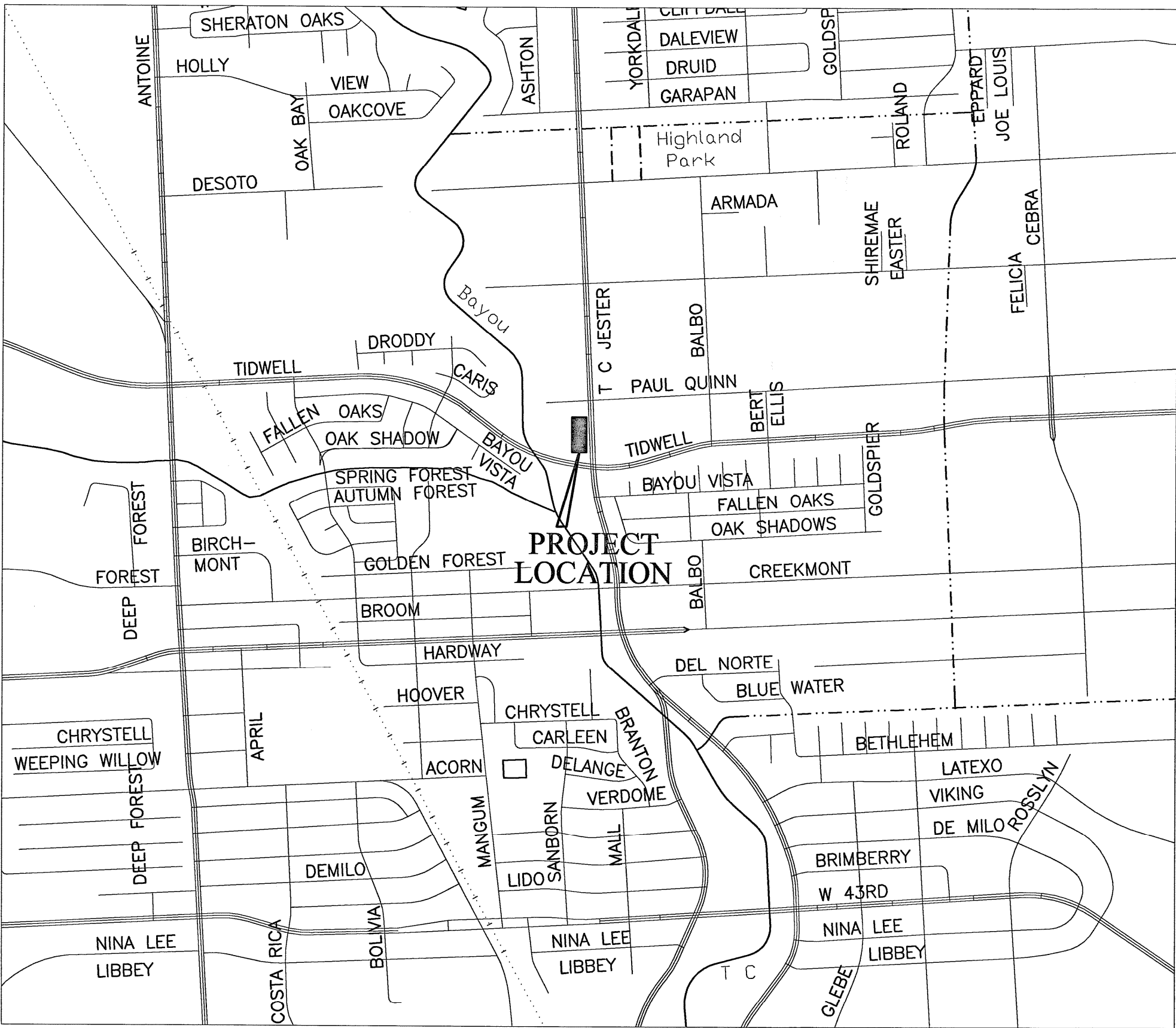


T. C. JESTER HYDRAULIC ANALYSIS

W. TIDWELL RD & T.C. JESTER BLVD,
HOUSTON, TEXAS
HARRIS COUNTY MUD 119

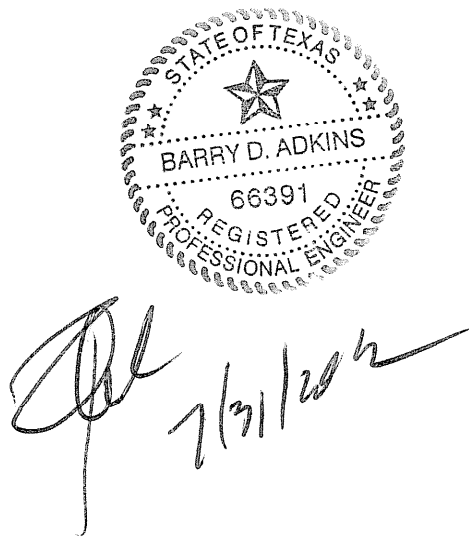
RESERVE "E" BLOCK 1 OF MEMORIAL
NORTHWEST COMMERCIAL FILM CODE NO. 424038 OF
MAP RECORDS



VICINITY MAP
KEY MAP 451D

DRAWING INDEX

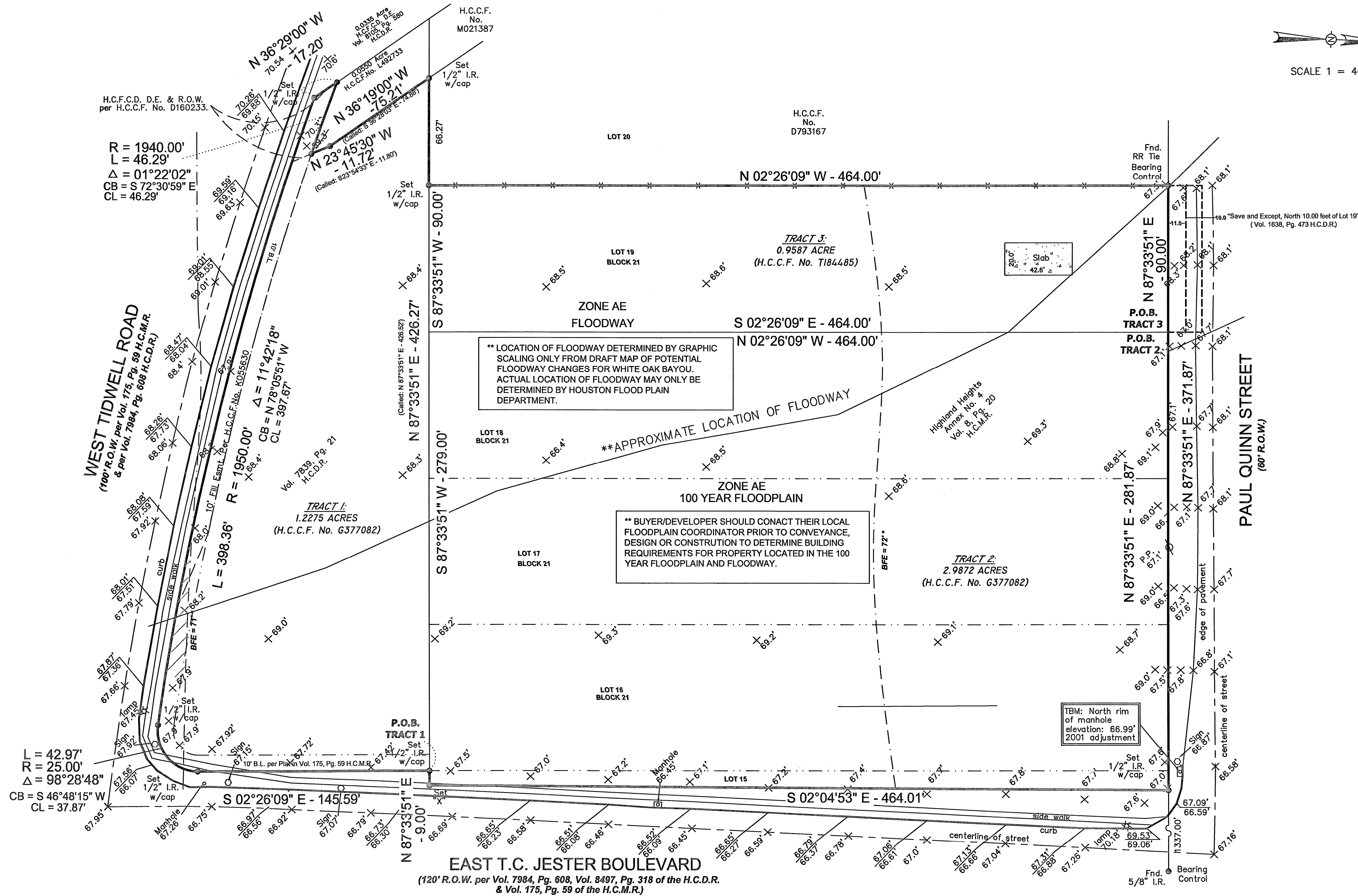
SHEET No.	DESCRIPTION
• COVER SHEET	C-1
• EXISTING TOPOGRAPHY	C-2
• DRAINAGE PLAN	C-3
• MITIGATION PLAN	C-4
• MITIGATION CUT & FILL PROFILES	C-5
• S.W.Q.M. PLAN	C-6
• H.C.F.C.D STORM & RIP RAP DETAILS	C-7



DaRam Engineers, Inc.

5420 DASHWOOD, SUITE 206
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(713)529-8997 FAX
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SCALE 1 = 40'

**AREA OF PROPERTY WITHIN THE FLOODWAY IS AN APPROXIMATION ONLY. NEITHER DARAM ENGINEERS, INC. NOR BARRY D. ADKINS, R.P.L.S. WARRANT THE ACCURACY OF THIS DETERMINATION.

* BASE FLOOD ELEVATIONS ARE AN APPROXIMATION BASED UPON GRAPHIC SCALING ONLY AND SHALL BE VERIFIED BY LOCAL FLOODPLAIN COORDINATOR

This property appears to be in the 100 year flood plain, & in insurance rate map zone AE, as per map 48201C0655L Dated : 6-18-07
This determination to be used for flood insurance rate purposes ONLY and is NOT to be relied upon for ANY other purpose.

ELEVATIONS BASED ON FLOODPLAIN RM NO. 050070 HCFC DISK E100 BM 12 ELEV.=72.11' NAVD 1988, 2001 ADJ.

The subject property is located within the City of Houston or within its extra territorial jurisdiction (within 5 miles of the city limits but outside another municipality). It is subject to the terms, conditions, and provisions of City of Houston Ordinance #65-1878, pertaining to among other things, the platting and replatting of real property and to the establishment of building lines (25 feet along major thoroughfares and 10 feet along other streets). A certified copy of said ordinance was filed for record on August 1, 1991 under Harris County Clerk's File No. N253986.

Notes :
- Basis for Bearings: South R.O.W. Paul Quinn Street per H.C.C.F. No. G377082.
- Distances shown are ground distances.
- All abstracting done by title company.
- This property subject to any and all recorded and unrecorded easements. Surveyor has made no investigation or independent search for easements of record, encumbrances, restrictive covenants or ownership title evidence.
- All B.L.'s & U.E.'s taken from recorded plat unless otherwise noted.
- All fences are 6' wood unless otherwise noted.
- This survey certified for this transaction ONLY.
- Survey is NOT to be relied upon for ANY other purpose.
- Dimension ties from improvements to property lines are calculated and should NOT be relied upon for construction and/or removal of any improvements including fences.
- Building dimensions may not be used to calculate square footage.

Notes:
- Harris County WCID No. 12 U.E. per Vol. 8081, Pg. 25 (H.C.C.F. No. D147967) does not appear to effect subject tract.
- Harris County WCID No. 12 U.E. per Vol. 8081, Pg. 28 (H.C.C.F. No. D147968) does not appear to effect subject tract.
- Harris County Flood Control District Esmt. & R.O.W. per Vol. 8105, Pg. 580 H.C.D.R. (H.C.C.F. No. D160233)
- Fill Esmt. across West Tidwell Frontage per H.C.C.F. No. K055630.

I do hereby certify that this survey under my supervision was this day made on the ground and that this plot correctly represents the property legally described hereon (or on attached sheet). That the facts found at the time of this survey show the improvements and that there are no visible encroachments apparent on the ground, except as shown, to the best of my knowledge, surveyed 05-23-2011.



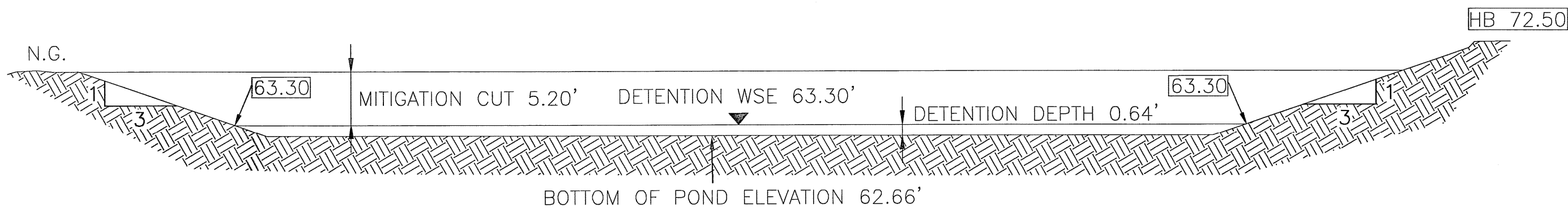
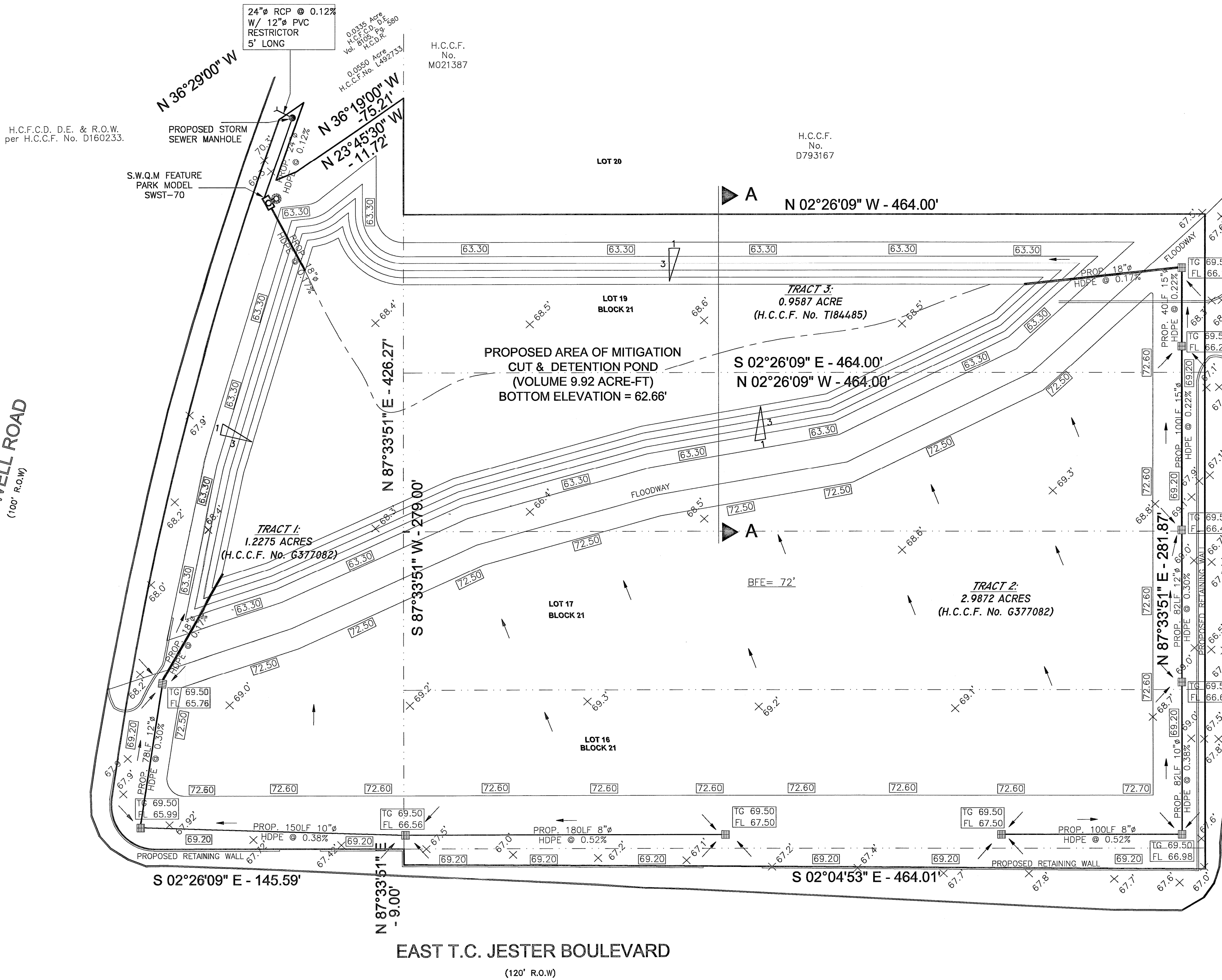
BARRY D. ADKINS, R.P.L.S. NO. 6137

Wherein inaccuracies of FEMA or flood control maps preclude a surveyor from certifying to accuracy of locations based on such maps
Surveyor Makes No Representation As To Whether Property Lies Within Floodway Area

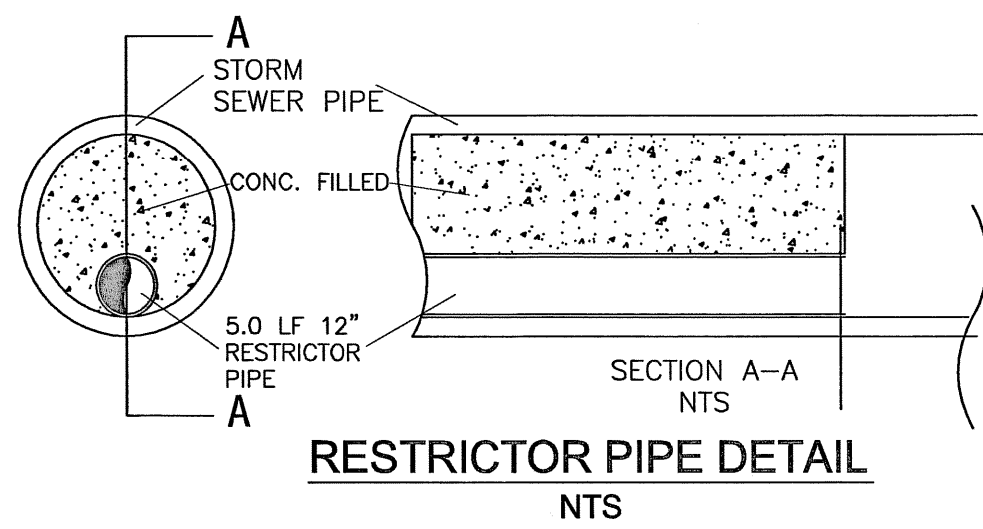
* 5.173 Acres, being more particularly described by metes and bounds attached.

LOT:	*	BLOCK:	21	SUBDIVISION:	HIGHLAND HEIGHTS ANNEX NO. 4		SECTION:	-
RECORDATION:	VOLUME 8, PAGE 20 OF MAP RECORDS				COUNTY:	HARRIS	STATE:	TEXAS
ADDRESS:	WEST TIDWELL ROAD & T.C. JESTER BOULEVARD				CITY:	HOUSTON	LENDER:	-
PURCHASER:	MANUEL DE JESUS FIGUEROA			TITLE COMPANY:	FIDELITY NATIONAL TITLE COMPANY		G.F.A.:	FTH11004548FS
DARAM ENGINEERS, INC. 5420 DASHWOOD DRIVE, SUITE 208 HOUSTON, TEXAS 77061 (713) 528-1552 • FAX (713) 528-8997								SURVEYED BY: M.S. / S.S. DRAWN BY: N.S./ARC/-JB DRAWING NO.: TCJester

WEST TIDWELL ROAD
(100' R.O.W)



MITIGATION CUT & DETENTION POND DETAIL SECTION A-A
NTS



RESTRICTOR PIPE DETAIL
NTS

DRAINAGE PLAN

SCALE: 1"=40'-0"

LEGEND:

- FLOW DIRECTION
- PROP. INLET
- EXISTING GRADE
- PROPOSED ELEVATIONS
- BFE BASE FLOOD ELEVATION
- TC TOP OF CURB
- G GUTTER
- TG TOP OF GRATE
- FL FLOW LINE

PROPOSED IMPERVIOUS AREA

-STORAGE UNITS WITH OFFICE	18,488.46	SQFT
-PAVED PARKING	39,878.00	SQFT
-TOTAL CONCESSION	8,676.00	SQFT
-DRIVE/DRIVE-THRU	9,437.00	SQFT
-TOTAL IMPERVIOUS AREA	76,479.46	SQFT
	=1.76	ACRE

DRAINAGE CALCULATIONS:

2_YR_RAIN_FALL_FREQUENCY
ALLOWABLE FLOW RATE = CIA = 0.45x3.19x5.17 = 7.42 CFS

EXISTING DRAINAGE CONDITIONS

LOT AREA = 5.1734 AC
IMPERVIOUS AREA = 0.0196 AC
TC = 10A^{0.1761} + 15 Tc = 28.35 MIN
 $I_{2yr} = \frac{b}{(d+TC)^e}$ $I_{2yr} = \frac{75.01}{(16.2+28.35)^{0.8315}}$ $I = 3.19$
Ia = IMPERVIOUS AREA/TOTAL AREA
Ia = 0.0196/5.173
Ia = 0.0038
C = 0.6Ia + 0.2
C = RUN OFF COEFFICIENT
C = 0.6(0.0038) + 0.2
C = 0.202
Q = CIA
Q = 3.33 CFS

PROPOSED DRAINAGE CONDITIONS

LOT AREA = 5.1734 AC
IMPERVIOUS AREA = 1.76 AC
TC = 10A^{0.1761} + 15 Tc = 28.35 MIN
 $I_{2yr} = \frac{b}{(d+TC)^e}$ $I_{2yr} = \frac{75.01}{(16.2+28.35)^{0.8315}}$ $I_{2yr} = 3.19$
Ia = IMPERVIOUS AREA/TOTAL AREA
Ia = 1.76/5.1734
Ia = 0.340
C = 0.6Ia + 0.2
C = RUN OFF COEFFICIENT
C = 0.6(0.340) + 0.2
C = 0.404
Q = CIA
Q = 6.67 CFS

DETENTION SUMMARY:

REQUIRED DETENTION:
1.76 ACRES (PROP. IMPERVIOUS AREA) x 0.5 ACRE-FT/ACRE = 0.88 ACRE-FT

DETENTION PROVIDED:

DETENTION VOLUME PROVIDED (V): 9.88 ACRE-FT

PROVIDED DETENTION VOLUME 9.88 ACRE-FT IS GREATER THAN THE REQUIRED DETENTION VOLUME OF 0.88 ACRE-FT.

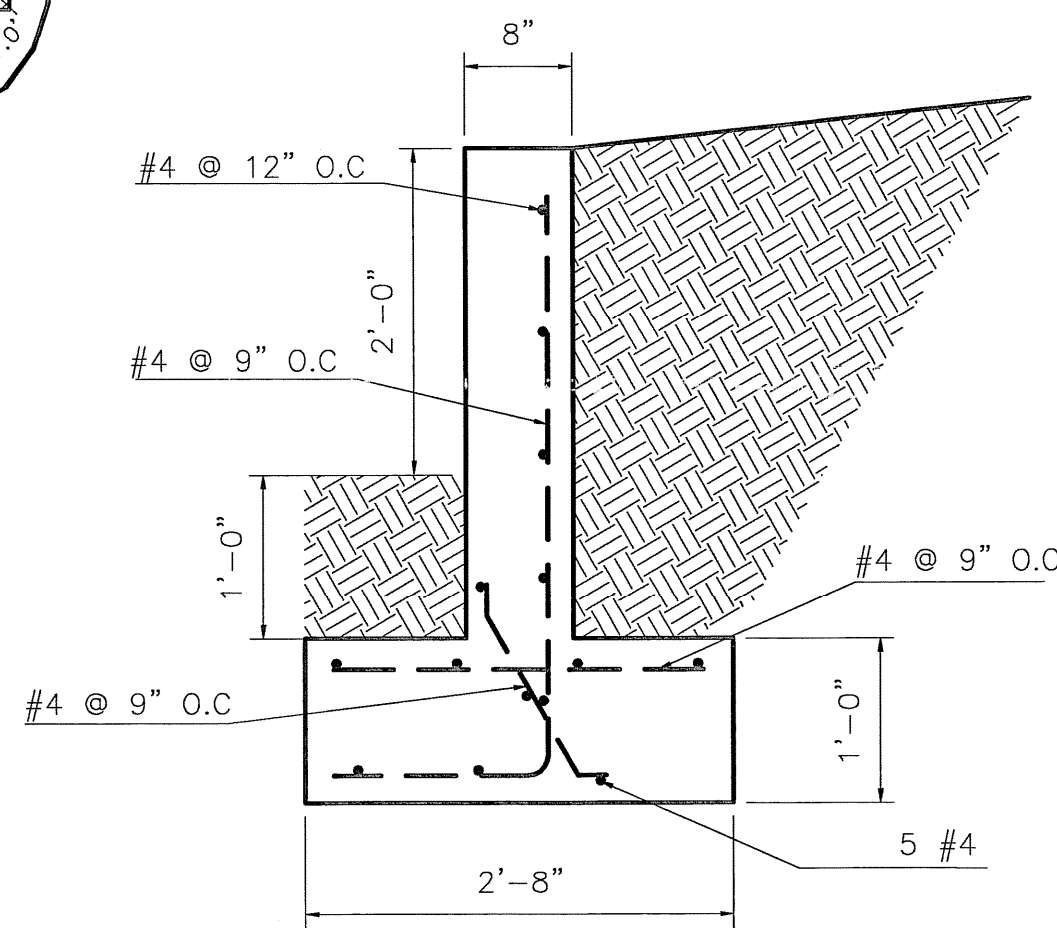
RESTRICTOR CALCULATIONS

$$D = \frac{Q^{1/2}}{(2.25)(H)^{1/4}}$$

$$D = \frac{7.42^{1/2}}{(2.25)(1)^{1/4}}$$

$$D = 1.21'$$

USE 12" Ø RESTRICTOR, HARRIS COUNTY MINIMUM.



RETAINING WALL SECTION
NTS

IMPACT STATEMENT

THE PROPOSED CONSTRUCTION FOR THIS SITE DOES NOT IMPACT EXISTING DRAINAGE COURSES FOR NEIGHBORING

- ALL EXCAVATED SOIL FROM THE PROPOSED CONSTRUCTION SHALL BE REMOVED FROM THE CONSTRUCTION SITE AND TAKEN OUT OF FLOODPLAIN
- CONSTRUCTION SITE IS TO BE MAINTAINED FREE OF ANY OPEN TRENCHES, PITS, HOLES OR OTHER EXCAVATIONS THAT MAY HOLD WATER, AND AT NO TIME MAY RUNOFF FROM THE CONSTRUCTION SITE TRAVERSE NEIGHBORING PROPERTY.
- RUNOFF SHALL BE FILTERED TO PREVENT SAND, MUD AND DIRT OF ANY KIND FROM ENTERING CITY STORM DRAINAGE SYSTEM.
- ALL MATERIALS FROM DEMOLITION OF EXISTING STRUCTURES SHALL BE REMOVED FROM THE SITE AND OUT OF FLOODPLAIN.

STORM WATER DETENTION VOLUME DETERMINATION FOR CITY OF HOUSTON

	VALUE	UNITS
TOTAL AREA	5.1734	ACRES
PROP TOTAL IMPERVIOUS AREA	1.76	ACRES
EXISTING OR PREVIOUS IMPERVIOUS AREA	0.0196	ACRES
INCREASE IN IMPERVIOUS AREA	1.76	ACRES
DETENTION RATIO PER C.O.H.	0.50	
DETENTION RATIO PROVIDED H.C.F.C.D.	0.55	
DETENTION STORAGE REQUIRED	0.970	ACRE-FT

STORM WATER DETENTION VOLUME DETERMINATION POND A,B,C, etc.

PARTICULARS	VALUE	UNITS
DETENTION VOLUME PROVIDED	0.971	ACRE-FT
DETENTION AREA	68,195.5	SQUARE FEET
DESIGN WATER SURFACE ELEVATION	63.30	FEET
LOWEST OVERFLOW ELEVATION	67.90	FEET
MAXIMUM DEPTH	5.84	FEET
ALLOWABLE FLOW RATE	7.42	CFS
DESIGN FLOW RATE	7.42	CFS
RESTRICTOR SIZE	12	INCHES

DETENTION FACILITY SHOWN IS A PRIVATE FACILITY AND SHALL BE PROPERLY OPERATED & MAINTAINED BY PROPERTY OWNER

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(713)529-8897 FAX
EMAIL: info@darameengineers.com

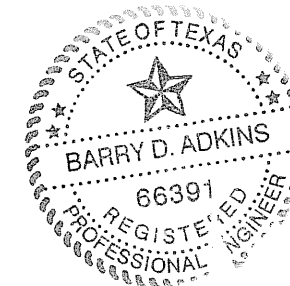
DaraM
Engineers, Inc.

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TEXAS FIRM REGISTRATION NUMBER F-9503

HYDRAULIC ANALYSIS

T.C JESTER,
HOUSTON, TEXAS.

PROFESSIONAL SEAL



ISSUED / REVISED

NO.	DATE	DESCRIPTION
1	06-25-12	FOR REVIEW JV
2	07-09-12	FOR REVIEW JV
3		
4		
5		

JOB NO: 12-061

CHECKED BY: JV

DRAWN BY: MM

DATE: 07-09-12

SCALE: 1"=40'-0"

DRAWING TITLE:

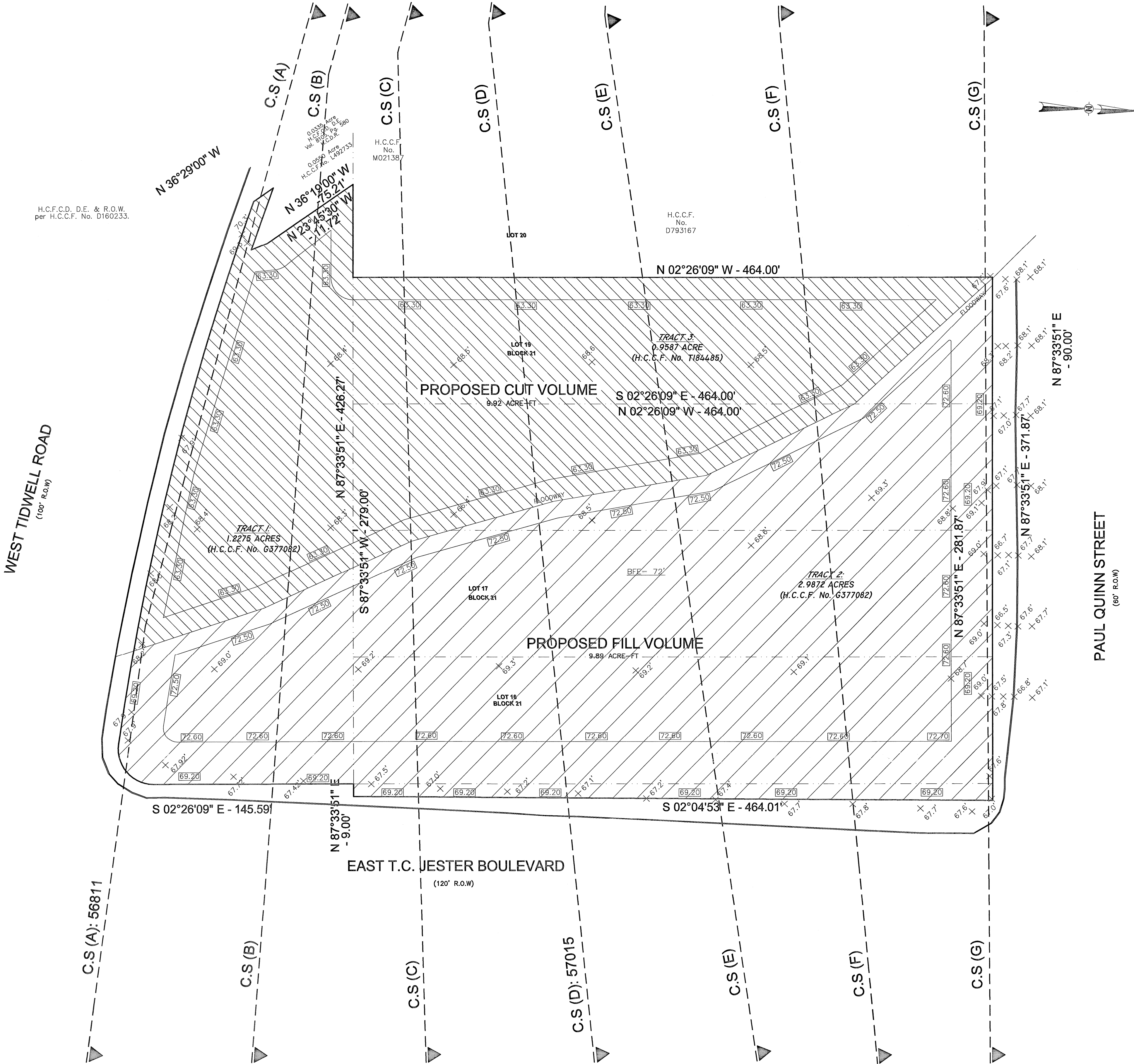
DRAINAGE PLAN

DRAWING NO.

C-3

MITIGATION PLAN

SCALE: 1"=40'-0"



MITIGATION CALCULATIONS

B.F.E = 72'

PROPOSED FILL ABOVE BFE:

FILL ELEVATION 72.5'

FILL AREA = 89,300 FT²

PROPOSED CUT UNDER BFE:

PROPOSED CUT ELEVATION 63.10'

CUT AREA 73,800 FT²

PROPOSED FILL VOLUME CALCULATION:

V1= PROPOSED FILL VOLUME

H= VERTICAL DISTANCE BETWEEN A1&A2= 4FT

A1= BASE AREA= 127,182 FT²

A2= TRUNCATED AREA= 89,275 FT²

$V1 = \frac{H}{3} [(A1+A2) + (A1)(A2)]$

$V1 = \frac{4FT}{3} [(127,182FT^2+89,275FT^2) + (127,182FT^2)(89,275FT^2)]$

V1= 430,684 FT³

PROPOSED CUT VOLUME CALCULATION:

V2= PROPOSED CUT VOLUME

H= VERTICAL DISTANCE BETWEEN A1&A2= 5.2FT

A3= BASE AREA= 92,666 FT²

A4= TRUNCATED AREA= 73,808 FT²

$V2 = \frac{H}{3} [(A3+A4) + (A3)(A4)]$

$V2 = \frac{5.2FT}{3} [(92,666FT^2+73,808FT^2) + (92,666FT^2)(73,808FT^2)]$

V2= 431,904 FT³

PROVIDED CUT VOLUME 9.92 ACRE-FT > PROVIDED FILL VOLUME 9.89 ACRE-FT

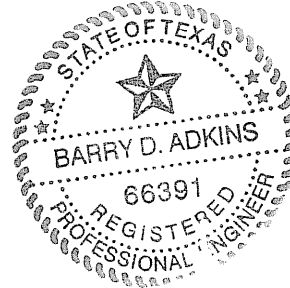
LEGEND:

- PROPOSED ELEVATION
- EXISTING GRADE
- PROPOSED CUT VOLUME
- PROPOSED FILL VOLUME
- PROFILE SECTIONS

HYDRAULIC ANALYSIS

T.C JESTER,
HOUSTON, TEXAS.

PROFESSIONAL SEAL



ISSUED / REVISED

NO.	DATE	DESCRIPTION	
1	06-25-12	FOR REVIEW	JV
2	07-09-12	FOR REVIEW	JV
3			
4			
5			

JOB NO: 12-061
CHECKED BY: JV
DRAWN BY: MM
DATE: 07-09-12
SCALE: 1"=40'-0"

DRAWING TITLE:
MITIGATION PLAN

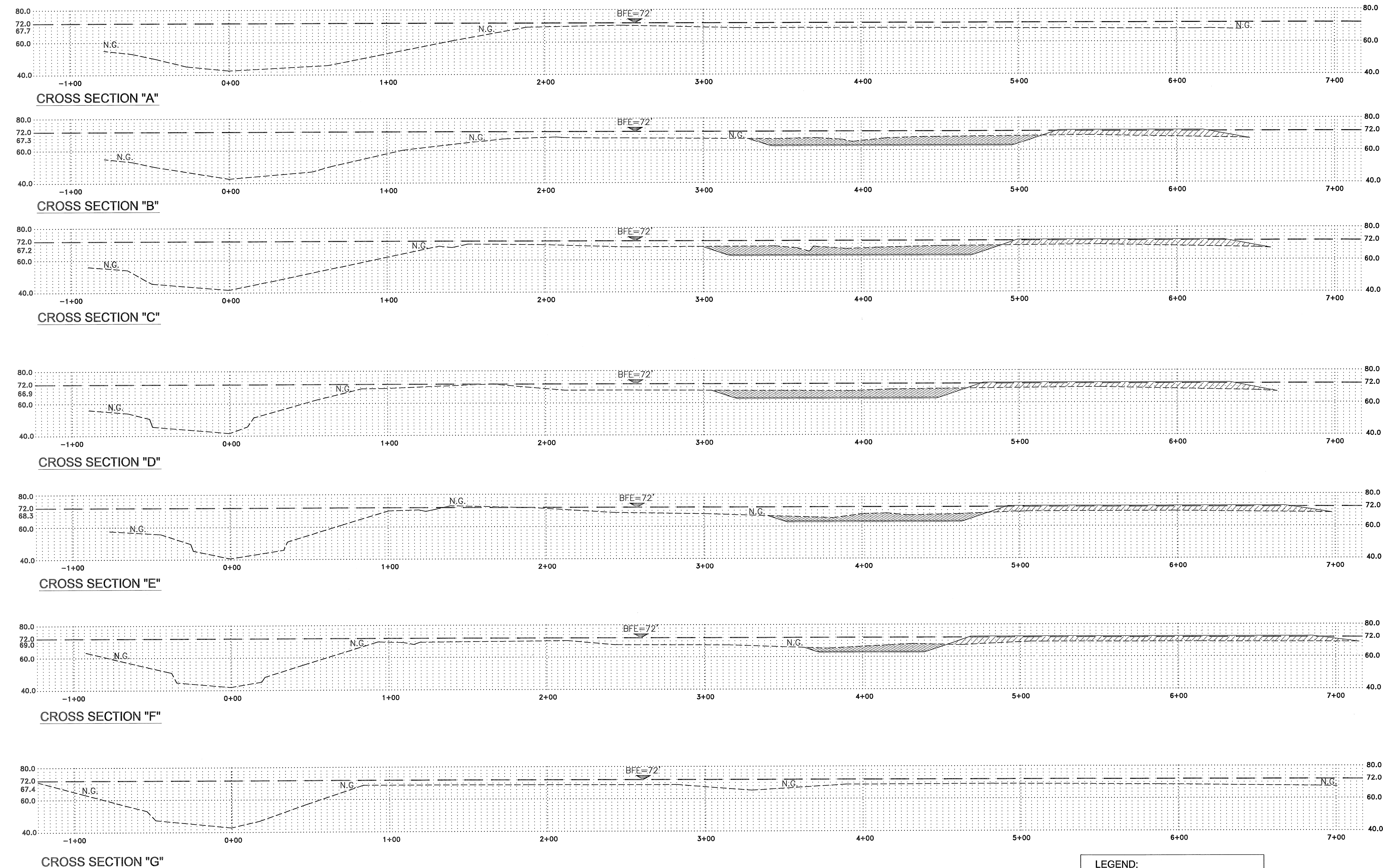
DRAWING NO.

C-4

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MITIGATION CUT & FILL PROFILE SECTIONS

SCALE: 1"=30'-0"

LEGEND:

- CUT AREA
- DETENTION AREA
- FILL AREA
- EXISTING GRADE
- PROPOSED GRADE
- BASE FLOOD ELEVATION

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HYDRAULIC ANALYSIS

T.C JESTER,
HOUSTON, TEXAS.

PROFESSIONAL SEAL

STATE OF TEXAS
BARRY D. ADKINS
66391
REGISTERED PROFESSIONAL ENGINEER

[Signature]
ISSUED / REVISED

NO.	DATE	DESCRIPTION
1	06-25-12	FOR REVIEW JV
2	07-09-12	FOR REVIEW JV
3		
4		
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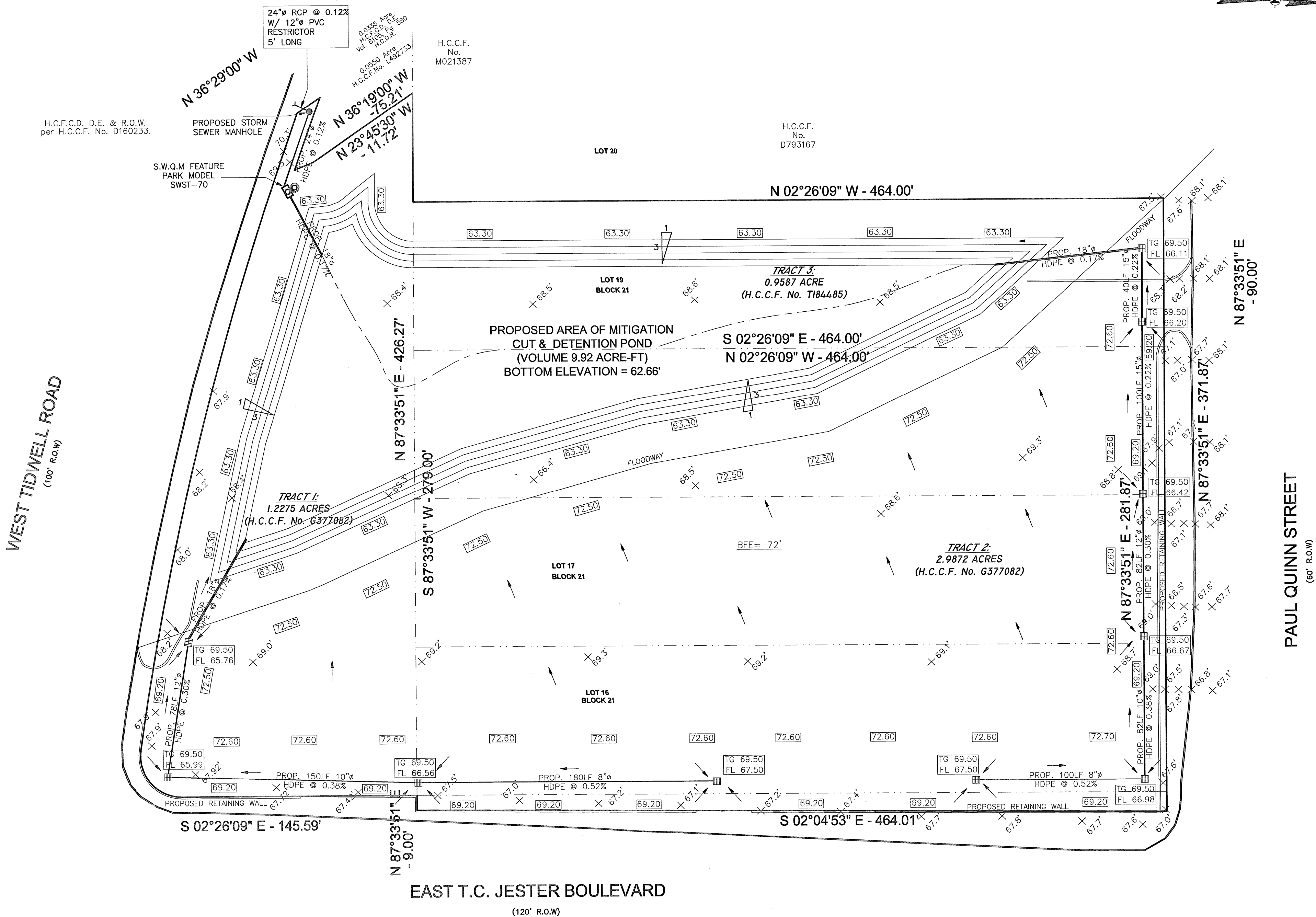
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CHECKED BY: JV
DRAWN BY: MM
DATE: 07-09-12
SCALE: 1"=30'-0"

DRAWING TITLE:
MITIGATION CUT & FILL SECTIONS

DRAWING NO.
C-5

S.W.Q.M. PLAN

SCALE: 1"=40'-0"



SYMBOL LEGEND:

 STORM WATER QUALITY FEATURE
 OIL, GRIP, TRASH SEPARATOR

SWQM FLOW:

$Q = ACI \times 449$ $A = 5.1734 \text{ AC}$
 $C = 0.404$
 $I = 3.19 \text{ in/Ac}$

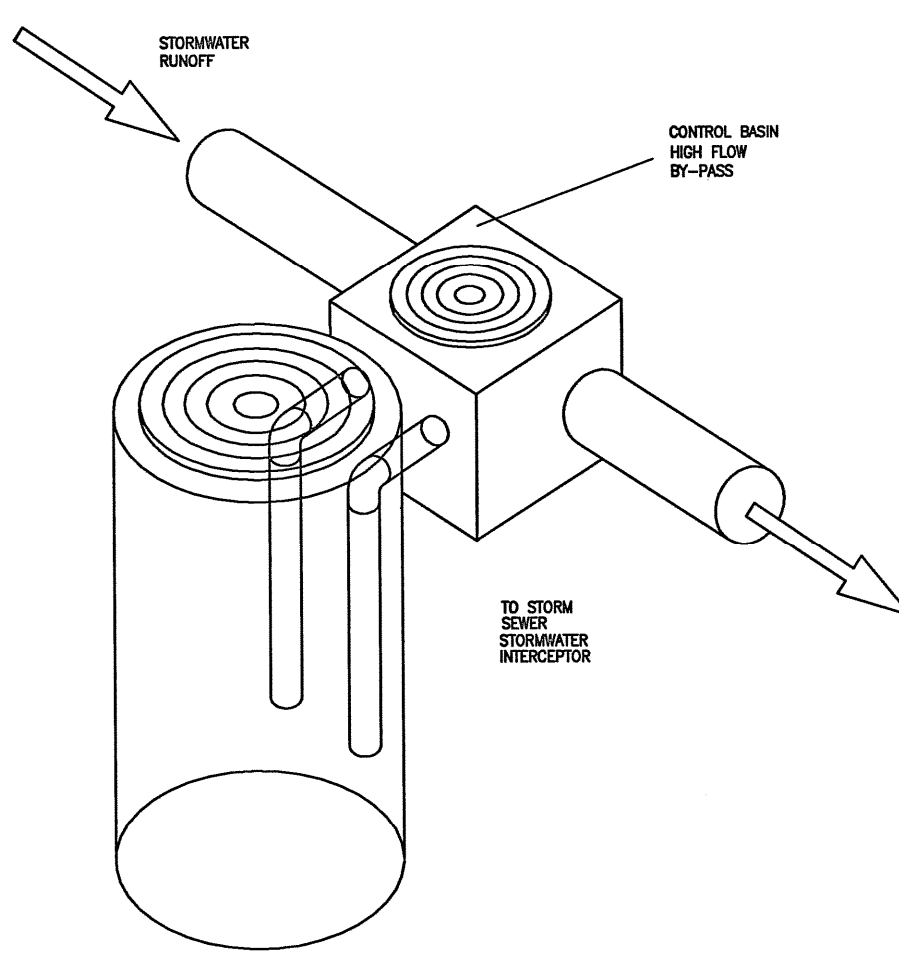
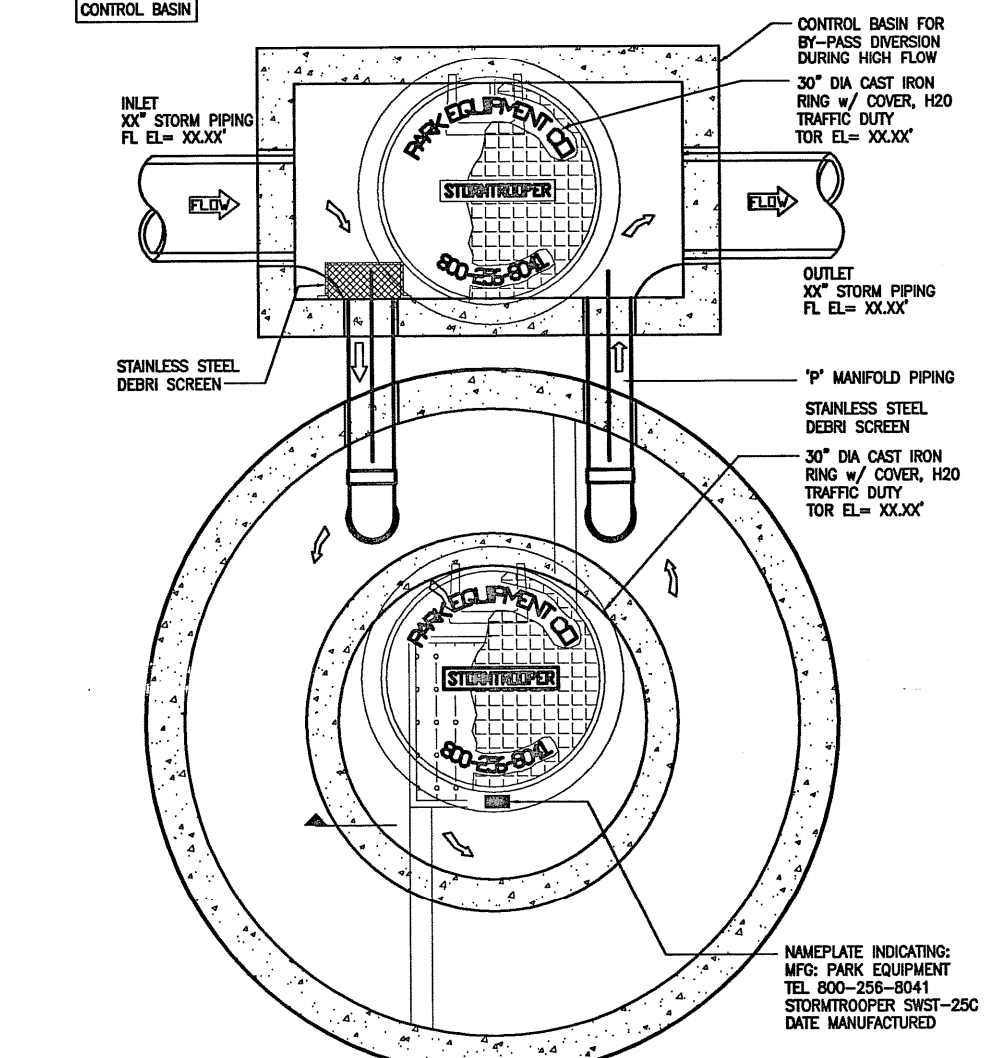
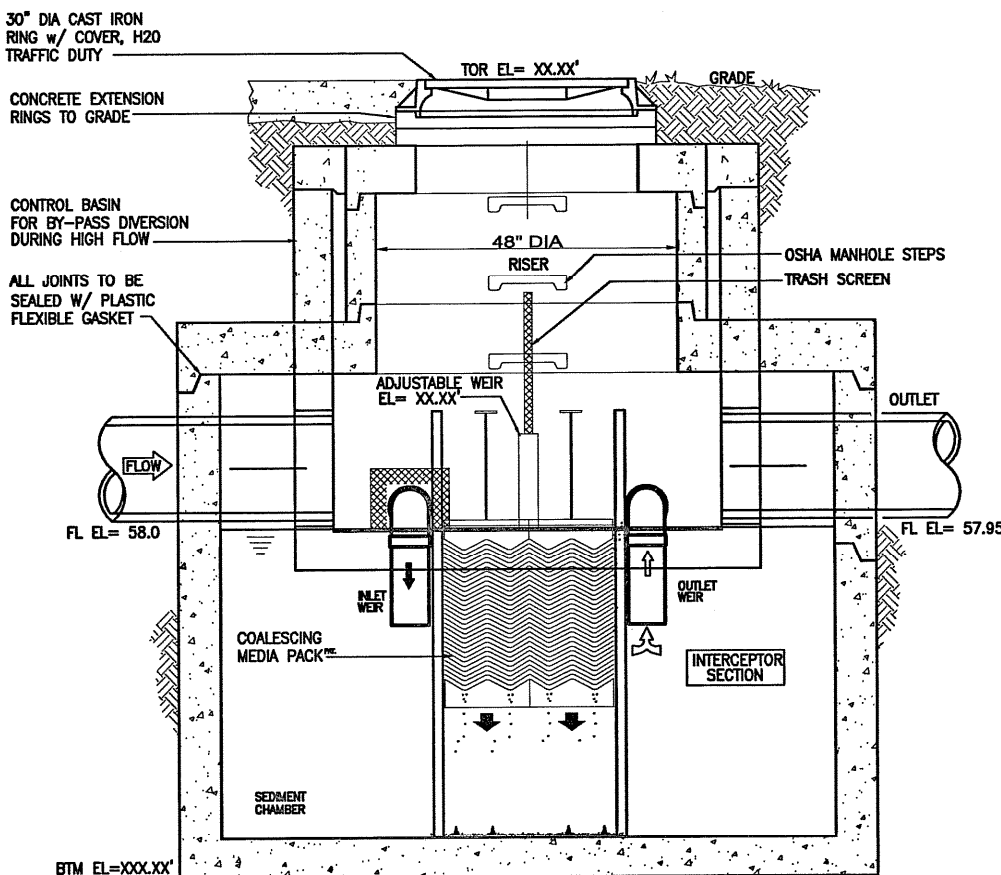
$Q_1 = 5.1734 \times 0.404 \times 3.19 \times 449 = 2,993.6 \text{ GPM}$

STORM TROOPER MODEL
(1) CYLINDRICAL DESIGN SWST-70 FOR 3,000 GPM
7,000 GALLONS
6.68 CFS

NOTE:
THE FLOW RATE AT THE STORM TROOPER SHALL BE CONTROLLED WITH A 12"Ø RESTRICTOR INSTALLED BEFORE THE STORM TROOPER. SEE SHEET C-5 FOR RESTRICTOR CALCULATIONS.

SWQMP PERMIT REQUIREMENTS:

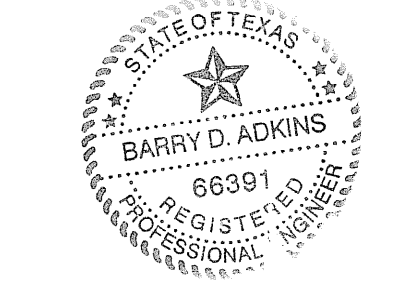
UPON COMPLETION OF CONSTRUCTION THE PERMANENT STORM WATER QUALITY FEATURE WILL BE CLEANED OF ALL SEDIMENT AND DEBRIS THAT MAY HAVE ACCUMULATED. ADDITIONALLY ALL DISTURBED AREAS RELATED TO THIS PROJECT WILL BE COMPLETELY STABILIZED, THIS WILL BE DONE PRIOR TO SUBMITTING AN "AS BUILT CERTIFICATE" AND CALLING FOR FINAL INSPECTION. HARRIS COUNTY ENGINEERING WILL NOT PASS THE FINAL INSPECTION OR ISSUE THE CERTIFICATE OF COMPLIANCE UNTIL THE REQUIRED FINAL CLEANOUT AND STABILIZATION HAVE BEEN COMPLETED, THE DEVELOPMENT IS NOT APPROVED FOR OPERATION UNTIL A CERTIFICATE OF COMPLIANCE HAS BEEN ISSUED.



HYDRAULIC ANALYSIS

T.C JESTER,
HOUSTON, TEXAS.

PROFESSIONAL SEAL



ISSUED / REVISED

NO.	DATE	DESCRIPTION
1	06-25-12	FOR REVIEW JV
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3		
4		
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JOB NO:	12-061
CHECKED BY:	JV
DRAWN BY:	MM
DATE:	07-09-12
SCALE:	1"=40'-0"

DRAWING TITLE:
S.W.Q.M. PLAN

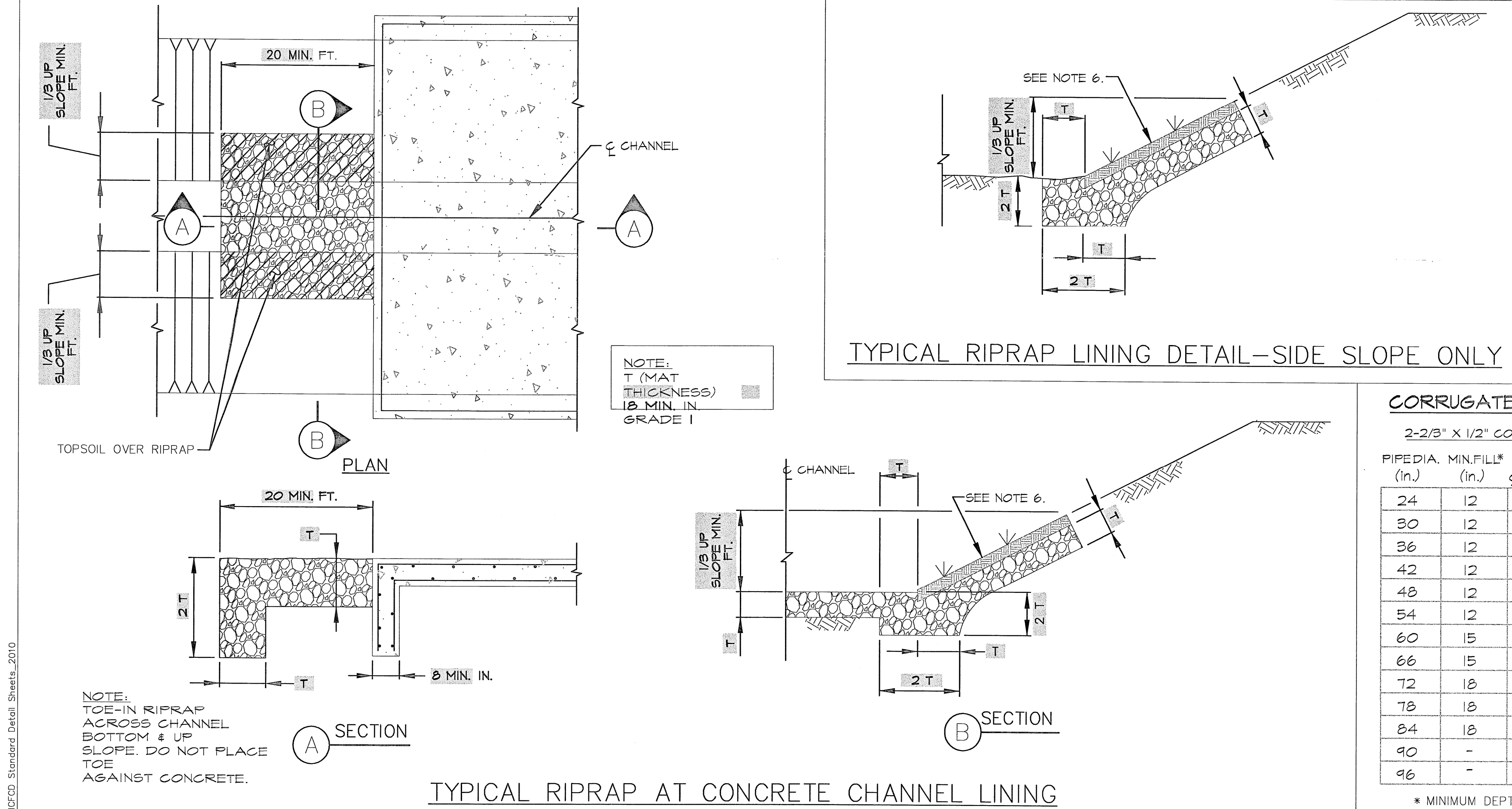
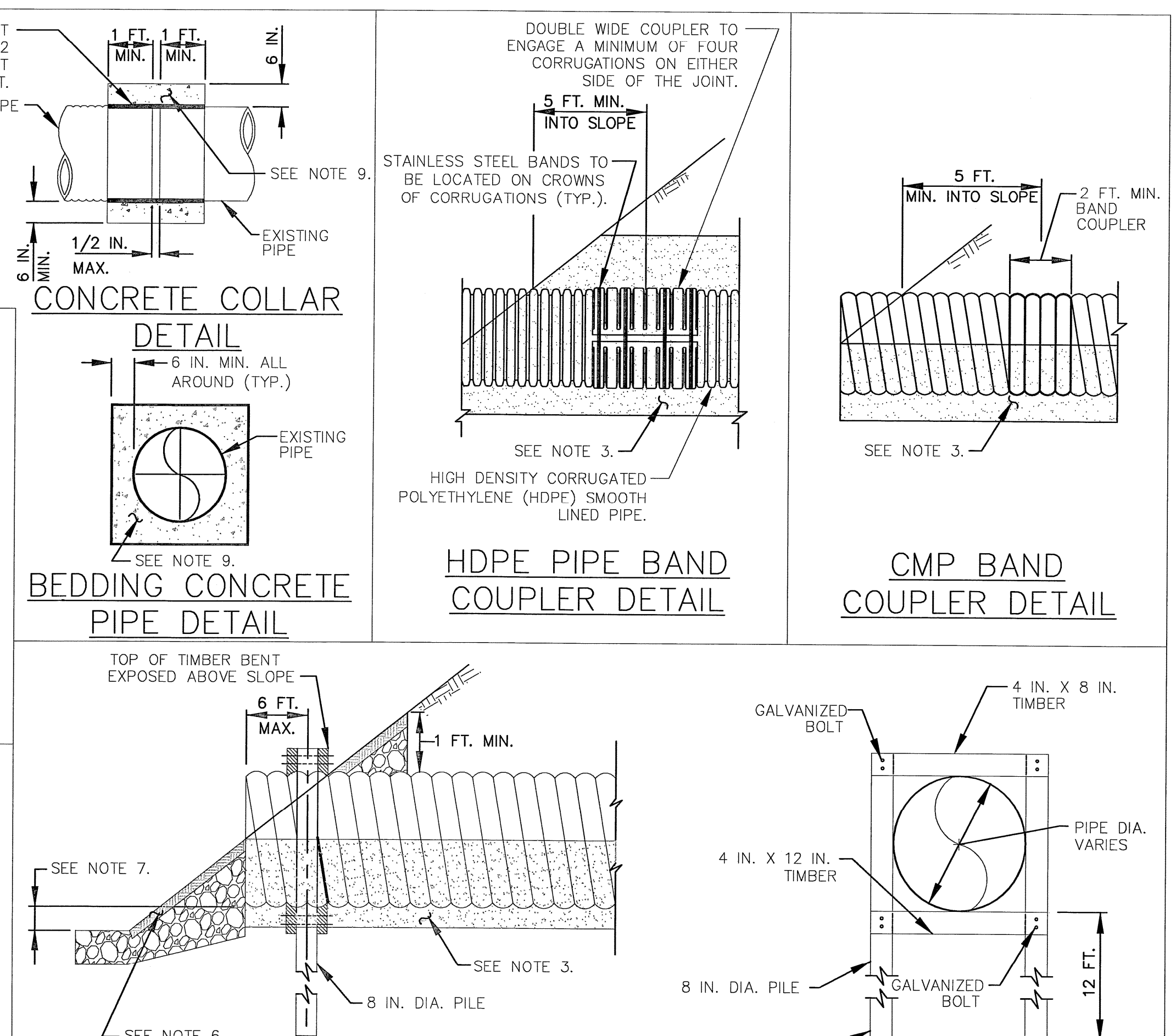
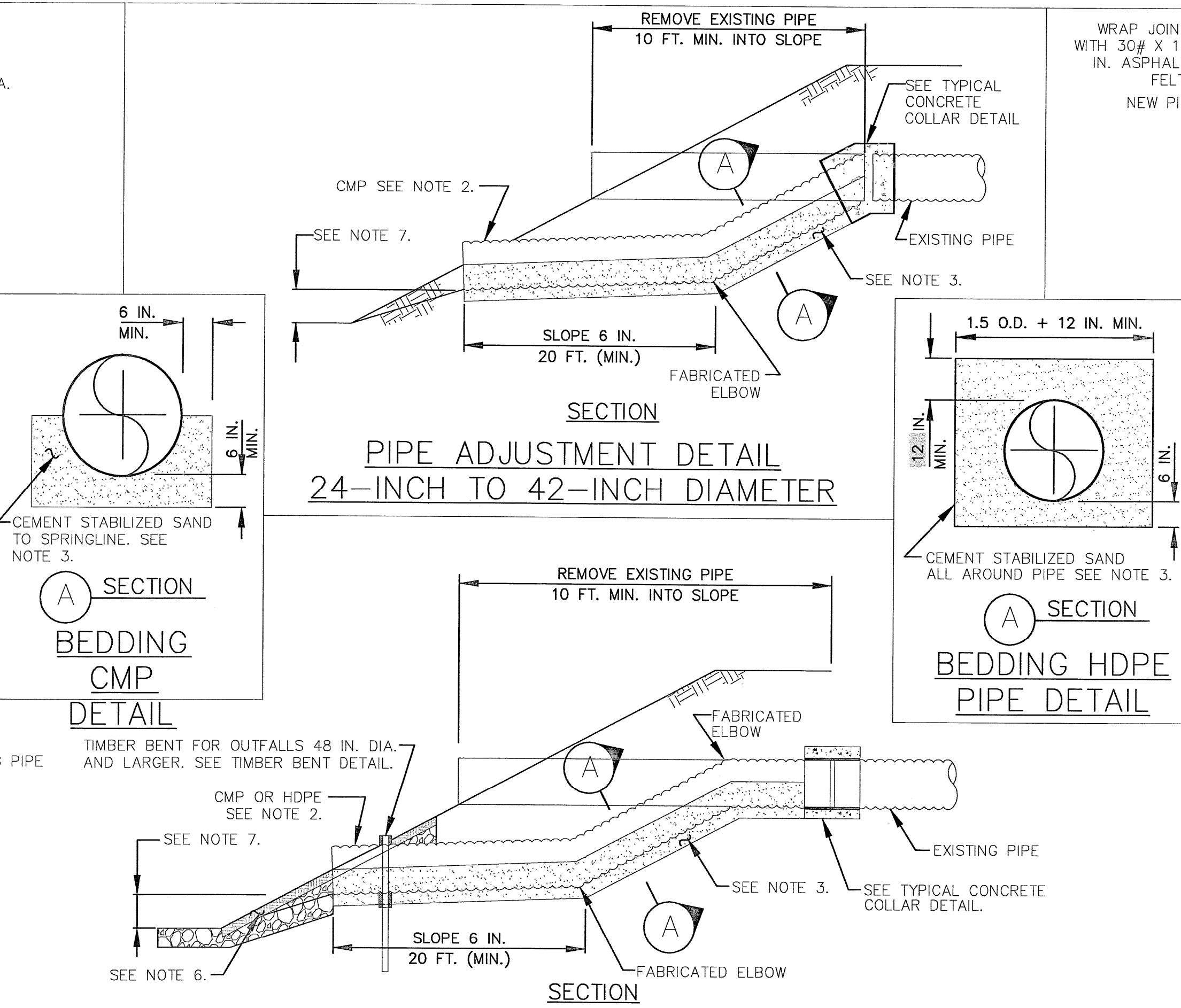
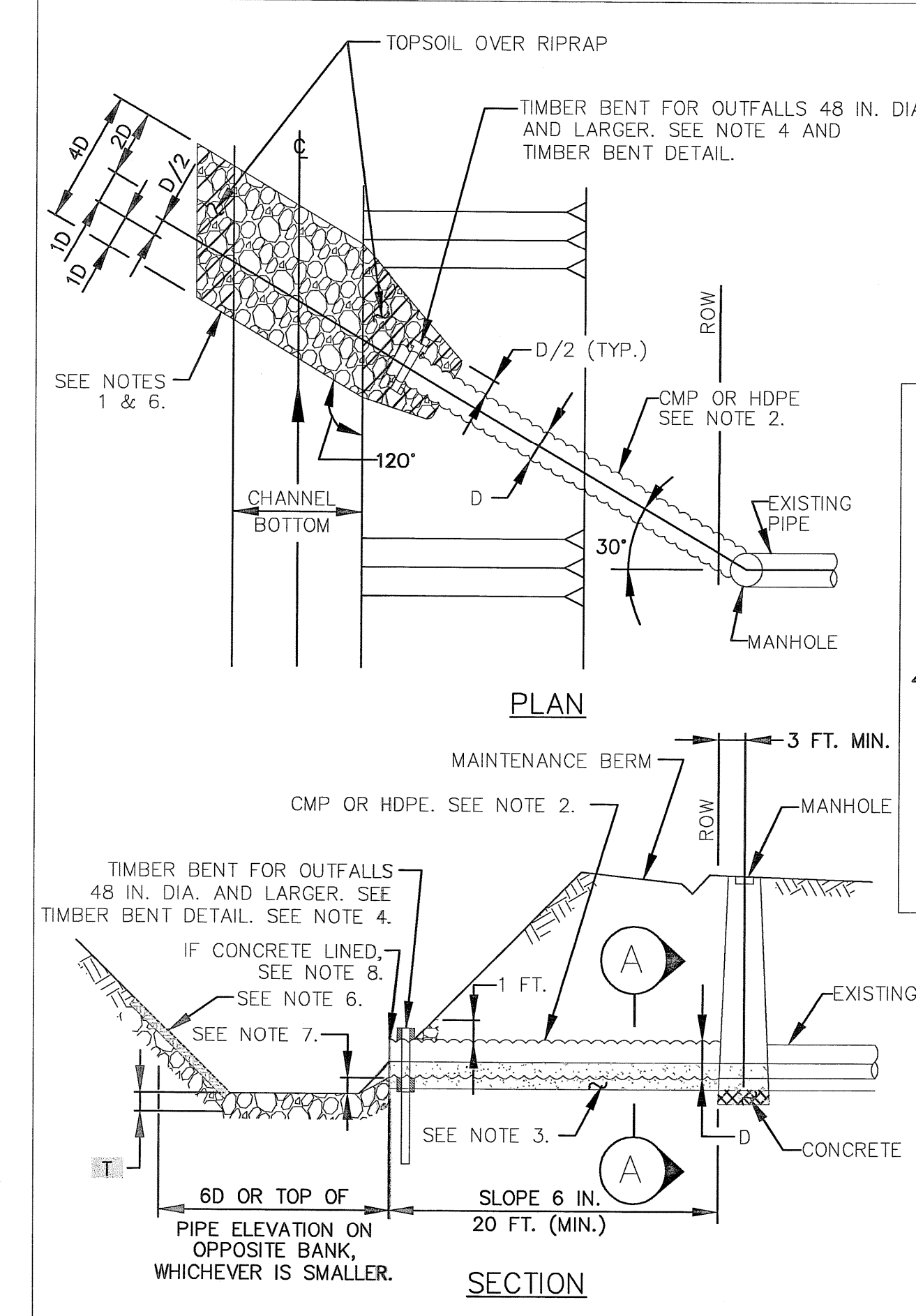
DRAWING NO.

C-6

5420 DASHWOOD DR, SUITE 206
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TEXAS FIRM REGISTRATION NUMBER F-9503



PIPE OUTFALL IN CHANNELS

BOTTOM WIDTH	PIPE OUTLET INVERT
6 FEET < BW < 20 FT	1 FOOT ABOVE FLOWLINE
20 FEET < BW < 60 FT	AT TOE OF SLOPE
BW > 60 FT	AT TOE OF SLOPE

CORRUGATED GALVANIZED STEEL PIPE (TYPE 1)

PIPE DIA. (in.)	MIN. FILL* (in.)	SHEET THICKNESS gage (in.)	SHEET THICKNESS (mm)
24	12	.16	.064 1.63
30	12	.16	.064 1.63
36	12	.16	.064 1.63
42	12	.16	.064 1.63
48	12	.16	.064 1.63
54	12	.14	.079 2.01
60	15	.12	.109 2.77
66	15	.12	.109 2.77
72	18	.10	.138 3.51
78	18	.08	.168 4.27
84	18	.08	.168 4.27
90	-	-	-
96	-	-	-

* MINIMUM DEPTH OF COVER ABOVE TOP OF PIPE, MAXIMUM DEPTH OF COVER ABOVE TOP OF PIPE IS 20 FEET.

- STORM SEWER OUTFALL NOTES:**
1. INSTALL OUTFALLS 48 INCHES OR LARGER AND TREATMENT PLANT OUTFALLS OF ANY DIAMETER, WITH RIPRAP EROSION DIMENSIONED AS SHOWN IN "TYPICAL STORM SEWER OUTFALL STRUCTURE LAYOUT."
 2. STORM SEWER OUTFALL PIPES WITHIN THE HCFCD RIGHT-OF-WAY SHALL BE CMP OR HDPE IN ACCORDANCE WITH SPECIFICATION SECTION 02642-CORRUGATED METAL PIPE, HIGH DENSITY POLYETHYLENE PIPE (HDPE) IN ACCORDANCE WITH SPECIFICATION SECTION 02505-HIGH DENSITY POLYETHYLENE PIPE, OR APPROVED EQUAL. USE TABLE BELOW FOR CORRUGATED GALVANIZED STEEL PIPE.
 3. PROVIDE AND PLACE CEMENT STABILIZED SAND IN ACCORDANCE WITH SPECIFICATION SECTION NO. 02321-CEMENT STABILIZED SAND.
 4. TIMBER BENTS SHALL BE IN ACCORDANCE WITH SPECIFICATION SECTION 02464-TIMBER BENTS.
 5. STORM SEWER OUTFALLS SHALL BE IN ACCORDANCE WITH SPECIFICATION SECTION 02316-STRUCTURAL EXCAVATING AND BACKFILLING.
 6. RIPRAP SHALL BE PLACED IN ACCORDANCE WITH SPECIFICATION SECTION 02378-RIPRAP AND GRANULAR FILL. FILL RIPRAP VOIDS AND BURY RIPRAP A MINIMUM OF 6 INCHES WITH TOPSOIL ON SIDE SLOPE AS DIRECTED BY THE ENGINEER.
 7. IN DETENTION BASIN, SET FLOWLINE OF OUTFALL AT TOE OF THE SLOPE. IN CHANNEL, USE ELEVATION INDICATED IN THE TABLE OR 1 FOOT ABOVE NORMAL WATER LEVEL, WHICHEVER IS HIGHER.
 8. SEE CONCRETE CHANNEL LINING DETAIL SHEET FOR CMP OR OUTFALL DETAILS THROUGH CONCRETE CHANNEL LINING.
 9. STRUCTURAL CONCRETE #4 BARS (GRADE 40) 12 INCH O.C. EACH WAY - FOR COLLARS ONLY.

THIS DETAIL SHEET HAS BEEN PREPARED FOR USE ON HCFCD PROJECTS OR PROJECTS TO BE MAINTAINED BY THE HCFCD WHEN COMPLETED BY OTHERS. AN ENGINEER WHO INCORPORATES THE DETAILS ON THIS SHEET BECOMES RESPONSIBLE FOR ITS USE IN THE END PRODUCT IN ACCORDANCE WITH RULE §137.33 (b) AND (c) OF THE TEXAS STATE BOARD OF REGISTRATION FOR PROFESSIONAL ENGINEERS.

P.E. SEAL AND SIGNATURE

HCFCD Standard Detail Sheets 2010

HCFCD STORM SEWER & RIP RAP DETAILS

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TEXAS FIRM REGISTRATION NUMBER F-9503

HYDRAULIC ANALYSIS

T.C JESTER,
HOUSTON, TEXAS.

PROFESSIONAL SEAL

STATE OF TEXAS
BARRY D. ADKINS
66391
REGISTERED PROFESSIONAL ENGINEER

ISSUED / REVISED

NO.	DATE	DESCRIPTION
1	06-25-12	FOR REVIEW
2	07-09-12	FOR REVIEW
3		
4		
5		

JOB NO: 12-061
CHECKED BY: JV
DRAWN BY: MM
DATE: 07-09-12
SCALE: 1"=30'-0"

DRAWING TITLE:
HCFCD STORM & RIP RAP DETAILS

DRAWING NO.
C-7