**PROPOSED**

**AKSAS Project No.: 52796**

Date Prepared: 12/14/10

**STATEMENT OF SERVICES**

**APPENDIX B**

**Term Agreement for Surveying and Mapping Services**

**HIGHWAYS and AIRPORTS**

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**ARTICLE B2**

**GENERAL CRITERIA FOR SURVEYING AND MAPPING SERVICES**

**B2.1** The Contractor shall perform the services to standards called for in the Alaska State Professional Land Surveyors (ASPLS) Standards of Practice, the California Geodetic Control Committee (CGCC) Standards for Band IV surveys, U.S. COE Manual EM-1110-1-10000 for Photogrammetric Mapping, or the DOT&PF Construction Surveying Requirements, as appropriate to the services being performed. California Geodetic Control Committee Standards can be found on the Web at: <http://www.rbf.com/cgcc/>. U.S. COE Manual EM-1110-1-10000 can be found on the Web at: <http://www.usace.army.mil/usace-docs/eng-manuals/em1110-1-1000/toc.htm>.

All studies, reports and services shall be performed in accordance with applicable codes, regulations and standards; professional practice procedures; and commonly recognized surveying and mapping methods. All documents including reports, computer printouts, half size Survey Control Diagrams or Sheets shall be bound and indexed in a three-ring binder, with the job name listed on the spine and cover. No loose-leaf papers will be accepted. The Contractor shall not begin surveying for design, surveying for right-of way, or right-of-way mapping without specific written authorization from the Contracting Agency.

**B2.2** The Contractor shall consider the geographical location of the project as well as other environmental and site specific constraints when performing services for this project.

**B2.3 Registration.** All survey services shall be conducted by, or under, the direct supervision of a Professional Land Surveyor (PLS) holding current registration in the State of Alaska. A Land Surveyor shall be an active, on-site field supervisor of the survey crew. A Land Surveyor shall also be directly involved in the preparation of the Base Maps, Right-of-Way Maps, and Parcel Plats. The field books, horizontal and vertical control summaries, survey control diagram, adjusted coordinates, TIN certification, survey control sheet(s), final centerline control, and all final maps and plats shall be sealed, signed, and certified by the PLS responsible for the accuracy and completeness of the services.

**B2.4 Field books**. The Contractor shall furnish hardbound field books for recording survey information. The books shall become the property of the Contracting Agency after the survey information has been entered and the contract completed. Each book shall be labeled with the project name and an appropriate title, e.g. Horizontal Control, Vertical Control, etc., and shall have an index and comments page. The index page shall reference the contents by page number. A readable PDF copy of the field books is acceptable.

**B2.4.1** Field notes shall be kept in a neat and orderly fashion. All pages shall be consecutively numbered, showing date, weather, and crew names. All abbreviations used shall be described on the comments page. Sketches are to be used frequently and shall be detailed enough to assist in following the progression of the services. Notes and sketches shall be adequately detailed to convey their intent to a person who is not familiar with the project.

**B2.4.2** Descriptions of all monuments or other points, recovered or set, are to include the data stamped on the monument and the condition of the monument. Two digital photos are required of each point found or set. The first is a close up of the cap, and the second is a general location picture, with some sort of reference like a tripod over the point. Name the photo electronically according to the DOT point numbering scheme, or by an identifier that is on the cap. Example: GPS point “VAN DUSEN” would be VAN DUSEN.jpg or 551.jpg, if that were it’s number on the Survey Control Diagram. A list of all corners searched for, but not recovered shall be included in the field notes. The DOT&PF Construction Surveying Requirements details the general note-keeping procedures.

**B2.5** U.S. Customary System of Measurement (foot units) shall be used throughout development of the project. Any metric conversions required shall be based upon the U.S. Survey Foot (3937 feet = 1200 meters exact).

**B2.6 Drawings, Plats, and Maps** shall be prepared in electronic format as specified by the Contracting Agency (currently 2011 Civil 3D compatible format).

**B2.6.1** Unless otherwise stated, the format and standards for all drawings will be according to the most current DOT/PF Central Region Design Drafting Manual (Consult your DOT Project Manager). These standards are available upon request or via the ROW Engineering FTP site. The plotted scale shall be as specified by the Contracting Agency.

**B2.6.2** Drawings shall be produced and provided in English (foot units) format. Distances will be shown in horizontal ground foot units. Areas shall be annotated with “Ac.” for acres, and “sq. ft." for square feet. Metric units shall not be shown on drawings developed for design work, unless requested to do so by the Contracting Agency.

**B2.6.3** All linework and lettering must be of professional quality and all line widths and lettering sizes must be of such size that all information can be clearly shown without overlap or confusion. All lettering must be a minimum size of 0.1 inch at a full-scale plot. Lettering and linework must be in the appropriate black drafting ink. AutoCAD style names and fonts shall follow the Contracting Agency’s specified standards. See the current Design Drafting Manual (B2.6.1)

**B2.6.4** Linework shall not run through text. Do not break lines at text; mask the linework using color 155 solids. Solids shall be placed on the same layer as the text that the solid lies under. AutoCAD’s Express Tools “textmask” may not be used.

**B2.6.5** Drawings are to be accurate models of the data shown, e.g.; a line labeled N 10°00'00" E 104.35’ shall be electronically drawn exactly as labeled, a line that is shown to terminate at a monument symbol shall be electronically drawn with no distance between the endpoint of the line and the center of the symbol, etc.

**B2.6.6 CAD Drawing:** All work within Model Space shall be color by layer. The drawing shall be purged before submitting. Zoom to extents and remove any extraneous features. Remove all empty layers. Check to ensure that all symbols are the same scale, which should be the plotted scale of the drawing. A standard DOT&PF north arrow, a legend depicting symbols used, a foot unit bar scale, the drawing file name, date of last edit, and standard DOT&PF border will be included on each sheet within the drawing.Visit our FTP site for an updated English DOT&PF border.

**B2.6.7** Plans, Maps, and Plats shall be submitted electronically and with solid black ink on 22” x 34” original vellum or mylar. **Final drawings** shall be on mylar unless another medium is specifically called for in the Contract. All final drawings shall be plotted so that the ink is on the front surface of the Mylar. No Kroy lettering or "sticky back" applications shall be used.

**B2.6.8 Drawings** not meeting these standards will be rejected. All drawing files shall be submitted electronically to the AK DOT&PF Survey Manager upon completion for review. The contractor shall perform their own internal review of these products before delivery, to see that Department standards have been followed.

**B2.7 TINs:** The format for TINs is Civil 3d TIN format with fault lines as 3D polylines and the boundary as a polyline at elevation zero. An AutoCAD drawing or DXF file with the TIN as 3-D faces is an acceptable alternative; include the TIN boundary as a closed polyline at elevation zero, and the fault lines as 3D polylines. All TINs produced shall be checked by ground based survey methods and by field inspection of contours generated by the TIN.

A TIN certificate shall be submitted, signed, and sealed by the responsible PLS and shall contain the following: 1) the methods used to gather data for production of the TIN(s), 2) the accuracy of the TIN(s), and 3) the checks used to substantiate the accuracy of the TIN(s). All ground based TIN(s) shall be field checked before final submittal, and this shall be stated on the TIN(s) certificate. All aerial TIN(s) shall be checked by a Registered Land Surveyor, not associated with the production of the TIN(s), using withheld Topographic points randomly collected throughout the TIN(s) area. A minimum of 50 points shall be collected. Provide a spreadsheet showing the elevation differences from the TIN(s). A sample certification of TIN is available from the Contracting Agency’s Survey Section.

**B2.8 Coordinate Files** shall be comma-delimited ASCII text files. Data shall be in the sequence Point Number, N, E, Z, and Description. Coordinates shall be given to eight decimals for the Northings and Eastings, and three decimals for elevations. Points of unknown elevation shall have a placeholder of -9999 in the Z position. Descriptors are to be case sensitive, e.g.: Rebar5 shall not equal REBAR5. See surveying for Right of Way B3.3 for property corner descriptors.

**B2.8.1 Point Numbering Scheme.** The following point numbering scheme shall be used:

|  |  |
| --- | --- |
| Range | Use |
| 1-100. | Primary Control Set (main project traverses) |
| 101-300 | Baseline Control (set PIs, PTs, etc.) |
| 301-400 | Aerial Control Panels or Naturals (HV’s) |
| 401-550 | Secondary Control Points |
| 551-600 | Recovered Published Hz. Control (NGS, GPS, etc.) |
| 601-700 | Set or Recovered Vertical Control |
| 701-2000 | Fnd Mons/Prop Cors |
| 2,001-5,000 | Computed/Protracted Points |
| 5,001-20,000 | Topography Survey Points |
| 20,001- | Reserved for use by DOT&PF |

The Surveyor shall ensure that point numbers used in this task do not conflict with point numbers used in other survey tasks on this project.

**B2.9 Electronic Data** (drawing files, coordinate files, reports, etc.) shall be submitted on CD ROM.

**B2.10 Quality Control** shall be performed by the Contractor prior to all submittals. Three dimensional backsight checks shall be recorded at the beginning and end of all instrument setups. Three dimensional coordinate checks shall be recorded at the beginning and end of an RTK GPS work session, for those who are approved to use this technique (see B3.2.1.3). These checks shall become part of the submittal, labeled as “Quality Control Checks”. The Contracting Agency will **reject** submittals that do not substantially conform to the requirements of this statement of services.

**B2.11 Reviews.** Draft documents required under this agreement shall be submitted to the Contracting Agency Project Manager for review. The Contractor shall allow three weeks for the return of written comments. The Contractor shall address these comments to the satisfaction of the Contracting Agency prior to submitting the final documents. For maps and drawings, the Contractor shall submit a copy of the project coordinate file with point descriptors and the AutoCAD drawing file along with the final survey point plot.

**B2.12 Submittal Delivery.** Deliverables shall be submitted to the Contracting Agency in accordance with the negotiated schedule.

**ARTICLE B3**

**SURVEYING AND MAPPING SERVICES**

**B3.1 OVERVIEW**

**B3.1.1** **General.** The Contractor shall research records of surveys applicable to the requirements of the assigned project and perform all necessary field and office survey services necessary to collect surveying data and to reduce the collected data to a form useful for the Contracting Agency’s project engineering design and right-of-way mapping.

**B3.1.2 Survey Limits.** The survey limits are defined within the Request for Proposal.

**B3.1.3 Survey Services** shall be performed in the following sequence unless otherwise directed by the Contracting Agency:

1. Research
2. Pre-Work Meeting with ADOT&PF
3. Control Survey
4. Aerial Photography/Photogrammetry
5. Topographic/Planimetric Survey
6. Bridge Site(s)/Drainage Survey
7. Special Features
8. Right-of-Way Survey
9. Monument Centerline

**B3.2 SURVEYING FOR DESIGN**

**B3.2.1 Control Surveys** include establishing horizontal and vertical control points from existing monuments, from survey control points previously established by the Contracting Agency, and/or from points newly established by the Contractor, and also includes locating and establishing project coordinates for the existing centerline and any monuments within the project survey limits. The Contractor shall prepare a Survey Control Diagram (SCD) in AutoCAD format showing the results of the control surveys. The Survey Control Diagram will be a recorded document, and as such, will need to meet certain criteria. Prior to submitting any data for design, the Survey Control Diagram shall be submitted, along with supporting documentation, for review and approval. All points used or tied as a part of these control surveys shall be included in the project coordinate file and shown on the SCD. SCD guidelines are available from the DOT&PF Survey Section. Prior to performing field surveys for the project, the Contractor shall meet with the Contracting Agency’s Locations/Survey Manager, or his designee, to get existing Department control data and to discuss the control requirements for the project.

**B3.2.1.1 Basis of Horizontal Control.** When the primary control traverse is provided by the Contracting Agency, it shall be the basis of control for the project. Any auxiliary control points necessary to augment this control shall be incidental to the task for which it is required. When the primary control traverse is to be performed by the Contractor, the basis of control shall be the NAD83 (CORS EPOCH?) system, and the primary control points to be used shall be decided in discussion with the Contracting Agency’s Survey Section. The NGS OPUS utility shall be used to establish the control coordinates in this case, unless another method has been discussed with the Contracting Agency. Please see B3.2.1.5 for more information. The local project coordinate system to be used shall be based upon transformation parameters supplied by the Contracting Agency.

**B3.2.1.2 Basis of Vertical Control.** When primary vertical control data is provided by the Contracting Agency, it shall be the basis of control for the project. Any auxiliary control points necessary to augment this control shall be incidental to the task for which it is required. When the primary vertical control circuits are to be performed by the Contractor, the vertical datum shall be NAVD 88, as determined by survey ties to existing vertical control points, or in areas with no official control, as directed by the Contracting Agency. Note: A tie to MLLW shall be made for all surveys in or adjoining tidally influenced areas unless specifically directed to do otherwise by the Contracting Agency. The primary control points to be used shall be decided in discussion with the Contracting Agency.

**B3.2.1.3 Horizontal Control Standards.** All horizontal control survey measurements shall be recorded in field books. The books shall also be used to record all measurements and references to control points found or set, section monuments, centerline monuments, and all found property corners. Electronic data collection can be used to record control data, but is not acceptable as the sole data source for survey measurements as this data needs to be recorded in field books for control surveys. Distances shall be measured and recorded in both feet (nearest 0.01 foot) and meters (nearest 0.001 meter) as a check. Recorded angle sets, at a minimum, will contain a direct and reverse pointing of both the forward angle right and the horizon closure angle. When the difference between a direct and reverse pointing of an angle pair exceeds six seconds (ten seconds for distances of 150 feet or less), then that angle pair shall be rejected and remeasured. When the sum of the mean angle right and the mean horizon closure angle differs from 360 degrees by more than ten seconds, that angle set shall be rejected and remeasured. The adjusted angle right (the mean angle right corrected by one half of the difference between the sum of the means and 360 degrees) shall be used for all computations. All foresights and backsights shall be of the fixed leg type. Auxiliary control points and/or monuments may be side-tied, providing that (a) the point is tied from two traverse points, or tied with two different backsight points (that are closed traverse points) or (b) The point is tied from one traverse point with only one backsight provided there is a three-dimensional backsight check recorded in the field book. When there is more than one value, the raw coordinate values for these side ties (calculated from the adjusted traverse coordinates) shall be within 0.10 feet. The final coordinate values for side tied points shall be the mean of the two raw coordinate values or proportionally weighted based on the strength of the observations. Auxiliary control points shall be, at minimum, a PK nail (mag nail preferred) in paved areas or a 6-inch spike in unpaved areas.

All traverses performed for this project shall meet or exceed the standards for Third Order Class I, Traverse Surveys as specified in the Alaska Society of Professional Land Surveyor's Standards of Practice. All traverses shall be closed; beginning and ending at known points with an allowable linear error of closure of 1:10,000 or better. In no case shall ground traverses run greater than 2 miles between GPS controlled points. Static GPS work shall meet current California Geodetic Control Committee (CGCC) Standards for Band IV Surveys. All geodetic positions shall be NAD83 based. Traverse and GPS network adjustments shall be by Simultaneous Least Squares Adjustment methods.

All cadastral, property, or right of way corners controlled with GPS shall be done using Static GPS survey methods. These corners are to be considered secondary control and need only to be occupied once, providing there is a minimum of two vectors computed for the corner position that differ by no more than .10 feet horizontally.

**The use of Post-Processed Kinematic (PPK) or Real-Time-Kinematic (RTK) GPS procedures are not allowed for establishing control, or for controlling cadastral, property, or right of way corners.**

**B3.2.1.4 Vertical Control Standards.** All vertical control survey measurements shall be recorded in field books, unless an electronic digital level is used and the data is recorded electronically, in which case the Contractor shall provide annotated copies of the raw and reduced data. All vertical survey circuits shall meet or exceed the standards for third order leveling as specified in the latest printing of the Federal Geodetic Control Committee's Standards and Specifications for Geodetic Control Networks. All vertical control points shall be part of a closed level loop; side-shots are not acceptable. Each loop shall be adjusted and this adjusted elevation used for any further loops. Loop closures and loop-adjusted elevations shall be shown in the field books. The books shall also be used to record descriptions and sketches of vertical control points found or set, condition of found points, and for electronically recorded data the loop information (start point, point(s) controlled, end point, etc.) necessary to interpret the data. Primary vertical control points (BMs and TBM’s) shall be controlled by differential leveling. Elevations may be established for auxiliary control points by closed trigonometric loops, in which case sight distances shall not exceed 750 feet with foresights and backsights of approximately equal lengths, and the line of sight shall clear obstacles by a minimum of 1.5 feet to avoid the effects of adverse refraction. Elevation differences shall be measured and recorded to the nearest 0.01 foot.

**B3.2.1.5 Primary Horizontal Control.** For Highway Projects or traverses along road corridors, GPS control points shall be set at approximately 2 mile intervals within the project limits, in areas where they may be easily traversed in and out of. These points shall be of the same type as the deep rod stainless steel monuments as described in this section under “For Airports”. Additional intervisible traverse points, as needed, shall be set at maximum 2640 foot intervals, and shall consist of a minimum 5/8 inch x 30 inch rebar (5/8 inch x 10 inch in pavement) with identifying cap. These points shall be located off of the existing paved surface wherever possible, and shall be set at least 0.1 foot below the existing ground surface.

All GPS control points shall be referenced by two secondary monuments or by one secondary monument with a defined backsight, set in-line and roughly perpendicular to the direction of travel, and set in such a manner that they may be expected to last through construction of the project. The reference data shall be recorded in field books, with sketches showing the area in the vicinity of the point in detail, reference distances recorded to the nearest 0.01 foot (nearest foot for defined backsight), and an angle turned from the traverse line to the reference line. All primary horizontal control points and reference points, found or set, shall be shown on the SCD.

For Airports there shall be a minimum of three deep rod monuments, or in areas of permafrost, three dig in stainless steel monuments, set near the airport and outside the construction limits. The type of monument shall receive approval from the Department’s Survey Manager. These points shall be used for both the project horizontal and vertical control. A 9/16” stainless steel rod shall be used for these deep monuments. A minimum 4 inch well case of length 2.5 feet shall be set around each monument with a protective cap and marker post. These points shall be driven to a maximum of 40 feet or refusal, whichever is less. ADOT will provide the caps for these points. An acceptable alternative would be to cement a cap into a solid rock outcropping or bedrock.

The Contractor shall prepare a narrative horizontal control summary detailing the datum, primary control points used, Basis of Bearings, type of adjustment performed and statistics, problems encountered during the survey, equipment used, etc., which shall include annotated copies of control computations and control adjustments, and a horizontal control statement. For GPS control surveys, the Contractor shall also provide a RINEX2 format data file of at least 8 hours of GPS data for at least two control points for at least two different days in the Contractor’s control network. **The Contracting Agency recommends logging as much data on as many different days as possible to account for any solar disturbances or other unanticipated problems that might occur**. These GPS files for the deep rod control points shall be sent to the NGS site and post-processed using the OPUS utility (see the exception below). OPUS will only accept dual frequency data up to 24 hours in length. The length of the observations is directly related to the distance from the CORS stations and should be discussed with the AKDOT&PF Survey Manager. The OPUS reports shall become part of the horizontal and vertical control summary. A mean horizontal and vertical value for the point with the smallest differences shall be computed and held as control for the network. The other OPUS point shall be used as a check. The most current Geoid model that is available for Alaska shall be used to compute a pseudo NAVD 88 elevation for the held point. Differential levels shall be run from the held control point to the other two so that a good vertical network exists between the three points. Exception: It is possible that only one CORS site will be held to establish the CORS value at a given location. The remoteness of possible work locations throughout the state make holding only the nearest CORS site a viable option, in which case the Contractor will have to do their own processing.

**B3.2.1.6 Primary Vertical Control.** For Highway Projects or Projects along road corridors, primary vertical control points shall be established every ½ mile or less. Existing official bench marks (BMs) shall be used wherever possible, with intermediate temporary bench marks (TBM’s) established between them. These TBM’s shall be stable objects such as luminaries’ and signal pole base bolts, spikes in trees, etc. **Wooden utility poles and traverse points shall not be used for TBM's.** Where no permanent official bench marks exist, the Contractor shall establish a minimum of two **permanent bench marks** per project site, or one per mile, whichever is the greater number, for use through project construction. Permanent bench marks shall be at a minimum, 9/16 inch stainless steel rod driven 40 feet or until refusal into dry ground, encased by a 2.5 foot section of 4 inch well casing buried 3 feet into the ground with a rubber cap covering the top of the pipe, or a brass cap cemented into rock outcrops or stable concrete structures, e.g. bridge abutments or building foundations and walls. These points may also satisfy the requirements for Horizontal control, under section B3.2.1.5. A marker post shall be placed near each permanent benchmark, found or set. Refer to the NOAA Manual NOS NGS 1, Geodetic Bench Marks for recommended guidelines for setting permanent benchmarks.

For Airports see B3.2.1.5

Primary vertical control points, found or set shall be described in great detail, identifying the particular physical feature used for the elevation point, and sketches shall be made to aid in this effort. Instructions sufficient to enable someone unfamiliar with the project to find these points shall be recorded; these instructions shall include distances and directions from recognizable terrain features such as major intersections, bridges, buildings, etc. All primary vertical control points, found or set, shall be tied to the project horizontal control and shown on the SCD.

The Contractor shall prepare and provide a narrative vertical control summary detailing the datum, primary control points used, vertical network adjustment data, problems encountered during the survey, equipment used, etc., which shall include a benchmark data sheet containing the name, description, final adjusted elevation, and instructions for finding each primary vertical control point, and a vertical control statement.

**B3.2.1.7 Monument Ties.** The Contractor shall locate and verify all monuments within the existing Right-of-Way limits and the proposed construction limits. If the Contracting Agency previously performed a field survey tying monumentation, the existence of these monuments shall be field verified. This will insure that the Contracting Agency can comply with the provisions of AS 19.10.260 and AS 34.65.040, and enable an estimate of quantities to be made. Examples would be Rectangular or Centerline monuments. In the event there is no Right of Way survey performed, these corners will need to be surveyed using the methodology described in section B3.2.1.3, so their position can be accurately reestablished. These corners are to be included on the SCD, if there is no surveying for ROW, or on the Record of Survey if there is surveying for Right of Way. Other types of monumentation, such as federal control points, shall be surveyed and shown, and can be located with RTK.

**B3.2.1.8 Survey Control Sheet.** The Contractor shall prepare a Survey Control Sheet(s) (SCS) for the project showing the relationship between the final project centerline and survey monuments found in the field. This differs from a Survey Control Diagram (SCD-see section B3.2.1) in that the SCD does not show the final project centerline. The SCS shall be part of the construction plan set and its principal users will likely be Land Surveyors staking the project centerline prior to and after construction or replacing corners that have been disturbed, Contracting Agency surveyors checking that work, and the Project Engineer to ensure that existing monumentation does not get disturbed. Other near-term users may include Land Surveyors who are performing boundary work in the vicinity of the project. **The SCS** **must not be prepared before the final design centerline is known**, typically after the Pre PS&E Review. SCS guidelines are available from the Contracting Agency’s Survey Section.

**B3.2.2** **Photogrammetry.** When directed by the Contracting Agency, the Contractor shall obtain aerial photography and associated photogrametric mapping products. The Contracting Agency shall be granted rights to use of the aerial photography and associated delivered photogrametric products, for our project design and other in-house uses, including transmittal to consultants.

As an alternative to ground surveying, the Contractor may use controlled aerial photography to provide planimetric and topographic information. Use of photogrametric data for this project is subject to the Contracting Agency’s approval. As aerial photography may be used for a variety of analyses, the photography shall be natural color film and have sufficient scale and resolution to allow for the preparation of the photogrametric products, which meet the required accuracies and provide economical acquisition. Aerial photography used for topographic mapping products shall be acquired during leaf-free and snow free conditions. Aerial photography used solely for orthophoto products may be acquired with leaf-on conditions. Existing photography may be substituted for new photography with the approval of the Contracting Agency Project Manager. All acquired aerial photography, and all photogrametric products prepared by the Contractor, shall conform to the guidelines and standards of the US COE Manual EM-1110-1-1000. The Contractor using methods suitable to return the desired mapping accuracies shall control aerial photography used for mapping products. Horizontal and vertical datum for the photogrametric products shall be on the same datum’s as that used for the project control. Any photo pre-mark panel points shall be set and controlled for this task, using the same methods and materials as detailed for auxiliary control points presented above for Horizontal and Vertical Control. The Contractor shall determine the number of, location of, and panel size for these points in conjunction with the firm performing the aerial photography. Each photogrametric control point shall be marked using appropriate panel material. The Contractor shall remove and dispose of all panels set under this contract at the direction of the Contracting Agency. The use of the most cost effective techniques that will provide the specified products is encouraged. All photogrametric products for development of TINs shall meet the format, content, accuracy and certification requirements of Section B3.2.3.1 through B3.2.3.6 unless directed otherwise by the Contracting Agency.

**B3.2.2.1** If aerial photography is acquired for, or available for use on this project, a digital orthophoto, geo-referenced to the project coordinates, shall be provided to the Contracting Agency for use in design. Orthophotos shall be delivered in two formats: uncompressed .TIF with the associated world file, and compressed Mr. Sid image file.

**B3.2.2.2** All photogrametric products will be certified to National Map Accuracy Standards. We recommend that the Contractor provide the firm providing the photogrametric products 50 percent of the data collected to confirm the accuracy of the photogrametric products. The remaining 50 percent will be retained to perform an independent review by the surveyor of the photogrametric products. The data collected and its use will be included in the TIN certification.

**B3.2.3 Topographic Survey.**  Topographic features shall be surveyed using appropriate data collection methods. The Contractor shall provide complete topographic mapping in a single AutoCAD drawing file along with a single TIN upon completion. All points located in these surveys shall be included in the project coordinate file. The use of Post-Processed Kinematic (PPK) or Real-Time-Kinematic (RTK) GPS procedures are only allowed for **topography** if the Contractor submits an observation plan for quality control to the Department’s Locations/Survey Manager, or his designee, and such plan is approved by the Department for use on this project. The Contractor shall:

**B3.2.3.1** **Define the existing ground surface** by creating a Triangular Irregular Network (TIN). The TIN shall be capable of accurately generating 1 foot contours in all areas. Hard shots (pavement, concrete, etc.) shall have vertical accuracy of less than 0.1 foot. The TIN shall incorporate fault lines (grade breaks, existing centerlines, edges of pavement, curbs [flowline and top back], sidewalks, shoulders and/or tops of bank, toes of slope/fill, ditches and/or drainages, etc.) and additional shots as necessary to insure that the TIN accurately represents the **existing ground surface**. The TIN shall not represent water surfaces. Sufficient data shall be gathered along driveways and side streets to allow grade matching. Provide TIN verification in the form of the Contracting Agency’s TIN Certificate. (B2.7)

**B3.2.3.2 Highway projects:** Locate and map all **existing improvements and utilities** (above and below ground) within the survey limits. Mapping of overhead utility wires shall include the apparent low point of the wire sag. Overhead wire crossings shall also be located at the existing and proposed centerlines. Elevations for these points shall be the bottom wire elevation.

**B3.2.3.3 Airport projects:** Locate and map all existing improvements and utilities (above and below ground) and attachments (guy wires, pedestals, stand pipes, load centers, runway and taxiway lights, etc.) within the project survey limits. This includes, but is not limited to, power, telephone, fuel lines, water and sewer lines, cable television, edge of pavement, wind cones, fences, signage, rotating beacons, AWOS, PAPIs, REILs, threshold markers, and other navaids within the survey limits. Wire heights shall be determined where proposed or existing roads, taxiways, or other improvements are located. Heights of towers, antennas and any other structure that could be considered a hazard to aircraft shall be included. Determine location, finish floor elevations, peak roof elevations and a description of all buildings in and within 100 feet of the surveyed area. Locate the first tier of structures lying outside of the proposed airport boundary and within 200 feet of that boundary. Note any historical sites located in this area. Caution shall be used to avoid disturbing any historic remnants, as they are being located within the survey limits. Locate the edge of trees and identify the approximate average height of the trees at the edge. Locate the limits of any apparent contaminated soils and waters within the project area. Tie to any Corp of Engineers flood plain datum’s.

**B3.2.3.4** Locate and map all **drainage structures** within the survey limits. Record diameter, length, invert elevations, structure type and condition, high water marks, and apparent flow direction.

**B3.2.3.5** Locate and map any **other physical feature, natural or man-made**, that could affect the design of the project, as directed by the Contracting Agency.

**B3.2.3.6** After the Contracting Agency has reviewed the provided data, the Contractor may need to **extend the TIN & topographic mapping as specified** by the Contracting Agency for those areas where construction will be beyond the TIN generated earlier.

**B3.2.3.7** Locate and tie, both horizontally and vertically, **all proposed and existing geotechnical sample locations.** The Contractor shall stake the baseline or sample locations as directed by the Contracting Agency.

**B3.2.4 Bridge Site/Drainage Survey.** The Contractor shall perform drainage surveys in the vicinity of proposed channel crossings or major drainages. All work shall be tied to project horizontal and vertical control. Surveys shall be performed as specified in the Preconstruction Manual unless otherwise directed by the Contracting Agency. The Contractor shall coordinate with the Contracting Agency for site-specific requirements. The data collected for these surveys shall be incorporated into the TIN and topographic files, and all shots taken shall be included in the project coordinate file.

For culverts 36 inches and over in diameter, 4 cross sections upstream and 4 cross sections downstream from the inlet and outlet of said culvert shall be surveyed. The spacing of these cross sections shall be equal to the average width of the existing streambed (i.e. 10 feet wide will then have cross sections taken at 10, 20, 30, and 40 feet up stream and downstream). Cross sections shall be taken perpendicular to the existing streambed. Shots shall be taken at: the thalweg, the toe of slope, the edge of existing water, ordinary high water, the top of bank, and one shot past the top of bank. The data collected for these surveys shall be incorporated into the TIN, topographic, and project coordinate files. The Contractor shall perform the following drainage survey work:

**B3.2.4.1** For bridge sites, the line of **ordinary high water** shall be located. The Contractor shall search for evidence of extreme high water and locate it at the existing structure. These items shall be located both horizontally and vertically. The Contractor shall complete the appropriate sections of the Contracting Agency's Bridge Site Survey Form.

**B3.2.4.2** Prepare a topographic map of each bridge site at ***[typically 1 foot]*** contours. Scale shall be at least at ***[typically 1”=100’***], unless otherwise directed by the Contracting Agency. The map shall show the ordinary high water elevation (or mean high water in tidally influenced areas) and indicate the edge of water at the time of the survey. All buildings, dikes, rock outcroppings and other physical features shall be noted on the map.

**B3.2.4.3** Additional data collection for the Hydraulic Report may be required after the design has reached the Local Review stage.

**B3.2.4.4** Prepare a Bridge Site Report, which is a summary in ASCII format noting pertinent information such as horizontal and vertical control basis, date of survey, bridge number, name of water body, ordinary high water coordinate point numbers, extreme high water high water coordinate point numbers, existing structure coordinate point numbers, and note whether body of water is navigable.

**B3.2.5 Special Features.** The Contractor shall collect ground elevation data necessary and stake the location of project specific appurtenances to the roadway (retaining walls, breakwaters, special ditches, turnouts, sound barriers, etc.) as necessary for their design and field review by the Contracting Agency.

**B3.2.6 Deliverable Items.** The deliverables shall be organized on the CD in folders according to the following list. Only submit what is required for your specific project. Do not submit extra information not required by the Department. Name the files and folders according to what they represent. Do not use contractor specific job numbers. CAD drawings should be named in such a manner that anyone can tell what it represents without having to open the drawing. An example would be Sleetmute\_Topo.dwg, and not 06-342.dwg.

A Field Books (if a PDF is submitted)

B Point Files

All Points (local system).txt

Descriptor List

D Control Summary

H&V Summary.txt

Traverse Adjustments?

Level Adjustments?

GPS Adjustments?

E LDD\_SCD

The SCD can be in its own LDD project, or combined with the Topo LDD

F LDD\_SCS

G GPS Data

H Electronic Pictures

I TIN

TIN Cert

QC Spreadsheet if Aerial

J Bridge Site Survey

LDD\_River Name

Bridge Site Form

L LDD\_Road name or Airport

Topo Drawing

SCD Drawing

N Photogrammetry Report

O Ortho Photos

All paper submittals shall be bound and tabbed in a three ring binder, with a label on the spine. The Contractor shall submit the following items related to their Survey to the AK DOT&PF Project Manager:

| **Deliverable Description** | **Delivery Date** |
| --- | --- |
|  |  |
| The original field books or PDF indexed, reduced, stamped and checked. (B2.4) |  |
|  |  |
| An ASCII coordinate file containing all recovered, computed, and topographic points in the local system (if provided). Electronic and hard copy printout (doubled sided) shall be submitted. Elevations that are not valid TIN elevations shall be coded as such in the descriptor. (B2.8) |  |
|  |  |
| An ASCII file listing all descriptors used and an expanded description of their meanings. Descriptors not used on this project shall not be included in this list. This file shall be submitted with the draft coordinate file. (B2.8) |  |
|  |  |
| Horizontal and vertical control summaries in ASCII format. The Contractor shall also provide annotated copies of control computations and control adjustments. (B3.2.1.5 & B3.2.1.6) |  |
|  |  |
| Survey Control Diagram. Obtain the Survey Control Diagram Standards from the Contracting Agency’s Survey Section. (B3.2.1) |  |
|  |  |
| 1. Survey Control Sheet(s) Obtain the Survey Control Sheet Standards from the Contracting Agency’s Survey Section. (B3.2.1.8) |  |
|  |  |
| For GPS control surveys, the Contractor shall also provide RINEX2 GPS data files of 8 hours length for at least 2 control points, along with the OPUS reports. (B3.2.1.5) |  |
|  |  |
| H. Electronic Pictures - A folder with all of the Control and ROW points (B2.4.2). |  |
|  |  |
| I. All TIN files with a sealed and signed certificate of accuracy. All Quality Control Check points showing the differences from the true values (B2.7). Obtain a sample TIN certificate from the Contracting Agency’s Survey Section. (B3.2.3.1) |  |
|  |  |
| J. Bridge Site/Drainage Survey mapping - (electronic drawing files and TIN files) (B3.2.4) |  |
|  |  |
| K. Bridge Site Report. A summary in ASCII format noting pertinent information such as horizontal and vertical control basis, date of survey, bridge number, name of water body, ordinary high water coordinate point numbers, extreme high water high water coordinate point numbers, existing structure coordinate point numbers, and note whether body of water is navigable. Refer to the Preconstruction Manual, and or the Contracting Agency for possible additional information. (B3.2.4.4) |  |
|  |  |
| L. A complete and edited AutoCAD drawing file of the entire survey limits, along with the entire LDD project, containing topographic mapping and Bridge Site/Drainage Surveys (in the local system if provided). (B3.2.3) |  |
|  |  |
| 1. M. One set of edited and titled aerial photography contact prints acquired for the project shall be delivered along with a photography index map plotted at a scale of 1”=1mile on a sheet no larger than 24”x36”. (B3.2.2) |  |
|  |  |
| 1. A report of the photogrametric control shall be provided including all ground control points, aerial photography camera logs, airborne GPS control procedures and results, analytical aero triangulation results, current camera calibration reports, and other data associated with control of the aerial photography. (B3.2.2) |  |
|  |  |
| Ortho Photo Mosaic in .tif format shall be delivered in files less than 80MB in size. A compressed image file in Mr. Sid format shall also be included. Image resolution shall be such that the ground pixel size is appropriate for the terrain being photographed. An 8-1/2" x 11" index sheet showing the project area and the areas covered by the individual files shall be included. Two sets of color ortho-rectified photos are required to be submitted. (B3.2.2.1) |  |

**B3.3 SURVEYING FOR RIGHT-OF-WAY**

**B3.3.1 Right-of-Way Boundary Survey.**  The Contractor shall perform the following services to Third Order, Class I standards, as specified by the ASPLS Standards of Practice, with an allowable error of closure of 1:10,000 or better. The use of Post-Processed Kinematic (PPK) or Real-Time-Kinematic (RTK) GPS procedures are not allowed for surveying Right-of-Way or any other monumentation. Typically the surveying for ROW is performed after horizontal control is established for the project, and the control information has been submitted to AKDOT&PF Survey Section for review and approval. The exceptions here are if the AKDOT&PF has already established control for the project OR if the project is located in a remote location that dictates only one mobilization of the survey team due to logistical concerns and/or economics. These exceptions shall be discussed at the project pre-work meeting.

**B3.3.1.1** Prior to commencement of the survey, the Contractor shall review any title documents and mapping in the Contracting Agency’s possession which the Contractor considers relevant to the project. The Contractor shall be responsible for researching additional relevant documentation from other sources. These documents may include but are not limited to the following:

Bureau of Land Management (BLM) and Department of Natural Resources (DNR) land status plats, BLM township survey plats, Mineral and U.S. Survey plats and field notes, any records of survey, subdivisions, and relevant engineering control surveys, United States Coast and Geodetic Survey (USC&GS)/ National Geodetic Survey (NGS) control diagrams-descriptions, DOT&PF right-of-way records and other easement or boundary documents of record, DOT&PF engineering as-builts, DNR surveys, and aerial photos.

One legible PDF copy on a CD of all of the above referenced reports, plats, notes and other source materials shall be submitted to the Contracting Agency.

**B3.3.1.2** Tie the nearest Public Land Survey System (PLSS) monuments (Section, ¼ Section and 1/16 Section Corners) left and right of the projectRight-of-Way corridoror if existing monuments that represent the legal corner positions don’t exist at those locations, sufficient additional rectangular monuments and/or accessories to control the computations of the legal locations of those corners per the BLM *1973 Manual of Surveying Instructions for Public Lands*. Any corner monument in need of rehabilitation or remonumentation shall have rehabilitation accomplished prior to tying the monument location. The intent of the PLSS monument ties is to define the larger remaining parcel surrounding the existing road Right-of-Way.

Tie all existing centerline monumentation throughout the project limits including two centerline monuments at each end that extend beyond the limits of the project. Additional PLSS monuments shall be recovered to allow section breakdown for property boundary determination as directed by the Contracting Agency. Tie adequate centerline monumentation on side streets to determine side street alignment to the project limits. A minimum of two side street centerline monuments shall be tied. If side street centerline monuments are not recovered then sufficient block or lot corners will be tied to define the side streets.

**B3.3.1.3** All research for property corner ties (generally includes local platting authority subdivision plats and right-of-way plats, BLM U.S. Surveys, state land survey plats, waiver documents, deeds, record of surveys and monument records) should be done prior to commencement of searching and tying property and ROW controlling corners. For the initial surveys all property corners within and along the existing ROW and the ROW centerlines should be searched for, documented and tied. In most cases, there will be some non-fronting property corners also required to be tied to setup subdivision blocks, survey boundaries and side-street ROWs. Sufficient control is required to establish the location of all surveys adjoining the ROW, or where acquisitions are planned. The extent of the corners to be tied normally is discussed and clarified during contract negotiations or at the survey pre-work meeting.

**B3.3.1.4** For projects with PLO ROWs or other ROWs dependent on the physical road location (such as prescriptive claims), tangent asbuilts are required. This procedure normally requires the field determination of pavement or unpaved surfaces centerline by physical measurement, and then location of those points. Points are normally surveyed near each tangent end and a minimum of 3 points on curves The number of shots actually required depends on curve length and degree of curve and should be clarified in writing at the pre-work meeting. The Contractor at the direction of the Contracting Agency may be tasked with developing an alignment. Please consult the Contracting Agency’s ROW Engineering section for guidance.

**B3.3.2 Record of Survey.** A Record of Survey shall be prepared for recording in the appropriate Recording District for the Right of Way survey. All Right of Way surveying completed above in section B3.3.1 shall be included in the Record of Survey. The Right of Way corner ties may be combined with the SCD in B3.2 Surveying for Design, if a Design Survey is a part of the Contractor’s work effort. Consult with the Contracting Agency for guidance in the preparation of the Record of Survey.

Descriptors for points shall follow the examples at the DOT FTP site: ftp://ftp.cadastral.info/dot-cadastral/Central-Region-DOT-CAD-Standards/DOT-Survey\_4\_ROW/Highways/Samples/Documentation

**B3.3.3 Annotated Plats and Research Documents.** Copies of all of the research documents for the rectangular survey, centerline monuments, ROW monuments and property corners shall be provided, along with annotations of whether the point was searched for and not found, or monument destroyed, or if found it’s corresponding project point number and field book and page number. These annotations do not need to be “works of art”, and many times are the original paper plat copies, or scans of such, that the field crews had in the field with them. It is important that all corners required to be researched, recovered and located be noted as to its location status during the field survey on the plats. The annotated plats should be indexed in some method (by Section Location, MOA grid, or other logical means), placed in labeled folders organized by the indexing scheme, and such indexing shown on the survey point plot drawing to aid use of the maps.

**B3.3.4 Electronic Photographs.** To assist in the point identification, verification of markings, condition of monument and accessories, we ask that digital photographs be gathered of all rectangular corners, and all primary monuments located for ROW centerlines, subdivisions, and other property corners. Each corner should have a minimum of three photographs: one readable close-up of the cap, one near distance, and one with an overview of the monument and its surroundings (it helps to have a tripod setup over the point or some other indicator like Carsonite post to find monument in surrounding picture). All original Bearing Trees and other accessories of record should also be photographed for these corners. The photographs should be indexed by point number, file directories, or by file names with the point number in the file name to aid identification of the point. Many times a chalkboard or other similar device can be used in the field to identify the point in the photographs by writing the point legal designation and project point number on the board, and placing board in scene of the pictures.

**B3.3.5 Additional Topography for Right-of-Way Acquisition.** The Contractor shall collect all topographic information that may affect the cost and/or schedule of defined right-of-way acquisitions for the project, such as culverts, land service or access roads, improvements, apparent contaminated soils or waters, fences and any structures. Septic system, well and building locations are examples of pertinent data, usually outside of the acquisition area, that may affect the value of the right-of-way to be acquired. Structures located on impacted parcels and within the specified distance (200 feet) of the right-of-way centerline shall have dimensions and ties to the centerline shown. For properties that have (or had) buried fuel tanks, collect data to the specified distance (200 feet) from centerline. The data collected for this survey shall be incorporated into the topographic AutoCAD drawing files, project coordinate file, and where applicable, the TIN (B2.6, B2.8, B3.2.3.1).

**B3.3.6 Monument Centerline.** **Pre-Construction**: When directed by the Contracting Agency upon completion of the design phase of the project, but prior to advertising for construction, the Contractor, using the previously established project control shall monument the project centerline (PC's, PT's, and no-curve PI's for roads) using conventional methods. All centerline monuments established shall consist of a minimum 5/8 inch X 30 inch rebar (5/8 inch X 10 in pavement) with a 2 inch cap, and stake nearby. Once set, all centerline monuments shall be re-tied to verify their position (B3.2.1.3), and a comparison to the design coordinates shall be presented to the Contracting Agency in spreadsheet format. This information shall be presented in the final centerline control report. The centerline monuments and all monuments that may be destroyed during construction shall be referenced by static GPS. Two in line conventional reference points, set outside the new Right of Way limits, may be used in the cases where static GPS will not work. It will be the Contractor’s responsibility to coordinate with the Agency or Firm developing the Right of Way Mapping to identify these monuments. Two vectors at a minimum will establish the position of the monument to be referenced. These two vectors shall differ by no more than .08’. This referencing network shall be a minimally constrained network using the CORS system, or a nearby stable, well-protected point with a published value. The final values shall be reported in the appropriate Alaska State Plane Zone grid coordinate system. Static GPS Control points for this task shall be set at approximately two mile intervals, or closer for a small project, outside of the construction limits, so as to last for the duration of the project. A plan identifying the type of monument to be set for control, and its proposed location, shall be submitted to the Contracting Agency prior to the work being performed. Control points from the Design Survey effort may be used for this effort upon approval. It will be the contractors’ responsibility to get permission to access any private property. The results of the static referencing shall be a submitted to the Department in the following format

:

1. The centerline staking report will be submitted in a tabulated three ring binder or in PDF format on a CD. The CD will be organized with folders for ease of finding data. The Department would prefer the data be submitted on a CD, but realizes not all contractors have the software available to perform this task.
2. A narrative describing the purpose of the survey, methods used, crew, equipment and the source of the horizontal control will be included. The narrative will describe which monuments were referenced from what control. A spreadsheet showing the final coordinates for the control and centerline points sealed by the PLS responsible for the survey will be included.
3. A complete and accurate description of the control points, including photographs, will be included. The control points will be tied to the CORS system. Once the coordinate values are established for the control network they will be held.
4. If RTK GPS methods are pre-approved by the Departments Survey Manager, then a report of the “One-Step Calibration”, “Site Calibration”, or “RTK Localization” will be included with the submittal. This report should show the relationship of the measured positions to the record positions supplied by DOT. This report should also give the translation parameters that were applied to the WGS84 coordinates in order to transform to the local system. In the case of RTK GPS methods being used, then it is also required that static ties from at least 2 control points be performed on each CL point set, and a report of those positions be included in the final submittal. There shall also be a spreadsheet comparing the Design position, the RTK setout position, and the Static tied position submitted to DOT. The Static tied positions will be considered the Final Positions that are to be listed in the reports as such.
5. A spreadsheet showing the comparison between the set position and the design coordinates shall be included. It is not necessary to perform an adjustment on the centerline points. The mean values can be reported as the final position, along with Quality/Difference between the vectors. The spreadsheet should identify the control points and which monuments were referenced using those control points.
6. Do not establish project coordinates on the control points or the referenced monuments. All coordinates will be reported in State Plane.
7. A record of survey will not be required.

**B3.3.7 Final Record of Survey (Airports).** When directed by the Contracting Agency, and upon completion of the Construction phase, the Contractor shall complete the final Record of Survey which may include, but is not limited to, the following tasks: locate all navigational aids, asbuilt the runway using guidelines provided by the Contacting Agency, set or check the airport boundary monumentation, set or check the access road monumentation, tie into older horizontal and vertical datum’s, and establish threshold coordinates.

**B3.3.8 Deliverable Items.** The Contractor shall submit the following items related to the Right-of-Way Survey: The deliverables shall be organized on the CD in folders according to the following list. Only submit what is required for your specific project. Do not submit extra information not required by the Department. Folder 1 “Report Docs” (item A and the spread sheet from item I), Folder 2 “Field Books” (If you choose to submit a PDF), Folder 3 “ASCII Files” (Items D & E can be combined here), Folder 4 “LDD\_Project Name” (item F), Folder 5 “GPS Data”, and Folder 6 “Photos”. All paper submittals shall be bound and tabbed in a three ring binder, with a label on the spine. The Contractor shall submit the following items related to their Survey to the AK DOT&PF Project Manager:

| **Deliverable Description** | **Delivery Date** |
| --- | --- |
|  |  |
| A. Right of Way Survey Report Memo. A brief description of the survey methods, equipment, computations, quality control checksand accuracy estimates **[only if not done in surveying for design]**. |  |
|  |  |
| B. The original field books or PDF indexed, reduced, stamped and checked. (B2.4) |  |
|  |  |
| C. Annotated Plats and Research Documents. (B3.3.1.1) |  |
|  |  |
| D. An ASCII coordinate file containing all recovered, computed, and topographic points in the local system (if provided). Electronic and hard copy printout shall be submitted. Elevations that are not valid TIN elevations shall be shown as -9999. Draft coordinate files shall be submitted upon completion of note reduction. (B2.8) |  |
|  |  |
| E. An ASCII file listing all descriptors used and an expanded description of their meanings. Descriptors not used on this project shall not be included in this list. This file shall be submitted with the draft coordinate file. (B2.8) |  |
|  |  |
| F. Record of Survey for the Right of Way Survey, the full LDD project shall be submitted. (B3.3.2) |  |
|  |  |
| G. For GPS control surveys, the Contractor shall also provide RINEX2 GPS data files of 8 hours length for at least 2 control points. (B3.2.1.5) |  |
|  |  |
| H. Electronic Photos (B3.3.4) |  |
|  |  |
| I. Final Centerline Control Report (B3.3.6) |  |
|  |  |
| J. Final Record of Survey for Airports (B3.3.7) |  |

**B3.4 RIGHT-OF-WAY MAPPING**

**B3.4.1General** The Contractor shall perform the services necessary to establish the existing Right of Way centerline, and prepare Record of Survey Maps; and, prepare Base Maps, Right of Way Maps, and Parcel Plats, in accordance with the DOT&PF Right of Way Manual and specific instructions from the Contract Manager. Services by the Contractor to modify the Plans Specifications & Estimates assemblies, as required to accommodate the right of way negotiations, shall be performed as part of the PS & E task.

**B3.4.2 Base Maps** will be ink on vellum or mylar and shall show the entire project limits and shall include a DOT&PF standard Right of Way title sheet, symbol sheet, tract maps, and plan sheets, using Contracting Agency supplied AutoCAD format at the scale and layout specified by the Contract Manager. The plan sheets shall show the following information:

1. Existing property boundaries, including all Public Land Survey System survey lines.
2. All subdivisions, including name, plat number, and lot and block designations or aliquot parts description.
3. Existing roadway centerline.
4. Existing rights-of-way
5. Improvements.
6. Other features required by the Right of Way Manual and /or the Contracting Agency.

**B3.4.2.1** When preparing Base Maps, the Contractor shall (a) thoroughly reread and document existing right-of-way rights (b) resolve problems with existing Right of Way and boundary locations and (c) analyze preliminary engineering information to determine where additional survey ties are required. The Contractor shall provide a written summary of (any significant) Boundary Problems encountered in making specific boundary determinations, including rationale for the solution.

**B3.4.2.2 Index Sheets (Point Plots).** The Contractor shall provide Base Map Index Sheets that depict the existing centerline and right of way lines, adjacent property lines including rectangular survey lines, and point numbers of all found and calculated points associated with said lines. The drawings shall be on vellum at a scale equal to the scale of the Base Maps.

The Contractor shall provide a Survey Point Plot in AutoCAD format showing all recovered monuments (including those recovered in the Control Surveys) with point numbers for the purpose of point number referencing. The scale shall be adequate to clearly show the relationship of the corners, and shall be tailored to the density of the points. A Printout of Adjusted Coordinates with descriptions of the corners shall accompany the plot along with the ASCII coordinate file with descriptors and AutoCAD drawing file. An ASCII file and hard copy printout listing all descriptors used and an expanded description of their meanings shall accompany all coordinate file submittals. The survey point plot shall be sealed, signed, and certified by the PLS responsible for the services, currently registered in the state of Alaska. The certification shall state the survey standard that was followed in performing the services.

**B3.4.2.3** The Contractor shall not begin preparing Base Maps without prior specific written authorization from the Contracting Agency.

**B3.4.3 Right of Way Maps** shall be ink (or other Contracting Agency approved permanent markings) on Mylar and shall include a title sheet, standard right of way symbols sheet, tract maps, plan sheets, and monument summary sheets for the entire project. The plan sheets shall show all the information required for the Base Maps plus the following information:

1. Proposed Right of Way.
2. Proposed centerline.
3. Easements.
4. Parcels.
5. Parcel Information Block.
6. Proposed slope limits.
7. Revision block.
8. Other features required by the Right of Way Manual and /or the Contracting Agency.
9. For Airport Property Plans (in addition to the above):

1. Plan view showing Tracts and Parcels.

1. Runway Centerline end coordinates in the NAD83 CORS datum.

**B3.4.3.1** When preparing Right of Way Maps, the Contractor shall:

1. Resolve survey conflicts with existing right of way and boundary locations.
2. Analyze preliminary engineering information to determine where additional survey ties are required.
3. Examine Title Reports and adjust preliminary boundaries as required.
4. Compute the Take and Remain areas of each parcel based on right of way requirements supplied by the Contracting Agency. Provide in a notebook format, inverse information for properties affected by acquisition. Include inverses for the larger parcel, take including easement, net take, and remain areas. Provide a plot of the immediate area showing property lines and associated point numbers.

**B3.4.4 Parcel Plats**. The Contractor shall prepare plats for all parcels to be acquired for this project. Note: full takes do not need a parcel plat prepared. Parcel plats shall contain the information required by the DOT&PF Right of Way Manual. Parcel Plats shall be prepared during the Right of Way Plan stage of development. The Contractor shall make revisions to Parcel Plats requested by the Contracting Agency. Parcel Plats shall use the Contracting Agency's standard 8-1/2 by 11 inch format on mylar, vellum, or paper as specified by the Contract Manager. Plats shall be at a scale suitable for legibility and clarity of detail using Contracting Agency supplied AutoCAD format and shall contain information as required by the DOT&PF Right of Way Manual and the parcel plat checklist. A Title block and border drawing file will be supplied by the Contracting Agency.

**B3.4.5 Copies.** The Contractor shall provide a hard copy of all draft and final maps and parcel plats (with the script files used to generate the hard copy documents) and a copy on CD ROM discs or with project coordinate file with descriptors and a drawing file in AutoCAD (version as specified by the Contracting Agency).

**B3.4.6 Right-of-Way Negotiations**. The Contractor shall provide technical support for right-of-way negotiations. This shall include interpreting documents prepared for the project and explaining project impacts to the Contracting Agency's personnel, property owners, and others. The Contractor shall also attend meetings as required to make presentations and answer questions.

**B3.4.7 Presentation.** The Contractor shall make an oral presentation with visual displays of Right-of-Way requirements to the Contracting Agency's personnel when requested near the beginning of the Contracting Agency's Right-of-Way acquisition activities. The presentation shall provide a project overview and show the proposed project features and impact on adjoining properties. Features shall include side streets, pathways, sidewalks, medians, curb and gutter, slope limits, impacts to driveways, striping, illumination, and signalization. Property information shall include lot boundaries, buildings, driveways, and any other features that will help the Contracting Agency in negotiations with affected property owners, and others to assess project impacts. Visual displays shall be at a scale to clearly show all features without being cluttered. Different colors shall be used to differentiate between project features and adjoining property features.

**B3.4.8 Reviews and Schedule.** The Contractor shall submit drafts of the Base Maps, Right of Way Maps and Parcel Plats, for the Contracting Agency's review, in accordance with the following: Base Maps shall be submitted with the Local Review Assembly. Right of Way Maps including proposed takes for project construction shall be submitted with the Plans-In-Hand Review Assembly. Right of Way Maps including proposed takes for the project and all required utility relocations shall be submitted within four months of the Plans-In-Hand Review submittal. Current Right of Way Maps shall be submitted with the PS&E Assembly. The Summary of Boundary Problems shall be submitted with the drafts of Base Maps. The Contracting Agency shall have a minimum of four weeks for the return of written comments. The Contractor shall address comments to the satisfaction of the Contracting Agency prior to submitting final documents. Final Right of Way Maps and Parcel Plats shall be submitted at the same time, after all parcels have been acquired.

**B3.4.9 Deliverable Items.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Type of Document** | **Paragraph** | **Copies** | **Originals** | **Delivery Date** |
|  |  |  |  |  |
| **Base Map** | B3.4.2 |  |  |  |
| Draft | B3.4.5 | 2 | 0 |  |
| CD ROM | B3.4.5 | 1 | 0 |  |
| Final | B3.4.5 | 4 | 1 |  |
| CD ROM | B3.4.5 | 1 | 0 |  |
| **Summary of Boundary Problems** | B3.4.2.1 | 1 | 0 |  |
| **Index Sheets (Point Plots)** | B3.4.2.2 | 1 | 1 |  |
| **Right of Way Maps** | B3.4.3 |  |  |  |
| Draft | B3.4.5 | 2 | 0 |  |
| CD ROM | B3.4.5 | 1 | 0 |  |
| Final | B3.4.5 | 4 | 1 |  |
| CD ROM | B3.4.5 | 1 | 0 |  |
| **Parcel Plats** | B3.4.4 |  |  |  |
| Draft | B3.4.5 | 2 | 0 |  |
| CD ROM | B3.4.5 | 1 | 0 |  |
| Final | B3.4.5 | 4 | 1 |  |
| CD ROM | B3.4.5 | 1 | 0 |  |

**B3.4.10 Provided Items.** The Contracting Agency will provide the following (item A can be found on the DOT&PF web site. Items B-D can be obtained on the DOT&PF FTP site. Call 269-0680 for site addresses):

* 1. One copy of the Title and Plans Section from the DOT&PF Right of Way Manual.
  2. Samples of final drawings, parcel plats, and title reports.
  3. AutoCAD menu file, layering scheme, symbols library, and AutoLISP routines. (Note that Ausfont and Soltex for AutoCAD software must be acquired.)
  4. The Contracting Agency's Standard Right of Way symbols sheet.
  5. Original Title reports for each property to be acquired.

**B3.5 Post Construction Surveying.** When directed by the Contracting Agency, and upon completion of the construction phase of the project, the Contractor shall establish and monument the project centerline (or a random control line) as determined by the Contracting Agency. Monument type and spacing shall be determined in discussions with the Contracting Agency. In the case of a project centerline, the points shall be established using the Record of Survey from the Pre-Construction effort. Right of Way monumentation that were referenced prior to construction will need to be field verified that they were not disturbed. A digital photo will be required as proof. Any disturbed ROW corners will need to be reestablished as part of this effort. A final Record of Survey shall be completed that shows any new monumentation set.

**B3.5.1 Provided Items.** The Contracting Agency will provide the following:

1. The Record of Survey with the control values for the project centerline, and the values for any ROW monuments that were referenced.
2. The control for establishing the random line if no project centerline is set.

**B3.5.2 Deliverables.**

| **Deliverable Description** | **Delivery Date** |
| --- | --- |
|  |  |
| A. Right of Way Survey Report Memo. A brief description of the survey methods, equipment, computations, quality control checksand accuracy estimates. |  |
|  |  |
| B. The original field books or PDF indexed, reduced, stamped and checked. (B2.4) |  |
|  |  |
| C. An ASCII coordinate file containing all recovered, computed, and set points in the local system (if provided). Electronic and hard copy printout shall be submitted. Elevations that are not valid TIN elevations shall be shown as -9999. (B2.8) |  |
|  |  |
| D. An ASCII file listing all descriptors used and an expanded description of their meanings. Descriptors not used on this project shall not be included in this list. (B2.8) |  |
|  |  |
| E. Record of Survey for the Right of Way Survey, the full LDD project shall be submitted. (B3.3.2) |  |
|  |  |
| F. Provide OPUS reports, using 8 hours of GPS Data for at least 2 control points, as a check on the control, before beginning work. |  |
|  |  |
| G. Electronic Photos (B3.5) |  |
|  |  |

**B3.6.1** Right of Way Engineering Services: The ADOT/PF requires the services of a Professional Land Surveyor to perform the *Right of Way Engineering Services* necessary to Close Out various projects, as defined by the Department. The *Right of Way Engineering Services* may include identification of field surveying and mapping services necessary to close out the various projects, such as a Record of Survey, but the performance of the identified field surveying and associated mapping services will not be part of these *Right of Way Engineering Services*. Field surveying and associated mapping services necessary to close the various projects will be negotiated and completed under this, or other agreements.

1. The Contractor shall perform the services necessary to reconcile the conveyance documents with the Right of Way Maps in accordance with the Department Project Close Out check list, and specific instructions from the Contract Manager.
2. Upon completion and acceptance by the Department of each Project Closeout check list, the Contractor may be requested to perform some mapping services, such as hand edits, necessary to Close Out the project, as defined by the Department.
3. The Contractor shall proof read the vesting documents of record on file with the Department and/or the Recorders Office. The written legal description and parcel plats will be proofed against the Right of Way plan set both visually and for mathematical closure (COGO program).
4. The Contractor shall review the Right of Way plan set. The plan sheets shall include (if it applies) the following information:
   1. Information as defined in the Project Close Out check list.
   2. Lands purchased in excess to the ROW needed for the project. These lands will be identified on the ROW plans as “X” or “R” parcels on older projects.
   3. Commissioner’s Quit Claim Deeds.
   4. Lands acquired from DNR will be referenced to the ADL number associated with the parcel.
   5. Files involving these parcels are contained within the Department Right of Way Section.
   6. Final Judgments need to be researched if there was a declaration of taking on the project.
5. When reviewing the Right of Way plan set, the Contractor shall tabulate in an approved spreadsheet format, a list of discrepancies, by parcel, among the written legal, parcel plats and ROW plans. The Department will determine the remedy for the discrepancies and advise the Contractor of corrective actions.
6. When directed by the Department the Contractor shall hand edit the Right of Way plan set, using drafting ink and lettering sets.

**B3.6.2 Tasks**: The Contractor shall perform the services in accordance with specific instructions from the Contract Manager. Subsequent Tasks and subtasks will be issued at the discretion of the Department. The Contractor shall not perform any Tasks or subtasks without prior specific written authorization from the Department. The Department reserves the right to reprioritize, revise, add or remove any of the Tasks or subtasks.

**B3.6.3 Schedule:** The Contractor shall complete the reconciliation portion of the Task within a negotiated period of time as delineated on the Notice to Proceed. The Department will need 30 days to review draft submittals prior to the negotiated due date.

**B3.6.4 Deliverable Items:**

1. Completed Close Out check list for each subtask.
2. List of discrepancies spreadsheet for each subtask, in both hard copy and electronic format.
3. Hand edited Right of Way plan sets, as directed.

**ARTICLE 4**

**ADMINISTRATIVE REQUIREMENTS**

**B4.1 General.** The Contractor shall provide services as identified and authorized by sequentially numbered Notices-to-Proceed. The Contractor shall not perform services or incur billable expense except as authorized by a NTP.

**B4.2 Project Staff.** All services must be performed by or under the direct supervision of the following individuals (replacement of, or addition to, the Project Staff named below shall be accomplished only by prior written approval from the Contracting Agency:

**Name Project Responsibilities**

*Enter names of Contractor’s & Subcontractor’s key staff*

**B4.3 Billing Reports.** The Contractor shall provide a two-page (typical) report with each monthly billing for months in which services are performed. The report shall specifically describe the services and other items ***for which the billing is submitted***, and shall estimate the percent the services are complete. Any delayed costs from previous billing periods that are included in the current billing must be clearly explained in the report.

**B4.4 Correspondence.** All correspondence prepared by the Contractor shall bear the Contracting Agency's assigned Project name and numbers (State & Federal).

**B4.5 Contractor Name on Plan Sheets and Documents.** No Contractor logos shall be allowed on any electronic or hard copy document produced for the Contracting Agency. The Contractor company name shall be included in the box above or below the engineer’s seal on each sheet. Documents produced for the Contracting Agency shall include the Contractor’s company name at the bottom right of the first page, cover sheet or title sheet only. Contractor letterhead shall be allowed only as exhibits in document appendices. The Contractor name shall be in the following format:

PLANS DEVELOPED BY:

COMPANY NAME

**B4.6 Documents and Reports** shall be printed with solid black letters that are double spaced on white, 8.5 inch x 11-inch bond or "Xerox Copy" paper. Other size paper may be used for illustrations if they are folded to 8.5 inch x 11-inch size. Original documents and reports shall be printed on one side of the paper only and shall be ready for copying. Documents and reports shall have no black and white photographs, color photographs, or multicolored graphics except as specifically approved by the Contracting Agency. Original, camera ready, copies of final documents and reports shall be submitted to the Contracting Agency for a check before printing.

**B4.6.1 Copies.** When the Contract calls for multiple copies of documents or reports, the copies shall be printed on both sides of the paper. However, the cover and pages with approved illustrations, multicolored graphics, or photographs shall be printed on one side of the page only. All copies - except for originals - shall be bound.

**B4.6.2 Page Numbers.** All documents shall be page numbered to allow every major Section, Chapter, Appendix, etc., to begin on a "right hand," odd numbered page.

**B4.6.3 Covers.** The cover of all documents and reports shall include the following information:

A. Name of document or report.

B. Date.

C. Indicate whether draft or final.

D. Project Name.

E. State and Federal Project Number(s).

F. Prepared for: Alaska Department of Transportation and Public Facilities.

G. Prepared by:

H. Map and/or picture of project area.

**B4.7 Revisions.** The Contractor shall modify work products in response to direction from the Contracting Agency. Corrections, adjustments, or modifications necessitated by the review/approval process, but which do not substantially affect the scope, complexity, or character of the services, shall be considered a normal part of the Contractor's services.

**B4.7.1 Errors and Omissions.** Except as described in this Statement of Services, work products shall be essentially complete when submitted to the Contracting Agency. Work products having significant errors or omissions will not be accepted until such problems are corrected.

**B4.7.2 Review Meetings.** Following each review the Contracting Agency will provide written comments and may hold a meeting to discuss the issues. The Contractor's personnel who are in responsible charge for the work products under review shall attend the meeting and they may be asked to interpret and provide explanations of the content.

**B4.7.3 Comment Resolution.** The Contractor shall provide a written response with subsequent submittals that address all written and oral comments from the Contracting Agency. All changes from previous submittals shall be clearly explained.

**B4.8 Reproduction and Distribution.** When the contract requires only the original or only one copy of a work product to be delivered, the Contracting Agency will reproduce and distribute all other copies required. Items delivered for reproduction shall be organized and camera ready for copying and not stapled or otherwise bound.