SECTION 1.0 INTRODUCTION

This report presents the results of a Phase II archaeological survey at the Williams Historic site (CRS # N03988, 7NC-F-164) and Howell School Road Prehistoric 2 site (CRS # N04347, 7NC-F-165) for the proposed realignment of Howell School Road in Pencader Hundred, New Castle County, Delaware (see Figures 1.1-1.2). An assessment of the National Register eligibility of the Howell School Road Prehistoric 1 site (CRS #N07458l, 7NC-F-166) was also performed. Using funds provided by the Federal Highway Administration, the Delaware Department of Transportation (DelDOT) proposes to realign Howell School Road and create a new intersection of Howell School Road and State Route (SR) 896. Since the project is using federal funds, this work was completed under Section 106 of the National Historic Preservation Act and its regulations (36 CFR 800). This Phase II archaeological survey was conducted in accordance with the Secretary of the Interior's *Standards and Guidelines for Archaeology and Historic Preservation* and the *Guidelines for Architectural and Archaeological Surveys in Delaware* (1993) issued by the Delaware Historic Preservation Office (DESHPO).

This survey was directed by Michael J. Gall and Sharon D. White, Ph.D., whose qualifications meet the requirements of Secretary of the Interior's Professional Qualifications Standards for Archaeology (36 CFR Part 61) (see Appendix A). Michael Tomkins performed background research. Phase II archaeological fieldwork was conducted between May 21 and June 27, 2012. Adrienne Jarczewski (Crew Chief) supervised fieldwork that was carried out by John Potts, Robert Kotlarek, and Joseph DeAngelis. Artifacts were catalogued by Laura Cushman, Sean Bratton, and Sharon D. White. Allison Gall photographed the artifacts. The report was written by Michael J. Gall, Sharon D. White, Michael Tomkins, and Paul McEachen. Report graphics were created by Patricia McEachen, Michael J. Gall, Jason Botcher, and Allison Gall. Paul J. McEachen, Damon Tvaryanas, and Richard Grubb edited this report. Christina Dunn edited and produced this report.

1.1 Project Description and the Area of Potential Effects

The Area of Potential Effects (APE) is defined in 36 CFR 800.16(d) as "the geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties, if any such properties exist. The area of potential effects is influenced by the scale and nature of an undertaking and may be different for different kinds of effects cause[d] by the undertaking." The APE includes all locations where an undertaking may result in ground disturbance.

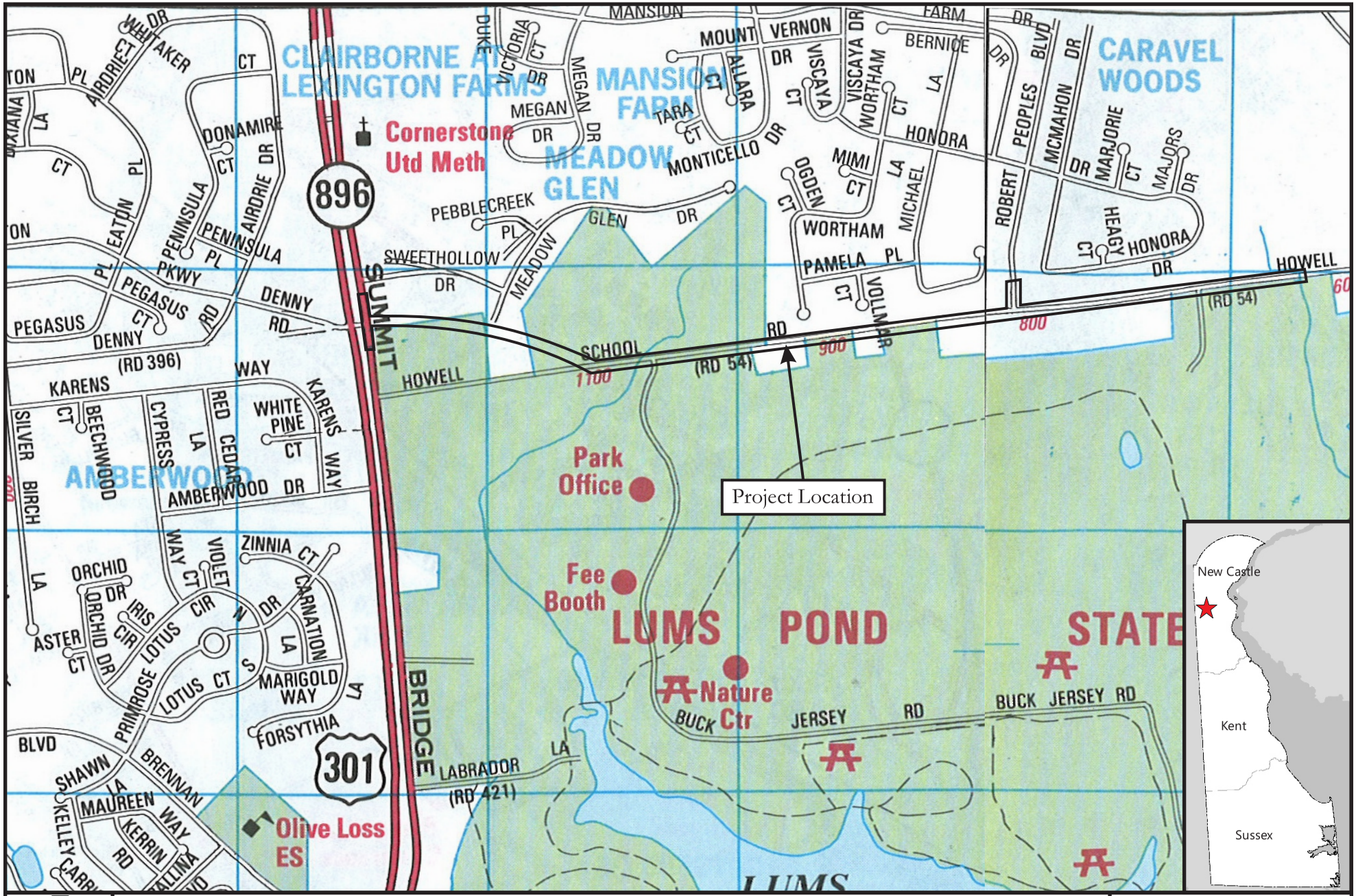


Figure 1.1:

County Map
(New Castle County, Delaware, Street Atlas, 2006 Alexandria Drafting Co.).

N W E S

0 Meters 305

0 Feet 1000

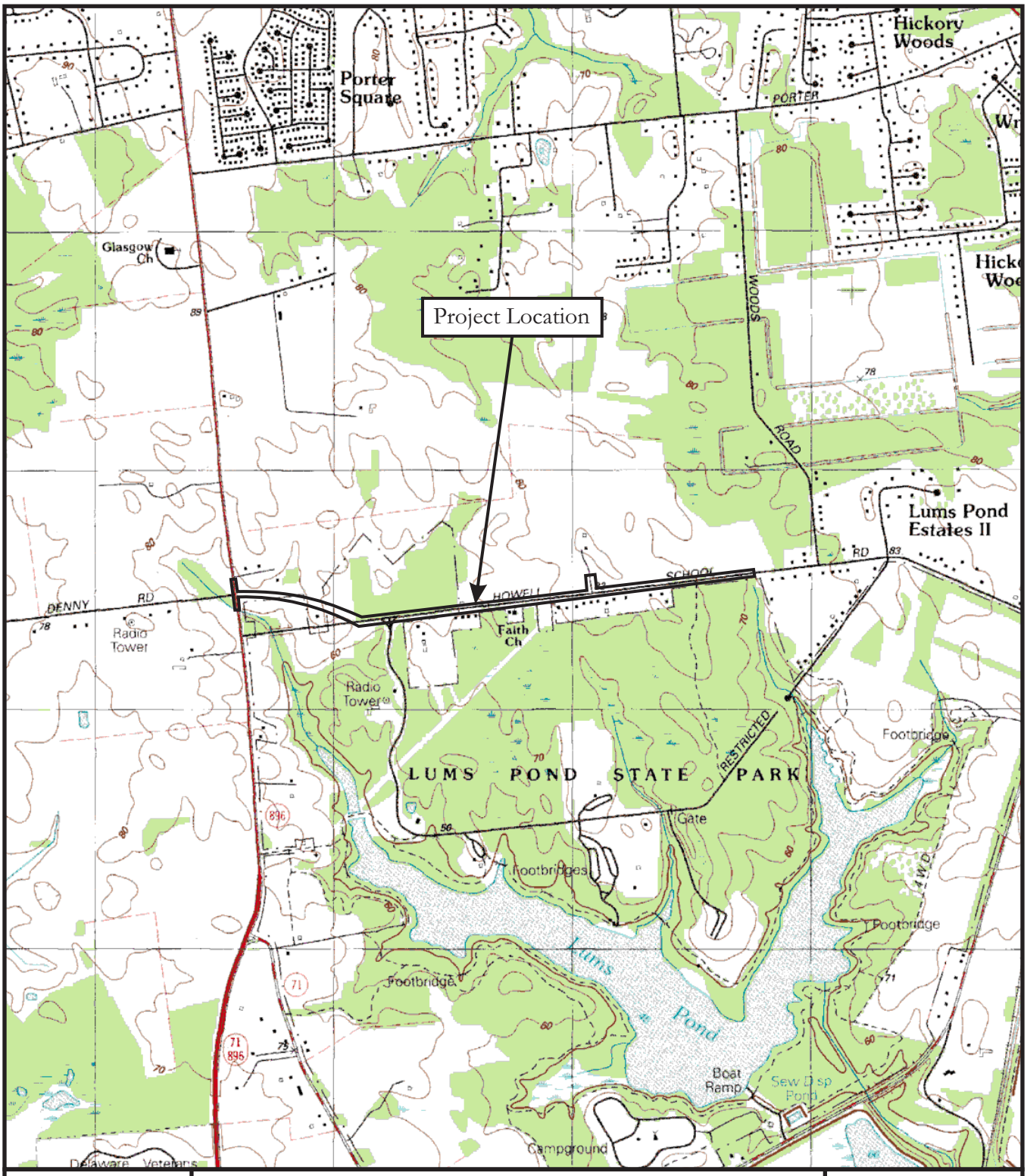


Figure 1.2:

U.S.G.S. Map
(from 1993 U.S.G.S. 7.5′ Quadrangle: Saint Georges, DEL).

N
W E
S

0 Meters 610

0 Feet 2000

The project includes the realignment of Howell School Road to create a new intersection of Howell School Road and SR 896 and improvements along Howell School Road from approximately 1,500 feet (457.2 meters) east of the existing intersection of Howell School Road with SR 896 to approximately 735 feet (224 meters) west of the intersection of Howell School Road with Woods Road, which is approximately 0.7 miles (1.13 kilometers) west of SR 71 (Figures 1.3a-k). This work will entail a new right-of-way for Howell School Road east of SR 896. The project will extend for approximately 7,800 linear feet (2,377.4 meters) along Howell School Road and approximately 1,700 linear feet (518.2 meters) along SR 896. The intersection of Sweet Hollow Drive and SR 896 will be removed, and a cul-de-sac built at Sweet Hollow Drive immediately east of SR 896. Improvements to the intersection of Denny Road and Howell School Road are also proposed. Portions of Howell School Road immediately east of SR 896 will be removed. Other than the new right-of-way for Howell School Road, the project consists of roadside improvements. The APE includes all areas within the limit of construction on the construction plans, and ranges in width from approximately 18 to 135 feet (5.5 to 41.1 meters) (see Figures 1.3a-g). The APE is bisected by St. George's Creek and is bounded by the existing SR 896 roadway to the west, and private and public land to the north, south, and east (see Figures 1.3a-g). Wetland mitigation sites for the proposed project are still under consideration by DelDOT, who will determine if an archaeological survey is necessary at those locations (David Clarke, personal communication, December 22, 2011).

1.2 Summary of Previous Survey

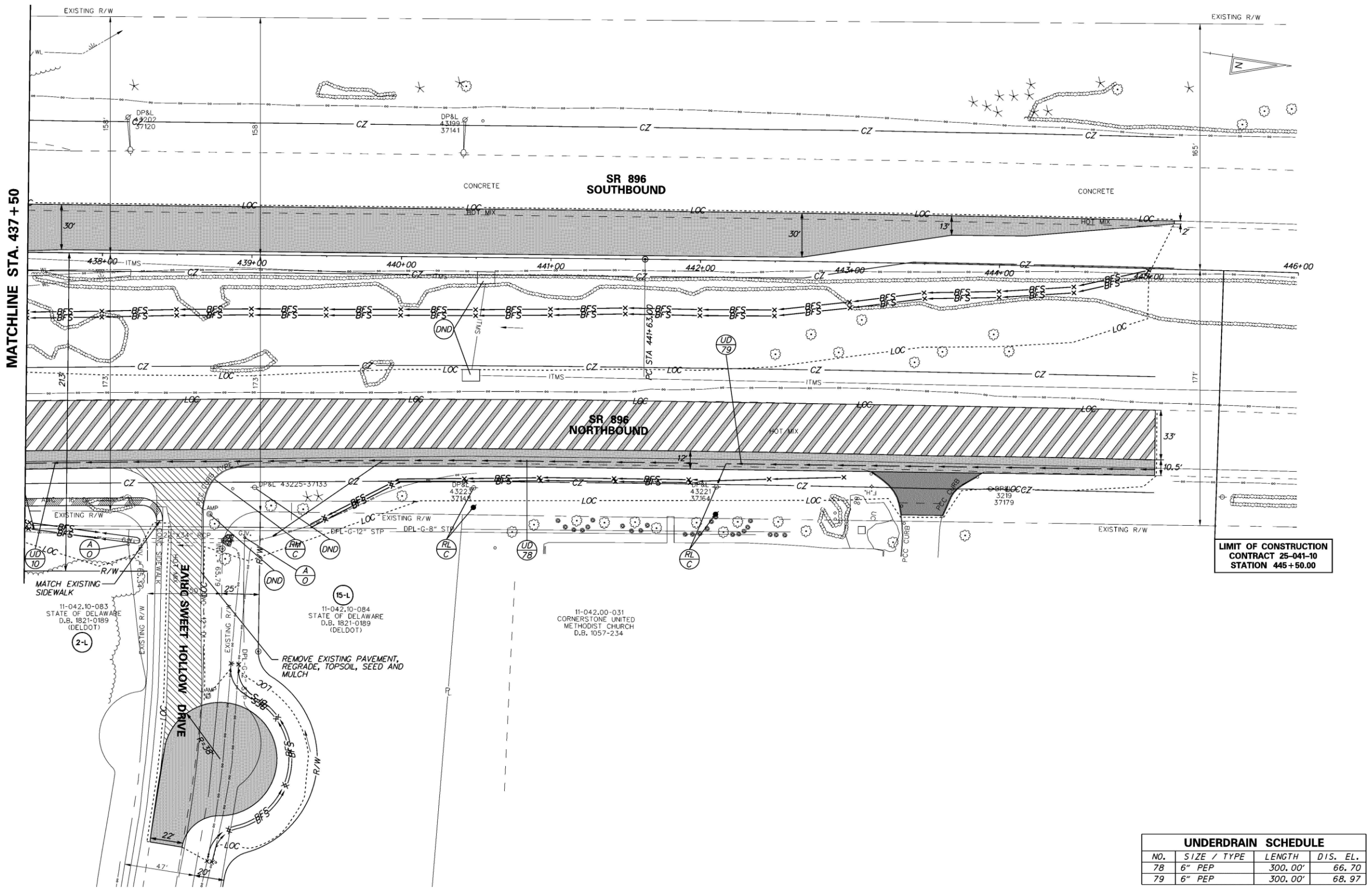
In 2011, Richard Grubb & Associates (RGA) completed a Phase I archaeological survey for the proposed project. Based on the proximity to St. George's Creek and Lums Pond, and the topographic setting and soil hydrology, the APE was considered to have a high potential for prehistoric resources. Historic archaeological resource potential was also considered high due to the presence of School No. 57 near the intersection of Howell School Road and SR 896, nearby historic resources, and eighteenth-century land ownership.

Phase I archaeological fieldwork was conducted during November and December of 2011. Fieldwork included a visual reconnaissance of the APE, the excavation of 143 shovel test pits (STPs) at 15-meter (49.2-foot) intervals, and 22, 3-meter (9.8-foot) and 7.5-meter (25-foot) bracket STPs around positive 15-meter (49.2-foot) STPs.

In total, 165 artifacts were recovered from 36 STPs that dated from the Woodland I period through the late nineteenth century. Of these, 103 artifacts with manufacture dates ranging between the eighteenth through mid-nineteenth century were recovered in a cluster of STPs east of SR 896 between Stations 115.00 and 118.50 of the proposed alignment of Howell School Road and Stations

434.50 and 438.25 of SR 896. The assemblage appeared to represent an eighteenth to early nineteenth-century deposit related to the occupation/ownership of the property by Roger Williams. This cluster of historic materials was designated the Williams Historic site (CRS # N03988, 7NC-F-164). A cluster of 14 prehistoric artifacts, designated Howell School Road Prehistoric 1 site (CRS # N07458; 7NC-F-166), was centered on STP 112 near Station 133.50 of the proposed alignment of Howell School Road. Included in this small assemblage were artifacts recovered in subsoils up to 93 centimeters below ground surface. A second cluster of 16 prehistoric artifacts, designated the Howell School Road Prehistoric 2 site (CRS # N04347, 7NC-F-165), was identified between STPs 134 and 136 from Station 139.00 to Station 140.50 of the existing Howell School Road alignment. One quartz Teardrop biface, dated to the Woodland I Period, was recovered from this cluster. Finally, 30 additional historic artifacts and one prehistoric artifact were located in 18 STPs within the APE. They were not considered indicative of potentially significant archaeological resources.

Three potentially significant archaeological resources were identified in the APE. Based on these results, RGA recommended a Phase II archaeological survey at the Williams Historic site and the Howell School Road Prehistoric 2 site to evaluate their eligibility for listing on the National Register of Historic Places. DelDOT interpreted the Phase I archaeological survey Howell School Road Prehistoric 1 site as lacking integrity and considered the site ineligible for listing on the National Register of Historic Places. As a result, no Phase II archaeological survey was conducted at the Howell School Road Prehistoric 1 site.



UNDERDRAIN SCHEDULE			
NO.	SIZE / TYPE	LENGTH	DIS. EL.
78	6" PEP	300.00'	66.70
79	6" PEP	300.00'	68.97

DELAWARE DEPARTMENT OF TRANSPORTATION	ADDENDUMS / REVISIONS	SCALE 0 30 60 90 FEET	N54, HOWELL SCHOOL ROAD FROM SR 896 TO SR 71	CONTRACT 25-041-10	BRIDGE NO.	CONSTRUCTION PLAN	SHEET NO. 31
				COUNTY NEW CASTLE	DESIGNED BY: TAM / MAG		TOTAL SHTS. 127
					CHECKED BY: PAH		

Figure 1.3a:

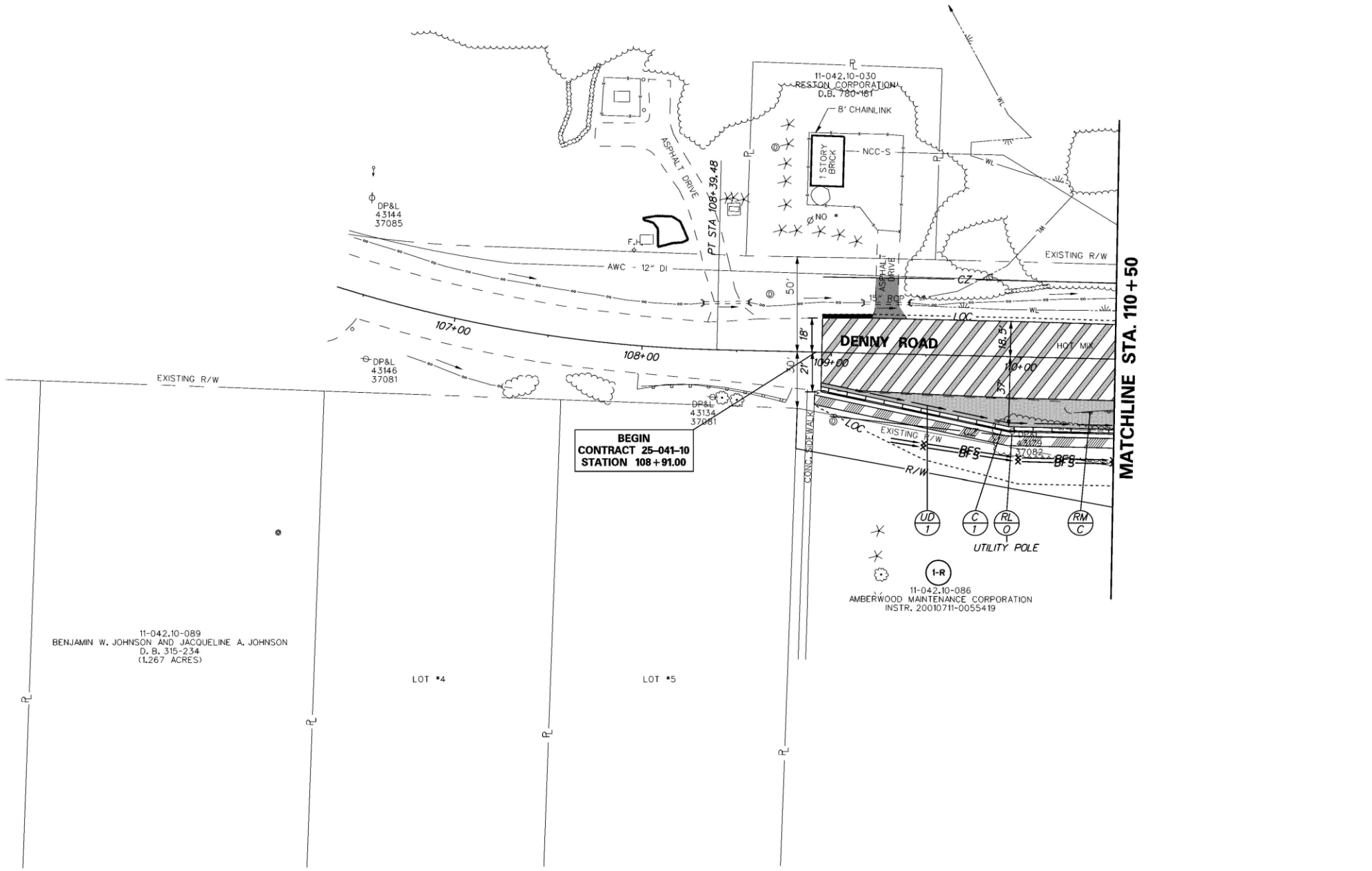
Construction Plan showing the north terminus to Station 437+50 (Pennoni Associates, Inc. 2010).

0 Meters 16

0 Feet 70

UNDERDRAIN SCHEDULE			
NO.	SIZE / TYPE	LENGTH	DIS. EL.
1	6" PEP	202.00'	62.78

CURB SCHEDULE		
NO.	ITEM DESCRIPTION / TYPE	LENGTH
1	INTEGRAL PCC CURB AND GUTTER, TYPE 4	157.00



DELAWARE DEPARTMENT OF TRANSPORTATION

ADDENDUMS / REVISIONS

SCALE 0 30 60 90 FEET

N54, HOWELL SCHOOL ROAD FROM SR 896 TO SR 71

CONTRACT	BRIDGE NO.	
25-041-10	DESIGNED BY:	TAM / MAG
COUNTY	CHECKED BY:	PAH
NEW CASTLE		

CONSTRUCTION PLAN

SHEET NO.
19
TOTAL SHTS.
127

Figure 1.3b:

Construction Plan showing the west terminus to Station 110+50 (Pennoni Associates, Inc. 2010).

0 Meters 16

0 Feet 70

UNDERDRAIN SCHEDULE			
NO.	SIZE / TYPE	LENGTH	DIS. EL.
2	6" PEP	46.00'	62.85
3	6" PEP	28.00'	62.85
4	6" PEP	77.00'	62.75
5	6" PEP	130.00'	62.23
6	6" PEP	100.00'	62.75
7	6" PEP	54.00'	63.85
8	6" PEP	174.00'	63.85
9	6" PEP	59.00'	60.45
10	6" PEP	290.00'	65.25
11	6" PEP	168.00'	61.80
12	6" PEP	41.00'	61.80
13	6" PEP	214.00'	60.50
14	6" PEP	85.00'	60.35
15	6" PEP	122.00'	60.75
16	6" PEP	137.00'	60.75
17	6" PEP	432.00'	61.55

FLARED END SECTION SCHEDULE			
NO.	SIZE / TYPE	SLOPE	SAFETY GRATE
1	18" RCP	0.0053	NO
2	42" RCP	0.0114	NO
3	18" RCP	0.0300	NO
4	24" RCP	0.0037	NO
5	24" RCP	0.0036	YES
6	24" x 38" RCP	0.0057	YES
7	24" x 38" RCP	0.0058	NO

ENERGY DISSIPATOR SCHEDULE									
STATION	OFFSET	RIP RAP SIZE	D (FT)	T (FT)	W1 (FT)	W2 (FT)	L (FT)	EL 1 (FT)	EL 2 (FT)
111+50	62'	R4	2.0	1.2	3.0	3.0	7.0	61.30	62.75
111+80	60'	R5	2.0	1.7	6.5	6.5	21.0	59.15	60.50
112+33	87'	R4	2.0	1.2	3.0	3.0	9.0	60.00	61.00

GUARDRAIL SCHEDULE				
NO.	ITEM DESCRIPTION / TYPE	BEGIN STA.	OFFSET	LENGTH
1	END TREATMENT ATTENUATOR, TYPE 2	111+36.50	-21.70'	50.00'
2	CURVED GUARDRAIL SECTION	111+86.50	-17.70'	125.00'
3	GALVANIZED STEEL GUARDRAIL, TYPE 1	112+83.00	-72.50'	25.00'
4	END TREATMENT ATTENUATOR, TYPE 2	112+83.00	-97.50'	50.00'
5	GALVANIZED STEEL GUARDRAIL, TYPE 1	81+50.00	48.00'	5.43'
6	GUARDRAIL OVER CULVERTS, TYPE 2	81+55.43	47.90'	38.54'
7	GALVANIZED STEEL GUARDRAIL, TYPE 1	81+93.97	47.70'	30.73'
8	END ANCHORAGE	82+24.70	47.60'	14.50'
9	GALVANIZED STEEL GUARDRAIL, TYPE 1	81+52.00	-2.70'	30.73'
10	GUARDRAIL OVER CULVERTS, TYPE 2	81+82.73	-2.70'	38.54'
11	GALVANIZED STEEL GUARDRAIL, TYPE 1	82+21.27	-3.40'	18.23'
12	END ANCHORAGE	82+39.50	-3.90'	14.50'

CURB SCHEDULE		
NO.	ITEM DESCRIPTION / TYPE	LENGTH
2	INTEGRAL PCC CURB AND GUTTER, TYPE 4	308.00
3	PCC CURB, TYPE 2	96.00
4	PCC CURB, TYPE 2	79.00
5	INTEGRAL PCC CURB AND GUTTER, TYPE 4	120.00
6	PCC CURB, TYPE 2	213.00
7	PCC CURB, TYPE 2	243.00
8	PCC CURB, TYPE 2	247.00
9	PCC CURB, TYPE 2	32.00
10	PCC CURB, TYPE 2	98.00
11	PCC CURB, TYPE 2	126.00
12	PCC CURB, TYPE 2	187.00
13	PCC CURB, TYPE 2	116.00
14	INTEGRAL PCC CURB AND GUTTER, TYPE 4	223.00

ENERGY DISSIPATOR SCHEDULE									
STATION	OFFSET	RIP RAP SIZE	D (FT)	T (FT)	W1 (FT)	W2 (FT)	L (FT)	EL 1 (FT)	EL 2 (FT)
113+85	78'	R4	0.5	1.2	4.0	4.0	10.0	60.40	60.50
115+50	110'	R4	0.5	1.2	3.0	3.0	12.0	58.10	58.20

DRAINAGE PIPE SCHEDULE						
NO.	SIZE / TYPE	CLASS	LENGTH	SLOPE	INV. EL.	DIS. EL.
1	14" x 23" RCP	4	46'	0.0050	61.85	61.62
2	18" RCP	4	17'	0.0053	61.42	61.33
3	42" RCP	4	14'	0.0114	59.40	59.24
4	18" RCP	4	29'	0.0300	61.05	60.18
5	24" RCP	4	46'	0.0037	60.59	60.42
6	18" RCP	4	75'	0.0051	60.97	60.59
7	24" RCP	4	109'	0.0036	60.98	60.59
8	24" x 38" RCP	4	70'	0.0057	59.22	58.82
9	24" x 38" RCP	4	2'	0.0450	58.82	58.73
10	24" x 38" RCP	4	67'	0.0051	58.73	58.39
11	30" RCP	5	51'	0.0051	58.39	58.13

DRAINAGE INLET SCHEDULE						
NO.	STATION	OFFSET	BOX SIZE	GRATE	T.G. EL.	INV. EL.
1	111+00.00	39.00	48" x 48"	TYPE 1	65.11	61.85
2	111+50.00	39.00	48" x 48"	TYPE 1	65.18	61.42
3	112+53.84	58.14	72" x 24"	TYPE 1	65.08	61.05
4	113+69.59	27.00	48" x 30"	TYPE 1	66.41	60.59
5	114+47.64	29.00	48" x 30"	TYPE 1	64.77	60.97
6	115+65.41	56.16	72" x 24"	TYPE 1	63.31	58.39
7	115+71.28	-18.00	66" x 48"	TYPE 1	64.52	58.82
8	115+63.86	-18.00	66" x 48"	TYPE 1	64.59	58.73

DELAWARE DEPARTMENT OF TRANSPORTATION

ADDENDUMS / REVISIONS

SCALE 0 30 60 90 FEET

N54, HOWELL SCHOOL ROAD FROM SR 896 TO SR 71

CONTRACT 25-041-10 | COUNTY NEW CASTLE | BRIDGE NO. | DESIGNED BY: TAM / MAG | CHECKED BY: PAH

CONSTRUCTION PLAN

SHEET NO. 20 | TOTAL SHTS. 127

Figure 1.3c:

Construction Plan showing Station 437+50 to Station 432+50 and 110+50 to 118+50 (Pennoni Associates, Inc. 2010).

0 Meters 16

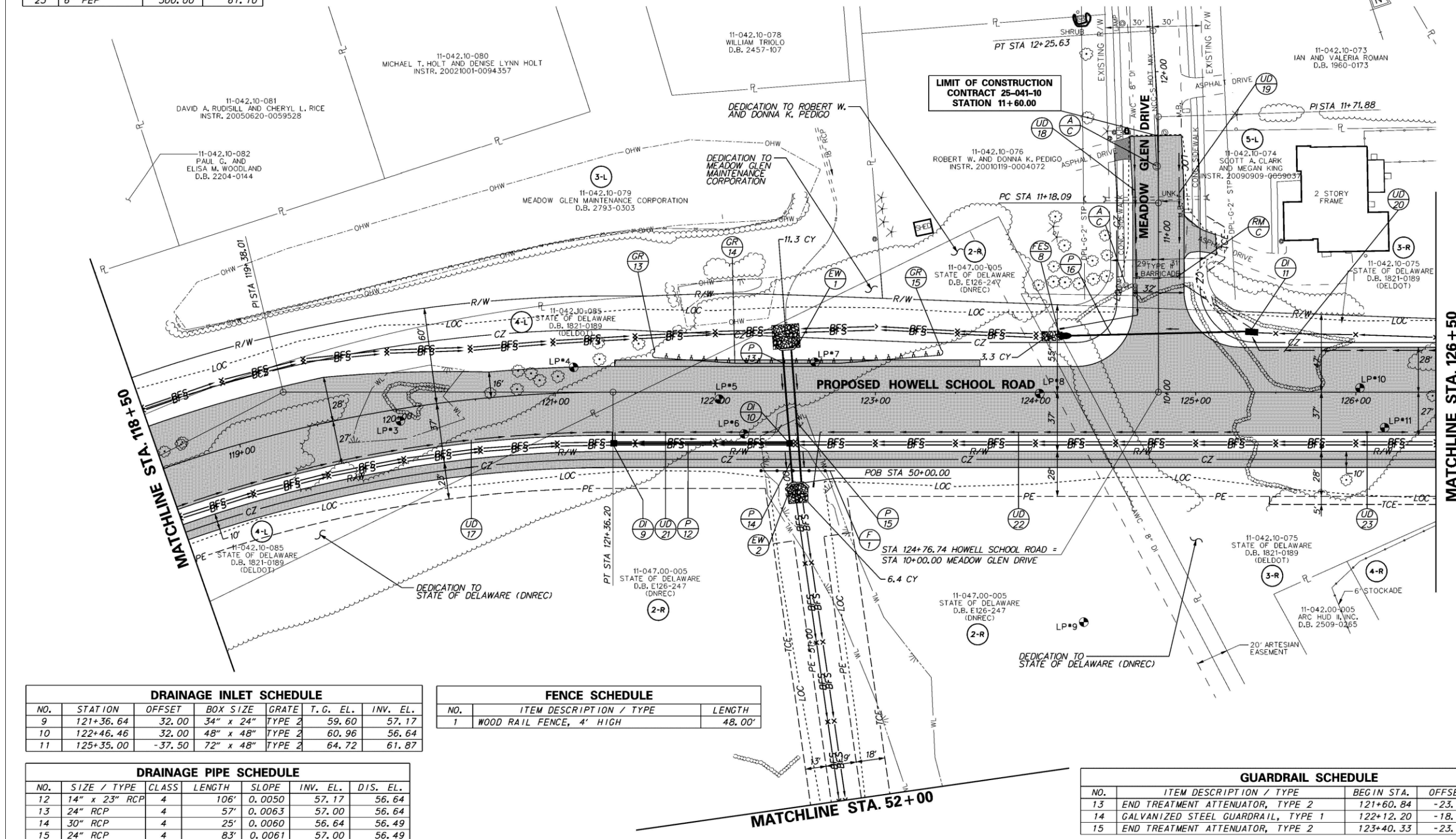
0 Feet 70

UNDERDRAIN SCHEDULE			
NO.	SIZE / TYPE	LENGTH	DIS. EL.
18	6" PEP	150.00'	61.95
19	6" PEP	135.00'	61.90
20	6" PEP	172.00'	61.90
21	6" PEP	112.00'	57.00
22	6" PEP	300.00'	59.45
23	6" PEP	300.00'	61.10

ENDWALL SCHEDULE			
NO.	SIZE / TYPE	SKEW	SAFETY GRATE
EW 1	2-24" DW	90	YES
EW 2	24" & 30" DW	90	NO

FLARED END SECTION SCHEDULE			
NO.	SIZE / TYPE	SLOPE	SAFETY GRATE
8	14" x 23" RCP	0.0040	NO

ENERGY DISSIPATOR SCHEDULE									
STATION	OFFSET	RIP RAP SIZE	D (FT)	T (FT)	W1 (FT)	W2 (FT)	L (FT)	EL 1 (FT)	EL 2 (FT)
122+45	-27'	R4	2.0	1.2	8.0	8.0	9.0	56.49	58.00
124+15	-35'	R4	0.5	1.2	3.0	3.0	8.0	61.40	61.50
122+52	57'	R4	0.5	1.2	9.0	9.0	10.0	56.49	56.60



DRAINAGE INLET SCHEDULE						
NO.	STATION	OFFSET	BOX SIZE	GRATE	T.G. EL.	INV. EL.
9	121+36.64	32.00	34" x 24"	TYPE 2	59.60	57.17
10	122+46.46	32.00	48" x 48"	TYPE 2	60.96	56.64
11	125+35.00	-37.50	72" x 48"	TYPE 2	64.72	61.87

FENCE SCHEDULE		
NO.	ITEM DESCRIPTION / TYPE	LENGTH
1	WOOD RAIL FENCE, 4' HIGH	48.00'

DRAINAGE PIPE SCHEDULE						
NO.	SIZE / TYPE	CLASS	LENGTH	SLOPE	INV. EL.	DIS. EL.
12	14" x 23" RCP	4	106'	0.0050	57.17	56.64
13	24" RCP	4	57'	0.0063	57.00	56.64
14	30" RCP	4	25'	0.0060	56.64	56.49
15	24" RCP	4	83'	0.0061	57.00	56.49
16	14" x 23" RCP	4	112'	0.0040	61.87	61.42

GUARDRAIL SCHEDULE				
NO.	ITEM DESCRIPTION / TYPE	BEGIN STA.	OFFSET	LENGTH
13	END TREATMENT ATTENUATOR, TYPE 2	121+60.84	-23.00'	50.00'
14	GALVANIZED STEEL GUARDRAIL, TYPE 1	122+12.20	-18.00'	65.62'
15	END TREATMENT ATTENUATOR, TYPE 2	123+40.33	-23.00'	50.00'

DELAWARE
DEPARTMENT OF TRANSPORTATION

ADDENDUMS / REVISIONS

SCALE
0 30 60 90
FEET

N54, HOWELL SCHOOL ROAD
FROM SR 896 TO SR 71

CONTRACT	BRIDGE NO.	
25-041-10	DESIGNED BY:	TAM / MAG
COUNTY	CHECKED BY:	PAH
NEW CASTLE		

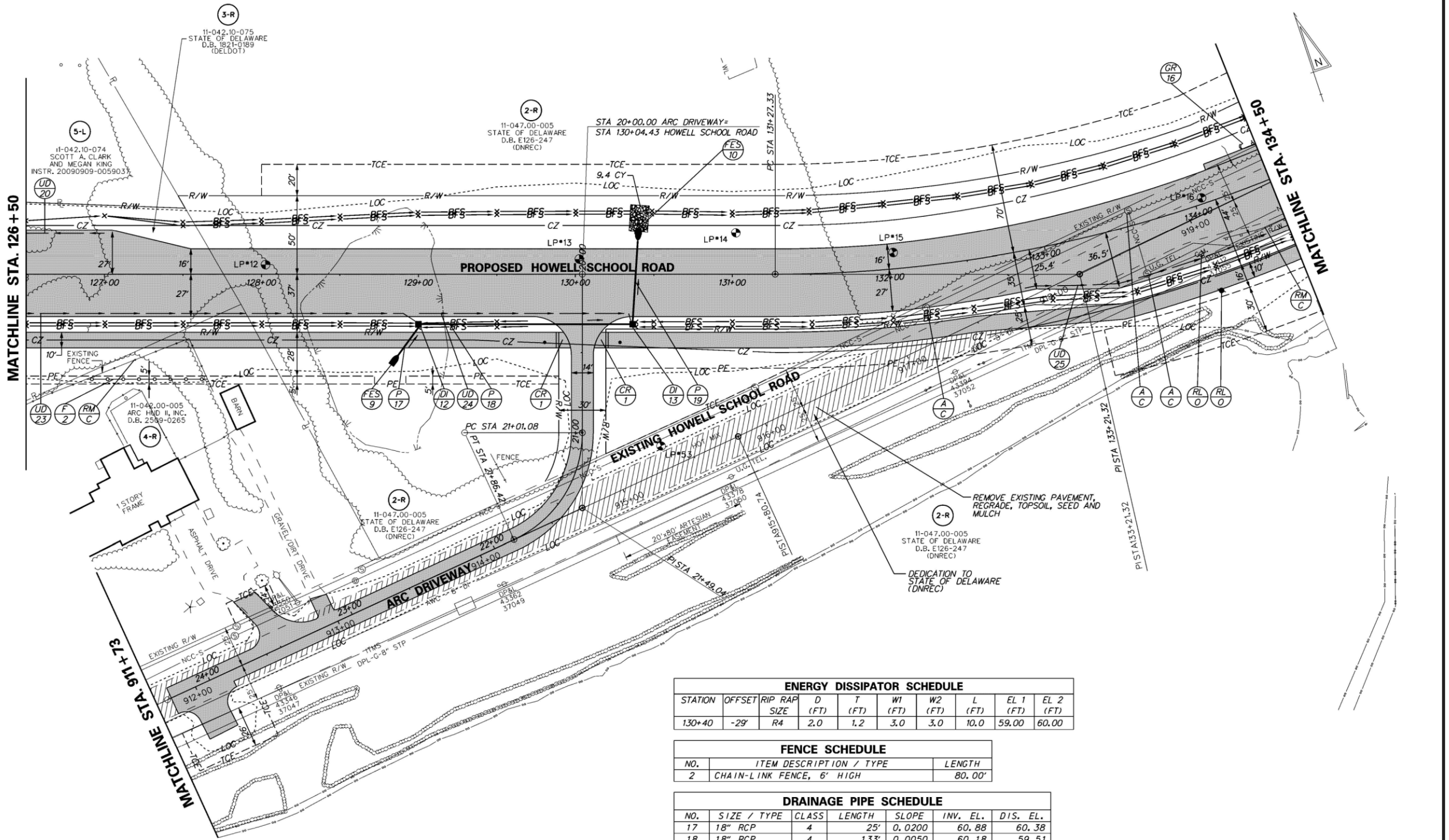
CONSTRUCTION PLAN

SHEET NO. 21
TOTAL SHTS. 127

Figure 1.3d:

Construction Plan showing Station 118+50 to 126+50 (Pennoni Associates, Inc. 2010).

0 Meters 16
0 Feet 70



ENERGY DISSIPATOR SCHEDULE

STATION	OFFSET	RIP RAP SIZE	D (FT)	T (FT)	W1 (FT)	W2 (FT)	L (FT)	EL 1 (FT)	EL 2 (FT)
130+40	-29'	R4	2.0	1.2	3.0	3.0	10.0	59.00	60.00

FENCE SCHEDULE

NO.	ITEM DESCRIPTION / TYPE	LENGTH
2	CHAIN-LINK FENCE, 6' HIGH	80.00'

DRAINAGE PIPE SCHEDULE

NO.	SIZE / TYPE	CLASS	LENGTH	SLOPE	INV. EL.	DIS. EL.
17	18" RCP	4	25'	0.0200	60.88	60.38
18	18" RCP	4	133'	0.0050	60.18	59.51
19	18" RCP	4	54'	0.0052	59.31	59.03

GUARDRAIL SCHEDULE

NO.	ITEM DESCRIPTION / TYPE	BEGIN STA.	OFFSET	LENGTH
16	END TREATMENT ATTENUATOR, TYPE 2	134+40.90	-21.70'	50.00'

UNDERDRAIN SCHEDULE

NO.	SIZE / TYPE	LENGTH	DIS. EL.
24	6" PEP	141.00'	61.55
25	6" PEP	300.00'	58.00

DRAINAGE INLET SCHEDULE

NO.	STATION	OFFSET	BOX SIZE	GRATE	T.G. EL.	INV. EL.
12	129+00.00	32.00	48" x 48"	TYPE 2	63.69	60.18
13	130+36.48	32.00	48" x 30"	TYPE 2	64.16	59.31

FLARED END SECTION SCHEDULE

NO.	SIZE / TYPE	SLOPE	SAFETY GRATE
9	18" RCP	0.0200	YES
10	18" RCP	0.0052	NO

DELAWARE DEPARTMENT OF TRANSPORTATION

ADDENDUMS / REVISIONS

SCALE 0 30 60 90 FEET

N54, HOWELL SCHOOL ROAD FROM SR 896 TO SR 71

CONTRACT	BRIDGE NO.	
25-041-10	DESIGNED BY:	TAM / MAG
COUNTY	CHECKED BY:	PAH
NEW CASTLE		

CONSTRUCTION PLAN

SHEET NO.
22
TOTAL SHTS.
127

Figure 1.3e:

Construction Plan showing Station 126+50 to 134+50 (Pennoni Associates, Inc. 2010).

0 Meters 16

0 Feet 70

DRAINAGE PIPE SCHEDULE

NO.	SIZE / TYPE	CLASS	LENGTH	SLOPE	INV. EL.	DIS. EL.
20	18" RCP	4	27'	0.0063	54.61	54.44
21	18" RCP	4	42'	0.0050	54.82	54.61
22	14" x 23" RCP	4	73'	0.0041	54.91	54.61
23	14" x 23" RCP	4	75'	0.0041	55.22	54.91
24	14" x 23" RCP	4	67'	0.0040	55.49	55.22
25	14" x 23" RCP	4	70'	0.0040	55.77	55.49
26	14" x 23" RCP	4	46'	0.0041	55.96	55.77
27	14" x 23" RCP	4	26'	0.0042	56.07	55.96
28	14" x 23" RCP	4	85'	0.0040	56.41	56.07
29	14" x 23" RCP	4	36'	0.0042	57.55	57.40
30	14" x 23" RCP	4	16'	0.0656	58.60	57.55
31	14" x 23" RCP	4	36'	0.0042	57.57	57.42
32	14" x 23" RCP	4	16'	0.0650	58.61	57.57

DRAINAGE INLET SCHEDULE

NO.	STATION	OFFSET	BOX SIZE	GRATE	T.G. EL.	INV. EL.
14	135+68.97	38.00	34" x 24"	TYPE 2	60.57	54.82
15	136+27.64	63.05	48" x 30"	TYPE 1	59.80	54.91
16	137+04.84	44.55	48" x 48"	TYPE 1	59.03	55.22
17	137+70.00	21.50	48" x 48"	TYPE 1	59.60	55.49
18	138+43.68	21.50	48" x 48"	TYPE 1	59.42	55.77
19	138+93.68	21.07	72" x 48"	TYPE 1	59.39	55.96
20	139+25.38	20.48	72" x 48"	TYPE 1	59.43	56.07
21	140+16.30	18.82	72" x 48"	TYPE 1	59.65	56.41
22	142+07.00	16.00	34" x 24"	TYPE 1	60.64	57.55
23	142+13.00	16.00	34" x 24"	TYPE 1	60.67	57.57

UNDERDRAIN SCHEDULE

NO.	SIZE / TYPE	LENGTH	DIS. EL.
26	6" PEP	278.00'	56.65
27	6" PEP	34.00'	57.85
28	6" PEP	300.00'	57.85
29	6" PEP	73.00'	57.20
30	6" PEP	102.00'	57.20
31	6" PEP	128.00'	56.45
32	6" PEP	69.00'	56.45
33	6" PEP	73.00'	56.85
34	6" PEP	47.00'	56.80
35	6" PEP	29.00'	56.80
36	6" PEP	88.00'	56.85
37	6" PEP	146.00'	57.05
38	6" PEP	36.00'	58.05
39	6" PEP	300.00'	58.10

FENCE SCHEDULE

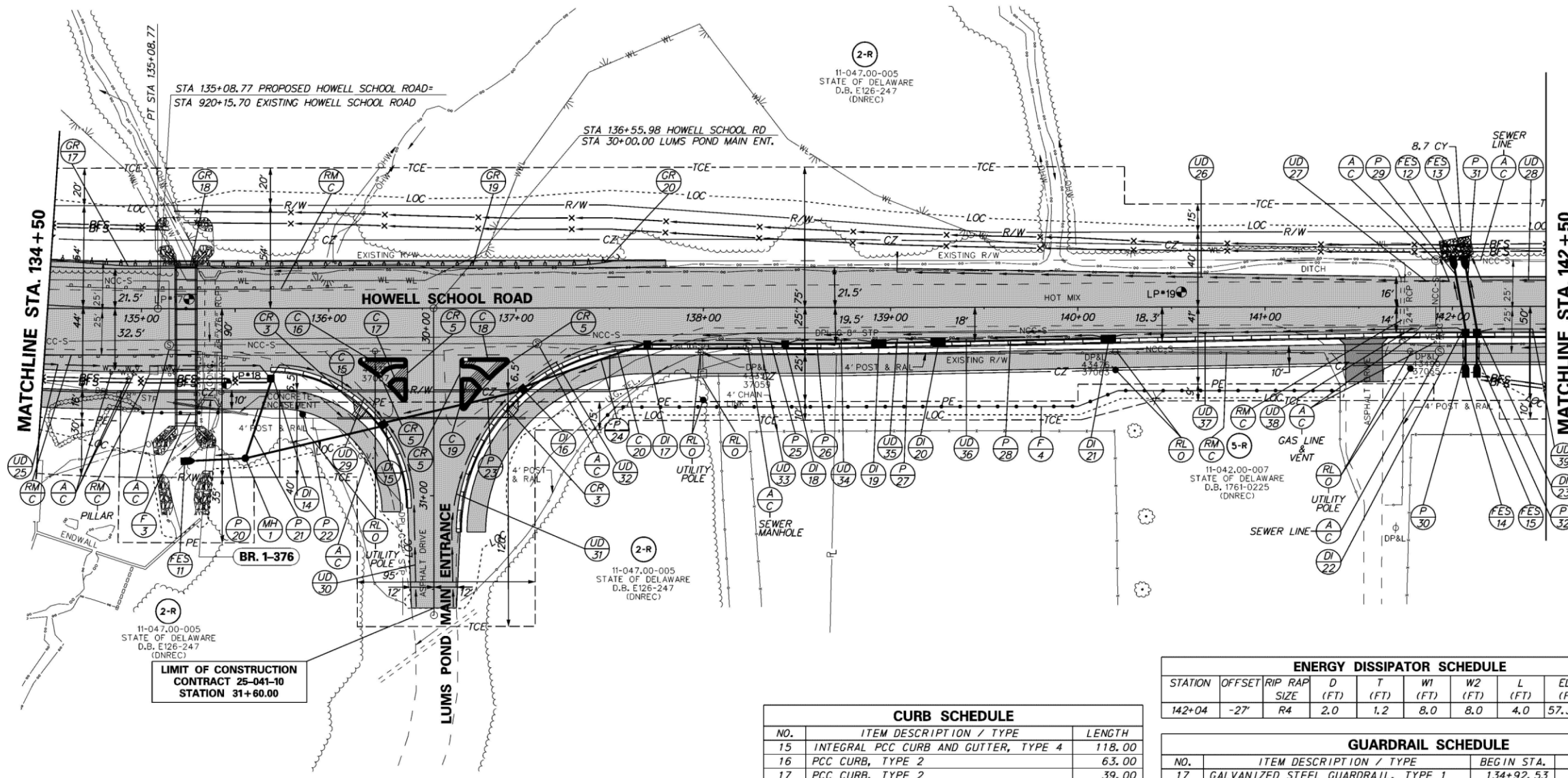
NO.	ITEM DESCRIPTION / TYPE	LENGTH
3	WOOD RAIL FENCE, 4' HIGH	48.00'
4	WOOD RAIL FENCE, 4' HIGH	400.00'

MANHOLE SCHEDULE

NO.	STATION	OFFSET	TYPE/SIZE	T.G. EL.	INV. EL.
MH 1	135+55.35	80.00	48" x 48"	59.00	54.61

FLARED END SECTION SCHEDULE

NO.	SIZE / TYPE	SLOPE	SAFETY GRATE
11	18" RCP	0.0063	NO
12	14" x 23" RCP	0.0042	NO
13	14" x 23" RCP	0.0042	NO
14	14" x 23" RCP	0.0066	YES
15	14" x 23" RCP	0.0065	YES



CURB SCHEDULE

NO.	ITEM DESCRIPTION / TYPE	LENGTH
15	INTEGRAL PCC CURB AND GUTTER, TYPE 4	118.00
16	PCC CURB, TYPE 2	63.00
17	PCC CURB, TYPE 2	39.00
18	PCC CURB, TYPE 2	65.00
19	PCC CURB, TYPE 2	48.00
20	INTEGRAL PCC CURB AND GUTTER, TYPE 4	640.00

ENERGY DISSIPATOR SCHEDULE

STATION	OFFSET	RIP RAP SIZE	D (FT)	T (FT)	W1 (FT)	W2 (FT)	L (FT)	EL 1 (FT)	EL 2 (FT)
142+04	-27'	R4	2.0	1.2	8.0	8.0	4.0	57.37	59.00

GUARDRAIL SCHEDULE

NO.	ITEM DESCRIPTION / TYPE	BEGIN STA.	OFFSET	LENGTH
17	GALVANIZED STEEL GUARDRAIL, TYPE 1	134+92.53	-22.55'	25.00'
18	GUARDRAIL OVER CULVERTS, TYPE 2	135+04.90	-21.43'	38.54'
19	GALVANIZED STEEL GUARDRAIL, TYPE 1	135+42.50	-21.50'	161.48'
20	END TREATMENT ATTENUATOR, TYPE 2	137+05.00	-21.50'	50.00'

DELAWARE DEPARTMENT OF TRANSPORTATION

ADDENDUMS / REVISIONS

SCALE 0 30 60 90 FEET

N54, HOWELL SCHOOL ROAD FROM SR 896 TO SR 71

CONTRACT	BRIDGE NO.		CONSTRUCTION PLAN	SHEET NO.
25-041-10	DESIGNED BY:	TAM / MAG		23
COUNTY	CHECKED BY:	PAH		TOTAL SHTS.
NEW CASTLE				127

Figure 1.3f:

Construction Plan showing Station 134+50 to 142+50 (Pennoni Associates, Inc. 2010).

0 Meters 16
0 Feet 70

DRAINAGE PIPE SCHEDULE						
NO.	SIZE / TYPE	CLASS	LENGTH	SLOPE	INV. EL.	DIS. EL.
33	19" X 30" RCP	4	36'	0.0100	58.87	58.51
34	19" X 30" RCP	4	147	0.0100	60.34	58.87
35	18" RCP	4	26'	0.0100	60.60	60.34
36	18" RCP	4	6'	0.0200	60.72	60.60
37	19" X 30" RCP	4	226'	0.0100	62.60	60.34
38	18" RCP	4	26'	0.0100	62.86	62.60
39	14" X 23" RCP	4	19'	0.0500	64.41	63.46
40	18" RCP	4	296'	0.0100	65.66	62.70

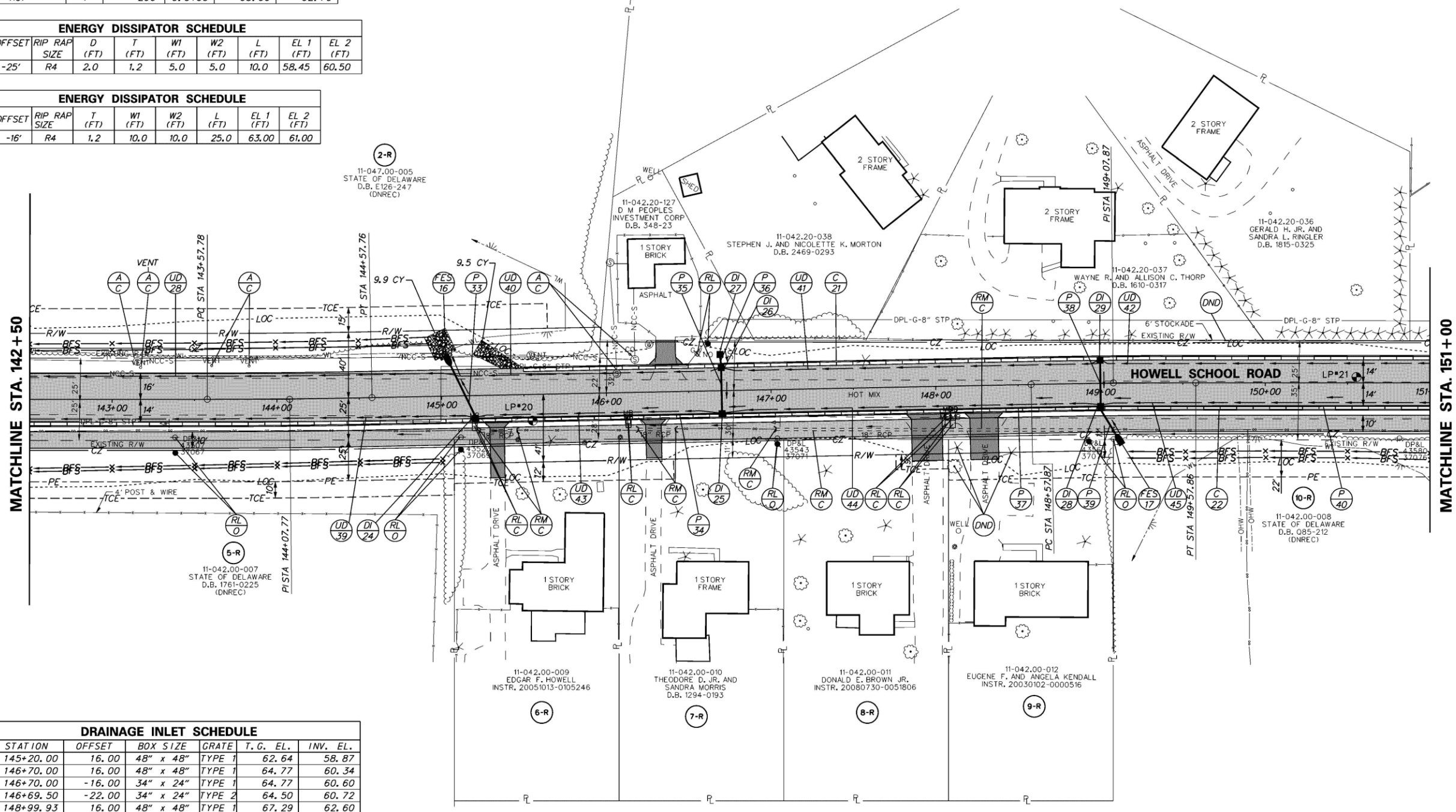
CURB SCHEDULE		
NO.	ITEM DESCRIPTION / TYPE	LENGTH
21	INTEGRAL PCC CURB AND GUTTER, TYPE 4	551.00
22	INTEGRAL PCC CURB AND GUTTER, TYPE 4	850.00

FLARED END SECTION SCHEDULE			
NO.	SIZE / TYPE	SLOPE	SAFETY GRATE
16	19" X 30" RCP	0.0100	NO
17	14" X 23" RCP	0.0500	YES

UNDERDRAIN SCHEDULE			
NO.	SIZE / TYPE	LENGTH	DIS. EL.
40	6" PEP	175.00'	59.65
41	6" PEP	228.00'	62.20
42	6" PEP	300.00'	64.70
43	6" PEP	147.00'	60.05
44	6" PEP	225.00'	62.20
45	6" PEP	300.00'	64.70

ENERGY DISSIPATOR SCHEDULE									
STATION	OFFSET	RIP RAP SIZE	D (FT)	T (FT)	W1 (FT)	W2 (FT)	L (FT)	EL 1 (FT)	EL 2 (FT)
145+03	-25'	R4	2.0	1.2	5.0	5.0	10.0	58.45	60.50

ENERGY DISSIPATOR SCHEDULE								
STATION	OFFSET	RIP RAP SIZE	T (FT)	W1 (FT)	W2 (FT)	L (FT)	EL 1 (FT)	EL 2 (FT)
145+47	-16'	R4	1.2	10.0	10.0	25.0	63.00	61.00



DRAINAGE INLET SCHEDULE						
NO.	STATION	OFFSET	BOX SIZE	GRATE	T.G. EL.	INV. EL.
24	145+20.00	16.00	48" x 48"	TYPE 1	62.64	58.87
25	146+70.00	16.00	48" x 48"	TYPE 1	64.77	60.34
26	146+70.00	-16.00	34" x 24"	TYPE 1	64.77	60.60
27	146+69.50	-22.00	34" x 24"	TYPE 2	64.50	60.72
28	148+99.93	16.00	48" x 48"	TYPE 1	67.29	62.60
29	148+99.93	-16.00	34" X 24"	TYPE 1	67.29	62.86

DELAWARE
DEPARTMENT OF TRANSPORTATION

ADDENDUMS / REVISIONS

SCALE
0 30 60 90
FEET

N54, HOWELL SCHOOL ROAD
FROM SR 896 TO SR 71

CONTRACT	BRIDGE NO.	
25-041-10	DESIGNED BY:	TAM / MAG
COUNTY	CHECKED BY:	PAH
NEW CASTLE		

CONSTRUCTION PLAN

SHEET NO. 24
TOTAL SHTS. 127

Figure 1.3g:

Construction Plan showing Station 142+50 to 151+00 (Pennoni Associates, Inc. 2010).

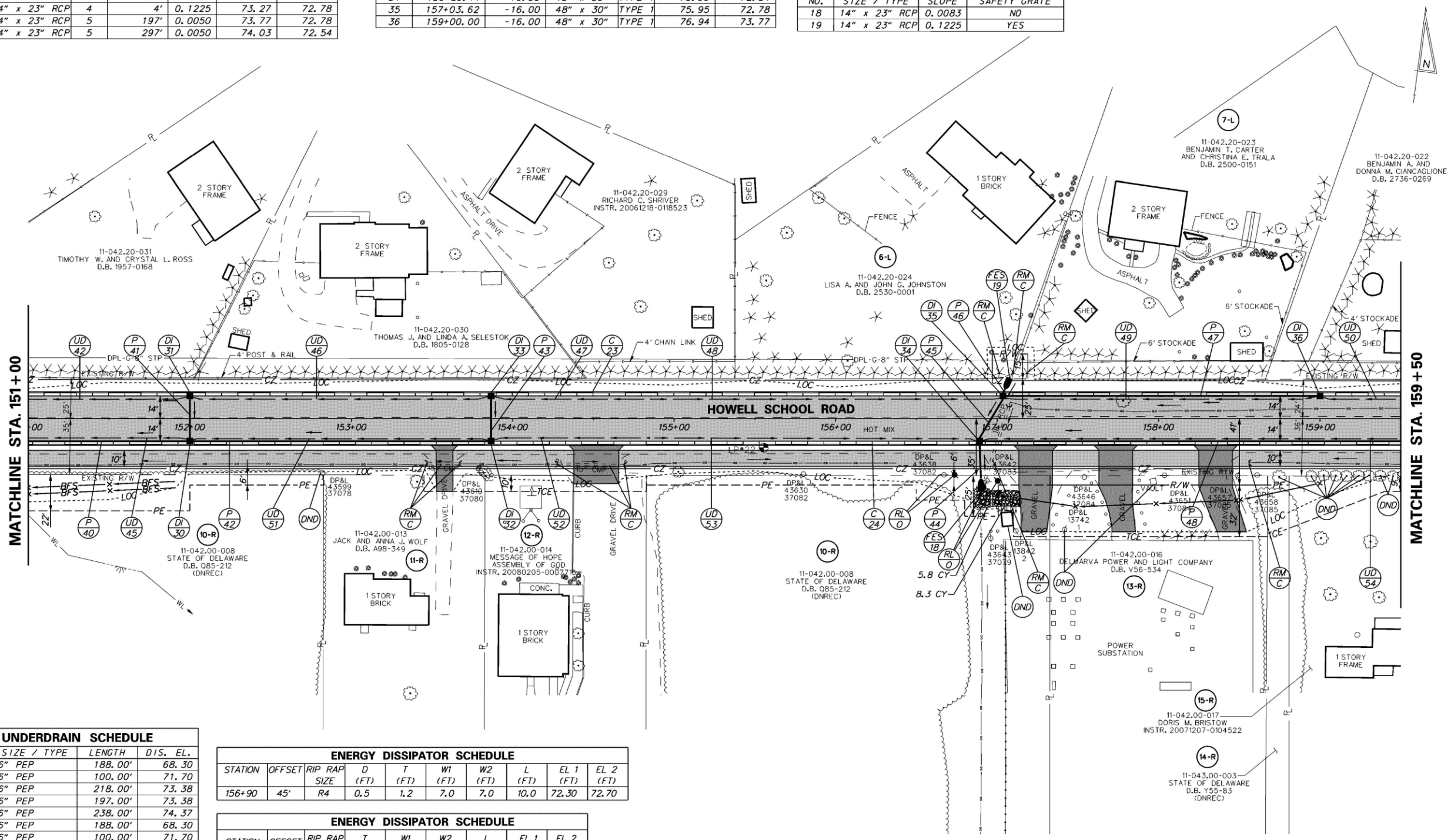
0 Meters 16
0 Feet 70

DRAINAGE PIPE SCHEDULE						
NO.	SIZE / TYPE	CLASS	LENGTH	SLOPE	INV. EL.	DIS. EL.
41	18" RCP	4	28'	0.0100	65.94	65.66
42	18" RCP	4	183'	0.0150	68.41	65.66
43	18" RCP	4	28'	0.0100	68.69	68.41
44	14" x 23" RCP	4	23'	0.0083	72.54	72.35
45	14" x 23" RCP	5	31'	0.0077	72.78	72.54
46	14" x 23" RCP	4	4'	0.1225	73.27	72.78
47	14" x 23" RCP	5	197'	0.0050	73.77	72.78
48	14" x 23" RCP	5	297'	0.0050	74.03	72.54

DRAINAGE INLET SCHEDULE						
NO.	STATION	OFFSET	BOX SIZE	GRATE	T.G. EL.	INV. EL.
30	152+00.00	16.00	48" x 30"	TYPE 1	70.90	65.66
31	152+00.00	-16.00	34" x 24"	TYPE 1	70.90	65.94
32	153+86.57	16.00	48" x 30"	TYPE 1	74.27	68.41
33	153+86.57	-16.00	34" x 24"	TYPE 1	74.27	68.69
34	156+89.11	16.00	48" x 30"	TYPE 1	75.90	72.54
35	157+03.62	-16.00	48" x 30"	TYPE 1	75.95	72.78
36	159+00.00	-16.00	48" x 30"	TYPE 1	76.94	73.77

CURB SCHEDULE		
NO.	ITEM DESCRIPTION / TYPE	LENGTH
23	INTEGRAL PCC CURB AND GUTTER, TYPE 4	850.00
24	INTEGRAL PCC CURB AND GUTTER, TYPE 4	850.00

FLARED END SECTION SCHEDULE			
NO.	SIZE / TYPE	SLOPE	SAFETY GRATE
18	14" x 23" RCP	0.0083	NO
19	14" x 23" RCP	0.1225	YES



UNDERDRAIN SCHEDULE			
NO.	SIZE / TYPE	LENGTH	DIS. EL.
46	6" PEP	188.00'	68.30
47	6" PEP	100.00'	71.70
48	6" PEP	218.00'	73.38
49	6" PEP	197.00'	73.38
50	6" PEP	238.00'	74.37
51	6" PEP	188.00'	68.30
52	6" PEP	100.00'	71.70
53	6" PEP	201.00'	73.30
54	6" PEP	300.00'	73.30

ENERGY DISSIPATOR SCHEDULE									
STATION	OFFSET	RIP RAP SIZE	D (FT)	T (FT)	W1 (FT)	W2 (FT)	L (FT)	EL 1 (FT)	EL 2 (FT)
156+90	45'	R4	0.5	1.2	7.0	7.0	10.0	72.30	72.70

ENERGY DISSIPATOR SCHEDULE								
STATION	OFFSET	RIP RAP SIZE	T (FT)	W1 (FT)	W2 (FT)	L (FT)	EL 1 (FT)	EL 2 (FT)
157+03	45'	R4	1.2	10.0	10.0	18.5	74.30	73.00

DELAWARE
DEPARTMENT OF TRANSPORTATION

ADDENDUMS / REVISIONS

SCALE
0 30 60 90
FEET

N54, HOWELL SCHOOL ROAD
FROM SR 896 TO SR 71

CONTRACT	BRIDGE NO.	
25-041-10	DESIGNED BY:	TAM / MAG
COUNTY	CHECKED BY:	PAH
NEW CASTLE		

CONSTRUCTION PLAN

SHEET NO.
25
TOTAL SHTS.
127

Figure 1.3h:

Construction Plan showing Station 151+50 to 159+50 (Pennoni Associates, Inc. 2010).

0 Meters 16
0 Feet 70

DRAINAGE INLET SCHEDULE

NO.	STATION	OFFSET	BOX SIZE	GRATE	T.G. EL.	INV. EL.
37	159+90.00	16.00	48" x 30"	TYPE 1	77.39	74.03
38	161+50.09	16.00	48" x 30"	TYPE 1	78.18	74.82
39	161+50.09	-16.00	34" x 24"	TYPE 1	78.18	74.96
40	163+57.05	-17.62	48" x 30"	TYPE 1	79.27	74.27
41	163+59.81	17.72	66" x 30"	TYPE 1	79.29	73.97
42	163+62.26	45.00	66" x 66"	TYPE 2	77.50	73.51
43	164+69.40	59.00	66" x 48"	TYPE 2	78.25	73.08
44	165+35.51	32.00	34" x 24"	TYPE 2	82.00	77.44
45	165+50.45	69.14	48" x 48"	TYPE 1	80.92	72.82
46	166+55.30	54.00	48" x 48"	TYPE 2	77.25	72.40
47	167+13.09	46.00	48" x 48"	TYPE 2	78.00	72.17
48	167+61.68	39.00	48" x 48"	TYPE 2	79.50	71.97
49	167+43.87	16.74	72" x 48"	TYPE 1	80.03	74.97
50	167+43.87	-16.74	72" x 48"	TYPE 1	80.03	75.45
51	167+10.78	17.62	48" x 30"	TYPE 1	80.05	75.94
52	166+93.87	-18.73	48" x 30"	TYPE 1	80.11	76.11
53	167+93.87	16.00	72" x 48"	TYPE 1	80.16	76.09
54	167+93.87	-16.00	72" x 48"	TYPE 1	80.16	76.09
55	40+39.38	89.00	72" x 48"	TYPE 2	78.50	74.38
56	40+82.09	35.02	48" x 48"	TYPE 1	80.63	75.25
57	40+84.32	-34.33	34" x 24"	TYPE 1	80.43	76.11
58	41+24.52	28.00	48" x 30"	TYPE 1	81.05	75.87
59	42+45.47	27.76	48" x 30"	TYPE 1	82.58	78.06

DRAINAGE PIPE SCHEDULE (CONT.)

NO.	SIZE / TYPE	CLASS	LENGTH	SLOPE	INV. EL.	DIS. EL.
67	18" RCP	4	106'	0.0100	74.38	73.32
68	18" RCP	4	67'	0.0100	75.25	74.58
69	18" RCP	4	66'	0.0100	76.11	75.45
70	18" RCP	4	42'	0.0100	75.87	75.45
71	18" RCP	4	119'	0.0100	78.06	76.87
72	30" RCP	4	263'	0.0040	71.97	70.91

CURB SCHEDULE

NO.	ITEM DESCRIPTION / TYPE	LENGTH
25	INTEGRAL PCC CURB AND GUTTER, TYPE 4	633.00
26	PCC CURB, TYPE 2	49.00
27	PCC CURB, TYPE 2	67.00
28	INTEGRAL PCC CURB AND GUTTER, TYPE 4	861.00
29	PCC CURB, TYPE 1	225.00
30	PCC CURB, TYPE 2 MODIFIED	315.00
31	PCC CURB, TYPE 2	93.00
32	PCC CURB, TYPE 2 MODIFIED	73.00
33	PCC CURB, TYPE 2	285.00
34	PCC CURB, TYPE 1	143.00
35	PCC CURB, TYPE 1 MODIFIED	25.00
36	PCC CURB, TYPE 1	143.00
37	INTEGRAL PCC CURB AND GUTTER, TYPE 4	306.00

DRAINAGE PIPE SCHEDULE

NO.	SIZE / TYPE	CLASS	LENGTH	SLOPE	INV. EL.	DIS. EL.
49	14" x 23" RCP	4	157'	0.0050	74.82	74.03
50	14" x 23" RCP	4	15'	0.0107	74.98	74.82
51	14" x 23" RCP	4	28'	0.0050	74.96	74.82
52	30" RCP	4	17'	0.0471	75.07	74.27
53	30" RCP	4	32'	0.0094	74.27	73.97
54	24" x 38" RCP	4	27'	0.0096	73.97	73.71
55	24" x 38" RCP	4	107'	0.0040	73.51	73.08
56	30" RCP	4	63'	0.0041	73.08	72.82
57	18" RCP	4	34'	0.0100	77.44	77.10
58	30" RCP	4	104'	0.0040	72.82	72.40
59	30" RCP	4	57'	0.0040	72.40	72.17
60	30" RCP	4	48'	0.0042	72.17	71.97
61	18" RCP	4	28'	0.0100	74.97	74.69
62	18" RCP	4	28'	0.0100	75.45	75.17
63	18" RCP	4	31'	0.0100	75.94	75.65
64	18" RCP	4	44'	0.0100	76.09	75.65
65	18" RCP	4	46'	0.0100	76.11	75.65
66	18" RCP	4	44'	0.0100	76.09	75.65

FLARED END SECTION SCHEDULE

NO.	SIZE / TYPE	SLOPE	SAFETY GRATE
20	14" x 23" RCP	0.0107	YES
21	30" RCP	0.0471	YES

FENCE SCHEDULE

NO.	ITEM DESCRIPTION / TYPE	LENGTH
5	WOOD RAIL FENCE, 4' HIGH	152.00'
6	CHAIN-LINK FENCE, 6' HIGH	70.00'
7	CHAIN-LINK FENCE, 4' HIGH	80.00'
8	WOOD RAIL FENCE, 4' HIGH	38.11'
9	CHAIN-LINK FENCE, 4' HIGH	68.00'

UNDERDRAIN SCHEDULE

NO.	SIZE / TYPE	LENGTH	DIS. EL.
55	6" PEP	207.00'	75.25
56	6" PEP	156.00'	76.70
57	6" PEP	35.00'	77.85
58	6" PEP	182.00'	77.85
59	6" PEP	123.00	78.52
60	6" PEP	48.00'	78.05
61	6" PEP	52.00'	78.05
62	6" PEP	35.00'	75.92
63	6" PEP	117.00'	77.56
64	6" PEP	49.00'	77.45

UNDERDRAIN SCHEDULE (CONT.)

NO.	SIZE / TYPE	LENGTH	DIS. EL.
65	6" PEP	47.00'	77.45
66	6" PEP	228.00'	77.60
67	6" PEP	161.00'	74.82
68	6" PEP	212.00'	75.25
69	6" PEP	188.00'	76.72
70	6" PEP	42.00'	78.35
71	6" PEP	103.00'	79.43
72	6" PEP	103.00'	79.42
73	6" PEP	111.00'	77.56
74	6" PEP	49.00'	77.45
75	6" PEP	47.00'	77.45
76	6" PEP	230.00'	77.60

DELAWARE DEPARTMENT OF TRANSPORTATION

ADDENDUMS / REVISIONS

SCALE 0 30 60 90 FEET

N54, HOWELL SCHOOL ROAD FROM SR 896 TO SR 71

CONTRACT	BRIDGE NO.	
25-041-10	DESIGNED BY: TAM / MAG	
COUNTY	CHECKED BY: PAH	
NEW CASTLE		

CONSTRUCTION PLAN

SHEET NO. 26 TOTAL SHTS. 127

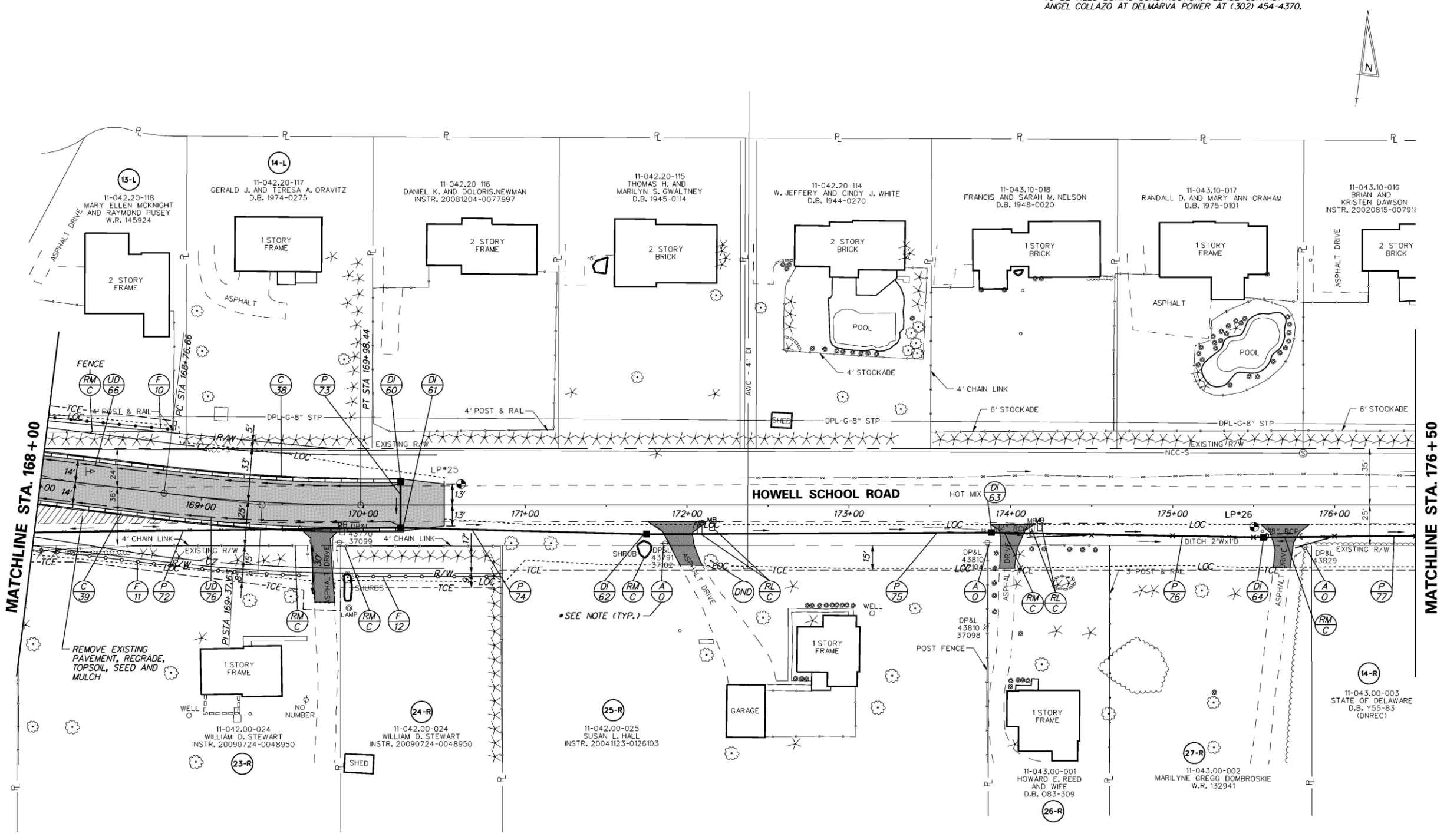
Figure 1.3i:

Construction Plan showing Station 159+50 to 168+00 (Pennoni Associates, Inc. 2010).

0 Meters 16

0 Feet 70

NOTE:
DUE TO TRENCH EXCAVATION UTILITY POLES NEED TO BE HELD DURING CONSTRUCTION. PLEASE CONTACT ANGEL COLLAZO AT DELMARVA POWER AT (302) 454-4370.



FENCE SCHEDULE

NO.	ITEM DESCRIPTION / TYPE	LENGTH
10	WOOD RAIL FENCE, 4' HIGH	73.89'
11	CHAIN-LINK FENCE, 4' HIGH	165.00'
12	CHAIN-LINK FENCE, 4' HIGH	55.00'

CURB SCHEDULE

NO.	ITEM DESCRIPTION / TYPE	LENGTH
38	INTEGRAL PCC CURB AND GUTTER, TYPE 4	224.00
39	INTEGRAL PCC CURB AND GUTTER, TYPE 4	227.00

DRAINAGE INLET SCHEDULE

NO.	STATION	OFFSET	BOX SIZE	GRATE	T.G. EL.	INV. EL.
60	170+23.00	-16.00	34" x 24"	TYPE 1	82.85	76.50
61	170+23.00	16.00	48" x 48"	TYPE 1	82.85	70.91
62	171+75.00	18.00	48" x 48"	TYPE 2	82.75	70.31
63	173+88.00	17.00	48" x 48"	TYPE 2	79.25	69.46
64	175+56.00	20.00	48" x 48"	TYPE 2	77.50	68.79

DRAINAGE PIPE SCHEDULE

NO.	SIZE / TYPE	CLASS	LENGTH	SLOPE	INV. EL.	DIS. EL.
73	18" RCP	4	27'	0.0100	76.50	76.23
74	30" RCP	4	150'	0.0040	70.91	70.31
75	30" RCP	4	211'	0.0040	70.31	69.46
76	30" RCP	4	166'	0.0040	69.46	68.79
77	30" RCP	4	267'	0.0050	68.79	67.46

DELAWARE DEPARTMENT OF TRANSPORTATION

ADDENDUMS / REVISIONS

SCALE 0 30 60 90 FEET

N54, HOWELL SCHOOL ROAD FROM SR 896 TO SR 71

CONTRACT	BRIDGE NO.	
25-041-10	DESIGNED BY:	TAM / MAG
COUNTY	CHECKED BY:	PAH
NEW CASTLE		

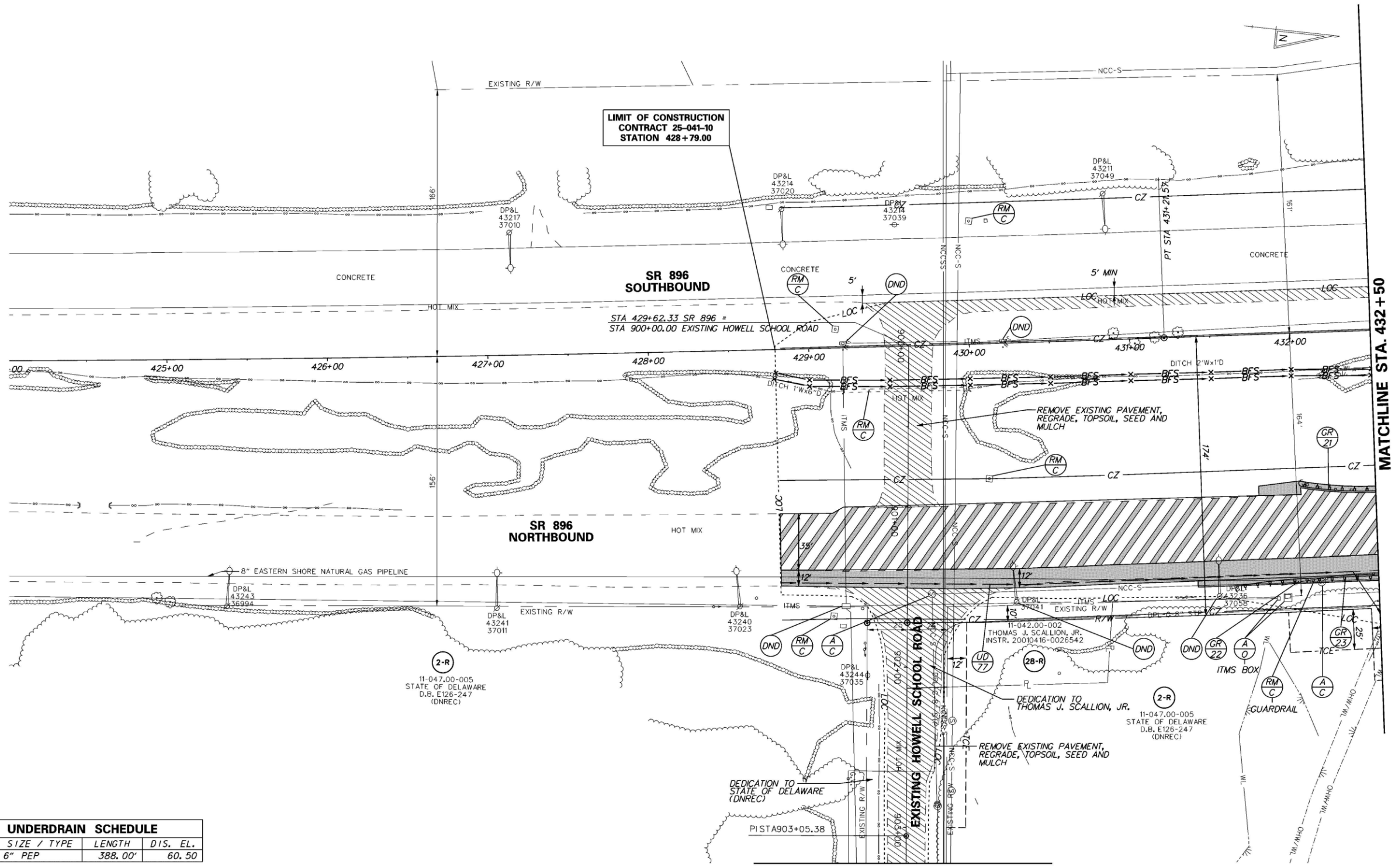
CONSTRUCTION PLAN

SHEET NO.
27
TOTAL SHTS.
127

Figure 1.3j:

Construction Plan showing Station 168+00 to the east terminus (Pennoni Associates, Inc. 2010).

0 Meters 16
0 Feet 70



UNDERDRAIN SCHEDULE

NO.	SIZE / TYPE	LENGTH	DIS. EL.
77	6" PEP	388.00'	60.50

GUARDRAIL SCHEDULE

NO.	ITEM DESCRIPTION / TYPE	BEGIN STA.	OFFSET	LENGTH
21	END TREATMENT ATTENUATOR, TYPE 2	432+02.23	-7.60'	50.00'
22	END TREATMENT ATTENUATOR, TYPE 2	431+60.66	52.20'	50.00'
23	GALVANIZED STEEL GUARDRAIL, TYPE 1	432+10.66	48.00'	37.80'

DELAWARE
DEPARTMENT OF TRANSPORTATION

ADDENDUMS / REVISIONS

SCALE 0 30 60 90 FEET

N54, HOWELL SCHOOL ROAD
FROM SR 896 TO SR 71

CONTRACT	BRIDGE NO.	
25-041-10	DESIGNED BY:	TAM / MAG
COUNTY	CHECKED BY:	PAH
NEW CASTLE		

CONSTRUCTION PLAN

SHEET NO.
30
TOTAL SHTS.
127

Figure 1.3k:

Construction Plan showing Station 432+50 to the south terminus (Pennoni Associates, Inc. 2010).

0 Meters 16
0 Feet 70