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UNITED STATES
DEPARTMENT OF THE INTERIOR
ALASKA ROAD COMMISSION
Juneau, Alaska

January 25, 1956

A.R.C. MEMORANDUM NO. 130 (Revised)

Subject: Farm Road Surveys

The purpose of this revision of A.R.C. Memorandum No. 130 is to set forth the newer concept of these surveys as discussed at the 1955 Resident Engineers' Conference; to incorporate various pertinent instructions issued by the Survey and Road Design Branch under the general heading of Cadastral Work; and to establish new standards. This is intended as an interim memorandum pending completion of a combined Engineering Manual, and will be revoked when the Manual is published.

The accurate survey of farm roads and preparation of as-built plans has a dual purpose. The first is to provide the Alaska Road Commission with record plans of alignment, grade, structures and adjacent property. These should be brought up to date annually, recording revisions and improvements made during the year. The second purpose is for filing definite location of each road with the Bureau of Land Management, as required in Secretarial Order No. 2665, dated October 16, 1951. Under this Order we have a clear obligation to complete plans for every road and to record them.

Previous requirement for accuracy of survey was a precision of one part in five thousand. Analysis of this requirement reveals that it is neither realistic nor necessary to demand such precise work. The new required order of accuracy will be that termed Class 2, with angular error of closure not to exceed 1 minute times the square root of the number of angles turned, and linear error of closure not to exceed 1 in 3,000. This order fits the middle of the allowable range of accuracy required by the Bureau of Land Management for Class 2 surveys, which include the public survey of agricultural lands and small tracts.

Even with this lowered degree of accuracy, all chains used must be compared to standard, and the temperature at the time of survey taken into consideration. If the combined linear error from these two sources approaches or exceeds the allowable linear error of 1 in 3,000, correction must be made for either or both, depending upon the circumstances.

An accurate determination of true bearing must be made for every survey, either by means of triangulation ties to two U.S.C. & G.S. monuments of known geographic position, or by astronomical observation. The derivation of bearing must be shown on the first sheet of plans for each specific road. The data should include the determined true bearing taken to the nearest second, but bearings shown thereafter on the plans or used in traverse computation may be taken to the nearest 30 seconds.

When the survey is a retracement of an existing road, every effort shall be made to exactly duplicate the centerline by splitting width on tangents and computing curves that fit. All curve data shall be computed by Lefax curve tables utilizing the Harger and Bonney curve.

Accurate ties must be made to B.L.M. section and quarter section corners adjacent to the road. In general, such ties should be made each mile, but if corners are difficult to recover, this distance may be extended up to five or six miles. If ties are being made each mile, they may be made on one side or the other and not necessarily on both sides of the road. Wherever possible, ties should be made by triangulation from two points, using the centerline as a true base, or, if from different tangents, a computed base. The transit work should be carefully performed. If obscured vision prevents this method, angle and chain ties will be necessary. All ties made must be indicated on the plans.

The station at which each section and quarter-section line crosses the centerline of the road must be established. This will usually be accomplished by computation of coordinates based on our survey, combined with B.L.M. record bearings and distances where required, and solving for intersection by either north-unknown or triangle calculation. If there is not too much field work involved the point of crossing may be established by transit and chain. The station and angle of crossing shall be indicated on the plans, and the distance to the adjacent corner shall be followed by "(calc.)" or "(ch.)" to indicate method of tie.

Office calculation of closures, based on a combination of our survey and B.L.M. record bearings and distances, must be performed immediately after making the survey in order to detect errors and recheck closures exceeding the allowable amounts. Such calculations must be made on our standard traverse form, using 7-place natural tables, and all calculations must be checked by a second engineer. The point of beginning will ordinarily have zero-zero coordinates, and all four quadrants may be used in the latitude and departure columns. Chainage and computed distances may be taken to the nearest tenth of a foot, provided this does not introduce error exceeding the allowable. If a recheck fails to establish the error in our survey, it will be assumed that the error lies in the B.L.M. layout of the sections. It will not be necessary to resurvey the section lines, but the error of closure and the fact that our work was rechecked must be noted on the plans.

All survey parties making ties to section and quarter-section corners shall be supplied with a tablet of blank forms issued by the Bureau of Land Management entitled, "Report on Corners of Cadastral Survey Grid". A form shall be completed in duplicate for each corner encountered by our party, indicating condition and other pertinent information. Upon the conclusion of a particular survey the originals of this form shall be transmitted by the District to the nearest office of the Bureau of Land Management. The transmittal shall state the name of the road being surveyed and shall include a tabulation of the corners by position, section, township, range, and meridian; and a copy of the transmittal shall be forwarded to the Survey and Road Design Branch at Juneau. The duplicates of the form shall be filed with the field notes in the District office.

The as-built plans for each road shall be prepared in the same general manner as our design plans for contract construction.

A standard master title sheet, similar to our standard contract title sheet, should be drawn up for use on each of the roads in a given area. This should be at the scale 1":1/2 mile and cover as large an area as the sheet permits, showing the whole road system. Cloth reproducibles should then be made, one for each road. The name of the specific road will be inked in heavily in the upper center of the sheet, the road heavied up with ink on the map, and an arrow brought from this point to a box in the lower center. This box will carry a summary showing length in feet and miles, type, and year of construction. Space should be provided for future addition to this information. The regular approval box should be shown in the lower right-hand corner. The Chief Engineer will approve all plans subsequent to final checking in Juneau and prior to filing prints with the Bureau of Land Management. Additions by later construction to an approved set of plans may be noted by date on the Index of Sheets, and such additions will be initialed for approval by the Chief Engineer.

A standard typical-section sheet should be prepared, showing a skeleton typical section with all dimensions left blank. A cloth reproducible will be made for each road, and the specific dimensions for that road inked in. The skeleton section and dimension lines should be rather open to leave ample room for addition of specific information. There will be room on this sheet for any special details peculiar to the road in question.

The plan sheets shall be standard Federal Aid cloth single plan and profile sheets, plotted to a scale of 1":100' horizontally and 1":10' vertically. The point of beginning should be from 10" to 12" right of the left-hand edge of the sheet, allowing space for noting the details of derivation of true bearing, and any other pertinent data. Section corner symbols shall be the same as shown on B.L.M. form "Report on Corners of Cadastral Grid". Whenever it is possible for the District to determine the right-of-way widths, these should be shown on the plans. Use a thin solid line on each side of centerline, positioned accurately by scale, and note by dimension and arrow the distance from centerline to each R/W line. Dimensions must be shown at the beginning and end of each sheet and at all changes in R/W width. The balance of the detail shall conform with all requirements for preparation of contract plan and profile sheets, except for the omission of quantities. All drainage structures should be shown.

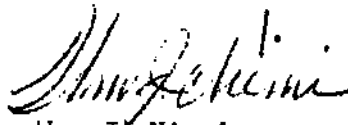
It is realized that until we are current with this program, the plan details may often be completed before much information has been placed on the profile. As soon as the plan portion is complete for any specific road, reproducible copies should be forwarded to Juneau for review, approval and filing with the B.L.M. This work should be expedited by the Districts since we are constantly falling behind in our requirements to make record filing.

The cadastral form J-GEN-110, Centerline Location, will no longer be used except in very special cases. This was developed for use on the through system in specific areas where there was a need for cooperative work for the Bureau of Land Management. This particular phase of our as-built work is now complete.

As-built plans for contract construction on all roads shall carry the required plan information specified herein for farm road surveys. This particularly includes derivation of bearing and tying of corners. In addition, on jobs of any appreciable length, bearings shall be adjusted at appropriate intervals for convergency, and the point and amount of adjustment shall be shown on the plans.

All location surveys in the future, whether for force account or for contract construction, shall adopt the same methods as outlined above. This will enable us to make our preliminary filing with the B.L.M. at the time of initiating construction, which is the most desirable procedure. A final filing will be made when as-built plans for the project are finished.

It will still be necessary to prepare special plats for all roads crossing School Sections as outlined in the memorandum to District Engineers from the Chief of the Engineering Division, dated January 18, 1955. The requirements of this memorandum should be reviewed from time to time, and the program of plat preparation kept current.



Wm. J. Niemi
Chief Engineer

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January 25, 1956

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UNITED STATES
DEPARTMENT OF THE INTERIOR
ALASKA ROAD COMMISSION
Juneau, Alaska

April 13, 1953

A.R.C. MEMORANDUM NO. 130

SUBJECT: Farm Road Surveys

Under the provisions of Secretarial Order No. 2665, dated October 16, 1951, it is necessary to submit plans and specifications for all farm roads to the Bureau of Land Management for right-of-way purposes.

Alignment surveys must be made to a precision of at least one part in five thousand for all future farm road construction, and in no case inferior to the limits of closure required during the survey of the land closed upon. As the alignment survey is run, complete ties must be made to all adjacent Bureau of Land Management survey monuments and all private property corners. In making ties to Bureau of Land Management survey corners, it is essential that the exact intersection of the road centerline with the section line or other B.L.M. survey line be obtained. Ties are also to be made to available U. S. Coast and Geodetic Survey and U. S. Geological Survey monuments to aid in checking positions and bearings. If alignment surveys of the above precision have not been made for farm roads previously constructed, such surveys should be made as soon as possible. Surveys of the same order should be made for all farm roads to be built during the 1953 season and thereafter.

As soon as necessary surveys covering previously constructed farm roads are made, the alignment shall be plotted to a scale of 1 inch = 400 feet and forwarded, with the original field notes, to Headquarters for review and transmittal to the proper land office of the Bureau of Land Management. In plotting, it is essential that all ties to Bureau of Land Management, private property, and other survey monuments be shown.

At the end of the 1953 and succeeding construction seasons, alignment maps and original survey notes for all farm roads constructed during the season shall be forwarded to Headquarters for review and filing of maps as above.

Wm. J. Niemi
Wm. J. Niemi
Chief Engineer

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