

CONTRACT NUMBER 0100xxx



**CONTRACT FOR
TOPOGRAPHIC MAPPING SERVICES**

PROJECT:

Topographic Mapping Services

OWNER:

City of Charlotte
c/o Engineering and Property Management

SURVEYOR:

Avioimage Mapping Services, Inc.

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**CONTRACT FOR MAPPING SERVICES
BETWEEN THE CITY OF CHARLOTTE AND
AVIOIMAGE MAPPING SERVICES, INC.**

THIS CONTRACT, made and entered into this ____ day of _____ 2009 (“Effective Date”), by and between the **CITY OF CHARLOTTE**, a North Carolina municipal corporation, hereinafter referred to as the “City”, and **AVIOIMAGE MAPPING SERVICES, INC.**, a North Carolina corporation with offices in Charlotte, North Carolina, hereinafter referred to as the “Surveyor”.

GENERAL RECITALS

WHEREAS, the City desires to engage the Surveyor to provide mapping services as outlined hereinafter upon the terms and conditions as set out herein;

WHEREAS, the City is authorized by the City Council to enter into an Contract for performance of such services;

NOW THEREFORE, the City and the Surveyor, for consideration hereinafter stipulated, mutually agree that the Surveyor shall perform the services provided under this Contract and shall do, perform and carry out in a satisfactory manner, as determined by the City, the following:

AGREEMENT

ARTICLE 1 - SCOPE OF SERVICES

The Surveyor shall provide aerial mapping services (“Services”) as directed by the City Project Manager. The City will specify services to be performed by the Surveyor in the form of written task orders. The Surveyor will acknowledge all such written task orders within 24 hours of receipt and complete all services within the timeframe stated in each individual task order.

The Surveyor shall provide surveying services on an as-needed basis as determined by the City’s Project Manager for various infrastructure improvement projects.

Individual work items under this contract shall be assigned by Task Orders issued by the City’s Project Manager. A task order scope shall be provided to the Surveyor and shall be the basis of negotiations between the City’s Project Manager and the Surveyor regarding:

fee, the scheduling of the proposed task; the personnel required and the time required for each; an itemized list of deliverables, and other expenses (such as reimbursables) deemed necessary to accomplish the proposed work. Cost of services shall be based on the hourly rates provided in **Exhibit 2, Fee Schedule**. Each Task Order may initially include any or all of the work elements outlined herein and may be modified to add or delete certain elements at the discretion of the City's Project Manager. This contract does not grant the Surveyor exclusive right to provide the specified services to the City. Similar services may be obtained from sources other than the Surveyor at the discretion of the City.

ARTICLE 2 – TIME OF BEGINNING AND COMPLETION

This Contract shall commence on the Effective Date and shall continue in full force for one 12-month period, unless sooner terminated or extended in accordance with the provisions of this Contract. The City reserves the right to extend the Contract at the discretion of the City Manager for two (2) additional 12-month periods. Time is of the essence and the Surveyor shall begin work immediately following issuance of a written Notice to Proceed.

ARTICLE 3 - PERSONNEL

The key personnel listed in the Surveyor's organizational chart (**Exhibit 4**) shall be assigned to the Project until completion. No changes in Surveyor's key personnel shall be made without prior written approval of the City.

The Surveyor shall submit, for approval by the City, organization charts and qualifications of personnel for any portions of the work subcontracted to other firms. No changes in the personnel of subcontracting firms shall be made without prior written approval by the City.

3.1 *Addition, Removal and Replacement of Personnel*

The City has the right to require any additional personnel that the City deems necessary to maintain the Project schedule. The City also has the right to require removal and replacement of any personnel deemed unsatisfactory by the City.

3.2 *Subconsultant Employees*

For purposes of this section, Surveyor's "employees" shall include employees of any subconsultant. The Surveyors' employees who normally and regularly come in direct contact with the public shall be clearly identifiable by name badges, nametags, or identification cards.

ARTICLE 4 - POINTS OF CONTACT; NOTIFICATION

4.1 *City's Point of Contact*

The City will designate a Project Manager who is authorized to act in the City's behalf with respect to the Project, except as otherwise limited by this Contract. The Project Manager will examine the documents submitted by the Surveyor and will expedite decisions concerning the documents in order to avoid unreasonable delay in the progress of the Surveyor's services. The Project Manager will coordinate all communication between the Surveyor and the City unless otherwise specified in writing. The Surveyor shall contact the Project Manager prior to all meetings involving City personnel.

The City's Point of Contact and Project Manager is:

David Snider
Engineering & Property Management
City of Charlotte
600 E. 4th Street
Charlotte, NC 28202
Phone: 704-336-3875
Fax: 704-336-4554
Email: dsnider@ci.charlotte.nc.us

4.2 *Surveyor's Point of Contact*

The duties of the Surveyor's Point of Contact include, but are not limited to:

- Coordinating Services and the Surveyor's resource assignments based on the City's requirements;
- Providing consultation and advice to the City on matters related to the Services and the Project;
- Acting as the Surveyor's point of contact for all aspects of contract administration, including invoicing for Services, and status reporting;
- Facilitating meetings and conferences between the City and the Surveyor's staff when scheduled or requested by the City;
- Communicating among and between the City and the Surveyor's staff;
- Promptly responding to the City's Project Manager when consulted in writing with respect to Service deviation and necessary documentation;

- Identifying and providing the City with written notice immediately after the Surveyor becomes aware of any issue that may threaten the delivery of Services in the manner contemplated by this Contract; and
- Ensuring that adequate quality assurance procedures are in place for the performance of Services.

The Surveyor's Point of Contact is:

Robert F. Akers, Jr., PLS
Avioimage Mapping Services, Inc.
4455 Morris Park Drive, Suite B
Charlotte, NC 28227-9269
Phone: 704-7080
Fax: 704-573-7081
Email: bob@avioimage.com

Any notice, consent or other formal communication required or contemplated by this Contract shall be in writing and shall be delivered in person, by U.S. mail, by overnight courier, by electronic mail or by telefax to the intended recipient at the address set forth below:

City:

Engineering & Property Management
City of Charlotte
600 East Fourth Street
Charlotte, NC 28202
Attn: David Snider
Phone: 704-336-3875
Fax: 704-336-4554
Email: dsnider@ci.charlotte.nc.us

Surveyor:

Avioimage Mapping Services, Inc.
4455 Morris Park Drive, Suite B
Charlotte, NC 28227-9269
Attn: Robert F. Akers, Jr., PLS
Phone: 704-573-7080
Fax: 704-573-7081

Email: bob@avioimage.com

Notice shall be effective upon the date of receipt by the intended recipient, provided that any notice that is sent by telefax or electronic mail shall also be simultaneously sent by mail deposited with the U.S. Postal Service or by overnight courier. Each party may change its address for notification purposes by giving the other party written notice of the new address and the date upon which it shall become effective.

ARTICLE 5 - COMPENSATION AND PAYMENTS

5.1 *Hourly and Unit Price Basis Allowances*

The Surveyor shall be compensated for actual work performed on an hourly and unit price basis for the services listed in each Task Order and as approved by the City Project Manager; provided, however, that the total of payments to the Surveyor for providing hourly and unit price basis services shall not exceed **\$50,000**.

5.2 *Invoices*

Payment of the fees provided for under this Contract will be made to the Surveyor on a monthly basis upon submission of an invoice stating the nature and quantity of work performed and accompanied by proper supporting documentation as the City may require, including a Monthly Project Status Report (see **Exhibit 7**). Any hourly basis fees and reimbursable expenses shall be itemized on each invoice. Payments will be made within 30 calendar days of the date of receipt of a correct payment request. A correct payment request is defined as an invoice that indicates only those work items that have been satisfactorily completed and accepted by the City. The Surveyor waives the right to payment for all services that are not invoiced to the City within 90 days after the date on which they have been completed.

In order to assure timely payment, the original paper invoice shall be mailed to the City's Finance Division, using a Bill to/Ship to format as follows:

BILL TO:

City of Charlotte
Finance Department, 10th Floor
600 East Fourth Street
Charlotte, NC 28202

SHIP TO:

City of Charlotte
E&PM, 12th Floor
Attn: David Snider
600 East Fourth Street
Charlotte, NC 28202

5.3 Cost Overruns

If it appears during the course of the work that any of the estimated fees and allowances may be exceeded, the Surveyor shall immediately notify the City's Project Manager in writing. The estimated fees and allowances shall not be exceeded except by written amendment to this Contract. Any work performed without prior written approval by the City shall be at the Surveyor's expense.

5.4 Accounting and Auditing

The Surveyor shall maintain complete and accurate records, using Generally Accepted Accounting Principles (GAAP), of all costs related to this Contract. Such records shall be open to inspection and subject to audit and/or reproduction, during normal working hours, by the City's agent or authorized representative to the extent necessary to adequately permit evaluation and verification of any invoices, payments, or claims submitted by the Surveyor or any of his payees in connection with this Contract. Records subject to examination will include, but are not limited to, those records necessary to evaluate and verify direct and indirect costs (including overhead allocations) as they may apply to costs associated with this Contract.

For the purpose of such inspections, the City's agent or authorized representative shall have access to said records from the Effective Date of this Contract, for the duration of the Services, and until three (3) years after the date of final payment by the City to the Surveyor pursuant to this Contract.

The City's agent or authorized representative shall have access to the Surveyor's facilities and shall be provided an adequate and appropriate work place, in order to conduct audits in compliance with this Article. The City will give the Surveyor reasonable advance notice of planned inspections. If, as the result of an audit hereunder, the Surveyor is determined to have charged the City for amounts that are not allocable or verifiable, the Surveyor shall promptly reimburse the City for said amount.

5.5 Withholding of Periodic Payments

The parties agree that the City shall be entitled to withhold periodic payments and

final payment due to the Surveyor under this Contract until the City has received in a form satisfactory to the City all claim releases and other documentation required by the City's Small Business Opportunity Program. In the event payments are withheld under this provision, the Surveyor waives any right to interest that might otherwise be warranted on such withheld amount under G.S. 143-134.1.

Nothing in this Section shall be construed to relieve a Surveyor from any obligation it may have under N.C. Gen. Stat. 143-134.1 regarding the payment of subcontractors.

ARTICLE 6 - INSURANCE

The Surveyor shall purchase and maintain during the life of this Contract with an insurance company acceptable to the City and authorized to do business in the State of North Carolina the following insurance:

6.1 *Automobile Liability*

Bodily injury and property damage liability covering all owned, non-owned and hired automobiles for limits of not less than \$1,000,000 bodily injury each person, each accident and \$1,000,000 property damage, or \$1,000,000 combined single limit each occurrence/aggregate.

6.2 *Commercial General Liability*

Bodily injury and property damage liability as shall protect the Surveyor and any subcontractor performing work under this Contract from claims of bodily injury or property damage which arise from operation of this Contract whether such operations are performed by Surveyor, any subcontractor or any person directly or indirectly employed by either. The amounts of such insurance shall not be less than \$1,000,000 bodily injury each occurrence/aggregate and \$1,000,000 property damage each occurrence/aggregate or \$1,000,000 bodily injury and property damage combined single limits each occurrence/aggregate. This insurance shall include coverage for products/completed operation, personal injury liability and contractual liability assumed under the indemnity provision of this Contract.

6.3 Workers' Compensation Insurance

Meeting the statutory requirements of the State of North Carolina and Employers Liability - \$100,000 per accident limit, \$500,000 disease per policy limit, \$100,000 disease each employee limit, providing coverage for employees and owners.

6.4 Professional Liability Insurance

In an amount of not less than \$1,000,000 each claim and \$1,000,000 aggregate.

The City shall be exempt from, and in no way liable for, any sums of money that may represent a deductible in any insurance policy. The payment of such deductible shall be the sole responsibility of the Surveyor and/or subconsultant providing such insurance.

The City of Charlotte shall be named as additional insured under the commercial general liability insurance for operations and services rendered under this Contract. Certificates of all required insurance shall be furnished to the City and shall contain the provision that the City will be given 30 day written notice of any intent to amend or terminate by either the insured or the insuring company.

If any part of the work under this Contract is sublet, the subconsultant shall be required to meet all insurance requirements set forth in this Contract. Nothing contained herein shall relieve the Surveyor from meeting all insurance requirements or otherwise being responsible for the subconsultant.

ARTICLE 7 - OWNERSHIP AND USE OF WORK PRODUCT

The City shall have exclusive ownership of all intellectual property rights in all designs, plans and specifications, documents and other work product prepared by, for or under the direction of the Surveyor pursuant to this Contract (collectively, the "Design Work"), including without limitation the right to copy, use, disclose, distribute, and make derivations of the Design Work for any purpose or to assign such rights to any third party. The Design Work shall be prepared in the City's name and shall be the sole and exclusive property of the City, whether or not the work contemplated therein is performed. The City grants the Surveyor a royalty-free, non-exclusive license to use and copy the Design Work to the extent necessary to perform this Contract. The Surveyor shall not use or release any component of the Design Work by the Surveyor to any other person, firm or corporation for any purpose other than performance of this Contract without the written approval of the City.

The Surveyor hereby assigns and transfers all rights in the Design Work to the City. The Surveyor further agrees to execute and deliver, and to cause its subconsultants and subcontractors to execute and deliver, such assignments and other documents as the City may later require to perfect, maintain and enforce the City's rights as sole owner of the City Intellectual Property, including all rights under copyright law. The Surveyor hereby appoints the City as attorney in fact to execute all such assignments and instruments and agrees that its appointment of the City as an attorney in fact is coupled with an interest and is irrevocable.

The Surveyor represents and warrants that the Design Work will not infringe or misappropriate the intellectual property or other rights of any person or entity, and that the City shall have the unrestricted right to use the Design Work for any purpose. The Surveyor further represents and warrants that it has the right to grant the rights granted to the City in this Article on behalf of the Surveyor's subconsultants and subcontractors.

7.1 *Work Product, Internet and CADD Related Liability*

The City recognizes that the Work Product may be generated, stored, transmitted or published in various media, including, but not limited to traditional hard-copy (i.e., blue prints), CADD formats, via Internet or Extranet websites or other electronic or other media and such Work Product may be subject to unauthorized tampering, modifications and alterations (collectively hereinafter referred to as "Unauthorized Use") by parties over whom the Surveyor has no control. The Work Product is also subject to discrepancies as a result of numerous factors, including without limitation, transmission and translation errors resulting from differences in computer software, hardware and equipment-related problems, disk malfunctions, and user error (collectively hereinafter referred to as "Discrepancies").

Accordingly, the Surveyor has no responsibility for any Discrepancies in the Work Product that are beyond the Surveyor's reasonable control. The Surveyor shall maintain a hard copy of the Work Product for three (3) years from the date it completes all work under this Contract. If requested, the Surveyor shall provide the City with the Work Product in electronic form, and the City agrees to release the Surveyor, from all claims, causes of action, suits, demands and damages, arising from or relating to any Discrepancies in such Work Product that are beyond the Surveyor's reasonable control.

ARTICLE 8 - TERMINATION

8.1 *Termination for Convenience*

The City may terminate this Contract for any reason or no reason by giving written notice of termination at least thirty (30) days before the date of termination. The notice shall specify the date upon which such termination becomes effective and the City shall pay the Surveyor for Services rendered prior to the effective date of termination.

8.2 *Termination for Default*

By giving written notice, either party may terminate this Contract upon the occurrence of one or more of the following events, each of which constitute a non-exclusive Event of Default under this Contract:

- a. The other party violates or fails to perform any covenant, provision, obligation, term, or condition contained in this Contract, provided that, unless otherwise provided in this Contract, such failure or violation shall not be cause for termination if the defaulting party cures such default (if the default is susceptible to cure) within thirty (30) days of receipt of written notice of default from the other party.
- b. The Surveyor takes or fails to take any action which constitutes grounds for immediate termination under the terms of this Contract, including but not limited to failure to obtain or maintain the insurance policies and endorsements as required by this Contract, or failure to provide the proof of insurance as required by this Contract.

Any notice of default shall state the party's intent to terminate this Contract if the default is not cured within the specified time period.

8.3 *Additional Grounds for Termination by the City*

The City may terminate this Contract immediately by written notice to the Surveyor upon the occurrence of one or more of the following events each of which shall also constitute a non-exclusive Event of Default:

- a. The Surveyor makes or allows to be made any material written

misrepresentation or provides any materially misleading written information in connection with this Contract, the Surveyor's Proposal, or any covenant, agreement, obligation, term, or condition contained in this Contract; or

- b. The Surveyor takes or fails to take any action which constitutes grounds for immediate termination under the terms of this Contract, including but not limited to failure to obtain or maintain the insurance policies and endorsements as required by this Contract, or failure to provide the proof of insurance as required by this Contract; or
- c. The Surveyor ceases to do business as a going concern, makes an assignment for the benefit of creditors, admits in writing its inability to pay debts as they become due, files a petition in bankruptcy or has an involuntary bankruptcy petition filed against it (except in connection with a reorganization under which the business of such party is continued and performance of all its obligations under this Contract shall continue), or if a receiver, trustee or liquidator is appointed for it or any substantial part of the other party's assets or properties.

8.4 ***Obligations Upon Expiration Or Termination***

Upon expiration or termination of the Contract, the Surveyor shall promptly provide or return to the City:

- a. All Deliverables, in whatever form;
- b. Documentation to evidence completion of matters covered by this Contract and setting forth progress in developing the Deliverables to the date of termination; and
- c. All equipment, materials, documents, or data, whether in written, graphic, machine readable or other form, supplied by the City in connection with this Contract, in as good condition as when delivered, reasonable wear and tear excepted.

Upon the request of the City, the Surveyor agrees to provide reasonable assistance and cooperation to the City and City contractors for a period of up to twelve (12) months after expiration or termination of this Contract at its then-current rates.

8.5 *No Effect On Taxes, Fees, Charges Or Reports*

Any termination of this Contract shall not relieve the Surveyor of the obligation to pay any fees, taxes, or other charges then due to the City, nor relieve the Surveyor of the obligation to file any daily, monthly, quarterly, or annual reports covering the period to termination nor relieve the Surveyor from any claim for damages previously accrued or then accruing against the Surveyor.

8.6 *Substitute Performance*

In the event the Surveyor fails to perform any part of the Scope of Services within the time frame set forth in this Contract without good cause, then, without limiting any other remedies available to the City, the City may take either or both of the following actions:

- a. Employ such means as it may deem advisable and appropriate to continue work until the matter is resolved and the Surveyor is again able to carry out operations under this Contract; and
- b. Deduct any and all operating expenses incurred by the City from any money then due or to become due the Surveyor and, should the City's cost of continuing the operation exceed the amount due the Surveyor, collect the amount due from the Surveyor.

8.7 *Cancellation of Orders and Subcontracts*

In the event this Contract is terminated by the City for any reason, the Surveyor shall upon the effective date of termination (unless the City's notice of termination directs otherwise), immediately discontinue all service in connection with this Contract and promptly cancel all existing orders and subcontracts which are chargeable to this Contract. As soon as reasonable after receipt of notice of termination, the Surveyor shall submit a statement to the City showing in detail the services performed under this Contract to the date of termination.

8.8 ***Other Remedies***

Upon termination of this Contract, each party may seek all legal and equitable remedies to which it is entitled. The remedies set forth herein shall be deemed cumulative and not exclusive and may be exercised successively or concurrently, in addition to any other available remedies.

8.9 ***Authority to Terminate***

The City Surveyor will have authority, without the necessity of further action by City Council, to terminate this Contract on behalf of the City.

ARTICLE 9 - COVENANTS AND REPRESENTATIONS

9.1 The Surveyor covenants and represents that it shall exercise a customary degree of care and diligence in performing all services under this Contract. The Surveyor shall render services under this Contract in accordance with the customary professional standards prevailing in the Mecklenburg County area.

9.2 The Surveyor further covenants and represents that (i) the services performed by it under this Contract do not violate any contracts with third parties or any third party rights in any patent, trademark, copyright, trade secret or similar right, (ii) that the services performed hereunder shall be performed in a professional manner and by qualified staff and shall satisfy the requirements set forth in this Contract, and (iii) that it has sufficient expertise and resources to perform under this Contract.

9.3 The Surveyor further represents and covenants that:

- a. It is validly existing and in good standing under the laws of North Carolina;
- b. It has all the requisite power and/or authority to execute, deliver and perform its obligations under this Contract;
- c. The execution, delivery, and performance of this Contract have been duly authorized by the Surveyor;
- d. No approval, authorization, or consent of any governmental or regulatory authority is required to be obtained or made by it in order for it to enter into and perform its obligations under this Contract; and
- e. In connection with its obligations under this Contract, it shall comply with all applicable federal, state and local laws and regulations and shall obtain all applicable permits and licenses.

9.4 Any defective designs, specifications, plats or surveys (BFF) furnished by the Surveyor and any failure of any services performed by the Surveyor to comply with any requirements set forth in this Contract shall be promptly corrected by the Surveyor at no cost to the City. The City's approval, acceptance, use of, or payment for all or any part of the Surveyor's services or of the Project itself shall in no way alter the Surveyor's obligations or the City's rights under this Contract.

ARTICLE 10 - INDEMNIFICATION

To the fullest extent permitted by law, the Surveyor shall indemnify, defend and hold harmless each of the "Indemnitees" (as defined below) from and against any and all "Charges" (as defined below) paid or incurred any of them as a result of any claims, demands, lawsuits, actions, or proceedings: (i) alleging violation, misappropriation or infringement of any copyright, trademark, patent, trade secret or other proprietary rights with respect to the Work or any products or deliverables provided to the City pursuant to this Contract ("Infringement Claims"); (ii) seeking payment for labor or materials purchased or supplied by the Surveyor or its subcontractors in connection with this Contract; or (iii) arising from the Surveyor's failure to perform its obligations under this Contract, or from any act of negligence or willful misconduct by the Surveyor or any of its agents, employees or subcontractors relating to this Contract, including but not limited to any liability caused by an accident or other occurrence resulting in bodily injury, death, sickness or disease to any person(s) or damage or destruction to any property, real or personal, tangible or intangible; or (iv) alleging violation of any federal, state or local law or regulation by the Surveyor or any of the Surveyor's subcontractors; or (v) alleging that an employee or subcontractor of the Surveyor is an employee of the City, including but not limited to claims relating to worker's compensation, failure to withhold taxes and the like. For purposes of this Section: (a) the term "Indemnitees" means the City and each of the City's officers, officials, employees, agents and independent contractors (excluding the Surveyor); and (b) the term "Charges" means any and all losses, damages, costs, expenses (including reasonable attorneys' fees), obligations, duties, fines, penalties, royalties, interest charges and other liabilities (including settlement amounts).

If an Infringement Claim occurs, the Surveyor shall either: (i) procure for the City the right to continue using the affected product or service; or (ii) repair or replace the infringing product or service so that it becomes non-infringing, provided that the performance of the overall product(s) and service(s) provided to the City shall not be adversely affected by such replacement or modification. If the Surveyor is unable to comply with the preceding

sentence within thirty days after the City is directed to cease use of a product or service, the Surveyor shall promptly refund to the City all amounts paid under this Contract.

ARTICLE 11 - GENERAL COMPLIANCE WITH LAWS

The Surveyor shall comply with all Federal, State, and local laws, ordinances, and regulations applicable to the services provided herein. If, due to conflicts between two or more such ordinances, statutes, laws, rules, and regulations (the "Regulations") or due to conflicts in the interpretation or enforcement of such Regulations by courts or governing bodies having jurisdiction over the project, the Surveyor is unable to comply with such Regulations, the Surveyor shall exercise usual and customary professional care in the in complying with such conflicting Regulations.

The Surveyor further agrees that it will at all times during the term of this Contract be in compliance with all applicable Federal, State and/or local laws regarding employment practices. Such laws include, but shall not be limited to workers' compensation, the Fair Labor Standards Act (FLSA), the Americans with Disabilities Act (ADA), the Family and Medical Leave Act (FMLA), and all Occupational Safety and Health Administration (OSHA) regulations applicable to the work.

ARTICLE 12 - DRUG FREE WORKPLACE REQUIREMENT

The Surveyor shall provide a drug-free workplace during the performance of this Contract. This obligation is met by:

- a. Notifying employees that the unlawful manufacture, distribution, dispensation, possession, or use of a controlled substance is prohibited in the Surveyor's workplace and specifying the actions that will be taken against employees for violations of such prohibition;
- b. Establishing a drug-free awareness program to inform employees about (i) the dangers of drug abuse in the workplace, (ii) the Surveyor's policy of maintaining a drug-free workplace, (iii) any available drug counseling, rehabilitation, and employee assistance programs and (iv) the penalties that may be imposed upon employees for drug abuse violations;
- c. Notifying each employee that as a condition of employment, the employee will (i) abide by the terms of the prohibition outlined in this ARTICLE and (ii)

notify the Surveyor of any criminal drug statute conviction for a violation occurring in the workplace not later than five (5) days after such conviction;

- d. Notifying the City within ten (10) days after receiving from an employee a notice of a criminal drug statute conviction or after otherwise receiving actual notice of such conviction, unless otherwise forbidden to communicate such information to third parties under the Surveyor's drug-free awareness program or other restrictions;
- e. Imposing a sanction on, or requiring the satisfactory participation in a drug counseling, rehabilitation or abuse program by an employee convicted of drug crime;
- f. Making a good faith effort to continue to maintain a drug-free workplace for employees; and
- g. Requiring any party to which it subcontracts any portion of the work under the Contract to comply with the provisions above.

If the Surveyor is an individual, the requirement is met by not engaging in the unlawful manufacture, distribution, dispensation, possession, or use of a controlled substance in the performance of this Contract.

Failure to comply with the above drug-free workplace requirements during the performance of the Contract shall be grounds for suspension, termination or debarment.

ARTICLE 13 - MISCELLANEOUS CONDITIONS

13.1 *Relationship of the Parties*

The relationship of the parties established by this Contract is solely that of independent contractors, and nothing contained in this Contract shall be construed to (i) give any party the power to direct or control the day-to-day activities of the other; or (ii) constitute such parties as partners, joint venturers, co-owners or otherwise as participants in a joint or common undertaking.

13.2 ***Entire Agreement***

This Contract is the entire agreement between the parties with respect to its subject matter, and there are no other representations, understandings, or agreements between the parties relative to such subject matter. This Contract supersedes all prior agreements, negotiations, representations, and proposals (prior agreements), written or oral, except to the extent such prior agreements are incorporated by reference into this Contract.

13.3 ***Amendment***

No amendment or change to this Contract shall be valid unless in writing and signed by both parties to this Contract.

13.4 ***Governing Law and Jurisdiction***

The parties acknowledge that this Contract is made and entered into in Charlotte, North Carolina. The parties further acknowledge and agree that North Carolina law shall govern all rights, obligations, duties, and liabilities of the parties to this Contract, and that North Carolina law shall govern interpretation of this Contract and any other matters relating to this Contract (all without regard to North Carolina conflicts of laws principles).

The parties further agree that any and all legal actions or proceedings relating to this Contract shall be brought in a state or federal court sitting in Mecklenburg County, North Carolina. By execution of this Contract, the parties submit to the jurisdiction of said courts and hereby irrevocably waive any and all objections that they may have with respect to venue in any of the above courts.

13.5 ***Binding Nature and Assignment***

This Contract shall bind the parties and their successors and permitted assigns. Neither party may assign this Contract without the prior written consent of the other. Any assignment attempted without the written consent of the other party shall be void.

13.6 ***Delays and Extensions***

Reasonable extensions of time for unforeseen or unavoidable delays may be made by mutual consent of the parties involved.

13.7 **Force Majeure**

The Surveyor shall not be liable for any failure or delay in the performance of its obligations pursuant to this Contract and such failure or delay shall not be deemed a default of this Contract or grounds for termination hereunder, except as set forth below, if all of the following conditions are satisfied:

- a. If such failure or delay could not have been prevented by reasonable precautions;
- b. If such failure or delay cannot reasonably be circumvented by the non-performing party through the use of alternate sources, work-around plans, or other means; and
- c. If and to the extent such failure or delay is caused by fire, flood, earthquake, elements of nature or acts of God, acts of war, terrorism, riots, civil disorders, rebellions or revolutions, strikes, lockouts or court order (each, a "Force Majeure Event").

Upon the occurrence of a Force Majeure Event, the Surveyor shall be excused from any further performance of those of its obligations pursuant to this Contract affected by the Force Majeure Event for as long as: (i) such Force Majeure Event continues and (ii) the Surveyor continues to use commercially reasonable efforts to recommence performance whenever and to whatever extent possible without delay.

The Surveyor shall promptly notify the City by telephone or other means available (to be confirmed by written notice within five (5) business days of the inception of the failure or delay) of the occurrence of a Force Majeure Event and describe in reasonable detail the nature of the Force Majeure Event. If any Force Majeure Event prevents the Surveyor from performing its obligations for more than thirty (30) days, the City may terminate this Contract.

13.8 **Severability**

The invalidity of one or more of the phrases, sentences, clauses or sections contained in this Contract shall not affect the validity of the remaining portion of the Contract so long as the material purposes of the Contract can be determined and effectuated. If any provision of this Contract is held to be unenforceable, then both parties shall be relieved of all obligations arising under such provision, but only to the extent that such provision is unenforceable, and this Contract shall be deemed

amended by modifying such provision to the extent necessary to make it enforceable while preserving its intent.

13.9 Approvals

All approvals or consents required under this Contract must be in writing. Electronic documents shall have the same validity as physical documents.

13.10 Waiver

No delay or omission by either party to exercise any right or power it has under this Contract shall impair or be construed as a waiver of such right or power. A waiver by either party of any covenant or breach of this Contract shall not constitute or operate as a waiver of any succeeding breach of that covenant or of any other covenant. No waiver of any provision of this Contract shall be effective unless in writing and signed by the party waiving the rights.

13.11 Interest of the Parties

The Surveyor covenants that its officers, employees, shareholders and subconsultants have no interest and shall not acquire any interest, direct or indirect, which would conflict in any manner or degree with the performance of services required to be performed under this Contract.

13.12 Taxes

The Surveyor shall pay all applicable Federal, State and local taxes that may be chargeable against the performance of the Services.

13.13 No Bribery or Lobby

The Surveyor certifies that to the best of its knowledge, information, and belief, neither it, any of its affiliates or subcontractors, nor any employees of any of the forgoing has bribed or lobbied, or attempted to bribe or lobby, an officer or employee of the City in connection with this Contract.

13.14 Change in Control

In the event of a change in "Control" of the Surveyor (as defined below), the City shall have the option of terminating this Contract by written notice to the Surveyor. The Surveyor shall notify the City within ten (10) days of the occurrence of a change

in control. As used in this Contract, the term "Control" shall mean the possession, direct or indirect, of either:

- a. The ownership of or ability to direct the voting of, as the case may be, fifty-one percent (51%) or more of the equity interests, value or voting power in the Surveyor; or
- b. The power to direct or cause the direction of the management and policies of the Surveyor whether through the ownership of voting securities, by contract or otherwise.

13.15 *Subcontracting*

Should the Surveyor choose to subcontract, the Surveyor shall remain fully responsible for performance of all obligations that it is required to perform under this Contract. Any subcontract entered into by the Surveyor in connection with the Project shall name the City as a third party beneficiary.

13.16 *City Not Liable for Delays*

Except as expressly provided in this Contract, the City shall not be liable to the Surveyor, its agents, representatives or subconsultants for or on account of any stoppages or delay in the performance of any obligations of the City or any other party hereunder.

13.17 *Survival of Provisions*

All definitions and express representations and indemnifications included in this Contract will survive its completion or termination. Those sections of this Contract including Exhibits that by their nature would reasonably be expected to continue after the termination of this Contract shall survive the termination of this Contract.

13.18 *Endorsement of Documents*

The Surveyor shall sign and seal, or shall cause to be signed and sealed, with the appropriate North Carolina Professional Seal, all plans, specifications, calculations, reports, plats, and construction documents prepared by the Surveyor under this Contract.

13.19 **CADD Standards; Final Plans**

The Consultant shall perform all services in accordance with the current version of the City's CADD standards available at:

<http://www.charmeck.org/Departments/City+Engineering/Resources/CAD+Standards.htm>.

13.20 **Familiarity and Compliance with Laws and Ordinances**

In performing this Contract, the Surveyor shall make itself aware of and comply with, and cause each of its subconsultants to comply with, all applicable federal, state and local laws and regulations (including without limitation obtaining all required permits and licenses).

ARTICLE 14 – SMALL BUSINESS OPPORTUNITY PROGRAM

The City has adopted a Small Business Opportunity Program, which is posted on the City's website and available in hard copy form upon request to the City. The parties agree that:

- (i) The terms of the City's Small Business Program, as revised from time to time, together with all rules and guidelines established under such program (collectively, the "SBO Program") is incorporated into this Contract by reference; and
- (ii) A violation of the SBO Program shall constitute a material breach of this Contract, and shall entitle the City to exercise any of the remedies set forth in Part D of the SBO Program, including but not limited to liquidated damages; and
- (iii) Without limiting any of the other remedies the City has under the SBO Program, the City shall be entitled to withhold periodic payments and final payment due to the Surveyor under this Contract until the City has received in a form satisfactory to the City all claim releases and other documentation required by the City's SBO Program (see **Exhibit 5**), and in the event payments are withheld under this provision, the Surveyor waives any right to interest that might otherwise be warranted on such withheld amount under G.S. 143-134.1; and

- (iv) The remedies set forth in Part D Section 13 of the SBO Program shall be deemed cumulative and not exclusive and may be exercised successively or concurrently, in addition to any other available remedy; and
- (v) The City will incur costs if the Surveyor violates the SBO Program, and such costs are difficult to ascertain due to their indefiniteness and uncertainty. Accordingly, the Surveyor agrees to pay the City liquidated damages at the rates set forth in Part D of the SBO Program; and
- (vi) The Surveyor agrees to participate in any dispute resolution process specified by the City from time to time for the resolution of disputes arising from the SBO Program; and
- (vii) Nothing in this Section shall be construed to relieve an Surveyor from any obligation it may have under N.C. Gen. Stat. 143-134.1 regarding the payment of subcontractors.

14.1 ***Remedies for Violation of SBO Program***

A violation of the SBO Program by a Surveyor shall constitute a material breach of the Contract, and shall entitle the City or private owner to:

- (i) Exercise all rights and remedies that it may have at law or at equity for violation of the SBO Program;
- (ii) Terminate the Contract for default;
- (iii) Suspend the Contract for default;
- (iv) Withhold all payments due to the Surveyor under the Contract until such violation has been fully cured or the City and the Surveyor have reached a mutually agreeable resolution;
- (v) Assess liquidated damages as provided in the following Part D Section 13.2; and/or
- (vi) Offset any liquidated damages and/or any amounts necessary to cure any violation of the SBO Program from any retainage being held by the City on the Contract, or from any other amounts due to the Surveyor under the Contract.

The remedies set forth herein shall be deemed cumulative and not exclusive, and may be exercised successively or concurrently, in addition to any other available remedy.

14.2 **Liquidated Damages**

The City and the Surveyor acknowledge and agree that the City will incur costs if the Surveyor violates the SBO Program in one or more of the ways set forth below. The parties further acknowledge and agree that the City will incur damages as a result of such failure, but that the costs the City might reasonably be anticipated to accrue as a result of such failures are difficult to ascertain due to their indefiniteness and uncertainty. Accordingly, the Surveyor agrees to pay the City liquidated at the rates set forth below for each specified violation of the SBO Program. The Surveyor further agrees that for each specified violation the agreed upon liquidated damages are reasonably proximate to the loss the City will incur as a result of such violation:

- i. **Failure to meet the SBE Goal.** If the City determines upon completion or termination of a Contract that the Surveyor did not meet the Committed SBE Goal and that such failure is not otherwise excused under Part D Section 2, the City may assess the lesser of : (a) \$30,000 or (b) the dollar difference between the Committed SBE Goal and the Surveyor's actual SBE utilization;
- ii. **Using SBE as a Conduit.** If the Surveyor lists an SBE to receive credit toward a Committed SBE Goal with knowledge that the SBE will be acting as a Conduit or will not be performing a Commercially Useful Function reasonably commensurate with the payment amount for which the Surveyor will be seeking credit, the City may assess the lesser of: (a) \$20,000 or (b) the dollar amount the Surveyor indicated that it would pay such SBE in the SBEs contract (or if no contract has been signed, the SBE's Letter of Intent);
- iii. **Wrongful Termination or Replacement of SBE Services.** If the Surveyor terminates or replaces an SBE in violation of the SBO Program, the City may assess the lesser of: (a) \$20,000 or (b) the dollar amount of the work remaining to be performed by the terminated SBE at the time it was terminated (or if the SBE was not terminated because it was never retained, then, the dollar amount that the Surveyor indicated it would pay the SBE in the SBE's letter of intent) or;

- iv. **Failure to Comply with SBO Program upon Termination or Withdrawal by SBE.** If the Surveyor fails to comply with Part D Section 5 of the SBO Program upon the termination or withdrawal of an SBE the City may assess the lesser of: (a) \$20,000 or (b) the dollar amount of the work remaining to be performed by the SBE that withdrew or was terminated at the time of the termination or withdrawal;
- v. **Failure to Comply with SBO Program to Add New Subcontractors.** If the Surveyor fails to comply with Part D of the SBO Program in adding new subcontractors to a Contract, or in the event of a Contract amendment or increase in the scope of work on a contract, the City may assess the lesser of: (a) \$20,000; or (b) the dollar amount of the new or additional work;
- vi. **False Statements and Misrepresentations.** If the Surveyor makes a false statement or material misrepresentation regarding any matter relevant to the SBO Program (including but not limited to information provided regarding payments made to SBEs), the City may assess the lesser of: (a) \$25,000; or (b) the dollar difference between what the Surveyor represented and the truth;
- vii. **Failure to Respond to Request for Information.** If the Surveyor fails to provide any report, documentation, affidavit, certification or written submission required under the SBO Program within the time period set forth therein, the City may assess \$25 per day for each day that such report, documentation or written submission is overdue.

ARTICLE 15 – COMMERCIAL NON-DISCRIMINATION POLICY

As a condition of entering into this Contract, the Surveyor represents and warrants that it will fully comply with the City's Commercial Non-Discrimination Policy as described in Section 2, Article V of the Charlotte City Code, and consents to be bound by the award of any arbitration conducted thereunder. As part of such compliance, the Surveyor shall not discriminate on the basis of race, gender, religion, national origin, ethnicity, age, or disability in the solicitation, selection, hiring, or treatment of subconsultants, vendors, suppliers, or commercial customers in connection with a City contract or contract solicitation process, nor shall the Surveyor retaliate against any person or entity for

reporting instances of such discrimination.

The Surveyor shall provide equal opportunity for subconsultants, vendors and suppliers to participate in all of its subcontracting and supply opportunities on City contracts, provided that nothing contained in this clause shall prohibit or limit otherwise lawful efforts to remedy the effects of marketplace discrimination that has occurred or is occurring in the marketplace. The Surveyor understands and agrees that a violation of this clause shall be considered a material breach of this Contract and may result in termination of this Contract, disqualification of the Surveyor from participating in City contracts or other sanctions.

As a condition of entering into this Contract, the Surveyor agrees to: (a) promptly provide to the City all information and documentation that may be requested by the City from time to time regarding the solicitation, selection, treatment and payment of subconsultants in connection with this Contract; and (b) if requested, provide to the City within sixty days after the request a truthful and complete list of the names of all subconsultants, vendors, and suppliers that Surveyor has used on City contracts in the past five years, including the total dollar amount paid by the Surveyor or on each subcontract or supply contract.

The Surveyor further agrees to fully cooperate in any investigation conducted by the City pursuant to the City's Commercial Non-Discrimination Policy as set forth in Section 2, Article V of the City Code, to provide any documents relevant to such investigation that are requested by the City, and to be bound by the award of any arbitration conducted under such Policy. The Surveyor understands and agrees that violation of this clause shall be considered a material breach of this Contract and may result in contract termination, disqualification of the Surveyor from participating in City contracts and other sanctions.

ARTICLE 16 - PUBLICITY AND STATEMENTS TO THE PRESS

Advertising, sales promotion or other materials of the Surveyor or its agents or representatives shall limit the identification or reference to this Contract to the general physical description and location of the approved final design/product of the Project. Descriptions of conceptual or alternative designs/products considered for the Project shall not be included in advertising, sales or other materials. As a condition of entering into this Contract, the Surveyor further agrees to refrain from the following, absent the City's prior written approval: (1) making any statement to the media or public regarding the subject matter of this Contract or the City's position on any issue relating to this Contract; or (2) making any statement to the media or public on any issue which is in the City's judgment

likely to cast doubt on the competence or integrity of the City or Surveyor. Failure to comply with this Article by the Surveyor shall constitute a material breach and, without limiting any other remedies the City may have, shall entitle the City to terminate this Contract for default.

ARTICLE 17 – PAYMENT AFFIDAVITS

To determine whether disparities exist in City contracting based on race, gender or other factors, and also to measure the effectiveness of the City’s Small Business Opportunity Program, the City tracks the utilization of first-tier subcontractors and suppliers on certain City contracts based on race, gender, small business status, and other factors. For analysis purpose, it is important that the City obtain this data not only for minority, female and small business suppliers and subcontractors, but also for other subcontractors and suppliers. As a condition to receiving payment under this Contract, the Surveyor agrees to provide to the City with each invoice for payment submitted under this Contract, a written payment affidavit detailing the amounts paid by the Surveyor to first tier subcontractors and suppliers in connection with this Contract (“Payment Affidavits”). Payment Affidavits shall be in the format specified by the City from time to time, and shall include all payments made to first tier subcontractors and suppliers under this Contract that are not included on a prior Payment Affidavit.

Failure to provide a properly completed version of each Payment Affidavit required by this Section shall constitute a default under this Contract, and shall entitle the City to: (a) withhold payment of any amounts due the Surveyor (whether under this Contract or otherwise), or (b) exercise any other remedies legally available for breach of this Contract, or (c) impose any other sanctions permitted under the City’s Small Business Opportunity Program. In order to have a properly completed Payment Affidavit, each prime contractor and first tier subcontractor identified must be registered in the City’s Vendor Registration System. The City may request on a case-by-case basis that the Surveyor require certain suppliers to be registered in the City’s Vendor Registration System, and may withhold payment of any amounts due the Surveyor in the event the Surveyor fails to comply with such request.

[REMAINDER OF PAGE INTENTIONALLY LEFT BLANK]

THIS CONTRACT, entered into as of the day and year first written above for Unspecified Mapping Services, **Contract Number 0100xxx** in an amount not to exceed **\$50,000.00**.

AVIOIMAGE MAPPING SERVICES, INC.

WITNESS

By: _____
President/Vice President

Date: _____

Date: _____

CITY OF CHARLOTTE

ATTEST

By: _____
Contracts Officer

Date: _____

Date: _____

This instrument has been preaudited in the manner required by the "Local Government Budget and Fiscal Control Act".

Deputy Finance Officer

Date: _____

EXHIBIT 1

SCOPE OF SERVICES

SECTION 1 - CONTROL SURVEYS

1.01 General

The City shall establish sufficient horizontal and vertical control surveys for completion of this photogrammetric mapping project. The City shall supply the Consultant with a digital photograph of each point and an Ascii text file, which contains information on the locations of Charlotte/Mecklenburg GPS photo control points. The location of these points needed for this project will be determined by the Consultant and provided to the City on existing base mapping (Autocad drawing files) for the field collection of the control point coordinates. The Consultant shall verify that the data provided meets the project requirements.

Mr. David Snider,PLS
Survey/Mapping/GIS Section
City of Charlotte Engineering & Property Management
600 East Fourth Street
Charlotte, NC 28202-2844
(704) 336-3875

All control used in the Project shall be paneled prior to flying for aerial photography. Control previously established in an adjacent county shall be utilized by the Consultant to the fullest extent possible to assure compatibility of maps from county to county. If small project areas do not utilize FAAT, a minimum of five (5) vertical and three (3) horizontal control points shall be required for each stereo model compiled.

1.02 Control Diagram

The City shall provide the Consultant with a digital Project Base Map, base9799.dwg, with neat image areas for all the map sheets to be produced during this two-year contract. The Consultant shall use this file as the instrument to plan and report their field control diagram or layout.

1.03 Control Diagram Prototype Drawing Layers

The Project Base Map prototype control diagram, base9799.dwg, will contain the following AutoCAD Layers.

- 0
 - acad color: 7-white
 - acad ltype: continuous
 - description: empty scratch-pad layer

• **fltnano00d1**

acad color: 7-white

acad ltype: continuous

description: this layer involves annotation for planned flight lines including line number and direction, then actual dates flown.

• **fltlines00d0**

acad color: 6-magenta

acad ltype: continuous (pline)

description: this layer depicts the planning phase flight lines for aerial photography.

• **mapsheet00d1**

acad color:

acad ltype: continuous

description: this layer includes map sheet number labels for each map set to be compiled for this contract.

• **neatline00d0**

acad color: 15-dim white

acad ltype: continuous

description: this layer contains neat image areas for the map sheets in this contract.

• **passpnts00d0**

acad color: 7-white

acad ltype: continuous

block: *passpnt*

insertion point: center of symbol at passpoint location

scale factor: 1

rotation angle: 0

UCS: world

attribute: Year-Consultant-Passpoint Number?

description: this layer contains nonscaled symbols representing fully analytical aerial triangulation passpoints.

• **tiepoint00d0**

acad color: 7-white

acad ltype: continuous

block: *tiepoint*

insertion point: center of symbol at the tiepoint location

scale factor: 1

rotation angle: 0

UCS: world

attribute: Year-Consultant-Tiepoint Number?
description: this layer includes nonscaled symbols representing fully analytical aerial triangulation tiepoints.

• **horzctrl00m0**

acad color: 12-dim cyan
acad ltype: continuous
block: *hctrl*
insertion point: center of symbol at the monument location
scale factor: 1
rotation angle: 0
UCS: world
attribute: Year-Consultant-Panel Number?
description: this layer contains nonscaled symbols representing paneled and field surveyed traverse stations.

• **hzvctrl00m0**

acad color: 4-cyan
acad ltype: continuous
block: *hvctrl*
insertion point: center of symbol at the monument location
scale factor: 1
rotation angle: 0
UCS: world
attribute: NAVD88 Elevation?
attribute: Year-Consultant-Panel Number?
description: this layer includes nonscaled symbols representing paneled and field surveyed horizontal/vertical control monuments.

• **vertctrl00m0**

acad color: 11-dim green
acad ltype: continuous
block: *vctrl*
insertion point: center of symbol at the monument location
scale factor: 1
rotation angle: 0
UCS: world
attribute: Year-Consultant-Panel Number?
attribute: NAVD88 Elevation?
description: this layer contains nonscaled symbols representing paneled and field surveyed level-loop stations.

1.04 Control Diagram Prototype Drawing Blocks

The Project Base Map prototype control diagram, base9799.dwg, will contain the following blocks created by the City.

• **hctrl**

insertion point: center of symbol at the monument location

scale factor: 1

rotation angle: 0

UCS: world

attribute: Year-Consultant-Panel Number?

description: nonscaled symbolic block with a related visible attribute

(concatenated from year established, establishing consultant, and panel number) representing the paneled field surveyed NAD83 traverse stations on the horzctrl00m0 layer.

• **hvctrl**

insertion point: center of symbol

scale factor: 1

rotation angle: 0

UCS: world

attribute: Year-Consultant-Panel Number?

attribute: NAVD88 elevation?

description: nonscalable symbolic block locating horizontal/vertical control

monuments on the hzvtctrl00m0 layer with associated visible attributes for concatenated year established, establishing consultant, panel number; and the NAVD88 elevation.

• **passpnt**

insertion point: center of symbol

scale factor: 1

rotation angle: 0

UCS: world

attribute: Year-Consultant-Passpoint Number?

description: nonscaled symbolic block with attribute concatenated from the

year of mapping (triangulation), consultant, and the passpoint number which represents FAAT passpoints established to assemble models into strips. The passpnt block is inserted on the passpnts00d0 layer.

• **tiepoint**

insertion point: center of symbol

scale factor: 1

rotation angle: 0

attribute: Year-Consultant-Tiepoint Number?

description nonscaled symbolic block with a related attribute for year of

mapping (triangulation) - the consultant's name - the tiepoint number, representing FAAT tiepoints established for assembling adjacent model strips.

· **vctrl**

insertion point: center of symbol

attribute: for Year-Consultant-Panel Number?

attribute: NAVD88 elevation?

description: nonscaled symbolic block with associated attributes for combined year established - establishing consultant - panel number, and the NAVD88 based elevation representing paneled field surveyed level-loop stations. This block is inserted on the vertctrl01m0 layer.

1.05 RESERVED

1.06 RESERVED

1.07 Photo Control Contact Prints

Control points shall be pin-pricked and symbolized on the face of the appropriate aerial photograph, and the locations shall be precisely described on the back of the photo. The Consultant shall deliver one set of control contact prints as described at a report meeting prior to map stereocompilation.

a) RESERVED

b) RESERVED

c) Control Diagram - The Consultant shall furnish a control diagram on the digital Project Base Map file at the Control Survey Report Meeting. The control diagram shall show all horizontal and vertical control pertinent to this project, all existing and established control points properly identified and located.

1.08 RESERVED

1.09 Feet/Meter Conversions

The US Survey Foot (1 meter = 3.2808333333 feet) shall be used in all conversions of North Carolina State Plane Coordinates from meters to feet or feet to meters. All final control data shall be in feet and the datum, NAD83/2001

SECTION 2 - AERIAL PHOTOGRAPHY

2.01 Photography Conditions

Vertical aerial photography shall be flown when deciduous trees are barren and when the sun's angle or elevation is not less than 30 degrees above the horizon. Photography shall not be undertaken when the ground is obscured by snow, haze, fog, or dust; when streams are not within their normal banks; or when clouds or cloud shadows will appear on more than five percent (5%) of the area in any one photograph. The photographs shall not contain objectionable shadows caused by relief or low solar altitude.

2.02 Photographic Targeting

The City shall panel all useable existing control within the proposed limits of photography.

Photographic targets shall also be set at the locations of baseline stations. Supplemental targets should be placed at regular intervals in the central zones of proposed flight strips to increase the density of horizontal and vertical photo ties. Targets may also be necessary in the direction of proposed flight lines at planned intervals near approximate model neat limits to aid the flight crew in less planimetric dense areas. The targets should either be matte-surfaced plastic sheeting or surface painted symbols; the targets must be of adequate size (minimum size for the longest dimension being .008 -.01 times the photo scale) and shape (either three-legged or four-legged crosses), and properly anchored for the duration of the photography phase of the project. Target reflective/light-absorbent properties should be considered in their placement at specific locations to insure high contrast against a particular background.

2.03 Contact Scale of Aerial Photography

The altitude above average ground elevation for aerial photography shall be such that the negatives shall be at the nominal scale of 1" = 660' plus or minus five percent (+/- 5%).

2.04 Flight Plan

The Consultant shall compile proposed flight lines and flight line annotation (flight line number, and direction) on the layers fltlines00d0 and fltlnano00d1 of the digital Project Base Map, base9799.dwg. Each flight line shall be flown continuous across the project area and so exposed that the principal points of the first two exposures and the last two exposures of each flight strip shall fall outside the boundaries of the specified area. All side boundaries shall be covered by a minimum of twenty-five percent (25%) of the photo image format.

2.05 Flight Over Restricted Areas

The Consultant shall obtain all required clearances for flying over restricted areas.

2.06 Reflights

Unacceptable aerial photography resulting from deviation from the flight design shall be reflown by the Consultant and corrected at the Consultant's expense with reflight coverage overlapping accepted photography by a sufficient amount to provide for continuous stereoscopic coverage.

2.07 Photograph Spacing

Overlapping photographs in each flight line shall provide full stereoscopic coverage of the area to be mapped.

2.08 Endlap

Photographs used as stereoscopic pairs shall not have endlap of less than fifty-five percent (55%) or more than sixty-five percent (65%) in one or more negatives.

2.09 Sidelap

Photography used as stereoscopic pairs for this planimetric mapping contract shall have sidelap of thirty percent (30%).

2.10 Crab

Crab in excess of three degrees may be cause for rejection of a flight line or any portion thereof, in which the excess crab occurs.

2.11 Tilt

Tilt of the camera from verticality at the instant of exposure shall not exceed three (3) degrees, nor shall the tilt exceed five (5) degrees between successive exposure stations. Average tilt over the entire project shall not exceed one (1) degree.

2.12 Aircraft

The Consultant shall furnish aircraft equipped with all essential navigational and photographic instruments. The Consultant shall also furnish a well-trained and experienced crew to operate the aircraft. All operations shall be in conformity with applicable Federal Aviation Administration (FAA) regulations and ordinances. The performance of the aircraft, crew, and equipment shall be adequate for completion of the project in accordance with the requirements of this Agreement.

2.13 Aerial Camera

A United States Geological Survey (USGS) Camera Calibration Report no more than four years old shall be required for each camera used to obtain aerial photography. The Camera Calibration Report shall be submitted to the County's Project Manager at the Aerial Photography Kick-off Meeting prior to flying. The following criteria shall be met and included in the Camera Calibration Report:

a) Camera and Lens - The aerial camera shall be a precision aerial mapping camera equipped with a low distortion, high resolution lens. The calibrated focal length of the lens shall be 153 millimeters plus or minus 3 millimeters (6 inch focal length). The characteristics of a nominal 6-inch camera shall be as follows: focal length, 153mm +/-3mm Universal Aviogon, Pleogon A, or equivalent; usable angular field, at least ninety (90) degrees; and the minimum acceptable radial and tangential resolution cycles (line pairs) per millimeter (measured with type V-F spectroscopic emulsion on micro flat glass plates exposed at maximum lens aperture) shown on page 156 of the American Society of Photogrammetry's Manual of Photogrammetry, fourth edition (copyright 1980).

b) Filter - An appropriate glass filter with a metallic antivignetting coating shall be used. A microdensitometer trace of the antivignetting coating located on the lens side of the filter shall be made and recorded. A copy of this trace shall accompany the Camera Calibration Report to verify that no deterioration has occurred to the coating that would affect the uniformity of illumination in the image plane. The filter shall have surfaces parallel to within 10 seconds of arc, and its optical quality shall be such that its addition to the camera shall not cause an undesirable reduction of image definition. A minus-blue glass filter shall be used with panchromatic emulsions.

c) Shutter Speed and Efficiency - The camera shall be equipped with a between-the-lens shutter of variable speed as approved by the County's Project Manager. The range of speed settings shall be such that in conjunction with flight height and aircraft speed, the camera shall produce negatives that shall result in high definition photographs. The shutter shall also have a speed of 1/200 second or slower for laboratory testing. The effective exposure time and the efficiency of the shutter as mounted in the camera shall be measured at maximum aperture, and the shutter shall have a minimum efficiency of seventy percent (70%) at a speed of 1/200 second. This test shall be made in accordance with "Method I", American National Standard PH3-48-1972 (R1978).

d) Platen Flatness and Identification - Cameras shall be equipped with an approved means of flattening the film at the instant of exposure. The platen against which the film is pressed shall not depart from a true plane by more than 13um (0.0005 inch) when the camera-magazine vacuum is applied. The lens number, an alphanumeric mark (or symbol) which identifies the platen used, and the most recent calibrated focal length shall be recorded clearly on the film for each negative either on the inside of the focal plane frame or on a data strip between frames. Data markers that protrude inside the focal plane frame shall not exceed 6.35mm (0.25 inch) in height and 25.4mm (1.0 inch) in length and shall not obscure any part of the fiducial mark or reduce the usable image area.

e) Fiducial Marks - Each camera body shall be equipped with means of recording eight fiducial marks on each exposure, the marks to be located in each corner and at the center of each side of the format. The corner fiducial marks shall form a quadrilateral whose sides are equal within 0.500mm. The midside fiducial marks shall be equidistant within 0.500mm from the adjacent corner fiducial marks. Lines joining opposite pairs of fiducial marks shall intersect at an angle of 90 degrees plus or minus one (1) degree and indicate the position of the principal point of autocollimation within 0.030mm. The fiducial centers and the point of symmetry shall fall within a 0.030mm radius circle around the principal point of autocollimation. For cameras with projection type fiducial marks, the projected images of all marks must be in focus on the emulsion surface. Any camera containing glass or plastic mounts of the fiducial marks shall not be accepted. All fiducial marks and other marks intended for precise measuring shall be clear and well defined on the negative and shall be of such a form that the standard deviation of repeated readings of the coordinates of each mark made on a comparator shall not exceed 0.002mm. The size of the negative image shall be 23cm x 23cm (or 9" x 9").

f) Stereomodel Flatness - Cameras shall be tested for stereomodel flatness by exposing two film negatives in the camera shell mounted on the USGS multifollimator camera calibrator and

analytically forming two stereomodels from them, using different halves of the exposures for each model. Each model thus formed shall consist of a small fixed number of symmetrically arranged points. In either model, the deviation from flatness (elevation discrepancy at photography scale) at measured points may not exceed plus or minus 1/5000 of the focal length of nominal 6-inch (153mm plus or minus 3.0mm) cameras. If elevation discrepancies exceed this value, the camera shall not be acceptable.

2.14 Aerial Film

The black and white aerial film used by the Consultant shall be a fine grain, high speed photographic emulsion on a dimensional stable base. The film must be stored and handled by the Consultant in accordance with the manufacturer's instructions.

2.15 Roll Film Container

The container for each roll of aerial film shall be made of plastic, shall not exceed 6 inches in diameter, and shall contain no more than 250 feet of film on the reel. The container shall be clearly labeled with the project name; name of the Consultant; date of photography; flight and exposure numbers (sequential numbers of the first and last exposure); type and serial number of the camera; the type, serial number, and calibrated focal length in millimeters of the camera lens; film roll number; and the approximate scale of the negatives.

2.16 Image Quality

All film and materials to be processed shall be in accordance with the film manufacturer's recommended procedures for processing and developing. Images on the aerial negatives shall be clear and sharp in detail and free from light streaks, static marks, scratches and other blemishes. Special care shall be exercised to ensure proper development, thorough fixing, and washing of all film; and to avoid rolling film too tightly on drums, or in any way distorting the film during processing or drying. The Consultant shall expose and process the film with a target density range of 1.0 plus or minus 0.2, as measured in the neat image areas of each roll of film. Density as measured with a densitometer, with a scale range of 0 to 3.0, shall not be less than 0.3 and not greater than 1.5. All fiducial mark images shall be clear and sharp.

2.17 Film Labeling

The Consultant shall clearly label each exposure by mechanical means with ink or foil at the edge of the negative just inside the image area on the north edge for north-south flights, and on the east edge for east-west flights. Labeling shall be sharp, uniform, and at least fourteen hundredths inches (0.14") in height. The following information shall be included in the film label: the photo date, the negative scale, the County's name, the flight line number, and the exposure number. The negative scale shall be expressed in inches and feet (ie. 1" = 1000'). The flight line numbers shall not be repeated anywhere within the photographic coverage of this project, and shall be numbered sequentially (beginning with flight line number 1) over all flight lines and scales. The exposure numbers for each flight line shall be numbered consecutively beginning with frame number 1 and continued to the end of that flight line. Flight lines with a north-south orientation shall be numbered (exposure number) beginning at the north end. Flight lines with an east-west orientation shall be numbered (exposure number) beginning at the east end.

2.18 Contact Prints

Two sets of prints contacted from the original aerial negatives shall be prepared by the Consultant on double weight semi-matte paper. One set will be used to locate the control points (pin pricked and labeled). The other unmarked set will show the camera records such as altimeter reading, time clock, level bubble, and other pertinent information. All prints shall be clear and free from chemicals, stains, blemishes, fog, streaks, or any defects which would decrease the prints' usefulness. One clean set of frosted diaps will also be provided.

2.19 Photo Index

The Consultant shall prepare a photo index by stapling or taping together the contact prints (or reduced size prints), trimmed to the image area. Alternate prints may be indexed for photography containing eighty percent (80%) forward lap. The Consultant shall carefully match the prints so that the corresponding images overlap and all photo numbers are visible. This original composite of contact prints shall be photographically copied, reduced in scale, and reproduced in uniform size sheets of a maximum size of 24 inches by 36 inches. The maximum number of adjacent flight strips shall be shown on any one index sheet to avoid the use of match notes and match lines. The reduction of the photo index scale may be to any appropriate size, but in no case smaller than four times the scale of the contact print or 1" = 5280', whichever is the larger scale. Indexes shall include the names of cities, towns, and other prominent geographic features for orientation purposes. County and state boundary lines shall be shown on photo indexes that cover the entire county. Indexes shall include title information identifying the area, name of Consultant and the City, date and scale of aerial photography, type of camera and focal length of lens, the scale of the photo index, and a north arrow. In the event two (2) or more index sheets are required for any one area at any one scale, the Consultant shall provide an index of sheets showing the relationship of one index to another in the title block. Index sheets shall be oriented to the north and Consultant shall place title information in the south or east margin of the sheet. The Consultant shall index all reflights of aerial photography.

A photo index negative; one (1) mylar-based, continuous tone photo index positive; and a photographic double-weight, semi-matte paper copy of the photo index shall be required for each scale of aerial photography.

SECTION 3 - FAAT

3.01 General

Fully Analytical Aerial Triangulation (FAAT) may be used to extend the horizontal ground control. If the Consultant is unable to locate the horizontal control points previously proposed to the County, then other horizontal control that exists in close proximity may be substituted with the prior approval of the County's Project Manager. If no suitable substitute exists, the Consultant shall establish new photo control points by field survey methods. These new photo control points must be approved by the County's Project Manager. The Consultant shall include as a minimum in the analytical triangulation adjustment all horizontal control paneled or set and proposed by the Consultant's ground control solution (as shown in the digital Project Base Map, base9799.dwg).

3.02 Nominal Scales for Triangulation

Aerial triangulation may be used for horizontal scaling to produce the 1"=200' topographic and planimetric maps for this project. The nominal scale of the mapping photographs shall be 1"=660'. Vertical ground control shall be established in order to utilize FAAT, and no high-to-low bridging shall be employed to obtain vertical control.

3.03 Ground Coordinate Systems

All ground positions determined by aerial triangulation shall be in the North Carolina State Plane Coordinate System (NAD83). Elevations of monumented positions shall be used in FAAT computations when they are available.

3.04 Accuracy Standards

The root-mean-square error (vector of both northing and easting coordinate errors) of pass points established by aerial triangulation shall not exceed one-fiftieth ($1/50$) of the denominator of the finished map scale.

3.05 Control Photographs

All targeted and photo identifiable control points to be used in aerial triangulation shall be located and symbolized on the image side of aerial photo contact prints and labeled on the reverse side.

3.06 Pass Points

Pass point locations shall be manually selected by reviewing the control photographs with a pocket stereoscope or other suitable stereo-viewing device. Selected pass points shall be located, symbolized, and labeled on the image side of the control photographs. All selected pass point locations shall lie on unobscured level ground whenever topographic conditions permit. Individual photo frames shall carry a minimum of nine (9) pass points, with the exception of end frames of flight lines which shall carry a minimum of six (6) pass points. One (1) point shall lie near the corner of each neat model, and one (1) point shall lie near the nadir position of each neat model. Deviation from the ideal distribution may be necessary for those photographs covering bodies of water or areas of heavy ground cover. Tie points between strips shall occur with a frequency of at least one (1) per frame. As a general rule, wing pass points within lines of flight shall also serve as tie points between strips.

3.07 Drop Points

Drop points used to control lower altitude flights for direct compilation from photographs of larger scale shall be located and labeled on the control photographs. These points shall be marked, measured, and carried as extra pass points in the aerial triangulation of the higher altitude photography.

3.08 Check Points

Check points are horizontal control points that have been established by ground control procedures throughout the block for accuracy checking purposes and shall not be used in the analytical adjustment.

3.09 Diapositives

All diapositives shall be printed from the original aerial photography negatives. Glass diapositives shall conform to Kodak Ultra Flat Glass specifications for aerographic positive plates.

If film positives are used, they shall be printed by a printer having a flat platen on cut sheets of Kodak Aerographic Duplicating (Estar Thick Base) Film Number 4427 or an equivalent film approved by the County's Project Manager. Outdated emulsions shall not be used under any circumstances. The printing and processing of all diapositives including development, fixation, washing, and drying must produce diapositives free from tears, scratches, abrasions, light fog, light streaks, static marks, finer marks, stains, spots, and blemishes of any kind except blemishes resulting from corresponding defects of the original aerial photography negatives. Extreme care shall be exercised to prevent lint from collecting on both the original negatives and the diapositives. All diapositives shall be clear and sharp in detail (with particular emphasis on legibility in the shadows). All diapositives shall have uniform tone and contrast so that ground details show clearly in dark-toned, middle-toned, and light-toned areas.

3.10 Point Marking

All point marking (pugging) shall be performed on the diapositives. Under no circumstances shall any marking be performed on the original negatives. Targets shall be marked, except targets which are exceptionally well defined on the diapositives. All pass points, check points, and drop points (if any) shall be marked stereoscopically on every frame with a Wild (or equivalent) pug point transfer instrument. The only exception to this requirement shall be points falling in sidelaps, but which will not be used as strip tie points. All ground control points, pass points, check points, and drop points shall be measured with a comparator having a minimum least count of one micrometer and an intrinsic accuracy (calibration applied) of at least two micrometers (root-mean-square).

3.11 Aerial Triangulation Report

The Consultant shall present a formal aerial triangulation report to the County's Project Manager, at a meeting prior to any stereocompilation, which includes:

a) Graphic Layout - The limits of all analytical triangulation block or subblock computations shall be indicated on the digital Project Base Map, base9799.dwg.

b) Analytical Control Layer - All control points contained in the analytical aerial triangulation computations shall be located on the digital Project Base Map, base9496.dwg. All control points shall be symbolized and labeled with their field and/or computation designations.

c) Aerial Triangulation Computations - Computations shall include ground control data, triangulated ground point residuals, triangulated camera stations, triangulated ground points, and corrections applied to ground control. Computed coordinates of all control points, pass points, check points, and drop points shall be labeled on a computer printout with their field and/or computation designations. The printout shall include the County's name, Consultant's name, date of computations, the name of the analytical program that was used to perform the computations, and the block or subblock designations. Root-mean-square (rms) error summaries shall be given for bundle adjustment photographic measurement residuals or strip tie point residuals and misclosures at control points. All FAAT computations shall be delivered to the County's Project Manager at a

meeting prior to any stereocompilation. The vertical root-mean-square (rms) of the FAAT will not exceed 1/4 of the specified contour interval. For example, rms for 2 foot contour interval shall not exceed 0.5 feet; rms for 5 foot contour interval will not exceed 1.25 feet. (For small areas for which FAAT is not utilized, a minimum of five (5) vertical and three (3) horizontal control points will be required for each stereo model compiled.)

d) Narrative - The report shall include a brief narrative tying together the above items (a, b, and c) including descriptions of laboratory equipment, procedures, and computer programs used. This narrative will also include: a listing of all field control points thrown out of the analytical computations prior to the final run; a full description of any codes utilized in the computations; and a full description of significant misfits encountered at control points, the steps taken to analyze such misfits, and the steps taken to rectify the discrepancies.

SECTION 4 - STEREOCOMPILATION

4.01 General

The Consultant shall stereocompile directly in AutoCAD 12 C2 (or later) in "real world" units (meaning one drawing unit equals one foot) the planimetric and topographic detail herein specified. The planimetric maps may be stereocompiled utilizing the techniques of Fully Analytical Aerial Triangulation (FAAT). The Consultant shall perform the stereocompilation with an analytical plotter of at least second order accuracy. True arcs should be used for circular edges of pavement.

4.02 Geographic Coverage

The general geographic extent of this mapping project are specified by Attachment 2 - the Project Map Index. The geographic coverage of each map sheet (neat image areas) is more accurately specified by the digital Project Base Map, base9799.dwg, which will be provided to the Consultant by the City of Charlotte Engineering & Property Management Department. Map sheets which encompass portions of another county or state will be mapped to the Mecklenburg County Line, with the exception of map sheets along Lake Norman, Mountain Island Lake, Catawba River, Lake Wylie, and Six Mile Creek which will be mapped to the opposite shoreline.

4.03 Coordinate System

The X, Y-coordinates for compiled map features will be ground coordinates projected up from the North Carolina State Plane correlated to the 1983 North American Datum. The Z-coordinate component for approximate water surface elevations will be adjusted to the 1988 National Geodetic Vertical Datum.

4.04 Accuracy Standards

The Contractor shall compile these digital base maps in strict accordance with accepted stereophotogrammetric procedures as published by the American Society for Photogrammetry and Remote Sensing and complying with the following standards of accuracy:

a) Vertical ground elevations generated from FAAT shall be of third order accuracy or higher.

These FAAT elevations must be adequate to level the stereo model to an accuracy consistent with the following standards.

b) Ninety percent (90%) of all planimetric features which are 'well defined points' (well defined points are also those that are judged to be easily visible or recoverable on the ground) on the photographs shall be plotted by the Consultant so that their position shall be accurate to within at least four (4) feet of the true ground coordinate position (or one-fiftieth, $1/50$, of true coordinate position). No planimetric feature shall be mislocated by more than one-fortieth ($1/40$) from its true coordinate position, except features such as treelines, which are not ground identifiable within close limits.

c) Vertical ground elevations used in the FAAT shall be of third order accuracy or higher. These FAAT elevations must be adequate to level the stereo model to an accuracy consistent with the following standards. Ninety percent (90%) of the elevations determined from the contours shall have at least an accuracy of one-half ($1/2$) the contour interval or better with respect to true elevation. The remaining ten percent (10%) shall not be in error by more than one (1) contour interval. A contour that can be brought within the stated vertical tolerance by shifting its location by one-fortieth ($1/40$) of an inch (or 0.025 inch) will be considered accurately plotted. Ninety percent (90%) of the elevations determined by dashed-line contours representing ground in densely wooded areas obscured by heavy tree or brush cover shall have an accuracy with respect to true elevation of one (1) contour interval or one-fourth ($1/4$) the average height of the ground cover, whichever is greater.

d) All horizontal and vertical control monuments (those established by the Consultant, NCGS, NGS, USGS, and Charlotte Mecklenburg GPS) shall be compiled by keyboard entry of their grid State Plane Coordinates to three decimal places. Elevations or z-values shall be keyboard entries in feet above sea level to two decimal places.

4.05 Planimetric Detail

The Consultant shall stereocompile the following photo identifiable or interpretable planimetric features:

- architectural and decorative walls.
- building outlines (stereocompiled not symbolized)(minor irregularities in building outlines less than ten feet or buildings with a shortest side less than ten feet shall be ignored) with solid fill pattern.
- farm structures such as silos and barns.
- foundation outlines of buildings under construction.
- retaining walls.
- outlines of ruins.

- large highway and billboard sign structures.
- surface (on the ground) storage tanks for gas, oil, etc.
- radio towers, television towers, smoke stacks, etc.
- photograph centers of mapping photography.

- electric power substations.
- transmission tower structures (towers, hframes, poles, etc.).
- centerline of perennial drainage averaging less than 20 feet wide.
- shoreline and centerline of perennial drainage averaging more than 20 feet wide (note: the 'opposite' bank of such perennial drainage, the centerline of which serves as the County boundary, should also be compiled; even though, it is not within the boundaries of Mecklenburg County. ie. both banks of the Catawba River, and Sixmile Creek).
- shorelines of lakes and large ponds more than 5 acres in area (the 'opposite' shoreline of such lakes or ponds, where the County boundary passes between the shorelines, should also be compiled; even though, it is not within the boundaries of Mecklenburg County. ie. relevant shorelines of Lake Norman, Mountain Island Lake, and Lake Wylie.).
- shorelines of small ponds less than 5 acres in area.
- limits of swamp areas.
- centerline of abandoned or dismantled railways.
- landmark buildings (churches, schools, hospitals, etc.).
- landmark trees (not necessarily single large trees or single landscape trees).
- fence lines running more than 200 feet or those with potential association to property lines.
- multi-user boat docks/houses, and boat access ramps.
- outline of golf course features (greens, and fairways).
- outline of recreational court surfaces (basketball, tennis, volleyball, etc.).
- outline of recreational field limits/markings (football, baseball, softball, track, soccer, etc.).
- outline of concrete apron of public and large private

outdoor swimming pools.

- non-earthen dam structures.
- road culverts/pipes/cross-drains with headwalls.
- road pipes/cross-drains without headwalls.
- airport/airfield runways, terminals, hangers, buildings, etc.).
- overpasses, vehicular bridges, foot bridges, and railroad trestles (any of these structures, which cross over the County boundary, shall be compiled completely).
- edge-of-surface of paved and unpaved driveways more than 200 feet long (drives less than ten feet wide symbolized as having a width of ten feet).
- designated trails (foot, horse, bike, etc.) specified by the county.
- edge-of-surface of paved and unpaved parking lots.
- centerline railway tracks.
- apparent centerline of roads under construction.
- centerline and edge-of-surface of paved and unpaved roads (roads less than ten feet wide symbolized as having a width of ten feet)(compile centerline for each traffic direction of divided highways).
- apparent boundaries of cemeteries and quarries.
- edge-of-treelines ('cleared' from other planimetric features such as buildings, paved roads, and paved parking lots).
- water supply features (water towers, lift stations, etc.).

4.06 Topographic Detail

The Consultant shall stereocompile the following photo interpretable topographic features:

- index contours and labels
- intermediate contours
- depression contours

- supplementary contours and labels (if necessary)
- approximate contours (if necessary)
- spot elevations (on tops, on saddles, bottoms of depressions, in irregular gaps between contours, flat expanses, and at centerline intersections of roads)
- water surface elevations (lakes and ponds larger than 5 acres)
- vertical control, and horizontal/vertical control
- active grading areas
- closed outlines of obscured areas

Contour Lines:

Contour lines shall be shown at a vertical interval of two (2) feet on 1" = 200' scale topographic maps. Every fifth contour line will be an index contour, indicated by a line heavier than that used for the intermediate contours. Index contours will be labelled inside a break in the contour line at a frequency that will permit ease of interpretation and that is aesthetically acceptable. All contour lines will be solid and unbroken 2d polylines with attached z-values except where they pass through dense ground cover, in which case dashed lines will be used. In those areas where vegetation prohibits accurate plotting of contour elevations, the contour line elevations will be interpolated as accurately as possible from spot elevations measured photogrammetrically in places where the ground is visible.

When dashed contours are shown, the digital line data shall be contiguous. This is necessary in order to topologically structure the digital data.

Spot Elevations:

Spot elevations will be determined by photogrammetric procedures from the aerial photography that was used to produce the contour lines. The spot elevations will be placed on topographic maps at: water levels of lakes, reservoirs and ponds; hilltops; saddles; bottoms of depressions; intersections of principal streets and highways; and ends of bridges. Where contour lines are more than an inch apart, additional spot elevations shall be shown to more accurately portray the slope of the land.

Compilation:

The topographic maps may be compiled utilizing the techniques of Fully Analytical Aerial Triangulation (FAAT) for control of the stereo models. The final deliverable data will be generated from digital terrain models (DTMs). The Contractor's technical proposal should describe the methodology used to produce the topographic maps.

4.07 Special Paneled Features

The Consultant shall stereocompile the following features paneled or painted by the County. The specific special features and their number shall be agreed upon at the time of contract negotiations.

- property corners of parcels owned by Mecklenburg County.
- key water or sewer manholes specified by the Charlotte

Mecklenburg Utility Department to locate major systems.

- key stormwater features specified by County Engineering to locate major systems.

SECTION 5 - DIGITAL MAP FILES

5.01 General

The Consultant shall perform map editing/corrections directly in AutoCAD 13 (or latest version) in "real world" units. Each Map Sheet Set shall be comprised of the following individual map elements: planimetric, topographic, base, building fill, and border. Final deliveries will be requested on CD-ROM or on a read/write optical. (each Map Set will be placed in a directory called \DWGS13\MAPC9798\). The County will select the best media type at the project kick off meeting.

5.02 Precision

The term 'snap' (or snapped) used in these specifications will mean that the Consultant shall use AutoCAD tools and techniques which result in identical x,y,z coordinates (maintaining sixteen significant figures) for the common nodes or vertices of features. It shall be the Consultant's responsibility to insure that any digital filtering or processing procedures they employ do not adversely effect the coordinate values of snapped features' vertices. If drawing interchange files are necessary for processing of drawings by other programs, then the Consultant will use either the Binary DXF file format (which preserve all of the accuracy in the drawing database), or the ASCII DXF file format using sixteen decimal places of accuracy (again the possible problems incurred concerning floating-point double precision will be the Consultant's responsibility).

5.03 Preliminary Compilation Files

The Consultant shall assemble each Map Sheet (seamless within each neat image area) as specified by the digital Project Base Map, base9798.dwg, from their photogrammetrically compiled models. All line symbolized features shall be represented by logically unbroken 2D-polylines with a width of 0 (zero), a beginning and ending elevation of 0 (zero), and a "continuous" AutoCAD linetype. The compatibility of the Consultant's standard compilation blocks (insertion point, scale, and rotation), and the Consultant's compilation level of feature separation (layering design) with the County's prototype drawing blocks and layers shall be the responsibility of the Consultant.

5.04 Prototype Drawing File Conventions

The County shall provide the following prototype drawing files for each of the Map Sheet Set elements or components (note the 'x' represents the alpha component associated with the sheet's easting, and the '00' represents the numeric component associated with the sheet's northing) that serve as the basis for the Preliminary Compilation files and all successive iterations:

- x00plan.dwg
- x00bldf.dwg
- x00topoH.dwg

- x00topo.dwg
- x00borp.dwg
- x00baseH.dwg
- x00base.dwg
- x00planH.dwg

Therefore, for example, the Map Sheet K-07 would be include five component drawing files: k07plan.dwg, k07topo.dwg, k07base.dwg, k07bldf.dwg, and k07borp.dwg.

5.05 Prototype Drawing File Layer Conventions

The layers in the x00plan.dwg, x00topo.dwg, x00base.dwg, and x00bldf.dwg prototype drawing files all adhere to the following naming convention:

$a_1a_1a_1a_1a_1a_1a_1n_1n_2a_2n_3$

where: the first eight character wide alpha field, $a_1a_1a_1a_1a_1a_1a_1$, represents the AutoCAD Drawing Editor displayed layer name (ie. roadname).

where: the first binary logic switch, n_1 , equals 1 if the layer is thawed when plotting the hardcopy mylar; and equals 0 if the layer is frozen when plotting the hardcopy mylar.

where: the second binary logic switch, n_2 , equals 1 if the layer is frozen when write-blocking to a drawing file for the Tax Conversion base map; and equals 0 if the layer frozen when write-blocking to a drawing file for the Tax Conversion base map.

where: the second one character wide alpha field, a_2 , equals one of the following feature classes:

- a - architectural features
- b - base
- c - general contour features
- d - documentation
- e - electric utility features
- g - gas utility features
- h - hydrologic features
- j - political jurisdiction features
- l - landmark features
- m - control survey monument features
- n - nondiscriminant
- o - waste water utility features
- p - parcel features
- q - quality control
- r - recreational features
- s - stormwater features
- t - transportation features
- u - landuse features
- v - vegetation features
- w - water utility features
- x - index contour features

where: the third binary logic switch, n_3 , equals 1 if the layer is strictly an annotation layer; and equals 0 if the layer is not just a textual layer.

The layers in the x00borp.dwg prototype drawing file maintain the following naming convention:

$a_1a_1a_1a_1a_1a_1a_1a_1n_1$

where: the first eight character wide alpha field, $a_1a_1a_1a_1a_1a_1a_1a_1$, represents the AutoCAD Drawing Editor displayed layer name (ie. legdtext).

where: the first binary logic switch, n_1 , equals 1 if the layer is thawed when plotting the hardcopy mylar; and equals 0 if the layer is frozen when plotting the hardcopy mylar.

5.06 Planimetric Prototype Drawing Layers

The prototype drawing for the planimetric component of the Map Sheet Set, x00plan.dwg, contains the following AutoCAD layers. All entities', compiled by the Consultant, colors and linetypes are assigned according to layer. The blocks described in the following section include blocks serving as labels, and those serving as symbols (both of which may have associated attributes). The block "insertion points" described below generally signify the insertion point of the block; however, in some cases the insertion point relative to the real world feature are also shown. The following section also indicates the associated annotation including dtext styles, user coordinate system orientation, and offset specifications for appropriate layers. The annotation justifications specified represent the preferred alignments based on horizontally oriented text (see [AutoCAD Reference Manual](#), c1990, page 132). The preferred map feature annotation position is starting at the southeast of point features, in the center of larger polygon features, and parallel to line features (with names being contiguous). The "processed ltypes" specified refer to the linetypes that entities on particular layer will be assigned in the processed drawing file.

• 0

acad color: 7-white
acad ltype: continuous
description: empty scratch-pad layer.

• archwall10a0

acad color: 6-magenta
acad ltype: continuous (pline)
block: wall
insertion point: bottom/center
scale factor: 1
rotation angle: 0
UCS: entity
description: this layer contains a line symbol representing various architectural or decorative walls.

• bldgotln11a0

acad color: 6-magenta
acad ltype: continuous (closed pline)
description: this layer consists of scaled symbols (10' minimum mapping dimension) representing building 'foot' (roof) prints.

• **farmanno11a1**

acad color: 2-yellow
acad ltype: continuous
dtext style: *stranno*
justification: middle/center
UCS: world
offset: fit
description: this layer includes generic annotation for various farm structures such as barns and silos. lower-case letters.

• **farmstr11a0**

acad color: 8-grey
acad ltype: continuous (closed pline)
anno layer: *farmanno11a1*
description: this layer consists of scaled symbols representing agricultural structures such as silos, barns, etc.

• **foundatn11a0**

acad color: 6-magenta
acad ltype: continuous
block: *foundation*
insertion point: middle/center
scale factor: 1
rotation angle: 0
UCS: entity
description: this layer consists of scaled symbols representing the foundation outline of buildings under-construction.

• **radiotow10a0**

acad color: 7-white
acad ltype: continuous
block: *radio*
insertion point: top/left

scale factor: 1
rotation angle: 0
UCS: world

block: *tower3lg*

insertion point: bottom left tower leg
scale factor: length of side
rotation angle: pick location for bottom right tower leg
UCS: world

block: *tower4lg*

insertion point: bottom left tower leg
scale factor: length of side
rotation angle: pick location for bottom right tower leg
UCS: world

description: this layer contains scaled symbols representing various types of radio towers.

• **retainwl10a0**

acad color: 6-magenta
acad ltype: continuous
block: *rwall*

insertion point: bottom/center
scale factor: 1
rotation angle: 0
UCS: entity

description: this layer includes line symbols representing retaining walls.

• **ruinotln10a0**

acad color: 6-magenta
acad ltype: continuous
block: *ruins*

insertion point: middle/center
scale factor: 1
rotation angle: 0
UCS: entity

description: this layer entails scaled symbols representing building ruins outlines.

• **signstr10a0**

acad color: 4-cyan
acad ltype: continuous
block: *sign*

insertion point: bottom/center
scale factor: 1
rotation angle: 0
UCS: entity

block: *signpole*
insertion point: center
scale factor: 1
rotation angle: 0
UCS: world
description: this layer involves scaled symbols representing large signs.

• **smokestk10a0**

acad color: 5-blue
acad ltype: continuous
block: *stack*
insertion point: middle/center
scale factor: 1
rotation angle: 0
UCS: world
description: this layer contains scaled symbols representing large smoke stacks.

• **tv towers10a0**

acad color: 7-white
acad ltype: continuous
block: *tower3lg*
insertion point: bottom left tower leg
scale factor: length of side
rotation angle: pick location for bottom right tower leg
UCS: world
block: *tower4lg*
insertion point: bottom left tower leg
scale factor: length of side
rotation angle: pick location for bottom right tower leg
UCS: world
block: *tv*
insertion point: top/left
scale factor: 1
rotation angle: 0
UCS: world
description: this layer contains scaled symbols representing various types of television towers.

• **tankgrnd11a0**

acad color: 7-white
acad ltype: continuous
block: *tank*
insertion point: middle/center
scale factor: 1
rotation angle: 0

UCS: world

description: this layer consists of scalable symbols representing surface tank structures.

• **locobjct00d0**

acad color: 4-cyan

acad ltype: continuous

description: this layer incorporates various compiled features edited as inappropriate for mapping scale, but valuable digital data preserved for future use.

• **neatline00d0**

acad color: 15-dim white

acad ltype: continuous (closed pline)

description: this layer entails nonplotted neat image area lines for purpose of trimming or extending planimetric features.

• **photocen00d0**

acad color: 12-dim cyan

acad ltype: continuous

block: *photocen*

insertion point: center

scale factor: 1

rotation angle: 0

attribute: flight line/ frame number

UCS: world

description: this layer consists of nonscaled symbols representing photograph centers.

• **elecanno10e1**

acad color: 2-yellow

acad ltype: continuous

dtext style: *elecanno*

justification: bottom/left

UCS: entity

offset: fit

description: this layer involves annotation for electric utility features. lower-case letters.

• **elecsubs10e0**

acad color: 4-cyan

acad ltype: continuous (closed pline)

processed ltype: areabnd

block: *subst*

insertion point: middle

scale factor: 1
rotation angle: 0
UCS: entity

description: this layer incorporates a line symbol representing boundary (ie. fenced-in area) of electric substations.

• **translin11e0**

acad color: 7-white
acad ltype: continuous
block: *transtow*

insertion point: bottom left tower leg
scale factor: length of side
rotation angle: pick location for bottom right tower leg
UCS: world

block: *transhfr*

insertion point: center (pole)
scale factor: 1
rotation angle: 0
UCS: world

block: *transpol*

insertion point: center of symbol at pole location
scale factor: 1
rotation angle: 0
UCS: entity (direction of power lines)

description: this layer contains scaled symbols representing cross-country four-legged transmission towers, or cross-country h-frame towers, or cross-country transmission poles.

• **drainln01h0**

acad color: 13-dim blue
acad ltype: continuous
processed ltype: *drainsln*

description: this layer consists of a line symbol representing the centerline of double line drainage features.

• **draindn11h0**

acad color: 5-blue
acad ltype: continuous
processed ltype: *draindn*
anno layer: *drdlname11h1*

description: this layer includes a line symbol representing the shorelines of perennial drainage averaging more than twenty feet wide.

• **drainsln11h0**

acad color: 13-dim blue

acad ltype: continuous
processed ltype: *drainsln*
anno layer: *drslname11h1*
description: this layer incorporates a line symbol representing the centerline of perennial drainage averaging less than twenty feet wide.

• **dransupl11h0**

acad color: 13-dim blue
acad ltype: continuous
processed ltype: *dransupl*
anno layer: *drsuname11h1*
description: supplementary drainage lines added during review process.

• **drdlname11h1**

acad color: 4-cyan
acad ltype: continuous
dtext style: *hydrname*
justification: bottom/center
UCS: entity
offset: 8 du
description: this layer includes proper names for "double-line" perennial drainage provided by City of Charlotte Engineering Department.
upper/lower case lettering.

• **drslname11h1**

acad color: 4-cyan
acad ltype: continuous
dtext style: *hydrname*
justification: bottom/center
UCS: entity
offset: 8 du
description: this layer contains proper names for "single-line" perennial drainage provided by City of Charlotte Engineering Department.
upper/lower case lettering.

• **lakepoly01h0**

acad color: 5-blue
acad ltype: continuous (plines)
description: this layer involves a line symbol, which coincides with county boundary lines in the "center" of lakes and rivers, exported with other shorelines to Arc/Info coverage and provides closed polygon graphic.

• **pdlgname11h1**

acad color: 4-cyan
acad ltype: continuous

dttext style: *hydrname*
justification: middle/center
UCS: world
offset: fit
description: this layer involves proper names of large ponds and lakes (associated with features on layer *pondslrg11h0*) provided by City of Charlotte Engineering Department. upper/lower case lettering.

• ***pdsmname11h1***

acad color: 4-cyan
acad ltype: continuous
dttext style: *hydrname*
justification: bottom/left, or bottom/center
UCS: world
offset: fit
description: this layer involves proper names of small ponds (associated with features on layer *pondssml11h0*) provided by City of Charlotte Engineering Department. upper/lower case lettering.

• ***pondlbrk01h0***

acad color: 5-blue
acad ltype: continuous (pline)
processed ltype: *shoreln*
description: this layer contains a line symbol representing the breaks in shorelines of large ponds and lakes, where the shorelines were carried by retaining walls or overlapped by docks.

• ***pondslrg11h0***

acad color: 5-blue
acad ltype: continuous (closed pline)
processed ltype: *shoreln*
anno layer: *pdlgname11h1*
description: this layer includes a line symbol representing lakes and ponds larger than five acres in area.

• ***pondssml11h0***

acad color: 5-blue
acad ltype: continuous (closed pline)
processed ltype: *shoreln*
anno layer: *pdsmname11h1*
description: this layer consists of a line symbol representing ponds less than five acres in area.

• ***swampbnd10h0***

acad color: 5-blue

acad ltype: continuous (closed pline)
processed ltype: *shoreln*
block: *swamp*
 insertion point: pick location for center of symbol
 scale factor: 1
 rotation angle: 0
 UCS: world
description: this layer incorporates pattern and line symbols representing the stereocompiled boundaries of swampy or marshy areas.

• **wetlands00h0**

acad color: 5-blue
acad ltype: continuous (closed pline)
processed ltype: *areabnd*
anno layer: *wetlanno00h1* (ie. "PFO4A")
description: this layer will contain wetlands compiled by City of Charlotte Engineering Department.

• **wetlanno00h1**

acad color: 15-dim white
acad ltype: continuous
dtext style: *hydranno*
 justification: middle/center
 UCS: world
 offset: fit
description: this layer entails annotation for wetlands classifications (ie. "PUBHh" or "PFO4A"). upper/lower case lettering.

• **citybnd11j0**

acad color: 7-white
acad ltype: continuous (pline)
processed ltype: *citybnd*
anno layer: *pbndname10j1*
description: this layer involves a line symbol representing city and municipal limits compiled by City of Charlotte Engineering Department.

• **meckbnd11j0**

acad color: 7-white
acad ltype: continuous (pline)
processed ltype: *cobnd*
anno layer: *pbndname10j1*
description: this layer consists of a line symbol representing county boundary lines compiled by City of Charlotte Engineering Department.

• **pbndname11j1**

acad color: 1-red
acad ltype: continuous
dtext style: *pbndname*
justification: center
UCS: entity
offset: 20 du

description: this layer entails proper names identifying the jurisdictions of political lines provided by City of Charlotte Engineering Department. upper/lower-case lettering (ie. "Mecklenburg County").

• **abanrlrd1110**

acad color: 8-grey
acad ltype: continuous (pline)
processed ltype: *abantrax*
block: *aban*
insertion point: bottom/center
scale factor: 1
rotation angle: 0
UCS: entity

description: this layer consists of a line symbol representing abandoned railways.

• **airpname1111**

acad color: 4-cyan
acad ltype: continuous
dtext style: *lmrkname*
justification: middle/center
UCS: world
offset: fit

description: this layer involves proper names of airports and airfields provided by City of Charlotte Engineering Department. upper/lower case lettering (ie. "Charlotte International Airport").

• **cemenam1111**

acad color: 4-cyan
acad ltype: continuous
dtext style: *lmrkname*
justification: middle/center
UCS: entity
offset: fit

description: this layer involves proper names of cemeteries provided by City of Charlotte Engineering Department. upper/lower case lettering.

• **churbldg1110**

acad color: 6-magenta

acad ltype: continuous (closed pline)

anno layer: *churname1111*

description: this layer contains scaled symbols representing landmark churches identified by City of Charlotte Engineering Department.

• **churname1111**

acad color: 4-cyan

acad ltype: continuous

dtext style: *lmrkname*

justification: bottom/center

UCS: entity

offset: 8 du

description: this layer involves proper names of churches provided by City of Charlotte Engineering Department.

• **damsname1111**

acad color: 4-cyan

acad ltype: continuous

dtext style: *lmrkname*

justification: bottom/center

UCS: world

offset: fit

description: this layer involves proper names of dams provided by City of Charlotte Engineering Department.

• **golfcour1111**

acad color: 4-cyan

acad ltype: continuous

dtext style: *lmrkname*

justification: middle/center

UCS: world

offset: fit

description: this layer involves proper names of golf courses and country clubs provided by City of Charlotte Engineering Department.
upper/lower case lettering.

• **hallbldg1010**

acad color: 6-magenta

acad ltype: continuous (closed pline)

anno layer: *hallname1011*

description: this layer contains scaled symbols representing townhall buildings identified by City of Charlotte Engineering Department.

• **hallname1011**

acad color: 4-cyan

acad ltype: continuous

dtext style: *lmrkname*

justification: bottom/center

UCS: entity

offset: fit

description: this layer involves proper names of Town Halls provided by City of Charlotte Engineering Department.

• **hospbldg1110**

acad color: 6-magenta

acad ltype: continuous (closed pline)

anno layer: *hospname1111*

description: this layer contains scaled symbols representing hospital buildings identified by City of Charlotte Engineering Department.

• **hospname1111**

acad color: 4-cyan

acad ltype: continuous

dtext style: *lmrkname*

justification: bottom/center

UCS: world

offset: fit

description: this layer involves proper names for hospitals provided by City of Charlotte Engineering Department. upper/lower case lettering.

• **lmrktree1010**

acad color: 11-dim green

acad ltype: continuous

block: *lmrktree*

insertion point: center (trunk)

scale factor: 1

rotation angle: 0

UCS: world

description: this layer contains nonscaled symbols representing landmark trees (not simply large single trees).

• **mariname1111**

acad color: 4-cyan

acad ltype: continuous

dtext style: *lmrkname*

justification: bottom/center

UCS: world

offset: fit

description: this layer includes proper names for boat marinas provided by City of Charlotte Engineering Department. upper/lower case lettering.

• **parkname1111**

acad color: 4-cyan

acad ltype: continuous

dtext style: *lmrkname*

justification: bottom/center

UCS: world

offset: fit

description: this layer includes proper names for parks provided by City of Charlotte Engineering Department. upper/lower case lettering.

• **poolname1111**

acad color: 4-cyan

acad ltype: continuous

dtext style: *lmrkname*

justification: bottom/center

UCS: entity

offset: fit

description: this layer entails proper names of large public and private pools, and swim clubs provided by City of Charlotte Engineering Department. upper/lower case lettering.

• **quarname1111**

acad color: 4-cyan

acad ltype: continuous

dtext style: *lmrkname*

justification: bottom/center

UCS: world

offset: fit

description: this layer involves proper names for rock quarries provided by City of Charlotte Engineering Department. upper/lower case lettering.

• **rampname1111**

acad color: 4-cyan

acad ltype: continuous

dtext style: *lmrkname*

justification: bottom/center

UCS: entity

offset: fit

description: this layer includes proper names for public and private boat access ramps provided by City of Charlotte Engineering Department. upper/lower case lettering.

• **schlbdg1110**

acad color: 6-magenta

acad ltype: continuous (closed pline)

anno layer: *schlname1111*

description: this layer contains scaled symbols representing landmark school buildings identified by City of Charlotte Engineering Department.

• **schlname1111**

acad color: 4-cyan

acad ltype: continuous

dtext style: *lmrkname*

justification: bottom/center

UCS: world

offset: fit

description: this layer consists of proper names for schools, colleges, and universities provided by City of Charlotte Engineering Department. upper/lower case lettering.

• **sewpname1011**

acad color: 4-cyan

acad ltype: continuous

dtext style: *lmrkname*

justification: bottom/center

UCS: world

offset: fit

description: this layer includes proper names for sewage or water treatment plant facilities provided by City of Charlotte Engineering Department. upper/lower case lettering.

• **sewpanno10o1**

acad color: 2-yellow

acad ltype: continuous

dtext style: *sansewan*

justification: bottom/left

UCS: entity

offset: fit

description: this layer incorporates annotation for sewage treatment plant features, provided by City of Charlotte Engineering. lower-case lettering (ie. "aeration tank").

• **sewplant10o0**

acad color: 6-magenta

acad ltype: continuous (closed plines)

anno layer: *sewpname1011*

anno layer: *sewpanno10o1*

description: this layer incorporates scaled symbols representing sewage treatment plant features (ie. buildings, aeration tanks, retention tanks, etc.).

• **fencelns11p0**

acad color: 4-cyan

acad ltype: continuous (pline)

processed ltype: *fenceln*

description: this layer entails a line symbol representing fencelines which overall run more than two hundred feet, or which appear to coincide or parallel property lines.

• **meckprln00p0**

acad color: 7-white

acad ltype: continuous (pline)

processed ltype: *meckprln*

description: this layer includes a line symbol representing property lines of County owned land (compiled by City of Charlotte Engineering Department).

• **editplan00q1**

acad color: 7-white

acad ltype: continuous

block: *edit*

insertion point: center of symbol

scale factor: 1

rotation angle: 0

attribute: Editor's Initials? (ie. "jds")

attribute: Editor's Organization? ("mced" or "adc")

attribute: Date Edit Completed?

UCS: world

description: this layer consists of edit calls and comments made by City of Charlotte Engineering Department.

• **boatdock11r0**

acad color: 7-white

acad ltype: continuous (pline)

anno layer: *mariname1111*

description: this layer contains scaled symbols for multi-user boat docks and boat houses not single-user docks.

• **boatramp11r0**

acad color: 7-white

acad ltype: continuous (pline)

block: *ramp*

insertion point: bottom/left

scale factor: 1

rotation angle: 0

UCS: entity

anno layer: *rampname1111*

description: this layer contains scaled symbols representing the ramp pad for boat access.

• **golfanno11r1**

acad color: 2-yellow

acad ltype: continuous

dtext style: *recranno1*

justification: middle/center

UCS: world

offset: fit

description: this layer involves general golf hole annotation such as hole number and fairway provided by City of Charlotte Engineering Department.

lower case lettering (ie. "fairway" or "hole #18").

• **golfhole11r0**

acad color: 12-dim cyan

acad ltype: continuous (closed pline)

processed ltype: areabnd

anno layer: *golfanno11r1*

description: this layer entails a line symbol representing the limits of fairways and greens of golf courses.

• **reccanno11r1**

acad color: 2-yellow

acad ltype: continuous

dtext style: *recranno1*

justification: middle/center

UCS: entity

offset: fit

description: this layer includes general annotation for types of recreation courts (ie. "tennis ct"; "bball ct").

• **reccourt11r0**

acad color: 12-dim cyan

acad ltype: continuous (closed pline)

anno layer: *recranno10r1*

description: this layer entails a line symbol representing edge-of-pavement of paved tennis courts, basketball courts, etc.

• **recfanno11r1**

acad color: 15-dim white

acad ltype: continuous

dtext style: *recranno2*

justification: middle/center

UCS: entity

offset: fit

description: this layer involves general annotation for type of recreation field (ie. "baseball"; "football"; "softball"; "soccer"; "track").

• **recfield11r0**

acad color: 12-dim cyan

acad ltype: continuous (closed pline)

anno layer: *recfanno11r1*

description: this layer incorporates a line symbol representing the striped limits of permanent baseball, softball, football and soccer fields; and running tracks.

• **swimpool11r0**

acad color: 12-dim cyan

acad ltype: continuous (closed pline)

block: *pool*

insertion point: middle/center

scale factor: 1

rotation angle: 0

UCS: entity (apron)

anno layer: *poolname1111*

description: this layer incorporates a line symbol representing the concrete apron of public swimming pools, with symbol "p" inside.

• **damstrts11s0**

acad color: 14-dim magenta

acad ltype: continuous (pline)

anno layer: *damsname1111*

description: this layer contains scaled symbols representing the plan view of dams other than earthen structures.

• **roadclvt10s0**

acad color: 14-dim magenta

acad ltype: continuous

block: *roadclvt*

insertion point: midpoint of symbol at center of headwall

scale: length of headwall

rotation angle: pick second point on line of headwall

UCS: world

description: this layer contains scaled symbols representing road culverts (culverts, cross-drains, pipes, etc.) with headwalls visible in the stereo instrument at this photo scale.

• **roadpipe10s0**

acad color: 9-dim red

acad ltype: continuous

block: *roadpipe*

insertion point: intersection of symbol at the ends of pipe

scale factor: 1

rotation angles: 0 or 180

UCS: entity (apparent pipe centerline)

description: this layer consists of unscaled symbols representing road pipes (cross-drains, pipes, culverts, etc.) without headwalls (earth berm instead or not visible to the stereocompiler).

• **airpanno11t1**

acad color: 2-yellow

acad ltype: continuous

dtext style: *airpanno*

justification: bottom/center

UCS: entity

offset: fit

description: this layer involves various airport/airfield miscellaneous annotation (note: airport proper names on *airpname1111*). lower case lettering (ie. "terminal").

• **airpstr11t0**

acad color: magenta

acad ltype: continuous (pline)

anno layer: *airpanno10t1*

description: this layer consists of a line symbol representing 'foot' (roof) prints of terminals, control towers, airplane hangers, and other airport buildings.

• **airrunwy11t0**

acad color: 1-red

acad ltype: continuous (pline)

description: this layer entails a line symbol representing runway and airport pavement edges-of-pavement.

• **bridgevh10t0**

acad color: 14-dim magenta

acad ltype: continuous

block: *bridgevh*

insertion point: midpoint of symbol (@ center of abutment)

scale factor: width of bridge deck
rotation angles: 0 and 180
UCS: entity (centerline or edge-of-pavement)
description: this layer contains scaled symbols representing the abutments of vehicular bridges crossing hydrologic features.

• **drivepav11t0**

acad color: 1-red
acad ltype: continuous (pline)
description: this layer includes a line symbol representing paved driveways more than two hundred feet in length.

• **driveupa11t0**

acad color: 1-red
acad ltype: continuous (pline)
processed ltype: *unpaved*
description: this layer incorporates a line symbol representing unpaved driveways more than two hundred feet in length.

• **footbrdg10t0**

acad color: 9-dim red
acad ltype: continuous
block: *footbrdg*
insertion point: intersection
scale factor: 1
rotation angles: 0 or 180
UCS: entity (trail)
description: this layer contains unscaled symbol representing foot bridges.

• **footpath10t0**

acad color: 1-red
acad ltype: continuous (pline)
processed ltype: *unpaved*
description: this layer consists of a line symbol representing both paved and unpaved designated trails specified by City of Charlotte Engineering Department.

• **overpass10t0**

acad color: 14-dim magenta
acad ltype: continuous
block: *overpass*
insertion point: endpoint of abutment symbol at location of corners of overpass deck)
scale factor: 1

rotation angles: 0 and 180

UCS: entity (edge of overpass deck)

description: this layer entails a line symbol representing edge of deck of highway overpasses with inserted nonscaled symbol representing the overpass abutments.

• **parklotp11t0**

acad color: 1-red

acad ltype: continuous (pline)

description: this layer incorporates a line symbol representing paved parking lots.

• **parklotu10t0**

acad color: 1-red

acad ltype: continuous

processed ltype: *unpaved*

description: this layer consists of a line symbol representing unpaved parking lots.

• **parkpbrk01t0**

acad color: 1-red

acad ltype: continuous

description: lines used in conjunction with parklotp11t0 lines allowing for closed polygons for stormwater impervious area calculations.

• **parkubr00t0**

acad color: 1-red

acad ltype: continuous

description: this layer contains a line symbol used in conjunction with parklotu10t0 lines allowing for closed polygons for stormwater impervious area calculations.

• **rlrdname10t1**

acad color: 7-white

acad ltype: continuous

dtext style: *rlrdname*

justification: bottom/center

UCS: entity (tracks)

offset: 10 du

description: this layer involves proper names of railways provided by City of Charlotte Engineering Department. upper/lower-case lettering (ie. "Southern Railway").

• **rlrdtrax11t0**

acad color: 8-grey

acad ltype: continuous (pline)

processed ltype: *trax*

anno layer: *rlrdname11t1*

description: this layer involves a line symbol representing the centerline of railroad tracks and spurs (composed of tangents and arcs).

• **rlrdtres10t0**

acad color: 14-dim magenta

acad ltype: continuous

block: *rlrdtres*

insertion point: midpoint

scale factor: width of trestle

rotation angles: 0 and 180

UCS: entity (tracks)

description: this layer contains scaled symbols representing railroad trestles or bridges.

• **roadaluc10t0**

acad color: 1-red

acad ltype: continuous (pline)

processed ltype: *condition*

block: *roaduc*

insertion point: bottom/center

scale factor: 1

rotation angle: 0

UCS: entity (road alignment)

description: this layer incorporates a line symbol representing the approximate location of road alignments which are under construction.

• **roadbrks01t0**

acad color: 1-red

acad ltype: continuous (pline)

description: this layer entails a line symbol representing sections of paved road edge-of-pavement broken for route number symbols.

• **roadclns01t0**

acad color: 7-white

acad ltype: continuous (pline)

description: this layer incorporates an unbroken line symbol representing the surface centerline of all paved/unpaved roads (both public and private).

• **roadpave11t0**

acad color: 1-red

acad ltype: continuous (pline)

anno layer: *roadpnam11t1*

description: this layer incorporates a line symbol representing the edge-of-pavement of paved roads (both public and private).

• **roadpnam11t1**

acad color: 7-white

acad ltype: continuous

dtext style: roadname

justification: bottom/center

UCS: entity (edge-of-surface)

offset: 8 du

description: this layer involves proper names for paved roads provided by City of Charlotte Engineering Department. the components - direction, name, and extension (all normal text kerning and spacing) will adhere to the following conventions:

direction (no periods):

N for North

S for South

E for East

W for West

name: upper/lower case letters (ie., "Shadyview")

extension (no periods):

Al for Alley

Av for Avenue

Bv for Boulevard

Cr for Circle

Ct for Court

Cv for Cove

Dr for Drive

Ep for Expressway

Ex for Extension

Fr for Freeway

Hy for Highway

Ln for Lane

Lp for Loop

Py for Parkway

Pl for Place

Ra for Ramp

Rd for Road

Rn for Run

Rw for Row

St for Street

Tr for Trail

Tr for Terrace

Wy for Way

• **roadunam11t1**

acad color: 7-white

acad ltype: continuous

dtext style: *roadname*

justification: bottom/center

UCS: entity (edge-of-surface)

offset: 8 du

description: this layer involves proper names for unpaved roads provided by City of Charlotte Engineering Department. the components - direction, name, and extension (all normal text kerning and spacing) will adhere to the same conventions listed above for roadpnam11t1.

• **roadupav11t0**

acad color: 1-red

acad ltype: continuous (pline)

processed ltype: *unpaved*

anno layer: *roadunam11t1*

description: this layer involves a line symbol representing apparent edge-of-surface of unpaved roads (both public and private).

• **routenum11t1**

acad color: 7-white

acad ltype: continuous

block: *intstate*

insertion point: center of shield

scale factor: 1

rotation angle: 0

UCS: world

attribute: interstate number

block: *usroute*

insertion point: center of shield

scale factor: 1

rotation angle: 0

UCS: world

attribute: US highway number

block: *stroute*

insertion point: center of shield

scale factor: 1

rotation angle: 0

UCS: world

attribute: state highway number

description: this layer contains nonscaled symbols representing interstate and route shields (with numbers) for the appropriate roads as provided by City of Charlotte Engineering Department.

• **trananno10t1**

acad color: 2-yellow

acad ltype: continuous
dtext style: *trananno*
justification: varies
UCS: world
offset: fit
description: this layer includes various generic transportation-engineering annotation. lower-case lettering (ie. "proposed").

• **cemetery10u0**

acad color: 4-cyan
acad ltype: continuous (pline)
processed ltype: *areabnd*
block: *ceme*
insertion point: middle center
scale factor: 1
rotation angle: 0
UCS: entity
anno layer: *cemename1111* (proper names)
description: this layer consists of a line symbol representing apparent limits of cemeteries.

• **quarybnd11u0**

acad color: 4-cyan
acad ltype: continuous (pline)
processed ltype: *areabnd*
block: *quar*
insertion point: middle/center
scale factor: 1
rotation angle: 0
UCS: world
anno layers: *quarname1111* (proper names)
description: this layer involves a line symbol representing identifiable of quarry activity.

• **treebrks01v0**

acad color: 3-green
acad ltype: continuous (pline)
processed ltype: *tre* (*tre.lsp*)
description: this layer incorporates a line symbol representing the edge-of-treeline segments broken for annotation; and therefore, allows closed treecover polygons to be exported to an Arc/Info coverage.

• **treeline11v0**

acad color: 3-green
acad ltype: continuous (pline)
processed ltype: *tre* (*tre.lsp*)

description: this layer involves a line symbol representing the edge-of-treelines. note: not compiled over planimetric features such as road edges or building outlines (pulled off of); and broken for various text to improve readability (see treebrks01v0).

• **watrpump10w0**

acad color: 4-cyan
acad ltype: continuous (pline)
processed ltype: *areabnd*
block: *liftst*
insertion point: middle/center
scale factor: 1
rotation angle: 0
UCS: entity

description: this layer incorporates a line symbol representing water utility pump/lift stations.

• **watrtowr10w0**

acad color: 7-white
acad ltype: continuous
block: *watert*
insertion point: middle/center (inside tower symbol where possible)
scale factor: 1
rotation angle: 0
UCS: world

description: this layer contains scaled symbols representing the structures leg-base locations and the outline of the tank.

5.07 Planimetric Prototype Drawing Blocks

The following blocks are provided in the planimetric prototype drawing x00plan.dwg. Some of these blocks are inserted to produce complete map symbols (ie. the instate block); others are used in conjunction with compiled lines or combinations of blocks to create specific map symbols (ie. the overpass block). This list of blocks includes some which are purely symbolic in nature (ie. the lmrktree block); and others which are actually text (ie. the pool block). Some of these blocks also have associated visible attributes (ie. the photocen block).

• **aban**

insertion: bottom/center
scale factor: 1
rotation angle: 0
UCS: entity (the track centerline)
description: textual block ("abandoned") used in conjunction with the abandoned railroad linetype (abantrax) on the abanlrld1110 layer.

• **bridgevh**

insertion point: midpoint of symbol

scale factor: equals the width of the bridge deck
rotation angle: 0 or 180
UCS: entity (the road edge-of-pavement)
description: scalable symbolic block representing the orientation and width of the bridge deck from abutment to abutment inserted on the bridgevh10t0 layer.

• **ceme**

insertion point: middle/center
scale factor: 1
rotation angle: 0
UCS: entity (the cemetery boundary line)
description: textual block ("cemetery") for smaller cemeteries (no proper name on the cemename1111 layer) used in conjunction with apparent cemetery limit lines (areabnd) linetype on the cemetery10u0 layer.

• **edit**

insertion point: center of symbol
scale factor: 1
rotation angle: 0
UCS: world
attribute: Editor's Initials? (ie. "jds")
attribute: Editor's Organization? ("mced" or "adc")
attribute: Date Edit Completed?
description: symbolic block with associated attribute for the editor's initials (ie. "JDS") on the editplan00q1 layer, for quality control tracking purposes.

• **fencpost**

insertion point: not applicable since not user defined
description: symbolic block associated with fenceln.

• **footbrdg**

insertion point: intersection of symbol
scale factor: 1
rotation angle: 0 or 180
UCS: entity (the foot trail)
description: nonscaled symbolic block representing the support structure of foot bridges on the footbrdg10t0 layer.

• **foundatn**

insertion point: middle/center
scale factor: 1
rotation angle: 0
UCS: entity (the foundation footprint)
description: textual block ("u/c") inserted inside building foundation outline on the foundatn11a0 layer.

• **intstate**

insertion point: middle of shield

scale factor: 1

rotation angle: 0

UCS: world

attribute: Route Number? (ie."77")

description: nonscaled symbolic block representing interstate shields with associated visible (displayed) attribute for route number on the routenum11t1 layer.

• **liftst**

insertion point: middle/center

scale factor: 1

rotation angle: 0

UCS: entity (the liftstation boundary)

description: textual block ("liftstation") used in conjunction with the line symbol delimiting waterpump or liftstation (areabnd) sites on the watrpump10w0 layer.

• **lmrktree**

insertion point: middle of symbol

scale factor: 1

rotation angle: 0

UCS: world

description: nonscaled symbolic block representing surveying type landmark trees on the lmrktree10I0 layer.

• **overpass**

insertion point: endpoint of symbol (at the intersection of the overpass deck and abutments)

scale factor: 1

rotation angle: 0 or 180

UCS: entity (the overpass deck)

description: nonscalable symbolic block depicting the overpass abutment ends location on the overpass10t0 layer.

• **photocen**

insertion point: center of symbol

scale factor: 1

rotation angle: 0

UCS: world

attribute: Photo Frame Number? (00-000)

description: nonscalable symbolic block with associated visible attribute for the photo frame number (concatenated 2-digit flight line number, and 3-digit frame number) on the photocen00d0 layer.

• **pool**

insertion point: middle/center

scale factor: 1

rotation angle: 0

UCS: entity (the swimming pool or pool apron)

description: textual block ("p") used in conjunction with swimming pools on the swimpool11r0 layer.

• **quar**

insertion point: middle/center

scale factor: 1

rotation angle: 0

UCS: world

description: textual block ("quarry") used in conjunction with quarries on the quarrybnd11u0 layer.

• **radio**

insertion point: top/left

scale factor: 1

rotation angle: 0

UCS: world

description: textual block ("radio") used in conjunction with the tower4lg block and tower3lg block to represent radio receiving, transmitting, and repeating towers on the radiotow10a0 layer.

• **ramp**

insertion point: center of block

scale factor: 1

rotation angle: 0

UCS: entity (the ramp drive)

description: textual block ("ramp") used in conjunction with boat access ramps on the boatramp11r0 layer.

• **rlrdtie**

insertion point: not applicable since not user defined

description: symbolic block, representing railroad cross ties.

• **rlrdtres**

insertion point: midpoint of the symbol at the location of the trestle abutements

scale factor: 1

rotation angle: 0 or 180

UCS: entity (the track centerline)

description: symbolic block representing railroad trestles used with the rlrdtres10t0 layer.

• **roadclvt**

insertion point: midpoint of symbol at the center of the headwall

scale factor: equals width of headwall

rotation angle: pick second point of the headwall

UCS: world

description: scalable symbolic block representing the headwall of culverts, cross-drains, and pipes with headwalls visible to the stereocompiler. Insert on the roadclvt10s0 layer.

• **roadpipe**

insertion point: intersection of block at ends of pipe

scale factor: 1

rotation angle: 0 or 180

UCS: entity (the apparent pipe centerline)

description: nonscaled symbolic block representing the orientation and endpoints of pipes with no headwall visible to the stereocompiler at the photo compilation scale. Inserted on the roadpipe10s0 layer.

• **roaduc**

insertion point: bottom/center of symbol parallel to the centerline of the road alignment

scale factor: 1

rotation angle: 0

UCS: entity (the road alignment centerline)

description: textual block ("u/c") used in conjunction with roads under-construction on the roadaluc10t0 layer.

• **ruins**

insertion point: middle/center of symbol inside ruins polygon

scale factor: 1

rotation angle: 0

UCS: entity (the ruins footprint)

description: textual block ("r") used in conjunction with building ruins on the ruinotln10a0 layer.

• **rwall**

insertion point: bottom/center of symbol parallel to the retaining wall

scale factor: 1

rotation angle: 0

UCS: entity (the retaining wall)

description: textual block ("rwall") used in conjunction with retaining walls on the retainwl10a0 layer.

• **sign**

insertion point: bottom/center

scale factor: 1
rotation angle: 0
UCS: entity (the sign face)
description: textual block ("sign") used in combination with the signpole block and other linework representing large overhead highway signs, or billboard signs on the signstr10a0 layer.

• **signpole**

insertion point: center of block at location of center of support poles or posts
scale factor: 1
rotation angle: 0
UCS: world
description: symbolic block used with lines to represent large interstate and highway overhead signs, or billboard signs on the signstr10a0 layer.

• **stack**

insertion point: middle/center
scale factor: 1
rotation angle: 0
UCS: world
description: textual block ("stack") used in conjunction with smoke stacks on the smokestk10a0 layer.

• **stroute**

insertion point: center of symbol
scale factor: 1
rotation angle: 0
attribute: State Route Number?
UCS: world
description: nonscaled symbolic block representing a state route shield with an associated attribute for the route number inserted on the routenum111 layer.

• **subst**

insertion point: middle/center
scale factor: 1
rotation angle: 0
UCS: entity
description: textual block ("substation") used in conjunction with electric substations on the elecsubs10e0 layer.

• **swamp**

insertion point: middle of block
scale factor: 1
rotation angle: 0

UCS: world

description: nonscaled symbolic block which provides a section of conventional swamp symbol on the swampbnd10h0 layer. Several copies may have to be inserted to cover larger swampy areas.

• **tank**

insertion point: middle/center

scale factor: 1

rotation angle: 0

UCS: world

description: textual block ("tank") used in conjunction with ground surface tanks on the tankgrnd11a0 layer.

• **tv**

insertion point: top/left

scale factor: 1

rotation angle: 0

UCS: world

description: textual block ("tv") used in conjunction with the tower4lg block and tower3lg block to represent television transmitting towers on the tvtowers10a0 layer.

• **tower3lg**

insertion point: bottom left tower leg

scale factor: equals length of tower side

rotation angle: pick location of bottom right tower leg

UCS: world

description: scalable symbolic block used in combination with the radio block to represent the three-legged type radio towers on the radiotow10a0 layer.

• **tower4lg**

insertion point: bottom left tower leg

scale factor: equals length of tower side

rotation angle: pick location of bottom right tower leg

UCS: world

description: scalable symbolic block used in conjunction with the radio block to represent the four-legged type radio towers on the radiotow10a0 layer.

• **transhfr**

insertion point: center of symbol at pole location

scale factor: 1

rotation angle: 0

UCS: world

description: symbolic block combined with linework to represent cross-country h-

frame transmission towers on the translin11e0 layer.

• **transpol**

insertion point: center of block at pole location
scale factor: 1
rotation angle: 0
UCS: entity (the apparent direction of power lines)
description: symbolic block representing cross-country power poles on the translin11e0 layer.

• **transtow**

insertion point: bottom left tower leg
scale factor: equals length of tower side
rotation angle: pick location for bottom right tower leg
UCS: world
description: symbolic block representing four-legged cross-country transmission towers; inserted on the translin11e0 layer.

• **usroute**

insertion point: center of symbol
scale factor: 1
rotation angle: 0
attribute: US Route Number?
UCS: world
description: nonscaled symbolic block representing a US route shield with associated attribute for the route number inserted on the routenum11t1 layer.

• **wall**

insertion point: bottom/center
scale factor: 1
rotation angle: 0
UCS: entity (the wall)
description: textual block ("wall") denoting architectural and decorative walls on the archwall10a0 layer.

• **watert**

insertion point: middle/center (inside tower symbol where possible)
scale factor: 1
rotation angle: 0
UCS: world
description: textual block ("water") used in conjunction with water towers on the watert10w0 layer.

5.08 Planimetric Prototype Drawing Dtext Styles

The planimetric prototype drawing file, x00plan.dwg, contains the following dtext styles. Some of the styles shall be used by the Consultant for annotation; other were used in creating blocks in the prototype drawing file.

- **airpanno**

- font file: romanc

- height: variable (from 10 du to 16 du)

- width factor: 1

- obliquing angle: 0

- backward: no

- upside-down: no

- vertical: no

- description: this text style shall be used for various airport/airfield
miscellaneous annotation on the airpanno1111 layer.

- **condanno**

- font file: romanc

- height: 12 du

- width factor: 1

- obliquing angle: 0

- backward: no

- upside-down: no

vertical: no

description: this text style was utilized in creating some of the textual blocks.

• **elecanno**

font file: romanc

height: 12 du

width factor: 1

obliquing angle: 0

backward: no

upside-down: no

vertical: no

description: this text style will be employed for annotation of electric utility features on the elecanno10e1 layer.

• **hydranno**

font file: italicc

height: 12 du

width factor: 1

obliquing angle: 0

backward: no

upside-down: no

vertical: no

description: this text style was employed in creating some of the textual blocks.

• **hydrname**

font file: italicc

height: 20 du

width factor: 1

obliquing angle: 0

backward: no

upside-down: no

vertical: no

description: this text style will be used by the Consultant to label hydrologic features including those on the drdlnname11h1, drslnname11h1, pdlgnname11h1, and pdsmname11h1 layers.

• **lmrkname**

font file: romanc

height: 18 du

width factor: 1

obliquing angle: 0

backward: no

upside-down: no

vertical: no

description: this text style shall be utilized by the Consultant to label landmark features with proper names including those on the airpname1111, cemename1111, churname1111, damsname1111, golfcour1111, hospname1111, mariname1111, parkname1111, poolname1111, quarname1111, rampname1111, schlname1111, and sewpname1111 layers.

• **luseanno**

font file: romanc

height: 12 du

width factor: 1

obliquing angle: 0

backward: no

upside-down: no

vertical: no

description: this text style was used in creating several of the textual blocks included in the planimetric prototype drawing file.

• **pbdname**

font file: romanc

height: 30 du

width factor: 1

obliquing angle: 0

backward: no

upside-down: no

vertical: no

description: this text style will be employed by the Consultant to create proper name text on the pbdname11j1 layer.

• **recranno1**

font file: romanc

height: 10 du

width factor: 1

obliquing angle: 0

backward: no

upside-down: no

vertical: no

description: this text style was used to construct several blocks; it will also be utilized by the Consultant for smaller generic recreational feature annotation on the golfanno11r1, reccanno11r1, and layers.

• **recranno2**

font file: romanc

height: 12 du

width factor: 1

obliquing angle: 0

backward: no
upside-down: no
vertical: no
description: this text style was used to construct several blocks; it will also be utilized by the Consultant for larger generic recreational feature annotation on the recfanno11r1 layer.

• **rlrdname**

font file: romanc
height: 20 du
width factor: 1
obliquing angle: 0
backward: no
upside-down: no
vertical: no
description: this text style shall be employed to label railways with proper names on the rlrddname11t1 layer.

• **roadname**

font file: romanc
height: 20 du
width factor: 1
obliquing angle: 0
backward: no
upside-down: no
vertical: no
description: this text style will be utilized to label both public and private, paved or unpaved roads on the roadpnam11t1 and the roadunam11t1 layers.

• **romanc**

font file: romanc
height: 0 du
width factor: 1
obliquing angle: 0
backward: no
upside-down: no
vertical: no
description: generic variable sized text style used on the editplan00q1 layer; also used in the construction of several blocks.

• **sansewan**

font file: romanc
height: 12 du
width factor: 1

obliquing angle: 0
backward: no
upside-down: no
vertical: no
description: this text style shall be used for the annotation of sewage treatment plant features on the sewpanno10o1 layer.

• **standard**

font file: txt
height: 0 du
width factor: 1
obliquing angle: 0
backward: no
upside-down: no
vertical: no
description: standard AutoCAD dtext style, which is not utilized in this contract.

• **strtanno**

font file: romanc
height: 10 du (drawing units)
width factor: 1
obliquing angle: 0
backward: no
upside-down: no
vertical: no
description: this text style was used to construct several textual blocks; and will be utilized for annotation on the farmanno11a1 layer.

• **trananno**

font file: romanc
height: 12 du
width factor: 1
obliquing angle: 0
backward: no
upside-down: no
vertical: no
description: this text style shall be employed by the Consultant for various generic transportation-engineering annotation on the trananno10t1 layer

• **watranno**

font file: romanc
height: variable (from 10 du to 16 du)
width factor: 1
obliquing angle: 0
backward: no

upside-down: no

vertical: no

description: this text style was used to create several blocks.

5.09 Planimetric Prototype Drawing AutoCAD Setvars

The following AutoCAD setvar values appear in the initial settings of the planimetric prototype drawing furnished by the City of Charlotte Engineering Department. These same settings should exist in the files returned by the Consultant, except the *limmin* and *limmax* setvars which can be changed to appropriate values for specific map sheets.

- insbase: 0.0, 0.0, 0.0
- limmin: 0.0, 0.0
- limmax: 1540000.0, 650000.0
- lunits: 2
- luprec: 1
- axismode: 0
- axisunit: 0.0, 0.0
- sketchinc: 5
- aunits: 0
- auprec: 4
- elevation: 0.0
- thickness: 0.0
- skpoly: 1
- angbase: 0
- angdir: 0
- pdmode: 0
- pdsiz: 0.0
- plinewid: 0.0

- coords: 2
- attdia: 0
- handling: 0
- handseed: 0
- ucsorg: 0.0, 0.0, 0.0
- ucsxdir: 1.0, 0.0, 0.0
- ucsydir: 0.0, 1.0, 0.0
- worldview: 1
- tilemode: 1
- unitmode: 0

5.10 Topographic Prototype Drawing Layers

The prototype drawing for the topographic component, x00topo.dwg, of the Map Sheet Set includes the following layers.

- **0**
 - acad color: 7-white
 - acad ltype: continuous
 - description: empty scratch-pad layer
- **aproxwse01c1**
 - acad color: 15-dim white
 - acad ltype: continuous
 - block: awse
 - insertion point: center
 - scale factor: 1
 - rotation angle: 0
 - attribute: Approximate Surface Elevation?
 - description: this layer contains annotation for the approximate water surface elevation to the nearest foot.
- **ucground10c0**
 - acad color: 11-dim green
 - acad ltype: continuous (pline)
 - processed ltype: *condition*

block: *grnduc*
insertion point: middle/center
scale factor: 1
rotation angle: 0
UCS: world
description: this layer incorporates a line symbol representing the outline of areas actively undergoing grading.

• **edittopo00q1**

acad color: 1-red
acad ltype: continuous
block: *edit*
insertion point: center of symbol
scale factor: 1
rotation angle: 0
attribute: Editor's Initials? (ie. "jds")
attribute: Editor's Organization? ("mced" or "adc")
attribute: Date Edit Completed?
UCS: world
description: this layer includes x00topo.dwg topographic element County edit notes and remarks.

• **indexlab10x1**

acad color: 4-cyan
acad ltype: continuous
description: labels for all index contours.italic-18-middle
ucs: entity

• **supplcon 10i0**

acad color: 15-dim white

acad ltype: supplcon
description: supplementary 1' contours

• **suppllab10i0**

acad color: 2-yellow
acad ltype: continuous
description: labels for supplementary contours. Italic-12-middle-UCS
ucs: entity

• **brksuppl00i0**

acad color: 15-dim white
acad ltype: continuous
description: breaks in supplemental contours for text, etc.

• **dtmpoint00c0**

acad color: 8-cyan
acad ltype: continuous
description: DTM Mass points; 3d acad point entities

• **dtmbrklin00c0**

acad color: 8-cyan
acad ltype: continuous
description: DTM breaklines; acad 3d polylines

• **dtmobsur00c0**

acad color: 8-cyan
acad ltype: condition
description: closed outlines of obscured areas acad 2d polylines

• **wsurelev10c1**

acad color: 13-dim blue
acad ltype: continuous
block: wse
insertion point: middle of block
scale factor: 1
rotation angle: 0
attribute: surface elevation
description: water surface elevation; italic-14-ll. to the nearest foot.
ucs: world

• **spotelev10c1**

acad color: 12-dim cyan
acad ltype: continuous
block: spot
insertion point: middle of block
scale factor: 1
rotation angle: 0

attribute: none
description: spot elevations with text; italicc-ll
ucs: world

• **neatline00d0**

acad color: 7-white
acad ltype: continuous
description: sheet neat image area

• **indexcon10x0**

acad color: 10-dim yellow
acad ltype: continuous
description: accurate 10' contours

• **depindex10x0**

acad color: 10-dim yellow
acad ltype: continuous
block: *deptick*
insertion point: end of block
scale factor: 1
rotation angle: with entity
description: accurate 10' depression contours

• **apxindex10x0**

acad color: 10-dim yellow
acad ltype: approxcon
description: approximate 10' contours

• **apdindex10x0**

acad color: 10-dim yellow
acad ltype: approxcon
block: *deptick*
insertion point: end of block
scale factor: 1
rotation angle: with entity
description: approximate 10' depression contours

• **brkindex00x0**

acad color: 10-dim yellow
acad ltype: continuous
description: breaks in 10' index contours for text, etc.

• **brkdxcon00x0**

acad color: 10-dim yellow
acad ltype: continuous
description: breaks in 10' depression contours for text, etc.

• **brkaxcon00x0**

acad color: 10-dim yellow

acad ltype: continuous

description: breaks in 10' approximate contours for text, etc.

• **brkaxdco00x0**

acad color: 10-dim yellow

acad ltype: continuous

description: breaks in 10' approximate depression contours for text, etc.

• **intercon10i0**

acad color: 2-yellow

acad ltype: continuous

description: accurate 2' contours

• **depinter10i0**

acad color: 2-yellow

acad ltype: continuous

block: *deptick*

insertion point: end of block

scale factor: 1

rotation angle: with entity

description: accurate 2' depression contours

• **apxinter10i0**

acad color: 2-yellow

acad ltype: approxcon

description: approximate 2' contours

• **apdinter10i0**

acad color: 2-yellow

acad ltype: approxcon

block: *deptick*

insertion point: end of block

scale factor: 1

rotation angle: with entity

description: approximate 2' depression contours

• **brkinter00i0**

acad color: 2-yellow

acad ltype: continuous

description: breaks in 2' intermediate contours for text, etc.

• **brkdicon00i0**

acad color: 2-yellow

acad ltype: continuous
description: breaks in 2' depression intermediate contours for text, etc.

• **brkaicon00i0**

acad color: 2-yellow
acad ltype: continuous
description: breaks for 2' approximate contours for text, etc.

• **brkaidco00i0**

acad color: 2-yellow
acad ltype: continuous
description: breaks for 2' approximate depression contours for text, etc.

5.11 Topographic Prototype Drawing Blocks

The following blocks included in the topographic prototype drawing are to used in this contract. The other blocks in the prototype drawing file are not relevant to this project due to the limited topographic scope of this contract.

• **awse**

insertion point: middle of block
scale factor: 1
rotation angle: 0
attribute: Approximate Surface Elevation?
description: approximate water surface elevation used in older Planimetric Mapping Projects

• **edit**

insertion point: center of symbol
scale factor: 1
rotation angle: 0
attribute: Editor's Initials? (ie. "jds")
attribute: Editor's Organization? (ie. "mced" or "adc")
attribute: Date Edit Completed?
UCS: world
description: symbolic block with associated attribute for the editor's initials (ie. "JDS") on the editplan00q1 layer, for quality control tracking purposes.

• **grnduc**

insertion point: middle center
scale factor: 1
rotation angle: 0
UCS: world
description: textual block used on the ucground10c0 layer in combination with a line symbol to represent the areas actively undergoing grading.

- **deptick**

- insertion point: end of block
 - scale factor: 1
 - rotation angle: with the entity
 - attribute: none
 - description: pattern for depression contours

- **spot**

- insertion point: middle of block
 - scale factor: 1
 - rotation angle: 0
 - attribute: none
 - description: symbol spot elevation

- **wse**

- insertion point: middle of block
 - scale factor: 1
 - rotation angle: 0
 - attribute: accurate water surface elevation
 - description: accurate water surface in topographic mapping projects

5.12 Topographic Prototype Drawing Dtext Styles

The following dtext styles are included in the topographic prototype drawing file, x00topo.dwg, provided by the City of Charlotte Engineering Department.

- **italicc**

- font file: romanc
 - height: 0 du
 - width factor: 1
 - obliquing angle: 0
 - backward: no
 - upside-down: no
 - vertical: no
 - description: generic variable sized text style used in the construction of several blocks.

- **romanc**

- font file: romanc
 - height: 0 du
 - width factor: 1
 - obliquing angle: 0
 - backward: no
 - upside-down: no
 - vertical: no
 - description: generic variable sized text style used on the edittopo00q1 layer; also used in the construction of some blocks.

- **standard**

- font file: txt
 - height: 0 du
 - width factor: 1
 - obliquing angle: 0
 - backward: no
 - upside-down: no
 - vertical: no
 - description: standard AutoCAD dtext style, which is not utilized in this contract.

5.13 Topographic Prototype Drawing AutoCAD Setvars

The significant difference in the setvars in the topographic prototype file and those of all the other drawing files is that the z-value of features on the topographic element correspond to their ground elevation.

5.14 Base Prototype Drawing Layers

The prototype drawing for the base/control component of the Map Sheet Set, x00base.dwg, contains the following layers. All entity colors and linetypes are assigned by layer with the exception of some blocks which have assigned colors.

- **0**

- acad color: 7-white
 - acad ltype: continuous
 - description: empty scratch-pad layer.

- **gridline10b0**

- acad color: 15-dim white
 - acad ltype: continuous
 - description: this layer consists of even one-thousand foot NAD83 grid lines.

- **neatline00d0**

- acad color: 15-dim white
 - acad ltype: continuous (pline)
 - description: this layer includes sheet neat image line.

- **passpnts00d0**

- acad color: 7-white
 - acad ltype: continuous
 - block: *passpnt*
 - insertion point: center of symbol (at passpoint location)
 - scale factor: 1
 - rotation angle: 0
 - UCS: world
 - attribute: Year-Consultant-Passpoint Number?

description: this layer contains nonscaled symbols representing fully analytical aerial triangulation passpoints established for the purpose of assembling strip (flight line) models.

• **tiepoint00d0**

acad color: 7-white

acad ltype: continuous

block: *tiepoint*

insertion point: center of symbol at the tiepoint location

scale factor: 1

rotation angle: 0

UCS: world

attribute: Year-Consultant-Tiepoint Number?

description: this layer consists of nonscaled symbols representing fully analytical aerial triangulation tiepoints established for the purpose of assembling adjacent strip models

• **meckbndx00j0**

acad color: 7-white

acad ltype: continuous

block: *meckbndx*

insertion point: center of symbol at the monument location

scale factor: 1

rotation angle: 0

UCS: world

description: this layer contains nonscaled symbols representing the paneled City of Charlotte Lime stone monuments.

• **horzctrl00m0**

acad color: 12-dim cyan

acad ltype: continuous

block: *hctrl*

insertion point: center of symbol at the monument location

scale factor: 1

rotation angle: 0

UCS: world

attribute: Year-Consultant-Panel Number?

description: this layer consists of nonscaled symbols representing paneled field surveyed traverse stations.

• **hzytctrl00m0**

acad color: 4-cyan

acad ltype: continuous

block: *hzytctrl*

insertion point: center of the symbol at the monument location

scale factor: 1

rotation angle: 0
UCS: world
attribute: NAVD88 Elevation?
attribute: Year-Consultant-Panel Number?
description: this layer consists of nonscaled symbols representing paneled field surveyed traverse/level-loop stations.

• **vertctrl00m0**

acad color: 1 1-dim green
acad ltype: continuous
block: *vctrl*
insertion point: center of symbol at the monument location
scale factor: 1
rotation angle: 0
UCS: world
attribute: Year-Consultant-Panel Number?
attribute: NAVD88 Elevation?
description: this layer contains nonscaled symbols representing paneled field surveyed level-loop stations.

• **meckprcn00p0**

acad color: 1-red
acad ltype: continuous
block: *propcorn*
insertion point: center of symbol at the property corner location
scale factor: 1
rotation angle: 0
UCS: world
description: this layer contains nonscaled symbols representing paneled property corners of City of Charlotte owned land.

• **editbase00q1**

acad color: 1-red
acad ltype: continuous
description: this layer consists of base/control component, x00base.dwg, edit remarks and notes made by the County.

5.15 Base Prototype Drawing Blocks

The following blocks are provided in the base prototype drawing, x00base.dwg, provided by the City of Charlotte Engineering Department.

• **edit**

insertion point: center of symbol
attribute: Editor's Initials? (ie. "jds")
attribute: Editor's Organization? ("mced" or "adc")
attribute: Date Edit Completed?

description: symbolic block with associated attribute for the editor's initials (ie. "JDS") on the editbase00q1 layer, for quality control tracking purposes.

• **hctrl**

insertion point: center of symbol

scale factor: 1

rotation angle: 0

UCS: world

attribute: Year-Consultant-Panel Number?

description: nonscaled symbolic block with a related visible attribute (concatenated from year established, establishing consultant, and panel number) representing the paneled field surveyed NAD83 traverse stations on the horzctrl00m0 layer.

• **hvctrl**

insertion point: center of symbol

scale factor: 1

rotation angle: 0

UCS: world

attribute: Year-Consultant-Panel Number?

attribute: NAVD88 elevation?

description: nonscalable symbolic block locating horizontal/vertical control monuments on the hzvctrl00m0 layer with associated visible attributes for concatenated year established, establishing consultant, panel number; and the NAVD88 elevation.

• **meckbndx**

insertion point: center of symbol

scale factor: 1

rotation angle: 0

UCS: world

description: nonscalable symbolic block representing the City of Charlotte line monuments.

• **passpnt**

insertion point: center of symbol

scale factor: 1

rotation angle: 0

UCS: world

attribute: Year-Consultant-Passpoint Number?

description: nonscaled symbolic block with attribute concatenated from the year of mapping (triangulation), consultant, and the passpoint number which represents FAAT passpoints established to assemble models into strips. The passpnt block is inserted on the passpnts00d0 layer.

- **propcorn**

- insertion point: center of symbol

- scale factor: 1

- rotation angle: 0

- UCS: world

- description: nonscaled symbolic block representing paneled property corners of land owned by City of Charlotte; it is inserted on the meckprcn00p0 layer.

- **tiepoint**

- insertion point: center of symbol

- scale factor: 1

- rotation angle: 0

- attribute: Year-Consultant-Tiepoint Number?

- description nonscaled symbolic block with a related attribute for year of mapping (triangulation) - the consultant's name - the tiepoint number, representing FAAT tiepoints established for assembling adjacent model strips.

- **vctrl**

- insertion point: center of symbol

- attribute: for Year-Consultant-Panel Number?

- attribute: NAVD29 elevation?

- description: nonscaled symbolic block with associated attributes for combined year established - establishing consultant - panel number, and the NAVD29 based elevation representing paneled field surveyed level-loop stations. This block is inserted on the vertctrl01m0 layer.

5.16 Base Prototype Drawing Dtext Styles

The following dtext styles are included in the base prototype drawing file, x00base.dwg, provided by the City of Charlotte Engineering Department. Only the romanc style is used in this contract; it is used in the construction of several of the base prototype drawing file blocks.

- **romanc**

- font file: romanc

- height: 0 du

- width factor: 1

- obliquing angle: 0

- backward: no

- upside-down: no

- vertical: no

- description: generic variable sized text style to be used on the editbase00q1 layer; also used in the construction of some blocks.

- **standard**

- font file: txt

- height: 0 du

width factor: 1
obliquing angle: 0
backward: no
upside-down: no
vertical: no
description: standard AutoCAD dtext style, which is not utilized in this contract.

5.17 Base Prototype Drawing AutoCAD Setvars

The AutoCAD Setvars set in the base prototype drawing, x00base.dwg, are the same as those listed for the planimetric prototype in section 5.08.

5.18 Building-fill Prototype Drawing Layers

The prototype drawing for the building-fill component of the Map Sheet Set, x00bldf.dwg, contains the following layers. Entity colors and linetypes are all assigned by layer.

- **0**
acad color: 7-white
acad ltype: continuous
description: empty scratch-pad layer.

- **bldgfill10a0**
acad color: 7-white
acad ltype: continuous
hatch pattern: bldfil
UCS: world
description: this layer consists of building fills for building outlines.

- **neatline00d0**
acad color: 15-dim white
acad ltype: continuous (pline)
description: this layer includes the neat image area for a specific map sheet set.

- **editbldf00q1**
acad color: 1-red
acad ltype: continuous
description: this layer contains building fill component, x00bldf.dwg, edit comments and notes made by the County.

5.19 Building-fill Prototype Drawing Hatch Pattern

The Consultant shall use the *bldfil* hatch pattern to shade-in (in model space of the x00bldf.dwg drawing file) building outlines on the bldgotln11a0, farmstr11a0, churbldg1110, hospbldg1110, schlbdg1110, sewplant10o0, and airpstr11t0 layers of the x00plan.dwg drawing file. The City of Charlotte Engineering Department shall furnish the Consultant with an ASCII text file, acadpat.apd, to be appended to their acad.pat file. The acadpat.apd file contains the following definition for the bldfil hatch pattern.

;written by John Schornak 1-1-91
*bldfil,Planimetric Building-fill
0, 0,0, 0,2.5

5.20 Building-fill Prototype Drawing AutoCAD Setvars

The AutoCAD setvars for the x00bldf.dwg prototype drawing file are the same as those listed for the Planimetric Prototype Drawing in section 5.08 above.

5.21 Planimetric Border Sheet Prototype Drawing Layers

The Map Sheet Set prototype drawing for the standard two hundred scale planimetric border sheet, x00borp.dwg, contains the following layers. The colors of entities are assigned by layer in some cases, but most colors are assigned by entity. All AutoCAD linetypes are continuous; symbols which use AutoLINE linetypes are only simulated (the border drawing file is not processed).

- **0**
acad color: 7-white
acad ltype: continuous
description: empty scratch-pad layer.

- **200scale1**
acad color: 15-dim white (colors also assigned by entity)
acad ltype: continuous
description: this layer contains all the text and graphics in the scale-legend box, including the scale, north arrow, scale-text, and scale-box outline.

- **charlogo0**
acad color: 7-white
acad ltype: continuous
description: this layer includes the City of Charlotte logo, and the outline of the logo-box. It is not plotted for this contract.

- **charmappc0**
acad color: 7-white
acad ltype: continuous
description: this layer contains text for the City of Charlotte Map Counter, and the outline of the map counter-box. It is not plotted for this contract.

- **constrln0**
acad color: 1-red
acad ltype: continuous
description: this layer contains construction lines used in creating the border sheet, and is not plotted.

- **consults1**

 - acad color: 7-white (colors also assigned by entity)

 - acad ltype: continuous

 - description: this layer involves text for the name of the consultant, the date of photography, the scale of photography, etc.; and the outline of the consultant box.

- **editbord0**

 - acad color: 6-magenta

 - acad ltype: continuous

 - description: this layer contains edit comments and calls made by the City of Charlotte Engineering Department.

- **legdtext1**

 - acad color: 12-dim cyan

 - acad ltype: continuous

 - description: this layer entails the legend text which identifies the legend symbology.

- **leglines1**

 - acad color: 15-dim white

 - acad ltype: continuous

 - description: this layer contains the legend lines separating the legend symbols and text.

- **legsyml1**

 - acad color: 7-white (colors assigned by entity)

 - acad ltype: continuous

 - description: this layer incorporates all the legend symbols.

- **mecklogo1**

 - acad color: 12-dim cyan (colors assigned by entity)

 - acad ltype: continuous

 - description: this layer contains the graphic and textual contents of the logo-box, and the logo-box outline.

- **meckmapc1**

 - acad color: 7-white

 - acad ltype: continuous

 - description: this layer contains the text and outline box associated with the County's map counter-box.

- **modelwin0**

 - acad color: 1-red

 - acad ltype: continuous

description: this layer includes the mview window for the map neat images.

• **nccoords1**

acad color: 4-cyan

acad ltype: continuous

description: this layer contains the text for the NAD83 base North Carolina State Plane Zone grid coordinate labels.

• **neatline1**

acad color: 15-dim white

acad ltype: continuous

description: this layer contains the border sheet neatline.

• **shtbordr1**

acad color: 7-white

acad ltype: continuous

description: this layer entails the border sheet outline or border line.

• **shtindex1**

acad color: 4-cyan (colors assigned by entity)

acad ltype: continuous

description: this layer contains the text and graphics associated with the sheet index-box and its outline.

• **trimtics1**

acad color: 2-yellow

acad ltype: continuous

description: this layer includes the border sheet trim tic marks, which represent the size and location of the final mylar plotted sheet's corners.

5.22 Planimetric Border Sheet Prototype Drawing Dtext Styles

The planimetric border sheet prototype drawing, x00borp.dwg, contains the following dtext styles. These styles were used in creating the standard border sheet. Since the Consultant will be using the AutoCAD *ddedit* routine to change text as applicable for specific map sheet sets, they are not strictly concerned with the dtext styles; however, this information is documented for reference purposes.

• **complex**

font file: complex

height: 0 du

width factor: 1

obliquing angle: 0

backward: no

upside-down: no

vertical: no

description: variable sized text style used to construct the north arrow.

- **italicc**

- font file: italicc
 - height: 0 du
 - width factor: 1
 - obliquing angle: 0
 - backward: no
 - upside-down: no
 - vertical: no
 - description: variable sized text style used employed in the standard border sheet.

- **romanc**

- font file: romanc
 - height: 0 du
 - width factor: 1
 - obliquing angle: 0
 - backward: no
 - upside-down: no
 - vertical: no
 - description: variable sized text style used extensively for text on the standard border sheet; also to be used on the editbord00q1 layer.

- **romant**

- font file: romant
 - height: 0 du
 - width factor: 1
 - obliquing angle: 0
 - backward: no
 - upside-down: no
 - vertical: no
 - description: variable sized text style used as part of the City of Charlotte Logo.

- **standard**

- font file: txt
 - height: 0 du
 - width factor: 1
 - obliquing angle: 0
 - backward: no
 - upside-down: no
 - vertical: no
 - description: standard AutoCAD dtext style, which is not utilized in this contract.

5.23 Border Sheet Prototype Drawing AutoCAD Setvars

The standard border sheet drawing file, x00borp.dwg, provided by the City of Charlotte Engineering & Property Management Department for this planimetric contract includes the

following AutoCAD Setvars. Most of the Setvars listed here pertain to Paper Space, since the border sheet prototype drawing file has a tilemode setting of zero.

- Itscale: 1.0
- pelevation: 0.0
- pucsorg: 0.0, 0.0, 0.0
- pucsxdir: 1.0, 0.0, 0.0
- pucsydir: 0.0, 1.0, 0.0
- pinsbase: 0.0, 0.0, 0.0
- plimmin: 0.0, 0.0
- plimax: 36.0, 24.0
- tilemode: 0
- worldview: 1

5.24 Edge Matching

All map features extending across the interface of two neat image areas will be edge matched to insure map continuity. The three possible types of match line ties are (1) between two digital map files compiled under this contract, (2) between a digital map file compiled for this contract and digital map file produced by a previous contract, and (3) between a digital map file compiled under this contract and an existing hardcopy 1"=200' map. If an edge match is performed on two digital map files, then all the common endpoints at the match line must be 'snapped' (meaning their x,y,z coordinates must be identical to fourteen decimal places). If one of the sheets to be tied is a digital map file from a previous contract and snapping a feature on the current map sheet violates its accuracy standards, then resolution of that problem will be discussed with the Project Manager. If one of the sheets to be tied is a hardcopy 1"=200' mylar, then the edge match will be a visual tie.

5.25 Processed Planimetric Drawing Files

The Consultant shall 'write block' all entities on the layers ????????1??? (where ? is an AutoCAD wildcard character) of each x00plan.dwg file to a corresponding x00planh.dwg file, which will then be processed with the AutoLINE batch file aline.tpl. The resulting planimetric file, x00planh.dwg will be used to produce hard copy plots.

5.26 Processed Topographic Drawing Files

The Consultant shall 'write block' all entities on the layers ????????1??? of each x00topo.dwg file to an appropriate x00topoh.dwg file, which will then be processed with the AutoLINE batch file aline.tpl. The resulting topographic file, x00topoh.dwg will be used to produce hard copy plots.

SECTION 6 - QUALITY CONTROL

6.01 General

The Consultant shall implement in-house quality control procedures which verify accuracy and completeness of work, and which minimize the number of errors and problems delivered to the City undetected or unresolved. The Consultant's quality control procedures for each phase of the project shall be explained and discussed at the "kick-off meetings" prior to each phase of work. The City shall monitor the Consultant's quality control efforts, and shall make written verification of acceptance of delivered items.

6.02 Field Control Quality Control

The Consultant shall be held accountable for the accuracy of the field control data required for the project. The Consultant shall define its ground control quality requirements to the City's Project Manager at the Control Survey Kick-off Meeting.

6.03 Aerial Photography Quality Control

The Consultant shall review its aerial photography quality assurance steps with the City's Project Manager at the Aerial Photography Kick-off Meeting. The Consultant will be responsible for insuring that the aerial photography is satisfactory for the purposes of this Agreement.

6.04 Aerial Triangulation Quality Control

The Consultant is liable for the accuracy and quality of the aerial triangulation with respect to the completion of this project and shall explain the steps to be taken insuring that quality at the Aerial Triangulation Kick-off Meeting.

6.05 Stereocompilation Quality Control

The Consultant shall review its quality control procedures for: model setup (printout), model detail (planimetric content), model edge ties, and map sheet facetization with the City's Project Manager at the Stereocompilation Kick-off Meeting. The Consultant shall deliver preliminary compilation files of the neat image area for each map sheet. These preliminary compilation files will follow the conventions: x00plan1.dwg, x00topo1.dwg, x00base1.dwg, x00bldf1.dwg, and x00borp1.dwg (where 'x' is the alpha character associated with the sheet's easting, and '00' is the numeric characters associated with the sheet's northing).

6.06 City Preliminary Stereocompilation Edit Procedures

The County shall make a complete edit on a copy of each preliminary compilation file for:

- **content**
 - compared to the aerial photography
 - static (only features existing prior to flight date) field verifications
- **accuracy**
 - compared to existing map sources (1"=50', 1"=200', and 1"=400' planimetric/topographic maps) for identification of possible problem areas

- if necessary actual field verification of questionable features by higher accuracy surveys
- **layer structure**
 - compared existing map sources for feature discrimination or interpretation, and layering
 - field verification of indeterminate feature discrimination/classification
- **symbolology and cartographic quality**
 - verify correct use of prototype blocks
 - substantiate annotation and labeling according to specifications
- **digital file quality**
 - verify joined plines use for logically continuous line features (ie. road edge-of-pavements)
 - confirm use of node or vertex snaps where applicable (intersections, edge matches, etc.)
 - check purge of Consultant defined stereocompilation blocks and layers
 - verify appropriate z-values for features

Review notes and comments shall be made on the appropriate layers (editplan00q1, edittopo00q1, editbase00q1, editbldf00q1, and editbord00q1) of the component file for each map sheet, and returned to the Consultant for appropriate action. The edit files returned to the Consultant shall maintain the file name conventions: x00plan2.dwg, x00topo2.dwg, x00base2.dwg, x00bldf2.dwg, and x00borp2.dwg (again where 'x' represents the alpha character associated with the sheet northing; and '00' represents the numeric characters associated with the sheet easting).

6.07 Confirmation Files

The Consultant shall return a corrected confirmation file on each map sheet (x00plan3.dwg, x00topo3.dwg, x00base3.dwg, x00bldf3.dwg, and x00borp3.dwg) to verify corrections, changes, or ambiguities. Each iteration of edit and confirmation files will continue to maintain the file name convention x00plany.dwg, where 'y' is the sequential iteration number (ie. k07plan4.dwg, k07plan5.dwg, and so on...). If all the review comments or "calls" have been resolved, then a confirmation compilation file can also serve as a delivered final map sheet file.

SECTION 7 - FINAL DELIVERABLE PRODUCTS

7.01 Report Meetings

The Consultant shall conduct "report meetings" with the City's Project Manager following the completion of work for each phase of this contract. The negotiated project schedule (see Attachment 4) will include approximate dates for a Field Control Report Meeting, Aerial Photography Report Meeting, Triangulation Report Meeting, phased Stereocompilation Report Meetings, and a final Project Report Meeting.

7.02 Final Digital Map Files

The Consultant shall deliver the following AutoCAD 2004 final drawing files on CDROM of Read/Write optical (stored in a subdirectory called \DWGS12\MAPC9798), for each 1"=200' scale map sheet (where 'x' represents the alpha character associated with the sheet's easting, and '00' represents the numeric character associated with the sheet's northing):

- **x00plan.dwg**
- **x00topo.dwg**
- **x00base.dwg**
- **x00bldf.dwg**
- **x00borp.dwg**
- **x00planh.dwg**
- **x00topoh.dwg**
- **x00baseh.dwg**

Acceptance of each set of map sheet files shall be verified by written notice from the County's Project Manager. The County reserves the right to request that the Consultant make upgrades with new releases of software utilized during the duration of this contract (including AutoCAD, DOS, or AutoLISP routines written for this contract) as deemed necessary by the County's Project Manager. Final deliveries will also be requested on Cd-ROM or a Read/Write Optical.

7.03 Hardcopy Map Plots

The Consultant shall deliver hardcopy double-sided mylar (0.004" or 4mil) plots using either ink-jet or electrostatic plotter technology for each map sheet (ie. K-07) after having received written acceptance of the relevant element or component files. The final trimmed sheet size will be 24" x 36" as defined by the trim tics on the prototype border drawing provided. Each composite hardcopy plot will be produced by plotting the appropriate border sheet (x00borp.dwg -paper space) with pertinent map element files (x00planh.dwg - model space, x00topoh.dwg - model space, x00base.dwg - model space, and x00bldf.dwg - model space) externally referenced into the border sheet mview window (view - saved - x00). Therefore to produce map sheet K-07 the file k07borp.dwg with the externally referenced files k07planh.dwg, k07topoh.dwg, k07base.dwg, and k07bldf.dwg will be plotted from the main menu. The plotted line densities shall be satisfactory enough to produce clean diazo bluelines on City of Charlotte Engineering Departments diazo machine.

7.04 Plots

The Consultant shall deliver mylar plots for each map sheet (ie. K-07). These plots shall be on 4mil double-sided mylar with 400 dpi resolution. The electrostatic plotted line weights shall correspond to the following AutoCAD entity/layer colors:

- 1-red = 0.0200" or 8 pixels
- 2-yellow = 0.0050" or 2 pixels
- 3-green = 0.0100" or 4 pixels
- 4-cyan = 0.0100" or 4 pixels
- 5-blue = 0.0150" or 6 pixels
- 6-magenta = 0.0300" or 12 pixels
- 7-white = 0.0150" or 6 pixels
- 8-grey = 0.0200" or 8 pixels
- 9-dim red = 0.0200" or 8 pixels
- 10-dim yellow = 0.0150" or 6 pixels
- 11-dim green = 0.0100" or 4 pixels
- 12-dim cyan = 0.0100" or 4 pixels
- 13-dim blue = 0.0150" or 6 pixels
- 14-dim magenta = 0.0300" or 12 pixels
- 15-dim white = 0.0050" or 2 pixels

7.05 RESERVED

7.06 Aerial Film

The Consultant shall deliver the original aerial negatives as specified in Attachment 1, Section 2.14 at the end of the third and final phase of this contract.

7.07 Pugged Diapositives

The Consultant shall deliver the pugged "working" diapositives utilized during the project for stereocompilation at the same time that the original aerial negatives are delivered.

SECTION 8 - DIGITAL MAPPING

8.01 Introduction

The purpose of this section is to provide the Contracting Officer and Contractor with a set of guidelines for digital mapping. This section also provides descriptions of terminology, data structure, accuracy, and data exchange specifications. Information to be used in the digital

mapping system will be stored in X and Y North Carolina State Plane Coordinates. Digitizing may be accomplished by manually typing in coordinates, by using electronic tables that record coordinate points as the operator traces over map information, by using automatic scanning (digitizing) devices, or by using stereo photogrammetric plotters equipped with digital encoders. The digitization of planimetric, topographic, and other information shall be based on existing maps or stereo models.

The deliverable data of digital mapping must be topologically structured digital data sets.

8.02 Data Definitions

The following definitions of map data are presented to clarify their usage and meaning in these specifications:

- a. Layer * A layer consists of the data contained on a map. Layers contain two or more components. (See definition below.) A cadastral map, a soil map, a topographic map, and a land use map would each be considered a layer. Some of the components of a cadastral layer include: plat lines; PIN numbers, right-of-way lines; transportation systems (roads, highways, alleys, and railroads); transportation names; hydrography (streams, rivers, and lakes); and City, township, municipality, public land, and subdivision boundaries.
- b. Component * A component is a discrete type of data that, in combination with other components, creates a layer. Examples of components include soil lines, soil labels, PIN numbers, and right-of-way lines. Each component is composed of objects (see definition below) that graphically represent a component's extent (lines or area) or that present information (symbols or text).
- c. Objects * The terminology used here to define objects draws upon current working documents from the National Committee for Digital Cartographic Data Standards. Objects are the basic graphic elements that are the "building blocks" of geographic data files. The primary objects used to create components are points, nodes, lines, and areas. Objects are intrerrelated in a "topological" structure that defines the relationships of the objects to each other. Topological data structures are defined below.
 1. Points: Points are used to represent the location of objects defined by a single set of X and Y coordinates (see Figure 8.1). In some cases, these are feature points that can be identified on the surface of the earth (e.g., benchmarks). In other cases, they are arbitrarily placed label points (e.g., locations for the placement of text). In other cases, they are attribute points for areas or lines (e.g., PIN's). The locations of attribute points may be digitized or may be calculated by computer software.
 2. Nodes: Nodes represent the ends or intersections of lines (linear objects). Nodes exist at the first (beginning point) and last (ending point) set of X and Y coordinates of a line. Each node may also reflect an intersection with one or more additional lines (see Figure 8.1). A node plays an important role in topological

definition and, as such, should reference each line that intersects it.

3. Lines or Arcs: Lines or arcs are strings of coordinates that run between nodes. Each line has a minimum of two X and Y State Plane Coordinate pairs (straight line). Lines and arcs also include references to attribute points, the beginning and ending node numbers, and identifiers of areas (when applicable) on the right and left of the line (see Figure 8.1).
 4. Areas: Areas are polygons which are defined by a series of lines or arcs. These lines or arcs must, in combination, totally encircle or close the area they represent. Areas also include references to attribute points and other associated data. The boundary of an area is defined by a listing of the lines or arcs that comprise the area's border (see Figure 8.1).
 5. Islands: Islands are holes in areas which are not part of an area's spatial extent. Thus, a doughnut-shaped property would have an island or hole in its center that is not part of the property. An island is stored as the boundary of the internal space of an area that is not part of the area. In most cases, another distinct area will fill the open area defined by an island. For example, a large parcel surrounding a cemetery parcel has an island, which is the boundary of the cemetery parcel. The cemetery parcel then forms another area which contains the area that was excluded from the large parcel (see Figure 8.1).
- d. Topological Data Structure * Topology is the study of the mathematical properties of geometric figures; it is a means of mathematically describing the relationship among points, lines, and areas used to define geographic entities. The use of topological data structure is important for the effective creation and manipulation of geographic data. Topology allows the interrelationships of graphic objects to be specified. It also prevents the necessity of storing repetitive data. Thus, one line can represent a stream and the boundary of each of two adjacent areas or parcels. This structure allows the computer to generate areas based on node and line information. Topological structures allow the efficient analysis of lines or areas. Thus, road networks stored in a format with topological structure can be used for school bus routing, garbage truck routing, or emergency service routing. Topology requires that several data items be maintained with relation to each node, line, and area. Figure 8.2 illustrates these relationships.

OBJECTS	GRAPHIC REPRESENTATION	COORDINATE REPRESENTATION
POINTS		X_1, Y_1
NODES		$X_a, Y_a; X_b, Y_b$ $X_c, Y_c; X_d, Y_d$
LINES		$X_1, Y_1; X_2, Y_2$ $X_3, Y_3; X_4, Y_4;$ X_5, Y_5
AREAS		$X_1, Y_1; X_2, Y_2;$ $\dots; X_8, Y_8$
ISLANDS		$X_{11}, Y_{11}; X_{21}, Y_{21};$ $X_{31}, Y_{31}; X_{41}, Y_{41};$ X_{51}, Y_{51}

Figure 8.2

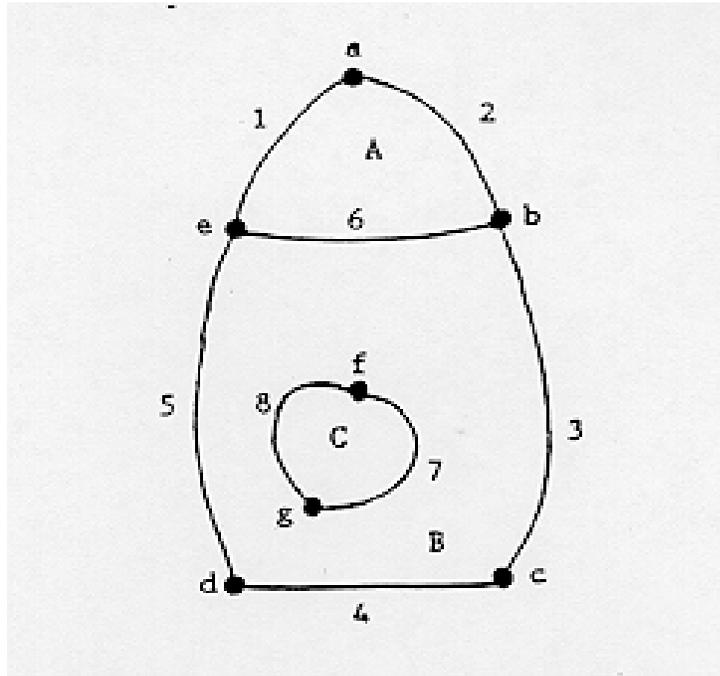


Figure 8.1 Graphic and Coordinate Depictions of objects.

AREA	BOUNDARY LINES	ISLAND LINES	NODES
A	1,2,6		e,a,b
B	6,3,4,5	7,8	e,b,c,d,f,g
C	7,8		f,g

Area Relationships for Figure 8.2

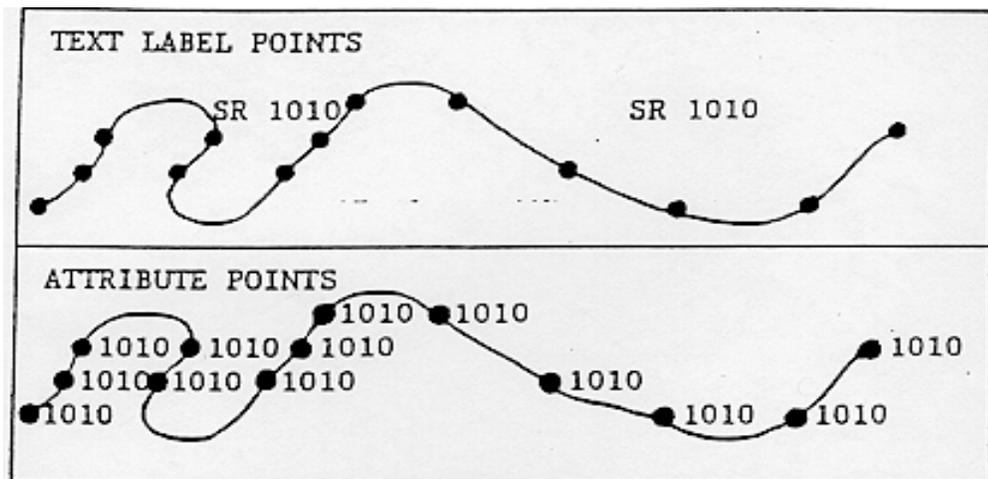
LINE	BEGIN NODE	END NODE	RIGHT AREA	LEFT AREA
1	e	a	A	-
2	a	b	A	-
3	b	c	B	-
4	c	d	B	-
5	d	e	B	-
6	e	b	B	A
7	f	g	C	B
8	g	f	C	B

Line Relationships for Figure 8.2

Node	<table border="1"> <thead> <tr> <th>NODE</th> <th>LINES</th> </tr> </thead> <tbody> <tr> <td>a</td> <td>1,2</td> </tr> <tr> <td>b</td> <td>2,3,6</td> </tr> <tr> <td>c</td> <td>3,4</td> </tr> <tr> <td>d</td> <td>4,5</td> </tr> <tr> <td>e</td> <td>5,6,1</td> </tr> <tr> <td>f</td> <td>7,8</td> </tr> <tr> <td>g</td> <td>8,7</td> </tr> </tbody> </table>	NODE	LINES	a	1,2	b	2,3,6	c	3,4	d	4,5	e	5,6,1	f	7,8	g	8,7	Relationships for Figure 8.2
NODE	LINES																	
a	1,2																	
b	2,3,6																	
c	3,4																	
d	4,5																	
e	5,6,1																	
f	7,8																	
g	8,7																	

Diagram illustrates topological relationships of areas, lines, arcs, and nodes in both graphic and tabular form.

- e. Digital Data Sets: Digital data sets are computer files that store geographic data. Each data set may contain components from one or more layers. For example, a data set may contain the hydrographic names component associated with the topographic layer and the road names component from the cadastral layer. Or a data set containing soils lines components would also contain soil labels. A roads data set could contain pavement width, right-of-way limits, and road labels.
- f. Digital Labeling: There are two methods of digital labeling: (1) attaching attribute data to points, lines, arcs, and areas, and (2) attaching text labels to points. Attribute data may be stored and linked to each line, area, or feature point to allow users to select the specific objects that they wish to plot, report on, or analyze. Thus, all of the lines that are State Road 1010 could be extracted and plotted because they each have State Road 1010 as an attribute. Text label points are used to locate labels for an object or a series of objects on a map.



Thus, two different text label points may be used to graphically label State Road 1010 as it crosses a map. Thirteen lines, each with data associated with its attribute points, are used to draw State Road 1010 on the map. Figure 8.3 illustrates the utility of text label points as opposed to attribute points in producing a readable map.

Figure 8.3 Illustration of State Road 1010 identified by text label points and by attribute points.

- g. **Edge Matching:** Edge matching is the matching of lines and areas between adjoining maps. With digital data, the match implies that each line ends with a node that has the same coordinates as the end point or node of the line that continues on the adjoining map (see Figure 8.4).

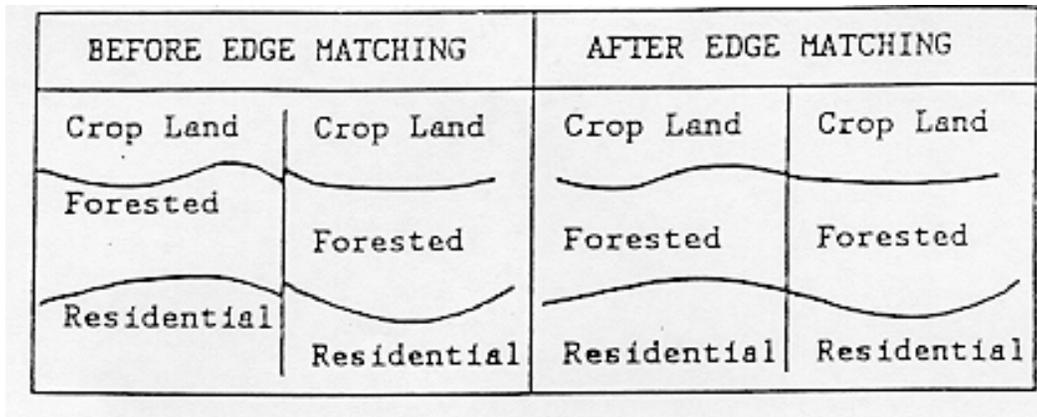


Figure 8.4 Illustration of edge matching.

- h. **Digital Mapping Product:** The product of digital mapping must be topologically structured digital data sets that store map objects using North Carolina State Plane Coordinates and associated attribute information with each object. Each object (e.g., point, line, area) of a component must have associated attributes. These attributes will be agreed to by both the Contracting Officer and the Contractor before digitizing begins. The digital data a County receives may include a number of individual data sets (computer files), or all data may be integrated in a single database for use in a Database Management System. Attribute data may be stored as part of the geographic data set or in an associated database. Each graphic object must be assigned attributes according to a labeling scheme agreed on by the Contracting Officer and the Contractor. Thus, a road could have only the road name stored as an attribute of a road line (e.g., SR 1010) or it could have road name, road number, type of road, road width, road owner, etc. stored for each line that represents a road. Similarly, an area representing a parcel might only have the PIN associated with it, or it might have all information that the County maintains on that property associated with it. Associated information may be keyed in or merged into a data set from information that has already been stored in a computer-readable format.

8.03 Digital Accuracy

A number of issues must be addressed to ensure the accuracy of the digital data. Each map to be digitized should have been created using a Lambert conformal conic projection. The North

Carolina State Plane Coordinate System is based on the Lambert conformal conic projection. If the map to be digitized uses another projection, it should be digitized using the map's projection and then converted to the Lambert conformal conic projection. The following digital accuracy requirements must be fully met to ensure product acceptability:

- a. Scaling Accuracy * Scaling refers to the initial setup of a map on a digitizing table. A minimum of three corner points (e.g., lower left, lower right, and upper right) of the map will be used to scale or tie the map to the surface of the earth through coordinate transformation algorithms. After a map is scaled, the accuracy of the transformation must be tested by digitizing a minimum of three points that were not used in setting up the map but have known X and Y North Carolina State Plane Coordinates. The digitized coordinates will be checked against known coordinates to verify that they are within the acceptable tolerance. The maximum tolerance will be one-fiftieth (1/50) of an inch (.02 inch). The maximum tolerance at map scale is listed by scale in Table 8.5.

TABLE 8.5 MAXIMUM ALLOWABLE SCALING ERRORS

Scale of Map	Maximum Scaling Error (at map scale)
1:4800 or 1" = 400'	± 8.0'
1:2400 or 1" = 200'	± 4.0'
1:1200 or 1" = 100'	± 2.0'
1:600 or 1" = 50'	± 1.0'

- a. Digitizing Accuracy * Digitizing accuracy refers to the results of comparing a check plot of a digitized line to the same line on the source map. This is accomplished by making a check plot of the digitized data at the same scale as the source map. The line width used for the check plot will not exceed .010 inch. The resulting plot is laid on the digitized source map, and the two are placed on a light table. If any light can be seen between the digitized line and the source map line, the line must redigitized. One special case exists with regard to line accuracy requirements. If the source map's lines are greater than 0.020 inches in width, the center of the lines must be digitized. The lines on the check plot of the digital data must overlay and not extend beyond the width of the original lines on the source map. Line smoothness and consistency shall be evaluated when reviewing line accuracy. Digitized data will form smooth lines and curves that are aesthetically pleasing and follow the lines they represent.
- b. Attribute Accuracy: After attributes are assigned to a source map (file), the map will be checked for accuracy, and all errors will be corrected. Testing for accuracy

is best accomplished by the creation of test plots including attributes that can be placed over the based map on a light table and checked for accuracy. Errors are then corrected.

- c. Edge Matching Accuracy: No edge match tolerance will be allowed in digital mapping. Before digitizing, the Contractor shall examine all source maps for edge match problems. If the ends of lines or areas between adjoining maps are less than one-fiftieth ($1/50$) of an inch (.020 inch), the Contractor may use computer programs to align the end points. If the ends of lines or areas between adjoining maps are greater than one-fiftieth ($1/50$) of an inch (.020 inch), the Contractor and Contracting Officer shall agree on methods and procedures to be used for accomplishing edge matching.

EXHIBIT 2

FEE SCHEDULE/BREAKDOWN

Each Task Order will be negotiated individually by the Project Manager using the hourly rates provided below:

AVIOIMAGE MAPPING SERVICES, INC.

<u>Classification</u>	<u>Hourly Rate</u>
Project Principle - Akers	\$ 95.00
Photogrammetric Manager – Mahecha/Gurlit	\$ 85.00
Senior Stereo Compiler – Guzman	\$ 76.50
GIS Specialist - Phelps	\$ 70.00
Stereo Compiler - Goings	\$ 65.00
GIS Technician - Hlorgbe	\$ 63.00
Senior Editing Technician - Rudolph	\$ 71.50
Cad Editing Technician - Mitchell	\$ 58.80
Digital Conversion Technician - Yen	\$ 47.50
Student Intern Rates	\$ 36.00
Analytical Aerotriangulation Per Plate	\$ 61.50
Aerial Photography Per Project Quote	

MEADE GUNNELL ENGINEERING & SURVEYING, P.C.

Principal	\$ 115.00 / hr
Senior Professional Land Surveyor/PLS.....	\$ 100.00 / hr
Project Land Surveyor	\$ 85.00 / hr
CADD Operator/Survey Tech.....	\$ 70.00 / hr
Office & Support Staff.....	\$ 50.00 / hr
One-Man Robotic Field Crew	\$ 95.00 / hr
Two-Man Field Crew	\$ 105.00 / hr
Three-Man Field Crew	\$ 135.00 / hr
Traffic Control	\$ 45.00 / hr
Party Chief-Office.....	\$ 65.00 / hr

EXHIBIT 3

PROJECT SCHEDULE

To be approved by the City Project Manager for each Task Order.

EXHIBIT 4

ORGANIZATION CHART

EXHIBIT 5

SMALL BUSINESS OPPORTUNITY PROGRAM REQUIREMENTS FOR PROFESSIONAL SERVICE CONTRACTS

The City's Small Business Opportunity Program (SBO Program) applies to all aspects of the City's contracting and procurement programs and its provisions are incorporated in their entirety into this Contract by reference. In order to comply with the SBO Program, the Consultant will need to complete the SBO Program forms referenced below at appropriate times during the term of the Contract.

The SBE Utilization Commitment for this Contract is TBD%

SBO Program Form 3– Subconsultant/Supplier Utilization Commitment

Once all subcontracts have been finalized, and prior to the finalization of the Contract, the Consultant will complete **SBOP Form 3** and submit it for inclusion in the Contract. This will constitute the Consultant's formal commitment to utilize the specified SBE and non-SBE firms as subconsultants or suppliers in the performance of the Contract.

SBO Program Form 4 – Letter of Intent

For each SBE firm listed on **SBO Form 3**, the Consultant will complete a Letter of Intent in the form of **SBOP Form 4**. A copy of each Letter of Intent, properly signed by the Consultant and the SBE, will become part of the Contract. A copy of each Letter of Intent, signed by both the Consultant and the SBE, will be provided to the E&PM SBO Liaison and kept in the contract file as an official record.

SBO Program Form 6 – Payment Affidavit - Subconsultant/Supplier Utilization

The Consultant must submit a completed **SBOP Form 6** with each invoice or payment request. All first tier subconsultants and suppliers to the contract must be listed on every SBOP Form 6 with current payment amount made by the Consultant. If no payment was made by the consultant to a particular subconsultant or supplier the payment amount will be zero.

SBO Program Provisions Applicable After Contract Award

Please note in particular the following Sections of the SBO Program that relate to post award requirements and activity:

- Compliance with committed SBE utilization level throughout the term of the Contract per Part D Section 2 of the SBO Program.
- Replacing an SBE on a Contract per Part D Section 5 of the SBO Program.
- Changes in Scope of Work or Adding Subcontracting Opportunities per Part D Section 6 of the SBO Program.
- Payments to subcontractors per Part D Section 7 of the SBO Program.
- Submittal of utilization reports and documentation of payments per Part D Section 8.



Small Business Opportunity Program

Payment Affidavit - Subconsultant / Supplier Utilization

SBO Form 6

To be submitted with **each** request for payment from the City of Charlotte. Copy this form as needed.

Invoice Amount: _____ Payment or Invoice #: _____
 Project Name: Unspecified Mapping Services Contract Number: _____
 Payment Period: From _____ To _____ City KBU: E&PM
(Department)

FINAL PAYMENT

Section 1: Payments to SUBCONSULTANTS

Complete the chart below for all subconsultants used on the Project/Contract regardless of dollar amount. All subconsultants must be registered in the City's Vendor Registration System.

Subconsultant Name	Description of Work Performed	NIGP Code	City VMS Number	Payment this Pay Period	Cumulative Payments

Section 2: Payments to SUPPLIERS

All suppliers providing goods under City contracts must be listed on the Sales Tax Statement submitted with each pay request. The City may request on a case-by-case basis that the Consultant require certain suppliers to be registered in the City's Vendor Registration System and may withhold payment of any amounts due the Consultant in the event the Consultant fails to comply with such request.

The undersigned Company certifies the preceding chart is a true and accurate statement of all payments that have been or will be made to subconsultants and suppliers on this Project/Contract. If no subconsultants or suppliers are listed on the preceding chart, the Company certifies that no subconsultants or suppliers were used in performing the Project/Contract for the payment period indicated. Failure to provide accurate and truthful information is a violation of the Small Business Opportunity Program and is subject to the sanctions prescribed therein.

This _____ day of _____ 200 ____

Name of Company

VMS #

Signature

Print Name and Title

To be completed by KBU for FINAL PAYMENT

Total Paid to Consultant _____
 SBE Goal _____
 SBE Goal Commitment _____

Total Paid to SBEs _____
 SBE Goal Attainment _____

EXHIBIT 6

PERFORMANCE EXPECTATIONS

FULFILLING CONTRACT OBLIGATIONS

- The City's Project Manager and the Consultant's Project Manager shall be responsible to review these Performance Expectations periodically, and participate fully in the Project Team Evaluation process.
- The City's Project Manager and the Consultant's Project Manager shall be responsible to read, understand and fulfill all items in the contract.
- The Consultant is responsible to fulfill all of the requirements of the contract, including the QA/QC plan.
- The Consultant is responsible for the schedule, budget and quality of all of the work performed on the project, including that of their subcontractors.
- The Consultant shall maintain continuity of staff assignments. Written approval from the City's Project Manager is required prior to changing staff assignments.

PROVIDING TIMELY/CLEAR COMMUNICATION

This performance expectation relates to all forms of communication, and apply to both the City's and Consultant's Project Managers unless otherwise denoted.

Timeliness/Responsiveness:

- Phone calls shall be returned by the end of the next working day.
- All correspondence which includes a request for response shall be responded to within the specified time frame.
- The Consultant's Project Manager shall inform the City's Project Manager in a timely manner of upcoming concerns, problems, etc. such that they can be addressed by the Project Team without delaying the project schedule.

Clarity:

- The City's Project Manager shall clearly lay out the project goals at the beginning of the project, and communicate additional expectations as soon as they are known.
- The Consultant's Project Manager shall request clarification in a timely fashion from the City's Project Team whenever required in order to understand the City's expectations.
- All communication shall be presented in a clear and concise manner.
- Monthly Status Report: With each monthly invoice, the Consultant's Project Manager shall provide a signed **Monthly Status Report** and document in that report any project questions/issues/concerns to be addressed by the Project Team.
- Questions/problems identified in the **Monthly Status Report** shall be promptly addressed by the entire Project Team.

Citizen Contacts:

Citizen Correspondence:

- The Consultant shall provide copies of all correspondence with property owners and third parties associated with the project (other than subconsultants) according to contract requirements.
- The Consultant shall not convey to citizens information on City policies or procedures unless otherwise directed by the City's Project Manager.
- The Consultant shall represent the City in a professional manner.

Public Meetings:

- The Consultant shall participate in a professional manner in all public meetings at a level determined by the City's Project Manager (e.g. serve as main speaker, share speaking responsibilities with P.M., answers questions etc.).
- The Consultant shall prepare exhibits which are clear, understandable information meeting the specifications set forth by the City's P.M and the contract.
- The City's Project Manager will provide a clear description of all exhibits, Powerpoint presentations, handouts etc. to be included in the public meeting. The City's Project Manager will provide a clear explanation of which topics the Consultant will be responsible to present at the meeting.

PROVIDING QUALITY SUBMITTALS

- The Consultant is responsible to ensure that their QA/QC plan is followed throughout the project.
- The Consultant shall provide recommendations/solutions that are innovative, appropriate, practical, feasible and cost effective that meet the goals of the project.
- The Consultant shall submit high quality work that meets all City standards, criteria and requirements as set forth in the Contract Scope.
- The City's Project Team shall provide to the Consultant's Project Manager clear, consistent, and timely written comments on submittals.

MEETING MILESTONE DEADLINES

- The Consultant shall meet all milestone deadlines as identified in the Contract Scope.
- The City's Project Team shall meet all review milestone deadlines as identified in the Contract Scope.

MEETING BUDGETS

- The Consultant shall work within the parameters of the budget and invoicing procedures as specified in the Contract Scope.
- No transition of funds from one task or another, or use of Specified or Unspecified Additional Services monies shall occur without prior written approval from the City's Project Manager.
- The Consultant's Project Manager is responsible for recommending alternative selections, design parameters, proposed alignments, major project features, special provisions etc. that follow City standard practices and meet the goals of the project. The Consultant's Project Manager is responsible to obtain clarification from the City's Project Manager prior to spending significant time on major tasks. The City will not compensate the Consultant for any alternatives, alignments, submittals etc., developed by the Consultant without prior approval from the City's Project Manager that do not meet the goals of the project.

MONTHLY PROJECT STATUS REPORT



PROJECT: _____ Engineering Consultant: _____
 Reporting Month/Year: _____ Consultant Project Manager: _____
 Date Report Submitted: _____ City Project Manager: _____

DIRECTIONS:

- ▶ Consultant to fill out Sections I & II each month and submit with invoice (hard copy or digital).
- ▶ City Project Manager to review, make comments in Section III, provide a copy back to consultant, and keep a copy in project files.

SECTION I – CONSULTANT PROJECT TASK STATUS: Describe progress on tasks worked on in the last month, listed by contract subtask, and document the % complete for each task.

Task	% of Total Task Work Complete
1.	
2.	
3.	
4.	
5.	
6.	
7.	

SECTION II – CONSULTANT’S ISSUE UPDATE: Provide the status on all issues identified in Sections II and III of the previous month’s report. Review performance expectations as listed in the Professional Services Contract and identify any new performance issues. Omit items identified as “Completed” in last month’s report.

Issue	New?	Action to be taken/By whom	Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			

SECTION III – CITY PROJECT MANAGER’S COMMENTS: Provide comments regarding the Consultant’s report given above. Review performance expectations as listed in the Professional Services Contract and identify any new performance issues. Comments related to the City’s Project Team performance may also be recorded here.

Issue or Comment	Action to be taken/By whom
1.	
2.	
3.	
4.	
5.	
6.	
7.	



REMEMBER OUR KEY PROJECT PERFORMANCE EXPECTATIONS
 Fulfilling Contract Obligations Meeting Milestone Deadlines & Budgets
 Providing Timely / Clear Communication & Quality Submittals



