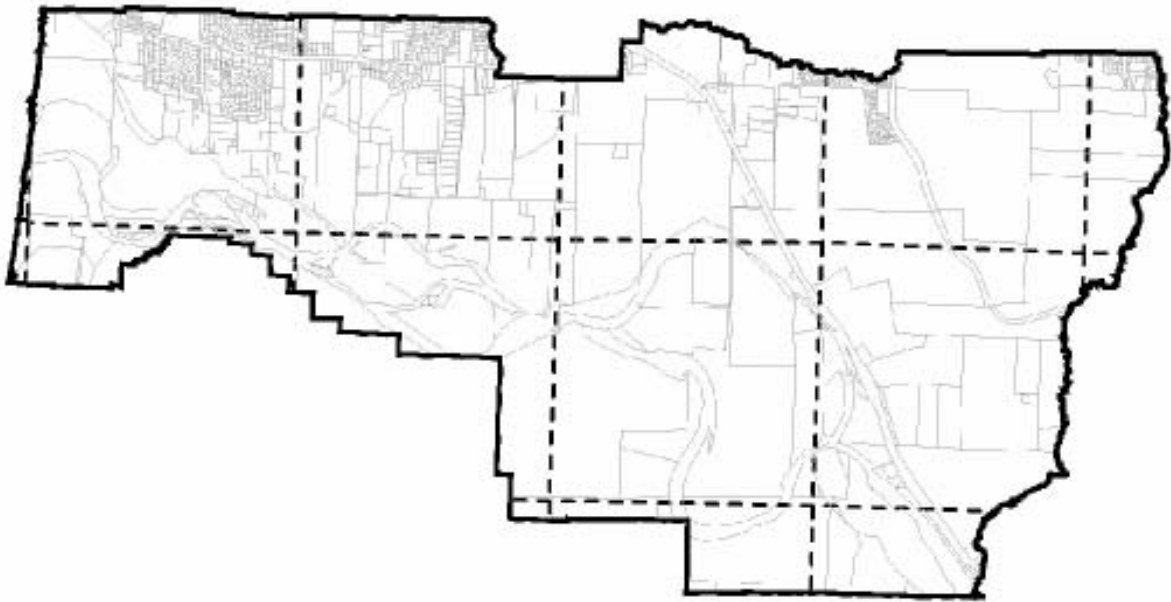


# Lane County Tax Map Project

**Strategic Plan  
March 2003**



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## I. Introduction

The Lane County Tax Map Project is designed to create the digital tax lot line information necessary for Assessment and Taxation to convert their manual map processes to a digital system. At the same time this project will also produce a tax lot data layer that can be used by Lane County and Regional GIS staff for their geographic information system (GIS) needs. The intent of this document is to describe, in general, non-technical terms, how the project will come together, where existing sources of data reside and how the data will be used for this project. This document also describes any decisions concerning methodology and technology, but recognizes that these decisions may change during the course of the project.

## II. Project Definition and Goals

### A. Project Definition

The Tax Map Project is a limited-duration project with a timeframe of three years. The project is expected to be complete by June 30, 2005. The project outcome will be a digital tax lot layer consistent with the goals set forth below. The tax lot data will be produced in a NAD83/91 Oregon State Plane South zone datum/projection and will conform to the Oregon Mapping Project (ORMAP) Goal 4 standards discussed in this document.

The project will use the best sources of existing digital data from Lane County and Regional GIS partners. Compiling the tax lot layer will be done using coordinate geometry (COGO) to enter tax lot description data from subdivision plats, minor partitions, A&T maps, and property description cards.

The Tax Map Project will be done in cooperation with the Regional GIS Partners which are comprised of Lane County, City of Eugene, City of Springfield, Eugene Water & Electric Board and the Lane Council of Governments. The bulk of project funding is provided through the Lane County Public Works Road Fund with additional contributions coming from the Oregon State Department of Revenue under ORMAP and through in-kind efforts of the regional partners. At a minimum, the Tax Map Project must meet the ongoing digital mapping needs of Lane County.

## B. Project Goals

The following goals represent the desired outcome by Lane County and build on the goals established by the Regional GIS Tax Lot Subcommittee.

- Create a complete and accurate set of digital tax lot polygons for Lane County.
- Finish, by June 2005, a tax lot base that complies with ORMAP Goal 4 standards.
- Facilitate the process for building and maintaining the Survey Control data layer.
- Facilitate the process for building and maintaining the Subdivision and Minor Partition Plat data layer.
- Build on, and leverage, to the extent possible, existing sources of digital tax lot data.
- Create a process capable of maintaining the digital data within in a shared, multi-agency environment.
- Create a tax lot base capable of being maintained by Lane County Assessment and Taxation.

## III. Background

The regional partners have been involved in a variety of planning efforts, at various levels, to craft a plan that results in an accurate property ownership layer for Lane County. This work has been an outgrowth of efforts to improve on the existing GIS data which was initially developed in the mid-1970's. This data, while a milestone for its time, does not meet current requirements for positional accuracy or cartographic quality, nor is it complete data for some of the rural areas.

Serious attempts at improving the tax lot base began in the early and mid-1980's with the formation of the Common Mapping Project and with Eugene and Springfield's work to improve the control data for their respective cities.

The partners migrated to Arc/Info in 1992 enabling the tax lot (and other GIS) data to be maintained in a topologically correct database. Parcel file update procedures (PFUP) were developed that are now being used by LCOG, Eugene and Springfield staff to maintain the GIS tax lot data. Lane County Assessment and Taxation continues to migrate their manually maintained map set to AutoCAD drawings, and the Lane County Surveyor has funded a substantial effort to improve the positional accuracy of the road right-of-way and government corners for much of Lane County. Moreover, Lane County Information Services has scanned and published the entire set of A&T maps which is now maintained on a regular basis.

Recent planning efforts and grant money have enabled LCOG to improve the GIS tax lot data for many areas of Lane County. The regional GIS partners continue to use

and maintain the current GIS-based tax lot layer and will do so until the efforts of the Tax Map Project result in a better digital source of tax lot data.

Moreover, Lane County Assessment and Taxation continues to work on converting their manually-maintained maps to a digital format. A&T cooperation and partnership will be vital to the on-going maintenance and quality of the digital tax lot base. As such, coordination at the early stages of the project with A&T will help ensure that the new tax lot data will meet the needs of Lane County Public Works, Assessment and Taxation and the regional GIS partner agencies.

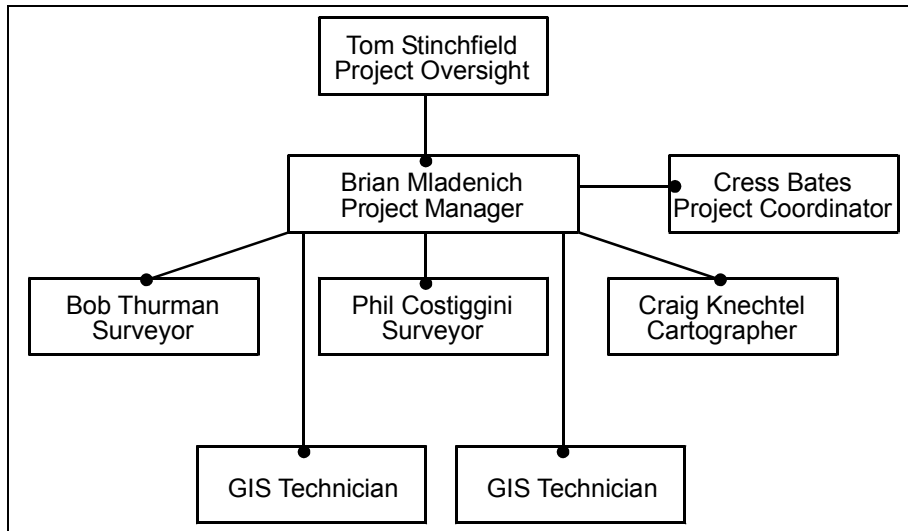
On May 9, 2002 the Lane County Commissioners approved a budget add package to provide the necessary resources to ensure the successful completion of the tax lot map conversion project. The \$1.1 million approved over a three-year period for Lane County Public Works represents the strongest commitment to date by Lane County to build an ORMAP Goal 4, digital tax lot base. Lane County Public Works has also hired a project coordinator to build a detailed tax map conversion & implementation plan, and provide oversight for the tax map conversion processes.

#### IV. Project Overview

##### Project Funding and Management

The project was successfully funded through an add package process which allocated timber revenue money to key County projects. Approximately \$365,000 each year, for three years, has been earmarked to complete the project.

The Tax Map Project is housed within the Lane County Public Works Transportation Engineering Division under the direction of the Public Works Director. The following organizational chart describes the initial Tax Map Project staffing.



The Public Works Department has assembled the project team and will coordinate efforts to construct a digital tax lot base through a variety of methods. Two new temporary technician positions have been created to complement the existing County staff and in-kind efforts from regional partner agencies. Project Coordination services were hired from Lane Council of Governments. The Tax Map Project assumes that, at a minimum, Eugene, Springfield, and LCOG will share their digital tax lot holdings; such as subdivisions, minor partitions, survey control and any other data relevant to developing the digital tax lot base.

Maintenance procedures will be developed as part of the tax map process and will depend on A&T involvement during the project life cycle. The project team will transition efforts to the A&T Cartography section during year 3 with the objective of A&T carrying out ongoing maintenance of the digital tax lot layer.

## V. Established Standards

Positional accuracy standards will guide the establishment of the common survey control data that will be used as the underpinning for the tax lot data. Standards developed by the ORMAP project will be used as the minimum requirement for establishing control throughout the County. In most, if not all, instances, the Lane County Surveyor has indicated that control data will meet or exceed the ORMAP standards.

At a minimum, the Tax Map Project will adopt the attribute definitions for tax lot linework set forth by the RLID Tax Lot Subcommittee and currently in use for managing the GIS tax lot lines and polygons.

### A. ORMAP Goal 4 Data Standards

#### Urban Accuracy (1-2 linear feet)

Method:	GPS or Survey
Control Point Accuracy:	radius of 1 foot = code 1
Construction Method:	Coordinate Geometry for Plats and Surveys Digitized for Metes & Bounds
Accuracy Test:	Control points are within 1 foot of locations on the ground. Majority of tax lot dimensions should be within 2 feet of record.

Urban Growth Boundary Accuracy (5-10 linear feet)

Method: Majority are Surveyed or GPS with some calculated  
Accuracy: radius of 3 foot = code 2  
Construction Method: Coordinate Geometry for Plats and Surveys  
Digitized for Metes & Bounds  
Accuracy Test: Control points are within 3 feet of locations on the  
ground.  
Majority of tax lot dimensions should be within 5  
feet of record.

Farmland Accuracy (10-20 linear feet)

Method: Some control points should be GPS or Surveyed.  
Other can be calculated or photo identified  
Accuracy: radius of 5 foot = code 3  
Construction Method: Some Plats and Surveys should be COGO'd. The  
rest can be digitized  
Accuracy Test: Control points are within 5 feet of locations on the  
ground.  
Majority of tax lot dimensions should be within 10  
feet of record.

Resource Land Accuracy (20+ linear feet)

Method: Control Points gathered any way possible  
Accuracy: radius of <20 feet = code 4-8  
Construction Method: Digitized for Plats, Surveys and Meets & Bounds  
Accuracy Test: Most control points are within 20 feet of locations  
on the ground.  
Majority of tax lot dimensions should be within 40  
feet of record.

ORMAP Goal 4 also states that tax lots are created so that 90% of the tax lot representations meet the accuracy standards described above. In addition, the tax lot layer must be maintained using a method directly related to County A&T Cartography cadastre map maintenance processes.

B. Regional Tax Lot Subcommittee

The “Tax Lot Layer Work Plan” completed in April 2001 by the regional Tax Lot Subcommittee will provide general direction for meeting the tax lot layer needs of the GIS partners. However, some of the goals outlined in the regional Tax Map Work Plan are beyond the scope of this project and will need to be addressed with additional resources provided by the GIS partners. Some of these issues include

how to integrate the maintenance of the land use polygons and address data with the digital tax lots; and how to address the issue of converting regional data holdings to the NAD83/91 datum.

### C. GIS Attribute data

The tax lot polygons will be assembled using two basic data features – tax lot centroids (points) and tax lot lines. The regional GIS partners have defined the attribute fields and values for the tax lot line data which has been published in a paper entitled: “Tax Lot Line Attribute Definitions”. The Tax Map project team will start with these definitions and add to them as project needs are further defined. A summary of the arc, or line, attributes that will be part of the tax map data are as follows:

#### Attribute Table Definitions

Attribute Name	Attribute Values	Attribute Description	Data Type	Domain
OBJECTED	Numeric	Database-assigned ID	Object ID	
Shape	Geometry	Geographic features	Geometry	
Shape_Length	Number	System calculated length	Double	
LOTLINETYPE	1	Right-of-Way line (road, water, railroad)	Short Integer	Subtype
	2	Tax Lot line (interior)		
	3	Land Use line (interior)		
ROWTYPE	0	Non Right-of-Way line	Short Integer	NULROW
	1	ROW cogo'd from surveyed centerline		ROWTYPE
	2	ROW cogo'd from surveyed property corners		
	3	ROW cogo'd from cogo'd centerline & ROW1		
	4	Built on digitized ROW from cogo'd centerline & ROW		
	5	Digitized ROW		
	6	Cogo'd & rotated or moved into position – no geodetic tie		
	7	Railroad right-of-way		
	8	Water Feature right-of-way		
	9	Unknown – needs additional research		
BUILTRW*	y	Built, traveled right-of-way	text	
	<blank>	Not built ROW		
PUBLICRW*	y	Public ROW	text	
	<blank>	Private ROW		
ARCTYPE	dig	Digitized without using COGO (e.g – on screen)	text	ARCTYPE
	cgo	Cogo'd using coordinate geometry software		
	van	Eugene Engineering VANGO data		
	mov	Data that was “floating” and moved to fit GIS		
	gps	Global Positioning Satellite technology		
SOURCE	epw	City of Eugene Public Works	text	SOURCE
	spw	City of Springfield Public Works		
	lpw	Lane County Public Works		
	lat	Lane County A&T		
	cog	Lane Council of Governments		
	ltm	Lane County Tax Map Project		
	lgp	Lane County GPS Project		

Attribute Name	Attribute Values	Attribute Description	Data Type	Domain
DOCTYPE	sub	Subdivision Plat	text	DOCTYPE
	prt	Partition Plat		
	srv	Property Line Survey		
	ant	A&T “paper” map		
	pcd	Property description card		
	acd	A&T CAD drawing file		
	lla	Lot Line adjustment – where known		
	air	Airphoto reference		
	eng	Public Works Engineering		
	est	Best guess		
	ecs	Eugene Centerline Survey		
	lgp	Lane County GPS Project		
	rau	Researched and unresolved		
FEAT_ID	number			
PLAT	text	Plat document number	Text	
DIRECTION	Text	Lot line bearing	Text	
DISTANCE	Text	Lot Line Distance	Text	
RADIUS	Text	Curve radius	Text	
DELTA	Text	Central angle and deflection angle	Text	
TANGENT	Text	Tangent arc	Text	
ARCLENGTH	Text	Length of arc	Text	
SIDE	Text	Side of the cord that the arc turns on	Text	

ORMAP standards provide for a minimal amount of attribute data for each tax lot centroid; essentially identifying the map and lot number, account number and County name. Initial work in the Pilot Project areas has indicated that by converting the existing GIS tax lot centroids to the NAD83/91 projection, a high percentage of GIS tax lot centroids can be used to build the final tax lot polygons.

#### D. A&T CAD Map layers

Lane County Assessment and Taxation (A&T) has a significant investment in using CAD (AutoCAD) as the mapping tool. This has resulted in a mature definition of data layers and standard symbology that A&T uses to build their CAD maps. These are documented in a paper entitled: “Lane County Assessment and Taxation CAD Layer Standards” and define 18 data groups comprising over 180 layers.

This same A&T CAD layer standard is the one used by A&T Cartography to build the control/framework data for each township-range in Lane County. Initial review of these CAD standards indicates that five primary layers from the CAD maps and control/framework data, will be needed to start building the tax lot layer. These five layers are supplemented by a dozen or so control layers.

## VI. Data Development Process

Lane County A&T has been working on building a series of AutoCAD Township-Range drawings which contain the control and skeletal data required to build accurate tax lot polygons. The Surveyor and Public Works have funded this effort over a period of about 7-8 years. The bulk of the work has been done by Craig Knechtel and is often called the “Knechtel” data. This data will be used as a starting point for assembling the existing digital data and is referred to as the “Framework” data in this document.

The Framework data will be reviewed by the Lane County Surveyor to check the control point accuracy in each Township drawing. Additional work will be done to remove any unnecessary data layers, place data in their proper layers and create a “clean” CAD drawing which can be used to assemble other digital data.

### Control Data

The Lane County Surveyors have developed a methodology for building the control data. The control framework for each township is being assembled in basically a four-step process:

1. Create the Abstract - this involves entering distance and bearing information onto a paper copy of the township for each section and DLC. Research and review of survey records is required as part of this step.
2. Enter the Abstract to WinGMM - the Geographic Measurement Management for Windows (WinGMM) program performs a least-squares adjustment on the abstracted township data; holding to known survey locations. This step requires that the abstract information be entered electronically to the WinGMM program.
3. Perform the Adjustment - the least-squares adjustment is run and refinements are made as known errors are flagged and corrected.
4. Perform Edge matching – the final step will be creating common control points along township boundaries to ensure that all the township edges match properly.

This process is being supplemented with additional field survey work.

### Parcel Data

Tax lot data will be built on a township-by-township basis and will start by adding existing digital data from the following sources:

- Eugene Legal Partition data – COGO’d plats/partitions in Arc/Info coverage
- Springfield control, partition and planimetric data – AutoCAD drawings
- Lane County A&T CAD maps – AutoCAD drawings
- LCPW capital improvement project data – AutoCAD drawings
- LC Surveyor plat check data – AutoCAD drawings

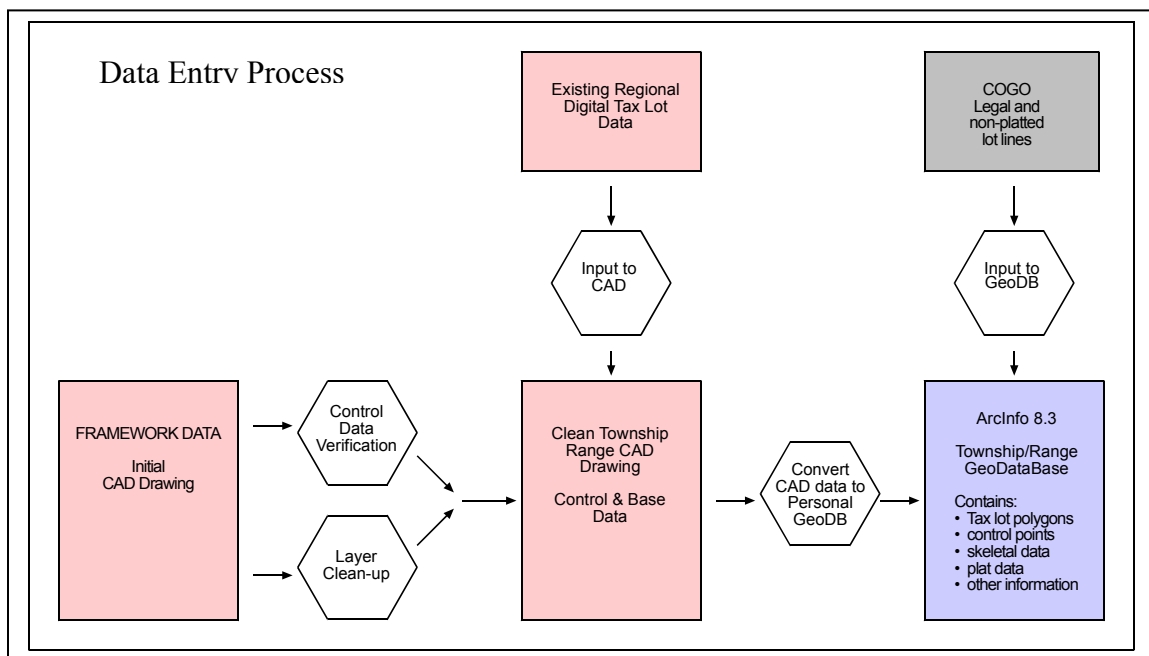
These data holdings are described in more detail below.

Once the initial digital data has been assembled in each TR CAD drawing, it will be converted to an Arc/Info 8.3 personal geodatabase. Arc/Info 8.3 offers several new tools that facilitate COGO'ing new tax lot lines and building tax lot polygons. These tools include the Traverse Editor (survey COGO tools), new polygon edit features and supports polygon topology feature classes. Arc/Info is also the primary GIS platform for the regional GIS partners. In addition, the GIS tax lot centroids (points) will be reprojected to the NAD83/91 datum and included in the geodatabase.

Tax lot lines that are part of a legal subdivision or partition will be entered to the geodatabase by COGO'ing off the legal subdivision or partition. Non-platted lot lines will be entered by using the distance and bearing information from the Assessor maps. Where the information on the Assessor map is inadequate, then further research will be done using property descriptions cards and/or deeds. If all that fails, then the tax lot line will be digitized from the A&T map. A level of accuracy will be assigned to each tax lot line.

Survey control, surrounding plats, and Digital Ortho Quads (DOQ's) will be used to help register tax lot lines to their proper location.

Initial data compilation will be done on a township-by-township basis. Early efforts to build a geodatabase will be done with the personal geodatabase (MS Access) in order to better understand the new polygon editing features and the topological validation process. The expectation is that the project will quickly migrate to an enterprise geodatabase to allow for multi-user data maintenance.



## A. Foundation Data – A&T Cartography Data

As mentioned above, the Foundation data are a series of AutoCAD drawings that use the same data layer convention as the A&T CAD maps. The data is organized on a township-range basis, with a drawing file for each township in Lane County. The drawings were initially created in the NAD 27 datum, with control points supplied by the Lane County Surveyor.

The NAD 27 control points tie to each other very precisely. However, when these points are reprojected to the NAD83/91 datum, depending on the conversion utility, they could be off by as much as 6-8 feet from true NAD83 values. It will be very important to have the Surveyor check the control point data for each Framework drawing prior to entering tax lot line data.

The Foundation data contains control point features as well as line work representing the skeleton of tax lot features.

### 1. Control Data – DLC's, Government Corners, Surveys

Control data includes Donation Land Claims; Lane County State Plane corners, quarter-corners, sixteenth corners; Lane County triangulation network stations; and survey points.

As mentioned above, this is the primary set of data that will be checked by the Surveyor using existing survey records, the Bureau of Land Management government corner data base (GCDB), and when necessary field survey work.

### 2. Skeletal Data

Of the over 180 layers defined by the A&T CAD layer standards, only about five will need to be extracted to create the initial “clean” CAD drawing. These layers include:

- Waterway right-of-way line (ocean, river, creek, lake)
- Non-platted lot lines
- Subdivision (platted) lot lines
- Road right-of-way lines
- Railroad right-of-way lines

Initial examination of the Foundation data drawing also indicates that some skeletal features are erroneously coded to the wrong layer and will need to be fixed as part of the drawing clean-up process.

## B. Existing Data Sources

The regional GIS partners have created a number of digital data resources that will contribute directly to the compilation of tax lot lines within each Framework drawing.

The contributing agency's data will be reviewed to determine that it meets the Tax Map Project accuracy standards and that the project members understand how the data was originally derived.

### 1. Eugene Plat Data

Since July 1, 1996, Eugene Engineering Technicians have been using Arc/Info's COGO package (known as ArcCOGO) to enter subdivisions and partitions recorded inside the Eugene urban growth boundary. The Technicians use the distance and bearing information off the plat to perform the COGO work. The digital plat is then transformed and rotated to fit the current GIS tax lot layer. Eugene Engineering has gone to some effort to make sure that the GIS tax lots fit, as well as possible, the accurate road centerline and right-of-way data that was collected in 1986-87. Since the original GIS was built on "loose" control, the surrounding non-platted lot lines often need to be adjusted to accommodate the newly COGO'd plat data.

During the COGO'ing process when a problem with plat closure occurs Eugene follows several problem resolution steps:

- Check for operator error – data entry error
- Do a distance-distance check to narrow down the problem
- Otherwise, flag the error and go to the surveyor for help
- May have to go back to the closure sheet
- Mid-manager makes the final call

The COGO data is tied to existing NAD 27 control, Eugene survey road centerlines, and/or existing digital plats. However, Eugene Engineering staff indicate that there still needs to be better coordination between Eugene and the Tax Map Project to ensure that Eugene is using the best possible control data. In addition, a better process could be in place for capturing the work done by Eugene Surveyor which apparently is using AutoCAD to perform the outer plat boundary check.

### 2. Springfield Plat and Control Data

The Springfield Surveyor creates AutoCAD drawings as part of their plat closure check. This work has been underway since about 1995 and has

resulted in drawings that contain the actual lot lines for these plats. In addition, Springfield Surveyor has created a NAD27 control “network” which contains not only control data, but also a point for each lot corner within each plat. This control database is comprised of:

- Existing Lane County control (DLC’s, PLSS points)
- Air photo projects ground control
- River traverses data

The control database was densified by COGO’ing each subdivision and building on existing control and plat data. Where possible, sample plat points were field checked for positional accuracy. Currently there are over 47,000 subdivision plat “control” points within for Springfield.

Springfield has provided the Tax Map Project with the complete set of subdivision control points as well as the existing digital subdivision plats for the City of Springfield. This information was created on the NAD27 datum and was converted to NAD83/91 for use on this project.

### 3. LC A&T CAD Data

For a number of years the Lane County Assessment and Taxation department has been involved in a process to convert their manually maintained map set to a digital system. Due to resource constraints this has been a slow process. There are currently about 700 of the 3,500 Lane County A&T maps that have been converted to the CAD system.

The CAD maps are constructed in accordance with the Department of Revenue digital map standards and are of a high cartographic quality. Most of the maps have been assembled using NAD27 control, although a few earlier maps were left “floating” and have not been registered to accurate ground control.

As the digital data for each Township is assembled the Tax Map team will be pulling in A&T CAD data, where available, and integrating it as part of the tax lot build processes.

### 4. LCPW Capital Improvement Project Data

Lane County Public Works has a series of AutoCAD design drawings for their road-related capital improvement projects. These drawings typically cover a small area or section of road right-of-way. In addition to building right-of-way lines and some property lines, there has been a substantial amount of work to tie many of these projects to the NAD83/91 control.

The Tax Map project team will work with LCPW staff to better understand which drawings will be useful to this project

5. LC Surveyor Plat Check Data

In September 2002, the Lane County Surveyor's Office began creating CAD drawings as part of the subdivision plat check process. These plats have field ties to NAD83/91 control and represent a useful source of tax lot data for areas outside an urban growth boundary.

C. New Data

Once the control data has been verified and the existing digital tax lot data has been assembled, the tax lot lines will be extracted from the CAD drawing and translated into an Arc/Info geodatabase format. Any remaining tax lot line work will be performed in the Arc/Info 8.3 environment. Remaining work will include entering additional plat data, COGO'ing non-platted lot lines and making any necessary lot line changes. The new data will include:

- COGO'd Plats – Subdivisions & Minor Partitions
- Non-platted lot lines

Lot line closures will be consistent with the ORMAP standards described earlier.

- Urban - within 2 feet of record
- Urban Growth - within 5-10 feet of record
- Farmland - within 10-20 feet of record
- Resource land - within 20-40 feet of record

Non-platted lot lines will be entered by:

- First using distance and bearing information from the A&T maps. Any level of closure error will be accepted if it is within ORMAP standards based on its location in the County. If the closure is beyond the level of required accuracy then,
- Property description cards and/or surveys of record will be used to reconcile closure errors. If the closure error can not be resolved through legal documents then,
- The lot line will be entered using "best judgment" and where appropriate comparison to air photo and/or other digital data sources.

Tax lot entry will be supplemented by using the following digital data sources:

- Scanned Tax Maps
- Scanned Plats
- Scanned Surveys
- 2000/2001 Air photos

## VII. Create Current Tax Lot Lines

The initial compilation of subdivision and partition data will be done from the legal plat documents. The older the plat is, the more likely that there will have been tax lot line adjustments and changes. These changes will need to be captured in order to reflect the most current tax lot configuration. There does not appear to be an easy way to find these changes other than by visually comparing the digital tax lot data against the current A&T map. Some electronic quality control can be done by comparing the map/lot in the digital tax lot base against the A&T Ascend system. Any mismatches between the two files can then be resolved. However, minor lot line adjustments do not require that the map/lot number change. So a visual inspection of the A&T map is in order.

A&T does have an electronic tax map change tracking system in an Access database that will be useful for catching the more recent lot line adjustments.

## VIII. Project Timeframe

Lane County Public Works expects to complete the creation of a digital tax lot base by June 2005. The regional GIS partners have completed an initial data migration plan to move the exiting GIS data holdings to the NAD83/91 datum. This effort will require a coordinated approach among the partners as well as some substantial clean-up and quality control after the initial datum conversion is done.

The ORMAP data exchange format and standards ask that taxcodes, school districts, fire districts, and city limit boundaries be part of the data created and/or contained in the goal 4 tax lot data being created. Lane County and the GIS partners are currently maintaining all of that data with the exception of the taxcode boundaries. Lane County Assessment and Taxation is in the process of building a plan to create that data layer for their mapping purposes.

The following table gives a breakdown of tax lot and map information for the Metro and Rural portions of Lane County.

Region	Parcels	Maps	Townships	Parcels/Map
Metro	85,430	1,207	6	71/map
Rural	53,183	1,888	122	28/map
Total	138,613	3,095	128	45/map

## Timeframe

### *FY 2001-2002*

- Complete NAD27 control and skeletal data
- Convert to NAD83/91
- Purchase ACAD Software
- Perform pilot project

### *FY 2002-2003*

- Appoint County Project Manager
- Hire ORMAP Goal 4 project coordinator
- Complete Pilot Project
- Create detailed tax map creation plan for Lane County
- Integrate RLID Partner data
- Hire 2 technician-level staff for COGO work
- Convert 20 townships resulting in 505 maps

### *FY 2003-2004*

- Convert 41 townships resulting in 1,026 maps
- Create data extraction process to create and maintain GIS layer using A&T CAD map data.
- Investigate use of spatial RDBMS technology for maintaining tax lot layer

### *FY 2004-2005*

- Convert remaining maps in Lane County – 67 townships resulting in 1,627 maps
- Transition on-going maintenance function to A&T department
- Investigate use of spatial RDBMS technology for maintaining tax lot layer