A History of Map Making at Metro

Regional Partner Meeting

June 8, 2011

Overview

Techniques

- Linework
- Patterns
- Lettering
- Media

Metro Map products

Publications

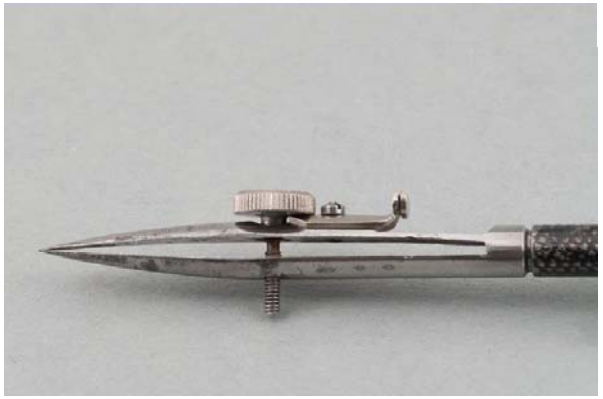
Early RLIS

This is a brief record of past methods for creating maps and publications before GIS, a history of practices during the 1970s and 80s at Metro. The goal is to avoid losing this institutional knowledge. My hope is that this will not be lost and that others will add to it to keep an ongoing record.

Alan Holsted

June, 2011

Linework



Ruling pen

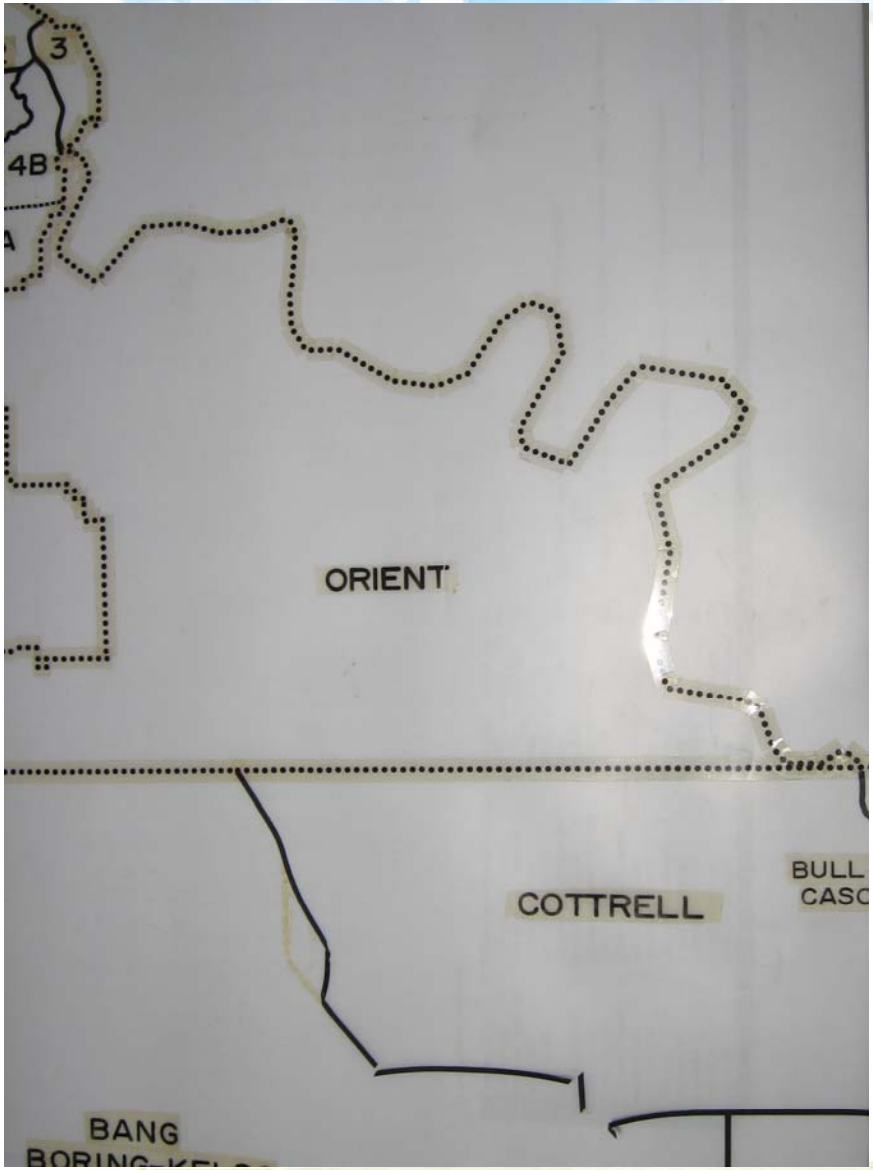
Before I started working for CRAG in 1972, the ruling pen was used to draw straight lines with ink. The user would place a drop of ink between the nibs and spread the nibs with a thumbscrew to the desired thickness. There was the occasional splatter of ink that would ruin a drawing, but most of the time it produced good results.

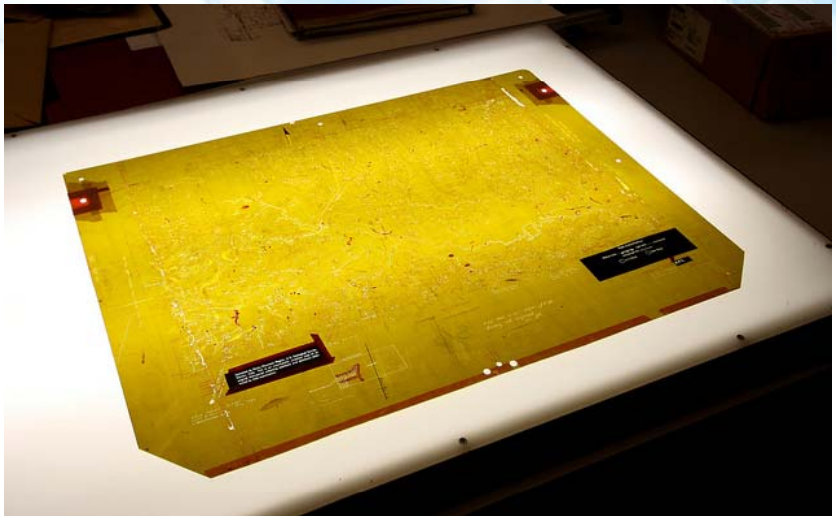
Rapidograph

The Rapidograph pen was a great advancement because the cartographer no longer dealt with individual drops of ink, but the pens required daily cleaning to avoid clogging. These came in various line weights and were used to put ink on paper or mylar with a matte surface.

Tape

Chartpak tape seen here was used to add thicker lines to maps. Solid lines came in a "crepe" variety which allowed the user to easily bend the tape into nice curves. It worked well to show roads which were not straight. The tape came in a variety of colors and patterns (solid, dashed, dotted, etc.).





Scribecoat

With scribecoat, the cartographer scratched a line into film, resulting in a negative of the final product. Most all work was done on a light table.

Tape on mylar

This mylar illustrates solid and dotted tape applied to mylar. The tape on this mylar is starting to peel due to age. Notice the stick-on lettering (discussed later). The mylar was overlaid on a mylar base map to produce a final mylar or sepia which then became a master for making blueline or blackline ammonia prints.

Patterns

During the 1970s and 80s, Metro used Zip-A-Tone (1937), Chart-Pak (1949), and Letratone (1966, from Letraset) as a technique for applying textures and shades to maps. Patterns were transferred to paper or mylar from preprinted sheets and were cut with X-Acto knife to the desired area on the map. The trick when trimming the pattern was to cut through the Zip-A-Tone without cutting through the paper or mylar. This technique saved time by allowing quick application of textures to maps where a hand-shaded area would not be reproduced in a timely or acceptable manner.

Lettering

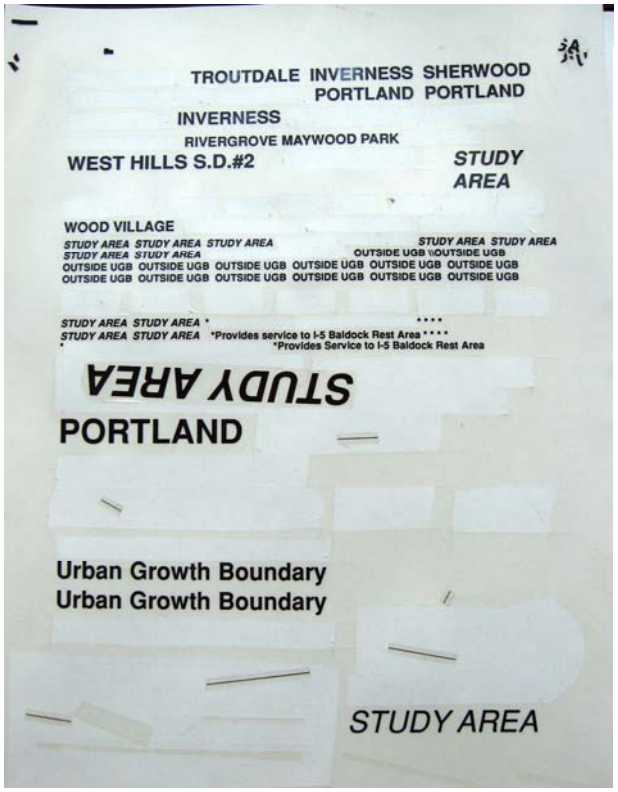
Leroy lettering set

Leroy lettering was our most popular method for applying annotation to maps. Once a person learned how to do it, it was relatively fast and they never ran out of letters (unlike press-on letters).

A drop of ink was placed in the reservoir which was inserted in the hand-held instrument. The instrument would trace the ruler-like template to place the equivalent letter on mylar or paper.

Press-on letters

Press-on letters looked as good as typesetting and was available in many fonts, but it was slow and the cartographer would invariably run out of a certain letter before the sheet was well-used. Therefore it was typically used only for titles and headings.



Typesetting on sticky-back material

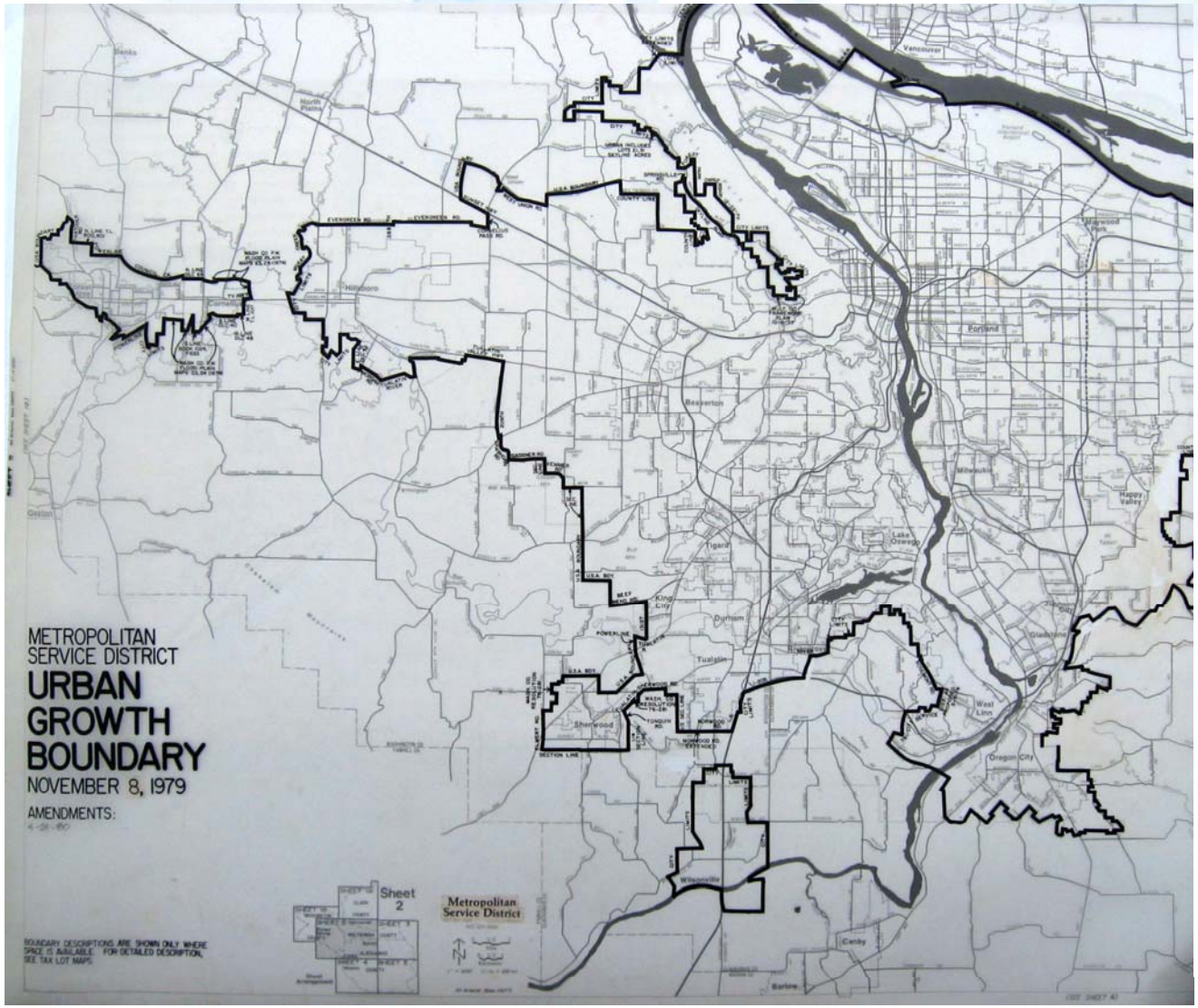
This process began with specifying type to be set by a typesetter. After the type was received from the typesetter, we sent the type to a reprographics shop where they photographically created the sticky-back film seen here. Words were cut with an X-Acto knife and transferred to the map.

Media

Clear mylar, matte mylar, negatives, sepia

Original mylar overlays were usually sent to a reprographics firm to make final photographic mylars that were used to make blueprints. Negatives were often created as an intermediate product. The negative could be used for combining multiple overlays into a final map or for map joining multiple map tiles.

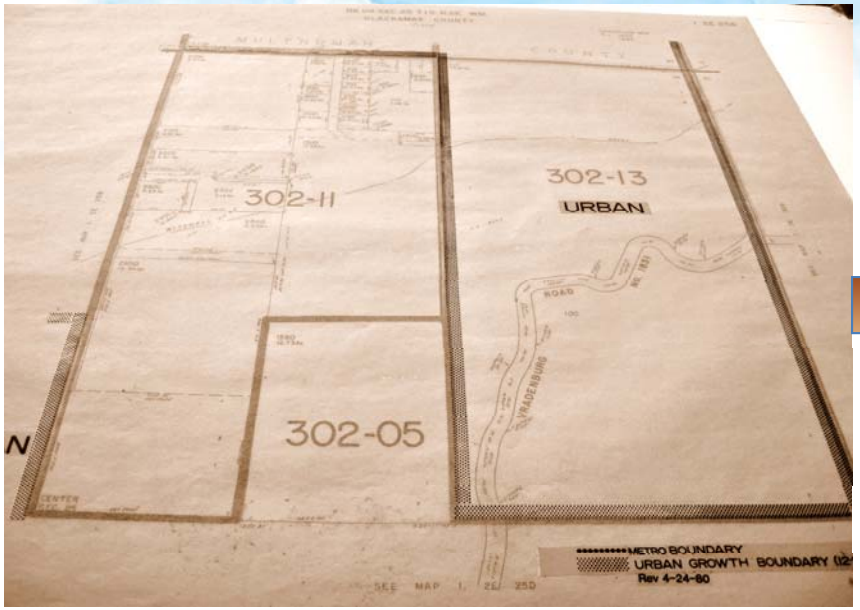
We would often did our own opaquing and masking with goldenrod paper to save the expense of having the printer to it. Registration holes were used to align multiple map overlays (seen along bottom of this negative). While most cartography was done on matte mylar which was good for receiving ink, we occasionally used clear mylar for meeting presentations.



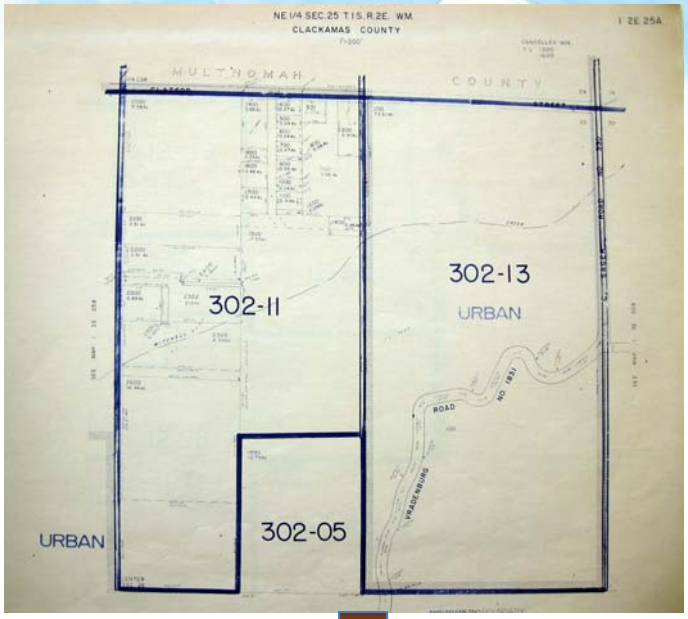
UGB on mylar

(photographically produced from overlays)

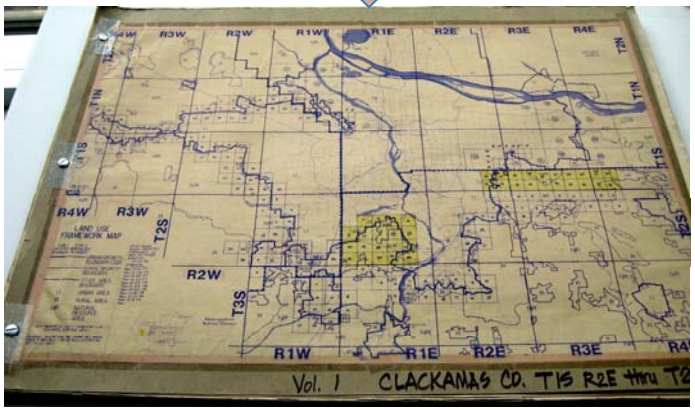
The UGB was drawn with tape and Leroy lettering on a mylar, then photographically combined with an arterial base map. The base map was screened to keep it in the background.



Sepia



Blueline print

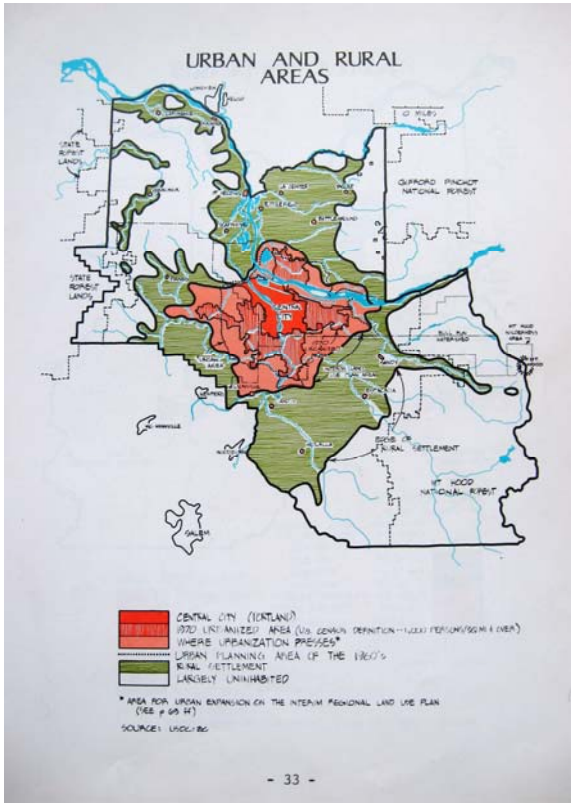


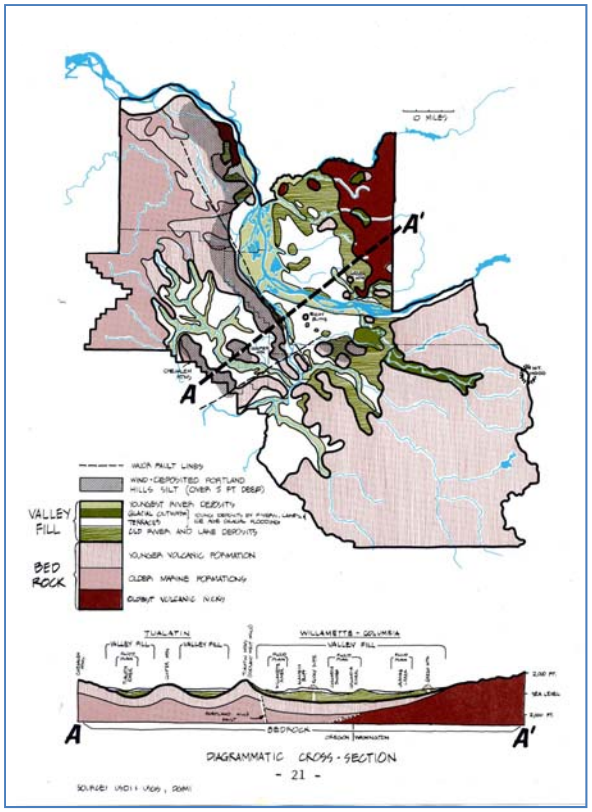
Map book

UGB on taxlots before GIS

As the UGB became more complex, we needed to put it on taxlots. We ordered a set of sepias from each county which were made from their taxlot mylars. Sepia was a transparent paper reproduction and much less expensive than mylars. We created blueline prints from the sepia and place the prints into map books. These maps were the official record of the UGB until RLIS.

Products

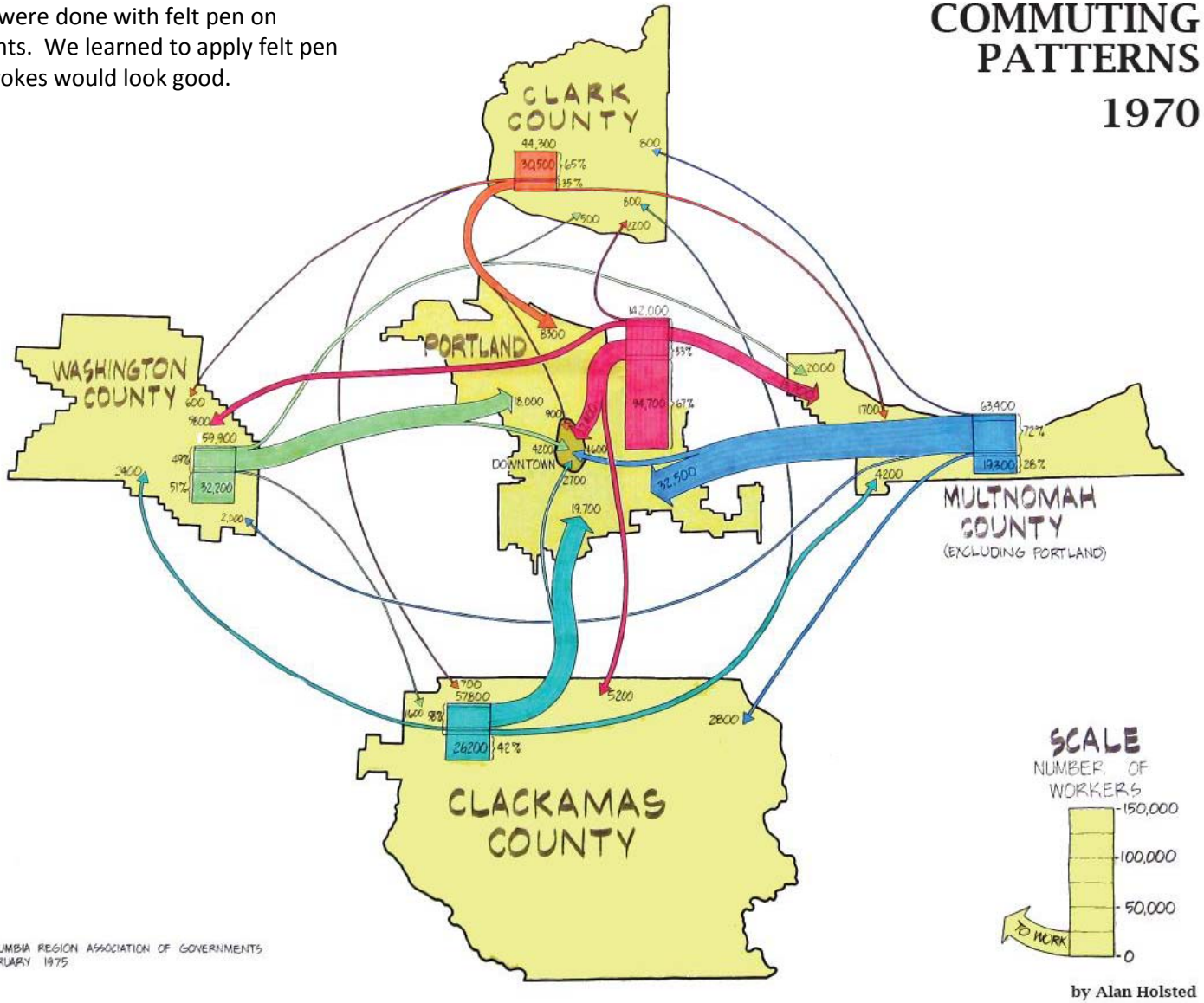


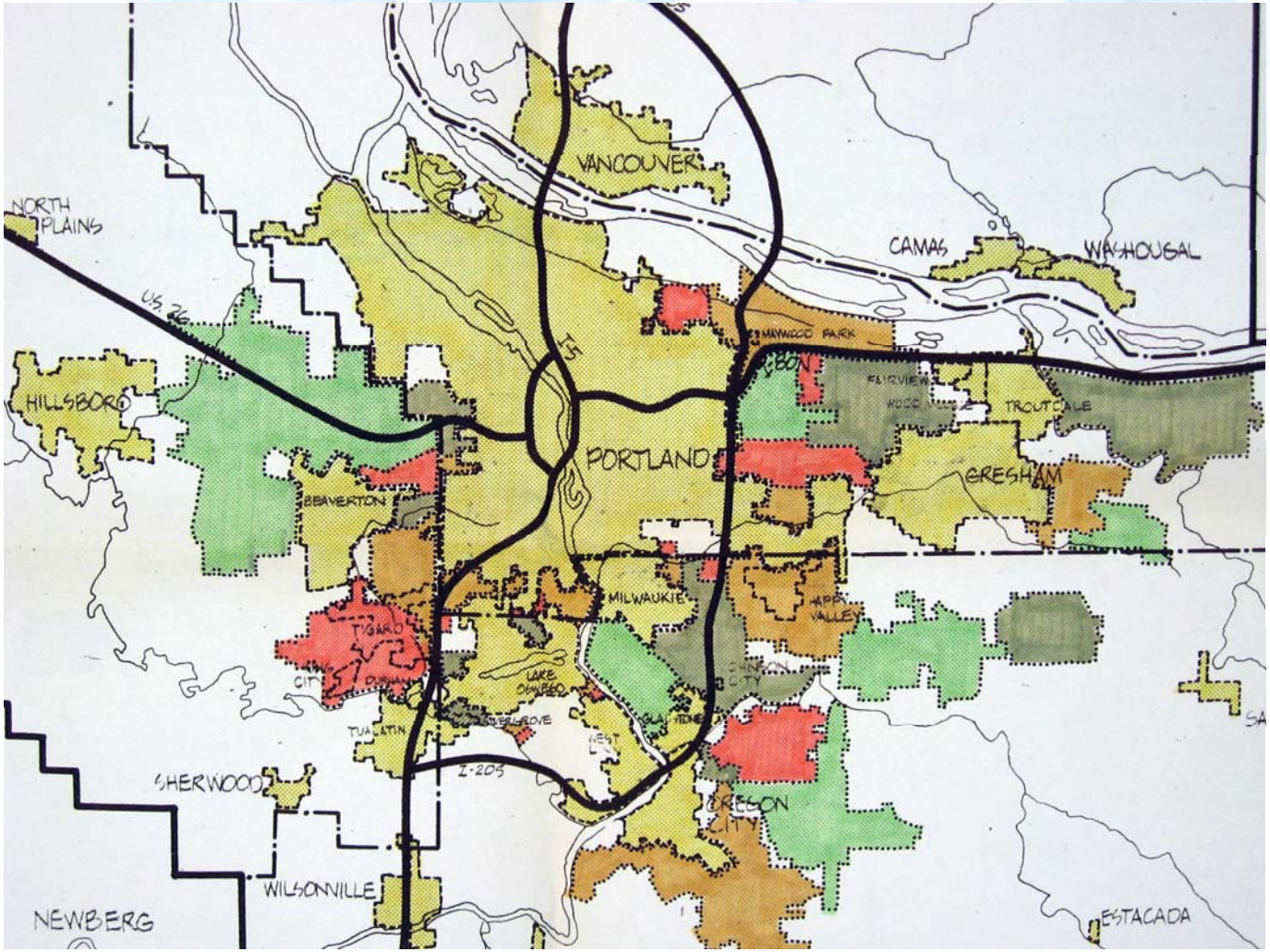


Freehand

During the 70s, we chose to use freehand linework and lettering because we liked the style and it facilitated production. The line patterns seen here were drawn by hand, but probably could have been done more quickly with Zip-A-Tone.

Display maps were done with felt pen on brownline prints. We learned to apply felt pen so that the strokes would look good.





Water providers (low level of detail)

We had a low level of detail by today's standards.

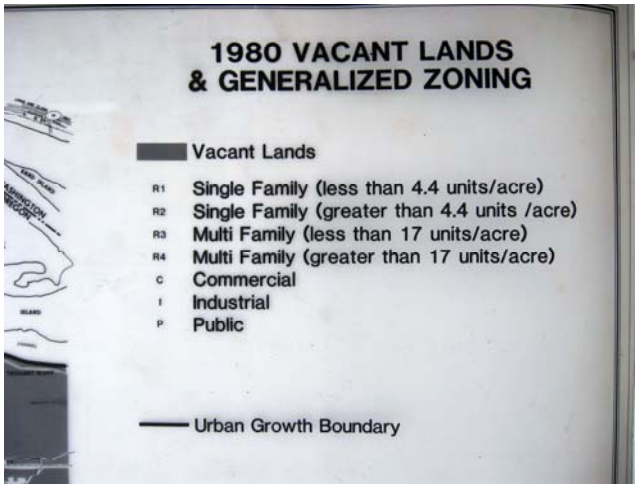
All arterial base map

This all arterial base map covered a whole wall and was great for meeting displays. As you can see, I-205 was still shown as proposed. This arterial map greatly influenced the arterials and anno that is now part of RLIS Live.

Detailed streets

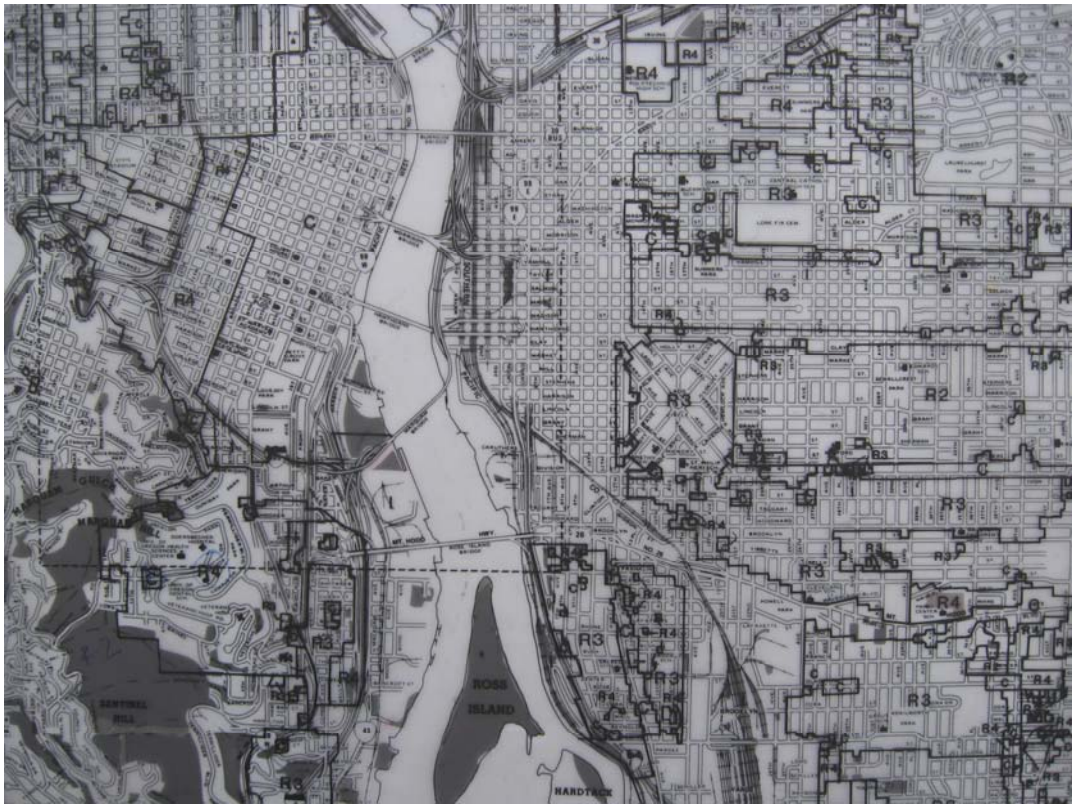
Whenever we wanted to show the complete street system, we had to resort to using a base map created from USGS quads. The problem with this was that we were unable to make our own updates and USGS didn't show very many street names. Our other choice was a double-line street map from ODOT, which worked well at 1"=2000', but not at the regional scale of 1"=4000'. Therefore, we decided to use scribecoat to draw our own streets so that we could at least have complete street linework.

When TriMet learned that we had nearly completed drawing the street linework, they approached us about adding all street names. They desired to create a route map that showed all streets and names. At the time, this seemed like an impossible task. The goal was to include every street name in readable fashion at a scale of 1" = 4000'. A partnership developed. TriMet paid us for an intern and set type for all the street names. Once the product was completed, Metro took advantage and printed a detailed street map with street index and a bike map in 1983.



The first vacant land inventory with regional zone class

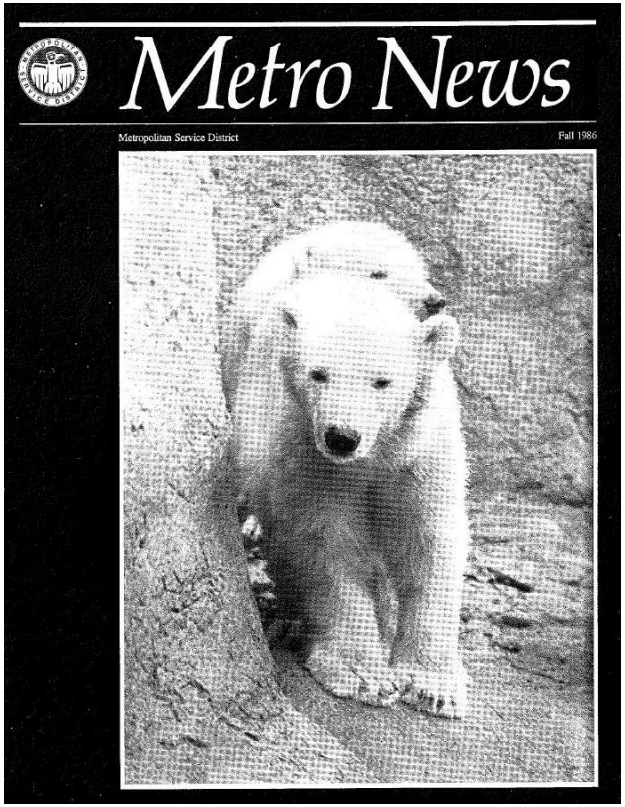
In 1980, the first vacant land inventory was completed, using the ODOT base map. Again, this influenced the zoning and vacant land that became part of RLIS.

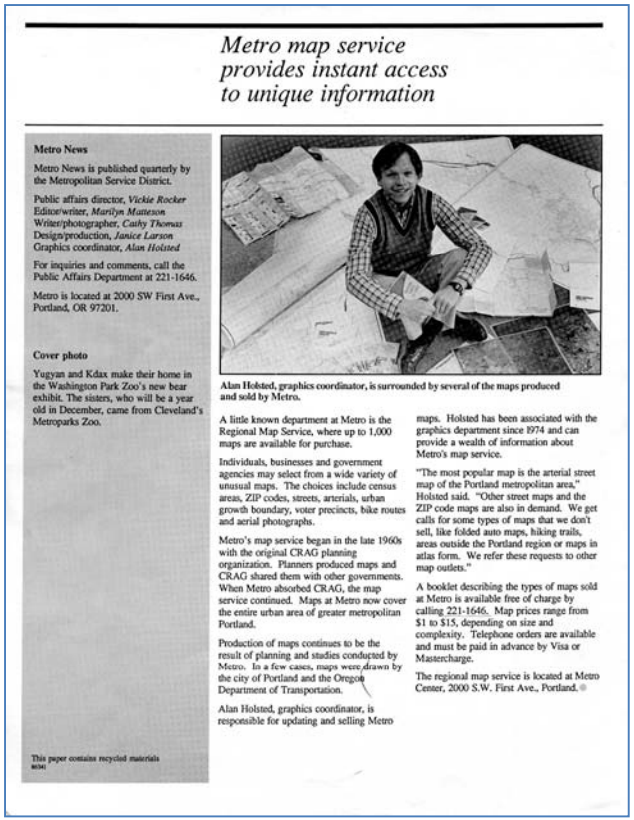


The 1991 aerial flight

Before 1994, Metro's aerial flights were black and white and on paper or mylar, usually at a scale of 1"=400'.

Publications





Metro map service provides instant access to unique information

Metro News

Metro News is published quarterly by the Metropolitan Service District.

Public affairs director, *Vickie Rocker*
Editor/writer, *Marilyn Matteson*
Writer/photographer, *Cathy Thomas*
Design/production, *Janice Larson*
Graphics coordinator, *Alan Holsted*

For inquiries and comments, call the Public Affairs Department at 221-1646.

Metro is located at 2000 SW First Ave., Portland, OR 97201.

Cover photo

Yugyan and Kdax make their home in the Washington Park Zoo's new bear exhibit. The sisters, who will be a year old in December, came from Cleveland's Metroparks Zoo.

This paper contains recycled materials

Alan Holsted, graphics coordinator, is surrounded by several of the maps produced and sold by Metro.

A little known department at Metro is the Regional Map Service, where up to 1,000 maps are available for purchase.

Individuals, businesses and government agencies may select from a wide variety of unusual maps. The choices include census areas, ZIP codes, streets, arterials, urban growth boundary, voter precincts, bike routes and aerial photographs.

Metro's map service began in the late 1960s with the original CRAG planning organization. Planners produced maps and CRAG shared them with other governments. When Metro absorbed CRAG, the map service continued. Maps at Metro now cover the entire urban area of greater metropolitan Portland.

Production of maps continues to be the result of planning and studies conducted by Metro. In a few cases, maps were drawn by the city of Portland and the Oregon Department of Transportation.

Alan Holsted, graphics coordinator, is responsible for updating and selling Metro maps. Holsted has been associated with the graphics department since 1974 and can provide a wealth of information about Metro's map service.

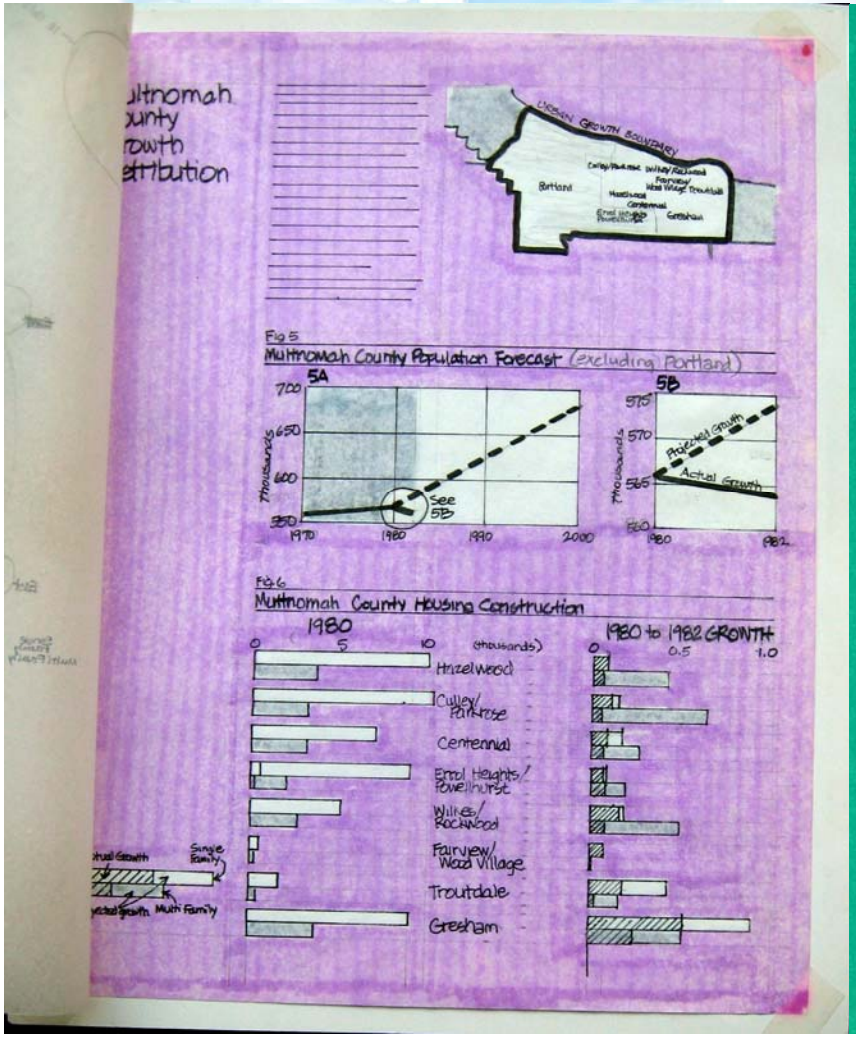
"The most popular map is the arterial street map of the Portland metropolitan area," Holsted said. "Other street maps and the ZIP code maps are also in demand. We get calls for some types of maps that we don't sell, like folded auto maps, hiking trails, areas outside the Portland region or maps in atlas form. We refer these requests to other map outlets."

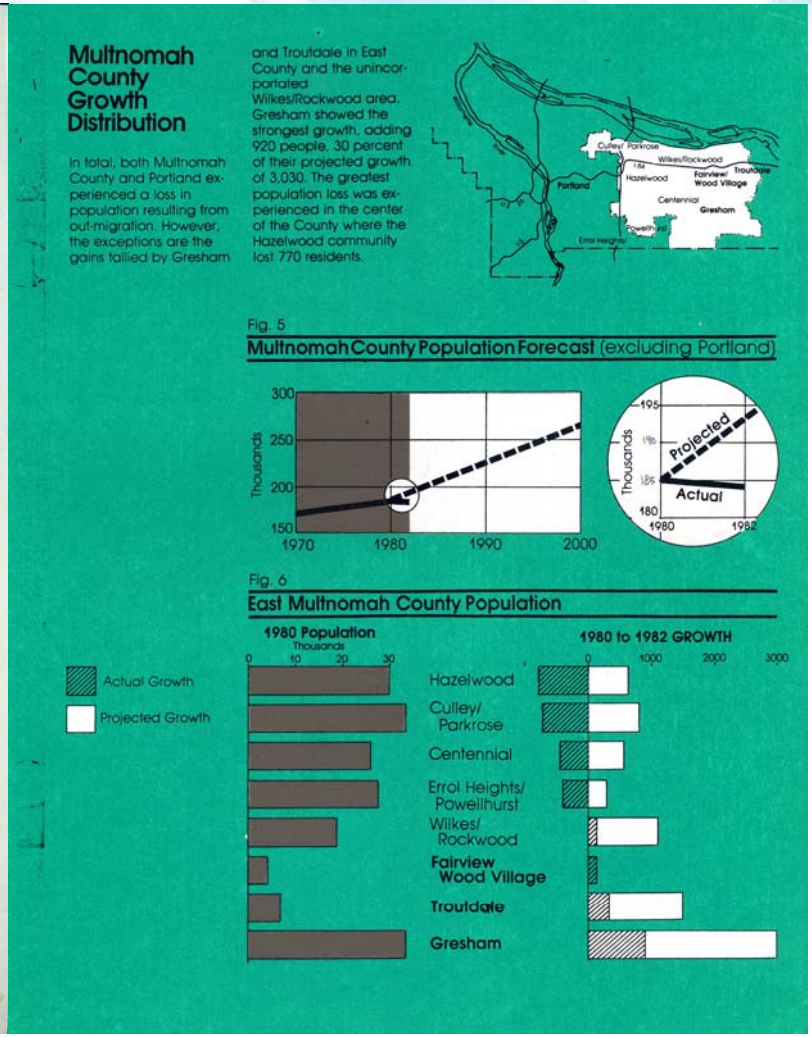
A booklet describing the types of maps sold at Metro is available free of charge by calling 221-1646. Map prices range from $1 to $15, depending on size and complexity. Telephone orders are available and must be paid in advance by Visa or Mastercharge.

The regional map service is located at Metro Center, 2000 S.W. First Ave., Portland.

During the 1980s, the graphics department was responsible for all Metro publications, not just maps. This 1986 copy of Metro News featured an article about Metro's map service.

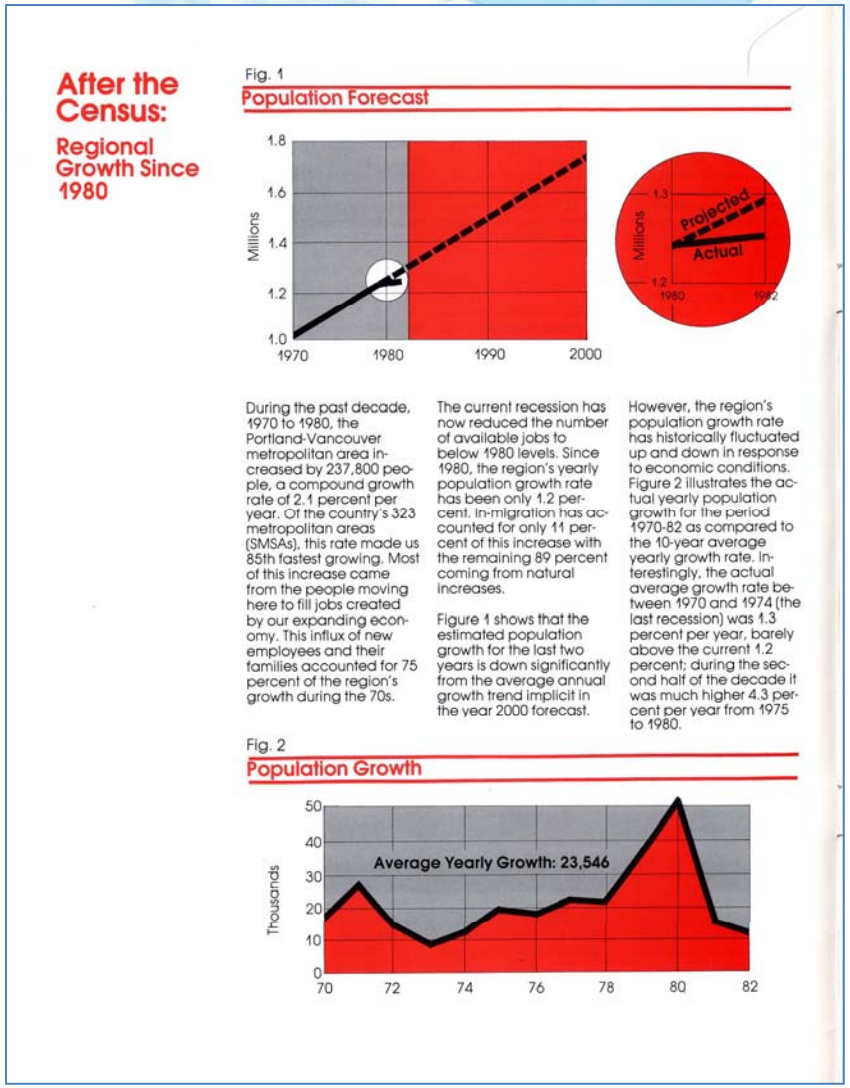
In 1982, Dick Bolen, former director of the DRC, approached me about producing a "slick" publication showing trends and forecast for the region. A second version of this document was published in 1983.





Mock ups

When creating a new publication, the page was first mocked with pens on tracing paper. In this case a more elaborate mockup was also created with a copy machine and green Zip-A-Tone.



After the Census:

Regional Growth Since 1980

Fig. 1

Population Forecast

During the past decade, 1970 to 1980, the Portland-Vancouver metropolitan area increased by 237,800 people, a compound growth rate of 2.1 percent per year. Of the country's 323 metropolitan areas (SMSAs), this rate made us 85th fastest growing. Most of this increase came from the people moving here to fill jobs created by our expanding economy. This influx of new employees and their families accounted for 75 percent of the region's growth during the 70s.

The current recession has now reduced the number of available jobs to below 1980 levels. Since 1980, the region's yearly population growth rate has been only 1.2 percent. In-migration has accounted for only 11 percent of this increase with the remaining 89 percent coming from natural increases.

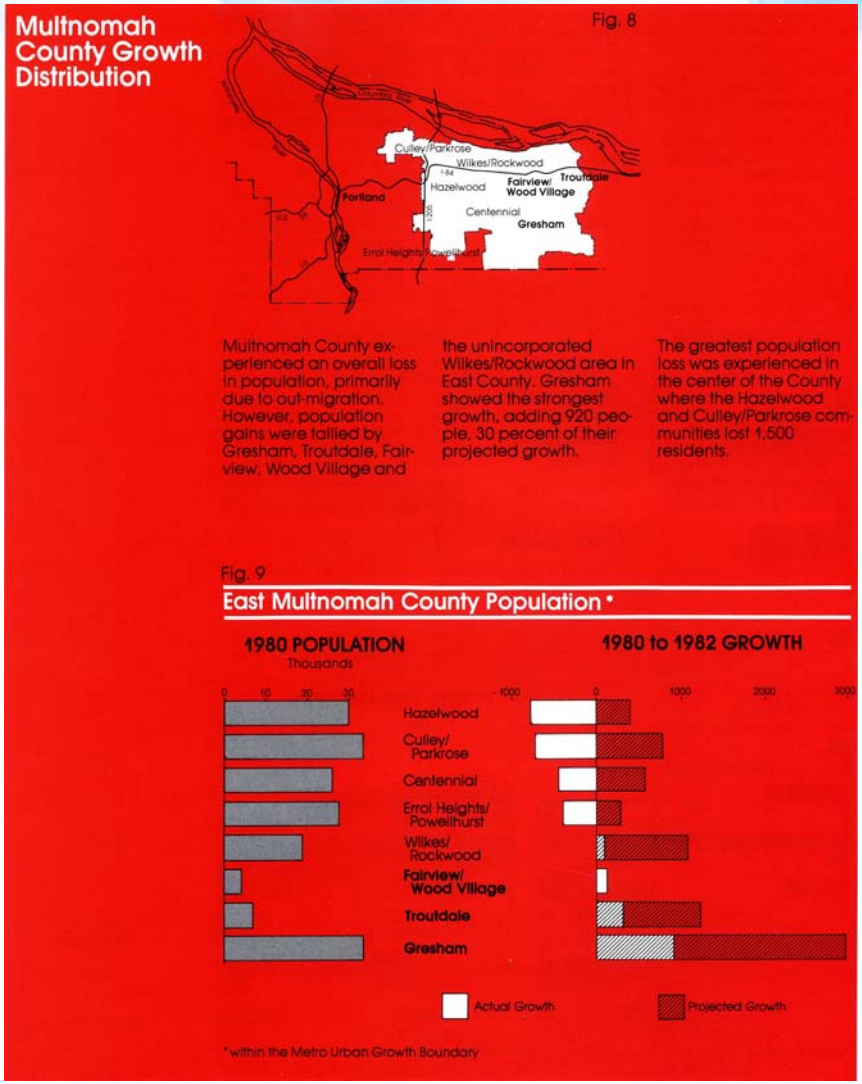
Figure 1 shows that the estimated population growth for the last two years is down significantly from the average annual growth trend implicit in the year 2000 forecast.

However, the region's population growth rate has historically fluctuated up and down in response to economic conditions. Figure 2 illustrates the actual yearly population growth for the period 1970-82 as compared to the 10-year average yearly growth rate. Interestingly, the actual average growth rate between 1970 and 1974 (the last recession) was 1.3 percent per year, barely above the current 1.2 percent; during the second half of the decade it was much higher 4.3 percent per year from 1975 to 1980.

Fig. 2

Population Growth

Final



Multnomah County Growth Distribution

Fig. 8

Multnomah County experienced an overall loss in population, primarily due to out-migration. However, population gains were tallied by Gresham, Troutdale, Fairview, Wood Village and the unincorporated Wilkes/Rockwood area in East County. Gresham showed the strongest growth, adding 920 people, 30 percent of their projected growth.

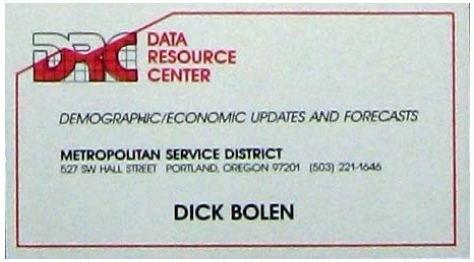
The greatest population loss was experienced in the center of the County where the Hazelwood and Culley/Parkrose communities lost 1,500 residents.

Fig. 9

East Multnomah County Population *

*within the Metro Urban Growth Boundary

The final printed pages resembled the mockup, although there were changes to layout and color during final production.



Stationery

At that time, Dick Bolen was able to convince us to create letterhead and business cards for the DRC.

RLIS

Regional Land Information System

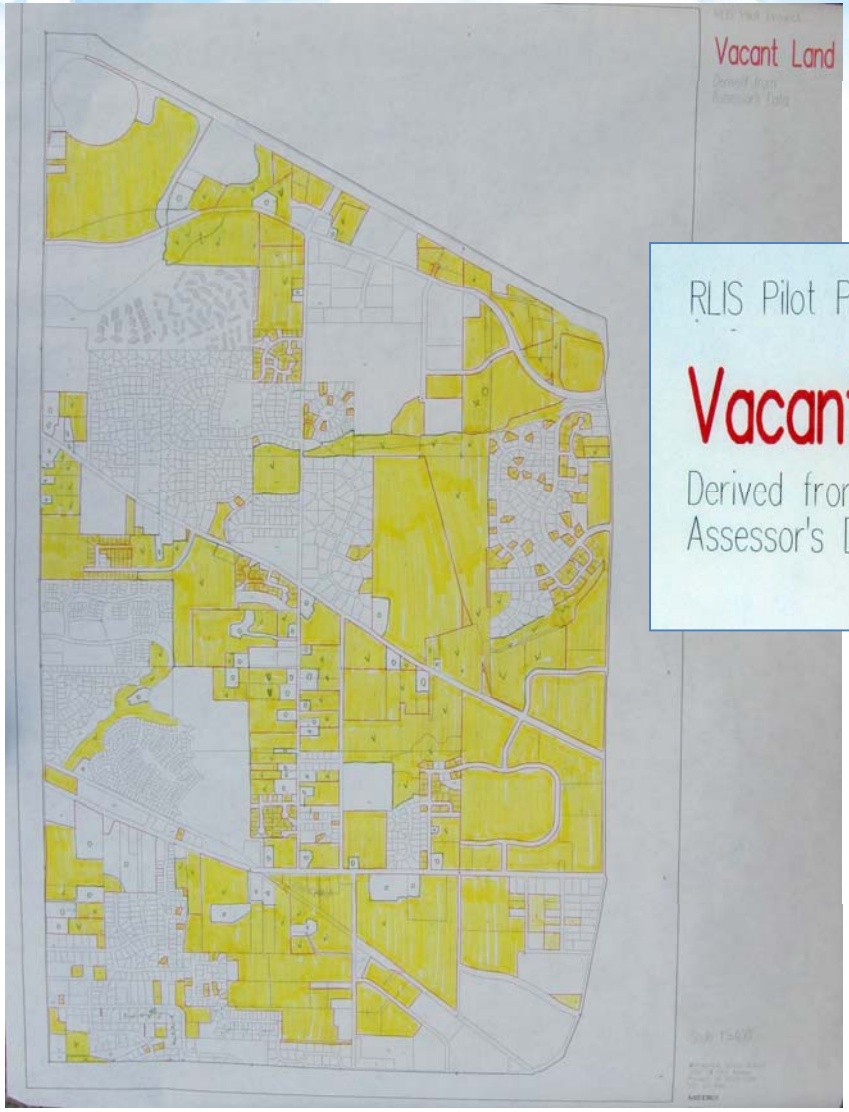
Map data layer	Data capture and update methodologies	Application notes
Geodetic Control Network	Metro develops and maintains records of geodetic control points (e.g. 1/4 section corners)	Provides for improved positional accuracy of the tax lot boundaries and other layers.
Tax Lots (property boundaries)	Obtain from PGE, they now update file continually; this function will evolve into the County Assesor's realm as they develop digital mapping (e.g. Multnomah County).	Provides ability to display property lines, and the basis for development of a parcel-based system.
Land Ownership	Attach tax lot numbers to PGE parcels; add ownership, value, tax data, and related items from assessors records.	Provides link to county assessors/building departments and other sources of tax lot and/or address-based data.
Vacant/Land in Use (identifies whether parcel is in use or vacant; one acre minimum)	Digitize map layer from aerial photos and use land use maps from local planners as a reference; update annually using fresh aerials and building permit records to identify in-fill development as it occurs.	Has its greatest utility when combined with other map layers, eg. zoning, comprehensive plans, sewer/water or transportation for determination of vacant land development potential. Greater detail may be added locally.
Detailed Land Use (identifies specific use by parcel, eg. retail, office, or manufacturing)	Derive from assessor's land use codes and records such as reverse directories and business licenses to produce an inventory of activity by parcel.	Focuses on what's currently on the ground in terms of land use; providing a supply-side inventory for market research and planning.
Zoning Maps (land uses permitted by ordinance)	Digitize city and county zoning maps; updating initially done by Metro as changes are approved, transferring to jurisdictions as they develop GIS.	Most useful with the vacant/land in-use layer, showing land uses permitted on parcels.
Comprehensive Plan Maps	Digitize city/county comprehensive plan maps, updating initially done by Metro as changes are approved, transferring to jurisdictions as they develop GIS.	Most useful with the vacant/land in-use layer, showing maximum development potential of parcels.
Development Constraints (flood plains & extreme slopes)	Digitize from city/county zoning overlays; updating as changes result from excavation & fill permits.	Additional data for determination of vacant land development potential and suitability.
Sewer and Water	Digitize from service provider maps and update annually. This will address service availability, not detailed facilities (e.g. pipe size).	Most useful in conjunction with the vacant land layer to determine development potential and timing of vacant parcels.
Transportation	Down-load network, volume, and capacity data from regional transportation model.	Provides capability for analysis of transportation and land use relationships.
Parks & Open Space	Digitize maps obtained from regional parks study; Metro updates as additions are made.	Identifies land not available for development and provides a community planning tool.
Boundaries (eg. cities, voter precincts)	Digitize from maps obtained from jurisdictions; updating initially done by Metro, transferring to users as they develop GIS.	Provides relationship of bounded area to other map data layers.
Census Geography	U.S. Census data and annual updates by Metro.	Provides census data for demographic profiles, trends and analysis.
Employment at the Work Location	Annual geocoding by Metro to street address location.	Provides employment by type of industry for economic analysis.

A one-page marketing piece

We created this one-page promotion of RLIS to sell the RLIS idea internally and to local jurisdictions.

The first digital vacant land inventory

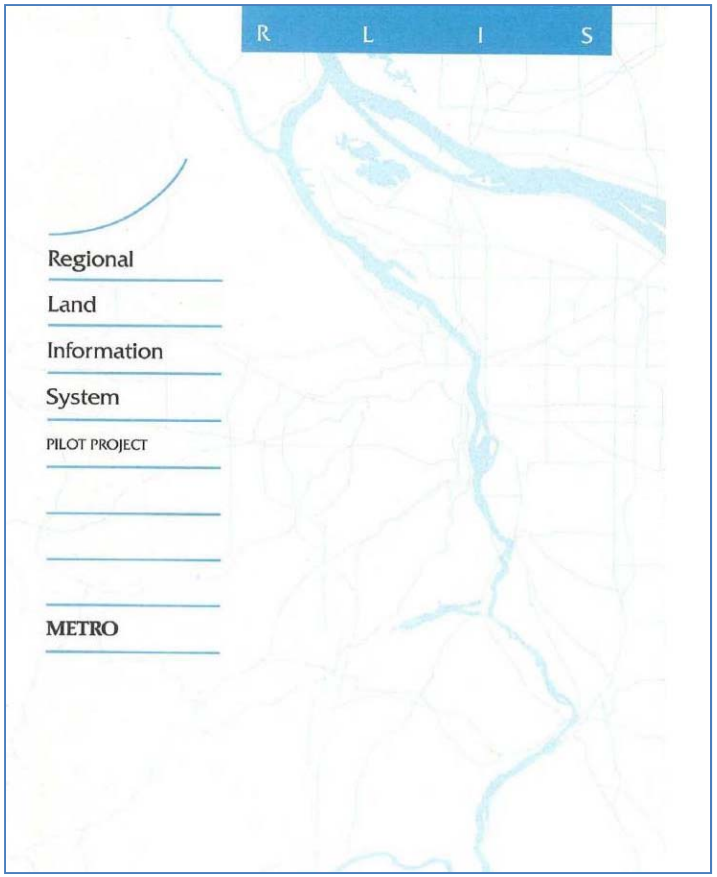
As part of the RLIS pilot project, we drew vacant land on a taxlot plot. Fully vacant lots were pre-marked based on assessor attributes.

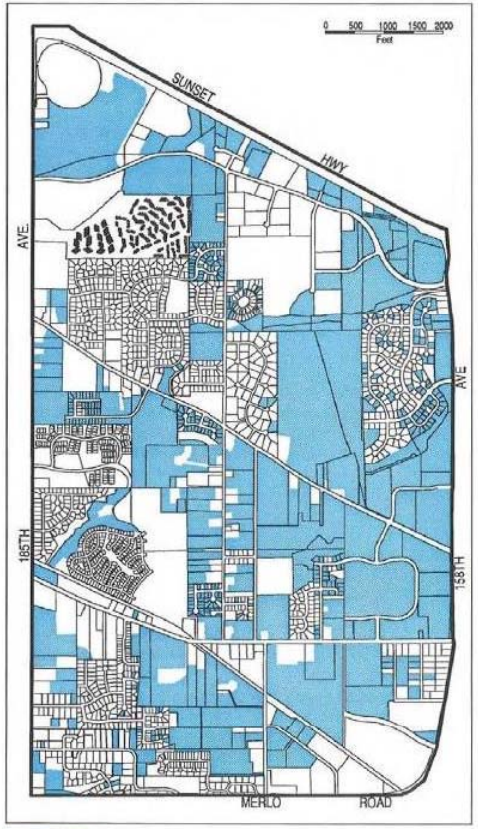


RLIS Pilot Project

Vacant Land

Derived from
Assessor's Data





Vacant Land

Pilot project report

The pilot project report described each of the ten original RLIS layers, including a cost of creating RLIS for the whole region.

Early Metadata

ddzongen.txt 11-30-90

ZONAL DATA DICTIONARY

Layer	Attributes
EDGE Edge of coverage (LINES)	
STR Freeways, arterials, collectors (LINES)	Street IDs 1 - Freeways 2 - Major arterials 3 - All arterials 4 - Collectors
	Text levels / Size 1 - Freeway names 80 2 - Major arterial names 80 3 - All arterial names 80 4 - Collector names 80 5 - Place names (lc) 110 Place names (uc) 150
DETANNO Large text primarily for publishing detailed street map	Text levels / Size 1 - freeway names 240 1 - freeway names 240 2 - major arterial names 140 3 - all arterial names 140 4 - collectors 140/100 5 - place names 6 - river names
STR (Regional) All arterial map (LINES)	Street IDs 1 - Freeways 2 - Major arterials 3 - All arterials
	Text levels / Size 1 - freeway names 400 2 - major arterial names 400 3 - all arterial names 400 11 - city names 12 - place names 22 - geographic features

ddpl.txt 2-12-92

PARCEL DATA DICTIONARY

Section Coverages	Feature Attribute Table	Lookup tables
EDGE: Edge of coverage (POLY)	AAT: EDGE-ID = 100	
TL: Tax lots, street outlines, tax lot numbers (POLY)	AAT: TL-ID - (in hierarchial order) 1 - public streets 52 - private streets, private R of W, e.g. BPA, RR (not condo common areas) 61 - dedicated street not built 62 - lot lines which are rivers 63 - stacked condominium division 11 - lot lines 100 - edge	
	PAT: TLNO 12 12 C 1S105AA00500 - Tax lot number (sample) 'STR' - Public street right of way (arc-id 1) 'BPA' - BPA ROW (arc-id 52) 'RR' - Railroads (arc-id 52) 'RW' - Misc. ROW, private streets, street islands (arc-id 52) 'DED' - Dedicated street not built (arc-id 61) 'RIV' - Water bodies (arc-id 62) 'COM' - Condo common areas (arc-id 11) 'NA' - Not available (Mult Co DOR) 'SEE_MAPNO' - Where tax map helps Redefined items: 17 TLNO12 12 12 C 17 TLNO7 7 7 C 24 TLNO5 5 5 C	ASSESSOR
	Differences in Multnomah County: RNO 10 10 C (instead of TLNO) FLAG 1 1 I (additional item) 0 - single record 1 - multiple records No redefined items	
	ANNO: Level / Sym / Size 1 - Street names 1 25 2 - Lot numbers 1 ? 3 - Subdivision names 1 ?	

Township Coverages	Feature Attribute Table	Lookup tables
CMP: Local comp plans, zoning ordinances, and	AAT: CMP-ID (not finished yet)	

This metadata pre-dated FGDC but did an adequate job of showing the data structure.

Other Early RLIS Memories

- AML and the command line
- Writing our own “zoom in” and “zoom out” AML
- Difficulty of getting ASCII files on 9-track tape
- Available disk space for RLIS was 300 MB
- Taking the server to the legislature
- Short cover names like “TL” to facilitate typing

Parting words

- Document, document, document
- You will all use new techniques that will make today's methods look antique