REVIEW BY FORT BEND COUNTY COMMISSIONERS COURT

On this 6th day of September, 2016, Commissioners Court came on to be heard and reviewed the accompanying notice of Burnside Services, Inc.
Job Location West Airport Boulevard, Richmond, TX 77407
Date 8/29/2016 Bond No. TX804810, Permit No. 2016-8899 to make use of certain Fort Bend County property subject to, "A Revised Order Regulating the Laying, Construction, Maintenance, and Repair of Buried Cables, Conduits, and Pole Lines, In, Under, Across or Along Roads, Streets, Highways, and Drainage Ditches in Fort Bend County, Texas, Under the Jurisdiction of the Commissioners Court of Fort Bend County, Texas," as passed by the Commissioners Court of Fort Bend County, Texas the 3rd day of August, 1987, recorded in Volume _____ of the Minutes of the Commissioners Court of Fort Bend County, Texas, to the extent that such order is not inconsistent with Article 1436a, Vernon's Texas Civil Statutes. Upon Motion of Commissioner _____, seconded by Commissioner _____, duly put and carried, it is ORDERED, ADJUDGED AND DECREED that said notice of said above purpose is hereby acknowledged by the Commissioners Court of Fort Bend County, Texas, and that said notice be placed on record according to the regulation order thereof.

Notes:

1. Evidence of review by the Commissioners Court must be kept on the job site and failure to do so constitutes grounds for job shutdown.
2. Written notices are required:
   a. 48 hours in advance of construction start up, and
   b. when construction is completed and ready for final inspection

   Mail notices to: Permit Administrator
   Fort Bend County Engineering
   301 Jackson Street
   Richmond, Texas 77469
   281-633-7500
3. This permit expires one (1) year from date of permit if construction has not commenced.

By: Charles O. Dy
for County Engineer

By: _____
Drainage District Engineer/Manager

Presented to Commissioners Court and approved.
Recorded in Volume
_____
Minutes of Commissioners Court

Clerk of Commissioners Court

By: _____
Deputy

County of Fort Bend

Engineering Department

301 Jackson Street
Richmond, Texas 77469

Phone: (281) 633-7500

Permit Application Review Form For
Cable, Conduit, and Pole Line Activity
In Fort Bend County

Permit No. 2016-8899

The following "Notice of Proposed Cable, Conduit, and/or Pole Line activity in Fort Bend County" and accompanying attachments have been reviewed and the notice conforms to appropriate regulations set by Commissioner's Court of Fort Bend County, Texas.

X (1) Complete Application Form:

- X a. Name of road, street, and/or drainage ditch affected.
- X b. Vicinity map showing course of directions
- X c. Plans and specifications

X (2) Bond:

District Attorney, approval when applicable.

Perpetual bond currently posted.

No:

Amount:

X Performance bond submitted.

No: TX804810

Amount: $5,000.00

Cashier's Check

No:

Amount:

(3) Verbal permission given for emergencies, to start construction before approved in Commissioner's Court.

Precinct Engineer Acknowledgment — Date

Precinct Commissioner Acknowledgment — Date

(4)

X Drainage District Approval when applicable

We have reviewed this project and agree it meets minimum requirements.

Charles O. [illegible] — 8/30/16

Assistant County Engineer — Date

PERFORMANCE BOND COVERING ALL CABLE, CONDUIT AND/OR POLE LINE ACTIVITY IN, UNDER, ACROSS OR ALONG FORT BEND COUNTY ROAD

AUTHORIZED

BOND NO TX 804810

THE STATE OF TEXAS §

KNOW ALL MEN BY THESE PRESENTS:

COUNTY OF FORT BEND §

THAT WE, Burnside Services, Inc. **whose address is** 1110 Navasota Ridge, Navasota, TX 77868 **Texas, hereinafter called the Principal, And** Merchants Bonding Company (Mutual)**, a Corporation existing under and by virtue of the laws of the state of** Iowa **and authorized to do an indemnifying business in the state of Texas, and whose principal office is located at** P.O. Box 14498, Des Moines, IA 50306**, whose officer residing in the State of Texas, authorized to accept service in all suits and actions brought whining said state is** Troy Key **and Whose address is** 5057 Keller Springs Rd., Suite 400, Addison, TX 75001**, hereinafter called the Surety, and held and firmly bound unto , Robert e. Hebert, County Judge of Fort Bend County, Texas, or his successors in office, in the full sum of** Five Thousand and 00/100s **Dollars ($** 5,000.00----- **) current, lawful money of the United Stated of America, to be paid to said Robert E. Hebert, County Judge of Fort Bend County, Texas, or his successors in office, to which payment well and truly to be made and done, we, the undersigned, bind ourselves and each of us, our heirs, executors, administrators, successors, assigns, and legal representatives, jointly and severally, by these presents.**

THE CONDITION OF THIS BOND IS SUCH THAT, WHEREAS, the above bounden principal contemplates laying, constructing, maintaining and/or repairing one or more cables, conduits, and/or pole lines in, under, across and/or along roads, streets and highways, commercial driveway and median openings or modifications in the County of Fort Bend, and the State of Texas, under the jurisdiction of the Commissioners' Court of Fort Bend County, Texas, pursuant to the Commissioners' Court order adopted on the 1st day of December, A.D. 1980, recorded in Volume 13, of the Commissioners' Court Minutes of Fort Bend County, Texas, regulating same, which Commissioners' Court order is hereby referred to and made a part hereof for all purposes as though fully set out herein;

AND WHEREAS, the principal desires to provide Fort Bend County with a performance bond covering all such cable, conduit and/or pole line activity, commercial driveway and median openings or modifications;

NOW, THEREFORE, if the above bounden principal shall faithfully perform all its cable, conduit and/or pole line activity (including, but not limited to the laying, construction, maintenance and/or repair of cables, conduits and/or pole lines) in, under, across and/or along roads, streets and highways, commercial driveway and median openings or modifications in the County of Fort Bend and State of Texas, under the jurisdiction of the Commissioners Court of Fort Bend County, Texas, pursuant to and in accordance with minimum requirements and conditions of the above mentioned Commissioners' Court order set forth and specified to be by said principal done and performed, at the time and in the manner therein specified, and shall pay over and make good and reimburse Fort Bend County, all loss and damages which Fort Bend County may sustain by reason of any failure or default on the part of said principal, then this obligation shall be null and void, otherwise to remain in full force and effect.

This bond is payable at the County Courthouse in the County of Fort Bend and State of Texas.

It is understood that at any time Fort Bend County deems itself insecure under this bond, it may require further and/or additional bonds of the principal.

EXECUTED this 29th **day of** August**, 20**16**.**

Burnside Services, Inc.
PRINCIPAL

Dayle Burnside
BY

Merchants Bonding Company (Mutual)
SURETY

Sandra Lee Roney
BY Sandra Lee Roney, Attorney in Fact

MERCHANTS
BONDING COMPANY™

POWER OF ATTORNEY

Know All Persons By These Presents, that MERCHANTS BONDING COMPANY (MUTUAL) and MERCHANTS NATIONAL BONDING, INC., both being corporations of the State of Iowa (herein collectively called the "Companies") do hereby make, constitute and appoint, individually,

Andrea Rose Crawford; Carolyn J Goodenough; Debra Lee Moon; John William Newby; Sammy Joe Mullis Jr; Sandra Lee Roney; Wilbert Raymond Watson

their true and lawful Attorney(s)-in-Fact, to make, execute, seal and deliver on behalf of the Companies, as Surety, bonds, undertakings and other written obligations in the nature thereof, subject to the limitation that any such instrument shall not exceed the amount of:

TEN MILLION ($10,000,000.00) DOLLARS

This Power-of-Attorney is granted and is signed and sealed by facsimile under and by authority of the following By-Laws adopted by the Board of Directors of Merchants Bonding Company (Mutual) on April 23, 2011 and adopted by the Board of Directors of Merchants National Bonding, Inc., on October 24, 2011.

"The President, Secretary, Treasurer, or any Assistant Treasurer or any Assistant Secretary or any Vice President shall have power and authority to appoint Attorneys-in-Fact, and to authorize them to execute on behalf of the Company, and attach the seal of the Company thereto, bonds and undertakings, recognizances, contracts of indemnity and other writings obligatory in the nature thereof."

"The signature of any authorized officer and the seal of the Company may be affixed by facsimile or electronic transmission to any Power of Attorney or Certification thereof authorizing the execution and delivery of any bond, undertaking, recognizance, or other suretyship obligations of the Company, and such signature and seal when so used shall have the same force and effect as though manually fixed."

In connection with obligations in favor of the Florida Department of Transportation only, it is agreed that the power and authority hereby given to the Attorney-in-Fact includes any and all consents for the release of retained percentages and/or final estimates on engineering and construction contracts required by the State of Florida Department of Transportation. It is fully understood that consenting to the State of Florida Department of Transportation making payment of the final estimate to the Contractor and/or its assignee, shall not relieve this surety company of any of its obligations under its bond.

In connection with obligations in favor of the Kentucky Department of Highways only, it is agreed that the power and authority hereby given to the Attorney-in-Fact cannot be modified or revoked unless prior written personal notice of such intent has been given to the Commissioner-Department of Highways of the Commonwealth of Kentucky at least thirty (30) days prior to the modification or revocation.

In Witness Whereof, the Companies have caused this instrument to be signed and sealed this 29th day of January , 2016 .

MERCHANTS NATIONAL BONDING, INC. INCORPORATED -o- 2003

MERCHANTS BONDING COMPANY (MUTUAL) INCORPORATED -o- 1933

MERCHANTS BONDING COMPANY (MUTUAL)
MERCHANTS NATIONAL BONDING, INC.

By Larry Taylor
President

STATE OF IOWA
COUNTY OF Dallas ss.

On this 29th day of January , 2016 , before me appeared Larry Taylor, to me personally known, who being by me sworn did say that he is President of the MERCHANTS BONDING COMPANY (MUTUAL) and MERCHANTS NATIONAL BONDING, INC.; and that the seals affixed to the foregoing instrument are the Corporate seals of the Companies; and that the said instrument was signed and sealed in behalf of the Companies by authority of their respective Boards of Directors.

NOTARIAL SEAL IOWA
WENDY WOODY
Commission Number 784654
My Commission Expires
June 20, 2017

Wendy Woody
Notary Public, Polk County, Iowa

(Expiration of notary's commission does not invalidate this instrument)

I, William Warner, Jr., Secretary of the MERCHANTS BONDING COMPANY (MUTUAL) and MERCHANTS NATIONAL BONDING, INC., do hereby certify that the above and foregoing is a true and correct copy of the POWER-OF-ATTORNEY executed by said Companies, which is still in full force and effect and has not been amended or revoked.

In Witness Whereof, I have hereunto set my hand and affixed the seal of the Companies on this 29th day of August , 2016 .

MERCHANTS NATIONAL BONDING, INC. INCORPORATED -o- 2003

MERCHANTS BONDING COMPANY (MUTUAL) INCORPORATED -o- 1933

William Warner Jr.
Secretary

POA 0014 (6/15)

MERCHANTS
BONDING COMPANY™
MERCHANTS BONDING COMPANY (MUTUAL) • MERCHANTS NATIONAL BONDING, INC.
P.O. Box 14498, Des Moines IA 50306-3498 - (800) 678-8171 - (515) 243-3854 FAX

IMPORTANT NOTICE

To obtain information or make a complaint:

You may contact your insurance agent at the telephone number provided by your insurance agent.

You may call Merchants Bonding Company (Mutual) toll-free telephone number for information or to make a complaint at:

1-800-678-8171

You may contact the Texas Department of Insurance to obtain information on companies, coverages, rights or complaints at:

1-800-252-3439

You may write the Texas Department of Insurance at:

P. O. Box 149104
Austin, TX 78714-9104
Fax: (512) 475-1771
Web: http://www.tdi.state.tx.us
E-mail: ConsumerProtection@tdi.state.tx.us

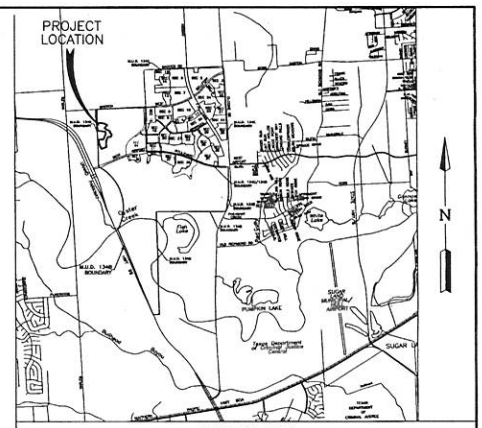
PREMIUM AND CLAIM DISPUTES: Should you have a dispute concerning your premium or about a claim you should contact the agent first. If the dispute is not resolved, you may contact the Texas Department of Insurance.

ATTACH THIS NOTICE TO YOUR POLICY: This notice is for information only and does not become a part or condition of the attached document.

FORT BEND COUNTY MUNICIPAL UTILITY DISTRICT NO. 134B
FORT BEND COUNTY, TEXAS

CONSTRUCTION PLANS FOR
BULLHEAD BAYOU PHASE II DRAINAGE IMPROVEMENTS

CITY OF HOUSTON E.T.J.



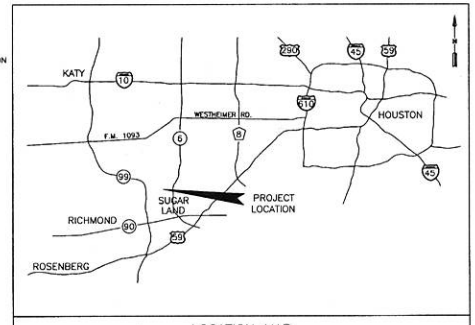
VICINITY MAP
FT BEND COUNTY KEY MAP – 526Z & 566D
GMG TILE NO. 4652–A, 4653–C
ZIP CODE: 77407

JOB NO. 1968-0627

DATE : MARCH 2016

NOTES

1. THESE PLANS WERE PREPARED TO MEET OR EXCEED FORT BEND COUNTY AND CITY OF HOUSTON SUBDIVISION RULES AND REGULATIONS (AS APPLICABLE) AS CURRENTLY AMMENDED.
2. CONSTRUCTION WILL BE MONITORED BY A PROFESSIONAL ENGINEER TO INSURE COMPLIANCE WITH THE CONSTRUCTION PLANS AND SPECIFICATIONS.
3. CONTRACTOR SHALL NOTIFY THE FOLLOWING ENTITIES AT LEAST 48 HOURS PRIOR TO COMMENCEMENT OF CONSTRUCTION.
   CITY OF HOUSTON PUBLIC WORKS DEPARTMENT (713) 837–0050
   FORT BEND COUNTY DRAINAGE DISTRICT (DWAYNE GRIGAR) (281) 342–2863
   ASSISTANT TO THE FORT BEND COUNTY ENGINEER CONSTRUCTION@FORTBENDCOUNTYTX.GOV
4. ONLY AUTHORIZED INDIVIDUALS FROM EITHER THE TESTING COMPANY OR A REPRESENTATIVE OF LJA ENGINEERING, INC. HAVE THE AUTHORITY TO ADD WATER TO A CONCRETE TRUCK.
5. CONTRACTOR SHALL CONTACT ANY PERTINENT UTILITY COMPANIES AT LEAST 48 HOURS PRIOR TO COMMENCEMENT OF EXCAVATION OR CONSTRUCTION IN THE VICINITY OF THEIR EASEMENTS AND/OR RIGHT–OF–WAYS.
6. THE OPENING AND CLOSING OF ALL VALVES ON EXISTING WATER LINES MUST BE PERFORMED EXCLUSIVELY BY THE DISTRICT OPERATOR.
7. THE DISTRICT OPERATOR MUST PERFORM ALL WATER LINE BACTERIOLOGICAL TESTS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING THE DISTRICT.
8. PRIOR TO CONSTRUCTION OF THIS FACILITY WITHIN OR BY THE DISTRICT, THE DISTRICT OR THE ENGINEER WILL GIVE A WRITTEN NOTICE BY REGISTERED OR CERTIFIED MAIL TO THE DIRECTOR OF PUBLIC WORKS AND ENGINEERING, CITY OF HOUSTON, STATING THE DATE SUCH CONSTRUCTION WILL COMMENCE.
9. CONTRACTOR SHALL NOTIFY THE CITY OF HOUSTON, DEPARTMENT OF PUBLIC WORKS AND ENGINEERING, OFFICE OF THE CITY ENGINEER, 48 HOURS BEFORE STARTING WORK ON THIS PROJECT. TELEPHONE NO. (832) 394–9098



LOCATION MAP

ONE–CALL NOTIFICATION SYSTEM
CALL BEFORE YOU DIG!!!
(713)223–4567 (IN HOUSTON)
(NEW STATEWIDE NUMBER OUTSIDE HOUSTON)
1–800–545–6005

FIRM
FLOOD INSURANCE MAP
PANEL 140 OF 575
MAP# 48157C0140L
FLOOD ZONE "X"

ETJ DETENTION PLANS INFORMATION
1) STORM WATER DETENTION PLANS
IS PROVIDED IN RED GULLEY LAKES PH. 1&2, ALIANA DETENTION/AMENITY PHASE 2, OYSTER CREEK DRAINAGE IMPROVEMENTS PHASE 3, AND OYSTER CREEK DRAINAGE IMPROVEMENTS PHASE 4
ENGINEERING FIRM LJA ENGINEERING & SURVEYING
DATE SIGNED MAY 2007, JANUARY 2012, DECEMBER 2013, FEBRUARY 2014, APRIL 2015
APPROVED BY FORT BEND COUNTY ENGINEERING DEPARTMENT
2) STORM WATER DRAINAGE DESIGN REPORT
REPORT TITLE MASTER DRAINAGE PLAN FOR ALIANA DEVELOPMENT
DATE APRIL 2015 ENGINEERING FORM REPORT
DATE OF ACKNOWLEDGEMENT BY FBC DRAINAGE DISTRICT JULY 2015
3) INCREASED IMPERVIOUS COVER = 247.00 ACRES
DETENTION RATE REQUIRED = 0.17 ACRE–FEET/ACRE
DETENTION RATE PROVIDED = 0.17 ACRE–FEET/ACRE

FORT BEND COUNTY ENGINEER
ENGINEER: Rick G. Stoltz PE, PTOE
FOR RICHARD W. STOLTZ, P.E.
DATE: 4/13/16
THESE SIGNATURES ARE VOID IF CONSTRUCTION HAS NOT COMMENCED IN ONE (1) YEAR FROM DATE OF APPROVAL
APPROVED: Maggie Dodd
DEVELOPMENT COORDINATOR
DATE: 4/12/16

SHEET INDEX

1. COVER SHEET
2. GENERAL NOTES
3. OVERALL LAYOUT
4. HORIZONTAL CONTROL LAYOUT
5. DRAINAGE AREA MAP
6. DRAINAGE CALCULATIONS (2–YR. CITY OF HOUSTON)
7. DRAINAGE CALCULATIONS (100–YR. CITY OF HOUSTON)
8. DRAINAGE CALCULATIONS (100–YR. FORT BEND COUNTY)
9. DRAINAGE CALCULATIONS (100–YR. FORT BEND COUNTY)
10. GRADING PLAN
11. CLEARING, FILL, AND TRAFFIC CONTROL PLANS (SHEET 1 OF 2)
12. CLEARING, FILL, AND TRAFFIC CONTROL PLANS (SHEET 2 OF 2)
13. STORM WATER POLLUTION PREVENTION PLAN

PLAN & PROFILE

14. OUTFALLS A, B, & C ..... STA. 0+00.00 TO END
15. OUTFALLS D, E, & F ..... STA. 0+00.00 TO END

DETAILS

16. STORM DETAILS (SHEET 1 OF 2)
17. STORM DETAILS (SHEET 2 OF 2)
18. STORM WATER POLLUTION PREVENTION PLAN DETAILS

NOTE: CITY SIGNATURES VALID FOR ONE YEAR ONLY AFTER DATE OF SIGNATURES

BLMS Loc 151350514
COH LOC 15–1745

LJA Engineering, Inc.

SURVEYED BY:
FB NO.:

CITY OF HOUSTON
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

WATER 3/3/16 — STREET & BRIDGE
WASTEWATER 3-3-16 — TRAFFIC
STORM 3/4/16 — STORM WATER QUALITY
FACILITIES

CITY ENGINEER — FOR CITY OF HOUSTON USE ONLY
CITY DWG NO.:
DIRECTOR OF PUBLIC WORKS AND ENGINEERING
55658

SHEET No: 1 OF 18

BULLHEAD BAYOU PHASE II DRAINAGE IMPROVEMENTS – JOB NO. 1968–0627

DEVELOPER:
ALIANA DEVELOPMENT COMPANY
11200 RICHMOND AVENUE SUITE 280
HOUSTON, TEXAS 77082

RECORD DRAWING
I CERTIFY THAT THIS DRAWING REFLECTS THE IMPROVEMENTS CONSTRUCTED AS TO SIZE, LOCATION AND GRADE AND THAT THE CONSTRUCTION WAS IN FULL COMPLIANCE WITH THE CONTRACT DOCUMENTS
BY _____ DATE _____
TITLE _____

STATE OF TEXAS — JOHN R. DRENNN — 108554 — PROFESSIONAL ENGINEER
5-2-2016
APPROVED FOR CONSTRUCTION
BY _____ DATE _____

ENGINEER:
LJA Engineering, Inc.
2929 Briarpark Drive
Suite 600
Houston, Texas 77042
Phone 713.953.5200
Fax 713.953.5026
FRN-F-1386

Date/Time : 1:46, 01 May 2016 = 5:00pm User Name : kcui
Drawing Name : T:\PROJ\1968\0627\DWG_Cover\Plans\ALIANA BULLHEAD BAYOU PHASE II COVER.dwg

GENERAL CONSTRUCTION NOTES:

1. EXISTING UTILITY INFORMATION SHOWN IS NOT GUARANTEED TO BE ACCURATE AND ALL INCLUSIVE. ALL EXISTING UTILITY LOCATIONS ARE APPROXIMATE AND SHOULD BE VERIFIED BY THE CONTRACTOR IN ADVANCE OF HIS CONSTRUCTION. ANY CONFLICT OR DISCREPANCY DISCOVERED MUST BE IMMEDIATELY BROUGHT TO THE ENGINEER'S ATTENTION. ANY DAMAGE TO EXISTING FACILITIES DUE TO THE CONTRACTOR'S ACTIVITIES SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE.
2. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGE TO EXISTING PUBLIC OR PRIVATE UTILITY LINES, INCLUDING BUT NOT LIMITED TO PAVING, 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" DATED OCTOBER 2011 WITH LATEST ADDENDA AND AMENDMENTS THERETO, WITH NO COST TO THE PUBLIC.
3. TREES ARE TO BE PROTECTED DURING CONSTRUCTION. PROTECTIVE FENCING WILL BE PROVIDED AND PLACED BY THE UTILITY CONTRACTOR AROUND DIAMETER OF DRIP LINE OF THE TREES WITH SUCH DESIGNATION. THE CIRCUMFERENCE WILL BE DETERMINED BY THE ENGINEER. REMOVAL OR INJURY OF TREES NOT SPECIFIED IN PLANS OR BY THE ENGINEER WILL RESULT IN A PENALTY TO THE CONTRACTOR.
4. THE CONTRACTOR, ON BEHALF OF THE OWNER, IS TO OBTAIN ALL PERMITS REQUIRED BY THE CITY OF HOUSTON OR FORT BEND COUNTY PRIOR TO STARTING CONSTRUCTION OF UTILITIES AND/OR CULVERTS WITHIN ALL RIGHTS-OF-WAY.
5. 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 FLAGMEN, SIGNING, STRIPING AND WARNING DEVICES, ETC., DURING CONSTRUCTION AND ALONG ROADWAYS BOTH DAY AND NIGHT.
6. THE WORK AREA SHALL BE BARRICADED AND ILLUMINATED DURING DARKNESS AND PERIODS OF INACTIVITY, WHEN IN AN AREA OF DIRECT PUBLIC ACCESS.
7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR SAFEGUARDING AND PROTECTING ALL MATERIAL AND EQUIPMENT STORED ON THE JOB SITE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE STORAGE OF MATERIALS IN A SAFE AND WORKMANLIKE MANNER TO PREVENT INJURIES, DURING AND AFTER WORKING HOURS, UNTIL PROJECT COMPLETION AND OWNER ACCEPTANCE.
8. THE LOADING AND UNLOADING OF ALL PIPE, VALVES, HYDRANTS, MANHOLES AND OTHER ACCESSORIES SHALL BE IN ACCORDANCE WITH THE MANUFACTURERS' 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 OUT OF OTHER CONTRACTOR'S WORK 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. CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING ADEQUATE AND POSITIVE DRAINAGE AT ALL TIMES DURING CONSTRUCTION OF PROPOSED FACILITIES.
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 29 CFR PART 1926, AS PUBLISHED IN THE FEDERAL REGISTER OCTOBER 31,1989, AND EFFECTIVE JANUARY 2, 1990.
15. ALL GEOTECHNICAL REPORTS (IF ANY) FOR THIS PROJECT ARE AVAILABLE FOR REFERENCE AT THE OFFICE OF THE ENGINEER.
16. 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 CONSTRUCTION. ALL FINISHED GRADES SHALL VARY UNIFORMLY BETWEEN THE FINISHED ELEVATIONS SHOWN.
17. FINAL ACCEPTANCE OF THE PROJECT WILL NOT BE GIVEN TO THE CONTRACTOR UNTIL THEY ARE INSPECTED AND APPROVED BY FORT BEND COUNTY MUD134C, FORT BEND COUNTY DRAINAGE DISTRICT AND FORT BEND COUNTY.
18. CONTRACTOR SHALL PROVIDE "RECORD DRAWINGS" UPON COMPLETION OF THE PROJECT.
19. THERE WILL BE NO SEPARATE PAYMENT FOR WORK SHOWN ON THESE PLANS, UNLESS SPECIFICALLY ESTABLISHED IN THE BID SECTION OF THE CONTRACT DOCUMENTS. INCLUDE COST OF THIS WORK IN THE CONTRACT UNIT PRICE FOR ITEMS OF WHICH THIS WORK IS A COMPONENT OR INCIDENTAL.
20. ALIGNMENT, CENTERLINE CURVE DATA, AND STATIONING SHALL BE VERIFIED.
21. CONTRACTOR SHALL VERIFY LOCATION AND ELEVATION OF EXISTING FACILITIES PRIOR TO CONSTRUCTION OF PROPOSED FACILITIES. ANY DAMAGE TO EXISTING FACILITIES INCURRED AS A RESULT OF CONSTRUCTION OPERATIONS WILL BE REPAIRED BY THE CONTRACTOR AT HIS EXPENSE.
22. CONTRACTOR SHALL COMPLY WITH ALL FEDERAL, STATE, AND LOCAL LAWS AND ALL REGULATIONS OF UTILITY COMPANIES CONCERNING SAFETY AND HEALTH PRACTICES.
23. INCLUDE PRICE OF ALL BEDDING AND BACKFILL OF TYPE REQUIRED IN PRICE BID PER LINEAR FOOT OF PIPE.
24. WHEN TRENCH CONDITIONS REQUIRE THE USE OF WELL POINTS AND WET SAND CONSTRUCTION, THIS IS TO BE REQUESTED BY THE CONTRACTOR TO THE ENGINEER AND THEN APPROVED BY THE OWNER PRIOR TO IMPLEMENTATION.
25. CONTRACTOR IS RESPONSIBLE FOR MAINTAINING ALL EXISTING ROADWAYS. DAMAGE TO THE EXISTING ROADWAYS DUE TO THE CONTRACTOR'S ACTIVITIES SHALL BE REPAIRED TO THE SATISFACTION OF THE OWNER AND ALL COSTS SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.

STRUCTURAL CONSTRUCTION NOTES:

1. CONCRETE FOR SLOPE PAVING SHALL BE TYPE "B" CONCRETE (3,000 PSI COMPRESSIVE STRENGTH). STRUCTURAL CONCRETE SHALL BE TYPE "A" CONCRETE (4,000 PSI COMPRESSIVE STRENGTH).
2. 4-INCH CONCRETE SLOPE PAVEMENT SHALL BE REINFORCED WITH 6X6XW2.9XW2.9 WELDED WIRE FABRIC OR #4 BARS, 24-INCH O.C.E.W, OR EQUIVALENT.
3. ALL TOE WALLS FOR SLOPE PAVING TO BE REINFORCED WITH #4 REBAR AT 18-INCH O.C.E.W.
4. ALL SLOPE PAVEMENT SHALL INCLUDE A 24-INCH TOE WALL AT THE TOP AND BOTTOM, AND A 24-INCH TOE WALL AT THE SIDES OF CHANNEL AS PER DETAIL.
5. ALL SLOPE PAVEMENT SHALL INCLUDE CONTROL JOINTS 20-FEET ON CENTER (MAXIMUM). JOINTS SHALL BE SEALED WITH SEALING AGENT.
6. RIPRAP SLOPE PROTECTION SHALL BE AS FOLLOWS:
   A. 18-INCH MAT THICKNESS (MIN.)
   B. 80 TO 150 LB BLOCKS, EVENLY GRADED.
   C. PLACED ON GEOTEXTILE
   D. NO EXPOSED STEEL
   E. MIN. 6-INCH THICKNESS PER BLOCK.

THE FOLLOWING ABBREVIATIONS USED IN THE PLAN ARE DEFINED AS FOLLOW:

1. W.L.E. – WATER LINE EASEMENT
2. S.S.E.– SANITARY SEWER EASEMENT
3. C.G.M.P.– CORRUGATED GALVANIZED METAL PIPE
4. R.C.P.– REINFORCED CONCRETE PIPE
5. R.C.B.– REINFORCED CONCRETE BOX
6. STM. SWR.– STORM SEWER
7. F.V.– FLUSHING VALVE
8. F.B.C.O.R.– FORT BEND COUNTY OFFICIAL RECORDS
9. F.B.C.P.R.– FORT BEND COUNTY PUBLIC RECORDS
10. F.B.C.D.R.– FORT BEND COUNTY DEED RECORDS
11. SHT. NO.– SHEET NUMBER
12. R.O.W.– RIGHT OF WAY
13. P.I.– POINT OF INTERSECTION
14. RT.– RIGHT SIDE
15. LT.– LEFT SIDE
16. STA.– STATION
17. LF.– LINEAR FEET
18. TC – TOP OF CURB

WARNING: OVERHEAD ELECTRICAL FACILITIES
OVERHEAD LINES MAY EXIST ON THE PROPERTY. WE HAVE NOT ATTEMPTED TO MARK THOSE LINES SINCE THEY ARE CLEARLY VISIBLE. BUT YOU SHOULD LOCATE THEM PRIOR TO BEGINNING ANY CONSTRUCTION. TEXAS LAW, SECTION 752, HEALTH & SAFETY CODE, FORBIDS ALL ACTIVITIES IN WHICH PERSONS OR THINGS MAY COME WITHIN SIX (6) 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 REMOVED CALL CENTER POINT ENERGY H.L.&P. AT 713-207-7777.

CAUTION: UNDERGROUND GAS FACILITIES
LOCATION OF CENTER POINT ENERGY ENTEX MAIN LINES (TO INCLUDE UNITED GAS TRANSMISSION AND/ OR INDUSTRIAL GAS SUPPLY CORPORATION WHERE APPLICABLE) ARE SHOWN IN AN APPROXIMATE LOCATION ONLY. SERVICE LINES ARE USUALLY NOT SHOWN. THE CONTRACTOR SHALL CONTACT THE UTILITY COORDINATING COMMITTEE AT (713) 223-4567 OR 1-800-669-8344 A MINIMUM OF 48 HOURS PRIOR TO CONSTRUCTION TO HAVE MAIN AND SERVICE LINES FIELD LOCATED.

STORM DRAINAGE CONSTRUCTION NOTES:

1. All storm sewers shall be reinforced concrete pipe, ASTM C-76, Class III) and shall be installed, bedded, and backfilled 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 side lot easement shall be R.C.P. (C-76, Class III) and shall be bedded 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 (1) foot back of all proposed or future curbs shall be backfilled with 1-1/2 sack cement per c.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 backfills shall be in 8" lifts, with tests taken at 100 foot intervals on 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-698/AASHTO T99).
5. Circular and elliptical reinforced concrete pipe shall be installed using rubber gasket joints conforming to ASTM C443 and ASTM C877 respectively.
6. All storm sewer pipes and inlet leads shall be 24-inch and larger R.C.P. (C-76, Class III) unless otherwise noted on plans.
7. All proposed pipe stub-outs from manholes and inlets are to be plugged with 8" brick walls unless otherwise noted.
8. Contractor shall provide 12" minimum clearance at storm sewer and water line crossings
9. Adjust Manhole covers to grade conforming to requirements of section 02086-adjusting manholes, inlets and valve boxes to grade.(No separate pay)
10. The contractor shall be responsible for protecting, maintaining, and restoring any back slope drainage system disturbed as a result of his/her work.
11. All ditches shall be regraded 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 shall be located to avoid existing curb inlet structures.

FORT BEND COUNTY GENERAL NOTES:

1. Fort Bend County must be invited to the pre-construction meeting.
2. Contractor shall notify Fort Bend County Engineering Department 48 hours prior to commencing construction and 48 hours notice to any construction activity within the limits of the paving at Construction@fortbendcountytx.gov.
3. Contractor is responsible for obtaining all permits required from Fort Bend County prior to commencing construction of any improvements within County road right of ways.
4. All Paving Improvements shall be constructed in accordance with Fort Bend County "Rules, Regulations and Requirements relating to the Approval and Acceptance of Improvements in Subdivisions" as currently amended.
5. All road widths, curb radii and curb alignment shown indicates back of curb.
6. A continuous longitudinal reinforcing bar shall be used in the curbs.
7. All concrete paving shall be 5½ sack cement with a minimum compressive strength of 3500 psi at 28 days. Transverse expansion joints shall be installed at each curb return and at a maximum spacing of 60 feet.
8. All weather access to all existing streets and driveways shall be maintained at all times.
9. 4"x12" reinforced concrete curb shall be placed in FRONT of single family lots only. ALL OTHER AREAS SHALL BE 6" REINFORCED CONCRETE CURB.
10. At all intersection locations, TYPE 7 RAMPS shall be placed in accordance with TXDOT PED-12A standard detail sheet. A.D.A – Handicap Ramps shall be installed with street paving at all intersections and comply with current A.D.A regulations.
11. Curb headers are required at curb connections to Handicap Ramps, with no construction joint within 5' of ramps.
12. All intersections utilizing Traffic Control measures shall have A.D.A. wheel chair ramps installed.
13. Guidelines are 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 flagmen, signing, striping, and warning devices, etc., during construction – both day and night.
14. All R1-1 stop signs shall be 30"x30" with diamond grade sheeting. Street name signs shall be upper and lower case letters with diamond grade sheeting.
15. Street name signage shall be on a 9" high sign flat blade w/reflective green background. Street names shall be upper and lowercase lettering with uppercase letters of 6" minimum and lowercase letters of 4.5" minimum. The letters shall be reflective white. Street name signs shall be mounted on stop sign post.
16. A Blue Double Reflectorized button shall be placed at all Fire Hydrant locations. The Button shall be placed 12 inches off the centerline of the street on the same side as the hydrant

NOTE: Fort Bend County "General Notes" Supercede ANY conflicting notes.

FILL CONSTRUCTION NOTES:

1. ALL AREAS PROPOSED FOR FILL SHALL BE STRIPPED A MINIMUM OF 6-INCHES AND PROOF ROLLED TO 95% PROCTOR DENSITY PRIOR TO THE PLACEMENT AND COMPACTION OF SUITABLE FILL MATERIAL.
2. CONTRACTOR SHALL COMPLETELY STRIP, PROOF ROLL AND FILL PROPOSED FILL AREAS ONE AT A TIME. CONTRACTOR SHALL NOT BEGIN STRIPPING THE SUBSEQUENT SITES UNTIL ALL PROPOSED FILL ELEVATIONS HAVE BEEN SATISFIED IN THE PRECEDING SITE.
3. ALL EXISTING DITCHES PROPOSED FOR FILL MUST BE DE-MUCKED PRIOR TO FILLING. ALL UNSUITABLE MATERIAL MUST BE REMOVED FROM THE BOTTOM AND SIDES OF THE DITCH.
4. CONTRACTOR SHALL NOT FILL ANY EXISTING DITCHES UNTIL THE PROPOSED DRAINAGE CHANNEL HAS BEEN CONSTRUCTED.
5. ALL FILL AREAS SHALL BE BROADCAST SEEDED FOLLOWING THE REPLACEMENT OF STRIPPING.
6. INCLUDE IN COST OF EMBANKMENT AND EXCAVATION: STRIPPING A MINIMUM OF 6-INCHES, PROOF ROLLING, STOCK PILING OF STRIPPINGS, AND REPLACEMENT AND COMPACTION OF STRIPPINGS ON FILL OR EXCAVATION AREA, COMPLETE AND IN PLACE. NO SEPARATE PAY.

RESERVOIR MAINTENANCE NOTE:

1. UPON INSPECTION AND ACCEPTANCE OF THE RESERVOIR CONSTRUCTION BY FORT BEND COUNTY DRAINAGE DISTRICT AND FORT BEND COUNTY MUD 134B, MAINTENANCE OF THE RESERVOIR WILL BECOME THE RESPONSIBILITY OF FORT BEND COUNTY MUD 134B.

FORT BEND COUNTY DRAINAGE DISTRICT NOTES

1. FORT BEND COUNTY DRAINAGE DISTRICT CONSTRUCTION DEPARTMENT SHALL BE NOTIFIED AT LEAST 48 HOURS PRIOR TO CONSTRUCTION AT 1004 BLUME ROAD, ROSENBERG, TEXAS 77471, ATTN: DEWAYNE GRIGAR PROPERTY MANAGEMENT DEPARTMENT BY WRITTEN NOTICE. (281-342-2863). A COPY OF THE APPROVED CONSTRUCTION DRAWINGS IS REQUIRED AT THIS TIME.
2. ENGINEER SHALL SUBMIT LETTER AND RECORD DRAWINGS TO THE FORT BEND COUNTY DRAINAGE DISTRICT, CONSTRUCTION DEPARTMENT, REQUESTING INSPECTION AND ACCEPTANCE OF ITEMS CONSTRUCTED IN FORT BEND COUNTY DRAINAGE DISTRICT RIGHT-OF-WAY. PRIOR TO REQUESTING INSPECTION, THE DRAINAGE RIGHT-OF-WAY AND/OR EASEMENTS SHALL BE STAKED AND FLAGGED.
3. CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING, MAINTAINING, AND RESTORING BACKSLOPE DRAINAGE SYSTEM.
4. ALL DISTURBED AREAS WITHIN THE FORT BEND COUNTY DRAINAGE DISTRICT RIGHT-OF-WAY, EXCEPT THE CHANNEL BOTTOM SHALL BE HYDRO-MULCH SEEDED AS PER FORT BEND COUNTY DRAINAGE DISTRICT SPECIFICATION ENTITLED "TURF ESTABLISHMENT" (DRY APPLICATION) OR APPROVED EQUAL.
5. BACKFILL TO BE COMPACTED IN NO GREATER THAN 8 INCH LIFTS TO THE DENSITY OF THE UNDISTURBED ADJACENT SOIL.
6. CONTRACTOR SHALL BE RESPONSIBLE FOR EXCAVATING CHANNEL FLOWLINE TO DESIGN ELEVATIONS AS SHOWN ON PLANS AND DOWNSTREAM AS NECESSARY TO INSURE NO WATER IN STORM SEWER DURING DRY CONDITIONS.
7. CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING FLOW IN CHANNEL DURING CONSTRUCTION AND RESTORING CHANNEL TO ORIGINAL CONDITION.
8. ALL EXCAVATED MATERIAL IS TO BE REMOVED FROM FORT BEND COUNTY DRAINAGE DISTRICT RIGHT-OF-WAY. NO FILL IS TO BE PLACED WITHIN DESIGNATED FLOOD PLAIN AREA WITHOUT FIRST OBTAINING A FILL PERMIT.
9. CONTRACTOR, WITH THE ASSISTANCE OF THE ENGINEER IF NECESSARY, SHALL BE RESPONSIBLE FOR OBTAINING ALL APPLICABLE CITY, COUNTY, STATE, AND FEDERAL PERMITS.

CLEARING AND GRUBBING CONSTRUCTION NOTES:

1. ALL BURNING ON-SITE SHALL BE DONE WITH THE APPROVAL OF THE OWNER AND ENGINEER.
2. UPON COMPLETION OF CLEARING, CONTRACTOR SHALL RAKE ALL REMAINING ROOTS FROM SITE.
3. COORDINATES PROVIDED ARE BASED ON SURFACE COORDINATES.
4. REMAINING ASH FROM PITS CAN BE SPREAD OVER SITE, ONLY AT THE DIRECTION OF THE ENGINEER.

POLLUTION PREVENTION PLAN NOTES:

1. CONTRACTOR TO SEQUENCE CONSTRUCTION ACTIVITIES AND STORM WATER CONTROL MEASURES NECESSARY TO ACCOMPLISH HIS WORK.
2. PRIOR TO START OF CONSTRUCTION, CONTRACTOR SHALL INSTALL, AS A MINIMUM, EROSION AND SEDIMENTATION CONTROLS AT LOCATIONS SHOWN ON PLANS.
3. CONTRACTOR SHALL INSPECT ALL EXISTING OR PROPOSED EROSION AND SEDIMENTATION CONTROL SYSTEMS.
4. CONTRACTOR SHALL MAINTAIN, REPAIR AND/OR REPLACE DAMAGED EXISTING OR PROPOSED EROSION AND SEDIMENTATION CONTROL SYSTEMS THROUGHOUT THE DURATION OF THE CONTRACT.
5. CONTRACTOR SHALL PROVIDE PROTECTED STORAGE AREAS FOR CHEMICALS, PAINTS, SOLVENTS, FERTILIZERS, AND OTHER POTENTIALLY TOXIC MATERIALS.
6. CONTRACTOR SHALL LOCATE FUEL/MATERIAL STORAGE AREAS AWAY FROM STORM WATER CONVEYANCE SYSTEMS. CONTRACTOR SHALL USE A LINER UNDER ABOVE GROUND STORAGE TANKS. CONTRACTOR SHALL USE SILT FENCING, STRAW BALES, OR BERMS AROUND FUEL STORAGE AREAS.
7. CONTRACTOR SHALL ADVISE OWNER IMMEDIATELY, VERBALLY, AND IN WRITING, OF ANY FUEL OR TOXIC MATERIAL SPILLS ONTO THE PROJECT/CONSTRUCTION AREA AND THE ACTIONS TAKEN TO REMEDY THE PROBLEM.
8. CONTRACTOR IS RESPONSIBLE FOR DISPOSING OF FUELS, MATERIALS, AND CONTAMINATED EXCAVATIONS IN A LEGALLY APPROVED MANNER.
9. CONTRACTOR IS RESPONSIBLE FOR COMPLYING WITH ALL APPLICABLE ENVIRONMENTAL LAWS.
10. CONTRACTOR SHALL ENSURE AND DEMONSTRATE COMPLIANCE WITH APPLICABLE STATE AND/OR LOCAL WASTE DISPOSAL, SANITARY SEWER OR SEPTIC SYSTEM REGULATIONS.
11. CONTRACTOR IS PROHIBITED FROM DISCHARGING SOLID MATERIALS, INCLUDING BUILDING MATERIALS INTO WATERS OF THE UNITED STATES, EXCEPT AS AUTHORIZED BY A SECTION 404 PERMIT.
12. CONTRACTOR SHALL MINIMIZE THE OFF-SITE TRACKING OF SEDIMENTS AND THE GENERATION OF DUST.
13. IF EROSION AND SEDIMENTATION CONTROL SYSTEMS ARE EXISTING FROM PRIOR CONTRACTS, OWNER AND/OR OWNER'S REPRESENTATIVE WITH THE CONTRACTOR SHALL EXAMINE THE EXISTING EROSION AND SEDIMENTATION CONTROL SYSTEMS FOR DAMAGE AND/OR APPLICABILITY PRIOR TO CONTRACTOR STARTING CONSTRUCTION OF THE CONTRACT. ANY DAMAGE NOTED AT THIS TIME SHALL BE REPAIRED AT OWNER'S EXPENSE.
14. CONTRACTOR SHALL BE RESPONSIBLE FOR STREET CLEANING, ON A DAILY BASIS, ALL MUD AND DIRT DEPOSITED ON THE EXISTING PAVEMENT DUE TO HIS CONSTRUCTION ACTIVITY.
15. DOWNSTREAM WATERCOURSES OR DITCHES MUST BE PROTECTED FROM SEDIMENT RUNOFF DEVELOPED DURING THE CONSTRUCTION PROCESS. PROVISIONS SUCH AS SILT FENCING, GEOTEXTILE FABRIC PROTECTION OVER STORM DRAIN SYSTEMS, HAY BALES, OR ROCK BERMS MAY BE USED.
16. ALL DISTURBED AREAS MUST BE SEEDED OR LANDSCAPED WITHIN 14 DAYS OF THE LAST ACTIVITY FOR THAT AREA.
17. CHANNEL/RESERVOIR BOTTOM SHALL BE BROADCAST SEEDED.

REINFORCED CONCRETE BOX CULVERT CONSTRUCTION NOTES:

1. ALL REINFORCED CONCRETE BOX CULVERT SHALL CONFORM TO ASTM C 1433 REQUIREMENTS UNLESS SPECIFICALLY ESTABLISHED IN THE CONSTRUCTION PLANS.
2. R.C. BOX CULVERTS SHALL BE INSTALLED, BEDDED AND BACKFILLED IN ACCORDANCE WITH THE SPECIFICATIONS. BEDDING SHALL BE CEMENT STABILIZED SAND (1.5 SACKS PER/CY). BEDDING AND BACKFILL SHALL NOT BE PAID FOR DIRECTLY, BUT SHALL BE CONSIDERED INCIDENTAL TO THE INSTALLATION OF THE R.C.

STATE OF TEXAS
JOHN R. DREAHN
108554
LICENSED
PROFESSIONAL ENGINEER
3-2-2016

BENCHMARK:
A-1212 – BRASS DISK, STAMPED A-1212 1973, SET IN THE TOP OF A CONCRETE HEADWALL ON THE WEST BOUND LANES OF HWY 90A APPROX. 4.7 MILES WEST ALONG HWY 90A FROM THE JUNCTION OF HWY 6, IN SUGARLAND, TEXAS. THE DISK IS SET 2.0 FEET EAST OF THE WEST END, OF THE NORTH CONCRETE HEADWALL, AND 27.0 FEET NORTH OF THE CENTERLINE OF THE WESTBOUND LANES, AND ½FOOT LOWER THAN THE ROAD.

ELEV. = 78.65 FEET (NGVD-29) 1973 ADJ.

TBM:
⅝" IRON ROD W/ LJA CAP LOCATED APPROX. 50.6 FEET SOUTHWEST OF THE NORTHEAST CORNER OF THE ALANA PROPERTY AT THE INTERSECTION OF MADDEN ROAD AND FM 1464.

ELEV. = 93.19 FEET 1973 ADJ.

NOTES:

APPROVED: Maggie Dodd
DEVELOPMENT COORDINATOR
DATE: 4/12/16

DATE	REVISION	BY

PLAT NAME:
CPC 101 FILE NO.
C.O.H. LOG NO. 15-1745

F.B.C.M.U.D. NO. 134B

BULLHEAD BAYOU PHASE II DRAINAGE IMPROVEMENTS

GENERAL NOTES

LJA Engineering, Inc.
2929 Briarpark Drive
Suite 600
Houston, Texas 77042
Phone 713.953.5200
Fax 713.953.5026
FRN - F-1386

LJA PROJECT NO.: 1968-0627

DESIGNED BY:	DRAWN BY:	DATE:
KDB	KDB	FEBRUARY 2016

NOTE: CITY SIGNATURES VALID FOR ONE YEAR ONLY AFTER DATE OF SIGNATURES

CITY OF HOUSTON
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

WATER	3/3/16	STREET & BRIDGE
WASTEWATER	3-3-16	TRAFFIC
STORM	3/7/16	STORM WATER QUALITY
FACILITIES	Megan Gordon	

FILE NO.

FOR CITY OF HOUSTON USE ONLY

DRAWING SCALE

SCALE: NONE

STATE OF TEXAS
55658
REGISTERED PROFESSIONAL ENGINEER

SHEET NO. 2 OF 18

BULLHEAD BAYOU PHASE II DRAINAGE IMPROVEMENTS – JOB NO. 1968-0627

Date/Time: Nov. 22, Fri, 2013, 2:46pm User Name: KDJ
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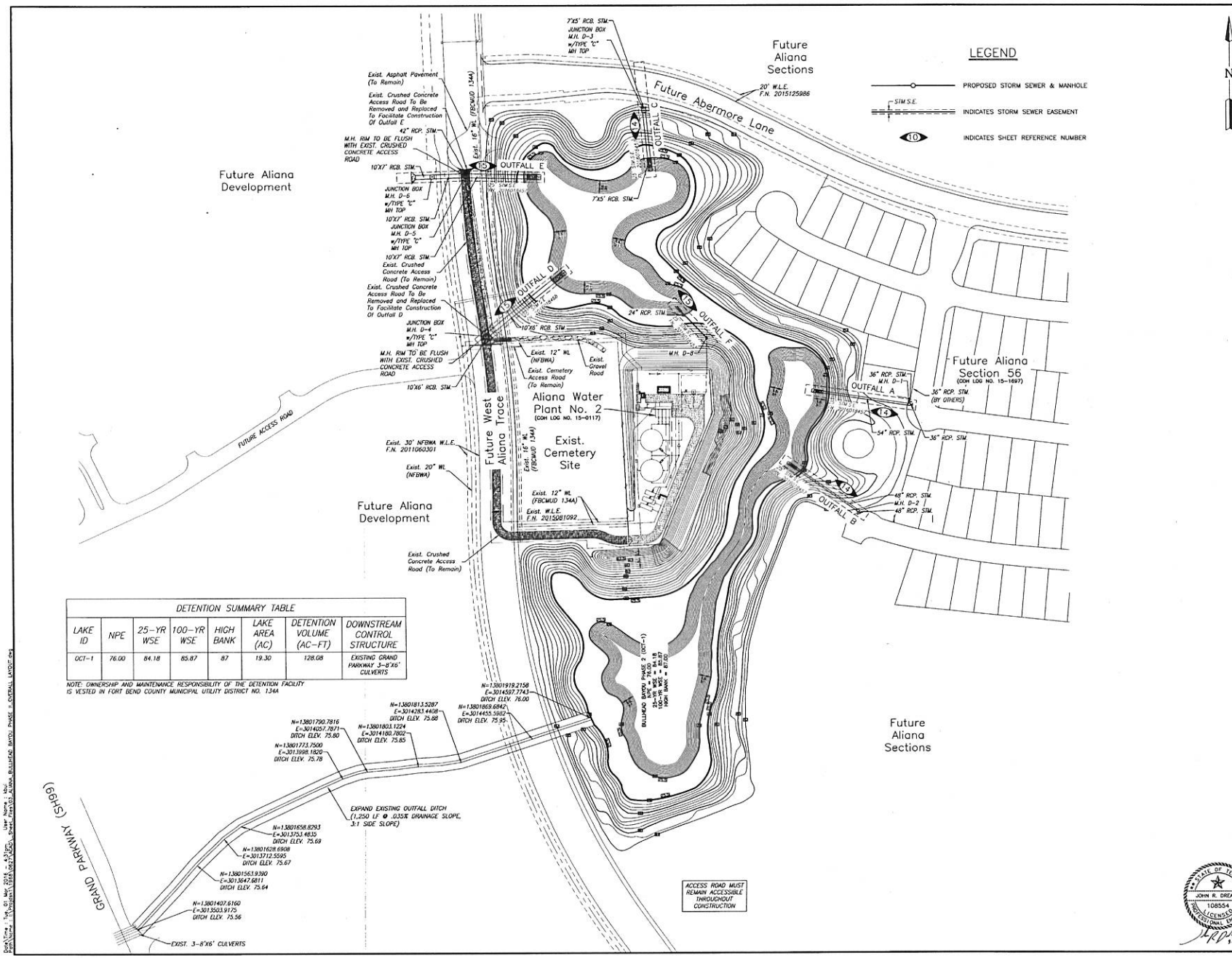

LEGEND

- PROPOSED STORM SEWER & MANHOLE
- STM S.E. — INDICATES STORM SEWER EASEMENT
- (10) — INDICATES SHEET REFERENCE NUMBER

DETENTION SUMMARY TABLE							
LAKE ID	NPE	25-YR WSE	100-YR WSE	HIGH BANK	LAKE AREA (AC)	DETENTION VOLUME (AC-FT)	DOWNSTREAM CONTROL STRUCTURE
OCT-1	76.00	84.18	85.87	87	19.30	128.08	EXISTING GRAND PARKWAY 3-8'X6' CULVERTS

NOTE: OWNERSHIP AND MAINTENANCE RESPONSIBILITY OF THE DETENTION FACILITY IS VESTED IN FORT BEND COUNTY MUNICIPAL UTILITY DISTRICT NO. 134A

BENCHMARK:

A-1212 – BRASS DISK, STAMPED A-1212 1973, SET IN THE TOP OF A CONCRETE HEADWALL ON THE WEST BOUND LANES OF HWY 90A APPROX. 4.1 MILES WEST ALONG HWY 90A FROM THE JUNCTION OF HWY 6, IN SUGARLAND, TEXAS. THE DISK IS SET 2.0 FEET EAST OF THE WEST END, OF THE NORTH CONCRETE HEADWALL, AND 27.0 FEET NORTH OF THE CENTERLINE OF THE WESTBOUND LANES, AND 19FOOT LOWER THAN THE ROAD.

ELEV. = 78.65 FEET (NGVD-29) 1973 ADJ.

TBM:

5/8" IRON ROD W/ LJA CAP LOCATED APPROX. 50.6 FEET SOUTHWEST OF THE NORTHEAST CORNER OF THE ALIANA PROPERTY AT THE INTERSECTION OF MADDEN ROAD AND FM 1464.

ELEV. = 93.19 FEET 1973 ADJ.

NOTES:

APPROVED: Maggie Dodd
DEVELOPMENT COORDINATOR

DATE: 4/12/16

DATE	REVISION	BY

PLAT NAME:
CPC 101 FILE NO.
C.O.H. LOG NO. 15-1745

F.B.C.M.U.D. NO. 134B

BULLHEAD BAYOU PHASE II DRAINAGE IMPROVEMENTS

OVERALL LAYOUT

LJA Engineering, Inc.
2929 Briarpark Drive
Suite 600
Houston, Texas 77042
Phone 713.953.5200
Fax 713.953.5026
FRN - F-1386

LJA PROJECT NO.: 1968-0627

DESIGNED BY:	DRAWN BY:	DATE:
KDB	KDB	FEBRUARY 2016

NOTE: CITY SIGNATURES VALID FOR ONE YEAR ONLY AFTER DATE OF SIGNATURES

CITY OF HOUSTON
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

MAPS	2/3/16	STREET & BRIDGE
WASTEWATER	3-3-16	TRAFFIC
WATER	3/9/16	STORM WATER QUALITY
FACILITIES		

FILE NO.

FOR CITY OF HOUSTON USE ONLY

DRAWING SCALE

SCALE: 1" = 100'

55658

SHEET NO. 3 OF 18

STATE OF TEXAS
JOHN R. DREAHN
108554
LICENSED
PROFESSIONAL ENGINEER
5-2-2016

BULLHEAD BAYOU PHASE II DRAINAGE IMPROVEMENTS – JOB NO. 1968-0627

Date/Time: 5/4/2016 9:23am User Name: KDB
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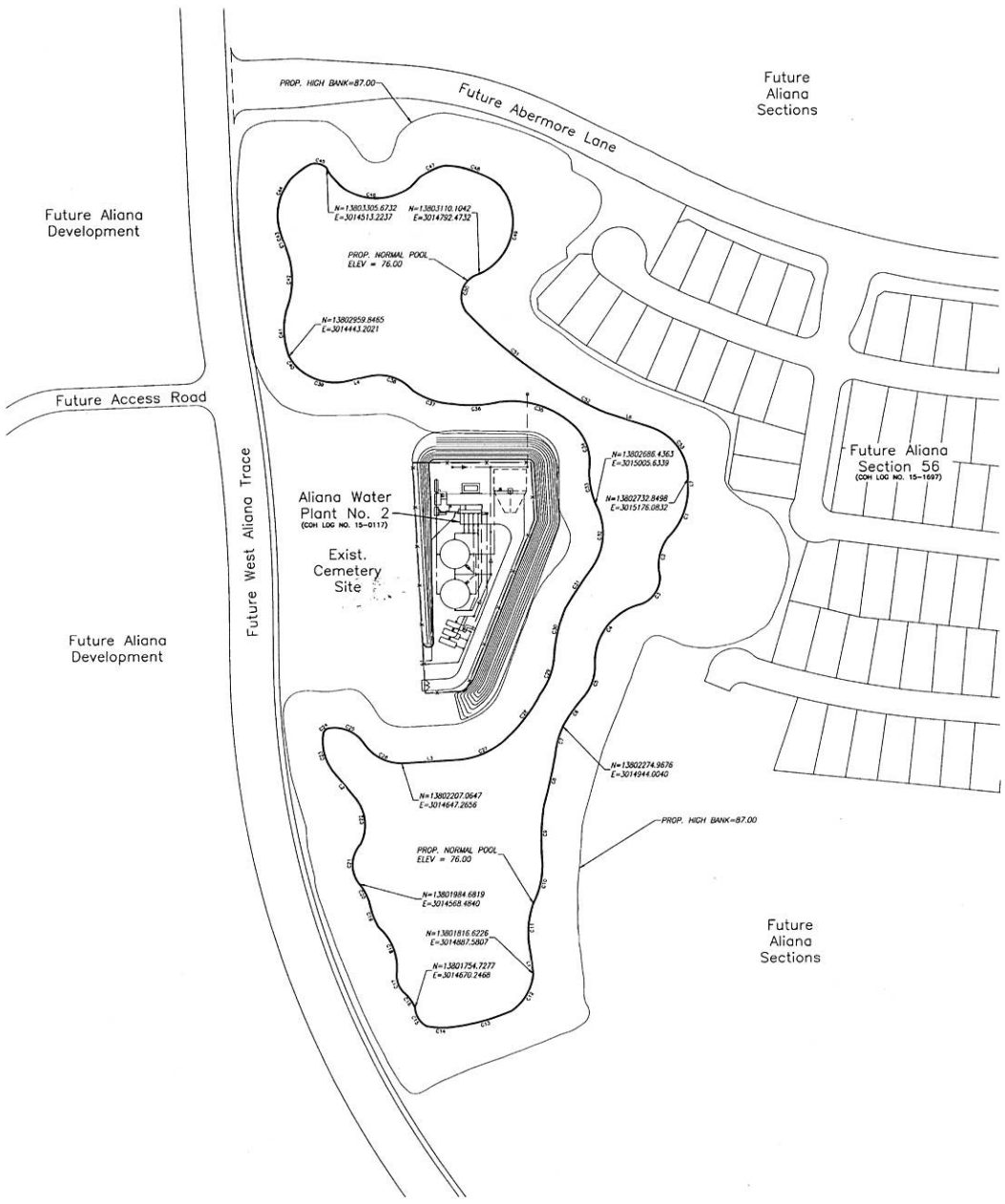


BENCHMARK:

A-1212 – BRASS DISK, STAMPED A-1212, 1973, SET IN THE TOP OF A CONCRETE HEADWALL ON THE WEST BOUND LANES OF HWY 90A, APPROX. 4.1 MILES WEST ALONG HWY 90A FROM THE JUNCTION OF HWY 6, IN SUGARLAND, TEXAS. THE DISK IS SET 2.0 FEET EAST OF THE WEST END, OF THE NORTH CONCRETE HEADWALL, AND 27.0 FEET NORTH OF THE CENTERLINE OF THE WESTBOUND LANES, AND ½FOOT LOWER THAN THE ROAD.

ELEV. = 78.65 FEET (NGVD-29) 1973 ADJ.

TBM:

⅝" IRON ROD W/ LJA CAP LOCATED APPROX. 50.6 FEET SOUTHWEST OF THE NORTHEAST CORNER OF THE ALIANA PROPERTY AT THE INTERSECTION OF MADDEN ROAD AND FM 1464.

ELEV. = 93.19 FEET 1973 ADJ.

NOTES:

CURVE TABLE

CURVE	RADIUS	TANGENT	CHORD	ARC	DELTA	CHORD BEARING
C1	129.51	52.68	97.98	100.31	44-48-36	S 22-39-11 W
C2	86.80	40.30	73.10	75.48	48-48-33	S 11-11-53 W
C3	54.11	38.28	53.56	67.96	71-57-45	S 30-12-22 W
C4	106.71	91.37	138.89	151.98	80-05-28	S 36-53-56 W
C5	86.80	32.86	61.66	63.00	40-34-06	S 18-43-51 W
C6	332.66	33.60	66.85	66.97	11-32-03	S 35-15-48 W
C7	156.44	27.82	54.79	55.07	19-54-51	S 15-16-22 W
C8	1030.18	48.23	96.35	96.39	5-21-39	S 12-39-16 W
C9	433.53	51.70	102.66	102.91	13-36-01	S 01-06-27 W
C10	150.83	41.56	80.16	81.13	30-51-42	S 12-18-06 W
C11	166.96	47.98	92.19	93.41	32-03-12	S 03-11-32 W
C12	93.90	43.35	79.50	81.07	50-13-11	S 30-06-12 W
C13	366.87	54.37	107.70	108.04	15-55-08	S 74-21-30 W
C14	151.56	27.40	53.93	54.22	20-29-45	N 68-33-37 W
C15	40.78	22.47	34.36	41.08	57-42-42	N 31-06-37 W
C16	74.36	17.82	34.84	35.16	27-04-53	N 35-53-35 W
C17	45.50	22.10	36.76	41.15	51-46-56	N 18-14-17 W
C18	100.87	30.31	86.90	93.17	52-55-33	N 21-50-22 W
C19	142.84	34.42	48.14	48.37	19-25-46	N 20-08-17 W
C20	103.85	20.40	40.03	40.28	22-13-30	N 27-47-16 W

CURVE TABLE

CURVE	RADIUS	TANGENT	CHORD	ARC	DELTA	CHORD BEARING
C21	36.60	47.44	72.72	78.97	79-56-00	N 02-33-20 E
C22	76.83	30.61	90.81	96.61	70-31-30	N 07-46-30 W
C23	92.88	43.08	78.18	80.88	49-49-42	N 15-46-31 W
C24	13.93	8.67	13.90	18.91	88-27-11	N 48-38-08 E
C25	85.88	38.88	67.11	70.41	81-09-36	S 85-32-03 E
C26	82.30	31.88	67.75	92.56	64-25-45	S 63-52-01 E
C27	145.05	80.56	111.82	114.78	45-10-48	N 85-45-40 E
C28	286.48	47.14	83.04	83.45	16-41-23	N 36-49-18 E
C29	133.48	43.24	82.27	83.63	35-53-48	N 18-13-18 E
C30	254.18	43.08	84.94	85.34	18-14-21	N 14-03-44 E
C31	959.80	48.01	91.92	91.98	5-29-22	N 33-30-08 E
C32	111.78	68.28	119.54	122.38	62-51-01	N 02-42-29 E
C33	158.02	32.57	63.62	64.25	23-09-53	N 10-30-35 W
C34	94.07	46.58	83.49	86.50	52-41-15	N 17-46-57 W
C35	168.28	81.38	148.79	151.90	51-43-23	N 71-44-51 W
C36	220.63	44.08	86.42	86.58	22-35-15	S 87-40-04 W
C37	135.77	38.92	76.59	77.85	32-48-04	N 71-02-32 W
C38	81.16	50.58	85.85	90.44	63-51-49	N 72-12-29 W
C39	100.24	48.21	86.80	89.87	51-32-18	N 74-08-08 W
C40	68.82	14.78	28.24	29.34	17-00-48	N 37-08-45 W

CURVE TABLE

CURVE	RADIUS	TANGENT	CHORD	ARC	DELTA	CHORD BEARING
C41	136.61	44.37	84.57	85.92	36-15-48	N 02-18-13 W
C42	153.55	80.14	112.00	114.85	42-48-48	N 00-08-21 E
C43	151.27	7.50	14.98	14.99	5-40-36	N 17-28-58 W
C44	103.90	81.61	137.26	150.03	82-56-07	N 24-40-52 E
C45	28.33	17.23	28.71	31.16	60-51-38	S 75-23-20 E
C46	101.44	161.19	171.71	204.73	115-37-57	S 84-17-03 E
C47	105.25	28.84	51.83	52.18	28-24-20	N 65-38-15 E
C48	166.93	56.12	106.37	108.27	37-13-22	S 66-48-24 E
C49	105.25	138.35	167.54	183.76	100-28-29	S 13-16-06 W
C50	43.96	66.54	72.28	86.71	113-10-38	S 18-48-12 W
C51	848.76	116.44	230.72	231.44	15-37-23	S 50-06-28 E
C52	427.76	43.50	86.65	86.80	11-37-34	S 61-53-57 E
C53	99.81	73.15	118.00	128.25	72-28-32	S 35-44-30 E

LINE TABLE

LINE	BEARING	DISTANCE
L1	N 07-06-54 W	38.60
L2	N 38-27-27 W	52.88
L3	N 88-28-43 E	86.10
L4	S 77-53-32 W	45.13
L5	N 21-15-02 W	19.18
L6	S 71-54-45 E	86.89
L7	S 06-14-53 W	19.29

APPROVED: Maggie Dodd
DEVELOPMENT COORDINATOR

DATE: 4/12/16

DATE	REVISION	BY

PLAT NAME:
CPC 101 FILE NO.
C.O.H. LOG NO. 15-1745

F.B.C.M.U.D. NO. 134B

BULLHEAD BAYOU PHASE II DRAINAGE IMPROVEMENTS

HORIZONTAL CONTROL LAYOUT

LJA Engineering, Inc.
2929 Briarpark Drive
Suite 600
Houston, Texas 77042
Phone 713.953.5200
Fax 713.953.5026
FRN - F-1386

LJA PROJECT NO.: 1968-0627

DESIGNED BY:	DRAWN BY:	DATE:
KDB	KDB	FEBRUARY 2016

NOTE: CITY SIGNATURES VALID FOR ONE YEAR ONLY AFTER DATE OF SIGNATURES

CITY OF HOUSTON
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

WATER: 3/3/16 STREET & BRIDGE
WASTEWATER: 3-3-16 TRAFFIC
DRAINAGE: 3/4/16 STORM WATER QUALITY
FACILITIES

FILE NO.
DRAWING SCALE
SCALE: 1" = 100'
SHEET NO. 4 OF 18

FOR CITY OF HOUSTON USE ONLY
55658

STATE OF TEXAS
JOHN R. DREAHN
108554
LICENSED
PROFESSIONAL ENGINEER
3-2-2016

BULLHEAD BAYOU PHASE II DRAINAGE IMPROVEMENTS – JOB NO. 1968-0627

Date/Time: Mar 22 Fri 2016 8:54am User Name: kdb
Drawing: U:\Projects\1968-0627-BULLHEAD BAYOU PHASE II_HORIZONTAL CONTROL LAYOUT.dwg

LEGEND

- PROPOSED STORM SEWER AND MANHOLE
- PROPOSED STORM SEWER BOX AND JUNCTION BOX W/ TYPE C MANHOLE TOP
- INDICATES SYSTEM LINE NUMBER
- INDICATES MANHOLE NUMBER
- INDICATES DRAINAGE SYSTEM
- INDICATES ACCUMULATED DRAINAGE AREA IN ACRES
- INDICATES ACCUMULATED RUN OFF IN C.F.S.
- INDICATES DRAINAGE AREA DIVIDE
- INDICATES EXISTING NATURAL GROUND CONTOURS
- NOTE: ONCE BULLHEAD BAYOU PHASE II IS CONSTRUCTED EXTREME EVENT SHEET FLOW FOR FUTURE ALIANA SECTIONS WILL BE DIRECTED TO 100-YR INLETS THAT WILL ULTIMATELY OUTFALL INTO BULLHEAD BAYOU PHASE II
- INDICATES FUTURE SHEET FLOW
- INDICATES EXISTING SHEET FLOW

BENCHMARK:

A-1212 — BRASS DISK, STAMPED A-1212 1973, SET IN THE TOP OF A CONCRETE HEADWALL ON THE WEST BOUND LANES OF HWY 90A, APPROX. 4.1 MILES WEST ALONG HWY 90A FROM THE JUNCTION OF HWY 6, IN SUGARLAND, TEXAS. THE DISK IS SET 2.0 FEET EAST OF THE WEST END, OF THE NORTH CONCRETE HEADWALL, AND 27.0 FEET NORTH OF THE CENTERLINE OF THE WESTBOUND LANES, AND 15FOOT LOWER THAN THE ROAD.

ELEV. = 78.65 FEET (NGVD-29) 1973 ADJ.

TBM:

⅝" IRON ROD W/ LJA CAP LOCATED APPROX. 50.6 FEET SOUTHWEST OF THE NORTHEAST CORNER OF THE ALIANA PROPERTY AT THE INTERSECTION OF MADDEN ROAD AND FM 1464.

ELEV. = 93.19 FEET 1973 ADJ.

NOTES:

APPROVED: Maggie Dalton
DEVELOPMENT COORDINATOR
DATE: 4/12/16

DATE	REVISION	BY

PLAT NAME:
CPC 101 FILE NO. :
C.O.H. LOG NO. 15-1745

F.B.C.M.U.D. NO. 134B

BULLHEAD BAYOU PHASE II DRAINAGE IMPROVEMENTS

DRAINAGE AREA MAP

LJA Engineering, Inc.
2929 Briarpark Drive
Suite 600
Houston, Texas 77042
Phone 713.953.5200
Fax 713.953.5026
FRN - F-1386

LJA PROJECT NO.: 1968-0627

DESIGNED BY:	DRAWN BY:	DATE:
KDB	KDB	FEBRUARY 2016

NOTE: CITY SIGNATURES VALID FOR ONE YEAR ONLY AFTER DATE OF SIGNATURES

CITY OF HOUSTON
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

PARKS	3/3/16	STREET & BRIDGE
WASTEWATER	3-3-16	TRAFFIC
WATER	3/4/16	STORM WATER QUALITY
FACILITIES		

FILE NO.

DRAWING SCALE

SCALE: 1" = 200'

SHEET NO. 5 OF 18

FOR CITY OF HOUSTON USE ONLY

STATE OF TEXAS
JOHN R. DRLANN
108554
LICENSED
PROFESSIONAL ENGINEER
55658
4-5-2016

BULLHEAD BAYOU PHASE II DRAINAGE IMPROVEMENTS – JOB NO. 1968-0627

Date/Time: Tue, 01 Mar 2016 at 4:30pm User Name: KDW
Drawing: I:\Projects\1968\0627\DGN_Sheet\134B_ALIANA_BULLHEAD BAYOU PHASE II_DRAINAGE AREA MAP.dwg

5

LJA Engineering , Inc.

Project: Aliana Bullhead Bayou System
LJA Job No. 1968-0627
System: Storm
By: KDB Date
Checked by: Date

Normal POOL 76.00
25-YR W.S.E. 84.18

COH 2 YR
b= 75.01
d= 16.2
e= 0.8315

Design Frequency: 2 years

2 YR 25-YR W.S.E. 84.18

FROM JUNCTION	TO JUNCTION	ADDED AREA ac	TOTAL AREA ac	TC min	Intensity	C	CI	Additional Q cfs	CUM Q(2 YR) cfs	REACH ft	LINE/BOX SIZE in	WIDTH FT	HEIGHT FT	SLOPE %	DESIGN Q cfs	V fps	D.S. FALL (ft)	OTHER LOSSES ft	FLOWLINE UP-STREAM	FLOWLINE DOWN-STREAM	ACT V fps	SLOPE HYD GRAD (%)	delta H ft	ELEV. HYD. GRAD. UP-STREAM	ELEV. HYD. GRAD. DOWN-STREAM	TC UP-STREAM	HG DIST BELOW TC ft	Maximum Ponding Elevation	Method 1 (Y/N)	Maximum Allowable Sheetflow	Actual Sheetflow	Method 2 (Y/N)	FLOWLINE @ 3 DECIMAL UP-STREAM	FLOWLINE @ 3 DECIMAL DOWN-STREAM
SYSTEM A																																		
LINE 1																																		
FUTURE	MH 1	5.64	5.64	28.56	3.18	0.55	1.75	0.00	9.86	8	36			0.110	22.18	3.1	8.30		77.44	77.43	1.39	0.022	0.002	84.21	84.21	87.50	3.29	88.50	Yes	54.33	0.00	Method 1	77.440	77.431
MH 1	OUTFALL	8.06	13.70	30.86	3.05	0.55	1.68	0.00	23.39	228	54			0.060	48.30	3.0	0.00		69.13	69.00	1.47	0.014	0.032	84.21	84.18	87.50	3.29	88.50	Yes	54.33	0.00	Method 1	69.130	69.003
FUTURE	MH 1	8.06	8.06	29.44	3.13	0.55	1.72	0.00	13.87	8	36			0.110	22.18	3.1	0.00		77.10	77.09	1.96	0.043	0.003	84.22	84.21	87.50	3.28	88.50	Yes	54.33	0.00	Method 1	77.100	77.091

2 YR 25-YR W.S.E. 84.18

FROM JUNCTION	TO JUNCTION	ADDED AREA ac	TOTAL AREA ac	TC min	Intensity	C	CI	Additional Q cfs	CUM Q(2 YR) cfs	REACH ft	LINE/BOX SIZE in	WIDTH FT	HEIGHT FT	SLOPE %	DESIGN Q cfs	V fps	D.S. FALL (ft)	OTHER LOSSES ft	FLOWLINE UP-STREAM	FLOWLINE DOWN-STREAM	ACT V fps	SLOPE HYD GRAD (%)	delta H ft	ELEV. HYD. GRAD. UP-STREAM	ELEV. HYD. GRAD. DOWN-STREAM	TC UP-STREAM	HG DIST BELOW TC ft	Maximum Ponding Elevation	Method 1 (Y/N)	Maximum Allowable Sheetflow	Actual Sheetflow	Method 2 (Y/N)	FLOWLINE @ 3 DECIMAL UP-STREAM	FLOWLINE @ 3 DECIMAL DOWN-STREAM
SYSTEM B																																		
LINE 2																																		
FUTURE	MH 2	13.59	13.59	30.83	3.05	0.55	1.68	0.00	22.81	8	48			0.070	22.18	3.1	6.79		75.94	75.93	3.22	0.116	0.009	84.24	84.23	87.00	2.76	88.00	Yes	54.33	0.00	Method 1	75.940	75.931
MH 2	OUTFALL	0.00	13.59	30.83	3.05	0.55	1.68	0.00	22.81	197	48			0.070	38.11	3.0	0.00		69.14	69.00	1.81	0.025	0.049	84.23	84.18	87.00	2.77	88.00	Yes	54.33	0.00	Method 1	69.140	69.002

2 YR 25-YR W.S.E. 84.18

FROM JUNCTION	TO JUNCTION	ADDED AREA ac	TOTAL AREA ac	TC min	Intensity	C	CI	Additional Q cfs	CUM Q(2 YR) cfs	REACH ft	LINE/BOX SIZE in	WIDTH FT	HEIGHT FT	SLOPE %	DESIGN Q cfs	V fps	D.S. FALL (ft)	OTHER LOSSES ft	FLOWLINE UP-STREAM	FLOWLINE DOWN-STREAM	ACT V fps	SLOPE HYD GRAD (%)	delta H ft	ELEV. HYD. GRAD. UP-STREAM	ELEV. HYD. GRAD. DOWN-STREAM	TC UP-STREAM	HG DIST BELOW TC ft	Maximum Ponding Elevation	Method 1 (Y/N)	Maximum Allowable Sheetflow	Actual Sheetflow	Method 2 (Y/N)	FLOWLINE @ 3 DECIMAL UP-STREAM	FLOWLINE @ 3 DECIMAL DOWN-STREAM
SYSTEM C																																		
LINE 3																																		
JUNCTION MH 3	OUTFALL	43.72	43.72	34.45	2.87	0.55	1.58	0.00	68.99	138		7	5	0.050	115.04	3.3	0.00		68.07	68.00	1.97	0.018	0.025	84.20	84.18	85.00	0.80	86.00	Yes	54.33	0.00	Method 1	68.070	68.001
LINE 4																																		
FUTURE	JUNCTION MH 3	43.72	43.72	34.45	2.87	0.55	1.58	0.00	68.99	8		7	5	0.050	115.04	3.3	0.00		74.50	74.50	1.97	0.018	0.001	84.21	84.20	86.00	1.79	87.00	Yes	54.33	0.00	Method 1	74.500	74.496

2 YR 25-YR W.S.E. 84.18

FROM JUNCTION	TO JUNCTION	ADDED AREA ac	TOTAL AREA ac	TC min	Intensity	C	CI	Additional Q cfs	CUM Q(2 YR) cfs	REACH ft	LINE/BOX SIZE in	WIDTH FT	HEIGHT FT	SLOPE %	DESIGN Q cfs	V fps	D.S. FALL (ft)	OTHER LOSSES ft	FLOWLINE UP-STREAM	FLOWLINE DOWN-STREAM	ACT V fps	SLOPE HYD GRAD (%)	delta H ft	ELEV. HYD. GRAD. UP-STREAM	ELEV. HYD. GRAD. DOWN-STREAM	TC UP-STREAM	HG DIST BELOW TC ft	Maximum Ponding Elevation	Method 1 (Y/N)	Maximum Allowable Sheetflow	Actual Sheetflow	Method 2 (Y/N)	FLOWLINE @ 3 DECIMAL UP-STREAM	FLOWLINE @ 3 DECIMAL DOWN-STREAM
SYSTEM D																																		
LINE 5																																		
JUNCTION MH 4	OUTFALL	67.30	67.30	35.99	2.80	0.80	2.24	0.00	150.69	237		10	6	0.030	180.63	3.0	0.00		66.07	66.00	2.51	0.021	0.049	84.23	84.18	88.80	4.57	89.80	Yes	54.33	0.00	Method 1	66.070	66.000
LINE 6																																		
FUTURE	JUNCTION MH 4	67.30	67.30	35.99	2.80	0.80	2.24	0.00	150.69	8		10	6	0.030	180.63	3.0	0.00		66.07	66.07	2.51	0.021	0.002	84.23	84.23	88.80	4.57	89.80	Yes	54.33	0.00	Method 1	66.070	66.068

2 YR 25-YR W.S.E. 84.18

FROM JUNCTION	TO JUNCTION	ADDED AREA ac	TOTAL AREA ac	TC min	Intensity	C	CI	Additional Q cfs	CUM Q(2 YR) cfs	REACH ft	LINE/BOX SIZE in	WIDTH FT	HEIGHT FT	SLOPE %	DESIGN Q cfs	V fps	D.S. FALL (ft)	OTHER LOSSES ft	FLOWLINE UP-STREAM	FLOWLINE DOWN-STREAM	ACT V fps	SLOPE HYD GRAD (%)	delta H ft	ELEV. HYD. GRAD. UP-STREAM	ELEV. HYD. GRAD. DOWN-STREAM	TC UP-STREAM	HG DIST BELOW TC ft	Maximum Ponding Elevation	Method 1 (Y/N)	Maximum Allowable Sheetflow	Actual Sheetflow	Method 2 (Y/N)	FLOWLINE @ 3 DECIMAL UP-STREAM	FLOWLINE @ 3 DECIMAL DOWN-STREAM
SYSTEM E																																		
LINE 7																																		
FUTURE	JUNCTION MH 6	57.67	57.67	35.42	2.82	0.80	2.26	0.00	130.30	40		10	7	0.050	289.56	4.1	10.82		77.85	77.83	1.86	0.010	0.004	84.22	84.21	89.00	4.78	90.00	Yes	54.33	0.00	Method 1	77.850	77.830
JUNCTION MH 6	JUNCTION MH 5	0.00	57.67	35.42	2.82	0.80	2.26	0.00	130.30	80		10	7	0.050	289.56	4.1	1.91		67.00	66.96	1.86	0.010	0.008	84.21	84.20	89.00	4.79	90.00	Yes	54.33	0.00	Method 1	67.000	66.960
JUNCTION MH 5	OUTFALL	9.59	67.26	35.98	2.80	0.80	2.24	0.00	151.77	172		10	7	0.030	224.29	3.2	0.00		66.05	66.00	2.17	0.014	0.023	84.20	84.18	89.00	4.80	90.00	Yes	54.33	0.00	Method 1	66.050	65.998
LINE 8																																		
FUTURE	JUNCTION MH 5	9.59	9.59	29.89	3.10	0.80	2.48	0.00	23.81	8	42			0.090	30.26	3.1	0.00		76.60	76.59	2.47	0.056	0.004	84.21	84.20	89.00	4.79	90.00	Yes	54.33	0.00	Method 1	76.600	76.593

2 YR 25-YR W.S.E. 84.18

FROM JUNCTION	TO JUNCTION	ADDED AREA ac	TOTAL AREA ac	TC min	Intensity	C	CI	Additional Q cfs	CUM Q(2 YR) cfs	REACH ft	LINE/BOX SIZE in	WIDTH FT	HEIGHT FT	SLOPE %	DESIGN Q cfs	V fps	D.S. FALL (ft)	OTHER LOSSES ft	FLOWLINE UP-STREAM	FLOWLINE DOWN-STREAM	ACT V fps	SLOPE HYD GRAD (%)	delta H ft	ELEV. HYD. GRAD. UP-STREAM	ELEV. HYD. GRAD. DOWN-STREAM	TC UP-STREAM	HG DIST BELOW TC ft	Maximum Ponding Elevation	Method 1 (Y/N)	Maximum Allowable Sheetflow	Actual Sheetflow	Method 2 (Y/N)	FLOWLINE @ 3 DECIMAL UP-STREAM	FLOWLINE @ 3 DECIMAL DOWN-STREAM
SYSTEM F																																		
LINE 9																																		
EXISTING	MH 2	1.61	1.61	25.87	3.35	0.55	1.84	0.00	2.96	86	24			0.180	9.62	3.1	5.66		75.99	75.84	0.94	0.017	0.015	84.21	84.20	87.00	2.79	88.00	Yes	54.33	0.00	Method 1	75.995	75.840
MH 2	OUTFALL	0.00	1.61	25.87	3.35	0.55	1.84	0.00	2.96	99	24			0.180	9.62	3.1	0.00		70.18	70.00	0.94	0.017	0.017	84.20	84.18	87.00	2.80	88.00	Yes	54.33	0.00	Method 1	70.180	70.002

BENCHMARK:

A-1212 – BRASS DISK, STAMPED A-1212 1973, SET IN THE TOP OF A CONCRETE HEADWALL ON THE WEST BOUND LANES OF HWY 90A, APPROX. 4.1 MILES WEST ALONG HWY 90A FROM THE JUNCTION OF HWY 6, IN SUGARLAND, TEXAS. THE DISK IS SET 2.0 FEET EAST OF THE WEST END OF THE NORTH CONCRETE HEADWALL, AND 27.0 FEET NORTH OF THE CENTERLINE OF THE WESTBOUND LANES, AND 7½FOOT LOWER THAN THE ROAD.

ELEV. = 78.65 FEET (NGVD-29) 1973 ADJ.

TBM:

⅝" IRON ROD W/ LJA CAP LOCATED APPROX. 50.6 FEET SOUTHWEST OF THE NORTHEAST CORNER OF THE ALIANA PROPERTY AT THE INTERSECTION OF MADDEN ROAD AND FM 1464.

ELEV. = 93.19 FEET 1973 ADJ.

NOTES:

APPROVED: Maggie Dodson
DEVELOPMENT COORDINATOR
DATE: 4/12/16

DATE	REVISION	BY

PLAT NAME:
CPC 101 FILE NO.
C.O.H. LOG NO. 15-1745

F.B.C.M.U.D. NO. 134B

BULLHEAD BAYOU PHASE II
DRAINAGE IMPROVEMENTS

DRAINAGE CALCULATIONS
(2-YR CITY OF HOUSTON)

LJA Engineering, Inc.
2929 Briarpark Drive
Suite 600
Houston, Texas 77042
Phone 713.953.5200
Fax 713.953.5026
FRN - F-1386

LJA PROJECT NO.: 1968-0627

DESIGNED BY:	DRAWN BY:	DATE:
KDB	KDB	FEBRUARY 2016

NOTE: CITY SIGNATURES VALID FOR ONE YEAR ONLY AFTER DATE OF SIGNATURES

CITY OF HOUSTON
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

DATE 3/4/16	STREET & BRIDGE
DATE 3/4/16	TRAFFIC
DATE 3/4/16	STORM WATER QUALITY
FACILITIES	

FILE NO.
DRAWING SCALE
SCALE: NONE
SHEET NO. 6 OF 18

FOR CITY OF HOUSTON USE ONLY

STATE OF TEXAS
JOHN R. DREANN
108554
LICENSED
PROFESSIONAL ENGINEER
3-4-16

55658
REGISTERED PROFESSIONAL ENGINEER

BULLHEAD BAYOU PHASE II DRAINAGE IMPROVEMENTS – JOB NO. 1968-0627

Date/Time: Thu, 03 Mar 2016 2:34pm User Name: LJA
File Name: U:\Projects\1968-0627_ALIANA_BULLHEAD BAYOU PHASE I_DRAINAGE CALCULATIONS.dwg

LJA Engineering , Inc.

Project: Aliana Bullhead Bayou System
LJA Job No: 1968-0627
System: Storm
By: KDB Date:
Checked by: Date:

Normal POOL 76.00
25-YR W.S.E. 84.18

COH 100 YR
b= 125.4
d= 21.8
e= 0.75

Design Frequency: 100 years

100 YR — 25-YR W.S.E. 84.18

FROM JUNCTION	TO JUNCTION	ADDED AREA ac	TOTAL AREA ac	TC min	Intensity	C	CI	Additional Q cfs	CUM Q(100 YR) cfs	REACH ft	LINE/BOX SIZE in	WIDTH FT	HEIGHT FT	SLOPE %	DESIGN Q cfs	V fps	D.S. FALL (ft)	OTHER LOSSES ft	FLOWLINE UP-STREAM	FLOWLINE DOWN-STREAM	ACT V fps	SLOPE HYD GRAD (%)	delta H ft	ELEV HYD GRAD UP-STREAM	ELEV HYD GRAD DOWN-STREAM	TC UP-STREAM	HG DIST BELOW TC ft	Maximum Ponding Elevation	Method 1 (Y/N)	Maximum Allowable Sheetflow	Actual Sheetflow	Method 2 (Y/N)	FLOWLINE @ 3 DECIMAL UP-STREAM	FLOWLINE @ 3 DECIMAL DOWN-STREAM
SYSTEM A																																		
LINE 1																																		
FUTURE	MH 1	5.64	5.64	28.56	6.63	0.55	3.65	0.00	20.58	8	36			0.110	22.18	3.1	8.30		77.44	77.43	2.91	0.094	0.008	84.33	84.32	87.50	3.17	88.50	Yes	54.33	0.00	Method 1	77.440	77.431
MH 1	OUTFALL	8.06	13.70	30.86	6.42	0.55	3.53	0.00	49.02	228	54			0.060	48.30	3.0	0.00		69.13	69.00	3.08	0.062	0.141	84.32	84.18	87.50	3.18	88.50	Yes	54.33	0.00	Method 1	69.130	69.003
FUTURE	MH 1	8.06	8.06	29.44	6.55	0.55	3.60	0.00	29.03	8	36			0.110	22.18	3.1	0.00		77.10	77.09	4.10	0.188	0.015	84.34	84.32	87.50	3.16	88.50	Yes	54.33	0.00	Method 1	77.100	77.091

100 YR — 25-YR W.S.E. 84.18

FROM JUNCTION	TO JUNCTION	ADDED AREA ac	TOTAL AREA ac	TC min	Intensity	C	CI	Additional Q cfs	CUM Q(100 YR) cfs	REACH ft	LINE/BOX SIZE in	WIDTH FT	HEIGHT FT	SLOPE %	DESIGN Q cfs	V fps	D.S. FALL (ft)	OTHER LOSSES ft	FLOWLINE UP-STREAM	FLOWLINE DOWN-STREAM	ACT V fps	SLOPE HYD GRAD (%)	delta H ft	ELEV HYD GRAD UP-STREAM	ELEV HYD GRAD DOWN-STREAM	TC UP-STREAM	HG DIST BELOW TC ft	Maximum Ponding Elevation	Method 1 (Y/N)	Maximum Allowable Sheetflow	Actual Sheetflow	Method 2 (Y/N)	FLOWLINE @ 3 DECIMAL UP-STREAM	FLOWLINE @ 3 DECIMAL DOWN-STREAM
SYSTEM B																																		
LINE 2																																		
FUTURE	MH 2	13.59	13.59	30.83	6.42	0.55	3.53	0.00	47.97	8	48			0.070	22.18	3.1	6.79		75.94	75.93	6.78	0.513	0.041	84.44	84.40	87.00	2.56	88.00	Yes	54.33	0.00	Method 1	75.940	75.931
MH 2	OUTFALL	0.00	13.59	30.83	6.42	0.55	3.53	0.00	47.97	197	48			0.070	38.11	3.0	0.00		69.14	69.00	3.81	0.111	0.218	84.40	84.18	87.00	2.60	88.00	Yes	54.33	0.00	Method 1	69.140	69.002

100 YR — 25-YR W.S.E. 84.18

FROM JUNCTION	TO JUNCTION	ADDED AREA ac	TOTAL AREA ac	TC min	Intensity	C	CI	Additional Q cfs	CUM Q(100 YR) cfs	REACH ft	LINE/BOX SIZE in	WIDTH FT	HEIGHT FT	SLOPE %	DESIGN Q cfs	V fps	D.S. FALL (ft)	OTHER LOSSES ft	FLOWLINE UP-STREAM	FLOWLINE DOWN-STREAM	ACT V fps	SLOPE HYD GRAD (%)	delta H ft	ELEV HYD GRAD UP-STREAM	ELEV HYD GRAD DOWN-STREAM	TC UP-STREAM	HG DIST BELOW TC ft	Maximum Ponding Elevation	Method 1 (Y/N)	Maximum Allowable Sheetflow	Actual Sheetflow	Method 2 (Y/N)	FLOWLINE @ 3 DECIMAL UP-STREAM	FLOWLINE @ 3 DECIMAL DOWN-STREAM
SYSTEM C																																		
LINE 3																																		
JUNCTION MH 3	OUTFALL	43.72	43.72	34.45	6.11	0.55	3.36	0.00	146.81	138		7	5	0.050	115.04	3.3	0.00		68.07	68.00	4.19	0.081	0.112	84.29	84.18	85.00	0.71	86.00	Yes	54.33	0.00	Method 1	68.070	68.001
LINE 4																																		
FUTURE	JUNCTION MH 3	43.72	43.72	34.45	6.11	0.55	3.36	0.00	146.81	8		7	5	0.050	115.04	3.3	0.00		74.50	74.50	4.19	0.081	0.006	84.30	84.29	86.00	1.70	87.00	Yes	54.33	0.00	Method 1	74.500	74.496

100 YR — 25-YR W.S.E. 84.18

FROM JUNCTION	TO JUNCTION	ADDED AREA ac	TOTAL AREA ac	TC min	Intensity	C	CI	Additional Q cfs	CUM Q(100 YR) cfs	REACH ft	LINE/BOX SIZE in	WIDTH FT	HEIGHT FT	SLOPE %	DESIGN Q cfs	V fps	D.S. FALL (ft)	OTHER LOSSES ft	FLOWLINE UP-STREAM	FLOWLINE DOWN-STREAM	ACT V fps	SLOPE HYD GRAD (%)	delta H ft	ELEV HYD GRAD UP-STREAM	ELEV HYD GRAD DOWN-STREAM	TC UP-STREAM	HG DIST BELOW TC ft	Maximum Ponding Elevation	Method 1 (Y/N)	Maximum Allowable Sheetflow	Actual Sheetflow	Method 2 (Y/N)	FLOWLINE @ 3 DECIMAL UP-STREAM	FLOWLINE @ 3 DECIMAL DOWN-STREAM
SYSTEM D																																		
LINE 5																																		
JUNCTION MH 4	OUTFALL	67.30	67.30	35.99	5.98	0.80	4.79	0.00	322.14	237		10	6	0.030	180.63	3.0	0.00		66.07	66.00	5.37	0.095	0.225	84.40	84.18	88.80	4.40	89.80	Yes	54.33	0.00	Method 1	66.070	66.000
LINE 6																																		
FUTURE	JUNCTION MH 4	67.30	67.30	35.99	5.98	0.80	4.79	0.00	322.14	8		10	6	0.030	180.63	3.0	0.00		66.07	66.07	5.37	0.095	0.008	84.41	84.40	88.80	4.39	89.80	Yes	54.33	0.00	Method 1	66.070	66.068

100 YR — 25-YR W.S.E. 84.18

FROM JUNCTION	TO JUNCTION	ADDED AREA ac	TOTAL AREA ac	TC min	Intensity	C	CI	Additional Q cfs	CUM Q(100 YR) cfs	REACH ft	LINE/BOX SIZE in	WIDTH FT	HEIGHT FT	SLOPE %	DESIGN Q cfs	V fps	D.S. FALL (ft)	OTHER LOSSES ft	FLOWLINE UP-STREAM	FLOWLINE DOWN-STREAM	ACT V fps	SLOPE HYD GRAD (%)	delta H ft	ELEV HYD GRAD UP-STREAM	ELEV HYD GRAD DOWN-STREAM	TC UP-STREAM	HG DIST BELOW TC ft	Maximum Ponding Elevation	Method 1 (Y/N)	Maximum Allowable Sheetflow	Actual Sheetflow	Method 2 (Y/N)	FLOWLINE @ 3 DECIMAL UP-STREAM	FLOWLINE @ 3 DECIMAL DOWN-STREAM
SYSTEM E																																		
LINE 7																																		
FUTURE	JUNCTION MH 6	57.67	57.67	35.42	6.03	0.80	4.82	0.00	278.08	40		10	7	0.050	289.56	4.1	10.82		77.85	77.83	3.97	0.046	0.018	84.34	84.32	89.00	4.66	90.00	Yes	54.33	0.00	Method 1	77.850	77.830
JUNCTION MH 6	JUNCTION MH 5	0.00	57.67	35.42	6.03	0.80	4.82	0.00	278.08	80		10	7	0.050	289.56	4.1	1.91		67.00	66.96	3.97	0.046	0.037	84.32	84.29	89.00	4.68	90.00	Yes	54.33	0.00	Method 1	67.000	66.960
JUNCTION MH 5	OUTFALL	9.59	67.26	35.98	5.98	0.80	4.79	0.00	323.98	172		10	7	0.030	224.29	3.2	0.00		66.05	66.00	4.63	0.062	0.107	84.29	84.18	89.00	4.71	90.00	Yes	54.33	0.00	Method 1	66.050	65.998
LINE 8																																		
FUTURE	JUNCTION MH 5	9.59	9.59	29.89	6.50	0.80	5.20	0.00	49.91	8	42			0.050	30.29	3.1	0.00		76.60	76.59	5.18	0.244	0.020	84.31	84.29	89.00	4.69	90.00	Yes	54.33	0.00	Method 1	76.600	76.593

100 YR — 25-YR W.S.E. 84.18

FROM JUNCTION	TO JUNCTION	ADDED AREA ac	TOTAL AREA ac	TC min	Intensity	C	CI	Additional Q cfs	CUM Q(100 YR) cfs	REACH ft	LINE/BOX SIZE in	WIDTH FT	HEIGHT FT	SLOPE %	DESIGN Q cfs	V fps	D.S. FALL (ft)	OTHER LOSSES ft	FLOWLINE UP-STREAM	FLOWLINE DOWN-STREAM	ACT V fps	SLOPE HYD GRAD (%)	delta H ft	ELEV HYD GRAD UP-STREAM	ELEV HYD GRAD DOWN-STREAM	TC UP-STREAM	HG DIST BELOW TC ft	Maximum Ponding Elevation	Method 1 (Y/N)	Maximum Allowable Sheetflow	Actual Sheetflow	Method 2 (Y/N)	FLOWLINE @ 3 DECIMAL UP-STREAM	FLOWLINE @ 3 DECIMAL DOWN-STREAM
SYSTEM F																																		
LINE 9																																		
EXISTING	MH 2	1.61	1.61	25.87	6.91	0.55	3.80	0.00	6.12	86	24			0.180	9.62	3.1	5.66		75.99	75.84	1.95	0.073	0.062	84.31	84.25	87.00	2.69	88.00	Yes	54.33	0.00	Method 1	75.995	75.840
MH 2	OUTFALL	0.00	1.61	25.87	6.91	0.55	3.80	0.00	6.12	99	24			0.180	9.62	3.1	0.00		70.18	70.03	1.95	0.073	0.072	84.25	84.18	87.00	2.75	88.00	Yes	54.33	0.00	Method 1	70.180	70.002

BENCHMARK:

A-1212 – BRASS DISK, STAMPED A-1212, 1973, SET IN THE TOP OF A CONCRETE HEADWALL ON THE WEST BOUND LANES OF HWY 90A APPROX. 4.1 MILES WEST ALONG HWY 90A FROM THE JUNCTION OF HWY 6, IN SUGARLAND, TEXAS. THE DISK IS SET 2.0 FEET EAST OF THE WEST END OF THE NORTH CONCRETE HEADWALL, AND 27.0 FEET NORTH OF THE CENTERLINE OF THE WESTBOUND LANES, AND ½FOOT LOWER THAN THE ROAD.

ELEV. = 78.65 FEET (NGVD-29) 1973 ADJ.

TBM:

½" IRON ROD W/ LJA CAP LOCATED APPROX. 50.6 FEET SOUTHWEST OF THE NORTHEAST CORNER OF THE ALIANA PROPERTY AT THE INTERSECTION OF MADDEN ROAD AND FM 1464.

ELEV. = 93.19 FEET 1973 ADJ.

NOTES:

APPROVED: Maggie Dodd
DEVELOPMENT COORDINATOR
DATE: 4/12/16

DATE	REVISION	BY

PLAT NAME:
CPC 101 FILE NO.
C.O.H. LOG NO. 15-1745

F.B.C.M.U.D. NO. 134B

BULLHEAD BAYOU PHASE II DRAINAGE IMPROVEMENTS

DRAINAGE CALCULATIONS (100-YR CITY OF HOUSTON)

LJA Engineering, Inc.
2929 Briarpark Drive
Suite 600
Houston, Texas 77042
Phone 713.953.5200
Fax 713.953.5026
FRN - F-1386

LJA PROJECT NO.: 1968-0627

DESIGNED BY:	DRAWN BY:	DATE:
KDB	KDB	FEBRUARY 2016

NOTE: CITY SIGNATURES VALID FOR ONE YEAR ONLY AFTER DATE OF SIGNATURES

CITY OF HOUSTON
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

WATER	STREET & BRIDGE
WASTEWATER	TRAFFIC
FLOOD CONTROL	STORM WATER QUALITY
FACILITIES	

FILE NO.
DRAWING SCALE
SCALE: NONE
SHEET NO. 7 OF 18

FOR CITY OF HOUSTON USE ONLY

STATE OF TEXAS
JOHN R. DREAHN
108554
LICENSED
PROFESSIONAL ENGINEER
3-4-16

BULLHEAD BAYOU PHASE II DRAINAGE IMPROVEMENTS – JOB NO. 1968-0627

Date/Time: Thu, 03 Mar 2016 at 2:42pm User Name: KDJ
Drawing: J:\1968\1968-0627\Aliana Bullhead Bayou Phase II Drainage Calculations.dwg

ALIANA BULLHEAD BAYOU PHASE 2 SYSTEM A

ULTIMATE 100 YEAR DRAINAGE CALCULATIONS

Contributing Area	Area (Ac)	Land Usage	Area (Ac)	"C" Factor
SECTION 54 (BY OTHER)	13.70	Residential	13.70	0.55
TOTAL			13.70	0.55

Time of Concentration

Flow Type	Distance (ft)	Slope (%)	Figure 2-9	(min)
Grass Flow	155	1.50%	1	2.58
Pavement Flow	937	0.50%	1.4	11.16
Time of Concentration				13.74

Rainfall Intensity, inch/hour 6.4

Fort Bend County Rational Method 100-Year Drainage

Actual Flow Over Down Stream High

Q=1.25*Q/A = 79.12 cfs

Inlet Design Size

Q 100-Year 79.12 cfs

Q 2-Year 23.39 cfs

Anticipated Street Flow 38.73 cfs

LJA Engineering, Inc.

Project Aliana Bullhead Bayou System

LJA Job No. 1968-0627

System Storm

By KDB Date

Checked by Date

Normal POOL 78.00

25-YR W S E 84.18

Design Frequency 100 years

100 YR FBC — 25-YR W S E 84.18

FROM JUNCTION	TO JUNCTION	ADDED AREA (Ac)	TOTAL AREA (Ac)	TC (min)	Intensity	C	CI	Additional Q (cfs)	CUM Q(100 YR) (cfs)	REACH (ft)	SIZE (in)	LINE/BOX WIDTH (FT)	HEIGHT (FT)	SLOPE (%)	DESIGN Q (cfs)	V (fps)	D.S. FALL (ft)	OTHER LOSSES (ft)	FLOWLINE UP STREAM	FLOWLINE DOWN STREAM	ACT V (fps)	SLOPE INVD GRAD (%)	delta H (ft)	ELEV INVD STREAM UP	ELEV INVD STREAM DOWN	GRAD STREAM UP	GRAD STREAM DOWN	TC (min)	HG DIST BELOW TC (ft)	Maximum Ponding Elevation	Method 1 (Y/N)	Maximum Allowable Streetflow	Actual Streetflow	Method 2 (Y/N)	FLOWLINE @ 3 DECIMAL UP STREAM	FLOWLINE @ 3 DECIMAL DOWN STREAM
SYSTEM A																																				
LINE 1																																				
FUTURE	MH 1	5.64	5.64	29.94	3.18	0.55	1.79	21.64	37.81	6	30			0.110	22.18	3.1	0.30		77.44	77.43	4.63	0.240	0.016	84.81	84.79	87.50	2.64	29.94	0.00	Method 1	77.440	77.431
MH 1	OUTFALL	8.06	13.70	30.86	3.05	0.55	1.68	33.73	152.36	228	54			0.060	46.30	3.0	0.00		69.13	68.00	4.41	0.267	0.608	84.76	84.18	87.50	2.71	30.50	Yes	54.33	0.00	Method 1	69.130	68.003
FUTURE	MH 1	8.06	8.06	29.44	3.13	0.55	1.72	37.79	46.66	6	36			0.110	22.18	3.1	0.00		77.10	77.06	5.39	0.405	0.024	84.83	84.79	87.50	2.67	30.50	Yes	54.33	0.00	Method 1	77.100	77.061

ALIANA BULLHEAD BAYOU PHASE 2 SYSTEM B

ULTIMATE 100 YEAR DRAINAGE CALCULATIONS

Contributing Area	Area (Ac)	Land Usage	Area (Ac)	"C" Factor
SECTION 54 (BY OTHER)	13.59	Residential	13.59	0.55
TOTAL			13.59	0.55

Time of Concentration

Flow Type	Distance (ft)	Slope (%)	Figure 2-9	(min)
Grass Flow	155	1.50%	1	2.58
Pavement Flow	967	0.50%	1.4	11.75
Time of Concentration				14.33

Rainfall Intensity, inch/hour 6.2

Fort Bend County Rational Method 100-Year Drainage

Actual Flow Over Down Stream High

Q=1.25*Q/A = 78.61 cfs

Inlet Design Size

Q 100-Year 78.61 cfs

Q 2-Year 22.91 cfs

Anticipated Street Flow 53.60 cfs

LJA Engineering, Inc.

Project Aliana Bullhead Bayou System

LJA Job No. 1968-0627

System Storm

By KDB Date

Checked by Date

Normal POOL 78.00

25-YR W S E 84.18

Design Frequency 100 years

100 YR FBC — 25-YR W S E 84.18

FROM JUNCTION	TO JUNCTION	ADDED AREA (Ac)	TOTAL AREA (Ac)	TC (min)	Intensity	C	CI	Additional Q (cfs)	CUM Q(100 YR) (cfs)	REACH (ft)	SIZE (in)	LINE/BOX WIDTH (FT)	HEIGHT (FT)	SLOPE (%)	DESIGN Q (cfs)	V (fps)	D.S. FALL (ft)	OTHER LOSSES (ft)	FLOWLINE UP STREAM	FLOWLINE DOWN STREAM	ACT V (fps)	SLOPE INVD GRAD (%)	delta H (ft)	ELEV INVD STREAM UP	ELEV INVD STREAM DOWN	GRAD STREAM UP	GRAD STREAM DOWN	TC (min)	HG DIST BELOW TC (ft)	Maximum Ponding Elevation	Method 1 (Y/N)	Maximum Allowable Streetflow	Actual Streetflow	Method 2 (Y/N)	FLOWLINE @ 3 DECIMAL UP STREAM	FLOWLINE @ 3 DECIMAL DOWN STREAM
SYSTEM B																																				
LINE 2																																				
MH 2	OUTFALL	0.03	13.59	30.83	3.05	0.55	1.68	33.80	76.61	197	48			0.070	36.11	3.0	0.00		69.14	68.00	6.09	0.252	0.506	84.74	84.68	87.00	2.26	30.00	Yes	54.33	0.00	Method 1	69.140	68.002

ALIANA BULLHEAD BAYOU PHASE 2 SYSTEM C

ULTIMATE 100 YEAR DRAINAGE CALCULATIONS

Contributing Area	Area (Ac)	Land Usage	Area (Ac)	"C" Factor
FUTURE SECTIONS	43.72	Residential	43.72	0.55
TOTAL			43.72	0.55

Time of Concentration

Flow Type	Distance (ft)	Slope (%)	Figure 2-9	(min)
Grass Flow	155	1.50%	1	2.58
Pavement Flow	1500	0.50%	1.4	18.65
Time of Concentration				21.23

Rainfall Intensity, inch/hour 6.9

Fort Bend County Rational Method 100-Year Drainage

Actual Flow Over Down Stream High

Q=1.25*Q/A = 207.40 cfs

Inlet Design Size

Q 100-Year 207.40 cfs

Q 2-Year 66.99 cfs

Anticipated Street Flow 138.40 cfs

LJA Engineering, Inc.

Project Aliana Bullhead Bayou System

LJA Job No. 1968-0627

System Storm

By KDB Date

Checked by Date

Normal POOL 78.00

25-YR W S E 84.18

Design Frequency 100 years

100 YR FBC — 25-YR W S E 84.18

FROM JUNCTION	TO JUNCTION	ADDED AREA (Ac)	TOTAL AREA (Ac)	TC (min)	Intensity	C	CI	Additional Q (cfs)	CUM Q(100 YR) (cfs)	REACH (ft)	SIZE (in)	LINE/BOX WIDTH (FT)	HEIGHT (FT)	SLOPE (%)	DESIGN Q (cfs)	V (fps)	D.S. FALL (ft)	OTHER LOSSES (ft)	FLOWLINE UP STREAM	FLOWLINE DOWN STREAM	ACT V (fps)	SLOPE INVD GRAD (%)	delta H (ft)	ELEV INVD STREAM UP	ELEV INVD STREAM DOWN	GRAD STREAM UP	GRAD STREAM DOWN	TC (min)	HG DIST BELOW TC (ft)	Maximum Ponding Elevation	Method 1 (Y/N)	Maximum Allowable Streetflow	Actual Streetflow	Method 2 (Y/N)	FLOWLINE @ 3 DECIMAL UP STREAM	FLOWLINE @ 3 DECIMAL DOWN STREAM
SYSTEM C																																				
LINE 3																																				
JUNCTION MH 3	OUTFALL	43.72	43.72	34.45	2.87	0.55	1.58	138.40	207.40	136		7	5	0.050	115.04	3.3	0.00		68.07	66.00	5.93	0.162	0.223	84.40	84.18	85.00	0.60	66.00	Yes	54.33	0.00	Method 1	68.070	66.001
LINE 4																																				
FUTURE	JUNCTION MH 3	43.72	43.72	34.45	2.87	0.55	1.58	138.40	207.40	8		7	5	0.050	115.04	3.3	0.00		74.90	74.90	5.93	0.162	0.013	84.42	84.40	86.00	1.58	67.00	Yes	54.33	0.00	Method 1	74.900	74.446

BENCHMARK:

A-1212 – GRASS DISK, STAMPED A-1212 1973, SET IN THE TOP OF A CONCRETE HEADWALL ON THE WEST (DOUND LANES OF HWY 90A, APPROX. 4.1 MILES, WEST ALONG HWY 90A FROM THE JUNCTION OF HWY. 6, IN SUGARLAND, TEXAS. THE DISK IS SET 2.0 FEET EAST OF THE WEST END, OF THE NORTH CONCRETE HEADWALL, AND 27.0 FEET NORTH OF THE CENTERLINE OF THE WESTBOUND LANES, AND ½FOOT LOWER THAN THE ROAD.

ELEV. = 78.65 FEET (NGVD-29) 1973 ADJ.

TBM:

⅝" IRON ROD W/ LJA CAP LOCATED APPROX. 50.6 FEET SOUTHWEST OF THE NORTHEAST CORNER OF THE ALIANA PROPERTY AT THE INTERSECTION OF MADDEN ROAD AND FM 1464.

ELEV. = 93.19 FEET 1973 ADJ.

NOTES:

APPROVED: Maggie Dalton
DEVELOPMENT COORDINATOR

DATE: 4/12/16

DATE	REVISION	BY

PLAT NAME:
CPC 101 FILE NO.
C.O.H. LOG NO. 15-1745

F.B.C.M.U.D. NO. 134B

BULLHEAD BAYOU PHASE II
DRAINAGE IMPROVEMENTS

DRAINAGE CALCULATIONS
(100-YR FBC)

LJA Engineering, Inc.
2929 Briarpark Drive
Suite 600
Houston, Texas 77042
Phone 713.953.5200
Fax 713.953.5026
FRN - F-1386

LJA PROJECT NO.: 1968-0627

DESIGNED BY:	DRAWN BY:	DATE:
KDB	KDB	FEBRUARY 2016

NOTE: CITY SIGNATURES VALID FOR ONE YEAR ONLY AFTER DATE OF SIGNATURES

CITY OF HOUSTON
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

DATE: 3/4/16	STREET & BRIDGE
RECEIVED BY: 3/4/16	TRAFFIC
STORM: 3/4/16	STORM WATER QUALITY
FACILITIES	

FILE NO.

DRAWING SCALE

SCALE: NONE

SHEET NO. 8 OF 18

FOR CITY OF HOUSTON USE ONLY

STATE OF TEXAS
JOHN R. DREAHN
108554
LICENSED
PROFESSIONAL ENGINEER
7-4-16

STATE OF TEXAS
55658
PROFESSIONAL ENGINEER

BULLHEAD BAYOU PHASE II DRAINAGE IMPROVEMENTS – JOB NO. 1968-0627

Date/Time: Thu, 03 Mar, 2016 - 2:24pm User Name: KDB
Drawing: T:\Projects\1968-0627\Aliana BULLHEAD BAYOU PHASE II_DRAINAGE CALCULATIONS.dwg

8

ALIANA BULLHEAD BAYOU PHASE 2 SYSTEM D

ULTIMATE 100 YEAR DRAINAGE CALCULATIONS

Contributing Area	Area (Ac)	Land Usage	Area (Ac)	"C" Factor
FUTURE SECTIONS	67.30	Residential	67.30	0.80
TOTAL			67.30	0.80

Time of Concentration

Flow Type	Distance (ft)	Slope (%)	Figure 2-6	(min)
Grass Flow	50	1.50%	1	0.83
Pavement Flow	3000	0.50%	1.4	35.71
Time of Concentration				36.55

Rainfall Intensity, inch/hour 5.7

Fort Bend County Rational Method 100 Year Drainage

Actual Flow Over Down Stream High

Q=1.25*C/A = 383.61 cfs

Inlet Design Size

Q 100 Year 383.61 cfs

Q 2-Year 150.00 cfs

Anticipated Sheet Flow 232.92 cfs

LJA Engineering , Inc.

Project Aliana Bullhead Bayou System

LJA Job No 1968-0627

System Storm

By KDB Date

Checked by Date

Design Frequency 100 years

Normal POOL 78.00

25-YR W S E 84.18

100 YR FBC — 25-YR W S E 84.18

FROM JUNCTION	TO JUNCTION	ADDED AREA ac	TOTAL AREA ac	TC min	Intensity	C	CI	Additional Q cfs	CUM Q(100 YR) cfs	REACH ft	SIZE in	LINE/BOX WIDTH FT	HEIGHT FT	SLOPE %	DESIGN Q cfs	V fps	D.S. FALL (ft)	OTHER LOSSES ft	FLOWLINE UP-STREAM	FLOWLINE DOWN-STREAM	ACT V fps	SLOPE HYD GRAD (%)	delta H ft	ELEV HYD UP-STREAM	GRAD DOWN-STREAM	TC UP-STREAM	HG DIST BELOW TC ft	Maximum Ponding Elevation	Method 1 (Y/N)	Maximum Allowable Spreadtow	Actual Spreadtow	Method 2 (Y/N)	FLOWLINE @ 3 DECIMAL UP-STREAM	FLOWLINE @ 3 DECIMAL DOWN-STREAM
SYSTEM D																																		
LINE E																																		
JUNCTION MH 4	OUTFALL	67.30	67.30	35.99	2.60	0.80	2.24	252.92	383.61	237		10	6	0.030	190.63	3.0	0.00		66.07	66.07	6.39	0.135	0.318	84.50	84.18	68.80	4.70	89.80	Yes	54.33	0.00	Method 1	66.070	66.068

LINE G																																		
FUTURE	JUNCTION MH 4	67.30	67.30	35.99	2.60	0.80	2.24	252.92	383.61	8		10	6	0.030	190.63	3.0	0.00		66.07	66.07	6.39	0.135	0.011	84.51	84.50	68.80	4.70	89.80	Yes	54.33	0.00	Method 1	66.070	66.068

ALIANA BULLHEAD BAYOU PHASE 2 SYSTEM E

ULTIMATE 100 YEAR DRAINAGE CALCULATIONS

Contributing Area	Area (Ac)	Land Usage	Area (Ac)	"C" Factor
FUTURE SECTIONS	67.26	Residential	67.26	0.80
TOTAL			67.26	0.80

Time of Concentration

Flow Type	Distance (ft)	Slope (%)	Figure 2-6	(min)
Grass Flow	50	1.50%	1	0.83
Pavement Flow	2940	0.50%	1.4	30.24
Time of Concentration				31.07

Rainfall Intensity, inch/hour 6

Fort Bend County Rational Method 100 Year Drainage

Actual Flow Over Down Stream High

Q=1.25*C/A = 403.56 cfs

Inlet Design Size

Q 100 Year 403.56 cfs

Q 100 Year (304 Acres) 155.10 cfs Ref. Master Drainage Plan For Aliana Development

Q 100 Year (West Section) 48.66 cfs Ref. West Bellfort Storm Calculations

Q 2-Year 151.77 cfs

Anticipated Sheet Flow 406.89 cfs

LJA Engineering , Inc.

Project Aliana Bullhead Bayou System

LJA Job No 1968-0627

System Storm

By KDB Date

Checked by Date

Design Frequency 100 years

Normal POOL 78.00

25-YR W S E 84.18

100 YR FBC — 25-YR W S E 84.18

FROM JUNCTION	TO JUNCTION	ADDED AREA ac	TOTAL AREA ac	TC min	Intensity	C	CI	Additional Q cfs	CUM Q(100 YR) cfs	REACH ft	SIZE in	LINE/BOX WIDTH FT	HEIGHT FT	SLOPE %	DESIGN Q cfs	V fps	D.S. FALL (ft)	OTHER LOSSES ft	FLOWLINE UP-STREAM	FLOWLINE DOWN-STREAM	ACT V fps	SLOPE HYD GRAD (%)	delta H ft	ELEV HYD UP-STREAM	GRAD DOWN-STREAM	TC UP-STREAM	HG DIST BELOW TC ft	Maximum Ponding Elevation	Method 1 (Y/N)	Maximum Allowable Spreadtow	Actual Spreadtow	Method 2 (Y/N)	FLOWLINE @ 3 DECIMAL UP-STREAM	FLOWLINE @ 3 DECIMAL DOWN-STREAM
SYSTEM E																																		
LINE F																																		
FUTURE	JUNCTION MH 6	57.67	57.67	35.42	2.62	0.80	2.28	466.89	531.18	40		10	7	0.050	349.58	4.1	10.82		77.85	77.83	7.67	0.171	0.068	84.70	84.64	69.00	4.30	90.00	Yes	54.33	0.00	Method 1	77.850	77.830
JUNCTION MH 6	JUNCTION MH 5	0.00	57.67	35.42	2.62	0.80	2.28	0.00	531.18	40		10	7	0.050	289.98	4.1	1.94		67.50	66.94	7.67	0.171	0.137	84.64	84.50	69.00	4.30	90.00	Yes	54.33	0.00	Method 1	67.500	66.940
JUNCTION MH 5	OUTFALL	9.59	67.26	35.98	2.60	0.80	2.24	0.00	556.66	172		10	7	0.030	274.28	3.2	0.00		66.05	66.00	7.98	0.185	0.238	84.50	84.18	69.00	4.50	90.00	Yes	54.33	0.00	Method 1	66.050	65.998

LINE G																																		
FUTURE	JUNCTION MH 5	9.59	9.59	29.89	3.10	0.80	2.48	48.96	72.79	8	42			0.040	30.28	3.1	0.00		76.50	76.59	7.35	0.519	0.042	84.54	84.50	69.00	4.40	90.00	Yes	54.33	0.00	Method 1	76.500	76.590

ALIANA BULLHEAD BAYOU PHASE 2 SYSTEM F

ULTIMATE 100 YEAR DRAINAGE CALCULATIONS

Contributing Area	Area (Ac)	Land Usage	Area (Ac)	"C" Factor
EXISTING AREA	1.61	Residential	1.61	0.55
TOTAL			1.61	0.55

Time of Concentration

Flow Type	Distance (ft)	Slope (%)	Figure 2-6	(min)
Grass Flow	20	1.50%	1	0.33
Pavement Flow	100	0.30%	1.4	1.19
Time of Concentration				1.52

Rainfall Intensity, inch/hour 11

Fort Bend County Rational Method 100 Year Drainage

Actual Flow Over Down Stream High

Q=1.25*C/A = 12.18 cfs

Inlet Design Size

Q 100 Year 12.18 cfs

Q 2-Year 2.96 cfs

Anticipated Sheet Flow 9.21 cfs

LJA Engineering , Inc.

Project Aliana Bullhead Bayou System

LJA Job No 1968-0627

System Storm

By KDB Date

Checked by Date

Design Frequency 100 years

Normal POOL 78.00

25-YR W S E 84.18

100 YR FBC — 25-YR W S E 84.18

FROM JUNCTION	TO JUNCTION	ADDED AREA ac	TOTAL AREA ac	TC min	Intensity	C	CI	Additional Q cfs	CUM Q(100 YR) cfs	REACH ft	SIZE in	LINE/BOX WIDTH FT	HEIGHT FT	SLOPE %	DESIGN Q cfs	V fps	D.S. FALL (ft)	OTHER LOSSES ft	FLOWLINE UP-STREAM	FLOWLINE DOWN-STREAM	ACT V fps	SLOPE HYD GRAD (%)	delta H ft	ELEV HYD UP-STREAM	GRAD DOWN-STREAM	TC UP-STREAM	HG DIST BELOW TC ft	Maximum Ponding Elevation	Method 1 (Y/N)	Maximum Allowable Spreadtow	Actual Spreadtow	Method 2 (Y/N)	FLOWLINE @ 3 DECIMAL UP-STREAM	FLOWLINE @ 3 DECIMAL DOWN-STREAM
SYSTEM F																																		
LINE A																																		
EXISTING	MH 2	1.61	1.61	25.87	3.35	0.55	1.84	6.21	12.18	86	24			0.180	9.47	3.1	0.66		75.99	75.84	3.87	0.267	0.247	84.87	84.62	67.00	2.13	88.00	Yes	54.33	0.00	Method 1	75.990	75.840
MH 2	OUTFALL	0.00	1.61	25.87	3.35	0.55	1.84	0.00	12.18	90	24			0.180	9.62	3.1	0.00		70.18	70.00	4.51	0.444	0.440	84.62	84.18	67.00	2.38	88.00	Yes	54.33	0.00	Method 1	70.180	70.000

BENCHMARK:

A-1212 – BRASS DISK, STAMPED A-1212 1973, SET IN THE TOP OF A CONCRETE HEADWALL ON THE WEST BOUND LANE'S OF HWY 90A APPROX. 4.1 MILES WEST ALONG HWY 90A FROM THE JUNCTION OF HWY 6, IN SUGARLAND, TEXAS. THE DISK IS SET 2.0 FEET EAST OF THE WEST END, OF THE NORTH CONCRETE HEADWALL, AND 27.0 FEET NORTH OF THE CENTERLINE OF THE WESTBOUND LANES, AND ½FOOT LOWER THAN THE ROAD.

ELEV. = 78.65 FEET (NGVD-29) 1973 ADJ.

TBM:

⅝" IRON ROD W/ LJA CAP LOCATED APPROX 50.6 FEET SOUTHWEST OF THE NORTHEAST CORNER OF THE ALIANA PROPERTY AT THE INTERSECTION OF MADDEN ROAD AND FM 1464.

ELEV. = 93.19 FEET 1973 ADJ.

NOTES:

APPROVED: Maggie Dalton
DEVELOPMENT COORDINATOR

DATE: 4/12/16

DATE	REVISION	BY

PLAT NAME:
CPC 101 FILE NO.
C.O.H. LOG NO. 15-1745

F.B.C.M.U.D. NO. 134B

BULLHEAD BAYOU PHASE II
DRAINAGE IMPROVEMENTS

DRAINAGE CALCULATIONS
(100-YR FBC)

LJA Engineering, Inc.
2929 Briarpark Drive
Suite 600
Houston, Texas 77042
Phone 713.953.5200
Fax 713.953.5026
FRN - F-1386

LJA PROJECT NO.: 1968-0627

DESIGNED BY:	DRAWN BY:	DATE:
KDB	KDB	FEBRUARY 2016

NOTE: CITY SIGNATURES VALID FOR ONE YEAR ONLY AFTER DATE OF SIGNATURES

CITY OF HOUSTON
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

MAP 3/14/16	STREET & BRIDGE
WATERWORKS 3-14-16	TRAFFIC
SEWER 3/14/16	STORM WATER QUALITY
FACILITIES	

FILE NO.

DRAWING SCALE

SCALE: NONE

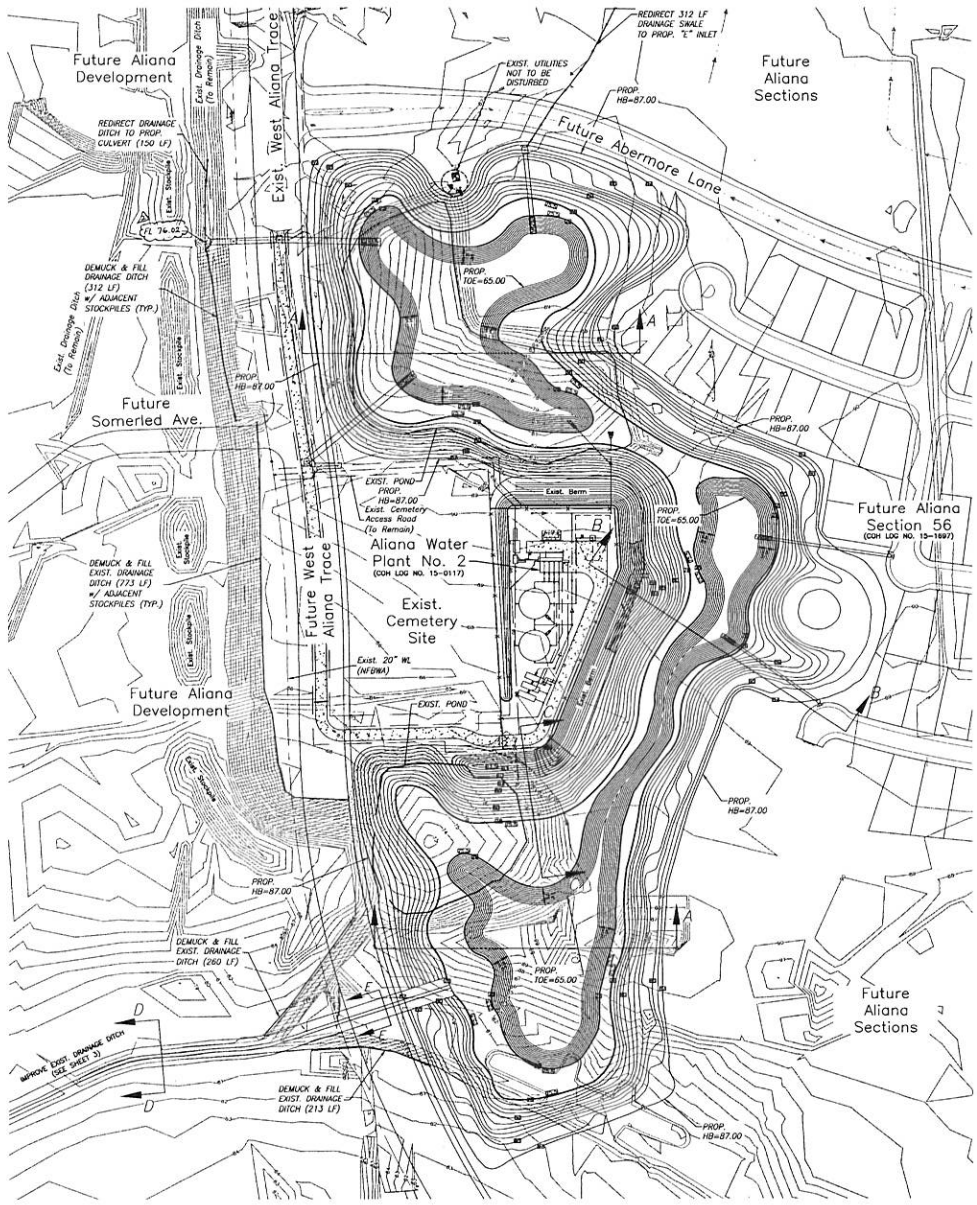
SHEET NO. 9 OF 18

FOR CITY OF HOUSTON USE ONLY

STATE OF TEXAS
JOHN R. DREANIN
108554
LICENSED
PROFESSIONAL ENGINEER
3-14-16

BULLHEAD BAYOU PHASE II DRAINAGE IMPROVEMENTS – JOB NO. 1968-0627

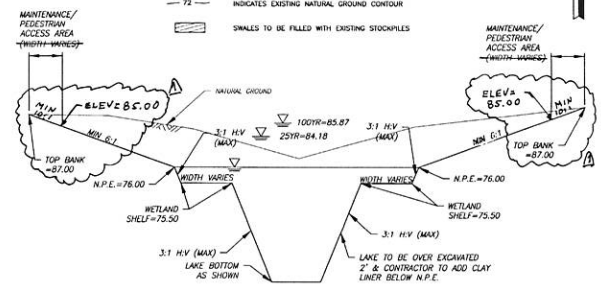
Date/Time: Thu, 03 Mar 2016 - 3:14pm User Name: KDB
Drawing: C:\Projects\1968-0627\Aliana - Bullhead Bayou Phase II\Drainage Calculations.dwg



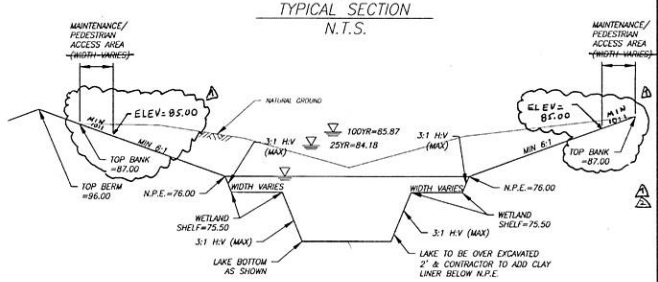
LEGEND

- STM. INLET
- (2) INDICATES BLOCK NUMBER
- 2 INDICATES LOT NUMBER
- —72— INDICATES EXISTING NATURAL GROUND CONTOUR
- SWALES TO BE FILLED WITH EXISTING STOCKPILES

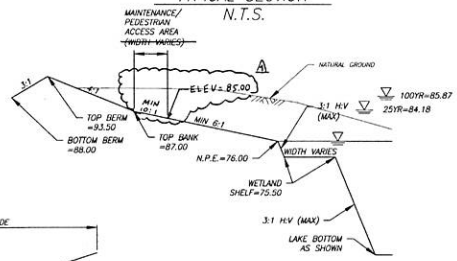
N



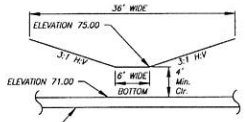
SECTION A–A
TYPICAL SECTION
N.T.S.



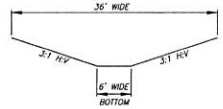
SECTION B–B
TYPICAL SECTION
N.T.S.



SECTION C–C
TYPICAL SECTION
N.T.S.



SECTION E–E
TYPICAL DITCH SECTION
N.T.S.



SECTION D–D
TYPICAL DITCH SECTION
N.T.S.

STATE OF TEXAS
JOHN R. DRAHN
108554
LICENSED
PROFESSIONAL ENGINEER
F-3-2016

BENCHMARK:

A-1212 – BRASS DISK, STAMPED A-1212 1973, SET IN THE TOP OF A CONCRETE HEADWALL ON THE WEST BOUND LANES OF HWY 90A, APPROX. 4.1 MILES WEST ALONG HWY 90A FROM THE JUNCTION OF HWY 6, IN SUGARLAND, TEXAS. THE DISK IS SET 2.0 FEET EAST OF THE WEST END, OF THE NORTH CONCRETE HEADWALL, AND 27.0 FEET NORTH OF THE CENTERLINE OF THE WESTBOUND LANES, AND 1/5 FOOT LOWER THAN THE ROAD.

ELEV. = 78.65 FEET (NGVD-29) 1973 ADJ.

TBM:

5/8" IRON ROD W/ LJA CAP LOCATED APPROX. 50.6 FEET SOUTHWEST OF THE NORTHEAST CORNER OF THE ALIANA PROPERTY AT THE INTERSECTION OF MADDEN ROAD AND FM 1464.

ELEV. = 93.19 FEET 1973 ADJ.

NOTES:

APPROVED: DEVELOPMENT COORDINATOR
DATE: 4/12/16

DATE	REVISION	BY
3-31-16	Revised Minimum Grade	KRB
6-8-16	Revised Flowline	KDB

PLAT NAME:
CPC 101 FILE NO.
C.O.H. LOG NO. 15-1745

F.B.C.M.U.D. NO. 134B

BULLHEAD BAYOU PHASE II
DRAINAGE IMPROVEMENTS

GRADING PLAN

LJA Engineering, Inc.
2929 Briarpark Drive
Suite 600
Houston, Texas 77042
Phone 713.953.5200
Fax 713.953.5026
FRN - F-1386

LJA PROJECT NO.: 1968-0627

DESIGNED BY:	DRAWN BY:	DATE:
KDB	KDB	FEBRUARY 2016

NOTE: CITY SIGNATURES VALID FOR ONE YEAR ONLY AFTER DATE OF SIGNATURES

CITY OF HOUSTON
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

3/3/16	STREET & BRIDGE
3-3-16	TRAFFIC
3/4/16	STORM WATER QUALITY

FILE NO.

DRAWING SCALE

SCALE: 1" = 100'

SHEET NO. 10 OF 18

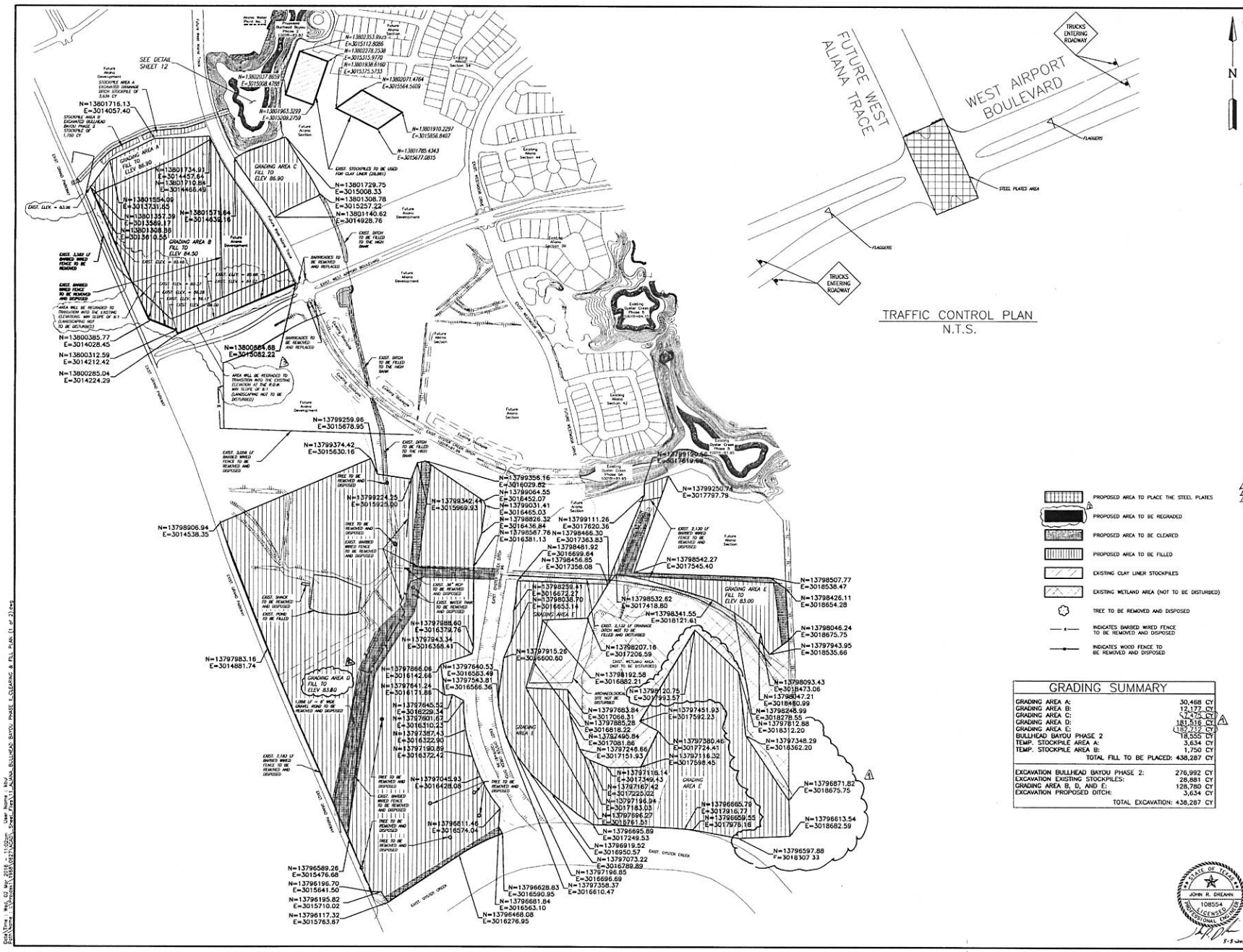
FOR CITY OF HOUSTON USE ONLY

55658

BULLHEAD BAYOU PHASE II DRAINAGE IMPROVEMENTS – JOB NO. 1968-0627

10

Date/Time: Mar 22 Fri 2016 at 8:04am User Name: kdab
Filename: J:\Projects\1968-0627\DGN_Sheet Files\10-ALIANA BULLHEAD BAYOU PHASE II GRADING PLAN.dwg



TRAFFIC CONTROL PLAN
N.T.S.

BENCHMARK:

A-1212 — BRASS DISK, STAMPED A-1212 1973, SET IN THE TOP OF A CONCRETE HEADWALL ON THE WEST BOUND LANES OF HWY 90A, APPROX. 4.1 MILES WEST ALONG HWY 90A FROM THE JUNCTION OF HWY 6, IN SUGARLAND, TEXAS. THE DISK IS SET 2.0 FEET EAST OF THE WEST END, OF THE NORTH CONCRETE HEADWALL, AND 27.0 FEET NORTH OF THE CENTERLINE OF THE WESTBOUND LANES, AND ½FOOT LOWER THAN THE ROAD.

ELEV. = 78.65 FEET (NGVD-29) 1973 ADJ.

TBM:

⅝" IRON ROD W/ LJA CAP LOCATED APPROX. 50.6 FEET SOUTHWEST OF THE NORTHEAST CORNER OF THE ALIANA PROPERTY AT THE INTERSECTION OF MADDEN ROAD AND FM 1464.

ELEV. = 93.19 FEET 1973 ADJ.

NOTES:

1) CONTRACTOR SHALL USE EXISTING WEST ALIANA TRACE INTERSECTION AS CROSSING TO TRANSPORT EXCAVATED MATERIAL. CONTRACTOR SHALL PLACE STEEL PLATES ACROSS PAVEMENT TO FACILITATE USE OF OFF-ROAD TRUCKS FOR THE PROJECT.

2) CONTRACTOR SHALL ONLY UTILIZE THE WEST ALIANA TRACE CROSSING DURING THE OFF-PEAK TRAFFIC HOURS OF 9A.M.-4P.M. DAILY. CONTRACTOR SHALL ALSO STAGE WARNING SIGNS FOR "TRUCKS ENTERING ROADWAY" AS SHOWN ON THIS SHEET FOR TRAFFIC CONTROL. CONTRACTOR SHALL ALSO USE FLAGGERS DURING THIS WORK TO WARN ONCOMING MOTORISTS OF TRUCK ENTERING ROADWAY.

- PROPOSED AREA TO PLACE THE STEEL PLATES
- PROPOSED AREA TO BE REGRADED
- PROPOSED AREA TO BE CLEARED
- PROPOSED AREA TO BE FILLED
- EXISTING CLAY LINER STOCKPILES
- EXISTING WETLAND AREA (NOT TO BE DISTURBED)
- TREE TO BE REMOVED AND DISPOSED
- INDICATES BARBED WIRED FENCE TO BE REMOVED AND DISPOSED
- INDICATES WOOD FENCE TO BE REMOVED AND DISPOSED

GRADING SUMMARY

GRADING AREA A:	30,468 CY
GRADING AREA B:	12,177 CY
GRADING AREA C:	7,475 CY
GRADING AREA D:	181,516 CY
GRADING AREA E:	182,717 CY
BULLHEAD BAYOU PHASE 2	18,555 CY
TEMP. STOCKPILE AREA A:	3,634 CY
TEMP. STOCKPILE AREA B:	1,750 CY
TOTAL FILL TO BE PLACED:	438,287 CY
EXCAVATION BULLHEAD BAYOU PHASE 2:	276,992 CY
EXCAVATION EXISTING STOCKPILES:	28,881 CY
GRADING AREA B, D, AND E:	128,780 CY
EXCAVATION PROPOSED DITCH:	3,634 CY
TOTAL EXCAVATION:	438,287 CY

STATE OF TEXAS
JOHN R. DREANN
108554
LICENSED
PROFESSIONAL ENGINEER
5-3-2016

APPROVED: DEVELOPMENT COORDINATOR
DATE: 4/12/16

DATE	REVISION	BY
3-11-16	Revised Fill Areas & Quantities	KDB
4-20-16	Revised Fill Elevation	KDB
4-25-16	Revised Regraded Areas	KDB

PLAT NAME:
CPC 101 FILE NO.
C.O.H. LOG NO. 15-1745

F.B.C.M.U.D. NO. 134B

BULLHEAD BAYOU PHASE II DRAINAGE IMPROVEMENTS

CLEARING, FILL, AND TRAFFIC CONTROL PLANS (SHEET 1 OF 2)

LJA Engineering, Inc.
2929 Briarpark Drive
Suite 600
Houston, Texas 77042
Phone 713.953.5200
Fax 713.953.5026
FRN - F-1386

LJA PROJECT NO.: 1968-0627

DESIGNED BY:	DRAWN BY:	DATE:
KDB	KDB	FEBRUARY 2016

NOTE: CITY SIGNATURES VALID FOR ONE YEAR ONLY AFTER DATE OF SIGNATURES

CITY OF HOUSTON
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

DATE 7/3/16	STREET & BRIDGE
RECOMMENDED	TRAFFIC
DATE 7/8/16	
DATE 7/8/16	STORM WATER QUALITY FACILITIES

FILE NO.

FOR CITY OF HOUSTON USE ONLY

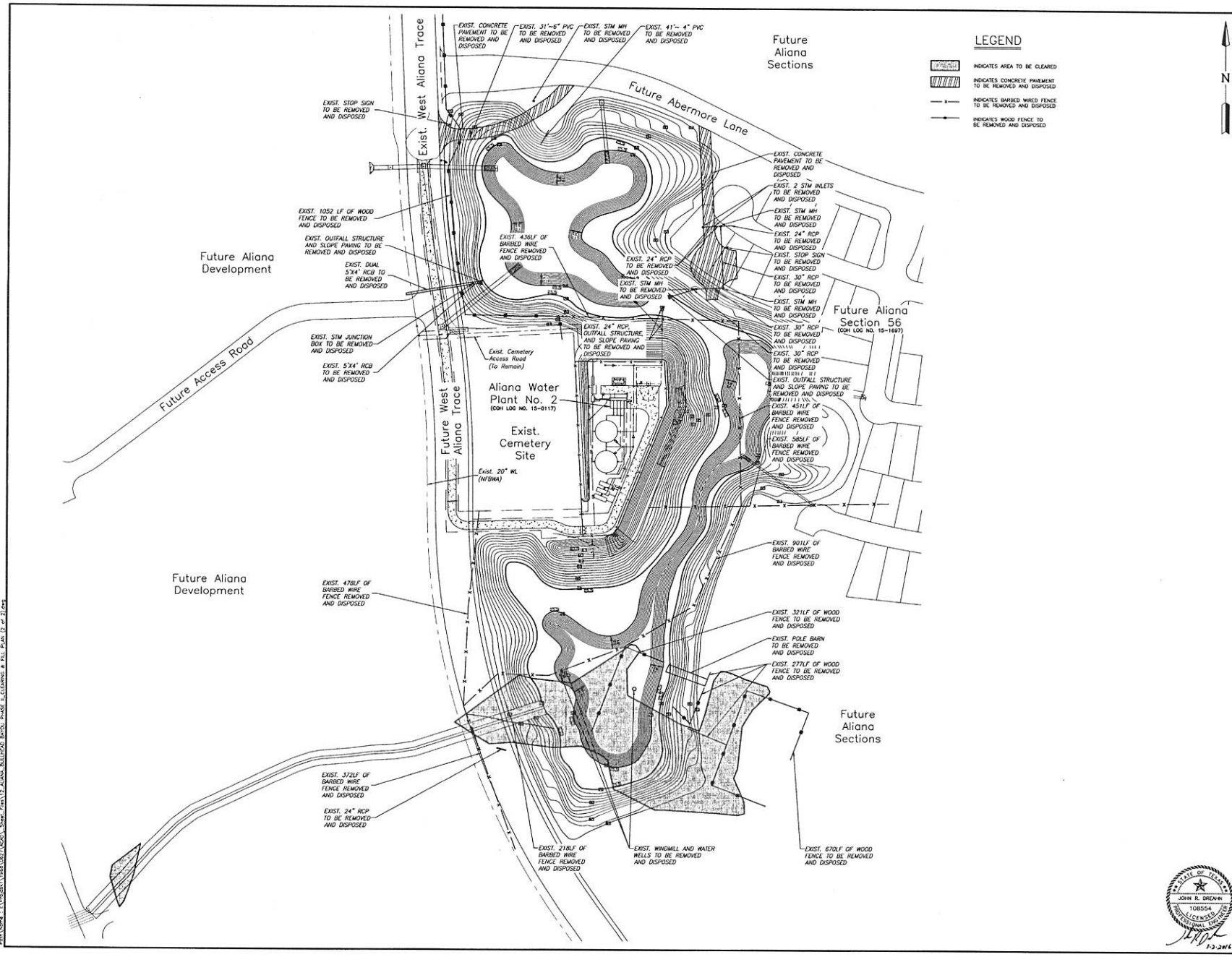
DRAWING SCALE

SCALE: 1" = 300'

55658

SHEET NO. 11 OF 18

BULLHEAD BAYOU PHASE II DRAINAGE IMPROVEMENTS – JOB NO. 1968-0627



BENCHMARK:

A-1212 – BRASS DISK, STAMPED A-1212 1973, SET IN THE TOP OF A CONCRETE HEADWALL ON THE WEST BOUND LANES OF HWY 90A APPROX. 4.1 MILES WEST ALONG HWY 90A FROM THE JUNCTION OF HWY 6, IN SUGARLAND, TEXAS. THE DISK IS 52.7 0 FEET EAST OF THE WEST END, OF THE NORTH CONCRETE HEADWALL, AND 27.0 FEET NORTH OF THE CENTERLINE OF THE WESTBOUND LANES, AND ½FOOT LOWER THAN THE ROAD.

ELEV. = 78.65 FEET (NGVD-29) 1973 ADJ.

TBM:

¾" IRON ROD W/ LJA CAP LOCATED APPROX. 50.6 FEET SOUTHWEST OF THE NORTHEAST CORNER OF THE ALIANA PROPERTY AT THE INTERSECTION OF MADDEN ROAD AND FM 1464.

ELEV. = 93.19 FEET 1973 ADJ.

NOTES:

APPROVED: Maggie Dalton
DEVELOPMENT COORDINATOR
DATE: 4/12/16

DATE	REVISION	BY

PLAT NAME: .
CPC 101 FILE NO. .
C.O.H. LOG NO. 15-1745

F.B.C.M.U.D. NO. 134B

BULLHEAD BAYOU PHASE II DRAINAGE IMPROVEMENTS

CLEARING, FILL, AND TRAFFIC CONTROL PLANS (SHEET 2 OF 2)

LJA Engineering, Inc.
2929 Briarpark Drive
Suite 600
Houston, Texas 77042
Phone 713.953.5200
Fax 713.953.5026
FRN - F-1386

LJA PROJECT NO.: 1968-0627

DESIGNED BY:	DRAWN BY:	DATE:
KDB	KDB	FEBRUARY 2016

NOTE: CITY SIGNATURES VALID FOR ONE YEAR ONLY AFTER DATE OF SIGNATURES

CITY OF HOUSTON
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

MANAGER	3/3/16	STREET & BRIDGE
MASTER PLANNER	3/3/16	TRAFFIC
CHIEF	3/4/16	STORM WATER QUALITY
FACILITIES		

FILE NO.

FOR CITY OF HOUSTON USE ONLY

DRAWING SCALE

SCALE: 1" = 100'

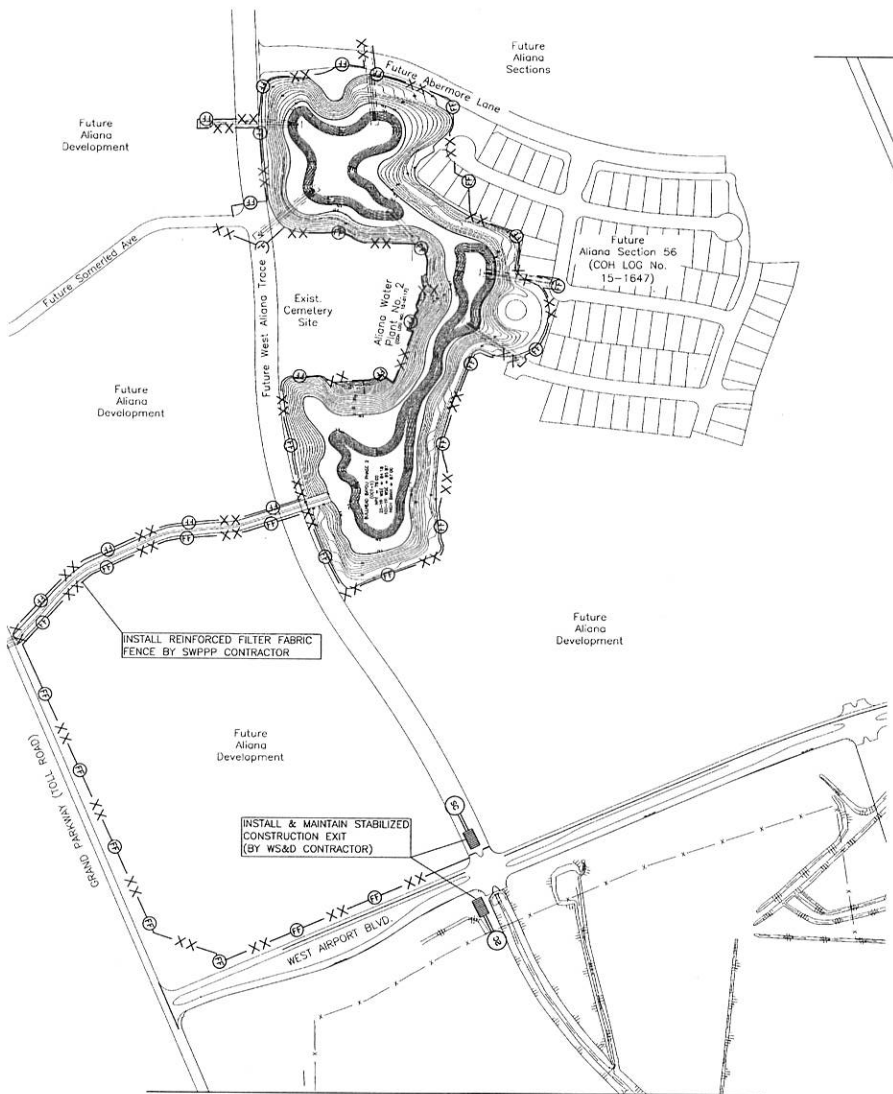
STATE OF TEXAS
JOHN R. DREANN
108554
LICENSED
PROFESSIONAL ENGINEER
1-3-2016

55658

SHEET NO. 12 OF 18

BULLHEAD BAYOU PHASE II DRAINAGE IMPROVEMENTS – JOB NO. 1968-0627

Date/Time : May 12, 2016 - 9:04am User Name : kbd
File Name : P:\0627\1 FBB\02\ACAD\ Sheet File\12 ALIANA BULLHEAD BAYOU PHASE II CLEARING & FILL PLAN (2 of 2).dwg



LEGEND

= STABILIZED CONSTRUCTION EXIT

XX—FF—XX = FILTER FABRIC FENCE

N

BENCHMARK:

A-1212 – BRASS DISK, STAMPED A-1212 1973, SET IN THE TOP OF A CONCRETE HEADWALL ON THE WEST BOUND LANES OF HWY 90A, APPROX. 4.1 MILES WEST ALONG HWY 90A FROM THE JUNCTION OF HWY 6, IN SUGARLAND, TEXAS. THE DISK IS SET 2.0 FEET EAST OF THE WEST END, OF THE NORTH CONCRETE HEADWALL, AND 27.0 FEET NORTH OF THE CENTERLINE OF THE WESTBOUND LANES, AND ½FOOT LOWER THAN THE ROAD.

ELEV. = 78.65 FEET (NGVD-29) 1973 ADJ.

TBM:

¾" IRON ROD W/ LJA CAP LOCATED APPROX. 50.6 FEET SOUTHWEST OF THE NORTHEAST CORNER OF THE ALIANA PROPERTY AT THE INTERSECTION OF MADDEN ROAD AND FM 1464.

ELEV. = 93.19 FEET 1973 ADJ.

NOTES:

APPROVED: Megan Dorsa
DEVELOPMENT COORDINATOR

DATE: 4/12/16

DATE	REVISION	BY

PLAT NAME:
CPC 101 FILE NO.
C.O.H. LOG NO. 15-1745

F.B.C.M.U.D. NO. 134B

BULLHEAD BAYOU PHASE II DRAINAGE IMPROVEMENTS

STORM WATER POLLUTION PREVENTION PLAN

LJA Engineering, Inc.
2929 Briarpark Drive
Suite 600
Houston, Texas 77042
Phone 713.953.5200
Fax 713.953.5026
FRN - F-1386

LJA PROJECT NO.: 1968-0627

DESIGNED BY:	DRAWN BY:	DATE:
KDB	KDB	FEBRUARY 2016

NOTE: CITY SIGNATURES VALID FOR ONE YEAR ONLY AFTER DATE OF SIGNATURES

CITY OF HOUSTON
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

3/3/16	STREET & BRIDGE
3-16	TRAFFIC
3/10/16	STORM WATER QUALITY
	WASTEWATER FACILITIES

FILE NO.

FOR CITY OF HOUSTON USE ONLY

DRAWING SCALE

SCALE: 1" = 200'

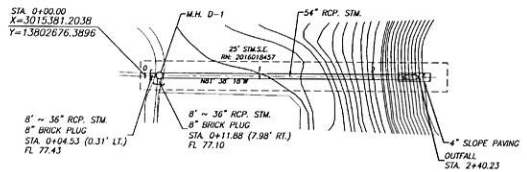
SHEET NO. 13 OF 18

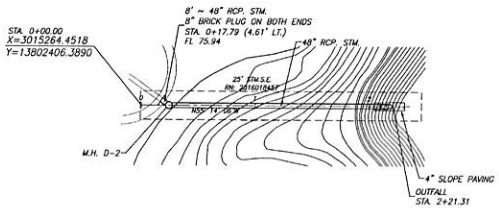
STATE OF TEXAS
JOHN R. DREHN
108554
LICENSED
PROFESSIONAL ENGINEER
5-2-2016

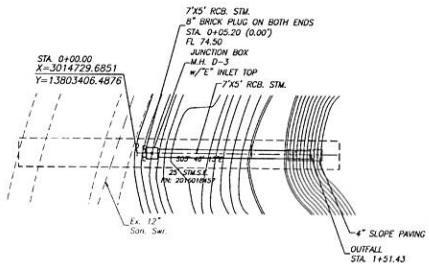
55658

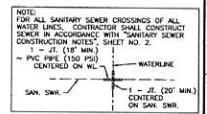
BULLHEAD BAYOU PHASE II DRAINAGE IMPROVEMENTS – JOB NO. 1968-0627

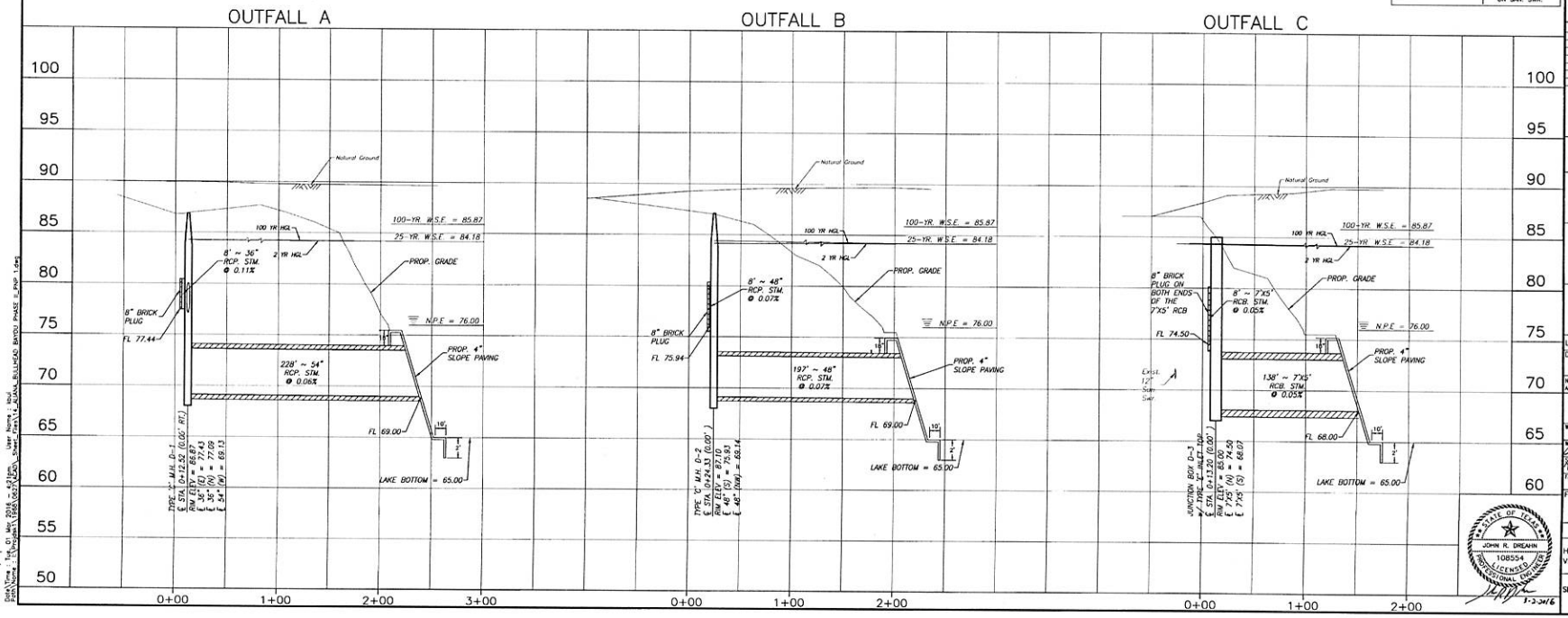
Date/Time : Mon, 22 Feb 2016 - 8:10am User Name : kbd
Sign/Name : P:\Projects\1968\0627\ADA\ Sheet File\13_ALIANA BULLHEAD BAYOU PHASE II SWPPP.dgn











BENCHMARK:

A-1212 - BRASS DISK, STAMPED A-1212 1973, SET IN THE TOP OF A CONCRETE HEADWALL ON THE WEST BOUND LANES OF HWY 90A APPROX. 4.1 MILES WEST ALONG HWY 90A FROM THE JUNCTION OF HWY 6 IN SUGARLAND, TEXAS. THE DISK IS SET 3.0 FEET EAST OF THE WEST END, OF THE NORTH CONCRETE HEADWALL, AND 27.0 FEET NORTH OF THE CENTERLINE OF THE WESTBOUND LANES, AND ½FOOT LOWER THAN THE ROAD.

ELEV. = 78.65 FEET (NGVD-29) 1973 ADJ.

TBM:

¾" IRON ROD W/ LJA CAP LOCATED APPROX. 50.6 FEET SOUTHWEST OF THE NORTHEAST CORNER OF THE ALIANA PROPERTY AT THE INTERSECTION OF MADDEN ROAD AND FM 1464.

ELEV. = 93.19 FEET 1973 ADJ.

NOTES:

APPROVED: Maggie Dodd
DEVELOPMENT COORDINATOR
DATE: 4/12/16

DATE	REVISION	BY

PLAT NAME:
CPC 101 FILE NO. :
C.O.H. LOG NO. 15-1745

F.B.C.M.U.D. NO. 134B

BULLHEAD BAYOU PHASE II
DRAINAGE IMPROVEMENTS

OUTFALLS A, B & C
STA. 0+00.00 TO END

LJA Engineering, Inc.
2929 Briarpark Drive
Suite 600
Houston, Texas 77042
Phone 713.953.5200
Fax 713.953.5026
FRN-F-1386

LJA PROJECT NO.: 1968-0627

DESIGNED BY:	DRAWN BY:	DATE:
KDB	KDB	FEBRUARY 2016

NOTE: CITY SIGNATURES VALID FOR ONE YEAR ONLY AFTER DATE OF SIGNATURES

CITY OF HOUSTON
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

WATER	3/3/16	STREET & BRIDGE
WASTEWATER	3-3-16	TRAFFIC
STORM	3/4/16	STORM WATER QUALITY
FACILITIES		

FILE NO.

FOR CITY OF HOUSTON USE ONLY

DRAWING SCALE
HORZ: 1" = 50'
VERT: 1" = 5'

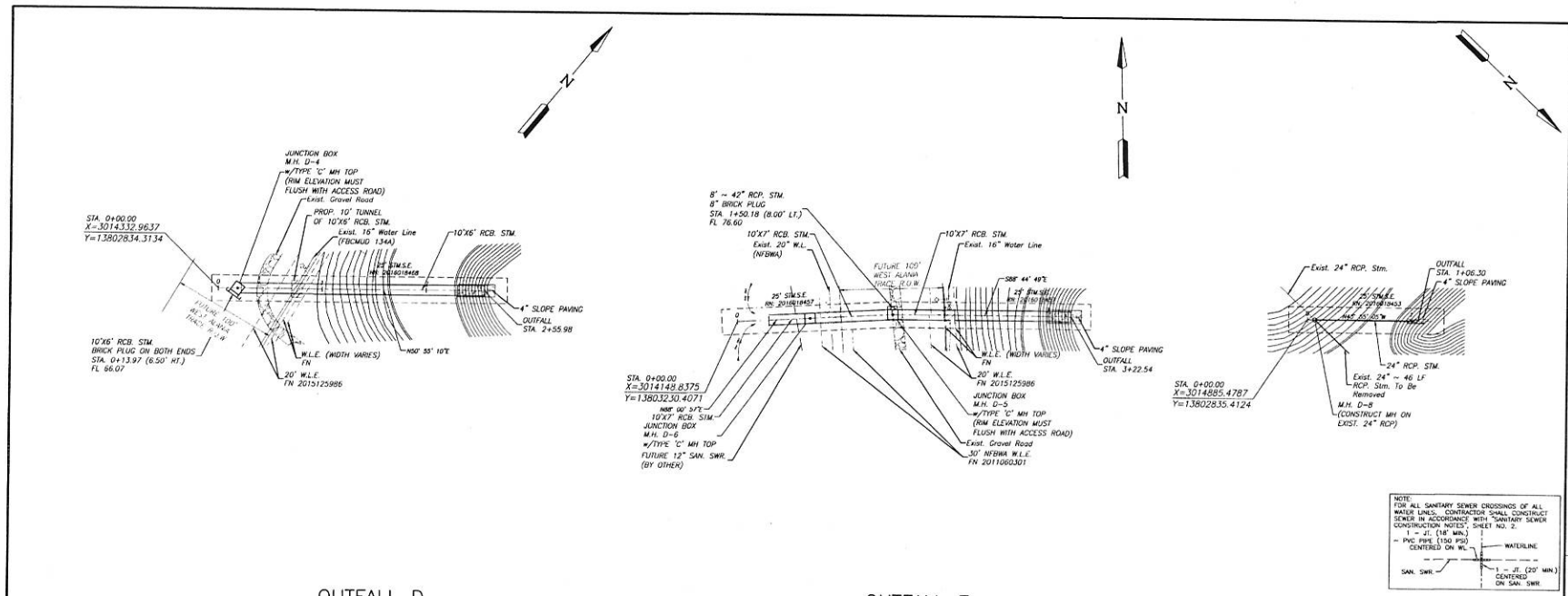
STATE OF TEXAS
JOHN R. DREAHN
108554
LICENSED
PROFESSIONAL ENGINEER
3-3-2016

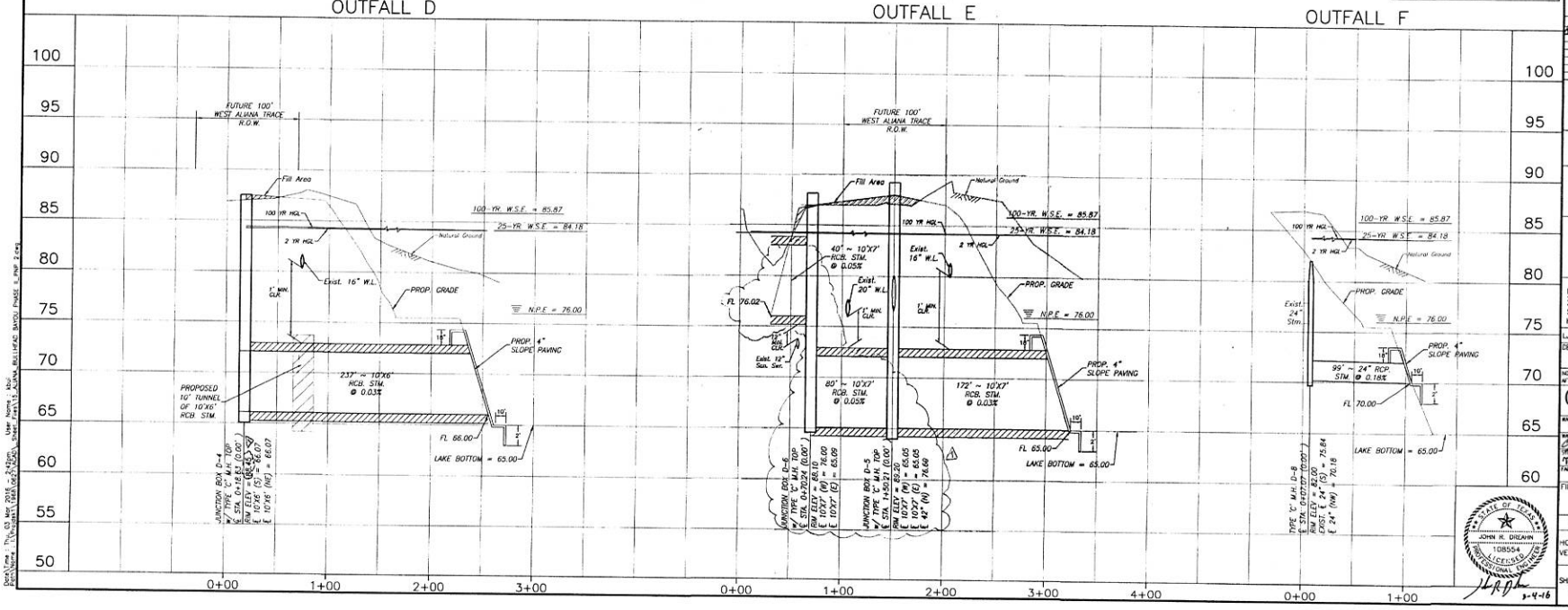
55658

SHEET NO. 14 OF 18

BULLHEAD BAYOU PHASE II DRAINAGE IMPROVEMENTS - JOB NO. 1968-0627

Date/Time : Tue, 01 Mar 2016 - 5:31pm User Name : kbd
File Name : I:\Projects\1968\0627\ACAD\ Sheet Files\14-ALIANA_BULLHEAD BAYOU PHASE II.dwg





BENCHMARK:

A-1212 ~ BRASS DISK, STAMPED A-1212 1973, SET IN THE TOP OF A CONCRETE HEADWALL ON THE WEST BOUND LANES OF HWY 90A, APPROX. 4.1 MILES WEST ALONG HWY 90A FROM THE JUNCTION OF HWY 6, IN SUGARLAND, TEXAS. THE DISK IS SET 2.0 FEET EAST OF THE WEST END, OF THE NORTH CONCRETE HEADWALL, AND 27.0 FEET NORTH OF THE CENTERLINE OF THE WESTBOUND LANES, AND ½FOOT LOWER THAN THE ROAD.

ELEV. = 78.65 FEET (NGVD-29) 1973 ADJ. ITEM.

⅝" IRON ROD W/ LJA CAP LOCATED APPROX. 50.6 FEET SOUTHWEST OF THE NORTHEAST CORNER OF THE ALIANA PROPERTY AT THE INTERSECTION OF MADDEN ROAD AND FM 1464.

ELEV. = 93.19 FEET 1973 ADJ.

NOTES:

APPROVED: Maggie Dodd
DEVELOPMENT COORDINATOR

DATE: 4/12/16

DATE	REVISION	BY
4/6-8-16	Revised FL & Rim Elevations	KDB

PLAT NAME:
CPC 101 FILE NO.
C.O.H. LOG NO. 15-1745

F.B.C.M.U.D. NO. 134B

BULLHEAD BAYOU PHASE II
DRAINAGE IMPROVEMENTS

OUTFALLS D, E, & F
STA. 0+00.00 TO END

LJA Engineering, Inc.
2929 Briarpark Drive
Suite 600
Houston, Texas 77042
Phone 713.953.5200
Fax 713.953.5026
FRN - F-1386

LJA PROJECT NO.: 1968-0627

DESIGNED BY:	DRAWN BY:	DATE:
KDB	KDB	FEBRUARY 2016

NOTE: CITY SIGNATURES VALID FOR ONE YEAR ONLY WITH DATE OF SIGNATURES

CITY OF HOUSTON
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

WATER	3/7/16
SIGNATURE	3-13-16
SIGNATURE	3/30/16
FACILITIES	
STREET & BRIDGE	
TRAFFIC	
STORM WATER QUALITY	

FILE NO.

DRAWING SCALE
HORZ: 1" = 50'
VERT: 1" = 5'

FOR CITY OF HOUSTON USE ONLY

STATE OF TEXAS
JOHN R. DREAHN
108554
LICENSED
PROFESSIONAL ENGINEER
3-4-16

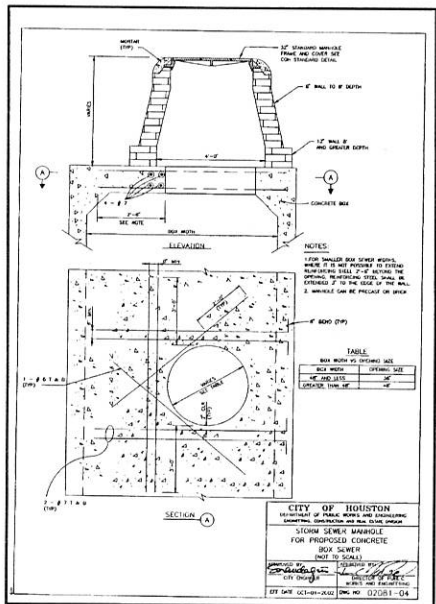
55658

SHEET NO. 15 OF 18

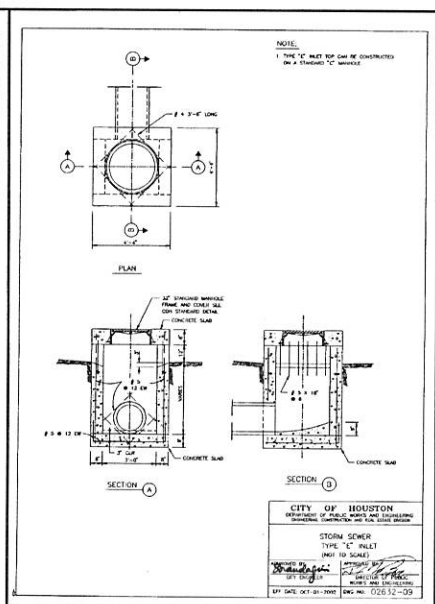
BULLHEAD BAYOU PHASE II DRAINAGE IMPROVEMENTS – JOB NO. 1968-0627

15

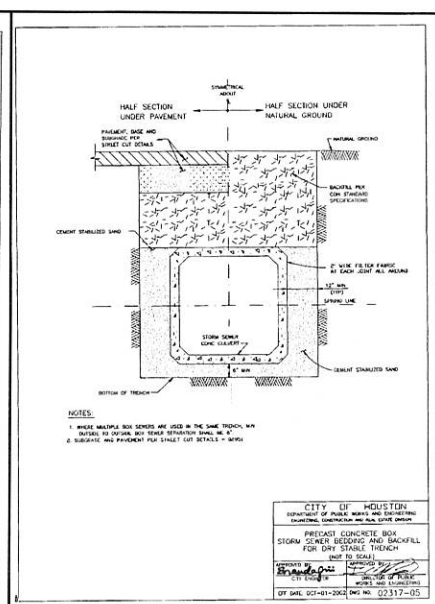
Dwg Name: T:\0_ES MGT DIVISION_Other Projects_Other Projects\BULLHEAD BAYOU PHASE II.DWG 2-24-16
Plot Date: Thu, Mar 03, 2016 Time: 3:42pm User Name: KDB
Plot Name: T:\0_ES MGT DIVISION_Other Projects_Other Projects\BULLHEAD BAYOU PHASE II.PMP 2-24-16



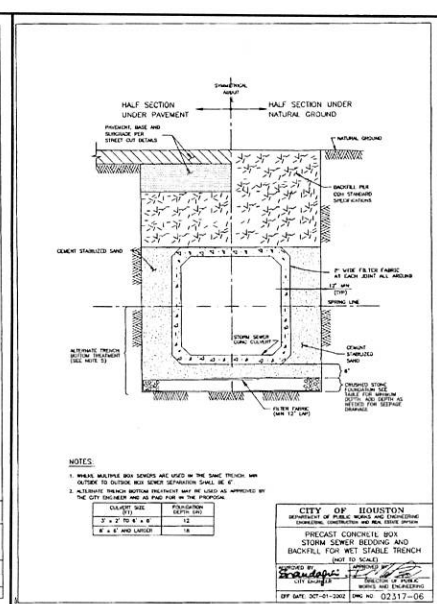
STORM SEWER MANHOLE FOR PROPOSED CONCRETE BOX SEWER



STORM SEWER TYPE "E" INLET



PRECAST CONCRETE BOX STORM SEWER BEDDING AND BACKFILL FOR DRY STABLE TRENCH



PRECAST CONCRETE BOX STORM SEWER BEDDING AND BACKFILL FOR WET STABLE TRENCH

BENCHMARK:

A-1212 – BRASS DISK, STAMPED A-1212 1973, SET IN THE TOP OF A CONCRETE HEADWALL ON THE WEST BOUND LANES OF HWY 90A, APPROX. 4.1 MILES WEST ALONG HWY 90A FROM THE JUNCTION OF HWY 6, IN SUGARLAND, TEXAS. THE DISK IS SET 2.0 FEET EAST OF THE WEST END, OF THE NORTH CONCRETE HEADWALL AND 27.0 FEET NORTH OF THE CENTERLINE OF THE WESTBOUND LANES, AND ½FOOT LOWER THAN THE ROAD.

ELEV. = 78.65 FEET (NGVD-29) 1973 ADJ.

TBM:

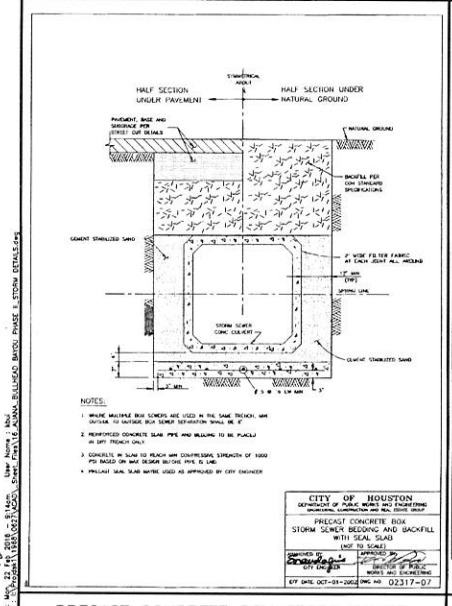
½" IRON ROD W/ LJA CAP LOCATED APPROX. 50.6 FEET SOUTHWEST OF THE NORTHEAST CORNER OF THE ALIANA PROPERTY AT THE INTERSECTION OF MADDEN ROAD AND FM 1464.

ELEV. = 93.19 FEET 1973 ADJ.

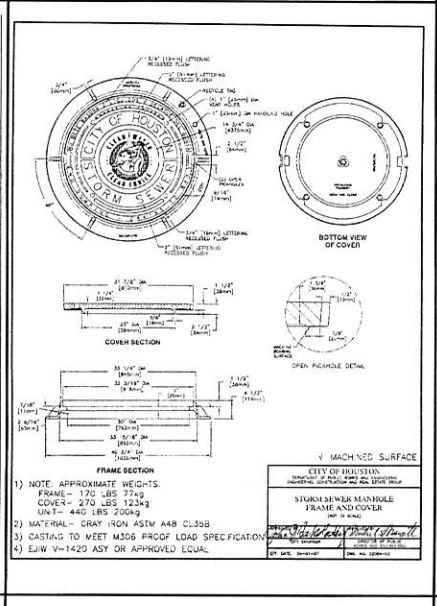
NOTES:

APPROVED: Maggie Dick
DEVELOPMENT COORDINATOR
DATE: 4/12/16

DATE	REVISION	BY



PRECAST CONCRETE BOX STORM SEWER BEDDING AND BACKFILL WITH SEAL SLAB



STORM SEWER MANHOLE FRAME AND COVER

TABLE A

SIZE 2 2/3" X 1" CORRUGATION	PIPE GAUGE	BAND COUPLER GAUGE	SIZE 3"X1" & 5"X1" CORRUGATION	PIPE GAUGE	BAND COUPLER GAUGE
24"	16	16			
30"	16	16			
36"	16	16			
42"	14	16			
48"	14	16	48"	16	16
54"	12	14	54"	16	16
60"	12	14	60"	16	16
66"	10	12	66"	16	16
72"	10	12	72"	16	16
78"	8	10	78"	14	16
84"	8	10	84"	14	16

$L : \frac{B.W.}{PIPE\ DIA.} \leq 7'-6"$

L WILL EXTEND ONE PIPE DIA. ABOVE F. ON OPPPOSITE BANK (MIN.

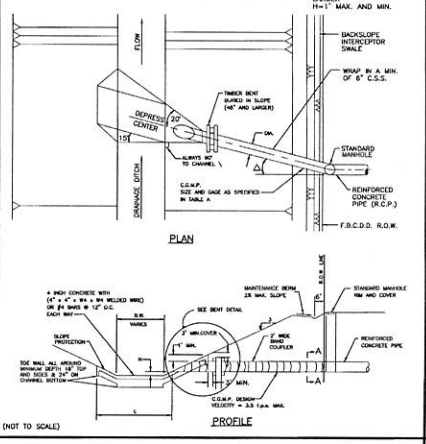
$\frac{B.W.}{PIPE\ DIA.} > 7'-6"$

L = 6 DIA. OR MIN. 1'-6" INTO B.W. WHICHEVER IS GREATER

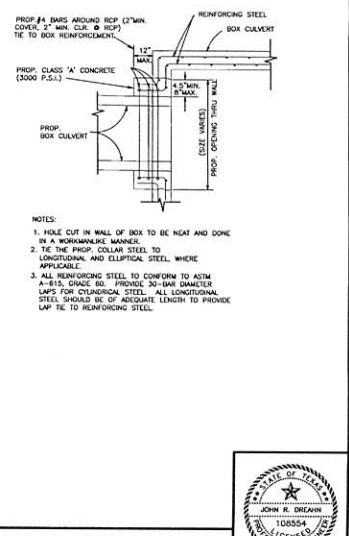
△: PROP. 24" TO 42" △ = 15'

PROP. 48" AND LARGER △ = 30'

H : FOR PIPE SIZES 24" TO 42" H=3' MAX. AND 1' MIN. FOR PIPE SIZES 48" AND LARGER H=1' MAX. AND MIN.



STORM SEWER OUTFALL



STORM SEWER / BOX CULVERT CONCRETE COLLAR

STATE OF TEXAS
JOHN R. DREAHN
108554
LICENSED
PROFESSIONAL ENGINEER
5-3-2016

PLAT NAME:
CPC 101 FILE NO.
C.O.H. LOG NO. 15-1745

F.B.C.M.U.D. NO. 134B

BULLHEAD BAYOU PHASE II DRAINAGE IMPROVEMENTS

STORM SEWER CONSTRUCTION DETAILS
(SHEET 1 OF 2)

LJA Engineering, Inc.
2929 Briarpark Drive
Suite 600
Houston, Texas 77042
Phone 713.953.5200
Fax 713.953.5026
FRN - F-1386

LJA PROJECT NO.: 1968-0627

DESIGNED BY:	DRAWN BY:	DATE:
KDB	KDB	FEBRUARY 2016

NOTE: CITY SIGNATURES VALID FOR ONE YEAR ONLY AFTER DATE OF SIGNATURES

CITY OF HOUSTON
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

MANAGER	3/3/16	STREET & BRIDGE
MANAGER	3/4/16	TRAFFIC
MANAGER	3/4/16	STORM WATER QUALITY FACILITIES

FILE NO.

DRAWING SCALE

SCALE: NONE

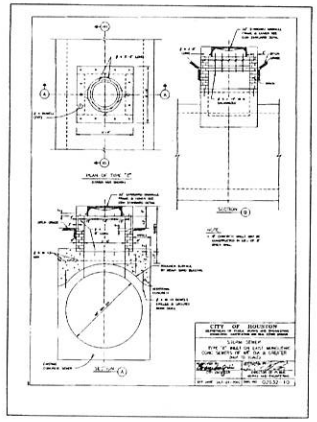
FOR CITY OF HOUSTON USE ONLY

STATE OF TEXAS 55658 REGISTERED PROFESSIONAL ENGINEER

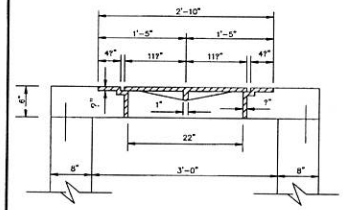
SHEET NO. 16 OF 18

BULLHEAD BAYOU PHASE II DRAINAGE IMPROVEMENTS – JOB NO. 1968-0627

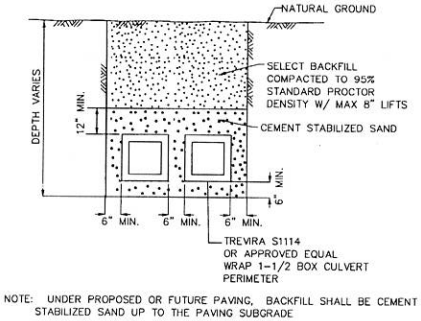
Date/Time: Mar 22, 2016 - 2:14pm User Name: kdb
Filename: N:\Projects\1968\0627\ACAD\ Sheet: Plat1&2 ALIANA BULLHEAD BAYOU PHASE II STORM DETAILS.dwg



TYPE 'E' INLET CONNECTED TO EXIST STRUCTURE

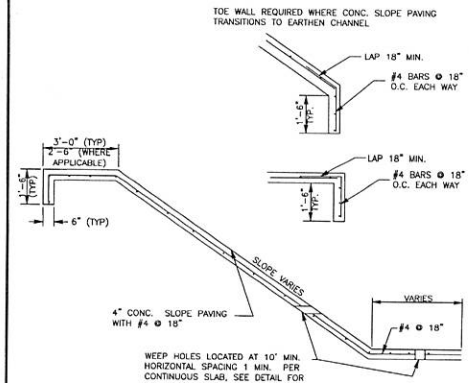


FRAME AND COVER SECTION FOR JUNCTION BOX



NOTE: UNDER PROPOSED OR FUTURE PAVING, BACKFILL SHALL BE CEMENT STABILIZED SAND UP TO THE PAVING SUBGRADE

MULTIPLE BOX CULVERT BEDDING AND BACKFILL DETAIL



1. EXPANSION JOINTS TO BE PLACED AT A MAXIMUM DISTANCE OF 80 FEET.
2. CENTER DOWEL HORIZONTALLY ON JOINT.
3. CENTER DOWEL HORIZONTALLY IN CONCRETE BASE. EXTEND THICKENED CONCRETE AS NEEDED TO MAINTAIN 3" MIN COVER.

SLOPE PAVING

BENCHMARK:

A-1212 – BRASS DISK, STAMPED A-1212 1973, SET IN THE TOP OF A CONCRETE HEADWALL ON THE WEST BOUND LANES OF HWY 90A, APPROX. 4.1 MILES WEST ALONG HWY 90A FROM THE JUNCTION OF HWY 6, IN SUGARLAND, TEXAS. THE DISK IS SET 2.0 FEET EAST OF THE WEST END, OF THE NORTH CONCRETE HEADWALL, AND 27.0 FEET NORTH OF THE CENTERLINE OF THE WESTBOUND LANES, AND ½FOOT LOWER THAN THE ROAD.

ELEV. = 78.65 FEET (NGVD-29) 1973 ADJ.

TBM:

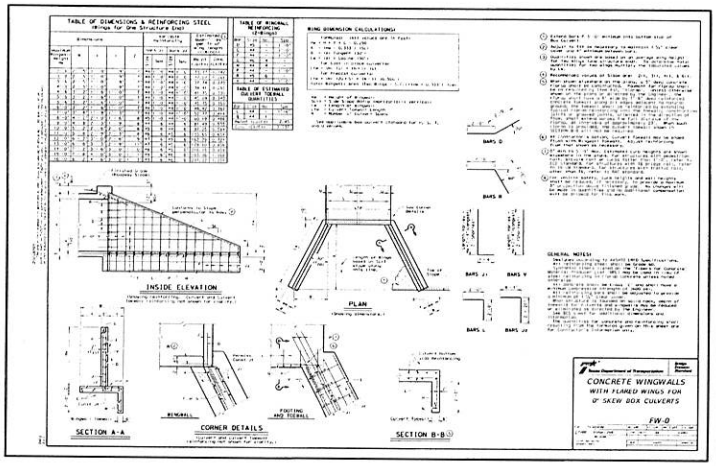
¾" IRON ROD W/ LJA CAP LOCATED APPROX. 50.6 FEET SOUTHWEST OF THE NORTHEAST CORNER OF THE ALIANA PROPERTY AT THE INTERSECTION OF MADDEN ROAD AND FM 1464.

ELEV. = 93.19 FEET 1973 ADJ.

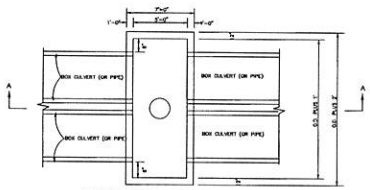
NOTES:

APPROVED: Maggie Dick
DEVELOPMENT COORDINATOR
DATE: 4/12/16

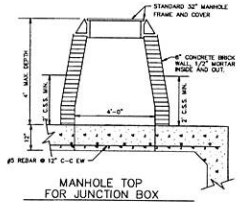
DATE	REVISION	BY



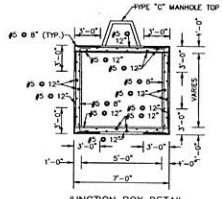
CONCRETE HEADWALL WITH FLARED WINGS



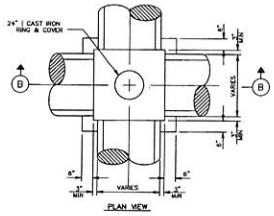
JUNCTION BOX DETAIL
(N.T.S.)

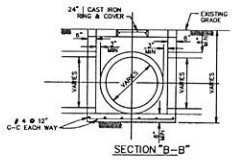


MANHOLE TOP FOR JUNCTION BOX



JUNCTION BOX DETAIL
SECTION "A-A"





SECTION "B-B"

(REVISION NO. 1)
REVISED STANDARD JUNCTION BOX DETAIL

STATE OF TEXAS
JOHN R. DREAHN
108554
LICENSED
PROFESSIONAL ENGINEER
4-12-2016

PLAT NAME:
CPC 101 FILE NO.
C.O.H. LOG NO. 15-1745

F.B.C.M.U.D. NO. 134B

BULLHEAD BAYOU PHASE II DRAINAGE IMPROVEMENTS

STORM SEWER CONSTRUCTION DETAILS
(SHEET 2 OF 2)

LJA Engineering, Inc.
2929 Briarpark Drive
Suite 600
Houston, Texas 77042
Phone 713.953.5200
Fax 713.953.5026
FRN - F-1386

LJA PROJECT NO.: 1968-0627

DESIGNED BY:	DRAWN BY:	DATE:
KDB	KDB	FEBRUARY 2016

NOTE: CITY SIGNATURES VALID FOR ONE YEAR ONLY AFTER DATE OF SIGNATURES

CITY OF HOUSTON
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

3/3/16	STREET & BRIDGE
3-3-16	TRAFFIC
3/4/16	STORM WATER QUALITY
	FACILITIES

FILE NO.

DRAWING SCALE

SCALE: NONE

FOR CITY OF HOUSTON USE ONLY

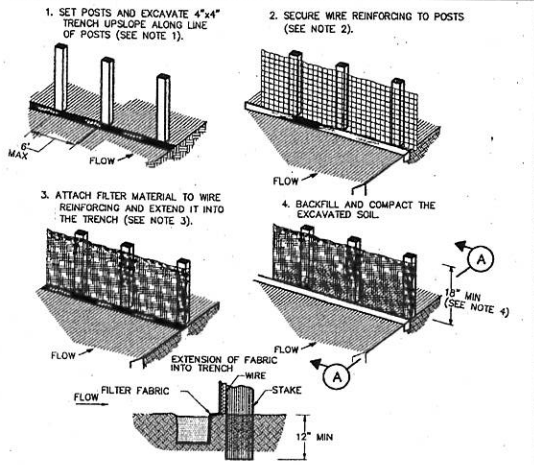
55658

SHEET NO. 17 OF 18

BULLHEAD BAYOU PHASE II DRAINAGE IMPROVEMENTS – JOB NO. 1968-0627

Date/Time: Mon, 22 Feb 2016 - 8:08am User Name: kbur
Filename: \\Houston\1968\0627\ACAD\Sheet Files\17-ALIANA_BULLHEAD BAYOU PHASE II-STORM DETAILS.dwg

17

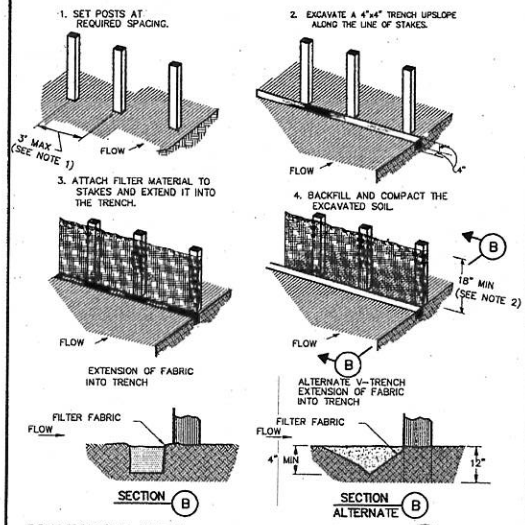


CONSTRUCTION NOTES:

1. SET 2 INCH BY 2 INCH WOODEN STAKES SPACED A MAX OF 6 FEET APART AND EMBEDDED A MIN OF 12 INCHES.
2. WOVEN WIRE REINFORCING TO BE FASTENED SECURELY TO BARRIER POSTS WITH STAPLES.
3. FILTER CLOTH TO BE FASTENED SECURELY TO WOVEN WIRE REINFORCING, WITH TIES SPACED EVERY 24 INCHES AT TOP AND MIDSECTION.
4. MINIMUM HEIGHT OF FILTER SHOULD BE 18 INCHES AND A MAXIMUM OF 36 INCHES ABOVE NATURAL GROUND.
5. WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER THEY SHALL BE OVERLAPPED 6 INCHES AT THE POSTS, AND FOLDED.
6. SEE COH STANDARD SPECIFICATION FOR FILTER FABRIC BARRIER.

X— (RFB) —X
SYMBOL

REINFORCED FILTER FABRIC BARRIER

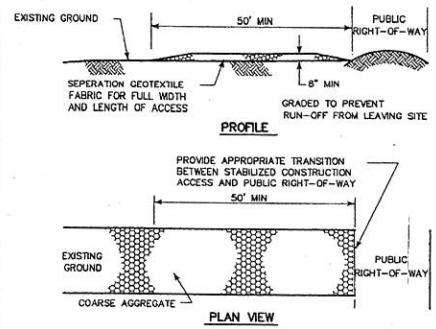


CONSTRUCTION NOTES:

1. 2 INCH THICK BY 2 INCH WOODEN STAKES TO BE SET AT MAX SPACING OF 3 FEET AND EMBEDDED A MIN OF 8 INCHES. IF PREASSEMBLED BARRIER WITH SUPPORT NETTING IS USED, SPACING OF POST MAY BE INCREASED TO 8 FEET MAX.
2. ATTACH FILTER FABRIC TO WOODEN STAKES. FILTER FABRIC BARRIER SHALL HAVE A MIN HEIGHT OF 18 INCHES AND MAX HEIGHT OF 36 INCHES ABOVE NATURAL GROUND.
3. WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER THEY SHOULD BE OVERLAPPED 6 INCHES AT THE POSTS, AND FOLDED.
4. SEE COH STANDARD SPECIFICATION FOR FILTER FABRIC BARRIER.

X— (FF) —X
SYMBOL

FILTER FABRIC BARRIER

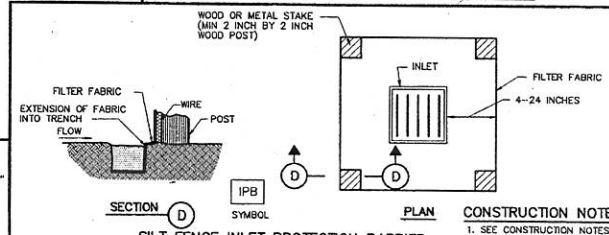


CONSTRUCTION NOTES:

1. LENGTH SHALL BE AS SHOWN ON THE CONSTRUCTION DRAWINGS, BUT NOT LESS THAN 50 FEET.
2. THICKNESS SHALL BE NOT LESS THAN 8 INCHES.
3. WIDTH SHALL BE NOT LESS THAN FULL WIDTH OF ALL POINTS OF INGRESS OR EGRESS.
4. STABILIZATION FOR OTHER AREAS SHALL HAVE THE SAME AGGREGATE THICKNESS AND WIDTH REQUIREMENTS AS THE STABILIZED CONSTRUCTION ACCESS, UNLESS OTHERWISE SHOWN ON THE CONSTRUCTION DRAWINGS.
5. STABILIZED AREA MAY BE WIDENED OR LENGTHENED TO ACCOMODATE A WASHING AREA. AN OUTLET SEDIMENT TRAP MUST BE PROVIDED FOR THE WASHING AREA.
6. COH STANDARD SPECIFICATION FOR STABILIZED CONSTRUCTION ACCESS.
7. STABILIZED CONSTRUCTION ACCESS SHALL BE MAINTAINED FREE OF SEDIMENT FOR THE DURATION OF THE PROJECT.

(SC)
SYMBOL

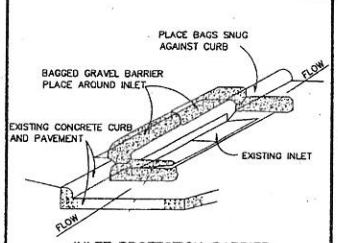
STABILIZED CONSTRUCTION ACCESS



SILT FENCE INLET PROTECTION BARRIER

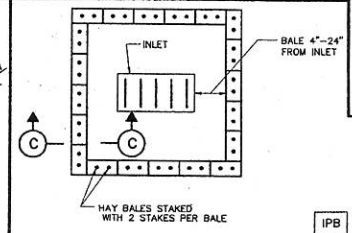
CONSTRUCTION NOTE:

1. SEE CONSTRUCTION NOTES FOR RFB.

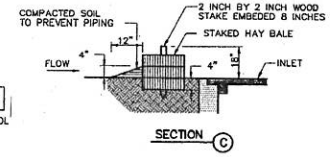


INLET PROTECTION BARRIER

(FOR STAGE II INLETS)
BAGGED GRAVEL BARRIER



IPB
SYMBOL



HAY BALE INLET PROTECTION BARRIER

CITY OF HOUSTON
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

STORM WATER POLLUTION PREVENTION PLAN DETAILS
(NOT TO SCALE)

APPROVED: CITY ENGINEER
APPROVED: DIRECTOR OF PUBLIC WORKS AND ENGINEERING
EFF DATE: JULY-01-2010
DWG NO: 01571-01

STATE OF TEXAS
JOHN R. DREAHN
108554
LICENSED
PROFESSIONAL ENGINEER
1-3-2016

BENCHMARK:
A-1212 – BRASS DISK, STAMPED A-1212 1973, SET IN THE TOP OF A CONCRETE HEADWALL ON THE WEST BOUND LANES OF HWY 90A APPROX. 4.1 MILES WEST ALONG HWY 90A FROM THE JUNCTION OF HWY 6, IN SUGARLAND, TEXAS. THE DISK IS SET 2.0 FEET EAST OF THE WEST END, OF THE NORTH CONCRETE HEADWALL, AND 27.0 FEET NORTH OF THE CENTERLINE OF THE WESTBOUND LANES, AND ½FOOT LOWER THAN THE ROAD.
ELEV. = 78.65 FEET (NGVD-29) 1973 ADJ.
TBM:
⅝" IRON ROD W/ LJA CAP LOCATED APPROX. 50.6 FEET SOUTHWEST OF THE NORTHEAST CORNER OF THE ALANA PROPERTY AT THE INTERSECTION OF MADDEN ROAD AND FM 1464.
ELEV. = 93.19 FEET 1973 ADJ.

NOTES:

APPROVED: DEVELOPMENT COORDINATOR
DATE: 4/12/16

DATE	REVISION	BY

PLAT NAME:
CPC 101 FILE NO.
C.O.H. LOG NO. 15-1745

F.B.C.M.U.D. NO. 134B

BULLHEAD BAYOU PHASE II DRAINAGE IMPROVEMENTS

STORM WATER POLLUTION PREVENTION PLAN DETAILS

LJA Engineering, Inc.
2929 Briarpark Drive
Suite 600
Houston, Texas 77042
Phone 713.953.5200
Fax 713.953.5026
FRN - F-1386

LJA PROJECT NO.: 1968-0627

DESIGNED BY:	DRAWN BY:	DATE:
KDB	KDB	FEBRUARY 2016

NOTE: CITY SIGNATURES VALID FOR ONE YEAR ONLY AFTER DATE OF SIGNATURES

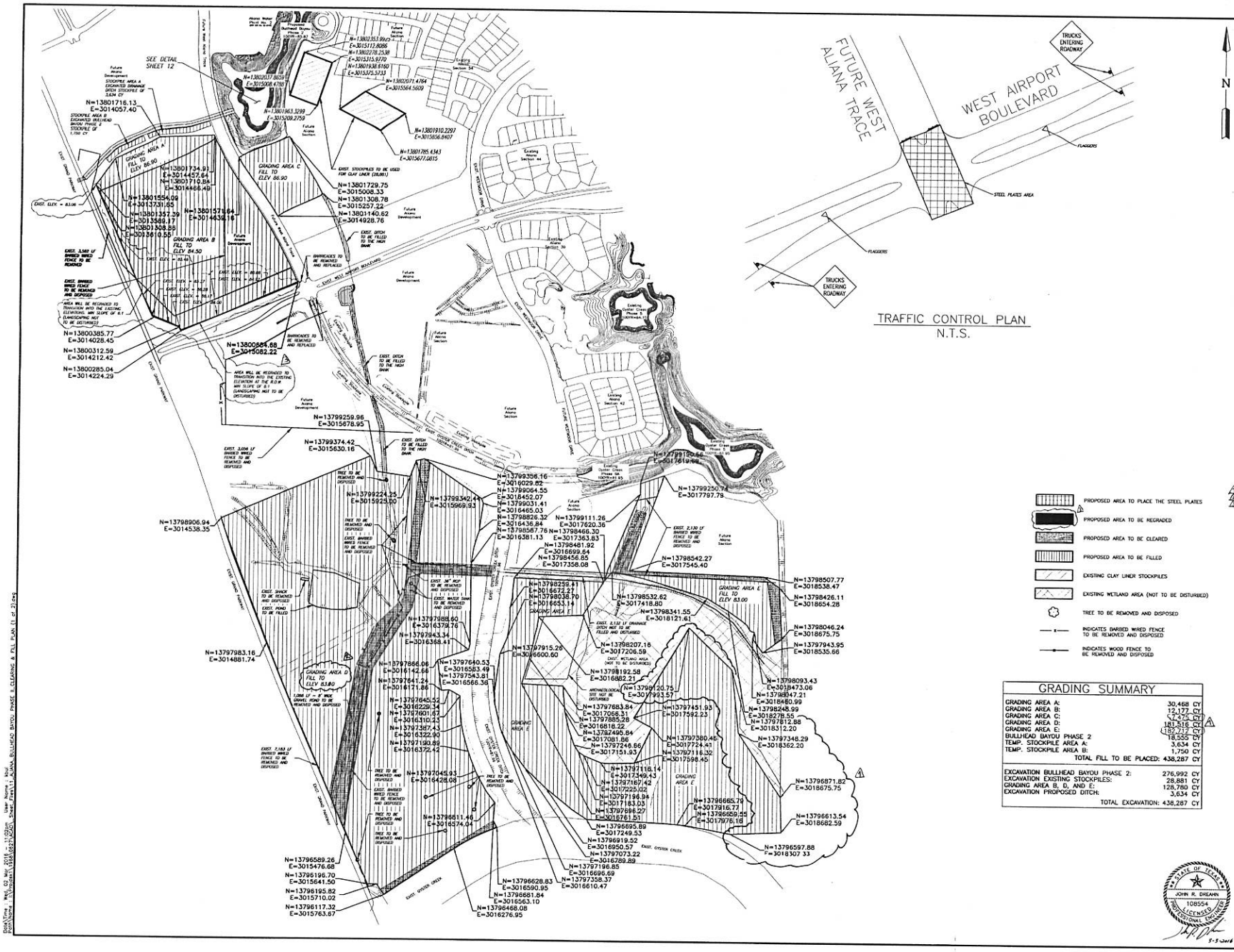
CITY OF HOUSTON
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

MANAGER	2/3/16	STREET & BRIDGE
WASTEWATER	3-3-16	STATIC
STORM WATER QUALITY	3/4/16	STORM WATER QUALITY
FACILITIES		

FILE NO.
FOR CITY OF HOUSTON USE ONLY
DRAWING SCALE
SCALE: NONE
55658
SHEET NO. 18 OF 18

BULLHEAD BAYOU PHASE II DRAINAGE IMPROVEMENTS – JOB NO. 1968-0627

Date/Time : Mon, 22 Feb 2016 - 8:46am User Name : kbui
Filename : I:\Projects\1968\0627\ACS_Sheet_Files\BULLHEAD BAYOU PHASE II_SWPP DETAILS.dwg



TRAFFIC CONTROL PLAN
N.T.S.

GRADING SUMMARY	
GRADING AREA A:	30,468 CY
GRADING AREA B:	12,177 CY
GRADING AREA C:	74,475 CY
GRADING AREA D:	181,516 CY
GRADING AREA E:	187,712 CY
BULLHEAD BAYOU PHASE 2	18,555 CY
TEMP. STOCKPILE AREA A:	3,634 CY
TEMP. STOCKPILE AREA B:	1,750 CY
TOTAL FILL TO BE PLACED:	438,287 CY
EXCAVATION BULLHEAD BAYOU PHASE 2:	276,992 CY
EXCAVATION EXISTING STOCKPILES:	28,881 CY
GRADING AREA B, D, AND E:	128,780 CY
EXCAVATION PROPOSED DITCH:	3,634 CY
TOTAL EXCAVATION:	438,287 CY

BENCHMARK:

A-1212 — BRASS DISK, STAMPED A-1212 1973, SET IN THE TOP OF A CONCRETE HEADWALL ON THE WEST BOUND LANES OF HWY 90A, APPROX. 4.1 MILES WEST ALONG HWY 90A FROM THE JUNCTION OF HWY 6, IN SUGARLAND, TEXAS. THE DISK IS SET 2.0 FEET EAST OF THE WEST END, OF THE NORTH CONCRETE HEADWALL, AND 27.0 FEET NORTH OF THE CENTERLINE OF THE WESTBOUND LANES, AND ½FOOT LOWER THAN THE ROAD.

ELEV. = 78.65 FEET (NGVD-29) 1973 ADJ.

TBM:

½" IRON ROD W/ LJA CAP LOCATED APPROX. 50.6 FEET SOUTHWEST OF THE NORTHEAST CORNER OF THE ALIANA PROPERTY AT THE INTERSECTION OF MAGDEN ROAD AND FM 1464.

ELEV. = 93.19 FEET 1973 ADJ.

NOTES:

1) CONTRACTOR SHALL USE EXISTING WEST ALIANA TRACE INTERSECTION AS CROSSING TO TRANSPORT EXCAVATED MATERIAL. CONTRACTOR SHALL PLACE STEEL PLATES ACROSS PAVEMENT TO FACILITATE USE OF OFF-ROAD TRUCKS FOR THE PROJECT.

2) CONTRACTOR SHALL ONLY UTILIZE THE WEST ALIANA TRACE CROSSING DURING THE OFF-PEAK TRAFFIC HOURS OF 9A.M.–4P.M. DAILY. CONTRACTOR SHALL ALSO STAGE WARNING SIGNS FOR "TRUCKS ENTERING ROADWAY" AS SHOWN ON THIS SHEET FOR TRAFFIC CONTROL. CONTRACTOR SHALL ALSO USE FLAGGERS DURING THIS WORK TO WARN ONCOMING MOTORISTS OF TRUCK ENTERING ROADWAY.

APPROVED: Margaret Dodd
DEVELOPMENT COORDINATOR
DATE: 4/12/16

DATE	REVISION	BY
3-11-16	Revised Fill Area & Quantities	KDB
4-20-16	Revised Fill Elevation	KDB
4-12-16	Revised Regraded Areas	KDB

PLAT NAME: -
CPC 101 FILE NO. -
C.O.H. LOG NO. 15-1745

F.B.C.M.U.D. NO. 134B

BULLHEAD BAYOU PHASE II DRAINAGE IMPROVEMENTS

CLEARING, FILL, AND TRAFFIC CONTROL PLANS (SHEET 1 OF 2)

LJA Engineering, Inc.
2929 Briarpark Drive
Suite 600
Houston, Texas 77042
Phone 713.953.5200
Fax 713.953.5026
FRN - F-1386

LJA PROJECT NO.: 1968-0627

DESIGNED BY:	DRAWN BY:	DATE:
KDB	KDB	FEBRUARY 2016

NOTE: CITY SIGNATURES VALID FOR ONE YEAR ONLY AFTER DATE OF SIGNATURES

CITY OF HOUSTON
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

WATER	STREET & DRAINAGE
WASTEWATER	TRAFFIC
STORM WATER QUALITY	STORM WATER QUALITY
FACILITIES	

FILE NO.

FOR CITY OF HOUSTON USE ONLY

DRAWING SCALE

SCALE: 1" = 300'

SHEET NO. 11 OF 18

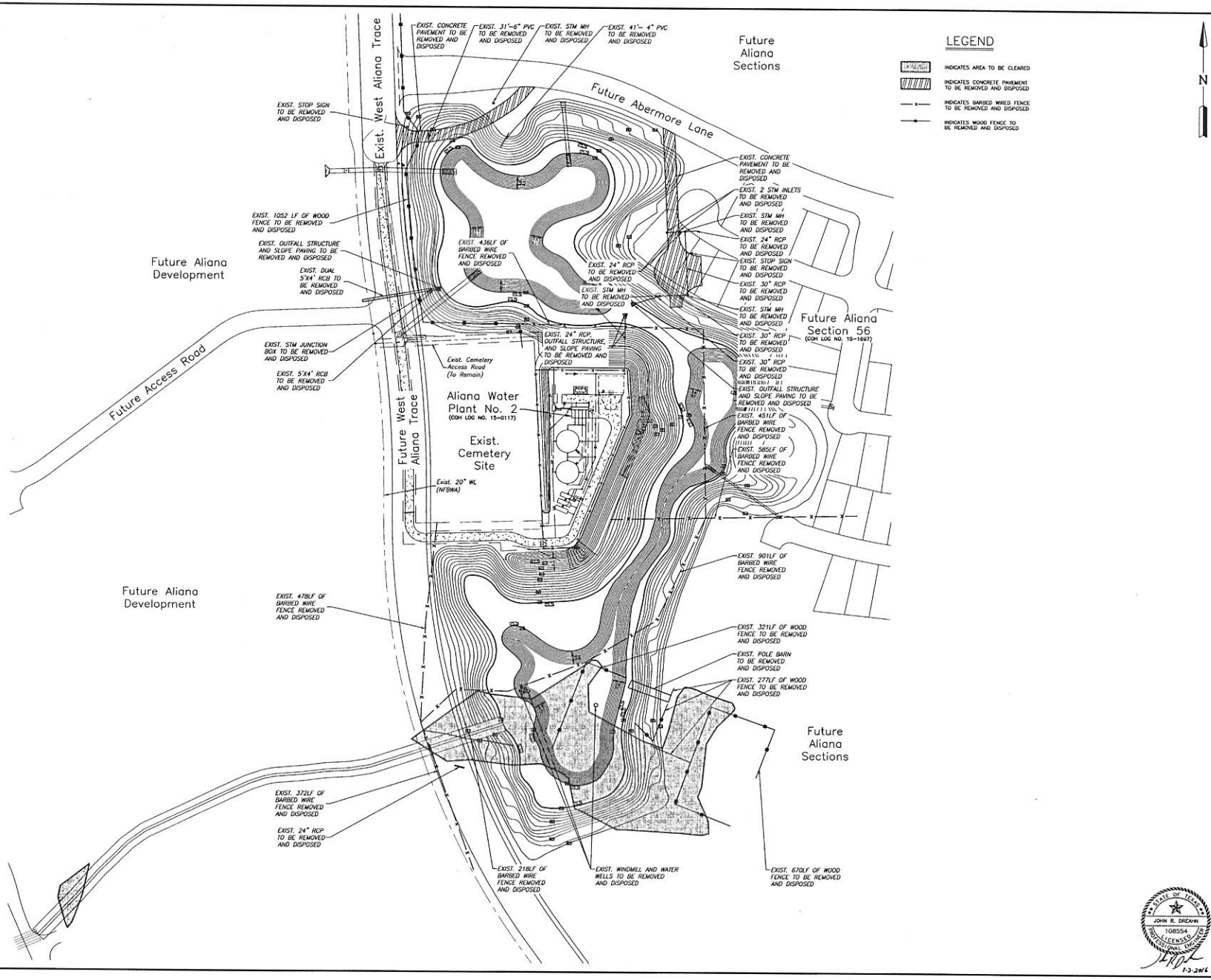
STATE OF TEXAS
JOHN R. DREANN
108554
LICENSED
PROFESSIONAL ENGINEER
5-5-2016

55658

BULLHEAD BAYOU PHASE II DRAINAGE IMPROVEMENTS – JOB NO. 1968-0627

11

DGN/Time: WED, 02 MAR 2016 – 11:02am User Name: kbd
FILENAME: 1968-0627-CIVIL-Sheet Part11-ALIANA BULLHEAD BAYOU PHASE II CLEARING & FILL PLAN (1 of 2).dgn



BENCHMARK:

A-1212 – BRASS DISK, STAMPED A-1212 1973, SET IN THE TOP OF A CONCRETE HEADWALL ON THE WEST BOUND LANES OF HWY 90A, APPROX. 4.1 MILES WEST ALONG HWY 90A FROM THE JUNCTION OF HWY 6, IN SUGARLAND, TEXAS. THE DISK IS SET 2.0 FEET EAST OF THE WEST END, OF THE NORTH CONCRETE HEADWALL, AND 27.0 FEET NORTH OF THE CENTERLINE OF THE WESTBOUND LANES, AND ½FOOT LOWER THAN THE ROAD.

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TBM:

½" IRON ROD W/ LJA CAP LOCATED APPROX. 50.6 FEET SOUTHWEST OF THE NORTHEAST CORNER OF THE ALIANA PROPERTY AT THE INTERSECTION OF MADDEN ROAD AND FM 1464.

ELEV. = 93.19 FEET 1973 ADJ.

NOTES:

APPROVED: DEVELOPMENT COORDINATOR

DATE: 4/12/16

DATE	REVISION	BY

PLAT NAME: .
CPC 101 FILE NO. .
C.O.H. LOG NO. 15-1745

F.B.C.M.U.D. NO. 134B

BULLHEAD BAYOU PHASE II DRAINAGE IMPROVEMENTS

CLEARING, FILL, AND TRAFFIC CONTROL PLANS (SHEET 2 OF 2)

LJA Engineering, Inc.
2929 Briarpark Drive
Suite 600
Houston, Texas 77042
Phone 713.953.5200
Fax 713.953.5026
FRN - F-1386

LJA PROJECT NO.: 1968-0627

DESIGNED BY:	DRAWN BY:	DATE:
KDB	KDB	FEBRUARY 2016

NOTE: CITY SIGNATURES VALID FOR ONE YEAR ONLY AFTER DATE OF SIGNATURES

CITY OF HOUSTON
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

PWE	3/3/16	STREET & BRIDGE	
WASTEWATER	3/3/16	TRAFFIC	
STORM FACILITIES	3/4/16	STORM WATER QUALITY	

FILE NO.

FOR CITY OF HOUSTON USE ONLY

DRAWING SCALE

SCALE: 1" = 100'

STATE OF TEXAS
JOHN R. DREAHN
108554
LICENSED PROFESSIONAL ENGINEER
1-2-2016

55658

SHEET NO. 12 OF 18

BULLHEAD BAYOU PHASE II DRAINAGE IMPROVEMENTS – JOB NO. 1968-0627

DgnFile: Time: Nov 17, 2014 – 5:30pm User Name: LJA
P:\Projects\1968\0627\CADD\ Sheet File\12_ALIANA_BULLHEAD BAYOU PHASE II_CLEARING & FILL PLAN (2 of 2).dgn