

“Highway Right of Way Surveys”

Introduction

Background

IRWA Seminar/ASPLS Manual - "Access Law and Issues Affecting Public and Private Lands" Regarding PLO's, RS-2477 trail and section line easements, '47 Act research and analysis.

Why can no two surveyors can survey one piece of property and reach the same conclusion?

Differing evidence, analysis, equipment and field procedures.

Usually far greater discrepancies in interpreting and locating rights of way.

Abstract

Locating highway rights of way in Alaska

Outline - This paper will discuss:

1. The types of ROW interests and how they are described
2. Monumentation - Past, present and future
3. Procedures, Intent and Resources used in analyzing highway rights of way
4. Conflict resolution - Case studies

Right of Way Interests & Methods of Description

What is a ROW: As in, "is it a right of way or an easement?".

General Definition: Right of Way: Generally, the right of a person, class of persons, or entity to use the land of another in some particular line.

They range from a limited and revocable permit to fee title.

Summary of interests which make up the majority of the DOT&PF highway system:

Group I

- *PLO's* - Between 1942 and 1958. Omnibus Act transferred 5,400 miles of ROW. Typically, the PLO right of way was described as 50, 100, or 150 feet on each side of the road centerline according to the road's classification.
- *Title 23 Highway Easement Deed* - FHWA authorized ROW as a part of the Interstate highway system.
- *DNR Right of Way Permit* - Permitting use of state land for highway ROW.
- *ROW Acquired by Negotiation/Condemnation* - DOT&PF policy is to acquire in fee. Access controlled ROW must be in fee. Must review the recorded document to determine the type of interest acquired.

Group II

- *Section Line Easements* - 33 or 50 feet on each side of the section line.
- *FLPMA Title V ROW* - Typically non federally funded projects.
- *Federal Patent Reservation ('47 Act)* - Implemented through the filing "Notice of Utilization".

Group III

- *Federal Patent Reservation (General)* - (i.e. Small Tracts parcels)
- *Statutory dedication* - A statutory dedication is one made under and in conformity with the provision of a statute regulating the subject.
- *Common Law dedication* - Requires an intent to dedicate on the part of the landowner, and an acceptance by the public. Acceptance may also be implied from acts of maintenance by public authorities.
- *RS-2477 Trail Rights of Way* - ROW for roads established across unreserved public lands by virtue of the RS-2477 grant. Width: "ditch to ditch" or 100 feet.
- *BIA Easement* - Granted across Tribal Trust or Restricted lands (Native Allotments or restricted townsite lots)

Group IV

- *Prescriptive Easement* - Easement can be acquired by the public across private lands. Requires a greater burden of proof due to a conflict with the constitutional provision that property not be taken without just compensation.

- *USFWS Special Use Permit* - National Wildlife Refuge System Administration Act of 1966.
- *ANCSA 17(b) Easement* - 17(b) easements were reserved for public access across ANCSA lands,

The majority of existing ROW are easements. Urban areas where ROW requires purchase or form a part of an access controlled facility, the interest is typically in fee.

Monumentation

ROW retracements: Do the monument positions hold?

- Original Monuments: Without positional error - Original surveys (cadastral)
Original interior subdivision monuments
Monuments set for and noted in deeds
- Right of Way Monuments: Generally set after a conveyance; not called for in the deed

Mark or referencing a line between unencumbered private or public lands and that which is encumbered by the highway easement.

These monuments do not fall into the class of monuments without positional error.

They are “one” surveyors opinion as to where the right of way line may be.

Not necessarily binding on the next surveyor who finds that were not established within a reasonable tolerance.

When retracing DOT&PF rights of way, you will generally find the following six categories of monuments:

- *Centerline Defined by As-built Survey:*

The physical location of the road centerlines represent a man-made monument.

Standard monuments were relatively unimportant on early projects:

The road was typically the first improvement into the wilderness.

There were few existing boundaries with which to conflict.

Many of these roads were constructed across federal lands prior to the rectangular survey net.

Often the control for the beginning of the next project was where the last project ended.

- *Centerline Referenced with Right of Way monuments:*

Mid-1950's ARC brass caps - Alaska highway, Tok Cutoff

8" x 8" yellow concrete monuments. Used between 1960 to 1975.

Set at PC's, PT's, jogs and generally every 1000 feet at even 10's of stations.

Some current projects monumented on ROW using standard monuments.

Validity of Yellow concrete monuments?.....

Some surveyors will not use them because they were not set by “licensed land surveyors”.

Generally were set using procedures and under an authority that was acceptable and appropriate at that time.

Until 1972, licensed engineers, DOH licensed professionals, were by law considered competent to perform land surveys. Many were later *grandfathered*.

Also, State employees were exempt from the licensing requirements.

Typically, the monuments were set in place by the construction contractor’s labor force.

Problems with contractors partially responsible for elimination of monuments.

In general, these monuments reflect the best evidence to locate the original centerline.

- *Centerline Monuments:*

The current standard. Use began on rural roads in 1979. Also some 1960’s projects.

In 1976, DOT began a transition contractor provided surveyors.

By the early 1980’s, all construction surveying including the final monumentation was turned over to the contractor’s surveyors.

- *Centerline Referenced with Shoulder Monuments:* This refers to uncapped rebar set on a parallel reference line on the shoulder for certain rural roads in the mid-1980's.
- *No monumentation:*

Conscious decision to delete any form of monumentation from the project.

Unfortunately, this was also applied to projects that did not have a uniform right of way

An as-built of the centerline would not necessarily provide adequate definition of the ROW.

Occurred on several projects which were constructed between 1975 and 1979.

This time period basically represents the gap between the end of the concrete ROW monuments and the beginning of the centerline monuments.

DOT&PF management believed this practice benefited private sector surveyors.

The monumentation was deleted in part for three reasons:

1. Lack of stability of the yellow concrete markers.

2. Limit liability exposure.
3. If DOT&PF did not survey its right of way, then there would be that much more work for private sector surveyors.

Some projects that were not monumented may have locations survey references were labeled on the construction as-builts.

- *Alternatives for the Future:* How can the right of way can be most effectively referenced?

Get control monuments out of the road!

1. Safety - Monumentation off the road will reduce surveyors exposure to traffic.
2. Maintenance - Paved over due to unstable road foundations
Milling machinery on pavement overlay projects (RotoMills)
3. Quality Control - Monuments now typically established by the construction contractor.

A weak link in the "Locations survey - ROW mapping - final monumentation" process.

DOT&PF staff surveyors certify as to our retracement of boundaries and as to the location, shape and size of the parcels acquired, but we have limited control or knowledge as to the procedures used to establish the final monumentation.

Moving monumentation outside of the construction limits will:

Remove that responsibility from the construction contractor.

Eliminate most of the cased monument item from the project.

Section corners, etc., will still have to be referenced, replaced and cased.

4. Rights of way no longer uniform with road centerline:

Centerline monuments good for uniform width ROW such as PLO's

Realigned project centerlines not parallel with existing uniform right of way.

Non-uniform ROW is acquired because of high land values and other concerns.
Difficult for property owners and M&O to locate the limits of the ROW.

Metric Rehab projects - metric centerline curve parameters will, by definition, not be the same as the original English unit centerline that was used as the basis for right of way.
This will result in having a construction centerline that rarely coincides with the centerline of right of way.

We can minimize these problems by getting out of the road and using right of way monuments and random control monuments.

Random control monumentation:

Recommended for some rural highways where there are few private parcels and little ROW acquisition is anticipated.

Random control monuments will be set at protected, stable locations and will be related to centerline or right of way by coordinates.

This provides suitable control while minimizing the level of monumentation required.

This was performed on certain segments of the Denali highway in 1994 and will be used on the 1995 Elliott highway surveying and mapping contract.

Extension of the DOT&PF Georeferencing project: Between 1988 and 1994, DOT&PF began the establishment of a network of geodetic control stations along the federal aid highway system using GPS technology.

The stations are generally spaced 10 kilometers apart.

Intended as a framework for a statewide highway GIS/LIS. The majority of new projects are now tied into this system.

Downside: Although most cost effective and secure, this type of monumentation suffers from the fact that it does not result in a readily apparent right of way line.

Right of Way Monuments :

ROW monumentation beneficial in urban and suburban areas with a higher land use density.

ROW line is apparent without a lot of computations required of reference & control monuments.

Certain platting authorities may require that ROW monuments set on the new ROW line as a replacement for existing monuments.

Downside: Typically set in pre-defined locations that may not be stable or protected.

Double the monuments = double cost.

Lines must be brushed to set or tie monuments.

Endangered by utilities, brushing and excavation close to the ROW line.

The 35 years since statehood has left us with a large part of our system yet to be monumented, and that which is, may be less than perfect.

Although it will still be several more decades before the system is adequately monumented, our goal will be to provide control which will be more secure and beneficial to the user.

Procedures, Intent & Resources

Always been a problem!

A. C. Mulford's 1912 publication of Boundaries and Landmarks included a chapter titled *Re-running Old Highway Records*. Mulford stated, "The actual process of 'running out' an old road record is even more difficult in practice than it is in theory. No actual rules can be given, but some general suggestions may be helpful."

One surveyor's opinion with regard to locating highway rights of way.

- *Should the monuments always control?*

Northern Region ROW plans:

Table of recovered property with stations and offsets to the "recovered" & "adjusted" position.

Or the table shows the "recovered" data and the "adjusted" positions are noted on the plan view.

Purpose is to reference both the corner's physical location and the right of way location based upon the intent of the source documents and our interpretation of what should be used to appropriately control the location.

Why not treat ROW monuments established by the State as "original" monuments?

If not original, a monumented boundary between private landowners, may become fixed after adverse rights have set in or by long acceptance by surveyors as a point of local control.

It would be easier to accept corners set by others to mark the ROW....., but there are many reasons why it is necessary to make a distinguish between boundaries separating private owners and boundaries separating a private owner from a public interest.

Adverse possession by the State against private property. Although the Courts have ruled that it is possible for the State to acquire property through adverse possession, it places a much greater burden of evidence on the State than that placed on an individual.

Adverse possession by private owner against the State. Both in common law and in statute, a private owner may not gain title to property through adverse possession against the sovereign. Therefore, an individual who occupies land within a State right of way is ineligible to claim title by adverse possession, even if he relied upon incorrectly established monuments and meets all of the statutory provisions typically required to obtain title.

Estoppel: Can the State be estopped from claiming the full width of a right of way when it has made representations (in the form of monuments) that the right of way is narrower than described in the source documents. The issue of estoppel has been raised in several Alaska Supreme Court cases relating to rights of way. Unfortunately, none of them included monuments as a factor.

Estoppel, according to the Alaska Supreme Court requires “the assertion of a position by conduct or word, reasonable reliance thereon by another party, and resulting prejudice.”

The typical right of way/estoppel case involves a situation where the private adjoiner has assumed a narrower right of way than is due the state by virtue of the instruments which created it. Estoppel was argued either because the property owner claimed that the state had not affirmatively asserted its right of way (in the form of mapping and monuments) or because the state had made a previous assertion as to width which was contrary to its current assertion. To date, the state has prevailed in these cases for two primary reasons. First, property owners had been placed on constructive notice as to the true width of the right of way by virtue of instruments filed at the recorder’s office or published in the federal register. Secondly, unless improvements are constructed by the adjoiner in the conflict area, it is difficult to show detrimental reliance.

This still, however, leaves the question of whether the state would be estopped from claiming its full right of way if an adjoiner constructs improvements in the right of way in reliance upon monuments erroneously placed by state surveyors. This may be clarified in the future. However, as the law stands, we generally apply the philosophy that even when in conflict with monuments purporting to define the right of way, the State is due the full width of right of way intended by the instrument which created it. And except for unusual circumstances, the State should receive no more than what was intended.

- *Data Collection*

You will generally acquire more data points than you need to solve the tangents and curves.

A best fit solution for the tangents and curves will

rarely result in record curve data,

rarely agree with record stationing,

and never pass through the center of every data point.

In short, there are an infinite number of solutions for the centerline.

Most of our ROW’s (PLO, RS-2477, Sec Line Easement) are defined by "strip" descriptions.

The intended width for these ROW’s is based upon a fixed number of feet on each side of a described centerline, no more and no less.

The location of these rights of way must be founded upon a re-establishment of the centerline (or section line) upon which the ROW is based.

Centerline defined by As-built Survey: Generally, if the road is considered the monument, an as-built survey is necessary to locate the apparent centerline of the tangents and curves by splitting the shoulders of the road.

Centerline defined by centerline/offset line Monuments: Simply, tie in all of the project monumentation relevant to your area of interest.

Right of Way Monuments: As the objective is to locate the original centerline, it is important to tie pairs of ROW monuments on both sides of the right of way.

- *Data Analysis and Determination of Centerline:*

Centerline defined by As-built Survey:

Use data to define tangents and project them to determine the point of intersection.

One or more points on the curve will then solve for the curve data.

Most of the roads were engineered, so developing a series of tangents and curves is possible.

Obviously there can be a lot of room for interpretation in developing a centerline by as-built.

The largest variances in interpretation generally depend upon the size of the project.

(Example)

Centerline referenced by Right of Way Monuments:

Split the recovered monument positions as the best evidence of the original ROW centerline.

Consider the project centerline as the basis for the right of way location and the ROW monuments are references to that centerline. (ROW monuments typically replaced the centerline references used for a construction project).

Compare monument pairs with favorable splits to determine whether some should not be considered.

After reducing your data to centerline points, you must decide what to use to build a centerline.

Throw out the obviously disturbed centerline monuments and the recovered/computed outliers that would tend to skew the majority of the data.

If you end up with several centerline points, you might select the pair that results in the least separation between the line they define and the other points or create a best fit tangent using all of the points.

Formal least squares analysis as opposed to a low tech common sense approach.

The intersection of any two tangents will give you the as-built delta angle at the P.I.

Any two pieces of curve data will solve the curve.. What to use?

No monumentation and no record data for the centerline... pick a centerline point at the middle of the curve and use the “external” distance to compute the remaining curve data.

As an alternative, you might select 3 points on centerline to solve for a curve radius.

If you have monuments..., you have several other choices for your second piece of curve data.

Tangent lengths: between PC and PT to the PI. Use one or average both.

Chord Length: measured/computed chord length between the PC and PT that could be used.

Review design data for design parameter curve element (Degree of Curve)

The resulting tangents and tangential curves should then be compared to the record data (if available) and the survey data points to see if a reasonable solution has been reached.

Stationing, PC's and PT's - Fixed or Flexible

Record or recovered PC's and PT's will rarely match the newly computed points.

Generally, for rural highway projects, the curves should be made tangential even when the newly computed PC conflicts with a monumented PC for the following reasons:

The curves were designed and intended to be tangential.

Real world field surveys can never establish or recover curves absolutely tangential

Many other monuments on centerline besides the PC and PT

Accepting all recovered positions would result in differing bearings between every two monuments on tangent and several definitions of a curve throughout its monumented length.

Good Geometry: Sharp Curve/Flat Curve -

Sharp curve/large delta will usually result in computed PI, PC and PT positions that are reasonably close to record.

Flat curves/small delta typically result in computed PI's that are significantly shifted from the record position due to the poor geometry when intersecting the two as-built tangents. This of course, results in significantly shifted PC's and PT's.

Rural highways - a large movement of the PC/PT on a flat curve, is rarely significant with regard to the change in offset from the tangent. For practical purposes, the PC's and PT's can be considered similar to a point on line.

Urban roads -

If lot frontage is small, these shifts can be very significant

May result in the apparent elimination or shifting of a record taking

Or the apparent creation of a taking where none actually occurred.

In these situations, constraining the re-established right of way line to meet tangential curve and record offset requirements may not be appropriate.

Basis in letting computed PC's and PT's float without regard to monuments can be found in 1974 Wattles book Land Survey Descriptions.

Basis of Stationing:

Stations and offsets are often used as a basis to defining points along ROW

The basis of stationing must be fixed (Cannot float - i.e. based upon as-built PI location)

Where there are no monuments to fix stationing - maybe ties to improvements such as the record station for the end of a bridge deck, or the record station of a PI on a sharp, well defined curve.

Data Analysis for Rights of Way not defined by "strip" Descriptions

This includes:

metes and bounds descriptions with redundant calls

"all that part of which lies within the right of way lines as depicted upon the attached plat".

These types of descriptions may generate conflicts between:

bearings & distance calls

calls to adjoiners & monuments

references to station and offset ties

Essentially, you are given more information than you need or want.

Intended to:

precisely dimension the relationship between the right of way and the adjoining property
& dimension relationship of the right of way to the centerline.

Problem: relationship between right of way and centerline was accurately known
relationship with the adjoining property was often based upon record information

Typical survey would tie the readily available rectangular and primary subdivision monuments near the existing right of way line.

Ties were rarely included all of the front or many back corners of adjoining properties.

Therefore, a subsequent retracement of a property in which all relevant monuments were recovered, would typically find inconsistencies with the acquisition description.

WashDOT Solution:

Investigated WashDOT's ROW description procedures -
exempted from licensing regulations

Plans present little more than the centerline geometry and a right of way width

Surveying the remainder of an acquisition parcel involved a three step process.

First, retrace the property as if there were no right of way acquisition.

Second, retrace the centerline of the right of way.

Finally, compute the intersection of the right of way offset with the original property boundaries, and what you get is what you get. No conflicting dimensions.

AKDOT Application:

In a sense, we have the same situation.

The spine of our right of way mapping is the project centerline.

It is the control from which our right of way needs are defined.

Generally, it is surveyed as a part of the design and is monumented or referenced during construction.

The parameters for right of way acquisition are handed to us from our designers in the form of stations and offsets.

It is from this source data that all of the computed intersections with record or monumented boundaries are generated.

Given that in many cases the stations and offsets represent the parameters of the new right of way and therefore the intent of the conveyance description, it may be appropriate to use them as control when they conflict with the bearing and distance dimensions.

Current standards for right of way surveys require ties to all relevant monuments and a higher level of precision and accuracy than were considered acceptable in past years.

Therefore, surveyed and record ROW conveyance dimensions should be more consistent.

- ***Resources for Re-establishing a Highway Right of Way***

Generally, there are three primary document sources that should be consulted prior to re-establishing a highway right of way:

Right of Way Plans -

Quality and quantity of information varies depending on vintage.

Rural projects in the 1960's might show :

centerline geometry

station ticks

two uniform right of way lines

Generally not the rectangular system (it may not have been there at the time)

If monuments are shown, may not distinguish between record and recovered.

Newer projects should show:

all monuments recovered

monuments to be set

existing rights of way and property boundaries

dimensions around the area of acquisition as well as station and offset ties.

Outlet: Right of way plans are all eventually recorded, maybe many years after construction pending the outcome of condemnation actions.

The primary outlet for good copies of these plans is the DOT&PF regional right of way office.

Maintaining uniform right of way width is no longer appropriate due to cost of acquisition.

Constructed centerline of a new road may not parallel ROW line

ROW plans should show ties between the design centerline and the existing ROW.

Never assume that the design and right of way centerlines are coincident.

Construction As-builts -

Construction as-builts generally the best source of information regarding where and what type of project monumentation was established.

Either a summary table or the plan view sheets will note location of monuments set.

When there are no monuments, the as-built ties to improvements such as bridge decks and culverts may provide the best evidence available to establish the record stationing.

1950's BPR and ARC references may still be recoverable.

Acquisition Documents -

Parcel plat and legal

Obtain from recorder's office or the DOT&PF Regional ROW office.

M&B descriptions or attached plats may be more detailed than plans on older projects

Conflict Resolution - Case Studies

What happens when we find large discrepancies the DOT interpretation of the ROW location the monuments set by other surveyors purporting to mark the right of way?

If we are correct, the conflict may be due to -

survey blunder

misinterpretation of the record documents (i.e. date of entry vs. effective PLO)

In some situations - DOT&PF can be shown to be its own worst enemy.

Cases

An equitable resolution was reached by accepting a definition of the existing right of way that was in favor of the adjoiners.

AGO believes resolutions were “generous” and not necessarily required by law

The following case studies discuss three particular right of way conflict situations, and how we decided to resolve them.

- ***Glenn Highway MP 118 North (MP 118- 135)***

Very basic situation:

New ROW plans developed in 1981.

No existing ROW or centerline monuments set by DOT.

1952 as-builts that provided centerline stationing and curve data.

Centerline defined by “best fit” as-built and record data

Few US Survey adjoiners

US Surveys defined ROW curves with chords instead of arcs

Conflict not significant, DOT conformed to U.S. Survey ROW boundary.

- ***Badger Road Reconstruction***

ROW conflict clearly caused by DOT&PF

200 parcel, 8 mile long, 1988 project (largest acquisition Northern Reg. project)

Existing ROW 50' on each side of centerline as per 1961 acquisition

Land use - rural residential and heavily subdivided on both sides of the road.

1960/61, ROW was acquired for a widening and realignment of the existing Badger road.

Acquisitions were described with respect to design (proposed) centerline.

At construction, 2.4 miles of centerline were shifted 5 feet to the right and monumented

Most of the subdivisions along this section were developed subsequent to the construction

Surveyors typically defined the ROW 50 feet on each side of the "monumented" centerline.

The ROW should have been set at 55 feet lt. and 45 feet rt. of the monumented centerline

The result was a conflicting 5 foot gap or overlap with adjoining properties for 2.4 miles.

Legal advice and expediency dictated that we give the benefit of the doubt to property owners and only claim the 95 feet of ROW not in conflict.

Private surveyors should take some responsibility for the conflict -

ROW evaluation in many cases is limited to a phone call to DOT to get a verbal statement

A review of the ROW documents, plans and as-builts would have indicated a conflict.

- ***Chena Hot Springs Road MP 0-7***

Construction expected on this project 1996-1997 seasons.

CHSR intersects the Steese highway approximately 5 miles north of Fairbanks.

From the intersection it runs easterly 57 miles to Chena Hot Springs.

The first 7 miles of the road generally runs along the east-west section lines.

The existing ROW is as per the first major reconstruction project in 1962.

New ROW plans identified a conflict with certain subdivision monuments .

Conflict area at Steele Creek road int. where the Alyeska pipeline crosses CHSR.

ROW based upon recovered DOT ROW monuments were found to be in conflict with both the adjoining subdivision monuments and the section corner for 22/23/26/27.

Initially the apparent error was due to the subdivider missing two angle points in the ROW

This would have indicated a 10 foot shift in the ROW line over 1600 feet.

We also noted that the section corner changed position between the 1962 and the current project.

In 1962 the section corner was 7.06 feet north of centerline. Now it was almost on centerline.

I believe that the 1962 plan tie was correct but that the section corner was reset in the wrong location during the 1962 reconstruction project.

In any event, the result was a conflict between the 1962 ROW monumentation and the section line control of 7 feet.

Even if we could prove that the original location was 7 feet north of the current location, it would serve no purpose to move it now that it has been used and accepted by a multitude of surveyors.

4 subdivisions adjoining the right of way in this vicinity were performed by the same surveyor.

None of the plats indicate the recovery of the concrete ROW monuments.

Or they may not have used them because they identified the 7' conflict.

The surveyor used the section line control and the record ROW ties to lay out the ROW.

The surveyor then connected his offset points by straight lines which disregarded the angle points intended for the ROW and monumented by the concrete markers.

If the entire blame for the conflict could be laid on subdivision surveyor, DOT could take the position of claiming the existing right of way approximately 7 feet into the adjoining lots.

The monuments set in the subdivision to the south had been generally accepted as the best evidence to define the existing right of way.

This resulted in a right of way width in this area ranging from approximately 200.4 feet near the 1/4 corner to the west to 207.7 feet near the Love Road section corner.

This was contrary to our philosophy of claiming no more than that to which we were entitled.

Our resolution for this conflict was to accept the right of way as defined by the subdivision plats.

Conclusion

This presentation may not reduce the large variation in interpretations in ROW

The intent is to clarify the logic that DOT&PF uses when it maps or surveys these boundaries.

The 3 cases represent situations where a ROW location conflict was identified

In these scenarios, we accepted the location defined by others as appropriate

However, DOT will and should not accept every conflicting monument it finds along ROW.

Monuments set within reasonable tolerances based upon a well reasoned analysis of the evidence and the law should be respected.

ROW location conflicts can be limited by consulting with the Department's land surveyors and reviewing the appropriate documents.