

Metropolitan Washington Airports Authority
PROCUREMENT AND CONTRACTS DEPT.
AMENDMENT OF SOLICITATION

Metropolitan Washington Airports Authority Procurement and Contracts Dept., MA-29 2733 Crystal Drive Arlington, VA 22202	1A. AMENDMENT OF SOLICITATION NO.	1B. DATED
	RFP-21-20743	April 9, 2021
	2A. AMENDMENT NO.	2B. EFFECTIVE DATE
	One (001)	April 27, 2021

The solicitation identified in Block 1A is amended as set forth in Block 3. Hour and date specified for receipt of offers is extended, is not extended. Offerors must acknowledge receipt of this amendment prior to the hour and dated specified in the solicitation or as amended, by one of the following methods: (a) by completing Block 4 and returning copy of the amendment; (b) by acknowledging receipt of this amendment on the Solicitation Offer and Award Sheet, Block 13. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER.

3. DESCRIPTION OF AMENDMENT

The Metropolitan Washington Airports Authority Solicitation RFP-21-20743 entitled, "Color Digital Orthophotography and Feature Extraction for the Metropolitan Washington Airports Authority" is amended as follows:

1. **Deadline for offer submission is unchanged and remains 2:00 P.M. May 10, 2021.**
2. The Statement of Work has been revised to clarify the deliverable of raw lidar data files and deletion of FAA Part 77 and Airport Airspace Analysis. Replace Attachment 01 Scope of Work with the attached Statement of Work (8 pages).
3. All other terms and conditions of the solicitation remain unchanged

Except as provided herein, all terms and conditions of the document referenced in Block 1A, as heretofore changed, remain unchanged and in full force and effect.

4A. NAME AND TITLE OF OFFEROR	4B. SIGNATURE	4C. DATE

Metropolitan Washington Airports Authority
Statement of Work
For

Color Digital Orthophotography and Feature Extraction for Washington Dulles International Airport,
Reagan National Airport and the Dulles Corridor Enterprise.

1.0 Introduction and Overview

Metropolitan Washington Airports Authority (MWAA) manages Washington Dulles International Airport, Ronald Reagan Washington National Airport, the Dulles Toll Road and the Dulles Access Road to Route 66. In an effort to maintain the Authority's GIS system updated Color Digital Orthophotos, contour lines, raw lidar and feature extraction are required.

2.0 Scope of Work - General

The purpose of this project is to acquire high quality color digital aerial imagery and aerial raw lidar data for the purpose of feature extraction, development of DTM (Digital Terrain Modeling) data and 1 foot topography and the capture of design grade planimetric data of the Washington Dulles International Airport, Reagan National Airport and the Dulles Corridor Enterprise for the production of 2 inch pixel color orthophotography.

The contractor will collect the imagery utilizing a digital mapping camera equipped with airborne GPS and IMU technology. The contractor will implement a quality control process that identifies and corrects spatial problems, format problems and visual problems before final delivery to the Authority. The location and boundaries of desired flight path is provided in Attachment #1. Upon award the Authority will provide location and boundaries in ESRI Personal Geodatabase format. The Authority will use the data produced under this project in both GIS (ESRI) and CADD (DGN) applications. Not only will this data be used by the Authority, but it will be also provided to Engineering/Surveying consultants for use on future design projects for the Authority. In order to meet the future mapping needs of design projects, the horizontal and vertical accuracy of all primary mapping deliverables developed under this project (Digital Orthoimagery, Planimetric Data, DTM [Digital Terrain Model] and 1-foot topography) shall meet, or exceed, NMAS (National Map Accuracy Standards) for 1"=50' scale map feature data with 1-foot topography. See Attachment #2 for excerpts of NMAS.

3.0 Project Specific Requirements

3.1 Digital Ortho-photography Methods and Guidelines

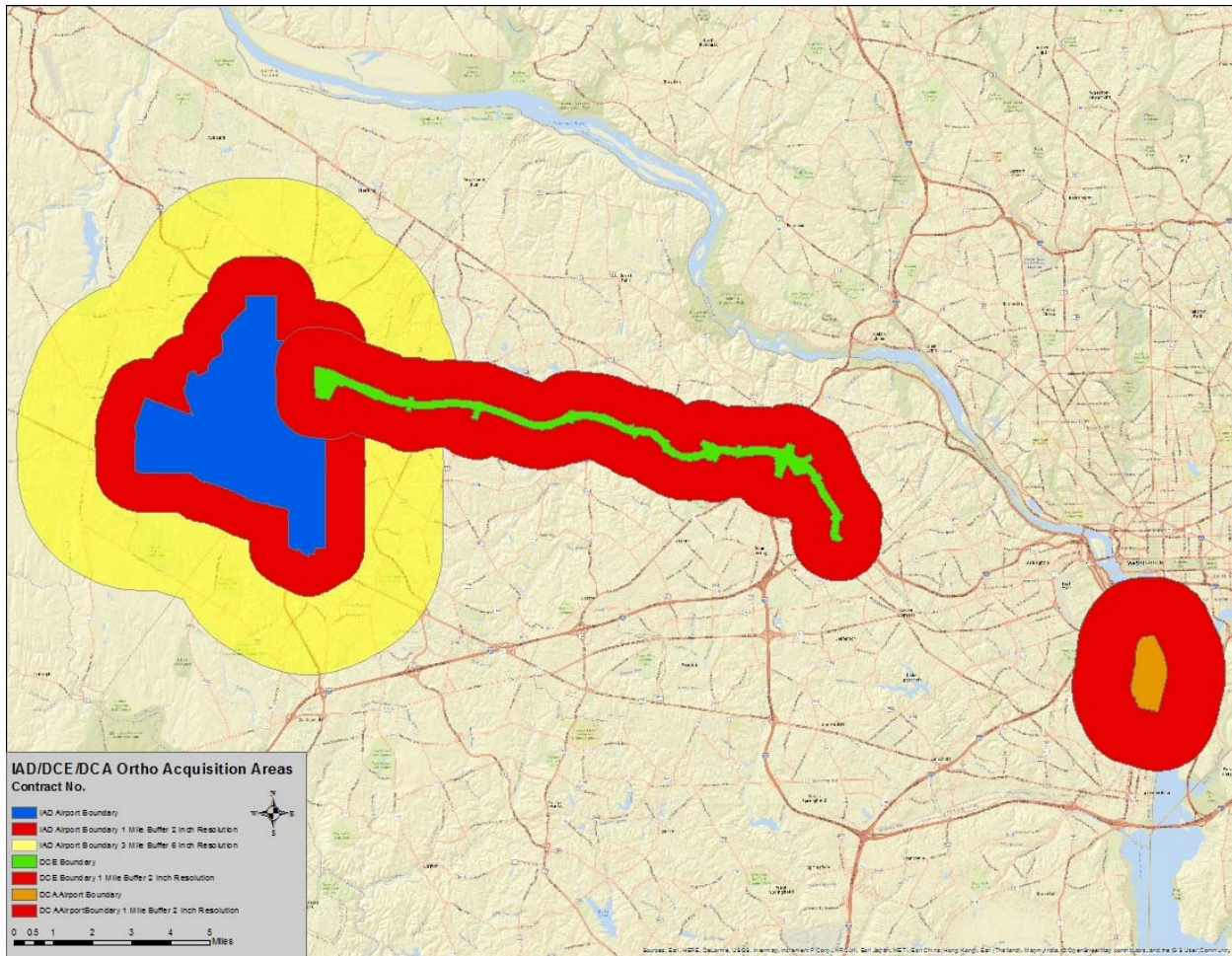
3.1.1 Aerial Image Acquisition

Weather and ground conditions permitting, the contractor must acquire color digital aerial imagery in the Spring/Summer with a minimum acceptable sun angle of 25 degrees. All imagery shall be free of clouds and/or cloud shadows. Should weather or snow conditions not permit the taking of imagery or a sun angle of less than 25 degrees the taking of the imagery may be deferred until the fall of 2021 when the sun angle is above 30 degrees. All digital orthophotography deliverables will be delivered to The Authority with no distribution/sale to any other entity.

3.1.2 Flight Plan

Once the scope has been approved the final flight plan will be given to The Authority and approved before work commences.

3.1.3 Base IAD/DCA/DCE ORTHO Acquisition Area Buffer Areas



3.1.4 Coordinate system

All mapping products will be delivered in Horizontal Datum State Plane Virginia North Zone NAD83; Vertical Datum NAVD88; Units in US Survey Feet. RTK Survey Grade GPS units with current GEOID will be used to collect any X, Y and Z positions for this project.

3.1.5 Flying Height

The altitude of the flight must be appropriate to produce digital orthophotography at a pixel resolution equal to, or less than, a GSD (ground sample distance) of 2 inches for the given area. Images captured at the time of flight containing pixels larger than a 2" GSD will be cause for rejection and reflights will be required. The imagery shall support the extraction of planimetric and topographic features that adhere to NMAS for 1"=50' scale feature mapping with 1' topography. Regardless of aerial camera platform used for this project, flight altitudes above mean terrain exceeding 2400 feet are not permitted due to the accuracy and map detail required for primary map-data deliverables.

3.1.6 Tile Size

Delivered Digital Orthoimagery tiles will be produced at 1500' x 1500'.

3.1.7 Environmental Conditions

Optimal conditions should favor the time of flight for the aerial imagery. Sun angle should be no less than 25 degrees above the horizon. The sky should be clear of low and high clouds, rain, smoke, haze, dust, ash, snow and etc. Rivers and streams shall be at normal heights for correct bank inventory. Correct spectral reflectance from water should be minimized and should not distort or wash out shoreline features.

3.1.8 Side overlap

Side overlap between flight lines must have an average of 40 percent +/- 5%. Imagery less than 30% will be rejected and re-flown at the contractor's expense.

3.1.9 Tilt

Tilt of the camera from verticality at the instant of exposure shall not exceed 3 degrees. Average tilt over the entire project shall not exceed 1 degree.

3.1.10 Crab

Crab shall not exceed three degrees (3°) in any image frame. Any two or more consecutive image frames displaying crab in excess of five degrees (5°) shall be rejected.

3.1.11 Mosaicing

Within the Airport boundaries best fit mosaicing practices will be used to correct structure lean than might create blind spots that would lead to missing or hidden features in the photos. Although "True-Ortho" orthorectification is not required, the contractor shall use the best available area possible of each raw image frame during mosaicing to minimize the vertical displacement of vertical features in the final ortho tile. Outside of the area boundaries structure lean will be held to the minimum.

3.1.12 Ground Control

The contractor is required to set ground control as targeted or clearly defined photo-identifiable feature points. The ground control points will be submitted to The Authority before flight for random accuracy checks by sub centimeter GPS collection units. The ground control target or photo-id marking must be large enough to be seen in the final aerial product. Photo-identifiable control will be set on points readily visible in the imagery and shall be marked so as to be readily recoverable.

3.1.13 Quality Control

Using aerotriangulation multiple checks must be made to detect data and control errors.

3.1.14 Deliverables

3.1.14.1 Sample (Pilot Area)

Prior to full production, the contractor shall submit digital sample TIF & MrSID orthoimages to The Authority for review and acceptance. The sample area will be a minimum of 20 contiguous image tiles for Dulles (IAD), Dulles Corridor Enterprise (DCE) and 10 for Reagan (DCA). After acceptance all QA/QC guidelines will be followed and The Authority has the right to refuse product if the entire set does not hold to the accepted samples quality.

Contractor shall also submit for review and approval sample files of the same area of IAD as outlined above containing DTM, DEM, breakline data, limited planimetrics and 1' contours. For DCA, the contractor will furnish similar sample files for a minimum of 5 tiles all falling within the DCA airport boundary. In addition, the contractor will furnish for review and approval sample file and attributes covering a representative area at each airport for each of the authorized alternates.

3.1.14.2 Final Deliverables

One set of 1"=50' scale 24 bit natural color digital orthophotography with a 2 inch pixel resolution that includes 256 levels for each color value band RGB in digital format and Raw Lidar data. Tile format must be 1500' x 1500' full tiles. Visible seams, transition, warp will constitute a rejection of the product and redone at contractors expense. A grid index will be provided to The Authority with reference for the 1500' x 1500' tiles including the Control Point Survey Record document.

Digital files to be delivered on USB hard drives which will become the property of MWAA.

3.1.14.2.2 Two mosaic images of the entire flight areas at 20:1, 40:1 and 80:1 compression delivered as a .sid file for each airport. Files will be delivered on the same USB hard drive as noted above or additional USB drives as may be required.

3.1.14.2.3 1"=50' planimetric, DTM, DEM & 1' contours

Required:

Reagan National Airport

1"=50' design-grade planimetric data, DTM's, DEM, and 1' topography and for both CADD & GIS environments to the DCA property boundaries and approximately 100' beyond as marked in Red in Attachment #1. All physical man-made and natural features as defined in 3.2.2 which can be accurately extracted as per the required accuracy specifications and flight altitude shall be collected and included in the final deliverable. In addition, the contractor will furnish for review/approval a sample file and attributes covering an appropriate number of files for each authorized alternate. Raw Lidar data file.

Dulles International Airport Area

1"=50' design-grade planimetric data, DTMs, DEM and 1' topography for both CADD & GIS environments to the IAD Property boundaries and approximately 100' beyond as marked in Blue in Red in Attachment #1. All physical man-made and natural features as defined in 3.2.2 which can be accurately extracted as per the required accuracy specifications and flight altitude shall be collected and included in the final deliverable. In addition, the contractor will furnish for review/approval a sample file and attributes covering an appropriate number of files for each authorized alternate. Raw Lidar data file.

Dulles Corridor Enterprise Area

1"=50' design-grade planimetric data, DTMs, DEM and 1' topography for both CADD & GIS environments to the DCE Property boundaries and approximately 100' beyond as marked in Blue in Red in Attachment #1. All physical man-made and natural features as defined in 3.2.2 which can be accurately extracted as per the required accuracy specifications and flight altitude shall be collected and included in the final deliverable. In addition, the contractor will furnish for review/approval a sample file and attributes covering an appropriate number of files for each authorized alternate. Raw Lidar data file.

3.2 Feature Extraction Methods and Guidelines

3.2.1 Feature Extraction

Feature Extraction will be executed by digitization from the newly acquired georeferenced stereo imagery and utilizing on ground survey methods. Upon award, the Authority will provide the boundaries in ESRI personal geodatabase format.

3.2.2 Standard 1:50 scale planimetric & topographic information required for the design-grade mapping

DTM Related Planimetric Data – the following features will be extracted and serve dual purposes in both the planimetric and topographic data. These features shall be captured as 3D Polylines with vertices adhering to NMAS.

- All Curbs – standard and depressed
- Edge of pavement – roads, alleys, parking, etc.
- Edge of gravel/dirt/unimproved Roads
- Sidewalks – public and private
- Edge of driveways – paved and unpaved
- All retaining walls greater than 6" in height above-grade – culvert headwalls, landscape, bulkheads, etc.
- Edge of concrete pads, areas, etc. greater than 100 square-feet in size
- Edge of Runways & Taxiways – on airport-property option

- All Hydrographic features:
 - > Edges of rivers, creeks, streams, ditches, etc. exceeding 5' in width
 - > Centerlines of creeks, streams, ditches, etc. – less than 5' in width
 - > Edges of ponds, lakes, reservoirs, etc. – natural and manmade

DTM 3D Breakline Data – Terrain features shall be captured as 3D Polylines with vertices adhering to NMAS. For abrupt changes in terrain not adequately defined by masspoint data, breaklines will be extracted from the stereo imagery in order to produce 1' topography adhering to NMAS. Sharp terrain changes such as tops of ditch banks, retaining walls, curbs, and road grades & embankments, etc. will be delineated as 3D breaklines and used in the final DTM.

3.2.3 Feature Schema

The Authority will provide a standard data shell that will be directly followed with no deviation without approval of the COTR.

3.2.3.1 Attributes will be populated by the Authority Data Standards with no deviation without approval of the COTR.

3.2.4 Meta Data

The Authority will provide Meta Data Standard that will be directly followed with no deviation without approval of the COTR.

3.2.5 Quality Control

3.2.5.1 Topology rules will be set to alleviate any gaps, overlaps, dangles, pseudonodes, all polygons will be closed, and entity points snapped.

3.2.5.2 Street centerline digitization guidelines will be provided for correct geocoding geometry

3.2.5.3 Guidelines will be provided for the cleanliness of rigid line structure and smooth seamless line geometry

3.2.6 Deliverables

- Digitized features will be delivered in ESRI File Geodatabase Version 10.6 and in Auto Cad .dwg.
- Complete data sets will be delivered on properly labeled DVDs Project Specific Requirements

3.3.1 Topographic Contour Lines

3.3.1.1 Using a TIN (Triangulated Irregular Network) generated from the required DTM data, Topographic Contour Lines will be created at 1 foot intervals. In addition to industry standard map content requirements, the following criteria and specific map content requirements will also be fulfilled.

3.3.1.2 Files will be compiled with coordinate values to the nearest one-thousandth (1/1000) of a foot.

3.3.1.3 Contours will reflect the crown or cross slope of all paved areas, including paved ditches, and will truly depict all drainage ways.

3.3.1.4 In areas of comparatively level terrain where contours are more than 2 inches apart (at final map scale), the contours will be supplemented by spot elevations spaced 1 – 2 inches apart (at final map scale) in each direction to form a rectangular grid. Where trees or buildings preclude exact adherence to a grid pattern, the pattern may be varied, but the density and spacing of spot elevations will insure that no place on the map is more than 2 inches from either a contour or spot elevation. Spot elevation in wood or obscured area will be shown to the best of contractor's ability but may not adhere to National Map Standard of accuracy.

3.3.1.5 Where the profile gradient is 2 percent or less, spot elevations will be shown at intervals not greater than 1 – 2 inches apart at final map scale, along the center of levees, roads, ditches, and railroads. Spot elevations will be shown at all saddles, crests, summits, depressions, and road intersections regardless of gradient where the feature is 0.5 inches or larger in size at final map scale.

3.3.1.6 Spot elevations will be shown at intervals not to exceed 2 inches (at final map scale) along the boundary of the area to be mapped at locations where the nearest contour is over 1 inch from the boundary.

3.3.1.7 Features that are interpreted from the photography as being under construction will be labeled as such.

3.3.1.8 Contours will meet or exceed the contracted map accuracy standards requirement except as follows: In areas where the ground is obscured by dense brush, shadows, or tree cover, contours will be plotted as accurately as possible, while making maximum use of spot elevations obtained from the stereoscopic model in places where the ground is visible.

3.3.1.9 The accuracy tolerance allowed for contours will not affect the requirement that contours reflect the crown or cross slope of all paved areas.

3.3.2 Contractor will adhere to the following compilation requirements:

3.3.2.1 Edgematching: All digitized tiles must be both visual and coordinate edgematched with adjacent sheets. No edgematch tolerance will be allowed. The coordinate edgematch must be 100 percent precise at double precision values. Attributes for adjoining features must also be identical.

3.3.2.2 Common Boundaries: All graphic features that share a common boundary must have the exact same digital representation of that boundary in all layers when required by the database design.

3.3.2.3 Point Duplication: No duplication of points that occur within a data string is permitted.

3.3.2.4 Connectivity: Where graphic elements visually meet, they must also digitally meet. All confluences of line, area and polygon data must be exact mathematically; that is, no “overshoots,” “undershoots,” or “offsets” are permitted. Lines that connect polygons must intersect those polygons precisely, that is, every end point must be an intersection point of the respective polygon.

3.3.2.5 Line Quality: A high quality cartographic appearance will be achieved. Transitions from straight line to curvilinear line segments will be smooth, and without angular inflections at the point of intersection. The digital representation must not contain extraneous data at a non-visible level. There should be no jags or hooks or zero length segments. Curvilinear graphic features should be smoothed with a minimum number of points. When appropriate, line-smoothing programs should be used to minimize the angular inflection in curvilinear lines. Any lines that are straight, or should be straight, should be digitized using only two points that represent the beginning and ending points of the line.

3.3.2.6 Segmentation: The digital representation of linear elements must reflect the visual network structure of the data type. An element should not be broken or segmented unless that segmentation reflects a visual or attribute code characteristic, or unless the break is forced by database limitations.

3.3.2.7 Area and Polygon Closure and Centroid: For area features being digitized, the last coordinate pair must be exactly (mathematically) equal to the first coordinate pair. No line or polygon will cross itself, or any other digitized feature, except to join at an actual confluence. All digitized features that are continuous across map boundaries will be edited to effect smooth, continuous lines.

3.3.2.8 Point Criteria: All point features will be digitized as a single X,Y coordinate pair at the visual center of that graphic feature.

3.3.2.9 Features that cross map sheet or model boundaries will not have duplicate data points at those boundaries except where those boundaries coincide with delivery areas. Post-processing procedures will be utilized as necessary to minimize data redundancies. No map sheet borders will be provided as continuous polygons for deliveries of a single coverage. One master grid will be created and all grid tics for all sheets will match exactly. Each coverage must be free of node and arc intersect errors. Each polygon coverage must have one unique label per polygon and be free of label errors.

3.3.2.10 All data created in this conversion effort will be spatially continuous. This requirement for spatial continuity means that the structure of the database will not inhibit the execution of GIS functions across boundaries or artificial discontinuities in the database (sheet edges, model edges, or other delimitations).

3.3.3 Deliverables

- Using the same tile grid as the Digital OrthoImagery, Topographic Contour lines will be delivered in 1500' x 1500' separate full tiles except where the project boundary forces a partial tile in digital format. Mg4 .SID and .Tiff.
- A complete seamless topographic contour line file will be delivered separately in digital format.
- Seamless, monolithic DTM file containing 3D breaklines and masspoints used for TIN Terrain Surface generation in digital format and Raw Lidar Data File.
- Grid index corresponding to the topographic Contour lines.
- Topographic data will be delivered in Geodatabase and AutoCad .DWG formats.

4.0 Ownership of Products

All the products and services of the produced for this project become the sole property of the Metropolitan Washington Airports Authority and will not be used or reproduced without written permission. The Authority has the right to grant or deny any request.

5.0 Notice to Proceed

Project duration from NTP (150days)

Phase 1 (Pilot Project – Features, DTM, Topo & Orthos)

Phase 2 (50% Features, DTM, Topo, Orthos and Lidar)

Phase 3 (100% Deliverable for Review)

Final Delivery of Orthos, Features, DTM, Topo in Geodatabase, DGN and Raw Lidar

Attachments

#1 the Authority will provide location and boundaries in ESRI geodatabase format.

#2 United States National Map Accuracy Standards

With a view to the utmost economy and expedition in producing maps that fulfill not only the broad needs for standard or principal maps, but also the reasonable particular needs of individual agencies, the Federal Government has defined the following standards of accuracy for published maps:

- 1) Horizontal accuracy. For maps on publication scales larger than 1:20,000, not more than 10 percent of the points tested shall be in error by more than 1/30 inch, measured on the publication scale; for maps on publication scales of 1:20,000 or smaller, 1/50 inch. These limits of accuracy shall apply to positions of well-defined points only. Well-defined points are those that are easily visible or recoverable on the ground, such as the following: monuments or markers, such as bench marks, property boundary monuments; intersections of roads and railroads; corners of large buildings or structures (or center points of small

buildings). In general, what is well-defined will also be determined by what is plottable on the scale of the map with-in 1/100 inch. Thus, while the intersection of two roads or property lines meeting at right angles would come within a sensible interpretation, identification of the intersection of such lines meeting at an acute angle would not be practicable within 1/100 inch. Similarly, features not identifiable upon the ground within close limits are not to be considered as test points within the limits quoted, even though their positions may be scaled closely upon the map. This class would cover timber lines and soil boundaries.

- 2) Vertical accuracy, as applied to contour maps on all publication scales, shall be such that not more than 10 percent of the elevations tested shall be in error by more than one-half the contour interval. In checking elevations taken from the map, the apparent vertical error may be decreased by assuming a horizontal displacement within the permissible horizontal error for a map of that scale.
- 3) The accuracy of any map may be tested by comparing the positions of points whose locations or elevations are shown upon it with corresponding positions as determined by surveys of a higher accuracy. Tests shall be made by the producing agency, which shall also determine which of its maps are to be tested, and the extent of such testing.
- 4) Published maps meeting these accuracy requirements shall note this fact in their legends, as follows: "This map complies with National Map Accuracy Standards."
- 5) Published maps whose errors exceed those stated shall omit from their legends all mention of standard accuracy.
- 6) When a published map is a considerable enlargement of a map drawing (manuscript) or of a published map, that fact shall be stated in the legend. For example, "This map is an enlargement of a 1:20,000-scale map drawing," or "This map is an enlargement of a 1:24,000-scale published map."
- 7) To facilitate ready interchange and use of basic information for map construction among all Federal mapmaking agencies, manuscript maps and published maps, wherever economically feasible and consistent with the use to which the map is to be put, shall conform to latitude and longitude boundaries, being 15 minutes of latitude and longitude, or 7.5 minutes, or 3.75 minutes in size.