WIGGINS PASS MONITORING REPORT
MAY 2004 SURVEY DATA

Submitted To:

COLLIER COUNTY
AND
THE STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

PERMIT NO. 0142538-001-JC

Submitted By:

Humiston & Moore Engineers

July 15, 2004
HM 11-054

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Wiggins Pass Monitoring Report
May 2004 Monitoring Data
July 2004

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Wiggins Pass Monitoring Report
May 2004 Monitoring Data

1. Introduction

Wiggins Pass is located in Collier County on the southwest coast of Florida as shown in Figure 1. The inlet has been dredged and has been maintained for navigation since 1984, with dredging currently projected at two-year intervals. The channel was deepened and shifted to the north in 2000. The monitoring program requirements are included in the Department of Environmental Protection (DEP) Permit No. 0142538-001-JC. Survey control information is presented on Figures 2, 3, and 4. This report presents the analysis of the most recent monitoring survey which was conducted in May 2004, and a discussion about the county's efforts to correct problems with the existing inlet management plan.

2. Background

Recent project history is described as follows:

- The Corps of Engineers completed a *Navigation for Wiggins Pass Study* in 1980 recommending dredging for navigation and the establishment of a special taxing district. The specific recommendations in the study were never implemented.
- Wiggins Pass was first dredged for navigation in 1984 by Collier County. The dredged material was disposed of on the beach south of the inlet on Delnor-Wiggins State Park.
- Maintenance dredging of Wiggins Pass was completed in 1991, 1993 and 1995. Beach disposal of sand dredged from the channel was placed both north and south of the inlet.
- Following recommendations in the Wiggins Pass Inlet Management Study[1] (1995), the inlet entrance channel was widened, deepened, and shifted north between March and July of 2000. Approximately 16,960 cubic yards of beach compatible material from the dredging were placed on the beach south of the inlet, and approximately 26,460 cubic yards were placed in the nearshore area north of the inlet. Approximately 53,170 cubic yards of non-beach compatible material from the modified dredging in 2000 were deposited in a designated offshore disposal area. Based on findings in the first monitoring report, this material remained very stable, and the Department of Environmental Protection excluded it from any further monitoring. Beach profiles were surveyed across all of the beach disposal areas, and at DEP reference monuments R-10 through R-22. The profile locations, monument

[1] Coastal Planning and Engineering, *Wiggins Pass Inlet Management Study*, 1995

coordinates, and azimuths are provided on Figure 2. Offshore profile data collection extended seaward approximately 2,000 feet. Channel cross sections were surveyed on stations –2+00 to 15+00, as shown on Figure 3 and extended approximately 1000 feet to either side of the channel centerline.

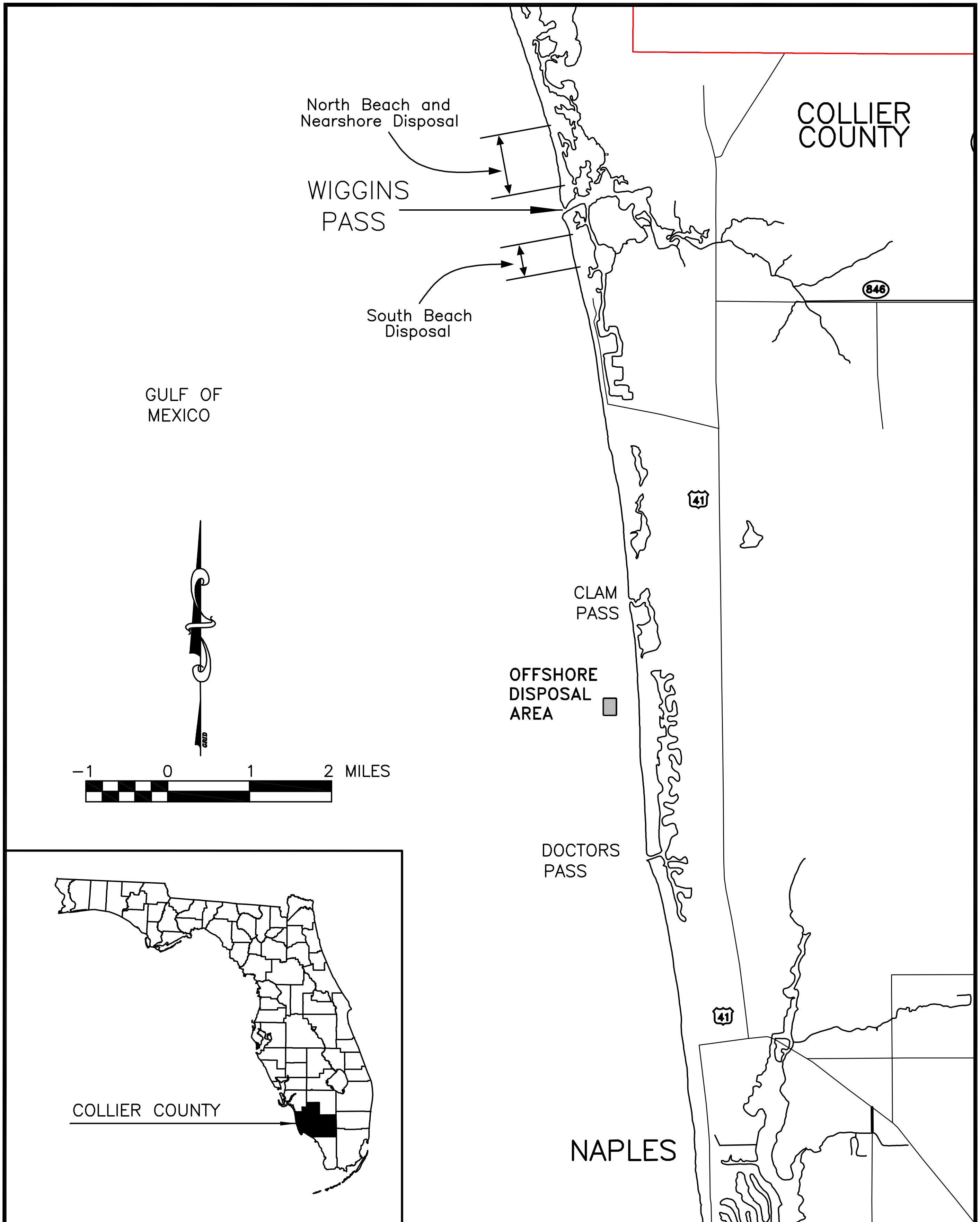
- During maintenance dredging in March 2002, approximately 57,080 cubic yards of sand were placed south of Wiggins Pass on Delnor-Wiggins State Park beach. Beach profiles were again surveyed across the disposal areas, and at DEP reference monuments R-10 through R-22.
- The Wiggins Pass area was subjected to a series of storms during the summer and fall of 2002. This resulted in shoaling within the area dredged in March 2002. In December 2002, an emergency dredging project was completed in response to the request of navigation interests. Approximately 46,635 cubic yards of beach compatible sand were placed north of Wiggins Pass.
- The channel inside the inlet was initially part of the monitoring scope of work. However, in order to develop a more thorough database of information on the inlet system, 34 cross sections of the inner channel were surveyed in January 2003 and again in May 2004. The additional cross sections and control are shown on Figure 4.

3. Monitoring Survey Data

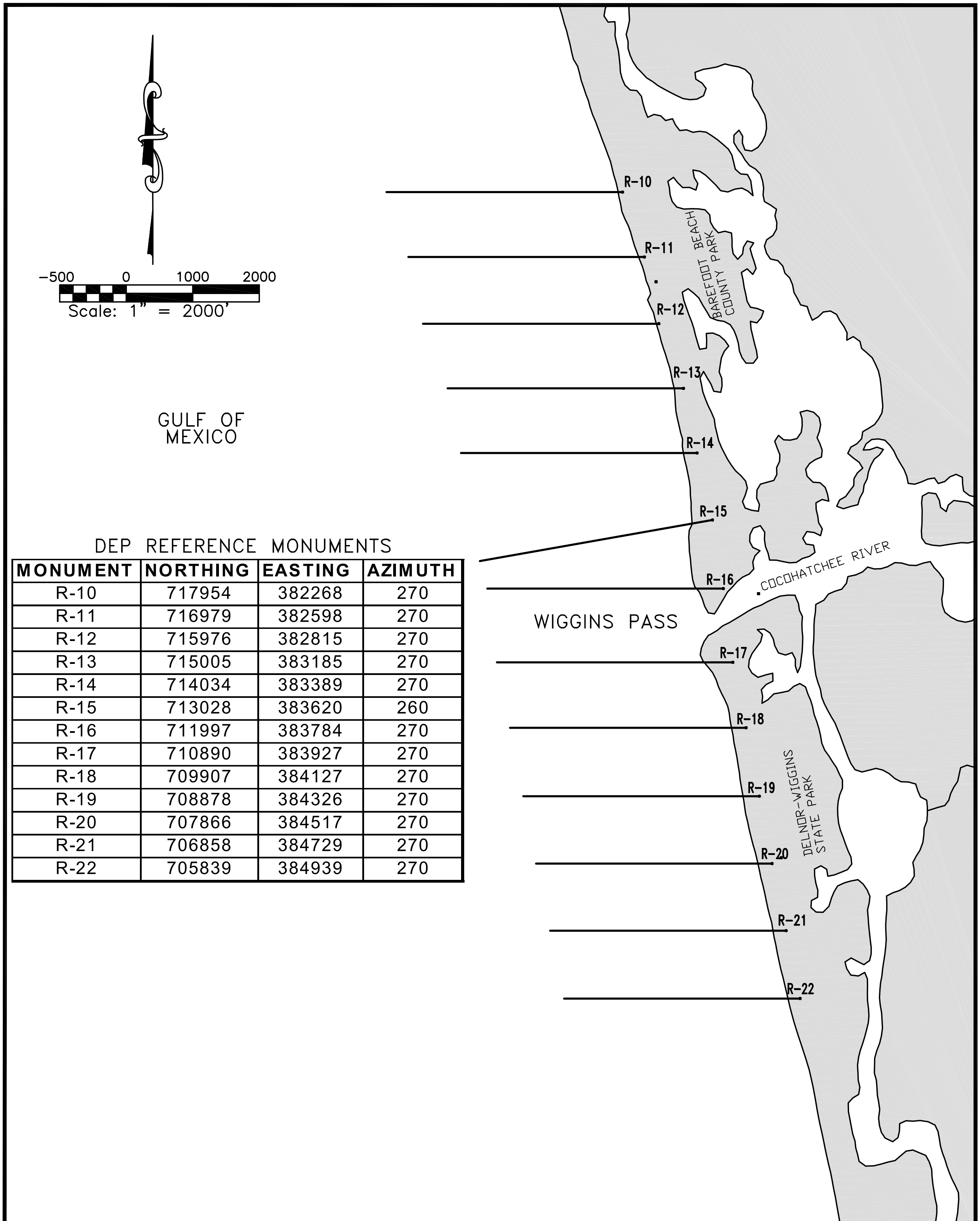
The analysis in this monitoring report is based on data from the following surveys.

1) Pre-dredging and post-dredging beach and inlet surveys conducted in 2000 in association with changes to the inlet maintenance dredging at that time.
2) A county-wide survey in October 2001 which included the beaches adjacent to Wiggins Pass.
3) A March 2002 pre-dredging survey of the inlet channel.
4) May 2002 monitoring surveys of both the inlet channel and the adjacent beaches.
5) November 2002 and January 2003 pre and post-dredging surveys of the inlet channel and the adjacent beach, north of the inlet.
6) May 2004 monitoring surveys of the inlet channel and adjacent beaches.

Additional monitoring surveys will be conducted annually as required by the dredging permit.



HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	WIGGINS PASS MONITORING REPORT LOCATION MAP		5679 STRAND COURT NAPLES, FL 34110 FAX: 239 594 2025 PHONE: 239 594 2021
	FOR: COLLIER COUNTY		
	DATE:07/13/04	FILE: LOC-MAP	SCALE: SHOWN
	JOB:11-054	DATUM: NONE	FIGURE: 1



DEP REFERENCE MONUMENTS

MONUMENT	NORTHING	EASTING	AZIMUTH
R-10	717954	382268	270
R-11	716979	382598	270
R-12	715976	382815	270
R-13	715005	383185	270
R-14	714034	383389	270
R-15	713028	383620	260
R-16	711997	383784	270
R-17	710890	383927	270
R-18	709907	384127	270
R-19	708878	384326	270
R-20	707866	384517	270
R-21	706858	384729	270
R-22	705839	384939	270

HUMISTON & MOORE ENGINEERS
COASTAL ENGINEERING DESIGN AND PERMITTING

DEP REFERENCE MONUMENTS & SURVEY LINES
WIGGINS PASS

FOR: COLLIER COUNTY		
DATE:07/13/04	FILE: R-MONS	SCALE:1"=2000'
JOB: 11-054	DATUM: NGVD	FIGURE: 2

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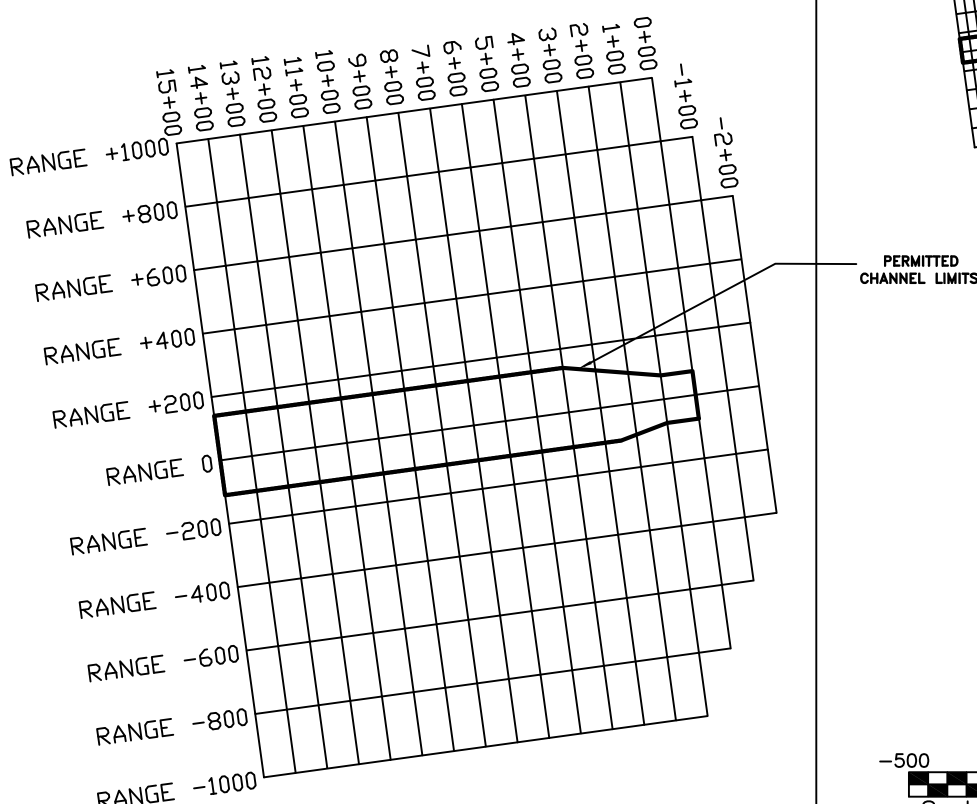
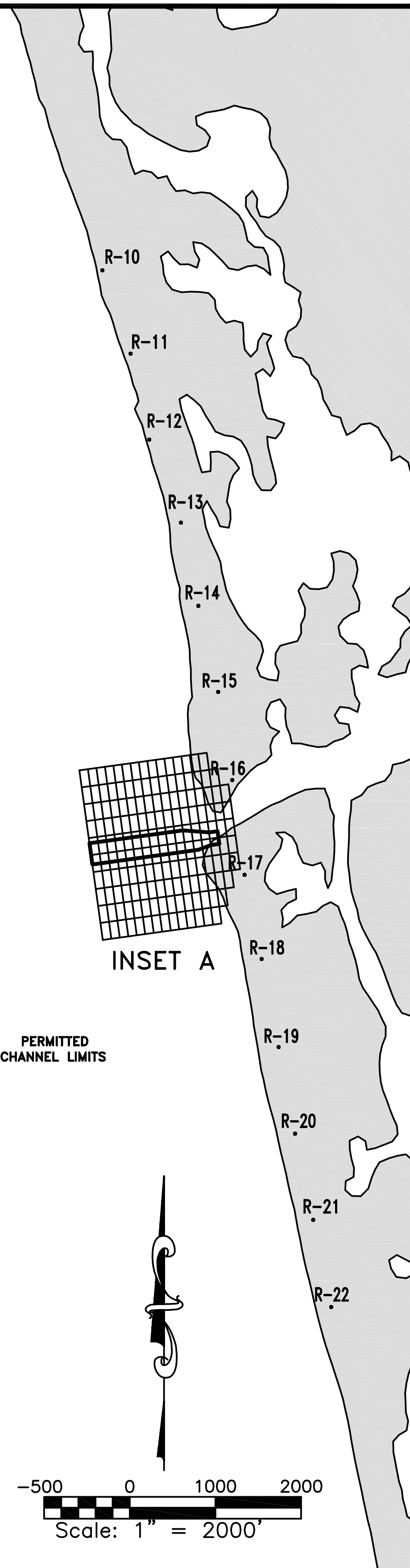
WIGGINS PASS MONITORING STATIONS FOR OUTER CHANNEL

Station	Northing	Easting	Azimuth	Length
-2+00	711947.44	383738.54	172.15	1000'
-1+00	712131.91	383612.17	172.15	1400'
0+00	712316.39	383485.8	172.15	1800'
1+00	712302.74	383386.74	172.15	2000'
2+00	712289.08	383287.68	172.15	2000'
3+00	712275.43	383188.61	172.15	2000'
4+00	712261.78	383089.55	172.15	2000'
5+00	712248.12	382990.48	172.15	2000'
6+00	712234.47	382891.42	172.15	2000'
7+00	712220.82	382792.36	172.15	2000'
8+00	712207.17	382693.29	172.15	2000'
9+00	712193.51	382594.23	172.15	2000'
10+00	712179.86	382495.17	172.15	2000'
11+00	712166.21	382396.1	172.15	2000'
12+00	712152.56	382297.04	172.15	2000'
13+00	712138.9	382197.98	172.15	2000'
14+00	712125.25	382098.91	172.15	2000'
15+00	712111.6	381999.85	172.15	2000'

CHANNEL STATION LOCATION – INSET A
SCALE: 1" = 600'

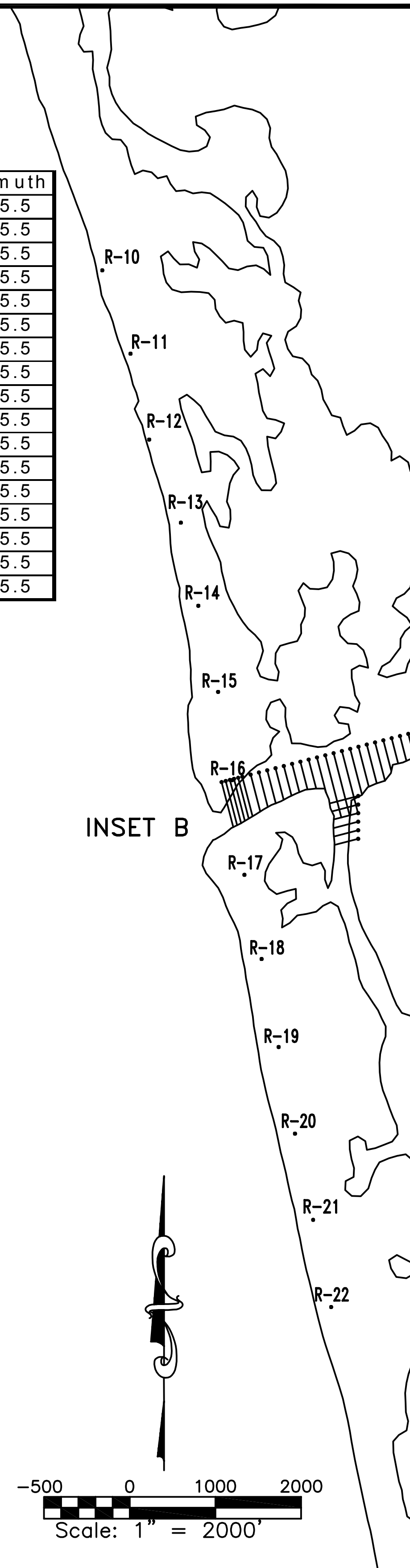




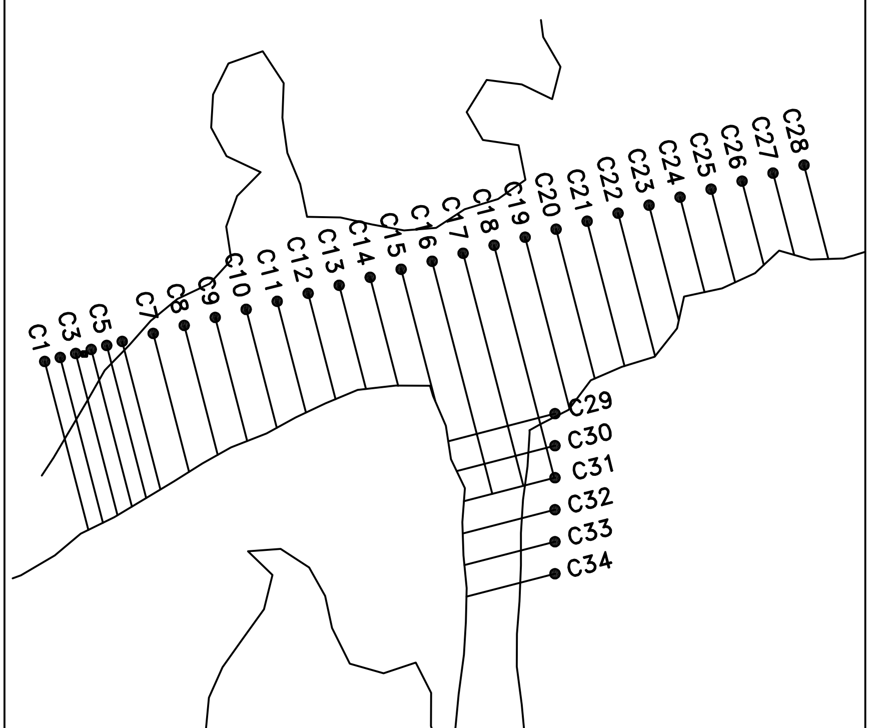
HUMISTON & MOORE ENGINEERS — COASTAL ENGINEERING DESIGN AND PERMITTING	WIGGINS PASS MONITORING REPORT OUTER CHANNEL STATION LOCATION			5679 STRAND COURT NAPLES, FL 34110 FAX: 239 594 2025 PHONE: 239 594 2021
	FOR: COLLIER COUNTY			
	DATE:07/13/04	FILE: CHAN-SITE	SCALE:SHOWN	
	JOB 11-054	DATUM: NGVD	FIGURE: 3	

WIGGINS PASS MONITORING STATION FOR INNER CHANNEL

Station	Northing	Easting	Azimuth		Station	Northing	Easting	Azimuth
C1	711973.9	383660.2	165.5		C18	712336.9	385064.0	165.5
C2	711986.4	383708.6	165.5		C19	712362.0	385160.8	165.5
C3	711998.9	383757.0	165.5		C20	712387.0	385257.6	165.5
C4	712011.4	383805.4	165.5		C21	712412.0	385354.5	165.5
C5	712023.9	383853.8	165.5		C22	712437.1	385451.3	165.5
C6	712036.5	383902.2	165.5		C23	712462.1	385548.1	165.5
C7	712061.5	383999.1	165.5		C24	712487.1	385644.9	165.5
C8	712086.5	384095.9	165.5		C25	712512.2	385741.7	165.5
C9	712111.6	384192.7	165.5		C26	712537.2	385838.5	165.5
C10	712136.6	384289.5	165.5		C27	712562.3	385935.3	165.5
C11	712161.7	384386.3	165.5		C28	712587.3	386032.2	165.5
C12	712186.7	384483.1	165.5		C29	711810.8	385254.1	255.5
C13	712211.7	384579.9	165.5		C30	711710.8	385254.1	255.5
C14	712236.8	384676.8	165.5		C31	711610.8	385254.1	255.5
C15	712261.8	384773.6	165.5		C32	711510.8	385254.1	255.5
C16	712286.8	384870.4	165.5		C33	711410.8	385254.1	255.5
C17	712311.9	384967.2	165.5		C34	711310.8	385254.1	255.5



CHANNEL STATION LOCATION – INSET B
SCALE: 1" = 600'
CHANNEL PROFILES EXTEND TO EDGE OF LAND



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WIGGINS PASS MONITORING REPORT
INNER CHANNEL STATION LOCATION

FOR: COLLIER COUNTY		
DATE:07/13/04	FILE: CHAN-LINE	SCALE:SHOWN
JOB: 11-054	DATUM: NGVD	FIGURE: 4

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4. Beach Profiles

A. Shoreline Change

Figure 5 is a stack plot which shows the changes in shoreline position between the pre (March) and post- (June) construction surveys of 2000, the October 2001 county-wide survey, the May 2002 monitoring survey, the January 2003 post dredging survey and the May 2004 monitoring survey. The shoreline changes are illustrated at +1.5 ft NGVD (Mean High Water) and at +4 ft NGVD which approximately corresponds to the beach berm elevation. Shoreline change in the +4 ft NGVD contour is also shown because it illustrates the continued recession of the escarpment due to the erosion that has occurred on the north side of the inlet. Additionally, a color coded time scale is represented at the bottom; each color represents a different survey period between March 2000 and May 2004. Storm and dredging events are also represented. This is included in order to provide the reader with a quantitative time sequence of the erosion that has been reported by many eye witnesses.

This exhibit shows that the edge of the berm and mean high water line do not always follow the same accretion and erosion trend. Disparities between the two illustrate that at times, the berm was eroding while the mean high water was accreting and vice versa. The shoreline generally advanced seaward in both the north and south beach fill sites, as a result of the beach disposal from the dredging between 2000 and 2002. The exception to this general accretion has been significant shoreline recession immediately adjacent to the inlet, at DEP reference monument R-16 and R-17. See Figure 2 for the locations of the monuments.

Averaged shoreline changes and rates are provided in Table 1 and Table 2 for the shoreline north and south of the inlet at +1.5 ft and +4 ft NGVD, respectively. The shoreline change and shoreline rates are averaged by monitoring period and by location as well. As indicated, these local averages were computed both with and without the changes adjacent to the inlet at R-16 and R-17 (highlighted in gray in the tables) in order to illustrate the influence of the inlet on the overall average changes in the study area.

The high erosion at the monuments adjacent to the inlet may be indicative of a localized response to the expanded dredging limits in 2000, and the maintenance of the modified dredging limits in 2002 through 2004. This localized effect is probably due to readjustment of the side-slopes of the larger dredged channel, and therefore would not be representative of general shoreline trends further from the immediate influence of the inlet. The high rates of shoreline recession adjacent to the inlet are discussed in more detail in Section 6 of this report.

Between the May 2002 and May 2004 monitoring surveys, the shoreline up to approximately 1 mile north of Wiggins Pass has experienced an average accretion of +10.3 feet (+5.1 feet per year). Some of the accretion at R-14 and R-15 is most likely due to onshore movement of material from the 2002-2003 nearshore sand disposal between R-12 and R-14. Meanwhile the berm has experienced the opposite trend with an average erosion of -2.9 feet (-1.4 feet per year).

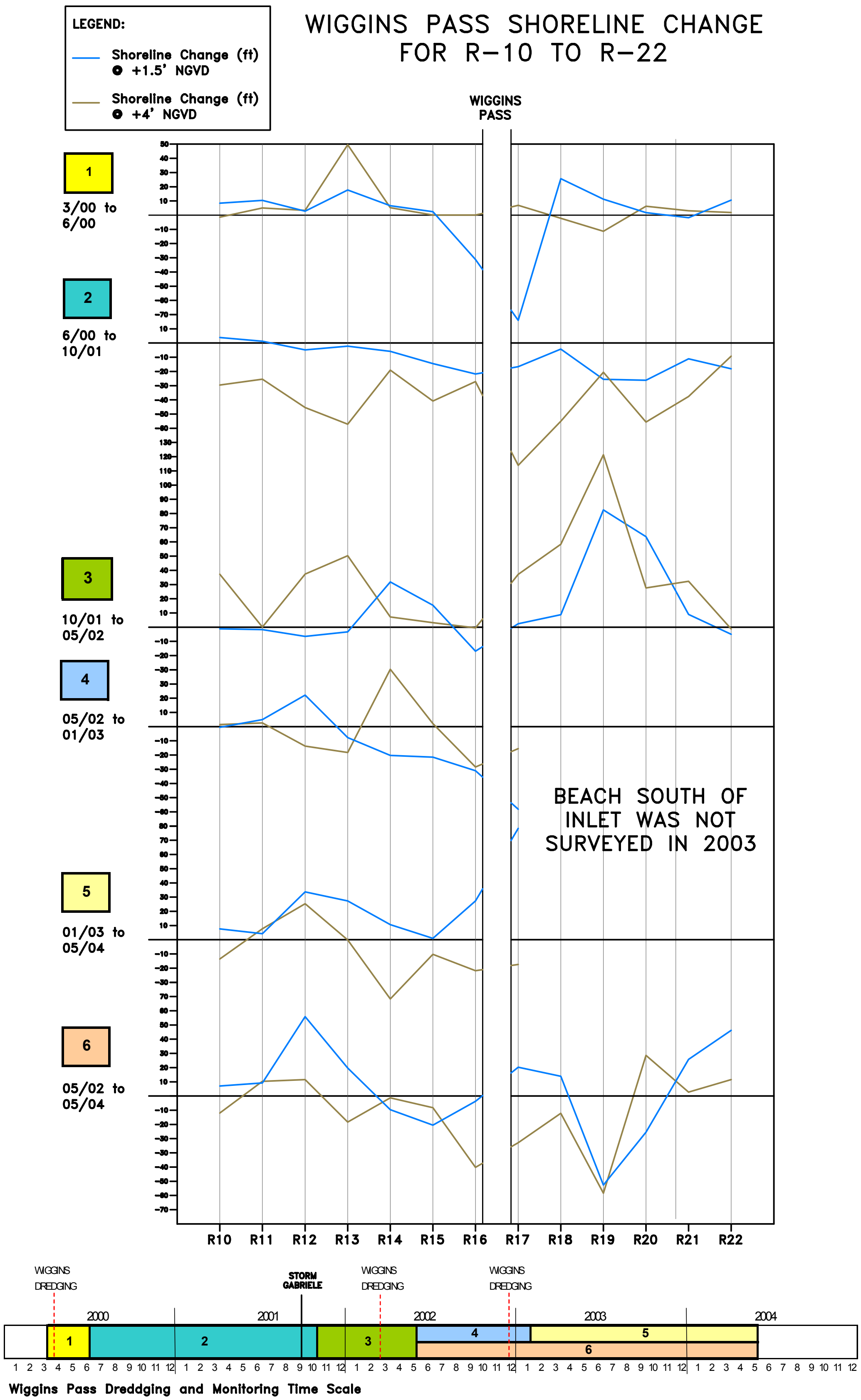
Since May 2002, the area to the south of Wiggins Pass has eroded an average of -0.5 feet (-0.26 feet per year) at the shoreline and an average of -3.8 feet (-1.4 feet per year) at the berm elevation. This includes the dredging in December 2002 when some beach material was placed north of the inlet.

B. Volume Change

Most volumetric changes occur on the beach face and in shallow water nearshore where wave action readily moves sediment. Further offshore in deeper water, wave forces have a much lesser effect on bottom sediments, and volume change is often smaller than nearshore. The depth below which volume change becomes negligible is the *depth of closure*; the depth at which comparative profiles from different monitoring surveys typically converge. Profile lines were surveyed to a distance of approximately 2,000 feet offshore for the purpose of extending the data collection seaward beyond the estimated depth of closure.

Figure 6 is a stack plot, which shows volumetric changes at each of the DEP reference monuments that are spaced at approximately 1000 feet along the coastline. The volume changes are presented as cubic yards per lineal foot of beach. Table 3 lists volume changes and offshore distance to closure. Table 4 is similar to Tables 1 and 2, it illustrates the variability of volume changes at the inlet vicinity with the adjacent beaches.

Over the most recent monitoring interval, from May 2002 to May 2004, the area including DEP reference monument R-14 and north has experienced a volumetric gain of material in the nearshore region of 0.9 cy/ft/yr. This volumetric gain is probably due to the placement of the dredged material onto the beach during the 2002-2003 dredging. From R-17 to the south, there was a volumetric loss of material in the nearshore region with an average volume change rate of -2.6 cy/ft/yr.



WIGGINS PASS SHORELINE CHANGE
FOR R-10 TO R-22
LEGEND:
Shoreline Change (ft) @ +1.5' NGVD
Shoreline Change (ft) @ +4' NGVD
WIGGINS PASS
1
3/00 to 6/00
2
6/00 to 10/01
3
10/01 to 05/02
4
05/02 to 01/03
5
01/03 to 05/04
6
05/02 to 05/04
BEACH SOUTH OF INLET WAS NOT SURVEYED IN 2003
R10 R11 R12 R13 R14 R15 R16 R17 R18 R19 R20 R21 R22
WIGGINS DREDGING
STORM GABRIELE
WIGGINS DREDGING
WIGGINS DREDGING
2000
2001
2002
2003
2004
Wiggins Pass Dredging and Monitoring Time Scale

Figure 5

Table 1
Shoreline Change and Rates
Measured @ +1.5' NGVD (Mean High Water)

Shoreline Change Rates (ft/yr) @ +1.5' NGVD

	3/00 to 6/00	6/00 to 10/01	10/01 to 05/02	05/02 to 05/04	Weighted Averages
R-10	33.7	2.9	-2.0	3.5	4.38
R-11	41.4	0.9	-3.0	4.6	4.59
R-12	11.2	-3.7	-11.1	27.9	11.36
R-13	70.9	-1.6	-5.7	9.8	7.66
R-14	26.7	-4.4	54.6	-4.8	5.51
R-15	9.6	-10.9	26.4	-10.2	-4.12
R-16	-124.9	-16.4	-28.9	-1.8	-17.67
R-17	-296.0	-12.5	4.2	10.1	-16.32
R-18	102.8	-3.2	15.1	7.0	10.61
R-19	45.0	-19.1	141.4	-31.3	1.34
R-20	7.1	-19.6	109.1	-13.0	3.19
R-21	-7.1	-8.3	15.4	12.9	5.25
R-22	42.2	-13.6	-8.6	23.1	8.07
Period Averages	-2.9	-8.4	23.6	2.9	**1.8**

05/02 to 05/04 bracketed averages:

R-10 to R-15	5.1
R-10 to R-16	4.1
R-16 to R-17	4.1
R-18 to R-22	-0.26
R-17 to R-22	1.4

Averages

Cumulative Shoreline Change Rate Averages 3/00 - 5/04

R-10 to R-15	4.9
R-16 to R-17	**-17.0**
R-18 to R-22	5.7
R-10 to R-16	1.7
R-17 to R-22	2.0
R-10 to R-22	**1.8**

Shoreline Change (ft) @ +1.5' NGVD

	3/00 to 6/00	6/00 to 10/01	10/01 to 05/02	05/02 to 05/04	Sum
R-10	8.4	3.9	-1.1	7.1	18.2
R-11	10.4	1.2	-1.7	9.2	19.1
R-12	2.8	-4.9	-6.5	55.9	47.3
R-13	17.7	-2.2	-3.3	19.7	31.9
R-14	6.7	-5.9	31.8	-9.6	23.0
R-15	2.4	-14.5	15.4	-20.5	-17.2
R-16	-31.2	-21.8	-16.9	-3.7	-73.6
R-17	-74.0	-16.7	2.4	20.2	-68.0
R-18	25.7	-4.3	8.8	14.0	44.2
R-19	11.3	-25.5	82.5	-62.7	5.6
R-20	1.8	-26.2	63.7	-26.0	13.3
R-21	-1.8	-11.1	9.0	25.8	21.9
R-22	10.6	-18.1	-5.0	46.2	33.6
Period Averages	-0.7	-11.2	13.8	5.8	**7.6**

05/02 to 05/04 bracketed averages:

R-10 to R-15	10.3
R-10 to R-16	8.3
R-16 to R-17	8.2
R-18 to R-22	-0.5
R-17 to R-22	2.9

Cumulative Shoreline Change 3/00 - 5/04

R-10 to R-15	20.4
R-16 to R-17	**-70.8**
R-18 to R-22	23.7
R-10 to R-16	7.0
R-17 to R-22	8.4
R-10 to R-22	**7.6**

(Shaded rows R-16 and R-17:) R-Monuments adjacent to the inlet; Wiggins Pass Located Between R-16 and R17

Table 2
Shoreline Change and Rates
Measured @ +4' NGVD (Berm Elevation)

Shoreline Change Rates (ft/yr) @ +4' NGVD

	3/00 to 6/00	6/00 to 10/01	10/01 to 05/02		05/02 to 05/04		Weighted Averages
R-10	-5.6	-22.2	63.9		-6.0		-1.37
R-11	20.4	-19.1	0.2		5.2		-2.38
R-12	13.6	-34.1	64.1		5.8		1.68
R-13	198.4	-42.8	86.2	-1.4	-9.2	-4.8	5.88
R-14	21.2	-14.3	12.3		-0.7		-1.90
R-15	0.4	-30.6	5.5		-4.1		-10.97
R-16	0.4	-20.3	-0.9		-25.1		-18.65
R-17	27.6	-64.6	63.8	-20.8	-16.5		-17.98
R-18		-41.3	100.1		-6.1		-2.14
R-19	-45.2	-15.5	207.9		-34.2		5.04
R-20	25.2	-41.7	47.3	-3.8	14.3	-5.85	1.66
R-21	12.4	-28.2	55.4		1.4		0.12
R-22	7.6	-6.9	-2.1		5.8		0.74
Period Averages	23.0	-29.3	54.1		-8.7		**-3.1**

Local Averages

Cumulative Shoreline Change Rates Averages 3/00 - 5/04

-1.5 (R-10 to R-15)	-4.0 (R-10 to R-16)	**-3.1** (R-10 to R-22)
-18.3		
1.1 (R-18 to R-22)	-2.1 (R-17 to R-22)	

Shoreline Change (ft) @ +4' NGVD

	3/00 to 6/00	6/00 to 10/01	10/01 to 05/02		05/02 to 05/04		Sum
R-10	-1.4	-29.6	37.3		-12.0		-5.7
R-11	5.1	-25.4	0.1		10.3		-9.9
R-12	3.4	-45.4	37.4		11.6		7.0
R-13	49.6	-57.1	50.3	--2.9	-18.3	-9.7	24.5
R-14	5.3	-19.1	7.2		-1.3		-7.9
R-15	0.1	-40.8	3.2		-8.2		-45.7
R-16	0.1	-27.1	-0.5		-50.2		-77.7
R-17	6.9	-86.1	37.2	-41.5	-32.9		-74.9
R-18		-55.1	58.4		-12.2		-8.9
R-19	-11.3	-20.6	121.3		-68.4		21.0
R-20	6.3	-55.6	27.6	-7.5	28.6	-11.7	6.9
R-21	3.1	-37.6	32.3		2.7		0.5
R-22	1.9	-9.2	-1.2		11.6		3.1
Period Averages	5.8	-39.1	31.6		-10.7		**-12.9**

Cumulative Shoreline Change Averages 3/00 - 5/04

-6.3 (R-10 to R-15)	-16.5 (R-10 to R-16)	**-12.9** (R-10 to R-22)
-76.3		
4.5 (R-18 to R-22)	-8.7 (R-17 to R-22)	

R-Monuments adjacent to the inlet (shaded); Wiggins Pass Located Between R-16 and R17

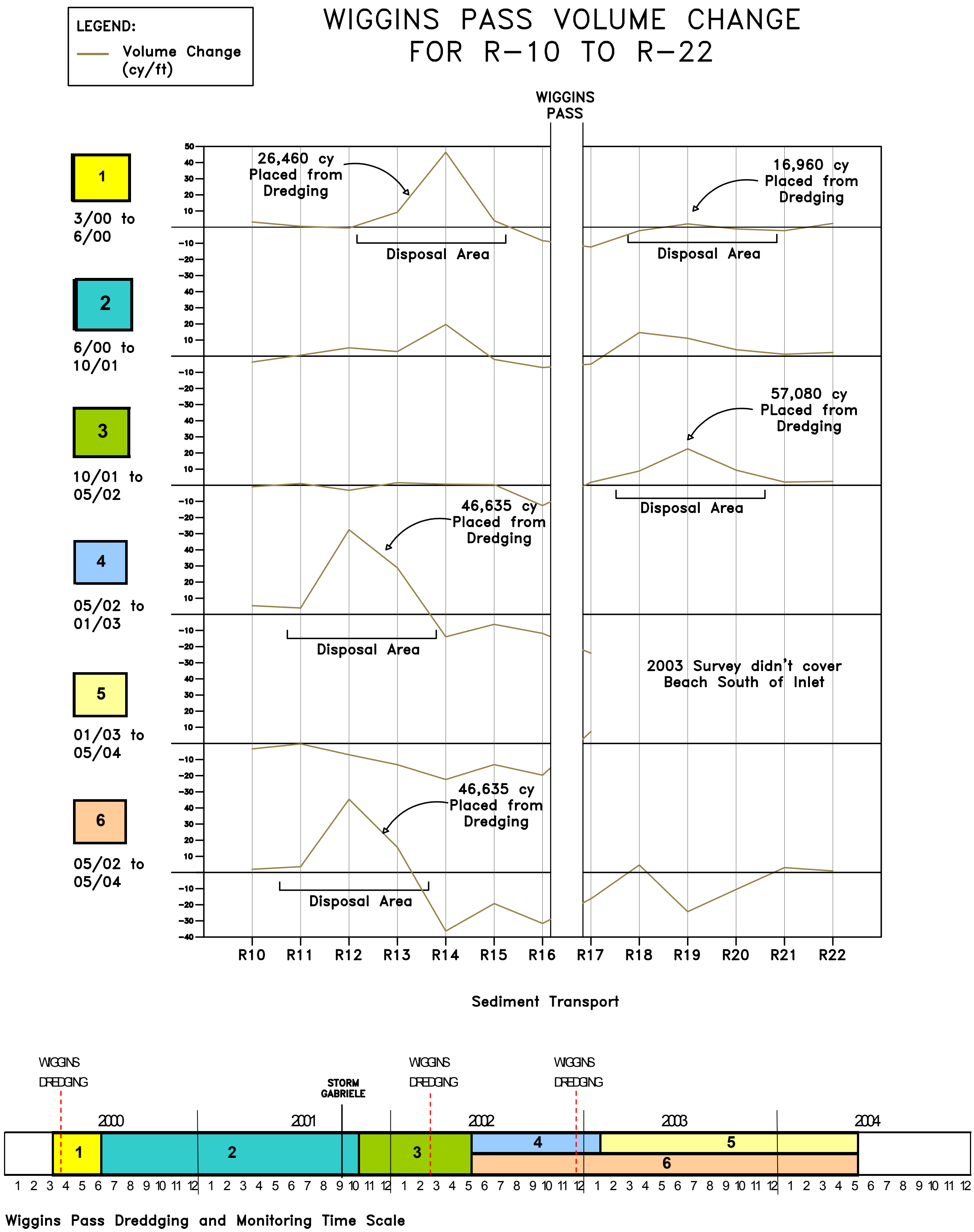

LEGEND:
Volume Change (cy/ft)
WIGGINS PASS VOLUME CHANGE
FOR R-10 TO R-22
WIGGINS PASS
1
3/00 to 6/00
2
6/00 to 10/01
3
10/01 to 05/02
4
05/02 to 01/03
5
01/03 to 05/04
6
05/02 to 05/04
26,460 cy Placed from Dredging
16,960 cy Placed from Dredging
57,080 cy PLaced from Dredging
46,635 cy Placed from Dredging
46,635 cy Placed from Dredging
Disposal Area
2003 Survey didn't cover Beach South of Inlet
R10
R11
R12
R13
R14
R15
R16
R17
R18
R19
R20
R21
R22
Sediment Transport
WIGGINS DREDGING
STORM GABRIELE
2000
2001
2002
2003
2004
Wiggins Pass Dreddging and Monitoring Time Scale

Figure 6

Table 3

Beach Volume Change
Volumetric Change Computations

Monument	Northing	Easting	Effective Distance	Closure	5/02 to 1/03	Total Volume	1/03 to 5/04	Total Volume	5/02-(5/04)	Total Volume
			Per Monument	Distance	VolChange(cy/ft)	Per Monument	VolChange(cy/ft)	Per Monument	VolChange(cy/ft)	Per Monument
R-10	717953.5	382268.3	514.2	800	5.4	2800	-3.4	-1746	2.0	1053
R-11	716979.2	382597.6	1027.3	800	3.9	3957	-0.3	-259	3.6	3698
R-12	715976.3	382815.0	1032.8	800	52.4	54144	-7.0	-7230	45.4	46914
R-13	715004.9	383185.0	1015.9	900	28.8	29292	-13.2	-13418	15.6	15875
R-14	714033.8	383389.3	1012.3	1300	-13.9	-14068	-22.4	-22695	-36.3	-36763
R-15	713027.6	383619.9	1038.0	1000	-6.2	-6432	-13.1	-13644	-19.3	-20075
R-16	711997.0	383784.4	1080.2	1200	-11.8	-12786	-19.7	-21296	-31.6	-34082
R-17	710889.5	383927.4	1059.8	1700	-24.1	-25549	7.8	8270	-16.3	-17278
R-18	709906.7	384127.0	1025.3	900	-	-	-	-	4.6	4754
R-19	708878.0	384326.0	1038.9	700	-	-	-	-	-24.3	-25237
R-20	707865.9	384517.2	1029.8	700	-	-	-	-	-10.5	-10802
R-21	706858.3	384728.9	1034.9	500	-	-	-	-	3.0	3089
R-22	705839.5	384938.9	520.1	700	-	-	-	-	1.0	510
					Total Volume Change:	**31360**	Total Volume Change:	**-72017**	Total Volume Change:	**-68342**

Table 4
Volume Change and Rates

Volume Change Rates (cy/ft/yr)

	3/00 to 6/00	6/00 to 10/01	10/01 to 05/02		05/02 to 05/04		Weighted Averages
R-10	13.0	-2.7	-1.5		1.0		0.20
R-11	2.1	0.4	1.9		1.8		1.41
R-12	-2.0	3.9	-5.4	0.9	22.7		11.29
R-13	36.8	2.2	2.8		7.8	-1.4	7.06
R-14	185.6	14.8	1.1		-18.2		7.31
R-15	15.8	-1.5	0.7		-9.7		-4.07
R-16	-33.7	-5.2	-21.6		-15.8		-14.30
R-17	-49.4	-3.7	3.1	-12	-8.2		-7.62
R-18	-8.8	11.0	15.1		2.3		6.24
R-19	8.1	8.3	38.8		-12.1		2.75
R-20	-4.3	3.0	16.2	-2.6	-5.2	-3.5	0.46
R-21	-8.7	0.9	3.5		1.5		0.97
R-22	9.3	1.8	4.0		0.5		1.92
Period Averages	12.6	2.6	4.5		-2.4		**1.0**

Local Averages

Cumulative Volume Change Rates Averages 3/00 - 5/04

3.9 R-10 to R-15	1.3 R-10 to R-16	**1.0** R-10 to R-22
-11.0		
2.5 R-18 to R-22	0.8 R-17 to R-22	

Volume Change (cy/ft)

	3/00 to 6/00	6/00 to 10/01	10/01 to 05/02		05/02 to 05/04		Sum
R-10	3.2	-3.6	-0.9		2.0		0.8
R-11	0.5	0.6	1.1		3.6		5.9
R-12	-0.5	5.2	-3.1	1.8	45.4		47.0
R-13	9.2	2.9	1.6		15.6	-2.9	29.4
R-14	46.4	19.7	0.7		-36.3		30.5
R-15	4.0	-2.0	0.4		-19.3		-17.0
R-16	-8.4	-7.0	-12.6	-24	-31.6		-59.6
R-17	-12.3	-4.9	1.8		-16.3		-31.7
R-18	-2.2	14.7	8.8		4.6		26.0
R-19	2.0	11.1	22.6		-24.3	-7	11.5
R-20	-1.1	4.0	9.4	-5.2	-10.5		1.9
R-21	-2.2	1.2	2.0		3.0		4.0
R-22	2.3	2.3	2.4		1.0		8.0
Period Averages	5.8	-39.1	31.6		-10.7		**4.4**

Cumulative Volume Change Averages 3/00 - 5/04

16.1 R-10 to R-15	5.3 R-10 to R-16	**4.4** R-10 to R-22
-45.7		
10.3 R-18 to R-22	3.3 R-17 to R-22	

R-Monuments adjacent to the inlet; Wiggins Pass Located Between R-16 and R17

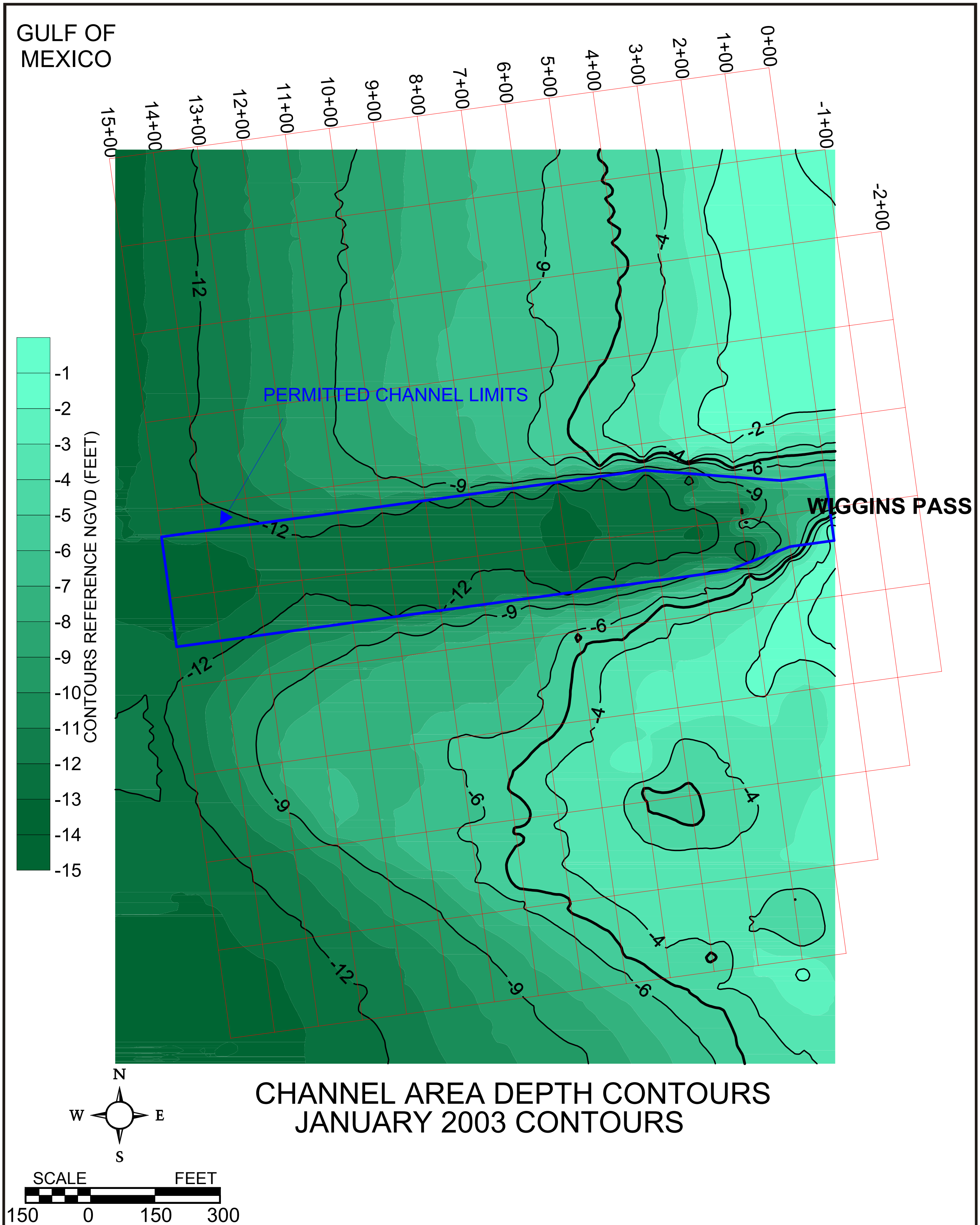
5. Channel Cross Sections

Plots of post-construction and monitoring survey data collected in January 2003 and May 2004 along with the survey data for the channel cross sections from stations 2+00 to 15+00 are provided in Appendix B. These comparative plots illustrate the changes in channel geometry due to the 2002-2003 dredging project and the shoaling which occurred following completion of the dredging. Figures 7 and 8 show the bathymetric contours of the channel for the 2003 January post-construction and May 2004 surveys.

Figure 9 shows the change in bottom elevation between the 2003 post-construction and the 2004 monitoring surveys. The contour lines are contours of depth *change.* In each case vertical changes of greater than one foot are highlighted. The elevation change shown in Figure 9 is predominately a decrease in depth which shows the highest shoaling occurred at station 5+00. This shoaling occurs in the area immediately west of where the current velocities are highest, in the throat of the inlet. Sand, which is scoured out of the throat of the inlet by the high current velocities, tends to be deposited in the area where current velocities diminish. This area is also in alignment with the adjacent littoral zone of the beach and shoal system where the highest sand transport occurs. The blue colors indicate contours of increased depth; these surround the dredged area and illustrate the migration of sand from the sloping sides of the dredge cut into the deepest part of the channel resulting in the scour previously discussed.

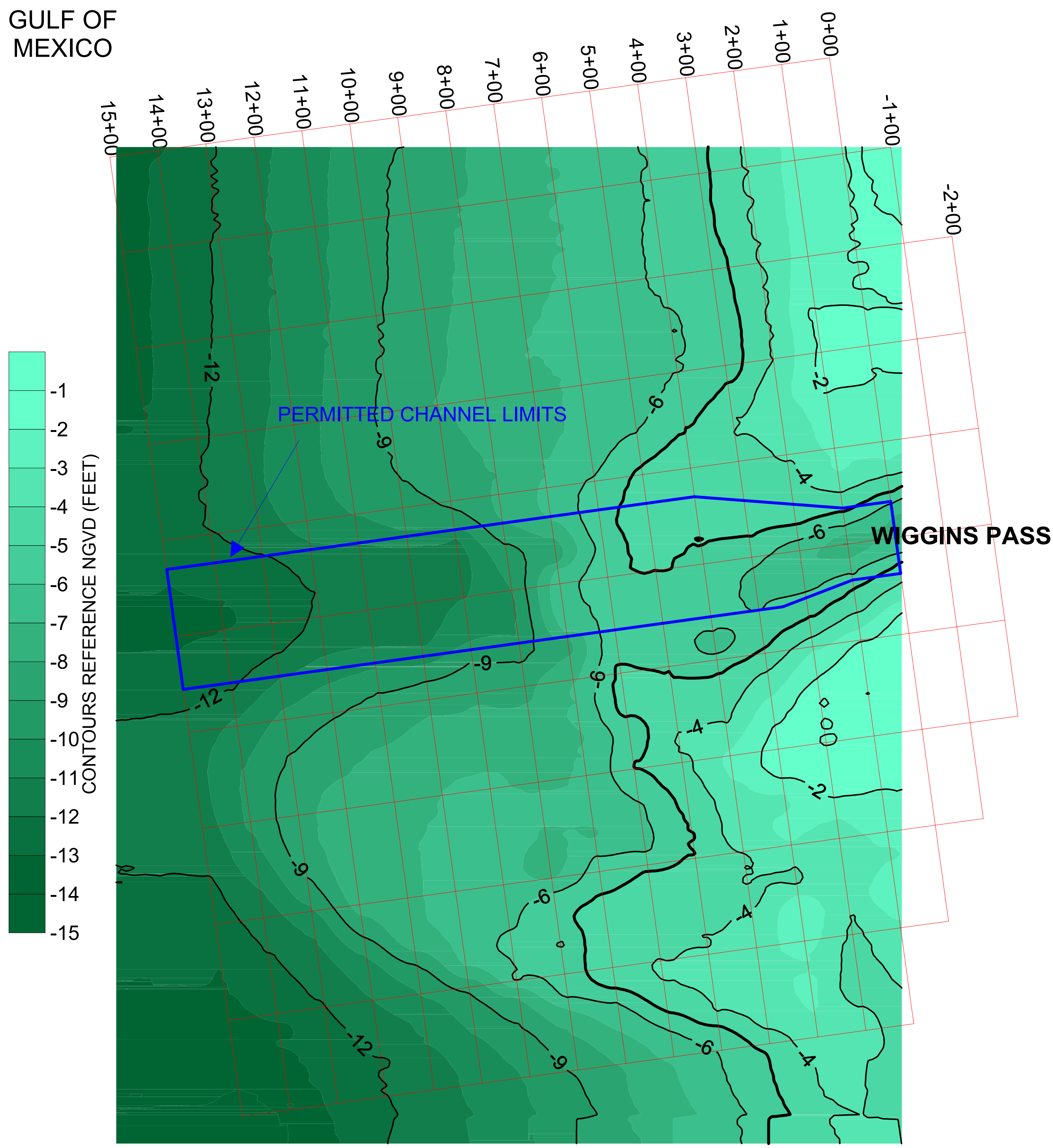
Figure 10 is a bar chart which shows the amount of material at each station within the channel limits for each survey since the dredging was completed in 2000. Data from the 1999 pre-dredge survey indicate that there were approximately 100,060 cubic yards available to be dredged from within the channel limits. The post dredge survey shows that all but approximately 1,230 cubic yards were removed during the dredging. It should be noted that the available quantity includes overdepth. This is the material at the bottom of the channel that the contractor is not required to remove, but will be paid for any portion of it that is removed. The purpose of this is to consider the inaccuracies in the dredging process and to provide incentive for the contractor to achieve the design depth at a minimum. The 2002 pre-construction survey shows approximately 57,175 cubic yards to be dredged from within the channel limits. The 2002 post dredge survey shows that all but approximately 6,580 cubic yards were removed during the dredging.

During the 2002-2003 maintenance dredging, all but 7,454 cubic yards were removed. Most of this was within the overdepth allowance, while the contactor removed approximately 96% of the required quantity. The most recent monitoring survey from May 2004 shows approximately 56,725 cubic yards within the dredged area, indicating that 49,271 cubic yards of shoaling occurred within approximately 16 months after dredging was completed. This indicates a shoaling rate of approximately 3,000 cubic yards/month, which is quite similar to the previous shoaling rate of 3,500 cubic yards/month between March 2002 and November 2002. These rates are not linear in time and a shorter survey period immediately after dredging is expected to show higher rates, as the dredged area shoals more rapidly soon after the dredging is completed.



CHANNEL AREA DEPTH CONTOURS
JANUARY 2003 CONTOURS

HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	WIGGINS PASS MAINTENANCE DREDGING POST-CONSTRUCTION CHANNEL CONTOURS		5679 STRAND COURT NAPLES, FL 34110 FAX: 239 594 2025 PHONE: 239 594 2021 E-MAIL: mail@humistonandmoore.com
	FOR: COLLIER COUNTY		
	DATE: 05/11/04	FILE:Jan-03-cont	SCALE: 1"=300'
	JOB FILE: 11-054	DATUM:NGVD, `29	FIGURE: 7



N
W E
S

CHANNEL AREA DEPTH CONTOURS
MAY 2004 CONTOURS

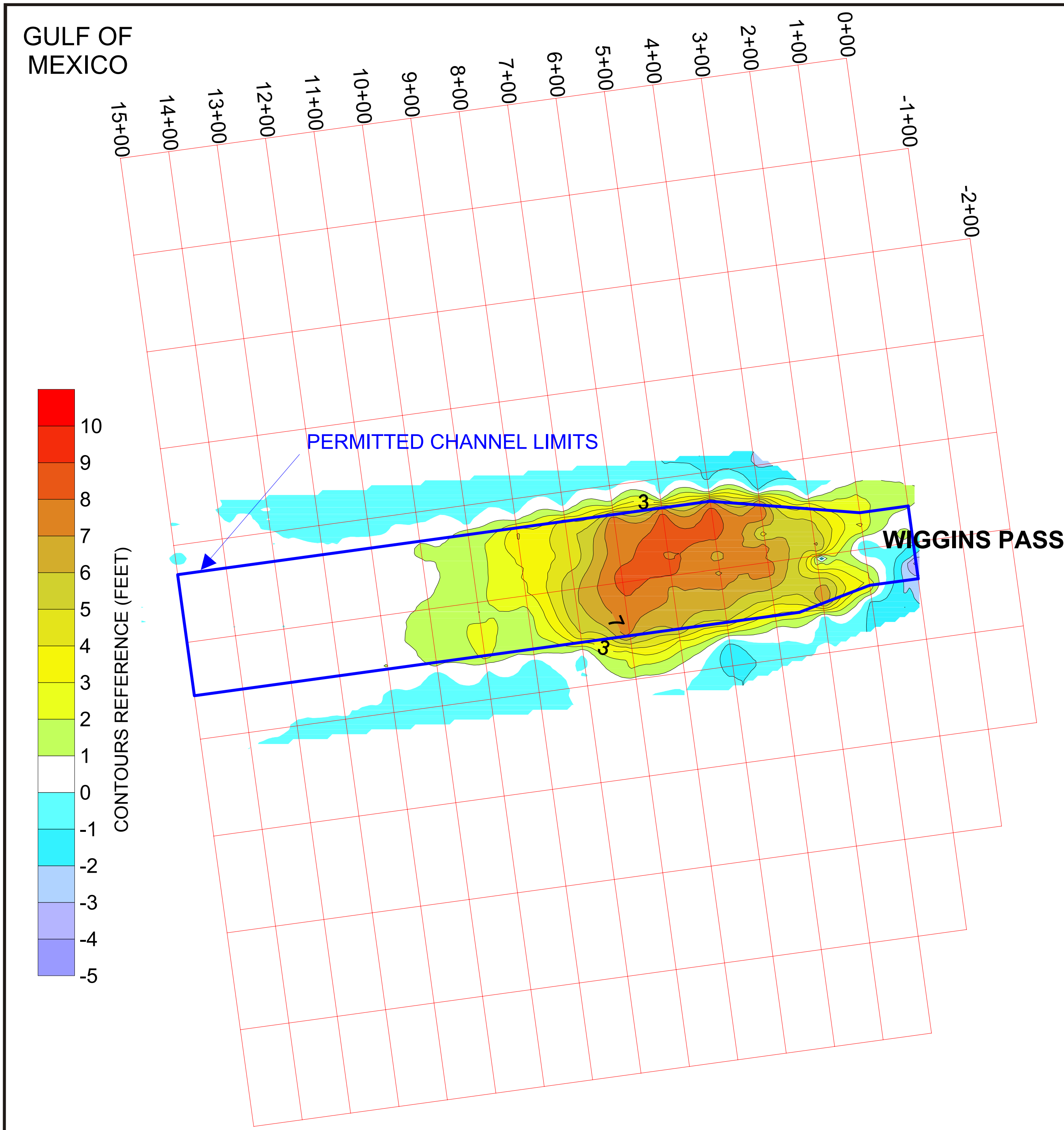
SCALE FEET
150 0 150 300

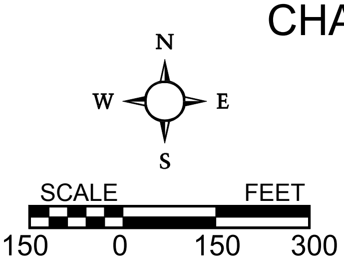
HUMISTON & MOORE ENGINEERS
COASTAL ENGINEERING DESIGN AND PERMITTING

WIGGINS PASS MAINTENANCE DREDGING
POST-CONSTRUCTION CHANNEL CONTOURS

FOR: COLLIER COUNTY		
DATE: 05/11/04	FILE: May04-cont	SCALE: 1"=300'
JOB FILE: 11-054	DATUM: NGVD, `29	FIGURE: 8

5679 STRAND COURT
NAPLES, FL 34110
FAX: 239 594 2025
PHONE: 239 594 2021
E-MAIL: mail@humistonandmoore.com





CHANNEL AREA CONTOURS OF DEPTH CHANGE POST-DREDGE (01-03)TO MONITORING SURVEY (05-04) CONTOUR CHANGE

HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	WIGGINS PASS MONITORING ENTRANCE CHANNEL CONTOUR CHANGES			5679 STRAND COURT NAPLES, FL 343110 FAX: 239 594 2025 PHONE: 239 594 2021 E-MAIL: mail@humistonandmoore.com
	FOR: COLLIER COUNTY			
	DATE: 09/09/02	FILE: Jan03-May04-Cont	SCALE: 1"=300'	
	JOB FILE: 11-054	DATUM:NGVD, `29	FIGURE: 9	

Comparison of Volume Within Dredge Limits for the 2000 through May 2004 Monitoring
(Volumes Include Overdepth)

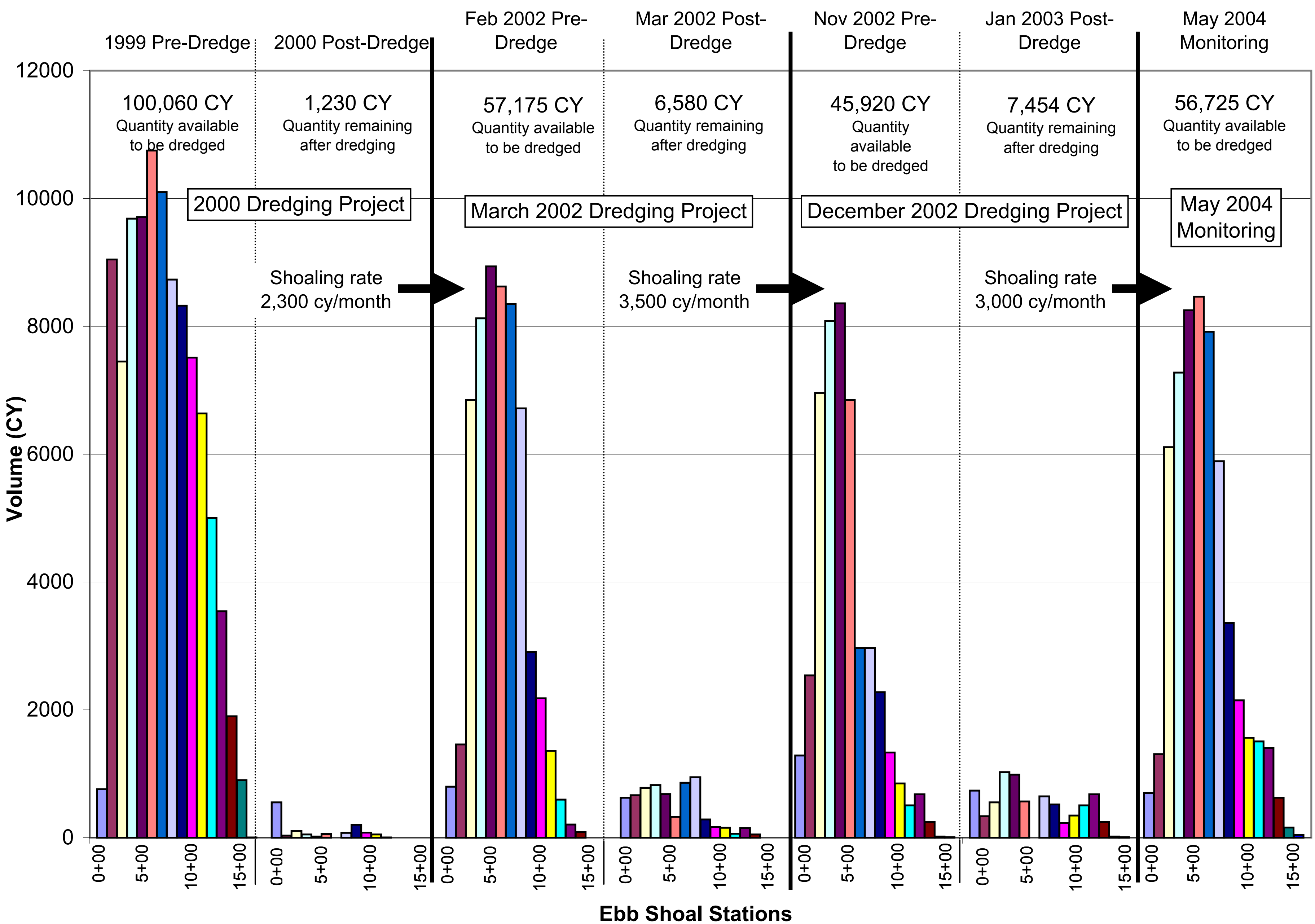


Figure 10

6. Erosion Adjacent to the Inlet at Reference Monuments R-16 and R-17

Concern has been expressed by the County Parks Department about the stability of the beach at R-16, which is located on the north shore of the inlet. Since the pre-construction survey of March 2000, the shoreline at R-16 has receded approximately -73.6 feet, or -17.7 feet per year, and lost approximately -59.6 cubic yards per foot, or –14.3 cubic yards per foot per year. It is likely that much of this material ended up in the dredged channel as a result of a natural adjustment to the expanded dredging limits, as discussed in Section 2.

Figure 11 – Escarpment formation at R-16 (Photograph taken April 2004)

The latest survey showed that the Mean High Water (MHW) line both north and south of the inlet at R-16 and R-17 had been accreting between January 2003 and May 2004 (+8.2 feet). This observation does not reflect the volumetric loss of material that occurred at the berm elevation with an escarpment recession of -24 feet and a total volume loss close to -41 cubic yard per foot of beach (Tables 1, 3 and 4). Some of the sand which eroded from the upland may have moved seaward resulting in shoreline accretion at MHW during the same time period. This significant berm (+4 ft NGVD) recession was observed by many eyewitnesses as formation of an escarpment (Figure 11), approximately 5 feet high which undermined trees and other vegetation. This is probably related to a shift in the beach profile from sand migrating offshore to reach the new dredge cut equilibrium angle of repose that was initiated in 2000 as implementation of the 1995 Inlet Management Plan. This high rate of erosion could also be related to greater wave energy reaching the shoreline as a result of removal of a more significant part of the ebb shoal.

Figure 12 is a plot of the cumulative shoreline change at +1.5 ft (approximate MHW) and +4 ft NGVD (approximate berm elevation) and the cumulative volume change, from March 2000 to May 2004. This plot reveals the overall shoreline and volume change trend around the inlet for the period, to help the reader quantitatively visualize what is occurring while trees on park land can be seen falling into the gulf. Generally, shoreline and volume changes agree and illustrate a gain of beach material both north and south of the inlet. Much of this can be attributed to past beach fill (Figure 6); while the beach sections directly adjacent to the inlet eroded significantly.

According to the Wiggins Pass Inlet Management Plan (Coastal Planning & Engineering, 1995), the shoreline at R-16 was accretional from 1885 through 1979. Figure 13 is a chart including more recent shoreline change at R-16 from 1973 to May 2004. This illustrates that the shoreline change rate from 1973 through 1979 was approximately +12 feet per year. The period of time from 1979 to 1988 shows erosion at R-16, documented for the first time in approximately 100 years. The first dredging of Wiggins Pass was completed during this time, in 1984. This kind of shoreline change often occurs in response to dredging inlet navigation channels. Figure 13 includes notations regarding timing of dredging events. In 1984, the dredged material was disposed south of the inlet on Delnor-Wiggins State Park.

The effects of dredging in 1990-1991 are reflected in the subsequent monitoring period from 1988 to 1992. This time the dredged material was placed north of the inlet, and the large gain of material at R-16 is most likely related to this spoil placement. The inlet was dredged again in 1993 and the material was placed south of the inlet.

The dredging projects of 2000 and 2002 have been more carefully monitored, and data shows that the shoreline change rate for the three month period from March 2000 to June 2000 was -125 feet per year at R-16. This large increase in the erosion rate may in several ways be related to the increased scope of the dredging project. The dredging project of 2000 was designed to widen, deepen and shift the channel slightly to the north. This changed the Gulf channel (Stations 2+00 to15+00) from a design of 150 feet wide and a depth of –8.5 feet NGVD to a design width of 250 feet and a depth of –13 feet NGVD. Widening and shifting the channel to the north removed more of the Wiggins Pass ebb shoal and resulted in a wider and deeper channel closer to the shoreline at R-16.

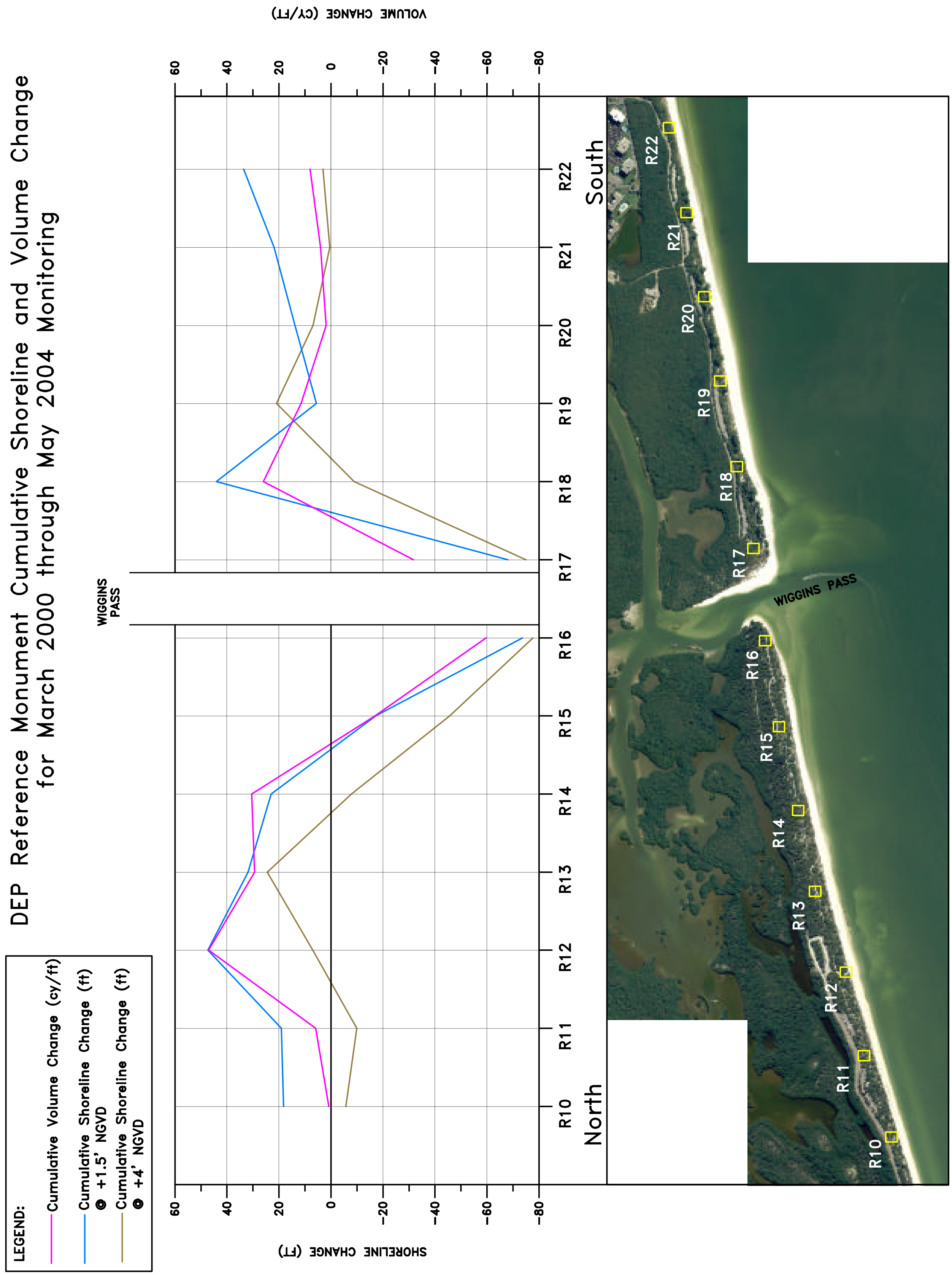

DEP Reference Monument Cumulative Shoreline and Volume Change
for March 2000 through May 2004 Monitoring
LEGEND:
Cumulative Volume Change (cy/ft)
Cumulative Shoreline Change (ft) @ +1.5' NGVD
Cumulative Shoreline Change (ft) @ +4' NGVD
SHORELINE CHANGE (FT)
VOLUME CHANGE (CY/FT)
60
40
20
0
-20
-40
-60
-80
R10
R11
R12
R13
R14
R15
R16
R17
R18
R19
R20
R21
R22
North
South
WIGGINS PASS

Figure 12

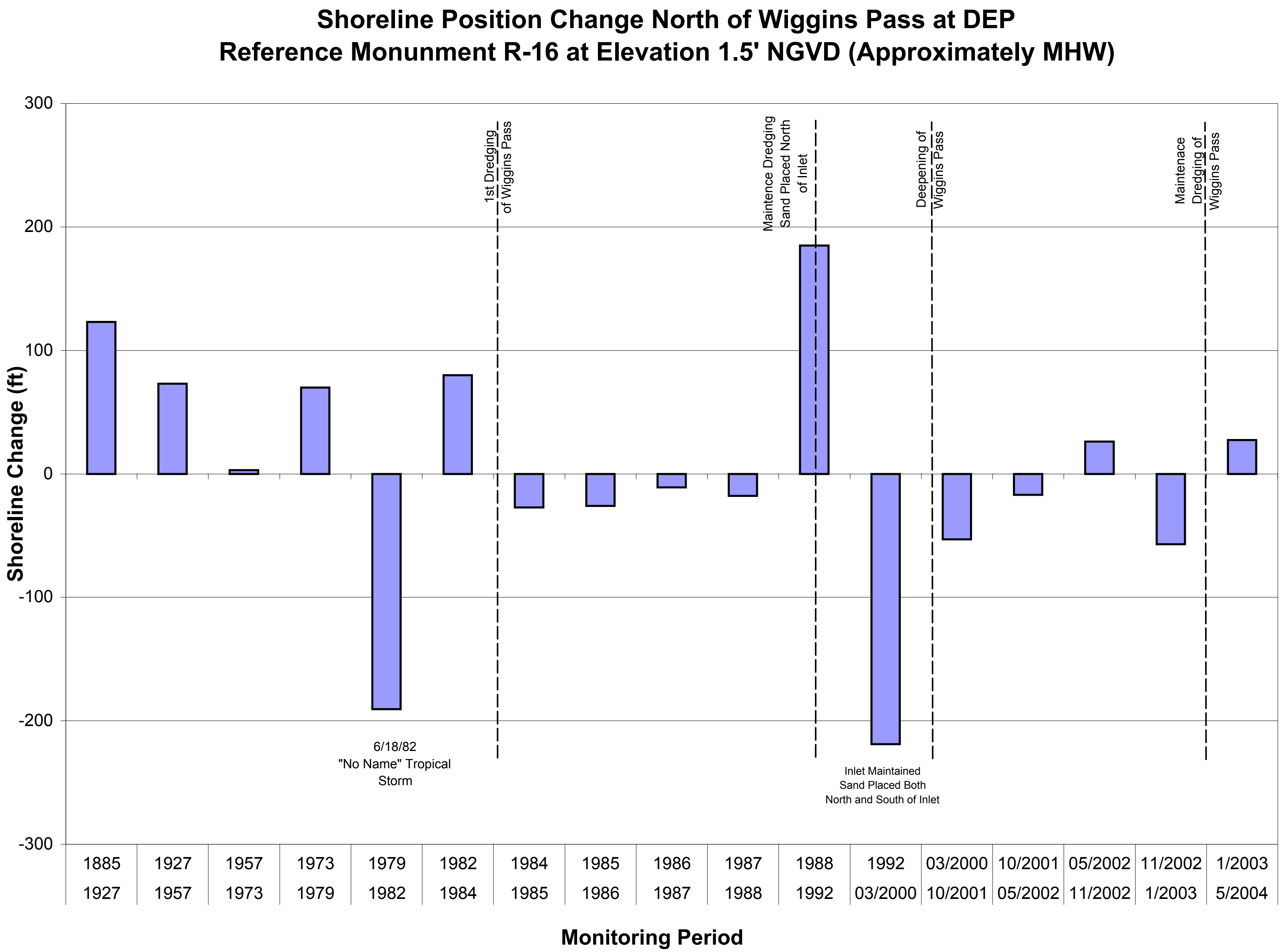

Shoreline Position Change North of Wiggins Pass at DEP
Reference Monunment R-16 at Elevation 1.5' NGVD (Approximately MHW)
Shoreline Change (ft)
300
200
100
0
-100
-200
-300
1st Dredging of Wiggins Pass
Maintence Dredging Sand Placed North of Inlet
Deepening of Wiggins Pass
Maintenace Dredging of Wiggins Pass
6/18/82 "No Name" Tropical Storm
Inlet Maintained Sand Placed Both North and South of Inlet
1885 1927
1927 1957
1957 1973
1973 1979
1979 1982
1982 1984
1984 1985
1985 1986
1986 1987
1987 1988
1988 1992
1992 03/2000
03/2000 10/2001
10/2001 05/2002
05/2002 11/2002
11/2002 1/2003
1/2003 5/2004
Monitoring Period

Figure 13

A natural response to channel dredging through tidal shoals is for the steep dredge cut side slopes to become flatter as the side slope material reaches the natural angle of repose, when material at the top of the slope sloughs off into the channel. The channel initially shoals rapidly by this process, but as the slope becomes flatter the rate of shoaling decreases. Additionally, removing a larger portion of the ebb shoal increases wave energy transmission across the shoal to the shoreline, and removal of a greater portion of the shoal may cause interruption of sand bypassing. Higher incident wave energy on the shoreline and reduced sand bypassing at the ebb shoal may accelerate sand transport and contribute to a higher erosion rate.

The erosion at the north side of Wiggins Pass should be expected to continue, with the highest erosion rates occurring during the months immediately following a dredging event. However, this dredging related erosion should diminish over time with successive maintenance dredging as the cumulative effect of the shoreline recession and readjustment of the dredge slope will result in a shoreline position further landward than it was at the time of the dredging in 2000.

7. Interior Channel Monitoring

In order to better understand the inlet system at Wiggins Pass, and in particular the shoaling within the inner channels, the scope of the monitoring was expanded to include 34 cross sections within the interior channel, including the entrance to Water Turkey Bay, as illustrated in Figure 4. The last survey conducted in this area was in 2003. The same station location and control were used for the 2004 survey in order to obtain comparative cross sections of the channel. Plots of these cross sections are provided in Appendix C.

In general, the channel cross sections in Appendix C show that the interior tidal channel location has remained relatively stable. The bend inside the throat of the inlet has been migrating to the north (see channel cross sections C-10 through C-15). Additionally, the north end of the Turkey Bay Channel has also undergone some shoaling on the east side of the channel.

8. Conclusions and Recommendations

Due to concerns expressed by Parks Department staff and members of the public who witnessed severe erosion of the south tip of Barefoot Beach Park, immediately north of Wiggins Pass, Collier County asked Humiston & Moore Engineers to evaluate the feasibility of modifications to the 1995 Inlet Management Plan for the purpose of addressing this erosion problem.

The conclusions of the Feasibility Study, which is supported by the findings of this monitoring report, included the following:

1. The 1995 Inlet Management Plan (IMP) recommended increasing the scope of dredging the inlet entrance channel but it did not evaluate potential impacts to the adjacent shoreline. Evaluation of inlet impacts to adjacent beaches was the primary purpose of the State funded IMPs, and any changes to the maintenance dredging of Wiggins Pass recommended as apart of the Wiggins Pass IMP should be carefully evaluated before implementation.
2. Monitoring since the expanded dredging recommended by the IMP and completed in 2000 indicates that the increased dredging depth and width of the dredge cut are largely responsible for recent severe erosion on the south tip of Barefoot Beach Park. This is resulting in erosion of park land which has recreational value, is sea turtle nesting habitat, and the upland portion is gopher tortoise nesting habitat.
3. The severe erosion resulting from the 2000 dredging may be expected to decrease with time as the new channel slopes achieve a more natural angle of repose. However, once that natural angel of repose is achieved, representing something like an equilibrium condition, the position of the shoreline will be significantly landward of the position of the shoreline prior to the dredging of the project to the expanded channel limits in 2000. There are many variables which effect the ultimate position of the shoreline, and the Feasibility Study did not include a projection of that shoreline position.
4. The severe erosion of the south end of Barefoot Beach Park could be diminished by modifying the recommended dredging plans of the 1995 IMP by reducing the dredging depth at the east end of the dredge cut from -13 feet the original depth of -8.8 feet. Establishing the limits of the portion of the channel where the dredging depth should be reduced is a design function which would need to be evaluated and was not part of the Feasibility Study.
5. The severe erosion at the south end of Barefoot Beach Park could be addressed with erosion control structures. The Feasibility Study recommended this as a potential phase II alternative to be considered only if other measures to control the erosion prove to be insufficient.
6. Erosion of the south tip of Barefoot Beach Park on the inside of the inlet, along the north shoreline of the inlet, is the result of a slow migration of the inlet flood tidal flow channel to the north. This channel migration and subsequent erosion is slow in comparison to the rapid erosion occurring on the gulf beach; however, the interior erosion is progressive and is also causing loss of land, gopher tortoise habitat, and is undermining native vegetation.
7. The northward migration of the interior channel is resulting in a longer meandering and less efficient tidal channel. This has several consequences;

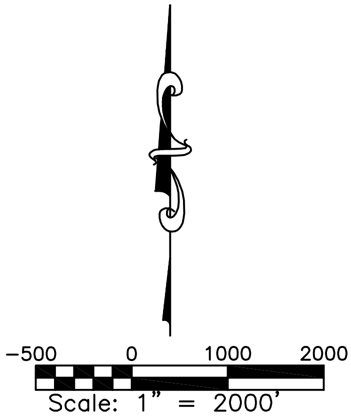
a) The longer and less efficient channel promotes slower tidal currents that are less able to scour sand deposits from the throat of the inlet, potentially leading to more frequent navigation problems, and a need for more frequent dredging and therefore higher long term maintenance costs.
b) The inner channel curvature and meander is a self-propagating feature which could accelerate the erosion of the Barefoot Beach Park, and at the same time contribute to more rapid deposits of sand on the flood tidal shoal within the inlet, further reducing inlet inefficiency.
c) The longer inefficient meandering channel may reduce the rate of discharge of fresh water from the estuarine system, potentially affecting water quality issues.

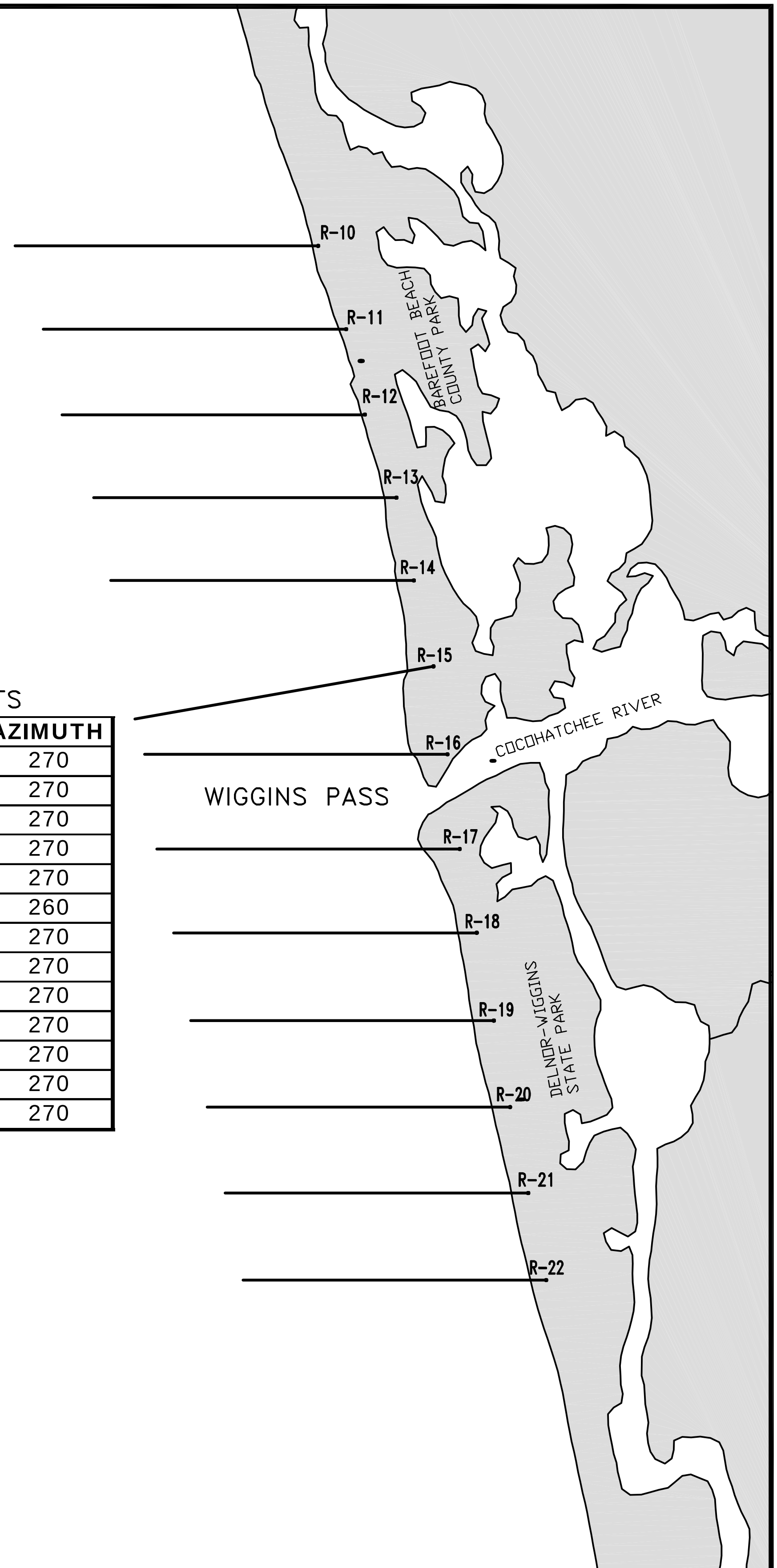
8. The Feasibility Study recommended additional analysis in the form of hydrodynamic modeling of the estuarine system in order to evaluate the effectiveness and potential impacts of the various recommendations.

End

Appendix A

Beach Profiles





DEP REFERENCE MONUMENTS

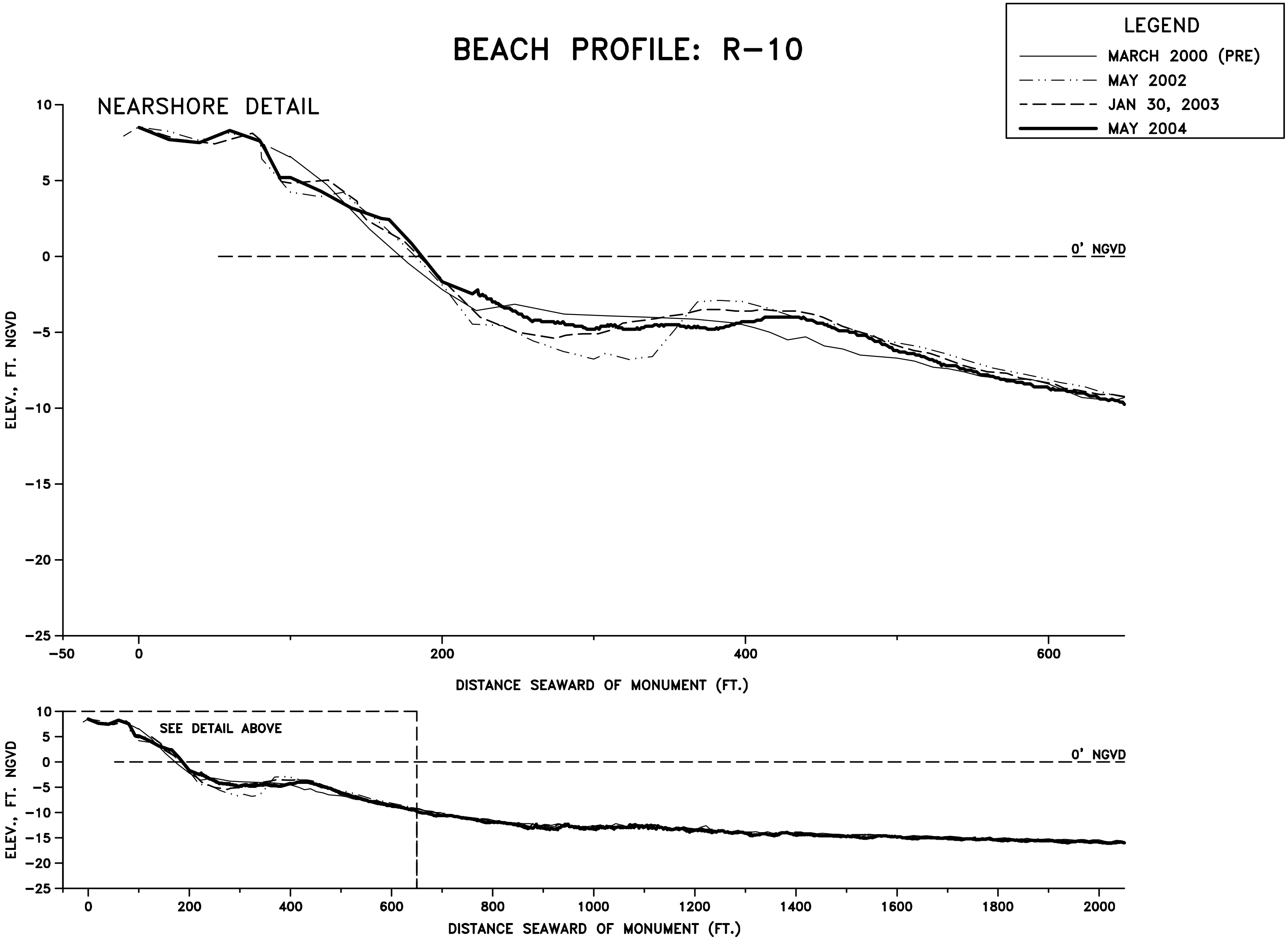
MONUMENT	NORTHING	EASTING	AZIMUTH
R-10	717954	382268	270
R-11	716979	382598	270
R-12	715976	382815	270
R-13	715005	383185	270
R-14	714034	383389	270
R-15	713028	383620	260
R-16	711997	383784	270
R-17	710890	383927	270
R-18	709907	384127	270
R-19	708878	384326	270
R-20	707866	384517	270
R-21	706858	384729	270
R-22	705839	384939	270

HUMISTON & MOORE ENGINEERS
COASTAL ENGINEERING DESIGN AND PERMITTING

DEP REFERENCE MONUMENTS & SURVEY LINES
WIGGINS PASS

FOR: COLLIER COUNTY		
DATE:07/13/04	FILE: R-MONS	SCALE:1"=2000'
JOB: 11-054	DATUM: NGVD	FIGURE: A

5679 STRAND COURT
NAPLES, FL 34110
FAX: 941 594 2025
PHONE: 941 594 2021

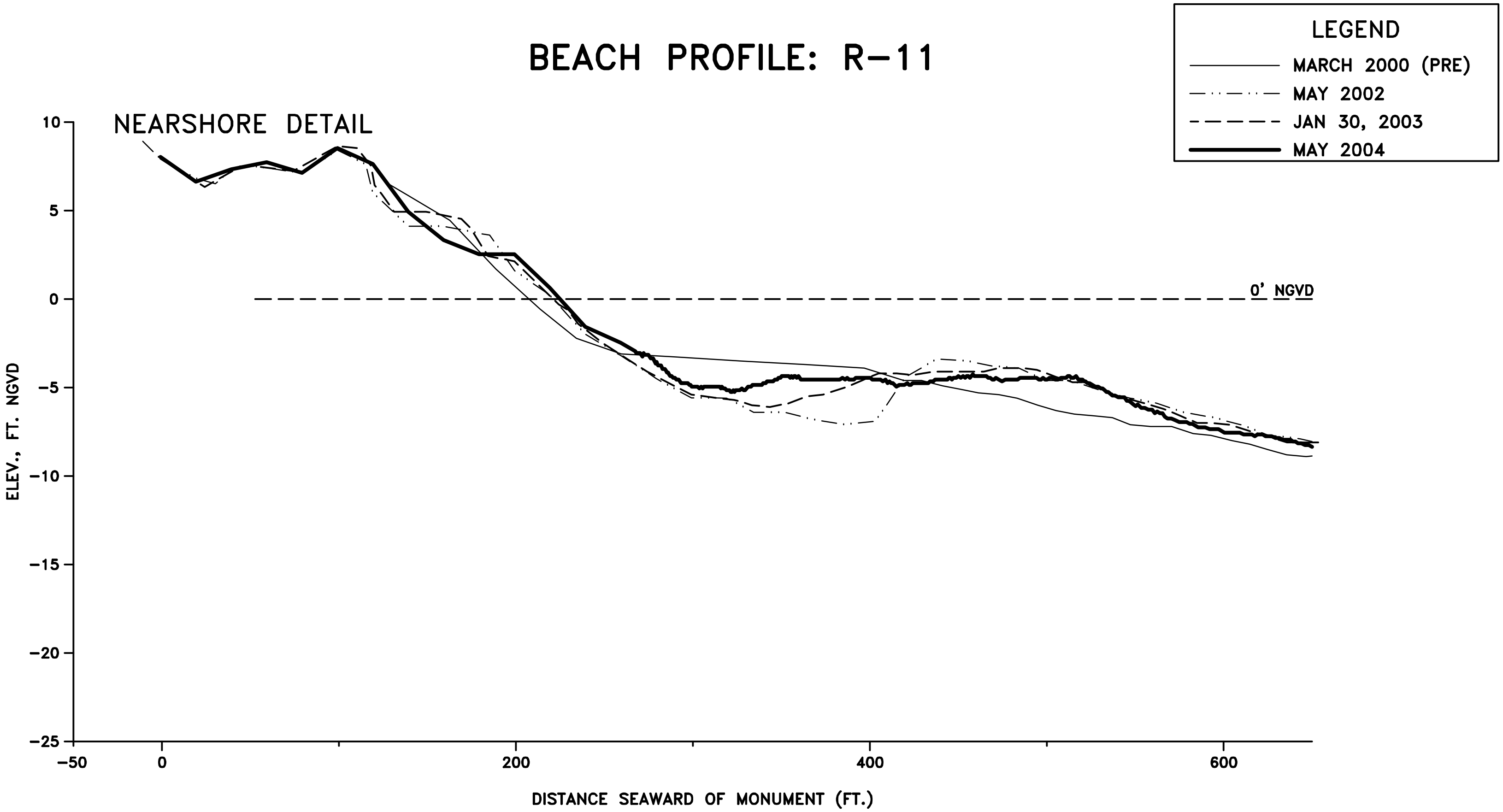


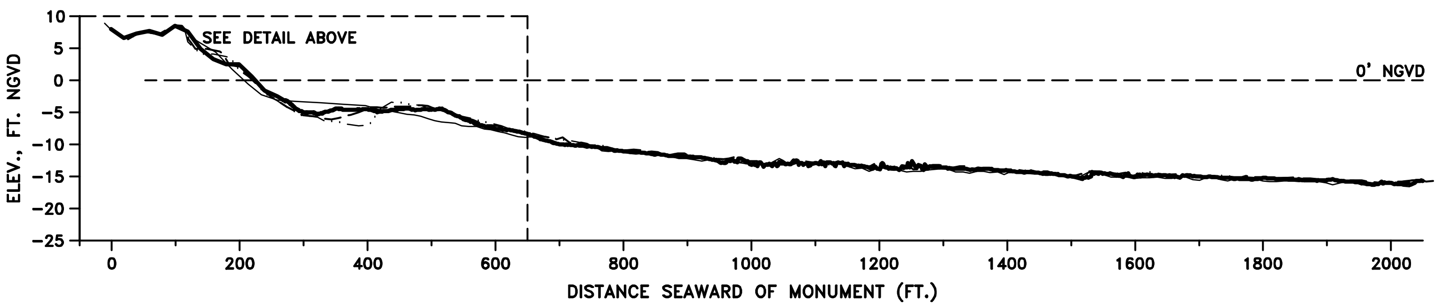
HUMISTON & MOORE ENGINEERS
COASTAL ENGINEERING DESIGN AND PERMITTING

WIGGINS PASS INLET MAINTENANCE BEACH PROFILE		
FOR: COLLIER COUNTY		
DATE:07/14/04	FILE:11-054-XS	SCALE:1"=300'
JOB FILE:11054	DATUM:NGVD	FIGURE:

5679 STRAND COURT
NAPLES, FL 34110
FAX: 239 594 2025
PHONE: 239 594 2021

BEACH PROFILE: R-11



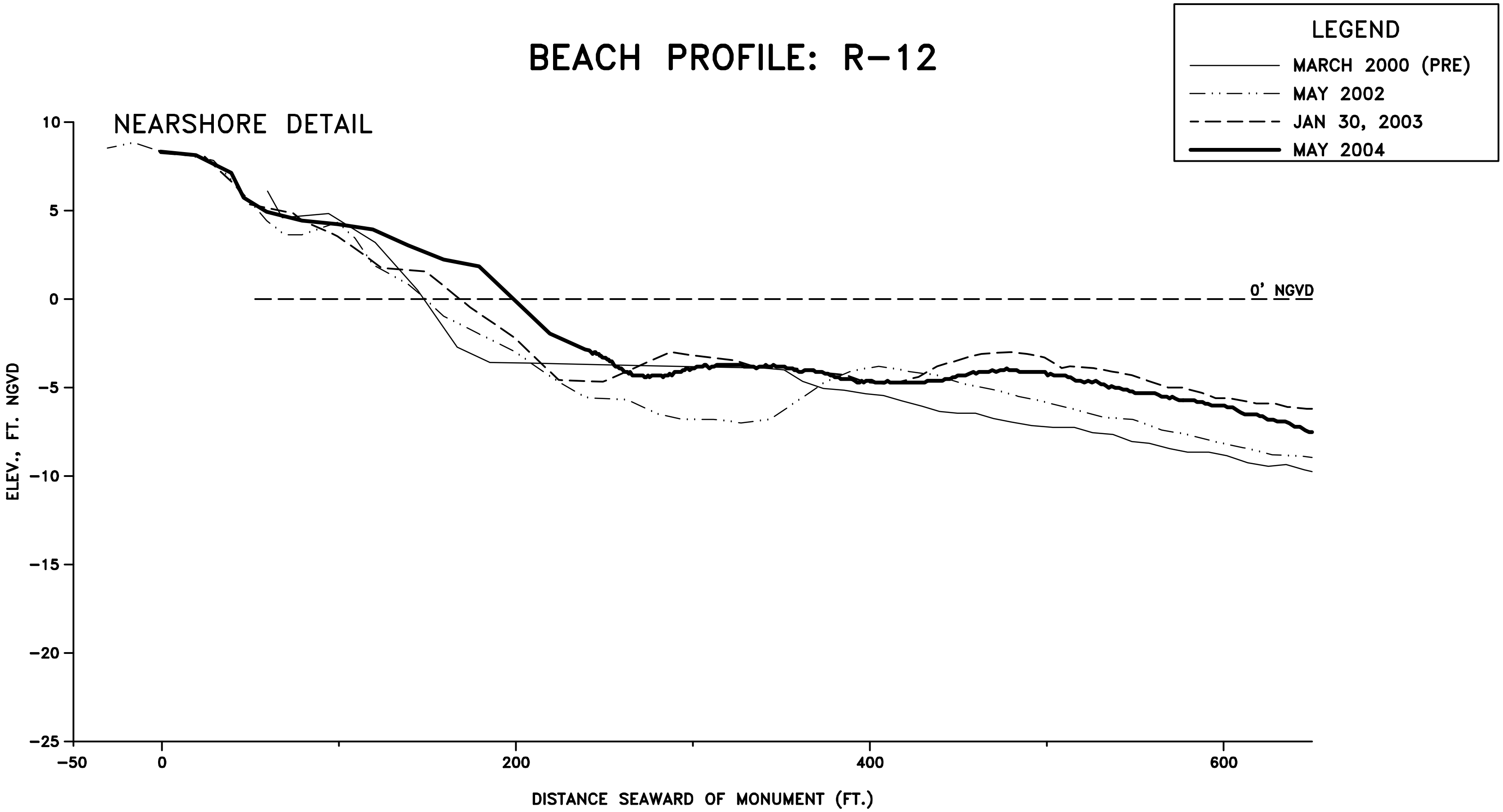


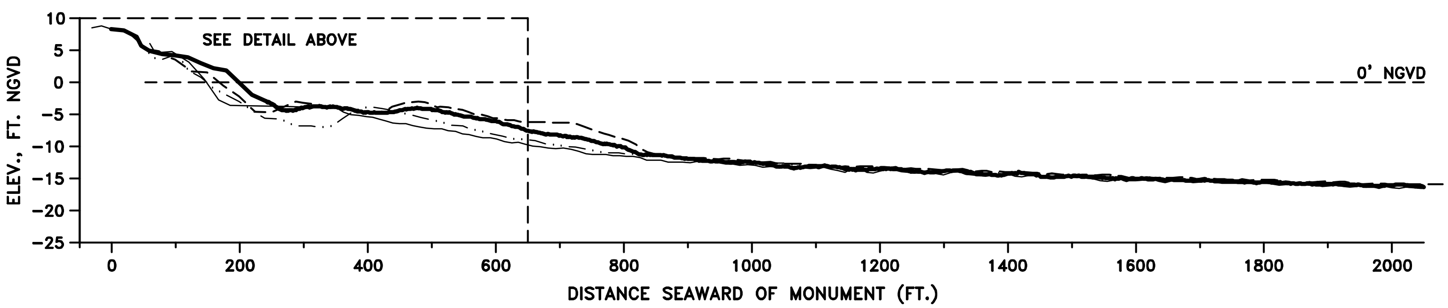
HUMISTON & MOORE ENGINEERS
COASTAL ENGINEERING DESIGN AND PERMITTING

WIGGINS PASS INLET MAINTENANCE BEACH PROFILE		
FOR: COLLIER COUNTY		
DATE:07/14/04	FILE:11-054-XS	SCALE:1"=300'
JOB FILE:11054	DATUM:NGVD	FIGURE:

5679 STRAND COURT
NAPLES, FL 34110
FAX: 239 594 2025
PHONE: 239 594 2021

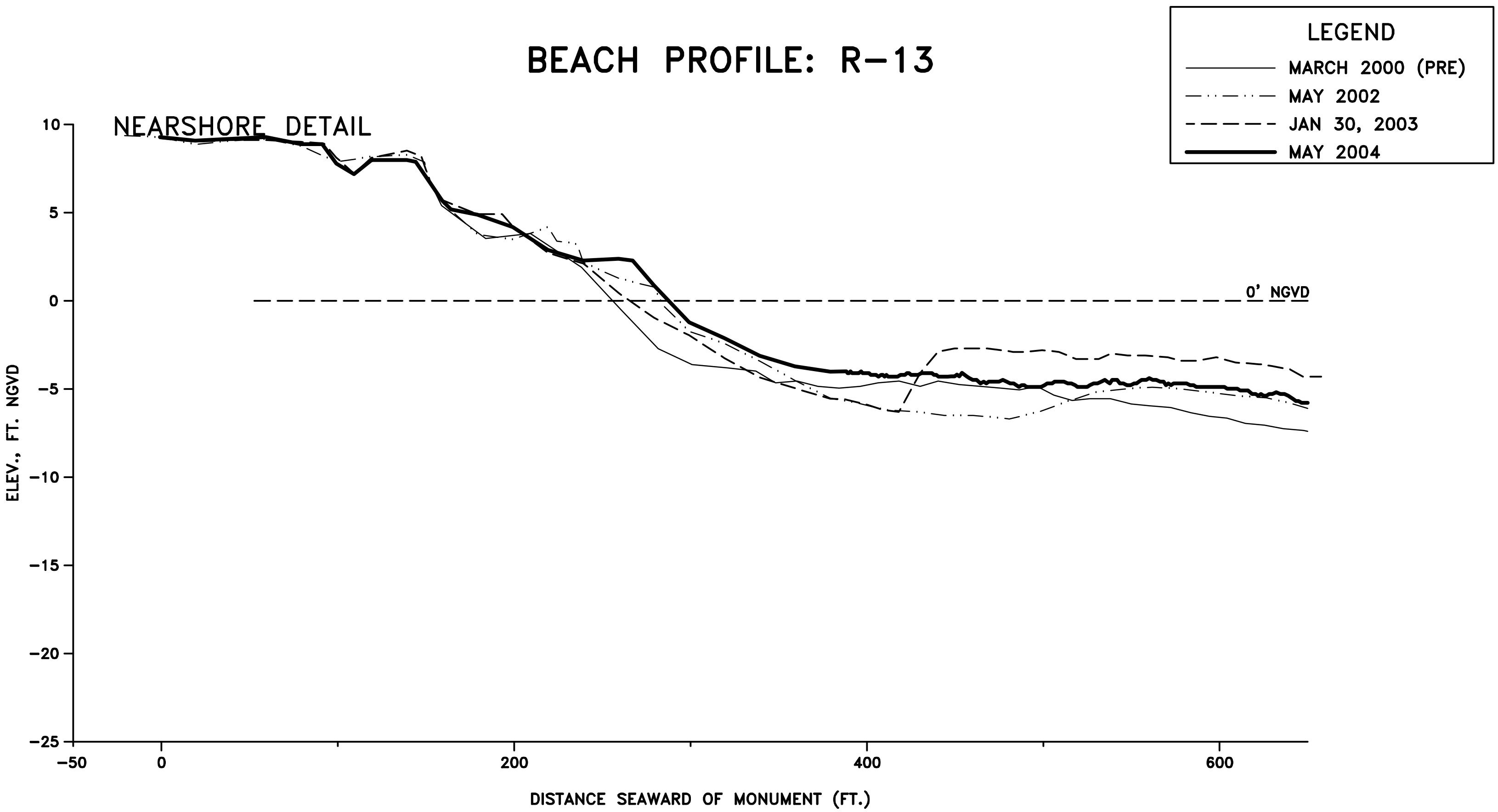
BEACH PROFILE: R-12

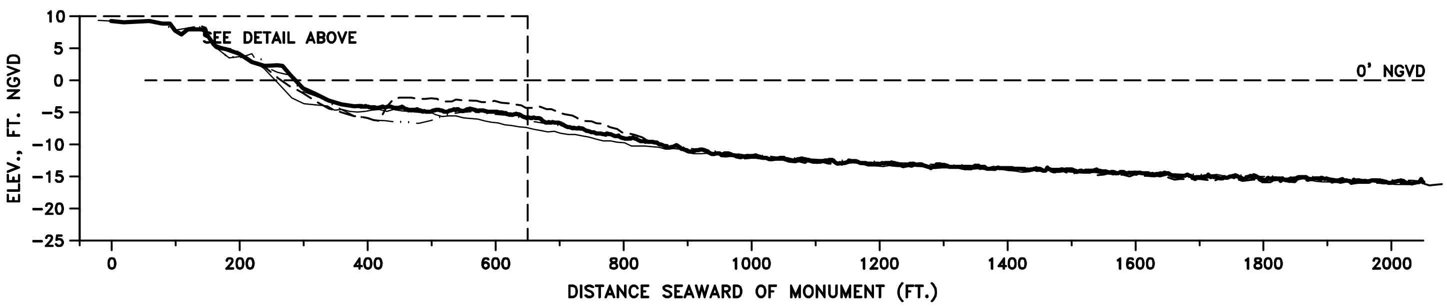




HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	WIGGINS PASS INLET MAINTENANCE BEACH PROFILE		5679 STRAND COURT NAPLES, FL 34110 FAX: 239 594 2025 PHONE: 239 594 2021
	FOR: COLLIER COUNTY		
	DATE:07/14/04	FILE:11-054-XS	SCALE:1"=300'
	JOB FILE:11054	DATUM:NGVD	FIGURE:

BEACH PROFILE: R-13





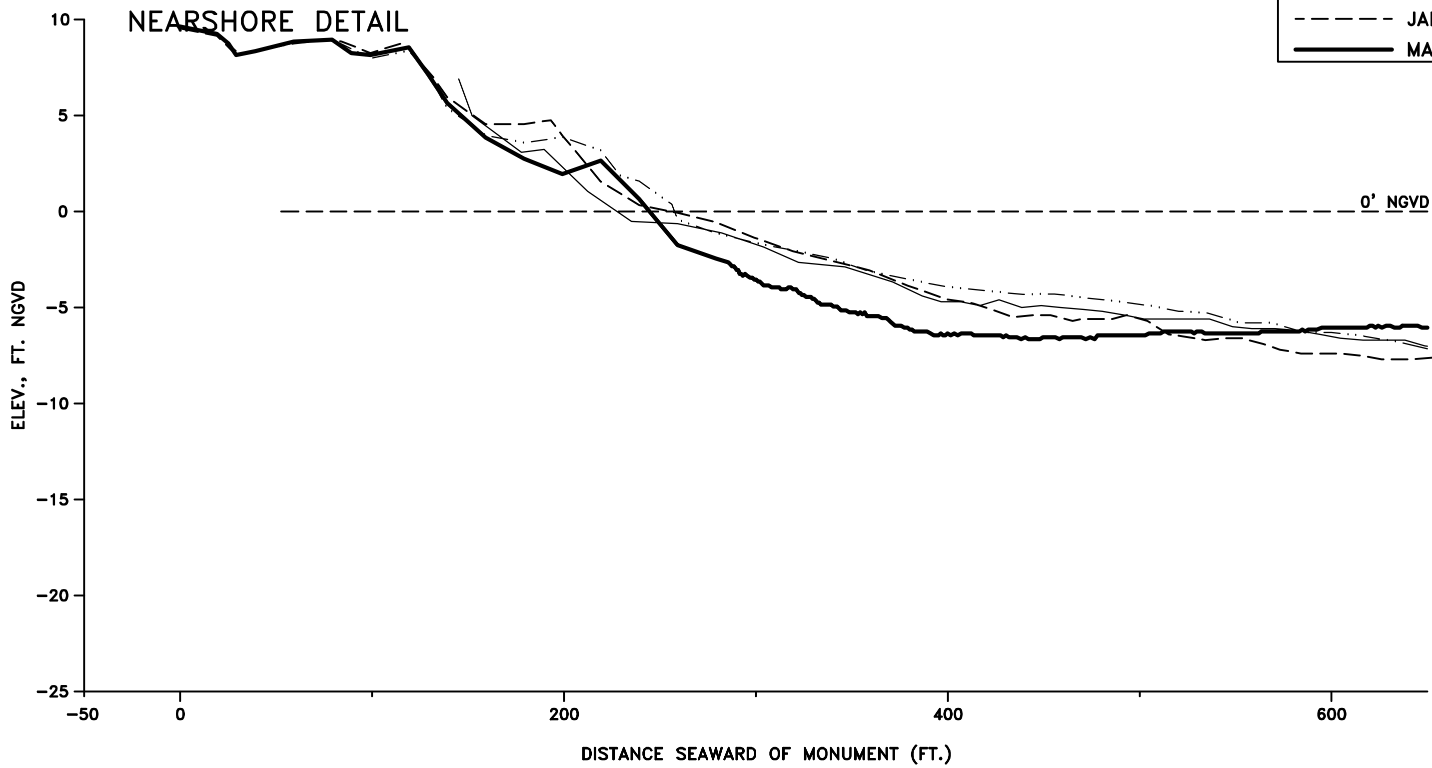
HUMISTON & MOORE ENGINEERS
COASTAL ENGINEERING DESIGN AND PERMITTING

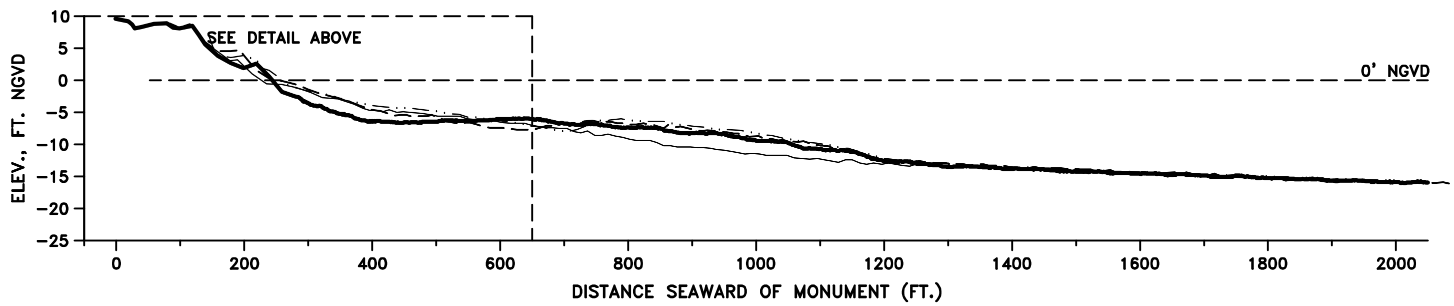
WIGGINS PASS INLET MAINTENANCE BEACH PROFILE		
FOR: COLLIER COUNTY		
DATE:07/14/04	FILE:11-054-XS	SCALE:1"=300'
JOB FILE:11054	DATUM:NGVD	FIGURE:

5679 STRAND COURT
NAPLES, FL 34110
FAX: 239 594 2025
PHONE: 239 594 2021

BEACH PROFILE: R-14

LEGEND
- MARCH 2000 (PRE)
- MAY 2002
- JAN 30, 2003
- MAY 2004



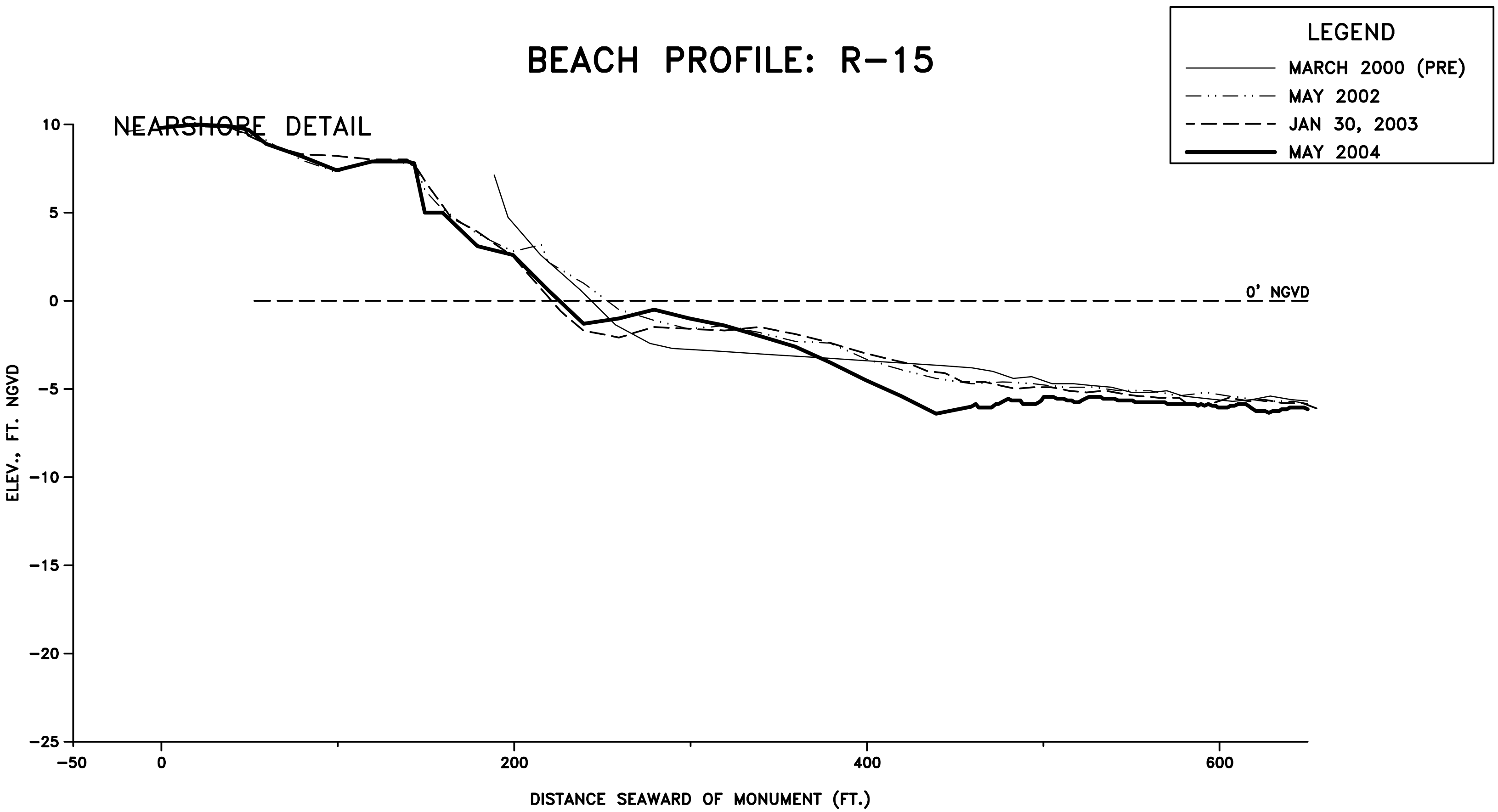


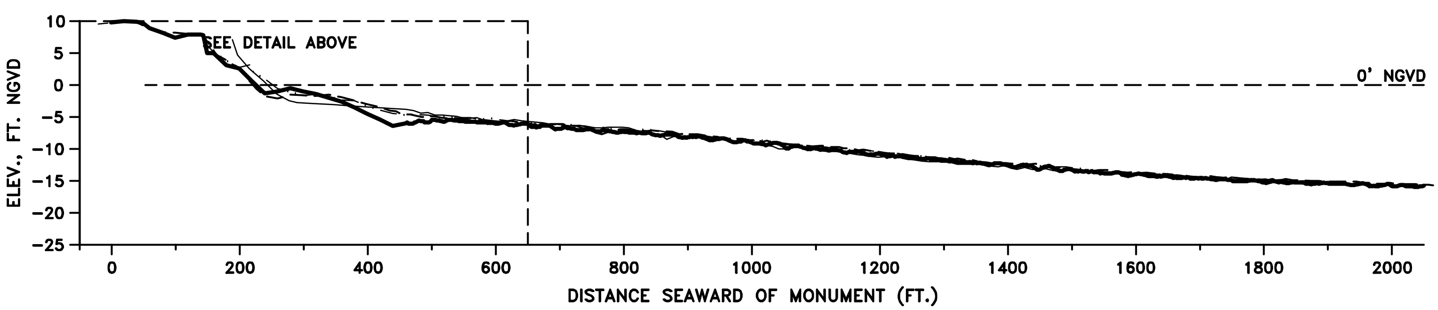
HUMISTON & MOORE ENGINEERS
COASTAL ENGINEERING DESIGN AND PERMITTING

WIGGINS PASS INLET MAINTENANCE BEACH PROFILE		
FOR: COLLIER COUNTY		
DATE:07/14/04	FILE:11-054-XS	SCALE:1"=300'
JOB FILE:11054	DATUM:NGVD	FIGURE:

5679 STRAND COURT
NAPLES, FL 34110
FAX: 239 594 2025
PHONE: 239 594 2021

BEACH PROFILE: R-15





HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	WIGGINS PASS INLET MAINTENANCE BEACH PROFILE			5679 STRAND COURT NAPLES, FL 34110 FAX: 239 594 2025 PHONE: 239 594 2021
	FOR: COLLIER COUNTY			
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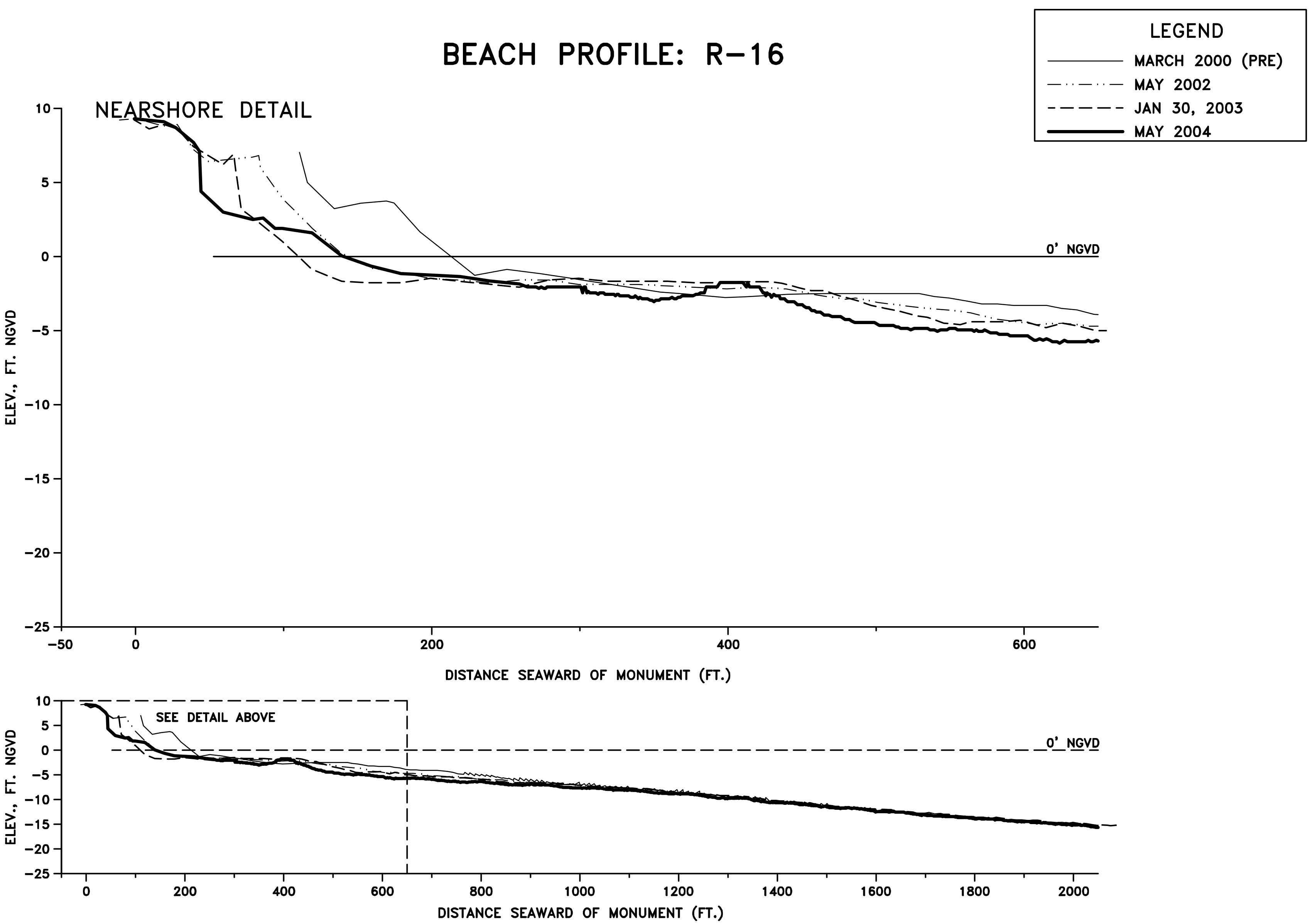
	JOB FILE:11054	DATUM:NGVD	FIGURE:	

BEACH PROFILE: R-16

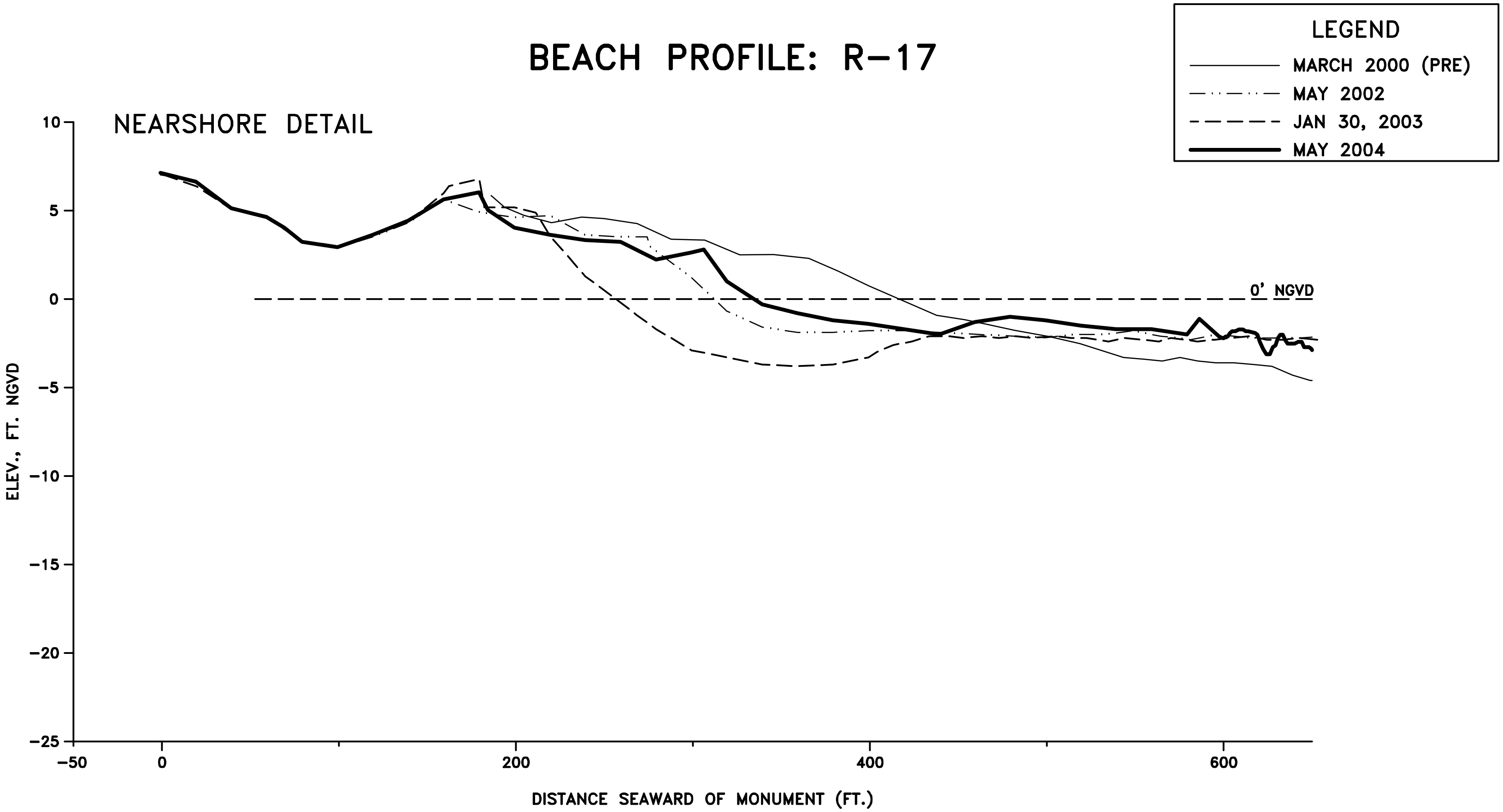


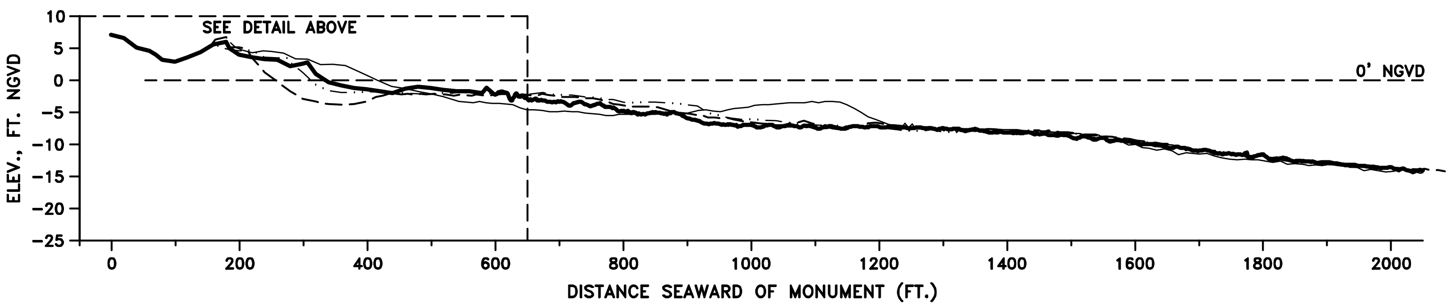
HUMISTON & MOORE ENGINEERS
COASTAL ENGINEERING DESIGN AND PERMITTING

WIGGINS PASS INLET MAINTENANCE BEACH PROFILE		
FOR: COLLIER COUNTY		
DATE:07/14/04	FILE:11-054-XS	SCALE:1"=300'
JOB FILE:11054	DATUM:NGVD	FIGURE:

5679 STRAND COURT
NAPLES, FL 34110
FAX: 239 594 2025
PHONE: 239 594 2021

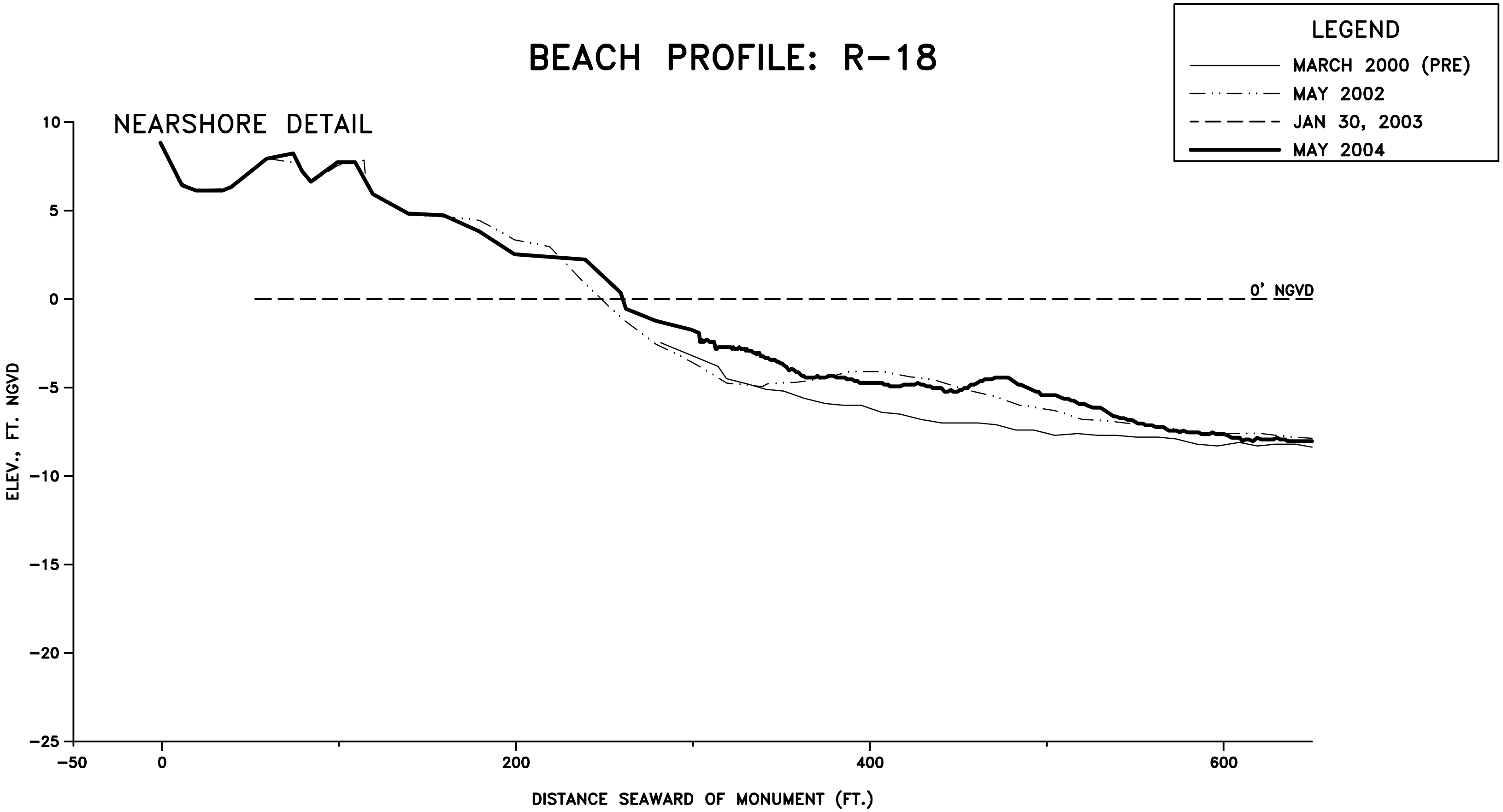
BEACH PROFILE: R-17

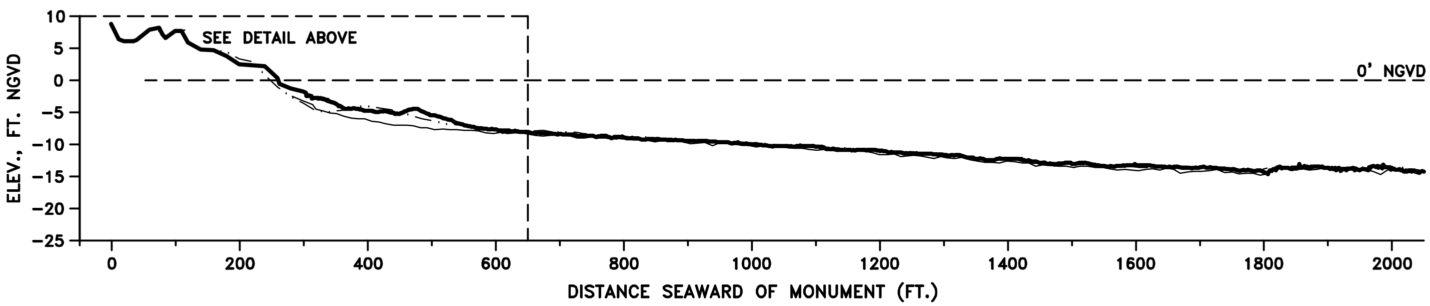




HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	WIGGINS PASS INLET MAINTENANCE BEACH PROFILE		5679 STRAND COURT NAPLES, FL 34110 FAX: 239 594 2025 PHONE: 239 594 2021
	FOR: COLLIER COUNTY		
	DATE:07/14/04	FILE:11-054-XS	SCALE:1"=300'
	JOB FILE:11054	DATUM:NGVD	FIGURE:

BEACH PROFILE: R-18



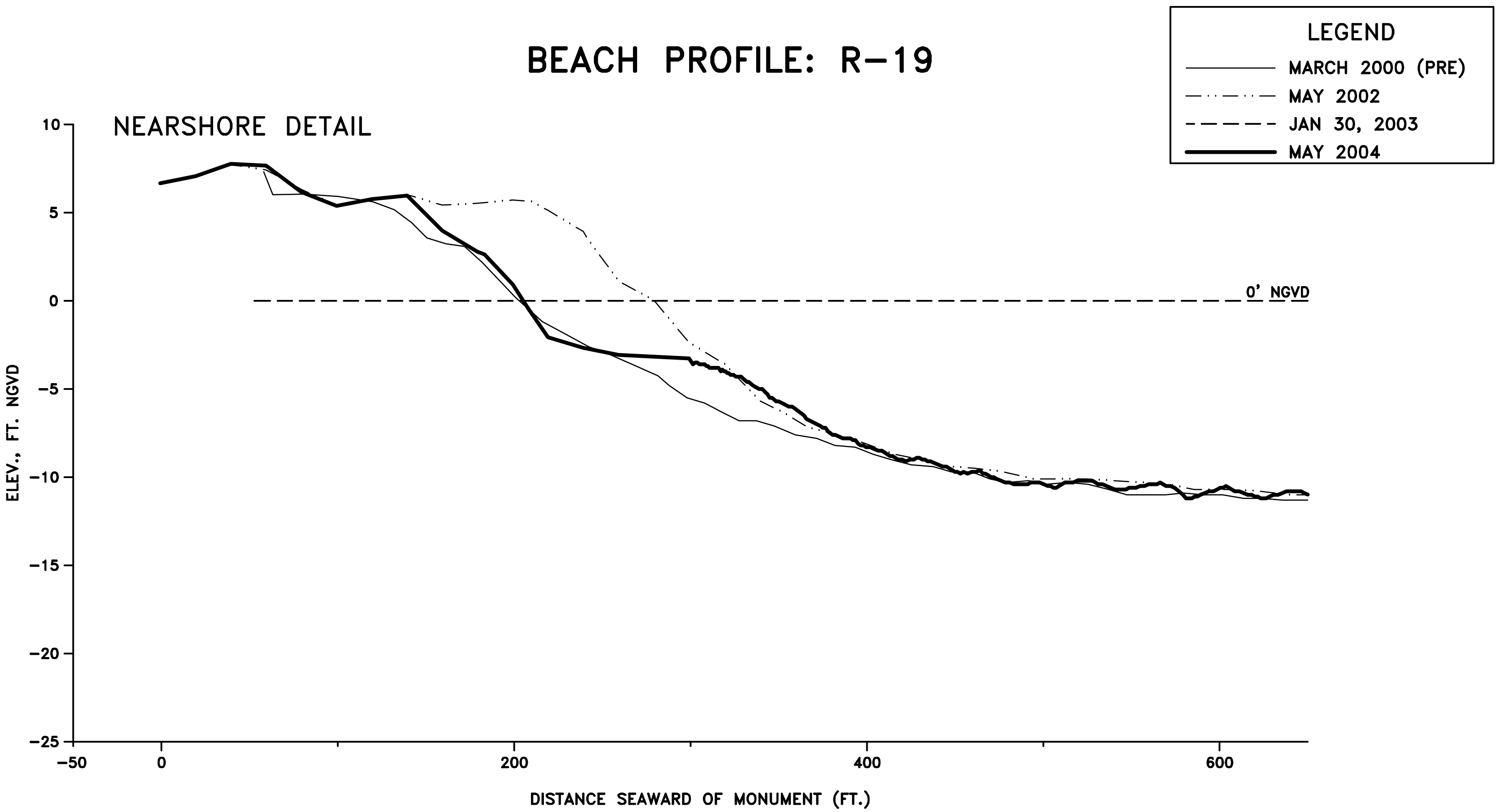


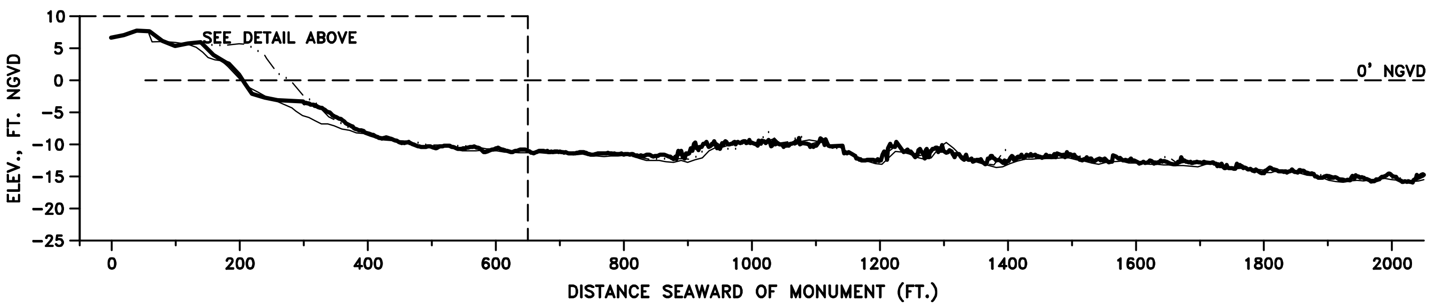
HUMISTON & MOORE ENGINEERS
COASTAL ENGINEERING DESIGN AND PERMITTING

WIGGINS PASS INLET MAINTENANCE BEACH PROFILE		
FOR: COLLIER COUNTY		
DATE:07/14/04	FILE:11-054-XS	SCALE:1"=300'
JOB FILE:11054	DATUM:NGVD	FIGURE:

5679 STRAND COURT
NAPLES, FL 34110
FAX: 239 594 2025
PHONE: 239 594 2021

BEACH PROFILE: R-19



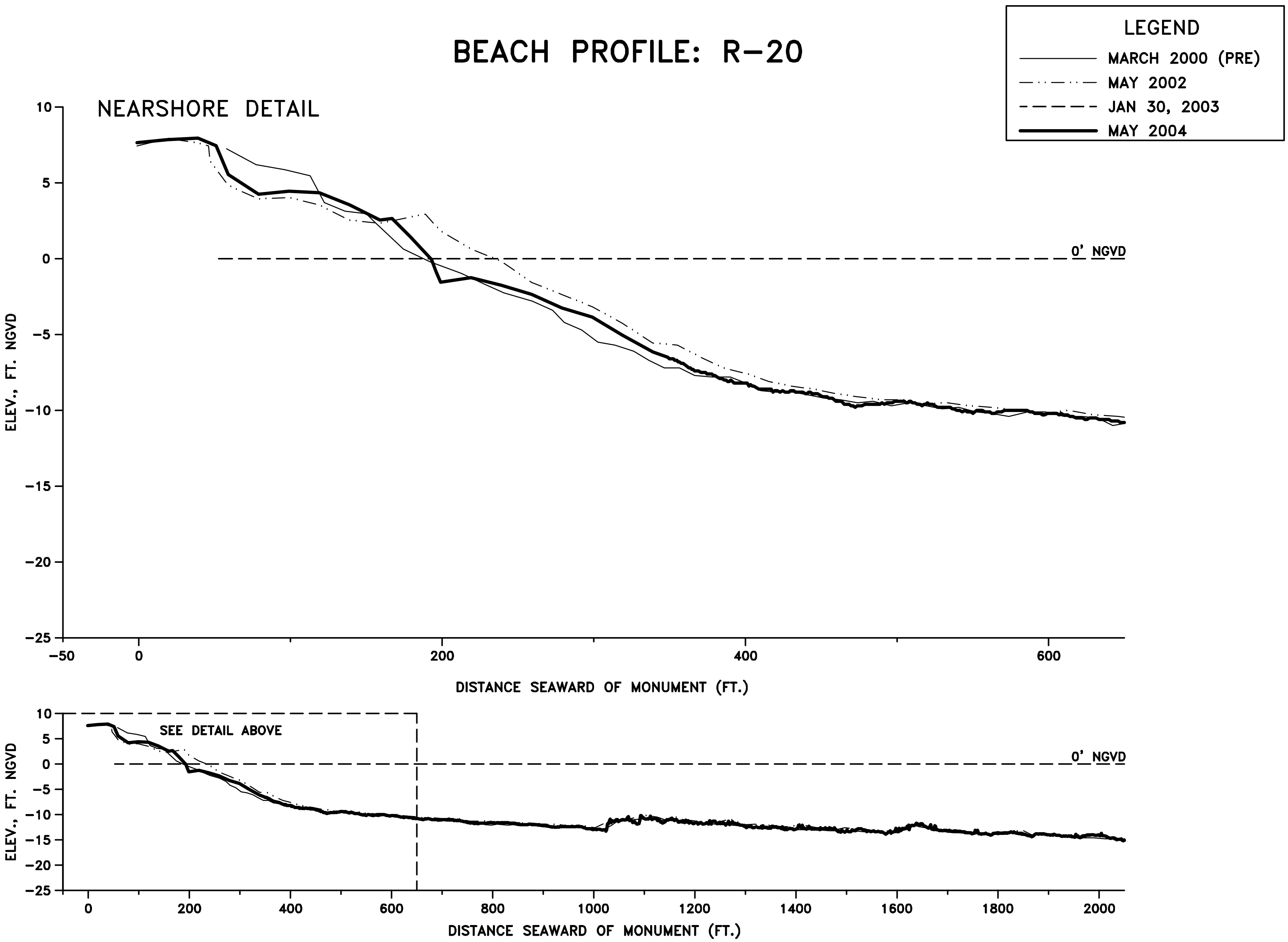


HUMISTON & MOORE ENGINEERS
COASTAL ENGINEERING DESIGN AND PERMITTING

WIGGINS PASS INLET MAINTENANCE BEACH PROFILE		
FOR: COLLIER COUNTY		
DATE:07/14/04	FILE:11-054-XS	SCALE:1"=300'
JOB FILE:11054	DATUM:NGVD	FIGURE:

5679 STRAND COURT
NAPLES, FL 34110
FAX: 239 594 2025
PHONE: 239 594 2021

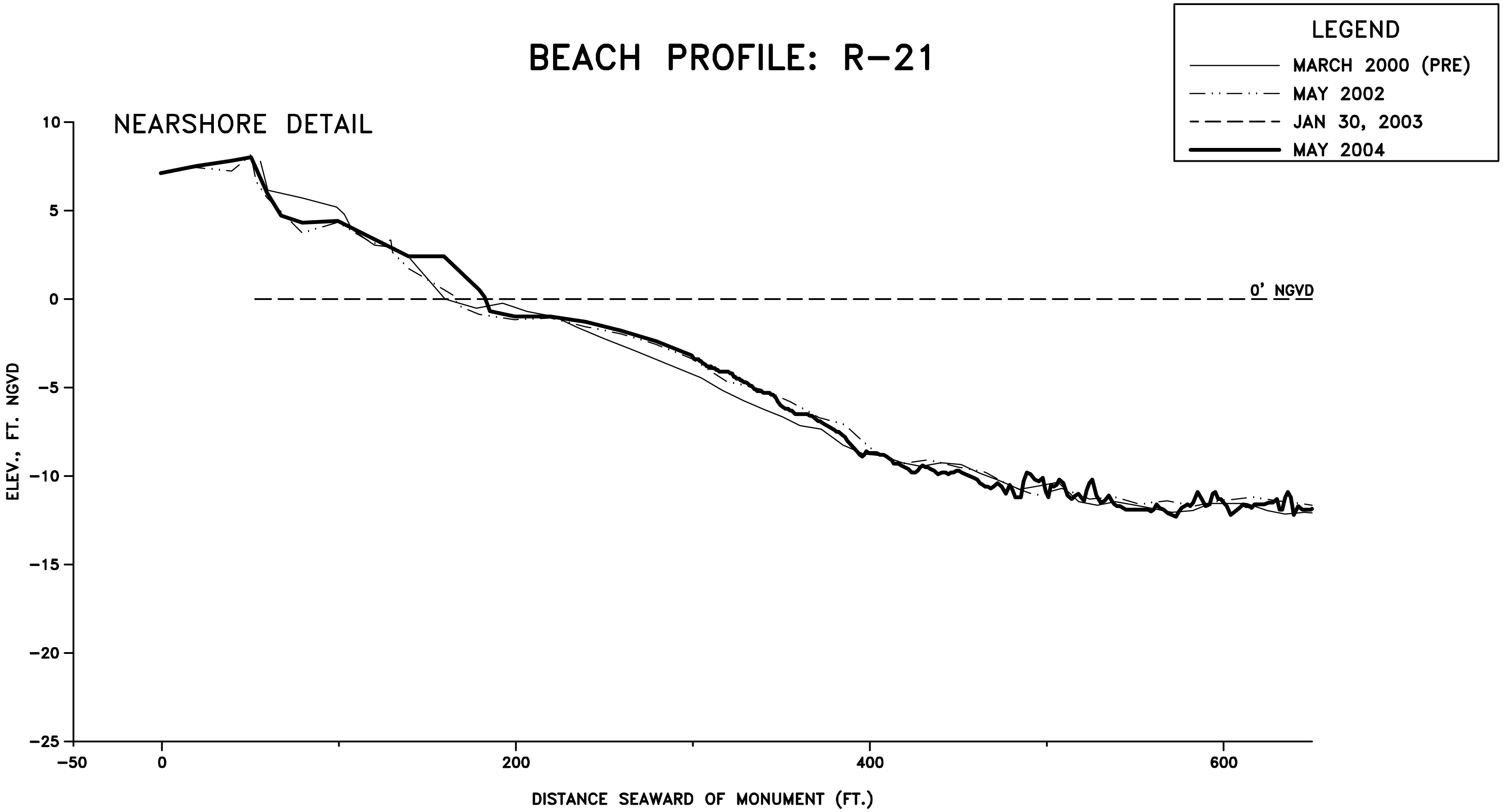
BEACH PROFILE: R-20

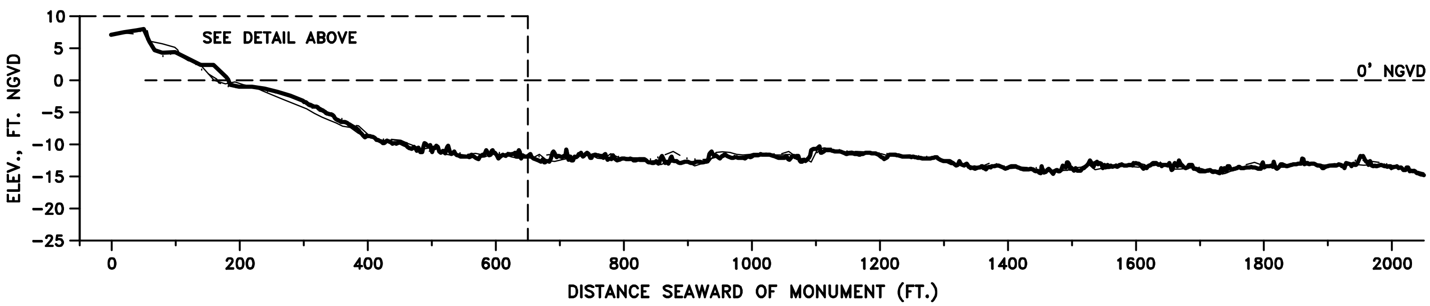


HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	WIGGINS PASS INLET MAINTENANCE BEACH PROFILE		
	FOR: COLLIER COUNTY		
	DATE:07/14/04	FILE:11-054-XS	SCALE:1"=300'
	JOB FILE:11054	DATUM:NGVD	FIGURE:

5679 STRAND COURT
NAPLES, FL 34110
FAX: 239 594 2025
PHONE: 239 594 2021

BEACH PROFILE: R-21



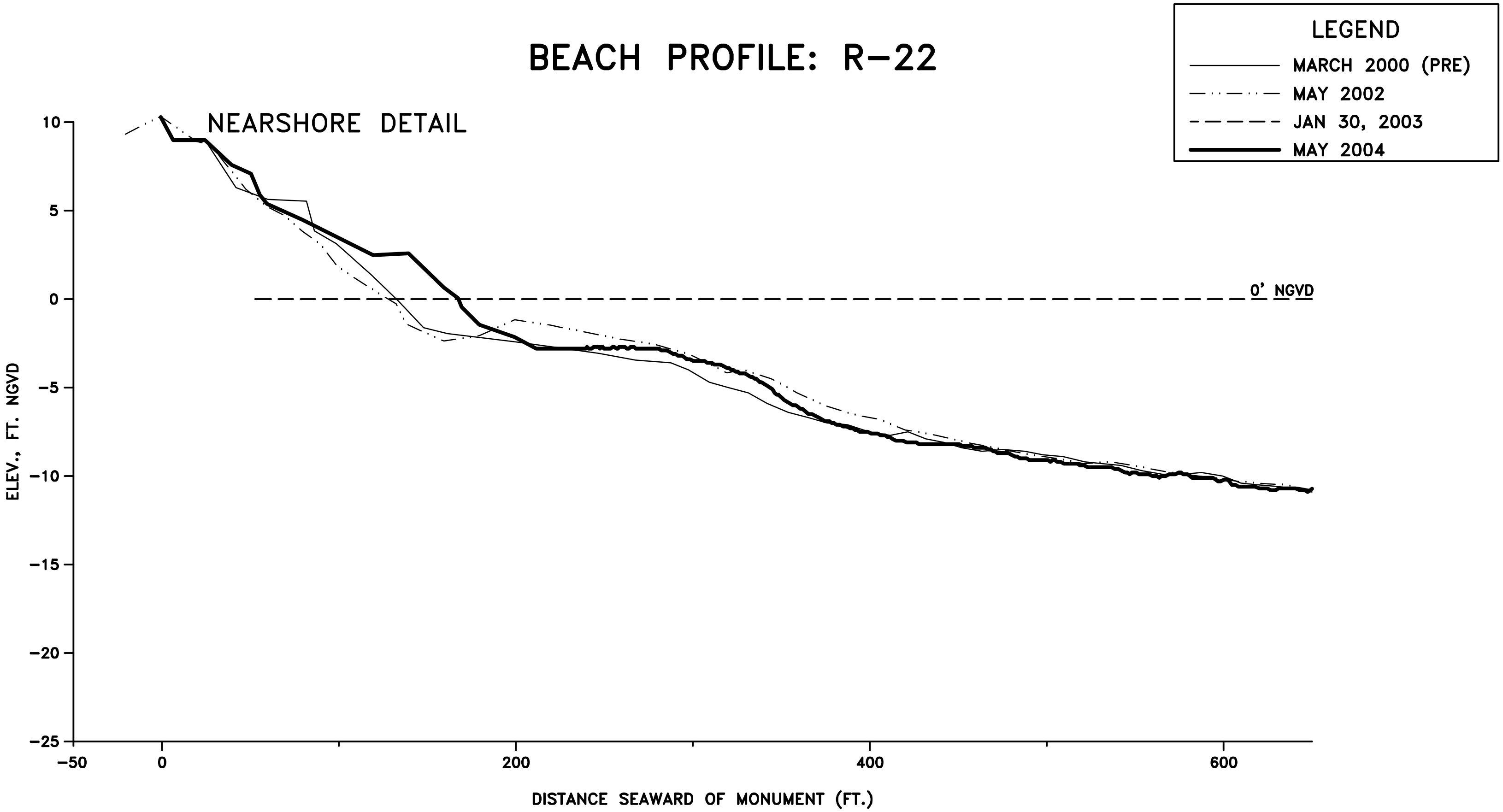


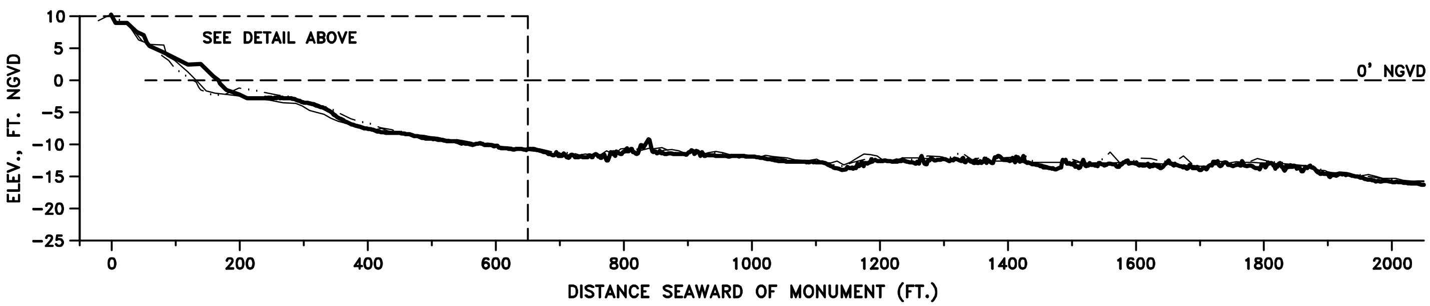
HUMISTON & MOORE ENGINEERS
COASTAL ENGINEERING DESIGN AND PERMITTING

WIGGINS PASS INLET MAINTENANCE BEACH PROFILE		
FOR: COLLIER COUNTY		
DATE:07/14/04	FILE:11-054-XS	SCALE:1"=300'
JOB FILE:11054	DATUM:NGVD	FIGURE:

5679 STRAND COURT
NAPLES, FL 34110
FAX: 239 594 2025
PHONE: 239 594 2021

BEACH PROFILE: R-22





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COASTAL ENGINEERING DESIGN AND PERMITTING

WIGGINS PASS INLET MAINTENANCE
BEACH PROFILE

FOR: COLLIER COUNTY

DATE:07/14/04	FILE:11-054-XS	SCALE:1"=300'
JOB FILE:11054	DATUM:NGVD	FIGURE:

5679 STRAND COURT
NAPLES, FL 34110
FAX: 239 594 2025
PHONE: 239 594 2021

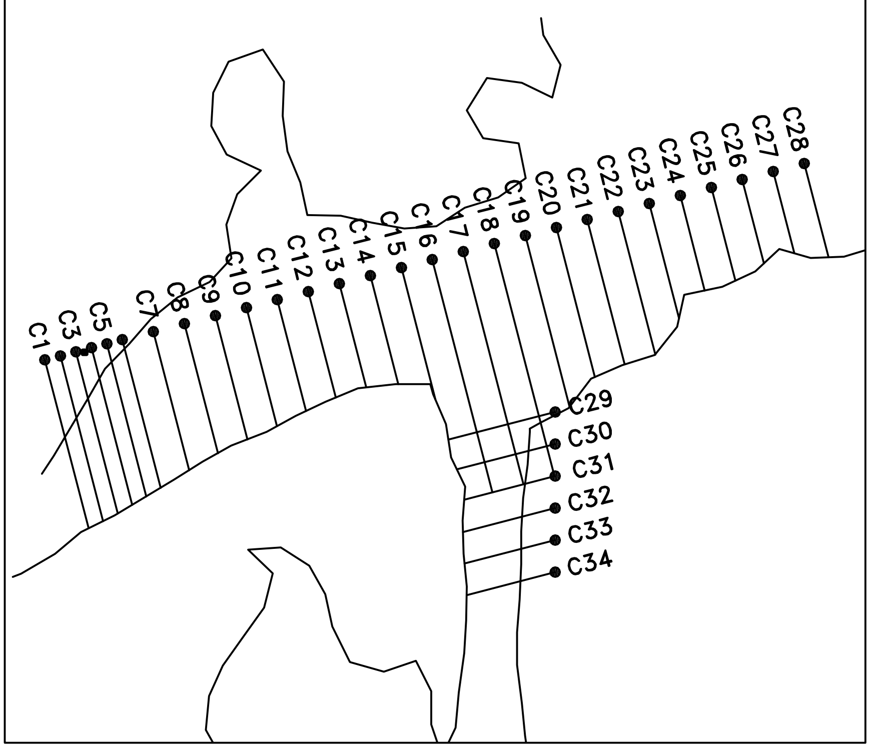
Appendix B

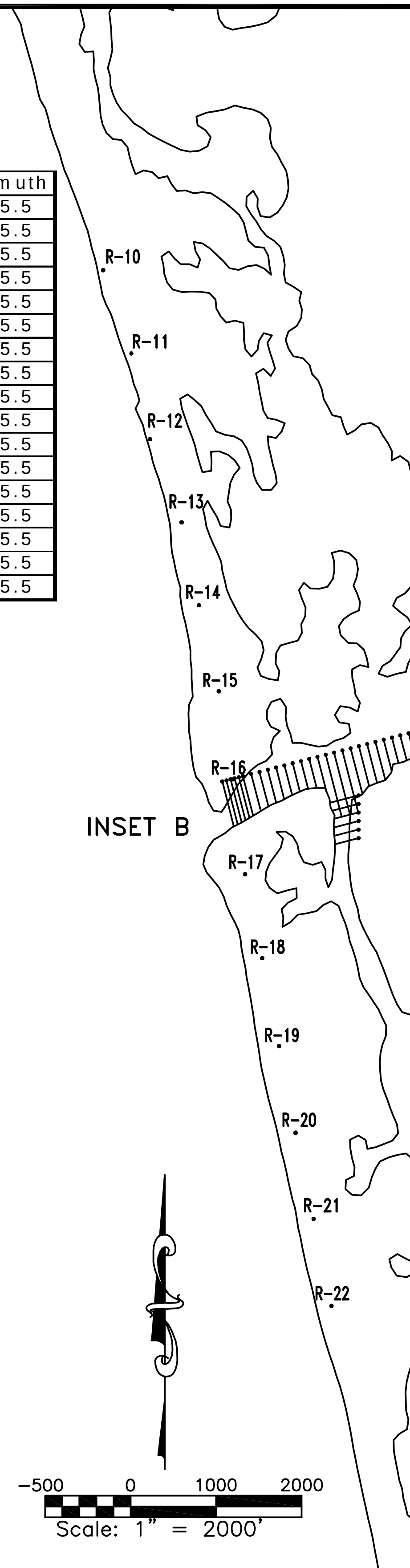
Wiggins Pass
Inner Channel Cross Sections

WIGGINS PASS MONITORING STATION FOR INNER CHANNEL

Station	Northing	Easting	Azimuth		Station	Northing	Easting	Azimuth
C1	711973.9	383660.2	165.5		C18	712336.9	385064.0	165.5
C2	711986.4	383708.6	165.5		C19	712362.0	385160.8	165.5
C3	711998.9	383757.0	165.5		C20	712387.0	385257.6	165.5
C4	712011.4	383805.4	165.5		C21	712412.0	385354.5	165.5
C5	712023.9	383853.8	165.5		C22	712437.1	385451.3	165.5
C6	712036.5	383902.2	165.5		C23	712462.1	385548.1	165.5
C7	712061.5	383999.1	165.5		C24	712487.1	385644.9	165.5
C8	712086.5	384095.9	165.5		C25	712512.2	385741.7	165.5
C9	712111.6	384192.7	165.5		C26	712537.2	385838.5	165.5
C10	712136.6	384289.5	165.5		C27	712562.3	385935.3	165.5
C11	712161.7	384386.3	165.5		C28	712587.3	386032.2	165.5
C12	712186.7	384483.1	165.5		C29	711810.8	385254.1	255.5
C13	712211.7	384579.9	165.5		C30	711710.8	385254.1	255.5
C14	712236.8	384676.8	165.5		C31	711610.8	385254.1	255.5
C15	712261.8	384773.6	165.5		C32	711510.8	385254.1	255.5
C16	712286.8	384870.4	165.5		C33	711410.8	385254.1	255.5
C17	712311.9	384967.2	165.5		C34	711310.8	385254.1	255.5

CHANNEL STATION LOCATION – INSET B
SCALE: 1" = 600'
CHANNEL PROFILES EXTEND TO EDGE OF LAND



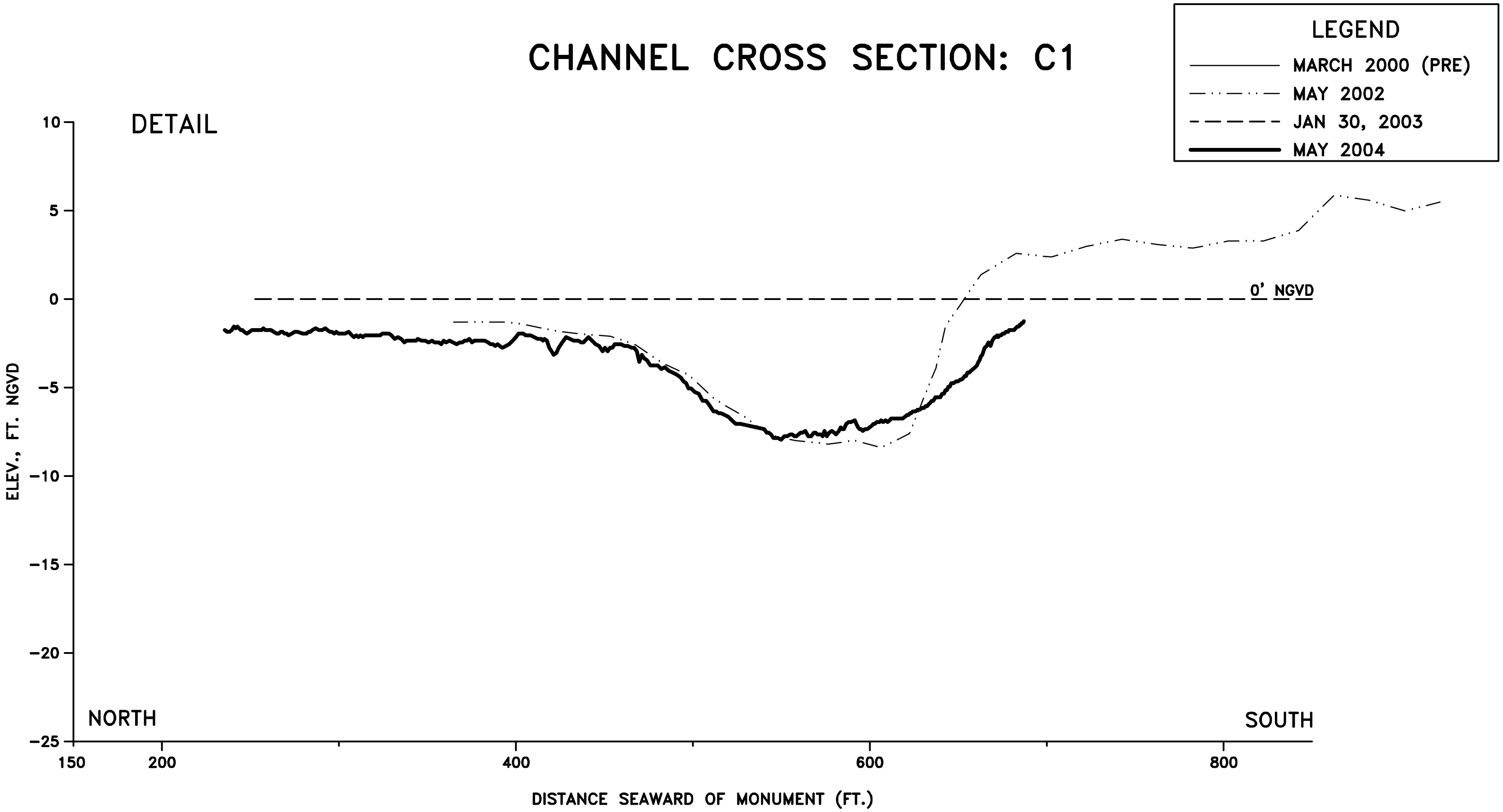


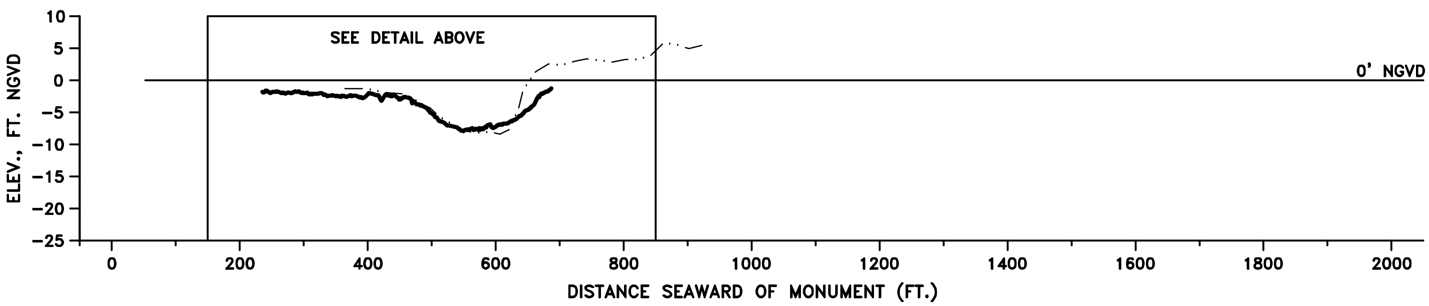
HUMISTON & MOORE ENGINEERS
COASTAL ENGINEERING DESIGN AND PERMITTING

WIGGINS PASS MONITORING REPORT INNER CHANNEL STATION LOCATION		
FOR: COLLIER COUNTY		
DATE:07/13/04	FILE: CHAN-LINE	SCALE:SHOWN
JOB: 11-054	DATUM: NGVD	FIGURE: B

5679 STRAND COURT
NAPLES, FL 34110
FAX: 239 594 2025
PHONE: 239 594 2021

CHANNEL CROSS SECTION: C1

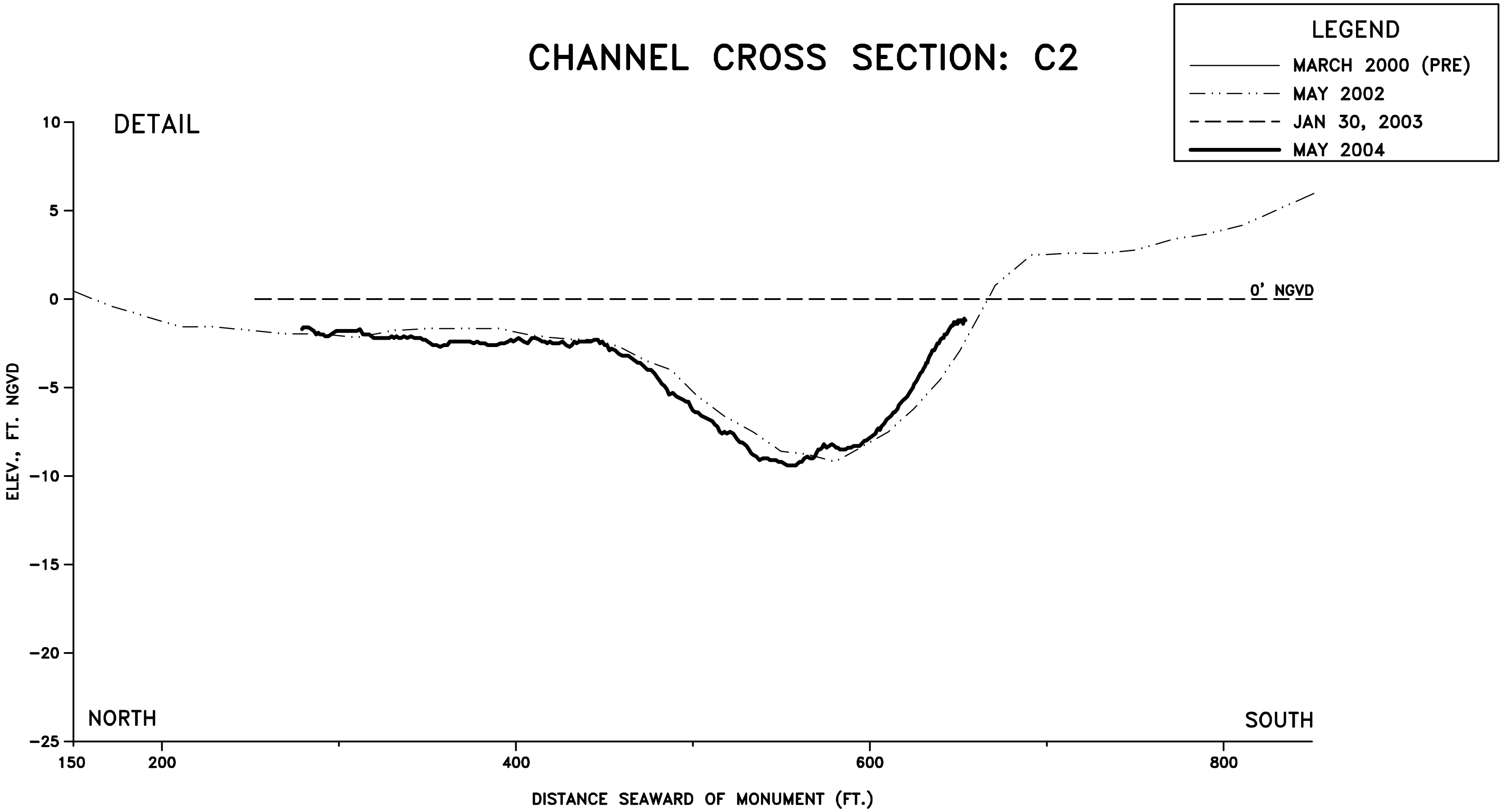


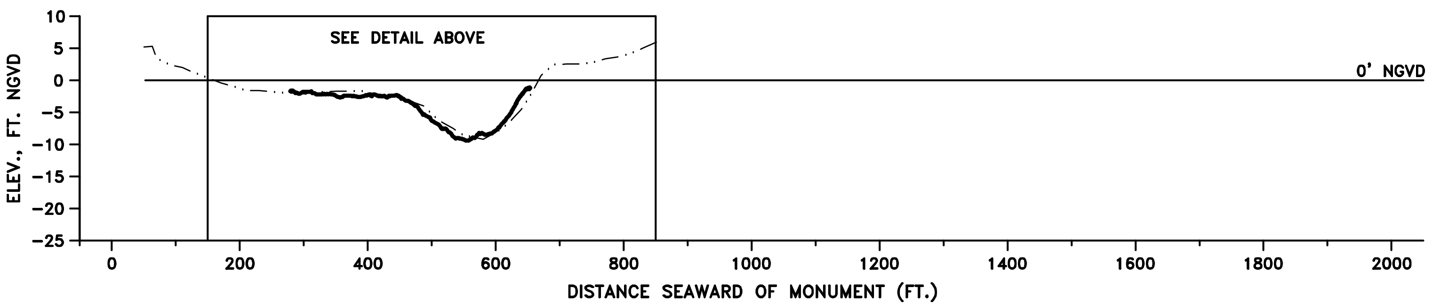


HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	WIGGINS PASS INLET MAINTENANCE CHANNEL CROSS SECTIONS		
	FOR: COLLIER COUNTY		
	DATE:07/14/04	FILE:11-054-XS	SCALE:1"=300'
	JOB FILE:11054	DATUM:NGVD	FIGURE:

5679 STRAND COURT
NAPLES, FL 34110
FAX: 239 594 2025
PHONE: 239 594 2021

CHANNEL CROSS SECTION: C2

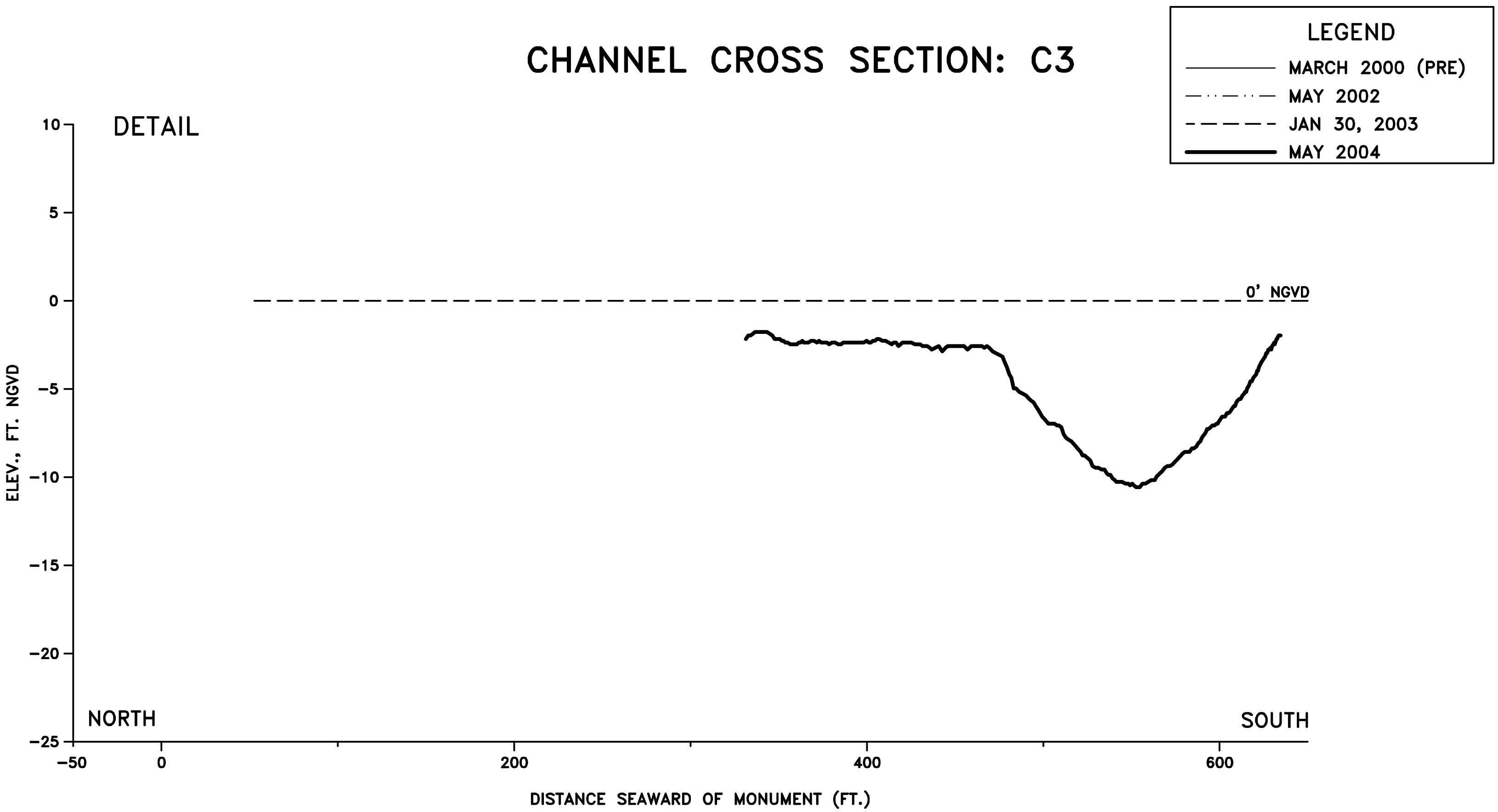


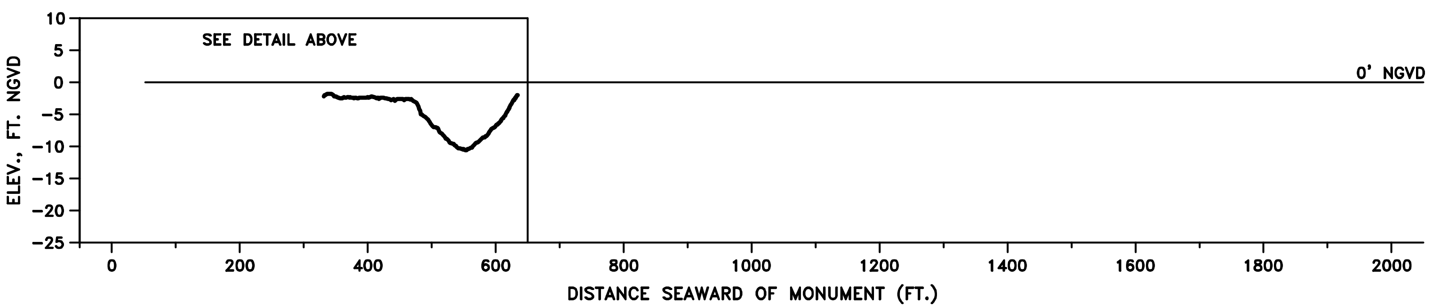


HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	WIGGINS PASS INLET MAINTENANCE CHANNEL CROSS SECTIONS		
	FOR: COLLIER COUNTY		
	DATE:07/14/04	FILE:11-054-XS	SCALE:1"=300'
	JOB FILE:11054	DATUM:NGVD	FIGURE:

5679 STRAND COURT
NAPLES, FL 34110
FAX: 239 594 2025
PHONE: 239 594 2021

CHANNEL CROSS SECTION: C3



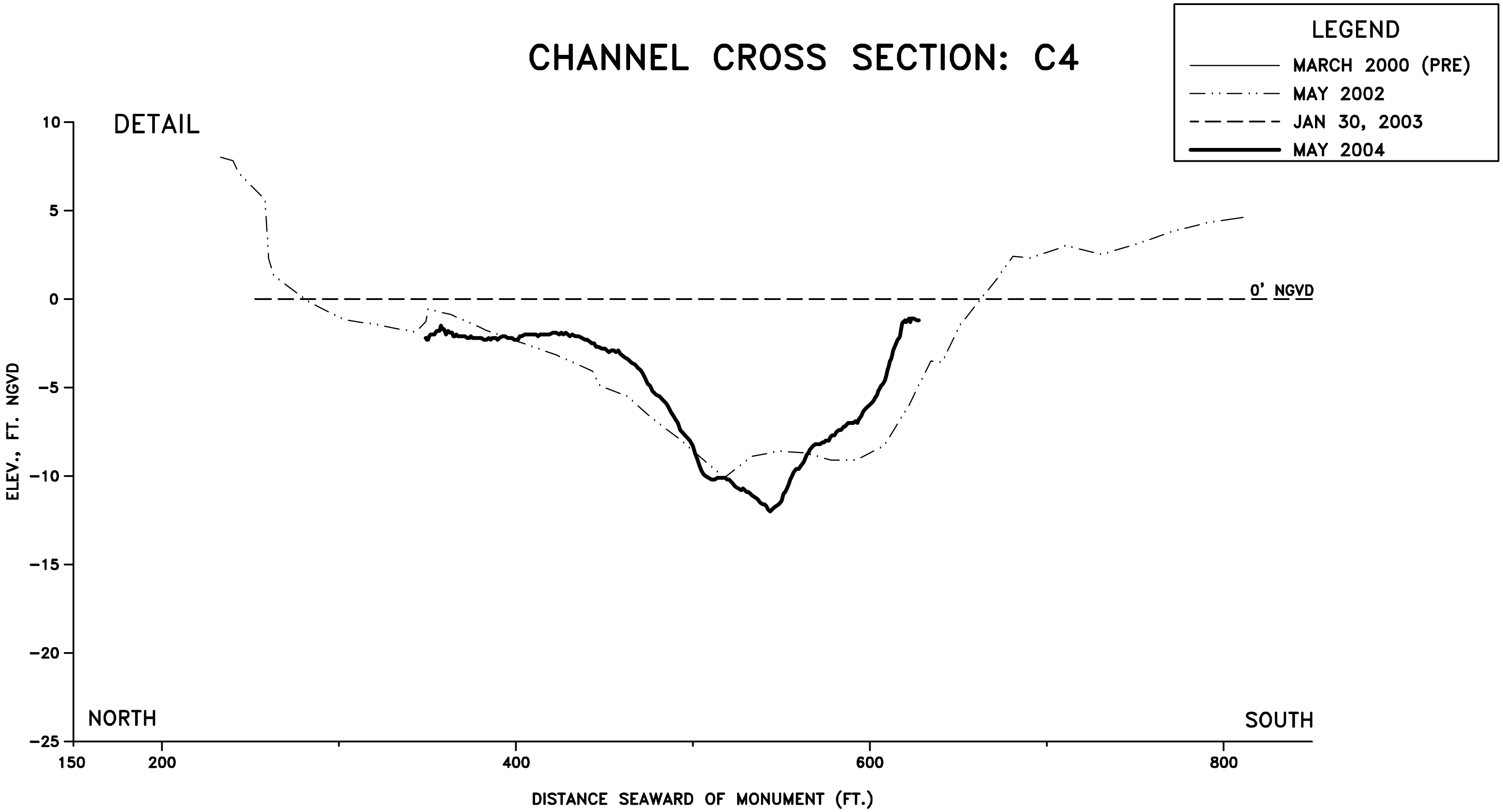


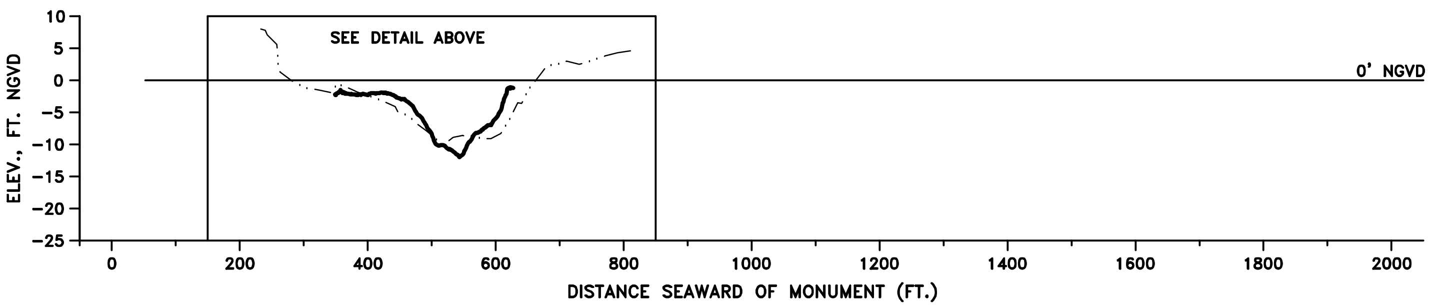
HUMISTON & MOORE ENGINEERS
COASTAL ENGINEERING DESIGN AND PERMITTING

WIGGINS PASS INLET MAINTENANCE CHANNEL CROSS SECTIONS		
FOR: COLLIER COUNTY		
DATE:07/14/04	FILE:11-054-XS	SCALE:1"=300'
JOB FILE:11054	DATUM:NGVD	FIGURE:

5679 STRAND COURT
NAPLES, FL 34110
FAX: 239 594 2025
PHONE: 239 594 2021

CHANNEL CROSS SECTION: C4

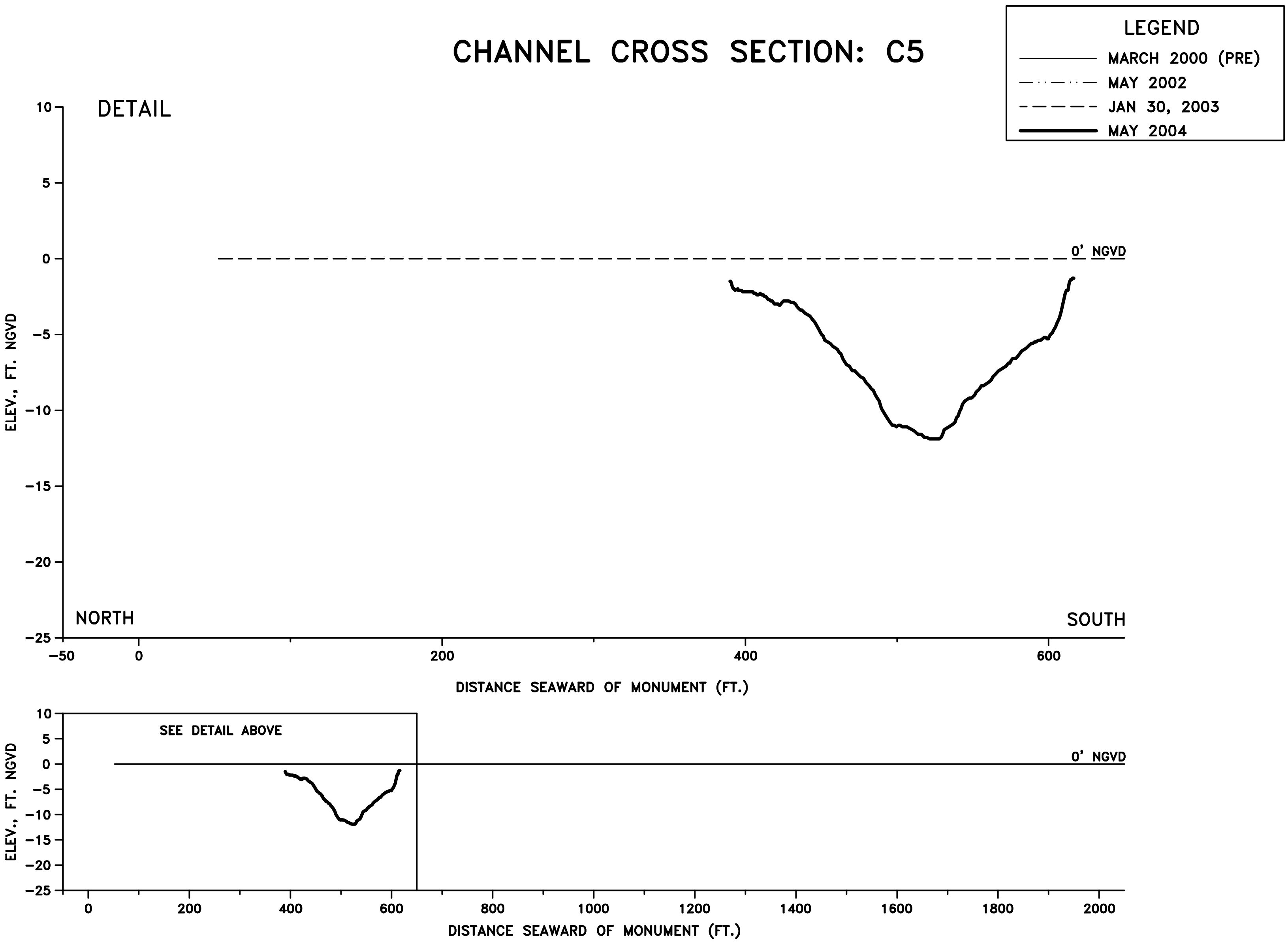




HUMISTON & MOORE ENGINEERS
COASTAL ENGINEERING DESIGN AND PERMITTING

WIGGINS PASS INLET MAINTENANCE CHANNEL CROSS SECTIONS		
FOR: COLLIER COUNTY		
DATE:07/14/04	FILE:11-054-XS	SCALE:1"=300'
JOB FILE:11054	DATUM:NGVD	FIGURE:

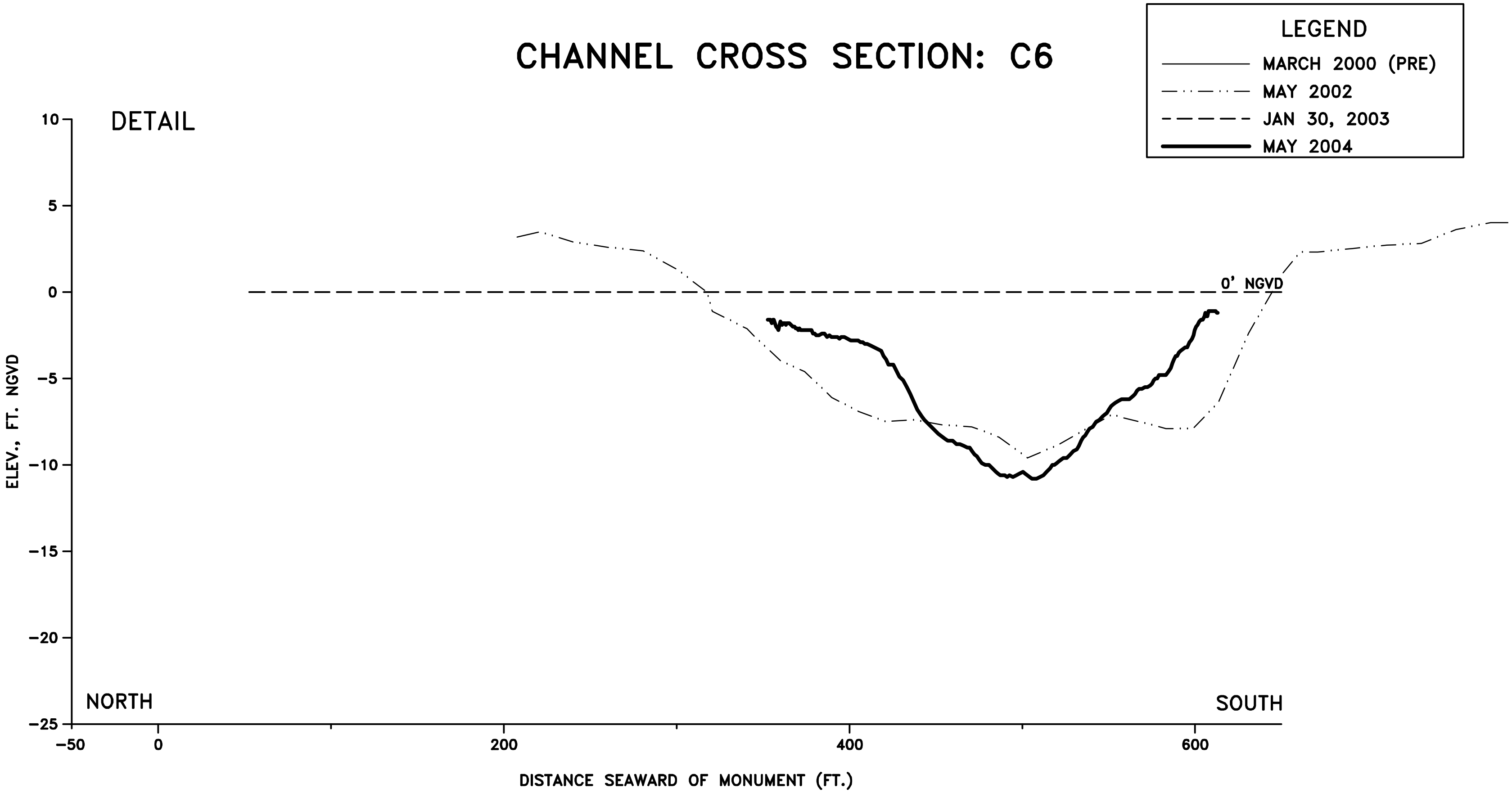
5679 STRAND COURT
NAPLES, FL 34110
FAX: 239 594 2025
PHONE: 239 594 2021

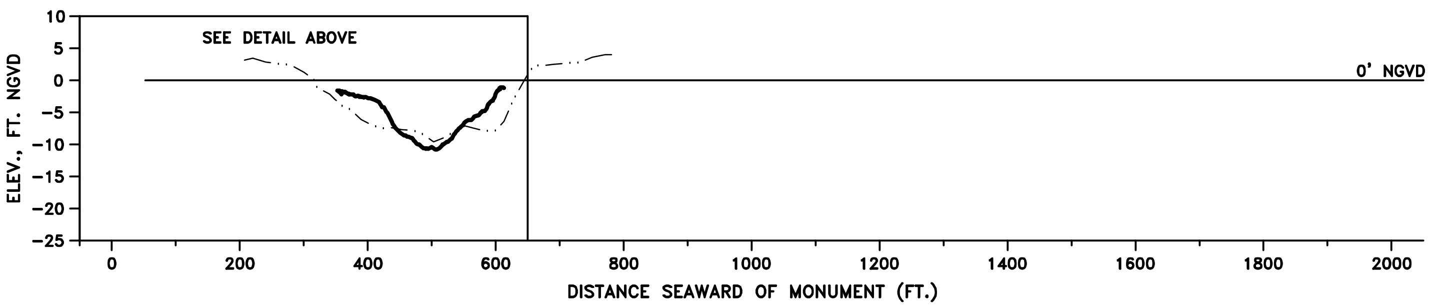


HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	WIGGINS PASS INLET MAINTENANCE CHANNEL CROSS SECTIONS		
	FOR: COLLIER COUNTY		
	DATE:07/14/04	FILE:11-054-XS	SCALE:1"=300'
	JOB FILE:11054	DATUM:NGVD	FIGURE:

5679 STRAND COURT
NAPLES, FL 34110
FAX: 239 594 2025
PHONE: 239 594 2021

CHANNEL CROSS SECTION: C6



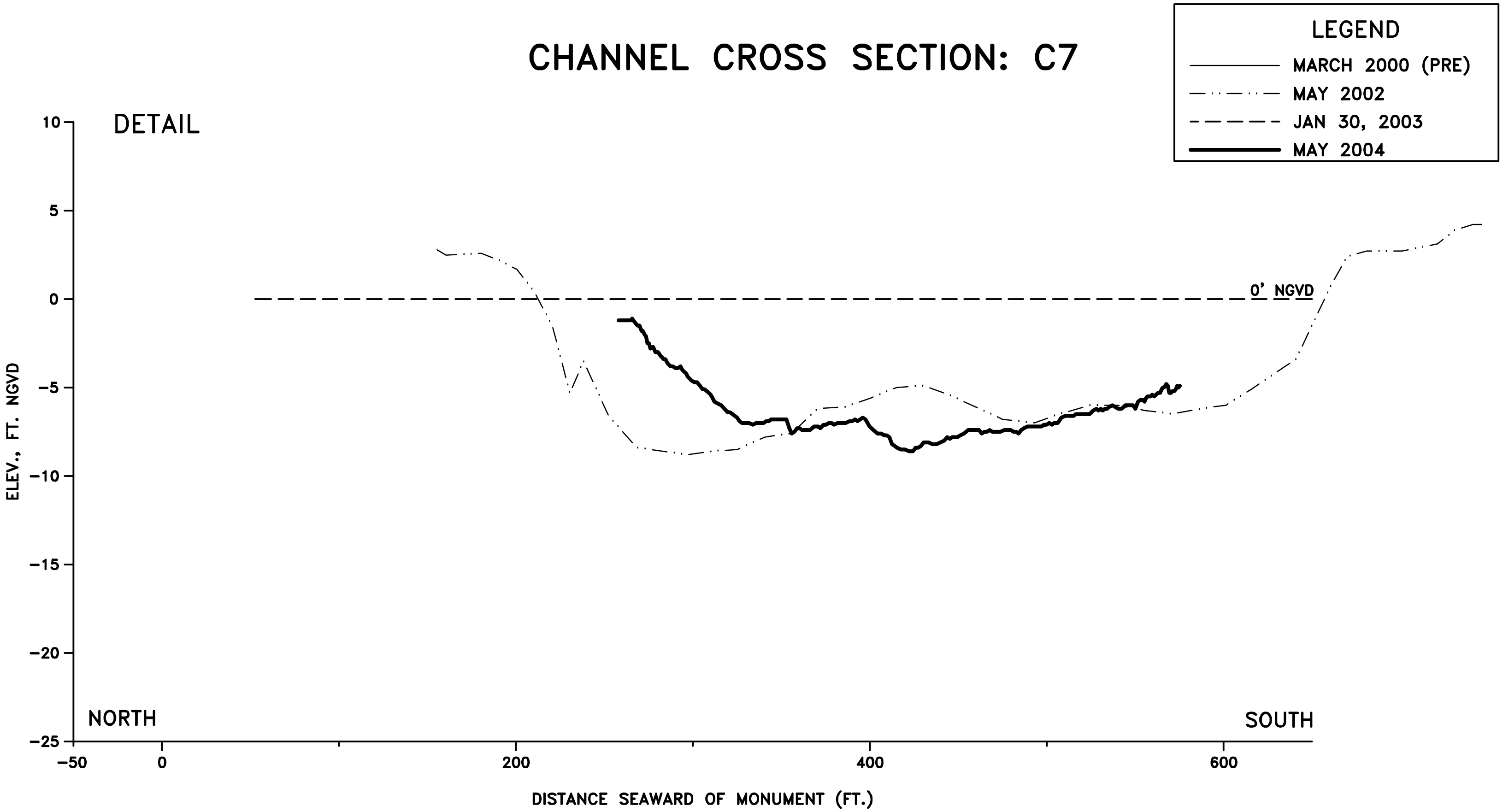


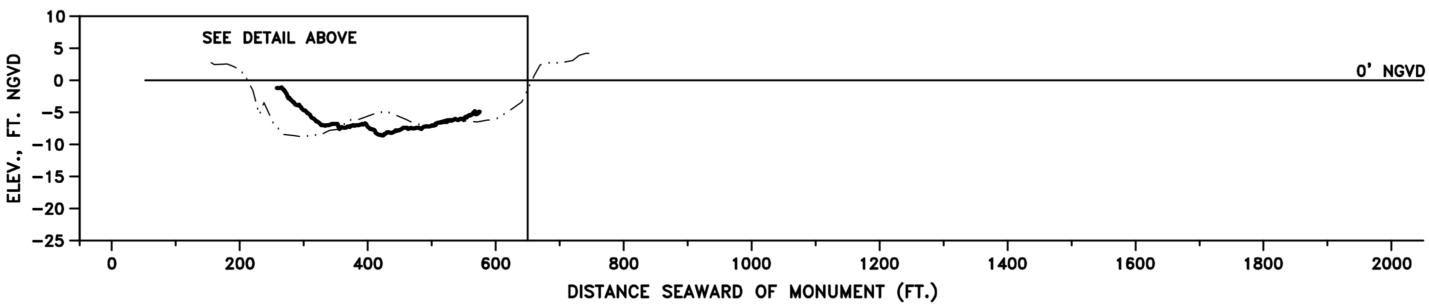
HUMISTON & MOORE ENGINEERS
COASTAL ENGINEERING DESIGN AND PERMITTING

WIGGINS PASS INLET MAINTENANCE CHANNEL CROSS SECTIONS		
FOR: COLLIER COUNTY		
DATE:07/14/04	FILE:11-054-XS	SCALE:1"=300'
JOB FILE:11054	DATUM:NGVD	FIGURE:

5679 STRAND COURT
NAPLES, FL 34110
FAX: 239 594 2025
PHONE: 239 594 2021

CHANNEL CROSS SECTION: C7

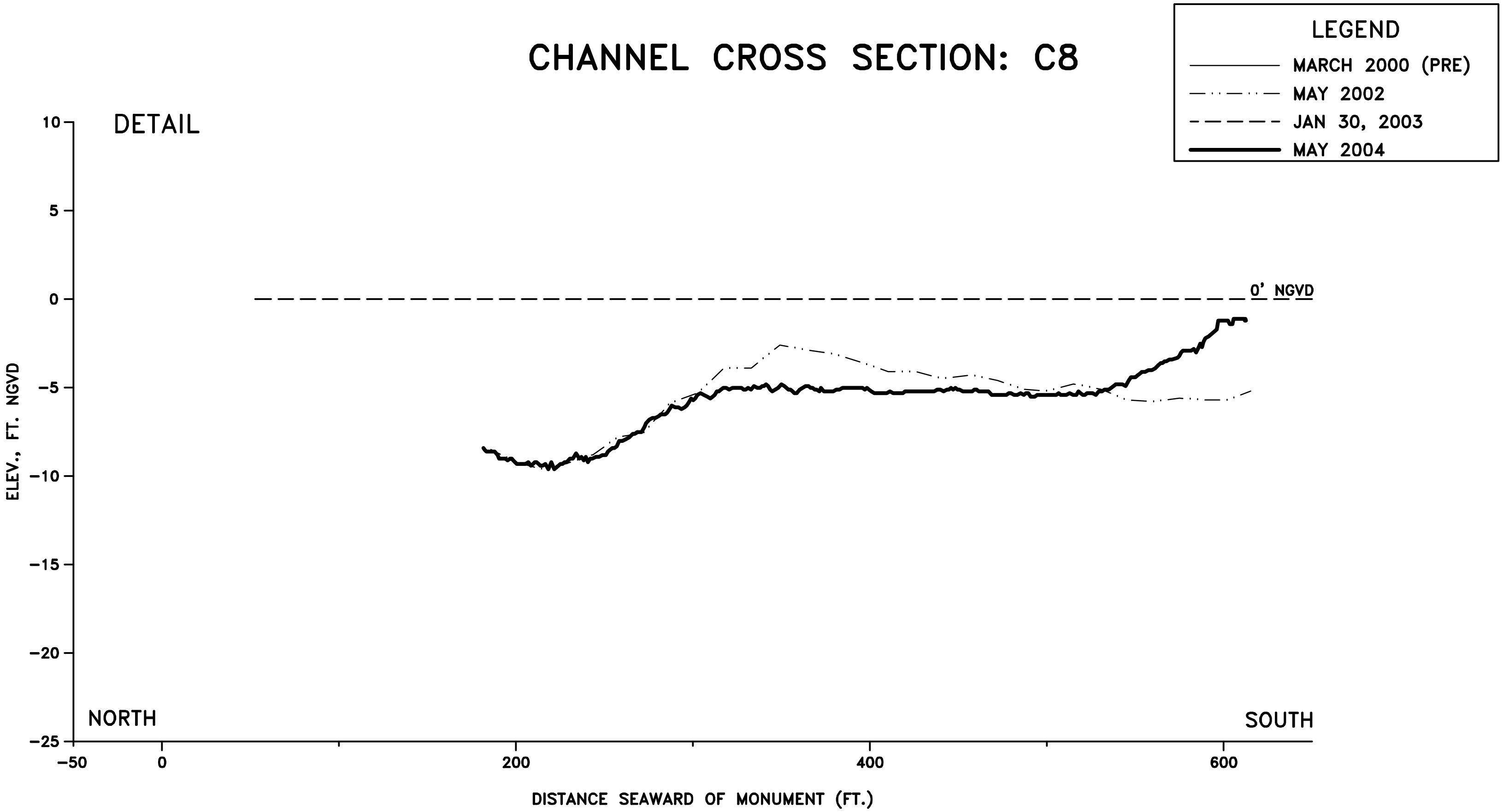


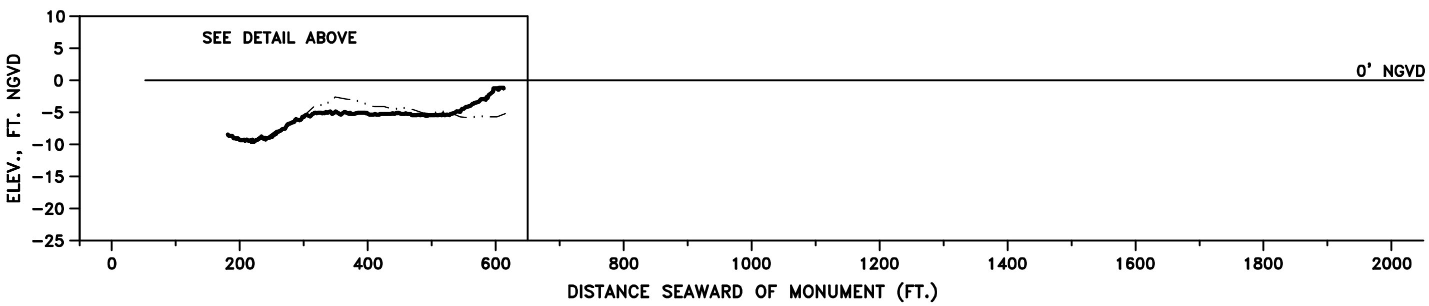


HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	WIGGINS PASS INLET MAINTENANCE CHANNEL CROSS SECTIONS		
	FOR: COLLIER COUNTY		
	DATE:07/14/04	FILE:11-054-XS	SCALE:1"=300'
	JOB FILE:11054	DATUM:NGVD	FIGURE:

5679 STRAND COURT
NAPLES, FL 34110
FAX: 239 594 2025
PHONE: 239 594 2021

CHANNEL CROSS SECTION: C8



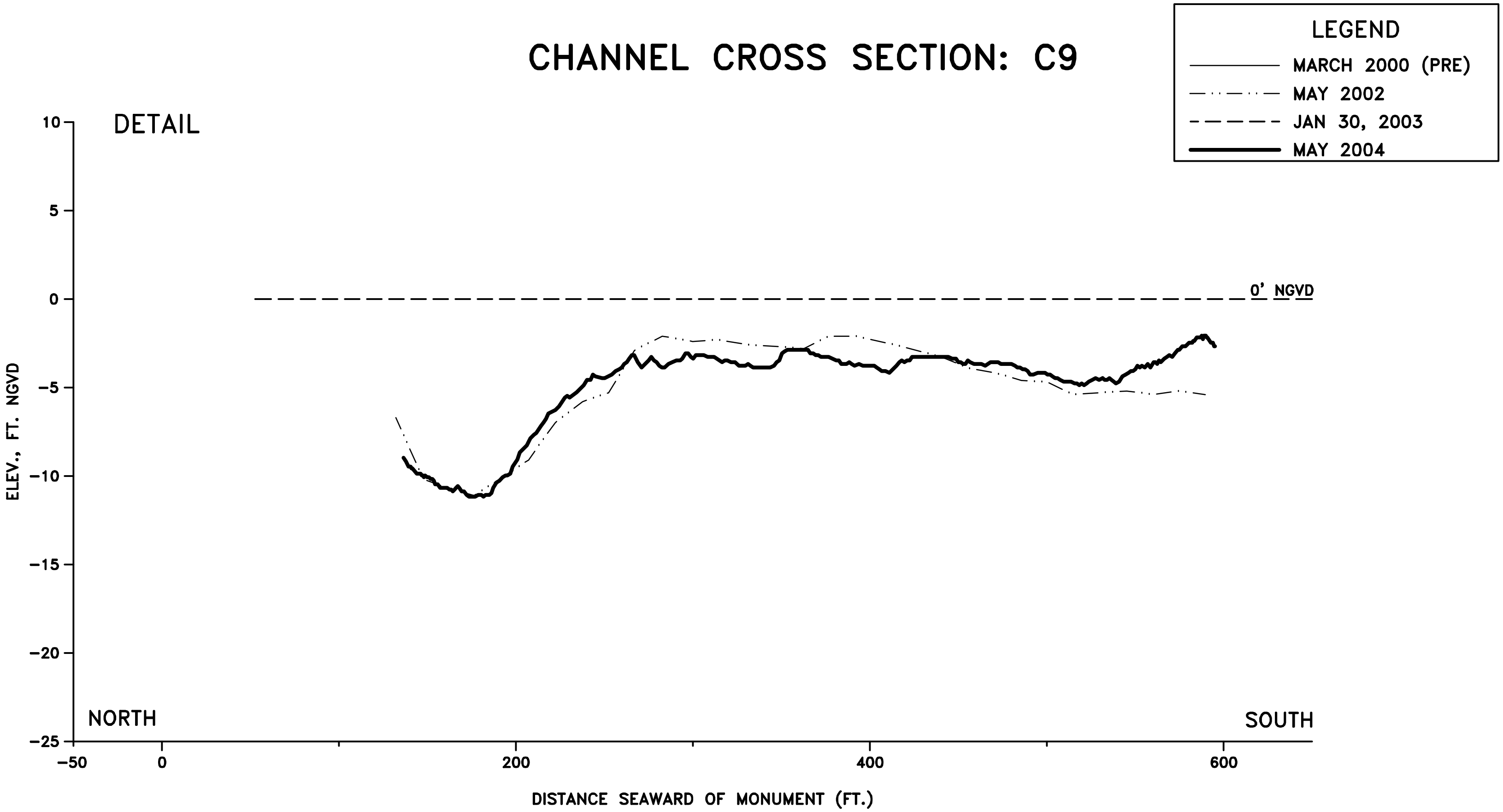


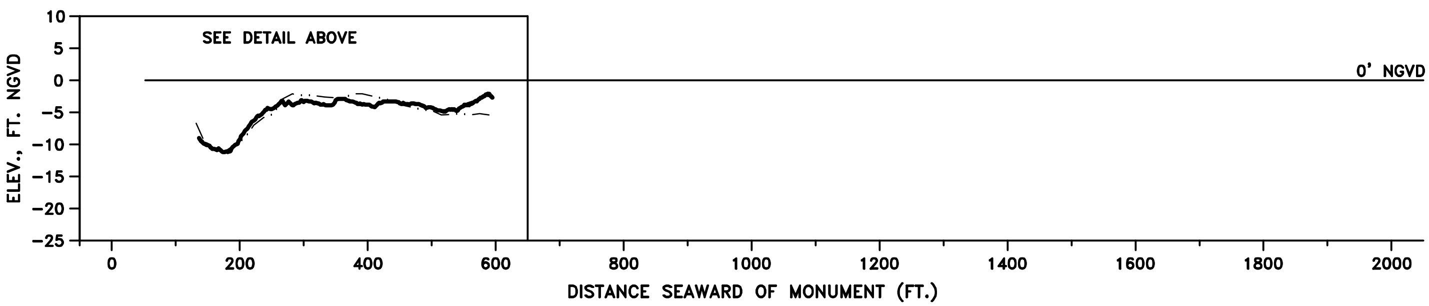
HUMISTON & MOORE ENGINEERS
COASTAL ENGINEERING DESIGN AND PERMITTING

WIGGINS PASS INLET MAINTENANCE CHANNEL CROSS SECTIONS		
FOR: COLLIER COUNTY		
DATE:07/14/04	FILE:11-054-XS	SCALE:1"=300'
JOB FILE:11054	DATUM:NGVD	FIGURE:

5679 STRAND COURT
NAPLES, FL 34110
FAX: 239 594 2025
PHONE: 239 594 2021

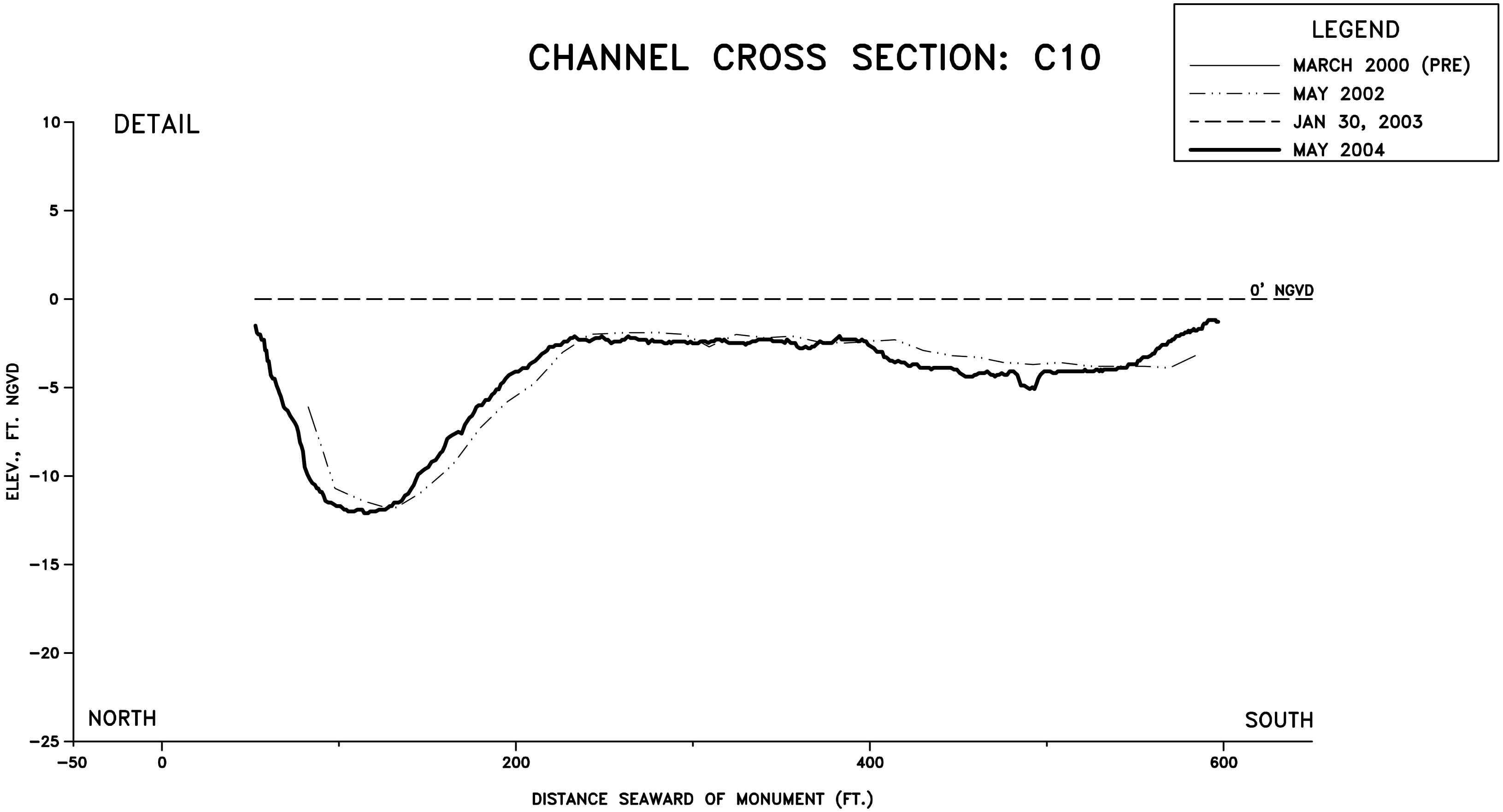
CHANNEL CROSS SECTION: C9

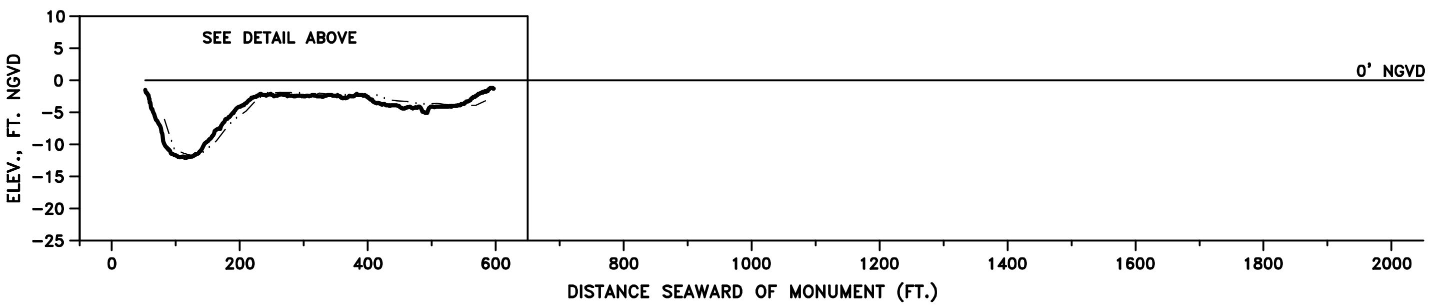




HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	WIGGINS PASS INLET MAINTENANCE CHANNEL CROSS SECTIONS		5679 STRAND COURT NAPLES, FL 34110 FAX: 239 594 2025 PHONE: 239 594 2021
	FOR: COLLIER COUNTY		
	DATE:07/14/04	FILE:11-054-XS	SCALE:1"=300'
	JOB FILE:11054	DATUM:NGVD	FIGURE:

CHANNEL CROSS SECTION: C10



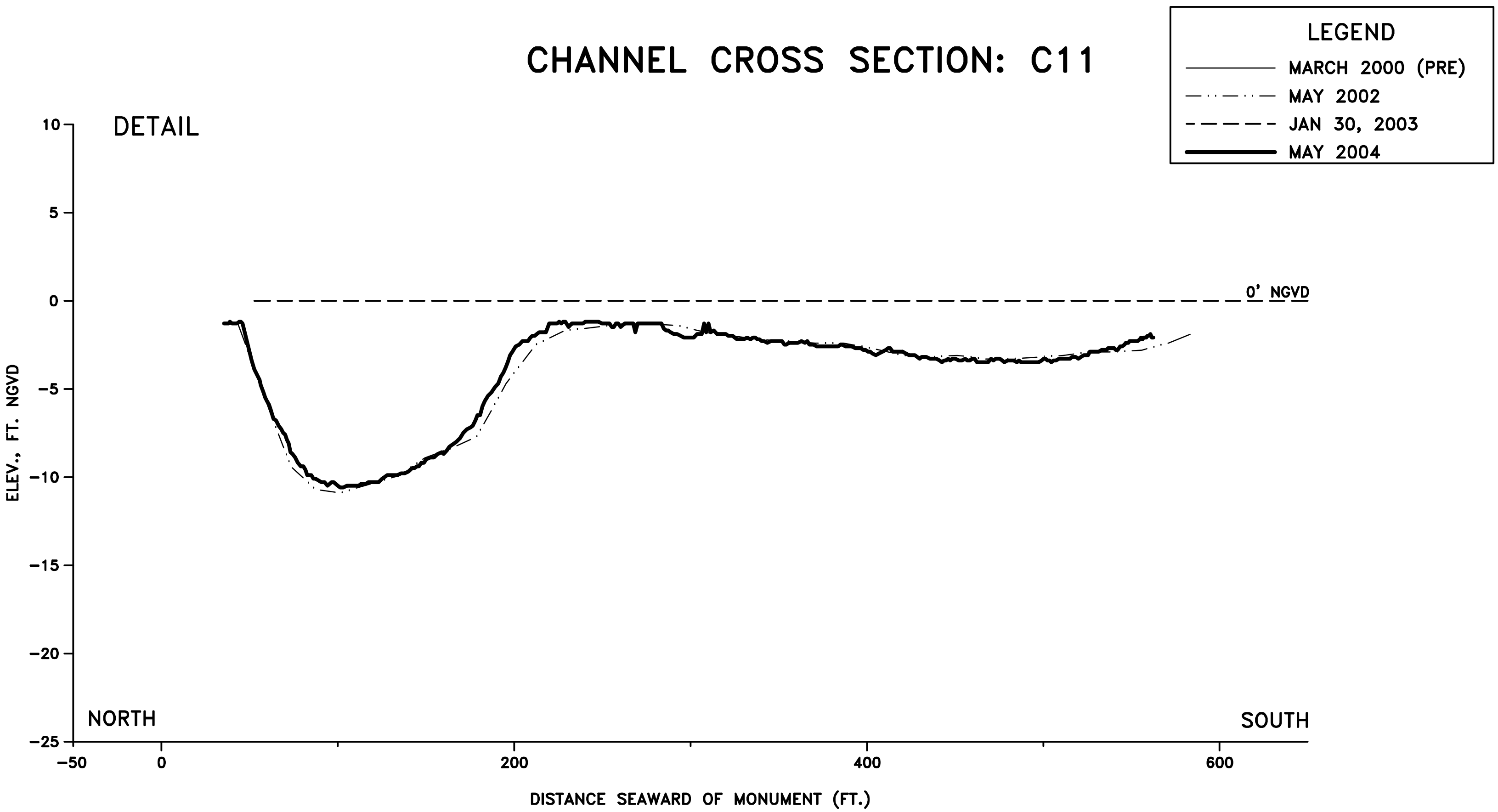


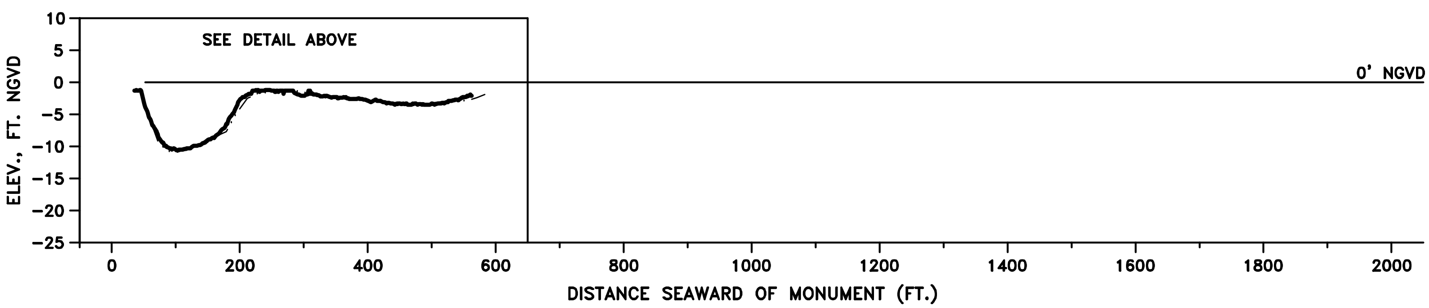
HUMISTON & MOORE ENGINEERS
COASTAL ENGINEERING DESIGN AND PERMITTING

WIGGINS PASS INLET MAINTENANCE CHANNEL CROSS SECTIONS		
FOR: COLLIER COUNTY		
DATE:07/14/04	FILE:11-054-XS	SCALE:1"=300'
JOB FILE:11054	DATUM:NGVD	FIGURE:

5679 STRAND COURT
NAPLES, FL 34110
FAX: 239 594 2025
PHONE: 239 594 2021

CHANNEL CROSS SECTION: C11



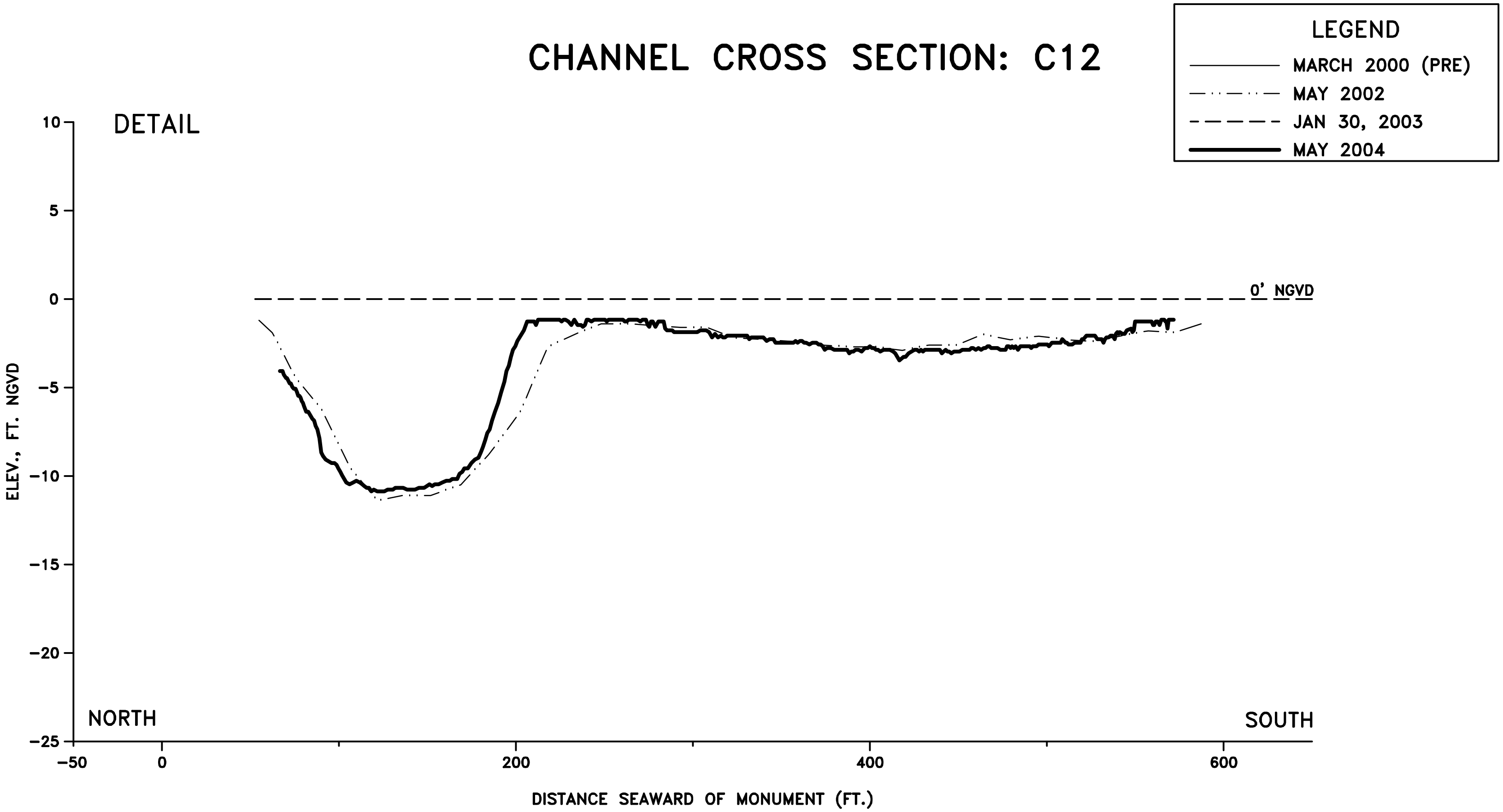


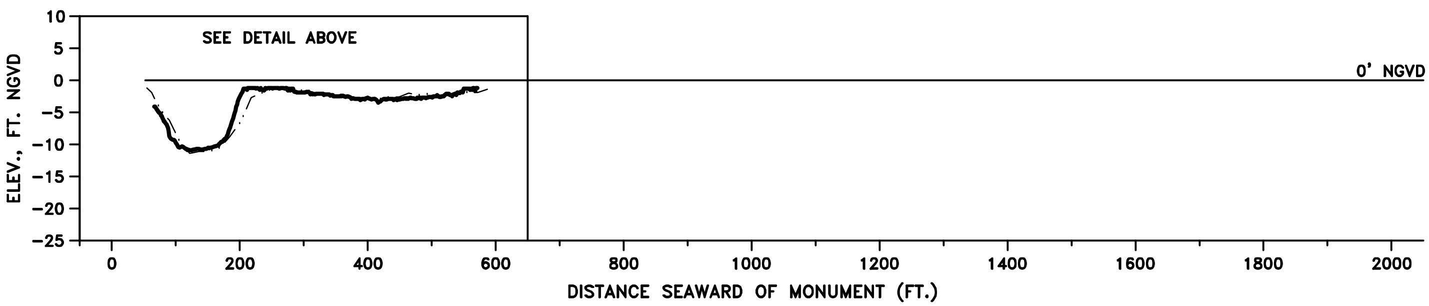
HUMISTON & MOORE ENGINEERS
COASTAL ENGINEERING DESIGN AND PERMITTING

WIGGINS PASS INLET MAINTENANCE CHANNEL CROSS SECTIONS		
FOR: COLLIER COUNTY		
DATE:07/14/04	FILE:11-054-XS	SCALE:1"=300'
JOB FILE:11054	DATUM:NGVD	FIGURE:

5679 STRAND COURT
NAPLES, FL 34110
FAX: 239 594 2025
PHONE: 239 594 2021

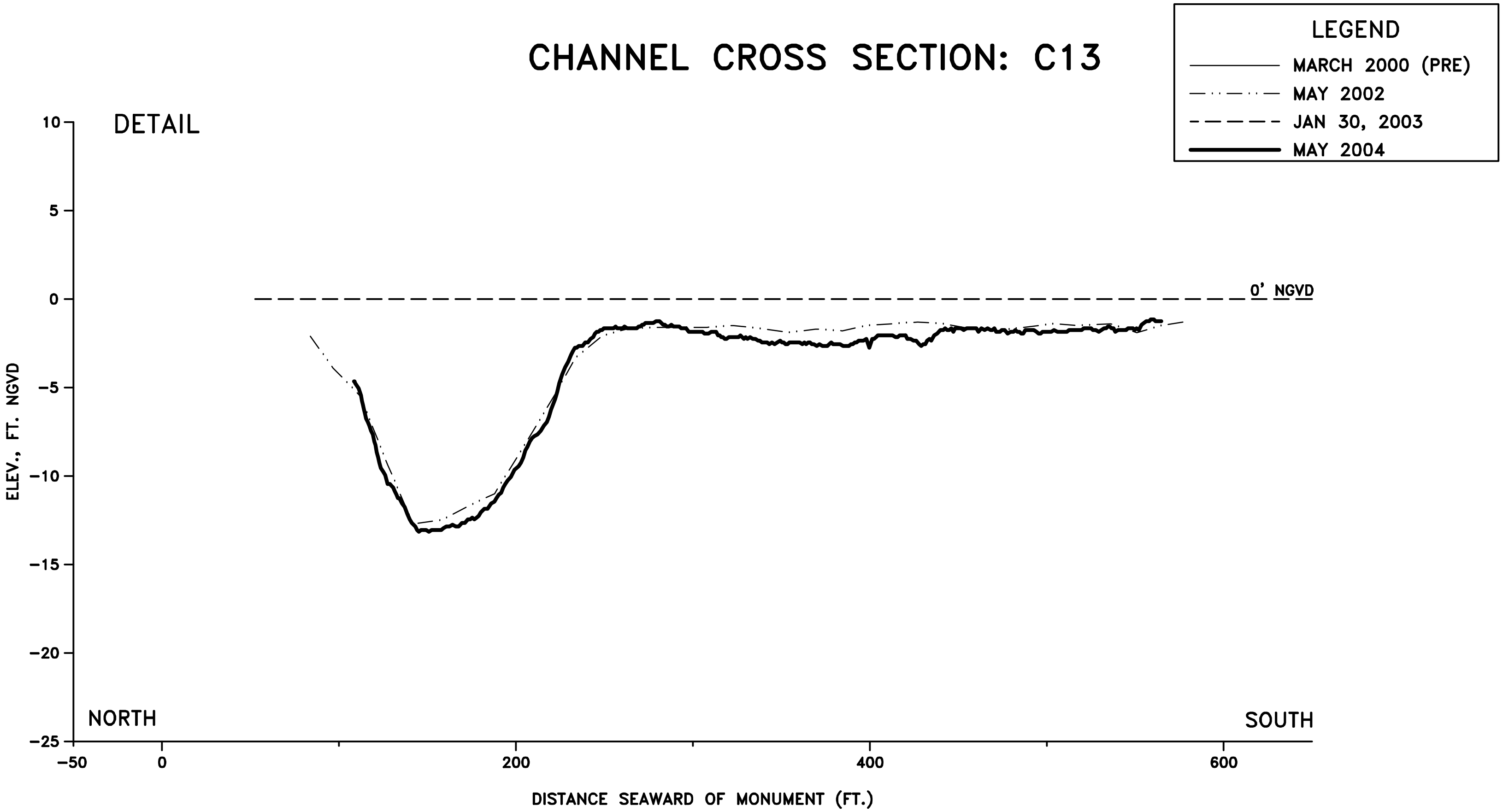
CHANNEL CROSS SECTION: C12

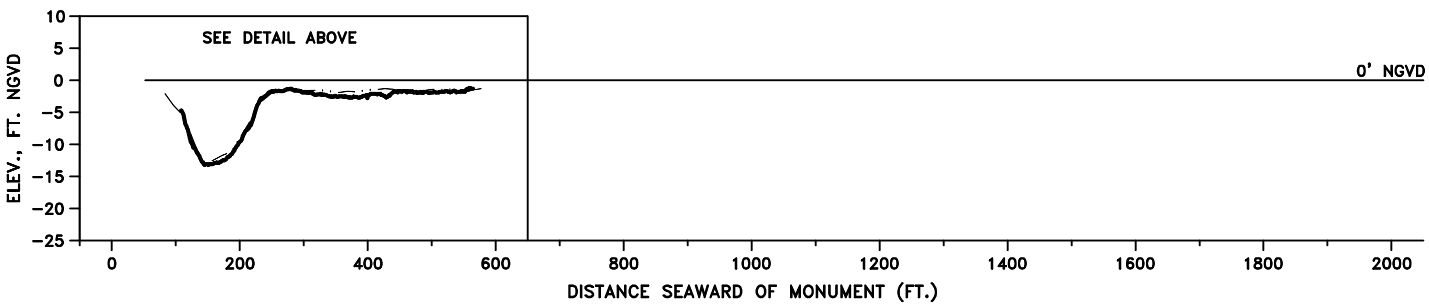




HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	WIGGINS PASS INLET MAINTENANCE CHANNEL CROSS SECTIONS			5679 STRAND COURT NAPLES, FL 34110 FAX: 239 594 2025 PHONE: 239 594 2021
	FOR: COLLIER COUNTY			
	DATE:07/14/04	FILE:11-054-XS	SCALE:1"=300'	
	JOB FILE:11054	DATUM:NGVD	FIGURE:	

CHANNEL CROSS SECTION: C13



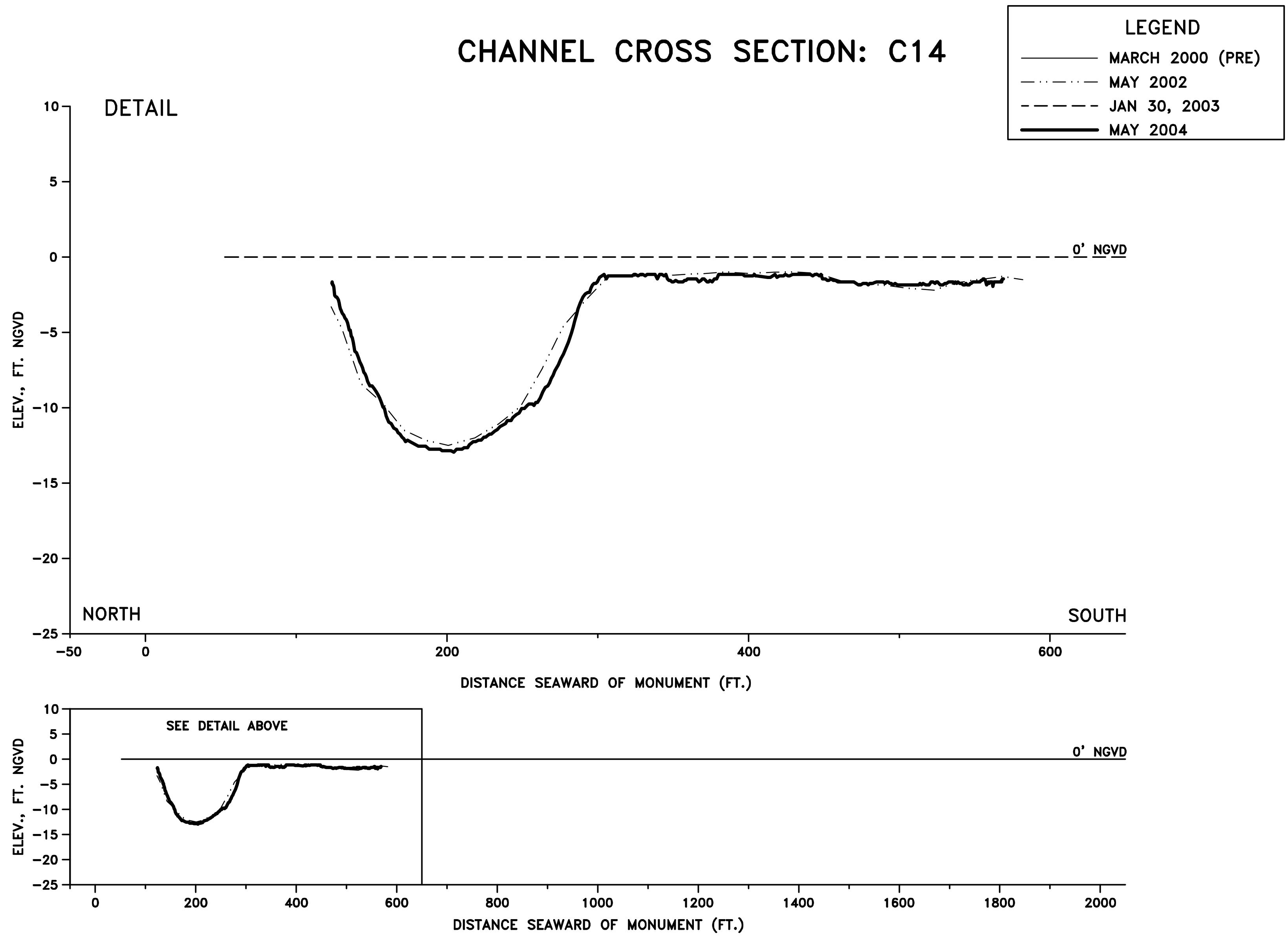


HUMISTON & MOORE ENGINEERS
COASTAL ENGINEERING DESIGN AND PERMITTING

WIGGINS PASS INLET MAINTENANCE CHANNEL CROSS SECTIONS		
FOR: COLLIER COUNTY		
DATE:07/14/04	FILE:11-054-XS	SCALE:1"=300'
JOB FILE:11054	DATUM:NGVD	FIGURE:

5679 STRAND COURT
NAPLES, FL 34110
FAX: 239 594 2025
PHONE: 239 594 2021

CHANNEL CROSS SECTION: C14

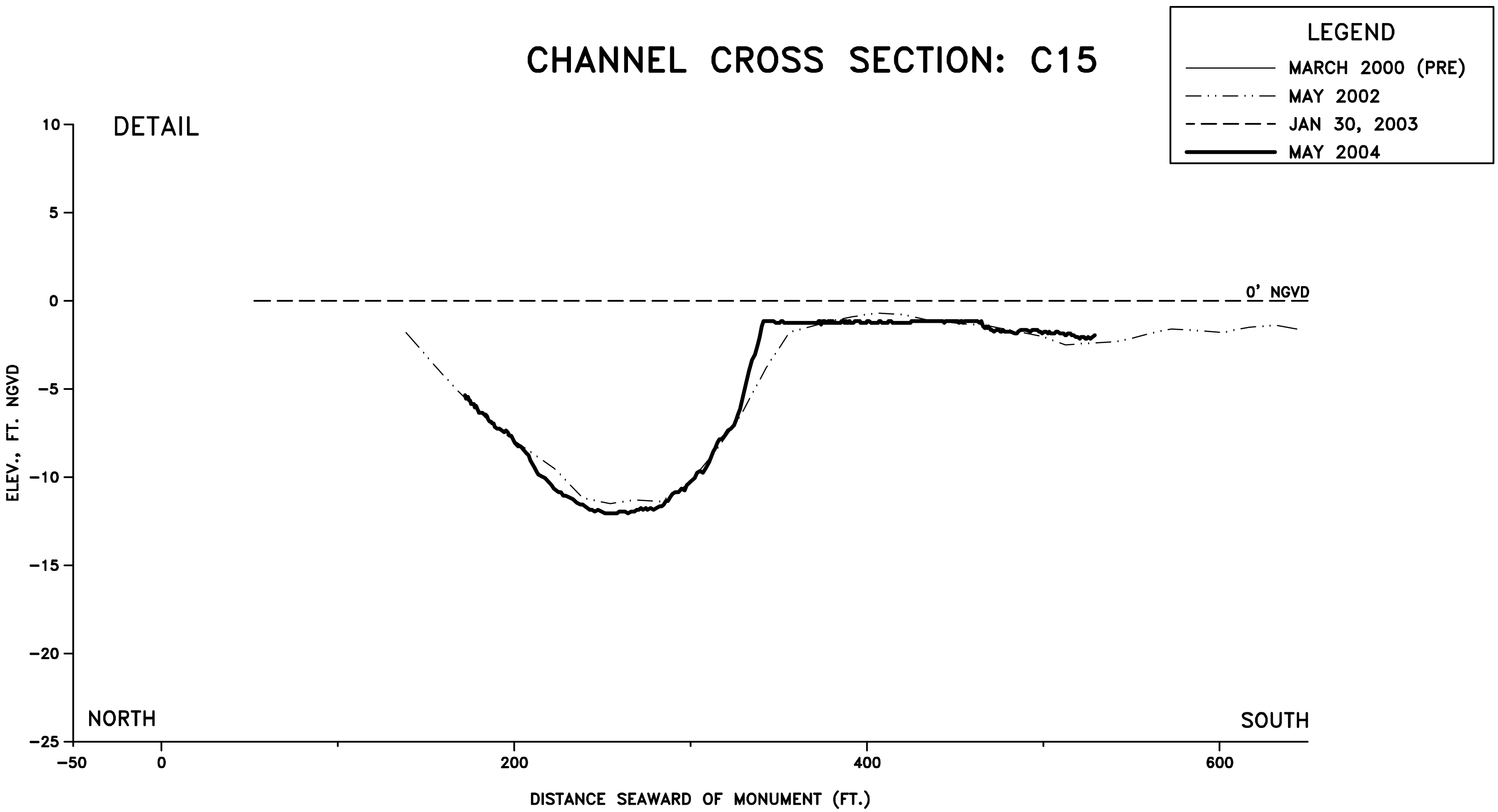


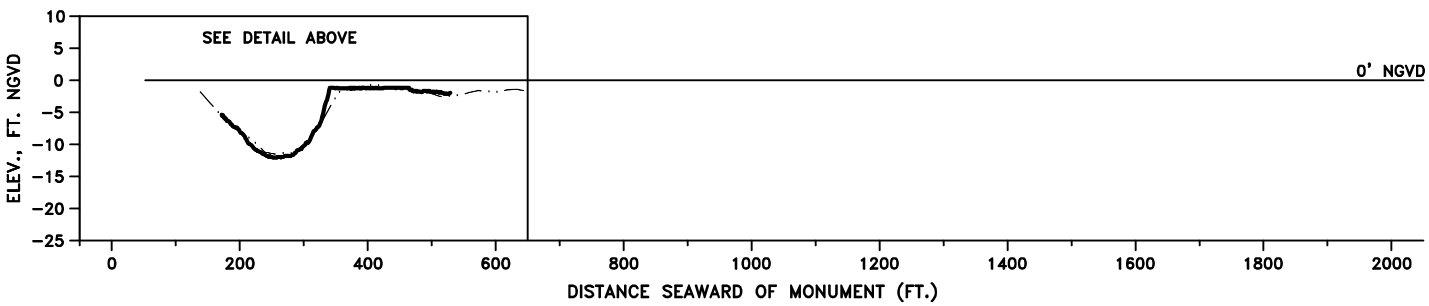
HUMISTON & MOORE ENGINEERS
COASTAL ENGINEERING DESIGN AND PERMITTING

WIGGINS PASS INLET MAINTENANCE CHANNEL CROSS SECTIONS		
FOR: COLLIER COUNTY		
DATE:07/14/04	FILE:11-054-XS	SCALE:1"=300'
JOB FILE:11054	DATUM:NGVD	FIGURE:

5679 STRAND COURT
NAPLES, FL 34110
FAX: 239 594 2025
PHONE: 239 594 2021

CHANNEL CROSS SECTION: C15



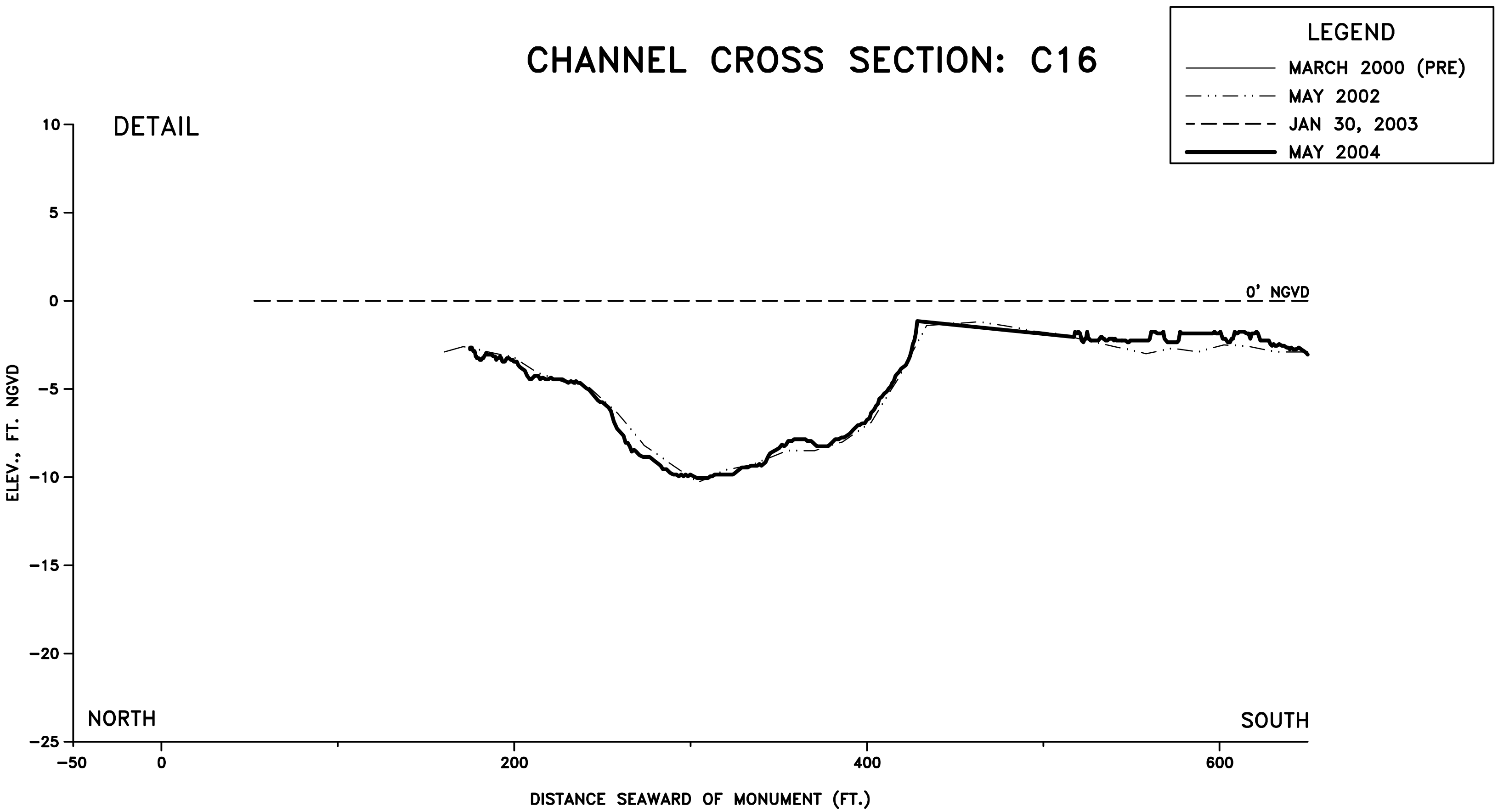


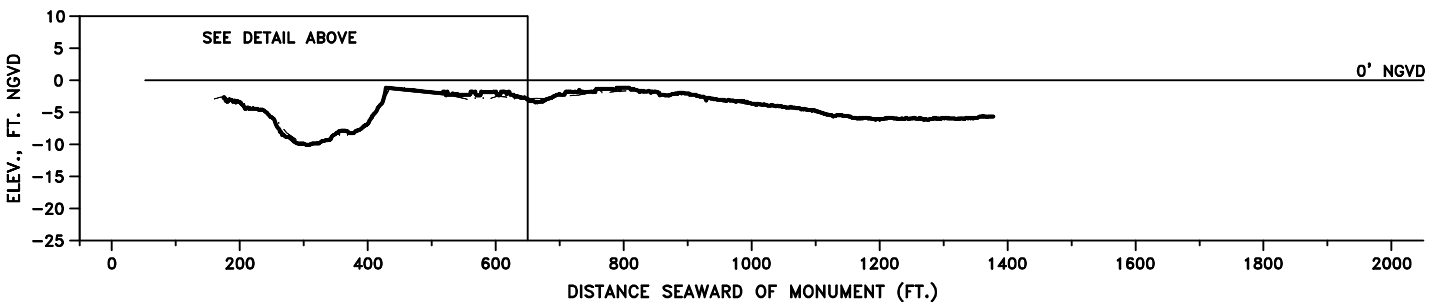
HUMISTON & MOORE ENGINEERS
COASTAL ENGINEERING DESIGN AND PERMITTING

WIGGINS PASS INLET MAINTENANCE CHANNEL CROSS SECTIONS		
FOR: COLLIER COUNTY		
DATE:07/14/04	FILE:11-054-XS	SCALE:1"=300'
JOB FILE:11054	DATUM:NGVD	FIGURE:

5679 STRAND COURT
NAPLES, FL 34110
FAX: 239 594 2025
PHONE: 239 594 2021

CHANNEL CROSS SECTION: C16



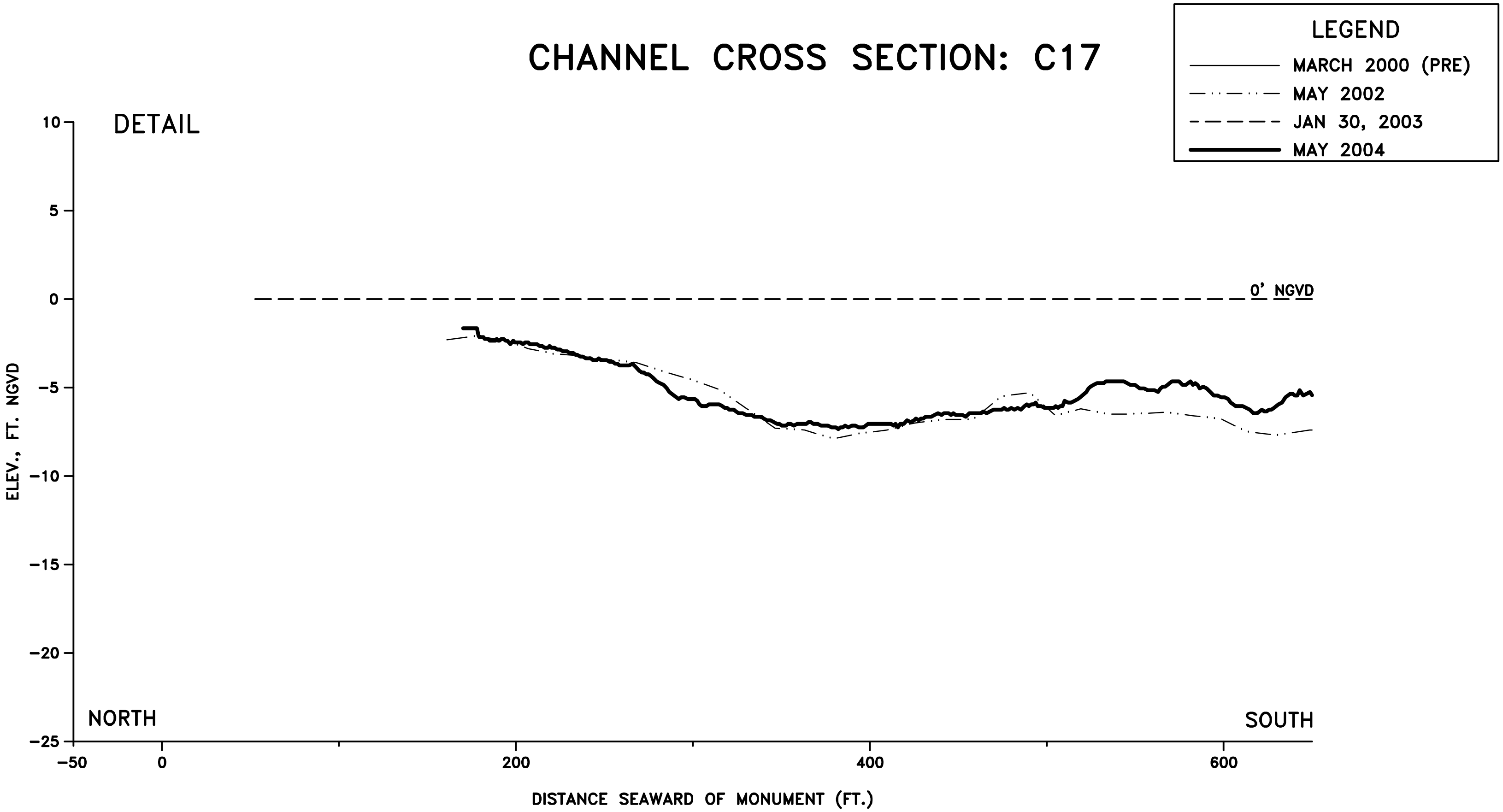


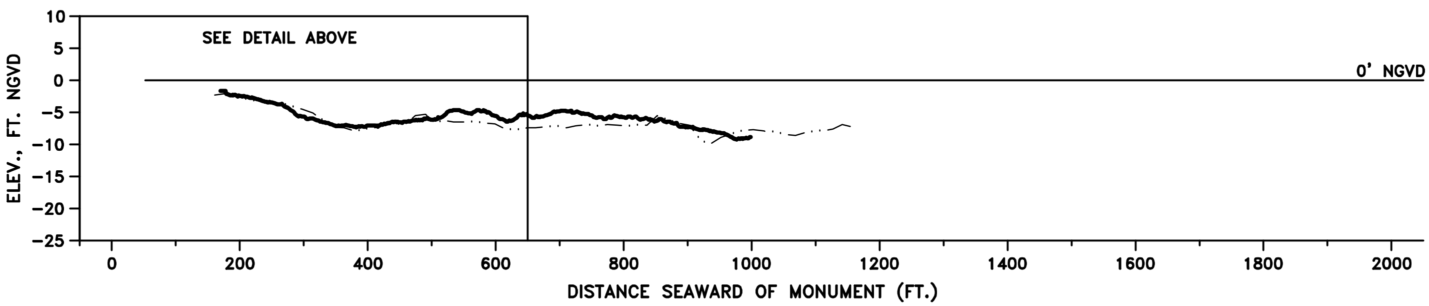
HUMISTON & MOORE ENGINEERS
COASTAL ENGINEERING DESIGN AND PERMITTING

WIGGINS PASS INLET MAINTENANCE CHANNEL CROSS SECTIONS		
FOR: COLLIER COUNTY		
DATE:07/14/04	FILE:11-054-XS	SCALE:1"=300'
JOB FILE:11054	DATUM:NGVD	FIGURE:

5679 STRAND COURT
NAPLES, FL 34110
FAX: 239 594 2025
PHONE: 239 594 2021

CHANNEL CROSS SECTION: C17

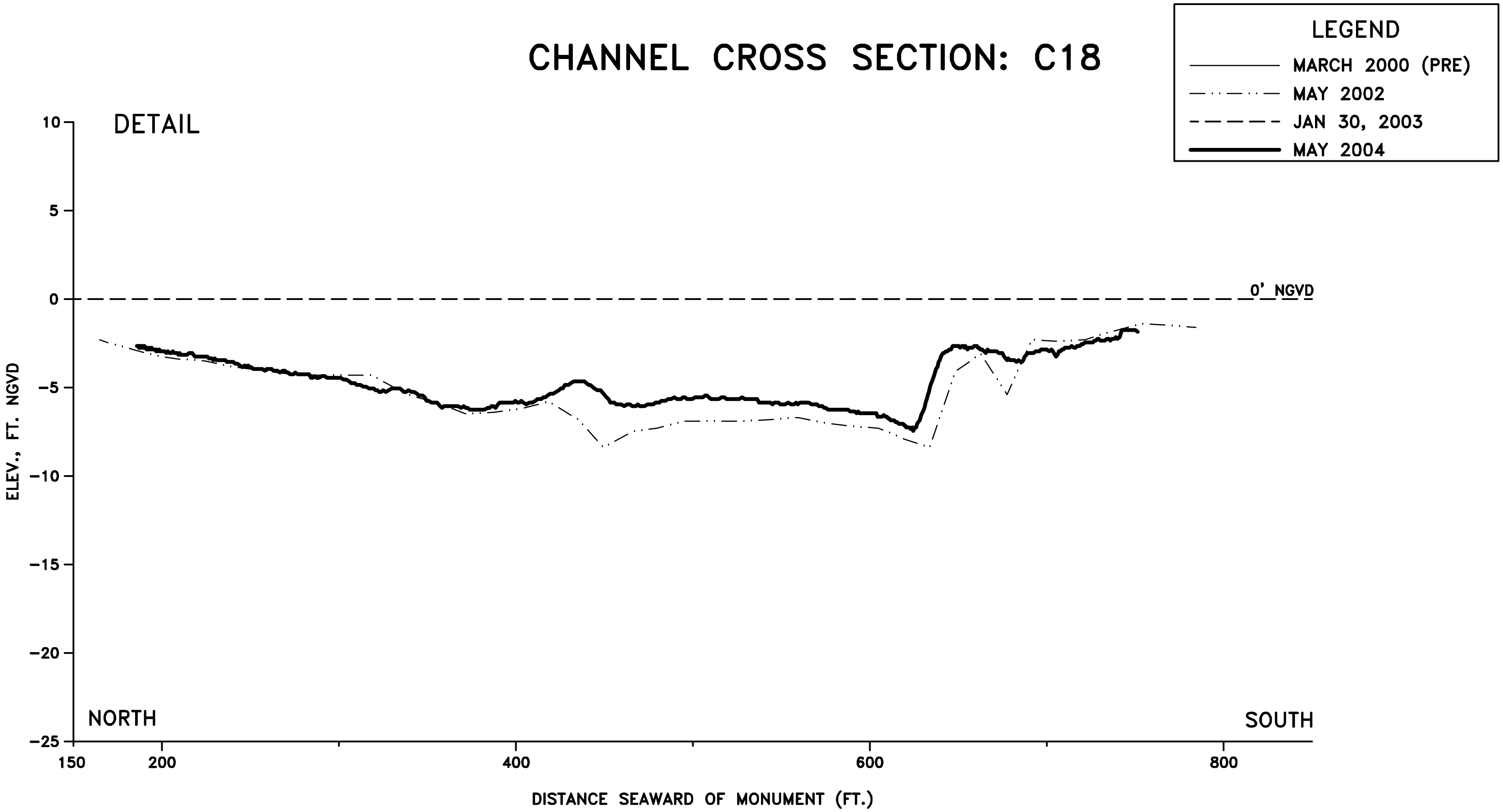


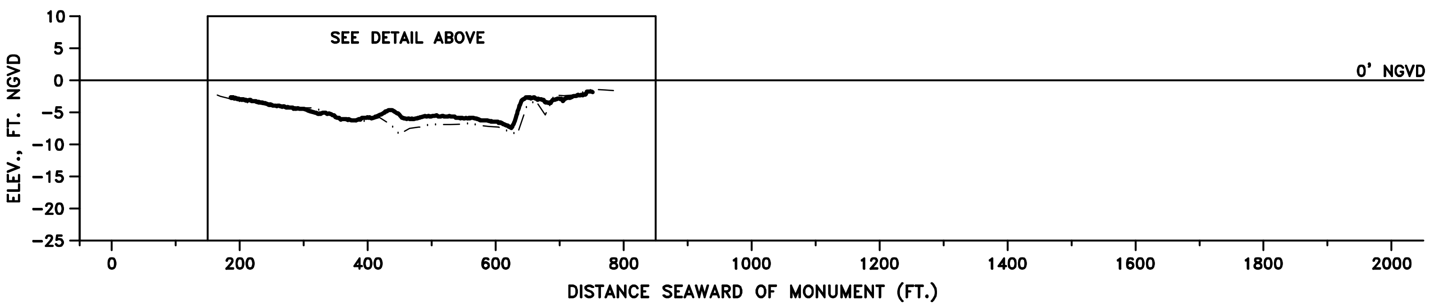


HUMISTON & MOORE ENGINEERS
COASTAL ENGINEERING DESIGN AND PERMITTING

WIGGINS PASS INLET MAINTENANCE CHANNEL CROSS SECTIONS		
FOR: COLLIER COUNTY		
DATE:07/14/04	FILE:11-054-XS	SCALE:1"=300'
JOB FILE:11054	DATUM:NGVD	FIGURE:

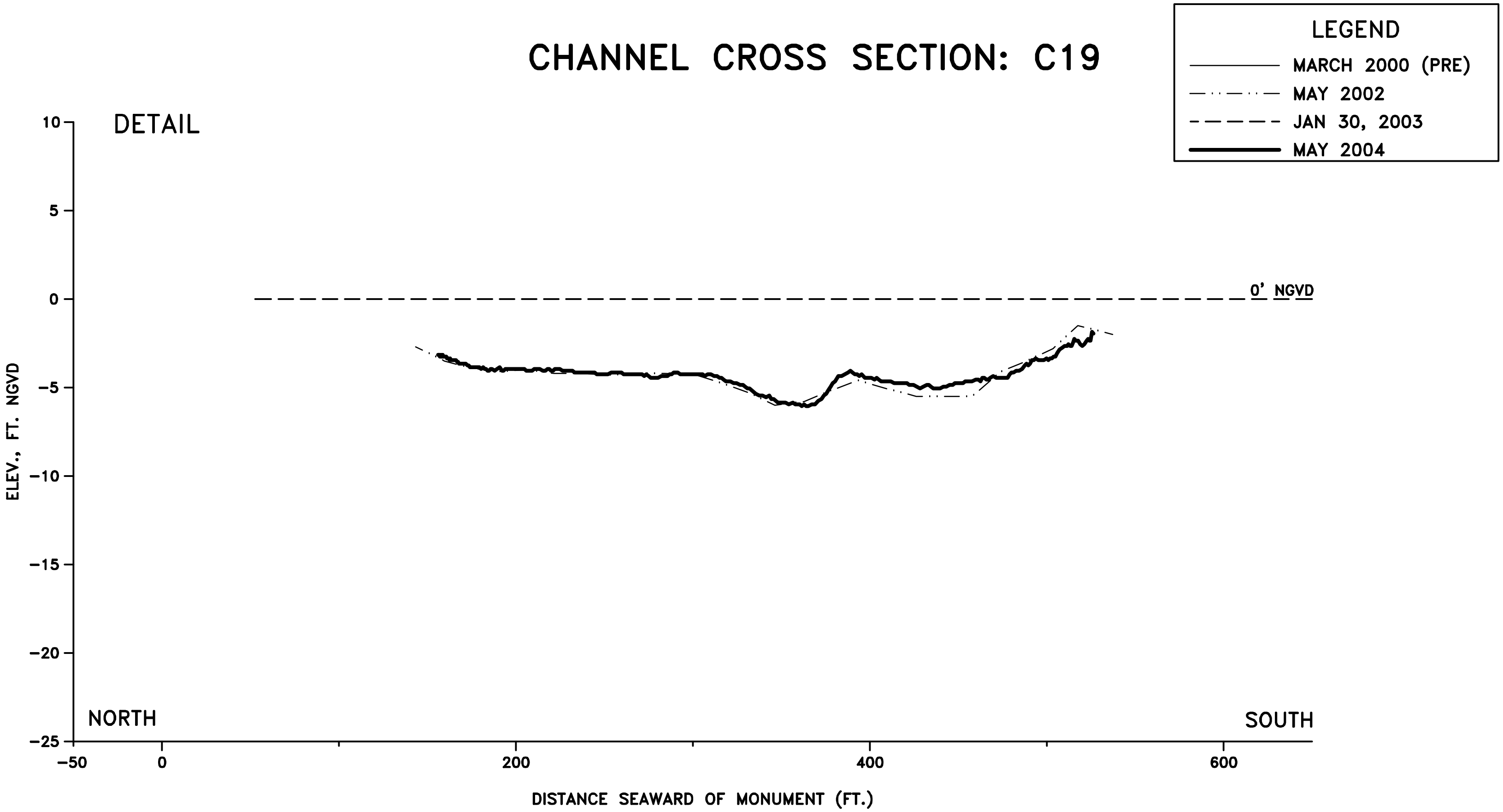
5679 STRAND COURT
NAPLES, FL 34110
FAX: 239 594 2025
PHONE: 239 594 2021

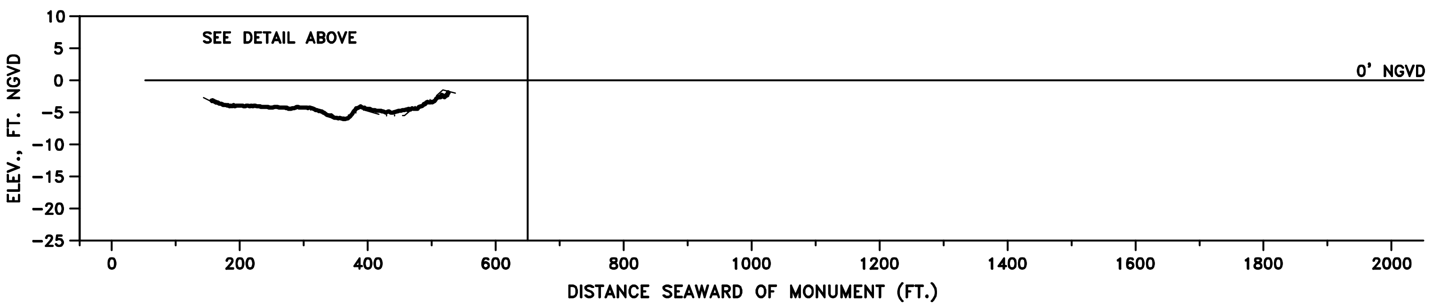




HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	WIGGINS PASS INLET MAINTENANCE CHANNEL CROSS SECTIONS		5679 STRAND COURT NAPLES, FL 34110 FAX: 239 594 2025 PHONE: 239 594 2021
	FOR: COLLIER COUNTY		
	DATE:07/14/04	FILE:11-054-XS	SCALE:1"=300'
	JOB FILE:11054	DATUM:NGVD	FIGURE:

CHANNEL CROSS SECTION: C19





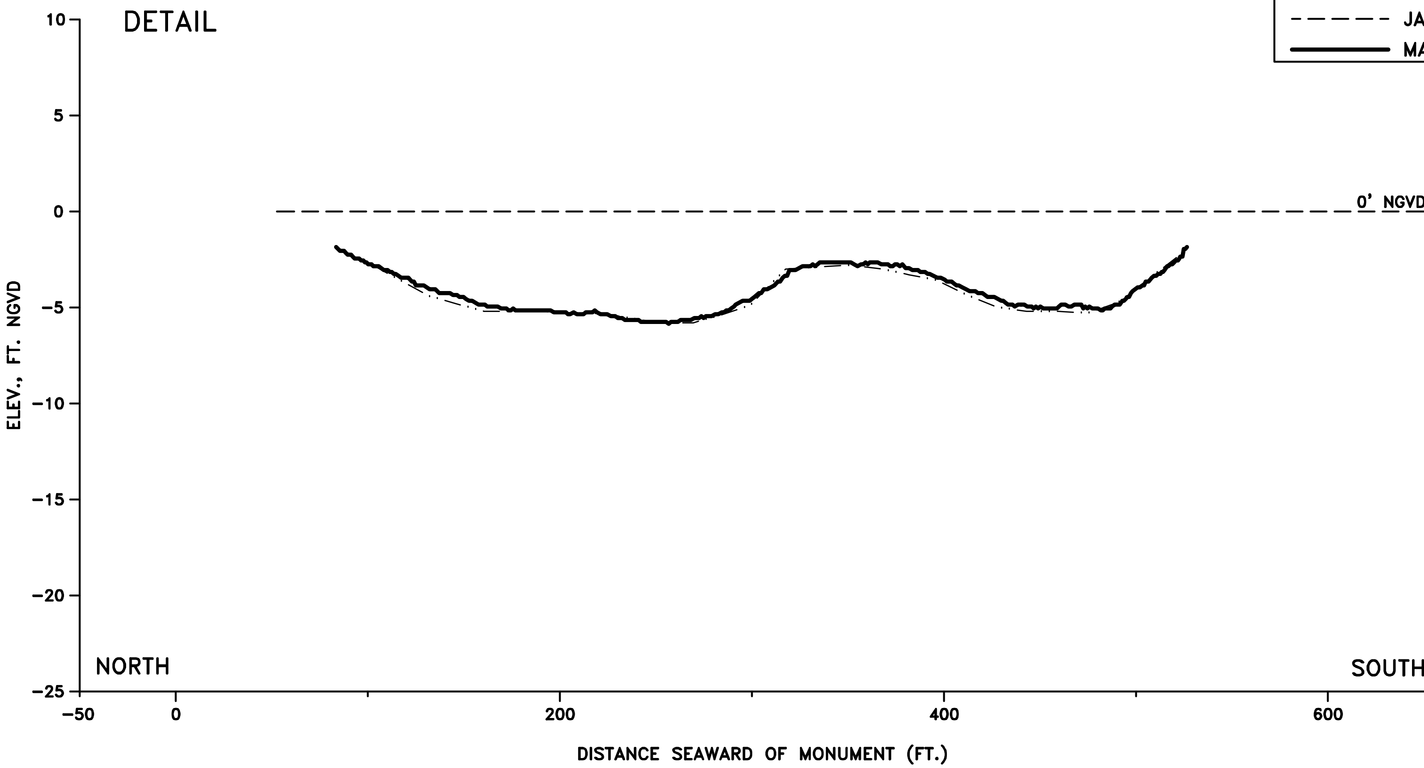
HUMISTON & MOORE ENGINEERS
COASTAL ENGINEERING DESIGN AND PERMITTING

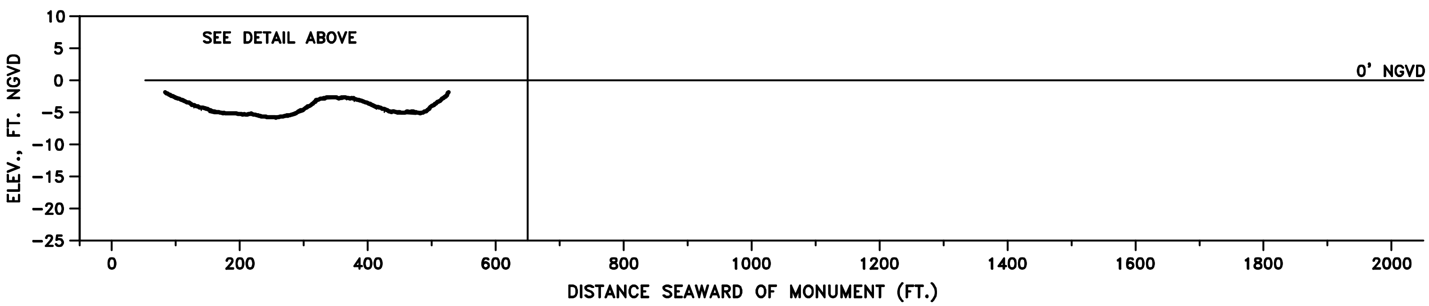
WIGGINS PASS INLET MAINTENANCE CHANNEL CROSS SECTIONS		
FOR: COLLIER COUNTY		
DATE:07/14/04	FILE:11-054-XS	SCALE:1"=300'
JOB FILE:11054	DATUM:NGVD	FIGURE:

5679 STRAND COURT
NAPLES, FL 34110
FAX: 239 594 2025
PHONE: 239 594 2021

CHANNEL CROSS SECTION: C20

LEGEND
- MARCH 2000 (PRE)
- MAY 2002
- JAN 30, 2003
- MAY 2004



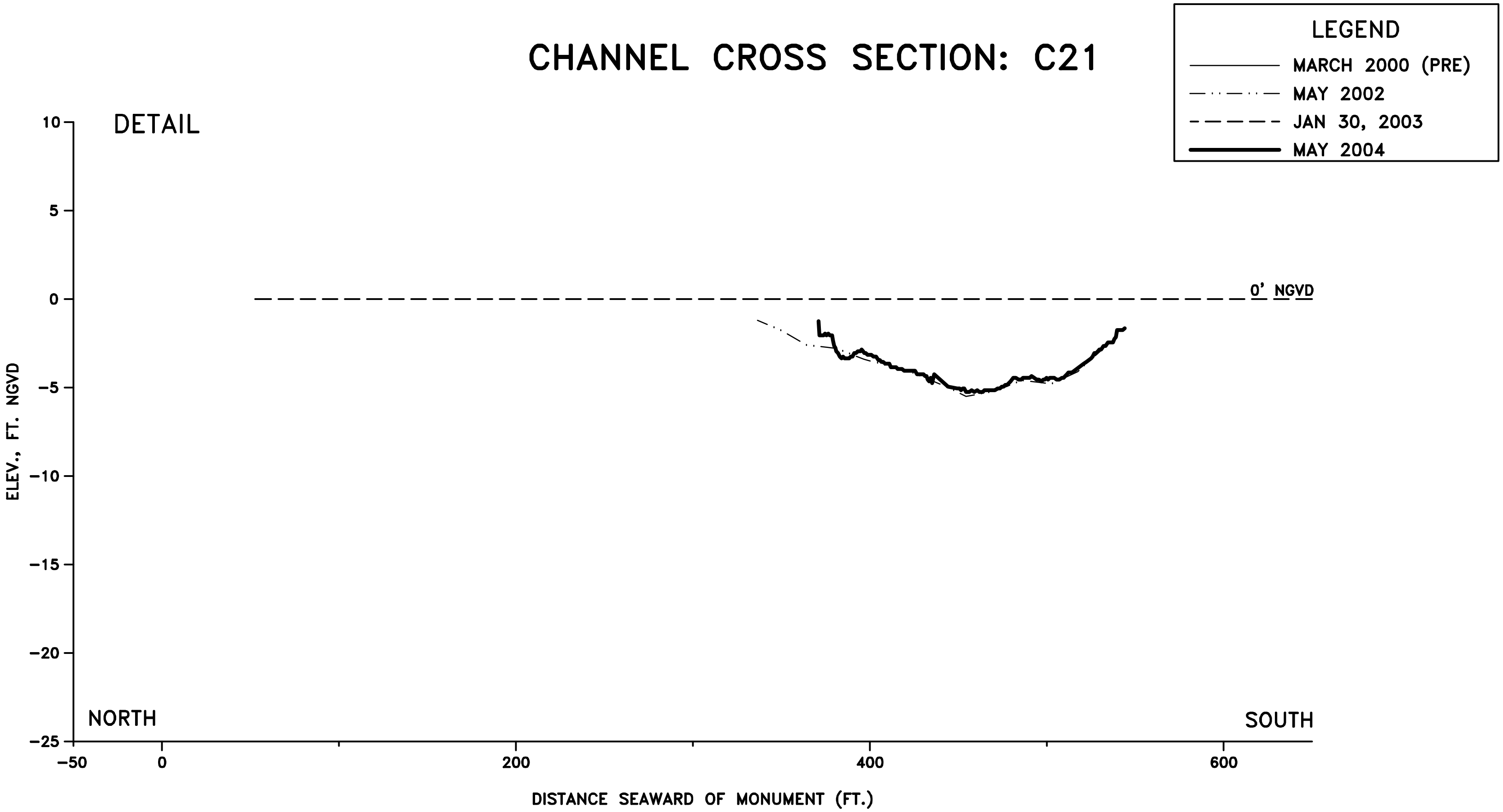


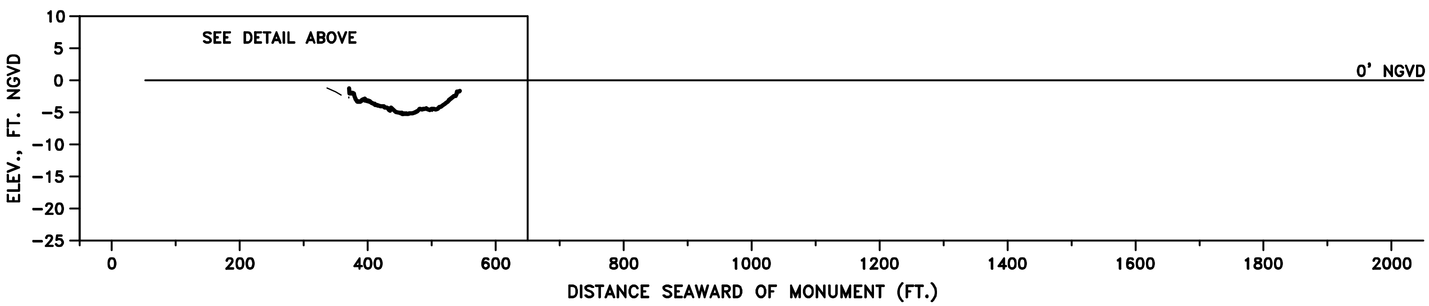
HUMISTON & MOORE ENGINEERS
COASTAL ENGINEERING DESIGN AND PERMITTING

WIGGINS PASS INLET MAINTENANCE CHANNEL CROSS SECTIONS		
FOR: COLLIER COUNTY		
DATE:07/14/04	FILE:11-054-XS	SCALE:1"=300'
JOB FILE:11054	DATUM:NGVD	FIGURE:

5679 STRAND COURT
NAPLES, FL 34110
FAX: 239 594 2025
PHONE: 239 594 2021

CHANNEL CROSS SECTION: C21

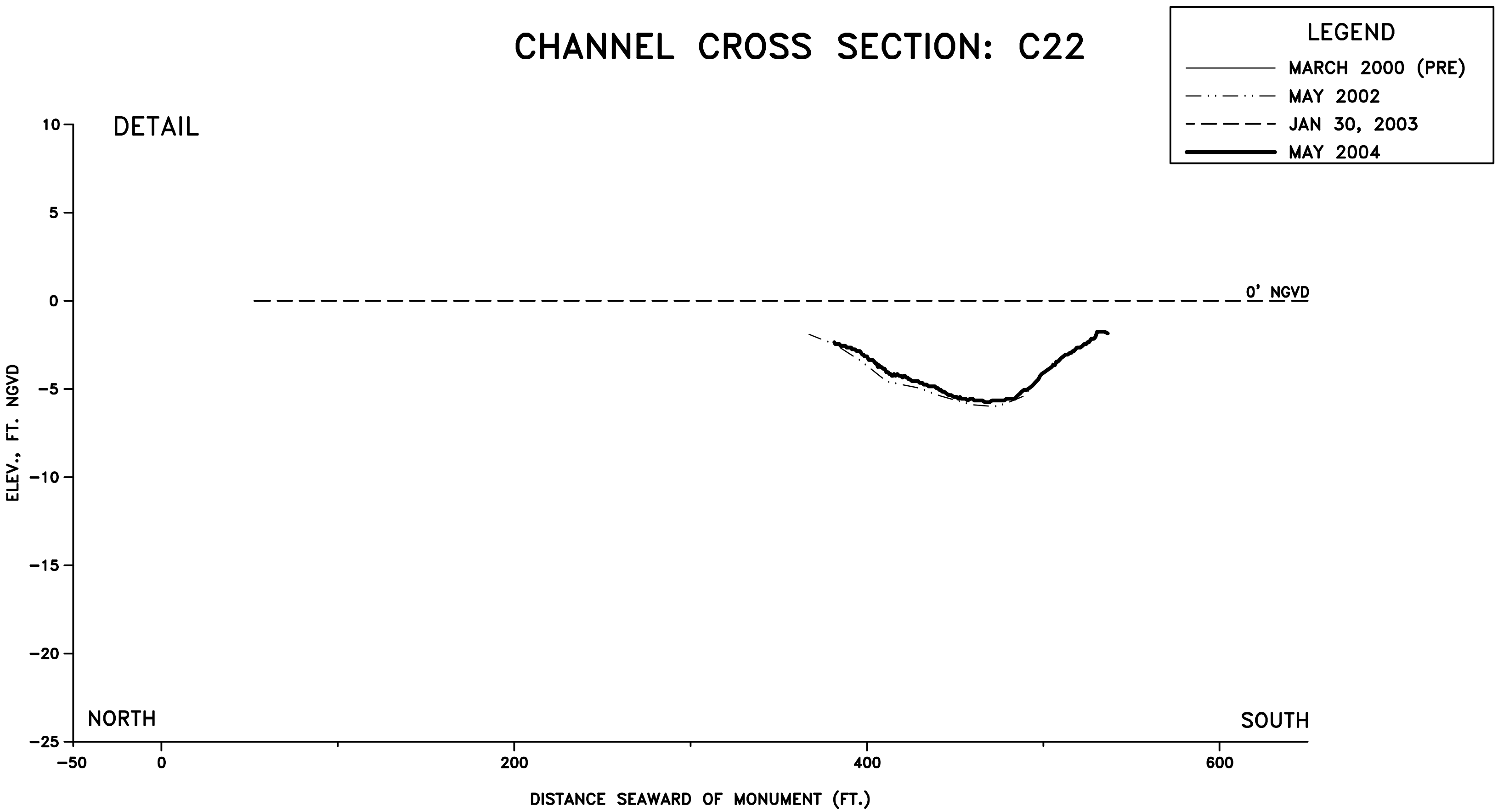


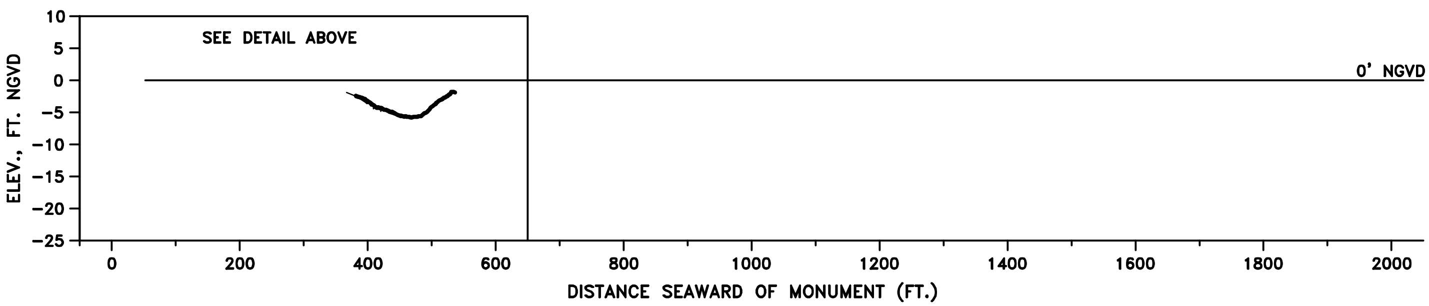


HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	WIGGINS PASS INLET MAINTENANCE CHANNEL CROSS SECTIONS		
	FOR: COLLIER COUNTY		
	DATE:07/14/04	FILE:11-054-XS	SCALE:1"=300'
	JOB FILE:11054	DATUM:NGVD	FIGURE:

5679 STRAND COURT
NAPLES, FL 34110
FAX: 239 594 2025
PHONE: 239 594 2021

CHANNEL CROSS SECTION: C22



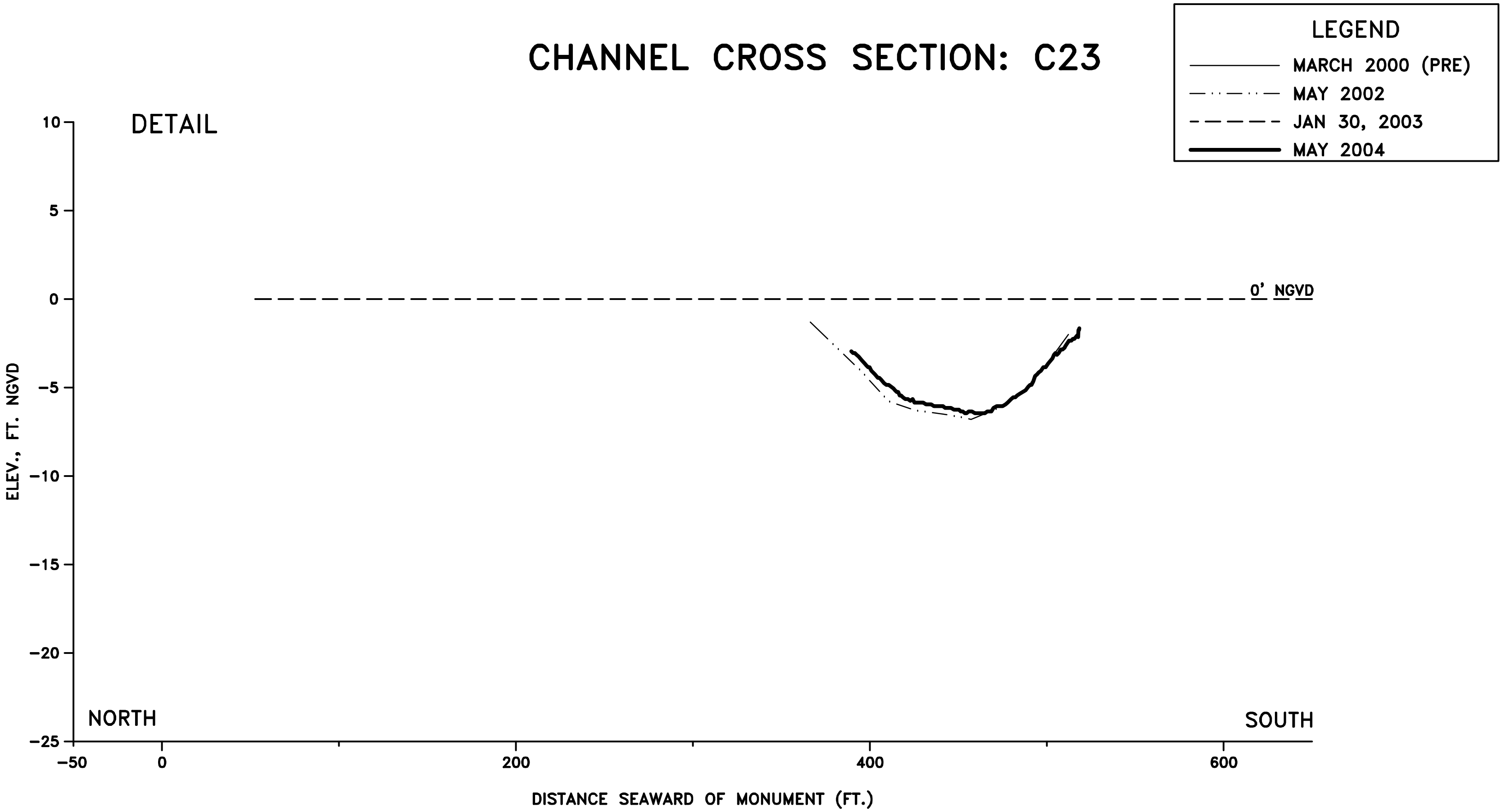


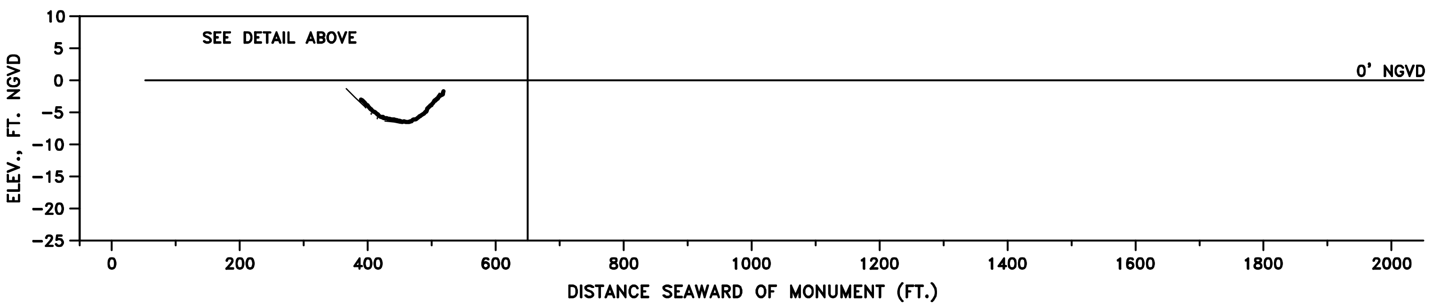
HUMISTON & MOORE ENGINEERS
COASTAL ENGINEERING DESIGN AND PERMITTING

WIGGINS PASS INLET MAINTENANCE CHANNEL CROSS SECTIONS		
FOR: COLLIER COUNTY		
DATE:07/14/04	FILE:11-054-XS	SCALE:1"=300'
JOB FILE:11054	DATUM:NGVD	FIGURE:

5679 STRAND COURT
NAPLES, FL 34110
FAX: 239 594 2025
PHONE: 239 594 2021

CHANNEL CROSS SECTION: C23



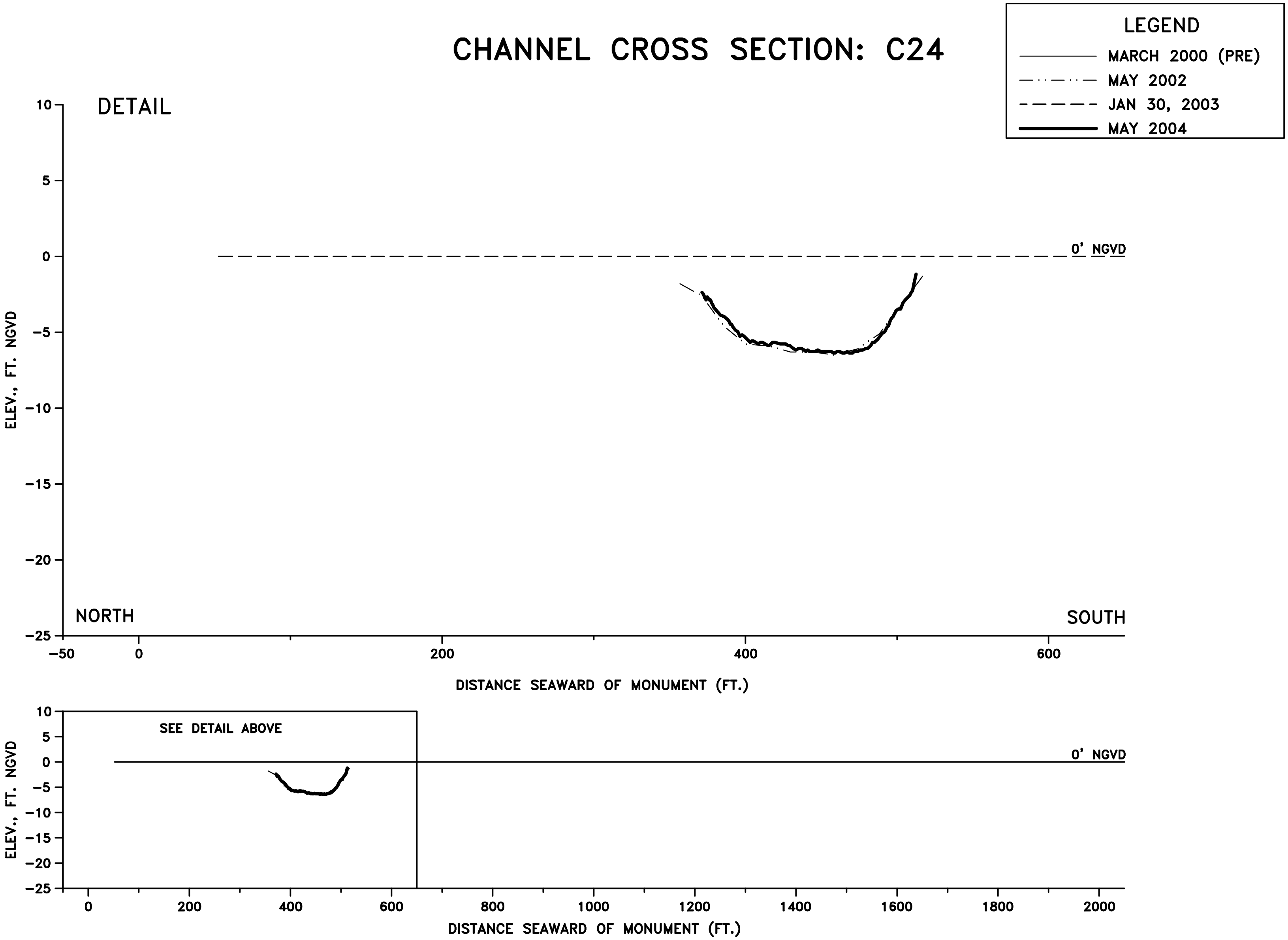


HUMISTON & MOORE ENGINEERS
COASTAL ENGINEERING DESIGN AND PERMITTING

WIGGINS PASS INLET MAINTENANCE CHANNEL CROSS SECTIONS		
FOR: COLLIER COUNTY		
DATE:07/14/04	FILE:11-054-XS	SCALE:1"=300'
JOB FILE:11054	DATUM:NGVD	FIGURE:

5679 STRAND COURT
NAPLES, FL 34110
FAX: 239 594 2025
PHONE: 239 594 2021

CHANNEL CROSS SECTION: C24

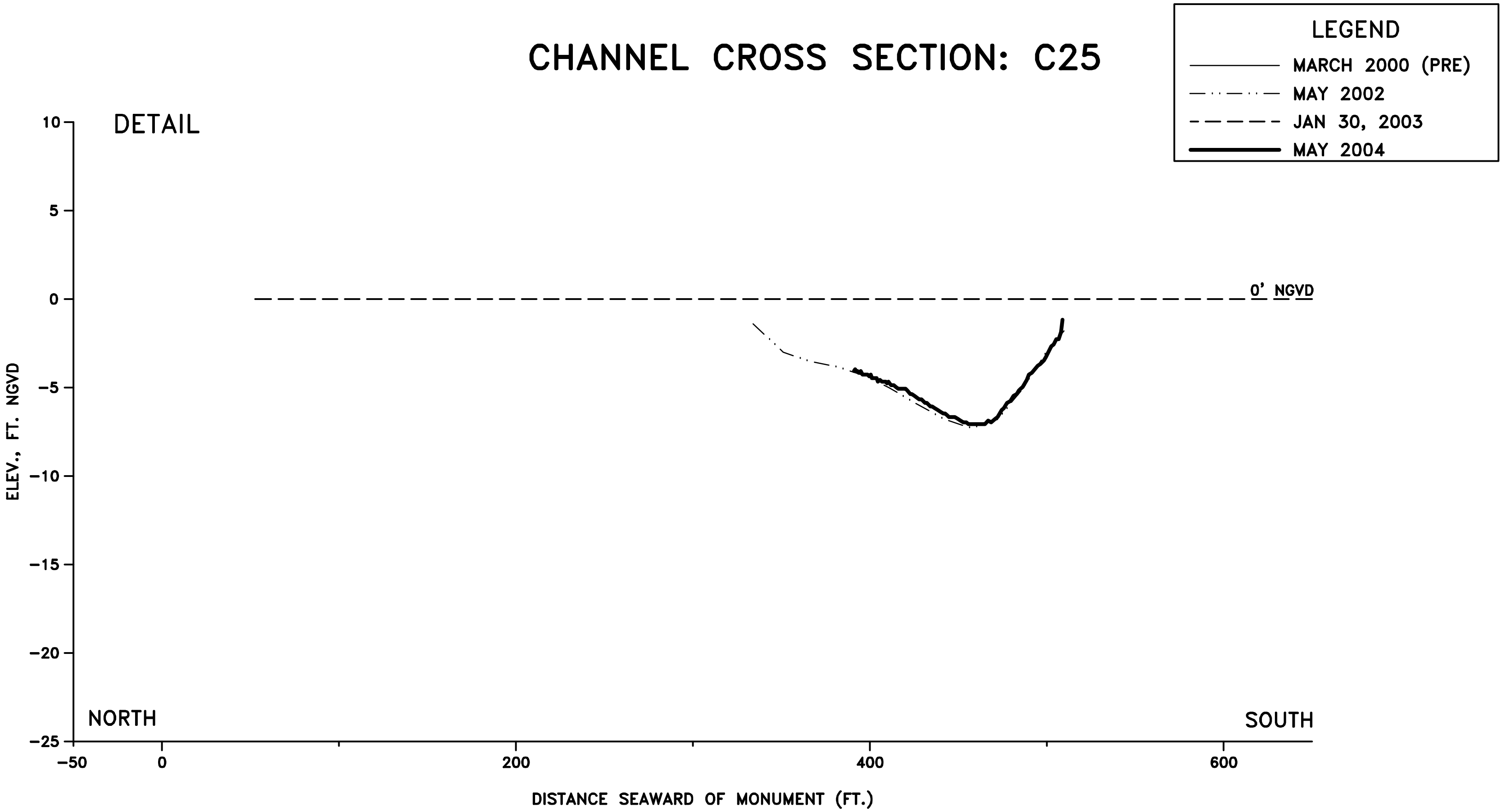


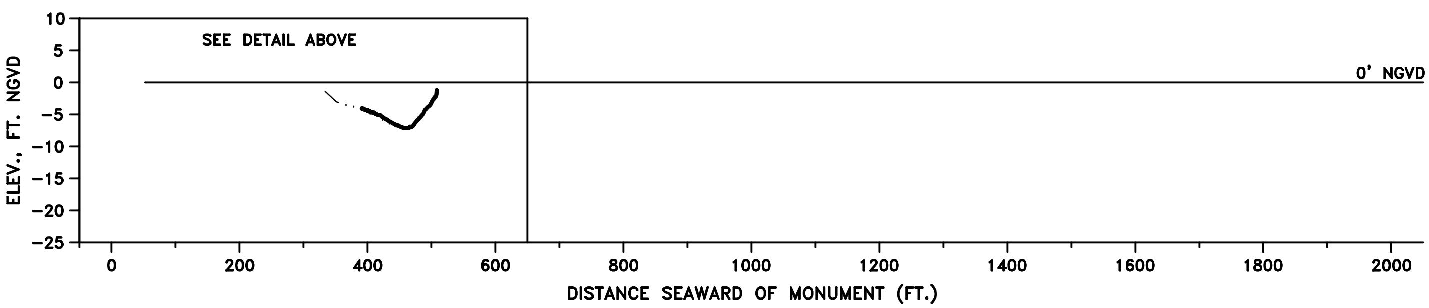
HUMISTON & MOORE ENGINEERS
COASTAL ENGINEERING DESIGN AND PERMITTING

WIGGINS PASS INLET MAINTENANCE CHANNEL CROSS SECTIONS		
FOR: COLLIER COUNTY		
DATE:07/14/04	FILE:11-054-XS	SCALE:1"=300'
JOB FILE:11054	DATUM:NGVD	FIGURE:

5679 STRAND COURT
NAPLES, FL 34110
FAX: 239 594 2025
PHONE: 239 594 2021

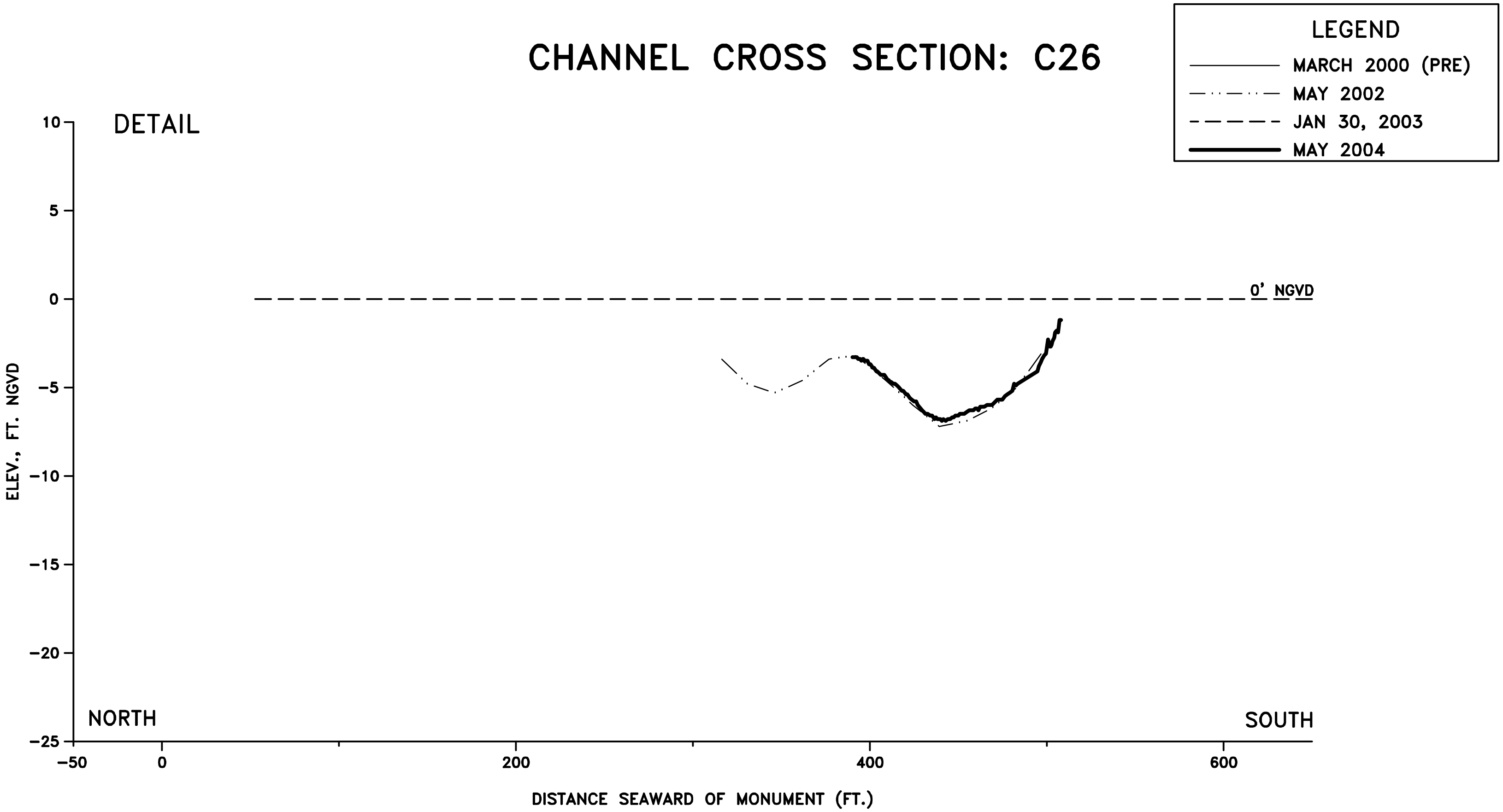
CHANNEL CROSS SECTION: C25

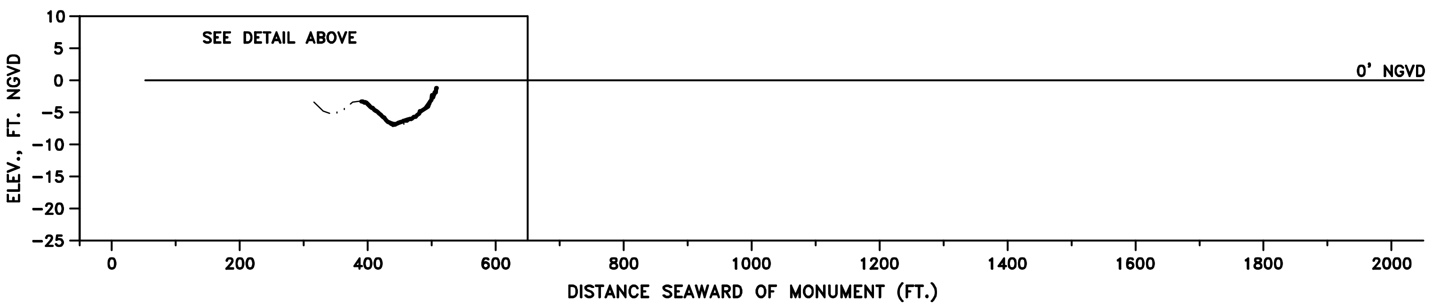




HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	WIGGINS PASS INLET MAINTENANCE CHANNEL CROSS SECTIONS		5679 STRAND COURT NAPLES, FL 34110 FAX: 239 594 2025 PHONE: 239 594 2021
	FOR: COLLIER COUNTY		
	DATE:07/14/04	FILE:11-054-XS	SCALE:1"=300'
	JOB FILE:11054	DATUM:NGVD	FIGURE:

CHANNEL CROSS SECTION: C26

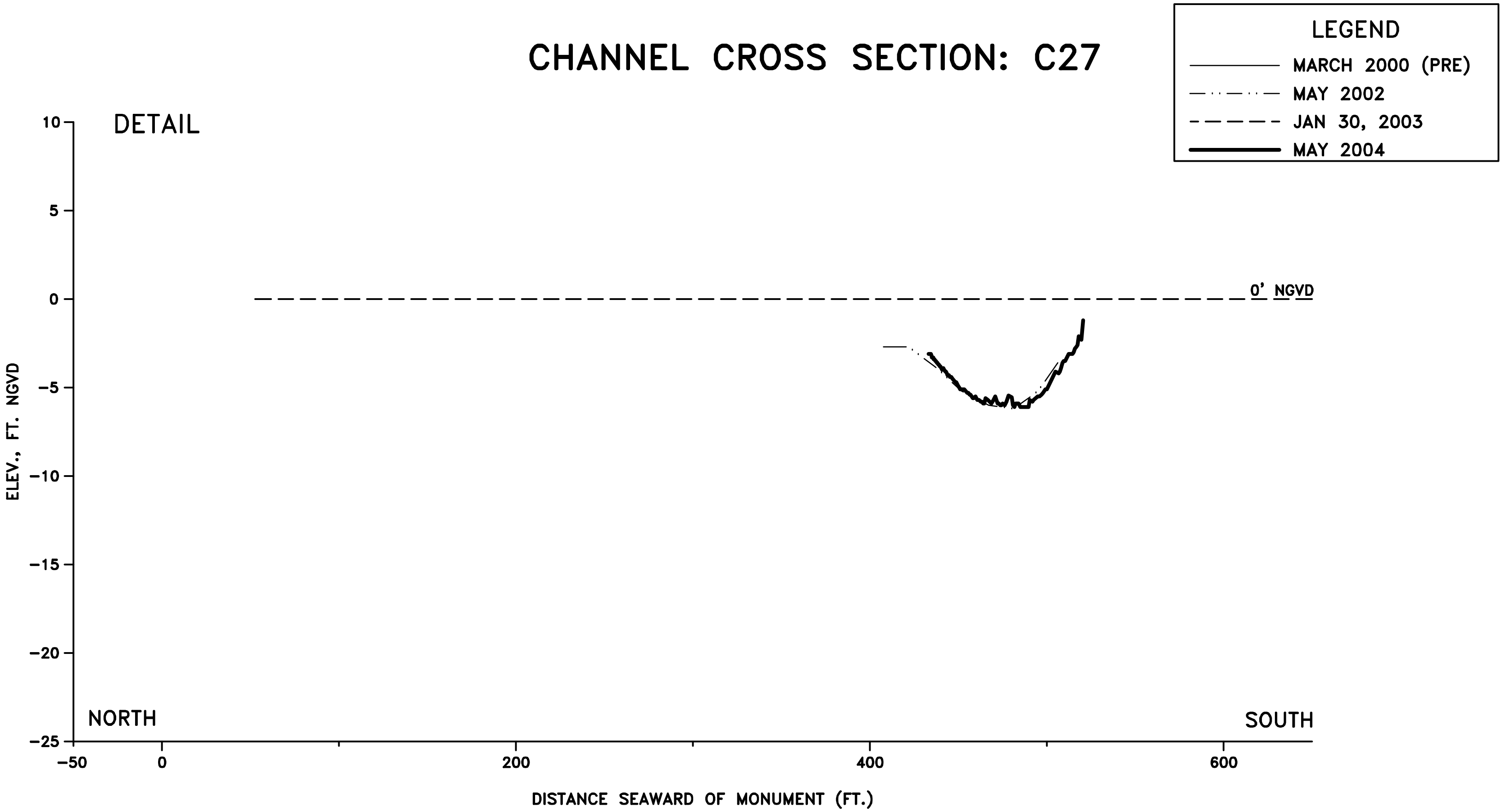


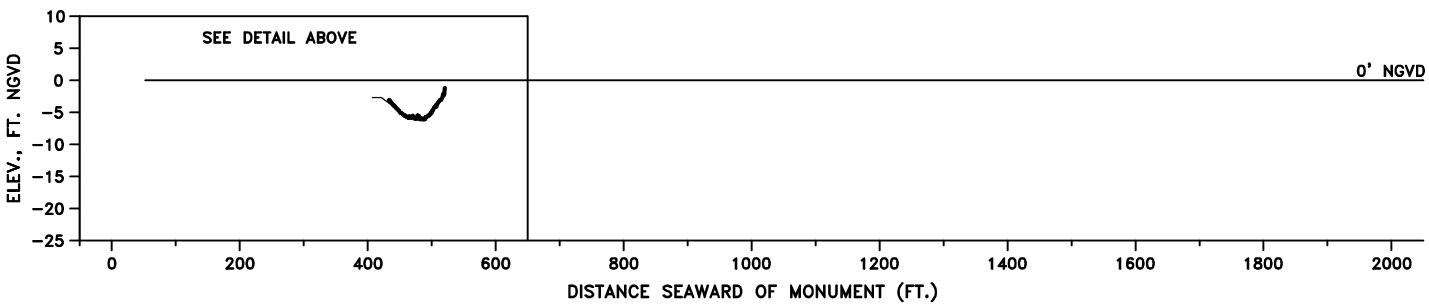


HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	WIGGINS PASS INLET MAINTENANCE CHANNEL CROSS SECTIONS		
	FOR: COLLIER COUNTY		
	DATE:07/14/04	FILE:11-054-XS	SCALE:1"=300'
	JOB FILE:11054	DATUM:NGVD	FIGURE:

5679 STRAND COURT
NAPLES, FL 34110
FAX: 239 594 2025
PHONE: 239 594 2021

CHANNEL CROSS SECTION: C27





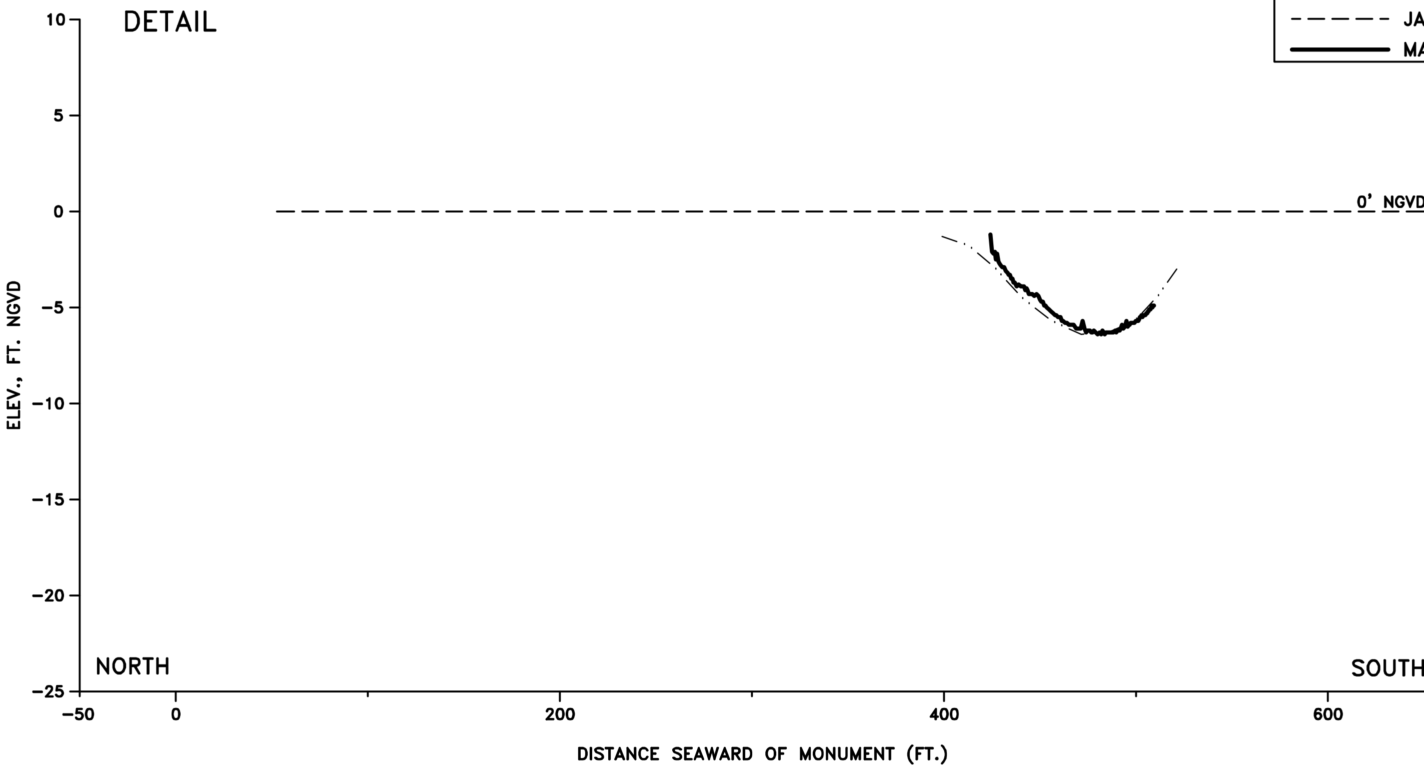
HUMISTON & MOORE ENGINEERS
COASTAL ENGINEERING DESIGN AND PERMITTING

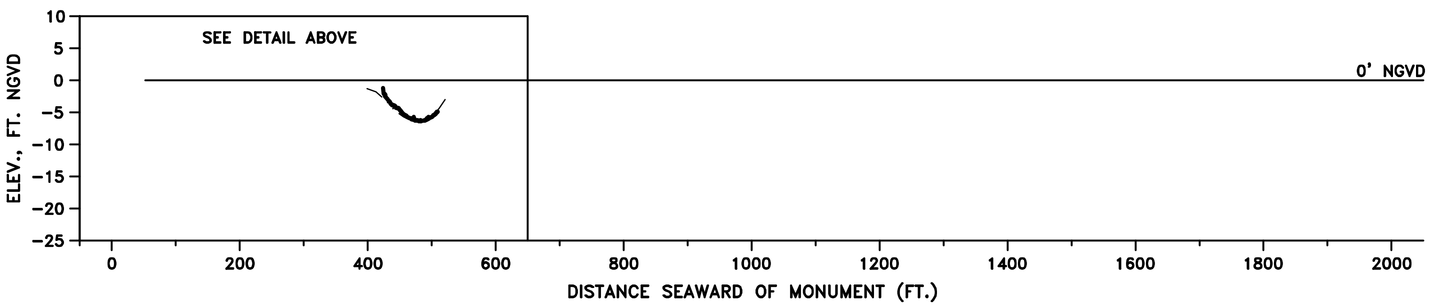
WIGGINS PASS INLET MAINTENANCE CHANNEL CROSS SECTIONS		
FOR: COLLIER COUNTY		
DATE:07/14/04	FILE:11-054-XS	SCALE:1"=300'
JOB FILE:11054	DATUM:NGVD	FIGURE:

5679 STRAND COURT
NAPLES, FL 34110
FAX: 239 594 2025
PHONE: 239 594 2021

CHANNEL CROSS SECTION: C28

LEGEND
MARCH 2000 (PRE)
MAY 2002
JAN 30, 2003
MAY 2004

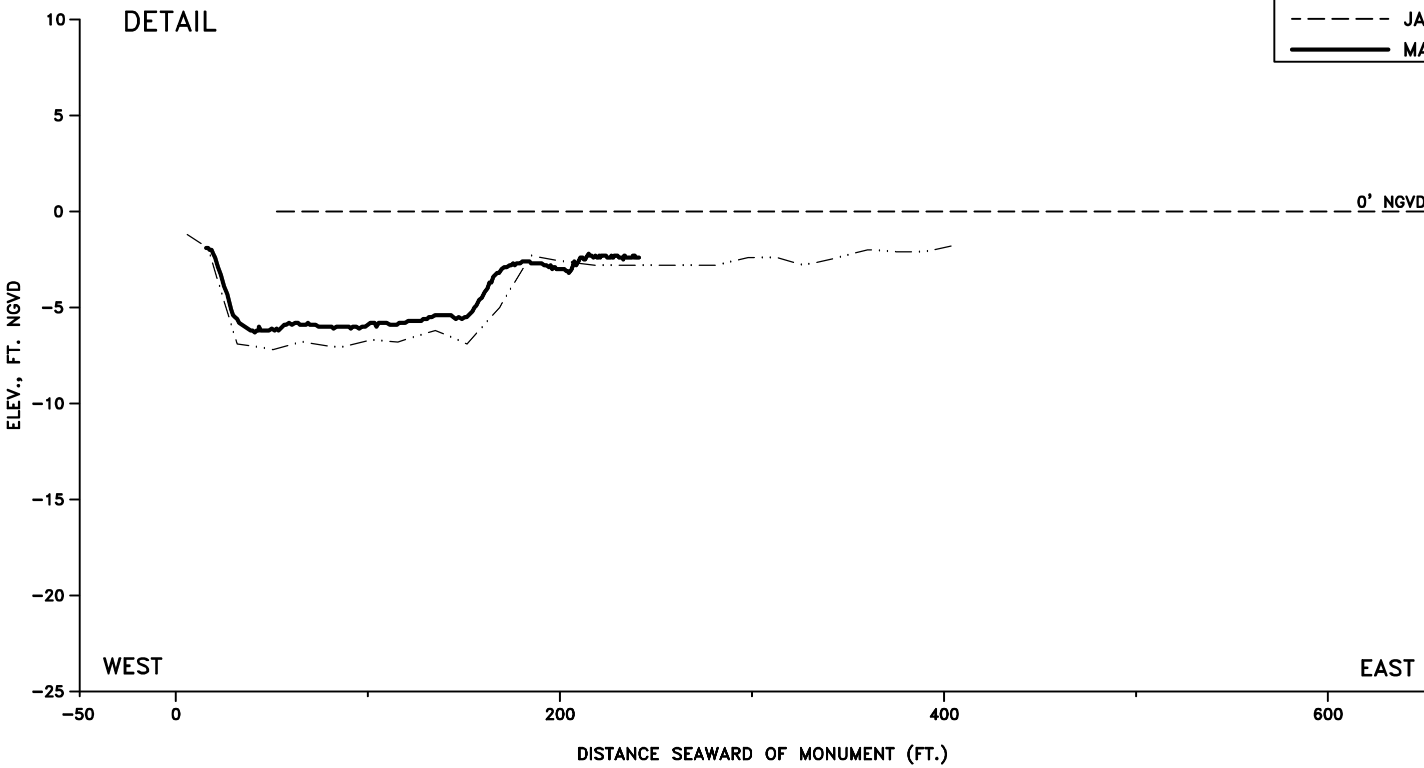


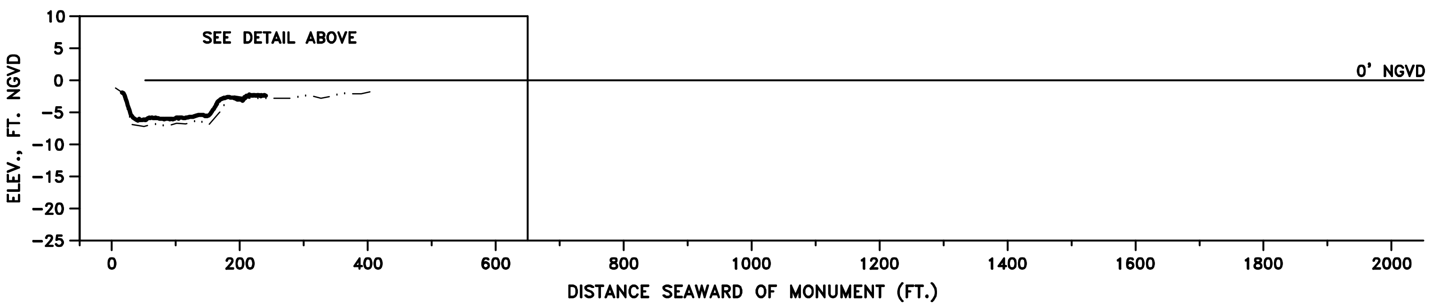


HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	WIGGINS PASS INLET MAINTENANCE CHANNEL CROSS SECTIONS			5679 STRAND COURT NAPLES, FL 34110 FAX: 239 594 2025 PHONE: 239 594 2021
	FOR: COLLIER COUNTY			
	DATE:07/14/04	FILE:11-054-XS	SCALE:1"=300'	
	JOB FILE:11054	DATUM:NGVD	FIGURE:	

CHANNEL CROSS SECTION: C29

LEGEND
- MARCH 2000 (PRE)
- MAY 2002
- JAN 30, 2003
- MAY 2004



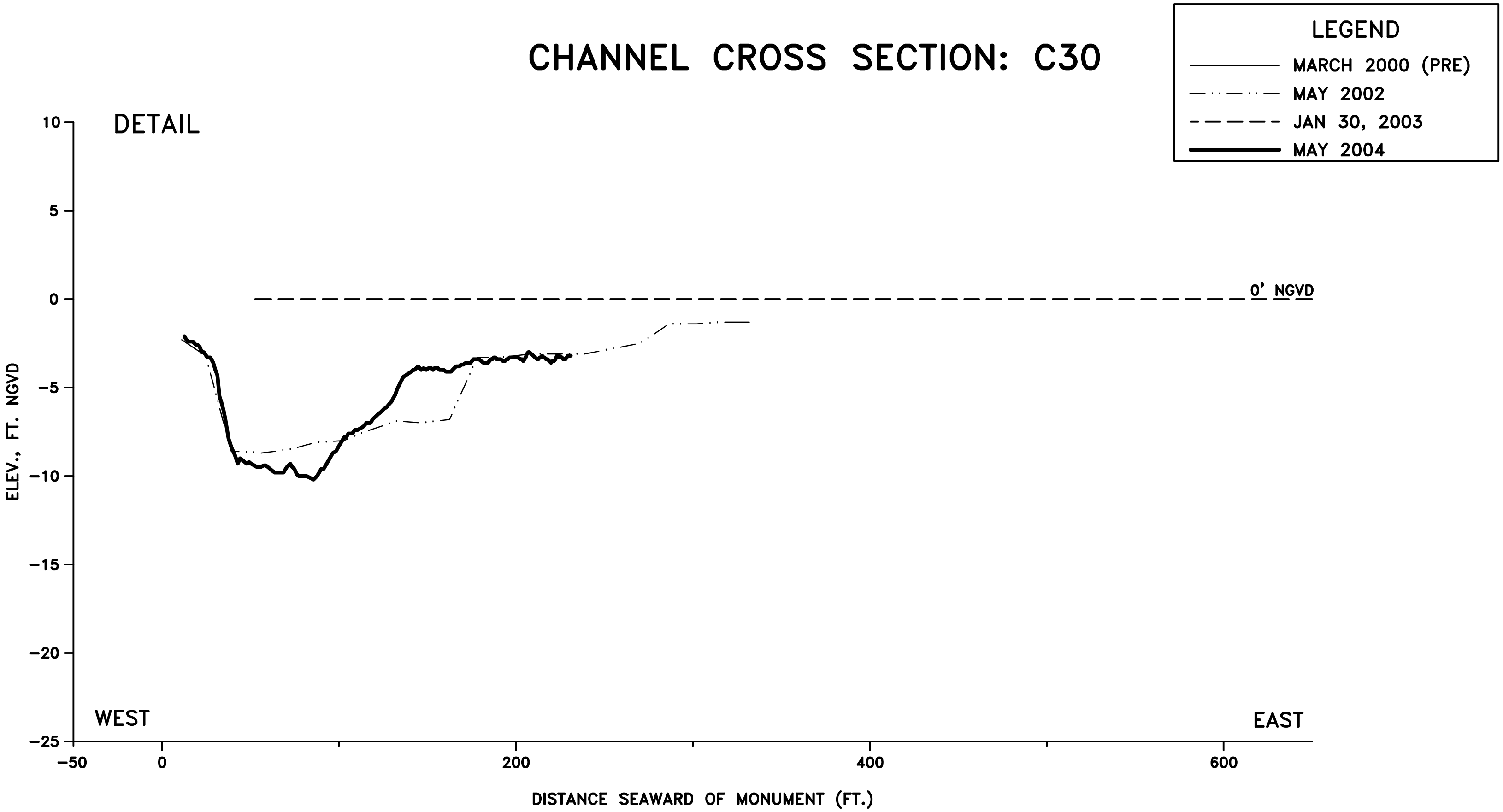


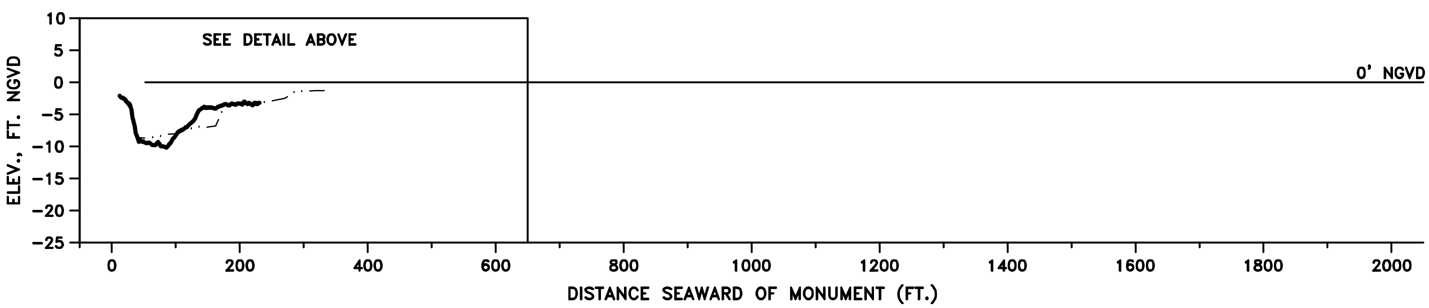
HUMISTON & MOORE ENGINEERS
COASTAL ENGINEERING DESIGN AND PERMITTING

WIGGINS PASS INLET MAINTENANCE CHANNEL CROSS SECTIONS		
FOR: COLLIER COUNTY		
DATE:07/14/04	FILE:11-054-XS	SCALE:1"=300'
JOB FILE:11054	DATUM:NGVD	FIGURE:

5679 STRAND COURT
NAPLES, FL 34110
FAX: 239 594 2025

CHANNEL CROSS SECTION: C30

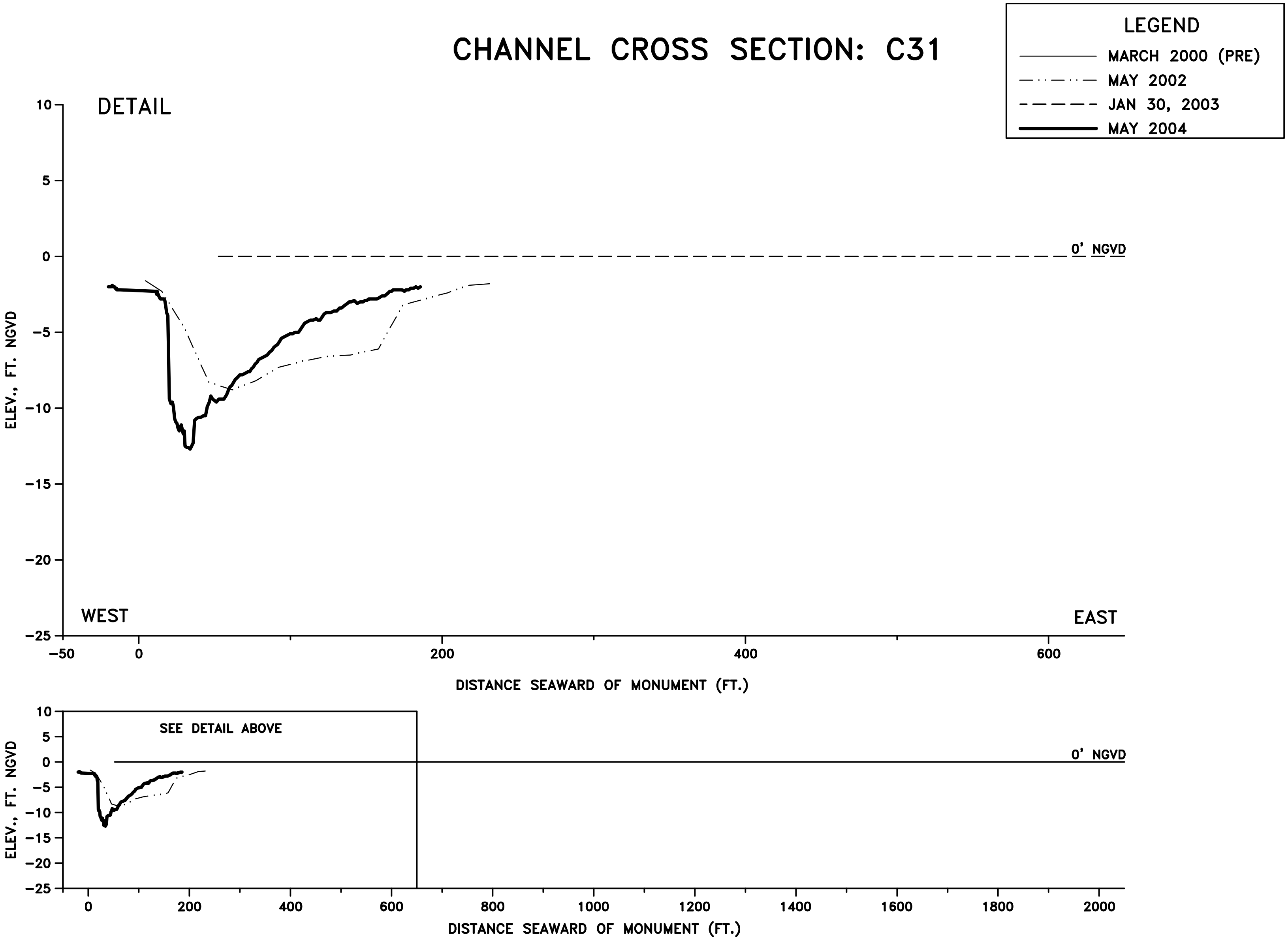




HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	WIGGINS PASS INLET MAINTENANCE CHANNEL CROSS SECTIONS		
	FOR: COLLIER COUNTY		
	DATE:07/14/04	FILE:11-054-XS	SCALE:1"=300'
	JOB FILE:11054	DATUM:NGVD	FIGURE:

5679 STRAND COURT
NAPLES, FL 34110
FAX: 239 594 2025
PHONE: 239 594 2021

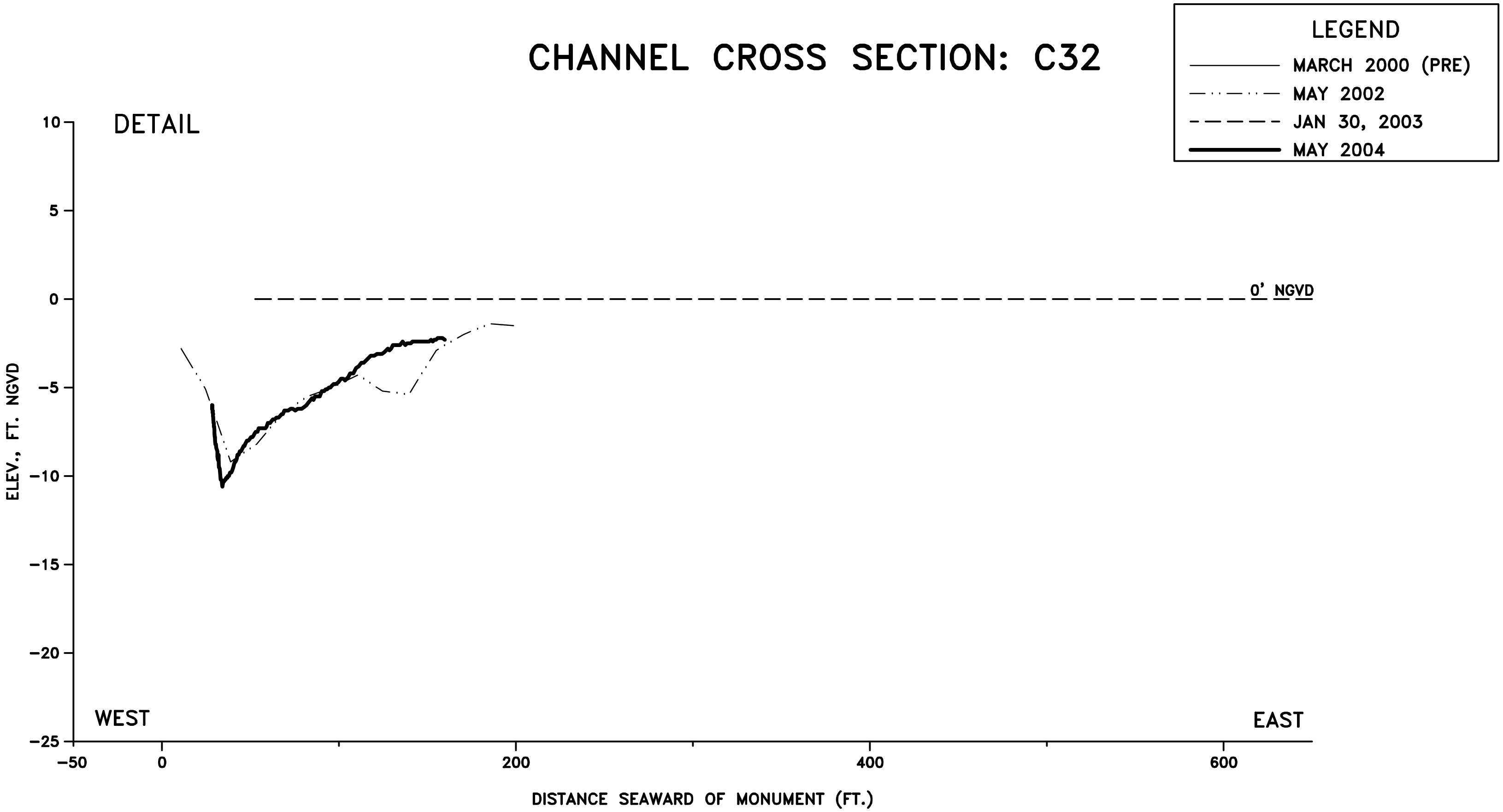
CHANNEL CROSS SECTION: C31

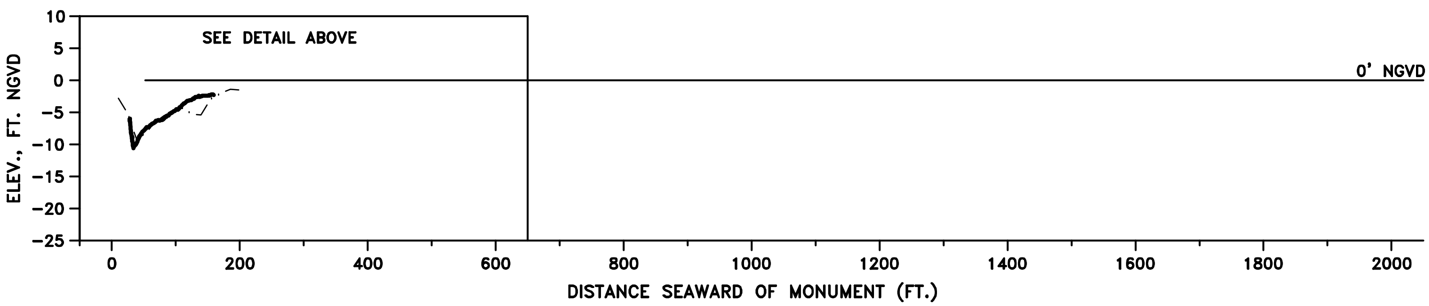


HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	WIGGINS PASS INLET MAINTENANCE CHANNEL CROSS SECTIONS		
	FOR: COLLIER COUNTY		
	DATE:07/14/04	FILE:11-054-XS	SCALE:1"=300'
	JOB FILE:11054	DATUM:NGVD	FIGURE:

5679 STRAND COURT
NAPLES, FL 34110
FAX: 239 594 2025
PHONE: 239 594 2021

CHANNEL CROSS SECTION: C32

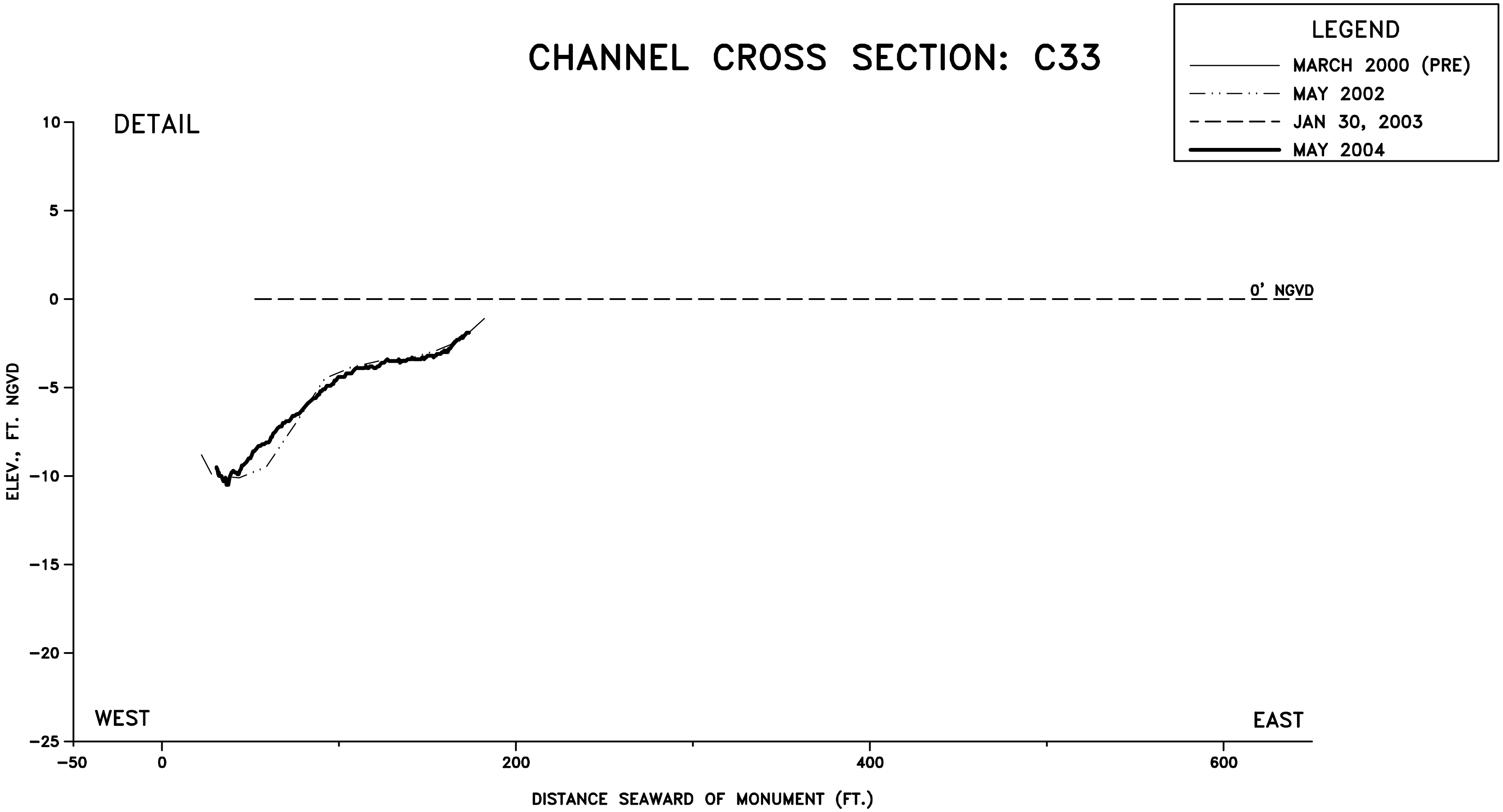


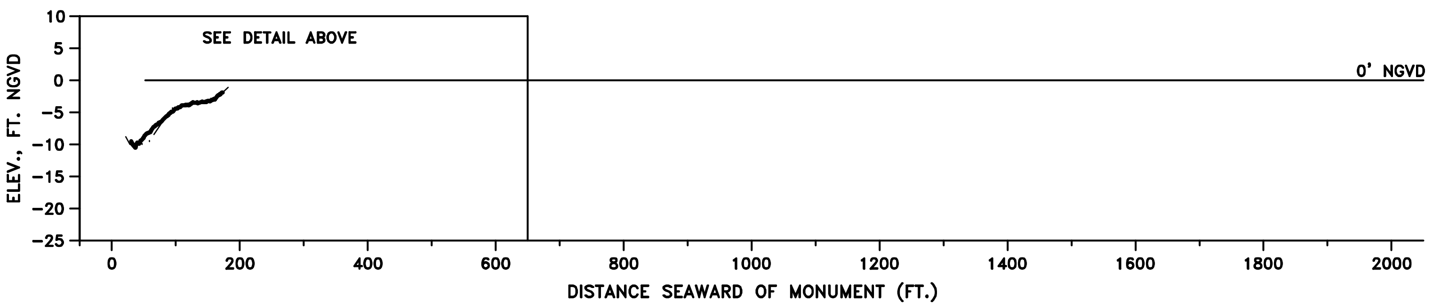


HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	WIGGINS PASS INLET MAINTENANCE CHANNEL CROSS SECTIONS		
	FOR: COLLIER COUNTY		
	DATE:07/14/04	FILE:11-054-XS	SCALE:1"=300'
	JOB FILE:11054	DATUM:NGVD	FIGURE:

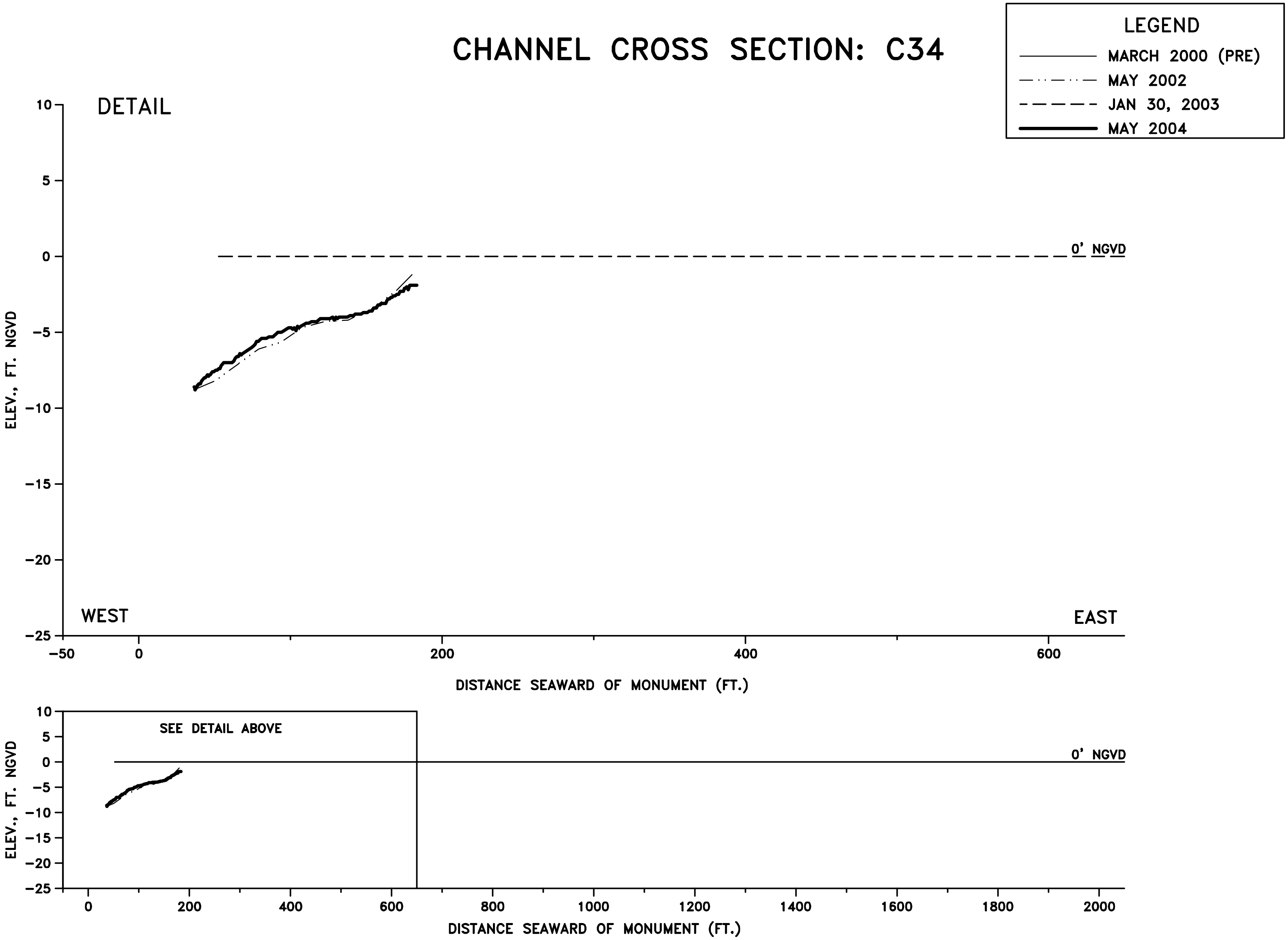
5679 STRAND COURT
NAPLES, FL 34110
FAX: 239 594 2025
PHONE: 239 594 2021

CHANNEL CROSS SECTION: C33





HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	WIGGINS PASS INLET MAINTENANCE CHANNEL CROSS SECTIONS			5679 STRAND COURT NAPLES, FL 34110 FAX: 239 594 2025 PHONE: 239 594 2021
	FOR: COLLIER COUNTY			
	DATE:07/14/04	FILE:11-054-XS	SCALE:1"=300'	
	JOB FILE:11054	DATUM:NGVD	FIGURE:	



WIGGINS PASS INLET MAINTENANCE CHANNEL CROSS SECTIONS		
FOR: COLLIER COUNTY		
DATE:07/14/04	FILE:11-054-XS	SCALE:1"=300'
JOB FILE:11054	DATUM:NGVD	FIGURE:

HUMISTON & MOORE ENGINEERS
COASTAL ENGINEERING DESIGN AND PERMITTING

5679 STRAND COURT
NAPLES, FL 34110
FAX: 239 594 2025
PHONE: 239 594 2021

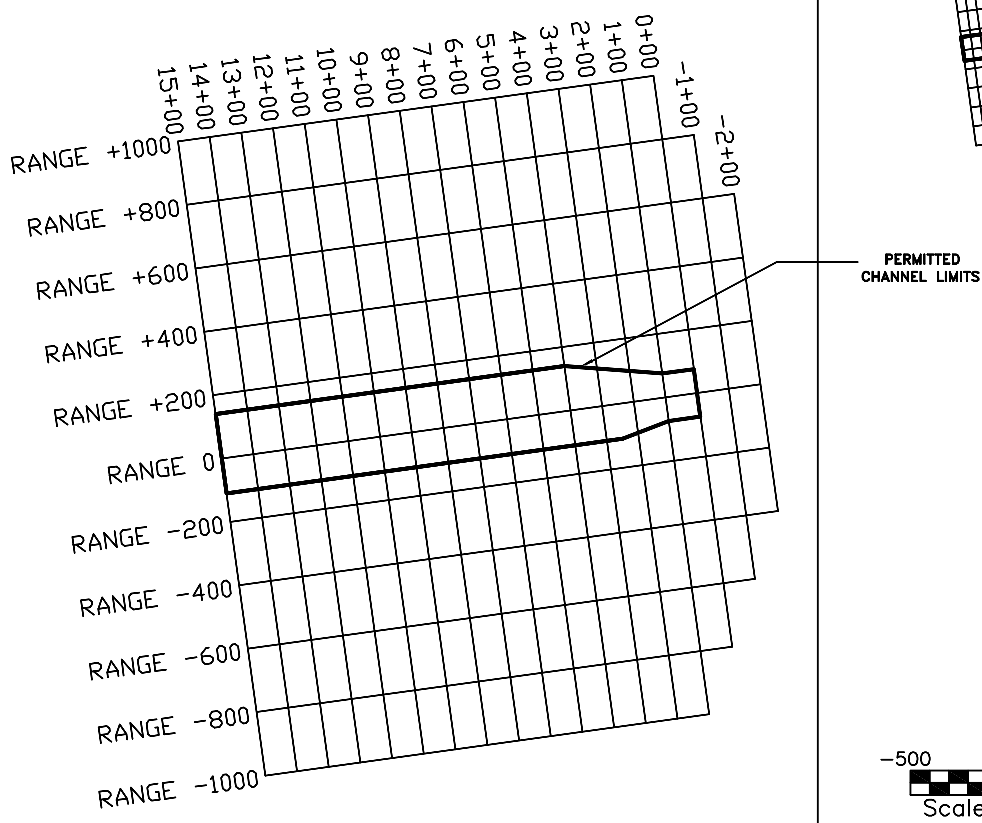
Appendix C

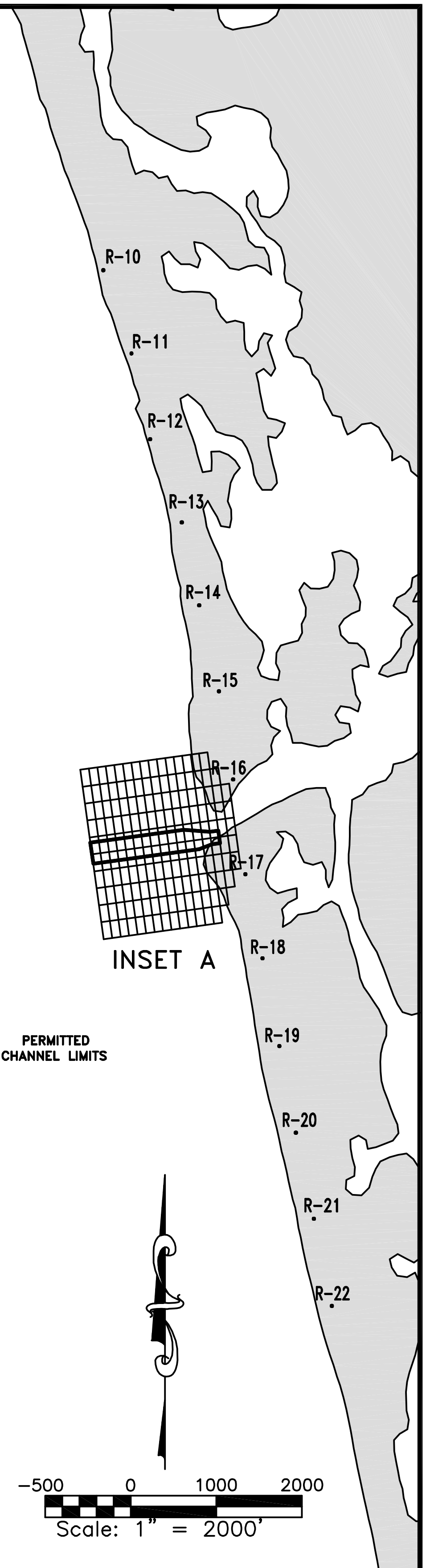
Wiggins Pass
Outer Channel Cross Sections

WIGGINS PASS MONITORING STATIONS FOR OUTER CHANNEL

Station	Northing	Easting	Azimuth	Length
-2+00	711947.44	383738.54	172.15	1000'
-1+00	712131.91	383612.17	172.15	1400'
0+00	712316.39	383485.8	172.15	1800'
1+00	712302.74	383386.74	172.15	2000'
2+00	712289.08	383287.68	172.15	2000'
3+00	712275.43	383188.61	172.15	2000'
4+00	712261.78	383089.55	172.15	2000'
5+00	712248.12	382990.48	172.15	2000'
6+00	712234.47	382891.42	172.15	2000'
7+00	712220.82	382792.36	172.15	2000'
8+00	712207.17	382693.29	172.15	2000'
9+00	712193.51	382594.23	172.15	2000'
10+00	712179.86	382495.17	172.15	2000'
11+00	712166.21	382396.1	172.15	2000'
12+00	712152.56	382297.04	172.15	2000'
13+00	712138.9	382197.98	172.15	2000'
14+00	712125.25	382098.91	172.15	2000'
15+00	712111.6	381999.85	172.15	2000'

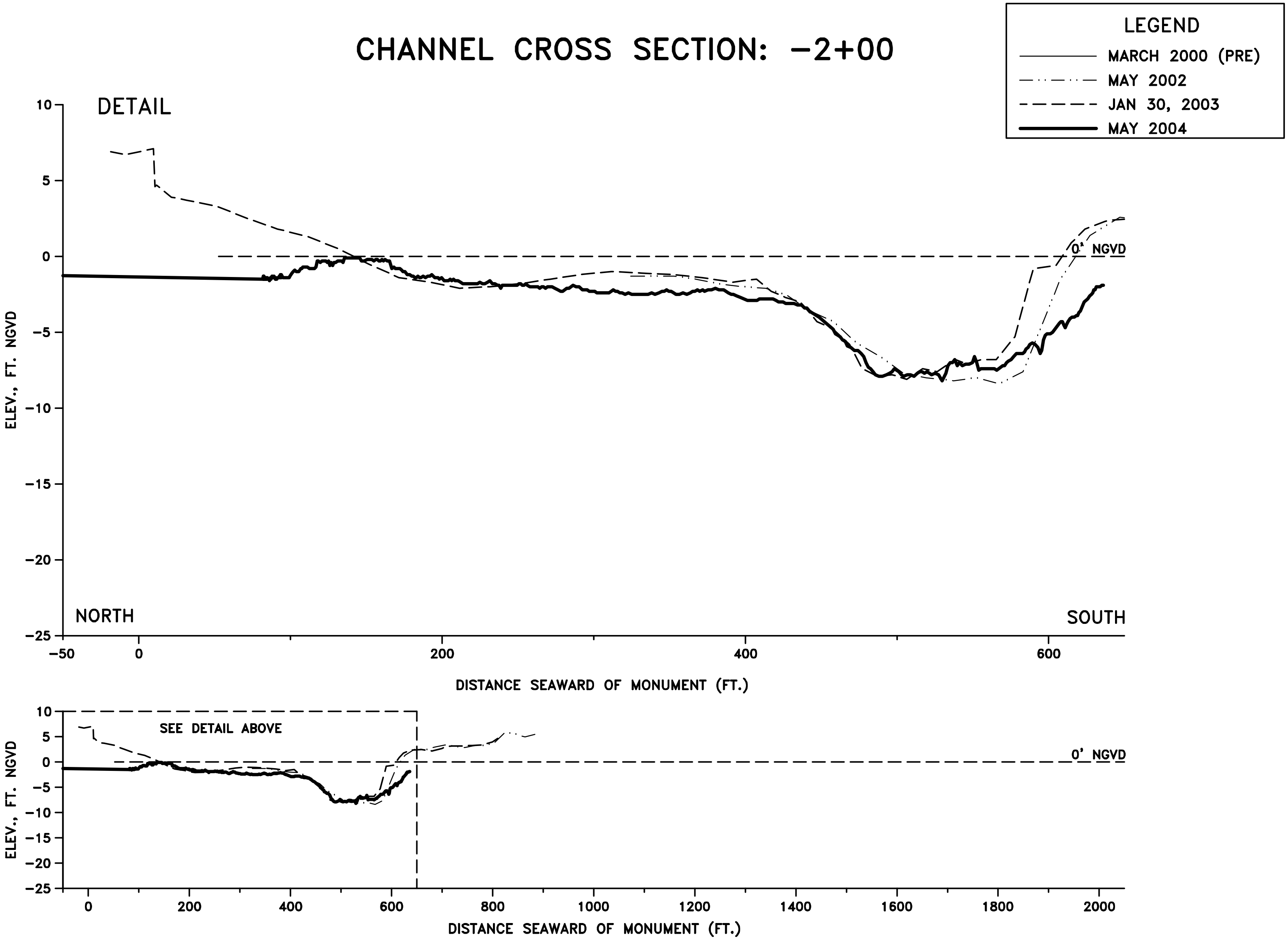
CHANNEL STATION LOCATION – INSET A
SCALE: 1" = 600'





HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	WIGGINS PASS MONITORING REPORT OUTER CHANNEL STATION LOCATION		5679 STRAND COURT NAPLES, FL 34110 FAX: 239 594 2025 PHONE: 239 594 2021
	FOR: COLLIER COUNTY		
	DATE:07/13/04	FILE: CHAN-SITE	SCALE:SHOWN
	JOB 11-054	DATUM: NGVD	FIGURE: C

CHANNEL CROSS SECTION: −2+00

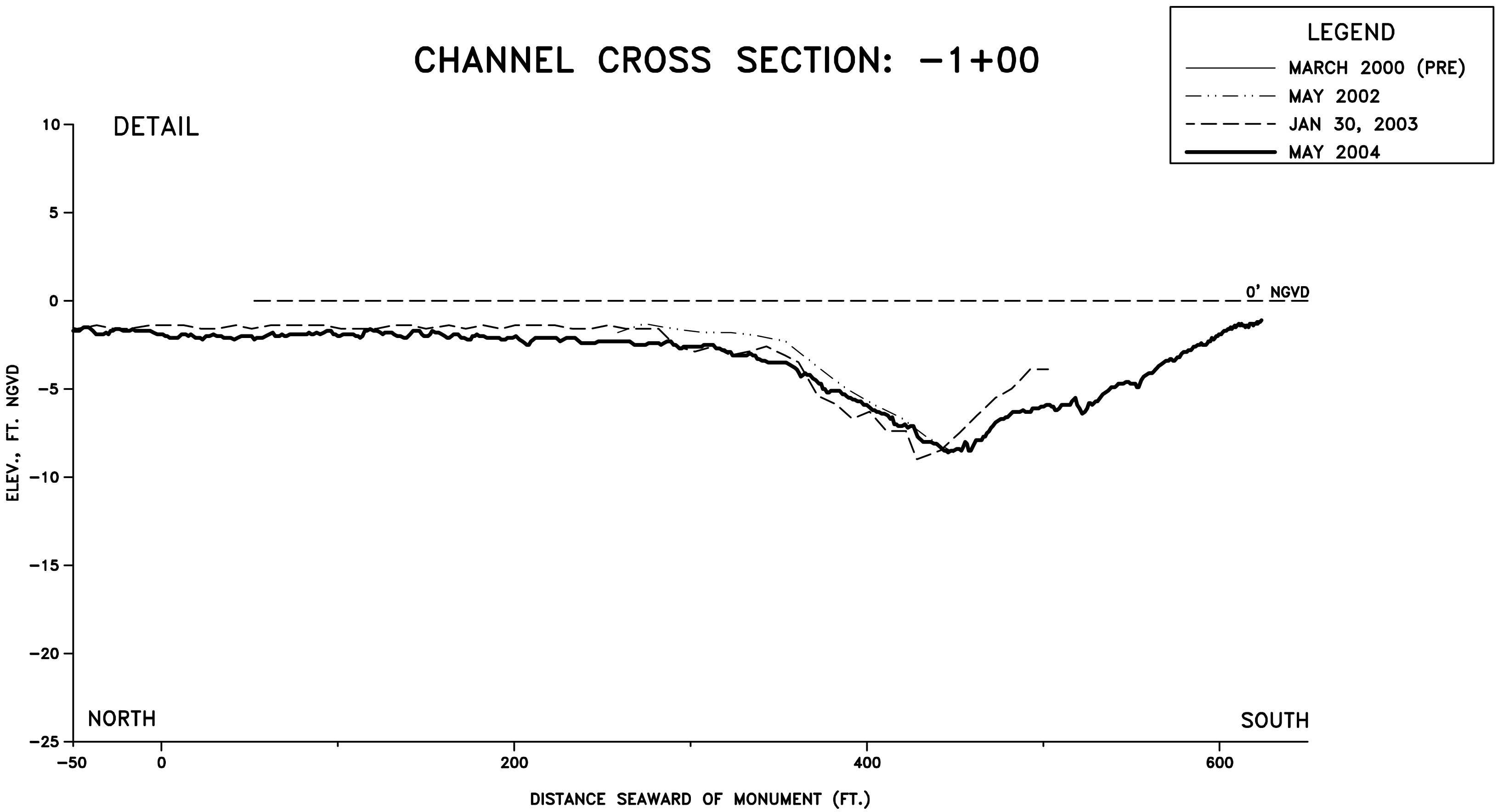


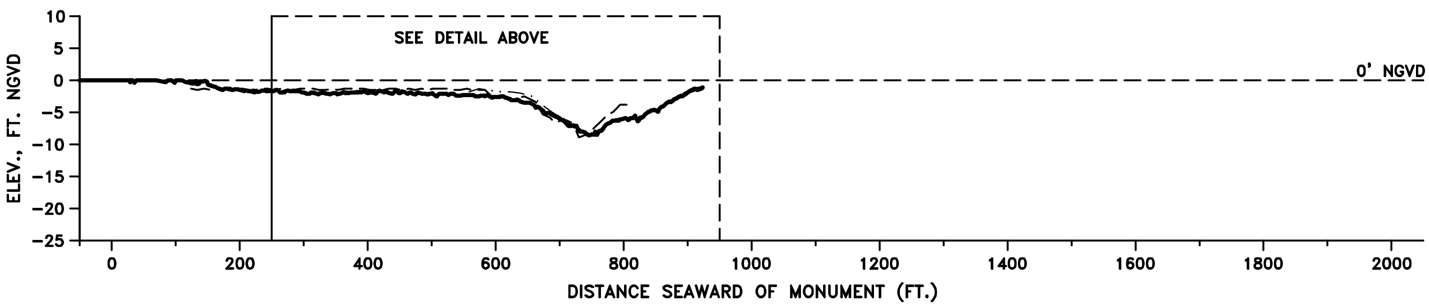
HUMISTON & MOORE ENGINEERS
COASTAL ENGINEERING DESIGN AND PERMITTING

WIGGINS PASS INLET MAINTENANCE CHANNEL CROSS SECTION		
FOR: COLLIER COUNTY		
DATE:07/14/04	FILE:11-054-XS	SCALE:1"=300'
JOB FILE:11054	DATUM:NGVD	FIGURE:

5679 STRAND COURT
NAPLES, FL 34110
FAX: 239 594 2025
PHONE: 239 594 2021

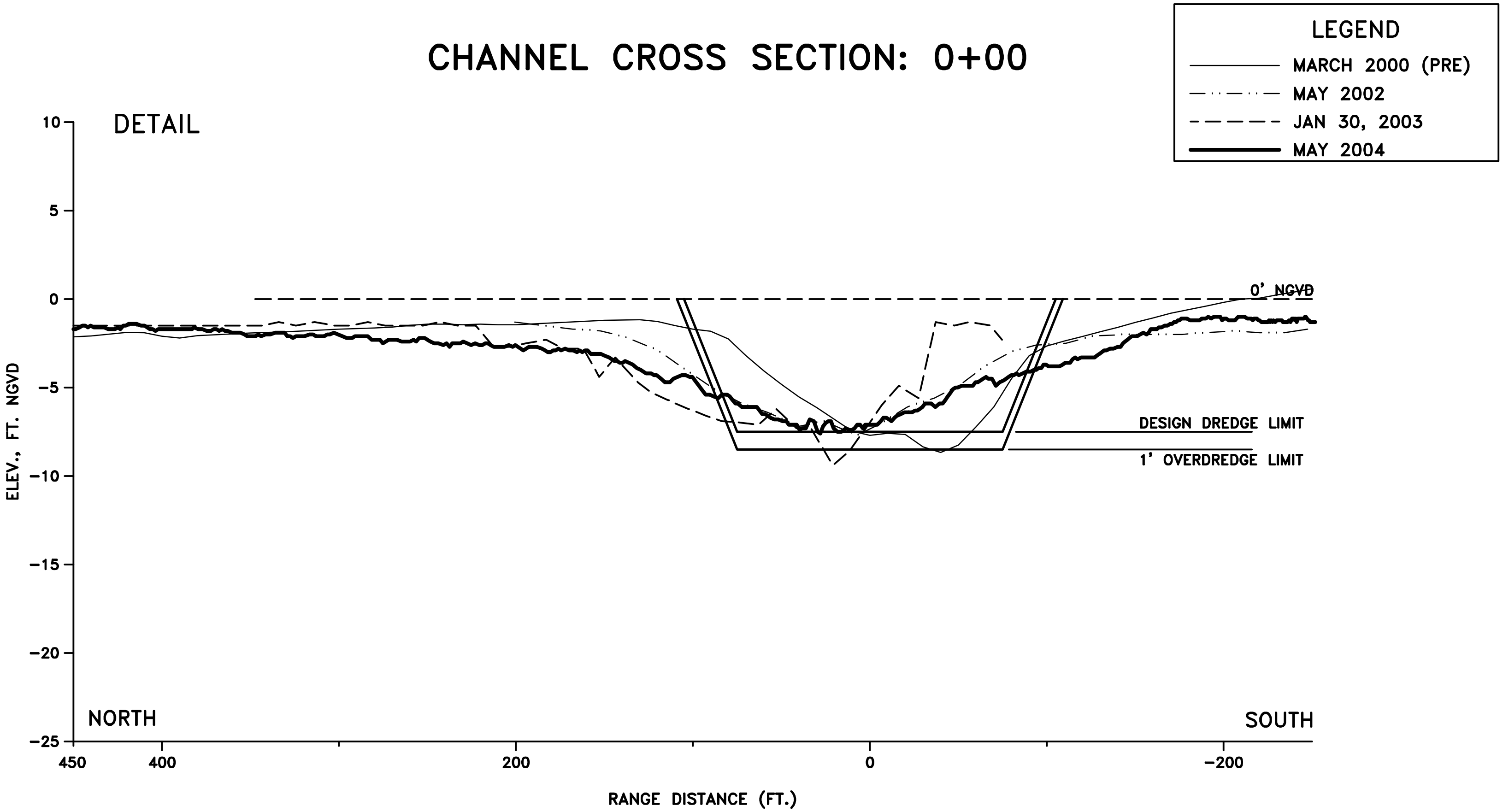
CHANNEL CROSS SECTION: -1+00

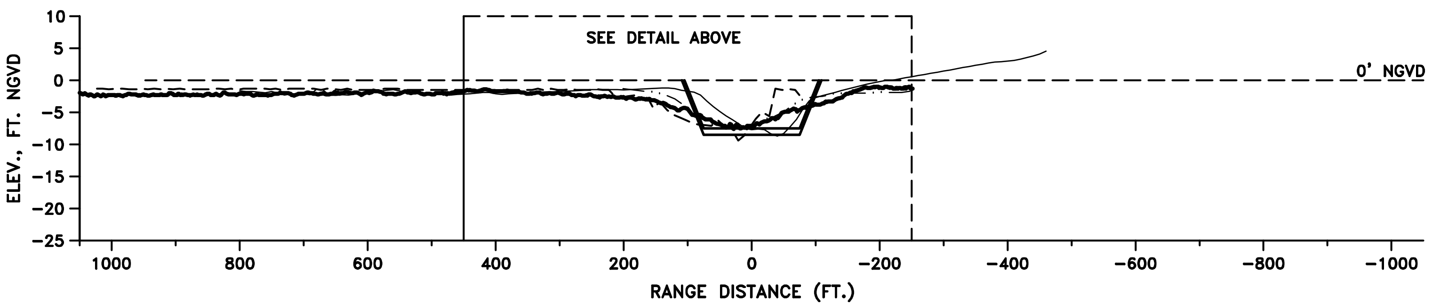




HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	WIGGINS PASS INLET MAINTENANCE CHANNEL CROSS SECTION			5679 STRAND COURT NAPLES, FL 34110 FAX: 239 594 2025 PHONE: 239 594 2021
	FOR: COLLIER COUNTY			
	DATE:07/14/04	FILE:11-054-XS	SCALE:1"=300'	
	JOB FILE:11054	DATUM:NGVD	FIGURE:	

CHANNEL CROSS SECTION: 0+00



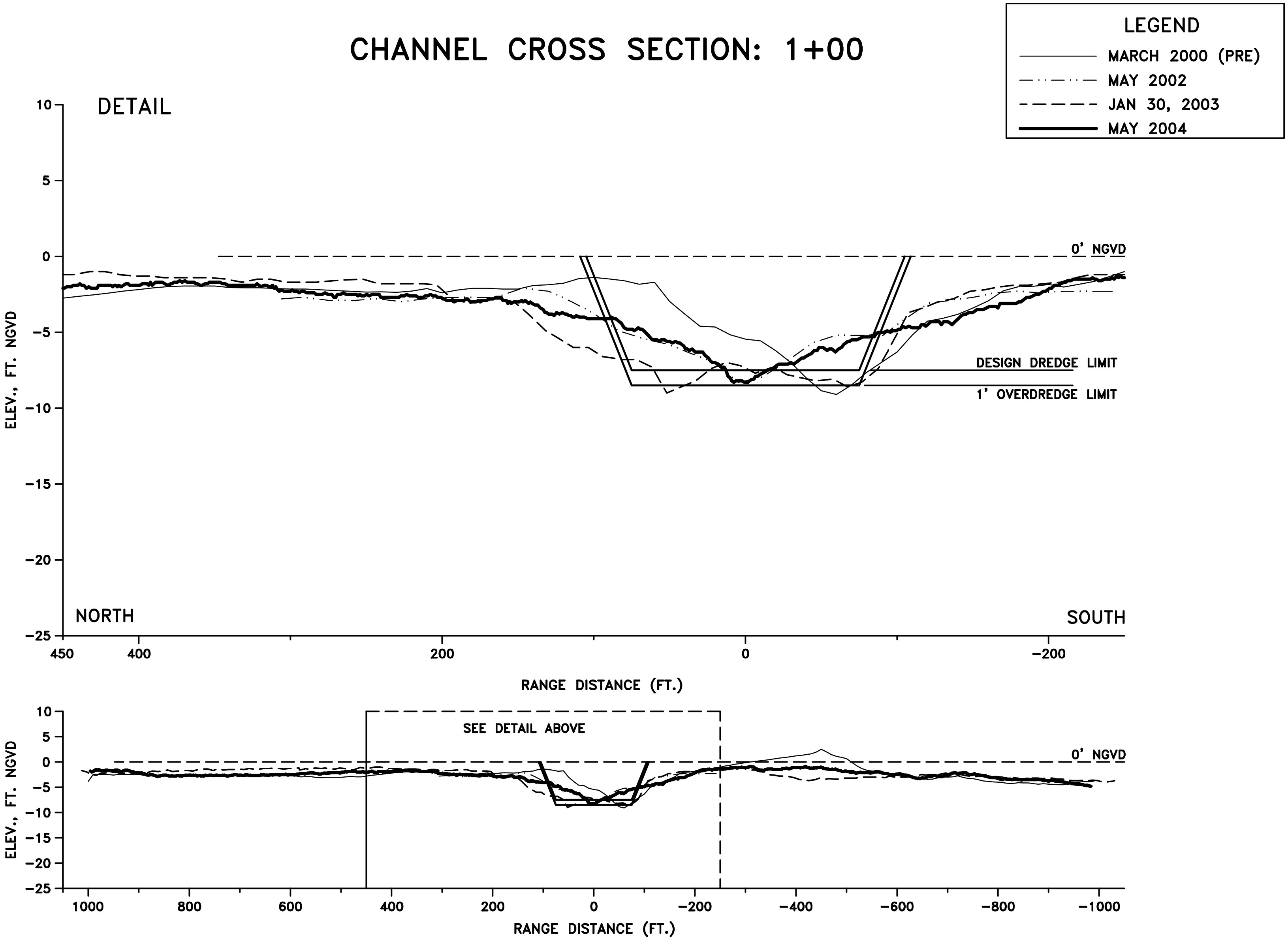


HUMISTON & MOORE ENGINEERS
COASTAL ENGINEERING DESIGN AND PERMITTING

WIGGINS PASS INLET MAINTENANCE CHANNEL CROSS SECTION		
FOR: COLLIER COUNTY		
DATE:07/14/04	FILE:11-054-XS	SCALE:1"=300'
JOB FILE:11054	DATUM:NGVD	FIGURE:

5679 STRAND COURT
NAPLES, FL 34110
FAX: 239 594 2025
PHONE: 239 594 2021

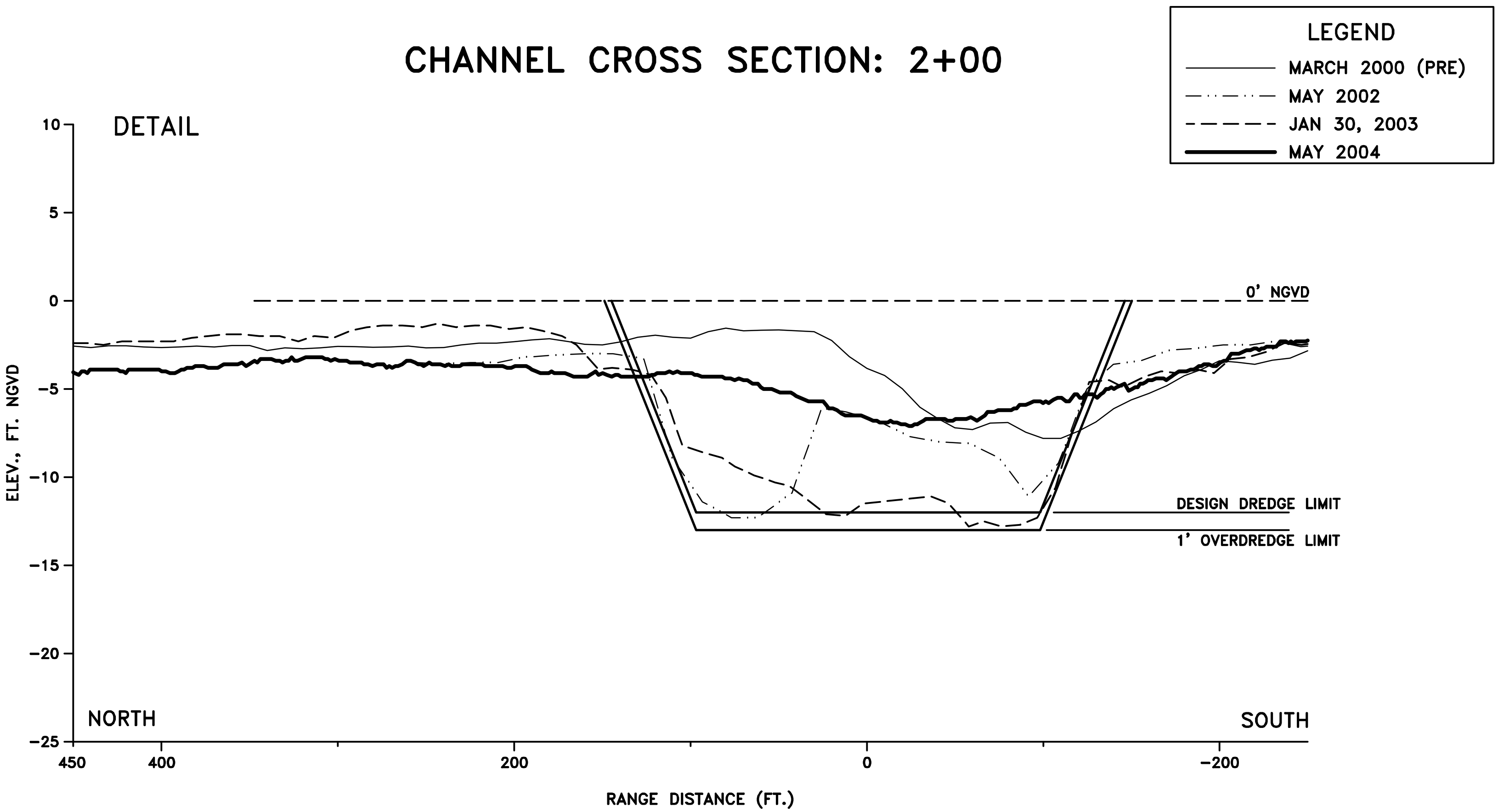
CHANNEL CROSS SECTION: 1+00

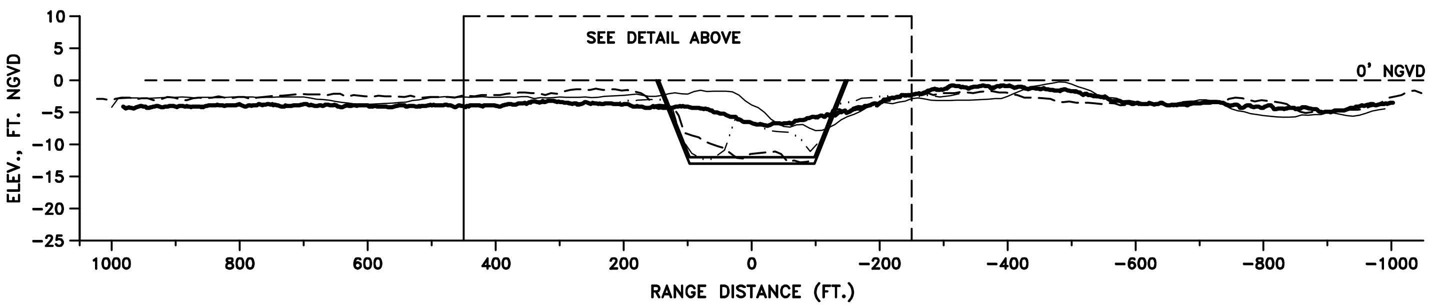


HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	WIGGINS PASS INLET MAINTENANCE CHANNEL CROSS SECTIONS		
	FOR: COLLIER COUNTY		
	DATE:07/14/04	FILE:11-054-XS	SCALE:1"=300'
	JOB FILE:11054	DATUM:NGVD	FIGURE:

5679 STRAND COURT
NAPLES, FL 34110
FAX: 239 594 2025
PHONE: 239 594 2021

CHANNEL CROSS SECTION: 2+00





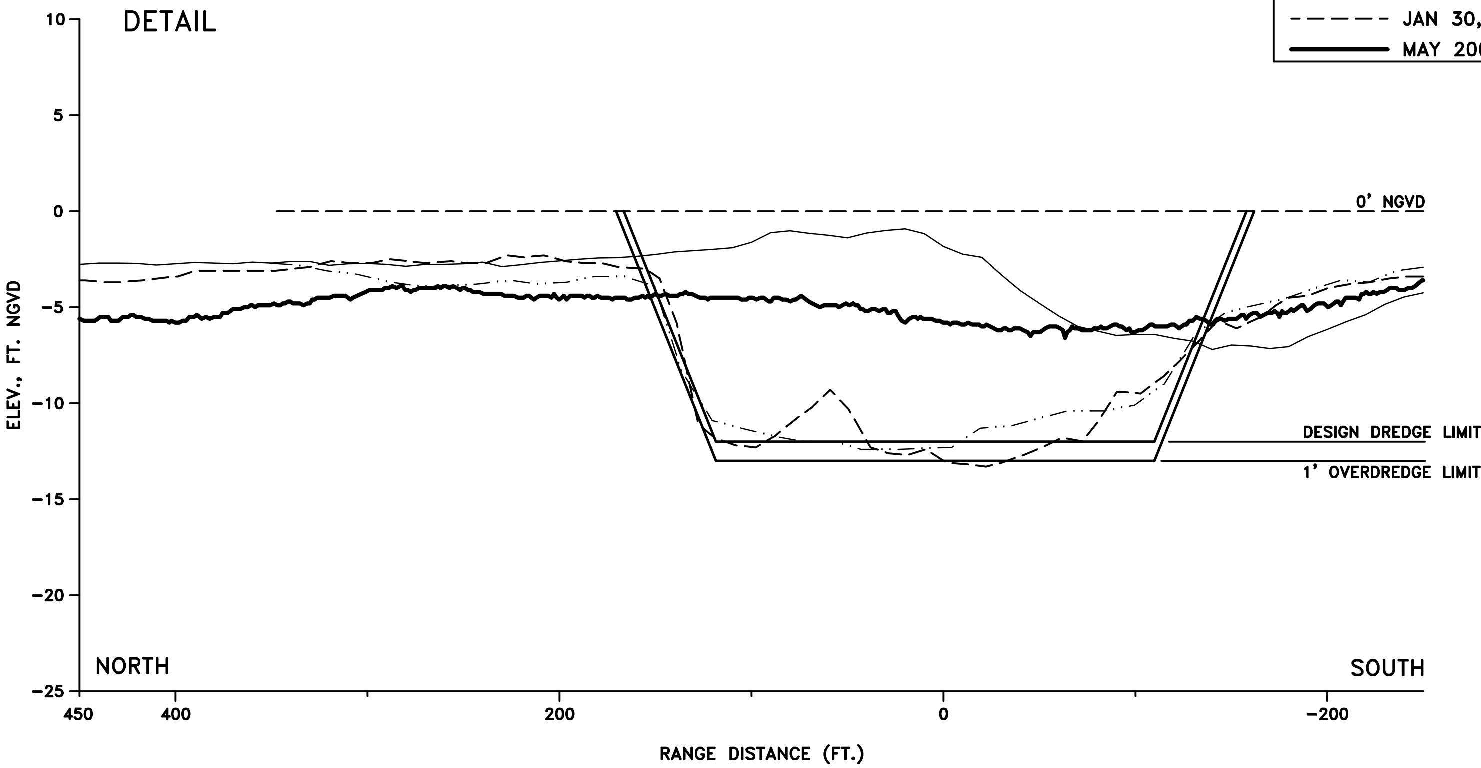
HUMISTON & MOORE ENGINEERS
COASTAL ENGINEERING DESIGN AND PERMITTING

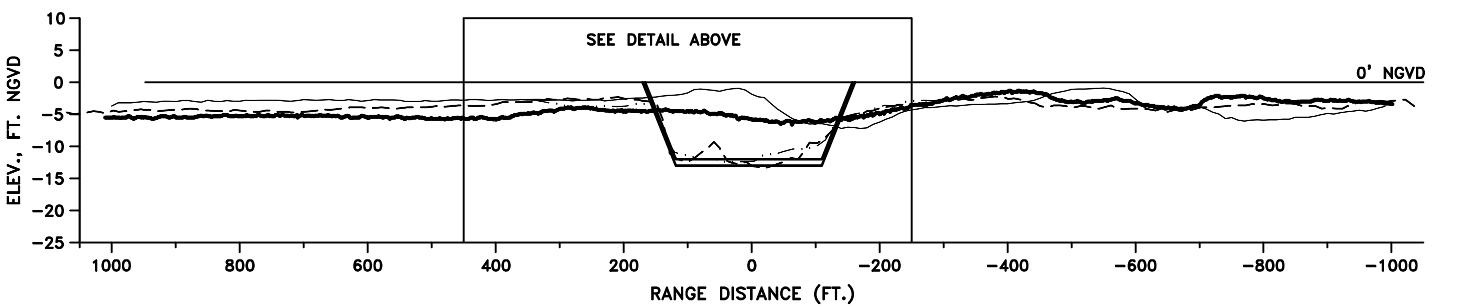
WIGGINS PASS INLET MAINTENANCE CHANNEL CROSS SECTIONS		
FOR: COLLIER COUNTY		
DATE:07/14/04	FILE:11-054-XS	SCALE:1"=300'
JOB FILE:11054	DATUM:NGVD	FIGURE:

5679 STRAND COURT
NAPLES, FL 34110
FAX: 239 594 2025
PHONE: 239 594 2021

CHANNEL CROSS SECTION: 3+00

LEGEND
- MARCH 2000 (PRE)
- MAY 2002
- JAN 30, 2003
- MAY 2004





HUMISTON & MOORE ENGINEERS
COASTAL ENGINEERING DESIGN AND PERMITTING

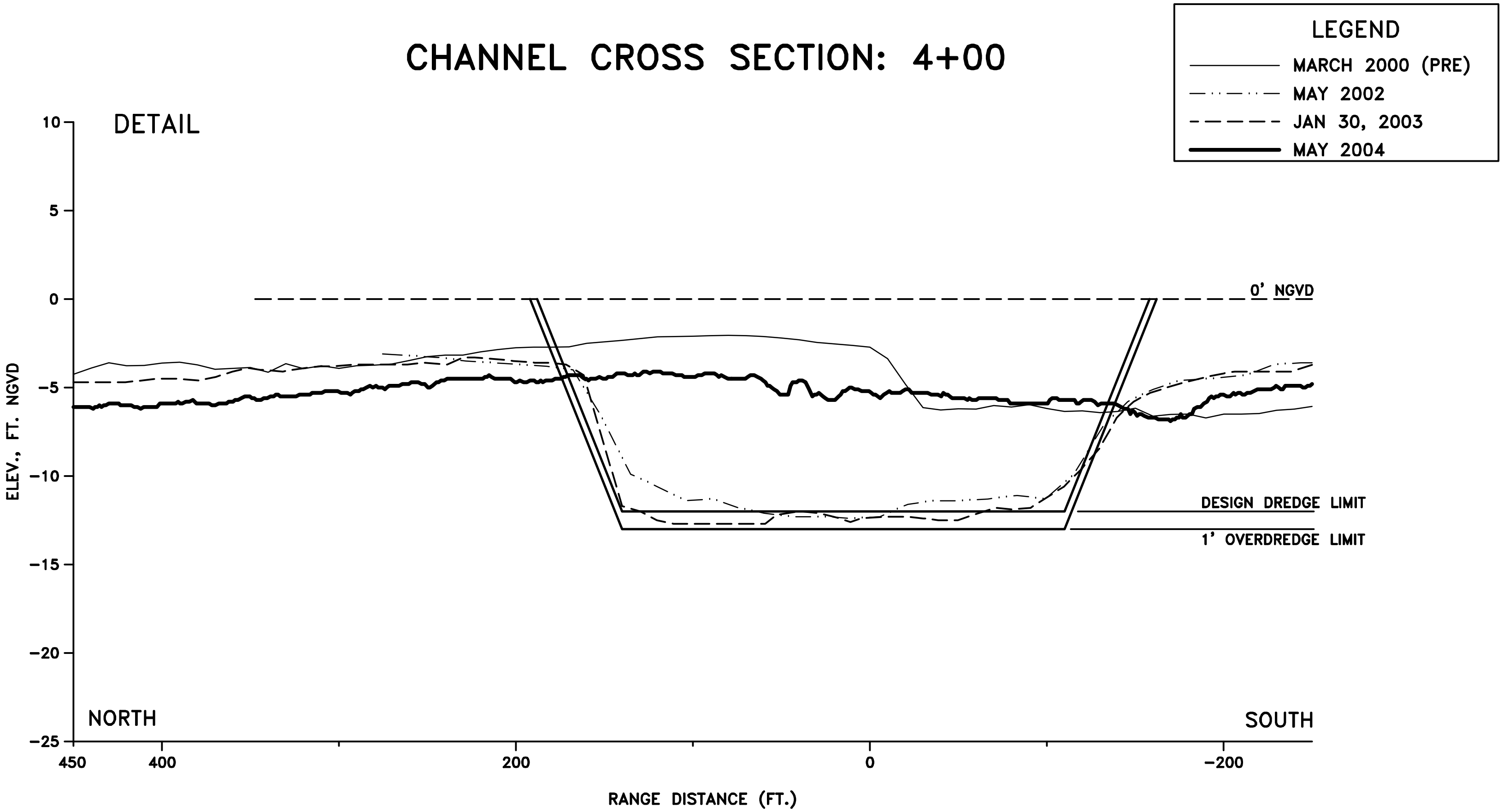
WIGGINS PASS INLET MAINTENANCE
CHANNEL CROSS SECTIONS

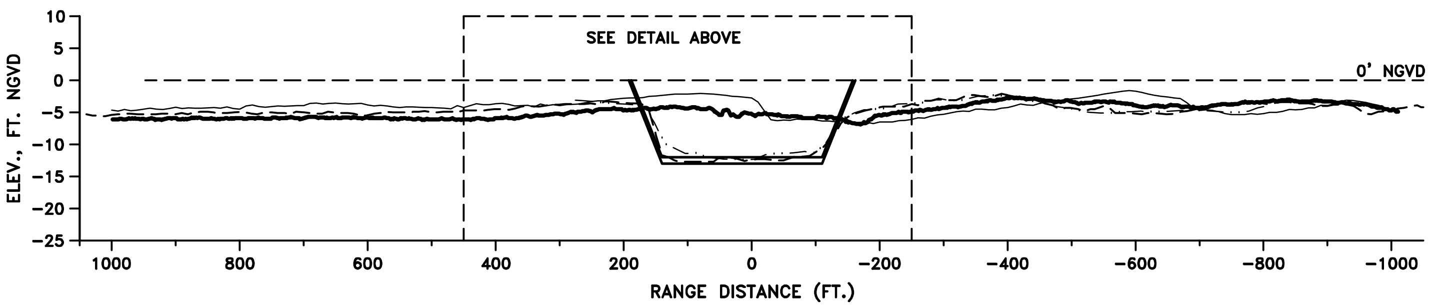
FOR: COLLIER COUNTY

DATE:07/14/04	FILE:11-054-XS	SCALE:1"=300'
JOB FILE:11054	DATUM:NGVD	FIGURE:

5679 STRAND COURT
NAPLES, FL 34110
FAX: 239 594 2025
PHONE: 239 594 2021

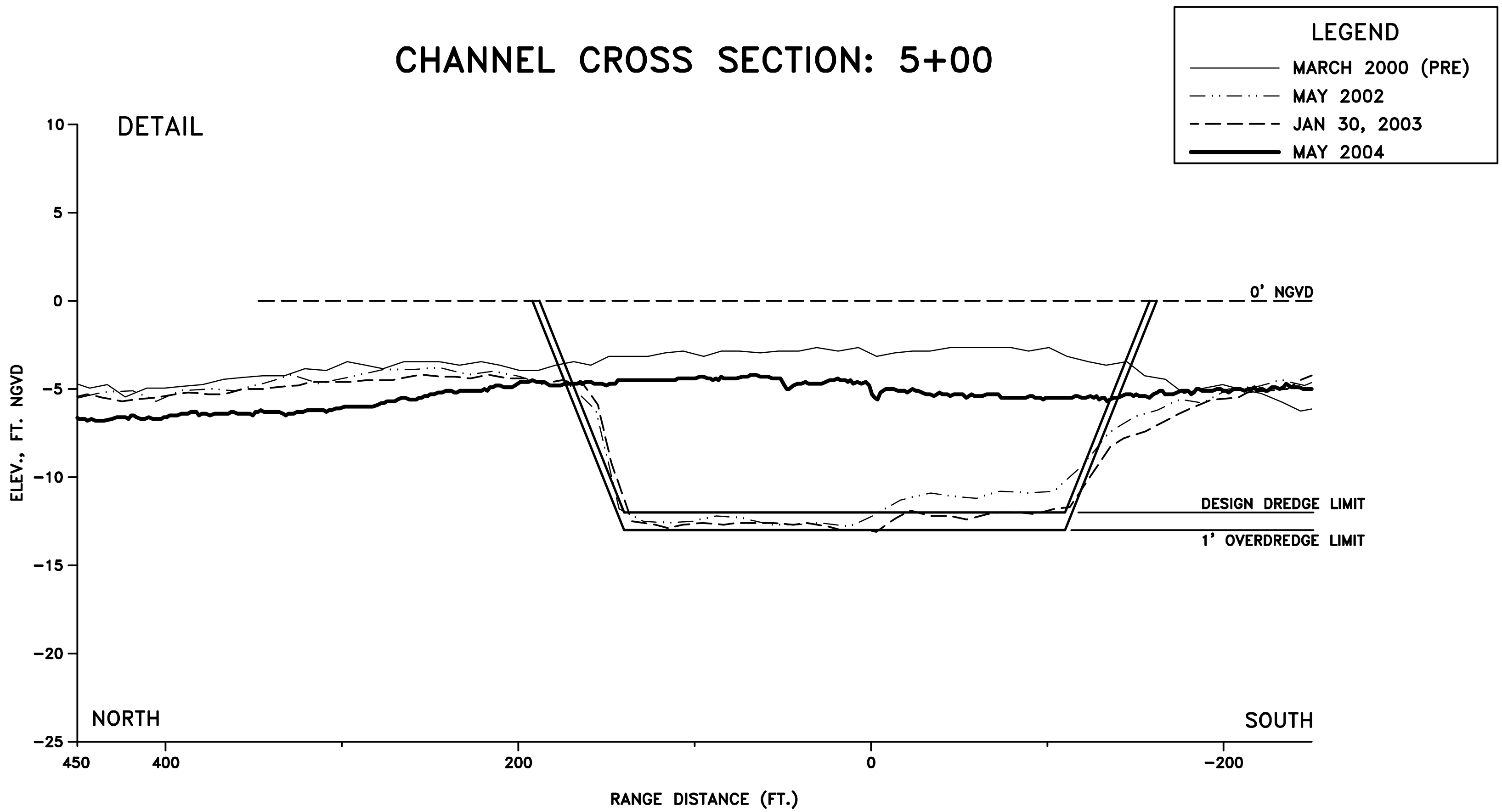
CHANNEL CROSS SECTION: 4+00

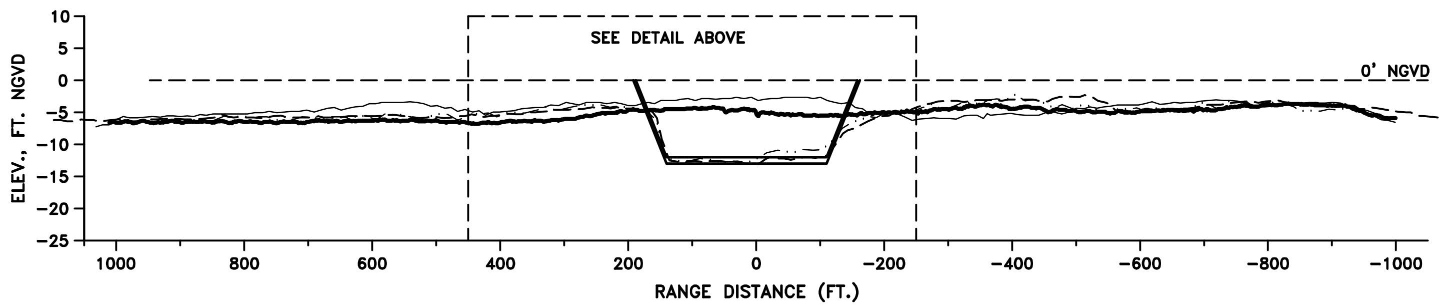




HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	WIGGINS PASS INLET MAINTENANCE CHANNEL CROSS SECTIONS			5679 STRAND COURT NAPLES, FL 34110 FAX: 239 594 2025 PHONE: 239 594 2021
	FOR: COLLIER COUNTY			
	DATE:07/14/04	FILE:11-054-XS	SCALE:1"=300'	
	JOB FILE:11054	DATUM:NGVD	FIGURE:	

CHANNEL CROSS SECTION: 5+00





HUMISTON & MOORE ENGINEERS
COASTAL ENGINEERING DESIGN AND PERMITTING

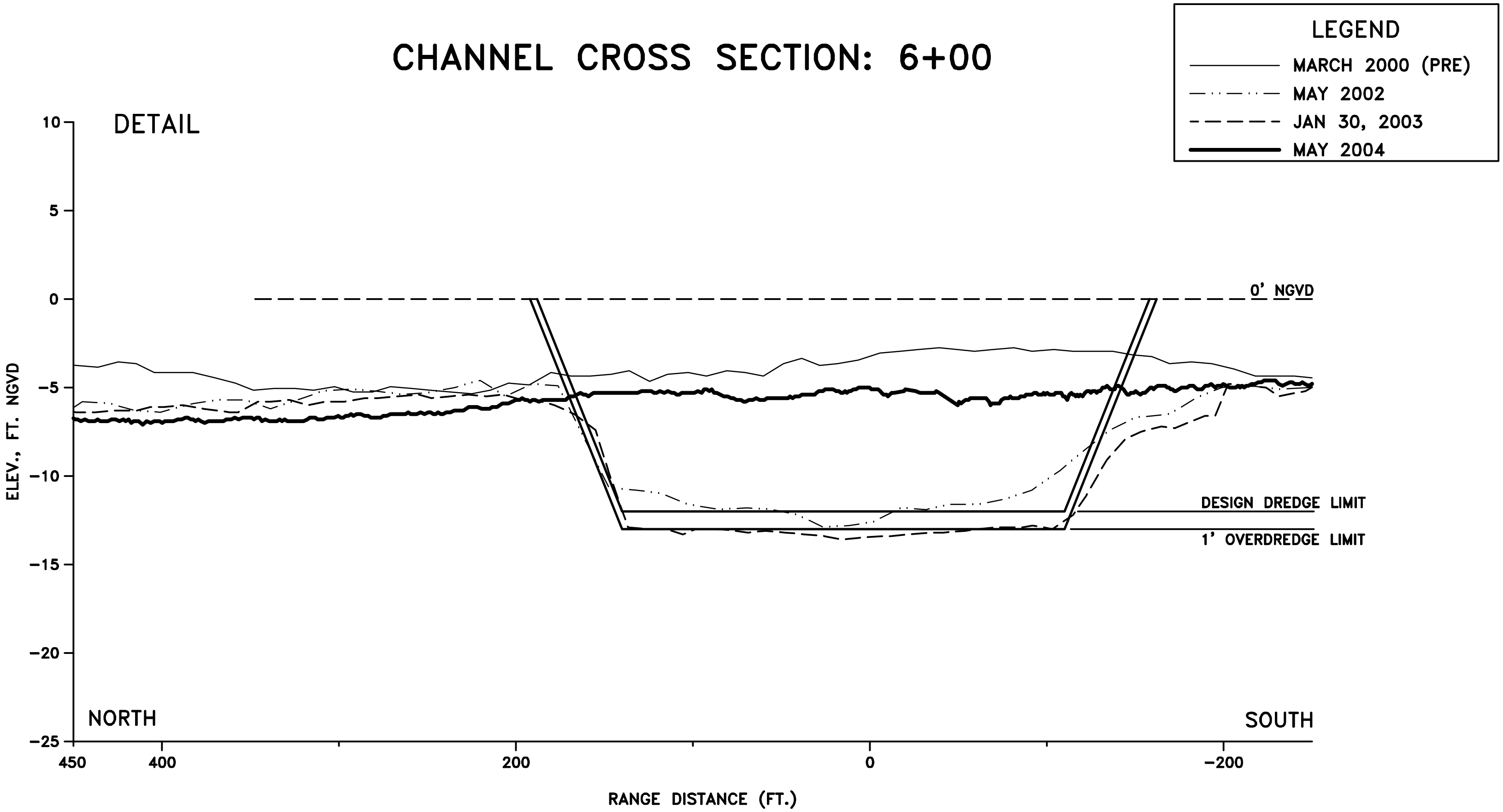
WIGGINS PASS INLET MAINTENANCE
CHANNEL CROSS SECTIONS

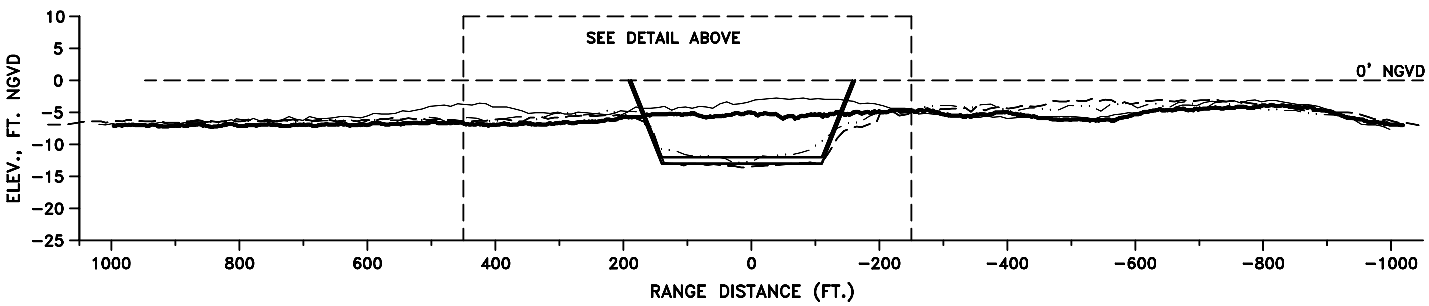
FOR: COLLIER COUNTY

DATE:07/14/04	FILE:11-054-XS	SCALE:1"=300'
JOB FILE:11054	DATUM:NGVD	FIGURE:

5679 STRAND COURT
NAPLES, FL 34110
FAX: 239 594 2025
PHONE: 239 594 2021

CHANNEL CROSS SECTION: 6+00



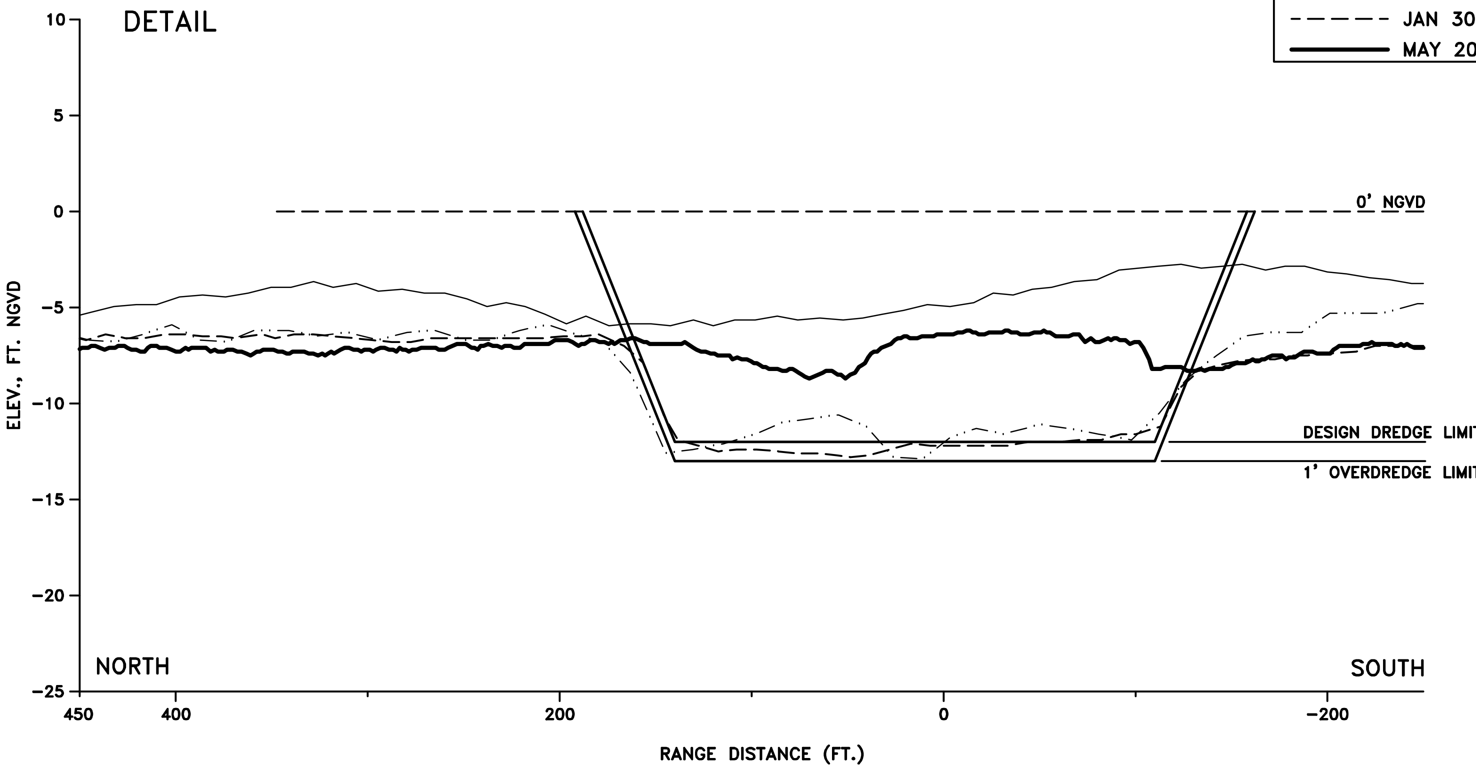


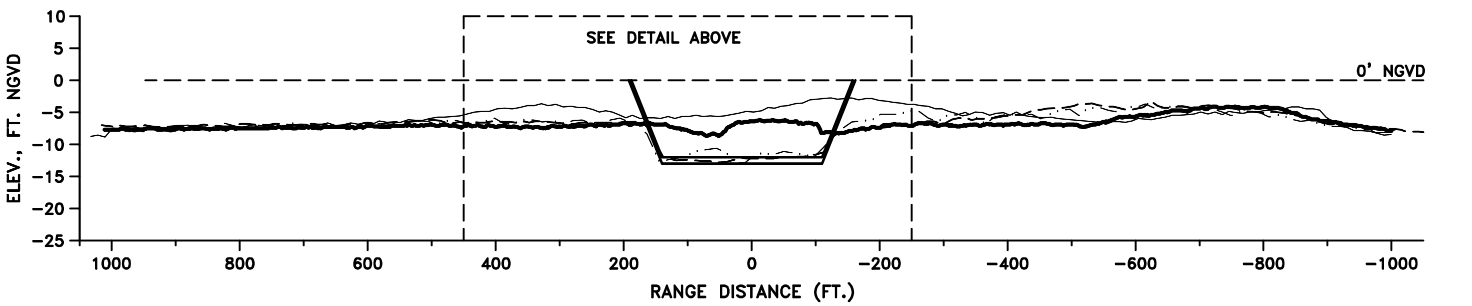
HUMISTON & MOORE ENGINEERS
COASTAL ENGINEERING DESIGN AND PERMITTING

WIGGINS PASS INLET MAINTENANCE CHANNEL CROSS SECTIONS		
FOR: COLLIER COUNTY		
DATE:07/14/04	FILE:11-054-XS	SCALE:1"=300'
JOB FILE:11054	DATUM:NGVD	FIGURE:

5679 STRAND COURT
NAPLES, FL 34110
FAX: 239 594 2025
PHONE: 239 594 2021

CHANNEL CROSS SECTION: 7+00





HUMISTON & MOORE ENGINEERS
COASTAL ENGINEERING DESIGN AND PERMITTING

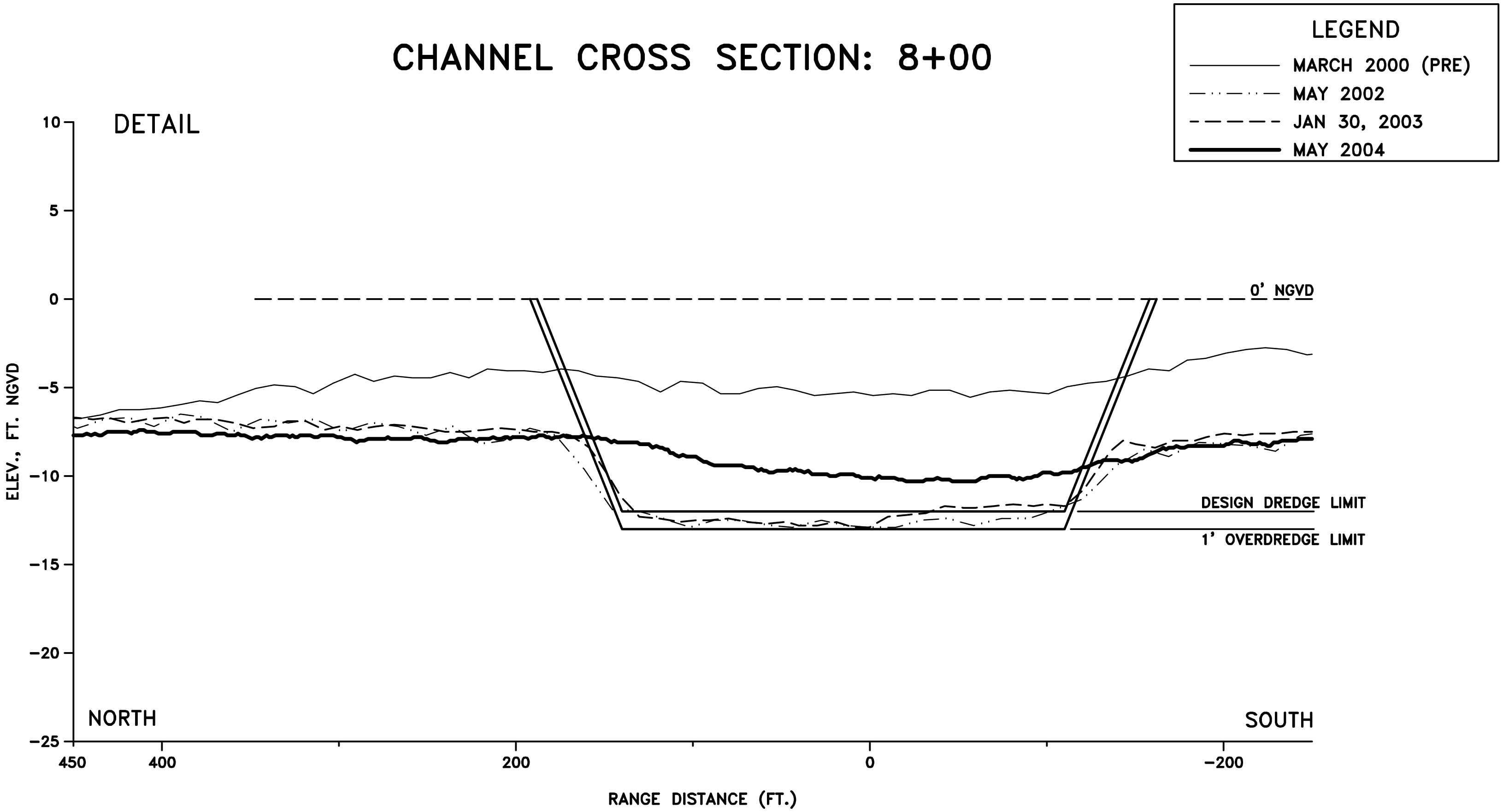
WIGGINS PASS INLET MAINTENANCE
CHANNEL CROSS SECTIONS

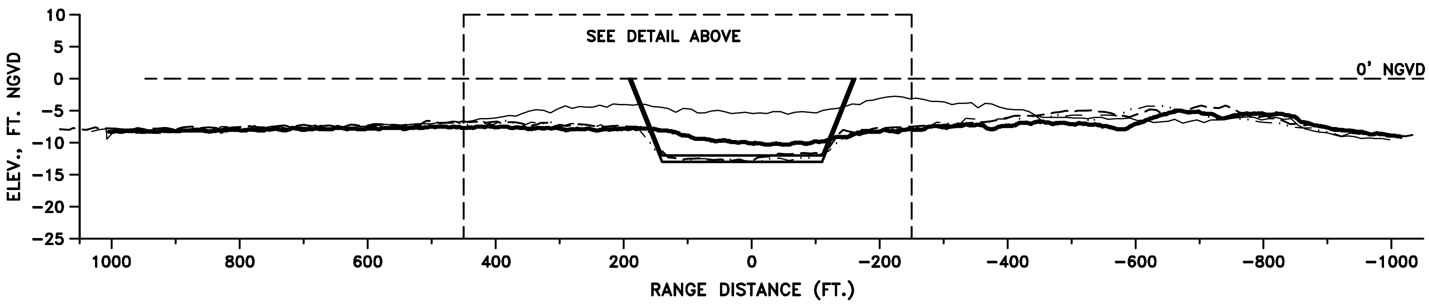
FOR: COLLIER COUNTY

DATE:07/14/04	FILE:11-054-XS	SCALE:1"=300'
JOB FILE:11054	DATUM:NGVD	FIGURE:

5679 STRAND COURT
NAPLES, FL 34110
FAX: 239 594 2025
PHONE: 239 594 2021

CHANNEL CROSS SECTION: 8+00



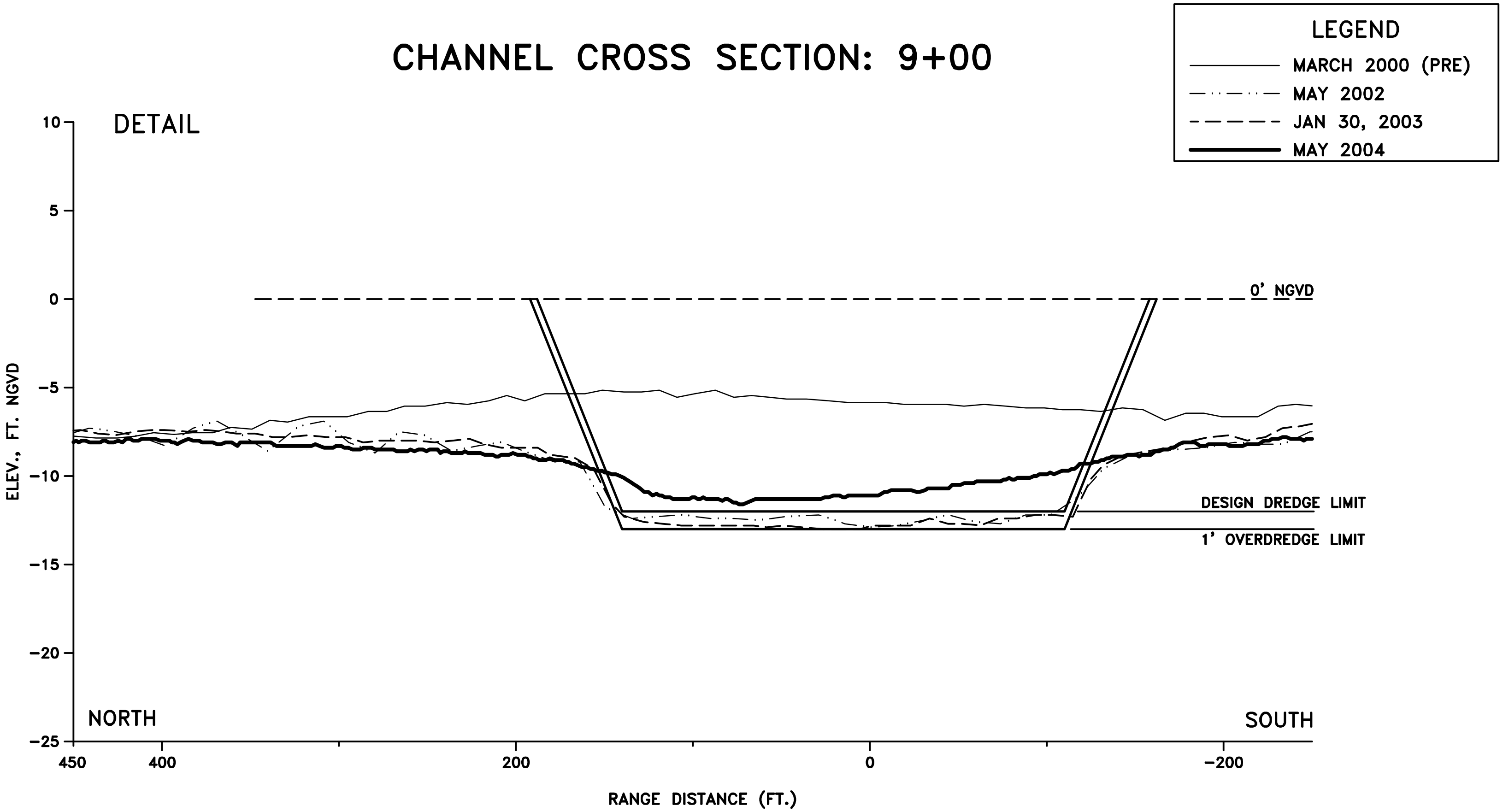


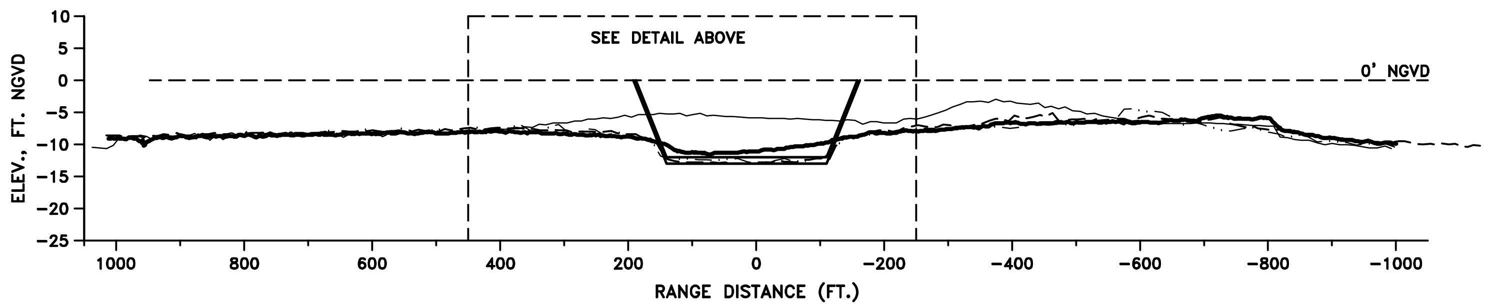
HUMISTON & MOORE ENGINEERS
COASTAL ENGINEERING DESIGN AND PERMITTING

WIGGINS PASS INLET MAINTENANCE CHANNEL CROSS SECTIONS		
FOR: COLLIER COUNTY		
DATE:07/14/04	FILE:11-054-XS	SCALE:1"=300'
JOB FILE:11054	DATUM:NGVD	FIGURE:

5679 STRAND COURT
NAPLES, FL 34110
FAX: 239 594 2025
PHONE: 239 594 2021

CHANNEL CROSS SECTION: 9+00





HUMISTON & MOORE ENGINEERS
COASTAL ENGINEERING DESIGN AND PERMITTING

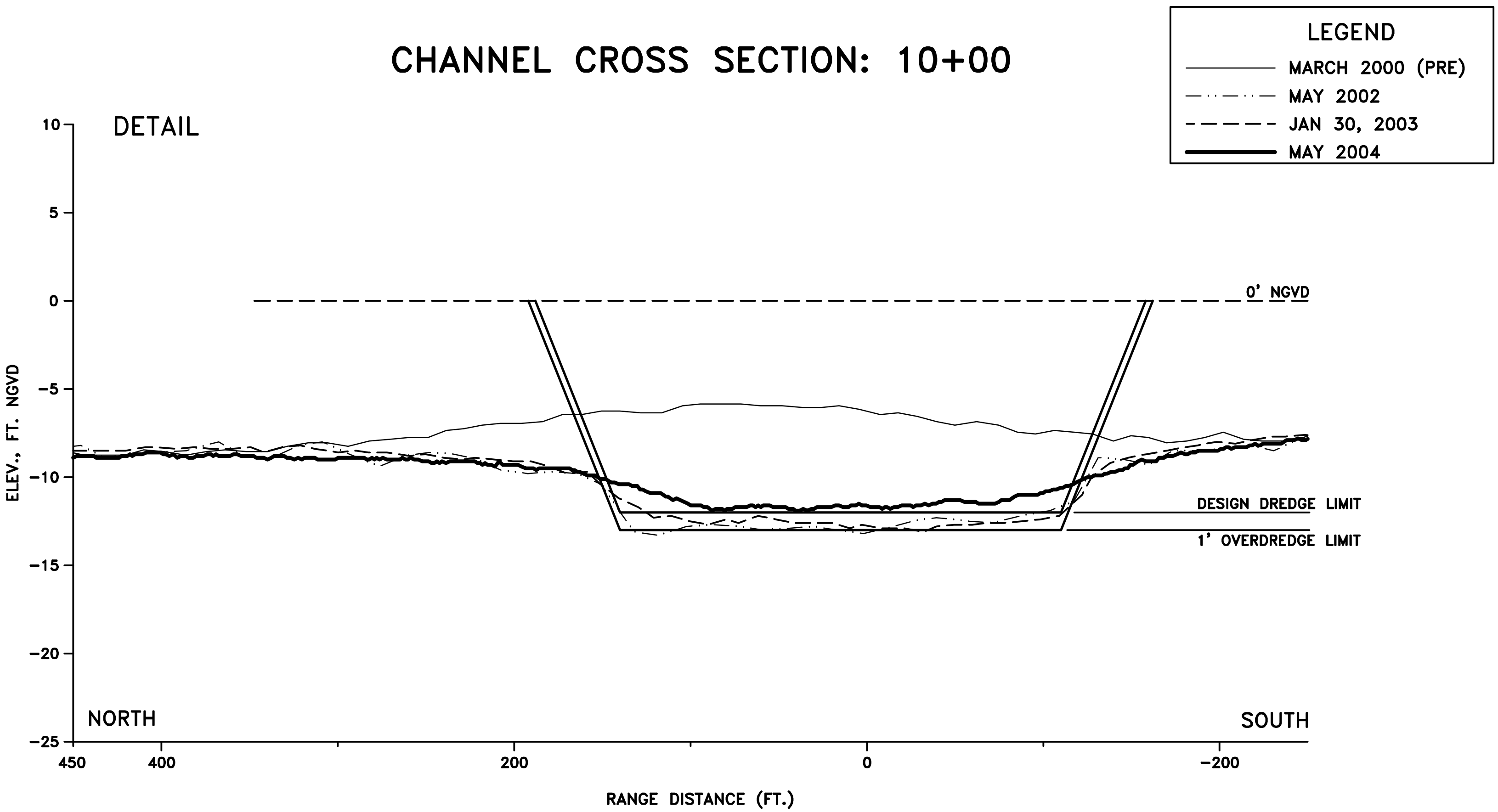
WIGGINS PASS INLET MAINTENANCE
CHANNEL CROSS SECTIONS

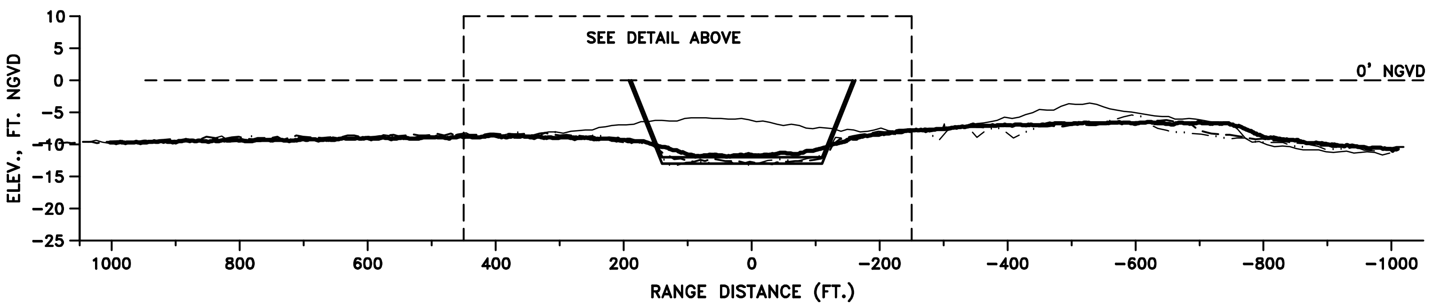
FOR: COLLIER COUNTY

DATE:07/14/04	FILE:11-054-XS	SCALE:1"=300'
JOB FILE:11054	DATUM:NGVD	FIGURE:

5679 STRAND COURT
NAPLES, FL 34110
FAX: 239 594 2025
PHONE: 239 594 2021

CHANNEL CROSS SECTION: 10+00



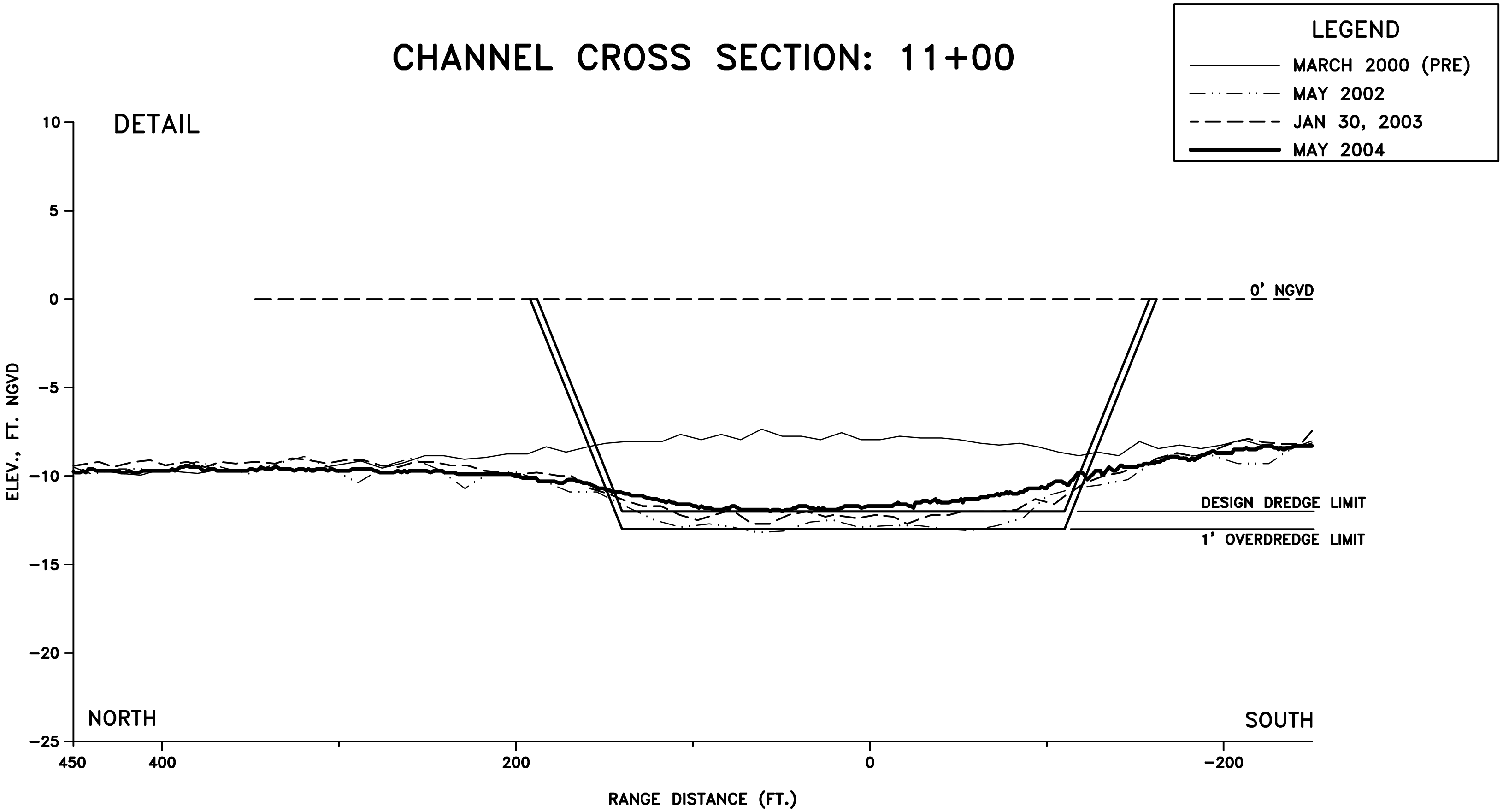


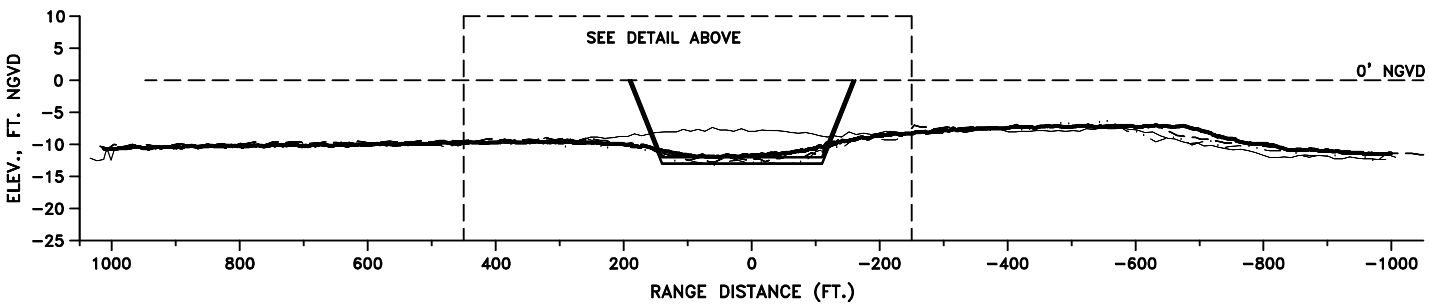
HUMISTON & MOORE ENGINEERS
COASTAL ENGINEERING DESIGN AND PERMITTING

WIGGINS PASS INLET MAINTENANCE CHANNEL CROSS SECTIONS		
FOR: COLLIER COUNTY		
DATE:07/14/04	FILE:11-054-XS	SCALE:1"=300'
JOB FILE:11054	DATUM:NGVD	FIGURE:

5679 STRAND COURT
NAPLES, FL 34110
FAX: 239 594 2025
PHONE: 239 594 2021

CHANNEL CROSS SECTION: 11+00



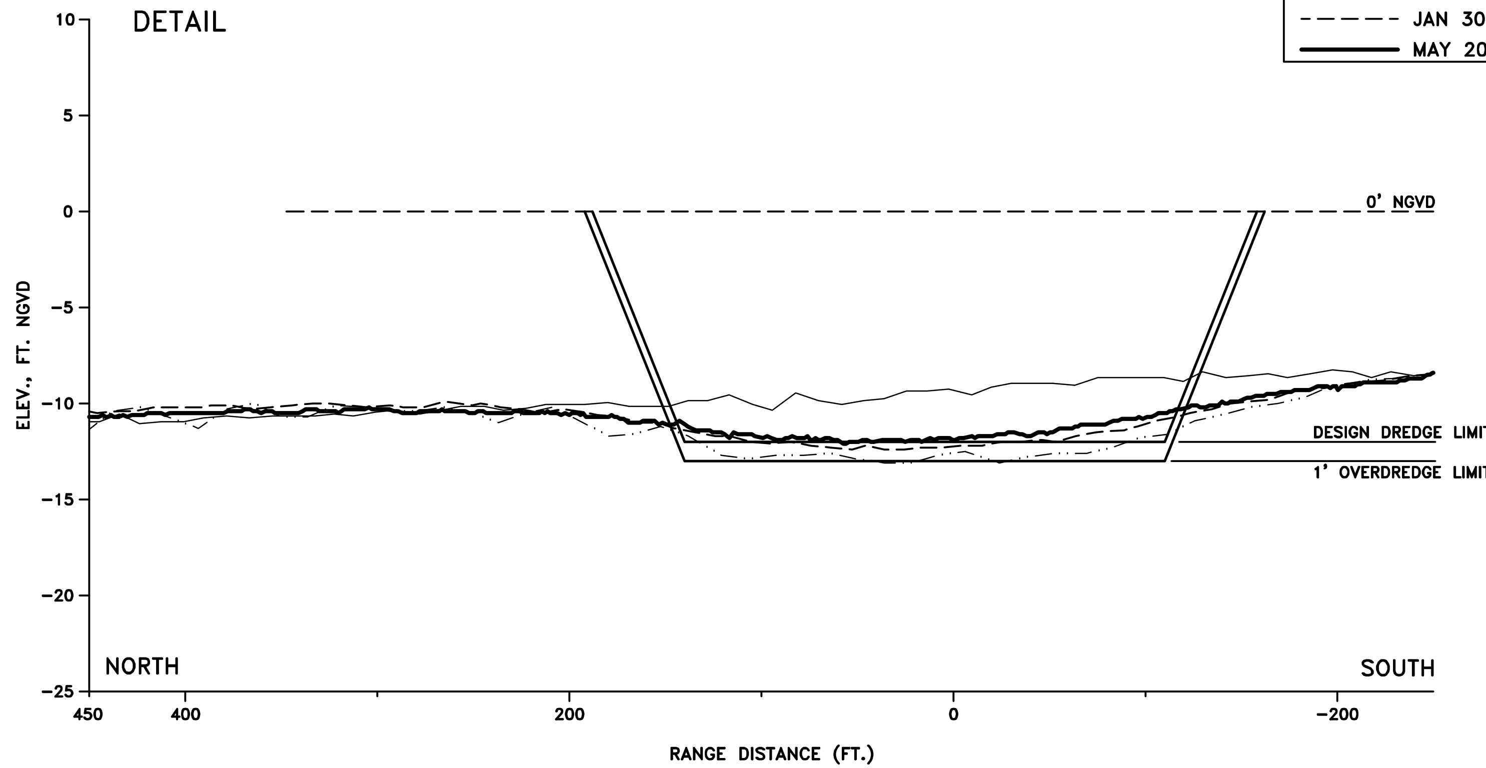


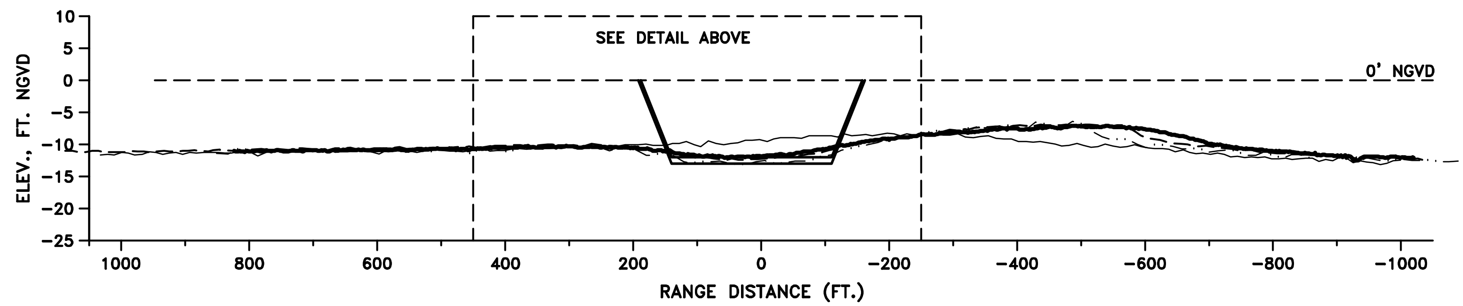
HUMISTON & MOORE ENGINEERS
COASTAL ENGINEERING DESIGN AND PERMITTING

WIGGINS PASS INLET MAINTENANCE CHANNEL CROSS SECTIONS		
FOR: COLLIER COUNTY		
DATE:07/14/04	FILE:11-054-XS	SCALE:1"=300'
JOB FILE:11054	DATUM:NGVD	FIGURE:

5679 STRAND COURT
NAPLES, FL 34110
FAX: 239 594 2025
PHONE: 239 594 2021

CHANNEL CROSS SECTION: 12+00





HUMISTON & MOORE ENGINEERS
COASTAL ENGINEERING DESIGN AND PERMITTING

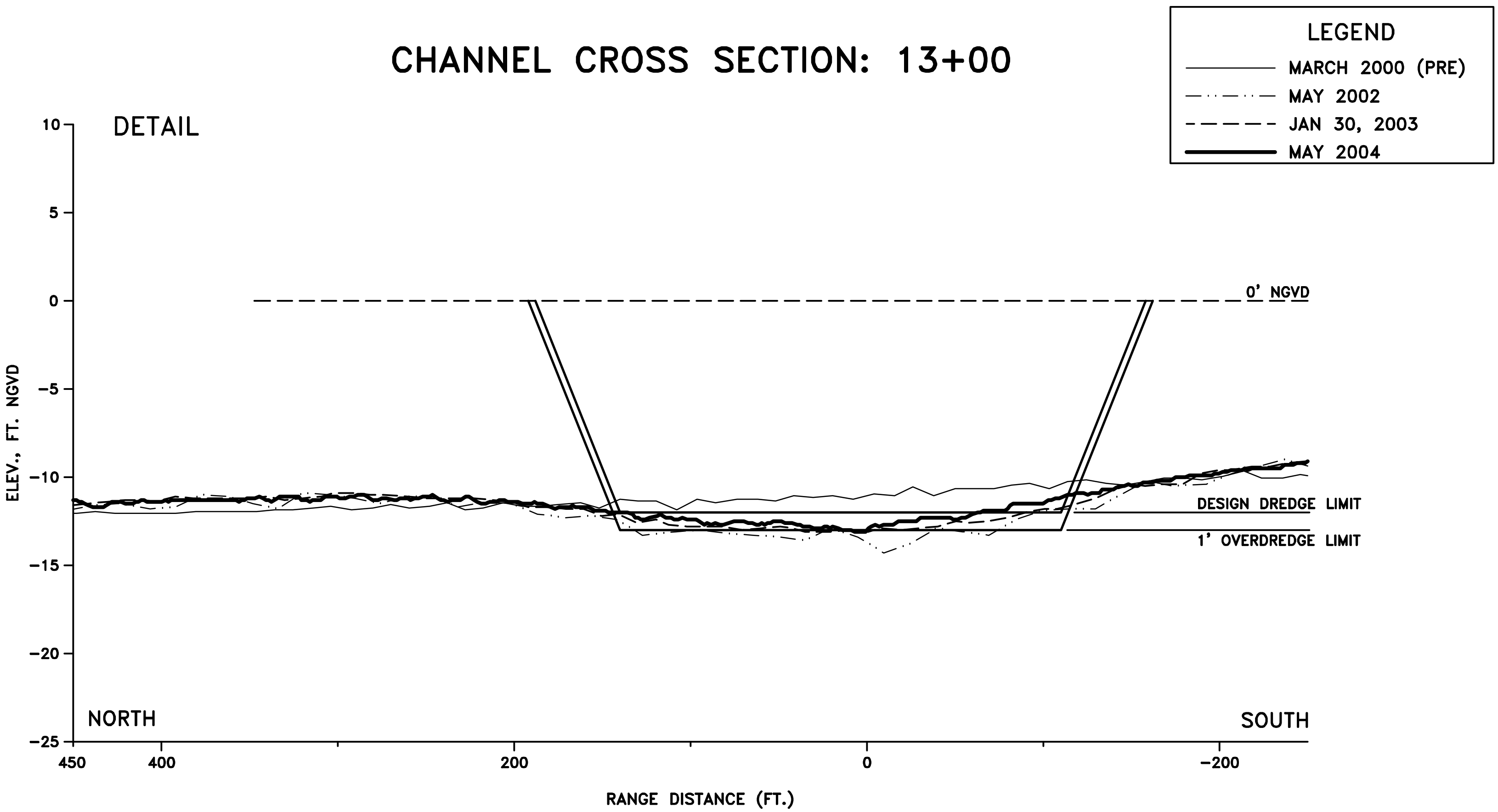
WIGGINS PASS INLET MAINTENANCE
CHANNEL CROSS SECTIONS

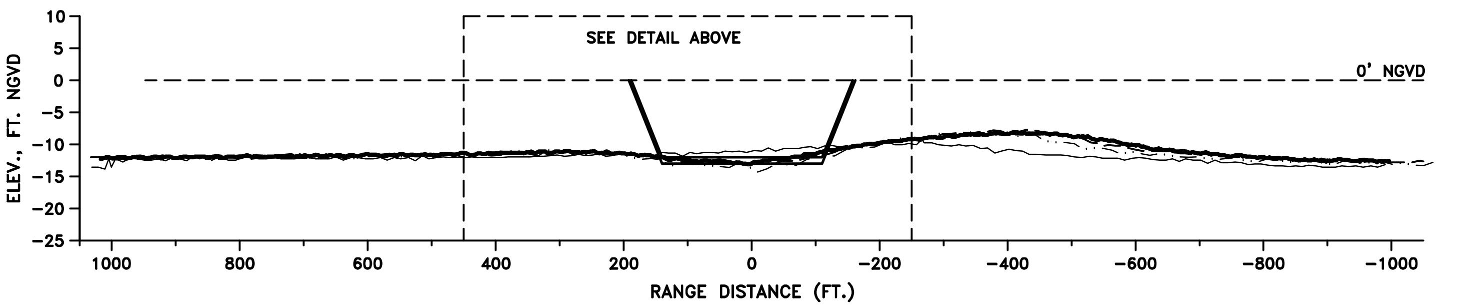
FOR: COLLIER COUNTY

DATE:07/14/04	FILE:11-054-XS	SCALE:1"=300'
JOB FILE:11054	DATUM:NGVD	FIGURE:

5679 STRAND COURT
NAPLES, FL 34110
FAX: 239 594 2025
PHONE: 239 594 2021

CHANNEL CROSS SECTION: 13+00





HUMISTON & MOORE ENGINEERS
COASTAL ENGINEERING DESIGN AND PERMITTING

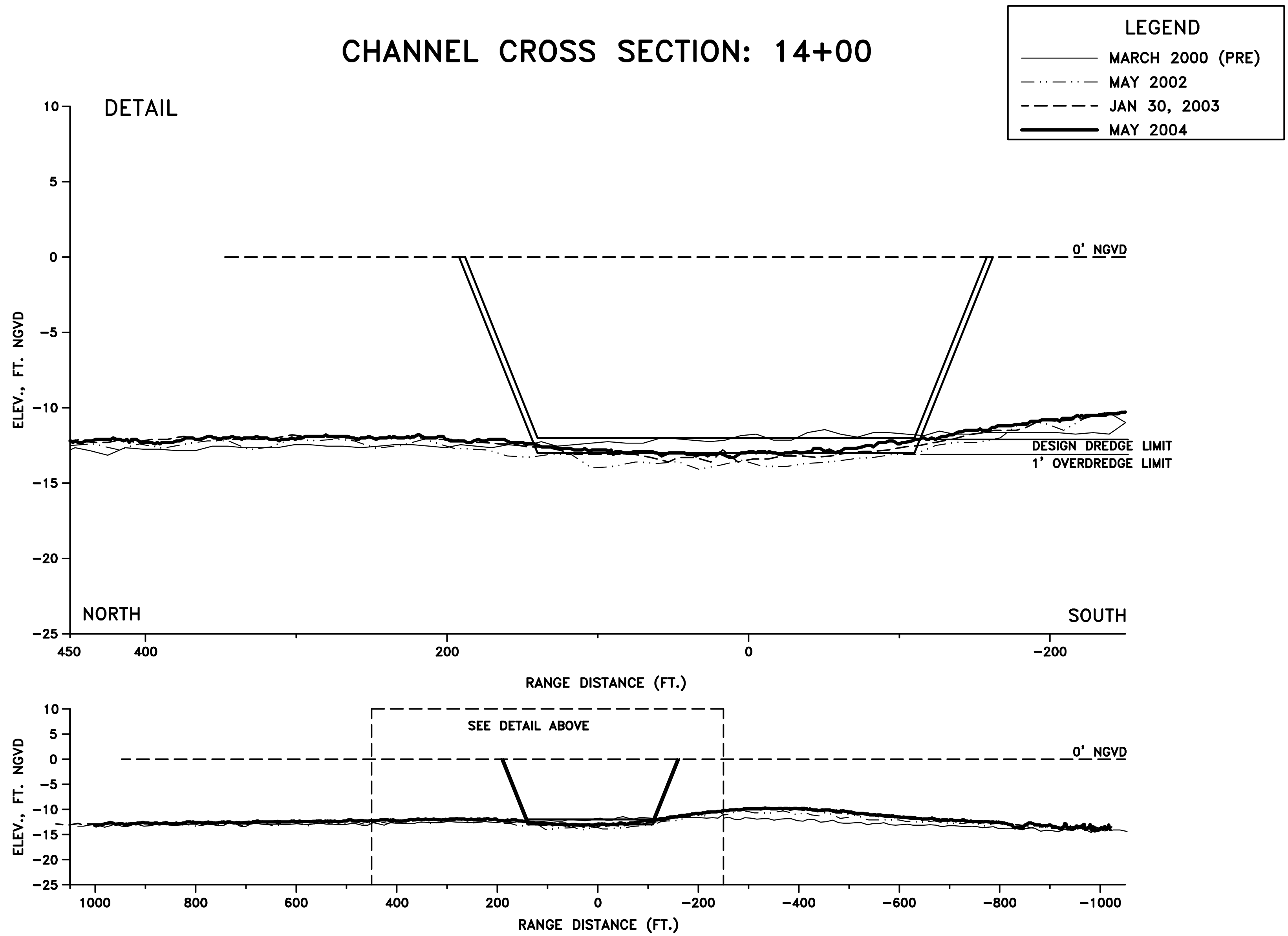
WIGGINS PASS INLET MAINTENANCE
CHANNEL CROSS SECTIONS

FOR: COLLIER COUNTY

DATE:07/14/04	FILE:11-054-XS	SCALE:1"=300'
JOB FILE:11054	DATUM:NGVD	FIGURE:

5679 STRAND COURT
NAPLES, FL 34110
FAX: 239 594 2025
PHONE: 239 594 2021

CHANNEL CROSS SECTION: 14+00

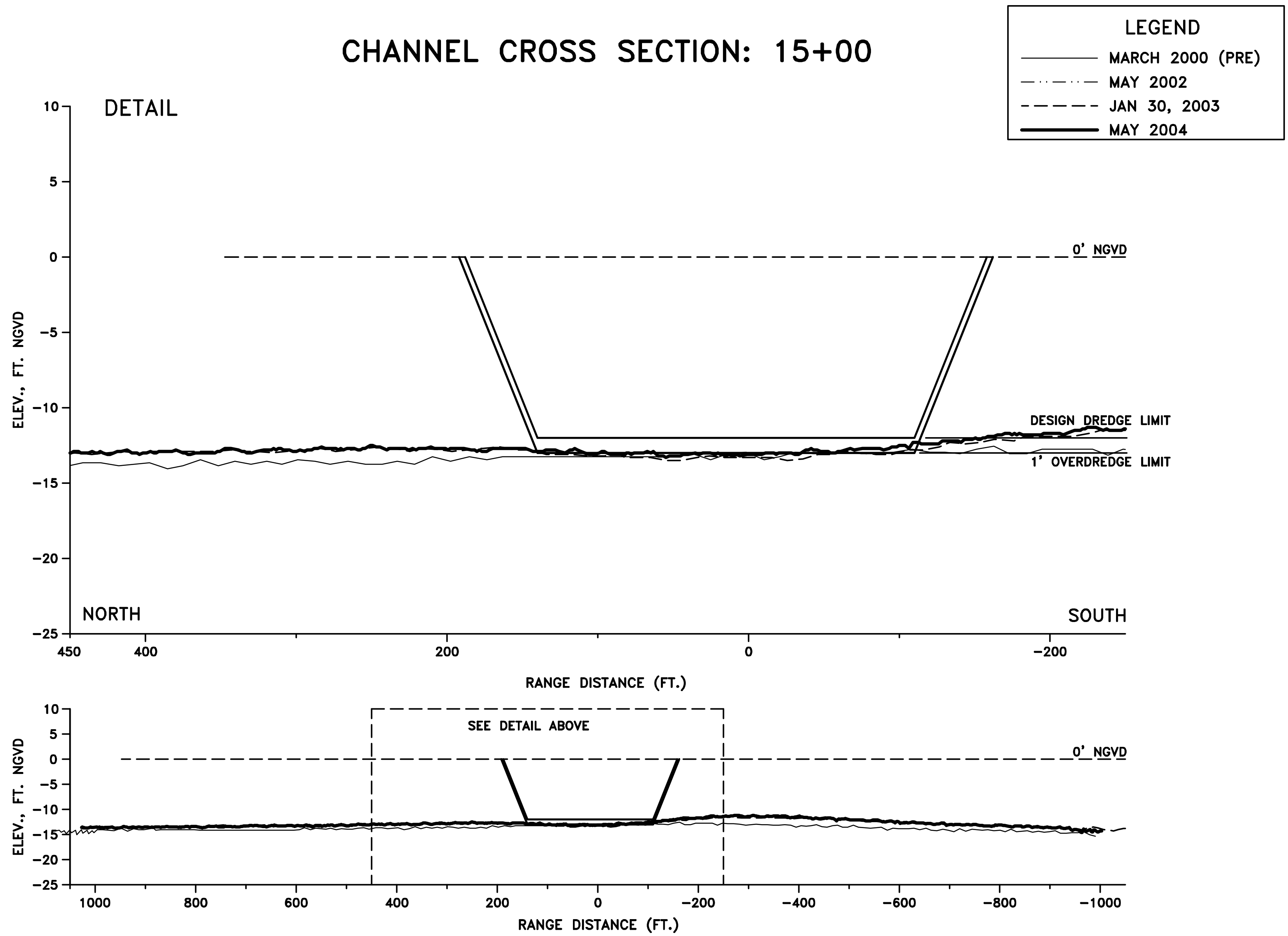


HUMISTON & MOORE ENGINEERS
COASTAL ENGINEERING DESIGN AND PERMITTING

WIGGINS PASS INLET MAINTENANCE CHANNEL CROSS SECTIONS		
FOR: COLLIER COUNTY		
DATE:07/14/04	FILE:11-054-XS	SCALE:1"=300'
JOB FILE:11054	DATUM:NGVD	FIGURE:

5679 STRAND COURT
NAPLES, FL 34110
FAX: 239 594 2025
PHONE: 239 594 2021

CHANNEL CROSS SECTION: 15+00



HUMISTON & MOORE ENGINEERS
COASTAL ENGINEERING DESIGN AND PERMITTING

WIGGINS PASS INLET MAINTENANCE CHANNEL CROSS SECTIONS		
FOR: COLLIER COUNTY		
DATE:07/14/04	FILE:11-054-XS	SCALE:1"=300'
JOB FILE:11054	DATUM:NGVD	FIGURE:

5679 STRAND COURT
NAPLES, FL 34110
FAX: 239 594 2025
PHONE: 239 594 2021