

I, <u>Keith M. Hamilton</u>, a Professional Engineer registered in the State of Texas, have prepared this drainage study in compliance with the latest published requirements and criteria of the City of North Richland Hills, and have verified that the topographic information used in this study is in compliance with said requirements and is otherwise suitable for developing theis workable Plan of Drainage which can be implemented through proper subsequent detailed construction planning.

\_\_\_\_\_, P.E. \* 87384 Signature \_\_\_\_

### DRAINAGE AREA COMPUTATIONS

O • CIA (Rational Method)
O • Storm discharge (cubic feet per second)
C • runoff coefficient, based on land use
I • average rainfall intensity for time of concentration (inches per hour) (per Technical Paper No. 40)
A • area contributing runoff (acres)

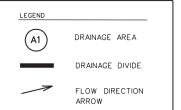
RUNOFF COEFFICIENT:
C = 0.30 Parks and Open Areas
C = 0.55 Single Family Residential
C = 1.00 Roofs/Paved Areas

# STORM FREQUENCY:

5 Years - Enclosed Pipe System 100 Years - Combined Enclosed Pipe System • Street • R.O.W.

Combination of inlet time and time of flow in the drain being the time for water to flow over the surface of the ground to the storm drain inlet (onsite • offsite, if applicable)

# MINIMUM INLET TIME OF CONCENTRATION:



A 1

01+02 +A1

NOTES:

OS3

AREA

3.05

12.49

4.37

ALL DRAINAGE DESIGN IS IN ACCORDANCE WITH CITY OF NORTH RICHLAND HILLS DESIGN CRITERIA MANUAL.

С

0.55

0.55

0.55

0.30

16.86 | 0.49 | 19.4

1. WEIGHTED C = [2.23(0.55)\*1.29(0.30)]/3.52 = 0.46 2. WEIGHTED C = [3.61(0.55)\*3.52(0.46)]/7.13 = 0.32 3. WEIGHTED C = [12.49(0.55)\*4.37(0.30)]/16.86 = 0.49 4. TC = 20 MIN (SEE CALCS THIS SHEET)

3.52 0.46

7.13 0.512

15

15

15

15

15

15

TIME OF CONCENTRATION DETERMINATION: (AREA B1)

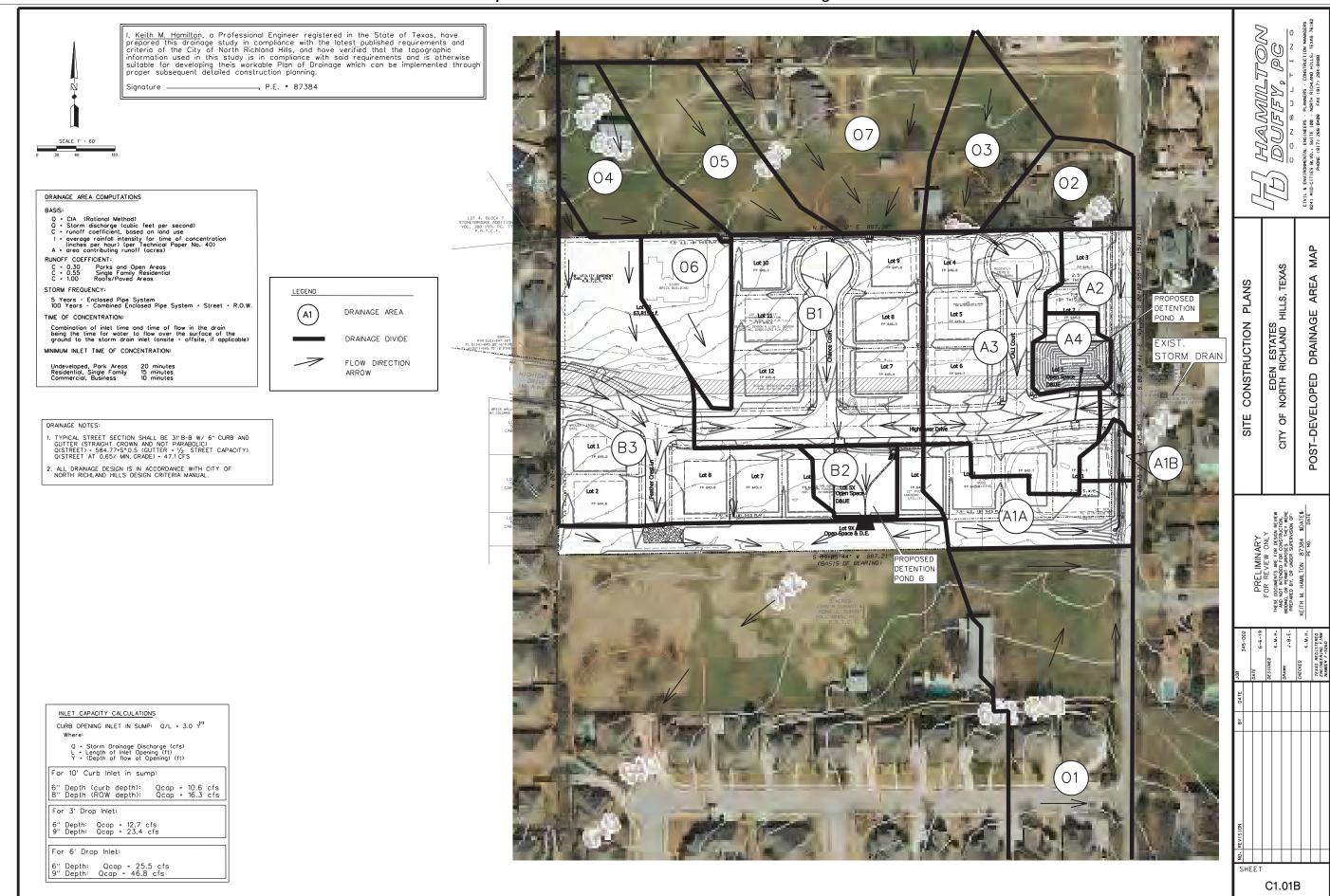
CHANNELIZED FLOW n = 0.030 (short grass) 500' @ 1.3%

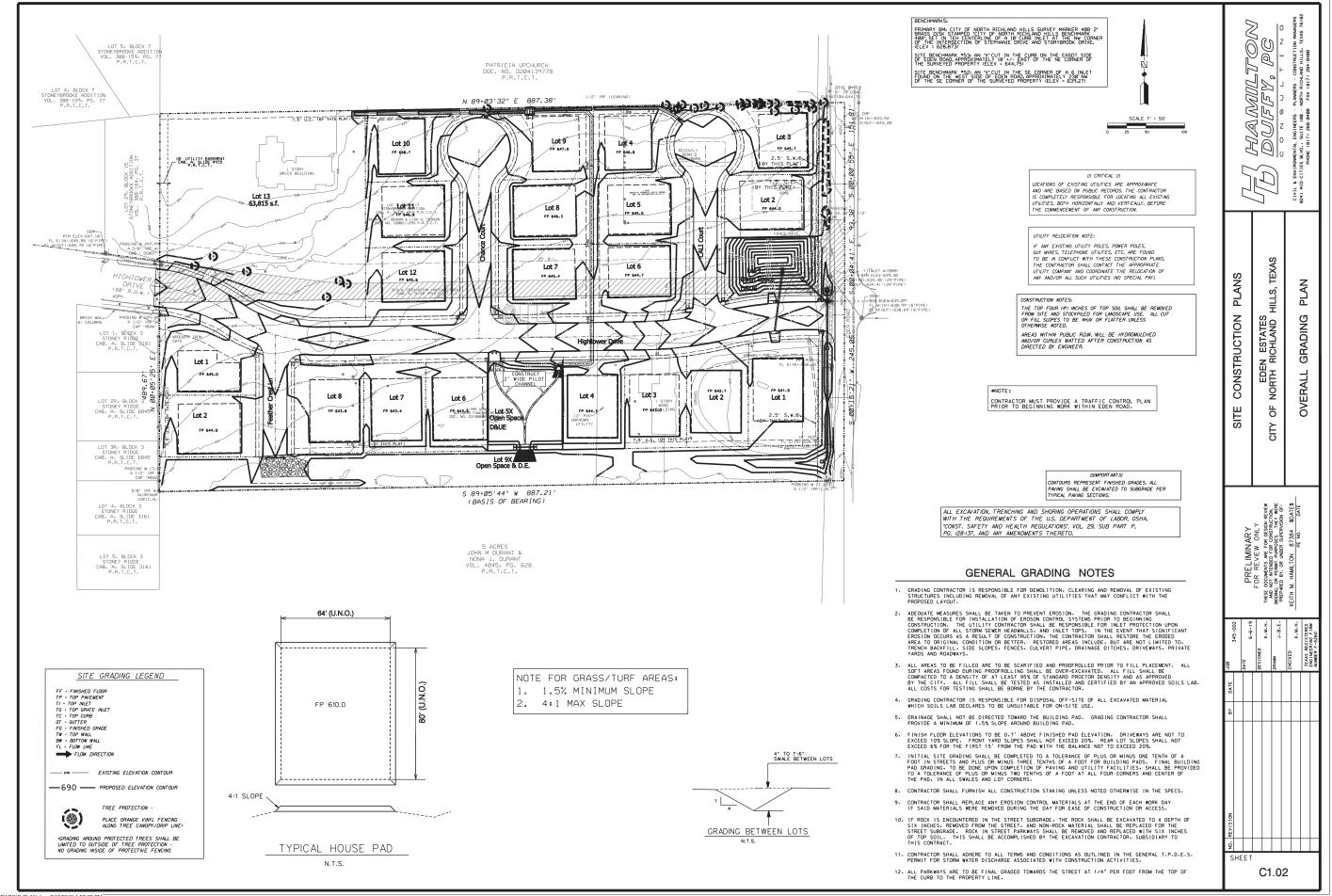
Tc = 15 + 4.4 = 19.4 minutes)

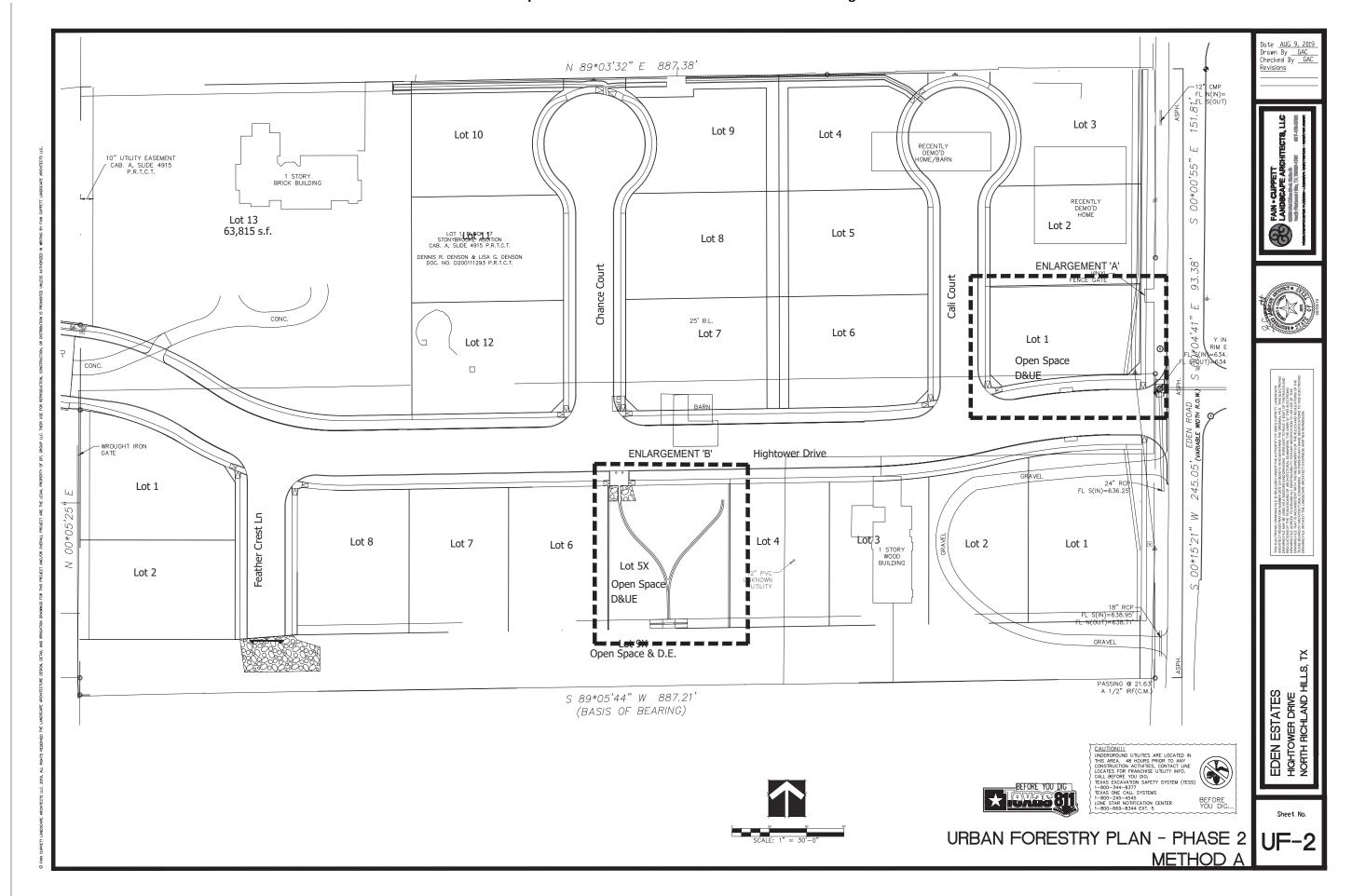
(Tc used to determine rainfall intensity "I")

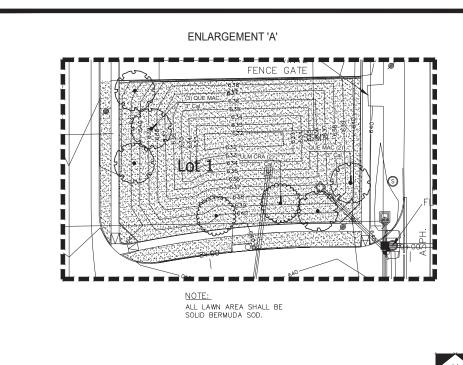
CITY OF	' NORTH									
PRE-	-DEVEI	LOPED	SITE	E DRA	INAGE	E DAT	A			
I <sub>2</sub> N/HR)	I <sub>5</sub> (IN/HR)	I <sub>25</sub> ( IN/HR )	I <sub>50</sub> ( IN/HR )	I <sub>100</sub> ( IN/HR )	Q <sub>2</sub> (CFS)	Q <sub>5</sub> (CFS)	Q <sub>25</sub> (CFS)	Q <sub>50</sub> (CFS)	Q <sub>100</sub> (CFS)	COMMENTS
4.4	5.6	7.7	8.7	9.6	7.4	9.4	12.9	14.6	16.1	TO STORM DRAIN (EAST)
							2.4	2.7		
1.4	5.6	7.7	8.7	9.6	1.4	1.7	2.4		3.0	TO STORM DRAIN (EAST)
	5.6	7.7	8.7	9.6	7.1	9.1	12.5	14.1	15.5	TO STORM DRAIN (EAST)  TO STORM DRAIN (EAST)
1.4										
. 4	5.6	7.7	8.7	9.6	7.1	9.1	12.5	14.1	15.5	TO STORM DRAIN (EAST)
. 4	5.6	7.7	8.7	9.6	7.1	9.1	12.5	14.1	15.5	TO STORM DRAIN (EAST)  TOTAL TO EAST

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PATH FOR TIME OF CONCENTRATION PIPE FLOW)  PATH FOR TIME OF CONCENTRATION PIPE FLOW)  PATH FOR TIME OF CONCENTRATION PIPE FLOW)	SITE CONSTRUCTION PLANS	EDEN ESTATES CITY OF NORTH RICHLAND HILLS, TEXAS	PRE-DEVELOPED DRAINAGE AREA MAP
G40.3 / J	PRELIMINARY	FOR REVIEW ONLY THESE DOCUMENTS ARE FOR DESIGN REVIEW AND NOT INTENDED FOR CONSTRUCTION, BROOMS, OR FERMT PURPOSES. PREPARED BY, OR UNDER SUPERVISION OF:	KEITH M. HAMILTON 87384 \$DATES PE NO. DATE
AST) AST)	MO.   REVISION   BY DATE   JOB   345-002   MO.   REVISION   BY DATE   JOB   JOB   MO.   REVISION   MO.   R	0.0 EST/0.04ED	(1) (1) (1) (1) (1) (1) (1) (1) (1) (1)
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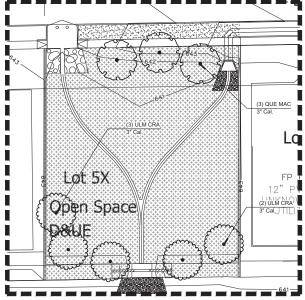








# ENLARGEMENT 'B'



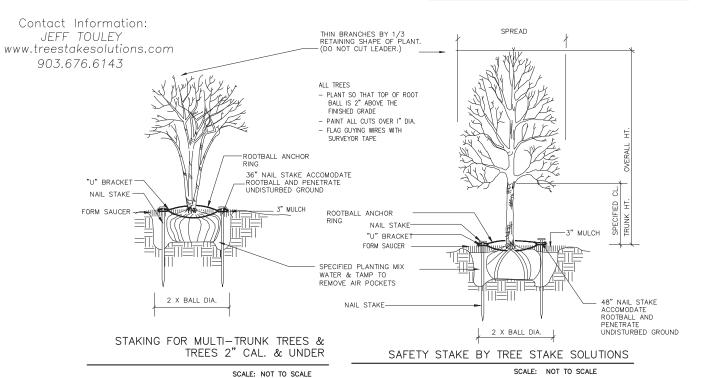
NOTE:

ALL DETENTION PONDS SHALL BE SEEDED WITH Tripsacum dactyloides (Eastern Gamagrass) AT A RATE OF 12 POUNDS PER ACRE. CONTRACTOR SHALL WATER UNTILL ESTABLISHED AND ACCEPTED BY OWNER.

NORTH RICHLAND HILLS LANDSCAPE REQUIREMENTS					
REQUIRED DETENTION	ONE TREE PER 50 PERIMETER FT.				
POND	REQUIRED	PROVIDED			
LANDSCAPING	360 LF / 50 = 7 TREES	7 TREES			

	NORTH RICHLAND HILLS LANDSCAPE REQUIREMENTS						
DE PO	REQUIRED DETENTION	ONE TREE PER 50 PERIMETER	FT.				
	POND	REQUIRED	PROVIDED				
LANDSCAPING							

395 LF / 50 = 8 TREES



# PLANTING NOTES:

- PLANT SIZE, TYPE, AND CONDITION SUBJECT TO APPROVAL OF OWNER'S REPRESENTATIVE.
   ALL PLANT MATERIAL TO BE NURSERY GROWN STOCK.
- CONTRACTOR RESPONSIBLE FOR MAINTENANCE OF ALL PLANT MATERIAL UNTIL PROJECT
- CONTRACTOR RESPONSIBLE FOR MAINTENANCE OF ALL PLANT MATERIAL UNTIL PROJECT ACCEPTANCE.
- ALL CONTAINER GROWN PLANTS TO HAVE FULL, VIGOROUS ROOT SYSTEM, COMPLETELY ENCOMPASSING CONTAINER.
- 5. ALL PLANTS WELL ROUNDED AND FULLY BRANCHED. ALL TREES WITH SPREAD 2/3 OF HEIGHT
- 6. CONTRACTOR TO PROVIDE OWNER WITH PREFERRED MAINTENANCE SCHEDULE OF ALL PLANTS AND LAWNS.
- MAINTAIN/PROTECT VISIBILITY TRIANGLE WITH PLANT MATERIAL PER CITY STANDARDS AT ALL ENTRANCES TO SITE.
- PREP ENTIRE WIDTH OF ALL DEFINED PLANTING BEDS WITH MIX AS OUTLINED IN SPECS.
   WHERE SHRUBS ARE LOCATED ALONG CURB, SET SHRUBS BACK FROM CURB 3 FT.
- 9. SEE DETAIL SHEET FOLLOWING FOR PLANTING DETAILS.
- 0. CONTRACTOR RESPONSIBLE FOR LOCATION OF ALL UTILITIES, INCLUDING BUT NOT LIMITED TO TELEPHONE, TELECABLE, ELECTRIC, GAS, WATER AND SEWER. ANY DAMAGE TO UTILITIES TO BE REPAIRED BY CONTRACTOR AT NO COST TO OWNER.
- 11. IF EXISTING TREES ARE SHOWN TO REMAIN, CONTRACTOR SHALL PRUNE AS DIRECTED BY OWNER'S REPRESENTATIVE. WORK TO INCLUDE REMOVAL OF ALL SUCKER GROWTH; DEAD AND DISEASED BRANCHES AND LIMBS; VINES, BIARS AND OTHER INVASIVE GROWTH; AND ALL INTERFERING BRANCHES. MAKE ALL CUTS FLUSH TO REMAINING LIMB. RETAIN NATURAL SHAPE OF PLANT. ALL WORK SUBJECT TO APPROVAL OF OWNER'S REPRESENTATIVE.
- QUANTITIES ARE PROVIDED AS A COURTESY AND NOT INTENDED FOR BID PURPOSES. CONTRACTOR TO VERIFY PRIOR TO PRICING.
- INSTALL EDGING BETWEEN LAWN AND PLANTING BEDS. REFER TO SPECIFICATIONS. FILE ALL CORNERS SMOOTH.
- . INSTALL CURLEX BLANKET (OR EQUAL) PER MANUFACTURES INSTRUCTIONS ON ALL GROUNDCOVER/SHRUB BEDS WITH A SLOPE OF 4;1 OR GREATER.
- 15. AT TIME OF PLAN PREPARATION, SEASONAL PLANT AVAILABILITY CANNOT BE DETERMINED. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO SECURE AND RESERVE ALL B&B PLANTS WHEN AVAILABLE IN CASE ACTUAL INSTALLATION OCCURS DURING THE OFF-SEASON. PURCHASE AND HOLD B&B PLANTS FOR LATE SEASON INSTALLATION.
- CONTRACTOR SHALL STAKE ALL TREE LOCATIONS FOR OWNER APPROVAL PRIOR TO PLANTING.
- BERM ALL PARKING LOT ISLANDS AS SHOWN ON ENCLOSED DETAIL SHEET. (BERMS MAY NOT BE SHOWN ON GRADING PLAN.)
- 17. NO PLANTINGS WITHIN 18" OF PARKING LOT CURBS.
- CONTRACTOR SHALL BE RESPONSIBLE FOR CONFIRMING TREE AND SHRUB SIZES CONFORM TO CITY LANDSCAPE STANDARDS AND MITIGATION REQUIREMENTS.

# PLANT SCHEDULE



TEMPORARY IRRIGATION WILL BE REQUIRED TO ESTABLISH TURF IN ALL DISTURBED AREAS WITHOUT A PERMANENT IRRIGATION SYSTEM. INSTALL SOD TO ESTABLISH TURF IN ALL DISTURBED AREAS AS IDENTIFIED ON GRADING AND EROSION CONTROL PLANS.



CAUTIONILI
UNDERGROUND UTILITES ARE LOCATED IN
THIS AREA. 48 HOURS PRIOR TO ANY
CONSTRUCTION ACTIVITIES, CONTACT LINE
LOCATES FOR FRANCHISE UTILITY INFO.
CALL BEFORE FVOU DIG:
TEXAS EXCAVATION SAFETY SYSTEM (TESS)
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LANDSCAPE PLAN

Date <u>AUG 9, 201</u> Drawn By <u>GAC</u> Checked By <u>GAC</u> <u>Revisions</u>





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### PART I GENERAL

### 1.01 DESCRIPTION OF WORK

- B. Related Work Specified Elsewhere

# 1.02 QUALITY ASSURANCE

### A. Contractor Qualifications

Minimum of three (3) years experience on projects of similar characteristics and size.

- American Joint Committee Of Horticultural Nomenclature: Standardized Plant Names, Second Edition, 1942;
- American Association Of Nurserymen: American Standard For Nursery Stock, 1973

- Substitutions accepted only upon written approval of Landscape Architect and Owner.
   Submit substitutions possessing same characteristics as indicated on plans and specifications.

### D. Inspection and Testing

- The project Owner's representative reserves the right to inspect and tag plants at the place of growth with the Contractor.
   Inspection at place of growth does not preclude the right of rejection due to improper digging or handling.
   Owner's representative reserves the right to request soil samples and analysis of soil and plant mix. Remove or correct unacceptable soil. Cost of testing by Contractor.

# 1.03 SUBMITTALS

### A. Certificates

- Submit State and Federal certificates of inspection with invoice.
  (Only if required by Landscape Architect.)
   File certificates with Owner's representative prior to material acceptance.

# 1.04 PRODUCT DELIVERY, STORAGE, & HANDLING

# A Preparation of Delivery

- Balled & Burlaped (B&B) Plants
- Dig and prepare for shipment in manner that will not damage roots, branches, shape, and future development after
- Ball with firm, natural ball of soil, wrapped tightly with burlap covering entire ball.

  Ball size and ratios: conform to American Association of Nurserymen standards unless otherwise shown on plant list.
- Pack plant material to protect against climatic & seasonal damage, as well as breakage injuries during transit.
   Securely cover plant tops with ventilated tarpaulin or canvas to
- minimize wind-whipping and drying in transit.

  4. Pack and verificate to prevent sweating of plants during transit. Give special attention to insure prompt delivery and careful handling to point of delivery at job site.

- Deliver fertilizer, fertilizer tablets, peat, mulch, soil additives, and Deriver retailizer, jettilizer tablets, plead, miliotri, soli outliners, and amendment materialis to site in original, unopenned containers, bearing manufacturer's guaranteed chemical analysis, name, trade name, trademark, and conformance to State law.

  Deliver plants with legible identification and size labels on example
- plants.
  Protect during delivery to prevent damage to root ball or desiccation of leaves.
  Notify Owner's representative of delivery schedule in advance so
- Deliver plants to job site only when areas are prepared.

- Protect roots of plant material from drying or other possible injury with wetted mulch or other acceptable material.
   Protect from weather.
   Maintain and protect plant material not to be planted immediately upon delivery.

# D. Handling

- Do not drop plants.
   Do not damage ball, trunk, or crown.
   Lift and handle plants from bottom of container or ball.

### 1.05 JOB CONDITIONS

- Planting Season Perform actual planting only when weather and soil conditions are suitable in accordance with locally acceptable practices.
   Protection Before excavations are made, take precautionary measures to protect areas trucked over and where soil is temporarily stacked.

- Guarantee new plant material for one year after acceptance of final installation (ie. Final Acceptance of project).
   Make replacement (one per plant) during one year guarantee period at appropriate season with original plant type, size and planting mixture.
   Repair damage to other plants, lawns, & irrigation caused during plant replacement at no cost to Owner.
   Use only plant replacements of indicated size and species.

- Hardy under climatic conditions similar to locality of project.
   True to botanical and common name variety.
   Sound, healthy, vigorous, well branched, and densely foliated when in leaf; with healthy well-developed root system.
   Free from disease, insects, and defects such as knots, sun-scald,
- windburn, injuries, disfigurement, or abrasions.

  5. Conform to measurements after pruning with branches in normal
- - Single, straight trunks, unless indicated otherwise
     Trees with weak, thin trunks not capable of support will not be
  - Trees with vewar, timit utims not capatite of support with not be acceptated.
     All multi-stem trees are to have a minimum of three stems, similar in size and shape, with a spread of approximately 2/3 of the height. All yaupons to be female. Crape myrtle color selection by Landscape Architect.
- 10. Seasonal color:
- Annuals in 4" pots or as specified
   Perennials in 4" pots, clumps, bulbs as specified

# B. Topsoil

- Natural, fertile, friable soils having a textural classification of loam or sandy loam possessing characteristics of soils in vicinity which produce heavy growth of crops, grass, or other vegetation.
   Free of subsoil, brush, organic litter, objectionable weeds, clods, shale, stones ½" claimeter or larger, stumps, roots or other material harmful to grading, planting, plant growth, or maintenance operations.
- Presence of vegetative parts of Bermuda grass ( Cynodon dactylon), Johnson grass, nut grass (Cyperus rotundus), and other hard to eradicate weeds or grass will be cause for rejection of
- 4. Test topsoil (cost by Contractor):

  - Available nitrogen Available phosphorus Available potash
- Iron Ph: 5.5 to 7.0
- Decomposed organic matter: 6-10%

- Top Dressing Mulch Shredded cypress or hard wood only
   Mulch for soil prep Shredded pine bark
   In pre-packaged bags only; bulk shredded material is unacceptable
- D. Peat Moss Commercially available baled peat moss or approved

# E. Staking Material

- Construction grade yellow pine, stain brown
   Size as noted on plans
- Wires:
  - Padded with rubbed hose to protect tree
- B. Galvanized
   With galvanized turnbuckle
   Evenly tighten turnbuckles with plant in vertical position.

# F. Water

- 1. Free of oils, acids, alkali, salt, and other substances harmful to plant
- growth

  2. Location: Furnish temporary hoses and connections on site.

- I. Edging 3/16" X 4" green, new and unused; with stakes.

# 2.02 MIXES

- D. Planting Mixture
  - Existing topsoil 50%
- E. Planting Mix for Annuals/Perennials
- Azalea mix: solid peat moss in hole 9" wider than root ball each direction Plant in solid peat moss and provide mound at base of plant to allow for
- drainage.

  Japanese maple, dogwood, camellias: Provide 50/50 peat moss to topsoil mix, raise for drainage.

### PART III - EXECUTION

3.01 UTILITIES - verify location of all utilities prior to initiating construction; repair any damage caused by construction at no cost to owner.

Inspect plants for injury and insect infestation; prune prior to installation.
 Inspect site to verify suitable job conditions.

### 3.03 FIELD MEASUREMENTS

- A. Location of all trees and shrubs to staked in the field and approved by
- Owner's representative prior to installation.

  B. Location of all groundcover and seeding limits as shown on plans.

### 3.04 EXCAVATION FOR PLANTING

- greater.
  Size for shrubs Size of planting bed as shown on drawings.
  Rototill soil mix thoroughly, full depth.
  NOTE: If beds are proposed beneath drip line of existing tree
  canopy, pocket prep plants. Do not roto-till beneath existing trees.

# B. Obstructions Below Ground

- Remove rock or underground obstructions to depth necessary to
- Remove out or unaversations control to permit planting.
   If underground obstructions cannot be removed, notify Owner's representative for instruction.
- C. Excess Soil Dispense of unacceptable or excess soil away from the project site at Contractor's expense

- Set plants 2" above existing grade to allow for settling.
   Set plants plumb and rigidly braced in position until planting mixture has been tamped solidly around ball.
   Apply soil in accordance with standard industry practice for the

- region.

  Thoroughly settle by water jetting and tamping soil in 6' lifts.

  Prepare 3' dish outside root ball after planting.

  Thoroughly water all beds and plants.

  Stake trees and large shrubs as indicated on plans.

  Apply anti-desicant according to manufacturer's instructions.

  Apply commercially manufactured root stimulator as directed by printed instruction.
- printed instruction.

  10. Plant and fertilize bedding plants per trade standards.

  11. Apply 3" mulch top dressing.

### B. Balled Plants

- 1. Place in pit of planting mixture that has been hand tamped prior to
- Place in jir to jialaning inikute in ian ias been nani tainpeu jiron to placing plant.
  Place with burlap intact to ground line. Top of ball to be 2" above surrounding soil to allow for settling.
  Remove binding at top of ball and lay top of burlap back 6".
  Do not pull wrapping from under ball, but cut all binding cord.
  Do not plant if ball is cracked or broken before or during planting process or if stem or trunk is loose.

- Backfill with planting mixture in 6" lifts.

# C. Container Grown Plants

- Place in pit on planting mixture that has been hand tamped prior to
- placing plant.

  Cut cans on two sides with an acceptable can cutter, and remove root ball from can. Do not injure root ball.

  Carefully remove plants without injury or damage to root balls.

- Cover planting bed evenly with 3" of mulch.
   Water immediately after mulching.
   Where mulch has settled, add additional mulch to regain 3" thickness.

- D. Pruning Prune minimum necessary to remove injured twigs and branches Prune minimum necessary to remove injured twigs and branches, dead wood, and succors; remove approximately 1/3 of higg growth as directed by landscape architect, do not cut leaders or other major branches of plant unless directed by landscape architect.
   Make cuts flush, leaving no stubs.
   Paint cuts over 1' diameter with approved tree wound paint.
   Do not prune evergreens except to remove injured branches.

# 3.06 EDGING

- A. Stake edging alignment with string line prior to installation. Use framing
- A. Stake edging alignment with string line prior to installation. Use framing square to insure right angles are true.

  B. Install all edging straight and true as indicated on drawings. Where edging layout is circular in design, maintain true and constant radii as shown.

  C. When required on slopes, make vertical cuts (approximately 6' on center) on bottom of edging to allow bending without crimping edging.

  D. Install edging so that approximately 1' is exposed on lawn side. Edging should not be visible from bed side after application of mulch.

  E. Align edging with architectural features (se pavement joints, windows, columns, wall, etc.) when drawings indicate.

  F. Bend all comers, do not cut corners.

  G. Interfock all pieces with pre-fabricated connectors.

  H. Install with all stakes on inside of planting bed.

  I. Remove, file of fall sharp corners and burns.

- Remove, file off all sharp corners and burrs

### 3.07 CLEAN-UP

Sweep and wash all paved surfaces.

Remove all planting and construction debris from site, including rocks, trash and all other miscellaneous materials.

Mowing (weekly)

- Provide Owner and Landscape Architect with preferred maintenance schedule in writing. Schedule shall include the above-listed tasks and shall address all frequencies, rates, times, levels, etc.

# END OF SECTION

Oate AUG 9, 2019 Drawn By <u>GAC</u> Checked By <u>GAC</u>

Revisions



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CALL BEFORE YOU DIG:

1EXAS EXCLAVATION SAFETY SYSTEM (TESS)

1-800-344-8377

1EXAS ONE CALL SYSTEMS

1-800-245-4545

1-800-669-8344 EXT. 5

PLANTING SPECIFICATIONS

BEFORE YOU DIG

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Sheet No.

### PART I - GENERAL

### 1.01 DESCRIPTION

- A. Work includes turf establishment (sod, hydromulch, etc.) as described on
- B. Make required analysis and material tests for topsoil, fertilizers, and other materials of similar character per current methods of the Association of Official Agricultural Chemists, when required.
- Grass seed shall conform to tolerances for germination and purity per applicable standards of U.S. Department of Agriculture.
- The turf contractor shall have a stand of grass established prior to substantial completion of the project. If this is not possible due to time of year or schedule, he shall maintain and protect the seeded areas until the

### PART II - PRODUCTS

- Topsoil material (stockpiled, as specified in Specifications) has been saved for use in finish grading. After sifting out all plant growth, rubbish, and stones, use for areas designated to receive grass. If stockpiled topsoil is not sufficient quantity to complete work, furnish acceptable topsoil from another approved source to provide four inches (4\*) of topsoil for grass areas unless otherwise noted on drawings. Grass areas shall be defined as the graded areas disturbed during construction not to be paved or built upon.
- Acceptable topsoil material shall be defined as natural, fertile, agricultural soil, capable of sustaining vigorous plant growth, uniform composition throughout admixture of subsoil, free of stones, lumps, plants, and their roots, sticks, or other extraneous matter; do not deliver while in a frozen or

- A. Provide a commercial balanced fertilizer delivered to the job in bags labeled with manufacturer's guaranteed analysis. Store in weatherproof st place in such a manner that its effectiveness will not be impaired.
- Fertilizer shall be a grade containing the percentages of plant food elements by weight as specified elsewhere in these specifications.
- C. Availability of various elements shall be per Standards of the Association of Official Agricultural Chemists.

### 2.03 GRASS SEED

- A. Grass seed shall be of the previous season's crop and the date of analysis shown on each bag shall be within nine (9) months of the time of delivery to the project. When requested by the Owner or Representative, the seeding contractor shall furnish a sample of seed from each bag for testing.
- B. The seed shall comply with all provisions of the U.S. Department of Agriculture as to labeling, purity, and germination.

# 2.04 MULCHING

- Dry straw or hay of good quality, free of seeds of competing plants and at such rate of 1 1/2 2 tons per acre; or,
- Wood cellulose or cane fiber mulch at a rate of 1,000 pounds per acre when the slope is 3/4:1 and steeper; or,
- A combination of good quality dry straw or hay free of seeds of competing plants at a rate of 2 1/2 tons per acre and wood cellulose or cane fiber mulch slope is flatter than 3/4:1; or,
- Sericea lespedza seed bearing hay at a rate of 3 tons per acre. This mulch may be applied green or air dried, but must contain mature seed.

# 2.05 HYDRO-MULCHING

Wood cellulose fiber or cane fiber mulch will be applied with hydraulic seeding and fertilizing equipment. All slurry ingredients shall be mixed to form a homogeneous slurry and spray applied within one hour after the mixture is made.

Wood cellulose or cane fiber mulch at the 1,000 pound per acre rate is used alone where other mulch material will not stick.

Wood cellulose or cane fiber mulch is self anchoring.

### PART III - EXECUTION

### 3.01 RESPONSIBILITY

The site grading contractor will be responsible to stockpile acceptable topsoi In a sufficient quantity acrow the feet of microscopic descriptions of southern acceptance topson in a sufficient quantity of the feet of microscopic descriptions, including but not limited to all chief and with as defined and shown on the factor and the southern at the appropriate higher and with as defined and shown on the further defined as any part of the feet of the feet

all perimeter graded areas and future building areas only.

The site grading contractor shall be responsible for backfilling of all curbed islands and planting mounds/berms. They shall also be responsible for removal of all stones, roots, and raking of all topsol areas hat are to be seeded and/or planted. It will also be the site grading contractor's responsibility to provide fertilizer, grass seed, and any additional topsoil required and mulching.

- topsoiled areas that are to be seeded.
- C. Provide permanent grass seeding for lawn areas so indicated. Seed in accordance with the following schedule (unless otherwise directed by Owner or Owner's Representative::

  - 3. Apply fertilizer at a rate of 20/25 pounds per 1,000 square feet.

- B. Area to be hydromulched with seed mix as follows

# 3.04 MULCH

- A. All areas to be seeded shall be mulched.
- gallons per 1,000 square feet.

# 3.05 PROTECTION

# 3 06 MAINTENANCE

The Owner's representative will designate areas to be replanted. Areas on which a stand of growing grass is not present in a reasonable length of time, (Bermuda grass seed should be germinating in 6-8 days) shall be prepared, reseeded and remulched, as specified for original planting at no additional cost to Owner. A stand shall be defined as live plants from seed occurring at a rate of not less than 1,000 growing plants per square foot. Replanting required because of faulty operations or negligence on the part of the Contractor shall be performed without cost to Owner.

# END OF SECTION

# SECTION 02922

### PART I - GENERAL

B. Related Work Specified Elsewhere

1.02 REFERENCE STANDARDS

American Joint Committee of Horticultural Nomenclature, Second Edition, 1942.

A. Vendors Certification That Sod Meets Texas State Sod Law Include labeling requirements. Include purity and type.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

Unopened bags labeled with the analysis.
 Conform to Texas Fertilizer Law.

B. Schedule - Only after all other construction is complete.

From traffic and all other use.
 Until sodding is complete and accepted.

B. Texas Highway Department - Standard Specifications for Construction, Item 164, Seeding for Erosion Control.

Previous season's crop with date of analysis on each bag. Furnish and deliver each variety in separate bags or containers.

Sod to be cut no more than three days before delivery

Only during suitable weather and soil conditions.
 As specifically authorized by the Owner's Representative.

Sod: As specified on drawings, weed, insect, and disease free having a minimum of 1 inch of topsoil attached to the roots and cut no more than three days prior to installation. The sod shall be cut in strips of at least 1/2 sq. yd. and not more than 1 sq. yd. Sod shall be cut into strips not less than 12° in width

or more than 9' in length. At the time of harvest, the top growth shall not exceed 3" in length.

All sod shall conform to the laws of the State and shall be obtained

from sources meeting the approval of the Department of Agriculture, Division of Entomology.

Free of oil, acid, alkali, salts or other substances harmful to growth

Analysis of 16-20-0, 16-8-8 or as directed

A. Standardized Plant Names

1.03 SUBMITTALS

1.05 JOB CONDITIONS

A. Planting Season:

PART II - PRODUCTS 2.01 MATERIALS

C. Water:

A. Work Included

The site grading contractor, shall be responsible to spread the topsoil within

### 3.02 GRASS SEEDING

- Remove stones, roots, rubbish and other deleterious materials from
- Immediately prior to sowing seed, scarify ground as necessary; rake until surface is smooth and friable. Sow seed evenly, lightly wood rake into ground, then roll ground with suttable roller; water thoroughly with fine spray. During any weather, keep lawn watered with sprinklers or other approved methods. Re-seed any areas not doing well or damaged. At intervals as may be required according to seasonal conditions, mow and water grass and execute necessary weeding until acceptable and full stand of grass has been
- - Sow areas ready for seeding between March 1 and October 1 with Hulled Common Bermuda at a rate of 85 pounds per acre.
  - 2. Sow areas ready for seeding between October 1 and March 1 with Unhulled Common Bermuda at a rate of 90 pounds per acre, and Annual Rye Grass at the rate of 50 pounds per acre.

Tickseed	10 pounds/acre
Cosmos	15 pounds/acre
Ox-Eyed Daisy	5 pounds/acre
Side Oats Grama	4 pounds/acre
Showy Primrose	0.5 pounds/acre
Plains Coreopsis	2 pounds/acre
Black Eyed Susan	2 pounds/acre
Indian Blanket	10 pounds/acre
Texas Bluebonnet	4 pounds/acre
Little Bluestem	4 pounds/acre

- C. Mulch shall be anchored with an emulsified asphalt binder at the rate of 10

Provide, at no additional cost to Owner, fencing, railing, wire or other types of protection for topsoiled and seeded areas against trespassing and damage. If lawns are damaged prior to Final Acceptance, treat or replace them as directed. Remove protection when so directed.

Provide maintenance from start of work until Final Acceptance. Maintenance Provide maintenance from start of work until minal Acceptance. Maintenance includes watering of lawns, weeding, mowing, edging, repairs of wash-outs and guillies, repairs to protection, and other necessary work of maintenance. Maintain slopes against erosion.

- At time of final inspection of work, and before final acceptance, clean paved areas that are soiled or stained by operations of work of this section. Clean by sweeping or washing, and remove all defacements or stains.
- Remove construction equipment, excess material and tools. Cart away from site any debris resulting from work of this section and dispose of as directed.

### PART III - EXECUTION

### 3.01 SOD BED PREPARATION

- A. Cultivate to a depth of four (4") inches by disking and tilling with a power
- Stumps, stones, and other objects larger than one inch (1"). Roots, brush, wire, stakes, etc. Any objects that may interfere with sodding or maintenance.

- Remove soil clods larger than one inch (1\*). Grade areas to smooth, even surface, removing ridges and filling depressions. Final grade to be below finish grade of curbing and edging as shown on details. All grades shall meet approval of Owner's Representative before sodding.

### 3.02 SODDING

- Lightly water prepared grade, lay sod with staggered joints and with edges touching. Topdress with topsoil at edges if necessary to provide smoth surface. On slopes of 2 to 1 and greater, fasten sod in place with wood pegs (two each piece) or other approved method. Sod damaged by storage or during installation shall be rejected. Following settling, topdress with screened, approved transoil.
- topsoil.
  Water and fertilize at 5 lbs. per 1,000 sq. ft.
  Sod shall not be placed during a drought, nor during periods when
  sod is not normally placed in the area, and shall not be placed on
  frozen ground. No dry or frozen sod is acceptable.
- The contractor shall keep all keep all sodded areas moist and growing until Final Acceptance. All areas shall be maintained in an acceptable condition until acceptance by Owner.

- After placing sod, roll with a hand roller, weighing not more than 100 lbs. per foot of width, in two directions.
- Eliminate all air pockets; finished surface should be free of excessive undulations.

# 3.05 MAINTENANCE AND MANAGEMENT

### B. Resodding:

- Resod damaged or unacceptable areas.
   Ruts, ridges, and other surface irregularities shall be corrected.

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L-4

TURF SPECIFICATIONS

TEXAS EXCAVATION SAFETY SYSTEM (TESS)

Sheet No.

### HYDRAULIC CALCULATIONS SPRAY ZONE A5

AVAILABLE PRESSURE 55 PSI (ESTIMATED)
24.0 GALLONS PER MINUTE
1" METER - 3.4 PSI

- 1-1/2" DCVA 6.1 PSI
- 1-1/2" DVVA 0.1 PSI 1-1/2" WYE 0.2 PSI 1-1/2" MAIN LINE LOSS (228') 2.5 PSI ELECTRIC CONTROL VALVE 1.5 PSI IN-LINE BALL VALVE 0.5 PSI

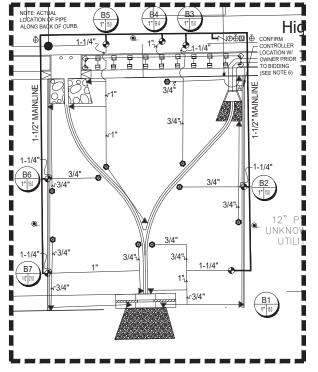
- ZONE LOSS 2.5 PSI
   ELEVATION CHANGE 0.0 PSI
   FITTING ESTIMATE 1.7 PSI
  OPERATING PRESSURE 31.6 PSI

# Irrigation Equipment Table Sym Equipment

5	•	HUNTER ICV (size as indicated) w/ACCUSYNC  LEMA1600HE Solenoid (Each Control Valve)  30-922 Adapter (Contractor to verify compatibility)
1	A	LEIT 4006 Solar Controller with  ■ MCOL 4000 (32") Mounting Column  ■ LEIT KEY Programer-Provide to owner  ■ SKIT 8821-4 Sensor Interface  ■ HUNTER Rain/Freeze CLIC
1	7	1-1/2" FEBCO Double Check/Gate
1	<b>(</b>	1-1/2" FEBCO 650A Wye Strainer
2	$\oplus$	Inline Ball Valve size to match mainline
1	M	1" Meter
2	<b>Q</b>	QUICK COUPLER VALVE
6	•	HUNTER PGP Ultra 12-CV Blue Standard 8.0 Nozzle ADJ
4	•	HUNTER PGP Ultra 12—CV Blue Standard 4.0 Nozzle ADJ
5	⊖	HUNTER Pro-Spray Strip Pattern LCS/RCS/ES - 515 EST
4	•	HUNTER Pro-Spray Strip Pattern SS-530 SST
6	•	HUNTER Pro-Spray 8' Nozzle 8 (Brown) 090
22	8	HUNTER Pro-Spray 8' Nozzle 8 (Brown) 180

ALL HEADS SHALL BE EQUIPPED WITH CHECK VALVES

# **ENLARGEMENT 'B'**



### HYDRAULIC CALCULATIONS SPRAY ZONE B7

AVAILABLE PRESSURE 55 PSI (ESTIMATED)

- 1" METER 2.8 PSI 1-1/2" DCVA 6.1 PSI
- 1-1/2" WYE 0.2 PSI
- 1-1/2" MAIN LINE LOSS (187') 1.7 PSI
- I-1/2 MAIN LINE LOSS (187)
  ELECTRIC CONTROL VALVE 1.5
  IN-LINE BALL VALVE 0.5 PSI
  ZONE LOSS 3.0 PSI
  ELEVATION CHANGE 0.0 PSI
  FITTING ESTIMATE 1.6 PSI
- OPERATING PRESSURE 37.6 PSI

# Irrigation Equipment Table

Qty	Sym	Equipment
7	•	HUNTER ICV (size as indicated) w/ACCUSYNC  LEMA1600HE Solenoid (Each Control Valve)  30-922 Adapter (Contractor to verify compatibility)
1	A	LEIT 4008 Solar Controller with  MCOL 4000 (32") Mounting Column  LEIT KEY Programer—Provide to owner  SKIT 8821—4 Sensor Interface  HUNTER Rain/Freeze CLIC
1	7	1-1/2" FEBCO Double Check/Gate
1	⊕	1-1/2" FEBCO 650A Wye Strainer
3	$\oplus$	Inline Ball Valve size to match mainline
1	M	1" Meter
3	<b>Q</b>	QUICK COUPLER VALVE
4	•	HUNTER Pro-Spray 8' Nozzle 8 (Brown) 090
18	8	HUNTER Pro-Spray 8' Nozzle 8 (Brown) 180
12	•	HUNTER PGP Ultra 12-CV Blue Standard 3.0 Nozzle ADJ
10	0	HUNTER PGP Ultra 12—CV Blue Standard 6.0 Nozzle ADJ

ALL HEADS SHALL BE EQUIPPED WITH CHECK VALVES

# **IRRIGATION NOTES:**

- IRRIGATION LINES ARE SOMETIMES SHOWN OUTSIDE PLANTING BEDS FOR GRAPHIC CLARITY ONLY. ADJUST INSIDE BEDS ON SITE.
  AVOID TRENCHING WITHIN DRIP LINE OF EXISTING TREES. WHERE NECESSARY, TRENCH RADIALLY, RATHER THAN, ACROSS THE ROOT SYSTEM.
- MAIN LINE TO BE 1-1/2".
- ALL SLEEVES UNDER PAVING TO EXTEND 12" PAST EDGE OF PAVING. COORDINATE
- ALL SLEEVES UNDER PAVING TO EXTEND 12 PAST EDGE OF PAVING. COORDINATE WORK WITH GENERAL AND PAVING SUBCONTRACTOR.

  ALL HEADS TO BE 4" POPS IN LAWNS. ALL HEADS WITH CHECK VALVES. COORDINATE SLEEVE SIZE AND LOCATION FOR FREEZE SENSOR, RAIN GAUGE AND CONTROLLER WITH GENERAL CONTRACTOR. SEAL ALL BUILDING PENETRATIONS WATER TIGHT.
- SEE FOLLOWING DETAIL SHEET FOR IRRIGATION DETAILS.
- 7. SEE FOLLOWING DETAIL SHEET FOR IRRIGATION DETAILS.

  PRESSURE ESTIMATED AT 55 PSI; MINIMUM 50 GPM AS PROVIDED BY CITY. VERIFY
  ON SITE AND REPORT TO LANDSCAPE ARCHITECT PRIOR TO BEGINNING ANY WORK.

  CONTRACTOR RESPONSIBLE FOR LOCATION OF ALL UTILITIES INCLUDING BUT NOT
  LIMITED TO TELEPHONE, TELECABLE, ELECTRIC, GAS, WATER, AND SEWER. ANY
  DAMAGE TO UTILITIES TO BE REPAIRED BY CONTRACTOR AT NO COST TO OWNER.
  REFER TO SITE/UTILITY PLANS.

  10. VERIFY 100% COVERAGE OF SYSTEM OVER ALL PLANTING & LAWN AREAS AS SHOWN
  ON DEADWINGS.
- ON DRAWINGS
- IF PEDESTAL MOUNTED CONTROLLER IS SPECIFIED, MOUNT ON 4"X3'X3' CONCRETE SLAB WITH (4) #4'S EACH WAY. SLEEVE THROUGH SLAB FOR CONTROLLER WIRING AS
- 12. UNLESS NOTED OTHERWISE, THERE ARE NO EXISTING SLEEVES. IRRIGATION CONTRACTOR TO SIZE AND COORDINATE SLEEVE INSTALLATION AS NEEDED IN ALL LOCATIONS UNDER PAVEMENT.
- 13. QUANTITES ARE PROVIDED AS A COURTESY AND ARE NOT INTENDED FOR BID PURPOSES. CONTRACTOR TO VERIFY ALL QUANTITIES PRIOR TO BIDDING.
- PURPOSES. CONTRACTOR TO VERIFY ALL QUANTITIES PRIOR TO BIDDING.

  14. IF DOUBLE CHECK IS PROHIBITED BY LOCAL CODE/ORDINANCE, SUBSTITUTE WITH APPROVED BACKFLOW PREVENTION DEVICE.

  15. ALL WORK IN ACCORDANCE WITH LOCAL, STATE, & NATIONAL CODES & ORDINANCES.

  16. CONTRACTOR TO SIZE CONTROL SIZE WIRE AS NECESSARY. HOWEVER, MINIMUM SIZE TO BE 14 GAUGE PER NATIONAL ELECTRICAL CODE. ALL SPLICES WITH APPROVED MANUFACTURED CONNECTOR IN VALVE BOX.

  17. DO NOT LOCATE VALVE BOXES IN SWALES, LOW AREAS, OR ANY OTHER LOCATIONS THAT MAY COLLECT WATER.

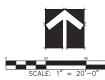
  18. CONTROLLER TO BE WIRED ON DEDICATED 110 VOLT CIRCUIT AND GROUNDED W/"GROUNDING SPIKE" PER MANUFACTURER'S INSTRUCTIONS.

  19. ADJUST HEADS TO AVOID OVERSPRAY ONTO STREETS, ROADWAYS, BUILDINGS AND ELECTRICAL EQUIPMENT.

- ELECTRICAL EQUIPMENT.
- ), INCLUDE ONE SPARE WRE FROM CONTROLLER TO EACH CONTROL VALVE. EACH WRE TO BE VARYING COLOR.
- TO BE VARTING COLOR.

  CONTRACTOR IS RESPONSIBLE FOR ADJUSTING FLOW CONTROL AND/OR PRESSURE REGULATOR AT EACH CONTROL VALVE AS NECESSARY TO MAKE SYSTEM OPERATE AS
- INTENDED.
  22. DRIP IRRIGATION IS INTENDED TO MAINTAIN ESTABLISHED PLANT MATERIAL CONTRACTOR SHALL HAND WATER AND MAINTAIN NEW PLANTINGS AS REQUIRED UNTIL ESTABLISHMENT AND ACCEPTANCE.

NOTE: INCLUDE (2) TORO SB-90-PC2 STREAM BUBBLERS TO EACH NEW TREE. ATTACH EACH BUBBLER TO TORO 570-6" POPUP. LOCATE BUBBLERS INSIDE TREE WELL OF EACH TREE ON OPPOSITE SIDES OF THE ROOT BALL. ALL BUBBLERS TO BE ZONED SEPARATELY FROM OTHER HEADS. CONTRACTOR RESPONSIBLE FOR PIPE SIZING, SLEEVING, ETC. AND ALL OTHER REQUIREMENTS TO MAKE CIRCUIT(S) OPERABLE. TOTAL COUNT FOR BUBBLERS AND VALVE(S) NOT SHOWN IN IRRIGATION KEY. IF TREE IS LOCATED IN DRIP ZONE, IN LIEU OF BUBBLER USE (2) RAIN BIRD SXB-180-025 XERI-BUBBLERS W/SXB-180-SPYK SPIKE TIED INTO ÉMITTER TUBING.



TEMPORARY IRRIGATION WILL BE REQUIRED TO ESTABLISH TURF IN ALL DISTURBED AREAS WITHOUT A PERMANENT RRIGATION SYSTEM. INSTALL SOD TO ESTABLISH TURF IN ALL DISTURBED AREAS AS IDENTIFIED ON GRADING AND EROSION CONTROL PLANS.



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**IRRIGATION PLAN** 

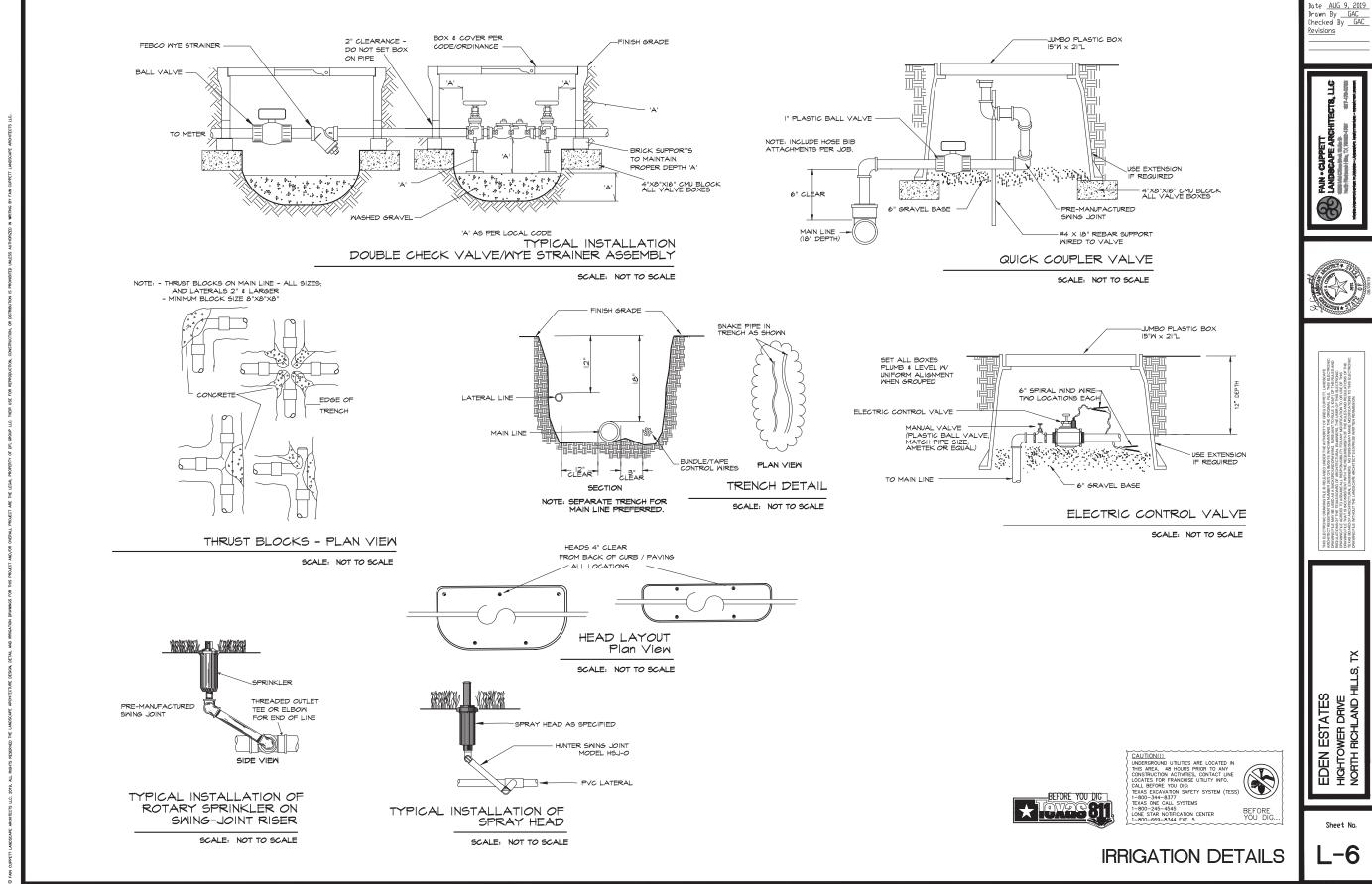
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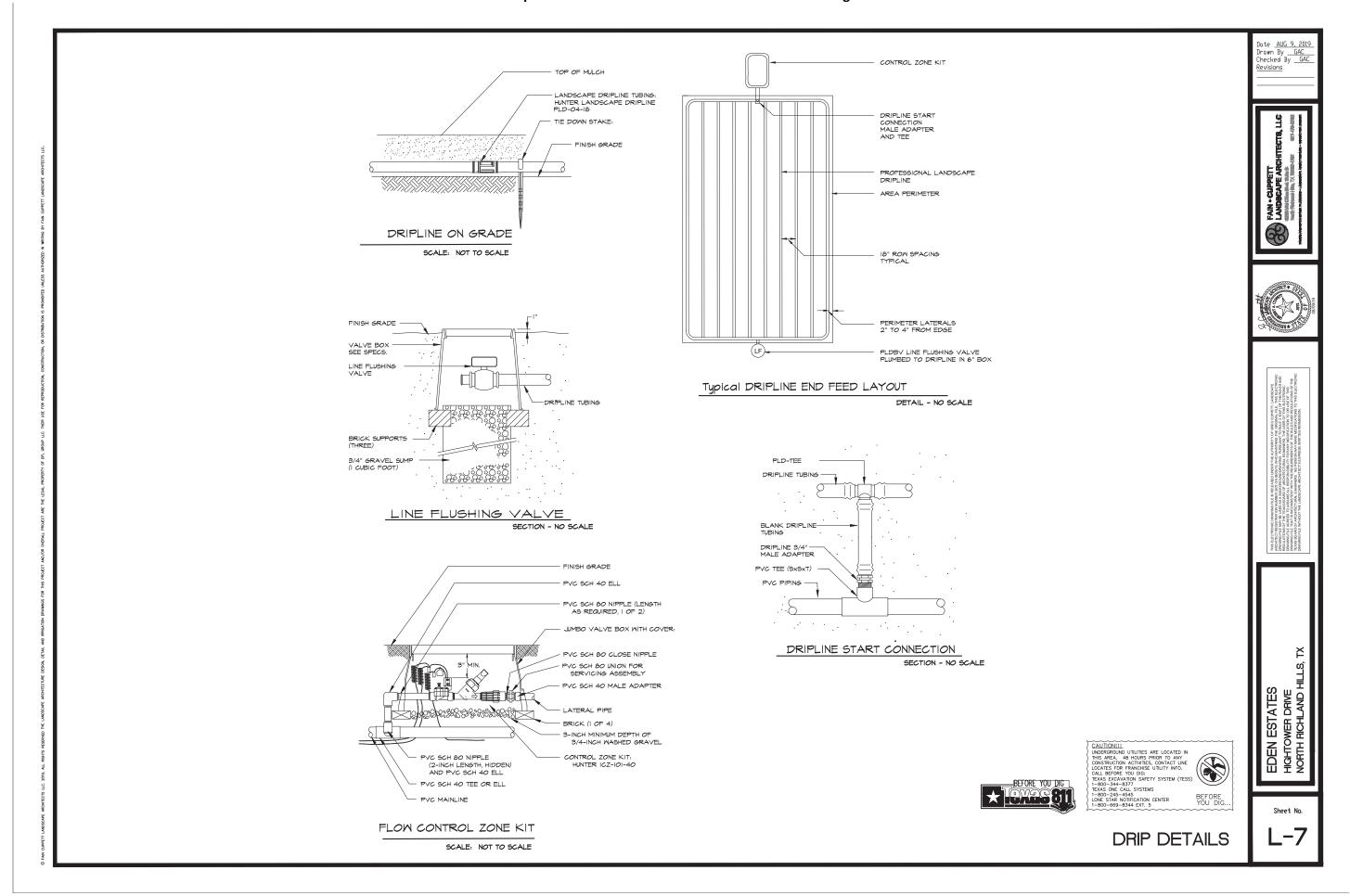




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Sheet No.





IRRIGATION PART I - GENERAL 1.01 DESCRIPTION B. Related Work Specified Elsewhere 1.02 QUALITY ASSURANCE A. Codes and Standards: B. Licenses: All work shall be performed by or under the direct supervision of an irrigator or plumber licensed to practice under the authority of the State of Texas. A. Maintenance Materials : At completion of the job, furnish spare parts and all special tools and equipment required to operate and maintain system. B. Maintenance Data: Furnish two copies of parts list and repair manuals and all special tools and equipment required to operate and maintain system. 1. All piping and wiring, including control wires by Locate all valves by dimension from two PART II - PRODUCTS A. Equipment and Material Requirements: Standard product of acceptable manufacturer.
 In-service performance records to verify d combilities. published capabilities.
3. New and unused. A. PVC Pipe and Fittings: 1. Polyvinyl chloride pipe (PVC) in accordance with ASTM D-2241-78 made to SDR-PR dimensions and approved by Notional Sonitation Foundation.
2. 2 inch pipe and smaller: Solvent weld PVC Type "Bell-End" pipe may be used.
3. 2 inch pipe fittings and smaller; Solvent weld type as recommended by pipe manufacturer.
4. All pipe downstream of backflow preventer to be Class 200 PVC; all swing joints and risers to be Schedule 80. 1. Nipples and risers: Schedule 80 threaded PVC pipe. 2. Fittings: Schedule 80 PVC. 1. Double Check Double Gate Valve a. Factory assembled and tested valve train.

b. Two spring loaded all brass check valves with soft rubber discs.

c. Two all brass shutoff valves.

d. Assembled with brass nipples.

e. In accordance with AWWA and ASSE specifications.

f. Approved Product: FEBCO.

2. Manual Control Valve

a. Straight type globe valve.
b. Size to match upstream pipe or as shown on drawings.
c. Cross handle control wheel.
d. Brass or bronze body and ports, Class 150.
e. Full floating valve disc with replaceable seat and washers.
f. Removable bonnet and stem assembly wit packing algand and nut.

f. Removable bonnet and stem assembly with packing gland and nut.

a. With flow control.
b. Globe valve.
c. Monual bleed.
d. 24 VAC soleroid.
e. Electric control, in—line.
f. Size to match upstream pipe or as shown on drawings. a. 1" female inlet.
b. Brass or bronze construction.
c. 150 psi capacity.
d. Self closing cover.
e. One piece, single lug, single key construction.

f. Provide owner with two quick coupler keys & hose bib attachments.

g. Install in "jumbo" plastic valve box, rectangular, heavy duty. D. Valve Boxes: 1. Box for Double check double gate valve: a. Concrete box with cast iron cover (or per code).
b. Sufficient size to house entire assembly and permit inspection, maintenance and repair. Box for Electric Valves, Manual Valves, and Double Check Valves
 Jumbo', rectangular
 Heavy duty plastic construction.
 With locking lid. 1. Bubbler, Flood Type b. 1/2" IPS female inlet.
 c. Adjustable flow via screen. 2. Spray Heads a. 4" pop/12" pop.
b. Plostic construction.
c. Stainless steel retraction spring.
d. Serviceable filter screen and nozzle.
e. Stationary or gear driven. 3. Rotary Heads a. 12" pop/4"pop b. Full and part circle heads as drawings Solid state.
 Digital readout.
 Dust Barrier.
 Pump/master valve circuit switch.
 0-60 minute timing per station or as specified. 6. Up to three start times/day with manual override. 7. UL listed. 8. Battery backup. G. Accessories: 1. Jointing Material: Teflon tape for threads on PVC pipe.

2. Control Wire: Direct Burial, size for voltage drop, minimum size per National Electric Code. PART III - EXECUTION 3.01 GENERAL Install all equipment and products in accordance with manufacturer's recommendations. 3.02 INSTALLATION A. PVC Pipe and Fittings: Handle and install PVC pipe, couplings, and fittings in accordance with manufacturer's recommendations and industry standards.
 All PVC fittings shall be molded of the same material as the pipe and shall be suitable for solvent weld, slip joint ring tight seal, or screwed connections. screwed connections.
3. No fittings made of other material shall be used except copper as specified in the plans and details copper as specimed in the plans and details.

4. Space pipe length in jointing and snake to allow for expansion and contraction.

5. Thoroughly clean interior of the pipe of all foreign matter before being lowered into trench. Keep clean during laying operation by means of plugs or other approved method.

6. Do not lay pipe in water or when trench or weather conditions are unsuitable for work. Keep water out of trench until the joints are completed.

 Fittings at bends in the pipe line and at ends of lines shall be firmly wedged against the vertical face of the trench.
 Make joints in all screwed fittings by applying teflon tope on male threads.
 Only schedule 80 pipe may be threaded. B. Valves: Install all new valves as indicated on the plans or as may be required for the proper control of the piping systems in which they are incorporated.
 Bury valves deep enough so that valve box lid will not protrude above the ground.
 Set valves vertically and locate 12 inches from sidewalks where possible.
 Adjust flow control to give correct pressure at sprinkler head.

C. Heads – Contractor shall field adjust all heads to minimize/eliminate direct head spray onto all paving, roadways, walks, buildings, electrical transformers and other above ground equipment.

### 3.03 FIELD QUALITY CONTROL

### A. Leak Test:

 When the main line or sections of the main line, e.g. loops with swing joints and valves have been installed, the system (or section) will then be pressurized to the operating pressure indicated on the drawings. The pressure will then be maintained for a twenty four hour leak test period.

2. All leaks will be repaired and retested prior to backfilling lines.

3. Any leaks developed during the first under

### B. Cleaning and Flushing System:

1. After pipe, fittings, and valves have been installed and connections made to water source, flush pipe free of all rock, dirt, trash, pipe shavings, and other debris before installing heads.

2. After heads have been installed, use system several times before final inspection.

3. Immediately before final inspection, check all heads for stoppage. Clean if necessary.

4. Chemos stoppage. Clean if necessary.

4. Chemos dependent of the stoppage clean in spection.

# C. Maintenance Instructions:

School at least two of the Owner's employees that will be maintaining the irrigation system in operating and maintenance procedures.
 Include operation of controllers and volves, balancing of the system, and maintenance of all equipment including removal and replacement of volve and controller components.

A. Make final cleanup of all parts of work before final acceptance.

# B. Remove all construction materials and equipment.

C. Prepare site in an orderly and finished appearance.

END OF SECTION

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IRRIGATION SPECIFICATIONS

Sheet No. L-8