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aerial mapping • gps • digital photogrammetry

PHOTOGRAMMETRIC MAPPING CONTRACT – APPENDIX A dated 28Sep2015 TECHNICAL SPECIFICATIONS AND GENERAL STANDARDS

(Available online at http://www.e-topo.com/AppendixA)

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PHOTOGRAMMETRIC MAPPING CONTRACT – APPENDIX A dated 28Sep2015 TECHNICAL SPECIFICATIONS AND GENERAL STANDARDS

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1. IMAGERY

1.1. AVAILABLE COVERAGE (LIBRARY)

If the IMAGERY section of your proposal indicates that your project uses Library imagery, the exposure date of that imagery will be provided. Almost all E-TOPO® library imagery is obtained during the optimum spring conditions of high sun angle and full defoliation. You should consider whether there has been significant change in the project area since the exposure date of the imagery. Your proposal includes a low resolution scanned copy of contact prints, Google Earth, or a USGS quad sheet illustrating proposed mapping limits.

1.2. CUSTOM FLIGHT

If the IMAGERY section of your proposal indicates that your project involves a custom flight, the flight will be scheduled immediately to capture imagery as soon as practical, considering site conditions (i.e. foliage) and weather (i.e. ground image visibility).

1.2.1. MULTIPLE CUSTOM FLIGHTS - DISCOUNT

If you contract to have us fly more than one project at the same time in the same vicinity, we will offer a discount for each additional site. Please note, to receive this discount you must pay the full flight charge for one project. This discount would not apply to projects flown on a speculative (no charge) basis, even if captured at the same time as other contracted projects.

1.2.2. FALL FLIGHTS

If the indicated flying season is fall, be advised that the fall / winter flying season is the period of lowest sun angle and consequently longest shadows. Flights must be scheduled based on sufficient defoliation of the project area. If there are many oak trees on the site, they tend to not lose their dead leaves until spring. Some areas may not be visible in fall photography that can be seen in much better spring photography. If your site includes a north facing slope which further accentuates harsh shadows, we will recommend waiting for a spring flight.

1.3. EXPOSURES

All exposures are made on 9” x 9” (23cm x 23cm) black and white (or color if requested) mapping quality aerographic film using a Cartographic Aerial Camera having a six inch (6”) focal length designed for precise aerial photography and topographic mapping.

1.4. CONTACT PRINTS (by special order only)

Hardcopy contact prints are not provided for mapping projects except by special order. When ordered, contact prints measure 9” x 9” (23cm x 23cm) and are produced on professional paper in direct “contact” with the original film (emulsion to emulsion) using an automatic electronic dodging printer to obtain maximum detail and contrast balance.

1.5. SCANNED IMAGES (provided on all mapping projects)

Original negatives are digitized using a Wehrli RM 5 high resolution precise photogrammetric scanner, usually at 13 microns equivalent to 2000 dpi. File size for a typical B&W negative is about 350 MB.

1.6. OWNERSHIP / RIGHTS

Proprietary rights related to the aerial photography negatives and subsequent use thereof shall remain the property of Eastern Topographics. Client will continue to have rights for use of this photography without access charge. Charges will be made for prints, enlargements and other reprographic services. E-TOPO® does not offer any warranty concerning archival film handling and storage.

1.6.1 Any custom flown imagery flown under contract for a specific project will remain confidential for a period of two (2) years with access controlled by the client. Thereafter, images will be available for viewing at our online aerial photo index. Projects flown by us on speculation (not under contract) will appear on our online index after a period of three (3) months.

2. DENSE FOLIAGE

2.1. We can only provide photogrammetric mapping where the ground is visible in the stereomodel imagery. In partially obscured areas we will provide as many spot elevations as possible from the stereomodel to aid your field editing.

2.2. At the time of preparing a proposal for mapping from library imagery, if our review of Library images finds there to be probability of significant areas of obscured ground (usually dense conifers / shadows), we will typically illustrate same on the Figure accompanying proposal.

3. GROUND CONTROL

3.1. CLIENT PROVIDED GROUND CONTROL

3.1.1. GROUND CONTROL ACCURACY

You are responsible for the accuracy of identifying ground control points and establishing horizontal (coordinates) and vertical (elevation) data for each required. Mapping compilation time lost because of errors in ground control supplied to us may be charged as an extra beyond contracted amount. We often encounter control difficulties and routinely communicate with the client to efficiently resolve problems. We do not charge for this first event. If you provide us with revised ground control and it does not "fit" a second or more times, we would then advise that there will be an additional charge for our services in assisting with solving your control problems.

3.1.2. GROUND CONTROL ERROR TOLERANCE

All control data provided for setting the photogrammetric model(s) must have an absolute value for each point from its true position as shown in the following table of error tolerance for various map scales / contour intervals.

Ground Control Field Survey Maximum Point Error Tolerance

Map Scale	Contour Interval	Horizontal	Vertical
1" = 20'	1'	0.1'	0.1'
1"= 40'	1'	0.3'	0.1'
1"= 40'	2'	0.3'	0.2'
1"= 50'	2'	0.4'	0.2'
1"= 100'	2'	0.8'	0.2'
1"= 100'	5'	0.8'	0.5'
1"= 200'	2'	1.5'	0.2'
1"= 200'	5'	1.5'	0.5'

3.1.3. PHOTO IDENTIFIABLE CONTROL

We will provide you with digital scans of the contact prints indicating the locations of necessary ground control points illustrated in red and blue: triangles require horizontal and circles require vertical control. We will also provide you with feature descriptions to assist your field crews in providing us with a minimum of horizontal and vertical control.

3.1.4. PRE-FLIGHT TARGETS (Custom Flights Only)

For many project locations, especially involving woodlands, distinct features such as buildings, roads, and telephone poles are not available or are not correctly situated to be suitable control points. The absence of distinct features that can be accurately located on the ground necessitates use of pre-flight targets placed in locations within or near the area to be mapped. These artificial targets need to be tied into control surveys. These targets will be used for precise measurements and to orient the entire mapping correctly. Care must be used in producing and placing them, if pre-flight targets are required. The figure accompanying your proposal illustrates the suggested locations. The pre-flight target instructions in Section 3.1.5 following also apply to your proposal. If additional or alternate control points are necessary, they can be selected and identified after the flight using available photo-identifiable objects.

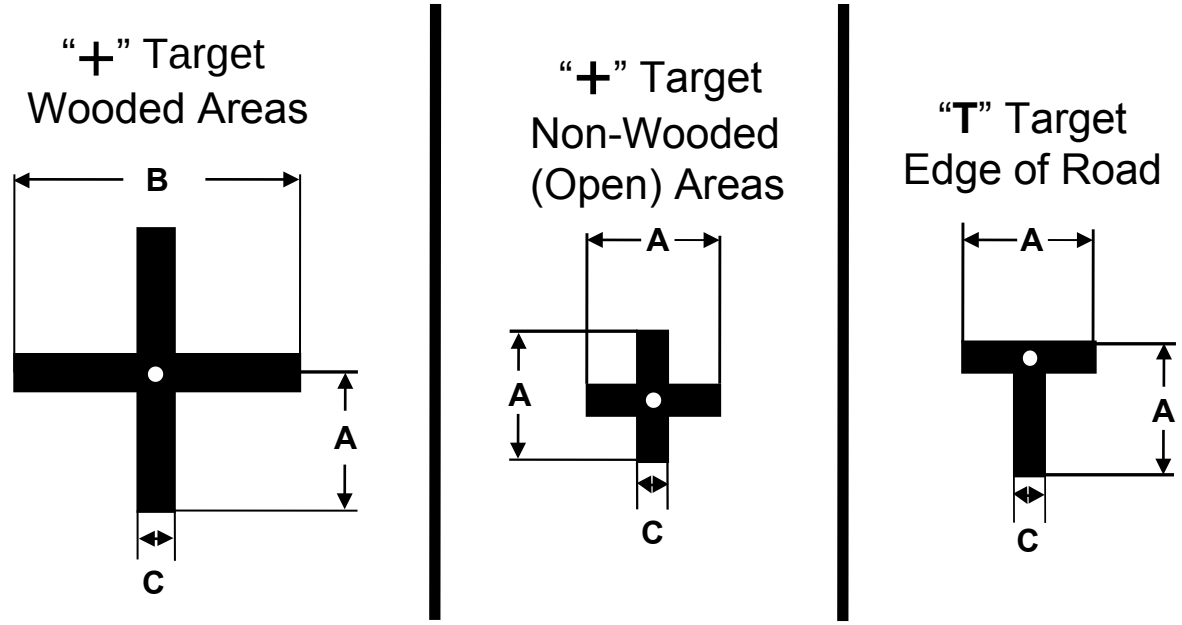
3.1.5. PRE-FLIGHT TARGET INSTRUCTIONS (Custom Flights Only)

The targets should be of weatherproof material and should stand out against the background surface. An easy and economical target can be made up with tarpaper painted white, or made of bleached cotton sheeting, white mercerized cotton bunting or white muslin. Caution in selection of materials should be exercised so sun reflection does not render the target useless by burning a tiny “sunburst” on the aerial film. For this reason, plastic sheeting or high gloss material should not be used. E-TOPO® purchases high quality targeting materials from Reef Industries, Inc., (800) 231-6074 (call and inquire about Griffolyn Aerial Targets).

If the target is to be placed on an asphalt road or paved parking lot, white paint can be used directly on the hard surface. On any light colored concrete roadway, black paint can be used. When placing the targets, one should refer to the general areas marked by us on the Figure accompanying the proposal. Since the aerial photography will occur between the hours of 9:30 a.m. – 3:30 p.m. for spring flights, and 10 a.m. – 1 p.m. for fall / winter flights, be certain that the targets where placed will be sunlit and shadow free during these hours. Placement should occur within the red cross and blue squared area on the Figure just prior to flight date in order to minimize the possibility of damage or loss. The target should be placed on a flat, but not necessarily level area, that is not obscured by evergreen trees or dark shadows. It is best to position the targets anywhere within the marked area that is open and free from deep shadows. Example - we have asked for a target on or near a property corner, but that corner is obscured by evergreen trees - it would then be necessary to move the target to an open area such as a swamp or hardwood stand. If it is necessary to move a target more than three hundred feet (300’), please contact us for advice, as the new location must stay within the proposed stereomodel (area of overlapping images).

3.1.6. SAMPLE TARGET DIAGRAMS AND TARGET DIMENSIONS

The following diagrams provide examples of typical "+" and "**T**" targets. Your contract will specify the sizes (dimensions A, B, and C in the diagrams) and numbers of targets required for your project.



White Circle = Measurement Location

The following table provides dimensions for photo scales ranging from 100 to 1200.

Photo Scale	A	B	C
100	1 Foot	2 Feet	2 Inches
200	2 Feet	4 Feet	4 Inches
300	3 Feet	6 Feet	6 Inches
400	4 Feet	8 Feet	8 Inches
500	5 Feet	10 Feet	12 Inches
600	6 Feet	12 Feet	14 Inches
700	7 Feet	14 Feet	16 Inches
800	8 Feet	16 Feet	18 Inches
900	9 Feet	18 Feet	20 Inches
1000	10 Feet	20 Feet	24 Inches
1100	11 Feet	22 Feet	26 Inches
1200	12 Feet	24 Feet	28 Inches

3.2. EASTERN TOPOGRAPHICS GROUND CONTROL OPTION

3.2.1. E-TOPO® EXPERTISE

Eastern Topographics is pleased to offer GPS ground control for your aerial mapping project. Unless otherwise declined by you, in most instances we include an optional cost for this service as part of this proposal. If this optional cost is not included please call our office if interested. Having Eastern Topographics provide your ground control offers many benefits. We are photogrammetric (aerial mapping) ground control specialists. You get a turnkey mapping project with no delays caused by ground control problems, and no disruption of your field crew's valuable time. We supply digital field photographs of all points and a hyper-linked ground control report that makes point recovery and identification easy. All points are clearly marked in the field. The same firm certifying your mapping is responsible for the ground control. If you elect this service please check the box provided in the Fee Schedule.

3.2.2. LICENSURE

All field surveys will be performed under the supervision and direction of a licensed land surveyor. We have surveyors on staff that are licensed in some, but not all states where we offer services. In any states where we may not have a licensed member on staff, we will accept providing GPS services under the client's responsibility / licensure. Alternatively, we may elect, at our expense, to have a qualified third-party consultant, licensed in the particular state, provide services including supervision of our GPS work and certification of same.

3.2.3. METHODOLOGY

Methodology of control field surveys will be designed to achieve horizontal and vertical closures consistent with desired accuracies as stated in Section 3.1.2. for the purpose of photogrammetric control for the contracted mapping scale and contour interval. The primary survey methodology will employ static GPS techniques, typically achieving Second Order, Class I geometric accuracy. Conventional survey methods will be employed where necessary and appropriate, based on closed traverses and networks with no unchecked open side-shots to control points. Position data will be computed in NAD83 values in the appropriate State Plane zone for the project location, with elevation data expressed on the National Geodetic Vertical Datum of 1929 (NGVD29), unless otherwise agreed to prior to the start of field work.

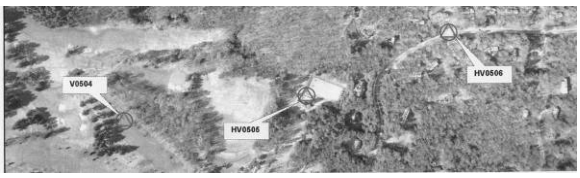
3.2.4. RECOVERABLE MARKERS

Whenever site conditions and time constraints permit, it is our intention to establish an intervisible pair of recoverable points at or near the mapping project to facilitate future survey efforts of tying into photogrammetric control.

3.2.5. GROUND CONTROL DELIVERABLE

Control survey values will be delivered as a report in electronic format. An index of all the primary control utilized and the surveyed picture points showing horizontal coordinates, elevations and descriptions will be hyperlinked to a key map with digital photos of all the surveyed points.

Point Numbers	Point photo available	North	East	Elev	Description	Aerial Photo
HV0501	Yes	852328.7	971902.3	302.4	Center of catch basin on southwest side of Drive at house	B258-27028
HV0502	Yes	853088.21	973227.23	257.73	PK nail at southwest corner of catch basin on south side of Road at house	B258-27028
HV0503	Yes	853251.85	974495.00	254.83	PK nail at southeast corner of catch basin on south side of Road at stream crossing	B258-27028
V0504	Yes	849910.53	972038.91	304.13	Spot elevation in golf course	B258-27028



3.2.6. EXCLUSIONS

Please note: This field surveying does not include any title research and / or boundary surveys, or fill-in of obscured areas not visible in imagery, and is limited to aerial mapping ground control only.

3.2.7. REMOVAL OF TARGETS

If your project involves a custom flight, the Figure accompanying your proposal illustrates approximate locations where targets will be set prior to the flight. ***E-TOPO® will not be returning to the project site to remove targets; client is responsible for removal of targets after the flight and control have been completed*.** Whenever possible, the control will be established on the targets when they are set, prior to the flight. If targets are to be removed as part of other survey work at site prior to delivery of mapping, please contact E-TOPO® for status of the control effort. If additional or alternate control points are necessary, they can be selected and identified after the flight using available photo-identifiable objects.

4. FEE SCHEDULE

4.1. INCLUDED ITEMS

The proposed fee for Mapping presented in the contract includes any of the following items applicable to your project: aerial photography library access fee or custom flight fee, photo lab fees (film, titling, digital photos and/or contact prints, film diapositives), identification of ground control picture points required for mapping, analytical bridging / aerotriangulation (computer expansion of horizontal / vertical control), compilation of topographic (contour) mapping, and translation for digital delivery.

4.1.1. OPTIONAL ITEMS

Orthophotos, additional digital scans or paper enlargements are optionally available if not specified in the contract as being included.

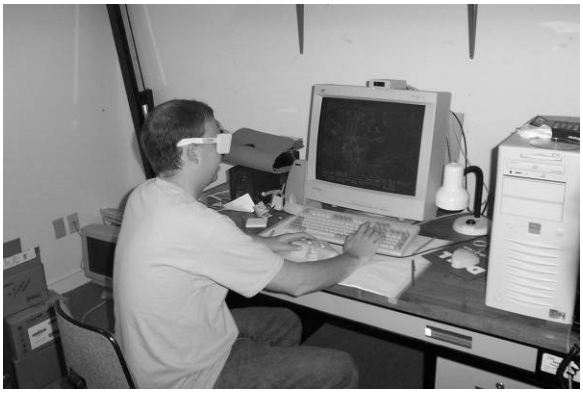
4.2. TURN-AROUND TIME OPTIONS

In some cases, the pricing included with your proposal offers several options. The base price is for our standard fast turn-around time for delivery of mapping jobs of the stated size. If applicable, we have provided options for longer turn-around times at a discounted rate; you may select one of these options if desired. Please note: the turn-around time starts when the ground control is either received by E-TOPO® or completed by E-TOPO® and is based on business days. Please indicate your selection of delivery times.

5. MAP COMPILATION

5.1. EQUIPMENT

The topographic mapping will be compiled on first order analytical KERN / LEICA DSR14 Stereoplotters each configured as digital collection workstations or on KLT Associates ATLAS / DSP Softcopy Station(s). Digital Orthophotos will be produced on a KLT Associates ATLAS / DSP Softcopy Station and will be delivered in .TIF format. Projects involving topographic mapping will include a file containing all elevation data as collected from the stereomodel(s) including surface breaklines and spot elevations. The softcopy station is a Windows PC based Digital image Stereoplotter (DSP) that allows photogrammetric mapping and digital orthophoto production from digitally scanned aerial photography.



5.2. SCALE AND CONTOUR INTERVAL

Scale and contour interval will be as specified in the Mapping Compilation section of your Photogrammetric Mapping Contract. Table 1 of this Appendix details what features are expected to be visible at various mapping scales.

5.3. FINAL DELIVERABLE

The final product delivered will be as appropriate for digital transfer via FTP or on CD / DVD or other mass storage device if required. Most mapping files are uploaded to our private FTP site, with a hyperlink e-mailed directly to you, along with a password, for personal download immediately upon completion.

5.3.1. OWNERSHIP / RIGHTS

It is the policy of Eastern Topographics to protect our client's ownership of the mapping which we are contracted to provide. Mapping and control data are not provided to a third party without written permission from the original client.

5.4. CERTIFICATION

All mapping will be done under the supervision and direction of a Photogrammetrist certified by the American Society of Photogrammetry and Remote Sensing (ASPRS).

6. MAP ACCURACIES

6.1. E-TOPO® MAP ACCURACY

Mapping will be delivered in accordance with **NATIONAL MAP ACCURACY STANDARDS** (NMAS) appropriate for the scale and contour interval specified in the contract. Changes or additions made to the delivered compilation may invalidate compliance to National Map Accuracies. Provided ground control meets accuracies as required in Section 3.1.2., map accuracy will be as follows:

6.1.1. CONTOURS

Ninety percent (90%) of the elevations determined from the solid line contours of the topographic maps shall have an accuracy with respect to true elevation of one-half (½) the contour interval or better and no remaining contour line shall be in error by more than one full contour interval. In densely wooded areas where brush or trees partially obscure the ground, contours will be shown as dashed lines representing less accuracy than solid lines and will be plotted as accurately as possible from the stereoscopic model. Formlines approximating index contours (five contour intervals) will be used to show contours in substantially, but not completely, obscured areas. Areas of dense foliage where the ground is completely obscured will be identified as "ground obscured" and no contour lines will be shown.

6.1.2. SPOT ELEVATIONS

Ninety percent (90%) of all spot elevations placed on the maps shall have an accuracy of at least one quarter (¼) the contour interval and the remaining ten percent (10%) no more than one half (½) the contour interval.

6.1.3. COORDINATE GRID LINES

The plotted position of each plan coordinate grid shall not vary by more than 1/100 of an inch from the true grid value on each map manuscript.

6.1.4. HORIZONTAL CONTROL

Each horizontal control point shall be plotted on the map manuscript within the coordinate grid in which it should lie to an accuracy of 1/50 of an inch of its true position for the point.

6.1.5. PLANIMETRIC FEATURES

Ninety percent (90%) of all planimetric features, which are well defined on the photographs, shall be plotted so that their position on the manuscript shall be accurate to within at least 1/40 of an inch of their true coordinate position. None of the features shall be misplaced on the manuscript by more than 1/20 of an inch from their true coordinate position. Partially obscured planimetric details that

may not meet this requirement will be shown by dashed lines where possible. Planimetric features totally obscured will not be shown.

6.2. SUMMARY OF ACCURACY STANDARDS

The following table specifies the level of E-TOPO® map accuracy (NMAS) to be expected for well defined (distinct) features as viewed in the stereomodel when ground control accuracy requirements are met as specified in Section 3.1.2.

Summary Of National Map Accuracy Standards				
Horizontal Scale	Feature Location[1]	Contour Interval	Vertical (90%)	Spot Elevations (90%)
1"=20'	0.5'±	1'	½ ft	¼ ft
1"=40'	1.0'±	2'	1 ft	½ ft
1"=50'	1.25'±	2'	1 ft	½ ft
1"=100'	2.5'±	2'	1 ft	½ ft
1"=100'	2.5'±	5'	2 ½ ft	1 ¼ ft
1"=200'	5.0'±	2'	1 ft	½ ft
1"=200'	5.0'±	5'	2 ½ ft	1 ¼ ft

[1] well defined (distinct) features as viewed in the stereomodel

6.3. QUALITY CONTROL

It is your responsibility and / or the subsequent users to perform field measurements and sufficient quality control (ground truthing) to determine suitability and acceptance of said mapping for its intended use, and assume all risk and liability in connection therewith. Eastern Topographics' liability is hereby limited to warranty and accuracy of said mapping within the expense of flying, photography, and compilation. Any errors or omissions, as determined by field editing will be corrected by Eastern Topographics at no additional expense. Failure to notify Eastern Topographics within ninety (90) days from delivery of any errors and / or omissions shall be deemed an acceptance of the map and any claims as a result of such defect are waived. It is imperative that our mapping be field tested prior to any use of basemapping for design or construction.

6.4. CAUTION

The above Map Accuracies apply only to the contracted map scale and contour interval. Whereas spatial terrain information is delivered in the form of digital files with breaklines and spot elevations, you and all other users are responsible to verify subsequent terrain model generation in other software environments and applications conforms to our final delivered mapping product. Any photographic enlargement, retracing or other reproduction of the original delivered products is not covered by these same warranties, since copies may not meet National Map Accuracy Standards. This caution applies especially to mapping subsequently used at a different scale than that as originally compiled – i.e. mapping compiled at any scale will not meet NMAS when zoomed IN to a more magnified scale.

7. PAYMENTS

7.1. PAYMENT SCHEDULES

You are required to make payments in accordance with the schedule specified in your proposal. If a third party is to be invoiced for these services, full payment (remaining balance) will be required prior to the delivery of mapping.

7.2. METHOD OF PAYMENT

Standard method of payment is by check. Under special circumstances to expedite a project, we can also accept credit card (Visa / MC) payments via telephone. If you elect this option there will be a two percent (2%) processing fee.

7.3. DELINQUENT ACOUNTS

Delinquent accounts will be charged two percent (2%) per month (24% per annum) from the due date, and attorney's fees if collection through legal process is necessary.

8. PROJECT SCHEDULE

8.1. CLIENT PROVIDED GROUND CONTROL

8.1.1. GROUND CONTROL PHOTO SCANS

Upon receipt of your authorization to proceed, we will provide digital photo scans illustrating the ground control points needed for mapping. If your project involves a custom flight, a flight will be scheduled as soon as practical (Section 1.2.) and the digital scans (Section 3.1.3.) will be sent as soon as possible after the flight, usually less than one week.

8.1.2. TURNAROUND TIME

The time frame specified in your contract for project completion (number of business days) begins upon our receipt of your completed ground control, confirmed mapping limits, and required payment(s). We will ship the completed mapping within the specified time frame.

8.1.3. EXCEPTION

Please note, the turnaround time stated in your proposal does not apply if ground control is received during Mid-April thru Mid-June. During these two (2) months, turnaround time will not be more than twice (2x) the stated business days in your proposal. As usual, it is our primary goal to deliver your mapping as quickly as possible.

8.2. E-TOPO® PROVIDED GROUND CONTROL

8.2.1. MAPPING LIMIT PHOTO SCAN(S)

If you elect to have us perform the control, we will provide digital scans of photos illustrating mapping limits for your review / confirmation. The schedule for our field crew will be refined based upon the date of authorization. Our field crew is typically on-site within ten (10) business days of client's approval of mapping limits. If inclement weather, including significant snowfall, occurs during field crew scheduling, it may delay the ground control schedule until roads are clear and conditions are safe. If a custom flight is required, the flight will be scheduled as soon as practical and digital photo scans will be sent immediately thereafter.

8.2.2. TURNAROUND TIME

The time frame for project completion (number of business days) specified in your contract begins upon our completion of ground control, receipt from you of confirmed mapping limits, and receipt of required payment(s). We will ship the completed mapping within the specified time frame.

8.2.3. EXCEPTION

Please note, the turnaround time stated in your proposal does not apply if ground control is received during Mid-April thru Mid-June. During these two (2) months, turnaround time will not be more than twice (2x) the stated business days in your proposal. As usual, it is our primary goal to deliver your mapping as quickly as possible.

9. PROPOSAL EXPIRATION

9.1. This proposal should be considered as a firm quotation only for six (6) months from date of issue. Terms and conditions may be renegotiated if mapping is not initiated within that time.

10. CANCELLATION OF PROJECT

10.1. Upon written receipt of project cancellation, Eastern Topographics will immediately cease work and render a billing for work completed to date.

TABLE 1 – PLANIMETRIC FEATURES AND MAPPING SCALES

Table 1 Key

Number	Qualification
1	1/10" at Map Scale
2	Landmark Only
3	Over 1'
4	Special Requirements[a]
5	Outline
6	Road LTP
7	Where Contours Required
8	Prominent Only
9	Permanent Only
10	Roadside Only
11	Large Public Buildings
12	Ornamental Only
13	Single Trees
14	Over 1" at map scale
15	Cross Country
16	Over 2'
17	Large Only
18	In ground Only

[a] needs to be specified in proposal

TABLE 1 – PLANIMETRIC FEATURES AND MAPPING SCALES

Planimetric Detail				1" = 20'	1" = 40'	1" = 50'	1" = 100'	1" = 200'
Airports								
	Lights/Detail			•	•	•	1	NO
	Runways/Taxiways			•	•	•	•	•
Asphalt Pads				•	•	•	1	1
Athletic Fields				•	•	•	•	NO
Billboards				•	•	•	2	2
Boulders				•	•	•	2	NO
Bridges				•	•	•	•	•
Buildings				•	•	•	•	•
Catch Basins				•	•	•	•	NO
Cemeteries								
	Headstones			4	4	NO	NO	NO
	Monuments			4	4	4	NO	NO
	Roads			•	•	•	•	•
	Walkways			•	•	•	NO	NO
Concrete								
	Barrier			•	•	•	8	NO
	Delineation			•	•	NO	NO	NO
	Pads			•	•	•	8	NO
Crosswalk				•	NO	NO	NO	NO
Culverts								
	Headwall			5	•	•	1	NO
Curbs								
	Curbs			•	•	•	NO	NO
	Terrain Modeled Curb			7	7	7	NO	NO
Retaining Walls				•	•	•	7	7
Terrain Modeled Retaining Walls				7	7	7	7	7
Dams				•	•	•	•	•
Decks				•	•	•	1	NO
Ditches				•	•	•	•	NO
Drains				•	•	•	•	NO
Drives				•	•	•	14	14

TABLE 1 – PLANIMETRIC FEATURES AND MAPPING SCALES

Planimetric Detail	1" = 20'	1" = 40'	1" = 50'	1" = 100'	1" = 200'
Fences	•	•	•	8	15
Fields	•	•	•	•	NO
Fire Hydrants	•	•	•	NO	NO
Foundations	•	•	•	•	•
Gas Pumps/Islands	•	•	•	NO	NO
Golf Courses					
Greens/Sand Traps	•	•	•	•	NO
Tees/Fairways	•	•	•	•	NO
Greenhouses	•	•	•	•	•
Guardrails	•	•	•	8	8
House Trailers	•	•	•	9	9
Ice	4	4	4	NO	NO
Lakes/Ponds	•	•	•	•	•
Lamp Posts (private)	•	•	•	NO	NO
Ledge Outline	•	•	•	1	1
Light Poles	•	•	•	•	NO
Mail Boxes	•	NO	NO	NO	NO
Manholes	•	•	•	•	NO
Marshes/Swamps	•	•	•	•	•
Mines	•	•	•	•	8
Misc:					
> 1/20" @ Map Scale	•	•	•	•	NO
> 1/40" @ Map Scale	•	•	•	•	•
Obscured Area	•	•	•	•	•
Parking Lots	•	•	•	•	NO
Parking Meters	•	•	NO	NO	NO
Parking Outlines	•	8	NO	NO	NO
Piers/Wharves/Docks	•	•	•	1	1
Pipelines	•	•	•	•	15
Poles (utility)	•	•	•	•	15
Quarries	•	•	•	•	•
Radio Towers	•	•	•	•	•
Railroads:					
Rails	•	•	•	•	•
Switches/Signal Boxes	•	•	•	NO	NO

TABLE 1 – PLANIMETRIC FEATURES AND MAPPING SCALES

Planimetric Detail				1" = 20'	1" = 40'	1" = 50'	1" = 100'	1" = 200'
Ramp/Dock				•	•	•	1	NO
Rapids				4	4	4	4	4
Reservoirs				•	•	•	•	•
Rivers				•	•	•	•	•
Roads				•	•	•	•	•
Rock:								
	Individual			3	3	16	NO	NO
	Outline			•	•	•	1	1
	Outcrop			•	•	•	1	1
Ruins				•	•	•	•	•
Schools				•	•	•	•	•
Sidewalks:								
	Public			•	•	•	10	NO
	Private			•	•	•	NO	NO
Signs				•	•	•	17	2
Silos				•	•	•	•	•
Stacks				•	•	•	17	NO
Steps				•	•	•	11	NO
Streams				•	•	•	•	•
Structure				1	1	1	1	1
Substations				•	•	•	•	•
Swamp/Wetland				•	•	•	•	•
Swimming Pool				•	•	•	18	NO
Tanks				•	•	•	17	17
Towers				•	•	•	•	•
Traffic Lights				•	•	•	NO	NO
Trailers				4	4	4	4	4
Trails				•	•	•	8	NO
Tunnels				•	•	•	•	•
Utility Poles				•	•	•	•	15
Utility Valves/Meter Caps				•	NO	NO	NO	NO
Vegetation:								
	Brush			•	•	•	NO	NO
	Bushes/Shrubbery			12	5	5	NO	NO

TABLE 1 – PLANIMETRIC FEATURES AND MAPPING SCALES

Planimetric Detail		1" = 20'	1" = 40'	1" = 50'	1" = 100'	1" = 200'
	Dense Wood Limit	•	•	•	•	•
	Hedges	•	•	•	NO	NO
	Individual Trees	•	•	•	2	NO
	Nurseries/Orchards	•	•	•	•	•
	Orchard Outline	5	5	5	5	5
	Treelines	•	•	•	•	•
	Woods	•	•	•	•	•
Walls		•	•	•	8	2
Waterfalls		•	•	•	•	•
Woods Roads		•	•	•	•	•