REFLECTIONS ON THE RETRACEMENT PROJECT

DARRELL SORENSON'S MEMORIES

On August 8, 1851 Deputy Surveyor William Ives and his crew camped near the corner of Townships 13 and 14 North on their survey of the Willamette Meridian. His crew of 6, mostly uneducated pioneers, started in the hills above Portland, Oregon at the Initial Point in June and he had surveyed 13 Townships north on the Willamette Meridian by August 8th.

On August 9th, he ran north on the Willamette Meridian for 4 miles, crossing Lucas Creek at 14 chains and the North Fork of the Newaukum River at 31.6 chains between Sections 24 and 19 and proceeded north another one and a half miles by the end of the day.

On August 8, 1985, 134 years later, in celebration of the 200th anniversary of the Rectangular Survey System, a professional crew consisting of Honorary Deputy Surveyor Dennis DeMeyer and 11 other persons (5' with PLS numbers) brushed a trail into the same township corner and camped for the night.

On August 9th with two chaining crews, compassman, axman, flagman and camera men, the LSAW Bicentennial Retracement project began at 7:00 A. M. and retraced 47 -1 /2 chains by 5:00 P. M. Deputy Surveyor Dennis DeMeyer figured that at this rate his crew would take until October to reach the shores of Puget Sound. (William Ives arrived there on August 16th.) Honorary Deputy Surveyor DeMeyer was glad his crew was paying their own expenses and that he didn't have to pay food and wages out of a $20.00/mile budget (1851 dollars). Especially since the crew of 11 was eating about $5.00 per day per person.

To follow in the footsteps of the original G.L.O. surveyors and relive history was the theme of the Land Surveyors' Association of Washington 1985 Spring Seminar (May 3-4 at the Bellingham Holiday Inn). Albert (AI) White gave an outstanding seminar on the History of the Rectangular Survey (he wrote the book, you know). At this seminar the idea for a retracement of the Willamette Meridian was revealed by the Northwest Chapter's Historical Chairman, Dennis DeMeyer. **Retrace the Willamette Meridian using antique equipment and the same methods used by William Ives.** What better way to understand history than to relive it!

After an enthusiastic response from several members of the Chapter and an indication of interest from others at the seminar, Denny started the planning. He sent Retracement Project Newsletters to other LSAW Chapter Historical Chairmen and to members who expressed an interest in the idea.

Denny then got the cooperation of Mike Kinnaman, State of Washington Department of Natural Resources, and Don Fitch, DNR Bureau of Surveys and Maps, who provided research material. Based on the information, three areas were tentatively selected for the retracement. The project soon had a cadre of dedicated surveyors adding their encouragement. As announced in the first newsletter, the purpose of the retracement project would be two-fold: (1) Publicize the 200th Anniversary of the Rectangular Survey System (1785-1985); (2) to enhance the skills and understanding of the problems in G.L.O. retracement of the land surveyors who participated in the project by actually using antique surveying equipment. The objective was to **follow in the footsteps** of William Ives using the same methods and equipment he and his crew had used. To add to the retracement realism, Harry and June Land, members of the Backcountry Horsemen of Washington, volunteered to come and pack into the base camps with their horses.

The last newsletter to the interested surveyors firmed up the location, contained a registration form and asked for a commitment of $5.00 per day for food and expenses from each participant. Denny, Bob Landon and Harry Land (the packer) had scouted the proposed retracement area and felt that it would be suitable for the project. With that brief background of how the retracement project was organized, the next section is a living history of how a "modern" G.L.O. survey crew lived in the footsteps of William Ives for five days and what they learned from the experience.

August 8, 1985 at about 1:15 P.M. a red World War I vintage Fokker Triplane flew over the parking lot of the Hemphill-O'neill Lumber Company in Chehalis, Washington. An omen that the timeclock was backing up for the retracement project was the opinion of Bob Landon to the assembled motley crew, Dave Jolly, Jerry Olson and Darrell Sorenson (myself) who, standing nearby, nodded their heads in agreement. Ten rough and ready "honorary" G.L.O. surveyors were discussing their "historical garb". Clothing and gear being proudly displayed by the crew had been assembled from the rag bag, Goodwill and chests belonging to grandfathers. Old hats, tin pants and other garb was all designed for the historical survey party look, Denny insisted that long underwear was the official "old look", others commented that it wasn't scratchy enough to be really old.

The crew was soon headed east of Chehalis to the Lucas Creek area and a Weyerhaeuser logging road which was fairly close to the starting corner on the Willamette Meridian fourteen townships north of the Initial Point of the Willamette Meridian in Portland, Oregon. After parking the caravan and piling our duffel bags on a tarp for the packer, the honorary G.L.O. survey crew proceeded to cut a trail suitable for horses for about one-half mile through the woods to the township corner and our camp site. It took the packer four trips to get camp gear, tents and equipment into the site. The bacon and beans dinner that William Ives' crew probably "enjoyed" was a little too authentic for Denny. His "roughing it" menu for the first evening dinner meal was char-broiled steak, fried potatoes, salad, cake and cold beer or pop. Camp consisted of four tents, a complete packer's kitchen and most of the trimmings. However, our Deputy Surveyor insisted on sleeping on the ground, "roughing it under the stars" with no foam pad or air mattress. Two others joined him "under the stars" for the first night.

Due to the high fire danger in July, the woods had been closed to the loggers. However, for the retracement project our luck was holding as it had rained the week before. Everybody thanked the rain god for lowering the fire danger. This meant we could have a careful campfire and that first night the stories really flowed.

The retracement crew was organized into a brushing crew, line crew and two chaining crews for the first morning's retracement. Before starting, however, the oaths were administered. With the crew assembled around the camp cooking area, the deputy surveyor's oath and the chainmen's oaths were solemnly given.

During the night, stars had been replaced by thick, dark clouds and a light rain started to fall before getting started. Because no solar shot was available as a starting point a variation (declination) was estimated and the project began.

The corner of Townships 13 North and 14 North on the Willamette Meridian was an anchor bolt. The first two chains were up to and along the top of the ridge, easy going, allowing the compassman to get out ahead. Chaining was also fairly level and other than figuring out what was the best way to chain (pull chain or carry chain), the first two chains went fairly rapidly.

The first test the chaining crews had was the descent into Lucas Creek. At nine chains the slope became very steep requiring that the chain be "broken" about every thirty links in order to keep the chain horizontal. Chaining crew number one, Royce Hill and Tom Starr, found that the best system was to pull the two-pole (33 feet long) Gunter's chain all the way out and lay it down on the slope. Then the head chainman came back and they "broke" chain in increments working ahead with the pin finally leaving it at the end. The other crew, Bruce Raper and Kyle Haggith, kept track of how far each increment was until the two poles were reached and the pin was stuck.

When ten chaining pins had been stuck by the head chainman, a tally (five chains) was declared and the pins were counted. On some crews, the head chainman remained the same and the pins were transferred, on the others, the head and rear chainmen exchanged places.

Two types of tally counters were used: (1) a leather thong attached to the belt with eight knots in it. A leather pad about ¾ inches square was threaded on the thong through a hole sized to make pulling over the knots difficult. To mark a tally, the pad was pulled over a knot when the end knot was reached and all pins stuck, the count was forty chains. (2) A similar leather thong attached to the belt however, it had only a single knot with eight pieces of leather with holes to be slipped over the knot one at a time when a tally was reached.

Grasping the concepts of a two-pole Gunter's chain, which is fifty-links (thirty-three feet), one chaining pin per fifty links (two-pole chain) seems easy. However, counting nine pins, instead of ten, when the head chainman was all out, caused the rear chainman to utter unprofessional words and start back along line looking every two poles (one-half chain = thirty-three feet) for the missing chaining pin.

The job of learning how to chain most efficiently was left up to each chaining crew to discover what worked best for them. Since the professional surveyors had level chained before in their surveying careers, learning how to use a twopole Gunter's chain was the main new experience, right? Guess again! In keeping with the objective of the retracement, we had to keep the calls in our head, learn to count tally's chains, read brass tabs on chains and untangle the chain from brush. **Gunter** soon became a swear word.

As the ground got steeper and steeper, dropping into Lucas Creek, the light rain (drizzle) and poor light in the thick second growth alder and fir forest made picture taking without a flash impossible. The rain also wasn't good for the rented viaeo camera, so it was soon put away to prevent damage.

Down to Lucas Creek our "G.L.O." crew marched, two poles (fifty links) at a step. A casual observer would never figure out what was happening from the shouts coming out of the woods.

"Chain!"

"You'll have to come back up the hill to level this chain."

"Stick!"

"Got it."

"OK?"

"Come ahead!"

"Why the hell doesn't the G.L.O. brushing crew do a better job?!!"

Up ahead, Denny DeMeyer was having his own prob lems running line.

"I can't see the line pole."

Picture right -Friday noon, August 9th, Bruce Roper and Kyle Haggith (chaining crew No.2) trying to remember chaining calls of the morning run.

The chaining crews were supposed to memorize the calls like the original crews did, but they cheated, storing the morning's calls in Kyle's HP-41 CV.

"Does anybody want to donate a red hankerchief to the lineman?"

"This damn stiff-legged G.L.O. tripod is impossible to set up!"

"Right."

"No, rightl"

"NO, YOUR OTHER RIGHT!!"

"Left'"

"Where the hell did you go?"

"Left, left."

"GOOD! !"

"OK, stuck, come ahead."

Because the camera crew was out of business due to the rain and poor light, they augmented the axman Dave Jolly. With Darrell Sorenson and Bob Landon helping, the slowest link in the chain of surveyors on the hillside was soon the chaining crew. Descending steeply into Lucas Creek was the call in the 1985 notes. However, what isn't said is that one needs to hold on with one hand and brush with the other. Sword fern and other brush hid the holes and dropoffs to even the most carefully placed step. Dave Jolly stepped carefully into air and was spotted ass over teakettle down the bank to Lucas Creek. He didn't even get hurt or wet.

"We'll really get ahead of the G.L.O. chaining crew now," was the comment exchanged by Darrell and Bob as they looked back up the obvious line call of "descending steeply into Lucas Creek", as Tom and Kyle were observed at the top of the slope making only ten to twenty links at a time level - chaining down the hillside. Their smug G.L.O. axmen smiles were soon erased by the wall of vine maples ahead. "Hey, let's offset into Smith's Field," they were soon saying.

"G.L.O. axmen and compassmen weren't stupid, you know." Reluctantly in the face of a mutiny, Deputy Surveyor DeMeyer, the instrumentman, agreed.

With the brushers threatening mutiny and the open field close enough to spit at, the offset was soon made and the instrument was set up for a clear shot to the road to the north of the field. When the chaining crew finally caught up and had to recount the calls from memory, crew number one had the usual difficulty in remembering the topography calls, but did get their chaining distances right. Crew number two (Bruce and Kyle) not only cheated (Kyle stored the calls in the memory of his HP-41 CV) on remembering the topography (a goal of the historical retracement), but blew one and a half chains in the first fifteen chains of measuring. They felt so bad about this that they gave up most of their lunch time to rechain it a second time.

The crew went back to camp for lunch after a group picture in the open field with better light. Washington Magazine wanted to meet the retracement crew in camp for a photo opportunity and to get some material for a story. Camp life, horses, packer and crew soon were immobilized on the super fast film of the professional photographer. The anchor bolt starting corner was dug out and replaced with first a scribed fir post, another photo opportunity, and then with a Washington State alloy monument. The monument was tied to new scribed Bearing Trees and after a few more pictures, the crew headed back to the field where the line had ended at about 9:00 A.M. for lunch and pictures.

The morning chaining crew now changed places with the line flagger and brushing crew. Word of mouth directions and advice helped to make sure that the new crew would get the benefits of the best system to chain by. They soon found that new chaining situations created new problems and new "perfect" systems to solve the problems.

Offsetting back to the line, the timber was entered with a fresh crew. Leaving the Lucas Creek area up the hill and along the next ridge, the crew proceeded to the area of the quarter corner between Sections 36 and 31. When it was reached, the line was 133 links west of the corner. After head scratching, it was determined that the variation for the compass should be over 20½° East. The chaining wasn't bad, however, at an average of 39.87 chains for both crews. (G.L.O. call, 40.00 chains, of course.)

The section corner awaited, so off the line crew went with the new variation (declination) set on the compass and the new men on each job. When the time came to head back to Lucas Creek Road and be picked up at 5:00 P.M., the crew had retraced forty-five chains, set one corner and scribed one post and four Bearing Trees. It was estimated that William Ives crew accomplished the same amount in two hours.

After a leisurely trip to the new camp site on the Newaukum River valley floor by vehicle, the experiences of the day were recounted with a cold beer in hand. On the way in to camp, the sun had finally appeared from behind the clouds and the first solar reading with the compass was obtained. The correct variation should have been 20° 35' East.

(Editor's Note: Darrell had to leave for two days at this point, so *his story will conclude in the next issue. Please refer to the other stories for additional information.)*

"REFLECTIONS. . ." (Continued)

BOB LANDON'S MEMORIES

As an associate member of the Northwest Chapter of LSAW, I felt greatly honored when I was allowed to accompany such illustrious surveyors as Denny (Surveyor of the' Year) DeMeyer and Dave (The Grey Fox) Jolly into the vast, untamed wilderness to "follow in the steps" of the original surveyors.

Little did I know that Deputy Surveyor DeMeyer had chosen a section of the Meridian that was surpassed in ruggedness only by the Himalayan Range in Nepal. However, after the first painful day of trying vainly to keep up with Dave (who is several years my senior), I decided that I would not dishonor good old B.V.T.I. and just try to keep up with the younger members of the crew.

We camped on the site occupied by the original surveyors (according to Denny). My luxurious accommodations were on the ground in the rain - very authentic except for the foam mattress and down sleeping bag. We awoke early - if we slept at all - and ate breakfast (the second of many memorable meals prepared by our two wonderful camp cooks) and proceeded forward through hill and valley, up hill and very little down. I was very impressed by the accuracy obtained using the old survey equipment and gained a new respect for the old surveyors who originally traversed this impenetrable wilderness. I was also much impressed by the new surveyors who so willingly and cheerfully gave of their time to make the Retracement the success and memorable experience that it *Was.* I am sure that we all came away with a better understanding of why we occasionally find discrepancies between the original notes (done under conditions that we now appreciate all too well) and the distances that we achieve using electronic distance measurement and theodolites. Also the axemen will bless the person who invented the chainsaw after five days of whaling on vine maple and devil's club with an axe.

In retrospect - after a suitable period of recuperation I enjoyed the project and look forward to the next time (if they'll have me) we venture forth to "retrace the footsteps" of history.

(Editor's Note: Bob Landon, you will remember from Denny's story is Surveying Instructor at Bellingham Vocational Technical Institute.)

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TOM STARR'S MEMORIES

This is a little report on my impressions of the "Old Timey" survey which I joined last August.

It was one of the richest historical and surveying experiences I have had. Being a frequent user of the original 1874 G.L.O. notes in my area, the San Juan Islands, I have always been curious as to just how the surveyors and equipment of 1874 operated. My job on the "G.LO." crew, as a rear chainman on the 33-foot Gunter's chain, gave me a real appreciation of how much work was involved in measuring a mile (160 pulls of the chain). Crashing through the woods and underbrush plus keeping track of the chaining pins and tally knots, proved to be a challenging job! Quite different than today's distance measurement techniques using Electronic Equipment and hopping several thousand feet per shot.

Another highlight of the trip for me was the fellowship and camaraderie with the other surveyors. It was a real opportunity to get to know the other surveyors in my area better. A real bond was made after working hard together in the woods all day and sharing experiences around the campfire that evening. Needless to say, I was "pooped" after a day of "G.L.O." work. Now I will have an even greater appreciation for the old crews when I read the number of "North 40 chains" entries in their notes.

It was a "once-in-a-lifetime" experience - being able to travel back in a surveyor's "time machine" like we did.

Thanks to Denny for setting up this trip. Thanks also to the others who helped you - your wife, Delores, Bob Landon for his photos, Harry Land and his wife, June, for the horse packing and the other fine surveyors who went along. I shall treasure the memory of this trip always.

(Editor's Note: Tom Starr is a *principal with Krabbe & Starr, Inc., Civil Engineering and Land Surveying in Friday Harbor, Washington.)*

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ROYCE HILL'S MEMORIES

I have always been impressed by and proud of the original government surveyors and the work they performed. Considering the circumstances of their surveys, they did a tremendous job and hopefully, surveyors of the future will be able to say the same thing about us.

My own experience in surveying has included a considerable amount of time on retracements of original surveys and tracking down the old corners. Since it is hard to call up the original surveyor on the A. T. & T., and all we have to usually go on is the bare bones written record stating what the original surveyor "said" he did or what he was supposed to have done, which, in the case of the rugged mountains of the Northwest, mayor may not be the case, it becomes necessary to speculate on just exactly what took place back then. The G.L.O. retracement project helped to give me a better understanding of how one of those surveys may have been done, and provided information on the field procedures and accuracies attainable using the same tools as the original surveyor.

Specifically, I learned what a remarkable instrument the solar compass is. It is nothing more than a mechanical solution to the altitude method of solar observation and solution of the PZS triangle. Set the knobs in the correct positions, line up the sun, and presto, there is North. Simple to use and accurate.

As an 1851 illiterate chainman, I learned that you don't drag the chain, you carry it with both ends suspended, which, it turns out to be, is no problem. Distance is kept track of by chaining pins for chaining and knots pulled through a piece of leather for tallys, which makes distance measurement easy. When you run out of knots" you've gone 40 chains, set a corner.

However, I did my best to keep track of the topo calls by memory, as an illiterate chainman would have done, but I had a heck of a hard time remembering exactly how far it was to that creek and that spur when the Deputy Surveyor asked me later on that same day. This settled the argument, as far as I'm concerned, as to why a lost corner should be reestablished by proportioning from the nearest original corners as opposed to using distant topo calls as is sometimes done in this area.

As far as accuracy goes, I was impressed by our chain

ing, we generally fell within just a few links in distance to what the other chaining crew got and what the original surveyor got.

Thanks Denny and Delores for making this all possible. You put a lot of work into it and we all appreciate it. I wouldn't of minded staying out there for another six months or so.

(Editor's Note: Royce Hill is with Ray Weden and Associates in Bellingham.)

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JERRY OLSON'S MEMORIES

First of all, thank you, Denny, for all your efforts to organize the commemorative retracement. I thoroughly enjoyed myself and was happy to participate.

For the 25+ years I have been doing cadastral retracement, I have often wished for the opportunity to go back in time and work with a G.L.O. crew just to see where they set those corners and unravel some of the mysteries. The next best thing is to simulate the conditions and use their pro cedures and equipment.

Here are. some of my specific comments and thoughts:

1. Chaining - *We were much more accurate than I* thought we could be. At least the separate crews were consistent between themselves. During my time chaining, I tried remembering the topographic calls, and did so fairly well. However, this was only for 20 chains and I did not keep track of what directions the breaks, ridges, roads, or creeks were going. I don't think you could correctly remember all of that. Some people unfamiliar with topographic calls dealing in chains made significant errors, even between crew members. Everyone made mistakes. Most were found and corrected by redoing the questionable part, but I wonder if G.L.O. crews would have redone anything. Darrell and I on two occasions forgot to pick up chaining pins, for when we ended a tally, we had only 8 or 9 pins, and had to walk back on line to find the missing ones.

2. Solar Compass - Ever since I took a short course on the solar compass from Bud Uzes, I have wanted to use one under field conditions. It was all I expected and more. Once it was adjusted it was as easy to set up as a staff compass and certainly as quick to read. It was a lot heavier and bulkier to carry. You had to be very careful walking with it for you knew if you fell it would be knocked out of adjustment. Since it rained while I was working. maybe I'll comment on magnetic variation. When the survey started we didn't have a chance to do a solar to determine the variation. No one was from the immediate vicinity and a discussion led to a guess as to what the variation might be at Chehalis. Estimates ranged from 19° to 23¾° with 21½° being a compromise. The first 40 chains were run on the needle and we missed the corner by 130+ links. If the two corners were oriented at cardinal, the variation would have been 19½°. A solar shot that evening showed the variation at camp to be 20½° and we used that the next morning, for it was still raining and cloudy. The next 40 chains were run and missed by about 30 links. I guess what we learned was that if lines were run on the needle, (and most were), reasonable accuracy might be developed if a solar compass were used to occasionally check the variation. If just a staff compass were used, a guess would be made about what the variation should be in that vicinity.

3. Supplies - John Trutch (G.L.O. Surveyor, c. 1854) wrote that he had to pack all of his supplies on the backs of his surveyors. They may have had horses to get them close, but the West side of Oregon and Washington required trails to be cut and they had no time for that. In the subdivision of townships, they probably established 3 or 4 camps and worked out of those. Horse packing would have been nearly impossible on the line we ran.

4. Production - When we were working and not practicing, our 8-man crew was getting about 10 chains an hour. By their record, the G.L.O. crew was going 25-30 chains per hour. We were able to do very accurate (by G.L.O. standards) work at our snail's pace. Also, our production didn't include the time it took to scribe posts and trees. The one corner we did properly took nearly an hour. Several factors may explain the differences. a) They were in better shape than us and worked harder. b) They did not brush for the chainmen but only to give line for the compassman. c) Liberal use of "sight trees" must have been made. Some time I would like to see how crude of a survey needed to be made to match the production listed for a G.L.O. crew. We all know how long it takes to properly set references and describe a G.L.O. corner, but I didn't realize how long it would take to do it by the 1851 manual. The original G.L.O. crew did 8 in the one day in which we retraced. If you are in a hurry, errors abound and they did.

Thanks again for the experience.

(Editor's Note: Jerry Olson is the principal of Olson Engineering, Inc. in Vancouver, Washington and was appointed to the State Board of Registration for Professional Engineers and Land Surveyors by Governor Booth Gardner shortly after the retracement and the WFPLS convention at Portland. See November, 1985 *issue for details.)*

Well, what do you think, readers. Is this the type of material you want to *see* in *your magazine. How about letting* me *know. Write* to *the Editor - today!*