January 31, 2025
AVO 37449.004

Ms. Ramie Hammonds
Development Services Director/Building Official
City of Sanger
201 Bolivar Street
P.O. Box 1729
Sanger, Texas 76266

Re: **Chapman Crossing Drainage Study/Downstream Assessment -Review #1**

Dear Ms. Hammonds,

Halff Associates, Inc. was requested by the City of Sanger to review the drainage study in support of the final plat/construction plans for the Chapman Crossing development. The submittal was prepared by mmm inc. and was received on January 17, 2023.

We have completed our review and offer the following comments. Please refer to City of Sanger Subdivision Regulations, article 10.100 and Denton County Subdivision Rules and Regulations dated July 2009.

General Comments

1. This phase appears to be part of the Sanger Malouf development preliminary plat. Please address applicable outstanding comments from drainage study in support of the preliminary plat (review letter dated 04/03/2024).
2. Is this drainage study in support of the final plat and construction plans for Birchway development (Phase 1) or will it be a separate study. Please explain. Please note, plans and pond for Phase 1 were not reviewed with this study.
3. Please show and label the preliminary platted area and Phase boundaries on the landuse exhibits. Also, include a full buildout scenario to represent the hydrologic and hydraulic conditions for the developed conditions of the overall development.
4. Please address comments on attached markups and provide annotated responses on markups. Please note, not all comments are written on letter since some comments are easier to show and explain on the markups. Please annotate markup with responses.
5. Please address final plat and construction plans comments provided separately. Please note an accepted drainage study is required prior to construction plans acceptance.
6. Please show all pond and channel/swale/SD drainage easements on plat. Provide minimum finished floor elevations on Final Plat and on grading plan (2’ above fully developed 100-yr water surface elevation) for lots surrounding ponds or channels.
7. Verify that a USACE Section 404 of Clean Water Act investigation was/will be conducted. Placement of fill at existing channels and ponds may require authorization by an appropriate Section 404 permit. Provide results of investigation with the drainage

study in support of the construction plans. Show and label any wetlands and/or Water of the US on grading plans.

8. Please note, proposed pond will need a maintenance agreement. Please submit after construction plans are accepted.

Hydrology and Hydraulic

9. Provide total drainage area at each outfall and extend analysis at each outfall thru the zone of influence based on the 10% rule. Please verify any adverse impacts thru the zone of influence caused by timing of the peak flow at ponds. Delaying the peak from a site may result in higher peaks downstream. (Section 10.106 (d)).
10. Provide HMS analysis for the more frequent events (Denton County 2-yr, 5-yr, 25-yr, and 50-yr flood events)
11. Please account for existing natural detention at drainage area B-C10.
12. Based on rational method calculations, flow is increased at site's outfall design point 1. Please provide pre- and post- development hydraulic analysis and verify capacity and no adverse impact of existing receiving ditch. Refer to Drainage Area map markup, sheet C10.
13. Is a swale proposed to direct OS2 north along the east property line? Please provide hydraulic calculations. Also extend proposed swale/ditch along Belz Road to convey road flow. Refer to markups on drainage area map sheet C10.
14. It appears drainage areas G and F will flow downstream of pond outfall. Please provide hydraulic calculation of channel/spreader. Use RAS with lateral weir for analysis; refer to drainage area map markup. Ensure no supercritical channels. For street flow please provide curb inlets.
15. Can drainage areas G and F be directed to pond and just upsize the pond outfall to result in the same 100-yr water surface elevation and outflow?
16. Provide details and profile of pond outflow pipes and account for tailwater from receiving ditch. Include cross sections with dimensions, slopes results, freeboard and easement/property/ROW lines. Include 100-yr flow and velocities and ensure appropriate dissipation. See markup sheet C11.0
17. Account for backwater from when calculating the elevation vs Q rating curves for proposed ponds. A RAS analysis will be needed to determine backwater from receiving creek/swales/ditches. Provide outflow backwater rating calculations.
18. Include flow and velocity at primary spillways and provide ensure appropriate armoring at spillway and embankment.
19. Address comments on pond sheets C11 and C11.1 and provide annotated responses.
20. Please provide hydraulic calculations to verify proposed concentrated flow at pond outfall mimics existing hydraulic conditions at outfall. Provide a pre- and post-

development RAS analysis and verify no significant increases in velocities and water surface elevations. See sheet C11.1 for suggested cross section layout

The Engineer shall revise the hydrologic study and/or plans in accordance with the above comments and/or provide a written response that addresses each comment. If you have any questions or need additional information, please do not hesitate to call me at (817) 764-7466.

Sincerely,

HALFF ASSOCIATES, INC.
Firm No. 0312

Emilia Yanagi

Emilia Yanagi, P.E., CFM
Review Consultant for the City of Sanger

Attachments: Drainage Study and Plans markups

- A detention pond was designed to match existing conditions by turning the point discharge generated by development into sheet flow onto the adjacent site. Refer to **Appendix A** for the construction plans detailing the pond and level spreader specifics. The pond was modeled in HEC-HMS with an elevation-area curve. Outfalls consisted of three groups of culverts, a weir and an emergency spillway. See table below for a pond summary table.

Pond A Results					
Storm (year)	**Peak inflow (cfs)**	**Peak Outflow (cfs)**	**WSEL**	**Storage (ac-ft)**	**Freeboard**
10	203.28	87.38	692.65	5.34	1.85
100	312.85	150.68	693.44	7.64	1.06
Outfall Structure	Structure A	5 - 2' RCP Culverts		FL=	690.50
	Structure B	2' RCP Culvert		FL=	690.60
	Structure C	2' RCP Culvert		FL=	690.80
	Structure D	10' Broad Crested Weir		FL=	692.80
	Overflow	200' Broad Crested Weir		FL=	694.50
Top of Bank	694.50				

Table 5 Pond A Summary Table

- Several onsite areas do not pass throug enter the level spreader. These areas are A12, A13, A15 & A16. They are all m the total discharge offsite.
- To demonstrate the impact of Phase II us Phase II discharge comparison of flow at all analysis points and the Junct e detention pond, J_A.1 is shown in the table below.

Add contributing DA. Ensure analysis extend thru the zone of influence based on the 10% rule

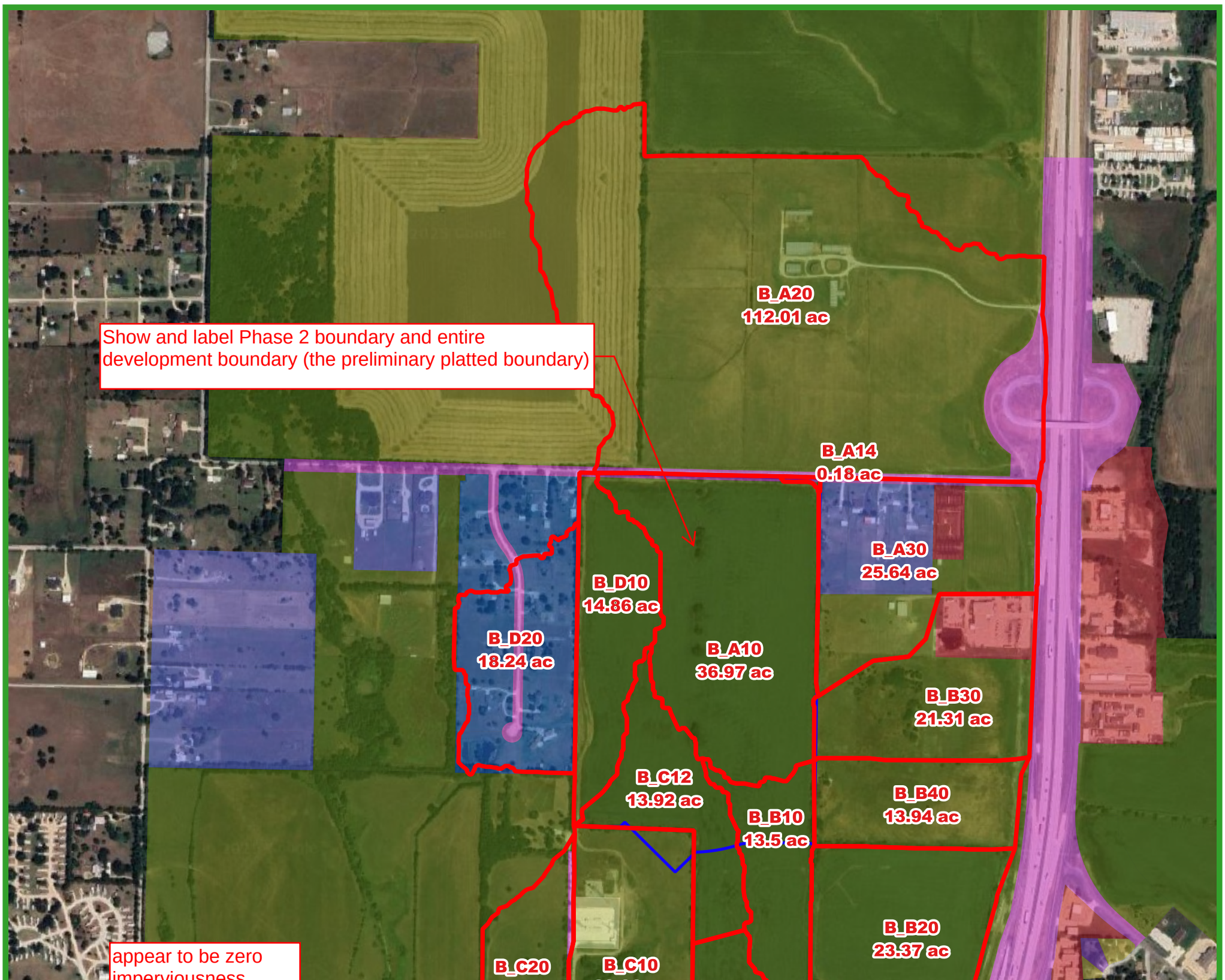
Please include the 2yr, 25yr, and 50yr.

Junction	Existing Discharge (cfs)		Phase II Discharg			
	10-Yr	**100-Yr**	**10-Yr**	**100-Yr**	**10-Yr**	**100-Yr**
J_A	409.6	686.7	405.3	682.9	-4.3	-3.8
J-A.1	126.5	211.7	119.3	203.9	-7.2	-7.8
J_B	242.5	405.4	177.9	280.0	-53.1	-111.5
J_C	205.4	350.7	195.7	328.4	-9.7	-22.3
J_D	109.5	180.2	97.1	157.0	-12.4	-23.2

Table 6 Existing vs Phase II Runoff Comparison

- As shown in the results above, there are no increases in discharge in Phase II conditions.

Include analysis of the full build-out scenario



Existing Percent Impervious Breakdown

Area Name	Land Use	Percent Impervious	Area (ac)	Area Name	Land Use	Percent Impervious	Area (ac)
B_D20	Vacant	3	0.1277	B_B20	Vacant	3	23.3683
B_D20	Road w/ROW	72	1.4848	B_B10	Vacant	3	13.5032
B_D20	Residential 1 ac	25	16.6242	B_B10	Commercial	85	0.0014
B_D10	Vacant	3	14.805	B_A30	Vacant	3	13.0727
B_A30	Residential 2+ ac	15	9.7389	B_A30	Road w/ROW	72	1.2398
B_A30	Commercial	85	1.7717	B_D10	Road w/ROW	72	0.0588
B_A20	Vacant	3	105.0238	B_C20	Vacant	3	14.0589
B_A20	Road w/ROW	72	6.9847	B_C20	Road w/ROW	72	0.6276
B_A10	Vacant	3	36.2592	B_C20	Industrial	72	0.0367
B_A10	Road w/ROW	72	0.7044	B_C10	Vacant	3	41.2907
B_A10	Residential 2+ ac	15	0.0062	B_C10	Road w/ROW	72	0.1495
B_B30	Vacant	3	16.4068	B_C10	Industrial	72	1.8261
B_B30	Road w/ROW	72	0.1564	B_B40	Vacant	3	13.9395
B_B30	Commercial	85	4.7452				

Notes:
1. Existing land uses are based on available city data along with adjustments for observations made from aerial photos.

m|m|a
civil engineering surveying landscape architecture planning
tbpe registration number: f – 2759
tbpls registration/license number: 10088000
519 east border
arlington, texas 76010
817-469-1671
fax: 817-274-8757
www.mmatexas.com

LEGEND

Existing Drainage Area

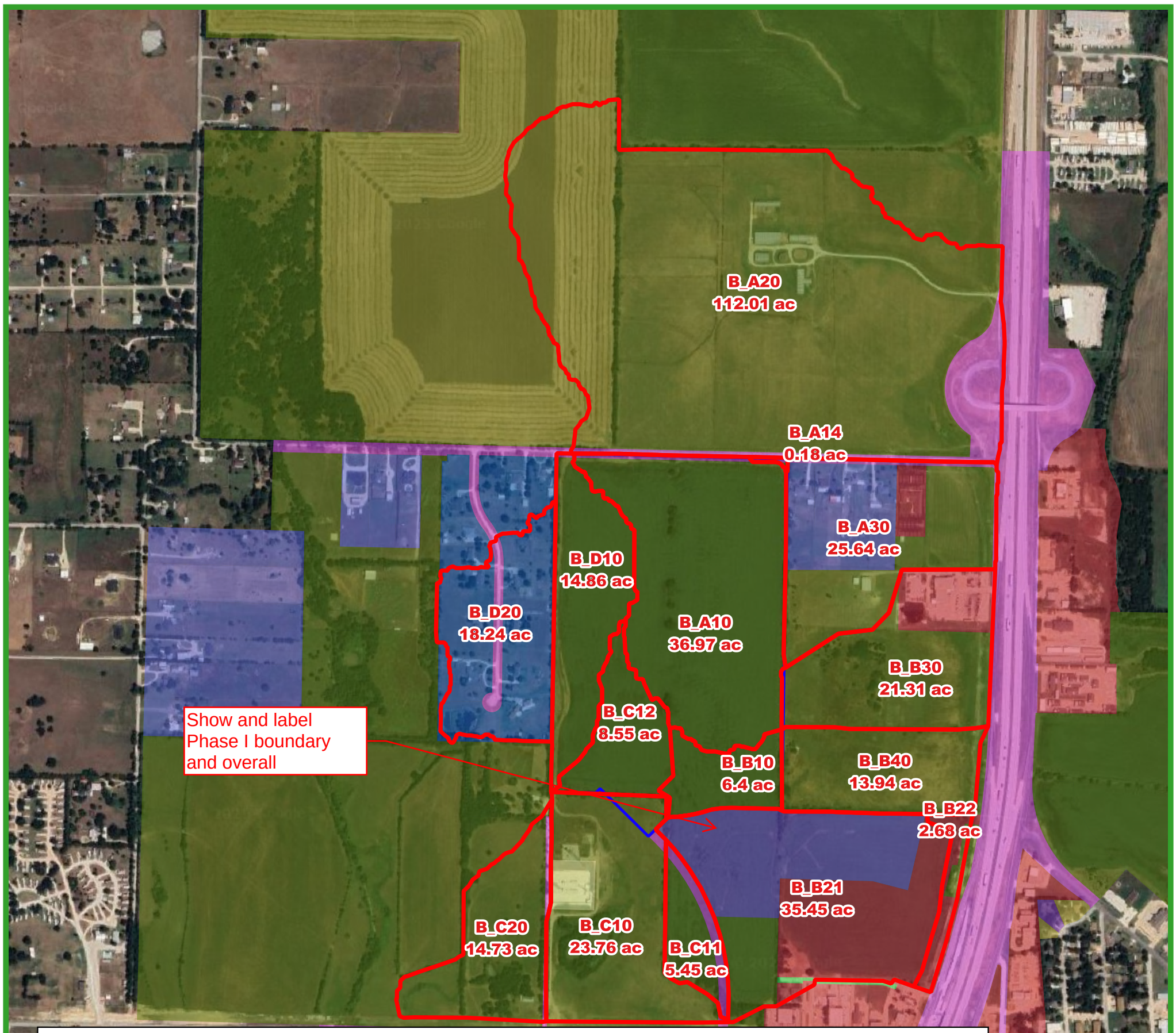
Existing Land Use
- Commercial
- Industrial
- Pavement
- Residential 1 ac
- Residential 1/2 ac
- Residential 1/3 ac
- Residential 1/4 ac
- Residential 2+ ac
- Road w/ROW
- Vacant

N

0 600 1,200 ft

Chapman Crossing
Sanger, Texas

FIGURE 1.3
EXISTING LAND USE MAP



Phase I Percent Impervious Breakdown

Area Name	Land Use	Percent Impervious	Area (ac)	Area Name	Land Use	Percent Impervious	Area (ac)
B_A10	Vacant	3	36.2664	B_B30	Commercial	85	4.7452
B_A10	Road w/ROW	72	0.7044	B_B40	Vacant	3	13.8439
B_A20	Vacant	3	105.0238	B_B40	Multi Family	65	0.0746
B_A20	Road w/ROW	72	6.9847	B_B40	Commercial	85	0.0234
B_A30	Vacant	3	13.1158	B_C10	Vacant	3	34.0695
B_A30	Residential 2+ ac	15	9.7033	B_C10	Industrial	72	1.8261
B_A30	Road w/ROW	72	1.2398	B_C10	Road w/ROW	72	1.8675
B_A30	Commercial	85	1.7717	B_C20	Vacant	3	14.0589
B_B10	Vacant	3	6.3948	B_C20	Industrial	72	0.0367
B_B10	Multi Family	65	0.001	B_C20	Road w/ROW	72	0.63
B_B21	Vacant	3	4.2344	B_D10	Vacant	3	14.805
B_B21	Multi Family	65	16.4168	B_D10	Road w/ROW	72	0.0588
B_B21	Road w/ROW	72	0.0141	B_D20	Vacant	3	0.1276
B_B21	Commercial	85	14.5742	B_D20	Residential 1 ac	25	16.6237
B_B21	Pavement	100	0.21	B_D20	Road w/ROW	72	1.4848
B_B22	Vacant	3	0.5439				
B_B22	Commercial	85	2.1387				
B_B30	Vacant	3	16.4116				
B_B30	Road w/ROW	72	0.1564				

Notes:
1. Existing land uses are based on available city data along with adjustments for observations made from aerial photos.

m|m|a
civil engineering surveying landscape architecture planning
tbpe registration number: f – 2759
tbpls registration/license number: 10088000
519 east border
arlington, texas 76010
817-469-1671
fax: 817-274-8757
www.mmatexas.com

LEGEND

- Phase I Drainage Area

Phase I Land Use

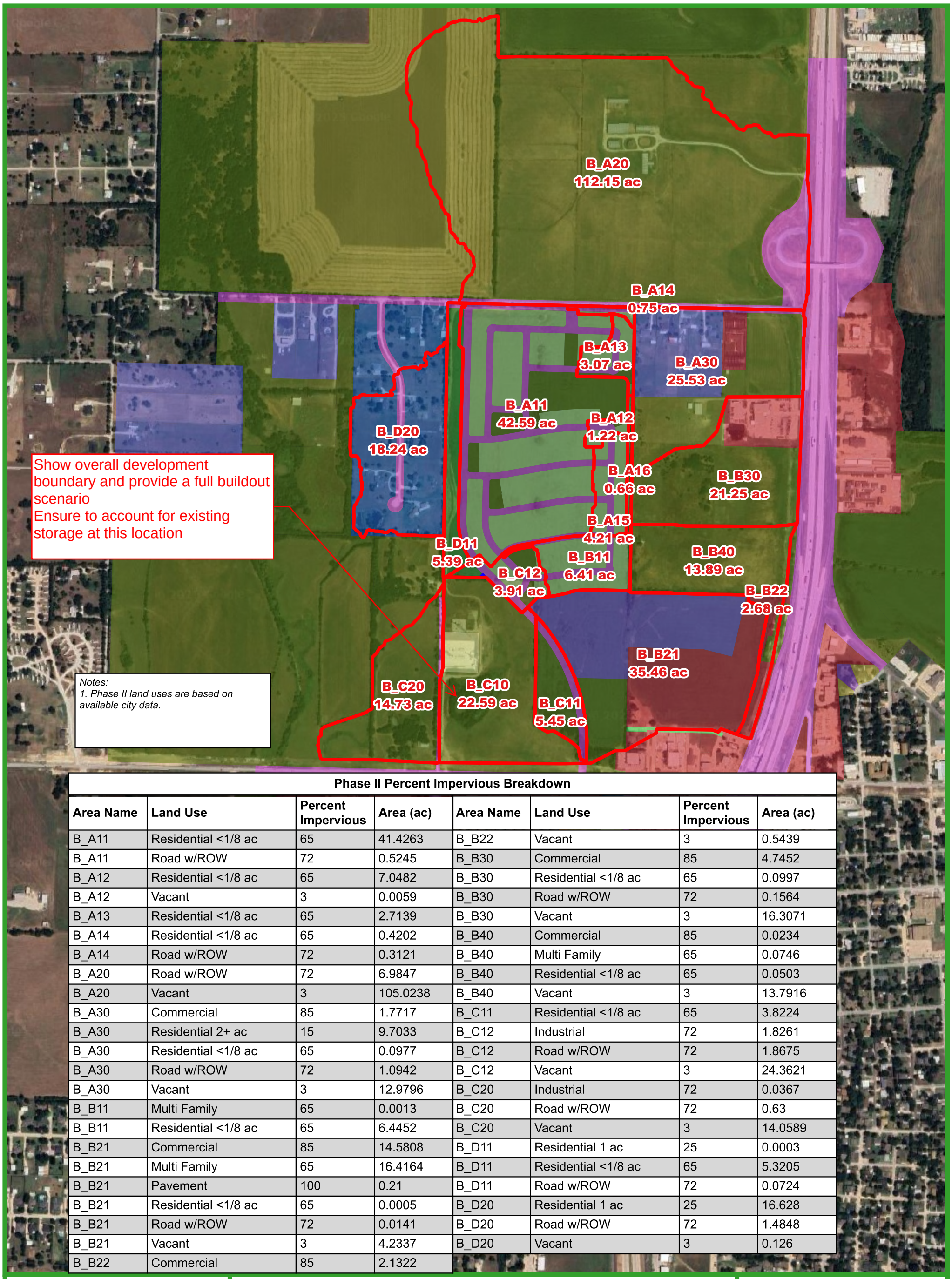
- Commercial
- Industrial
- Multi Family
- Pavement
- Residential 1 ac
- Residential 1/2 ac
- Residential 1/3 ac
- Residential 1/4 ac
- Residential 2+ ac
- Road w/ROW
- Vacant

N

0 600 1,200 ft

Chapman Crossing
Sanger, Texas

FIGURE 2.2
PHASE I LAND USE MAP



Phase II Percent Impervious Breakdown

Area Name	Land Use	Percent Impervious	Area (ac)	Area Name	Land Use	Percent Impervious	Area (ac)
B_A11	Residential <1/8 ac	65	41.4263	B_B22	Vacant	3	0.5439
B_A11	Road w/ROW	72	0.5245	B_B30	Commercial	85	4.7452
B_A12	Residential <1/8 ac	65	7.0482	B_B30	Residential <1/8 ac	65	0.0997
B_A12	Vacant	3	0.0059	B_B30	Road w/ROW	72	0.1564
B_A13	Residential <1/8 ac	65	2.7139	B_B30	Vacant	3	16.3071
B_A14	Residential <1/8 ac	65	0.4202	B_B40	Commercial	85	0.0234
B_A14	Road w/ROW	72	0.3121	B_B40	Multi Family	65	0.0746
B_A20	Road w/ROW	72	6.9847	B_B40	Residential <1/8 ac	65	0.0503
B_A20	Vacant	3	105.0238	B_B40	Vacant	3	13.7916
B_A30	Commercial	85	1.7717	B_C11	Residential <1/8 ac	65	3.8224
B_A30	Residential 2+ ac	15	9.7033	B_C12	Industrial	72	1.8261
B_A30	Residential <1/8 ac	65	0.0977	B_C12	Road w/ROW	72	1.8675
B_A30	Road w/ROW	72	1.0942	B_C12	Vacant	3	24.3621
B_A30	Vacant	3	12.9796	B_C20	Industrial	72	0.0367
B_B11	Multi Family	65	0.0013	B_C20	Road w/ROW	72	0.63
B_B11	Residential <1/8 ac	65	6.4452	B_C20	Vacant	3	14.0589
B_B21	Commercial	85	14.5808	B_D11	Residential 1 ac	25	0.0003
B_B21	Multi Family	65	16.4164	B_D11	Residential <1/8 ac	65	5.3205
B_B21	Pavement	100	0.21	B_D11	Road w/ROW	72	0.0724
B_B21	Residential <1/8 ac	65	0.0005	B_D20	Residential 1 ac	25	16.628
B_B21	Road w/ROW	72	0.0141	B_D20	Road w/ROW	72	1.4848
B_B21	Vacant	3	4.2337	B_D20	Vacant	3	0.126
B_B22	Commercial	85	2.1322				

m|m|a
civil engineering surveying landscape architecture planning
tbpe registration number: f – 2759
tbpls registration/license number: 10088000
519 east border
arlington, texas 76010
817-469-1671
fax: 817-274-8757
www.mmatexas.com

LEGEND

- Phase II Drainage Area

Phase II Land Use

- Commercial
- Gravel
- Industrial
- Multi Family
- Park
- Pavement
- Residential <1/8 ac
- Residential 1 ac
- Residential 1/2 ac
- Residential 1/3 ac
- Residential 1/4 ac
- Residential 2+ ac
- Road w/ROW
- Vacant

N

0 600 1,200 ft

Chapman Crossing
Sanger, Texas

FIGURE 3.2
PHASE II LAND USE MAP

There appears to be an overhead electric facility running through property line. Please confirm there is not an existing utility easement here

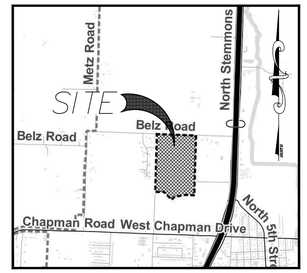
Indicate 20.9 ft distance between mag nail and Iron Rod

Provide Min FFE at all lots adjacent to pond 2' above 100-yr

Provide DE

Recorded as 660.45 ft in metes and bounds description. Please verify

Please verify the scale factor. State plane to surface scale factor for Denton County is 1.00015063 per TXDOT Surface Adjustment Factors



VICINITY MAP

NO SCALE

100 0 50 100 200

1 inch = 100 ft.

LEGEND/ABBREVIATIONS

CIRS	5/8" CAPPED IRON ROD SET STAMPED "MMA" (UNLESS OTHERWISE NOTED)
CIRF	CAPPED IRON ROD FOUND
DRDCT	DEED RECORDS DENTON COUNTY, TEXAS
PRDCT	PLAT RECORDS DENTON COUNTY, TEXAS
ORDCT	OFFICIAL RECORDS DENTON COUNTY, TEXAS
VOL.	VOLUME
PG.	PAGE
UE	UTILITY EASEMENT
BL	BUILDING LINE
DE	DRAINAGE EASEMENT
SSE	SANITARY SEWER EASEMENT
WE	WATER EASEMENT
PAE	PEDESTRIAN ACCESS EASEMENT
POB	POINT OF BEGINNING
FND.	FOUND
IRF	IRON ROD FOUND
MFF	MINIMUM FINISHED FLOOR ELEVATION
*	FEMA ELEVATION CERTIFICATE NOT REQUIRED
Doc. No.	COUNTY CLERK'S DOCUMENT NUMBER

UTILITY PROVIDERS:

- ELECTRIC:
  CITY OF SANGER
  202 RAILROAD AVENUE
  SANGER, TX 76266
  940-458-2064
- NATURAL GAS:
  ATMOS ENERGY CORPORATION
  585 WESTPORT PKWY.
  FORT WORTH, TX 76177
  214-415-0482
- TELECOMMUNICATIONS:
  NORTEX COMMUNICATIONS
  P.O. BOX 587
  205 N. WALNUT ST.
  MUENSTER, TX 76252
  940-759-2251

FINAL PLAT

LOT 1X, LOTS 2-32, BLOCK A, LOT 1X,
LOTS 2-12, LOT 13X, LOTS 14-60, LOT 61X, BLOCK B,
LOTS 1-6, LOT 7X, LOTS 8-25, BLOCK C,
LOTS 1-26, BLOCK D, LOT 1X, BLOCK E,
LOT 1X, LOTS 2-37, BLOCK F,
LOT 1X, LOTS 2-39, BLOCK G, LOTS 1-41, BLOCK H,
LOT 1X, LOTS 2-31, BLOCK I,
LOT 1X, LOTS 2-18, BLOCK J,
LOT 1X, BLOCK K

CHAPMAN CROSSING

BEING 68.209 ACRES OF LAND SITUATED
IN THE H. TIERWESTER SURVEY
ABSTRACT NO. 1241
CITY OF SANGER, DENTON COUNTY, TEXAS

296 SINGLE FAMILY RESIDENTIAL LOTS
11 HOA/OPEN SPACE LOTS

15.290 ACRES RIGHT-OF-WAY DEDICATION

JANUARY 2025

* GENERAL NOTES *

1. ALL CORNERS CALLED "MMA" ARE 5/8 INCH CAPPED IRON RODS SET STAMPED "MMA".
2. BEARINGS AND COORDINATES ARE GRID BASED ON THE "TEXAS COORDINATE SYSTEM OF 1983, NORTH CENTRAL ZONE (4202)" (2011) AS DETERMINED BY GPS OBSERVATIONS. THE CONVERGENCE ANGLE AT THE POINT OF BEGINNING IS 0°42'58.8". ALL DISTANCES HAVE BEEN ADJUSTED TO SURFACE USING A COMBINED SCALE FACTOR OF 1.00014268135.
3. THE SUBJECT PROPERTY DOES NOT LIE WITHIN A 100 – YEAR FLOODPLAIN. IT IS LOCATED IN ZONE "X", AREA OF MINIMAL FLOOD HAZARD ACCORDING TO THE FLOOD INSURANCE RATE COMMUNITY PANEL No. 48121C0070G, MAP EFFECTIVE 4/18/2011 AND PANEL No. 48121C0210G, MAP EFFECTIVE 4/18/2011.
4. THE PROPERTY OWNER SHALL BE RESPONSIBLE FOR THE OPERATION AND MAINTENANCE OF ANY BUILDING, PARK, EQUIPMENT, POOLS, PLANTING, LAWNS, OR LEGAL INTERESTS WITHIN THE SUBDIVISION.
5. THE PURPOSE OF THIS FINAL PLAT IS TO ESTABLISH A SINGLE FAMILY RESIDENTIAL LOT SUBDIVISION.
6. ALL RESIDENTIAL LOTS SHALL HAVE A FRONT BUILDING LINE OF 20', SIDE BUILDING LINE OF 5', SIDE STREET AND REAR BUILDING LINE OF 10', AND REAR GARAGE BUILDING LINE OF 5', UNLESS OTHERWISE SHOWN.

GENERAL NOTES (CONT.) *

7. ALL LOTS COMPLY WITH THE MINIMUM SIZE REQUIREMENTS OF THE ZONING DISTRICT.
8. THIS PROPERTY MAY BE SUBJECT TO CHARGES RELATED TO IMPACT FEES AND THE APPLICANT SHOULD CONTACT THE CITY REGARDING ANY APPLICABLE FEES DUE.
9. ALL COMMON AREAS, DRAINAGE EASEMENTS, AND DETENTION FACILITIES WILL BE OWNED AND MAINTAINED BY THE HOA/POA. ANY COMMON AREA WITHIN THE CITY'S RIGHT-OF-WAY WILL REQUIRE A FACILITIES AGREEMENT, TO BE REVIEWED AND APPROVED BY THE CITY.
10. NOTICE – SELLING A PORTION OF THIS ADDITION BY METES AND BOUNDS IS A VIOLATION OF CITY ORDINANCE AND STATE LAW AND IS SUBJECT TO FINES AND WITHHOLDING OF UTILITIES AND BUILDING PERMITS.
11. THIS PLAT DOES NOT ALTER OR REMOVE EXISTING DEED RESTRICTIONS, IF ANY, ON THIS PROPERTY.
12. MINIMUM FINISHED FLOOR ELEVATIONS ARE AT LEAST 2 FEET ABOVE THE 100-YEAR FLOOD PLAIN.

LAND USE TABLE

LAND USE	LOTS	ACREAGE	SQUARE FEET
RIGHT-OF-WAY	N/A	15.290	666,007
RESIDENTIAL	296	36.666	1,597,174
PRIVATE OPEN SPACE	11	16.253	707,999
TOTAL	307	68.209	2,971,180

OWNERS:

CHAPMAN CROSSING, LTD.
4143 MAPLE AVE., SUITE 325
DALLAS, TX 75219

SANGER MULTI P2, LTD.
4143 MAPLE AVE., SUITE 325
DALLAS, TX 75219

DEVELOPER:

GREYSTAR DEVELOPMENT CENTRAL, LLC
600 E. LAS COLINAS BLVD., STE. 2100
IRVING, TX 75039
TEL: (214) 451-5698
EMAIL: jthulin@greystar.com
CONTACT: JR THULIN

SURVEYOR/ENGINEER:

mma
civil engineering surveying landscape architecture planning
tbpels registration number: f - 2759
tbpels registration/license number: 10088000
519 east border
arlington, texas 76010
817-469-1671
fax: 817-274-8757
www.mmatexas.com
CONTACT: ANDREA TAYLOR, PE

MMA PROJECT NO. 3883-00-01

PLOTTED BY: JENNIFER STORZ DATE: 1/15/2025 11:22 AM PATH: P:\3883-00-01\000 Land Surveying\205 Platting\3883-00-01 Final Plat.dwg

Verify grading and ensure there is positive drainage at the intersection

Please provide drainage easement

Avoid cross drainage at divided roads

MATCHLINE SHEET C5.1

MATCHLINE SHEET C5.5

SUTTON STREET

GEROW STREET

JACKSON LANE

SUMMERALL LANE

BELZ ROAD

PATE DRIVE

!!!CAUTION!!! UNDERGROUND UTILITIES

LIMITS OF GRADING

BRAZOS ELECTRIC POWER COOPERATIVE EASEMENT VOL. 749, PG. 352 DRDCT

60' BRAZOS ELECTRIC POWER COOPERATIVE EASEMENT VOL. 749, PG. 401 DRDCT

LOT 3 MEADOW LANDS ADDITION CAB. F, PG. 80 PRDCT

LOT 4 MEADOW LANDS ADDITION CAB. F, PG. 80 PRDCT

LOT 5 MEADOW LANDS ADDITION CAB. F, PG. 80 PRDCT

1 inch = 40 ft.

LEGEND:

EXISTING MAJOR CONTOUR	-640-
EXISTING MINOR CONTOUR	-641-
PROPOSED MAJOR CONTOUR	640
PROPOSED MINOR CONTOUR	641
PAD ELEVATION	PAD 630.0
PROPOSED ELEVATION	• 630.00
PROPOSED TOP OF WALL	• TW 630.00
PROPOSED BOTTOM OF WALL	• BW 630.00
MATCH EXISTING	• EX 630.00±
PROPOSED RETAINING WALL	
HIGH POINT	HP
LOW POINT	LP
LIMITS OF GRADING	
FLOW ARROW	
EXPOSED BEAM	

NOTES:

1. MINIMUM LOT SLOPES SHALL BE 1.00%
2. SIDE YARD SLOPES SHALL BE 25% MAX.
3. WALLS CONSTRUCTED ALONG FUTURE FENCE LINE SHALL BE DESIGNED TO ACCEPT SLEEVES FOR FENCE POST. SLEEVES SHALL BE INSTALLED EVERY 8' AND AT ALL PROPERTY CORNERS TO ALLOW INSTALLATION OF STANDARD FENCING ON TOP OF WALL.
4. PRIVATE RETAINING WALL TO BE WHOLLY LOCATED ON LOT WITH TOP OF WALL GRADE AND WILL BE MAINTAINED BY PROPERTY OWNER.
5. THE GEOTECHNICAL REPORT AND ITS ADDENDUMS ARE A PART OF THE CONSTRUCTION DOCUMENTS. ALL EXCAVATION, EMBANKMENT AND OTHER APPURTENANCES ASSOCIATED WITH THE GRADING PROCESS SHALL BE IN ACCORDANCE WITH THE RECOMMENDATIONS OUTLINED IN THE GEOTECHNICAL REPORT.
6. PRIOR TO ANY GRADING THE CONTRACTOR IS TO INSTALL THE CONSTRUCTION ENTRANCE AS SHOWN ON THE EROSION CONTROL PLAN (SHEET C6.0).
7. CONTRACTOR SHALL PROVIDE STRUCTURAL DESIGN FOR STONE GRAVITY RETAINING WALL AND OBTAIN PERMIT FROM THE CITY OF SANGER.

GENERAL UTILITY NOTES:

ALL EXISTING UTILITY DATA IS PROVIDED FOR INFORMATION ONLY. ALTHOUGH THIS DATA IS SHOWN AS ACCURATELY AS POSSIBLE, THE CONTRACTOR IS CAUTIONED THAT NEITHER THE OWNER NOR THE ENGINEER ASSUME ANY RESPONSIBILITY FOR THE ACCURACY OF THIS DATA. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO VERIFY THESE LOCATIONS AND ELEVATIONS PRIOR TO CONSTRUCTION.

CALL TEXAS 811 OR OTHER UTILITY LOCATING SERVICES 48 HOURS PRIOR TO CONSTRUCTION ACTIVITY. MMA INC. IS NOT RESPONSIBLE FOR KNOWING ALL EXISTING UTILITIES OR DEPICTING EXACT LOCATIONS OF UTILITIES ON DRAWINGS.

SOURCE BENCHMARK:

VERTICAL DATUM ESTABLISHED USING LEICA SMARTNET NORTH AMERICA GPS REFERENCE NETWORK. ALL ELEVATIONS SHOWN ARE NAVD88.

SITE BENCHMARK:

BM #1 – "X" CUT IN SQUARE LOCATED ON THE WEST CONCRETE EDGE OF AN ASPHALT PARKING LOT, BEING 56' SOUTH OF THE NORTHWEST CORNER OF SAID PARKING LOT LOCATED AT 3009 BELZ ROAD.
ELEV: 684.62'
NAD83 TXNC (GRID)
N: 7186166.06'
E: 2371494.31'

CHAPMAN CROSSING
SANGER, TEXAS
GRADING PLAN

mma
civil engineering surveying landscape architecture planning
tbpels registration number: f – 2759
tbpels registration/license number: 10088000
519 east border
arlington, texas 76010
817-469-1671
fax: 817-274-8757
www.mmatexas.com

1/15/2025
STATE OF TEXAS
ANDREA E. TAYLOR
124055
LICENSED PROFESSIONAL ENGINEER
FOR REVIEW

PROJECT NUMBER:	3883-00-01
PROJECT MANAGER:	A. TAYLOR
DRAWN BY:	B.SHELTON
CHECKED BY:	A.TAYLOR
ISSUE DATE:	1/15/25

REV.	DATE	DESCRIP.	BY

SHEET CONTENT: GRADING PLAN

SHEET NO: C5.4

PLOTTED BY: MADELINE MILBY DATE: 1/15/2025 11:32 AM PATH: z:\3883-00-01\700 land development\703 construction documents\Design\plot sheets\GRADING PLAN.dwg

Provide inlet and SD line to convey street flow to pond

Ensure no supercritical flow

Provide hydraulic analysis of channel/level spreader Recommend using RAS with lateral weir.

Is a swale proposed to direct flow north? . Provide cross section with hydraulic parameters for proposed swale. Demonstrate capacity Show lot lines, site boundary and easements.

Can drainage areas G and F be directed to pond and just upsize the pond outfall to result in the same 100-yr water surface elevation and outflow?

Extend ditch to convey Beltz road flow. Avoid ROW flow into lots

Provide a hydraulic analysis of receiving ditch and demonstrate capacity and no adverse impacts

Provide existing drainage area map and calculations to determine pond discharge flows

DESIGN Q_{100YR} = 48.86 CFS
PROPOSED Q_{100YR} = 31.54 CFS
DESIGN Q PER BIRCHWAY SANGER PLANS DATED 12/3/24 BY CLAYMORE ENGINEERING

100 0 50 100 200
1 inch = 100 ft.

LEGEND:

- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- PROPOSED MINOR CONTOUR
- PROPOSED MAJOR CONTOUR
- PROPOSED STORM DRAIN
- DRAINAGE AREA BOUNDARY
- DRAINAGE AREA LABEL (NAME / AREA (ACRES))
- INLET DESIGNATION (XX' C.I. / XX)
- FLOW AREA
- DESIGN POINT

NOTES:

1. PROPERTY IS ZONED PLANNED DEVELOPMENT (PD).
2. DESIGN CRITERIA IS BASED ON CITY OF SANGER SUBDIVISION REGULATIONS DATED 2019 AND TOEQ DATED 2023.
3. EXISTING CONTOURS ARE BASED ON TOPOGRAPHIC SURVEY PREPARED BY MMA, DATED SEPTEMBER, 2024 AND LIDAR COMPLETED IN 2020 DOWNLOADED FROM TNRIS.
4. DRAINAGE AREAS ARE BASED ON PROPOSED GRADING DESIGN, EXISTING TOPOGRAPHY, AND ASBUILT PLAN INFORMATION.
5. DESIGN POINT DISCHARGES BY SCS METHOD. REFERENCE DRAINAGE STUDY PREPARED BY MMA DATED JAN 2025.
6. REFER TO SHEETS C12.1–C12.15 FOR STORM PLAN AND PROFILES.

GENERAL UTILITY NOTES:

ALL EXISTING UTILITY DATA IS PROVIDED FOR INFORMATION ONLY. ALTHOUGH THIS DATA IS SHOWN AS ACCURATELY AS POSSIBLE, THE CONTRACTOR IS CAUTIONED THAT NEITHER THE OWNER NOR THE ENGINEER ASSUME ANY RESPONSIBILITY FOR THE ACCURACY OF THIS DATA. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO VERIFY THESE LOCATIONS AND ELEVATIONS PRIOR TO CONSTRUCTION.

CALL TEXAS 811 OR OTHER UTILITY LOCATING SERVICES 48 HOURS PRIOR TO CONSTRUCTION ACTIVITY. MMA INC. IS NOT RESPONSIBLE FOR KNOWING ALL EXISTING UTILITIES OR DEPICTING EXACT LOCATIONS OF UTILITIES ON DRAWINGS.

DESIGN POINTS

POINT NO.	EXISTING Q_{100YR}	PROPOSED Q_{100YR}
1	2.0 CFS	5.8 CFS
2	211.7 CFS	192.2 CFS
3	76.1 CFS	36.0 CFS

NOTE: THE INCREASED FLOW AT DESIGN POINT 1 HAS NO AFFECT ON THE DOWNSTREAM CONDITIONS. REFER TO CHAPMAN CROSSING DRAINAGE STUDY PREPARED BY MMA FOR DETAILS.

SOURCE BENCHMARK:

VERTICAL DATUM ESTABLISHED USING LEICA SMARTNET NORTH AMERICA GPS REFERENCE NETWORK. ALL ELEVATIONS SHOWN ARE NAVD88.

SITE BENCHMARK:

BM #1 – "X" CUT IN SQUARE LOCATED ON THE WEST CONCRETE EDGE OF AN ASPHALT PARKING LOT, BEING 56' SOUTH OF THE NORTHWEST CORNER OF SAID PARKING LOT LOCATED AT 3009 BELZ ROAD.
ELEV: 684.62'
NAD83 TXNC (GRID)
N: 7186166.06'
E: 2371494.31'

CHAPMAN CROSSING
SANGER, TEXAS
DRAINAGE AREA MAP

mma
civil engineering surveying landscape architecture planning
tbpels registration number: f – 2759
tbpels registration/license number: 10088000
519 east border
arlington, texas 76010
817-469-1671
fax: 817-274-8757
www.mmatexas.com

1/15/2025

STATE OF TEXAS
ANDREA E. TAYLOR
124055
LICENSED PROFESSIONAL ENGINEER

FOR REVIEW

PROJECT NUMBER:	3883-00-01
PROJECT MANAGER:	A. TAYLOR
DRAWN BY:	M. MILBY
CHECKED BY:	A. TAYLOR
ISSUE DATE:	1/15/25

REV.	DATE	DESCRIP.	BY

SHEET CONTENT:

DRAINAGE AREA MAP

SHEET NO:

C10.0

CHAPMAN CROSSING
SANGER, TEXAS
POND PLAN

Show and label 100-yr WSELev

include Q100 and V100 at each spillway

Reconcile with HMS, 10' based on HMS

1 SECTION A-A
NOT TO SCALE

Provide inlet and SD lines to convey flow into pond

Cross section AA seams to be top of pond. Please update location

Provide profiles for outflow pipes Include Q and velocity, headwater, talwater, etc. Show flume, wall, riprap property line, etc.

Reconcile with HMS Verify all

Provide Access ramp

Show and label Emergency spillway Ensure freeboard to top of pond under clogged conditions Include cross section with hydraulic calculations

Include profile at spillways, provide Q100 and V and ensure appropriate armoring at spillway

Show and label DE for proposed SD, Ensure DE is accessible (ie cross slope at about 2% and wider berm). Show cross slopes and DE on cross section BB

Provide curb inlet to convey street flow and connect to SD line

Show DE and ensure 2% slope within DE

Revise sections B-B and C-C to match pond plan

STA 1+00.00 SD-A
36" SETP-CD 4:1 SAFETY END TREATMENT
INSTALL 13 SY 12" DIA ROCK RIP RAP (12" THICK)
FL 42" IN = 690.50 S
N 7186751.42
E 2370703.24

STA 1+00.00 SD-B
30" SETP-CD 4:1 SAFETY END TREATMENT
INSTALL 10 SY 12" DIA ROCK RIP RAP (12" THICK)
FL 30" IN = 690.50 W
N 7186624.22
E 2370431.27

STA 1+00.00 SD-C
4'x3' SETB-CD 4:1 SAFETY END TREATMENT
INSTALL 13 SY 12" DIA ROCK RIP RAP (12" THICK)
FL 4'x3' IN = 690.50 S
N 7186597.91
E 2370821.06

STA 1+44.55 OUTFALL 1
5-24" SETP-CD 4:1 SAFETY END TREATMENT
FL 24" OUT = 690.50 E
N 7186688.24
E 2371076.27

STA 1+42.27 OUTFALL 2
24" SETP-CD 4:1 SAFETY END TREATMENT
FL 24" OUT = 690.50 E
N 7186636.25
E 2371075.40

STA 1+42.04 OUTFALL 3
24" SETP-CD 4:1 SAFETY END TREATMENT
FL 24" OUT = 690.50
N 7186561.26
E 2371074.03

STA 1+00.00 OUTFALL 1
5-24" SETP-CD 4:1 SAFETY END TREATMENT
FL 24" IN = 689.60 W
N 7186687.42
E 2371120.82

STA 1+00.00 OUTFALL 2
24" SETP-CD 4:1 SAFETY END TREATMENT
FL 24" IN = 690.15 W
N 7186635.47
E 2371117.66

STA 1+00.00 OUTFALL 3
24" SETP-CD 4:1 SAFETY END TREATMENT
FL 24" IN = 690.42 W
N 7186560.48
E 2371116.06

STA 1+00.00 SD-F
27" SETP-CD 4:1 SAFETY END TREATMENT
FL 27" IN = 690.50 SW
N 7186537.31
E 2371117.09

INSTALL 836 SY 12" DIA ROCK RIP RAP (12" THICK)

STETSON DRIVE

PULLER DRIVE

EARL DRIVE

SUTTON STREET

POND BOTTOM ELEV. 682.5

RETENTION POND

100-YR WSEL 693.51

1.3X

PAD 698.4

PAD 698.0

PAD 699.1

PAD 698.7

PAD 699.4

PAD 696.86

FG 699.54

FG 700.04

FG 699.08

FG 694.67

FG 694.50

FG 695.94

FG 695.88

FG 695.50

FG 692.80

FG 694.54

FG 692.58

FG 689.92

FG 689.00

FG 694.50

FG 692.56

FG 691.00

FG 693.33

FG 691.61

FG 691.62

FG 692.98

FG 692.48

FG 693.04

FG 692.54

TC 693.34 GT 692.35

TC 693.38 GT 692.88

TC 692.84 GT 692.34

TC 690.07 GT 689.57

12" CURB TC 690.74 GT 689.77

TC 695.61 GT 695.11

TC 695.68 GT 695.38

TC 695.62 GT 695.12

TC 690.50 GT 690.00

TC 690.99 GT 690.49

TC 691.61 GT 691.11

TC 691.62 GT 691.12

25' SEWER EASEMENT

25' WATER & SEWER EASEMENT

20' SEWER EASEMENT

10' UE

EX 12" SS

EX 30" SS

EX 24" SS

2 SECTION B-B
NOT TO SCALE

3 SECTION C-C
NOT TO SCALE

LEGEND:

EXISTING MAJOR CONTOUR	— -640- —
EXISTING MINOR CONTOUR	— -641- —
PROPOSED MINOR CONTOUR	—640—
PROPOSED MAJOR CONTOUR	—641—
PAD ELEVATION	PAD 630.0
MINIMUM FINISHED FLOOR	MFF 630.0
FINISHED GRADE	• FG 630.00
PROPOSED TOP OF WALL	• TW 630.00
PROPOSED BOTTOM OF WALL	• BW 630.00
MATCH EXISTING	• EX 630.00±
PROPOSED RETAINING WALL	

NOTES:
1. REFER TO SHEET C12.1–C12.10 FOR STORM DRAIN PLAN AND PROFILES.
2. REFER TO SHEETS C15.7 FOR STORM DRAIN DETAILS.
3. ALL PROPOSED CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE CITY OF SANGER STANDARDS AND SPECIFICATIONS. A COPY OF THE CITY STANDARDS AND SPECIFICATIONS FOR USE ON THIS PROJECT MAY BE OBTAINED FROM THE CITY OF SANGER.
4. TRENCH EXCAVATION FOR TRENCHES 5 FEET OR MORE IN DEPTH SHALL BE IN ACCORDANCE WITH ALL PROVISIONS OF PART 1926, SUBPART B – "EXCAVATIONS, TRENCHING AND SHORING OF THE OCCUPATIONAL SAFETY AND HEALTH'S STANDARDS AND INTERPRETATIONS". IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO CONFIRM TO THE ABOVE PROVISIONS AND PROVIDE NECESSARY TRENCH SAFETY PLANS TO THE CITY PRIOR TO RELEASE OF PLANS FOR CONSTRUCTION.
5. PRIOR TO CITY ACCEPTANCE DETENTION/RETENTION FACILITIES, CHANNEL, DRAINAGE WAYS, AND OUTFALLS SHALL HAVE ESTABLISHED PERENNIAL VEGETATION WITH 100% COVERAGE.
6. REFER TO SHEET C11.2 FOR POND ELEVATION AREA TABLE.

DETENTION POND MAINTENANCE GUIDELINES:

1. THE DETENTION POND SHALL BE MOWED AT LEAST TWO TIMES PER YEAR.
2. ESTABLISHMENT OF WEEDS AND WOODY GROWTH SHALL BE PREVENTED.
3. ANY STANDING WATER SHALL BE REMOVED TO PREVENT INSECT INFESTATION. AFTER WATER IS REMOVED GRADES SHALL BE ADJUSTED TO ELIMINATE STANDING WATER.
4. ACCUMULATED SEDIMENT SHALL BE REMOVED AT LEAST TWICE A YEAR.
5. THE POND SHALL BE INSPECTED FOR EROSION DAMAGE AND REPAIRED AT LEAST TWICE PER YEAR.
6. DEBRIS AND LITTER SHALL BE REMOVED PERIODICALLY TO PREVENT CLOGGING OF THE OUTLET STRUCTURE.
7. IT IS THE RESPONSIBILITY OF THE PROPERTY OWNER TO COMPLY WITH THE APPROVED DETENTION POND GUIDELINES.

SOURCE BENCHMARK:

VERTICAL DATUM ESTABLISHED USING LEICA SMARTNET NORTH AMERICA GPS REFERENCE NETWORK. ALL ELEVATIONS SHOWN ARE NAVD88.

SITE BENCHMARK:

BM #1 – "X" CUT IN SQUARE LOCATED ON THE WEST CONCRETE EDGE OF AN ASPHALT PARKING LOT, BEING 56' SOUTH OF THE NORTHWEST CORNER OF SAID PARKING LOT LOCATED AT 3009 BELZ ROAD.
ELEV. 684.62'
NAD83 TXNC (GRID)
N: 7186166.06'
E: 2371494.31'

40 0 20 40 80
1 inch = 40 ft.

mma
civil engineering surveying landscape architecture planning
tbpels registration number: f – 2759
tbpels registration/license number: 10088000
519 east border
arlington, texas 76010
817-469-1671
fax: 817-274-8757
www.mmatexas.com

1/15/2025
STATE OF TEXAS
ANDREA E. TAYLOR
124055
LICENSED PROFESSIONAL ENGINEER
FOR REVIEW

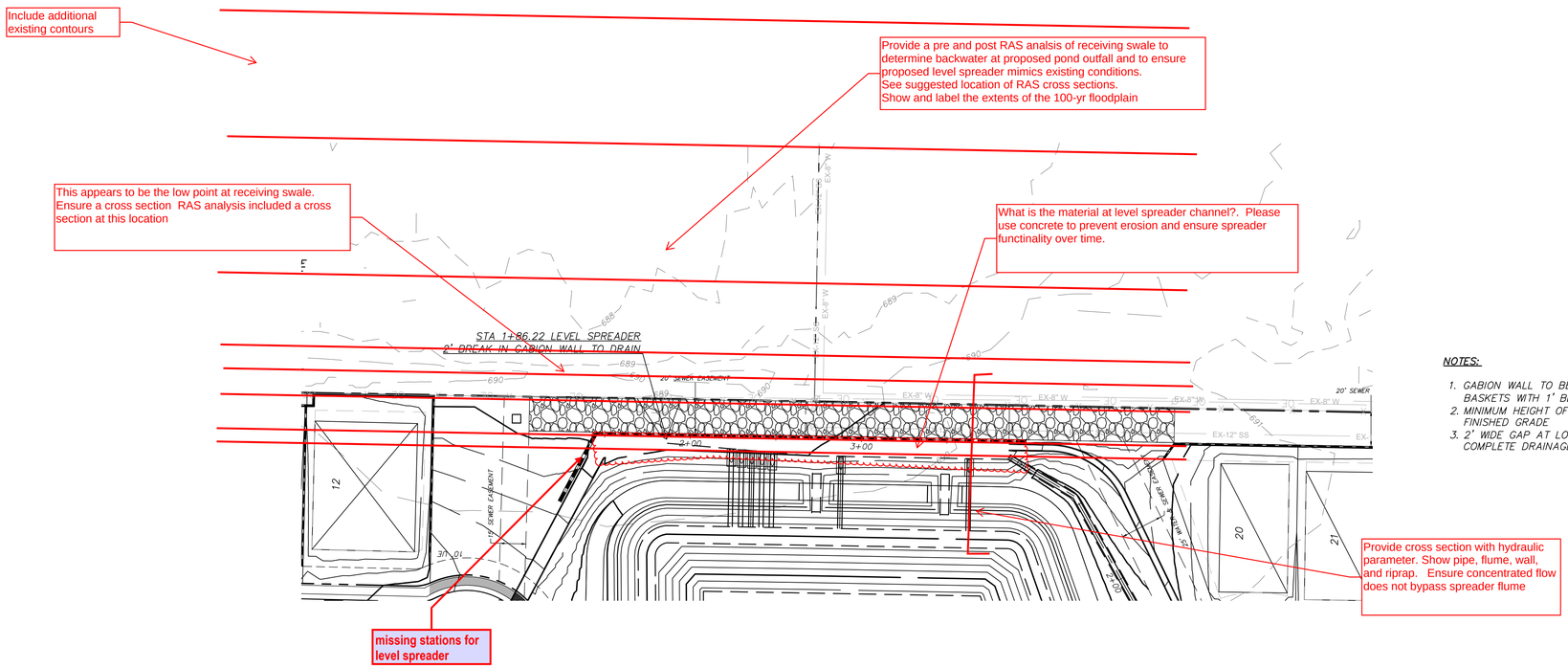
PROJECT NUMBER:	3883-00-01
PROJECT MANAGER:	A. TAYLOR
DRAWN BY:	D. ANGLE
CHECKED BY:	A. TAYLOR
ISSUE DATE:	1/15/25

REV.	DATE	DESCRIP.	BY

SHEET CONTENT:
POND PLAN

SHEET NO:
C11.0

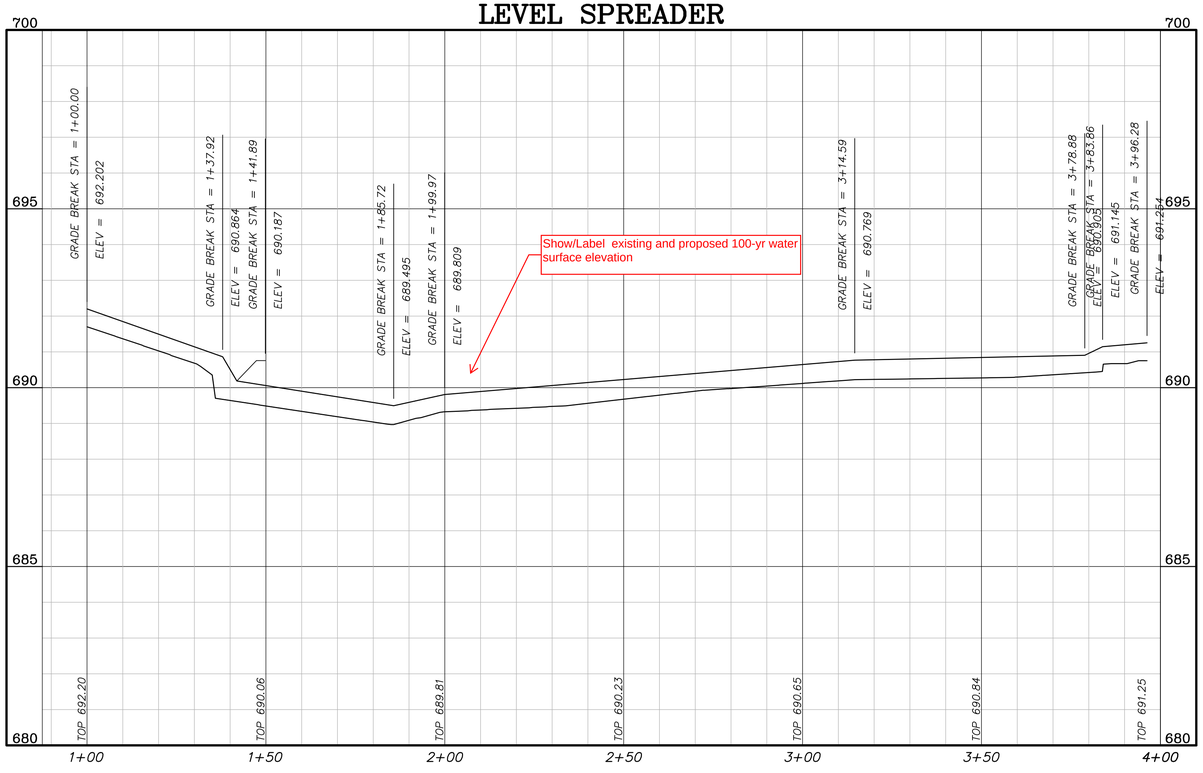
PLOTTED BY: MADELINE MILBY DATE: 1/15/2025 12:01 PM PATH: p:\3883-00-01\700 land development\7003 construction documents\Design\plot sheets\POND PLAN AND CALCS.dwg

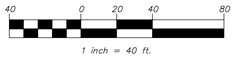


NOTES:

1. GABION WALL TO BE CONSTRUCTED OF 2'X18" BASKETS WITH 1' BELOW FINISHED GRADE
2. MINIMUM HEIGHT OF GABION WALL 6" ABOVE FINISHED GRADE
3. 2' WIDE GAP AT LOW POINT TO ALLOW FOR COMPLETE DRAINAGE OF LEVEL SPREADER

LEVEL SPREADER





LEGEND:	
EXISTING MAJOR CONTOUR	— -640- —
EXISTING MINOR CONTOUR	— -641- —
PROPOSED MINOR CONTOUR	—640—
PROPOSED MAJOR CONTOUR	—641—
PAD ELEVATION	PAD 630.0
MINIMUM FINISHED FLOOR	MFF 630.0
FINISHED GRADE	• FG 630.00
PROPOSED TOP OF WALL	• TW 630.00
PROPOSED BOTTOM OF WALL	• BW 630.00
MATCH EXISTING	• EX 630.00±
PROPOSED RETAINING WALL	

NOTES:

1. REFER TO SHEET **C12.1–C12.10** FOR STORM DRAIN PLAN AND PROFILES.
2. REFER TO SHEETS **C15.7** FOR STORM DRAIN DETAILS.
3. ALL PROPOSED CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE CITY OF **SANGER** STANDARDS AND SPECIFICATIONS. A COPY OF THE CITY STANDARDS AND SPECIFICATIONS FOR USE ON THIS PROJECT MAY BE OBTAINED FROM THE CITY OF **SANGER**.
4. TRENCH EXCAVATION FOR TRENCHES 5 FEET OR MORE IN DEPTH SHALL BE IN ACCORDANCE WITH ALL PROVISIONS OF PART 1926, SUBPART B – "EXCAVATIONS, TRENCHING AND SHORING OF THE OCCUPATIONAL SAFETY AND HEALTH'S STANDARDS AND INTERPRETATIONS". IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO CONFIRM TO THE ABOVE PROVISIONS AND PROVIDE NECESSARY TRENCH SAFETY PLANS TO THE CITY PRIOR TO RELEASE OF PLANS FOR CONSTRUCTION.
5. PRIOR TO CITY ACCEPTANCE DETENTION/RETENTION FACILITIES, CHANNEL, DRAINAGE WAYS, AND OUTFALLS SHALL HAVE ESTABLISHED PERENNIAL VEGETATION WITH 100% COVERAGE.
6. REFER TO SHEET **C11.2** FOR POND ELEVATION AREA TABLE.

DETENTION POND MAINTENANCE GUIDELINES:

1. THE DETENTION POND SHALL BE MOWED AT LEAST TWO TIMES PER YEAR.
2. ESTABLISHMENT OF WEEDS AND WOODY GROWTH SHALL BE PREVENTED.
3. ANY STANDING WATER SHALL BE REMOVED TO PREVENT INSECT INFESTATION. AFTER WATER IS REMOVED GRADES SHALL BE ADJUSTED TO ELIMINATE STANDING WATER.
4. ACCUMULATED SEDIMENT SHALL BE REMOVED AT LEAST TWICE A YEAR.
5. THE POND SHALL BE INSPECTED FOR EROSION DAMAGE AND REPAIRED AT LEAST TWICE PER YEAR.
6. DEBRIS AND LITTER SHALL BE REMOVED PERIODICALLY TO PREVENT CLOGGING OF THE OUTLET STRUCTURE.
7. IT IS THE RESPONSIBILITY OF THE PROPERTY OWNER TO COMPLY WITH THE APPROVED DETENTION POND GUIDELINES.

SOURCE BENCHMARK:

VERTICAL DATUM ESTABLISHED USING LEICA SMARTNET NORTH AMERICA GPS REFERENCE NETWORK. ALL ELEVATIONS SHOWN ARE NAVD88.

SITE BENCHMARK:

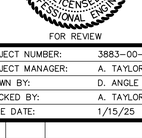
BM #1 – "X" CUT IN SQUARE LOCATED ON THE WEST CONCRETE EDGE OF AN ASPHALT PARKING LOT, BEING 56' SOUTH OF THE NORTHWEST CORNER OF SAID PARKING LOT LOCATED AT 3009 BELZ ROAD.
ELEV: 684.62'
NAD83 TXNC (GRID)
N: 7186166.06'
E: 2371494.31'

CHAPMAN CROSSING
SANGER, TEXAS

POND DETAILS

mma
civil engineering surveying landscape architecture planning
tbpels registration number: f – 2759
tbpels registration/license number: 10088000
519 east border
arlington, texas 76010
817-469-1671
fax: 817-274-8757
www.mmatexas.com

1/15/2025



FOR REVIEW

PROJECT NUMBER:	3883-00-01
PROJECT MANAGER:	A. TAYLOR
DRAWN BY:	D. ANGLE
CHECKED BY:	A. TAYLOR
ISSUE DATE:	1/15/25

REV.	DATE	DESCRIP.	BY

SHEET CONTENT:

POND DETAILS

SHEET NO:

C11.1