

CITY OF LANCASTER, TEXAS



Lancaster

GENERAL DESIGN MANUAL

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Title

This General Construction Design Manual is in conformance with the “Subdivision Regulations of the City of Lancaster, Texas”.

Purpose

The regulations are designed and enacted in accordance with state law and the City’s home-rule legislative powers.

This following document contains the various construction criteria, techniques, and details, which are the minimum requirements of the City of Lancaster for public facilities. This data is primarily intended for the use of the Developer and his Engineer to enable the applicant to provide the proper design for the public facilities associated with a proposed development or project. This criteria is not intended as an exhaustive list of the construction techniques available. In the event that specific circumstances dictate additional requirements, it shall be the responsibility of the Engineer of record to provide the necessary details for construction to be approved by the Engineering Division of the Development Services Department for the City of Lancaster.

The review is for general conformance with the design concept of the project and general compliance with the information given in the contract and construction documents. Any action shown is subject to the requirements of the plans and specifications. Contractor is responsible for dimensions which shall be confirmed and correlated at the job site; fabrication processes and techniques of construction, coordination of their work with that of all other trades and performing their work in a safe and satisfactory manner.

This design criteria and details may be modified by administrative action of the City and subsequent Resolution by the City Council at such times as may be appropriate in keeping with the most up-to-date construction techniques and specifications of the North Central Texas Council of Government (NCTCOG).

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STANDARD CONSTRUCTION DETAILS

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SECTION 1-01 CONSTRUCTION PLANS

A. Construction Plan Requirements

All civil construction plans for proposed public water, sanitary sewer, fire lanes, street, drainage and traffic improvements shall adhere to the City of Lancaster's standards and specifications and the following requirements:

1. Plans shall be clear, legible, and neatly drawn on bordered sheets, size 22" x 34" or 24" x 36". Each sheet shall clearly display the seal of the Texas Professional Engineer licensed by the State of Texas, under whose direction the plans were designed. A title block in the lower right-hand corner shall be filled in to include: project name; Engineer's name, address, and telephone number, and furnished in the following format:
 - a. Cover Sheet containing:
 - Project title
 - Legal property description
 - Assigned street address by the City of Lancaster
 - City name
 - Vicinity map with Mapsco grid number
 - Owner, Engineer, and Surveyor's name, address and telephone number
 - Project title in small print placed vertical along the middle right border
 - Sheet index
 - Development Service's approval signature block (Obtained from the Engineering Division of Development Services)
 - b. Copy of approved and/or accepted plat bound with final plans. The signed plat shall be bound with five (5) copies of the proposed construction plans including the Engineer's signature and seal.
 - c. Drainage area map and storm drainage calculations with all existing contours, existing and proposed storm drains, and/or other drainage facilities.
 - d. Approved site plan indicating the location and width of all proposed and existing street and driveway approaches noting the back-of-curb radii. All public easements delineated.
 - e. Utility plan indicating the location and size of all existing and proposed water and sanitary sewer lines with adjacent existing or proposed top of curb grades. Also, the location of all existing and

proposed fire hydrants adjacent to the site shall be shown, including the maximum coverage radius of each as outlined in later sections of this manual.

- f. Plan and Profile Sheets for roadways, sewer lines, storm drains, flumes, water lines and channels. Stationing shall be generally left to right and with stationing beginning at the downstream end of all sewers, storm drains, and channels.
- g. Stationing shall be included on the plan view as well as the profile for all roads, water, sewer, storm drain, and channel sheets. Elevations shall be calculated and provided in all profiles as indicated below.
 - 1. Straight grade – provide elevations at a maximum interval of 100’ feet.
 - 2. Vertical curve – provide elevations at the beginning and ending points at a maximum interval of 25’ feet in between.
 - 3. State design speed for all horizontal and vertical curves.
- h. Details for improvement which are to become public
 - 1. Horizontal scale shall be on 1” equals fifty (50’) feet or larger, i.e. 1” = 40’. Vertical scale shall be one (1”) inch equals five (5’) feet or larger.
 - 2. Hydraulic grade line or water surface profile based on FEMA 100 year water surface shall be plotted with all drainage design. Discharge capacity, 100-year design discharge, velocity, and friction slope shall be noted on each segment of drainage facility in the profile and all drainage calculations shown in accordance with the City’s storm drainage manual with one or more of these parameters changes.
 - 3. Construction plans will be reviewed by the City of Lancaster Development Services staff and signed after all comments have been resolved. Construction must start within two (2) years following the final acceptance of plans. Plans for projects, which have not started construction within this two-year period, must be submitted to Development Services staff for a new review.

B.. Other Utilities

The developer shall furnish all easements and right-of-way (onsite and offsite) necessary for construction of water, sanitary sewer, storm drainage, and electrical, gas, cable TV, and telephone service to the proposed subdivision. All on and off site utilities must be included. Additional franchise utility easements (seven [7'] feet on streets and, five [5'] feet on alley) will be required for developments where no alley exists.

1. Specifications are the Standard Specifications for Public Work Construction, North Central Texas (4th Edition or as amended) as prepared by the North Central Texas Council of Governments.
2. Special Provisions to the Specifications must be addressed during preliminary platting unless otherwise directed.
3. Standard Construction Details are as prepared by the City of Lancaster.

C. Notification

Utility contractor and street contractor are to notify the City's construction inspector at least 48 hours prior to beginning construction.

D. Record Drawings (As-Built)

The developer shall furnish record drawings and the accepted final plat completed with engineer signature and seal. The developer shall furnish:

- One (1) set reduced in 11" x 17" completed with engineer signature and seal.
- Record drawings will need to show tie downs for water and sewer services from each lot line.
- In addition, electronic files of the record drawings shall be submitted in dgn and pdf format. Record drawings (stamped as "as-builts") shall include all changes made by change order, field change, or on-site changes. Record drawings shall be provided to the City prior to final acceptance of the project.

Other Items Needed for Project Close-Out

- 1 electronic set of Final Plat (i.e. DVD, flash drive)
- Additionally required is a Subdivision Infrastructure Inventory Disk on DVD or flash drive, formatted as an Excel Spreadsheet with no protection locks.

- Owners will need to submit Bid Tabulations for Water, Sewer, Storm Drainage, Fire Lanes, and Streets.
- Original copy of Geotechnical report for project with form 79G completed for each lot.

E. Form of Plans

The plan sheet should be drawn so that the north arrow points to the top or to the left side of the sheet. The plan must show sufficient surrounding streets, lots, and property lines so the existing water and sewer may be adequately shown and so that proper consideration may be given to future extensions. The City will determine if sufficient data is shown. Proposed water and sewer lines shall be stubbed out to the addition extremities in order that future extensions may be made. Unless it would make the plan very difficult to read, both water and sewer lines should be shown on the same sheet. The lines on the profile sheet shall be drawn in the same direction as on the plan. Lettering shall be oriented to be read upward or to the left.

On large additions or layouts requiring the use of more than six sheets (total of plan & profile), key sheets may be required on a scale of 1" = 400' or 1" = 1000', as designated by the City Engineer. They shall show the overall layout with the specific project clearly indicated with reference to individual sheets.

The use of "off-standard" scales will not be permitted. A plan shall be drawn to a horizontal scale of 1" = 20', or 1" = 40'. Plans for water and sewer that do not involve great detail should be drawn on a scale of 1" = 50'. Plans in and along creeks, heavily wooded sections, streets with numerous utilities, or as may be required to produce a clean and legible drawing, shall be drawn on plan-profile sheets or separate plan and profile sheets on a scale 1" = 40'. If the plan is in an extremely congested area, a scale of 1" = 10' may be necessary. All profiles shall be drawn on a vertical scale (1" = 5') as required for clarity, and the horizontal scale shall be the same as for the plan unless otherwise directed by the City Engineer.

F. Data to be included in Plans

Sewer data to be included on plan sheets: The plan shall show the existing and proposed water and sewer lines and all appurtenances thereto. The plan should also have the storm sewer system dashed in. All lines shall be numbered, lettered or otherwise designated on both plan and profile sheets. All lines shall show sizes and direction of flow on both plan and profile sheets. Stationing shall be shown to the nearest 0.1' foot and each new line shall begin at 1+00 at the outlet and increase up the sewer. Station pluses at all junctions of sewers, horizontal P.C.'s, and P.T.'s, bends, angle points, wyes, cleanouts, manholes, the centerlines of all cross streets and railroads, and all crossing utilities, etc., shall be shown on both plan and profile. The degree of angles and horizontal curve data shall be shown on the plan only. Radius for specific pipe size and material shall be determined by the Engineer of

record and approved by the City Engineer. While curved sanitary sewer lines are allowed per manufacturer specifications, sewer radius pipe shall be used as a last resort. Sewer laterals shall be shown at a location most convenient to serve the property.

Sewer laterals will usually be near the center of the lot, either at the street or alley. If the lateral is to be adjacent to the water service, then show the lateral 10 feet downstream. The location shall be designated on the plans.

G. Sewer Data to be Included on the Profile Sheet

The data for the profile sheet shall be obtained by running a line of levels along the actual route and by taking any other necessary observations. Profiles shall show the elevations to the nearest 0.1 foot of the ground at the centerline of the sewer, and to the right and left of the centerline of the sewer at the location of the approximate center of the proposed houses or buildings to be served, and the approved street or alley grade. Profiles shall also show the sewer pipe, manholes, cleanouts, etc. The size of the sewer, the direction of the flow, and the grade to the nearest 0.01 foot shall be indicated just over the "pipe" and the total linear footage of line, size, kind of pipe, and type of embedment or encasement shown below the "pipe". The design flow, pipe capacity and velocity must be shown in the profile. All of the information pertaining to the horizontal data, station pluses, appurtenances to be built, etc., is usually shown just above the ground line, whereas, the flow line (invert) elevations are shown below the pipe. Elevations of crossing and parallel utilities shall be shown. All invert elevations shall be shown to the nearest 0.01 foot. Invert elevations shall be recorded at all junctions (all lines-in and out), at grade breaks, the ends of lines, or other points as requested by the City Engineer. Benchmarks used shall also be clearly shown, giving the descriptive locations and elevations. Elevations will be given using the State Plan Coordinate System the City has established benchmarks and must be adhered to. All existing water, sewer, gas, storm sewer, telephone, power, and other utilities parallel to or crossing the proposed sewer or water line shall be adequately designated as to size, type, and location. All Texas Commission on Environmental Quality (TCEQ) requirements shall be covered in the design and in the plans.

H. Data to be Included for Water Plan and Profile

Indicate the location of any existing valves required for shutdown purposes and of any tees, ends, etc., to be tied into horizontal distances. Shut down of existing lines shall be approved by the City Engineer. Otherwise wet taps will be required. Indicate clearly the sizes of the lines to be installed, and all proposed valves, fire hydrants, tees, crosses, bends, reducers, plugs, sleeves, wet connections, tap connections, creeks, railroad or highway crossings, tunnels, meter boxes, valve vaults, and other appurtenances at each intersection or as required. Where the

pipe is to be placed around a curve, the curve data must be provided. The size and type of services and the material, type of joint, and class of pipe shall be indicated by adequate notation in the lower left or right hand corners of the plan sheet. Water services and meter boxes shall be indicated and shall be located at or near the center of the front of each lot. Waterline profiles are required on lines 12-inches and larger; follow the general procedures as outlined for sewers, except that the grades and elevations of the proposed water line usually need not be shown closer than the nearest 0.1' foot. All TCEQ requirements shall be included in the plans.

SECTION 1-02 WATER SYSTEM

This section is intended to aid and assist engineers in the layout and design of water lines to definite standards and to obtain uniformity in the plans. Any proposed variances to these rules must be submitted to the Director of Public Works based on sound and acceptable engineering practices.

A. Review Process

1. Submittal

On completion of the planning and preliminary engineering of a subdivision, submit five (5) copies along with a contour map and preliminary water and sewer layout to the City, whereby a check can be made as to the general layout and availability of water and sewer. If problems arise as to the availability of water and sewer, it may be necessary to meet with the developer and discuss and resolve those issues prior to further review and acceptance.

2. Preliminary Check

When the engineering plans are complete, submit three (3) sets of full sized (22" x 34" or 24" x 36") legible prints. Every attempt will be made to review plans within ten (10) business days. Review time is typically governed by the completeness of the plans being reviewed.

3. Final Check

The following items shall be reviewed prior to submittal of final plans. The transmittal letter shall include certification that those items have been completed.

4. Final Approval of Plans

The following list should be verified before submittal of plans are submitted for City approval:

- (a) The plans must be complete and correct.
- (b) The approved preliminary plat must have been submitted.

- (c) The street grades and storm sewer plans must have been submitted and approved by City Engineer.
- (d) The plans must be signed and sealed by the Professional Engineer licensed in the State of Texas, who is responsible for the design.
- (e) All fees and other monies due must be paid in full. Impact fees must be paid prior to any construction activities.

B. Water System Extensions

1. Water systems shall be of sufficient size to furnish adequate domestic service, to provide adequate fire protection to all lots, and to conform to the City's current Master Water Distribution System Plan (<http://lancaster-tx.com/DocumentCenter/View/3374>). Public water mains adjacent to federal, state, or county roadways shall be constructed outside the rights-of-way in a separate easement dedicated by separate instrument, and shown on plat. Fire flow calculations for non-master plan network lines must be submitted for review.
2. All tee intersections of public water mains shall include at least two (2) gate valves. Valve placement shall be in such a manner as to require preferably 2 valves, but not more than 3 valves, to shut down each City block, or as required to prevent shutting off more than one fire hydrant. Valves shall be spaced a maximum of 800-feet apart in residential districts and a maximum of 500-feet apart in all other districts. Valves 12 inches and smaller shall be resilient seated gate valves (RSGV), and valves larger than 12 inches shall be butterfly valves. All cross intersections of public water mains shall include at least four (4) gate valves.
3. The minimum size water main in conventional single-family residential areas shall be eight (8") inches in diameter, unless a larger line is shown on the master plan. Smaller lines may be utilized in some areas with prior approval of the Director of Public Works. The Director of Public Works or the Water/Wastewater Superintendent shall have final approval of their use.
4. The minimum size water main in all other areas shall be eight (8") inches in diameter. Larger diameter mains will be necessary if fire flow requirements so dictate or the master plan shows a large line. A fire flow analysis is required to determine adequate proposed water main sizes.
5. Minimum depth of cover over all water mains shall be 48 inches.

6. Water mains 12 inches and larger shall be profiled. P.I.s and elevations shall be provided to the nearest 0.01 feet for all profiled water lines. Where water mains are to be installed in rights-of-way having roads constructed without curb and gutter, regardless of water main diameter, a plan and profile sheet shall be submitted with the construction plans showing the proposed water main profile, the existing street grades, and the preliminary future top-of-curb grades for at least 300 feet either side of the boundary of the proposed subdivision. The preliminary grade shall be set by the submitting design engineer.
7. The minimum horizontal and vertical separation between water and sewer lines shall be in accordance with TCEQ requirements.
8. The minimum easement width for a water line on private property shall be seven and one half (7.5') feet on each side of the pipe for a total of 15 feet. Water and shallow depth sanitary sewer easements (less than 12 feet deep) shall be 25 feet in width.
9. Residential water services shall not normally be directly connected to water mains 16 inches in diameter or greater. Smaller, parallel water mains are required for water service connections.
10. All water services shall be placed at the lot line, between lots, where possible and all water meters shall be located in City rights-of-way or inside a waterline easement, unless approved otherwise by the Public Works Department.

C. Fire Hydrants

1. In all conventional single-family subdivisions, fire hydrant spacing shall not allow the fire hose lay distance to any point on the building to exceed five-hundred (500') feet as measured along public ROW and/or emergency access easements. All lots within the proposed subdivision shall be within five hundred (500') feet radial distance of a fire hydrant.
2. In all other subdivisions, fire hydrant spacing shall not allow the fire hose lay distance to any point on the building to exceed five hundred (500') feet as measured along public ROW and/or emergency access easements. The entire subdivision shall be within three hundred (300') feet radial distance of a fire hydrant.
3. Fire hydrants located on the opposite side of a major collector or arterial street, (i.e., roadway width greater than forty [40'] feet), from a development shall not be considered when determining adequate fire hydrant coverage for a development.

4. All fire hydrants shall be installed at property lines.
5. All fire hydrants for commercial development must be approved by the City of Lancaster Fire Marshal.
 - (a) Number and Locations - A sufficient number of fire hydrants shall be installed to provide hose stream protection for every point on the exterior wall of the building with the lengths of hose normally attached to the hydrants. There shall be sufficient hydrants to concentrate the required fire flow, as recommended by the publication "GUIDE FOR DETERMINATION OF REQUIRED FIRE FLOW" published by the Insurance Service Office, around any building with no hose line exceeding the distances hereinafter established and with an adequate flow available from the water system to meet this required flow. In addition, the following guidelines shall be met or exceeded:
 - (b) SINGLE FAMILY AND DUPLEX RESIDENTIAL - As the property is developed, fire hydrants shall be located at all intersecting streets and at intermediate locations between intersections at a maximum spacing of 500 feet between fire hydrants as measured along the route that fire hose is laid by a fire vehicle.
 - (c) MULTIFAMILY RESIDENTIAL - As the property is developed, fire hydrants shall be located at all intersecting streets and at intermediate locations between intersections at a maximum spacing of 400 feet as measured along the length of the centerline of the roadway, and the front of any structure at grade shall be no further than 500 feet from a minimum of 2 fire hydrants as measured along the route that a fire hose is laid by a fire vehicle.
 - (d) OTHER DISTRICTS - As the property is developed, fire hydrants shall be located at all intersecting streets and at intermediate locations between intersections at a maximum spacing of 300 feet as measured along the length of the centerline of the roadway, and the front of any building at grade shall be no farther than 300 feet from a minimum of 2 fire hydrants as measured along the route that the fire hose is laid by a fire vehicle.
 - (e) PROTECTED PROPERTIES - Fire hydrants required to provide a supplemental water supply for automatic fire protection systems shall be within 100 feet of the Fire Department connection for such system.
 - (f) BUILDINGS WITH FIRE SPRINKLER – All fire line stub-outs and valves shall be sized according to the requirements of an approved fire

flow analysis signed and sealed by a registered fire flow engineer.

- g) The size of the water line serving the fire hydrants shall be a minimum of eight (8") inch and shall be sized according to the requirements of an approved fire flow analysis signed and sealed by a registered fire flow engineer. Fire hydrants shall be installed along all fire lane areas as follows:
 - 1. Non-Residential Property or Use
 - (aa) Within 150 feet of the main entrance.
 - (bb) Within 50 feet of any Fire Department Connection.
 - (cc) At a maximum intermediate spacing of 500 feet as measured along the length of the fire lane.
 - 2. Apartment Townhouse' or Cluster Residential Property or Use
 - (aa) Within 50 feet of any Fire Department Connection.
 - (bb) At maximum intermediate spacing of 400 feet as measured along the length of the fire lane.
 - 3. Commercial and Industrial Use
 - (aa) Within 50 feet of any Fire Department Connection.
 - (bb) At maximum intermediate spacing of 300 feet as measured along the length of the fire lane.
- 6. Generally, no fire hydrant shall be located closer than 50 feet to a non-residential building or structure unless approved by the Engineering and Fire Departments.
- 7. In instances where access between the fire hydrant and the building that it is intended to serve may be blocked, extra fire hydrants shall be provided to improve the fire protection. Railroads, divided thoroughfares, expressways, blocks which are subject to buildings restricting movement, and other man-made or natural obstacles are considered as barriers.

8. Restrictions

- (a) All required fire hydrants shall be of the national standard three (3) way breakaway type no less than five and one-quarter (5¼") inches in size and shall conform to the provisions of the latest AWWA Standard C502 and shall be placed upon water mains of no less than eight (8") inches in size. Fire hydrants shall have a bury depth of four (4) feet.
- (b) Valves shall be placed on all fire hydrants leads. Valves shall be flanged by mechanical joint. Water service connections shall not be allowed on fire hydrant leads.
- (c) Required fire hydrants shall be installed so the breakaway point will be no less than two (2") inches, and no greater than six (6") inches above the grade surface.
- (d) Fire hydrants shall be located a minimum of two (2') feet and a maximum of six (6') feet behind the curb line, based on the location of the sidewalk. The fire hydrant shall not be in the sidewalk.
- (e) All required fire hydrants placed on private property shall be adequately protected by either curb stops or concrete posts or other methods as approved by the Fire Marshal and shall be within dedicated easements. Such stops or posts to be the responsibility of the landowner on which the said fire hydrant is placed.
- (f) All required fire hydrants shall be installed so that the steamer connection will face the fire lane or street, or as directed by the Fire Marshal.
- (g) Fire hydrants, when placed at intersections or access drives to parking lots, when practical, shall be placed so that no part of the fire truck will block the intersection or parking lot access when connections to the fire hydrant are made.
- (h) Fire hydrants, required by this article, and located on private property, shall be accessible to the Fire Department at all times.
- (i) Fire hydrants shall be located at street or fire lane intersections, when feasible.
- (j) A Blue Stimsonite, Fire-Lite reflector (or approved equal) shall be placed in the center of the drive lane on the side of the fire hydrant. When a hydrant is located at an intersection a marker will be placed on both sides of the hydrant,

in the center of the drive lane of both intersecting streets.

- (k) In non-residential developments an eight (8") inch lead will be required on all fire hydrants that are located more than 20 feet from the looped main.
- (l) Eight (8") inch mains used for hydrant supply shall be looped and dead-ends eliminated where practical. Eight (8") inch lines shall be connected so that only one hydrant will be between intersecting lines where practical with not more than two hydrants on an eight (8") inch main between intersecting lines. Dead-end water mains, such as in cul-de-sacs, longer than 300 feet shall require a fire hydrant to serve as a flush point.
- (m) The minimum cover to the top of the pipe is 48 inches. In general, the minimum cover below the top of the street sub-grade should be as follows: six (6") inch and smaller, four (4.0') feet; eight (8") inch, four (4.0') feet; 12" inch, four and a half (4.5') feet; 16" inch, five (5.0') feet. Lines larger than 16" inch shall have a minimum of six (6') feet of cover, which is sufficient to allow water and sewer and other utilities to go over the large main. For water lines to be constructed along county-type roads commonly built with a high crown about the surrounding property, increase the cover as required to allow for future paving grade changes.
- (n) A service with a meter box is constructed from the main to a point just behind the curb line, usually in advance of paving. The location of the meter box is at or near the center of the front of the lot to be served. On multiple apartments and business properties, the desired size and location is usually specified by the Owner or Architect. Minimum requirements for water service sizes are:
 - 1. One (1) inch copper services are required to serve all residential lots including townhouse lots and patio homes. Separate services shall be provided for each of the family units.
 - 2. The size of apartment, condominium, or multi-family services will depend on the number of units served with a minimum of one (1) meter per building.
 - 3. Fittings shall include megalugs. A domestic service connection shall not be allowed on fire hydrant leads.
- (o) Route water lines around storm drain inlets with a minimum of 12 inches of clearance out-to-out.

D. Required Water Main Extensions

All water mains constructed within a proposed subdivision shall be extended to the perimeter (stubbed out) of the proposed subdivision to allow for future extension of the water system into adjacent properties. All stubbed out lines and dead end lines within the project boundaries shall include a post type hydrant for the purpose of bleeding the system.

Post hydrants can be either an above ground type or below ground installed in a meter box, (Examples of both are given in the Standard Construction Details sheet Water-01) as manufactured by Gil Industries, Inc. or The Kupferle Foundry Company or equal approved by the Public Works Director. Post Hydrants will be equipped with weep holes to prohibit freezing. Hydrant will be tied to main by means of a two (2") inch double strap bronze tapping saddle with cc threads and a two (2") inch compression by cc corporation stop. Either two (2") inch copper or polyethylene tubing may be utilized to run the lateral for post hydrant. Set back from curb will be the same as for fire hydrants, three (3) feet to six (6) feet behind curb line, based on location of sidewalk. The post hydrant will not be allowed in the sidewalk.

E. Material and Workmanship

All materials and workmanship incorporated in water system extensions shall be in accordance with the currently adopted City Standard Construction Details.

WATER SYSTEM IMPROVEMENTS

All work and materials shall be in accordance with City Standard Construction Details and General Construction Design Standards.

1. Fire Hydrants to be Mueller, M&H, or approved equal with standard three-way connections, one (1) four (4") inch and two (2) two and one-half (2 ½") inch, with standard NST thread.
2. Valves to be Mueller or an approved equal by the water and wastewater superintendent.
3. All residential water service shall be as follows:
 - (a) See details for sizes and types of materials to be used on all services. (Per City of Lancaster General Construction Design Standards).
 - (b) The water service shall be 1-inch diameter type "K" soft copper pipe, unless otherwise shown on the plans.
 - (c) The utility Contractor shall install the water services to from the property line, at a depth of 12 inches. The meter box shall be furnished and installed by the Contractor after the paving Contractor has completed the final grading in back of the curb. Each service location will be marked on the curb by etching the letter "W" by the Utility Contractor and tied to property lines on the "Record" drawings.
4. The Contractor shall install fire hydrants at the locations shown on the plans.
5. The Contractor shall furnish the City of Lancaster with a Maintenance Bond from an approved surety company which protects the City against defective workmanship and materials for a period of two (2) years from the date of the final acceptance by the City. Where defective workmanship and/or materials are discovered requiring repairs to be made under this guarantee, all such repair work shall be done by the Contractor at his own expense within five (5) days after written notice of such defect has been given to him by the City. Should the Contractor fail to repair leaks or correct such defective workmanship and/or materials within five (5) days after being notified, the City may make the necessary repairs and charge the Contractor with the actual cost of all labor and materials required. The Maintenance Bond shall be in the amount of \$50,000.00 or 10 percent (10%) of the amount of the Contract. The Contractor shall execute the Maintenance Bond on the forms furnished by the City. The Contractor shall be responsible for providing "Record Drawings" to the Engineer showing the location of water services and valves by distance to both lot lines. This information shall be placed and marked "Record Drawings" by the engineer of record. Copies of these "Record Drawings" plans shall be furnished to the City.

6. The installation of a Blue Stimsonite (or equal) Model 88-SSA Fire Hydrant Marker will be installed by the Developer or Contractor at their own cost.
7. All fire hydrants are to be painted with two coats of aluminum paint.
8. P.V.C. pipe will be in accordance with AWWA C-900 Class 150 (DR-18) unless indicated otherwise on plans. All water pipe shall be installed with a "Tracer Tape" four (4) inches to six (6) inches over the top of the pipe ("water" laid above the pipe to identify it). This tape shall be installed in the backfill material over the top of the water main.
9. For embedment details on all water conduits, refer to Standard Construction Details.
10. Double strap brass saddle to be used on three-fourths (¾") through two (2") inch services. Refer to Standard Construction Details, sheet Water-01.
11. It shall be the sole responsibility of the contractor to open and or close all valves including but not limited to the City of Lancaster valves during construction of a project. The procedures to open or close City valves are as follows:
 - The contractor shall contact the City of Lancaster City Inspector at least 48 hours prior to operating City water valve(s) to get permission to open or close a valve(s).
 - If the contractor is given permission by the City Inspector to operate the valve(s), the contractor shall contact the City Inspector and develop a list of addresses that will be affected by any valve closings. After the list has been developed each address affected shall be given a written notice stating the water will be off due to construction for a given period of time (not to exceed 4 hours) and the notice(s) shall be delivered by the contractor to the address(s) affected, at least 48 hours prior to closing the valve(s). After the notification has been delivered and 48 hours have elapsed the contractor may operate the valve(s) with the Inspector present and at his instruction.
 - In no case shall City personnel be responsible for operating valves for construction in the event the valve(s) does not operate properly, then the contractor shall ask the inspector for assistance. No time or charges shall be charged to the City by the contractor for operating valves.
 - TCEQ rules and regulations shall apply to all water lines that fall below the TCEQ's minimum pressures.
12. All fire hydrants shall be Mueller or Clow, three-way standard thread with 4" nozzle and 2 ½" nozzles.

13. Gate valves shall be resilient wedge epoxy coated gate valves, ISO Test, Mueller or Clow.
14. Tapping sleeves shall be full circle, all stainless steel with stainless steel bolts and nuts.
15. All water mains shall have a minimum of 48" cover over the top of the pipe unless otherwise stipulated on the plan.
16. All connections used for flushing shall be metered with a certified backflow prevention device and all water used shall be at the contractor's expense
17. Water lines shall be tested at 200 psi pressure for a three-hour continuous period. The leakage rate will not exceed 25 gallons per inch of nominal diameter per mile of pipe over a 24-hour period. The contractor will flush and sterilize lines and perform bacteriological tests as directed by the City Inspector and to prove lines to be free of coliform organisms. The chlorination steps are as follows, chlorinate to at least 50 ppm-wait 24 hours. Flush super chlorination, check Chlorine (CL₂), then wait additional 24 hours before taking sample. All flushing shall be metered. If samples are reported positive, the contractor will flush and re-sterilize and repeat steps until water samples are free from coliform organisms.
18. Connection to the water system shall not be made until all lines have been pressure tested and satisfactory written bacteriological report results have been received by the City of Lancaster Inspector.
19. All residential services shall be installed as follows:
 - Meter boxes shall be a plastic body type with locking cast iron or steel ring and lid to meet City of Dallas specification or approved equal and will be installed two (2) feet back of curb line. All meter boxes in paving shall be Traffic Rated. See Sheet number Water-04for details. All water services will be 1" in diameter and made of type "k" soft copper pipe unless otherwise shown on the plans and approved by the City. Refer to standard construction detail water sheet. Water services shall be located upstream of the sanitary sewer services except as may be shown on the plans.
 - The utility contractor will install the water service to a point two (2) feet past the back of curb, or as may be shown on the plans, at a depth of 12 inches. The meter box will be furnished and installed by the contractor after the paving contractor has completed the final grading in back of the curb. All water services shall be embedded in at least 6" of sand from tap to meter box.

- Contractor will tie a 1” wide piece of blue plastic flagging to the water service curb stop and will leave a minimum of 36” of flagging exposed after backfilling curb and paving is complete.
 - Contractor shall be responsible for providing and installing meter to City of Lancaster’s specification at his own cost.
20. Polytubewrapping- The contractor shall furnish and install polyethylene wrap around the ductile iron pipe, fire hydrant up to the bury line and related fittings and valves. This wrap will be an 8 mil thickness polytube. Seams and overlaps will be wrapped and held in place by two inch (2”) wide plastic backed adhesive tape, Polyken No. 900 or Scotthraf No. 50 or an equal with approximately two (2’) footlaps on the polytube. The wrap on the barrel of the pipe will be loose enough to allow the film to shift with the soil. The wrap will be installed without breaks, tears or holes in the film. The cost of the polyethylene tube wrap and complete installation will be included in the unit price bid for furnishing and installing ductile iron pipe and related fittings, valves and fire hydrants.
21. Ductile iron fittings shall be a minimum C-ISO, pressure class 250 and all mechanical bends and fittings shall be mega-lug restrained and blocked with 3600 psi concrete.
22. The contractor shall install fire hydrants 2’ from back of curb or as may be shown on the plans or as may be required to avoid conflicts. The splash pad (3’x 4’) when no curb and will be placed in front of fire hydrants that are not abutting sidewalks or close enough to flow onto paved roadways. The flash pads will be dowelled in to the curb when adjacent to curb.
23. All bolts and nuts used with mechanical joint fittings will be high strength, corrosion resistant steel per ASTM A 235 Type 3.
24. Valve boxes will be furnished and set on each gate valve. After final clean up and alignment has been completed, the contractor (utility) will pour a steel reinforced (#3 bars on 12” centers) concrete block 30”x30”x6” around all valve box tops so the finished grade is level with the finished parkway.
25. The contractor will be responsible for providing “as-built” plans to the engineer showing the location of sewer services. This information will be placed on the engineering plans and marked “as built” by the design engineer. Copies of these “as-built” plans will be furnished to the City. Ties will be made by distance measurements from both lot lines for all manholes, cleanouts and services.
26. The installation of Blue Stemsonite (or approved equal) Model 88-SSA fire hydrant marker will be furnished and installed by the contractor.

27. Fire hydrants will be painted as noted. All hydrants are to be painted with two (2) coats of aluminum paint.
28. PVC pipe will be a minimum C-900 class (DR-18) unless indicated otherwise on the plans. All water pipe will be installed with a “tracer tape” placed over the top of the pipe with word “water” multiply repeated on the tape, laid 2’ above the pipe prior to final back fill.
29. Water mains will be installed with a class B+ embedment and all ditches and trenches will be tamped and compacted to 95% proctor density. Moisture content shall be within 0 to +4 of optimum.
30. Double strap brass saddle to be used on all service lines installed on PVC pipe.
31. Contactor will protect all public utilities during the construction of this project. The utility contactor must adjust all existing manholes, cleanouts, valves, boxes, fire hydrants and appurtances, to proper line and grade after replacement of paving. The work is subsidiary to pavement.
32. The locations of all utilities indicated on the plans are taken from existing public records. The contractor must determine the exact location and elevation of all public utilities. It will be the responsibility of the contractor to ascertain whether any additional facilities other than those shown on the plans may be present.
33. Where storm sewer inlets are installed over top of water lines, the contractor must provide a minimum clearance of 18”. Where the water crosses over top of the storm sewer, there must be a minimum of 18” of clearance.
34. Refer to City of Lancaster Standard Details for additional information regarding construction of water and sanitary sewer systems.
35. Contractor will install a post hydrant where shown on the plans for the purpose of sampling. Waterlines installed will be Kupferle Eclipse 88 or approved equal by the City. Refer to Standard Construction Detail Sheets for water.
36. Dead end lines should be avoided but in cases where they cannot, the contractor must install a flush point per TCEQ regulations.
37. A list of approved water utility materials and approval of alternate materials must be obtained from the City Water and Sewer Superintendent prior to beginning of construction.
38. At the end of the project and before final acceptance, all valves and water services located behind the curb shall be marked by sawing or inscribing into the curb the

letter W for water services and the letter V for valves and FH for fire hydrants. Painting of such lettering shall not be an accepted substitute.

39. Contractors are required to submit an application/deposit for use of a City water meter with the Utility Billing Department prior to starting work. The Contractor must supply a testable backflow to be tested after installed. Test reports must be submitted to the City.

WATER MAINS

In general, water mains are placed on the north and west sides of a street, at a distance of ten feet from the centerline of the street, or otherwise as directed by the City. Where applicable, line sizes will comply with the Water Distribution System Master Plan (<http://lancaster-tx.com/DocumentCenter/View/3374> or as amended) and be adequate to convey a fire flow. Fire flow analysis will be required on lines that are questionable. Starting pressures shall be obtained from the nearest junction node as stated in the City’s Water Distribution Master Plan Map.

1. Minimum eight (8) inch pipe, (other sizes approved by the Director of Public Works and Water/Wastewater Superintendent) required in residential, commercial and retail areas.
2. Minimum twelve (12) inch pipe required on industrial areas.
3. Dead-end mains shall not exceed 600 feet in length. A fire hydrant will be required at the end of all dead-end mains.
4. No water main shall be located closer than five (5) feet from any tree or structure without permission of the Public Works Director.
5. Water Main Specifications: City mains shall have a minimum diameter of eight (8) inches, unless a larger line size is required by the Comprehensive Plan, Water Master Plan or to meet fire protection needs as determined by analysis. All water lines shall meet the requirements of AWWA and NCTCOG under the following specifications:

| Line Size | NCTCOG Item | AWWA Standard | Description |
|-----------------------|---------------------|---------------|-----------------------------------|
| 8” thru 12” | 501.14.1 | C905 | PVC |
| Greater than 12” Pipe | 501.4.5 and 501.4.6 | C301 & C303 | Reinforced Concrete Cylinder Pipe |
| | 501.15 | ASTM D2241. | High Density Polyethylene |

All mains supplying fire sprinkler systems outside of utility easements shall be minimum 200 PSI working pressure and U.L. listed.

6. Valves 12-inch and under shall be placed on or near street property lines and not over 800 feet apart in residential, duplex and apartment districts and not over 500

feet apart in all other districts: and in such a manner as to require preferably 2, but not more than 3 valves to shut down each City block, or as may be required to prevent shutting off more than 1 fire hydrant. On cross-feed mains without services, a maximum of four valves shall be used to shut down each block. Also, valves shall be placed at or near the ends of mains in such a manner that a shutdown can be made for a future main extension without causing loss of service on the existing main. The location of valves larger than 12 inches will be as approved by the Director of Public Works. Valves 12 inches and under will be Gate Valves meeting requirements of AWWA C500 or AWWA C509 (NCTCOG Item 502.6.1 and 502.6.2) with non-rising stems. Valves over 12 inches will be Butterfly Valves meeting requirements of AWWA C504 (NCTCOG Item 502.6.5). All actuators shall be for direct bury service.

7. Maintain all valves during construction so they are protected, marked, and accessible at all times.

SECTION 1-03 SANITARY SEWER SYSTEM IMPROVEMENTS

All work and materials shall be in accordance with the City Standard Specifications and General Construction Design standards.

1. All P.V.C. sewer pipe shall be minimum S.D.R. 35 or 26 (depths greater than 10 feet), as per City Specifications and shall be laid on a minimum of Class "B+" Embedment or as specified by the City.
2. Any other pipe to be used for sanitary sewer main other than P.V.C. must be approved by the Director of Public Works.
3. All residential sewer tap service shall be a minimum four (4") inch diameter.
4. All sewer mains shall be a minimum diameter of eight (8") inches and shall maintain a minimum flow velocity of two (2') feet per second and a maximum velocity of ten (10') feet per second. Exceeding maximum velocity shall be as approved by the Director of Public Works.
5. All trenches will be tampered and compacted to a 95% proctor density. Moisture content shall be within 0 to +4 of optimum. After pipe has been laid on proper bedding, backfill with 8" maximum loose lifts mechanically compacted to 95% standard proctor. Moisture content shall be within 0 to +4 of optimum under roadway and 12" maximum loose lift behind curb. Maximum size in backfill shall not exceed 6" in diameter.
6. Contractor shall tie a one-inch (1") wide piece of green plastic flagging to the end of sewer service and shall leave a minimum of 36 inches of flagging exposed after backfill. After curb and paving is completed, Contractor shall etch a red "s" size two (2") inch, on the curb or alley at location of the sewer service. All P.V.C. sewer pipe shall be installed with green metallic tape "Tracer Tape" over the top of the embedment pipe. Tracer tape over the top of the P.V.C. pipe similar to "Blue Terra Tape D" Detectable, installed in accordance with manufacturer's recommendation. All P.V.C. sewer pipe that is not green in color shall also be installed with a red plastic identification tape marked "sewer" laid above the pipe to identify it.
7. The Contractor shall furnish the City of Lancaster with a Maintenance Bond from an approved surety company which protects the City against defective workmanship and materials for a period of two (2) years from the date of the final acceptance by the City. Where defective workmanship and/or materials are discovered requiring repairs to be made under this guarantee, all such repair work shall be done by the Contractor at his own expense within five (5) days after written notice of such defect has been given to him by the City. Should the Contractor fail to repair leaks or correct such defective workmanship and/or materials within five (5) days after being notified, the City may make the necessary repairs and charge the Contractor with the actual cost of

all labor and materials required. The Maintenance Bond shall be in the amount of \$50,000.00 or 10 percent (10%) of the amount of the Contract, whichever is greater, but not to exceed 100 percent (100%) of the Contract amount. The Contractor shall execute the Maintenance Bond on the forms furnished by the City.

8. The Contractor shall be responsible for providing “Record Drawings” to the City showing the location of sewer service by distance to both lot lines. This information shall be placed on the Engineering Plans and marked “Record Drawings” by the Design Engineer. Copies of these “Record Drawings” plans shall be furnished to the City prior to final acceptance of project. Ties shall be made by distance measurements from both lot lines or from building corners for all manholes, clean-outs and services.
9. All sanitary sewer line shall be tested for infiltration and by the Low Pressure Air Test Method in accordance with the standard specifications and as shown on the plans. Low Pressure Air Test is to be performed on all completed sections of sewer mains. Successful air tests shall be mandatory to prove acceptability of the sewer lines. Lines shall be mandreled in accordance with TCEQ requirements. Completed lines shall be inspected by color video camera. The camera shall have pan and tilt capabilities. All services and manholes shall be taped (measured). Original color videotape shall be provided to the City.
10. All PVC sewer pipe will be SDR 35 for depth less than 10’ and SDR 26 for depth 10’ or grater as per City specifications and will be installed with a minimum of class B+ embedment.
11. Any other pipe for sanitary sewer main construction must be approved by the City Engineer.
12. All residential sewer services will be a minimum of four (4”) inches in diameter or as specified on the plans and shall terminate at the property line with a clean out. Services shall be located downstream of the water services except as may be shown on the plans. All services shall be embedded in minimum of 6” of sand on all sides of pipe.
13. All sewer mains will be a minimum diameter of eight (8”) inches and will be installed per the plan profile.
14. All trenches will be tamped and compacted to a 95% proctor density. Moisture content shall be within 0 to +4 of optimum.
15. Contractor will tie 1” wide piece of red plastic flagging to the end of the sewer service and will leave a minimum of 36” of flagging exposed after backfill. At the end of the project and before final acceptance, all manholes and sewer services located behind the curb shall be marked 2” notch by sawing into the curb. The letters

for sewer services and the letter MH for manhole. Painting of such lettering shall not be an accepted substitute.

16. The contractor will be responsible for providing “as-built” plans to the engineer showing the location of sewer services. This information will be placed on the engineering plans and marked “as-built” by the design engineer. Copies of these “as-built” plans will be furnished to the City. Ties will be made by distance measurements from both lot lines for all manholes, cleanouts and services.
17. All sanitary sewer lines and manholes will be tested for infiltration and exfiltration by the low pressure air test method in accordance with the TCEQ current specifications.
18. All sewer pipes will be installed with a red plastic identification tape marked “sewer” laid 2’ above the pipe.
19. A low pressure air test will be performed on all installed sections of sewer mains. Successful air tests will be mandatory to prove acceptability of the sewer lines.
20. All new sanitary sewer mains will require mandrel tests in accordance with TCEQ requirements.
21. Manholes are to be installed with a ductile iron hinged ring and water tight cover gasket type to prevent infiltration with and locking device Pam-Rex brand or approved equal with the wording sanitary sewer forged into the lid.
22. The contractor shall center a 20 foot joint of pressure rated PVC sanitary sewer pipe at all water line crossings. Embed sanitary sewer line in cement stabilized sand in accordance with TCEQ regulations chapter 290, page 43. The pressure rated pipe shall be ASTM 2241 SDR-26 or approved equal.
23. A list of approved sanitary sewer utility materials and approval of alternate materials must be obtained from the City Water and Sewer Superintendent prior to beginning of construction.
24. For final acceptance, the City will require video inspection of all sanitary sewer mains. A copy of the results must be provided to the City on a CD Rom or DVD disc. VHS tapes will not be accepted.
25. No vertical curves will be allowed. Horizontal curvature may be by joint deflection. The Engineer must specify on the plans the allowable radius and joint deflection for each pipe size. The allowable deflection shall be 5 degrees or 80% of the manufacturer’s recommended maximum joint deflection, whichever is less. When joint deflection is used the Engineer must specify the size of mandrel used for deflection testing. The mandrel shall be sized to verify the maximum joint deflection has not been exceeded. Horizontal curves shall match change in street direction as

near as possible, but will not be allowed across residential single family and duplex lots. Slopes on horizontally curved sanitary sewers shall be a minimum of 1% greater than the corresponding minimum slope of sanitary sewers on a straight line.

Manholes on horizontally curved sanitary sewers shall be located at the P.C. and P.T. of the curve and a maximum spacing of 300 feet along the curve.

26. General Sewerage System Extensions

- a. All subdivisions developed must be served by community sanitary sewer collection, treatment and disposal systems approved by the City. Each lot must be provided with an individual service
- b. Sanitary sewer facilities shall be provided to adequately service each lot or tract of the subdivision, and shall conform to the City's current Sanitary Sewer Master Plan; <http://www.lancaster-tx.com/DocumentCenter/View/3373> or as amended.
- c. No sanitary sewer main shall be less than eight (8") inches in diameter. All sewers shall be designed with consideration for serving the natural drainage basin at full develop cut conditions. Drainage area main and calculations are required. Exceptions to this requirement may be made only at the direction of the Public Works Director.
- d. All laterals and sewer mains installed within subdivision must extend to the borders of the subdivision as required for future extensions of the collection system regardless of whether or not such extensions are required for service within the subdivision. Manholes are required at the end of lines with 13 stubout capped.
- e. The minimum easement width for a sanitary sewer main shall be seven and ½ (7.5') feet on each side of the pipe for a total of 15 feet.
- f. The population density shall be based on three (3) persons per single family unit, but shall not be less than nine point five (9.5) persons per acre. The contributing sewage flow shall be determined on the basis of an average flow of 140 gallons per person per day which includes provisions for minimal I & I. A peaking factor shall be applied to the flow. Peaking factor shall be determined from curve A in ASCE Manual of Practice No. 60 "Gravity Sanitary Sewer Design and Construction" or a factor of five (5) times may be used.

27. Sanitary Sewer Improvements Design Criteria

- a. All services shall be placed ten (10') feet downstream of water service and shall maintain a minimum 10 foot separation from water and sewer lines unless instructed otherwise by the Director of Public Works.

- b. Manhole spacing shall not exceed five hundred (500') feet as measured horizontally along the centerline of the pipe.
- c. Sewer mains, which require more than an 18-inch difference in flow line elevations, must be accommodated with a five (5') foot diameter external drop manhole.
- d. All upstream ends of sanitary sewer mains shall terminate at a manhole. Cleanouts will not be allowed unless approved by the Director of Public Works.
- e. Four-foot (4') diameter manholes or six-inch (6") sampling cleanouts will be required as sampling ports on businesses that are required to pre-treat their sewer discharge. The manhole or sampling cleanout must be located between the public sewer main and the grease trap and located within a public sanitary sewer easement if on private property.
- f. If a new sewer line is to be constructed adjacent to an existing street, the profile will need to include the existing top of curb grades.
- g. All sanitary sewers constructed adjacent to federal, state or county roadways shall be constructed outside the ROW in a separate easement dedicated by separate instrument, not by plat or as directed by the City.
- h. All sanitary sewer pipes and manholes shall maintain horizontal and vertical separations from public water supply pipes as specified by TCEQ regulations. The minimum horizontal separation between any sanitary sewer main and a storm drain facility shall be equal to two point five (2.5') feet or half the depth of the sanitary sewer, whichever is greater.

28. Lift Stations or Separate Treatment Facilities

The provisions for lift stations or separate treatment facilities will not be permitted unless, in the opinion of the Public Works Director and City Engineer, there is no feasible alternative which can provide the necessary service to the proposed subdivision. Property deeds and easements to the City may be required.

29. Connections

No connection shall be made to any sanitary sewer within the City which will permit the entrance of surface water or waste which has other than domestic sewage characteristics without the specific authorization of the City.

30. Alternate Sewage Systems

Where public sanitary sewerage systems are not within 500 feet of the plat, alternate sewerage systems may be approved only if all of the following conditions are met:

- a. The proposed subdivision consists of three (3) lots or less.
- b. The existing City sewer system is not and cannot feasibly, in the opinion of the Public Works Department be made available to the area of development.
- c. Percolation tests run by an independent testing laboratory are submitted to both the City and the Dallas County Health Department with results showing that a septic tank and absorption field can be developed in accordance with state and county criteria to provide adequate disposal of the sewage. Where septic tank installations are permitted in lieu of a sanitary sewerage system, approval must be given by the Dallas County Health Department as the plat must include dedicated sanitary sewer easements not less than 20 feet in width adjacent to all lots to facilitate the future installation of a sewerage system. Dedication of such easement shall prohibit fencing or other obstructions that would interfere with the future installation of the sewers.
- d. Installation of individual septic tanks shall be according to rules and regulations issued by the State of Texas and minimum standards and approval of Dallas County Health Department.
- e. Such designs shall include provisions to tie the system into the gravity system when it becomes available.
- f. Sizes and grades for sanitary sewer lines shall be based on serving the proposed development and all upstream areas in the drainage basin at full development. Design calculations for sizing lines shall be included in the plans, along with drainage area map. If feasible, sewers shall be placed in streets. Sewers are usually located in the center of the street. Each addition has its challenges; therefore, no fixed rules will apply to all cases.
- g. Minimum cover shall be three point five (3.5') feet; exceptions authorized by the Director of Public Works shall have concrete protection. In general, the minimum depth for sewer to serve given property with a four (4") inch lateral shall be three (3') feet plus 2% times the length of the house lateral (the distance from the sewer to the center of the house). Thus, for a house 135 feet from the sewer, the depth would be three (3') feet plus 2% x 135 feet = three (3.0') plus two point seven (2.7') = five point seven (5.7') feet. The depth of the flow line of the sewer should then be at least five point seven (5.7') feet below the elevation of the ground at the point where the service enters the

house. Profiles of the ground line 20 feet past the building line will be required to verify that this criteria is met. On lines deeper than 12 feet, a parallel sewer line will be required when laterals are to be attached. This requirement should be discussed with the City Engineer.

- h. Pipes should be placed on such a grade that the velocity when flowing full is not less than 2 feet or more than 10 feet per second. Minimum grades shall be as follows: *

| | | | |
|--------------|-------------|--------------|--------------|
| 6" - 0.54%; | 8" - 0.35%; | 10" - 0.26%; | 12" - 0.22%; |
| 15" - 0.16%; | 18" - 0.12% | 21" - 0.095% | 27" - 0.065% |

* Accordance with TCEQ Requirement

- i. All grades shall be shown to the nearest 0.01-foot. Grades shall be evenly divisible by four (4), and if practical, they should be even, such as: 0.20%, 0.40%, 0.60%, and 1.00%, etc., in order to facilitate field computations. When the slope of a sewer changes, a manhole will be required. No vertical curves will be allowed.
- j. The sizes and locations of manholes, wyes, bends, tap connections, cleanouts, etc., shall be approved by the Director of Public Works. In general, manholes shall be placed at all four-way connections and three-way connections. The diameter of a manhole constructed over the center of a sewer should vary with the size of the sewer. For six (6"), eight (8"), ten (10"), and twelve (12) inch sewers the manhole shall be four (4.0') feet minimum diameter; for 15", 18", 21", 24", and 27" – five (5.0') feet minimum diameter; 30", and 36" – six (6') feet minimum diameter. In Flood Plains, sealed manholes are to be used to prevent the entrance of storm water. Manholes in flood plains shall be vented as required by TCEQ. No main line clean-outs will be allowed on the ends of lines. External drop manholes shall be required when the inflow elevation is more than 18 inches above the outflow elevation. Construct manholes at each end of lines that are installed by other than open cut and at each end of aerial crossing lines. Sewer mains and water mains separation shall be in accordance with TCEQ requirements.
- k. LATERALS: The sizes and locations of laterals shall be as approved by the City Engineer. In general, for single family dwellings, the lateral size shall be four (4") inch minimum; for multiple units, apartments, local retail and commercial – six (6") inch minimum; for manufacturing and industrial, the size should be eight (8") inch or larger as required. House laterals shall come out ten (10') feet downstream from the center of the lot and shall have a minimum of ten (10) feet lateral separation from the water service. Manholes will be required on six (6") inch and larger laterals where they connect to the

main line. Laterals will not be attached to sewer mains that are deeper than 12feet. A minimum of one lateral per building shall be required. Also, a minimum of one lateral per residential lot shall be required. Duplexes shall have two laterals.

- l. Railroad, State Highway and creek crossings, etc., shall be as approved by the City Engineer. The developer is responsible for obtaining permits from the Railroad Company and from the Texas Department of Transportation. Such approved permits shall be provided to the City prior to construction.

- m. Line and grade stakes for construction shall be furnished by the developer's engineer. All property lines and corners must be properly staked with iron rods to insure correct alignment. The City Engineer will not be liable for improper alignment or delay of any kind caused by improper or inadequate surveys by the developer or by interference of other utilities.

- n. In order to provide access for sewer lines for cleaning, manholes and/or cleanouts shall be so located that 250 feet of sewer rod can reach any point in the line. This means that manhole spacing shall be a maximum of 500 feet: that spacing between a manhole and an upstream cleanout, if allowed, shall be limited to 400 feet.

- o. No sewer line shall be located nearer than five feet (5') from any tree or structure. No sewer lateral line shall cross property lines without a minimum of five (5') feet easement recorded in county records.

- p. No sanitary sewer will be allowed in alleys unless approved by the City Engineer.

- q. Finish floor elevations shall be at least 1.5 feet above the rim elevation of the closest downstream manhole.

- r. Main Sewer Lines Specifications

All main sewer lines shall be PVC and meet the requirement of ASTM and NCTCOG under the following specifications:

| Pipe Diameter | NCTCOG Item | ASTM Standard |
|---------------|-------------|--|
| 6" thru 15" | 501.17.2 | D3034/SDR 35 or SDR-26 For depths greater than 10-feet, SDR-26 must be used |

| | | |
|---------------------------|----------|------|
| Lines Greater Than 15" | 501.17.2 | F679 |
|---------------------------|----------|------|

Sewer pipe shall conform to the Specifications and/or Special Provisions.

s. Lift Stations

Lift station design shall be in full conformance to TCEQ Regulations, latest revision. Letter approval from the TCEQ must be provided at time of Preliminary Engineering plan submittal. Flows shall be as calculated in accordance with this manual.

t. Material disposal for developer projects

The contractor shall notify the City Engineer in writing of proposed material disposal sites to be utilized outside of the project limits and inside of the City of Lancaster. Project limits shall include legal lot/block, addition description and address of the proposed site. The Director of Public Works shall be notified two (2) weeks in advance of any material being deposited.

u. Current Texas Commission on Environmental Quality rules can be obtained at: www.tceq.texas.gov/rules/current.html

SECTION 1-04 STREET SYSTEM

A. Streets Required

All streets constructed within the City shall be required to be constructed with curbs and gutters. The required widths of all streets within the City shall be determined by the “Functional Classification” of the streets as contained in the most current revision of the City Master Thoroughfare Plan; <http://www.lancaster-tx.com/documentcenter/view/10285>.

B. Paving Improvements

All work and materials shall be in accordance with the City Standard Construction Details and General Construction Design Standards.

1. The street and alley right-of way width shall be excavated full width in accordance with the street and sidewalk section to be constructed.
2. All streets, alleys and fire lanes require a compacted lime stabilized subgrade to a distance of 12 inches beyond the back of curb or edge of pavement. Only hydrated lime shall be utilized. Optimum lime shall be applied. Optimum lime application rate shall be determined by a lime series test to reduce the plasticity index (PI) to 15 or less as conducted by a City approved testing laboratory. The City will add 1% for field variation. Lime series test shall be taken along the excavation at all changes in soil or at a maximum of 300 feet between sample spots. The lime treated subgrade shall be compacted to a density of not less than 95% of the maximum density as determined by ASTM D698. Moisture content shall be within 0 to +4 of optimum. Density test results shall be completed by an independent laboratory approved by the City at the contractor’s expense. A copy of all results shall be given to the City Inspector. Sulfate tests shall also be conducted at the discretion of the City.
3. All concrete paving for street construction shall have a minimum compressive strength of 4,000 pounds per square inch (psi) in 28 days as no fly ash is allowed. All concrete paving for alley construction shall develop a minimum compressive strength of 4,000 (psi) in 28 days as no fly ash is allowed. The submitted design for City consideration must be submitted by a certified independent testing laboratory.
4. All roadway embankments with PI (Plastic Index) above 20 shall be compacted to a density as determined by a geotechnical study unless otherwise shown on the construction plans and approved by the City Engineer. Maximum loose lifts eight (8”) inches. Compaction shall be by mechanical methods, unless otherwise shown on the construction plans and approved by the City Engineer.
5. Testing of materials required for the construction of the specified street and alley improvements shall be performed by a certified independent testing laboratory approved by Engineering. The cost for such testing services shall be paid by the

Contractor. The City shall approve the laboratory to do the testing of materials, 72 hours prior to construction commencing. It shall be the Contractor's responsibility to show by standard testing procedures that the work constructed does meet the requirements of the specifications. If the resting lab is not present during a concrete pour, the City reserves the right to request core samples be taken and analyzed as this will be paid by the contractor.

6. The Contractor shall furnish a maintenance bond to the City to run two (2) years from the date of final acceptance of the infrastructure improvements by the City.
7. A twenty-four (24) foot wide lane shall be paved in all apartment and commercial areas, with a minimum of six (6) inches of reinforced concrete pavement (minimum of 4,000 psi) on a six (6") inch lime stabilized sub-grade. The remaining area, parking area, shall consist of 6-inch reinforced class "A" concrete or a minimum of three (3") inches of Type "D" H.M.A.C. on a six (6") inch lime stabilized sub-grade or a pavement design approved by the Director of Public. Parking and non-fire lane drive area pavement sections shall have a minimum pavement thickness of five inches (5") and shall be designed by a geotechnical engineer. Subgrade preparation shall be per the geotechnical engineer's design.
8. Required number of passing field density tests on lime stabilized sub-grade shall be equal to the ratio of 1 per 100 linear feet of street, and all failing density tests shall require moisture-density curves.
9. All dumpster sites shall have a paved lane up to the site that shall consist of a minimum of six (6") inches of a minimum of 3,600 psi reinforced concrete on a six (6") inch lime stabilized sub-grade.
10. All fill shall be mechanically compacted per the geotechnical report.
11. All construction barricading to be in accordance with current "Texas Manual on Uniform Traffic Control Devices for Streets and Highways" guidelines Part IV.
12. Reinforcement shall be in accordance with City detail sheet Street-01.
13. All reinforcement steel shall be 100% tied, with no skip ties, reinforcing steel shall be set on every other chair and shall be uniform. Bar laps shall be extended to a minimum overlap of 18 inches.
14. All streets and alleys shall have expansion joints installed at 200 feet intervals and at all intersections or as may be shown on the plans.
15. Sawed transverse dummy joints shall be placed in pavement every 20'. Sawing of pavement shall occur within 5 to 12 hours after curing and sealing. Otherwise, the section shall be removed and a longitudinal butt joint constructed.

16. Lime Trimmings are not acceptable for any use. Fill in or level up is to be completed with flowable fill (min. 2000 psi).
17. All fill shall be compacted by mechanical methods. Maximum loose lift for compaction shall be 8 inches. All lifts shall be tested for density by an independent laboratory approved by the City at the contractor's expense. Density requirements shall be as shown on the plans for the type of material called for on the plans.
18. All disturbed areas of roadway work shall have grass established immediately. Grass shall meet the requirement of item 3.8, 3.9 and 3.11 of the NCTCOG latest edition.
19. All areas to be excavated or filled shall have erosion control placed prior to commencing any work. Erosion control devices shall be maintained throughout the project in accordance with item 3.12 of the NCTCOG latest edition.
20. All sidewalks shall include barrier-free ramps at intersecting streets, alleys, driveway, etc. Barrier-free ramps shall meet current TAS or ADA accessibility guideline requirements.
21. Sidewalks shall be doweled into pavement where it abuts pavement and driveways. Expansion joint material shall be used at these locations. Steel for sidewalks shall be number 3 bars placed per the detail sheet 100% tied with plastic chairs at every other bar supporting steel. The chairs shall be placed uniformly. Concrete shall be 3000 psi at 28 days compressive strength.
22. Test cylinders: 1 set of 4 every 80 to 100 CY poured, but no less than 1 set per pour or per day-1 @ 7 days, 2 @ 28 days and hold one. 56 day breaks are not acceptable. Minimum 28 day design strength for all streets, alleys and fire lanes is 4,000 psi. If 28 day strength is not attained, the laboratory needs to schedule cores to prove out the deficient section no more than 2 days beyond 28. As a minimum, all reports shall indicate unit weight, air content, slump and ambient/concrete temperatures. All streets, alleys and fire lanes shall also be cored for depth checks every 300 LF. LT-CNTR-RT. There is a minimum of one quarter inch tolerance for all concrete depths. Anything more than one quarter inch shy will be assessed a penalty or be removed and replaced according to City's criteria.
23. All subgrade testing (includes fire lanes) gradations/pulverizations shall be taken every 300 LF and PI's every 300 LF. Densities (95%, 0 to +4% of optimum moisture) every 300 LF. LT-CNTR-RT. Grab samples will need to be tested for PI's at each gradation check to make sure sufficient lime was installed. Lime depth checks every 300 LF. LT-CNTR-RT or when the soil changes composition.
24. All density control shall be received, reviewed and approved by the City prior to any subgrade work. Density reports are only good for 48 hours after taken or right before a rain. 2 batch designs required, one each for machine and hand pours.

Street Design Criteria

1. All streets within or abutting the proposed subdivision shall be paved, with curbs and gutters installed, in accordance with the City’s Standards and Specifications. All paving shall be to the width specified on the Master Thoroughfare Plan and shall be constructed under the inspection of the Engineering Division. The construction costs of all street improvements shall be borne by the developer unless participation by the City has been approved.
2. All underground utilities required in the subdivision shall be placed under or across all streets after the rough grades are made, but prior to lime stabilization. Paving operations will not be allowed to start until the utility work is complete.
3. Street grades shall be designed such that excessive sand deposition from too low a water velocity or pavement scouring from too high a velocity is avoided. The minimum street grade permitted shall be 0.50%. The maximum street grade shall not exceed 8.0%. Any deviation from this range of permissible grades shall require written approval of the Director of Public Works.
4. Standard roadway widths from face-of-curb to face-of-curb shall be according to the following table:

| STANDARD PAVEMENT WIDTHS | | | | |
|--------------------------|----------------------------|----------------------|------------------------|------------------------|
| Street Type | Number of Traffic Lanes | Lane Width (feet) | Median Width (feet) | R.O.W. Width (feet) |
| TYPE F | 2 | 12 | - | 60 |
| TYPE E | 2 | 12 | - | 50 |
| TYPE D | 2 | 12 | - | 65 |
| TYPE C | 4 | 12 | - | 85 |
| TYPE B | 4 | 12 | - | 100 |
| TYPE B Major | 4 | 12 | 14 | 100 |
| TYPE A | 6 | 12 | 18 | 110 |

5. The minimum classified width of a proposed street shall be enlarged under the following conditions.
 - a. Adjacent to commercial or multi-family land uses where, in the opinion of the Public Works Department or Fire Marshal, additional width is necessary for proper access and circulation.

- b. Where, in the opinion of the City or in the opinion of the Developer, with the concurrence of the City, the aesthetic value achieved from extra width is dictated by special conditions.
- 6. The proposed streets shall be located in the center of the right-of-way to allow both parkways to be the same width. The final grade of all parkways, existing and proposed, shall be one-half (1/2") inch per foot from the top of curb to the property line. All parkways shall drain to the street.
- 7. All cul-de-sacs shall be installed with a forty (40') foot radius to the face of curb in a fifty (50') foot radius ROW. Smaller shall be approved by the Public Works Director.
- 8. Standard reinforced concrete curb height and width is six (6") inches with a twenty-four (24") inch integral gutter section measured from the face of the curb. Any deviation from this section will require the approval of the Public Works Director.
- 9. The minimum pavement and sub-grade thickness for the various street widths shall be as indicated in the standard details.
- 10. All construction barricading to be in accordance with current "Texas Manual on Uniform Traffic Control Devices (TMUTCD) for Streets and Highways" guidelines Part IV.
- 11. Minimum horizontal curvature radii for design of street centerlines shall be as follows:

| | |
|-------------|----------|
| Arterial | 800 feet |
| Collector | 400 feet |
| Residential | 200 feet |

All street intersections shall be constructed to form a ninety (90) degree angle.

- 12. In order to maintain minimum sight distance, the minimum "K" values for the computation of vertical curves in the formula $L=KA$, where L is the length of the vertical curve in feet, and A is the algebraic difference of the street grades in percent (%) are listed below:

| Design Speed MPH | Crest Vertical Curve "K" Value | Sag Vertical Curve "K" Value |
|---------------------|-----------------------------------|---------------------------------|
| 30 | 28 | 35 |
| 40 | 60 | 60 |
| 50 | 110 | 90 |

13. The minimum radius for curb returns at intersections shall be thirty (30') feet to the face of curb.
14. A tangent of at least one hundred (100') feet long is preferred between reverse curves on arterial and collector streets.
15. At all street intersections, there shall be provided a minimum twenty-five (25') foot by twenty-five (25') foot corner clip sidewalk and utility easement.
16. Reinforced concrete valley gutters are required at all asphalt street intersections where gutter flowlines cross another street or at low points where water flow crosses the street.
17. Median openings shall be spaced a minimum of six hundred (600') feet center-to-center or five hundred (500') feet curb-to-curb, whichever is greater.

C. Sidewalks and Leadwalks

1. Sidewalks and leadwalks shall be constructed with a minimum thickness of four (4") inches. They shall utilize NCTCOG Class "A" concrete with 3,000 psi and #3 steel bars placed on a spacing of eighteen (18") inch centers each direction, with a minimum of three (3) longitudinal bars 6 inches apart at expansion joints. Refer to Lancaster Development Code for additional sidewalk requirements.
2. Sidewalks shall be constructed with a minimum of four (4') feet in width in residential areas and five (5') feet at curb line and non-residential areas. The sidewalk shall be located on the City parkway adjacent to the private property line. Sidewalks shall be graded at one-quarter (1/4") inch per foot such that the sidewalk at the property line shall be no greater than two and one-half (2-1/2 ") inches higher than the top of curb on a typical ten (10') foot parkway.
3. Sidewalks shall be a minimum of five (5') feet in width adjacent to curb and shall be doveled into the curb. Sidewalks in City parkway adjacent to the private property line shall be four (4') feet in width. Leadwalks shall be minimum three (3') feet in width and dowel into front porch and public walks, and expansion joint at both locations.
4. All fire hydrants, street lights and, utility poles that conflict with sidewalks or Barrier Free Ramps shall be relocated at the Utility Contractor's expense.

5. Entrances to sidewalks, alleys, and streets or approaches shall meet the current American Disabilities Act (ADA) standards. Transitions from sidewalks to alleys shall have smooth transitions without a drop off.

D. Driveway Standards

1. Residential Driveways shall be dowel into the foundation and alley or street Approaches
 - a. All approaches shall be constructed of six (6") inch thick NCTCOG class "A" reinforced concrete pavement with number three (#3) steel bars on eighteen (18") inch centers each way. The driveway approach shall begin at the street curb and extend to the property line or to a point ten (10') feet from the face of the curb whichever is greater. The driveway approach shall be constructed such that the height of the drive approach at the property ROW, with a normal ten (10') feet parkway, shall be two and one-half (2-1/2") inches higher than the top of the curb. Two-foot asphalt transition shall be required on asphalt streets.
 - b. Width of Driveway Approaches: Residential driveway approaches shall not be less than sixteen (16') feet in width nor more than twenty (20') feet wide measured at the property line. Specific variance to this criteria may be requested by the property owner. Any variance granted based on a specific design submittal must have the approval of the Public Works Department.

Width of driveway approaches: (Residential Development)

residential driveways shall be a minimum of sixteen (16') feet wide, from face of garage door to property line, and twenty-six (26') feet minimum width at alley or street, including a five (5') foot radius. Specific variance to this criteria may be requested by property owner. Any variance granted based on a specific design submittal must have the approval of the Public Works Department.

- c. Radius: Residential driveways shall be constructed with the return curbs having a rolled face disappearing at the sidewalk and joining the street curb with a minimum five (5') foot radius with a typical ten (10') foot radius requirement.
- d. Provision for Joint Approaches: Driveway approaches shall be located entirely within the frontage of the premises they serve except that joint, or cooperative, driveways with adjoining property holders may be permitted and may be required by the City Engineer. When

the joint drive approach is proposed by the developer, the request must be made by all the interested parties and all property owners involved. The design of the joint driveway facilities must be submitted with the request to be approved by the City Engineer.

- e. Residential Driveway Approaches at Street Intersections: The drive approach on corner lots must be located to approximately line up with the side of the house or garage that is farthest from the intersection.

Only drive approaches in accordance with the above criteria will be allowed onto residential streets or the minor street at a street intersection. If both streets are residentially classified, a circular drive will be allowed on a corner lot if one of its two approaches meets the above location criteria. The other drive approach can have its near side no closer than 25 feet to the property corner closest to the intersection. If both streets have the same classification, other than residential per the currently adopted City Thoroughfare Plan, the City Engineer shall make the determination as to which street access will be allowed.

2. Commercial/Industrial Driveway Approaches

- a. Commercial and Industrial driveway approaches shall be constructed of six (6") inch thick (minimum 4,000 psi) concrete with #4 steel bars on eighteen (18") inch centers each way. The driveway shall begin at the curb of the street and extend to the property line or to a point ten (10') feet from the face of the curb, whichever is greater. The drive approach shall be constructed such that the height of the drive approach at the property line shall be two and one-half (2-1/2") inches higher than the top of curb at the street.
- b. Width of driveway approach: The width of any commercial or industrial driveway approach shall not be less than thirty (30') feet measured along the property line. Specific variance to this criteria may be requested by the Developer. Any variance granted based upon a specific design submittal must have the approval of the City Engineer.
- c. Radius: Commercial and Industrial driveways shall be constructed with the return curbs having a rolled face disappearing at the sidewalk and joining the street curb with a minimum thirty (30') foot radius. All fire lanes shall have a minimum turning radius of thirty (30') feet.

- d. Allowable Spacing for Driveway Approaches: On streets classified as Collector Streets, the minimum centerline spacing between driveways shall be at least three hundred (300') feet. On streets classified as Arterials, minimum spacing shall be at least five hundred (500') feet. This spacing criteria shall be applied irrespective of the number of individual properties located within the intervening distance. Deviation from this criteria may be requested by the Developer. Any deviation granted will be based on a specific design submittal and must have the approval of the City Engineer.
 - e. Provision for Joint Approaches: Driveway approaches shall be located entirely within the frontage of the premises and shall be located no closer than ten (10') feet from each side property line except that joint, or cooperative, drive approaches with adjoining property holders may be permitted in order to conform with the provisions of paragraph (d) above. Any request for joint drive access must be by agreement of all parties involved and a specific plan submittal must be included for approval of the City Engineer. Both properties will be required to dedicate public ingress and egress easements to cover the approach and joint access area and must be filed on the plat and filed with the Dallas County Court of Records and one copy of this record must be submitted to the City.
 - f. Approaches on Properties other than Residential: The driveway for the corner lot, if allowed, must be located a minimum of one hundred (100') feet from the point of intersection of the curb lines of both streets.
 - g. Angle of Driveway Approach: The angle of the driveway approach with the curb line shall be ninety (90) degrees.
 - h. Sidewalk to be Removed: When a driveway approach is to be built, the sidewalk shall be removed and the entire area replaced as a driveway. The drive approach shall extend to the property line. The sidewalk removed shall be tied back into the approach by dowels and shall meet the American Disabilities Act (ADA) requirements to be barrier free.
3. Driveways Crossing Bar Ditches:
- a. The minimum eighteen-inch (18") culvert pipe size of (inside diameter) 3:1 slope, will be determined based upon the drainage area that it serves. The ends of all culvert pipe shall be cut at a 6:1 slope.

- b. Radius: Driveways shall be constructed with the return curbs joining the edge of pavement at the street with a minimum five (5') foot radius, with a typical ten (10') foot radius requirement.
- c. The maximum slope from the edge of driveway to the top of the culvert pipe shall be 3:1. The sloped area around the end of the culvert pipe shall be sodded or hydromulched to resist erosion. Safety devices shall be installed as required by the Design Engineer.

The minimum cross slope on the drive shall be 1/8" inch per foot. The minimum longitudinal slope between the edge of pavement at the street and the valley over the culvert pipe shall be 1/4" inch per foot.

All future maintenance of the drive approach, curb, sidewalk, and culvert pipe is the responsibility of the property owner.

- d. During the drive approach installation, all ditch grading upstream and downstream of the proposed driveway culvert is the responsibility of the property owner, and shall be approved by the City Engineer.

4. General - A.D.A. Guidelines – Per Guidelines State and Federal

- a. Driveway Approaches at Pedestrian Crossings: Driveway approaches shall not be located in street intersections or at established pedestrian crossings.
- b. Driveway Approaches at Obstructions: Driveways shall be kept at a minimum of five (5') feet away from obstructions such as street light posts, fire hydrants, traffic signals, etc.
- c. Driveway Approach not to be Obstructed: Driveway approaches shall not be constructed or designed for parking of vehicles or for use as angle parking.
- d. Accumulative Width of Approaches: Driveway approaches shall not occupy more than forty (40%) percent of the frontage of a lot or tract, unless approved by the City.
- e. Curb Ramps are to be constructed on all permanent curb returns at intersections of all streets or as directed by the City Engineer.

SECTION 1-05 STORM DRAINAGE IMPROVEMENTS

A. General

The criteria herein provided shall govern the design of storm drainage improvements within the City of Lancaster and shall comply with the Lancaster Code of Ordinance; Article 24.06 (Drainage Utility System) and 24.08 (Stormwater Management). Improvements shall include streets, alleys, storm sewers, channels, culverts, bridges, swales, and any other facilities through which storm water flows. All drainage improvements shall be constructed in accordance with City specifications and be located entirely in dedicated right-of-ways (ROW) or drainage easements. The Developer shall provide all the necessary easements and ROWs, on-site and off-site, required for drainage structures, including storm sewers and open channels with access ramps. Easement width for storm sewer pipe shall not be less than fifteen (15') feet, and easement width for open channels shall be at least twenty-five (25') feet wider than the top of the channel with twenty (20') feet on one side to serve as an access way for maintenance purposes.

The Developer shall be required to install at his own expense all storm sewers and drainage structures, and appurtenances, designed to convey the 100-year design storm. This policy is applicable to all required drainage facilities including the channel improvements on the main channels and tributaries.

The Developer shall be responsible for excavation and channel liner improvements based on the fully urbanized one hundred (100) year frequency discharge for the channel and to process a U.S. Army Corps of Engineers Permit 404.

B. Basis of Design

All storm drainage design shall be in accordance with the City's manual for the design of storm drainage systems; *City of Lancaster Storm Water Design Manual* (Revised August 2007) <http://www.lancaster-tx.com/DocumentCenter/Home/View/598>; or as amended and Standard Construction Details.

1. Open Channels: When the runoff exceeds the capacity of a seventy-two (72") inch diameter concrete pipe or equivalent cross sectional pipe area (i.e., 2-51 inch diameter concrete pipe), the discharge can be carried in an open channel. Open channels shall be designed to carry the one hundred (100) year frequency storm runoff from a fully urbanized watershed with two (2') foot of freeboard. Improvements to existing channel shall include all Corps of Engineers permitting (#404 permit), Federal Emergency Management Agency map amendments and Environmental Protection Agency.

- a. All hydraulic studies shall be based on known FEMA 100-year water surfaces. The height of concrete channel liner shall be at least one (1') foot above the fully urbanized one hundred (100) year water surface profile. Such profile shall be determined by backwater calculations using the HEC-RAS computer program or other approved modeling methods by the City Engineer, which take into account backwater effects from downstream bridges, culverts, and other obstructions.
- c. Special considerations of levees will be considered in conjunction with the City and U.S. Army Corps of Engineers.
- d. Earthen Channels: Earthen channels shall meet the following requirements:
 - 1. The velocity of flow will not exceed eight (8') feet per second.
 - 2. That channel banks be reinforced, such reinforcing methods shall be approved by the City.
 - 3. That sufficient energy dissipation is designed and constructed at all locations where concrete lining meets earthen slopes and bottoms.
 - 4. That drainage easements are dedicated to encompass the area below the elevation of the water surface profile of a fully urbanized one hundred (100) year frequency storm, plus two-foot (2') of freeboard and any additional area necessary to provide access for maintenance, but not less than sixty (60') feet in width.
 - 5. That, arrangements have been made for perpetual maintenance of the channel by the adjacent property owners within the dedicated drainage easement or the channel has been dedicated and accepted for City Park purposes.
 - 6. That, in the judgement of the City Engineer, the appropriate use of the neighboring property or the health and safety of persons affected will not be substantially injured.
 - 7. Earthen channels, when approved, shall be constructed with a trapezoidal shape and a minimum bottom width of twelve (12') feet and side slopes not steeper than four (4') feet horizontal to one (1') foot vertical (5 to 1 preferred). A reinforced concrete pilot channel not less than twelve (12') feet in width or, as determined by the Public Works director, shall be constructed. The side slopes shall be smooth, free of rocks, and contain a minimum of six (6") inches of top soil. Gabion, rock, rubble, riprap, or other such similar materials shall be placed a minimum of four (4') feet along both sides of the pilot

channel to a depth of at least two (2') feet. Size and gradation of such material shall be determined based on peak discharge velocity requirements. The pilot channel shall be constructed as approved by the Engineering Division. The easement width for an earthen channel shall extend at least twenty (20') feet beyond the top of each channel bank and shall not be cross-fenced. The top of bank areas shall remain open for maintenance purposes.

After proposed earthen side slopes are cut, slopes shall be established in accordance by the City's specifications with grass or other designed vegetation as approved by the City Engineer. The grass shall be planted to twenty (20') feet outside the top of banks, and no less than one (2) two-inch high sprig per half square inch of slope and bottom.

The water surface profile (hydraulic grade line) for the one hundred (100) year frequency storm shall be shown on all sections and profiles. Maximum permissible velocities for the one hundred (100) year frequency flow shall be eight (8') feet per second in partially concrete lined channels while in fully lined channels, the maximum permissible velocities for one hundred (100) year frequency discharge shall be fifteen (15) feet per second.

Special consideration should be given to outlet structures on channels where concrete lining meets earthen banks.

One reinforced concrete access ramp shall be provided at all intersections of every open channel with a public street. Access ramps shall be a minimum of twelve (12') feet wide with a maximum slope of sixteen (16%) percent.

2. Bridges and Culverts: All bridges and culverts shall be designed in accordance with the City's Storm Water Drainage Manual. The fully urbanized one hundred (100) year frequency storm hydraulic grade line shall be plotted on all sections. All culverts shall have headwalls and wingwalls upstream and downstream. All culverts shall pass the fully urbanized one hundred (100) year frequency storm runoff without allowing runoff to pass over the road. All bridges shall have channel bottom and slopes concrete or gabion lined. The low point on the bridge structure shall be at least two (2') foot above the fully urbanized one hundred (100) year frequency storm water surface.
3. Lot Grading: existing and proposed grading plan of developments shall be provided. The contour interval shall be two (2') feet unless other interval is approved by the City Engineer.

Commercial lot grading will be conducted in a manner, which will take all runoff to the adjacent streets or drainage easements. No lot area will drain onto adjacent properties without approval of the City Engineer.

Finished floor elevations shall be set a minimum of one (1') foot above the top of curb at the centerline of the lot or one (1) foot above the one hundred (100) year frequency storm water surface elevation, whichever is higher.

4. Off-Site Drainage: In respect to offsite drainage, the following provisions shall apply:

- a. The Developer shall be responsible for all runoff from property upstream of his proposed development as though it were all fully developed. Runoff coefficients utilized to design drainage systems for the properties involved shall use the current zoning and/or the future use of the property as shown in the Future Land Use Plan, whichever is the most intensive use.
- b. Effect of the development's drainage design on downstream properties and adjacent properties shall be given proper consideration. Water concentrated in streets, pipes, drains, culverts, and channels will be moved to a recognized watercourse without damage to intervening structures or undue spreading across intervening land.

The Developer is responsible for constructing all offsite channelization or underground storm drain with overland relief required to discharge concentrated storm water from the low end of his development to the recognized watercourse, and also to obtain all the necessary easements from intervening land owners. Calculations will be required to show that connecting offsite drainage ways are capable to handling any increase in runoff due to development, concentration, or diversion for at least the ten (10) year storm frequency.

Any drainage easements necessary due to the Developer's alteration of existing concentrated discharge locations (i.e., existing creeks, channels, or storm sewers) shall be acquired by the Developer at no cost to the City.

- c. Where the preliminary drainage analysis by the Developer indicates that additional runoff from the developing property will overload downstream drainage facilities and result in hazardous conditions, the City may withhold approval of the development until appropriate provisions have been made.
- C. Developer and his Engineer shall furnish to the City, a "hold harmless agreement" and a "release of liability" indemnifying the City of Lancaster from any liabilities due to damages cause to the downstream property owner by the discharge of storm drainage water from the said development.

Preliminary Drainage Analysis Guidelines

The purpose of a Preliminary Drainage analysis is to determine the need for drainage facilities and drainage easements either within the proposed development or offsite. These guidelines shall be used as the minimum for a Preliminary Plat. When requested by the Public Works Department, a Preliminary Drainage Analysis shall be submitted with a Replat or Amended Plat. The Preliminary Drainage Analysis shall consist of the following items:

1. A topographical map drawn at a scale of 1" – 200' and depicting the entire natural watershed, which drains to and across the subdivision. Also a map, which includes the subdivision and an area extending for 200 feet in all directions from the proposed subdivision as a minimum. The map must also include contour lines at two-foot vertical intervals or less depending on terrain. Data from the City topo maps will be acceptable where available. Data from the USGS Quad sheets will be acceptable only where City topo maps are not available. Field surveys may be required to clearly depict the area.

The map shall indicate any offsite or adjoining areas outside the limits of the area being platted, which are relevant to onsite drainage. Show any proposed or existing drainage and utility easements, water bodies, streams, and railroads, parks, cemeteries, and drainage ditches. Show location of existing utilities including gas and petroleum lines, electric, telephone and TV cable. Also, the location of any existing structures located within the area being proposed for the subdivision.

The datum for all topography shall be that of the USGS. The Preliminary Analysis shall be sealed by a Professional Engineer licensed by the State of Texas.

2. Calculation of the drainage areas, time of concentration, and storm water runoff rate for the 100-year frequency storms shall be provided in accordance with City's Storm Water Design Manual.
3. Identification of special flood hazard areas as defined by the flood Damage Ordinance and as located by the current Flood Insurance Rate Map shall be shown and for FEMA panel number provided.

D. Drainage Study Guidelines

A Drainage Study is required when it has been determined that the area being developed will require storm water drainage facilities or drainage easements either within the development or offsite. The following criteria shall be used by the Design Engineer to prepare a Drainage Study.

1. The study shall analyze the effect of the subdivision on existing downstream drainage facilities. The study shall be sufficient to verify compliance with the City's criteria.

2. The study shall include a topographical map as defined above in Subsection C. “Preliminary Drainage Analysis Guidelines.”
3. Delineation and calculation of drainage areas together with proposed flow arrows shall represent flow patterns from runoff after all proposed improvements have been installed. Surface water drainage patterns shall be shown for each and every lot in the proposed subdivision and for each lot adjacent to the proposed subdivision (proposed grading plan).
4. In addition to those calculations required by the preliminary Drainage Analysis, this study shall also include:
 - a. Hydraulic calculations to each lateral, manhole, inlet and outlet structure in the system. Such calculations shall be in tabular form as outlined in the City’s Storm Drainage Manual and be made part of the construction plans.
 - b. Inlet calculations utilizing the minimum time of concentration for the zoning type which is contributing the largest “CA” to the inlet. Such calculation shall be in tabular form as outlined in the City’s Storm Drainage Manual and made part of the construction plans.
5. If any portion of the proposed subdivision or its offsite improvements (including pipes or ditches) fall within the limits of a Federal Emergency Management Agency (FEMA) floodplain, additional backwater calculations may be required. Additional calculations in the form of a Conditional Letter of Map Revision will be required if:
 - a. Any portion of the proposed subdivision is determined to be located within a FEMA Zone “A” floodplain; or
 - b. Any portion of the proposed subdivision is determined to be located within a FEMA Zone “AE” floodplain and the overall subdivision (including all phases) is five (5) acres or larger; or
 - c. Any portion of the proposed improvements from a subdivision include dredging or filling within a FEMA designated floodway.

Backwater calculations shall comply with normally accepted standards as required by FEMA for application of a Letter of Map Revision (LOMR). In addition, the calculations must begin with a previously defined Base Flood Elevation (BFE). The calculations shall continue upstream through the project until the proposed BFE is within .01’ feet of the existing BFE or the limits of the existing Zone “A” have been reached.

A LOMR will be required prior to issuing building permits.

6. The Drainage Study shall be sealed by a Professional Engineer licensed by the State of Texas.

DRAINAGE IMPROVEMENTS

All work and materials shall be in accordance with the City's General Construction Design Standards, Storm Drainage Manual and Standard Construction Details.

1. Inlet installation; The floor of the excavation for the inlet box must provide a firm, level bed for the base section to rest upon. Use a minimum of 6" depth of 1" diameter (maximum) rock or gravel to prepare the inlet bedding to final grade. When installing inlet with wet soil conditions, use cement stabilized-sand and allow it to set up by keeping hole pumped dry.
2. After pipe has been laid on proper bedding, backfill with 8" maximum loose lifts mechanically compacted to 95% standard proctor. Moisture content shall be within 0 to +4 of optimum under roadway and 12" maximum loose lift behind curb. Maximum size rock in backfill shall not exceed 4" in diameter.
3. Precast inlets and headwalls must be approved by the City Engineer.
4. Concrete for inlets and head walls must be a minimum of 4,200 psi.
5. Connection of the storm sewer pipe laterals to inlets shall be made with pipe that is smooth and even. If the pipe has to be cut, then the end of the pipe shall be evenly saw-cut. Chipped or broken pipe will be rejected.
6. Locking device is required for all storm sewer lids.
7. The wording "Storm Water" shall be forged into all inlet lids and letters shall be a minimum of 2" in height.
8. Existing storm sewer pipe and/or laterals shall be located prior to construction of inlet boxes. If adjustment in grade of lateral is required, a revised design by the engineer of record shall be submitted to the City Engineer for approval.
9. Reinforced concrete pipe shall be class III minimum or approved equal, installed on a class B+ embedment.
10. Connections between pipe size changes shall be made with only pre-cast manufactured pipe fittings.
11. All transitions and bends must be pre-cast manufactured.
12. All storm sewer pipe spigot and bell ends shall be asphalt primered.
13. For final acceptance, the City will require video inspection of all storm sewer mains. A copy of the results must be provided to the City Inspector on a CD Rom or DVD disc. VHS tapes will not be accepted.

14. All inlets shall have MS-4 drain tile markers. For detail, contact City Inspector.
15. No tracking of mud from construction site is allowed. The mud tracked shall be immediately cleaned.

Storm Sewer Pipe Embedment

1. A compacted crushed stone six (6") inches thick shall be required under the bottom of the pipe as Class B+ embedment is required.
2. The initial backfill of fine granular material shall be required to a minimum of twelve (12) inches over the top of the pipe.
3. All ditches not under existing or proposed paving sections, where ditches cross existing or proposed street or alley sections the ditch shall be mechanically compacted to 95% Standard Proctor Density, unless otherwise approved by the City Engineer.

Pipe Joints

The joints shall be constructed and jointed together in such a manner that no spill through or backfill will occur. This includes the lift holes used in certain size, and types of pipe. The use of the following types of joint materials are acceptable.

1. Cold applied, plastic asphalt joint compound
2. Rubber gaskets
3. Cold applied, performed plastic gasket

Storm Drainage Inlets

1. The type of drainage inlet shall be as indicated on the construction plans. For secondary and major street sections, a recessed type inlet shall be required. For industrial and residential streets, a curb line inlet will be acceptable unless otherwise shown on the construction plans.
2. Pipe backfill on 10% grades or greater should be stabilized, minimum half way up the pipe.
3. A round manhole cover with locking device shall be placed on all inlet tops.
4. The inlet throat shall be constructed with a rounded section with a maximum depth of opening of a maximum six (6") inches unless otherwise shown on the construction plans.

SECTION 1-06 STREET LIGHTING (TXU)

A. Reference *City of Lancaster 2006 Streetscape Master Plan* (<http://www.lancaster-tx.com/DocumentCenter/View/7866>) (or as amended) for additional street light design requirements.

B. Installation

Street light in all subdivisions shall be installed on approved metal (galvanized steel) poles.

1. Poles must be approved by Oncor Electric Delivery (Oncor) and the Public Works Director.
2. Poles shall be contracted and paid for by the Developer during the construction phase of a subdivision and before building permits are issued.
3. Requirement for fiber-class galvanized poles only. Poles not purchased through Oncor, shall be certified in writing by a Professional Engineer licensed in the State of Texas to meet the specifications as required by Oncor.

C. Location

The location of street lights shall be as follows:

1. At all intersections.
2. Where a new street intersects an existing street.
3. Where a block is four hundred (400') feet or longer, a street light shall be installed approximately 180 -220 feet apart; low in height and warm in color.
4. If a cul-de-sac block is four hundred (400') feet or longer, a street light shall be installed in the end of the cul-de-sac.
5. Street light poles should be at a minimum of ten (10') away from any obstruction.
6. Street lights shall be installed at any other location as may be directed by Oncor or the Director of Public Works for the welfare and safety of the community.

SECTION 1-07 MASONRY/CONCRETE SCREENING WALLS

A. Construction

Masonry or concrete screening walls shall be constructed according to the following specifications.

1. Concrete foundations shall have a minimum compressive strength of 3000 psi at 28 days meeting the requirements of NCTCOG Class “A” concrete. Compressive strength tests conducted by an independent testing laboratory shall be submitted to the City staff for confirmation. All testing costs shall be paid by the developer or his contractor.
2. Reinforcing steel shall be billet steel conforming to the requirements of ASTM A-615-GR.60.
3. Concrete for piers shall be placed within 8 hours of drilling pier holes, and protected, and poured dry immediately.
4. Material used for screening fence shall be approved by the City of Lancaster Standard Details.
5. Mortar shall be Type “S”.
6. Construction shall be in accordance with the requirements of the City of Lancaster General Construction Design Manual; “WALL-01” (Standard Construction Details).
7. The wall shall be a minimum of six (6’) feet in height as measured from the nearest/adjacent sidewalk grade. No masonry or concrete screening wall or column shall exceed eight (8’) feet in height unless the wall is functioning as a retaining wall and is designed as such. Note: Wood is prohibited.
8. Unless it has been determined by the City Engineer that no drainage problems are anticipated, openings designed to allow for storm water drainage shall be provided.
9. No prefabricated or simulated screening fence shall be allowed.
10. All screening walls i.e. masonry, concrete, rock, stone, decorative Concrete Masonry Unit (CMU) shall be designed and sealed by a Professional Engineer (Structural or Civil) licensed in the State of Texas. Sealed plans shall be submitted to the City for review.

Location

1. No wall shall be located on public right-of-way.
2. Sight triangles shall be provided at street intersections according to the schedule contained in the Lancaster Development Code.
3. The location and placement of a wall shall be installed to avoid conflicts with utility and drainage easements.

B. Plan Approval

1. Plans are to be designed, signed, sealed and dated by a Professional Engineer licensed in the State of Texas and furnished with the following information:
 - a. The title shall include the legal name of the property owner's on which the wall is being constructed.
 - b. A plan view of the wall showing its location, limits, and stationing.
 - c. A profile of the wall including grades for the top of the concrete mow-strip, adjacent top of curb, sidewalk and finished floor of proposed and/or existing adjacent slabs.
 - d. Elevation view of a typical column.
 - e. Elevation view of the wall.
 - f. Mow-strip detail
 - g. Drainage clearance under wall (2" minimum).
 - h. Steel tensile strength.
 - i. Concrete compressive strength.
 - j. Wind load calculations.
 - k. Construction details of screening walls.
 - l. Pier design.
2. City approval will be given through either 1) a new building permit application as part of a new improvement or 2) as part of a civil package review for a new retail or commercial development project. If detailed construction plans are not a part of the civil package, a new building permit application will be required.

SECTION 1-08 EARTHWORK

A. Definitions

1. Conceptual Grading Plan- A topographical map of the subdivision to provide a clear definition of the initial elevations, watercourses, and drainage patterns. The grading plan shall involve a minimum 50' feet beyond the subdivision limits to establish an overview of the area. In addition, a proposed grading plan shall be provided. The two set of plans must be sealed and signed by a Professional Engineer Licensed by the State of Texas.
2. Excavation- The removal of turf, soil, rock or weeds such that the surface is six (6") inches lower than the initial elevation.
3. Fill- The deposition of rock, concrete, soil or sod such that the cumulative thickness of all materials is equivalent to six (6") inches or greater. All backfill shall not have rock or stone (debris) larger than four (4") inch in all directions.
4. Final Grading Plan-A topographical map of the subdivision with sufficient perimeter area to provide a clear definition of the initial elevations, watercourses and drainage patterns. In addition, the plan shall include two (2') feet contours, spot elevations and flow arrows. The plan is in sufficient detail and scale to determine limits and depths of excavation or fill. The plan must be signed and sealed by a Professional Engineer licensed in the State of Texas. All fill and excavation shall be mechanically compacted per the geotechnical report. All material testing reports must be furnished to the City.
5. Grading-The movement of dirt, top soil, grass, native material, brush, trees, landscaping or other forms of surface material which will result in a long term difference of six (6") inches or greater from the initial elevation.
6. Initial Elevation-The mean sea level elevation as it existed five (5) years prior to the current date.
7. Multi-Lot Subdivision-A division of any tract of land into two or more parcels.

B. Unplatted Multi-Lot Subdivision

When multi-lot subdivision has been proposed for platting, but has not yet been approved by the City, the following provisions shall govern the excavation and fill process.

1. A conceptual grading plan and related geotechnical report shall be submitted to the Engineering Division. The plan and report will be reviewed for consistency with City ordinances and policies. If the plan and report are approved, an early grading permit will be issued to allow grading to begin as site plan approval by the Planning division is required. An early grading permit application submittal will include grading plans, erosion control plans, the permit application and required fees. With an early grading permit, no utilities will be allowed.
2. The process must be inspected by a construction inspector of Engineering. All lifts shall be tested for compaction per the approved geotechnical report and reviewed by the testing laboratory. All tests shall be done by an independent testing laboratory. Copies of all tests shall be furnished to the city for their review and approval.
3. Areas which fail the compaction tests shall be excavated, the material replaced (or new material imported, depending on moisture content) re-compacted and retested at the contractor's expense.
4. Areas which have been filled without adequate compaction tests or without inspection by the City, shall be considered as areas which have failed the compaction tests and such fill removed and the fill section constructed with proper testing and observation.

C. Platted Multi-Lot Subdivision

When a multi-lot subdivision has been platted in accordance with the existing Subdivision Ordinance and the plat has been filed with the County, the following provisions shall apply.

1. A final grading plan shall be submitted to the Engineering Division. The plan will be reviewed for consistency with City ordinances and policies. If the plan is approved, then applicant will be allowed to apply for an early grading permit will be issued to allow grading to begin as site plan approval by the Planning division is required. An early grading permit submittal includes grading plans, erosion control plans, and a grading permit application. With an early grading permit, no utilities will be allowed.
2. The process must be inspected by a construction inspector from Engineering and all fill within public rights-of-way shall be tested for compaction. Tests results to be furnished to Engineering as they are completed.
3. Areas which fail the compaction tests shall be excavated, the material replaced (or new material imported, depending on moisture content) re-compacted and retested at the contractor's expense.

4. Areas which have been filled without adequate compaction tests or without inspection by a construction inspector from Engineering shall be considered as areas which have failed the compaction tests and such fill removed.
5. Areas of a multi-lot subdivision which are not graded at the same time as the rest of the subdivision will be required to comply with the provisions of a single-lot subdivision.

D. Single-Lot Subdivision

All single lot subdivisions shall be required to obtain a Grading and Excavation Permit from Building Inspections. Note that single-lot subdivision shall be considered multi-lot if the subject parcel and any adjacent parcels are filled.

E. Testing

All compaction shall be tested by an independent soil-testing laboratory approved by the City.

1. The testing facility must be registered with the City. The Engineering Division may disallow any and all firms which cannot or refuse to meet the minimum criteria established.
2. All lots that are filled must be compacted per the approved geotechnical report.
3. All lifts shall be tested per the approved geotechnical report and reviewed by the testing laboratory on each lot. Copies of all tests shall be furnished to the city for their review and approval.
4. Slopes created by excavation or fill shall not exceed six horizontal to one vertical (6:1) in residential areas, and shall not exceed three horizontal to one vertical (3:1) in other locations approved by the City.
5. All select backfill shall not have rock or stone (debris) larger than four (4") inch in all directions.

EROSION CONTROL

1. Every soil disturbing activity shall have an accompanying erosion control plan (ECP) and either a construction site notice (CSN) for those activities disturbing more than 1 but less than 5 acres, or a notice of intent (NOI) for those activities disturbing more than 5 acres. A copy of the appropriate CSN or NOI shall be provided to the City of Lancaster (City Engineer) prior to issuance of an early grading permit or construction activities.
2. The CSN or NOI shall be posted in a location viewable to the public until construction is complete and a notice of termination (NOT) is submitted. The Storm Water Prevention Plan (SW3P) shall be readily available for review by federal, state or local authorities.
3. No soil disturbing activities will occur prior to SW3P, ECP and associated Best Management Practices (BMP) being fully implemented, then inspected by the City of Lancaster's Construction Inspector.
4. The contractor shall comply with the City of Lancaster's MS4 Stormwater Ordinance. The current NCTCOG Best Management Practices Manual, The Texas Pollutant Discharge Elimination System (TPDES) General Construction Permit TXR 150000, and any other state and or local regulations.
5. The site shall be reviewed by the contractor or his representative weekly and after any major storm adjustments/repairs may be inspected and approved.
6. Final acceptance of a site shall be contingent upon vegetation being established per the TPDES General Construction Permit TXR150000, and proper Notice of Termination (NOT) has been submitted to the State of Texas. A copy of the Notice of Termination (NOT) shall be submitted to the City of Lancaster.
7. Contractor (or Subcontractor) shall provide a copy of self-inspection report (related to SW3P) to the City Construction Inspector on a weekly basis.

SECTION 1-9 UTILITIES, R-O-W, TELECOMMUNICATION

- A. Installation of utilities in existing streets shall be by bore (open cut not allowed), unless approved in writing by the City Engineer. Plans that have been approved with an open cut must be validated by the City Engineer and an Excavation Permit obtained prior to cutting. Tunneling and boring under city streets, paved structures, and tree lines shall be accomplished by means of jacking, boring or tunneling equipment, which is subject to City approval through the Engineering Division prior to the start of operation.
- B. Lane and Road Closures: A detailed traffic control plan shall be prepared and signed by a professional engineer unless approved by the City Engineer. Provide a copy of the approved plan and notify the City Engineer at least 72 hours in advance so the appropriate City Emergency Services can be notified. Lane closure of any street and/or intersection will be between the hours of 9 am to 3 pm, unless approved by the City of Lancaster.
- C. The voids outside of the carrier pipe or casing pipe shall be backfilled by hydraulically placed material so that there are no open voids over the roof of the tunnel or bore. This shall be done without damage to the roadway surface. Shall maintain a minimum eighteen (18”) inches clearance from water- and wastewater utility lines.
- D. All bore pits, trenches, open cuts, and holes shall be inspected and backfilled within 24 hours after installation of utility lines. The method of compaction shall be in accordance with the earthwork section of this manual. Any excess or surplus material resulting due to displacement of utility lines and conduits shall be disposed of in an acceptable manner to the City.
- E. Utility clearances that apply to streets shall apply to alleys and driveways.
- F. The Contractor shall be required to install all necessary warning and safety devices in accordance with TXDOT Manual of Traffic Control Devices Part IV and or those warning and safety devices required to protect the safety and health of the public until the work has been furnished and accepted by the City.
- G. Utility crossings of state and federal highways or railroads shall meet the requirements of that agency. Approved permits from those agencies shall be provided to the City, prior to construction commencing.
- H. H. The use of a casing pipe will be based upon the specific project location and soil conditions. The approved plans will show casing pipe if it is to be used on the specific bore in question.

For R-O-W and Telecommunications, refer to the Lancaster Code of Ordinances; ARTICLES 24.09 (RIGHT-OF-WAY MANAGEMENT) & 24.10 (CERTAIN USES OF PUBLIC RIGHTS-OF-WAY AND ERECTION OF NETWORK NODES AND SUPPORT POLES IN THE PUBLIC RIGHT-OF-WAY) as they can be found at: <http://z2codes.franklinlegal.net/franklin/Z2Browser2.html?showset=lancasterset>

**CITY OF LANCASTER, TEXAS
WIRELESS COMMUNICATION USE OF CITY WATER TANKS**

GENERAL REQUIREMENTS

SUBMITTAL PROCESS

1. Letter to City requesting consideration to use specifically identified site. Letter to include type of wireless communication and general equipment proposal. Include a statement that no expense will be borne by the City for submittal information. Statement to acknowledge public hearing and action by City Council required to accept or reject request to use a City owned site.
2. Approval and subsequent executed contract agreements will include full insurance coverage as outlined in Attachment A.
3. Detailed submittal of engineering drawings.
4. Letter from Tank Manufacturer.
5. Artist rendering of additions to the site.

COSTS/LEASE TERMS

1. The City desires a 5-year lease with two 5-year renewable lease options for each site.
2. All expenses required for additions to the site and telecommunications maintenance shall be at the expense of the telecommunications company.
3. All expenses required to make a complete submittal package shall be at the expense of the telecommunications company.
4. Telecommunications companies will be responsible for obtaining and paying for all required utilities.
5. Lease terms can be structured to provide monthly payments or in kind services or a combination of each. Lease terms should consider the renewable options and should include inflationary increases.

REQUIREMENTS

1. Public hearings will occur that will be hosted by the City Council or other Council appointed board. Final decisions of acceptance or rejection of each proposal will be made by the City Council.
2. Fully developed plans with complete details will be required as part of any submittal package for consideration. Artist rendering or illustration will be required to show the effects of telecommunication additions to the tank structure and effects on adjacent properties.
3. Telecommunication companies will be responsible for repairs and relocation's to existing irrigation and landscaping due to their activities.
4. All improvements to the site shall be permanent in nature and meet all building codes. Cabinets and structures shall be adequately landscaped. Improvements shall blend with the surrounding community.
5. No exterior lighting is expected. All lighting shall be internal to telecommunications equipment.
6. Telecommunications companies shall provide typical routine maintenance schedule and projected emergency access to the City sites.
7. No entry into the tank structure shall be permitted by telecommunications personnel, unless in the company of the City of Lancaster personnel.
8. All access to the site will be through the existing gate. Telecommunications companies will have access to the site 24-hours a day.
9. Telecommunication company shall have tank manufacturer review proposed attachments to water tank and provide a letter, sealed and signed by a Professional Engineer registered in the State of Texas, stating that the improvements have been reviewed and that no adverse effects will be placed on the structure due to live, dead and wind loads. Further, the tank manufacturer will need to state any reservations that may exist.
10. No penetrations shall be made to steel or concrete portions of any tank or tank structure without design calculations being provided as part of No. 9 above.
11. Any attachment made to a steel tank or steel tank structure interior or exterior shall be welded and all damage to existing coating system repaired and recoated to match the existing coating system. Attachments shall be coated in the same manner as the repair work. No welding or attachments will be allowed on the wet riser or on the

wet compartment. No telecommunication equipment or appurtenances shall interfere with the City's existing electrical or telecommunication equipment or the alike.

12. Any bands or attachments made to concrete structures shall be stainless steel. Such devices shall not chip or spall the existing concrete.
13. All cable or conduit runs located on the exterior of the tank or tank structure shall be totally enclosed. Such enclosed cable or conduit trays on concrete structure shall be stainless steel, on steel tank structure the trays shall be steel and shall be coated to match the existing color of the tank and tank structure. All conduit runs between tank and telecommunication's cabinets or buildings shall be underground.
14. Any cable or conduit runs located on the interior of the tank or tank structure shall be attached to existing ladders in a secure and rigid fashion. Such attachments or hangers shall be stainless steel. In addition, no cable or conduit shall be run and/or attached to the existing floor. Empty conduits in the floor may be made available for telecommunication company's use. Cable or conduit runs shall not interfere with ladders, safety devices or access routes.
15. Any secondary user or a site shall make improvements that are aesthetically compatible with the primary telecommunication user, buildings, cabinets, landscaping and antennas shall match.

TANK PREPARATION AND PAINTING

A. Surface Preparation

All steel surfaces shall be thoroughly cleaned of all existing paint and mill scale by abrasive blasting in the field after erection of all steel members. All interior surfaces shall be abrasive blasted to a near white metal blast in accordance with Steel Structures Painting Council Specification SSPC-SP10 after erection of all steel members. All exterior surfaces shall be abrasive blasted to a commercial finish in accordance with SSP-SP6. If blasting of any previously painted surfaces is required, the blast finish shall be feathered to provide a smooth uniform paint finish.

Final determination of blasting quality shall be determined by the Owner. All abrasive blasting shall be performed in full accordance with the latest regulations issued by the Texas Air Control Board.

The Contractor shall be in full conformance with the Texas Air Control Board's (TNRCC) General Rules for nuisance. If such a nuisance arises from the Contractor's work on this project, the Contractor shall immediately shutdown the work causing the nuisance and makes the necessary changes in operation, including preventative shields and containment. Contractor shall provide whatever is necessary to resolve the nuisance caused by the Contractor's operation to the satisfaction of the State of Texas and the City. All cost of whatever the nature shall be included in the unit price bid for the project.

B. Standard of Comparison

The specific paint referred to in these specifications is manufactured by Valspar Chemical Company, or Carboline and is presented as a standard of comparison. Other paints may be acceptable if they are equal in quality as determined by the Owner. The Owner shall determine the acceptability of paints to be used. The Owner reserves the right to request the Contractor to supply a complete history of the paint system he proposes to use. This information would be used to determine acceptability of the system. All paints applied are to be by the same manufacturer. Any deviation of the specified paint systems must be presented at the Owner's Pre-bid Conference in writing for acceptance.

C. Paint System

All tank surfaces shall be coated after erection of all members as follows:

1. Interior Steel Painting

The interior paint system shall be certified by the national Sanitation Foundation – ANSI/NSF Standard 61 Drinking Water System Components for Potable Water Coatings.

After interior surfaces have been abrasive blasted they shall be painted by spraying with one coat of food grade Valspar 32-D-7 PWR High Build Epoxy, or Carboline 191 Epoxy Primer. Minimum dry film thickness shall be 5.0 mils throughout. All touch-up painting shall also be done with the approved prime paint. Prior to the first coat of paint, all welds shall be coated by brush with the approved prime paint thinned by 50% with the approved paint supplier's food grade thinner.

The second interior and final coat shall be applied by spraying one coat of white food grade Valspar 32-W-3 PWR Hi Build Epoxy, or Carboline 191 Epoxy Finish. The minimum dry film thickness of the second coat shall be 5.0 mils throughout.

Total dry film thickness of the interior paint after seven days (75°F Temperature) drying time shall not be less than 10.0 mils throughout. Contractor shall provide adequate forced ventilation during application and curing to achieve required results. Each coat of paint shall be applied in a uniform thickness and shall be feathered as necessary at its edges to prevent lap marks and provide a smooth paint finish. All interior paint shall comply with ANSI/NSF Standard 61.

2. Exterior Steel Painting

After exterior surfaces have been abrasive blasted they shall be painted by spraying or rolling, one coat of Valspar Val-Chem Hi Build Epoxy Primer. Minimum dry film thickness shall be 5.0 mils throughout.

The final exterior coat shall be applied by spraying or rolling one coat of Valspar, V 41 Series, Val-Chem Urethane Enamel, or Carboline 133 HB. The minimum dry film thickness shall be 5.0 mils throughout.

The minimum total dry film thickness of the exterior paint system shall be no less than 10.0 mils throughout. Each coat of paint shall be applied in a uniform thickness and shall be feathered as necessary at its edges to prevent lap marks and provide a smooth paint finish. The final coat may require placing this coating in more than one (1) coat to insure a uniform color. It shall be the Contractors responsibility to produce the uniform cover on the exterior of this tank. If additional coats are used they shall be

placed in thickness of 1.5 mils minimum.

Color of the exterior of steel shall be white. The column shall not be coated. Colors shall be reviewed and approved by the Owner. Colors for logos shall be selected and approved by the Owner. The logo shall consist of two coats of final coat 2.5 mils average, and shall include two coats of a clear coat compatible with the paint system. The logo will appear on four sides of the tank.

D. Application

Coatings shall be applied in accordance with paint manufacturer's recommendations found on the paint data sheets and are subject to inspection at all times by the on-site representative. Paint manufacturer's data sheets shall be submitted as part of the shop drawing submittal process. Contractor shall follow the Steel Structures Painting Council Good Painting Practice except where exceeded in these specifications.

No painting shall take place utilizing the interior paint system unless the atmospheric temperature is above 50°F and metal surface temperatures is about 50°F above the dew point. The relative humidity shall not be greater than 80%. Painting also shall not proceed if the temperature is expected to fall below 40°F before the paint has dried to the recoat window (24 hours) or if the surface temperature is at or above 110°F.

No painting shall take place utilizing the first coat of exterior paint system unless the atmospheric temperature is above 50°F and metal surface temperatures is above 50°F and a minimum of 5°F above the dew point. The relative humidity shall not be greater than 85%. No painting shall take place utilizing the several and final coat of the exterior paint system unless the atmospheric temperature is above 40°F above the dew point. The relative humidity shall not be greater than 89%. Painting utilizing the exterior system shall not proceed if the temperature is expected to fall below 40°F before the paint has dried to the recoat window (24 Hours) or if the surface temperature is at or above 110°F.

Contractor shall have sufficient number of compressors and adequate compressor output on site to complete the blasting and painting in a timely manner.

Contractor shall have on site and utilize during the coating of the tank, two (2) 45:1 Ratio airless spray Graco Pumps or equal in working order.

All spray equipment shall be inspected and approved by Owner's representative before any application is begun. A moisture trap shall be placed in line from air supply to pressure pot and spray gun. This trap shall be opened slightly to provide a continuous bleed. Regulators and gauges shall be provided for air to

both pressure pot and spray gun.

All abrasive and dust from blasting operations shall be removed from surfaces before paint application is begun. Blasted surfaces shall be coated with one coat of primer during the same day that blasting was done. Primer shall not be applied closer than six inches to non-blasted area. Any subsequent blasting operation shall not result in abrasive particles embedded in the paint film. The sequence to be followed in painting shall be such that a minimum of damage to finished coatings will result.

Spray guns must be held perpendicular to the surface being painted, handled and adjusted in such a manner so dry overspray is kept at a minimum.

The Contractor shall at all times protect the buildings, homes, automobiles and other items from blasting and paint that is being applied to the tank. Contractor shall be solely liable for all claims of damage of whatever nature which results from the blasting and/or painting operations on this project.

E. Inspection

All work shall be done in a workmanlike manner, so that the finished coating on the interior, exterior and all painted surfaces of the tank and structures shall be free from bubbles, runs, drips, ridges, waves and unnecessary brush marks and variations in color. Additionally, all surfaces that will be in contact with potable water shall be free of holidays and pinholes. With the roof structure being seal welded, the roof area (all surfaces above water level) shall be free of holidays and pinholes.

Inspection and acceptance of the abrasive blasting shall be achieved prior to application of the prim coat of paint on the tank. The Contractor shall schedule and coordinate his work with the Owner to allow for expeditious prosecution of the inspection and painting.

All paint film thickness shall be verified by the Contractor by measuring the wet film thickness of each coat as it is applied. The Contractor shall coordinate the use of the painting scaffolds and rigging with the Owner or his representative to provide regular access for the paint inspections. A wet film thickness measurement shall be made for each 100 square feet of surface painted.

All paint will be inspected for applied dry film thickness using a non-destructive magnetic gauge such as a Mikrotest Gauge or an Elkometer. Dry film thickness, pinholes and Holidays shall be inspected throughout the painted surface at locations determined by the Owner. Testing for dry film thickness will be done by the Owner or an independent testing laboratory which is chosen and paid by the Owner. General paint inspection will be done by the Owner. All work shall

be done in a workmanlike manner, so that the finished coating on the interior and exterior of the tank shall be free from bubbles, runs, drips, ridges, waves, brush marks and variations in color.

The Contractor shall minimize lap marks created from the seal of the containment system. These areas shall be strategically located in welled seams.

F. Safety Precautions

The Contractor shall be fully responsible for the safety of the workmen on this project and public in the vicinity of this tank at all times during the removal of the rust and mill scale, painting and sterilization of the tank. The Contractor shall be responsible for meeting all OSHA Safety Standards and Regulations. Protective equipment, abrasive resistant clothing, safety shoes, leather gloves, ear protection and OSHA approved respirators shall be utilized as a minimum during blasting and painting on this tank. All respirators shall be air fed. Contractor shall provide all workers, Owner Personnel and all other persons on site the minimum described safety equipment as well as that required by OSHA.

G. Contractor Liability

Contractor shall be solely liable for all claims for personal and property damage, including death, which result from the blasting, painting and sterilization operations on this project. The Contractor shall take special precautions to control paint from damaging automobiles, homes and other facilities in the developed area around the tank. If complaints are received by the Contractor or the Owner, the Contractor shall investigate the complaint immediately and report in writing to the Owner corrective action he is taking. It shall be the Contractor's complete responsibility to correct or make whole any damage or injuries caused by his painting operations.

EXHIBIT A

INSURANCE REQUIREMENTS

Vendor shall procure and maintain for the duration of the contract, insurance against claims for injuries to persons or damages to property that may arise from or in connection with the performance of the work hereunder by the vendor, his agents, representative, employees or subcontractors. The cost of such insurance shall be included in the Contractor's bid.

A. Minimum Scope of Insurance

Coverage shall be at least as broad as:

1. ISO Form Number GL 0002 (Ed 1/72) covering Comprehensive General Liability and ISO Form Number GL 0404 covering Broad Form Comprehensive General Liability; or ISO Commercial General Liability coverage ("occurrence" Form CG 0001). "Claims made" form is unacceptable except for professional liability.
2. Automobile liability shall include all owned, hired and non-owned vehicles.
3. Worker's Compensation insurance as required by the Labor code of the State of Texas, including Employer's Liability Insurance.

B. Minimum Limits of Insurance

Vendor shall maintain limits not less than:

1. Commercial General Liability: \$5,000,000 per occurrence for bodily Injury, personal injury and property damage. \$10,000,000 Aggregate Policy will include coverage for a) Premises – Operations; b) Broad Form Contractual Liability; c) Products and Completed Operations; d) Use of Contractors and Subcontractors; e) Personal Injury; f) Broad Form Property Damage; g) Explosion Collapse and Underground (XCU) Coverage, Fire Damage, Medical Expense. NOTE: The aggregate loss limit applies to each project.
2. Automobile liability: \$1,000,000 combined single limit per accident, for bodily injury and property damage.
3. Worker's Compensation and Employer's Liability: Worker's Compensation limits as required by the Labor Code of the State of Texas and Statutory Employer's Liability Limits.

C. Deductibles and Self-Insured Retentions

Any deductible or self-insured retention must be declared to and approved by the City.

D. Other Insurance Provisions

The policies are to contain, or be endorsed to contain the following provisions:

1. General Liability and Automobile Liability Coverage

- a. The City, its officers, officials, employees, Boards and volunteers are to be added as “Additional Insureds” as respects liability arising out of activities performed by or on behalf of the vendor, products and completed operations of the vendor, premises owned, occupied or used by the Contractor. The coverage shall contain no special limitations on the scope of protection afforded to the City, its officers, officials, employees or volunteers. It is understood that the business auto policy under “Who is an Insured” automatically provides liability coverage in favor of the City.
 - b. The vendor’s insurance coverage shall be primary insurance as respects the City, its officers, officials, employees and volunteers. Any insurance or self-insurance maintained by the City, its officials, employees or volunteers shall be excess of the vendors insurance and shall not contribute with it.
 - c. Any failure to comply with reporting provisions of the policy shall not affect coverage provided to the City, its officers, officials, employees, Boards and Commissions or volunteers.
 - d. The vendor’s insurance shall apply separately to each insured against which claim is made or suit is brought, except with respect to the limits of the insured’s liability.
2. **Worker’s Compensation and Employer’s Liability Coverage**
The insurer shall agree to waive all rights of subrogation against the City, its officers, officials, employees and volunteers for losses arising from work performed by the vendor for the City.
 3. **All Coverages**
Each insurance policy required by this clause shall be endorsed to state that coverage shall not be suspended, voided, canceled or non-renewed by either party, reduced in coverage or in limits except after ten (10) ten days prior written notice by certified mail, return receipt requested, has been given to the City.
- E. **Acceptability of Insurers**
The City prefers that Insurance be placed with insurers with an A.M. Best’s rating of no less than A-:VI, or, A or better by Standard & Poors. This requirement will be waived for worker’s compensation coverage only for those vendors whose worker’s compensation coverage is placed with companies who participate in the State of Texas Worker’s Compensation Assigned Risk Pool. Professional Liability carriers will need to be approved by the Risk Manager.
- F. **Verification of Coverage**
Contractor shall furnish the City with certificates of insurance effecting coverage required. The certificates for each insurance policy are to be signed by a person

authorized by that insurer to bind coverage on its behalf. The certificates are to be on forms provided by the City and are to be received and approved by the City before work commences. The City reserves the right to require complete, certified copies of all required insurance policies, at any time.

Section 1-10 - Stormwater Pollution Program

All contractors (and their subcontractors) shall abide by all city, state, and federal stormwater regulations while performing work in the City of Lancaster. The City of Lancaster has an MS4 program as contractors shall comply with the City's stormwater management program best management practices; Lancaster Code of Ordinances; Article 24.08 – Stormwater Management as this can be found at:

<http://z2codes.franklinlegal.net/franklin/Z2Browser2.html?showset=lancasterset>

Ordinance 2012-07-11 adopted 7/23/12

Section 1-11 - Benchmarks

GPS MONUMENT CONTROL SHEET

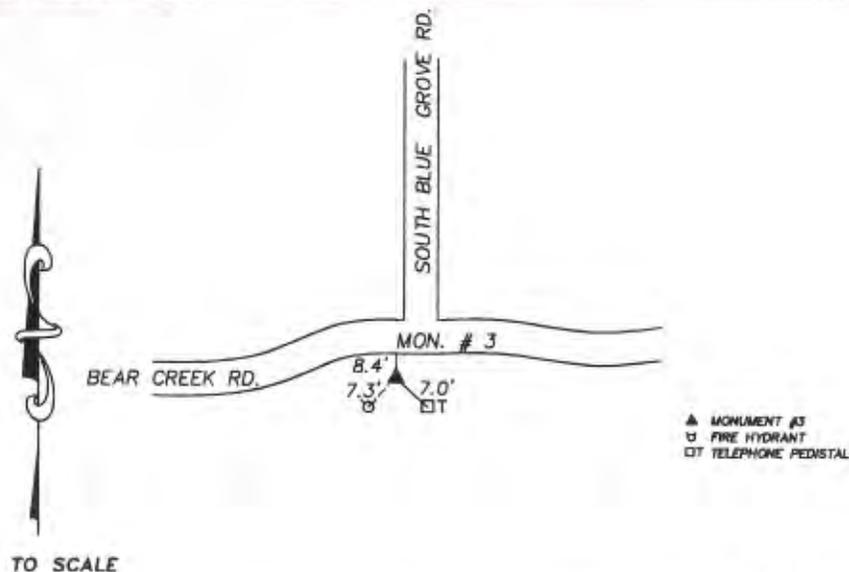
| | | | | | |
|---|----------------|------------------------|---------------------------------------|---|-----------------------------------|
| STATION NAME: LANCASTER #3 | | DATE: OCT & NOV. 2001 | ADJUSTED HORIZONTAL CONTROL DATA | | |
| MONUMENT TYPE: 3 1/2" BRASS MON. STAMPED #3 | | | ORDER: 2ND | SURVEY METHOD: GPS <input checked="" type="checkbox"/> OTHER <input type="checkbox"/> | |
| CITY: LANCASTER | COUNTY: DALLAS | STATE: TX | COMBINED SCALE FACTOR: 0.999884456 | | |
| SURVEYOR: VANNOY & ASSOC., INC. | | PREPARED BY: KCC | NAD 27 GRID DATA | COORDINATES (U.S. SURVEY FEET) | PLANE AZIMUTH ANGLE (CONVERGENCE) |
| PROJECT NUMBER: 0107-012 | | | STATE: TX | | |
| DISTANCE & DIRECTIONS TO REFERENCES MARKS | | | ZONE: NC | | |
| 8.4' | SOUTH | SOUTH EDGE OF PAVEMENT | CODE: 4202 | | |
| 7.3' | NORTHEAST | FIRE HYDRANT | // | | |
| 7.0' | NORTHWEST | TELEPHONE PEDISTAL | NAD 83 GRID DATA | COORDINATES (U.S. SURVEY FEET) | PLANE AZIMUTH ANGLE (CONVERGENCE) |
| | | | STATE: TX | N 6891231.1607 | 0°56'00.932" |
| | | | ZONE: NC | E 2495851.7432 | |
| | | | CODE: 4202 | | |
| | | | METRIC CONVERSION FACTOR: 3.280833333 | | |

DESCRIPTION TO POINT:

3 1/2" BRASS CAP WITH "CITY OF LANCASTER MONUMENT NO. 3" STAMPED ON IT BEING APPROXIMATELY 0.3' BELOW THE GROUND AT THE INTERSECTION OF SOUTH BLUE GROVE ROAD AND BEAR CREEK ROAD. MONUMENT IS LOCATED 8.4' SOUTH OF THE SOUTH EDGE OF PAVEMENT OF BEAR CREEK ROAD, 7.3' NORTHEAST OF A FIRE HYDRANT, AND 7.0' NORTHWEST OF A TELEPHONE PEDISTAL.

| | | | | |
|---------------|----------------------------|---------------------------------|--|--------------|
| GEODETIC DATA | POSITION | NAD 27 <input type="checkbox"/> | NAD 83 <input checked="" type="checkbox"/> | ELEV: (FEET) |
| | LATITUDE: 32°33'38.58669" | NORTH | | 601.1799 |
| | LONGITUDE: 96°47'17.61111" | WEST | | |

FIELD SKETCH:



▲ MONUMENT #3
 □ FIRE HYDRANT
 ○ TELEPHONE PEDISTAL

GPS MONUMENT CONTROL SHEET

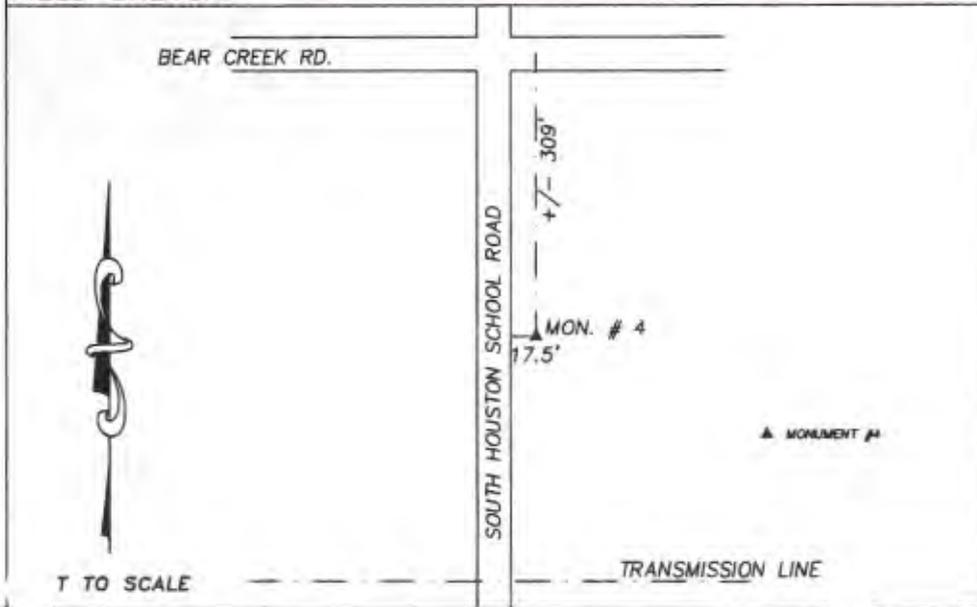
| | | | | | |
|---|----------------|--|--|---|--------------------------------------|
| STATION NAME: LANCASTER #4 | | DATE: OCT & NOV. 2001 | ADJUSTED HORIZONTAL CONTROL DATA | | |
| MONUMENT TYPE: 3 1/2" BRASS MON. STAMPED #4 | | | ORDER: 2ND | SURVEY METHOD: GPS <input checked="" type="checkbox"/> OTHER <input type="checkbox"/> | |
| CITY: LANCASTER | COUNTY: DALLAS | STATE: TX | COMBINED SCALE FACTOR: 0.999885184 | | |
| SURVEYOR: VANNOY & ASSOC., INC. | | PREPARED BY: KCC | NAD 27 GRID DATA | COORDINATES (U.S. SURVEY FEET) | PLANE AZIMUTH ANGLE (CONVERGENCE) |
| PROJECT NUMBER: 0107-012 | | | STATE: TX | | |
| DISTANCE & DIRECTIONS TO REFERENCES MARKS | | | ZONE: NC | | |
| +/- 309' | SOUTH | CL OF BEAR CREEK ROAD | CODE: 4202 | | |
| 17.5' | EAST | EDGE PAVEMENT OF SOUTH HOUSTON SCHOOL ROAD | NAD 83 GRID DATA | | |
| | | | COORDINATES (U.S. SURVEY FEET) | PLANE AZIMUTH ANGLE (CONVERGENCE) | |
| | | | STATE: TX | N 6890835.4443 | 0°55'27.236" |
| | | | ZONE: NC | | |
| | | | CODE: 4202 | E 2490570.0513 | |
| | | | METRIC CONVERSION FACTOR: 3.2808333333 | | |

DESCRIPTION TO POINT:

3 1/2" BRASS CAP WITH "CITY OF LANCASTER MONUMENT NO. 4" STAMPED ON IT BEING APPROXIMATELY 0.3' BELOW THE GROUND SOUTH OF THE INTERSECTION OF SOUTH HOUSTON SCHOOL ROAD AND BEAR CREEK ROAD, MONUMENT IS LOCATED +/- 309' SOUTH OF THE CENTERLINE OF BEAR CREEK ROAD, AND 17.5' EAST OF EDGE OF PAVEMENT OF SOUTH HOUSTON SCHOOL ROAD.

| | | | | |
|------------------|----------------------------|---------------------------------|--|--------------|
| GEODETIC DATA | POSITION | NAD 27 <input type="checkbox"/> | NAD 83 <input checked="" type="checkbox"/> | ELEV: (FEET) |
| | LATITUDE: 32°33'35.51870" | NORTH | | 588.7492 |
| | LONGITUDE: 96°48'19.39435" | WEST | | |

FIELD SKETCH:



GPS MONUMENT CONTROL SHEET

| | | |
|----------------------------|-----------------------|----------------------------------|
| STATION NAME: LANCASTER #5 | DATE: OCT & NOV. 2001 | ADJUSTED HORIZONTAL CONTROL DATA |
|----------------------------|-----------------------|----------------------------------|

| | | |
|---|------------|---|
| MONUMENT TYPE: 3 1/2" BRASS MON. STAMPED #5 | ORDER: 2ND | SURVEY METHOD: GPS <input checked="" type="checkbox"/> OTHER <input type="checkbox"/> |
|---|------------|---|

| | | | |
|-----------------|----------------|-----------|-----------------------------------|
| CITY: LANCASTER | COUNTY: DALLAS | STATE: TX | COMBINED SCALE FACTOR: 0.99885381 |
|-----------------|----------------|-----------|-----------------------------------|

| | | | | |
|---------------------------------|------------------|------------------|--------------------------------|-----------------------------------|
| SURVEYOR: VANNOY & ASSOC., INC. | PREPARED BY: KCC | NAD 27 GRID DATA | COORDINATES (U.S. SURVEY FEET) | PLANE AZIMUTH ANGLE (CONVERGENCE) |
|---------------------------------|------------------|------------------|--------------------------------|-----------------------------------|

| | |
|--------------------------|-------------------------------------|
| PROJECT NUMBER: 0107-012 | STATE: TX ZONE: NC CODE: 4202 |
|--------------------------|-------------------------------------|

DISTANCE & DIRECTIONS TO REFERENCES MARKS

| Distance | Direction | Reference Mark | NAD 83 GRID DATA | COORDINATES (U.S. SURVEY FEET) | PLANE AZIMUTH ANGLE (CONVERGENCE) |
|----------|-----------|------------------------|------------------|--------------------------------|-----------------------------------|
| 90.1' | WEST | WEST END OF GUARD RAIL | | | |
| 12.8' | NORTH | NORTH EDGE OF W. MAIN | | | |
| 6.2' | WEST | WEST SIGN POST | | | |
| | | | | | |
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|-------------------------------------|--------------------------------------|-----------------------------------|
| NAD 83 GRID DATA | COORDINATES (U.S. SURVEY FEET) | PLANE AZIMUTH ANGLE (CONVERGENCE) |
| STATE: TX ZONE: NC CODE: 4202 | N 6899656.8623 E 2496206.8983 | 0°56'04.071" |

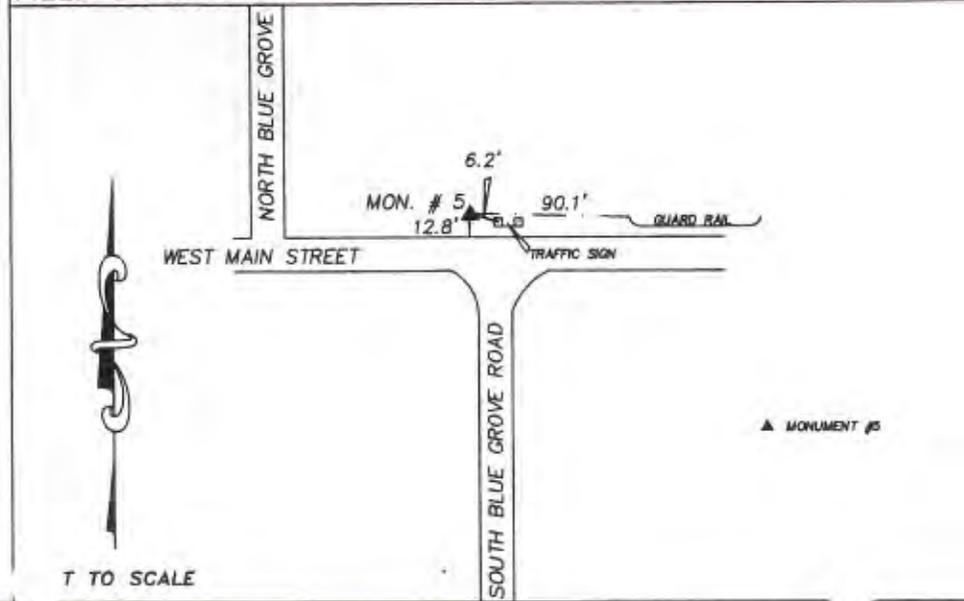
METRIC CONVERSION FACTOR: 3.2808333333

DESCRIPTION TO POINT:

3 1/2" BRASS CAP WITH "CITY OF LANCASTER MONUMENT NO. 5" STAMPED ON IT BEING APPROXIMATELY 0.3' BELOW THE GROUND NORTH OF THE INTERSECTION OF SOUTH BLUE GROVE ROAD AND WEST MAIN STREET, MONUMENT IS LOCATED 90.1' WEST OF THE WEST END OF A GUARDRAIL ON THE NORTH SIDE OF WEST MAIN STREET, 12.8' NORTH OF THE NORTH EDGE OF PAVEMENT OF WEST MAIN STREET, AND 6.2' WEST OF THE MOST WESTERLY POST OF A SIGN.

| | | | | |
|----------------|----------------------------|---------------------------------|--|--------------|
| GEODETTIC DATA | POSITION | NAD 27 <input type="checkbox"/> | NAD 83 <input checked="" type="checkbox"/> | ELEV: (FEET) |
| | LATITUDE: 32°35'01.89514" | | | 511.7572 |
| | LONGITUDE: 96°47'11.85600" | | | |

FIELD SKETCH:



1" TO SCALE

GPS MONUMENT CONTROL SHEET

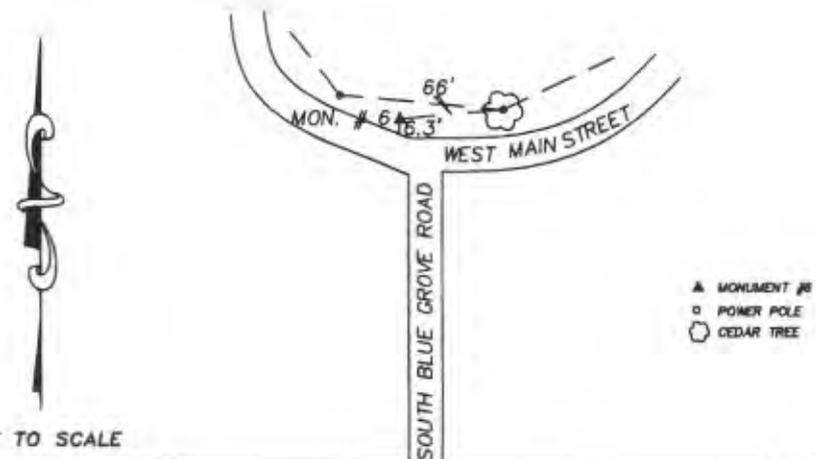
| | | | | | |
|---|----------------|-----------------------|---------------------------------------|---|--------------------------------------|
| STATION NAME: LANCASTER #6 | | DATE: OCT & NOV. 2001 | ADJUSTED HORIZONTAL CONTROL DATA | | |
| MONUMENT TYPE: 3 1/2" BRASS MON. STAMPED #6 | | | ORDER: 2ND | SURVEY METHOD: GPS <input checked="" type="checkbox"/> OTHER <input type="checkbox"/> | |
| CITY: LANCASTER | COUNTY: DALLAS | STATE: TX | COMBINED SCALE FACTOR: 0.999885578 | | |
| SURVEYOR: VANNOY & ASSOC., INC. | | PREPARED BY: KCC | NAD 27 GRID DATA | COORDINATES (U.S. SURVEY FEET) | PLANE AZIMUTH ANGLE (CONVERGENCE) |
| PROJECT NUMBER: 0107-012 | | | STATE: TX | | |
| DISTANCE & DIRECTIONS TO REFERENCES MARKS | | | ZONE: NC | | |
| 66' | SOUTHWEST | POWER POLE IN A CEDAR | CODE: 4202 | | |
| 6.3' | NORTH | NORTH EDGE OF W. MAIN | //////////////////////////////////// | | |
| | | | NAD 83 GRID DATA | COORDINATES (U.S. SURVEY FEET) | PLANE AZIMUTH ANGLE (CONVERGENCE) |
| | | | STATE: TX | N 6898999.1492 | |
| | | | ZONE: NC | | 0°55'32.626" |
| | | | CODE: 4202 | E 2491284.0401 | |
| | | | METRIC CONVERSION FACTOR: 3.280833333 | | |

DESCRIPTION TO POINT:

3 1/2" BRASS CAP WITH "CITY OF LANCASTER MONUMENT NO. 6"
 STAMPED ON IT BEING APPROXIMATELY 0.3' BELOW THE GROUND NORTH OF
 THE INTERSECTION OF NORTH HOUSTON SCHOOL ROAD AND WEST MAIN
 STREET, MONUMENT IS LOCATED 66' SOUTHWEST OF POWER POLE IN A BIG
 CEDAR TREE, AND 6.3' NORTH OF THE NORTH EDGE OF PAVEMENT OF WEST
 MAIN STREET.

| | | | | |
|----------------|----------------------------|---------------------------------|--|--------------|
| GEODETTIC DATA | POSITION | NAD 27 <input type="checkbox"/> | NAD 83 <input checked="" type="checkbox"/> | ELEV: (FEET) |
| | LATITUDE: 32°34'56.17834" | NORTH | | 512.4708' |
| | LONGITUDE: 96°48'09.51136" | WEST | | |

FIELD SKETCH:



- ▲ MONUMENT #6
- POWER POLE
- CEDAR TREE

GPS MONUMENT CONTROL SHEET

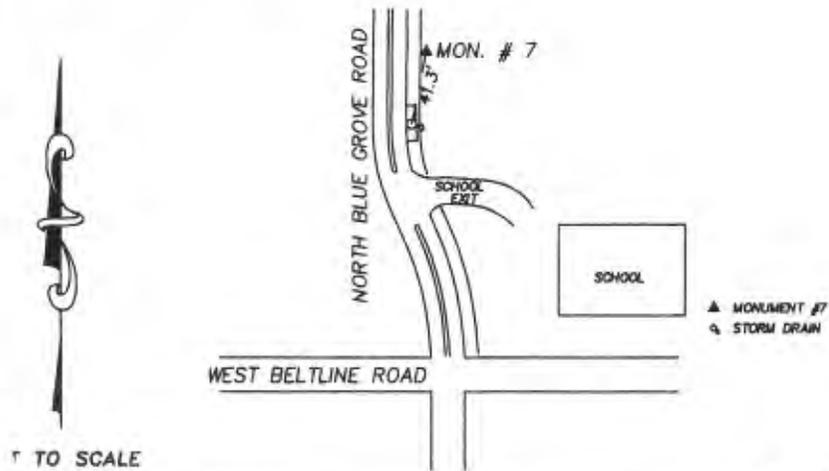
| | | | | | |
|---|----------------|------------------------------------|-------------------------------------|---|--|
| STATION NAME: LANCASTER #7 | | DATE: OCT & NOV. 2001 | ADJUSTED HORIZONTAL CONTROL DATA | | |
| MONUMENT TYPE: 3 1/2" BRASS MON. STAMPED #7 | | | ORDER: 2ND | SURVEY METHOD: GPS <input checked="" type="checkbox"/> OTHER <input type="checkbox"/> | |
| CITY: LANCASTER | COUNTY: DALLAS | STATE: TX | COMBINED SCALE FACTOR: 0.999882356 | | |
| SURVEYOR: VANNOY & ASSOC., INC. | | PREPARED BY: KCC | NAD 27 GRID DATA | COORDINATES (U.S. SURVEY FEET) | PLANE AZIMUTH ANGLE (CONVERGENCE) |
| PROJECT NUMBER: 0107-012 | | | STATE: TX ZONE: NC CODE: 4202 | | |
| DISTANCE & DIRECTIONS TO REFERENCES MARKS | | | | | |
| 41.3' | NORTH | CENTER OF A STORM DRAIN MANHOLE | NAD 83 GRID DATA | | |
| 0.4' | EAST | EAST EDGE OF SIDEWALK | | | |
| | | | COORDINATES (U.S. SURVEY FEET) | | PLANE AZIMUTH ANGLE (CONVERGENCE) |
| | | | STATE: TX ZONE: NC CODE: 4202 | | N 6903076.2492 E 2495691.6682 0°56'01.143" |
| METRIC CONVERSION FACTOR: 3.2808333333 | | | | | |

DESCRIPTION TO POINT:

3 1/2" BRASS CAP WITH "CITY OF LANCASTER MONUMENT NO. 7"
STAMPED ON IT BEING APPROXIMATELY 0.3' BELOW THE GROUND NORTH OF
THE INTERSECTION OF NORTH BLUE GROVE ROAD AND BELTLINE, MONUMENT
IS LOCATED NORTH OF THE EXIT OF A SCHOOL, 41.3' NORTH OF THE CENTER
OF A STORM DRAIN MANHOLE, AND 0.4' EAST OF THE EAST EDGE OF A
SIDEWALK.

| | | | | |
|-------------------|----------------------------|---------------------------------|--|--------------|
| GEODETTIC DATA | POSITION | NAD 27 <input type="checkbox"/> | NAD 83 <input checked="" type="checkbox"/> | ELEV: (FEET) |
| | LATITUDE: 32°35'35.81041" | | | NORTH |
| | LONGITUDE: 96°47'17.22601" | | | WEST |

FIELD SKETCH:



GPS MONUMENT CONTROL SHEET

STATION NAME: LANCASTER #8 DATE: OCT & NOV. 2001 ADJUSTED HORIZONTAL CONTROL DATA

MONUMENT TYPE: 3 1/2" BRASS MON. STAMPED #8 ORDER: 2ND SURVEY METHOD: GPS OTHER

CITY: LANCASTER COUNTY: DALLAS STATE: TX COMBINED SCALE FACTOR: 0.999882445

SURVEYOR: VANNOY & ASSOC., INC. PREPARED BY: KCC

| | | |
|-------------------------------------|--------------------------------|-----------------------------------|
| NAD 27 GRID DATA | COORDINATES (U.S. SURVEY FEET) | PLANE AZIMUTH ANGLE (CONVERGENCE) |
| STATE: TX ZONE: NC CODE: 4202 | | |

PROJECT NUMBER: 0107-012

DISTANCE & DIRECTIONS TO REFERENCES MARKS

| | | |
|--------|-----------|--|
| 20.6' | SOUTH | EDGE OF PAVEMENT BELTLINE |
| 54.4' | SOUTHWEST | SPEED LIMIT SIGN |
| +/-93' | EAST | EAST OF EDGE OF PAVEMENT HOUSTON SCHOOL ROAD |
| | | |
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|-------------------------------------|--------------------------------------|-----------------------------------|
| NAD 83 GRID DATA | COORDINATES (U.S. SURVEY FEET) | PLANE AZIMUTH ANGLE (CONVERGENCE) |
| STATE: TX ZONE: NC CODE: 4202 | N 6902699.7137 E 2490424.2161 | 0°55'27.527 |

DISTANCE & DIRECTIONS TO REFERENCES MARKS

| | | |
|-------------------------------------|--------------------------------------|-----------------------------------|
| NAD 83 GRID DATA | COORDINATES (U.S. SURVEY FEET) | PLANE AZIMUTH ANGLE (CONVERGENCE) |
| STATE: TX ZONE: NC CODE: 4202 | N 6902699.7137 E 2490424.2161 | 0°55'27.527 |

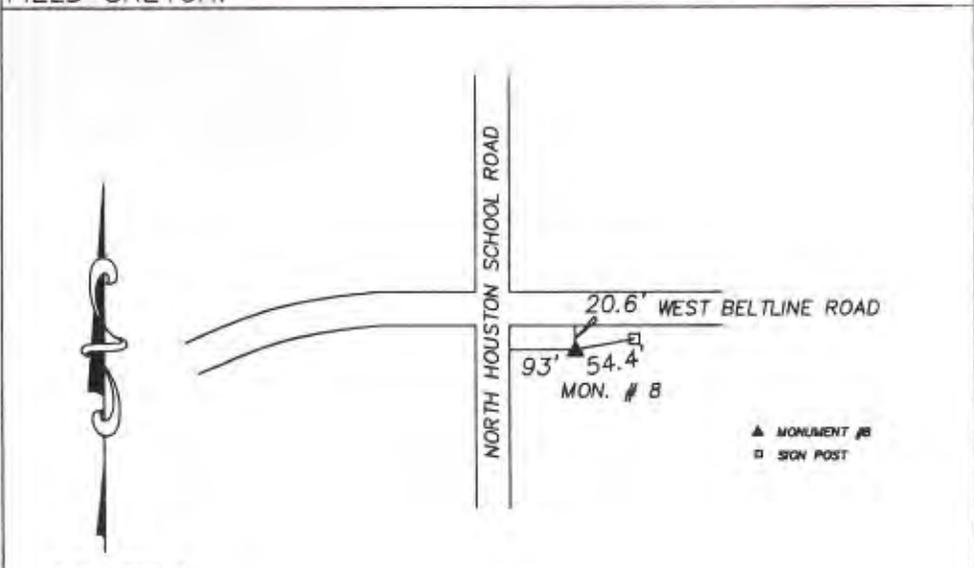
METRIC CONVERSION FACTOR: 3.280833333

DESCRIPTION TO POINT:

3 1/2" BRASS CAP WITH "CITY OF LANCASTER MONUMENT NO. 8" STAMPED ON IT BEING APPROXIMATELY 0.3' BELOW THE GROUND, 20.6' SOUTH OF THE EDGE OF PAVEMENT OF THE SOUTH EDGE OF WEST BELTLINE ROAD, 54.4' SOUTHWEST OF SPEED LIMIT SIGN, AND +/-93' EAST OF THE EAST EDGE OF PAVEMENT OF NORTH HOUSTON SCHOOL ROAD.

| | | |
|----------------|--|--------------|
| GEODETTIC DATA | POSITION NAD 27 <input type="checkbox"/> NAD 83 <input checked="" type="checkbox"/> | ELEV: (FEET) |
| | LATITUDE: 32°35'32.92998" | NORTH |
| | LONGITUDE: 96°48'18.86183" | WEST |
| 548.0341 | | |

FIELD SKETCH:



T TO SCALE

GPS MONUMENT CONTROL SHEET

| | | |
|----------------------------|-----------------------|----------------------------------|
| STATION NAME: LANCASTER #9 | DATE: OCT & NOV. 2001 | ADJUSTED HORIZONTAL CONTROL DATA |
|----------------------------|-----------------------|----------------------------------|

| | | |
|---|------------|---|
| MONUMENT TYPE: 3 1/2" BRASS MON. STAMPED #9 | ORDER: 2ND | SURVEY METHOD: GPS <input checked="" type="checkbox"/> OTHER <input type="checkbox"/> |
|---|------------|---|

| | | | |
|-----------------|----------------|-----------|------------------------------------|
| CITY: LANCASTER | COUNTY: DALLAS | STATE: TX | COMBINED SCALE FACTOR: 0.999879523 |
|-----------------|----------------|-----------|------------------------------------|

| | | | | |
|---------------------------------|------------------|------------------|--------------------------------|-----------------------------------|
| SURVEYOR: VANNOY & ASSOC., INC. | PREPARED BY: KCC | NAD 27 GRID DATA | COORDINATES (U.S. SURVEY FEET) | PLANE AZIMUTH ANGLE (CONVERGENCE) |
|---------------------------------|------------------|------------------|--------------------------------|-----------------------------------|

PROJECT NUMBER: 0107-012

DISTANCE & DIRECTIONS TO REFERENCES MARKS

| DISTANCE | DIRECTION | REFERENCE MARK |
|----------|-----------|----------------------------|
| 0.4' | NORTHEAST | INSIDE ELL OF BACK OF CURB |
| | | |
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|-----------|----------|------------|--------------------------------|-----------------------------------|
| STATE: TX | ZONE: NC | CODE: 4202 | COORDINATES (U.S. SURVEY FEET) | PLANE AZIMUTH ANGLE (CONVERGENCE) |
|-----------|----------|------------|--------------------------------|-----------------------------------|

| | | |
|------------------|--------------------------------|-----------------------------------|
| NAD 83 GRID DATA | COORDINATES (U.S. SURVEY FEET) | PLANE AZIMUTH ANGLE (CONVERGENCE) |
|------------------|--------------------------------|-----------------------------------|

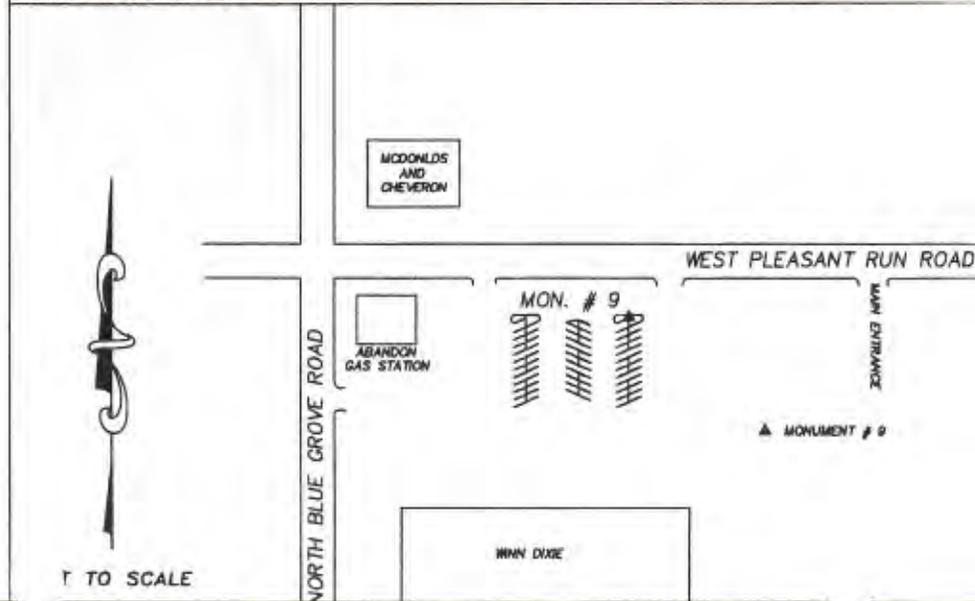
| | | | | | |
|-----------|----------|------------|----------------|----------------|--------------|
| STATE: TX | ZONE: NC | CODE: 4202 | N 6906991.2760 | E 2495967.6655 | 0°56'03.309" |
|-----------|----------|------------|----------------|----------------|--------------|

METRIC CONVERSION FACTOR: 3.2808333333

DESCRIPTION TO POINT:

| | | | | |
|----------------|----------------------------|---------------------------------|--|--------------|
| | POSITION | NAD 27 <input type="checkbox"/> | NAD 83 <input checked="" type="checkbox"/> | ELEV: (FEET) |
| GEODETTIC DATA | LATITUDE: 32°36'14.50201" | NORTH | | 575.8654 |
| | LONGITUDE: 96°47'13.25404" | WEST | | |

FIELD SKETCH:



3 1/2" BRASS CAP WITH "CITY OF LANCASTER MONUMENT NO. 9" STAMPED ON IT BEING APPROXIMATELY 0.3' BELOW THE GROUND, 0.4' NORTHEAST OF THE POINT OF THE INSIDE ELL CORNER OF A BACK OF CURB OF A PARKING ISLAND, NEAR THE INTERSECTION OF NORTH BLUE GROVE ROAD AND WEST PLEASANT RUN ROAD BEING EAST OF THE MOST WESTERLY ENTRANCE INTO SHOPPING CENTER ALONG WEST PLEASANT RUN ROAD YET BEING WEST OF THE NEXT ENTRANCE EAST ON WEST PLEASANT RUN ROAD.

1" TO SCALE

GPS MONUMENT CONTROL SHEET

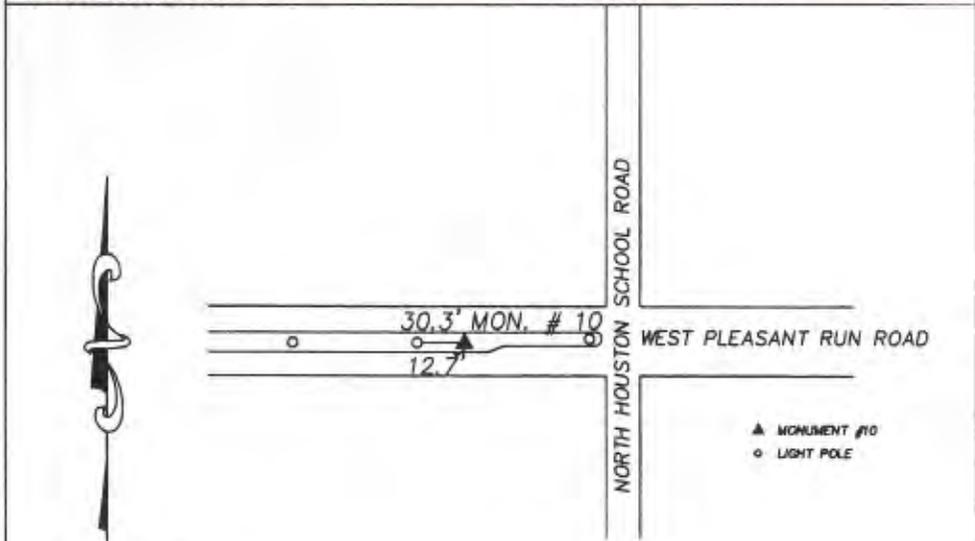
| | | | | | |
|--|----------------|---------------------------------|---|-----------------------------------|--------------------------------------|
| STATION NAME: LANCASTER #10 | | DATE: OCT & NOV. 2001 | ADJUSTED HORIZONTAL CONTROL DATA | | |
| MONUMENT TYPE: 3 1/2" BRASS MON. STAMPED #10 | | ORDER: 2ND | SURVEY METHOD: GPS <input checked="" type="checkbox"/> OTHER <input type="checkbox"/> | | |
| CITY: LANCASTER | COUNTY: DALLAS | STATE: TX | COMBINED SCALE FACTOR: 0.999879356 | | |
| SURVEYOR: VANNOY & ASSOC., INC. | | PREPARED BY: KCC | NAD 27 GRID DATA | COORDINATES (U.S. SURVEY FEET) | PLANE AZIMUTH ANGLE (CONVERGENCE) |
| PROJECT NUMBER: 0107-012 | | | STATE: TX ZONE: NC CODE: 4202 | | |
| DISTANCE & DIRECTIONS TO REFERENCES MARKS | | | STATE: TX ZONE: NC CODE: 4202 | | |
| 30.3' | EAST | LIGHT POLE | COORDINATES (U.S. SURVEY FEET) | | |
| 12.7' | NORTH | SOUTH BACK OF CURB OF MEDIAN | | | |
| | | | PLANE AZIMUTH ANGLE (CONVERGENCE) | | |
| | | | STATE: TX ZONE: NC CODE: 4202 | | 0°55'25.420" |
| | | | METRIC CONVERSION FACTOR: 3.2808333333 | | |

DESCRIPTION TO POINT:

3 1/2" BRASS CAP WITH "CITY OF LANCASTER MONUMENT NO. 10" STAMPED ON IT BEING APPROXIMATELY 0.3' BELOW THE GROUND, WEST OF THE INTERSECTION OF NORTH HOUSTON SCHOOL ROAD AND WEST PLEASANT RUN ROAD, 30.3' EAST OF THE SECOND LIGHT POLE FROM INTERSECTION, AND 12.7' NORTH OF THE SOUTH BACK OF CURB OF THE MEDIAN.

| | | | | |
|-------------------|----------------------------|---------------------------------|--|--------------|
| GEODETTIC DATA | POSITION | NAD 27 <input type="checkbox"/> | NAD 83 <input checked="" type="checkbox"/> | ELEV: (FEET) |
| | LATITUDE: 32°36'15.22530" | NORTH | | 578.9422 |
| | LONGITUDE: 96°48'22.72375" | WEST | | |

FIELD SKETCH:



▲ MONUMENT #10
○ LIGHT POLE

T TO SCALE

GPS MONUMENT CONTROL SHEET

STATION NAME: LANCASTER #11 DATE: OCT & NOV. 2001 ADJUSTED HORIZONTAL CONTROL DATA

MONUMENT TYPE: 3 1/2" BRASS MON. STAMPED #11 ORDER: 2ND SURVEY METHOD: GPS OTHER

CITY: LANCASTER COUNTY: DALLAS STATE: TX COMBINED SCALE FACTOR: 0.999874888

SURVEYOR: VANNOY & ASSOC., INC. PREPARED BY: KCC

| | | |
|------------------|--------------------------------|-----------------------------------|
| NAD 27 GRID DATA | COORDINATES (U.S. SURVEY FEET) | PLANE AZIMUTH ANGLE (CONVERGENCE) |
|------------------|--------------------------------|-----------------------------------|

PROJECT NUMBER: 0107-012

DISTANCE & DIRECTIONS TO REFERENCES MARKS

| | | |
|-------|-----------|-----------------------|
| 17.2' | EAST | EAST EDGE OF PAVEMENT |
| 33' | SOUTH | POWER POLE |
| 40' | SOUTHWEST | GUY ANCHOR |
| | | |
| | | |
| | | |
| | | |

| | | |
|-------------------------------------|--|--|
| STATE: TX ZONE: NC CODE: 4202 | | |
|-------------------------------------|--|--|

NAD 83 GRID DATA COORDINATES (U.S. SURVEY FEET) PLANE AZIMUTH ANGLE (CONVERGENCE)

| | | |
|-------------------------------------|--------------------------------------|--------------|
| STATE: TX ZONE: NC CODE: 4202 | N 6912195.3980 E 2490176.3160 | 0°55'26.923" |
|-------------------------------------|--------------------------------------|--------------|

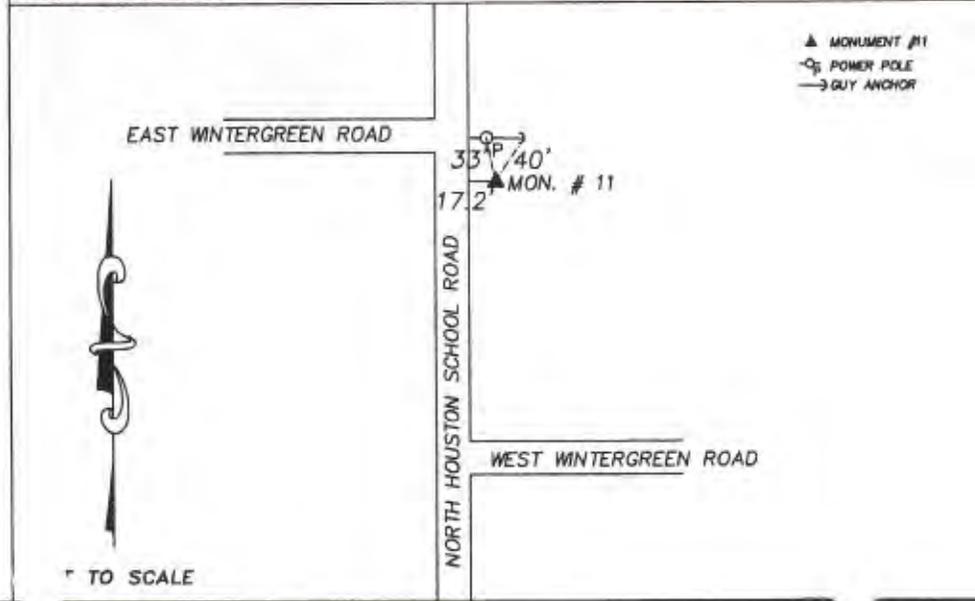
METRIC CONVERSION FACTOR: 3.280833333

DESCRIPTION TO POINT:

| | | |
|----------------|--|--------------|
| GEODETTIC DATA | POSITION NAD 27 <input type="checkbox"/> NAD 83 <input checked="" type="checkbox"/> | ELEV: (FEET) |
| | LATITUDE: 32°37'06.92213" NORTH | 632.3728 |
| | LONGITUDE: 96°48'19.96897" WEST | |

3 1/2" BRASS CAP WITH "CITY OF LANCASTER MONUMENT NO. 11" STAMPED ON IT BEING APPROXIMATELY 0.3' BELOW THE GROUND, SOUTH OF THE INTERSECTION OF NORTH HOUSTON SCHOOL ROAD AND EAST WINTERGREEN ROAD, 17.2' EAST OF THE EAST EDGE OF PAVEMENT OF NORTH HOUSTON SCHOOL ROAD, 33' SOUTH OF A POWER POLE, AND 40' SOUTHWEST OF A GUY ANCHOR.

FIELD SKETCH:



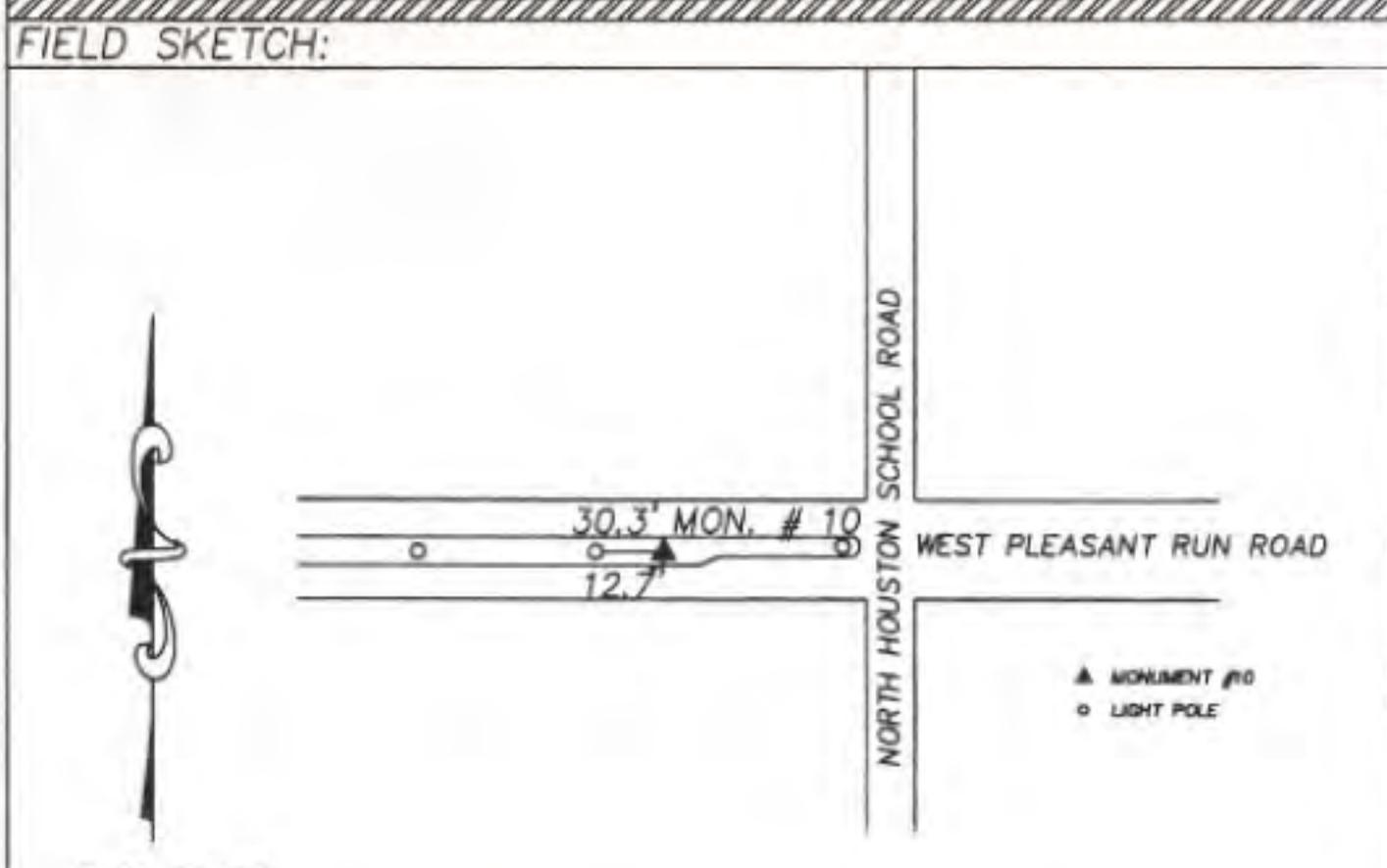
GPS MONUMENT CONTROL SHEET

| | | | | | |
|--|----------------|---------------------------------|--|---|--------------------------------------|
| STATION NAME: LANCASTER #10 | | DATE: OCT & NOV. 2001 | ADJUSTED HORIZONTAL CONTROL DATA | | |
| MONUMENT TYPE: 3 1/2" BRASS MON. STAMPED #10 | | | ORDER: 2ND | SURVEY METHOD: GPS <input checked="" type="checkbox"/> OTHER <input type="checkbox"/> | |
| CITY: LANCASTER | COUNTY: DALLAS | STATE: TX | COMBINED SCALE FACTOR: 0.999879356 | | |
| SURVEYOR: VANNOY & ASSOC., INC. | | PREPARED BY: KCC | NAD 27 GRID DATA | COORDINATES (U.S. SURVEY FEET) | PLANE AZIMUTH ANGLE (CONVERGENCE) |
| PROJECT NUMBER: 0107-012 | | | STATE: TX | | |
| DISTANCE & DIRECTIONS TO REFERENCES MARKS | | | ZONE: NC | | |
| | | | CODE: 4202 | | |
| 30.3' | EAST | LIGHT POLE | NAD 83 GRID DATA | | |
| 12.7' | NORTH | SOUTH BACK OF CURB OF MEDIAN | | | |
| | | | COORDINATES (U.S. SURVEY FEET) | | PLANE AZIMUTH ANGLE (CONVERGENCE) |
| | | | STATE: TX | N 6906968.0153 | 0°55'25.420" |
| | | | ZONE: NC | | |
| | | | CODE: 4202 | E 2490024.9691 | |
| | | | METRIC CONVERSION FACTOR: 3.2808333333 | | |

DESCRIPTION TO POINT:

3 1/2" BRASS CAP WITH "CITY OF LANCASTER MONUMENT NO. 10" STAMPED ON IT BEING APPROXIMATELY 0.3' BELOW THE GROUND, WEST OF THE INTERSECTION OF NORTH HOUSTON SCHOOL ROAD AND WEST PLEASANT RUN ROAD, 30.3' EAST OF THE SECOND LIGHT POLE FROM INTERSECTION, AND 12.7' NORTH OF THE SOUTH BACK OF CURB OF THE MEDIAN.

| | | | | |
|-------------------|----------------------------|---------------------------------|--|--------------|
| GEODETTIC DATA | POSITION | NAD 27 <input type="checkbox"/> | NAD 83 <input checked="" type="checkbox"/> | ELEV: (FEET) |
| | LATITUDE: 32°36'15.22530" | NORTH | | 578.9422 |
| | LONGITUDE: 96°48'22.72375" | WEST | | |



T TO SCALE

GPS MONUMENT CONTROL SHEET

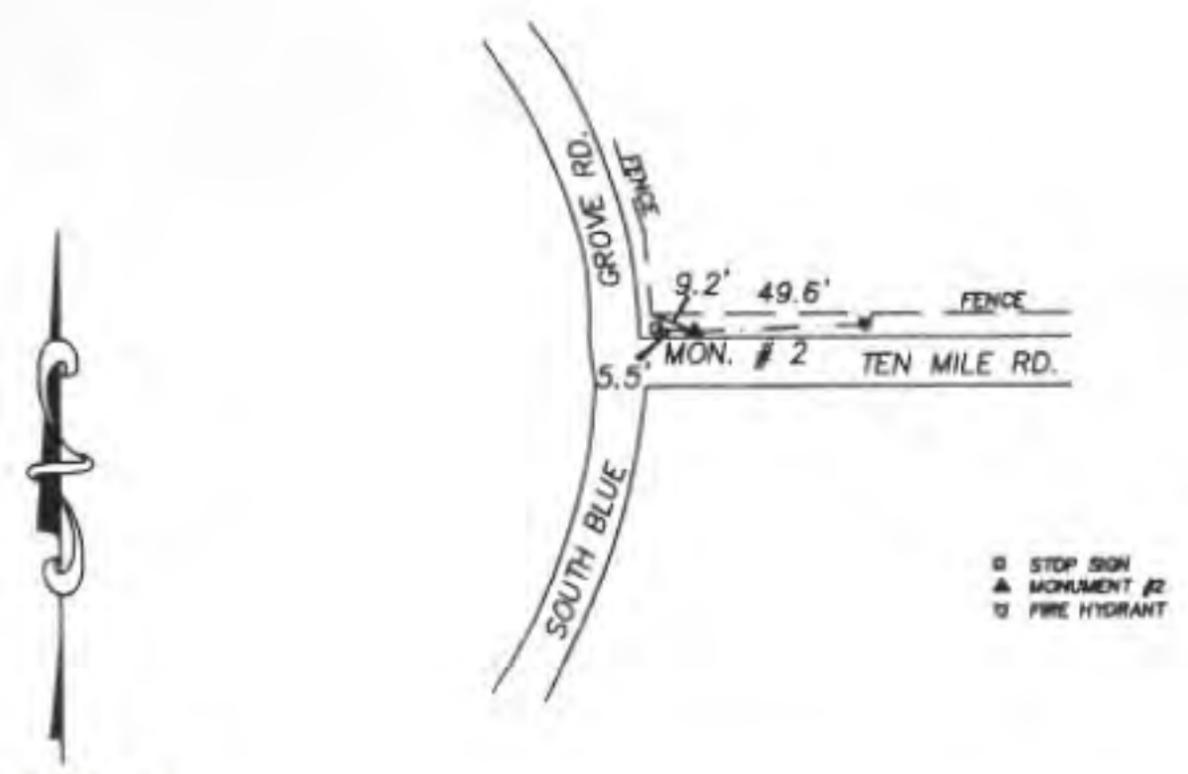
| | | | | | | | | | | | | | | | | | | | | |
|--|----------------|-----------------------|--|---|--------------------------------------|------|-----------|--------------|------|------|-----------|-------|------|--------------|--|--|--|----------|--|--|
| STATION NAME: LANCASTER #2 | | DATE: OCT & NOV. 2001 | ADJUSTED HORIZONTAL CONTROL DATA | | | | | | | | | | | | | | | | | |
| MONUMENT TYPE: 3 1/2" BRASS MON. STAMPED #2 | | | ORDER: 2ND | SURVEY METHOD: GPS <input checked="" type="checkbox"/> OTHER <input type="checkbox"/> | | | | | | | | | | | | | | | | |
| CITY: LANCASTER | COUNTY: DALLAS | STATE: TX | COMBINED SCALE FACTOR: 0.999884104 | | | | | | | | | | | | | | | | | |
| SURVEYOR: VANNOY & ASSOC., INC. | | PREPARED BY: KCC | NAD 27 GRID DATA | COORDINATES (U.S. SURVEY FEET) | PLANE AZIMUTH ANGLE (CONVERGENCE) | | | | | | | | | | | | | | | |
| PROJECT NUMBER: 0107-012 | | | STATE: TX | | | | | | | | | | | | | | | | | |
| DISTANCE & DIRECTIONS TO REFERENCES MARKS <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%;">3.5'</td> <td style="width: 30%;">NORTH</td> <td style="width: 40%;">NORTH EDGE OF PAVEMENT</td> </tr> <tr> <td>9.2'</td> <td>SOUTHEAST</td> <td>FENCE CORNER</td> </tr> <tr> <td>5.5'</td> <td>EAST</td> <td>STOP SIGN</td> </tr> <tr> <td>49.6'</td> <td>WEST</td> <td>FIRE HYDRANT</td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> </table> | | | 3.5' | NORTH | NORTH EDGE OF PAVEMENT | 9.2' | SOUTHEAST | FENCE CORNER | 5.5' | EAST | STOP SIGN | 49.6' | WEST | FIRE HYDRANT | | | | ZONE: NC | | |
| | | | 3.5' | NORTH | NORTH EDGE OF PAVEMENT | | | | | | | | | | | | | | | |
| | | | 9.2' | SOUTHEAST | FENCE CORNER | | | | | | | | | | | | | | | |
| | | | 5.5' | EAST | STOP SIGN | | | | | | | | | | | | | | | |
| | | | 49.6' | WEST | FIRE HYDRANT | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| CODE: 4202 | | | NAD 83 GRID DATA | COORDINATES (U.S. SURVEY FEET) | PLANE AZIMUTH ANGLE (CONVERGENCE) | | | | | | | | | | | | | | | |
| | | | STATE: TX | N 6894689.1047 | 0°56'07.962" | | | | | | | | | | | | | | | |
| | | | ZONE: NC | E 2496898.4954 | | | | | | | | | | | | | | | | |
| | | | CODE: 4202 | | | | | | | | | | | | | | | | | |
| | | | METRIC CONVERSION FACTOR: 3.2808333333 | | | | | | | | | | | | | | | | | |

DESCRIPTION TO POINT:

3 1/2" BRASS DISK WITH "CITY OF LANCASTER MONUMENT NO. 2" STAMPED ON IT BEING APPROXIMATELY 0.3' BELOW GROUND AT THE NORTHEAST CORNER OF THE INTERSECTION OF TEN MILE LANE AND SOUTH BLUE GROVE ROAD, MONUMENT IS LOCATED 3.5' NORTH OF THE NORTH EDGE OF PAVEMENT OF TEN MILE LANE, 9.2' SOUTHEAST OF A FENCE CORNER, 5.5' EAST OF A STOP SIGN, AND 49.6' WEST OF A FIRE HYDRANT.

| | | | | |
|----------------|----------------------------|---------------------------------|--|--------------|
| GEODETTIC DATA | POSITION | NAD 27 <input type="checkbox"/> | NAD 83 <input checked="" type="checkbox"/> | ELEV: (FEET) |
| | LATITUDE: 32°34'12.63140" | NORTH | | 579.4481 |
| | LONGITUDE: 96°47'04.72168" | WEST | | |

FIELD SKETCH:



T TO SCALE

GPS MONUMENT CONTROL SHEET

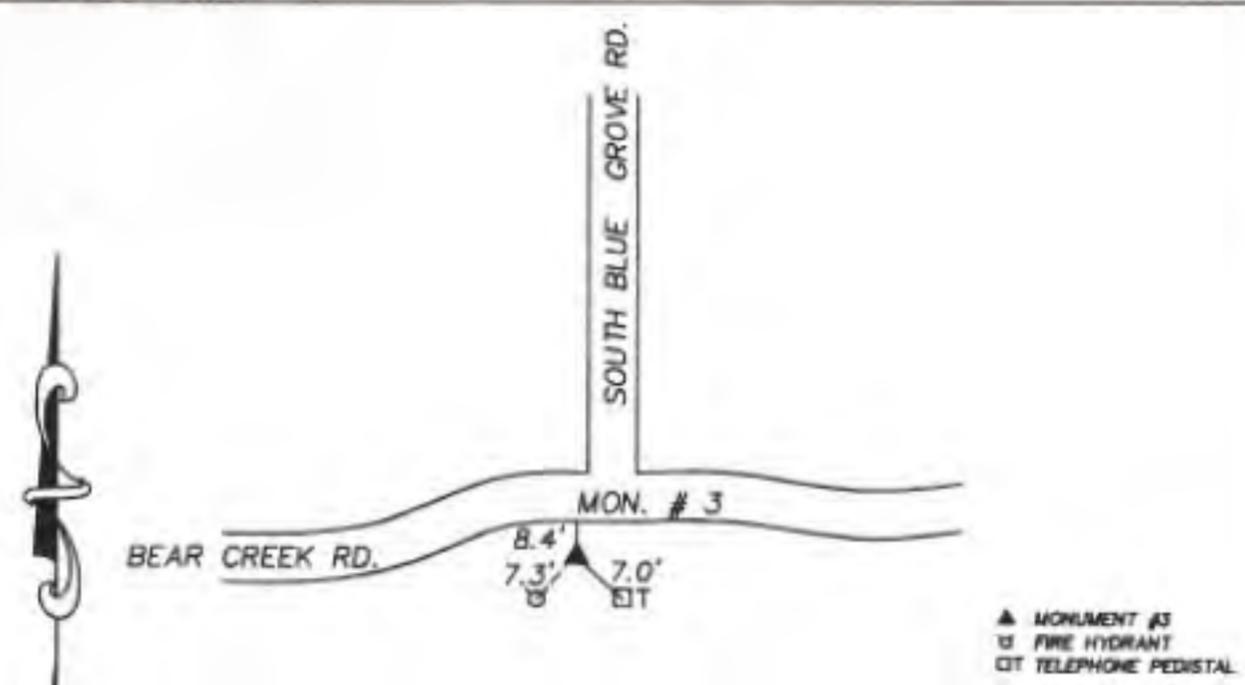
| | | | | | |
|---|----------------|------------------------|--|---|-----------------------------------|
| STATION NAME: LANCASTER #3 | | DATE: OCT & NOV. 2001 | ADJUSTED HORIZONTAL CONTROL DATA | | |
| MONUMENT TYPE: 3 1/2" BRASS MON. STAMPED #3 | | | ORDER: 2ND | SURVEY METHOD: GPS <input checked="" type="checkbox"/> OTHER <input type="checkbox"/> | |
| CITY: LANCASTER | COUNTY: DALLAS | STATE: TX | COMBINED SCALE FACTOR: 0.999884456 | | |
| SURVEYOR: VANNOY & ASSOC., INC. | | PREPARED BY: KCC | NAD 27 GRID DATA | COORDINATES (U.S. SURVEY FEET) | PLANE AZIMUTH ANGLE (CONVERGENCE) |
| PROJECT NUMBER: 0107-012 | | | STATE: TX | | |
| DISTANCE & DIRECTIONS TO REFERENCES MARKS | | | ZONE: NC | | |
| 8.4' | SOUTH | SOUTH EDGE OF PAVEMENT | CODE: 4202 | | |
| 7.3' | NORTHEAST | FIRE HYDRANT | ----- | | |
| 7.0' | NORTHWEST | TELEPHONE PEDISTAL | NAD 83 GRID DATA | COORDINATES (U.S. SURVEY FEET) | PLANE AZIMUTH ANGLE (CONVERGENCE) |
| | | | STATE: TX | N 6891231.1607 | 0°56'00.932" |
| | | | ZONE: NC | E 2495851.7432 | |
| | | | CODE: 4202 | | |
| | | | METRIC CONVERSION FACTOR: 3.2808333333 | | |

DESCRIPTION TO POINT:

| | | | | |
|----------------|------------|---------------------------------|--|--------------|
| GEODETTIC DATA | POSITION | NAD 27 <input type="checkbox"/> | NAD 83 <input checked="" type="checkbox"/> | ELEV: (FEET) |
| | LATITUDE: | 32°33'38.58669" | | NORTH |
| | LONGITUDE: | 96°47'17.61111" | | WEST |

3 1/2" BRASS CAP WITH "CITY OF LANCASTER MONUMENT NO. 3" STAMPED ON IT BEING APPROXIMATELY 0.3' BELOW THE GROUND AT THE INTERSECTION OF SOUTH BLUE GROVE ROAD AND BEAR CREEK ROAD. MONUMENT IS LOCATED 8.4' SOUTH OF THE SOUTH EDGE OF PAVEMENT OF BEAR CREEK ROAD, 7.3' NORTHEAST OF A FIRE HYDRANT, AND 7.0' NORTHWEST OF A TELEPHONE PEDISTAL.

FIELD SKETCH:



T TO SCALE

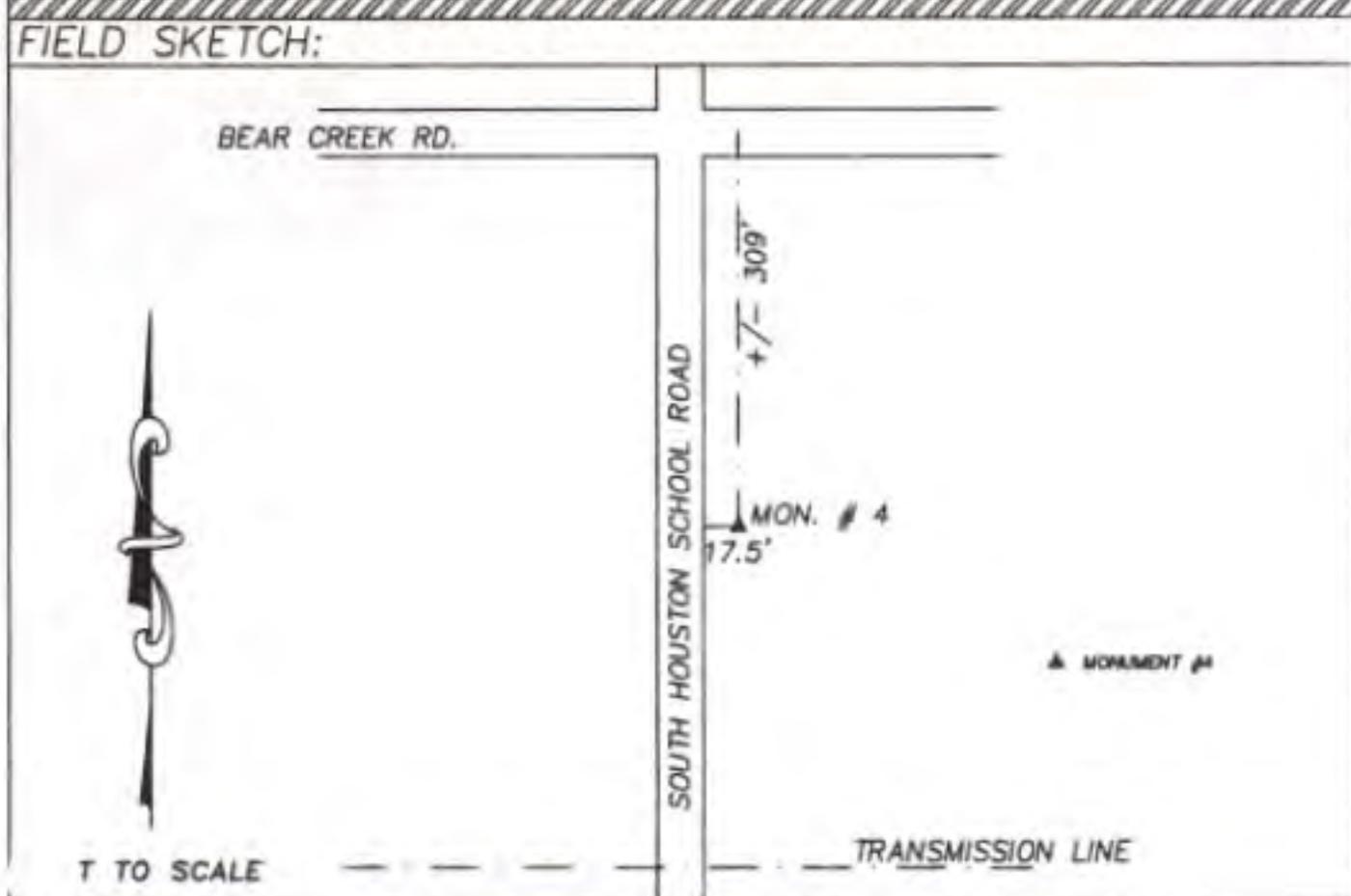
GPS MONUMENT CONTROL SHEET

| | | | | | |
|---|----------------|--|--|---|--------------------------------------|
| STATION NAME: LANCASTER #4 | | DATE: OCT & NOV. 2001 | ADJUSTED HORIZONTAL CONTROL DATA | | |
| MONUMENT TYPE: 3 1/2" BRASS MON. STAMPED #4 | | | ORDER: 2ND | SURVEY METHOD: GPS <input checked="" type="checkbox"/> OTHER <input type="checkbox"/> | |
| CITY: LANCASTER | COUNTY: DALLAS | STATE: TX | COMBINED SCALE FACTOR: 0.999885184 | | |
| SURVEYOR: VANNOY & ASSOC., INC. | | PREPARED BY: KCC | NAD 27 GRID DATA | COORDINATES (U.S. SURVEY FEET) | PLANE AZIMUTH ANGLE (CONVERGENCE) |
| PROJECT NUMBER: 0107-012 | | | STATE: TX | | |
| DISTANCE & DIRECTIONS TO REFERENCES MARKS | | | ZONE: NC | | |
| | | | CODE: 4202 | | |
| +/- 309' | SOUTH | CL OF BEAR CREEK ROAD | NAD 83 GRID DATA | | |
| 17.5' | EAST | EDGE PAVEMENT OF SOUTH HOUSTON SCHOOL ROAD | | | |
| | | | COORDINATES (U.S. SURVEY FEET) | | PLANE AZIMUTH ANGLE (CONVERGENCE) |
| | | | STATE: TX | N 6890835.4443 | 0°55'27.236" |
| | | | ZONE: NC | | |
| | | | CODE: 4202 | E 2490570.0513 | |
| | | | METRIC CONVERSION FACTOR: 3.2808333333 | | |

DESCRIPTION TO POINT:

3 1/2" BRASS CAP WITH "CITY OF LANCASTER MONUMENT NO. 4" STAMPED ON IT BEING APPROXIMATELY 0.3' BELOW THE GROUND SOUTH OF THE INTERSECTION OF SOUTH HOUSTON SCHOOL ROAD AND BEAR CREEK ROAD, MONUMENT IS LOCATED +/- 309' SOUTH OF THE CENTERLINE OF BEAR CREEK ROAD, AND 17.5' EAST OF EDGE OF PAVEMENT OF SOUTH HOUSTON SCHOOL ROAD.

| | | | | |
|----------------|----------------------------|---------------------------------|--|--------------|
| GEODETTIC DATA | POSITION | NAD 27 <input type="checkbox"/> | NAD 83 <input checked="" type="checkbox"/> | ELEV: (FEET) |
| | LATITUDE: 32°33'35.51870" | NORTH | | 588.7492 |
| | LONGITUDE: 96°48'19.39435" | WEST | | |



GPS MONUMENT CONTROL SHEET

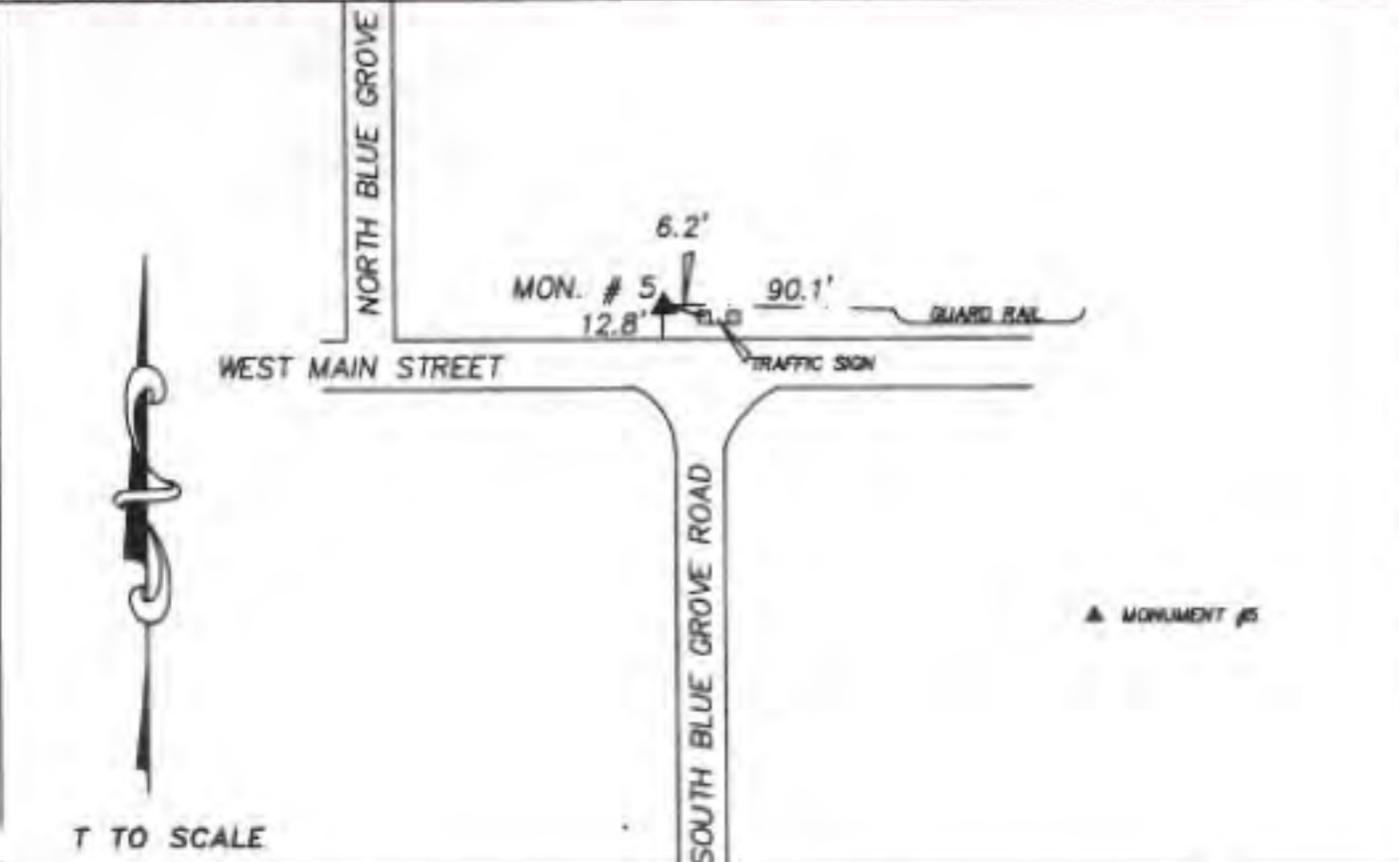
| | | | | | |
|---|----------------|------------------------|--|---|--------------------------------------|
| STATION NAME: LANCASTER #5 | | DATE: OCT & NOV. 2001 | ADJUSTED HORIZONTAL CONTROL DATA | | |
| MONUMENT TYPE: 3 1/2" BRASS MON. STAMPED #5 | | | ORDER: 2ND | SURVEY METHOD: GPS <input checked="" type="checkbox"/> OTHER <input type="checkbox"/> | |
| CITY: LANCASTER | COUNTY: DALLAS | STATE: TX | COMBINED SCALE FACTOR: 0.99885381 | | |
| SURVEYOR: VANNOY & ASSOC., INC. | | PREPARED BY: KCC | NAD 27 GRID DATA | COORDINATES (U.S. SURVEY FEET) | PLANE AZIMUTH ANGLE (CONVERGENCE) |
| PROJECT NUMBER: 0107-012 | | | STATE: TX | | |
| DISTANCE & DIRECTIONS TO REFERENCES MARKS | | | ZONE: NC | | |
| 90.1' | WEST | WEST END OF GUARD RAIL | CODE: 4202 | | |
| 12.8' | NORTH | NORTH EDGE OF W. MAIN | NAD 83 GRID DATA | | |
| 6.2' | WEST | WEST SIGN POST | COORDINATES (U.S. SURVEY FEET) | PLANE AZIMUTH ANGLE (CONVERGENCE) | |
| | | | STATE: TX | N 6899656.8623 | 0°56'04.071" |
| | | | ZONE: NC | E 2496206.8983 | |
| | | | CODE: 4202 | | |
| | | | METRIC CONVERSION FACTOR: 3.2808333333 | | |

DESCRIPTION TO POINT:

3 1/2" BRASS CAP WITH "CITY OF LANCASTER MONUMENT NO. 5" STAMPED ON IT BEING APPROXIMATELY 0.3' BELOW THE GROUND NORTH OF THE INTERSECTION OF SOUTH BLUE GROVE ROAD AND WEST MAIN STREET, MONUMENT IS LOCATED 90.1' WEST OF THE WEST END OF A GUARDRAIL ON THE NORTH SIDE OF WEST MAIN STREET, 12.8' NORTH OF THE NORTH EDGE OF PAVEMENT OF WEST MAIN STREET, AND 6.2' WEST OF THE MOST WESTERLY POST OF A SIGN.

| | | | | |
|----------------|----------------------------|---------------------------------|--|--------------|
| GEODETTIC DATA | POSITION | NAD 27 <input type="checkbox"/> | NAD 83 <input checked="" type="checkbox"/> | ELEV: (FEET) |
| | LATITUDE: 32°35'01.89514" | NORTH | | 511.7572 |
| | LONGITUDE: 96°47'11.85600" | WEST | | |

FIELD SKETCH:



▲ MONUMENT #5

GPS MONUMENT CONTROL SHEET

| | | | | | |
|---|----------------|-----------------------|--|---|--------------------------------------|
| STATION NAME: LANCASTER #6 | | DATE: OCT & NOV. 2001 | ADJUSTED HORIZONTAL CONTROL DATA | | |
| MONUMENT TYPE: 3 1/2" BRASS MON. STAMPED #6 | | | ORDER: 2ND | SURVEY METHOD: GPS <input checked="" type="checkbox"/> OTHER <input type="checkbox"/> | |
| CITY: LANCASTER | COUNTY: DALLAS | STATE: TX | COMBINED SCALE FACTOR: 0.999885578 | | |
| SURVEYOR: VANNOY & ASSOC., INC. | | PREPARED BY: KCC | NAD 27 GRID DATA | COORDINATES (U.S. SURVEY FEET) | PLANE AZIMUTH ANGLE (CONVERGENCE) |
| PROJECT NUMBER: 0107-012 | | | STATE: TX | | |
| DISTANCE & DIRECTIONS TO REFERENCES MARKS | | | ZONE: NC | | |
| 66' | SOUTHWEST | POWER POLE IN A CEDAR | CODE: 4202 | | |
| 6.3' | NORTH | NORTH EDGE OF W. MAIN | NAD 83 GRID DATA | | |
| | | | COORDINATES (U.S. SURVEY FEET) | | |
| | | | PLANE AZIMUTH ANGLE (CONVERGENCE) | | |
| | | | STATE: TX | N 6898999.1492 | 0°55'32.626" |
| | | | ZONE: NC | | |
| | | | CODE: 4202 | E 2491284.0401 | |
| | | | METRIC CONVERSION FACTOR: 3.2808333333 | | |

DESCRIPTION TO POINT:

3 1/2" BRASS CAP WITH "CITY OF LANCASTER MONUMENT NO. 6" STAMPED ON IT BEING APPROXIMATELY 0.3' BELOW THE GROUND NORTH OF THE INTERSECTION OF NORTH HOUSTON SCHOOL ROAD AND WEST MAIN STREET, MONUMENT IS LOCATED 66' SOUTHWEST OF POWER POLE IN A BIG CEDAR TREE, AND 6.3' NORTH OF THE NORTH EDGE OF PAVEMENT OF WEST MAIN STREET.

| | | | | |
|----------------|----------------------------|---------------------------------|--|--------------|
| GEODETTIC DATA | POSITION | NAD 27 <input type="checkbox"/> | NAD 83 <input checked="" type="checkbox"/> | ELEV: (FEET) |
| | LATITUDE: 32°34'56.17834" | NORTH | | 512.4708' |
| | LONGITUDE: 96°48'09.51136" | WEST | | |

FIELD SKETCH:



1" TO SCALE

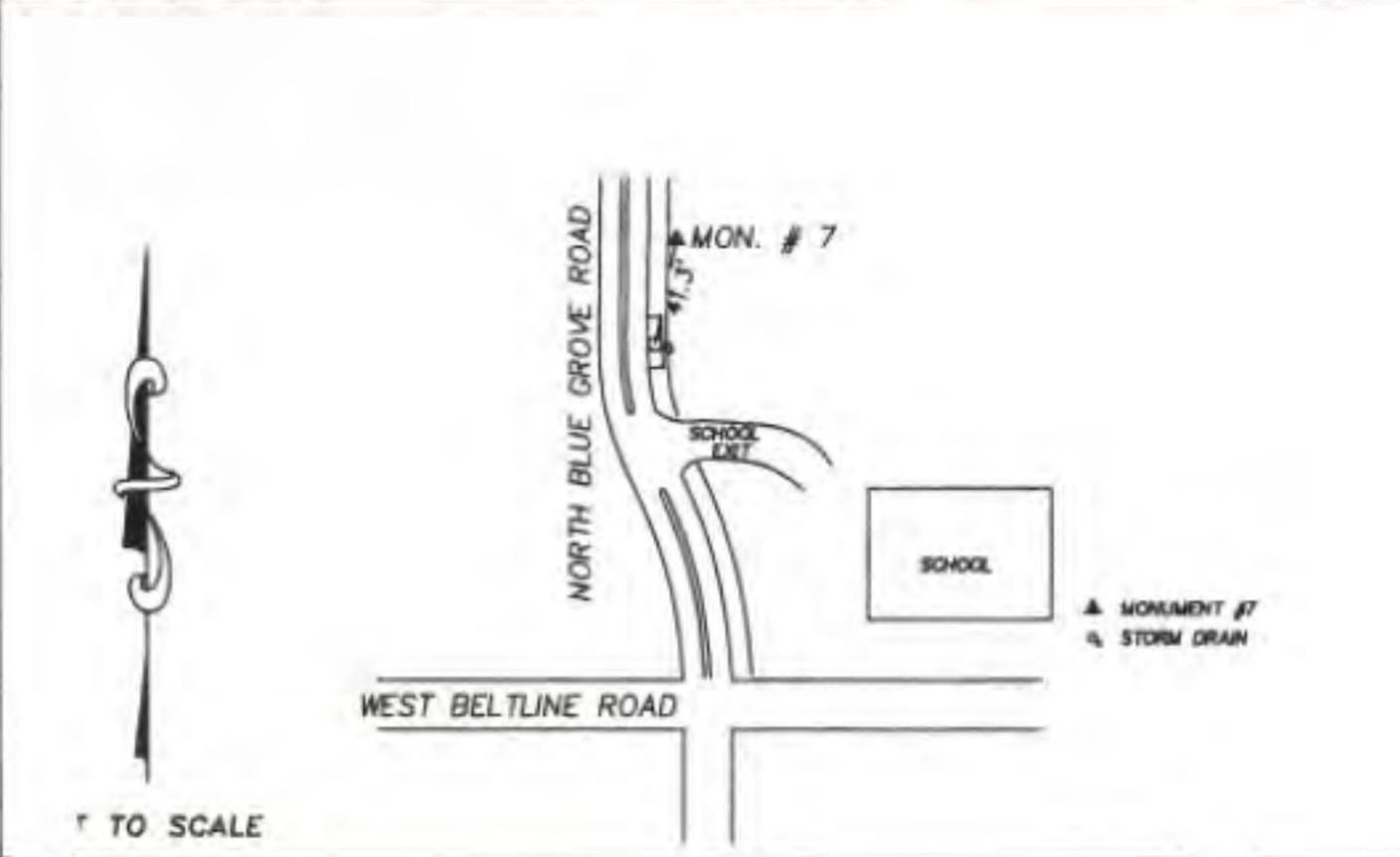
GPS MONUMENT CONTROL SHEET

| | | | | | |
|---|----------------|------------------------------------|--|---|--------------------------------------|
| STATION NAME: LANCASTER #7 | | DATE: OCT & NOV. 2001 | ADJUSTED HORIZONTAL CONTROL DATA | | |
| MONUMENT TYPE: 3 1/2" BRASS MON. STAMPED #7 | | | ORDER: 2ND | SURVEY METHOD: GPS <input checked="" type="checkbox"/> OTHER <input type="checkbox"/> | |
| CITY: LANCASTER | COUNTY: DALLAS | STATE: TX | COMBINED SCALE FACTOR: 0.999882356 | | |
| SURVEYOR: VANNOY & ASSOC., INC. | | PREPARED BY: KCC | NAD 27 GRID DATA | COORDINATES (U.S. SURVEY FEET) | PLANE AZIMUTH ANGLE (CONVERGENCE) |
| PROJECT NUMBER: 0107-012 | | | STATE: TX | | |
| DISTANCE & DIRECTIONS TO REFERENCES MARKS | | | ZONE: NC | | |
| | | | CODE: 4202 | | |
| 41.3' | NORTH | CENTER OF A STORM DRAIN MANHOLE | NAD 83 GRID DATA | COORDINATES (U.S. SURVEY FEET) | PLANE AZIMUTH ANGLE (CONVERGENCE) |
| 0.4' | EAST | EAST EDGE OF SIDEWALK | STATE: TX | N 6903076.2492 | 0°56'01.143" |
| | | | ZONE: NC | E 2495691.6682 | |
| | | | CODE: 4202 | | |
| | | | METRIC CONVERSION FACTOR: 3.2808333333 | | |

| | | | | | |
|-----------------------|----------------|----------------------------|---------------------------------|--|--------------|
| DESCRIPTION TO POINT: | GEODETTIC DATA | POSITION | NAD 27 <input type="checkbox"/> | NAD 83 <input checked="" type="checkbox"/> | ELEV: (FEET) |
| | | LATITUDE: 32°35'35.81041" | | NORTH | 547.4262 |
| | | LONGITUDE: 96°47'17.22601" | | WEST | |

3 1/2" BRASS CAP WITH "CITY OF LANCASTER MONUMENT NO. 7" STAMPED ON IT BEING APPROXIMATELY 0.3' BELOW THE GROUND NORTH OF THE INTERSECTION OF NORTH BLUE GROVE ROAD AND BELTLINE, MONUMENT IS LOCATED NORTH OF THE EXIT OF A SCHOOL, 41.3' NORTH OF THE CENTER OF A STORM DRAIN MANHOLE, AND 0.4' EAST OF THE EAST EDGE OF A SIDEWALK.

FIELD SKETCH:



↑ TO SCALE

GPS MONUMENT CONTROL SHEET

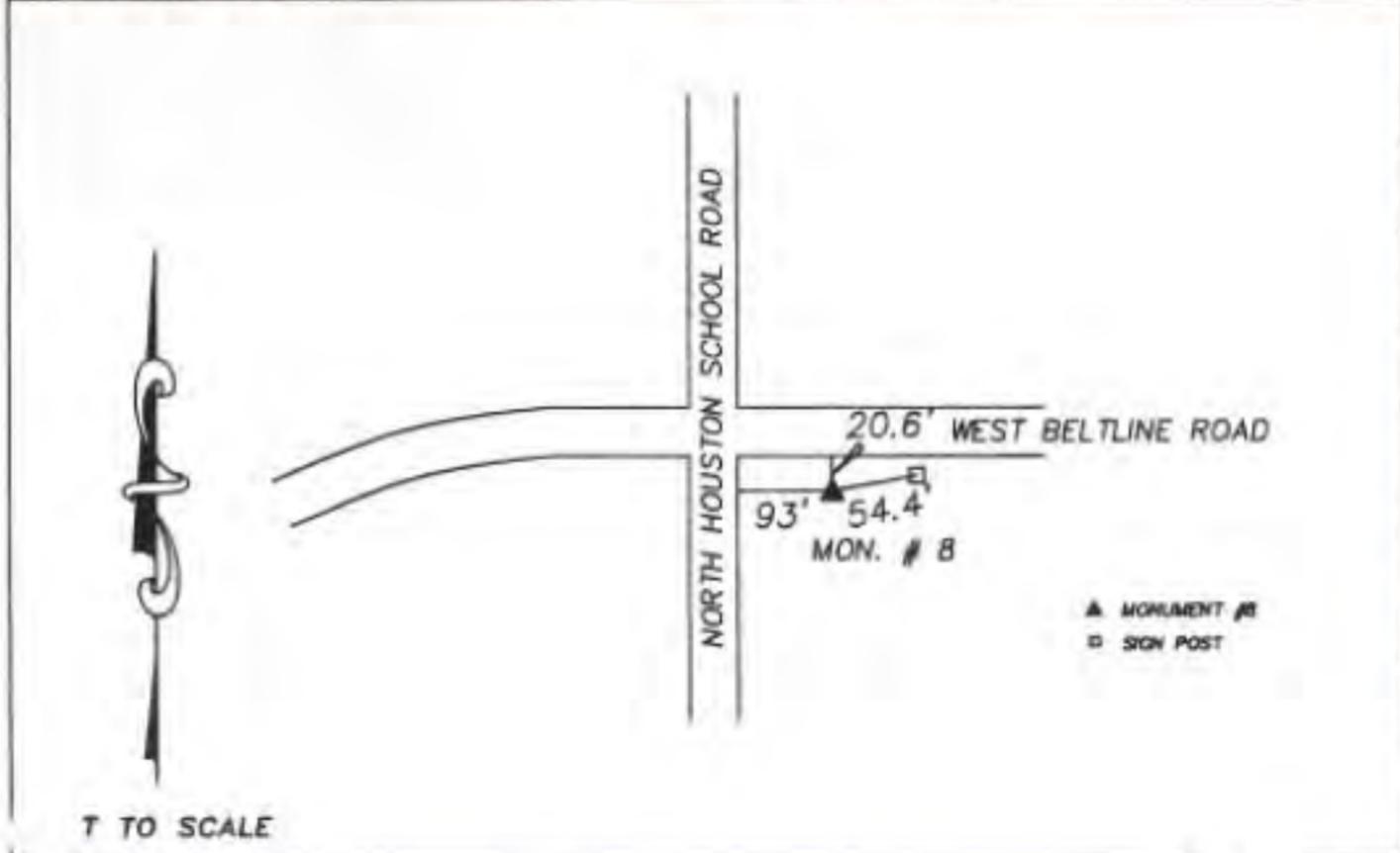
| | | | | | |
|---|----------------|---|--|---|--------------------------------------|
| STATION NAME: LANCASTER #8 | | DATE: OCT & NOV. 2001 | ADJUSTED HORIZONTAL CONTROL DATA | | |
| MONUMENT TYPE: 3 1/2" BRASS MON. STAMPED #8 | | | ORDER: 2ND | SURVEY METHOD: GPS <input checked="" type="checkbox"/> OTHER <input type="checkbox"/> | |
| CITY: LANCASTER | COUNTY: DALLAS | STATE: TX | COMBINED SCALE FACTOR: 0.999882445 | | |
| SURVEYOR: VANNOY & ASSOC., INC. | | PREPARED BY: KCC | NAD 27 GRID DATA | COORDINATES (U.S. SURVEY FEET) | PLANE AZIMUTH ANGLE (CONVERGENCE) |
| PROJECT NUMBER: 0107-012 | | | STATE: TX | | |
| DISTANCE & DIRECTIONS TO REFERENCES MARKS | | | ZONE: NC | | |
| | | | CODE: 4202 | | |
| 20.6' | SOUTH | EDGE OF PAVEMENT BELTLINE | NAD 83 GRID DATA | COORDINATES (U.S. SURVEY FEET) | PLANE AZIMUTH ANGLE (CONVERGENCE) |
| 54.4' | SOUTHWEST | SPEED LIMIT SIGN | STATE: TX | N 6902699.7137 | 0°55'27.527 |
| +/-93' | EAST | EAST OF EDGE OF PAVEMENT HOUSTON SCHOOL ROAD | ZONE: NC | E 2490424.2161 | |
| | | | CODE: 4202 | | |
| | | | METRIC CONVERSION FACTOR: 3.2808333333 | | |

DESCRIPTION TO POINT:

3 1/2" BRASS CAP WITH "CITY OF LANCASTER MONUMENT NO. 8"
 STAMPED ON IT BEING APPROXIMATELY 0.3' BELOW THE GROUND, 20.6'
 SOUTH OF THE EDGE OF PAVEMENT OF THE SOUTH EDGE OF WEST BELTLINE
 ROAD, 54.4' SOUTHWEST OF SPEED LIMIT SIGN, AND +/-93' EAST OF THE
 EAST EDGE OF PAVEMENT OF NORTH HOUSTON SCHOOL ROAD.

| | | | | |
|-------------------|----------------------------|---------------------------------|--|--------------|
| GEODETTIC DATA | POSITION | NAD 27 <input type="checkbox"/> | NAD 83 <input checked="" type="checkbox"/> | ELEV: (FEET) |
| | LATITUDE: 32°35'32.92998" | NORTH | | 548.0341 |
| | LONGITUDE: 96°48'18.86183" | WEST | | |

FIELD SKETCH:



GPS MONUMENT CONTROL SHEET

| | | | | | |
|---|----------------|----------------------------|--|---|--------------------------------------|
| STATION NAME: LANCASTER #9 | | DATE: OCT & NOV. 2001 | ADJUSTED HORIZONTAL CONTROL DATA | | |
| MONUMENT TYPE: 3 1/2" BRASS MON. STAMPED #9 | | | ORDER: 2ND | SURVEY METHOD: GPS <input checked="" type="checkbox"/> OTHER <input type="checkbox"/> | |
| CITY: LANCASTER | COUNTY: DALLAS | STATE: TX | COMBINED SCALE FACTOR: 0.999879523 | | |
| SURVEYOR: VANNOY & ASSOC., INC. | | PREPARED BY: KCC | NAD 27 GRID DATA | COORDINATES (U.S. SURVEY FEET) | PLANE AZIMUTH ANGLE (CONVERGENCE) |
| PROJECT NUMBER: 0107-012 | | | STATE: TX | | |
| DISTANCE & DIRECTIONS TO REFERENCES MARKS | | | ZONE: NC | | |
| 0.4' | NORTHEAST | INSIDE ELL OF BACK OF CURB | CODE: 4202 | | |
| | | | | | |
| | | | NAD 83 GRID DATA | COORDINATES (U.S. SURVEY FEET) | PLANE AZIMUTH ANGLE (CONVERGENCE) |
| | | | STATE: TX | N 6906991.2760 | |
| | | | ZONE: NC | | |
| | | | CODE: 4202 | E 2495967.6655 | 0°56'03.309" |
| | | | METRIC CONVERSION FACTOR: 3.2808333333 | | |

DESCRIPTION TO POINT:

3 1/2" BRASS CAP WITH "CITY OF LANCASTER MONUMENT NO. 9"
 STAMPED ON IT BEING APPROXIMATELY 0.3' BELOW THE GROUND, 0.4'
 NORTHEAST OF THE POINT OF THE INSIDE ELL CORNER OF A BACK OF CURB
 OF A PARKING ISLAND, NEAR THE INTERSECTION OF NORTH BLUE GROVE
 ROAD AND WEST PLEASANT RUN ROAD BEING EAST OF THE MOST WESTERLY
 ENTRANCE INTO SHOPPING CENTER ALONG WEST PLEASANT RUN ROAD YET
 BEING WEST OF THE NEXT ENTRANCE EAST ON WEST PLEASANT RUN ROAD.

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|-------------------|----------------------------|---------------------------------|--|--------------|
| GEODETTIC DATA | POSITION | NAD 27 <input type="checkbox"/> | NAD 83 <input checked="" type="checkbox"/> | ELEV: (FEET) |
| | LATITUDE: 32°36'14.50201" | NORTH | | 575.8654 |
| | LONGITUDE: 96°47'13.25404" | WEST | | |

FIELD SKETCH:

