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ATTACHMENT R
REQUIREMENTS FOR DIGITAL PHOTOGRAPHS OF SURVEY CONTROL

TO
SCOPE OF WORK FOR SHORELINE MAPPING
UNDER THE
NOAA COASTAL MAPPING PROGRAM

NATIONAL GEODETIC SURVEY
NATIONAL OCEAN SERVICE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
U.S. DEPARTMENT OF COMMERCE

TABLE OF CONTENTS

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1. PURPOSE - This document describes digital photographic standards for images of survey marks that will be stored in the National Geodetic Survey (NGS) database and for other reconnaissance photographs (including photo ground control). Since many of these images will be in the NGS database and available to the public, the photograph subject matter (survey equipment, personnel, background, etc.) shall be in good taste and professional in nature.

Digital photographs are useful for station (mark) reconnaissance, mark recovery, mark stability assessment, quality control, and as an aid during data processing and data verification. Some projects may require digital photographs during more than one stage of the project. The photographs stored in the NGS database will be accessible to future users. The table below summarizes the required photographs. Detailed descriptions of the photographs follow.

2. SURVEY MARK PHOTOGRAPHS - This section states the requirements for digital photographs of new and existing survey marks. For the requirements for reconnaissance photographs, including photo control points, runways, etc., see Section 3, below.

Take all photographs during daylight hours.

Take all photos of the same point consecutively, (photo #1, #2, then #3) so that they are all stored together in the camera's memory. This should help avoid misidentifying photos later.

2.1. NUMBER OF SURVEY MARK PHOTOGRAPHS - At least three digital photographs are required for each permanent mark recovered or described. This means marks for which a written, NGS format, digital description or recovery note was prepared. The three photographs are described as numbers: (1) extreme close-up, (2) eye-level (5-6 feet distant), and (3) horizontal view (approx. 10-30 feet distant). All three photographs require correct file names. Photographs type #2 and #3 also require a **small, temporary sign** in the photograph. Use a small sign with large, clear letters (e.g. white board with dark marker). Ensure that the sign is legible in the photograph and that it does not cover any portion of the mark, the monument, or any important feature. Have a tripod in place over the mark for photo #3, if possible.

REQUIRED PHOTOGRAPHS

All Permanent Marks Recovered and/or Described
1. Close-up (Taken Vertically; so stamping is clear and legible)
2. Eye level (Taken Vertically; shows mark and area)
3. Horizontal view(s), mark in foreground, feature(s) in background

Take sufficient photographs to describe the stamping, appearance, condition, and location of the mark and points of potential interest including visibility obstructions, buildings, trees, roads, runways, taxiways, or other dangers, and any special set-up requirements, etc. Alter the orientation of the photographs as necessary to include this information in as few photographs as possible. For example, for a tall obstruction, rotate the camera 90 degrees so that the longer axis of the image is vertical. Capture the full heights (including tops) of nearby obstructions, if possible. If a station already has acceptable photographs in the NGS database, additional photographs are not required, unless changes have occurred or more than one year has passed. An "acceptable photograph" is defined as an image that meets the requirements of this document, is of good visual quality, and that no changes have taken place that a new photograph would help clarify.

2.2. CAPTION - A caption on each photograph is no longer required. If the camera allows, include the date and time on the image.

2.3. DESCRIPTION OF PHOTOGRAPHS:

A. CLOSE-UP (#1) - For permanent survey marks, the first photograph (type #1) will be a close-up, taken vertically. It will be oriented downward to show the survey mark from directly above with the disk or logo cap nearly filling the image. The tripod shall not be in place when this photograph is captured. Remove any dirt, debris, water, or snow to show the complete disk. Avoid shadow lines crossing the disk. If it has a logo cap, the logo cap should be open. The intent of this photograph is to **clearly show the mark, its condition, and all stamping on the mark or logo cap so that it is clearly legible**. Use extra care to ensure that the stamping is clear. Suggestions: set the camera to its highest quality and resolution modes; rub a yellow crayon across the stamping to highlight the letters, or use a white house-hold powder for highlighting; set the camera to "macro" mode, if available; consider the minimum focusing distance of the camera (take test photographs to determine the minimum focusing distance and consult the camera owner's manual) ; and, if a flash is used, hold the camera above and off to the side so that the flash does not create a bright spot in the middle of the disk's image, due to the reflection of the flash. Note, medium quality and resolution camera modes may be used for photographs other than the close-ups. If additional close-up photographs are required, number these close-ups as 1A, 1B, etc.

B. EYE-LEVEL (#2) - For permanent survey marks, this photograph (type #2) will be oriented vertically downward from eye level to show the monument from directly above and cover an area about 1 meter in radius, all around the mark. The tripod shall not be in place when this photograph is captured. Remove any dirt, debris, water, or snow from the mark to show the disk and the setting. If it is a concrete monument, clear off debris to the edge of the monument. If it has a logo cap, the logo cap should be open. **Include a small, temporary sign in this photograph with the station designation (name) printed so it is clearly visible in the photograph.** The intent of this photograph is to show the general condition of the mark and the immediate surrounding area, especially any condition that would be a threat to the stability of the mark. If additional photographs are required, number these eye-level photos as 2A, 2B, etc.

C. HORIZONTAL VIEW(S) (#3) - For permanent survey marks, take at least one additional, daylight photograph oriented near horizontal (type #3) and show the mark, with tripod and antenna (if possible), in the foreground, and the mark's identifying surroundings and any significant obstructions or possible sources of multi-path in the background. Show the top of nearby obstructions, if possible. Consider rotating the camera 90 degrees to use the long axis of the image to capture entire obstructions. **Place a temporary sign in this photograph with the station designation (name) and the direction the camera is pointing, both printed so they are clearly visible in the photograph.** If additional photographs are taken, ideally move around the mark to locations which are 90 degrees apart (preferably cardinal directions). Name these photographs number 3XX, where the "XX" is the cardinal direction the camera is pointing, for example, 3N or 3NE.

3. RECONNAISSANCE PHOTOGRAPHS - Some, none, or all of the digital images described in this section may be required on a given project; refer to the Project Instructions. Each of these photographs requires a legible sign and the correct file name. **The file names for all of these photographs shall begin with "RE" to indicate REconnaissance.**

Required Item	Contents	Description
Sign in Photo	Name & Direction (unless vertical photo)	Place a sign in this photograph with the station designation (name) and the direction the camera is pointing, both printed so they are clearly visible in the photograph.
~~Digital Caption~~	No longer required	
Photo File Name	RE-PID*-Name-Number-Date.jpg	See Section 4.4 below

*PID = Permanent Identifier

All of the images required by this section shall be designated as reconnaissance (recon) with the letters "RE" at the beginning of their file names. Generally these recon images will not be loaded in the NGS data base but may be required for use during planning, review, etc. Note, in these specifications, **"RE" stands for "REconnaissance"** and "R" stands for "Right" runway.

See the Project Instructions to determine which, if any, of the following are required:

3.1. PROPOSED LOCATIONS FOR MARKS - Take two photographs of each proposed permanent mark location. These should be two #3 (3A and 3B) photographs. Include a tripod, stake, sign, or other device showing the proposed mark location.

3.2. RUNWAY END PHOTOGRAPHS - For airport projects, take at least three photographs at the end of each runway (including thresholds and stopways), as follows:

- Eye-Level (photo type #1) - photo from directly above the mark, showing about 1 meter in diameter,
- Approach (photo type #3) - photo showing tripod over mark in foreground and approach in background
- Across runway (photo type #3) - photo taken from the side of the runway looking across the end of the runway, with a tripod or arrow indicating the end point; include any features used to identify the runway end.

3.3. NAVIGATION AIDS (NAVAIDS) - Take photos (type #3) of all NAVAIDS surveyed. Show the survey tripod in place to indicate the exact point surveyed, or if positioned remotely, add arrows and labels to the photograph indicating the horizontal and/or vertical point(s) surveyed.

3.4. DEPTH OF HOLE PHOTOGRAPHS - Take at least one photograph showing the hole dug or drilled for a concrete or rod mark. Place a measuring device (e.g., tape measure or level rod) in the hole, clearly showing the depth of the hole and clearing showing the readings on the tape or rod. Also show the measurement of the diameter of the hole, and show the belled-out bottom portion of the hole.

3.5. PHOTOGRAMMETRIC CONTROL POINTS AND CHECK POINTS (Paneled and photo identified) - **Take two #3 type photographs** (3A and 3B) of all photogrammetric control points clearly showing the point. This requirement includes both ground control points and ground check points. These photos may be used later as an aid in identifying the point on the aerial photographs. Show the mark in the foreground and the nearest identifiable feature in the background. The two photographs should be taken from two different directions, ideally 90 degrees apart (such as from the East and the South). Indicate the location of the survey point in the photograph. It may be helpful to have the survey tripod in the photograph.

3.6. OTHER REQUIRED PHOTOGRAPHS - as may be required by other instructions.

4. GENERAL:

4.1. IMAGE SIZE - Each image should be about 800 by 1000 pixels when submitted.

4.2. FILE SIZE - Maximum file size for each image is 500 KiloBytes (KB), typical file size should be about 50 – 100 KB.

4.3. IMAGE FORMAT - Store the digital photographs in JPEG format, approximately 50% reduction.

4.4. PHOTOGRAPH FILE NAME - Use the following file naming convention: "RE" (for reconnaissance photographs only), dash, the PID, dash, the station designation, dash, the photo type number (1, 1A, 2, 3N, or 3NE, etc.), dash, date, dot, jpg. For new marks, there is no PID. Use a maximum of 30 alpha-numeric characters to the left of the dot.

Sample File Names

For new stations:	SMITH-3-date.jpg
For existing stations:	AB1234-JONES-1-date.jpg
For recon/photo control photos:	RE-MILLER-3N-date.jpg
For runway end point:	RE-LAX_CL_END_RWY_12R-3-date.jpg

For the runway end point example, "RE" = reconnaissance, dash, LAX = Location Identifier (LID), dash, "CL END RWY 12R" = runway end point designator (CL = centerline, END = end,

RWY = runway, 12 = runway number, and R = right (or C = center, or L = left), dash, "3" = photo number, and date. Note, "_" (underscores) used to fill blanks. Note, in these specifications, "RE" stands for "reconnaissance" and "R" stands for "right" runway (used if there is a parallel set of runways). Also, the LID may be four characters rather than just three.

The format for the date is: "yyyymmdd", all numeric.

5. STORAGE MEDIUM - Submit all digital photos for permanent marks (3 photo sets) together on their own archival quality Digital Video Disk (DVD), **not on the same medium with other types of data**. Label this disk with the Project name, number, and the words "Database Photos", and use a DVD safe pen. Submit all RE photos on a separate DVD, also labeled. Do not apply paper labels to DVDs. For airport work, submit all photos for a given airport in a subdirectory named for that airport.

*Acronyms:
CBN - Cooperative Base Network
CORS - Continuously Operating Reference Station (Global Positioning System receiver)
DVD – Digital Video Disk
FBN - Federal Base Network
JPEG (or .jpg) – Joint Photographic Experts Group
KB - KiloByte
LID – Location IDentifier (for airports)
NAVAIDS – NAVigation AIDs
PACS - Primary Airport Control Station
PID – Permanent IDentifier (for NGS control stations)
RE - REconnaissance
SACS - Secondary Airport Control Station
= Number

ANNEX 1
INFORMATION SHEET FOR TAKING PHOTOGRAPHS OF SURVEY MARKS

EQUIPMENT REQUIRED:
CAMERA (WITH MEMORY CHIP, OR FILM FOR LATER SCANNING)
STIFF BRUSH TO CLEAN OFF MARK AND CLEAN LETTERING
SMALL SHOVEL OR SCRAPER TO DIG OUT AND/OR CLEAN OFF MARK
YELLOW CONSTRUCTION CRAYON, OR WHITE HOUSE-HOLD POWDER (BABY POWDER, CORN STARCH, ETC.)
WHITE BOARD WITH DARK MARKER
WEED WACKER (OR OTHER CUTTING DEVICE) TO CUT BACK GRASS AND WEEDS
COMPASS TO DETERMINE DIRECTIONS
MAP
MARK DESCRIPTION
MEASURING TAPE
GPS RECEIVER
SCREW DRIVER (TO OPEN LOGO CAPS AND TO HOLD END OF TAPE)
TILE PROBE
SCIENTIFIC CALCULATOR

PHOTO #1 - CLOSE-UP:
- SET CAMERA TO HIGH RESOLUTION,
- SET CAMERA TO MACRO MODE (IF AVAILABLE),
- DETERMINE CAMERA'S MINIMUM FOCUS DISTANCE,
- SET DATE AND TIME INTO CAMERA, IF POSSIBLE,
- THOROUGHLY CLEAN OFF TOP OF MARK (INCL. LOGO CAP, CONCRETE, ETC.),
- THOROUGHLY CLEAN LETTERING (DISK OR LOGO CAP),
- CUT BACK GRASS AND WEEDS, AS REQUIRED,
- REMOVE SURVEY TRIPOD,
- OPEN LOGO CAP,
- RUB YELLOW CRAYON (OR WHITE, HOUSE-HOLD POWDER) ACROSS STAMPING,
- ORIENT CAMERA VERTICALLY, AT APPROX. MINIMUM FOCUS DISTANCE,
- COMPOSE TO INCLUDE ENTIRE DISK, OR TOP OF ROD AND LOGO CAP STAMPING,
- EXPOSE PHOTOGRAPH IN MID-AM OR MID-PM, IF POSSIBLE, TO OBTAIN GOOD LIGHTING OF THE STAMPING,
- AVOID SHADOWS ACROSS THE MARK,
- NOTE, IF FLASH IS REQUIRED, MOVE CAMERA SLIGHTLY OFF CENTER TO MINIMIZE REFLECTION,
- EXPOSE PHOTOGRAPH.

PHOTO #2 - EYE LEVEL
- SET CAMERA TO NORMAL RESOLUTION,
- SET CAMERA TO NORMAL MODE (NOT MACRO),
- SET DATE AND TIME INTO CAMERA (IF AVAILABLE),
- IF NOT ALREADY DONE, CLEAN OFF MARK AND STAMPING,
- CUT BACK GRASS AND WEEDS, AS REQUIRED,
- REMOVE SURVEY TRIPOD,

- WRITE STATION NAME, IN LARGE LETTERS, ON SIGN AND PLACE NEAR (NOT ON) MARK,
- OPEN LOGO CAP,
- ORIENT CAMERA VERTICALLY AT EYE LEVEL,
- COMPOSE WITH ENTIRE MONUMENT AND AREA AROUND MARK APPROX. 1 METER IN RADIUS,
- EXPOSE PHOTOGRAPH.

PHOTO #3 - HORIZONTAL VIEW(S)
- SET CAMERA TO NORMAL RESOLUTION,
- SET CAMERA TO NORMAL MODE (NOT MACRO),
- SET DATE AND TIME INTO CAMERA (IF AVAILABLE),
- IF NOT ALREADY DONE, CLEAN OFF MARK AND STAMPING,
- CUT BACK GRASS AND WEEDS, AS REQUIRED,
- SET-UP SURVEY TRIPOD OVER MARK,
- WRITE STATION NAME AND CAMERA DIRECTION, IN LARGE LETTERS, ON SIGN AND PLACE NEAR (NOT ON) MARK,
- CLOSE LOGO CAP,
- ORIENT CAMERA HORIZONTALLY AT EYE LEVEL,
- COMPOSE TO INCLUDE MARK, ANY IDENTIFYING SURROUNDINGS, AND ANY OBSTRUCTIONS OR POSSIBLE SOURCES OF MULTI-PATH,
- EXPOSE PHOTOGRAPH(S), AS REQUIRED.