

Development and Implementation of Large-scale Orthophoto Standards

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Co-Is:

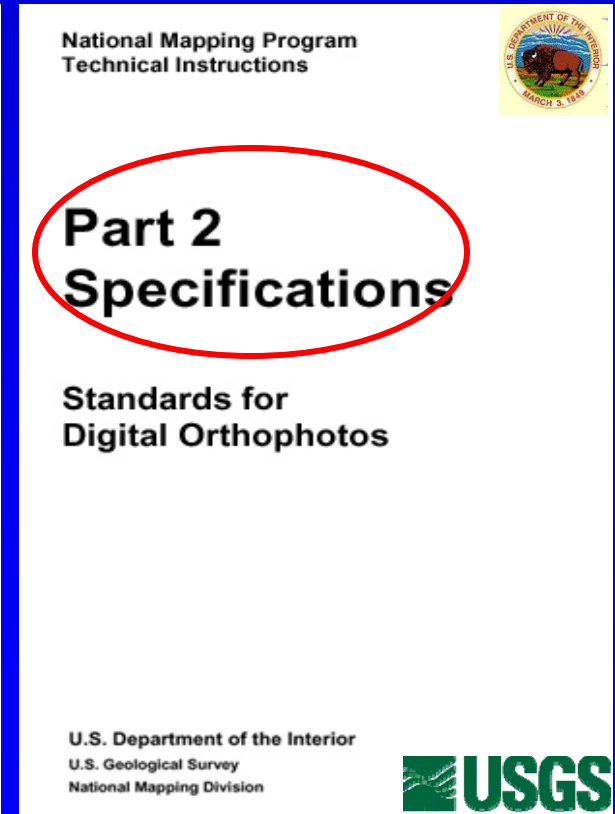
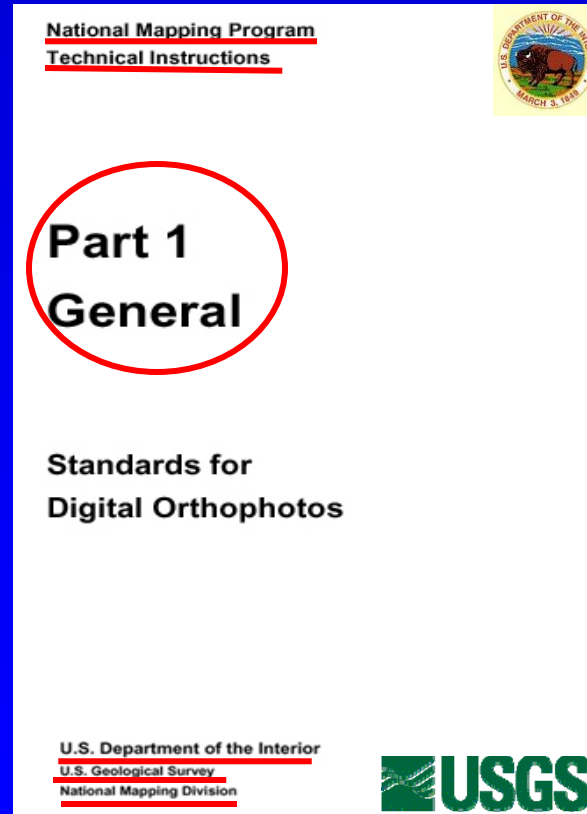
Robin Fegeas, Mapping Applications Center, USGS,
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Norfolk, VA

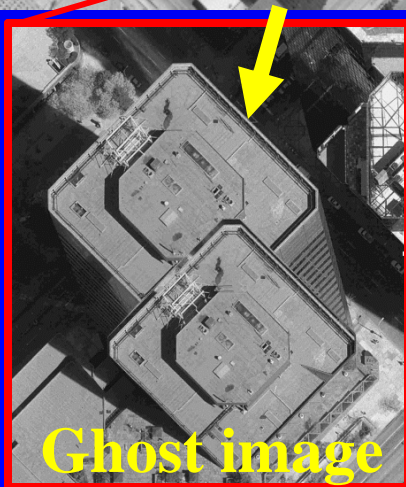
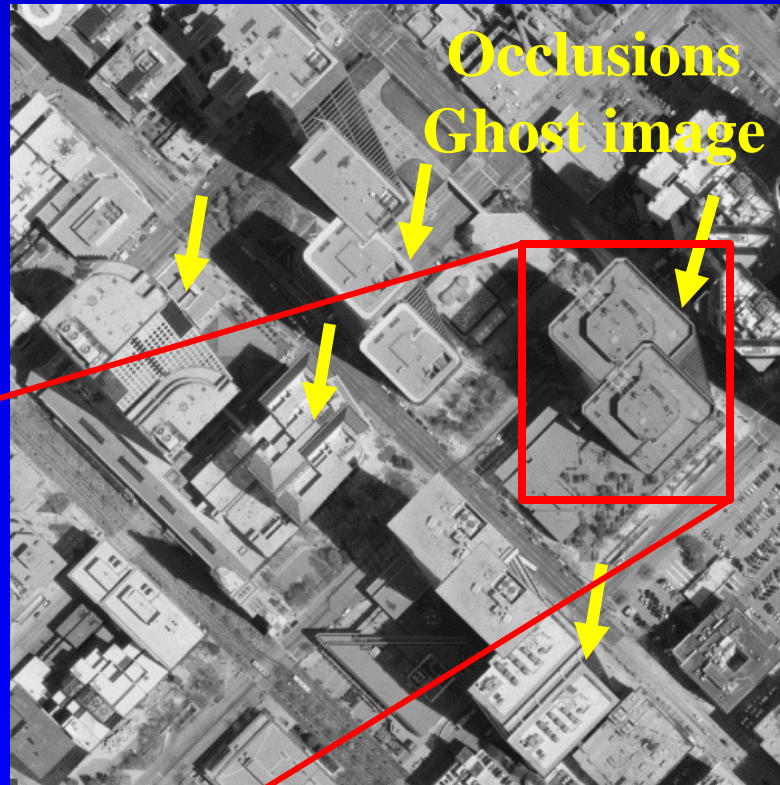
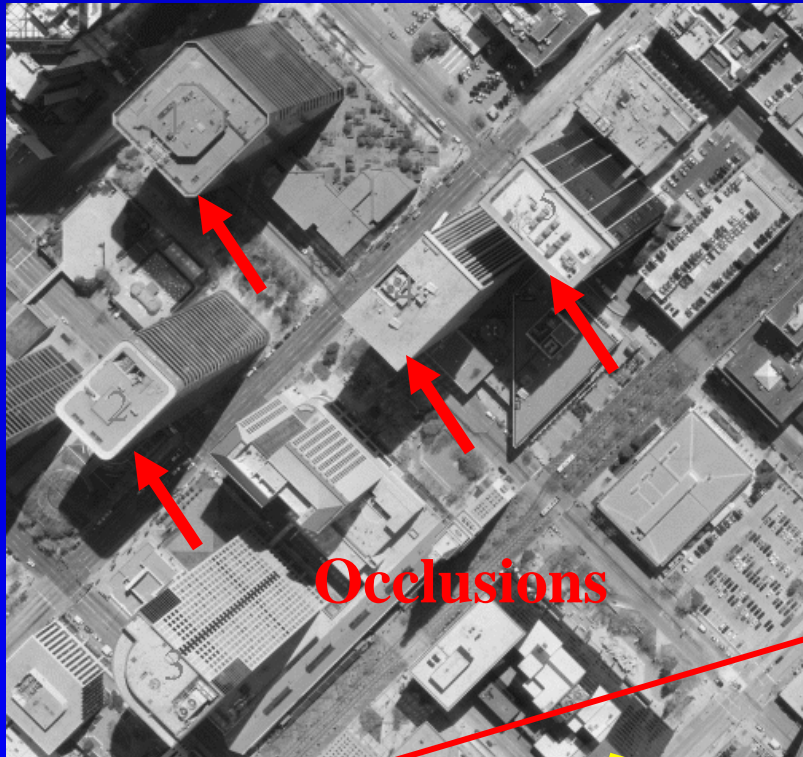
Jeann Foust, ESRI Corporate, Redlands, CA

Standards For Digital Orthophotos

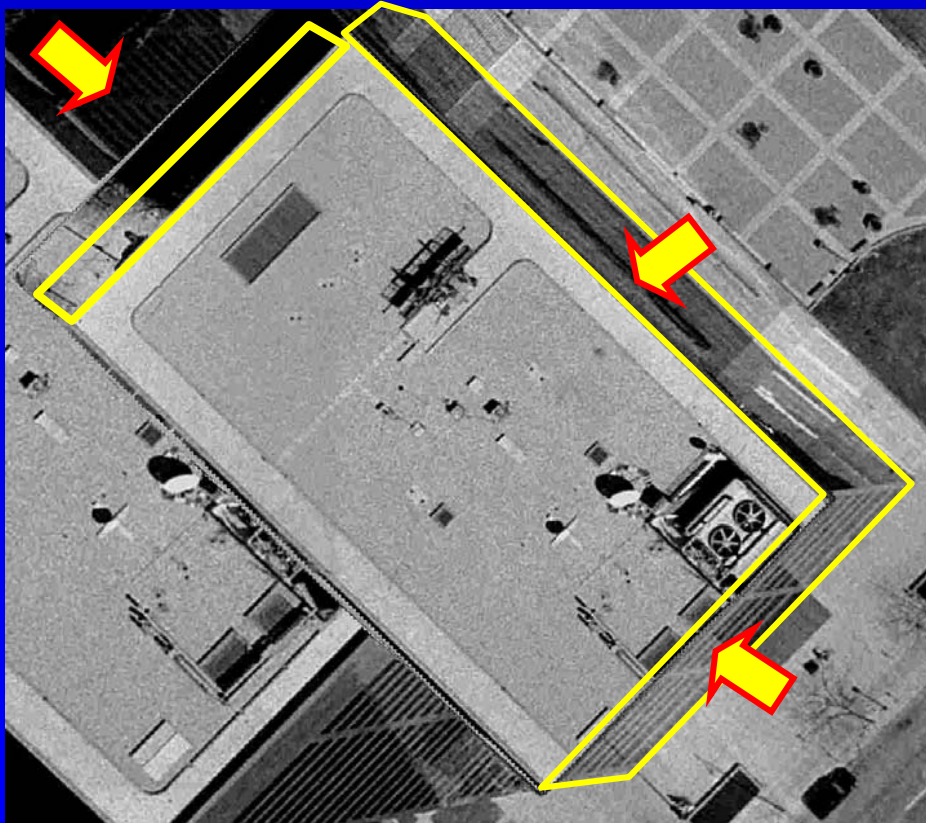
Standard for Digital Orthophoto (USGS, 1996)



Example - 1



Example - 2



Non orthorectification

National Digital Orthophoto Program

- The National Digital Orthophoto Program (NDOP) was first proposed in 1990 by the U.S. Department of Agriculture's (USDA) Natural Resources Conservation Service, Farm Service Agency and the U.S. Geological Survey (USGS)
- The primary goal of this program is to ensure the public domain availability of digital orthophoto quadrangle (DOQ) data for the nation.
- The USGS began to produce DOQ's in 1991 and currently has nearly 50,000 available for distribution.
- The DOQ's will be updated on a 5- or 10-year cycle in area where land use change is most rapid.

Standard for Digital Orthophoto

This 1990's program (USGS, 1996):

- A quarter-quadrangle-centered coverage (3.75 minutes of longitude and latitude)
- A nominal flying height of 20,000 feet above mean terrain using a 6-inch focal-length camera (photo scale = 1: 40,000) aerial photographs
- The *Standard for Digital Orthophoto* formulated by USGS has not considered the requirements of large-scale city orthophoto generation.
- These early procedures and algorithms were based on earlier USGS mapping operations, such as field control, aerotriangulation (using photogrammetric equations derived in the early 1920's), and 2.5 D digital elevation models.

The procedures and algorithms used in the 1990's are **NOT** appropriate for large-scale city orthorectification.

Objectives

- (1) Develop and implement a revised *Standard* with emphasizing on large-scale orthoimage, and
- (2) Provide the technical base (algorithms, procedure) and experience needed for final revision of the *Standard* in the near future national large-scale digital orthophoto deployment in NDOP after evaluating the revised Standard in government agency and industry.

Technical Approach

- 1) Develop and implement a draft of revised *Standard* with emphasizing on large-scale orthoimage
- 2) Technically verify each items of *Standard* ;
- 3) Evaluate the Standard using federal, state, local agencies and industrial sectors; and
- 4) Promotion and outreach.

1. General

- 1) Definitions
- 2) Objectives
- 3) Product Description
- 4) Sources
- 5) Digital Orthophoto Structure and Format

2. Specifications

- 1) Definitions
- 2) Collection
- 3) Datums and Coordinates
- 4) Processing
- 5) DTM-based orthophoto
- 6) DBM-based orthophoto
- 7) Merging DTM-based and DBM-based orthophoto
- 8) Occlusion Detection and Compensation

- 9) Shadow detection and removal
- 10) Accuracy
- 11) Ground Sample Distance
- 12) Image Radiometry
- 13) Image Mosaicking
- 14) Data Quality
- 15) Radiometric Verification
- 16) Accuracy Verification
- 17) Archive And Distribution Format
- 18) Header Format
- 19) Image Data Format
- 20) Header Data Format
- 21) Identification
- 22) Display
- 23) Other Information

Appendix : Examples of Orthophoto

Schedules

- July 1, 2009 – Nov. 30, 2009 (5 months):
**Development and implementation of
Standard;**
- Dec. 1, 2009 – March 3, 2010 (4 months):
Technical verification
- April 1, 2010 – June 30, 2010 (3 months):
Evaluation and promotion

Anticipated Results & Deliverables

- 1) Implementation guides for Standards for large-scale orthoimage;
- 2) Implementation strategies and/or components (e.g., algorithm and procedures) that facilitate implementation of Standards;
- 3) Outreach materials to promote use of Standards (hardcopy and web-based); and
- 4) Result of review and evaluation of Standards.

Thank You

The text 'Thank You' is rendered in a bold, sans-serif font. Each letter is filled with a different color from a rainbow spectrum: 'T' is pink, 'h' is red, 'a' is orange, 'n' is yellow, 'k' is light green, 'Y' is blue, 'o' is purple, and 'u' is magenta. The letters have a slight 3D effect with a white outline and a grey shadow cast to the left and slightly downwards. The entire graphic is centered on a solid blue background.