





STATE OF TEXAS  
COUNTY OF HARRIS

We, WWBD, L.P., a Texas limited partnership, acting by and through Adam Beckman, its Managing Partner, hereinafter referred to as Owners of the 1.6714 acre tract described in the above and foregoing map of LOST OAKS, do hereby make and establish said subdivision and development plat of said property according to all lines, dedications, restrictions and notations on said maps or plat, and hereby dedicate to the use of the public forever, all streets (except those streets designated as private streets, or permanent access easements), alleys, parks, water courses, drains, easements and public places shown thereon for the purposes and considerations therein expressed; and do hereby bind ourselves, our heirs, successors and assigns to warrant and forever defend the title on the land so dedicated.

FURTHER, Owners have dedicated and by these presents do dedicate to the use of the public for public utility purposes forever unobstructed aerial easements. The aerial easements shall extend horizontally an additional eleven feet, six inches (11' 6") for ten feet (10' 0") perimeter ground easements or seven feet, six inches (7' 6") for fourteen feet (14' 0") perimeter ground easements or five feet, six inches (5' 6") for sixteen feet (16' 0") perimeter ground easements, from a plane sixteen feet (16' 0") above ground level upward, located adjacent to and adjoining said public utility easements that are designated with aerial easements (U.E. and A.E.) as indicated and depicted, hereon, whereby each aerial easement totals twenty one feet, six inches (21' 6") in width.

FURTHER, Owners have dedicated and by these presents do dedicate to the use of the public for public utility purpose forever unobstructed aerial easements. The aerial easements shall extend horizontally an additional ten feet (10' 0") for ten feet (10' 0") back-to-back ground easements, or eight feet (8' 0") for fourteen feet (14' 0") back-to-back ground easements or seven feet (7' 0") for sixteen feet (16' 0") back-to-back ground easements, from a plane sixteen feet (16' 0") above ground level upward, located adjacent to both sides and adjoining said public utility easements that are designated with aerial easements (U.E. and A.E.) as indicated and depicted hereon, whereby each aerial easement totals thirty feet (30' 0") in width.

FURTHER, Owners do hereby covenant and agree that all of the property within the boundaries of this plat shall be restricted to prevent the drainage of any septic tanks into any public or private street, permanent access easement, road or alley or any drainage ditch, either directly or indirectly.

FURTHER, Owners do hereby dedicate to the public a strip of land fifteen feet (15' 0") wide on each side of the center line of any and all bays, creeks, gullies, ravines, draws, sloughs, or other natural drainage courses located in said plat, as easements for drainage purposes, giving the City of Houston, Harris County, or any other governmental agency, the right to enter upon said easement at any times for the purpose of construction and maintenance of drainage facilities and structures.

FURTHER, Owners do hereby covenant and agree that all of the property within the boundaries of this plat and adjacent to any drainage easement, ditch, gully, creek or natural drainage way is hereby restricted to keep such drainage ways and easements clear of fences, buildings, and other obstructions to the operations and maintenance of the drainage facility and that such abutting property shall not be permitted to drain directly into this easement except by means of an approved drainage structure.

FURTHER, Owners hereby certify that this replat does not attempt to alter, amend, or remove any covenants or restrictions; we further certify that no portion of the preceding plat was limited by deed restriction to residential use for not more than two (2) residential units per lot.

In testimony thereof, WWBD, L.P., has caused these presents to be signed by Adam Beckman, its Managing Partner, hereunto authorized this 12 day of October, 2023.

WWBD, L.P.  
a Texas limited partnership

By: *Adam Beckman*  
Adam Beckman  
Managing Partner

STATE OF TEXAS  
COUNTY OF HARRIS

BEFORE ME, the undersigned authority, on this day personally appeared Adam Beckman, known to me to be the person whose name is subscribed to the foregoing instrument and acknowledgement to me that they executed the same for the purposes and considerations therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this 12 day of October, 2023.

APRIL REYNERO  
Notary Public, State of Texas  
Comm. Expires 12-03-2028  
Notary ID 191813108

Notary Public in and for the State of Texas  
Printed Name: April Reynero  
My Commission expires: 12-03-2028

I, Kevin K. Kolb, am registered under the laws of the State of Texas to practice the profession of surveying and hereby certify that the above subdivision shown hereon is true and correct; was prepared from a practical survey of the property made under my supervision on the ground; that all boundary corners, angle points, points of curvature and other points of reference have been marked with iron pipes or rods having an outside diameter of not less than three (3/4) inch and a length of not less than three (3) feet; and that the plat boundary corners have been tied to state plane coordinates (NAD 83) and NAD 1988 with 2001 adjustment, and to the nearest public street intersection.



Total Surveyors Inc.  
4301 Center St.  
Deer Park, Texas 77536  
281-479-8719

KEVIN K. KOLB  
REGISTERED PROFESSIONAL LAND SURVEYOR NO. 5269  
STATE OF TEXAS

This is to certify that the Planning Commission of the City of Houston, Texas, has approved this plat and subdivision of LOST OAKS, in conformance with the laws of the State of Texas and the ordinances of the City of Houston as shown hereon and attested the recording of this plat this 12 day of October, 2023.

By: *Martha L. Stein*  
Martha L. Stein, Chair  
or  
M. Sonny Garza, Vice-Chair

By: *Margaret Wallace Brown*  
Margaret Wallace Brown, M.P., C.M.U.-A  
Secretary

I, Tenshia Hudspeth, Clerk of the County Court of Harris County, do hereby certify that the within instrument with its certificate of authentication was filed for registration in my office on Oct 12, 2023, at 8:11 o'clock A.M., and duly recorded on Oct 14, 2023, at 2:55 o'clock P.M., and in Film Code Number 705 & 18 of the Map Records of Harris County for said county.

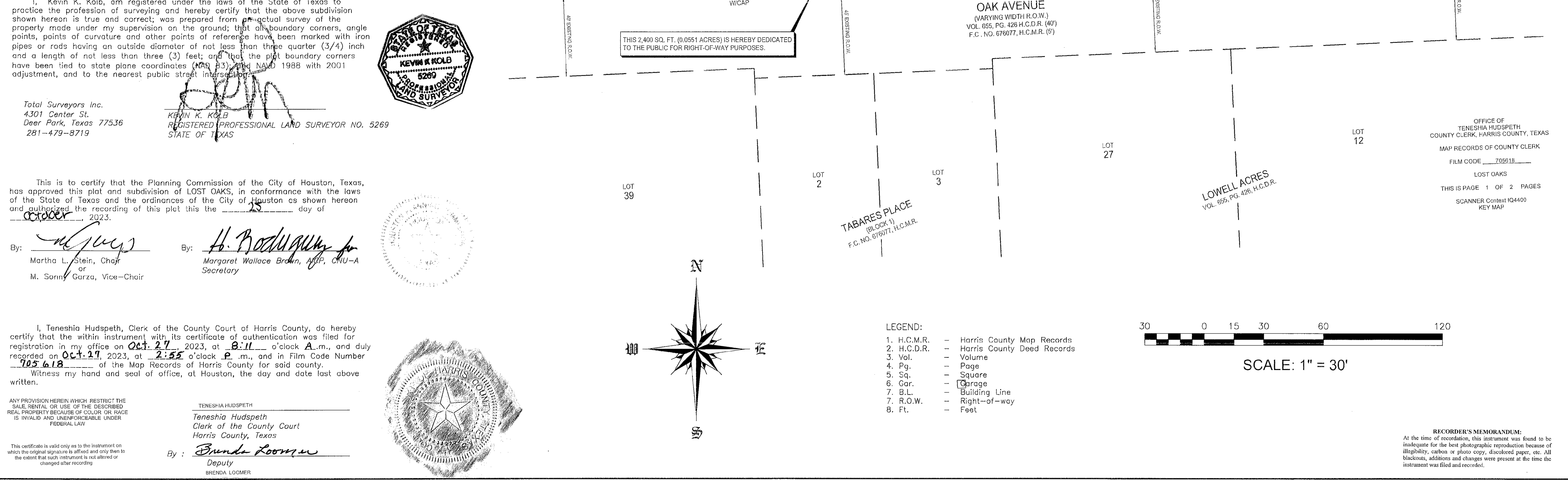
Witness my hand and seal of office, at Houston, the day and date last above written.

ANY PROVISION HEREIN WHICH RESTRICTS THE SALE, RENTAL OR USE OF THE DESCRIBED REAL PROPERTY BECAUSE OF COLOR OR RACE IS INVALID AND UNENFORCEABLE UNDER FEDERAL LAW.

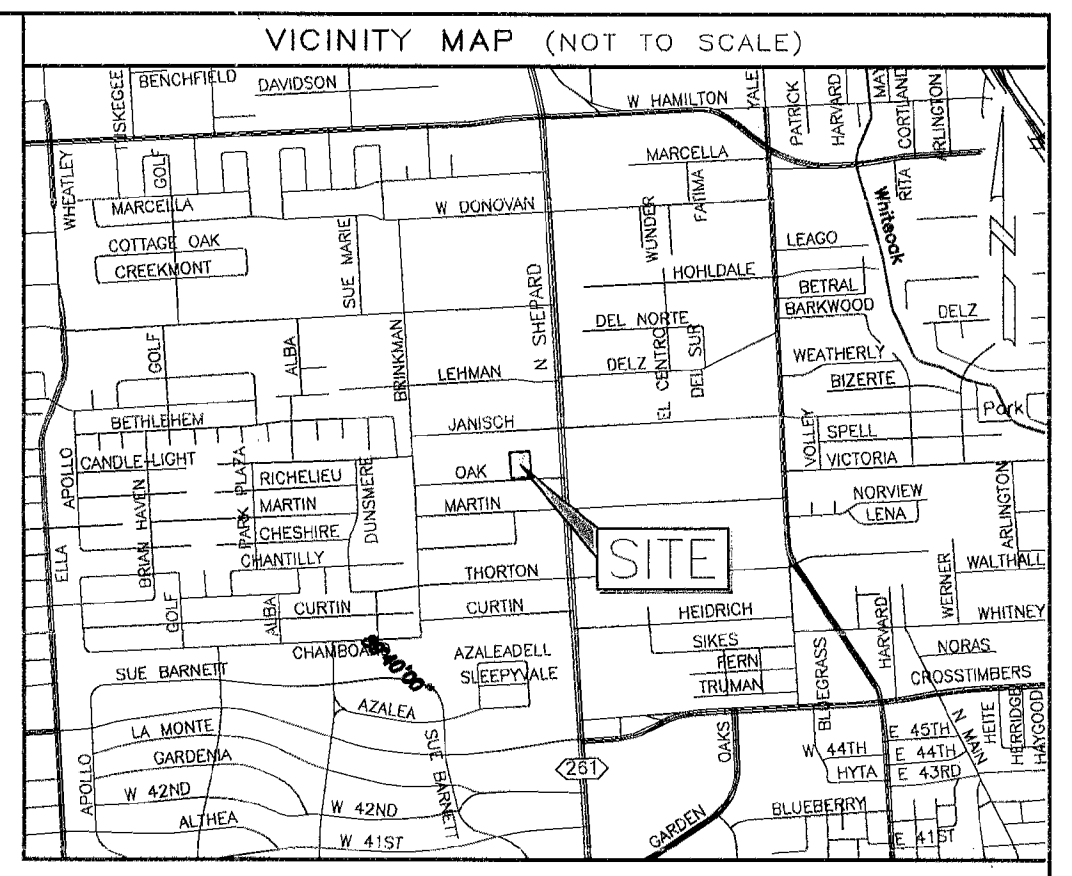
TENSHIA HUDSPETH  
Tenshia Hudspeth  
Clerk of the County Court  
Harris County, Texas

By: *Brenda Loomer*  
Brenda Loomer  
Deputy

This certificate is valid only as to the instrument on which the original signature is affixed and only then to the extent that such instrument is not altered or changed after recording.



RP-2023-411363  
10/27/2023 hccp1p1 60.00  
FILED  
10/27/2023 8:11 AM  
County Clerk



- PLAT NOTES:
1. Unless otherwise indicated, the building lines (b.l.), whether one or more, shown on this subdivision plat are established to evidence compliance with the applicable provisions of Chapter 42, Code of Ordinances, City of Houston, Texas, in effect at the time this plat was approved, which may be amended from time to time.
  2. The coordinates shown hereon are Texas South Central Zone No. 4204 State Plane Coordinates (NAD83) and may be brought to surface by applying the following combined scale factor of 1.00012813.
  3. If this plat is proposed to be multifamily residential, it is subject to the Parks and Open Space requirements of 42-251. A fee per unit will be assessed at the time of permitting at the then current fee rate. If a private park is to be proposed or public park land to be dedicated, park land reserves or land dedication must be shown on the face of the plat at this time.
  4. This property(s) is located in Park Sector number 1.
  5. Absent written authorization by the affected utilities, all utility and aerial easements must be kept unobstructed from any non-utility improvements or obstructions by the property owner. Any unauthorized improvements or obstructions may be removed by any public utility at the property owner's expense. While wooden posts and paneled wooden fences along the perimeter and back to back easements and alongside rear lots lines are permitted, they too may be removed by public utilities at the property owner's expense should they be an obstruction. Public Utilities may put said wooden posts and paneled wooden fences back up, but generally will not replace with new fencing.

## LOST OAKS

A SUBDIVISION OF 1,6714 ACRES (72,804 SQUARE FEET) OF LAND SITUATED IN THE S.W. ALLEN SURVEY, ABSTRACT No. 94, CITY OF HOUSTON, HARRIS COUNTY, TEXAS, FURTHER BEING A REPLAT OF LOTS 26 & 32, OF LOWELL ACRES, AN ADDITION IN HARRIS COUNTY, TEXAS, ACCORDING TO THE MAP OR PLAT THEREOF RECORDED IN VOLUME 655, PAGE 426, OF THE DEED RECORDS OF HARRIS COUNTY, TEXAS

SCALE: 1" = 30'  
1 UNRESTRICTED RESERVE

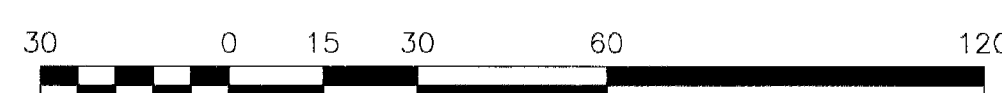
DATE: OCTOBER, 2023  
1 BLOCK

REASON FOR REPLAT:  
TO CREATE ONE UNRESTRICTED RESERVE.

PREPARED BY:  
**TSE**  
TOTAL SURVEYORS, INC.  
4301 CENTER STREET, DEER PARK, TEXAS  
PHONE: 281-475-8719 | TOTALSURVEYORS.COM  
T.S.P. L.L.S. FIRM REGISTRATION NO. 10075100

OWNER(S):  
WWBD, L.P.  
a Texas limited partnership

- LEGEND:
- 1. H.C.M.R. - Harris County Map Records
  - 2. H.C.D.R. - Harris County Deed Records
  - 3. Vol. - Volume
  - 4. Pg. - Page
  - 5. Sq. - Square
  - 6. Gar. - Garage
  - 7. B.L. - Building Line
  - 7. R.O.W. - Right-of-way
  - 8. Ft. - Feet



SCALE: 1" = 30'

CO.2 PLAT  
(FOR REFERENCE ONLY)



**GENERAL CONSTRUCTION NOTES**

- 1. ALL PROPOSED CONSTRUCTION SHALL CONFORM TO THE LATEST STANDARDS, CODES AND SPECIFICATION OF CITY OF HOUSTON AND HARRIS COUNTY. WHERE CONFLICT EXIST THE MORE STRINGENT REQUIREMENT SHALL BE ENFORCED.
- 2. CONTRACTOR SHALL LAYOUT THE ENTIRE PROJECT AND VERIFY CRITICAL DIMENSIONS, LOCATIONS, ALL EXISTING BENCHMARKS AND ELEVATIONS PRIOR TO THE START OF CONSTRUCTION. BRING ANY DISCREPANCIES TO THE ENGINEER FOR SOLUTION PRIOR TO PROCEEDING WITH THE WORK. IF NO VERIFICATION IS CONDUCTED CONTRACTOR SHALL ASSUME ALL RESPONSIBILITY.
- 3. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGE TO THE EXISTING PUBLIC OR PRIVATE UTILITY LINES, INCLUDING BUT NOT LIMITED TO WATER LINES, WASTEWATER COLLECTION SYSTEMS AND STORM SEWERS, DURING CONSTRUCTION. ALL DAMAGES SHALL BE REPAIRED IN ACCORDANCE WITH CITY OF HOUSTON, DEPARTMENT OF PUBLIC WORKS AND ENGINEERING "STANDARD CONSTRUCTION SPECIFICATIONS" WITH LATEST ADDENDA AND AMENDMENTS "THERETO, WITH NO COST" TO THE PUBLIC.
- 4. EXISTING UTILITY INFORMATION SHOWN IS NOT GUARANTEED TO BE ACCURATE AND ALL EXISTING UTILITY LOCATIONS ARE APPROXIMATE. CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING AND PROTECTING ALL EXISTING UTILITIES AND OTHER FACILITIES PRIOR TO CONSTRUCTION. ANY CONFLICT OR DISCREPANCY DISCOVERED MUST BE IMMEDIATELY BROUGHT TO THE ENGINEER'S ATTENTION.
- 5. THE CONTRACTOR SHALL NOTIFY THE CITY OF HOUSTON, ENGINEERING DEPARTMENT HARRIS COUNTY ENGINEERING DEPARTMENT, CENTERPOINT ENERGY AND ALL OTHER APPLICABLE AGENCIES AT LEAST 48 HOURS PRIOR TO COMMENCEMENT OF WORK, NOTIFICATIONS SHALL BE FOLLOWED WITH A LETTER, COPIES OF WHICH SHALL BE SENT TO THE ENGINEER.
- 6. THE CONTRACTOR, ON BEHALF OF THE OWNER, IS TO OBTAIN ALL NECESSARY PERMITS REQUIRED BY THE CITY OF HOUSTON OR HARRIS COUNTY, PRIOR TO STARTING CONSTRUCTION.
- 7. GUIDELINES SET FORTH IN THE TEXAS "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES", AS CURRENTLY AMENDED, SHALL BE OBSERVED. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING ADEQUATE FLAG MEN, SIGNWAS, STRIPING, AND WARNING DEVICES, ETC., DURING CONSTRUCTION - BOTH DAY AND NIGHT.
- 8. THE LOADING AND UNLOADING OF ALL PIPE, VALVES, HYDRANTS, MANHOLES, AND OTHER ACCESSORIES SHALL BE IN ACCORDANCE WITH THE MANUFACTURER RECOMMENDED PRACTICES AND SHALL AT ALL TIMES BE PERFORMED WITH CARE, TO AVOID ANY DAMAGE TO THE MATERIAL. THE CONTRACTOR SHALL LOCATE AND PROVIDE THE NECESSARY STORAGE AREAS FOR THE MATERIALS AND EQUIPMENT.
- 9. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE SHIPPING AND STORING OF ALL MATERIALS. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO EXAMINE SUCH MATERIAL AT THE POINT OF DELIVERY AND TO REJECT ALL DEFECTIVE MATERIAL. ANY DEFECTIVE MATERIAL INCORPORATED INTO THE WORK SHALL BE REMOVED AND REPLACED AT THE CONTRACTOR'S EXPENSE. THERE SHALL BE NO PAYMENT MADE FOR STORED MATERIAL.
- 10. ALL PIPE AND REINFORCEMENT STEEL SHALL BE KEPT FREE OF DIRT AND OTHER DEBRIS. ANY DAMAGE TO THE COATING OF THE VARIOUS MATERIALS MUST BE REPAIRED.
- 11. ADEQUATE DRAINAGE SHALL BE MAINTAINED AT ALL TIMES DURING CONSTRUCTION AND ANY DRAINAGE DITCH OR STRUCTURE DISTURBED DURING CONSTRUCTION SHALL BE RESTORED TO THE SATISFACTION OF THE DRAINING AUTHORITY. ALL CONSTRUCTION STORM RUNOFF SHALL COMPLY WITH THE FINAL DRAFT OF STORMWATER MANAGEMENT HANDBOOK FOR CONSTRUCTION ACTIVITIES AS PREPARED BY HARRIS COUNTY/HCFD, AND THE CITY OF HOUSTON AT IN COMPLIANCE WITH THE TEXAS POLLUTANT DISCHARGE ELIMINATION SYSTEM (TPDES) REQUIREMENTS.
- 12. ACCESS TO ALL EXISTING STREETS AND DRIVEWAYS SHALL BE MAINTAINED AT ALL TIMES.
- 13. CONTRACTOR IS TO MAINTAIN A CLEAN PROJECT AREA, FREE FROM WORKMAN TRASH AND REFUSE, AT ALL TIMES.
- 14. THE CONTRACTOR IS REQUIRED TO FOLLOW ALL APPLICABLE OSHA RULES AND REGULATIONS. TRENCH SAFETY SHALL BE DONE IN ACCORDANCE WITH OSHA STANDARDS.
- 15. SITE CONTRACTOR SHALL COORDINATE THE LOCATION OF ALL UTILITIES WITH THE BUILDING CONTRACTOR.
- 16. ALL GEOTECHNICAL REPORTS (IF ANY) FOR THIS PROJECT ARE AVAILABLE FOR REFERENCE AT THE OFFICE OF THE ENGINEER.
- 17. SURFACE RESTORATION: AT THE END OF ALL CONSTRUCTION PROJECTS, THE CONTRACTOR SHALL RESTORE THE EXISTING FACILITIES, I.E. THE PROPERTY, EQUAL TO OR BETTER THAN EXISTING SITE CONDITIONS PRIOR TO THE CONSTRUCTION. ALL FINISHED GRADES SHALL VARY UNIFORMLY BETWEEN THE FINISHED ELEVATIONS SHOWN.

**WATERLINE CONSTRUCTION NOTES**

- 1. WATER LINES SHALL BE CONSTRUCTED IN ACCORDANCE WITH CITY OF HOUSTON, HOUSTON PUBLIC WORKS STANDARD SPECIFICATIONS AND STANDARD CONSTRUCTION DETAILS FOR WASTEWATER COLLECTION SYSTEMS, WATER LINES, STORM DRAINAGE AND STREET PAVING.
- 2. 4" THRU 12" WATER LINES SHALL BE P.V.C. CLASS 150, DR-18, AWWA C-900, SMALLER THAN 4" WATER LINE SHALL BE PVC SCH 40 AS PER ASTM D1785 OR SEAMLESS COPPER TUBING TYPE "K" AS PER ASTM B88.
- 3. ALL WATERLINES, AFTER INSTALLATION, SHALL BE THOROUGHLY DISINFECTED ACCORDING TO AWWA SPECIFICATION C-851 AND THEN FLUSHED BEFORE BEING PLACED INTO SERVICE. AT LEAST ONE WATER SAMPLE FROM EACH LINE MUST BE COLLECTED AND SUBMITTED FOR BACTERIOLOGICAL ANALYSIS TO A LABORATORY CERTIFIED BY THE TEXAS DEPARTMENT OF HEALTH AND MUST MEET DEPARTMENT OF HEALTH AND CITY OF HOUSTON REQUIREMENTS PRIOR TO PLACING LINES INTO SERVICE.
- 4. HYDROSTATIC TESTING: ALL WATER PIPE SHALL BE TESTED FOR LEAKAGE IN ACCORDANCE WITH AWWA C-400, SECTION STANDARDS FOR A DURATION OF NOT LESS THAN TWO HOURS. LEAKAGE SHALL BE DEFINED AS THE QUANTITY OF WATER THAT MUST BE SUPPLIED INTO THE NEWLY LAID PIPE OR ANY VALVED SECTION THEREOF, TO MAINTAIN PRESSURE WITHIN 5 PSI OF THE SPECIFIED TEST PRESSURE AFTER THE PIPE HAS BEEN FILLED WITH WATER AND THE AIR HAS BEEN EXPELLED. THE TEST PRESSURE SHALL BE EITHER A MINIMUM OF 125 PSIG OR 1.5 TIMES THE MAXIMUM DESIGN PRESSURE, WHICHEVER IS LARGER. THE MAXIMUM LEAKAGE SHALL BE CALCULATED USING THE FORMULA AS FOLLOWS:

$$L = (S/D)(P^{1.25}/13,200)$$

WHERE L = ALLOWABLE LEAKAGE IN GAL./HR.  
S = LENGTH OF PIPE TESTED IN FEET  
D = INSIDE DIAMETER OF PIPE IN INCHES  
P = PRESSURE IN POUNDS PER SQUARE INCH (GAUGE)

- 5. 2,500 PSI CONCRETE THRUST BLOCKS SHALL BE PROVIDED AT ALL UNDERGROUND TEES BENDS AND LATERALS. THEY SHALL BE BUILT AS PER THE DETAILS PROVIDED TO PREVENT PIPE MOVEMENT.
- 6. ALL ABOVE GROUND DUCTILE IRON PIPE CONNECTIONS SHALL BE FLANGED. UNDERGROUND DUCTILE IRON PIPE CONNECTIONS SHALL BE BOLTLESS AND PUSH-ON AFTER THE FIRST FLANGED FITTING BELOW GRADE UNLESS NOTED OTHERWISE ON THE PLANS.
- 7. ALL FLANGES BELOW GRADE SHALL HAVE STAINLESS STEEL BOLTS AND NUTS AND SHALL BE INSULATED.
- 8. ALL WATER VALVES SHALL OPEN COUNTER CLOCKWISE. ALL WATER VALVES SHALL BE SUPPLIED AND INSTALLED IN ACCORDANCE WITH THE LATEST EDITION OF AWWA C-500 AND SHALL BE OF THE RESILIENT SEAT TYPE.
- 9. ALL BELOW GRADE VALVES SHALL BE GASKETED, HUB-END GATE VALVES WITH A CAST IRON BOX, EXCEPT WHERE FLANGES ARE CALLED OUT ON THE PLANS.
- 10. ALL WATER LINES TO HAVE 4" MINIMUM COVER TO FINISHED GRADE AND MINIMUM 12" CLEARANCE TO OTHER UTILITIES AT CROSSING UNLESS OTHERWISE NOTED ON PLANS. ALL WATER LINE INSTALLED OVER 8" DEEP SHALL UTILIZE RESTRAINED JOINT FITTINGS
- 11A. MAINTAIN MINIMUM 9-FOOT HORIZONTAL CLEARANCE BETWEEN OUTSIDE OF SANITARY SEWER MANHOLE AND WATERLINE.
- 11B. WATER LINES PARALLEL TO SANITARY LINES SHALL BE INSTALLED WITH AT LEAST A 9-FOOT CLEARANCE AND IN SEPARATE TRENCHES.
- 12. SANITARY PRECAUTIONS MUST BE TAKEN DURING WATERLINE CONSTRUCTION, PER AWWA STANDARDS. PRECAUTIONS INCLUDE KEEPING THE PIPE CLEAN AND CAPPING OR OTHERWISE EFFECTIVELY COVERING OPEN PIPE ENDS TO EXCLUDE INSECTS, ANIMALS OR OTHER SOURCES OF CONTAMINATION FORM UNFINISHED PIPE LINES AT TIMES WHEN CONSTRUCTION IS NOT IN PROGRESS.
- 13. CONTRACTOR SHALL PROVIDE FOR A MINIMUM OF 2 FEET CLEARANCE AT THE STORM SEWER AND WATER LINE CROSSINGS AND SANITARY SEWER AND WATER LINE CROSSINGS. THE WATER LINE SHALL BE LOCATED AT A HIGHER LEVEL THAN THE SANITARY SEWER WHENEVER POSSIBLE.
- 14. ALL WATER LINE FITTINGS SHALL BE DUCTILE IRON COMPACT FITTINGS PER AWWA 153, UNLESS OTHERWISE NOTED.
- 15. THE CENTER OF FIRE HYDRANTS ARE TO BE LOCATED 3'-0" BEHIND THE BACK OF CURBS UNLESS OTHERWISE SHOWN. THE STEAMER NOZZLE SHALL BE A MINIMUM OF 18" (AND A MAXIMUM OF 30) INCHES ABOVE FINISHED GRADE, AND SHALL FACE THE STREET PAVEMENT UNLESS OTHERWISE SHOWN. ALL FIRE HYDRANTS SHALL BE PAINTED IN ACCORDANCE WITH THE CITY OF HOUSTON STANDARDS.

**SANITARY SEWER CONSTRUCTION NOTES**

- 1. ALL SEWERS SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE CITY OF HOUSTON "STANDARD CONSTRUCTION SPECIFICATIONS FOR WASTEWATER COLLECTION SYSTEMS, WATER LINES, STORM DRAINAGE, STREET PAVING, AND TRAFFIC" AND ALL CURRENT AMENDMENTS "THERETO AND BE SUBJECT TO A STANDARD EXFILTRATION TEST. TESTS ARE TO BE PERFORMED ON THE TOTAL FOOTAGE OF SEWER LINE INCLUDED IN THE PROJECT. REQUIREMENTS OF TEXAS ADMINISTRATIVE CODE, TITLE 30 CHAPTER 317, "DESIGN CRITERIA FOR SEWAGE SYSTEMS" SHALL GOVERN WHERE CONFLICTS EXIST EXCEPT WHERE CITY REQUIREMENTS ARE MORE STRINGENT.
- 2. ALL MANHOLES ARE TO BE PER CITY OF HOUSTON STANDARD DETAILS DRAWING NUMBERS 02082-01, 02082-02, 02082N-02, 02082-03, AND 02082N-03 UNLESS OTHERWISE NOTED. USE 2010 VERSION AS APPLICABLE.
- 3. SANITARY SEWER MANHOLES WILL HAVE BEDDING AND BACKFILL PER CITY OF HOUSTON STANDARD DETAILS DRAWING NO. 02317-08 UNLESS OTHERWISE NOTED.
- 4. THE SANITARY SEWER PVC PIPE SHALL BE ASTM D 3034 TYPE PSM SDR 26 GRAVITY SEWER PIPE, ASTM D2241 SDR 26 PRESSURE RATED SEWER PIPE OR AWWA C-900 DR-18 GREEN PVC PRESSURE RATED SEWER PIPE BASED ON CONSTRUCTION CONDITION REQUIREMENT AND CONFORMING TO ASTM D1784 AND CITY OF HOUSTON STANDARD SPECIFICATION SECTION 02506 POLYVINYL CHLORIDE PIPE.
- 5. WHEN SS PRESSURE RATED PVC PIPE IS USED ON WATERLINE (WL) CROSSING UNDER CONDITION 1 OF COH (DM) TABLE 7.3, THE SAME TYPE OF D2241 SDR 26 PVC PIPE OR C-900 GREEN DR-18 PVC GREEN PRESSURED TO BE UTILIZING IN-BETWEEN TWO SS MHS. OR TO UTILIZE A DI TRANSITION ADAPTER FOR THE CONNECTING OF ASTM D-3034 PVC GRAVITY PIPE TO D100 AWWA C-900 PVC PIPE CENTERED AT WL WHEN CONNECTING TWO DIFFERENT TYPES OF PVC PIPES FOR SEWER CONSTRUCTION.
- 6. AWWA C-900 DR-18 PVC PIPE USES EITHER AWWA C900 DR-18 PVC FITTINGS OR DIP FITTINGS.
- 7. ALL SANITARY SEWER LINES UNDER PROPOSED OR FUTURE PAVEMENT AND TO A POINT ONE (1) FOOT BACK OF ALL PROPOSED OR FUTURE CURBS SHALL HAVE BEDDING PER CITY OF HOUSTON STANDARD DETAILS DRAWING NUMBERS 02317-01, 02317-02, OR 02317-03 AS APPLICABLE, WITH 1 1/2 SACK CEMENTITY STABILIZED SAND BACKFILL UP TO THE BOTTOM OF THE PAVEMENT SUBGRADE. 100 PSI PERFORMANCE RESULTS ARE STILL REQUIRED.
- 8. ALL SANITARY SEWERS CROSSING WATER LINES WITH A CLEARANCE BETWEEN 12 INCHES AND 9 FEET SHALL HAVE A MINIMUM OF ONE 18" JOINT OF 150 PSI DUCTILE IRON OR (GREEN) C900 PVC PIPE MEETING ASTM SPECIFICATION D2241 CENTERED ON WATER LINE. WHEN WATER LINE IS BELOW SANITARY SEWER PROVIDE MINIMUM 2 FOOT SEPARATION.
- 9. CONTRACTOR SHALL PROVIDE A MINIMUM HORIZONTAL CLEARANCE OF 9 FEET BETWEEN WATER LINES AND SANITARY SEWER MANHOLES AND LINES.
- 10. SANITARY SEWER MANHOLE RIMS OUTSIDE OF PROPOSED PAVING WILL BE SET 3" - 6" ABOVE THE SURROUNDING LEVEL. FINISHED GRADE AFTER PAVING WITH SLOPED BACKFILL ADDED FOR STORM WATER TO DRAIN AWAY FROM MANHOLE RIM.
- 11. IN WET STABLE TRENCH AREAS USE BEDDING PER CITY OF HOUSTON STANDARD DETAILS DRAWING NUMBER 02317-02 (2002).
- 12. DEFLECTION TEST: DEFLECTION TESTS SHALL BE PERFORMED ON ALL FLEXIBLE AND SEMI-RIGID SEWER PIPE. THE TEST SHALL BE CONDUCTED AFTER THE FINAL BACKFILL HAS BEEN IN PLACE AT LEAST 30 DAYS. NO PIPE SHALL EXCEED A DEFLECTION OF 5% IF THE DEFLECTION TEST IS TO BE RUN USING A RIGID MANDREL. IT SHALL HAVE A DIAMETER EQUAL TO 95% OF THE INSIDE DIAMETER OF THE PIPE. THE TEST SHALL BE PERFORMED AS PER 30 TAC 317.2 LATEST AMENDMENT AND WITHOUT MECHANICAL PULLING DEVICES. NO BALL-TYPE MANDREL IS ALLOWED.
- 13. INFILTRATION, EXFILTRATION OR LOW-PRESSURE AIR TEST: EITHER OF THE FOLLOWING TESTS SHALL BE PERFORMED AS PER TAC, TITLE 30 317.2 WITHIN THE SPECIFIED TOLERANCES ON ALL GRAVITY SEWERS.

- A. INFILTRATION OR EXFILTRATION TEST: TOTAL LEAKAGE AS DETERMINED BY A HYDROSTATIC HEAD TEST SHALL NOT EXCEED 50 GALLONS PER INCH DIAMETER PER MILE OF PIPE PER 24 HOURS AT A MINIMUM TEST HEAD OF TWO (2) FEET.
- B. LOW-PRESSURE AIR TEST: PERFORM TEST ACCORDING TO UNI-B-6-90 OR OTHER APPROPRIATE PROCEDURES. FOR SECTIONS OF PIPE LESS THAN 36" (INCH) AVERAGE INSIDE DIAMETER, THE MINIMUM ALLOWABLE TIME FOR PRESSURE DROP FROM 3.5 P.S.I.G. TO 2.5 P.S.I.G. SHALL BE AS FOLLOWS:

6" 340 SECONDS OR 0.855(L) FOR TEST LENGTHS GREATER THAN 398'  
8" 454 SECONDS OR 1.520(L) FOR TEST LENGTHS GREATER THAN 298'  
10" 567 SECONDS OR 2.374(L) FOR TEST LENGTHS GREATER THAN 239'  
15" 850 SECONDS OR 5.342(L) FOR TEST LENGTHS GREATER THAN 159'  
18" 1020 SECONDS OR 8.693(L) FOR TEST LENGTHS GREATER THAN 133'  
WHERE L = LENGTH OF LINE OF SAME PIPE SIZE IN FEET.

- 14. "SAN. S. E." INDICATES "SANITARY SEWER EASEMENT"
- 15. FOR SANITARY MANHOLE (MH) RIMS SET INSIDE OF OR @ CURB & GUTTER PAVEMENT AND/OR BELOW T.C., MH RIMS WILL BE SET FLUSHED WITH AN ABUTTING PAVED SURFACE. THE (VALCUL, NEEWANH OR EQUAL) HEAVY DUTY BOLTED SOLID MH COVER SHALL BE PROPERLY AND SECURELY ATTACHED AND SEALED TO ITS COMPATIBLE GASKETED FRAME BY USING BOTH A NEOPRENE GASKET AND (AT LEAST) A COUNTER-SUNK HEX-HEAD COARSE THREADED 1/2"-13 UNC STAINLESS STEEL BOLTS. THE HEAVY DUTY FRAME MH COVER SHALL BE SOLID (NO AIR HOLES), SAID FRAME SHALL BE BOTH EMBEDDED INTO THE MHS TOP ALSO SECURELY ANCHORED TO THE UNDERLYING MH STRUCTURE WITH EITHER SECURELY ATTACHED EMBEDDED ANCHOR BOLTS OR THE CONCRETE MHS EXPOSED REBARS WELDED TO THE FRAME OR OTHER EQUALLY SECURED METHODS TO PREVENT MH COVER/FRAME BLOW-OFFS/SECTIONS.

**STORM SEWER CONSTRUCTION NOTES**

- 1. STORM SEWER SHALL BE REINFORCED CONCRETE PIPE (C-76, CLASS III), AND SHALL BE INSTALLED, BEDDED, AND BACK FILLED IN ACCORDANCE WITH THE CITY OF HOUSTON DRAWING NOS. 02317-02, 02317-03, 02317-05, 02317-06, AND 02317-07 (OCT. 2002) AS APPLICABLE UNLESS OTHERWISE SHOWN ON THE DRAWINGS.
- 2. ALL STORM SEWER CONSTRUCTED IN SIDELOT EASEMENT SHALL BE R.C.P. (C-76, CLASSIII) AND SHALL BE EMBEDDED IN ACCORDANCE WITH THE CITY OF HOUSTON DRAWING NOS. 02317-02, 02317-03, 02317-05, 02317-06, AND 02317-07 AS APPLICABLE.
- 3. ALL SEWER UNDER PROPOSED OR FUTURE PAVEMENT AND TO A POINT ONE (1) FOOT BACK OF ALL PROPOSED OR FUTURE CURBS SHALL BE BACKFILLED WITH 1-1/2 SACK CEMENTIC Y, STABILIZED SAND TO WITHIN ONE (1) FOOT OF SUBGRADE. THE REMAINING DEPTH OF TRENCH SHALL BE BACKFILLED WITH SUITABLE EARTH MATERIAL.
- 4. ALL TRENCH BACKFILL SHALL BE IN 8' LIFTS, WITH TESTS TAKEN AT 100 FOOT INTERVALS IN EACH LIFT, AND MECHANICALLY COMPACTED TO A DENSITY OF NOT LESS THAN 95% OF THE MAXIMUM DRY DENSITY AS DETERMINED BY THE STANDARD PROCTOR COMPACTION TEST (ASTM D-998/ASTM 709).
- 5. CIRCULAR AND ELLIPTICAL REINFORCED CONCRETE PIPE SHALL BE INSTALLED USING RUBBER GASKET JOINT CONFORMING TO ASTM C443 AND ASTM C877 RESPECTIVELY.
- 6. ALL STORM SEWER PIPES AND INLET LEADS SHALL BE 24" AND LARGER R.C.P. (C-76, CLASSIII) CLEARANCE TO OTHER UTILITIES AT CROSSING UNLESS OTHERWISE NOTED.
- 7. MINIMUM HORIZONTAL CLEARANCE BETWEEN ANY STORM PIPE AND BOX SHALL BE AT LEAST 48-INCHES FROM EXTERIOR OF THE STORM PIPE OR BOX TO THE EXTERIOR OF THE EXISTING OR PROPOSED PUBLIC OR PROPOSED PUBLIC OR PRIVATE UTILITY AND OTHER APPURTENANCES. MINIMUM VERTICAL CLEARANCE BETWEEN ANY STORM PIPE AND BOX SHALL BE AT LEAST 18-INCHES FROM EXTERIOR OF THE STORM PIPE OR BOX TO THE EXTERIOR OF THE EXISTING OR PROPOSED PUBLIC OR PRIVATE UTILITY AND OTHER APPURTENANCES.
- 9. ADJUST MANHOLE COVERS TO GRADE CONFORMING TO REQUIREMENTS OF SECTION 02086-ADJUSTING MANHOLES, INLETS, AND VALVE BOXES TO GRADE.
- 10. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING, MAINTAINING, AND RESTORING ANY BACK SLOPE DRAINAGE SYSTEM DISTURBED AS A RESULT OF THIS WORK.
- 11. ALL DITCHES SHALL BE GRADED TO PROPOSED ELEVATIONS TO INSURE PROPER DRAINAGE. ALL OUTFALLS SHALL BE PROPERLY BACKFILLED AND COMPACTED. ALL DISTURBED AREA SHALL BE REGRADED, SEEDED, AND FERTILIZED.
- 12. ALL DRIVEWAYS WILL BE LOCATED TO AVOID EXISTING CURB INLET STRUCTURES.

**PAVING CONSTRUCTION NOTES**

- 1. CONTRACTOR SHALL OBTAIN ENGINEERS OR OWNERS APPROVAL OF GRADES PRIOR TO PLACEMENT OF ANY PAVEMENT. IF APPROVAL IS NOT OBTAINED CONTRACTOR SHALL BE RESPONSIBLE FOR PAVEMENT PLACED.
- 2. ALL TEMPORARY AND PERMANENT SIGNAGE MUST COMPLY WITH THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, MOST RECENT EDITION WITH REVISIONS.
- 3. ALL PAVING WIDTHS, CURB RADI, AND CURB ALIGNMENT SHOWN INDICATE FACE OF CURB. T.C. INDICATES TOP OF CURB. T.P. INDICATES TOP OF PAVEMENT ELEVATIONS.
- 4. THE CONTRACTOR SHALL PROTECT ALL UTILITIES, SIDEWALKS, PAVEMENT, ETC. AND SHALL REPAIR OR REPLACE AT HIS EXPENSE ANY UTILITIES DAMAGED DURING PAVING OR GRADING OPERATIONS.
- 5. DRIVEWAY CONNECTIONS IN CITY OF HOUSTON STREET RIGHT-OF-WAY SHALL COMPLY WITH CITY OF HOUSTON DRAWING NO. 17201-1 AND DRIVEWAY DETAILS ON THESE PLANS.
- 6. AREAS TO BE FILLED SHALL BE SCARIFIED AND COMPACTED TO AT LEAST 95% OF MAXIMUM STANDARD PROCTOR DENSITY (+3% OF OPTIMUM MOISTURE) PER ASTM D-698 TO A DEPTH OF 6" PRIOR TO FILL PLACEMENT. FILL MATERIAL SHALL BE PLACED IN MAXIMUM 8" THICK LIFTS (MEASURED LOOSE) AND COMPACTED TO AT LEAST 95% OF MAXIMUM STANDARD PROCTOR DENSITY (+ 3% OF OPTIMUM MOISTURE) PER ASTM D-698. FILL SHALL BE CLEAN EARTH AND BE FREE FROM TRASH, VEGETATION AND LARGE STONES. TEST REPORTS SHALL BE SUBMITTED PRIOR TO PLACEMENT OF PAVEMENT.
- 7. NECESSARY TESTING OF SUBGRADE AND PAVEMENT TO PROVE THAT THESE ITEMS MEET REQUIREMENTS SHALL BE DONE BY A COMMERCIAL TESTING LABORATORY ENGAGED BY THE CONTRACTOR.
- 8. WHERE PROPOSED PAVEMENT IS TO MEET EXISTING PAVEMENT, THE EXISTING REBAR OR DOWELS SHALL BE CLEANED AND TIED INTO THE PROPOSED PAVEMENT, USING A MINIMUM OF 30 BAR DIAMETERS LAPS. WHERE PROPOSED CONCRETE ENDS AT A CONSTRUCTION JOINT OR EXPANSION JOINT, THE REBAR SHALL BE EXTENDED A MINIMUM LENGTH OF 30 BAR DIAMETERS, COATED WITH ASPHALT AND WRAPPED WITH BURLAP.
- 9. ALL CONCRETE PAVEMENT SHALL BE OF SPECIFIED THICKNESS SHOWN. ALL CONCRETE SHALL BE A 5 1/2 SACK MIX WITH A MINIMUM 500 P.S.I. FLEXURAL STRENGTH AT 7 DAYS AND A MINIMUM 3500 P.S.I. COMPRESSIVE STRENGTH AT 28 DAYS. REINFORCING STEEL SHALL CONFORM TO ASTM A-615, GRADE 60, UNLESS OTHERWISE NOTED ON THE PLAN.
- 10. ALL CUL-DE-SAC ISLANDS AND MEDIANS SHALL HAVE STANDARD 6"CONCRETE CURBS.
- 11. PUBLIC SIDEWALKS SHALL BE BUILT IN ACCORDANCE WITH CITY OF HOUSTON DESIGN STANDARDS. ALL INTERSECTIONS SHALL BE CONSTRUCTED WITH WHEEL CHAIR RAMPS, IN CONFORMANCE WITH THE GOVERNOR'S OFFICE OF TRAFFIC SAFETY MEMORANDUM DATED MAY 6 1976 (HIGHWAY SAFETY ACT, 1973, SEC 2.88). AMERICANS WITH DISABILITIES ACT (ADA) AND TEXAS ACCESSIBILITY STANDARDS (TAS) SHALL BE COMPLIED WITH IN ALL SIDEWALK CONSTRUCTION.
- 12. CONCRETE WASH-OUT AREAS ARE TO BE PROVIDED BY THE CONTRACTOR AT A LOCATION ACCEPTABLE TO THE OWNER UNDER NO CIRCUMSTANCES IS THE CONTRACTOR TO PERMIT CONCRETE TRUCKS TO WASH AT ANY AREA OTHER THAN THAT DESIGNATED.
- 13. STREET NAME SIGNS SHALL BE BUILT IN ACCORDANCE WITH CITY OF HOUSTON REQUIREMENTS AND SPECIFICATIONS, AND BEAR STREET NAMES AS PER RECORDED PLAT.
- 14. A DOUBLE-REFLECTORIZED BLUE TRAFFIC MARKER SHALL BE PLACED ON A ONE FOOT OFFSET OF THE PAVEMENT CENTERLINE AT ALL FIRE HYDRANT LOCATIONS BY THE CONTRACTOR. HYDRANTS LOCATED AT INTERSECTIONS SHALL HAVE A MARKER PLACED ON EACH STREET. THERE WILL BE NO SEPARATE PAYMENT FOR THESE MARKERS.
- 15. DRIVEWAYS WITH TxDOT R.O.W. SHALL BE CONSTRUCTED IN ACCORDANCE WITH TxDOT STANDARDS.
- 16. CURBS ARE 6 INCHES IN HEIGHT.

**TRAFFIC CONSTRUCTION NOTES**

- 1. CONTRACTOR SHALL PROVIDE AND INSTALL TRAFFIC CONTROL DEVICES IN CONFORMANCE WITH PART VI OF THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (TEXAS MUTCD, MOST RECENT EDITION WITH REVISIONS) DURING CONSTRUCTION.
- 2. NO TRAFFIC LANES SHALL BE CLOSED DURING THE HOURS OF 5:30 AM TO 7:00 PM MONDAY THRU FRIDAY IN DOWNTOWN/MIDTOWN AREA.
- 3. NO LANES ON MAJORITY THOROUGHFARES MAY BE BLOCKED FROM 6:00 AM TO 9:00 AM AND 4:00 PM TO 7:00 PM UNLESS OUTLINED IN THE MOBILITY PERMIT.
- 4. NO TRAFFIC LANES SHALL BE CLOSED IN RESIDENTIAL AREAS FROM 7:00 PM TO 7:00 AM.
- 5. CONTRACTOR SHALL MAINTAIN ONE LANE OF TRAFFIC IN EACH DIRECTION DURING WORKING HOURS.
- 6. CONTRACTOR SHALL COVER OPEN EXCAVATIONS WITH STEEL PLATES ANCHORED PROPERLY DURING NON-WORKING HOURS, AND OPEN THE LANES FOR NORMAL TRAFFIC FLOW.
- 7. OFF DUTY UNIFORMED POLICE OFFICER(S)/FLAGGER(S) IS/ARE REQUIRED TO DIRECT TRAFFIC WHEN LANES ARE BLOCKED.
- 8. IN THE EVENT WHEN NO "TRAFFIC CONTROL PLANS" EXIST AS A PART OF CONTRACT DRAWINGS, CONTRACTOR MAY PREPARE "PLANS" AND SUBMIT TO THE PLAN REVIEW SECTION FOR APPROVAL. TEN WORKING DAYS PRIOR TO IMPLEMENTATION.
- \* THESE PLANS SHALL BE DRAWN TO SCALE ON REPRODUCEIBLE MYLARS AND SEALED BY A LICENSED ENGINEER IN THE STATE OF TEXAS. PLANS WILL BECOME A PART OF THE CONTRACT DRAWINGS.
- 9. IF THE CONTRACTOR CHOOSES TO USE A DIFFERENT METHOD OF "TRAFFIC CONTROL PLANS" DURING THE CONSTRUCTION THAN WHAT IS OUTLINES IN THE CONTRACT DRAWINGS, HE/SHE SHALL BE RESPONSIBLE FOR PREPARING AND SUBMITTING AN ALTERNATE SET OF PLANS TO THE PLAN REVIEW SECTION FOR APPROVAL. TEN WORKING DAYS PRIOR TO IMPLEMENTATION.
- 10. APPROVED COPIES OF TRAFFIC CONTROL PLANS AND MOBILITY PERMITS SHALL BE MADE AVAILABLE FOR INSPECTION AT THE JOB SITE AT ALL TIMES. CONTRACTORS MUST SECURE MOBILITY PERMITS FROM THE CITY'S TRAFFIC MANAGEMENT AND MAINTENANCE BRANCH BEFORE CLOSING A LANESIDEWALK. THE REQUEST MUST BE MADE AT LEAST TEN BUSINESS DAYS IN ADVANCE OF THE CLOSURE. NOTE THAT WORKING HOURS MAY BE RESTRICTED OR THE REQUEST MAY BE DENIED. CALL 832-395-3920 FOR AN APPLICATION OR LOG ONTO WWW.GIMS.HOUSTONTX.GOV.

**SWPPP CONSTRUCTION NOTES**

- 1. CONTRACTOR SHALL IMPLEMENT INLET PROTECTION DEVICES AND REINFORCED FILTER FABRIC BARRIER ALONG ROAD AND SIDE DITCHES AT LOCATIONS SHOWN ON THE TYPICAL STORM WATER POLLUTION PREVENTION (SWPPP) PLANS TO KEEP SILT AND EXCAVATED MATERIALS FROM ENTERING INTO THE STORM WATER INLETS AND DITCHES EVENTUALLY POLLUTING THE RECEIVING STORM.
- 2. DURING THE EXCAVATION PHASE OF THE PROJECT, CONTRACTOR SHALL SCHEDULE THE WORK IN SHORT SEGMENTS SO THAT EXCAVATED MATERIAL CAN BE QUICKLY HAULED AWAY FROM THE SITE AND TO PREVENT IT FROM STAYING UNCOLLECTED ON THE EXISTING PAVEMENT. ANY LOOSE EXCAVATED MATERIAL WHICH FALL ON PAVEMENTS OR DRIVEWAYS SHALL BE SWEEP BACK INTO THE EXCAVATED AREA.
- 3. CONTRACTOR SHALL CLEAN UP THE EXISTING STREET INTERSECTIONS AND DRIVEWAYS DAILY, AS NECESSARY, TO REMOVE ANY EXCESS MUD, SILT OR ROCK TRACKED FROM THE EXCAVATED AREA.
- 4. CONTRACTOR SHALL FOLLOW GOOD HOUSEKEEPING PRACTICES DURING THE CONSTRUCTION OF THE PROJECT, ALWAYS CLEANING UP DIRT AND LOOSE MATERIAL AS CONSTRUCTION PROGRESSES.
- 5. CONTRACTOR TO INSPECT AND MAINTAIN THE AREAS LISTED BELOW AT LEAST ONE EVERY FOURTEEN (14) CALENDAR DAYS AND WITHIN 24 HOURS OF THE END OF A STORM EVENT OF 0.5 INCHES OR GREATER.
  - A) DISTURBED AREAS OF THE CONSTRUCTION SITE THAT HAVE NOT BEEN FINALLY STABILIZED.
  - B) AREAS USED FOR STORAGE OF MATERIALS THAT ARE EXPOSED TO PRECIPITATION.
  - C) STRUCTURAL CONTROL MEASURES.
  - D) LOCATIONS WHERE VEHICLES ENTER OR EXIT THE SITE.
- 6. CONTRACTOR TO BE RESPONSIBLE TO MAINTAIN EXISTING DITCHES AND/OR CULVERTS FOR UNOBSTRUCTED DRAINAGE AT ALL TIMES. WHERE SODDING IS DISTURBED BY EXCAVATION ON BACKFILLING OPERATIONS, SUCH AREAS SHALL BE REPLACED BY SEEDING OR SODDING. SLOPES 4:1 OR STEEPER SHALL BE REPLACED BY BLOCK SODDING.

**PRIVATE UTILITY NOTES**

- WARNING: OVERHEAD ELECTRICAL FACILITIES**
- OVERHEAD LINES MAY EXIST ON THE PROPERTY. THE LOCATION OF OVERHEAD LINES HAS NOT BEEN SHOWN ON THESE PLANS. THE LINES ARE NOT CLEARLY VISIBLE, BUT YOU SHOULD LOCATE THEM PRIOR TO BEGINNING ANY CONSTRUCTION. TEXAS LAW, SECTION 752, HEALTH & SAFETY CODE, FORBIDS ACTIVITIES THAT OCCUR IN CLOSE PROXIMITY TO HIGH VOLTAGE LINES, SPECIFICALLY:
  - ANY ACTIVITY WHERE PERSON OR THINGS MAY COME WITHIN SIX(6) FEET OF LIVE OVERHEAD HIGH VOLTAGE LINES.
  - OPERATING A CRANE, DERRICK, POWER SHOVEL, DRILLING RIG, PILE DRIVER, HOISTING EQUIPMENT, OR SIMILAR APPARATUS WITHIN 10 FEET OF LIVE OVERHEAD HIGH VOLTAGE LINES.

PARTIES RESPONSIBLE FOR THE WORK, INCLUDING CONTRACTORS, ARE LEGALLY RESPONSIBLE FOR THE SAFETY OF CONSTRUCTION WORKERS UNDER THIS LAW. THIS LAW CARRIES BOTH CRIMINAL AND CIVIL LIABILITY. TO ARRANGE FOR LINES TO BE TURNED OFF OR MOVED, CALL CENTERPOINT ENERGY AT 713-207-2222.

**ACTIVITIES ON OR ACROSS CENTERPOINT ENERGY FEE OR EASEMENT PROPERTY**

NO APPROVAL TO USE, CROSS OR OCCUPY CENTERPOINT FEE OR EASEMENT PROPERTY IS GIVEN, IF YOU NEED TO USE CENTERPOINT PROPERTY, PLEASE CONTACT OUR SURVEYING & RIGHT OF WAY DIVISION AT (713) 207-6348 OR (713) 207-5789.

**CAUTION: AT&T TEXAS/SWB T FACILITIES**

- 1. THE LOCATIONS OF AT&T TEXAS/SWB FACILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION BEFORE COMMENCING WORK. HE AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE OCCASIONED BY HIS FAILURE TO EXACTLY LOCATE AND PRESERVE THESE UNDERGROUND UTILITIES.
- 2. THE CONTRACTOR SHALL CALL 1-800-344-8377 A MINIMUM OF 48 HOURS PRIOR TO CONSTRUCTION TO HAVE UNDERGROUND LINES FIELD LOCATED.
- 3. WHEN EXCAVATING WITHIN EIGHTEEN INCHES (18") OF THE INDICATED LOCATION OF AT&T TEXAS/SWB FACILITIES, ALL EXCAVATIONS MUST BE ACCOMPLISHED USING NON-MECHANIZED EXCAVATION PROCEDURES. WHEN BORING THE CONTRACTOR SHALL EXPOSE THE AT&T TEXAS/SWB FACILITIES.
- 4. WHEN AT&T TEXAS/SWB FACILITIES ARE EXPOSED, THE CONTRACTOR SHOULD PROVIDE SUPPORT TO PREVENT COLLAPSE TO THE CONDUIT DUCTS OR CABLES. WHEN EXCAVATING NEAR TELEPHONE POLES THE CONTRACTOR SHALL BRACE THE POLE FOR SUPPORT.
- 5. THE PRESENCE OR ABSENCE OF AT&T TEXAS/SWB UNDERGROUND CONDUIT FACILITIES OR BURIED CABLE FACILITIES SHOWN ON THESE PLANS DOES NOT MEAN THAT THERE ARE NO DIRECT BURIED CABLES OR OTHER CABLES IN CONDUIT IN THE AREA.
- 6. PLEASE CONTACT THE AT&T TEXAS/SWB DAMAGE PREVENTION MANAGER MR. ROOSEVELT LEE JR. (713)967-4552 OR E-MAIL HIM AT RL729@ATT.COM. IF THERE ARE QUESTION ABOUT BORING OR EXCAVATING NEAR AT&T TEXAS/SWB FACILITIES.

**CAUTION: UNDERGROUND GAS FACILITIES**

LOCATIONS OF CENTERPOINT ENERGY MAIN LINES (TO INCLUDE CENTERPOINT ENERGY, INTRASTATE PIPELINE LLC, WHERE APPLICABLE) ARE SHOWN IN AN APPROXIMATE LOCATION ONLY. SERVICE LINES ARE USUALLY NOT SHOWN. OUR SIGNATURE ON THESE PLANS ONLY INDICATES THAT OUR FACILITIES ARE SHOWN IN APPROXIMATE LOCATION. IT DOES NOT MEAN THAT A CONFLICT ANALYSIS HAS BEEN MADE. THE CONTRACTOR SHALL CONTACT THE UTILITY COORDINATING COMMITTEE AT 1-800-545-6005 OR 811 A MINIMUM OF 48 HOURS PRIOR TO CONSTRUCTION TO HAVE MAIN AND SERVICE LINES FIELD LOCATED.

WHEN CENTERPOINT ENERGY PIPE LINE MARKINGS ARE NOT VISIBLE, CALL 713-945-8036 OR 713-945-8037 (7:00 AM TO 4:30 PM) FOR STATUS OF LINE LOCATION REQUEST BEFORE EXCAVATION BEGINS.

WHEN EXCAVATING WITHIN EIGHTEEN INCHES (18") OF THE INDICATED LOCATION OF CENTERPOINT ENERGY FACILITIES, ALL EXCAVATION MUST BE ACCOMPLISHED USING NON-MECHANIZED EXCAVATION PROCEDURES.

WHEN CENTERPOINT ENERGY FACILITIES ARE EXPOSED, SUFFICIENT SUPPORT MUST BE PROVIDED TO THE FACILITIES TO PREVENT EXCESSIVE STRESS ON THE PIPING.

FOR EMERGENCIES REGARDING GAS LINES CALL (713) 659-3552 OR (713) 207-4200

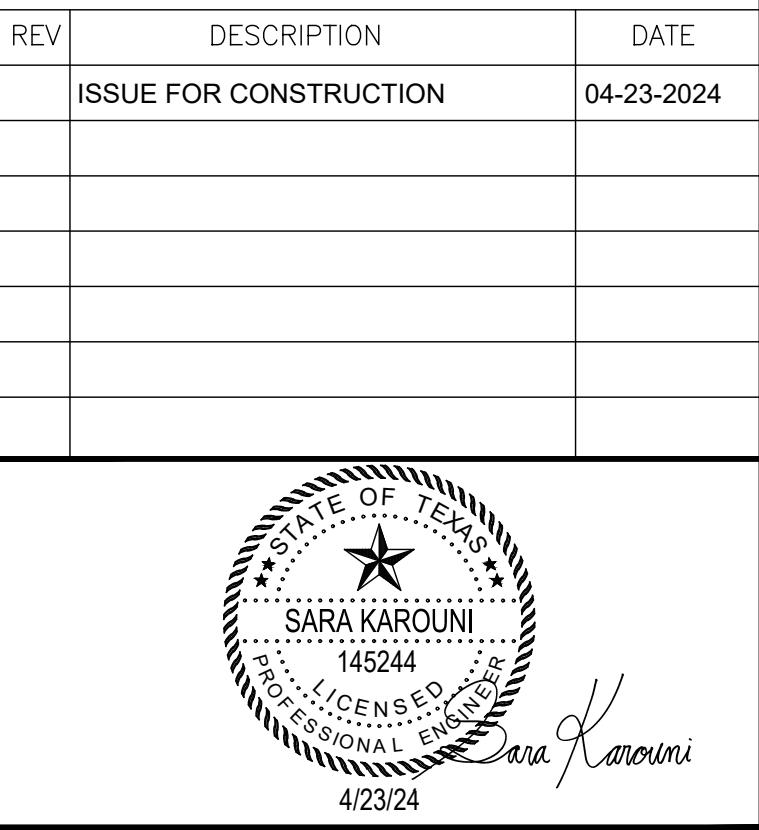
THE CONTRACTOR IS FULLY RESPONSIBLE FOR ANY DAMAGES CAUSED BY HIS FAILURE TO EXACTLY LOCATE AND PRESERVE THESE UNDERGROUND FACILITIES.

**ABBREVIATIONS**

B-B	= BACK TO BACK	NG	= NATURAL GROUND
BL	= BUILDING LINE	PROP	= PROPOSED
BOC	= BACK OF CURB	ROW	= RIGHT-OF-WAY
BBR	= BOTTOM OF RAM	RT	= RIGHT
BRW	= BASE OF WALL	RS	= RADIUS
ESMT	= EASEMENT	SS	= SANITARY SEWER
EX	= EXISTING	SSE	= SANITARY SEWER EASEMENT
FL	= FLOWLINE	STM SWR	= STORM SEWER
GR	= GRADIENT	TR	= TOP OF CURB
HG	= HYDRAULIC GRADIENT	TG	= TOP OF GRATE
HP	= HIGH POINT	TP	= TOP OF PAVEMENT
IB	= JUNCTION BOX	TR	= TOP OF RAMP
LF	= LINEAR FEET	TW	= TOP OF WALK OR WALL
LT	= LEFT	UE	= UTILITY EASEMENT
ME	= MATCH EXISTING	WL	= WATERLINE
MH	= MANHOLE	WS&D	= WATER, SANITARY & DRAINAGE

**APPENDIX D**

- 1. WATER LINES, WASTEWATER COLLECTION SYSTEMS, AND STORM DRAINAGE SYSTEMS SHALL BE DESIGNED AND CONSTRUCTED IN ACCORDANCE WITH THE CITY OF HOUSTON'S DEPARTMENT OF PUBLIC WORKS AND ENGINEERING "DESIGN MANUAL, STANDARD CONSTRUCTION SPECIFICATIONS, AND DETAILS FOR WASTEWATER COLLECTION SYSTEMS, WATER LINES, STORM DRAINAGE, AND STREET PAVING".
- 2. ALL STORM SEWER WILL BE REINFORCED CONCRETE (C76 CLASS III) AND SHALL BE INSTALLED, BEDDED AND BACKFILLED IN ACCORDANCE WITH THE CITY OF HOUSTON'S DRAWINGS 02317-02, 02317-03, 02317-05, 02317-06, AND 02317-07 AS APPLICABLE.
- 3. ALL STORM SEWERS CONSTRUCTED IN SIDE LOT EASEMENTS SHALL BE R.C.P., MINIMUM TWENTY (20) FOOT WIDE EASEMENTS SHALL BE PROVIDED.
- 4. AN ALTERNATIVE TO CEMENT STABILIZED SAND MAY BE USED AS BACKFILL FOR PIPES FIFTY-FOUR (54) INCH AND LARGER, FROM 1-FOOT ABOVE THE TOP OF THE PIPE TO THE BOTTOM OF THE SUBGRADE. CONTRACTOR MAY BACKFILL WITH SUITABLE MATERIAL. PROVIDED THE BACKFILL MATERIAL IS PLACED IN EIGHT (8) INCH LIFTS AND MECHANICALLY COMPACTED TO NINETY-FIVE (95%) STANDARD PROCTOR DENSITY. TESTS SHALL BE TAKEN AT ONE HUNDRED (100) FOOT INTERVALS ON EACH LIFT. BEDDING AND BACKFILL TO WITHIN ONE (1) FOOT ABOVE THE TOP OF THE PIPE SHALL BE CEMENT STABILIZED SAND.
- 4. ALL PROPOSED PIPE STUB-OUTS FROM MANHOLES OR INLETS ARE TO BE PLUGGED WITH EIGHT (8) INCH BRICK WALLS UNLESS OTHERWISE NOTED.
- 6. THE CONTRACTOR(S) SHALL NOTIFY HARRIS COUNTY ENGINEERING DEPARTMENT - PERMIT OFFICE TWENTY-FOUR HOURS IN ADVANCE OF COMMENCING UTILITY AND/OR PAVING CONSTRUCTION AT (713) 274 - 3831 AND WRITTEN NOTIFICATION FOURTY-EIGHT (48) HOURS IN ADVANCE OF COMMENCING CONSTRUCTION AT 10555 NORTHWEST FREEWAY, SUITE 144 HOUSTON, TX 77062.
- 7. PAVING SHALL BE IN ACCORDANCE WITH THE "REGULATIONS OF HARRIS COUNTY, TEXAS FOR THE APPROVAL AND ACCEPTANCE OF INFRASTRUCTURE" AND/OR AMENDMENTS OF THE SAME.
- 8. GUIDELINES SET FORTH IN THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES" SHALL BE OBSERVED.
- 9. OWNER OR OWNER'S AGENT TO OBTAIN ALL PERMITS REQUIRED BY THE "REGULATIONS OF HARRIS COUNTY, TEXAS FOR FLOOD PLAN MANAGEMENT" PRIOR TO STARTING CONSTRUCTION.
- 10. OWNER OR OWNER'S AGENT TO OBTAIN ALL NOTIFICATIONS REQUIRED BY HARRIS COUNTY, TEXAS PRIOR TO STARTING CONSTRUCTION OF UTILITIES AND/OR CULVERTS WITHIN HARRIS COUNTY AND HARRIS COUNTY FLOOD CONTROL DISTRICT RIGHTS-OF-WAY.



WARD, GETZ & ASSOCIATES, PLLC  
TEXAS REGISTERED ENGINEERING FIRM F-9756  
2500 Tangelsville, Suite 120  
Houston, Texas 77063  
713.789.1900

**LOST OAKS**

**GENERAL NOTES**

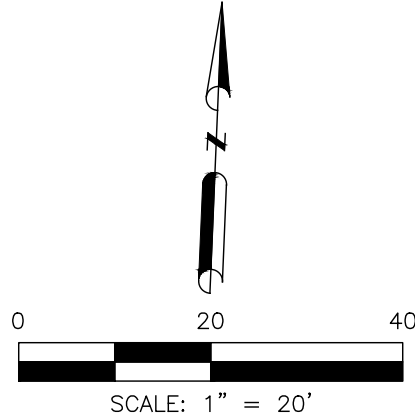
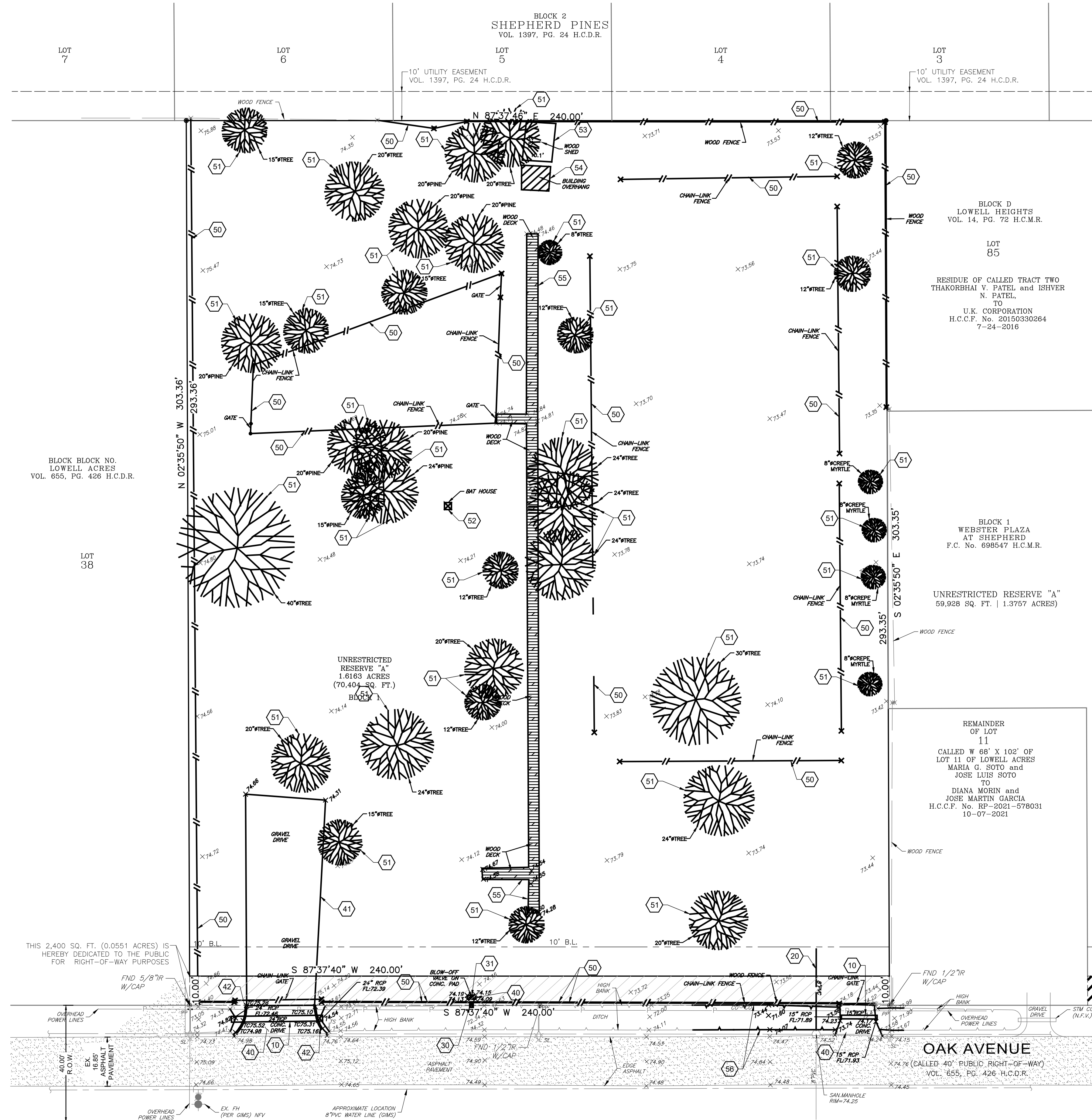
SCALE N/A	DESIGN AB, AG	DRAWN AB, AG
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**SHEET  
C1.1**









**BENCHMARKS:**  
 PRIMARY BENCHMARK  
 PUBLISHED ELEVATION - 63.42'  
 BRASS DISC STAMPED 050165 ON BRIDGE AT WERNER AND LITTLE OAK BAYOU LOCATED ON CONCRETE FOOTING OF PIPELINE ON DOWNSTREAM SIDE OF BRIDGE IN KEYMAP 453E IN THE WHITE OAK WATERSHED NEAR STREAM E101-00-00

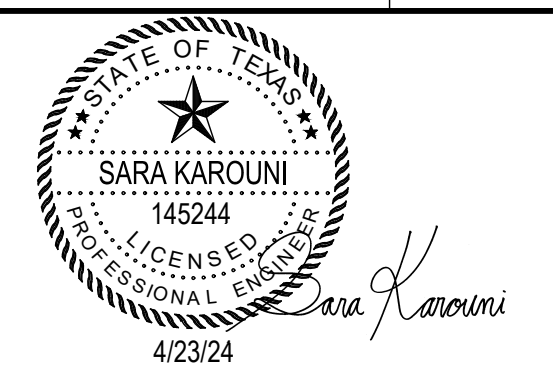
**FLOOD PLAIN NOTE:**  
 THIS SUBJECT TRACT LIES WITHIN UNSHADED ZONE "X" AREAS DETERMINED TO BE OUTSIDE THE 50-YEAR FLOODPLAIN (0.2% ANNUAL FLOODPLAIN CHANCE) AS DELINEATED ON THE FLOOD INSURANCE MAP FOR HARRIS COUNTY, TEXAS AND INCORPORATED AREAS. MAP NO. 48201V0660M MAP REVISED JUNE 14, 2014.

THE NEAREST AND HIGHEST CURRENTLY KNOWN AND RELEVANT 1% ANNUAL CHANCE FLOOD ELEVATION APPEARS TO BE 64.40 FT (NAVD 1988, 2001 ADJUSTMENT) IN LITTLE WHITE OAK BAYOU E101-00-00. THE NEAREST AND HIGHEST CURRENTLY KNOWN AND RELEVANT 0.2% ANNUAL CHANCE FLOOD ELEVATION APPEARS TO BE 65.60 FT (NAVD, 1988, 2001 ADJUSTMENT) ACCORDING TO CROSS SECTION LINE "T" ALONG LITTLE WHITE OAK BAYOU, REVISED JANUARY 6, 2017 FLOOD INSURANCE STUDY NUMBER 48201CV005C.

- DEMOLITION KEYNOTES**
- STORM SEWER DEMOLITION:**
- 10 STORM SEWER TO BE REMOVED
- SANITARY SEWER DEMOLITION:**
- 20 SANITARY SEWER LINE TO BE REMOVED
- WATER DEMOLITION:**
- 30 WATER METER TO BE REMOVED
  - 31 BLOW OFF VALVE TO BE REMOVED
- PAVEMENT DEMOLITION:**
- 40 CONCRETE PAVING TO BE REMOVED
  - 41 GRAVEL OR CRUSHED CONCRETE TO BE REMOVED
  - 42 CONCRETE CURB TO BE REMOVED
- MISCELLANEOUS DEMOLITION:**
- 50 FENCING TO BE REMOVED
  - 51 TREE TO BE REMOVED
  - 52 BAT HOUSE TO BE REMOVED
  - 53 WOOD SHED TO BE REMOVED
  - 54 BUILDING OVERHANG TO BE REMOVED
  - 55 WOOD DECK TO BE REMOVED
  - 56 DITCH TO BE REMOVED

**SITE DEMOLITION NOTES:**  
 ALL EXISTING FACILITIES, AS DEPICTED ON THE TOPOGRAPHIC SURVEY, BOTH ABOVE GROUND AND UNDERGROUND, TO BE REMOVED BY CONTRACTOR UNLESS OTHERWISE NOTED. CONTRACTOR TO CONTACT 811 (CITY OF HOUSTON) OR LOCAL EQUIVALENT PRIOR TO DIGGING OR REMOVAL OF ANY WET OR DRY UTILITIES.  
 CONTRACTOR TO COORDINATE GAS, ELECTRIC, AND COMMUNICATION REMOVAL/RELOCATION WITH THE PROPER PUBLIC & PRIVATE JURISDICTIONAL AGENCIES. WGA DOES NOT GUARANTEE THE LOCATION OR STATUS OF ANY EXISTING UTILITIES SHOWN.

REV	DESCRIPTION	DATE
	ISSUE FOR CONSTRUCTION	04-23-2024



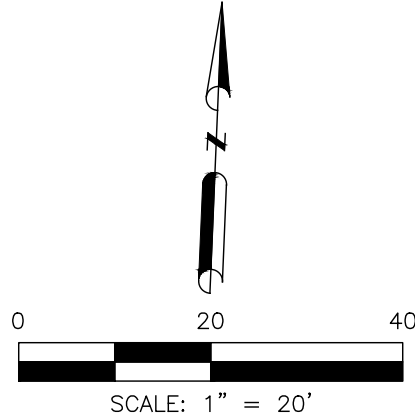
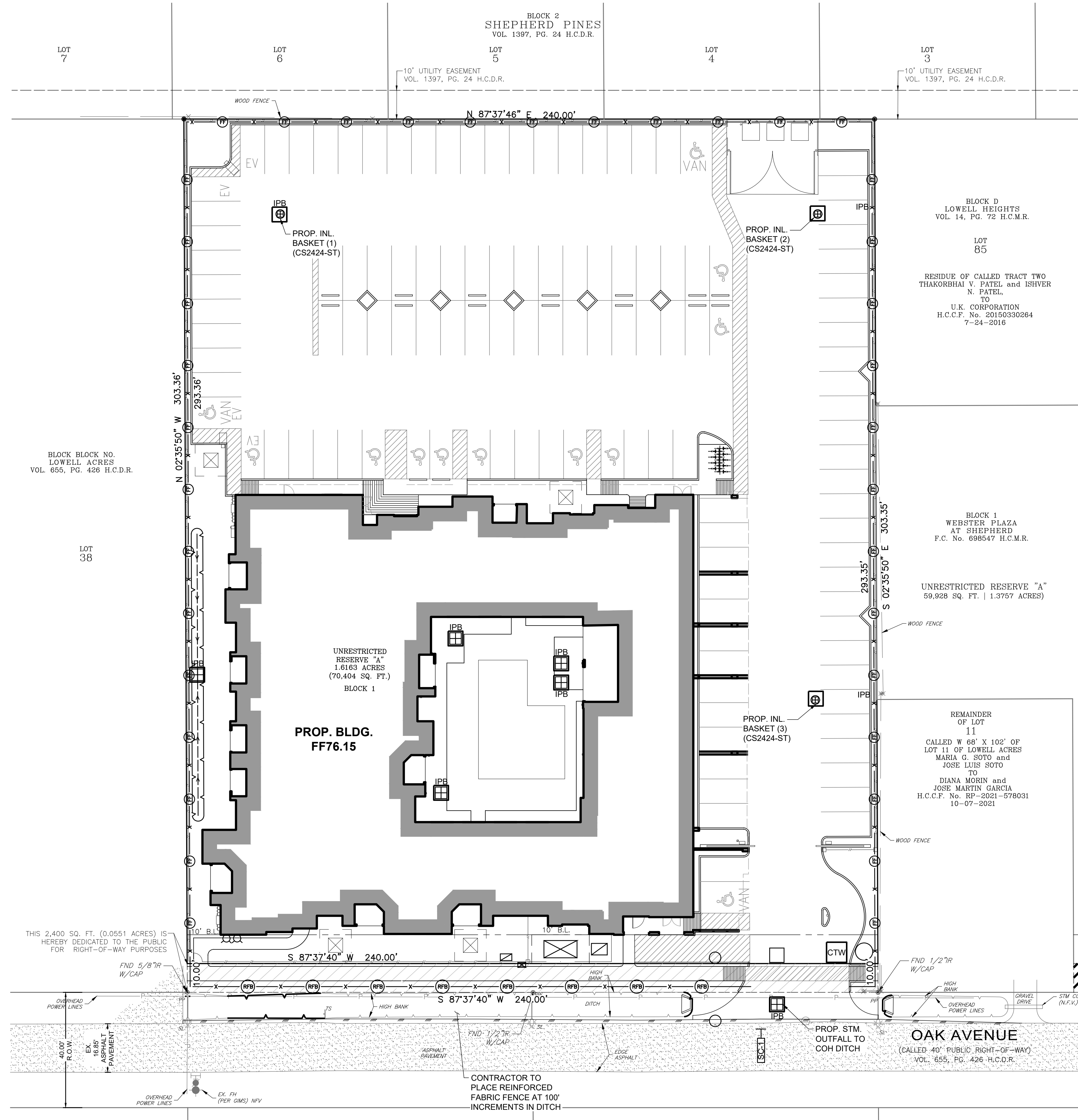
**LOST OAKS**

**DEMOLITION PLAN**

SCALE 1"=20'	DESIGN AB, AG	DRAWN AB, AG
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**SHEET  
C1.3**





**BENCHMARKS:**  
 PRIMARY BENCHMARK  
 PUBLISHED ELEVATION - 63.42'  
 BRASS DISC STAMPED 050165 ON BRIDGE AT WERNER AND LITTLE OAK BAYOU LOCATED ON CONCRETE FOOTING OF PIPELINE ON DOWNSTREAM SIDE OF BRIDGE IN KEYMAP 453E IN THE WHITE OAK WATERSHED NEAR STREAM E101-00-00

**FLOOD PLAIN NOTE:**  
 THIS SUBJECT TRACT LIES WITHIN UNSHADED ZONE "X" AREAS DETERMINED TO BE OUTSIDE THE 500-YEAR FLOODPLAIN (0.2% ANNUAL FLOODPLAIN CHANCE) AS DELINEATED ON THE FLOOD INSURANCE MAP FOR HARRIS COUNTY, TEXAS AND INCORPORATED AREAS, MAP NO. 48201V0660M MAP REVISED JUNE 14, 2014.

THE NEAREST AND HIGHEST CURRENTLY KNOWN AND RELEVANT 1% ANNUAL CHANCE FLOOD ELEVATION APPEARS TO BE 64.40 FT (NAVD 1988, 2001 ADJUSTMENT) IN LITTLE WHITE OAK BAYOU E101-00-00. THE NEAREST AND HIGHEST CURRENTLY KNOWN AND RELEVANT 0.2% ANNUAL CHANCE FLOOD ELEVATION APPEARS TO BE 65.60 FT (NAVD, 1988, 2001 ADJUSTMENT) ACCORDING TO CROSS SECTION LINE "T" ALONG LITTLE WHITE OAK BAYOU, REVISED JANUARY 6, 2017 FLOOD INSURANCE STUDY NUMBER 48201CV005C.

**SWPPP LEGEND:**

[SC-1]	STABILIZED CONSTRUCTION EXIT
[X-REF]	REINFORCED FILTER FABRIC BARRIER
[X-FF]	FILTER FABRIC FENCE
[IPB]	INLET PROTECTION BARRIER (STAGE 1 & 2)
[CTW]	CONCRETE TRUCK WASHOUT AREA

**EROSION CONTROL SCHEDULE AND SEQUENCING**

**I. ROUGH GRADING**  
 GRADING CONSTRUCTION ENTRANCE/EXIT, SILT FENCE PROTECTION, AND STONE OVERFLOW STRUCTURES SHALL BE INSTALLED PRIOR TO THE INITIATION OF ROUGH GRADING, AS NEEDED.

**II. UTILITY INSTALLATION**  
 ALL PRIOR EROSION CONTROL MEASURES INSTALLED ABOVE TO BE MAINTAINED AS NECESSARY DURING UTILITY INSTALLATION. INLET PROTECTION SHALL BE INSTALLED AS STORM DRAINAGE SYSTEM IS CONSTRUCTED.

**III. PAVING**  
 ALL PRIOR EROSION CONTROL MEASURES INSTALLED ABOVE TO BE MAINTAINED AS NECESSARY DURING PAVING AND THROUGHOUT THE REMAINDER OF THE PROJECT.

**IV. FINAL GRADING/SOIL STABILIZATION**  
 ALL TEMPORARY EROSION CONTROL MEASURES TO BE REMOVED AT THE CONCLUSION OF THE PROJECT ONCE FINAL STABILIZATION HAS BEEN ACHIEVED.

**SWPPP NOTE:**  
 ANY OFF-SITE STAGING AREA UTILIZED BY THE OPERATOR OF THIS SITE MUST BE INCLUDED IN THE SWPPP NARRATIVE PLAN AND TO SWPPP SITE PLAN AS REQUIRED BY THE TPDES TEXAS GENERAL PERMIT TXR150000 (SECTION F). ANY SUCH AREA INCLUDED IN THE SWPPP WILL BE TREATED BY THE OPERATOR AS ANY OTHER PART OF THE CONSTRUCTION ACTIVITY FOR THE PURPOSES OF STORM WATER POLLUTION PREVENTION.

REV	DESCRIPTION	DATE
	ISSUE FOR CONSTRUCTION	04-23-2024

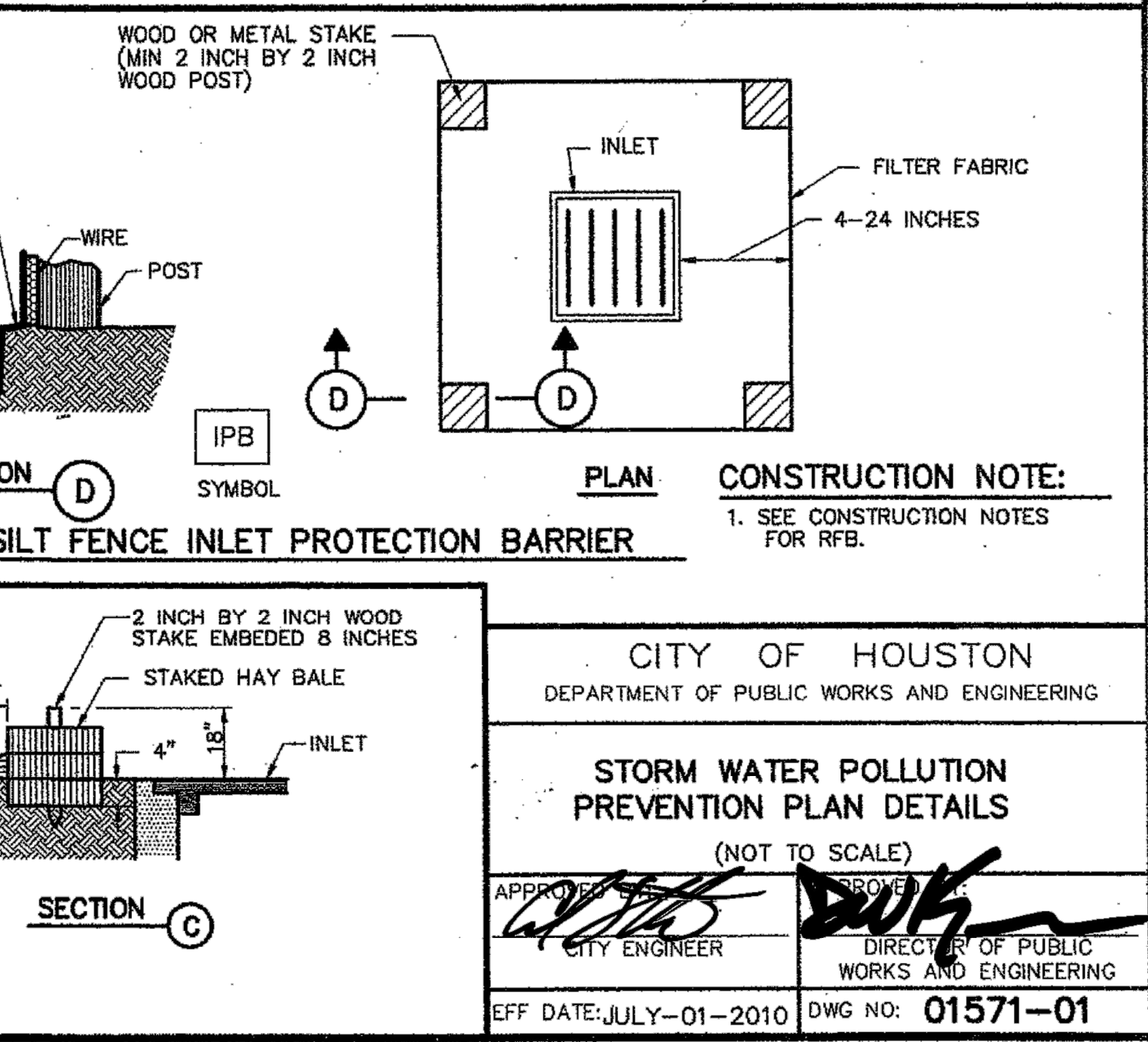
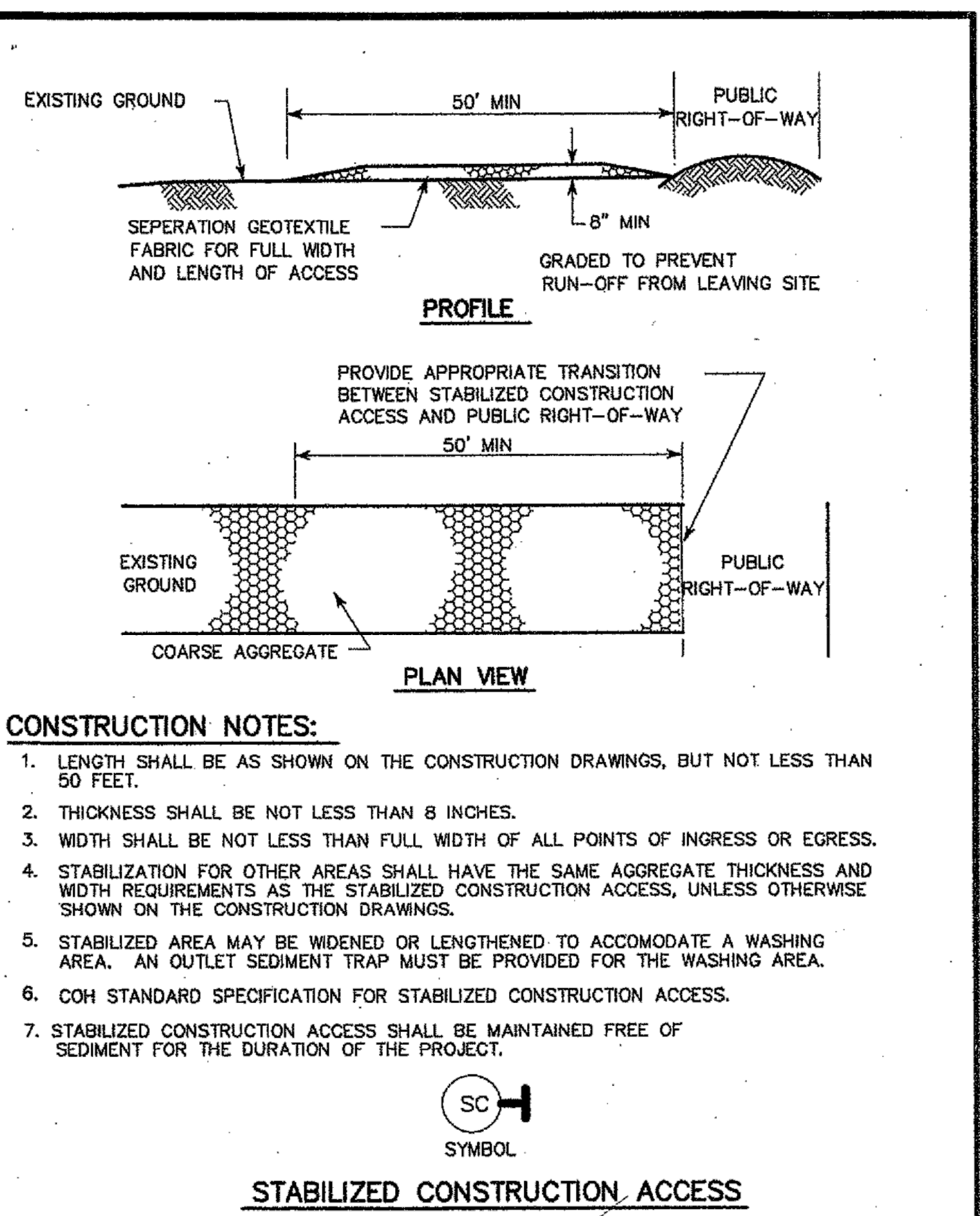
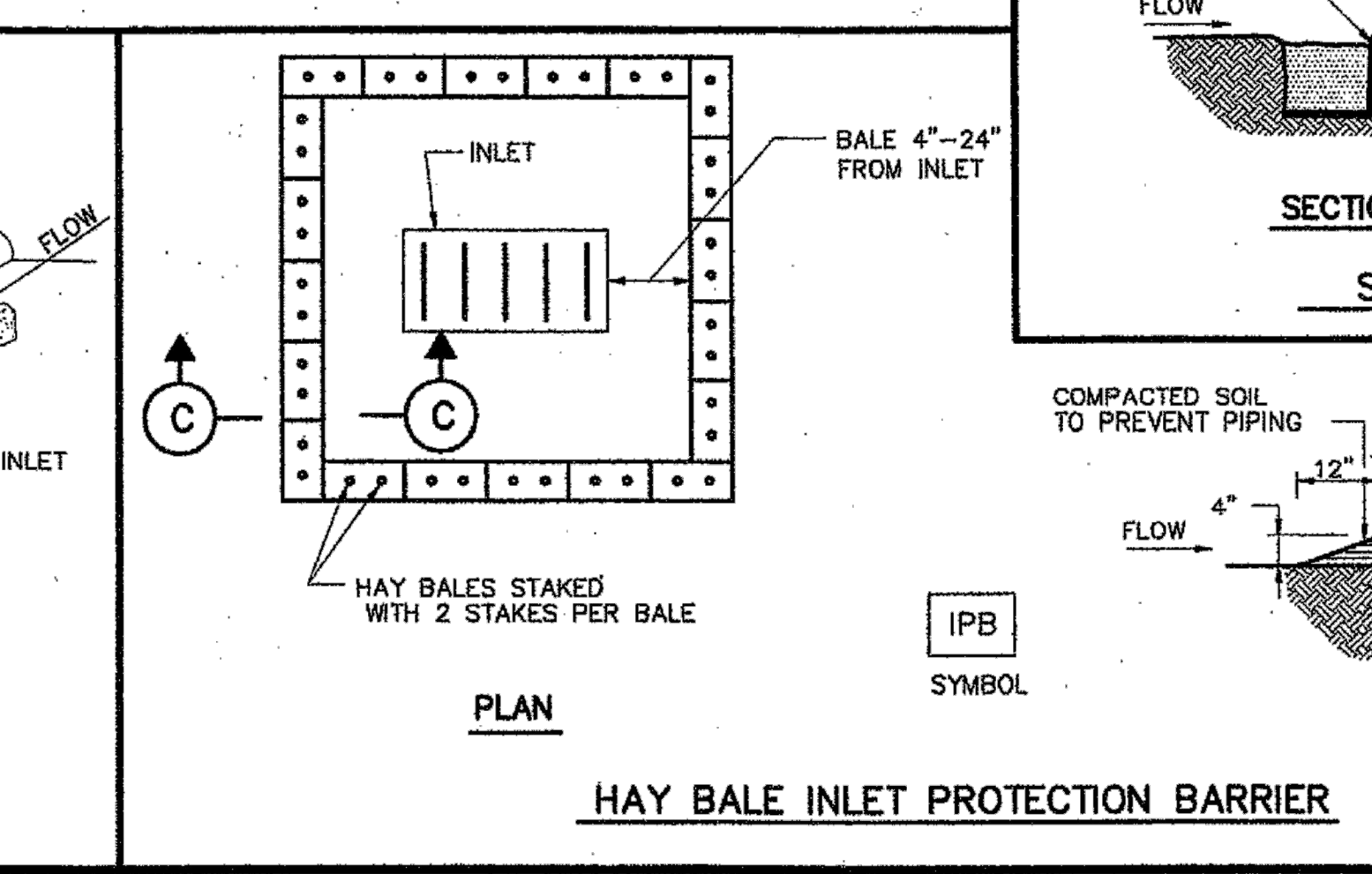
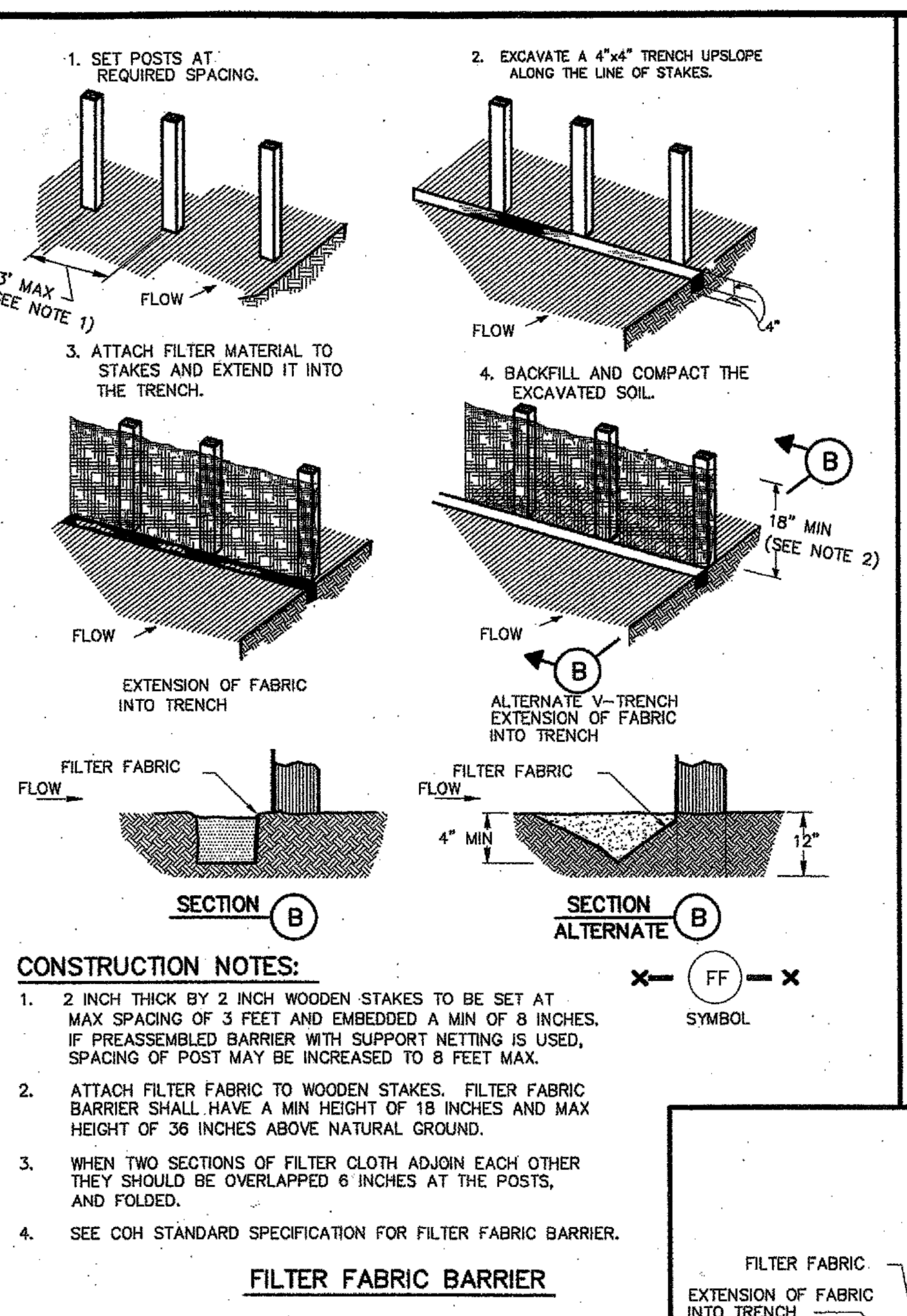
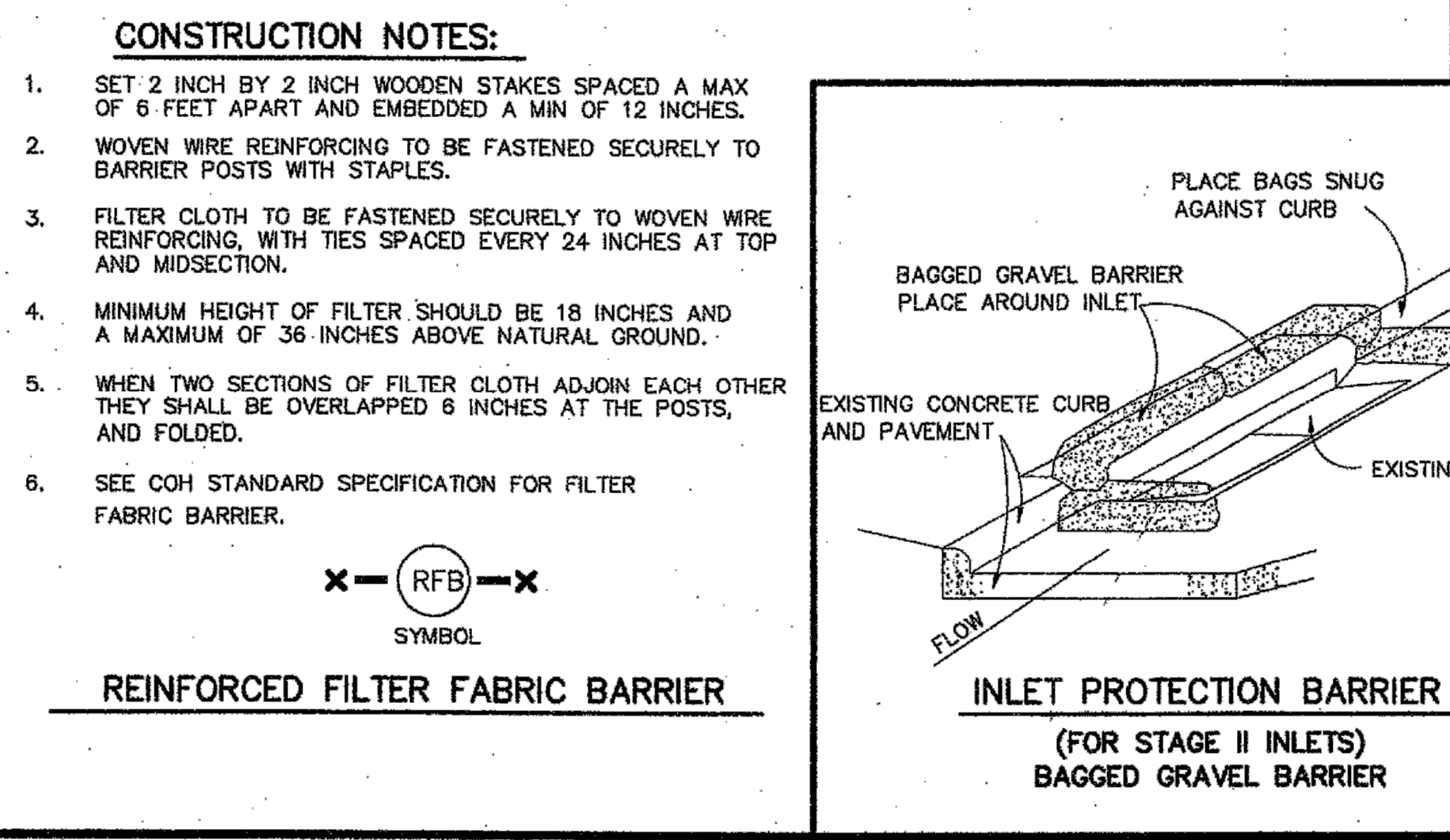
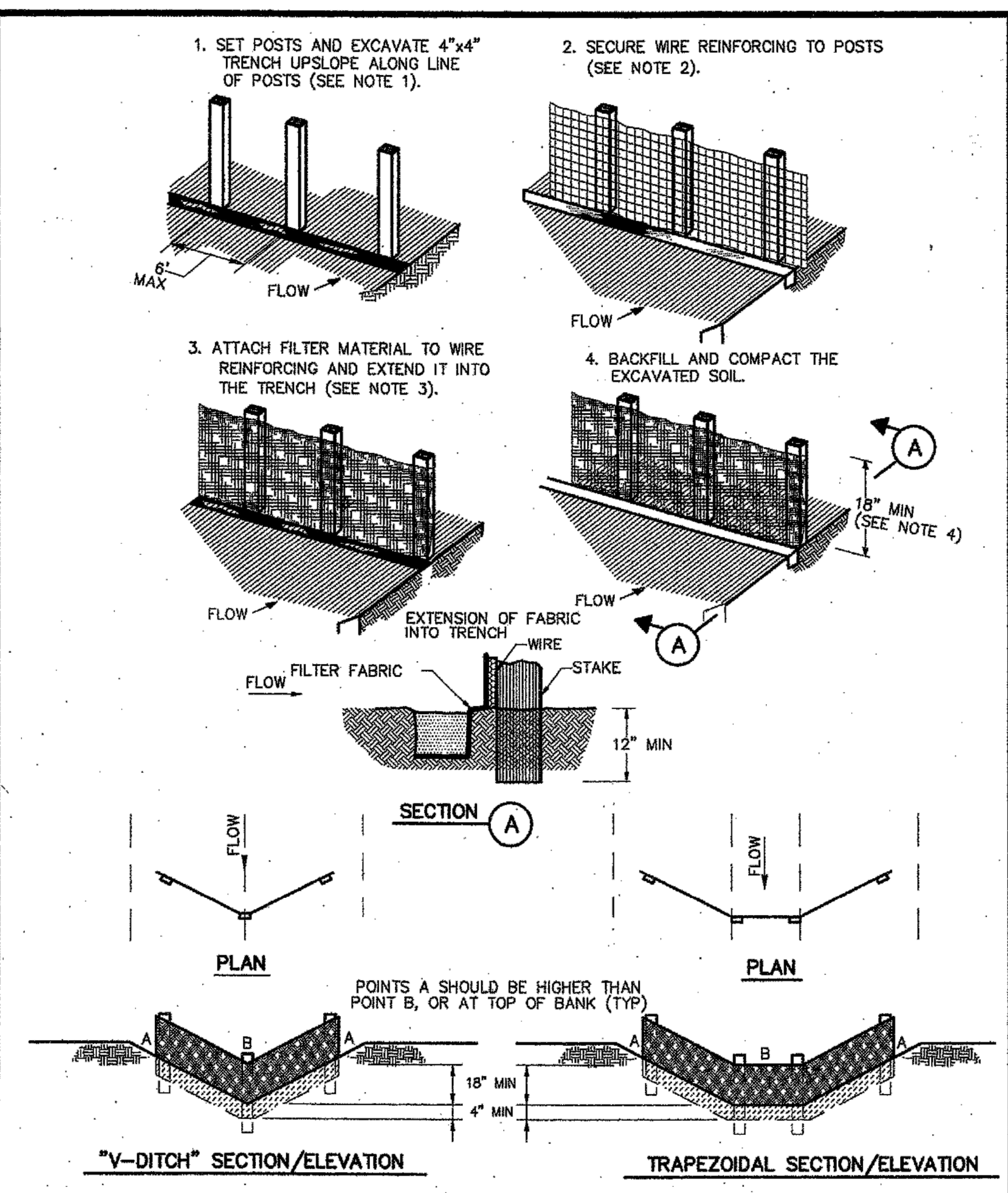


**LOST OAKS**  
**STORM WATER POLLUTION PREVENTION AND STORM WATER QUALITY PLAN**

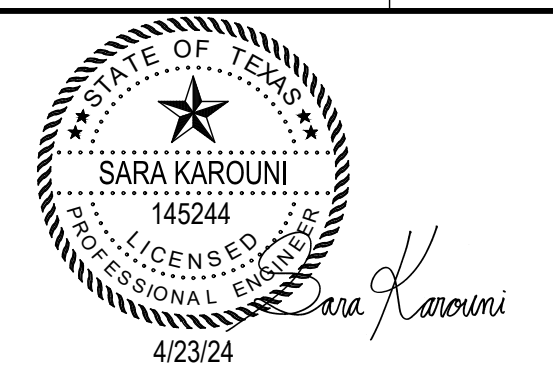
SCALE 1"=20'	DESIGN AB, AG	DRAWN AB, AG
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**SHEET C2.1**





REV	DESCRIPTION	DATE
1	ISSUE FOR CONSTRUCTION	04-23-2024



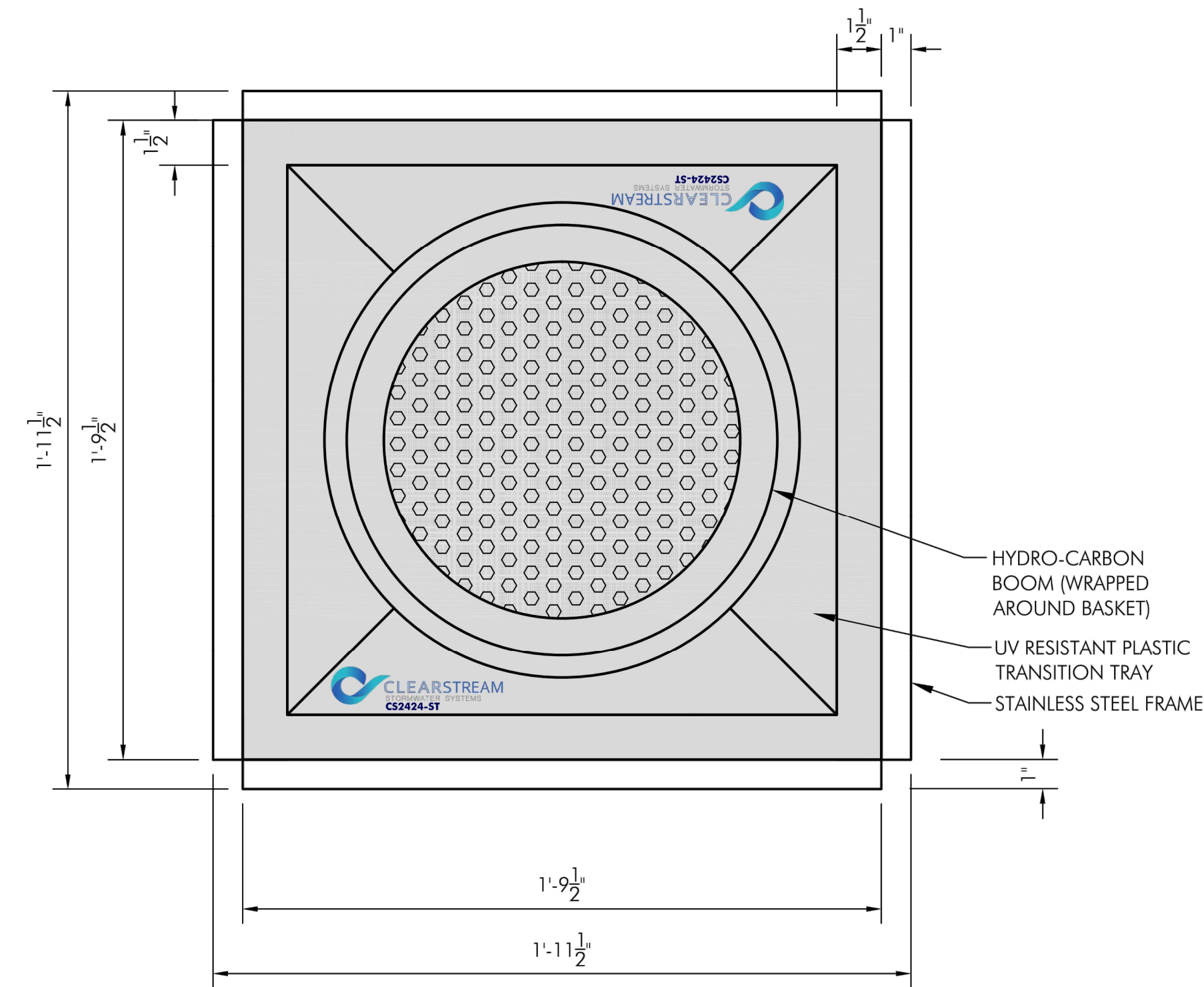
LOST OAKS

**STORM WATER POLLUTION PREVENTION PLAN DETAILS**

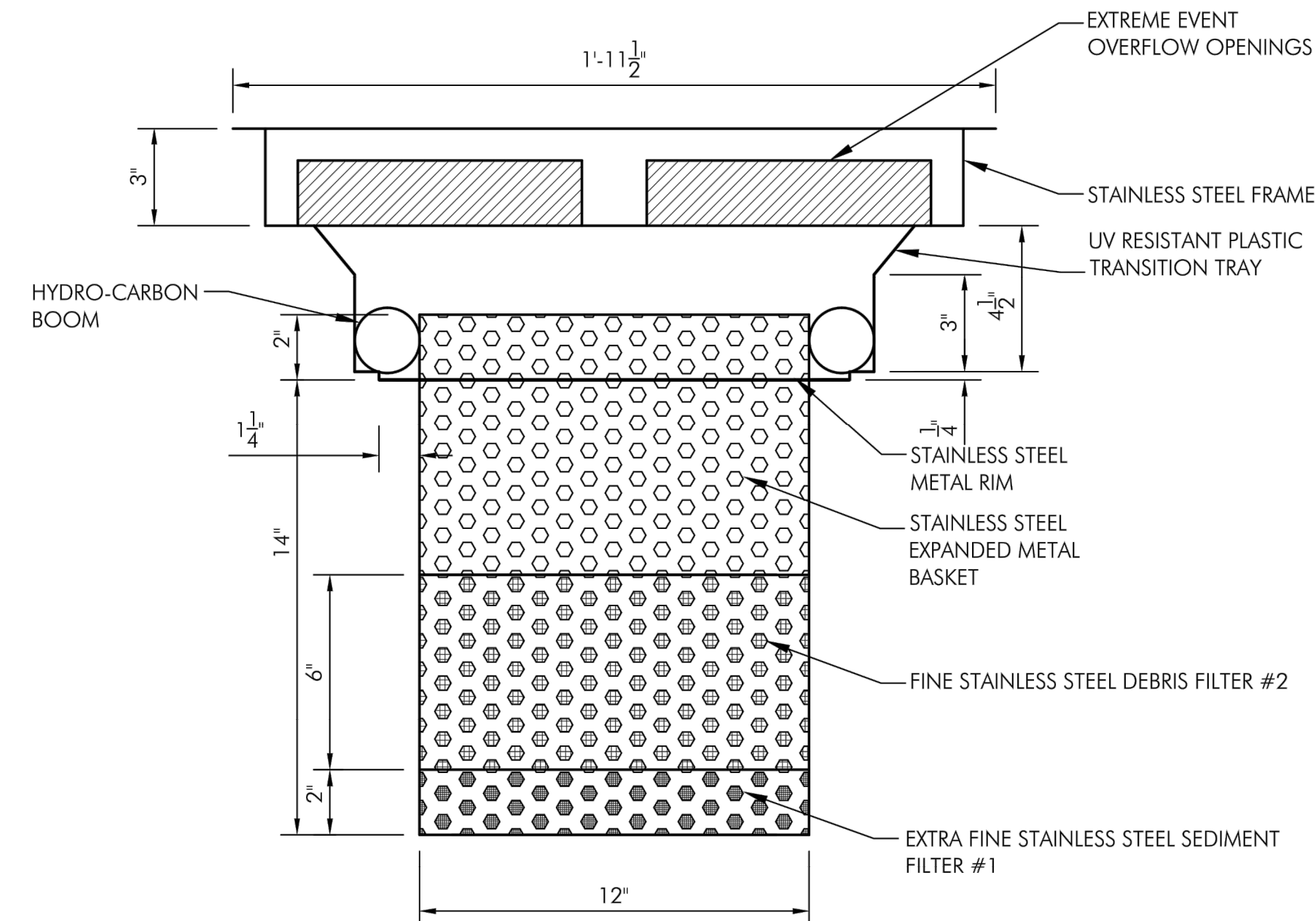
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N/A	AB, AG	AB, AG

SHEET  
C2.2



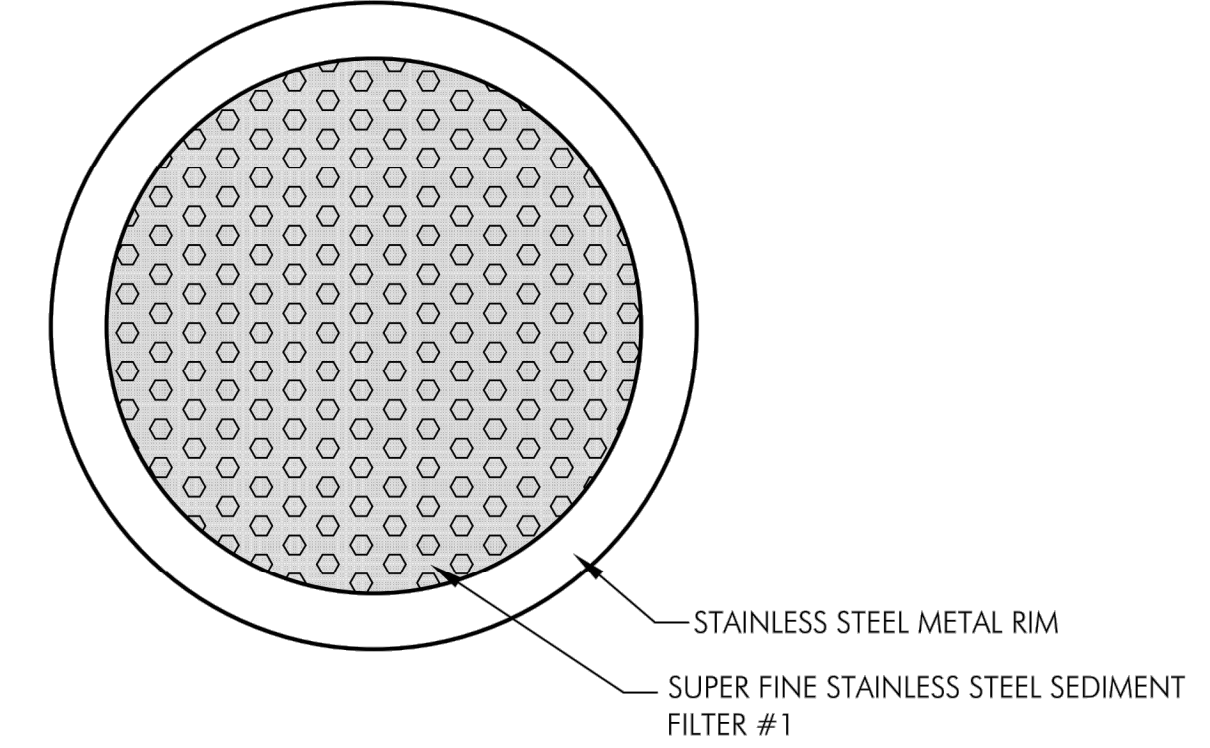


**CLEARSTREAM** 24" SQUARE INLET-PLAN VIEW: INSTALLED

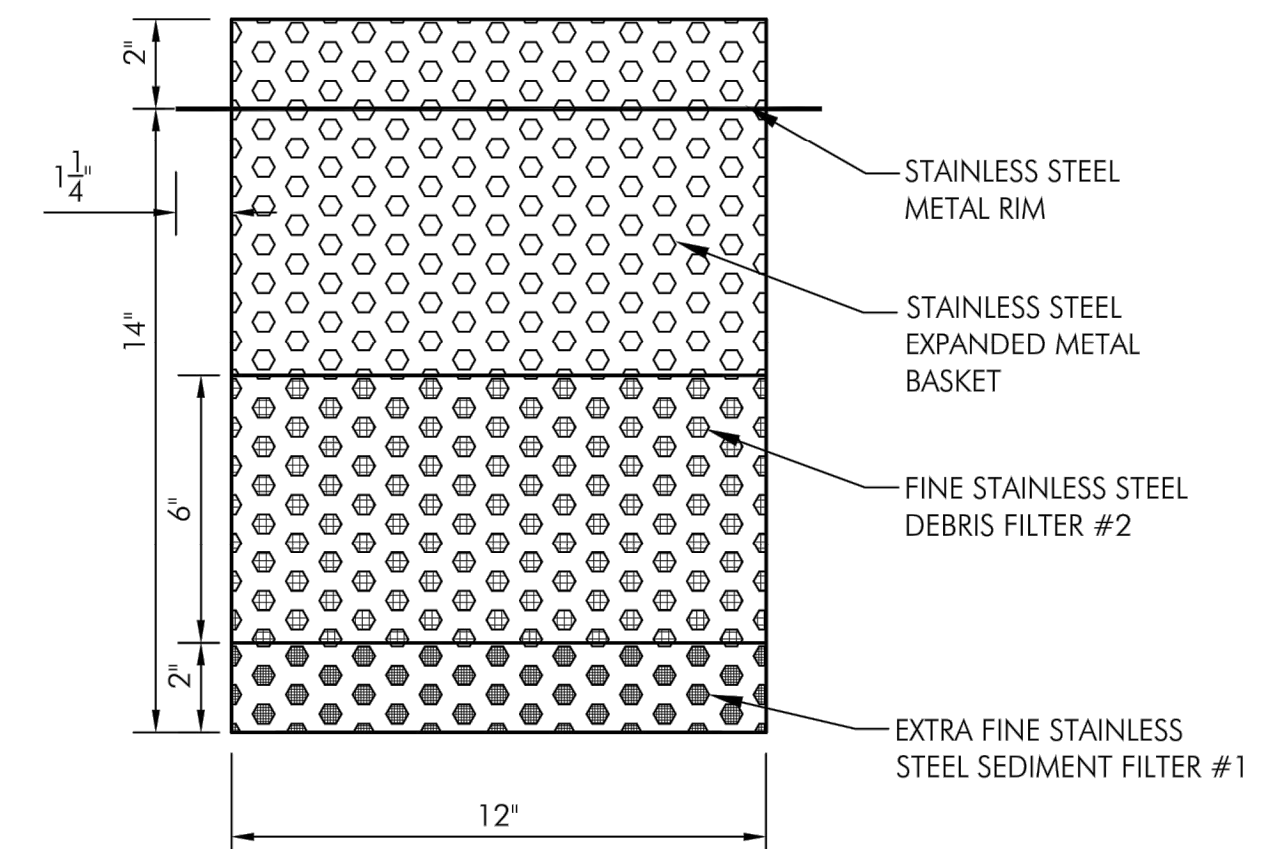


**CLEARSTREAM** 24" SQUARE INLET- SECTION : INSTALLED

FLOW SPECIFICATIONS				
$Q=50*A*c_d(2*g*h)^{.5}$	$c_d = \text{Coefficient of Discharge} = 0.60$			
	SO	A(ft <sup>2</sup> )	h(ft)	Q(ft <sup>3</sup> /s)
COARSE	73%	0.4583	0.73	1.38
MEDIUM	51%	0.2431	1.23	0.66
FINE	30%	0.1806	1.56	0.33
<b>TREATED FLOW</b>				<b>2.36</b>
<b>OVERFLOW</b>	<b>100%</b>	<b>0.972</b>	<b>0.17</b>	<b>1.91</b>



24" SQUARE INLET: BASKET- TOP VIEW



24" SQUARE INLET: BASKET- SIDE VIEW

**CLEARSTREAM** 24" SQUARE INLET: BASKET

### Clearstream Inlet Filter Basket

The Clearstream Inlet Filter Basket is a permanent storm water quality inlet-based filtration device designed to capture silt, sediment, gross pollutants, and hydrocarbons from rainwater runoff. Because these units are installed under the storm grate in parking areas and driveways, they are designed to handle H-20 loading by utilizing 14ga stainless steel frame to support the unit. Framing members are welded for additional support and structural integrity. The transition tray is fabricated with a single 1/4" thick vacuum molded UV resistant plastic which is both rigid and light designed to support the filter basket without adding any unnecessary weight. Additionally, the tray includes a recessed area to accept a standard 3" hydrocarbon boom, eliminating the need to use any proprietary filtration devices to satisfy hydrocarbon filtration required by most storm water regulations. The filter basket is constructed of 304 stainless steel which will not rust, corrode or warp under normal use. All screens are made of 304 stainless to create a basket that will last for decades if properly maintained. All Clearstream filters and associated components carry a 5-year warranty against manufacturing defects.

CLEARSTREAM STORMWATER SYSTEMS LLC.  
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 WITHOUT THE EXPRESSED WRITTEN  
 PERMISSION OF CLEARSTREAM  
 STORMWATER SYSTEMS LLC.

**CLEARSTREAM**  
 STORMWATER SYSTEMS  
 21175 TOMBALL PARKWAY #570  
 HOUSTON, TX 77070  
 PH# 888-799-8769  
**MODEL: CS2424-ST**

REV	DESCRIPTION	DATE
	ISSUE FOR CONSTRUCTION	04-23-2024

**FOR REFERENCE ONLY**

**WGA**

WARD, GETZ & ASSOCIATES, PLLC  
 TEXAS REGISTERED ENGINEERING FIRM F-9756  
 2500 Tanglewilde, Suite 120  
 Houston, Texas 77063  
 713.789.1900

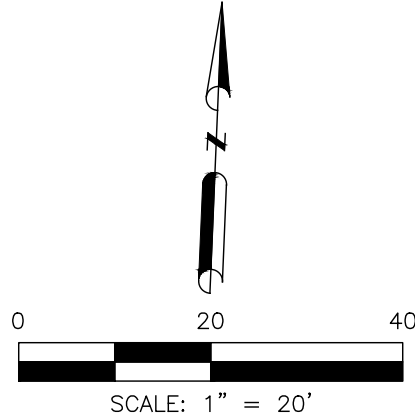
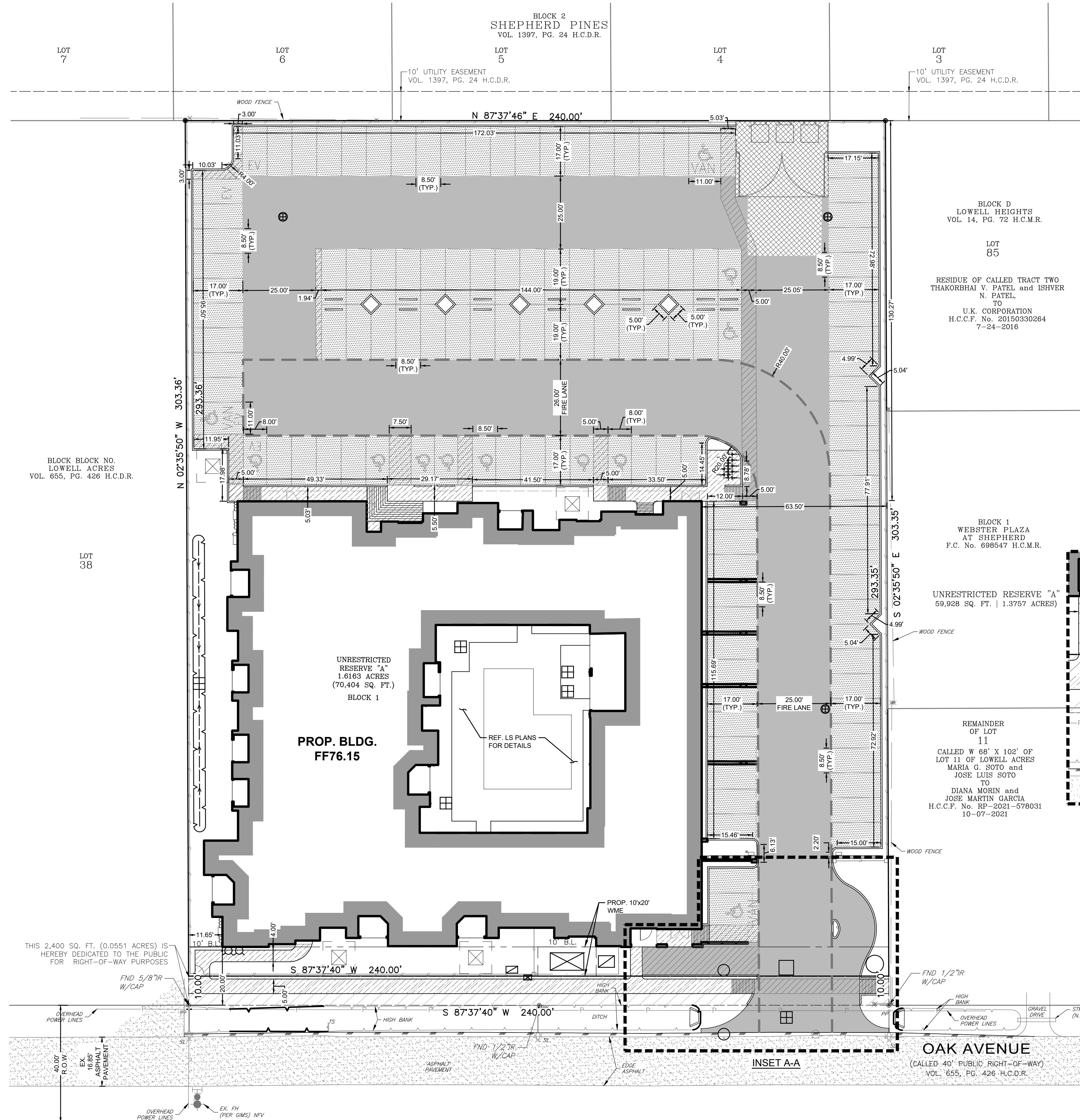
LOST OAKS

**STORM WATER QUALITY  
 FEATURE DETAIL**

SCALE	DESIGN	DRAWN
N/A	AB, AG	AB, AG

SHEET  
**C2.3**





**BENCHMARKS:**  
 PRIMARY BENCHMARK  
 PUBLISHED ELEVATION - 63.42'  
 BRASS DISC STAMPED 050165 ON BRIDGE AT WERNER AND LITTLE OAK BAYOU LOCATED ON CONCRETE FOOTING OF PIPELINE ON DOWNSTREAM SIDE OF BRIDGE IN KEYMAP 453E IN THE WHITE OAK WATERSHED NEAR STREAM E101-00-00

**FLOOD PLAIN NOTE:**  
 THIS SUBJECT TRACT LIES WITHIN UNSHADED ZONE "X" AREAS DETERMINED TO BE OUTSIDE THE 500-YEAR FLOODPLAIN (0.2% ANNUAL FLOODPLAIN CHANCE) AS DELINEATED ON THE FLOOD INSURANCE MAP FOR HARRIS COUNTY, TEXAS AND INCORPORATED AREAS, MAP NO. 48201V0660M MAP REVISED JUNE 14, 2014.  
 THE NEAREST AND HIGHEST CURRENTLY KNOWN AND RELEVANT 1% ANNUAL CHANCE FLOOD ELEVATION APPEARS TO BE 64.40 FT (NAVD 1988, 2001 ADJUSTMENT) IN LITTLE WHITE OAK BAYOU E101-00-00. THE NEAREST AND HIGHEST CURRENTLY KNOWN AND RELEVANT 0.2% ANNUAL CHANCE FLOOD ELEVATION APPEARS TO BE 65.60 FT (NAVD, 1988, 2001 ADJUSTMENT) ACCORDING TO CROSS SECTION LINE "T" ALONG LITTLE WHITE OAK BAYOU, REVISED JANUARY 6, 2017 FLOOD INSURANCE STUDY NUMBER 48201CV005C.

**LEGEND:**

	EXISTING PAVEMENT (CONCRETE, ASPHALT AS NOTED)
	PROPOSED 4" CONCRETE PAVEMENT (SIDEWALK)
	PROPOSED 5" CONCRETE PAVEMENT
	PROPOSED 6" CONCRETE PAVEMENT
	PROPOSED 7" CONCRETE PAVEMENT
	PROPOSED BUILDING

**NOTE:**  
 PROPOSED 6" CONCRETE WITHIN FIRE LANE WILL SUPPORT A LOAD OF 90,000 LBS.

**SHEET NOTES:**

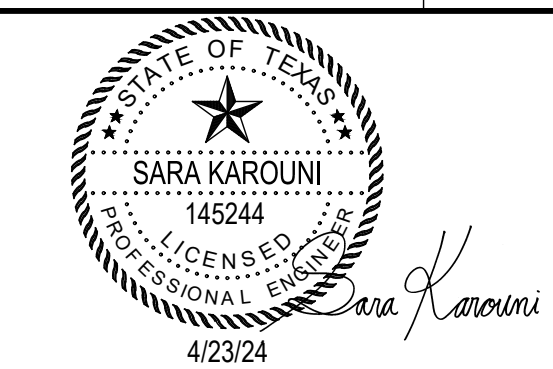
- ALL DIMENSIONS ARE TO FACE OF CURB UNLESS OTHERWISE NOTED.
- REFERENCE ARCHITECTURAL PLANS FOR EXACT BUILDING DIMENSIONS.
- ALL CURB RADII TO BE 2' (FEET) UNLESS OTHERWISE SHOWN ON PLAN.
- PROPOSED HANDICAP SIGN SEE PAVEMENT DETAILS.
- PROPOSED SIGN REFERENCE LANDSCAPE ARCHITECT PLANS FOR DETAILS.
- CONTRACTOR SHALL REFERENCE THE LANDSCAPE ARCHITECTURAL PLANS FOR ALL COURTYARD DETAILS.
- EXISTING SURVEY WAS DONE BY TOTAL SURVEYORS, INC. WITH THEIR CONTACT INFORMATION AS FOLLOWS:  
**TOTAL SURVEYORS, INC.**  
 4301 CENTER STREET, DEER PARK, TEXAS  
 Phone (281) 479-8719

**WORK BREAKDOWN**

TYPE	AMOUNT	UNIT
DRIVEWAY APPROACHES	1EA	
WIDTH	34.50	FT
RADI	20.00, 10.00	FT
DEPTH	21.00	FT
PRIVATE PAVING	23,663	SF
PUBLIC SIDEWALK WIDTH	206	LF
PUBLIC SIDEWALK	1,120	SF
PRIVATE SIDEWALK	1,936	SF
CONCRETE IN R.O.W.	0	LF
CURB IN R.O.W.	0	LF

**FIRE LANE LEGEND:**  
 PROPOSED FIRE LANE

REV	DESCRIPTION	DATE
ISSUE FOR CONSTRUCTION		04-23-2024

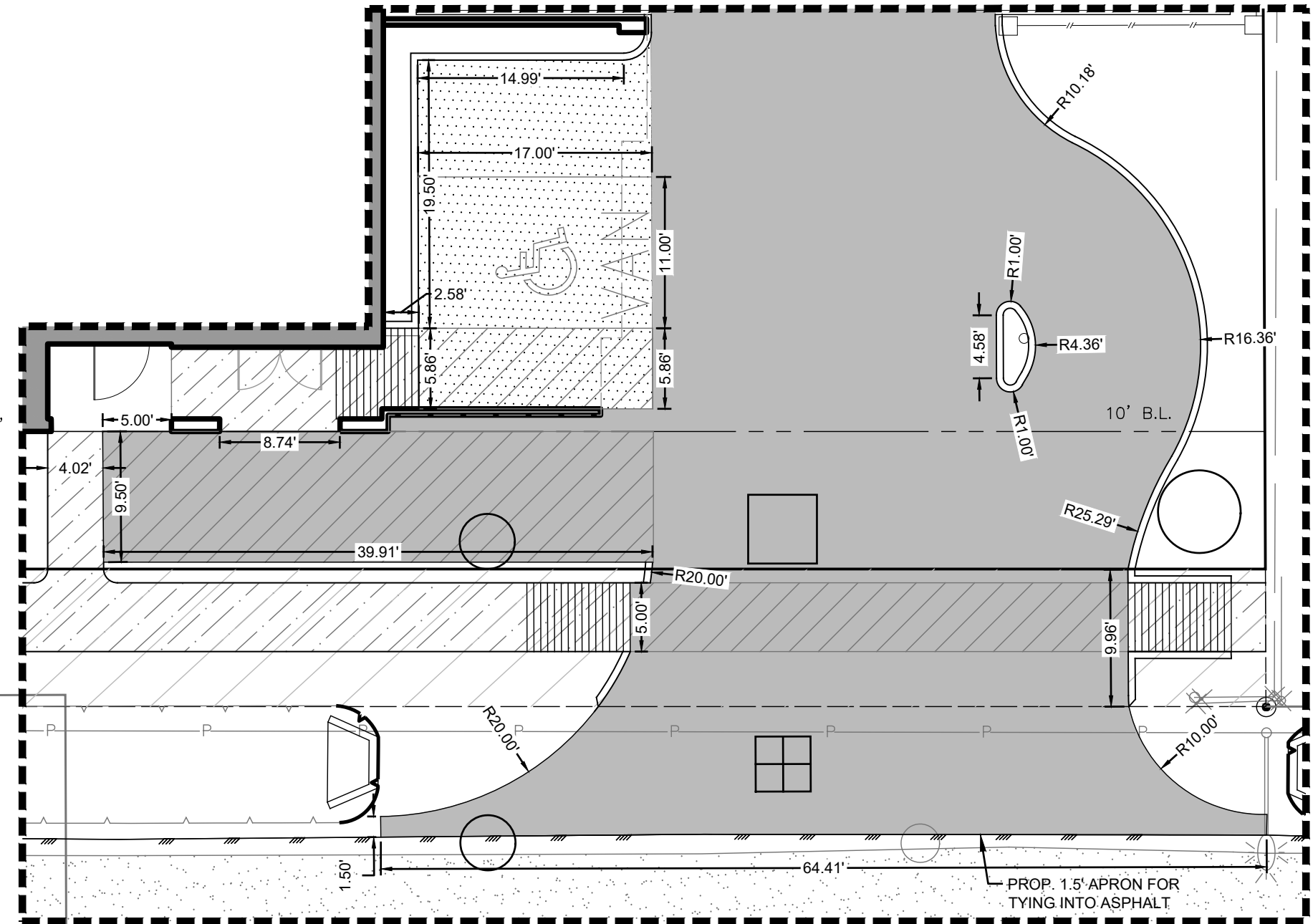


**LOST OAKS**

**DIMENSION CONTROL PLAN**

SCALE 1"=20'	DESIGN AB, AG	DRAWN AB, AG
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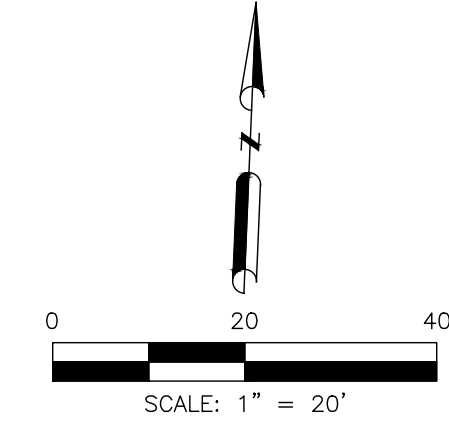
**SHEET C3.1**



**INSET A-A**  
 SCALE 1"=10'



**BENCHMARKS:**  
 PRIMARY BENCHMARK  
 PUBLISHED ELEVATION - 63.42'  
 BRASS DISC STAMPED 050165 ON BRIDGE AT WERNER AND LITTLE OAK BAYOU LOCATED ON CONCRETE FOOTING OF PIPELINE ON DOWNSTREAM SIDE OF BRIDGE IN KEYMAP 453E IN THE WHITE OAK WATERSHED NEAR STREAM E1010000



**FLOOD PLAIN NOTE:**  
 THIS SUBJECT TRACT LIES WITHIN UNSHADED ZONE "X" AREAS DETERMINED TO BE OUTSIDE THE 500-YEAR FLOODPLAIN (0.2% ANNUAL FLOODPLAIN CHANCE) AS DELINEATED ON THE FLOOD INSURANCE MAP FOR HARRIS COUNTY, TEXAS AND INCORPORATED AREAS. MAP NO. 48201V0660M MAP REVISED JUNE 14, 2014.

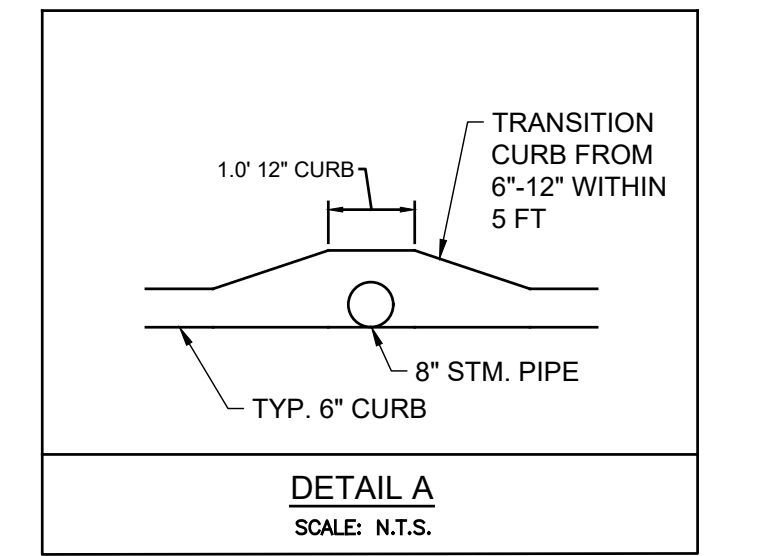
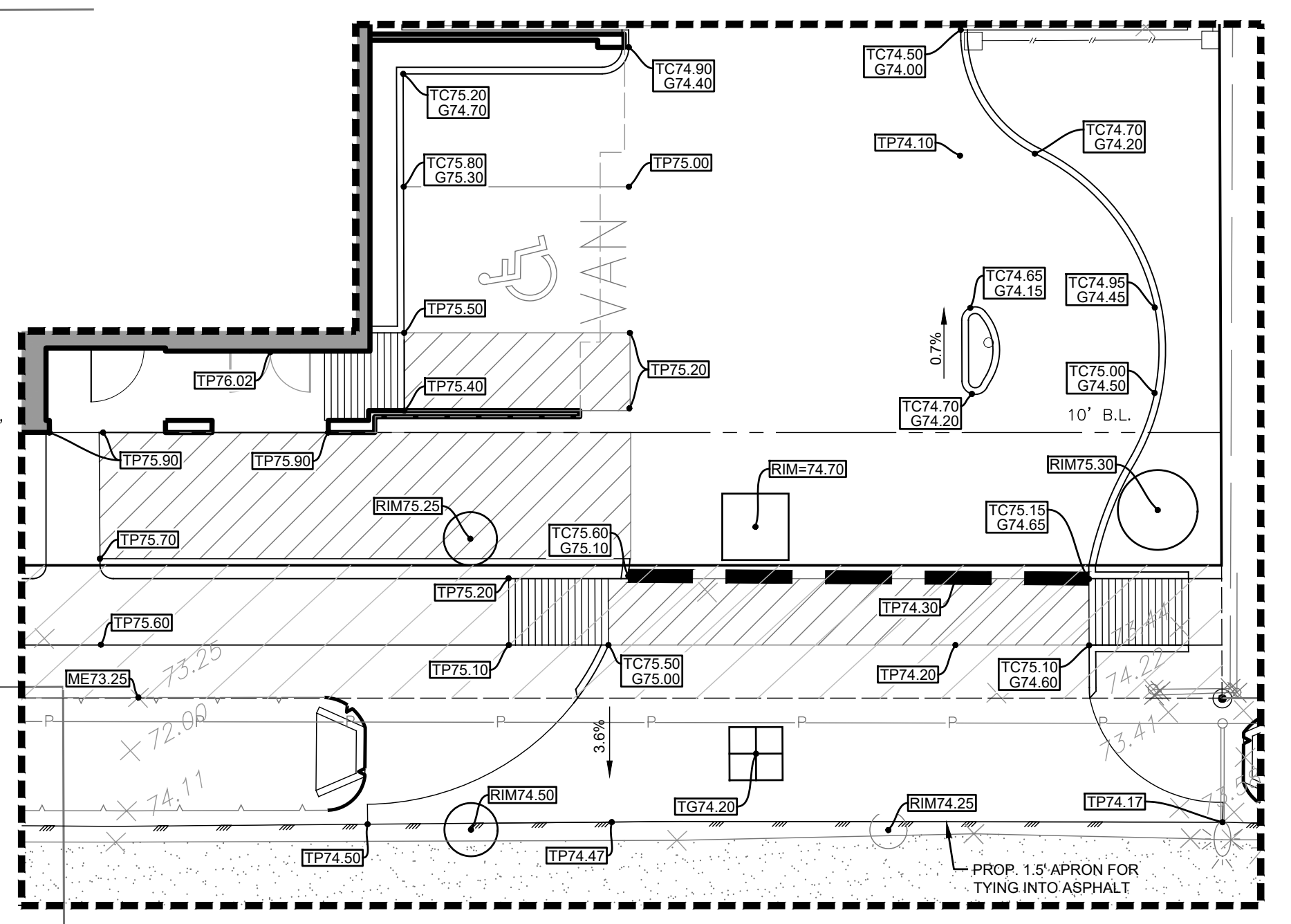
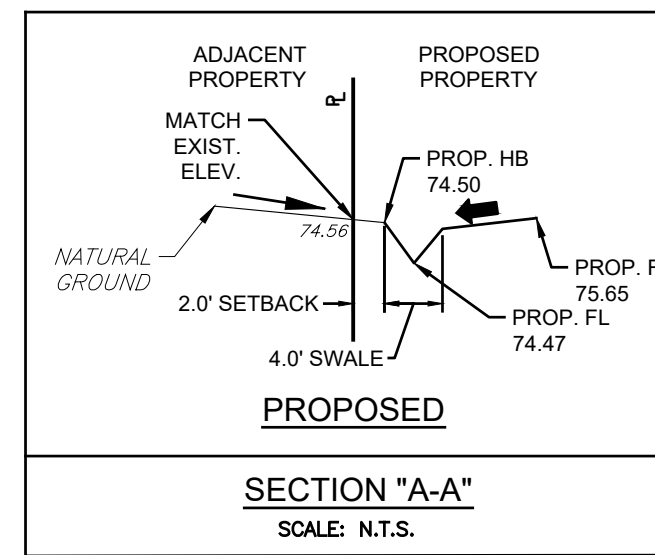
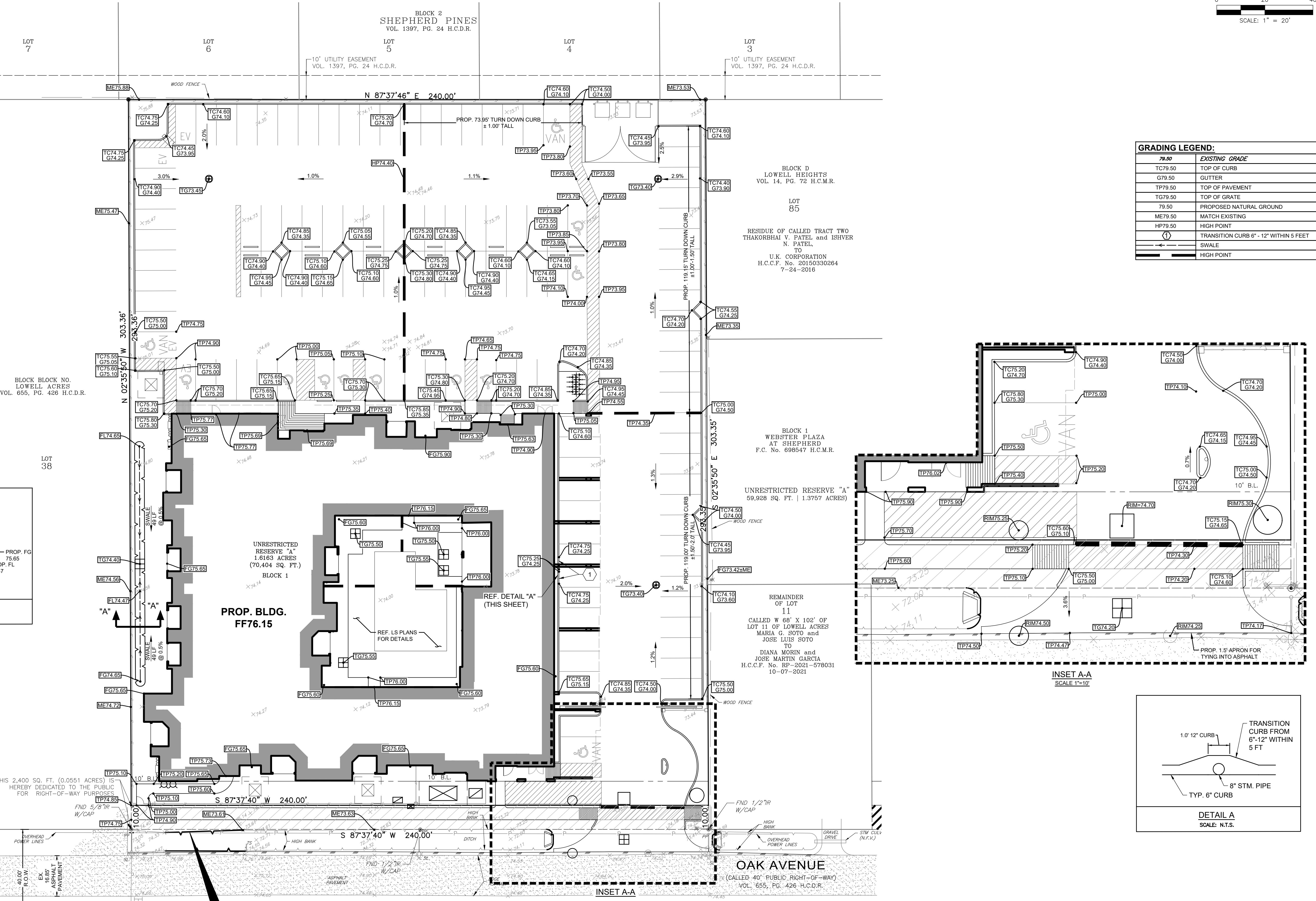
THE NEAREST AND HIGHEST CURRENTLY KNOWN AND RELEVANT 1% ANNUAL CHANCE FLOOD ELEVATION APPEARS TO BE 64.40 FT (NAVD 1988, 2001 ADJUSTMENT) IN LITTLE WHITE OAK BAYOU E10100-00. THE NEAREST AND HIGHEST CURRENTLY KNOWN AND RELEVANT 0.2% ANNUAL CHANCE FLOOD ELEVATION APPEARS TO BE 65.60 FT (NAVD, 1988, 2001 ADJUSTMENT) ACCORDING TO CROSS SECTION LINE "T" ALONG LITTLE WHITE OAK BAYOU, REVISED JANUARY 6, 2017 FLOOD INSURANCE STUDY NUMBER 48201CV005C.

**GRADING NOTES:**

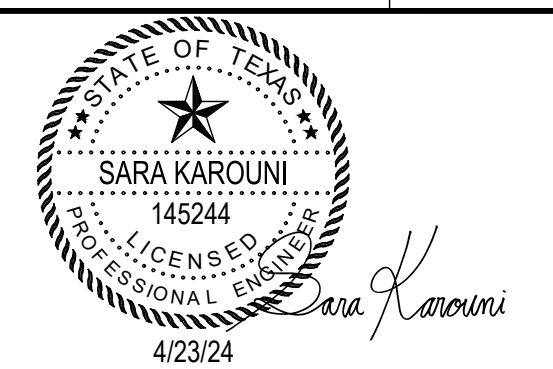
1. ALL SPOT ELEVATIONS ARE TO TOP OF PAVEMENT UNLESS OTHERWISE NOTED.
2. ALL SIDEWALKS AND ACCESSIBLE ROUTES, INCLUDING DRIVEWAY CROSSWALKS, SHALL CONFORM TO ALL APPLICABLE AMERICANS WITH DISABILITIES ACT STANDARDS AND THE TEXAS ACCESSIBILITY STANDARDS. IF ANY DISCREPANCY IS DISCOVERED, THE CONTRACTOR SHALL NOTIFY THE ENGINEER PRIOR TO POURING ANY PAVEMENT.
3. ALL SIDEWALKS AND ACCESSIBLE ROUTES, INCLUDING DRIVEWAY CROSSWALKS, SHALL NOT EXCEED A RUNNING SLOPE OF 5% (1:20) WITHOUT A RAMP, AND SHALL NOT EXCEED A 2% CROSS SLOPE (1:50).
4. THE ACCESSIBLE PARKING AND PASSENGER LOADING AREAS SHALL NOT EXCEED A SLOPE OF 2% (1:50) IN ANY DIRECTION.
5. ALL EXISTING APPURTENANCES ON SITE SHALL BE ADJUSTED TO PROPOSED GRADE AS APPLICABLE.
6. CONTRACTOR SHALL REFERENCE GEOTECHNICAL REPORT AND ALL ADDENDA FOR BUILDING PAD LIMITS AND PREPARATION REQUIREMENTS.
7. CONTRACTOR SHALL ENSURE THERE IS POSITIVE DRAINAGE FROM THE PROPOSED BUILDINGS AND NO PONDING IN PAVED AREAS, AND SHALL NOTIFY ENGINEER IF ANY GRADING DISCREPANCIES ARE FOUND IN THE EXISTING AND PROPOSED GRADES PRIOR TO PLACEMENT OF PAVEMENT OR UTILITIES.

**GRADING LEGEND:**

79.50	EXISTING GRADE
TC79.50	TOP OF CURB
G79.50	GUTTER
TP79.50	TOP OF PAVEMENT
TG79.50	TOP OF GRATE
79.50	PROPOSED NATURAL GROUND
ME79.50	MATCH EXISTING
HP79.50	HIGH POINT
(Symbol: Circle with '1')	TRANSITION CURB 6" - 12" WITHIN 5 FEET
(Symbol: Triangle)	SWALE
(Symbol: Square)	HIGH POINT



REV	DESCRIPTION	DATE
ISSUE FOR CONSTRUCTION		04-23-2024



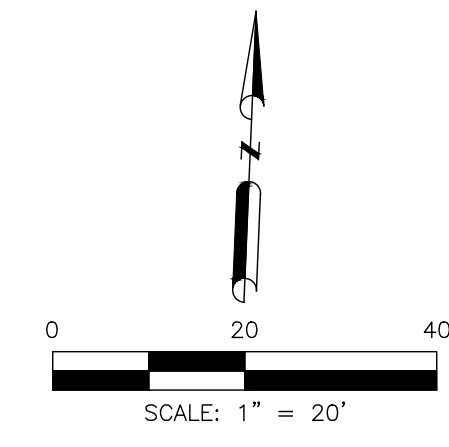
**LOST OAKS**

**GRADING PLAN**

SCALE 1"=20'	DESIGN AB, AG	DRAWN AB, AG
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**SHEET C4.1**

PROJECT No. 05443-007



**BENCHMARKS:**  
 PRIMARY BENCHMARK  
 PUBLISHED ELEVATION - 63.42'  
 BRASS DISC STAMPED 050165 ON BRIDGE AT WERNER AND LITTLE OAK BAYOU LOCATED ON CONCRETE FOOTING OF PIPELINE ON DOWNSTREAM SIDE OF BRIDGE IN KEYMAP 453E IN THE WHITE OAK WATERSHED NEAR STREAM E101-00-00

**FLOOD PLAIN NOTE:**  
 THIS SUBJECT TRACT LIES WITHIN UNSHADED ZONE "X" AREAS DETERMINED TO BE OUTSIDE THE 500-YEAR FLOODPLAIN (0.2% ANNUAL FLOODPLAIN CHANCE) AS DELINEATED ON THE FLOOD INSURANCE MAP FOR HARRIS COUNTY, TEXAS AND INCORPORATED AREAS, MAP NO. 48201V0660M MAP REVISED JUNE 14, 2014.

THE NEAREST AND HIGHEST CURRENTLY KNOWN AND RELEVANT 1% ANNUAL CHANCE FLOOD ELEVATION APPEARS TO BE 64.40 FT (NAVD 1988, 2001 ADJUSTMENT) IN LITTLE WHITE OAK BAYOU E101-00-00. THE NEAREST AND HIGHEST CURRENTLY KNOWN AND RELEVANT 0.2% ANNUAL CHANCE FLOOD ELEVATION APPEARS TO BE 65.62 FT (NAVD, 1988, 2001 ADJUSTMENT) ACCORDING TO CROSS SECTION LINE "T" ALONG LITTLE WHITE OAK BAYOU, REVISED JANUARY 6, 2017 FLOOD INSURANCE STUDY NUMBER 48201CV005C.

PIPING MATERIAL SCHEDULE	
SANITARY SEWER - 6" AND SMALLER	SCHEDULE 40 PVC
SANITARY SEWER - 8" AND LARGER	SDR-26 PVC
WATER LINE - SMALLER THAN 4"	SCHEDULE 40 PVC AS PER ASTM D1785
WATER LINE - 4" TO 12"	PVC CLASS 150, DR-18, AWWA C-900
STORM SEWER - SMALLER THAN 12"	SDR-35 PVC PER ASTM D3034
STORM SEWER - 12" OR LARGER (PRIVATE)	DUAL-WALLED HDPE, AASHTO M252 & M294
STORM SEWER - WITHIN PUBLIC EASEMENT OR RIGHT-OF-WAY	RCP, C-76, CLASS III
STORM SEWER - UNDERNEATH BUILDING	SCHEDULE 40 PVC

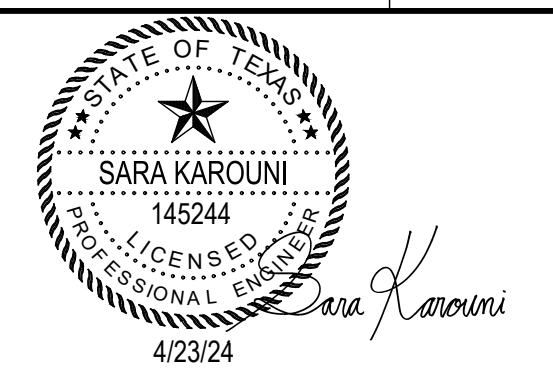
**NOTE:**  
 CLEARSTREAM INLET BASKETS (CS2424-ST) TO BE UTILIZED AT ALL TYPE "A" INLETS AS STORM WATER QUALITY FEATURE

WATER CALLOUTS:	
1	6" 45° BEND
2	WATER / SANITARY CROSSING (SEE SHEET NOTE 9)
3	6" GATE VALVE & BOX
4	6"x4" TEE
5	4" GATE VALVE & BOX
6	6" WATER LINE (FIRE)
7	4" WATER LINE (DOMESTIC)

**UTILITY NOTES:**

- PRIVATE STORM SEWER TO BE HDPE UNLESS OTHERWISE NOTED. FOR PUBLIC STORM SEWER REFERENCE GENERAL NOTES.
- UTILITIES SHOWN ARE APPROXIMATE. CONTRACTOR TO FIELD VERIFY EXISTING UTILITY LOCATIONS PRIOR TO CONSTRUCTION AND IMMEDIATELY NOTIFY ENGINEER OF ANY CONFLICT OR DISCREPANCIES.
- CONTRACTOR TO COORDINATE WITH UTILITY COMPANIES FOR SERVICE ORIGINATION AND CONNECTION.
- CONTRACTOR SHALL TAKE CARE NOT TO DAMAGE ANY EXISTING ITEMS ON SITE.
- CONTRACTOR SHALL KEEP THE SITE CLEAN OF DEBRIS AND ANY EROSION CONTROL MEASURES ARE ADEQUATELY PLACED.
- CONTRACTOR TO COORDINATE LOCATIONS OF UNDERGROUND IRRIGATION SLEEVING PRIOR TO PAVING. SEE LANDSCAPE PLANS.
- CONTRACTOR TO COORDINATE LOCATIONS OF UNDERGROUND CONDUIT FOR SITE LIGHTING PRIOR TO PAVING.
- ALL CONSTRUCTION OPERATIONS SHALL BE ACCOMPLISHED IN ACCORDANCE WITH APPLICABLE REGULATIONS OF THE U.S. OCCUPATIONAL HEALTH AND SAFETY ADMINISTRATION. COPIES OF OSHA STANDARDS MAY BE PURCHASED FROM THE U.S. GOVERNMENT PRINTING OFFICE. INFORMATION AND RELATED REFERENCE MATERIALS MAY BE PURCHASED FROM OSHA, 903 SAN JACINTO, RM 319, AUSTIN, TX. 78701. TEL: (512) 916-5783.
- ALL SANITARY SEWERS CROSSING WATER LINES WITH A 6 INCHES TO 9 FEET CLEARANCE SHALL HAVE A MINIMUM OF 18" JOINT OF 150 P.S.I. SDR 26 PVC PIPE MEETING ASTM SPECIFICATION D2241 CENTERED ON WATER LINE. WHEN WATER LINE IS BELOW SANITARY SEWER PROVIDE MINIMUM 2 FOOT SEPARATION.
- REFERENCE MEP PLANS FOR UTILITY CONDUIT LOCATIONS.
- CONTRACTOR TO ADJUST ALL EXISTING APURTENANCES ON SITE TO PROPOSED GRADE, AS APPLICABLE.

REV	DESCRIPTION	DATE
ISSUE FOR CONSTRUCTION		04-23-2024

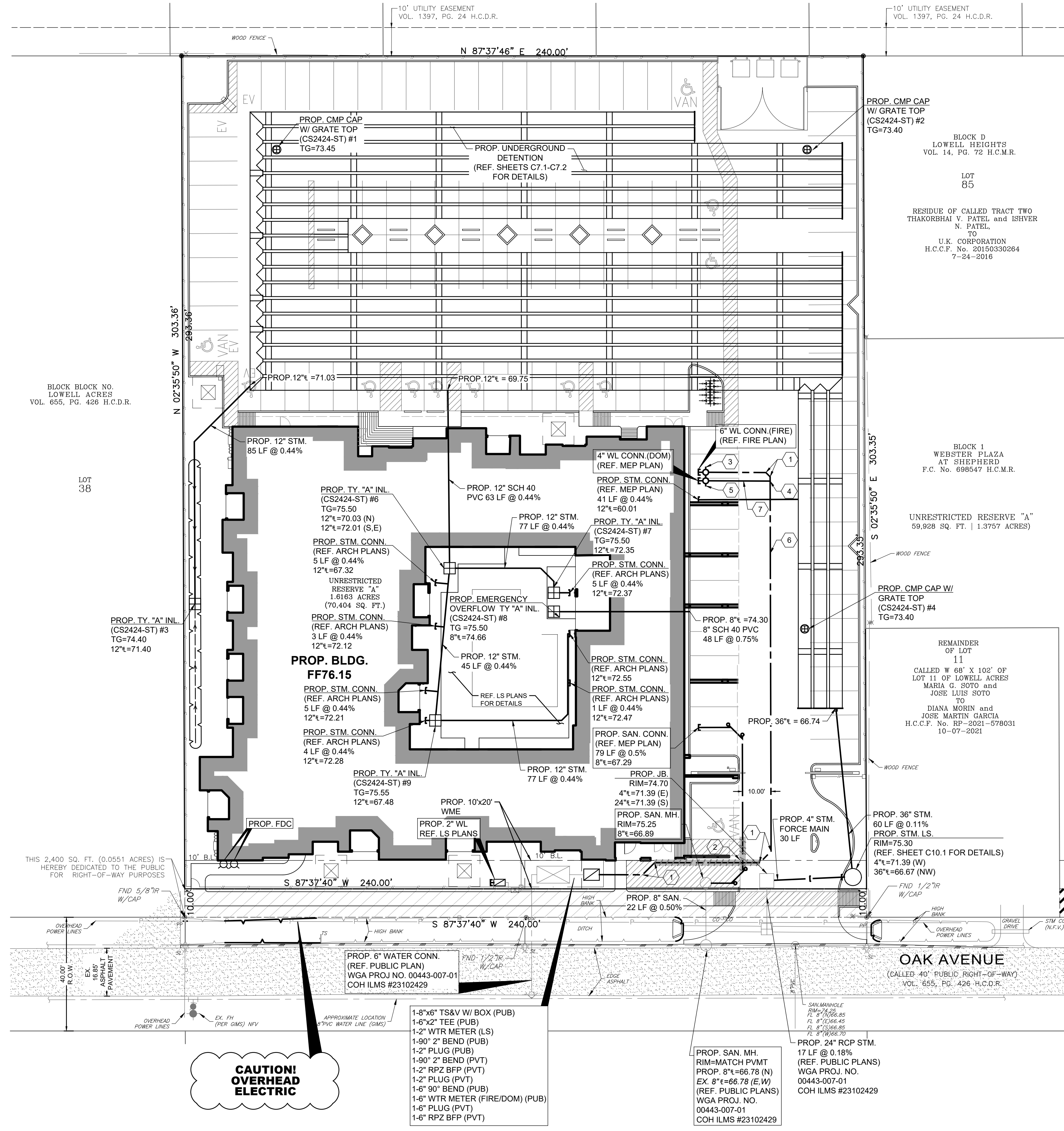


LOST OAKS

UTILITY PLAN

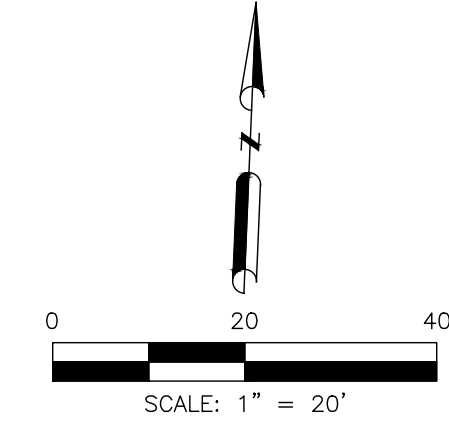
SCALE	DESIGN	DRAWN
1"=20'	AB, AG	AB, AG

SHEET  
C5.1





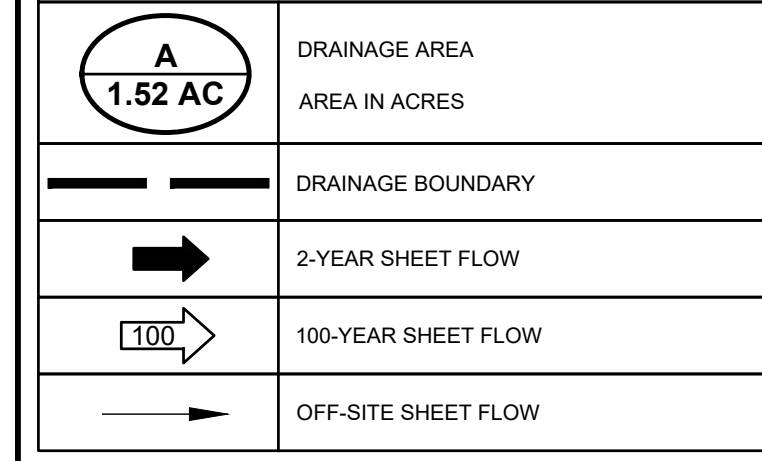
**BENCHMARKS:**  
 PRIMARY BENCHMARK  
 PUBLISHED ELEVATION - 63.42'  
 BRASS DISC STAMPED 050165 ON BRIDGE AT WERNER AND LITTLE  
 OAK BAYOU LOCATED ON CONCRETE FOOTING OF PIPELINE ON  
 DOWNSTREAM SIDE OF BRIDGE IN KEYMAP 453E IN THE WHITE OAK  
 WATERSHED NEAR STREAM E101-00-00



**FLOOD PLAIN NOTE:**  
 THIS SUBJECT TRACT LIES WITHIN UNSHADED ZONE "X" AREAS  
 DETERMINED TO BE OUTSIDE THE 500-YEAR FLOODPLAIN (0.2%  
 ANNUAL FLOODPLAIN CHANCE) AS DELINEATED ON THE FLOOD  
 INSURANCE MAP FOR HARRIS COUNTY, TEXAS AND INCORPORATED  
 AREAS, MAP NO. 48201V0660M MAP REVISED JUNE 14, 2014.

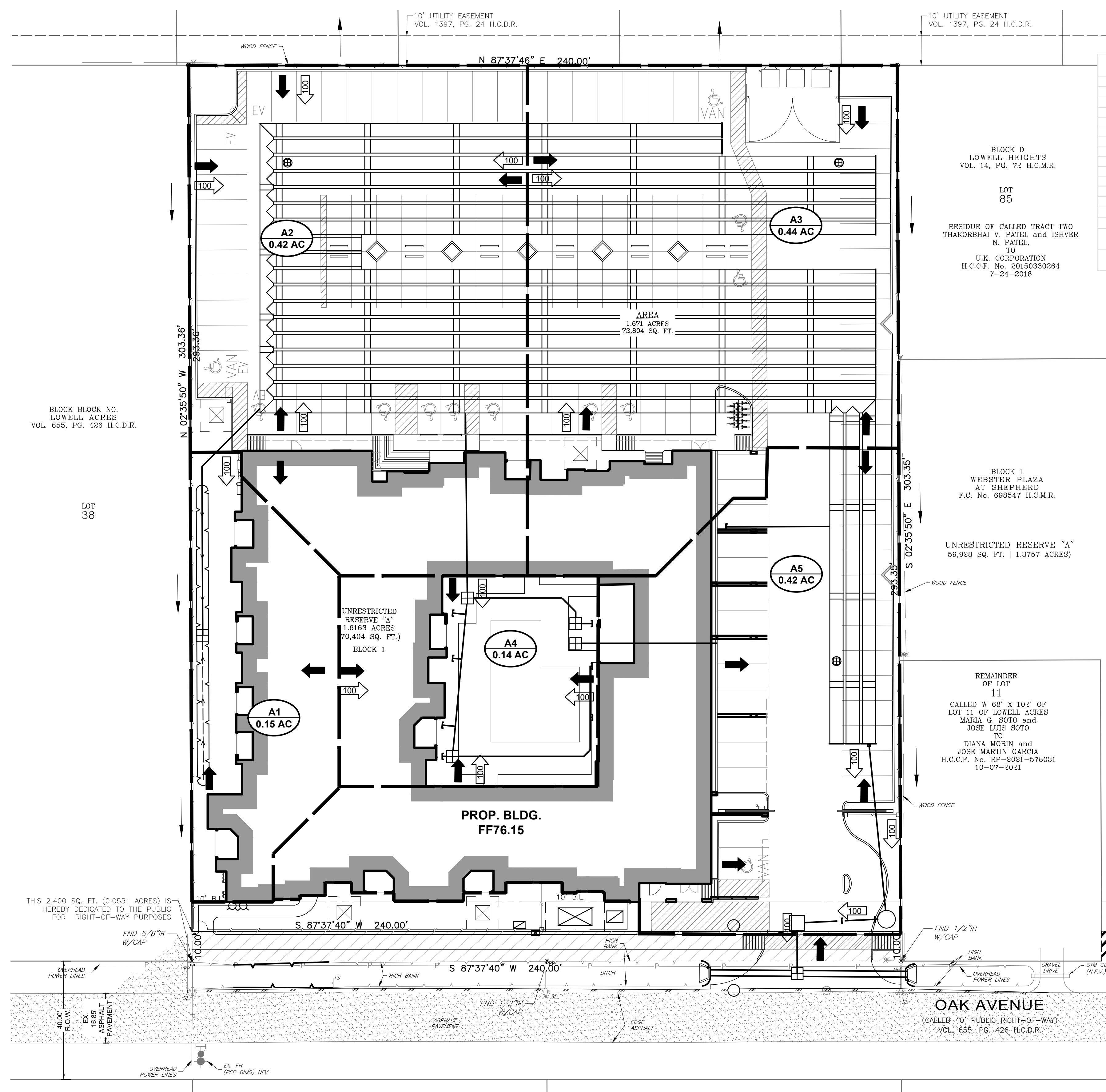
THE NEAREST AND HIGHEST CURRENTLY KNOWN AND RELEVANT 1%  
 ANNUAL CHANCE FLOOD ELEVATION APPEARS TO BE 64.40 FT (NAVD  
 1988, 2001 ADJUSTMENT) IN LITTLE WHITE OAK BAYOU E101-00-00.  
 THE NEAREST AND HIGHEST CURRENTLY KNOWN AND RELEVANT  
 0.2% ANNUAL CHANCE FLOOD ELEVATION APPEARS TO BE 65.60 FT  
 (NAVD, 1988, 2001 ADJUSTMENT) ACCORDING TO CROSS SECTION  
 LINE "T" ALONG LITTLE WHITE OAK BAYOU, REVISED JANUARY 6,  
 2017 FLOOD INSURANCE STUDY NUMBER 48201CV005C.

**DRAINAGE AREA MAP LEGEND:**



**OFFSITE SHEET FLOW**

Project:	Lost Oaks	DATE:	4-18-2024			
Job No.:	00443-007	Rainfall Frequency:	100			
System:	By: AG					
Equations:	$i = \frac{b}{(d + TC)^e}$ $Q = CiA$ $TC = 10A^{0.1761} + 15$					
	Area A (Acres)	Runoff Coeff. C	Runoff Coeff. C-Cr	Time of Conc. min.	Intensity (In / Hr.)	Sum of Flows Q cfs
Existing	1.13	0.18	0.18	25.22	8.49	1.73
Proposed	0.04	0.80	0.80	20.67	9.35	0.30



BLOCK D  
 LOWELL HEIGHTS  
 VOL. 14, PG. 72 H.C.M.R.

LOT  
 85

RESIDUE OF CALLED TRACT TWO  
 THAKORBHAI V. PATEL and ISHVER  
 N. PATEL,  
 TO  
 U.K. CORPORATION  
 H.C.C.F. No. 20150330264  
 7-24-2016

BLOCK 1  
 WEBSTER PLAZA  
 AT SHEPHERD  
 F.C. No. 698547 H.C.M.R.

UNRESTRICTED RESERVE "A"  
 59,928 SQ. FT. | 1.3767 ACRES)

REMAINDER  
 OF LOT  
 11  
 CALLED W 68' X 102' OF  
 LOT 11 OF LOWELL ACRES  
 MARIA G. SOTO and  
 JOSE LUIS SOTO  
 TO  
 DIANA MORIN and  
 JOSE MARTIN GARCIA  
 H.C.C.F. No. RP-2021-578031  
 10-07-2021

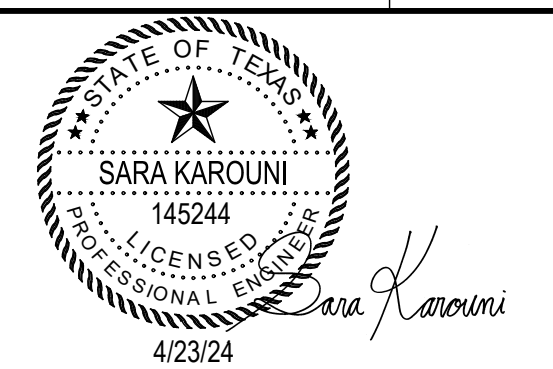
BLOCK BLOCK NO.  
 LOWELL ACRES  
 VOL. 655, PG. 426 H.C.D.R.

LOT  
 38

THIS 2,400 SQ. FT. (0.0551 ACRES) IS  
 HEREBY DEDICATED TO THE PUBLIC  
 FOR RIGHT-OF-WAY PURPOSES

OAK AVENUE  
 (CALLED 40' PUBLIC RIGHT-OF-WAY)  
 VOL. 655, PG. 426 H.C.D.R.

REV	DESCRIPTION	DATE
	ISSUE FOR CONSTRUCTION	04-23-2024



**LOST OAKS**

**DRAINAGE AREA MAP**

SCALE 1"=20'	DESIGN AB, AG	DRAWN AB, AG
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**SHEET  
 C6.1**



CITY OF HOUSTON  
RESTRICTOR CALCULATIONS

**WGA**

**STORM SEWER CALCULATIONS**

Project: Lost Oaks  
Job No: 00443-007  
System: AB  
By: AG

DATE: 4-19-2024  
Rainfall Frequency (years): 2

$$i = \frac{b}{(d + TC)^e}$$

$C_1 = 1.00$   
 $b = 48.35$   
 $d = 9.07$   
 $e = 0.72$

ID	From MH	To MH	Sub Area Acres	Total Area Acres	Sub Runoff Coeff. C	Sub Runoff Coeff. C <sub>C</sub>	Sum of CFC*A	Time of Conc. min.	Intensity I (In / Hr.)	Sum of Flows cfs Q	LINE				DESIGN				HYD. GRAD				TG/ Gutter Elevation Upstream	TG/ Gutter Elevation Downstream	MH UP	flowline upstream	MH DOWN	flowline downstream	Top of Pipe (upstream)	Top of Pipe (downstream)	
											Reach Length Feet	Dia. in. or Rise (ft)	# of Pipes/ Boxes	Width of box (ft)	Slope %	Mannings n"	Capacity cfs Q	Velocity fps	drop at down stream manhole	Actual Velocity fps	Hydraulic Gradient %	Change in Head Ft.									Elev. Up Stream
*A*	1	Pond	0.15	0.15	0.80	0.80	0.12	22.16	4.00	0.48	85	12	1	0.44	0.012	2.57	3.27	0.00	2.49	0.015	0.013	69.69	69.67	74.40	-	1	71.40	Pond	71.03	72.40	72.03
*TOP OF PIPE																															
*A*	2	Pond	0.42	0.42	0.80	0.80	0.34	23.58	3.87	1.30	0	12	1	0.44	0.012	2.57	3.27	0.00	3.27	0.113	0.000	69.67	69.67	73.40	-	2	66.74	Pond	66.74	67.74	67.74
*TOP OF PIPE																															
*A*	3	Pond	0.44	0.44	0.80	0.80	0.35	23.65	3.86	1.36	0	12	1	0.44	0.012	2.57	3.27	0.00	3.30	0.124	0.000	69.67	69.67	74.40	-	3	68.70	Pond	68.70	69.70	69.70
*TOP OF PIPE																															
*A*	4	Pond	0.14	0.14	0.80	0.80	0.11	22.07	4.00	0.45	63	12	1	0.44	0.012	2.57	3.27	0.00	2.44	0.014	0.009	69.68	69.67	75.50	-	4	71.97	Pond	71.69	72.97	72.69
*TOP OF PIPE																															
*A*	5	Pond	0.42	0.42	0.80	0.80	0.34	23.58	3.87	1.30	0	12	1	0.44	0.012	2.57	3.27	0.00	3.27	0.113	0.000	69.67	69.67	73.40	-	5	71.69	Pond	71.69	72.69	72.69
*TOP OF PIPE																															
*B*	Pond	LS	0.00	1.57	0.80	0.80	1.26	25.83	3.69	4.63	60	36	1	0.12	0.012	25.10	3.55	0.00	2.70	0.004	0.002	69.67	69.67	-	75.30	Pond	66.74	LS	66.67	69.74	69.67
*B*	LS	MH1	0.00	1.57	0.80	0.80	1.26	26.11	3.67	4.63	32	24	1	0.18	0.012	10.43	3.32	0.00	3.20	0.036	0.011	68.67	73.39	75.30	74.20	LS	66.67	MH1	71.39	68.67	73.39
*B*	MH1	OUT	0.00	1.57	0.80	0.80	1.26	26.27	3.65	4.63	24	24	1	0.18	0.012	10.43	3.32	0.00	3.20	0.036	0.009	73.36	73.35	74.20	74.50	MH1	71.39	OUT	71.35	73.39	73.35
*TOP OF PIPE																															
*E*	CY	POND	0.09	0.09	0.80	0.80	0.07	21.54	4.06	0.29	48	8	1	0.75	0.012	1.14	3.26	0.00	2.70	0.050	0.024	69.70	69.67	76.10	-	CY	74.66	POND	74.30	75.33	74.97

RESTRICTOR CALCULATION		
LOW LEVEL RESTRICTOR (25% FLOW)		
TOTAL DRAINAGE AREA	1.671	ACRES
OUTFLOW RATE ALLOWED FOR LOW FLOW (QL1)	0.836	CFS
HEAD HL1 FOR LOW FLOW	1.06	FT
CALCULATED LOW LEVEL RESTRICTOR SIZE DL1	6.0	INCHES
PROVIDED/DESIGNED LOW LEVEL RESTRICTOR SIZE DL1	6.0	INCHES
HIGH LEVEL RESTRICTOR (75%)		
TOTAL DRAINAGE AREA	1.671	ACRES
TOTAL OUTFLOW RATE ALLOWED (100%) Q	3.34	CFS
RECALCULATED HEAD HL2 FOR LOW LEVEL RESTRICTOR	3.08	FT
RECALCULATED LOW FLOW QL2 FOR LOW LEVEL RESTRICTOR	2.21	CFS
OUTFLOW RATE ALLOWED FOR HIGH FLOW QH1 (75%)		
HEAD Hh2 FOR HIGH LEVEL RESTRICTOR	N/A	FT
CALCULATED HIGH LEVEL RESTRICTOR Dh	N/A	INCHES
PROVIDED/DESIGNED HIGH LEVEL RESTRICTOR SIZE Dh1 (75%)	N/A	INCHES
OUTFLOW RATE PROVIDED FOR HIGH FLOW Qh2	N/A	CFS

NOTE:  
THE LIFT STATION WILL SERVE AS THE RESTRICTOR. (REF. SHEET C10.1 FOR DETAILS)

**ORIFICE CALCULATIONS:**  
ALLOWABLE RUNOFF (Q) OF EACH STORM EVENT IS BASED PER COH CHAPTER 9.

WHERE: Q = ALLOWABLE OUTFLOW DISCHARGE IN (CFS)  
C = DISCHARGE COEFFICIENT, 0.8 FOR SHORT PIPE, 0.6 OPENING IN PLATES, STANDPIPES, OR HEADWALLS  
A = ORIFICE AREA (SF)  
G = GRAVITATIONAL FACTOR (32.2 FT/S<sup>2</sup>)  
H = HEAD, WATER SURFACE ELEVATION (FT)  
D = ORIFICE DIAMETER (FT)

Q<sub>LOWER</sub> = 0.5 CFS / AC; WHERE H = 25% BASIN DEPTH  
Q<sub>UPPER</sub> = 2.0 CFS - Q<sub>LOWER</sub> / AC; WHERE HIGH FLOW  $\epsilon$  = 75% BASIN DEPTH

ORIFICE EQUATIONS:  $Q = CA\sqrt{2GH}$   
 $D = \frac{\sqrt{Q}}{2.25H^{0.4}}$   
 $A = \frac{Q}{C\sqrt{2GH}}$

**WGA**

**STORM SEWER CALCULATIONS**

Project: Lost Oaks  
Job No: 00443-007  
System: AB  
By: AG

DATE: 4-19-2024  
Rainfall Frequency (years): 100

$$i = \frac{b}{(d + TC)^e}$$

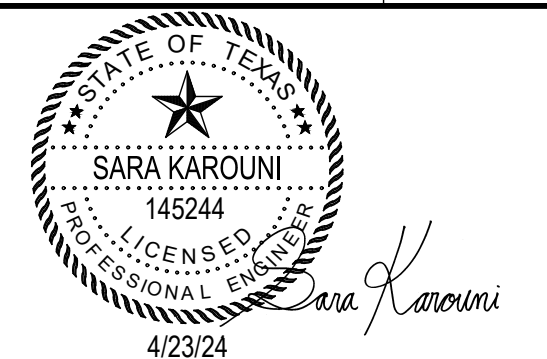
$C_1 = 1.00$   
 $b = 60.66$   
 $d = 4.44$   
 $e = 0.58$

C:\Users\agelidenuh\AppData\Local\Microsoft\Windows\NetCache\Content.MSO\Copy of Lost Oaks Storm Calcs.xls\DESIGN (2-year)

ID	From MH	To MH	Sub Area Acres	Total Area Acres	Sub Runoff Coeff. C	Sub Runoff Coeff. C <sub>C</sub>	Sum of CFC*A	Time of Conc. min.	Intensity I (In / Hr.)	Sum of Flows cfs Q	LINE				DESIGN				HYD. GRAD				TG/ Gutter Elevation Upstream	TG/ Gutter Elevation Downstream	MH UP	flowline upstream	MH DOWN	flowline downstream	Top of Pipe (upstream)	Top of Pipe (downstream)	
											Reach Length Feet	Dia. in. or Rise (ft)	# of Pipes/ Boxes	Width of box (ft)	Slope %	Mannings n"	Capacity cfs Q	Velocity fps	drop at down stream manhole	Actual Velocity fps	Hydraulic Gradient %	Change in Head Ft.									Elev. Up Stream
*A*	1	Pond	0.15	0.15	0.80	0.80	0.12	22.16	9.06	1.09	85	12	1	0.44	0.012	2.57	3.27	0.00	3.12	0.079	0.067	68.69	68.62	74.40	-	1	71.40	Pond	71.03	72.40	72.03
*10-YR WSEL																															
*A*	2	Pond	0.42	0.42	0.80	0.80	0.34	23.58	8.79	2.95	0	12	1	0.44	0.012	2.57	3.27	0.00	3.76	0.585	0.000	69.68	69.68	73.40	-	2	66.74	Pond	66.74	67.74	67.74
*10-YR WSEL																															
*A*	3	Pond	0.44	0.44	0.80	0.80	0.35	23.65	8.77	3.09	0	12	1	0.44	0.012	2.57	3.27	0.00	3.93	0.640	0.000	69.68	69.68	74.40	-	3	68.70	Pond	68.70	69.70	69.70
*10-YR WSEL																															
*A*	4	Pond	0.14	0.14	0.80	0.80	0.11	22.07	9.07	1.02	63	12	1	0.44	0.012	2.57	3.27	0.00	3.05	0.069	0.044	68.66	68.62	75.50	-	4	71.97	Pond	71.69	72.97	72.69
*10-YR WSEL																															
*A*	5	Pond	0.42	0.42	0.80	0.80	0.34	23.58	8.79	2.95	0	12	1	0.44	0.012	2.57	3.27	0.00	3.76	0.585	0.000	69.68	69.68	73.40	-	5	71.69	Pond	71.69	72.69	72.69
*10-YR WSEL																															
*B*	Pond	LS	0.00	1.57	0.80	0.80	1.26	25.83	8.40	10.55	60	36	1	0.12	0.012	25.10	3.55	0.00	3.39	0.021	0.013	69.68	69.67	-	75.30	Pond	66.74	LS	66.67	69.74	69.67
*B*	LS	MH1	0.00	1.57	0.80	0.80	1.26	26.11	8.36	10.55	32	24	1	0.18	0.012	10.43	3.32	0.00	3.78	0.185	0.059	68.67	73.39	75.30	74.20	LS	66.67	MH1	71.39	68.67	73.39
*B*	MH1	OUT	0.00	1.57	0.80	0.80	1.26	26.27	8.33	10.55	24	24	1	0.18	0.012	10.43	3.32	0.00	3.78	0.185	0.044	73.39	73.35	74.20	74.50	MH1	71.39	OUT	71.35	73.39	73.35
*TOP OF PIPE																															
*E*	CY	POND	0.09	0.09	0.80	0.80	0.07	21.54	9.18	0.66	48	8	1	0.75	0.012	1.14	3.26	0.00	3.36	0.255	0.122	69.81	69.68	76.10	-	CY	74.66	POND	74.30	75.33	74.97

STORMWATER DETENTION VOLUME DETERMINATION		
TOTAL TRACT AREA	1.62	ACRES
SITE IMPERVIOUS COVER	1.42	ACRES
IMPERVIOUS COVER IN R.O.W.	0.08	ACRES
REQUIRED DETENTION RATIO	0.95	ACRE - FEET / ACRE
DETENTION STORAGE REQUIRED	1.43	ACRE - FEET
TOTAL DETENTION STORAGE PROVIDED	1.66	ACRE - FEET
REMAINING AVAILABLE DETENTION	0.23	ACRE - FEET

REV	DESCRIPTION	DATE
	ISSUE FOR CONSTRUCTION	04-23-2024



LOST OAKS

**DRAINAGE AND  
DETENTION  
CALCULATIONS**

SCALE	DESIGN	DRAWN
N/A	AB, AG	AB, AG

SHEET  
C6.2



**PROJECT SUMMARY**

**CALCULATION DETAILS**

- LOADING = HS20HS25
- APPROX. LINEAR FOOTAGE = 3,654 LF

**STORAGE SUMMARY**

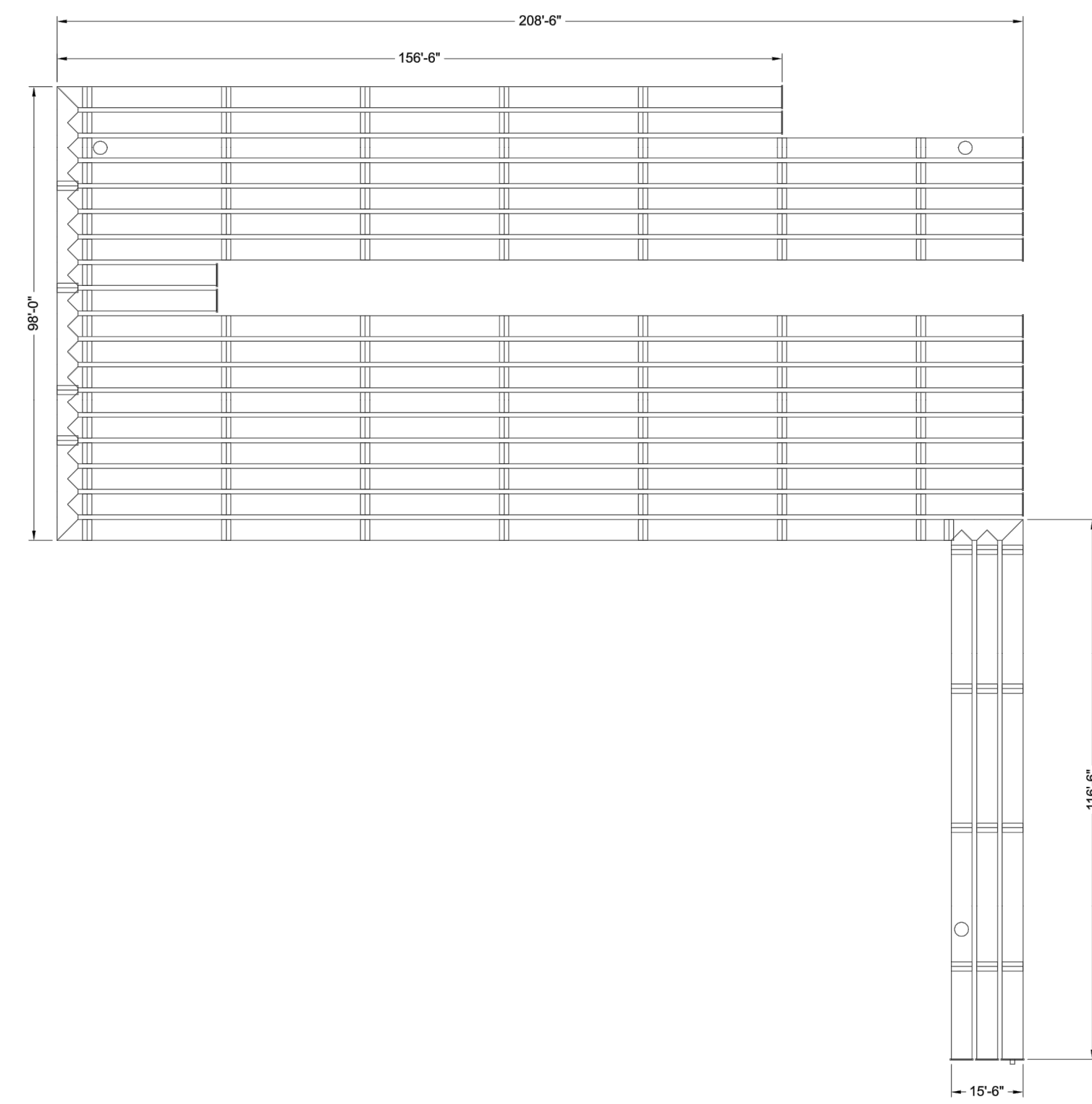
- STORAGE VOLUME REQUIRED = 71,438 CF
- PIPE STORAGE VOLUME = 58,114 CF
- BACKFILL STORAGE VOLUME = 14,069 CF
- TOTAL STORAGE PROVIDED = 72,174 CF

**PIPE DETAILS**

- DIAMETER = 54"
- CORRUGATION = 5x1"
- GAGE = 16
- COATING = ALT2
- WALL TYPE = SOLID
- BARREL SPACING = 12"

**BACKFILL DETAILS**

- WIDTH AT ENDS = 12"
- ABOVE PIPE = 0"
- WIDTH AT SIDES = 12"
- BELOW PIPE = 0"



**NOTES**

- ALL RISER AND STUB DIMENSIONS ARE TO CENTERLINE. ALL ELEVATIONS, DIMENSIONS, AND LOCATIONS OF RISERS AND INLETS, SHALL BE VERIFIED BY THE ENGINEER OF RECORD PRIOR TO RELEASING FOR FABRICATION.
- ALL FITTINGS AND REINFORCEMENT COMPLY WITH ASTM A998.
- ALL RISERS AND STUBS ARE 2 1/2" x 1/2" CORRUGATION AND 16 GAGE UNLESS OTHERWISE NOTED.
- RISERS TO BE FIELD TRIMMED TO GRADE.
- QUANTITY OF PIPE SHOWN DOES NOT PROVIDE EXTRA PIPE FOR CONNECTING THE SYSTEM TO EXISTING PIPE OR DRAINAGE STRUCTURES. OUR SYSTEM AS DETAILED PROVIDES NOMINAL INLET AND/OR OUTLET PIPE STUBS FOR CONNECTION TO EXISTING DRAINAGE FACILITIES. IF ADDITIONAL PIPE IS NEEDED IT IS THE RESPONSIBILITY OF THE CONTRACTOR.
- BAND TYPE TO BE DETERMINED UPON FINAL DESIGN.
- THE PROJECT SUMMARY IS REFLECTIVE OF THE DYODES DESIGN, QUANTITIES ARE APPROX. AND SHOULD BE VERIFIED UPON FINAL DESIGN AND APPROVAL. FOR EXAMPLE, TOTAL EXCAVATION DOES NOT CONSIDER ALL VARIABLES SUCH AS SHORING AND ONLY ACCOUNTS FOR MATERIAL WITHIN THE ESTIMATED EXCAVATION FOOTPRINT.
- THESE DRAWINGS ARE FOR CONCEPTUAL PURPOSES AND DO NOT REFLECT ANY LOCAL PREFERENCES OR REGULATIONS. PLEASE CONTACT YOUR LOCAL CONTECH REP FOR MODIFICATIONS.

ASSEMBLY  
SCALE: 1" = 30'

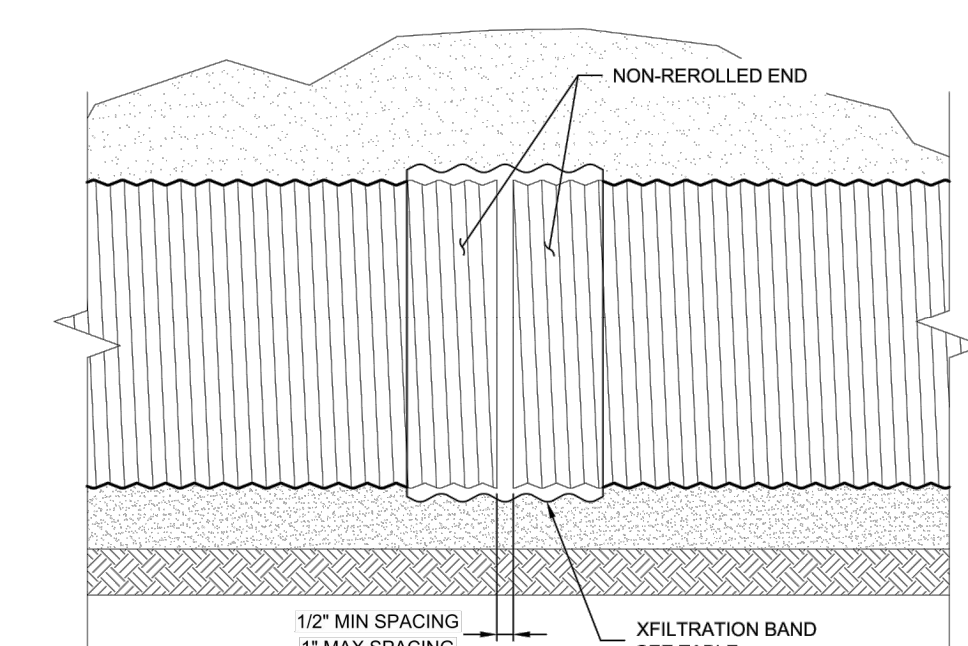
**CONTECH**  
ENGINEERED SOLUTIONS LLC  
www.contechES.com  
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069  
800-338-1122 513-645-7000 513-645-7993 FAX

**CONTECH**  
CMP DETENTION SYSTEMS  
DYODES  
DRAWING

DYO50132 Lost Oaks  
54" diameter xFiltration - 4-17-24  
Houston, TX  
DETENTION SYSTEM

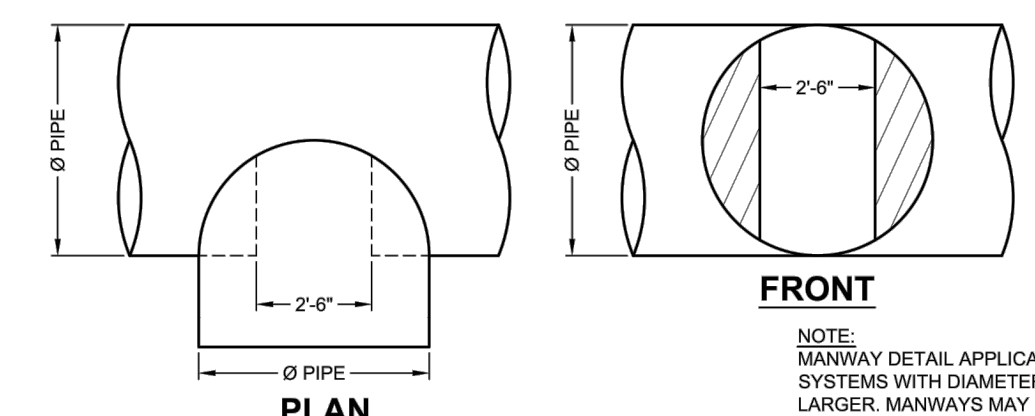
PROJECT NO:	80132	DATE:	4/17/2024
DESIGNED:	DYO	DRAWN:	DYO
CHECKED:	DYO	APPROVED:	DYO
SHEET NO.:			1

CONTECH ENGINEERED SOLUTIONS LLC, THE CONTRACTOR'S RESPONSIBILITY FOR THE DESIGN OF THIS SYSTEM IS LIMITED TO THE INFORMATION PROVIDED ON THIS DRAWING.

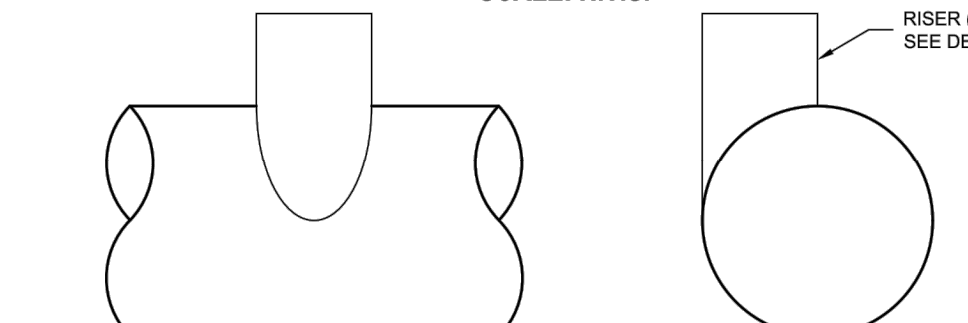


XFILTRATION BAND		
DIAMETER	BAND	FASTENER
UP TO 84"	5-C OR H-12	STD. PLANT FASTENER WITH NO GASKET
84" +	10-C	STD. PLANT FASTENER WITH NO GASKET

XFILTRATION JOINT DETAIL  
NOT TO SCALE



TYPICAL MANWAY DETAIL  
SCALE: N.T.S.



TYPICAL RISER DETAIL  
SCALE: N.T.S.

NOTE:  
MANWAY DETAIL APPLICABLE FOR CMP SYSTEMS WITH DIAMETERS 48" AND LARGER. MANWAYS MAY BE REQUIRED ON SMALLER SYSTEMS DEPENDING ON ACTUAL SITE SPECIFIC CONDITIONS.

RISER (TYP.)  
SEE DETAIL

NOTE:  
LAGGERS ARE OPTIONAL AND ARE NOT REQUIRED FOR ALL SYSTEMS.

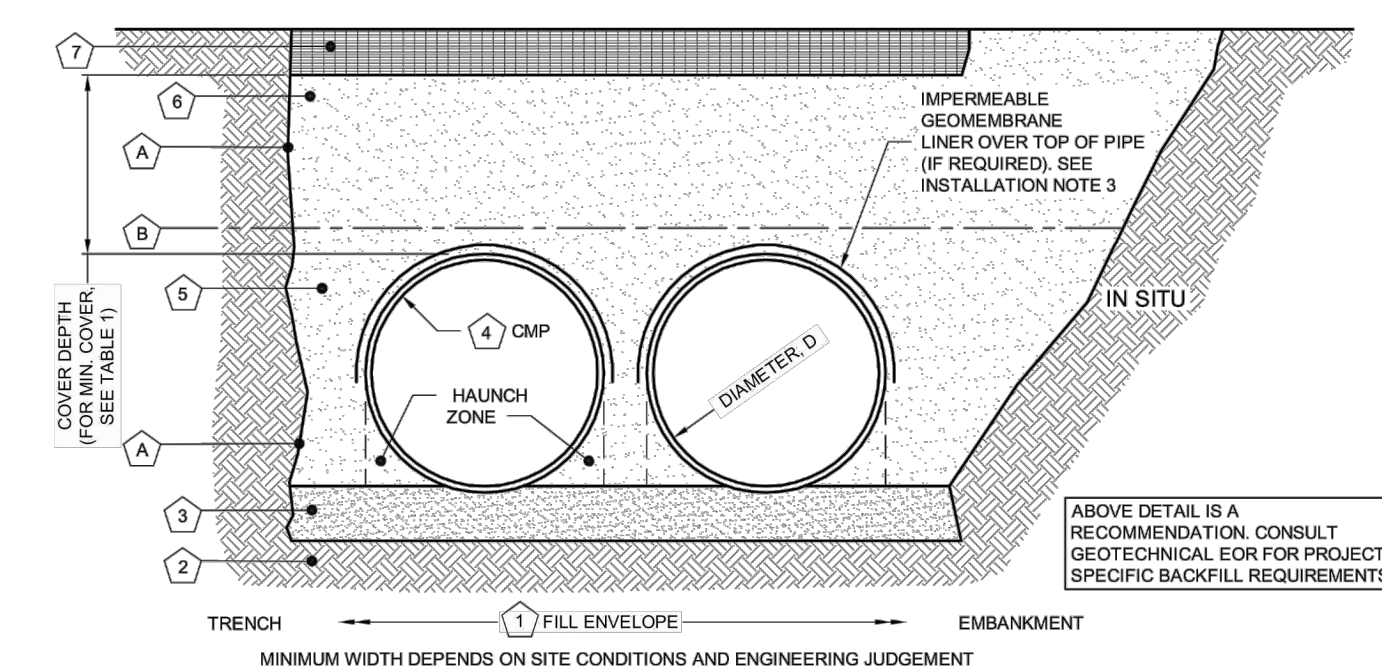
XFILTRATION JOINT SYSTEM DETAILS

PROJECT NO.:	80132	DATE:	4/17/2024
DESIGNED:	DYO	DRAWN:	DYO
CHECKED:	DYO	APPROVED:	DYO
SHEET NO.:			1

TABLE 1:

DIAMETER, D	MIN. COVER	CORR. PROFILE
6"-10"	12"	1 1/2" x 1/4"
12"-48"	12"	2 2/3" x 1/2"
>48"-96"	12"	3" x 1/2", 5" x 1"
>96"-144"	D/8	3" x 1/2", 5" x 1"

- STRUCTURAL BACKFILL MUST EXTEND TO LIMITS OF THE TABLE
- TOTAL HEIGHT OF COMPACTED COVER FOR CONVENTIONAL HIGHWAY LOADS IS MEASURED FROM TOP OF PIPE TO BOTTOM OF FLEXIBLE PAVEMENT OR TOP OF RIGID PAVEMENT.



- INSTALLATION NOTES**
- WHEN PLACING THE FIRST LIFTS OF BACKFILL IT IS IMPORTANT TO MAKE SURE THAT THE BACKFILL IS PROPERLY COMPACTED UNDER AND AROUND THE PIPE HAUNCHES.
  - OTHER ALTERNATE BACKFILL MATERIALS MAY BE ALLOWED DEPENDING ON SITE SPECIFIC CONDITIONS. AS APPROVED BY SITE ENGINEER.
  - IF SALTING AGENTS FOR SNOW AND ICE REMOVAL ARE USED ON OR NEAR THE PROJECT, A GEOMEMBRANE BARRIER IS RECOMMENDED OVER THE TOP OF THE PIPE. THE GEOMEMBRANE LINER IS INTENDED TO HELP PROTECT THE SYSTEM FROM THE POTENTIAL ADVERSE EFFECTS THAT MAY RESULT FROM A CHANGE IN THE SURROUNDING ENVIRONMENT OVER A PERIOD OF TIME. PLEASE REFER TO THE CORRUGATED METAL PIPE DETENTION DESIGN GUIDE FOR ADDITIONAL INFORMATION.

TABLE 2:

XFILTRATION <sup>®</sup> JOINT STANDARD BACKFILL SPECIFICATIONS			
MATERIAL LOCATION	MATERIAL SPECIFICATION	DESCRIPTION	
1	FILL ENVELOPE WIDTH	PER ENGINEER OF RECORD	MINIMUM TRENCH WIDTH MUST ALLOW ROOM FOR PROPER COMPACTION OF HAUNCH MATERIALS UNDER THE PIPE. THE SUGGESTED MINIMUM TRENCH WIDTH, OR EOR RECOMMENDATION: PIPE ≤ 24" : D + 16" PIPE > 24" : 1.5D + 12"
2	FOUNDATION	AASHTO 26.5.2 - PER ENGINEER OF RECORD	PRIOR TO PLACING THE BEDDING, THE FOUNDATION MUST BE CONSTRUCTED TO A UNIFORM AND STABLE GRADE. IN THE EVENT THAT UNSUITABLE FOUNDATION MATERIALS ARE ENCOUNTERED DURING EXCAVATION, THEY SHALL BE REMOVED AND FOUNDATION BROUGHT BACK TO GRADE WITH A FILL MATERIAL APPROVED BY THE ENGINEER OF RECORD.
3	BEDDING	AASHTO M 43: 3, 357, 4, 467, 5, 56, 57	ENGINEER OF RECORD TO DETERMINE IF BEDDING IS REQUIRED. PIPE MAY BE PLACED ON THE TRENCH BOTTOM OF A RELATIVELY LOOSE, NATIVE SUITABLE WELL GRADED GRANULAR MATERIAL THAT IS ROUGHLY SHAPED TO FIT THE BOTTOM OF THE PIPE. 2" MIN DEPTH. THE BEDDING MATERIAL MAY BE SUITABLE OPEN GRADED GRANULAR BEDDING CONFORMING TO AASHTO SOIL CLASSIFICATIONS A1, A2, OR A3 WITH MAXIMUM PARTICLE SIZE OF 3" PER AASHTO 26.3.1
4		CORRUGATED METAL PIPE	
5	BACKFILL	FREE-DRAINING, ANGULAR, WASHED STONE PER AASHTO M 43: 3, 357, 4, 467, 5, 56, 57 WITH A 1/2" - 2 1/2" PARTICLE SIZE OR APPROVED EQUAL MEETING AASHTO M 145: A-1 (APPROVED REGIONAL EQUIVALENTS INCLUDE MIDOT 6AA, 6A, OR 6G)	HAUNCH ZONE MATERIAL SHALL BE HAND SHOVELED OR SHOVEL SLICED INTO PLACE TO ALLOW FOR PROPER COMPACTION WITHOUT SOFT SPOTS. BACKFILL SHALL BE PLACED IN 6" - 12" LOOSE LIFTS AND COMPACTED TO 90% STANDARD PROCTOR PER AASHTO T 99. BACKFILL SHALL BE PLACED SUCH THAT THERE IS NO MORE THAN A TWO LIFT (18") DIFFERENTIAL BETWEEN ANY OF THE PIPES AT ANY TIME DURING THE BACKFILL PROCESS. THE BACKFILL SHOULD BE ADVANCED ALONG THE LENGTH OF THE SYSTEM TO AVOID DIFFERENTIAL LOADING. WHERE CONVENTIONAL COMPACTION TESTING IS NOT PRACTICAL, THE MATERIAL SHALL BE MECHANICALLY COMPACTED UNTIL NO FURTHER YIELDING OF MATERIAL IS OBSERVED UNDER THE COMPACTOR.
6	COVER MATERIAL	UP TO MIN. COVER - AASHTO M 145: A-1, A-2, A-3 ABOVE MIN. COVER - PER ENGINEER OF RECORD	COVER MATERIAL MAY INCLUDE NON-BITUMINOUS, GRANULAR ROADBASE MATERIAL WITH MIN COVER LIMITS
7	RIGID OR FLEXIBLE PAVEMENT (IF APPLICABLE)	PER ENGINEER OF RECORD	FLEXIBLE PAVEMENT SHOULD NOT BE COUNTED AS PART OF THE FILL HEIGHT OVER THE CMP. FINAL BACKFILL MATERIAL SELECTION AND COMPACTION REQUIREMENTS SHALL FOLLOW THE PROJECT PLANS AND SPECIFICATIONS PER THE ENGINEER OF RECORD.
A	OPTIONAL SIDE GEOTEXTILE	NONE	GEOTEXTILE LAYER IS RECOMMENDED ON SIDES OF EXCAVATION TO PREVENT SOIL MIGRATION.
B	OPTIONAL SIDE GEOTEXTILE BETWEEN LAYERS	NONE	IF SOIL TYPES DIFFER AT ANY POINT ABOVE PIPE INVERT, A GEOTEXTILE LAYER IS RECOMMENDED TO BE PLACED BETWEEN THE LAYERS TO PREVENT SOIL MIGRATION.

- NOTES:**
- FOR MULTIPLE BARREL INSTALLATIONS, THE RECOMMENDED STANDARD SPACING BETWEEN PARALLEL PIPE RUNS SHALL BE THE PIPE DIAMETER / 2 BUT NO LESS THAN 12" FOR DIAMETERS < 72". FOR 72" AND LARGER DIAMETERS, THE MINIMUM SPACING IS 36". CONTACT YOUR CONTECH REPRESENTATIVE FOR NON-STANDARD SPACING.
  - REGIONAL EQUIVALENTS ACCEPTED WHERE SHOWN. IF NO REGIONAL EQUIVALENT IS LISTED, MATERIAL SHOULD MEET THE AASHTO SPECIFICATION INDICATED.
- MANUFACTURER RECOMMENDED BACKFILL**  
NOT TO SCALE

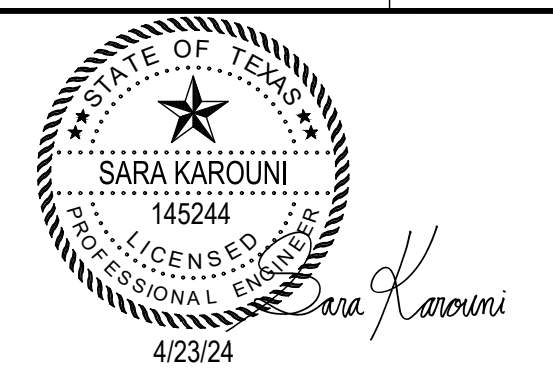
**CONTECH**  
ENGINEERED SOLUTIONS LLC  
www.contechES.com  
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069  
800-338-1122 513-645-7000 513-645-7993 FAX

**CONTECH**  
CMP DETENTION SYSTEMS  
DYODES  
DRAWING

XFILTRATION JOINT SYSTEM DETAILS

PROJECT NO.:	80132	DATE:	4/17/2024
DESIGNED:	DYO	DRAWN:	DYO
CHECKED:	DYO	APPROVED:	DYO
SHEET NO.:			1

REV	DESCRIPTION	DATE
1	ISSUE FOR CONSTRUCTION	04-23-2024



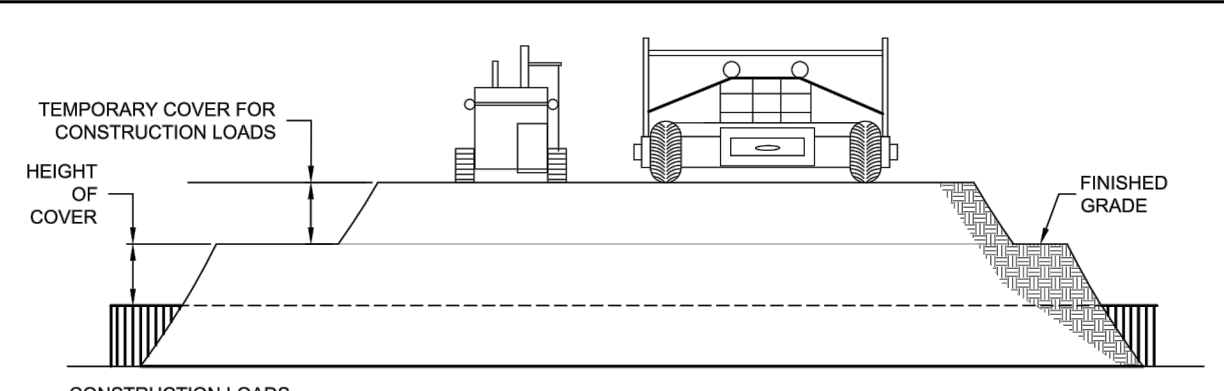
**WGA**  
WARD, GETZ & ASSOCIATES, PLLC  
TEXAS REGISTERED ENGINEERING FIRM F-9756  
2500 Tangierwilde, Suite 120  
Houston, Texas 77063  
713.789.1900

LOST OAKS  
**UNDERGROUND  
DETENTION DETAILS**

SCALE	DESIGN	DRAWN
N/A	AB, AG	AB, AG

SHEET  
C7.1





**CONSTRUCTION LOADS**  
FOR TEMPORARY CONSTRUCTION VEHICLE LOADS, AN EXTRA AMOUNT OF COMPACTED COVER MAY BE REQUIRED OVER THE TOP OF THE PIPE. THE HEIGHT-OF-COVER SHALL MEET THE MINIMUM REQUIREMENTS SHOWN IN THE TABLE BELOW. THE USE OF HEAVY CONSTRUCTION EQUIPMENT NECESSITATES GREATER PROTECTION FOR THE PIPE THAN FINISHED GRADE COVER MINIMUMS FOR NORMAL HIGHWAY TRAFFIC.

PIPE SPAN, INCHES	AXLE LOADS (kips)			
	18-50	50-75	75-110	110-150
	MINIMUM COVER (FT)			
12-42	2.0	2.5	3.0	3.0
48-72	3.0	3.0	3.5	4.0
78-120	3.0	3.5	4.0	4.0
126-144	3.5	4.0	4.5	4.5

\*MINIMUM COVER MAY VARY, DEPENDING ON LOCAL CONDITIONS. THE CONTRACTOR MUST PROVIDE THE ADDITIONAL COVER REQUIRED TO AVOID DAMAGE TO THE PIPE. MINIMUM COVER IS MEASURED FROM THE TOP OF THE PIPE TO THE TOP OF THE MAINTAINED CONSTRUCTION ROADWAY SURFACE.

**CONSTRUCTION LOADING DIAGRAM**  
SCALE: N.T.S.

**SPECIFICATION FOR DESIGNED DETENTION SYSTEM**

**SCOPE**  
THIS SPECIFICATION COVERS THE MANUFACTURE AND INSTALLATION OF THE DESIGNED DETENTION SYSTEM DETAILED IN THE PROJECT PLANS.

**MATERIAL**  
THE MATERIAL SHALL CONFORM TO THE APPLICABLE REQUIREMENTS LISTED BELOW.

ALUMINIZED TYPE 2 STEEL COILS SHALL CONFORM TO THE APPLICABLE REQUIREMENTS OF AASHTO M-274 OR ASTM A-92.

THE GALVANIZED STEEL COILS SHALL CONFORM TO THE APPLICABLE REQUIREMENTS OF AASHTO M-218 OR ASTM A-929.

THE POLYMER COATED STEEL COILS SHALL CONFORM TO THE APPLICABLE REQUIREMENTS OF AASHTO M-248 OR ASTM A-742.

THE ALUMINUM COILS SHALL CONFORM TO THE APPLICABLE REQUIREMENTS OF AASHTO M-197 OR ASTM B-744.

**CONSTRUCTION LOADS**  
CONSTRUCTION LOADS MAY BE HIGHER THAN FINAL LOADS. FOLLOW THE MANUFACTURERS OR NCSIPA GUIDELINES.

**NOTE**  
THESE DRAWINGS ARE FOR CONCEPTUAL PURPOSES AND DO NOT REFLECT ANY LOCAL PREFERENCES OR REGULATIONS. PLEASE CONTACT YOUR LOCAL CONTECH REP FOR MODIFICATIONS.

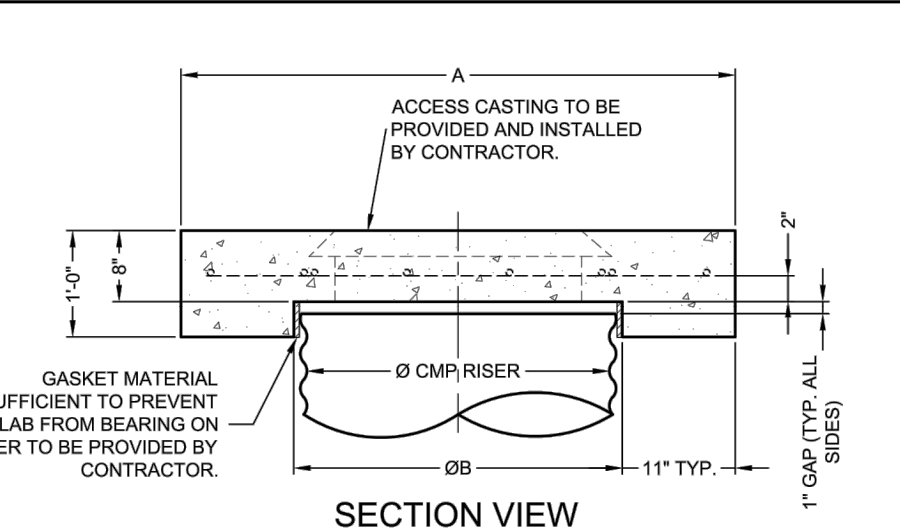
**PIPE**  
THE PIPE SHALL BE MANUFACTURED IN ACCORDANCE TO THE APPLICABLE REQUIREMENTS LISTED BELOW:

ALUMINIZED TYPE 2: AASHTO M-36 OR ASTM A-760  
GALVANIZED: AASHTO M-36 OR ASTM A-760  
POLYMER COATED: AASHTO M-245 OR ASTM A-752  
ALUMINUM: AASHTO M-196 OR ASTM B-745

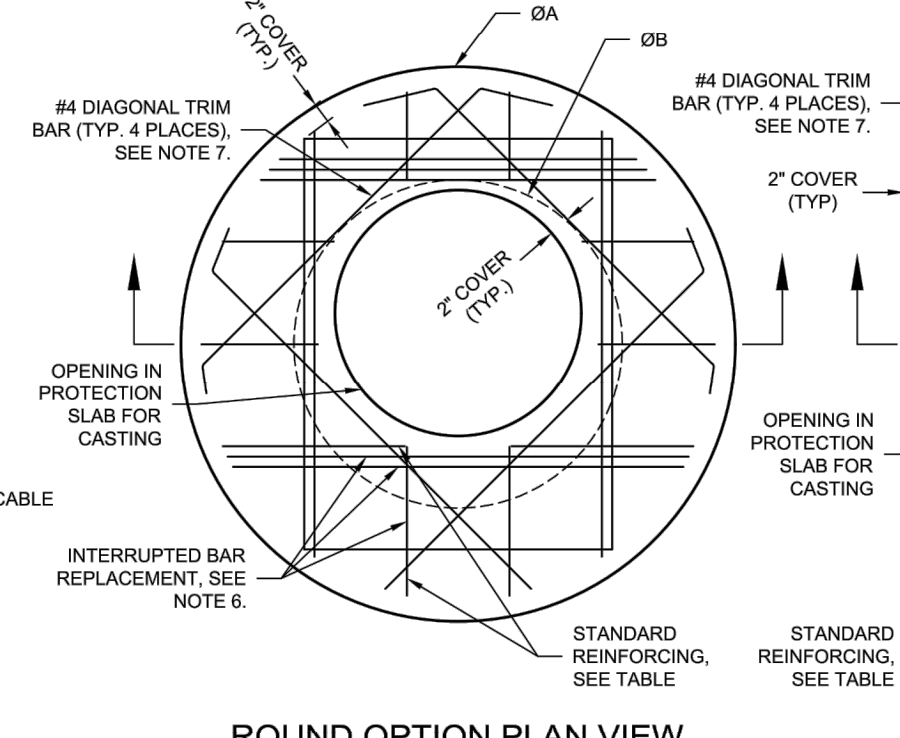
**HANDLING AND ASSEMBLY**  
SHALL BE IN ACCORDANCE WITH NCSIPA'S NATIONAL CORRUGATED STEEL PIPE ASSOCIATION) FOR ALUMINIZED TYPE 2, GALVANIZED OR POLYMER COATED STEEL. SHALL BE IN ACCORDANCE WITH THE MANUFACTURERS' RECOMMENDATIONS FOR ALUMINUM PIPE.

**INSTALLATION**  
SHALL BE IN ACCORDANCE WITH AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES, SECTION 26, DIVISION II DIVISION II OR ASTM A-798 FOR ALUMINIZED TYPE 2, GALVANIZED OR POLYMER COATED STEEL) OR ASTM B-788 (FOR ALUMINUM PIPE) AND IN CONFORMANCE WITH THE PROJECT PLANS AND SPECIFICATIONS. IF THERE ARE ANY INCONSISTENCIES OR CONFLICTS THE CONTRACTOR SHOULD DISCUSS AND RESOLVE WITH THE SITE ENGINEER.

IT IS ALWAYS THE RESPONSIBILITY OF THE CONTRACTOR TO FOLLOW OSHA GUIDELINES FOR SAFE PRACTICES.



**ACCESS CASTING SUPPLIED BY CONTECH IN SELECT MARKETS UNDER SEPARATE SUBMITTAL**

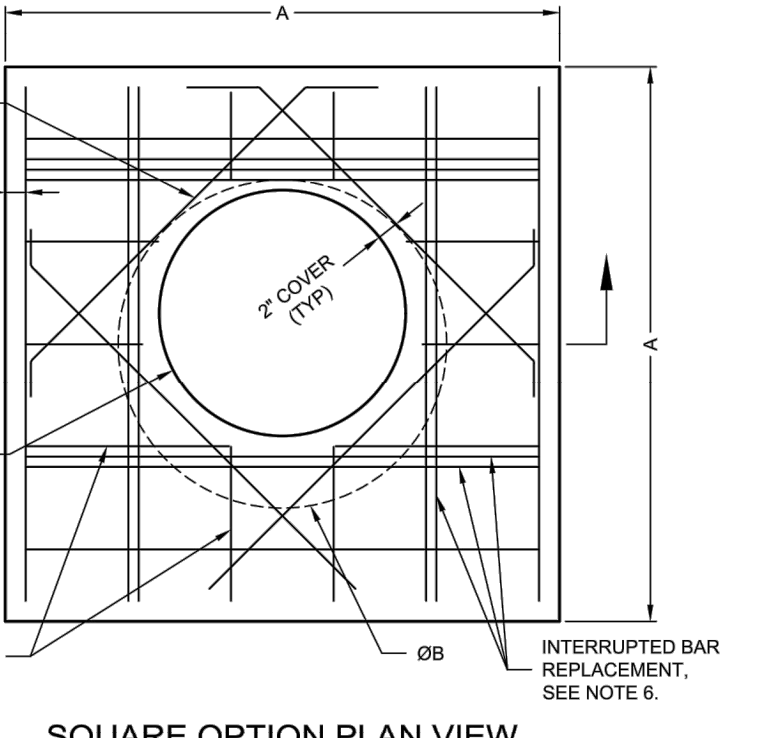


**ROUND OPTION PLAN VIEW**

**REINFORCING TABLE**

Ø CMP RISER	A	Ø B	REINFORCING	**BEARING PRESSURE (PSF)
24"	Ø 4' 4"x4'	20"	#5 @ 12" OCEW #5 @ 12" OCEW	2,410 1,780
30"	Ø 4'-6" 4'-6" X 4'-6"	32"	#5 @ 12" OCEW #5 @ 12" OCEW	2,120 1,530
36"	Ø 5' Ø X 5'	38"	#5 @ 10" OCEW #5 @ 10" OCEW	1,890 1,350
42"	Ø 5'-6" 5'-6" X 5'-6"	44"	#5 @ 10" OCEW #5 @ 9" OCEW	1,720 1,210
48"	Ø 6' Ø X 6'	50"	#5 @ 9" OCEW #5 @ 8" OCEW	1,600 1,100

\*\* ASSUMED SOIL BEARING CAPACITY



**SQUARE OPTION PLAN VIEW**

- NOTES:**
- DESIGN IN ACCORDANCE WITH AASHTO, 17th EDITION.
  - DESIGN LOAD HS25.
  - EARTH COVER = 1' MAX.
  - CONCRETE STRENGTH = 3,500 psi
  - REINFORCING STEEL = ASTM A615, GRADE 60.
  - PROVIDE ADDITIONAL REINFORCING AROUND OPENINGS EQUAL TO THE BARS INTERRUPTED, HALF EACH SIDE. ADDITIONAL BARS TO BE IN THE SAME PLANE.
  - TRIM OPENING WITH DIAGONAL #4 BARS, EXTEND BARS A MINIMUM OF 12" BEYOND OPENING, BEND BARS AS REQUIRED TO MAINTAIN BAR COVER.
  - PROTECTION SLAB AND ALL MATERIALS TO BE PROVIDED AND INSTALLED BY CONTRACTOR.
  - DETAIL DESIGN BY DELTA ENGINEERING, BINGHAMTON, NY.

**MANHOLE CAP DETAIL**  
SCALE: N.T.S.

**CONTECH ENGINEERED SOLUTIONS LLC**  
www.ContechES.com  
8025 Centre Pointe Dr., Suite 400, West Chester, OH 45386  
800-338-1122 513-645-7000 513-645-7993 FAX

**CONTECH CMP DETENTION SYSTEMS**

**XFILTRATION RETENTION SYSTEM DETAILS**

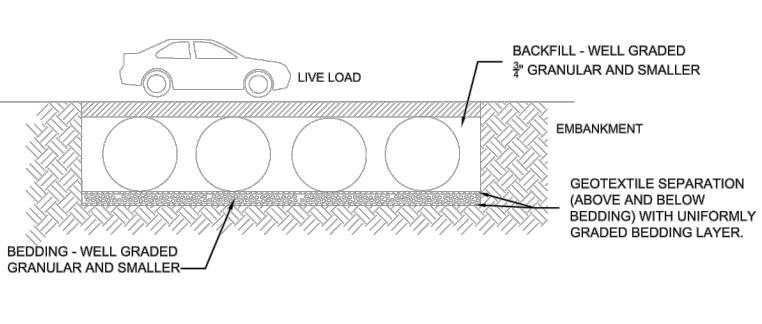
PROJECT No.:	DES. No.:	DATE:
DYD	DYD	DYD
CHECKED:	APPROVED:	
DYD	DYD	
SHEET No.:	DATE:	REVISION DESCRIPTION:

**CMP DETENTION INSTALLATION GUIDE**  
PROPER INSTALLATION OF A FLEXIBLE UNDERGROUND DETENTION SYSTEM WILL ENSURE LONG-TERM PERFORMANCE. THE CONFIGURATION OF THESE SYSTEMS OFTEN REQUIRES SPECIAL CONSTRUCTION PRACTICES THAT DIFFER FROM CONVENTIONAL FLEXIBLE PIPE CONSTRUCTION. CONTECH ENGINEERED SOLUTIONS STRONGLY SUGGESTS SCHEDULING A PRE-CONSTRUCTION MEETING WITH YOUR LOCAL SALES ENGINEER TO DETERMINE IF ADDITIONAL MEASURES, NOT COVERED IN THIS GUIDE, ARE APPROPRIATE FOR YOUR SITE.

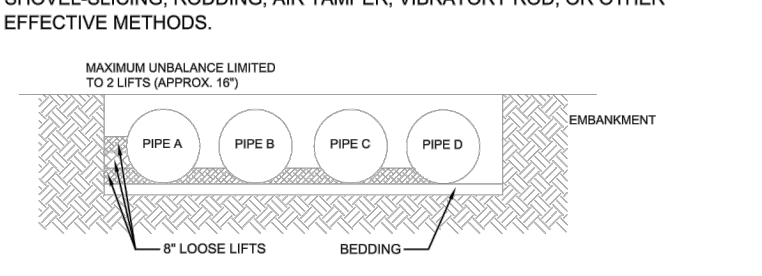
**FOUNDATION**  
CONSTRUCT A FOUNDATION THAT CAN SUPPORT THE DESIGN LOADING APPLIED BY THE PIPE AND ADJACENT BACKFILL WEIGHT AS WELL AS MAINTAIN ITS INTEGRITY DURING CONSTRUCTION.

IF SOFT OR UNSUITABLE SOILS ARE ENCOUNTERED, REMOVE THE POOR SOILS DOWN TO A SUITABLE DEPTH AND THEN BUILD UP TO THE APPROPRIATE ELEVATION WITH A COMPETENT BACKFILL MATERIAL. THE STRUCTURAL FILL MATERIAL, GRADATION SHOULD NOT ALLOW THE MIGRATION OF FINES, WHICH CAN CAUSE SETTLEMENT OF THE DETENTION SYSTEM OR PAVEMENT ABOVE. IF THE STRUCTURAL FILL MATERIAL IS NOT COMPATIBLE WITH THE UNDERLYING SOILS AN ENGINEERING FABRIC SHOULD BE USED AS A SEPARATOR. IN SOME CASES, USING A STIFF REINFORCING GEOGRID REDUCES OVER EXCAVATION AND REPLACEMENT FILL QUANTITIES.

IF AASHTO T99 PROCEDURES ARE DETERMINED INFEASIBLE BY THE GEOTECHNICAL ENGINEER OF RECORD, COMPACTION IS CONSIDERED ADEQUATE WHEN NO FURTHER YIELDING OF THE MATERIAL IS OBSERVED UNDER THE COMPACTOR, OR UNDER FOOT, AND THE GEOTECHNICAL ENGINEER OF RECORD (OR REPRESENTATIVE THEREOF) IS SATISFIED WITH THE LEVEL OF COMPACTION.



**BACKFILL PLACEMENT**

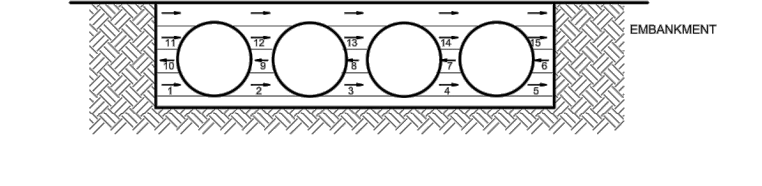
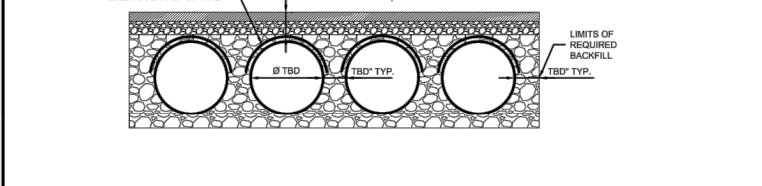


MATERIAL SHALL BE WORKED INTO THE PIPE HAUNCHES BY MEANS OF SHOVEL-SLICING, RODDING, AIR TAMPER, VIBRATORY ROD, OR OTHER EFFECTIVE METHODS.

GRADE THE FOUNDATION SUBGRADE TO A UNIFORM OR SLIGHTLY SLOPING GRADE. IF THE SUBGRADE IS CLAY OR RELATIVELY NON-POROUS AND THE CONSTRUCTION SEQUENCE WILL LAST FOR AN EXTENDED PERIOD OF TIME, IT IS BEST TO SLOPE THE GRADE TO ONE END OF THE SYSTEM. THIS WILL ALLOW EXCESS WATER TO DRAIN QUICKLY, PREVENTING SATURATION OF THE SUBGRADE.

**GEOMEMBRANE BARRIER**  
A SITE'S RESISTIVITY MAY CHANGE OVER TIME WHEN VARIOUS TYPES OF SALTING AGENTS ARE USED, SUCH AS ROAD SALTS FOR DEICING AGENTS. IF SALTING AGENTS ARE USED ON OR NEAR THE PROJECT SITE, A GEOMEMBRANE BARRIER IS RECOMMENDED WITH THE SYSTEM. THE GEOMEMBRANE LINER IS INTENDED TO HELP PROTECT THE SYSTEM FROM THE POTENTIAL ADVERSE EFFECTS THAT MAY RESULT FROM THE USE OF SUCH AGENTS INCLUDING PREMATURE CORROSION AND REDUCED ACTUAL SERVICE LIFE.

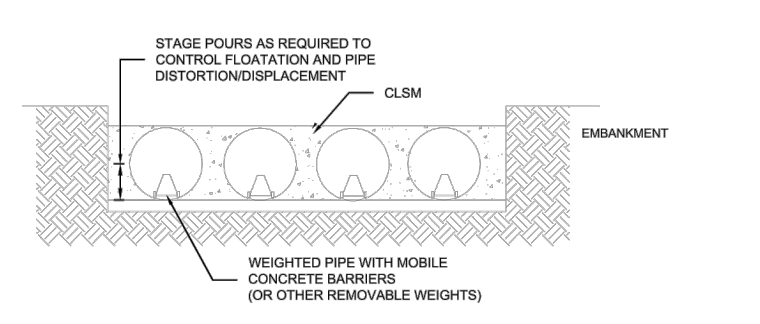
THE PROJECTS ENGINEER OF RECORD IS TO EVALUATE WHETHER SALTING AGENTS WILL BE USED ON OR NEAR THE PROJECT SITE, AND USE HIS/BEST JUDGEMENT TO DETERMINE IF AN ACCESS/INSPECTION MANHOLE SITUATED AT OR NEAR THE INLET AND THE OUTLET ORIFICE SHOULD IT BE NECESSARY TO GET INSIDE THE SYSTEM TO PERFORM MAINTENANCE ACTIVITIES. ALL APPROPRIATE PRECAUTIONS REGARDING CONFINED SPACE ENTRY AND OSHA REGULATIONS SHOULD BE FOLLOWED.



**CMP DETENTION SYSTEM INSPECTION AND MAINTENANCE**  
UNDERGROUND STORMWATER DETENTION AND INFILTRATION SYSTEMS MUST BE INSPECTED AND MAINTAINED AT REGULAR INTERVALS FOR PURPOSES OF PERFORMANCE AND LONGEVITY.

**INSPECTION**  
INSPECTION IS THE KEY TO EFFECTIVE MAINTENANCE OF CMP DETENTION SYSTEMS AND IS EASILY PERFORMED. CONTECH RECOMMENDS ONGOING, ANNUAL INSPECTIONS. SITES WITH HIGH TRASH LOAD OR SMALL OUTLET CONTROL ORIFICES MAY NEED MORE FREQUENT INSPECTIONS. THE RATE AT WHICH THE SYSTEM COLLECTS POLLUTANTS WILL DEPEND MORE ON SITE SPECIFIC ACTIVITIES RATHER THAN THE SIZE OR CONFIGURATION OF THE SYSTEM.

INSPECTIONS SHOULD BE PERFORMED MORE OFTEN IN EQUIPMENT WASHDOWN AREAS, IN CLIMATES WHERE SANDING AND/OR SALTING OPERATIONS TAKE PLACE, AND IN OTHER VARIOUS INSTANCES IN WHICH ONE WOULD EXPECT HIGHER ACCUMULATIONS OF SEDIMENT OR ABRASIVE/ CORROSIVE CONDITIONS. A RECORD OF EACH INSPECTION IS TO BE MAINTAINED FOR THE LIFE OF THE SYSTEM.



**MAINTENANCE**

CMP DETENTION SYSTEMS SHOULD BE CLEANED WHEN AN INSPECTION REVEALS ACCUMULATED SEDIMENT OR TRASH IS CLOGGING THE DISCHARGE ORIFICE.

ACCUMULATED SEDIMENT AND TRASH CAN TYPICALLY BE EVACUATED THROUGH THE MANHOLE OVER THE OUTLET ORIFICE. IF MAINTENANCE IS NOT PERFORMED AS RECOMMENDED, SEDIMENT AND TRASH MAY ACCUMULATE IN FRONT OF THE OUTLET ORIFICE. MANHOLE COVERS SHOULD BE SECURELY SEATED FOLLOWING CLEANING ACTIVITIES. CONTECH SUGGESTS THAT ALL SYSTEMS BE DESIGNED WITH AN ACCESS/INSPECTION MANHOLE SITUATED AT OR NEAR THE INLET AND THE OUTLET ORIFICE. SHOULD IT BE NECESSARY TO GET INSIDE THE SYSTEM TO PERFORM MAINTENANCE ACTIVITIES, ALL APPROPRIATE PRECAUTIONS REGARDING CONFINED SPACE ENTRY AND OSHA REGULATIONS SHOULD BE FOLLOWED.

**CONSTRUCTION LOADING**

TYPICALLY, THE MINIMUM COVER SPECIFIED FOR A PROJECT ASSUMES H-20 LIVE LOAD. BECAUSE CONSTRUCTION LOADS OFTEN EXCEED DESIGN LIVE LOADS, INCREASED TEMPORARY MINIMUM COVER REQUIREMENTS ARE NECESSARY. SINCE CONSTRUCTION EQUIPMENT VARIES FROM JOB TO JOB, IT IS BEST TO ADDRESS REQUIREMENTS SPECIFIC TO THE PROJECT. CONTACT YOUR LOCAL CONTECH SALES ENGINEER DURING YOUR PRE-CONSTRUCTION MEETING.

**ADDITIONAL CONSIDERATIONS**

BECAUSE MOST SYSTEMS ARE CONSTRUCTED BELOW-GRADE, RAINFALL CAN RAPIDLY FILL THE EXCAVATION, POTENTIALLY CAUSING FLOATION AND MOVEMENT OF THE PREVIOUSLY PLACED PIPES. TO HELP MITIGATE POTENTIAL PROBLEMS, IT IS BEST TO START THE INSTALLATION AT THE DOWNSTREAM END WITH THE OUTLET ALREADY CONSTRUCTED TO ALLOW A ROUTE FOR THE WATER TO ESCAPE. TEMPORARY DIVERSION MEASURES MAY BE REQUIRED FOR HIGH FLOWS DUE TO THE RESTRICTED NATURE OF THE OUTLET PIPE.

ANNUAL INSPECTIONS ARE BEST PRACTICE FOR ALL UNDERGROUND SYSTEMS. DURING THIS INSPECTION, IF EVIDENCE OF SALTING/ICEING AGENTS IS OBSERVED WITHIN THE SYSTEM, IT IS BEST PRACTICE FOR THE SYSTEM TO BE RINSED, INCLUDING ABOVE THE SPRING LINE SOON AFTER THE SPRING THAW AS PART OF THE MAINTENANCE PROGRAM FOR THE SYSTEM.

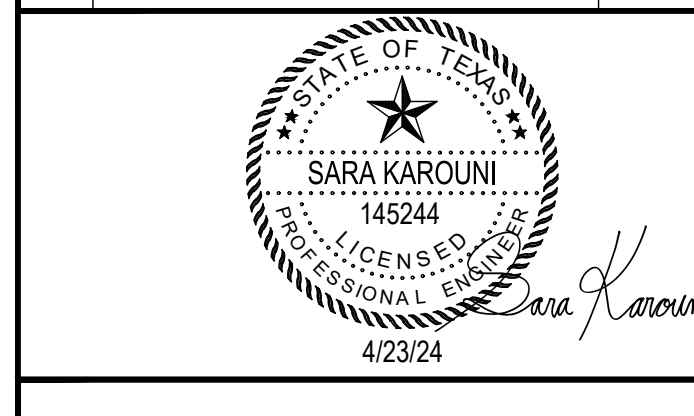
MAINTAINING AN UNDERGROUND DETENTION OR INFILTRATION SYSTEM IS EASIER WHEN THERE IS NO FLOW ENTERING THE SYSTEM. FOR THIS REASON, IT IS A GOOD IDEA TO SCHEDULE THE CLEANOUT DURING DRY WEATHER.

THE FOREGOING INSPECTION AND MAINTENANCE EFFORTS HELP ENSURE UNDERGROUND SYSTEMS USED FOR STORMWATER STORAGE CONTINUE TO FUNCTION AS INTENDED BY IDENTIFYING RECOMMENDED REGULAR INSPECTION AND MAINTENANCE PRACTICES. INSPECTION AND MAINTENANCE RELATED TO THE STRUCTURAL INTEGRITY OF THE PIPE OR THE SOUNDNESS OF PIPE JOINT CONNECTIONS IS BEYOND THE SCOPE OF THIS GUIDE.



**XFILTRATION JOINT SYSTEM DETAILS**

REV	DESCRIPTION	DATE
ISSUE FOR CONSTRUCTION		04-23-2024

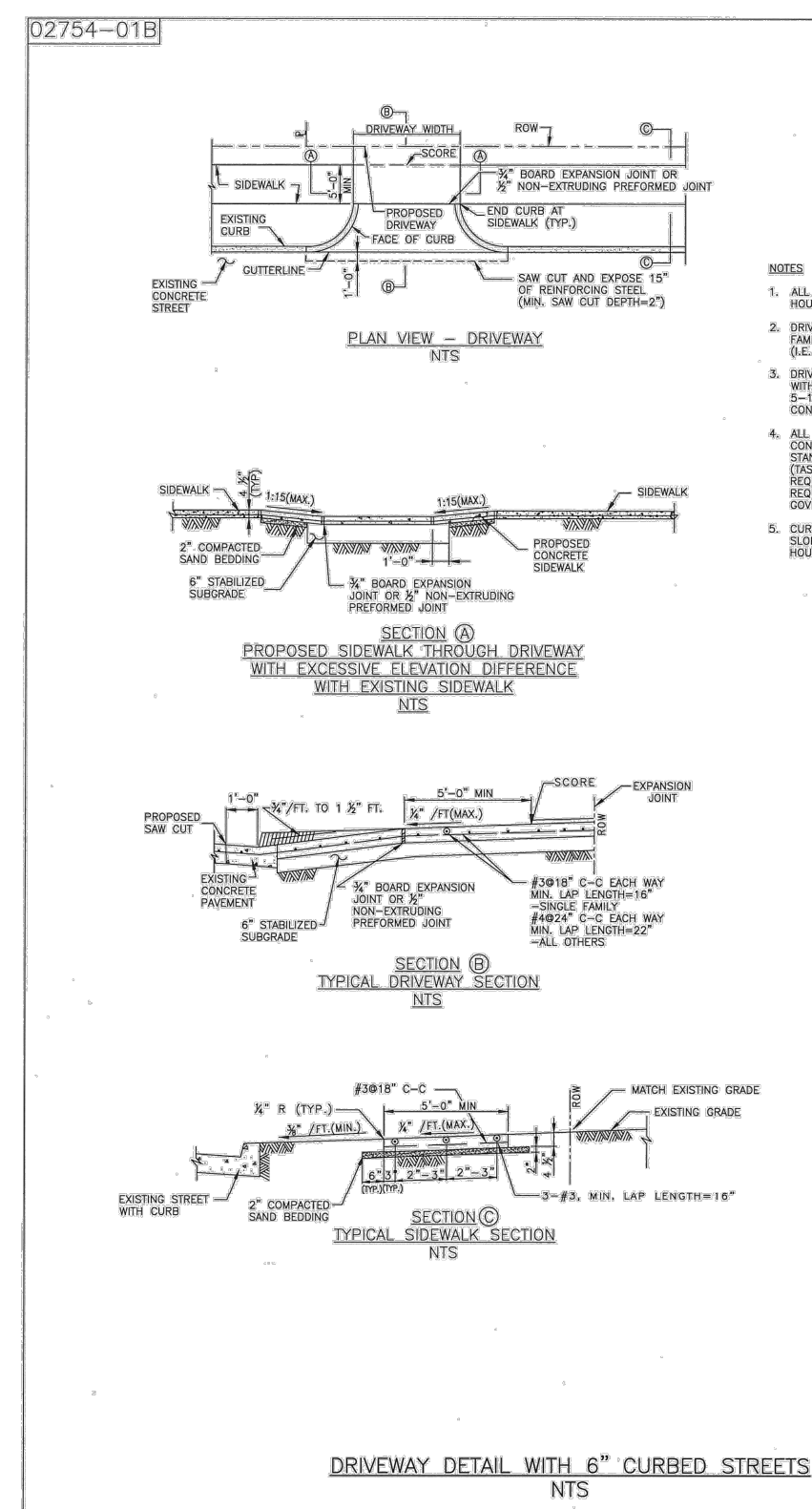


**LOST OAKS**  
**UNDERGROUND DETENTION DETAILS**

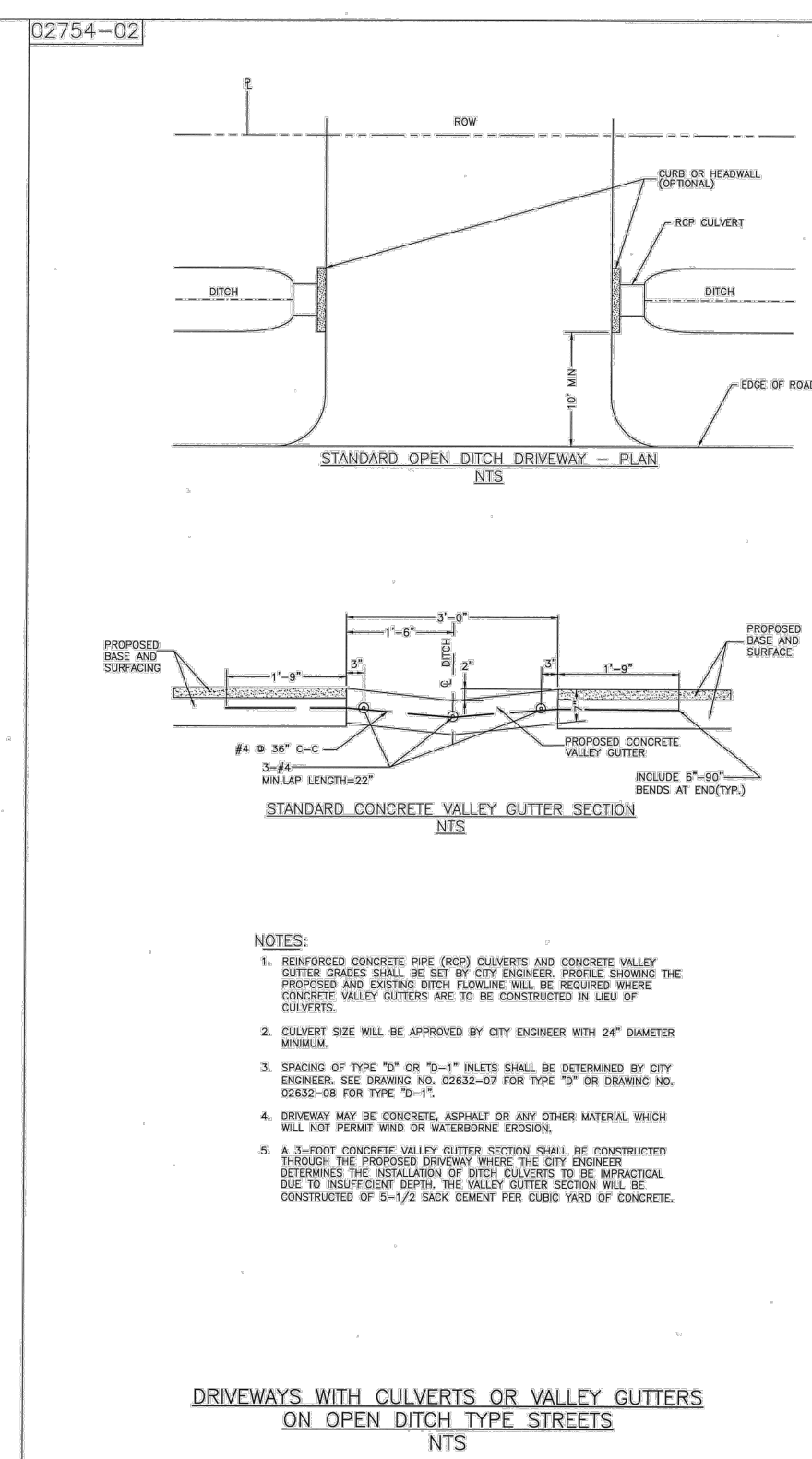
SCALE: N/A	DESIGN: AB, AG	DRAWN: AB, AG
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**SHEET C7.2**





- NOTES:
1. ALL JOINTS SHALL CONFORM TO CITY OF HOUSTON SPECIFICATIONS.
  2. DRIVEWAYS SHALL BE MINIMUM 4" THICK FOR SINGLE DRIVEY USE AND MINIMUM 7" THICK FOR ALL OTHERS (IE: COMMERCIAL, INDUSTRIAL, ETC).
  3. DRIVEWAYS AND SIDEWALKS SHALL BE CONSTRUCTED TO THE SAME FINISH ELEVATION UNLESS OTHERWISE SPECIFIED IN THE CONTRACT DOCUMENTS.
  4. ALL RAMP AND SIDEWALKS SHALL BE CONSTRUCTED TO A FINISH ELEVATION THAT ACCORDS WITH THE CITY ENGINEER'S REQUIREMENTS. THE CONTRACTOR SHALL VERIFY THE FINISH ELEVATION OF THE DRIVEWAY AND SIDEWALK BEFORE CONSTRUCTION.
  5. CURB RAMP THAT ARE STEEPER THAN A 1:15 MAX SLOPE SHALL BE ACCEPTED BY THE CITY OF HOUSTON.



- NOTES:
1. REFERENCED CONCRETE CURB, DRIVEWAYS AND CONCRETE VALLEY GUTTERS SHALL BE CONSTRUCTED TO A FINISH ELEVATION THAT ACCORDS WITH THE CITY ENGINEER'S REQUIREMENTS. THE CONTRACTOR SHALL VERIFY THE FINISH ELEVATION OF THE DRIVEWAY AND SIDEWALK BEFORE CONSTRUCTION.
  2. DRIVEWAY JOINTS SHALL BE APPROVED BY CITY ENGINEER WITH 24" SPACED JOINTS.
  3. SLOPE OF THE 1" OR 2" RAMP SHALL BE DETERMINED BY CITY ENGINEER. SEE DRAWING NO. 02754-02 FOR THE 1" OR 2" RAMP.
  4. DRIVEWAY MAY BE CONCRETE, ASPHALT OR ANY OTHER MATERIAL WHICH WILL NOT CAUSE DAMAGE TO THE SIDEWALK SURFACE.
  5. A 3" DEEP CONCRETE VALLEY GUTTER SHALL BE CONSTRUCTED THROUGH THE DRIVEWAY DRIVEWAY WHERE THE CITY ENGINEER HAS DETERMINED THAT A VALLEY GUTTER IS REQUIRED. THE VALLEY GUTTER SHALL BE CONSTRUCTED TO A FINISH ELEVATION THAT ACCORDS WITH THE CITY ENGINEER'S REQUIREMENTS.

**CITY OF HOUSTON**  
HOUSTON PUBLIC WORKS

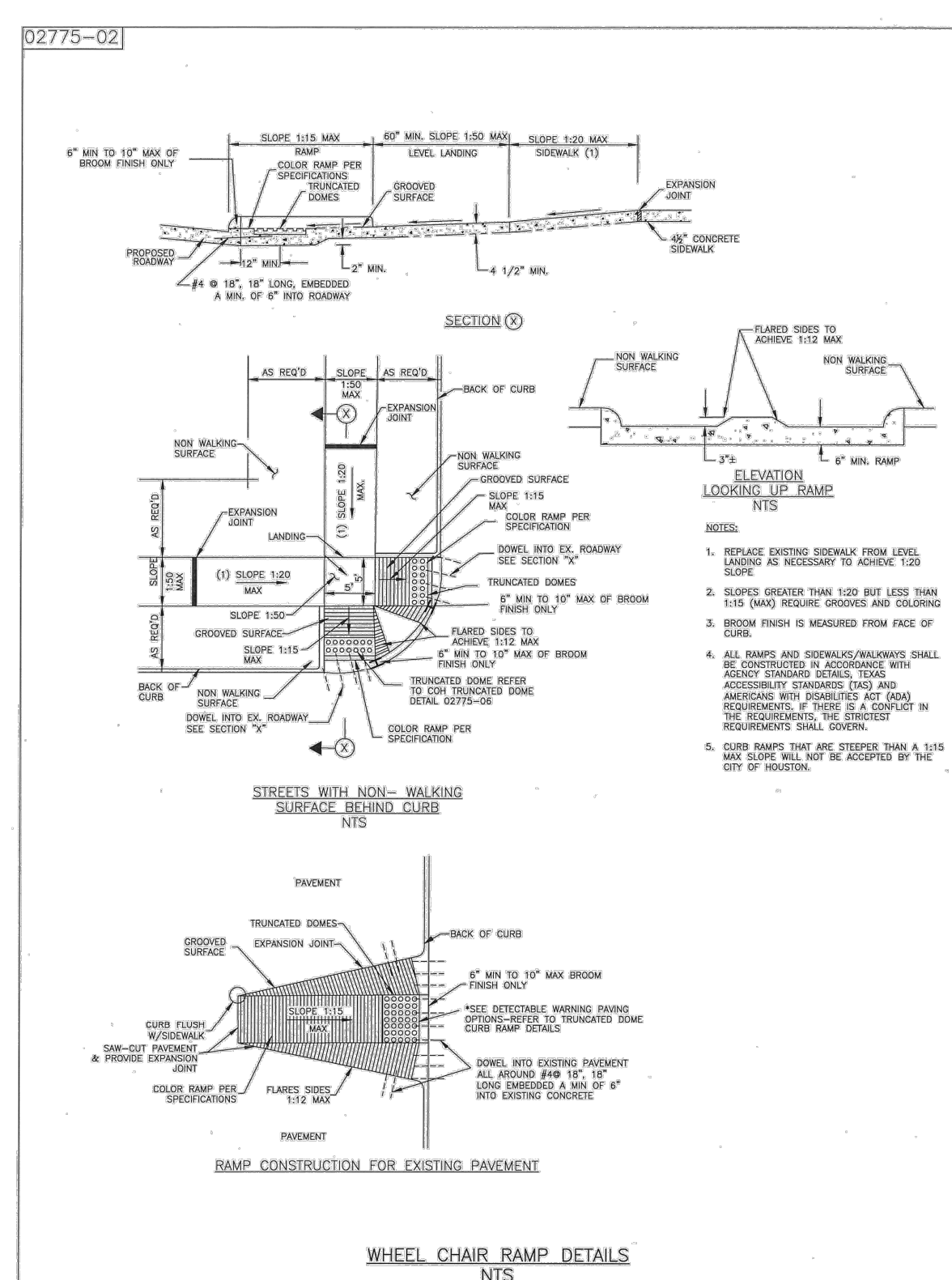
STREET PAVING AND SIDEWALK  
02754-01B THROUGH 02754-02

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CITY ENGINEER

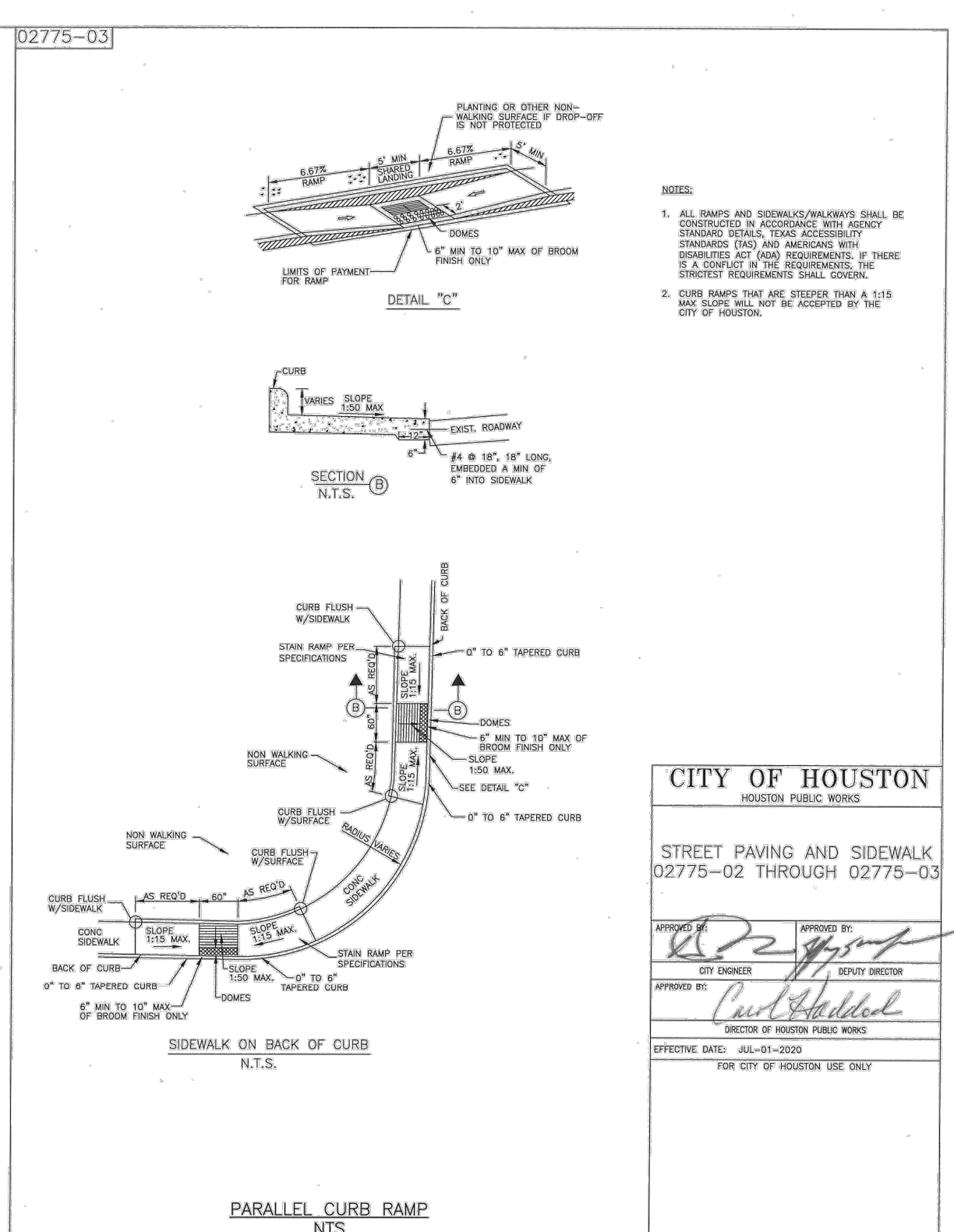
APPROVED BY: *[Signature]*  
SECTOR OF HOUSTON PUBLIC WORKS

OFFERING DATE: 04-10-2024  
FOR CITY OF HOUSTON USE ONLY

SHEET NO. \_\_\_\_\_



- NOTES:
1. REPLACE EXISTING SIDEWALK FROM LEVEL LANDING AS NECESSARY TO ADHERE TO 2.0.
  2. SLOPE GREATER THAN 1:15 BUT LESS THAN 1:10 SHALL BE BROOM FINISH AND COLOR FINISH IS REQUIRED FROM FACE OF CURB.
  3. ALL RAMP AND SIDEWALKS SHALL BE CONSTRUCTED TO A FINISH ELEVATION THAT ACCORDS WITH THE CITY ENGINEER'S REQUIREMENTS. THE CONTRACTOR SHALL VERIFY THE FINISH ELEVATION OF THE DRIVEWAY AND SIDEWALK BEFORE CONSTRUCTION.
  4. CURB RAMP THAT ARE STEEPER THAN A 1:15 MAX SLOPE SHALL NOT BE ACCEPTED BY THE CITY OF HOUSTON.



**CITY OF HOUSTON**  
HOUSTON PUBLIC WORKS

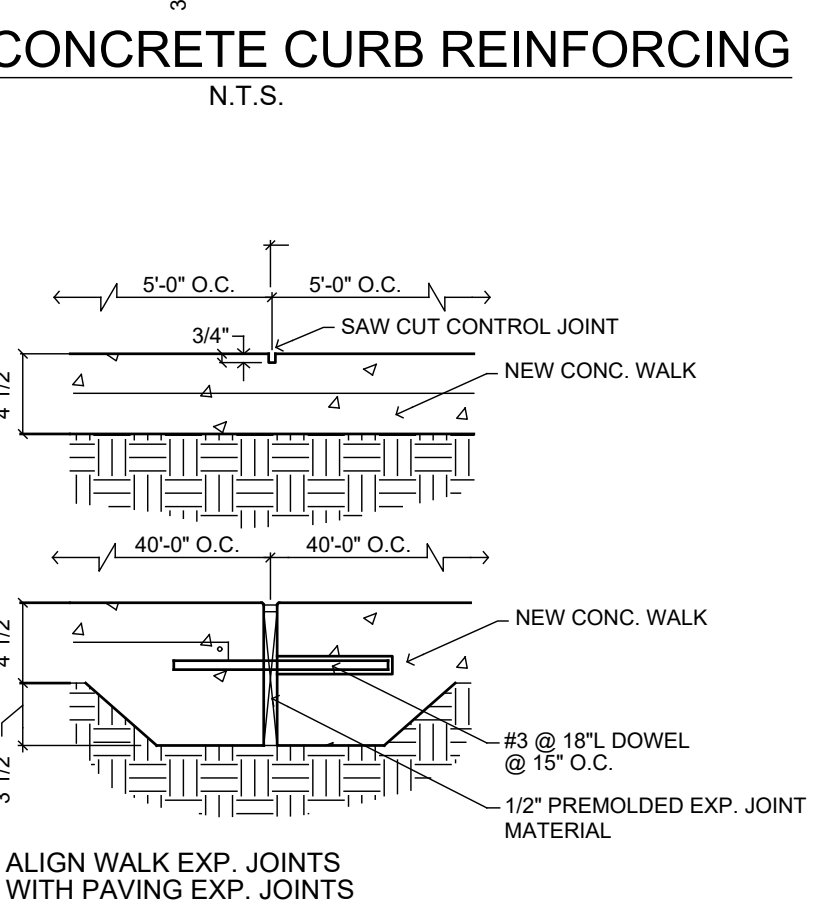
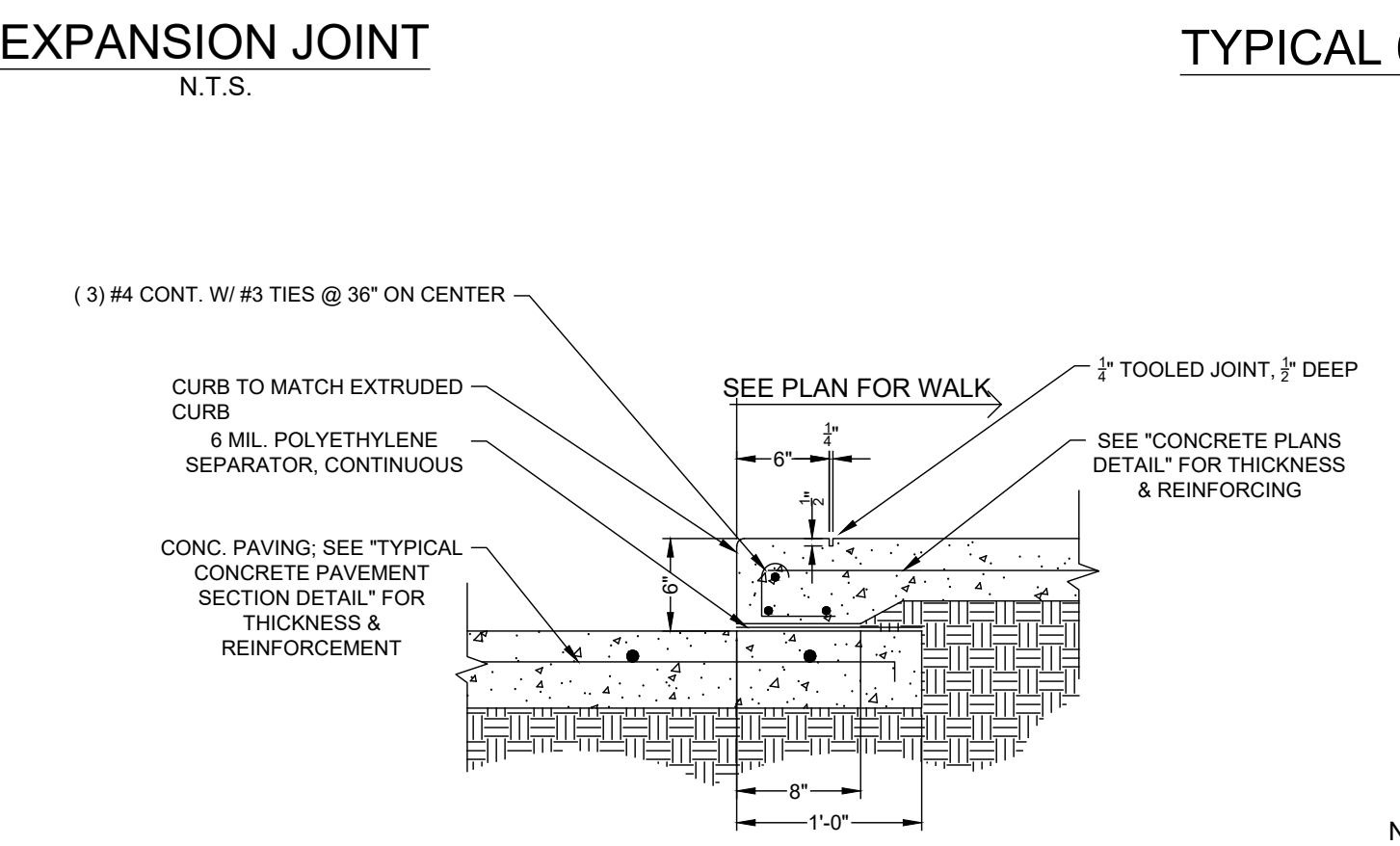
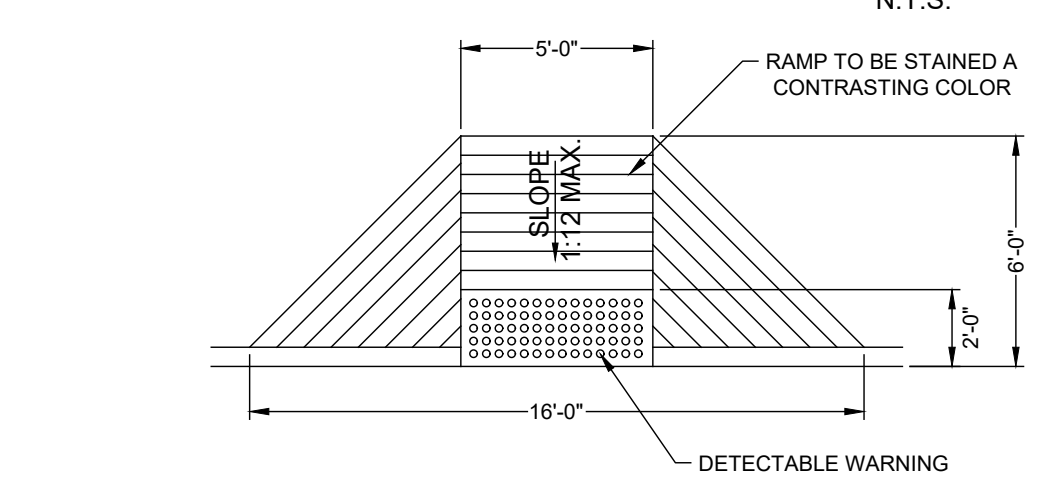
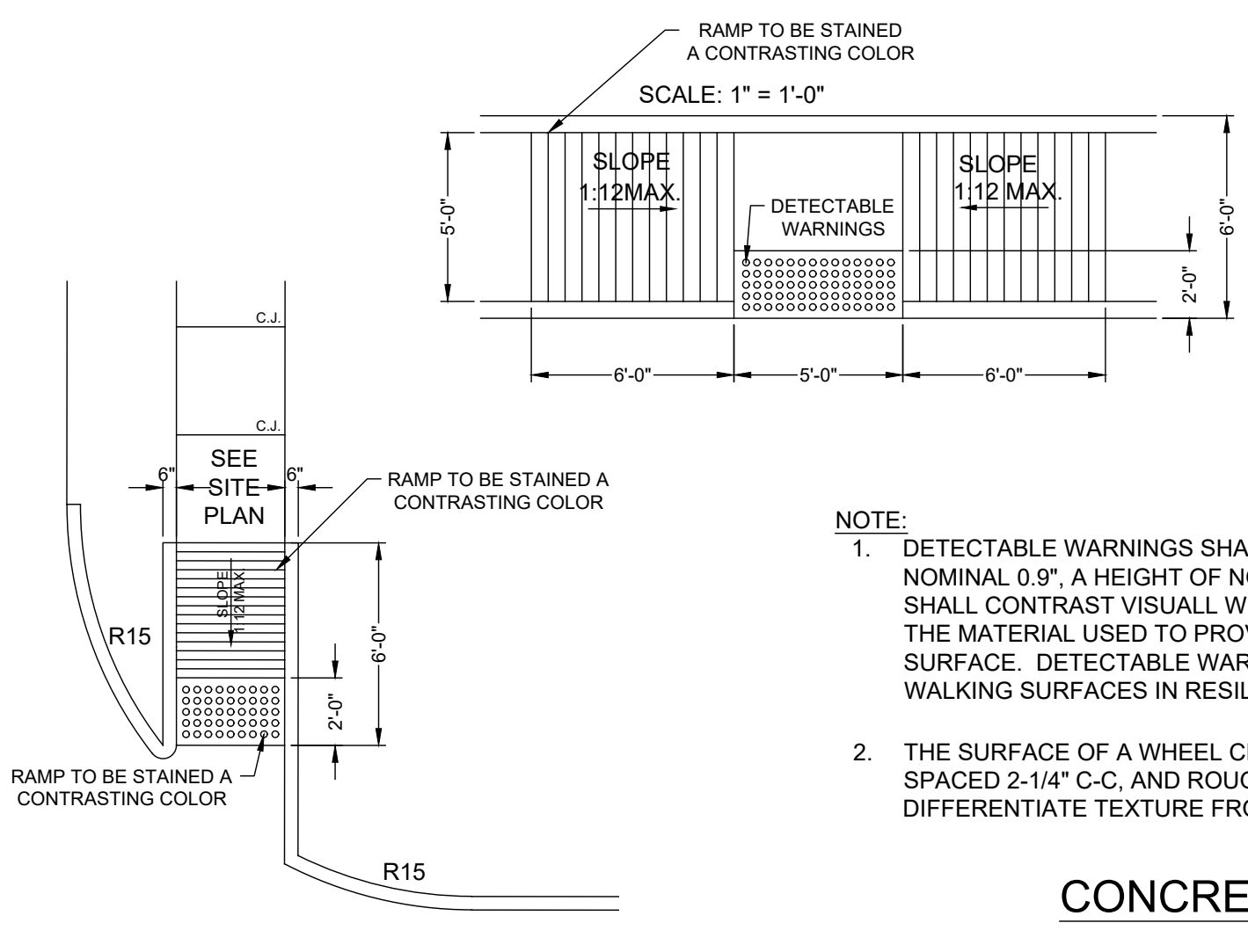
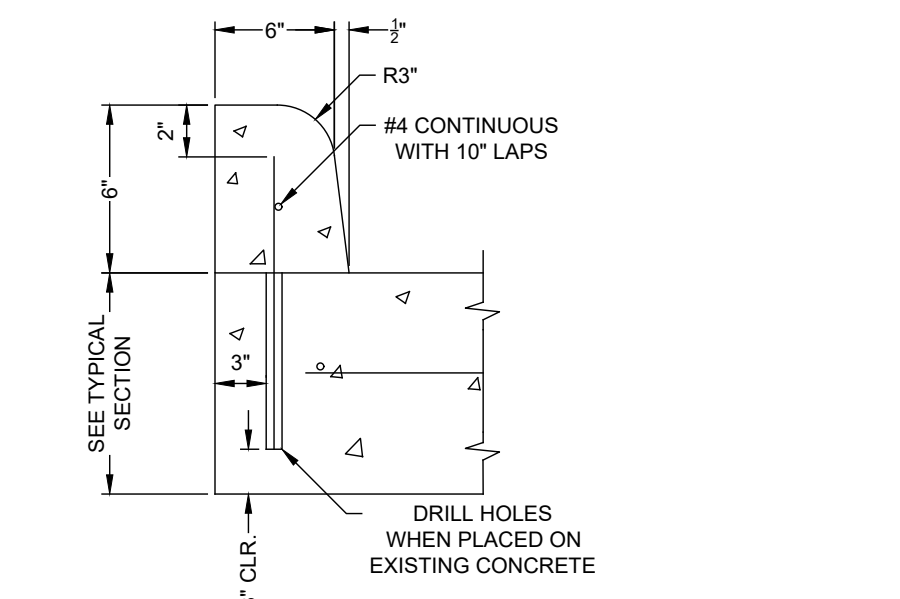
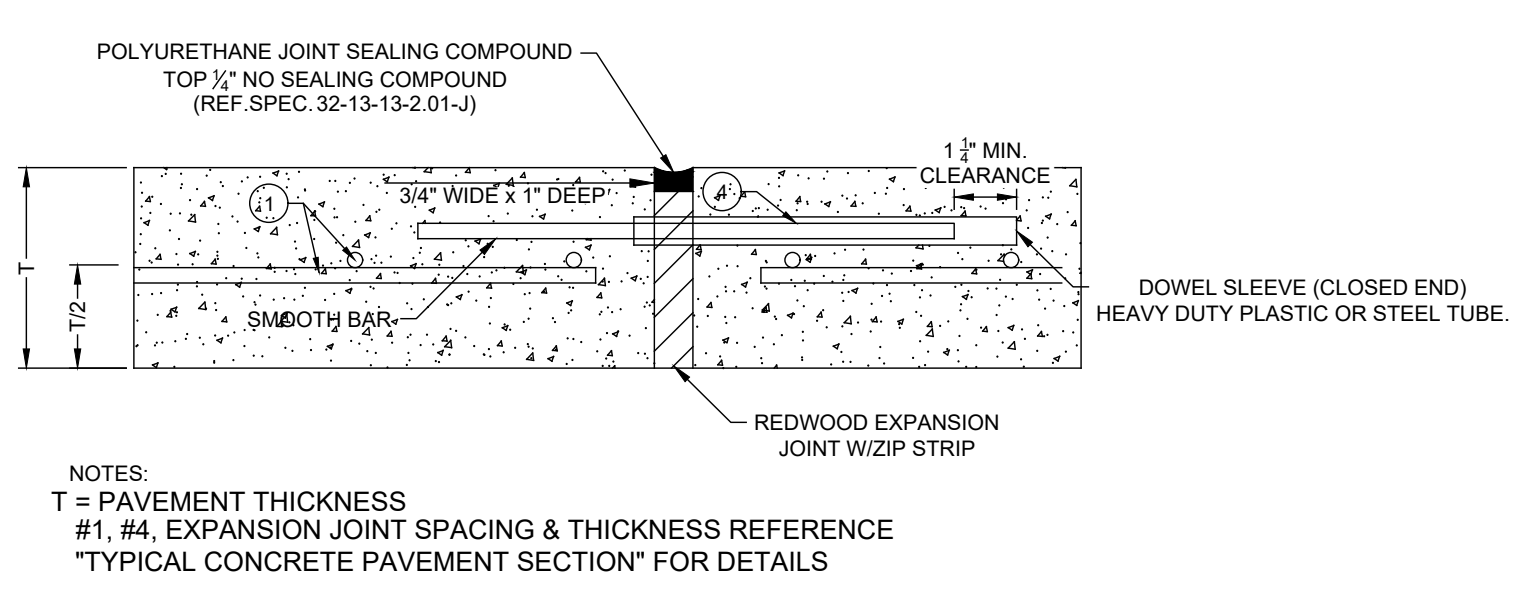
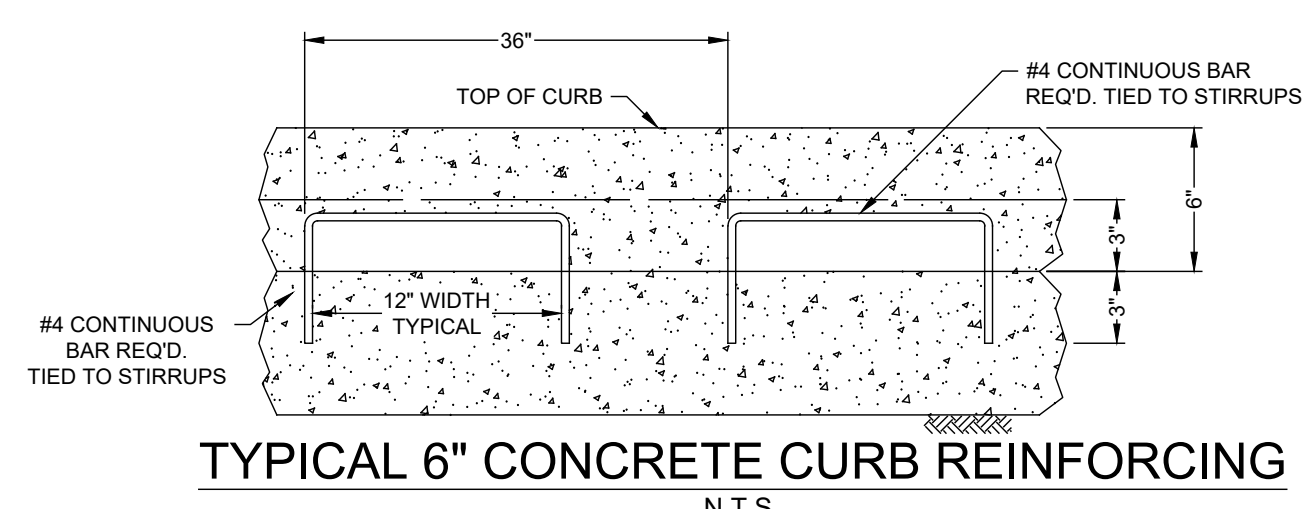
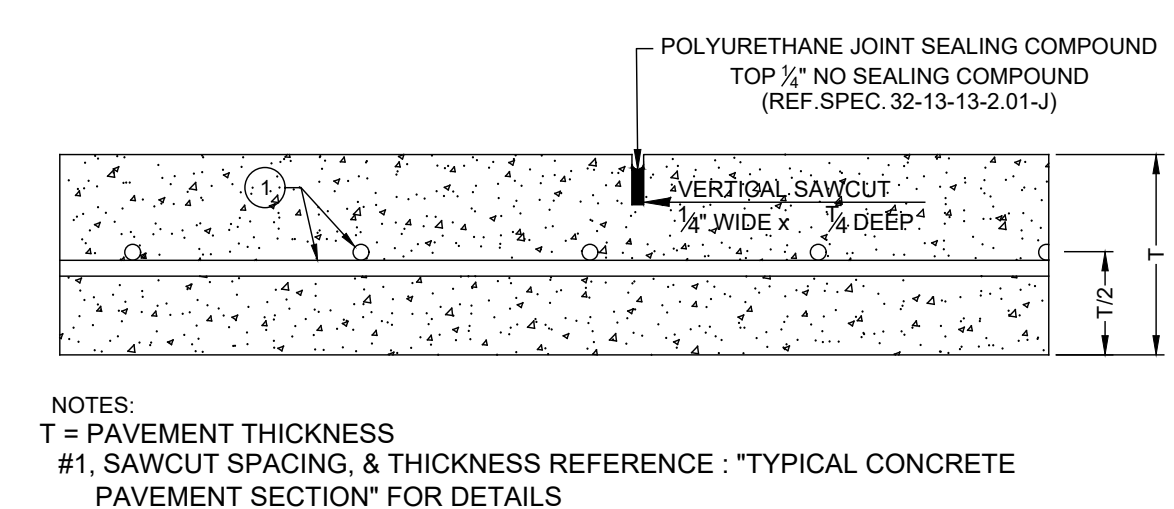
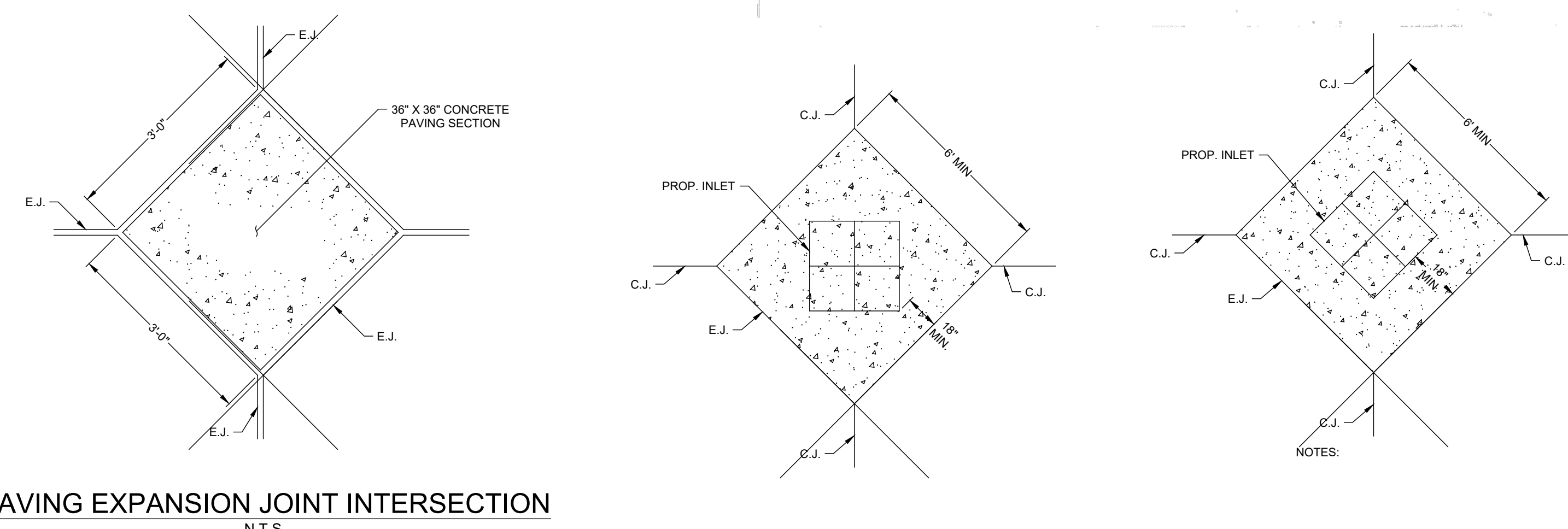
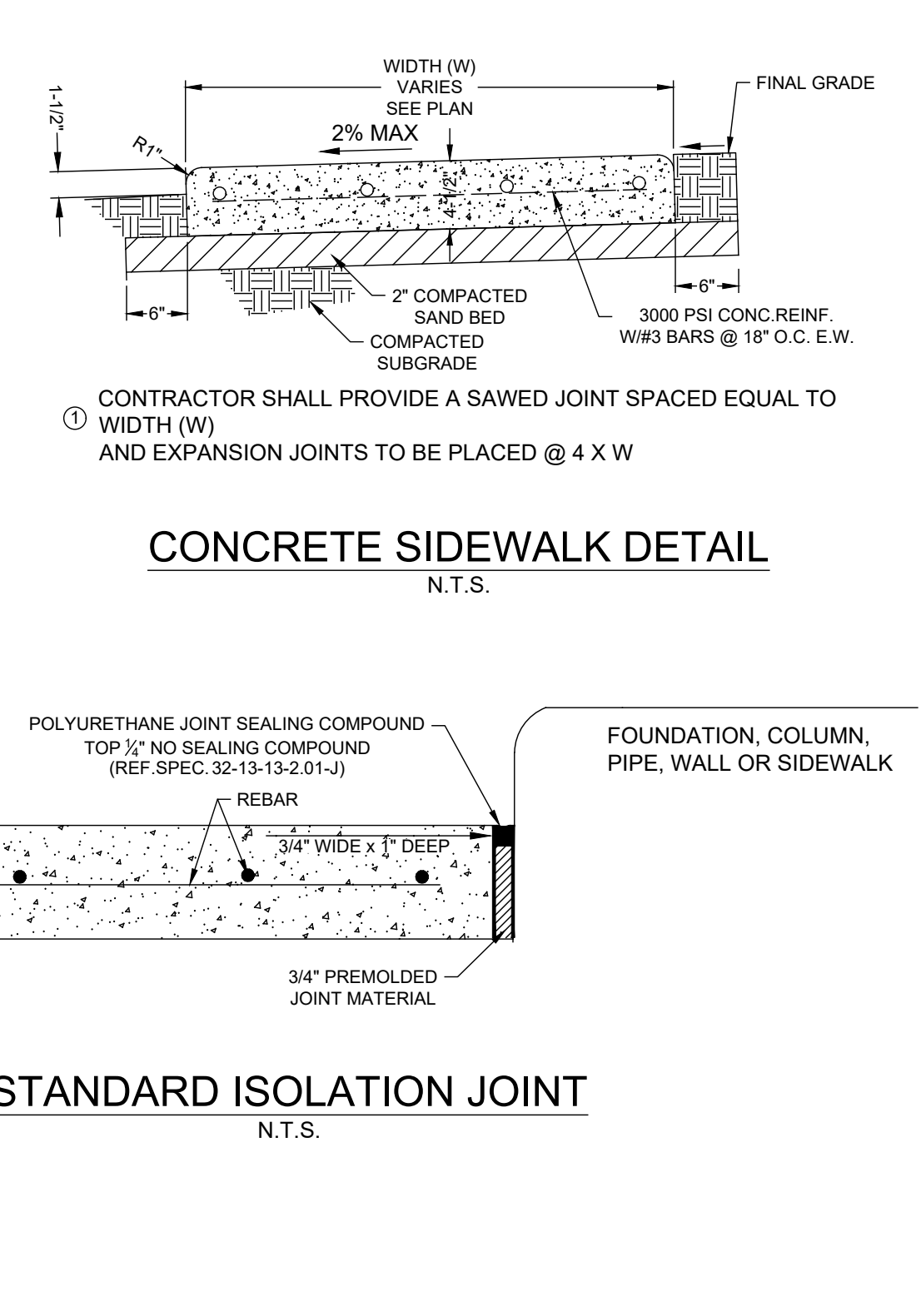
STREET PAVING AND SIDEWALK  
02775-02 THROUGH 02775-03

APPROVED BY: *[Signature]*  
CITY ENGINEER

APPROVED BY: *[Signature]*  
SECTOR OF HOUSTON PUBLIC WORKS

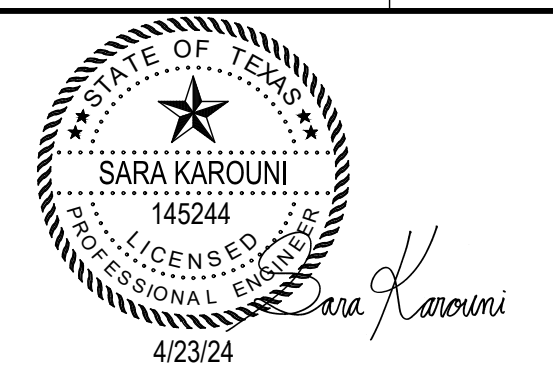
OFFERING DATE: 04-10-2024  
FOR CITY OF HOUSTON USE ONLY

SHEET NO. \_\_\_\_\_



- NOTE:
1. DETECTABLE WARNINGS SHALL CONSIST OF RAISED TRUNCATED DOMES WITH A DIAMETER OF NOMINAL 0.9" A HEIGHT OF NOMINAL 0.2" AND A CENTER TO CENTER SPACING OF NOMINAL 2.35" AND SHALL CONTRAST VISUALLY WITH ADJOINING SURFACES, EITHER LIGHT-ON-DARK OR DARK-ON-LIGHT. THE MATERIAL USED TO PROVIDE CONTRAST SHALL BE AN INTEGRAL PART OF THE WALKING SURFACE. DETECTABLE WARNINGS USED ON INTERIOR SURFACES SHALL DIFFER FROM ADJOINING WALKING SURFACES IN RESILIENCY OR SOUND-ON-CANE CONTACT.
  2. THE SURFACE OF A WHEEL CHAIR RAMP IS BE GROVED LATERALLY WITH 1/2" WIDE BY 1/8" DEEP GROOVES, SPACED 2-1/4" C-C, AND ROUGHENED NO LESS THAN A BROOM FINISH TO PREVENT SLIPPING, AND TO DIFFERENTIATE TEXTURE FROM THAT OF STANDARD SIDEWALK.

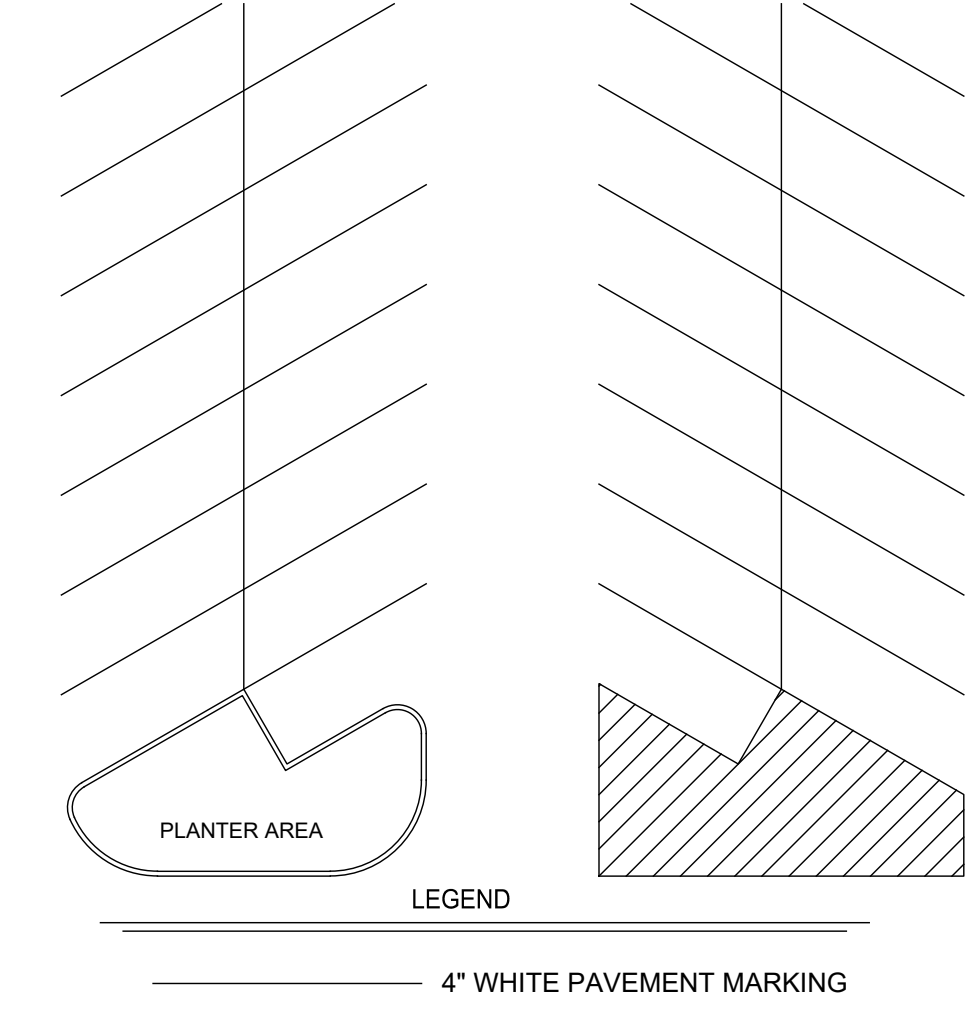
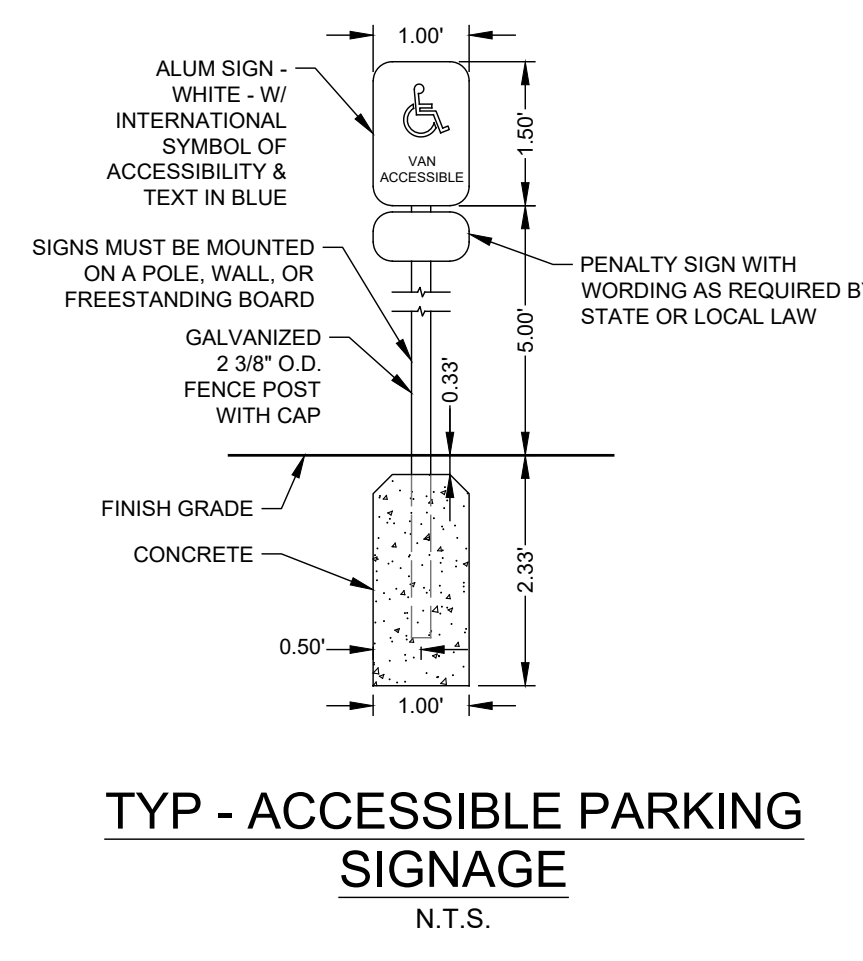
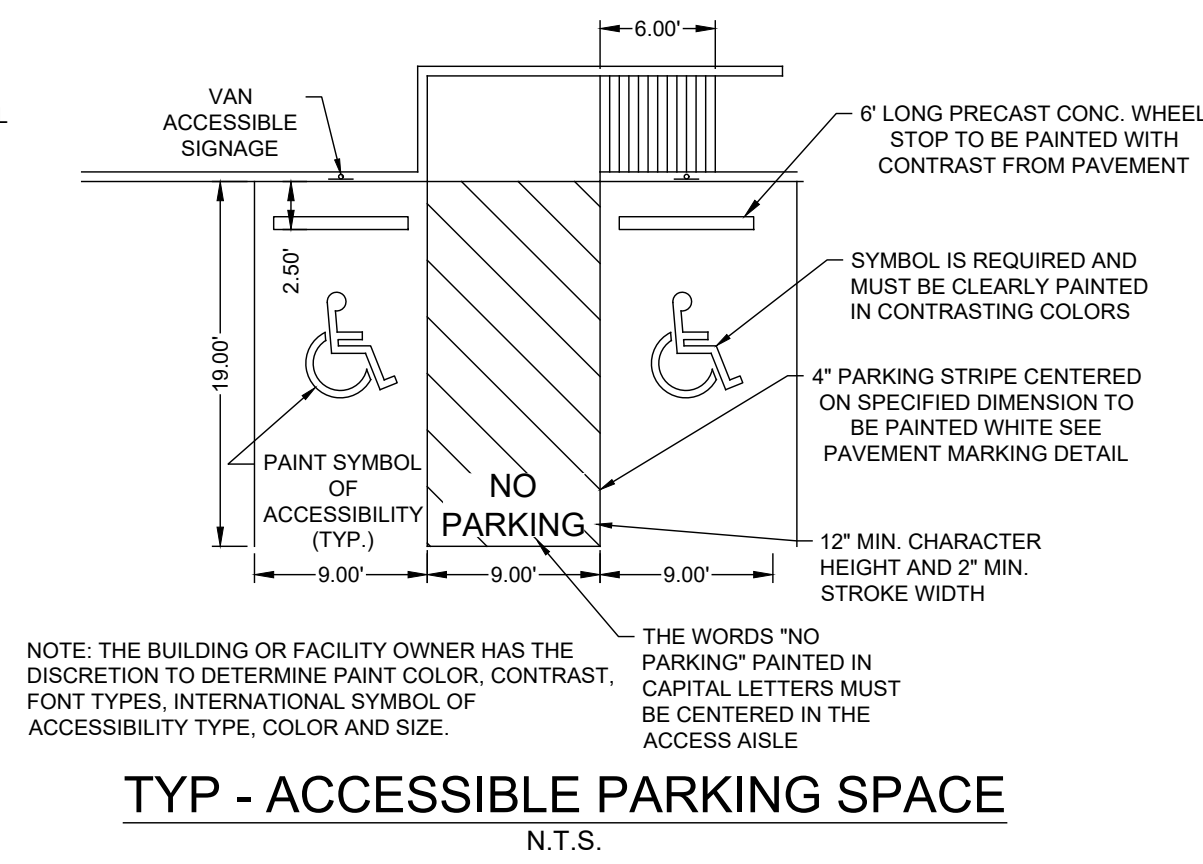
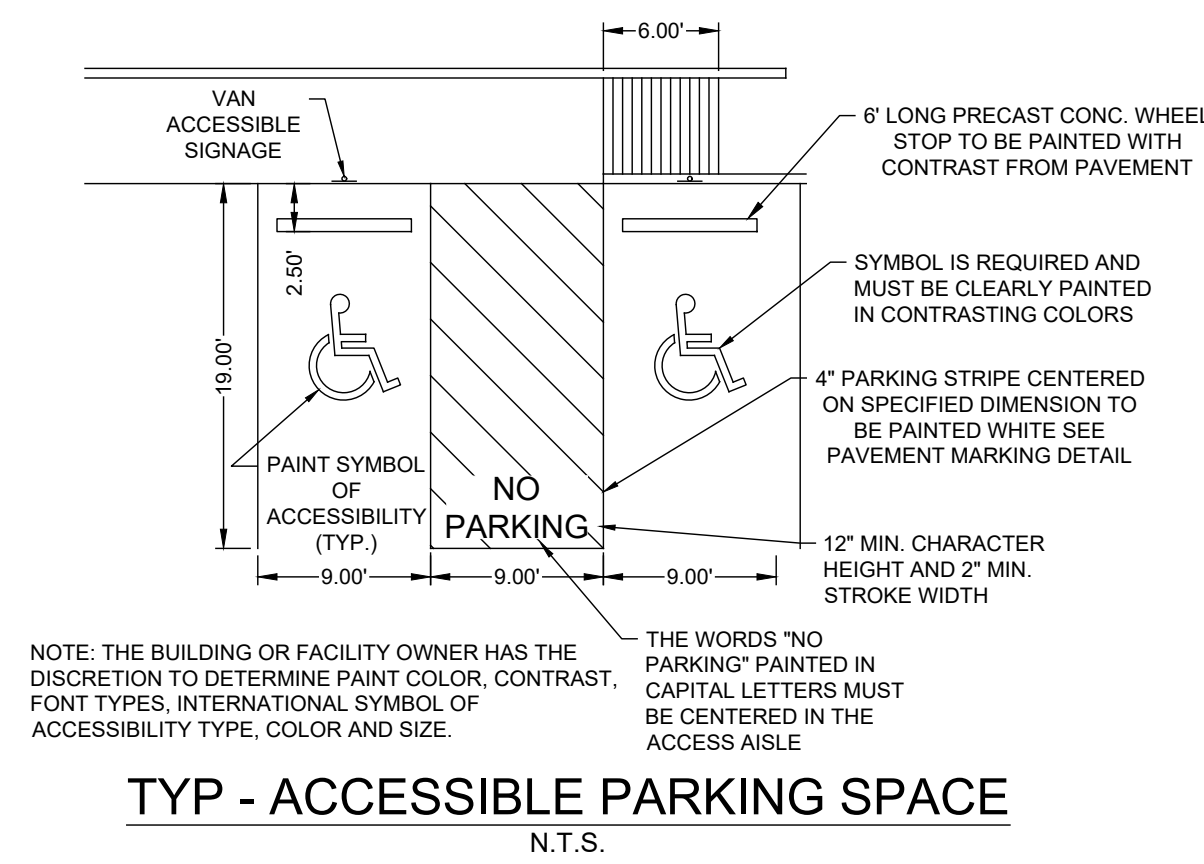
REV	DESCRIPTION	DATE
ISSUE FOR CONSTRUCTION		04-23-2024



LOST OAKS		
PAVING DETAILS		
SCALE	DESIGN	DRAWN
N/A	AB, AG	AB, AG

SHEET  
**C8.1**

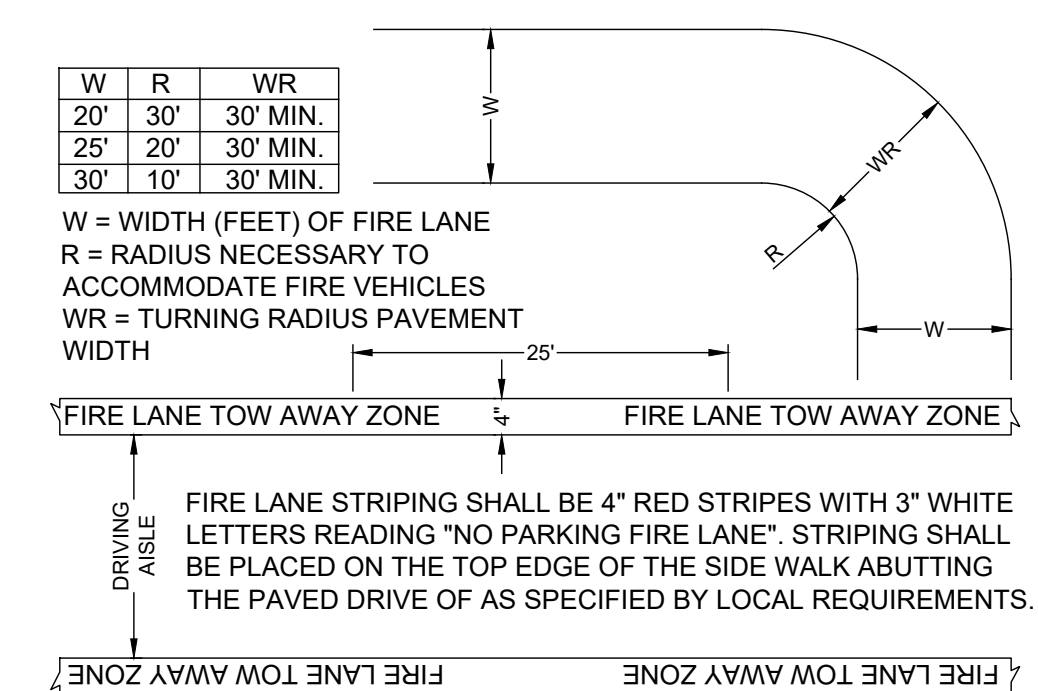




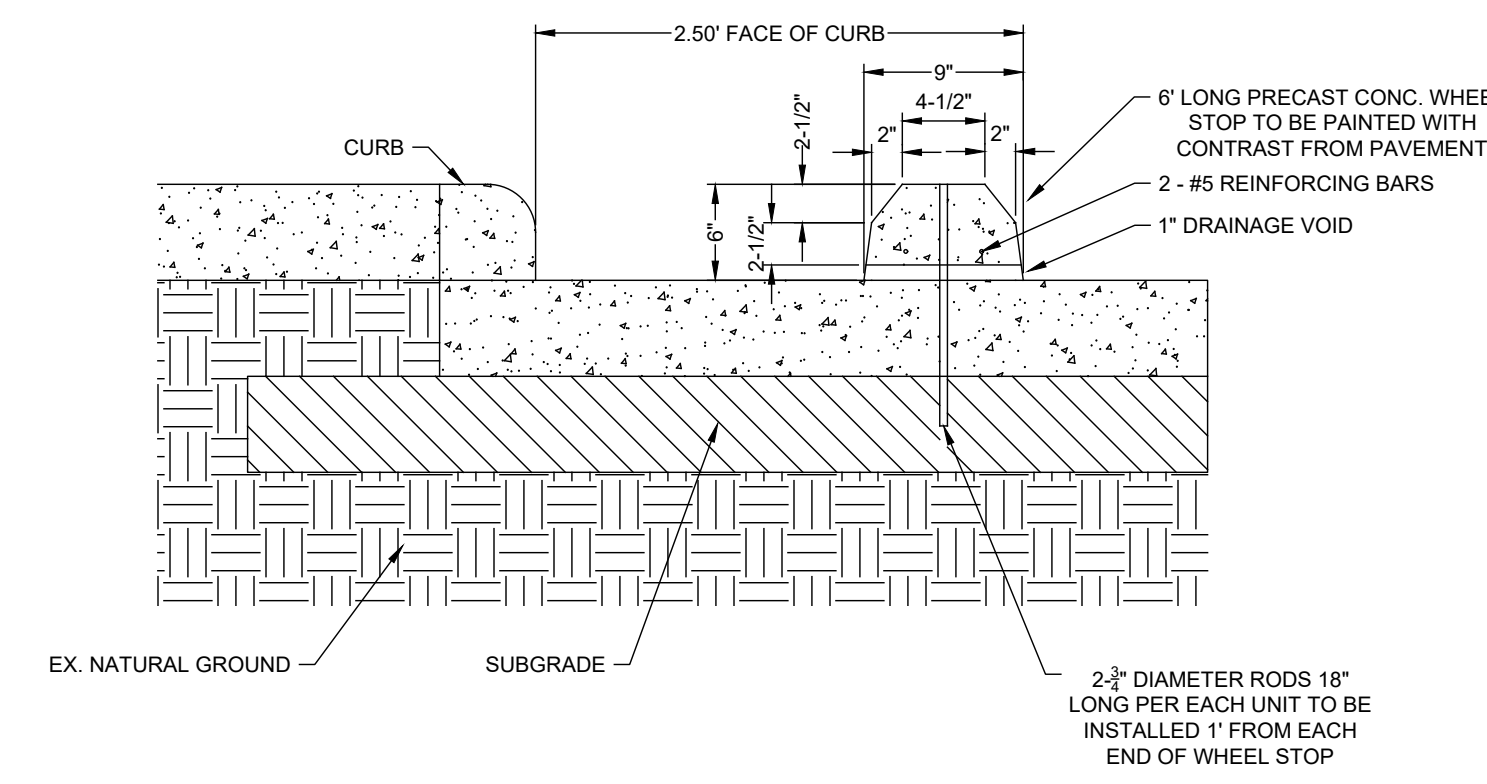
**PAVEMENT MARKINGS NOTES:**  
 FURNISH AND INSTALL PAVEMENT MARKINGS OF THE TYPE AND SIZE SHOWN ON THE PLANS AND AS REQUIRED FOR COMPLIANCE WITH GOVERNING CODES. IF NO GOVERNING CODES APPLY, THEN USE TXDOT STANDARDS.

**EXECUTION:**

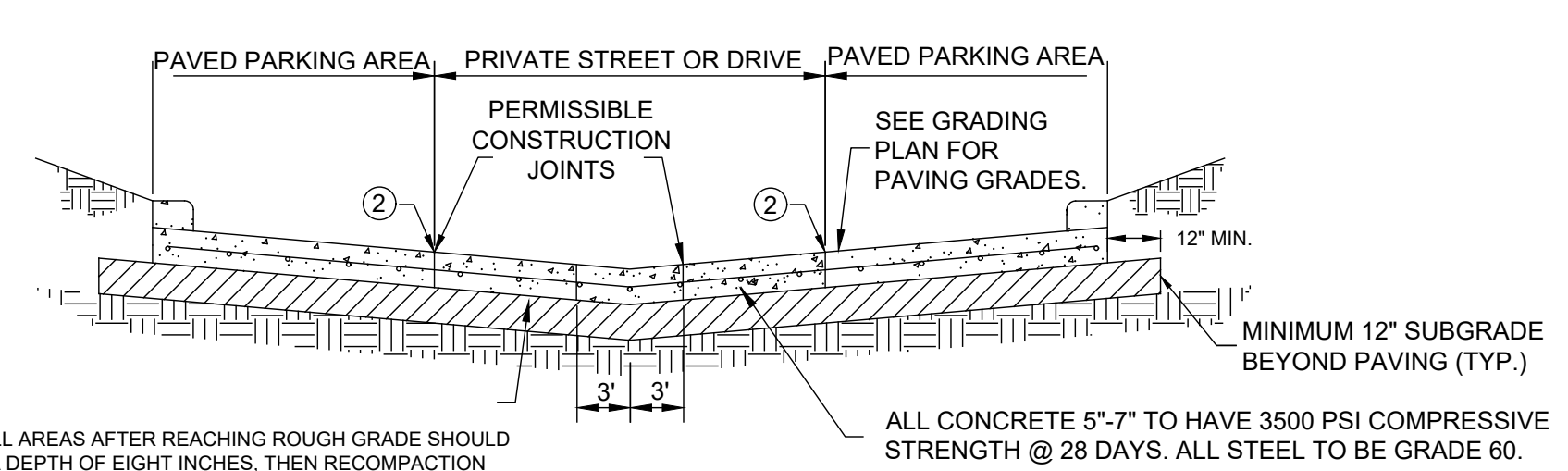
- MINIMUM LINE WIDTH IS 4 INCHES. PAVEMENT MARKINGS MUST COMPLY WITH LOCAL FIRE STANDARDS AND CURRENT ACCESSIBILITY CODE.
- A MINIMUM OF TWO COATS SHALL BE REQUIRED. WAIT 30 DAYS AFTER PAVEMENT INSTALLATION BEFORE APPLYING THE SECOND COAT OF PAVEMENT MARKINGS.
- CLOSE AREAS TO TRAFFIC FOR DURATION OF DRYING TIME, WHICH SHALL BE NO LESS THAN THE MINIMUM RECOMMENDED BY THE PAINT MANUFACTURER.
- TRAFFIC PAINT SHALL BE AS FOLLOWS OR APPROVED EQUAL:
  - CONCRETE- SHERWIN WILLIAMS, SETFAST ACRYLIC ZONE MARKING PAINT
  - CONCRETE & BLUE HANDICAP BACKGROUNDS- SHERWIN WILLIAMS, SETFAST CHLORINATED RUBBER ZONE MARKING PAINT
  - NEW ASPHALT- SHERWIN WILLIAMS, SETFAST, ACRYLIC LATEX TRAFFIC MARKING PAINT
  - OLD ASPHALT- SHERWIN WILLIAMS, SETFAST ACRYLIC WB TRAFFIC MARKING PAINT



**FIRE STRIPING DETAIL**  
N.T.S.

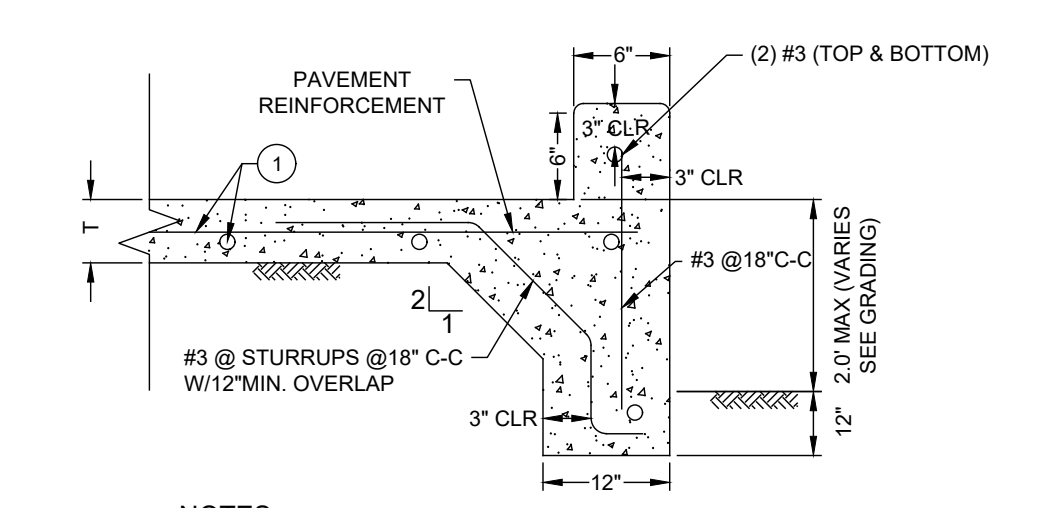


**WHEEL STOP DETAIL**  
N.T.S.



- REINFORCING STEEL:
  - 5\"/>
- \*CONTROL JOINT SPACING:
  - 7\"/>
- EXPANSION JOINT:
  - THE INSTALLATION OF EXPANSION JOINTS IS OPTIONAL, BUT IF USED, THEY SHOULD HAVE A MAXIMUM SPACING OF 60 FEET
- DOWELS AT EXPANSION JOINTS:
  - 3/4\"/>

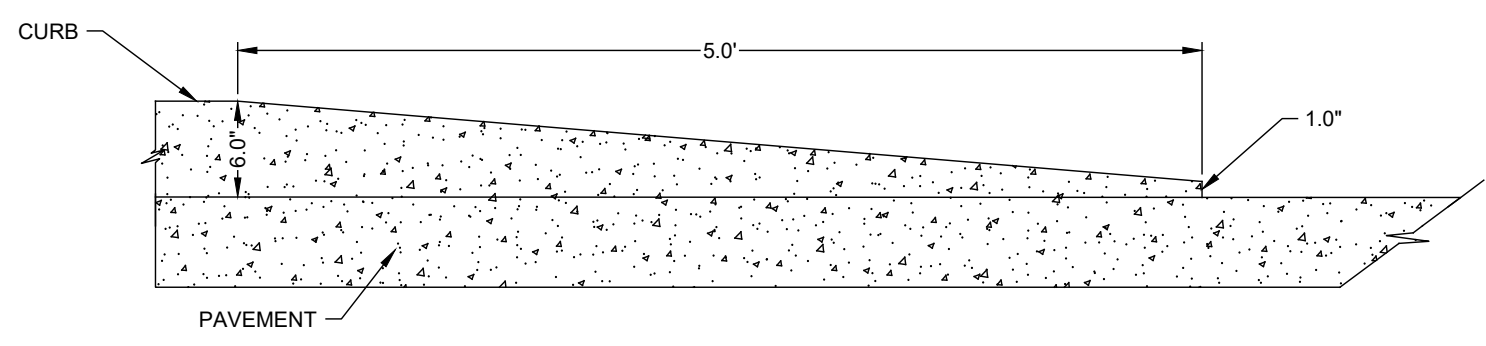
**TYPICAL CONCRETE PAVEMENT SECTION**  
N.T.S.  
 SEE GEOTECHNICAL ENGINEERING REPORT BY THE MURILLO COMPANY (PROJECT No. GEO3082023, DATED AUGUST, 2023)



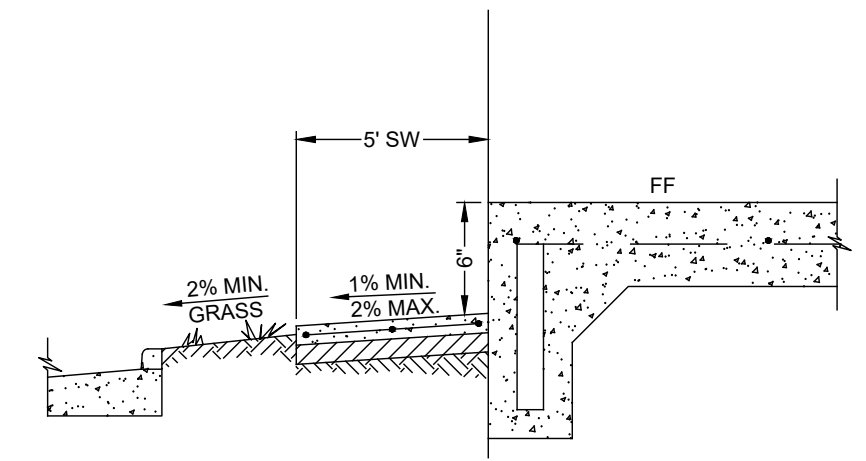
**NOTES:**  
 T = PAVEMENT THICKNESS  
 #1, SAWCUT SPACING, & THICKNESS REFERENCE: "TYPICAL CONCRETE PAVEMENT SECTION" FOR DETAILS

**TYPICAL CURB WITH TURNDOWN**  
N.T.S.

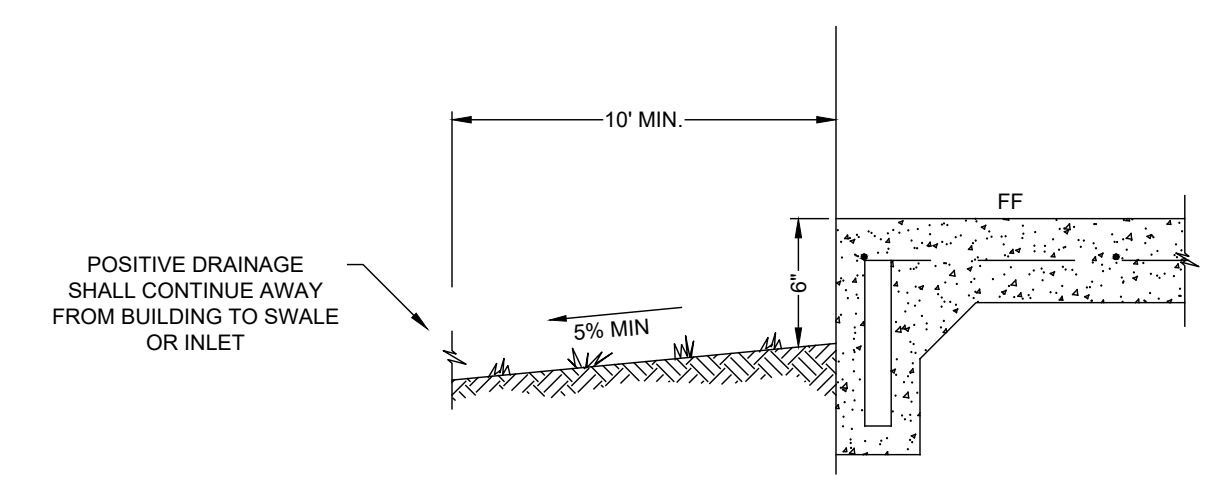
- PAVER NOTES:**
- CONSTRUCT PAVERS/TERRAZZO PAVING AS SHOWN ON THIS SHEET.
  - PAVESTONE AND TERRAZZO PAVING SHALL COMPLY WITH SPECIFICATIONS OF THE MANUFACTURER.
  - THIS BLOCKOUT DIMENSION FOR PAVERS/TERRAZZO IS NOMINAL. THE CONTRACTOR MAY ADJUST BLOCKOUT AS NEEDED TO MINIMIZE THE AMOUNT OF PAVERS/TERRAZZO TO BE CUT. HOWEVER, THE PAVERS MUST ALWAYS BE HELD ONE FOOT AWAY FROM FACE OF CURB AT THE DRIVEWAY.



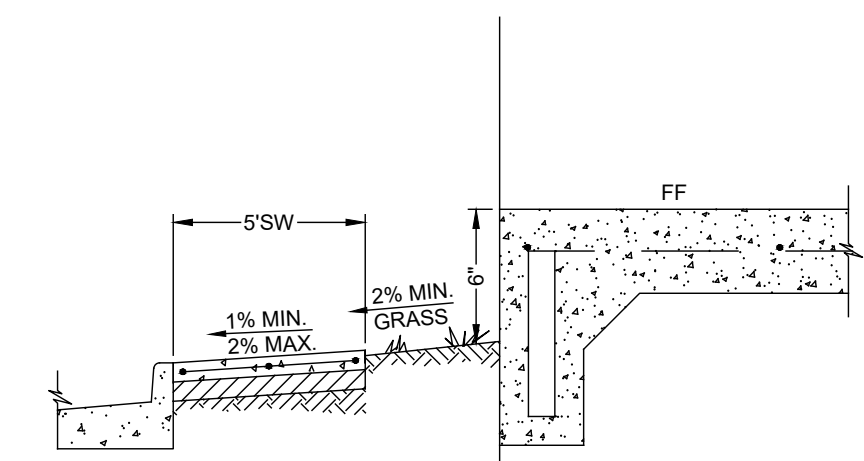
**CURB TRANSITION**  
N.T.S.



**TYPICAL PERIMETER GRADES AROUND BUILDING**  
N.T.S.



**TYPICAL PERIMETER GRADES AROUND BUILDING**  
N.T.S.



**TYPICAL PERIMETER GRADES AROUND BUILDING**  
N.T.S.

REV	DESCRIPTION	DATE

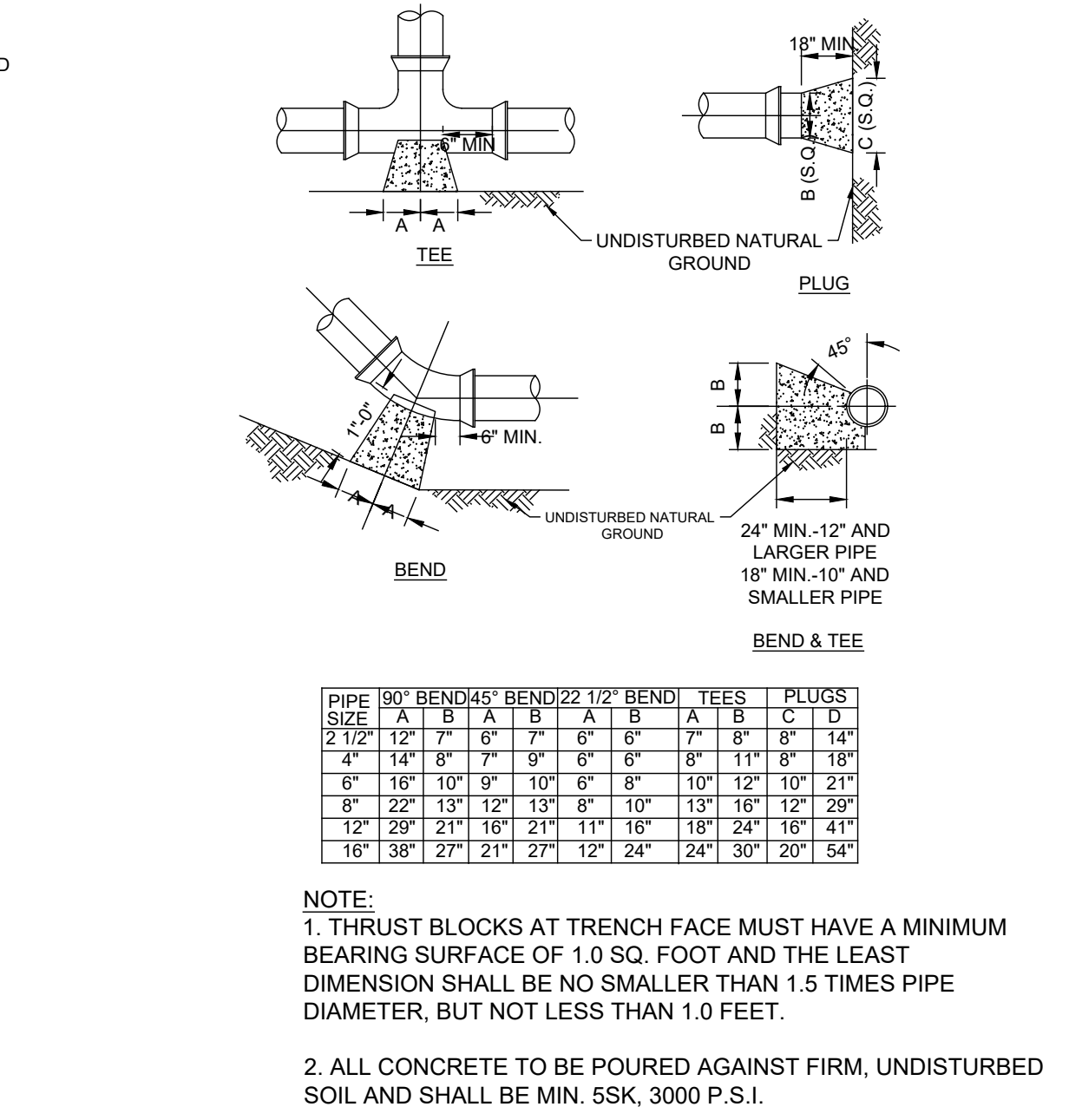
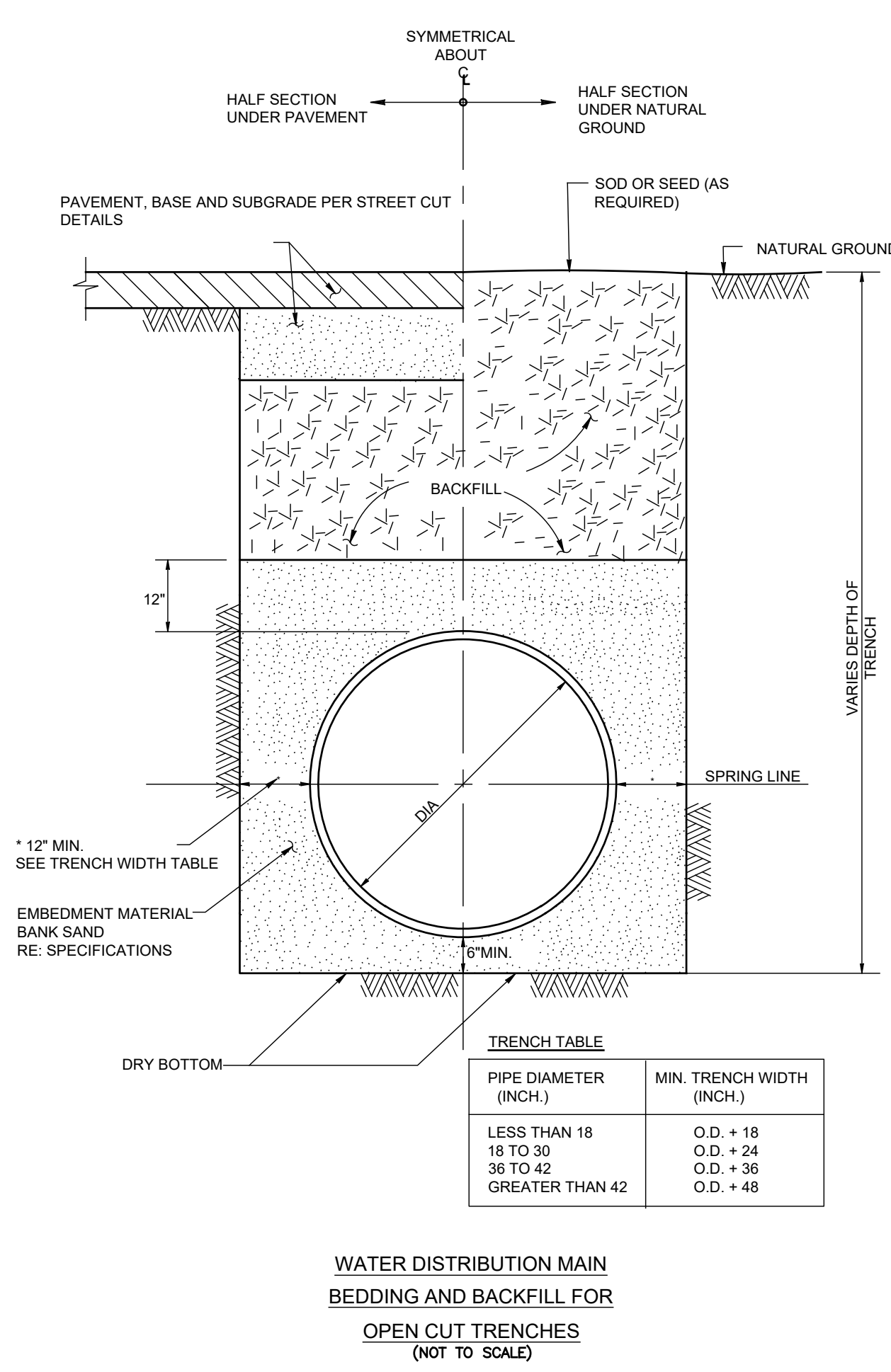
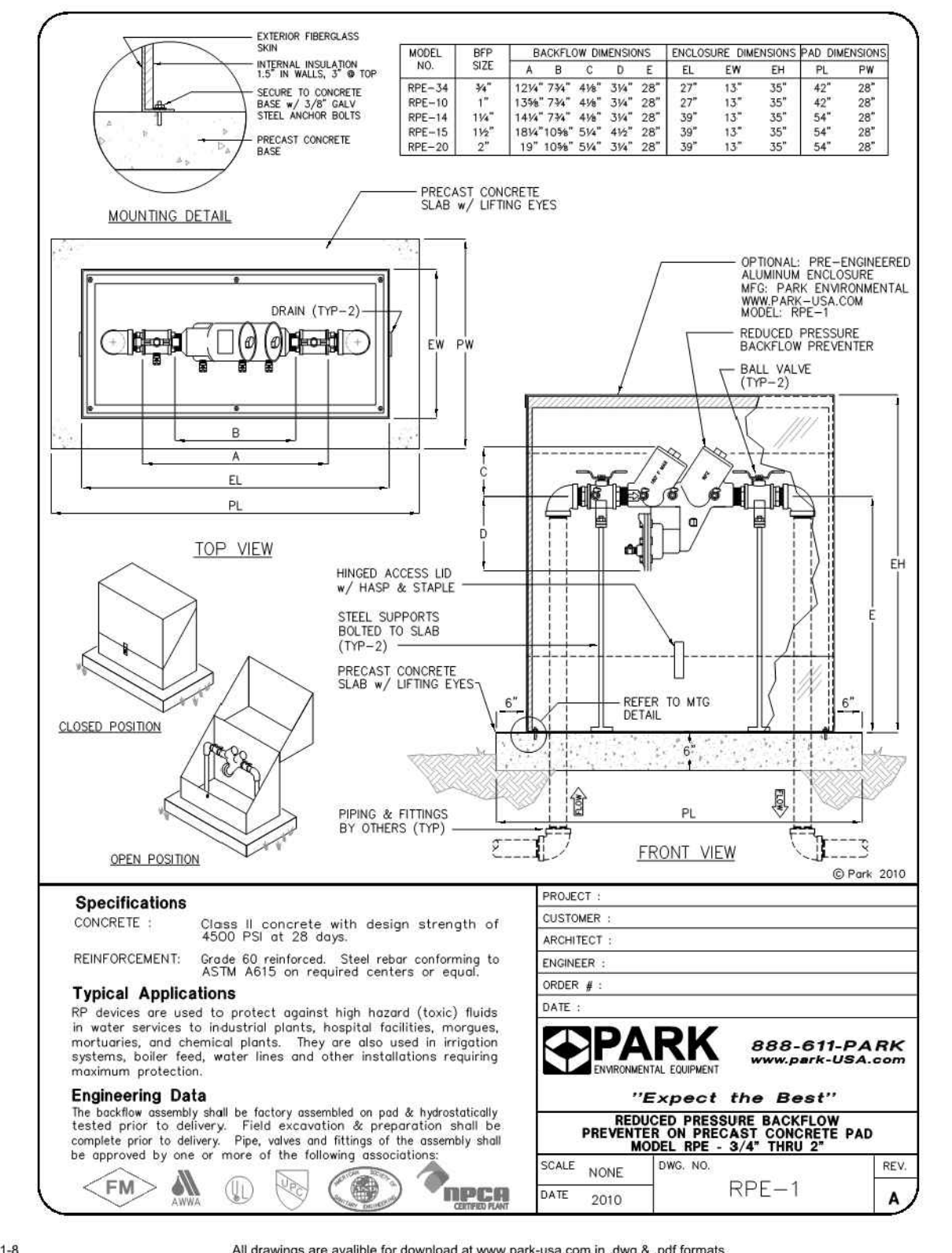
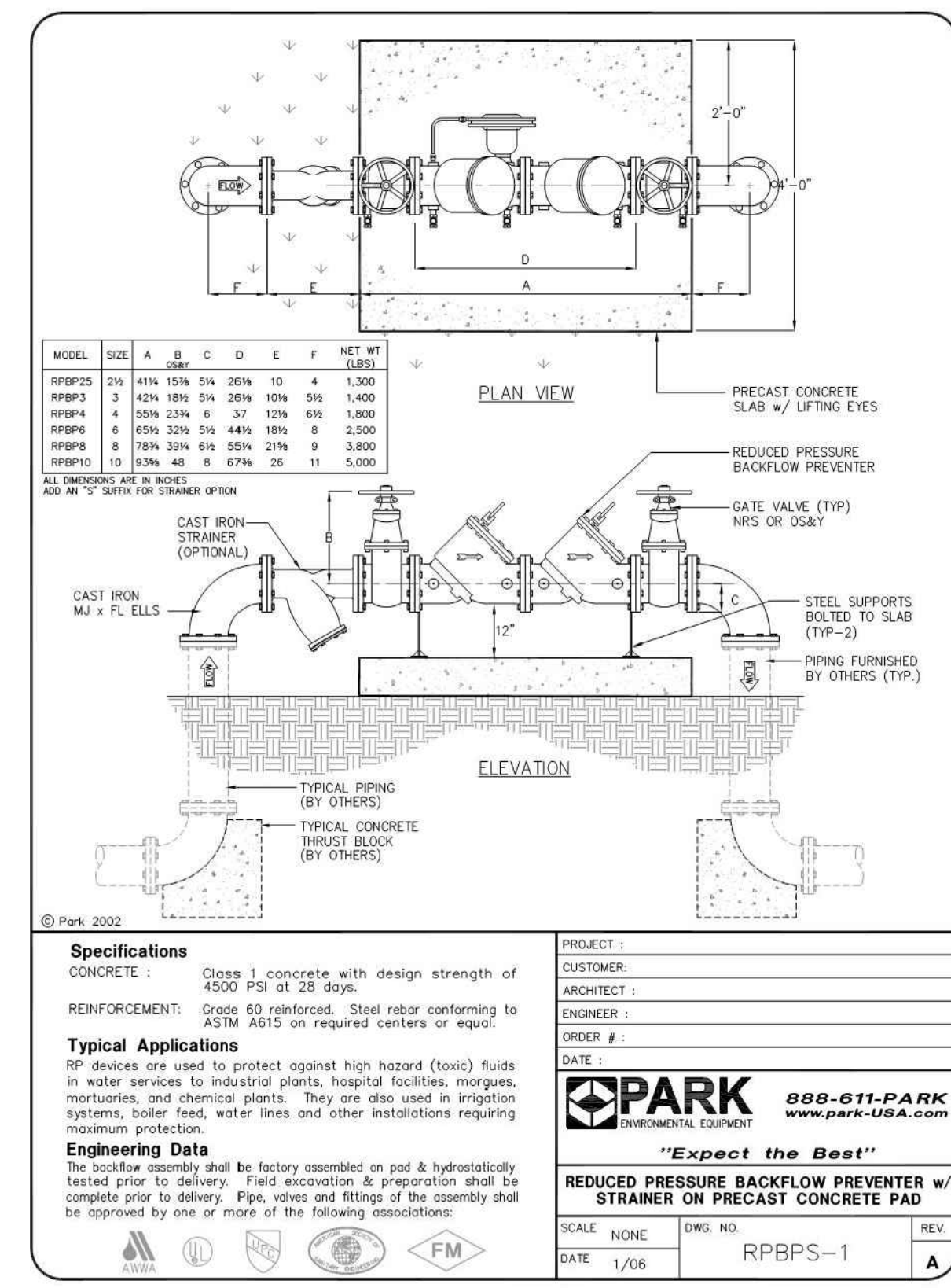
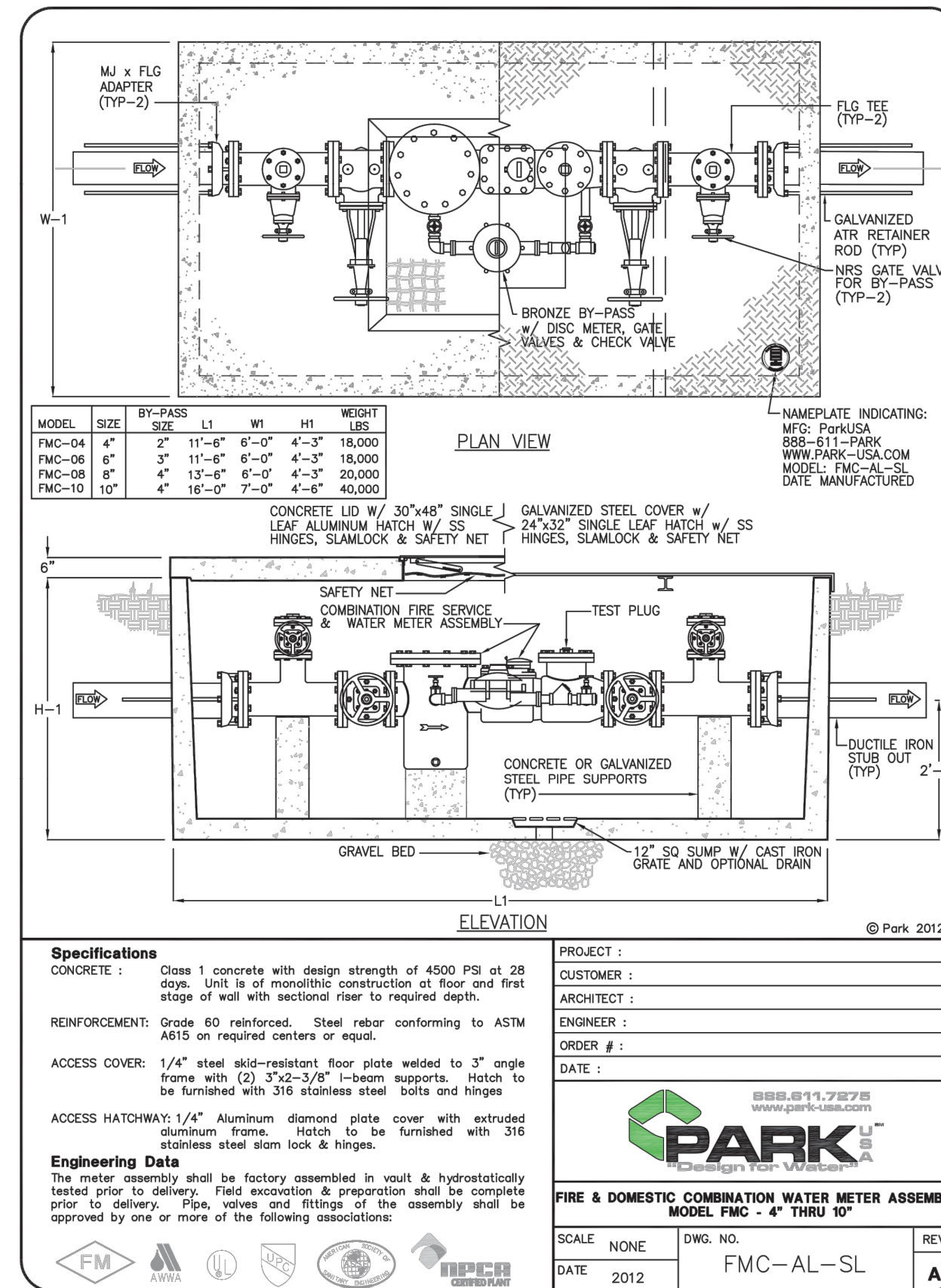
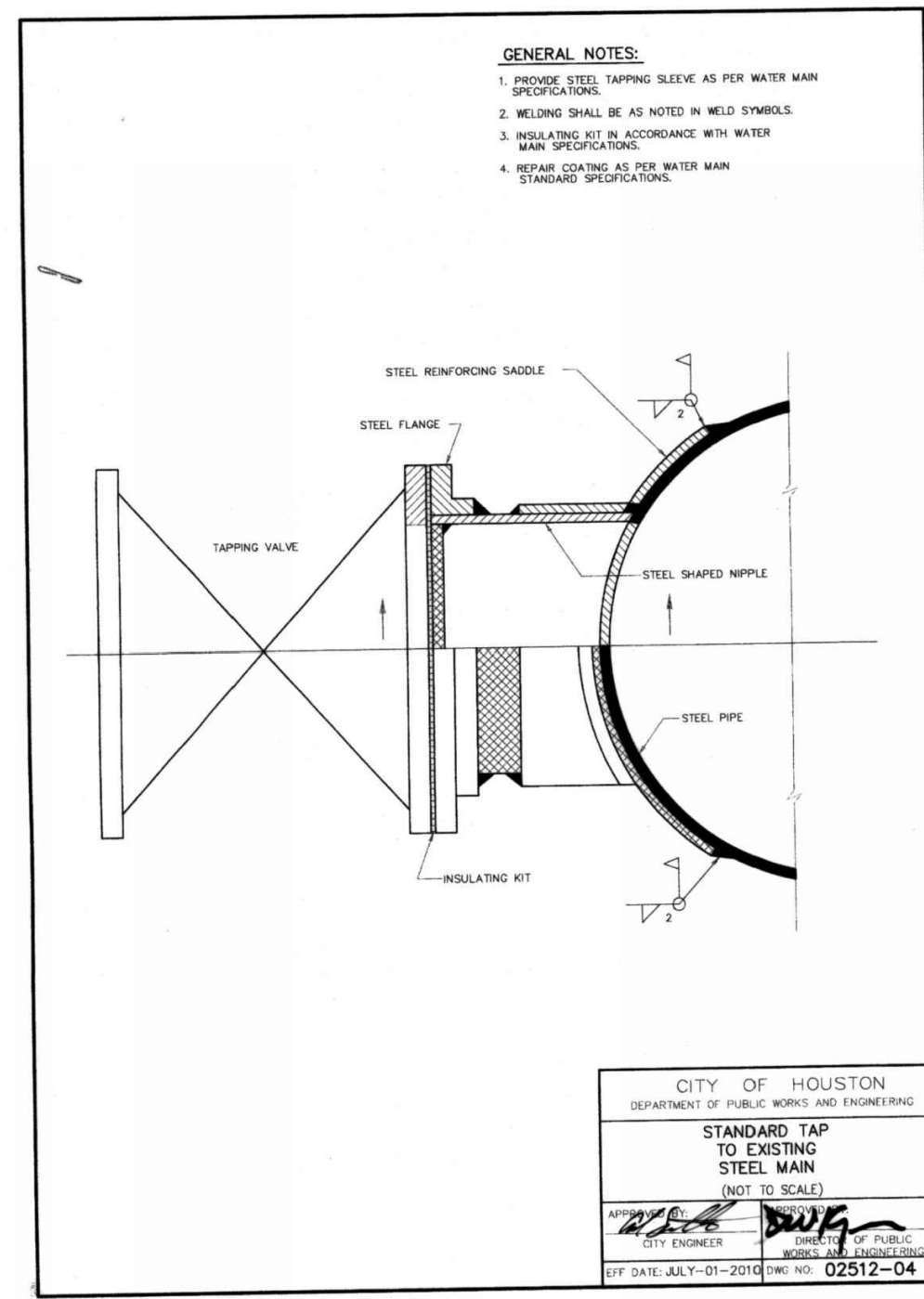


**WGA**  
 WARD, GETZ & ASSOCIATES, PLLC  
 TEXAS REGISTERED ENGINEERING FIRM F-9756  
 2500 Tangleville, Suite 120  
 Houston, Texas 77063  
 713.789.1900

LOST OAKS		
PAVING DETAILS		
SCALE N/A	DESIGN AB, AG	DRAWN AB, AG

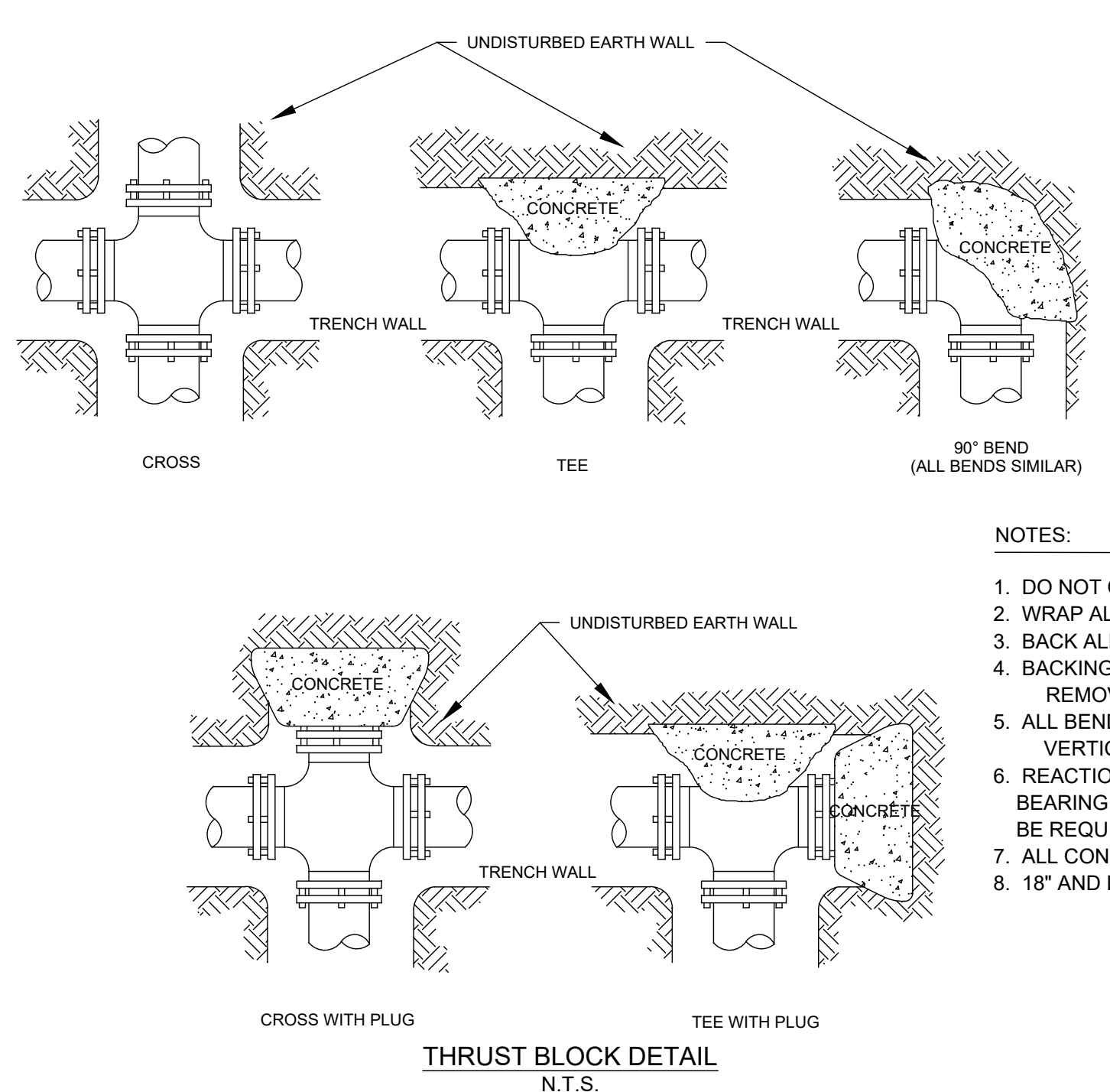
SHEET  
C8.2





PIPE SIZE	90° BEND		45° BEND		22 1/2° BEND		TEES		PLUGS	
	A	B	A	B	A	B	A	B	C	D
2 1/2"	12"	7"	6"	7"	6"	6"	7"	8"	8"	14"
4"	14"	8"	7"	9"	6"	8"	8"	11"	8"	18"
6"	16"	10"	9"	10"	6"	8"	10"	12"	10"	21"
8"	22"	13"	12"	13"	6"	10"	13"	16"	12"	29"
12"	28"	21"	18"	21"	11"	16"	18"	24"	16"	41"
16"	38"	27"	21"	27"	12"	24"	24"	30"	20"	54"

NOTE:  
1. THRUST BLOCKS AT TRENCH FACE MUST HAVE A MINIMUM BEARING SURFACE OF 1.0 SQ. FOOT AND THE LEAST DIMENSION SHALL BE NO SMALLER THAN 1.5 TIMES PIPE DIAMETER, BUT NOT LESS THAN 1.0 FEET.  
2. ALL CONCRETE TO BE POURED AGAINST FIRM, UNDISTURBED SOIL AND SHALL BE MIN. 5SK, 3000 P.S.I.



HORIZONTAL THRUST BLOCKING (BLOCKING HEIGHT GREATER THAN PIPE O.D.) (BLOCKING WIDTH BETWEEN 1 & 2 TIMES HEIGHT)				
REQUIRED SQ. FT. OF UNDISTURBED EARTH WALL FOR REACTION BACKING				
PIPE SIZE	TEE & PLUG	TYPE OF FITTINGS		
		BENDS		
		90°	45°	22 1/2°
3"	0.5	1.5	1.5	0.5
4"	1.5	2.0	1.5	1.0
6"	3.0	4.0	2.0	1.0
8"	5.0	7.0	4.0	2.0
10"	8.0	10.0	6.0	3.0
12"	11.0	17.0	9.0	5.0

NOTES:  
1. DO NOT COVER BELLS OR FLANGES WITH CONCRETE  
2. WRAP ALL FITTINGS WITH VISQUEEN.  
3. BACK ALL TEES ACCORDING TO SIZE OF BRANCH.  
4. BACKING FUTURE LINE EXTENSIONS SHALL BE SUCH THAT LATER REMOVAL IS POSSIBLE.  
5. ALL BENDS WHERE FITTINGS ARE USED, BOTH HORIZONTAL OR VERTICAL SHALL BE BACKED.  
6. REACTION BACKING TABLE IS BASED ON 60 P.S.I. AND SOIL BEARING PRESSURE OF 1500 lb./sq. ft. ADDITIONAL BACKING MAY BE REQUIRED IN SOME AREAS AS DIRECTED BY ENGINEERS.  
7. ALL CONCRETE SHALL BE 2500 P.S.I.  
8. 18" AND LARGER REQUIRES SPECIFIC ANTI-THRUST DESIGN.

REV	DESCRIPTION	DATE
ISSUE FOR CONSTRUCTION		04-23-2024

**WARD, GETZ & ASSOCIATES, PLLC**  
TEXAS REGISTERED ENGINEERING FIRM F-9756  
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Houston, Texas 77063  
713.789.1900

**LOST OAKS**

**WATER DETAILS**

SCALE	DESIGN	DRAWN
N/A	AB, AG	AB, AG

**SHEET C9.1**



