

Updated Descriptive Memoir: Improvements to the Patillas-Arroyo Trunk Sewer

1 INTRODUCTION

The Puerto Rico Aqueduct and Sewer Authority, through its Capital Improvement Program initiative pursuant to a 2006 EPA-PRASA Consent Order, proposes the elimination of the Patillas Waste Water Treatment Plant (Patillas WWTP) and the deviation of the influent through a new trunk sewer line that will connect with the Arroyo Pump Station and to the Guayama Regional Waste Water Treatment Plant. The project area is located between the Patillas and Arroyo Ward, beginning at the Patillas WWTP and ending in the Arroyo Pump Station, following State Road PR-181, PR-3 and PR-53 (Ave. José Celso Barbosa).

In 2013, this project was the subject of a previous USACE permit application, SAI-2013-Q1789(SP-CGR), which was not completed at the time.

2 PURPOSE AND NEED

The main objective of the proposed action is to eliminate the Patillas WWTP in agreement with the 2006 EPA-PRASA Consent Order. The project will help simplify the sewer operational system in the area and provide adequate sewer management capabilities as well as to eliminate discharges from septic tanks within the service area.

3 PROJECT COMPONENTS

An engineering solution was developed to significantly improve the transfer of the Patillas WWTP influent to the Guayama Regional WWTP and to increase the volumes that this sewer system can handle to ensure optimum performance and residual capacity that can withstand increases in wastewater flows brought about by population growth in the near future.

The project consists of construction of two new pump stations (La Providencia and Las Palmas), 1.9 Km of 12 and 15-inch gravity lines, and 2.52 Km of 16-inch force line and approx. 5 km of 30-inch gravity line to eliminate the Patillas Wastewater Treatment Plant. These are described in the following lines:

- A gravity line of 15 inches in diameter with a length of 1,862 lineal meters (LM) and the necessary manholes will be installed to divert the wastewater from the Patillas WWTP up to a proposed La Providencia Pump Station. The new pump station will be constructed with a capacity of 1,684 gpm and will be located at the State Road 181 in Pollos Ward. Once the new La Providencia Pump Station is constructed, the existing La Providencia Pump Station will be eliminated. The new pump station will receive influents from sector along state road PR-3 in Maunabo and the Patillas WWTP.

- A 16-inch force line with a length of 2,503 LM will be installed to convey wastewater from the proposed La Providencia Pump Station along an existing dirt road crossing state highway PR-53 to continue beyond the highway's ROW up to the proposed Palmas Pump Station. The new pump station will be constructed with a capacity of 2,662 gpm across PR-53. This pump station will allow the elimination of the existing Airport Pump Station and the existing Palmas Pump Station.
- A 20-inch force line with a length of 3,760 LM will be installed to convey wastewater from the new Palmas pump station to the Miramar Sector in Arroyo. A 30-inch gravity line with a length of 1,969 LM will be installed to improve the wastewater collection from sectors in the east side of the Municipality of Arroyo.

Impacts to jurisdictional waters, the reason of this application, consists of various segments of pipeline to be installed across portions of the Rio Chico (sheet 1 of 9), Quebrada Mamey (sheet 2 of 9), an unnamed seasonal channel located at Los Pollos sector (sheet 3 of 9), Rio Patillas (sheet 4 of 9), and Rio Nigua (sheet 8 of 9). An existing wetland will also be impacted for the construction of the proposed Las Palmas Pump Station (sheets 5, 6 and 7 of 9). Regarding the pump station relocation component, only the construction of the new Palmas pump station main building will result in impacts to existing wetlands. The elimination of the existing WWTP will not result in impacts to jurisdictional areas.

Wetland impacts in all cases will result from activities related to the removal of vegetation, trench excavation, placement of pipelines, concrete protection and earth fill, traffic of construction vehicles and personnel, as well as the operation of staging areas at various locations within the construction site. Pipe installation will be accomplished by conventional mechanical means: trench excavation, pipe installation followed by placement of fill and as detailed in the attached drawings. Concrete protection will be placed as well at selected locations within the total impact area (sheet 9 of 9).

Total impacts to jurisdictional areas are estimated in **2.50 acres of palustrine wetlands**, classified as PI03A, PEM1A and PEM1C by the US Fish and Wildlife Service (USFWS) National Wetland Inventory database. From this total, **0.79 acres** correspond to temporary construction staging areas and **1.71 acres** to impacts related to the placement of underground pipes and the construction of the afore-mentioned pump station. Please refer to the attached drawings for details. Also, approximately **3,413 cubic meters** of fill mostly consisting of clean fill and alluvium will be deposited as part of the proposed construction activities. Surplus material will be disposed of at an authorized upland facility. A summary of potential impacts has been included along the revised drawing set attached to this document.

A preliminary consultation through the USFW Information for Planning and Consultation web site (IPaC) indicated the following species may be potentially affected by the proposed construction activity:

Common Name	Scientific Name	Status	Notes
Puerto Rican Boa	<i>Epicrates inornatus</i>	Endangered	No critical habitat has been designated for this species.
Guajon	<i>Eleutherodactylus cooki</i>	Threatened	There is final critical habitat for this species. Project location is outside the critical habitat.

The same source indicated that no critical habitats of flora and fauna were identified in the impacted area. Attached please a copy of the documentation resulting from the USFWS IPaC preliminary consultation. The Applicant understands that the USACE permitting process will include an official consultation with USFWS and is willing to implement all recommendations resulting from said process.

4 AVOIDANCE, MINIMIZATION, AND MITIGATION

The Applicant understands that in order for a project to be permitted by the USACE, it must be demonstrated that, to the extent practicable: steps have been taken to avoid impacts to wetlands and other aquatic resources, potential impacts have been minimized, and compensation will be provided for any remaining unavoidable impacts. A process commonly referred to as the mitigation-sequencing requirement of the Clean Water Act § 404 regulatory program.

Towards this goal the following avoidance, minimization and compensation actions have taken place when planning this project:

- The project has been conceptualized so as to avoid impacts to waters of the US to the extent possible. Delineation of the pipe route preserved to the extent possible high-density value wetland areas in favor of less dense tracts that were used to demarcate the final route of the pipeline. Unavoidable impacts employed the smallest footprint technically possible while
- Likewise, the extent of unavoidable impacts has been minimized as much as possible. Pipeline route crossing at all water bodies (Quebrada Mamey, Río Chico, Río Patillas and Río Nigua) took into account impacts to jurisdictional resources to the extent that the segment between the new Providencia PS and the west bank of the Quebrada Mamey and from Manhole #11 to Manhole #12 toward the east bank of Río Chico were accomplished by means of conventional and/or directional drilling, avoiding altogether impact to the bed of these water bodies and associated jurisdictional wetlands. Finally,

the design of the new Palmas pump station was intended to utilize the least amount of space possible while conveying the design flows.

- The applicant is willing to provide compensation for all impacts to jurisdictional waters caused by the proposed action. The mitigation program to be implemented may include both in-kind and out-of-kind components to achieve a goal of “no net loss” of wetlands as directed by the COE. These actions may include stewardship actions by the Applicant towards the improvement of existing wetlands in the project areas, among other initiatives.
- Nevertheless, it is expected that most of the impacts caused by the proposed action will be of temporary nature and most of the areas along the pipeline corridor will return to their original state shortly. Only a reduced area, including that of the new Palmas pump station will cause permanent impacts and those have been reduced to the extent possible while attaining the project goals of providing an effective means to convey wastewater to an adequate treatment facility.

On a final note, it is expected that long-term effects of the proposed measures will have a beneficial effect on human health in the sanitary sewer system service areas affected by the proposed action. At the same time, it is anticipated that negligible temporary impacts will be caused on submerged habitats in the Quebrada Mamey, Rio Chico, Río Nigua and Rio Patillas.

Project Location (USGS, 1982)



Project Location (Google Earth™)

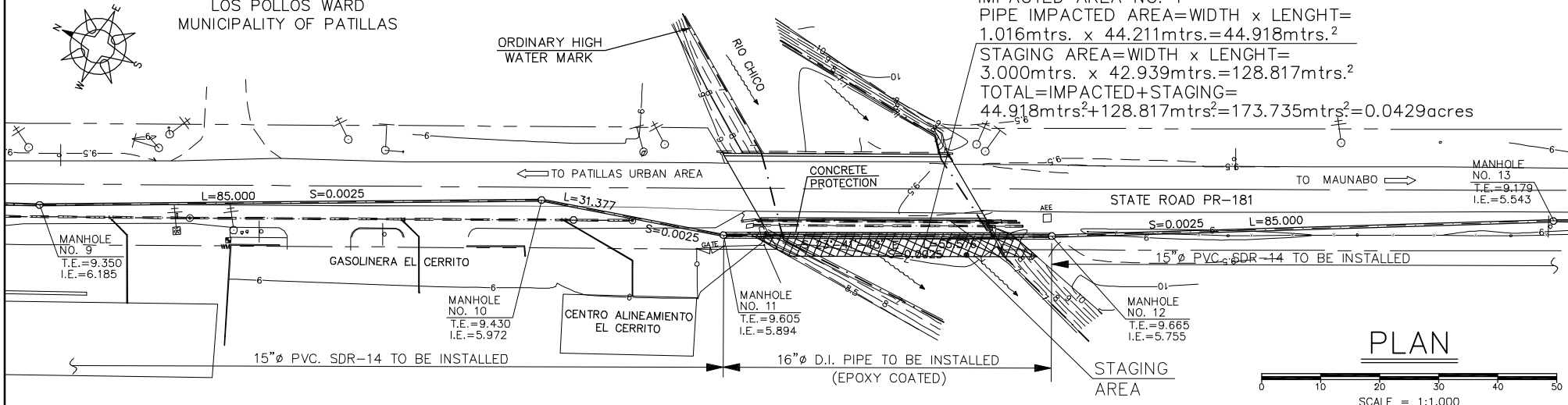


IMPACTED AREAS SUMMARY TABLE FOR PATILLAS-ARROYO TRUNK SEWER										
IMPACTED AREA IDENTIFICATION NO.	IMPACT AREA (Pipe)				IMPACT AREA (Staging)				TOTALS	
	DIMENSIONS (mtrs)		AREA (W x L)		DIMENSIONS (mtrs)		AREA (W x L)		(Pipe and Staging)	
	WIDTH	LENGTH	Mtrs. ²	Acres	WIDTH	LENGTH	Mtrs. ²	Acres	Mtrs. ²	Acres
1	1.016	44.211	44.918	0.0111	3.000	42.939	128.817	0.0318	173.735	0.0429
2	1.016	28.630	29.088	0.0072	3.000	29.504	88.512	0.0219	117.600	0.0291
3	1.016	26.613	27.039	0.0067	3.000	30.442	91.326	0.0226	118.365	0.0292
4	1.016	330.000	335.280	0.0828	3.000	329.282	987.846	0.2441	1323.126	0.3270
5	5.231	194.360	1016.643	0.2512	3.179	194.360	617.861	0.1527	1634.503	0.4039
6	-	-	4272.894	1.0559	-	-	21.719	0.0054	4294.613	1.0612
7	3.000	378.518	1135.554	0.2806	6.026	378.518	2280.857	0.5636	3416.410	0.8442
8	1.372	42.770	58.680	0.0145	3.000	43.291	129.873	0.0321	188.553	0.0466
TOTALS			6920.096	1.7100			4346.810	1.0741	11266.906	2.7841

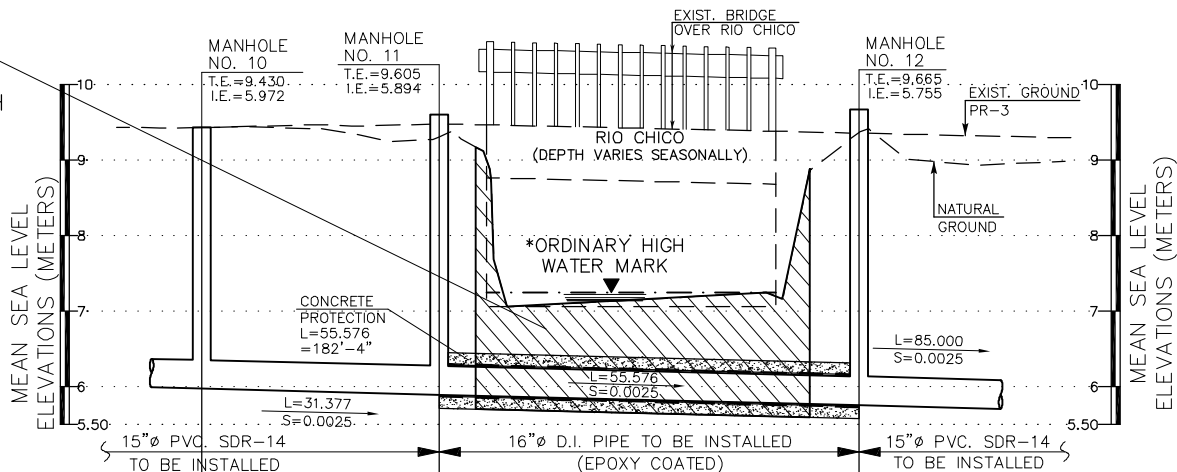
EARTHWORK CALCULATION				
AREA ID	IMPACTED SECTION AREA FROM PROFILE (Mtrs. ²)	WIDTH Mtrs.	CUT VOLUME	
			Mtrs. ³	Yards ³
1	74.450	1.016	75.641	98.935
2	63.709	1.016	64.728	84.662
3	100.353	1.016	101.959	133.357
4	742.117	1.016	753.991	986.183
5	536.635	1.016	545.221	713.123
6	993.158	1.016	1009.049	1319.786
7	657.441	1.016	667.960	873.659
8	141.201	1.372	193.728	253.386
TOTAL			3412.277	4463.097

LOS POLLOS WARD
MUNICIPALITY OF PATILLAS

IMPACTED AREA NO. 1
PIPE IMPACTED AREA=WIDTH x LENGHT=
1.016mtrs. x 44.211mtrs.=44.918mtrs.²
STAGING AREA=WIDTH x LENGHT=
3.000mtrs. x 42.939mtrs.=128.817mtrs.²
TOTAL=IMPACTED+STAGING=
44.918mtrs.²+128.817mtrs.²=173.735mtrs.²=0.0429acres



IMPACTED AREA NO. 1
EARTHWORK VOLUME=
PROFILE SECTION AREA x IMPACTED WIDTH
=74.450mtrs.² x 1.016mtrs.=75.641mtrs.³
=98.935yard³



LEGEND:

- IMPACTED AREA
- STAGING AREA (PLAN)

NOTE:
FOR CONCRETE PROTECTION,
TRENCH DETAILS AND NOTES
SEE SHEET NO. 9 of 9

STATIONS	ELEVATIONS	
	PARTIAL	INVERT TOP
7+65.000	85.000	9.430
7+96.377	31.377	5.972
8+51.954	55.576	9.365

PROFILE 15" Ø PVC GRAVITY LINE

SCALES: HORIZONTAL=1:1,000 VERTICAL=1:100

*STREAM BED WAS DRY
AT THE TIME OF
FIELD SURVEY

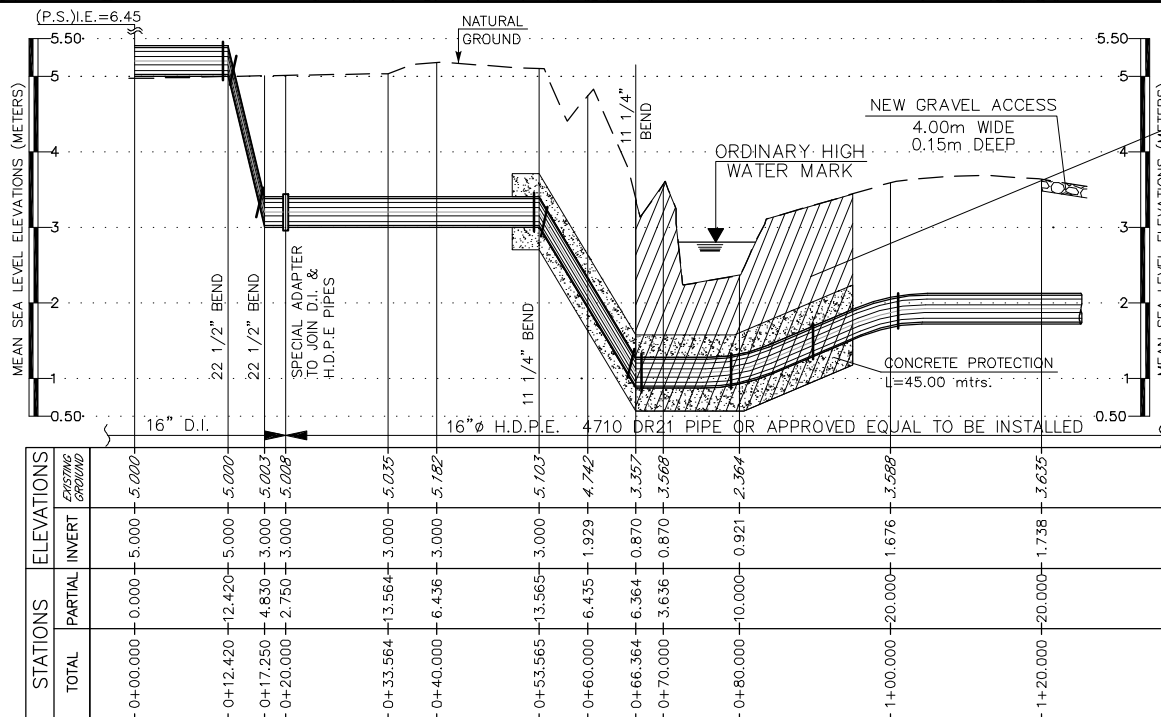
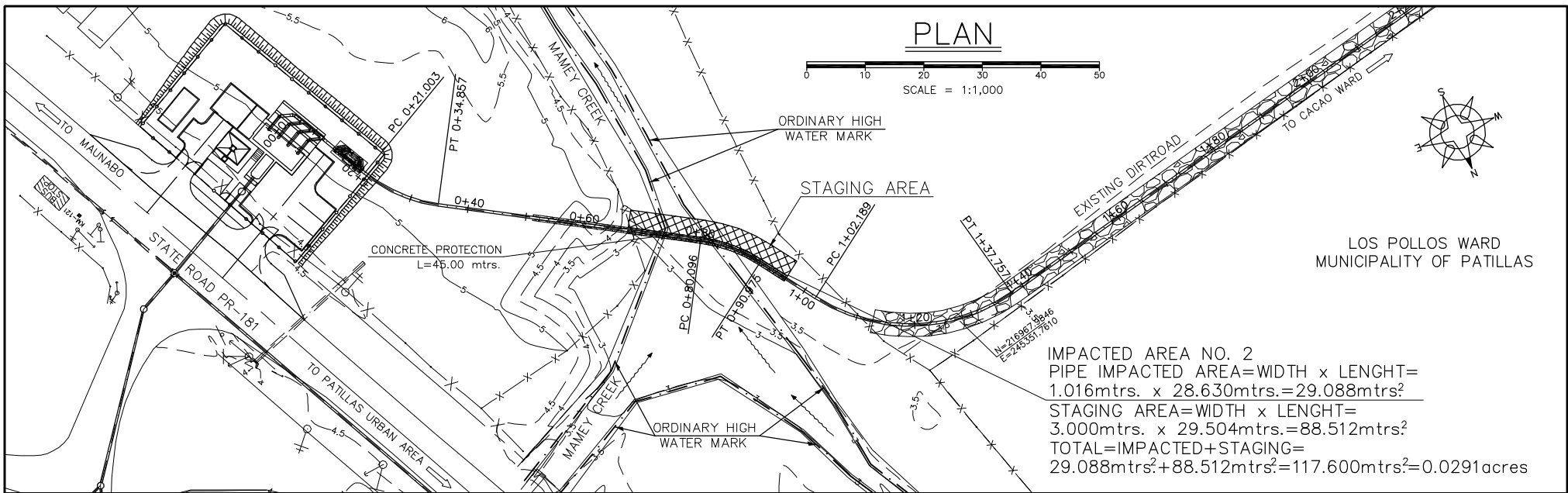
**PATILLAS - ARROYO TRUNK SEWER
AND COMPLEMENTARY WORKS**



OWNER:



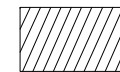
IMPACTED AREA NO. 1
CROSSING UNDER "CHICO" RIVER
SHEET NO. 1 OF 9



PROFILE 16"Ø H.D.P.E. DR21 PIPE (FORCE MAIN)

SCALES: HORIZONTAL=1:1,000 VERTICAL=1:100

LEGEND:



IMPACTED AREA



STAGING AREA
(PLAN)

NOTE:
 FOR CONCRETE PROTECTION,
 TRENCH DETAILS AND NOTES
 SEE SHEET NO. 9 of 9

PATILLAS - ARROYO TRUNK SEWER AND COMPLEMENTARY WORKS



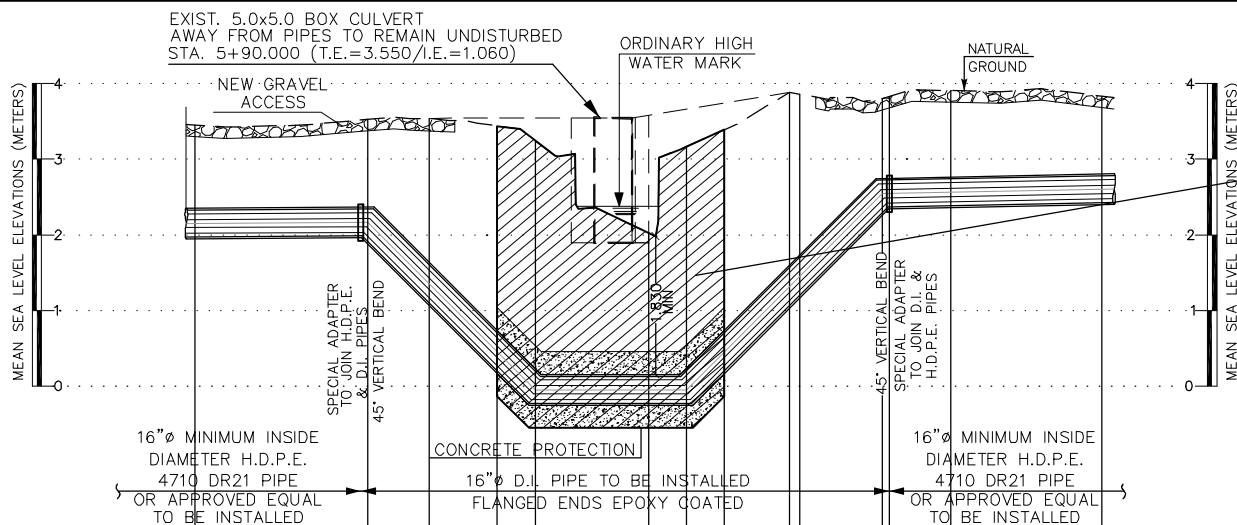
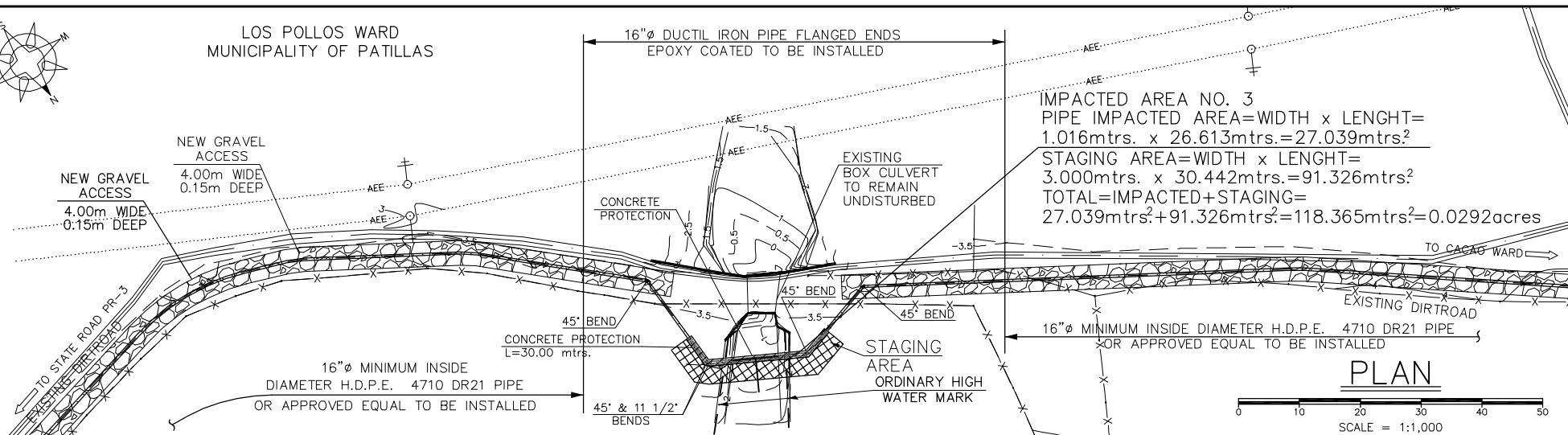
OWNER:



IMPACTED AREA NO. 2
 CROSSING UNDER MAMEY CREEK
 SHEET NO. 2 OF 9



LOS POLLOS WARD
MUNICIPALITY OF PATILLAS



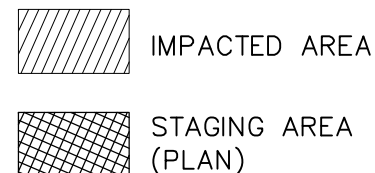
STATIONS	ELEVATIONS	EXISTING GROUND
TOTAL	PARTIAL	INVERT
5+40.000	-20.000	1.947
5+61.961	21.961	1.959
5+62.871	0.910	1.875
5+70.963	-8.092	1.066
5+80.000	-9.037	0.162
5+85.000	-5.000	-0.254
6+00.000	-15.000	-0.254
6+05.000	-5.000	-0.254
6+10.000	-5.000	0.162
6+18.640	8.640	1.026
6+20.000	-1.360	1.162
6+30.914	10.914	2.341
6+31.824	0.910	2.343
6+40.000	-8.176	2.318
6+60.000	-20.000	2.364

PROFILE 16" Ø H.D.P.E. DR21 PIPE (FORCE MAIN)

SCALE: HORIZONTAL=1:1,000 VERTICAL=1:100

IMPACTED AREA NO. 3
EARTHWORK VOLUME=
PROFILE SECTION AREA x IMPACTED WIDTH
=100.353mtrs.² x 1.016mtrs.=101.959mtrs.³
=133.357yard³

LEGEND:



NOTE:
FOR CONCRETE PROTECTION,
TRENCH DETAILS AND NOTES
SEE SHEET NO. 9 of 9

PATILLAS - ARROYO TRUNK SEWER
AND COMPLEMENTARY WORKS



OWNER:



IMPACTED AREA NO. 3
CROSSING UNDER EXIST. CREEK
SHEET NO. 3 OF 9

PALMAS WARD
MUNICIPALITY OF ARROYO

IMPACTED AREA NO. 5
PIPE IMPACTED AREA=1,016.6426mtrs.²
STAGING AREA=617.8607mtrs.²
TOTAL=1,634.5033mtrs.²=0.4039acres

NEW
MANHOLE
NO. 31A
T.E.=3.015
I.E.=1.515

NEW
MANHOLE
NO. 33
T.E.=2.973
I.E.=(-)0.263

NEW
MANHOLE
NO. 33A
T.E.=1.809
I.E.=(-)0.286

NEW
MANHOLE
NO. 33B
T.E.=3.170
I.E.=(-)0.309

NEW
MANHOLE
NO. 32
T.E.=2.917
I.E.=(-)0.150

STATE ROAD PR-53

TO PR-3 (ARROYO URBAN AREA)

LEGEND:

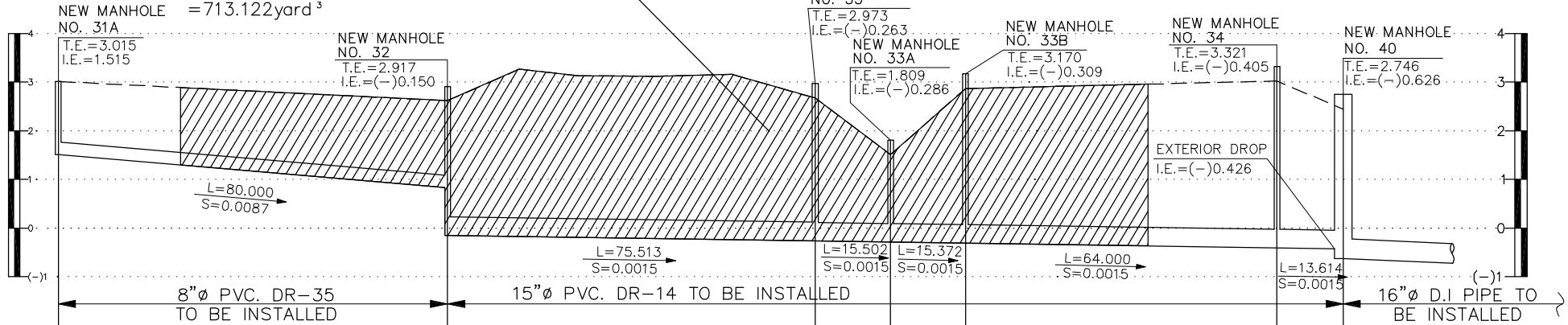


NOTE:
FOR CONCRETE PROTECTION,
TRENCH DETAILS AND NOTES
SEE SHEET NO. 9 OF 9

PLAN

0 10 20 30 40 50
SCALE = 1:1,250

IMPACTED AREA NO. 5
EARTHWORK VOLUME=
PROFILE SECTION AREA x IMPACTED WIDTH
=536.635mtrs.² x 1.016mtrs.=545.221mtrs.³
=713.122yard³



STATIONS	ELEVATIONS	
	PARTIAL	TOTAL
TOP		
		2.617
	41.922	(-)0.150
	2+40.108	75.513
		(-)0.263
	2+55.610	15.502
		(-)0.286
	2+70.982	15.372
		(-)0.309
	3+34.982	64.000
		(-)0.405
	3+48.596	13.614
		(-)0.426
		(-)0.626
		2.446

PROFILE 8"Ø, 12"Ø PVC & 16"Ø D.I. GRAVITY LINES TO ELIMINATE EXIST. PALMAS P.S.

SCALES: HORIZONTAL=1:1,250 VERTICAL=1:125

**PATILLAS - ARROYO TRUNK SEWER
AND COMPLEMENTARY WORKS**



OWNER:



IMPACTED AREA NO. 5
EXISTING WETLAND NEAR
PATILLAS AIRPORT ENTRANCE
SHEET NO. 5 OF 9

LEGEND:



IMPACTED AREA NO. 6
PIPE AND NEW PALMAS PUMP STATION

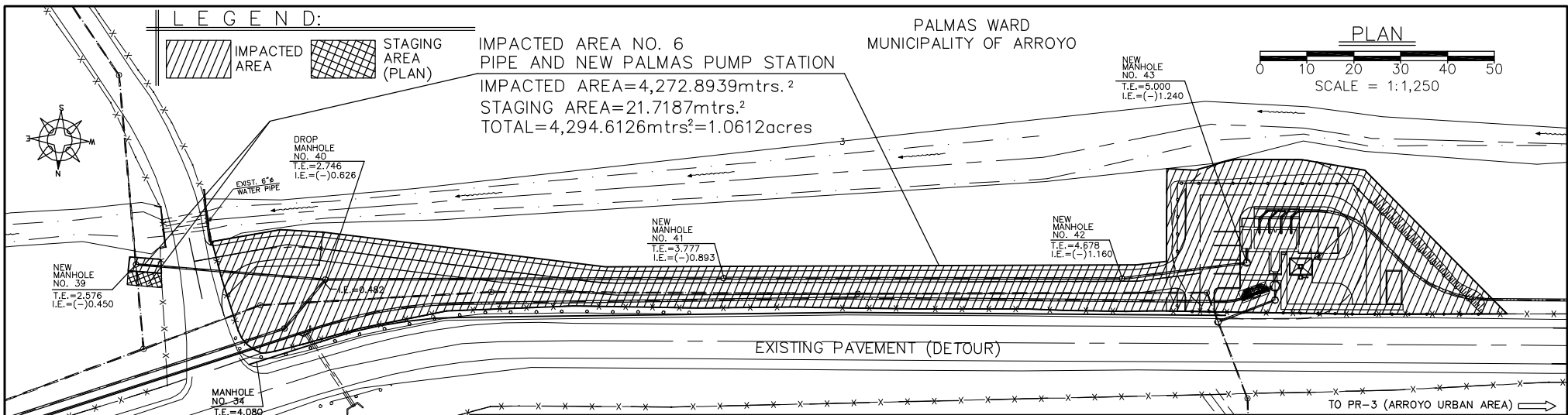
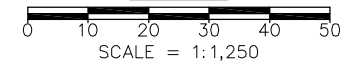
IMPACTED AREA=4,272.8939mtrs.²

STAGING AREA=21.7187mtrs.²

TOTAL=4,294.6126mtrs.²=1.0612acres

PALMAS WARD
MUNICIPALITY OF ARROYO

PLAN



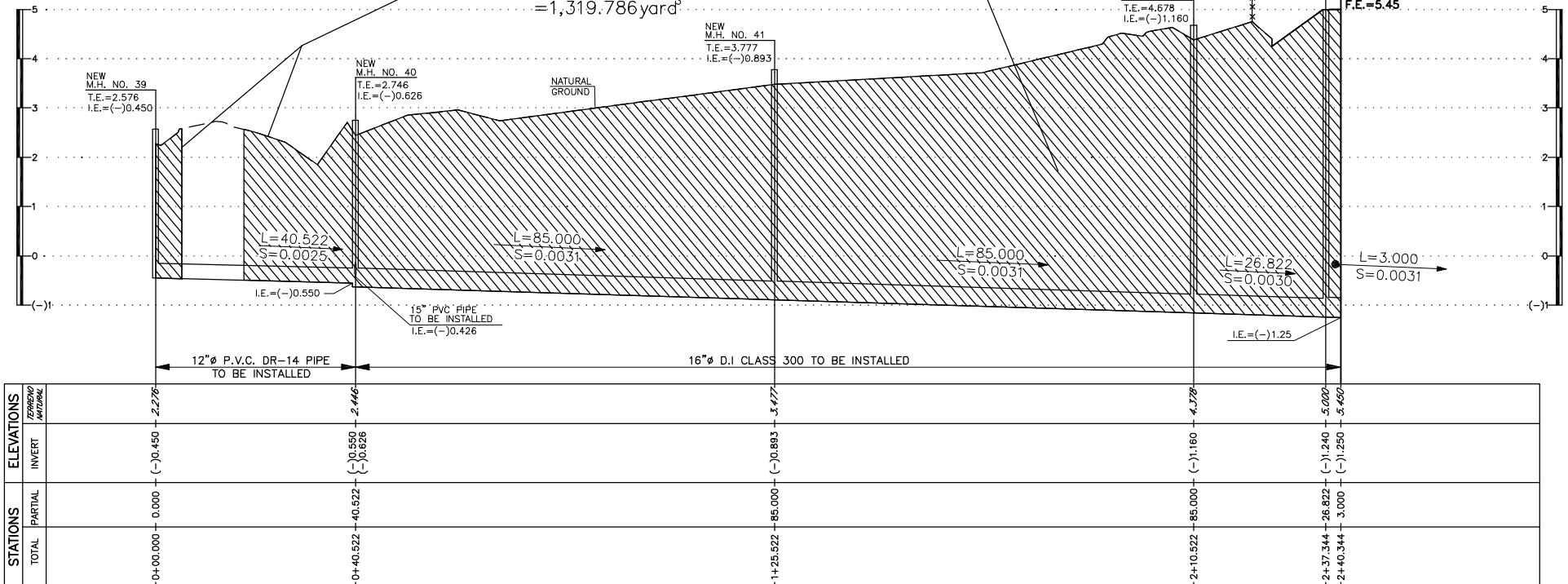
IMPACTED AREA NO. 6

EARTHWORK VOLUME=

PROFILE SECTION AREA x IMPACTED WIDTH

=993.158mtrs.² x 1.016mtrs.=1,009.049mtrs.³

=1,319.786yard³



STATIONS	TOTAL	PARTIAL	ELEVATIONS	VERTICAL	INVERT	STATION
	0+00.000	0.000				2.276
						(-)0.450
	0+40.522	40.522				2.446
						(-)0.550
						(-)0.626
	0+125.522	85.000				3.477
						(-)0.893
	2+10.522	85.000				4.178
						(-)1.160
	2+37.344	26.822				5.000
						(-)1.240
	2+40.344	3.000				5.450
						(-)1.250

PROFILE 12" & 16" PIPE (GRAVITY LINE)

SCALES: HOR.=1:1,250 VERT.=1:125

**PATILLAS - ARROYO TRUNK SEWER
AND COMPLEMENTARY WORKS**



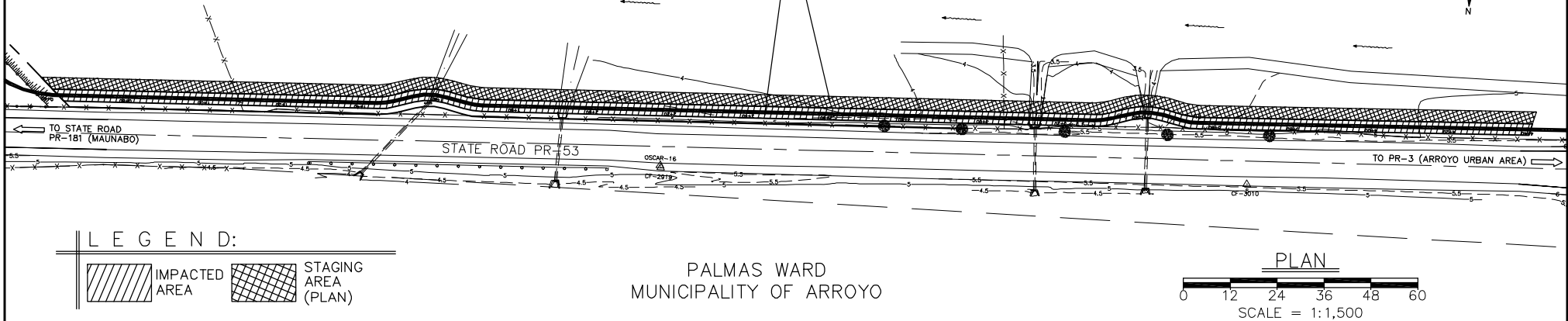
OWNER:



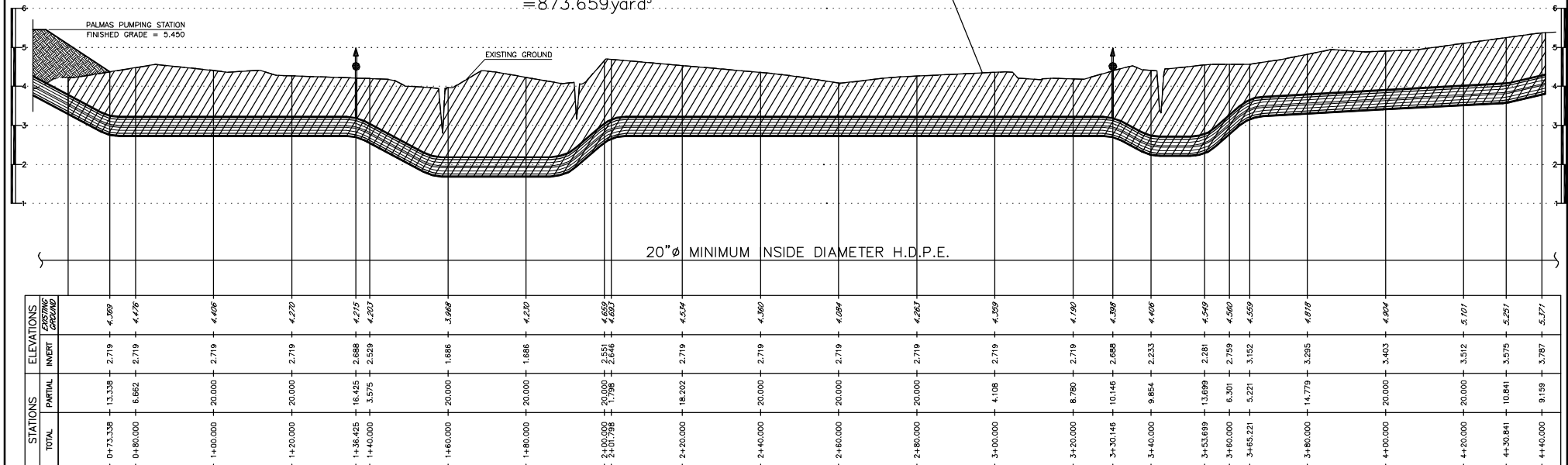
IMPACTED AREA NO. 6
EXISTING WETLAND AT NEW PALMAS
PUMPING STATION & GRAVITY LINES
SHEET NO. 6 OF 9

IMPACTED AREA NO. 7
 PIPE IMPACTED AREA=1,134.5544mtrs.²
 STAGING AREA=1,146.3033mtrs.²
 TOTAL=2,280.8577mtrs.²=0.5636acres

NOTE:
 FOR CONCRETE PROTECTION,
 TRENCH DETAILS AND NOTES
 SEE SHEET NO. 9 of 9



IMPACTED AREA NO. 7
 EARTHWORK VOLUME=
 PROFILE SECTION AREA x IMPACTED WIDTH
 =657.441mtrs.² x 1.016mtrs.=667.960mtrs.³
 =873.659yard³



PROFILE 20"Ø H.D.P.E. PIPE (FORCE MAIN)

SCALES: HORIZONTAL=1:1,500 VERTICAL=1:150

PATILLAS - ARROYO TRUNK SEWER AND COMPLEMENTARY WORKS

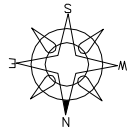


OWNER:

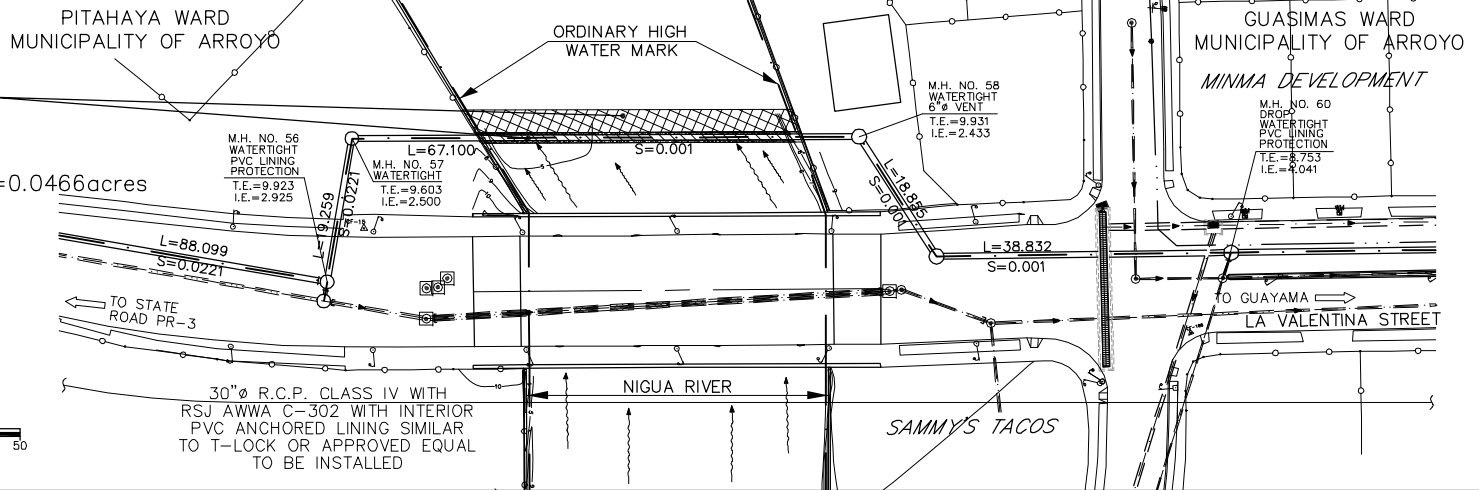
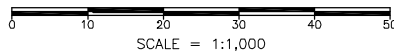


IMPACTED AREA NO. 7
 EXISTING WETLAND BETWEEN NEW PALMAS
 PUMP STATION AND STATE ROAD PR-3
 SHEET NO. 7 OF 9

IMPACTED AREA NO. 8
 PIPE IMPACTED AREA=WIDTH x LENGHT=
 1.372mtrs. x 42.770mtrs.=58.680mtrs.²
 STAGING AREA=WIDTH x LENGHT=
 3.000mtrs. x 43.291mtrs.=129.873mtrs.²
 TOTAL=IMPACTED+STAGING=
 58.680mtrs.²+129.873mtrs.²=188.583mtrs.²=0.0466acres



PLAN

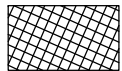


IMPACTED AREA NO. 8
 EARTHWORK VOLUME=
 PROFILE SECTION AREA x IMPACTED WIDTH
 =141.201mtrs.² x 1.372mtrs.=193.728mtrs.³
 =253.387yard³

LEGEND:



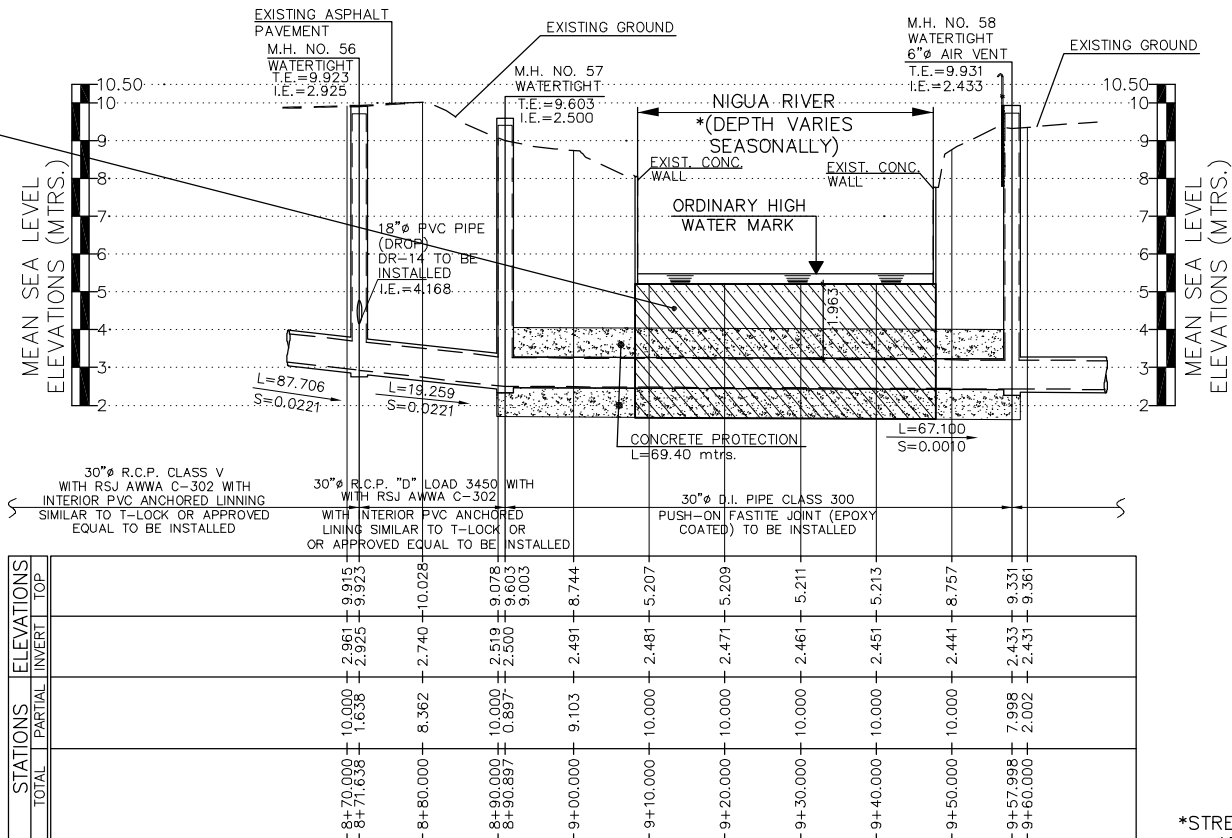
IMPACTED AREA



STAGING AREA
 (PLAN)

NOTE:

FOR CONCRETE PROTECTION,
 TRENCH DETAILS AND NOTES
 SEE SHEET NO. 9 of 9



STATIONS	ELEVATIONS		
	TOTAL	PARTIAL	INVERT TOP
8+00.000	10.000	1.638	8.362
8+10.000	10.000	2.961	7.039
8+20.000	10.000	2.925	7.075
8+30.000	10.000	2.740	7.260
8+40.000	10.000	2.519	7.481
8+50.000	10.000	2.500	7.500
8+60.000	10.000	2.491	7.509
8+70.000	10.000	2.481	7.519
8+80.000	10.000	2.471	7.529
8+90.000	10.000	2.461	7.539
8+100.000	10.000	2.451	7.549
8+110.000	10.000	2.441	7.559
8+120.000	10.000	2.431	7.569
8+130.000	10.000	2.421	7.579
8+140.000	10.000	2.411	7.589
8+150.000	10.000	2.401	7.599
8+160.000	10.000	2.391	7.609
8+170.000	10.000	2.381	7.619
8+180.000	10.000	2.371	7.629
8+190.000	10.000	2.361	7.639
8+200.000	10.000	2.351	7.649

PROFILE 30"Ø GRAVITY LINE

SCALE: HORIZONTAL=1:1,000 VERTICAL=1:200

*STREAM BED WAS DRY
 AT THE TIME OF
 THE SURVEY

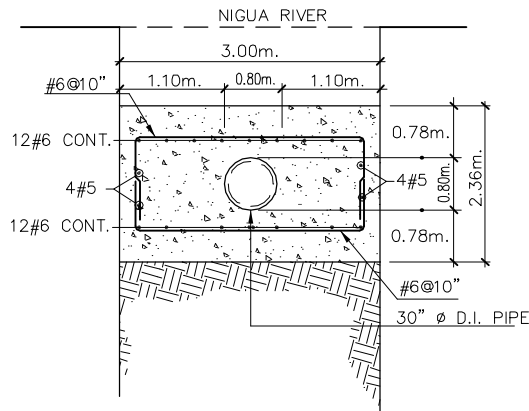
**PATILLAS - ARROYO TRUNK SEWER
 AND COMPLEMENTARY WORKS**



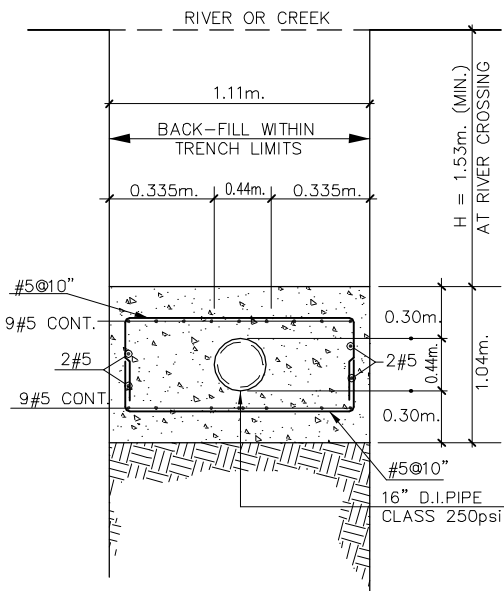
OWNER:



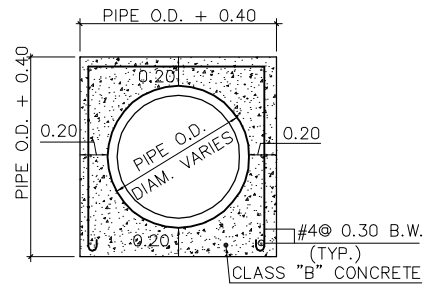
IMPACTED AREA NO. 8
 CROSSING UNDER "NIGUA" RIVER
 SHEET NO. 8 OF 9



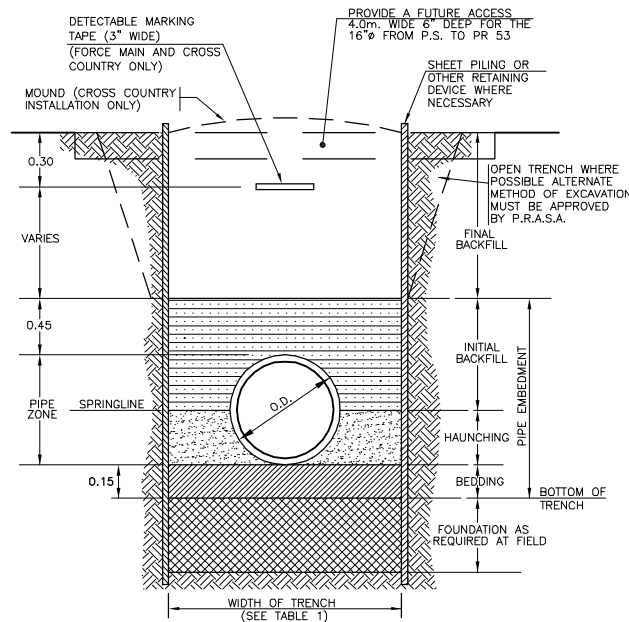
CONCRETE
PROTECTION DETAIL
FOR NIGUA RIVER CROSSING
NOT TO SCALE



CONCRETE PROTECTION
DETAIL FOR RIVER
OR CREEK CROSSING
NOT TO SCALE

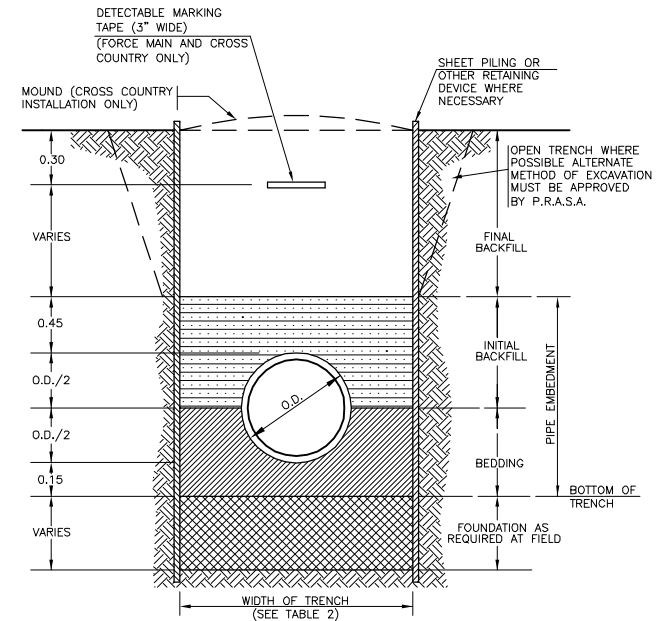


CONCRETE
PROTECTION DETAIL
NOT TO SCALE



TRENCH DETAILS FOR
P.V.C. & HDPE PIPES
NOT TO SCALE

TABLE 1 WIDTH OF TRENCH		NOTE:
DIAMETER (INCHES)	*WIDTH OF TRENCH AT TOP OF PIPE (INCHES)	
4"-27"	O.D. + 24"	* WHENEVER MOVABLE SHEET PILING OR OTHER TRENCH PROTECTION IS USED BELOW THE TOP OF THE PIPE, THE CLEAR DISTANCE BETWEEN THE OUTSIDE FACE OF THE PIPE AND THE MOVABLE TRENCH SUPPORT SHALL BE NOT LESS THAN 2-1/2" X OUTSIDE PIPE DIAMETER.



TRENCH DETAILS FOR
CONCRETE AND D.I. PIPES
NOT TO SCALE

TABLE 2 WIDTH OF TRENCH		NOTE:
DIAMETER (INCHES)	*WIDTH OF TRENCH AT TOP OF PIPE (INCHES)	
18" - 84"	O.D. + 24"	* WHENEVER MOVABLE SHEET PILING OR OTHER TRENCH PROTECTION IS USED BELOW THE TOP OF THE PIPE, THE CLEAR DISTANCE BETWEEN THE OUTSIDE FACE OF THE PIPE AND THE MOVABLE TRENCH SUPPORT SHALL BE NOT LESS THAN 2-1/2" X OUTSIDE PIPE DIAMETER.

NOTE:

FOUNDATION AND BEDDING:

- 1) MATERIALS AS CLASSIFIED BY USCS AS PER ASTM D-2487 SOILS CLASSES 1-2-3 WHERE CRUSHED GRAVEL OR CRUSHED STONE IS USED IT SHALL AS PER ASTM C-33 GRADATION NO. 67
- 2) FILL MATERIAL SHALL BE PLACED IN 0.15 mt. LAYERS.
- 3) COMPACT TO 95% OF MODIFIED PROCTOR TEST AS PER ASTM D-1557 FOR COHESIVE SOILS OR 70% OF MAX. RELATIVE DENSITY AS PER ASTM D-2049 FOR GRANULAR SOILS. TESTS SHALL BE PERFORMED AT 50 MTS. INTERVALS. COMPACTING EFFORT NOT REQUIRED WHEN USING CRUSHED STONE OR CRUSHED GRAVEL GRADATION NO. 67.

INITIAL BACKFILL CROSS COUNTRY:

- 1) PREVIOUS EXCAVATED MATERIAL FREE FROM BOULDERS AND STONES LARGER THAN 2"
- 2) FILL MATERIAL SHALL BE PLACED IN 0.30 mt. LAYERS.
- 3) COMPACTING EFFORT NOT REQUIRED OTHER THAN OBTAINED BY SPREADING AND LEVELING BACKFILL MATERIAL. ROLLING EQUIPMENT NOT ALLOWED FOR WORKING BACKFILL MATERIAL IN THIS SECTOR OF TRENCH.

FINAL BACKFILL-CROSS COUNTRY:

- 1) PREVIOUS EXCAVATED MATERIAL.
- 2) FILL MATERIAL SHALL BE LOOSELY PLACED IN 0.90 mt. LAYERS.
- 3) COMPACTING AS OBTAINED BY ROLLING WITH THE PLACEMENT EQUIPMENT.
- 4) MOUND THE SURFACE AND FILL AND MAINTAIN ALL SUNKEN TRENCHES UNTIL FINAL ACCEPTANCE OF THE PROJECT.