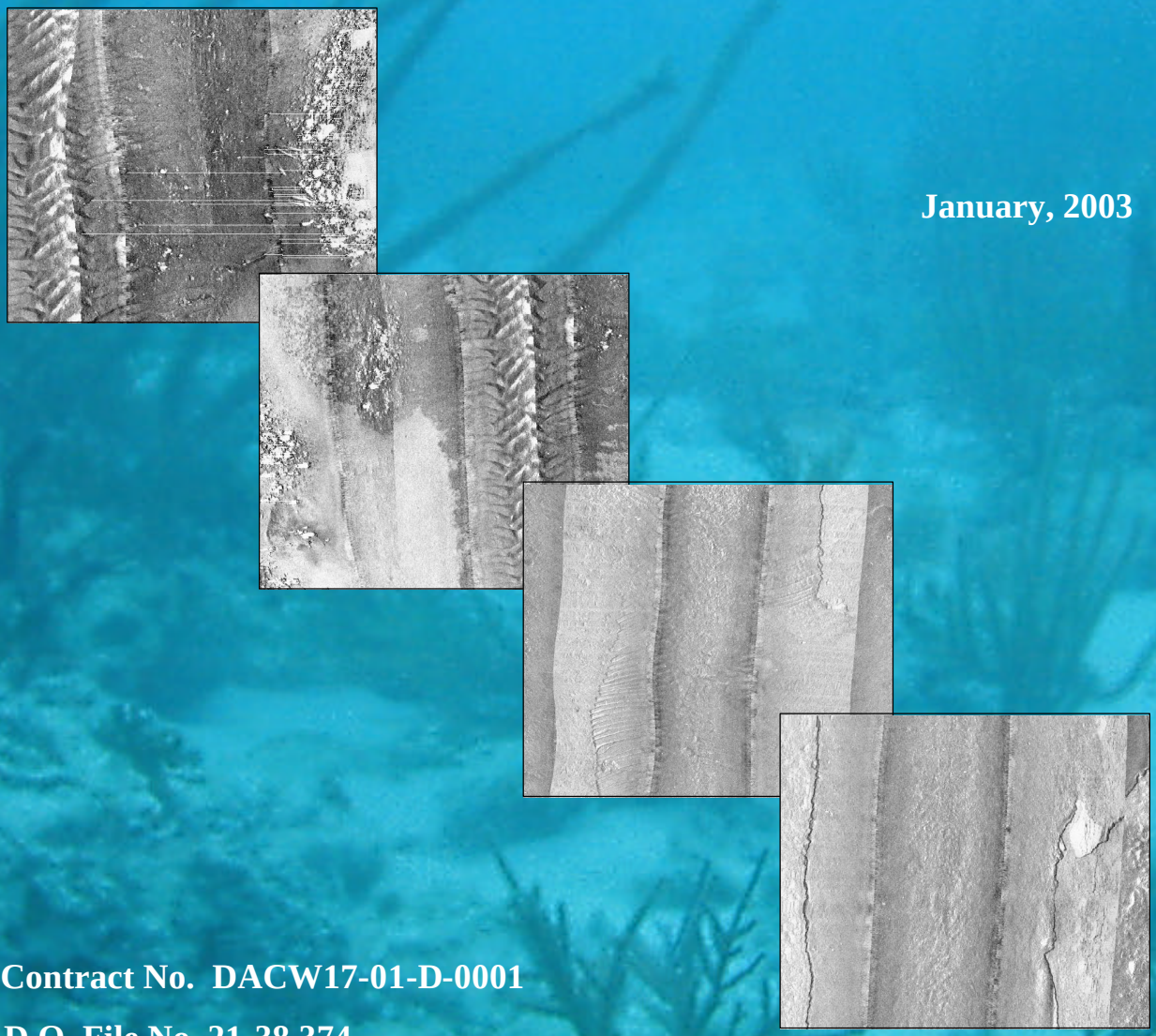
Key West, Entrance Channel
Geophysical Data Acquisition and Hydrographic Survey
Key West, Monroe County, Florida



January, 2003

Contract No. DACW17-01-D-0001

D.O. File No. 21-38,374

Survey Number 02-226

Sea Systems Corporation
2300 N.W. 30th Place
Pompano Beach, Florida

Key West Entrance Channel and Turning Basins

Geophysical Data Acquisition and Hydrographic Survey

Key West, Monroe County, Florida

USACE Survey Number 02-226

Contract Number DACW17-01-D-0001

Sea Systems Corporation Survey Number 02-3364

January, 2003

Prepared for:

The U.S. Army Corps of Engineers

Jacksonville District

Prepared by:

Sea Systems Corporation

2300 NW 30th Place
Pompano Beach, Florida
954-979-9071

Survey Title:	***Key West Entrance Channel*** ***Geophysical Data Acquisition and Hydrographic Survey*** ***Key West, Monroe County, Florida 02-226***
Date:	**January, *2003***
Prepared for:	***USACE, Jacksonville District***
Prepared by:	***Sea Systems Corporation*** ***Sea Systems Corporation Survey Number 02-3364***
Dates of Survey:	***October 7, 2002 through January 31, 2003***
Survey Location:	***Key West, Monroe County, Florida***

Notes:

1. This survey report has been prepared to accompany the bathymetric and geophysical survey data files prepared by Sea Systems Corporation for the United States Army Corps of Engineers (USACE), Jacksonville District. The survey is neither valid nor complete without the survey report entitled *"Key West Entrance Channel Geophysical Data Acquisition and Hydrographic Survey, January 2003"*, the final survey maps and the data files provided on the enclosed CD. The survey encompassed the Main Ship Channel, Cut-A, Cut-B, Cut-C, and the Truman Annex Turning Basin and were described by the USACE in the Technical Requirements for Survey Number 02-226, D.O. File Number 21-38,374 under Contract Number DACW17-01-D-0001.

2. This Hydrographic Survey, consisting of bathymetric, side scan sonar and sub-bottom data acquisition was conducted October 7, 2002 through January 31, 2003.

3. The coordinates shown hereon are in feet and are based on the Florida State Plane Coordinate System, East Zone (0901), Transverse Mercator Projection, North American Datum, 1983, 1990 adjustment (NAD83/90).

4. Contours and plan view elevations are relative to the Mean Lower Low Water (MLLW), which is 0.65 feet below the National Geodetic Vertical Datum of 1929 (NGVD 29). Contours shown hereon are in feet relative to Mean Lower Low Water (MLLW) and are displayed at one-foot intervals and are based on a gridded digital terrain model.

5. Vessel positioning was obtained using a Trimble, Real-time Differential Global Positioning System (DGPS) utilizing the United States Coast Guard (U.S.C.G.) Navbeacon.

6. Bathymetric data was obtained using an Odom Echotrac Model MKII survey grade echosounder with a 200kHz narrow beam transducer.

7. Tidal reductions were based on observations of a tide staff set near and relative to a Army Corps of Engineers bronze disk set in asphalt stamped "KH4 1961" having an elevation of 6.14 feet based on (NGVD29).

8. Side scan sonar data was acquired using an Edgetech TD-272 dual frequency towfish operating at 500kHz.

9. Sub-bottom data was collected utilizing an Edgetech SB-424 and an SB-216S towfish. Acoustic Sub-bottom data was supplemented with data obtained from jet probe investigation.

10. Jet probes were performed using a 1" galvanized pipe 10 foot in length.

11. Submerged features, as depicted on the charts, have been described based upon their apparent physical characteristics through interpretation of side scan sonar imagery and ground-truthing based on underwater video and photography.

12. Underground utilities, other than those observed from the side scan sonar imagery, were not located as part of this survey and should be field verified prior to any dredging and/or construction.

13. Aids to navigation and navigation information signs were located during this survey.

14. This survey report and associated charts or maps are not valid without the signature and the original raised seal of a Florida Licensed Surveyor and Mapper.

15. Refer to field book numbers "2003 Monroe County, 23 and 24"

16. Refer to raw field data:

    a. Magnetic Optical Drive Discs 02-226-1, 02-226-2, and 02-226-3.
    b. CADD files D226SH01-SH16.DGN
    c. Echosounder rolls dated October 8, 9, 10, 11, and 12, 2002

Kenneth C. Jackson, P.S.M. Date
Florida Registration Number LS 4549
Vice President of Surveying
Sea Systems Corporation
Florida Authorization Number LB 5861

Sea Systems Corporation was contracted by the U.S. Army Corps of Engineers, Jacksonville District (USACE) in September of 2002 to conduct a comprehensive survey of the Key West Main Ship Channel, including Cut-A, Cut-B and Cut-C of the entrance channel and the Truman Annex Turning Basin, Key West, Florida, (Contract Number DACW17-01-D-0001, USACE Survey Number 02-226). The objectives of the survey were to accurately map the bathymetric characteristics of the channel areas and turning basin, identify and map the horizontal extent of exposed hardbottom, rock outcrops and / or manmade debris within these areas and to obtain sufficient sub-bottom data for assessment of sediment thickness over subsurface hardbottom.

To accomplish these objectives, specific tasks were performed by Sea Systems Corporation during the months of October 2002 through January 2003. Specifically, this included a bathymetric survey, side scan sonar survey, sub-bottom profile investigation and dive-supported groundtruthing operations. The surveys were conducted in accordance with the Scope of Work developed by the USACE dated September 19, 2002. Additionally, the surveys were conducted in compliance with the USACE "Technical Requirements for Hydrographic and Topographic Surveys" and the Minimum Technical Standards as set forth by the Florida Board of Professional Surveyors and Mappers in Chapter 61G17-6, of the Florida Administrative Code pursuant to Section 472.027 of the Florida Statutes. As prescribed in the Scope of Work, the vertical datum for the surveys was relative to Mean Lower Low Water (MLLW), which is 0.65 feet below the National Geodetic Vertical Datum, 1929 (NGVD29). The Horizontal Datum for the survey was in feet and relative to the Florida State Plane Coordinate System, East Zone (0901), North American Datum, 1983 (NAD83).

The bathymetric survey was conducted on October 8, 2002 through October 22, 2002 with minor supplemental data collection on December 6, 2002. The primary purpose of the survey was to map the bathymetric characteristics of the channel areas and turning basin. The data was also used to assist in the interpretation of side scan sonar data and to reduce sub-bottom data to subsurface strata elevation for proper comparison with seafloor elevation and ultimately sediment volume analyses. The bathymetric data was acquired using a single beam, automated hydrographic survey system comprised of a survey grade echosounder, Differential Global Positioning System (DGPS), and computer based navigation / data collection system. Data was collected along transects spaced at one hundred (100) foot intervals aligned perpendicular to the centerline of each cut within the channel areas and at equivalent transect spacings within the project turning basin.

The side scan sonar survey was commenced on October 19, 2002 and subsequently completed on November 5, 2002. The purpose of the investigation was to identify, locate and characterize features projecting above the seafloor such as hard-bottom areas, rock outcrops, and manmade features or debris. The survey was conducted using a fully digital side scan sonar data acquisition system comprised of an Edgetech Dual Frequency (100/500 kHz) Towfish (Model TD-272) and Oceanic Imaging Consultants (OIC) computer-based data collection / processing system (GeoDAS). Side scan sonar data was collected along transects spaced at one hundred fifty (150) foot (fifty (50) meters +/-) intervals oriented parallel to the centerline of each cut and as required to achieve one hundred percent 100% bottom coverage within the turning basin. For optimum resolution, data was collected at the

500kHz frequency setting. A range setting of fifty (50) meters was used in order to achieve adequate overlap of data between adjoining lines.

The sub-bottom profile survey was commenced on October 30, 2002 and completed on November 5, 2002. The intent of this remote sensing survey was to identify and map subsurface material stratifications with the objective of determining the elevation of bedrock or subsurface hardbottom. The resultant data is to be used to assess volume of sediment over hardbottom for ultimate use in planning future dredging projects. The survey was conducted utilizing an Edgetech SB-424 and a SB-216S Swept Frequency Towfish. Data was collected along transects spaced two hundred (200) foot intervals oriented perpendicular to the centerline of each cut. The transects were established as required to coincide with the transects developed for the bathymetric survey operations.

In order to verify the results of both the sub-bottom profile and side scan sonar surveys, an extensive groundtruthing effort was conducted between the dates of November 1, 2002 and January 30, 2003. Groundtruthing the sub-bottom survey results consisted of numerous jet probes along equivalent transects as the remote sensing operations combined with random jet probes in specific areas of questionable remote sensing results and in areas where seafloor conditions prohibited or deterred acoustic energy penetration. The intent of the jet probe investigation was to confirm variations in sediment type and consistency and to verify depths at which material changes occur. Ten (10) foot probes were used for the operation to achieve penetration depths that meet or exceed the proposed design channel cuts described by the USACE.

Groundtruthing operations pertaining to the results of the side scan sonar survey consisted of underwater still and video photography within areas of questionable classification and diver observations at specific features of interest. The visual observations of seafloor conditions assisted in the classification of acoustic images acquired from the side scan sonar investigation and helped to assess the presence or absence of biological habitat within areas of exposed hardbottom or rock outcropping.

Upon completion of the field data acquisition, all data was processed, charted and reviewed. Mosaics were created using the digital side scan sonar imagery, which served as base sheets for bathymetric data overlays and to depict the results of the side scan sonar data interpretation. Digital Terrain Models (DTM's) were developed from the final edited and reduced bathymetric data as required for creating contour maps and to prepare cross section plots. Surface models developed from the bathymetric data were also used to assist in the interpretation and reduction of acoustic sub-bottom profile data as well as the supplemental jet probe data. Sub-bottom material changes determined through the combination of acoustic and jet probe measures, indicating apparent subsurface hardbottom strata, were modeled as required to depict such subsurface layers on bathymetric cross section plots. Models of the apparent subsurface hardbottom were also produced for analysis of sediment thickness throughout the channel areas as well as the turning basin.

Final deliverables included full size charts (30" x 42" glossy paper) produced at a scale of 1" = 100'. In addition to the final charts, digital data files were provided on CD ROM, in ASCII format containing the results of the survey, as well as digital CADD files in *MicroStation* format (DGN), and digital mosaics of

the side scan sonar imagery. As survey report was prepared to accompany the charts and included a detailed description of survey methodologies along with a discussion regarding the results of the various survey components.

Results of the side scan sonar survey with supplemental diver verification indicate the presence of exposed hardbottom communities projecting into the Main Ship Channel, primarily between stations 0+00 and 60+00. In this area of the Main Ship Channel, sub-bottom profile survey results combined with numerous jet probes indicate subsurface hardbottom elevations to be very erratic with thickness of sand overlying hardbottom within the limits of the channel to vary from less than one (1) foot to over ten (10) feet, or beyond the limits of jet probing.

Between station 60+00 and station 155+00 of the Main Ship Channel, no exposed hardbottom features were encountered and sediment thickness increased to over ten (10) feet on average. Side scan sonar results, as well as diver observations indicate this region of the channel to consist primarily of sand bottom with little or no exposed features of interest with exception to apparently five (5) cable crossings located at stations 58+00, 112+00, 124+00, 137+00 and 141+00. Subsequent investigations such as magnetometer surveys are recommended to confirm the presence of these apparent subaqueous cables.

Between stations 155+00 and approximately station 160+00 of the Main Ship Channel, exposed hardbottom with medium to high relief characteristics was encountered predominately along the outer edges of the channel limits. Side scan sonar results combined with subsequent groundtruthing efforts revealed these features to be a natural reef hardbottom area combined with large deposits of manmade debris. Within the limits of the channel, sub-bottom profile results indicate the sediment thickness within the channel to range from three (3) to six (6) feet.

From about station 160+00 northerly through the remainder of the Main Ship Channel to approximately the north limits of Cut-A, survey results indicate seafloor conditions to consist of predominately sand ranging from three (3) to over ten (10) feet with only one (1) isolated patch of apparent exposed hardbottom. At the northerly limits of Cut-A, the subsurface hardbottom profile rises rapidly to approximately station 60+00 where exposed low to medium relief hardbottom was encountered. North of this feature, through the entire limits of Cut-B and Cut-C, remote sensing results indicate seafloor conditions to be a thin veneer of sand over hardbottom.

Small pockets of sand ranging from one (1) to three (3) feet were encountered at the extreme northwesterly corners of Cut-C. Also within Cut-C, side scan sonar results indicate a cable crossing at approximately station 40+00 extending northwesterly across the cut to about station 43+00. Within the Truman Annex Turning Basin, remote sensing results indicate the entire basin to be silt and coarse sand, two (2) to three (3) feet thick, overlying hardbottom. Side scan sonar results revealed numerous isolated objects of unknown classification within this basin.

Introduction

Survey Methodologies

Survey Results

Appendix A: 11”x17” Reduced Charts

Appendix B: Jet Probe Results

Appendix C: Representative Photographs

In September, 2002 Sea Systems Corporation was contracted by the U.S. Army Corps of Engineers, Jacksonville District (USACE) to conduct a detailed survey of the Key West Main Ship Channel including Cut-A, Cut-B, Cut-C, and the Truman Annex Turning Basin in Key West, Florida, (Contract Number DACW17-01-D-0001, Survey Number 02-226). The scope of work included a bathymetric survey, side scan sonar survey and sub-bottom profile survey. Extensive groundtruthing operations were also employed to confirm the results of the remote sensing investigations. The objectives of the survey were to accurately map the bathymetric characteristics of the channel areas and turning basin, identify and map the horizontal extent of exposed hardbottom, rock outcrops and / or manmade debris within these areas and to obtain sufficient sub-bottom data for assessment of sediment thickness over subsurface hardbottom.

Field survey operations were commenced in October of 2002 and subsequently completed in January of 2003. This report describes the full extent of the survey including methodologies and equipment employed for each specific task and results obtained. Chart reductions (11”x17) along with digital CADD files (MicroStation .dgn format) copied to CD ROM have been incorporated in the appendices of the report. Representative photographs and clipped digital images of representative side scan sonar results have also been incorporated into the Appendix.

The following section describes the methodologies employed for the geophysical, bathymetric, and side scan sonar survey operations.

General:

The surveys were conducted in accordance with the Scope of Work developed by the USACE dated September 19, 2002. Additionally, the surveys were conducted in accordance with the USACE "Technical Requirements for Hydrographic and Topographic Surveys" and the Minimum Technical Standards as set forth by the Florida Board of Professional Surveyors and Mappers in Chapter 61G17-6 of the Florida Administrative Code pursuant to Section 472.027 of the Florida Statutes.

Vertical datum: Feet, relative to Mean Lower Low Water (MLLW), (0.65 feet below the National Geodetic Vertical Datum of 1929 (NGVD29).

Horizontal datum: Feet, relative to the Florida State Plane Coordinate System, East Zone (0901), North American Datum, 1983 (NAD83).

Task One: Bathymetric Survey

The bathymetric survey was conducted on October 8, 2002 through October 22, 2002 with minor supplemental data collection on December 6, 2002. The bathymetric survey was conducted using an Odom Echotrac MK II survey grade Echosounder with a 200kHz narrow beam transducer. The Coastal Oceanographic's "Hypack" system was used for vessel navigation with positioning data provided by a Trimble Real-Time Differential Global Positioning System (DGPS), Model DSM212L.

Data was collected along transects spaced at one hundred (100) foot intervals aligned perpendicular to the centerline of each cut within the channel areas and at equivalent transect spacings within the project turning basin. During the course of the survey, tide readings were recorded at ten (10) minute intervals. Tidal observations were recorded from a tide staff set near and relative to a USACE bronze disk set in asphalt stamped "KH4 1961" having an elevation of 6.14 feet based on (NGVD29).

Upon completion of the data acquisition, raw soundings were corrected for tides and subsequently reduced to MLLW datum via application of the appropriate correction factor as described above. Final processed data was imported to MicroStation and subsequently used to develop a Digital Terrain Model (DTM) of the seafloor. The resultant DTM was used to generate contours, which were depicted at one (1) foot intervals on charts as an overlay to the side scan sonar mosaics. Cross-sections of the DTM were also extracted at two hundred (200) foot intervals.

Task Two: Side Scan Sonar Survey

The side scan sonar survey was commenced on October 19, 2002 and subsequently completed on November 5, 2002. The survey was conducted using a fully digital side scan sonar data acquisition

system comprised of an Edgetech Dual Frequency (100/500 kHz) Towfish (Model TD-272) and Oceanic Imaging Consultants (OIC) computer-based data collection / processing system (GeoDAS). For vessel navigation, the Coastal Oceanographic's "Hypack" system was used with positioning data provided by a Trimble Real-Time Differential Global Positioning System (DGPS), Model DSM212L.

Side scan sonar data was collected along transects spaced at one hundred fifty (150) foot (fifty (50) meters +/-) intervals oriented parallel to the centerline of each cut and as required to achieve one hundred percent 100% bottom coverage within the turning basin. Data was collected along adjacent lines in opposing directions to enable features to be viewed in different perspectives, maximizing the accuracy of the interpretation efforts. For optimum resolution, data was collected at the 500kHz frequency setting. A range setting of fifty (50) meters was used in order to achieve adequate overlap of data between adjoining lines. During the survey, side scan sonar images were viewed continuously for real-time interpretation and annotation of any features of interest. Data was recorded in digital format on magneto-optical drives for post-survey reviewing, processing, mosaicking and archiving purposes.

Upon completion of the field efforts, the digital side scan sonar images were processed as required to produce georeferenced mosaics for each of the described sites. The mosaics were used to identify, map and classify features lying on or protruding above the seafloor. Features or objects identified from the review of the digital images were identified on charts. The side scan sonar mosaics were imported to MicroStation and subsequently used as a base sheet for bathymetric plan view overlays and the depiction of hard-bottom limits, debris or manmade features mapped as part of the overall survey.

Hardbottom features were specifically mapped and classified by apparent type of relief and coverage in accordance with parameters specified by the USACE. The parameters are as follows:

Relief Type:

Low Relief :	less than 1 foot
Medium Relief :	1-3 feet
High Relief:	3 feet or higher

Coverage Type:

Scattered:	less than or equal to 20 percent coverage
Medium:	greater than 20 percent, less then 75 percent coverage
Hardbottom:	greater than or equal to 75 percent coverage

As part of the scope of work associated with this task, groundtruthing operations were employed to verify the results of the side scan sonar survey. This consisted of underwater still and video photography within areas of questionable classification and diver observations at specific features of interest. The visual observations of seafloor conditions assisted in the classification of acoustic images acquired from the side scan sonar investigation

Task Three: Sub-bottom Investigation

The sub-bottom profile survey was commenced on October 30, 2002 and completed on November 5, 2002. The survey was conducted utilizing an Edgetech SB-424 and a SB-216S Swept Frequency Towfish. For vessel navigation, the Coastal Oceanographic's "Hypack" system was used with positioning data provided by a Trimble Real-Time Differential Global Positioning System (DGPS), Model DSM212L. Data was collected along transects spaced two hundred (200) foot intervals oriented perpendicular to the centerline of each cut. The transects were established as required to coincide with the transects developed for the bathymetric survey operations.

In order to verify the results of the acoustic sub-bottom profile survey and to obtain supplemental sub-bottom data in areas void of remote sensing data, an extensive jet probing effort was implemented. This included ten (10) foot maximum jet probes, along equivalent transects as the remote sensing operations combined with random jet probes in specific areas of questionable remote sensing results and in areas where seafloor conditions prohibited or deterred acoustic energy penetration.

Upon completion of the data acquisition, an (X) easting, (Y) northing, and (D) sediment thickness, file was imported into MicroStation and subsequently used to develop a Digital Terrain Model (DTM) of the sub-bottom. The DTM was developed primarily from data acquired from the acoustic sub-bottom profiler, with supplemental jet probe data utilized where necessary. The resultant DTM was used to generate isopack contours, which were depicted at one (1) foot intervals on charts as an overlay to the side scan sonar mosaics. Cross-sections of the DTM were also extracted at two hundred (200) foot intervals.

Final Deliverables:

Final deliverables included full size charts (30" x 42" glossy paper) produced at a scale of 1" = 100'. In addition to the final charts, digital data files were provided on CD ROM, in ASCII format containing the results of the survey, as well as digital CADD files in *MicroStation* format (DGN), and digital mosaics of the side scan sonar imagery.

Results of the side scan sonar survey with supplemental diver verification indicate the presence of exposed hardbottom communities projecting into the Main Ship Channel, primarily between stations 0+00 and 60+00. The hardbottom features are comprised of varying degrees of relief ranging from low (less than one (1) foot) to medium (between one (1) and three (3) feet), with the higher relief features predominant towards the outer limits of the channel extending outwards beyond the limits of ship navigation. Within the limits of the channel, exposed hardbottom features were also identified, however less pronounced and intermixed with large sand pockets, isolated rock outcrops and gravel type seafloor characteristics. Hardbottom areas were confirmed to have extensive marine habitat especially within areas of higher, more dense hardbottom coverage. (Reference Plates 1 through 4 in **Appendix C)**

In this area of the Main Ship Channel, sub-bottom profile survey results combined with numerous jet probes indicate subsurface hardbottom elevations to be very erratic with thickness of sand overlying hardbottom within the limits of the channel to vary from less than one (1) foot to over ten (10) feet, or beyond the limits of jet probing. This information was acquired primarily through jet probes due to seafloor sediment characteristics in this area, which limited acoustic penetration via remote sensing operations for detection of subsurface material changes. Subsurface hardbottom models were developed based upon the limited jet probe data to generally describe the sub-bottom characteristics in the area. Additional investigations would be required to fully evaluate and quantify the extent of sediment over hardbottom or bedrock.

Proceeding northerly along the Main Ship Channel, acoustic sub-bottom profile results indicate that the subsurface hardbottom profile drops to greater than ten (10) feet below seafloor levels until at or about station 155+00 where again exposed hardbottom features were encountered. Side scan sonar results, as well as diver observations indicate this region of the channel between station 60+00 and station 155+00 to be essentially free of exposed hardbottom and apparently consisting of sand bottom with little or no exposed features of interest with exception to apparently five (5) cable crossings located at stations 58+00, 112+00, 124+00, 137+00 and 141+00. These apparent cable crossing were identified through analysis of images from the side scan sonar survey. Subsequent investigations such as magnetometer surveys combined with diver investigations are recommended to confirm the presence and horizontal / vertical location of these apparent subaqueous cables.

Between stations 155+00 and approximately station 160+00 of the Main Ship Channel, exposed hardbottom with medium to high relief characteristics was encountered predominately along the outer edges of the channel limits. Side scan sonar results combined with subsequent groundtruthing efforts revealed this area to be a natural reef hardbottom area combined with large deposits of manmade debris. (Reference Plates 5 and 6 in **Appendix C**). These features extended slightly into the navigation channel, however predominated the regions either side of the channel. Within the primary limits of the channel, seafloor characteristics consisted of coarse sand with no exposed hardbottom. Sub-bottom profile results indicate the sediment thickness within the channel to range from three (3) to six (6) feet. Acoustic sub-bottom results were confirmed via jet probes.

From about station 160+00 northerly through the remainder of the Main Ship Channel to approximately

the north limits of Cut-A, remote sensing results indicate seafloor conditions to consist of predominately sand with only one (1) isolated patch of apparent exposed hardbottom just beyond the easterly toe of the channel at approximately station 164+00. Acoustic sub-bottom profile results with confirmation via jet probes indicate a subsurface material change occurring at approximately three (3) to over ten (10) feet below seafloor elevations through this reach of the channel.

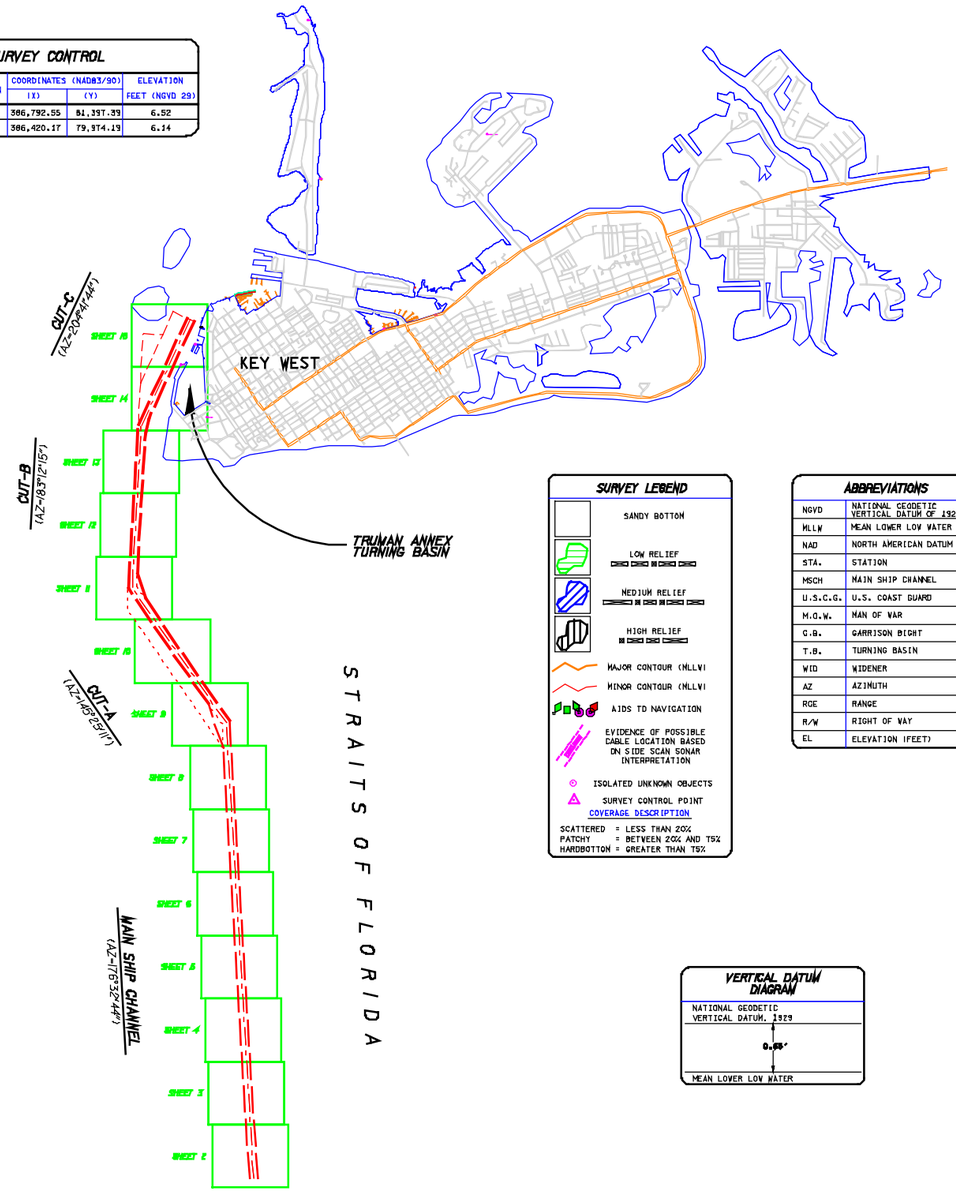
At the northerly limits of Cut-A, the subsurface hardbottom profile rises rapidly to approximately station 60+00 where a patch of exposed low to medium relief hardbottom was encountered within this limits of the channel. This exposed hardbottom feature diminished at the P.I. of Cut-A and Cut-B. Proceeding northerly, through the entire limits of Cut-B and Cut-C, remote sensing results indicate seafloor conditions to be a thin veneer of sand over hardbottom. It was apparent through review of bathymetric survey cross sections that the navigation channel may have actually been cut through hardbottom noting the steep, essentially vertical side slopes of channel starting at or about station 30+00 of Cut-B. These vertical cuts along the toes of the channel limits were evidenced throughout Cut-B and Cut-C.

Within Cut-C, which is generally used as a turning basin for large ships, small areas of sand ranging from one (1) to three (3) feet were found at the extreme northwesterly corners of the basin area. The remainder of the basin was confirmed to be hardbottom with little or no relief and only isolated pockets of sand and gravel type material. Side scan sonar results also indicate a cable crossing at approximately station 40+00 extending northwesterly across the cut to about station 43+00. Signs located on opposite shorelines confirm the presence of the subaqueous cable crossing.

Within the Truman Annex Turning Basin, remote sensing results indicate the entire basin to be silt and coarse sand, two (2) to three (3) feet thick, overlying hardbottom. This was confirmed via extensive jet probe operations throughout the basin area. Side scan sonar results revealed numerous isolated objects of unknown classification within the basin. Additional diver groundtruthing would be required to determine the characteristic of the isolated objects.

SURVEY CONTROL

MONUMENT DESIGNATION	COORDINATES (NAD83/90) (X)	(Y)	ELEVATION FEET (NGVD 29)
KEY WEST GSL	386,792.55	81,397.39	6.52
KW 4 1961	386,420.17	79,374.13	6.14



SURVEY LEGEND

- SANDY BOTTOM
- LOW RELIEF
- MEDIUM RELIEF
- HIGH RELIEF
- MAJOR CONTOUR (MLLW)
- MINOR CONTOUR (MLLW)
- AIDS TO NAVIGATION
- EVIDENCE OF POSSIBLE CABLE LOCATION BASED ON SIDE SCAN SONAR INTERPRETATION
- ISOLATED UNKNOWN OBJECTS
- SURVEY CONTROL POINT

COVERAGE DESCRIPTION

SCATTERED = LESS THAN 20%
PATCHY = BETWEEN 20% AND 75%
HARDBOTTOM = GREATER THAN 75%

ABBREVIATIONS

NGVD	NATIONAL GEODETIC VERTICAL DATUM OF 1929
MLLW	MEAN LOWER LOW WATER
NAD	NORTH AMERICAN DATUM
STA.	STATION
MSCH	MAIN SHIP CHANNEL
U.S.C.G.	U.S. COAST GUARD
M.O.W.	MAN OF WAR
G.B.	GARRISON BIGHT
T.B.	TURNING BASIN
WID	WIDENER
AZ	AZIMUTH
RGE	RANGE
R/W	RIGHT OF WAY
EL	ELEVATION (FEET)

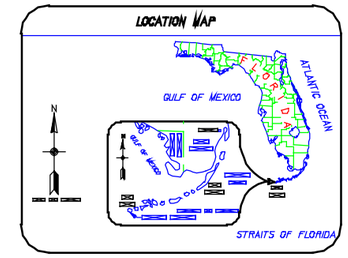
VERTICAL DATUM DIAGRAM

NATIONAL GEODETIC VERTICAL DATUM, 1929

0.65'

MEAN LOWER LOW WATER

LOCATION MAP



NOTES:

1. THIS SURVEY REPORT HAS BEEN PREPARED TO ACCOMPANY THE BATHYMETRIC AND GEOPHYSICAL SURVEY DATA FILES PREPARED BY SEA SYSTEMS CORPORATION FOR THE UNITED STATES ARMY CORPS OF ENGINEERS (USACE), JACKSONVILLE DISTRICT. THE SURVEY IS NEITHER VALID NOR COMPLETE WITHOUT THE SURVEY REPORT ENTITLED "KEY WEST ENTRANCE CHANNEL GEOPHYSICAL DATA ACQUISITION AND HYDROGRAPHIC SURVEY, JANUARY 2003". THE FINAL SURVEY MAPS AND THE DATA FILES PROVIDED ON THE ENCLOSED CD. THE SURVEY ENCOMPASSED THE MAIN SHIP CHANNEL, CUT-A, CUT-B, CUT-C, AND THE TRUMAN ANNEX TURNING BASIN AND WERE DESCRIBED BY THE USACE IN THE TECHNICAL REQUIREMENTS FOR SURVEY NUMBER 02-226, D.O. FILE NUMBER 21-38,374 UNDER CONTRACT NUMBER DACW17-01-D-0001.

2. THIS HYDROGRAPHIC SURVEY, CONSISTING OF BATHYMETRIC, SIDE SCAN SONAR AND SUB-BOTTOM DATA ACQUISITION WAS CONDUCTED OCTOBER 7, 2002 THROUGH JANUARY 31, 2003.

3. THE COORDINATES SHOWN HEREON ARE IN FEET AND ARE BASED ON THE FLORIDA STATE PLANE COORDINATE SYSTEM, EAST ZONE (0901), TRANSVERSE MERCATOR PROJECTION, NORTH AMERICAN DATUM, 1983, 1990 ADJUSTMENT (NAD83/90).

4. CONTOURS AND PLAN VIEW ELEVATIONS ARE RELATIVE TO THE MEAN LOWER LOW WATER (MLLW), WHICH IS 0.65 FEET BELOW THE NATIONAL GEODETIC VERTICAL DATUM OF 1929 (NGVD 29). CONTOURS SHOWN HEREON ARE IN FEET RELATIVE TO MEAN LOWER LOW WATER (MLLW) AND ARE DISPLAYED AT ONE-FOOT INTERVALS AND ARE BASED ON A GRIDDED DIGITAL TERRAIN MODEL.

5. VESSEL POSITIONING WAS OBTAINED USING A TRIMBLE, REAL-TIME DIFFERENTIAL GLOBAL POSITIONING SYSTEM (DGPS) UTILIZING THE UNITED STATES COAST GUARD (U.S.C.G.) NAVBEACON.

6. BATHYMETRIC DATA WAS OBTAINED USING AN ODOM ECHOTRAC MODEL MKII SURVEY GRADE ECHOSOUNDER WITH A 200KHZ NARROW BEAM TRANSDUCER.

7. TIDAL REDUCTIONS WERE BASED ON OBSERVATIONS OF A TIDE STAFF SET NEAR AND RELATIVE TO A ARMY CORPS OF ENGINEERS BRONZE DISK SET IN ASPHALT STAMPED "KH4 1961" HAVING AN ELEVATION OF 6.14 FEET BASED ON (NGVD29).

8. SIDE SCAN SONAR DATA WAS ACQUIRED USING AN EDGETECH TD-272 DUAL FREQUENCY TOWFISH OPERATING AT 500KHZ.

9. SUB-BOTTOM DATA WAS COLLECTED UTILIZING AN EDGETECH SB-424 AND AN SB-216S TOWFISH. ACOUSTIC SUB-BOTTOM DATA WAS SUPPLEMENTED WITH DATA OBTAINED FROM JET PROBE INVESTIGATION.

10. JET PROBES WERE PERFORMED USING A 1" GALVANIZED PIPE 10 FOOT IN LENGTH.

11. SUBMERGED FEATURES, AS DEPICTED ON THE CHARTS, HAVE BEEN DESCRIBED BASED UPON THEIR APPARENT PHYSICAL CHARACTERISTICS THROUGH INTERPRETATION OF SIDE SCAN SONAR IMAGERY AND GROUND-TRUTHING BASED ON UNDERWATER VIDEO AND PHOTOGRAPHY.

12. UNDERGROUND UTILITIES, OTHER THAN THOSE OBSERVED FROM THE SIDE SCAN SONAR IMAGERY, WERE NOT LOCATED AS PART OF THIS SURVEY AND SHOULD BE FIELD VERIFIED PRIOR TO ANY DREDGING AND/OR CONSTRUCTION.

13. AIDS TO NAVIGATION AND NAVIGATION INFORMATION SIGNS WERE LOCATED DURING THIS SURVEY.

14. THIS SURVEY REPORT AND ASSOCIATED CHARTS OR MAPS ARE NOT VALID WITHOUT THE SIGNATURE AND THE ORIGINAL RAISED SEAL OF A FLORIDA LICENSED SURVEYOR AND MAPPER.

15. REFER TO FIELD BOOK NUMBERS "2003 MONROE COUNTY. 23 AND 24"

16. REFER TO RAW FIELD DATA:

   a. MAGNETIC OPTICAL DRIVE DISCS 02-226-1, 02-226-2, AND 02-226-3.
   b. CADD FILES D226SHO1-SH16.DGN
   c. ECHOSOUNDER ROLLS DATED OCTOBER 8, 9, 10, 11, AND 12, 2002

N

GRID

2000 1000 0 2000 4000FT

SCALE: 1"=2000'

KENNETH C. JACKSON, P.S.M. DATE
FLORIDA REGISTRATION NUMBER LS 4549
VICE PRESIDENT OF SURVEYING
SEA SYSTEMS CORPORATION
FLORIDA AUTHORIZATION NUMBER LB 5861

US Army Corps of Engineers
Jacksonville District

SAFETY ON THIS JOB DEPENDS ON YOU

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

SEA SYSTEMS CORPORATION
2800 NORTHWEST 30TH PLACE
POMPANO BEACH, FLORIDA 33069
PHONE (954) 978-8071 FAX (954) 978-8078

DACW17-01-D-0001
AS SHOWN
FEBRUARY, 2003
D.O. FILE NO. 21-38,374

Reference files:
D226BROR.DGN

KEY WEST HARBOR, FLORIDA
MONROE COUNTY, FLORIDA

GEOPHYSICAL DATA ACQUISITION AND HYDROGRAPHIC SURVEY

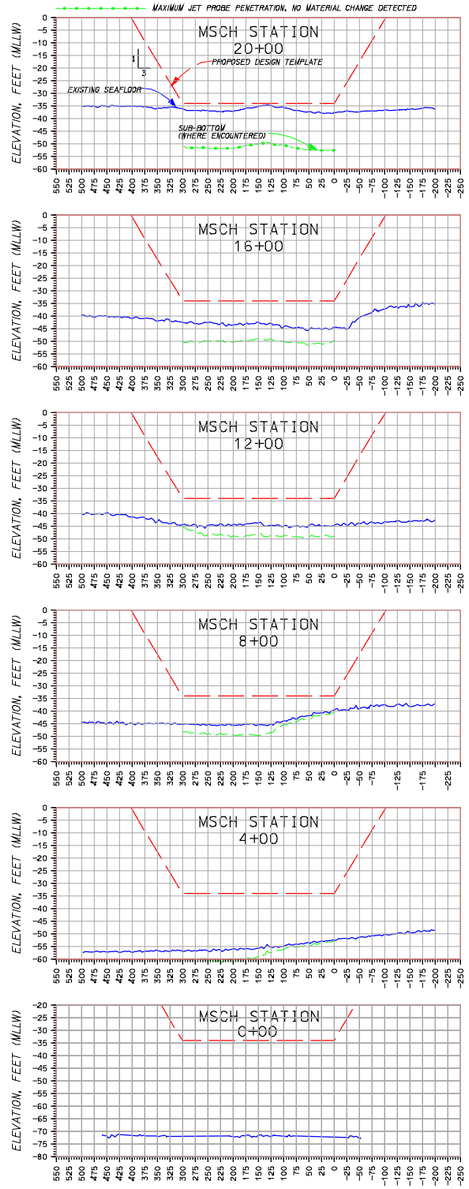
MAIN SHIP CHANNEL, CUT-A, CUT-B, AND CUT-C

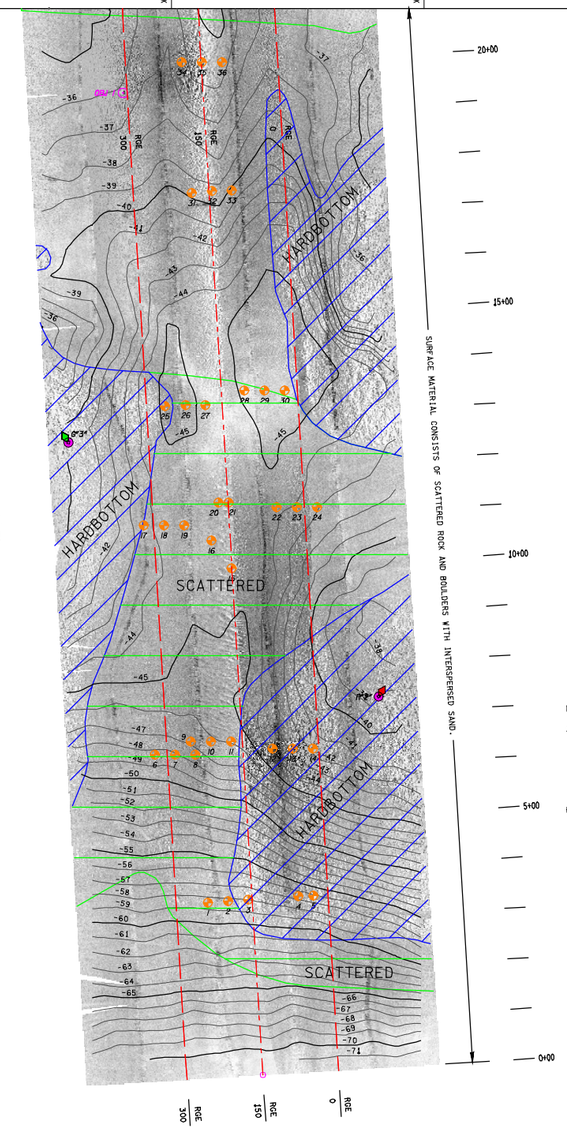
COVER

DRAWING NO.

SHEET 1 OF 16

MATERIAL CHANGE DETECTED VIA SUB-BOTTOM PROFILER
MATERIAL CHANGE DETECTED VIA JET PROBES
MAXIMUM JET PROBE PENETRATION, NO MATERIAL CHANGE DETECTED





ISOLATED UNKNOWN OBJECTS

DESIGNATION	NAD83 COORDINATES (FEET) (X)	(Y)
OBJ 1	389,403	51,143

JET PROBE LOCATIONS

NO.	SEDIMENT THICKNESS	NAD83 COORDINATES (FEET) (X)	(Y)
1	6'	389,572	49,540
2	4'	389,612	49,543
3	2'	389,652	49,545
4	1'	389,751	49,553
5	0.5'	389,781	49,554
6	2.5'	389,467	49,833
7	2'	389,507	49,833
8	2'	389,547	49,833
9	0.3'	389,538	49,859
10	4'	389,578	49,859
11	4'	389,618	49,859
12	0.2'	389,700	49,845
13	0.5'	389,740	49,845
14	0.1'	389,780	49,845
15	5'	389,619	50,202
16	8'	389,579	50,257
17	3'	389,445	50,287
18	4'	389,485	50,287
19	5'	389,525	50,287
20	7'	389,595	50,332
21	2.5'	389,615	50,332
22	2.5'	389,708	50,323
23	2'	389,748	50,323
24	2'	389,788	50,323
25	10+'	389,487	50,523
26	10+'	389,528	50,525
27	10+'	389,567	50,525
28	10+'	389,644	50,554
29	10+'	389,684	50,554
30	6'	389,724	50,554
31	10+'	389,540	50,945
32	10+'	389,580	50,949
33	10+'	389,619	50,951
34	10+'	389,520	51,204
35	10+'	389,560	51,204
36	10+'	389,600	51,204

NOTES:

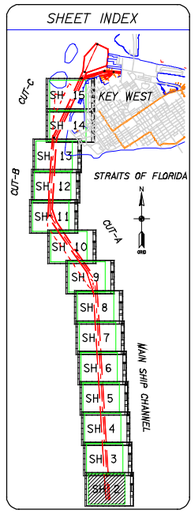
A. SUB-BOTTOM DATA COLLECTED VIA SUB-BOTTOM PROFILER INDICATE LIMITED ACCOUSTIC PENETRATION FOR DETECTION OF SUB-SURFACE MATERIAL CHANGES.
RANDOM JET PROBE RESULTS INDICATE SUB-SURFACE STRATA BETWEEN STATIONS 0+00 THROUGH 46+00 OF THE MAIN SHIP CHANNEL TO BE VERY IRRATIC, VARYING FROM LESS THAN ONE (1) FOOT BENEATH THE SURFACE TO GREATER THAN TEN (10) FEET.

B. SIDE SCAN SONAR RESULTS SUPLEMENTED BY DIVER GROUNDTRUTHING INDICATE SURFACE CHARACTERISTICS ARE SCATTERED ROCK AND BOULDERS WITH NATURAL REEF OUTCROPS AND INTERMIXED SAND THROUGHOUT.

AIDS TO NAVIGATION

SEA BUOY	(X)/(Y)	389,957	47,260
	LON/LAT	81 48 01.246	24 27 40.583
R"2"	(X)/(Y)	389,910	49,948
	LON/LAT	81 48 01.930	24 28 07.202
G"3"	(X)/(Y)	389,295	50,451
	LON/LAT	81 48 08.616	24 28 12.152
LOCATION DATES	OCTOBER 18, 2002 AND DECEMBER 6, 2002		

SHEET INDEX



SURVEY LEGEND

- SANDY BOTTOM
- LOW RELIEF LESS THAN 1 FOOT HIGH
- MEDIUM RELIEF BETWEEN 1 AND 3 FEET HIGH
- HIGH RELIEF 3 FEET AND HIGHER
- MAJOR CONTOUR (MLLW)
- MINOR CONTOUR (MLLW)
- TIDE STAFF
- AIDS TO NAVIGATION
- EVIDENCE OF POSSIBLE CABLE LOCATION BASED ON SIDE SCAN SONAR INTERPRETATION
- JET PROBE LOCATION
- ISOLATED UNKNOWN OBJECTS
- SURVEY CONTROL POINT

COVERAGE DESCRIPTION

SCATTERED = LESS THAN 20%
PATCHY = BETWEEN 20% AND 75%
HARDBOTTOM = GREATER THAN 75%

VERTICAL DATUM DIAGRAM

NATIONAL GEODETIC VERTICAL DATUM, 1929
0.65'
MEAN LOWER LOW WATER

GRID
100 50 0 100 200FT
SCALE: 1"=100'

NOTES:
1. REFER TO SURVEY NO. 02-226.
2. REFER TO SHEET NO. 1 FOR NOTES.
3. SUBMERGED FEATURES AND SEAFLOOR CLASSIFICATIONS, AS DEPICTED ON THE CHARTS, HAVE BEEN DESCRIBED BASED UPON THEIR APPARENT PHYSICAL CHARACTERISTICS THROUGH INTERPRETATION OF SIDE SCAN SONAR IMAGERY. DUE TO INHERENT LIMITATIONS IN SIDE SCAN SONAR TECHNOLOGY, GROUNDTRUTHING IS RECOMMENDED TO CONFIRM THE RESULTS OF THE INTERPRETATION EFFORTS.

US Army Corps of Engineers
Jacksonville District

SAFETY ON THIS JOB DEPENDS ON YOU

No.	Description	Date	Approved

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

SBA SYSTEMS CORPORATION
2300 NORTHWEST 30TH PLACE
POMPANO BEACH, FLORIDA 33069
PHONE (954) 979-9071 FAX (954) 979-9076

Inv. No. DACW17-01-D-0001
Date: FEBRUARY, 2003
D.O.FILE NO. 21-38,374
Scale: AS SHOWN
Plot date:
Plot scale:
Designed by:
Dwn by: SBA
Ckd by: KCJ
Ckd by:
Reviewed by:
Approved by:
Yes, Symbol, Zone

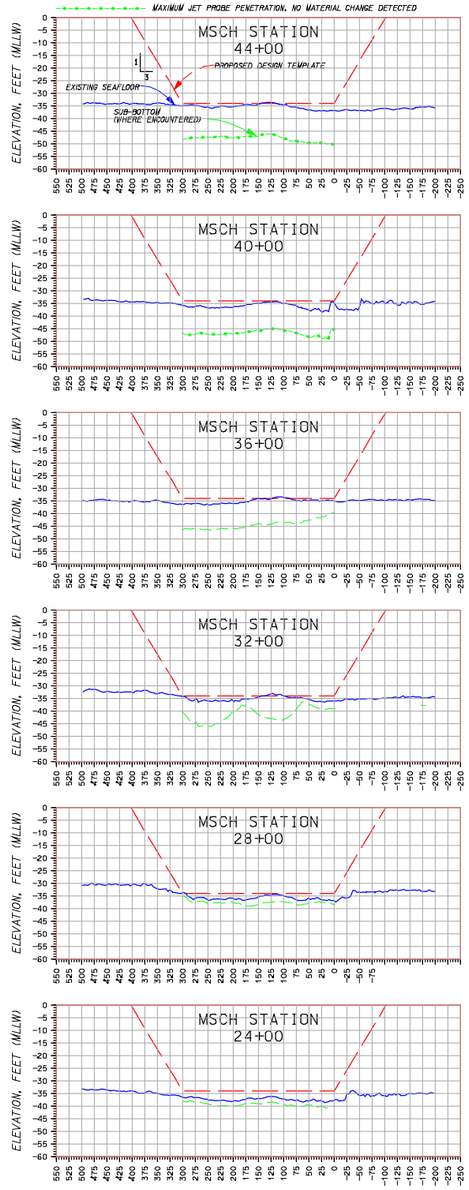
File name: D22ESS002.DGN
Reference files: D22ESS001.DGN, D22GBGRID.DGN, D22ACONT.DGN, D22ACONT2.DGN, D22ADSLG.DGN, D22ADSLG2.DGN, D22ESS2LG.DGN, D22ESS3LG.DGN, D22ESTLADGN

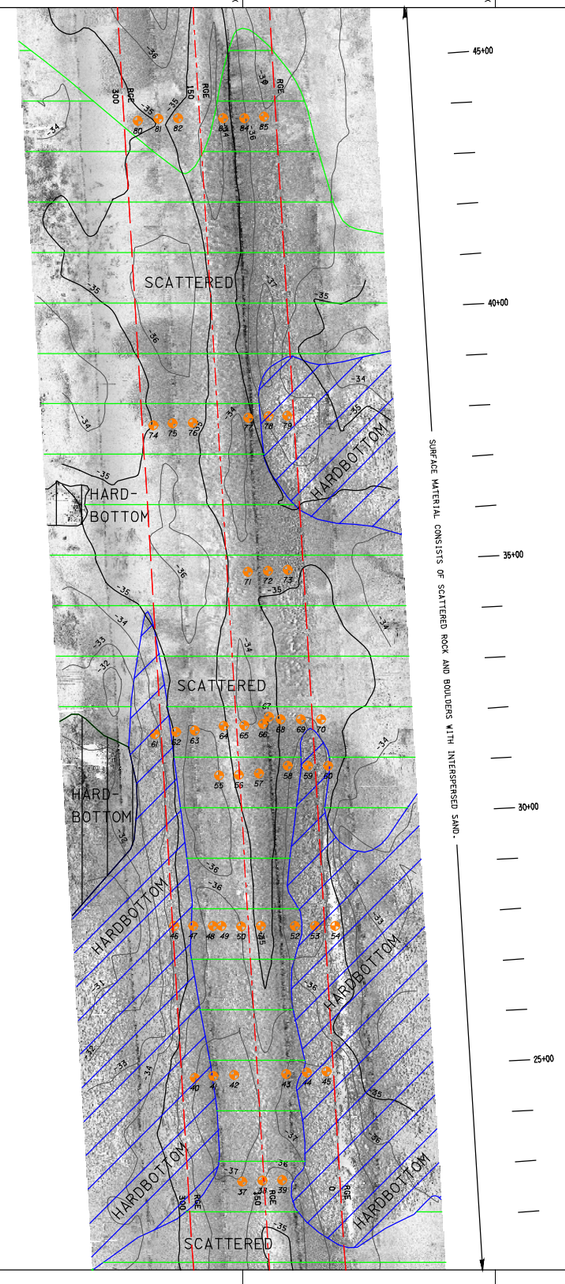
KEY WEST HARBOR, FLORIDA
MONROE COUNTY, FLORIDA
GEOPHYSICAL DATA ACQUISITION AND HYDROGRAPHIC SURVEY
MSCH STA. 0+00 THRU 21+15.31
CONTOUR

DRAWING NO.

SHEET 2 OF 16

MATERIAL CHANGE DETECTED VIA SUB-BOTTOM PROFILER
MATERIAL CHANGE DETECTED VIA JET PROBES
MAXIMUM JET PROBE PENETRATION, NO MATERIAL CHANGE DETECTED





JET PROBE LOCATIONS

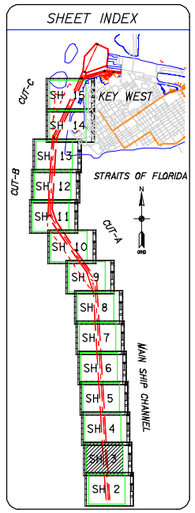
NO.	SEDIMENT THICKNESS	NAD83 COORDINATES (FEET) (X)	(Y)
37	10'	389,499	51,485
38	10'	389,539	51,488
39	10'	389,578	51,489
40	2'	389,405	51,691
41	0.5'	389,442	51,694
42	0.5'	389,483	51,697
43	2.5'	389,586	51,698
44	0.5'	389,627	51,701
45	0.2'	389,666	51,704
46	1.5'	389,364	51,992
47	1.5'	389,402	51,992
48	1.5'	389,441	51,991
49	1'	389,458	51,992
50	3'	389,497	51,991
51	3'	389,536	51,992
52	1.5'	389,603	51,992
53	1'	389,643	51,992
54	2'	389,683	51,992
55	3'	389,452	52,290
56	2.5'	389,492	52,291
57	4'	389,531	52,294
58	1'	389,589	52,309
59	2'	389,629	52,309
60	3'	389,669	52,309
61	1.5'	389,325	52,372
62	10'	389,368	52,376
63	10'	389,405	52,379
64	1'	389,462	52,388
65	10'	389,502	52,389
66	10'	389,540	52,392
67	10'	389,552	52,406
68	1'	389,575	52,401
69	3'	389,615	52,401
70	3'	389,655	52,401
71	10'	389,510	52,693
72	10'	389,550	52,695
73	10'	389,589	52,697
74	10'	389,323	52,983
75	10'	389,361	52,987
76	10'	389,401	52,989
77	10'	389,510	52,998
78	10'	389,551	53,002
79	6'	389,588	53,002
80	15'	389,292	53,587
81	15'	389,332	53,591
82	15'	389,372	53,592
83	15'	389,461	53,591
84	15'	389,503	53,592
85	15'	389,542	53,595

NOTES:

A. SUB-BOTTOM DATA COLLECTED VIA SUB-BOTTOM PROFILER INDICATE LIMITED ACCOUSTIC PENETRATION FOR DETECTION OF SUB-SURFACE MATERIAL CHANGES. RANDOM JET PROBE RESULTS INDICATE SUB-SURFACE STRATA BETWEEN STATIONS 0+00 THROUGH 46+00 OF THE MAIN SHIP CHANNEL TO BE VERY IRRATIC, VARYING FROM LESS THAN ONE (1) FOOT BENEATH THE SURFACE TO GREATER THAN TEN (10) FEET.

B. SIDE SCAN SONAR RESULTS SUPLEMENTED BY DIVER GROUNDTRUTHING INDICATE SURFACE CHARACTERISTICS ARE SCATTERED ROCK AND BOULDERS WITH NATURAL REEF OUTCROPS AND INTERMIXED SAND THROUGHOUT.

SHEET INDEX



SURVEY LEGEND

- SANDY BOTTOM
- LOW RELIEF LESS THAN 1 FOOT HIGH
- MEDIUM RELIEF BETWEEN 1 AND 3 FEET HIGH
- HIGH RELIEF 3 FEET AND HIGHER
- MAJOR CONTOUR (MLLW)
- MINOR CONTOUR (MLLW)
- TIDE STAFF
- AIDS TO NAVIGATION
- EVIDENCE OF POSSIBLE CABLE LOCATION BASED ON SIDE SCAN SONAR INTERPRETATION
- JET PROBE LOCATION
- ISOLATED UNKNOWN OBJECTS
- SURVEY CONTROL POINT

COVERAGE DESCRIPTION

SCATTERED = LESS THAN 20%
PATCHY = BETWEEN 20% AND 75%
HARDBOTTOM = GREATER THAN 75%

VERTICAL DATUM DIAGRAM

NATIONAL GEODETIC VERTICAL DATUM, 1929

0.65'

MEAN LOWER LOW WATER

N

GRID

100 50 0 100 200FT

SCALE: 1"=100

NOTES:
1. REFER TO SURVEY NO. 02-226.
2. REFER TO SHEET NO. 4 FOR NOTES.
3. SUBMERGED FEATURES AND SEAFLOOR CLASSIFICATIONS, AS DEPICTED ON THE CHARTS, HAVE BEEN DESCRIBED BASED UPON THEIR APPARENT PHYSICAL CHARACTERISTICS THROUGH INTERPRETATION OF SIDE SCAN SONAR IMAGERY. DUE TO INHERENT LIMITATIONS IN SIDE SCAN SONAR TECHNOLOGY, GROUNDTRUTHING IS RECOMMENDED TO CONFIRM THE RESULTS OF THE INTERPRETATION EFFORTS.

US Army Corps of Engineers
Jacksonville District

SAFETY ON THIS JOB DEPENDS ON YOU

No.	Symbol	Zone	Description	Approved

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

SBA SYSTEMS CORPORATION
2300 NORTHWEST 30TH PLACE
POMPANO BEACH, FLORIDA 33069
PHONE (954) 979-9071 FAX (954) 979-9076

Inv. No. DACW17-02-D-0001
Date: FEBRUARY, 2003
Scale: AS SHOWN
Plot date:
Plot scale:
D.O.F.FILE NO. 21-38,374

Designed by:
Dwn by: SBS
Ckd by: CCS

File name: 22265NO3.DGN
Reference files: 22265BGN.DGN, 22262CNT.DGN, 22263CNT.DGN, 22265BLD.DGN, 22265BGN.DGN, 22265SSS.DGN, 22265TLA.DGN

KEY WEST HARBOR, FLORIDA
MONROE COUNTY, FLORIDA

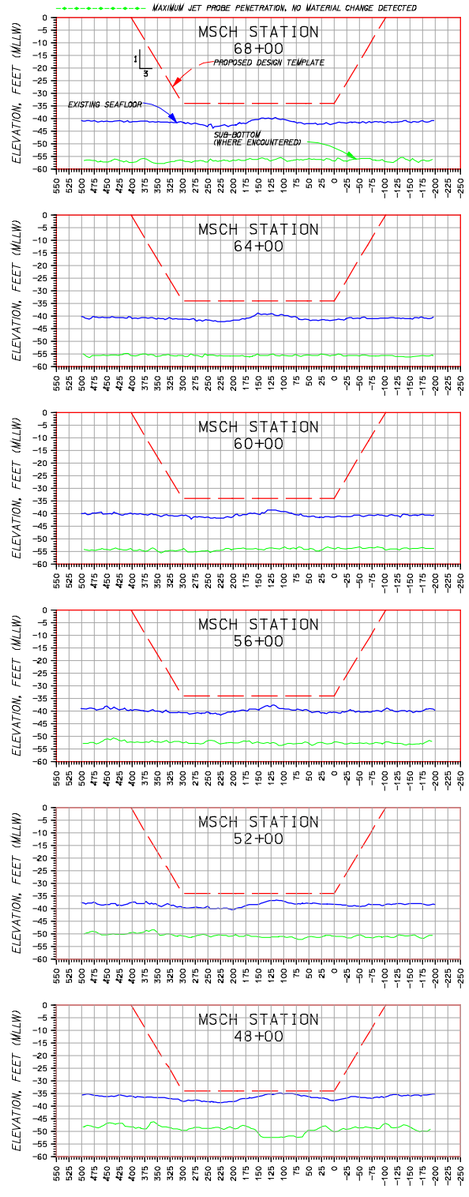
GEOPHYSICAL DATA ACQUISITION AND HYDROGRAPHIC SURVEY

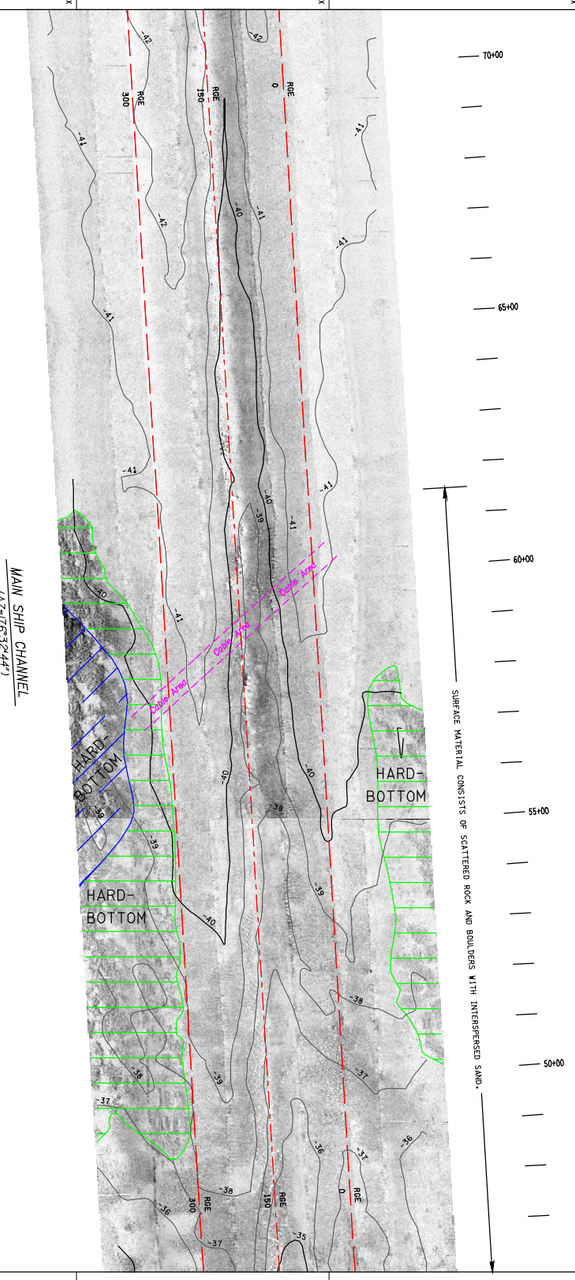
MSCH STA. 21+15.31 THRU 46+19.86
CONTOUR

DRAWING NO.

SHEET 3 OF 16

MATERIAL CHANGE DETECTED VIA SUB-BOTTOM PROFILER
MATERIAL CHANGE DETECTED VIA JET PROBES
MAXIMUM JET PROBE PENETRATION, NO MATERIAL CHANGE DETECTED



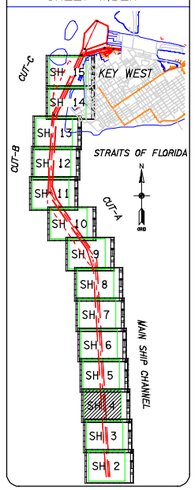


NOTES:

A. SUB-BOTTOM DATA COLLECTED VIA SUB-BOTTOM PROFILER INDICATE LIMITED ACCOUSTIC PENETRATION FOR DETECTION OF SUB-SURFACE MATERIAL CHANGES. RANDOM JET PROBE RESULTS INDICATE SUB-SURFACE STRATA BETWEEN STATIONS 0+00 THROUGH 46+00 OF THE MAIN SHIP CHANNEL TO BE VERY IRRATIC. VARYING FROM LESS THAN ONE (1) FOOT BENEATH THE SURFACE TO GREATER THAN TEN (10) FEET.

B. SIDE SCAN SONAR RESULTS SUPLEMENTED BY DIVER GROUNDTRUTHING INDICATE SURFACE CHARACTERISTICS ARE SCATTERED ROCK AND BOULDERS WITH NATURAL REEF OUTCROPS AND INTERMIXED SAND THROUGHOUT.

SHEET INDEX



SURVEY LEGEND

- SANDY BOTTOM
- LOW RELIEF LESS THAN 1 FOOT HIGH
- MEDIUM RELIEF BETWEEN 1 AND 3 FEET HIGH
- HIGH RELIEF 3 FEET AND HIGHER
- MAJOR CONTOUR (MLLW)
- MINOR CONTOUR (MLLW)
- TIDE STAFF
- AIDS TO NAVIGATION
- EVIDENCE OF POSSIBLE CABLE LOCATION BASED ON SIDE SCAN SONAR INTERPRETATION
- JET PROBE LOCATION
- ISOLATED UNKNOWN OBJECTS
- SURVEY CONTROL POINT

COVERAGE DESCRIPTION

SCATTERED = LESS THAN 20%
PATCHY = BETWEEN 20% AND 75%
HARDBOTTOM = GREATER THAN 75%

VERTICAL DATUM DIAGRAM

NATIONAL GEODETIC VERTICAL DATUM, 1929

0.65'

MEAN LOWER LOW WATER

N

GRID

100 50 0 100 200FT

SCALE: 1"=100

NOTES:
1. REFER TO SURVEY NO. 02-226.
2. REFER TO SHEET NO. 1 FOR NOTES.
3. SUBMERGED FEATURES AND SEAFLOOR CLASSIFICATIONS, AS DEPICTED ON THE CHARTS, HAVE BEEN DESCRIBED BASED UPON THEIR APPARENT PHYSICAL CHARACTERISTICS THROUGH INTERPRETATION OF SIDE SCAN SONAR IMAGERY. DUE TO INHERENT LIMITATIONS IN SIDE SCAN SONAR TECHNOLOGY, GROUNDTRUTHING IS RECOMMENDED TO CONFIRM THE RESULTS OF THE INTERPRETATION EFFORTS.

US Army Corps of Engineers
Jacksonville District

SAFETY ON THIS JOB DEPENDS ON YOU

No.	Symbol	Zone	Description	Approved

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

SBA SYSTEMS CORPORATION
2300 NORTHWEST 30TH PLACE
POMPANO BEACH, FLORIDA 33069
PHONE (954) 979-9071 FAX (954) 979-9076

Rev. No. DACW17-03-D-0001
Datum: AS SHOWN
Scale: Plot date: Plot scale:
Designed by: Dwn by: SBS Ckd by: CCS
Date: FEBRUARY, 2003
D.O.F.FILE NO. 21-38,374

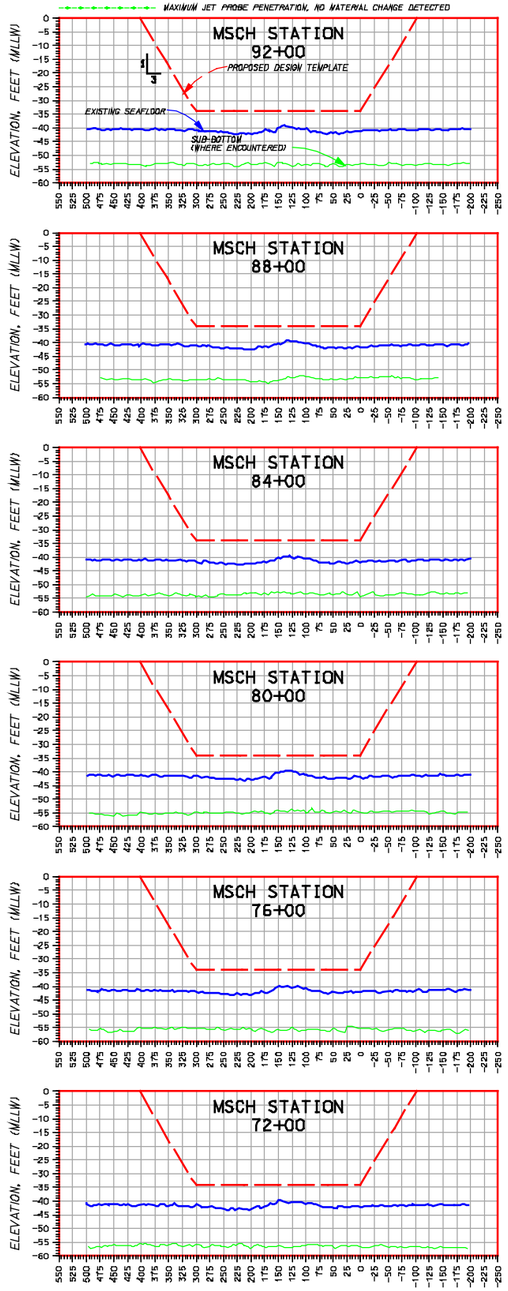
File name: 22265H04.DGN
Reference files: 22265BOR.DGN 22265CNT.DGN 22265HDR.DGN 22265MSL.DGN 22265SSS.DGN 22265TIDE.DGN

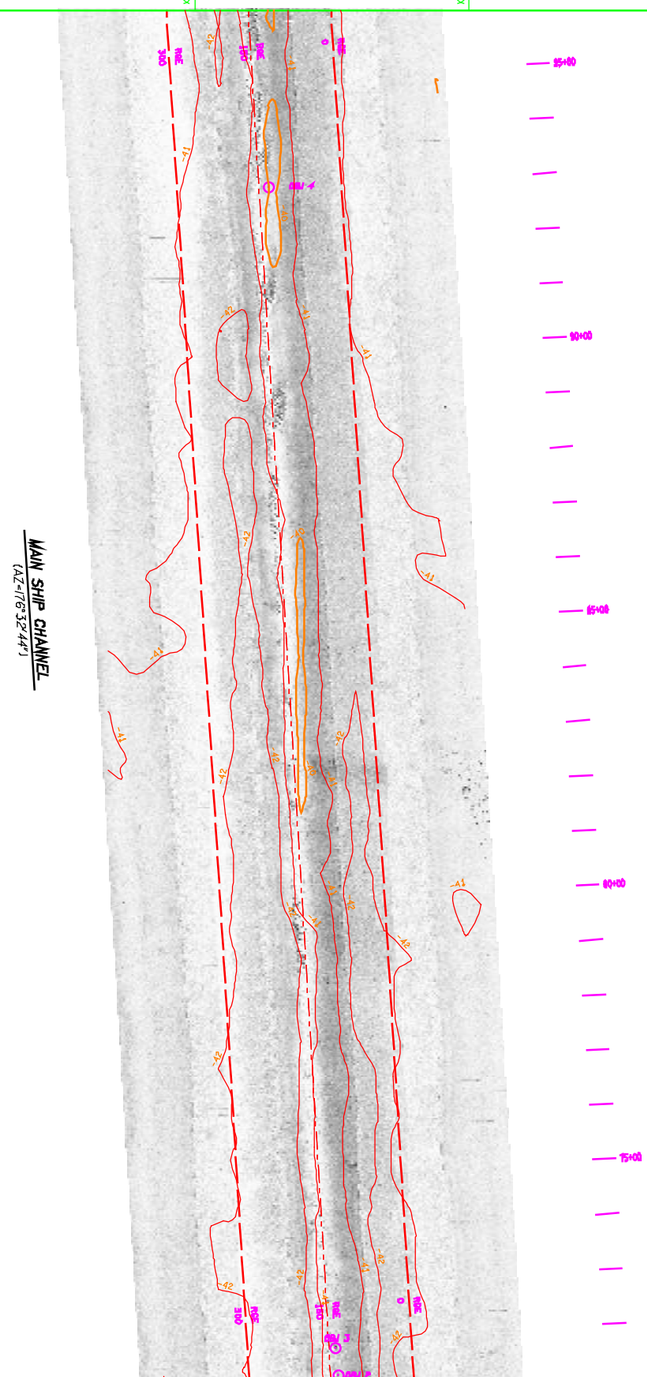
KEY WEST HARBOR, FLORIDA
MONROE COUNTY, FLORIDA
GEOPHYSICAL DATA ACQUISITION AND HYDROGRAPHIC SURVEY
MSCH: STA. 46+19.86 THRU 71+24.41
CONTOUR

DRAWING NO.

SHEET 4 OF 16

MATERIAL CHANGE DETECTED VIA SUB-BOTTOM PROFILER
MATERIAL CHANGE DETECTED VIA JET PROBES
MAXIMUM JET PROBE PENETRATION, NO MATERIAL CHANGE DETECTED

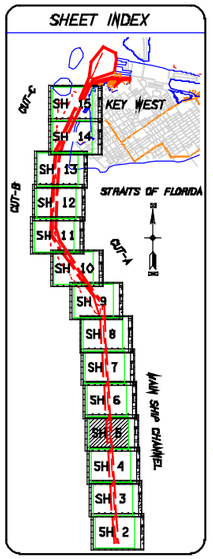




ISOLATED UNKNOWN OBJECTS

DESIGNATION	NAD83 COORDINATES (FEET) (X)	(Y)
OBJ 2	389,262	56,322
OBJ 3	389,257	56,372
OBJ 4	389,134	58,488

SHEET INDEX



SURVEY LEGEND

- SANDY BOTTOM
- LOW RELIEF
- MEDIUM RELIEF
- HIGH RELIEF 3 FEET AND HIGHER
- MAJOR CONTOUR (MLLW)
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- JET PROBE LOCATION
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- SURVEY CONTROL POINT

COVERAGE DESCRIPTION

SCATTERED = LESS THAN 20%
PATCHY = BETWEEN 20% AND 75%
HARDBOTTOM = GREATER THAN 75%

VERTICAL DATUM DIAGRAM

NATIONAL GEODETIC VERTICAL DATUM, 1929

0.55'

MEAN LOWER LOW WATER

GRID

100 50 0 100 200FT

SCALE: 1"=100

3. SUBMERGED FEATURES AND SEAFLOOR CLASSIFICATIONS, THROUGH INTERPRETATION OF SIDE SCAN SONAR IMAGERY. CONFIRM THE RESULTS OF THE INTERPRETATION EFFORTS.

US Army Corps of Engineers
Jacksonville District

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SEA SYSTEMS CORPORATION
2300 NORTHWEST 30TH PLACE
POMPANO BEACH, FLORIDA 33069
PHONE (954) 979-9077 FAX (954) 979-9078

Designed by: JCU
Scale: AS SHOWN
Plot date:
Dated: FEBRUARY, 2003
D.O.FILE NO. 21-38,374

D2283PCR.DGN
D2283SYS.DGN
D2283BAV.DGN
D2283NL.DGN
D2283SS.DGN
D2283TA.DGN

KEY WEST HARBOR, FLORIDA
MONROE COUNTY, FLORIDA

GEOPHYSICAL DATA ACQUISITION AND HYDROGRAPHIC SURVEY

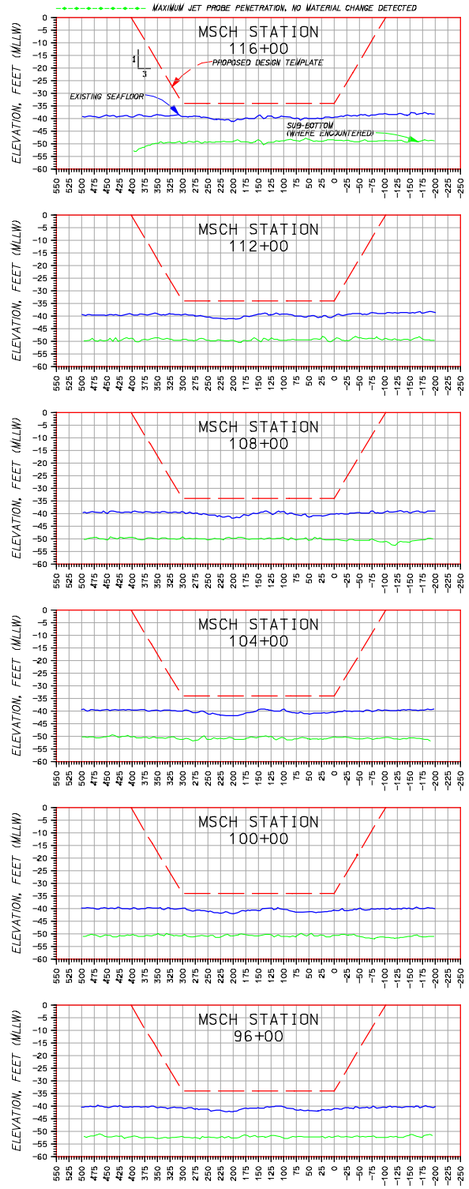
MSCH STA. 71+24.41 THRU 96+28.97

CONTOUR

DRAWING NO.

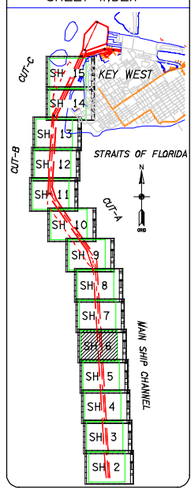
SHEET 5 OF 18

MATERIAL CHANGE DETECTED VIA SUB-BOTTOM PROFILER
MATERIAL CHANGE DETECTED VIA JET PROBES
MAXIMUM JET PROBE PENETRATION, NO MATERIAL CHANGE DETECTED



AIDS TO NAVIGATION			
G"3A"	(X)/(Y)	388,627	60,533
	LON/LAT	81 48 16.482	24 29 51.982
LOCATION DATES	OCTOBER 18, 2002 AND DECEMBER 6, 2002		

SHEET INDEX



SURVEY LEGEND

- SANDY BOTTOM
- LOW RELIEF LESS THAN 1 FOOT HIGH
- MEDIUM RELIEF BETWEEN 1 AND 3 FEET HIGH
- HIGH RELIEF 3 FEET AND HIGHER
- MAJOR CONTOUR (MLLW)
- MINOR CONTOUR (MLLW)
- TIDE STAFF
- AIDS TO NAVIGATION
- EVIDENCE OF POSSIBLE CABLE LOCATION BASED ON SIDE SCAN SONAR INTERPRETATION
- JET PROBE LOCATION
- ISOLATED UNKNOWN OBJECTS
- SURVEY CONTROL POINT

COVERAGE DESCRIPTION

SCATTERED = LESS THAN 20%
PATCHY = BETWEEN 20% AND 75%
HARDBOTTOM = GREATER THAN 75%

VERTICAL DATUM DIAGRAM

NATIONAL GEODETIC VERTICAL DATUM, 1929
0.65'
MEAN LOWER LOW WATER

N
GRID
100 50 0 100 200FT
SCALE: 1"=100'

NOTES:
1. REFER TO SURVEY NO. 02-226.
2. REFER TO SHEET NO. 1 FOR NOTES.
3. SUBMERGED FEATURES AND SEAFLOOR CLASSIFICATIONS, AS DEPICTED ON THE CHARTS, HAVE BEEN DESCRIBED BASED UPON THEIR APPARENT PHYSICAL CHARACTERISTICS THROUGH INTERPRETATION OF SIDE SCAN SONAR IMAGERY. DUE TO INHERENT LIMITATIONS IN SIDE SCAN SONAR TECHNOLOGY, GROUNDTRUTHING IS RECOMMENDED TO CONFIRM THE RESULTS OF THE INTERPRETATION EFFORTS.

US Army Corps of Engineers
Jacksonville District

SAFETY ON THIS JOB DEPENDS ON YOU

No.	Symbol	Zone	Description	Approved

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

SBA SYSTEMS CORPORATION
2301 NORTHWEST 30TH PLACE
POMPANO BEACH, FLORIDA 33069
PHONE (954) 979-9071 FAX (954) 979-9076

Inv. No. DACW17-01-D-0001
Date#
Scale: AS SHOWN
Plot date:
Plot scale:
Designed by:
Dwn by: SBA
Ckd by: VCJ
Date# FEBRUARY, 2003
D.O.F.ILE NO. 21-38,374

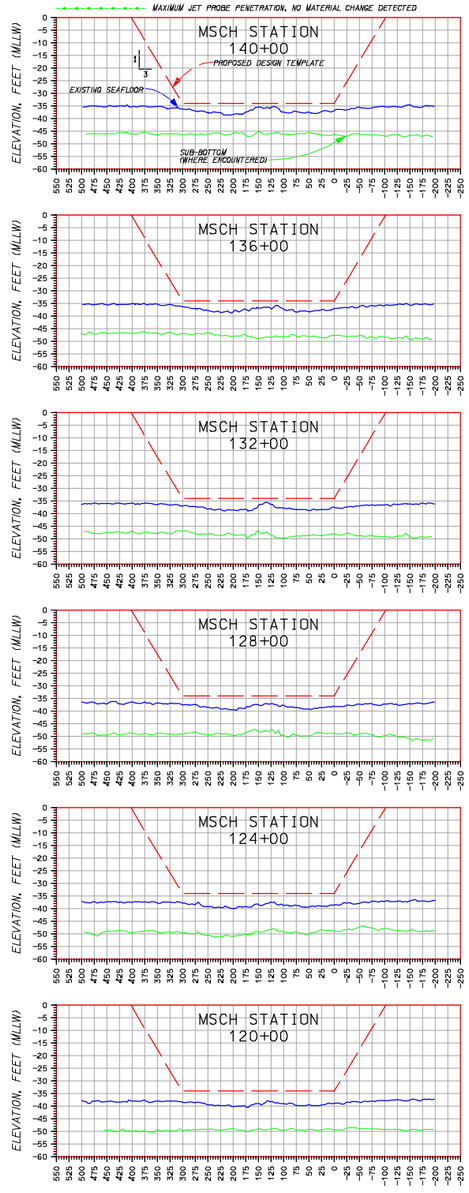
File name: D22ESS05.DGN
Reference files: D22ESS01.DGN, D22BGBGR.DGN, D22ACONT.DGN, D22BGBGR.DGN, D22ACBLA.DGN, D22ESS02.DGN, D22ESS03.DGN, D22ESS13.DGN, D22ESTLA.DGN

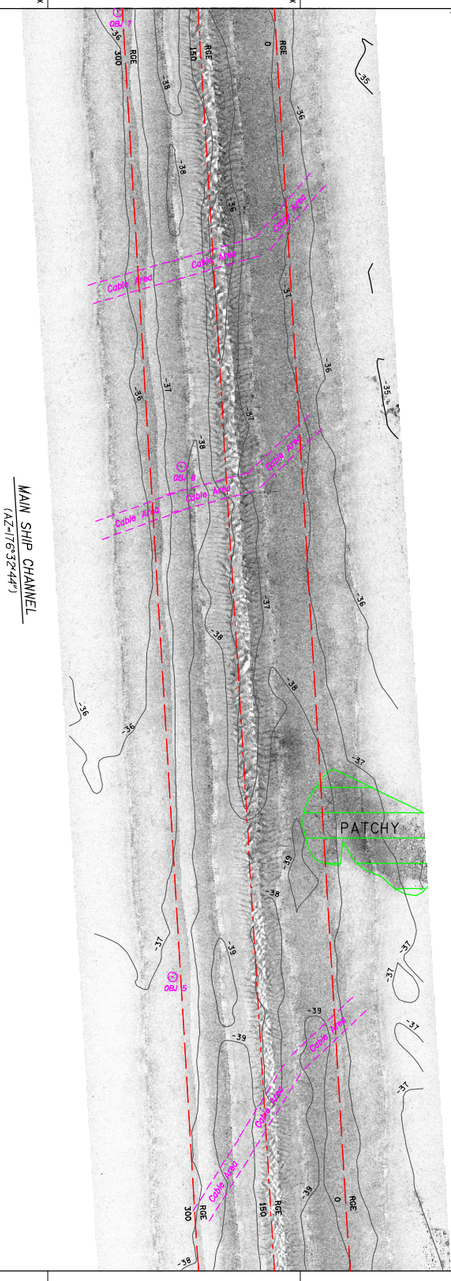
KEY WEST HARBOR, FLORIDA
MONROE COUNTY, FLORIDA
GEOPHYSICAL DATA ACQUISITION AND HYDROGRAPHIC SURVEY
MSCH STA. 96+28.97 THRU 121+33.52
CONTOUR

DRAWING NO.

SHEET 6 OF 16

MATERIAL CHANGE DETECTED VIA SUB-BOTTOM PROFILER
MATERIAL CHANGE DETECTED VIA JET PROBES
MAXIMUM JET PROBE PENETRATION, NO MATERIAL CHANGE DETECTED

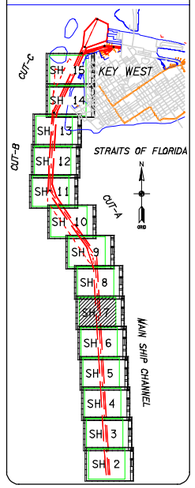




ISOLATED UNKNOWN OBJECTS

DESIGNATION	NAD83 COORDINATES (FEET) (X)	(Y)
OBJ 5	388,747	61,893
OBJ 6	388,765	62,904
OBJ 7	388,639	63,803

SHEET INDEX



SURVEY LEGEND

- SANDY BOTTOM
- LOW RELIEF LESS THAN 1 FOOT HIGH
- MEDIUM RELIEF BETWEEN 1 AND 3 FEET HIGH
- HIGH RELIEF 3 FEET AND HIGHER
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- MINOR CONTOUR (MLLW)
- TIDE STAFF
- AIDS TO NAVIGATION
- EVIDENCE OF POSSIBLE CABLE LOCATION BASED ON SIDE SCAN SONAR INTERPRETATION
- JET PROBE LOCATION
- ISOLATED UNKNOWN OBJECTS
- SURVEY CONTROL POINT

COVERAGE DESCRIPTION

SCATTERED = LESS THAN 20%
PATCHY = BETWEEN 20% AND 75%
HARDBOTTOM = GREATER THAN 75%

VERTICAL DATUM DIAGRAM

NATIONAL GEODETIC VERTICAL DATUM, 1929

0.65'

MEAN LOWER LOW WATER

N

GRID

100 50 0 100 200FT

SCALE: 1"=100

NOTES:
1. REFER TO SURVEY NO. 02-226.
2. REFER TO SHEET NO. 4 FOR NOTES.
3. SUBMERGED FEATURES AND SEAFLOOR CLASSIFICATIONS, AS DEPICTED ON THE CHARTS, HAVE BEEN DESCRIBED BASED UPON THEIR APPARENT PHYSICAL CHARACTERISTICS THROUGH INTERPRETATION OF SIDE SCAN SONAR IMAGERY. DUE TO INHERENT LIMITATIONS IN SIDE SCAN SONAR TECHNOLOGY, GROUNDTRUTHING IS RECOMMENDED TO CONFIRM THE RESULTS OF THE INTERPRETATION EFFORTS.

US Army Corps of Engineers
Jacksonville District

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No.	Symbol	Zone	Description	Approved

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

SBA SYSTEMS CORPORATION
2300 NORTHWEST 30TH PLACE
POMPANO BEACH, FLORIDA 33069
PHONE (954) 979-9071 FAX (954) 979-9076

Inv. No. DACW17-01-D-0001
Date: FEBRUARY, 2003
D.O.FILE NO. 21-38,374

Designed by: Dwn by: SBB | Ckd by: CCS
Scale: AS SHOWN
Plot date:
Plot scale:

File name: 02265007.DGN
Reference files: 02265001.DGN, 02265006.DGN, 02265007.DGN, 02265008.DGN, 02265009.DGN, 02265010.DGN, 02265015.DGN, 02265016.DGN

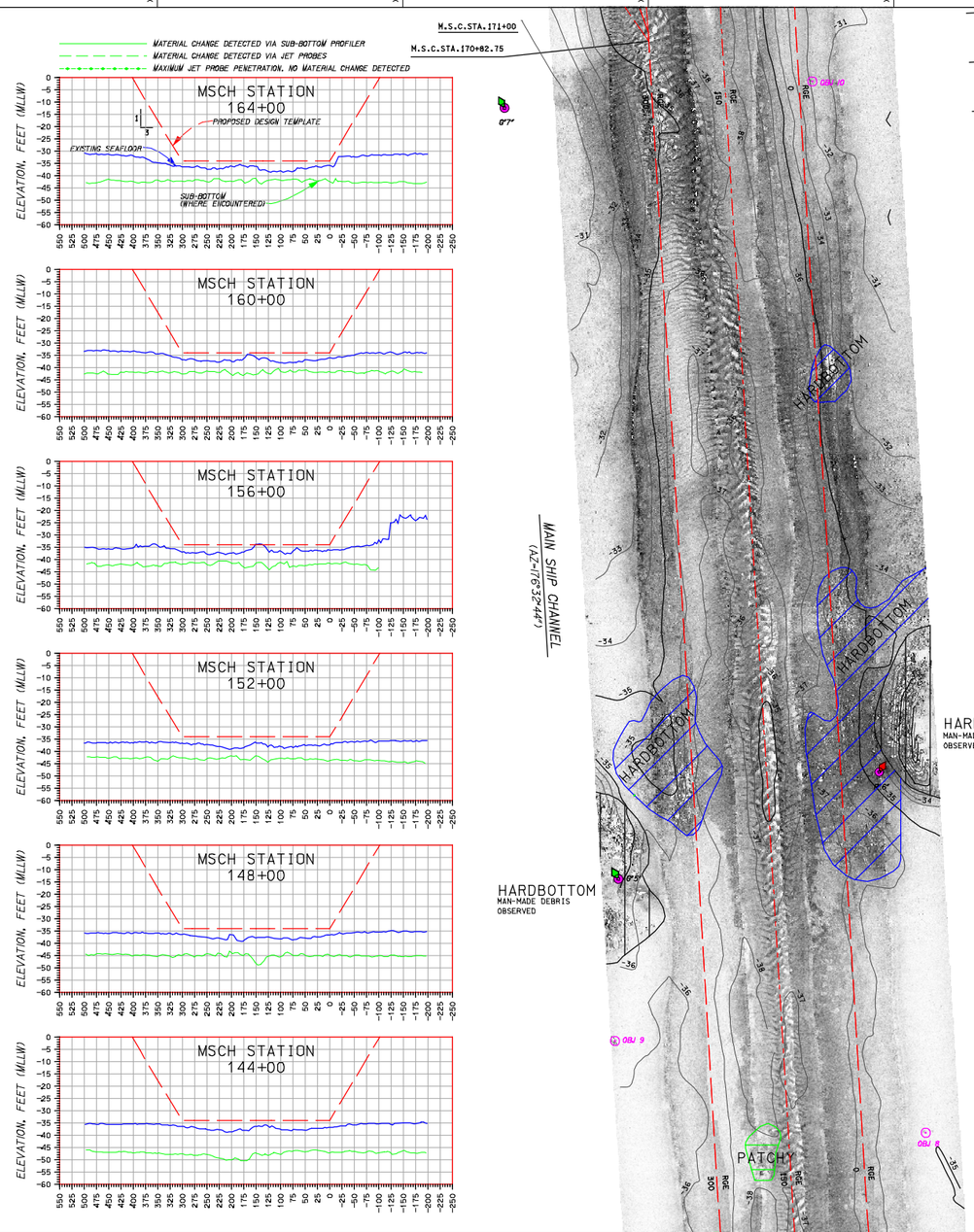
KEY WEST HARBOR, FLORIDA
MONROE COUNTY, FLORIDA

GEOPHYSICAL DATA ACQUISITION AND HYDROGRAPHIC SURVEY

MSCH STA. 121+33.52 THRU 146+38.07
CONTOUR

DRAWING NO.

SHEET 7 OF 16



ISOLATED UNKNOWN OBJECTS

DESIGNATION	NAD83 COORDINATES (FEET) (X)	(Y)
OBJ 8	389,065	64,017
OBJ 9	388,432	64,204
OBJ 10	388,834	66,159

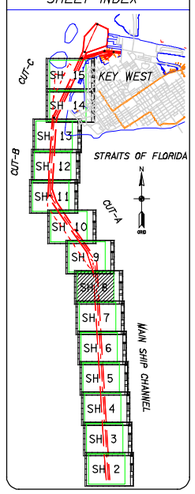
AIDS TO NAVIGATION

G"5"	(X)/(Y)	388,439	64,534
	LON/LAT	81 48 18.772	24 30 31.610
R"6"	(X)/(Y)	388,971	64,752
	LON/LAT	81 48 13.027	24 30 33.794
G"7"	(X)/(Y)	388,207	66,106
	LON/LAT	81 48 21.376	24 30 47.166

LOCATION DATES: OCTOBER 18, 2002 AND DECEMBER 6, 2002

NOTES:
1. REFER TO SURVEY NO. 02-226.
2. REFER TO SHEET NO. 1 FOR NOTES.
3. SUBMERGED FEATURES AND SEAFLOOR CLASSIFICATIONS, AS DEPICTED ON THE CHARTS, HAVE BEEN DESCRIBED BASED UPON THEIR APPARENT PHYSICAL CHARACTERISTICS THROUGH INTERPRETATION OF SIDE SCAN SONAR IMAGERY. DUE TO INHERENT LIMITATIONS IN SIDE SCAN SONAR TECHNOLOGY, GROUNDTRUTHING IS RECOMMENDED TO CONFIRM THE RESULTS OF THE INTERPRETATION EFFORTS.

SHEET INDEX



SURVEY LEGEND

- SANDY BOTTOM
- LOW RELIEF LESS THAN 1 FOOT HIGH
- MEDIUM RELIEF BETWEEN 1 AND 3 FEET HIGH
- HIGH RELIEF 3 FEET AND HIGHER
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- JET PROBE LOCATION
- ISOLATED UNKNOWN OBJECTS
- SURVEY CONTROL POINT

COVERAGE DESCRIPTION

SCATTERED = LESS THAN 20%
PATCHY = BETWEEN 20% AND 75%
HARDBOTTOM = GREATER THAN 75%

VERTICAL DATUM DIAGRAM

NATIONAL GEODETIC VERTICAL DATUM, 1929

0.65'

MEAN LOWER LOW WATER

N

GRID

100 50 0 100 200FT

SCALE: 1"=100'

US Army Corps of Engineers
Jacksonville District

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No.	Symbol	Zone	Description	Approved

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

SBA SYSTEMS CORPORATION
2300 NORTHWEST 30TH PLACE
POMPANO BEACH, FLORIDA 33069
PHONE (954) 979-9071 FAX (954) 979-9076

Inv. No. DACW17-01-D-0001
Date# FEBRUARY, 2003
D.O.FILE NO. 21-38,374

Designed by: Drw by: SBI
Cad by: CCS
Scale: AS SHOWN
Plot date:
Plot scale:

File name: D226SHOR.DGN
Reference files: D226BORI.DGN, D226CONT.DGN, D226DEPT.DGN, D226HOSL.DGN, D226HOSS.DGN, D226SSLC.DGN, D226STAT.DGN

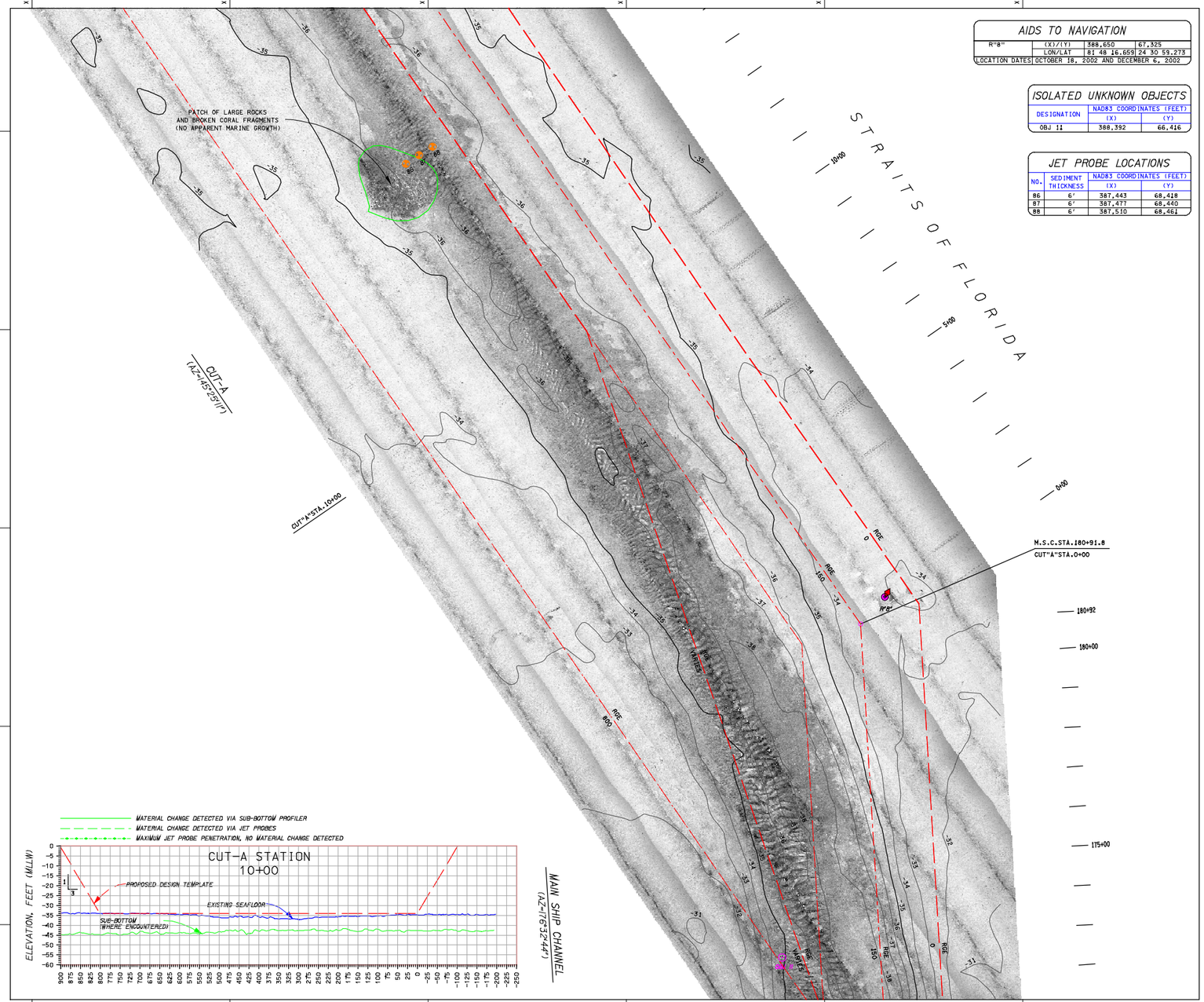
KEY WEST HARBOR, FLORIDA
MONROE COUNTY, FLORIDA

GEOPHYSICAL DATA ACQUISITION AND HYDROGRAPHIC SURVEY

MSCH STA. 146+38.07 THRU 171+42.62
CONTOUR

DRAWING NO.

SHEET 8 OF 16



AIDS TO NAVIGATION

R"8"	(X)/(Y)	388,650	67,325
	LON/LAT	81 48 16.659	24 30 59.273
LOCATION DATES	OCTOBER 18, 2002 AND DECEMBER 6, 2002		

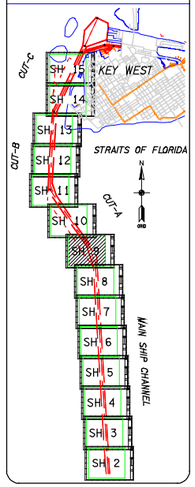
ISOLATED UNKNOWN OBJECTS

DESIGNATION	NAD83 COORDINATES (FEET)	
	(X)	(Y)
OBJ 11	388,392	66,416

JET PROBE LOCATIONS

NO.	SEDIMENT THICKNESS	NAD83 COORDINATES (FEET)	
		(X)	(Y)
86	6'	387,443	68,418
87	6'	387,477	68,440
88	6'	387,510	68,461

SHEET INDEX



SURVEY LEGEND

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- ISOLATED UNKNOWN OBJECTS
- SURVEY CONTROL POINT

COVERAGE DESCRIPTION

SCATTERED = LESS THAN 20%
PATCHY = BETWEEN 20% AND 75%
HARDBOTTOM = GREATER THAN 75%

VERTICAL DATUM DIAGRAM

NATIONAL GEODETIC VERTICAL DATUM, 1929

0.65'

MEAN LOWER LOW WATER

N

GRID

100 50 0 100 200FT

SCALE: 1"=100

NOTES:
1. REFER TO SURVEY NO. 02-226.
2. REFER TO SHEET NO. 1 FOR NOTES.
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US Army Corps of Engineers
Jacksonville District

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JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

SBA SYSTEMS CORPORATION
2300 NORTHWEST 30TH PLACE
POMPANO BEACH, FLORIDA 33069
PHONE (954) 979-9071 FAX (954) 979-9076

Inv. No. DACW17-01-D-0001
Date: FEBRUARY, 2003
Scale: AS SHOWN
Plot date:
Plot scale:
Designed by:
Drawn by: SBI
Chkd by: CCJ
Approved:
D.O.FILE NO. 21-38,374

File name: D225SS09.DGN
Reference files: D225BG08.DGN, D225BG09.DGN, D225CONT.DGN, D225DNS01.DGN, D225DNS02.DGN, D225ISLS.DGN, D225SSLS.DGN, D225STA2.DGN

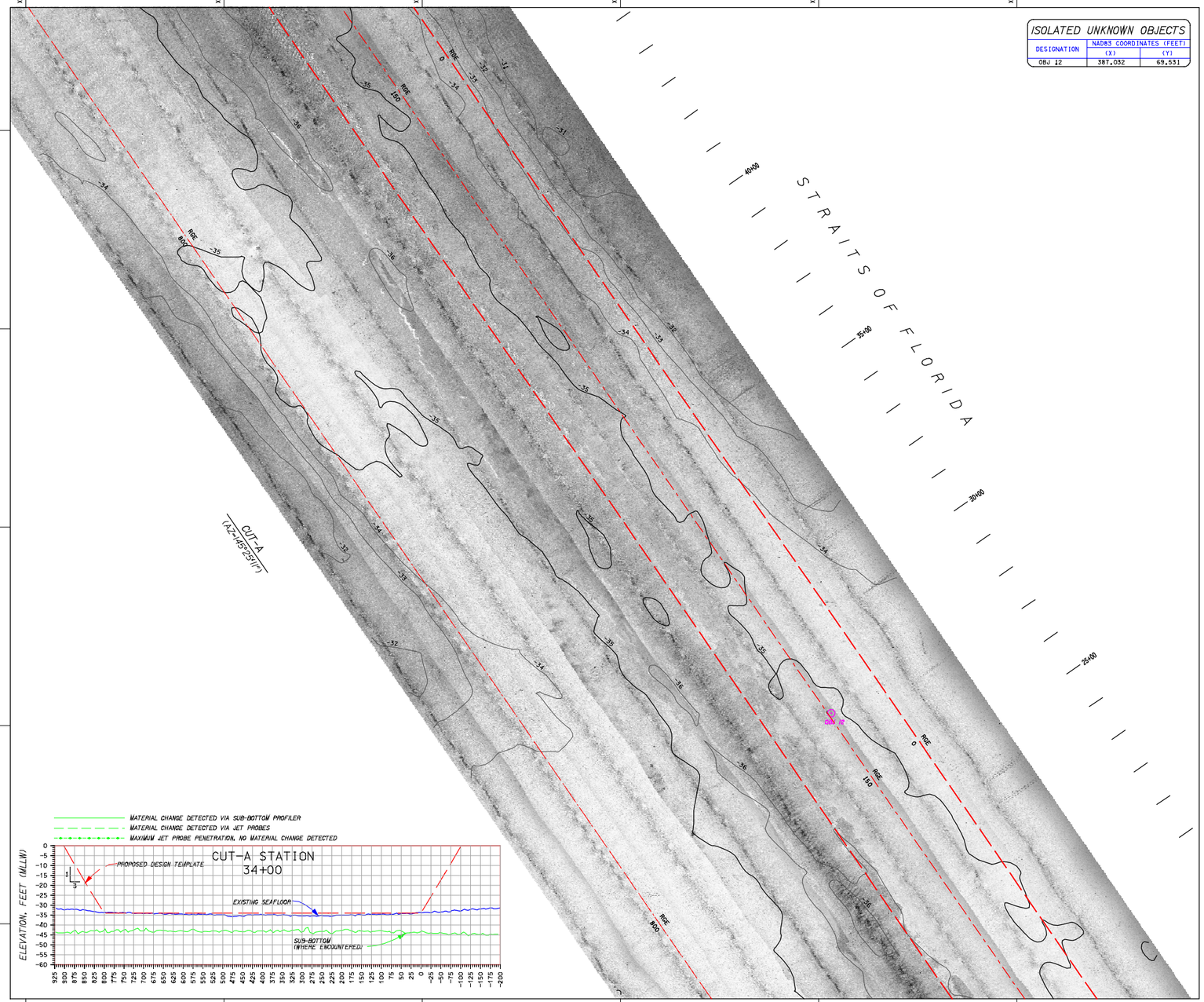
KEY WEST HARBOR, FLORIDA
MONROE COUNTY, FLORIDA

GEOPHYSICAL DATA ACQUISITION AND HYDROGRAPHIC SURVEY

MSCH STA. 17+42.62 THRU CUT-A STA. 18+85.67
CONTOUR

DRAWING NO.

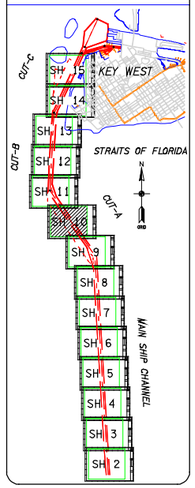
SHEET 9 OF 16



ISOLATED UNKNOWN OBJECTS

DESIGNATION	NAD83 COORDINATES (FEET)	
	(X)	(Y)
OBJ 12	387,032	69,531

SHEET INDEX



SURVEY LEGEND

- SANDY BOTTOM
- LOW RELIEF — LESS THAN 1 FOOT HIGH
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- HIGH RELIEF — 3 FEET AND HIGHER
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COVERAGE DESCRIPTION

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VERTICAL DATUM DIAGRAM

NATIONAL GEODETIC VERTICAL DATUM, 1929

0.65'

MEAN LOWER LOW WATER

N

GRID

100 50 0 100 200FT

SCALE: 1"=100

NOTES:
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US Army Corps of Engineers
Jacksonville District

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JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

SBA SYSTEMS CORPORATION
2300 NORTHWEST 30TH PLACE
POMPANO BEACH, FLORIDA 33069
PHONE (954) 979-9071 FAX (954) 979-9076

Prj. No. DACW17-01-D-0001
Dsing: AS SHOWN
Scale:
Plot date:
Plot scale:
Designed by:
Drawn by: SBS
Cad by: CCS
Dsned: FEBRUARY, 2003
D.O. FILE NO. 21-38,374

File name: 0226SHO.DGN
Reference files: 0226BASE.DGN, 0226BOUN.DGN, 0226CONT.DGN, 0226DEPT.DGN, 0226POSL.DGN, 0226SHOR.DGN, 0226SSSS.DGN, 0226STAD.DGN

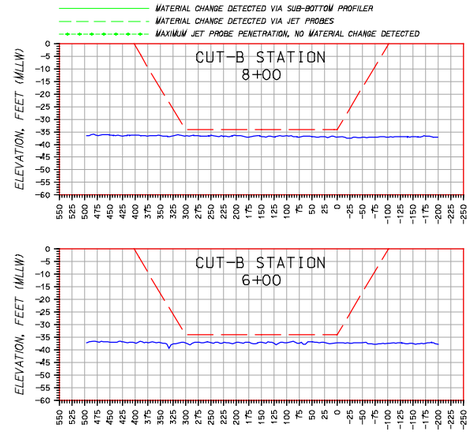
KEY WEST HARBOR, FLORIDA
MONROE COUNTY, FLORIDA

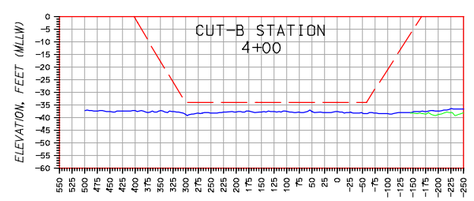
GEOPHYSICAL DATA ACQUISITION AND HYDROGRAPHIC SURVEY

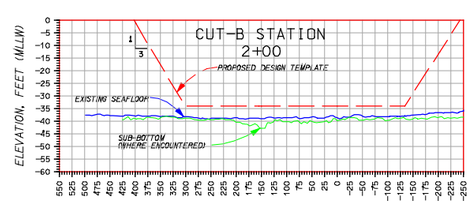
CUT-A STA. 18+85.67 THRU 49+22.10
CONTOUR

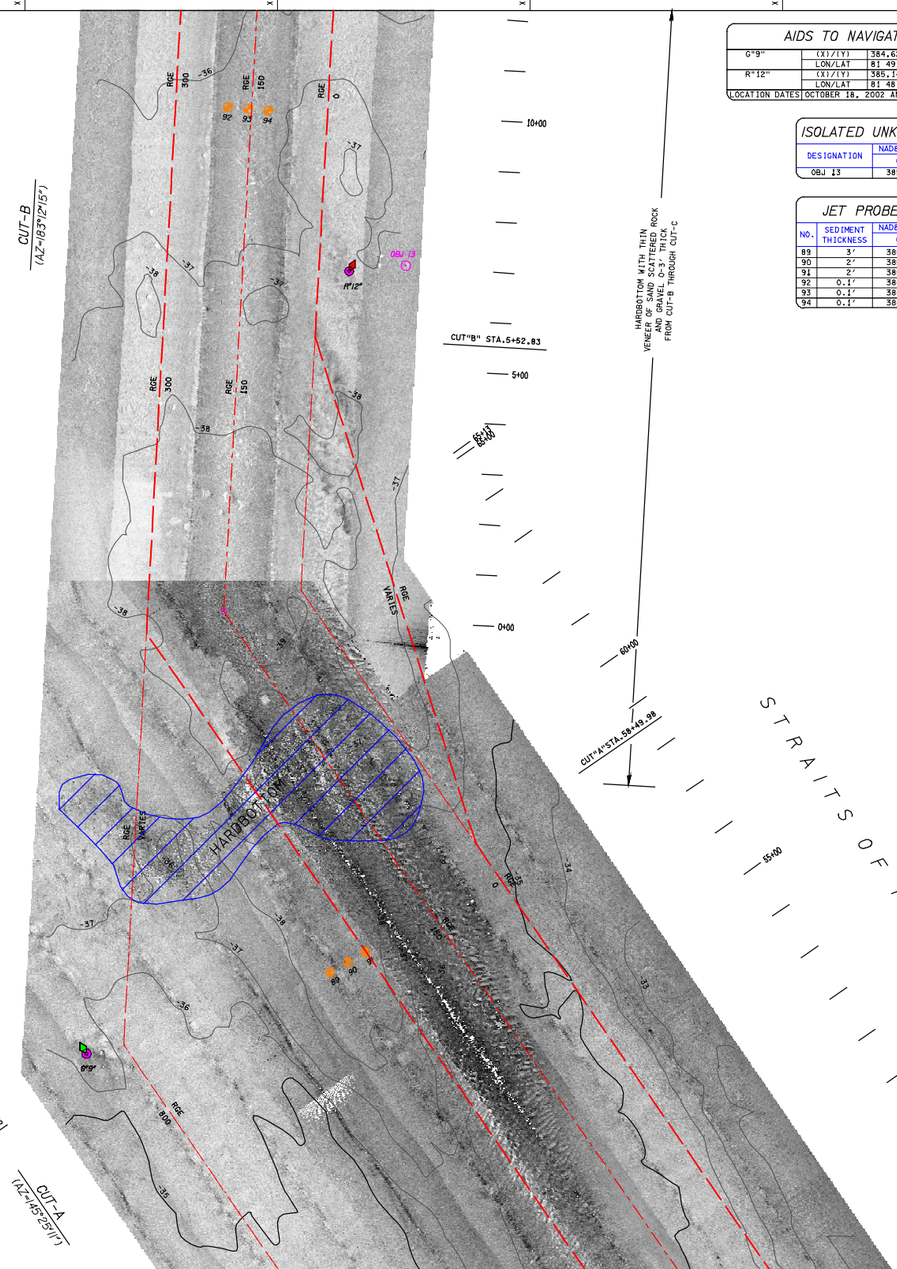
DRAWING NO.

SHEET 10 OF 16









AIDS TO NAVIGATION

G"9"	(X)/(Y)	384.621	71.745
	LON/LAT	81 49 00.561	24 31 42.817
R"12"	(X)/(Y)	385.142	73.294
	LON/LAT	81 48 55.026	24 31 58.196
LOCATION DATES	OCTOBER 18, 2002 AND DECEMBER 6, 2002		

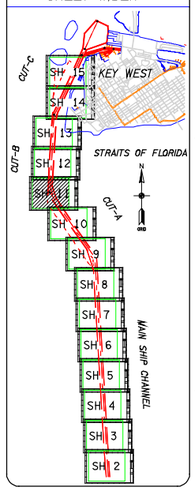
ISOLATED UNKNOWN OBJECTS

DESIGNATION	NAD83 COORDINATES (FEET)	
	(X)	(Y)
OBJ 13	385.253	73.305

JET PROBE LOCATIONS

NO.	SEDIMENT THICKNESS	NAD83 COORDINATES (FEET)	
		(X)	(Y)
89	3'	385.104	71.906
90	2'	385.139	71.926
91	2'	385.173	71.945
92	0.1'	384.902	73.616
93	0.1'	384.942	73.616
94	0.1'	384.982	73.616

SHEET INDEX



SURVEY LEGEND

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- LOW RELIEF — LESS THAN 1 FOOT HIGH
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COVERAGE DESCRIPTION

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PATCHY = BETWEEN 20% AND 75%
HARDBOTTOM = GREATER THAN 75%

VERTICAL DATUM DIAGRAM

NATIONAL GEODETIC VERTICAL DATUM, 1929

0.65'

MEAN LOWER LOW WATER

N

GRID

100 50 0 100 200FT

SCALE: 1"=100

NOTES:
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US Army Corps of Engineers
Jacksonville District

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JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

SBA SYSTEMS CORPORATION
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Inv. No. DACW17-01-D-0001
Dated
Scale: AS SHOWN
Plot date:
Plot scale:
Dated FEBRUARY, 2003
D.O.F.ILE NO. 21-38,374

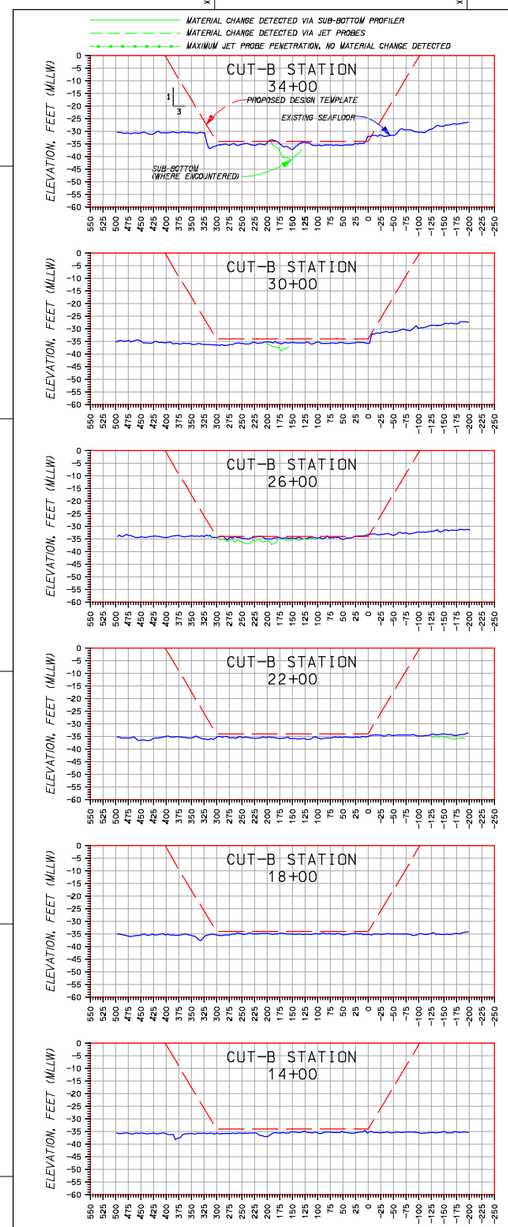
Designed by:
Drn by: SBI
Ckd by: KCS

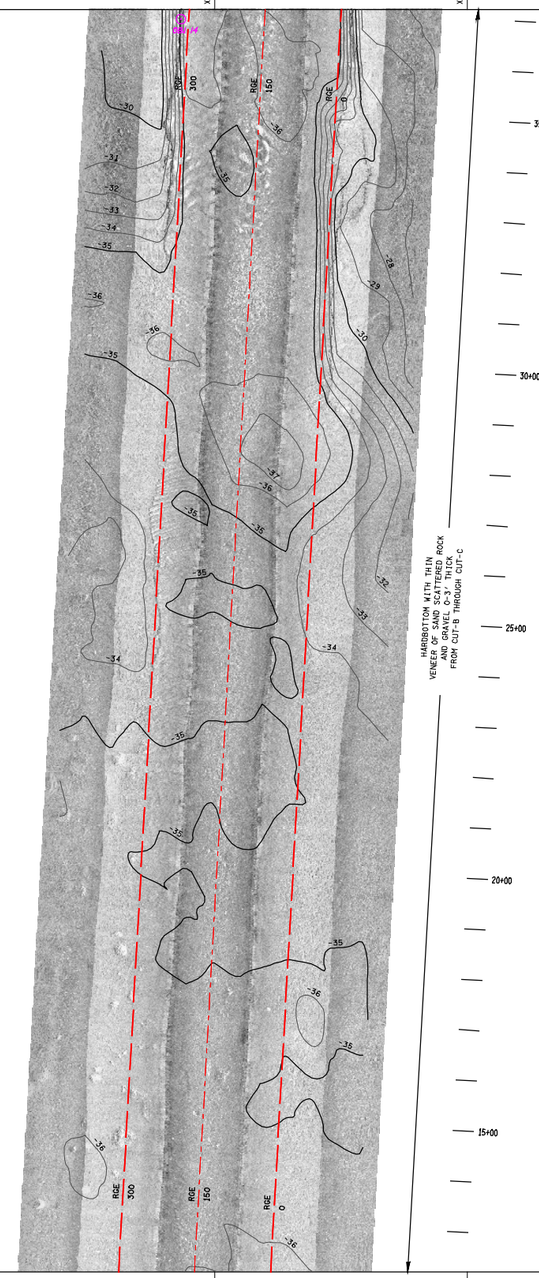
File name: D2225SHTLDGN
Reference files: D2226BATH.DGN D2226BGRID.DGN D2226CONT.DGN D2226HARDB.DGN D2226LOGO.DGN D2226SHTLDGN D2226TITLEDGN

KEY WEST HARBOR, FLORIDA
MONROE COUNTY, FLORIDA
GEOPHYSICAL DATA ACQUISITION AND HYDROGRAPHIC SURVEY
CUT-A STA.49+22.10 THRU CUT-B STA.11+91.70
CONTOUR

DRAWING NO.

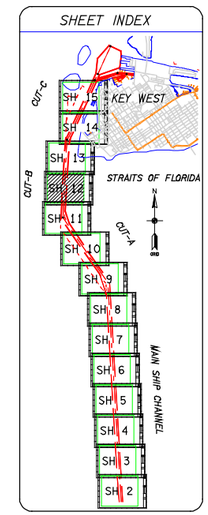
SHEET 11 OF 16





ISOLATED UNKNOWN OBJECTS

DESIGNATION	NAD83 COORDINATES (FEET)	
	(X)	(Y)
OBJ 14	384,933	76,292



SURVEY LEGEND

- SANDY BOTTOM
- LOW RELIEF LESS THAN 1 FOOT HIGH
- MEDIUM RELIEF BETWEEN 1 AND 3 FEET HIGH
- HIGH RELIEF 3 FEET AND HIGHER
- MAJOR CONTOUR (MLLW)
- MINOR CONTOUR (MLLW)
- TIDE STAFF
- AIDS TO NAVIGATION
- EVIDENCE OF POSSIBLE CABLE LOCATION BASED ON SIDE SCAN SONAR INTERPRETATION
- JET PROBE LOCATION
- ISOLATED UNKNOWN OBJECTS
- SURVEY CONTROL POINT

COVERAGE DESCRIPTION

SCATTERED = LESS THAN 20%
PATCHY = BETWEEN 20% AND 75%
HARDBOTTOM = GREATER THAN 75%

VERTICAL DATUM DIAGRAM

NATIONAL GEODETIC VERTICAL DATUM, 1929

0.65'

MEAN LOWER LOW WATER

N

GRID

100 50 0 100 200FT

SCALE: 1"=100'

NOTES:
1. REFER TO SURVEY NO. 02-226.
2. REFER TO SHEET NO. 1 FOR NOTES.
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US Army Corps of Engineers
Jacksonville District

SAFETY ON THIS JOB DEPENDS ON YOU

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DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

SBA SYSTEMS CORPORATION
2303 NORTHWEST 30TH PLACE
POMPANO BEACH, FLORIDA 33069
PHONE (954) 979-9071 FAX (954) 979-9076

Inv. No. DACW17-01-D-0001
Date: FEBRUARY, 2003
D.O.F.ILE NO. 21-38,374

Designed by: Dwn by: SBA; Ckd by: VCJ; Scale: AS SHOWN; Plot date: Plot scale:

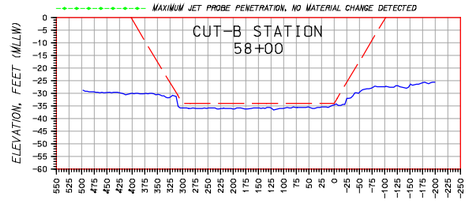
File name: D22SSM12.DGN
Reference files: D22SSM01.DGN, D22SSBGR.DGN, D22SSCNT.DGN, D22SSMBS.DGN, D22SSGAL.DGN, D22SSSSS.DGN, D22SSTLA.DGN

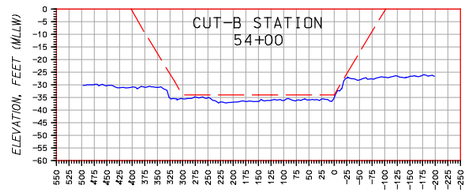
KEY WEST HARBOR, FLORIDA
MONROE COUNTY, FLORIDA
GEOPHYSICAL DATA ACQUISITION AND HYDROGRAPHIC SURVEY
CUT-B STA. 11+91.70 THRU 36+95.62
CONTOUR

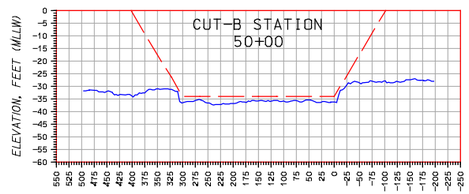
DRAWING NO.

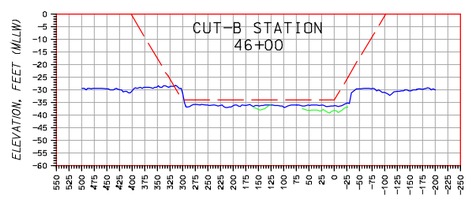
SHEET 12 OF 16

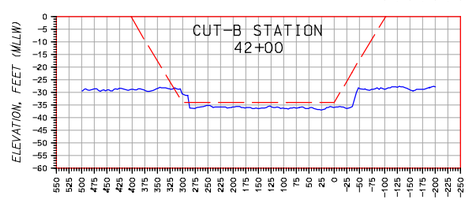
MATERIAL CHANGE DETECTED VIA SUB-BOTTOM PROFILER
MATERIAL CHANGE DETECTED VIA JET PROBES
MAXIMUM JET PROBE PENETRATION, NO MATERIAL CHANGE DETECTED

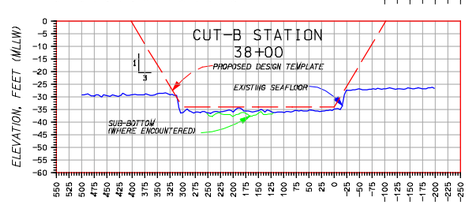


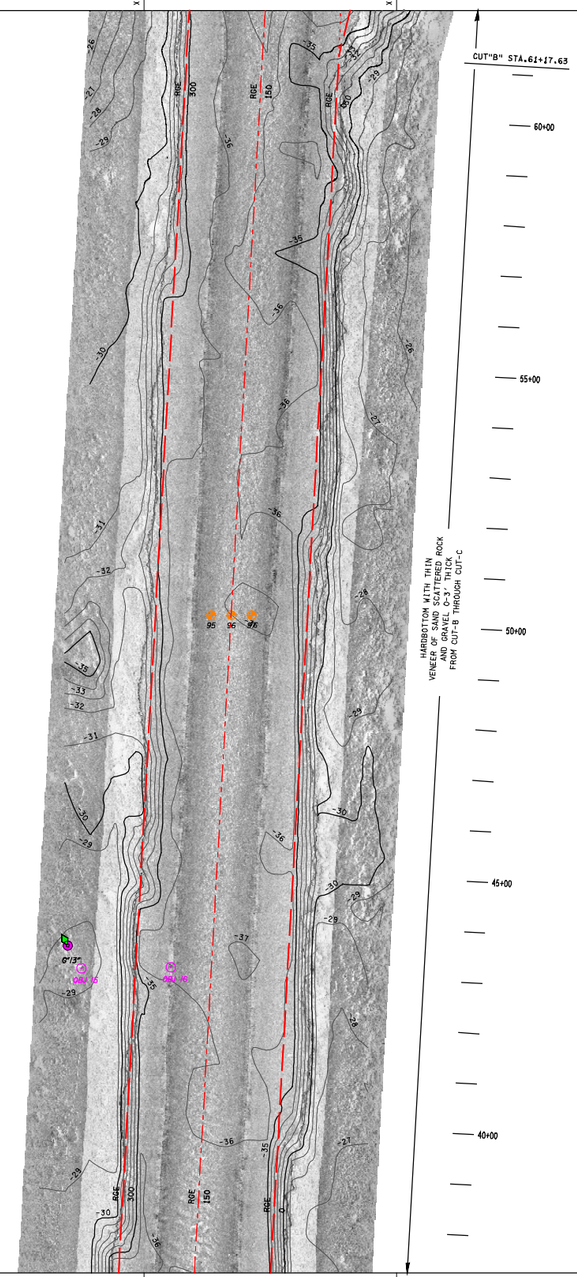












ISOLATED UNKNOWN OBJECTS

DESIGNATION	NAD83 COORDINATES (FEET) (X)	(Y)
OBJ 15	384,876	76,913
OBJ 16	385,053	76,915

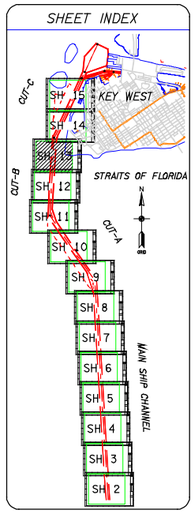
JET PROBE LOCATIONS

NO.	SEDIMENT THICKNESS	NAD83 COORDINATES (FEET) (X)	(Y)
95	0.1'	385,133	77,613
96	0.1'	385,173	77,613
97	0.1'	385,213	77,613

AIDS TO NAVIGATION

G"13"	(X)/(Y)	384,849	76,959
	LON/LAT	81 48 58.435	24 32 34.484
LOCATION DATES	OCTOBER 18, 2002 AND DECEMBER 6, 2002		

SHEET INDEX



SURVEY LEGEND

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COVERAGE DESCRIPTION

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VERTICAL DATUM DIAGRAM

NATIONAL GEODETIC VERTICAL DATUM, 1929
0.65'
MEAN LOWER LOW WATER

N
GRID
100 50 0 100 200FT
SCALE: 1"=100

NOTES:
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JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

SBA SYSTEMS CORPORATION
2300 NORTHWEST 30TH PLACE
POMPANO BEACH, FLORIDA 33069
PHONE (954) 979-9071 FAX (954) 979-9076

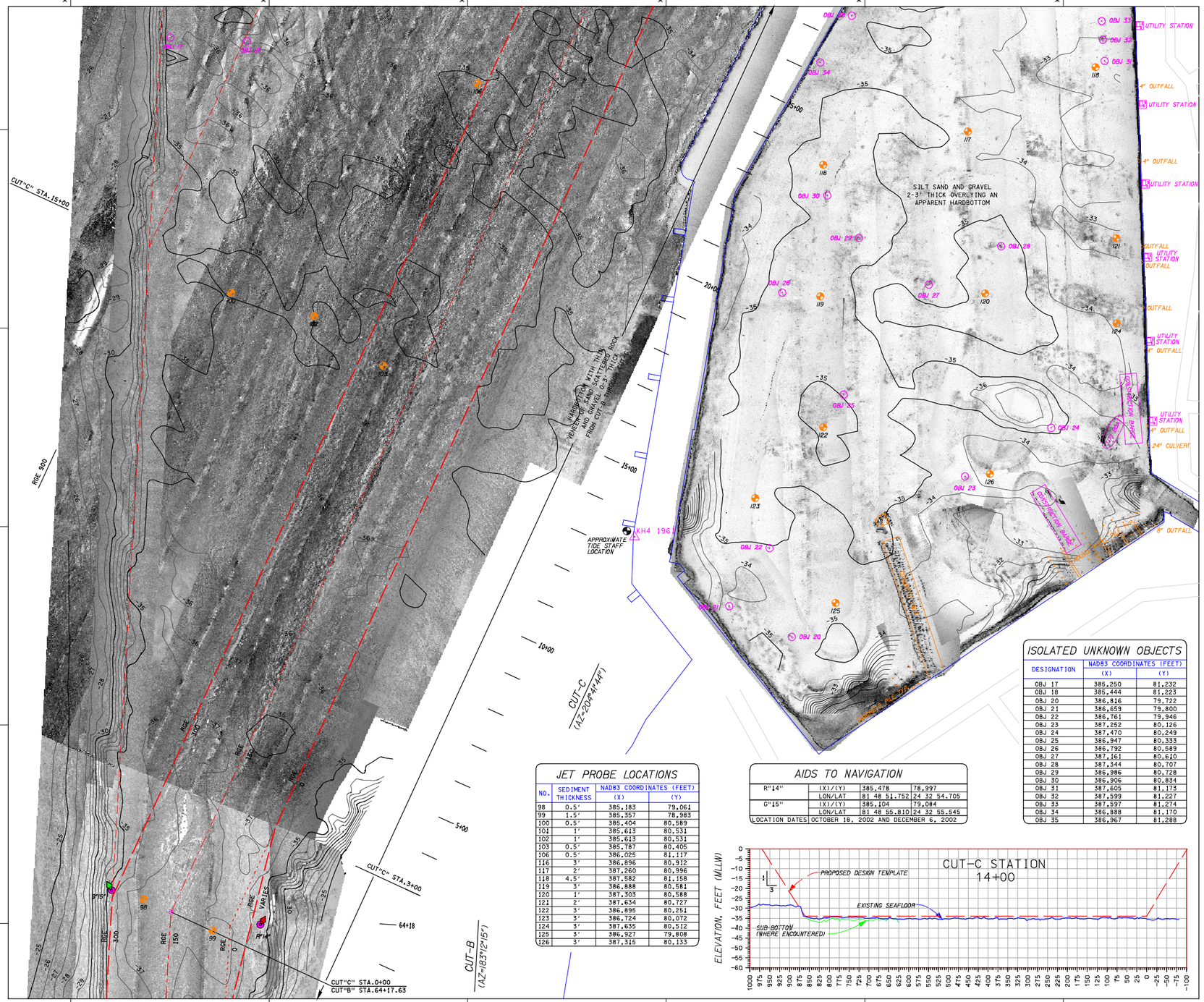
Prev. No. DACW17-02-D-0001
Dated
Scale: AS SHOWN
Plot date:
Plot scale:
Designed by:
Drawn by: SBS
Checked by: CCS
Dated: FEBRUARY, 2003
D.O. FILE NO. 21-38,374

File name: 0226SHX.DGN
Reference files: 0226BGN.DGN, 0226BGN.DGN, 0226CONT.DGN, 0226DTM.DGN, 0226GLA.DGN, 0226SENS.DGN, 0226SENS.DGN, 0226STA.DGN

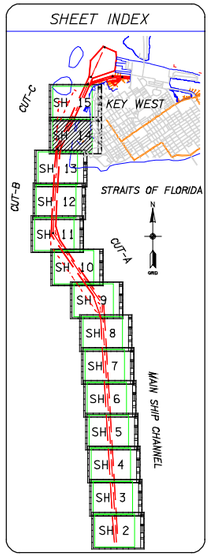
KEY WEST HARBOR, FLORIDA
MONROE COUNTY, FLORIDA
GEOPHYSICAL DATA ACQUISITION AND HYDROGRAPHIC SURVEY
CUT-B STA.36+95.62 THRU 61+99.53
CONTOUR

DRAWING NO.

SHEET 13 OF 16



SHEET INDEX



SURVEY LEGEND

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VERTICAL DATUM DIAGRAM

NATIONAL GEODETIC VERTICAL DATUM, 1929

0.65'

MEAN LOWER LOW WATER

ISOLATED UNKNOWN OBJECTS

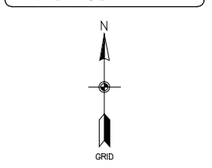
DESIGNATION	NAD83 COORDINATES (FEET) (X)	(Y)
OBJ 17	385,250	81,232
OBJ 18	385,444	81,223
OBJ 20	386,816	79,722
OBJ 21	386,659	79,800
OBJ 22	386,761	79,946
OBJ 23	387,262	80,126
OBJ 24	387,470	80,249
OBJ 25	386,947	80,333
OBJ 26	386,792	80,589
OBJ 27	387,161	80,610
OBJ 28	387,344	80,707
OBJ 29	386,986	80,728
OBJ 30	386,906	80,834
OBJ 31	387,605	81,173
OBJ 32	387,599	81,227
OBJ 33	387,597	81,274
OBJ 34	386,888	81,170
OBJ 35	386,967	81,288

JET PROBE LOCATIONS

NO.	SEDIMENT THICKNESS	NAD83 COORDINATES (FEET) (X)	(Y)
98	0.5'	385,183	79,061
99	1.5'	385,357	78,983
100	0.5'	385,404	80,589
101	1'	385,613	80,531
102	1'	385,613	80,531
103	0.5'	385,787	80,405
106	0.5'	386,025	81,117
116	3'	386,896	80,912
117	2'	387,260	80,996
118	4.5'	387,582	81,158
119	3'	386,888	80,581
120	1'	387,303	80,588
121	2'	387,634	80,727
122	3'	386,895	80,251
123	3'	386,724	80,072
124	3'	387,635	80,512
125	3'	386,927	79,808
126	3'	387,315	80,133

AIDS TO NAVIGATION

R"14"	(X)/(Y)	385,478	78,997
	LON/LAT	81 48 51.752	24 32 54.705
G"15"	(X)/(Y)	385,104	79,084
	LON/LAT	81 48 55.810	24 32 55.545
LOCATION DATES	OCTOBER 18, 2002 AND DECEMBER 6, 2002		



NOTES:
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Jacksonville District

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JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

SEA SYSTEMS CORPORATION
2300 NORTHWEST 30TH PLACE
POMPANO BEACH, FLORIDA 33069
PHONE (954) 979-9071 FAX (954) 979-9076

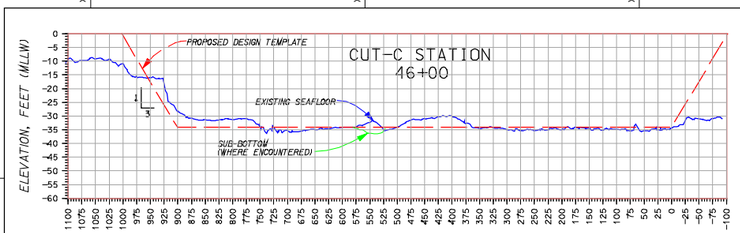
Inv. No. DACW17-01-D-0001
Status:
Scale: AS SHOWN
Plot date:
Plot scale:
Designed by:
Dwn by: SSM
Ckd by: KCG
Date: FEBRUARY, 2003
D.O.FILE NO. 21-38,374

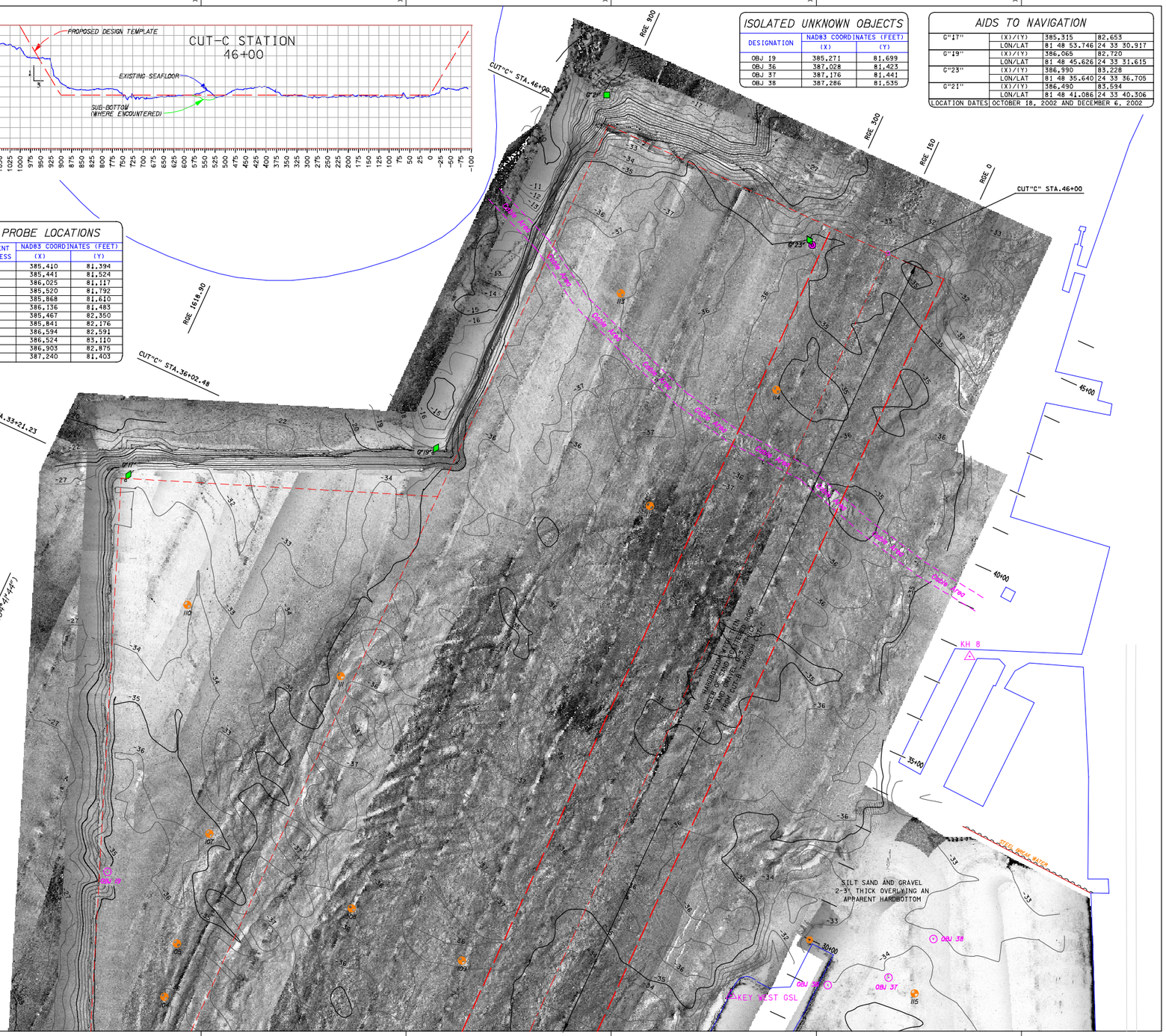
The name D226SNCGN.DGN
Reference files: D226AUXLA.DGN, D226BGCR.DGN, D226CONTOUR.DGN, D226NAVD.DGN, D226OBJLA.DGN, D226SBPROF.DGN, D226SNCG.DGN, D226STATION.DGN, D226STA.DGN

KEY WEST HARBOR, FLORIDA
MONROE COUNTY, FLORIDA
GEOPHYSICAL DATA ACQUISITION AND HYDROGRAPHIC SURVEY
CUT-B STA. 61+99.53 THRU CUT-C 25+11.98
CONTOUR

DRAWING NO.

SHEET 14 OF 16





ISOLATED UNKNOWN OBJECTS

DESIGNATION	NAD83 COORDINATES (FEET) (X)	(Y)
OBJ 19	385,271	81,699
OBJ 36	387,028	81,423
OBJ 37	387,176	81,441
OBJ 38	387,286	81,535

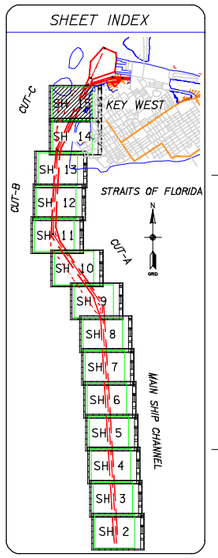
AIDS TO NAVIGATION

G"17"	(X)/(Y)	385,315	82,653
	LON/LAT	81 48 53.746	24 33 30.917
G"19"	(X)/(Y)	386,065	82,720
	LON/LAT	81 48 45.626	24 33 31.615
G"23"	(X)/(Y)	386,990	83,228
	LON/LAT	81 48 35.640	24 33 36.705
G"21"	(X)/(Y)	386,490	83,594
	LON/LAT	81 48 41.086	24 33 40.306
LOCATION DATES	OCTOBER 18, 2002 AND DECEMBER 6, 2002		

JET PROBE LOCATIONS

NO.	SEDIMENT THICKNESS	NAD83 COORDINATES (FEET) (X)	(Y)
104	1.5'	385,410	81,394
105	1.5'	385,441	81,524
106	0.5'	386,025	81,117
107	2.3'	385,520	81,792
108	0'	385,868	81,610
109	1'	386,136	81,483
110	3'	385,467	82,350
111	3'	385,841	82,176
112	0'	386,594	82,591
113	3'	386,524	83,110
114	1.5'	386,903	82,875
115	3'	387,240	81,403

SHEET INDEX



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COVERAGE DESCRIPTION

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VERTICAL DATUM DIAGRAM

NATIONAL GEODETIC VERTICAL DATUM, 1929
0.65'
MEAN LOWER LOW WATER

N
GRID
100 50 0 100 200FT
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NOTES:
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Dataset AS SHOWN
Scale Not to scale
Plot scale

Designed by
Dwn by SSN
Ckd by KCJ

Date FEBRUARY, 2003
D.O.FILE NO. 21-38,374

File name D226SHTS.DGN
Plot file D226ALL.DGN
D226BRGR.DGN
D226BOUD.DGN
D226NAVD.DGN
D226TBL1.DGN
D226TBL2.DGN
D226SNDC.DGN
D226SHTS.DGN
D226STFA.DGN

KEY WEST HARBOR, FLORIDA
MONROE COUNTY, FLORIDA
GEOPHYSICAL DATA ACQUISITION AND HYDROGRAPHIC SURVEY
CUT-C STA. 25+11.98 THRU 46+00
CONTOUR

DRAWING NO.

SHEET 15 OF 16

CHANNEL CONTROL POINTS

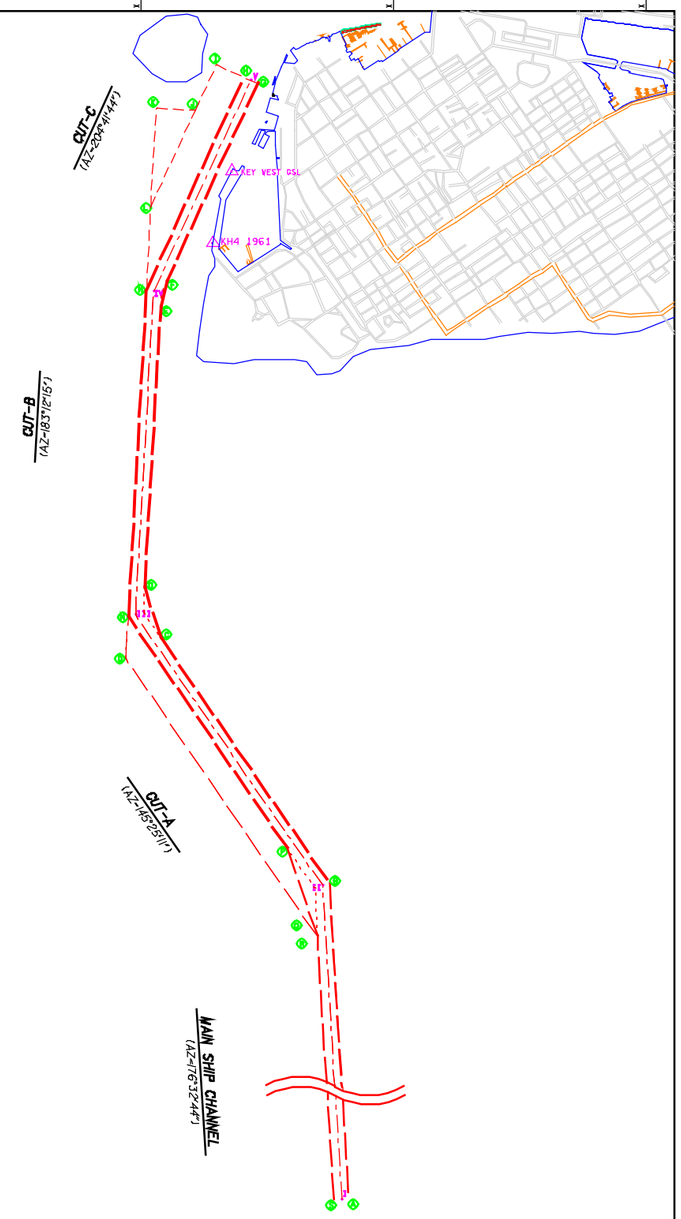
CHANNEL POINTS	COORDINATES (NAD83) (X)	(Y)	STATION	RANGE	CUT
A	389,830.36	49,208.17	0+00	0	MSCH
B	388,737.73	67,308.80	181+33.68	0	MSCH
C	385,393.03	72,159.69	58+49.98	0	CUT-A
D	385,074.48	73,164.34	5+52.83	0	CUT-B
E	385,385.51	78,720.44	61+17.63	0	CUT-B
F	385,614.13	79,238.25	3+00	0	CUT-C
G	387,310.66	83,144.98	64+00	0	CUT-C
H	387,038.10	83,270.32	64+00	300	CUT-C
I	386,492.97	83,521.00	64+00	900	CUT-C
J	386,076.97	82,614.35	36+02.48	900	CUT-C
K	385,305.55	82,659.53	33+21.23	1618.9	CUT-C
L	385,197.80	80,704.52	15+00	900	CUT-C
M	385,104.34	79,065.16	64+46.09	300	CUT-B
N	384,741.18	72,577.89	65+64.71	300	CUT-A
O	384,645.57	71,763.10	59+19.75	800	CUT-A
P	387,499.45	67,996.26	10+00	300	CUT-A
Q	388,600.54	66,259.03	171+00	300	MSCH
R	388,601.58	66,241.81	-7+86.24	800	CUT-A
S	389,630.90	49,190.09	0+00	300	MSCH

CENTERLINE CONTROL POINTS

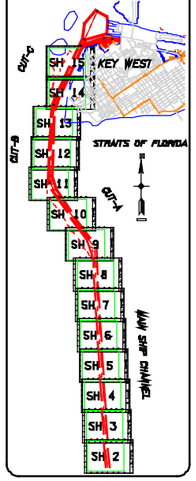
CHANNEL POINTS	COORDINATES (NAD83) (X)	(Y)	STATION	RANGE	CUT
I	389,680.63	49,199.13	0+00	150	MSCH
II	388,530.51	67,258.06	180+91.80	150	MSCH
			0+00	150	CUT-A
III	384,893.81	72,620.76	65+13.88	150	CUT-A
			0+00	150	CUT-B
IV	385,252.51	78,028.36	62+17.63	150	CUT-B
			0+00	150	CUT-C
V	387,174.37	83,207.66	46+00	150	CUT-C

SURVEY CONTROL

MONUMENT DESIGNATION	COORDINATES (NAD83) (X)	(Y)	ELEVATION FEET (NGVD 29)
KEY WEST GSL	386,792.55	81,397.33	6.52
KW 4 1961	386,420.17	79,974.13	6.14



SHEET INDEX



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0.0'

MEAN LOWER LOW WATER

N

GRID

1000 500 0 1000 2000FT

SCALE: 1"=1000'

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JACKSONVILLE, FLORIDA

SEA, SYSTEMS CORPORATION
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DCK/TJ-01-0-001
AS SHOWN
GSM
KCJ
FEBRUARY, 2003
D.O.FILE NO. 21-38,374

Reference files:
2222BATHY.DGN
2222BGRID.DGN
2222CONT.DGN
2222FIX.DGN
2222SBSCAN.DGN
2222SSS.DGN

KEY WEST HARBOR, FLORIDA
MONROE COUNTY, FLORIDA

GEOPHYSICAL DATA ACQUISITION AND HYDROGRAPHIC SURVEY

MAIN SHIP CHANNEL, CUT-A, CUT-B, CUT-C

CONTROL

DRAWING NO.

SHEET 10 OF 10

Jet Probes

No.	Sediment Thickness	NAD83 Coordinates (Feet) (X)	(Y)
1	6'	389,572	49,540
2	4'	389,612	49,543
3	2'	389,652	49,545
4	1'	389,751	49,553
5	0.5'	389,781	49,554
6	2.5'	389,467	49,833
7	2'	389,507	49,833
8	2'	389,547	49,833
9	0.3'	389,538	49,859
10	4'	389,578	49,859
11	4'	389,618	49,859
12	0.2'	389,700	49,845
13	0.5'	389,740	49,845
14	0.1'	389,780	49,845
15	5'	389,619	50,202
16	8'	389,579	50,257
17	3'	389,445	50,287
18	4'	389,485	50,287
19	5'	389,525	50,287
20	7'	389,593	50,332
21	2.5'	389,613	50,332
22	2.5'	389,708	50,323
23	2'	389,748	50,323
24	2'	389,788	50,323
25	10'	389,487	50,523
26	10'	389,528	50,525
27	10'	389,567	50,525
28	10'	389,644	50,554
29	10'	389,684	50,554
30	6'	389,724	50,554
31	10'	389,540	50,945
32	10'	389,580	50,949
33	10'	389,619	50,951
34	10'	389,520	51,204
35	10'	389,560	51,204
36	10'	389,600	51,204
37	10'	389,499	51,485
38	10'	389,539	51,488

Jet Probes

No.	Sediment Thickness	NAD83 Coordinates (Feet) (X)	(Y)
39	10'	389,578	51,489
40	2'	389,405	51,691
41	0.5'	389,442	51,694
42	0.5'	389,483	51,697
43	2.5'	389,586	51,698
44	0.5'	389,627	51,701
45	0.2'	389,666	51,704
46	1.5'	389,364	51,992
47	1.5'	389,402	51,992
48	1.5'	389,441	51,991
49	1'	389,458	51,992
50	3'	389,497	51,991
51	3'	389,536	51,992
52	1.5'	389,603	51,992
53	1'	389,643	51,992
54	2'	389,683	51,992
55	3'	389,452	52,290
56	2.5'	389,492	52,291
57	4'	389,531	52,294
58	1'	389,589	52,309
59	2'	389,629	52,309
60	3'	389,669	52,309
61	1.5'	389,325	52,372
62	10'	389,368	52,376
63	10'	389,405	52,379
64	1'	389,462	52,388
65	10'	389,502	52,389
66	10'	389,540	52,392
67	10'	389,552	52,406
68	1'	389,575	52,401
69	3'	389,615	52,401
70	3'	389,655	52,401
71	10'	389,510	52,693
72	10'	389,550	52,695
73	10'	389,589	52,697
74	10'	389,323	52,983
75	10'	389,361	52,987
76	10'	389,401	52,989

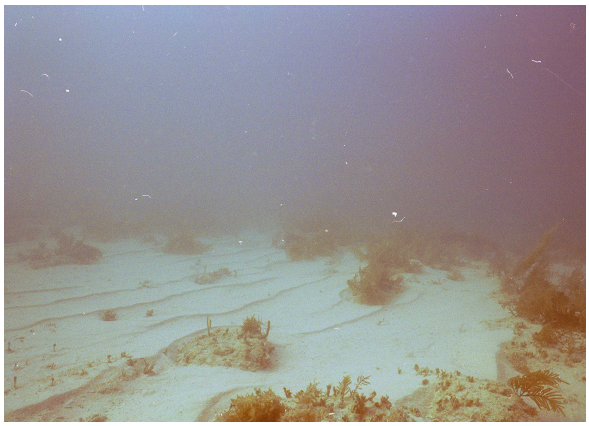
Jet Probes

No.	Sediment Thickness	NAD83 Coordinates (Feet) (X)	(Y)
77	10'	389,510	52,998
78	10'	389,551	53,002
79	6'	389,588	53,002
80	15'	389,292	53,587
81	15'	389,332	53,591
82	15'	389,372	53,592
83	15'	389,461	53,591
84	15'	389,503	53,592
85	15'	389,542	53,595
86	6'	387,443	68,418
87	6'	387,477	68,440
88	6'	387,510	68,461
89	3'	385,104	71,906
90	2'	385,139	71,926
91	2'	385,173	71,945
92	0.1'	384,902	73,616
93	0.1'	384,942	73,616
94	0.1'	384,982	73,616
95	0.1'	385,133	77,613
96	0.1'	385,173	77,613
97	0.1'	385,213	77,613
98	0.5'	385,183	79,061
99	1.5'	385,357	78,983
100	0.5'	385,404	80,589
101	1'	385,613	80,531

Jet Probes

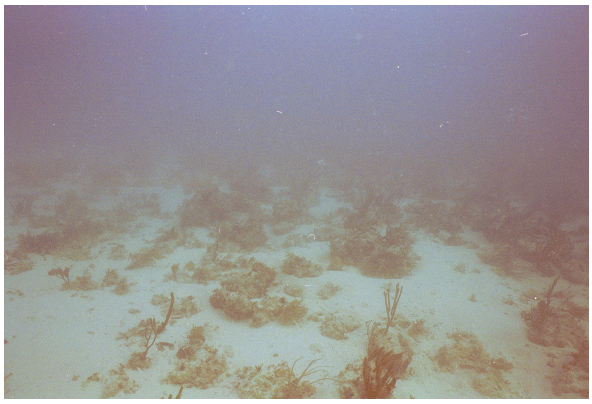
No.	Sediment Thickness	NAD83 Coordinates (Feet) (X)	(Y)
102	1'	385,613	80,531
103	0.5'	385,787	80,405
104	1.5'	385,410	81,394
105	1.5'	385,441	81,524
106	0.5'	386,025	81,117
107	2.3'	385,520	81,792
108	0'	385,868	81,610
109	1'	386,136	81,483
110	3'	385,467	82,350
111	3'	385,841	82,176
112	0'	386,594	82,591
113	3'	386,524	83,110
114	1.5'	386,903	82,875
115	3'	387,240	81,403
116	3'	386,896	80,912
117	2'	387,260	80,996
118	4.5'	387,582	81,158
119	3'	386,888	80,581
120	1'	387,303	80,588
121	2'	387,634	80,727
122	3'	386,895	80,251
123	3'	386,724	80,072
124	3'	387,635	80,512
125	3'	386,927	79,808
126	3'	387,315	80,133

Representative Bottom Condition
Plate Number 1
Main Ship Channel Station 3+50 Range 200
January 30, 2003

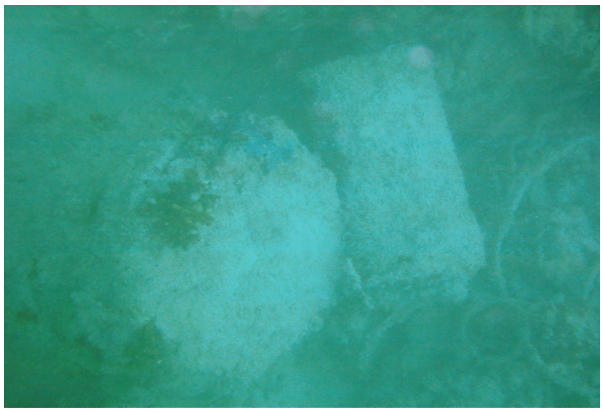


Representative Bottom Condition
Plate Number 2
Main Ship Channel Station 6+50 Range 50
January 29, 2003

Representative Bottom Condition
Plate Number 3
Main Ship Channel Station 6+50 Range 290
January 30, 2003



Representative Bottom Condition
Plate Number 4
Main Ship Channel Station 23+00 Range 150
January 29, 2003



Representative Bottom Condition
Plate Number 5
Main Ship Channel Station 90+00 Range 250
January 30, 2003

Representative Bottom Condition
Plate Number 6
Main Ship Channel 90+00 Range 250
December 10, 2002