

MEMORANDUM FOR RECORD

20 MAY 2011

SUBJECT: ADDITIONAL INFO ON HDD

1. ENCLOSED DRAWINGS PROVIDED BY APPLICANT (LARRY EVANS) AT MEETING 20 MAY 2011 TO ACCOMPANY THE FRAC-OUT AND EROSION CONTROL PLAN (SUBMITTED W/ PERMIT APPLICATION) IN ORDER TO EVALUATE POTENTIAL FOR MATERIAL (EG. BENTONITE) REACHING OPEN WATER AND CORALS OFF COAST.

2. LARRY NOTED IS CLAY DRILLING THROUGH.

Exemption (b)(6)

July 16, 2009

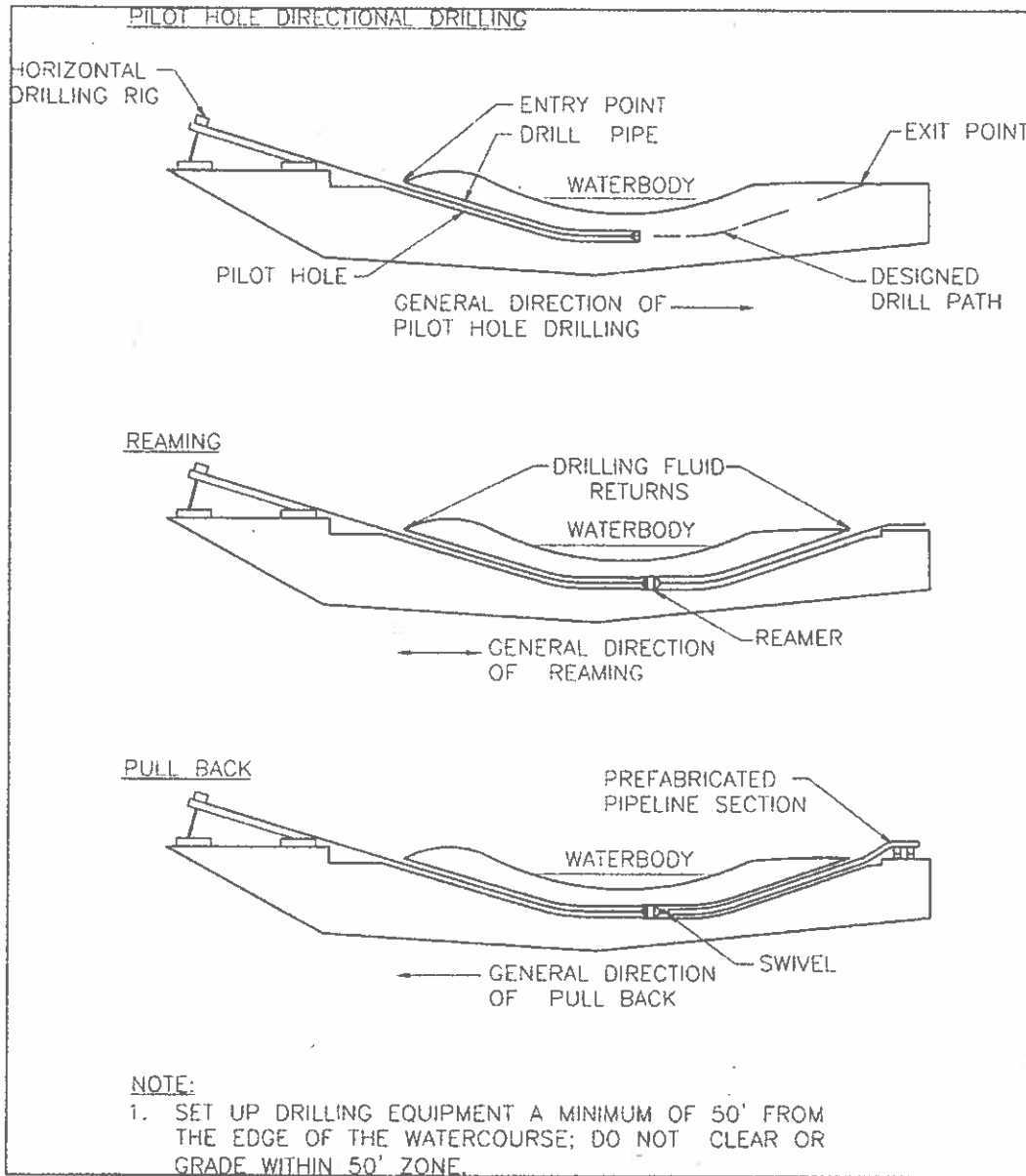


Figure 9 Horizontal Directionally Drilled (HDD) Crossing

CARRIER PIPE

24" O.D. X 0.500" W.T.
 AP-5C-X70 14 MILS MIN. FBE
 COATED WITH 40MILS ABRASION RESISTANT OVERCOAT

HYDROSTATIC TEST

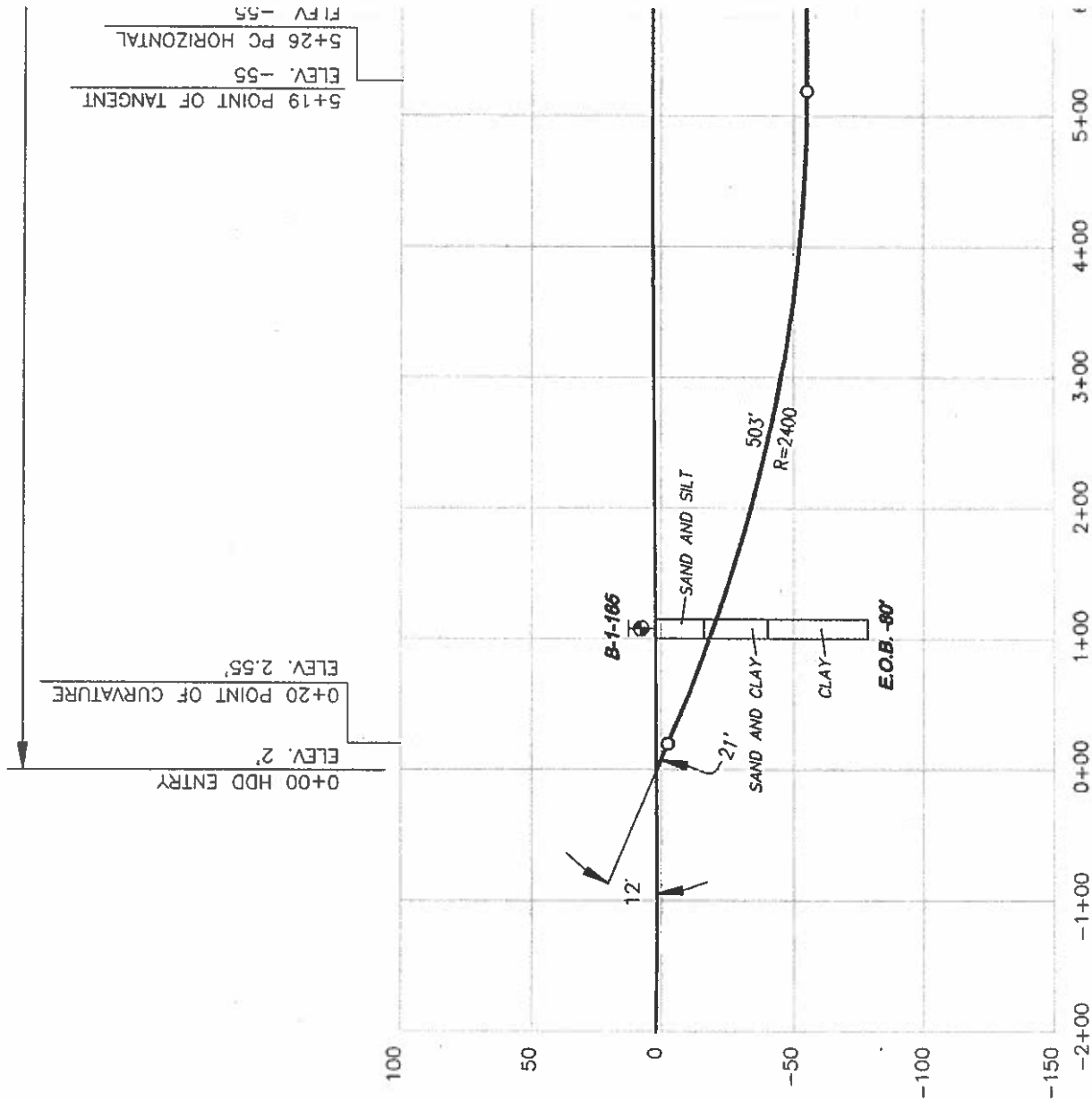
PRIOR TO INSTALLATION CARRIER PIPE SHALL BE HYDROSTATICALLY TESTED FOR 4 HOURS. MINIMUM TEST PRESSURE SHALL BE 2025 PSL. MAXIMUM TEST PRESSURE SHALL BE 2800 PSI.

DIRECTIONAL DRILL NOTES

- CONTRACTOR TO SUPPLY AND INSTALL A CONDUIT IN THE HDD CROSSING. CONDUIT SHALL BE BUNDLED WITH THE PIPELINE AND INSTALLED IN A COMMON BORE. THE HDD BORE DIAMETER SHALL BE 40" - 42". ALTERNATIVELY THE CONDUIT MAY BE INSTALLED IN A SEPARATE HDD BORE. IN THIS CASE THE BORE FOR THE PIPELINE SHALL BE 34"-36". THE CONDUIT MUST BE INSTALLED WITHIN THE PERMANENT EASEMENT. CONDUIT SHALL BE INSTALLED NO LESS THAN 1' FROM EDGE OF PERMANENT EASEMENT AT A DEPTH NO SHALLOWER THAN THE PIPELINE. THE CONDUIT SHALL CONSIST OF 4-1/2" O.D. x 0.237" W.T. WELDED STEEL PIPE.
- MINIMUM ALLOWABLE 3 JOINT RADIUS 2000'.
- HORIZONTAL POSITION OF BOREHOLE SHALL BE NO LESS THAN 1' FROM EDGE OF PERMANENT R.O.W.
- DRILLED ENTRY POINT SHALL BE EXACTLY AT LOCATION SHOWN.
- DRILLED EXIT POINT SHALL NOT BE MORE THAN 10' FROM DESIGNED CENTERLINE. (ALSO SEE NOTE 3)
- HDD BORE WILL NOT BE INSTALLED AT A DEPTH SHALLOWER THAN SHOWN.
- AFTER INSTALLATION IS COMPLETE A GAUGING PLATE SHALL BE RUN THROUGH CARRIER PIPE. GAUGING PLATE SHALL HAVE A DIAMETER OF 22.5". PLATE MATERIAL SHALL BE 1/2" ALUMINUM PLATE.
- GEOTECHNICAL DATA SHOWN IS CURRENT AS OF 11/30/10. GEOTECHNICAL INVESTIGATION IS ONGOING.
- DRILL FLUID AND DRILL SPILLS SHALL BE DISPOSED OF EITHER AT AN APPROVED LANDFILL OR BY MIXING WITH TOPSOIL AT AN APPROVED SITE.
- DISPOSAL SITES TO BE DETERMINED BY CONTRACTOR AND SUBMITTED TO "PREPA" FOR APPROVAL PRIOR TO USE.
- THERE SHALL BE NO CLEARING OF TREES BETWEEN THE ENTRY SIDE WORKSPACE AND THE EXIT SIDE WORKSPACE. MINOR BRUSH CLEARINGS, DOWNHOLE SURVEY SYSTEM.
- CONTRACTOR SHALL IDENTIFY WATER SOURCE FOR DRILL FLUID MAKEUP. SOURCES MUST BE APPROVED BY PREPA PRIOR TO STARTING WORK.
- WATER SOURCE AND DISCHARGE POINT FOR HYDROSTATIC TEST OF PIPE PRIOR TO PULLBACK SHALL BE AS PER HYDROSTATIC TEST PLAN AND APPLICABLE PERMITS.
- ELEVATIONS SHOWN ARE BASED ON SURVEY DATA PROVIDED BY OTHERS. ELEVATIONS ARE APPROXIMATE AND MUST BE FIELD VERIFIED BY CONTRACTOR PRIOR TO BEGINNING CONSTRUCTION.
- PHOTOGRAPHY SHOWN IS OF UNKNOWN VANTAGE AND MAY NOT DEPICT CURRENT CONDITIONS.
- COORDINATES PROVIDED ARE BASE UPON NAD 83 PUERTO RICO AND VIRGIN ISLANDS, US FOOT.

NOTES:

- WATERBODY CROSSING CONSTRUCTION, RESTORATION AND MITIGATION WILL BE PERFORMED IN ACCORDANCE WITH TERMS & CONDITIONS OF APPLICABLE PERMITS AND PREPA'S EROSION PREVENTION AND SEDIMENT CONTROL AND WETLAND & WATERBODY CONSTRUCTION GUIDANCE MANUAL.
- SEDIMENT BARRIERS SHALL BE INSTALLED AND MAINTAINED AS PER ALL APPLICABLE STORMWATER CONTROL REQUIREMENTS.
- THE LOCATIONS OF ALL UTILITIES SHOWN ARE APPROXIMATE. CONTRACTOR TO FIELD VERIFY LOCATIONS AND DEPTHS PRIOR TO CONSTRUCTION. THIS INCLUDES CONTACTING THE PRET EXCAVATION CENTER 72 HOURS PRIOR TO BEGINNING WORK. (787) 792-7478
- WORKMATS OR OTHER APPROVED PROTECTION TO BE INSTALLED OVER FOREGOING LINES. OWNERS OF FOREGOING PIPELINES TO BE NOTIFIED 48 HOURS PRIOR TO BEGINNING WORK.

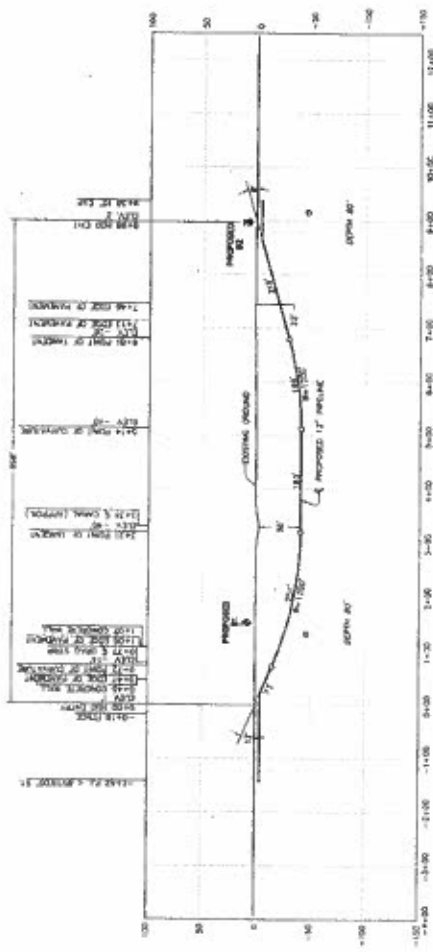
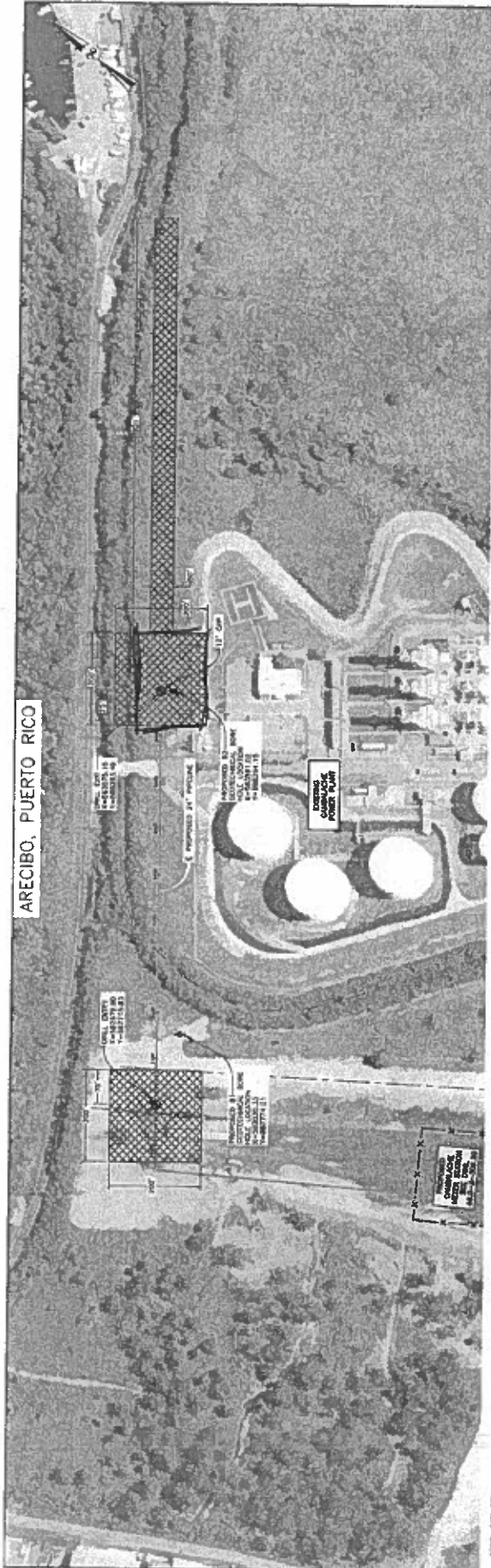


<p>1. ALL DIMENSIONS ARE IN FEET AND DECIMALS THEREOF.</p> <p>2. ALL DIMENSIONS ARE TO CENTERLINE UNLESS OTHERWISE NOTED.</p> <p>3. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE NOTED.</p> <p>4. ALL DIMENSIONS ARE TO CENTERLINE UNLESS OTHERWISE NOTED.</p> <p>5. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE NOTED.</p> <p>6. ALL DIMENSIONS ARE TO CENTERLINE UNLESS OTHERWISE NOTED.</p> <p>7. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE NOTED.</p> <p>8. ALL DIMENSIONS ARE TO CENTERLINE UNLESS OTHERWISE NOTED.</p> <p>9. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE NOTED.</p> <p>10. ALL DIMENSIONS ARE TO CENTERLINE UNLESS OTHERWISE NOTED.</p>	<p>11. ALL DIMENSIONS ARE IN FEET AND DECIMALS THEREOF.</p> <p>12. ALL DIMENSIONS ARE TO CENTERLINE UNLESS OTHERWISE NOTED.</p> <p>13. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE NOTED.</p> <p>14. ALL DIMENSIONS ARE TO CENTERLINE UNLESS OTHERWISE NOTED.</p> <p>15. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE NOTED.</p> <p>16. ALL DIMENSIONS ARE TO CENTERLINE UNLESS OTHERWISE NOTED.</p> <p>17. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE NOTED.</p> <p>18. ALL DIMENSIONS ARE TO CENTERLINE UNLESS OTHERWISE NOTED.</p> <p>19. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE NOTED.</p> <p>20. ALL DIMENSIONS ARE TO CENTERLINE UNLESS OTHERWISE NOTED.</p>
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<p>DATE: 11/15/10</p> <p>SCALE: 1"=100'</p> <p>PROJECT: VIA VERDE PIPELINE PROJECT</p> <p>CONSTRUCTION ALIGNMENT SHEET</p> <p>CAMBALOGUE LATERAL A VERDE WATER FEED LINE</p> <p>BTLA 0+00 TO BTLA 0+75</p> <p>AMERICAN, PUERTO RICO</p>	<p>NO. OF SHEETS: 12</p> <p>SHEET NO.: 1</p> <p>DATE: 11/15/10</p> <p>SCALE: 1"=100'</p> <p>PROJECT: VIA VERDE PIPELINE PROJECT</p> <p>CONSTRUCTION ALIGNMENT SHEET</p> <p>CAMBALOGUE LATERAL A VERDE WATER FEED LINE</p> <p>BTLA 0+00 TO BTLA 0+75</p> <p>AMERICAN, PUERTO RICO</p>
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ARECIBO, PUERTO RICO



PRELIMINARY
DO NOT USE FOR
CONSTRUCTION

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NOTES:

1. ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE LATEST EDITIONS OF THE P.R. DEPARTMENT OF TRANSPORTATION AND PUBLIC WORKS SPECIFICATIONS.
2. THE PROPOSED PIPELINE SHALL BE INSTALLED AT A DEPTH OF 10 FEET BELOW FINISH GRADE UNLESS OTHERWISE NOTED.
3. THE PROPOSED PIPELINE SHALL BE MADE OF 17" DIA. HDPE PIPE WITH A WALL THICKNESS OF 1.5 INCHES.
4. THE PROPOSED PIPELINE SHALL BE SUPPORTED BY 12" DIA. CONCRETE PILES SPACED AT 10 FEET ON CENTER.
5. THE PROPOSED PIPELINE SHALL BE COVERED WITH 18 INCHES OF SAND AND 18 INCHES OF GRAVEL.
6. THE PROPOSED PIPELINE SHALL BE PROTECTED BY 18 INCHES OF CONCRETE SLAB.
7. THE PROPOSED PIPELINE SHALL BE INSTALLED IN ACCORDANCE WITH THE LATEST EDITIONS OF THE P.R. DEPARTMENT OF TRANSPORTATION AND PUBLIC WORKS SPECIFICATIONS.
8. THE PROPOSED PIPELINE SHALL BE INSTALLED IN ACCORDANCE WITH THE LATEST EDITIONS OF THE P.R. DEPARTMENT OF TRANSPORTATION AND PUBLIC WORKS SPECIFICATIONS.
9. THE PROPOSED PIPELINE SHALL BE INSTALLED IN ACCORDANCE WITH THE LATEST EDITIONS OF THE P.R. DEPARTMENT OF TRANSPORTATION AND PUBLIC WORKS SPECIFICATIONS.
10. THE PROPOSED PIPELINE SHALL BE INSTALLED IN ACCORDANCE WITH THE LATEST EDITIONS OF THE P.R. DEPARTMENT OF TRANSPORTATION AND PUBLIC WORKS SPECIFICATIONS.

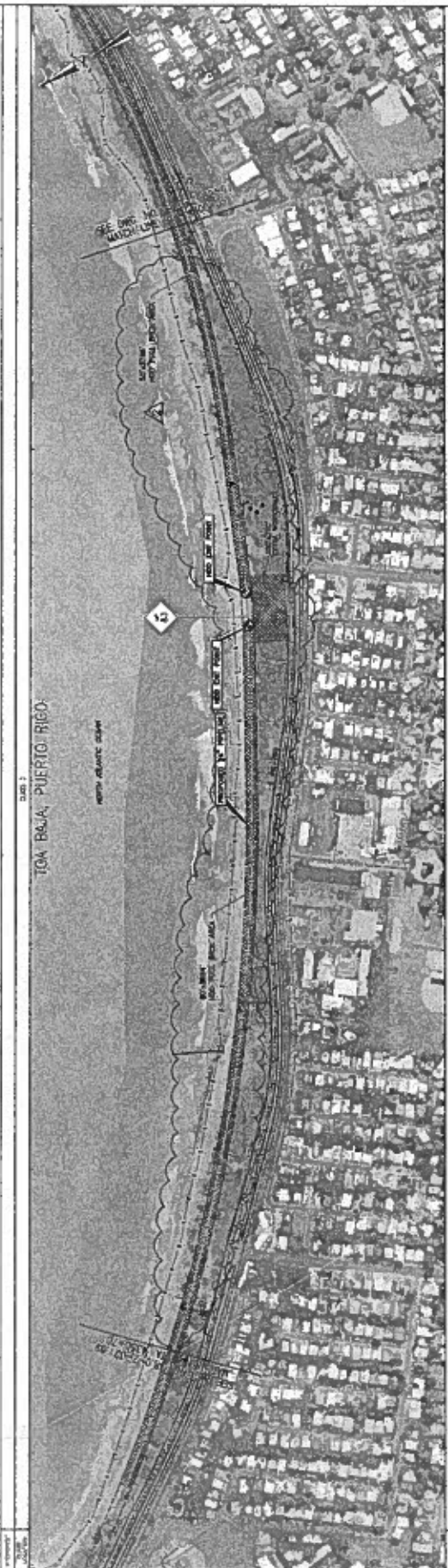
		VIA VERDE PIPELINE PROJECT HORIZONTAL DIRECTIONAL DRILL PROPOSED VIA VERDE PIPELINE CAMAGUEY POWER STATIONING ARECIBO, PUERTO RICO	
DATE: 08-11-2011 DRAWN BY: [Name] CHECKED BY: [Name] SCALE: 1" = 100' H & V	PROJECT NO.: 48-3-2-305.23 SHEET NO.: 1 OF 10	PROJECT NO.: 48-3-2-305.23 SHEET NO.: 1 OF 10	PROJECT NO.: 48-3-2-305.23 SHEET NO.: 1 OF 10

1354'	1341'	1388'	1354'
1354'	1341'	1388'	1354'
1354'	1341'	1388'	1354'
1354'	1341'	1388'	1354'



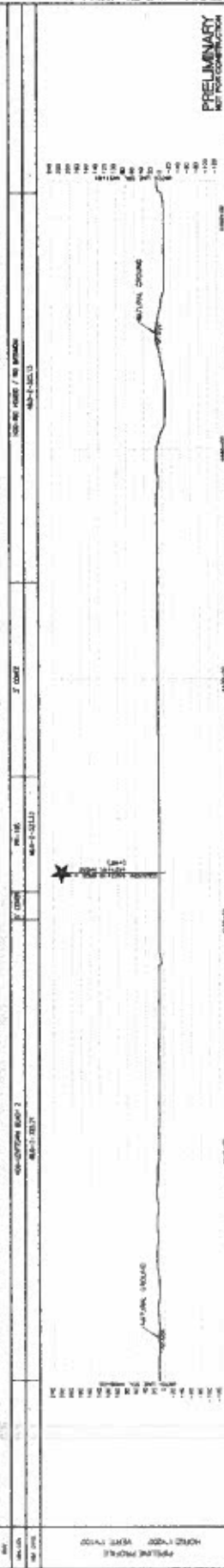
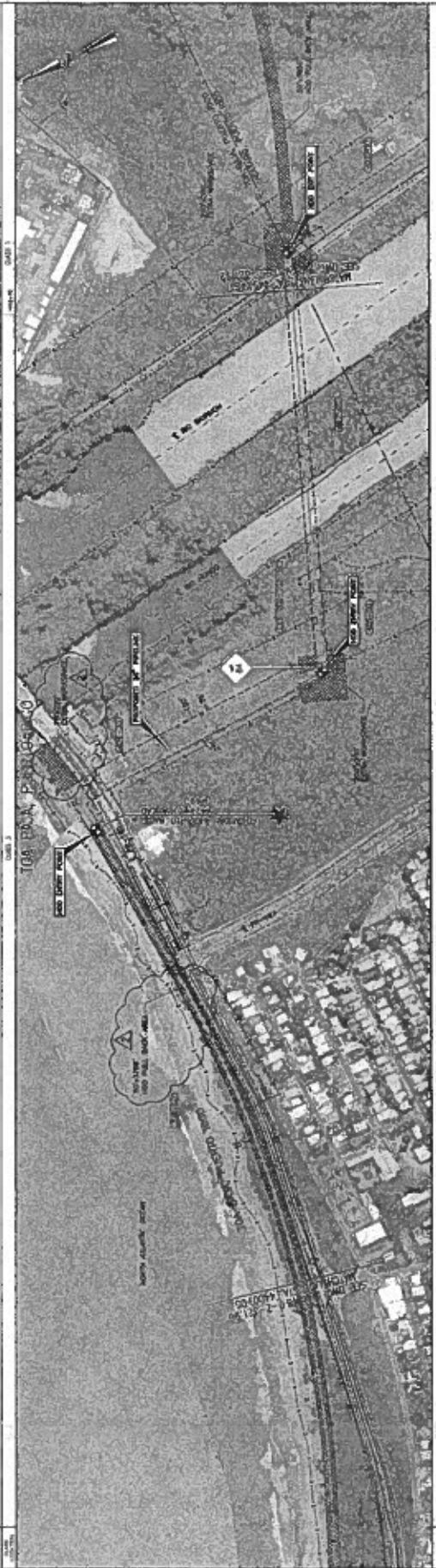
<p>PROJECT: PIPELINE PROJECT CONTRACTOR: MCM ENGINEERING PROPOSED: VIA VERDE PARALLEL ELECUTRICA TO SAN JUAN STA. 0+00 TO STA. 0+70</p> <p>DATE: 08-23-2012 DRAWN BY: [Name] CHECKED BY: [Name]</p> <p>SCALE: AS SHOWN</p>	<p>DATE: 08-23-2012 DRAWN BY: [Name] CHECKED BY: [Name]</p> <p>SCALE: AS SHOWN</p>	<p>DATE: 08-23-2012 DRAWN BY: [Name] CHECKED BY: [Name]</p> <p>SCALE: AS SHOWN</p>	<p>DATE: 08-23-2012 DRAWN BY: [Name] CHECKED BY: [Name]</p> <p>SCALE: AS SHOWN</p>
<p>PROJECT: PIPELINE PROJECT CONTRACTOR: MCM ENGINEERING PROPOSED: VIA VERDE PARALLEL ELECUTRICA TO SAN JUAN STA. 0+00 TO STA. 0+70</p> <p>DATE: 08-23-2012 DRAWN BY: [Name] CHECKED BY: [Name]</p> <p>SCALE: AS SHOWN</p>	<p>DATE: 08-23-2012 DRAWN BY: [Name] CHECKED BY: [Name]</p> <p>SCALE: AS SHOWN</p>	<p>DATE: 08-23-2012 DRAWN BY: [Name] CHECKED BY: [Name]</p> <p>SCALE: AS SHOWN</p>	<p>DATE: 08-23-2012 DRAWN BY: [Name] CHECKED BY: [Name]</p> <p>SCALE: AS SHOWN</p>

NO. 1	NO. 2	NO. 3	NO. 4	NO. 5	NO. 6	NO. 7	NO. 8	NO. 9	NO. 10	NO. 11	NO. 12	NO. 13	NO. 14	NO. 15	NO. 16	NO. 17	NO. 18	NO. 19	NO. 20	NO. 21	NO. 22	NO. 23	NO. 24	NO. 25	NO. 26	NO. 27	NO. 28	NO. 29	NO. 30	NO. 31	NO. 32	NO. 33	NO. 34	NO. 35	NO. 36	NO. 37	NO. 38	NO. 39	NO. 40	NO. 41	NO. 42	NO. 43	NO. 44	NO. 45	NO. 46	NO. 47	NO. 48	NO. 49	NO. 50	NO. 51	NO. 52	NO. 53	NO. 54	NO. 55	NO. 56	NO. 57	NO. 58	NO. 59	NO. 60	NO. 61	NO. 62	NO. 63	NO. 64	NO. 65	NO. 66	NO. 67	NO. 68	NO. 69	NO. 70	NO. 71	NO. 72	NO. 73	NO. 74	NO. 75	NO. 76	NO. 77	NO. 78	NO. 79	NO. 80	NO. 81	NO. 82	NO. 83	NO. 84	NO. 85	NO. 86	NO. 87	NO. 88	NO. 89	NO. 90	NO. 91	NO. 92	NO. 93	NO. 94	NO. 95	NO. 96	NO. 97	NO. 98	NO. 99	NO. 100
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PROPOSED VIA VERDE PIPELINE CONSTRUCTION ALIGNMENT SHEET STA. 4550+70 TO STA. 4600+05 TOTA BAJA, PUERTO RICO		VIA VERDE PIPELINE PROJECT
DATE: 11/11/03 DRAWN BY: J. L. GARCIA CHECKED BY: J. L. GARCIA SCALE: AS SHOWN	PROJECT NO.: 48-0-2321-90 SHEET NO.: 30 OF 86	PROJECT NO.: 48-0-2321-90 SHEET NO.: 30 OF 86
NO. 1 NO. 2 NO. 3 NO. 4 NO. 5 NO. 6 NO. 7 NO. 8 NO. 9 NO. 10 NO. 11 NO. 12 NO. 13 NO. 14 NO. 15 NO. 16 NO. 17 NO. 18 NO. 19 NO. 20 NO. 21 NO. 22 NO. 23 NO. 24 NO. 25 NO. 26 NO. 27 NO. 28 NO. 29 NO. 30 NO. 31 NO. 32 NO. 33 NO. 34 NO. 35 NO. 36 NO. 37 NO. 38 NO. 39 NO. 40 NO. 41 NO. 42 NO. 43 NO. 44 NO. 45 NO. 46 NO. 47 NO. 48 NO. 49 NO. 50 NO. 51 NO. 52 NO. 53 NO. 54 NO. 55 NO. 56 NO. 57 NO. 58 NO. 59 NO. 60 NO. 61 NO. 62 NO. 63 NO. 64 NO. 65 NO. 66 NO. 67 NO. 68 NO. 69 NO. 70 NO. 71 NO. 72 NO. 73 NO. 74 NO. 75 NO. 76 NO. 77 NO. 78 NO. 79 NO. 80 NO. 81 NO. 82 NO. 83 NO. 84 NO. 85 NO. 86 NO. 87 NO. 88 NO. 89 NO. 90 NO. 91 NO. 92 NO. 93 NO. 94 NO. 95 NO. 96 NO. 97 NO. 98 NO. 99 NO. 100	NO. 1 NO. 2 NO. 3 NO. 4 NO. 5 NO. 6 NO. 7 NO. 8 NO. 9 NO. 10 NO. 11 NO. 12 NO. 13 NO. 14 NO. 15 NO. 16 NO. 17 NO. 18 NO. 19 NO. 20 NO. 21 NO. 22 NO. 23 NO. 24 NO. 25 NO. 26 NO. 27 NO. 28 NO. 29 NO. 30 NO. 31 NO. 32 NO. 33 NO. 34 NO. 35 NO. 36 NO. 37 NO. 38 NO. 39 NO. 40 NO. 41 NO. 42 NO. 43 NO. 44 NO. 45 NO. 46 NO. 47 NO. 48 NO. 49 NO. 50 NO. 51 NO. 52 NO. 53 NO. 54 NO. 55 NO. 56 NO. 57 NO. 58 NO. 59 NO. 60 NO. 61 NO. 62 NO. 63 NO. 64 NO. 65 NO. 66 NO. 67 NO. 68 NO. 69 NO. 70 NO. 71 NO. 72 NO. 73 NO. 74 NO. 75 NO. 76 NO. 77 NO. 78 NO. 79 NO. 80 NO. 81 NO. 82 NO. 83 NO. 84 NO. 85 NO. 86 NO. 87 NO. 88 NO. 89 NO. 90 NO. 91 NO. 92 NO. 93 NO. 94 NO. 95 NO. 96 NO. 97 NO. 98 NO. 99 NO. 100	NO. 1 NO. 2 NO. 3 NO. 4 NO. 5 NO. 6 NO. 7 NO. 8 NO. 9 NO. 10 NO. 11 NO. 12 NO. 13 NO. 14 NO. 15 NO. 16 NO. 17 NO. 18 NO. 19 NO. 20 NO. 21 NO. 22 NO. 23 NO. 24 NO. 25 NO. 26 NO. 27 NO. 28 NO. 29 NO. 30 NO. 31 NO. 32 NO. 33 NO. 34 NO. 35 NO. 36 NO. 37 NO. 38 NO. 39 NO. 40 NO. 41 NO. 42 NO. 43 NO. 44 NO. 45 NO. 46 NO. 47 NO. 48 NO. 49 NO. 50 NO. 51 NO. 52 NO. 53 NO. 54 NO. 55 NO. 56 NO. 57 NO. 58 NO. 59 NO. 60 NO. 61 NO. 62 NO. 63 NO. 64 NO. 65 NO. 66 NO. 67 NO. 68 NO. 69 NO. 70 NO. 71 NO. 72 NO. 73 NO. 74 NO. 75 NO. 76 NO. 77 NO. 78 NO. 79 NO. 80 NO. 81 NO. 82 NO. 83 NO. 84 NO. 85 NO. 86 NO. 87 NO. 88 NO. 89 NO. 90 NO. 91 NO. 92 NO. 93 NO. 94 NO. 95 NO. 96 NO. 97 NO. 98 NO. 99 NO. 100

STATION	VERTICAL CURVE DATA	GRADES	VERTICAL ALIGNMENT
1+00	1.00	1.00	1.00
2+00	2.00	2.00	2.00
3+00	3.00	3.00	3.00
4+00	4.00	4.00	4.00
5+00	5.00	5.00	5.00
6+00	6.00	6.00	6.00
7+00	7.00	7.00	7.00
8+00	8.00	8.00	8.00
9+00	9.00	9.00	9.00
10+00	10.00	10.00	10.00
11+00	11.00	11.00	11.00
12+00	12.00	12.00	12.00
13+00	13.00	13.00	13.00
14+00	14.00	14.00	14.00
15+00	15.00	15.00	15.00
16+00	16.00	16.00	16.00
17+00	17.00	17.00	17.00
18+00	18.00	18.00	18.00
19+00	19.00	19.00	19.00
20+00	20.00	20.00	20.00



MATERIAL QUANTITIES		MATERIAL QUANTITIES		MATERIAL QUANTITIES	
ITEM	QUANTITY	ITEM	QUANTITY	ITEM	QUANTITY
1. GRAVEL	1000	1. SAND	500	1. ASPHALT	200
2. CONCRETE	500	2. BRICK	100	2. PLASTER	100
3. STEEL	100	3. WOOD	50	3. PAINT	50
4. CEMENT	200	4. GLASS	20	4. INSULATION	100
5. BRICK	100	5. TILE	50	5. ROOFING	50
6. PLASTER	50	6. PAINT	20	6. INSULATION	50
7. ROOFING	20	7. INSULATION	10	7. OTHER	10
8. OTHER	10	8. TOTAL	1000	8. TOTAL	1000

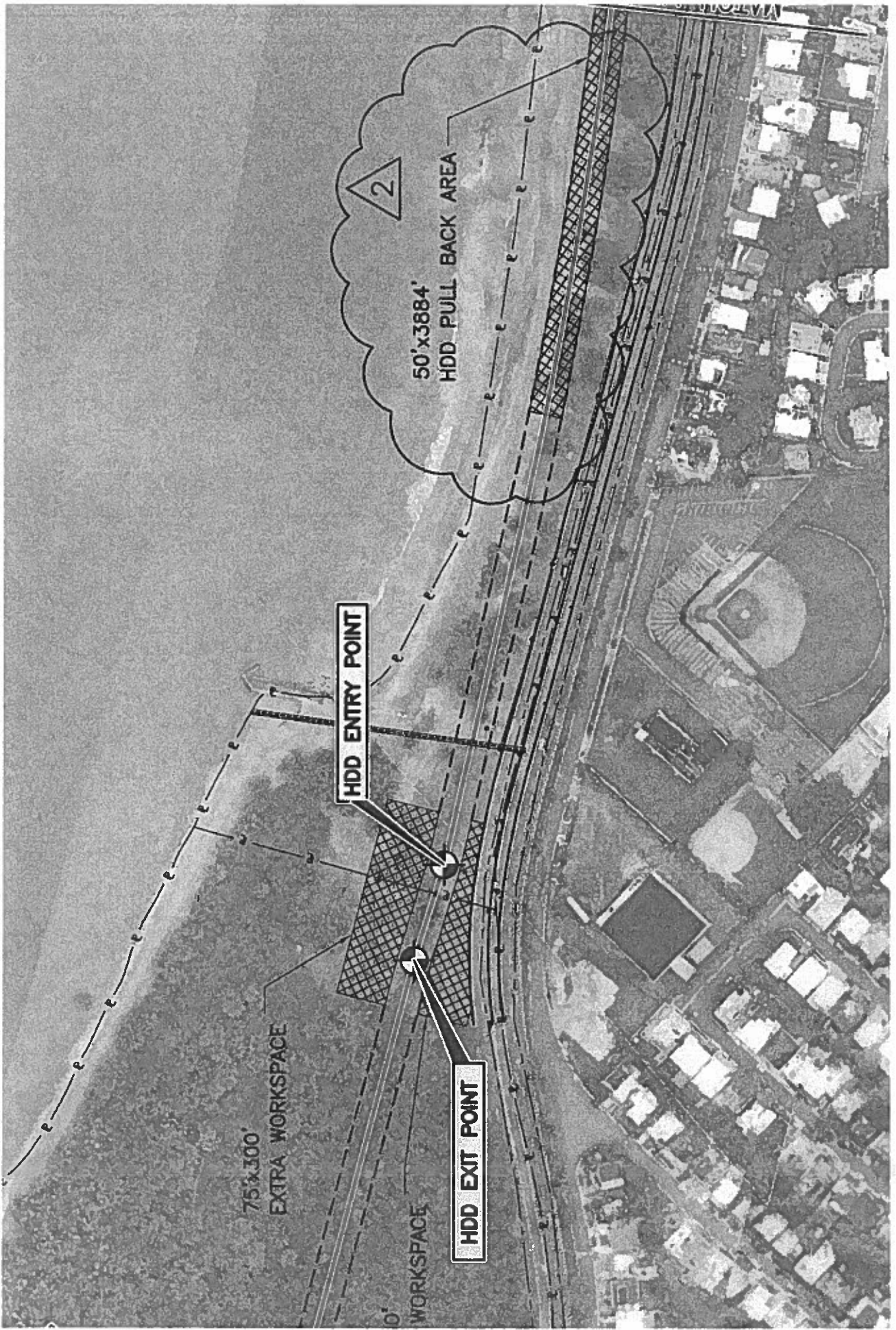
PRELIMINARY
NOT FOR CONSTRUCTION

VIA VERDE
PIPELINE PROJECT
CONSTRUCTION ALIGNMENT SHEET
PROPOSED VIA VERDE PIPELINE
ELECTRIFICATION TO SAN JUAN
STATION, STA. 10+00 TO STA. 20+00
LOS ALAMOS, PUEBLO CO.

DATE: 08/14/14
SCALE: AS SHOWN
SHEET NO. 91 OF 96
PROJECT NO. 48-D-2-221.01

DESIGNED BY: [Name]
CHECKED BY: [Name]
APPROVED BY: [Name]

DATE: 08/14/14



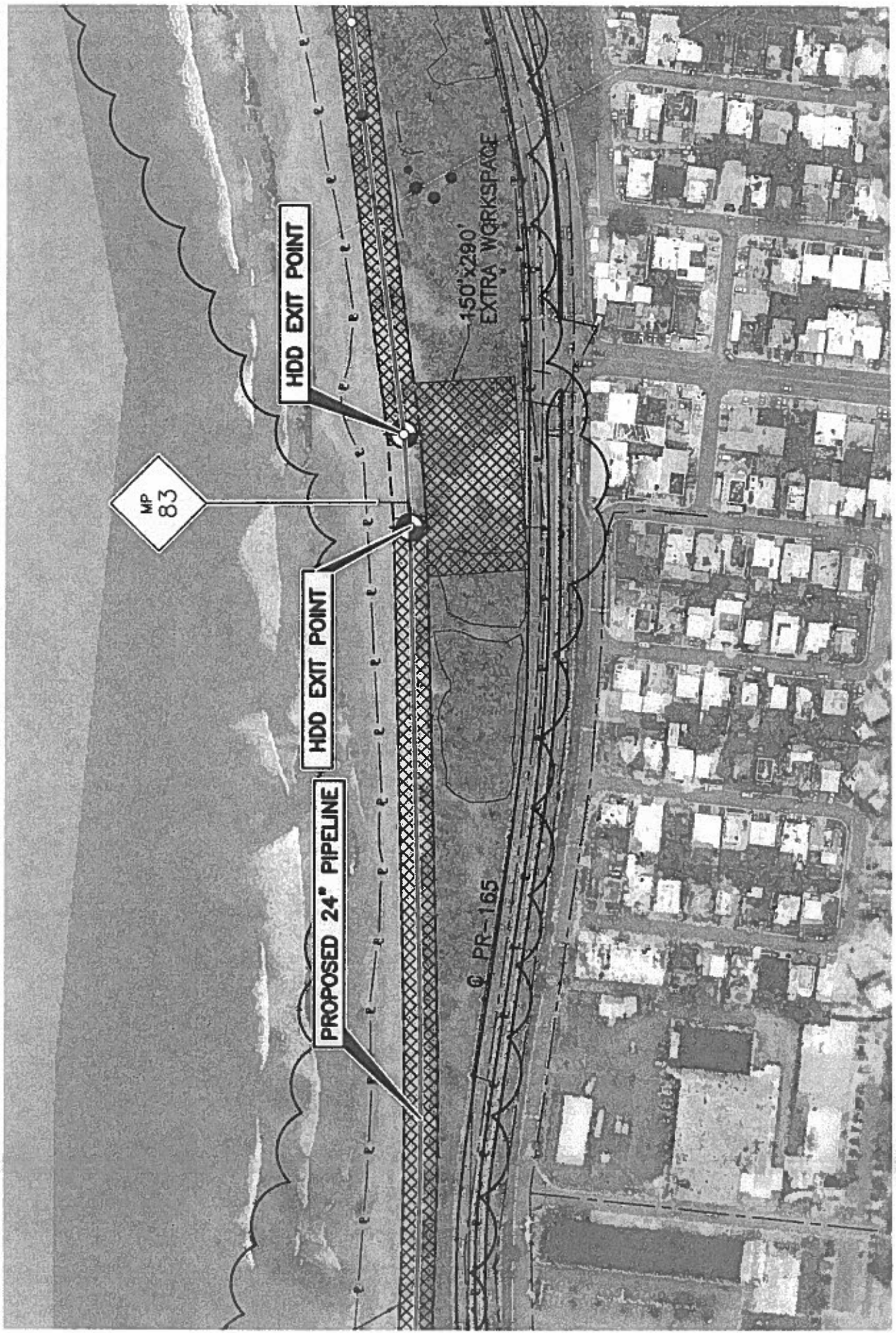
HDD ENTRY POINT

HDD EXIT POINT

75'x300'
EXTRA WORKSPACE

10'
WORKSPACE

2
50'x3884'
HDD PULL BACK AREA



HDD EXIT POINT

150' x 290'
EXTRA WORKSPACE

MP
83

HDD EXIT POINT

PROPOSED 24" PIPELINE

PR-165

TOA BAJA, PUERTO RICO

HDD ENTRY POINT

75'x220'
EXTRA WORKSPACE

PROPOSED 24" PIP

MP
84

50'x3786'
HDD PULL BACK AREA

EQUATION: $4422+10 \text{ BACK} = 4421+61 \text{ AHEAD} (+49)$

2

2

404-00

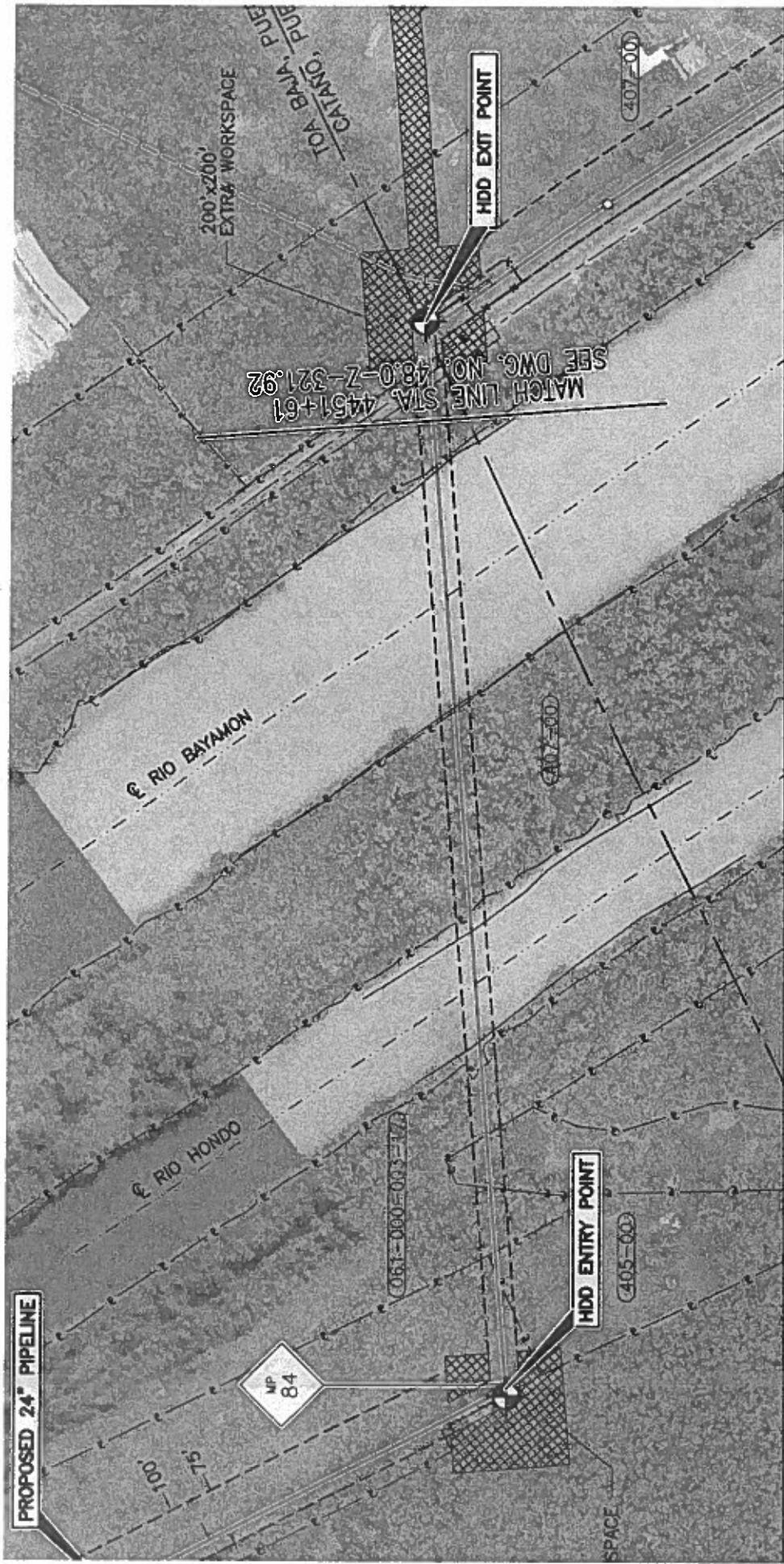
-00

PR-165

PR-167

100'
75'
52'





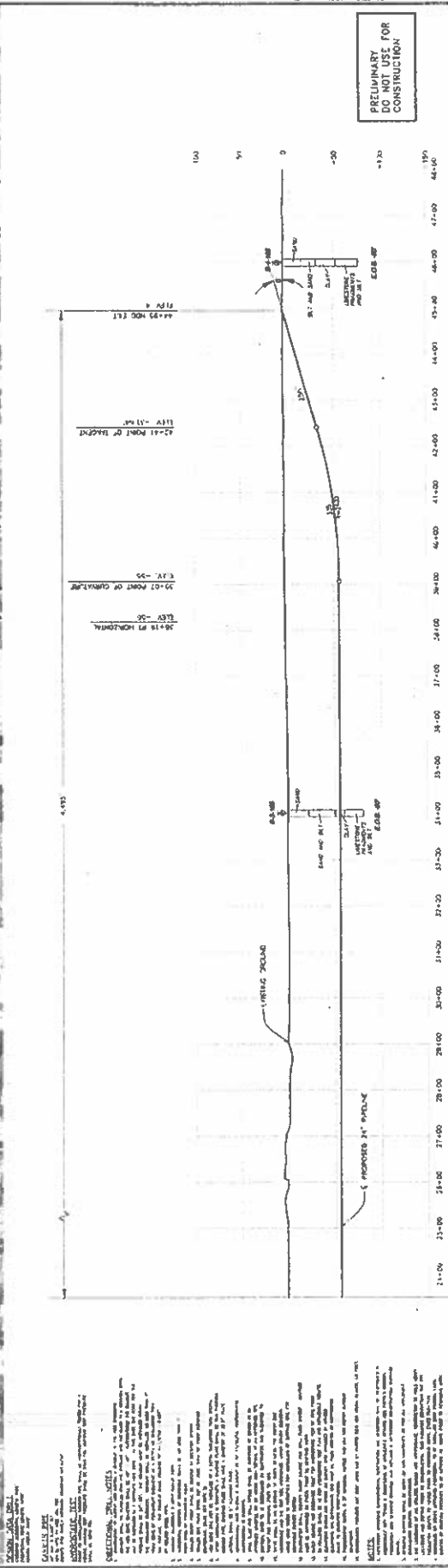
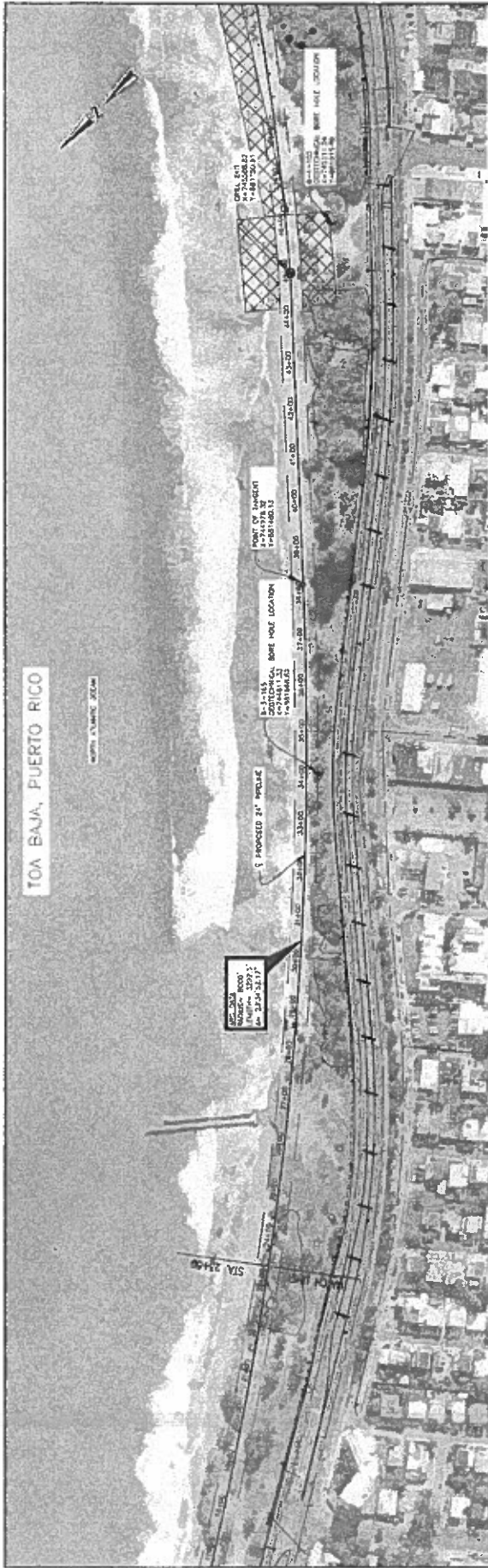
3' COVER

HDD-RIO HONDO / RIO BAYAMON

48.0-Z-325.13

240	
220	
200	
180	
160	
140	

TOA BAJA, PUERTO RICO



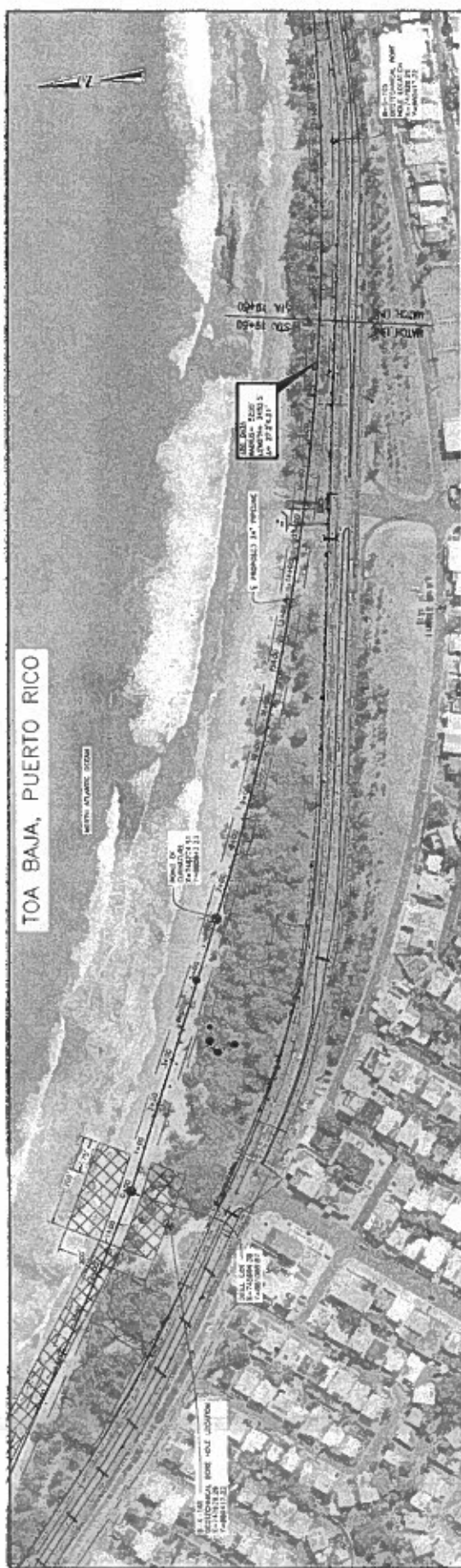
GENERAL REMARKS		NATIONAL BUREAU OF STANDARDS		REVISIONS		DATE		BY		CHECKED		DATE		BY	
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2	ADDED	2	2	2	2	2	2	2	2	2	2	2	2	2	2
3	ADDED	3	3	3	3	3	3	3	3	3	3	3	3	3	3
4	ADDED	4	4	4	4	4	4	4	4	4	4	4	4	4	4
5	ADDED	5	5	5	5	5	5	5	5	5	5	5	5	5	5
6	ADDED	6	6	6	6	6	6	6	6	6	6	6	6	6	6
7	ADDED	7	7	7	7	7	7	7	7	7	7	7	7	7	7
8	ADDED	8	8	8	8	8	8	8	8	8	8	8	8	8	8
9	ADDED	9	9	9	9	9	9	9	9	9	9	9	9	9	9
10	ADDED	10	10	10	10	10	10	10	10	10	10	10	10	10	10

PRELIMINARY DESIGN FOR CONSTRUCTION

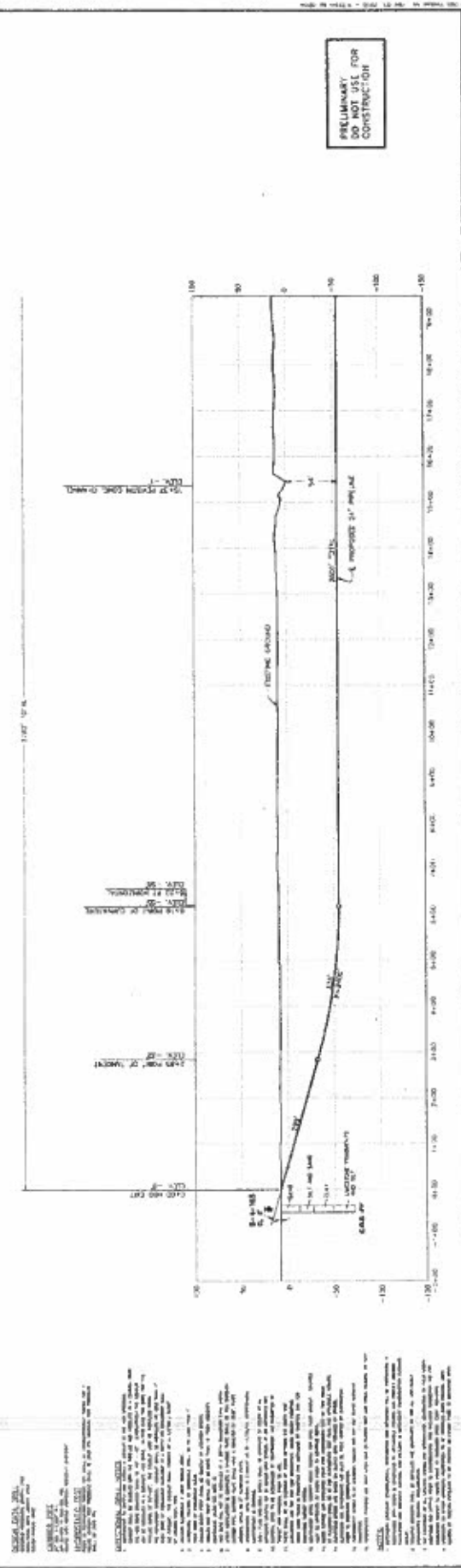
VIA VERDE PIPELINE PROJECT

HORIZONTAL DIRECTIONAL DRILL PROPOSED VIA VERDE PIPELINE FROM LEVITT BEACH HOOD TOA BAJA, PUERTO RICO

DATE: 02-28-2020
 DRAWING NO.: 48.0-2-025.20
 SHEET NO.: 2 OF 2



TOA BAJA, PUERTO RICO



PRELIMINARY
DO NOT USE FOR
CONSTRUCTION

GENERAL NOTES:

1. THE PROPOSED PIPELINE SHALL BE INSTALLED AT A DEPTH OF 48\"/>
- 2. THE PROPOSED PIPELINE SHALL BE INSTALLED IN A TRENCH WITH A MINIMUM WIDTH OF 36\"/>
- 3. THE PROPOSED PIPELINE SHALL BE INSTALLED IN A TRENCH WITH A MINIMUM COVER OF 48\"/>
- 4. THE PROPOSED PIPELINE SHALL BE INSTALLED IN A TRENCH WITH A MINIMUM COVER OF 48\"/>
- 5. THE PROPOSED PIPELINE SHALL BE INSTALLED IN A TRENCH WITH A MINIMUM COVER OF 48\"/>
- 6. THE PROPOSED PIPELINE SHALL BE INSTALLED IN A TRENCH WITH A MINIMUM COVER OF 48\"/>
- 7. THE PROPOSED PIPELINE SHALL BE INSTALLED IN A TRENCH WITH A MINIMUM COVER OF 48\"/>
- 8. THE PROPOSED PIPELINE SHALL BE INSTALLED IN A TRENCH WITH A MINIMUM COVER OF 48\"/>
- 9. THE PROPOSED PIPELINE SHALL BE INSTALLED IN A TRENCH WITH A MINIMUM COVER OF 48\"/>
- 10. THE PROPOSED PIPELINE SHALL BE INSTALLED IN A TRENCH WITH A MINIMUM COVER OF 48\"/>

PROJECT INFORMATION		DATE	
PROJECT NO.	48-0-2-325.21	DATE	1 OF 2
CLIENT		SCALE	
CLIENT NAME	TOA BAJA, PUERTO RICO	SCALE	AS SHOWN
DESIGNER		DATE	
DESIGNER NAME	AE&E ENGINEERING	DATE	1 OF 2
PROJECT LOCATION		DATE	
PROJECT LOCATION	TOA BAJA, PUERTO RICO	DATE	1 OF 2
PROJECT DESCRIPTION		DATE	
PROJECT DESCRIPTION	PROPOSED 24\"/>		
PROJECT STATUS		DATE	
PROJECT STATUS	PRELIMINARY	DATE	1 OF 2
PROJECT CONTACT		DATE	
PROJECT CONTACT	TOA BAJA, PUERTO RICO	DATE	1 OF 2
PROJECT NOTES		DATE	
PROJECT NOTES	TOA BAJA, PUERTO RICO	DATE	1 OF 2

GEO ENGINEERING INC.

BORING NO. 1-165
 SHEET 1 OF 3
 START DATE 10/4/10
 COMPLTN. DATE 10/5/10

PROJECT Via Verde Pipeline
 LOCATION Peñuelas-Guaynabo, PR
 CLIENT RAY Architects and Engineers PROJECT NO. GEO-750-2010
 BORING LOCATION PR-165

COMPLETION DEPTH 80.50ft.

DRILL RIG CME-55 SAMPLER: HAMMER WT. 140 lbs DROP 30 in
 FOREMAN W. Pérez CHECKED J.C. León

WATER DEPTH:
 DURING DRILLING (ft.) 6
 AFTER COMPLETION (ft) N/A

DEPTH (FT)	SPT N VALUE (BLOWS/FT)	FIELD VALUES		SYMBOL	MATERIAL DESCRIPTION	U.S.C.S. DESIGNATION	MOISTURE CONTENT					DEPTH (FT)
		SPT					W%	PL	LL	PI	(γ_{sat}) _{sp}	
0	5	102030405060			Dark brown fine sand with few silt (Topsoil)		8					0
	7				Grayish brown fine sand with traces to few silt (probably Alluvial)		14					
	10						31					
5	23						22					
	12				Grayish brown medium to coarse sand with shell fragments		17					
10	19				Grayish brown silty sand		29					10
	19						34					
	20				Dark gray fine (silty sand and sandy silt)		37					
15	24						32					15
	15				Dark gray, slightly organic, fine silty sand and sandy silt with few shell fragments and dark gray clay		41					
20	7						33					20
	12						15					
	9						28					
25	13						29					25

U.S.C.S. - UNIFIED SOIL CLASSIFICATION SYSTEM DESIGNATION.
 W%, PL, LL AND PI - NATURAL WATER CONTENT, PLASTIC LIMIT, LIQUID LIMIT AND PLASTICITY INDEX (RESPECTIVELY)

* q_u - UNCONFINED COMPRESSION STRENGTH; REPORTED VALUES OBTAINED FROM:
 A. POCKET PENETROMETER
 B. SPRING TEST
 C. UNCONFINED COMPRESSION TEST
 D. TRIAXIAL TEST
 E. VANE TEST

GEO ENGINEERING INC.

BORING NO. 1-165
 SHEET 2 OF 3
 LOCATION PR-165
 COMPLETION DEPTH 80.5ft.

DEPTH (FT)	SPT N VALUE (BLOWS/FT)	FIELD VALUES	SYMBOL	MATERIAL DESCRIPTION	U.S.C.S. DESIGNATION	MOISTURE CONTENT					DEPTH (FT)
						W% ●	W%	PL	LL	PI	
30	3	SPT 102030405060		(light gray)		45					30
35	2					43					35
40	10			(with peat)		34					40
45	24			Tannish brown, gray mottled, sandy clay (Alluvial)		16				2.5 A	45
50	22					34				2.5 A	50
55	23			Tannish brown clay		37				1.8 B	55
60	27					34				3.5 A	60
65	23					38				3.5 A	65

GEO ENGINEERING INC.

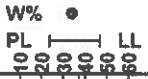
BORING NO. 1-165
 SHEET 3 OF 3
 LOCATION PR-165
 COMPLETION DEPTH 80.5ft.

DEPTH (FT)	SPT N VALUE (BLOWS/FT)	FIELD VALUES					SYMBOL	MATERIAL DESCRIPTION	U.S.C.S. DESIGNATION	MOISTURE CONTENT					DEPTH (FT)	
		SPT								W%	PL	LL	PI	(u_v) ⁺		
		10	20	30	40	50	60									
70	31														2.75	A
75	23														1.9	B
80	18														0.75	A
85																
90																
95																
100																
105																

(with remnants of highly weathered gravel)

(sandy clay)

End of Boring



GEO ENGINEERING INC.

BORING NO. 2-165
 SHEET 1 OF 3
 START DATE 10/4/10
 COMPLTN. DATE 10/5/10

PROJECT Via Verde Pipeline
 LOCATION Peñuelas-Guaynabo, PR
 CLIENT RAY Architects and Engineers PROJECT NO. GEO-750-2010
 BORING LOCATION PR-165
 DRILL RIG BK-5T SAMPLER: HAMMER WT. 140 lbs DROP 30 in
 FOREMAN L. Olivo CHECKED J.C. León

COMPLETION DEPTH 80.00ft.
 WATER DEPTH:
 DURING DRILLING (ft.) 10
 AFTER COMPLETION (ft) N/A

DEPTH (FT)	SPT N VALUE (BLOWS/FT)	FIELD VALUES					SYMBOL	MATERIAL DESCRIPTION	U.S.C.S. DESIGNATION	MOISTURE CONTENT					DEPTH (FT)
		SPT	W%	PL	LL	PI				W%	PL	LL	PI	(<i>q_u</i>) ^{1/2}	
0	17	10					[Cross-hatched]								0
	23	20					[Dotted]								
5	20	20					[Horizontal lines]								5
	20	24					[Vertical lines]								
10	31	22					[Diagonal lines]								10
	22	31					[Diagonal lines]								
15	31	22					[Diagonal lines]								15
	22	11					[Diagonal lines]								
20	20	13					[Diagonal lines]								20
	13	8					[Diagonal lines]								
25	4						[Diagonal lines]								25

U.S.C.S. - UNIFIED SOIL CLASSIFICATION SYSTEM DESIGNATION.
 W%, PL, LL AND PI - NATURAL WATER CONTENT, PLASTIC LIMIT,
 LIQUID LIMIT AND PLASTICITY INDEX
 (RESPECTIVELY)

^{1/2}*q_u* - UNCONFINED COMPRESSION STRENGTH; REPORTED VALUES
 OBTAINED FROM:
 A. POCKET PENETROMETER
 B. SPRING TEST
 C. UNCONFINED COMPRESSION TEST
 D. TRIAXIAL TEST
 E. VANE TEST

GEO ENGINEERING INC.

BORING NO. 2-165

SHEET 2 OF 3

LOCATION PR-165

COMPLETION DEPTH 80ft.

DEPTH (FT)	SPT N VALUE (BLOWS/FT)	FIELD VALUES	SYMBOL	MATERIAL DESCRIPTION	U.S.C.S. DESIGNATION	MOISTURE CONTENT					DEPTH (FT)
						W% ●	W%	PL	LL	PI	
30	4	SPT 102030405080		(with few gray organic clay)		41					0.5 A
35	3			Tannish brown clay		39					0.5 A
40	17					37					2.5 A
45	25					37					2.5 A
50	24					40					2.5 A
55	21			(silty clay)		47					2.0 A
60	17			(sandy silty clay)		25					1.5 A
65	23					24					1.5 A

GEO ENGINEERING INC.

BORING NO. 3-165
SHEET 1 OF 3

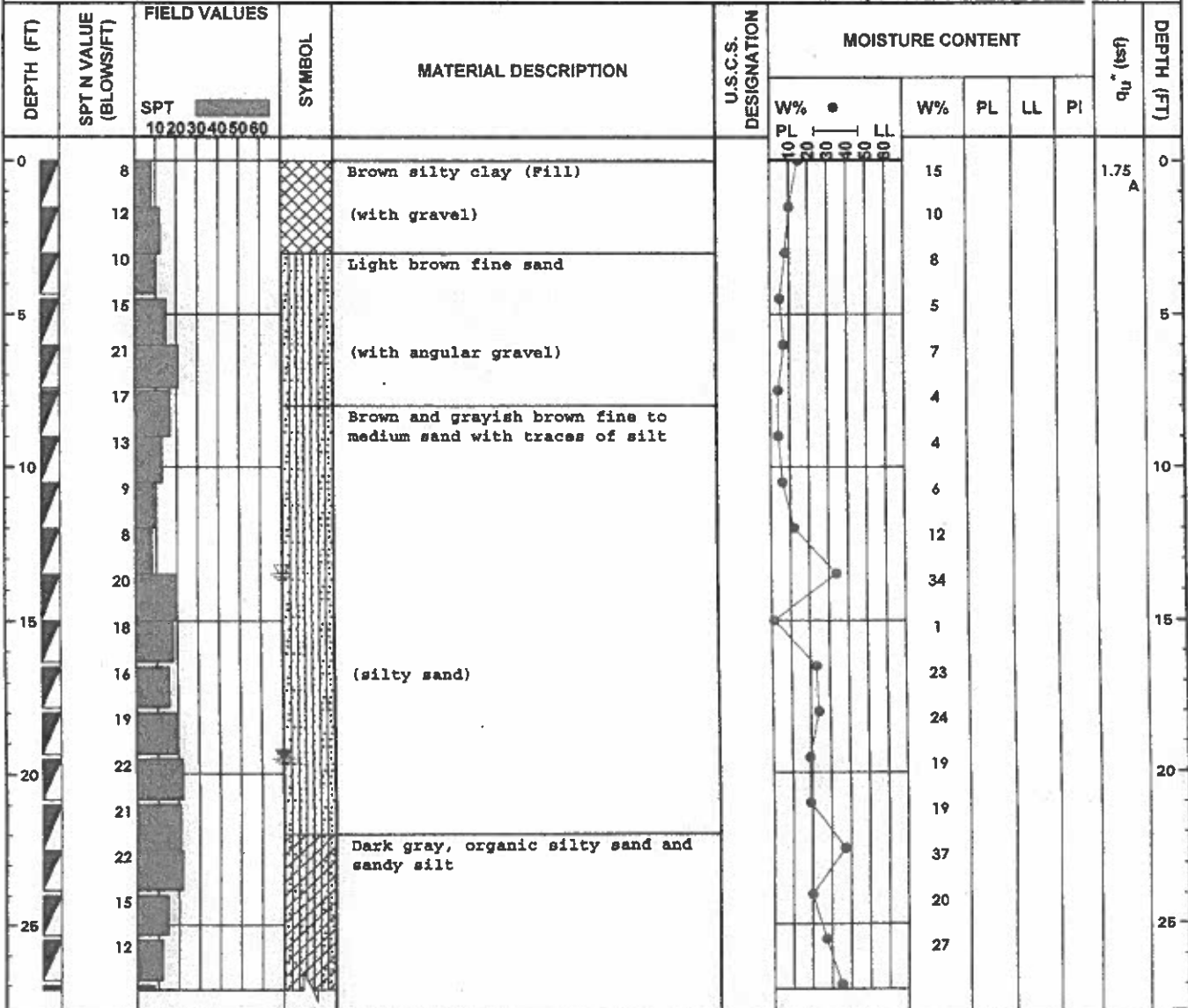
START DATE 10/12/10
COMPLTN. DATE 10/13/10

PROJECT Via Verde Pipeline
LOCATION Peñuelas-Guaynabo, PR
CLIENT RAY Architects and Engineers PROJECT NO. GEO-750-2010
BORING LOCATION PR-165

COMPLETION DEPTH 81.50ft.

DRILL RIG CME-55 SAMPLER: HAMMER WT. 140 lbs DROP 30 in
FOREMAN C. Calderon CHECKED J.C. León

WATER DEPTH:
DURING DRILLING (ft.) 13.5
AFTER COMPLETION (ft.) 19.5



U.S.C.S. - UNIFIED SOIL CLASSIFICATION SYSTEM DESIGNATION.
W%, PL, LL AND PI - NATURAL WATER CONTENT, PLASTIC LIMIT,
LIQUID LIMIT AND PLASTICITY INDEX (RESPECTIVELY)

*q_u - UNCONFINED COMPRESSION STRENGTH; REPORTED VALUES
OBTAINED FROM:
A. POCKET PENETROMETER
B. SPRING TEST
C. UNCONFINED COMPRESSION TEST
D. TRIAXIAL TEST
E. VANE TEST

GEO ENGINEERING INC.

BORING NO. 4-165
 SHEET 1 OF 3

START DATE 10/5/10
 COMPLTN. DATE 10/6/10

PROJECT Via Verde Pipeline
 LOCATION Peñuelas-Guaynabo, PR
 CLIENT RAY Architects and Engineers PROJECT NO. GEO-750-2010
 BORING LOCATION PR-165

COMPLETION DEPTH 80.50ft.

DRILL RIG CME-55 SAMPLER: HAMMER WT. 140 lbs DROP 30 in
 FOREMAN W. Pérez CHECKED J.C. León

WATER DEPTH:
 DURING DRILLING (ft.) 10
 AFTER COMPLETION (ft) N/A

DEPTH (FT)	SPT N VALUE (BLOWS/FT)	FIELD VALUES		SYMBOL	MATERIAL DESCRIPTION	U.S.C.S. DESIGNATION	MOISTURE CONTENT					DEPTH (FT)
		SPT					W%	PL	LL	PI	γ _{sat} (pcf)	
0	4	10	20		Light brown fine to medium sand		8					0
4	16						8					
5	16						5					
6	14				(with traces of silt)		6					
10	12				(with traces of silt)		27					
10	14				(with traces of silt)		24					
15	26				(with traces of silt)		22					
15	14				(grayish brown, with shell fragments)		30					
17	17				(grayish brown, with shell fragments)		19					
18	15				(grayish brown, with shell fragments)		21					
20	11				Dark gray organic sandy silt and silty sand		45					
24	24						26					
25	8						31					
25	15						32					

U.S.C.S. - UNIFIED SOIL CLASSIFICATION SYSTEM DESIGNATION.
 W%, PL, LL AND PI - NATURAL WATER CONTENT, PLASTIC LIMIT, LIQUID LIMIT AND PLASTICITY INDEX (RESPECTIVELY)

q_u - UNCONFINED COMPRESSION STRENGTH; REPORTED VALUES OBTAINED FROM:
 A. POCKET PENETROMETER
 B. SPRING TEST
 C. UNCONFINED COMPRESSION TEST
 D. TRIAXIAL TEST
 E. VANE TEST

GEO ENGINEERING INC.

BORING NO. 4-165

SHEET 2 OF 3

LOCATION PR-165

COMPLETION DEPTH 80.5R.

DEPTH (FT)	SPT N VALUE (BLOWS/FT)	FIELD VALUES SPT 10 20 30 40 50 60	SYMBOL	MATERIAL DESCRIPTION	U.S.C.S. DESIGNATION	MOISTURE CONTENT					DEPTH (FT)
						W% ●	W%	PL	LL	PI	
30	11			(with few gray clay)		36					30
35	7			(with shell fragments)		31					35
				Greenish brown and brown sandy clay							
40	10					30				1.0 A	40
45	14					24				1.25 A	45
50	16			(with weathered gravel)		23				1.0 A	50
55	15			(with limestone fragments)		35				0.75 A	55
				Highly weathered limestone - recovered as limestone fragments with yellowish brown clayey silt							
60	13					23					60
65	18					25				0.25 A	65

GEO ENGINEERING INC.

BORING NO. 5-165
SHEET 1 OF 3

START DATE 10/7/10
COMPLTN. DATE 10/11/10

PROJECT Via Verde Pipeline
LOCATION Peñuelas-Guaynabo, PR
CLIENT RAY Architects and Engineers PROJECT NO. GEO-750-2010
BORING LOCATION PR-165

COMPLETION DEPTH 80.50ft.

DRILL RIG CME-55 SAMPLER: HAMMER WT. 140 lbs DROP 30 in
FOREMAN W. Pérez CHECKED J.C. León

WATER DEPTH:
DURING DRILLING (ft.) 14
AFTER COMPLETION (ft.) N/A

DEPTH (FT)	SPT N VALUE (BLOWS/FT)	FIELD VALUES	SYMBOL	MATERIAL DESCRIPTION	U.S.C.S. DESIGNATION	MOISTURE CONTENT					DEPTH (FT)
						W% ●	W%	PL	LL	PI	
0	7	SPT 102030405060		Dark brown clay with gravel (Fill)		12					0
5	15			Light brown fine sand with traces of silt		14					5
10	16			Grayish brown fine to medium silty sand		10					10
15	15			(with shell fragments)		7					15
20	13			Dark gray, slightly organic sandy silt and silty sand		8					20
25	8					23					25
	10					24					
	16					22					
	12					21					
	13					26					
	14					23					
	12					22					
	21					40					
						26					

U.S.C.S. - UNIFIED SOIL CLASSIFICATION SYSTEM DESIGNATION.
W%, PL, LL AND PI - NATURAL WATER CONTENT, PLASTIC LIMIT, LIQUID LIMIT AND PLASTICITY INDEX (RESPECTIVELY)

*q_u - UNCONFINED COMPRESSION STRENGTH; REPORTED VALUES OBTAINED FROM:
A. POCKET PENETROMETER
B. SPRING TEST
C. UNCONFINED COMPRESSION TEST
D. TRIAXIAL TEST
E. VANE TEST

GEO ENGINEERING INC.

BORING NO. 5-165

SHEET 2 OF 3

LOCATION PR-165

COMPLETION DEPTH 80.5ft.

DEPTH (FT)	SPT N VALUE (BLOWS/FT)	FIELD VALUES	SYMBOL	MATERIAL DESCRIPTION	U.S.C.S. DESIGNATION	MOISTURE CONTENT					DEPTH (FT)	
						W% ●	W%	PL	LL	PI		($\frac{lb}{cu\ ft}$) % _p
15		SPT 10 20 30 40 50 60				37						
30												
35	4			(with shell fragments)		30						
40	6			Tannish brown clay and silty clay (Alluvial)		35					1.5 A	40
45	14					31					1.5 A	45
50	41			(with limestone fragments)		25					1.0 A	50
55	30			(with limestone fragments)		28					0.3 B	55
60	16			Highly weathered limestone - recovered as limestone fragments with yellowish brown clayey silt		37					1.0 A	60
65	42					41					1.75 A	65

GEO ENGINEERING INC.

BORING NO. 6-165
SHEET 1 OF 3

START DATE 10/14/10
COMPLTN. DATE 10/15/10

PROJECT Via Verde Pipeline
LOCATION Peñuelas-Guaynabo, PR
CLIENT RAY Architects and Engineers PROJECT NO. GEO-750-2010
BORING LOCATION PR-165

WATER DEPTH:
DURING DRILLING (ft) 19
AFTER COMPLETION (ft) N/A

DRILL RIG CME-55 SAMPLER: HAMMER WT. 140 lbs DROP 30 in
FOREMAN W. Pérez CHECKED J.C. León

DEPTH (FT)	SPT N VALUE (BLOWS/FT)	FIELD VALUES		SYMBOL	MATERIAL DESCRIPTION	U.S.C.S. DESIGNATION	MOISTURE CONTENT					DEPTH (FT)
		SPT					W%	PL	LL	PI	γ_b (pcf)	
0	15	10	20	30	40	50	60	9				0
	34				Grayish and brownish fine silty sand (Fill)			10				
	70							10				5
5	25				Dark gray clay (Fill)			9				
	25				(with gravel)			10				
10	56				Grayish brown fine sand with angular gravel (Fill)			13				10
	71				Brown fine to medium sand with traces of silt			11				
15	24							8				15
	19							13				
	11							24				
20	23							24				20
	21							19				
	14							24				
25	9							20				25

U.S.C.S. - UNIFIED SOIL CLASSIFICATION SYSTEM DESIGNATION.
W%, PL, LL AND PI - NATURAL WATER CONTENT, PLASTIC LIMIT, LIQUID LIMIT AND PLASTICITY INDEX (RESPECTIVELY)

q_{cu} - UNCONFINED COMPRESSION STRENGTH; REPORTED VALUES OBTAINED FROM:
A. POCKET PENETROMETER
B. SPRING TEST
C. UNCONFINED COMPRESSION TEST
D. TRIAXIAL TEST
E. VANE TEST

GEO ENGINEERING INC.

BORING NO. 6-165
 SHEET 2 OF 3
 LOCATION PR-165

DEPTH (FT)	SPT N VALUE (BLOWS/FT)	FIELD VALUES SPT 10 20 30 40 50 60	SYMBOL	MATERIAL DESCRIPTION	U.S.C.S. DESIGNATION	MOISTURE CONTENT					DEPTH (FT)
						W% ●	W%	PL	LL	PI	
30	14					23					30
35	23					24					35
40	8					34					40
45	5			Dark gray, slightly organic fine silty sand and sandy silt		23					45
50	5			Peat							50
55	6					74					55
60	3			Greenish gray, slightly organic sandy clayey silt		20					60
65	16			Brown sandy clay with faint clasts							65

GEO ENGINEERING INC.

BORING NO. 6-165

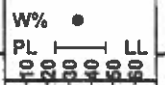
SHEET 3 OF 3

LOCATION PR-165

DEPTH (FT)	SPT N VALUE (BLOWS/FT)	FIELD VALUES				SYMBOL	MATERIAL DESCRIPTION	U.S.C.S. DESIGNATION	MOISTURE CONTENT					DEPTH (FT)
		SPT							W% ●	W%	PL	LL	PI	
70	27	10	20	30	40	50	60							70
75	20													75
80	17													80
85														85
90														90
95														95
100														100
105														105

Tannish brown clay with limestone fragments (Alluvial)

End of Boring





B-8-165 (N: 18.465281° W: 66.191703°)

B-7-165 (N: 18.463498° W: 66.188216°)

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Image U.S. Geological Survey
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lat. 18.465087° long. -66.189389° elev. 0 pies

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