 Post - 50 x 50 mm								Total	1.04
63302-2012 - Sign Installation, 4 Post - 57 x 57 mm								Total	0.00

WILSON &COMPANY
4401 MASTHEAD ST. NE. SUITE 150
ALBUQUERQUE, NM 87109
PHONE: 505-348-4000
FAX: 505-348-4072
www.wilsonco.com

Registered Professional Engineer (Civil) CERTIFICATE NO. 83225 MYRA K. CANDELARIA Date Signed 01/31/22 ARIZONA, U.S.A.

	REVISION	BY	DATE
△			

NAVAJO D.O.T.

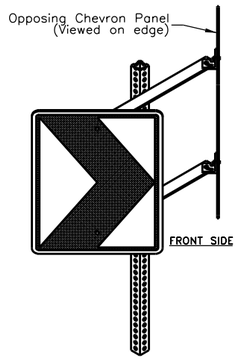
NAVAJO NATION
DIVISION OF TRANSPORTATION

N9073(1) 1, 2 & 4

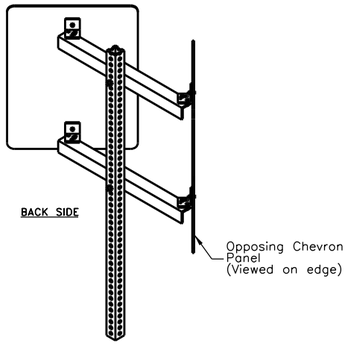
PERMANENT & TEMPORARY
TRAFFIC CONTROL DETAILS

PROJECT MANAGER: DDM	DATE: 1/22	DRAWING	SHEET
LEAD DESIGNER: MLL	DATE: 1/22		
ASBUILT BY:	DATE: XXX		28 OF 84
SCALE: N/A			

STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	29



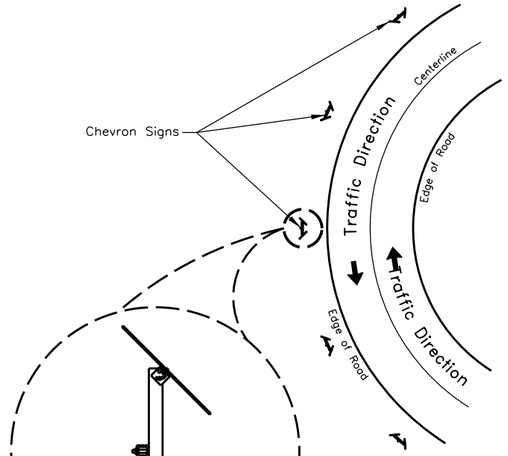
SIDE VIEW
CHEVRON SIGN
(NTS)



ISOMETRIC VIEW
CHEVRON DETAILS
(NTS)

Note: Each Chevron Symbol/Panel (2 ea.) Shall Face On-Coming Traffic And Shall Follow The Direction Of Curvature.

SIDE VIEW
CHEVRON SIGN
(NTS)



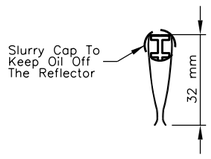
TYPICAL CHEVRON
SIGN LAYOUT
(NTS)

TOP VIEW
CHEVRON SIGN
(NTS)

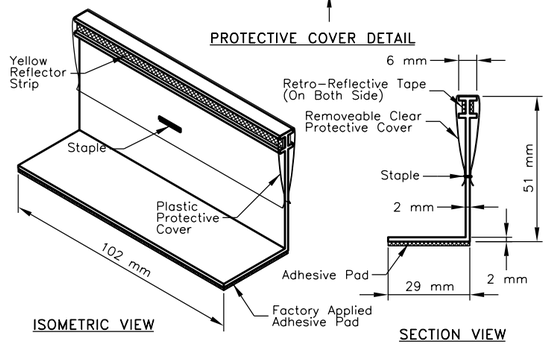
TEMPORARY TRAFFIC CONTROL SIGNS

TYPE	DESCRIPTION	SIZE (mm)
W20-1	ROAD WORK XXX FT	1219 x 1219
W20-4	ONE LANE ROAD XXX FT	1219 x 1219
W13-1	25 MPH	610 x 610
W20-7a		914 x 914
supplemental plate	500 FEET	457 x 610
G20-2	END ROAD WORK	1524 x 610
W1-4L		762 x 762
W20-1a	ROAD WORK AHEAD	1219 x 1219
G20-1	ROAD WORK NEXT 6 MILES	1524 x 914
W8-12	NO CENTER STRIPE	914 x 914

ITEM 63302-2001, CHEVRON SIGN						
1-POST, 38 X 38 MM SQUARE STEEL TUBE						
Station	**Location**	**Description**	**Panel Size**	**No. of Panel**	**Area (sq/m)**	**TOTAL AREA (sq/m)**
PHASE 1, SEGMENT 2						
PC 3+036.39	Rt.	W1-8L	457 x 610mm	1	0.28	0.28
3+052.21	Rt.	W1-8L & W1-8R	458 x 610mm	2	0.28	0.56
3+068.03	Rt.	W1-8L & W1-8R	459 x 610mm	2	0.28	0.56
3+083.84	Rt.	W1-8L & W1-8R	460 x 610mm	2	0.28	0.56
3+099.66	Rt.	W1-8L & W1-8R	461 x 610mm	2	0.28	0.56
3+115.48	Rt.	W1-8L & W1-8R	462 x 610mm	2	0.28	0.56
3+147.11	Rt.	W1-8L & W1-8R	463 x 610mm	2	0.28	0.56
3+162.93	Rt.	W1-8L & W1-8R	464 x 610mm	2	0.28	0.56
PT 3+178.74	Rt.	W1-8R	465 x 610mm	1	0.28	0.28
PC 5+005.07	Lt.	W1-8R	466 x 610mm	1	0.28	0.28
5+028.30	Lt.	W1-8L & W1-8R	467 x 610mm	2	0.28	0.56
5+028.30	Lt.	W1-8L & W1-8R	468 x 610mm	2	0.28	0.56
5+051.54	Lt.	W1-8L & W1-8R	469 x 610mm	2	0.28	0.56
5+074.77	Lt.	W1-8L & W1-8R	470 x 610mm	2	0.28	0.56
5+098.00	Lt.	W1-8L & W1-8R	471 x 610mm	2	0.28	0.56
5+121.24	Lt.	W1-8L & W1-8R	472 x 610mm	2	0.28	0.56
5+144.47	Lt.	W1-8L & W1-8R	473 x 610mm	2	0.28	0.56
5+167.71	Lt.	W1-8L & W1-8R	474 x 610mm	2	0.28	0.56
PT 5+190.94	Lt.	W1-8L	475 x 610mm	1	0.28	0.28
					Total	9.52
PHASE 2, FOR REFERENCE ONLY						
PC 0+383.40	Lt.	W1-8R	475 x 610mm	1	0.28	0.28
0+393.45	Lt.	W1-8L & W1-8R	476 x 610mm	2	0.28	0.56
0+403.49	Lt.	W1-8L & W1-8R	477 x 610mm	2	0.28	0.56
0+413.54	Lt.	W1-8L & W1-8R	478 x 610mm	2	0.28	0.56
0+423.59	Lt.	W1-8L & W1-8R	479 x 610mm	2	0.28	0.56
0+433.63	Lt.	W1-8L & W1-8R	480 x 610mm	2	0.28	0.56
0+443.68	Lt.	W1-8L & W1-8R	481 x 610mm	2	0.28	0.56
PT 0+453.72	Lt.	W1-8L	482 x 610mm	1	0.28	0.28

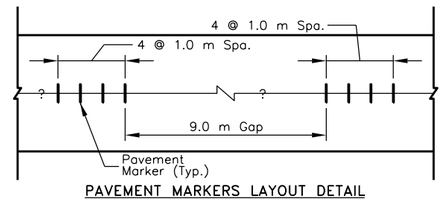


PROTECTIVE COVER DETAIL



ISOMETRIC VIEW

SECTION VIEW



PAVEMENT MARKERS LAYOUT DETAIL

ITEM 63502-3000 TEMP. TRAFFIC CONTROL
RAISED PAVEMENT MARKER, YELLOW TYPE Y-2

WILSON &COMPANY
4401 MASTHEAD ST. NE. SUITE 150
ALBUQUERQUE, NM 87109
PHONE: 505-348-4000
FAX: 505-348-4072
www.wilsonco.com

Registered Professional Engineer (Civil) CERTIFICATE NO. 83225 MYRA K. CANDELARIA Date Signed 10/20/22 ARIZONA, U.S.A.

	REVISION	BY	DATE

NAVAJO NATION
DIVISION OF TRANSPORTATION
NAVAJO D.O.T.

N9073(1) 1, 2 & 4

PERMANENT & TEMPORARY
TRAFFIC CONTROL DETAILS

PROJECT MANAGER: DDM	DATE: 1/22	DRAWING	SHEET
LEAD DESIGNER: MLL	DATE: 1/22		
ASBUILT BY:	DATE: XXX		29 OF 84
SCALE: N/A			

STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	30

ITEM 63401-1510: PAVEMENT MARKINGS, SOLID YELLOW

Station to Station			Location	Description	Length (m)
PHASE 1, SEGMENT 1					
0+000.00	to	0+383.00	CL	Solid Yellow	766
TURNOUT IMPROVEMENT					
1+200.00	to	1+250.00	CL	Double Solid Yellow	100
PHASE 1, SEGMENT 2					
1+950.00	to	2+350.00	CL	Double Solid Yellow	800
2+350.00	to	2+600.00	Lt. CL	Solid Yellow	250
3+650.00	to	3+900.00	Rt. CL	Solid Yellow	250
3+900.00	to	10+152.00	CL	Double Solid Yellow	12,504
				Total	14,670
				Use	14,700
PHASE 2 (FOR REFERENCE ONLY)					
1+250.00	to	1+500.00	Lt. CL	Solid Yellow	250
1+800.00	to	1+950.00	Rt. CL	Solid Yellow	150
0+950.00	to	1+200.00	Rt. CL	Solid Yellow	250

ITEM No.63401-1520: PAVEMENT MARKINGS, SOLID WHITE

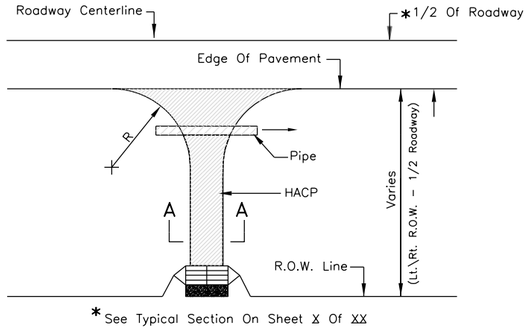
Station to Station			Location	Length (m)	Remarks
PHASE 1, SEGMENT 1					
0+000.00	to	0+383.00	Right Shoulder	383	Right R/W Fencing
0+000.00	to	0+383.00	Left Soulder	383	Left R/W Fencing
PHASE 1, SEGMENT 2					
1+900.00	to	10+152.00	Right Shoulder	8,252	Right R/W Fencing
1+900.00	to	10+152.00	Left Soulder	8,252	Left R/W Fencing
Minus (15) 4.50 m T.O. @ 3.792 m @ 14 Turnouts			Right	-289	
Minus (9) 4.50 m T.O. @ 3.792 m @ 9 Turnouts			Left	-186	
Minus (2) 7.00 m T.O. @ 5.792 m @ 2 Turnouts			Right	-46	
Minus (5) 7.00 m T.O. @ 5.792 m @ 4 Turnouts			Left	-70	
			Total	16,679	
			Use	16,700	

ITEM No.63401-1610: PAVEMENT MARKINGS, BROKEN YELLOW

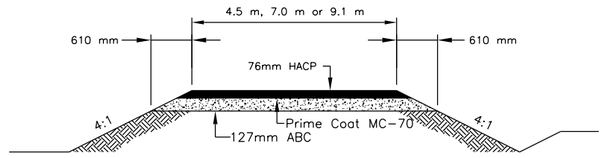
Station to Station			Location	Description	Length (m)
PHASE 1, SEGMENT 2					
1+900.00	to	1+950.00	CL	Broken Yellow	50
2+350.00	to	3+900.00	CL	Broken Yellow	1,550
				Total	1,600
				Use	1,600
PHASE 2 (FORREFERENCE ONLY)					
0+450.00	to	1+200.00	CL	Broken Yellow	1,500
1+250.00	to	1+900.00	CL	Broken Yellow	650

ITEM No. 63405-3260: STOP BAR

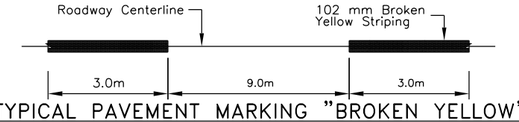
STATION	LOCATION	EACH	REMARKS
PHASE 1, SEGMENT 1			
0+002.00	BOP	1	CL. Rt.
PHASE 1, SEGMENT 2			
3+130.41	Turnout Rt.	1	CL. Rt. On Cty. C455
	TOTAL	2	



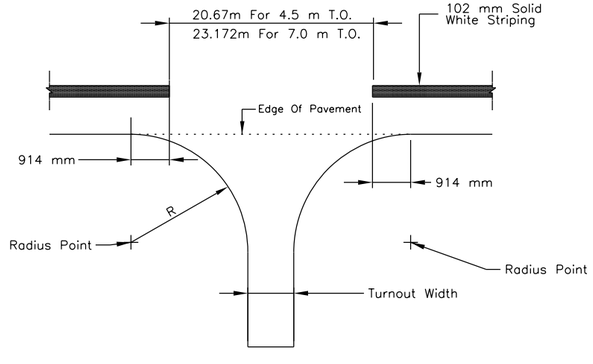
TYPICAL TYPE "A" TURNOUT
w/Cattleguard & Fencing



SECTION A-A



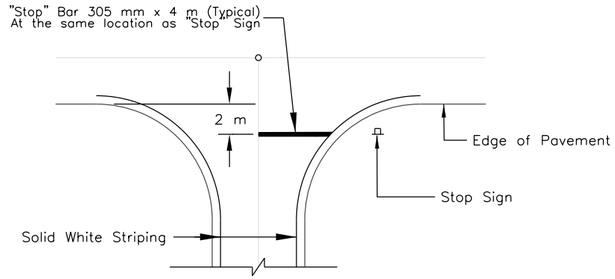
TYPICAL PAVEMENT MARKING "BROKEN YELLOW"
ROADWAY CENTERLINE STRIPING



TYPICAL PAVEMENT MARKING @ TURNOUT
ROADWAY SHOULDER STRIPING

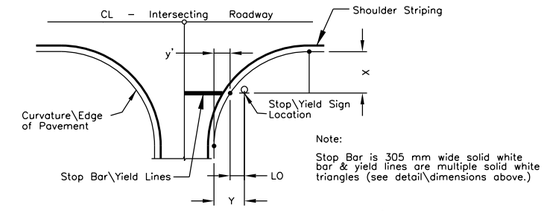
GENERAL NOTES

1. SEE SHEETS FOR SIGN DETAILS, DIMENSION, PLACEMENT/LOCATION, MARKINGS, TURNOUT TYPICALS, STOP BARS, ETC.



TYPICAL "TURNOUT" STOP BAR MARKING
@ Turnouts 7.0 m or Greater

STOP\YIELD SIGN LOCATION TABLE



STOP\YIELD SIGN LOCATION AT MAJOR INTERSECTION/ TURNOUT

			Y (m)=	
RADIUS OF TURNOUT (m)	X (m)	y' (m)	y'+LO (m)	LENGTH of STOP BAR
3.00	1.80	0.25	2.05	1/2 Roadway width
6.00	3.00	0.80	2.60	1/2 Roadway width
9.00	4.50	1.21	3.01	1/2 Roadway width
12.00	6.00	1.61	3.41	1/2 Roadway width
15.00	7.50	2.01	3.81	1/2 Roadway width

y'= Distance is the lateral projection from Roadway EOP (tangential) To Curvature\EOP. Lateral Offset (LO) is the lateral projection from Curvature\EOP to sign location = 1.80 m.

WILSON &COMPANY
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Registered Professional Engineer (Civil) CERTIFICATE NO. 83225 MYRA K. CANDELARIA Date Signed: 10/31/22 ARIZONA, U.S.A.

	REVISION	BY	DATE

NAVAJO NATION
DIVISION OF TRANSPORTATION
NAVAJO D.O.T.

N9073(1) 1, 2 & 4

PAVEMENT STRIPING, MARKING & TURNOUT LAYOUT DETAIL

PROJECT MANAGER: DDM	DATE: 1/22	DRAWING	SHEET
LEAD DESIGNER: MLL	DATE: 1/22		
ASBUILT BY:	DATE: XXX		30 OF 84
SCALE: N/A			

STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	31

Square Tube Selection; Single post – 2.80 mm thickness

Post Size	H = Panel Height To Bottom Of Sign + 1/2 Height Of Traffic Sign (meter)					
	1.52	1.83	2.13	2.44	2.74	<--- H(m)
38 mm x 38 mm	0.51	0.43	0.37	0.31	n/a	
44 mm x 44 mm	0.81	0.68	0.58	0.47	0.41	Maximum Sign
50 mm x 50 mm	1.14	0.95	0.84	0.70	0.58	Area (m²)
57 mm x 57 mm	1.49	1.27	1.07	0.95	0.84	
64 mm x 64 mm	1.88	1.68	1.41	1.25	1.07	

Square Tube Selection; Double post – 2.80 mm thickness

Post Size	H = Panel Height To Bottom Of Sign + 1/2 Height Of Traffic Sign (meter)					
	1.52	1.83	2.13	2.44	2.74	<--- H(m)
57 mm x 57 mm	n/a	n/a	2.49	2.07	0.58	Maximum Sign
64 mm x 64 mm	n/a	n/a	2.68	2.46	2.26	Area (m²)

Square Tube Selection; Triple post – 2.80 mm thickness

Post Size	H = Panel Height To Bottom Of Sign + 1/2 Height Of Traffic Sign (meter)					
	1.52	1.83	2.13	2.44	2.74	<--- H(m)
57 mm x 57 mm	n/a	n/a	3.08	2.83	2.61	Maximum Sign
64 mm x 64 mm	n/a	n/a	3.82	3.52	3.26	Area (m²)

Guide Sign Post Dimensions

(Not for use with Warning, Regulatory or Marker Panels)

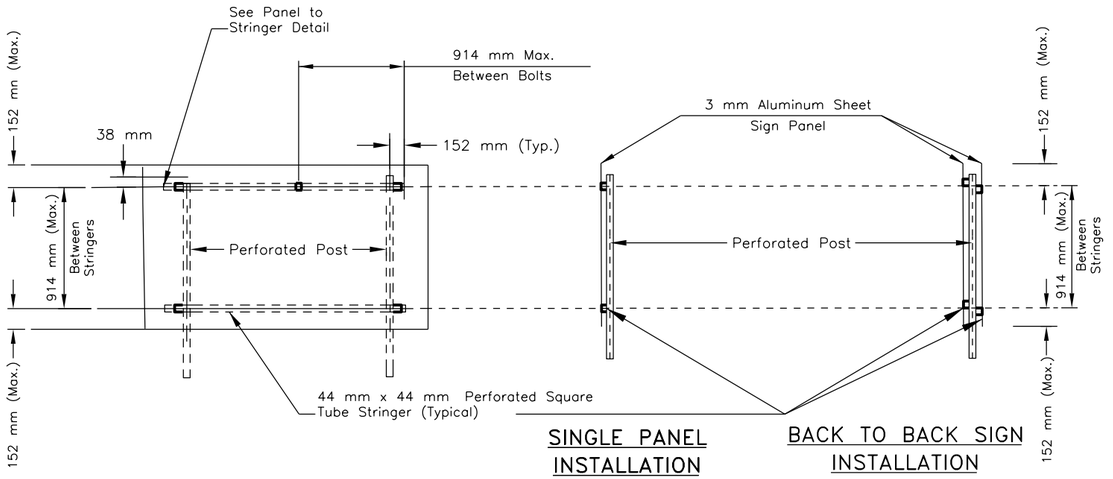
Panel Width	914 mm	1.22 m	1.52 m	1.83 m	2.13 m	2.44 m	2.74 m	3.05 m
two posts spacing (A)	559 mm	711 mm	914 mm	1.12 m	1.27 m	1.47 m	1.63 m	1.83 m
bolts to panel (per stringer)	–	–	3	3	3	3	4	4
length of each stringer	–	–	1.22 m	1.42 m	1.57 m	1.78 m	1.93 m	2.13 m
two posts spacing (B)	–	–	533 mm	635 mm	737 mm	864 mm	965 mm	1.07 m
bolts to panel (per stringer)	–	–	3	3	3	4	4	4
length of each stringer	–	–	1.37 m	1.57 m	1.78 m	2.03 m	2.24 m	2.44 m

GENERAL NOTES:

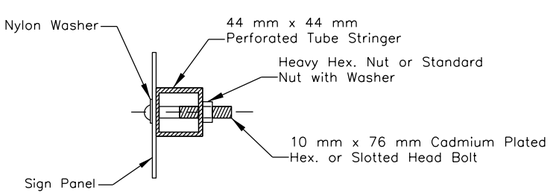
1. THE CONTRACTOR SHALL BE REQUIRED TO ADJUST THE LENGTH OF SIGN SUPPORT POSTS. THIS WORK SHALL BE INCLUDED IN THE UNIT PRICE FOR THE APPROPRIATE BID ITEMS SHOWN IN THE BID SCHEDULE.

2. SIGNS GREATER THAN 762 mm IN WIDTH SHALL BE MOUNTED ON TWO OR MORE POSTS.

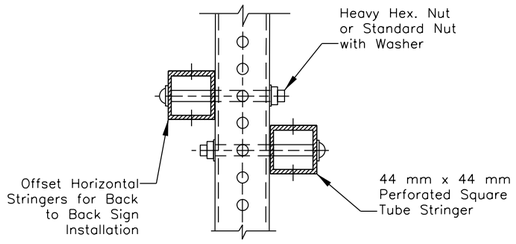
3. SIGN POST CONCRETE FOUNDATION SHALL BE USED IN LOOSE FINE GRAVITY SOILS THAT ARE HARD TO COMPACT AS DIRECTED BY COTR. THE CONCRETE SHALL MEET THE REQUIREMENTS OF SECTION 601.



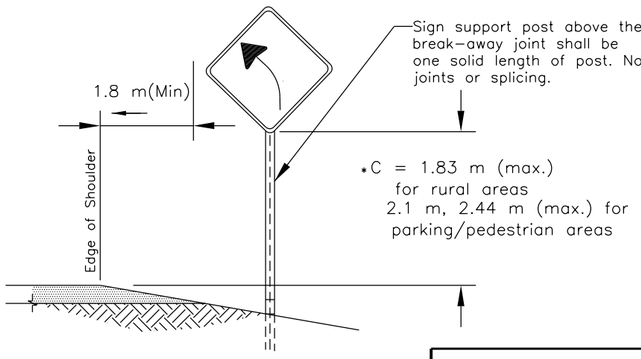
STRINGER DETAILS (FOR GUIDE SIGNS UP TO AND INCLUDING 3.05 mm WIDE)



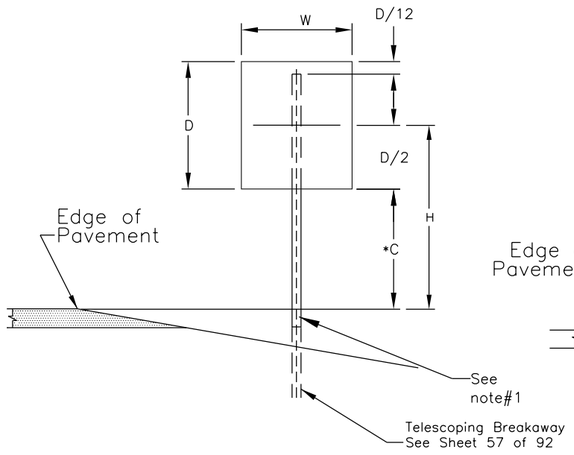
PANEL TO STRINGER OR POST



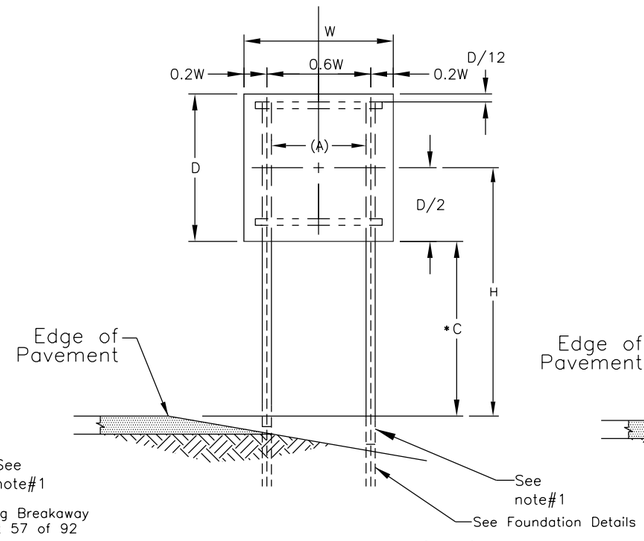
STRINGER TO POST



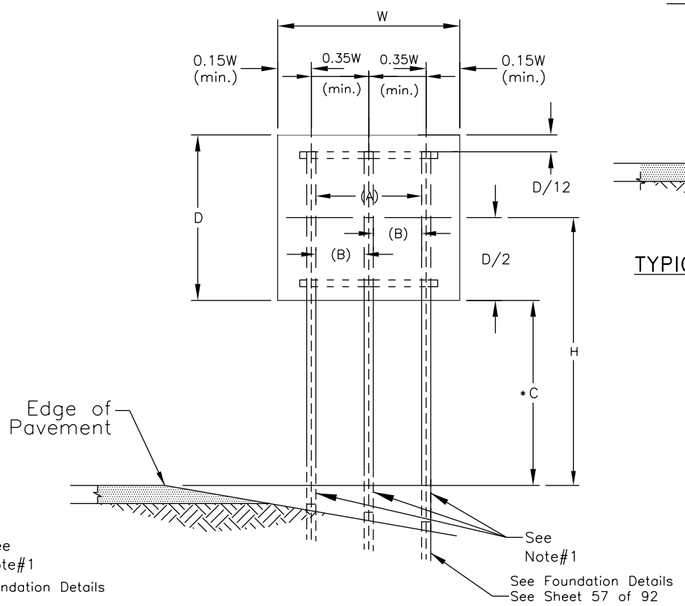
TYPICAL ROADSIDE SIGN LOCATION



SINGLE POST SIZE (typ.)



DOUBLE POST SIZE (typ.)



THREE POST SIZE (typ.)

WILSON & COMPANY
4401 MASTHEAD ST. NE. SUITE 150
ALBUQUERQUE, NM 87109
PHONE: 505-348-4000
FAX: 505-348-4072
www.wilsonco.com

Registered Professional Engineer (Civil) CERTIFICATE NO. 63225 MYRA K. CANDELARIA Date Signed 09/30/22 ARIZONA, U.S.A.

	REVISION	BY	DATE

NAVAJO NATION
DIVISION OF TRANSPORTATION

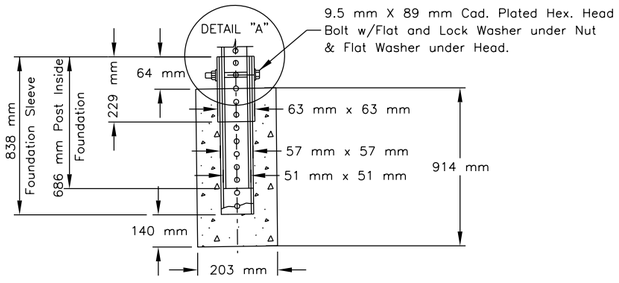
NAVAJO D.O.T.

N9073(1) 1, 2 & 4

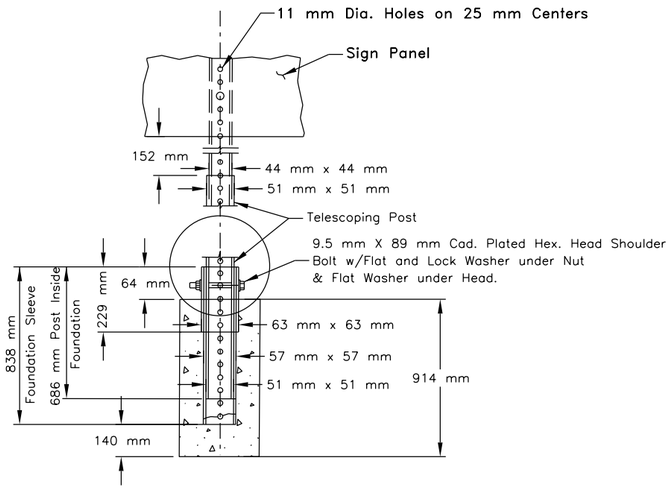
SQUARE TUBE POST SELECTION AND SIGN MOUNTING DETAILS

PROJECT MANAGER: DDM	DATE: 1/22	DRAWING	SHEET
LEAD DESIGNER: MLL	DATE: 1/22		
ASBUILT BY:	DATE: XXX		31 OF 84
SCALE: N/A			

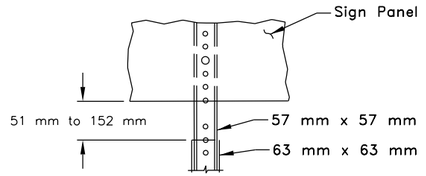
STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	32



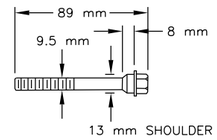
SINGLE POST FOUNDATION DETAIL



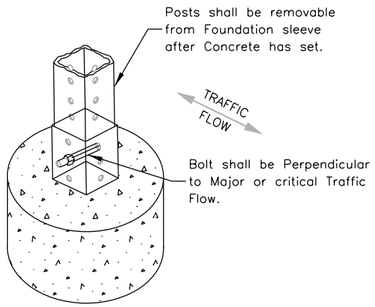
TELESCOPING POST DETAIL



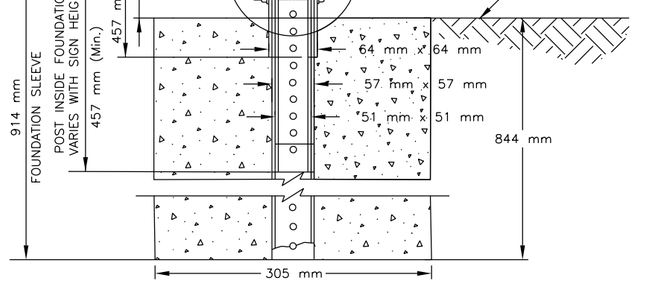
TELESCOPING POST INSTALLATION



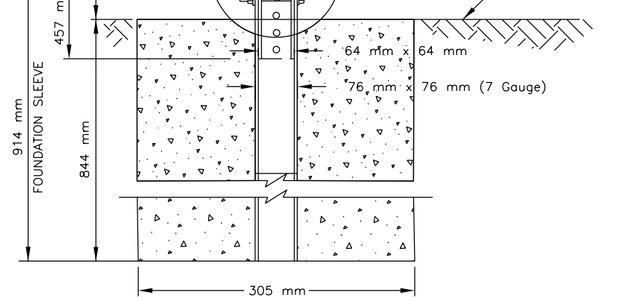
SHOULDER BOLT (HEAD)



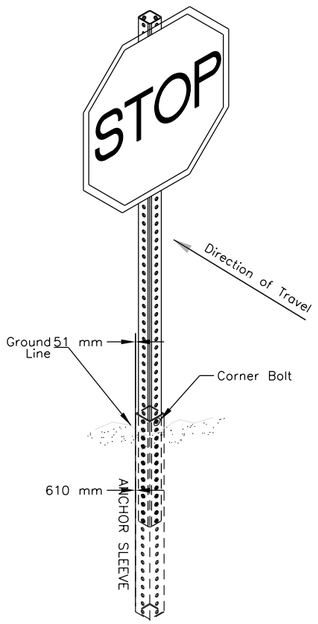
DETAIL "A"



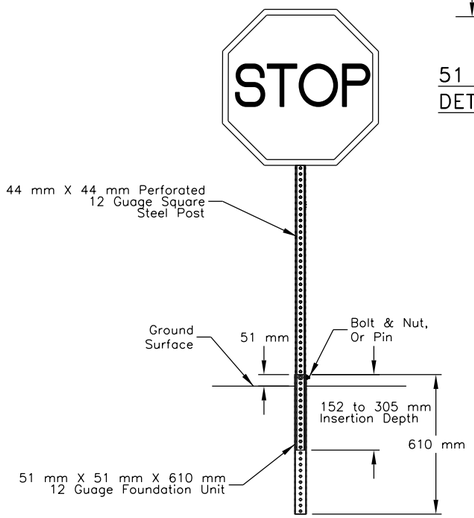
51 mm SINGLE POST CONCRETE FOUNDATION DETAIL (IN WEAK SOILS)



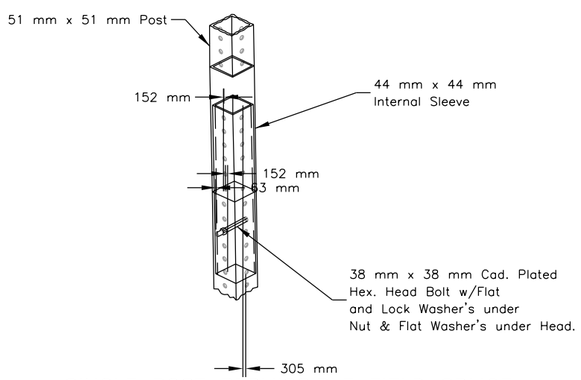
64 mm SINGLE POST CONCRETE FOUNDATION DETAIL (IN WEAK SOILS)



ISOMETRIC VIEW



TELESCOPING BREAKAWAY
(Single Post)



SINGLE POST PERMISSIBLE FIELD SPLICE
(Not allowed on Telescoping Post)

WILSON &COMPANY
4401 MASTHEAD ST. NE. SUITE 150
ALBUQUERQUE, NM 87109
PHONE: 505-348-4000
FAX: 505-348-4072
www.wilsonco.com

Registered Professional Engineer (Civil) CERTIFICATE NO. 83225 MYRA K. CANDELARIA Date Signed ARIZONA, U.S.A.

	REVISION	BY	DATE

NAVAJO D.O.T.

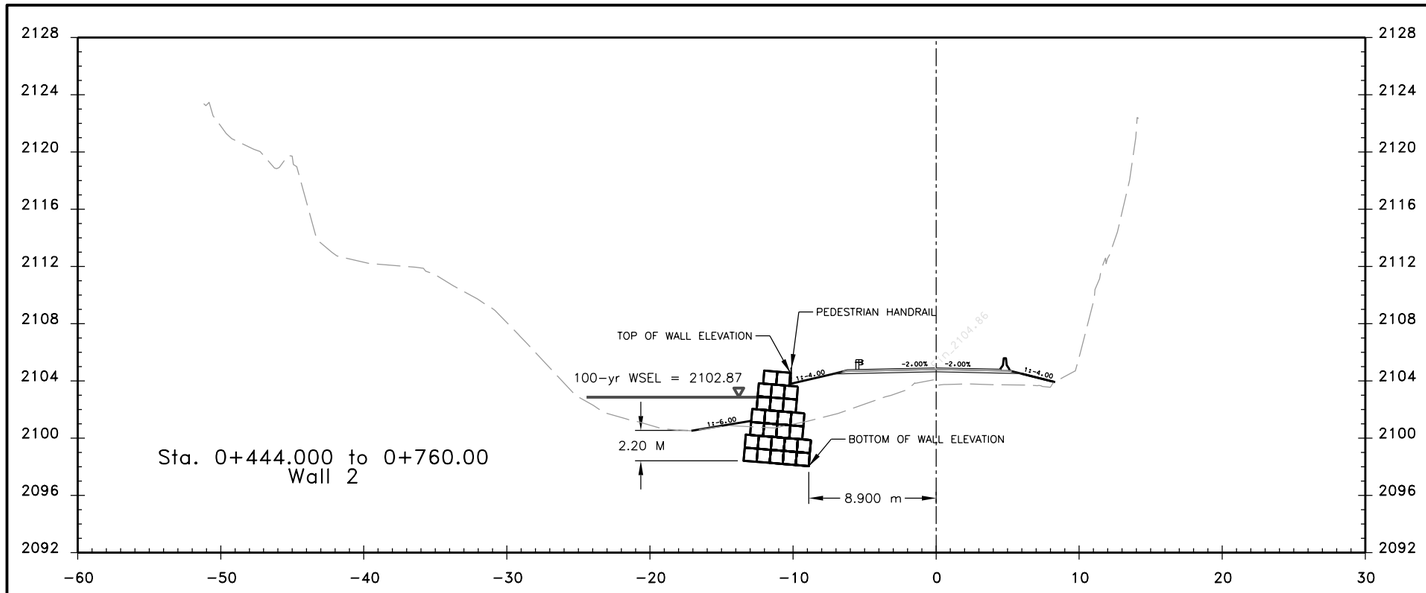
NAVAJO NATION
DIVISION OF TRANSPORTATION

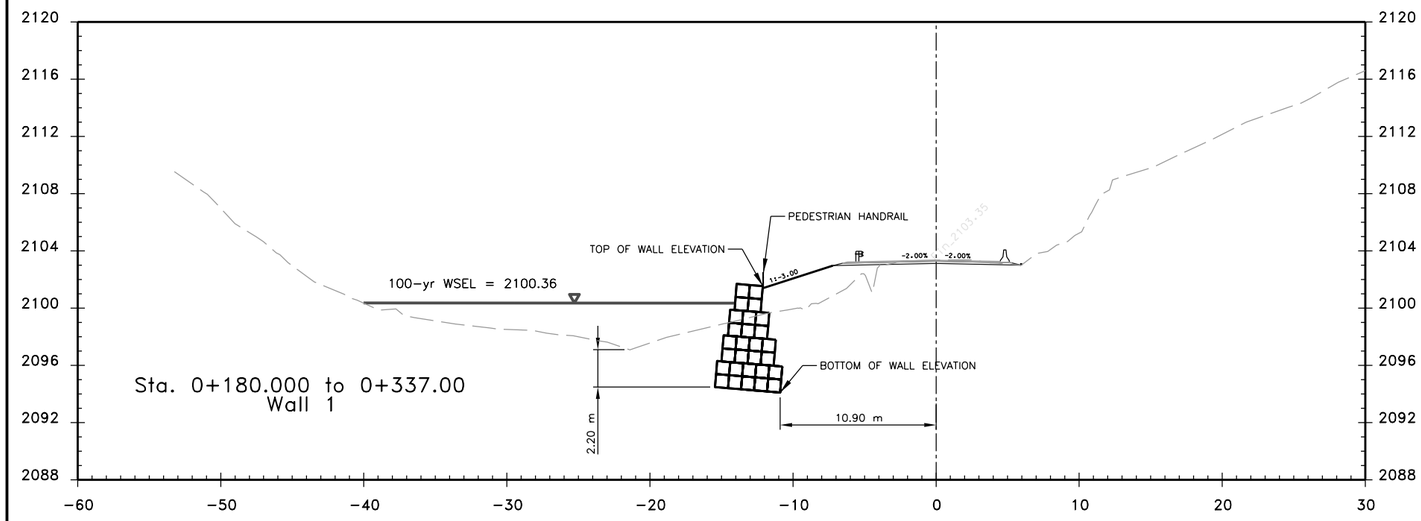
N9073(1) 1, 2 & 4

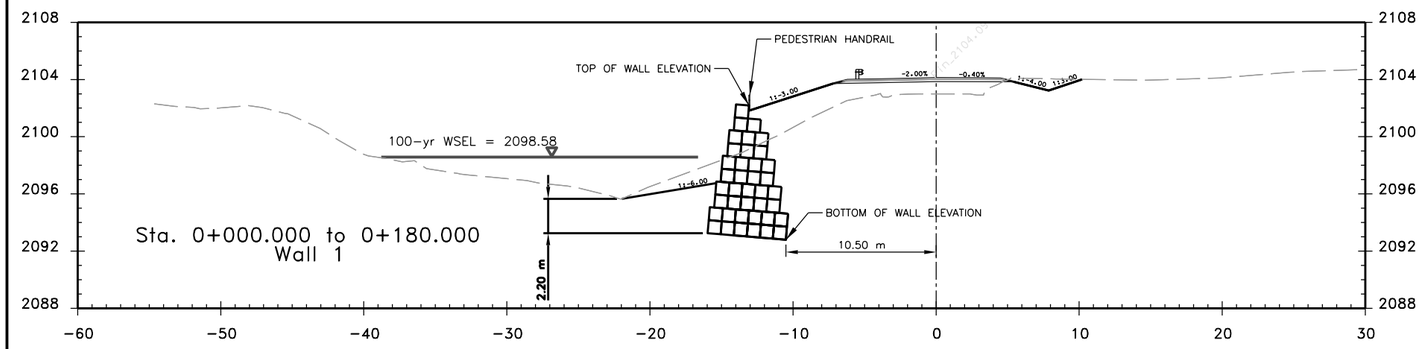
POST SELECTION AND SIGN MOUNTING DETAILS

PROJECT MANAGER: DDH	DATE: 1/22	DRAWING	SHEET
LEAD DESIGNER: MJL	DATE: 1/22		
QC/QA BY:	DATE: 2022		32 OF 84
SCALE: N/A			

STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	33A







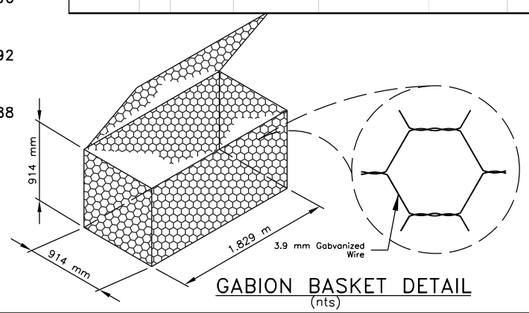
SECTION VIEWS

GENERAL NOTES

1. WORKMANSHIP AND MATERIALS SHALL CONFORM TO THE STANDARD SPECIFICATIONS OR CONSTRUCTION OF ROADS AND BRIDGES ON FEDERAL HIGHWAY PROJECTS (FP-14) ALONG WITH ALL SUPPLEMENTAL SPECIFICATIONS FOR THIS PROJECT.
2. THE QUANTITIES SHOWN ARE ONLY AN ESTIMATE. ACTUAL QUANTITIES SHALL BE DETERMINED IN THE FIELD.THE CONTRACTOR WILL BE REQUIRED TO MAKE ANY NECESSARY ADJUSTMENTS IN THE FIELD TO MATCH EXISTING FIELD CONDITIONS. THESE FIELD ADJUSTMENTS ARE INCIDENTAL OBLIGATIONS OF THE CONTRACTOR.
3. GABION MATERIAL SHALL BE RECTANGULAR, COMPARTMENTED CONTAINERS FABRICATED FROM STYLE 1 DOUBLE-TWISTED HEXAGONAL MESH OF GALVANIZED STEEL WIRE.
4. WIRE SHALL CONFORM TO ASTM A-691, GALVANIZED STEEL WIRE, SOFT TEMPER. MESH OPENING OF 83mm x 114 mm.
   MESH WIRE _____3.05 mm dia.
   WIRE FOR NETTING: _____3.00 mm dia.
   WIRE FOR SELVEDGES & CORNERS:_____3.80 mm dia.
   WIRE FOR BINDING: _____2.20 mm dia.
   ZINC COATING: _____260 g/m2
5. GABIONS SHALL BE PLACED TO THE DETAIL SHOWN ON SHEET 33B. IF UNSUITABLE MATERIAL IS FOUND AT THE FOOTING LOCATION AND ELEVATIONS, THE MATERIAL SHALL BE REMOVED ANDREPLACED WITH APPROVED SELECTED BACKFILL AS DESIGNED BY THE CM. ALL SELECTEDBACKFILL SHALL BE COMPACTED TO 95% OF MAXIMUM DENSITY AS DETERMINED BY AASHTO T-99 METHOD C, BEFORE AND AFTER FOOTINGS ARE PLACED. THE STRUCTURAL BACKFILL MATERIAL SHALL CONFORM TO AASHTO "A-2-4" SOIL CLASS OR BETTER. THIS WORK AND MATERIAL SHALL BE CONSIDERED INCIDENTAL TO ITEM 25302-1000.
6. ALL FOOTING EXCAVATIONS SHALL BE INSPECTED AND APPROVED BY THE CM. PRIOR TO PLACEMENT OF FORMS, WELDED WIRE FABRIC, HARDWARE AND SUBSEQUENT CONCRETE. ALL FOOTINGS EXCAVATIONS SHALL BE KEPT FREE OF WATER AT ALL TIMES. ALL EXCAVATION REQUIRED FOR CONSTRUCTION OF THE GABION WALL SHALL BE CONSIDERED INCIDENTAL TO THE GABION BASKET BID ITEM.
7. BACK SLOPES RESHAPING, CLEANING, AND EXCAVATION SHALL BE DONE IN ACCORDANCE WITH THE PLANS AND AS DIRECTED BY THE CM. ANY WASTE MATERIAL SHALL BE USED AS BORROW WHERE NEEDED IN OTHER PROJECT LOCATIONS AS DESIGNATED AND APPROVAL BY THE CM. ALL BACK SLOPES EXCAVATION, CLEANING, AND RESHAPING SHALL BE CONSIDERED INCIDENTAL TO COMPLETION OF THE STRUCTURE.
8. ALL STONE FOR WIRE ENCLOSED RIPRAP TO BE CLASS 2 MEETING THE GRADING REQUIREMENTS OF TABLE 705-1, AND SECTION 705 OF THE FP-14.
9. WARP EXISTING CUT BACK SLOPES AROUND ENDS OF GABION WALLS AND COMPACT SO THAT THE ENDS OF THE GABION STRUCTURE ARE BURIED INTO THE CUT BACK SLOPES. THIS WORK IS AN INCIDENTAL OBLIGATION OF THE CONTRACTOR.
10. FILTER FABRIC SHALL CONFORM TO SECTION 207 AND 714.01(a) OF THE FP-14 FOR TYPE 1V-B MATERIAL AND SHALL BE INCLUDED IN THE UNIT PRICE FOR ITEM 25302-1000.
11. AT PIPE LOCATION, THE GABION WALL SHALL REMAIN OPEN TO WIDTH OF PIPE DIAMETER AS SHOWN. CONTRACTOR CUT OUT AND FABRICATE & PLACE 3 mm ALLUMINUM PLATE AROUND THE PIPE ON BACK SIDE OF GABION WALL AS SHOWN BEFORE BACK FILLING.

ITEM NO. 25302-1000 GABIONS, ALUMINIZED COATED, CLASS 2

			Layout Point Information			Approximate	Length of Wall	Volume	
Station		Station	Location	Bottom of Wall Elev.	# of courses	Top of Wall Elev.	(m)	(cu m)	Remarks
0+000			10.5 m Lt	2,092.80	10	2,101.94			Wall 1
0+000	to	0+060			10		60	1,956.5	Wall 1
0+060			10.5 m Lt	2,092.90	10	2,102.04			Wall 1
0+060	to	0+120			10		60	1,956.5	Wall 1
0+120			10.5 m Lt	2,092.90	9	2,101.13			Wall 1
0+120	to	0+180			9		60	1,655.5	Wall 1
0+180			10.9 m Lt	2,094.10	8	2,101.42			Wall 1
0+180	to	0+240			8		60	1,354.5	Wall 1
0+240			10.9 m Lt	2,094.20	8	2,101.52			Wall 1
0+240	to	0+300			8		60	1,354.5	Wall 1
0+300			10.9 m Lt	2,094.40	8	2,101.72			Wall 1
0+300	to	0+337			8		37	835.3	Wall 1
0+337			10.9 m Lt	2,094.45	8	2,101.77			Wall 1
							Wall 1 Subtotal	9,112.9	
0+440			9.5 m Lt	2,096.90	6	2,102.39			Wall 2
0+440	to	0+500			6		60	852.9	Wall 2
0+500			8.9 m Lt	2,097.70	7	2,104.10			Wall 2
0+500	to	0+560			7		60	1,103.6	Wall 2
0+560			8.9 m Lt	2,098.20	7	2,104.60			Wall 2
0+560	to	0+620			7		60	1,103.6	Wall 2
0+620			8.9 m Lt	2,098.60	7	2,105.00			Wall 2
0+620	to	0+680			7		60	1,103.6	Wall 2
0+680			8.9 m Lt	2,099.30	7	2,105.70			Wall 2
0+680	to	0+740			7		60	1,103.6	Wall 2
0+740			8.9 m Lt	2,100.00	7	2,106.40			Wall 2
0+740	to	0+760			7		20	367.9	Wall 2
0+760			8.9 m Lt	2,100.50	7	2,106.90			Wall 2
							Wall 2 Subtotal	5,635.3	
3+660			5.5 m Lt	2,140.30	1	2,141.21			Wall 3
3+660	to	3+700			1		40	33.4	Wall 3
3+700			5.5 m Lt	2,140.30	1	2,141.21			Wall 3
							Wall 3 Subtotal	33.4	
							Project Total	14,781.6	
							Project Use	**14,790**	cu m



GABION BASKET DETAIL
(nts)

Registered Professional Engineer (Civil)
CERTIFICATE NO.
83225
MYRA K. CANDELARIA
Date Signed
ARIZONA, U.S.A.

WILSON & COMPANY
4401 MASTHEAD ST. NE, SUITE 150
ALBUQUERQUE, NM 87109
PHONE: 505-348-4000
FAX: 505-348-4072
www.wilsonco.com

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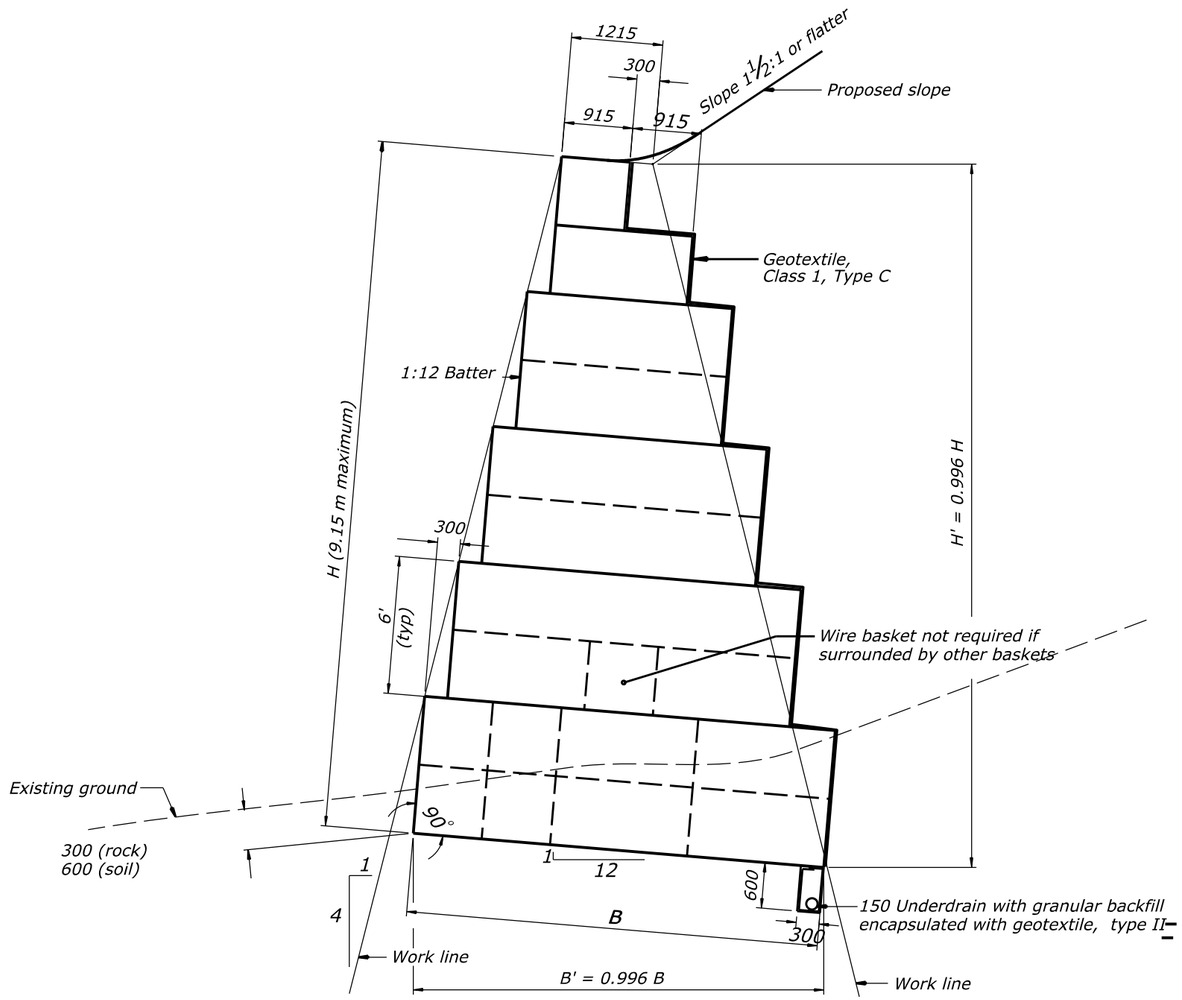
GABION WALL CROSS SECTION
TABLE & GENERAL NOTES

PROJECT MANAGER: DDM	DATE: 1/22	DRAWING	SHEET
LEAD DESIGNER: MLL	DATE: 1/22		
ASBUILT BY:	DATE: XXX		33A OF 83
SCALE: N/A			

STATE	PROJECT	SHEET NUMBER
AZ	N7054 (1) 2&4	33B



TYPICAL CROSS SECTION

NOTES:

1. *Unless otherwise shown, dimensions are in millimeters.*
2. *For design and layout, H' and B' may be considered equal to H and B, respectively.*
3. *DESIGN DATA:*

   Weight of earth = 18.8 kN/m^3.
   Weight of rock-filled gabions = 17.3 kN/m^3.
   Angle of repose = 34° (1½:1 slope)

   Design earth pressure:
   Horizontal - 12.6 kN/m^3 equivalent fluid pressure
   Vertical - 6.3 kN/m^3 equivlalent fluid pressure
4. *CONSTRUCTION:*

   Fractional height courses (300 or 600 mm) will be permitted only in the top course next to the foundation.

   Wire baskets may be omitted from any 915 mm square section which is surrounded on all four sides by standard baskets and on ends by baskets not less than 1830 mm in length.

   Provide underdrain outlets at all low points, and intervals not to exceed 30 meters.

NUMBER OF COURSES	*"H" m*	*"B" m*	*GABIONS m^3/m*
1	*0.915*	*0.915*	*0.255*
2	*1.830*	*1.830*	*0.766*
3	*2.745*	*2.745*	*1.532*
4	*3.660*	*2.745*	*2.298*
5	*4.575*	*3.660*	*3.320*
6	*5.490*	*3.660*	*4.341*
7	*6.405*	*4.575*	*5.618*
8	*7.320*	*4.575*	*6.895*
9	*8.235*	*5.490*	*8.427*
10	*9.150*	*5.490*	*9.959*

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FAX: 505-348-4072
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Registered Professional Engineer (Civil)
CERTIFICATE NO.
63225
MYRA K.
CANDELARIA
Date Signed
ARIZONA, U.S.A.

	REVISION	BY	DATE

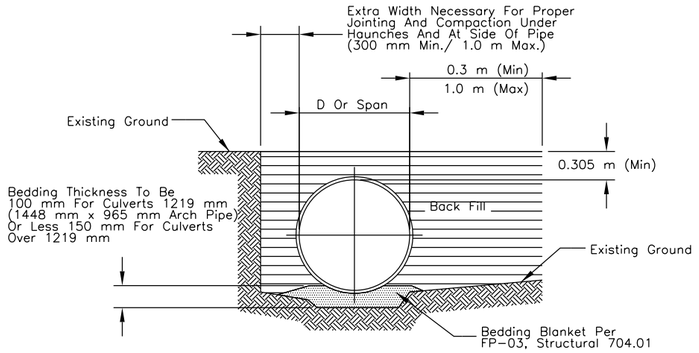
NAVAJO NATION
DIVISION OF TRANSPORTATION
NAVAJO D.O.T.

N9073 (1)

GABION RETAINING WALL

PROJECT MANAGER: DDM	DATE: 1/22	DRAWING	SHEET
LEAD DESIGNER: MLL	DATE: 1/22		
ASBUILT BY:	DATE: XXX		33B OF 83
SCALE: N/A			

STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	34A



NEGATIVE PROJECTING POSITIVE PROJECTING

FIGURE A: BEDDING

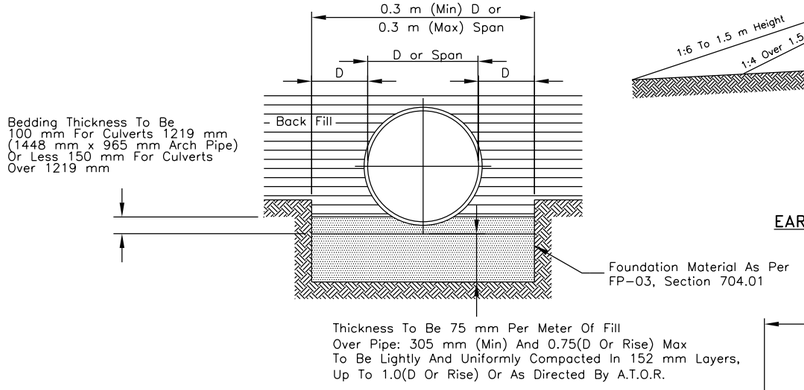


FIGURE B: ROCK BEDDING

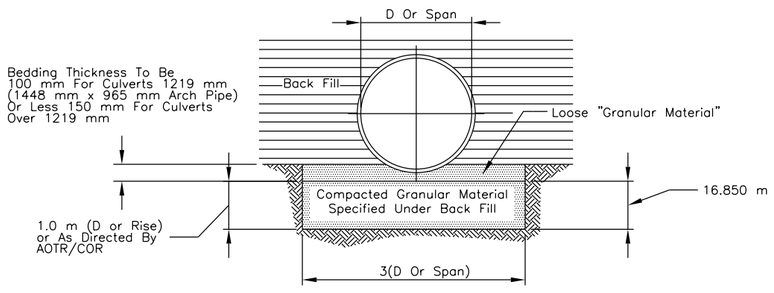
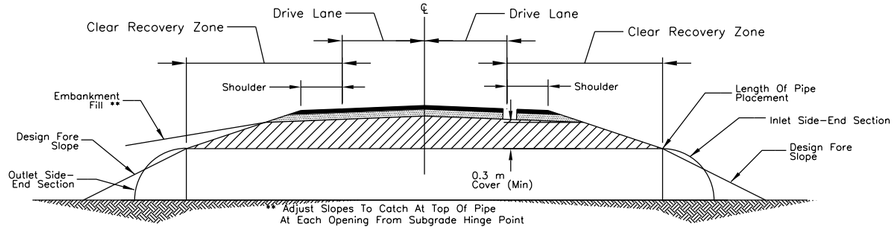
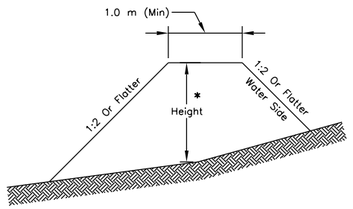


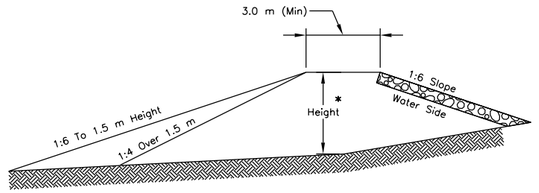
FIGURE C: FOUNDATION STABILIZATION BEDDING



TYPICAL PIPE INSTALLATION-(TURNOUT/DRIVEWAY, USE 2-END SECTIONS)

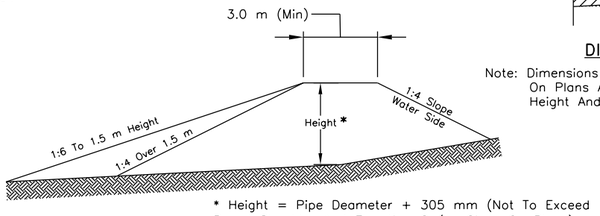


TYPE "A" DIKE/BERM



TYPE "B" DIKE/BERM

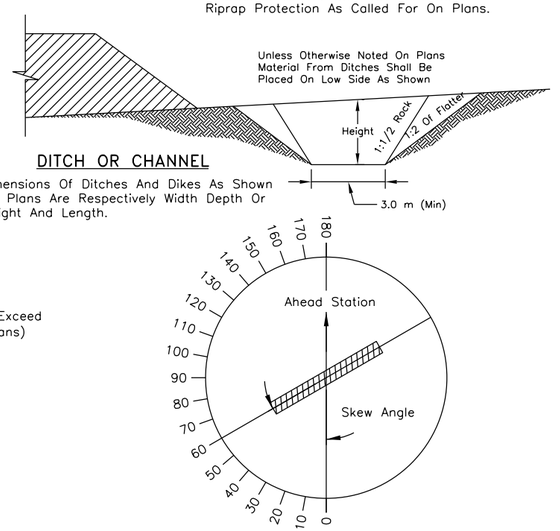
NOTE: When Necessary The Slope May Be Flattened To 1:6 With 457 mm Thick Riprap Protection As Called For On Plans.



* Height = Pipe Deameter + 305 mm (Not To Exceed Paved Shoulder And Elevation Or/As Given On Plans)

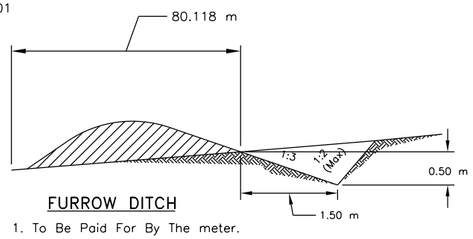
TYPE "B" DIKE/BERM

EARTHEN DIKE/BERM DETAILS



DITCH OR CHANNEL

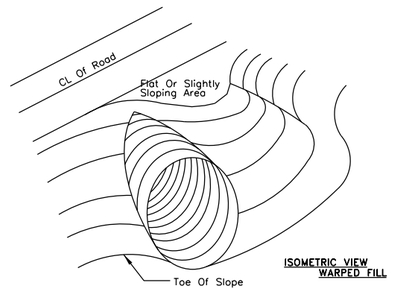
Note: Dimensions Of Ditches And Dikes As Shown On Plans Are Respectively Width Depth Or Height And Length.



FURROW DITCH

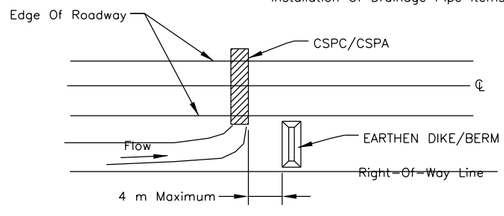
1. To Be Paid For By The meter.
2. Furrow Ditch Sections As Shown Above And/Or Approved Equivalent Shall Be Built As Directed By The AOTR/COR.
3. See Sheet XX For Riprap Lined Furrow Ditch Dimensions.

STRUCTURE SKEW DIAGRAM



PIPE SKEWS TO THE EMBANKMENT (TYP.)

The Contractor Shall Be Required To Build The Warped Embankment Around The Skewed Drainage Pipe(s). This Work Shall Be Incidental To The Earthwork And Installation Of Drainage Pipe Items Shown.



EARTHEN DIKE/BERM INSTALLATION AT STRUCTURE

1. Earthen Dike/Berm At Structures To Be So Placed That They Create A Water Cushion. Elevation At Top Of Earthen Dike/Berm Shall Be 305 mm Above Elevation Of Top Of Pipe Unless Otherwise Shown Or Directed By The AOTR/COR.
2. Earthen Dike/Berm Shall Be Located A Distance Equal To The Largest Dimension Of Box Culvert Or Pipe From The Face Of The Drainage Structure. In No Case Shall The Distance Exceed 4.0 m.

DRAINAGE STRUCTURE NOTES

1. PLACE LOOSE BEDDING ROUGHLY SHAPED TO BOTTOM OF PIPE, THEN COMPACT UNDER HAUNCHES AFTER PIPE PLACEMENT.
2. SEE SECTIONS 204, 209, 602, AND 704 OF FP-14, INCLUDING THE SUPPLEMENTAL SPECIFICATION FOR ADDITIONAL NOTES/REQUIREMENTS.
3. ALL DRAINAGE STRUCTURE MATERIAL SHALL BE UNLOADED AND HANDLED WITH REASONABLE CARE. NO STRUCTURE SHALL BE DRAGGED OR ALLOWED TO STRIKE ANY HARD SURFACE DURING PLACEMENT. ANY DAMAGED STRUCTURE SHALL BE REPAIRED OR REPLACED, BY THE CONTRACTOR, AT NO ADDITIONAL COST TO THE GOVERNMENT.
4. ALL STRUCTURAL PLATE PIPE & BOX STRUCTURES SHALL BE ASSEMBLED AND INSTALLED IN ACCORDANCE WITH THE FABRICATOR'S RECOMMENDATIONS AND DETAILS ELSEWHERE ON THESE PLANS.
5. BACKFILL MATERIAL SHALL BE PLACED (610 mm (min) TO 1.0 m (max)) PIPE DIAMETER WIDTH ON THE SIDES AND 305 mm OVER THE PIPE. BACKFILL MATERIAL BEYOND THESE LIMITS SHALL BE REGULAR EARTHWORK EMBANKMENT MATERIAL. THE BACKFILL MATERIAL SHALL BE APPROVED BY THE CM PRIOR TO IT'S USE AND SHALL BE PLACED IN ACCORDANCE WITH THE PLANS AND SPECIFICATIONS.
6. POUNDING OR JETTING PIPE BACKFILL SHALL NOT BE PERMITTED.
7. ALL PIPE EXCAVATION, BACKFILLING, DE-WATERING, PUMPING OR COFFER DAMS REQUIRED TO PROPERLY INSTALL THE DRAINAGE PIPE SHALL BE CONSIDERED INCIDENTAL TO COMPLETION OF THE PROJECT AND NO ADDITIONAL PAYMENT SHALL BE MADE.
8. MULTIPLE PIPE INSTALLATIONS SHALL BE PLACED 610 mm MINIMUM BETWEEN END SECTIONS UNLESS OTHERWISE DIRECTED BY THE CM OR AS SHOWN ON THE PLANS.
9. ALL PIPES SHALL BE PROTECTED BY A COVER OF NOT LESS THAN 914 mm OF EMBANKMENT ABOVE PIPE BEFORE ANY HEAVY EQUIPMENT IS ALLOWED TO PASS OVER THE STRUCTURE(S) DURING CONSTRUCTION.
10. ALL DRAINAGE STRUCTURES SHALL BE INSTALLED AT THE ORIGINAL GROUND LINE AND SLOPE TO ASSURE POSITIVE DRAINAGE UP TO THE ROW LIMITS. IN NO CASE SHALL THE PIPE(S) BE PLACED BELOW THE ORIGINAL GROUND ELEVATIONS (UNLESS PLANS CALL FOR ADDITIONAL GRADING BEYOND THE INLET). THIS WORK SHALL BE CONSIDERED INCIDIDENTAL TO COMPLETION OF PROJECT AND NO ADDITIONAL PAYMENT SHALL BE MADE.
11. AT DRAINAGE PIPE REPLACEMENTS, INSTALLATION, EXTENSIONS, AND IN-PLACE PIPE CLEANING LOCATIONS, THE CONTRACTOR SHALL RESHAPE, REGRADE AND CLEAN THE INLET AND OUTLET CHANNELS TO THE ROW LINE AND/OR EXISTING DRAINAGE CHANNEL TO PRODUCE SMOOTH FLOWS AT CULVERT INLETS/OUTLETS AS DIRECTED BY THE CM. THIS WORK SHALL BE INCIDENTAL TO THE BID ITEMS UNDER SECTIONS 602, 603, 604 AND 607.
12. ALL CULVERTS UNDER TURNOUTS AND DRIVEWAYS SHALL BE PLACED AT THE PROPOSED DITCH FLOWLINE, THE CONTRACTOR SHALL BE REQUIRED TO FIELD ADJUST THE TURNOUT PROFILE GRADES OVER PIPE AS DIRECTED BY THE CM TO PROVIDE FOR THE MINIMUM COVER.
13. TYPE "B" DIKE/BERM SHALL BE USED ON THIS PROJECT UNLESS OTHERWISE NOTED ON THE PLANS. EMBANKMENT MATERIAL NEEDED TO BUILD EARTHEN DIKES SHALL BE CONSIDERED INCIDENTAL TO THE BID ITEMS FOR DITCH BLOCKS AS SHOWN IN THE BID SCHEDULE. ADJUST THE DITCH BLOCKS WITH A CURVE TO FIT FIELD CONDITIONS AS DIRECTED BY THE CM. THESE ADJUSTMENTS SHALL BE CONSIDERED INCIDENTAL TO BID ITEMS FOR DITCH BLOCKS SHOWN IN THE BID SCHEDULE.
14. BACKFILL AND BEDDING MATERIAL INSTALLATION FOR PRECAST BOX STRUCTURES SHALL BE IN ACCORDANCE WITH THE FABRICATORS RECOMMENDATIONS, DESIGN CRITERIA ON SHEET AND APPROVED SHOP PLANS.

WILSON &COMPANY
4401 MASTHEAD ST. NE. SUITE 150
ALBUQUERQUE, NM 87109
PHONE: 505-348-4000
FAX: 505-348-4072
www.wilsonco.com

Registered Professional Engineer (Civil) CERTIFICATE NO. 83225 MYRA K. CANDELARIA Date Signed 09/09/22 ARIZONA, U.S.A.

REVISION	BY	DATE

NAVAJO D.O.T.

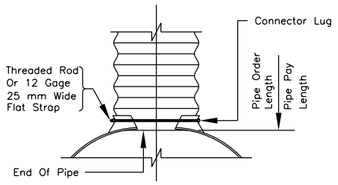
NAVAJO NATION
DIVISION OF TRANSPORTATION

N9073(1) 1, 2 & 4

STANDARD PIPE INSTALLATION AND DITCH DETAILS

PROJECT MANAGER: DDM	DATE: 1/22	DRAWING	SHEET
LEAD DESIGNER: MLL	DATE: 1/22		
ASBUILT BY:	DATE: XXX		34A OF 84
SCALE: N/A			

STATE	PROJECT	SHEET NUMBER
AZ	N7054 (1) 2&4	34B



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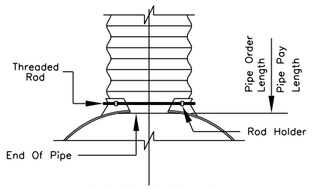

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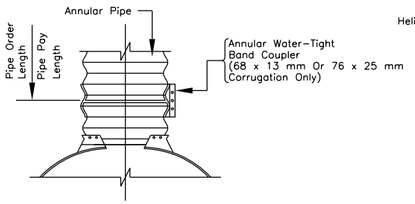

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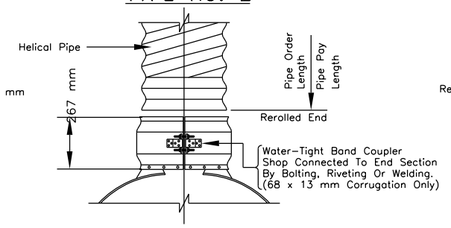
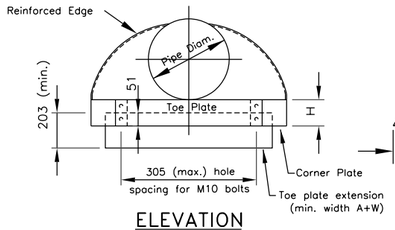
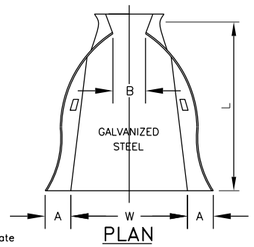


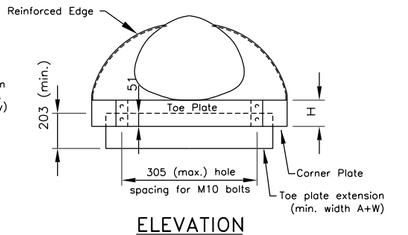
TYPE NO. 5
(See Note No.9)



ELEVATION



PLAN



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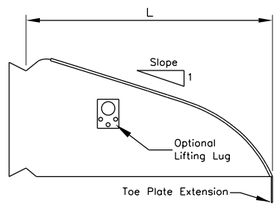


TYPICAL CROSS SECTION

GENERAL NOTES

1. For Multiple Installation Of All Types, A Minimum Of A 610 mm Spacing Measured Along The Horizontal Between Flared End Sections At Their Widest Cross Section Shall Be Used.
2. All Three (3) Piece Bodies To Have 2.77 mm Thickness Sides And 3.5 mm Thickness Center Panels. Width Of Center Panels To Be Greater Than 20% Of The Pipe Periphery. Multiple Panel Bodies To Have Lap Seams Which Are To Be Tightly Joined By 9.53 mmø Galvanized Rivets Or Bolts.
3. End Sections For Steel Pipe-Arches: For The 1956 mm x 1321 mm And 2108 mm X 1448 mm Sizes, Reinforced Edge To Be Supplemented By 51 mm x 51 mm x 6.35 mm Galvanized Angles. The Angles To Be Attached By 9.53 mm Dia. Galvanized Nuts And Bolts. Angle Reinforcement Will Be Placed Under The Center Panel Seams.
4. End Sections For Steel Circular Pipes: For 1524 mm Thru 2134 mm Sizes, Reinforced Edge To Be Supplemented With Galvanized Stiffener Angles. The Angles Will Be 51 mm x 51 mm x 6.35 mm For 1524 mm Thru 1829 mm, And 64 mm x 64 mm x 6.35 mm For 1981 mm And 2134 mm. The Angles To Be Attached By 9.53 mm Galvanized Nuts And Bolts.
5. Welding Shall Not Be Permitted In Connecting End Sections To Connector Sections Or Connector Sections To Pipe.
6. Type No. 1 Steel End Section: Connect End Section With Threaded Rod With Connector Lug, For 610 mm Pipe Only.
7. Type No. 2 Steel End Section: Connect End Section With Threaded Rod With Rod Holder, For 762 mm And 914 mm Round Pipe; And 432 mm x 330 mm Thru 1448 mm x 965 mm CSPA.
8. Type No. 3 Steel End Section: The Connection Includes 305 mm Of The Pipe Length As A Connector Section For Pipe Arch Sizes 1626 mm x 1092 mm Thru 2108 mm x 1448 mm And Round Pipe Sizes 1067 mm Thru 2134 mm. Gages Of Connector Section Shall Be The Same As The End Sections As Mentioned Above. The Connector Section Will Be Attached To The End Section By 9.5 mm Galvanized Rivets Or Bolts On Approximately 152 mm Centers.
9. Helically Corrugated Pipe: For Type No. 5 And Type No. 3 The Dimple Band Or Corrugated Pipe Connector Section Shall Be Attached To The End Section By 9.5 mm Galvanized Steel Rivets Or Bolts Spaced At Approximately 152 mm Centers.
10. Type No. 1, Type No. 2, And Type No. 3 Connections May Be Used With Welded Seams Helically Corrugated Pipe With Re-Rolled Ends. Re-Rolled Ends Shall Include A Minimum Of Two (2) Annular Corrugations Of The Same Size As The Pipe Corrugations.

ROUND PIPE END SECTION

Pipe Diam (mm)	Thick ness (mm)	DIMEMSIONS A (25 mm=)	B (Max.)	H (25 mm±)	F (mm)	L (38 mm±)	W (51 mm±)	Approx. Slope	BODY
610	1.6	254	330	152	1168	1041	1219	2 1/2	1 Pc
762	2	311	318	203	1397	1229	1448	2 1/2	2 Pc
914	2	368	305	229	1778	1524	1829	2 1/2	2 Pc
1067	2.8	432	279	267	2082	1753	2134	2 1/2	2 Pc
1219	2.8	470	737	305	2235	2007	2286	2 1/4	3 Pc
1372	2.8	470	762	305	2540	2134	2591	2	3 Pc
1524	2.8 / 3.5	457	914	305	2845	2235	2896	1 3/4	3 Pc
1676	2.8 / 3.5	457	914	305	2997	2210	3048	1 1/2	3 Pc
1829	2.8 / 3.5	457	1118	305	3048	2248	3048	1 1/3	3 Pc
1981	2.8 / 3.5	457	168	305	3302	2223	3505	1 1/4	4 Pc
2134	2.8 / 3.5	457	1219	305	3454	2223	3658	1 1/6	4 Pc

ARCH PIPE END SECTION

SPAN* *68 mm x 13 mm	RISE *76 mm x 25 mm	Thick ness (mm)	DIMEMSIONS A (25 mm±)	B (Max.)	H (25 mm±)	F (mm)	L (38 mm±)	W (51 mm±)	Approx. Slope	BODY
711 x 508		1.6	203	406	152	711	813	1219	2 1/2	1 Pc
889 x 610		2.0	254	406	152	863	991	1524	2 1/2	1 Pc
1067 x 737		2.0	305	305	191	1016	168	1905	2 1/2	2 Pc
1245 x 838		2.8	343	508	229	1168	1346	2134	2 1/2	2 Pc
1448 x 965		2.8	470	660	305	1473	1575	2286	2 1/4	3 Pc
1626 x 1092		2.8	457	737	305	1854	1753	2591	2 1/4	3 Pc
1803 x 1194		2.8 / 3.5	470	914	305	2540	1956	2896	2 1/4	3 Pc
	1854 x 1397	2.8	457	914	305	3149	1956	3200	2.0	3 Pc
	2057 x 1499	2.8	457	991	305	3454	1956	3505	2.0	3 Pc
	2210 x 1600	2.8	457	991	305	3454	1956	3505	2.00	3 Pc

* CORRUGATION DIMENSION

WILSON &COMPANY
4401 MASTHEAD ST. NE. SUITE 150
ALBUQUERQUE, NM 87109
PHONE: 505-348-4000
FAX: 505-348-4072
www.wilsonco.com

Registered Professional Engineer (Civil) Certificate No. 83225 MYRA K. CANDELARIA Date Signed ARIZONA, U.S.A.

	REVISION	BY	DATE

NAVAJO NATION
DIVISION OF TRANSPORTATION

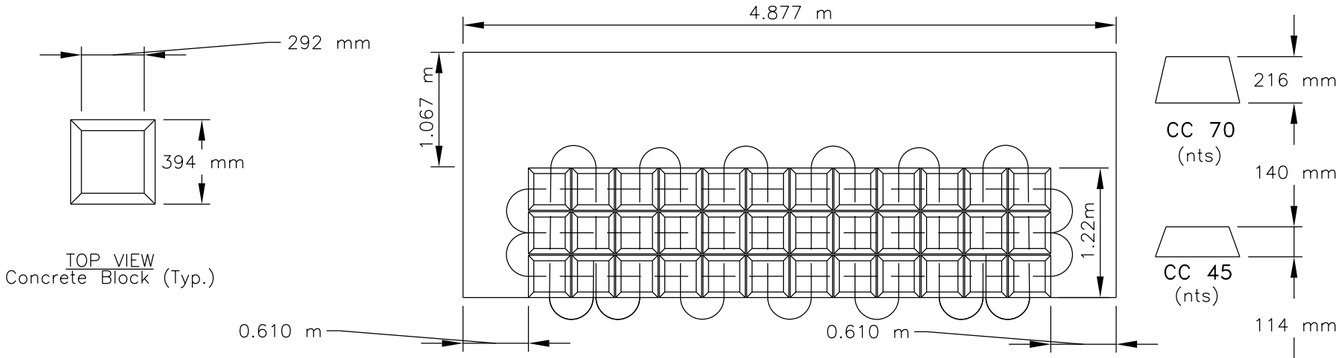
NAVAJO D.O.T.

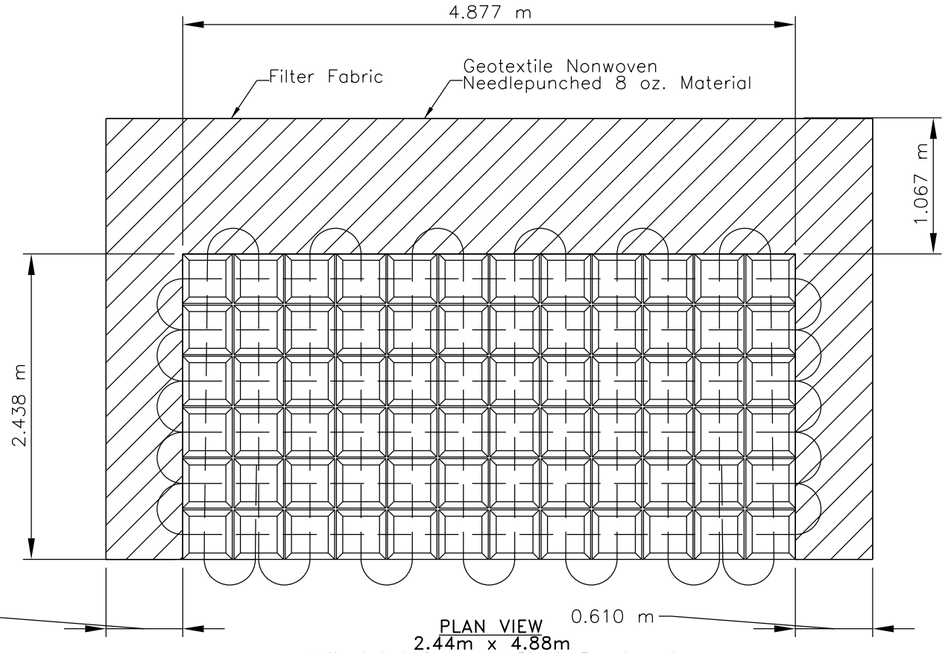
N9073 (1)

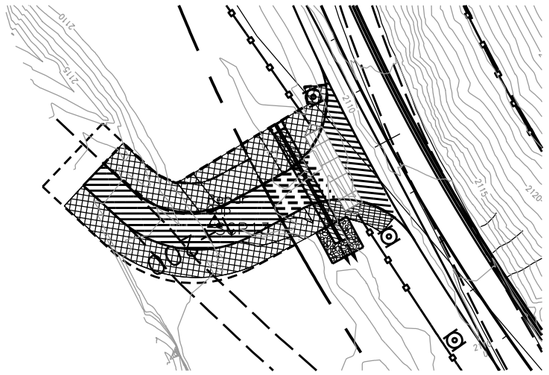
END SECTION DETAILS

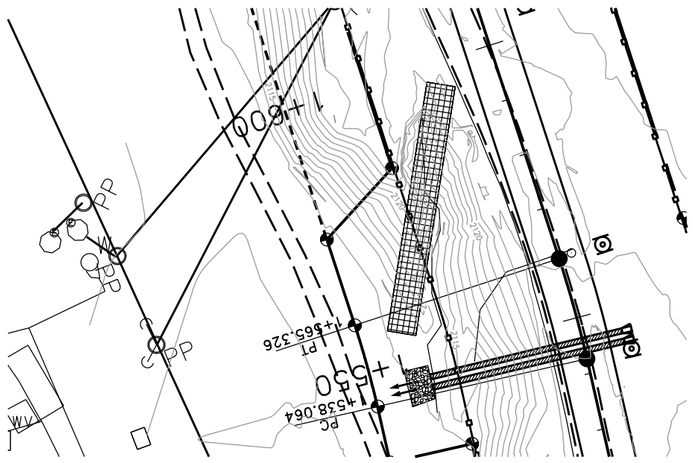
PROJECT MANAGER: DDM	DATE: 1/22	DRAWING	SHEET
LEAD DESIGNER: MLL	DATE: 1/22		
ASBUILT BY:	DATE: XXX		34B OF 84
SCALE: N/A			

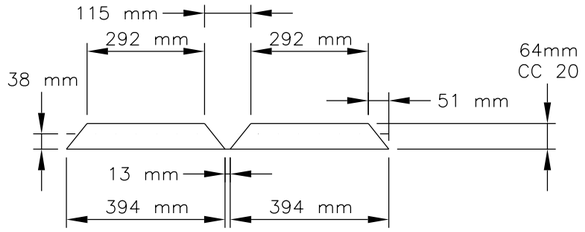
STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	34C











ITEM No. 25112-3000: ARTICULATED CONCRETE BLOCK REVETMENT

STATION	LOCATION	AREA (m^2)
1+200	Turnout Lt.	559
1+500 to 1+600	Turnout Rt.	250
	TOTAL	809
	USE	850

GENERAL NOTES

1. Workmanship and Materials Shall Conform to the Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects (FP-14), Along with All Supplemental Specifications for This Project.
2. The Quantities Shown are Only an Estimate. Actual Quantities Shall Be Determined in the Field. The Contractor Will Be Required to Make Adjustments to the Articulated Concrete Block Revetment (ACBR) as Necessary to Fit Actual Field Conditions. These Field Adjustments Will Be Incidental Obligations of the Contractor. See sheet 53 for layout details.
3. Channel Grading Shall Be Done in Accordance with the Plans and as Determined By the COTR/COR. All Grading Shall Be Considered Incidental to Completion of the ACBR Installation.
4. Embankment Below ACBR Shall Conform to Section 204 of FP-14. All Embankment For ACBR Above Natural Ground Is Included in the Quantity For Item 20401-0000, Roadway Excavation, and Shall Be Paid For Under That Item. All Excavation For ACBR Installation Shall Be Considered Incidental to Item 25112-3000, Articulated Concrete Block Revetment.
5. ACBR Shall Be Installed In Accordance With Manufacturer's Recommendations.
6. Waste Rock From Roadway Excavations May Be Placed with borrow In Fills Behind Bank Protection At Wash On Lt. Rock To Be Placed As Per FP-14, Section 204 And As Approved By CM. Waste Rock Placement To Be Incidental To Bid Item 20401-0000, Roadway Excavation.

WILSON &COMPANY
4401 MASTHEAD ST. NE. SUITE 150
ALBUQUERQUE, NM 87109
PHONE: 505-348-4000
FAX: 505-348-4072
www.wilsonco.com

Registered Professional Engineer (Civil) CERTIFICATE NO. 35225 MYRA K. CANDELARIA Date Signed 6/17/2022 ARIZONA, U.S.A.

	REVISION	BY	DATE

NAVAJO D.O.T.

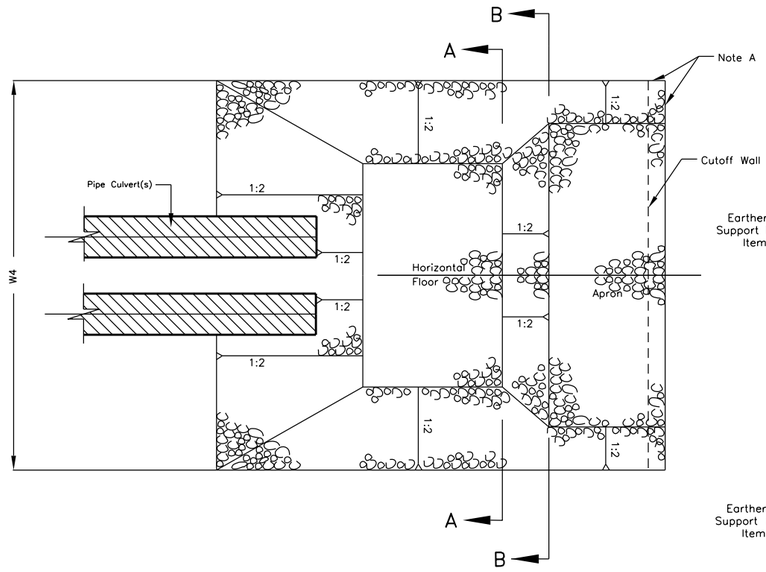
NAVAJO NATION
DIVISION OF TRANSPORTATION

N9073(1) 1, 2 & 4

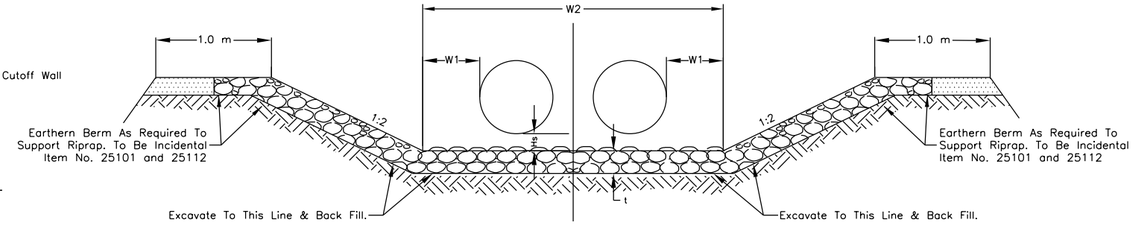
ARTICULATED CONCRETE BLOCK REVETMENT DETAILS

PROJECT MANAGER: DDM	DATE: 1/22	DRAWING	SHEET
LEAD DESIGNER: MLL	DATE: 1/22		
ASBUILT BY:	DATE: XXX		34C OF 84
SCALE: N/A			

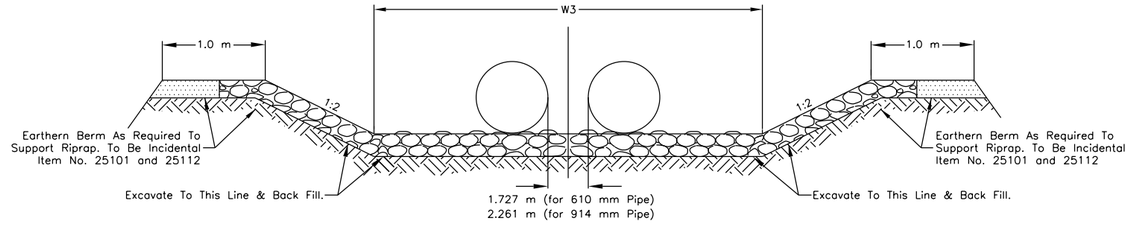
STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	35



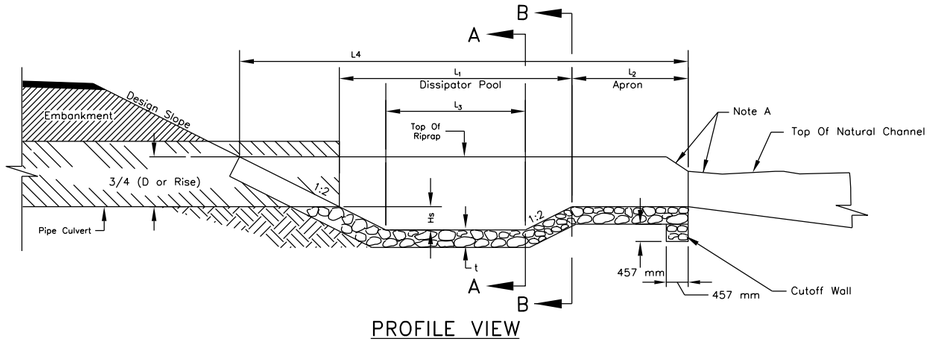
PLAN VIEW



SECTION A–A



SECTION B–B



PROFILE VIEW

NOTE A: Warp Basin To Conform To Natural Stream Channel. Top Of Apron Riprap Should Be At The Same Elevation Or Lower Than Natural Channel Bottom.

GENERAL NOTES

1. SEE SHEET 34A FOR ADDITIONAL DETAILS/NOTES ON PIPE INSTALLATION. SEE SHEET 36A FOR ADDITIONAL DETAILS/NOTES ON WIRE ENCLOSED RIPRAP INSTALLATION.
2. SEE SHEETS 56 & 57 FOR DRAINAGE STRUCTURE PROFILES/BUILD NOTES AND STILLING BASIN LOCATIONS.
3. ALL STONE FOR RIPRAP SHALL BE CLASS 2 MEETING THE GRADING REQUIREMENTS OF TABLE 705-1 OF THE FP-14. SEE SUPPLEMENTAL SPECIFICATION SECTION 705 FOR ROCK MODIFICATION (NO MINUS 76 mm ROCK) FOR ROCK USED WITH GROUTED RIPRAP.
4. ALL EXCAVATIONS AND BACKFILL OPERATIONS SHALL BE DONE TO NEAT LINES IN ACCORDANCE WITH SECTION 209 OF THE FP-14 AND WILL BE INCIDENTAL TO INSTALLATION OF RIPRAP. SEE SUPPLEMENTAL SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
5. ANY BORROW MATERIAL NEEDED TO BRING EXISTING CHANNELS UP TO GRADE SHALL BE TAKEN FROM A DESIGNATED AREA WITHIN THE RIGHT-OF-WAY. THIS WORK SHALL BE INCIDENTAL TO THE RIPRAP PAY ITEMS. SHAPE ALL SHARP CONTOURS AS REQUIRED TO FIT THE NEW EARTHEN BERM MATERIAL FLUSH WITH THE EXISTING GROUND.
6. WIRE ENCLOSED RIPRAP SHALL CONFORM TO SECTION 251 OF THE FP-14 AND THE SUPPLEMENTAL SPECIFICATIONS. WIRE MESH SHALL BE PLACED TO ENCLOSE THE STONE LAYER ON ALL SIDES AND FACES. THE WIRE MESH SHALL BE SPLICED ON ALL EDGES AND SHALL BE DRAWN TIGHTLY AGAINST THE STONE BY MEANS OF 3.8 mm WIRE TIES SPACED 0.61 m LONGITUDINALLY AND TRANSVERSELY.
7. THE WIRE FABRIC SHALL BE GALVANIZED AND BE OF THE CONFIGURATION SHOWN ON THIS SHEET. AN ALTERNATE WIRE FABRIC MAY BE SUBMITTED FOR REVIEW AND APPROVAL. ANY WIRE FABRIC USED SHALL HAVE A MINIMUM WIRE DIAMETER OF 2.8 mm, A CLASS 3 ZINC COATING (GALVANIZED), SHALL HAVE A MINIMUM OPENING DIMENSION OF 100 mm, AND SHALL NOT ALLOW A 75 mm ⌀SPHERE TO PASS THROUGH WIRE FABRIC OPENING.
8. WIRE ENCLOSED RIPRAP SHALL BE ANCHORED WITH L 102 mm x 102 mm x 9.5 m STEEL ANGLES AND SHALL BE CONSIDERED INCIDENTAL TO THE COMPLETION OF THE WORK AND NO PAYMENT SHALL BE MADE. STEEL ANGLES SHALL EXTEND 100 mm ABOVE THE TOP OF THE RIPRAP.

ITEM No. 25112-3000: WIRE ENCLOSED RIPRAP STILLING BASIN, CLASS 2

Station:	Structure:	L_1 (m)	L_2 (m)	L_3 (m)	L_4 (m)	h_s (mm)	t (mm)	W_1 (m)	W_2 (m)	W_3 (m)	W_4 (m)	Est. Quantity (m^3)
2+000	DS-71P, 2-914mm CMPs	3.050	1.525	1.830	5.946	305	610	0.500	5.089	6.309	9.051	34.72
2+300	DS-62P, 2-914mm CMPs	3.050	1.525	1.830	5.946	305	610	0.500	5.089	6.309	9.051	34.72
3+065	DS-63P, 3-914mm CMPs	3.050	1.525	1.830	5.946	305	610	0.500	8.264	9.484	12.226	46.90
4+677	DS-29, 2-610mm CMPs	3.050	1.525	1.830	5.490	305	610	0.500	3.947	5.167	6.997	24.89
4+961	DS-30, 4-610mm CMPs	3.050	1.525	1.830	5.490	305	610	0.500	8.621	9.841	11.671	41.52
											TOTAL:	182.75
											USE:	200.00

WILSON &COMPANY
4401 MASTHEAD ST. NE. SUITE 150
ALBUQUERQUE, NM 87109
PHONE: 505-348-4000
FAX: 505-348-4072
www.wilsonco.com

Certified Professional Engineer (Civil) CERTIFICATE 83225 MYRA K. CANDELARIA Date Signed 07/15/2022 ARIZONA, U.S.A.

	REVISION	BY	DATE

NAVAJO D.O.T.

NAVAJO NATION
DIVISION OF TRANSPORTATION

N9073(1) 1, 2 & 4

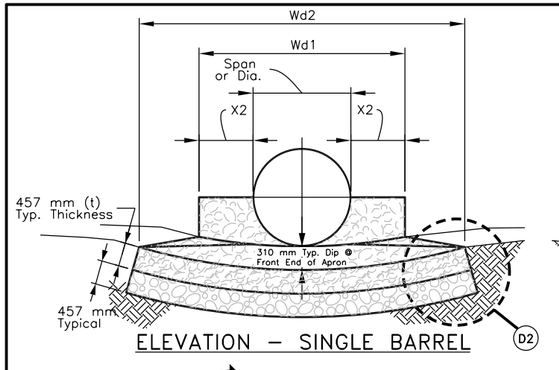
RIPRAP STILLING BASIN DETAIL

PROJECT MANAGER: DDM	DATE: 1/22	DRAWING	SHEET
LEAD DESIGNER: MLL	DATE: 1/22		
ASBUILT BY:	DATE: XXX		35 OF 84
SCALE: N/A			

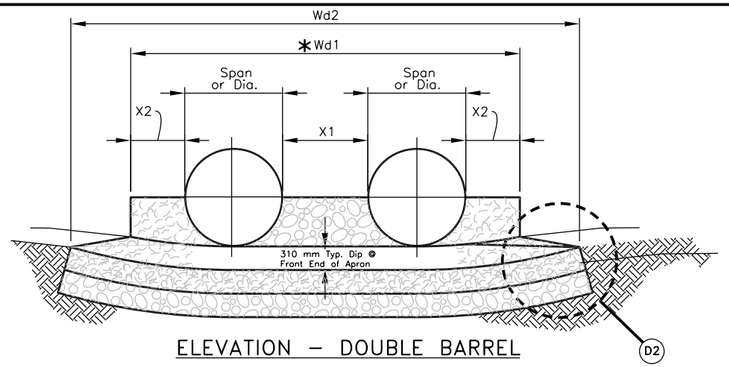
STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	36A

ITEM No. 25112-2000: WIRE ENCLOSED RIPRAP APRON, CLASS 2

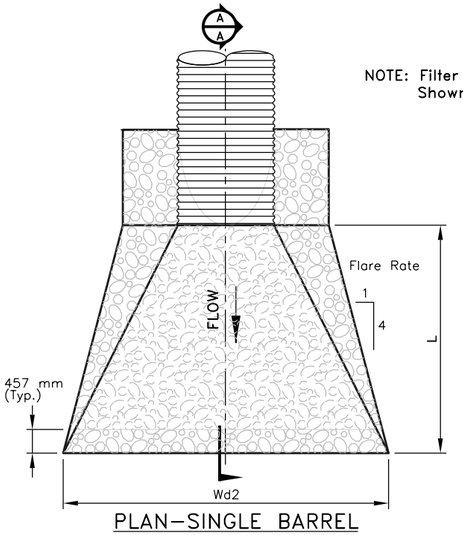
Station:	Structure:	Location	X_1 (m)	X_2 (m)	W_{d1} (m)*	W_{d2} (m)*	L (m)*	L_s (m)*	t (mm)	Estimated Qty (m^3)
TURNOUT IMPROVEMENT										
1+200 Lt.	2-914mm x 21.34m CMP	OUTLET				6.1	6.1		457	17
PHASE 1, SEGMENT 2										
4+215	2-3.048m x 2.438m x 24.24m CBC	OUTLET				6.1	3.05		457	8
4+490	CUT TO FILL TRANSITION	-				20.0	3.0		457	27
4+700	CUT TO FILL TRANSITION					25.0	3.0		458	34
									TOTAL	128
									USE	200
PHASE 2 (FOR REFERENCE ONLY)										
1+545 Lt.	2-914mm x 36.0m CMP	OUTLET				6.1	4.25		457	12
1+560 to 1+600 Lt.	CUT TO FILL TRANSITION	-				5.0	44.0		457	101



ELEVATION – SINGLE BARREL

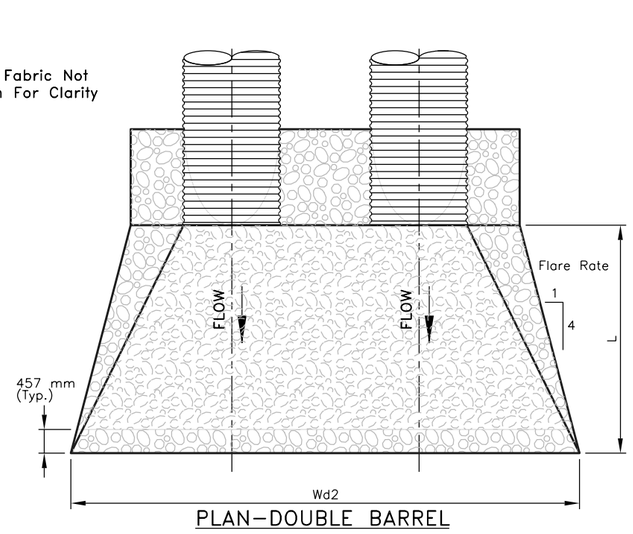


ELEVATION – DOUBLE BARREL

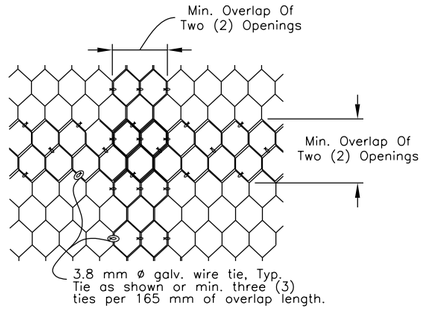


PLAN–SINGLE BARREL

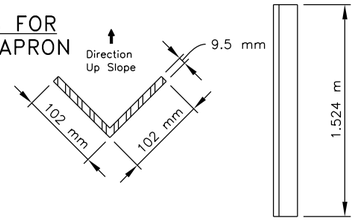
NOTE: Filter Fabric Not Shown For Clarity



PLAN–DOUBLE BARREL



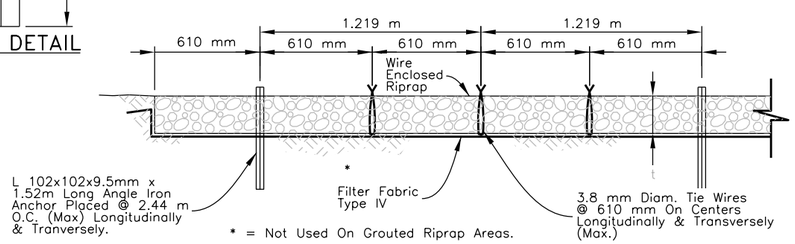
FABRIC SPLICING DETAILS FOR WIRE ENCLOSED RIPRAP APRON



ANGLE IRON ANCHOR DETAIL

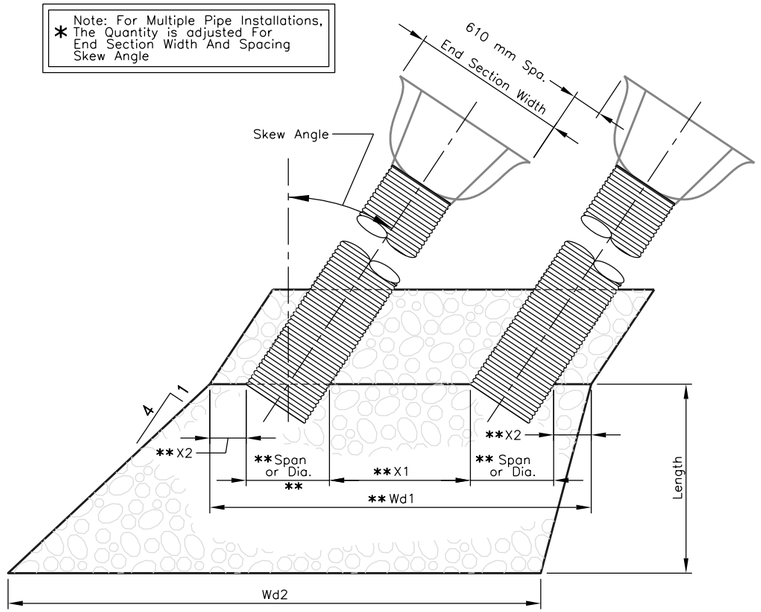
GENERAL NOTES

1. SEE SHEET 40 FOR ADDITIONAL NOTES.
2. ALL STONE FOR RIPRAP SHALL BE CLASS 2 MEETING THE GRADING REQUIREMENTS OF TABLE 705–1 OF THE FP–14. SEE SUPPLEMENTAL SPECIFICATION SECTION 705 FOR MODIFICATION (NO MINUS 76 mm ROCK) TO ROCK SPECIFICATION FOR ROCK USED WITH GROUTE RIPRAP.
3. ALL EXCAVATIONS AND BACKFILL OPERATIONS SHALL BE DONE TO NEAT LINES IN ACCORDANCE WITH SECTION 209 OF THE FP–14 AND WILL BE INCIDENTAL TO INSTALLATION OF RIPRAP. SEE SUPPLEMENTAL SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
4. ANY BORROW MATERIAL NEEDED TO BRING EXISTING CHANNELS UP TO GRADE SHALL BE INCIDENTAL TO RIPRAP PAY ITEMS.
5. THE CONTRACTOR HAS THE OPTION TO USE ARTICULATED CONCRETE BLOCK REVETMENT.
6. THE WIRE FABRIC SHALL BE GALVANIZED AND BE OF THE CONFIGURATION SHOWN IN THIS SHEET. AN ALTERNATE WIRE FABRIC MAY BE SUBMITTED FOR REVIEW AND APPROVAL. ANY WIRE FABRIC USED SHALL HAVE A MINIMUM WIRE DIAMETER OF 2.0 mm. A CLASS 3, ZINC COATING (GALVANIZED) SHALL HAVE A MAXIMUM OPENING DIMENSION OF 100 m AND SHALL NOT ALLOW A 75 mm ø SPHERE TO PASS THROUGH THE WIRE FABRIC OPENING.
7. WIRE ENCLOSED RIPRAP SHALL BE ANCHORED AS SHAWN WITH L 102 mm x 9.5 mm STEEL ANGLES SPACED AT 2.44 m EACH WAY. STEEL ANGLES SHALL EXTEND 75 mm ABOVE THE TOP OF THE MESH. IN ROCKY AREAS DRIVE ANGLE IRON ANCHORS TO REFUSAL (MIN. EMBEDDED 500 mm). THEN CUT AT 75 mm ABOVE RIPRAP. ANCHORS SHALL BE SAW–CUT TO LEAVE A SMOOTH EDGE. DO NOT USE A CUTTING TORCH. FURNISHING AND PLACEMENT OF ANGLE STEEL SHALL BE CONSIDERED INCIDENTAL TO COMPLETION OF THE STRUCTURE.
8. FOR ALL RIPRAP DOWNDRAIN AND CULVERT OUTLETS, PROVIDE CENTER OF RIPRAP 305 mm (MIN) DIP BELOW OUTER EDGES AT OUTLET END. PLACE RIPRAP TO FIT CHANNEL BANKS WHERE POSSIBLE. ALL EXCAVATION AND APRON WARP RESHAPING SHALL BE CONSIDERED INCIDENTAL TO COMPLETION OF THE STRUCTURE.



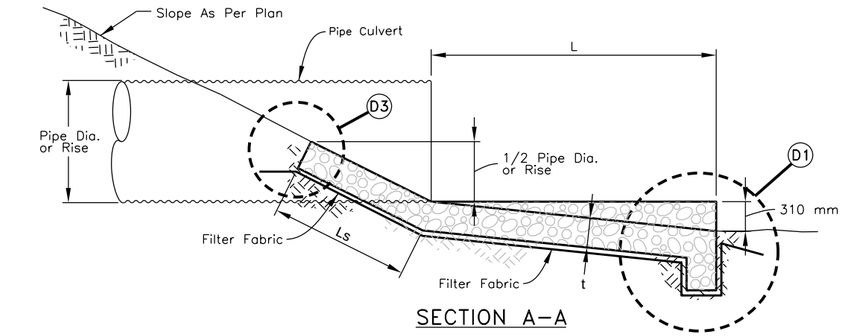
ANGLE IRON ANCHOR DETAILS
WIRE ENCLOSED RIPRAP APRON

Note: For Multiple Pipe Installations, * The Quantity is adjusted For End Section Width And Spacing Skew Angle

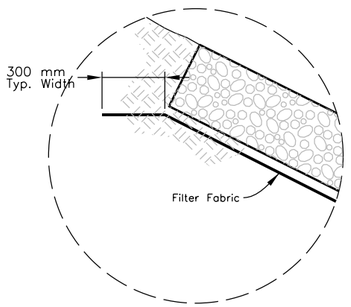


PLAN–SKEWED PIPES

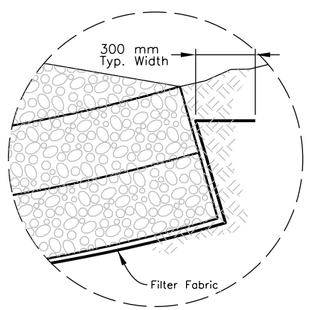
**Note: Divide X1, X2, Span or Diam. Wd1 & Wd2 Width by (1/ cos Skew Angel)



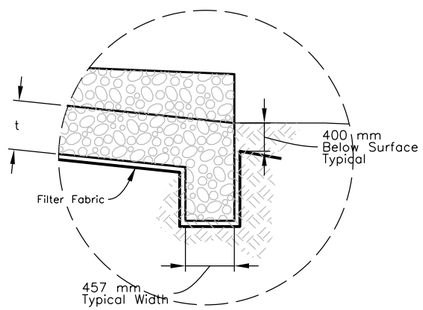
SECTION A–A



DETAIL–D3



DETAIL–D2



DETAIL–D1

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4401 MASTHEAD ST. NE. SUITE 150
ALBUQUERQUE, NM 87109
PHONE: 505-348-4000
FAX: 505-348-4072
www.wilsonco.com

Registered Professional Engineer (Civil) CERTIFICATE NO. 83225 MYRA K. CANDELARIA Date Signed ARIZONA, U.S.A.

REVISION	BY	DATE

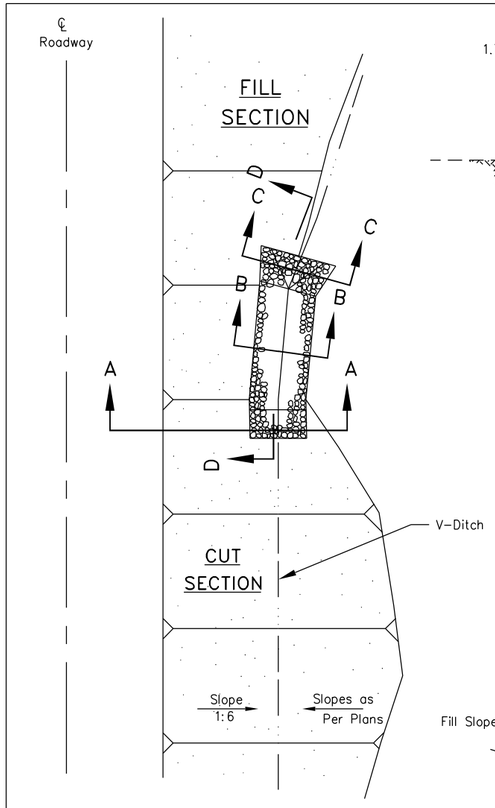
NAVAJO NATION
DIVISION OF TRANSPORTATION
NAVAJO D.O.T.

N9073(1) 1, 2 & 4

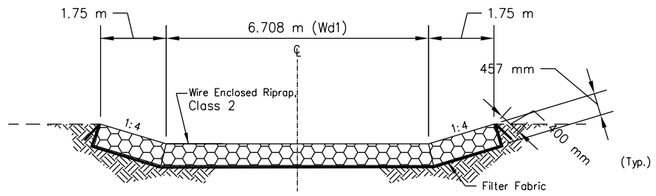
PLACED AND WIRE ENCLOSED RIPRAP APRON DETAIL

PROJECT MANAGER: DDM	DATE: 1/22	DRAWING	SHEET
LEAD DESIGNER: MLL	DATE: 1/22		
ASBUILT BY:	DATE: XXX		36A OF 84
SCALE: N/A			

STATE	PROJECT	SHEET NUMBER
AZ	N7054 (1) 2&4	36B

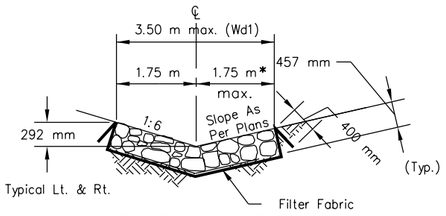


PLAN VIEW
CUT TO FILL TRANSITION
AT V-DITCH



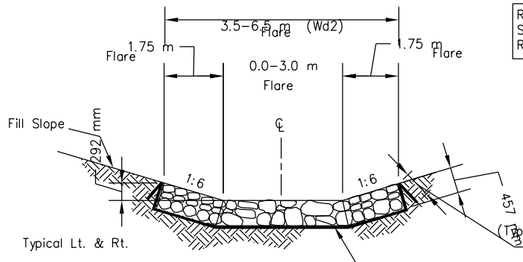
FLAT BOTTOM DITCH

Sta. 5+597 to 5+624 Lt. & 5+885 to 5+937 Lt.



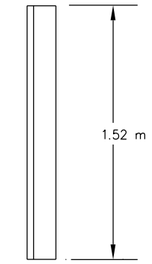
SECTION B-B

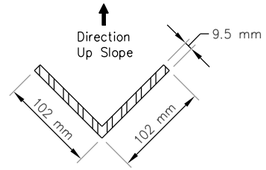
*Width=Depth Divided By Backslope(As Per Plans)



SECTION C-C

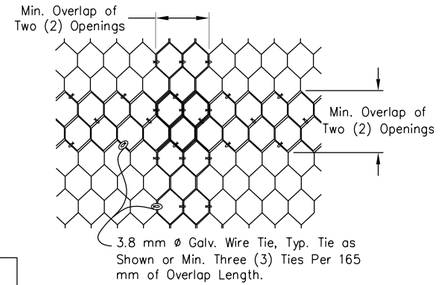
Refer To Notes On Plan & Profile Sheets For Location And Type of Riprap To Be Used.





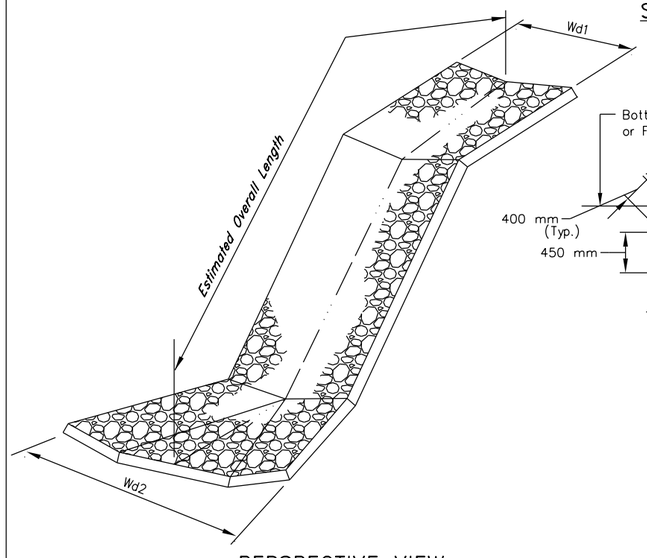
ANGLE IRON ANCHOR DETAIL

N.T.S.

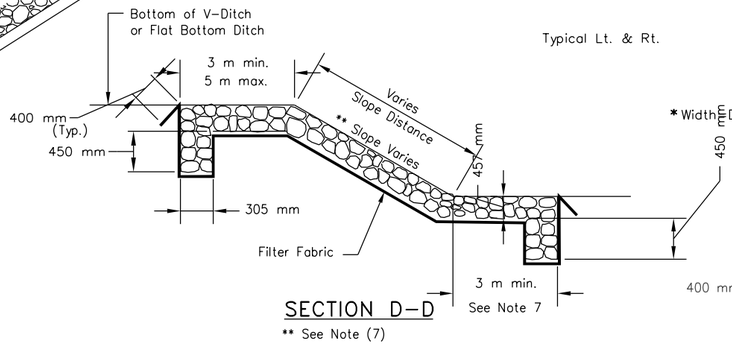


FABRIC SPLICING DETAIL

N.T.S.

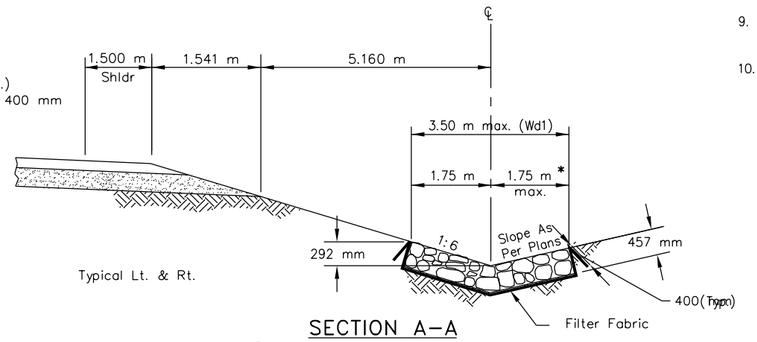


PERSPECTIVE VIEW
PLACED RIPRAP DOWNDRAIN/CUT TO FILL TRANSITIONS
AT V-DITCHES & WASHES



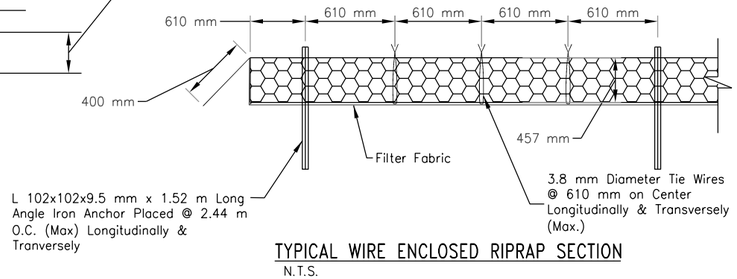
SECTION D-D

** See Note (7)



SECTION A-A

*Width=Depth Divided By Backslope (As Per Plans)



TYPICAL WIRE ENCLOSED RIPRAP SECTION

N.T.S.

GENERAL NOTES

1. Workmanship and Materials Shall Conform to the Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects (FP-14), Along with All Supplemental Specifications for This Project.
2. The Quantities Shown are Only an Estimate. Actual Quantities Shall Be Determined in the Field. The CM, and Contractor Shall Review All Rock Cut Areas After the Construction of Vee and/or Flat Bottom Ditches Have Been "Roughed In". If in the Opinion of the CM the Rock Cut Is Stable, the CM May Elect to Delete Sections of the Riprap. The Contractor Will Be Required to Make Adjustments to the Riprap as Necessary to Fit Actual Field Conditions. These Field Adjustments Will Be Incidental Obligations of the Contractor.
3. Ditch and Back Slope Reshaping, Cleaning, and Excavation Shall Be Done in Accordance with the Plans and as Determined By the CM. All Ditch Excavation, Cleaning, and Reshaping Shall Be Considered Incidental to Completion of the Structure. Riprap Shall Conform to Section 251 of FP-14, the Supplemental Specifications, and the Details Shown in These Construction Plans.
4. The Wire Fabric Shall Be Galvanized And Be Of The Configuration Shown On This Sheet. An Alternate Wire Fabric May Be Submitted For Review And Approval. Any Wire Fabric Used Shall Have A Minimum Wire Diameter Of 2.8 mm, A Class 3 Zinc Coating (Galvanized), Shall Have A Maximum Opening Dimension Of 100 mm, And Shall Not Allow A 75 mmø Sphere To Pass Through Wire Fabric Opening.
5. Embankment Below Riprap Shall Conform to Section 204 of FP-14. Excavation For Riprap Foundations Shall Conform to Section 209 of FP-14. All Embankment For Riprap Above Natural Ground Is Included in the Quantity For Item 20401-0000, Roadway Excavation, and Shall Be Paid For Under That Item. All Excavation For Riprap Construction Shall Be Considered Incidental to Riprap Bid Item.
6. Rock Size Shall Conform to FP-14, Section 705, Table 705-1, Class 2.
7. Riprap Downdrains Shall Be Carried Down Slope to the Intersection of the Fill Slope and Extended Until a 2% or Lower Slope Is Achieved Before Termination or as Directed by the CM.
8. Wire Enclosed Riprap Shall Be Anchored As Shown With L 102 mm x 102 mm x 9.5 mm Steel Angles Spaced At 2.44 m Each Way. Steel Angles Shall Extend 75 mm Above The Top Of The Mesh. In Rocky Areas, Drive Angle Iron Anchors To Refusal (Min. Embedded 500 mm), Then Cut At 75 mm Above Riprap. Anchors Shall Be Saw Cut To Leave A Smooth Edge. Do Not Use A Cutting Torch. Furnishing And Placement Of Steel Angles Shall Be Considered Incidental To Completion Of The Structure.
9. The Finished Surface of All Riprap Shall Be Set 30 mm Below the Ground Surface Except at Riprap Discharge Ends, Which Shall Be Set 30 mm Above the Ground Surface.
10. Filter Fabric Shall Be Installed Under All Riprap (Except Grouted Riprap And Check Dams) And Shall Conform To Section 714, And Shall Be Considered Incidental To Riprap Bid Items. Round All Sharp Contours As Required To Fit The Soil Erosion Material Flush With The Existing Ground.

WILSON &COMPANY
4401 MASTHEAD ST. NE, SUITE 150
ALBUQUERQUE, NM 87109
PHONE: 505-348-4000
FAX: 505-348-4072
www.wilsonco.com

Registered Professional Engineer (Civil)
CERTIFICATE NO.
83225
MYRA K. CANDELARIA
Date Signed
ARIZONA, U.S.A.

	REVISION	BY	DATE

NAVAJO D.O.T.

NAVAJO NATION
DIVISION OF TRANSPORTATION

N9073 (1)

RIPRAP LINED DITCH, DOWNDRAIN
& FLAT BOTTOM DITCH DETAILS

PROJECT MANAGER: DDM	DATE: 1/22	DRAWING	SHEET
LEAD DESIGNER: MLL	DATE: 1/22		
ASBUILT BY:	DATE: XXX		36B OF 84
SCALE: N/A			

STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	37A

GENERAL NOTES:

1. WORKMANSHIP AND MATERIALS SHALL CONFORM TO THE FP-14 SPECIFICATIONS
2. CONCRETE SHALL CONFORM TO SECTION 601 – MINOR CONCRETE STRUCTURES. CONCRETE SHALL BE CLASS A(AE). APPLY PENETRATING WATER REPELLENT.
3. REINFORCING STEEL (REBAR) SHALL CONFORM TO SECTION 554 – REINFORCING STEEL. REINFORCE CONCRETE BLANKETS WITH ONE (1) LAYER OF WELDED WIRE FABRIC. PLACE FABRIC IN THE CENTER OF THE CONCRETE BLANKET AND EXTEND INTO CUT-OFF WALL FULL DEPTH.
4. THE CORRUGATED METAL PIPE (CMP) SHALL BE ANCHORED TO THE BLANKET WITH A DOUBLE-NUTTED THREADED ROD. FOR SPACING AND LOCATION, SEE "ANCHOR LOCATION TABLE". BOLTS AND NUTS SHALL BE ZINC COATED.
5. INSTALL SWELLABLE HYDROPHILIC WATERSTOP AT THE PIPE TO BLANKET INTERFACE.
6. IN GENERAL, THESE STRUCTURES SHALL BE LOCATED OUT OF THE CLEAR ZONE. IF LOCATED IN THE CLEAR ZONE, THE DESIGN SHALL PROVIDE FOR APPROPRIATE BARRIER GUARD RAIL.
7. CULVERT PIPE DESIGNED FOR A MINIMUM OF 5'-0" AND A MAXIMUM OF 20'-0" COVER.
8. JOINT SEALANT SHALL BE PROVIDED AT CONTROL JOINTS AND SHALL CONFORM TO SECTION 712 – JOINT MATERIAL.
9. SKEW ANGLES IN INCREMENTS OF 5° FROM 0° TO 15° REQUIRES NO ADDITIONAL STEEL REINFORCEMENT.
10. FOR D AND ES SEE ROADWAY PLANS. WHEN EMBANKMENT SLOPE (ES) AT A STRUCTURE DIFFERS FROM THE ORDINARY ROADWAY EMBANKMENT SLOPE, THE CONTRACTOR WILL BE REQUIRED TO TRANSITION SLOPE AS SHOWN ON NMDOT STANDARD DRAWING 511-13-3/3.
11. FOR L, E, F, G, AND B SEE TABLE BELOW.

STRUCTURAL QUANTITIES

(QUANTITIES PROVIDED IN TABLE BELOW ARE FOR INFORMATIONAL PURPOSES ONLY AND SHOULD BE VERIFIED).

D (IN.)	L (FT.) ES:1		E (FT.)	F (IN.)	G (FT.)	B (FT.)	TOTAL VOLUME OF CONCRETE (CU.YDS.) SKEW ANGLE						WEIGHT OF REINFORCING (LBS.)	
							5° ES:1		10° ES:1		15° ES:1		ES:1	
	2	3					2	3	2	3	2	3	2	3
60	13.39	16.86	5	6	4	16	5.1	5.5	5.1	5.6	5.2	5.7	356.6	366.9
66	14.22	18.04	5	6	4	16.5	5.4	5.9	5.4	5.9	5.5	6.0	399.6	411.0
72	16.06	20.23	6	6	4	17	5.9	6.4	6.0	6.5	6.1	6.6	418.1	430.7
78	16.90	21.42	6	6	4	17.5	6.2	6.8	6.3	6.9	6.4	7.0	440.9	454.7
84	19.74	24.60	8	6	5	18	7.7	8.4	7.8	8.5	8.0	8.6	520.2	535.2
90	20.58	25.79	8	8	5	18.5	9.3	10.3	9.4	10.4	9.6	10.6	546.1	562.4
96	21.42	26.97	8	8	5	19	9.8	10.8	9.9	10.9	10.1	11.1	561.3	578.9
102	24.25	30.16	10	8	5	19.5	10.9	12.0	11.1	12.2	11.3	12.4	599.9	618.7
108	25.09	31.35	10	12	6	20	15.4	17.1	15.6	17.3	15.9	17.7	675.5	695.6
114	25.93	32.53	10	12	6	20.5	16.1	17.9	16.3	18.1	16.6	18.5	733.1	754.6
120	26.77	33.72	10	12	6	21	16.7	18.7	16.9	18.9	17.3	19.3	750.7	773.6

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4401 MASTHEAD ST. NE. SUITE 150
ALBUQUERQUE, NM 87109
PHONE: 505-348-4000
FAX: 505-348-4072
www.wilsonco.com

Registered Professional Engineer (Cond) CERTIFICATE NO. 53225 MYRA K. CANDELARIA Date Signed 12/31/2022 ARIZONA, U.S.A.

	REVISION	BY	DATE

NAVAJO D.O.T.

NAVAJO NATION
DIVISION OF TRANSPORTATION

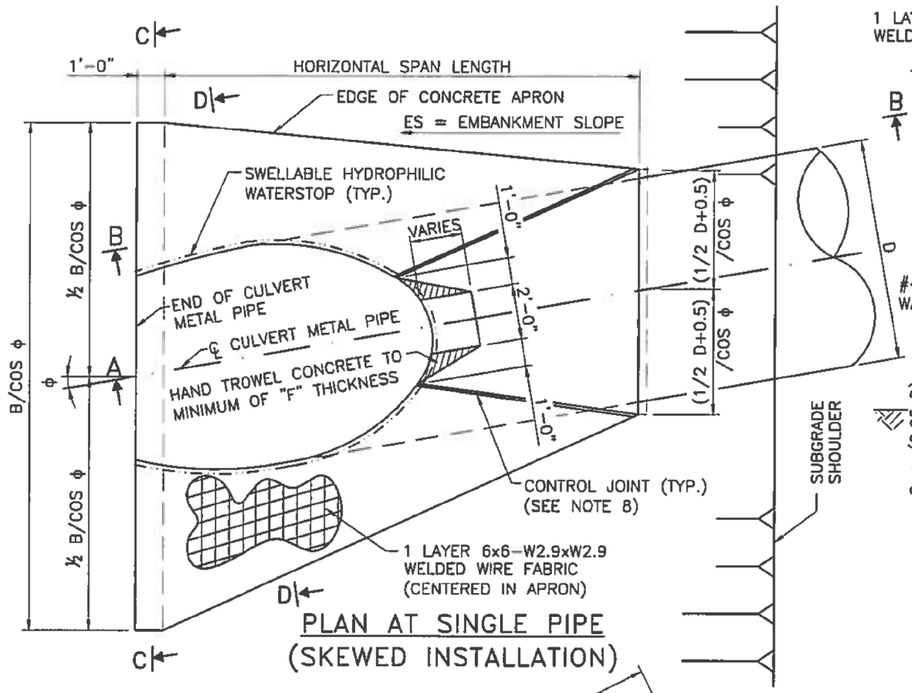
N9073(1) 1, 2 & 4

SINGLE CIRCULAR METAL PIPE
CONCRETE BLANKET
AND CUTOFF WALL
60" - 120" DIAMETER PIPE
(5' TO 15' SKEW)

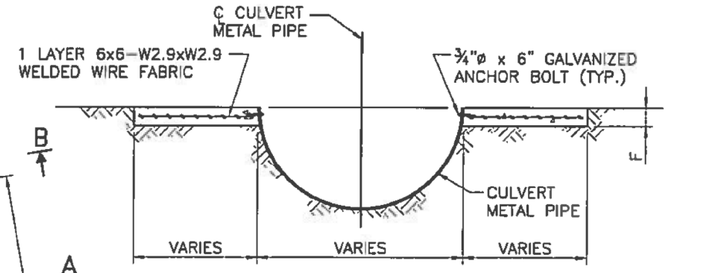
NMDOT STD. DWG. 511-26-1/2

PROJECT MANAGER: DDM	DATE: 1/22	DRAWING	SHEET
LEAD DESIGNER: MLL	DATE: 1/22		
ASBUILT BY:	DATE: XXX		37A OF 84
SCALE: N/A			

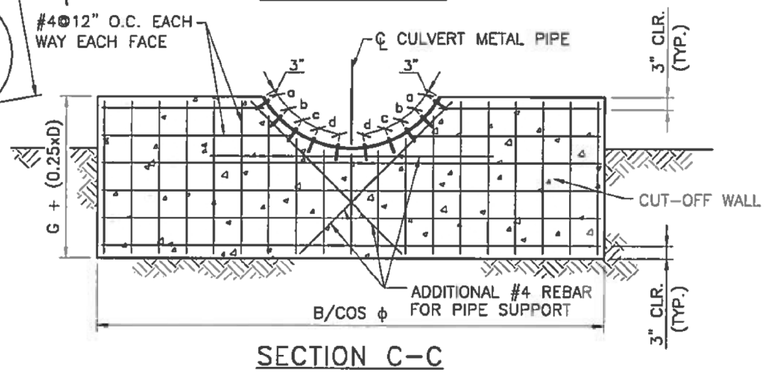
STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	37B



PLAN AT SINGLE PIPE (SKEWED INSTALLATION)



SECTION D–D



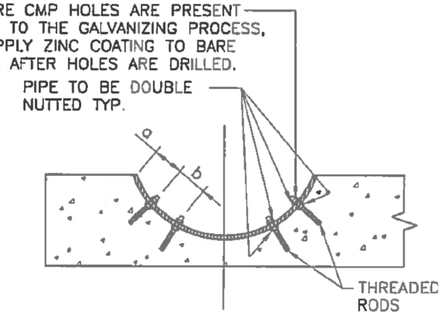
SECTION C–C

LOCATION OF ANCHOR BOLTS AT CUT–OFF WALL/CULVERT PIPE				
D (IN.)	a (IN.)	b (IN.)	c (IN.)	d (IN.)
60	12	12	N/A	N/A
66	12	12	N/A	N/A
72	12	15	N/A	N/A
78	12	15	N/A	N/A
84	12	12	12	N/A
90	12	12	15	N/A
96	12	15	15	N/A
102	15	15	15	N/A
108	15	15	15	N/A
114	12	12	12	15
120	12	12	15	15

ANCHOR LOCATION TABLE

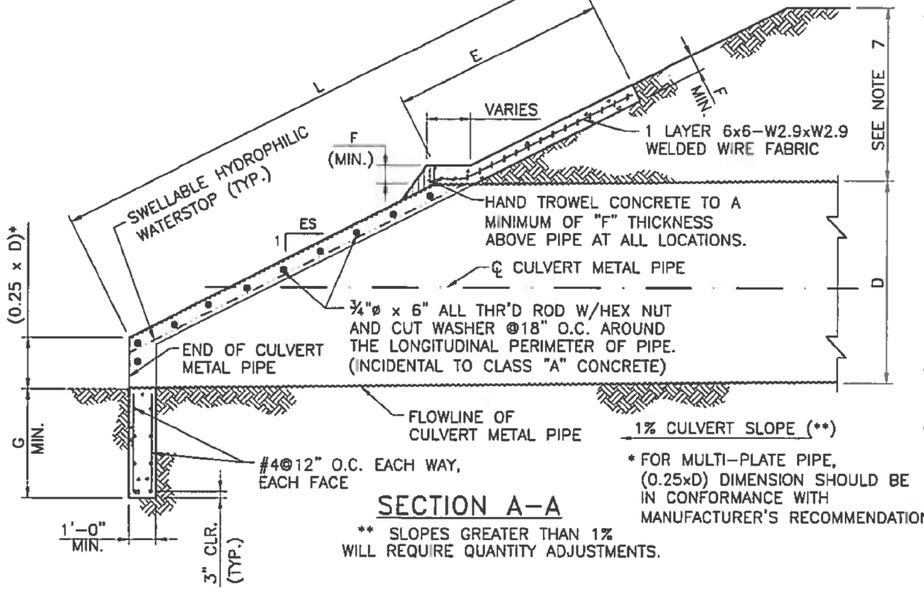
(D IS THE DIAMETER OF CULVERT PIPE OR THE SPAN OF ARCHED PIPE.)

ENSURE CMP HOLES ARE PRESENT PRIOR TO THE GALVANIZING PROCESS, OR APPLY ZINC COATING TO BARE METAL AFTER HOLES ARE DRILLED.



ANCHOR DETAIL

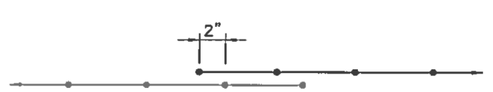
THIS STANDARD DRAWING IS FOR USE ON NMDOT PROJECTS. OTHERS WHO USE THE NMDOT STANDARD DRAWINGS DO SO AT THEIR OWN RISK. STANDARD DRAWINGS THAT ARE APPLICABLE TO A SPECIFIC PROJECT WILL BE IDENTIFIED ON THE PROJECT PLANS BUT WILL NOT BE PHYSICALLY INCLUDED IN THOSE PLANS. THE DESIGNER WHO SPECIFIES A STANDARD DRAWING ACCEPTS THE RESPONSIBILITY OF DETERMINING THEIR APPLICABILITY.



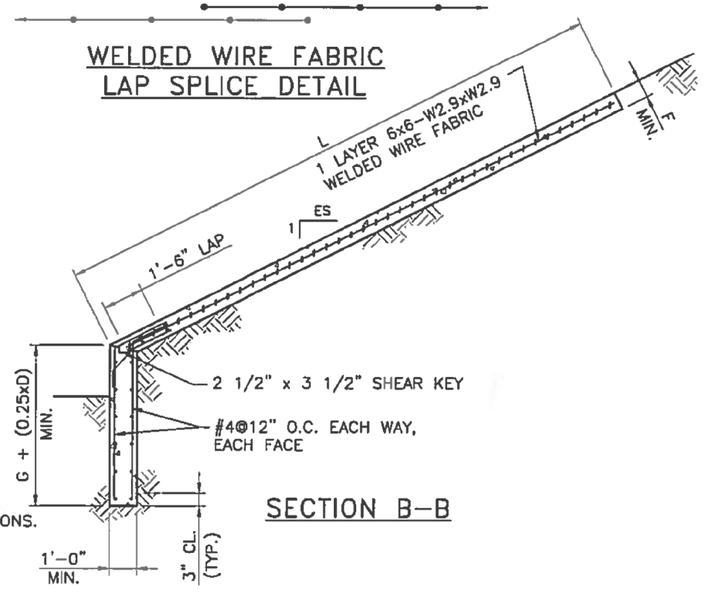
SECTION A–A

** SLOPES GREATER THAN 1% WILL REQUIRE QUANTITY ADJUSTMENTS.

* FOR MULTI–PLATE PIPE, (0.25xD) DIMENSION SHOULD BE IN CONFORMANCE WITH MANUFACTURER'S RECOMMENDATIONS.



WELDED WIRE FABRIC LAP SPLICE DETAIL



SECTION B–B

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4401 MASTHEAD ST. NE. SUITE 150
ALBUQUERQUE, NM 87109
PHONE: 505-348-4000
FAX: 505-348-4072
www.wilsonco.com

Registered Professional Engineer (Civil) CERTIFICATE NO. 63225 MYRA K. CANDELARIA Date Signed 09/30/22 ARIZONA, U.S.A.

	REVISION	BY	DATE

NAVAJO NATION DIVISION OF TRANSPORTATION

NAVAJO D.O.T.

N9073(1) 1, 2 & 4

SINGLE CIRCULAR METAL PIPE CONCRETE BLANKET AND CUTOFF WALL
60" - 120" DIAMERTER PIPE (5 TO 15 SKEW)

PROJECT MANAGER: DDM	DATE: 1/22	DRAWING	SHEET
LEAD DESIGNER: MLL	DATE: 1/22		
ASBUILT BY:	DATE: XXX		37B OF 84
SCALE: N/A			

NMDOT STD. DWG. 511-26-2/2

STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	37C

GENERAL NOTES:

1. WORKMANSHIP AND MATERIALS SHALL CONFORM TO THE FP-14 SPECIFICATIONS
2. CONCRETE SHALL CONFORM TO SECTION 601 – MINOR CONCRETE STRUCTURES. CONCRETE SHALL BE CLASS A(AE). APPLY PENETRATING WATER REPELLENT.
3. REINFORCING STEEL (REBAR) SHALL CONFORM TO SECTION 554 – REINFORCING STEEL. REINFORCE CONCRETE BLANKETS WITH ONE (1) LAYER OF WELDED WIRE FABRIC. PLACE FABRIC IN THE CENTER OF THE CONCRETE BLANKET AND EXTEND INTO CUT-OFF WALL FULL DEPTH.
4. THE CORRUGATED METAL PIPE (CMP) SHALL BE ANCHORED TO THE BLANKET WITH A DOUBLE-NUTTED THREADED ROD. FOR SPACING AND LOCATION, SEE "ANCHOR LOCATION TABLE". BOLTS AND NUTS SHALL BE ZINC COATED.
5. INSTALL SWELLABLE HYDROPHILIC WATERSTOP AT THE PIPE TO BLANKET INTERFACE.
6. IN GENERAL, THESE STRUCTURES SHALL BE LOCATED OUT OF THE CLEAR ZONE. IF LOCATED IN THE CLEAR ZONE, THE DESIGN SHALL PROVIDE FOR APPROPRIATE BARRIER GUARD RAIL.
7. CULVERT PIPE DESIGNED FOR A MINIMUM OF 5'-0" AND A MAXIMUM OF 20'-0" COVER.
8. JOINT SEALANT SHALL BE PROVIDED AT CONTROL JOINTS AND SHALL CONFORM TO SECTION 712 – JOINT MATERIAL.
9. SKEW ANGLES IN INCREMENTS OF 5° FROM 0° TO 15° REQUIRES NO ADDITIONAL STEEL REINFORCEMENT.
10. FOR D AND ES SEE ROADWAY PLANS. WHEN EMBANKMENT SLOPE (ES) AT A STRUCTURE DIFFERS FROM THE ORDINARY ROADWAY EMBANKMENT SLOPE, THE CONTRACTOR WILL BE REQUIRED TO TRANSITION SLOPE AS SHOWN ON STANDARD DRAWING 511-13-3/3.
11. FOR L, E, F, G, AND C SEE TABLE TOP RIGHT.

STRUCTURAL QUANTITIES

(QUANTITIES PROVIDED IN TABLE BELOW ARE FOR INFORMATIONAL PURPOSES ONLY AND SHOULD BE VERIFIED).

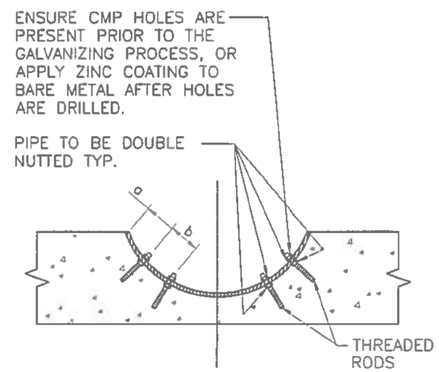
D (IN.)	L (FT.) ES:1		E (FT.)	F (IN.)	G (FT.)	B (FT.)	C (FT.)	TOTAL VOLUME CONCRETE (CU.YDS.) SKEW ANGLE 5° ES:1		10° ES:1		15° ES:1		WEIGHT OF REINFORCING (LBS.) ES:1	
	2	3						2	3	2	3	2	3	2	3
60	13.39	16.86	5	6	4	24	3	7.8	8.5	7.9	8.6	8.1	8.8	553.4	569.3
66	14.22	18.04	5	6	4	25	3	8.3	9.1	8.4	9.2	8.6	9.4	617.1	634.9
72	16.06	20.23	6	6	4	26	3	9.3	10.1	9.4	10.2	9.6	10.4	659.0	678.8
78	16.90	21.42	6	6	4	27	3	9.8	10.7	10.0	10.9	10.2	11.1	692.8	714.5
84	19.74	24.60	8	6	5	29	4	12.9	14.0	13.1	14.2	13.4	14.5	862.7	888.5
90	20.58	25.79	8	8	5	30	4	15.8	17.4	16.0	17.6	16.3	18.0	901.5	929.6
96	21.42	26.97	8	8	5	31	4	16.6	18.3	16.9	18.6	17.2	19.0	940.8	971.1
102	24.25	30.16	10	8	5	33	5	19.6	21.6	19.9	21.9	20.3	22.4	1,035.6	1,070.7
108	25.09	31.35	10	12	6	34	5	27.9	31.2	28.4	31.6	28.9	32.2	1,179.1	1,216.7
114	25.93	32.53	10	12	6	35	5	29.2	32.6	29.7	33.1	30.2	33.8	1,271.9	1,312.1
120	26.77	33.72	10	12	6	36	5	30.5	34.1	30.9	34.6	31.5	35.3	1,318.6	1,361.3

LOCATION OF ANCHOR BOLTS AT CUT-OFF WALL/CULVERT PIPE

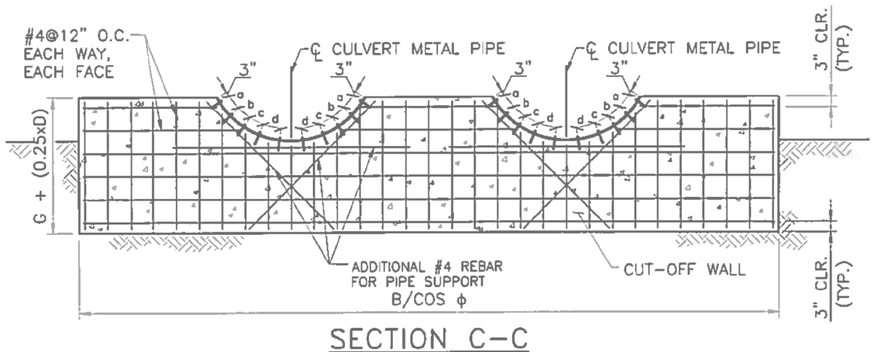
D (IN.)	a (IN.)	b (IN.)	c (IN.)	d (IN.)
60	12	12	N/A	N/A
66	12	12	N/A	N/A
72	12	15	N/A	N/A
78	12	15	N/A	N/A
84	12	12	12	N/A
90	12	12	15	N/A
96	12	15	15	N/A
102	15	15	15	N/A
108	15	15	15	N/A
114	12	12	12	15
120	12	12	15	15

ANCHOR LOCATION TABLE

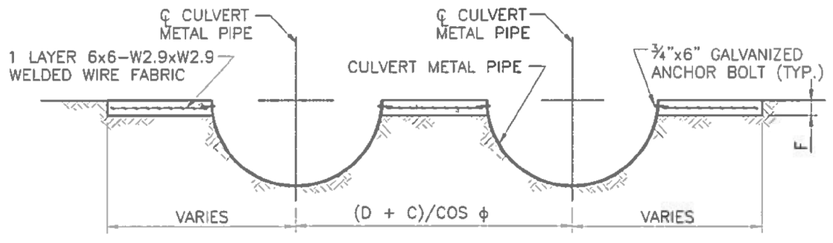
(D IS THE DIAMETER OF CULVERT PIPE OR THE SPAN OF ARCHED PIPE.)



ANCHOR DETAIL



SECTION C-C



SECTION D-D

WILSON & COMPANY
4401 MASTHEAD ST. NE. SUITE 150
ALBUQUERQUE, NM 87109
PHONE: 505-348-4000
FAX: 505-348-4072
www.wilsonco.com

Registered Professional Engineer (Civil) CERTIFICATE NO. 83225 MYRA K. CANDELARIA Date Signed ARIZONA, U.S.A.

	REVISION	BY	DATE

NAVAJO NATION
DIVISION OF TRANSPORTATION

NAVAJO D.Q.T.

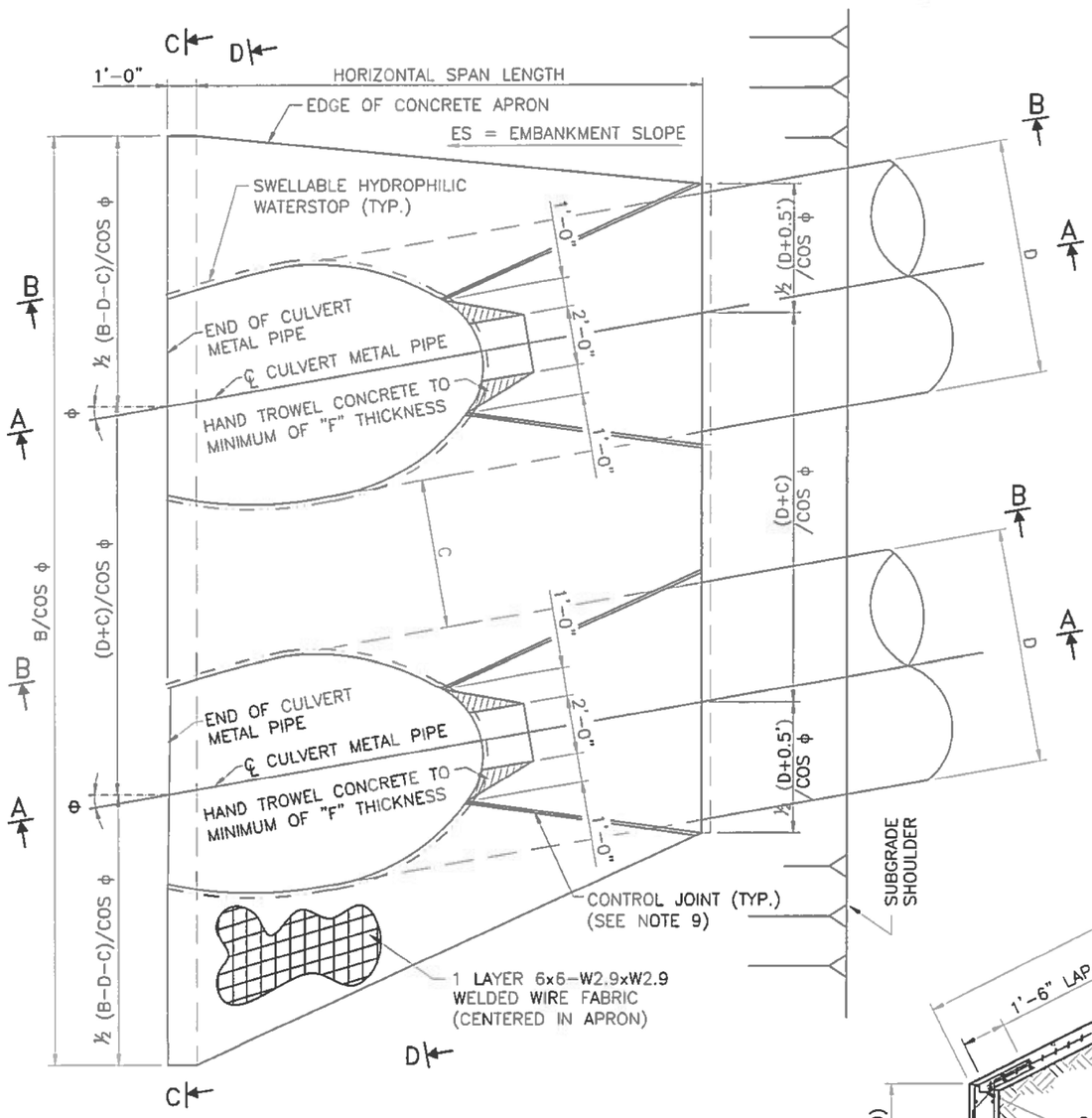
N9073(1) 1, 2 & 4

DOUBLE CIRCULAR METAL PIPE
CONCRETE BLANKET
AND CUTOFF WALL
60" - 120" DIAMETER PIPE
(5° TO 15° SKEW)

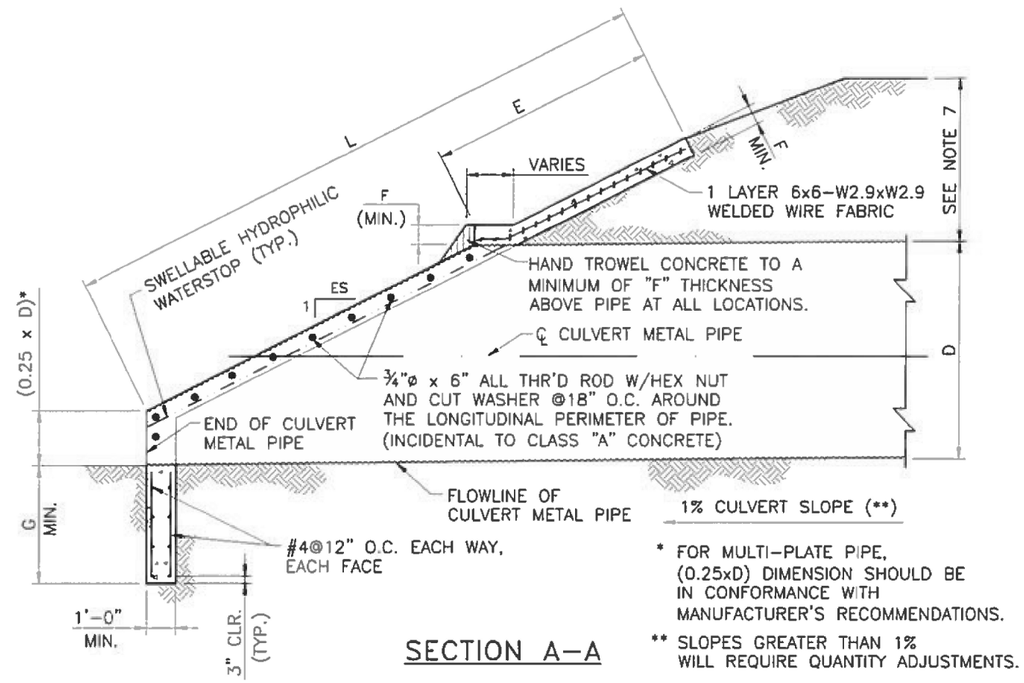
PROJECT MANAGER: DDM	DATE: 1/22	DRAWING	SHEET
LEAD DESIGNER: MLL	DATE: 1/22		
ASBUILT BY:	DATE: XXX		
SCALE: N/A			37C OF 84

NMDOT STD. DWG. 511-28-1/2

STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	37D



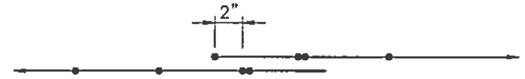
PLAN AT DOUBLE PIPE
(SKEWED INSTALLATION)



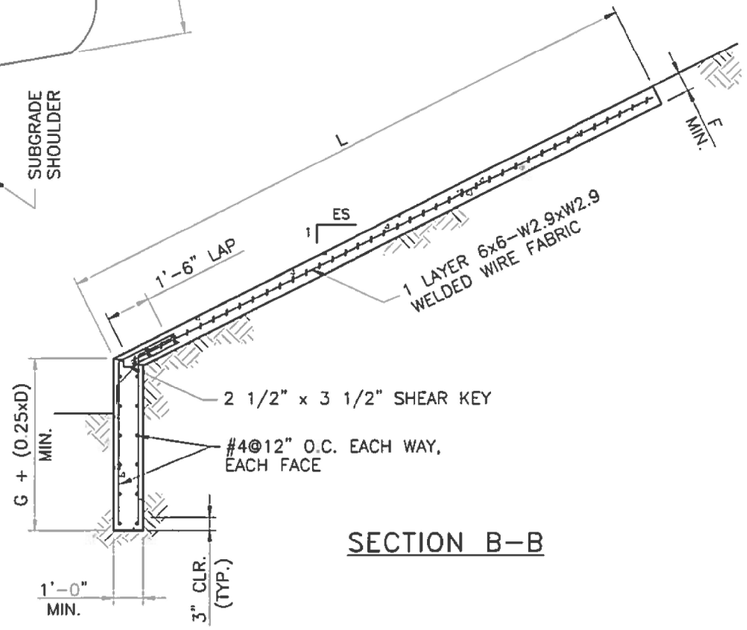
SECTION A-A

* FOR MULTI-PLATE PIPE, (0.25xD) DIMENSION SHOULD BE IN CONFORMANCE WITH MANUFACTURER'S RECOMMENDATIONS.

** SLOPES GREATER THAN 1% WILL REQUIRE QUANTITY ADJUSTMENTS.



WELDED WIRE FABRIC
LAP SPLICE DETAIL



SECTION B-B

WILSON & COMPANY
4401 MASTHEAD ST. NE. SUITE 150
ALBUQUERQUE, NM 87109
PHONE: 505-348-4000
FAX: 505-348-4072
www.wilsonco.com

Registered Professional Engineer (Civil) CERTIFICATE NO. 83225 MYRA K. CANDELARIA Date Signed 06/30/22 ARIZONA, U.S.A.

REVISION	BY	DATE

NAVAJO NATION
DIVISION OF TRANSPORTATION

NAVAJO D.O.T.

N9073(1) 1, 2 & 4

DOUBLE CIRCULAR METAL PIPE
CONCRETE BLANKET AND CUTOFF WALL
60" - 120" DIAMETER PIPE (5 TO 15 SKEW)

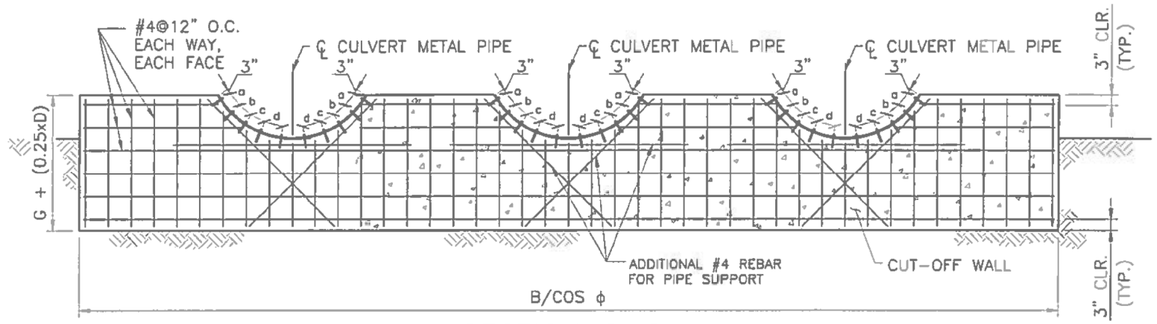
PROJECT MANAGER: DDM	DATE: 1/22	DRAWING	SHEET
LEAD DESIGNER: MLL	DATE: 1/22		
ASBUILT BY:	DATE: XXX		37D OF 84
SCALE: N/A			

NMDOT STD. DWG.
511-28-2/2

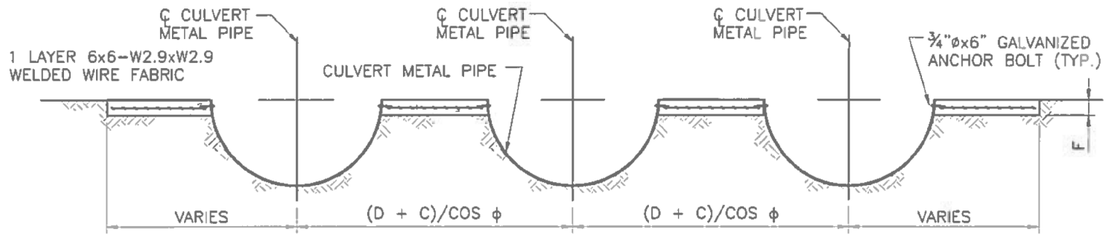
STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	37E

GENERAL NOTES:

1. WORKMANSHIP AND MATERIALS SHALL CONFORM TO THE FP-14 SPECIFICATIONS
2. CONCRETE SHALL CONFORM TO SECTION 601 – MINOR CONCRETE STRUCTURES. CONCRETE SHALL BE CLASS A(AE). APPLY PENETRATING WATER REPELLENT.
3. REINFORCING STEEL (REBAR) SHALL CONFORM TO SECTION 554 – REINFORCING STEEL. REINFORCE CONCRETE BLANKETS WITH ONE (1) LAYER OF WELDED WIRE FABRIC. PLACE FABRIC IN THE CENTER OF THE CONCRETE BLANKET AND EXTEND INTO CUT-OFF WALL FULL DEPTH.
4. THE CORRUGATED METAL PIPE (CMP) SHALL BE ANCHORED TO THE BLANKET WITH A DOUBLE-NUTTED THREADED ROD. FOR SPACING AND LOCATION, SEE "ANCHOR LOCATION TABLE". BOLTS AND NUTS SHALL BE ZINC COATED.
5. INSTALL SWELLABLE HYDROPHILIC WATERSTOP AT THE PIPE TO BLANKET INTERFACE.
6. IN GENERAL, THESE STRUCTURES SHALL BE LOCATED OUT OF THE CLEAR ZONE. IF LOCATED IN THE CLEAR ZONE, THE DESIGN SHALL PROVIDE FOR APPROPRIATE BARRIER GUARD RAIL.
7. CULVERT PIPE DESIGNED FOR A MINIMUM OF 5'-0" AND A MAXIMUM OF 20'-0" COVER.
8. JOINT SEALANT SHALL BE PROVIDED AT CONTROL JOINTS AND SHALL CONFORM TO SECTION 712 – JOINT MATERIAL.
9. SKEW ANGLES IN INCREMENTS OF 5° FROM 0° TO 15° REQUIRES NO ADDITIONAL STEEL REINFORCEMENT.
10. FOR D AND ES SEE ROADWAY PLANS. WHEN EMBANKMENT SLOPE (ES) AT A STRUCTURE DIFFERS FROM THE ORDINARY ROADWAY EMBANKMENT SLOPE, THE CONTRACTOR WILL BE REQUIRED TO TRANSITION SLOPE AS SHOWN ON STANDARD DRAWING.
11. FOR L, E, F, G, B, AND C SEE TABLE BELOW.



SECTION C-C



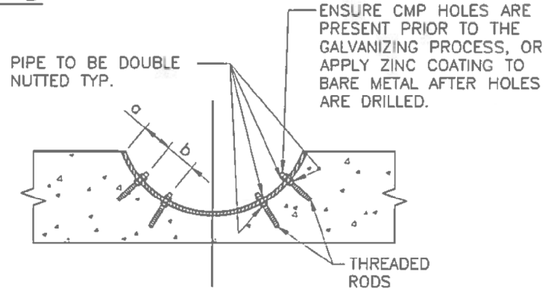
SECTION D-D

LOCATION OF ANCHOR BOLTS AT CUT-OFF WALL/CULVERT PIPE

D (IN.)	a (IN.)	b (IN.)	c (IN.)	d (IN.)
60	12	12	N/A	N/A
66	12	12	N/A	N/A
72	12	15	N/A	N/A
78	12	15	N/A	N/A
84	12	12	12	N/A
90	12	12	15	N/A
96	12	15	15	N/A
102	15	15	15	N/A
108	15	15	15	N/A
114	12	12	12	15
120	12	12	15	15

ANCHOR LOCATION TABLE

(D IS THE DIAMETER OF CULVERT PIPE OR THE SPAN OF ARCHED PIPE.)



ANCHOR DETAIL

STRUCTURAL QUANTITIES

(QUANTITIES PROVIDED IN TABLE BELOW ARE FOR INFORMATIONAL PURPOSES ONLY AND SHOULD BE VERIFIED).

D (IN.)	L (FT.) ES:1		E (FT.)	F (IN.)	G (FT.)	B (FT.)	C (FT.)	TOTAL VOLUME CONCRETE (CU.YDS.) SKEW ANGLE						WEIGHT OF REINFORCING (LBS.) ES:1	
								5° ES:1		10° ES:1		15° ES:1			
	2	3						2	3	2	3	2	3	2	3
60	13.39	16.86	5	6	4	32	3	10.6	11.5	10.7	11.6	10.9	11.9	750.1	771.8
66	14.22	18.04	5	6	4	33.5	3	11.3	12.4	11.5	12.5	11.7	12.8	843.5	867.8
72	16.06	20.23	6	6	4	35	3	12.7	13.6	12.8	14.0	13.1	14.2	900.0	926.9
78	16.90	21.42	6	6	4	36.5	3	13.5	14.7	13.6	14.9	13.9	15.2	953.9	983.5
84	19.74	24.60	8	6	5	40	4	18.2	19.7	18.4	20.0	18.8	20.4	1,205.3	1,241.9
90	20.58	25.79	8	8	5	41.5	4	22.3	24.6	22.6	24.9	23.1	25.4	1,268.0	1,307.7
96	21.42	26.97	8	8	5	43	4	23.5	26.0	23.8	26.3	24.3	26.8	1,320.3	1,363.3
102	24.25	30.16	10	8	5	46.5	5	28.4	31.4	28.8	31.7	29.3	32.4	1,482.8	1,534.1
108	25.09	31.35	10	12	6	48	5	40.7	45.4	41.2	45.9	42.0	46.8	1,682.8	1,737.8
114	25.93	32.53	10	12	6	49.5	5	42.6	47.6	43.0	48.1	43.9	49.1	1,823.8	1,882.6
120	26.77	33.72	10	12	6	51	5	44.4	49.8	44.9	50.4	45.8	51.4	1,886.5	1,949.1

NMDOT STD. DWG. 511-30-1/2

WILSON & COMPANY
4401 MASTHEAD ST. NE. SUITE 150
ALBUQUERQUE, NM 87109
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Registered Professional Engineer (Civil) CERTIFICATE NO. 83225 MYRA K. CANDELARIA Date Signed 09/30/22 ARIZONA, U.S.A.

REVISION	BY	DATE

NAVAJO NATION DIVISION OF TRANSPORTATION

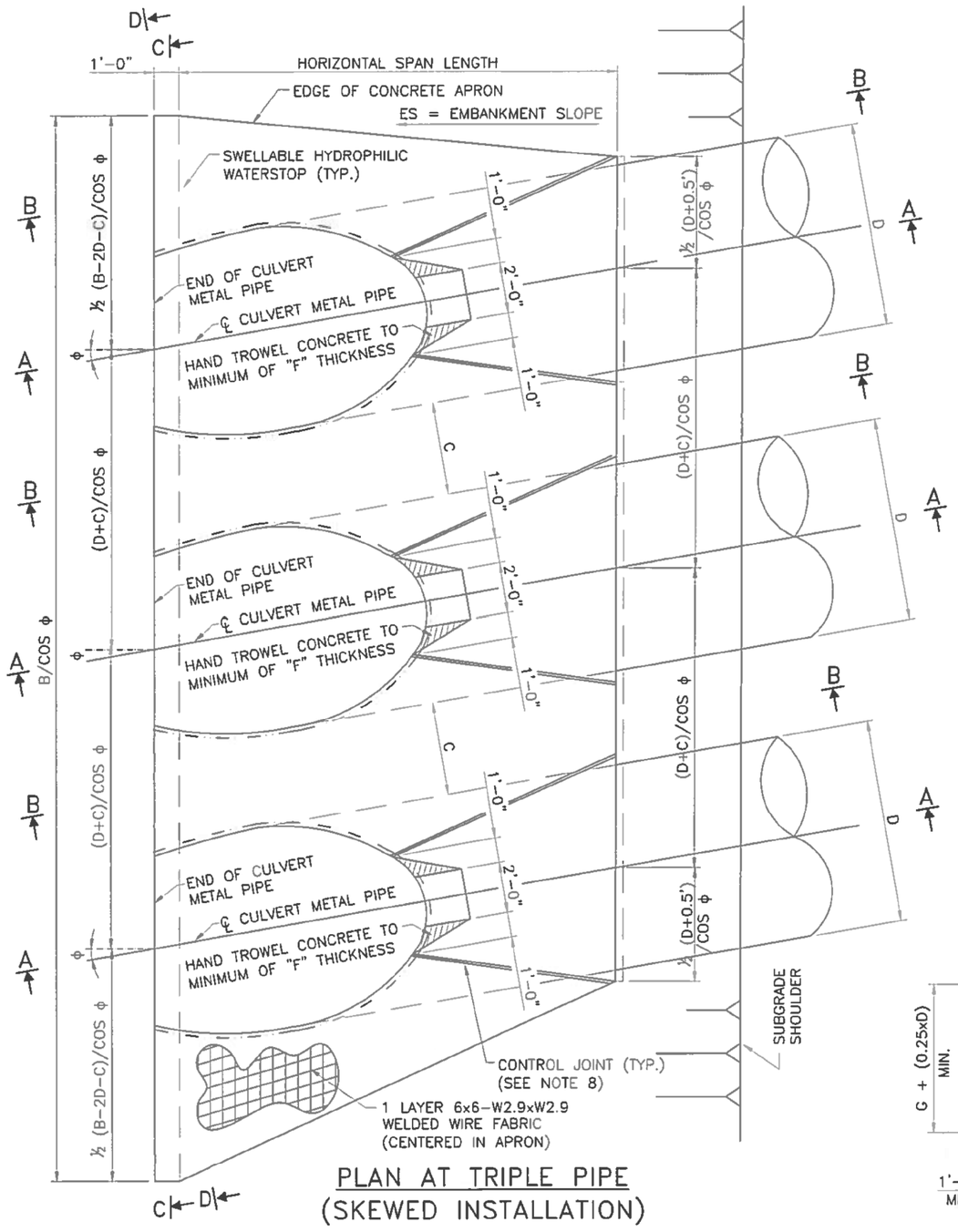
NAVAJO D.O.T.

N9073(1) 1, 2 & 4

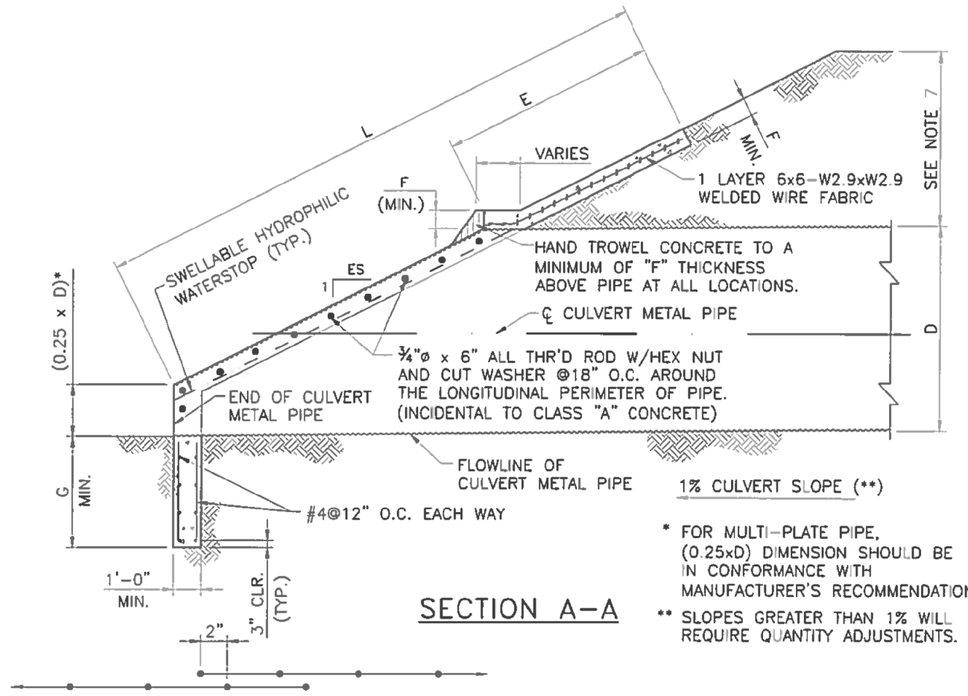
TRIPLE CIRCULAR METAL PIPE CONCRETE BLANKET AND CUTOFF WALL 60" - 120" DIAMETER PIPE (5 TO 15 SKEW)

PROJECT MANAGER: DDM	DATE: 1/22	DRAWING	SHEET
LEAD DESIGNER: MLL	DATE: 1/22		
ASBUILT BY:	DATE: XXX		
SCALE: N/A			37E OF 84

STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	37F



PLAN AT TRIPLE PIPE
(SKEWED INSTALLATION)

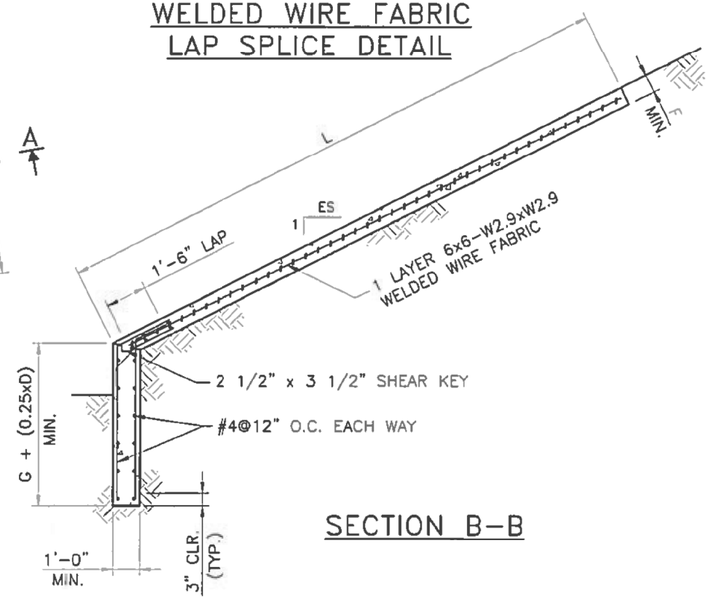


SECTION A-A

* FOR MULTI-PLATE PIPE, (0.25xD) DIMENSION SHOULD BE IN CONFORMANCE WITH MANUFACTURER'S RECOMMENDATIONS.

** SLOPES GREATER THAN 1% WILL REQUIRE QUANTITY ADJUSTMENTS.

WELDED WIRE FABRIC
LAP SPLICE DETAIL



SECTION B-B

NMDOT STD. DWG.
511-30-2/2

WILSON & COMPANY
4401 MASTHEAD ST. NE. SUITE 150
ALBUQUERQUE, NM 87109
PHONE: 505-348-4000
FAX: 505-348-4072
www.wilsonco.com

Registered Professional Engineer (Civil)
CERTIFICATE NO. 83225
MYRA K. CANDELARIA
Date Signed
ARIZONA, U.S.A.

	REVISION	BY	DATE

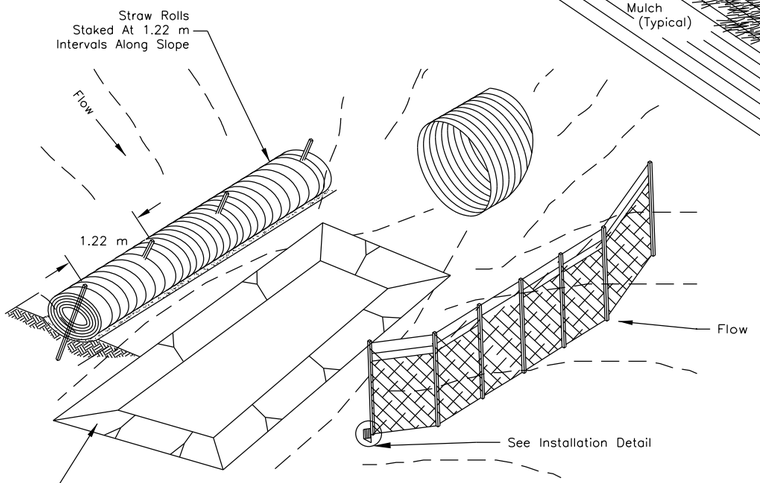
NAVAJO NATION
DIVISION OF TRANSPORTATION
NAVAJO D.O.T.

N9073(1) 1, 2 & 4

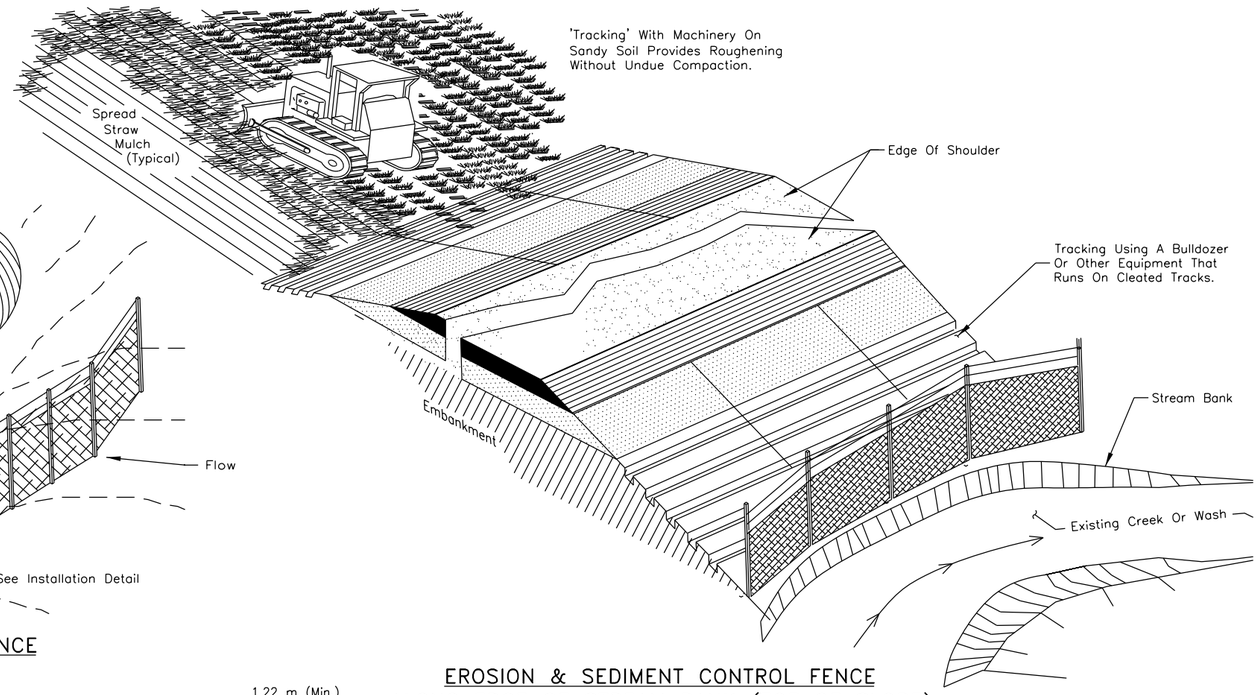
TRIPLE CIRCULER METAL PIPE
CONCRETE BLANKET
AND CUTOFF WALL
60" - 230" DIAMETER PIPE
(5° TO 15° SKEW)

PROJECT MANAGER: DDM	DATE: 1/22	DRAWING	SHEET
LEAD DESIGNER: MLL	DATE: 1/22		
ASBUILT BY:	DATE: XXX		37F OF 84
SCALE: N/A			

STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	39



EROSION & SEDIMENT CONTROL FENCE AT DRAINAGE STRUCTURE

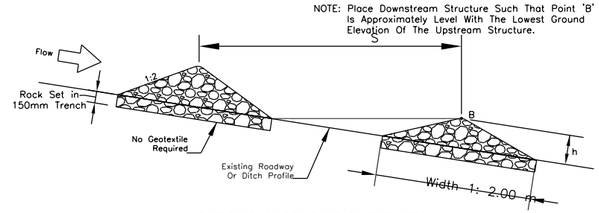


EROSION & SEDIMENT CONTROL FENCE ALONG EDGE OF STREAM BANK (TOE OF SLOPE)

CHECK DAM NOTES

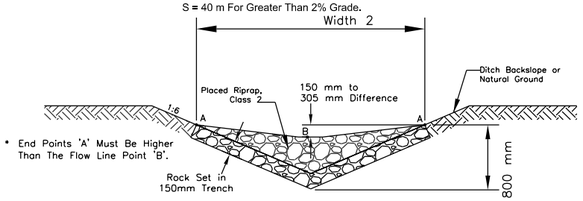
1. Workmanship And Materials Shall Conform To The Standard Specifications For Construction Of Roads And Bridges On Federal Highway Projects (FP-14) Along With All Supplemental Specifications For This Project.
2. Riprap Check Dams Shall Be Placed Prior To Cross Scarifying The Existing Road Bed To Prevent Recompacting The Road Bed During Check Dam Placement. The Check Dam Stations Given Are Approximate. The CM Shall Adjust As Necessary To Fit Field Conditions.
3. If In The Opinon Of The CM, The Existing Road Bed (During Scarfying) Is Rock Material And Not Prone To Erosion, The Check Dams May Be Deleted Or Relocated To More Erosive Sections Of The Existing Road Bed. All Riprap Field Adjustments Are Incidental Obligations Of The Contractor.
4. Check Dam Riprap Quantities Shown Are Approximate. Actual Quantities Shall Be Determined By Field Measurement.
5. Ditches And Backslope Reshaping, Cleaning, And Excavation Shall Be Done In Accordance With The Plans And As Determined By The CM. All Ditch Excavation, Cleaning, And Reshaping Shall Be Considered Incidental To Completion Of The Structure.
6. All Stone For Placed Riprap To Be Class 2 Meeting The Grading Requirements Of Table 705-1, And Section 251 Of The FP-14.

NOTE: Place Downstream Structure Such That Point 'B' Is Approximately Level With The Lowest Ground Elevation Of The Upstream Structure.



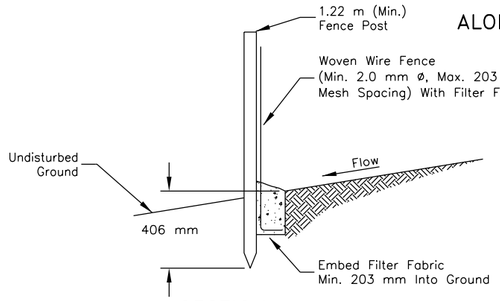
CHECK DAM SPACING GUIDELINES

S = 60 m For 2% & Less Grade.
S = 40 m For Greater Than 2% Grade.

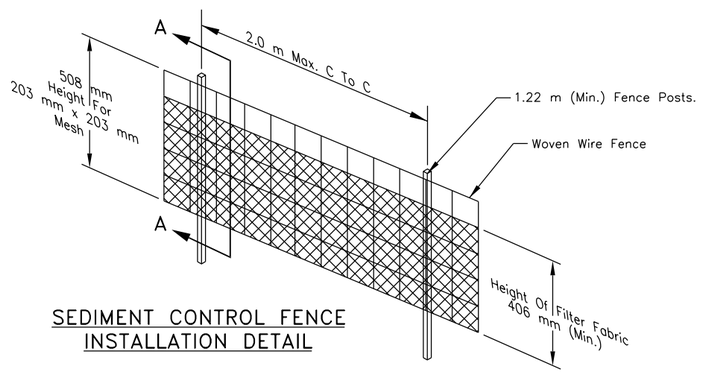


CROSS SECTION DETAILS FOR V DITCH

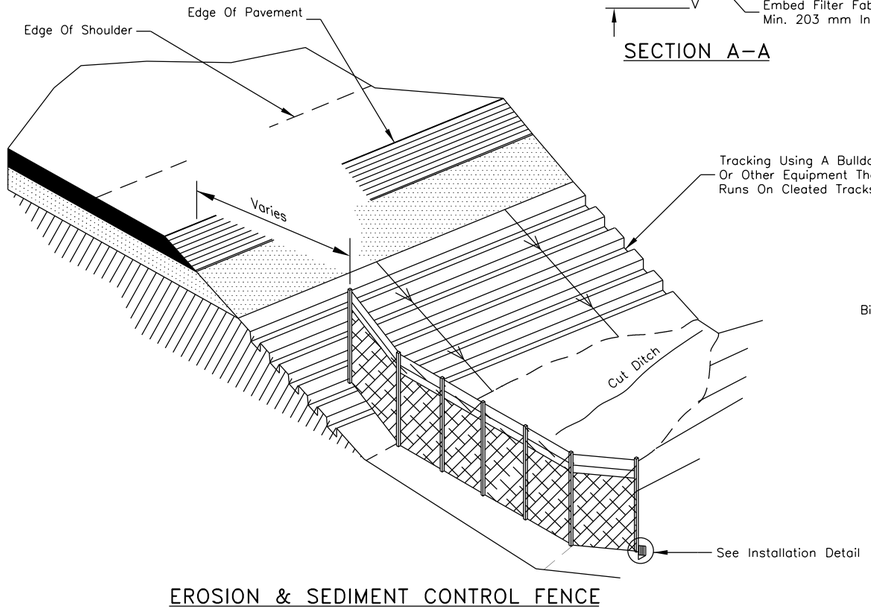
*If required to maintain the 150mm minimum height of the top edge of the check dam (at back slopes) above the check dam flow line, the Contractor shall place embankment material as directed by the CM. This work shall be incidental to the riprap bid items and no additional payment will be made.



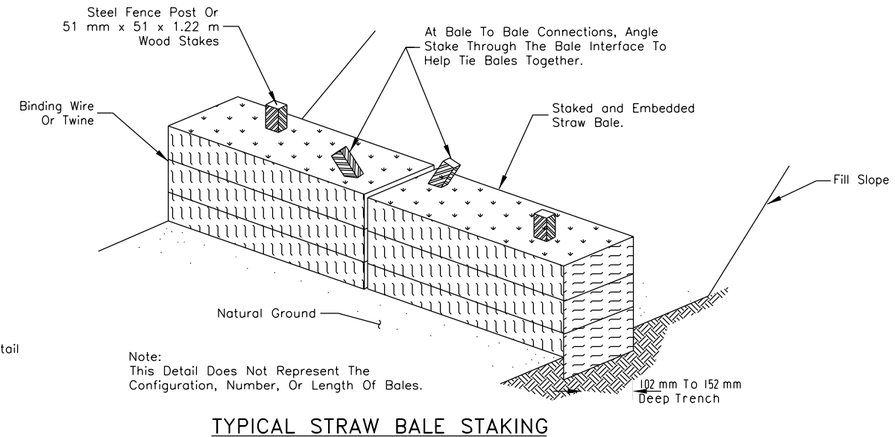
SECTION A–A



SEDIMENT CONTROL FENCE INSTALLATION DETAIL



EROSION & SEDIMENT CONTROL FENCE IN MINOR SWALES OR CUT DITCHES (APPROX. 60 m SPACING FOR FABRIC)



Note:
This Detail Does Not Represent The Configuration, Number, Or Length Of Bales.

TYPICAL STRAW BALE STAKING AND TRENCHING DETAIL

WILSON & COMPANY
4401 MASTHEAD ST. NE. SUITE 150
ALBUQUERQUE, NM 87109
PHONE: 505-348-4000
FAX: 505-348-4072
www.wilsonco.com

Registered Professional Engineer (Civil) CERTIFICATE NO. 83225 MYRA K. CANDELARIA Date Signed 06/30/22 ARIZONA, U.S.A.

	REVISION	BY	DATE

NAVAJO D.O.T.

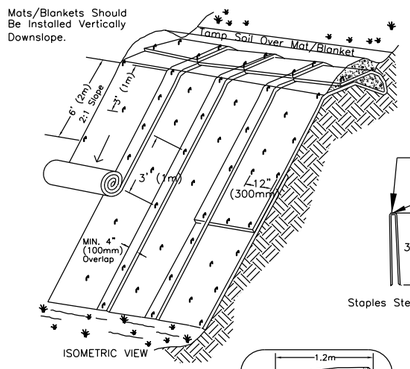
NAVAJO NATION
DIVISION OF TRANSPORTATION

N9073(1) 1, 2 & 4

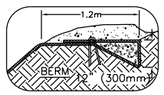
STORMWATER POLLUTION AND EROSION/SEDIMENT CONTROL DETAILS

PROJECT MANAGER: DDM	DATE: 1/22	DRAWING	SHEET
LEAD DESIGNER: MLL	DATE: 1/22		
ASBUILT BY:	DATE: XXX		39 OF 84
SCALE: N/A			

STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	40



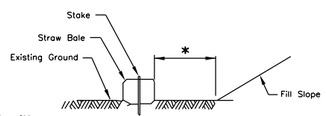
TYPICAL SLOPE SOIL STABLIZATION



NOT TO SCALE

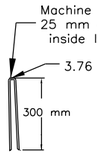
NOTES:
1. SLOPE SURFACE SHALL BE FREE OF ROCKS, CLODS, STICKS AND GRASS. MATS/ BLANKETS SHALL HAVE GOOD SOIL CONTACT.
2. APPLY PERMANENT SEEDING BEFORE PLACING BLANKETS.
3. LAY BLANKETS LOOSELY AND STAKE OR STAPLE TO MAINTAIN DIRECT CONTACT WITH THE SOIL. DO NOT STRETCH.

EROSION BLANKETS & TURF REINFORCEMENT MATS SLOPE INSTALLATION

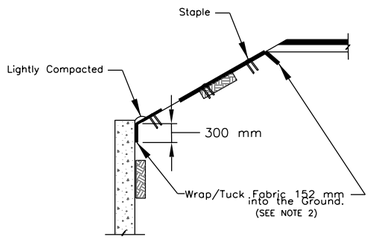


SECTION D–D

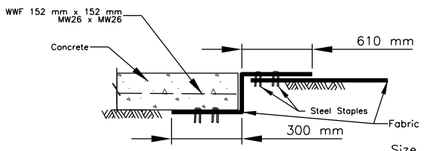
* See General Notes.



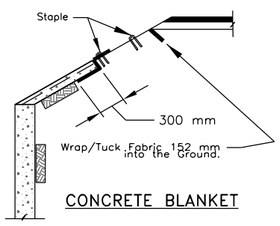
Staples Steel Wire



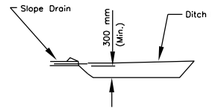
CONCRETE HEADWALL

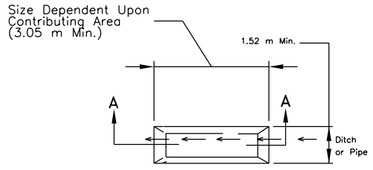


TUCKING of FABRIC AROUND CONCRETE STRUCTURE DETAIL



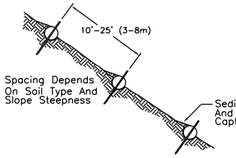
CONCRETE BLANKET

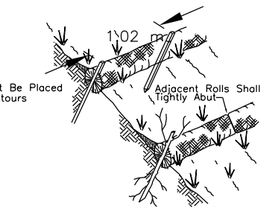


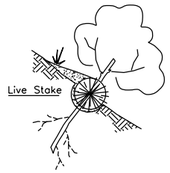


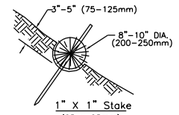
SEDIMENT TRAP

(Traps shall not fill to beyond one–half capacity prior to cleaning)





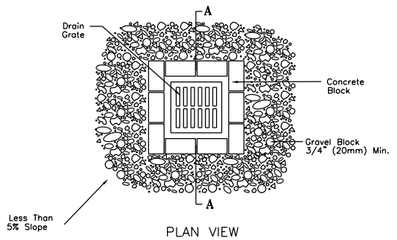




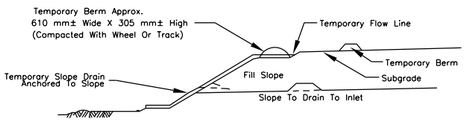
Not To Scale

NOTE:
1. STRAW ROLL INSTALLATION REQUIRES THE PLACEMENT AND SECURE STAKING OF THE ROLL IN A TRENCH, 3"–5" (75–125mm) DEEP, DUG ON CONTOUR. RUNOFF MUST NOT BE ALLOWED TO RUN UNDER OR AROUND ROLL.

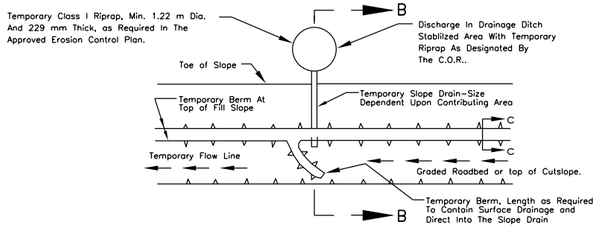
STRAW ROLLS



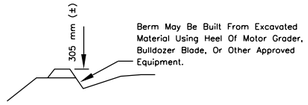
PLAN VIEW



SECTION B–B

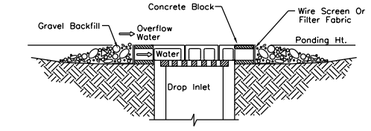


PLAN VIEW

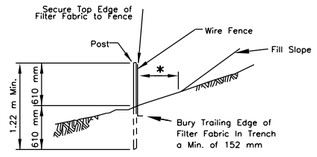


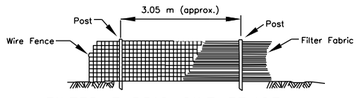
SECTION C–C

Temporary Slope Drain, Berm. (for fill and cutslopes)
[NOTE: Temporary berms may also be constructed of straw bales set 104–152mm into ground.]



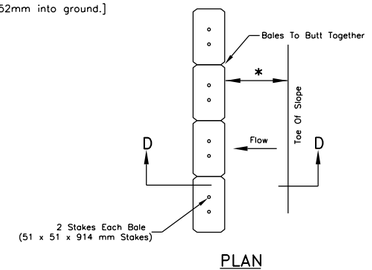
SECTION A – A





FILTER FABRIC SILT FENCE

* See General Notes.



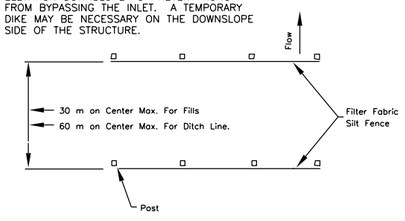
PLAN

STRAW BALE SILT BARRIER

* See general notes.

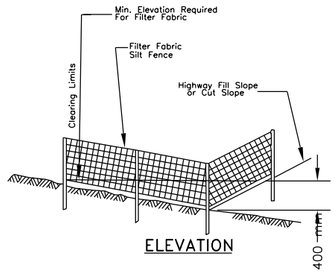
BLOCK AND GRAVEL DROP INLET SEDIMENT BARRIER

NOTES:
1. DROP INLET SEDIMENT BARRIERS ARE TO BE USED FOR SMALL, NEARLY LEVEL DRAINAGE AREAS. (LESS THAN 5%)
2. EXCAVATE A BASIN OF SUFFICIENT SIZE ADJACENT TO THE DROP INLET.
3. THE TOP OF THE STRUCTURE (PONDING HEIGHT) MUST BE WELL BELOW THE GROUND ELEVATION DOWNSLOPE TO PREVENT RUNOFF FROM BYPASSING THE INLET. A TEMPORARY DIKE MAY BE NECESSARY ON THE DOWNSLOPE SIDE OF THE STRUCTURE.

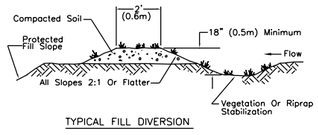


PLAN

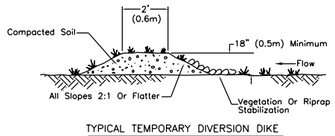
SILT FENCE EROSION CHECK



ELEVATION



TYPICAL FILL DIVERSION



TYPICAL TEMPORARY DIVERSION DIKE

(For Top Of Cut Back Slopes.)

NOTES:
1. THE CHANNEL BEHIND THE DIKE SHALL HAVE POSITIVE GRADE TO A STABILIZED OUTLET.
2. THE DIKE SHALL BE ADEQUATELY COMPACTED TO PREVENT FAILURE.
3. THE DIKE SHALL BE STABLILIZED WITH TEMPORARY OR PERMANENT SEEDING OR RIPRAP.
4. THE DIVERSION DIKE SHALL EXTEND TO THE BOTTOM OF CUT BACK SLOPE AND INTERCEPT THE CUT DITCH.

TEMPORARY DIVERSION DIKE

WILSON &COMPANY
4401 MASTHEAD ST. NE. SUITE 150
ALBUQUERQUE, NM 87109
PHONE: 505-348-4000
FAX: 505-348-4072
www.wilsonco.com

Registered Professional Engineer (Civil) Certificate No. 83225 MYRA K. CANDELARIA Date Signed 05/27/22 ARIZONA, U.S.A.

	REVISION	BY	DATE

NAVAJO D.O.T.

NAVAJO NATION
DIVISION OF TRANSPORTATION

N9073(1) 1, 2 & 4

STORMWATER POLLUTION AND EROSION/SEDIMENT CONTROL DETAILS

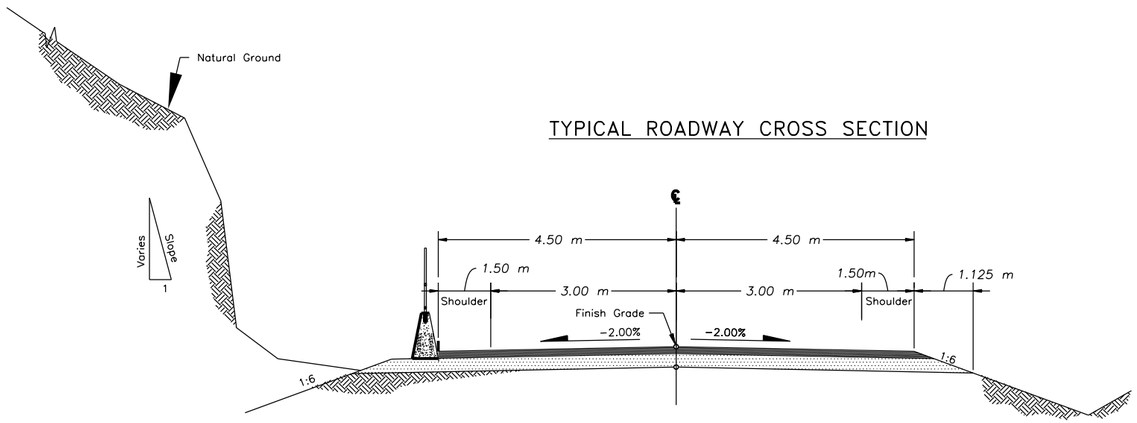
PROJECT MANAGER: DDM	DATE: 1/22	DRAWING	SHEET
LEAD DESIGNER: MLL	DATE: 1/22		
ASBUILT BY:	DATE: XXX		40 OF 84
SCALE: N/A			

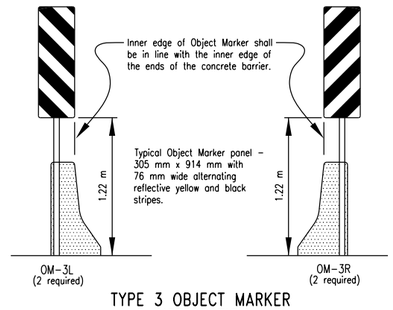
STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	41A

GENERAL NOTES

1. CONSTRUCTION – STANDARD SPECIFICATIONS FOR CONSTRUCTION OF ROADS AND BRIDGES ON FEDERAL HIGHWAY PROJECTS – FP–14.
2. DESIGN – AASHTO STANDARD SPECIFICATION FOR HIGHWAY BRIDGES, CURRENT EDITION.
3. ALL CONCRETE SHALL BE CLASS A(AE) UNDER SECTION 601, MINOR CONCRETE STRUCTURES, F'c = 20.7 MPa. @ 28 DAYS.
4. REINFORCING STEEL SHALL CONFORM TO AASHTO M13M (ASTM SPECIFICATION A615). BAR SIZES ARE DESIGNED AS GRADE 300 AND FURNISHED AS GRADE 300 OR GRADE 420.
5. ALL DIMENSIONS FOR REINFORCING BARS SHALL BE TO CENTER OF BARS UNLESS NOTED OTHERWISE.
6. ALL REINFORCING STEEL SHALL HAVE 51 mm (MINIMUM) CLEAR COVER UNLESS NOTED OTHERWISE.
7. ALL GALVANIZING THAT HAS BEEN DAMAGED IN HANDLING, TRANSPORTATION OR WELDING SHALL BE REPAIRED BY THE APPLICATION OF A PASTE COMPOUND OF AN APPROVED ZINC POWDER AND FLUX.
8. ALL EXPOSED EDGES OF CONCRETE BARRIER SHALL BE CHAMFERED 20 mm.
9. CONCRETE BARRIER TO BE FABRICATED (PRE–CAST) OR (CAST IN PLACE) IN LENGTH TO ALLOW FOR PROPER INSTALLATION OF VERTICAL FENCE POST IN ACCORDANCE WITH THE DETAILS SHOWN. THE CONTRACTOR SHALL SUBMIT HIS PROPOSED WALL BARRIER DESIGN AND LAYOUT TO THE EOR, THROUGH THE CM PRIOR TO ORDERING MATERIAL.

TYPICAL ROADWAY CROSS SECTION





TYPE 3 OBJECT MARKER INSTALLATION

WILSON &COMPANY
4401 MASTHEAD ST, NE, SUITE 150
ALBUQUERQUE, NM 87109
PHONE: 505-348-4000
FAX: 505-348-4072
www.wilsonco.com

Registered Professional Engineer (Civil) CERTIFICATE NO. 55225 MYRA K. CANDELARIA Date Signed 09/30/2022 ARIZONA, U.S.A.

	REVISION	BY	DATE

NAVAJO B.Q.T.

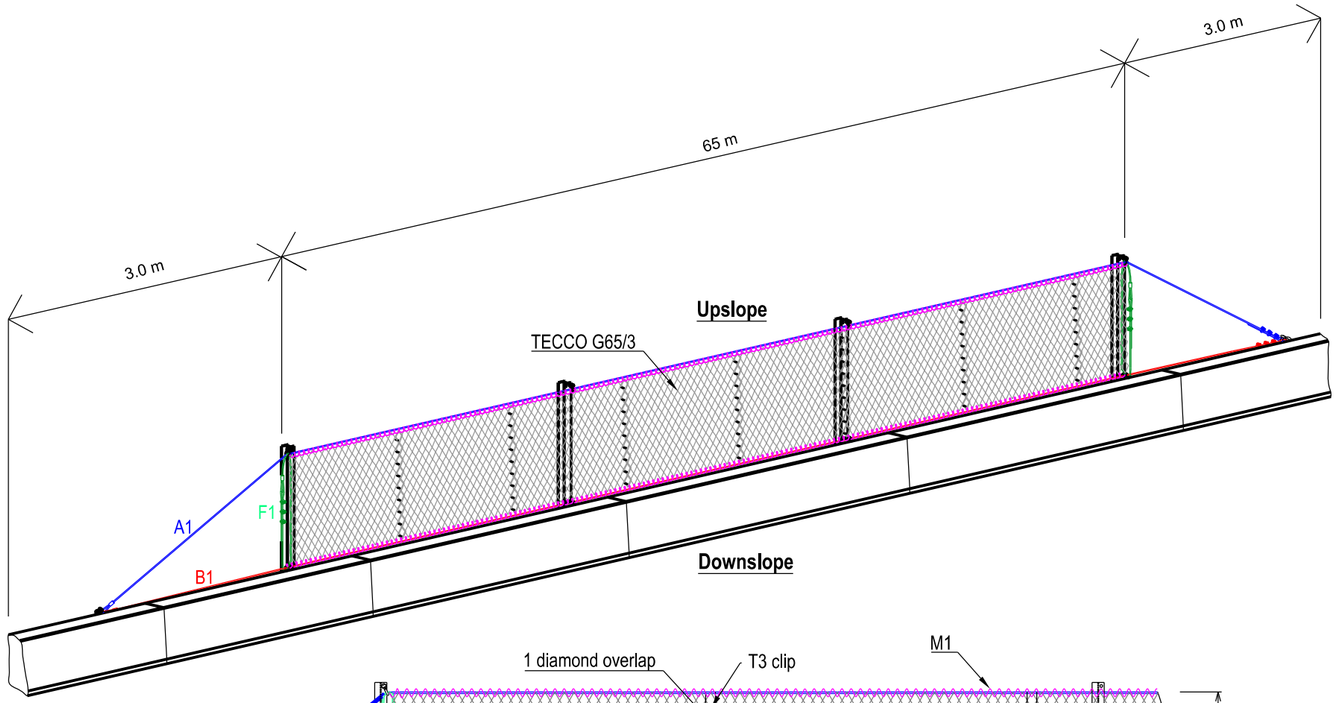
NAVAJO NATION
DIVISION OF TRANSPORTATION

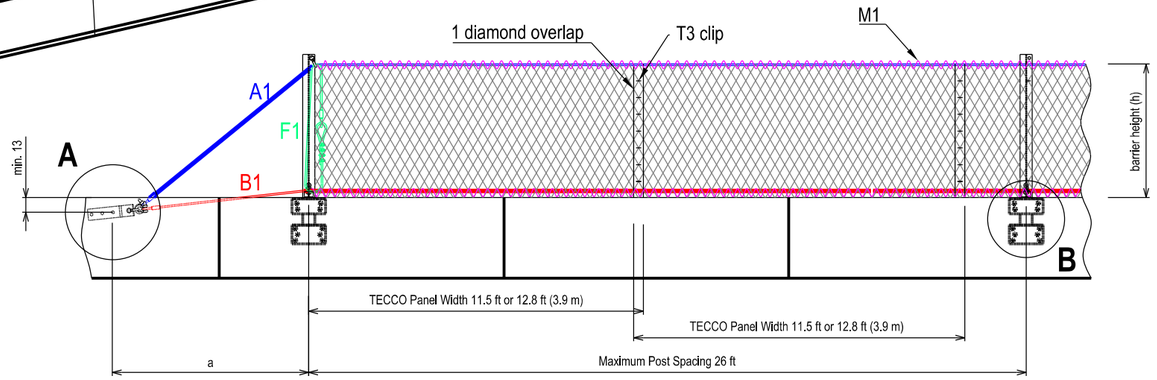
N9073(1) 1, 2 & 4

ROCKFALL PROTECTION FENCE AND CONCRETE WALL BARRIER DETAILS

		DRAWING	SHEET
PROJECT MANAGER: DDM	DATE: 1/22		
LEAD DESIGNER: MLL	DATE: 1/22		
ASBUILT BY:	DATE: XXX		41A OF 84
SCALE: N/A			

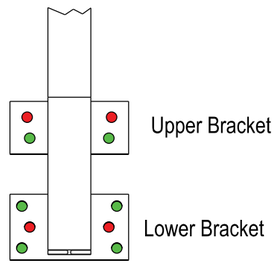
STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	41B





A1: Top support rope ø5/8"
B1: Bottom support rope ø5/8"
F1: Vertical support rope ø5/8"
M1: 3500 x 64/56 - 83

Detail B:



- see table 1
- use in case of subsurface obstruction problems

Table 1:

Barrier height (h)	lateral anchor bracket			Anchor Schedule ITW RED HEAD Trubolt Wedge Anchor or equivalent Anchor DIA. 3/4 in. Carbon Steel w/ Hot-dip Galvanization (WS-3484G)				Post profile	Drawing
	distance (a)	anchor force	No. Anchors[2]	No. Anchors per Upper Post Bracket[2]	No. Anchors per Lower Post Bracket[2]	Embedment depth (in.)	Installation Torque (Ft. Lbs.)		
[ft]	[ft]	[kips]							
6.0	6.50	27.0	2	2	4	6 5/8	110	W6 x 16	GS-6708us

[1] see Trubolt Wedge Anchor - Technical Data (https://www.itwredhead.com/engineering/anchor-design/designtables/55)

[2] based on compressive strength value of concrete f'c = 4000 PSI

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REVISION	BY	DATE

NAVAJO B.Q.T.

NAVAJO NATION
DIVISION OF TRANSPORTATION

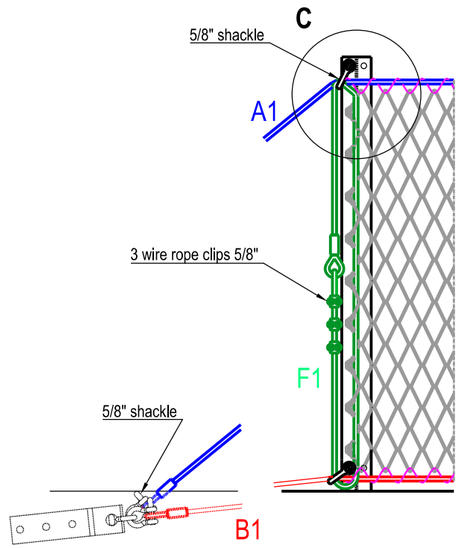
N9073(1) 1, 2 & 4

ROCKFALL PROTECTION FENCE AND CONCRETE WALL BARRIER DETAILS

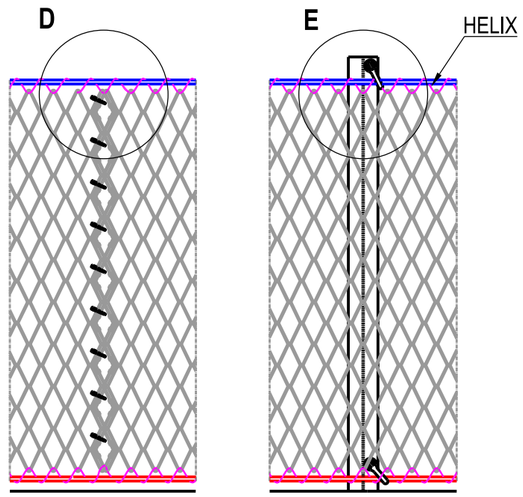
PROJECT MANAGER: DDM	DATE: 1/22	DRAWING	SHEET
LEAD DESIGNER: MLL	DATE: 1/22		
ASBUILT BY:	DATE: XXX		41B OF 84
SCALE: N/A			

STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	41C

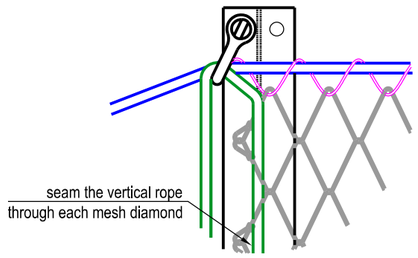
Border Post:



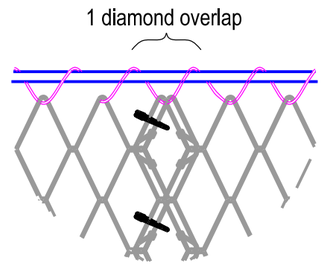
Middle Post:



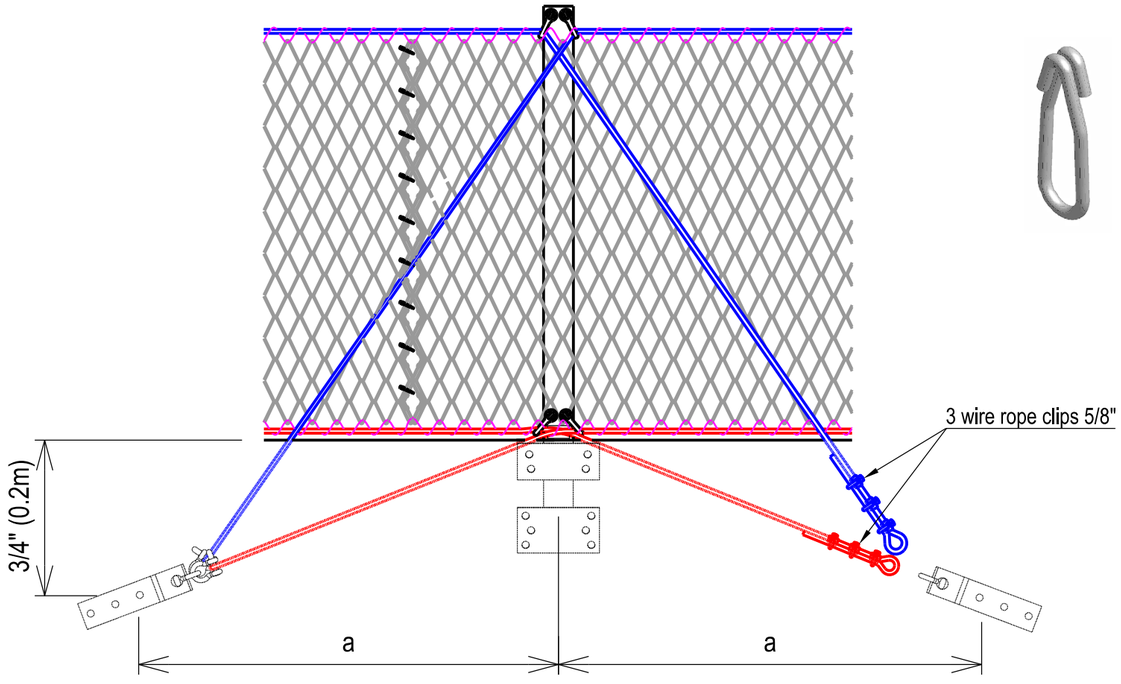
Detail C:



Detail D:



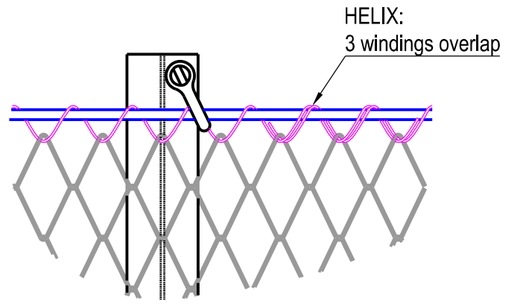
Rope Separation Concrete:



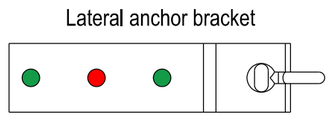
Support rope separation is required every 325 ft, however this may reduce depending on changes in direction of the barrier. Please get in contact with Geobrugg if you are unsure.

Detail Connection T3 Clip

Detail E:



Detail A:



- see table 1
- use in case of subsurface obstruction problems

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ROCKFALL PROTECTION FENCE AND CONCRETE WALL BARRIER DETAILS

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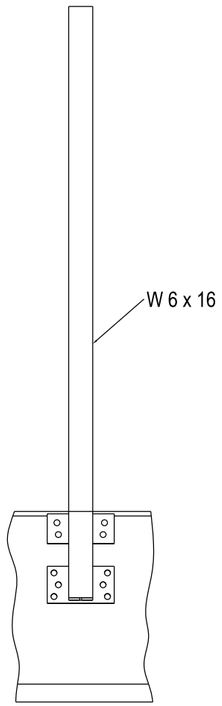
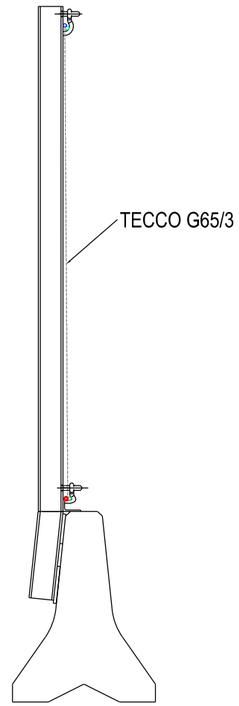
LEAD DESIGNER: MLL	DATE: 1/22		
ASBUILT BY:	DATE: XXX		41C OF 84
SCALE: N/A			

STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	41D

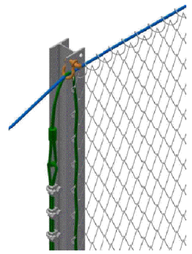
Section Post



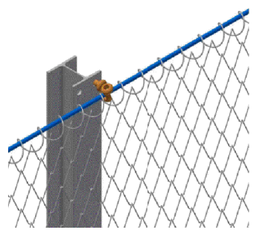
Cross Section Post



Detail Border Post
Top support rope:



Detail Middle Post
Top support rope:



Use of wire rope clips:

The first wire rope clip is attached close to the loop. The wire rope clips must be spaced so that the distance between them is a multiple of 1 to 2 times the width of the clamping jaw. Pay attention to the orientation of the wire rope clips.
Note: "Never saddle a dead horse"

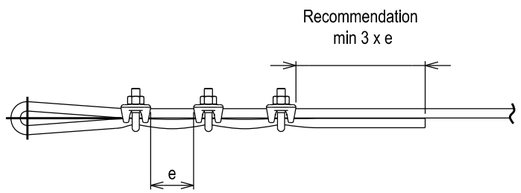


Table 2:

Wire rope diameter [in]	Nominal size [in]	Distance e [in]	Required number of clips	Required torque unlubricated [ft-lbs]
5/8	5/8	3/4 - 1 1/2	3	95

Installation:

1.) Mark out post locations and lateral anchor bracket. The distance between the post and lateral anchor bracket is 6.5 ft *(see table 1)*.

2.) Drill the correct amount of holes depending on the barrier height for the post anchors and lateral anchor brackets, into the concrete barrier *(see table 1)*.

3.) Install posts and lateral anchor brackets onto the concrete barrier.

4.) Install the 5/8 inch shackles on the top and bottom of each post.

5.) Install the 5/8 inch top and bottom support rope. This is done by threading the rope through the 5/8 inch shackles on the top and bottom of each post.

6.) Attach the top and bottom rope to the lateral anchor bracket. One end is attached using 5/8 inch shackles, the other is attached using 5/8 inch wire rope clips. Make sure you pay attention to the orientation of the wire rope clips and their spacing *(see table 2)*. Tension both ropes to approximately 2,250 lbs.

7.) After installing the support ropes measure the span between the ropes vertically and cut one TECCO panel from the full roll at a height of the rope span. Note: cut one panel first to make sure they fit. Then repeat.

8.) Starting at one end, hang the panel of the TECCO mesh on the support rope using Tie-Strap as temporary fixation.

9.) Screw on a helix spring through each mesh opening.

10.) Repeat the process above, however this time for the bottom support rope.

11.) Move along to the next section of the barrier, and repeat the process above. Adjacent spring helix overlap 3 windings. Overlap the adjacent TECCO mesh panel by a minimum of one diamond, and connect the two panels vertically together using one T3 clip per diamond *(see detail D)*.

12.) Repeat the process above until all the TECCO mesh has been hung. Depending on the overall length of the barrier, you may end up with more overlap on the last two mesh panels.

13.) Install the vertical ropes at the end posts of the barrier. Thread the rope through the top shackle, then thread it through the mesh (every diamond), and finally through the bottom shackle. Thread the rope through the thimble, and connect using wire rope clips. Make sure you pay attention to the orientation of the wire rope clips and their spacing *(see table 2)*.

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Registered Professional Engineer (Civil) CERTIFICATE NO. 83225 MYRA K. CANDELARIA Date Signed ARIZONA, U.S.A.

REVISION	BY	DATE

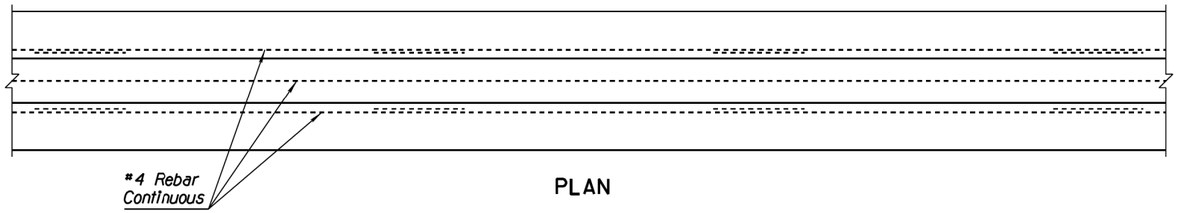
NAVAJO NATION
DIVISION OF TRANSPORTATION
NAVAJO D.O.T.

N9073(1) 1, 2 & 4

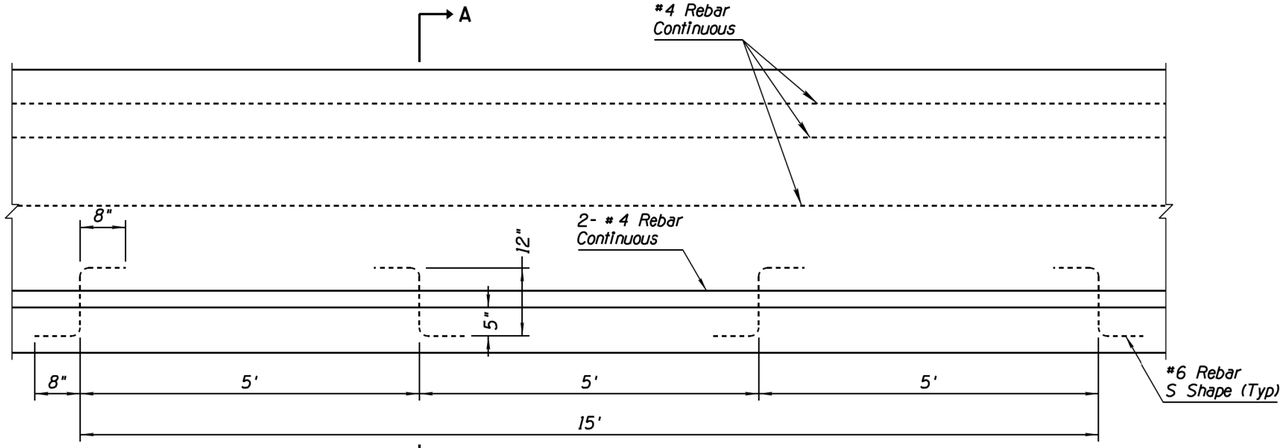
ROCKFALL PROTECTION FENCE AND CONCRETE WALL BARRIER DETAILS

PROJECT MANAGER: DDM	DATE: 1/22	DRAWING	SHEET
LEAD DESIGNER: MLL	DATE: 1/22		
ASBUILT BY:	DATE: XXX		41D OF 84
SCALE: N/A			

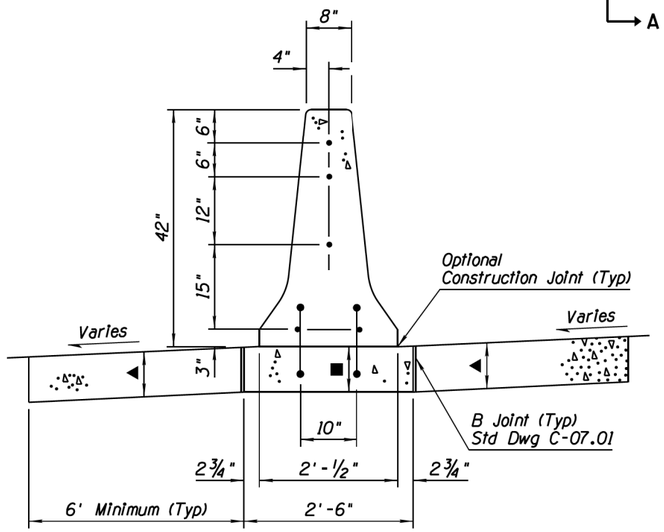
STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	41E



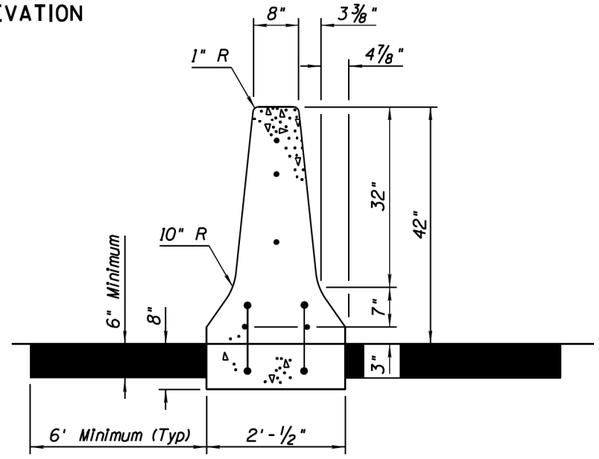
PLAN



ELEVATION



WITH PCCP
SECTION A-A



WITH AC
SECTION A-A

GENERAL NOTES

1. Median Barrier shall be constructed by the slip form or by the formed cast-in-place method.
2. When obstacles prevent the use of slip form equipment, stationary forms shall be used.
3. Barrier concrete shall be Class S, f'_c=4500 PSI.
4. Rebar shall be Grade 60.
5. If the footing and barrier are cast monolithically, #6 S shape rebars are not required.
6. Barrier width shall not exceed the barrier footing width nor overhang the adjacent pavement.
7. #4 rebar shall extend 12" past the construction joint at the completion of the day's pour.

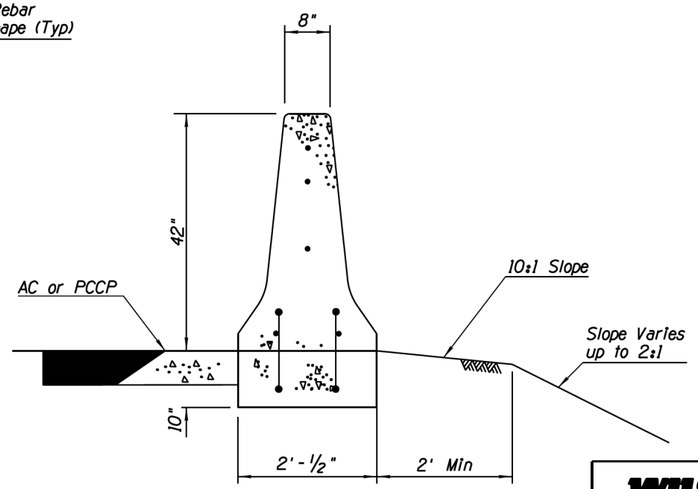
▲ Depth to match adjacent PCCP thickness.

■ Footing depth shall match adjacent PCCP thickness and shall consist of either:

a) full-depth concrete, or

b) 8" concrete over compacted AB (Class 2).

See Special Provisions for measurement and payment.



ADJACENT TO SLOPE
SECTION A-A

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CERTIFICATE NO.
83225
MYRA K.
CANDELARIA
Date Signed
ARIZONA, U.S.A.

REVISION	BY	DATE

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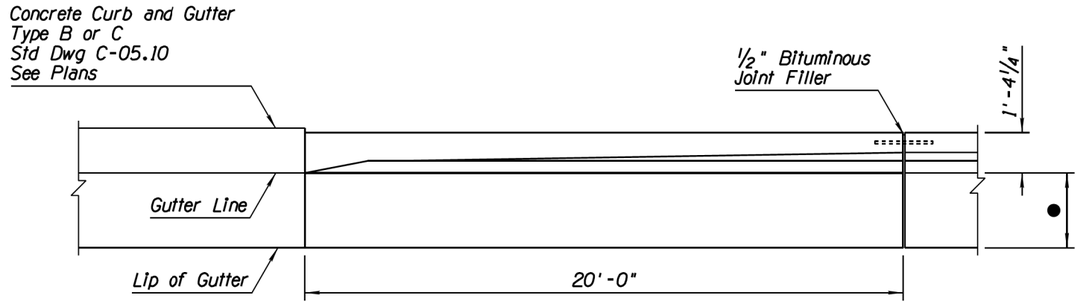
NAVAJO NATION
DIVISION OF TRANSPORTATION

N9073(1) 1, 2 & 4

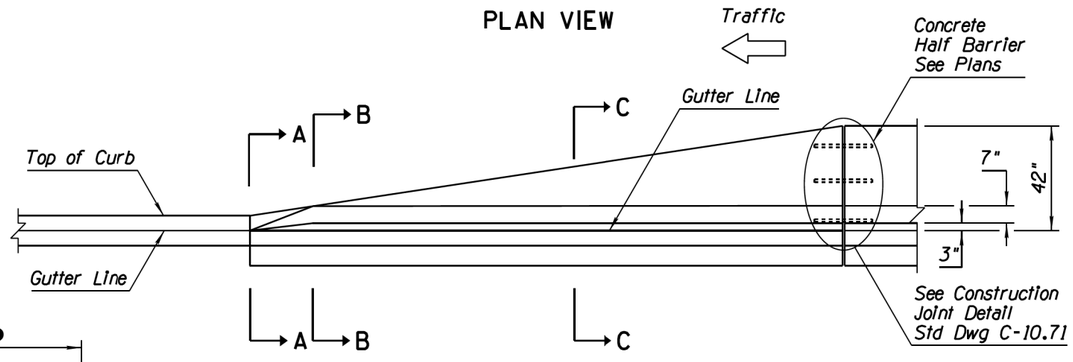
ROCKFALL PROTECTION FENCE AND
CONCRETE WALL BARRIER DETAILS

PROJECT MANAGER: DDM	DATE: 1/22	DRAWING	SHEET
LEAD DESIGNER: MLL	DATE: 1/22		
ASBUILT BY:	DATE: XXX		41E OF 84
SCALE: N/A			

STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	41F



PLAN VIEW



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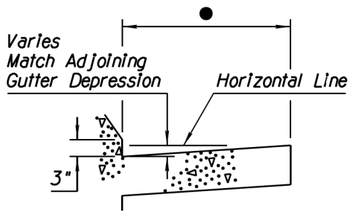
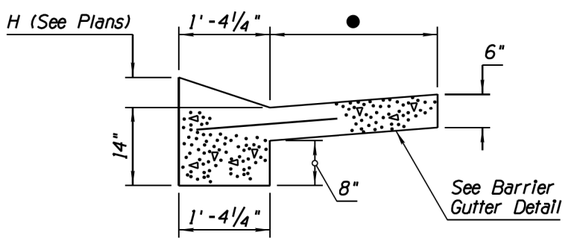
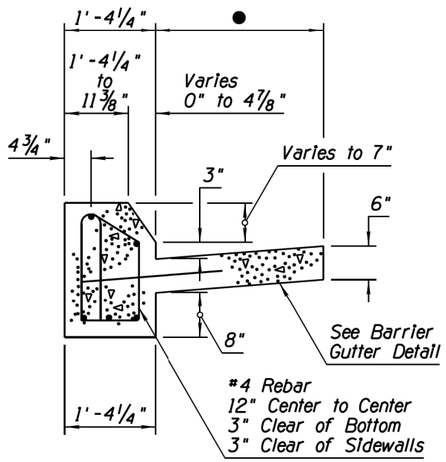


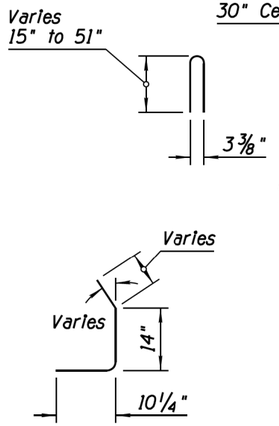
BARRIER GUTTER DETAIL



SECTION A-A



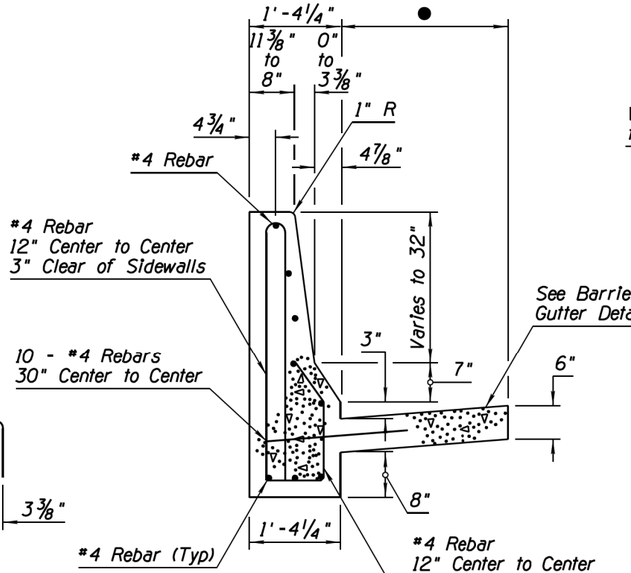
SECTION B-B



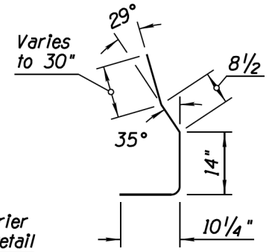
GENERAL NOTES

1. Barrier concrete shall be Class S, f'c=4500 PSI.
2. Rebar shall be Grade 60.
3. All rebar shall have 2" minimum clear cover unless otherwise noted.
4. See drainage sheets for slotted drain and catch basin details.
5. Barrier transition shall match both adjoining curb and gutter and concrete half barrier.
6. See Std Dwg C-05.20 for sidewalk construction.
7. All bend dimensions for rebar shall be out-to-out of bars.
8. Two-inch deep contraction joints shall be placed in the gutter at locations which match the joints in adjacent PCCP and at approximate 15-foot centers when adjacent to AC pavement. Joints shall be either hand tooled or sawn.

● Varies - 2'-6", 4'-6" or width as shown on plans.



SECTION C-C



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NAVAJO NATION
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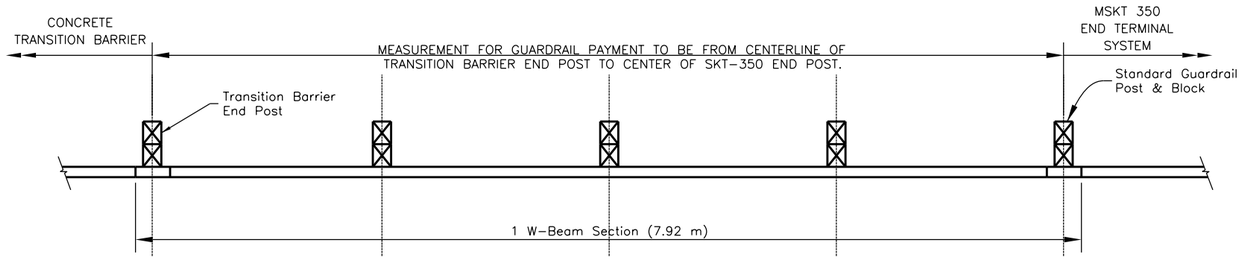
N9073(1) 1, 2 & 4

ROCKFALL PROTECTION FENCE AND CONCRETE WALL BARRIER DETAILS

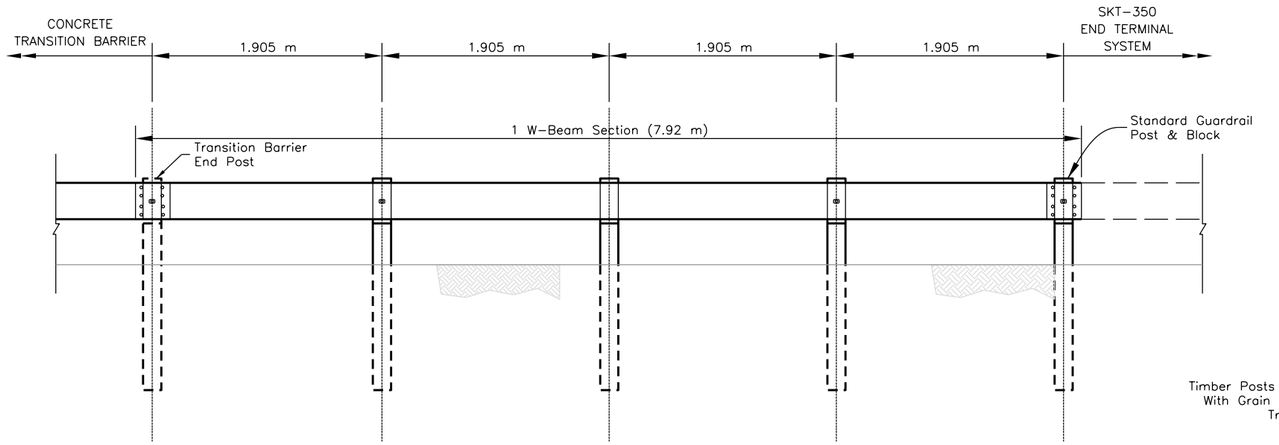
PROJECT MANAGER: DDM	DATE: 1/22	DRAWING	SHEET
LEAD DESIGNER: MLL	DATE: 1/22		
ASBUILT BY:	DATE: XXX		41F OF 84
SCALE: N/A			

STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	42

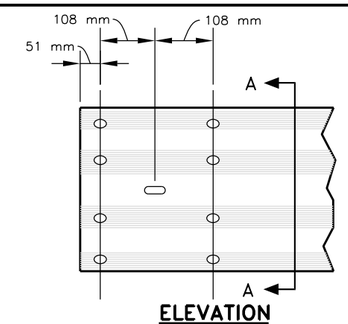


PLAN

TRAFFIC DIRECTION

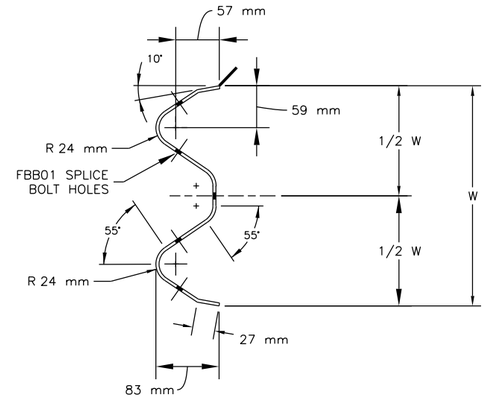


ELEVATION

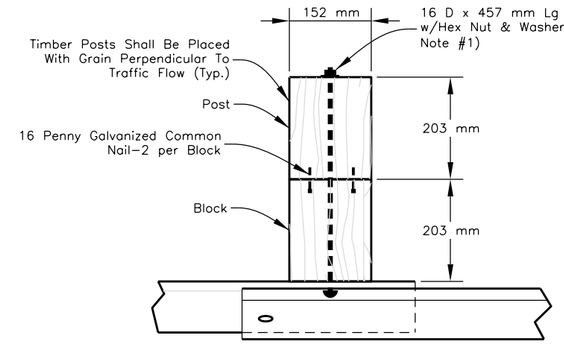


ELEVATION
RAIL

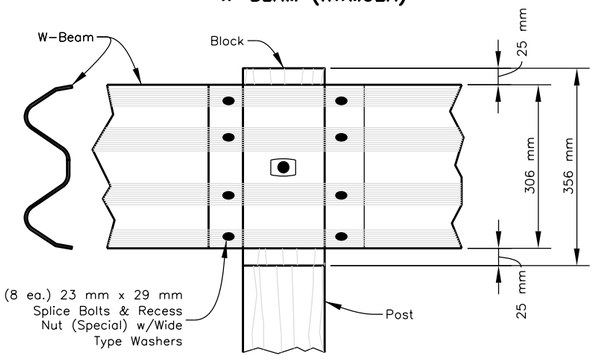
DESIGNATOR	COMPONENT	NUMBER
FBB01	Splice Bolt and Nut	2
FBB02	Guardrail-Post Bolt and Nut	2
FBB03	Guardrail-Post Bolt and Nut	2
FBB04	Guardrail-Post Bolt and Nut	2
FBX16a	Post Blockout Bolt (40 mm)	4
FWC16a	Round Washer	2
PDB01a	Timber Post Blockout	2
PDB01b	Timber Post Blockout	2
PDE02	Timber Post	2
PDE13	Timber Post	2
PWB01	Steel Post Blockout	2
PWE01	Steel Post	2
PWE02	Steel Post	2
RWB01a	W-Beam Backup Plate	1
RWM02a	W-Beam Rail	1



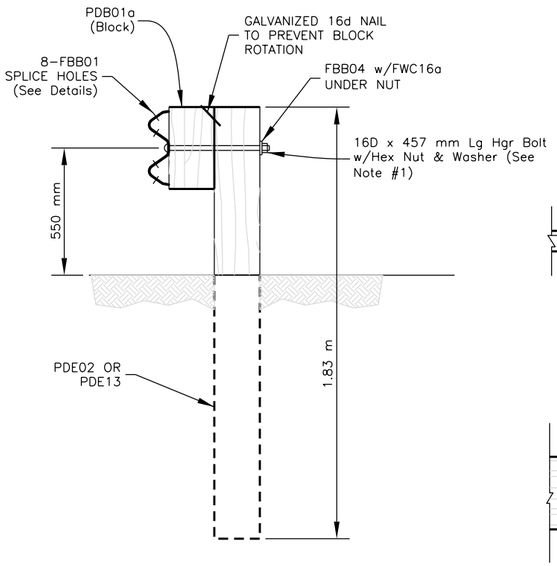
SECTION A-A
W-BEAM (RWM02A)



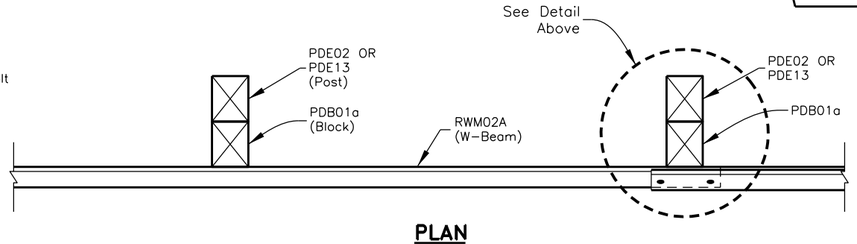
PLAN
POST/BLOCK & SPLICE DETAIL



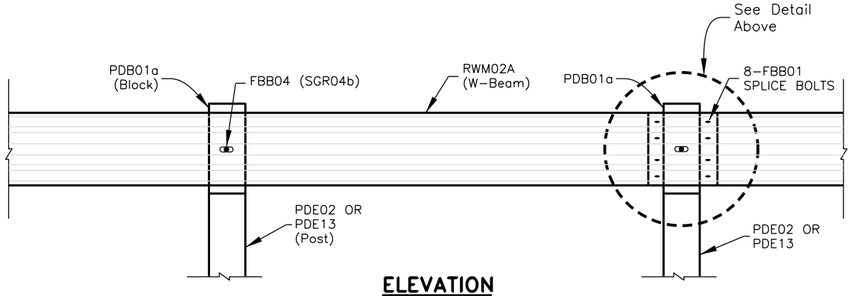
ELEVATION
POST/BLOCK
SPLICE DETAIL



ELEVATION
STRONG-POST W-BEAM



PLAN
W-BEAM/POST & BLOCK DETAILS



ELEVATION
W-BEAM/POST & BLOCK DETAILS

GENERAL NOTES

1. THE 16 D FLAT WASHER IS USED UNDER THE NUT, BEHIND THE POST ONLY. NO WASHER IS USED AT THE RAIL.
2. SEE SHEET 57 OF 83 FOR ADDITIONAL NOTES.
3. THE CONTRACTOR HAS THE OPTION TO USE ALL-STEEL POSTS W/WOODEN BLOCK ON STANDARD LINE POSTS, UNLESS OTEHERWISE NOTED ON THE DESIGN PLANS.
4. IF STEEL POSTS ARE APPROVED THEN RUBBER BLOCKS WILL BE REQUIRED.
5. BEGIN/END ASPHALT CURB AT POST #2.
6. BEGIN REFLECTIVE TABS ON THE W-BEAM AT EVERY FOURTH POST. THE COLOR OF THE TABS SHALL CONFORM TO THE COLOR OF THE ADJACENT EDGE LINE.
7. ANGLE STRUT MUST BE ATTACHED USING 19D HIGH STRENGTH BOLTS.

WILSON & COMPANY
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ALBUQUERQUE, NM 87109
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FAX: 505-348-4072
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Registered Professional Engineer (Civil) CERTIFICATE NO. 83225 MYRA K. CANDELARIA Date Signed 09/09/22 ARIZONA, U.S.A.

REVISION	BY	DATE

NAVAJO NATION
DIVISION OF TRANSPORTATION

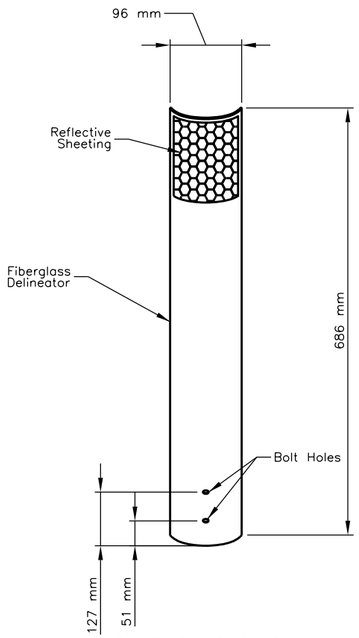
NAVAJO D.O.T.

N9073(1) 1, 2 & 4

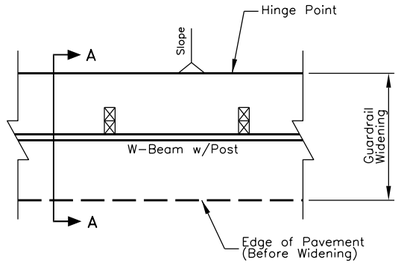
STANDARD GUARDRAIL DETAIL

PROJECT MANAGER: DDM	DATE: 1/22	DRAWING	SHEET
LEAD DESIGNER: MLL	DATE: 1/22		
ASBUILT BY:	DATE: XXX		42 OF 84
SCALE: N/A			

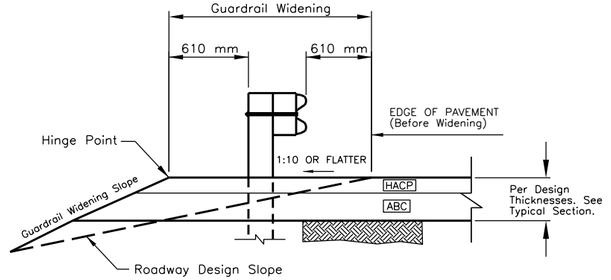
STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	43



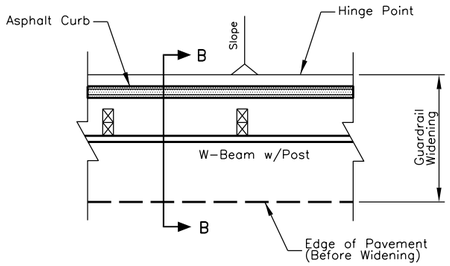
DELINEATOR DETAIL
(Reflective Sheeting Shall Face Traffic)



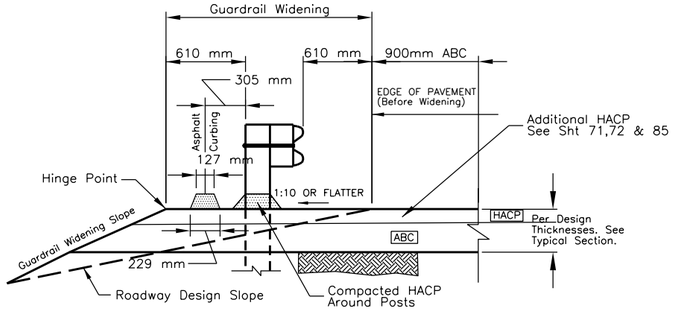
PLAN VIEW
w/NO CURBING



SECTION A–A
w/No Curbing



PLAN VIEW
w/CURBING

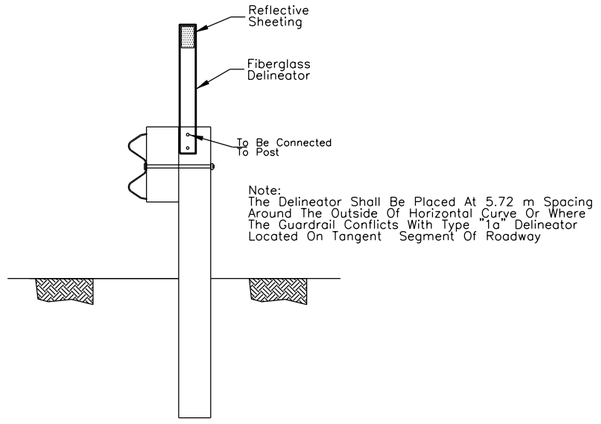


SECTION B–B
w/CURBING
Asphalt Curb Depth=102 mm

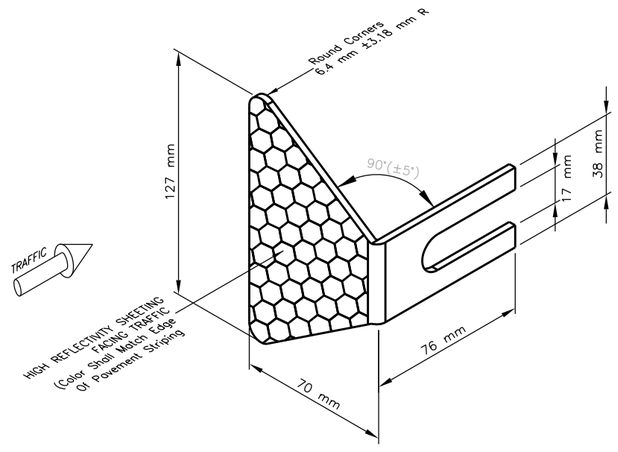
GENERAL NOTES

1. ALL GUARDRAIL "W" BEAMS, SHALL BE GALVANIZED IN ACCORDANCE WITH (AASHTO M–180, CLASS A, TYPE 1) SPECIFICATION. ALL HARDWARE SHALL CONFORM TO (ASTM A–325) AND GALVANIZED IN ACCORDANCE WITH (ASTM A–153).
2. ALL STRUCTURAL STEEL ITEMS SHOWN SHALL CONFORM TO (AASHTO N183/ASTM A36) AND BE GALVANIZED IN ACCORDANCE WITH (AASHTO M–111) SPECIFICATION.
3. WIRE ROPE, FITTINGS AND HARDWARE SHALL CONFORM TO (ASSHTO M–30) SPECIFICATION TYPE II WITH A 19 mm DIAMETER AND A CLASS B ZINC COATING.
4. WOOD POSTS AND BLOCKS SHALL BE ROUGH SAWN LUMBER OR (S4S) HAVING MINIMUM BENDING STRENGTH OF 8.27 MPa (SINGLE MEMBER USE) AND MEETING AASHTO N168 (21TH EDITION), ALL POSTS SHALL BE TREATED IN ACCORDANCE WITH (AASHTO M–133) SPECIFICATION.
5. ASPHALT CONCRETE CURBING SHALL BE INSTALLED IN ACCORDANCE WITH SECTION B–B, AND CONSIDERED INCIDENTAL TO PAVING ITEMS AND NO DIRECT PAYMENT SHALL BE MADE.
6. ALL EMBANKMENT AND AGGREGATE BASE COURSE MATERIALS SHALL BE COMPACTED TO 95% OF MAXIMUM DRY DENSITY.
7. THE EMBANKMENT MATERIALS AND THE PLACING THEREOF SHALL BE INCLUDED IN CONTRACT BID ITEM 20401–0000 AND NO DIRECT PAYMENT SHALL BE MADE.
8. THE CONTRACTOR SHALL BE REQUIRED TO COMPACT THE BACKFILL AND THE ASPHALT ALL AROUND EACH GUARD RAIL POST WITH HAND TAMPERS TO INSURE INTEGRITY OF THE PAVEMENT AND GUARDRAIL AND TO PREVENT SEEPAGE OF WATER INTO THE PAVEMENT FROM THE GUARD RAIL POST HOLES. THIS WORK SHALL BE INCIDENTAL OBLIGATIONS OF THE WORK DESCRIBED HEREIN.
9. PLACEMENT OF HOT ASPHALT AND ABC MATERIAL FOR GUARDRAIL WIDENING SHALL BE INCLUDED IN BID ITEMS 30101–2000 AND 40201–0500.
10. FURNISHING & PLACEMENT OF 371 mm x 701 mm REFLECTIVE SHEETING AND REFLECTIVE TABS SHALL BE CONSIDERED INCIDENTAL TO ITEM 61701–5000 AND NO DIRECT PAYMENT SHALL BE MADE.
11. ANY RELATED PATENT RIGHTS WILL BE THE RESPONSIBILITY OF THE CONTRACTOR AS PER SECTION 107.01 OF THE FP–14.
12. THE CONTRACTOR HAS THE OPTION TO USE STEEL POSTS. IF STEEL POSTS ARE APPROVED THEN RUBBER BLOCKS WILL BE REQUIRED.
13. PLACE REFLECTIVE TABS ON POSTS AT EVERY FOURTH POST. THE COLOR OF THE TABS SHALL CONFORM TO THE COLOR OF THE ADJACENT EDGE LINE

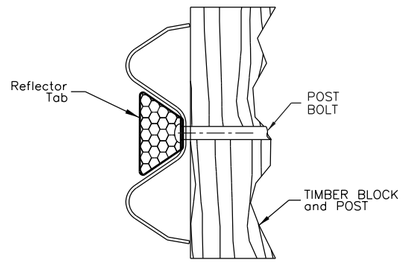
.



ELEVATION
GUARDRAIL/POST MOUNTED
DELINEATOR (TYP.)



ISOMETRIC VIEW
REFLECTOR TAB DETAIL



SECTION
REFLECTOR TAB
MOUNTING DETAIL
Install Tab on Every Second Post

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	REVISION	BY	DATE
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NAVAJO NATION
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NAVAJO D.O.T.

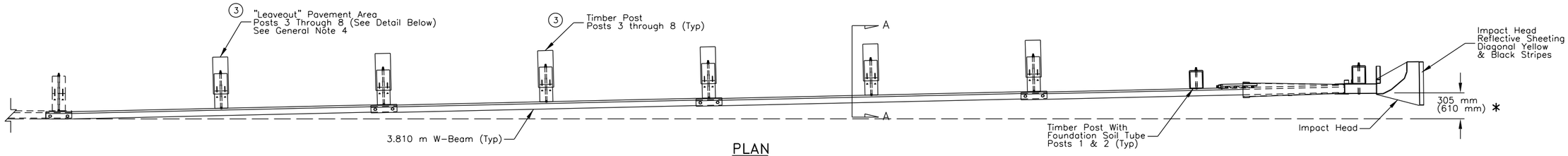
N9073(1) 1, 2 & 4

STANDARD GUARDRAIL DETAIL

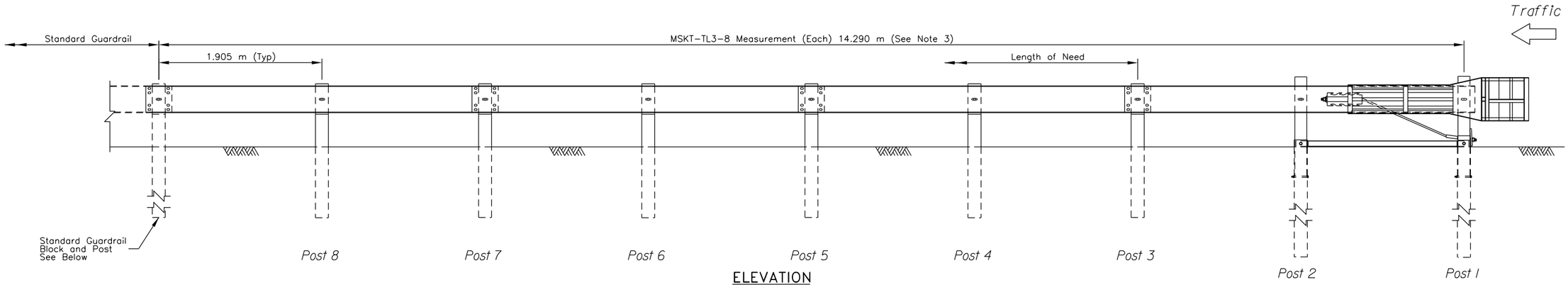
PROJECT MANAGER: DDM	DATE: 1/22	DRAWING	SHEET
LEAD DESIGNER: MLL	DATE: 1/22		
ASBUILT BY:	DATE: XXX		43 OF 84
SCALE: N/A			

STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	44

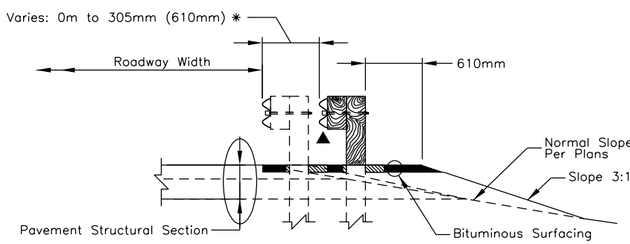
*FOR ELEVATIONS ABOVE (1,220 m) USE THE VALUES IN PARENTHESES



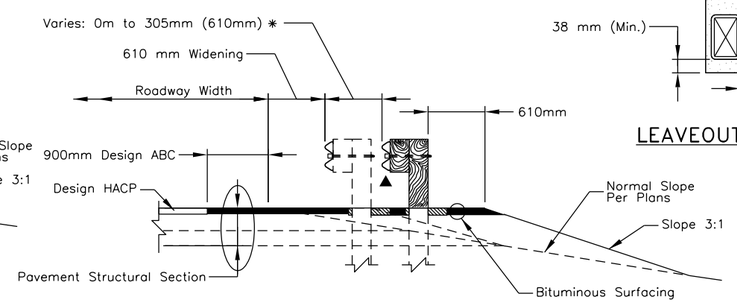
PLAN



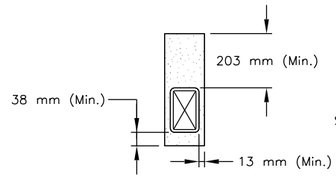
ELEVATION



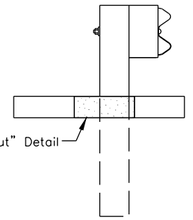
TYPE A SECTION



TYPE B SECTION



LEAVEOUT DETAIL

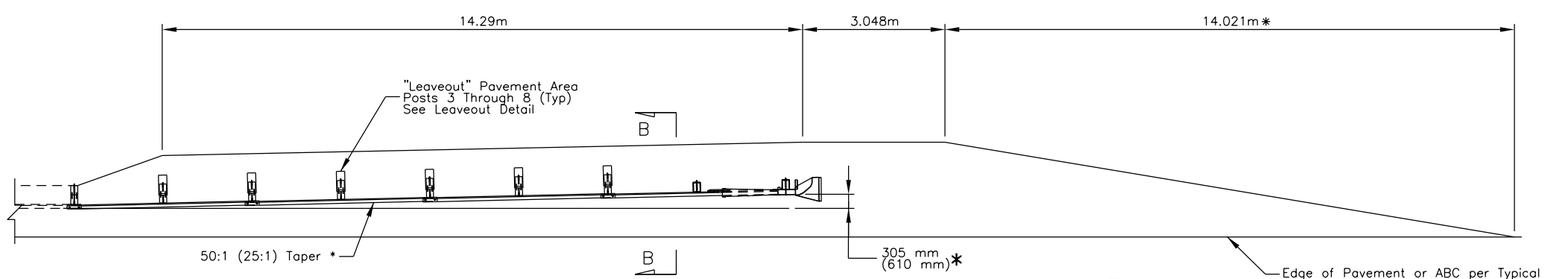


SECTION A-A
Typical At Post 3 Thru 8

GENERAL NOTES

1. THIS DETAIL IS FOR ROADWAY LAYOUT ONLY.
2. THE MSKT-TL3-8 SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS AND CURRENT APPROVED DRAWINGS INCLUDING ALL DETAILS HARDWARE, HARDWARE QUANTITIES AND OTHER INFORMATION AS SHOWN IN THESE PLANS.
3. THE 15.240 m W-BEAM LENGTH SHALL CONSIST OF FOUR 4.0 m SECTIONS. THE END SECTION BEING A PROPRIETARY SPLIT RAIL.
4. "LEAVEOUT" IN ASPHALTIC CONCRETE SHALL BE PROVIDED IN THE AC PAVEMENT AROUND THE GUARDRAIL POSTS AT THE LOCATIONS AND DIMENSIONS SPECIFIED ON THE ROAD SYSTEMS INC. APPROVED DRAWING SHOWN IN THESE PLANS. "LEAVEOUT" MATERIAL SHALL CONSIST OF A 1-SACK GROUT MIX OR OTHER NON-COHESIVE MATERIAL AS APPROVED BY THE NRDOT MATERIALS UNIT.

See Sheet 44-46 For General Notes.



TYPE B GUARDRAIL INSTALLATION
(FACE OF RAIL OFFSET 610mm FROM NORMAL EDGE OF PAVEMENT)

WILSON & COMPANY
4401 MASTHEAD ST. NE. SUITE 150
ALBUQUERQUE, NM 87109
PHONE: 505-348-4000
FAX: 505-348-4072
www.wilsonco.com

Registered Professional Engineer (Civil) Certificate No. 83225 MYRA K. CANDELARIA Date Signed 07/30/2021 ARIZONA, U.S.A.

	REVISION	BY	DATE

NAVAJO D.O.T.

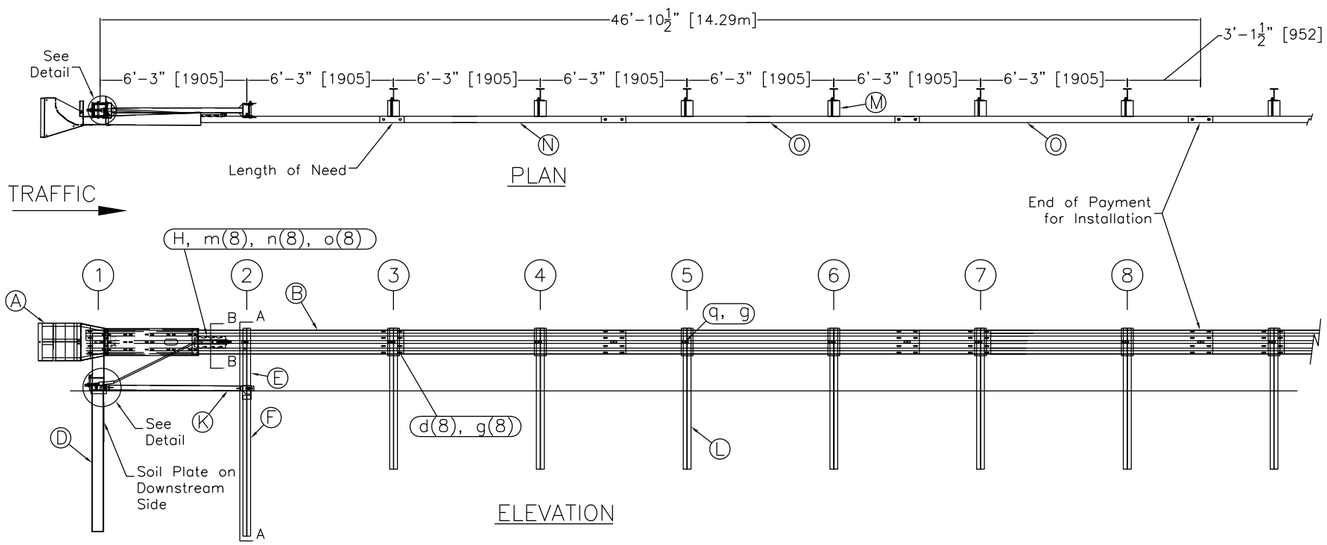
NAVAJO NATION
DIVISION OF TRANSPORTATION

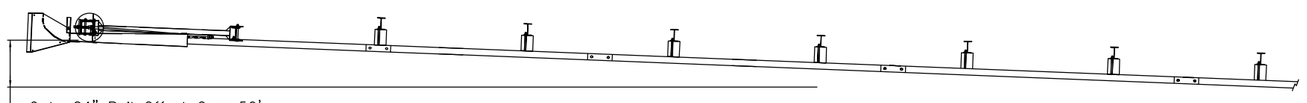
N9073(1) 1, 2 & 4

GUARDRAIL END TREATMENT
MSKT-TL3-8 LAYOUT

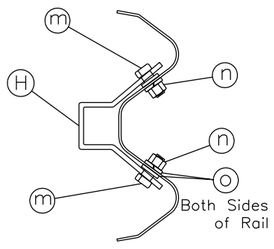
PROJECT MANAGER: DDM	DATE: 1/22	DRAWING	SHEET
LEAD DESIGNER: MLL	DATE: 1/22		
ASBUILT BY:	DATE: XXX		44 OF 84
SCALE: N/A			

STATE	PROJECT	SHEET NUMBER
NM	N7054 (1) 2&4	45

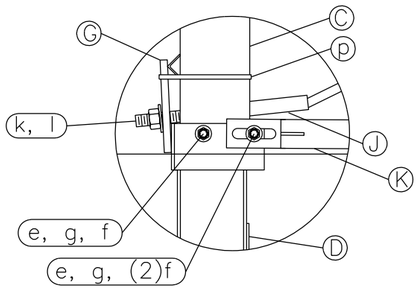




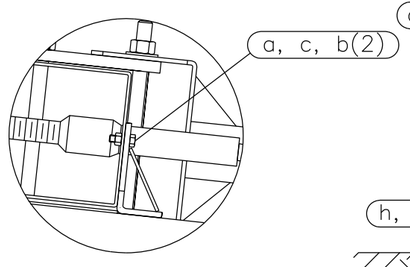
OPTIONAL FLARED INSTALLATION
25:1 maximum flare rate



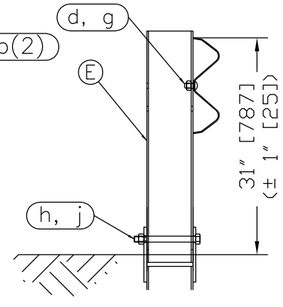
SECTION B–B
Anchor Bracket



Post #1 Connection Detail



Impact Head Connection Detail



SECTION A–A
Post #2

ITEM	QTY	BILL OF MATERIALS	ITEM NO.
A	1	IMPACT HEAD	MS3000
B	1	W-BEAM GUARDRAIL END SECTION, 12 Ga.	SF1303
C	1	FIRST POST TOP (6X6X⅛" Tube)	MTPHP1A
D	1	FIRST POST BOTTOM (6' W6X15)	MTPHP1B
E	1	SECOND POST ASSEMBLY TOP	UHP2A
F	1	SECOND POST ASSEMBLY BOTTOM	HP2B
G	1	BEARING PLATE	E750
H	1	CABLE ANCHOR BOX	S760
J	1	BCT CABLE ANCHOR ASSEMBLY	E770
K	1	STRUT	MS785
L	6	6x9 (6x8.5) STEEL POST	P621
M	6	RECYCLED PLASTIC BLOCK OR EQUIV.	CBSP-14
N	1	W-BEAM MGS RAIL SECTION (9'-4 1/2")	G12025
O	2	W-BEAM MGS RAIL SECTION (12'-6")	G1203A
HARDWARE (ALL DIMENSIONS IN INCHES)			
a	2	5/16 x 1 HEX BOLT GRD 5	B5160104A
b	4	5/16 WASHER	W0516
c	2	5/16 HEX NUT	N0516
d	25	5/8 Dia. x 1 1/4 SPLICE BOLT (POST #2)	B580122
e	2	5/8 Dia. x 9 HEX BOLT A449	B580904A
f	3	5/8 WASHER	W050
g	33	5/8 Dia. H.G.R NUT	N050
h	1	3/4 Dia. x 8 1/2 HEX BOLT GRD A449	B340854A
j	1	3/4 Dia. HEX NUT	N030
k	2	1 ANCHOR CABLE HEX NUT	N100
l	2	1 ANCHOR CABLE WASHER	W100
m	8	1/2 RSI SHOULDER BOLT W/WASHER	SB12A
n	8	1/2 STRUCTURAL NUT	N012A
o	8	1/2 STRUCTURAL WASHER	W012A
p	1	BEARING PLATE RETAINER TIE	CT-100ST
q	6	5/8" x 10" H.G.R. BOLT	B581002

NOTES:

1. BREAKAWAY POSTS ARE REQUIRED WITH SEQUENTIAL KINKING TERMINAL.
2. ALL BOLTS, NUTS, CABLE ASSEMBLIES, CABLE ANCHORS AND BEARING PLATES SHALL BE GALVANIZED.
3. THE MSKT-TL3-8 CAN BE FLARED AT A RATE OF 25:1 TO PREVENT THE IMPACT HEAD FROM ENCROACHING ON THE SHOULDER. THE FLARE IS NOT REQUIRED MAY BE DECREASED OR ELIMINATED FOR SPECIFIC INSTALLATIONS.
4. THE SOIL TUBES SHALL NOT PROTRUDE MORE THAN 102 mm ABOVE GROUND (MEASURED ALONG A 1.5 m CHORD). SITE GRADING MAY BE NECESSARY TO MEET THIS REQUIREMENT.
5. THE SOIL TUBES MAY BE DRIVEN WITH AN APPROVED DRIVING HEAD. SOIL TUBES SHOULD NOT BE DRIVEN WITH THE POST IN THE TUBE. IF THE ARE PLACED IN DRILLED HOLES, THE BACKFILL MATERIAL MUST BE SATISFACTORILY COMPACTED TO PREVENT SETTLEMENT.
6. WHEN ROCK IS ENCOUNTERED DURING EXCAVATION, A 308 mm DIA. POST HOLE, 508 mm INTO ROCK MAY BE USED IF APPROVED BY THE ENGINEER. GRANULAR MATERIAL WILL BE PLACED IN THE BOTTOM OF THE HOLE APPROX. 64 mm DEEP TO PROVIDE DRAINAGE. THE SOIL TUBES WILL BE FIELD CUT TO LENGTH, PLACED IN THE HOLE, AND BACKFILLED WITH ADEQUATELY COMPACTED MATERIAL EXCAVATED FROM HOLE.
7. THE BREAKAWAY CABLE ASSEMBLY MUST BE TAUT. A LOCKING DEVICE, (VICE-GRIPS OR CHANNEL-LOCK PLIERS) SHOULD BE USED TO PREVENT CABLE FROM TWISTING WHEN TIGHTENING NUTS.
8. A SPECIAL SITE EVALUATION SHOULD BE CONSIDERED PRIOR TO USING THE MSKT-TL3-8 WHERE THERE IS LESS THAN 7.620 m BETWEEN THE OUTLET SIDE AND ANY ADJACENT DRIVING LANE.
9. THE WOOD BLOCKOUTS SHOULD BE "TOE-NAILED" TO THE WOOD POSTS TO PREVENT THEM FROM TURNING WHEN WOOD SHRINKS.
10. GUARDRAIL SPLICE SHALL BE OVERLAPPED IN HE DIRECTION OF THE ADJACENT TRAFFIC.
11. BILL OF MATERIALS AND SOME OF THE DETAILS HEREIN WERE PROVIDED BY ROAD SYSTEMS INC.
12. ALL BOLTS, NUTS, CABLES ASSEMBLIES, CABLE ANCHORS AND BEARING PLATES SHALL BE GALVANIZED.
13. THE LOWER SECTION OF THE POSTS 1 & 2 SHALL NOT PROTRUDE MORE 4 in. (100 m) ABOVE THE GROUND (MEASURED ALONG A 5' [1.5M] CORD LONGITUDINAL TO THE SYSTEM). SITE GRADING MAY BE NECESSARY TO MEET THIS REQUIREMENT.
14. THE LOWER SECTION OF THE HINGED POST SHOULD NOT BE DRIVEN WITH THE UPPER POST ATTACHED. IF THE POST IS PLACED IN A DRILLED HOLE, THE BACKFILL MATERIAL MUST BE SATISFACTORILY COMPACTED TO PREVENT SETTLEMENT.
15. THE TERMINAL BREAK-AWAY SYSTEM SHALL MEET THE CRASH TEST AND EVALUATION CRITERIA ASSHTO MASH (TL3).
16. THE DETAILS PROVIDED ARE FROM ROAD SYSTEMS INC. THE CONTRACTOR SHALL PROVIDE THE SKT IMPACT HEAD WITH 350 SKT TERMINALS OR EQUAL FROM ANY APPROVED VENDER.
17. DIMENSIONS IN BRACKETS [ ] ARE METRIC.
18. SEE THE CONTRACT SUPPLEMENTAL SPECIFICATION FOR SECTION 617 FOR ADDITIONAL REQUIREMENTS.

WILSON & COMPANY
4401 MASTHEAD ST. NE. SUITE 150
ALBUQUERQUE, NM 87109
PHONE: 505-348-4000
FAX: 505-348-4072
www.wilsonco.com

Registered Professional Engineer (Civil)
CERTIFICATE NO.
83225
MYRA K. CANDELARIA
Date Signed
ARIZONA, U.S.A.

REVISION	BY	DATE

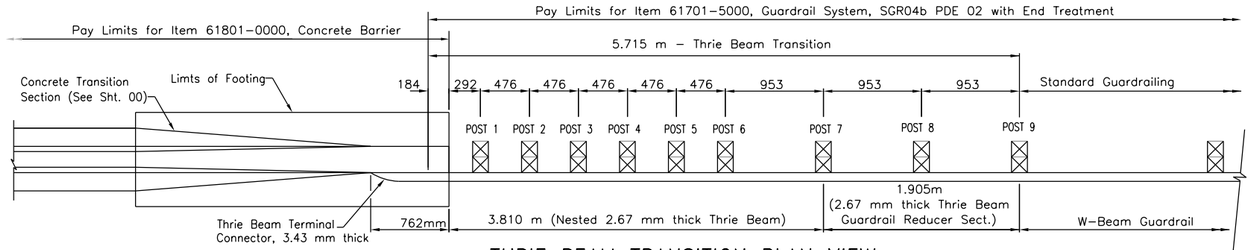
NAVAJO NATION
DIVISION OF TRANSPORTATION
NAVAJO D.O.T.

N9073 (1)

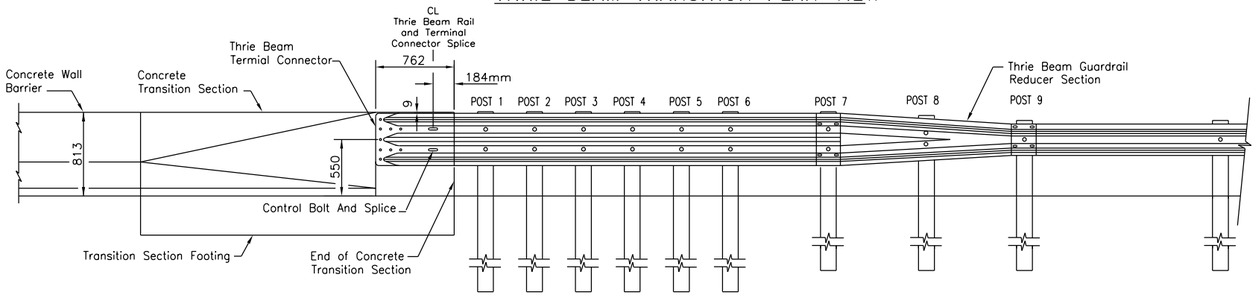
GUARDRAIL END TREATMENT
MDKT-TL3-8 LAYOUT: SHEET 2 OF 2

PROJECT MANAGER: DDM	DATE: 1/22	DRAWING	SHEET
LEAD DESIGNER: MLL	DATE: 1/22		
ASBUILT BY:	DATE: XXX		45 OF 84
SCALE: N/A			

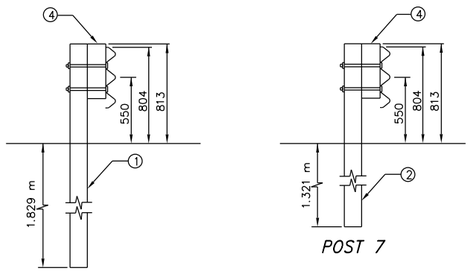
STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	46

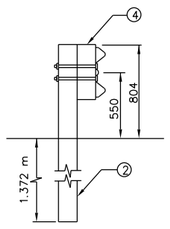


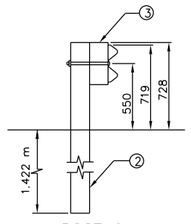
THRIE BEAM TRANSITION PLAN VIEW



THRIE BEAM TRANSITION ELEVATION VIEW

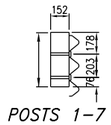


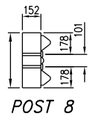


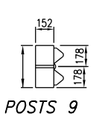


LEGEND

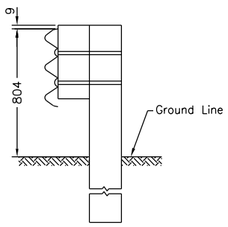
① 152 x 635 x 2.591 m or W203 x 533 x 2.591 m Post
② W152 x 508 x 2.134 m or W203 x 457 x 2.134 m Post
③ 152 x 203 x 356 Treated Timber Offset Block
④ 152 x 203 x 457 Treated Timber Offset Block



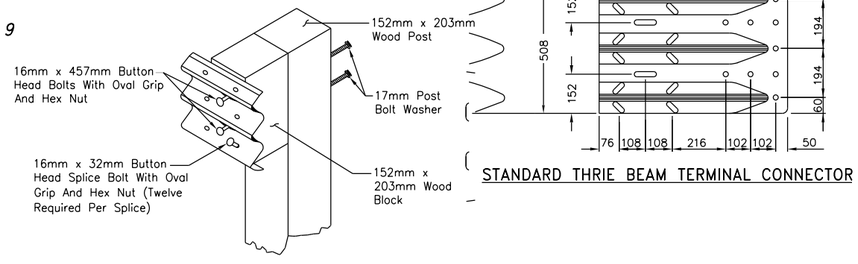




BLOCK DETAILS

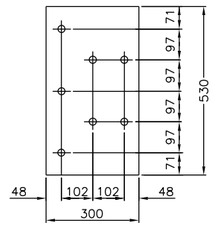


THRIE BEAM RAIL ASSEMBLY

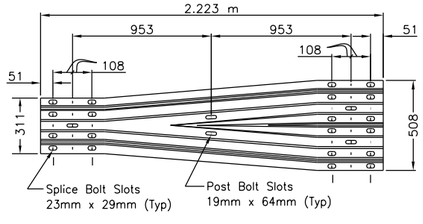


THRIE BEAM POST ASSEMBLY

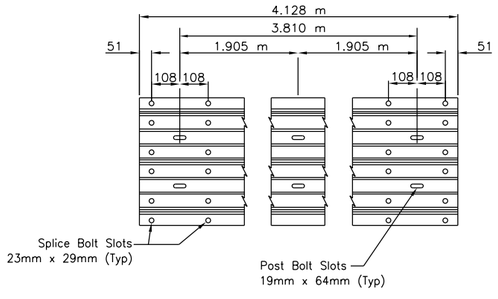
STANDARD THRIE BEAM TERMINAL CONNECTOR



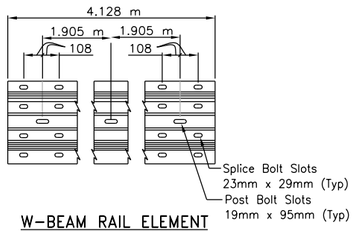
16 mm BEARING PLATE



THRIE BEAM GUARDRAIL REDUCER SECTION



THRIE BEAM RAIL ELEMENT



W-BEAM RAIL ELEMENT

GENERAL NOTES

1. All Dimensions In Millimeters Unless Otherwise Shown.
2. All Materials and Workmanship Shall Conform To FP-14.
3. All Hardware Shall Meet FHWA Crash Worthiness Requirements As Per NCHRP 350 Guidelines.
4. Five 22 mm Diameter Galvanized AASHTO M164 Bolts Are Required For The Attachment Of The Thrie Beam Terminal Connector to the Concrete Barrier. The Length To Be Determined in the Field By The COR/COTR. Holes For Bolts Shall be 25mm Dia. And Shall Be Either Formed or Core Drilled.
5. Furnishing And Placing Of Bolts, Washers, And Bearing Plate Shall Be Considered Incidental To The Cost OF Metal Barrier And No Direct Payment Will Be made Thereof.
6. Install Thrie Beam Terminal Connector Between Nested Guardrail Elements On The Approach Section.
7. Install Thrie Beam Terminal Connector Outside Of The Nested Guardrail Elements On The Departure Section.
8. Bolts Are To Be Installed As Shown So That The Threaded End Of The Bolts And Nuts Are Placed Away From Traffic Side Of Rail.
9. Do Not Place Any Washers Under The Bolts On The Traffic Side Of The Barrier.
10. Place Reflector Tabs on posts 1, 6 and 9..
11. The Color Of The Reflective Sheeting On The Reflector Tabs Shall Be The Same As The Color Of The Edge line Pavement Marking In Front and Yellow on Back Side.
12. Reflector Tabs Shall Have a Minimum Of 76 mm x 127 mm Reflective Sheeting On Both Sides And Shall Attach Securely To The Blockout.
13. Splices Shall Be Lapped So The Free End Does Not Face Traffic Flow.
14. Construction Tolerance For Height Of Guardrail Is 13 mm.
15. Connector, Bearing plate and Associated Hardware Shall Be Considered Incidental to Bid Item 61701-5000 & 61802-0100. Thrie Beam Transition Shall Be Measured and Paid For under Bid Item 61701-5000 & 61802-0100.

WILSON & COMPANY
4401 MASTHEAD ST, NE, SUITE 150
ALBUQUERQUE, NM 87109
PHONE: 505-348-4000
FAX: 505-348-4072
www.wilsonco.com

Registered Professional Engineer (Civil) CERTIFICATE NO. 53225 MYRA K. CANDELARIA Date Signed 09/30/22 ARIZONA, U.S.A.

REVISION	BY	DATE

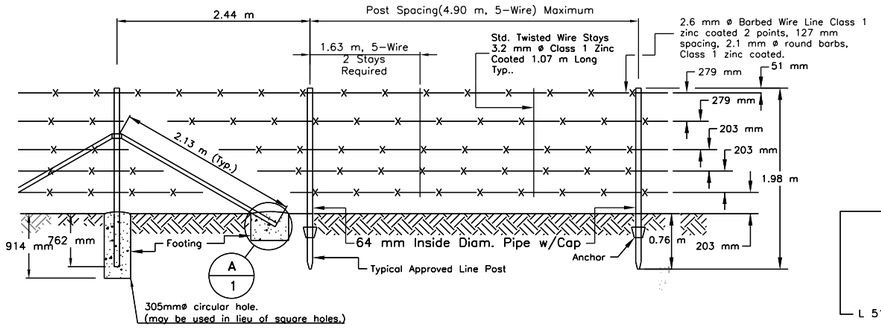
NAVAJO NATION
DIVISION OF TRANSPORTATION
NAVAJO D.O.T.

N9073(1) 1, 2 & 4

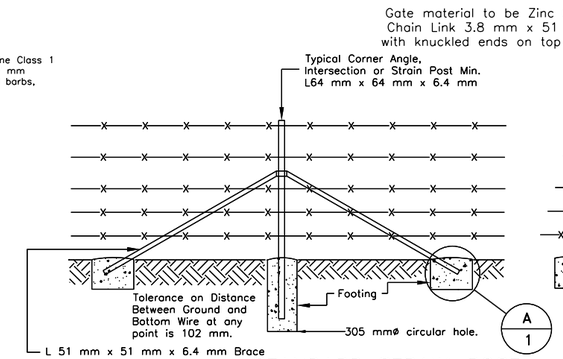
GUARDRAIL TRANSITION AND THRIE BEAM DETAILS

PROJECT MANAGER: DDM	DATE: 1/22	DRAWING	SHEET
LEAD DESIGNER: MLL	DATE: 1/22		
ASBUILT BY:	DATE: XXX		46 OF 84
SCALE: N/A			

STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	47

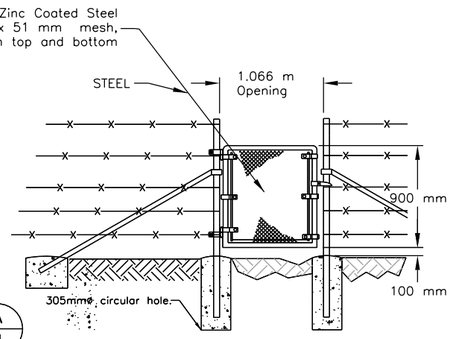


STANDARD 5 LINE GALVANIZED BARBED WIRE PANEL

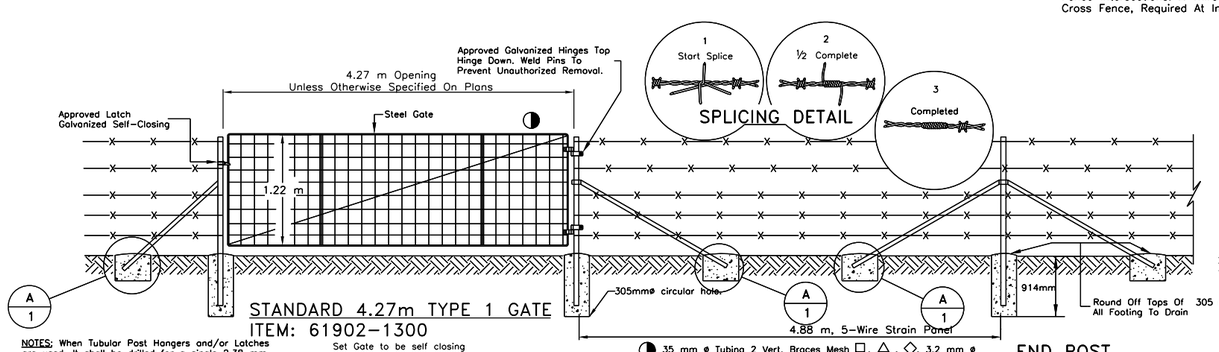


STANDARD STRAIN POST

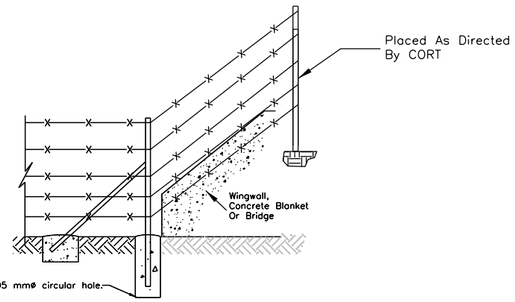
To Be Placed @ 198 m Max. Intervals. Strain Posts With Braces Shall Be Installed At All Corners (R/W Corners Etc.) And Angles Exceeding 15° And Fence Intersections. A Third Brace, In Line With Cross Fence, Required At Intersection.



STANDARD PEDESTRIAN GATE DETAIL



STANDARD 4.27m TYPE 1 GATE
ITEM: 61902-1300

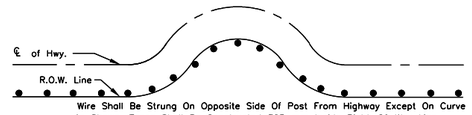


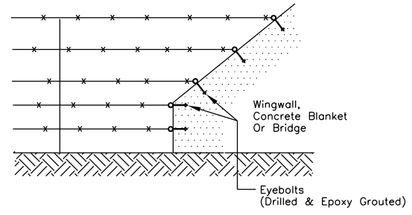
END POST

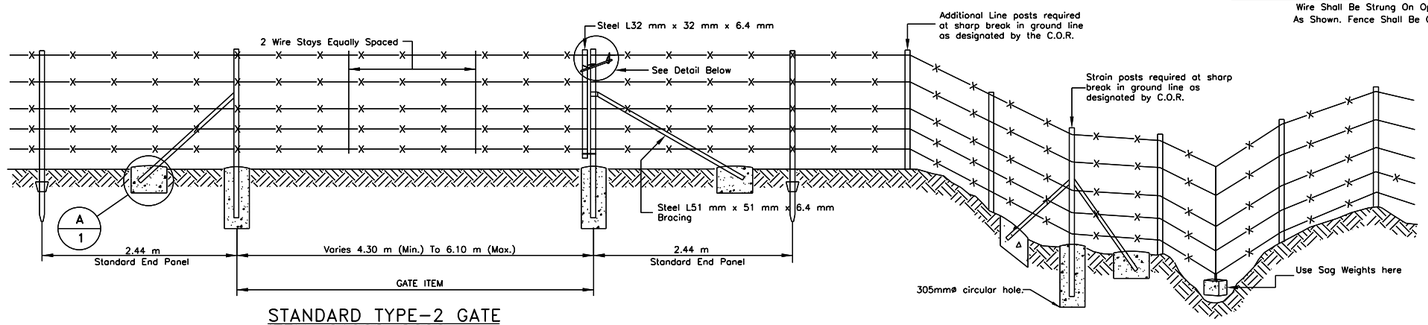
NOTES: When Tubular Post Hangers and/or Latches are used, It shall be drilled for a single 2.38 mm ø Min. drive pin to prevent rotation of the hangers and/or latches.

Set Gate to be self closing (use only when specified by special note in the plans)

For Gate Details at Cattle guard location see standard cattle guard drawings.





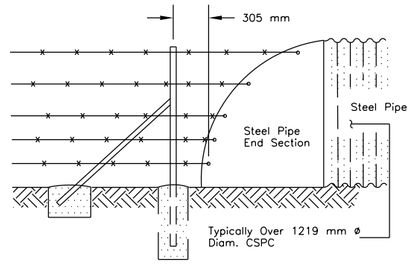


STANDARD TYPE-2 GATE
ITEM: 61902-2600

Use At Locations Noted On Plans

FENCE PROFILE IN ROUGH TERRAIN

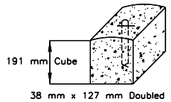
In Rough Terrain Post Spacing Shall Be Reduced Where Necessary To Maintain Required Spacing Below Bottom Wire Within The Tolerance Allowed.



WING FENCE

Detail For Corr. Metal Culvert

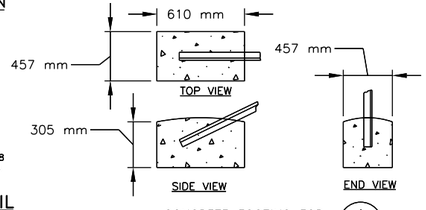
TYPICAL STEEL POST SECTION



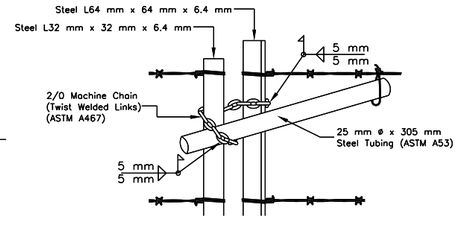
38 mm x 127 mm Doubled and Twisted 3.8 mm(dia.) Wire Loop Centered in Block. 25.4 mm Projection Twisted Ends Down.

CONCRETE SAG WEIGHT DETAIL

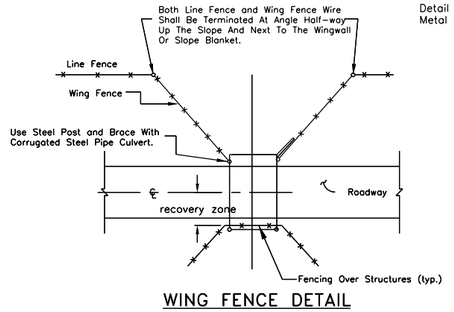
Min. Weight Of Concrete Sag Shall Be 16 kg.



CONCRETE FOOTING FOR CORNER & STRAIN POST (A 1)



GATE SECURING DETAIL



WING FENCE DETAIL

WILSON & COMPANY
4401 MASTHEAD ST. NE. SUITE 150
ALBUQUERQUE, NM 87109
PHONE: 505-348-4000
FAX: 505-348-4072
www.wilsonco.com

Registered Professional Engineer (Civil) CERTIFICATE 85225 MYRA K. CANDELARIA Date Signed 10/10/22 ARIZONA, U.S.A.

△	REVISION	BY	DATE

NAVAJO D.O.T.

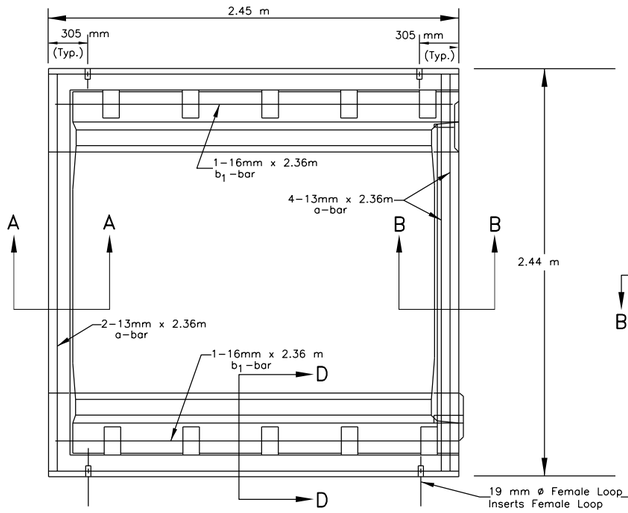
NAVAJO NATION
DIVISION OF TRANSPORTATION

N9073(1) 1, 2 & 4

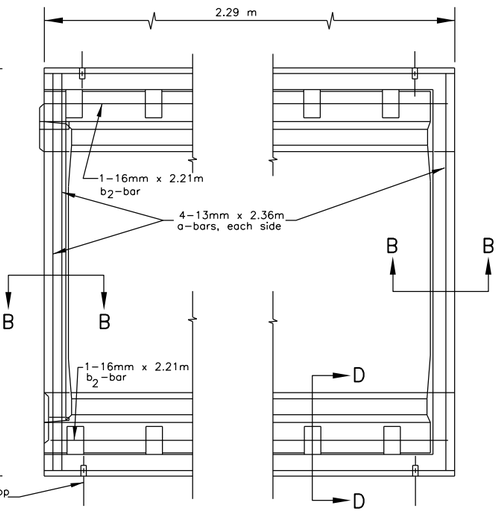
STANDARD FENCING DETAIL

PROJECT MANAGER: DDM	DATE: 1/22	DRAWING	SHEET
LEAD DESIGNER: MLL	DATE: 1/22		
ASBUILT BY:	DATE: XXX		47 OF 84
SCALE: N/A			

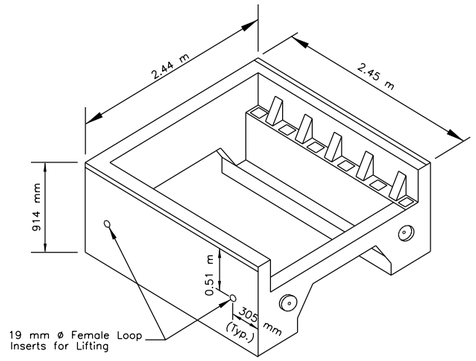
STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	48



PLAN – END UNIT



PLAN – INTERMEDIATE UNIT



ISOMETRIC VIEW – END UNIT

GENERAL NOTES

1. PRECAST CONCRETE SHALL ATTAIN 28–DAY COMPRESSIVE STRENGTH OF 27.62 MPA (MINIMUM) IN ACCORDANCE WITH AASHTO T22 (ASTM C–39). THE CONCRETE SHALL BE CLASS A(AE) CONFORMING TO SECTION 552 OF FP–03.

2. REINFORCING STEEL SHALL CONFORM TO ASTM A615, GRADE 420. ALL STRUCTURAL STEEL SHALL CONFORM TO AASHTO M–183.

3. THE CONTRACTOR SHALL SLOPE THE BASES OF THE CATTLE GUARDS AS REQUIRED TO PROVIDE ROADWAY CROWNS OR SUPERELEVATION AS SHOWN ON THE PLANS.

4. BOLTS, WASHERS, AND NUTS SHALL BE GALVANIZED TO MEET THE REQUIREMENTS OF AASHTO M111 OR AASHTO M298.

5. ALL TRAFFIC GRILL UNIT, AND WING BRACE STRUCTURAL STEEL AND PIPE, INCLUDING THE STEEL ANGLES SHALL RECEIVE ONE (1) PRIMER COAT, ONE (1) INTERMEDIATE COAT, AND ONE (1) FINISH COAT IN ACCORDANCE WITH SECTION 563, PAINT SYSTEM 2, OF FP–03.

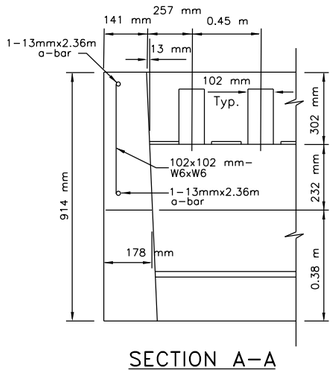
6. WING BRACES SHALL BE CONSIDERED SUBSIDIARY ITEMS TO THE CATTLEGUARD UNIT.

7. THE CONTRACTOR HAS THE OPTION TO USE ALL STEEL FRAME CATTLEGUARD. IF THE CONTRACTOR ELECTS TO SUBSTITUTE FOR THE STEEL FRAME CATTLEGUARD, CONTRACTOR SHALL SHOW THEY ARE MORE COST EFFECTIVE WITH SUPPORTING DATA. THE CONTRACTOR IS RESPONSIBLE FOR ALL PATENT PROTECTION RIGHTS, SHOP DRAWINGS, MATERIAL CERTIFICATIONS, AND MILL TEST REPORTS. HOWEVER, NO STEEL FRAME CATTLEGUARD SHALL BE USED FOR CONCRETE DRAINAGE PAD CATTLEGUARD LOCATIONS.

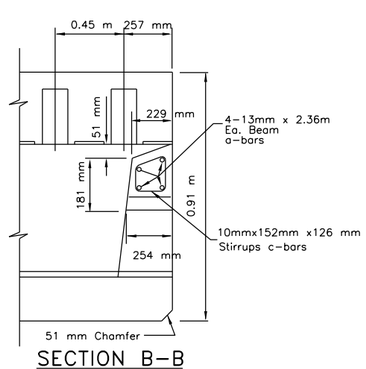
8. ELASTOMERIC BEARING PADS SHALL BE SEAL WITH EPOXY ADHESIVE PRIOR TO THE INSTALLATION OF TRAFFIC GRILL UNIT.

9. DESIGN DATA: DESIGN ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, THIRD EDITION.

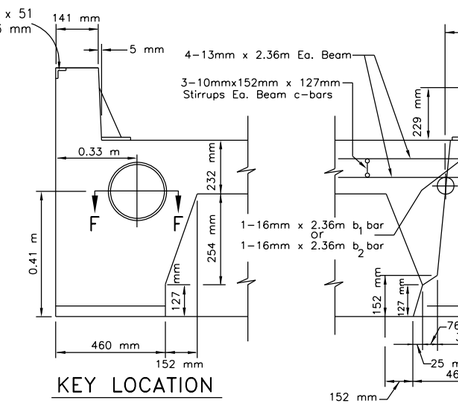
   DESIGN LOADS: HS20 AND DESIGN TANDEM WITH 33% IMPACT.



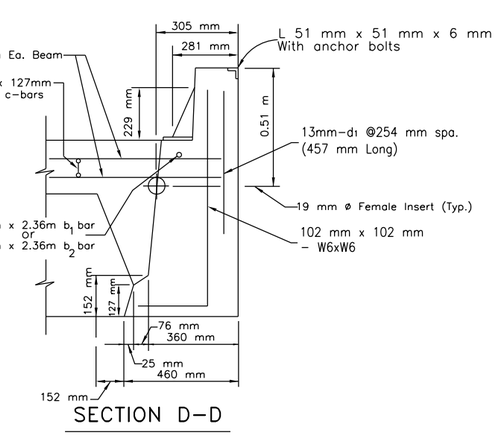
SECTION A–A



SECTION B–B



KEY LOCATION



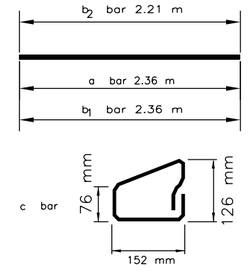
SECTION D–D

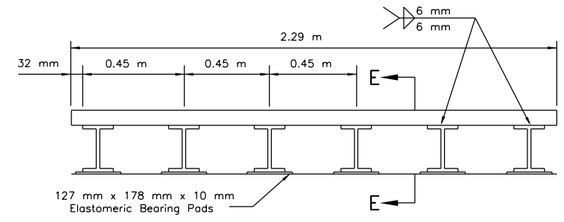
REINFORCING STEEL SCHEDULE

STRAIGHT BARS				BENT BARS			
MARK	NO.	SIZE	LENGTH	MARK	NO.	SIZE	LENGTH
END UNIT							
a	6	13	2.36 m				
b_1	2	16	2.36 m				
				c	3	10	0.61 m
D_1	20	13	0.46 m				
INTERMEDIATE UNIT							
a	8	13	2.36 m				
b_2	2	16	2.21 m				
				c	6	10	0.61 m
D_1	18	13	0.46 m				

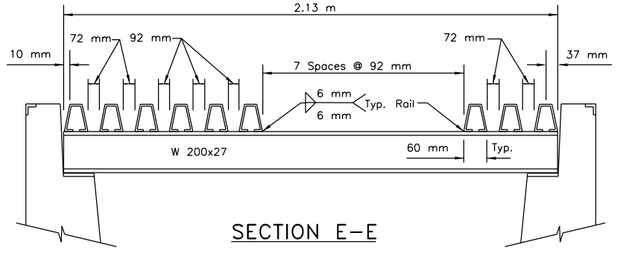
BENDING DIAGRAMS

ALL DIMENSIONS ARE OUT TO OUT

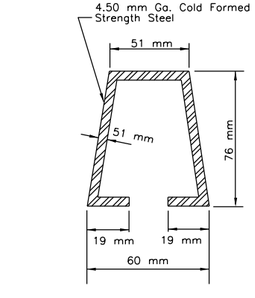




TRAFFIC GRILLE UNIT

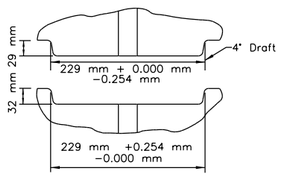


SECTION E–E

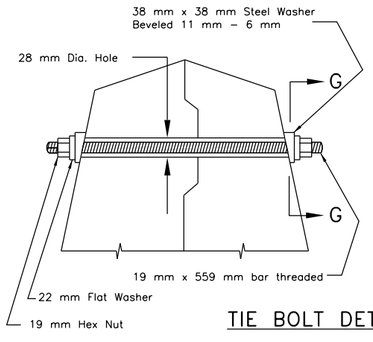


STEEL CROSSBAR SECTION

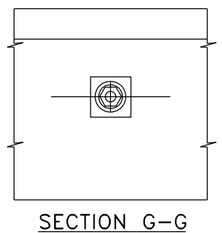
15 Req'd for 1 Grid



SECTION F–F



TIE BOLT DETAIL



SECTION G–G

WILSON & COMPANY
4401 MASTHEAD ST. NE. SUITE 150
ALBUQUERQUE, NM 87109
PHONE: 505-348-4000
FAX: 505-348-4072
www.wilsonco.com

Registered Professional Engineer (Civil) CERTIFICATE NO. 13225 MYRA K. CANDELARIA Date Signed 09/30/22 ARIZONA, U.S.A.

	REVISION	BY	DATE

NAVAJO NATION
DIVISION OF TRANSPORTATION

N9073(1) 1, 2 & 4

PRECAST CONCRETE CATTLEGUARD DETAILS

PROJECT MANAGER: DDM	DATE: 1/22	DRAWING	SHEET
LEAD DESIGNER: MLL	DATE: 1/22		
ASBUILT BY:	DATE: XXX		48 OF 84
SCALE: N/A			

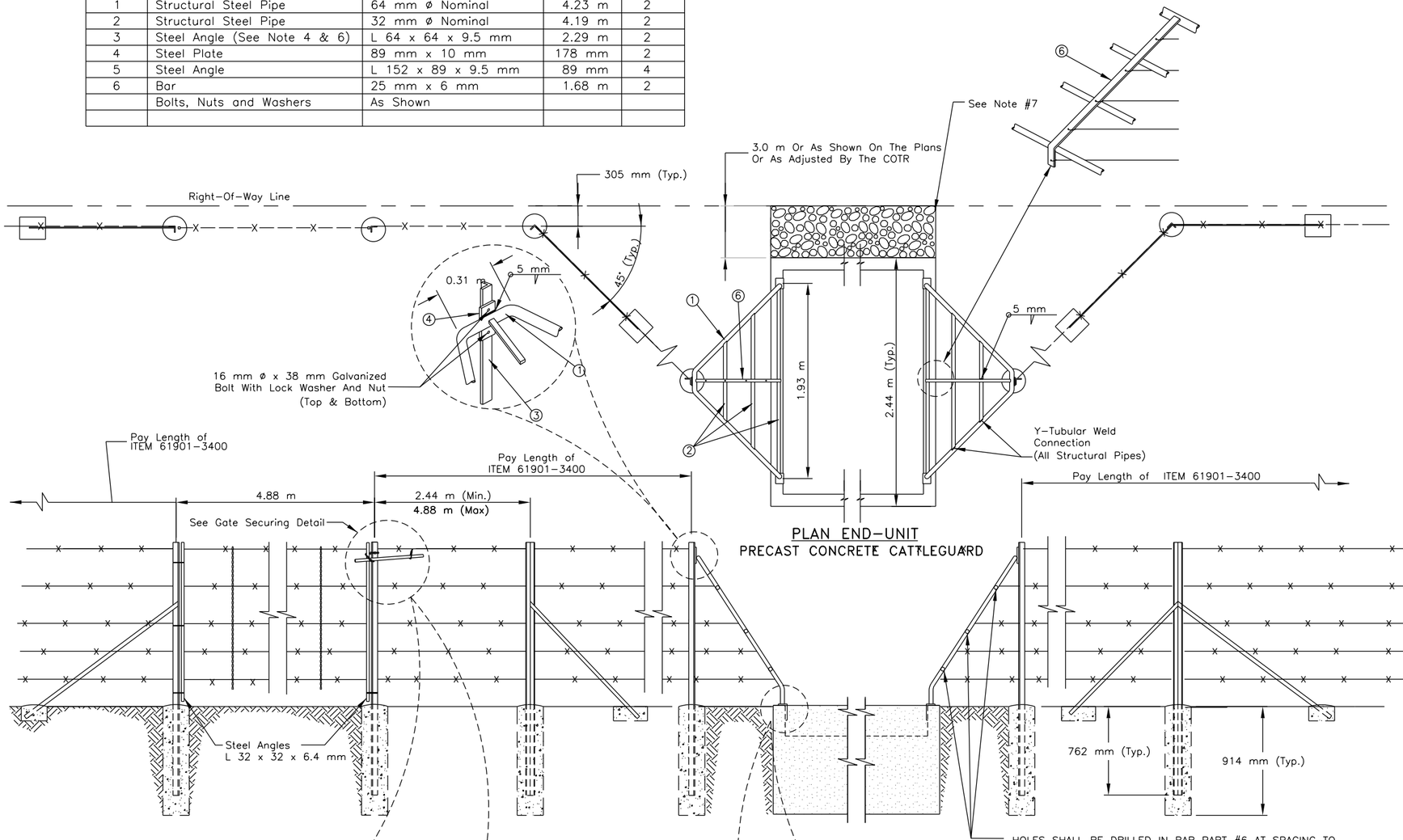
STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	49

ESTIMATED MATERIAL LIST

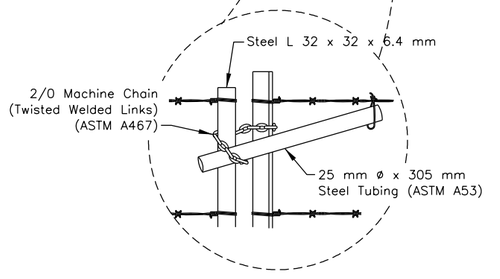
PART NO.	MATERIAL	SIZE AND THICKNESS	LENGTH	QUANTITY
1	Structural Steel Pipe	64 mm ø Nominal	4.23 m	2
2	Structural Steel Pipe	32 mm ø Nominal	4.19 m	2
3	Steel Angle (See Note 4 & 6)	L 64 x 64 x 9.5 mm	2.29 m	2
4	Steel Plate	89 mm x 10 mm	178 mm	2
5	Steel Angle	L 152 x 89 x 9.5 mm	89 mm	4
6	Bar	25 mm x 6 mm	1.68 m	2
	Bolts, Nuts and Washers	As Shown		

GENERAL NOTES

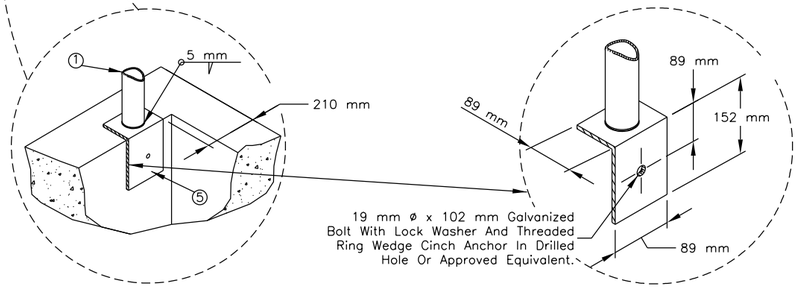
1. STRUCTURAL PIPE SHALL CONFORM TO ASTM A53–93a, GRADE B. ALLOTHER STRUCTURAL STEEL SHALL CONFORM TO ASTM–A36.
2. ALL STRUCTURAL PIPE JOINTS SHALL BE FABRICATED IN ACCORDANCEWITH AISC MANUAL OF STEEL CONSTRUCTION, LATEST EDITION.
3. WELDING SHALL MEET THE REQUIREMENTS OF AASHTO STANDARDSPECIFICATIONS FOR WELDING AT STRUCTURAL STEEL HIGHWAY BRIDGES, LATEST EDITION.
4. THE SUPPORTING WING BRACE POSTS LENGTH (PART 3) SHALL PROVIDE A MINIMUM OF 610 mm OF SOIL PENETRATION. UNDER CERTAIN CONDITIONS (SUCH AS DRAIN THROUGH CATTLEGUARD, HIGH EMBANKMENT, ETC.) THE LENGTH OF POST MAY VARY TO FULLY SUPPORT THE WING BRACES. THIS WORK SHALL BE INCIDENTAL TO CONTRACT ITEM 61903. INSTALLATION OF GATE SHALL BE SUBSIDIARY ITEM TO THE CATTLEGUARD ITEM(S).
5. THE CORT MAY ADJUST THE FINISHED CATTLEGUARD ELEVATION ASNEEDED TO FIT FIELD/DRAINAGE CONDITIONS. THE CONTRACTOR SHALL RE–GRADE THE ADJOINING TURNOUT APPROACHES AS REQUIRED. THIS WORK SHALL BE CONSIDERED INCIDENTAL TO CONTRACT ITEM 61903 OF FP–03. ANY MISTAKES MADE BY CORT IN DIRECTING ADJUSTMENTS TO THE FINISHED GRADE FOR THE CATTLEGUARDS AND APPROACH ROADWAY WILL BE CORRECTED UNDER SUBSECTION 109.02(m).
6. AT SHEWED TURNOUT LOCATIONS, THE CATTLEGUARD SHALL BE INSTALLED PERPENDICULAR TO TURNOUT.
7. THE LENGTH OF THE TRUNOUT BETWEEN THE BACK EDGE OF THECATTLEGUARD AND THE RIGHT–OF–WAY LIMIT SHALL BE SURFACED WITH A 100 mm THICKNESS OF AGGREGATE BASE COURSE AT ALL 4.5 m WIDE TURNOUTS. FOR TURNOUTS WIDER THAN 4.5 m, PLACE AGGREGATE BASE COURSE AND ASPHALT SURFACING TO MATCH THE TURNOUT STRUCTURAL SECTION, BETWEEN THE BACK OF THE CATTLEGUARD AND THE RIGHT–OF–WAY LINE. THE SURFACING MATERIAL AND WORK SHALL BE INCLUDED IN THE UNIT PRICE BID FOR THE PAVING ITEMS SHOWN IN THE BID SCHEDULE.
8. AT CATTLEGUARD LOCATIONS WHERE THE DESIGN TYICAL WIDTH IS WIDER ON ONE SIDE OF THE CATTLEGUARD THAN THE OTHER SIDE, THE NARROWER ROADWAY WIDTH SHALL FLARED OUT TO MATCH THE WIDER ROADWAY WIDTH USING AN 8:1 TAPER OR TO THE LENGTH ALLOW BY THE RIGHT–OF–WAY WIDTH. THIS INCLUDES AT NARROW RIGHT–OF–WAY WIDTH WHERE THE TURNOUT RADIUS CANNOT BE COMPLETELY INSTALL BETWEEN THE MAIN ROAD AND THE CATTLEGUARD. THIS WORK SHALL BE PAID UNDER THE EARTHWORK, AGGREGATE BASE, AND PAVING ITEMS INCLUDED IN THED BID SCHEDULE.



PLAN END–UNIT
PRECAST CONCRETE CATTLEGUARD



GATE SECURING DETAIL



WILSON &COMPANY
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ALBUQUERQUE, NM 87109
PHONE: 505-348-4000
FAX: 505-348-4072
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Registered Professional Engineer (Civil)
CERTIFICATE NO. 83225
MYRA K. CANDELARIA
Date Signed
ARIZONA, U.S.A.

	REVISION	BY	DATE

NAVAJO D.O.T.

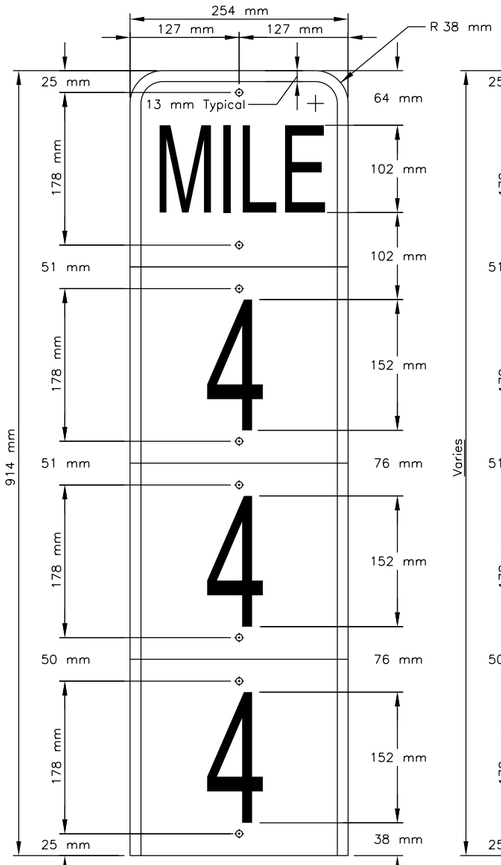
NAVAJO NATION
DIVISION OF TRANSPORTATION

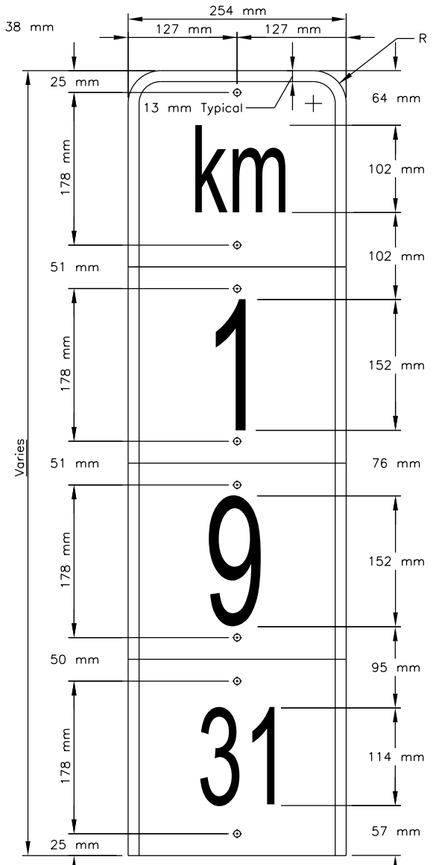
N9073(1) 1, 2 & 4

CATTLEGUARD AND
WING BRACE DETAILS

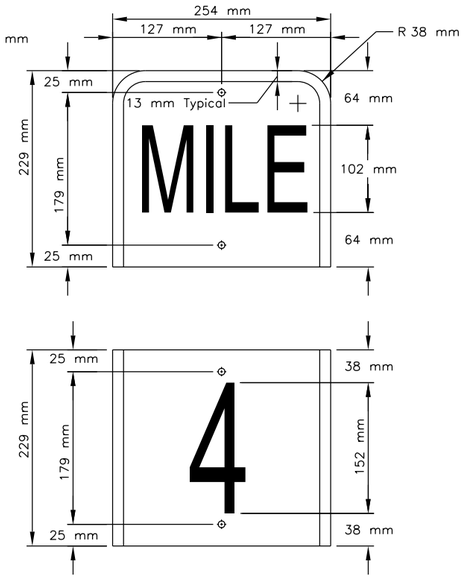
PROJECT MANAGER: DDM	DATE: 1/22	DRAWING	SHEET
LEAD DESIGNER: MLL	DATE: 1/22		
ASBUILT BY:	DATE: XXX		49 OF 84
SCALE: N/A			

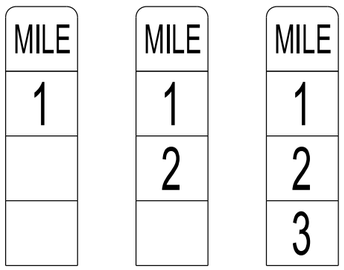
STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	50



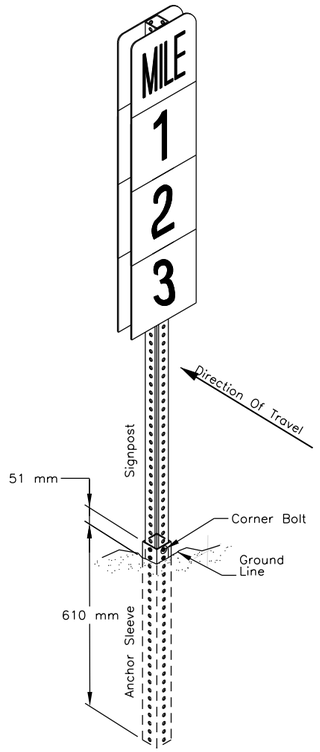


TYPICAL MILEPOST DETAIL



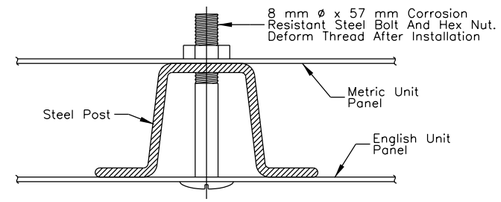


STANDARD NUMERAL POSITION

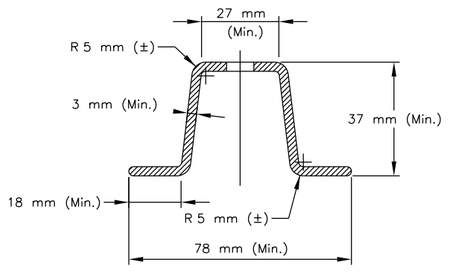


ISOMETRIC VIEW

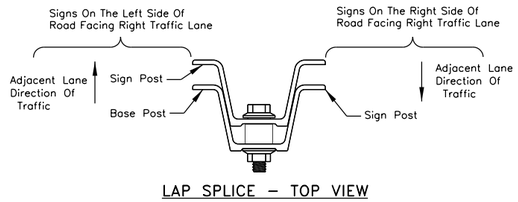
NOTE: Square Tube Splice Connection Detail on Sheet 60



TYPICAL MOUNTING DETAIL FOR BACKPLATE



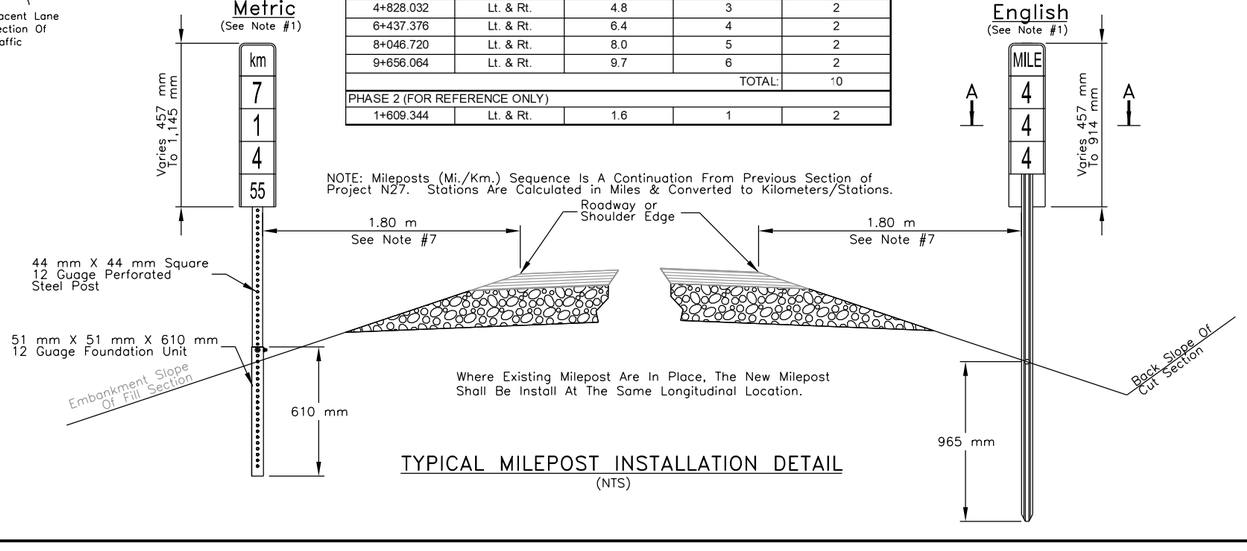
SECTION A–A



LAP SPLICE – TOP VIEW

ITEM: 63318-1000 MILEPOST
38 mm x 38 mm STEEL SQUARE TUBE

STATION (m)	LOCATION	Kilometers (Labels	MILES (Labels)	QUANTITY (Each)
PHASE 1, SEGMENT 2				
3+218.688	Lt. & Rt.	3.2	2	2
4+828.032	Lt. & Rt.	4.8	3	2
6+437.376	Lt. & Rt.	6.4	4	2
8+046.720	Lt. & Rt.	8.0	5	2
9+656.064	Lt. & Rt.	9.7	6	2
			TOTAL:	10
PHASE 2 (FOR REFERENCE ONLY)				
1+609.344	Lt. & Rt.	1.6	1	2



TYPICAL MILEPOST INSTALLATION DETAIL
(NTS)

WILSON &COMPANY
4401 MASTHEAD ST. NE. SUITE 150
ALBUQUERQUE, NM 87109
PHONE: 505-348-4000
FAX: 505-348-4072
www.wilsonco.com

Registered Professional Engineer (Civil) CERTIFICATE NO. 83225 MYRA K. CANDELARIA Date Signed 09/30/22 ARIZONA, U.S.A.

	REVISION	BY	DATE

NAVAJO D.O.T.

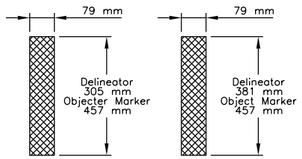
NAVAJO NATION
DIVISION OF TRANSPORTATION

N9073(1) 1, 2 & 4

MILEPOST AND SQUARE STEEL TUBE POST DETAILS

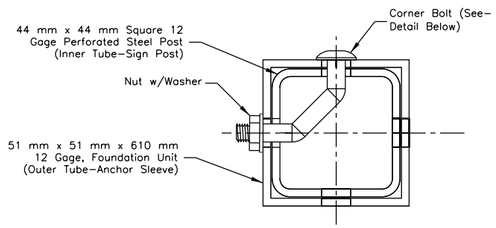
PROJECT MANAGER: DDM	DATE: 1/22	DRAWING	SHEET
LEAD DESIGNER: MLL	DATE: 1/22		
ASBUILT BY:	DATE: XXX		50 OF 84
SCALE: N/A			

STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	51

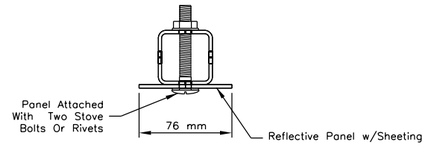


REFLECTIVE SHEETING

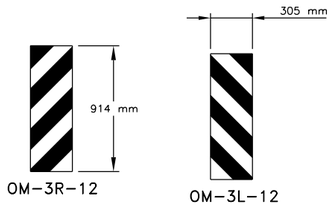
TYPE	POST COLOR	HIGH INTENSITY REFLECTIVE SHEETING
1a	WHITE	WHITE, ONE SIDE
1b	WHITE	WHITE, BOTH SIDES
2	YELLOW	AMBER, ONE SIDE



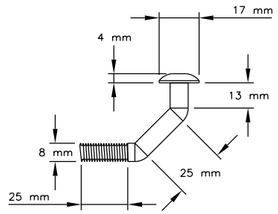
"BREAK–AWAY" DETAIL
SIGN POST/SLEEVE INTERFACE



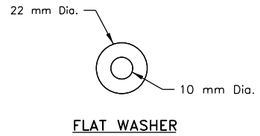
SQUARE TUBE POST AND PANEL



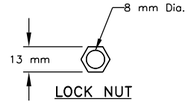
TYPE–3 OBJECT MARKER



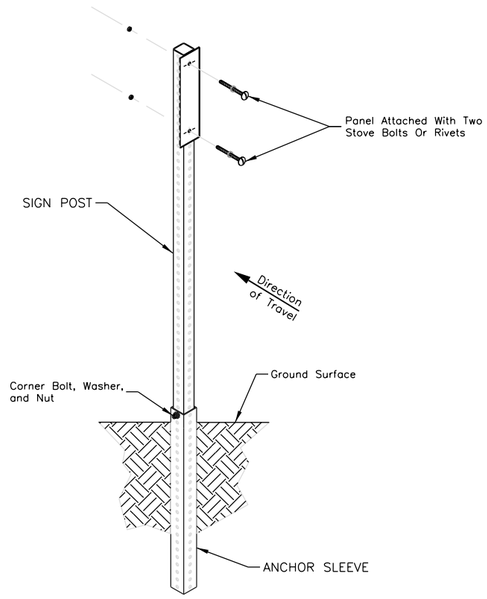
CORNER BOLT



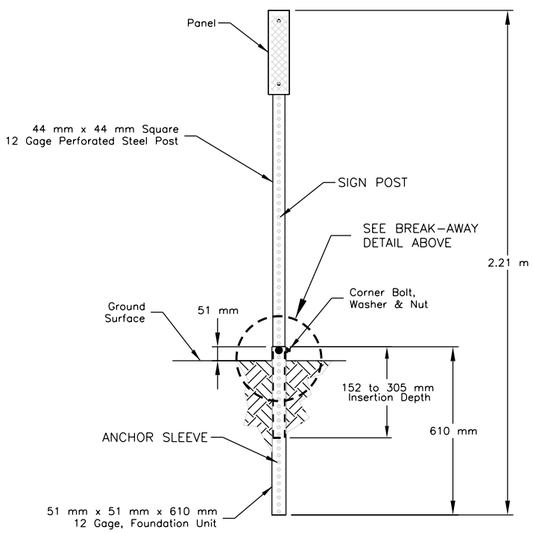
FLAT WASHER



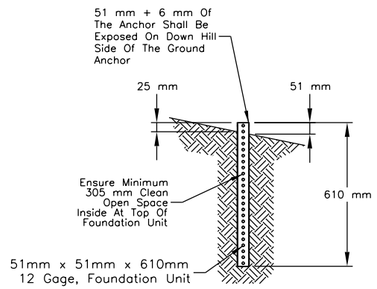
LOCK NUT



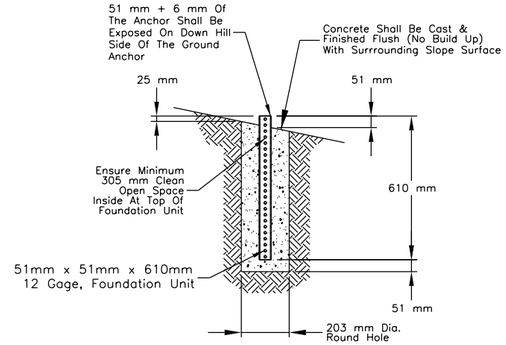
ISOMETRIC VIEW



SQUARE TUBE ASSEMBLY
(For Delineators Or Object Markers)



ANCHOR SLEEVE
IN–GROUND DRIVEN



ANCHOR SLEEVE
IN–GROUND W/CONCRETE

Note: Use Chair Device To Ensure
Minimum 51 mm Clearance Between
Bottom Of Anchor And Bottom Of Hole

WILSON &COMPANY
4401 MASTHEAD ST. NE. SUITE 150
ALBUQUERQUE, NM 87109
PHONE: 505-348-4000
FAX: 505-348-4072
www.wilsonco.com

Registered Professional Engineer (Civil)
CERTIFICATE NO.
83225
MYRA K.
CANDELARIA
Date Signed
ARIZONA, U.S.A.

	REVISION	BY	DATE

NAVAJO D.O.T.

NAVAJO NATION
DIVISION OF TRANSPORTATION

N9073(1) 1, 2 & 4

DELINEATOR AND
OBJECT MARKER DETAILS

PROJECT MANAGER: DDM	DATE: 1/22	DRAWING	SHEET
LEAD DESIGNER: MLL	DATE: 1/22		
ASBUILT BY:	DATE: XXX		51 OF 84
SCALE: N/A			

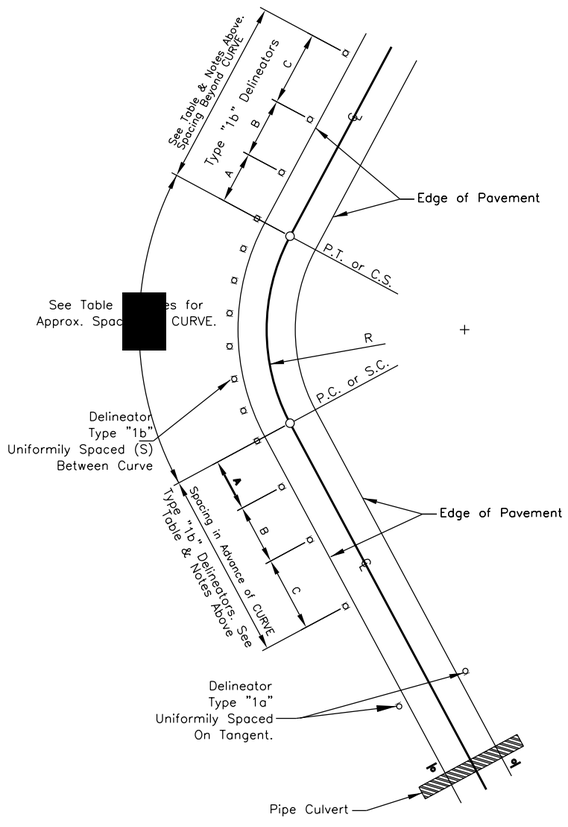
STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	52

RADIUS OF CURVE (m)	APPROXIMATE SPACING (S) ON CURVE (m)	SPACING ON ADVANCE OF OR BEYOND A CURVE (m)		
		A (2S)	B (3S)	C (6S)
15	6	12	18	36
35	8	16	24	48
55	11	22	33	66
75	13	26	39	78
95	15	30	45	90
125	18	36	54	108
155	20	40	60	120
185	22	44	66	132
215	24	48	72	144
245	26	52	78	156
275	27	54	81	162
305	29	58	87	174
400	33	67	100	200
500	37	75	112	225
600	41	82	123	247
700	44	89	133	267
800	48	95	143	286
900	51	101	152	303
1000	53	107	160	320
1500	66	131	197	393
2000	76	151	227	454
2500	85	169	254	508
3000	93	186	279	557
3500	100	201	301	602
4000	107	215	322	644
4500	114	228	342	683
5000	120	240	360	720
5500	126	252	378	755
6000	132	263	395	789

S= 1.7 * sq. rt. (R−15).
Spacing for specific radii may be interpolated from table.
The spacing on curves should not exceed 90 meters.
Shaded areas denotes to use 90 meter spacings.
Delineators should be spaced 60 to 160 meters apart on Roadway tangent sections.

NOTE: When uniform spacing is interrupted by such features as culverts, signs, driveways, intersections, delineators which would ordinarily be located within the features may be relocated in either direction for a distance not exceeding one quarter of the uniform spacing. Delineators still falling within such features may be eliminated.

NOTE: Delineator and Object Markers shall be installed 610 (min) or 1219 mm (normal), or in−line with the guardrail posts, measured from Roadway or shoulder edge.



ITEM: 63309−0010: Type 1a Delineators

Station	Offset	Each	Description
6+157.00	Lt. & Rt.	2	Type 1a Delineator
6+317.00	Lt. & Rt.	2	Type 1a Delineator
7+360.00	Lt. & Rt.	2	Type 1a Delineator
7+520.00	Lt. & Rt.	2	Type 1a Delineator
7+680.00	Lt. & Rt.	2	Type 1a Delineator
7+840.00	Lt. & Rt.	2	Type 1a Delineator
9+000.00	Lt. & Rt.	2	Type 1a Delineator
9+160.00	Lt. & Rt.	2	Type 1a Delineator
9+320.00	Lt. & Rt.	2	Type 1a Delineator
	Total	18	

ITEM: 63308-2000 OBJECT MARKER

TYPE 2, 38 mm x 38 mm SQUARE STEEL TUBE

STATION	LOCATION	TYPE 2	TYPE 3
PHASE 1, SEGMENT 1			
0+023.00	Lt. & Rt.	2	
PHASE 1, SEGMENT 2			
3+302.00	Lt. & Rt.	2	
3+528.00	Lt. & Rt.	2	
3+740.00	Lt. & Rt.	2	
3+957.00	Lt. & Rt.	2	
4+215.00	Lt. & Rt.	2	
4+677.00	Lt. & Rt.	2	
4+960.00	Lt. & Rt.	2	
5+431.00	Lt. & Rt.	2	
5+757.00	Lt. & Rt.	2	
6+012.00	Lt. & Rt.	2	
6+236.00	Lt. & Rt.	2	
7+139.00	Lt. & Rt.	2	
7+645.50	Lt. & Rt.	6	
8+807.50	Lt. & Rt.	6	
9+137.00	Lt. & Rt.	6	
9+455.00	Lt. & Rt.	2	
10+056.45	Lt. & Rt.	2	
	TOTAL	48	0
PHASE 2 (FOR REFERENCE ONLY)			
1+368.00	Lt. & Rt.	2	2

ITEM: 63309-0020 Type 1b Delineators

Station	Offset	Each	Description
PHASE 1, SEGMENT 1			
0+167.25	Rt.	1	Type 1b Delineator
0+207.25	Rt.	1	Type 1b Delineator
0+229.63	Rt.	1	Type 1b Delineator
0+252.00	Rt.	1	Type 1b Delineator
0+292.00	Rt.	1	Type 1b Delineator
0+328.40	Lt.	1	Type 1b Delineator
0+361.40	Lt.	1	Type 1b Delineator
PHASE 1, SEGMENT 2			
1+926.83	Lt.	1	Type 1b Delineator
1+984.83	Lt.	1	Type 1b Delineator
2+018.06	Lt.	1	Type 1b Delineator
2+051.29	Lt.	1	Type 1b Delineator
2+084.53	Lt.	1	Type 1b Delineator
2+146.81	Lt.	1	Type 1b Delineator
2+181.93	Lt.	1	Type 1b Delineator
2+217.04	Lt.	1	Type 1b Delineator
2+252.16	Lt.	1	Type 1b Delineator
2+287.28	Lt.	1	Type 1b Delineator
2+322.39	Lt.	1	Type 1b Delineator
2+357.51	Lt.	1	Type 1b Delineator
2+392.63	Lt.	1	Type 1b Delineator
2+427.74	Lt.	1	Type 1b Delineator
2+502.74	Lt.	1	Type 1b Delineator
2+668.37	Lt.	1	Type 1b Delineator
2+755.37	Lt.	1	Type 1b Delineator
2+813.37	Lt.	1	Type 1b Delineator
2+843.56	Lt.	1	Type 1b Delineator
2+873.75	Lt.	1	Type 1b Delineator
2+903.94	Lt.	1	Type 1b Delineator
2+961.39	Rt.	1	Type 1b Delineator
2+961.94	Lt.	1	Type 1b Delineator
3+006.39	Rt.	1	Type 1b Delineator
3+208.74	Rt.	1	Type 1b Delineator
3+253.74	Rt.	1	Type 1b Delineator
3+330.22	Rt.	1	Type 1b Delineator
3+330.22	Lt.	1	Type 1b Delineator
3+416.70	Lt.	1	Type 1b Delineator
3+483.70	Lt.	1	Type 1b Delineator
3+517.71	Lt.	1	Type 1b Delineator
3+551.72	Lt.	1	Type 1b Delineator
3+585.73	Lt.	1	Type 1b Delineator
3+619.74	Lt.	1	Type 1b Delineator
3+653.75	Lt.	1	Type 1b Delineator
3+687.75	Lt.	1	Type 1b Delineator
3+721.76	Lt.	1	Type 1b Delineator
3+755.77	Lt.	1	Type 1b Delineator
3+822.77	Lt.	1	Type 1b Delineator
3+839.49	Rt.	1	Type 1b Delineator
3+879.49	Rt.	1	Type 1b Delineator
3+901.02	Rt.	1	Type 1b Delineator
3+922.54	Rt.	1	Type 1b Delineator
3+944.06	Rt.	1	Type 1b Delineator
3+965.59	Rt.	1	Type 1b Delineator
3+987.11	Rt.	1	Type 1b Delineator
4+008.64	Rt.	1	Type 1b Delineator
4+048.64	Rt.	1	Type 1b Delineator
4+108.64	Rt.	1	Type 1b Delineator
4+159.03	Lt.	1	Type 1b Delineator
4+246.75	Lt.	1	Type 1b Delineator
4+271.00	Lt.	1	Type 1b Delineator
4+306.20	Lt.	1	Type 1b Delineator
4+364.20	Lt.	1	Type 1b Delineator
4+417.20	Rt.	1	Type 1b Delineator
4+475.20	Rt.	1	Type 1b Delineator
4+506.35	Rt.	1	Type 1b Delineator
4+568.65	Rt.	1	Type 1b Delineator
4+599.80	Rt.	1	Type 1b Delineator
4+630.95	Rt.	1	Type 1b Delineator
4+662.10	Rt.	1	Type 1b Delineator
4+720.10	Rt.	1	Type 1b Delineator
4+807.10	Rt.	1	Type 1b Delineator
4+840.07	Lt.	1	Type 1b Delineator
4+930.07	Lt.	1	Type 1b Delineator
4+975.07	Lt.	1	Type 1b Delineator
5+220.94	Lt.	1	Type 1b Delineator
5+248.16	Rt.	1	Type 1b Delineator
5+270.48	Rt.	1	Type 1b Delineator
5+292.79	Rt.	1	Type 1b Delineator
5+315.10	Rt.	1	Type 1b Delineator
5+337.41	Rt.	1	Type 1b Delineator
5+400.04	Rt.	1	Type 1b Delineator
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5+492.23	Rt.	1	Type 1b Delineator
5+522.96	Rt.	1	Type 1b Delineator
5+553.69	Rt.	1	Type 1b Delineator
5+584.42	Rt.	1	Type 1b Delineator
5+615.15	Rt.	1	Type 1b Delineator
5+645.88	Rt.	1	Type 1b Delineator
5+703.88	Rt.	1	Type 1b Delineator
5+790.88	Rt.	1	Type 1b Delineator
5+964.88	Rt.	1	Type 1b Delineator
6+477.11	Rt.	1	Type 1b Delineator
6+651.11	Rt.	1	Type 1b Delineator
6+738.11	Rt.	1	Type 1b Delineator
6+796.11	Rt.	1	Type 1b Delineator
6+828.77	Rt.	1	Type 1b Delineator
6+861.44	Rt.	1	Type 1b Delineator
6+894.10	Rt.	1	Type 1b Delineator
6+952.10	Rt.	1	Type 1b Delineator
7+039.10	Rt.	1	Type 1b Delineator
7+213.10	Rt.	1	Type 1b Delineator
7+986.86	Rt.	1	Type 1b Delineator
8+160.86	Rt.	1	Type 1b Delineator
8+247.86	Rt.	1	Type 1b Delineator
8+305.86	Rt.	1	Type 1b Delineator
8+325.61	Rt.	1	Type 1b Delineator
8+345.36	Rt.	1	Type 1b Delineator
8+403.36	Rt.	1	Type 1b Delineator
8+433.26	Lt.	1	Type 1b Delineator
8+491.26	Lt.	1	Type 1b Delineator
8+519.68	Lt.	1	Type 1b Delineator
8+548.10	Lt.	1	Type 1b Delineator
8+576.52	Lt.	1	Type 1b Delineator
8+634.52	Lt.	1	Type 1b Delineator
8+721.52	Lt.	1	Type 1b Delineator
8+895.52	Lt.	1	Type 1b Delineator
9+445.56	Lt.	1	Type 1b Delineator
9+619.56	Lt.	1	Type 1b Delineator
9+706.56	Lt.	1	Type 1b Delineator
9+764.56	Lt.	1	Type 1b Delineator
9+794.42	Lt.	1	Type 1b Delineator
9+824.29	Lt.	1	Type 1b Delineator
9+854.16	Lt.	1	Type 1b Delineator
9+884.03	Lt.	1	Type 1b Delineator
9+942.03	Lt.	1	Type 1b Delineator
10+029.03	Lt.	1	Type 1b Delineator
	Total	125	
PHASE 2 (FOR REFERENCE ONLY)			
0+475.72	Lt.	1	Type 1b Delineator
0+508.72	Lt.	1	Type 1b Delineator
0+552.00	Rt.	1	Type 1b Delineator
0+610.35	Rt.	1	Type 1b Delineator
0+635.32	Rt.	1	Type 1b Delineator
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0+824.52	Lt.	1	Type 1b Delineator
0+854.52	Lt.	1	Type 1b Delineator
0+866.89	Lt.	1	Type 1b Delineator
0+879.27	Lt.	1	Type 1b Delineator
0+891.64	Lt.	1	Type 1b Delineator
0+904.01	Lt.	1	Type 1b Delineator
0+934.01	Lt.	1	Type 1b Delineator
0+979.28	Lt.	1	Type 1b Delineator
1+073.16	Lt.	1	Type 1b Delineator
1+131.16	Lt.	1	Type 1b Delineator
1+158.30	Lt.	1	Type 1b Delineator
1+185.44	Lt.	1	Type 1b Delineator
1+212.57	Lt.	1	Type 1b Delineator
1+239.71	Lt.	1	Type 1b Delineator
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1+560.79	Rt.	1	Type 1b Delineator
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1+795.42	Rt.	1	Type 1b Delineator
1+821.61	Rt.	1	Type 1b Delineator
1+879.61	Rt.	1	Type 1b Delineator

WILSON &COMPANY
4401 MASTHEAD ST. NE. SUITE 150
ALBUQUERQUE, NM 87109
PHONE: 505-348-4000
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www.wilsonco.com

Registered Professional Engineer (Civil) CERTIFICATE NO. 85225 MYRA K. CANDELARIA Date Signed 10/19/2022 ARIZONA, U.S.A.

	REVISION	BY	DATE

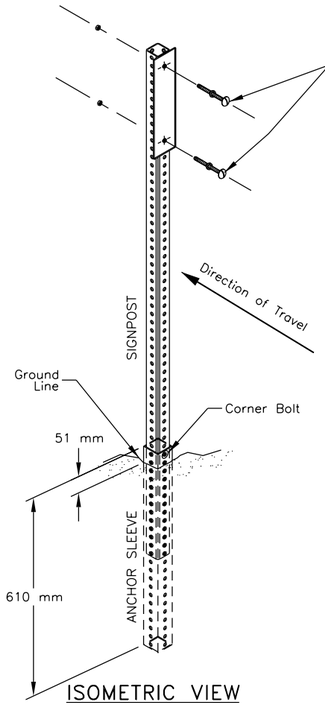
NAVAJO NATION
DIVISION OF TRANSPORTATION
NAVAJO D.O.T.

N9073(1) 1, 2 & 4

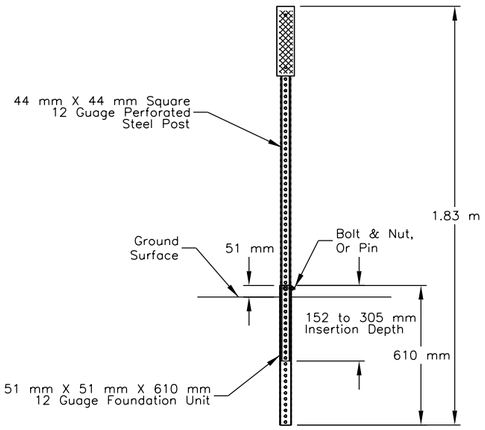
DELINEATOR & OBJECT MARKER LAYOUT AND QUANTITY TABLES

PROJECT MANAGER: DDM	DATE: 1/22	DRAWING	SHEET
LEAD DESIGNER: MLL	DATE: 1/22		
ASBUILT BY:	DATE: XXX		52 OF 84
SCALE: N/A			

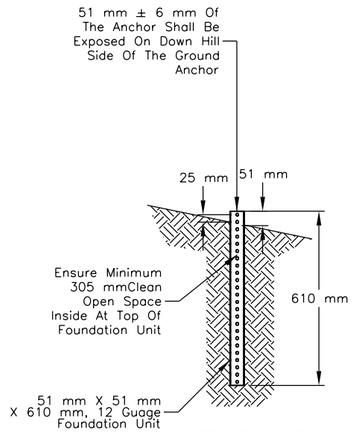
STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	53



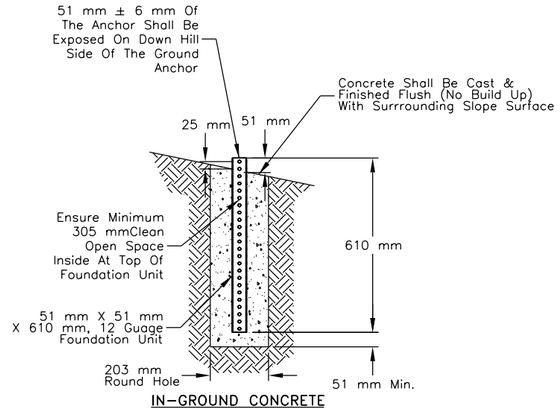
ISOMETRIC VIEW



ALTERNATE ASSEMBLY



IN-GROUND DRIVEN



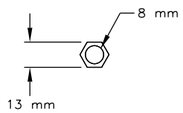
IN-GROUND CONCRETE

Use Chair Device To Ensure Minimum 51 mm Clearance Above Bottom Of Hole

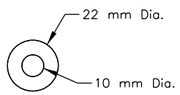
GENERAL NOTES

1. ALL CONCRETE SHALL BE CLASS A(AE) AND SHALL CONFORM TO SECTION 601 OF THE FP-03. FURNISHING AND PLACING OF CONCRETE, WHEN REQUIRED, SHALL BE CONSIDERED INCIDENTAL TO ITEM 63309-0020.

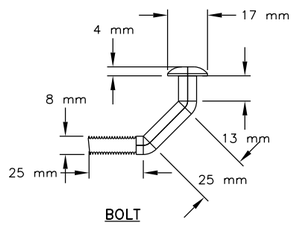
2. THE CONTRACTOR HAS THE OPTION TO USE 51 mm X 51 mm ALL STEEL SQUARE TUBE DELINEATORS. SEE SHEET 59 FOR POST SPACING.



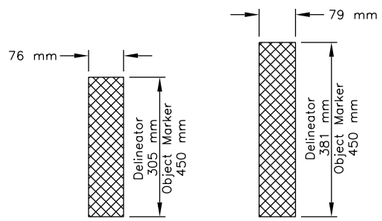
LOCK NUT



FLAT WASHER

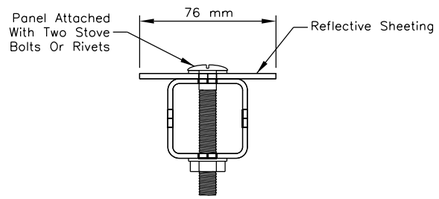


BOLT



REFLECTOR

REFLECTIVE PANEL (Pre-Drilled/Punched)



ALTERNATES

WILSON &COMPANY
4401 MASTHEAD ST. NE. SUITE 150
ALBUQUERQUE, NM 87109
PHONE: 505-348-4000
FAX: 505-348-4072
www.wilsonco.com

Registered Professional Engineer (Civil) CERTIFICATE NO. 85225 MYRA K. CANDELARIA Date Signed 10/31/2022 ARIZONA, U.S.A.

	REVISION	BY	DATE

NAVAJO NATION
DIVISION OF TRANSPORTATION

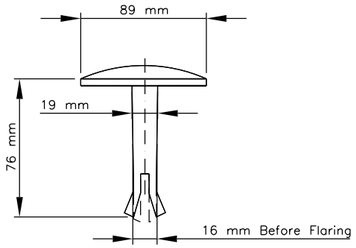
NAVAJO D.O.T.

N9073(1) 1, 2 & 4

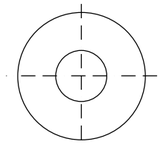
GLASS FIBER & SQUARE STEEL TUBE POST DETAILS

PROJECT MANAGER: DDM	DATE: 1/22	DRAWING	SHEET
LEAD DESIGNER: MLL	DATE: 1/22		
ASBUILT BY:	DATE: XXX		53 OF 84
SCALE: N/A			

STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	54

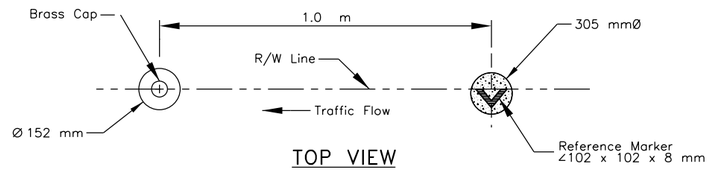


BRASS CAP DETAIL

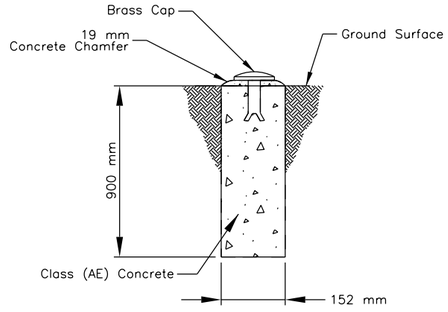


BOTTOM VIEW

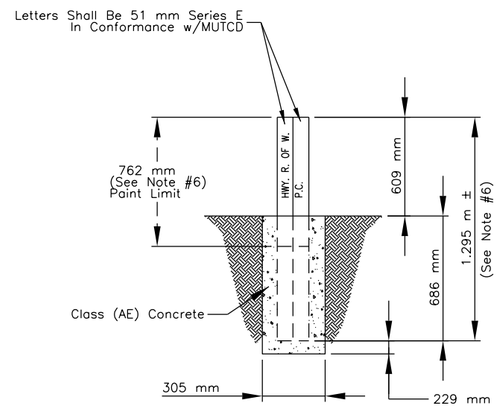
TOP VIEW



TOP VIEW



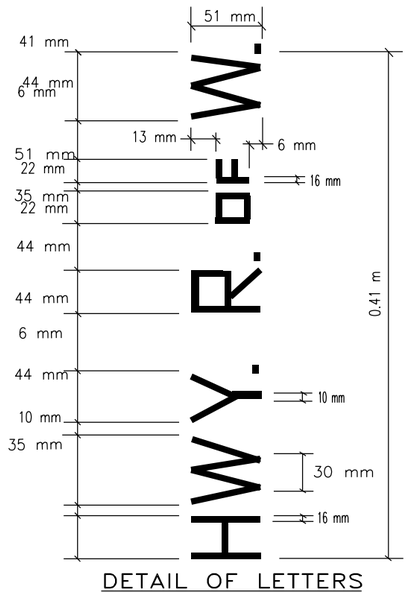
SURVEY MONUMENT
NTS



REFERENCE MARKER
NTS

NOTE: GENERALLY
ROW MONUMENTS AND REFERENCE MARKERS
ARE PLACED COINCIDENT

R/W MONUMENT SYMBOL



DETAIL OF LETTERS

ITEM 62101-0000: RIGHT-OF-WAY MONUMENT
ITEM 62102-0000: REFERENCE MARKER

Station		Location		ROW Monument	Marker Coincident ROW Monument
PHASE 1, SEGMENT 1					
0+000.000	BOP	22.86 m Rt.	22.86 m Lt.	2	2
0+029.655	PC	22.86 m Rt.	22.86 m Lt.	2	2
0+086.463	PT	22.86 m Rt.	22.86 m Lt.	2	2
0+207.254	PC	22.86 m Rt.	22.86 m Lt.	2	2
0+252.001	PT	22.86 m Rt.	22.86 m Lt.	2	2
PHASE 1, SEGMENT 2					
1+984.832	PC	22.86 m Rt.	22.86 m Lt.	2	2
2+084.526	PT	22.86 m Rt.	22.86 m Lt.	2	2
2+146.810	PC	22.86 m Rt.	22.86 m Lt.	2	2
2+427.743	PT	22.86 m Rt.	22.86 m Lt.	2	2
2+813.366	PC	22.86 m Rt.	22.86 m Lt.	2	2
2+903.938	PT	22.86 m Rt.	22.86 m Lt.	2	2
3+036.394	PC	22.86 m Rt.	22.86 m Lt.	2	2
3+178.742	PT	22.86 m Rt.	22.86 m Lt.	2	2
3+483.703	PC	22.86 m Rt.	22.86 m Lt.	2	2
3+755.772	PT	22.86 m Rt.	22.86 m Lt.	2	2
3+879.492	PC	22.86 m Rt.	22.86 m Lt.	2	2
4+008.636	PT	22.86 m Rt.	22.86 m Lt.	2	2
4+217.028	PC	22.86 m Rt.	22.86 m Lt.	2	2
4+306.203	PT	22.86 m Rt.	22.86 m Lt.	2	2
4+475.202	PC	22.86 m Rt.	22.86 m Lt.	2	2
4+662.096	PT	22.86 m Rt.	22.86 m Lt.	2	2
5+005.070	PT	22.86 m Rt.	22.86 m Lt.	2	2
5+190.939	PC	22.86 m Rt.	22.86 m Lt.	2	2
5+248.162	PT	22.86 m Rt.	22.86 m Lt.	2	2
5+337.414	PC	22.86 m Rt.	22.86 m Lt.	2	2
5+400.039	PT	22.86 m Rt.	22.86 m Lt.	2	2
5+645.879	PC	22.86 m Rt.	22.86 m Lt.	2	2
6+796.108	PC	22.86 m Rt.	22.86 m Lt.	2	2
6+894.103	PT	22.86 m Rt.	22.86 m Lt.	2	2
8+305.661	PC	22.86 m Rt.	22.86 m Lt.	2	2
8+345.357	PT	22.86 m Rt.	22.86 m Lt.	2	2
8+491.259	PC	22.86 m Rt.	22.86 m Lt.	2	2
8+576.518	PT	22.86 m Rt.	22.86 m Lt.	2	2
9+764.556	PC	22.86 m Rt.	22.86 m Lt.	2	2
9+884.031	PT	22.86 m Rt.	22.86 m Lt.	2	2
			Total =	**70**	**70**
PHASE 2 (FOR REFERENCE ONLY)					
0+383.403	PC	22.86 m Rt.	22.86 m Lt.	2	2
0+453.723	PT	22.86 m Rt.	22.86 m Lt.	2	2
0+610.354	PC	22.86 m Rt.	22.86 m Lt.	2	2
0+685.255	PT	22.86 m Rt.	22.86 m Lt.	2	2
0+854.518	PC	22.86 m Rt.	22.86 m Lt.	2	2
0+904.015	PT	22.86 m Rt.	22.86 m Lt.	2	2
0+972.627	PC	22.86 m Rt.	22.86 m Lt.	2	2
0+988.590	PT	22.86 m Rt.	22.86 m Lt.	2	2
1+131.160	PC	22.86 m Rt.	22.86 m Lt.	2	2
1+293.986	PT	22.86 m Rt.	22.86 m Lt.	2	2
1+538.064	PC	22.86 m Rt.	22.86 m Lt.	2	2
1+565.326	PT	22.86 m Rt.	22.86 m Lt.	2	2
1+716.852	PC	22.86 m Rt.	22.86 m Lt.	2	2
1+821.612	PT	22.86 m Rt.	22.86 m Lt.	2	2

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Registered Professional Engineer (Civil)
Certificate No.
83225
MYRA K. CANDELARIA
Date Signed
ARIZONA, U.S.A.

	REVISION	BY	DATE

NAVAJO D.O.T.

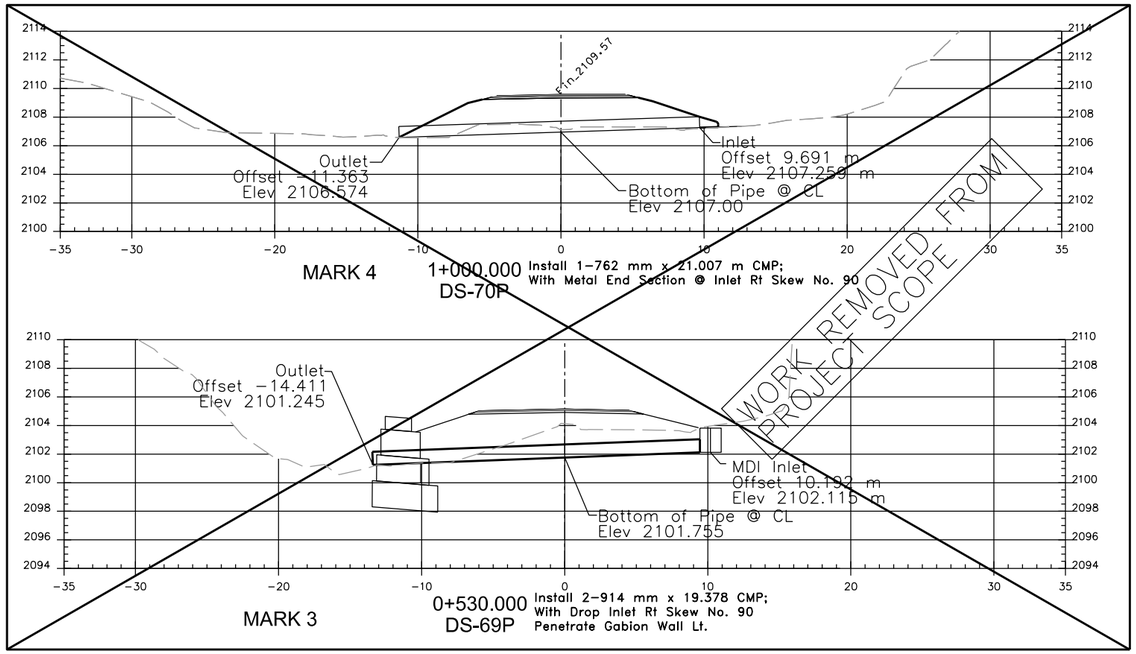
NAVAJO NATION
DIVISION OF TRANSPORTATION

N9073(1) 1, 2 & 4

RIGHT-OF-WAY & REFERENCE MARKERS DETAIL

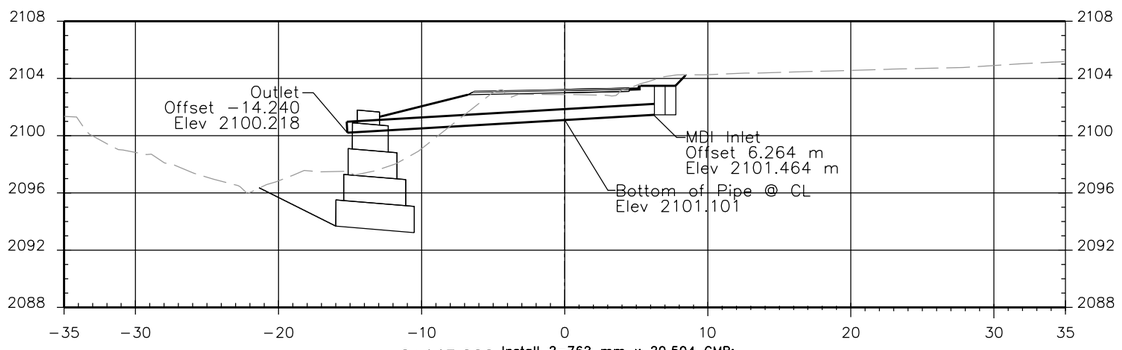
PROJECT MANAGER: DDM	DATE: 1/22	DRAWING	SHEET
LEAD DESIGNER: MLL	DATE: 1/22		
ASBUILT BY:	DATE: XXX		54 OF 84
SCALE: N/A			

STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	55

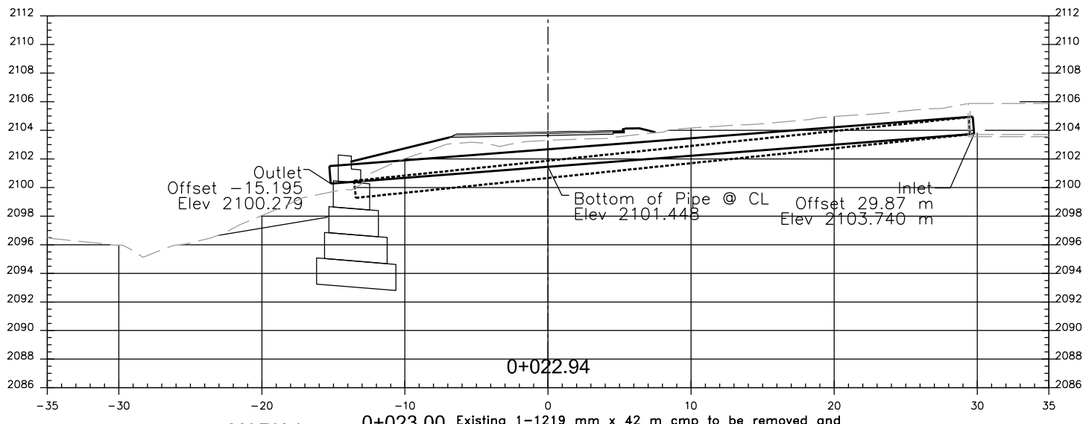


MARK 4 — 1+000.000 DS-70P — Install 1-762 mm x 21.007 m CMP; With Metal End Section @ Inlet Rt Skew No. 90

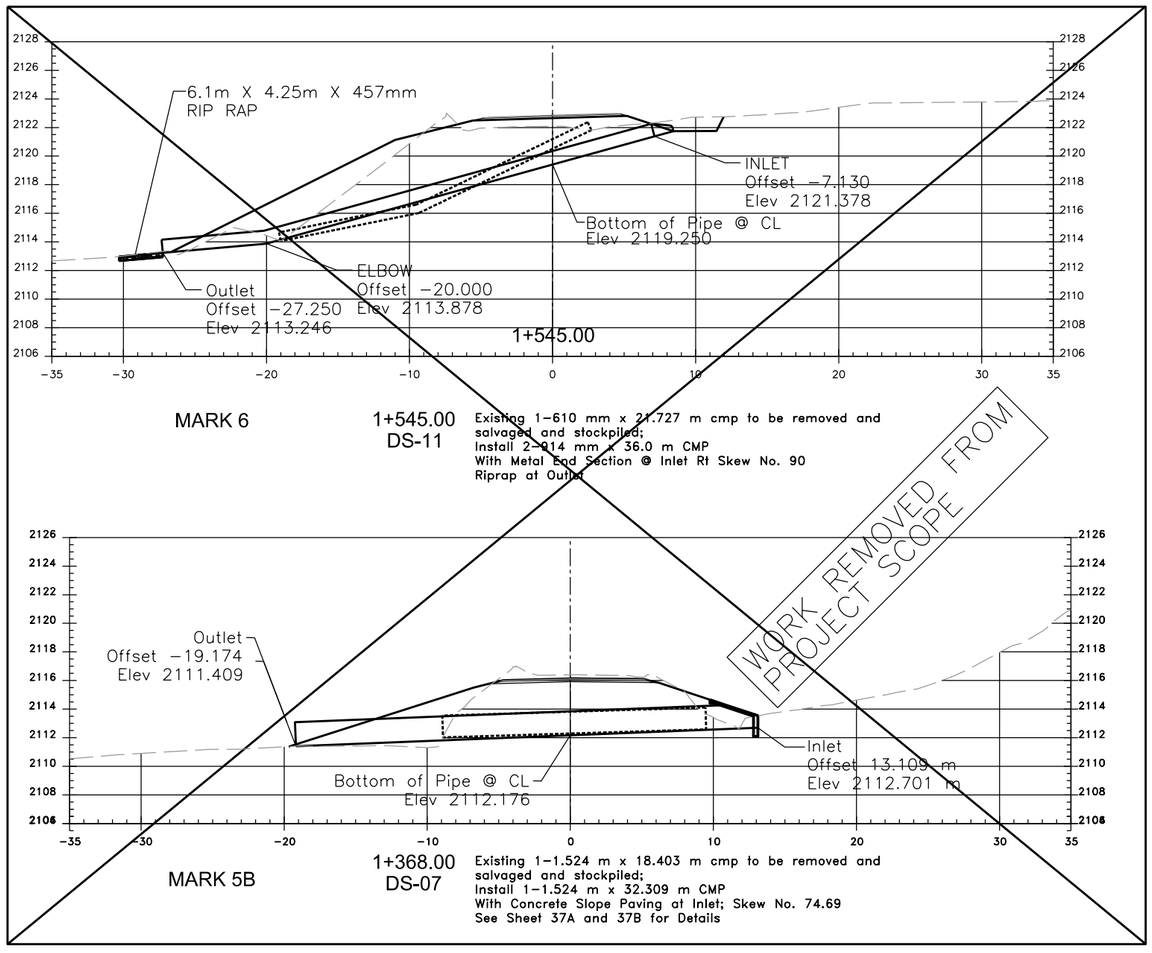
MARK 3 — 0+530.000 DS-69P — Install 2-914 mm x 19.378 CMP; With Drop Inlet Rt Skew No. 90 Penetrate Gabion Wall Lt.



MARK 2 — 0+145.000 DS-61P — Install 2-762 mm x 20.504 CMP; With Drop Inlet Rt Skew No. 90 Penetrate Gabion Wall Lt.

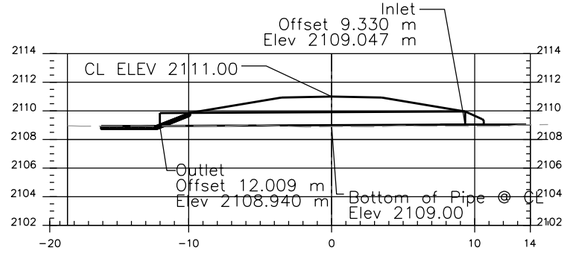


MARK 1 — 0+023.00 DS-01 — Existing 1-1219 mm x 42 m cmp to be removed and salvaged and stockpiled; Install 1-1219 mm x 44 m cmp Connect to existing structure Rt. Penetrate Gabion Wall Lt.



MARK 6 — 1+545.00 DS-11 — Existing 1-610 mm x 21.727 m cmp to be removed and salvaged and stockpiled; Install 2-914 mm x 36.0 m CMP With Metal End Section @ Inlet Rt Skew No. 90 Riprap at Outlet

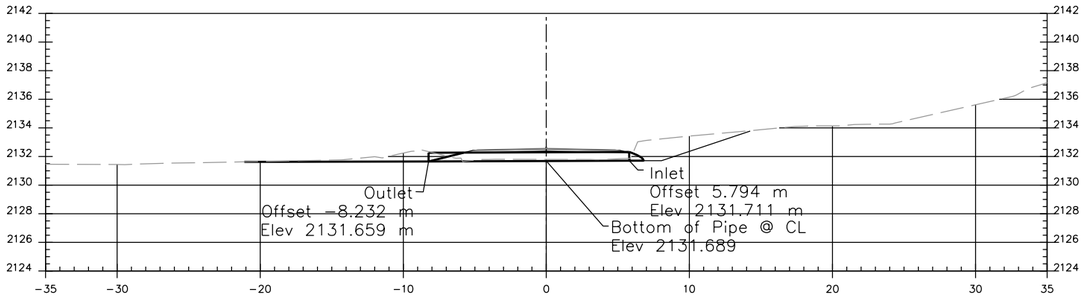
MARK 5B — 1+368.00 DS-07 — Existing 1-1.524 m x 18.403 m cmp to be removed and salvaged and stockpiled; Install 1-1.524 m x 32.309 m CMP With Concrete Slope Paving at Inlet; Skew No. 74.69 See Sheet 37A and 37B for Details



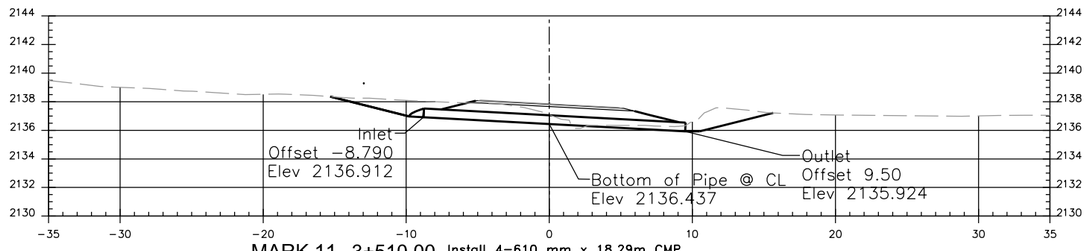
MARK 5A — 1+200.00 — Install 2 -914 mm x 21.34 m cmp With End Section at inlet. Install 6.1 m x 6.1 m Wire Enclosed Riprap pad at outlet

Registered Professional Engineer (Civil) CERTIFICATE NO. 53225 MYRA K. CANDELARIA Date Signed ARIZONA, U.S.A.

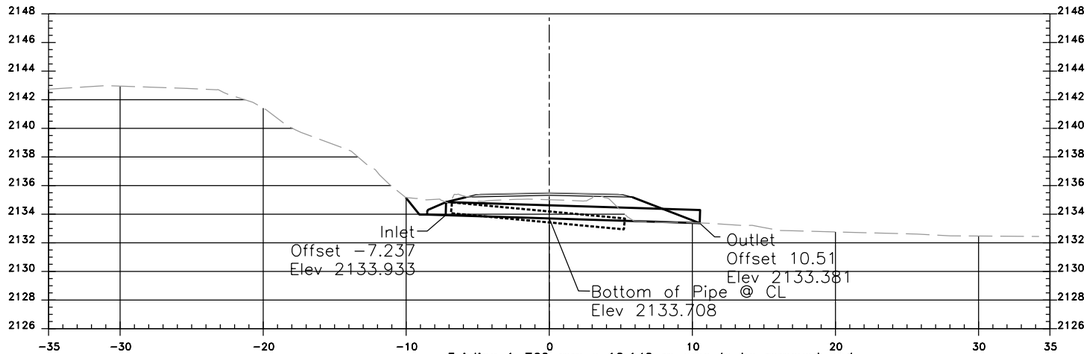
STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	56



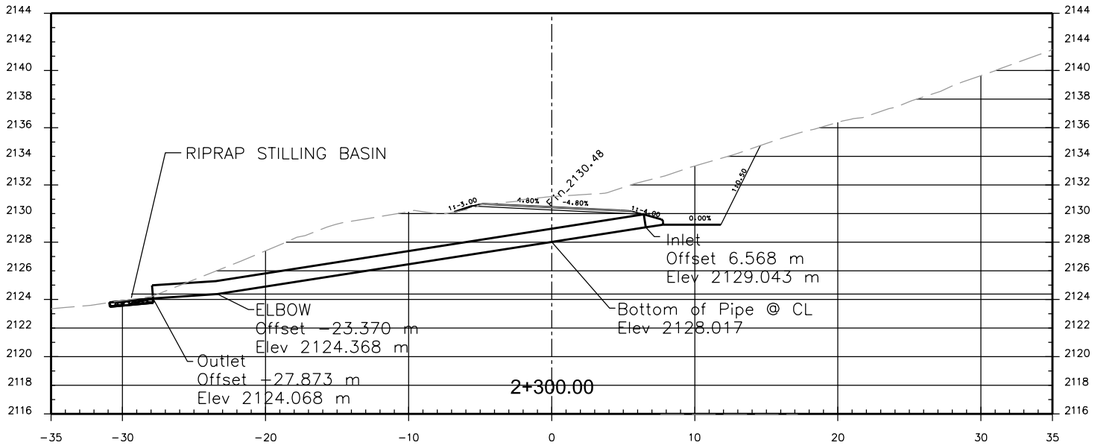
MARK 8B 2+760.00 DS-62PB
Install 1−610 mm x 14.026 m CMP;
With Metal End Section @ Inlet Rt Skew No. 90



MARK 11 3+510.00 DS-17A
Install 4−610 mm x 18.29m CMP
With End Section at Each Inlet
Skew No. 90.0

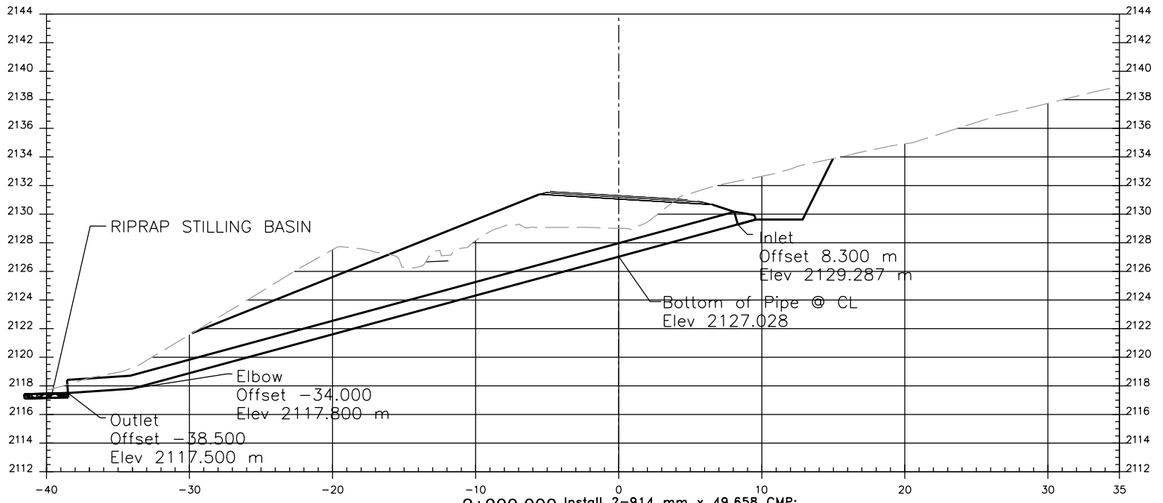


MARK 10 3+302.00 DS-17
Existing 1−762 mm x 12.140 m cmp to be removed and
salvaged and stockpiled;
Install 1−610mm x 18.29 m CMP
With End Section at Inlet; Skew No. 90.0

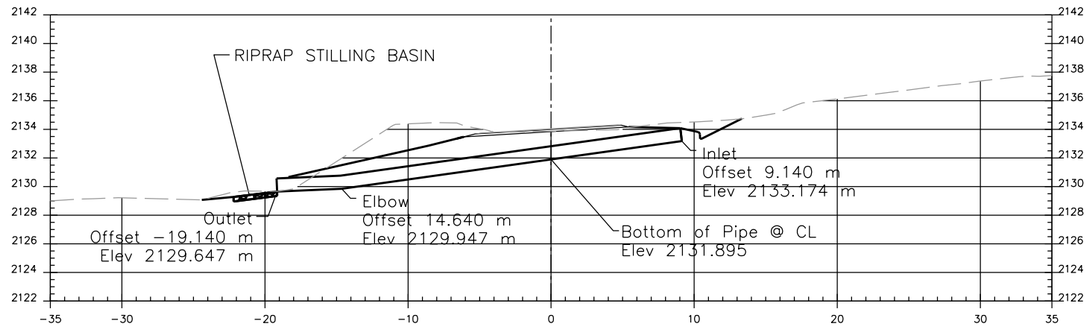


MARK 8A 2+300.00 DS-62P
Install 2−914 mm x 34.798 CMP;
With Metal End Section @ Inlet Rt Skew No. 90
Install Riprap Stilling Basin at Outlet See sheet 35

SEE SHEET 63 FOR
DS-15, DS-16 AND 606 BRIDGE

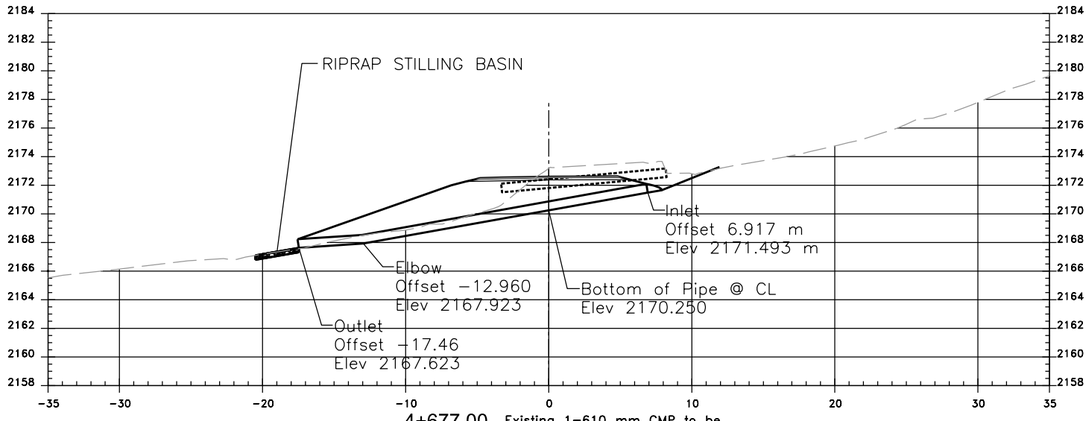


MARK 7 2+000.000 DS-71P
Install 2−914 mm x 49.658 CMP;
With Metal End Section @ Inlet Rt Skew No. 90
Install Riprap Stilling Basin at Outlet See sheet 35



MARK 9 3+065.00 DS-63P
Install 3−914 mm x 28.526m CMP;
With Metal End Section @ Inlet Rt Skew No. 90
Install Riprap Stilling Basin at Outlet See sheet 35

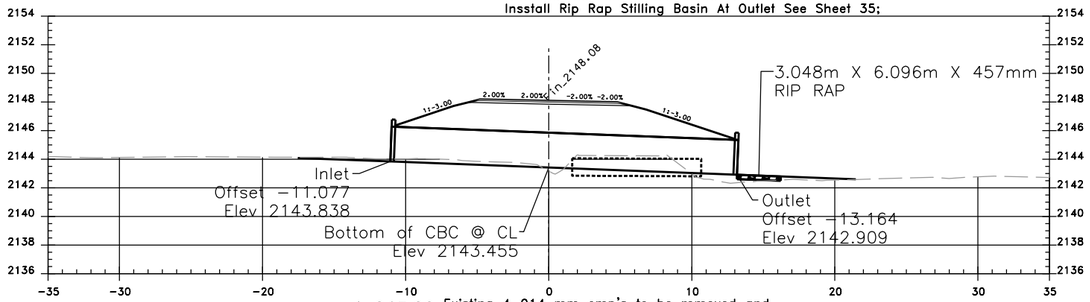
STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	57



MARK 16B

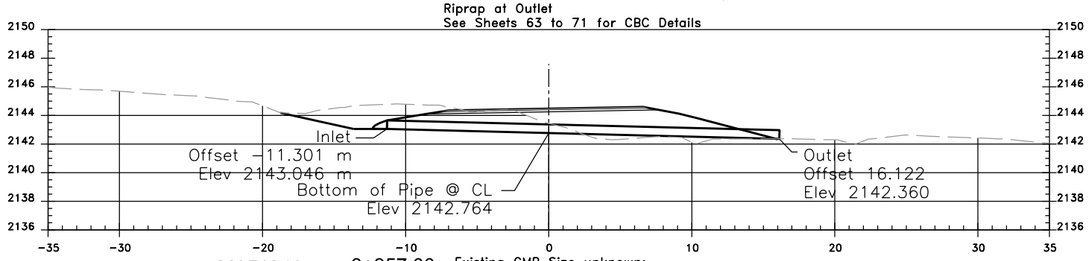
4+677.00
DS-29

Existing 1−610 mm CMP to be
Removed and Salvaged and stockedpiled;
Install 2−610mm x 24.380m CMP;
With End Section At Inlet Skew No. 90.0
Insstall Rip Rap Stilling Basin At Outlet See Sheet 35;



4+215.00
DS-25

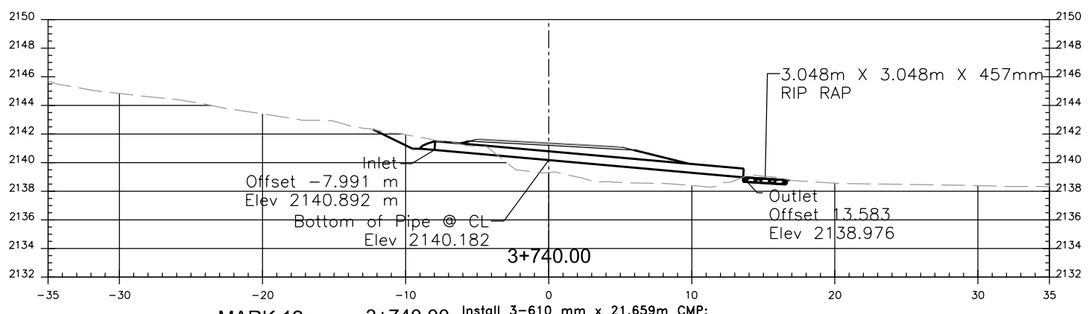
Existing 4−914 mm cmp's to be removed and salvaged and stockpiled;
Install 2−3.048 m x 2.438 m x 24.24 m CBC
With Beveled Headwalls at inlet & outlet; Skew No. 90.0
Riprap at Outlet
See Sheets 63 to 71 for CBC Details



MARK 13

3+957.00
DS-65P

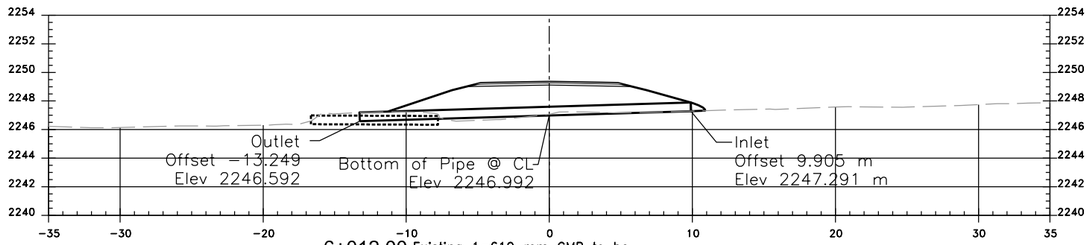
Existing CMP Size unknown;
Remove and Salvage and Stockpile
Install 3−914 mm x 27.423m CMP;
With End Section at Inlet
Skew No. 135.0



MARK 12

3+740.00
DS-64P

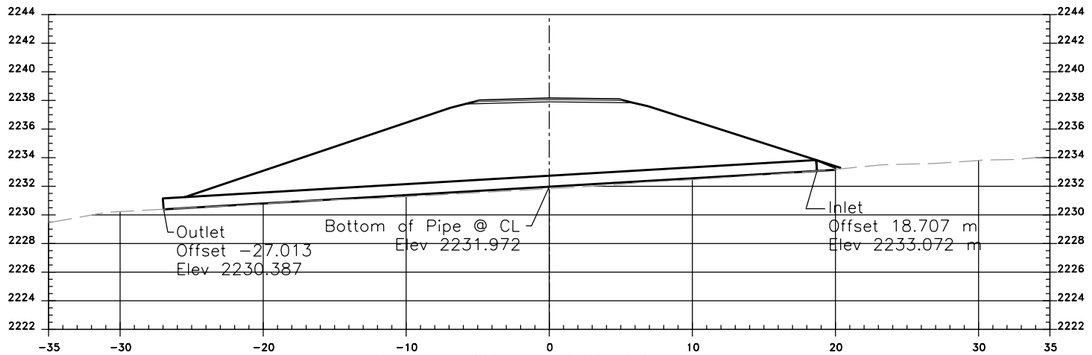
Install 3−610 mm x 21.659m CMP;
With End Section at Each Inlet; Riprap at Outlet
Skew No. 110.0



MARK 20

6+012.00
DS-39

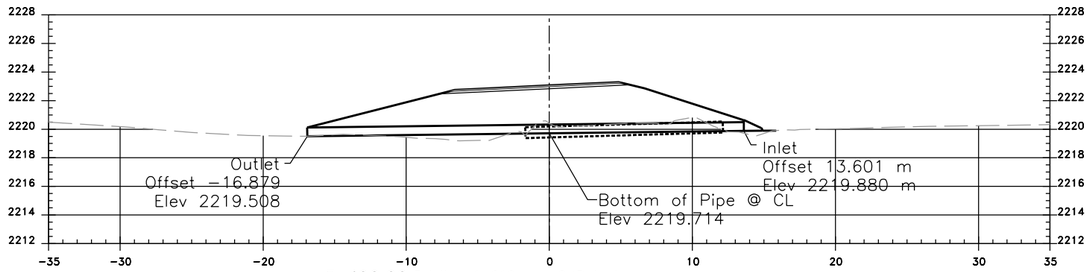
Existing 1−610 mm CMP to be
Removed and Salvaged and stockedpiled;
Install 1−762 mm x 23.154m CMP
With End Section At Inlet; Skew No. 90.0



MARK 19A

5+757.00
DS-14B

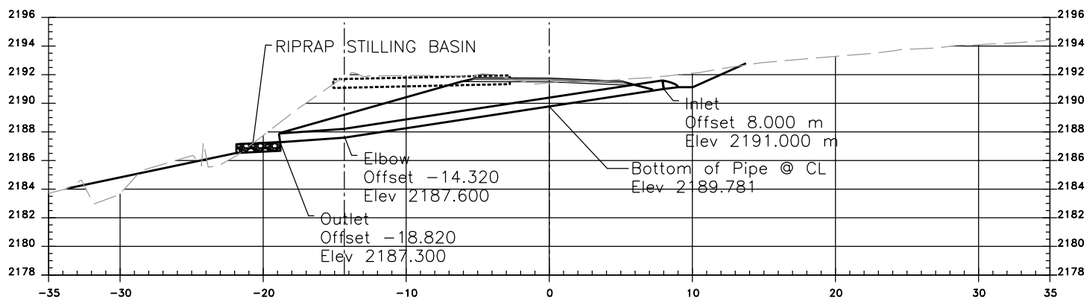
Install 1−762 mm x 45.720m CMP
With End Section At Inlet; Skew No. 80.0



MARK 18

5+430.00
DS-34

Existing 1−610 mm CMP to be
Removed and Salvaged and stockedpiled;
Install 1−762 mm x 30.480m CMP
With End Section At Inlet
Skew No. 80.0

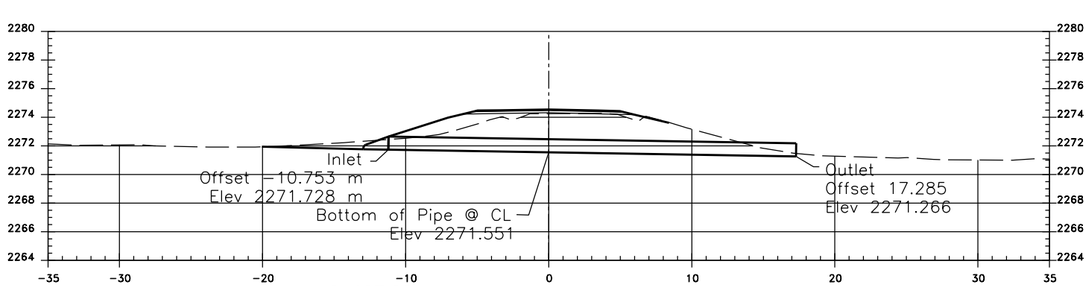


MARK 17

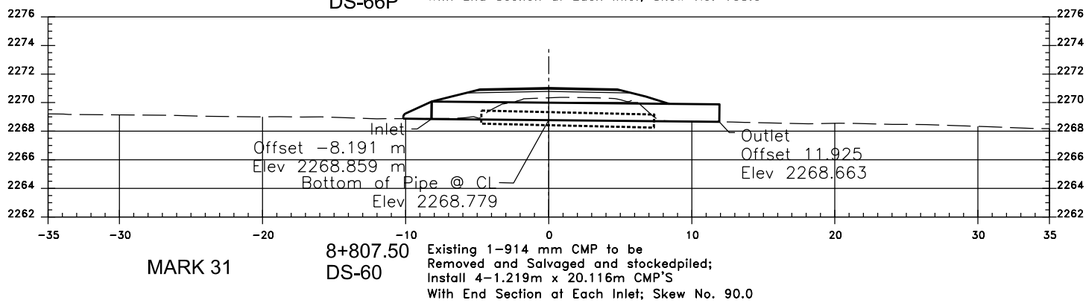
4+961.00
DS-30

Existing 1−762 mm CMP to be
Removed and Salvaged and stockedpiled;
Install 4−610mm x 26.82m CMP'S
With End Section At Each Inlet;
Install Rip Rap Stilling Basin At Outlet See sheet 35;
Skew No. 110.0

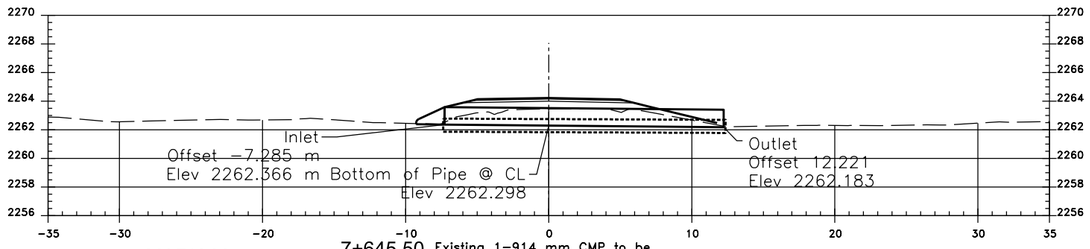
STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	58



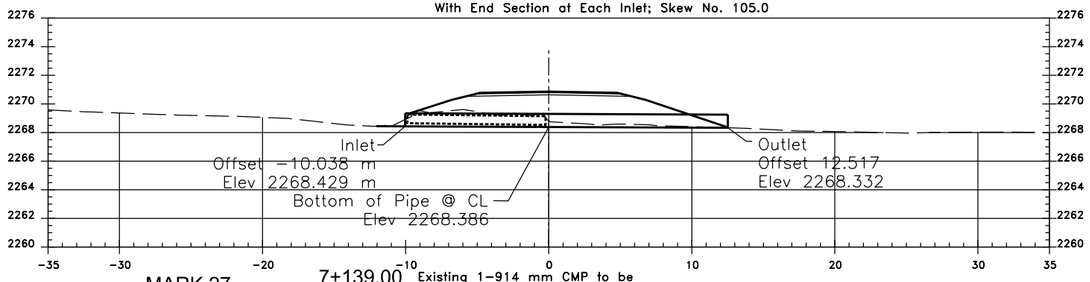
MARK 32 — 9+137.00 DS-66P — Install 3−914mm x 28.038m CMP'S With End Section at Each Inlet; Skew No. 105.0



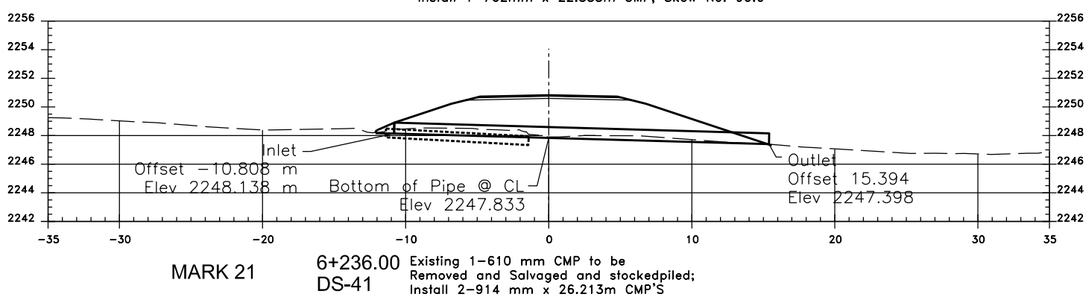
MARK 31 — 8+807.50 DS-60 — Existing 1−914 mm CMP to be Removed and Salvaged and stockedpiled; Install 4−1.219m x 20.116m CMP'S With End Section at Each Inlet; Skew No. 90.0



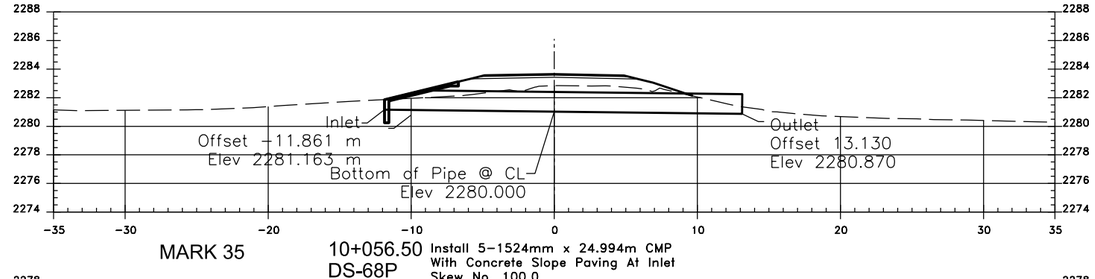
MARK 29 — 7+645.50 DS-53 — Existing 1−914 mm CMP to be Removed and Salvaged and stockedpiled; Install 3−1.219 m x 19.507m CMP'S With End Section at Each Inlet; Skew No. 105.0



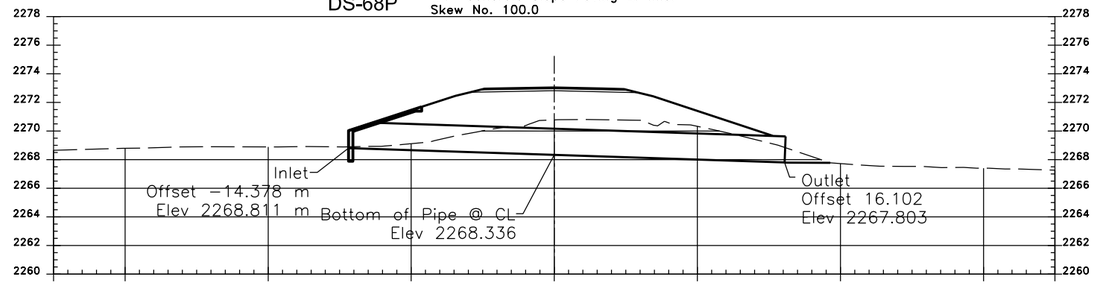
MARK 27 — 7+139.00 DS-49 — Existing 1−914 mm CMP to be Removed and Salvaged and stockedpiled; Install 1−762mm x 22.555m CMP; Skew No. 90.0



MARK 21 — 6+236.00 DS-41 — Existing 1−610 mm CMP to be Removed and Salvaged and stockedpiled; Install 2−914 mm x 26.213m CMP'S With End Section at Each Inlet; Skew No. 90.0



MARK 35 — 10+056.50 DS-68P — Install 5−1524mm x 24.994m CMP With Concrete Slope Paving At Inlet Skew No. 100.0



MARK 33B — 9+455.00 DS-67P — Install 4−1830 mm x 30.48 m CMP'S With Concrete Slope Paving at Inlet; Skew No. 100.0

STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	59

BRIDGE AND ROADWAY ESTIMATED QUANTITIES

ITEM	DESCRIPTION	QUANTITY	UNIT	AS BUILT
20301-0400	Removal of Existing Bridge	1	Lump Sum	
25101-2000	Placed RipRap Class 2	55	Cubic Meter	
25302-1000	Gabions, Galv. or Aluminized coated	185	Cubic Meter	
63308-3000	OBJECT MARKER, TYPE 3, W/ 1 POST & HARDWARE: 2.98 kg/m	4	EA	
61701-5000	Guardrail system SGR04b type PDE02, w MSKT-TL3-8 end treatment	176	m	
60223-4050	3-Barrel 4.27m Span x 2.44m Rise x 18.632 m CBC with Headwalls, Wingwalls & Footing	1	Lump Sum	
**	Structural Concrete Class A(AE)	239	Cubic meter	
**	Reinforcing Steel	25,665	Kilogram	

**Note: the Structural Concrete Class A(AE) and Reinforcing Steel items are not bid items and shown for Contractor's information only. The payment for these items are included inItem Number 60223-4050, 3-Barrel 4.27m Span x 2.44m Rise x 18.632, CC with Headwalls, Wingwalls & Footing. No separate measurement or payment therefore.

EXISTING UTILITY CROSSINGS

STATION	LOC.	OWNER	DESCRIPTION	SKEW	REMARKS
3+155.819	℄	TEL	Over Head Telephone	55°	To Remain in Place

ITEM 25302-1000 - GABIONS, GALV. OR ALUMINIZED COATED

STATION TO STATION	LOCATION OFFSET	LENGTH (m)	AREA (m^2)	VOLUME (m^3)
3+221.309 TO 3+241.836	RT	20.527	4.185	85.906
3+241.836 TO 3+253.294	RT	11.458	3.348	38.361
3+253.294 TO 3+277.171	RT	23.877	2.510	59.931
			TOTAL:	185

ITEM 25101-2000 - PLACED RIPRAP, CLASS 2

STATION	LOCATION	AREA (m^2)	THICKNESS (mm)	ITEM 25101 PLACED CLASS 2 (m^3)
3+204.291	LT	114.779	460	52.799
			TOTAL:	52.799
			USE:	55

ITEM 20301-0400 - REMOVAL OF EXISTING BRIDGE

STATION	LOCATION	DESCRIPTION
3+206.901	℄	Existing Bridge

ITEM 61701-5000 - GUARDRAIL SYSTEM SGR04b TYPE PDE02 with MSKT-TL3-8 END TREATMENT

STATION TO STATION	LENGTH (m)	REMARKS
3+171.399 TO 3+278.079 RT	106.680	WITHOUT CURB
3+168.532 TO 3+237.205 LT	68.673	
TOTAL:	176	

ITEM 63308-3000 - OBJECT MARKERS TYPE 3

STATION	REQUIRED	LOCATION
3+187.034	1	LEFT
3+184.169	1	RIGHT
3+198.482	1	LEFT
6+195.617	1	RIGHT
TOTAL REQ'D:	4	

BRIDGE GENERAL NOTES

SPECIFICATIONS: Design; AASHTO Standard Specifications for Highway Bridges, 1996, 16th Ed. w/ Intermins thru 2000 Construction; Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects, FP-14 and Supplemental Specifications.

UNITS: This project has been designed and drawn using the SI (metric) system of units.

DESIGN LOADS: Weight of fill on top of box = 13.2kN/m^3, Backfill Earth Pressure = 4.70 kPa/m, 610mm surcharge. LIVE LOADS; MS 18.

DESIGN & CONSTRUCTION: Material strengths are F'c = 20.7 MPa for reinforced concrete and Fy = 413.7 MPa for reinforcing steel.

CONCRETE: Cast in place concrete on Class A(AE) with the minimum design strength indicated above at 28 days. The air content for Class A(AE) concrete shall not be less than that specified in the FP-14, Table 552-2. All concrete cast on, or below grade shall contain Type II cement. The contractor may also use concrete with Type II cement elsewhere at no extra cost to the BIA. Chamfer exposed corners of all concrete 19 mm unless otherwise shown. The time limits specified in the FP-14, Table 552-4 shall apply. If concrete can not be discharged within the specified time limit, alternatives such as dry batching, a site batching plant conforming to the specifications or retardant admixtures shall be used. If required, such alternatives shall be discussed at pre-construction meeting. Approval of alternative methods shall be based on review of historical data for identical strength concrete placed at similarly remote locations. Historical data shall indicate conformance to the required specifications. Exposed surfaces 300 mm below the ground line shall be given a Class 2 rubbed finish as specified in Section 552.16 of the FP-14. All other surfaces of concrete shall be given a Class 1 ordinary finish.

REINFORCING STEEL: All reinforcing steel shall conform to AASHTO M31M, Grade 420. The minimum cover of any reinforcing steel shall be 50 mm unless otherwise specified. Lengths of reinforcing steel bars shown include required splice lengths for splices shown. Any additional splices not shown in the plans shall be requested for approval by the Contractor and shall not be utilized until written approval is granted by the CO. Additional reinforcing steel quantities required for additional splices not shown in the plans shall not be paid for. Reinforcing steel sizes shown in these plans are in accordance with AASHTO M31M.

STRUCTURE EXCAVATION AND BACKFILL: All structure excavation and backfill shall be done according to FP-14, Section 209 - Structure Excavation and Backfill.

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ALBUQUERQUE, NM 87109
PHONE: 505-348-4000
FAX: 505-348-4072
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Registered Professional Engineer (Civil) CERTIFICATE NO. 83225 MYRA K. CANDELARIA Date Signed ARIZONA, U.S.A.

	REVISION	BY	DATE

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DIVISION OF TRANSPORTATION

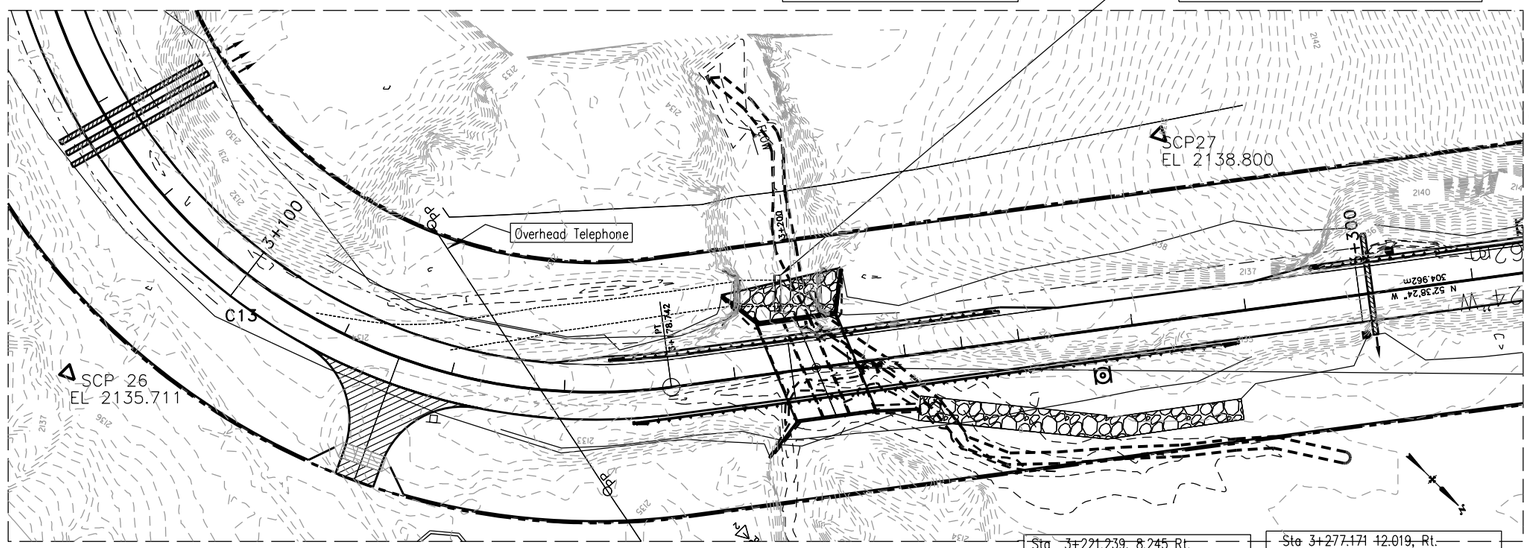
N9073(1) 1, 2 & 4

BRIDGE GENERAL NOTES, QUANTITIES AND TABLES

PROJECT MANAGER: DDM	DATE: 1/22	DRAWING	SHEET
LEAD DESIGNER: MLL	DATE: 1/22		
ASBUILT BY:	DATE: XXX		59 OF 84
SCALE: N/A			

STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	60

C13
PI 3+122.650
A 81°33'32" Lt
R 100.000
L 142.347
T 86.255
E 32.060
N 529686.975
E 310222.486



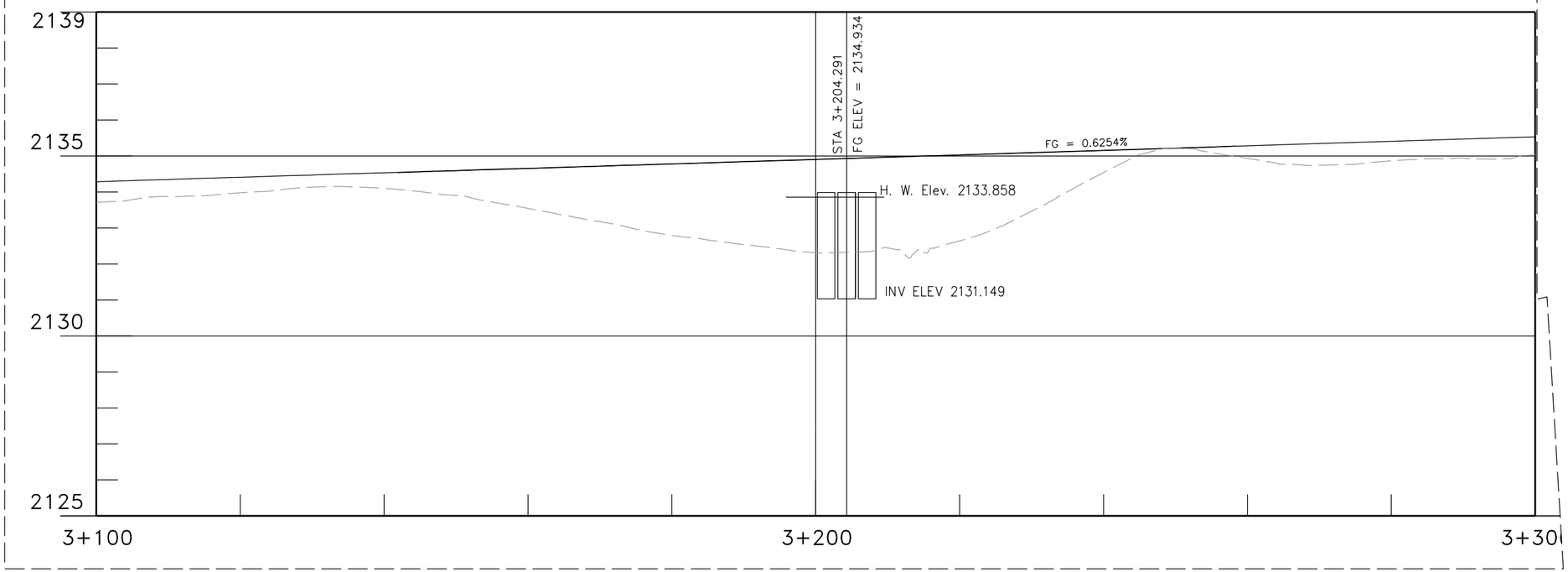
Survey data Not Available in This Area.
Warping of Match Slope May be Required to Maintain Slope Limit with in the ROW.

LEGEND
F Fill Slope Limits
C Cut Slope Limits

HORIZONTAL SCALE (meters)
0 10 20 30 40 50

DRAINAGE STRUCTURES

STATION	STRUCTURE	SKEW NO.	D.A. (Ha.)	Remarks
3+204.291, ℄	New 3–4.267m x 2.438m x 18.0m Box Culvert	75°	13,468	



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ALBUQUERQUE, NM 87109
PHONE: 505-348-4000
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CERTIFICATE NO.
83225
MYRA K.
CANDELARIA
Date Signed
ARIZONA, U.S.A.

	REVISION	BY	DATE

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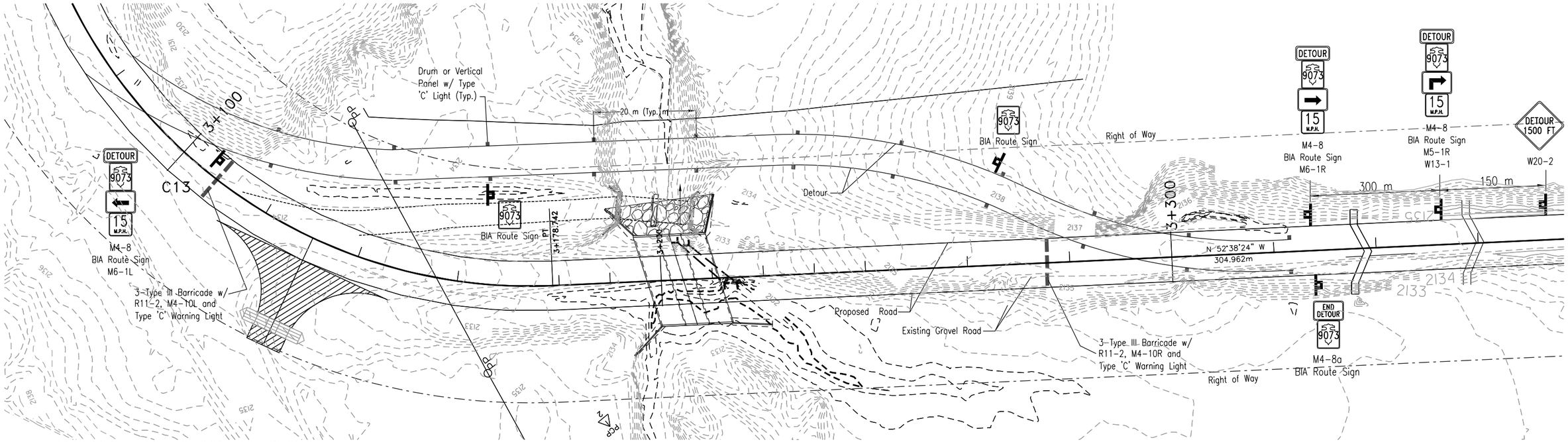
DIVISION OF TRANSPORTATION

N9073(1) 1, 2 & 4

Sta. 3+204.29, CBC
PLAN & PROFILE DETAIL

PROJECT MANAGER: DDM	DATE: 1/22	DRAWING	SHEET
LEAD DESIGNER: MLL	DATE: 1/22		
ASBUILT BY:	DATE: XXX		60 OF 84
SCALE: N/A			

STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	61

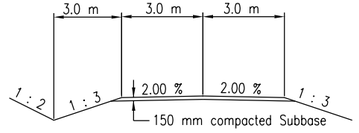


TEMPORARY TRAFFIC CONTROL SIGNS

QUANTITY	DESIGNATION	DETAIL	MINIMUM SIZE (mm)
1	W20-2	DETOUR 1500 FT	1220 X 1220
3	M4-8	DETOUR	610 x 305
6	BIA Route Sign	9504	460 x 610
1	M5-1 right		535 x 380
1	M6-1 left		535 x 380
1	M6-1 right		535 x 380
1	M4-8a	END DETOUR	610 x 460
8	Type III Barricade		As Shown
2	R11-2	BRIDGE CLOSED	1220 x 760
1	M4-10R	DETOUR	1220 x 460
1	M4-10L	DETOUR	1220 x 460
3	W13-1	15 M.P.H.	460 x 460
22	DRUMS or VERTICAL PANELS		As Shown

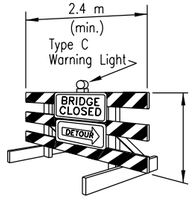
GENERAL NOTES

1. The Temporary Traffic Control Plan shown is a minimum guide only.
2. The Contractor shall be responsible for establishing a profile grade and horizontal alignment for the Detour Road in conformance with the AASHTO "Green Book". The Profile and Horizontal Alignment shall be approved by the C. O. prior to construction of detour.
3. The detour road shall be maintained in a drivable condition at all times. The Contractor shall be responsible for maintenance of the detour road. The maintenance of the detour road shall be considered as incidental to Item 63501, Temporary Traffic Control.
5. All traffic control devices not associated with the detour road shall be removed to a location at lease 10 meters from the edge of the roadway shoulder when not in use.
6. The Contractor has the option of using either drums or vertical panels as shown on this sheet, but shall not use a combination of both.
7. Design of the temporary drainage structure will be the contractor's responsibility.

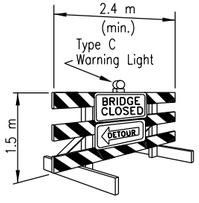


DETOUR ROAD TYPICAL SECTION
N.T.S.

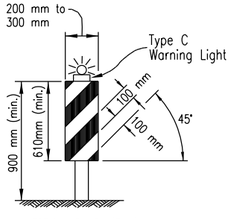
Traffic shall be routed around construction area on a two-lane 6.0 m wide detour road which shall be maintained at all times in a smooth dust-free condition. Profile grades for detour road will be approved in the field by the C.O.R. The detour road, including all traffic control, drainage structures, maintenance, earthwork and obliteration shall be paid for under Item 63501, Temporary Traffic Control. Slope designations shown are in accordance with Section 101.03 (d) of the FP-14.



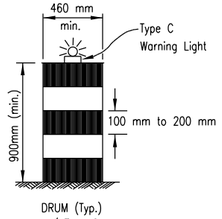
TYPE III BARRICADE
w/ R11-2, M4-10R and
Type C Warning Light



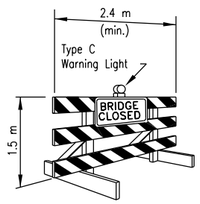
TYPE III BARRICADE
w/ R11-2, M4-10L and
Type C Warning Light



VERTICAL PANEL (Typ.)
w/ Type C
Warning Light



DRUM (Typ.)
w/ Type C
Warning Light



TYPE III BARRICADE
w/ R11-2 and
Type C Warning Light

WILSON &COMPANY
4401 MASTHEAD ST. NE. SUITE 150
ALBUQUERQUE, NM 87109
PHONE: 505-348-4000
FAX: 505-348-4072
www.wilsonco.com

Registered Professional Engineer (Civil) CERTIFICATE NO. 83225 MYRA K. CANDELARIA Date Signed 09/30/22 ARIZONA, U.S.A.

	REVISION	BY	DATE

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DIVISION OF TRANSPORTATION
NAVAJO D.O.T.

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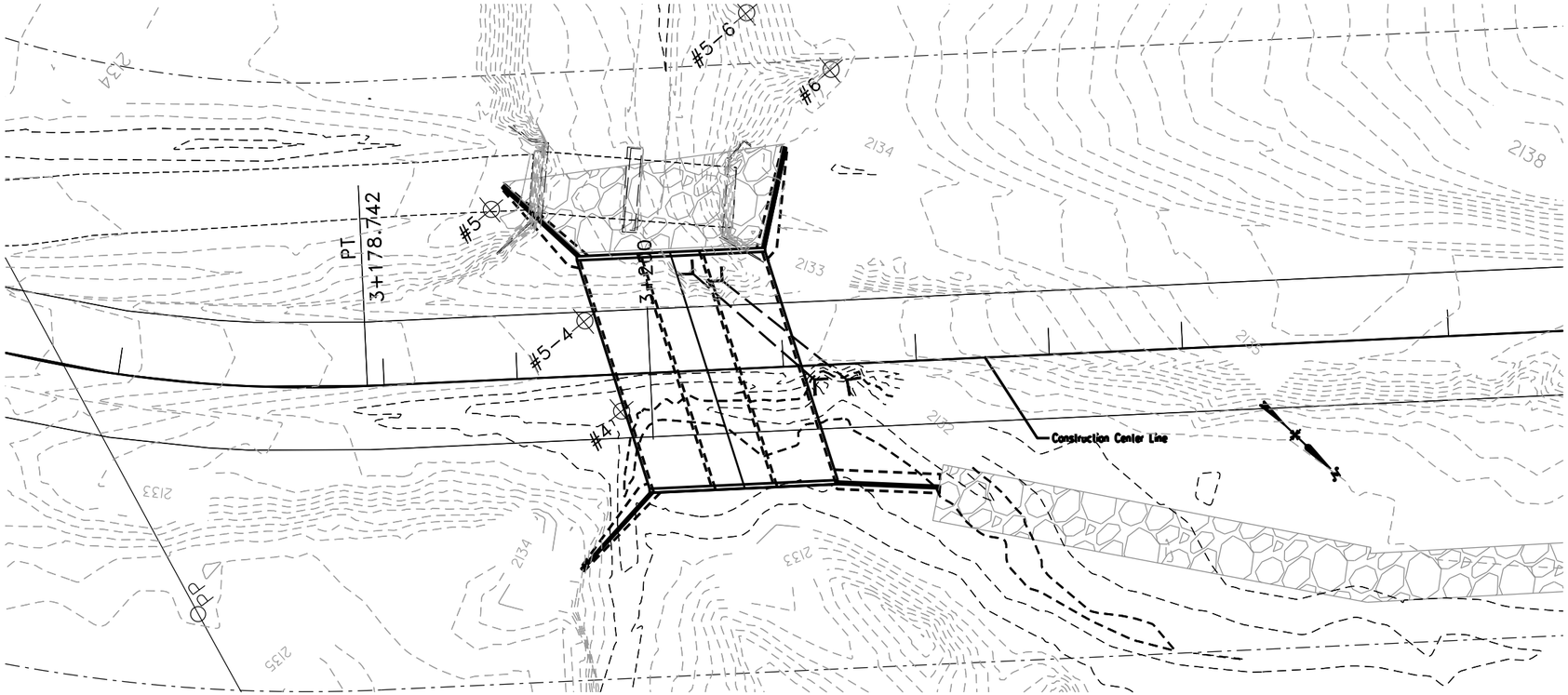
TEMPORARY TRAFFIC CONTROL
DETOUR LAYOUT & DETAILS

PROJECT MANAGER: DDM	DATE: 1/22	DRAWING	SHEET
LEAD DESIGNER: MLL	DATE: 1/22		
ASBUILT BY:	DATE: XXX		61 OF 84
SCALE: N/A			

STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	62A



BORING LOCATION PLAN

SAMPLE TYPE

A – Auger Cuttings B – Block sample.
S – 51 mm O.D. 35 mm I.D. tube sample.
U – 76 mm O.D. 61 mm I.D. tube sample.
T – 76 mm O.D. thin-walled Shelby tube.

BORING OPERATION

HSA – 165 mm Hollow Stem Auger.
C – 114 mm Continuous Flight Auger.
GB – Tricone (Gear Bit)
NX, HX – Conventional Rock Coring.
NQ, HQ – Wireline Rock Coring.

NOTE: BORING LOCATIONS ARE APPROXIMATE. PLEASE SEE FULL "GEOTECHNICAL REPORT FOR THE BLUE CANYON BRIDGE, BRIDGE NO. N606"DATED DECEMBER 30, 1993, BY HORSE CAPTURE CONSULTANTS INC.

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4401 MASTHEAD ST. NE. SUITE 150
ALBUQUERQUE, NM 87109
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	REVISION	BY	DATE

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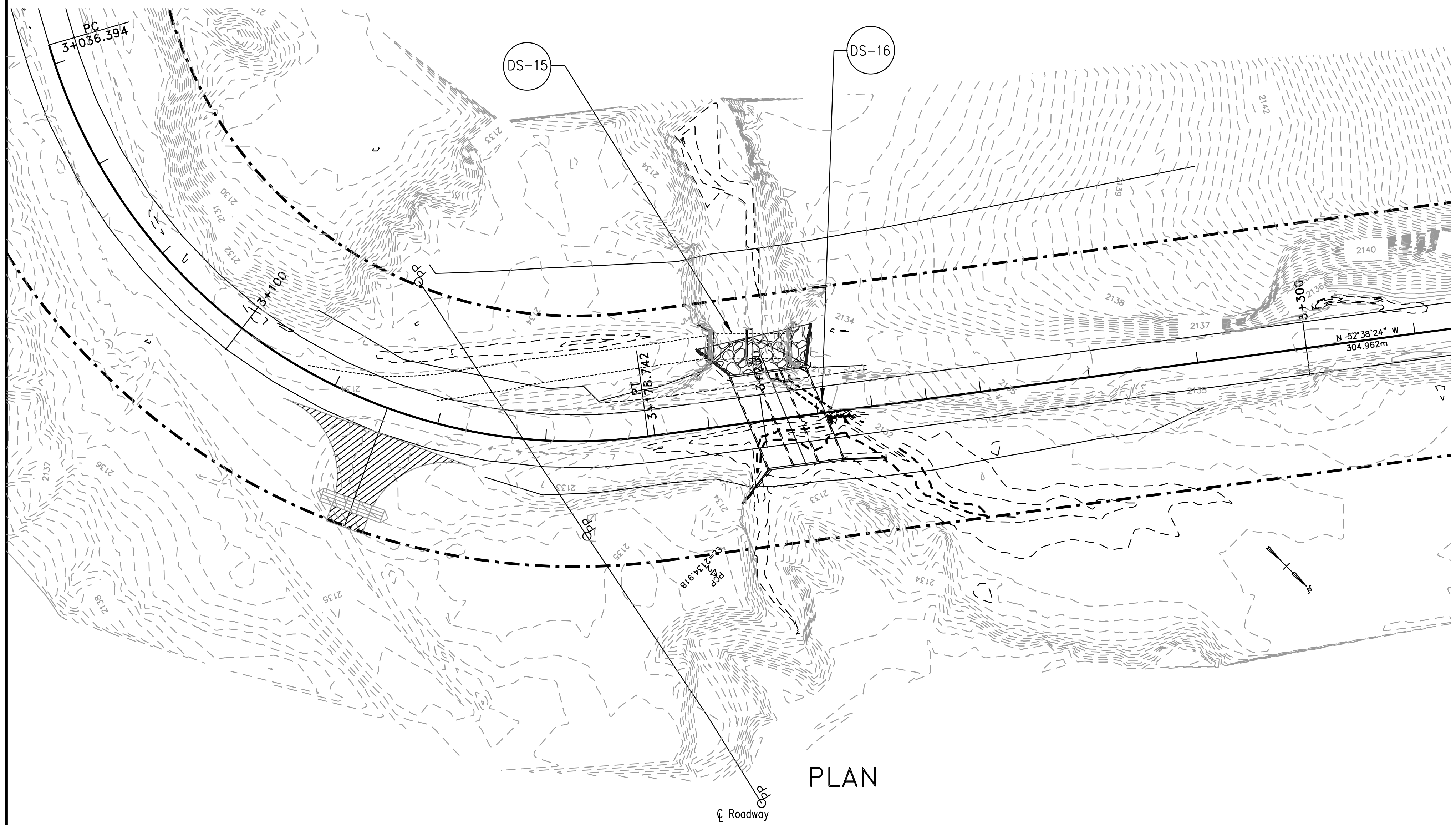
DIVISION OF TRANSPORTATION

N9073(1) 1, 2 & 4

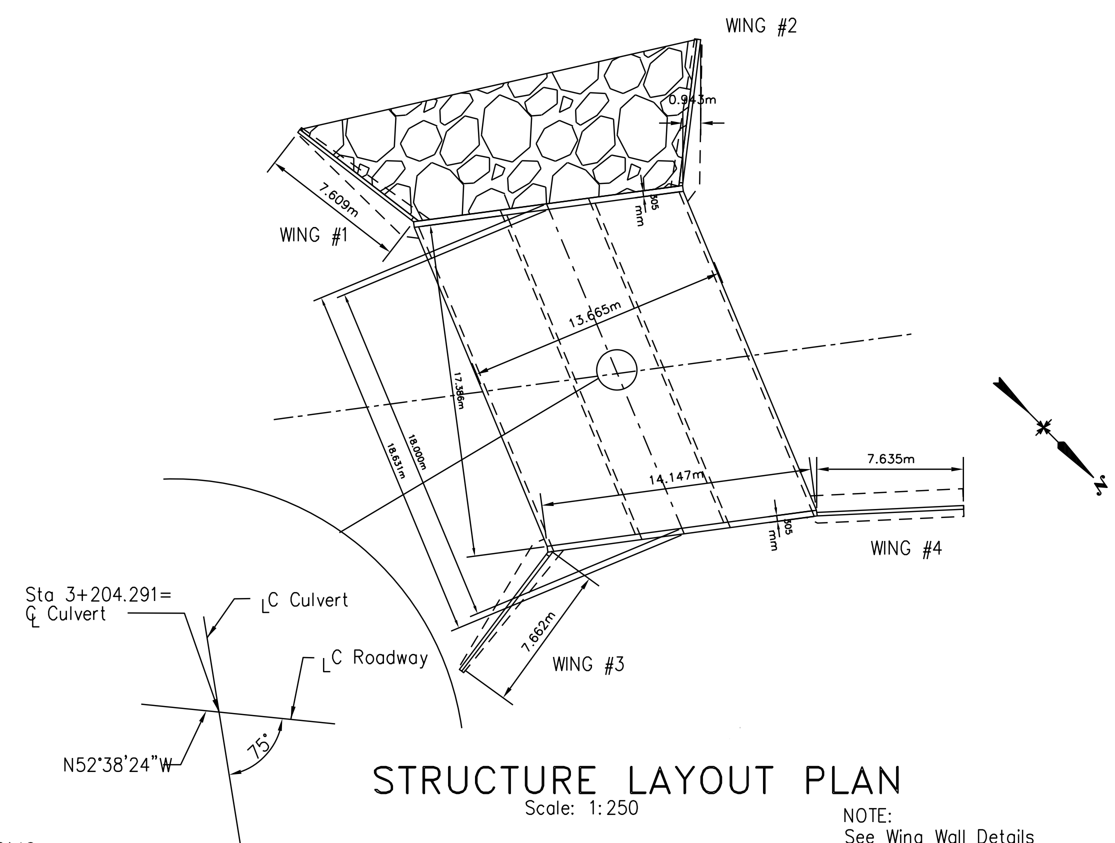
SOIL PROFILE & BORING PLAN

PROJECT MANAGER: DDM	DATE: 1/22	DRAWING	SHEET
LEAD DESIGNER: MLL	DATE: 1/22		
ASBUILT BY:	DATE: XXX		62A OF 84
SCALE: N/A			

STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	62B

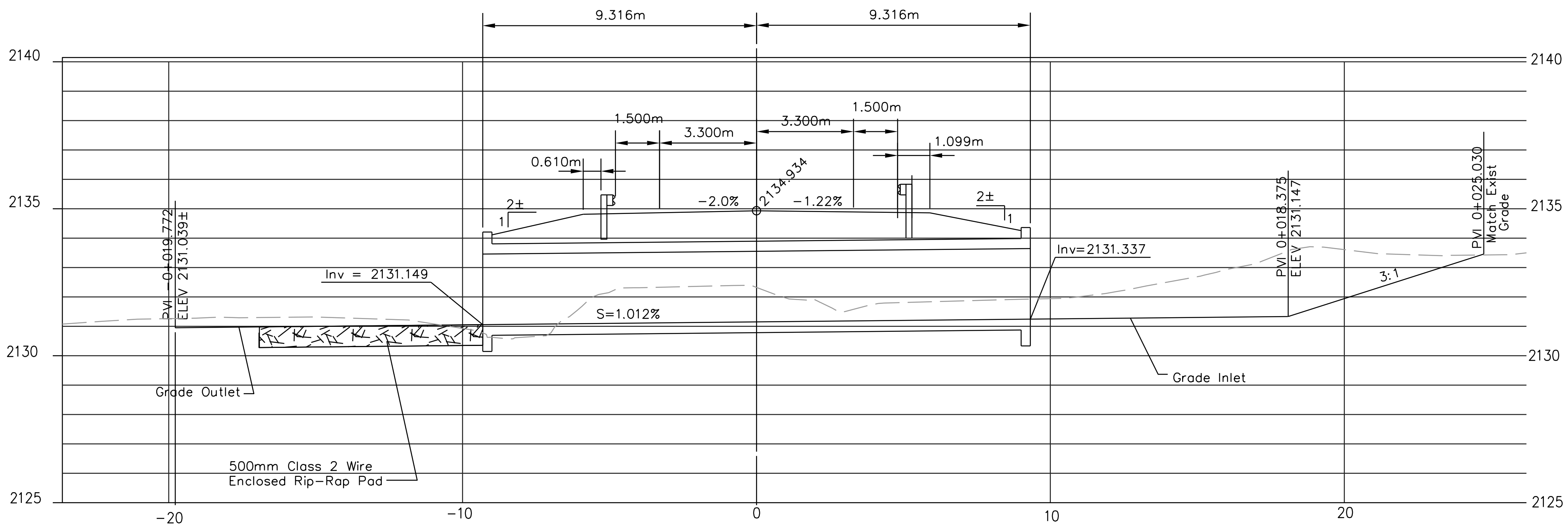


PLAN



STRUCTURE LAYOUT PLAN
Scale: 1:250

NOTE:
See Wing Wall Details
For Footing Layout.



CULVERT PLACEMENT SECTION
STA 3+204.291
Skew 75° ALONG SKEW

Existing Bridge to be removed;
Existing SD-15 & SD-16 cmps to
be removed and salvaged and stockpiled;
Install 3-4.267 m x 2.438 m 18.632 m CBCs
With Wing wall Lt & RT; Skew No. 75.0

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ALBUQUERQUE, NM 87109
PHONE: 505-348-4000
FAX: 505-348-4072
www.wilsonco.com

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CERTIFICATE NO. 83225
MYRA K. CANDELARIA
Date Signed 05/15/2026
ARIZONA, U.S.A.

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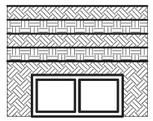
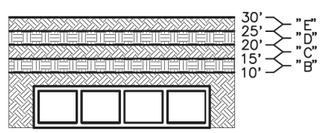
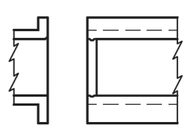
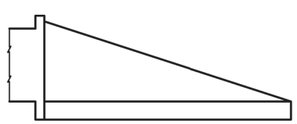
NAVAJO NATION
DIVISION OF TRANSPORTATION

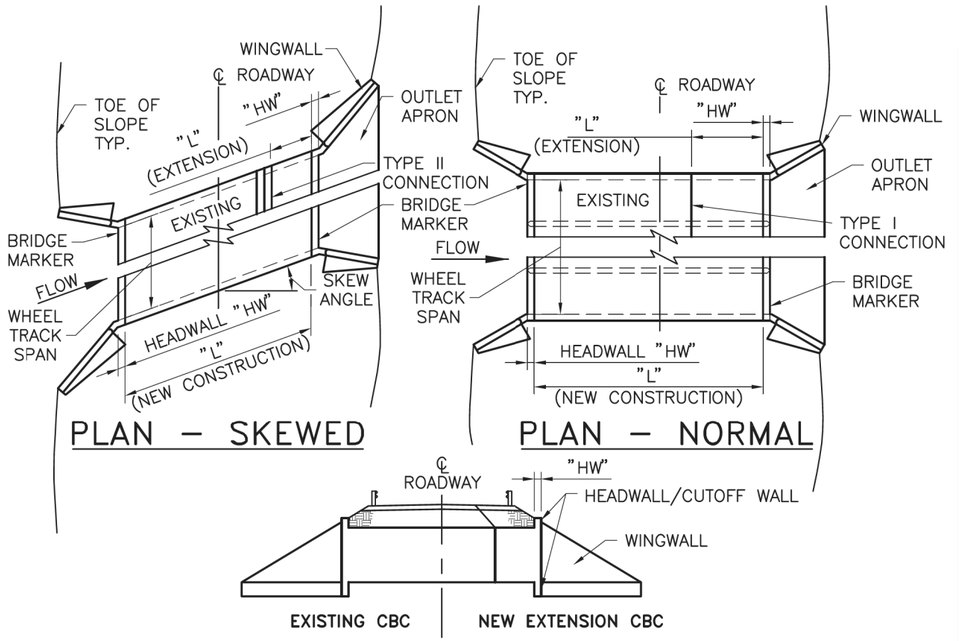
N9073(1) 1, 2 & 4

STA. 3+204.291 CULVERT PLAN AND PROFILE

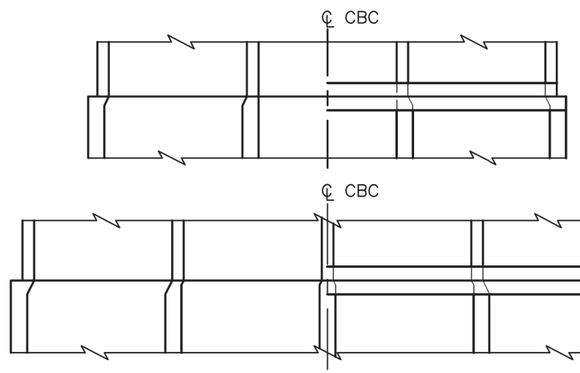
PROJECT MANAGER: DDM	DATE: 1/22	DRAWING	SHEET
LEAD DESIGNER: MLL	DATE: 1/22		62 OF 84
ASBUILT BY:	DATE: XXX		
SCALE: N/A			

STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	63

BOX TYPE	CONFIGURATION	DESIGN FILL	DRAWINGS
SINGLE BARREL CBC		"A"	511-60-1/2 511-60-2/2
SINGLE BARREL CBC		"B" "C" "D" "E"	511-61-1/2 511-61-2/2
DOUBLE BARREL CBC		"A"	511-62-1/2 511-62-2/2
DOUBLE BARREL CBC		"B" "C" "D" "E"	511-63-1/2 511-63-2/2
TRIPLE AND QUADRUPLE BARREL CBC		"A"	511-64-1/3 511-64-2/3 511-64-3/3
TRIPLE AND QUADRUPLE BARREL CBC		"B" "C" "D" "E"	511-65-1/3 511-65-2/3 511-65-3/3
CBC HEADWALL/CUTOFF WALL & MISC. DETAILS		"A" "B" "C" "D" "E"	511-66-1/6 511-66-2/6 ~~511-66-3/6~~ ~~511-66-4/6~~ 511-66-5/6 511-66-6/6
WINGWALL & APRON		"A" "B" "C" "D" "E"	511-67-1/2 511-67-2/2

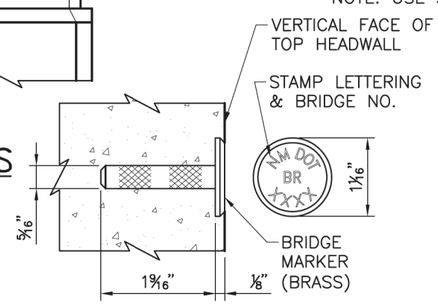


NOTE: IF THE WHEEL TRACK SPAN DIMENSION (PARALLEL TO ℄ OF ROADWAY AS SHOWN ABOVE) IS GREATER THAN 20' THE CBC IS CONSIDERED A BRIDGE AND A MAJOR STRUCTURE. FOR CBC EXTENSIONS RE-MARK BRIDGE NUMBER. NEW CBC SHALL BE MARKED AS PER DETAIL ON THIS SHEET. BRIDGE NUMBER SHALL BE OBTAINED BY REQUEST AT THE NMDOT BRIDGE MANAGEMENT SECTION. MARK SHALL BE PLACED AT UPPER LEFT SIDE OF VERTICAL FACE OF HEADWALL, BOTH INLET AND OULET.



METHOD OF EXTENDING UNEQUAL BOX DIMENSIONS

FOR DETAILS SEE SHEET 511-66-4/6



BRIDGE MARK DETAIL

PAYMENT

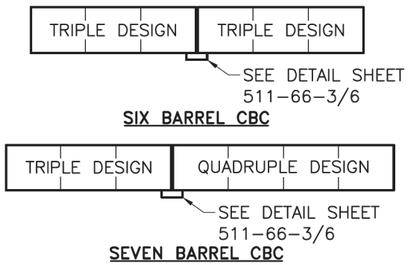
PAYMENT FOR CBC'S IS BASED ON "M" UNIT OF MEASUREMENT FOR THE TOTAL LENGTH OF ALL NEW BARRELS CONSTRUCTED AT THE CENTERLINE OF BARREL. LENGTH OF BARREL SHALL NOT INCLUDE "HW" WHICH SHALL BE PAID FOR SEPARATELY.

PAYMENT FOR HEADWALL/CUTOFF WALL IS BASED ON "EACH" NEW BARREL CONSTRUCTED. IN CASE OF TYPE II CONNECTION EACH HEAD/CUTOFF WALL UNIT SHALL BE PAID FOR, I.E. TWO PER BARREL PER CULVERT EXTENSION.

PAYMENT FOR WINGWALL IS BASED ON "SQ. M." UNIT OF MEASUREMENT BASED ON SOIL SIDE VERTICAL FACE AREA FOR EACH INDIVIDUAL HEIGHT OF INTERIOR BARREL DIMENSION. PAYMENT FOR OUTLET APRON IS BASED ON "SQ. M." UNIT OF MEASUREMENT BASED ON PLAN AREA OF APRON.

ALTERNATIVELY, A COMPLETE CONCRETE BOX CULVERT MAY BE PAID FOR UNDER CLASS "AA" CONRETE BY "CU. YD." ITEM 511030 AND GRADE 60 REBAR BY "LBS." ITEM 540060.

REBAR, CONCRETE, FORMING, DEMOLITION, AND ALL OTHER WORK AND METERIAL REQUIRED FOR A COMPLETE CBC, HEADWALL/CUTOFF WALL, WINGWALL, AND APRON CONSTRUCTION SHALL BE INCLUDED IN THE UNIT COST FOR EACH AND NO FURTHER PAYMENT SHALL BE MADE FOR THESE INCIDENTAL ITEMS.



EXAMPLE CONFIGURATIONS OF CBC W/MORE THAN 4 BARRELS

NOTE: USE SAME BARREL CONFIGURATION IF POSSIBLE

WILSON & COMPANY
4401 MASTHEAD ST. NE, SUITE 150
ALBUQUERQUE, NM 87109
PHONE: 505-348-4000
FAX: 505-348-4072
www.wilsonco.com

Registered Professional Engineer (Civil) CERTIFICATE NO. 83225 MYRA K. CANDELARIA Date Signed 6/30/22 ARIZONA, U.S.A.

REVISION	BY	DATE

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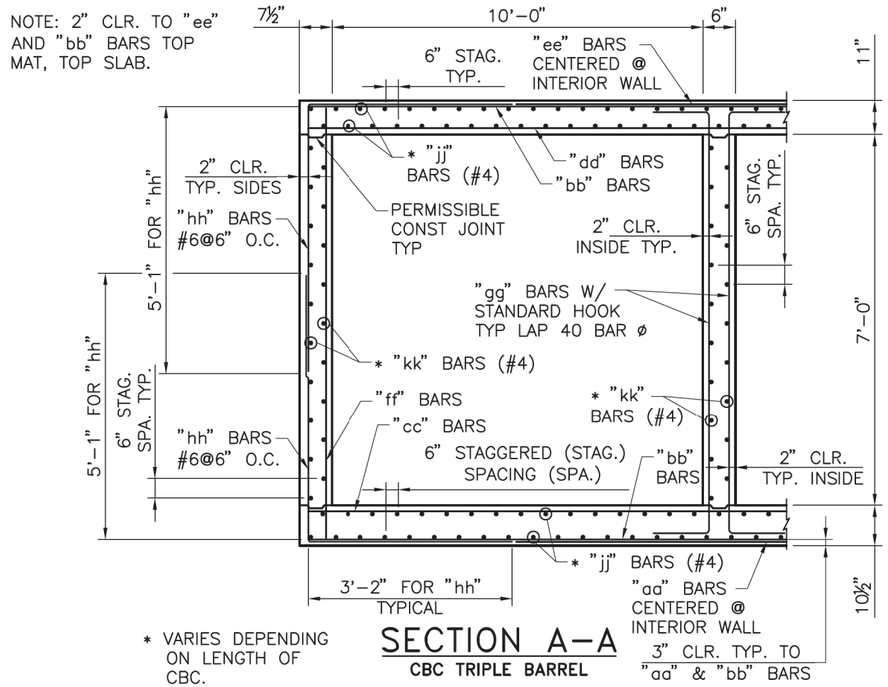
CONCRETE BOX CULVERT
EXAMPLE OF USE OF DRAWINGS

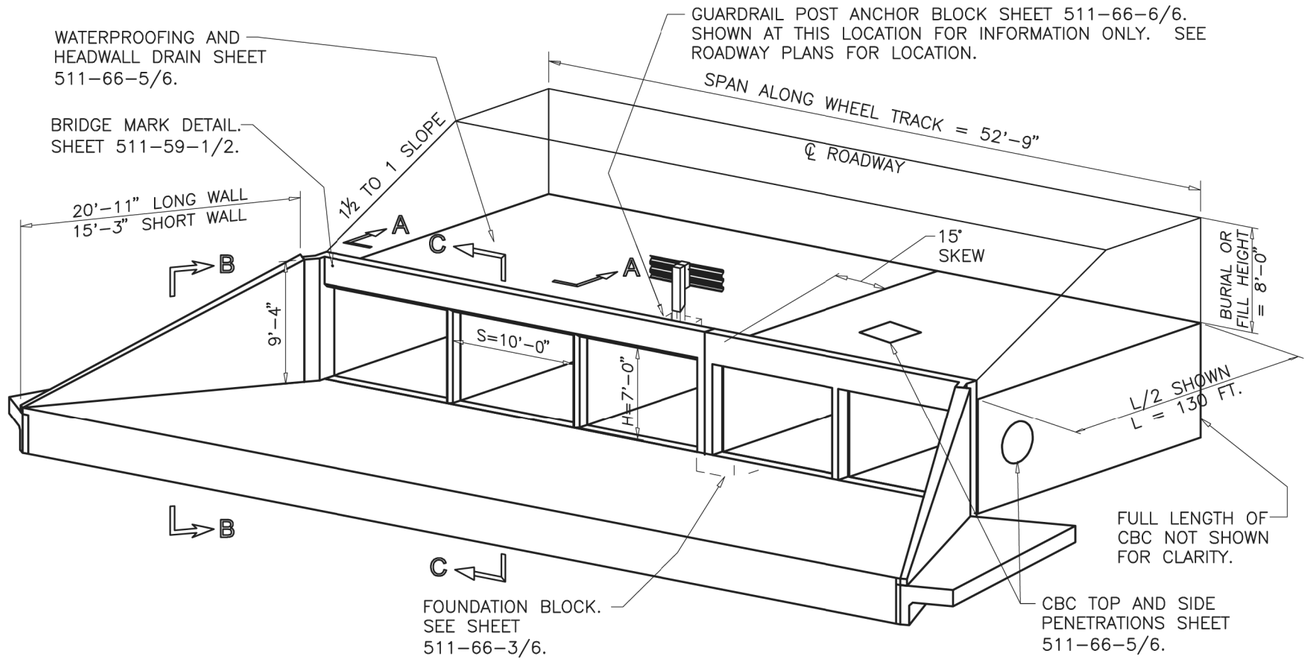
PROJECT MANAGER: DDM	DATE: 1/22	DRAWING	SHEET
LEAD DESIGNER: MLL	DATE: 1/22		
ASBUILT BY:	DATE: XXX		63 OF 84
SCALE: N/A			

STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	64



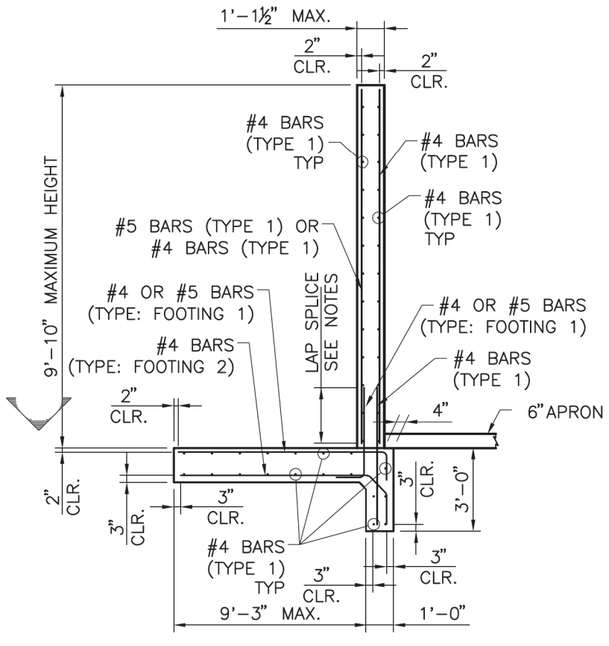
SECTION A-A

CBC TRIPLE BARREL



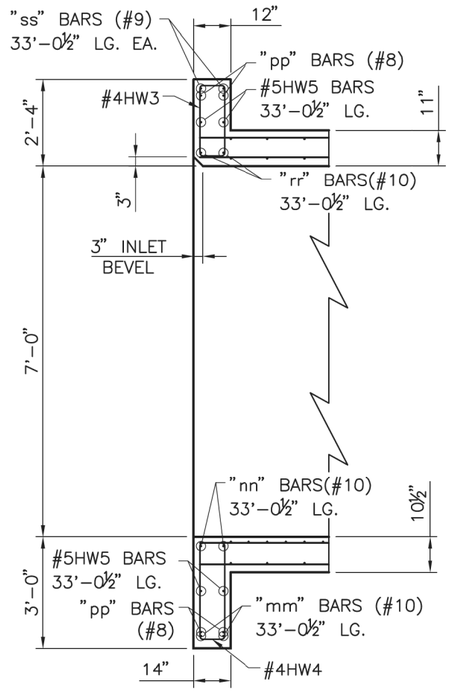
PERSPECTIVE OF 5 BARREL CBC

10' SPAN, 7' HEIGHT, 15° SKEW, 8' FILL HT.



SECTION B-B

WINGWALL & FOOTING



SECTION C-C

HEADWALL/CUTOFF WALL @ TRIPLE BARREL

NOTES

1. THE PURPOSE OF THIS DRAWING IS TO PROVIDE AN EXAMPLE OF USE OF THESE SERIAL CBC DRAWINGS. THIS EXAMPLE IS BASED ON A 5 BARREL, 10'S X 7'H, 15° SKEW, W/ 8' BURIAL DEPTH TO FINISHED ℄ ROADWAY. THIS 8' BURIAL REQUIRES THE DESIGN FILL "A" 0'-10' CATERGORY.

2. PAYMENT FOR THE CBC BARREL CONSTRUCTION IS BY THE LINEAL FOOT OF BARREL. PAYMENT FOR THE FIVE BARREL IS 5*L, UNDER PAY ITEM 511668, CBC DESIGN "A" 10X7, "L" BEING 130FT, FOR A TOTAL LINEAL FOOT PAYMENT UNDER THIS ITEM OF 650 FT. PAYMENT FOR THE WINGWALLS CONSTRUCTION IS BY THE SQUARE FOOT OF SOIL SIDE VERTICAL FACE. UNDER PAY ITEM 511868, CBC WINGWALL BARREL HEIGHT 7FT, QUANTITY EQUALS [(20'-11")X(9'-10")+(15'-3")X(9'-10")]/2, TOTALING 178 SQ. FT. FOR THE OUTLET WINGS. PAYMENT FOR THE HEADWALL/CUTOFF WALL CONSTRUCTION IS UNDER ITEM 511845, CBC HEADWALL/CUTOFF WALL 15 DEG SKEW 10X3 THRU 10X7, UNIT OF EACH PER BARREL, TOTALING 5 EACH FOR THE OUTLET SIDE. OUTLET APRON IS MEASURED BY THE PLAN SQ. FT. UNDER ITEM 511876, CBC OUTLET APRON.

3. NO REBAR DIMENSIONS ARE SHOWN ON SECTION B-B. IT IS THE CONTRACTOR'S RESPONSIBILITY TO DETAIL THE LENGTH OF BARS DUE TO THE CONSTANT CHANGE IN LENGTH DUE TO SLOPE AND FOOTING DIMENSION CHANGE.

REBAR DETAILS

BAR	2 BARREL			3 BARREL		
	LENGTH	SIZE	SPA.	LENGTH	SIZE	SPA.
"aa" BARS	10'-9"	#8	12"	10'-9"	#8	12"
"bb" BARS	21'-5"	#8	12"	31'-11"	#8	12"
"cc" BARS	21'-5"	#6	6"	31'-11"	#6	6"
"dd" BARS	21'-5"	#6	6"	31'-11"	#6	6"
"ee" BARS	10'-9"	#7	12"	10'-9"	#7	12"
"ff" BARS	8'-4"	#6	6"	8'-4"	#6	6"
"gg" BARS	**	#4	12"	**	#4	12"

** SEE NOTES ON SHEETS 511-62-2/2 & 511-64-2/3

WILSON &COMPANY
4401 MASTHEAD ST. NE. SUITE 150
ALBUQUERQUE, NM 87109
PHONE: 505-348-4000
FAX: 505-348-4072
www.wilsonco.com

Registered Professional Engineer (Civil) CERTIFICATE NO. 83225 MYRA K. CANDELARIA Date Signed ARIZONA, U.S.A.

REVISION	BY	DATE

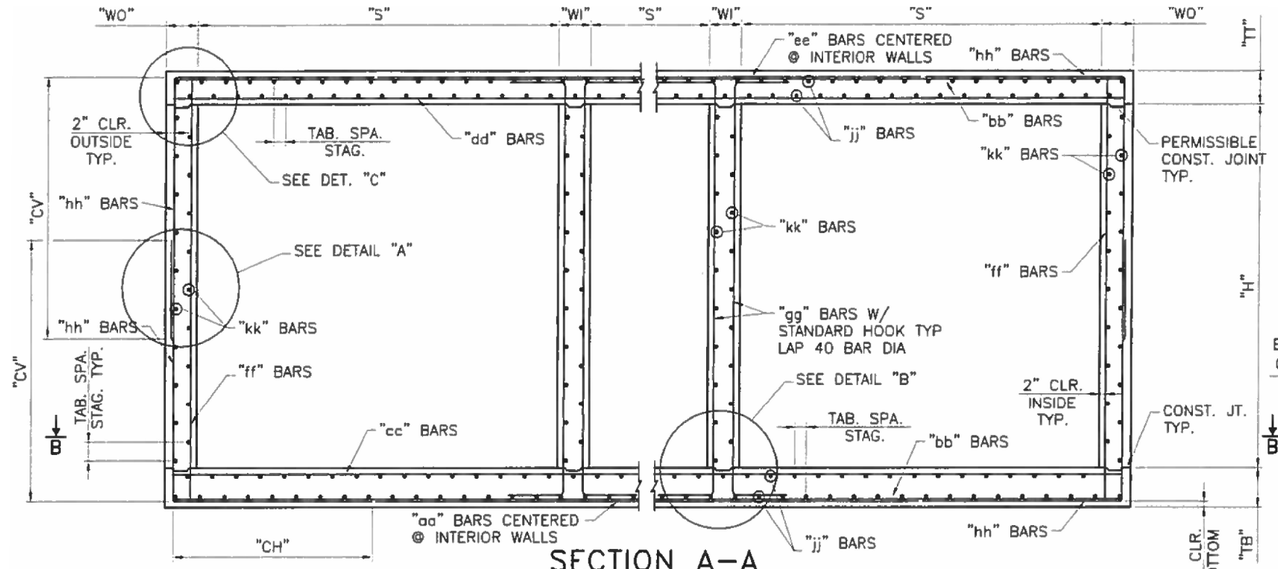
NAVAJO NATION
DIVISION OF TRANSPORTATION
NAVAJO D.O.T.

N9073(1) 1, 2 & 4

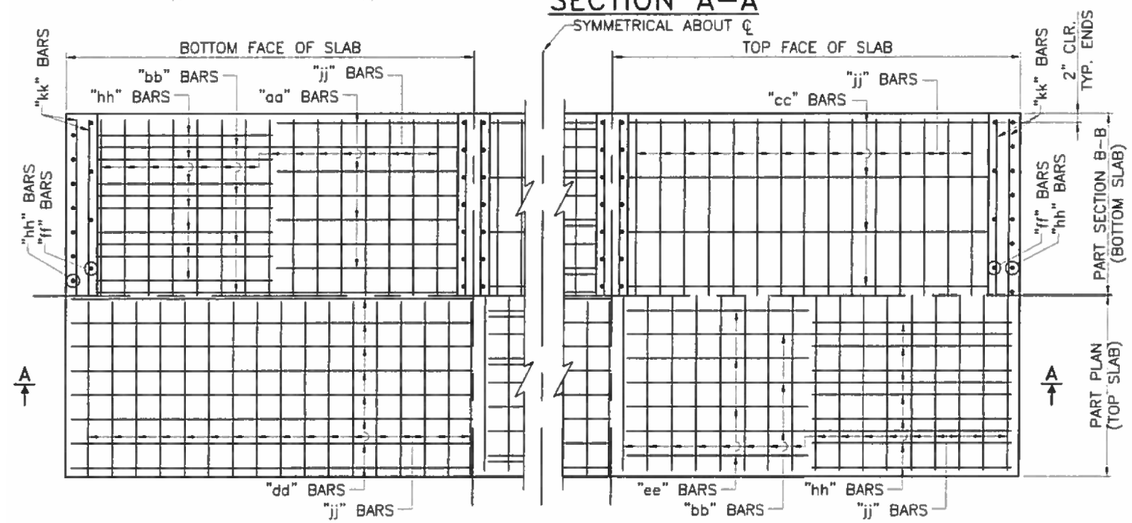
CONCRETE BOX CULVERT
EXAMPLE OF USE OF DRAWINGS

PROJECT MANAGER: DDM	DATE: 1/22	DRAWING	SHEET
LEAD DESIGNER: MLL	DATE: 1/22		
ASBUILT BY:	DATE: XXX		64 OF 84
SCALE: N/A			

STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	65



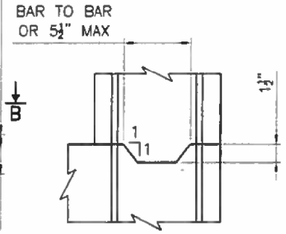
SECTION A–A



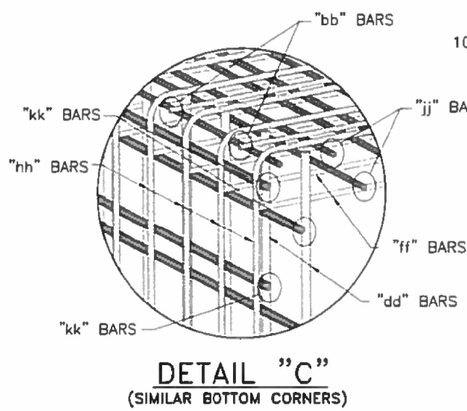
REBAR LAYOUT – PLAN VIEW

BAR SCHEDULES

FOR BAR SCHEDULE SEE SHEET 511-64-2/3 FOR TRIPLE BARREL AND SHEET 511-64-3/3 FOR QUADRUPLE BARRELS



CONST. JOINT DETAIL



DETAIL "C"
(SIMILAR BOTTOM CORNERS)

GENERAL NOTES

1. ALL MATERIALS AND WORKMANSHIP SHALL CONFORM TO THE NEW MEXICO DEPARTMENT OF TRANSPORTATION SPECIFICATIONS FOR HIGHWAY AND BRIDGE CONSTRUCTION (CURRENT EDITION) WITH APPLICABLE SPECIAL PROVISIONS.
2. ALL CONCRETE SHALL BE CLASS "AA" (4000 psi). CHAMFER ALL EXPOSED EDGES ¾".
3. ALL REINFORCING STEEL TO BE DEFORMED BARS, CONFORMING TO AASHTO M-31, GRADE 60. ALL DIMENSIONS REFER TO THE CENTERLINE OF BAR.
4. "COVER" IS HEIGHT OF FILL FROM TOP OF BOX TO THE TOP OF PAVEMENT. ORIGINAL HEIGHT OF COVER MAY NOT BE EXCEEDED IN THE FUTURE OR WILL REQUIRE REMOVAL AND REPLACEMENT WITH PROPER DESIGN FILL CBC. IN CASE OF COVER EQUAL TO 10', 15', 20', OR 25' USE HIGHER DESIGN FILL IN CASE OF FUTURE AC OVERLAY.
5. "jj" AND "kk" BARS MAY BE SPLICED WHEN NECESSARY BY LAPPING AT LEAST 40 BAR DIAMETERS. NO OTHER SPLICING OF BARS WILL BE PERMITTED. LENGTH OF THESE BARS SHALL EQUAL THE LENGTH OF BARREL "L" PLUS (2 X "HW") MINUS 4" FOR TOTAL NEW CONSTRUCTION, NOT INCLUDING LAP LENGTH. FOR CULVERT EXTENSION, LENGTH OF THESE BARS SHALL BE "L" PLUS "HW" MINUS 2".
6. REINFORCING SHOWN IS FOR PLACEMENT LOCATION ONLY. USE APPROPRIATE SHEETS AND CORRESPONDING TABLES TO DETERMINE THE REINFORCING REQUIREMENTS AND SPACINGS.
7. ALL CONSTRUCTION JOINTS SHALL BE AS PER DETAIL THIS SHEET. CONSTRUCTION JOINTS ARE PERMISSIBLE AND SHALL BE BE LOCATED AT WALL/SLAB HORIZONTAL INTERFACE.
8. DO NOT BACKFILL WALLS UNTIL TOP SLAB HAS REACHED 4000 psi DESIGN STRENGTH.
9. CBC'S SHALL BE CONSTRUCTED TO THE SPAN, HEIGHT, NUMBER OF BARRELS, SKEW, ALIGNMENT, AND FLOWLINE GRADE AS SPECIFIED ON THE PLAN AND PROFILE AND STRUCTURE PLACEMENT SECTIONS.
10. EXCAVATION AND BACKFILL OF CBC'S SHALL BE IN ACCORDANCE WITH STANDARD DRAWING 210-01-1/1.

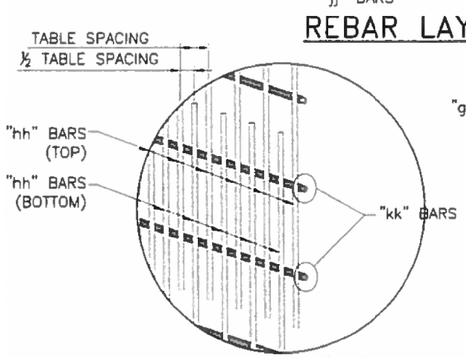
DESIGN

DESIGNED IN ACCORDANCE WITH AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, THIRD EDITION.

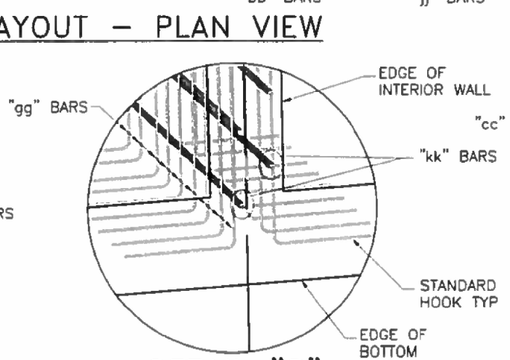
PAYMENT

PAYMENT FOR CBC'S IS BASED ON "LIN. FT." UNIT OF MEASUREMENT FOR THE TOTAL LENGTH OF ALL NEW BARRELS CONSTRUCTED AT THE CENTERLINE OF BARREL. I.E. SINGLE BARREL SHALL BE 1 X "L" AND TRIPLE BARREL SHALL BE 3 X "L" FOR PAYMENT. LENGTH OF BARREL SHALL NOT INCLUDE "HW" WHICH SHALL BE PAID FOR SEPARATELY. CONCRETE, REBAR, FORMING, AND OTHER WORK AND MATERIAL SHALL BE INCLUDED IN THE LIN. FT. COST FOR THE CBC AND NO FURTHER PAYMENT SHALL BE MADE FOR THESE INCIDENTAL ITEMS.

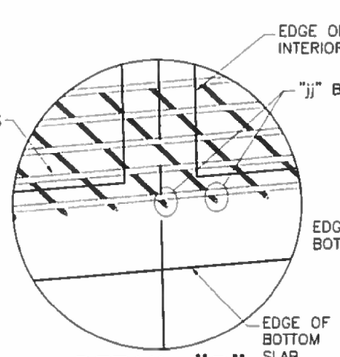
ALTERNATIVELY, A COMPLETE CONCRETE BOX CULVERT MAY BE PAID FOR UNDER CLASS "AA" CONCRETE BY "CU. YD." ITEM 511030 AND GRADE 60 REBAR BY "LBS." ITEM 540060.



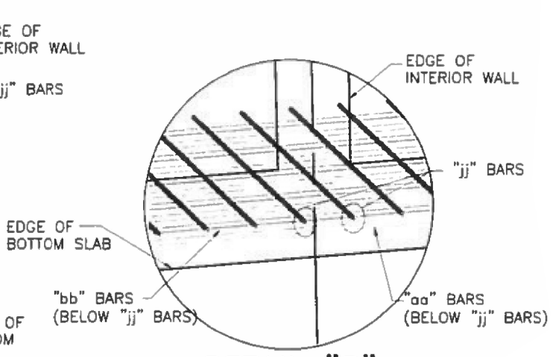
DETAIL "A"
(INSIDE FACE OMITTED FOR CLARITY)



DETAIL "B"
(WALL REINFORCING ONLY)



DETAIL "B"
(BOTTOM SLAB – TOP MAT)



DETAIL "B"
(BOTTOM SLAB – BOTTOM MAT)

WILSON & COMPANY
4401 MASTHEAD ST. NE. SUITE 150
ALBUQUERQUE, NM 87109
PHONE: 505-348-4000
FAX: 505-348-4072
www.wilsonco.com

Certified Professional Engineer (Civil) 83225 MYRA K. CANDELARIA Date Signed ARIZONA, U.S.A.

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NAVAJO D.O.T.

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CBC TRIPLE AND QUADRUPLE OPENING - DESIGN "A" 0-10 FT
STRUCTURAL SECTIONS AND REBAR

PROJECT MANAGER: DDM	DATE: 1/22	DRAWING	SHEET
LEAD DESIGNER: MLL	DATE: 1/22		
ASBUILT BY:	DATE: XXX		65 OF 84
SCALE: N/A			

STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	66

TRIPLE OPENING BOX CULVERT STRUCTURE DIMENSIONS						GRADE 60 REINFORCING BAR SCHEDULE (BAR SIZE, SPACING AND LENGTH DIMENSIONS)																											
DIM		0–10 FT BURIAL DESIGN FILL "A"				"aa"		"ee"		"aa" & "ee"		"bb"		"cc"		"dd"		"bb", "cc" & "dd"	"ff"		"gg"		"ff" & "gg" **	"hh"				"jj"		"kk"	
SPAN "S" INSIDE	HEIGHT "H" INSIDE	TOP SLAB "TT"	BOTTOM SLAB "TB"	WALLS OUTER "WO"	WALLS INTERIOR "WI"	SIZE	SPACING	SIZE	SPACING	LENGTH	NUMBER OF BARS	SIZE	SPACING	SIZE	SPACING	SIZE	SPACING	LENGTH	SIZE	SPACING	SIZE	SPACING	LENGTH	SIZE	SPACING	"CH" LENGTH	"CV" LENGTH	SIZE	STAGGERED SPACING	SIZE	STAGGERED SPACING
4'	2'	7.5''	8.5''	7.5''	6.0''	#4	12''	#5	12''	5'–0"	2	#5	12''	#4	6''	#4	6''	13'–11"	#4	6''	#4	12"	2'–11"	#4	6''	24''	25''	#4	6''	#4	6''
4'	3'	7.5''	8.5''	7.5''	6.0''	#4	12''	#5	12''	5'–0"	2	#5	12''	#4	6''	#4	6''	13'–11"	#4	6''	#4	12"	3'–11"	#4	6''	24''	31''	#4	6''	#4	6''
4'	4'	7.5''	8.5''	7.5''	6.0''	#4	12''	#5	12''	5'–0"	2	#5	12''	#4	6''	#4	6''	13'–11"	#4	6''	#4	12"	4'–11"	#4	6''	24''	37''	#4	6''	#4	6''
6'	2'	8.0''	8.5''	7.5''	6.0''	#5	12''	#7	12''	7'–5"	2	#7	12''	#6	6''	#5	6''	19'–11"	#5	6''	#4	12"	2'–11"	#5	6''	30''	27''	#4	6''	#4	6''
6'	3'	8.0''	8.5''	7.5''	6.0''	#5	12''	#7	12''	7'–5"	2	#7	12''	#6	6''	#5	6''	19'–11"	#5	6''	#4	12"	3'–11"	#5	6''	30''	33''	#4	6''	#4	6''
6'	4'	8.0''	8.5''	7.5''	6.0''	#5	12''	#7	12''	7'–5"	2	#7	12''	#6	6''	#5	6''	19'–11"	#5	6''	#4	12"	4'–11"	#5	6''	30''	39''	#4	6''	#4	6''
6'	5'	8.0''	8.5''	7.5''	6.0''	#5	12''	#7	12''	7'–5"	2	#7	12''	#6	6''	#5	6''	19'–11"	#5	6''	#4	12"	5'–11"	#5	6''	30''	45''	#4	6''	#4	6''
6'	6'	8.0''	8.5''	7.5''	6.0''	#5	12''	#7	12''	7'–5"	2	#7	12''	#6	6''	#5	6''	19'–11"	#5	6''	#4	12"	6'–11"	#5	6''	30''	51''	#4	6''	#4	6''
6'	7'	8.0''	8.5''	7.5''	6.0''	#5	12''	#7	12''	7'–5"	2	#7	12''	#6	6''	#5	6''	19'–11"	#5	6''	#4	12"	7'–11"	#5	6''	30''	57''	#4	6''	#4	6''
8'	4'	9.5''	9.0''	7.5''	6.0''	#7	12''	#6	12''	8'–5"	2	#7	12''	#5	6''	#5	6''	25'–11"	#5	6''	#4	12"	5'–1"	#6	6''	36''	41''	#4	6''	#4	6''
8'	5'	9.5''	9.0''	7.5''	6.0''	#7	12''	#6	12''	8'–5"	2	#7	12''	#5	6''	#5	6''	25'–11"	#5	6''	#4	12"	6'–1"	#6	6''	36''	47''	#4	6''	#4	6''
8'	6'	9.5''	9.0''	7.5''	6.0''	#7	12''	#6	12''	8'–5"	2	#7	12''	#5	6''	#5	6''	25'–11"	#5	6''	#4	12"	7'–1"	#6	6''	36''	53''	#4	6''	#4	6''
8'	7'	9.5''	9.0''	7.5''	6.0''	#7	12''	#6	12''	8'–5"	2	#7	12''	#5	6''	#5	6''	25'–11"	#5	6''	#4	12"	8'–1"	#6	6''	36''	59''	#4	6''	#4	6''
8'	8'	9.5''	9.0''	7.5''	6.0''	#7	12''	#6	12''	8'–5"	2	#7	12''	#5	6''	#5	6''	25'–11"	#5	6''	#4	12"	9'–1"	#6	6''	36''	65''	#4	6''	#4	6''
10'	3'	11.0''	10.5''	7.5''	6.0''	#8	12''	#7	12''	10'–9"	2	#8	12''	#6	6''	#6	6''	31'–11"	#6	6''	#4	12"	4'–4"	#6	6''	38''	37''	#4	6''	#4	6''
10'	4'	11.0''	10.5''	7.5''	6.0''	#8	12''	#7	12''	10'–9"	2	#8	12''	#6	6''	#6	6''	31'–11"	#6	6''	#4	12"	5'–4"	#6	6''	38''	43''	#4	6''	#4	6''
10'	5'	11.0''	10.5''	7.5''	6.0''	#8	12''	#7	12''	10'–9"	2	#8	12''	#6	6''	#6	6''	31'–11"	#6	6''	#4	12"	6'–4"	#6	6''	38''	49''	#4	6''	#4	6''
10'	6'	11.0''	10.5''	7.5''	6.0''	#8	12''	#7	12''	10'–9"	2	#8	12''	#6	6''	#6	6''	31'–11"	#6	6''	#4	12"	7'–4"	#6	6''	38''	55''	#4	6''	#4	6''
* 10'	7'	11.0''	10.5''	7.5''	6.0''	#8	12''	#7	12''	10'–9"	2	#8	12''	#6	6''	#6	6''	31'–11"	#6	6''	#4	12"	8'–4"	#6	6''	38''	61''	#4	6''	#4	6''
10'	8'	11.0''	10.5''	9.0''	6.0''	#8	12''	#7	12''	10'–10"	2	#8	12''	#6	6''	#6	6''	32'–2"	#6	6''	#4	12"	9'–4"	#7	6''	45''	69''	#4	6''	#4	6''
10'	9'	11.0''	10.5''	9.0''	6.0''	#8	12''	#7	12''	10'–10"	2	#8	12''	#6	6''	#6	6''	32'–2"	#6	6''	#4	12"	10'–4"	#7	6''	45''	75''	#4	6''	#4	6''
10'	10'	11.0''	10.5''	9.0''	6.0''	#8	12''	#7	12''	10'–10"	2	#8	12''	#6	6''	#6	6''	32'–2"	#6	6''	#4	12"	11'–4"	#7	6''	45''	81''	#4	6''	#4	6''
10'	11'	11.0''	10.5''	9.0''	6.0''	#8	12''	#7	12''	10'–10"	2	#8	12''	#6	6''	#6	6''	32'–2"	#6	6''	#4	12"	12'–4"	#7	6''	45''	87''	#4	6''	#4	6''
10'	12'	11.0''	10.5''	9.0''	6.0''	#8	12''	#7	12''	10'–10"	2	#8	12''	#6	6''	#6	6''	32'–2"	#6	6''	#4	12"	13'–4"	#7	6''	45''	93''	#4	6''	#4	6''
12'	6'	12.5''	12.0''	9.0''	6.0''	#8	12''	#8	12''	11'–10"	2	#8	12''	#6	6''	#7	6''	38'–2"	#7	6''	#4	12"	7'–7"	#8	6''	55''	63''	#4	6''	#4	6''
12'	7'	12.5''	12.0''	9.0''	6.0''	#8	12''	#8	12''	11'–10"	2	#8	12''	#6	6''	#7	6''	38'–2"	#7	6''	#4	12"	8'–7"	#8	6''	55''	69''	#4	6''	#4	6''
12'	8'	12.5''	12.0''	9.0''	6.0''	#8	12''	#8	12''	11'–10"	2	#8	12''	#6	6''	#7	6''	38'–2"	#7	6''	#4	12"	9'–7"	#8	6''	55''	75''	#4	6''	#4	6''
12'	9'	12.5''	12.0''	9.0''	6.0''	#8	12''	#8	12''	11'–10"	2	#8	12''	#6	6''	#7	6''	38'–2"	#7	6''	#4	12"	10'–7"	#8	6''	55''	81''	#4	6''	#4	6''
12'	10'	12.5''	12.0''	9.0''	6.0''	#8	12''	#8	12''	11'–10"	2	#8	12''	#6	6''	#7	6''	38'–2"	#7	6''	#4	12"	11'–7"	#8	6''	55''	87''	#4	6''	#4	6''
12'	12'	12.5''	12.0''	9.0''	6.0''	#8	12''	#8	12''	11'–10"	2	#8	12''	#6	6''	#7	6''	38'–2"	#7	6''	#4	12"	13'–7"	#8	6''	55''	99''	#4	6''	#4	6''
14'	8'	14.0''	13.5''	11.0''	7.0''	#9	12''	#8	12''	14'–4"	2	#9	12''	#7	6''	#7	6''	44'–8"	#7	6''	#4	12"	9'–10"	#8	6''	60''	76''	#4	6''	#4	6''
14'	9'	14.0''	13.5''	11.0''	7.0''	#9	12''	#8	12''	14'–4"	2	#9	12''	#7	6''	#7	6''	44'–8"	#7	6''	#4	12"	10'–10"	#8	6''	60''	82''	#4	6''	#4	6''
14'	10'	14.0''	13.5''	11.0''	7.0''	#9	12''	#8	12''	14'–4"	2	#9	12''	#7	6''	#7	6''	44'–8"	#7	6''	#4	12"	11'–10"	#8	6''	60''	88''	#4	6''	#4	6''
14'	11'	14.0''	13.5''	11.0''	7.0''	#9	12''	#8	12''	14'–4"	2	#9	12''	#7	6''	#7	6''	44'–8"	#7	6''	#4	12"	12'–10"	#8	6''	60''	94''	#4	6''	#4	6''
14'	12'	14.0''	13.5''	11.0''	7.0''	#9	12''	#8	12''	14'–4"	2	#9	12''	#7	6''	#7	6''	44'–8"	#7	6''	#4	12"	13'–10"	#8	6''	60''	100''	#4	6''	#4	6''
14'	13'	14.0''	13.5''	11.0''	7.0''	#9	12''	#8	12''	14'–4"	2	#9	12''	#7	6''	#7	6''	44'–8"	#7	6''	#4	12"	14'–10"	#8	6''	60''	106''	#4	6''	#4	6''
14'	14'	14.0''	13.5''	11.0''	7.0''	#9	12''	#8	12''	14'–4"	2	#9	12''	#7	6''	#7	6''	44'–8"	#7	6''	#4	12"	15'–10"	#8	6''	60''	112''	#4	6''	#4	6''

FOR EXTENSIONS OF EXISTING CBC'S OF S=5', S=7', AND S=9' SIZE SPANS NOT INCLUDED IN THIS TABLE, USE DIMENSIONS FOR NEXT GREATER SPAN TO BUILD. FOR EXAMPLE: FOR S=5' USE DESIGN DIMENSIONS FROM THE TABLE FOR S=6'. ALSO REDUCE THE S=6' TABLE LENGTH OF BARS "bb", "cc" AND "dd" BY ONE FOOT TO ACCOMMODATE THE SHORTER SPAN. SEE DETAILS ON SHEET 511–66–4/6. ANY OTHER SIZES OF BOX EXTENSIONS NOT COVERED BY THIS MODIFICATION SHALL BE DONE THROUGH SPECIAL DESIGNS INCLUDED IN THE PROJECT PLANS.

** TOTAL LENGTH OF "gg" BARS IS TABLE LENGTH PLUS TWO STANDARD 90° HOOKS AND OPTIONAL 40 BAR ø LAP IF NECESSARY.

* EXAMPLE OF USE OF THIS TABLE:
PROPOSED STRUCTURE – TRIPLE BARREL, 10 FT. SPAN/7 FT. HEIGHT, CBC WITH 2 FT. DEPTH OF COVER.
USE THE FOLLOWING BUILD INFORMATION FROM THE TABLE ABOVE:

DIM		0–10 FT BURIAL DESIGN FILL "A"				"aa"		"ee"		"aa" & "ee"		"bb"		"cc"		"dd"		"bb", "cc" & "dd"	"ff"		"gg"		"ff" & "gg"	"hh"				"jj"		"kk"	
SPAN "S" INSIDE	HEIGHT "H" INSIDE	TOP SLAB "TT"	BOTTOM SLAB "TB"	WALLS OUTER "WO"	WALLS INTERIOR "WI"	SIZE	SPACING	SIZE	SPACING	LENGTH	NUMBER OF BARS	SIZE	SPACING	SIZE	SPACING	SIZE	SPACING	LENGTH	SIZE	SPACING	SIZE	SPACING	LENGTH	SIZE	SPACING	"CH" LENGTH	"CV" LENGTH	SIZE	STAGGERED SPACING	SIZE	STAGGERED SPACING
10'	7'	11.0''	10.5''	7.5''	6.0''	#8	12''	#7	12''	10'–9"	2	#8	12''	#6	6''	#6	6''	31'–11"	#6	6''	#4	12"	8'–4"	#6	6''	38''	61''	#4	6''	#4	6''

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4401 MASTHEAD ST. NE. SUITE 150
ALBUQUERQUE, NM 87109
PHONE: 505-348-4000
FAX: 505-348-4072
www.wilsonco.com

Registered Professional Engineer (Civil) CERTIFICATE 83225 MYRA K. CANDELARIA Date Signed 05/05/22 ARIZONA, U.S.A.

	REVISION	BY	DATE

NAVAJO NATION
DIVISION OF TRANSPORTATION
NAVAJO D.O.T.

N9073(1) 1, 2 & 4

CONCRETE BOX CULVERT TRIPLE OPENING - DESIGN "A" 0-10 FT. DIMENSIONS AND REBAR SECHEDULE

PROJECT MANAGER: DDM	DATE: 1/22	DRAWING	SHEET
LEAD DESIGNER: MLL	DATE: 1/22		
ASBUILT BY:	DATE: XXX		66 OF 84
SCALE: N/A			

STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	67

QUADRUPLE OPENING BOX CULVERT STRUCTURE DIMENSIONS						GRADE 60 REINFORCING BAR SCHEDULE (BAR SIZE, SPACING AND LENGTH DIMENSIONS)																									
DIM		0–10 FT BURIAL DESIGN FILL "A"				"aa"		"ee"		"aa" & "ee"		"bb"		"cc"		"dd"		"bb", "cc" & "dd"	"ff"		"gg"		"ff" & "gg" **	"hh"				"jj"		"kk"	
SPAN "S" INSIDE	HEIGHT "H" INSIDE	TOP SLAB "TT"	BOTTOM SLAB "TB"	WALLS OUTER "WO"	WALLS INTERIOR "WI"	SIZE	SPACING	SIZE	SPACING	LENGTH	NUMBER OF BARS	SIZE	SPACING	SIZE	SPACING	SIZE	SPACING	LENGTH	SIZE	SPACING	SIZE	SPACING	LENGTH	SIZE	SPACING	"CH" LENGTH	"CV" LENGTH	SIZE	STAGGERED SPACING	SIZE	STAGGERED SPACING
4'	2'	7.5''	8.5''	7.5''	6.0''	#4	12''	#5	12''	5'–0"	3	#5	12''	#4	6''	#4	6''	18'–5"	#4	6''	#4	12''	2'–11"	#4	6''	24''	25''	#4	6''	#4	6''
4'	3'	7.5''	8.5''	7.5''	6.0''	#4	12''	#5	12''	5'–0"	3	#5	12''	#4	6''	#4	6''	18'–5"	#4	6''	#4	12''	3'–11"	#4	6''	24''	31''	#4	6''	#4	6''
4'	4'	7.5''	8.5''	7.5''	6.0''	#4	12''	#5	12''	5'–0"	3	#5	12''	#4	6''	#4	6''	18'–5"	#4	6''	#4	12''	4'–11"	#4	6''	24''	37''	#4	6''	#4	6''
6'	2'	8.0''	8.5''	7.5''	6.0''	#5	12''	#7	12''	7'–5"	3	#7	12''	#6	6''	#5	6''	26'–5"	#5	6''	#4	12''	2'–11"	#5	6''	30''	27''	#4	6''	#4	6''
6'	3'	8.0''	8.5''	7.5''	6.0''	#5	12''	#7	12''	7'–5"	3	#7	12''	#6	6''	#5	6''	26'–5"	#5	6''	#4	12''	3'–11"	#5	6''	30''	33''	#4	6''	#4	6''
6'	4'	8.0''	8.5''	7.5''	6.0''	#5	12''	#7	12''	7'–5"	3	#7	12''	#6	6''	#5	6''	26'–5"	#5	6''	#4	12''	4'–11"	#5	6''	30''	39''	#4	6''	#4	6''
6'	5'	8.0''	8.5''	7.5''	6.0''	#5	12''	#7	12''	7'–5"	3	#7	12''	#6	6''	#5	6''	26'–5"	#5	6''	#4	12''	5'–11"	#5	6''	30''	45''	#4	6''	#4	6''
6'	6'	8.0''	8.5''	7.5''	6.0''	#5	12''	#7	12''	7'–5"	3	#7	12''	#6	6''	#5	6''	26'–5"	#5	6''	#4	12''	6'–11"	#5	6''	30''	51''	#4	6''	#4	6''
6'	7'	8.0''	8.5''	7.5''	6.0''	#5	12''	#7	12''	7'–5"	3	#7	12''	#6	6''	#5	6''	26'–5"	#5	6''	#4	12''	7'–11"	#5	6''	30''	57''	#4	6''	#4	6''
8'	4'	9.5''	9.0''	7.5''	6.0''	#7	12''	#7	12''	8'–5"	3	#7	12''	#5	6''	#5	6''	34'–5"	#5	6''	#4	12''	5'–1"	#6	6''	36''	41''	#4	6''	#4	6''
8'	5'	9.5''	9.0''	7.5''	6.0''	#7	12''	#7	12''	8'–5"	3	#7	12''	#5	6''	#5	6''	34'–5"	#5	6''	#4	12''	6'–1"	#6	6''	36''	47''	#4	6''	#4	6''
8'	6'	9.5''	9.0''	7.5''	6.0''	#7	12''	#7	12''	8'–5"	3	#7	12''	#5	6''	#5	6''	34'–5"	#5	6''	#4	12''	7'–1"	#6	6''	36''	53''	#4	6''	#4	6''
8'	7'	9.5''	9.0''	7.5''	6.0''	#7	12''	#7	12''	8'–5"	3	#7	12''	#5	6''	#5	6''	34'–5"	#5	6''	#4	12''	8'–1"	#6	6''	36''	59''	#4	6''	#4	6''
8'	8'	9.5''	9.0''	7.5''	6.0''	#7	12''	#7	12''	8'–5"	3	#7	12''	#5	6''	#5	6''	34'–5"	#5	6''	#4	12''	9'–1"	#6	6''	36''	65''	#4	6''	#4	6''
10'	3'	11.0''	10.5''	7.5''	6.0''	#8	12''	#7	12''	10'–9"	3	#8	12''	#6	6''	#6	6''	42'–5"	#6	6''	#4	12''	4'–4"	#6	6''	38''	37''	#4	6''	#4	6''
10'	4'	11.0''	10.5''	7.5''	6.0''	#8	12''	#7	12''	10'–9"	3	#8	12''	#6	6''	#6	6''	42'–5"	#6	6''	#4	12''	5'–4"	#6	6''	38''	43''	#4	6''	#4	6''
10'	5'	11.0''	10.5''	7.5''	6.0''	#8	12''	#7	12''	10'–9"	3	#8	12''	#6	6''	#6	6''	42'–5"	#6	6''	#4	12''	6'–4"	#6	6''	38''	49''	#4	6''	#4	6''
10'	6'	11.0''	10.5''	7.5''	6.0''	#8	12''	#7	12''	10'–9"	3	#8	12''	#6	6''	#6	6''	42'–5"	#6	6''	#4	12''	7'–4"	#6	6''	38''	55''	#4	6''	#4	6''
* 10'	7'	11.0''	10.5''	7.5''	6.0''	#8	12''	#7	12''	10'–9"	3	#8	12''	#6	6''	#6	6''	42'–5"	#6	6''	#4	12''	8'–4"	#6	6''	38''	61''	#4	6''	#4	6''
10'	8'	11.0''	10.5''	9.0''	6.0''	#8	12''	#7	12''	10'–10"	3	#8	12''	#6	6''	#6	6''	42'–8"	#6	6''	#4	12''	9'–4"	#7	6''	45''	69''	#4	6''	#4	6''
10'	9'	11.0''	10.5''	9.0''	6.0''	#8	12''	#7	12''	10'–10"	3	#8	12''	#6	6''	#6	6''	42'–8"	#6	6''	#4	12''	10'–4"	#7	6''	45''	75''	#4	6''	#4	6''
10'	10'	11.0''	10.5''	9.0''	6.0''	#8	12''	#7	12''	10'–10"	3	#8	12''	#6	6''	#6	6''	42'–8"	#6	6''	#4	12''	11'–4"	#7	6''	45''	81''	#4	6''	#4	6''
10'	11'	11.0''	10.5''	9.0''	6.0''	#8	12''	#7	12''	10'–10"	3	#8	12''	#6	6''	#6	6''	42'–8"	#6	6''	#4	12''	12'–4"	#7	6''	45''	87''	#4	6''	#4	6''
10'	12'	11.0''	10.5''	9.0''	6.0''	#8	12''	#7	12''	10'–10"	3	#8	12''	#6	6''	#6	6''	42'–8"	#6	6''	#4	12''	13'–4"	#7	6''	45''	93''	#4	6''	#4	6''
12'	6'	12.5''	12.0''	9.0''	6.0''	#8	12''	#8	12''	11'–10"	3	#8	12''	#6	6''	#7	6''	50'–8"	#7	6''	#4	12''	7'–7"	#8	6''	55''	63''	#4	6''	#4	6''
12'	7'	12.5''	12.0''	9.0''	6.0''	#8	12''	#8	12''	11'–10"	3	#8	12''	#6	6''	#7	6''	50'–8"	#7	6''	#4	12''	8'–7"	#8	6''	55''	69''	#4	6''	#4	6''
12'	8'	12.5''	12.0''	9.0''	6.0''	#8	12''	#8	12''	11'–10"	3	#8	12''	#6	6''	#7	6''	50'–8"	#7	6''	#4	12''	9'–7"	#8	6''	55''	75''	#4	6''	#4	6''
12'	9'	12.5''	12.0''	9.0''	6.0''	#8	12''	#8	12''	11'–10"	3	#8	12''	#6	6''	#7	6''	50'–8"	#7	6''	#4	12''	10'–7"	#8	6''	55''	81''	#4	6''	#4	6''
12'	10'	12.5''	12.0''	9.0''	6.0''	#8	12''	#8	12''	11'–10"	3	#8	12''	#6	6''	#7	6''	50'–8"	#7	6''	#4	12''	11'–7"	#8	6''	55''	87''	#4	6''	#4	6''
12'	12'	12.5''	12.0''	9.0''	6.0''	#8	12''	#8	12''	11'–10"	3	#8	12''	#6	6''	#7	6''	50'–8"	#7	6''	#4	12''	13'–7"	#8	6''	55''	99''	#4	6''	#4	6''
14'	8'	14.0''	13.0''	11.0''	7.0''	#9	12''	#8	12''	14'–4"	3	#9	12''	#7	6''	#7	6''	59'–3"	#7	6''	#4	12''	9'–10"	#8	6''	60''	76''	#4	6''	#4	6''
14'	9'	14.0''	13.0''	11.0''	7.0''	#9	12''	#8	12''	14'–4"	3	#9	12''	#7	6''	#7	6''	59'–3"	#7	6''	#4	12''	10'–10"	#8	6''	60''	82''	#4	6''	#4	6''
14'	10'	14.0''	13.0''	11.0''	7.0''	#9	12''	#8	12''	14'–4"	3	#9	12''	#7	6''	#7	6''	59'–3"	#7	6''	#4	12''	11'–10"	#8	6''	60''	88''	#4	6''	#4	6''
14'	11'	14.0''	13.0''	11.0''	7.0''	#9	12''	#8	12''	14'–4"	3	#9	12''	#7	6''	#7	6''	59'–3"	#7	6''	#4	12''	12'–10"	#8	6''	60''	94''	#4	6''	#4	6''
14'	12'	14.0''	13.0''	11.0''	7.0''	#9	12''	#8	12''	14'–4"	3	#9	12''	#7	6''	#7	6''	59'–3"	#7	6''	#4	12''	13'–10"	#8	6''	60''	100''	#4	6''	#4	6''
14'	13'	14.0''	13.0''	11.0''	7.0''	#9	12''	#8	12''	14'–4"	3	#9	12''	#7	6''	#7	6''	59'–3"	#7	6''	#4	12''	14'–10"	#8	6''	60''	106''	#4	6''	#4	6''
14'	14'	14.0''	13.0''	11.0''	7.0''	#9	12''	#8	12''	14'–4"	3	#9	12''	#7	6''	#7	6''	59'–3"	#7	6''	#4	12''	15'–10"	#8	6''	60''	112''	#4	6''	#4	6''

FOR EXTENSIONS OF EXISTING CBC'S OF S=5', S=7', AND S=9' SIZE SPANS NOT INCLUDED IN THIS TABLE, USE DIMENSIONS FOR NEXT GREATER SPAN TO BUILD. FOR EXAMPLE: FOR S=5' USE DESIGN DIMENSIONS FROM THE TABLE FOR S=6'. ALSO REDUCE THE S=6' TABLE LENGTH OF BARS "bb", "cc" AND "dd" BY ONE FOOT TO ACCOMMODATE THE SHORTER SPAN. SEE DETAILS ON SHEET 511–66–4/6. ANY OTHER SIZES OF BOX EXTENSIONS NOT COVERED BY THIS MODIFICATION SHALL BE DONE THROUGH SPECIAL DESIGNS INCLUDED IN THE PROJECT PLANS.

** TOTAL LENGTH OF "gg" BARS IS TABLE LENGTH PLUS TWO STANDARD 90° HOOKS AND OPTIONAL 40 BAR ø LAP IF NECESSARY.

* EXAMPLE OF USE OF THIS TABLE:
PROPOSED STRUCTURE – QUADRUPLE BARREL, 10 FT. SPAN/7 FT. HEIGHT, CBC WITH 2 FT. DEPTH OF COVER.
USE THE FOLLOWING BUILD INFORMATION FROM THE TABLE ABOVE:

DIM		0–10 FT BURIAL DESIGN FILL "A"				"aa"		"ee"		"aa" & "ee"		"bb"		"cc"		"dd"		"bb", "cc" & "dd"	"ff"		"gg"		"ff" & "gg"	"hh"				"jj"		"kk"	
SPAN "S" INSIDE	HEIGHT "H" INSIDE	TOP SLAB "TT"	BOTTOM SLAB "TB"	WALLS OUTER "WO"	WALLS INTERIOR "WI"	SIZE	SPACING	SIZE	SPACING	LENGTH	NUMBER OF BARS	SIZE	SPACING	SIZE	SPACING	SIZE	SPACING	LENGTH	SIZE	SPACING	SIZE	SPACING	LENGTH	SIZE	SPACING	"CH" LENGTH	"CV" LENGTH	SIZE	STAGGERED SPACING	SIZE	STAGGERED SPACING
10'	7'	11.0''	10.5''	7.5''	6.0''	#8	12''	#7	12''	10'–9"	3	#8	12''	#6	6''	#6	6''	42'–5"	#6	6''	#4	12''	8'–4"	#6	6''	38''	61''	#4	6''	#4	6''

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Registered Professional Engineer (Civil) CERTIFICATE NO. 83225 MYRA K. CANDELARIA Date Signed 12/31/22 ARIZONA, U.S.A.

	REVISION	BY	DATE

NAVAJO NATION
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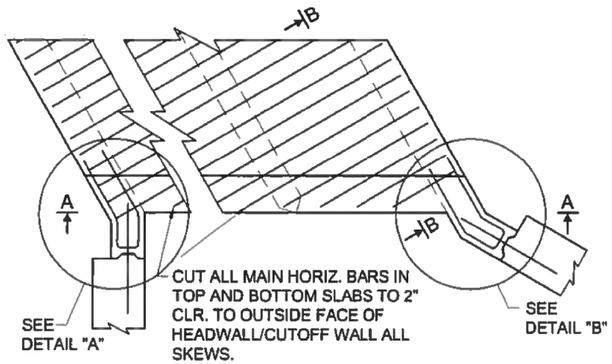
N9073(1) 1, 2 & 4

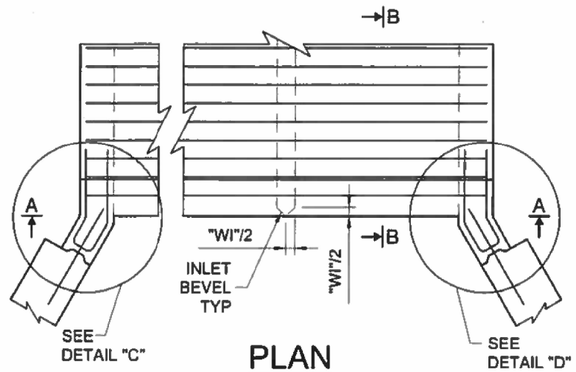
CONCRETE BOX CULVERT QUADRUPLE OPENING - DESIGN FILL "A" 0-10 FT. DIMENSIONS AND REBAR SCHEDULE

PROJECT MANAGER: DDM	DATE: 1/22	DRAWING	SHEET
LEAD DESIGNER: MLL	DATE: 1/22		
ASBUILT BY:	DATE: XXX		67 OF 84
SCALE: N/A			

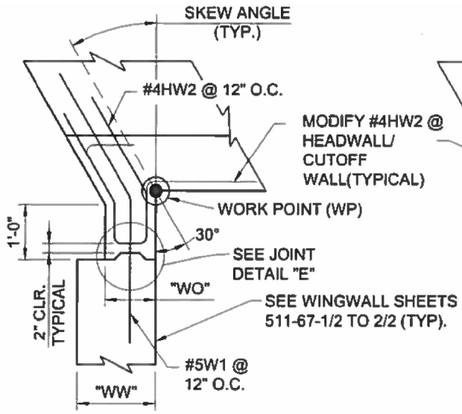
STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	68



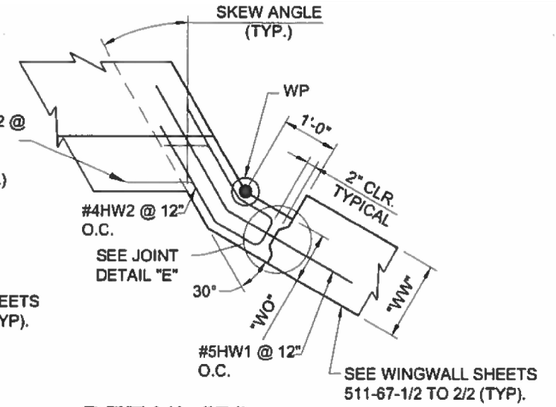
PLAN
(SKEWED)
SIMILAR FOR SINGLE BARREL
(NOT TO BE USED FOR SKEWS OVER 45°)



PLAN
(NORMAL)
SIMILAR FOR SINGLE BARREL

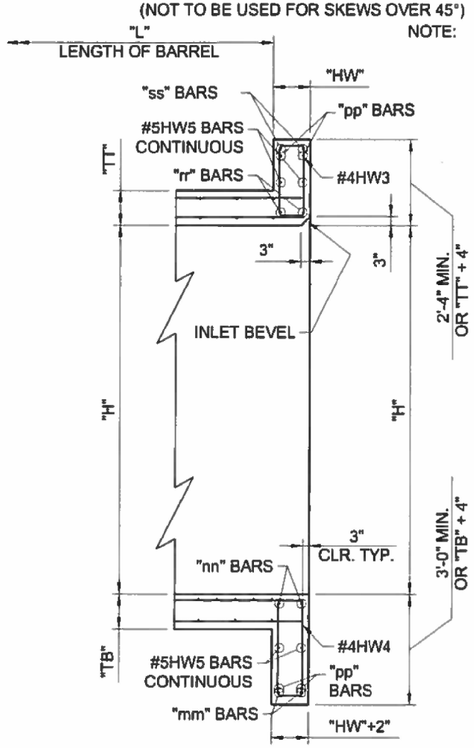


DETAIL "A"
(SKEWED)

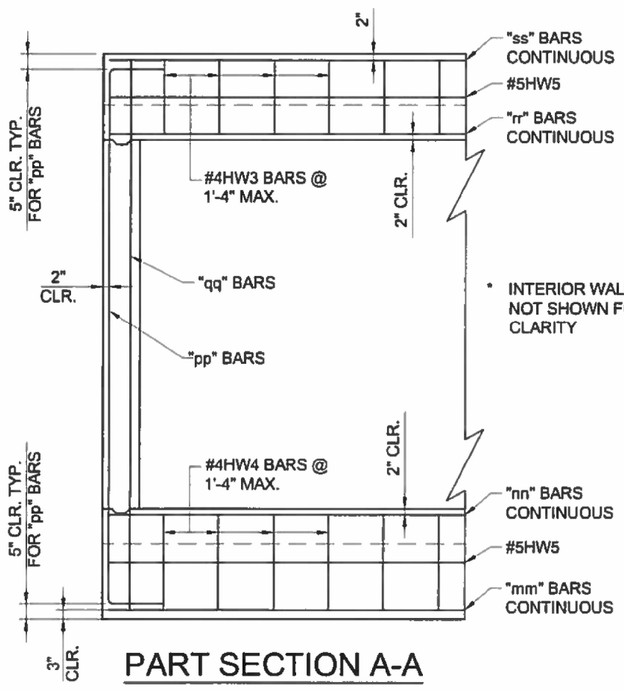


DETAIL "B"
(SKEWED)

NOTE: SEE SHEET 511-66-2/6 FOR BAR SIZES, NUMBER OF BARS, AND BAR LENGTH FORMULAS.

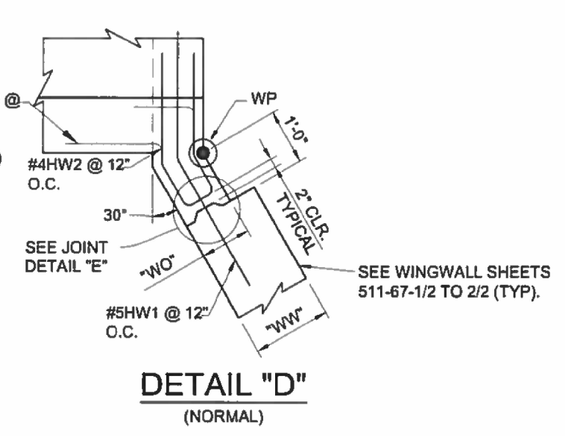


PART SECTION B-B



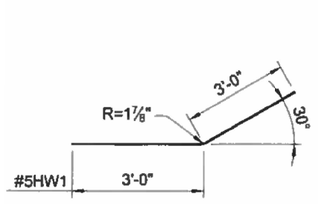
PART SECTION A-A

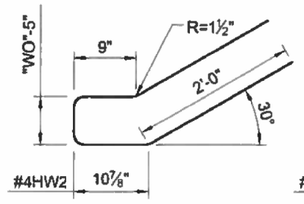
* INTERIOR WALL NOT SHOWN FOR CLARITY

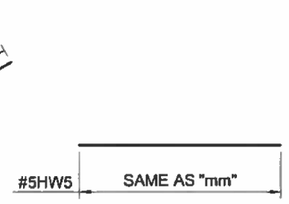


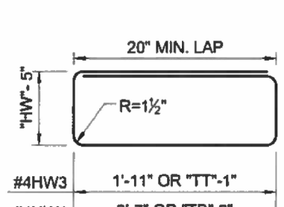
DETAIL "C"
(NORMAL)

DETAIL "D"
(NORMAL)

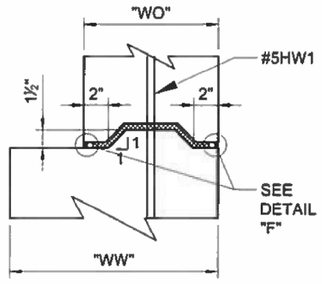




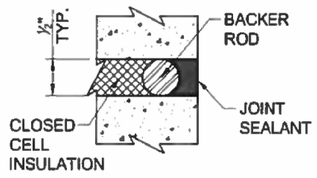




REINFORCING BARS



JOINT DETAIL "E"



DETAIL "F"

NOTE: DETAILS "A", "B", "C", & "D" EXTEND FULL HEIGHT FROM TOP OF PARAPET TO BOTTOM OF CUTOFF WALL. THESE EXTENSIONS SHALL BE CAST INTEGRALLY WITH HEADWALL/CUTOFF WALL (NO CONSTRUCTION JOINT). ELEVATION AT EXTENSION SHALL BE EQUAL TO PARAPET.

PAYMENT

PAYMENT FOR HEADWALL/CUTOFF WALL IS BASED ON "EACH" UNIT OF MEASUREMENT FOR EACH NEW BARREL CONSTRUCTED. IN CASE OF TYPE II CONNECTION EACH HEADWALL/CUTOFF WALL UNIT SHALL BE PAID FOR, I.E. TWO PER CULVERT EXTENSION.

ALTERNATIVELY, A COMPLETE CONCRETE BOX CULVERT MAY BE PAID FOR UNDER CLASS "AA" CONCRETE BY "CU.YD." ITEM 511030 AND GRADE 60 REBAR BY "LBS." ITEM 540060.

WILSON &COMPANY
4401 MASTHEAD ST. NE. SUITE 150
ALBUQUERQUE, NM 87109
PHONE: 505-348-4000
FAX: 505-348-4072
www.wilsonco.com

Certified Professional Engineer (Civil) Certificate No. 83225 MYRA K. CANDELARIA Date Signed 12/30/22 ARIZONA, U.S.A.

REVISION	BY	DATE

NAVAJO NATION
DIVISION OF TRANSPORTATION
NAVAJO D.O.T.

N9073(1) 1, 2 & 4

CBC HEAD/CUTOFF WALL-ALL
DESIGN FILLS - 0o 15o 30o SKEWS
STRUCTURAL SECTIONS AND REBAR

PROJECT MANAGER: DDM	DATE: 1/22	DRAWING	SHEET
LEAD DESIGNER: MLL	DATE: 1/22		
ASBUILT BY:	DATE: XXX		68 OF 84
SCALE: N/A			

STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	69

BOX CULVERT NOMINAL DIMENSIONS		HEADWALL AND CUTOFF WALL DIMENSION & GRADE 60 REINFORCING BAR SCHEDULE (BAR SIZE AND NUMBER OF BARS REQUIRED)												
		0 DEGREE SKEW												
			"mm"		"nn"		"pp"		"qq"		"rr"		"ss"	
SPAN "S" INSIDE	HEIGHT "H" INSIDE	WIDTH HEAD WALL "HW"	SIZE	NUMBER OF BARS	SIZE	NUMBER OF BARS	SIZE	NUMBER OF BARS	SIZE	NUMBER OF BARS	SIZE	NUMBER OF BARS	SIZE	NUMBER OF BARS
4'	2'	12''	#7	2	#7	2	#7	2	#4	2	#7	2	#7	2
4'	3'	12''	#7	2	#7	2	#7	2	#4	2	#7	2	#7	2
4'	4'	12''	#7	2	#7	2	#7	2	#4	2	#7	2	#7	2
6'	2'	12''	#7	2	#7	2	#7	2	#4	2	#7	2	#7	2
6'	3'	12''	#7	2	#7	2	#7	2	#4	2	#7	2	#7	2
6'	4'	12''	#7	2	#7	2	#7	2	#4	2	#7	2	#7	2
6'	5'	12''	#7	2	#7	2	#7	2	#4	2	#7	2	#7	2
6'	6'	12''	#7	2	#7	2	#7	2	#4	2	#7	2	#7	2
6'	7'	12''	#7	2	#7	2	#7	2	#4	2	#7	2	#7	2
8'	4'	12''	#7	2	#7	2	#7	2	#4	2	#7	2	#7	2
8'	5'	12''	#7	2	#7	2	#7	2	#4	2	#7	2	#7	2
8'	6'	12''	#7	2	#7	2	#7	2	#4	2	#7	2	#7	2
8'	7'	12''	#7	2	#7	2	#7	2	#4	2	#7	2	#7	2
8'	8'	12''	#7	2	#7	2	#7	2	#4	2	#7	2	#7	2
10'	3'	12''	#7	2	#7	2	#7	2	#4	2	#7	2	#7	2
10'	4'	12''	#7	2	#7	2	#7	2	#4	2	#7	2	#7	2
10'	5'	12''	#7	2	#7	2	#7	2	#4	2	#7	2	#7	2
10'	6'	12''	#7	2	#7	2	#7	2	#4	2	#7	2	#7	2
10'	7'	12''	#7	2	#7	2	#7	2	#4	2	#7	2	#7	2
10'	8'	12''	#7	2	#7	2	#7	2	#4	2	#7	2	#7	2
10'	9'	12''	#7	2	#7	2	#7	2	#4	2	#7	2	#7	2
10'	10'	12''	#7	2	#7	2	#7	2	#4	2	#7	2	#7	2
10'	11'	12''	#7	2	#7	2	#7	2	#4	2	#7	2	#7	2
10'	12'	12''	#7	2	#7	2	#7	2	#4	2	#7	2	#7	2
12'	6'	12''	#7	2	#7	2	#7	2	#4	2	#7	2	#7	2
12'	7'	12''	#7	2	#7	2	#7	2	#4	2	#7	2	#7	2
12'	8'	12''	#7	2	#7	2	#7	2	#4	2	#7	2	#7	2
12'	9'	12''	#7	2	#7	2	#7	2	#4	2	#7	2	#7	2
* 12'	10'	12''	#7	2	#7	2	#7	2	#4	2	#7	2	#7	2
12'	12'	12''	#7	2	#7	2	#7	2	#4	2	#7	2	#7	2
14'	8'	12''	#7	2	#7	2	#7	2	#4	2	#7	2	#7	2
14'	9'	12''	#7	2	#7	2	#7	2	#4	2	#7	2	#7	2
14'	10'	12''	#7	2	#7	2	#7	2	#4	2	#7	2	#7	2
14'	11'	12''	#7	2	#7	2	#7	2	#4	2	#7	2	#7	2
14'	12'	12''	#7	2	#7	2	#7	2	#4	2	#7	2	#7	2
14'	13'	12''	#7	2	#7	2	#7	2	#4	2	#7	2	#7	2
14'	14'	12''	#7	2	#7	2	#7	2	#4	2	#7	2	#7	2

BOX CULVERT NOMINAL DIMENSIONS		HEADWALL AND CUTOFF WALL DIMENSION & GRADE 60 REINFORCING BAR SCHEDULE (BAR SIZE AND NUMBER OF BARS REQUIRED)												
		15 DEGREE SKEW												
			"mm"		"nn"		"pp"		"qq"		"rr"		"ss"	
SPAN "S" INSIDE	HEIGHT "H" INSIDE	WIDTH HEAD WALL "HW"	SIZE	NUMBER OF BARS	SIZE	NUMBER OF BARS	SIZE	NUMBER OF BARS	SIZE	NUMBER OF BARS	SIZE	NUMBER OF BARS	SIZE	NUMBER OF BARS
4'	2'	12"	#7	2	#7	2	#7	2	#4	2	#7	2	#7	2
4'	3'	12"	#7	2	#7	2	#7	2	#4	2	#7	2	#7	2
4'	4'	12"	#7	2	#7	2	#7	2	#4	2	#7	2	#7	2
6'	2'	12"	#7	2	#7	2	#7	2	#4	2	#7	2	#7	2
6'	3'	12"	#7	2	#7	2	#7	2	#4	2	#7	2	#7	2
6'	4'	12"	#7	2	#7	2	#7	2	#4	2	#7	2	#7	2
6'	5'	12"	#7	2	#7	2	#7	2	#4	2	#7	2	#7	2
6'	6'	12"	#7	2	#7	2	#7	2	#4	2	#7	2	#7	2
6'	7'	12"	#7	2	#7	2	#7	2	#4	2	#7	2	#7	2
8'	4'	12"	#9	2	#9	2	#7	2	#4	2	#8	2	#8	2
8'	5'	12"	#9	2	#9	2	#7	2	#4	2	#8	2	#8	2
8'	6'	12"	#9	2	#9	2	#7	2	#4	2	#8	2	#8	2
8'	7'	12"	#9	2	#9	2	#7	2	#4	2	#8	2	#8	2
8'	8'	12"	#9	2	#9	2	#7	2	#4	2	#8	2	#8	2
10'	3'	12"	#10	2	#10	2	#8	2	#5	2	#10	2	#9	2
10'	4'	12"	#10	2	#10	2	#8	2	#5	2	#10	2	#9	2
10'	5'	12"	#10	2	#10	2	#8	2	#5	2	#10	2	#9	2
10'	6'	12"	#10	2	#10	2	#8	2	#5	2	#10	2	#9	2
10'	7'	12"	#10	2	#10	2	#8	2	#5	2	#10	2	#9	2
10'	8'	12"	#10	2	#10	2	#8	2	#5	2	#10	2	#9	2
10'	9'	12"	#10	2	#10	2	#8	2	#5	2	#10	2	#9	2
10'	10'	12"	#10	2	#10	2	#8	2	#5	2	#10	2	#9	2
10'	11'	12"	#10	2	#10	2	#8	2	#5	2	#10	2	#9	2
10'	12'	12"	#10	2	#10	2	#8	2	#5	2	#10	2	#9	2
12'	6'	14"	#11	3	#10	3	#11	2	#6	2	#11	3	#10	3
12'	7'	14"	#11	3	#10	3	#11	2	#6	2	#11	3	#10	3
12'	8'	14"	#11	3	#10	3	#11	2	#6	2	#11	3	#10	3
12'	9'	14"	#11	3	#10	3	#11	2	#6	2	#11	3	#10	3
* 12'	10'	14"	#11	3	#10	3	#11	2	#6	2	#11	3	#10	3
12'	12'	14"	#11	3	#10	3	#11	2	#6	2	#11	3	#10	3
14'	8'	24"	#11	4	#11	4	#10	3	#8	3	#11	4	#10	4
14'	9'	24"	#11	4	#11	4	#10	3	#8	3	#11	4	#10	4
14'	10'	24"	#11	4	#11	4	#10	3	#8	3	#11	4	#10	4
14'	11'	24"	#11	4	#11	4	#10	3	#8	3	#11	4	#10	4
14'	12'	24"	#11	4	#11	4	#10	3	#8	3	#11	4	#10	4
14'	13'	24"	#11	4	#11	4	#10	3	#8	3	#11	4	#10	4
14'	14'	24"	#11	4	#11	4	#10	3	#8	3	#11	4	#10	4

BOX CULVERT NOMINAL DIMENSIONS		HEADWALL AND CUTOFF WALL DIMENSION & GRADE 60 REINFORCING BAR SCHEDULE (BAR SIZE AND NUMBER OF BARS REQUIRED)												
		30 DEGREE SKEW												
			"mm"		"nn"		"pp"		"qq"		"rr"		"ss"	
SPAN "S" INSIDE	HEIGHT "H" INSIDE	WIDTH HEAD WALL "HW"	SIZE	NUMBER OF BARS	SIZE	NUMBER OF BARS	SIZE	NUMBER OF BARS	SIZE	NUMBER OF BARS	SIZE	NUMBER OF BARS	SIZE	NUMBER OF BARS
4'	2'	12"	#7	2	#7	2	#7	2	#4	2	#7	2	#7	2
4'	3'	12"	#7	2	#7	2	#7	2	#4	2	#7	2	#7	2
4'	4'	12"	#7	2	#7	2	#7	2	#4	2	#7	2	#7	2
6'	2'	12"	#8	2	#8	2	#7	2	#4	2	#8	2	#7	2
6'	3'	12"	#8	2	#8	2	#7	2	#4	2	#8	2	#7	2
6'	4'	12"	#8	2	#8	2	#7	2	#4	2	#8	2	#7	2
6'	5'	12"	#8	2	#8	2	#7	2	#4	2	#8	2	#7	2
6'	6'	12"	#8	2	#8	2	#7	2	#4	2	#8	2	#7	2
6'	7'	12"	#8	2	#8	2	#7	2	#4	2	#8	2	#7	2
8'	4'	12"	#10	2	#10	2	#7	2	#4	2	#10	2	#9	2
8'	5'	12"	#10	2	#10	2	#7	2	#4	2	#10	2	#9	2
8'	6'	12"	#10	2	#10	2	#7	2	#4	2	#10	2	#9	2
8'	7'	12"	#10	2	#10	2	#7	2	#4	2	#10	2	#9	2
8'	8'	12"	#10	2	#10	2	#7	2	#4	2	#10	2	#9	2
10'	3'	14"	#11	3	#11	3	#9	2	#6	2	#11	3	#11	3
10'	4'	14"	#11	3	#11	3	#9	2	#6	2	#11	3	#11	3
10'	5'	14"	#11	3	#11	3	#9	2	#6	2	#11	3	#11	3
10'	6'	14"	#11	3	#11	3	#9	2	#6	2	#11	3	#11	3
10'	7'	14"	#11	3	#11	3	#9	2	#6	2	#11	3	#11	3
10'	8'	14"	#11	3	#11	3	#9	2	#6	2	#11	3	#11	3
10'	9'	14"	#11	3	#11	3	#9	2	#6	2	#11	3	#11	3
10'	10'	14"	#11	3	#11	3	#9	2	#6	2	#11	3	#11	3
10'	11'	14"	#11	3	#11	3	#9	2	#6	2	#11	3	#11	3
10'	12'	14"	#11	3	#11	3	#9	2	#6	2	#11	3	#11	3
12'	6'	24"	#11	3	#10	3	#11	2	#6	2	#11	3	#9	3
12'	7'	24"	#11	3	#10	3	#11	2	#6	2	#11	3	#9	3
12'	8'	24"	#11	3	#10	3	#11	2	#6	2	#11	3	#9	3
12'	9'	24"	#11	3	#10	3	#11	2	#6	2	#11	3	#9	3
* 12'	10'	24"	#11	3	#11	3	#11	2	#6	2	#11	3	#9	3
12'	12'	24"	#11	3	#11	3	#11	2	#6	2	#11	3	#9	3
14'	8'	36"	#11	9	#11	9	#9	8	#6	8	#11	9	#11	9
14'	9'	36"	#11	9	#11	9	#9	8	#6	8	#11	9	#11	9
14'	10'	36"	#11	9	#11	9	#9	8	#6	8	#11	9	#11	9
14'	11'	36"	#11	9	#11	9	#9	8	#6	8	#11	9	#11	9
14'	12'	36"	#11	9	#11	9	#9	8	#6	8	#11	9	#11	9
14'	13'	36"	#11	9	#11	9	#9	8	#6	8	#11	9	#11	9
14'	14'	36"	#11	9	#11	9	#9	8	#6	8	#11	9	#11	9

BOX CULVERT NOMINAL DIMENSIONS		HEADWALL AND CUTOFF WALL DIMENSION & GRADE 60 REINFORCING BAR SCHEDULE (BAR SIZE AND NUMBER OF BARS REQUIRED)												
		45 DEGREE SKEW												
			"mm"		"nn"		"pp"		"qq"		"rr"		"ss"	
SPAN "S" INSIDE	HEIGHT "H" INSIDE	WIDTH HEAD WALL "HW"	SIZE	NUMBER OF BARS	SIZE	NUMBER OF BARS	SIZE	NUMBER OF BARS	SIZE	NUMBER OF BARS	SIZE	NUMBER OF BARS	SIZE	NUMBER OF BARS
4'	2'	12"	#7	2	#7	2	#7	2	#4	2	#7	2	#7	2
4'	3'	12"	#7	2	#7	2	#7	2	#4	2	#7	2	#7	2
4'	4'	12"	#7	2	#7	2	#7	2	#4	2	#7	2	#7	2
6'	2'	12"	#10	2	#10	2	#7	2	#4	2	#9	2	#8	2
6'	3'	12"	#10	2	#10	2	#7	2	#4	2	#9	2	#8	2
6'	4'	12"	#10	2	#10	2	#7	2	#4	2	#9	2	#8	2
6'	5'	12"	#10	2	#10	2	#7	2	#4	2	#9	2	#8	2
6'	6'	12"	#10	2	#10	2	#7	2	#4	2	#9	2	#8	2
6'	7'	12"	#10	2	#10	2	#7	2	#4	2	#9	2	#8	2
8'	4'	14"	#11	3	#11	3	#9	2	#5	2	#11	3	#11	3
8'	5'	14"	#11	3	#11	3	#9	2	#5	2	#11	3	#11	3
8'	6'	14"	#11	3	#11	3	#9	2	#5	2	#11	3	#11	3
8'	7'	14"	#11	3	#11	3	#9	2	#5	2	#11	3	#11	3
8'	8'	14"	#11	3	#11	3	#9	2	#5	2	#11	3	#11	3
10'	3'	24"	#11	3	#11	3	#11	2	#5	2	#11	3	#11	3
10'	4'	24"	#11	3	#11	3	#11	2	#6	2	#11	3	#11	3
10'	5'	24"	#11	3	#11	3	#11	2	#6	2	#11	3	#11	3
10'	6'	24"	#11	3	#11	3	#11	2	#6	2	#11	3	#11	3
10'	7'	24"	#11	3	#11	3	#11	2	#6	2	#11	3	#11	3
10'	8'	24"	#11	3	#11	3	#11	2	#6	2	#11	3	#11	3
10'	9'	24"	#11	3	#11	3	#11	2	#6	2	#11	3	#11	3
10'	10'	24"	#11	3	#11	3	#11	2	#6	2	#11	3	#11	3
10'	11'	24"	#11	3	#11	3	#11	2	#6	2	#11	3	#11	3
10'	12'	24"	#11	3	#11	3	#11	2	#6	2	#11	3	#11	3
12'	6'	48"	#11	12	#11	12	#8	11	#5	11	#11	12	#11	12
12'	7'	48"	#11	12	#11	12	#8	11	#5	11	#11	12	#11	12
12'	8'	48"	#11	12	#11	12	#8	11	#5	11	#11	12	#11	12
12'	9'	48"	#11	12	#11	12	#8	11	#5	11	#11	12	#11	12
* 12'	10'	48"	#11	12	#11	12	#8	11	#5	11	#11	12	#11	12
12'	12'	48"	#11	12	#11	12	#8	11	#5	11	#11	12	#11	12
14'	8'	48"	#11	12	#11	12	#8	11	#5	11	#11	12	#11	12
14'	9'	48"	#11	12	#11	12	#8	11	#5	11	#11	12	#11	12
14'	10'	48"	#11	12	#11	12	#8	11	#5	11	#11	12	#11	12
14'	11'	48"	#11	12	#11	12	#8	11	#5	11	#11	12	#11	12
14'	12'	48"	#11	12	#11	12	#8	11	#5	11	#11	12	#11	12
14'	13'	48"	#11	12	#11	12	#8	11	#5	11	#11	12	#11	12
14'	14'	48"	#11	12	#11	12	#8	11	#5	11	#11	12	#11	12

* EXAMPLE OF USE OF THIS TABLE:
PROPOSED STRUCTURE – DOUBLE BARREL, 12 FT. SPAN/10 FT. HEIGHT, CBC WITH 30° SKEW.
USE THE FOLLOWING BUILD INFORMATION FROM THE TABLE ABOVE:

BOX CULVERT NOMINAL DIMENSIONS		HEADWALL AND CUTOFF WALL DIMENSION GRADE 60 REINFORCING BAR SCHEDULE (BAR SIZE AND NUMBER OF BARS REQUIRED)												
		30 DEGREE SKEW												
			"mm"		"nn"		"pp"		"qq"		"rr"		"ss"	
SPAN "S" INSIDE	HEIGHT "H" INSIDE	WIDTH HEAD WALL "HW"	SIZE	NUMBER OF BARS	SIZE	NUMBER OF BARS	SIZE	NUMBER OF BARS	SIZE	NUMBER OF BARS	SIZE	NUMBER OF BARS	SIZE	NUMBER OF BARS
12'	10'	24''	#11	3	#11	3	#11	2	#6	2	#11	3	#9	3

LENGTH OF BARS: THE LENGTH OF "mm", "nn", "rr", "ss", & #5HW5 SHALL BE DETERMINED BY:

LENGTH = [[[("WO"*2)+("S"*N)+["WI"*(N–1)]]/COS(SKEW ANGLE)] –4" (ROUND DOWN TO NEAREST ½")

THESE BARS SHALL BE FURNISHED IN FULL LENGTHS CALCULATED OR BE MECHANICALLY COUPLED BY DEVICES LISTED ON THE NMDOT APPROVED PRODUCTS LIST.

N = NUMBER OF BARRELS (1, 2, 3, OR 4)

"qq" BAR LENGTH = "H" + 59"

"pp" BAR = ["H"+(5'–4" MIN. OR ("TT"+"TB"+8") IF LARGER)]–10"+ 2*STANDARD HOOK LENGTH

FOR EXTENSIONS OF EXISTING CBC'S OF S=5', S=7', AND S=9' SIZE SPANS NOT INCLUDED IN THIS TABLE, USE DIMENSIONS, BAR SIZES, AND NUMBER OF BARS FOR NEXT GREATER SPAN TO BUILD. FOR EXAMPLE, FOR S=5' USE DIMENSIONS AND BAR DETAILS FROM THE TABLE FOR S=6'. USE S=5' IN FORMULAS TC DETERMINE LENGTH OF BARS "mm", "nn", "ss", "rr", AND #5HW5. ANY OTHER SIZE OF BOX EXTENSIONS NOT COVERED BY THIS MODIFICATION SHALL BE DONE THROUGH SPECIAL DESIGNS INCLUDED IN THE PROJECT PLANS.

NOTE:
THIS TABLE IS FOR USE WITH ONE TO FOUR BARRELS. FOR FIVE OR MORE BARRELS USE COMBINATIONS OF ONE TO FOUR BARRELS REPEATING THIS DESIGN.

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4401 MASTHEAD ST. NE. SUITE 150
ALBUQUERQUE, NM 87109
PHONE: 505-348-4000
FAX: 505-348-4072
www.wilsonco.com

Registered Professional Engineer (Civil) CERTIFICATE NO. 13225 MYRA K. CANDELARIA New Mexico ARIZONA, U.S.A.

REVISION	BY	DATE

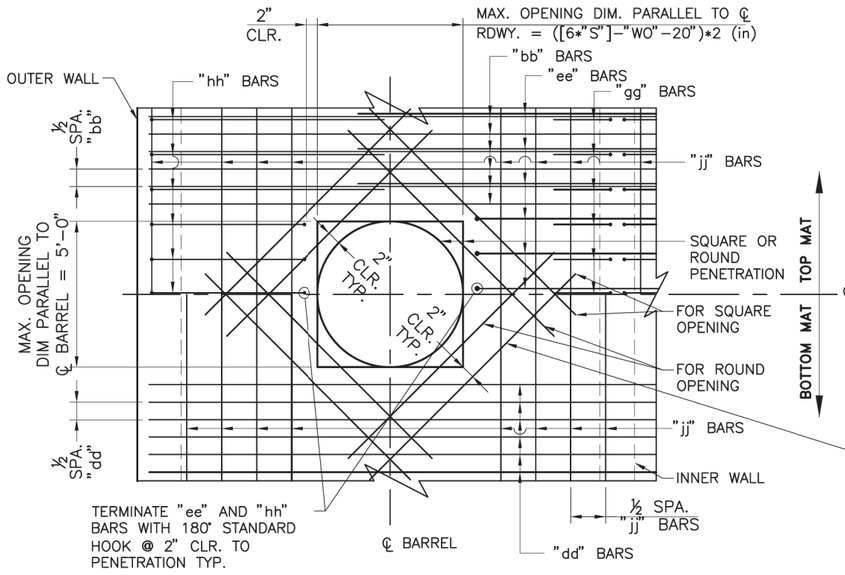
NAVAJO NATION
DIVISION OF TRANSPORTATION
NAVAJO D.O.T.

N9073(1) 1, 2 & 4

CBC HEAD/CUTOFF WALL-ALL
DESIGN FILLS - 0o 15o 30o SKEWS
STRUCTURAL SECTIONS AND REBAR

PROJECT MANAGER: DDM	DATE: 1/22	DRAWING	SHEET
LEAD DESIGNER: MLL	DATE: 1/22		
ASBUILT BY:	DATE: XXX		69 OF 84
SCALE: N/A			

STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	70



TOP SLAB PENETRATION DETAIL

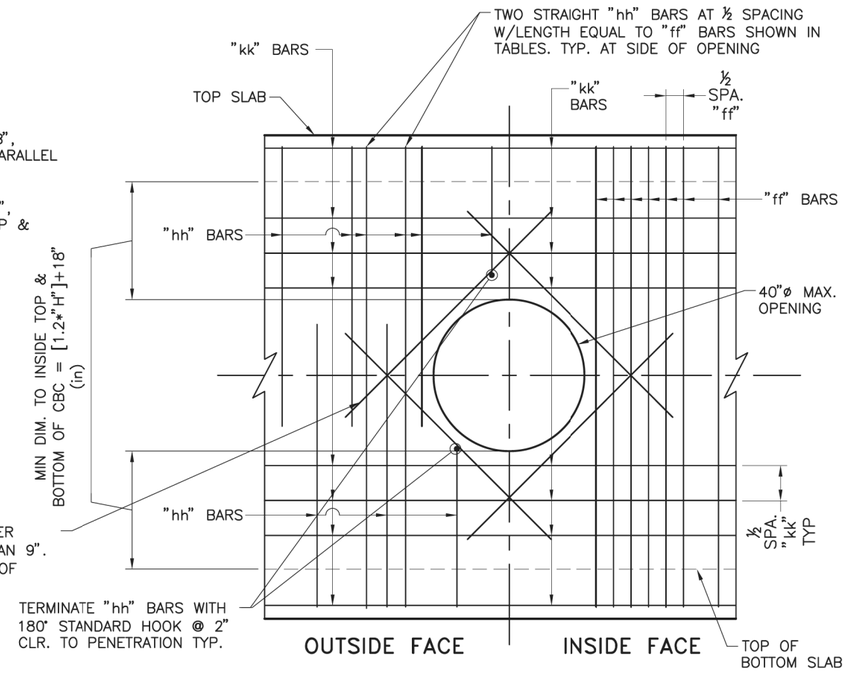
NOTE: MOVE "bb", "dd" AND "jj" BARS FROM LOCATION AT PENETRATION AND PLACE EQUALLY AT ½ SPACING ON EACH SIDE OF OPENING.

EXAMPLES:

TOP SLAB – "S"=10' "H"=7', DESIGN FILL "B", DOUBLE BARREL CBC: MAX. OPENING DIM. PARALLEL TO ℄ RDWY. = ([6*10]–9–20)*2 = 62 (in)

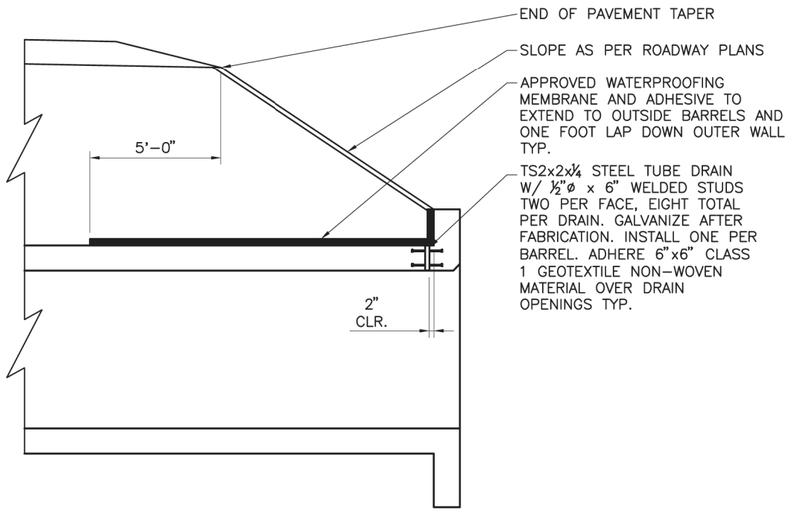
SIDE WALL – S"=10' "H"=7', DESIGN FILL "B", DOUBLE BARREL CBC: MIN DIM. TO INSIDE TOP & BOTTOM OF CBC = [1.2*7]+18 = 26.4 (in)

TWO MATS OF #5 BARS INSIDE OF ALL OTHER TYPICAL REINFORCING FOR "T" GREATER THAN 9". OTHERWISE ONE MAT OF #5 BARS. LENGTH OF BARS EQUAL TO TWICE DIM. OF OPENING.



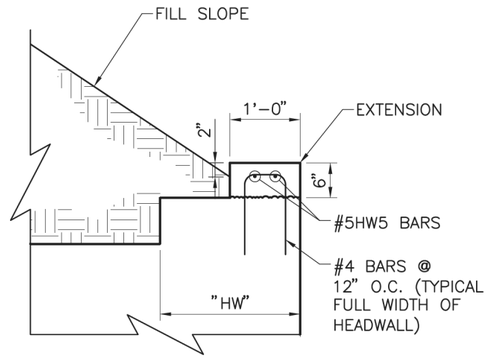
OUTER WALL PENETRATION DETAIL

NOTE: MOVE "ff" AND "kk" BARS FROM LOCATION AT PENETRATION AND PLACE EQUALLY AT ½ SPACING ON EACH SIDE OF OPENING.



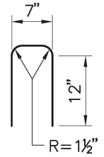
TOP SLAB MEMBRANE AND HEADWALL DRAIN DETAIL

NOTE: THIS DETAIL SHALL BE CONSTRUCTED FOR ANY NEW CBC OR CBC EXTENSION.



HEADWALL EXTENSION DETAIL

NOTE: IF "HW" IS GREATER THAN 12" ADD EXTENSION AND FILL AS SHOWN. 2" DIM. TYP. OF ALL HEADWALL.



BAR DETAIL

PAYMENT NOTE: ALL WORK AND MATERIALS ASSOCIATED WITH HEADWALL EXTENSION, MEMBRANE, DRAINS, AND PENETRATIONS SHALL BE CONSIDERED INCIDENTAL TO CONSTRUCTION OF A FINISHED CBC AND NO FURTHER PAYMENT WILL BE MADE FOR THESE INCLUDED ITEMS.

WILSON & COMPANY
4401 MASTHEAD ST. NE. SUITE 150
ALBUQUERQUE, NM 87109
PHONE: 505-348-4000
FAX: 505-348-4072
www.wilsonco.com

Registered Professional Engineer (Civil) CERTIFICATE NO. 83225 MYRA K. CANDELARIA Date Signed 08/10/2022 ARIZONA, U.S.A.

	REVISION	BY	DATE

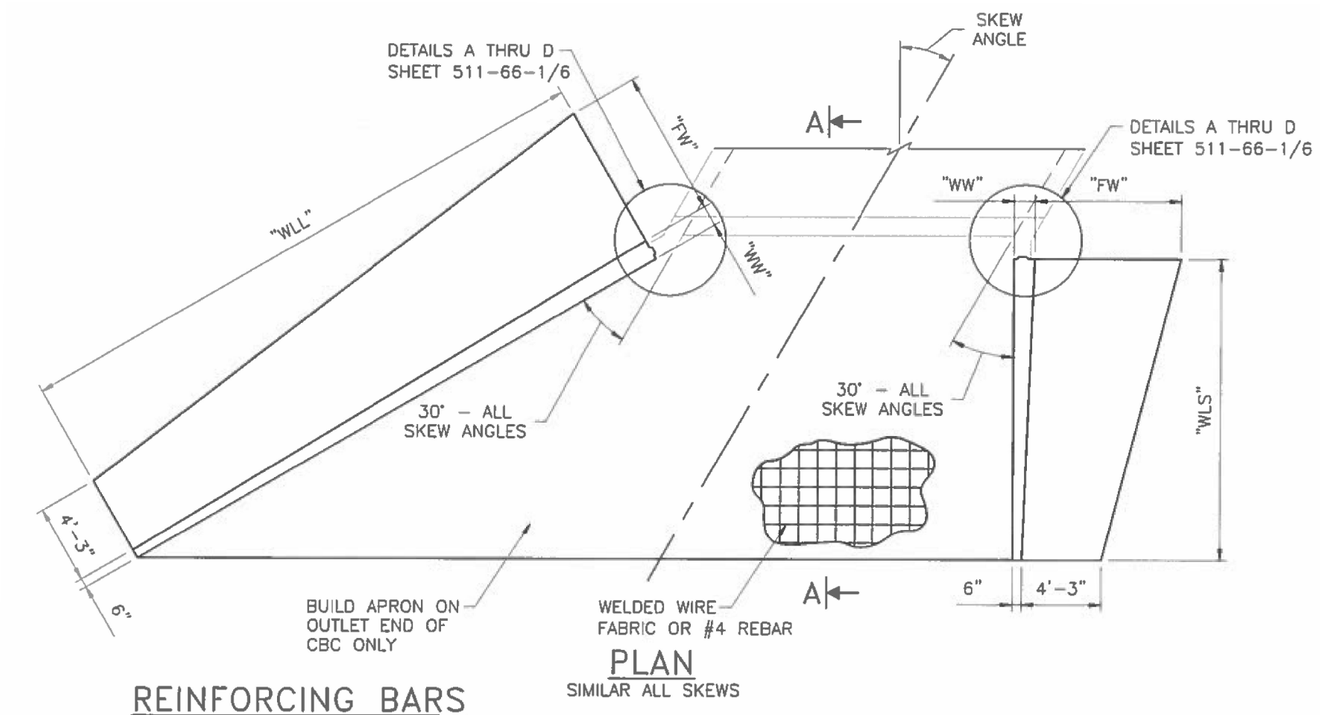
NAVAJO NATION
DIVISION OF TRANSPORTATION
NAVAJO D.O.T.

N9073(1) 1, 2 & 4

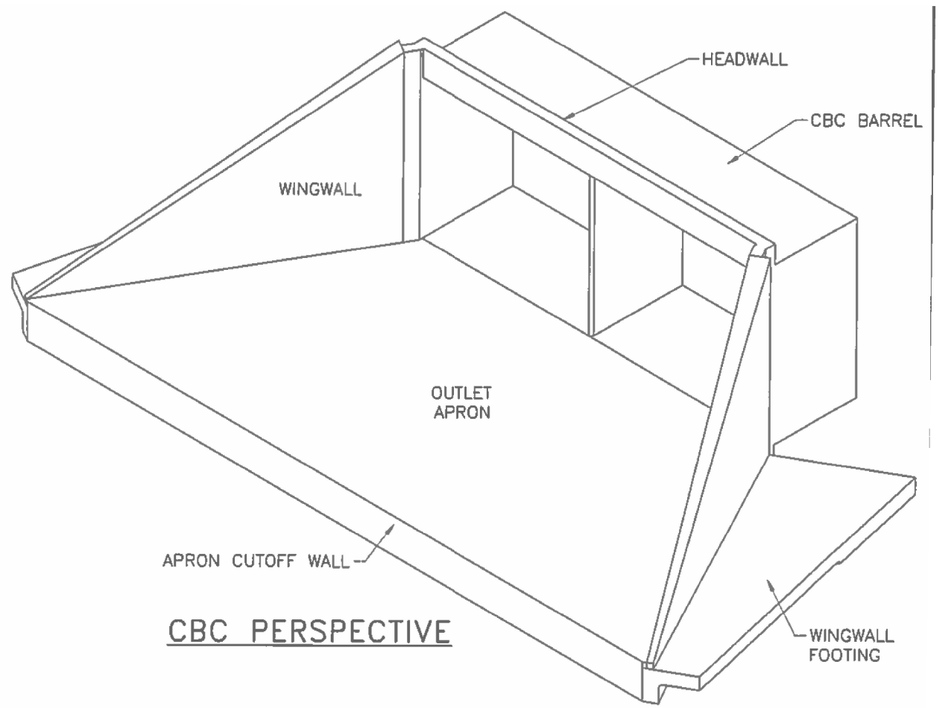
CONCRETE BOX CULVERT EXTENSION
ALL DESIGN FILLS - ALL SKEWS
MISCELLANEOUS DETAILS & BACKFILL

PROJECT MANAGER: DDM	DATE: 1/22	DRAWING	SHEET
LEAD DESIGNER: MLL	DATE: 1/22		
ASBUILT BY:	DATE: XXX		70 OF 83
SCALE: N/A			

STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	71

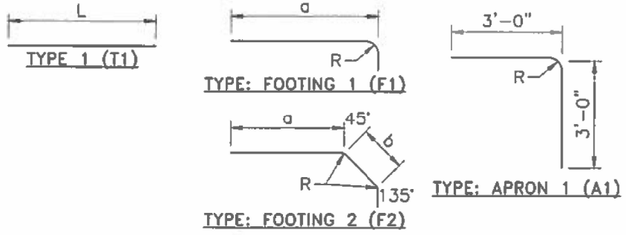


PLAN
SIMILAR ALL SKEWS



CBC PERSPECTIVE

REINFORCING BARS



NOTE:
CONTRACTOR IS RESPONSIBLE FOR DETERMINING ALL BAR LENGTHS DIMENSIONS FOR THE WINGWALL REINFORCEMENT.

R SHALL BE 1¾" FOR #4 BARS AND 2¼" FOR #5 BARS.

WINGWALL DIMENSIONS

WINGS A AND B			0° SKEW		15° SKEW		30° SKEW		45° SKEW	
"H"	"WW"	"FW"	"WLL"	"WLS"	"WLL"	"WLS"	"WLL"	"WLS"	"WLL"	"WLS"
2'-0"	0'-9½"	6'-8½"	8'-5"	8'-5"	10'-3"	7'-6"	14'-6"	7'-3"	28'-0"	7'-6"
3'-0"	0'-10¼"	7'-2½"	10'-1"	10'-1"	12'-5"	9'-1"	17'-6"	8'-9"	33'-10"	9'-1"
4'-0"	0'-11½"	7'-8½"	11'-10"	11'-10"	14'-6"	10'-8"	20'-6"	10'-3"	39'-8"	10'-8"
5'-0"	1'-0"	8'-2½"	13'-7"	13'-7"	16'-8"	12'-2"	23-'6"	11'-9"	45'-5"	12'-2"
6'-0"	1'-0¾"	8'-9"	15'-4"	15'-4"	18'-9"	13'-9"	26'-6"	13'-3"	51'-3"	13'-9"
7'-0"	1'-1½"	9'-3"	17'-1"	17'-1"	20'-11"	15'-3"	29'-6"	14'-9"	57'-0"	15'-3"
8'-0"	1'-2¼"	9'-9"	18'-9"	18'-9"	23'-0"	16'-10"	32'-6"	16'-3"	62'-10"	16'-10"
9'-0"	1'-3¼"	10'-3"	20'-6"	20'-6"	25'-1"	18'-5"	35'-6"	17'-9"	68'-7"	18'-5"
10'-0"	1'-4"	10'-9"	22'-3"	22'-3"	27'-3"	19'-11"	38'-6"	19'-3"	74'-5"	19'-11"
11'-0"	1'-4¾"	11'-3"	24'-0"	24'-0"	29'-4"	21'-6"	41'-6"	20'-9"	80'-2"	21'-6"
12'-0"	1'-5½"	11'-9"	25'-9"	25'-9"	31'-6"	23'-1"	44'-6"	22'-3"	86'-0"	23'-1"
13'-0"	1'-6¼"	12'-3"	27'-5"	27'-5"	33'-7"	24'-7"	47'-6"	23'-9"	91'-9"	24'-7"
14'-0"	1'-7"	12'-9"	29'-2"	29'-2"	35'-9"	26'-2"	50'-6"	25'-3"	97'-7"	26'-2"

NOTE: TABLE DIMENSIONS SHOWN ARE FOR SLOPES OF 1.5 TO 1. FOR OTHER SLOPES MULTIPLY TABLE VALUES OF "WLS" AND "WLS" BY (SLOPE/1.5).

NOTES:

1. WORKMANSHIP AND MATERIALS SHALL CONFORM TO NEW MEXICO DEPARTMENT OF TRANSPORTATION'S STANDARD SPECIFICATIONS FOR HIGHWAY AND BRIDGE CONSTRUCTION, CURRENT EDITION, AND APPLICABLE SUPPLEMENTAL SPECIFICATIONS AND SPECIAL PROVISIONS.
2. CONCRETE SHALL BE CLASS AA. CHAMFER ALL EDGES OF CONCRETE ¾".
3. REINFORCING BARS SHALL CONFORM TO REQUIREMENTS OF AASHTO M 31. REINFORCING BARS SHALL BE GRADE 60. DIMENSIONS SHOWN REFER TO CENTER LINES OF BARS UNLESS NOTED OTHERWISE.
4. MINIMUM SPLICE LENGTH SHALL BE 2'-0" ON ALL #4 BARS, AND 2'-6" ON ALL #5 BARS. LONGITUDINAL SPLICES SHOULD BE STAGGERED BY A MINIMUM OF TWO TIMES THE SPLICES LENGTH IN ADJACENT BARS. NO SPLICES SHALL BE ALLOWED IN VERTICAL BARS EXCEPT AS SHOWN ON THE DRAWINGS. SPLICES SHALL NOT BE ALLOWED IN TRANSVERSE DIRECTION.

WILSON & COMPANY
4401 MASTHEAD ST. NE. SUITE 150
ALBUQUERQUE, NM 87109
PHONE: 505-348-4000
FAX: 505-348-4072
www.wilsonco.com

Registered Professional Engineer (Civil) CERTIFICATE NO. 83225 MYRA K. CANDELARIA Date Signed 12/15/2022 ARIZONA, U.S.A.

	REVISION	BY	DATE

NAVAJO D.O.T.

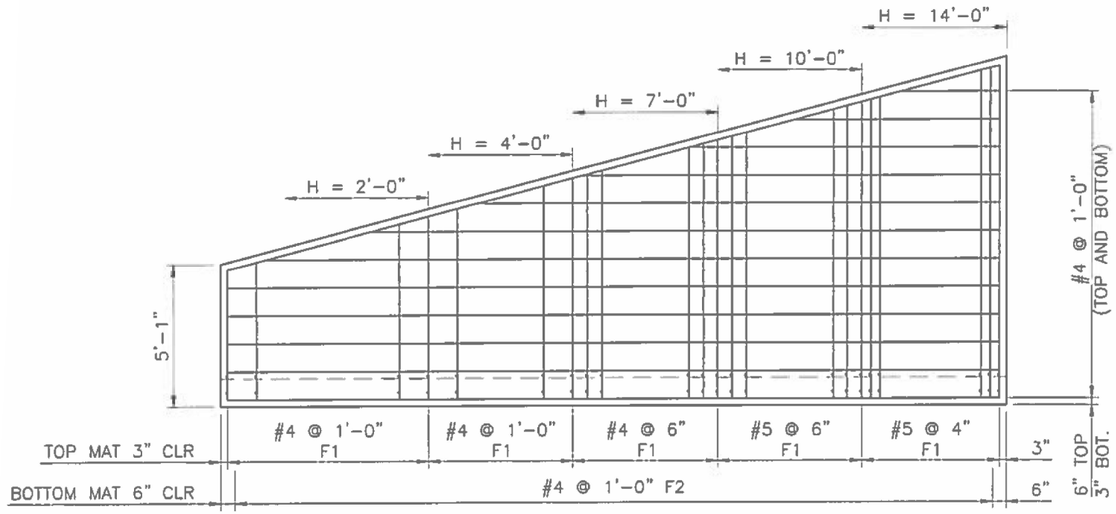
NAVAJO NATION
DIVISION OF TRANSPORTATION

N9073(1) 1, 2 & 4

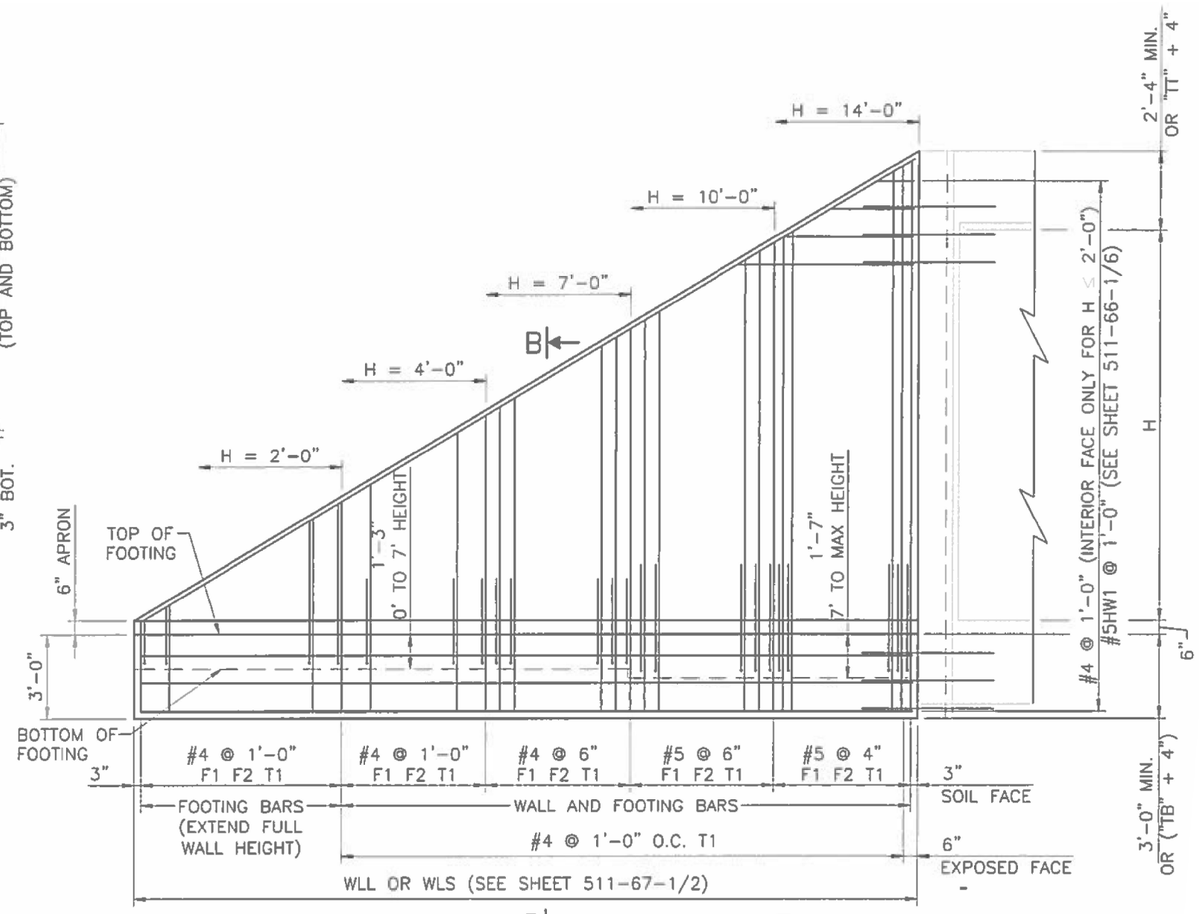
CONCRETE BOX CULVERT
WINGWALL & OUTLET APRON ALL SKEWS
PLAN, PERSPECTIVE & DIMENSIONS

PROJECT MANAGER: DDM	DATE: 1/22	DRAWING	SHEET
LEAD DESIGNER: MLL	DATE: 1/22		
ASBUILT BY:	DATE: XXX		71 OF 84
SCALE: N/A			

STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	72



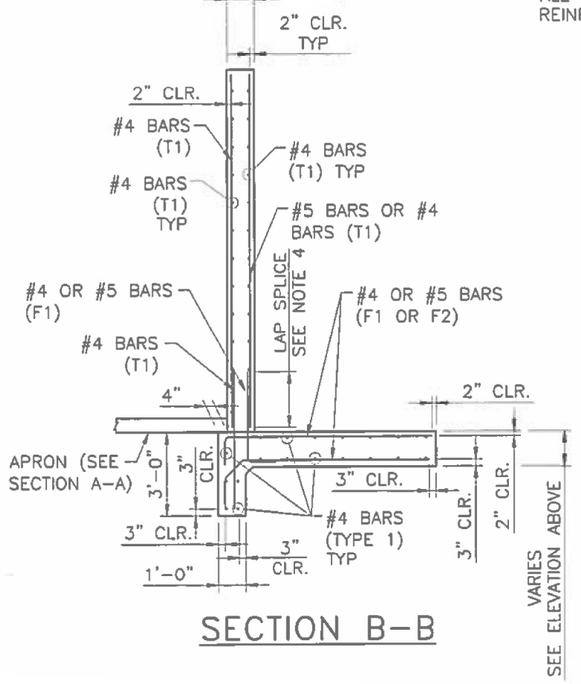
FOOTING PLAN



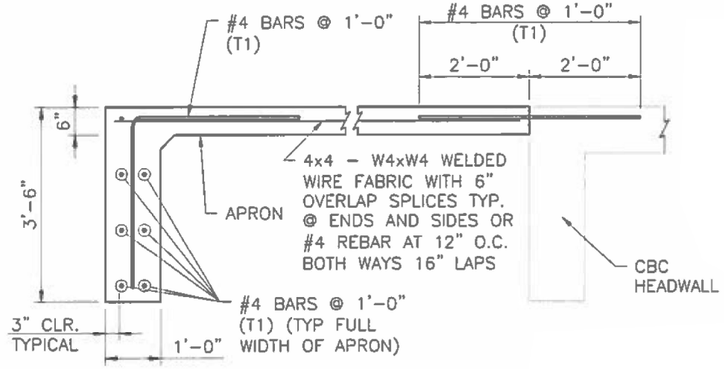
B

WINGWALL ELEVATION

CONTRACTOR IS RESPONSIBLE FOR DETERMINING ALL BAR LENGTH DIMENSIONS FOR THE WINGWALL REINFORCEMENT.



SECTION B-B



SECTION A-A

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ALBUQUERQUE, NM 87109
PHONE: 505-348-4000
FAX: 505-348-4072
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	REVISION	BY	DATE

NAVAJO NATION
DIVISION OF TRANSPORTATION

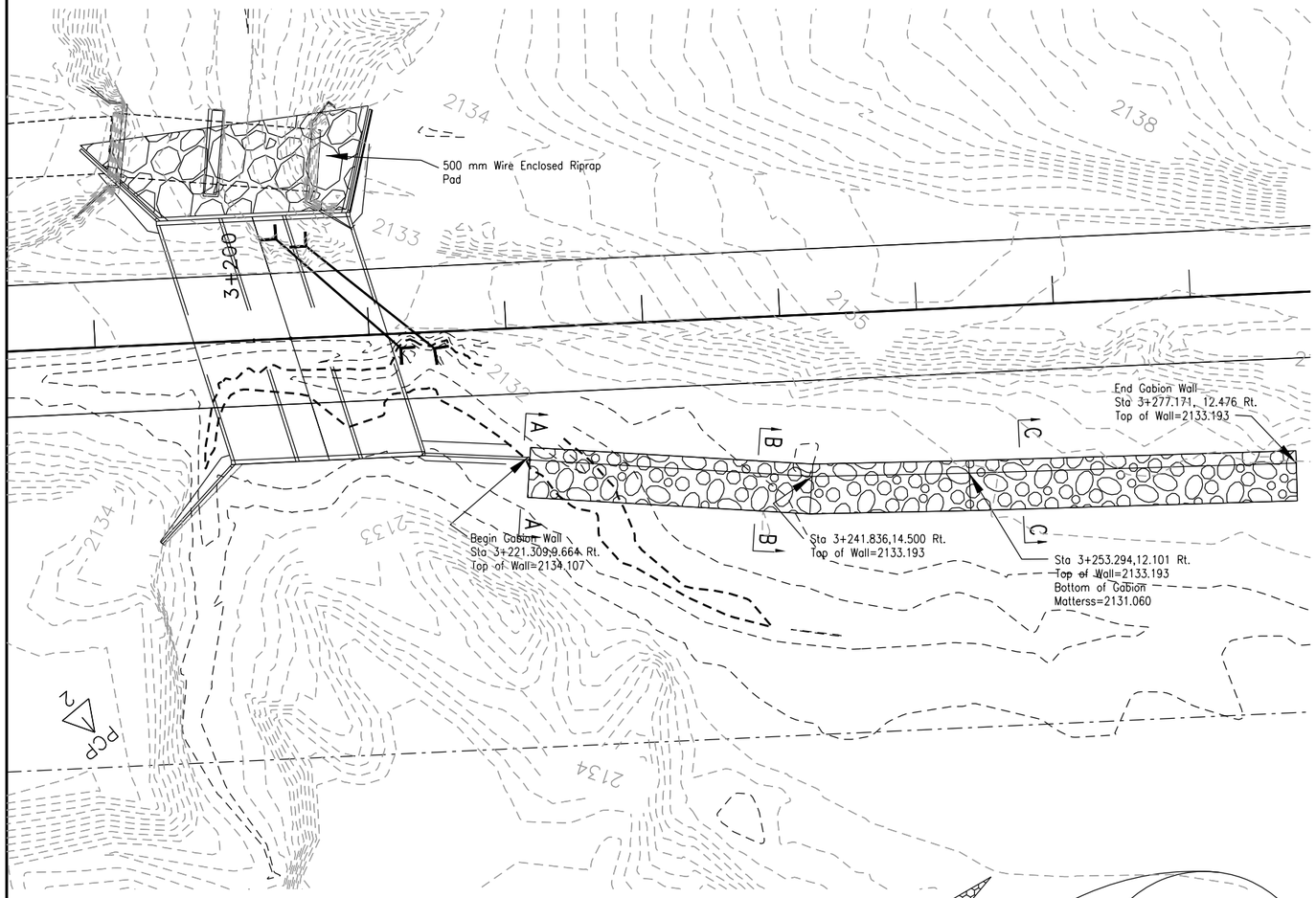
NAVAJO D.O.T.

N9073(1) 1, 2 & 4

CONCRETE BOX CULVERT
WINGWALL & OUTLET APRON ALL SKEWS
PLAN, PERSPECTIVE & DIMENSIONS

PROJECT MANAGER: DDM	DATE: 1/22	DRAWING	SHEET
LEAD DESIGNER: MLL	DATE: 1/22		
ASBUILT BY:	DATE: XXX		72 OF 84
SCALE: N/A			

STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	73



GABION LAYOUT PLAN

ITEM 25302-1000 – GABIONS, GALV. or ALUM. COATED

STATION	LENGTH (m)	AREA (m^2)*	VOLUME (m^3)	LOCATION
3+221.309 – 3+241.836	20.527	4.185	85.906	Rt.
3+241.836 – 3+253.294	11.458	3.348	38.361	Rt.
3+253.294– 3+277.171	23.877	2.510	59.931	Rt.
TOTAL			184.198	

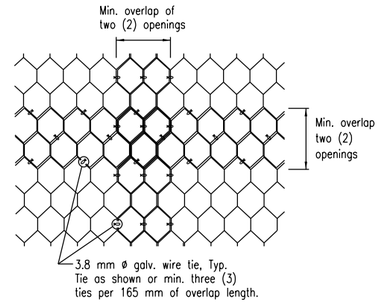
* Cross section area of the gabion wall

WIRE ENCLOSED RIP-RAP GENERAL NOTES

1. Wire Enclosed Riprap shall conform to Section 251 of the FP-14, the supplemental specifications and to the details shown in these construction plans.
2. Wire fabric shall be galvanized and be of the configuration shown on this sheet. An alternate wire fabric may be submitted for review and approval. Any wire fabric used shall have a Class 3 zinc coating (galvanizing), have a maximum opening dimension of 100 mm, and shall not allow a 75 mm ø sphere to pass through a wire fabric opening.
3. Wire Enclosed Riprap shall be anchored as shown by L 102 x 102 x 9.5 mm steel angles. Steel angles shall extend 100 mm above the top surface of wire enclosed riprap when placed.
4. Embankment below riprap shall conform to Section 204 of the FP-14; Excavation for riprap foundation shall conform to Section 209 of the FP-14. All embankment for wire enclosed riprap above natural ground is included in the quantity for Item 20401, Roadway Excavation and shall be paid for under that Item. All excavation for riprap construction shall be considered incidental to Item 25106, Wire Enclosed Riprap.
5. Rock size shall conform to FP-14, Section 705, Table 705-1 Class 2.
6. Erosion Control Geotextile shall be installed under all riprap as shown and shall be incidental to Item 25106, Wire Enclosed Riprap. Erosion Control Geotextile shall conform to Section 714.01 Class 1 Type C of the FP-14.
7. Slope designations shown on this sheet are in accordance with Section 101.03 (e) of the FP-14 (vertical : horizontal).
8. All areas to receive riprap to be filled, excavated and/or shapped as directed by the COR. This work shall be incidental to the riprap installation.

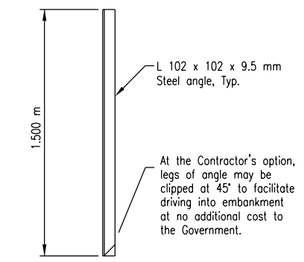
GABION GENERAL NOTES

1. WIRE MESH FOR GABION BASKETS AND/OR WIRE ENCLOSED MAT SHALL BE MADE FROM COLD DRAWN STEEL WIRE WITH A MINIMUM DIAMETER OF 3 MM CONFORMING TO ASTM A641 WITH A CLASS 3 ZINC COATING. WIRE MESH SHALL HAVE A MAXIMUM NOMINAL OPENING OF 60 MM BY 80 MM.
2. TIE WIRE SHALL BE COLD DRAWN STEEL WIRE WITH A MINIMUM DIAMETER OF 2.2 MM CONFORMING TO ASTM A641 WITH A CLASS 3 ZINC COATING.
3. ROCK FOR FILLING GABION BASKETS AND/OR WIRE ENCLOSED MAT SHALL CONFORM TO CLASS 2 ROCK IN TABLE 705-1 OF THE FP-14.
4. EROSION CONTROL GEOTEXTILE UNDER AND BEHIND GABIONS AND/OR WIRE ENCLOSED MAT SHALL CONFORM TO TABLE 714-4 OF SECTION 714.04 OF THE FP-14. FURNISHING AND INSTALLATION OF EROSION CONTROL GEOTEXTILE SHALL BE INCIDENTAL TO ITEM 25303, GABIONS, GALVANIZED.
5. BACKFILL MATERIAL UNDER AND BEHIND GABIONS AND/OR WIRE ENCLOSED MAT SHALL BE NATIVE MATERIAL COMPACTED TO 95% PER SECTION 253.07 OF THE FP-14. PLACEMENT AND COMPACTION OF NATIVE MATERIAL AS BACKFILL SHALL BE INCIDENTAL TO ITEM 253, GABIONS, GALVANIZED.
6. WIRE MESH FOR GABIONS AND/OR WIRE ENCLOSED MAT SHALL BE 6X8 MESH AS MANUFACTURED BY MACCAFERRI, OR AN APPROVED EQUAL. FURNISHING, FABRICATION AND INSTALLATION SHALL BE AS PER THE MANUFACTURERS RECOMMENDATIONS AND INSTRUCTIONS. MATERIAL INFORMATION AND CERTIFICATIONS SHALL BE SUBMITTED FOR REVIEW AND BE APPROVED PRIOR TO INSTALLATION.
7. AFTER CONSTRUCTION OF GABION STRUCTURE, GRADE CHANNEL TO PLANNED CONTOURS SHOWN WITHIN RIGHT- OF-WAY LIMITS. MATERIAL REMOVED FOR CONSTRUCTION OF GABION STRUCTURE SHALL BE PLACED AS DIRECTED BY THE COR. PARTIAL COVERING OF THE GABION STRUCTURE WILL BE NECESSARY TO PLACE EXCAVATED MATERIAL AS SHOWN. MATERIAL PLACED AFTER CONSTRUCTION OF GABION STRUCTURE SHALL BE COMPACTED ONLY BY THOROUGH TAMPING BY PLACEMENT EQUIPMENT WHILE AVOIDING ANY DAMAGE TO GABION STRUCTURE. ANY DAMAGE TO GABION STRUCTURE SHALL BE REPAIRED BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE GOVERNMENT. CHANNEL GRADING TO THE PLANNED CONTOURS SHOWN SHALL BE CONSIDERED INCIDENTAL TO THE COMPLETION OF THE PROJECT.
8. ALL AREAS TO RECEIVE GABIONS TO BE FILLED, EXCAVATED AND/OR SHAPED AS DIRECTED BY COR.
9. THE CONTRACTOR SHALL BE REQUIRED TO MAKE ALL FIELD ADJUSTMENTS TO MEET FIELD CONDITIONS. THESE ADJUSTMENTS SHALL BE INCIDENTAL OBLIGATIONS OF THE CONTRACTOR.



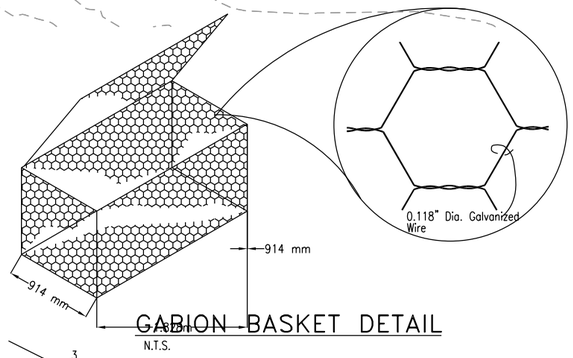
FABRIC SPLICING DETAIL

N.T.S.



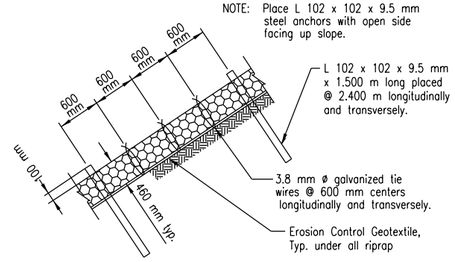
STEEL ANCHOR DETAIL

N.T.S.



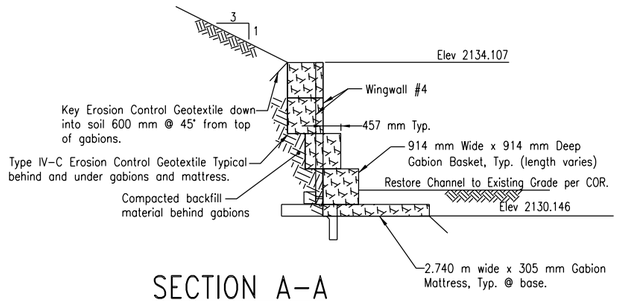
GABION BASKET DETAIL

N.T.S.



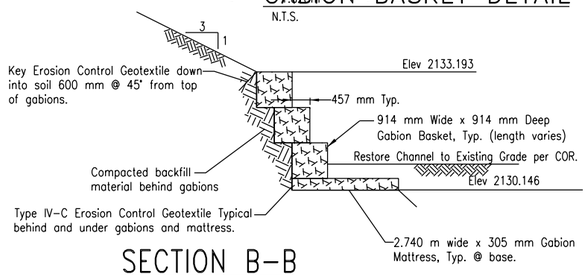
WIRE ENCLOSED RIPRAP TYPICAL SECTION

N.T.S.



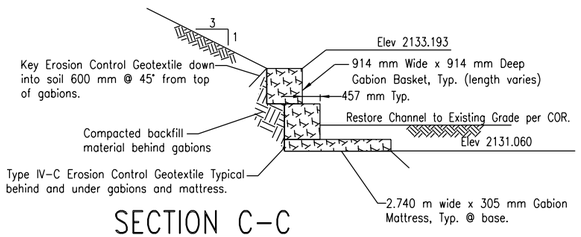
SECTION A-A

N.T.S.



SECTION B-B

N.T.S.



SECTION C-C

N.T.S.

WILSON & COMPANY
4401 MASTHEAD ST. NE. SUITE 150
ALBUQUERQUE, NM 87109
PHONE: 505-348-4000
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Registered Professional Engineer (Civil) CERTIFICATE NO. 83225 MYRA K. CANDELARIA Date Signed ARIZONA, U.S.A.

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NAVAJO NATION
DIVISION OF TRANSPORTATION

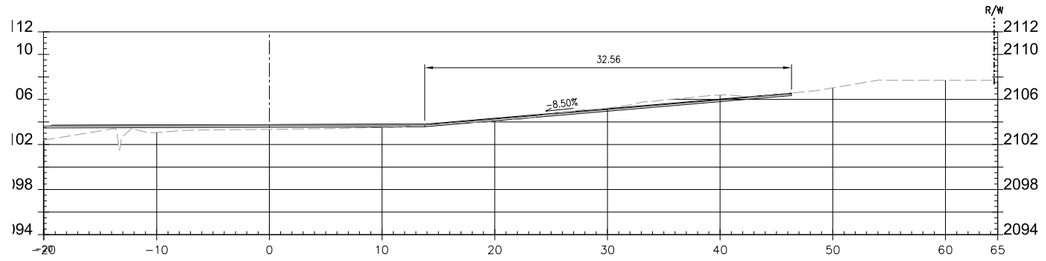
NAVAJO D.O.T.

N9073(1) 1, 2 & 4

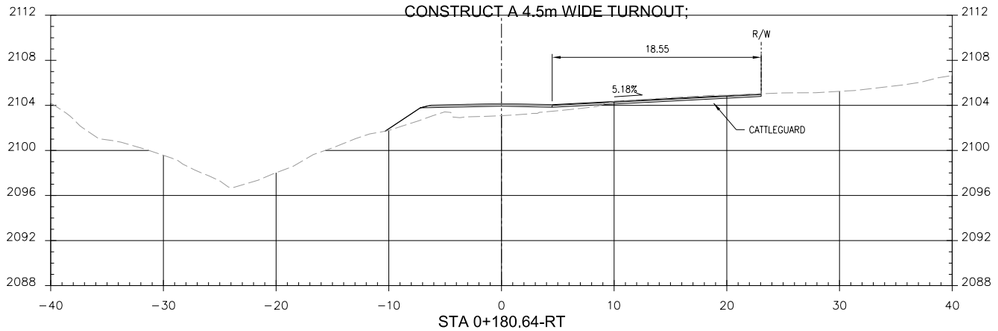
GABION WALL AND WIRE ENCLOSED RIP-RAP DETAILS

PROJECT MANAGER: DDM	DATE: 1/22	DRAWING	SHEET
LEAD DESIGNER: MLL	DATE: 1/22		
ASBUILT BY:	DATE: XXX		73 OF 84
SCALE: N/A			

STATE	PROJECT	SHEET NUMBER
AZ	N7054 (1) 2&4	74

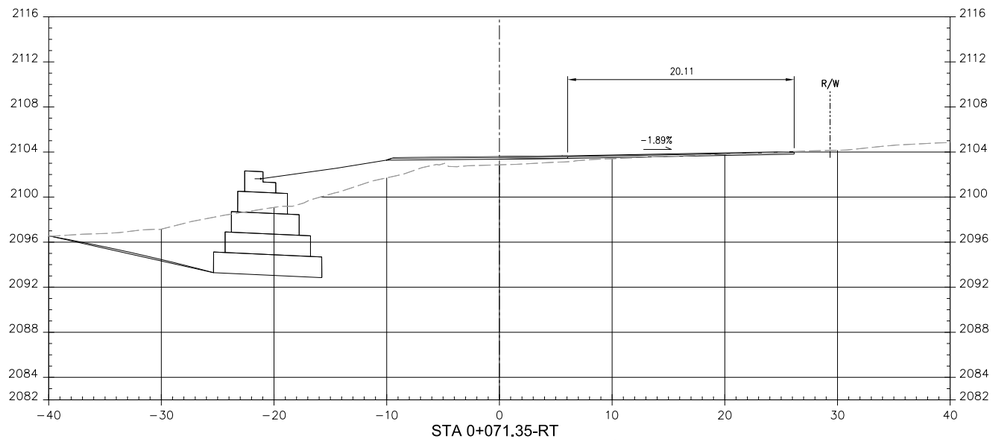


STA 0+287.47-RT
CONSTRUCT A 4.5m WIDE TURNOUT;

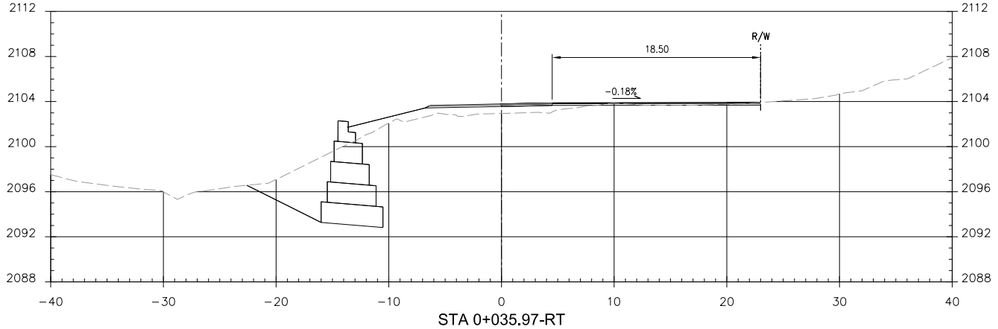


STA 0+180.64-RT

CONSTRUCT A 4.5m WIDE TURNOUT;
CONSTRUCT 2 UNIT CATTLEGUARD

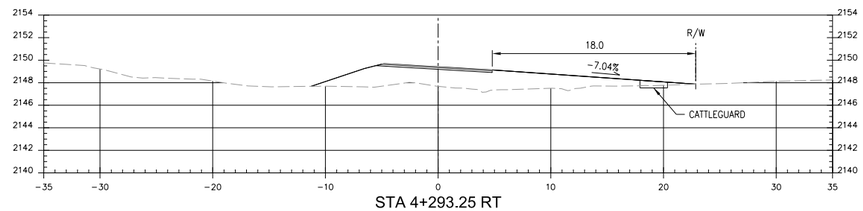


STA 0+071.35-RT
CONSTRUCT A 4.5m WIDE TURNOUT;



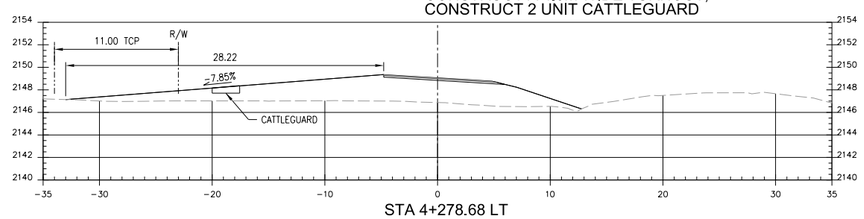
STA 0+035.97-RT

CONSTRUCT A 4.5m WIDE TURNOUT;
CONSTRUCT 2 UNIT CATTLEGUARD



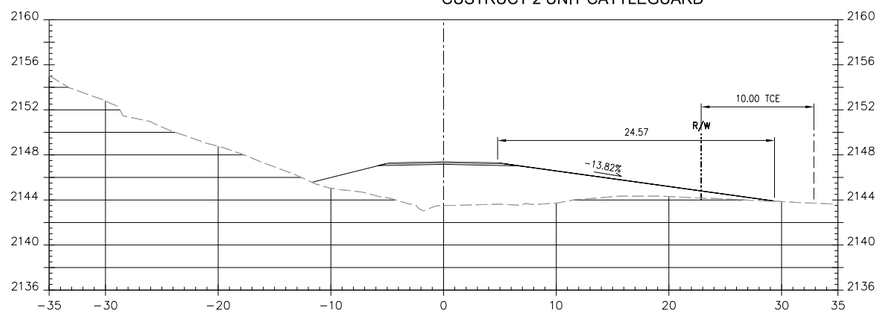
STA 4+293.25 RT

CONSTRUCT A 4.5m WIDE TURNOUT;
CONSTRUCT 2 UNIT CATTLEGUARD



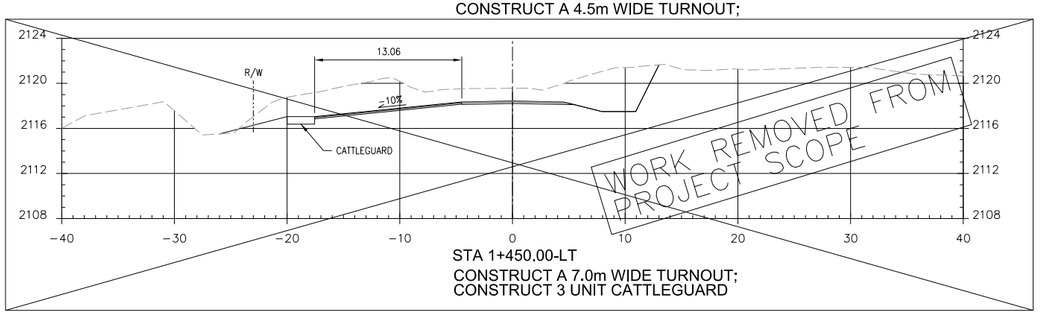
STA 4+278.68 LT

CONSTRUCT A 4.5m WIDE TURNOUT;
CUSTRUCT 2 UNIT CATTLEGUARD



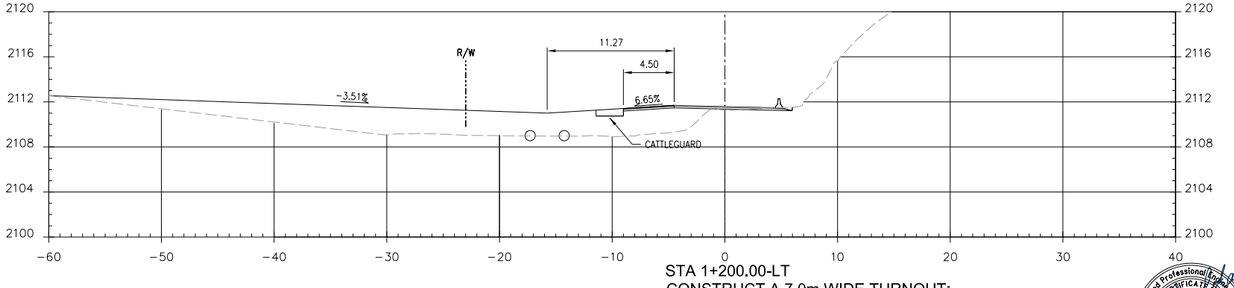
STA 4+165.67-RT

CONSTRUCT A 4.5m WIDE TURNOUT;



STA 1+450.00-LT

CONSTRUCT A 7.0m WIDE TURNOUT;
CONSTRUCT 3 UNIT CATTLEGUARD



STA 1+200.00-LT

CONSTRUCT A 7.0m WIDE TURNOUT;
CONSTRUCT 4 UNIT CATTLEGUARD

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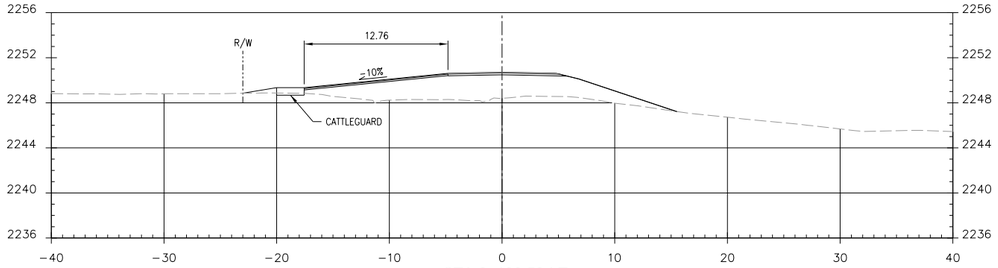
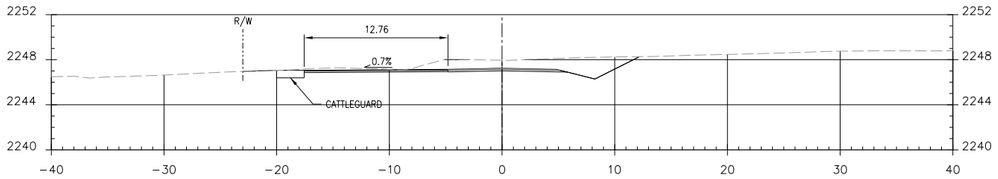
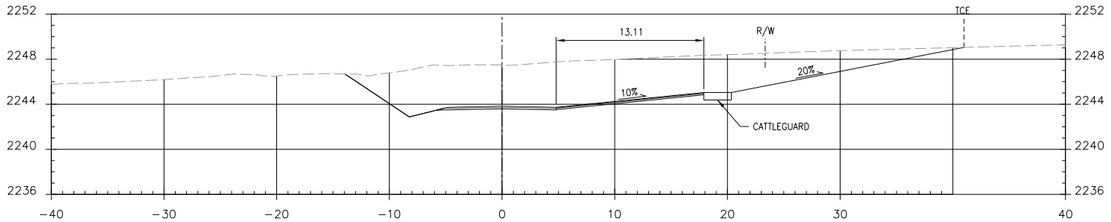
AZ	N7054 (1) 2&4	75



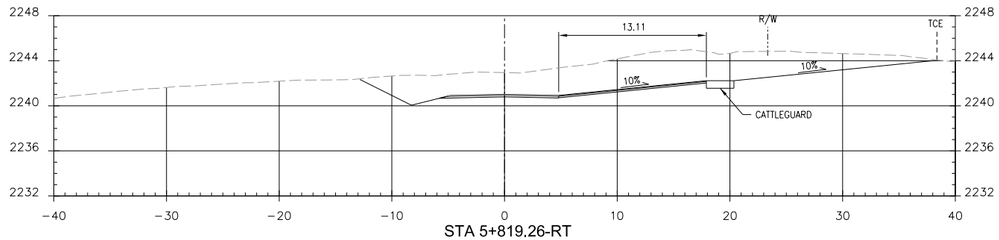
STA 6+190.58-LT
CONSTRUCT A 4.5m WIDE TURNOUT;
CONSTRUCT 2 UNIT CATTLEGUARD



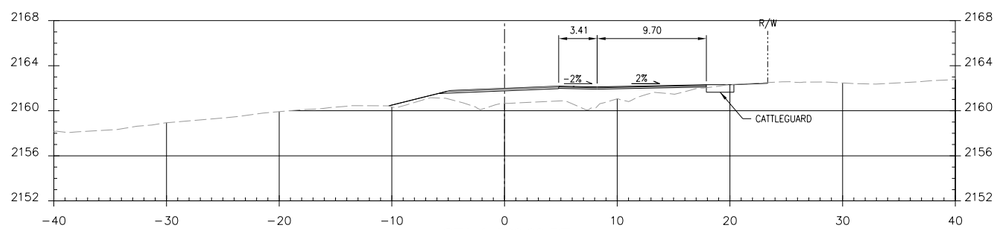
STA 5+953.96-LT
CONSTRUCT A 7.0m WIDE TURNOUT;
CONSTRUCT 3 UNIT CATTLEGUARD



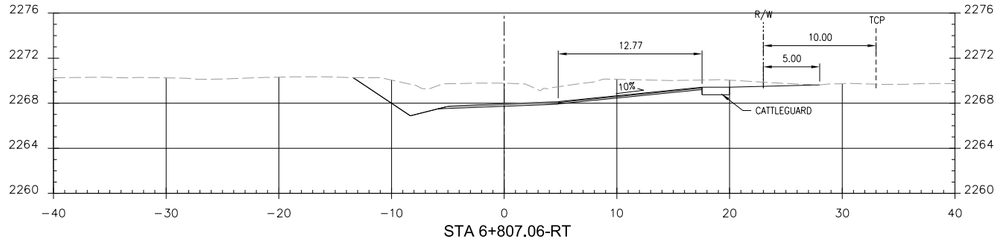
STA 5+880.00-RT
CONSTRUCT A 4.5m WIDE TURNOUT;
CONSTRUCT 2 UNIT CATTLEGUARD



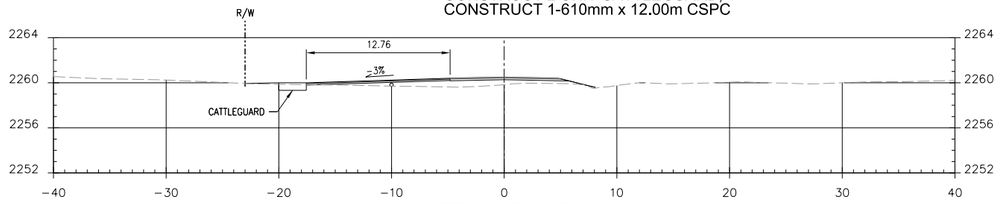
STA 5+819.26-RT
CONSTRUCT A 4.5m WIDE TURNOUT;
CONSTRUCT 2 UNIT CATTLEGUARD



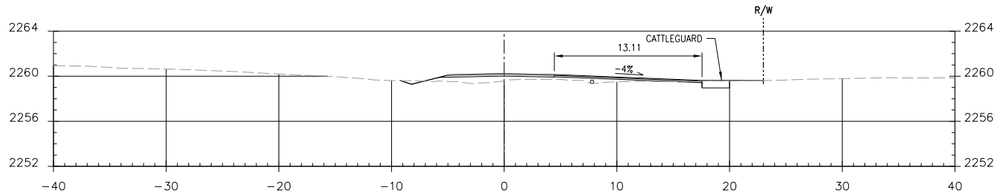
STA 4+520.00-RT
CONSTRUCT A 4.5m WIDE TURNOUT;
CONSTRUCT 2 UNIT CATTLEGUARD



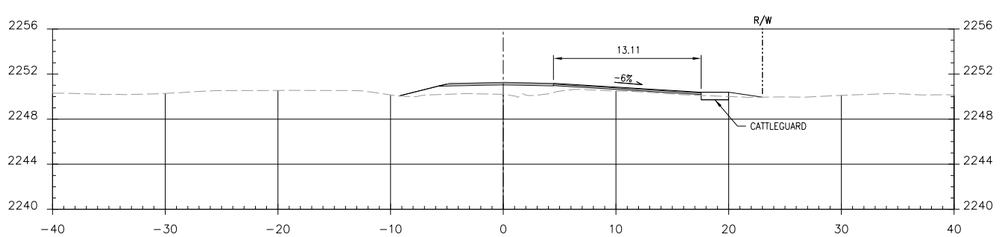
STA 6+807.06-RT
CONSTRUCT A 4.5m WIDE TURNOUT;
CONSTRUCT 2 UNIT CATTLEGUARD;
CONSTRUCT 1-610mm x 12.00m CSPC



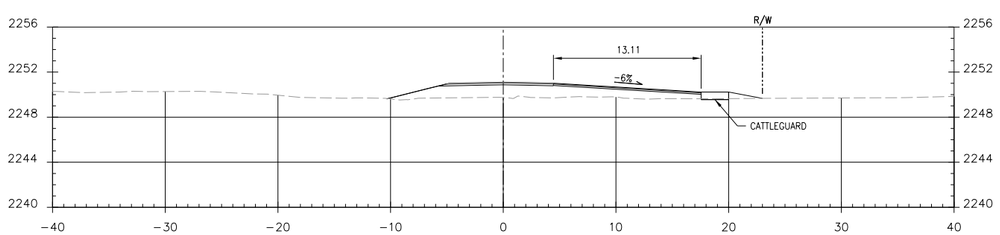
STA 6+617.34-LT
CONSTRUCT A 4.5m WIDE TURNOUT;
CONSTRUCT 2 UNIT CATTLEGUARD;
CONSTRUCT 1-610mm x 20.00m CSPC



STA 6+610.76-RT
CONSTRUCT A 4.5m WIDE TURNOUT;
CONSTRUCT 2 UNIT CATTLEGUARD
CONSTRUCT 1-610mm x 12.00m CSPC



STA 6+359.36-LT
CONSTRUCT A 7.0m WIDE TURNOUT;
CONSTRUCT 3 UNIT CATTLEGUARD



STA 6+342.12-RT
CONSTRUCT A 4.5m WIDE TURNOUT;
CONSTRUCT 2 UNIT CATTLEGUARD

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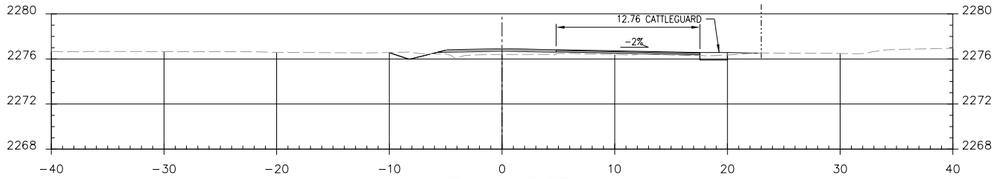
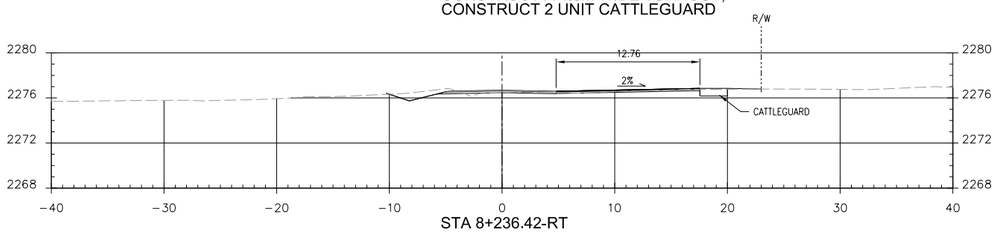
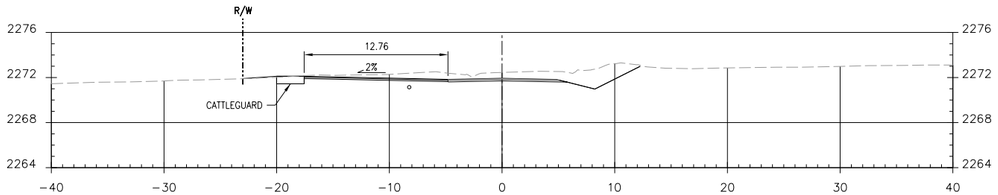
AZ	N7054 (1) 2&4	76



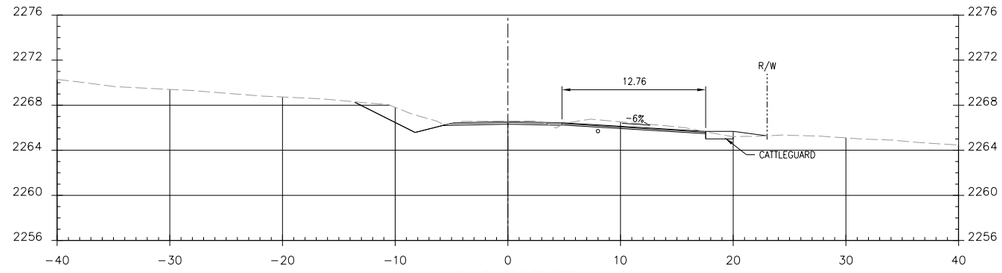
STA 8+386.73-RT
CONSTRUCT A 4.5m WIDE TURNOUT;
CONSTRUCT 2 UNIT CATTLEGUARD



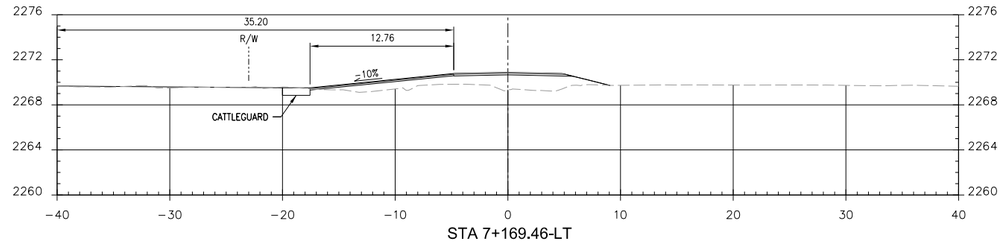
STA 8+236.42-RT
CONSTRUCT A 4.5m WIDE TURNOUT;
CONSTRUCT 2 UNIT CATTLEGUARD



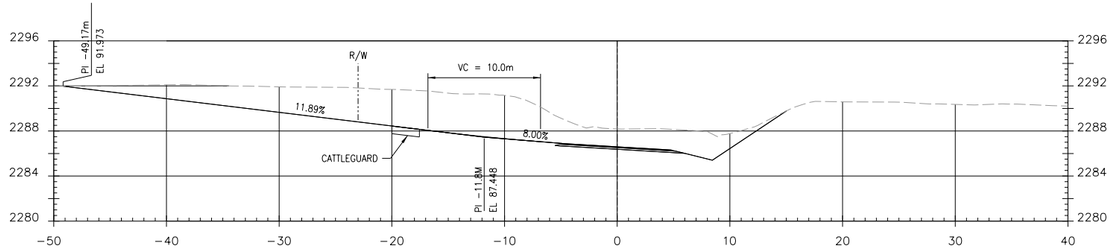
STA 7+911.04-LT
CONSTRUCT A 4.5m WIDE TURNOUT;
CONSTRUCT 2 UNIT CATTLEGUARD



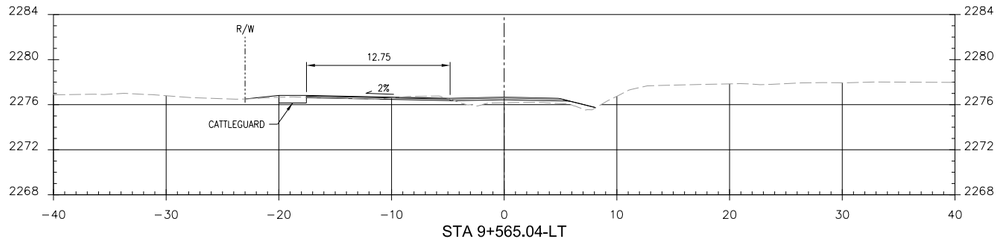
STA 7+508.78-RT
CONSTRUCT A 4.5m WIDE TURNOUT;
CONSTRUCT 2 UNIT CATTLEGUARD;
CONSTRUCT 1-610mm x 12.00m CSPC



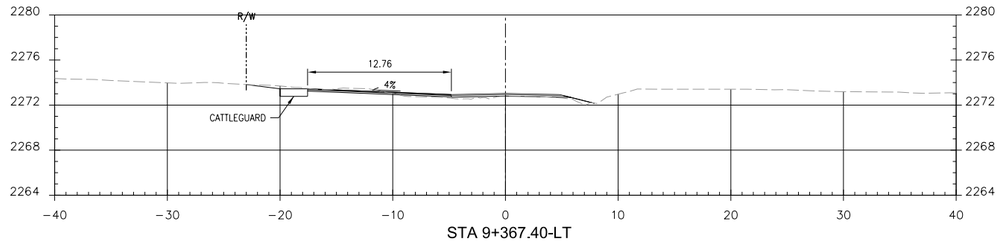
STA 7+169.46-LT
CONSTRUCT A 4.5m WIDE TURNOUT;
CONSTRUCT 2 UNIT CATTLEGUARD



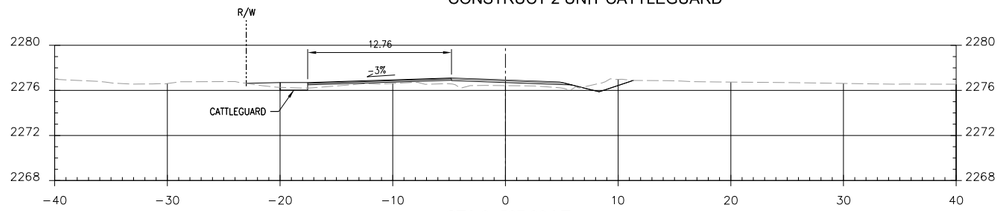
STA 9+805.14-LT
CONSTRUCT A 4.5m WIDE TURNOUT;
CONSTRUCT 2 UNIT CATTLEGUARD



STA 9+565.04-LT
CONSTRUCT A 4.5m WIDE TURNOUT;
CONSTRUCT 2 UNIT CATTLEGUARD



STA 9+367.40-LT
CONSTRUCT A 4.5m WIDE TURNOUT;
CONSTRUCT 2 UNIT CATTLEGUARD



STA 8+567.30-LT
CONSTRUCT A 4.5m WIDE TURNOUT;
CONSTRUCT 2 UNIT CATTLEGUARD

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BOP Sta. 0+000.00

Existing 25mm CAP Sta −0+004.45, 0.80 Rt
Existing 250mm AC Pipe ends here within Project Limits, Sta 0+000, Rt.

[1] Sta −0+006.36, 0.47 Rt,

250mm x 250mm Tee MJ x MJ Sta −0+007.080, 1.25 Rt.

[1] Sta 0+007.080, 1.28 Rt.

Sta −0+008.40, 250mm Tie−In, to existing 250mm AC

10m of 500mm steel casing

[1] Sta −0+000.30, 13.8 Rt

[5] Sta −0+000.39, 15.0Rt

Sta −0+003.28, 150mm Tie−In to Existing 150mm AC 16.31 Rt

[2] Sta 0+002.33, 13.78 Rt

Existing PRV

[2] Sta 0+013.77, 28.58 Rt

[4] Sta 0+018.13, 34.58 Rt.

[4] Sta 0+025.100, 37.13 Rt.

[1] Sta 0+026.39, 39.71 Rt.

Blow−off (2−inch flush hydrant) STA 0+026.91, 40.89 RT

Sta 0+027.42, 42.11 Rt, Tie−In to existing 10"

Protect and Keep Existing Serviceline Pipe and Appurtenances

18m−500mm steel casing

Sta 0+005.26, 9.21 Lt, [1]

Sta 0+005.97, 9.79 Lt. [4]

New MH−See Asbuilts

Sta 0+020.37, 9.85 Lt, [1]

25 m 250mm C900 HDPE Pipe Wash Crossing

Sta 0+022.99, 9.85 Lt, [1]

Sta 0+039.29, 9.41 Lt, [3]

Sta 0+058.16, 9.41 Lt, [3]

Sta 0+077.03, 9.41 Lt, [3]

Sta 0+029.00, 20.51 Rt, [5]

25m 150mm C900 HDPE Pipe Wash Crossing

25mm CAP Sta 0+024.17, 35.34 Rt
Existing 250mm AC Pipe ends here within Project Limits

Sta 0+013.77, 28.58 Rt, [5]

[9] Sta 0+082.89, 13.55 Rt.

Sta 0+141.22, 9.85 Lt, [1]

30 m 250mm C900 HDPE Pipe Wash Crossing

Sta 0+148.29, 9.82 Lt, [1]

250mm C900 PVC, DR 18 235 PSI PIPE

Sta 0+000, 150mmx50mm Reducer

Sta 0+110.55, 9.43 Rt. tie−in to 50mm Existing, Rt.

Sta 0+108.88, 50mm Gate Valve 9.24 Rt,

Sta 0+095.57, 50mm Tee 11.35 Rt,

Sta 0+095.96, 50mm Tie−In to Existing 50mm PVC 11.93 Rt.

Sta 0+096.33, 50mm Gate Valve 12.47 Rt.

Sta 0+086.76, 50mm Tee 12.76 Rt,

Sta 0+086.92, 50mm Gate Valve 13.74 Rt.

Sta 0+087.09, 50mm Tie−In to Existing 50mm PVC 14.71 Rt.

Protect and Keep Existing Serviceline Pipe and Appurtenances

Sta 0+222.02, 9.20 Lt, [3]

Sta 0+246.81, 9.54 Lt, [3]

CL OF CONSTRUCTION

Demolish and Remove Existing Mainline Pipe, Appurtenances and Marker Posts. See Note on Demolition.

NOTE:
TO AVOID OBSTRUCTIONS IN SUBGRADE PREP, EXISTING AC PIPE FOUND WITHIN TOP 3 FEET OF SURFACE SHOULD BE REMOVED.

EXISTING AC PIPE FOUND 3 FEET AND BELOW SURFACE ARE TO BE CAPPED AT THE SHOWN LOCATIONS, FILLED WITH GROUT, AND ABONDONED IN PLACE.

EXISTING NON AC PIPES, GATE VALVES, APPURTENANCES, WITHIN TOP 3 FEET OF SURFACE SHOULD BE REMOVED.

ANY EXISTING SERVICE LINES WHICH ARE DISCONNECTED DUE TO CONSTRUCTION ACTIVITIES SHOULD BE RECONNETED TO THE NEW WATERLINE, WITH NEW WATER SERVICE LINES AND NEW CURBSTOPS.

SIZES OF EXISTING WATER SERVICELINES AND LOCATIONS ARE NOT KNOWN.

SCALE: Meters
0 10 20 30 40 50

SCP 6, Rebar with Cap
Sta 0+012.516,
Offset 15.791 m Rt.
EL 2105.276

SCP 7, Rebar with Cap
Sta 0+158.646,
Offset −31.820 m Lt.
EL 2099.544

KEY NOTES:

[1] 250mm GATE VALVE, MJ X MJ WITH BOX AND THRUST BLOCK OR PIPE RESTRAINTS

[2] 250mmX150mm TEE MJ X MJ WITH THRUST BLOCK OR PIPE RESTRAINTS

[3] 250mm−11−¼° BEND MJ X MJ WITH THRUST BLOCK OR PIPE RESTRAINTS

[4] 250mmX45° BEND MJ X MJ WITH THRUST BLOCK OR PIPE RESTRAINTS

[5] 150mm GATE VALVE, MJ X MJ WITH BOX AND THRUST BLOCK OR PIPE RESTRAINTS

[6] 150mmX150mm TEE MJ X MJ WITHTHRUST BLOCK OR PIPE RESTRAINTS

[7] 150MMX11−¼° BEND MJ X MJ WITH THRUST BLOCK OR PIPE RESTRAINTS

[8] 150mmX45° BEND MJ X MJ WITH THRUST BLOCK OR PIPE RESTRAINTS

[9] 150mm 22½° BEND MJ X MJ WITH TURUST BLOCK OR PIPE RESTRANTS

[10] 50MMX11−1/4° BEND MJ X MJ WITH THRUST BLOCK OR PIPE RESTRAINTS

BOP Sta. 0+000.00
Elev.= 2104.000

Sta. 0+011.950 & 0+013.140, Existing WL X−ings

Sta. 0+023.00 Install New 1−1219 mm x 44m cmp Skew No. 81.82 Inv Elev 2101.448

Sta. 0+022.943 Existing 1−1219 mm CMP Remove, Salvage & Stockpile

Sta. 0+065.916 & 0+082.916 Existing WL X−ings

Finish Grade

FG = −0.5714%

Sta. 0+022.943 Existing 8−inch Sewer Line Protect in Place

L= 25.00 m
K= 26
e= 0.03 m
SD= 118.47 m

PVC 0+127.500 Elev 2103.271

PVT 0+152.500 Elev 2103.248

Sta. 0+145.00 Install New 2−750 mm x _____m CMP Skew No. 90 Inv Elev 2100.470 Q100 cms

Existing Ground

PVI 0+140.000 Elev 2103.200

LO 0+142.500 Elev 2103.229

Sta. 0+145.00 Install New 2−762mm x 20.504m cmp Skew No. 110 Inv Elev 2101.124 Q_{100} = 139 cms

Sta. 0+178.051 Existing Powerline X−ing Elev. 2112.584

Sta. 0+178.036 Existing Powerline X−ing Elev. 2108.867

Sta. 0+243.949 Existing WL X−ings

FG = 0.3810%

L= 25.00 m
K= 3192
e= 0.00 m
SD= 11206.07 m

PVC 0+337.500 Elev 2103.952

PVI 0+000.000 Elev 2104.000

PVI 0+350.000 Elev 2104.000

2132 2128 2124 2120 2116 2112 2108 2104 2100 2096 2092 2088 2084

0+000 0+050 0+100 0+150 0+200 0+250 0+300 0+350

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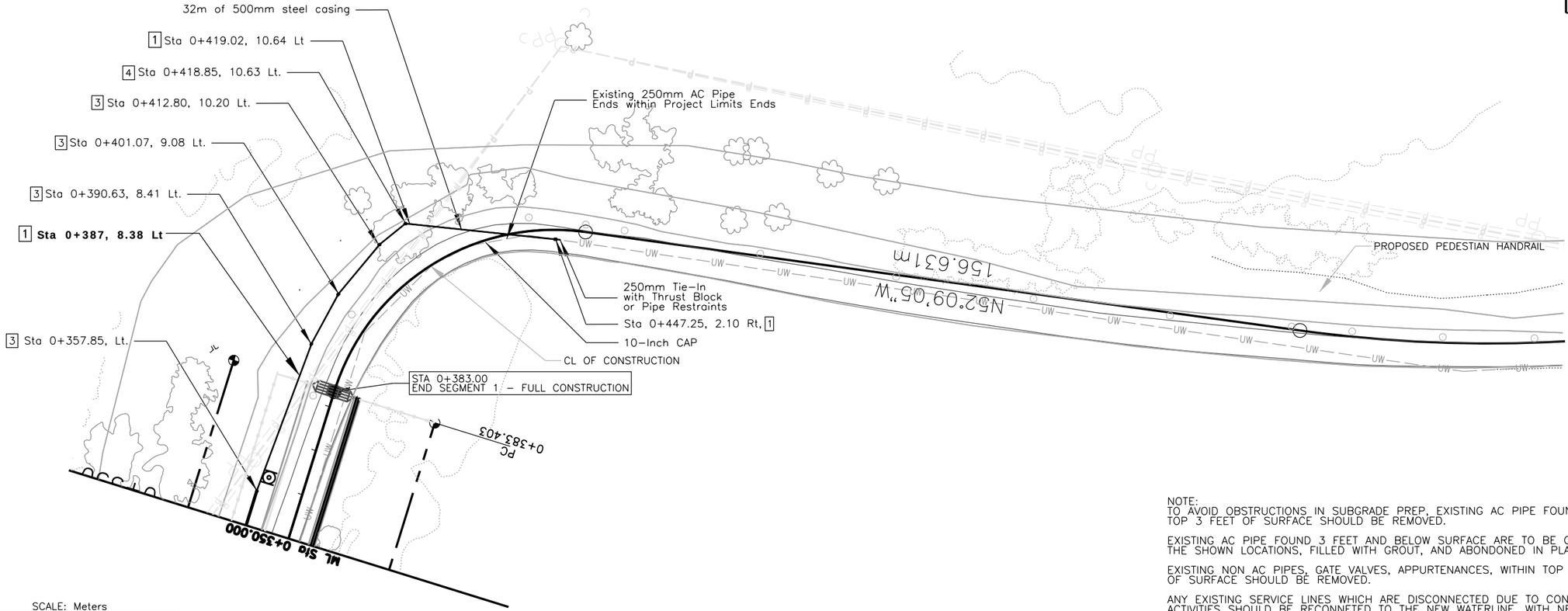
AZ	N9073(1) 1, 2 & 4	78



KEY NOTES:

1	250mm GATE VALVE, MJ X MJ WITH BOX AND THRUST BLOCK OR PIPE RESTRAINTS
2	250mmX150mm TEE MJ X MJ WITH THRUST BLOCK OR PIPE RESTRAINTS
3	250mm-11-¼° BEND MJ X MJ WITH THRUST BLOCK OR PIPE RESTRAINTS
4	250mmX45° BEND MJ X MJ WITH THRUST BLOCK OR PIPE RESTRAINTS
5	150mm GATE VALVE, MJ X MJ WITH BOX AND THRUST BLOCK OR PIPE RESTRAINTS
6	150mmX150mm TEE MJ X MJ WITHTHRUST BLOCK OR PIPE RESTRAINTS
7	150MMX11-¼° BEND MJ X MJ WITH THRUST BLOCK OR PIPE RESTRAINTS
8	150mmX45° BEND MJ X MJ WITH THRUST BLOCK OR PIPE RESTRAINTS
9	150mm 22½° BEND MJ X MJ WITH TURUST BLOCK OR PIPE RESTRANTS
10	50MMX11-1/4° BEND MJ X MJ WITH THRUST BLOCK OR PIPE RESTRAINTS

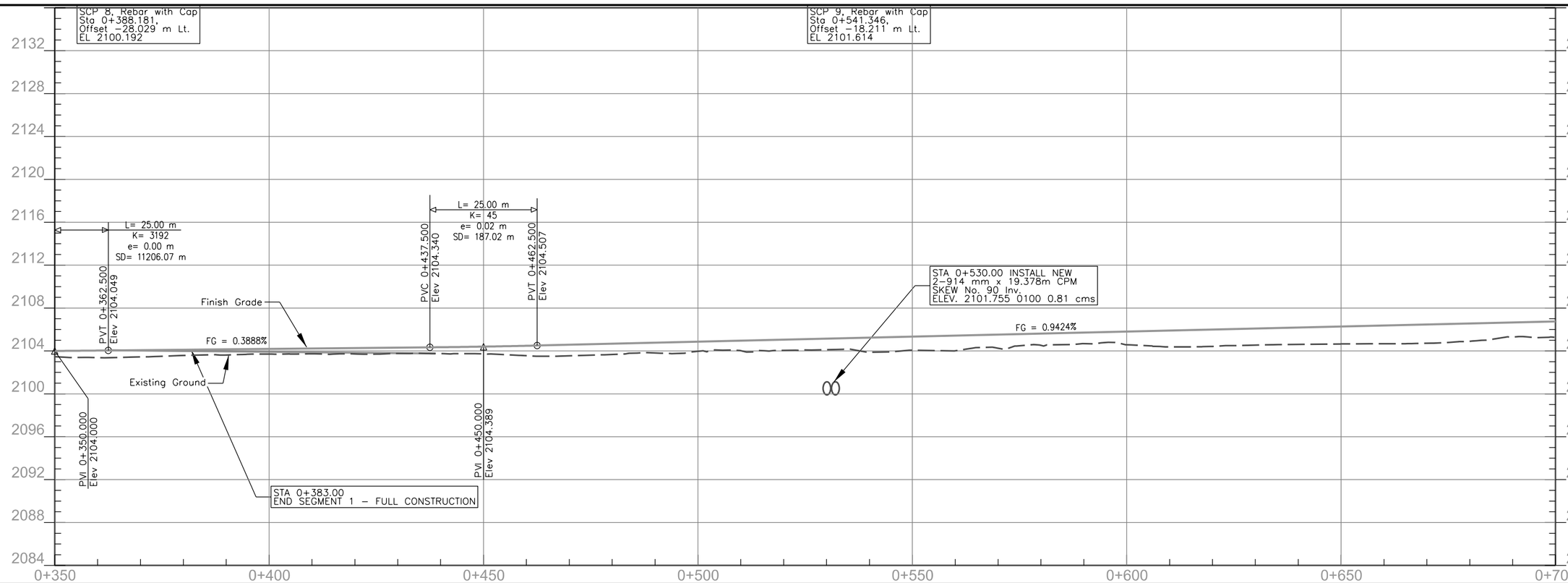
NOTE:
TO AVOID OBSTRUCTIONS IN SUBGRADE PREP, EXISTING AC PIPE FOUND WITHIN TOP 3 FEET OF SURFACE SHOULD BE REMOVED.

EXISTING AC PIPE FOUND 3 FEET AND BELOW SURFACE ARE TO BE CAPPED AT THE SHOWN LOCATIONS, FILLED WITH GROUT, AND ABONDONED IN PLACE.

EXISTING NON AC PIPES, GATE VALVES, APPURTENANCES, WITHIN TOP 3 FEET OF SURFACE SHOULD BE REMOVED.

ANY EXISTING SERVICE LINES WHICH ARE DISCONNECTED DUE TO CONSTRUCTION ACTIVITIES SHOULD BE RECONNETED TO THE NEW WATERLINE, WITH NEW WATER SERVICE LINES AND NEW CURBSTOPS.

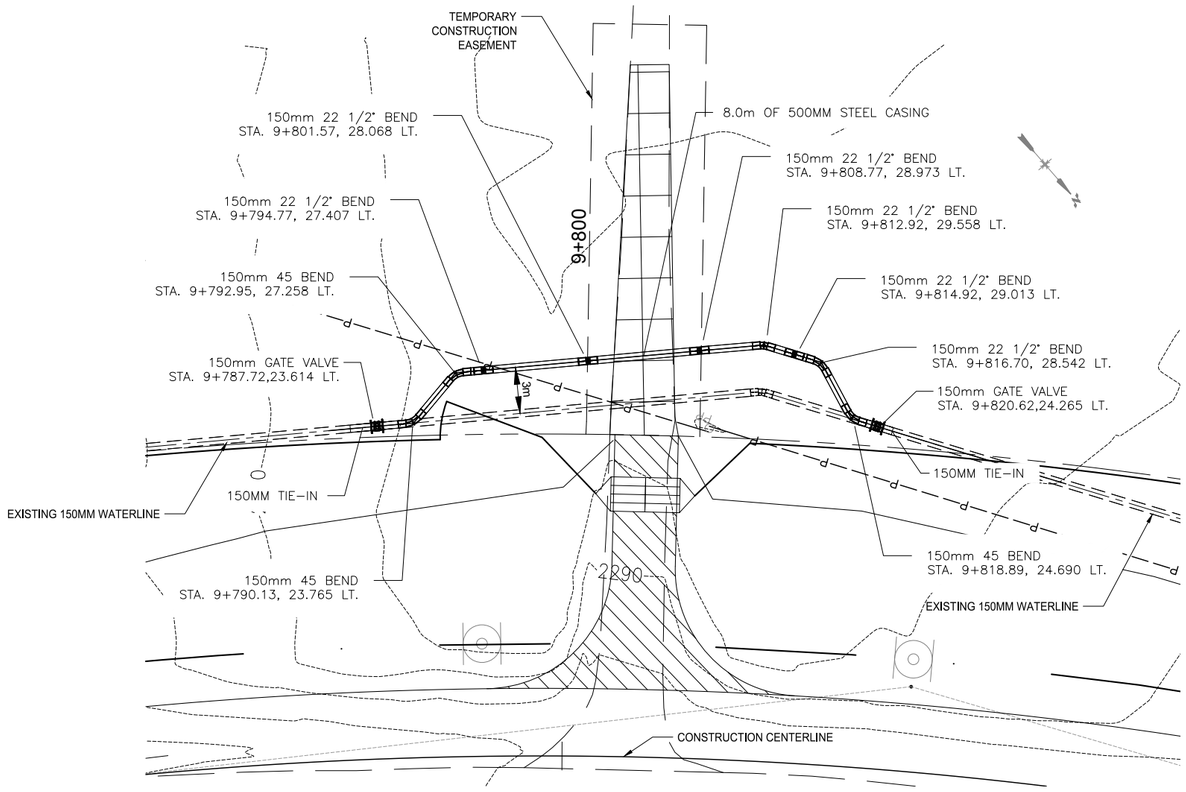
SIZES OF EXISTING WATER SERVICELINES AND LOCATIONS ARE NOT KNOWN.

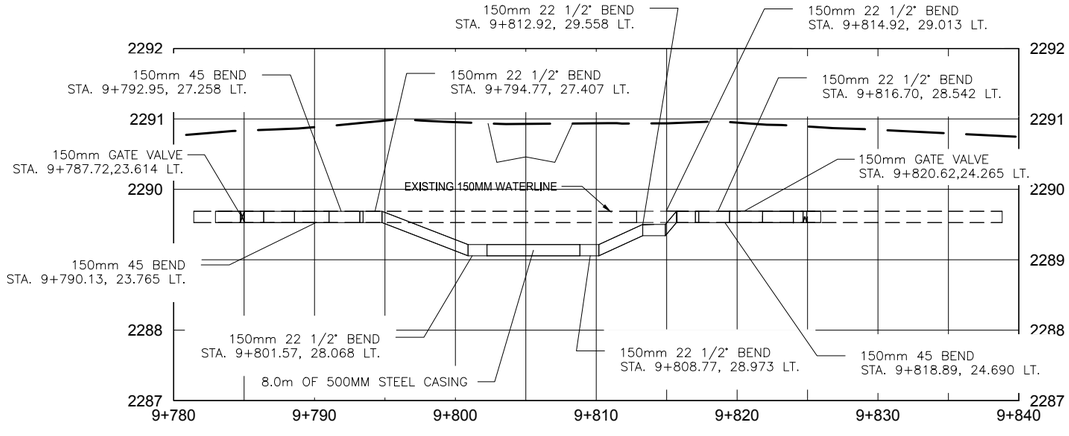


STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	79

WATERLINE CROSSINGS, OPEN-CUT

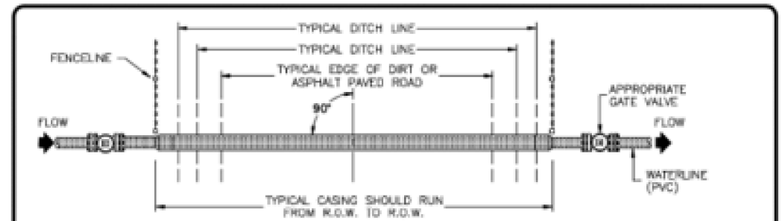
N9402		Removal of Waterline	**Item No. 61102-2950**, 150mm PVC	**Item No. 61103-1480**, 500mm STEEL PIPE	**Item No. 61104-0800**, 150mm Gate Valve	**Item No. 61114-1000**, Water System Accessory Bends	**Item No. 61114-1500**, Tie-Ins	Description
Existing Crossing Station at CL	LOC	Length (m)	Length (m)	Length (m)	Each	Each	Each	
9+805	TO	None	43	8	2	9	2	INSTALL NEW 150mm WATERLINE WITH 18-INCH STEEL CASING LEVEL ROW TO ROW. LAY NEW PIPE & CASING PARALLEL 10 FEET FROM EXISTING. SEE CROSS-SECTIONS FOR NEW ELEVATION OF PIPE TO MEET 42 INCHES OF COVER OVER TOP OF CASING. ABANDON EXISTING WATER LINE AND CASING IN-PLACE. REMOVE EXISTING GATE VALVES/ BOXES IF ANY. ADD NEW GATE VALVES/ BOXES. PROVIDE HORIZ AND VERTICAL BENDS TO RE-ESTABLISH CONNECTON TO EXISTING LINE. FINAL LOCATION & LIMITS TO BE VERIFIED IN THE FIELD.



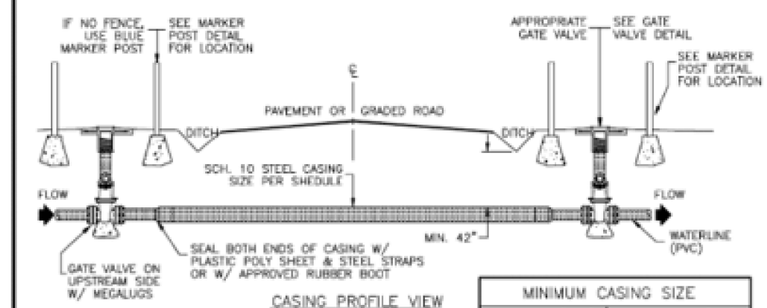


NOTE:

THIS DETAIL IS IN CUSTOMARY UNITS.



CASING PLAN VIEW



CASING PROFILE VIEW

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

NOTES:

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

SHEET 1 OF 2

DESIGNED BY:	KTJH
QUANTITY BY:	
DRAWN BY:	KTJH
APPROVED BY:	KTJH
DATE:	04/08
PROJECT NO.:	
SCALE:	NTS
ROAD REFERENCE:	Water Standard
DWG. NO.:	WS-17a.DWG

NAVAJO TRIBAL UTILITY AUTHORITY

TYPICAL ROAD CROSSING FOR NTUA WATERLINES

REVISIONS			
No.	Date	Brief	By
01	04/08	Revised	LJA
02			
03			
04			
05			
06			

REVISION	BY	DATE

NAVAJO NATION
DIVISION OF TRANSPORTATION

N90072(1) 1, 2&3

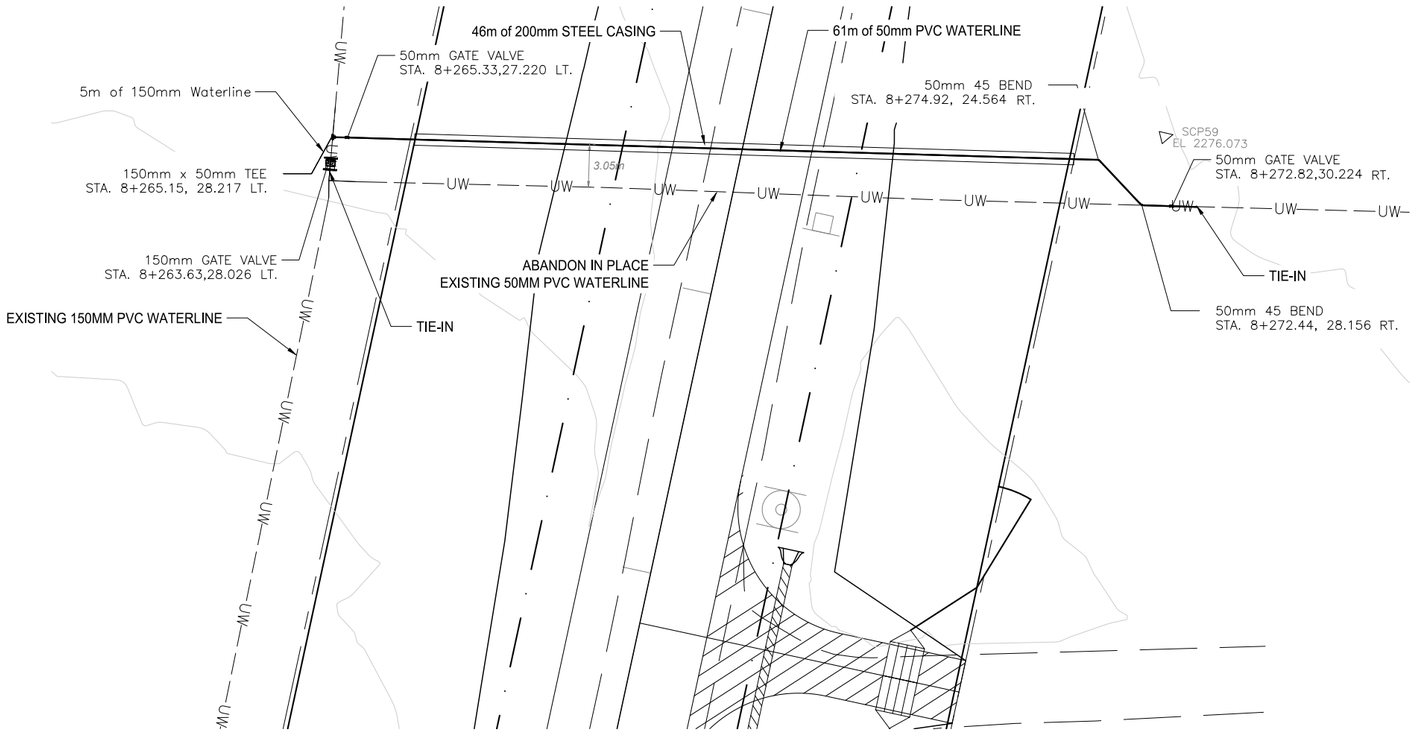
WATERLINE RELOCATION

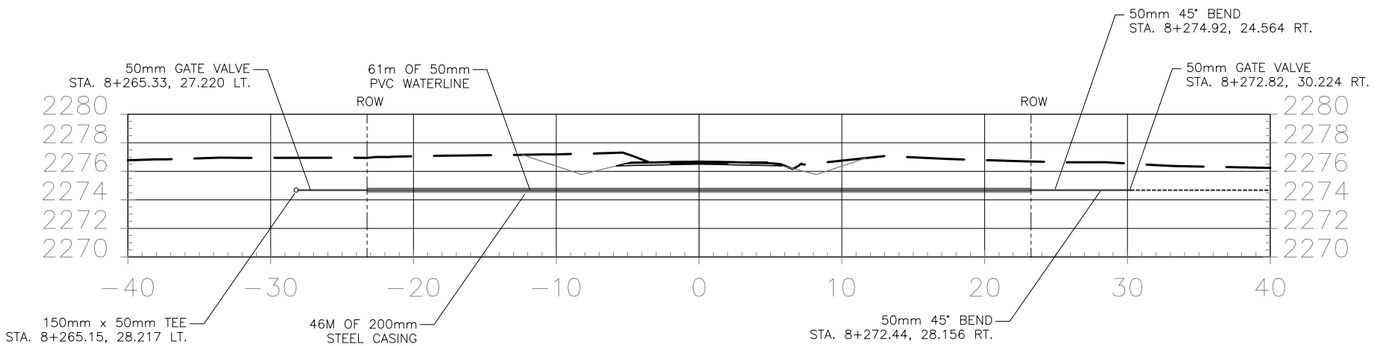
PROJECT MANAGER: MLL	DATE: 4/26	DRAWING	SHEET
LEAD DESIGNER: RW	DATE: 4/26		
ASBUILT BY:	DATE:	22X34	79

STATE	PROJECT	SHEET NUMBER
AZ	N9073(1) 1, 2 & 4	80

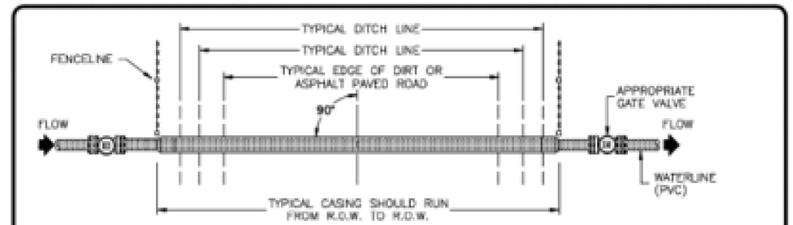
WATERLINE CROSSINGS, OPEN-CUT

N9073		Removal of Waterline	**Item No. 61102-1700,** 50mm PVC	**Item No. 61102-2950,** 150mm PVC	**Item No. 61103-0700,** 200mm Encasement Pipe, Galv. Steel	**Item No. 61104-0600,** 50mm Gate Valve	**Item No. 61104-0800,** 150mm Gate Valve	**Item No. 61114-0000,** Water System Accessory	**Item No. 61114-1500,** Water System Accessory, Tie-Ins	Description
Existing Crossing Station at CL	LOC	Length (m)	Length (m)	Length (m)	Length (m)	Each	Each	Each	Each	
8+267	RT/LT	None	61	5	46	2	1	3	2	INSTALL NEW 2-INCH WATERLINE WITH 8-INCH STEEL CASING LEVEL ROW TO ROW. LAY NEW PIPE & CASING PARALLEL 10 FEET FROM EXISTING. SEE CROSS-SECTIONS FOR NEW ELEVATION OF PIPE TO MEET 42 INCHES OF COVER OVER TOP OF CASING. ABANDON EXISTING WATER LINE AND CASING IN-PLACE. REMOVE EXISTING GATE VALVES/ BOXES IF ANY. ADD NEW GATE VALVES/ BOXES. PROVIDE HORIZ. AND VERTICAL BENDS TO RE-ESTABLISH CONNECTON TO EXISTING LINE. FINAL LOCATION & LIMITS TO BE VERIFIED IN THE FIELD.

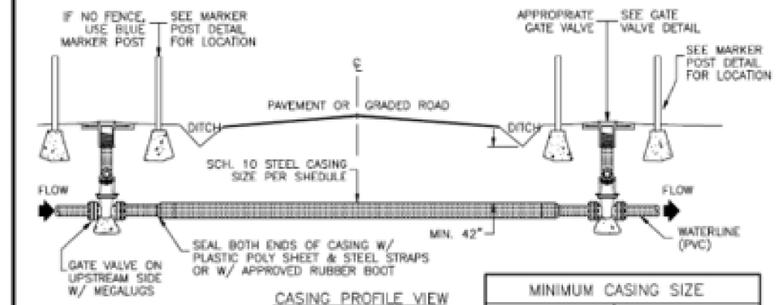




NOTE:
THIS DETAIL IS IN CUSTOMARY UNITS.



CASING PLAN VIEW



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SHEET 1 OF 2

DESIGNED BY:	KTJH
CALCULATED BY:	
DRAWN BY:	KTJH
APPROVED BY:	KTJH
DATE:	04/08
PROJECT NO:	
SCALE:	NTS
ADD'L STANDARD:	Water Standard
DWG. NO.:	WS-17a.DWG

NAVAJO TRIBAL UTILITY AUTHORITY

TYPICAL ROAD CROSSING FOR NTUA WATERLINES

REVISIONS			
No.	Date	Brief	By
01	04/08	Revised	LJA
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REVISION	BY	DATE

NAVAJO NATION
DIVISION OF TRANSPORTATION

N90072(1) 1, 2&3

WATERLINE RELOCATION

PROJECT MANAGER: MLL	DATE: 4/26	DRAWING	SHEET
LEAD DESIGNER: RW	DATE: 4/26		
ASBUILT BY:	DATE:	22X34	80