

CITY OF HIGHLAND VILLAGE, TEXAS

TCSS MANUAL - UTILITIES, STREETS & DRAINAGE / TECHNICAL CONSTRUCTION STANDARDS & SPECIFICATIONS

SECTION 1. DEFINITIONS.

Section 1.01 Definitions.

The following terms when used herein shall have the following meanings:

- (a) "ASTM" shall mean the American Society of Testing Material.
- (b) "AWWA" shall mean the American Water Works Association.
- (c) "Commission" shall mean the City's Planning and Zoning Commission.
- (d) "City Engineer" shall mean the duly appointed engineer for the City.
- (e) "City" shall mean the responsible entity duly authorized to act on behalf of the City of Highland Village.
- (f) "C.O.G. Specifications" shall mean the North Central Texas Council of Governments "Standard Specifications for Public Works Construction".
- (g) "Major Thoroughfare" is defined by the City Thoroughfare Plan.
- (h) "Residential Roadways" is defined by the City Thoroughfare Plan.
- (i) "Residential and Commercial Collectors" are defined by the City Thoroughfare Plan.
- (j) "State Standards" shall mean the design standards of the Texas Highway Department - Design Division, and specifications as established by the most recent of the Texas Highway Department - Standard Specifications for Construction of Highways, Streets and Bridges.
- (k) "Subdivider shall mean any person or any agent thereof, dividing or proposing to divide land so as to constitute a Subdivision as that term is defined herein. In any event, the term "Subdivider" shall be restricted to include only the owner, equitable owner, or authorized agent of such owner or equitable owner, such as developer, or land sought to be subdivided.

SECTION 2. GENERAL REQUIREMENTS.

Section 2.01 Conformance with Standards.

No improvement referred to in this Ordinance shall be constructed within any Development of the City unless such improvement is in conformance with the

standards set forth herein or as outlined in the North Central Texas Council of Governments "Standard Specifications for Public Work Construction" and the Paving Design Manual of the City of Dallas Department of Public Works.

Section 2.02 Plans and Specifications.

- (a) Prior to commencing construction of any improvements, the Subdivider shall submit three (3) sets of Plans and Specifications for such improvements to the City Staff for approval. Lot Grading Plans and Construction Schedules shall be submitted with the Plans and Specifications. Such Plans and Specifications shall be prepared and sealed by a licensed Professional Engineer registered in the State of Texas.
- (b) When required by the City, revised Plans and Specifications shall be resubmitted until approval is granted.
- (c) Prior to final acceptance & issuing of building permit(s) by the City, a 1-year 100% maintenance bond or a 2-year 10% maintenance bond shall be submitted of the public improvements dedicated to the City to serve the development and the developer shall submit to the City one (1) set of blue-line prints with original P.E. seal and one (1) digital copy, (on a disc in the latest pdf format), of the civil plans including the paving, drainage, water, wastewater, plat and other improvements showing all changes made in the plans during construction and containing on each sheet an "AS-BUILT" or "Record Drawing" stamp bearing the signature of the Engineer and date.
- (d) "As-Built" plans shall include the following water and wastewater information:
 - 1) All sewer tap locations.
 - 2) All water tap locations.
 - 3) All valve locations.
 - 4) All manhole locations and/or clean out locations.
 - 5) All fire hydrant locations.
 - 6) All water line locations.
 - 7) All wastewater line locations.

Section 2.03 Testing.

- (a) Testing of materials as called for within these specifications shall be performed by a qualified testing laboratory as approved by the City.
- (b) The cost of all testing shall be borne by the Subdivider/Developer.

- (c) The Subdivider/Developer shall submit a proposed schedule of testing for review and approval, along with the Plans and Specifications outlined in Section 2.02.
- (d) No improvements requiring testing shall be covered, constructed upon, or utilized in any manner until City approval of testing has been granted.

Section 2.04 Construction Contracts.

No subdivider shall award any construction contract or make payments to any contractor for improvements until the Plans and Specifications required by Section 2.02 and all other required submissions are approved by the City.

Section 2.05 Damage to Improvements.

Should any person damage or cause to be damaged any improvement, they shall submit and have approved by the City Engineer, the method and materials to repair such damage at their sole cost.

Section 2.06 Minimum Improvements.

Every Subdivision shall be constructed with the following minimum improvements:

- (a) All streets within Commercial and Industrial areas, all Arterial and Primary Collector streets and all other streets within six hundred feet (600') of any school, shall be constructed with sidewalks.
- (b) Each intersection shall have at least one street sign.
- (c) All roadways shall be lighted in accordance with the requirements of Section 11.
- (d) A water system, storm sewer system, wastewater system and all other utilities necessary to service the needs of the City and Subdivision shall be provided. All utilities shall be provided to the property line of each lot or to a point within each lot in a manner to allow the connection of such service without disturbing any improvement.
- (e) All parties participating in the construction shall meet with the City for a pre-construction conference to discuss the project prior to beginning work.
- (f) A complete list of Contractors, their representatives on the site, and telephone numbers where a responsible party may be reached at all times, must be submitted to the City.
- (g) ADA requirements shall be followed.

SECTION 3. STREETS.

Section 3.01 General.

- (a) All roadways shall be constructed with 4,000psi concrete pavement and curbs in

accordance with the Standards and Specifications of the City of Highland Village, C.O.G. and the Standard Construction Details for the City of Dallas. In the event of a conflict, the Standards and Specifications of the City of Highland Village shall govern. If additional details are required for the construction of a project, State Standards may be used provided approval is obtained from the City Engineer.

- (b) All pavement widths shall conform with the City of Highland Village Thoroughfare Plan except that local streets shall be no less than thirty feet (30') in width, measured from the face of curb and constructed of four-thousand (4,000) psi reinforced concrete. Depth of concrete paving shall be recommended by a licensed professional engineer, supported by a geotechnical report & approved by the City.
- (c) The subgrade of all roadways shall be inspected by the City Inspector after grading and prior to the commencement of subgrade stabilization. All spongy or soft material shall be removed by the Contractor and all depressions shall be filled with approved material having a Plasticity Index (PI) of less than 12. All embankments shall be compacted to a uniform density of not less than ninety-five percent (95%) of the maximum density determined by ASTM D698.
- (d) Any work related to the preparation of the subgrade, including lime stabilization and foundation courses, shall be performed to a point one foot (1') beyond the curb line, at a minimum.
- (e) Complete engineering design details, including such items as joint spacing, reinforcement area and spacing and other information deemed appropriate by the Design Engineer & approved by the City shall be shown on the Construction Plans.
- (f) Transverse contraction joints shall be spaced twelve feet (12') apart for six-inch (6") thick concrete pavement and sixteen feet (16') apart for eight-inch (8") thick concrete pavement.
- (g) The Subdivider shall provide the City with soil borings taken by a qualified testing laboratory to determine whether groundwater is present in the Subdivision. The soil borings shall be spaced no further apart than one thousand feet (1,000'), measured along the centerline of the Subdivision streets, or at the low points in the streets, whichever is more frequent. Where an underground water problem is identified, the City Engineer may require the design & installation of an under drain system behind the curb.

Section 3.02 Subgrade Stabilization.

- (a) The subgrade of all streets shall be lime stabilized to a depth of six inches (6") with seven percent (7%) hydrated lime unless the city approves a lesser percentage following receipt of independent laboratory tests supplied by the subdivider. Soils having a plasticity index (PI) of less than twelve (12) shall not require lime stabilization unless requested by the City Engineer upon review of the laboratory tests.

- (b) Subgrade shall be compacted to a uniform density of not less than of ninety-five percent (95%) of the maximum density determined by ASTM D698.

Section 3.03 Street Sign Standards

- (a) Nine inches (9") wide, .080 Gauge Anodized Aluminum Flat Blade.
- (b) Color 6" x 1/2 " reflective white block letters on Highland Village Blue background.
- (c) Block No. 2 1/4" x 3/8" white only as required by the City.
- (d) All street signs shall have Lettering on front and back.
- (e) Letters and background shall be of diamond prismatic (high intensity prismatic) reflective sheeting as approved by the City.

SECTION 4. STORMWATER COLLECTION SYSTEMS.

Section 4.01 System Design Requirements.

No storm water collection system shall be constructed within the City unless it is designed by a Professional Engineer registered in the State of Texas, and approved by the City Engineer. All developed areas shall have concrete curb and gutter drainage unless the development has a minimum lot size of twenty thousand square feet (20,000 SF). These lower density developments can utilize roadside ditch drainage systems. All plans submitted to the City Engineer for approval shall include a layout of the storm water collection system, together with supporting calculations for the design of the system. In addition to any other requirements established by the City, the Plan shall conform to the City of Highland Village Public Works Department's "Drainage Criteria Manual" as well as the following requirements:

- (a) All storm water collection systems shall be designed in accordance with the Standards and Specifications of the City of Highland Village and the Standard Construction Details of the City of Dallas. In the event of a conflict, the Standards and Specifications of the City of Highland Village shall govern.
- (b) All plans shall take into account all storm water runoff emanating or discharging from areas that surround the Subdivision or contribute runoff to it. Furthermore, each Plan shall accommodate both the existing off-site land usage as well as any potential land usage contemplated by the City in its Master Plan.
- (c) All drainage systems must be designed for the one hundred year (100-year) storm intensity.
- (d) The allowable spread of water collected in curb and guttered streets shall be in accordance with the Highland Village Drainage Criteria Manual.

- (e) No cross street flow of runoff perpendicular to the direction of traffic shall be permitted unless approved by the City Engineer.
- (f) For erosion and sedimentation control, the developer shall follow the City's current ordinances and BMP's. The Construction Plans and Specifications shall include temporary and permanent erosion control measures.
- (g) All storm sewers and culverts shall be located in a drainage easement or common space unless the storm sewer or culvert conveys runoff from a single lot. Maintenance of those storm sewers and culverts that are located on private property shall be the responsibility of the property owners. Maintenance of those storm sewers and culverts that are located within a common space shall be the responsibility of the homeowners association.
- (h) The Subdivider shall provide a drainage easement or common space for any natural creeks located within the Subdivision unless the City elects to accept dedication of the creek property for park use. In the event that the natural creek is not dedicated for park use, it shall be the property owners' responsibility to maintain the creek.
- (i) If the Subdivider alters the natural condition of a creek, or if a new channel is created within the Subdivision, the creek or channel shall be located in a drainage easement or common space. If the velocity in the improved creek or channel is less than six feet per second (6 fps), a grass cover shall be established on the side slopes. If the velocity in the creek or channel exceeds 6 fps, either a reinforced concrete pilot channel or concrete-lined channel shall be required to prevent erosion. If the Subdivider elects to install a reinforced concrete pilot channel, a grass cover shall be established on the unlined channel side slopes. The maximum side slopes for unlined channels are set forth in the Drainage Criteria Manual. The drainage easements required for lined channels and reinforced concrete pilot channels shall be of sufficient width to allow City maintenance of the channel. The maintenance of unlined creeks or channels shall be the responsibility of the property owners.
- (j) Runoff conveyed in roadway ditches shall be confined to the ditch. The flow in the ditch shall not exceed six feet per second (6 fps) and the side slope shall not exceed 3:1. The edge of the ditch nearest the road shall be at least three feet (3') from the road edge.

SECTION 5. WATER SYSTEM.

Section 5.01 Minimum Size.

The water system in the Subdivision shall be designed to furnish adequate and sufficient water for both domestic use and fire protection to each lot within the Subdivision. Water mains shall be sized to meet the City's requirements as may be

determined by Subdivider or the City Engineer. Water main sizes determined by the Subdivider are subject to the approval of the City Engineer.

Section 5.02 Service to Property Line.

- (a) Water lines shall be a minimum of 1” and extend to the property line of each lot or to a point within each lot so that service connections can be made without disturbing any other Improvement.
- (b) A box for a water meter shall be provided for each lot.
- (c) All water services shall be copper with compression type fittings. No sweat joints or flare joints shall be accepted.
- (d) All water taps shall be marked with one hash mark on the curb and painted blue to indicate location of water service to each lot.
- (e) All water services shall have a 3M Brand locator device for services placed six (6) inches above corporation at the main and not to exceed 36 inches in depth from final grade. Device will be directly over water main where corporation penetrates main line.

Section 5.03 Ductile-Iron Pressure Pipe.

- (a) All such pipe shall have a diameter of six inches (6") or greater and shall conform to AWWA Designation C150. All highway, railroad and other specified crossings and bores shall be completed using ductile-iron pipe. All such pipe shall be wrapped with poly wrapping unless resistivity tests indicate that such wrapping is not required. Such resistivity tests shall be conducted by the Subdivider at the Subdivider's expense.
- (b) All such pipe shall be designed to withstand a minimum working pressure of two hundred pounds per square inch (200 psi). Pipe having diameters of six inches (6") to twelve inches (12"), inclusive, shall conform to AWWA Designation 50. Any pipe having diameters greater than twelve (12") or having cover depths greater than ten feet (10') must be approved by the City Engineer.
- (c) Joints shall conform to AWWA Designations C110 and C111. Fittings shall conform to AWWA Designation C110 for pipe sizes twenty inches (20”) and larger and C153 for pipe sizes eighteen inches (18”) and smaller and be secured with locking joint restrainers (megalug). Double strap brass saddles or tapped couplings shall be used for water service connections.

Section 5.04 Polyvinyl Chloride Pipe.

- (a) Polyvinyl Chloride Pipe (PVC) water pipe shall be approved for potable water usage by the National Sanitation Foundation Testing Laboratory. Such pipe shall meet or exceed the requirements of AWWA Designation C900.
- (b) PVC water pipe shall conform to AWWA Designation C900 for pipe with a

minimum diameter ratio of eighteen (18).

- (c) PVC water pipe shall be installed with a rubber rising at each joint and an integral thickened bell as part of each joint. Pipe joints and fittings for PVC water pipe shall conform to AWWA Designation C110 for pipe sizes twenty inches (20") and larger and C153 for pipe sizes eighteen inches (18") and smaller and be secured with locking joint restrainers (megalug). Saddles or tapped couplings shall be used for water service connections.

Section 5.05 Concrete Cylinder Pressure Pipe.

This section includes material, fabrication, and delivery of concrete cylinder pipe and specials of the various sizes and classes required in the Project Plans and Specifications. All concrete cylinder pipe shall be manufactured in accordance with the requirements of American Water Works Standard C303-78, entitled "Reinforced Concrete Water Pipe - Steel Cylinder Type, Pre-Stressed," with additional requirements and/or modifications as described herein.

Section 5.06 Pipe Bends.

Each pipe bend must have an area sufficient to accept appropriate blocking. Each bend must be sufficiently reinforced to counter all thrust when used with this blocking. Blocking charts should be included in each set of plans.

Section 5.07 Water Main Testing.

The following tests are hereby authorized:

- (a) Sterilization of mains according to Texas Commission on Environmental Quality (TCEQ) standards.
- (b) Pressure tests meeting the following requirements: Two hundred (200) psi for two (2) hours with leakage not exceeding 11.65 gal/inch/dia. per mile of pipe over a twenty-four-hour (24-hour) period.
- (c) All testing costs shall be borne by the Developer and test results shall be submitted to the City.
- (d) Bacteriological samples will be submitted by the developer to an approved lab for analysis. The original results with the subdivision name clearly marked on the form, shall be submitted to the manager of the utilities division. All analysis costs shall be borne by the Developer.

Section 5.08 Installation Requirements.

- (a) Pipe and fittings shall be installed pursuant to manufacturer's specifications and as shown on approved engineering plans. Pipe shall have a six-inch (6") sand

bedding with six-inches (6") of sand on each side and twelve-inches (12") of sand over the top of pipe.

- (b) All brass fittings shall be compression type.
- (c) Water pipe shall be installed outside of the pavement section within the right-of-way (R.O.W.) or within drainage and utility easements along the roadway.
- (d) THE CITY SHALL OPERATE ALL VALVES FOR LOADING, TESTING, OR BLOWING OFF OF NEW LINES.
- (e) Bacteriological sampling stations may be required to be installed at the discretion of the Utilities Division.
- (f) All water mains shall be installed with a 14 Ga. tracer wire that is compatible with and will allow detection by Radiodetection Corporation's digital PXL - 2 pipe locator. The tracer wire shall be installed just above the proposed water mains and throughout the length of the water mains.
- (g) All pipefittings shall be installed with a megalug type pipe restraint.
- (h) All tapping sleeves shall be stainless steel full-seal type.

Section 5.09 Meter Box.

All water meter boxes shall meet the following requirements:

- (a) Plastic type with plastic lid or approved equal.
- (b) 18 inches (18") in diameter and 18 inches (18") tall.
- (c) Locking lid.
- (d) Double slotted.
- (e) Placed two-inches (2") above sub-grade.
- (f) See Attachment A.

Section 5.10 Dead End Lines.

No dead end lines shall be accepted, except in rare cases where the Utilities Division and the Director of Public Works both agree there is no other option. If a dead end water line is approved and installed, the following shall apply:

- (a) A flushing device shall be installed at the end of the line.
- (b) A Hydro-guard HG-1 integrated flush unit (or equal as approved by the Utilities Division) shall be installed to allow for automatic flushing of the water main.

- (c) See Attachment B.
- (d) A variance is submitted and approved by the City Council.

SECTION 6. GATE VALVES FOR ORDINARY WATERWORKS SERVICE.

Section 6.01 General.

Gate valves having diameters from six inches (6") to twelve inches (12") shall be designed to withstand a working pressure of two hundred (200) psi and a test pressure of four hundred (400) psi. Such valves shall conform to the AWWA Designation C509 and epoxy coated per AWWA C550.

Section 6.02 Description.

All gate valves shall be iron body, stainless steel mounted, non-rising stem, internal wedging type. Mechanical joint ends and punch-on joint ends shall conform to AWWA Designation C111. Flanged ends shall conform to AWWA Designation C110 for Class 250.

Section 6.03 Installation.

Gate valves shall be installed pursuant to manufacturing specifications and as shown on approved Construction Plans.

Section 6.04 Valve Boxes.

All valve boxes shall be of the adjustable type. The following requirements shall apply:

- (a) The valve box shall be centered over the valve.
- (b) The valve box shall be free of dirt or debris.
- (c) The valve box shall have a concrete pad poured around it at finished grade. This pad shall be 2' x 2' square.
- (d) All valve boxes shall have a rain guard under lid.
- (e) See Attachment D.

Section 6.05 Additional Requirements.

Three (3) complete sets of manufacturing detailed drawings and service manuals shall be furnished to the City for each type valve installed. All gate valves shall be installed within an adjustable cast iron valve box. Valves on all mains shall be located such that the distance between valves is a maximum of five hundred (500) feet or as approved by the City. Valves shall be furnished with extensions, such that the working nut is a

maximum of twenty-four inches (24") below grade.

SECTION 7. FIRE HYDRANTS.

Section 7.01 General.

Hydrants shall conform to AWWA Designation C502 for dry barrel hydrants. Additionally, all hydrants shall meet the following requirements:

- (a) All Fire hydrants shall be Mueller, Clow, American, AVK, Kennedy, Waterous or M&H brand. (Or similar equal as approved by the Manager of Utilities)
- (b) Shut-off valves shall be either upward closing or downward closing, and be of the horizontal-seat, compression-valve type.
- (c) Inlet connections shall be at least six inches (6") in diameter and shall be of the standard mechanical joint hub type. Inlet connections shall be installed with a gate valve.
- (d) Hydrants shall have two (2) hose nozzles, two and one-half inches (2 1/2") in diameter and one (1) pumper nozzle, four and one-half inches (4 1/2") in diameter. Such nozzles shall conform to National Standard Fire Hose Coupling Screw Standards.
- (e) All fire hydrants shall have a clear space of at least fourteen inches (14") between the top of the pumper nozzle and the bottom of the hydrant nut.
- (f) Hydrants shall be of the breakable, safety type and repairable by replacing the stem coupling and bolting the head back onto the standpipe. Such repair shall not require excavation or any work on the design of the stem to disconnect the stem from the hydrant parts above the standpipe breakpoint, in event of a traffic accident.
- (g) Hydrants shall be constructed so that the nozzles may be faced in any desired direction.
- (h) All fire hydrants shall be installed with a flanged end mechanical joint gate valve which shall be affixed to the "tee" of the water main with a mechanical joint and a "flanged" or "rotating gland" ring.
- (i) All fire hydrants shall be installed with quick connect adapters on each pumper nozzle as specified by City.
- (j) Minimum fire hydrants spacing shall meet the State Insurance Board Criteria as well as the following minimum standards:
 - (1) No structure may be located more than two hundred and fifty feet (250') of street distance from any given hydrant in a residential district.
 - (2) No structure may be located more than one hundred fifty feet (150') of street

distance from any given hydrant in commercial, institutional or multi-family districts.

Section 7.02 Painting.

Hydrants shall be painted in accordance to the City of Dallas specifications for hydrant colors with one (1) primer coat and one (1) final coat using Flynt brand paint. Reflective (blue) fire hydrant spotters shall be installed on all streets at a point opposite fire hydrants; located along centerline of street, closest to the fire hydrant. When fire hydrants are located at intersection corners, blue spotters shall be placed on both streets.

Section 7.03 Color Codes.

All Fire hydrants shall be color coded using the following City of Highland Village Fire Department's color codes:

- (a) Hydrant body shall be silver.
- (b) 6" main, red bonnet
- (c) 8" main, blue bonnet
- (d) 10" main and larger, green bonnet

Flow in Gallons Per Minute (GPM)
0-500 gpm, red 2 ½" caps
500-1000 gpm, orange 2 ½" caps
1000-2000 gpm, green 2 ½" caps
Over 2000 gpm, blue 2 ½" caps

Section 7.04 Installation Requirements.

All fire hydrants shall be installed in accordance with the following requirements:

- (a) Hydrants shall be installed upon a concrete slab not less than four inches (4") thick and not less than one square foot (1'sq.) of surface area.
- (b) At least seven cubic feet (7') of crushed rock or clean gravel shall be provided for drainage around each hydrant.
- (c) All weep holes shall have gravel placed around and under them.
- (d) Hydrants shall be carefully and substantially blocked with concrete against firm trench walls.
- (e) Hydrants and valve boxes shall be level with finished grade within six feet (6') of street curb.

- (f) A gate valve shall be installed for all fire hydrants. A locating device shall be placed next to all valves in the system. Locating device shall be such that a 3M locating device will detect.
- (g) All fire hydrants shall be installed with a grade lock device. See attachment C-1.
- (h) Flow Testing shall be performed prior to painting of hydrants. A flow test record shall be signed by the developer and submitted to the Utility Division, which confirms the accuracy of the flow tests.
- (i) See Attachment C-2.

Section 7.05 Sample Sites.

All new subdivisions shall be required to furnish the City a test site. This is to allow the City to take daily water samples. The test site shall be as follows:

- (a) Water Plus Corporation Model #15005834 with backflow. (Or similar equal as approved by the Utilities Division.)
- (b) See Attachment E.

SECTION 8. WASTEWATER SYSTEM.

Section 8.01 Minimum Size.

The wastewater system in the Subdivision shall be designed to adequately conduct the domestic and commercial wastewater flows generated within the subdivision. The wastewater mains shall be sized to meet the City requirements as determined by the Subdivider or the City Engineer. Wastewater main sizes determined by the Subdivider are subject to approval by the City Engineer.

Section 8.02 Service to the Property Line.

Sewer lines shall extend to the property line of each lot to allow connection of service without disturbing any other Improvement. A wye connection cleanout with riser shall be provided at the property line for each lot. Sewer service for each lot shall have a minimum depth of ground cover at the property line of four feet (4') and a maximum of six feet (6'). There shall be a separate sewer service provided from the property to the sewer main for each lot. Exceptions to this shall be granted by permission of the Manager of Utilities or the Director of Public Works.

Section 8.03 General.

- (a) PVC sewer pipe used in gravity drainage sewer systems shall conform to ASTM Specification D3034 for pipe having a standard diameter ratio of thirty-five (35).
- (b) PVC joints shall be rubber compression type seal. Assembly of joints shall be in

accordance with the manufacturer's recommendations.

- (c) Sewer flows shall be between two cfs (2 cfs) and ten cfs (10 cfs).
- (d) All manholes shall be equipped with a manhole rain pan and chimney seal. These devices must be a product, which has been approved by the City. See attachment F-1.
- (e) Manhole spacing shall not exceed five hundred feet (500'). Cleanouts shall not be spaced greater than (200') two hundred feet apart.
- (f) All manholes shall be flush with finished grade.
- (g) All cleanouts shall have a two foot by two foot (2' x 2') concrete pad poured around them.
- (h) See Attachment F-2 for Sanitary Sewer covers.
- (i) See Attachment G for cleanout castings.

Section 8.04 Installation.

- (a) Sewer pipe and fittings shall be installed pursuant to manufacturer's specifications and as shown on approved engineering plans. Pipe shall be bedded with six inches (6") of crushed stone below to six inches (6") over the top of the pipe.
- (b) Sewer pipe shall be installed outside of the pavement section within the ROW or within drainage and utility easements along the roadway.
- (c) All sewer pipe shall have locator tape installed one (1) foot above the pipe.

Section 8.05 Sewer Main Testing.

The following tests are hereby authorized:

- (a) Mandrel Test - manhole to manhole.
- (b) Pressure Test - three psi (3 psi) for thirty (30) minutes, no leakage.
- (c) TV Camera Inspection - shall be required for final acceptance and one (1) month before the expiration of the Maintenance Bond with the documentation furnished to the City.
- (d) All testing costs shall be borne by the Developer and tests results submitted to the City.

Section 8.06 Sewer Taps.

All sewer taps being installed in any new subdivision shall be as follows:

- (a) The pipe shall be PVC SDR 35.
- (b) The tap shall be brought to property line.
- (c) The tap shall be raised to a maximum depth of four (4) feet deep of finished grade.
- (d) A locating device shall be placed over end of tap. The locating device must be a type that a 3M sewer tap locator will trace.
- (e) Each tap shall be capped.
- (f) All sewer taps shall be marked with 2 hash marks on the curb and painted green to indicate location of sewer tap.

SECTION 9. UNDERGROUND PIPE EMBEDMENT AND BACKFILL.

Section 9.01 Embedment.

All underground pipe shall be laid, embedded and back filled in accordance with the minimum standards as described above.

- (a) For trenches under roadways, six percent (6%) cement stabilization shall be used when required by the City Engineer.
- (b) All materials used to backfill utilities shall be approved by the City and shall be compacted to at least ninety-five percent (95%) maximum density under roadways and at least ninety percent (90%) maximum density elsewhere.

SECTION 10. SIDEWALKS.

Section 10.01 General.

All sidewalks shall be four feet (4') wide, four inches (4") thick and constructed of three thousand (3,000) psi reinforced concrete.

SECTION 11. STREET LIGHTS.

Section 11.01. Street Lights.

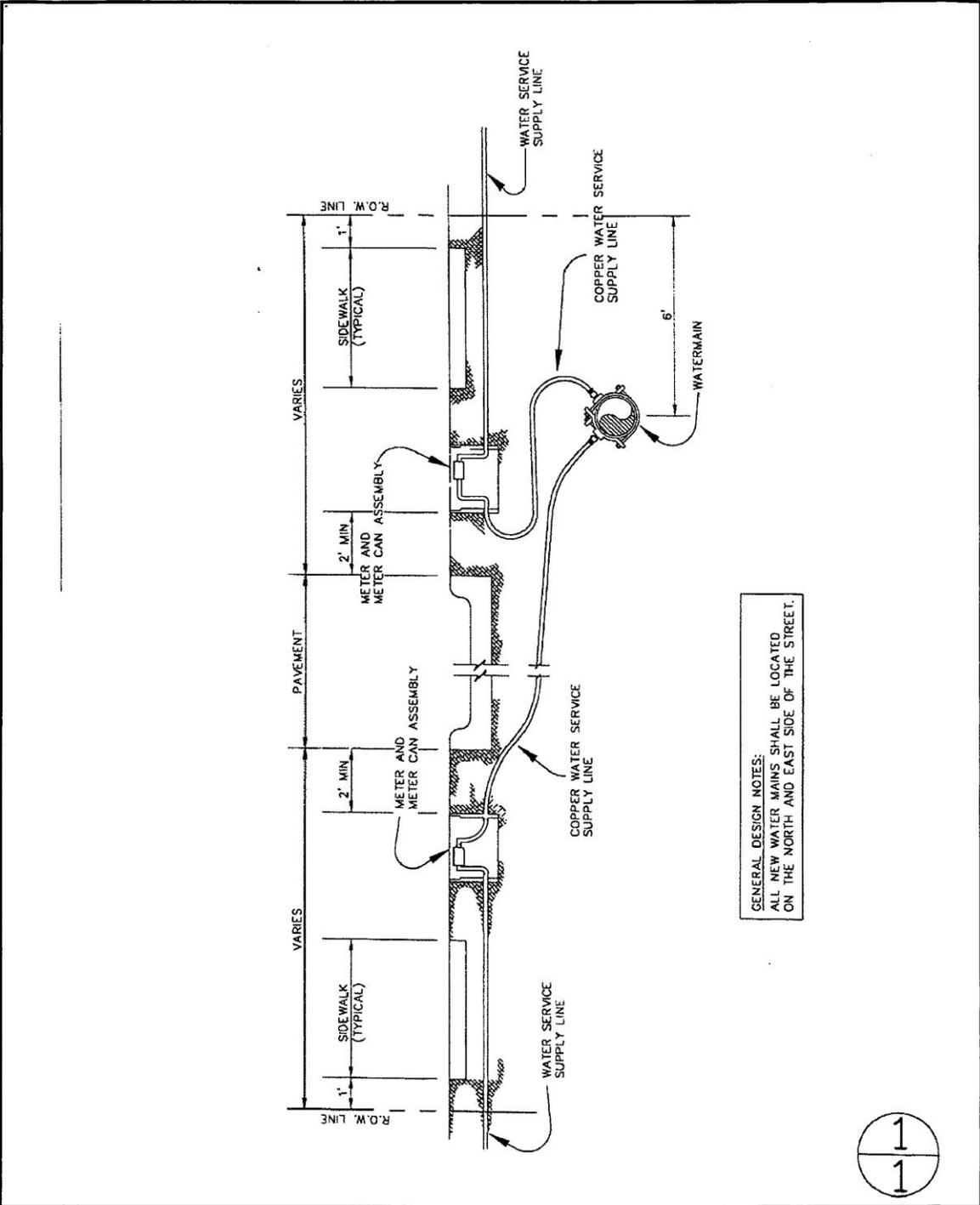
All roadways shall be lighted to provide for "Safety Lighting" in accordance with State Standards. Lighting plans and design shall be prepared by a registered Professional Engineer registered in the state of Texas and approved by the City Engineer.

SECTION 12. PARK LAND DEDICATED TO THE CITY.

Section 12.01 Maintenance.

All park land dedicated to the City must be cleaned up by the property owner to the satisfaction of the City prior to dedication. The clean up shall include, but not be limited to, mowing of grass and weeds, removal of all debris, trimming of dead branches from trees, and the installation of erosion control measures in accordance with Section 4.01.

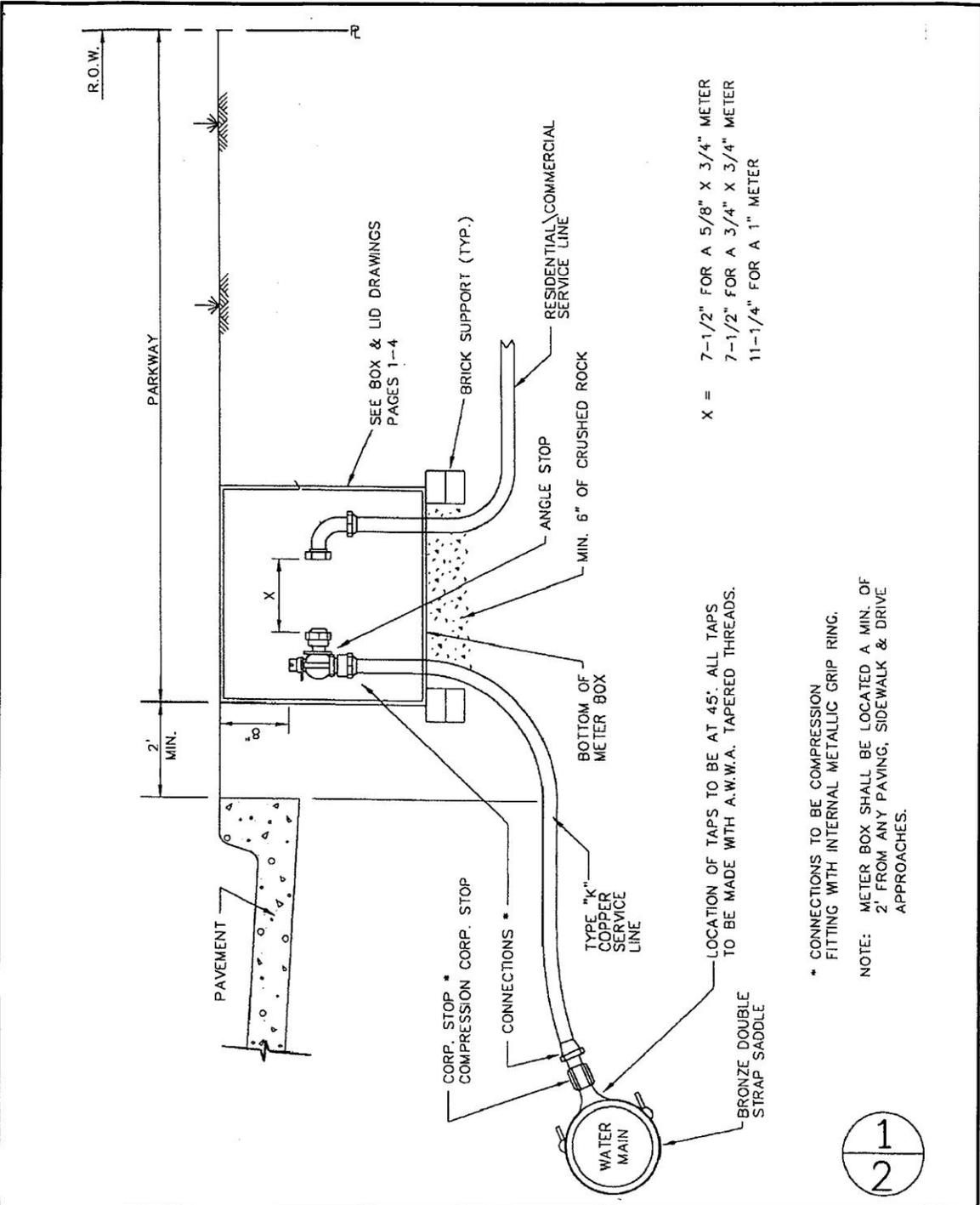
ATTACHMENT "A"



CITY OF HIGHLAND VILLAGE
 PUBLIC WORKS
 STANDARD DETAILS

**WATER MAINS WITH
 WATER SERVICE SUPPLY LINES**

PAGE
7



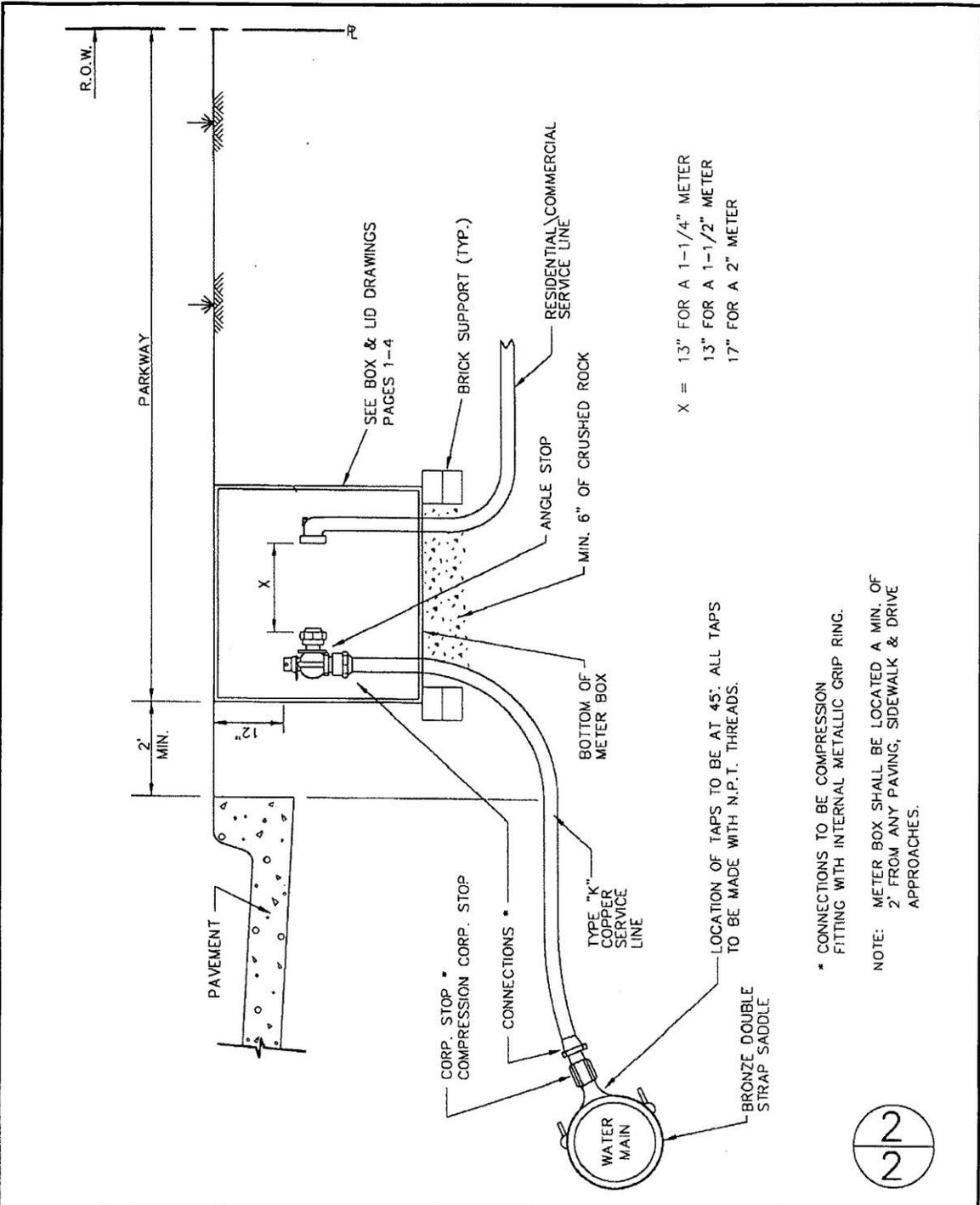
X = 7-1/2" FOR A 5/8" X 3/4" METER
 7-1/2" FOR A 3/4" X 3/4" METER
 11-1/4" FOR A 1" METER

LOCATION OF TAPS TO BE AT 45°. ALL TAPS TO BE MADE WITH A.W.W.A. TAPERED THREADS.

* CONNECTIONS TO BE COMPRESSION FITTING WITH INTERNAL METALLIC GRIP RING.
 NOTE: METER BOX SHALL BE LOCATED A MIN. OF 2' FROM ANY PAVING, SIDEWALK & DRIVE APPROACHES.

1/2

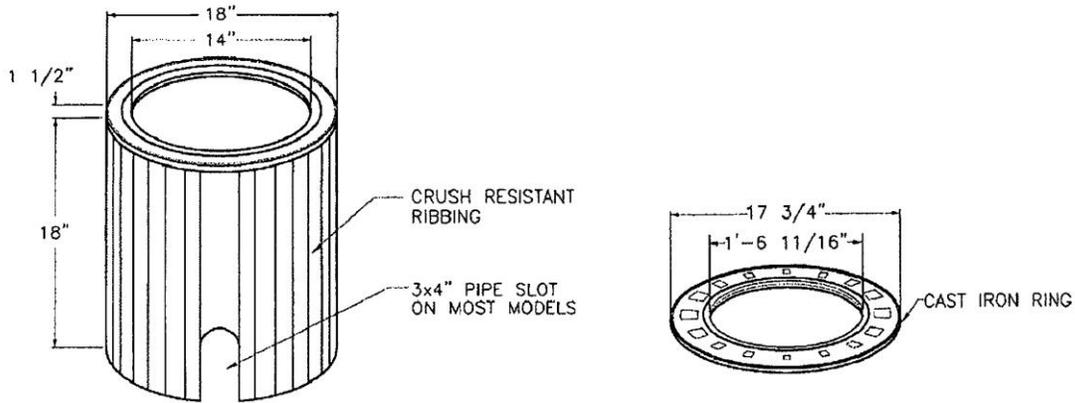
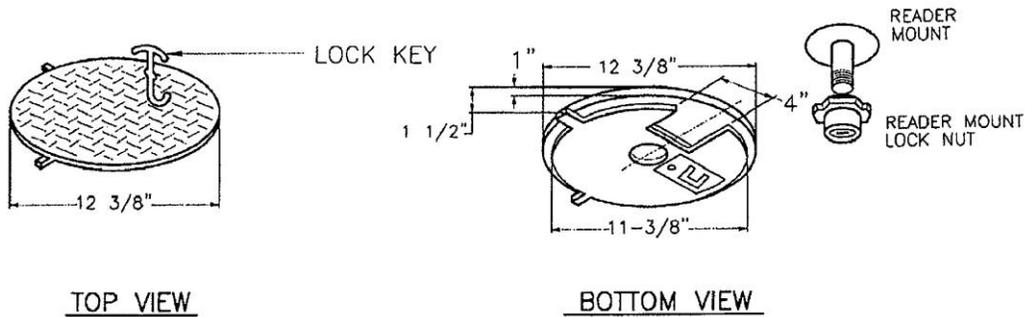
<p>CITY OF HIGHLAND VILLAGE PUBLIC WORKS STANDARD DETAILS</p>	<p>WATER SERVICE INSTALLATION 3/4" OR 1" LINE</p>	<p>PAGE 1</p>
--	---	---------------------------



CITY OF HIGHLAND VILLAGE
 PUBLIC WORKS
 STANDARD DETAILS

WATER SERVICE INSTALLATION
 1-1/4", 1-1/2", 2" LINE

PAGE
2



METER BOX SHALL BE "F" SERIES BY DFW PLASTICS INC., OR BASS & HAYS FOUNDRY, INC. (SIMILAR IN SIZE TO DFW PLASTICS) OR APPROVED EQUAL. ALL SPECS ARE SUBJECT TO CHANGE WITHOUT NOTICE.

Part No.	Series	Size	Height	ID	OD
DFW-1814F	F	18x14"	14"	14"	18"
DFW-1814-PLCIR	F	18x14"	14"	14"	18"
DFW-18RING	F	18"	1 1/2"	11 3/4"	17 3/4"
DFW-18AMRL-Lid	F	12"	1 1/2"	11 3/8"	12 3/8"

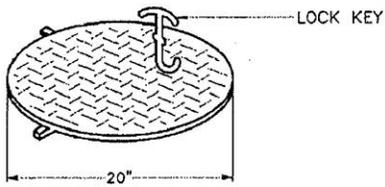
* SEE SHEET 4 FOR LID AND BODY DETAILS

1
4

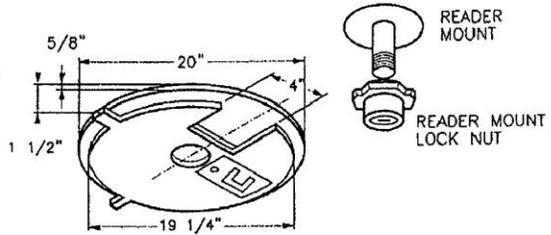
CITY OF HIGHLAND VILLAGE
PUBLIC WORKS
STANDARD DETAILS

**BOX AND LID FOR
5/8" & 3/4" METERS**

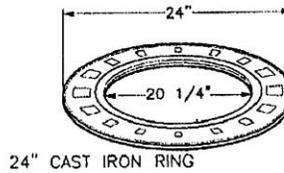
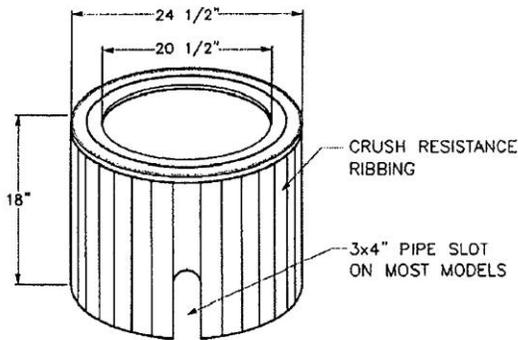
PAGE
3



TOP VIEW



BOTTOM VIEW



METER BOX SHALL BE "F" SERIES BY DFW PLASTICS INC., OR BASS & HAYS FOUNDRY, INC. (SIMILAR IN SIZE TO DFW PLASTICS) OR APPROVED EQUAL. ALL SPECS ARE SUBJECT TO CHANGE WITHOUT NOTICE.

Part No.	Series	Size	Height	ID	OD
DFW-2418F	F	24x18"	18"	20 1/2"	24 1/2"
DFW-2418-PLCIR	F	24x18"	18"	20 1/2"	24 1/2"
DFW-24RING	F	24"	1 1/2"	20 1/4"	24"
DFW-20AMRL-Lid	F	20"	1 1/2"	19 1/4"	20"

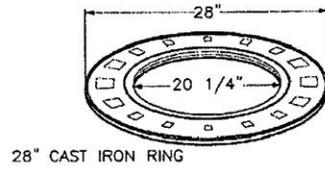
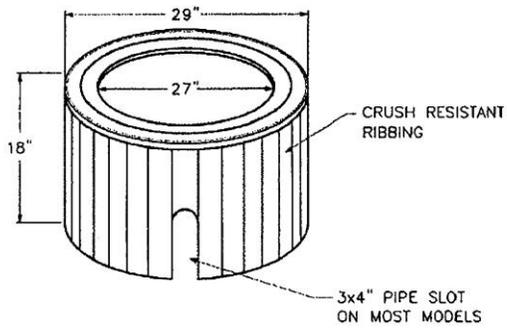
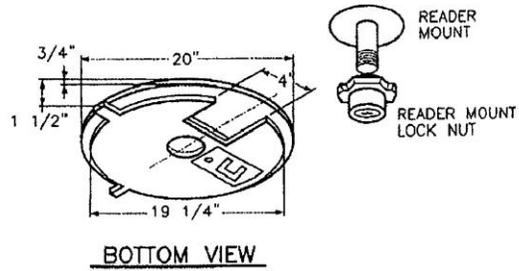
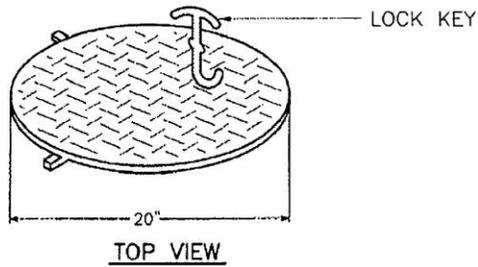
* SEE SHEET 4 FOR LID AND BODY DETAILS.

2
4

CITY OF HIGHLAND VILLAGE
PUBLIC WORKS
STANDARD DETAILS

BOX AND LID FOR
1" & 1-1/4" METERS

PAGE
4



METER BOX SHALL BE "F" SERIES BY DFW PLASTICS INC., OR BASS & HAYS FOUNDRY, INC. (SIMILAR IN SIZE TO DFW PLASTICS) OR APPROVED EQUAL. ALL SPECS ARE SUBJECT TO CHANGE WITHOUT NOTICE.

Part No.	Series	Size	Height	ID	OD
DFW-2818F	F	28x18"	18"	27"	29"
DFW-2818-PLCIR	F	28x18"	18"	27"	29"
DFW-28RING	F	28"	1 1/2"	20 1/4"	28"
DFW-20AMRL-Lid	F	20"	1 1/2"	19 1/4"	20"

* SEE SHEET 4 FOR LID AND BODY DETAILS.

3
4

NOTES

METER BOX SHALL BE BLACK AND CONSTRUCTED OUT OF MODIFIED POLYETHYLENE MATERIAL FOR MAXIMUM DURABILITY AND CORROSION RESISTANCE.

THE BLACK MATERIAL IS FOR MAXIMUM UV PROTECTION. THE BLACK MATERIAL IS FOR MAXIMUM UV PROTECTION. THE BLACK MATERIAL SHALL BE UNIFORM THROUGHOUT THE METER BOX FOR MAXIMUM LONGEVITY AND NOT HAVE A FOAMING AGENT THAT CREATES AIR POCKETS WITHIN THE PLASTIC WALL.

PLASTIC LID

- THE LID SHALL HAVE "WATER METER" MOLDED INTO THE LID WITH A DIAMOND PATTERN FOR SKID RESISTANCE.
- THE LID SHALL HAVE A MOLDED SLIDE MOUNT UNDERNEATH THE LID TO ACCEPT AMR TRANSPONDERS.
- THE LID SHALL SEAT SECURELY AND EVENLY INSIDE THE CAST IRON RING.
- THE LID SHALL HAVE A SPRING LOADED BRASS LOCKING MECHANISM THAT USES A STANDARD BRASS KEY

PLASTIC BODY

- THE BODY SHALL HAVE CRUSH RESISTANT RIBBING ALONG THE OUTSIDE OF THE BOX WITH 2" BASE FOOTING LOCATED AT THE BOTTOM OF THE METER PIT TO HELP ELIMINATE SINKING OR FLOATING ONCE INSTALLED.
- THE BODY SHALL HAVE A PATENTED UNIVERSAL RING LOCATOR MOLDED INTO THE TOP OF THE METER PIT TO HELP SECURE CAST IRON RING (MFG BY SIGMA) ONTO TOP OF METER PIT WITH 4 COATED SELF TAPPING BOLTS.
- THE BODY SHALL HAVE ONE PIPE SLOT ON EACH END OF THE BODY THAT MEASURE 3"x4"



<p>CITY OF HIGHLAND VILLAGE PUBLIC WORKS STANDARD DETAILS</p>	<p>GENERAL NOTES & LID & BODY DETAILS</p>	<p>PAGE 6</p>
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ATTACHMENT "B"



Hydro-Guard® Introduces **Gary Moody** as your Regional Sales / Service Associate

Hydro-Guard® HG1-Integrated

The HG1-Integrated Unit provides the benefits of automatic flushing in warm weather climates. The unit's built-in programmer is both convenient and easy-to-use.



Hydro-Guard® HG-5

The HG5 Vertical Discharge Unit features a directed discharge with an above-ground valve. The units are equipped with your choice of Pressure Vacuum Breaker or Air Gap for backflow prevention.



Hydro-Guard® HG-6 Hydrant Flusher

This durable yet, light weight, automatic programmable flushing system offers a built-in sample station, OEM Dechlorination, and can be used to elevate the water quality anywhere in the water distribution system within hours of installation. The HG-6 provides a perfect fit for temporary use and emergency applications.



Custom Enclosures

Designed for year-round use, the Safety-Guard™ custom-bracketed pedestal enclosures were developed to accommodate a multitude of private and municipal utility and distribution system applications...from backflow prevention devices to air release valves...and everything in between.



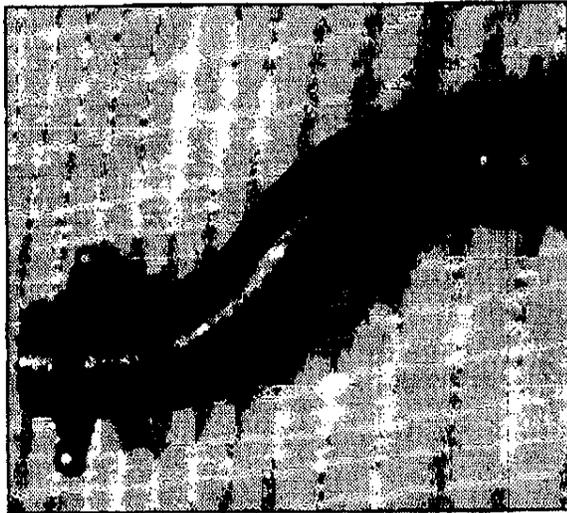
Bacteriological Sampling Station

Housed in the industry's most durable and secure enclosure, the Safety-Guard™ Bacteriological Sampling Station offers a one-inch high flow blowoff, 360° accessibility, CyberLock security upgrades, and maximum durability.

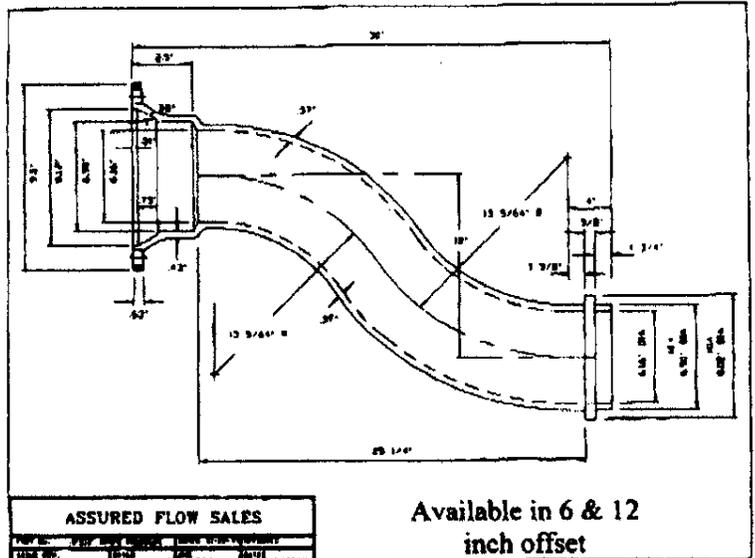
For more information call **(832) 257-7132** or via e-mail GaryMoody@hydro-guard.com

ATTACHMENT "C-1" Hydrant Change Out *Use Gradelok*

The next time you change out an existing fire hydrant, make sure your crew is equipped with **Gradelok**. Insure your hydrants will be installed with the break flange at the proper grade.



The above picture is a mechanical joint bell by a swivel joint, "Gradelok".



The above drawing is a m.j. **Gradelok** with a m.j. bell by a swivel joint (easily adaptable to a cut pipe.)

Often times when a hydrant is replaced it occurs that when the repair crew digs down to the bottom of the hydrant, in order to dislodge the hydrant, a lead pipe from the main may have to be cut. This m.j. "Gradelok" would allow for a simple adaptation, allowing for the installation of a new hydrant (with a break flange) to an existing water main.

Gradelok is good insurance.

ASSURED FLOW SALES, INC.

P.O. Box 49633
Sarasota, Florida 34230-6633
(800) 388-0678 Fax: (941) 953-9695
E-mail: afsi@gte.net
Website: www.gradelok.com

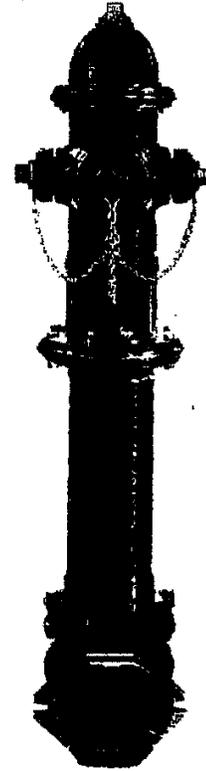
9.4



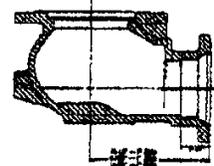
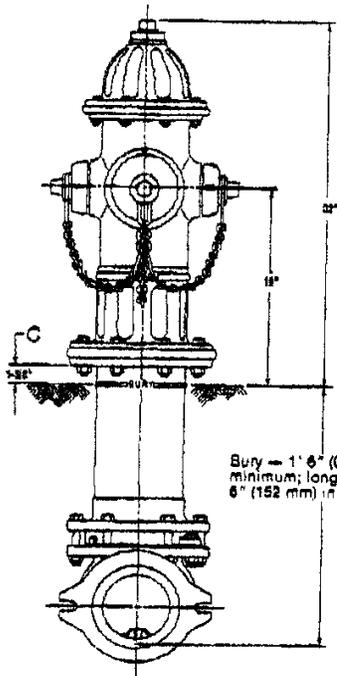
MUELLER® SUPER CENTURION 200™ ATTACHMENT "C-2" FIRE HYDRANT

7-90

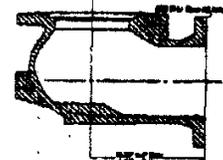
- Catalog numbers---
 - A-420 4-1/2" main valve opening two way (two hose nozzles)
 - A-421 4-1/2" main valve opening three way (two hose nozzles and one pumper nozzle)
 - A-422 5-1/4" main valve opening two way (two hose nozzles)
 - A-423 5-1/4" main valve opening three way (two hose nozzles and one pumper nozzle)
 - A-424 4-1/2" main valve opening one way (one pumper nozzle)
 - A-425 5-1/4" main valve opening two way (two pumper nozzles)
- 10 year limited warranty on material and workmanship
- Meets all applicable parts of ANSI/AWWA C502 Standard
- Post type dry barrel design
- Dry top design with O-ring sealed oil reservoir
- Traffic feature
- Compression type main valve closes with pressure
- Operating nut available in wide variety of shapes and sizes---open left or right
- Field replaceable hose and pumper nozzles
- Hose and pumper nozzles have large radius, full flow openings for low friction loss
- Contoured shoe is designed for full flow
- Dual bronze drain valves provide effective barrel drainage
- 200 psig (1379 kPa) maximum working pressure, 400 psig (2758 kPa) test pressure



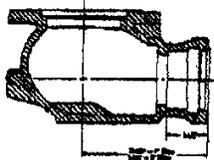
Dimensions



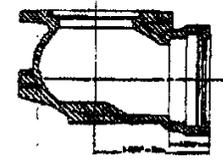
Mechanical joint
---standard and
D-150



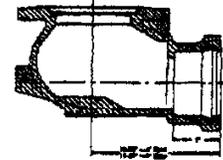
Flange



A-C



Slip-on



Hub



Subsidiary of
Tyler Corporation

ATTACHMENT "D"

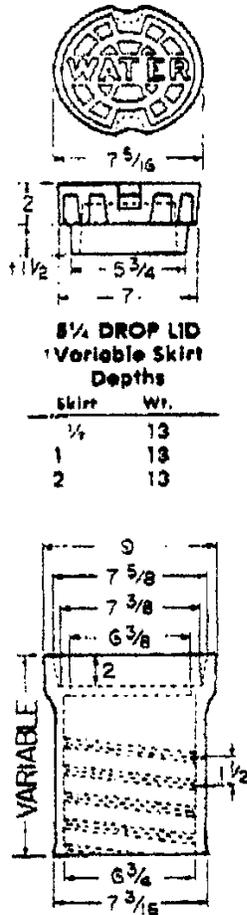
CAST IRON VALVE BOXES, TWO-PIECE

Accommodates 4" Through 12" Valves
5/8-inch Shafts, Screw-Type
6850 Series

Item	Box Complete		Top Section, w/Lid		Bottom		*Pieces Per Pkg.
	Extension, In Inches	Wt.	Length	Wt.	Length	Wt.	
461-S	19-22	60	10	35	15	25	..
462-S	27-32	70	10	36	24	36	..
562-S	27-37	80	16	45	24	35	20
563-S	33-43	85	16	46	30	40	20
564-S	39-50	90	16	45	36	45	20
662-S	36-62	108	26	65	30	40	20
664-S	39-60	110	26	65	36	45	20
666-S	61-71	138	24	68	**48	70	20
668-S	62-82	145	26	65	**60	80	20

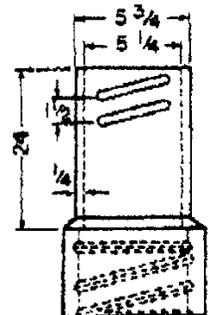
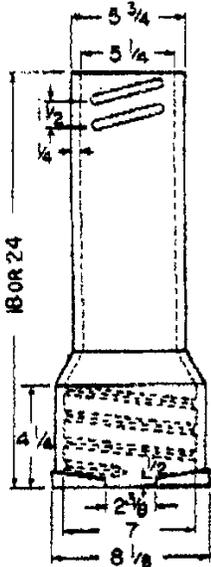
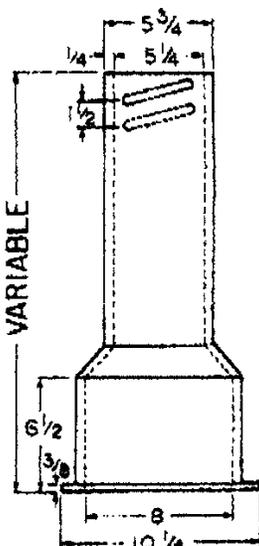
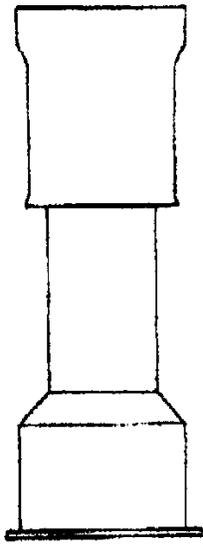
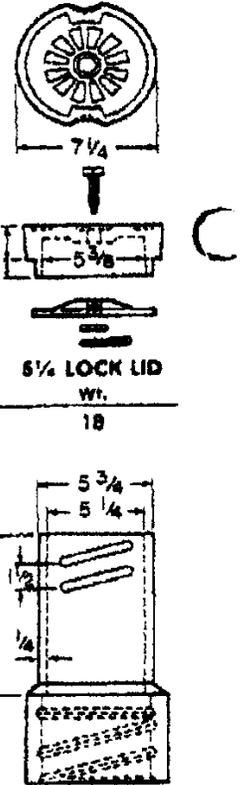
*Tyler may ship loose pieces if packaging delays your order

**May be furnished in two pieces screwed together to make the length required.



For special application components, see pages 8-10.

LIDS ARE MARKED "WATER" OR "GAS" Unless specified otherwise, "Water" will be shipped.



BOX COMPLETE

TOP

BOTTOM

58 AND 59 EXTENSION

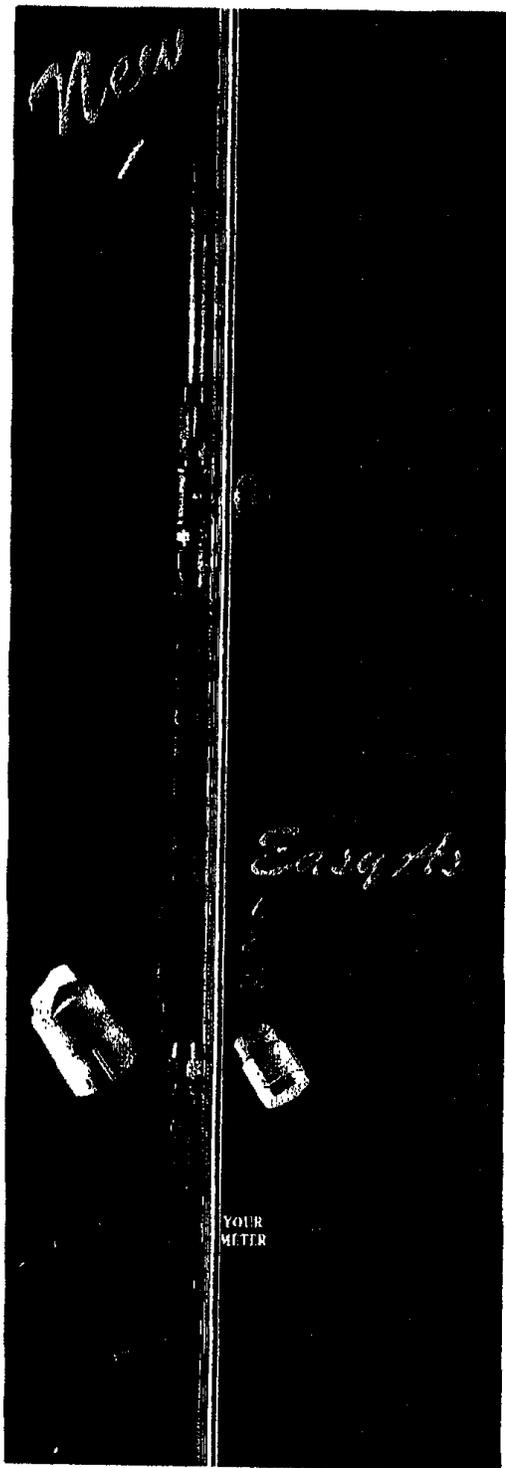
60 EXTENSION

Item	Height Increase	Wt.
58	14	25
59	18	30

Item	Height Increase	Wt.
60	24	35

These extensions also fit Series 6800 three-piece valve boxes

ATTACHMENT "E"



The All-In-One Sample Station fits into any normal meter box below grade for protection from freeze or damage caused by traffic, mowers or vandals. The length of the station is available in the same size as a 5/8", 5/8" X 3/4" of full 3/4" water meter so it may be placed in line in the position where an existing meter is set while allowing for the reinstallation of the meter in the same existing meter box. End connections accommodate standard water meter couplings. A built-in dual check backflow preventer prevents cross connection contamination of the potable water system and is constructed of brass throughout (with the exception of a plastic housing cap) with compression type sealing gasket to prevent groundwater infiltration and contamination of the station. The housing cap has a built-in key way for ease of operation with a standard meter key.

The operation consists of a positive lock-up which is activated and deactivated by the use of the probe rod. Pushing the rod into the station turns the water on and locks the rod in place. Pushing the outer housing of the rod turns the water off and releases the probe rod. A glove valve for adjusting the flow of water is placed in line at a distance from the spigot end to allow a steady flow of water with no aeration. There are no threads on the exhaust area of the spigot which could harbor bacteria. The probe rod is constructed of brass and copper with a plastic housing to protect the rod and disengage it from the sample station. Only one probe rod is needed as it fits all stations. The operator carries the rod, leaving nothing above ground. Order: probe rod model No. 150-G. Sample station model No. 1500 specify meter size and length. "Custom Designs Available"

Distributed In Your Area By:



& Associates, Inc.
Water Utility Specialties
3103 Clear Lake Ct., Arlington, Texas 76017
800-939-6896
817-487-7008 (METRO)

ATTACHMENT "F-1"

KNUTSON MANHOLE INSERT

ADVANTAGES

- ① Eliminates water run-off from entering sewer collection systems at the manholes.
- ② Keeps dirt and debris out of sewer collection system.
- ③ Controls sewer odors.
- ④ Also excellent for electrical and telecommunication manholes.

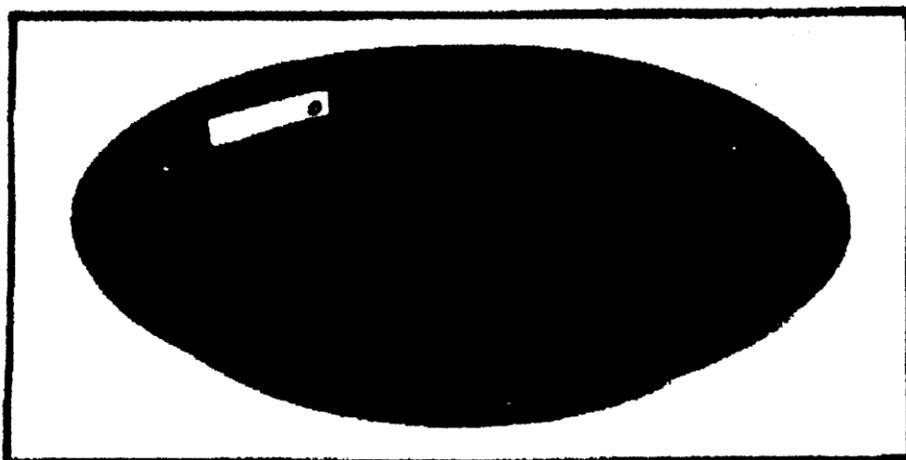
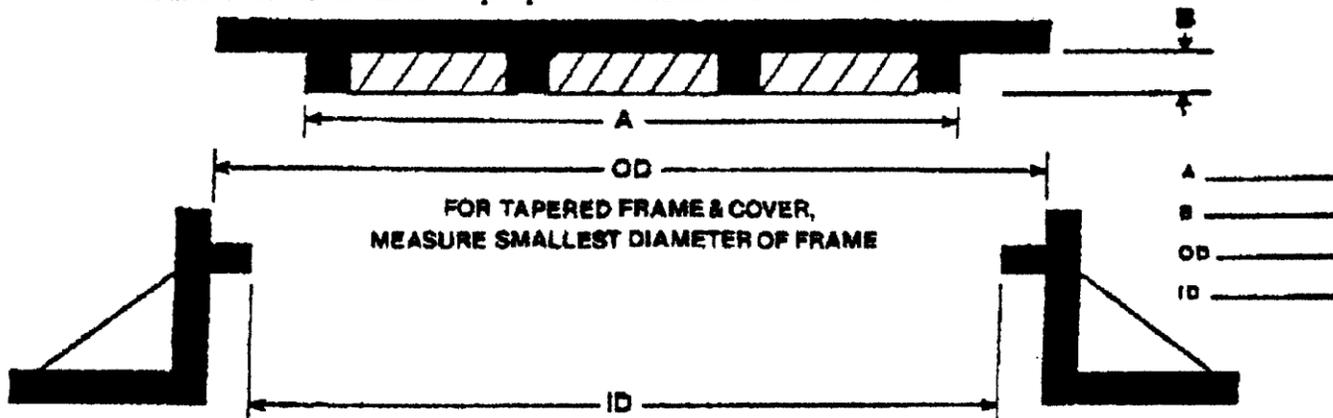
FEATURES

- ① Manufactured of high density, high molecular weight polyethylene, which eliminates brittleness, caused by cold temperatures.
- ② Five year guarantee against manufacturer defects (does not cover valve, handle, or gasket).
- ③ Ventilation by valve or vent hole.
- ④ Certified engineering reports from Southwest Research Institute available upon request.
- ⑤ No corrosive parts.



ATTACHMENT "F-1" CONTINUED

Measurements needed for proper installation of KNUTSON MANHOLE INSERTS



For Further Product Information And Pricing Contact:

J  **The Rohan Company**

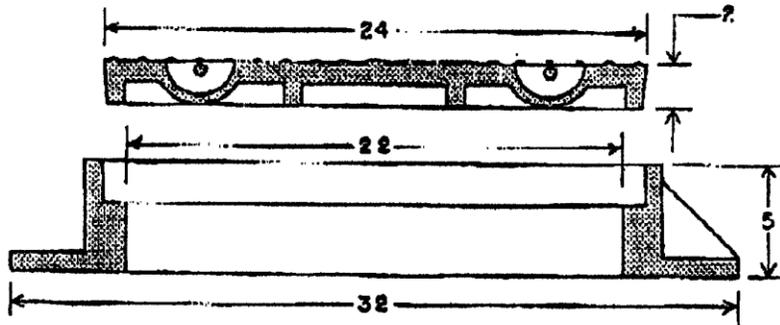
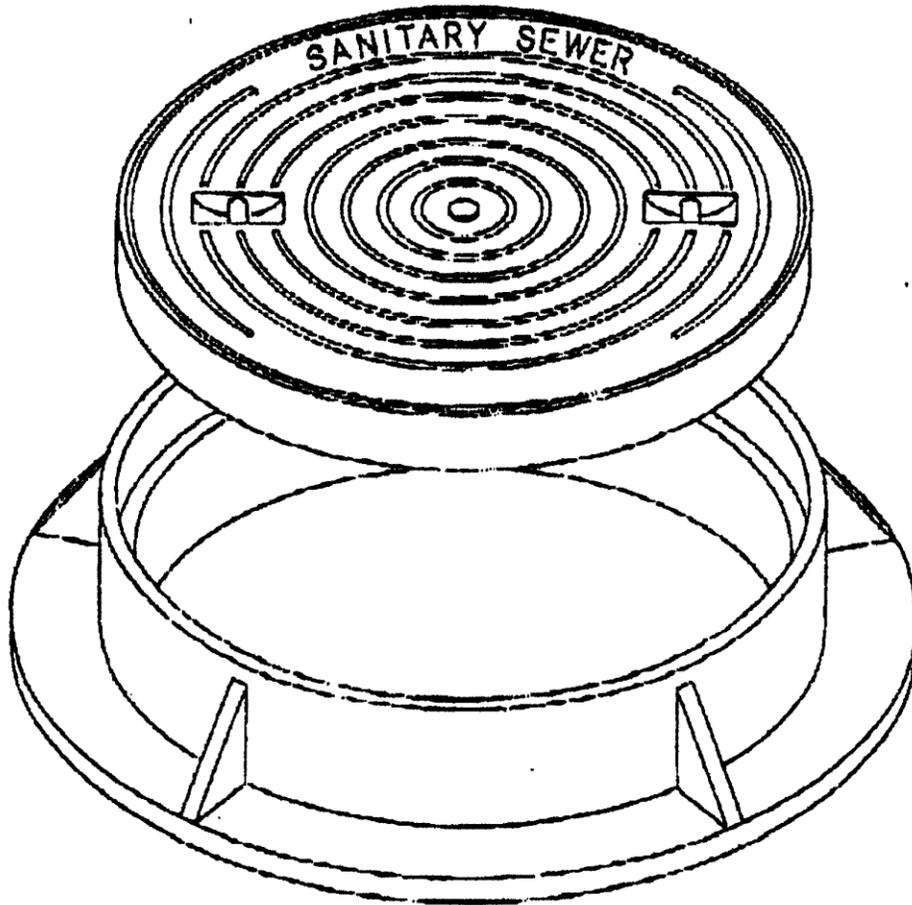
Waco, Texas
(817) 772-7910
(800) 876-7910

RUSSELL S. NELSON
Sales Representative

4333 Irving Blvd.
P.O. Box 659250
Dallas, TX 75366-9250
(214) 831-9410
(800) 262-1557

FAX (214) 805-0768
Metro 263-6806
24 Hour # (214) 235-0849

ATTACHMENT "F-2"



943-1012

BASS & HAYS
FOUNDRY, INC.

943-1262

PATTERN NUMBER # 300-24

RING WEIGHT	170
COVER WEIGHT	134
SET WEIGHT	304

DESCRIPTION

DRAWN BY:

ATTACHMENT "G"



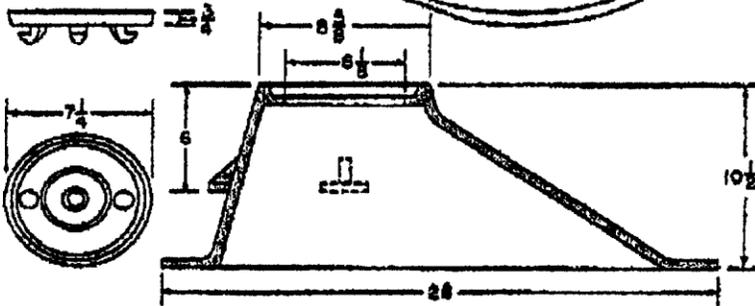
339

Sanitary Cleanout Boot

BASE 92 lbs.

LID 8 lbs.

SET 100 lbs.



404

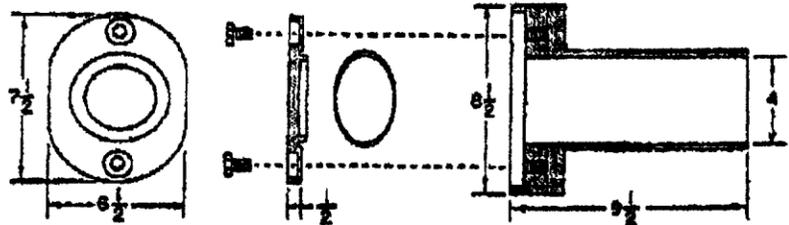
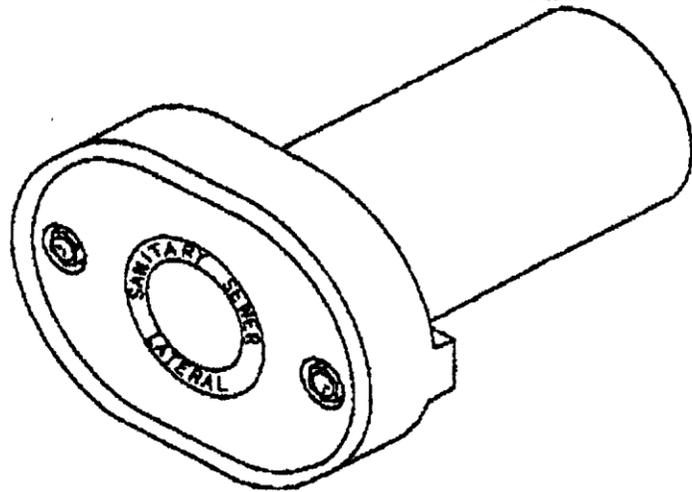
Lateral Cleanout

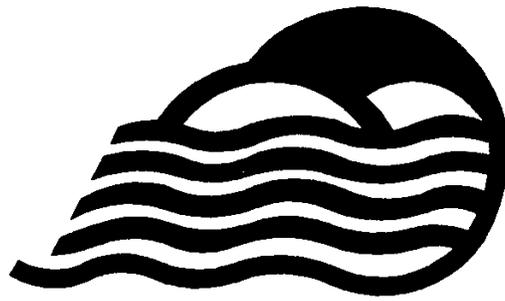
With Gasket, two Bolts

BASE 11 lbs.

LID 4 lbs.

SET 15 lbs.





HIGHLAND VILLAGE



CONTROL MONUMENT DATA



BW2 Engineers, Inc.

1919 S. Shiloh Road
Suite 500, L.B. 27
Garland, Texas 75042
(972) 864-8200 (tel)
(972) 864-8220 (fax)

AUGUST 2003

PROJECT SUMMARY

BACKGROUND

In June of 2003, the City of Highland Village Public Works Department contracted with BW2 Engineers, Inc (BW2) to establish a control network in the City. The purpose of this network would be to provide a single horizontal and vertical control system for future surveying and engineering needs, and to provide a framework for the Geographic Information System (GIS) database currently being created. On June 23rd, BW2 personnel met with members of the City's Public Works Staff to discuss implementation of the project.

In order to minimize costs, City of Highland Village personnel were utilized to set the monuments. It was recommended that permanent monuments be placed at approximately a one mile grid, with the perimeter of the grid being laid out generally along the limits of the City. The one mile grid would provide adequate control for use within the city. All future needs using conventional survey methods could be tied into two monuments with a horizontal and vertical control loop of approximately one mile. Those using Global Positioning Systems (GPS) could easily use the monumentation to calibrate their project.

IMPLEMENTATION

It was recommended that permanent structures such as inlets, junction boxes, or headwalls, which are substantially deep into the ground should be used whenever possible for monument location. Concrete relatively thin structures such as sidewalks and curbs should be avoided. It was determined from our June 23rd meeting that approximately 15 monuments would be required for the City. Of these, approximately 12 would be located on a substantial concrete structure. The remaining monuments would be set into the ground using a special FENO monument created by Berntsen Monuments. These monuments are attached to a 1000 mm. (39 inch) shaft which incorporates an anchor system at the bottom. The monuments which fell inside the city limits were stamped "CITY OF HIGHLAND VILLAGE" "CONTROL MONUMENT NO. ___". Monuments which are located outside the city limits have no marking except the monument number.

On July 10, 2003 BW2's field coordinator met with the City staff that would set the monuments. Using the the preliminary locations determined in the June 23rd meeting, the City staff set the monuments in the established location and insured that there were no utilities in the area where monuments were set in the ground.

CALIBRATION

GPS observations were taken on August 5th, 2003 using two Trimble 4700 receivers. BW2 occupied the four exterior corner monuments in order to set up a calibration system. Using an approximate three hour occupation on each monument (two monuments in the morning and two monuments in the afternoon), sufficient data was collected for processing through the National Geodetic Survey "OPUS" system. On August 6th, BW2 occupied the fifteen control monuments along with an additional four Texas Department of Transportation (TxDOT) monuments. This occupation was completed with a GPS base station located near the center of the city using Real Time Kinematic methods. Utilizing the four exterior corner monuments and the four TxDOT monuments, a calibration was determined for the city control system. The calibration has a root mean square error as follows:

Horizontal = 0.008 ft.
Vertical = 0.012 ft.

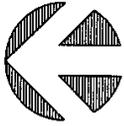
The calibration error falls well within the Standards for a Horizontal and Vertical Control system based on the *Manual of Practice for Land Surveying in the State of Texas (1999)*.

The Horizontal datum is based on the State Plane Coordinate System, Texas North Central Zone 4202 in feet at grid. Conversion to surface coordinates is based on the TxDOT factor for Denton County of 1.000150630. The Vertical datum is based on NAVD '88 in feet at surface. A table for Latitudes and Longitudes of each point is also included in this report.

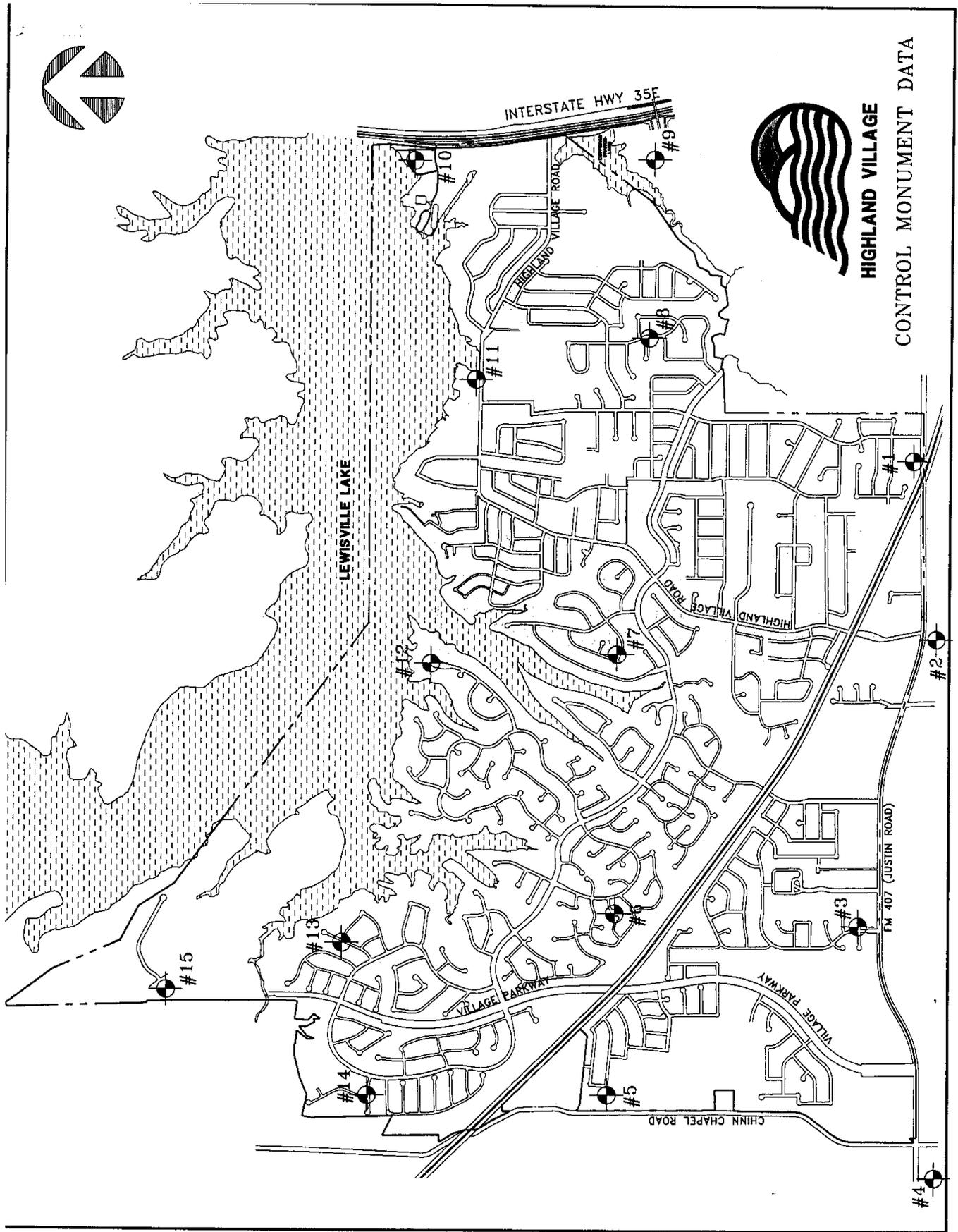
ACKNOWLEDGEMENTS:

BW2 would like to acknowledge the City of Highland Village Public Works personnel for their assistance with this project, in the setting of the GPS Control Monuments. Additionally, special thanks are given to Ms. Marikka Williams, GIS Project Coordinator; Mr. Scott Kriston, Utility Superintendent; and Mr. Charles Mitchell, Street Superintendent; for their assistance with site selection, placement, and system implementation.

APPENDIX A
Vicinity Map



HIGHLAND VILLAGE
CONTROL MONUMENT DATA



APPENDIX B

Locator Maps

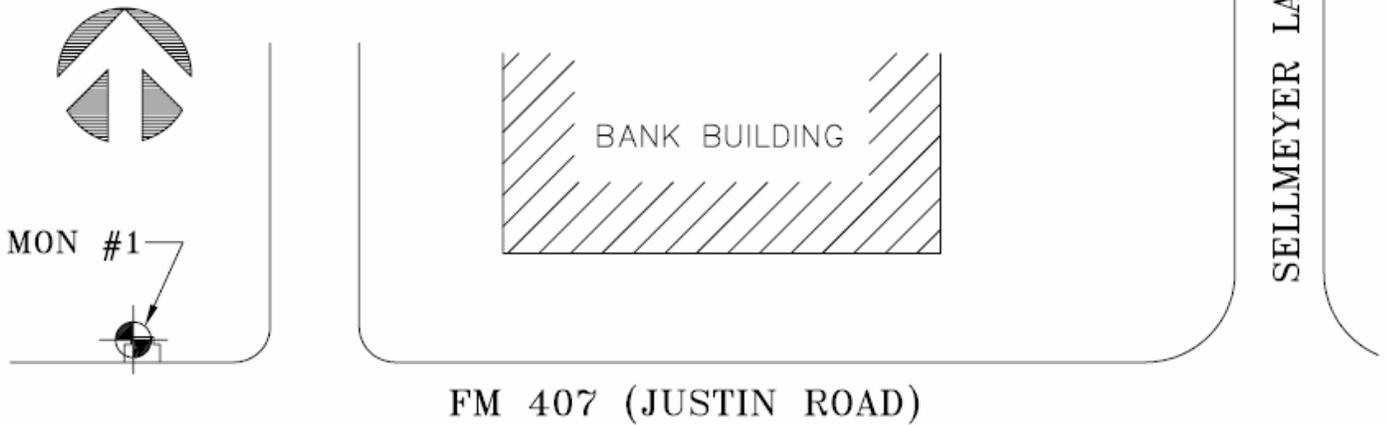


HIGHLAND VILLAGE

GPS CONTROL NETWORK
MONUMENT NO. 1

MON #1

MAPSCO 549 V
(LOOKING EAST)



HORIZONTAL DATUM:
STATE PLANE COORDINATES (FEET)
TEXAS NORTH CENTRAL ZONE 4202

VERTICAL DATUM:
NAVD '88

CONVERSION TO SURFACE
BASED ON TXDOT FACTOR FOR
DENTON COUNTY (1.000150630)

STATE PLANE COORDINATES (FEET)

N = 7075884.310
E = 2413553.258
ELEV = 594.12

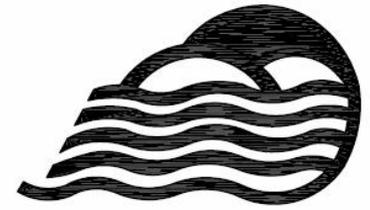
LATITUDE AND LONGITUDE

33°04'17.85941"N
97°02'49.33853"W



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HIGHLAND VILLAGE

GPS CONTROL NETWORK
MONUMENT NO. 2

MAPSCO 549 T
(LOOKING NORTH)



HIGHLAND
VILLAGE ROAD

FM 407 (JUSTIN ROAD)

MON #2

BROWING
ROAD

HORIZONTAL DATUM:
STATE PLANE COORDINATES (FEET)
TEXAS NORTH CENTRAL ZONE 4202

VERTICAL DATUM:
NAVD '88

CONVERSION TO SURFACE
BASED ON TXDOT FACTOR FOR
DENTON COUNTY (1.000150630)

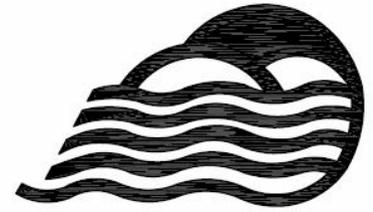
STATE PLANE COORDINATES (FEET)
N = 7075707.884
E = 2410269.197
ELEV = 619.56

LATITUDE AND LONGITUDE
33°04'16.56159"N
97°03'27.95933"W



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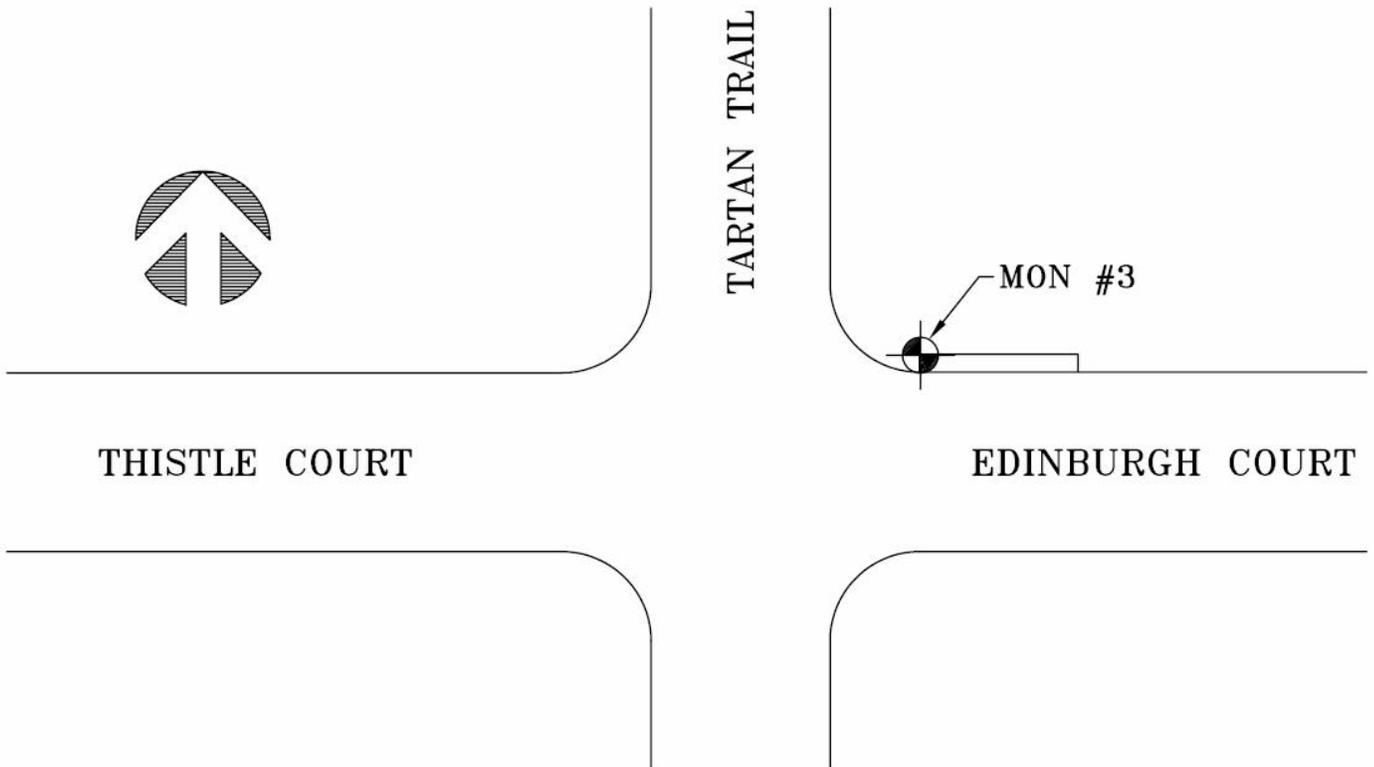
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HIGHLAND VILLAGE

GPS CONTROL NETWORK
MONUMENT NO. 3

MAPSCO 549 S
(LOOKING WEST)



HORIZONTAL DATUM:
STATE PLANE COORDINATES (FEET)
TEXAS NORTH CENTRAL ZONE 4202

VERTICAL DATUM:
NAVD '88

CONVERSION TO SURFACE
BASED ON TXDOT FACTOR FOR
DENTON COUNTY (1.000150630)

STATE PLANE COORDINATES (FEET)

N = 7076946.592
E = 2405004.605
ELEV = 646.14

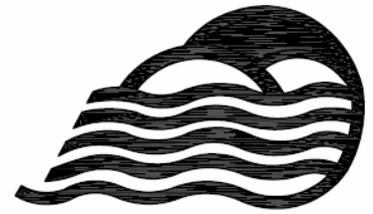
LATITUDE AND LONGITUDE

33°04'29.52847"N
97°04'29.62810"W



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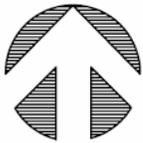


HIGHLAND VILLAGE

GPS CONTROL NETWORK
MONUMENT NO. 4

MON #4

FT. WORTH MAPSCO 548 U
(LOOKING NORTH)



CHINN CHAPEL
ROAD

FM 407 (JUSTIN ROAD)



CROSSROAD BIBLE CHURCH
PARKING LOT

FLUME

MON #4

HORIZONTAL DATUM:
STATE PLANE COORDINATES (FEET)
TEXAS NORTH CENTRAL ZONE 4202

VERTICAL DATUM:
NAVD '88

CONVERSION TO SURFACE
BASED ON TXDOT FACTOR FOR
DENTON COUNTY (1.000150630)

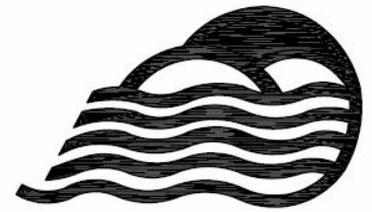
STATE PLANE COORDINATES (FEET)
N = 7075681.954
E = 2399872.827
ELEV = 645.61

LATITUDE AND LONGITUDE
33°04'17.70067"N
97°05'30.13543"W,



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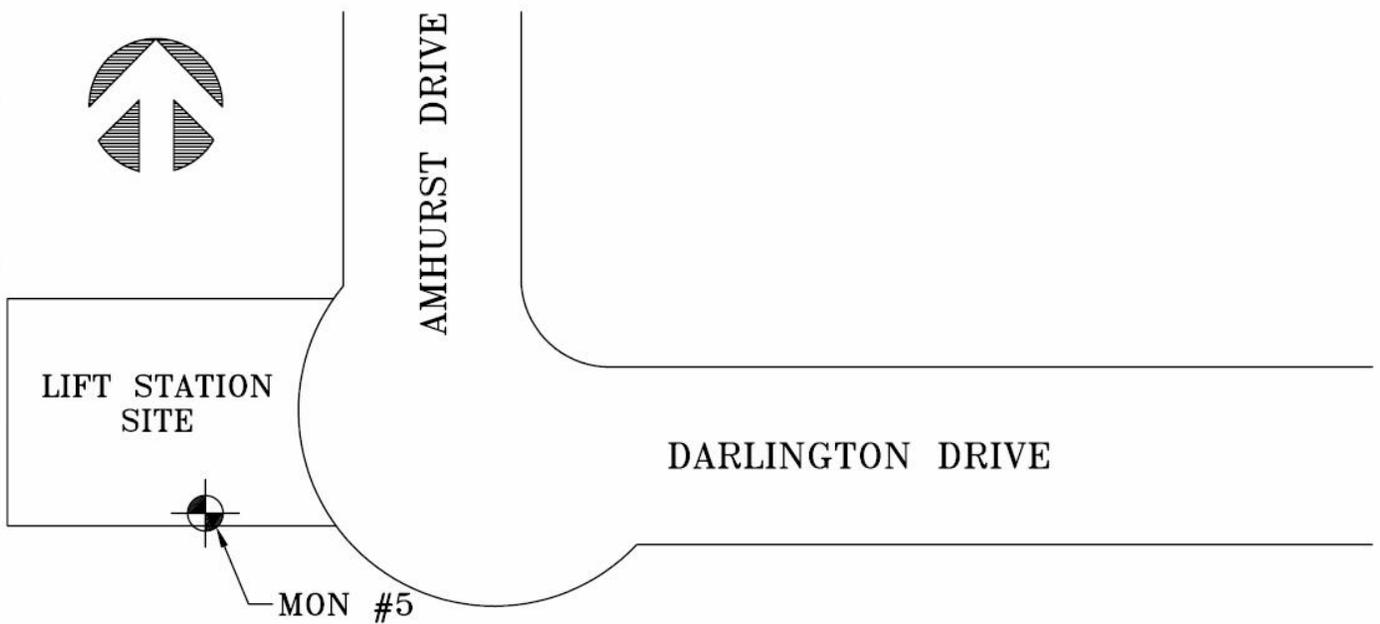
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HIGHLAND VILLAGE

GPS CONTROL NETWORK
MONUMENT NO. 5

MAPSCO 548 M
(LOOKING WEST)



HORIZONTAL DATUM:
STATE PLANE COORDINATES (FEET)
TEXAS NORTH CENTRAL ZONE 4202

VERTICAL DATUM:
NAVD '88

CONVERSION TO SURFACE
BASED ON TXDOT FACTOR FOR
DENTON COUNTY (1.000150630)

STATE PLANE COORDINATES (FEET)
N = 7081487.128
E = 2402097.063
ELEV = 589.86

LATITUDE AND LONGITUDE
33°05'14.84228"N
97°05'03.07800"W

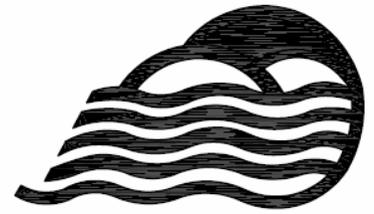


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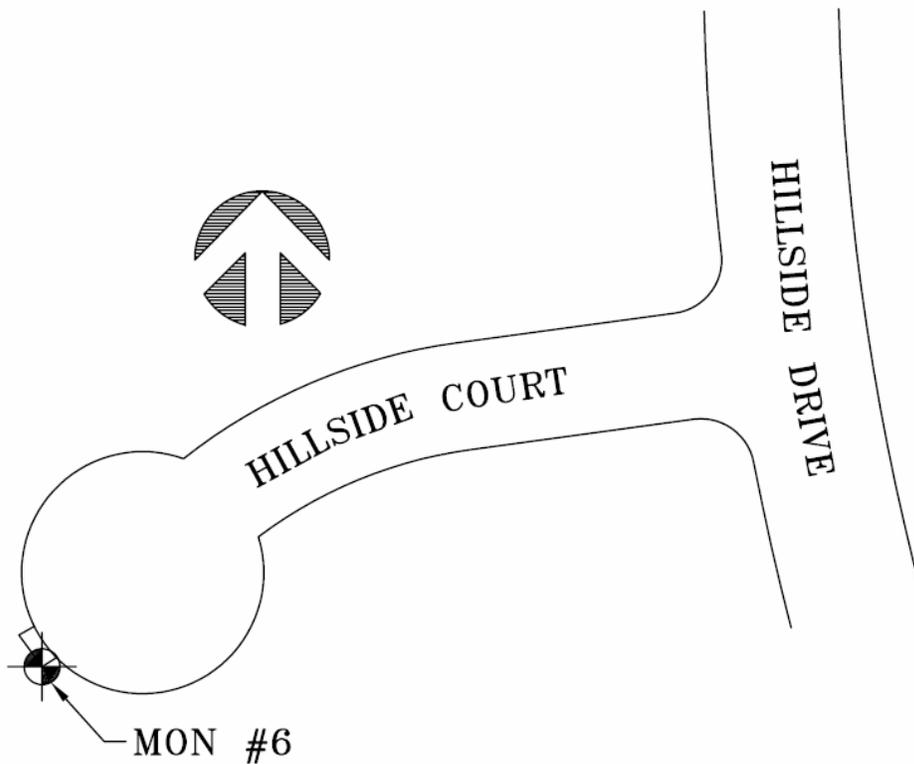


MAPSCO 549 J
(LOOKING WEST)



HIGHLAND VILLAGE

GPS CONTROL NETWORK
MONUMENT NO. 6



HORIZONTAL DATUM:
STATE PLANE COORDINATES (FEET)
TEXAS NORTH CENTRAL ZONE 4202

VERTICAL DATUM:
NAVD '88

CONVERSION TO SURFACE
BASED ON TXDOT FACTOR FOR
DENTON COUNTY (1.000150630)

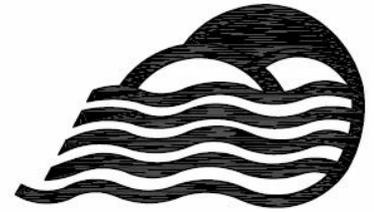
STATE PLANE COORDINATES (FEET)
N = 7081329.828
E = 2405233.428
ELEV = 573.89

LATITUDE AND LONGITUDE
33°05'12.86619"N
97°04'26.23973"W



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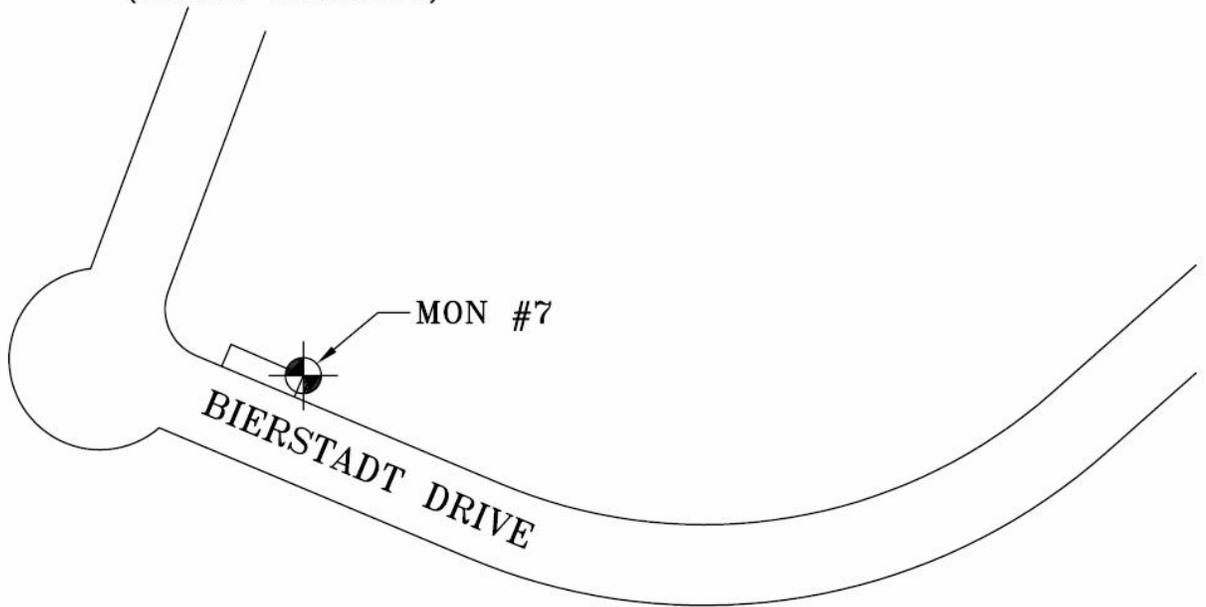


HIGHLAND VILLAGE

GPS CONTROL NETWORK
MONUMENT NO. 7

MON #7

MAPSCO 549 K
(LOOKING NORTHWEST)



HORIZONTAL DATUM:
STATE PLANE COORDINATES (FEET)
TEXAS NORTH CENTRAL ZONE 4202

VERTICAL DATUM:
NAVD '88

CONVERSION TO SURFACE
BASED ON TXDOT FACTOR FOR
DENTON COUNTY (1.000150630)

STATE PLANE COORDINATES (FEET)

N = 7081354.569
E = 2409829.343
ELEV = 548.99

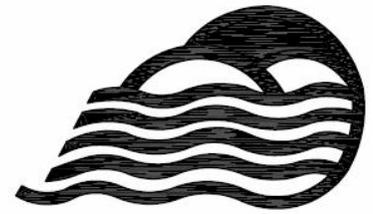
LATITUDE AND LONGITUDE

33°05'12.49043"N
97°03'32.21793"W



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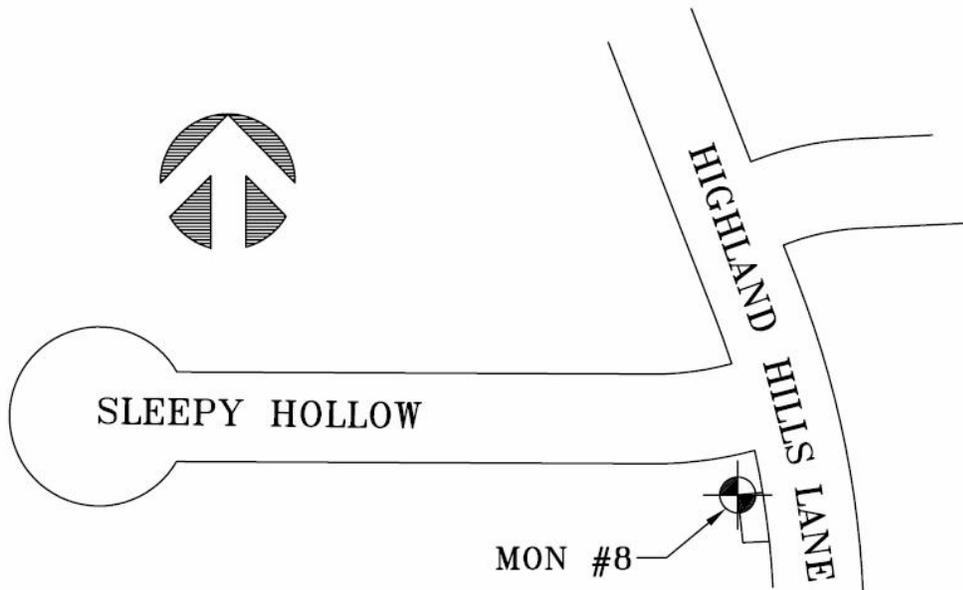


HIGHLAND VILLAGE

GPS CONTROL NETWORK
MONUMENT NO. 8

MON #8

MAPSCO 549 R
(LOOKING SOUTH)



HORIZONTAL DATUM:
STATE PLANE COORDINATES (FEET)
TEXAS NORTH CENTRAL ZONE 4202

VERTICAL DATUM:
NAVD '88

CONVERSION TO SURFACE
BASED ON TXDOT FACTOR FOR
DENTON COUNTY (1.000150630)

STATE PLANE COORDINATES (FEET)

N = 7080850.025
E = 2415626.983
ELEV = 561.99

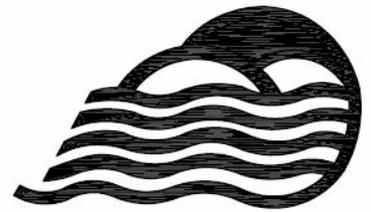
LATITUDE AND LONGITUDE

33°05'06.70634"N
97°02'24.15840"W



BW2 Engineers, Inc.

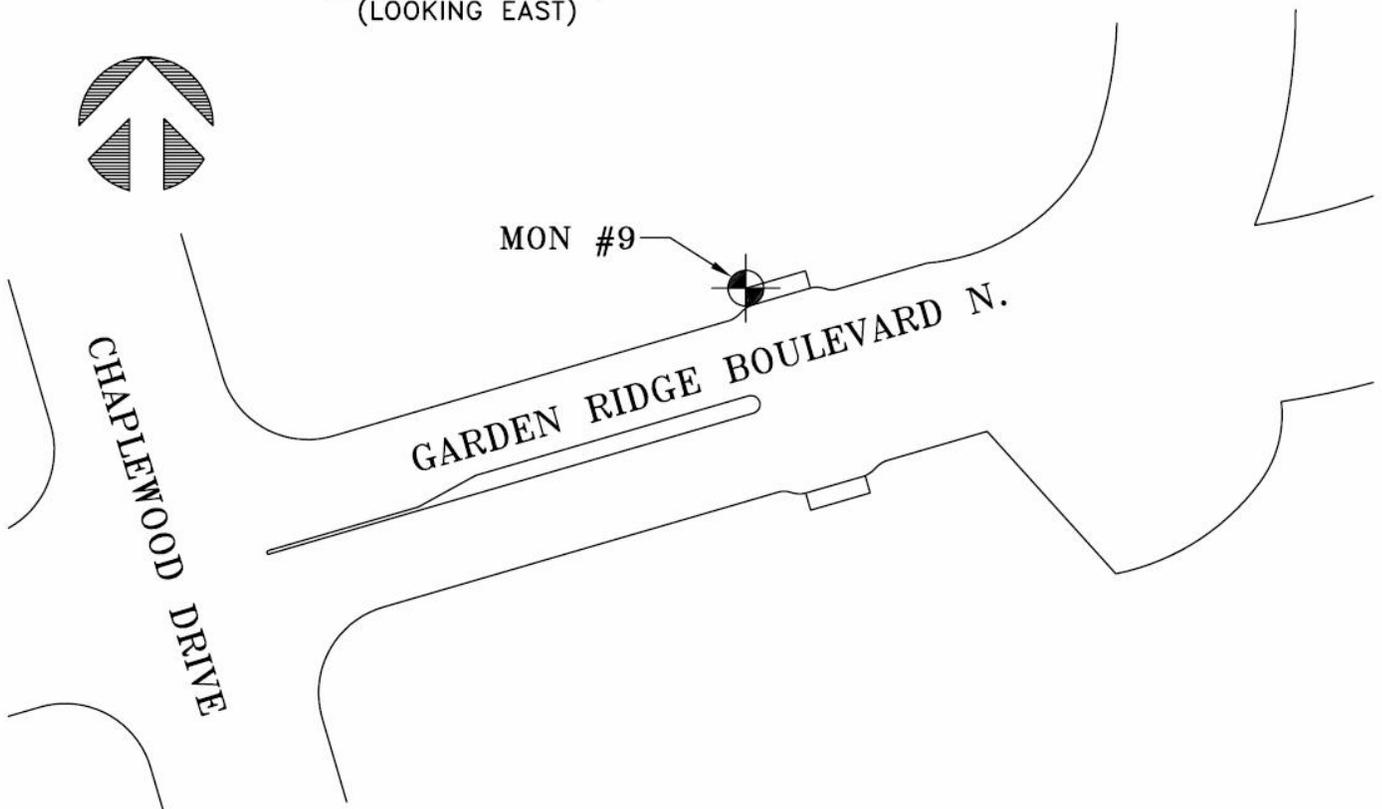
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HIGHLAND VILLAGE

GPS CONTROL NETWORK
MONUMENT NO. 9

MAPSCO 550 P
(LOOKING EAST)



HORIZONTAL DATUM:
STATE PLANE COORDINATES (FEET)
TEXAS NORTH CENTRAL ZONE 4202

VERTICAL DATUM:
NAVD '88

CONVERSION TO SURFACE
BASED ON TXDOT FACTOR FOR
DENTON COUNTY (1.000150630)

STATE PLANE COORDINATES (FEET)

N = 7080536.302
E = 2419106.175
ELEV = 553.39

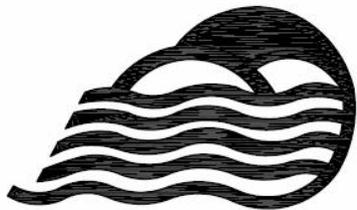
LATITUDE AND LONGITUDE

33°05'03.12206"N
97°01'43.31852"W



BW2 Engineers, Inc.

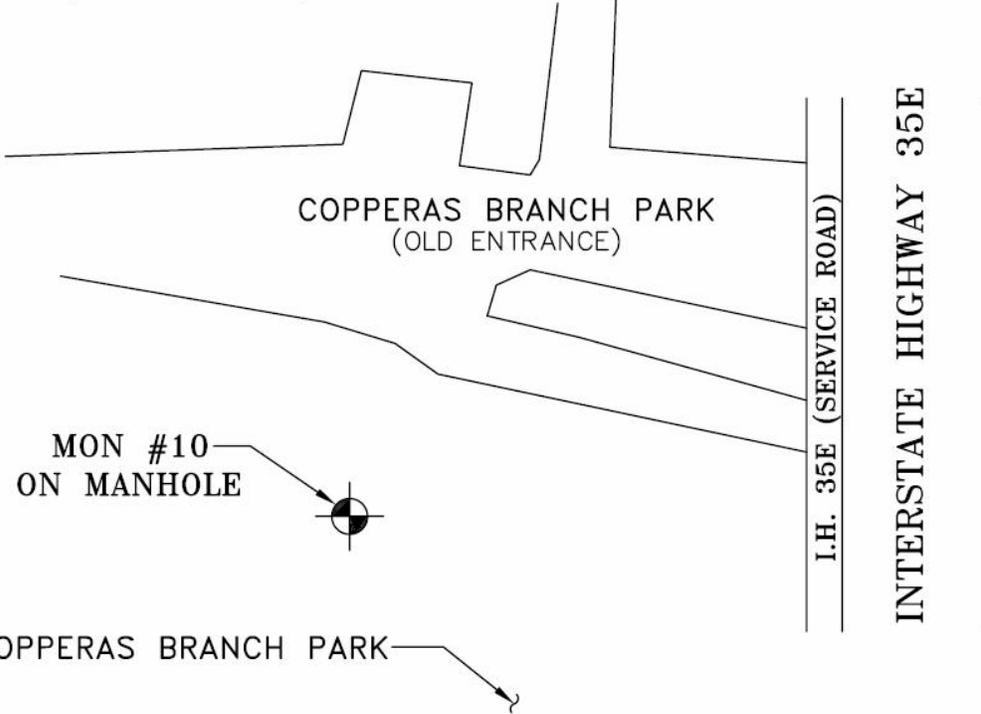
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HIGHLAND VILLAGE

GPS CONTROL NETWORK
MONUMENT NO. 10

MAPSCO 550 E
(LOOKING SOUTH)



HORIZONTAL DATUM:
STATE PLANE COORDINATES (FEET)
TEXAS NORTH CENTRAL ZONE 4202

STATE PLANE COORDINATES (FEET)
N = 7084629.962
E = 2418747.998
ELEV = 536.73

VERTICAL DATUM:
NAVD '88

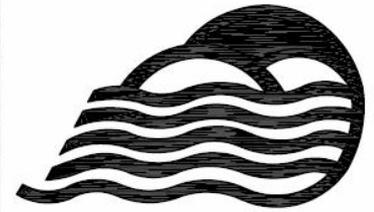
CONVERSION TO SURFACE
BASED ON TXDOT FACTOR FOR
DENTON COUNTY (1.000150630)

LATITUDE AND LONGITUDE
33°05'43.67470"N
97°01'46.85476"W



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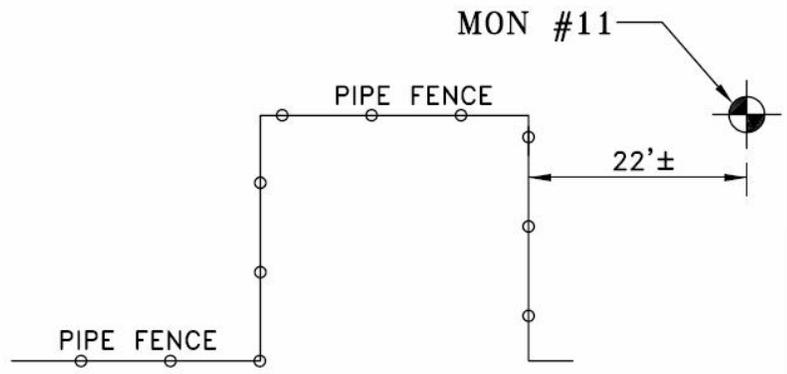


HIGHLAND VILLAGE

GPS CONTROL NETWORK
MONUMENT NO. 11

MON #11

MAPSCO 549 M
(LOOKING WEST)



HIGHLAND VILLAGE ROAD

**SELLMEYER
LANE**

HORIZONTAL DATUM:
STATE PLANE COORDINATES (FEET)
TEXAS NORTH CENTRAL ZONE 4202

VERTICAL DATUM:
NAVD '88

CONVERSION TO SURFACE
BASED ON TXDOT FACTOR FOR
DENTON COUNTY (1.000150630)

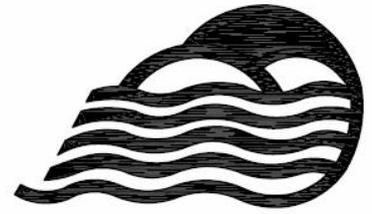
STATE PLANE COORDINATES (FEET)
N = 7083959.369
E = 2414899.451
ELEV = 529.08

LATITUDE AND LONGITUDE
33°05'37.57048"N
97°02'32.20208"W



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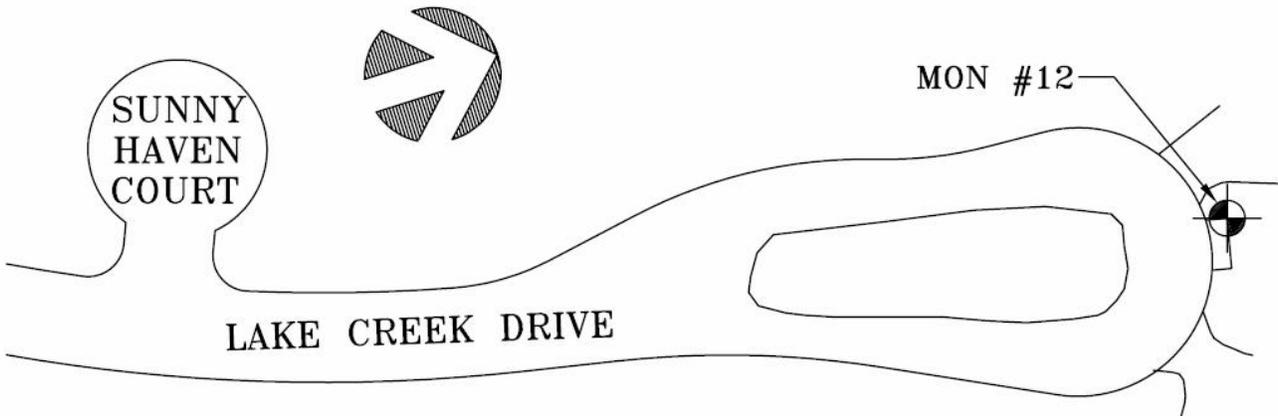


HIGHLAND VILLAGE

GPS CONTROL NETWORK
MONUMENT NO. 12

MON #12

MAPSCO 549 F
(LOOKING NORTH)



HORIZONTAL DATUM:
STATE PLANE COORDINATES (FEET)
TEXAS NORTH CENTRAL ZONE 4202

VERTICAL DATUM:
NAVD '88

CONVERSION TO SURFACE
BASED ON TXDOT FACTOR FOR
DENTON COUNTY (1.000150630)

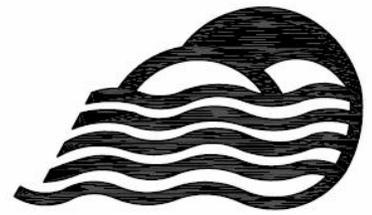
STATE PLANE COORDINATES (FEET)
N = 7084701.036
E = 2409689.793
ELEV = 540.96

LATITUDE AND LONGITUDE
33°05'45.61973"N
97°03'33.31867"W



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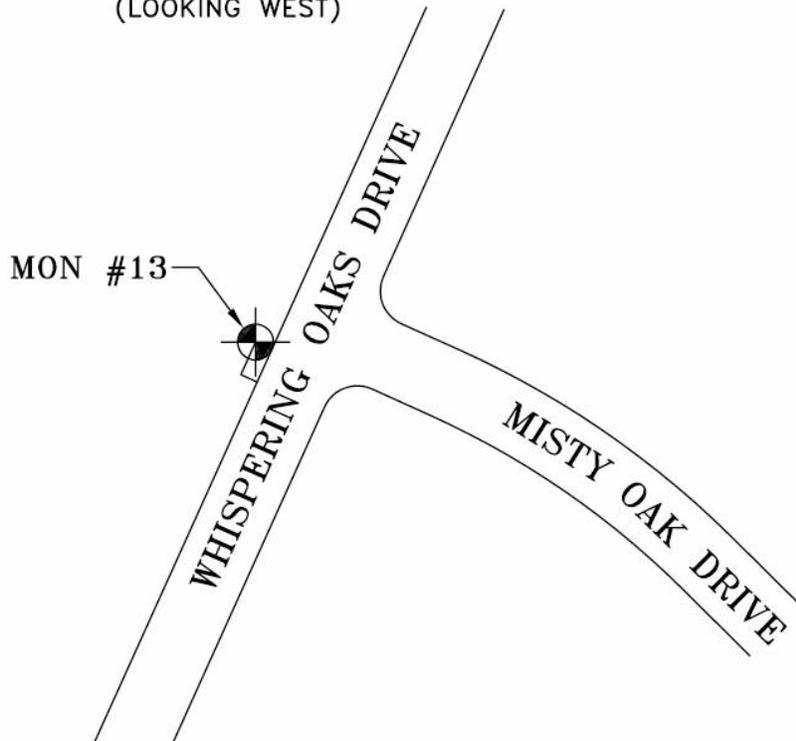
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HIGHLAND VILLAGE

GPS CONTROL NETWORK
MONUMENT NO. 13

MAPSCO 549 E
(LOOKING WEST)



HORIZONTAL DATUM:
STATE PLANE COORDINATES (FEET)
TEXAS NORTH CENTRAL ZONE 4202

VERTICAL DATUM:
NAVD '88

CONVERSION TO SURFACE
BASED ON TXDOT FACTOR FOR
DENTON COUNTY (1.000150630)

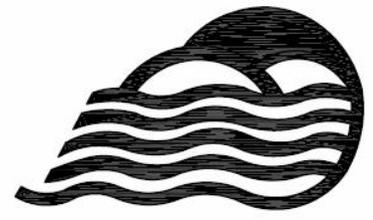
STATE PLANE COORDINATES (FEET)
ZONE 4202 (TXNC)
N = 7086232.483
E = 2404630.068
ELEV = 584.06

LATITUDE AND LONGITUDE
33°06'01.45473"N
97°04'32.55001"W



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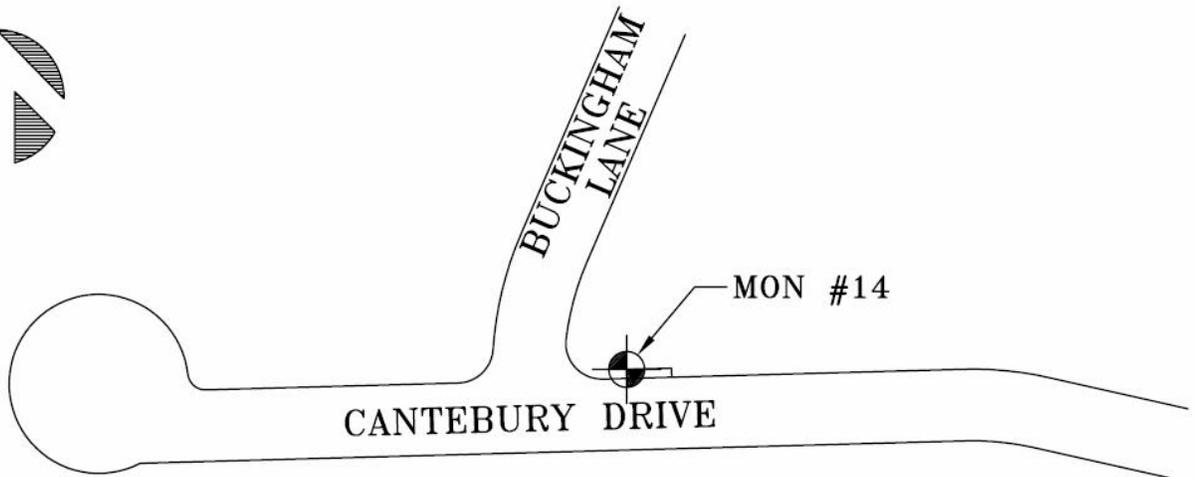


HIGHLAND VILLAGE

GPS CONTROL NETWORK
MONUMENT NO. 14

MON #14

MAPSCO 548 H
(LOOKING WEST)



HORIZONTAL DATUM:
STATE PLANE COORDINATES (FEET)
TEXAS NORTH CENTRAL ZONE 4202

VERTICAL DATUM:
NAVD '88

CONVERSION TO SURFACE
BASED ON TXDOT FACTOR FOR
DENTON COUNTY (1.000150630)

STATE PLANE COORDINATES (FEET)
ZONE 4202 (TXNC)
N = 7085704.164
E = 2401852.076
ELEV = 552.45

LATITUDE AND LONGITUDE
33°05'56.59894"N
97°05'05.28973"W

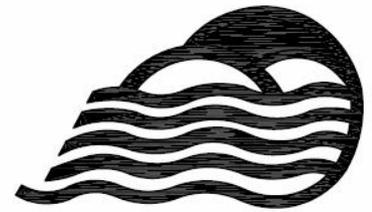


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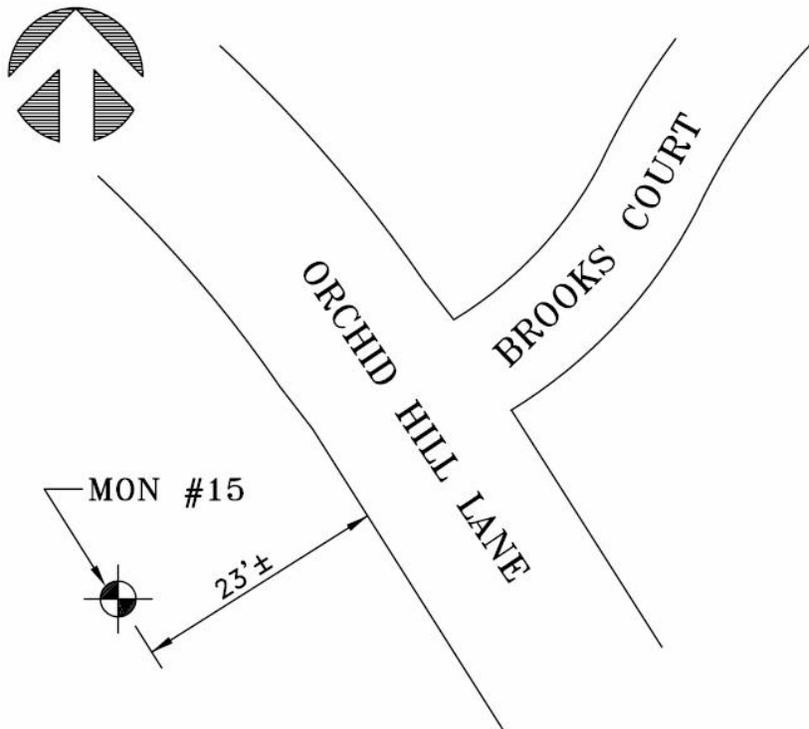


MAPSCO 548 D
(LOOKING SOUTH)



HIGHLAND VILLAGE

GPS CONTROL NETWORK
MONUMENT NO. 15



HORIZONTAL DATUM:
STATE PLANE COORDINATES (FEET)
TEXAS NORTH CENTRAL ZONE 4202

VERTICAL DATUM:
NAVD '88

CONVERSION TO SURFACE
BASED ON TXDOT FACTOR FOR
DENTON COUNTY (1.000150630)

STATE PLANE COORDINATES (FEET)
ZONE 4202 (TXNC)
N = 7089498.707
E = 2403845.079
ELEV = 556.09

LATITUDE AND LONGITUDE
33°06'33.87637"N
97°04'41.25805"W



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