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Federal Emergency Management Agency

Converting the National Flood Insurance Program to the North American Vertical Datum of 1988

Guidelines for Community Officials, Engineers, and Surveyors

CONVERTING THE NATIONAL FLOOD INSURANCE PROGRAM TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88)

Guidelines for Community Officials, Engineers, and Surveyors

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration
Washington, D.C. 20472

CONVERTING THE NATIONAL FLOOD INSURANCE PROGRAM TO THE NORTH AMERICAN VERTICAL DATUM OF 1988

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PART 1 - GUIDELINES FOR COMMUNITY OFFICIALS

Introduction

The National Geodetic Survey (NGS) has determined that it is necessary to readjust the national vertical control network. The current reference is the National Geodetic Vertical Datum of 1929 (NGVD 29). The vast majority of products of the Federal Emergency Management Agency, National Flood Insurance Program (NFIP), which is administered by the Federal Insurance Administration (FIA), are currently referenced to NGVD 29 for vertical control data (ground, structure, and flood elevations).

To remain in agreement with the national standard, FIA will be converting its products to the new national datum, the North American Vertical Datum of 1988 (NAVD 88). This conversion will necessarily take place in a gradual process driven by the opportunity to republish our Flood Insurance Studies (FISs) and Flood Insurance Rate Maps (FIRMs) for other substantive reasons.

Background of Vertical Reference Data

1. What is Local Mean Sea Level?

Local mean sea level (LMSL) is the result of hourly values of still water levels are observed over a period of 19 years. The arithmetic mean of the observed levels at each station is taken as local mean sea level for each station included in the observations. LMSL can be used for a vertical datum of reference that is based on the observation of one or more nearby tidal gaging stations.

2. What is the National Geodetic Vertical Datum of 1929 (NGVD 29)?

NGVD 29 was established based on the assumption that the height of local mean sea level at 21 tidal stations in the United States and 5 tidal stations in Canada equaled 0.0000 foot on the NGVD. However, since the height of mean sea level can and does change over each tidal epoch (19 years) and is different from station to station, the name was changed in 1973 from the Sea Level Datum of 1929 to NGVD 29 to avoid confusion.

3. Why is a Change of the Datum Necessary?

Since the establishment of NGVD 29, it has become obvious that the geoid (the estimate of the basic shape of the Earth based on local mean tidal observations) would continue to change with each new set of observations. Geodesists would prefer to base the measurement of the Earth's shape on a more stable surface than that provided by the constantly changing tides. Also, technology for making measurements of the Earth's size and shape has been improving to the point to allow thinking in global rather than local terms. Global positioning systems (GPSs) have been developed that demand more accurate and stable definition of the Earth.

4. How Does the North American Vertical Datum of 1988 (NAVD 88) Do This?

The datum for NAVD 88 is based on the mass or density of the Earth instead of the varying values of the heights of the seas. Measurements of the acceleration of gravity are made at observation points in the network being used and only one point is defined as the datum point. The vertical reference surface is then defined by the surface on which the gravity values are equal to the datum point value. This is called an equipotential surface.

5. When Will the Change to NAVD 88 Take Place?

The National Geodetic Survey has completed the analyses of measurements and the adjustments of the resulting data. The datum point has been defined using the reference station at Pointe-au-Pere (Father Point)/Rimousk on the St. Lawrence River, Quebec Province, Canada. Existing projects will be converted to NAVD 88 as funding and other reasons for revisions dictate. The NFIP will also follow a transition conversion program for effecting the change. Tentatively, all FIA studies contracted for FY 93 will require the use of NAVD 88 as vertical control. As of October 1, 1992, all requests for map change actions received will require the inclusion of NAVD 88 data.

Effects of NAVD 88 on Flood Insurance Rate Maps (FIRMs) and Communities

6. Is the Conversion to NAVD 88 Necessary for My Community?

Ultimately, all vertical measurements in the United States will be made from NAVD 88. As other substantive reasons require the revision of your community's FIRM, the Base (100-year) Flood Elevations (BFEs) and Elevation Reference Marks (ERMs) on it will be converted to NAVD 88.

7. Can the Current Datum Continue to Be Used?

Use of the current datum by your community will be acceptable until the change is made on your FIRM. After that time, all flood insurance policy sales and renewals will be based on elevations referenced to NAVD 88. Also, determinations regarding the locations of structures and proposed projects with respect to the special flood hazard areas (SFHAs) will be based on elevations referenced to NAVD 88.

8. Which Datum Should Be Used in Completing FEMA Elevation and Floodproofing Certificates?

The datum listed as the reference datum on the applicable FIRM panel should be used for Elevation Certificate completion.

9. **Does This Change Affect All NFIP Communities?**

Yes. NAVD 88 will be defined for the continental United States (including Alaska). The datums for Hawaii, the Pacific Trust Territories, the Commonwealth of Puerto Rico, and the U. S. Virgin Islands will be adjusted based on releveling work done in those areas and their 1960-78 tidal epoch. Their local datums will be designated NAVD 88, and will be defined by their current local mean sea level determinations.

10. **Will Local Community Vertical Control Networks Be Required to Be Releveled?**

No requirement for local vertical control network releveling for NFIP purposes will be made. However, if your community's current vertical control system is referenced to an NGS bench mark(s) that is included in the new NAVD 88 data published by the NGS, then the appropriate conversion should be made by applying correction factor(s) provided by NGS, or by readjustment of the local network.

11. **Have the U. S. Geological Survey (USGS) and Corps of Engineers (COE) Bench Marks Been Revised, Too?**

Only those first- and second-order accuracy bench marks that were included in the NGS database were included in the general adjustment. Almost all third-order bench marks of the USGS and COE were not included. A number of COE bench marks that were previously published by NGS will no longer be published; the leveling

observations to these bench marks were not included into the NGS data base. The original leveling observations never resided at NGS. All leveling observations residing at NGS were included in the data base.

Methods of Conversion to NAVD 88

12. How Is the Conversion Made from NGVD 29 to NAVD 88?

If your bench mark system is leveled based on a closed loop tied to a single NGS bench mark, simply obtain the NAVD 88 elevation value for that bench mark and add the difference between the NGVD 29 value and the NAVD 88 value to the NGVD 29 height of each bench mark. If your system is based on leveling networks from two or more NGS bench marks, consult the Vertical Network Branch of the NGS.

13. How Is the Conversion Made from Mean Sea Level Datum to NAVD 88?

In most instances, Mean Sea Level Datum is an older reference to the same vertical reference datum as NGVD 29. If so, use the procedure described above in 12.

14. How Is the Conversion Made from Local Mean Low Water or Local Mean Sea Level to NAVD 88?

Mean Low Water is an important reference datum in coastal and riverine communities. However, heights of tidal bench marks, in most cases, are available (published) referenced to all local datums and also to NGVD 29 and NAVD 88. The

relationship of various datums can be computed from these published heights.

15. What Assistance Is Available for Answering Technical Questions?

Questions regarding the mechanics of shifting to NAVD 88 may be addressed to appropriate FEMA Regional Offices listed in the appendix. A telephone call to the Regional Engineer is appropriate if the problem is simple. Complex or detailed problems require written presentation of facts and should be sent to the Regional Engineer.

16. Will There Be a Cost to the Community for This Assistance?

No charges are anticipated at this time.

17. Are Areas of Subsidence Included in the New Adjustment to NAVD 88?

Yes. All areas of the conterminous United States, Canada, Mexico, U.S. Territories, Commonwealths, and Possessions are included in this general adjustment. Additional work and further data inclusion will continue in areas of crustal motion as resources will allow.

18. What Are Some Potential Problems of Mixing Datums?

Figure 1 illustrates a possible situation. Note that if a consistent datum is used for determining the Base (100-year) Flood Elevation (BFE) and lowest floor elevation, actuarial ratings and building requirements would be correctly determined. However, if mixed datums were used, significant problems could arise. For example, in the case illustrated in the figure, if the 1-foot NAVD 88 BFE were used in conjunction with the 2-foot NGVD 29 lowest floor elevation, an error of 2 feet would occur, resulting in a mis-rating of the building in question and an inaccurate insurance premium.

19. Will the Datum Change Result in New BFEs or Flood Depths?

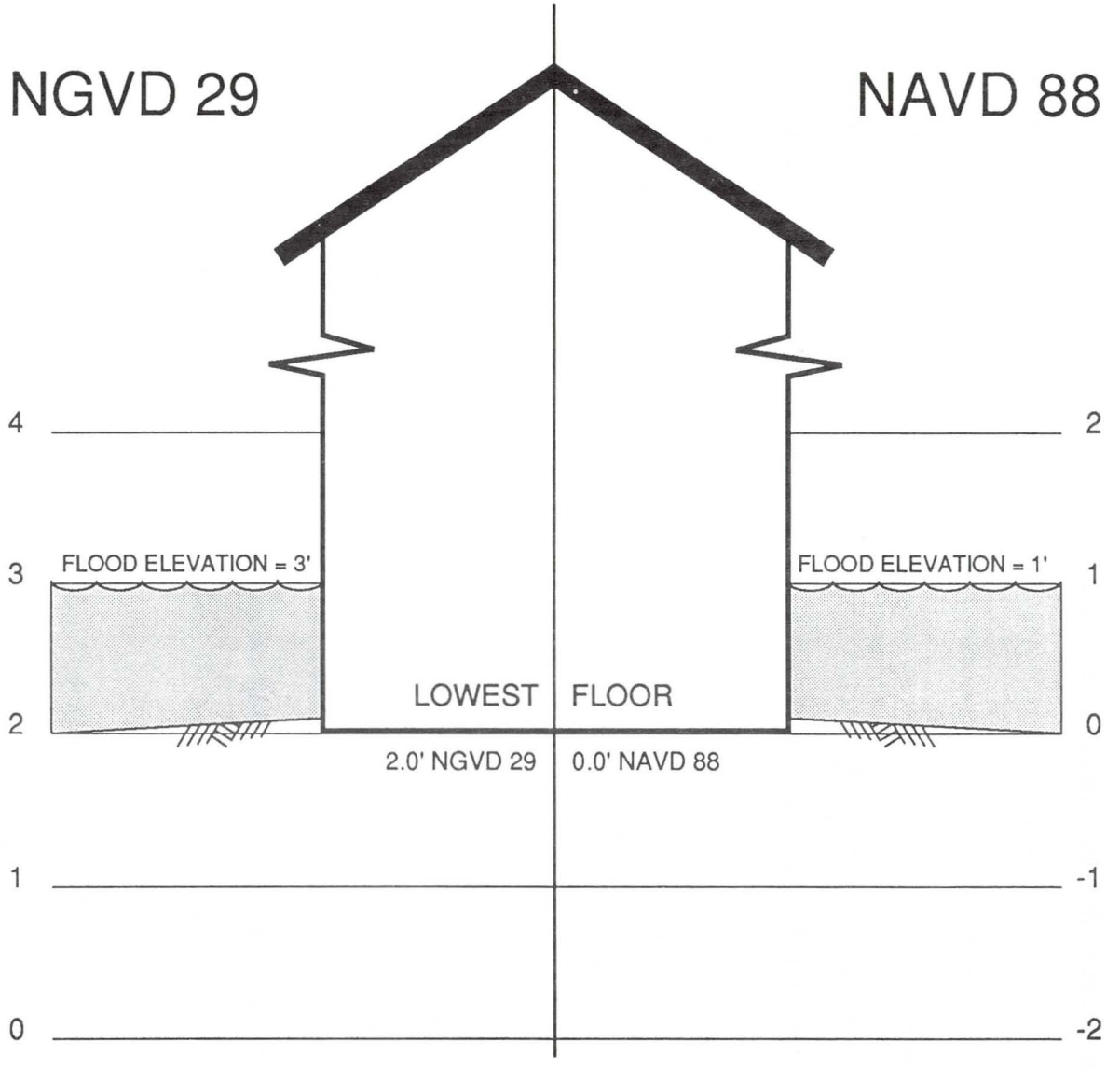
The BFEs shown on the FIRM may or may not change, depending on the community's location. However, the datum change will not result in any change of flood depths.

20. How does the International Great Lakes Datum (IGLD) of 1985 relate to NAVD 88?

Both datums, through negotiation with the Canadian and Mexican governments, use the same data point, Pointe-au-Pere (Father Point)/Rimousk. For reference points common to both datums, the National Geodetic Information Center will provide upon request IGLD 85 and NAVD 88 values.

21. Where Can the New NAVD 88 Bench Mark Data Be Found?

Bench mark data can be obtained by calling the National Geodetic Information Center in Rockville, Maryland, at (301) 443-8631.



The use of mixed datums in computing flood insurance premiums can cause significant inequities to either the insured or the insurer, depending on the error. In this example, an error in computing a flood insurance premium of as much as $1,300 a year could occur for a home with maximum coverage of $185,000 in an area subject to coastal flooding.

Figure 1

PART 2 - TECHNICAL CONSIDERATIONS FOR ENGINEERS, SURVEYORS, AND FEMA STAFF

Background

Mean Sea Level. When the Sea Level Datum of 1929 (SLD 29) was established by the NGS, it was defined using multiple constraint points at 21 tide gage stations in the United States and 5 tide gage stations in Canada. The initial definition seemed to be a reasonable definition and would be easily adopted by users of the vertical datum. From a theoretical point of view, however, this datum only represents an approximation of the geoid. Observations since adoption of SLD 29 have revealed that multiple factors affecting the determination of mean sea level are variable over time. Additionally, absolute values of local mean sea level change over time with respect to more stable land masses, and vary from location to location. A more stable and definable reference plane than mean sea level is needed.

National Geodetic Vertical Datum of 1929. Although the initial definition of NGVD 29 was based on local mean sea level at selected locations, those values have changed with each tidal epoch (19 years). To avoid confusion resulting from constantly changing values of local mean sea level, the reference surface name was changed in 1973 to the National Geodetic Vertical Datum of 1929, reflecting that it was not necessarily equivalent to mean sea level at any given location.

A review by NGS of leveling data used to establish NGVD 29 indicated that considerable error had been distributed in a line from Seattle, Washington, to Crookston, Minnesota. The error distribution within the NGVD 29 data further supported a need for redefining the reference datum. The magnitude of this

distributed error is approximately equal to the difference between the NAVD 88 primary vertical control network and the published NGVD 29 heights. New leveling data along this line confirm that the error is systematic and not in the observed height differences.

North American Vertical Datum of 1988. Unlike the NGVD 29 assumption that local mean sea level at selected tide gage stations equaled 0.0000 ft, the NAVD 88 network is defined by a single constraint. Mean sea level at Pointe-au-Pere (Father Point)/Rimouski on the St. Lawrence River is this single constraint. This results in approximately a -25 cm difference in NGVD 29 heights along the east coast.

The NGS stresses that, in areas that are stable vertically, the relative differences between the published NGVD 29 values and the new NAVD 88 values are due mainly to better determinations of height differences between bench marks, rather than simply the change in the definition of the basic datum[1].

Map Revision Requests

As the NFIP moves further into the maintenance stage of the mapping program, the major action with respect to mapping of flood hazards will be the review and processing of requests for revisions to the currently effective FISs and FIRMs. As with the change of any type of mapping format, no strict requirement can be

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[1]For a more complete discussion of the theory and background of the NAVD 88 establishment, please see "NAVD 88 Datum Definition Study," (9.13.89 Draft), by David B. Zilkoski, Emery I. Balazs, and Janice M. Bengston, Vertical Network Branch, NGS, NOAA, Rockville, MD 20852.

established to apply to every map revision case. Depending on the magnitude of the changes, the number of map panels affected, and the costs involved in reprinting map panels, the decision of whether to convert to NAVD 88 as the reference datum for a revision action must be made case by case. In order to ensure that the required data are available for use if needed, however, all map revision requests should contain documentation of vertical control efforts. Therefore, all requests for map revision actions submitted to FEMA after October 1, 1992, must include vertical control data referenced to NAVD 88. The decision regarding the published reference for the map revision will be made by the FEMA Project Officer for the applicable region.

Submitted Materials. The following information shall be included with map revision requests:

1. One copy of the NGS published (or NGS data base hard copy) bench mark(s) description and elevation, including the date of recovery or establishment and releveling (if applicable) and last adjustment date.
2. If non-NGS bench mark(s) is used, one copy of the methodology and computations used in lieu of NGS published (or NGS data base) elevations.
3. If a computer program is used for the computations, the program name and location where an exact copy of the program can be found shall be given.
4. One copy of leveling field notes for vertical leveling surveys from/to published bench mark(s).

The information described above shall be provided in addition to the requirements described in *Appeals, Revisions, and Amendments to Flood Insurance Maps, A Guide for Community Officials*, January 1990. All surveying data must be certified by

a Licensed Land Surveyor or Registered Professional Engineer. When other than NGS published data are used for vertical control, documentation must be provided to demonstrate how they are related to or tied to NGS information.

In cases that published data from NGS are not available, documentation to that effect must be submitted with the request for map revision. For assistance in determining the availability of data for a specific area or region, contact the National Geodetic Information Center (address and telephone number follow this section).

Effects on Flooding Sources

Riverine and Lacustrine Flooding. For the majority of areas affected by this type of flooding, the changes will be mostly uniform over a given community. Shift, or bias, factors for areas of U. S. Geological Survey (USGS) 7.5 minute (quadrangle) series topographic maps will normally provide elevation data to the required accuracy for flood insurance purposes. Since the surrounding land surface vertical reference elevation has changed, the estimated flood profiles or static water surface elevations can be assumed to experience the same change. In large areas, such as county-wide studies, which may involve significant stream reach lengths, additional considerations may be necessary to provide a smooth change over adjacent quadrangles.

Coastal Flooding. In areas affected by coastal flooding, additional care must be taken to avoid confusion with local mean sea level data that are often in use in addition to NGVD 29 data. In many areas, local mean sea level and NGVD 29 are assumed to be one and the same, while in other areas differences may exist based

on the latest tidal observations. NGS has included in its published data the new reference elevations for tidal stations previously taken as 0.0000 foot NGVD 29. For communities affected by coastal flooding, all vertical data must be clearly identified as to the basis of control used. If a local mean low water datum was used, conversion to NAVD 88, or at a minimum, conversion to NGVD 29, must be provided and sealed by a certified land surveyor.

Conversion Methods

There are three basic conversion methods available to the users of NAVD 88: 1) Least squares adjustment of existing leveling data into NAVD 88; 2) Rigorous transformation of bench mark heights using datum conversion correctors; and 3) Simplified transformation using average bias shift factors.

Technique number 1 is the most exact approach and is used by NGS to incorporate high-order leveling data into the NAVD 88 adjustment. For FIS purposes, it will not be necessary to go to this level of effort.

Technique number 2 is also a time consuming process, which may be necessary in areas of sparse primary NGS control points. However, it can be performed by NGS if the data are provided to them in computer-readable form. This process should be avoided unless other means are economically prohibitive.

Technique number 3 will provide the easiest method to accomplish conversion and provide sufficient accuracy for FIS mapping requirements. These average bias

conversion factors are available from the National Geodetic Information Center.

Appendix 1 illustrates a sample of the preliminary form of the NAVD 88 data as it is available from NGS. ***Please note that the data provided in this figure are draft and should not be used for ANY purpose!*** The first page of the figure includes an explanation of the headings and attributes of the following pages. Also note that the geographic positions provided for the vertical control points are the result of scaling from available mapping and should not be used as geodetic positions.

Other Influences

Crustal Motion and Land Subsidence. Areas that have experienced crustal motion or land subsidence, such as southern California; Phoenix, Arizona; Houston, Texas; and southern Louisiana, since the publication of the vertical control data for that area must be referenced to at least one, preferably more, bench marks that have been shown to be outside the affected area, or have been releveled in recent times. Documentation by the releveling agency or a certified land surveyor is required with the data. NGS will be publishing special reports for these areas as part of its on-going, long term task which began in January 1991.

FEMA Policy for Mapping Conversion

This section addresses the effects that use of the new datum may have on the various NFIP products. Direction is given for ensuring the proper use of NAVD 88 on those products and when reversion to NGVD 29 is allowable in lieu of conversion to NAVD 88.

Tentative scheduling for conversion activities calls for all FY 93 Flood Insurance Studies to be referenced to NAVD 88, and shall be confirmed by the contractor with the Project Officer prior to the beginning of survey work. The study contractor as directed by the Project Officer is responsible for assuring that the vertical data used in preparing the study are properly referenced to NAVD 88. Work already in progress shall not be affected by these guidelines, except when specifically ordered by the Project Officer. Specifications for "Surveys," as given in Chapter 3, Section D, and Appendix 6, *Guidelines and Specifications for Study Contractors*, shall continue to apply.

Requirements for Flood Insurance Studies.

Initial (Type 15) Studies: When an initial study for a community includes detailed study, the use of NAVD 88 shall be required. Exceptions must be approved by the Project Officer prior to beginning survey work.

Restudies (Type 19): The use of NAVD 88 for these studies shall be at the direction of the Project Officer. If NGVD 29 is used for the effective study,

then a conversion factor to allow comparison to NAVD 88 elevations shall be included, if possible, in the study material submitted to FEMA.

The use of NAVD 88 for these studies will be determined by the extent of the changes that will occur to the community's FIRM when revised. For example, if the community's FIRM consists of 1 panel with 1 to 2 streams studied by detailed methods, then any revision to that panel shall include the conversion of vertical data to NAVD 88. For communities whose FIRM is larger than 1 panel and revision of other panels is unlikely with the restudy, the use of NGVD 29 may be continued, but a note explaining the proper means to convert the panel elevations to NAVD 88 shall be included in "NOTES" in the map border of the panel being revised.

Limited Map Maintenance Program Studies: The use of NAVD 88 for these studies shall be at the direction of the Project Officer. If NGVD 29 is used for the study, then a conversion factor to allow comparison to NAVD 88 elevations shall be included, if possible, in the study material submitted to FEMA.

The use of NAVD 88 for these studies will be determined by the extent of the changes that will occur to the community's FIRM when revised. For example, if the community's FIRM consists of 1 panel with 1 to 2 streams studied by detailed methods, then any revision to that panel shall include the conversion of vertical data to NAVD 88. For communities whose FIRM is larger than 1 panel and revision of other panels is unlikely with the LMMP, the use of NGVD 29 may be continued, but a note explaining the proper means to convert the panel elevations to NAVD 88 shall be included in "NOTES" in the map border of the panel being revised.

Map Revisions: For all map revision efforts, the datum referenced on the current FIRM shall be used, unless otherwise directed by the Project Officer. When the current map datum is used, a conversion factor to allow comparison to NAVD 88 elevations shall be included, if possible.

Other Map Amendment or Revision Actions: For all other actions, the datum referenced on the current FIRM shall be used, unless otherwise directed by the Project Officer.

Sources of Assistance

REGIONAL OFFICES

REGION I

(Connecticut, Maine, Massachusetts,
New Hampshire, Rhode Island, Vermont)

Mr. Albert A. Gammal, Jr., Chief
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Virginia, West Virginia

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Oklahoma, Texas)

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Risk Studies Division
Office of Risk Assessment
Federal Insurance Administration
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National Geodetic Information Center
National Geodetic Survey, N/CG17
Coast and Geodetic Survey
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(301) 443-8631

Vertical Network Branch, NGS
National Geodetic Survey, N/CG13
Coast and Geodetic Survey
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APPENDIX 1

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NAVD 88 HEIGHT LISTING

BLOCK NUMBER

B29084

Compiled and published by
National Geodetic Survey
Rockville, Md.

U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Ocean Service
Coast & Geodetic Survey

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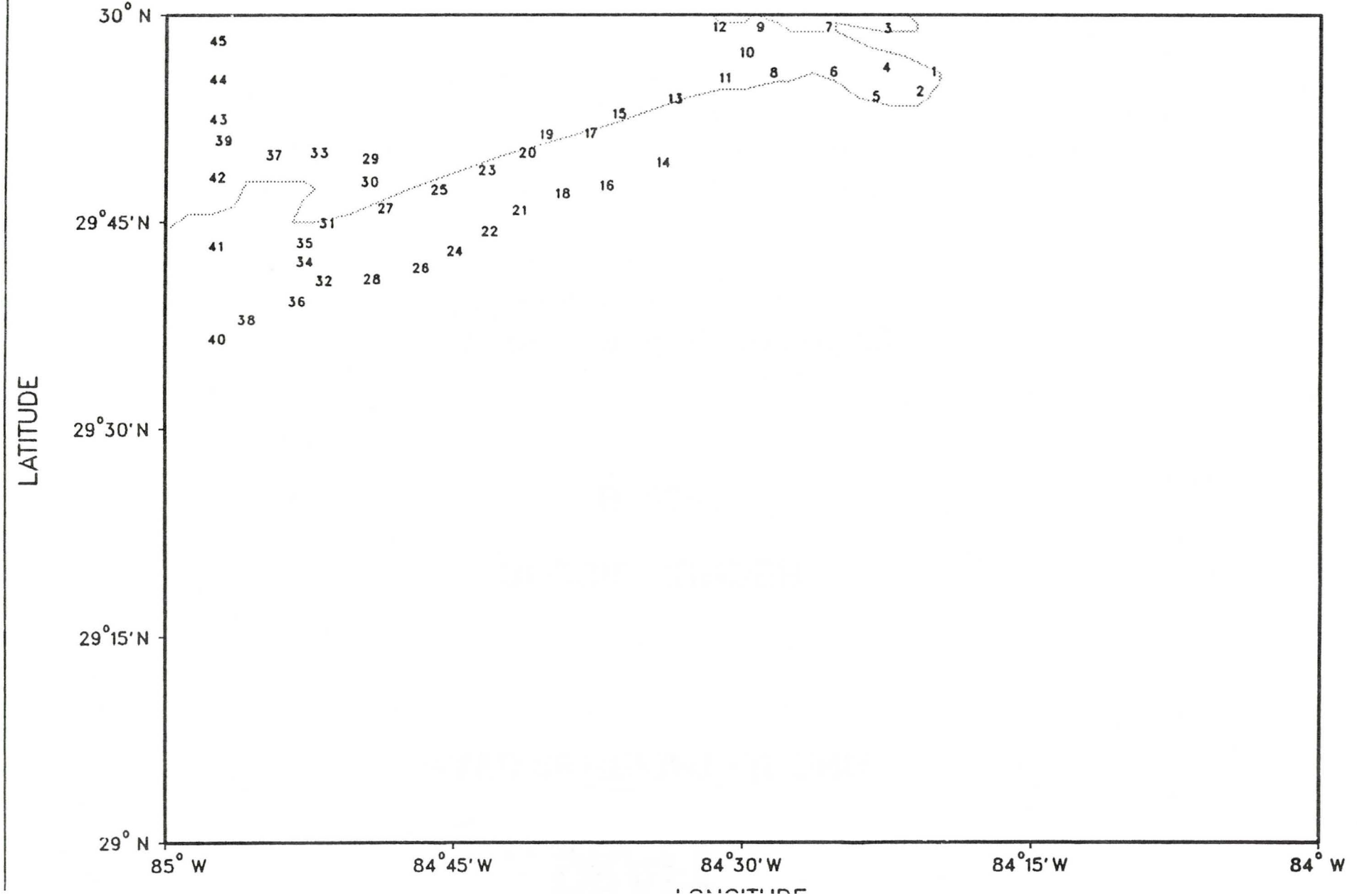
DEPARTMENT OF COMMERCE
NOAA – NOS – C&GS
NATIONAL GEODETIC SURVEY

APALACHICOLA
quad 29084

DRAFT DRAFT



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NOAA - NOS - C&GS
NATIONAL GEODETIC SURVEY
DATE PRINTED: Jul 10 1991

EXPLANATION OF ATTRIBUTES PRINTED
IN HEADINGS OF THIS DOCUMENT

GEODETIC CONTROL DIAGRAM:
APALACHICOLA
LATITUDE RANGE: 29 TO 30 DEG N
LONGITUDE RANGE: 084 TO 85 DEG W

1. DESIGNATION - THE OFFICIAL NAME OF THE GEODETIC REFERENCE POINT. THIS ATTRIBUTE USUALLY REFLECTS THOSE CHARACTERS STAMPED ON THE MARK.

2. MONUMENTING AGENCY - THE ABBREVIATION OF THE NAME OF THE ORGANIZATION THAT CONSTRUCTED OR PLACED THE GEODETIC REFERENCE POINT IN THIS LOCATION.

3. ORTHOMETRIC HEIGHT IN METERS:

   1. NAVD 88 - VALUE PRINTED IS REFERENCED TO THE DATUM DEFINED AS THE NORTH AMERICAN VERTICAL DATUM OF 1988.
   2. NGVD 29 - VALUE PRINTED IS REFERENCED TO THE DATUM DEFINED AS THE NATIONAL GEODETIC VERTICAL DATUM OF 1929.
   3. TYPE CODE - THIS CODE ADJACENT TO THE VALUE PRINTED AS THE NGVD 29 DATUM HEIGHT, INDICATES THE METHOD USED TO GENERATE THE HEIGHT REFERENCED TO NGVD 29 DATUM. THE ONLY VALID CHARACTERS APPEARING IN THIS LOCATION ARE "A" WHICH INDICATES THE VALUE WAS OUTPUT AS PART OF ADJUSTMENT SOFTWARE, "B" WHICH INDICATES THE VALUE WAS KEY ENTERED FROM PRINTED DOCUMENTS AND NOT KEY VERIFIED, AND "C" WHICH INDICATES THE VALUE WAS GENERATED BY APPLYING UNCORRECTED HEIGHT DIFFERENCES TO OTHER ADJUSTED VALUES. TYPE "C" VALUES ARE OFTEN OF NON-GEODETIC ACCURACY AND FOR THIS REASON ARE PRINTED TO ONLY THE NEAREST CENTIMETER.

4. ORDER & CLASS - THE ORDER AND CLASS OF THE SURVEY THAT PRODUCED THE OBSERVATIONS USED TO COMPUTE THIS HEIGHT. DETAILS ON ACCURACIES AND CRITERIA FOR OBSERVATION EVALUATION ARE IN THE DOCUMENT -- STANDARDS AND SPECIFICATIONS FOR GEODETIC CONTROL NETWORKS. A CLASS CODE OF "0" REPRESENTS OTHER CASES. USUALLY, THE TOLERANCE FACTOR FOR ORDER/CLASS = 1/0 IS 2 MM OR LESS; FOR 2/0, 8.4 MM; AND FOR 3/0, 12.0 MM.

5. CRUSTAL MOTION CODE - THE * CHARACTER ADJACENT TO THE ORDER & CLASS INDICATES THAT THE GEODETIC REFERENCE POINT IS LOCATED IN AN AREA OF APPARENT CRUSTAL MOTION.

6. YEAR OBSERVED - THE MOST RECENT YEAR IN WHICH THIS POINT WAS INCLUDED IN A SURVEY PROJECT WHICH GENERATED A HEIGHT OF GEODETIC QUALITY. AN ADJACENT * CHARACTER INDICATES THIS POINT WAS INCLUDED IN MORE THAN ONE SURVEY.

7. YEAR RECOVERED - THE MOST RECENT YEAR IN WHICH AN ATTEMPT TO LOCATE THIS POINT WAS MADE. THIS MAY SIGNIFICANTLY DIFFER FROM THE YEAR OBSERVED. THE ALPHA CODE CONCATENATED TO THE YEAR RECOVERED INDICATES THE RESULTS OF THE ATTEMPT TO LOCATE THE CONTROL POINT. VALID ENTRIES FOR THIS CODE ARE "G" MEANING POINT WAS FOUND IN GOOD CONDITION, "N" MEANING POINT WAS NOT LOCATED AFTER A THOROUGH SEARCH, "P' MEANING POINT WAS FOUND IN POOR CONDITION, AND "X" INDICATING POINT WAS FOUND TO BE DESTROYED.

8. DATE ADJUSTED - THE DATE (MONTH,DAY,YEAR) OF THE ADJUSTMENT THAT GENERATED THE PUBLISHED HEIGHTS FOR THIS GEODETIC POINT.

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NOAA - NOS - C&GS
NATIONAL GEODETIC SURVEY
DATE PRINTED: Jul 10 1991

EXPLANATION OF ATTRIBUTES PRINTED
IN HEADINGS OF THIS DOCUMENT
(CONTINUED)

GEODETIC CONTROL DIAGRAM:
APALACHICOLA
LATITUDE RANGE: 29 TO 30 DEG N
LONGITUDE RANGE: 084 TO 85 DEG W

9. APPROXIMATE POSITION - THE GEOGRAPHIC LOCATION OF THE GEODETIC REFERENCE POINT AS DETERMINED BY SCALING PROCEDURES FROM THE BEST AVAILABLE MAPS. THESE VALUES OF LATITUDE AND LONGITUDE ARE PRINTED IN DEGREES, MINUTES, AND SECONDS. THEY ARE NOT OF GEODETIC QUALITY AND SHOULD NOT BE INTERPRETED AS SUCH.

10. PLOT NUMBER - THE VALUE THAT IS USED AS REFERENCE TO THE ACCOMPANYING PLOT. THE PURPOSE IS TO PROVIDE THE USER WITH A METHOD TO DETERMINE PROXIMITY OF POINTS. NOTE THAT THE SAME NUMBER MAY BE USED FOR SEVERAL GEODETIC REFERENCE POINTS WHICH ARE CLOSE TO EACH OTHER.

11. PERMANENT IDENTIFIER - THIS CHARACTER STRING REPRESENTS UNIQUE IDENTIFICATION FOR THE INDIVIDUAL POINTS INCLUDED IN THE NATIONAL GEODETIC REFERENCE NETWORK, ALSO CALLED ARCHIVAL CROSS REFERENCE NUMBER (ACRN).

12. STATE - THE STATE OR POLITICAL SUBDIVISION IN WHICH THE GEODETIC CONTROL POINT IS LOCATED.

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NOAA - NOS - C&GS
NATIONAL GEODETIC SURVEY
DATE PRINTED: Jul 10 1991

HEIGHT OF NGRS VERTICAL CONTROL POINTS
SORTED BY DESIGNATION

GEODETIC CONTROL DIAGRAM:
APALACHICOLA
LATITUDE RANGE: 29 TO 30 DEG N
LONGITUDE RANGE: 084 TO 85 DEG W

DESIGNATION	MONUMENTING AGENCY	ORTHOMETRIC HEIGHT IN METERS NAVD 88	NGVD 29	ORDER & CLASS	YEAR OBS.	YEAR REC.	DATE ADJUSTED	APPROXIMATE POSITION LATITUDE	LONGITUDE	PLOT #	PERMANENT IDENT.	ST
1	DOD	2.471	2.471B	1/1	*1967	1985X	021290	29-50-01	084-41-01	19	AS0219	FL
14 M	USGS	6.711	6.711B	1/1	1967	1985G	021290	29-58-13	084-29-56	9	AS0253	FL
2	DOD	3.900	3.900B	1/1	*1967	1975G	021290	29-50-52	084-40-38	19	AS0220	FL
A 115	CGS	2.968	2.968B	1/1	*1967	1985X	021290	29-42-54	084-59-54	41	AS0252	FL
A 293	CGS	3.214	3.214B	1/1	1967	1985G	021290	29-50-59	084-39-43	17	AS0231	FL
A 294	CGS	3.267	3.267B	1/1	1967		021290	29-49-24	084-58-16	39	AS0183	FL
A 298	CGS	3.485	3.485B	1/1	1967	1985G	021290	29-52-54	084-35-33	13	AS0169	FL
A 46	CGS	2.793	2.793B	2/1	*1979	1979G	021290	29-45-28	084-49-52	27	AS0204	FL
APALACHICOLA	CGS	6.010	6.010B	1/1	1967	1979G	021290	29-43-29	084-59-32	41	AS0246	FL
APALACHICOLA AZ RESET1960	CGS	4.847	4.847B	1/1	1967	1975G	021290	29-43-21	084-59-21	41	AS0248	FL
APALACHICOLA RM 2	CGS	5.710	5.710B	1/1	1967	1967G	021290	29-43-29	084-59-32	41	AS0245	FL
APALACHICOLA RM 3	CGS	5.829	5.829B	1/1	1967	1975G	021290	29-43-29	084-59-32	41	AS0247	FL
B 293	CGS	2.987	2.987B	1/1	1967	1985G	021290	29-48-46	084-43-06	20	AS0215	FL
B 294	CGS	2.868	3.091B	1/1	1967	1985G	021290	29-50-09	084-55-29	37	AS0188	FL
B 46	CGS	2.209	2.209B	1/1	*1967	1975G	021290	29-45-43	084-48-56	27	AS0205	FL
BM	DOD	3.517	3.51 C	1/1	1967	1985X	021290	29-51-04	084-40-32	19	AS0225	FL
C 293	CGS	2.388	2.388B	1/1	1967	1975G	021290	29-46-05	084-47-57	25	AS0206	FL
C 294	CGS	3.200	3.200B	1/1	1967	1975G	021290	29-50-21	084-56-35	37	AS0186	FL
C 46	CGS	3.607	3.607B	1/1	*1967	1973G	021290	29-46-37	084-47-08	25	AS0207	FL
CARRABELLE	CGS	3.893	3.893B	1/1	1967	1985G	021290	29-51-17	084-41-28	19	AS0222	FL
CARRABELLE AZ	CGS	4.223	4.22 C	1/1	1967	1985G	021290	29-51-03	084-41-28	19	AS0221	FL
CARRABELLE RM 2	CGS	2.901	2.901B	1/1	1967	1985G	021290	29-51-16	084-41-28	19	AS0224	FL
CARRABELLE RM 3	CGS	3.298	3.298B	1/1	1967	1985G	021290	29-51-17	084-41-27	19	AS0223	FL
CAT	CGS	6.252	6.252B	1/1	1967	1985G	021290	29-46-56	084-49-55	27	AS0201	FL
CAT RM 1	CGS	6.207	6.207B	1/1	1967	1975G	021290	29-46-56	084-49-55	27	AS0202	FL
CAT RM 2	CGS	6.159	6.159B	1/1	1967	1975G	021290	29-46-56	084-49-55	27	AS0200	FL
D 288	CGS	2.791	2.791B	2/1	*1978	1985G	021290	29-59-39	084-30-13	9	AS0153	FL
D 293	CGS	4.637	4.637B	1/1	1967	1985G	021290	29-47-36	084-50-11	30	AS0198	FL
D 294	CGS	3.845	3.845B	1/1	1967	1975G	021290	29-50-37	084-57-26	39	AS0181	FL
D 46	CGS	3.910	3.910B	1/1	*1967	1985G	021290	29-47-31	084-45-23	23	AS0209	FL

* INDICATES THIS POINT IS IN AN AREA OF APPARENT CRUSTAL MOVEMENT.

FOR CONVERSION OF METERS TO U.S. SURVEY FEET, MULTIPLY THE METERS BY 3.28083333333 (TO 12 SIGNIFICANT FIGURES).
FOR CONVERSION OF METERS TO INTERNATIONAL FEET, MULTIPLY THE METERS BY 3.28083989501 (TO 12 SIGNIFICANT FIGURES).

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NOAA - NOS - C&GS
NATIONAL GEODETIC SURVEY
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HEIGHT OF NGRS VERTICAL CONTROL POINTS
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GEODETIC CONTROL DIAGRAM:
APALACHICOLA
LATITUDE RANGE: 29 TO 30 DEG N
LONGITUDE RANGE: 084 TO 85 DEG W

DESIGNATION	MONUMENTING AGENCY	ORTHOMETRIC HEIGHT IN METERS NAVD 88	NGVD 29	ORDER & CLASS	YEAR OBS.	YEAR REC.	DATE ADJUSTED	APPROXIMATE POSITION LATITUDE	LONGITUDE	PLOT #	PERMANENT IDENT.	ST
DIP RM 1	CGS	1.934	1.934B	1/1	1967	1976G	021290	29-49-44	084-52-28	33	AS0193	FL
E 293	CGS	3.383	3.383B	1/1	1967	1975G	021290	29-50-48	084-58-01	39	AS0179	FL
E 294	CGS	3.231	3.231B	1/1	1967		021290	29-52-09	084-58-28	43	AS0177	FL
E 46	CGS	2.447	2.447B	1/1	*1967	1975G	021290	29-48-28	084-43-43	23	AS0214	FL
F 293	CGS	2.180	2.180B	1/1	1967	1985G	021290	29-49-39	084-53-19	33	AS0192	FL
F 294	FLHD	4.454	4.454B	1/1	1967	1967G	021290	29-51-14	084-58-19	39	AS0178	FL
G 293	CGS	3.600	3.600B	1/1	1967	1985X	021290	29-54-30	084-32-21	11	AS0164	FL
G 294	CGS	1.822	1.822B	1/1	1967	1975N	021290	29-48-35	084-58-35	42	AS0184	FL
H 293	CGS	3.177	3.177B	1/1	1967	1985G	021290	29-54-06	084-33-01	11	AS0165	FL
J 293	CGS	2.342	2.342B	1/1	1967	1985G	021290	29-53-38	084-33-53	13	AS0166	FL
J 45=TIDAL BENCH MARK	CGS	4.709	4.709B	1/1	*1967	1967G	021290	29-43-33	084-58-59	41	AS0241	FL
JAMES	CGS	7.060	7.060B	1/1	1967	1985G	021290	29-56-57	084-30-10	10	AS0156	FL
K 293	CGS	3.069	3.069B	1/1	1967	1985G	021290	29-53-19	084-34-41	13	AS0167	FL
K 294	CGS	1.444	1.444B	1/1	1967	1975G	021290	29-43-45	084-59-09	41	AS0238	FL
L 293	CGS	2.933	2.933B	1/1	1967	1985G	021290	29-52-32	084-36-45	15	AS0168	FL
LAUREL TRI STATION	CGS	4.961	4.961B	1/1	*1967	1967G	021290	29-43-11	084-59-08	41	AS0249	FL
M 288	CGS	6.136	6.136B	1/1	1967	1985G	021290	29-57-34	084-30-12	9	AS0155	FL
M 293	CGS	3.478	3.478B	1/1	1967	1985G	021290	29-51-55	084-37-11	15	AS0170	FL
M 45	CGS	3.758	3.758B	1/1	*1967	1967G	021290	29-47-57	084-59-17	42	AS0185	FL
MC INTYRE SOUTH BASE AZI	CGS	3.277	3.277B	1/2	1934	1967N	021290	29-58-50	084-31-32	9	AS0176	FL
N 288	CGS	10.369	10.369B	1/1	1967	1985G	021290	29-56-25	084-30-02	8	AS0157	FL
N 293	CGS	5.531	5.531B	1/1	1967	1985G	021290	29-51-01	084-38-35	17	AS0233	FL
N 45	CGS	3.783	3.783B	1/1	*1967	1975G	021290	29-49-56	084-58-09	39	AS0182	FL
NEW	CGS	1.859	1.859B	1/1	1967	1985G	021290	29-51-09	084-38-12	17	AS0234	FL
NEW RM 3	CGS	1.437	1.437B	1/1	1967	1985G	021290	29-51-09	084-38-13	17	AS0235	FL
P 288	CGS	10.686	10.686B	1/1	1967	1985G	021290	29-55-56	084-30-35	8	AS0158	FL
P 293	CGS	3.564	3.56 C	1/1	1967	1985G	021290	29-51-04	084-39-54	17	AS0228	FL
P 45	CGS	3.357	3.357B	1/1	*1967	1967G	021290	29-52-15	084-58-19	43	AS0303	FL
Q 293	CGS	2.906	2.906B	1/1	1967	1985G	021290	29-49-43	084-41-37	20	AS0218	FL
Q 45	CGS	4.534	4.534B	1/2	1934	1975N	021290	29-53-14	084-58-34	43	AS0152	FL

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FOR CONVERSION OF METERS TO U.S. SURVEY FEET, MULTIPLY THE METERS BY 3.28083333333 (TO 12 SIGNIFICANT FIGURES).
FOR CONVERSION OF METERS TO INTERNATIONAL FEET, MULTIPLY THE METERS BY 3.28083989501 (TO 12 SIGNIFICANT FIGURES).

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HEIGHT OF NGRS VERTICAL CONTROL POINTS
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GEODETIC CONTROL DIAGRAM:
APALACHICOLA
LATITUDE RANGE: 29 TO 30 DEG N
LONGITUDE RANGE: 084 TO 85 DEG W

DESIGNATION	MONUMENTING AGENCY	ORTHOMETRIC HEIGHT IN METERS NAVD 88	NGVD 29	ORDER & CLASS	YEAR OBS.	YEAR REC.	DATE ADJUSTED	APPROXIMATE POSITION LATITUDE	LONGITUDE	PLOT #	PERMANENT IDENT.	ST
Q 46	CGS	3.617	3.617B	1/2	1934	1967N	021290	29-58-47	084-31-35	12	AS0175	FL
R 293	CGS	5.232	5.232B	1/1	1967	1985G	021290	29-49-29	084-42-18	20	AS0216	FL
R 45	CGS	4.859	4.859B	1/2	1934	1975P	021290	29-55-02	084-58-35	44	AS0151	FL
ROYAL BLUFF 2	CGS	9.800	9.800B	1/1	1967	1967G	021290	29-47-34	084-45-04	23	AS0210	FL
ROYAL BLUFF 2 RM 1	CGS	10.148	10.148B	1/1	1967	1976G	021290	29-47-34	084-45-04	23	AS0212	FL
ROYAL BLUFF 2 RM 2	CGS	9.670	9.670B	1/1	1967	1976G	021290	29-47-34	084-45-04	23	AS0211	FL
S 293	CGS	7.391	7.391B	1/1	1967	1985G	021290	29-48-00	084-44-33	23	AS0213	FL
S 45	CGS	7.661	7.661B	1/2	1934	1975N	021290	29-57-47	084-58-32	45	AS0150	FL
STA 3-66 APALACHICOLA BM	CGS	4.807	4.807B	1/1	*1967	1967G	021290	29-43-28	084-59-09	41	AS0244	FL
STA 3-66 WEST POINT RM 2	CGS	3.591	3.591B	1/1	1967	1975G	021290	29-43-26	084-59-00	41	AS0243	FL
STA D	DOD	4.536	4.53 C	1/1	1967	1985X	021290	29-51-05	084-40-31	19	AS0226	FL
T 293	CGS	4.343	4.343B	1/1	1967	1975G	021290	29-47-03	084-46-11	25	AS0208	FL
TIDAL STA 3-63 TIDAL 2	CGS	3.828	3.82 C	1/1	1967	1975G	021290	29-51-02	084-39-51	17	AS0230	FL
TIDAL STA 3-66 TIDAL 1	CGS	4.305	4.305B	1/1	*1967	1975G	021290	29-43-29	084-59-09	41	AS0240	FL
TIDAL STA 3-66 TIDAL 2	CGS	2.610	2.610B	1/1	*1967	1975X	021290	29-43-40	084-59-03	41	AS0239	FL
TURKEY	CGS	10.184	10.184B	2/1	*1976	1985G	021290	29-55-19	084-31-14	11	AS0159	FL
TURKEY AZ MK	CGS	8.504	8.504B	2/1	*1977	1976P	021290	29-55-08	084-31-13	11	AS0162	FL
TURKEY RM 1	CGS	10.161	10.161B	1/1	1967	1985G	021290	29-55-19	084-31-14	11	AS0160	FL
TURKEY RM 2	CGS	10.299	10.299B	1/1	1967	1985G	021290	29-55-19	084-31-14	11	AS0161	FL
U 293	CGS	8.246	8.246B	2/1	*1979	1985G	021290	29-46-12	084-49-57	27	AS0203	FL
U 45	CGS	3.896	3.89 C	1/1	*1967	1967G	021290	29-51-05	084-57-46	39	AS0180	FL
V 293	CGS	3.853	3.853B	1/1	1967	1985G	021290	29-48-26	084-50-33	29	AS0197	FL
V 45	CGS	3.064	3.064B	1/1	*1967	1973G	021290	29-50-16	084-55-40	37	AS0187	FL
W 293	FLHD	3.261	3.261B	1/1	1967	1985G	021290	29-49-26	084-50-48	29	AS0195	FL
W 45	CGS	1.951	1.951B	1/1	*1967	1975N	021290	29-49-33	084-53-48	33	AS0190	FL
X 288	CGS	5.601	5.601B	2/1	*1978	1985G	021290	29-58-55	084-30-03	9	AS0154	FL
X 293	CGS	2.888	2.888 :	1/1	1967	1985G	021290	29-49-34	084-51-42	29	AS0194	FL
Y 293	CGS	2.193	2.193B	1/1	1967	1985G	021290	29-49-33	084-53-48	33	AS0191	FL
Z 288	CGS	7.286	7.286B	2/1	*1977	1985G	021290	29-54-53	084-31-26	11	AS0163	FL
Z 293	CGS	2.596	2.596B	1/1	1967	1985G	021290	29-49-33	084-54-46	37	AS0189	FL

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FOR CONVERSION OF METERS TO INTERNATIONAL FEET, MULTIPLY THE METERS BY 3.28083989501 (TO 12 SIGNIFICANT FIGURES).

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HEIGHT OF NGRS VERTICAL CONTROL POINTS
SORTED BY PLOT NUMBER

GEODETIC CONTROL DIAGRAM:
APALACHICOLA
LATITUDE RANGE: 29 TO 30 DEG N
LONGITUDE RANGE: 084 TO 85 DEG W

DESIGNATION	MONUMENTING AGENCY	ORTHOMETRIC HEIGHT IN METERS NAVD 88	NGVD 29	ORDER & CLASS	YEAR OBS.	YEAR REC.	DATE ADJUSTED	APPROXIMATE POSITION LATITUDE	LONGITUDE	PLOT #	PERMANENT IDENT.	ST
N 288	CGS	10.369	10.369B	1/1	1967	1985G	021290	29-56-25	084-30-02	8	AS0157	FL
P 288	CGS	10.686	10.686B	1/1	1967	1985G	021290	29-55-56	084-30-35	8	AS0158	FL
14 M	USGS	6.711	6.711B	1/1	1967	1985G	021290	29-58-13	084-29-56	9	AS0253	FL
X 288	CGS	5.601	5.601B	2/1	*1978	1985G	021290	29-58-55	084-30-03	9	AS0154	FL
M 288	CGS	6.136	6.136B	1/1	1967	1985G	021290	29-57-34	084-30-12	9	AS0155	FL
D 288	CGS	2.791	2.791B	2/1	*1978	1985G	021290	29-59-39	084-30-13	9	AS0153	FL
MC INTYRE SOUTH BASE AZI	CGS	3.277	3.277B	1/2	1934	1967N	021290	29-58-50	084-31-32	9	AS0176	FL
JAMES	CGS	7.060	7.060B	1/1	1967	1985G	021290	29-56-57	084-30-10	10	AS0156	FL
TURKEY AZ MK	CGS	8.504	8.504B	2/1	*1977	1976P	021290	29-55-08	084-31-13	11	AS0162	FL
TURKEY	CGS	10.184	10.184B	2/1	*1976	1985G	021290	29-55-19	084-31-14	11	AS0159	FL
TURKEY RM 1	CGS	10.161	10.161B	1/1	1967	1985G	021290	29-55-19	084-31-14	11	AS0160	FL
TURKEY RM 2	CGS	10.299	10.299B	1/1	1967	1985G	021290	29-55-19	084-31-14	11	AS0161	FL
Z 288	CGS	7.286	7.286B	2/1	*1977	1985G	021290	29-54-53	084-31-26	11	AS0163	FL
G 293	CGS	3.600	3.600B	1/1	1967	1985X	021290	29-54-30	084-32-21	11	AS0164	FL
H 293	CGS	3.177	3.177B	1/1	1967	1985G	021290	29-54-06	084-33-01	11	AS0165	FL
Q 46	CGS	3.617	3.617B	1/2	1934	1967N	021290	29-58-47	084-31-35	12	AS0175	FL
J 293	CGS	2.342	2.342B	1/1	1967	1985G	021290	29-53-38	084-33-53	13	AS0166	FL
K 293	CGS	3.069	3.069B	1/1	1967	1985G	021290	29-53-19	084-34-41	13	AS0167	FL
A 298	CGS	3.485	3.485B	1/1	1967	1985G	021290	29-52-54	084-35-33	13	AS0169	FL
L 293	CGS	2.933	2.933B	1/1	1967	1985G	021290	29-52-32	084-36-45	15	AS0168	FL
M 293	CGS	3.478	3.478B	1/1	1967	1985G	021290	29-51-55	084-37-11	15	AS0170	FL
NEW	CGS	1.859	1.859B	1/1	1967	1985G	021290	29-51-09	084-38-12	17	AS0234	FL
NEW RM 3	CGS	1.437	1.437B	1/1	1967	1985G	021290	29-51-09	084-38-13	17	AS0235	FL
N 293	CGS	5.531	5.531B	1/1	1967	1985G	021290	29-51-01	084-38-35	17	AS0233	FL
A 293	CGS	3.214	3.214B	1/1	1967	1985G	021290	29-50-59	084-39-43	17	AS0231	FL
TIDAL STA 3-63 TIDAL 2	CGS	3.828	3.82 C	1/1	1967	1975G	021290	29-51-02	084-39-51	17	AS0230	FL
P 293	CGS	3.564	3.56 C	1/1	1967	1985G	021290	29-51-04	084-39-54	17	AS0228	FL
BM	DOD	3.517	3.51 C	1/1	1967	1985X	021290	29-51-04	084-40-32	19	AS0225	FL
STA D	DOD	4.536	4.53 C	1/1	1967	1985X	021290	29-51-05	084-40-31	19	AS0226	FL
2	DOD	3.900	3.900B	1/1	*1967	1975G	021290	29-50-52	084-40-38	19	AS0220	FL

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HEIGHT OF NGRS VERTICAL CONTROL POINTS
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GEODETIC CONTROL DIAGRAM:
APALACHICOLA
LATITUDE RANGE: 29 TO 30 DEG N
LONGITUDE RANGE: 084 TO 85 DEG W

DESIGNATION	MONUMENTING AGENCY	ORTHOMETRIC HEIGHT IN METERS NAVD 88	NGVD 29	ORDER & CLASS	YEAR OBS.	YEAR REC.	DATE ADJUSTED	APPROXIMATE POSITION LATITUDE	LONGITUDE	PLOT #	PERMANENT IDENT.	ST
1	DOD	2.471	2.471B	1/1	*1967	1985X	021290	29-50-01	084-41-01	19	AS0219	FL
CARRABELLE RM 3	CGS	3.298	3.298B	1/1	1967	1985G	021290	29-51-17	084-41-27	19	AS0223	FL
CARRABELLE AZ	CGS	4.223	4.22 C	1/1	1967	1985G	021290	29-51-03	084-41-28	19	AS0221	FL
CARRABELLE RM 2	CGS	2.901	2.901B	1/1	1967	1985G	021290	29-51-16	084-41-28	19	AS0224	FL
CARRABELLE	CGS	3.893	3.893B	1/1	1967	1985G	021290	29-51-17	084-41-28	19	AS0222	FL
Q 293	CGS	2.906	2.906B	1/1	1967	1985G	021290	29-49-43	084-41-37	20	AS0218	FL
R 293	CGS	5.232	5.232B	1/1	1967	1985G	021290	29-49-29	084-42-18	20	AS0216	FL
B 293	CGS	2.987	2.987B	1/1	1967	1985G	021290	29-48-46	084-43-06	20	AS0215	FL
E 46	CGS	2.447	2.447B	1/1	*1967	1975G	021290	29-48-28	084-43-43	23	AS0214	FL
S 293	CGS	7.391	7.391B	1/1	1967	1985G	021290	29-48-00	084-44-33	23	AS0213	FL
ROYAL BLUFF 2	CGS	9.800	9.800B	1/1	1967	1967G	021290	29-47-34	084-45-04	23	AS0210	FL
ROYAL BLUFF 2 RM 1	CGS	10.148	10.148B	1/1	1967	1976G	021290	29-47-34	084-45-04	23	AS0212	FL
ROYAL BLUFF 2 RM 2	CGS	9.670	9.670B	1/1	1967	1976G	021290	29-47-34	084-45-04	23	AS0211	FL
D 46	CGS	3.910	3.910B	1/1	*1967	1985G	021290	29-47-31	084-45-23	23	AS0209	FL
T 293	CGS	4.343	4.343B	1/1	1967	1975G	021290	29-47-03	084-46-11	25	AS0208	FL
C 46	CGS	3.607	3.607B	1/1	*1967	1973G	021290	29-46-37	084-47-08	25	AS0207	FL
C 293	CGS	2.388	2.388B	1/1	1967	1975G	021290	29-46-05	084-47-57	25	AS0206	FL
B 46	CGS	2.209	2.209B	1/1	*1967	1975G	021290	29-45-43	084-48-56	27	AS0205	FL
A 46	CGS	2.793	2.793B	2/1	*1979	1979G	021290	29-45-28	084-49-52	27	AS0204	FL
CAT	CGS	6.252	6.252B	1/1	1967	1985G	021290	29-46-56	084-49-55	27	AS0201	FL
CAT RM 1	CGS	6.207	6.207B	1/1	1967	1975G	021290	29-46-56	084-49-55	27	AS0202	FL
CAT RM 2	CGS	6.159	6.159B	1/1	1967	1975G	021290	29-46-56	084-49-55	27	AS0200	FL
U 293	CGS	8.246	8.246B	2/1	*1979	1985G	021290	29-46-12	084-49-57	27	AS0203	FL
V 293	CGS	3.853	3.853B	1/1	1967	1985G	021290	29-48-26	084-50-33	29	AS0197	FL
W 293	FLHD	3.261	3.261B	1/1	1967	1985G	021290	29-49-26	084-50-48	29	AS0195	FL
X 293	CGS	2.888	2.888B	1/1	1967	1985G	021290	29-49-34	084-51-42	29	AS0194	FL
D 293	CGS	4.637	4.637B	1/1	1967	1985G	021290	29-47-36	084-50-11	30	AS0198	FL
DIP RM 1	CGS	1.934	1.934B	1/1	1967	1976G	021290	29-49-44	084-52-28	33	AS0193	FL
F 293	CGS	2.180	2.180B	1/1	1967	1985G	021290	29-49-39	084-53-19	33	AS0192	FL
W 45	CGS	1.951	1.951B	1/1	*1967	1975N	021290	29-49-33	084-53-48	33	AS0190	FL

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FOR CONVERSION OF METERS TO U.S. SURVEY FEET, MULTIPLY THE METERS BY 3.28083333333 (TO 12 SIGNIFICANT FIGURES).
FOR CONVERSION OF METERS TO INTERNATIONAL FEET, MULTIPLY THE METERS BY 3.28083989501 (TO 12 SIGNIFICANT FIGURES).

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NOAA - NOS - C&GS
NATIONAL GEODETIC SURVEY
DATE PRINTED: Jul 10 1991

HEIGHT OF NGRS VERTICAL CONTROL POINTS
SORTED BY PLOT NUMBER

GEODETIC CONTROL DIAGRAM:
APALACHICOLA
LATITUDE RANGE: 29 TO 30 DEG N
LONGITUDE RANGE: 084 TO 85 DEG W

DESIGNATION	MONUMENTING AGENCY	ORTHOMETRIC HEIGHT IN METERS NAVD 88	NGVD 29	ORDER & CLASS	YEAR OBS.	YEAR REC.	DATE ADJUSTED	APPROXIMATE POSITION LATITUDE	LONGITUDE	PLOT #	PERMANENT IDENT.	ST
Y 293	CGS	2.193	2.193B	1/1	1967	1985G	021290	29-49-33	084-53-48	33	AS0191	FL
Z 293	CGS	2.596	2.596B	1/1	1967	1985G	021290	29-49-33	084-54-46	37	AS0189	FL
B 294	CGS	2.868	3.091B	1/1	1967	1985G	021290	29-50-09	084-55-29	37	AS0188	FL
V 45	CGS	3.064	3.064B	1/1	*1967	1973G	021290	29-50-16	084-55-40	37	AS0187	FL
C 294	CGS	3.200	3.200B	1/1	1967	1975G	021290	29-50-21	084-56-35	37	AS0186	FL
D 294	CGS	3.845	3.845B	1/1	1967	1975G	021290	29-50-37	084-57-26	39	AS0181	FL
A 294	CGS	3.267	3.267B	1/1	1967		021290	29-49-24	084-58-16	39	AS0183	FL
N 45	CGS	3.783	3.783B	1/1	*1967	1975G	021290	29-49-56	084-58-09	39	AS0182	FL
E 293	CGS	3.383	3.383B	1/1	1967	1975G	021290	29-50-48	084-58-01	39	AS0179	FL
U 45	CGS	3.896	3.89 C	1/1	*1967	1967G	021290	29-51-05	084-57-46	39	AS0180	FL
F 294	FLHD	4.454	4.454B	1/1	1967	1967G	021290	29-51-14	084-58-19	39	AS0178	FL
A 115	CGS	2.968	2.968B	1/1	*1967	1985X	021290	29-42-54	084-59-54	41	AS0252	FL
LAUREL TRI STATION	CGS	4.961	4.961B	1/1	*1967	1967G	021290	29-43-11	084-59-08	41	AS0249	FL
APALACHICOLA AZ RESET1960	CGS	4.847	4.847B	1/1	1967	1975G	021290	29-43-21	084-59-21	41	AS0248	FL
STA 3-66 WEST POINT RM 2	CGS	3.591	3.591B	1/1	1967	1975G	021290	29-43-26	084-59-00	41	AS0243	FL
STA 3-66 APALACHICOLA BM	CGS	4.807	4.807B	1/1	*1967	1967G	021290	29-43-28	084-59-09	41	AS0244	FL
APALACHICOLA	CGS	6.010	6.010B	1/1	1967	1979G	021290	29-43-29	084-59-32	41	AS0246	FL
APALACHICOLA RM 2	CGS	5.710	5.710B	1/1	1967	1967G	021290	29-43-29	084-59-32	41	AS0245	FL
APALACHICOLA RM 3	CGS	5.829	5.829B	1/1	1967	1975G	021290	29-43-29	084-59-32	41	AS0247	FL
TIDAL STA 3-66 TIDAL 1	CGS	4.305	4.305B	1/1	*1967	1975G	021290	29-43-29	084-59-09	41	AS0240	FL
J 45-TIDAL BENCH MARK	CGS	4.709	4.709B	1/1	*1967	1967G	021290	29-43-33	084-58-59	41	AS0241	FL
TIDAL STA 3-66 TIDAL 2	CGS	2.610	2.610B	1/1	*1967	1975X	021290	29-43-40	084-59-03	41	AS0239	FL
K 294	CGS	1.444	1.444B	1/1	1967	1975G	021290	29-43-45	084-59-09	41	AS0238	FL
M 45	CGS	3.758	3.758B	1/1	*1967	1967G	021290	29-47-57	084-59-17	42	AS0185	FL
G 294	CGS	1.822	1.822B	1/1	1967	1975N	021290	29-48-35	084-58-35	42	AS0184	FL
E 294	CGS	3.231	3.231B	1/1	1967		021290	29-52-09	084-58-28	43	AS0177	FL
P 45	CGS	3.357	3.357B	1/1	*1967	1967G	021290	29-52-15	084-58-19	43	AS0303	FL
Q 45	CGS	4.534	4.534B	1/2	1934	1975N	021290	29-53-14	084-58-34	43	AS0152	FL
R 45	CGS	4.859	4.859B	1/2	1934	1975P	021290	29-55-02	084-58-35	44	AS0151	FL
S 45	CGS	7.661	7.661B	1/2	1934	1975N	021290	29-57-47	084-58-32	45	AS0150	FL

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GEODETIC CONTROL DIAGRAM:
APALACHICOLA
LATITUDE RANGE: 29 TO 30 DEG
LONGITUDE RANGE: 084 TO 85 DEG

DESIGNATION	PLOT #	DESIGNATION	PLOT #	DESIGNATION	PLOT #
10 FLDT	27	16.747	31	17 17 M USGS	6
21 M USGS	1	290841 AA 1 FLDNR	5	290841 AA 2 FLDNR	5
290841 AA 5 FLDNR	5	290841 AA FLDNR	5	290841 AB 1 FLDNR	7
290841 AB 3 FLDNR	7	290841 AB 4 FLDNR	7	290841 AB 5 FLDNR	7
290841 AC 1 FLDNR	3	290841 AC 2 FLDNR	3	290841 AC 3 FLDNR	3
290841 AC 4 FLDNR	3	290841 AC 5 FLDNR	3	49 79 A 07 FLDT	35
49 79 A 08 FLDT	35	49 79 A 09 FLDT	35	49 79 A 10 FLDT	35
49 79 A 11 FLDT	31	49 79 A 12 FLDT	31	49 79 A 13 FLDT	31
49 79 A 14 FLDT	31	49 79 A 15 FLDT	27	49 79 A 16 FLDT	27
49 79 A 17 FLDT	35	49 80 A15	40	49 80 A17	38
49 80 B01	38	49 80 B02	38	49 80 B06	36
49 80 B16	28	49 80 B18	26	49 80 B19	26
49 80 B20	26	49 80 B20 RM 2	26	49 80 B26	22
49 80 B34	18	49 80 B34 RM1	18	49 80 C01	18
49 80 C01 RM 1	18	49 80 C01 RM 2	18	49 80 C04	16
49 80 C06	16	49 80 C09	14	49 80 C10	14
49 80 C11	14	49 80 C12	14	49 80 C13	14
49 80 C14	14	49 80 C15	14	49 80 C15 RM 1	14
49 80 C15 RM 2	14	49 80 C16	14	84 00 1000 R	38
872 8237 A TIDAL FLDNR	1	872 8237 B TIDAL FLDNR	1	872 8237 C TIDAL FLDNR	1
872 8237 D TIDAL FLDNR	1	872 8255 A TIDAL FLDNR	1	872 8255 B TIDAL FLDNR	1
872 8255 C TIDAL FLDNR	1	872 8255 D TIDAL FLDNR	1	872 8261 A TIDAL FLDNR	2
872 8261 B TIDAL FLDNR	2	872 8261 C TIDAL FLDNR	2	872 8261 D TIDAL FLDNR	2
872 8261 E TIDAL FLDNR	2	872 8261 F TIDAL FLDNR	5	872 8261 G TIDAL FLDNR	2
872 8311 C TIDAL	6	872 8360 A TIDAL	8	872 8360 J TIDAL	8
872 8360 TIDAL 1	8	872 8360 TIDAL 2	8	872 8360 TIDAL 3	8
872 8366 A TIDAL FLDNR	12	872 8408 A TIDAL	14	872 8408 B TIDAL	14
872 8408 C TIDAL	14	872 8408 D TIDAL	14	872 8408 E TIDAL	14
872 8465 E TIDAL	18	872 8465 F TIDAL	18	872 8465 G TIDAL	18
872 8465 H TIDAL	18	872 8548 TIDAL 1	24	872 8548 TIDAL 2	24
872 8548 TIDAL 3	24	872 8548 TIDAL 4	26	872 8548 TIDAL 6	26
872 8619 A TIDAL	31	872 8619 B TIDAL	31	872 8619 C TIDAL	31

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APALACHICOLA
LATITUDE RANGE: 29 TO 30 DEG
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DESIGNATION	PLOT #	DESIGNATION	PLOT #	DESIGNATION	PLOT #
872 8619 D TIDAL	31	872 8626 TIDAL 1	32	872 8626 TIDAL 2	32
872 8626 TIDAL 3	32	872 8626 TIDAL 4	36	872 8626 TIDAL 5	36
872 8669 G TIDAL	38	872 8669 H TIDAL	38	872 8669 TIDAL AA 2	38
9 19 M USGS	3	A 340	28	A 341	21
A FLDNR	8	AA 3	38	AA 4	38
AA 5	38	AP 1 FLDNR	2	AP 2 FLDNR	2
AP 3 FLDNR	5	B 340	32	B 341	21
B FLDNR	8	BA FLDNR	3	BAY 1 FLDNR	3
BAY 2 FLDNR	3	BB FLDNR	3	BC FLDNR	3
BD FLDNR	7	BOUNDARY LANDFILL	34	BP 1 FLDNR	1
BP 2 FLDNR	1	C 340	36	C FLDNR	6
D 340	28	D FLDNR	6	DOG ISLAND WEST RM 3	18
DOG ISLAND WEST RM SW	18	DOG ISLAND WEST RM SW	18	E 340	28
E FLDNR	4	F 340	26	F 46	20
F FLDNR	4	FRA 1 FLDNR	9	FRA 10	32
FRA 11	34	FRA 15	36	FRA 16	38
FRA 5	35	FRA 6	34	FRA 7	32
FRA 8	32	FRA 9	32	G 340	26
G 46	19	G FLDNR	4	H 340	26
H 341	40	H 45	41	H 46	17
H FLDNR	3	I FLDNR	3	J 340	24
J 341	38	J 46	17	JWM 1 FLDNR	4
K 340	24	K 396	38	K 46	15
L 340	22	L 396	14	L 46	13
M 340	22	M 46	13	MCINTYRE S BASE	12
MCINTYRE S BASE RM 1	12	MCINTYRE S BASE RM 2	12	N 340	21
N 46	11	P 340	24	P 46	10
Q 340	22	R 109 T RESET	26	R 149	18
R 193	14	R 340	38	R 52 T	38
R 74	36	S 340	21	T 340	38
T8 9S R6 7W SEC 1 6 31 36	31	TIDAL 3 STA 111 66	41	TIDAL 4 STA III 66	41

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GEODETIC CONTROL DIAGRAM:
APALACHICOLA
LATITUDE RANGE: 29 TO 30 DEG
LONGITUDE RANGE: 084 TO 85 DEG

DESIGNATION	PLOT #	DESIGNATION	PLOT #	DESIGNATION	PLOT #
TIDAL 6 LAUREL RM	41	U 340	36	V 340	36
W 340	36	WAK 1 FLDNR	9	WAK FLDT	3
X 340	36	X 45	29	Y 340	24
Y 45	29	Z 340	21	Z 45	30

*U.S. Government Printing Office: 1992 — 624-025/60340