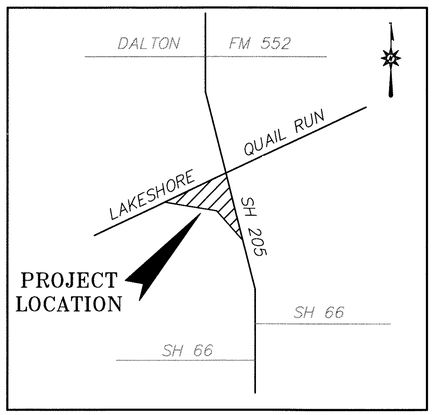
CONSTRUCTION PLANS
FOR

LAKESHORE COMMONS
4.7 AC±
LOTS 1 - 4, BLOCK A
LAKESHORE COMMONS ADDN
IN
ROCKWALL, TEXAS

FOR

MOORE WORTH INVESTMENTS, LLC
8445 FREEPORT PARKWAY, SUITE 175
IRVING, TX 75063
214-415-9993

FEBRUARY 2017



VICINITY MAP

PLAN SUBMITTALS		
No	DATE	COMMENTS
1	09-16-16	CITY OF ROCKWALL - 1st SUBMITTAL
2	02-06-17	CITY OF ROCKWALL - 2nd SUBMITTAL
3	03-06-17	CITY OF ROCKWALL - 3rd SUBMITTAL
4	03-15-17	CITY OF ROCKWALL - PARTIAL; SHTS C-4, C-5 & C-12
F	03-22-17	FINALS
REVISIONS		
1	03-23-17	REV UTILITY PLAN
2	05-17-17	REV SITE, PAVING, GRADING, DRAINAGE AND UTILITY PLAN
2	05-30-17	FINALS
3	10-12-17	REV UTIL PLAN - WATER CONNECTION
4	10-16-17	REV POND B
5	05-10-18	REV DRAINAGE & LOT 3&4 UDS - 1ST SUB
5	06-26-18	REV SS, DRAINAGE, LOT 3&4 UDS, POND B, 205 SWALE & STRUCTURE #6 (LINE E) - 2ND SUB
5	07-17-18	REV OFF-SITE DRAINAGE AREAS - 3RD SUB
5	07-25-18	FINALS

SHEET INDEX	
SHT #	SHEET TITLE
C-1	COVER SHEET
	FINAL PLAT - BY OTHERS
C-2	SITE & PAVING PLAN
C-3	GRADING PLAN
C-4	DRAINAGE PLAN
C-5	UDS DRAINAGE AREA MAP
C-6	DETENTION CALCULATIONS - POND A
C-7	DETENTION CALCULATIONS - POND B
C-8	DETENTION CALCULATIONS - UDS
C-9	UNDERGROUND DETENTION SYSTEM DETAILS
C-10	STORM SEWER PROFILES
C-11	STORM SEWER PROFILES
C-12	STORM SEWER & INLET CALCULATIONS
C-13	UTILITY PLAN
C-14	EROSION CONTROL PLAN
C-15	DETAILS & SANITARY SEWER PROFILE

RECORD DRAWING

THIS RECORD DRAWING HAS BEEN PREPARED BASED ON INFORMATION PROVIDED BY OTHERS. THE ENGINEER HAS NOT VERIFIED THE ACCURACY OF THIS INFORMATION AND SHALL NOT BE RESPONSIBLE FOR ANY DISCREPANCIES WHICH MAY BE INCORPORATED HEREIN AS A RESULT.

Hickman Consulting Engineers, Inc.
3094 County Road 1024
Farmersville, Texas 75442
Ph (972)784-2490
markrethick@gmail.com
Engineers Planners

COVER SHEET
LAKESHORE COMMONS
LOTS 1 - 4; LAKESHORE COMMONS
ROCKWALL, ROCKWALL COUNTY, TEXAS
MOORE WORTH INVESTMENTS, LLC
8445 FREEPORT PARKWAY, SUITE 175
IRVING, TX 75063
214-415-9993

SCALE: N/A
DATE: AUG2016
DRAWN BY: FP
CHK'D BY: MHH
JOB NO: 1501-357
FILE:165-1501357-LC-PWD
DATE SUBMITTAL: 03/22/17(F)

Hickman Consulting Engineers, Inc.
STATE OF TEXAS
MARK H. HICKMAN
78409
REGISTERED PROFESSIONAL ENGINEER
7/21/18
F-12172

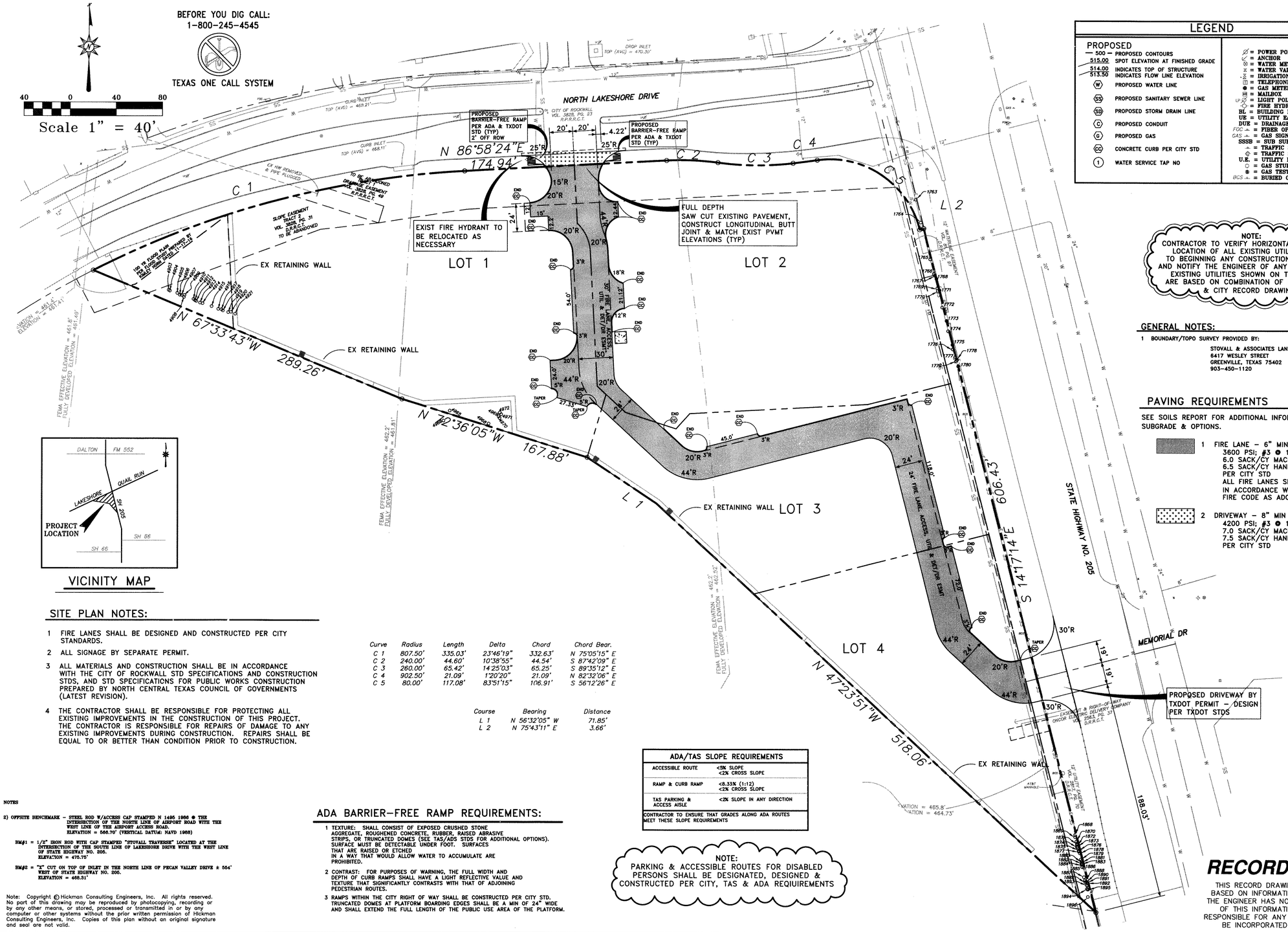
REVISION	DESCRIPTION	DATE	BY

SHEET
C-1

BEFORE YOU DIG CALL:
1-800-245-4545

TEXAS ONE CALL SYSTEM

Scale 1" = 40'



VICINITY MAP

LEGEND

PROPOSED		EXISTING	
— 500 —	PROPOSED CONTOURS	⌀	POWER POLE
515.00	SPOT ELEVATION AT FINISHED GRADE	⚓	ANCHOR
514.00	INDICATES TOP OF STRUCTURE	WM	WATER METER
513.50	INDICATES FLOW LINE ELEVATION	WV	WATER VALVE
W	PROPOSED WATER LINE	IRR	IRRIGATION CONTROL VALVE
SS	PROPOSED SANITARY SEWER LINE	TP	TELEPHONE PEDESTAL
SD	PROPOSED STORM DRAIN LINE	GM	GAS METER
C	PROPOSED CONDUIT	MB	MAILBOX
G	PROPOSED GAS	LP	LIGHT POLE
CC	CONCRETE CURB PER CITY STD	FH	FIRE HYDRANT
1	WATER SERVICE TAP NO	BL	BUILDING LINE
		UE	UTILITY EASEMENT
		DUE	DRAINAGE & UTILITY EASEMENT
		FOC	FIBER OPTIC CABLE MARKER
		GAS	GAS SIGN
		SSSB	SUB SURFACE SERVICE BOX
			TRAFFIC SIGN
			TRAFFIC SIGNAL
		U.E.	UTILITY EASEMENT
			GAS STUB
			GAS TEST STATION
		BCS	BURIED CABLE SIGN

NOTE:
CONTRACTOR TO VERIFY HORIZONTAL & VERTICAL LOCATION OF ALL EXISTING UTILITIES PRIOR TO BEGINNING ANY CONSTRUCTION/EXCAVATION AND NOTIFY THE ENGINEER OF ANY DISCREPANCIES EXISTING UTILITIES SHOWN ON THESE PLANS ARE BASED ON COMBINATION OF FIELD SURVEY & CITY RECORD DRAWINGS

GENERAL NOTES:

1 BOUNDARY/TOPO SURVEY PROVIDED BY:

STOVALL & ASSOCIATES LAND SURVEYING
6417 WESLEY STREET
GREENVILLE, TEXAS 75402
903-450-1120

PAVING REQUIREMENTS

SEE SOILS REPORT FOR ADDITIONAL INFORMATION, REINFORCEMENT, SUBGRADE & OPTIONS.

1 FIRE LANE - 6" MIN CONC THICKNESS;
3600 PSI; #3 @ 18 OCEW
6.0 SACK/CY MACHINE
6.5 SACK/CY HAND
PER CITY STD
ALL FIRE LANES SHALL BE STRIPPED OR SIGNED IN ACCORDANCE WITH THE 2015 INTERNATIONAL FIRE CODE AS ADOPTED BY THE CITY OF ROCKWALL

2 DRIVEWAY - 8" MIN CONC THICKNESS;
4200 PSI; #3 @ 18 OCEW
7.0 SACK/CY MACHINE
7.5 SACK/CY HAND
PER CITY STD

SITE PLAN NOTES:

1 FIRE LANES SHALL BE DESIGNED AND CONSTRUCTED PER CITY STANDARDS.

2 ALL SIGNAGE BY SEPARATE PERMIT.

3 ALL MATERIALS AND CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE CITY OF ROCKWALL STD SPECIFICATIONS AND CONSTRUCTION STDS, AND STD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION PREPARED BY NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS (LATEST REVISION).

4 THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING ALL EXISTING IMPROVEMENTS IN THE CONSTRUCTION OF THIS PROJECT. THE CONTRACTOR IS RESPONSIBLE FOR REPAIRS OF DAMAGE TO ANY EXISTING IMPROVEMENTS DURING CONSTRUCTION. REPAIRS SHALL BE EQUAL TO OR BETTER THAN CONDITION PRIOR TO CONSTRUCTION.

Curve	Radius	Length	Delta	Chord	Chord Bear.
C 1	807.50'	335.03'	23°46'19"	332.63'	N 75°05'15" E
C 2	240.00'	44.60'	10°38'55"	44.54'	S 87°42'09" E
C 3	260.00'	65.42'	14°25'03"	65.25'	S 89°35'12" E
C 4	902.50'	21.09'	1°20'20"	21.09'	N 82°32'06" E
C 5	80.00'	117.08'	83°51'15"	106.91'	S 56°12'26" E

Course	Bearing	Distance
L 1	N 56°32'05" W	71.85'
L 2	N 75°43'11" E	3.66'

ADA/TAS SLOPE REQUIREMENTS	
ACCESSIBLE ROUTE	<5% SLOPE <2% CROSS SLOPE
RAMP & CURB RAMP	<8.33% (1:12) <2% CROSS SLOPE
TAS PARKING & ACCESS AISLE	<2% SLOPE IN ANY DIRECTION
CONTRACTOR TO ENSURE THAT GRADES ALONG ADA ROUTES MEET THESE SLOPE REQUIREMENTS	

NOTE:
PARKING & ACCESSIBLE ROUTES FOR DISABLED PERSONS SHALL BE DESIGNATED, DESIGNED & CONSTRUCTED PER CITY, TAS & ADA REQUIREMENTS

ADA BARRIER-FREE RAMP REQUIREMENTS:

1 TEXTURE: SHALL CONSIST OF EXPOSED CRUSHED STONE AGGREGATE, ROUGHENED CONCRETE, RUBBER, RAISED ABRASIVE STRIPS, OR TRUNCATED DOMES (SEE TAS/ADS STDS FOR ADDITIONAL OPTIONS). SURFACE MUST BE DETECTABLE UNDER FOOT. SURFACES THAT ARE RAISED OR ETCHED IN A WAY THAT WOULD ALLOW WATER TO ACCUMULATE ARE PROHIBITED.

2 CONTRAST: FOR PURPOSES OF WARNING, THE FULL WIDTH AND DEPTH OF CURB RAMPS SHALL HAVE A LIGHT REFLECTIVE VALUE AND TEXTURE THAT SIGNIFICANTLY CONTRASTS WITH THAT OF ADJOINING PEDESTRIAN ROUTES.

3 RAMPS WITHIN THE CITY RIGHT OF WAY SHALL BE CONSTRUCTED PER CITY STD. TRUNCATED DOMES AT PLATFORM BOARDING EDGES SHALL BE A MIN OF 24" WIDE AND SHALL EXTEND THE FULL LENGTH OF THE PUBLIC USE AREA OF THE PLATFORM.

NOTES

2) OFFSITE BENCHMARK - STEEL ROD W/ACCESS CAP STAMPED N 1495 1986 ● THE INTERSECTION OF THE NORTH LINE OF AIRPORT ROAD WITH THE WEST LINE OF THE AIRPORT ACCESS ROAD. ELEVATION = 568.70' (VERTICAL DATUM: NAVD 1988)

BM#1 = 1/2" IRON ROD WITH CAP STAMPED "STOVALL TRAVERSE" LOCATED AT THE INTERSECTION OF THE SOUTH LINE OF LAKESHORE DRIVE WITH THE WEST LINE OF STATE HIGHWAY NO. 205. ELEVATION = 475.75'

BM#2 = "X" CUT ON TOP OF INLET IN THE NORTH LINE OF PECAN VALLEY DRIVE ± 554' WEST OF STATE HIGHWAY NO. 205. ELEVATION = 468.31'

RECORD DRAWING

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(972) 784-2430
markehickman@gmail.com
Engineers Planners

SITE PLAN
LAKESHORE COMMONS
LOTS 1 - 4; LAKESHORE COMMONS
ROCKWALL, ROCKWALL COUNTY, TEXAS
OWNER:
MOORE WORTH INVESTMENTS, LLC
8445 FREEPORT PARKWAY, SUITE 175
IRVING, TX 75063
214-415-9993

SCALE: 1"=40'
DATE: AUG2016
DRAWN BY: FP
CHK'D BY: MHH
JOB NO: 1501-357
FILE:C:\15-1501\357-LC-PI WD
DATE SUBMITTAL: 03/22/17(F)

Hickman Consulting Engineers, Inc.
STATE OF TEXAS
MARK H. HICKMAN
78409
REGISTERED PROFESSIONAL ENGINEER
2/3/18
F-12172

REVISION	DESCRIPTION	DATE	BY
2	REV. TO SHOW ADDITIONAL PAVING/CURB ALONG FIRE LANE	05-17-17	FP

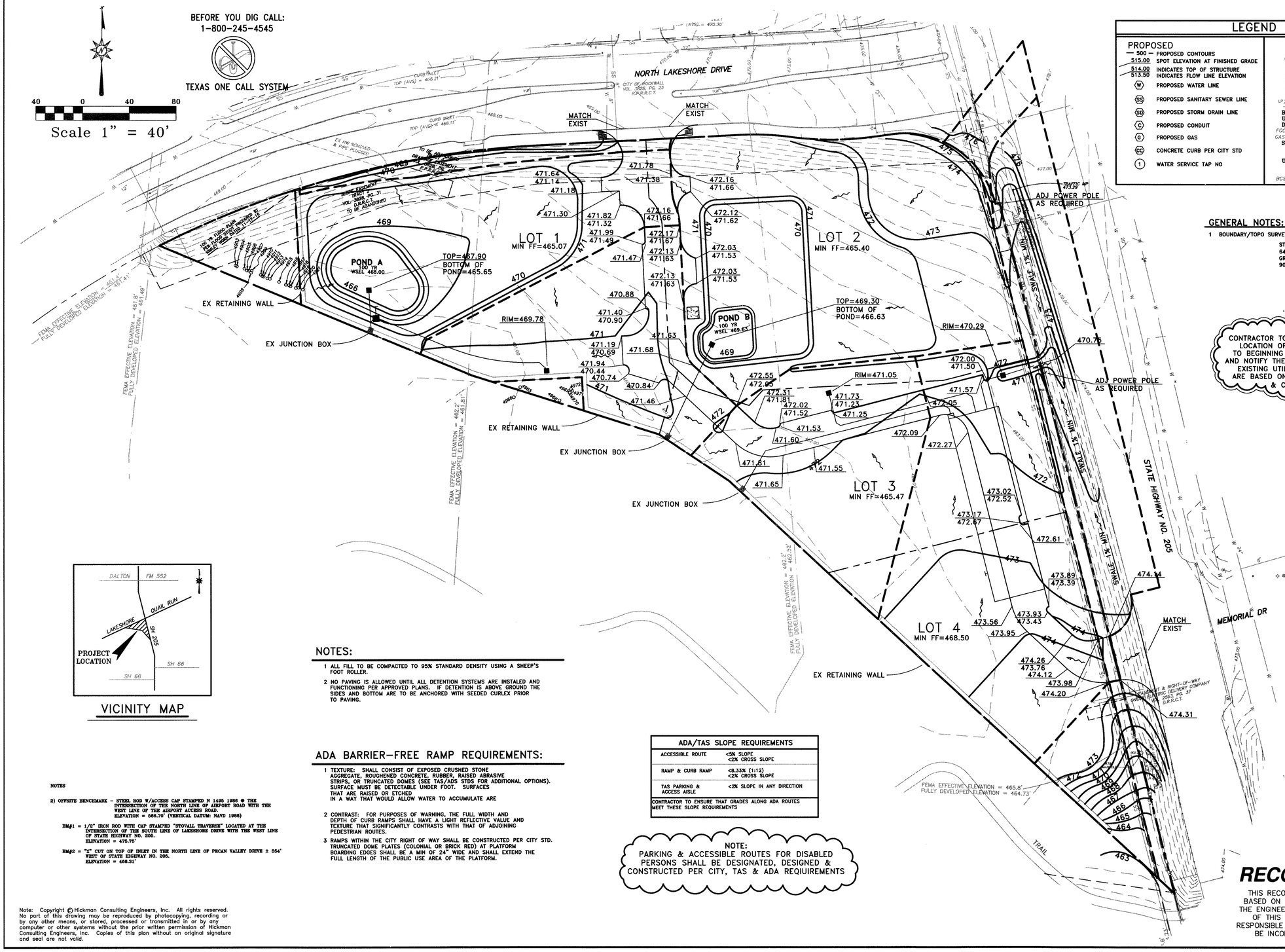
SHEET
C-2

BEFORE YOU DIG CALL:
1-800-245-4545

TEXAS ONE CALL SYSTEM

40 0 40 80

Scale 1" = 40'



LEGEND

PROPOSED		EXISTING	
— 500 —	PROPOSED CONTOURS	PP	= POWER POLE
515.00	SPOT ELEVATION AT FINISHED GRADE	ANC	= ANCHOR
514.00	INDICATES TOP OF STRUCTURE	WM	= WATER METER
513.50	INDICATES FLOW LINE ELEVATION	WV	= WATER VALVE
W	PROPOSED WATER LINE	IRR	= IRRIGATION CONTROL VALVE
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1	WATER SERVICE TAP NO	BL	= BUILDING LINE
		UE	= UTILITY EASEMENT
		DUE	= DRAINAGE & UTILITY EASEMENT
		FOC	= FIBER OPTIC CABLE MARKER
		GAS	= GAS SIGN
		SSSB	= SUB SURFACE SERVICE BOX
			= TRAFFIC SIGN
			= TRAFFIC SIGNAL
		U.E.	= UTILITY EASEMENT
			= GAS STUB
			= GAS TEST STATION
		BCS	= BURIED CABLE SIGN

GENERAL NOTES:

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NOTE:
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VICINITY MAP

NOTES:

1 ALL FILL TO BE COMPACTED TO 95% STANDARD DENSITY USING A SHEEP'S FOOT ROLLER.

2 NO PAVING IS ALLOWED UNTIL ALL DETENTION SYSTEMS ARE INSTALED AND FUNCTIONING PER APPROVED PLANS. IF DETENTION IS ABOVE GROUND THE SIDES AND BOTTOM ARE TO BE ANCHORED WITH SEEDED CURLEX PRIOR TO PAVING.

ADA BARRIER-FREE RAMP REQUIREMENTS:

1 TEXTURE: SHALL CONSIST OF EXPOSED CRUSHED STONE AGGREGATE, ROUGHENED CONCRETE, RUBBER, RAISED ABRASIVE STRIPS, OR TRUNCATED DOMES (SEE TAS/ADS STDS FOR ADDITIONAL OPTIONS). SURFACE MUST BE DETECTABLE UNDER FOOT. SURFACES THAT ARE RAISED OR ETCHED IN A WAY THAT WOULD ALLOW WATER TO ACCUMULATE ARE

2 CONTRAST: FOR PURPOSES OF WARNING, THE FULL WIDTH AND DEPTH OF CURB RAMPS SHALL HAVE A LIGHT REFLECTIVE VALUE AND TEXTURE THAT SIGNIFICANTLY CONTRASTS WITH THAT OF ADJOINING PEDESTRIAN ROUTES.

3 RAMPS WITHIN THE CITY RIGHT OF WAY SHALL BE CONSTRUCTED PER CITY STD. TRUNCATED DOME PLATES (COLONIAL OR BRICK RED) AT PLATFORM BOARDING EDGES SHALL BE A MIN OF 24" WIDE AND SHALL EXTEND THE FULL LENGTH OF THE PUBLIC USE AREA OF THE PLATFORM.

ADA/TAS SLOPE REQUIREMENTS	
ACCESSIBLE ROUTE	<5% SLOPE <2% CROSS SLOPE
RAMP & CURB RAMP	<8.33% (1:12) <2% CROSS SLOPE
TAS PARKING & ACCESS AISLE	<2% SLOPE IN ANY DIRECTION
CONTRACTOR TO ENSURE THAT GRADES ALONG ADA ROUTES MEET THESE SLOPE REQUIREMENTS	

NOTE:
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NOTES

2) OFFSITE BENCHMARK - STEEL ROD W/ACCESS CAP STAMPED N 1495 1998 @ THE INTERSECTION OF THE NORTH LINE OF AIRPORT ROAD WITH THE WEST LINE OF THE AIRPORT ACCESS ROAD.
ELEVATION = 566.70' (VERTICAL DATUM: NAVD 1988)

BM#1 = 1/2" IRON ROD WITH CAP STAMPED "STOVALL TRAVERSE" LOCATED AT THE INTERSECTION OF THE SOUTH LINE OF LAKESHORE DRIVE WITH THE WEST LINE OF STATE HIGHWAY NO. 205.
ELEVATION = 475.76'

BM#2 = "X" CUT ON TOP OF INLET IN THE NORTH LINE OF PECAN VALLEY DRIVE ± 554' WEST OF STATE HIGHWAY NO. 205.
ELEVATION = 468.31'

RECORD DRAWING

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Ph (972)784-2489
markrehick@gmail.com
Engineers Planners

GRADING PLAN

LAKESHORE COMMONS
LOTS 1 - 4, LAKESHORE COMMONS
ROCKWALL, ROCKWALL COUNTY, TEXAS
MOORE WORTH INVESTMENTS, LLC
8445 FREEPORT PARKWAY, SUITE 175
IRVING, TX 75063
214-415-9993

SCALE: 1"=40'
DATE: MAY2016
DRAWN BY: FP
CHK'D BY: MHH
JOB NO: 1501-357
FILE:165-1501357-LGWD
DATE SUBMITTAL: 03/22/17(C)

REVISION	DESCRIPTION	DATE	BY

Hickman Consulting Engineers, Inc.
STATE OF TEXAS
MARK H. HICKMAN
78409
REGISTERED PROFESSIONAL ENGINEER
4/3/18
F-12172

SHEET
C-3

BEFORE YOU DIG CALL:
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TEXAS ONE CALL SYSTEM

40 0 40 80

Scale 1" = 40'

NOTES:

1 BOUNDARY/TOPO SURVEY PROVIDED BY:
STOVALL & ASSOCIATES LAND SURVEYING
6417 WESLEY STREET
GREENVILLE, TEXAS 75402
903-450-1120

NOTES

2) OFFSITE BENCHMARK – STEEL ROD W/ACCESS CAP STAMPED N 1495 1996 ● THE INTERSECTION OF THE NORTH LINE OF AIRPORT ROAD WITH THE WEST LINE OF THE AIRPORT ACCESS ROAD.
ELEVATION = 566.70' (VERTICAL DATUM: NAVD 1988)

BM#1 = 1/2" IRON ROD WITH CAP STAMPED "STOVALL TRAVERSE" LOCATED AT THE INTERSECTION OF THE SOUTH LINE OF LAKESHORE DRIVE WITH THE WEST LINE OF STATE HIGHWAY NO. 205.
ELEVATION = 475.75'

BM#2 = "X" CUT ON TOP OF INLET IN THE NORTH LINE OF PECAN VALLEY DRIVE ± 054' WEST OF STATE HIGHWAY NO. 205.
ELEVATION = 468.31'

NORTH LAKESHORE DRIVE

POND A
100 YR
WSEL 468.00

POND B
100 YR
WSEL 469.63

LINE A–STA 0+32.00
PROPOSED OUTFALL STUCTURE #1
TOP = 467.90
FL 24" = 462.39

LINE B–STA 1+60.68
PROPOSED 3'X3' DROP INLET–STUCTURE #2
RIM = 469.78
FL 18" = 466.28

LINE C–STA 0+84.64
PROPOSED OUTFALL STUCTURE #5
TOP = 469.30
FL 18" = 463.25

LINE F–STA 1+59.15
PROPOSED 3'X3' DROP INLET STUCTURE #4
RIM = 471.05
FL 18" = 467.55

LINE E–STA 0+41.41
PROPOSED 3'X3' DROP INLET STUCTURE #6
RIM = 470.29
FL 18" = 467.90

PROP PLUG
FL 18"=462.61

EX RETAINING WALL

PROPOSED 25.73'–24" RCP ●S=1%

PROPOSED 6.27'–24" RCP ●S=1%

PROPOSED 4.10'–18"RCP ●S=1%

PROPOSED 152.58'–18"RCP ●S=2.29%

PROPOSED 45° BEND

PROPOSED 84.64'–18" RCP ●S=1%

PROPOSED 159.15'–18" RCP ●S=1.81%

PROPOSED 41.41'–18" RCP ●S=7.80%

PROPOSED 2–45° BENDS

PROPOSED 204.92'–24" RCP ●S=1.07%

PROPOSED 2–45° BENDS

PROPOSED 45° BEND

LINE A–STA 0+06.27
FL 24"=462.13

LINE B–STA 0+00
FL 18"=462.38

LINE A–STA 0+00
CONNECT TO EX JUNCTION BOX
FL 24" IN=462.07
EX OUTFALL OPENING =462.07

LINE B–STA 0+06.10
PROP 4' SQUARE STORM SEWER MH–STRUC #3
TOP=469.0±
FL 18" OUT=462.42
FL 18" IN=462.79
FL 18" STUB=462.69

LINE C–STA 0+00
CONNECT TO EX JUNCTION BOX
FL 18" IN=462.40
EX OUTFALL OPENING =462.40

LINE D–STA 0+00
CONNECT TO EX JUNCTION BOX
FL 24" IN=462.47
EX OUTFALL OPENING =462.47

LINE D–STA 2+04.92
FL 24"=464.67

LINE F–STA 0+00
FL 18"=464.67

LINE E–STA 0+00
FL 18"=464.67

PROP PLUG
FL 18"● UDS=464.67

PROPOSED UDS–SEE SHT C–8 & C–9 FOR DETAILS
FL=464.67

30' FIRE LANE, ACCESS, UTIL & DET/DR ESMT

24' FIRE LANE, ACCESS, UTIL & DET/DR ESMT

SCENIC EASEMENT TRACT 4A, 31 VOL. 98R, P.R.R.C.T. TO BE ABANDONED

CITY OF ROCKWALL VOL. 5828, PG. 23 R.P.R.R.C.T.

FEMA EFFECTIVE ELEVATION = 461.8' FULLY DEVELOPED ELEVATION = 461.49'

FEMA EFFECTIVE ELEVATION = 462.2' FULLY DEVELOPED ELEVATION = 462.07'

FEMA EFFECTIVE ELEVATION = 462.2' FULLY DEVELOPED ELEVATION = 462.52'

FEMA EFFECTIVE ELEVATION = 465.8' FULLY DEVELOPED ELEVATION = 464.73'

STATE HIGHWAY NO. 205

MEMORIAL

TRAIL

ZARDOT & RIGHT-OF-WAY ELECTRONIC DELIVERY COMPANY VOL. 2583, PG. 37 D.R.R.C.T.

NOTE:
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LEGEND

PROPOSED	EXISTING
— 500 — PROPOSED CONTOURS	⌀ = POWER POLE
515.00 SPOT ELEVATION AT FINISHED GRADE	⌀ = ANCHOR
514.00 INDICATES TOP OF STRUCTURE	⊗ = WATER METER
513.50 INDICATES FLOW LINE ELEVATION	⋈ = WATER VALVE
(W) PROPOSED WATER LINE	⋈ = IRRIGATION CONTROL VALVE
(SS) PROPOSED SANITARY SEWER LINE	⊡ = TELEPHONE PEDESTAL
(SD) PROPOSED STORM DRAIN LINE	● = GAS METER
(C) PROPOSED CONDUIT	⊠ = MAILBOX
(G) PROPOSED GAS	LP ⌀ = LIGHT POLE
(CC) CONCRETE CURB PER CITY STD	◇ = FIRE HYDRANT
(1) WATER SERVICE TAP NO	BL = BUILDING LINE
	UE = UTILITY EASEMENT
	DUE = DRAINAGE & UTILITY EASEMENT
	FOC = FIBER OPTIC CABLE MARKER
	GAS = GAS SIGN
	SSSB = SUB SURFACE SERVICE BOX
	= TRAFFIC SIGN
	= TRAFFIC SIGNAL
	U.E. = UTILITY EASEMENT
	= GAS STUB
	= GAS TEST STATION
	BCS = BURIED CABLE SIGN

NOTES:

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6417 WESLEY STREET
GREENVILLE, TEXAS 75402
903-450-1120

KEY:

DRAINAGE AREA NO (X)

DALTON FM 532 QUAIL RUN LAKESHORE ST 205 SH 66 PROJECT LOCATION

VICINITY MAP

PROPOSED WEIGHTED "C" FACTOR					
AREA	A acres	C runoff coefficient	% OF OVERALL SITE	C sub area	TOTAL WEIGHTED C
1–4	5.32*				
IMPERVIOUS	0.84	1.00	16	0.16	
PERVIOUS	4.48	0.35	84	0.29	0.46
Tc = 10 min					

* INCLUDES OFF–SITE AREAS 3A & 6a

PROPOSED DRAINAGE AREA CHART – POND A, B & UDS							
AREA	C runoff coefficient	I_{100} rainfall intensity	A acres	Q_{100} cfs	CONVEYANCE	REMARKS	OUTFALL
1	0.46	9.80	0.80	3.61	TO STR #1–DROP INLET	TO POND A	TO CREEK
2	0.46	9.80	0.57	2.57	TO STR #2–DROP INLET	TO POND A	TO CREEK
3	0.46	9.80	1.22	5.50	TO STR #5–DROP INLET	TO POND B	TO CREEK
3a	0.90	9.80	0.09	0.79	TO STR #5–DROP INLET	TO POND B	TO CREEK
4	0.46	9.80	0.59	2.66	TO STR #4–DROP INLET	TO UDS LOT 3 & 4*	TO CREEK
5	0.46	9.80	0.99	4.46	TO STR #6–DROP INLET	TO UDS LOT 3 & 4*	TO CREEK
5a	0.90	9.80	0.61	5.38	TO STR #6–DROP INLET	TO UDS LOT 3 & 4*	TO CREEK
6	0.46	9.80	0.16	0.72	SHEET FLOW	BYPASS UDS LOT 3 & 4	TO CREEK
7	0.46	9.80	0.02	0.09	SHEET FLOW	REMAIN NATURAL/FLOODPLAIN	TO CREEK
8	0.46	9.80	0.14	0.63	SHEET FLOW	REMAIN NATURAL/FLOODPLAIN	TO CREEK
9	0.46	9.80	0.08	0.36	SHEET FLOW	BYPASS POND A	TO LAKESHORE DR
Tc = 10 min							

*UDS (UNDERGROUND DETENTION SYSTEM) DESIGNED FOR FUTURE DEVELOPED CONDITIONS; SEE SHT C–5

FUTURE DRAINAGE AREA CHART – STORM SEWER DESIGN							
AREA	C runoff coefficient	I_{100} rainfall intensity	A acres	Q_{100} cfs	CONVEYANCE	REMARKS	OUTFALL
1	0.90	9.80	0.80	7.06	TO FUTURE CURB INLET	TO FUTURE UDS LOT 1	TO CREEK
2	0.90	9.80	0.57	5.03	TO FUTURE CURB INLET	TO FUTURE UDS LOT 1	TO CREEK
3	0.90	9.80	1.22	10.76	TO FUTURE CURB INLET	TO FUTURE UDS LOT 2	TO CREEK
3a	0.90	9.80	0.09	0.79	TO FUTURE CURB INLET	TO FUTURE UDS LOT 2	TO CREEK
4	0.90	9.80	0.59	5.21	TO FUTURE CURB INLET	TO FUTURE UDS LOT 2 & EX UDS LOT 3 & 4	TO CREEK
5	0.90	9.80	0.99	8.73	TO FUTURE CURB INLET	TO FUTURE UDS LOT 2 & EX UDS LOT 3 & 4	TO CREEK
5a	0.90	9.80	0.61	5.38	TO FUTURE CURB INLET	TO FUTURE UDS LOT 2 & EX UDS LOT 3 & 4	TO CREEK
6	0.90	9.80	0.16	1.41	SHEET FLOW	BYPASS EX UDS LOT 3 & 4	TO CREEK
7	0.90	9.80	0.02	0.18	SHEET FLOW	REMAIN NATURAL/FLOODPLAIN	TO CREEK
8	0.90	9.80	0.14	1.23	SHEET FLOW	REMAIN NATURAL/FLOODPLAIN	TO CREEK
9	0.90	9.80	0.08	0.70	SHEET FLOW	BYPASS FUTURE UDS LOT 1	TO LAKESHORE DR
Tc = 10 min							

PROPOSED STORM DRAIN PIPES TO BE DESIGNED FOR FUTURE CONDITIONS

RECORD DRAWING

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Hickman Consulting Engineers, Inc.
3094 County Road 1024
Farmersville, Texas 75442
Ph (972)784-2498
markredhick@gmail.com
Engineers Planners

DRAINAGE PLAN

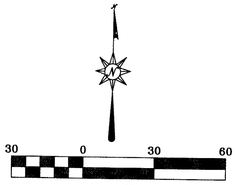
LAKESHORE COMMONS
LOTS 1 – 4; LAKESHORE COMMONS
ROCKWALL, ROCKWALL COUNTY, TEXAS
MOORE WORTH INVESTMENTS, LLC
8445 FREEPORT PARKWAY, SUITE 175
IRVING, TX 75063
214-415-9993

SCALE: 1"=40'
DATE: MAY'2016
DRAWN BY: FP
CHK'D BY: MHH
JOB NO.: 1501-357
FILE:150-1501357-LDWD
DATE SUBMITTAL: 03/22/17(F)

Hickman Consulting Engineers, Inc.
STATE OF TEXAS
MARK H. HICKMAN
78409
REGISTERED PROFESSIONAL ENGINEER
7/31/08
F-12172

REVISION	DESCRIPTION	DATE	BY

SHEET
C–4



Scale 1" = 30'

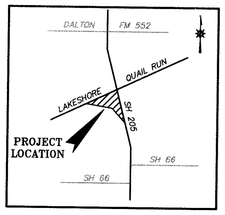
BEFORE YOU DIG CALL:
1-800-245-4545

TEXAS ONE CALL SYSTEM

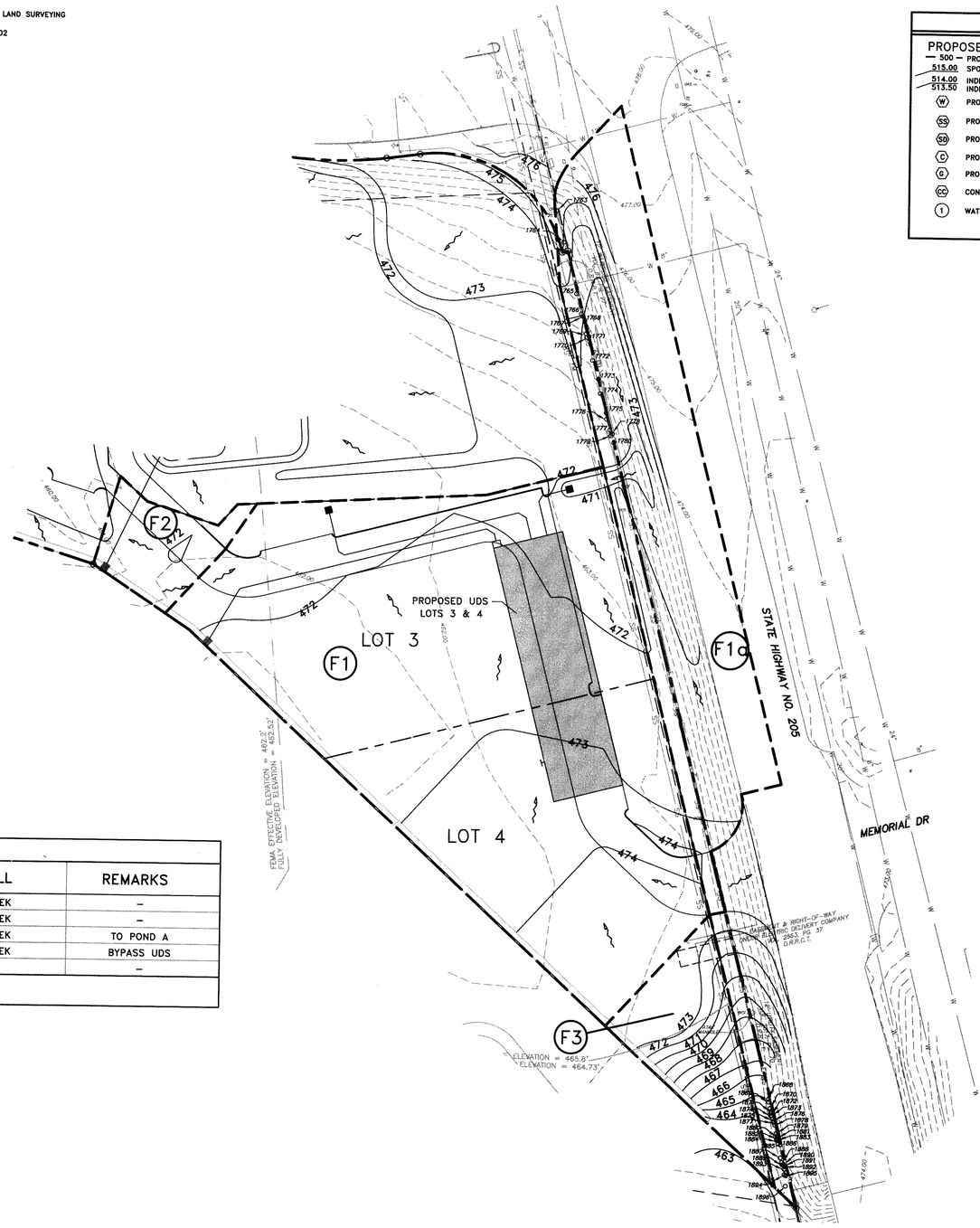
NOTES:

1 BOUNDARY/TOPO SURVEY PROVIDED BY:

STOVALL & ASSOCIATES LAND SURVEYING
6417 WESLEY STREET
GREENVILLE, TEXAS 75402
903-450-1120



VICINITY MAP



LEGEND

PROPOSED	EXISTING
— 500 — PROPOSED CONTOURS	⌀ = POWER POLE
515.00 SPOT ELEVATION AT FINISHED GRADE	⚓ = ANCHOR
514.00 INDICATES TOP OF STRUCTURE	⊗ = WATER METER
513.50 INDICATES FLOW LINE ELEVATION	⊗ = WATER VALVE
(W) PROPOSED WATER LINE	⊞ = IRRIGATION CONTROL VALVE
(SS) PROPOSED SANITARY SEWER LINE	⊞ = TELEPHONE PEDESTAL
(SD) PROPOSED STORM DRAIN LINE	⊛ = GAS METER
(C) PROPOSED CONDUIT	▣ = MAILBOX
(G) PROPOSED GAS	☼ = LIGHT POLE
(CC) CONCRETE CURB PER CITY STD	◇ = FIRE HYDRANT
(1) WATER SERVICE TAP NO	BL = BUILDING LINE
	UE = UTILITY EASEMENT
	DUE = DRAINAGE & UTILITY EASEMENT
	FOC = FIBER OPTIC CABLE MARKER
	GAS = GAS SIGN
	SSSB = SUB SURFACE SERVICE BOX
	= TRAFFIC SIGN
	= TRAFFIC SIGNAL
	U.E. = UTILITY EASEMENT
	= GAS STUB
	= GAS TEST STATION
	BCS = BURIED CABLE SIGN

NOTES:

1 BOUNDARY/TOPO SURVEY PROVIDED BY:

STOVALL & ASSOCIATES LAND SURVEYING
6417 WESLEY STREET
GREENVILLE, TEXAS 75402
903-450-1120

NOTE:
CONTRACTOR TO VERIFY HORIZONTAL & VERTICAL LOCATION OF ALL EXISTING UTILITIES PRIOR TO BEGINNING ANY CONSTRUCTION/EXCAVATION AND NOTIFY THE ENGINEER OF ANY DISCREPANCIES EXISTING UTILITIES SHOWN ON THESE PLANS ARE BASED ON COMBINATION OF FIELD SURVEY & CITY RECORD DRAWINGS

KEY:

DRAINAGE AREA NO (X)

FUTURE DRAINAGE AREA CHART – LOTS 3 & 4							
AREA	C runoff coefficient	I_{100} rainfall intensity	A acres	Q_{100} cfs	CONVEYANCE	OUTFALL	REMARKS
F1	0.90	9.80	1.55	12.70	TO UDS	TO CREEK	–
F1a	0.90	9.80	0.61	5.38	TO UDS	TO CREEK	–
F2	0.90	9.80	0.09	0.79	SHEET FLOW TO NORTHWEST	TO CREEK	TO POND A
F3	0.90	9.80	0.16	1.41	SHEET FLOW TO SOUTH	TO CREEK	BYPASS UDS
							–
Tc = 10 min							
UDS – UNDERGROUND DETENTION SYSTEM							

NOTES

2) OFFSITE BENCHMARK – STEEL ROD W/ACCESS CAP STAMPED N 1495 1995 @ THE INTERSECTION OF THE NORTH LINE OF AIRPORT ROAD WITH THE WEST LINE OF THE AIRPORT ACCESS ROAD.
ELEVATION = 566.70' (VERTICAL DATUM: NAVD 1988)

BM#1 = 1/2" IRON ROD WITH CAP STAMPED "STOVALL TRAVERSE" LOCATED AT THE INTERSECTION OF THE SOUTH LINE OF LAKESHORE DRIVE WITH THE WEST LINE OF STATE HIGHWAY NO. 205.
ELEVATION = 475.75'

BM#2 = "X" CUT ON TOP OF INLET IN THE NORTH LINE OF PECAN VALLEY DRIVE ± 554' WEST OF STATE HIGHWAY NO. 205.
ELEVATION = 466.31'

FOR UDS DESIGN LOTS 3 & 4 – CALC BASED ON FUTURE DEVELOPMENT

RECORD DRAWING

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HCE
Hickman Consulting Engineers, Inc.
3094 County Road 1024
Farmersville, Texas 75442
Ph (972)784-2499
markredhick@gmail.com
Engineers Planners

UDS DRAINAGE AREA MAP
LAKESHORE COMMONS
LOTS 1 – 4; LAKESHORE COMMONS
ROCKWALL, ROCKWALL COUNTY, TEXAS
MOORE WORTH INVESTMENTS, LLC
8445 FREEPORT PARKWAY, SUITE 175
IRVING, TX 75063
214-415-9993

SCALE: 1"=30'
DATE: MAY2016
DRAWN BY: FP
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SUBMITTAL 03/22/17(F)

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1/31/18
F-12172

REVISION	DESCRIPTION	DATE	BY

SHEET
C-5

5 YEAR STORM

AREA	ACRE	C	Tc	I_5	Q_5
PRE-DEV (AREAS 1, 2 & 9)	1.46	0.35	20	4.9	2.49
POST-DEV (AREA 2 & 9 BY-PASS)	0.65	0.46	10	6.1	1.82

Allowable Q from Pond = Q_{Dx} − $Q_{By\ Pass}$ = $Q_{Discharge}$
Allowable Q from Pond = 2.49 − 1.82 = 0.67 cfs

A = 1.45 ACRES			
CA = 0.46 * 1.45 = 0.67			
DURATION	I_5	CA	Q_5
10	6.1	0.67	4.09
20	4.9	0.67	3.28
30	4.1	0.67	2.75
40	3.4	0.67	2.28
50	2.8	0.67	1.88
60	2.6	0.67	1.74
70	2.4	0.67	1.61
80	2.3	0.67	1.54

POND VOLUME CALCULATIONS – 5 YEAR STORM

10	10 * 4.09 * 60 = 2454 0.50 * 20 * 0.67 * 60 = 402	2052 ft.³
20	20 * 3.28 * 60 = 3936 0.50 * 30 * 0.67 * 60 = 603	3333 ft.³
30	30 * 2.75 * 60 = 4950 0.50 * 40 * 0.67 * 60 = 804	4146 ft.³
40	40 * 2.28 * 60 = 5472 0.50 * 50 * 0.67 * 60 = 1005	4467 ft.³
50	50 * 1.88 * 60 = 5640 0.50 * 60 * 0.67 * 60 = 1206	4434 ft.³

PEAK STORM = 40 MIN.
REQUIRED STORAGE = 4467 ft.³

ELEVATION @ 4467 ft.³ = 467.11

10 YEAR STORM

AREA	ACRE	C	Tc	I_{10}	Q_{10}
PRE-DEV (AREAS 1, 2 & 9)	1.45	0.35	20	5.9	2.99
POST-DEV (AREA 2 & 9 BY-PASS)	0.65	0.46	10	7.1	2.12

Allowable Q from Pond = Q_{Dx} − $Q_{By\ Pass}$ = $Q_{Discharge}$
Allowable Q from Pond = 2.99 − 2.12 = 0.87 cfs

A = 1.45 ACRES			
CA = 0.46 * 1.45 = 0.67			
DURATION	I_{10}	CA	Q_{10}
10	7.1	0.67	4.76
20	5.9	0.67	3.95
30	4.8	0.67	3.22
40	4.0	0.67	2.68
50	3.5	0.57	2.35
60	3.0	0.67	2.01
70	2.8	0.67	1.88
80	2.6	0.67	1.74

POND VOLUME CALCULATIONS – 10 YEAR STORM

10	10 * 4.76 * 60 = 2856 0.50 * 20 * 0.87 * 60 = 522	2334 ft.³
20	20 * 3.95 * 60 = 4740 0.50 * 30 * 0.87 * 60 = 783	3957 ft.³
30	30 * 3.22 * 60 = 5796 0.50 * 40 * 0.87 * 60 = 1044	4752 ft.³
40	40 * 2.68 * 60 = 6432 0.50 * 50 * 0.87 * 60 = 1305	5127 ft.³
50	50 * 2.35 * 60 = 7050 0.50 * 60 * 0.87 * 60 = 1566	5484 ft.³
60	60 * 2.01 * 60 = 7236 0.50 * 70 * 0.87 * 60 = 1827	5409 ft.³

PEAK STORM = 50 MIN.
REQUIRED STORAGE = 5484 ft.³

ELEVATION @ 5484 ft.³ = 467.34

25 YEAR STORM

AREA	ACRE	C	Tc	I_{25}	Q_{25}
PRE-DEV (AREAS 1, 2 & 9)	1.45	0.35	20	7.5	3.35
POST-DEV (AREA 2 & 9 BY-PASS)	0.65	0.46	10	8.3	2.48

Allowable Q from Pond = Q_{Dx} − $Q_{By\ Pass}$ = $Q_{Discharge}$
Allowable Q from Pond = 3.35 − 2.48 = 0.87 cfs

A = 1.45 ACRES			
CA = 0.46 * 1.45 = 0.67			
DURATION	I_{25}	CA	Q_{25}
10	8.3	0.67	5.56
20	6.6	0.67	4.42
30	5.5	0.67	3.69
40	4.6	0.67	3.08
50	4.0	0.67	2.68
60	3.5	0.67	2.35
70	3.3	0.67	2.21
80	3.1	0.67	2.08
90	2.9	0.67	1.94
100	2.7	0.67	1.81
110	2.5	0.67	1.68

POND VOLUME CALCULATIONS – 25 YEAR STORM

10	10 * 5.56 * 60 = 3336 0.50 * 20 * 0.87 * 60 = 522	2814 ft.³
20	20 * 4.42* 60 = 5304 0.50 * 30 * 0.87 * 60 = 783	4521 ft.³
30	30 * 3.69 * 60 = 6642 0.50 * 40 * 0.87 * 60 = 1044	5598 ft.³
40	40 * 3.08 * 60 = 7392 0.50 * 50 * 0.87 * 60 = 1305	6087 ft.³
50	50 * 2.68 * 60 = 8040 0.50 * 60 * 0.87 * 60 = 1566	6474 ft.³
60	60 * 2.35 * 60 = 8460 0.50 * 70 * 0.87 * 60 = 1827	6633 ft.³
70	70 * 2.21 * 60 = 9282 0.50 * 80 * 0.87 * 60 = 2088	7194 ft.³
80	80 * 2.08 * 60 = 9984 0.50 * 90 * 0.87 * 60 = 2349	7635 ft.³
90	90 * 1.94 * 60 = 10,476 0.50 * 100 * 0.87 * 60 = 2610	7866 ft.³
100	100 * 1.81 * 60 = 10,860 0.50 * 110 * 0.87 * 60 = 2871	7989 ft.³
110	110 * 1.68 * 60 = 11,088 0.50 * 120 * 0.87 * 60 = 3132	7956 ft.³

PEAK STORM = 100 MIN.
REQUIRED STORAGE = 7989 ft.³

ELEVATION @ 7989 ft.³ = 467.90

100 YEAR STORM

AREA	ACRE	C	Tc	I_{100}	Q_{100}
PRE-DEV (AREAS 1, 2 & 9)	1.45	0.35	20	8.3	4.21
POST-DEV (AREA 2 & 9 BY-PASS)	0.65	0.46	10	9.8	2.93

Allowable Q from Pond = Q_{Dx} − $Q_{By\ Pass}$ = $Q_{Discharge}$
Allowable Q from Pond = 4.21 − 2.93 = 1.28 cfs

A = 1.45 ACRES			
CA = 0.46 * 1.45 = 0.67			
DURATION	I_{100}	CA	Q_{100}
10	9.8	0.67	6.57
20	8.3	0.67	5.56
30	6.9	0.67	4.62
40	5.8	0.67	3.89
50	5.0	0.67	3.35
60	4.5	0.67	3.02
70	4.0	0.67	2.68
80	3.7	0.67	2.48
90	3.4	0.67	2.28
100	3.1	0.67	2.08

POND VOLUME CALCULATIONS – 100 YEAR STORM

10	10 * 6.57 * 60 = 3942 0.50 * 20 * 1.28 * 60 = 768	3174 ft.³
20	20 * 5.56 * 60 = 6672 0.50 * 30 * 1.28 * 60 = 1152	5520 ft.³
30	30 * 4.62 * 60 = 8316 0.50 * 40 * 1.28 * 60 = 1536	6780 ft.³
40	40 * 3.89 * 60 = 9336 0.50 * 50 * 1.28 * 60 = 1920	7416 ft.³
50	50 * 3.35 * 60 =10,050 0.50 * 60 * 1.28 * 60 = 2304	7746 ft.³
60	60 * 3.02 * 60 = 10,872 0.50 * 70 * 1.28 * 60 = 2688	8184 ft.³
70	70 * 2.68 * 60 = 11,256 0.50 * 80 * 1.28 * 60 = 3072	8184 ft.³
80	80 * 2.48 * 60 = 11,904 0.50 * 90 * 1.28 * 60 = 3456	8448 ft.³
90	90 * 2.28 * 60 = 12,312 0.50 * 100 * 1.28 * 60 = 3840	8472 ft.³
100	100 * 208 * 60 = 12,480 0.50 * 110 * 1.28 * 60 = 4224	8256 ft.³

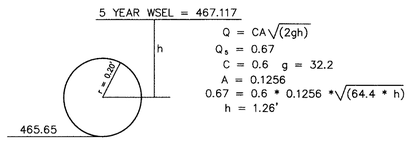
PEAK STORM = 90 MIN.
REQUIRED STORAGE = 8472 ft.³

ELEVATION @ 8472 ft.³ = 468.00

DETENTION POND STAGE/STORAGE CALCS

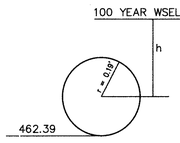
ELEV.	AREA (SF)	VOLUME (CF)	CUM. VOL. (CF)	NOTES
465.65	0		0	BOTTOM
		536		
466.0	3064		536	
		3506		
467.0	3947		4042	
		440		
467.11	4055		4482	5 YR WSEL
		1399		
467.34	4282		5441	10 YR WSEL
		3951		
467.90	4834		7993	25 YR WSEL
		4440		
468.0	4932		8482	100 YR WSEL
470.0				TOP OF POND

5 YEAR WEIR CALCULATIONS



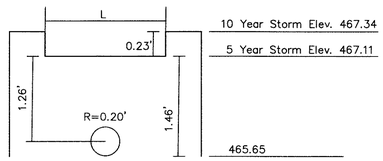
$Q = CA\sqrt{(2gh)}$
$Q_5 = 0.67$
$C = 0.6 \quad g = 32.2$
$A = 0.1256$
$0.67 = 0.6 * 0.1256 * \sqrt{(64.4 * h)}$
$h = 1.26'$

100 YEAR ORIFICE CALCULATIONS



$Q = CA\sqrt{(2gh)}$
$Q_{100} = 1.28$
$C = 0.6 \quad g = 32.2$
$A = 0.1134$
$1.28 = 0.6 * 0.1134 * \sqrt{(64.4 * h)}$
$h = 5.42'$

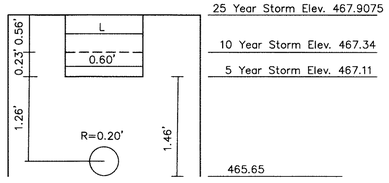
10 YEAR WEIR CALCULATIONS



$Q = Q_{10} - Q_5$
$Q = 0.87 - 0.67$
$Q = 0.20$

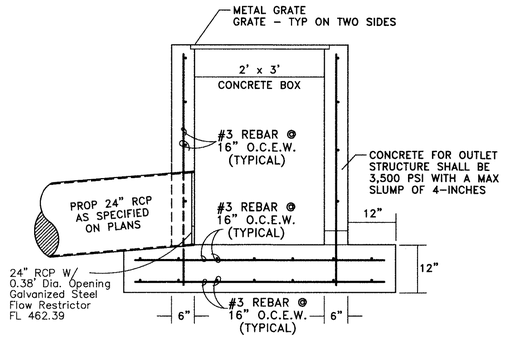
$Q = CLH^{3/2}$
$C = 3 \quad H = 0.23' \quad Q = 0.20$ cfs
$0.20 = 3 * L * (0.23)^{3/2}$
$L = 0.60'$

25 YEAR WEIR CALCULATIONS

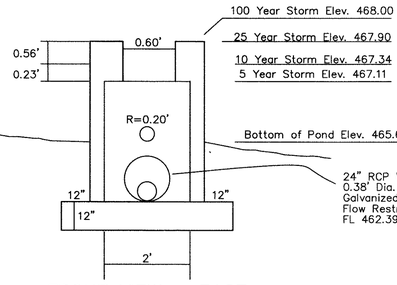


$Q = Q_{25} - Q_{10}$
$Q = 1.2 - 1.07$
$Q = 0.13$

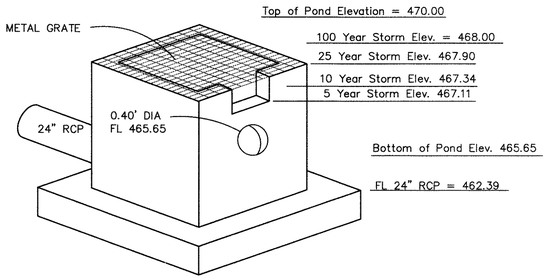
$Q = CLH^{3/2}$
$C = 3 \quad H = 0.16' \quad Q = 0.13$ cfs
$0.13 = 3 * L * (0.16)^{3/2}$
$L = 0.68'$



REINFORCING STEEL FOR OUTLET STRUCTURE



FRONT VIEW – EAST



ISOMETRIC VIEW

For Reference Only
See Details This Sheet For Dimensions

OUTLET STRUCTURE

RECORD DRAWING

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Hickman Consulting Engineers, Inc.
3094 County Road 1024
Farmersville, Texas 75442
Ph (972)784-2499
markredhick@gmail.com
Engineers Planners

DRAINAGE CALCULATIONS – POND A
LAKESHORE COMMONS
LOT 1-4; LAKESHORE COMMONS
ROCKWALL, ROCKWALL COUNTY, TEXAS
MOORE WORTH INVESTMENTS, LLC
8445 FREEPORT PARKWAY, SUITE 175
IRVING, TX 75063
214-415-9933

SCALE: N/A
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DRAWN BY: FP
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DATE OF SUBMITTAL: 03/22/17(YC)

Hickman Consulting Engineers, Inc.
STATE OF TEXAS
MARK H. HICKMAN
78409
REGISTERED PROFESSIONAL ENGINEER
7/31/18
F-12172

REVISION	DESCRIPTION	DATE	BY

SHEET
C-6

5 YEAR STORM

AREA	ACRE	C	Tc	I_5	Q_5
PRE-DEV (AREA 3)	1.22	0.35	20	4.9	2.09
POST-DEV (BY-PASS)	N/A	0.46	10	6.1	0
3a (PASS-THRU)	0.09	0.90	10	6.1	0.49

Allowable Q from Pond = Q_{5a} − Q $_{\text{By Pass}}$ = Q $_{\text{Discharge}}$
Allowable Q from Pond = 2.09 − 0 = 2.09 cfs

A = 1.22 ACRES CA = 0.46 * 1.22 = 0.56			
DURATION	I_5	CA	Q_{5a}
10	6.1	0.56	3.42
20	4.9	0.56	2.74
30	4.1	0.56	2.30
40	3.4	0.56	1.90
50	2.8	0.56	1.57
60	2.6	0.56	1.46
70	2.4	0.56	1.34
80	2.3	0.56	1.29

POND VOLUME CALCULATIONS – 5 YEAR STORM

10	10 * 3.42 * 60 = 2052 0.50 * 20 * 2.09 * 60 = 1254	798 ft.³
20	20 * 2.74 * 60 = 3288 0.50 * 30 * 2.09 * 60 = 1881	1407 ft.³
30	30 * 2.30 * 60 = 4140 0.50 * 40 * 2.09 * 60 = 2508	1632 ft.³
40	40 * 1.90 * 60 = 4560 0.50 * 50 * 2.09 * 60 = 3135	1425 ft.³

PEAK STORM = 30 MIN.
REQUIRED STORAGE = 1632 ft.³

ELEVATION @ 1632 ft.³ = 468.95

10 YEAR STORM

AREA	ACRE	C	Tc	I_{10}	Q_{10}
PRE-DEV (AREA 3)	1.22	0.35	20	5.9	2.52
POST-DEV (BY-PASS)	N/A	0.46	10	7.1	0
3a (PASS-THRU)	0.09	0.90	10	7.1	0.56

Allowable Q from Pond = Q_{10a} − Q $_{\text{By Pass}}$ = Q $_{\text{Discharge}}$
Allowable Q from Pond = 2.52 − 0 = 2.52 cfs

A = 1.22 ACRES CA = 0.46 * 1.22 = 0.56			
DURATION	I_{10}	CA	Q_{10}
10	7.1	0.56	3.98
20	5.9	0.56	3.30
30	4.8	0.56	2.69
40	4.0	0.56	2.24
50	3.5	0.56	1.96
60	3.0	0.56	1.68
70	2.8	0.56	1.57
80	2.6	0.56	1.46

POND VOLUME CALCULATIONS – 10 YEAR STORM

10	10 * 3.98 * 60 = 2388 0.50 * 20 * 2.52 * 60 = 1512	876 ft.³
20	20 * 3.30 * 60 = 3960 0.50 * 30 * 2.52 * 60 = 2268	1692 ft.³
30	30 * 2.69 * 60 = 4842 0.50 * 40 * 2.52 * 60 = 3024	1818 ft.³
40	40 * 2.24 * 60 = 5376 0.50 * 50 * 2.52 * 60 = 3780	1596 ft.³

PEAK STORM = 30 MIN.
REQUIRED STORAGE = 1818 ft.³

ELEVATION @ 1818 ft.³ = 469.08

25 YEAR STORM

AREA	ACRE	C	Tc	I_{25}	Q_{25}
PRE-DEV (AREA 3)	0.78	0.35	20	6.6	2.82
POST-DEV (BY-PASS)	N/A	0.46	10	8.3	0
3a (PASS-THRU)	0.09	0.90	10	8.3	0.67

Allowable Q from Pond = Q_{25a} − Q $_{\text{By Pass}}$ = Q $_{\text{Discharge}}$
Allowable Q from Pond = 2.82 − 0 = 2.82 cfs

A = 1.22 ACRES CA = 0.46 * 1.22 = 0.56			
DURATION	I_{25}	CA	Q_{25}
10	8.3	0.56	4.65
20	6.6	0.56	3.70
30	5.5	0.56	3.08
40	4.6	0.56	2.58
50	4.0	0.56	2.24
60	3.5	0.56	1.96
70	3.3	0.56	1.85
80	3.1	0.56	1.74

POND VOLUME CALCULATIONS – 25 YEAR STORM

10	10 * 4.65 * 60 = 2790 0.50 * 20 * 2.82 * 60 = 1692	1098 ft.³
20	20 * 3.70 * 60 = 4440 0.50 * 30 * 2.82 * 60 = 2538	1902 ft.³
30	30 * 3.08 * 60 = 5544 0.50 * 40 * 2.82 * 60 = 3384	2160 ft.³
40	40 * 2.58 * 60 = 6192 0.50 * 50 * 2.82 * 60 = 4230	1962 ft.³

PEAK STORM = 30 MIN.
REQUIRED STORAGE = 2160 ft.³

ELEVATION @ 2160 ft.³ = 469.30

100 YEAR STORM

AREA	ACRE	C	Tc	I_{100}	Q_{100}
PRE-DEV (AREA 3)	1.22	0.35	15	8.3	3.54
POST-DEV (BY-PASS)	N/A	0.46	10	9.8	0
3a (PASS-THRU)	0.09	0.90	10	9.8	0.79

Allowable Q from Pond = Q_{100a} − Q $_{\text{By Pass}}$ = Q $_{\text{Discharge}}$
Allowable Q from Pond = 3.54 − 0 = 3.54 cfs

A = 1.22 ACRES CA = 0.46 * 1.22 = 0.56			
DURATION	I_{100}	CA	Q_{100}
10	9.8	0.56	5.50
20	8.3	0.56	4.65
30	6.9	0.56	3.86
40	5.8	0.56	3.25
50	5.0	0.56	2.8
60	4.5	0.56	2.52
70	4.0	0.56	2.24
80	3.7	0.56	2.07
90	3.5	0.56	1.96

POND VOLUME CALCULATIONS – 100 YEAR STORM

10	10 * 5.50 * 60 = 3300 0.50 * 20 * 3.54 * 60 = 2124	1176 ft.³
20	20 * 4.65 * 60 = 5580 0.50 * 30 * 3.54 * 60 = 3186	2394 ft.³
30	30 * 3.86 * 60 = 6948 0.50 * 40 * 3.54 * 60 = 4248	2700 ft.³
40	40 * 3.25 * 60 = 7800 0.50 * 50 * 3.54 * 60 = 5310	2490 ft.³

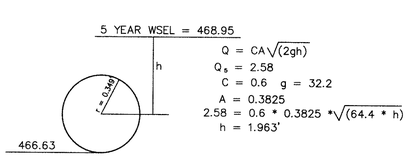
PEAK STORM = 30 MIN.
REQUIRED STORAGE = 2700 ft.³

ELEVATION @ 2700 ft.³ = 469.63

DETENTION POND STAGE/STORAGE CALCS

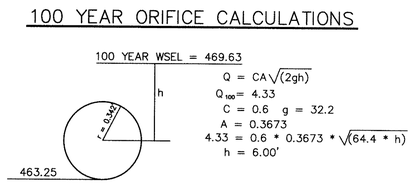
ELEV.	AREA (SF)	VOLUME (CF)	CUM. VOL. (CF)	NOTES
466.63	0		0	BOTTOM
		42		
467.0	225		42	
		530		
468.0	834		572	
		1067		
468.95	1067		1639	5 YR WSEL
		1139		
469.0	1443		1711	
		117		
469.08	1487		1828	10 YR WSEL
		458		
469.30	1610		2169	25 YR WSEL
		1028		
469.63	1826		2739	100 YR WSEL
471.63				TOP OF POND

5 YEAR WEIR CALCULATIONS



Q = CA$\sqrt{(2gh)}$
Q_5 = 2.58
C = 0.6 g = 32.2
A = 0.3825
2.58 = 0.6 * 0.3825 * $\sqrt{(64.4 * h)}$
h = 1.963'

100 YEAR ORIFICE CALCULATIONS



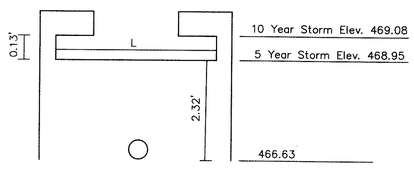
Q = CA$\sqrt{(2gh)}$
Q_{100} = 4.33
C = 0.6 g = 32.2
A = 0.3673
4.33 = 0.6 * 0.3673 * $\sqrt{(64.4 * h)}$
h = 6.00'

ALLOWABLE RELEASE RATES

PASS-THRU (AREA 3a) + ALLOWABLE

	PASS-THRU	ADJUSTED ALLOWABLE
5 YR	0.49 cfs	0.49 + 2.09 = 2.58 cfs
10 YR	0.56 cfs	0.56 + 2.52 = 3.08 cfs
25 YR	0.67 cfs	0.67 + 2.82 = 3.49 cfs
100 YR	0.79 cfs	0.79 + 3.54 = 4.33 cfs

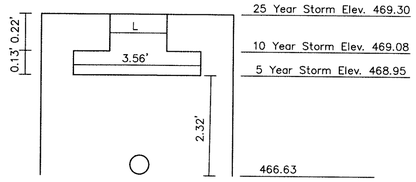
10 YEAR WEIR CALCULATIONS



$Q = Q_{10} - Q_5$
Q = 3.08 − 2.58
Q = 0.50

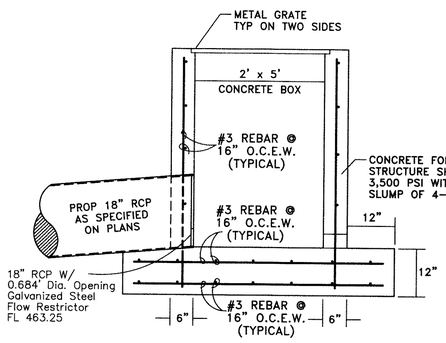
$Q = CLH^{\frac{3}{2}}$
C = 3 H = 0.13' Q = 0.50 cfs
$0.50 = 3 * L * (0.13)^{\frac{3}{2}}$
L = 3.56'

25 YEAR WEIR CALCULATIONS

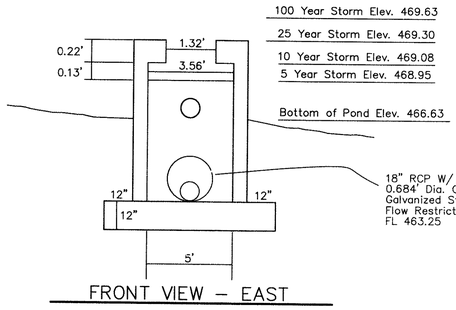


$Q = Q_{25} - Q_{10}$
Q = 3.49 − 3.08
Q = 0.41

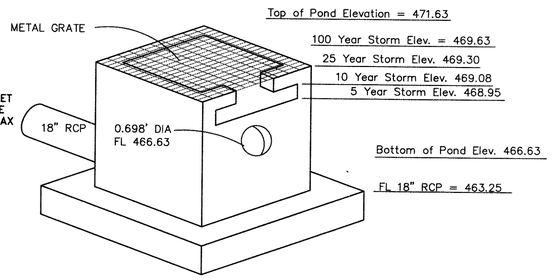
$Q = CLH^{\frac{3}{2}}$
C = 3 H = 0.22' Q = 0.41 cfs
$0.41 = 3 * L * (0.22)^{\frac{3}{2}}$
L = 1.32'



REINFORCING STEEL FOR OUTLET STRUCTURE



FRONT VIEW – EAST



ISOMETRIC VIEW

For Reference Only
See Details This Sheet For Dimensions

OUTLET STRUCTURE

RECORD DRAWING

THIS RECORD DRAWING HAS BEEN PREPARED BASED ON INFORMATION PROVIDED BY OTHERS. THE ENGINEER HAS NOT VERIFIED THE ACCURACY OF THIS INFORMATION AND SHALL NOT BE RESPONSIBLE FOR ANY DISCREPANCIES WHICH MAY BE INCORPORATED HEREIN AS A RESULT.

Hickman Consulting Engineers, Inc.
3094 County Road 1024
Farmersville, Texas 75442
Ph (972)784-2499
markredhick@gmail.com
Engineers Planners

DRAINAGE CALCULATIONS – POND B
LAKESHORE COMMONS
LOT 1-4; LAKESHORE COMMONS
ROCKWALL, ROCKWALL COUNTY, TEXAS
MOORE WORTH INVESTMENTS, LLC
8445 FREEPORT PARKWAY; SUITE 175
IRVING, TX 75063
214-415-9933

SCALE: N/A
DATE: SEPT2016
DRAWN BY: FP
CHK'D BY: MHH
JOB NO: 1501-357
FILE:165-1501357-LDWD
DATE OF SUBMITTAL: 03/22/17(F)

Hickman Consulting Engineers, Inc.
STATE OF TEXAS
MARK H. HICKMAN
78409
REGISTERED PROFESSIONAL ENGINEER
7/31/16
F-12172

REVISION	DESCRIPTION	DATE	BY

SHEET
C-7

5 YEAR STORM

AREA	ACRE	C	Tc	I_5	Q_5
PRE-DEV (AREAS F1, F2 & F3)	1.80	0.35	20	4.9	3.09
POST-DEV (AREA F2, & F3; BY-PASS)	0.25	0.90	10	6.1	1.37
F1a (PASS-THRU)	0.61	0.90	10	6.1	3.35

Allowable Q from Pond = Q_{5a} − $Q_{\text{By Pass}}$ = $Q_{\text{Discharge}}$
Allowable Q from Pond = 3.09 − 1.37 = 1.72 cfs

A = 1.80 ACRES			
CA = 0.90 * 1.80 = 1.62			
DURATION	I_5	CA	Q_5
10	6.1	1.62	9.88
20	4.9	1.62	7.94
30	4.1	1.62	6.64
40	3.4	1.62	5.51
50	2.8	1.62	4.54
60	2.6	1.62	4.21
70	2.4	1.62	3.89
80	2.3	1.62	3.73
90	2.1	1.62	3.40

POND VOLUME CALCULATIONS – 5 YEAR STORM

10	10 * 9.88 * 60 = 5928 0.50 * 20 * 1.72 * 60 = 1032	4896 ft.³
20	20 * 7.94 * 60 = 9528 0.50 * 30 * 1.72 * 60 = 1548	7980 ft.³
30	30 * 6.64 * 60 = 11,952 0.50 * 40 * 1.72 * 60 = 2064	9888 ft.³
40	40 * 5.51 * 60 = 13,224 0.50 * 50 * 1.72 * 60 = 2580	10,644 ft.³
50	50 * 4.54 * 60 = 13,620 0.50 * 60 * 1.72 * 60 = 3096	10,524 ft.³

PEAK STORM = 40 MIN.
REQUIRED STORAGE = 10,524 ft.³

ELEVATION @ 10,574 ft.³ = 467.06

10 YEAR STORM

AREA	ACRE	C	Tc	I_{10}	Q_{10}
PRE-DEV (AREAS F1, F2 & F3)	1.80	0.35	20	5.9	3.72
POST-DEV (AREA F2, & F3; BY-PASS)	0.25	0.90	10	7.1	1.60
F1a (PASS-THRU)	0.61	0.90	10	7.1	3.90

Allowable Q from Pond = Q_{10} − $Q_{\text{By Pass}}$ = $Q_{\text{Discharge}}$
Allowable Q from Pond = 3.72 − 1.60 = 2.12 cfs

A = 1.80 ACRES			
CA = 0.90 * 1.80 = 1.62			
DURATION	I_{10}	CA	Q_{10}
10	7.1	1.62	11.50
20	5.9	1.62	9.56
30	4.8	1.62	7.78
40	4.0	1.62	6.48
50	3.5	1.62	5.67
60	3.0	1.62	4.86
70	2.8	1.62	4.54
80	2.6	1.62	4.21
90	2.5	1.62	4.05

POND VOLUME CALCULATIONS – 10 YEAR STORM

10	10 * 11.50 * 60 = 6900 0.50 * 20 * 2.12 * 60 = 1272	5628 ft.³
20	20 * 9.56 * 60 = 11,470 0.50 * 30 * 2.12 * 60 = 1908	9562 ft.³
30	30 * 7.78 * 60 = 14,004 0.50 * 40 * 2.12 * 60 = 2544	11,460 ft.³
40	40 * 6.48 * 60 = 15,552 0.50 * 50 * 2.12 * 60 = 3180	12,372 ft.³
50	50 * 5.67 * 60 = 17,010 0.50 * 60 * 2.12 * 60 = 3816	13,194 ft.³
60	60 * 4.86 * 60 = 17,496 0.50 * 70 * 2.12 * 60 = 4452	13,044 ft.³

PEAK STORM = 50 MIN.
REQUIRED STORAGE = 13,194 ft.³

ELEVATION @ 13,194 ft.³ = 467.53

25 YEAR STORM

AREA	ACRE	C	Tc	I_{25}	Q_{25}
PRE-DEV (AREAS F1, F2 & F3)	1.80	0.35	20	6.6	4.16
POST-DEV (AREA F2, & F3; BY-PASS)	0.25	0.90	10	8.3	1.87
F1a (PASS-THRU)	0.61	0.90	10	8.3	4.56

Allowable Q from Pond = Q_{25} − $Q_{\text{By Pass}}$ = $Q_{\text{Discharge}}$
Allowable Q from Pond = 4.16 − 1.87 = 2.29 cfs

A = 1.80 ACRES			
CA = 0.90 * 1.80 = 1.62			
DURATION	I_{25}	CA	Q_{25}
10	8.3	1.62	13.45
20	6.6	1.62	10.69
30	5.5	1.62	8.91
40	4.6	1.62	7.45
50	4.0	1.62	6.48
60	3.5	1.62	5.67
70	3.3	1.62	5.35
80	3.1	1.62	5.02
90	2.9	1.62	4.70
100	2.4	1.62	3.89

POND VOLUME CALCULATIONS – 25 YEAR STORM

10	10 * 13.45 * 60 = 8070 0.50 * 20 * 2.29 * 60 = 1374	6696 ft.³
20	20 * 10.69 * 60 = 12,828 0.50 * 30 * 2.29 * 60 = 2061	10,767 ft.³
30	30 * 8.91 * 60 = 16,038 0.50 * 40 * 2.29 * 60 = 2748	13,290 ft.³
40	40 * 7.45 * 60 = 17,880 0.50 * 50 * 2.29 * 60 = 3435	14,445 ft.³
50	50 * 6.48 * 60 = 19,440 0.50 * 60 * 2.29 * 60 = 4122	15,318 ft.³
60	60 * 5.67 * 60 = 20,412 0.50 * 70 * 2.29 * 60 = 4809	15,603 ft.³
70	70 * 5.35 * 60 = 22,470 0.50 * 80 * 2.29 * 60 = 5490	16,974 ft.³
80	80 * 5.02 * 60 = 24,096 0.50 * 90 * 2.29 * 60 = 6183	17,913 ft.³
90	90 * 4.70 * 60 = 25,380 0.50 * 100 * 2.29 * 60 = 6870	18,510 ft.³
100	100 * 3.89 * 60 = 23,340 0.50 * 110 * 2.29 * 60 = 7557	15,783 ft.³

PEAK STORM = 90 MIN.
REQUIRED STORAGE = 18,510 ft.³

ELEVATION @ 18,510 ft.³ = 468.55

100 YEAR STORM

AREA	ACRE	C	Tc	I_{100}	Q_{100}
PRE-DEV (AREAS F1, F2 & F3)	1.80	0.35	20	8.3	5.23
POST-DEV (AREA F2, & F3; BY-PASS)	0.25	0.90	10	9.8	2.21
F1a (PASS-THRU)	0.61	0.90	10	9.8	5.38

Allowable Q from Pond = Q_{100} − $Q_{\text{By Pass}}$ = $Q_{\text{Discharge}}$
Allowable Q from Pond = 5.23 − 2.21 = 3.02 cfs

A = 1.80 ACRES			
CA = 0.90 * 1.80 = 1.62			
DURATION	I_{100}	CA	Q_{100}
10	9.8	1.62	15.88
20	8.3	1.62	13.45
30	6.9	1.62	11.18
40	5.8	1.62	9.40
50	5.0	1.62	8.10
60	4.5	1.62	7.29
70	4.0	1.62	6.48
80	3.7	1.62	5.99
90	3.5	1.62	5.67
100	3.3	1.62	5.35
110	3.0	1.62	4.86

POND VOLUME CALCULATIONS – 100 YEAR STORM

10	10 * 15.88 * 60 = 9528 0.50 * 20 * 3.02 * 60 = 1812	7716 ft.³
20	20 * 13.45 * 60 = 16,140 0.50 * 30 * 3.02 * 60 = 2718	13,422 ft.³
30	30 * 11.18 * 60 = 20,124 0.50 * 40 * 3.02 * 60 = 3624	16,500 ft.³
40	40 * 9.40 * 60 = 22,560 0.50 * 50 * 3.02 * 60 = 4530	18,030 ft.³
50	50 * 8.10 * 60 = 24,300 0.50 * 60 * 3.02 * 60 = 5436	18,864 ft.³
60	60 * 7.29 * 60 = 26,244 0.50 * 70 * 3.02 * 60 = 6342	19,902 ft.³
70	70 * 6.48 * 60 = 27,216 0.50 * 80 * 3.02 * 60 = 7248	19,968 ft.³
80	80 * 5.99 * 60 = 28,752 0.50 * 60 * 3.02 * 60 = 8154	20,598 ft.³
90	90 * 5.67 * 60 = 30,618 0.50 * 1000 * 3.02 * 60 = 9060	21,558 ft.³
100	100 * 5.35 * 60 = 32,100 0.50 * 110 * 3.02 * 60 = 9966	22,134 ft.³
110	110 * 4.86 * 60 = 32,076 0.50 * 120 * 3.02 * 60 = 10,872	21,204 ft.³

PEAK STORM = 100 MIN.
REQUIRED STORAGE = 22,134 ft.³

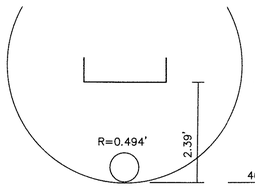
ELEVATION @ 22,134 ft.³ = 469.59

ALLOWABLE RELEASE RATES

PASS-THRU (AREA F1a) + ALLOWABLE

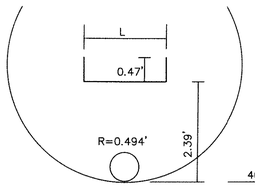
	PASS-THRU	ADJUSTED ALLOWABLE
5 YR	3.35 cfs	3.35 + 1.72 = 5.07 cfs
10 YR	3.90 cfs	3.90 + 2.12 = 6.02 cfs
25 YR	4.56 cfs	4.56 + 2.29 = 6.85 cfs
100 YR	5.38 cfs	5.38 + 3.02 = 8.40 cfs

5 YEAR WEIR CALCULATIONS



$Q = CA\sqrt{(2gh)}$
$Q_5 = 5.07$
$C = 0.6$ $g = 32.2$
$A = 0.7663$
$5.07 = 0.6 * 0.7663 * \sqrt{(64.4 * h)}$
$h = 1.90'$

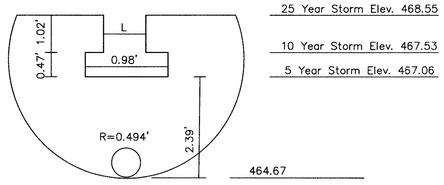
10 YEAR WEIR CALCULATIONS



$Q = Q_{10} - Q_5$
$Q = 6.02 - 5.07$
$Q = 0.95$

$Q = CLH^{3/2}$
$C = 3$ $H = 0.47'$ $Q = 0.95$ cfs
$0.95 = 3 * L * (0.47)^{3/2}$
$L = 0.98'$

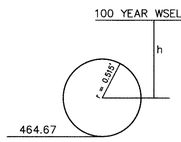
25 YEAR WEIR CALCULATIONS



$Q = Q_{25} - Q_{10}$
$Q = 6.85 - 6.02$
$Q = 0.83$

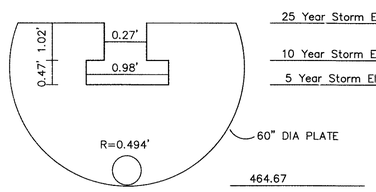
$Q = CLH^{3/2}$
$C = 3$ $H = 1.02'$ $Q = 0.83$ cfs
$0.83 = 3 * L * (1.02)^{3/2}$
$L = 0.27'$

100 YEAR ORIFICE CALCULATIONS

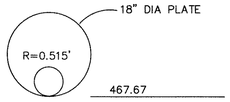


$Q = CA\sqrt{(2gh)}$
$Q_{100} = 8.40$
$C = 0.6$ $g = 32.2$
$A = 0.8328$
$9.11 = 0.6 * 0.8328 * \sqrt{(64.4 * h)}$
$h = 4.416'$

WEIR PLATE UPSTREAM



WEIR PLATE DOWNSTREAM



UDS STAGE/STORAGE CALCS

CONTECH ENGINEERED SOLUTIONS

CMP: Underground Detention System
Storage Volume Estimation

[redacted] =Adjustable Input Cells

Date: 2/27/17
Project Name: Lakeshore Commons

City / County: Rockwall
State: TX

Designed By: MJR
Company: Contech
Telephone:

Contech Engineered Solutions, LLC is pleased to offer the following estimate of storage volume for the above named project. The results are submitted as an estimate only, without liability on the part of Contech Engineered Solutions, LLC for accuracy or suitability to any particular applicaton and are subject to verification of the Engineer of Record. **This tool is only applicable for rectangular shaped systems.**

Summary of Inputs

System Information	Backfill Information	Pipe & Analysis Information
Out-to-out length (ft): [redacted]	Backfill Porosity (%): [redacted]	System Diameter (in): [redacted]
Out-to-out width (ft):	Depth Above Pipe (in):	Pipe Spacing (in):
Number of Manifolds (ea):	Depth Below Pipe (in):	Incremental Analysis (in):
Number of Barrels (ea):	Width At Ends (ft):	System Invert (Elevation):
	Width At Sides (ft):	

Storage Volume Estimation

System		Pipe		Stone		Total System		Miscellaneous	
Depth (ft)	Elevation (ft)	Incremental Storage (cf)	Cumulative Storage (cf)	Incremental Storage (cf)	Cumulative Storage (cf)	Incremental Storage (cf)	Cumulative Storage (cf)	Percent Open Storage (%)	Ave. Surface Area (sf)
0.00	464.67	0.0	0.0	0.0	0.0	0.0	0.0	0.0%	0.0
0.17	464.83	227.5	227.5	0.0	0.0	227.5	227.5	100.0%	2,033.8
0.33	465.00	409.4	636.9	0.0	0.0	409.4	636.9	100.0%	2,826.2
0.50	465.17	520.9	1,157.8	0.0	0.0	520.9	1,157.8	100.0%	3,399.0
0.67	465.33	605.5	1,763.3	0.0	0.0	605.5	1,763.3	100.0%	3,851.5
0.83	465.50	673.8	2,437.1	0.0	0.0	673.8	2,437.1	100.0%	4,222.4
1.00	465.67	730.3	3,167.4	0.0	0.0	730.3	3,167.4	100.0%	4,532.0
1.17	465.83	777.6	3,945.0	0.0	0.0	777.6	3,945.0	100.0%	4,792.1
1.33	466.00	817.4	4,762.4	0.0	0.0	817.4	4,762.4	100.0%	5,010.3
1.50	466.17	850.7	5,613.1	0.0	0.0	850.7	5,613.1	100.0%	5,192.1
1.67	466.33	878.2	6,491.3	0.0	0.0	878.2	6,491.3	100.0%	5,341.0
1.83	466.50	900.5	7,391.8	0.0	0.0	900.5	7,391.8	100.0%	5,459.9
2.00	466.67	917.9	8,309.7	0.0	0.0	917.9	8,309.7	100.0%	5,550.5
2.17	466.83	930.8	9,240.5	0.0	0.0	930.8	9,240.5	100.0%	5,614.4
2.33	467.00	939.3	10,179.7	0.0	0.0	939.3	10,179.7	100.0%	5,652.4
2.50	467.17	943.5	11,123.2	0.0	0.0	943.5	11,123.2	100.0%	5,665.0
2.67	467.33	943.5	12,066.7	0.0	0.0	943.5	12,066.7	100.0%	5,652.4
2.83	467.50	939.3	13,005.9	0.0	0.0	939.3	13,005.9	100.0%	5,614.4
3.00	467.67	930.8	13,936.7	0.0	0.0	930.8	13,936.7	100.0%	5,550.5
3.17	467.83	917.9	14,854.6	0.0	0.0	917.9	14,854.6	100.0%	5,459.9
3.33	468.00	900.5	15,755.1	0.0	0.0	900.5	15,755.1	100.0%	5,341.0
3.50	468.17	878.2	16,633.3	0.0	0.0	878.2	16,633.3	100.0%	5,192.1
3.67	468.33	850.7	17,484.0	0.0	0.0	850.7	17,484.0	100.0%	5,010.3
3.83	468.50	817.4	18,301.4	0.0	0.0	817.4	18,301.4	100.0%	4,792.1
4.00	468.67	777.6	19,079.0	0.0	0.0	777.6	19,079.0	100.0%	4,532.0
4.17	468.83	730.3	19,809.3	0.0	0.0	730.3	19,809.3	100.0%	4,222.4
4.33	469.00	673.8	20,483.1	0.0	0.0	673.8	20,483.1	100.0%	3,851.5
4.50	469.17	605.5	21,088.6	0.0	0.0	605.5	21,088.6	100.0%	3,399.0
4.67	469.33	520.9	21,609.5	0.0	0.0	520.9	21,609.5	100.0%	2,826.2
4.83	469.50	409.4	22,018.9	0.0	0.0	409.4	22,018.9	100.0%	2,033.8
5.00	469.67	227.5	22,246.4	0.0	0.0	227.5	22,246.4	100.0%	0.0

These results are submitted to you as a guideline only, without liability on the part of CONTECH Engineered Solutions, LLC for accuracy or suitability to any particular application, and are subject to your verification.

UDS LOTS 3 & 4 IS DESIGNED FOR FUTURE CONDITIONS

RECORD DRAWING

THIS RECORD DRAWING HAS BEEN PREPARED BASED ON INFORMATION PROVIDED BY OTHERS. THE ENGINEER HAS NOT VERIFIED THE ACCURACY OF THIS INFORMATION AND SHALL NOT BE RESPONSIBLE FOR ANY DISCREPANCIES WHICH MAY BE INCORPORATED HEREIN AS A RESULT.

Hickman Consulting Engineers, Inc.
3094 County Road 1024
Parmersville, Texas 75442
Ph (972)784-2499
markredhick@gmail.com
Engineers Planners

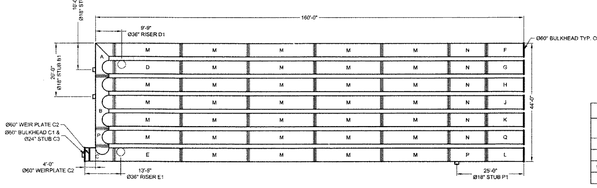
DETENTION CALCS – UDS
LAKESHORE COMMONS
LOT 1-4; LAKESHORE COMMONS
ROCKWALL, ROCKWALL COUNTY, TEXAS
MOORE WORTH INVESTMENTS, LLC
8445 FREEPORT PARKWAY, SUITE 175
IRVING, TX 75063
214-415-9993

SCALE: N/A
DATE: SEPT2016
DRAWN BY: FP
CHK'D BY: MHH
JOB NO: 1501-357
FILE:165-1501357-Comb
DATE SUBMITTAL 03/22/17(F)

Hickman Consulting Engineers, Inc.
STATE OF TEXAS
MARK H. HICKMAN
78409
LICENSED PROFESSIONAL ENGINEER
7/31/18
F-12172

REVISION	DESCRIPTION	DATE	BY

SHEET
C-8



STUB INFORMATION		
PIECE	STUB INVERT	SYSTEM INVERT
Ø18" STUB A1	464.67	464.67
Ø18" STUB B1	464.67	464.67
Ø24" STUB C3	464.67	464.67
Ø18" STUB P1	464.67	464.67

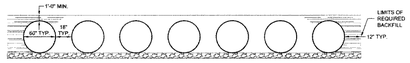
RISER INFORMATION		
PIECE	RIM ELEV.	SYSTEM INVERT
Ø36" RISER D1	TBD	464.67
Ø36" RISER E1	TBD	464.67

THE UNDERSIGNED HEREBY APPROVES THE ATTACHED (3) PAGES INCLUDING THE FOLLOWING:

- **PIPE STORAGE = 22,246CF**
- **MAINLINE PIPE GAGE = 16**
- **WALL TYPE = SOLID**
- **DIAMETER = 60"**
- **FINISH = ALT2**
- **CORRUGATION = 2 2/3x1/2**

CUSTOMER _____ DATE _____

ASSEMBLY
SCALE: 1" = 20'
PIPE STORAGE: 22,246CF
LOADING: H20/H25
SYSTEM INV = 464.67±



TYPICAL SECTION VIEW
SCALE: N.T.S.

NOTES

- ALL RISER AND STUB DIMENSIONS ARE TO CENTERLINE.
- ALL ELEVATIONS, DIMENSIONS, AND LOCATIONS OF RISERS AND INLETS, SHALL BE VERIFIED BY THE ENGINEER OF RECORD PRIOR TO RELEASING FOR FABRICATION.
- ALL WELDS AND REINFORCEMENT COMPLY WITH ASTM A36.
- ALL RISERS AND STUBS ARE 2⅔" x ½" CORRUGATION, AND 16 GAGE UNLESS OTHERWISE NOTED.
- RISERS TO BE FIELD TRIMMED TO GRADE AS REQUIRED BY CONTRACTOR.
- QUANTITY OF PIPE SHOWN DOES NOT PROVIDE EXTRA PIPE FOR CONNECTING THE SYSTEM TO EXISTING PIPE OR DRAINAGE STRUCTURES. OUR SYSTEM AS DETAILED PROVIDES NOMINAL INLET AND/OR OUTLET PIPE STUB FOR CONNECTION TO EXISTING DRAINAGE FACILITIES. IF ADDITIONAL PIPE IS NEEDED IT IS THE RESPONSIBILITY OF THE CONTRACTOR.

MARK	DATE	REVISION DESCRIPTION	BY

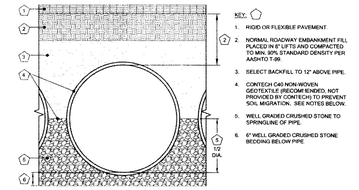
CONTECH ENGINEERED SOLUTIONS LLC
www.ContechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

CONTECH CMP DETENTION SYSTEMS
CONTECH PROPOSAL DRAWING

60" UNDERGROUND DETENTION SYSTEM - 536951-20
LAKESHORE COMMONS - ROCKWALL, TX
ROCKWALL, TX Solid
SITE DESIGNATION: LOTS 3&4

PROJECT No.	REQ No.	DATE
536951	20	1/26/2017
DESIGNED	DRAWN	
MJR	LMO	
CHECKED	APPROVED	
SHEET NO.		

P1 OF 3



FOUNDATION/BEDDING PREPARATION

PRIOR TO PLACING THE BEDDING, THE FOUNDATION MUST BE CONSTRUCTED TO A UNIFORM AND STABLE GRADE. IN THE EVENT THAT UNSUITABLE FOUNDATION MATERIALS ARE ENCOUNTERED DURING EXCAVATION, THEY SHALL BE REMOVED AND BROUGHT BACK TO THE GRADE WITH A FILL MATERIAL AS APPROVED BY THE ENGINEER. ONCE THE FOUNDATION PREPARATION IS COMPLETE, THE 6 INCHES OF A WELL-GRADED GRANULAR MATERIAL SHALL BE PLACED AS THE BEDDING.

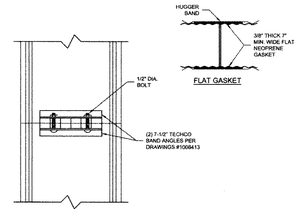
BACKFILL

THE SELECT BACKFILL SHALL BE AN A1, A2 OR A3 GRANULAR FILL PER AASHTO M-145 OR A WELL-GRADED GRANULAR FILL AS APPROVED BY THE ENGINEER. (SEE INSTALLATION GUIDELINES FOR ADDITIONAL INFORMATION.) THE BACKFILL SHALL BE PLACED AND COMPACTED TO 90% AASHTO T99 STANDARD PROCTOR DENSITY IN MAXIMUM LOOSE LIFTS AND LIFTS OF BACKFILL IT IS IMPORTANT TO MAKE SURE THAT THE BACKFILL IS PROPERLY COMPACTED UNDER AND AROUND THE PIPE HAUNCHES. BACKFILL SHALL BE PLACED SUCH THAT THERE IS NO MORE THAN A TWO LIFT (10") DIFFERENTIAL BETWEEN ANY OF THE PIPES AT ANY TIME DURING THE BACKFILL PROCESS. THE BACKFILL SHALL BE ADVANCED ALONG THE LENGTH OF THE DETENTION SYSTEM AT THE SAME RATE TO AVOID DIFFERENTIAL LOADING ON THE PIPE.

OTHER ALTERNATE BACKFILL MATERIAL MAY BE ALLOWED DEPENDING ON SITE SPECIFIC CONDITIONS. REFER TO TYPICAL BACKFILL DETAIL FOR MATERIAL REQUIRED.

IF SOIL MIGRATION IS NOT A CONCERN, THEN GEOTEXTILE FABRIC WILL NOT BE REQUIRED.

BACKFILL DETAIL
SCALE: N.T.S.



CONNECTION DETAIL
SINGLE
7-1/2" TECHCO ANGLE

GENERAL NOTES

1. BANDS ARE NORMALLY FURNISHED AS FOLLOWS:
   12" THRU 48" 1-PIECE
   54" THRU 96" 2-PIECE
   102" THRU 144" 3-PIECES
2. BAND FASTENERS ARE ATTACHED WITH SPOT WELDS, RIVETS OR HAND WELDS
3. REROLLED ANNULAR END CORRUGATIONS ARE NORMALLY 2⅔" x ½". DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES

H-12 HUGGER BAND DETAIL
SCALE: N.T.S.

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60" UNDERGROUND DETENTION SYSTEM - 536951-20
LAKESHORE COMMONS - ROCKWALL, TX
ROCKWALL, TX Solid
SITE DESIGNATION: LOTS 3&4

PROJECT No.	REQ No.	DATE
536951	20	1/26/2017
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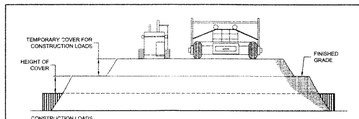
CHECKED	APPROVED	
SHEET NO.		

P2 OF 3



CONSTRUCTION LOADS

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

PIPE SPAN, INCHES	AXLE LOADS (kips)			
	16-50	50-75	75-110	110-150
	MINIMUM COVER (FT).			
12-42	2.0	2.5	3.0	3.0
48-72	3.0	3.0	3.5	4.0
78-120	3.0	3.5	4.0	4.0
126-144	3.5	4.0	4.5	4.5

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

CONSTRUCTION LOADING DIAGRAM
SCALE: N.T.S.

SPECIFICATION FOR CORRUGATED STEEL PIPE-ALUMINIZED TYPE 2 STEEL

SCOPE

THIS SPECIFICATION COVERS THE MANUFACTURE AND INSTALLATION OF THE CORRUGATED STEEL PIPE (CSP) DETAILED IN THE PROJECT PLANS.

MATERIAL

THE ALUMINIZED TYPE 2 STEEL COILS SHALL CONFORM TO THE APPLICABLE REQUIREMENTS OF AASHTO M274 OR ASTM A929.

PIPE

THE CSP SHALL BE MANUFACTURED IN ACCORDANCE WITH THE APPLICABLE REQUIREMENTS OF AASHTO M36 OR ASTM A760. THE PIPE SIZES, GAGES AND CORRUGATIONS SHALL BE AS SHOWN ON THE PROJECT PLANS.

ALL FABRICATION OF THE PRODUCT SHALL OCCUR WITHIN THE UNITED STATES.

HANDLING AND ASSEMBLY

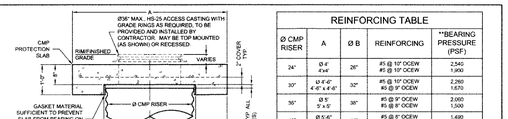
SHALL BE IN ACCORDANCE WITH RECOMMENDATIONS OF THE NATIONAL CORRUGATED STEEL PIPE ASSOCIATION (NCSPA)

INSTALLATION

SHALL BE IN ACCORDANCE WITH AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES, SECTION 26, DIVISION II OR ASTM A798 AND IN CONFORMANCE WITH THE PROJECT PLANS AND SPECIFICATIONS. IF THERE ARE ANY INCONSISTENCIES OR CONFLICTS THE CONTRACTOR SHOULD DISCUSS AND RESOLVE WITH THE SITE ENGINEER.

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

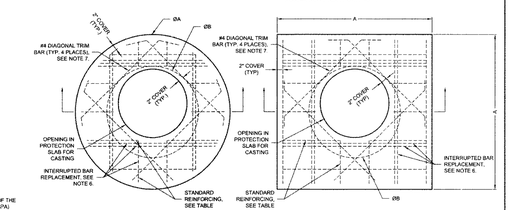
MATERIAL SPECIFICATION
SCALE: N.T.S.



SECTION VIEW

REINFORCING TABLE				
Ø CMP RISER	A	Ø B	REINFORCING	**BEARING PRESSURE (PSF)
24"	Ø 4' 4"x4'	26"	#5 @ 10" OCEW #5 @ 10" OCEW	2,540 1,900
30"	Ø 4' 6" x 4'-6"	32"	#5 @ 10" OCEW #5 @ 7" OCEW	2,260 1,670
36"	Ø 5' 5' x 5'	38"	#5 @ 9" OCEW #5 @ 6" OCEW	2,000 1,500
42"	Ø 5'-6" x 5'-6"	44"	#5 @ 8" OCEW #5 @ 6" OCEW	1,490 1,370
48"	Ø 6' 6' x 6'	50"	#5 @ 7" OCEW #5 @ 7" OCEW	1,210 1,270

** ASSUMED SOIL BEARING CAPACITY



ROUND OPTION PLAN VIEW

SQUARE OPTION PLAN VIEW

NOTES:

1. DESIGN IN ACCORDANCE WITH AASHTO. 17th EDITION AND ACI 350.
2. DESIGN LOAD HS25.
3. EARTH COVER = 1' MAX.
4. CONCRETE STRENGTH = 4,000 psi
5. REINFORCING STEEL = ASTM A615. GRADE 60.
6. PROVIDE ADDITIONAL REINFORCING AROUND OPENINGS EQUAL TO THE BARS INTERRUPTED, HALF EACH SIDE. ADDITIONAL BARS TO BE IN THE SAME PLANE.
7. TRIM OPENING WITH DIAGONAL #4 BARS. EXTEND BARS A MINIMUM OF 12" BEYOND OPENING. BEND BARS AS REQUIRED TO MAINTAIN BAR COVER.
8. PROTECTION SLAB AND ALL MATERIALS TO BE PROVIDED AND INSTALLED BY CONTRACTOR.
9. DETAIL DESIGN BY DELTA ENGINEERS, ARCHITECTS AND LAND SURVEYORS, ENCWELL, NY.

MANHOLE CAP DETAIL
SCALE: N.T.S.

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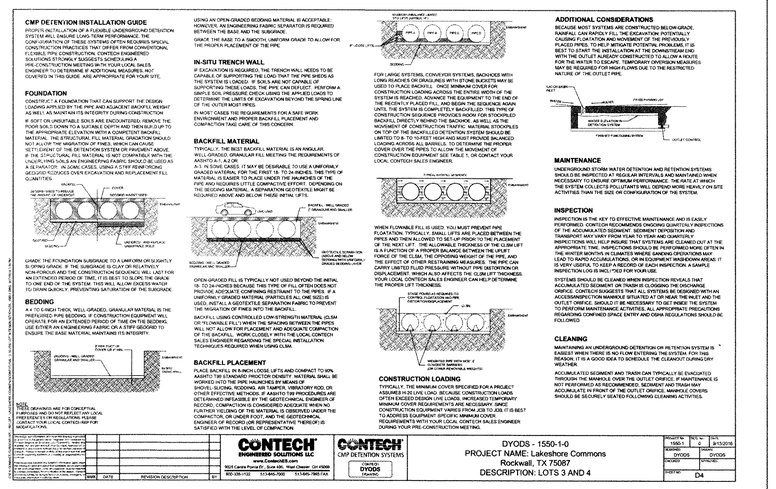
CONTECH CMP DETENTION SYSTEMS
CONTECH PROPOSAL DRAWING

60" UNDERGROUND DETENTION SYSTEM - 536951-20
LAKESHORE COMMONS - ROCKWALL, TX
ROCKWALL, TX Solid
SITE DESIGNATION: LOTS 3&4

PROJECT No.	REQ No.	DATE
536951	20	1/26/2017
DESIGNED	DRAWN	
MJR	LMO	
CHECKED	APPROVED	
SHEET NO.		

P3 OF 3



CMP DETENTION INSTALLATION GUIDE

PROPER INSTALLATION OF A FLEXIBLE UNDERGROUND DETENTION SYSTEM WILL ENSURE LONG TERM PERFORMANCE. THE CONFIGURATION OF THESE SYSTEMS often REQUIRES SPECIAL CONSTRUCTION PRACTICES THAT DIFFER FROM CONVENTIONAL FLEXIBLE PIPE INSTALLATIONS. CONTECH ENGINEERED SOLUTIONS LLC (CONTECH) STRONGLY RECOMMENDS THAT THE LOCAL CONSTRUCTION REPRESENTATIVE FROM THE LOCAL SALES ENGINEER TO DETERMINE IF ADDITIONAL MEASURES, NOT COVERED IN THIS GUIDE, ARE APPROPRIATE FOR YOUR SITE.

FOUNDATION

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

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

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

BEDDING

A 6" TO 9" HIGH THICK, WELL GRADED, GRANULAR MATERIAL IS THE PREFERRED PIPE BEDDING. IF CONSTRUCTION EQUIPMENT WILL OPERATE FOR AN EXTENDED PERIOD OF TIME ON THE BEDDING, USE EITHER AN ENGINEERING FABRIC OR A STIFF GEOGRID TO ENSURE THE BASE MATERIAL MAINTAINS ITS INTEGRITY.

USING AN OPEN-GRADED BEDDING MATERIAL IS ACCEPTABLE HOWEVER, AN ENGINEERING FABRIC SEPARATOR IS REQUIRED BETWEEN THE BASE AND THE SUBGRADE.

GRADE THE BASE TO A SMOOTH, UNIFORM GRADE TO ALLOW FOR THE PROPER PLACEMENT OF THE PIPE.

IN-SITU TRENCH WALL

IF EXCAVATION IS REQUIRED, THE TRENCH WALL NEEDS TO BE CAPABLE OF SUPPORTING THE LOAD THAT THE PIPE SHOES AS SUPPORTS. IF THE SOIL IS UNABLE TO SUPPORT THE LOAD, A SHORING SYSTEM MUST BE USED. CONTACT YOUR LOCAL CONTECH SALES ENGINEER TO DETERMINE THE LIMITS OF EXCAVATION BEYOND THE SPRING LINE OF THE OUTER MOST PIPES.

IN MOST CASES, THE REQUIREMENTS FOR A SAFE WORK ENVIRONMENT AND PROPER BACKFILL PLACEMENT AND COMPACTION CAN BE MET WITH CARE OF THIS CONCERN.

BACKFILL MATERIAL

TYPICALLY, THE BEST BACKFILL MATERIAL IS AN ANGULAR, WELL GRADED, GRANULAR FILL MEETING THE REQUIREMENTS OF AASHTO A-1, A-2 OR A-3. IN SOME CASES, IT MAY BE DESIRABLE TO USE A UNIFORMLY GRADED MATERIAL FOR THE FIRST 18 TO 24 INCHES. THIS TYPE OF MATERIAL WILL FLOW EASILY AROUND THE HAUNCHES OF THE PIPE AND REQUIRES LITTLE COMPACTIVE EFFORT. DEPENDING ON THE BEDDING MATERIAL, A SEPARATION GEOTEXTILE MIGHT BE REQUIRED ABOVE AND BELOW THESE WITHIN LIFTS.

OPEN GRADED FILL IS TYPICALLY NOT USED BEYOND THE INITIAL 18- TO 24-INCHES BECAUSE THIS TYPE OF FILL OFTEN DOES NOT FLOW EASILY AROUND THE HAUNCHES OF THE PIPES. IF A FLOWABLE, GRANULAR MATERIAL IS DESIRED TO BE USED, INSTALL A GEOTEXTILE SEPARATION FABRIC TO PREVENT THE MIGRATION OF FINES INTO THE BACKFILL.

BACKFILL USING CONTROLLED LOW-STRENGTH MATERIAL (CLSM OR FLOWABLE FILL) WHEN THE SPACING BETWEEN THE PIPES WILL NOT ALLOW FOR PLACEMENT AND ADEQUATE COMPACTION OF THE BACKFILL. WORK CLOSELY WITH THE LOCAL CONTECH SALES ENGINEER REGARDING THE SPECIAL INSTALLATION TECHNIQUES REQUIRED WHEN USING CLSM.

BACKFILL PLACEMENT

PLACE BACKFILL IN 8-INCH LOOSE LIFTS AND COMPACT TO 95% AASHTO T-99 STANDARD PROCTOR DENSITY. MATERIAL SHALL BE WORKED INTO THE PIPE HAUNCHES BY MEANS OF SHOVELING AND ROD AND TAMPING. USE A HEAVY ROD, OR OTHER EFFECTIVE METHODS, IF AASHTO T-99 PROCEDURES ARE DETERMINED INFEASIBLE BY THE GEOTECHNICAL ENGINEER OF RECORD. COMPACTION IS CONSIDERED ADEQUATE WHEN NO FURTHER YIELDING OF THE MATERIAL IS OBSERVED UNDER THE COMPACTION EQUIPMENT. CONTACT YOUR LOCAL CONTECH ENGINEER OF RECORD OR REPRESENTATIVE IF THERE IT IS SATISFIED WITH THE LEVEL OF COMPACTION.

WHEN AUTOMATED FILL IS USED, YOU MUST PREVENT PIPE FLOATATION. TYPICALLY, SMALL LIFTS ARE PLACED BETWEEN THE PIPES AND THEN ALLOWED TO SET UP PRIOR TO THE PLACEMENT OF THE NEXT LIFT. THE ALLOWABLE THICKNESS OF THE CLSM LIFT IS A FUNCTION OF A PROPER BALANCE BETWEEN THE UPLIFT FORCE OF THE CLSM, THE OPPOSING WEIGHT OF THE PIPE, AND THE SHEAR STRENGTH OF THE CLSM MATERIAL. IN ORDER TO CARRY LIMITED FLUID PRESSURE WITHOUT PIPE DISTORTION OR DISPLACEMENT, WHICH ALSO AFFECTS THE CLSM LIFT THICKNESS, YOUR LOCAL CONTECH SALES ENGINEER CAN HELP DETERMINE THE PROPER LIFT THICKNESS.

CONSTRUCTION LOADING

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

ADDITIONAL CONSIDERATIONS

BECAUSE MOST SYSTEMS ARE CONSTRUCTED BELOW GRADE, RAINFALL CAN RAPIDLY FILL THE EXCAVATION. POTENTIALLY DESTABILIZING THE SUBGRADE AND FLOATING THE PIPE IF NOT PLACED PROPERLY. TO HELP MITIGATE POTENTIAL PROBLEMS, IT IS BEST TO START THE INSTALLATION AT THE DOWNSTREAM END WITH THE OUTLET ALREADY CONSTRUCTED TO ALLOW A ROUTE FOR THE WATER TO ESCAPE. TEMPORARY DIVERSION MEASURES MAY BE REQUIRED FOR HIGH FLOWS DUE TO THE RESTRICTED NATURE OF THE OUTLET PIPE.

MAINTENANCE

UNDERGROUND STORM WATER DETENTION AND RETENTION SYSTEMS SHOULD BE INSPECTED AT REGULAR INTERVALS AND MAINTAINED WHEN NECESSARY TO ENSURE OPTIMUM PERFORMANCE. THE RATE AT WHICH THE SYSTEM COLLECTS POLLUTANTS WILL DEPEND MORE HEAVILY ON SITE ACTIVITIES THAN THE SIZE OR CONFIGURATION OF THE SYSTEM.

INSPECTION

INSPECTION IS THE KEY TO EFFECTIVE MAINTENANCE AND IS EASILY PERFORMED. CONTECH RECOMMENDS ONGOING QUARTERLY INSPECTIONS OF THE ACCUMULATED SEDIMENT. SEDIMENT DEPOSITION AND TRANSPORT MAY VARY FROM YEAR TO YEAR AND QUARTERLY INSPECTIONS WILL HELP INSURE THAT SYSTEMS ARE CLEANED OUT AT THE MOST APPROPRIATE TIMES. THE FREQUENCY OF SEDIMENT DEPOSITION IS A FUNCTION OF A PROPER BALANCE BETWEEN THE UPLIFT FORCE OF THE CLSM, THE OPPOSING WEIGHT OF THE PIPE, AND THE SHEAR STRENGTH OF THE CLSM MATERIAL. IN ORDER TO CARRY LIMITED FLUID PRESSURE WITHOUT PIPE DISTORTION OR DISPLACEMENT, WHICH ALSO AFFECTS THE CLSM LIFT THICKNESS. YOUR LOCAL CONTECH SALES ENGINEER CAN HELP DETERMINE THE PROPER LIFT THICKNESS.

DURING THE FIRST YEAR OF OPERATION, INSPECT THE SYSTEM AT LEAST FOUR TIMES TO ESTABLISH A PATTERN FOR THE MINIMUM FREQUENCY OF INSPECTIONS. THEREAFTER, INSPECT AT LEAST ONCE A YEAR. ADDITIONAL INSPECTIONS MAY BE PERFORMED AT SITES WITH HIGHER POLLUTANT LOADINGS. IT IS RECOMMENDED THAT INSPECTIONS BE PERFORMED DURING THE WET WEATHER TO DETERMINE IF THE SYSTEM IS FUNCTIONING AS DESIGNED. IF BYPASS FLOW IS OBSERVED DURING A STORM EVENT THAT IS SMALLER THAN THE DESIGN STORM, IT IS LIKELY THAT THE SYSTEM NEEDS MAINTENANCE. ALL APPROPRIATE PRECAUTIONS REGARDING CONFINED SPACE ENTRY AND OSHA REGULATIONS SHOULD BE FOLLOWED.

CLEANING

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

ACCUMULATED SEDIMENT AND TRASH CAN TYPICALLY BE EVACUATED THROUGH THE MANHOLE OVER THE OUTLET ORIFICE. IF MAINTENANCE IS NOT PERFORMED AS RECOMMENDED, SEDIMENT AND TRASH MAY ACCUMULATE IN FRONT OF THE OUTLET ORIFICE. MANHOLE COVERS SHOULD BE SECURELY SEATED FOLLOWING CLEANING ACTIVITIES.

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

CONTECH CMP DETENTION SYSTEMS
CONTECH DYODS (Flume)

DYODS - 1550-1-0
PROJECT NAME: Lakeshore Commons
Rockwall, TX 75087
DESCRIPTION: LOTS 3 AND 4

PROJECT No.	REQ No.	DATE
1550-1	0	9/13/2016
DESIGNED	DRAWN	
DYODS	DYODS	
CHECKED	APPROVED	
SHEET NO.	D4	

UDS LOTS 3 & 4 IS DESIGNED FOR FUTURE CONDITIONS

RECORD DRAWING

THIS RECORD DRAWING HAS BEEN PREPARED BASED ON INFORMATION PROVIDED BY OTHERS. THE ENGINEER HAS NOT VERIFIED THE ACCURACY OF THIS INFORMATION AND SHALL NOT BE RESPONSIBLE FOR ANY DISCREPANCIES WHICH MAY BE INCORPORATED HEREIN AS A RESULT.

Hickman Consulting Engineers, Inc.
3094 County Road 1024
Farmersville, Texas 75442
Ph (972)784-2499
markredhick@gmail.com
Engineers Planners

UDS DETAILS
LAKESHORE COMMONS
LOT 1-4; LAKESHORE COMMONS
ROCKWALL, ROCKWALL COUNTY, TEXAS
MOORE WORTH INVESTMENTS, LLC
8445 FREEPORT PARKWAY, SUITE 175
IRVING, TX 75063
214-415-9993

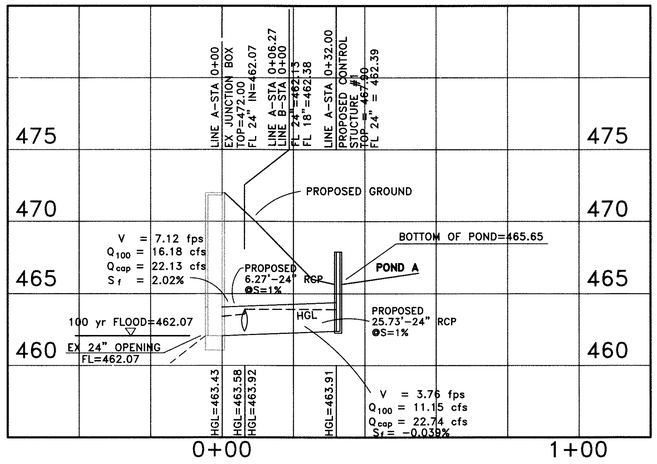
SCALE: N/S
DATE: SEPT2016
DRAWN BY: FP
CHK'D BY: MHH
JOB NO: 1501-357
FILE: 165-1501357-LOWD
DATE OF SUBMITTAL: 03/22/17(C)

Hickman Consulting Engineers, Inc.
STATE OF TEXAS
MARK H. HICKMAN
78409
REGISTERED ENGINEER
PROFESSIONAL
4/24/16
F-12172

REVISION	DESCRIPTION	DATE	BY

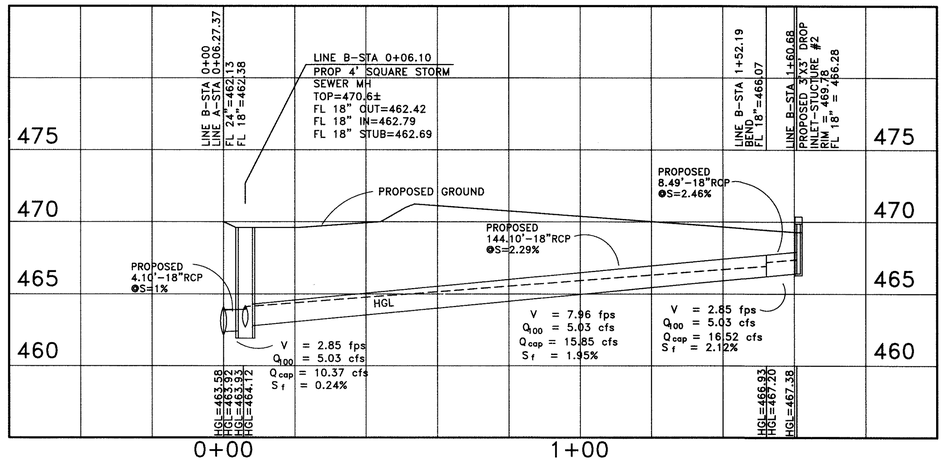
SHEET
C-9

SCALE: HORIZ 1"=20'
VERT 1"=5'



STORM SEWER PROFILE – LINE A

SCALE: HORIZ 1"=20'
VERT 1"=5'



STORM SEWER PROFILE – LINE B

NOTE:
CONC ENCASE WATER LINE WHERE
9' OF HORIZONTAL & VERTICAL CLEARANCE
TO SANITARY SEWER LINE CANNOT BE MAINTAINED
ENCASEMENT SHALL BE CENTERED ON CROSSING
AND EXTENDED 10' EACH WAY–TOTAL 20' ENCASEMENT

CONC ENCASE SANITARY SEWER LINE WHERE
2' OF VERTICAL CLEARANCE TO STORM SEWER
LINE CANNOT BE MAINTAINED
ENCASEMENT SHALL BE CENTERED ON CROSSING
AND EXTENDED 10' EACH WAY–TOTAL 20' ENCASEMENT

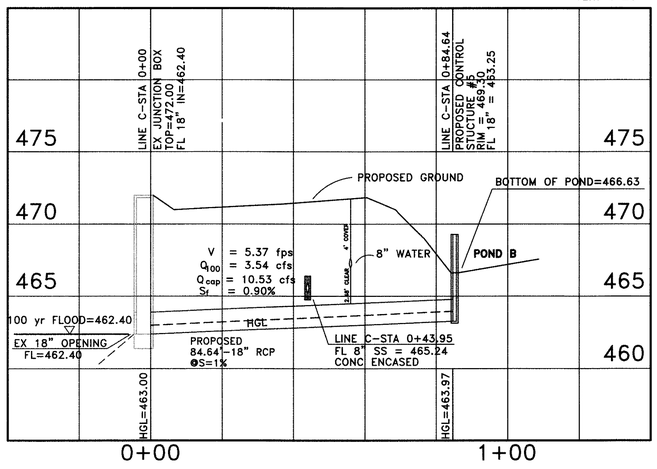
NOTES

2) OFFSITE BENCHMARK – STEEL ROD W/ACCESS CAP STAMPED N 1495 1986 ⊕ THE INTERSECTION OF THE NORTH LINE OF AIRPORT ROAD WITH THE WEST LINE OF THE AIRPORT ACCESS ROAD.
ELEVATION = 566.70' (VERTICAL DATUM: NAVD 1988)

BM#1 = 1/2" IRON ROD WITH CAP STAMPED "STOVALL TRAVERSE" LOCATED AT THE INTERSECTION OF THE SOUTH LINE OF LAKESHORE DRIVE WITH THE WEST LINE OF STATE HIGHWAY NO. 205.
ELEVATION = 475.76'

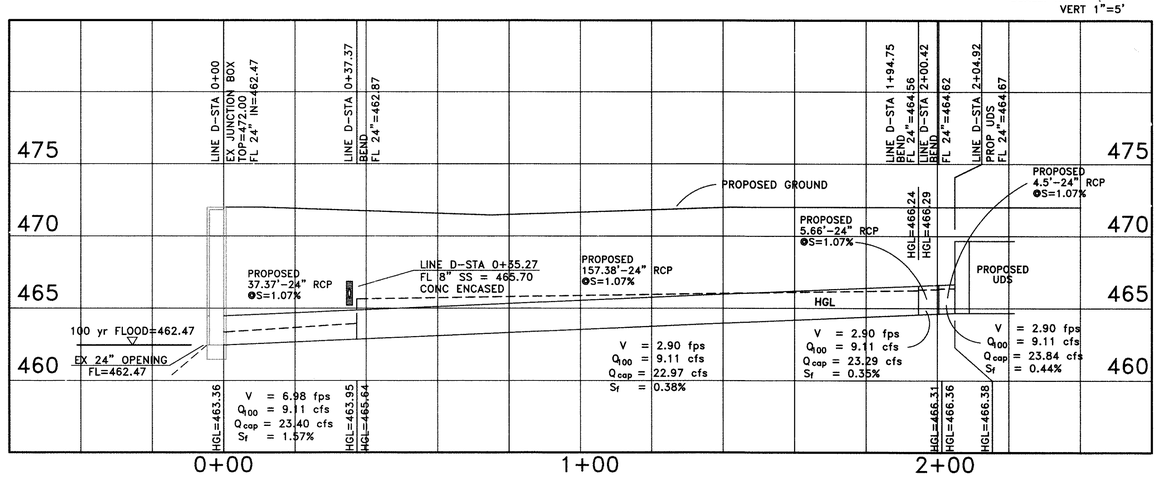
BM#2 = "X" CUT ON TOP OF INLET IN THE NORTH LINE OF PECAN VALLEY DRIVE ± 554' WEST OF STATE HIGHWAY NO. 205.
ELEVATION = 465.31'

SCALE: HORIZ 1"=20'
VERT 1"=5'



STORM SEWER PROFILE – LINE C

SCALE: HORIZ 1"=20'
VERT 1"=5'



STORM SEWER PROFILE – LINE D

RECORD DRAWING

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Hickman Consulting Engineers, Inc.
3094 County Road 1024
Farmersville, Texas 75442
Ph (972)784-2499
markredhick@gmail.com
Engineers Planners

STORM SEWER PROFILES

LAKESHORE COMMONS
LOTS 1 – 4; LAKESHORE COMMONS
ROCKWALL, ROCKWALL COUNTY, TEXAS
MOORE WORTH INVESTMENTS, LLC
8445 FREEPORT PARKWAY, SUITE 175
IRVING, TX 75063
214-415-9993

SCALE: AS SHOWN
DATE: AUG2016
DRAWN BY: FP
CHK'D BY: MHH
JOB NO: 1501-357
FILE:I:\65-1501\357-LCMD
DATE OF SUBMITTAL: 03/22/17(F)

Hickman Consulting Engineers, Inc.
STATE OF TEXAS
MARK H. HICKMAN
78409
REGISTERED PROFESSIONAL ENGINEER
3/31/16
F-12172

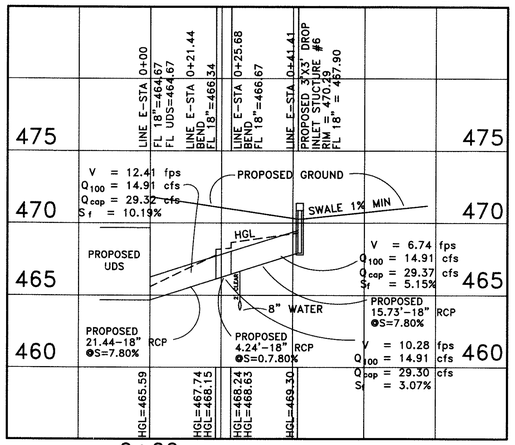
REVISION	DESCRIPTION	DATE	BY

SHEET
C-10

NOTE:
CONC ENCASE WATER LINE WHERE
9' OF HORIZONTAL & VERTICAL CLEARANCE
TO SANITARY SEWER LINE CANNOT BE MAINTAINED
ENCASEMENT SHALL BE CENTERED ON CROSSING
AND EXTENDED 10' EACH WAY-TOTAL 20' ENCASEMENT

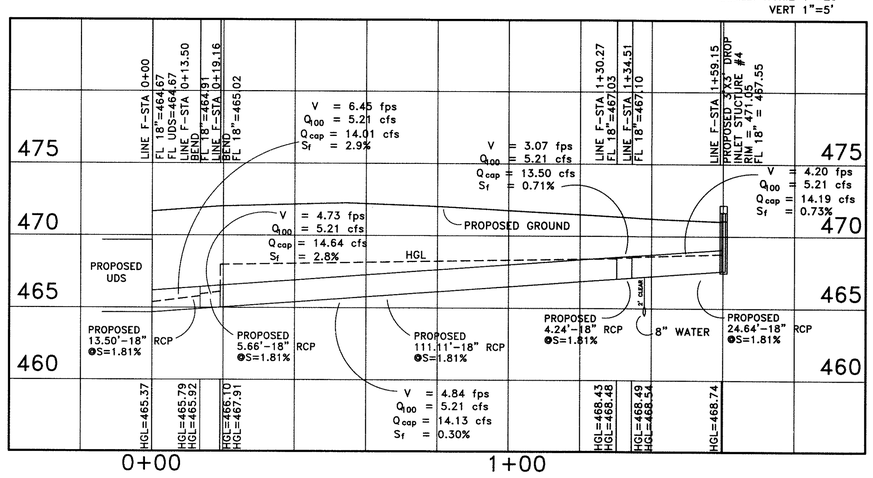
CONC ENCASE SANITARY SEWER LINE WHERE
2' OF VERTICAL CLEARANCE TO STORM SEWER
LINE CANNOT BE MAINTAINED
ENCASEMENT SHALL BE CENTERED ON CROSSING
AND EXTENDED 10' EACH WAY-TOTAL 20' ENCASEMENT

SCALE: HORIZ 1"=20'
VERT 1"=5'



STORM SEWER PROFILE – LINE E

SCALE: HORIZ 1"=20'
VERT 1"=5'



STORM SEWER PROFILE – LINE F

NOTES

2) OFFSITE BENCHMARK – STEEL ROD W/ACCESS CAP STAMPED N 1495 1988 @ THE INTERSECTION OF THE NORTH LINE OF AIRPORT ROAD WITH THE WEST LINE OF THE AIRPORT ACCESS ROAD.
ELEVATION = 566.70' (VERTICAL DATUM: NAVD 1988)

BM#1 = 1/2" IRON ROD WITH CAP STAMPED "STOVALL TRAVERSE" LOCATED AT THE INTERSECTION OF THE SOUTH LINE OF LAKESHORE DRIVE WITH THE WEST LINE OF STATE HIGHWAY NO. 205.
ELEVATION = 475.75'

BM#2 = "X" CUT ON TOP OF INLET IN THE NORTH LINE OF PECAN VALLEY DRIVE ± 554' WEST OF STATE HIGHWAY NO. 205.
ELEVATION = 468.31'

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Farmersville, Texas 75442
Ph (972)784-2499
markredhick@gmail.com
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STORM SEWER PROFILES

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MOORE WORTH INVESTMENTS, LLC
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DATE OF SUBMITTAL: 03/22/17(F)

Hickman Consulting Engineers, Inc.
STATE OF TEXAS
MARK H. HICKMAN
78409
REGISTERED PROFESSIONAL ENGINEER
1/31/18
F-12172

REVISION	DESCRIPTION	DATE	BY

SHEET
C-11

INLET DESIGN CALCULATIONS

INLET ID	LOCATION			DESIGN FREQ	AREA RUNOFF						UPSTREAM BYPASS	TOTAL GUTTER FLOW Qo	GUTTER FLOW														INLET CAPACITY												INLET BYPASS			REMARKS
													THOROUGH-FARE TYPE	ON-GRADE/ SAG	MANNING'S n	LONG SLOPE S	CROWN TYPE	CROSS SLOPE Sx	DEPRESSION		PONDING WIDTH/SPREAD		DEPTH OF GUTTER/FLOW		MAX ALLOWABLE FLOW BASED ON MAX PONDING WIDTH	DEPRESSED GUTTER SEC		SEC BEYOND DEPRESSION		CONVEYANCE		RATIO OF DEPRESSION FLOW TO TOTAL FLOW	EQUIVALENT CROSS-SLOPE	INLET LENGTH		INLET CAPACITY	FLOW	C*A	TO INLET ID	
																			DEPTH	WIDTH	(allow)	(actual)	(allow)	(actual)	Qallowable gutter	AREA	WETTED PERIMETER	AREA	WETTED PERIMETER	DEPRESSION SECTION	SECTION BEYOND DEPRESSION			REQUIRED	ACTUAL				
	ALIGNMENT	STATION	OFFSET	yr	C	AREA ID	Tc min	INTENSITY I in/hr	AREA A acres	RUNOFF Q cfs	cfs	cfs				ft/ft		ft/ft	ft	ft	T_{allow} ft	T_{actual} ft	Y_{allow} ft	Y_{actual} ft	cfs	A_w sf	P_w ft	A_o sf	P_o ft	K_w cfs	K_o cfs	E_o	S_e	$L_{req'd}$ ft	L_{actual} ft	Q_c cfs	Q_{bypass} cfs		
STR #2	LINE B	1+60.68	X	100	0.46	2	10	9.80	0.57	2.57	0	2.57	N/A	SAG	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.5	0.165	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2.6	3'x3'	13.10	0	N/A	N/A	
STR #4	LINE F	1+59.15	X	100	0.46	4	10	9.80	0.59	2.66	0	2.66	N/A	SAG	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.5	0.17	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2.7	3'x3'	13.10	0	N/A	N/A	
STR #6	LINE E	0+41.41	X	100	varies	3a/5/5a	10	9.80	1.69	10.64	0	10.64	N/A	SAG	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.5	0.44	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	9.5	3'x3'	13.10	0	N/A	N/A	

STORM SEWER CALCULATIONS

SYSTEM ID	CONDUIT PROPERTIES														INCREMENTAL DRAINAGE AREA						UP-STREAM Tc	DESIGN STORM FREQ	INTENSITY I	RUNOFF Q	CONDUIT CAPACITY Qc	PARTIAL FLOW	VELOCITY V	TIME IN CONDUIT	FRICTION SLOPE Sf	FRICTION HEAD-LOSS	HGL		HEADLOSS CALCULATIONS						DESIGN HGL	TOP OF CURB ELEV	HGL DEPTH BELOW T/C	REMARKS
	COLLECTION POINT STA		LENGTH	# OF BARRELS	PIPE SIZE	BOX		TYPE	AREA	WETTED PERIMETER Pw	HYDRAULIC RADIUS	MANNING'S n	FLOWLINE ELEVATION		SLOPE	INLET ID	AREA	RUNOFF COEFF	INCRE-MENTAL	ACCUM-ULATED											U/S	D/S	U/S $\frac{V^2}{2g}$	D/S $\frac{V^2}{2g}$	JCT TYPE	COEFF K_J	HEADLOSS H_L			
	U/S	D/S				SPAN	RISE						U/S	D/S			acres	C	C*A	C*A	min	yr	in/hr	cfs	cfs	yes/no	ft/s	min	ft/ft	ft	ft	ft	ft			ft	ft			ft			
LINE A	0+06.27	0+00	6.27	1	24	N/A	N/A	CONC	3.14	3.7	0.57	0.13	462.13	462.07	0.01	STR #1	0.37	0.46	0.63	0.63	10	100	9.80	3.61	22.13	YES	7.69	0.014	0.0238	1.36	463.58	463.43	0.68	0.79	BEND	0.35	0.15	N/A	N/A	N/A	
LINE A	0+32.00	0+06.27	25.73	1	24	N/A	N/A	CONC	3.14	3.1	0.50	0.13	462.39	462.13	0.01		0.80	0.46	0.37	0.37	10	100	9.80	2.57	22.74	YES	7.20	0.06	0.0024	0.34	463.91	463.92	0.30	0.22	INLET	1.5	0	463.91	468.90	4.99	
LINE C	0+84.64	0+00	84.64	1	18	N/A	N/A	CONC	1.77	2.1	0.84	0.13	463.25	462.40	0.01	STR #5	1.22	0.46	0.56	0.56	10	100	9.80	3.54	10.59	YES	5.37	0.26	0.009	0.76	463.97	463.00	0.28	0.45	INLET	0.35	0.97	463.97	470.91	6.94	
LINE B	0+00	0+06.10	6.10	1	18	N/A	N/A	CONC	1.77	4.7	0.38	0.13	462.42	462.38	0.01		1.16	0.46	0.53	0.53	10	100	9.80	5.03	10.37	YES	2.85	0.024	0.0024	0.01	463.93	463.92	0.13	0.13	MH	0.5	0.01	464.12	470.60	6.48	
LINE B	0+06.10	1+52.19	146.09	1	18	N/A	N/A	CONC	1.77	2.0	0.89	0.13	466.07	462.79	0.0229		1.16	0.46	0.53	0.53	10	100	9.80	5.03	15.85	YES	7.96	0.302	0.0195	2.85	466.93	464.12	0.35	0.14	45°BEND	0.37	2.81	N/A	N/A	N/A	
LINE B	1+52.19	1+60.68	8.49	1	18	N/A	N/A	CONC	1.77	4.7	0.38	0.13	466.28	466.07	0.0246	STR #2	1.16	0.46	0.53	0.53	10	100	9.80	5.03	16.52	YES	2.85	0.050	0.0212	0.18	467.38	467.20	0.15	0.30	INLET	1.5	0.18	467.38	469.78	2.40	
LINE D	0+00	0+37.40	37.40	1	24	N/A	N/A	CONC	3.14	2.9	1.08	0.13	462.87	462.47	0.011	UDS	N/A	N/A	N/A	N/A	10	100	9.80	9.11	23.40	YES	6.98	0.089	0.008	0.30	463.95	463.36	0.43	0.71	BEND	0.35	0.59	N/A	N/A	N/A	
LINE D	0+37.40	1+94.75	157.38	1	24	N/A	N/A	CONC	3.14	6.3	0.50	0.13	464.56	462.87	0.010	UDS	N/A	N/A	N/A	N/A	10	100	9.80	9.11	22.97	YES	2.90	0.942	0.002	0.31	466.24	465.64	0.13	0.43	BEND	0.35	0.60	N/A	N/A	N/A	
LINE D	1+94.75	2+00.42	5.67	1	24	N/A	N/A	CONC	3.14	6.3	0.46	0.13	464.62	464.56	0.011	UDS	N/A	N/A	N/A	N/A	10	100	9.80	9.11	23.29	YES	2.90	0.033	0.002	0.01	466.31	466.29	0.15	0.17	BEND	0.35	0.02	N/A	N/A	N/A	
LINE D	2+00.42	2+04.92	4.50	1	24	N/A	N/A	CONC	3.14	6.3	0.46	0.13	464.67	464.62	0.011	UDS	N/A	N/A	N/A	N/A	10	100	9.80	9.11	23.84	YES	2.90	0.026	0.001	0.005	466.38	466.36	0.15	0.16	UDS	1.5	0.02	466.38	472.31	5.93	
LINE E	0+00	0+21.40	21.40	1	18	N/A	N/A	CONC	1.77	2.4	0.38	0.13	466.34	464.67	0.078		1.69	0.90	1.52	1.52	10	100	9.80	14.91	29.32	YES	16.66	0.021	0.031	2.15	467.74	465.59	1.17	2.66	BEND	0.35	2.15	N/A	N/A	N/A	
LINE E	0+21.40	0+25.68	4.28	1	18	N/A	N/A	CONC	1.77	4.7	0.38	0.13	466.67	466.34	0.078		1.69	0.90	1.52	1.52	10	100	9.80	14.91	29.30	YES	8.44	0.008	0.047	0.09	468.24	468.15	1.11	1.11	BEND	0.35	0.09	N/A	N/A	N/A	
LINE E	0+25.68	0+41.41	15.73	1	18	N/A	N/A	CONC	1.77	4.0	0.38	0.13	467.90	466.67	0.078		1.69	0.90	1.52	1.52	10	100	9.80	14.91	29.37	YES	16.69	0.016	0.02	0.67	469.30	468.63	1.17	1.11	INLET	1.5	0.67	469.30	470.29	0.99	
LINE F	0+00	0+13.50	13.50	1	18	N/A	N/A	CONC	1.77	2.1	0.33	0.13	464.91	464.67	0.018		0.59	0.46	0.27	0.27	10	100	9.80	2.66	14.01	YES	7.34	0.031	0.0311	4.22	465.79	465.37	0.36	0.65	BEND	0.35	0.42	N/A	N/A	N/A	
LINE F	0+13.50	0+19.20	5.70	1	18	N/A	N/A	CONC	1.77	4.7	0.41	0.13	465.02	464.91	0.019		0.59	0.46	0.27	0.27	10	100	9.80	2.66	14.64	YES	2.95	0.032	0.0316	0.13	466.10	465.92	0.19	0.35	BEND	0.35	0.18	N/A	N/A	N/A	
LINE F	0+19.20	1+30.30	111.10	1	18	N/A	N/A	CONC	1.77	4.7	0.41	0.13	467.03	465.02	0.018		0.59	0.46	0.27	0.27	10	100	9.80	2.66	14.13	YES	2.95	0.628	0.0047	1.81	468.43	467.91	0.14	0.36	BEND	0.35	0.52	N/A	N/A	N/A	
LINE F	1+30.30	1+34.50	4.20	1	18	N/A	N/A	CONC	1.77	4.7	0.41	0.13	467.10	467.03	0.017		0.59	0.46	0.27	0.27	10	100	9.80	2.66	13.50	YES	2.95	0.024	0.0238	0.05	468.49	468.48	0.14	0.15	BEND	0.35	0.02	N/A	N/A	N/A	
LINE F	1+34.50	1+59.10	24.60	1	18	N/A	N/A	CONC	1.77	4.7	0.41	0.13	467.55	467.10	0.018		0.59	0.46	0.27	0.27	10	100	9.80	2.66	14.19	YES	2.95	0.139	0.0081	0.05	468.74	468.54	0.14	0.27	INLET	1.5	0.20	468.74	472.05	3.31	

RECORD DRAWING

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Hickman Consulting Engineers, Inc.
3094 County Road 1024
Farmersville, Texas 75442
Ph (972)784-2499
markredhick@gmail.com
Engineers Planners

STORM SEWER & INLET CALCS
LAKESHORE COMMONS
LOT 1-4; LAKESHORE COMMONS
ROCKWALL, ROCKWALL COUNTY, TEXAS
MOORE WORTH INVESTMENTS, LLC
8445 FREEPORT PARKWAY, SUITE 175
IRVING, TX 75063
214-415-9993

SCALE: N/A
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CHK'D BY: MHH
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FILE:165-1501357-LDWD
DATE OF SUBMITTAL: 03/22/17(F)

Hickman Consulting Engineers, Inc.
STATE OF TEXAS
MARK H. HICKMAN
78409
REGISTERED PROFESSIONAL ENGINEER
3/31/16
F-12172

REVISION	DESCRIPTION	DATE	BY

SHEET
C-12

BEFORE YOU DIG CALL:
1-800-245-4545

TEXAS ONE CALL SYSTEM

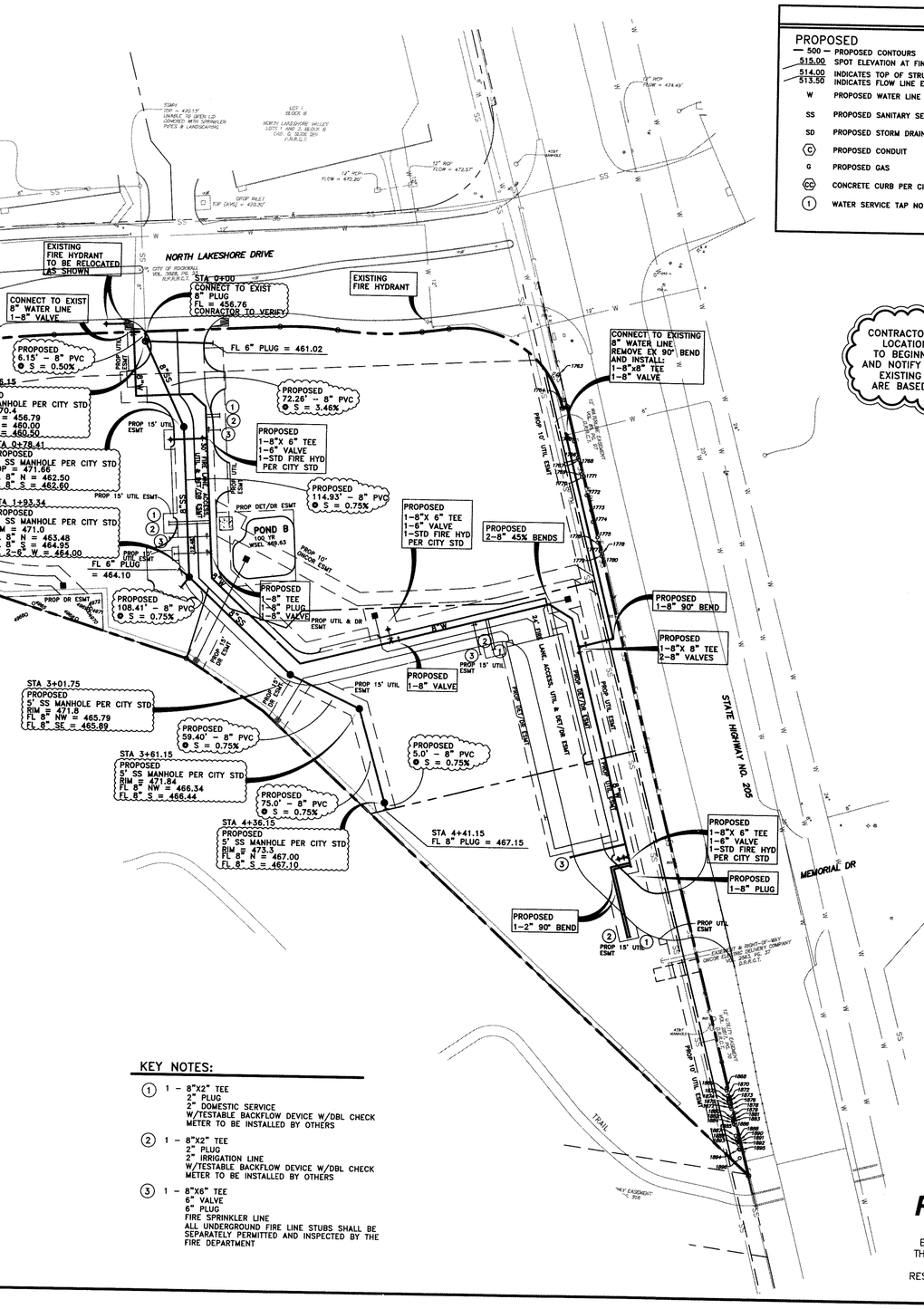
40 0 40 80

Scale 1" = 40'

NOTES:

1 BOUNDARY/TOPO SURVEY PROVIDED BY:

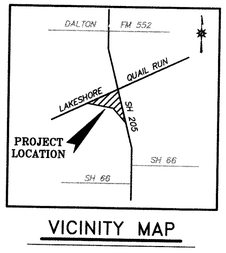
STOVALL & ASSOCIATES LAND SURVEYING
6417 WESLEY STREET
GREENVILLE, TEXAS 75402
903-450-1120



LEGEND

PROPOSED		EXISTING	
500	PROPOSED CONTOURS	∅	POWER POLE
515.00	SPOT ELEVATION AT FINISHED GRADE	⊙	ANCHOR
514.00 / 513.50	INDICATES TOP OF STRUCTURE / INDICATES FLOW LINE ELEVATION	⊗	WATER METER
W	PROPOSED WATER LINE	⋈	WATER VALVE
SS	PROPOSED SANITARY SEWER LINE	⊠	IRRIGATION CONTROL VALVE
SD	PROPOSED STORM DRAIN LINE	⊟	TELEPHONE PEDESTAL
C	PROPOSED CONDUIT	⊛	GAS METER
G	PROPOSED GAS	MB	MAILBOX
CC	CONCRETE CURB PER CITY STD	LP	LIGHT POLE
1	WATER SERVICE TAP NO	◇	FIRE HYDRANT
		BL	BUILDING LINE
		UE	UTILITY EASEMENT
		DUE	DRAINAGE & UTILITY EASEMENT
		FOC	FIBER OPTIC CABLE MARKER
		GAS	GAS SIGN
		SSSB	SUB SURFACE SERVICE BOX
		→	TRAFFIC SIGN
		◈	TRAFFIC SIGNAL
		U.E.	UTILITY EASEMENT
		○	GAS STUB
		⊛	GAS TEST STATION
		BCS	BURIED CABLE SIGN

NOTE:
CONTRACTOR TO VERIFY HORIZONTAL & VERTICAL LOCATION OF ALL EXISTING UTILITIES PRIOR TO BEGINNING ANY CONSTRUCTION/EXCAVATION AND NOTIFY THE ENGINEER OF ANY DISCREPANCIES EXISTING UTILITIES SHOWN ON THESE PLANS ARE BASED ON COMBINATION OF FIELD SURVEY & CITY RECORD DRAWINGS



VICINITY MAP

WATER & WASTEWATER NOTES:

1 ALL WATER AND SANITARY SEWER MAIN CONSTRUCTION WITHIN PUBLIC RIGHT-OF-WAY OR EASEMENT SHALL CONFORM TO THE REQUIREMENTS OF THE TEXAS COMMISSION ON ENVIRONMENTAL QUALITY (TCEQ) GUIDELINES FOR CONSTRUCTION OF PUBLIC WATER AND SEWER SYSTEMS. WATER AND SANITARY SERVICES SHALL BE TESTED IN ACCORDANCE WITH CITY STANDARDS AND SPECIFICATIONS.

2 CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE CITY STANDARD SPECIFICATIONS & NCTCOG 3RD EDITION.

3 CONTRACTOR SHALL MAINTAIN EXISTING SANITARY SEWER AND WATER SERVICE AT ALL TIMES DURING CONSTRUCTION.

4 THE CONTRACTOR SHALL PROVIDE "AS-BUILT" PLANS TO THE OWNER SO THAT THE REPRODUCIBLES OF THE PLANS MAY BE CORRECTED TO REFLECT "AS-BUILT" CONDITIONS.

5 THE CONTRACTOR SHALL BE REQUIRED TO MAINTAIN ALL NECESSARY WARNING AND SAFETY DEVICES (FLASHING LIGHTS, BARRICADES, SIGNS, ETC.) TO PROTECT THE PUBLIC SAFETY AND HEALTH UNTIL ALL WORK HAS BEEN COMPLETED AND ACCEPTED BY THE CITY.

6 THE LOCATION OF EXISTING UTILITIES SHOWN ON THESE PLANS ARE APPROXIMATE. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO LOCATE AND VERIFY IN THE FIELD ANY UTILITIES THAT MAY CONFLICT WITH HIS CONSTRUCTION. CONTRACTOR IS RESPONSIBLE FOR ANY RELOCATION OR ADJUSTMENT COST ASSOCIATED WITH HIS WORK. AT LEAST 48 HOURS PRIOR TO BEGINNING CONSTRUCTION IN THE VICINITY OF EXISTING UNDERGROUND UTILITIES, THE CONTRACTOR SHALL NOTIFY UTILITY COMPANIES TO LOCATE ALL UNDERGROUND UTILITIES.

7 ALL SANITARY SEWER PIPES SHALL SHALL BE SDR 35 CLASS 150 AND SHALL BE TESTED IN ACCORDANCE WITH CITY REQUIREMENTS.

8 ALL DIMENSIONS SHOWN ARE TO CENTERLINE OF PIPE AND RIGHT-OF-WAY OR PROPERTY LINE, UNLESS NOTED OTHERWISE.

9 WATER SERVICES SHALL BE POLY SDR 9, LOCATED AS INDICATED ON THE PLANS. METER BOXES SHALL MEET CITY SPECIFICATIONS.

10 SANITARY SEWER LATERALS SHALL BE AS INDICATED ON THE PLAN.

11 EMBEDMENTS SHALL BE PER CITY REQUIREMENTS.

12 THE CONTRACTOR SHALL PROVIDE A TRENCH SAFETY PLAN AND BE RESPONSIBLE FOR FIELD VERIFYING ALL EXISTING UTILITY LOCATIONS PRIOR TO HIS WORK.

13 ALL WATER METERS ARE TO BE LOCATED IN NON-TRAFFIC AREAS.

14 CONSTRUCTION SHALL NOT PROCEED ABOVE THE FOUNDATION PRIOR TO COMPLETION OF ALL FIRE LANES AND FIRE HYDRANTS.

15 ALL SANITARY SEWER LATERALS OUTSIDE OF EASEMENT SHALL BE INSPECTED BY THE CITY BUILDING INSPECTOR PRIOR TO BACKFILL.

16 A CLEAR SPACE OF 5' SHALL BE MAINTAINED AROUND ALL FIRE HYDRANTS.

17 WHEN TYING TO EXISTING MANHOLES, THE INVERT SHALL BE REWORKED.

18 THE FIRE SYSTEM REQUIRES A SEPARATE PERMIT.

19 PRIVATE WATER LINES AND SEWER LINES REQUIRE A SEPARATE PERMIT.

20 WATER MAIN LINES TO BE CLASS 200 DR-14.

21 ALL MANHOLES TO BE RAVEN LINED OR APPROVED EQUAL.

22 INSTALL BLUE EMS DISK ON THE WATER LINES AT EVERY CHANGE IN DIRECTION, VALVE, SERVICE CONNECTION AND 250'.

23 INSTALL GREEN EMS DISK ON THE SANITARY SEWER LINES AT EVERY CHANGE IN DIRECTION, MANHOLE, CLEANOUT AND SERVICE CONNECTION.

24 MIN SEPARATION BETWEEN FIRE SPRINKLER LINE AND ALL OTHER UTILITIES SHALL BE 10'.

25 MIN SEPARATION BETWEEN WATER & SANITARY SEWER LINES SHALL BE 10'.

KEY NOTES:

(1) 1 - 8"X2" TEE
2" PLUG
2" DOMESTIC SERVICE
W/TESTABLE BACKFLOW DEVICE W/DBL CHECK METER TO BE INSTALLED BY OTHERS

(2) 1 - 8"X2" TEE
2" PLUG
2" IRRIGATION LINE
W/TESTABLE BACKFLOW DEVICE W/DBL CHECK METER TO BE INSTALLED BY OTHERS

(3) 1 - 8"X6" TEE
6" VALVE
6" PLUG
FIRE SPRINKLER LINE
ALL UNDERGROUND FIRE LINE STUBS SHALL BE SEPARATELY PERMITTED AND INSPECTED BY THE FIRE DEPARTMENT

NOTES

2) OFFSITE BENCHMARK - STEEL ROD W/ACCESS CAP STAMPED N 1496 1986 @ THE INTERSECTION OF THE NORTH LINE OF AIRPORT ROAD WITH THE WEST LINE OF THE AIRPORT ACCESS ROAD.
ELEVATION = 566.70' (VERTICAL DATUM: NAVD 1988)

BM#1 = 1/2" IRON ROD WITH CAP STAMPED "STOVALL TRAVERSE" LOCATED AT THE INTERSECTION OF THE SOUTH LINE OF LAKESHORE DRIVE WITH THE WEST LINE OF STATE HIGHWAY NO. 205.
ELEVATION = 475.75'

BM#2 = "X" CUT ON TOP OF INLET IN THE NORTH LINE OF PECAN VALLEY DRIVE ± 554' WEST OF STATE HIGHWAY NO. 205.
ELEVATION = 468.31'

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NOTES

2) OFFSITE BENCHMARK – STEEL ROD W/ACCESS CAP STAMPED N 1495 1986 ⊕ THE INTERSECTION OF THE NORTH LINE OF AIRPORT ROAD WITH THE WEST LINE OF THE AIRPORT ACCESS ROAD.
ELEVATION = 566.70' (VERTICAL DATUM: NAVD 1988)

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50 0 50 100
Scale 1" = 50'

PHASE 1–3
PROPOSED
TEMPORARY STONE CONSTRUCTION
ENTRANCE/EXIT

PHASE 1–4
PROPOSED
EROSION CONTROL SILT
FENCE

PHASE 2–3
PROPOSED
INLET PROTECTION
FENCE

PHASE 1–4
PROPOSED
EROSION CONTROL SILT
FENCE

PHASE 2–3
PROPOSED
INLET PROTECTION
FENCE

PHASE 2–3
PROPOSED
INLET PROTECTION
FENCE

PHASE 1–4
PROPOSED
EROSION CONTROL SILT
FENCE

NORTH LAKESHORE DRIVE

STATE HIGHWAY NO. 205

MEMORIAL DR

POND A
100 YR
WSEL 468.00

POND B
100 YR
WSEL 469.93

LOT 3
BLOCK B
NORTH LAKESHORE VALLEY
LOTS 3, BLOCK B
CAB. H, SLIDE 285
P.R.R.C.T.

LOT 1
BLOCK B
NORTH LAKESHORE VALLEY
LOTS 1 AND 2, BLOCK B
CAB. G, SLIDE 281
P.R.R.C.T.

CITY OF ROCKWALL
VOL. 3688, PG. 23
R.P.R.R.C.T.

RIGHT-OF-WAY DEDICATION
VOL. 87, PG. 31
D.R.R.C.T.

RIGHT-OF-WAY DEDICATION
VOL. 87, PG. 31
D.R.R.C.T.
(TO BE ABANDONED TO BE REC.)

RIGHT-OF-WAY EASEMENT
VOL. 63, PG. 328
D.R.R.C.T.

TEXAS POWER & LIGHT COMPANY
VOL. 87, PG. 31
D.R.R.C.T.

EXISTING PAVED ROADWAY

DIVERSION RIDGE REQUIRED WHERE GRADE EXCEEDS 2%

2% OR GREATER

FILTER FABRIC

SECTION A–A
N.T.S.

SPILLWAY

SEDIMENT BARRIER (SILT FENCE)

NOTE:
USE SANDBAGS, DIVERSIONS OR OTHER APPROVED METHODS TO CHANNELIZE RUNOFF TO SEDIMENT BARRIER AS REQUIRED

SUPPLY WATER TO WASH WHEELS IF NECESSARY

FLOW

FLOW

EXISTING PAVED ROADWAY

4"–6" COURSE AGGREGATE MIN. 12" THICK NO CRUSHED CONC ALLOWED

20' MIN.

DIVERSION RIDGE 50' MIN.

TEMPORARY STONE CONSTRUCTION ENTRANCE / EXIT
N.T.S.

STEEL TEE POST PLACED AT 8' OC (APPROX)

AMXCO SILT STOP SF 26 FILTER FABRIC OR EQUAL

BACKFILL

NATURAL GROUND

NATURAL GROUND

2.4"

2.4"

6"

6"

6"x6" TRENCH

FILTER FABRIC TO EXTEND INTO TRENCH

SILT FENCE
N.T.S.

EROSION CONTROL NOTES

1. SOIL EROSION AND SEDIMENT CONTROL SHALL BE PROVIDED IN ACCORDANCE WITH THE CURRENT CITY SEDIMENT AND EROSION CONTROL ORDINANCE.
2. SEDIMENT TRAPS, SILT FENCE, AND OTHER MEASURES INTENDED TO TRAP SEDIMENT ON–SITE MUST BE CONSTRUCTED AND FUNCTIONAL BEFORE ANY GRADING OR LAND DISTURBANCE TAKES PLACE.
3. PERMANENT OR TEMPORARY SOIL STABILIZATION MUST BE APPLIED TO DENUDED AREAS WITHIN FIFTEEN (15) DAYS AFTER FINAL GRADE IS REACHED ON ANY PORTION OF THE SITE. SOIL STABILIZATION MUST ALSO BE APPLIED WITHIN FIFTEEN (15) DAYS TO DENUDED AREAS WHICH MAY NOT BE AT FINAL GRADE BUT WILL REMAIN DORMANT (UNDISTURBED) FOR LONGER THAN SIXTY (60) DAYS. (INCLUDES APPLICATION OF BASE MATERIAL ON AREAS TO BE PAVED.
4. THE CITY\COUNTY & APPROPRIATE STATE AGENCIES SHALL MAKE A CONTINUING REVIEW AND EVALUATION OF THE METHOD USED AND THE OVERALL EFFECTIVENESS OF THE EROSION CONTROL PROGRAM. IF AN EROSION AND SEDIMENT ON–SITE INSPECTION INDICATES THAT THE APPROVED CONTROL MEASURES ARE NOT EFFECTIVE IN CONTROLLING EROSION AND SEDIMENTATION OR IF BECAUSE OF CHANGED CIRCUMSTANCES, THE APPROVED PLAN CAN NOT BE CARRIED OUT, ADDITIONAL MEASURES MAY BE REQUIRED TO BE INSTALLED.
5. ALL EROSION CONTROL DEVICES SHALL BE INSPECTED DAILY BY THE SITE FOREMAN. ANY STRUCTURES THAT ARE DAMAGED OR INOPERATIVE WILL BE IMMEDIATELY REPAIRED OR REPLACED.
6. CONTRACTOR TO CONSTRUCT A PIT OR WASH BASIN FOR "WASH OUT" OF CONCRETE TRUCKS. CONTRACTOR TO CONSTRUCT AN ENCLOSER TO STORE ALL TRASH AND WASTE MATERIALS UNTIL PROPER DISPOSAL AT OFF–SITE FACILITY.
7. CONTRACTOR TO SUPPLY SPILL PROTECTION FOR ANY TEMPORARY FUEL STORAGE TANK ON SITE DURING CONSTRUCTION.
8. EROSION CONTROL DEVICES AS SHOWN ON THE EROSION CONTROL PLAN FOR THE PROJECT SHALL BE INSTALLED PRIOR TO THE START OF LAND DISTURBING ACTIVITIES ON THE PROJECT.
9. ALL EROSION CONTROL DEVICES ARE TO BE INSTALLED IN ACCORDANCE WITH THE APPROVED PLANS AND SPECIFICATIONS FOR THE PROJECT. CHANGES ARE TO BE APPROVED BEFORE CONSTRUCTION BY THE DESIGN ENGINEER AND THE CITY ENGINEERING DEPT.
10. IF THE EROSION CONTROL PLAN AS APPROVED CANNOT CONTROL EROSION AND OFF–SITE SEDIMENTATION FROM THE PROJECT THE EROSION CONTROL PLAN WILL BE REQUIRED TO BE REVISED AND/OR ADDITIONAL EROSION CONTROL DEVICES WILL BE REQUIRED ON SITE.
11. IF OFF–SITE SOIL BORROW OR SPOIL SITES ARE USED IN CONJUNCTION WITH THIS PROJECT, THIS INFORMATION SHALL BE DISCLOSED AND SHOWN ON THE EROSION CONTROL PLAN. OFF–SITE BORROW AND SPOIL AREAS ARE CONSIDERED A PART OF THE PROJECT SITE AND THEREFORE SHALL COMPLY WITH CITY EROSION CONTROL REQUIREMENTS. THESE AREAS SHALL BE STABILIZED WITH PERMANENT GROUND COVER PRIOR TO FINAL APPROVAL OF THE PROJECT.
12. MOWABLE VEGETATION SHALL BE ESTABLISHED PRIOR TO RECEIVING A CERTIFICATE OF OCCUPANCY.

NOTE:
GENERAL CONTRACTOR TO BE RESPONSIBLE FOR INSTALLING & MAINTAINING ALL EROSION CONTROL DEVICES PER CITY OF ROCKWALL REQUIREMENTS & STANDARDS

CONSTRUCTION SEQUENCE

PHASE 1 – GRADING
PHASE 2 – UTILITY INSTALLATION
PHASE 3 – PAVING
PHASE 4 – LANDSCAPE/SOIL STABILIZATION

DISTRUBED AREA:

4.56 Ac±

SILT FENCE

SILT FENCE SHOULD BE INSPECTED WEEKLY AND AFTER MAJOR RAIN EVENTS TO ENSURE THAT THE DEVICE IS FUNCTIONING PROPERLY. REMOVE SEDIMENT FROM BEHIND FENCE WHEN THE DEPTH OF SEDIMENT HAS BUILT UP TO ONE–THIRD THE HEIGHT OF THE FENCE ABOVE GRADE. INSPECT THE BASE OF THE FENCE TO ENSURE THAT NO GAPS HAVE DEVELOPED AND RE–TRENCH AS NECESSARY. INSPECT FENCE POSTS TO ENSURE THAT THEY ARE PROPERLY SUPPORTING THE FENCE. STRAIGHTEN, RESET AND ADD POSTS IF NECESSARY. IF FILTER FABRIC IS RIPPED, DAMAGED OR DETERIORATED, REPLACE IT IN ACCORDANCE WITH THE ORIGINAL SPECIFICATIONS AND DETAILS.

INLET PROTECTION

CURB INLET PROTECTION SHOULD BE INSPECTED WEEKLY AND AFTER MAJOR RAIN EVENTS TO ENSURE THAT THE DEVICE IS FUNCTIONING PROPERLY. REMOVE SEDIMENT FROM THE STORAGE AREA WHEN THE DEPTH OF SEDIMENT HAS BUILT UP TO ONE–HALF OF THE STORAGE DEPTH. IF DEWATERING OF THE STORAGE VOLUME IS NOT OCCURING, CLEAN OR REPLACE THE FILTER STONE. CLEAN THE FILTER STONE SURFACE THE FIRST FEW TIMES BY RAKING. REPEATED SEDIMENT BUILD–UP WILL REQUIRE FILTER STONE REPLACEMENT.

CONSTRUCTION ENTRANCE

INSPECTIONS SHOULD BE MADE WEEKLY AND AFTER RAIN STORM EVENTS TO ENSURE THAT THE DEVICE IS FUNCTIONING PROPERLY. WHEN SEDIMENT OR MUD HAS CLOGGED THE VOID SPACES BETWEEN THE STONES OR MUD IS BEING TRACKED ONTO THE PUBLIC ROADWAY THE AGGREGATE PAD MUST BE WASHED DOWN OR REPLACED. RUNOFF FROM THE WASHDOWN OPERATION SHALL NOT BE ALLOWED TO DRAIN DIRECTLY OFF SITE WITHOUT FIRST FLOWING THROUGH ANOTHER BMP TO CONTROL OFF–SITE SEDIMENTATION. PERIODIC RE–GRADING OR THE ADDITION OF NEW STONE MAY BE REQUIRED TO MAINTAIN THE EFFICIENCY OF THE INSTALLATION.

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Hickman Consulting Engineers, Inc.
3094 County Road 1024
Farmersville, Texas 75442
Ph (972)784–2499
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EROSION CONTROL PLAN

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GENERAL NOTES:

1) ALL WORK WITHIN RIGHT-OF-WAY SHALL CONFORM TO CITY STANDARDS AND DETAILS & NCTCOG 3RD EDITION.

2) EXISTING UTILITIES SHOWN ARE FROM AVAILABLE RECORDS. LOCATIONS SHOWN ARE GENERALLY SCHEMATIC IN NATURE AND MAY NOT ACCURATELY REFLECT THE SIZE AND LOCATION OF EACH PARTICULAR UTILITY. SOME UTILITY LINES MAY NOT BE SHOWN. CONTRACTOR SHALL ASSUME RESPONSIBILITY FOR ACTUAL FIELD LOCATION AND PROTECTION OF EXISTING FACILITIES WHETHER SHOWN OR NOT. CONTRACTOR SHALL ALSO ASSUME RESPONSIBILITY FOR REPAIRS TO EXISTING FACILITIES, WHETHER SHOWN OR NOT, DAMAGED BY CONTRACTOR'S ACTIVITIES. DIFFERENCES IN HORIZONTAL OR VERTICAL LOCATIONS EXISTING UTILITIES SHALL NOT BE A BASIS FOR ADDITIONAL EXPENSES.

3) TRAFFIC FLOW AND ACCESS SHALL BE MAINTAINED DURING ALL PHASES OF THE CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING TRAFFIC SAFETY MEASURES FOR WORK WITHIN THE PUBLIC RIGHT-OF-WAY.

4) THE CONTRACTOR SHALL PROVIDE MATERIAL AND QUALITY CONTROL TESTING AS REQUIRED BY OWNER. TESTS SHALL INCLUDE BUT NOT BE LIMITED TO THE FOLLOWING:
   - DENSITY TESTS FOR GENERAL SITE FILL. (MINIMUM ONE TEST PER LIFT PER 10,000 S.F. FILL.)
   - DENSITY TESTS FOR UTILITY TRENCH BACK FILL (MINIMUM ONE TEST PER 100 L.F. ON EVERY OTHER LIFT)
   - CONCRETE CYLINDER TESTS. (MINIMUM 4 CYLINDERS PER 100 C.Y. OF MATERIAL.)

5) CONTRACTOR SHALL MAINTAIN DRAINAGE AT ALL TIMES DURING CONSTRUCTION. PONDING OF WATER IN STREETS, DRIVES, TRUCK COURTS, TRENCHES, ETC. WILL NOT BE ALLOWED.

6) PAVEMENT REMOVAL AND REPAIR SHALL CONFORM TO CITY GUIDELINES. ALL SAW CUTS SHALL BE FULL DEPTH CUTS. CONTRACTOR SHALL MAKE EFFORTS TO PROTECT CONCRETE EDGES. ANY LARGE SPALLED OR BROKEN EDGES SHALL BE REMOVED BY SAW CUTTING PAVEMENT PRIOR TO REPLACEMENT. DOWEL NEW PAVEMENT TO EXISTING CONCRETE PAVEMENT WITH #6 SMOOTH DOWELS AT 15" C-C EACH FACE. DRILL DOWELS TO A DEPTH OF 12 INCHES AND GROUT OR EPOXY IN PLACE.

7) EARTHWORK OPERATIONS SHALL BE PERFORMED UNDER THE SUPERVISION OF QUALIFIED PERSONNEL WORKING IN CONJUNCTION WITH THE PROJECT GEOTECHNICAL ENGINEER.

8) CONCRETE CURB TO BE CONSTRUCTED PER CITY STANDARDS.

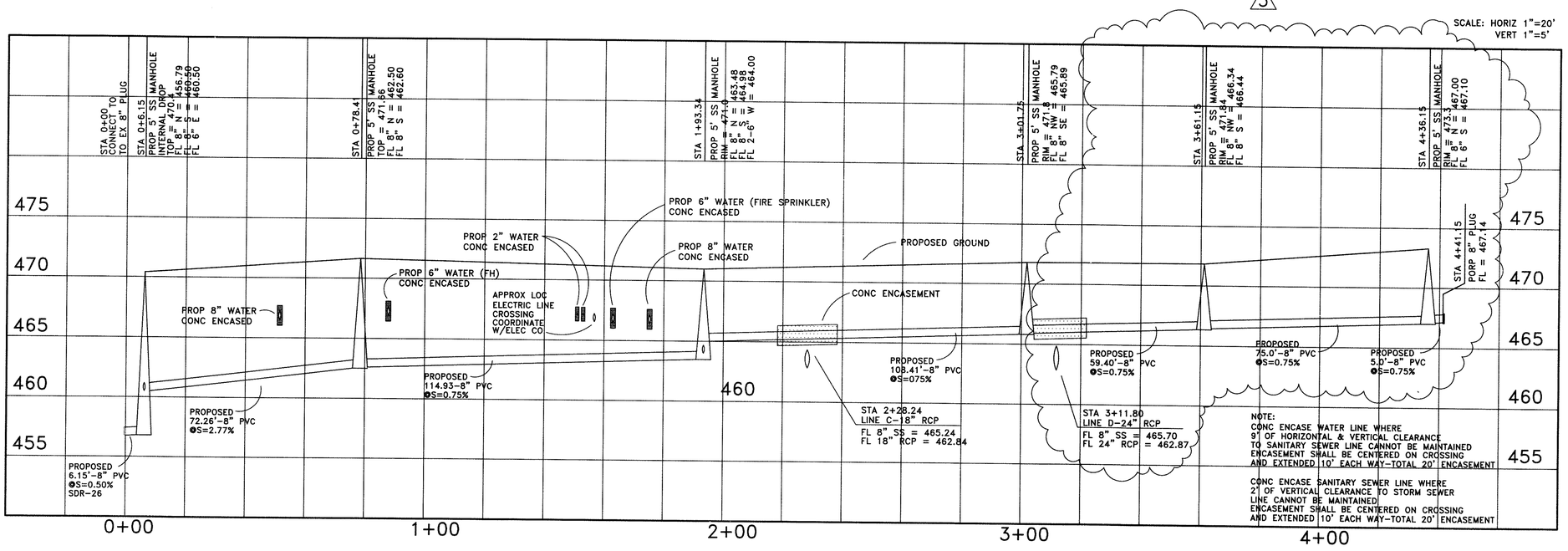
9) SEE LANDSCAPE PLAN PRIOR TO ANY CLEARING AND/OR GRUBBING TO LOCATE WHICH TREES AND SHRUBS WILL REMAIN OR BE RELOCATED.

10) REVIEW UTILITY PLAN PRIOR TO ANY CLEARING AND/OR GRUBBING.

11) REMOVE ALL EXISTING TREES, BUSHES, AND/OR SHRUBS IN THE PATH OF THE SIDEWALK CONSTRUCTION. SPECIAL LANDSCAPE FEATURES TO BE REPLACED WHEN DETERMINED BY THE CITY ENGINEER.

12) ALL EXPANSION JOINTS TO BE CONSTRUCTED AT EVERY 40 FEET, AT CURBS AND AT ALL DRIVEWAYS.

13) ALL CONSTRUCTION JOINTS SHALL BE PLACED AT 4 OR 5 FOOT INTERVALS ON 4 FOOT WIDE SIDEWALK AND AT EVERY 6 FOOT INTERVALS ON 6 FOOT SIDEWALKS.



SANITARY SEWER PROFILE

SEE NCTCOG 3RD EDITION FOR ADDITIONAL SPECIFICATIONS AND DETAILS

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5	REV SS PROFILE	06-26-18	FP

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C-15