Kraft Subdivision Unit 3

A distinguished project by:

Lennar Homes of Texas and Construction, LTD.

Laubach Lift Station Upgrades Engineering Design Report

05/13/2024

New Braunfels, Texas
May 2024

Prepared by:

HMT
ENGINEERING & SURVEYING
290 S. Castell Avenue, Ste 100
New Braunfels, TX 78130
TBPE-FIRM F-10961
TBPLS FIRM 10153600

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This Engineering Design Report has been prepared to comply with GBRA Standards and Design Guidelines for Waste Water Treatment Plans and Lift Stations and the Texas Commission on Environmental Quality's Design Criteria for Domestic Wastewater Systems (30 TAC 217).

1.0 Project Overview

HMT Engineering and Surveying has been retained by Lennar Homes of Texas and Construction, LTD to provide professional engineering services for the development of a project located just north of Klein Road at the intersection with Legend Park in New Braunfels, Texas (Reference Attachment A). The project consists of 24.98 AC tract of land to be developed into Unit 3 of the Kraft Subdivision master planned development (Attachment B). Per the approved Waste Water LOC, Kraft Subdivision drains into the the exsiting Laubach (Voss Farms) sewer infrastructure, which then drains into the Laubach Lift Station, which conveys flows through a force main to the Stein Falls gravity waste water line. This lift station is currently sized to serve Kraft Units 1 and 2. The lift station will need to be upsized to serve Kraft Units 3 and 4. There is also proposed improvements to be made to the Laubach Sewer mains in order to satisfy GBRA design criteria.

2.0 Sewer Shed and Flow Calculations Shed

Sizing for the lift station improvements were made based on the fully built out sewer shed which includes the Kraft Subdivision, Laubach Units 4A, 4B, 5, 6, and flows from the NBISD property located on the south side of Klein Rd. The lift station will be designed to convey a peak flow of 533.8 gpm with the largest pump out of service. The sewer shed map and flow calculations can be found on Attachment E. The design criteria provided by GBRA for calculating the flows (Attachment F) for each site is summarized below.

Table 1 – Flow Calculation Design Criteria

Site	LUEs	AC	Average Daily Flow (GPD/LUE)	Peak Factor	I&I (GPD/Ac)	Peak Flow (GPM)
Laubach	268	77	250	4	300	202.15
Kraft 1	154	25.66	240	2.5	650	75.75
Kraft 2	80	19.46	240	2.5	650	42.12
Kraft 3	156	25.14	240	2.5	650	76.35
Kraft 4	148	23.64	240	2.5	650	72.34
NBISD*	57	30	250	4	300	45.83
Total	**863**	**200.9**				**514.54**

*NBISD LUE count is based on a peak flow of 66,000 GPD provided by GRBA (Attachment G)

3.0 Pump Selection

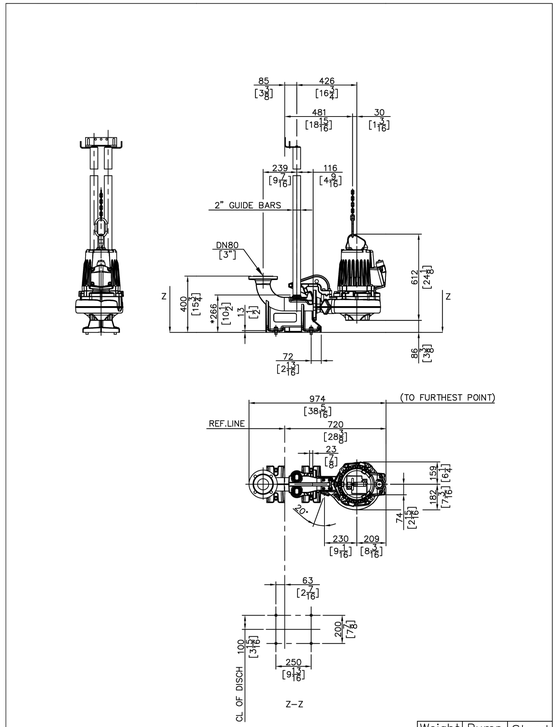
Using the peak flow and head loss calculations found in Attachment F, we recommend a duplex system with two NP 3171 SH 3 Flygt ~ 278 35 HP submersible pumps for the following reasons:

- The discharge manifold and current lift station is set up for a Flygt duplex system
- This system conveys peak flows with the largest pump out of service

The lead pump shall automatically alternate between both pumps at the completion of each pumping cycle. This will allow even wear both pumps and extend the life of both pumps.

The existing guide rails and pump hatch compatible with the proposed pumps. The wet well floor will need to be chipped and regrouted to accommodate the larger pumps. The hoist and hatch will also need to be upsized. The existing discharge manifold geometry will need to be slightly adjusted to accommodate the new pump spacing requirements. See the next page to see a comparison of the existing and proposed pump dimensions and weights. Also see the owner's manual and loading charts for the proposed Thern electric hoist.

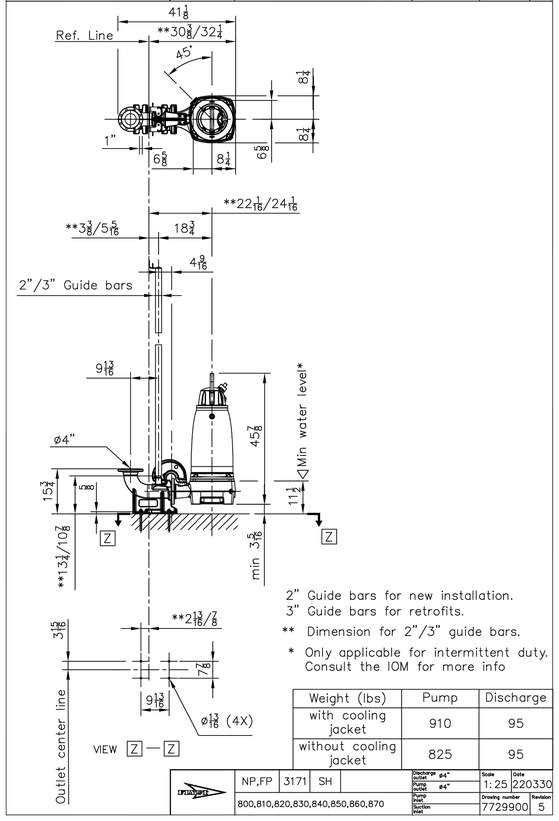
EXISTING PUMP
(EXTRACTED FROM MUELLER & ASSOCIATES REPORT TITLED "LAUBACK SUBDIVISION LIFT STATION DESIGN REPORT" DATED FEBRUARY 2019



Weight	Pump	Stand
kg	147	35
lbs	325	80

FLYGT	FP,NP	3127	SH	Discharge (inches) DN 80	Scale 1:20	Date 170914
				Pump inlet DN 80		
				Pump shaft	Drawing number 7319700	Revision 2
				Section sheet		

PROPOSED PUMP



Weight (lbs)	Pump	Discharge
with cooling jacket	910	95
without cooling jacket	825	95

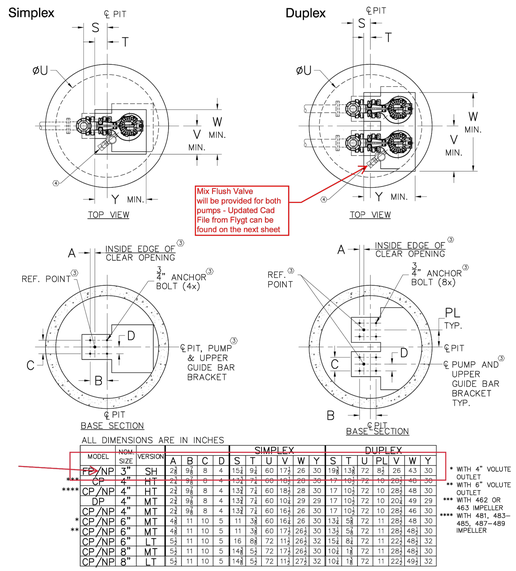
FLYGT	NP,FP	3171	SH	Discharge (inches) ø4"	Scale 1:25	Date 220330
	800,810,820,830,840,850,860,870			Pump inlet ø4"		
				Pump shaft	Drawing number 7729900	Revision 5
				Section sheet		

FLYGT a xylem brand

Issued: 11/11 Supersedes: 1/11

CP/DP/FP/NP-3127

NOTES:
1. CONFIGURATION AND DIMS. SHOWN ARE SUGGESTED REQUIREMENTS ONLY. ALL DETAILS, INCLUDING SIZING OF PIT, TYPE, LOCATION AND ARRANGEMENT OF VALVES AND PIPING, ETC. ARE TO BE SPECIFIED BY THE CONSULTING ENGINEER AND ARE SUBJECT TO THEIR APPROVAL.
2. REFERENCE GENERIC DUPLEX LIFT STATION LAYOUT FOR ELEVATION VIEW.
3. LOCATE ANCHOR BOLTS USING INSIDE EDGE OF CLEAR OPENING AND PUMP CENTERLINE AS REFERENCE POINT. BOLT LOCATIONS MUST BE HELD TO MAINTAIN EXACT POSITION OF PUMP TO CLEAR OPENING.
4. FLYGT MIX-FLUSH VALVE.



ALL DIMENSIONS ARE IN INCHES

MODEL	NOM. SIZE	VERSION	GUIDE BAR SIZE	A	B	C	D	SIMPLEX S	T	U	V	W	Y	DUPLEX S	T	U	PL	V	W	Y
FP/NP	3"	SH	2"	23	9⅜	8	4	19⅜	13⅜	72	9⅛	26	30	19⅜	13⅜	72	8¼	26	43	30
CP	3"	HT	2"	23	9⅜	8	4	19⅜	15¼	72	7½	28	30	19⅜	17	72	10	28	48	30
CP/NP	4"	HT	2"	23	9⅜	8	4	13⅜	7¼	60	18½	28	30	17	10½	72	10	28	48	30
DP	4"	MT	2"	23	9⅜	8	4	13⅜	7¼	60	10¼	29	29	17	10½	72	10	20¼	49	29
CP/NP	4"	MT	3"	23	9⅜	8	4	13⅜	7¼	60	16¼	26	30	17	10½	72	10	28¼	46	30
CP/NP	6"	MT	3"	46	11	10	5	11	3⅜	60	16¼	26	30	13¼	5⅜	72	11	28¼	48	30
CP/NP	6"	MT	4"	46	11	10	5	11	3⅜	60	17½	26¼	30	13½	5⅜	72	11	28¼	48½	30
CP/NP	6"	LT	3"	54	11	10	5	16	8⅜	72	11½	26¼	32	15¼	8¼	72	11	22¼	48¼	32
CP/NP	8"	MT	3"	54	11	10	5	14⅜	5¾	72	17½	26¼	30	10¾	1⅜	72	11	28¼	48¼	30
CP/NP	8"	LT	3"	54	11	10	5	14⅜	5¾	72	11½	27½	32	10¾	1⅜	72	11	22¼	49¼	32

* WITH 4" VOLUTE OUTLET
** WITH 6" VOLUTE OUTLET
*** WITH 462 OR 463 IMPELLER
**** WITH 481, 483-485, 487-489 IMPELLER

FLYGT a xylem brand

Issued: 11/11 Supersedes: 2/09

FP/NP-3171

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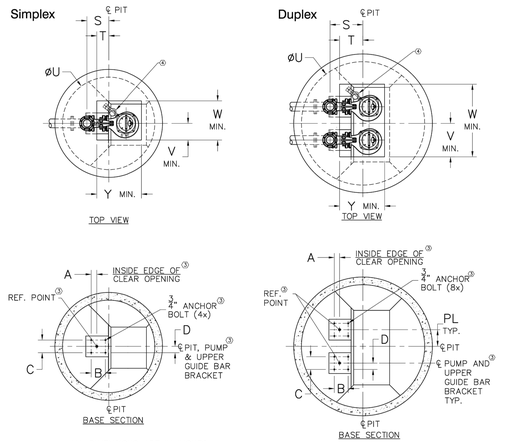


ALL DIMENSIONS ARE IN INCHES

MODEL	NOM. SIZE	VERSION	GUIDE BAR SIZE	A	B	C	D	SIMPLEX S	T	U	V	W	Y	DUPLEX S	T	U	PL	V	W	Y
NP	4"	SH	2"	23	9⅜	8	4	19⅜	13⅜	72	9⅛	27½	32	22⅜	15⅜	84	13	22¼	53¼	32
NP	4"	SH	3"	23	9⅜	8	4	19⅜	15¼	72	9⅛	27½	34	22⅜	17⅜	84	13	22¼	53¼	34
FP/NP	4"	HT	2"	23	9⅜	8	4	19⅜	13¼	72	12	29½	33	22⅜	15⅜	84	13	25	55¼	33
FP/NP	4"	HT	3"	23	9⅜	8	4	19⅜	15¼	72	12	29½	35	22⅜	17⅜	84	13	25	55¼	35
FP/NP	6"	MT	2"	46	11	10	5	17	9⅜	72	13	30½	35	25⅜	18⅜	96	13	26	56¼	35
FP/NP	6"	MT	3"	46	11	10	5	17	11⅜	72	13	30½	37	25⅜	20⅜	96	13	26	56¼	37
NP	10"	LT	2"	16⅛	19⅜	10	5	23⅜	13	96	17½	37	43	28⅜	17⅜	120	22	39¼	81	43
NP	10"	LT	3"	14⅛	19⅜	10	5	23⅜	14⅜	96	17½	37	45	28⅜	19½	120	22	39¼	81	45

Pump Dimension Comparison Summary		
	Existing Pump	Proposed Pump
Top of Motor	2.3'	4.1'
Pump Seperation	1.42'	2.17'
Min Hatch Size	43"x30"	54"x32"
Weight	325 lbs	910 lbs

NOTE:
THE EXISTING WETWELL HATCH DIMENSIONS HAVE BEEN FIELD VERIFIED IN FEBRUARY 2024 TO BE 51" X 37", WHICH IS LESS THAN THE MINIMUM REQUIREMENTS AS RECOMENDED BY THE PUMP MANUFACTURER SHOWN IN THE TABLE ABOVE. PLANS CALL FOR WIDENING OF EXISTING OPENING TO MEET MINIMUM REQUIREMENTS

Captain 2500
Performance Ratings

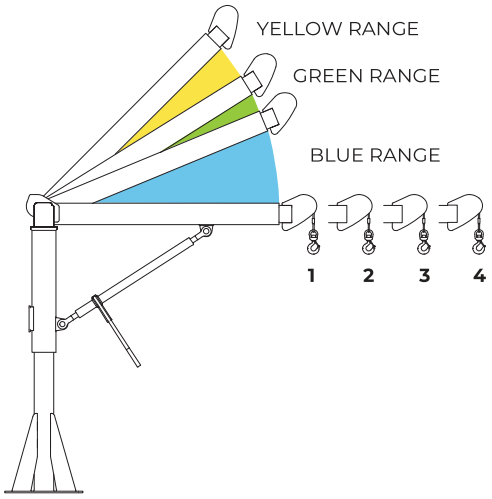
	Boom Position	1st Layer Load Rating	
		(lb)	(kg)
BLUE RANGE	1	2,500	1,130
	2	2,500	905
	3	1,700	770
	4	1,500	680
GREEN RANGE	1	2,800	1,270
	2	2,300	1,040
	3	2,000	905
	4	1,700	770
YELLOW RANGE	1	2,800	1,270
	2	2,600	1,180
	3	2,200	1,000
	4	1,800	860

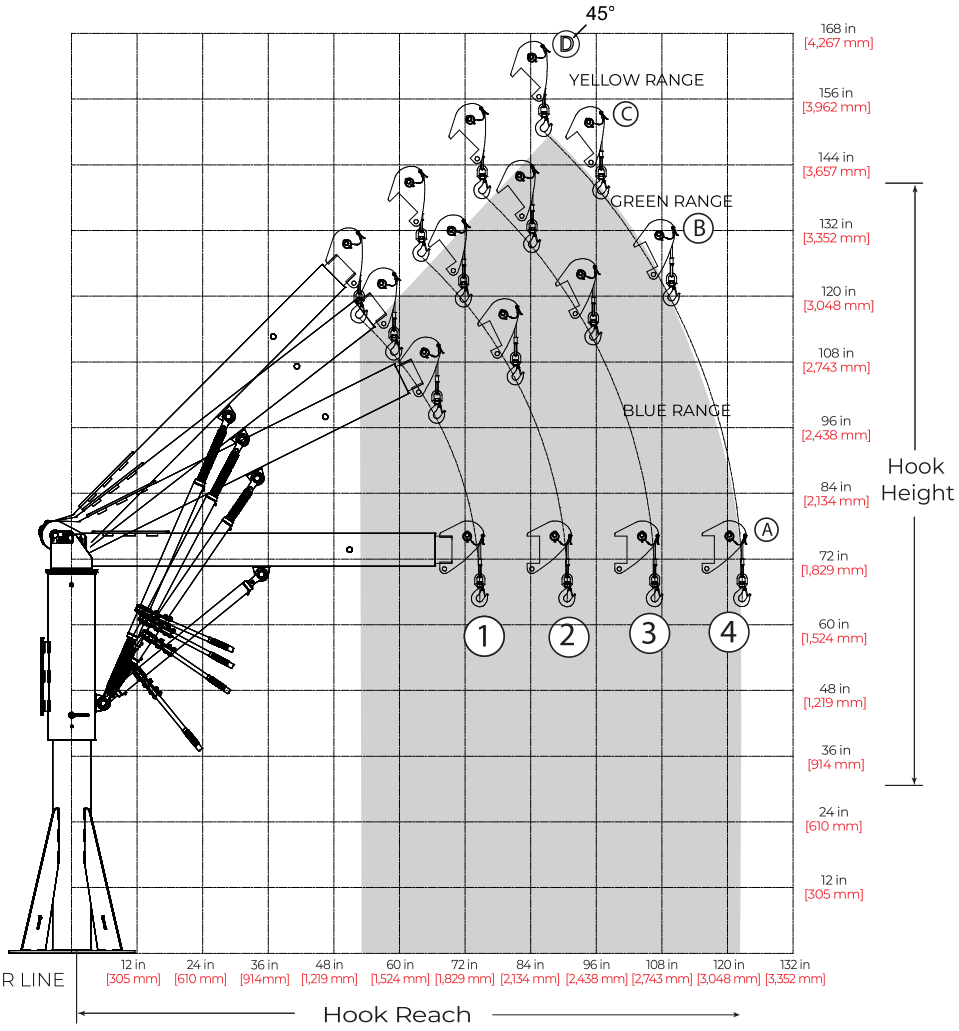
Captain 2500
Reach & Height Above Floor

Boom Position	Hook Reach		Hook Height	
	(in)	(mm)	(in)	(mm)
A-1	74	1,879	64	1,625
A-2	90	2,286	64	1,625
A-3	106	2,692	64	1,625
A-4	122	3,098	64	1,625
B-1	67	1,701	98	2,489
B-2	81	2,057	105	2,667
B-3	95	2,413	112	2,844
B-4	110	2,794	119	3,022
C-1	59	1,498	109	2,768
C-2	71	1,803	119	3,022
C-3	84	2,133	129	3,276
C-4	97	2,463	138	3,505
D-1	53	1,346	116	2,946
D-2	64	1,625	127	3,225
D-3	75	1,905	139	3,530
D-4	87	2,209	150	3,810

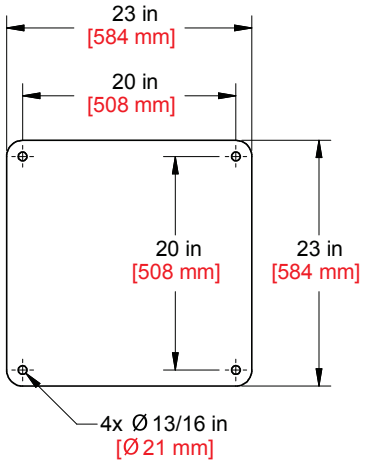
RECOMENDED POSITION

Dimensions are for reference only and subject to change without notice.





Base Dimensions



4.0 Force Main, Wet Well and Odor Control

The existing wet well and force main were analyzed to see if they meet the capacity of the sewer shed. The existing wet well is 6' diameter and the force main is 6" dia. It was calculated that both the existing force main and wet well have the capacity to serve the full build out of the sewer shed. The nominal diameters of both the wet well and force main were used for the calculations. The existing 6" – DR 18 C900 force main has a velocity of 5.88 ft/s with one proposed pump operating at full power. This also meets the TCEQ minimum bidaily flushing velocity of 5 ft/s. The Water Hammer Calculations are shown to are shown in **Attachment E** to be within the required threshold of C900 pressure pipe.

Figure: 30 TAC §217.60(b)(8)

Equation C.4.

$$V = \frac{T \times Q}{4 \times 7.48}$$

Where:

V = Active volume (cubic feet)

Q = Pump capacity (gallons per minute)

T = Cycle time (minutes)

7.48 = Conversion factor (gallons/cubic foot)

Figure: 30 TAC §217.60(b)(7)

Table C.5. - Minimum Pump Cycle Times

Pump Horsepower	Minimum Cycle Times *(minutes)*
< 50	6
50-100	10
> 100	15

Using the TCEQ 6-minute cycle time for a pump less than 50 HP and the proposed pump capacity of 533.8 gpm, the calculated minimum TCEQ active volume is 800.7 gallons. The proposed active volume was calculated to be 845.52 gallons based on the existing 6' diameter wet well and the elevation difference between the proposed pump on and pump off elevations. This volume and a pump staging sequence that meets GBRA design criteria, the existing wet well adequately serves the ultimate sewer shed peak wet weather flow of 514.53 GPM. Please reference the original lift station design report (Attachment G) for the buoyancy calculations.

Emergency storage will not be required since the site will utilize a generator during emergency outages.

The site was analyzed for odor control as well. Since neither GBRA nor TCEQ provide criteria for analyzing odor, NBU design criteria was used for the odor control analysis. The total wet well detention time during minimum dry weather flow is 41.22 minutes, and the force main flush time for average daily flow is 17.7 minutes, which results in a total detention time of 55.92 min. Odor control is not required for Laubach, based on a maximum detention time of 180 minutes per NBU Waste Water Design Criteria.

The site was also analyzed for odor control in temporary conditions. Using the flows from Kraft 1-2 and Laubach and using NBU design criteria no odor control is required. The total wet well detention time during minimum dry weather flow is 47.71 min, and the force main flush time for average daily flow is 17.7 min, which results in a total detention time of 65.41 min. This is below the maximum detention time of 180 min. Please reference **Attachment E**, for the full wet well, force main, and odor control calculations.

5.0 Bypass Plan

There are two influent lines that will be plugged while the pumps are being replaced and the wet well floor is regrouted to accommodate the new pumps. Calculations found in **Attachment D** show the respective flows draining into each of these lines, as well as the first point of overflow, total storage, and time to spill.

Pump 1

Bypass pump 1 will be sized to convey the flow from the NW influent line. The total flow entering the wetwell from the NW line is 108.75 gpm. The first point of overflow is NBISD MH 4 which has a rim elevation of 652.73. The total storage in this system is 5,887 gallons and the time to spill is 54.13 min.

Pump 2

Bypass pump 2 will be sized to convey the flow from the NW influent line. The total flow entering the wetwell from the NW line is 188.54 gpm. The first point of overflow is MH A3 which has a rim elevation of 658.90. The total storage in this system is 6,158 gallons and the time to spill is 32.66 min.

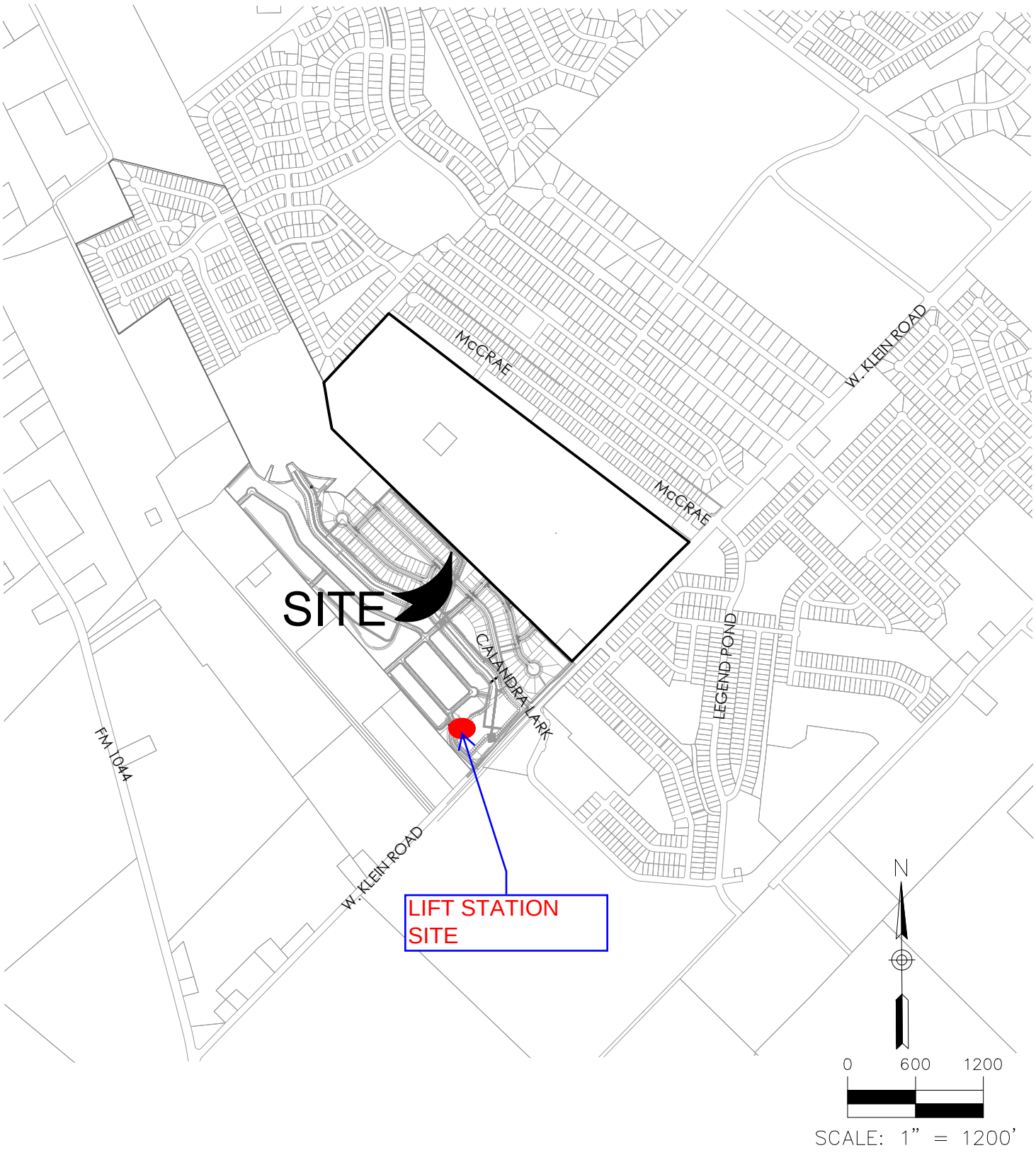
6.0 Conclusion

The proposed improvements were designed to meet or exceed current GBRA and TCEQ lift station design criteria. To serve the ultimate sewer shed of the Laubach Lift station, the existing pumps, pump control panel and the feeder to the pump control panel will need to be replaced. The pump feeders from the control panel to the pumps will also need to be replaced. The existing force main and wet well are adequately sized to serve the ultimate sewer shed.

Attachment A

Location Map

LOCATION MAP



Attachment B

Kraft Master Plan

MASTER PLAN FOR KRAFT SUBDIVISION

NOTES:

1. ALL LOTS WITHIN THE SUBDIVISION WILL BE PROVIDED WATER SERVICES BY GREEN VALLEY SPECIAL UTILITY DISTRICT (GVSUD). SEWER SERVICES WILL BE PROVIDED BY GUADALUPE-BLANCO RIVER AUTHORITY (GBRA) AND ELECTRIC SERVICES WILL BE PROVIDED BY GUADALUPE VALLEY ELECTRIC COOPERATIVE (GVEC). TELEPHONE AND CABLE SERVICES FOR THE SUBDIVISION WILL BE PROVIDED BY AT&T COMMUNICATIONS AND/OR SPECTRUM.
2. THIS SUBDIVISION IS NOT WITHIN THE EDWARDS AQUIFER RECHARGE ZONE.
3. THIS SUBDIVISION IS WITHIN THE EXTRATERRITORIAL LIMITS OF THE CITY OF NEW BRAUNFELS.
4. THIS SUBDIVISION IS WITHIN THE NEW BRAUNFELS INDEPENDENT SCHOOL DISTRICT.
5. NO PORTION OF THE SUBDIVISION IS LOCATED WITHIN A SPECIAL FLOOD HAZARD AREA (100 YR. FLOOD), AS DEFINED BY THE GUADALUPE COUNTY, TEXAS, FLOOD INSURANCE RATE MAP NUMBER 48187C0115F, EFFECTIVE DATE NOVEMBER 2, 2007 AS PREPARED BY THE FEDERAL EMERGENCY MANAGEMENT AGENCY.
6. NO STRUCTURES, WALLS OR OTHER OBSTRUCTIONS OF ANY KIND SHALL BE PLACED WITHIN THE LIMITS OF THE DRAINAGE EASEMENTS SHOWN ON THIS PLAT. NO LANDSCAPING, FENCES, OR OTHER TYPE OF MODIFICATIONS WHICH ALTER THE CROSS SECTIONS OF THE DRAINAGE EASEMENTS OR DECREASE THE HYDRAULIC CAPACITY OF THE EASEMENT, AS APPROVED, SHALL BE ALLOWED WITHOUT THE APPROVAL OF THE CITY ENGINEER. THE CITY OF NEW BRAUNFELS SHALL HAVE THE RIGHT OF INGRESS AND EGRESS OVER GRANTOR'S ADJACENT PROPERTY TO REMOVE ANY OBSTRUCTIONS PLACED WITHIN THE LIMITS OF SAID DRAINAGE EASEMENTS AND TO MAKE ANY MODIFICATIONS OR IMPROVEMENTS WITHIN SAID DRAINAGE EASEMENTS.
7. FUTURE DEVELOPMENT IS SUBJECT TO CHAPTER 114 (STREETS, SIDEWALKS AND OTHER PUBLIC SPACES) OF THE NEW BRAUNFELS CODE OF ORDINANCES.
8. FOUR (4) FOOT WIDE SIDEWALKS WILL BE CONSTRUCTED PER CITY STANDARDS ADJACENT TO NON-BUILDABLE LOTS AND FM 1044 BY THE OWNER/DEVELOPER AT THE TIME OF SUBDIVISION CONSTRUCTION AND FOUR (4) FOOT WIDE SIDEWALKS WILL BE CONSTRUCTED PER CITY STANDARDS ADJACENT TO RESIDENTIAL LOTS BY THE HOME BUILDER AT THE TIME OF BUILDING CONSTRUCTION.
9. LAND USE FOR THIS SUBDIVISION IS SINGLE-FAMILY RESIDENTIAL.
10. THIS SUBDIVISION IS SUBJECT TO THE 2018 CITY OF NEW BRAUNFELS PARK LAND DEDICATION AND DEVELOPMENT ORDINANCE. THIS MASTER PLAN IS APPROVED FOR ONE (1) DWELLING UNIT PER BUILDABLE LOT WHERE FEES ARE DUE AT THE TIME OF FINAL PLAT RECORDATION. AT SUCH TIME THAT ADDITIONAL DWELLING UNITS ARE CONSTRUCTED, THE OWNER OF THE LOT SHALL CONTACT THE CITY AND COMPLY WITH THE ORDINANCE FOR EACH DWELLING UNIT.
11. PERMANENT WATER QUALITY CONTROLS ARE REQUIRED FOR THIS SUBDIVISION MASTER PLAN IN ACCORDANCE WITH THE CITY OF NEW BRAUNFELS DRAINAGE AND EROSION CONTROL DESIGN MANUAL.

GVEC NOTES:

1. GVEC WILL POSSESS A 5-FOOT WIDE EASEMENT TO THE SERVICE METER LOCATION. EASEMENT TO FOLLOW SERVICE LINE AND WILL VARY DEPENDING ON LOCATION OF BUILDING OR STRUCTURE.
2. GVEC SHALL HAVE ACCESS TO METER LOCATIONS FROM THE FRONT YARD WITH THE LOCATION NOT BEING WITHIN A FENCED AREA.
3. ANY EASEMENT DESIGNATED AS A GVEC 20'x20' UTILITY EASEMENT SHALL REMAIN OPEN FOR ACCESS AT ALL TIMES AND SHALL NOT BE WITHIN A FENCED AREA.
4. ALL UTILITY EASEMENTS ARE FOR THE CONSTRUCTION, MAINTENANCE (INCLUDING BUT NOT LIMITED TO REMOVAL OF TREES AND OTHER OBSTRUCTIONS), READING OF METERS, AND REPAIR OF ALL OVERHEAD AND UNDERGROUND UTILITIES.

GVSUD NOTES:

EASEMENT CERTIFICATE
THE OWNER OF THE LAND SHOWN ON THIS PLAT AND WHOSE NAME IS SUBSCRIBED HERETO, IN PERSON OR THROUGH A DULY AUTHORIZED AGENT, DEDICATES TO GREEN VALLEY SPECIAL UTILITY DISTRICT OF MARION, TEXAS, ITS SUCCESSORS AND ASSIGNS, A PERPETUAL EASEMENT WIT THE RIGHT TO ERECT, CONSTRUCT, INSTALL AND LAY OVER AND ACROSS THOSE AREAS MARKED AS "WATERLINE EASEMENT" AND IN ALL STREETS AND BYWAYS, SUCH PIPELINES, SERVICE LINES, WATER METERS, AND OTHER WATER SYSTEM APPURTENANCES AS IT REQUIRES, TOGETHER WIT THE RIGHT OF INGRESS AND EGRESS, THE RIGHT TO REMOVE FROM SAID LAND ALL TREES, SHRUBS, GRASSES, PAVEMENTS, FENCES, STRUCTURES, IMPROVEMENTS OR OTHER OBSTRUCTIONS WHICH MAY INTERFERE WITH THE FACILITY OR THE ACCESS THERETO. IT IS AGREED AND UNDERSTOOD THAT NO BUILDING, CONCRETE SLAB OR WALLS WILL BE PLACED WITHIN SAID EASEMENT AREAS. NO OTHER UTILITY LINES MAY BE LOCATED WITHIN 36" PARALLEL TO WATER LINES.

ANY MONETARY LOSS TO GREEN VALLEY SUD RESULTING FROM MODIFICATIONS REQUIRED OF UTILITY EQUIPMENT LOCTED WITHIN SAID EASEMENTS DUE TO GRADE CHANGE OR GROUND ELEVATION ALTERATION SHALL BE CHARGED TO THE PERSON OR PERSONS DEEMED RESPONSIBLE FOR SAID GRADE CHANGES OR GROUND ELEVATION ALTERATIONS. UPON ENTERING IN AND UPON SAID EASEMENT, THE DISTRICT WILL ENDEAVOR TO RESTORE THE LAND SURFACE TO A USEABLE CONDITION BUT IS NOT OBLIGATED TO RESTORE IT TO A PRE-EXISTING CONDITION.

THE EASEMENT CONVEYED HEREIN WAS OBTAINED OR IMPROVED THROUGH FEDERAL FINANCIAL ASSISTANCE. THIS EASEMENT IS SUBJECT TO THE PROVISION OF TITLE VI OF THE CIVIL RIGHTS ACT OF 1964, AND THE REGULATION ISSUED PURSUANT THERETO FOR SO LONG AS THE EASEMENT CONTINUES TO BE USED FOR THE SAME OR SIMILAR PURPOSE FOR WHICH FINANCIAL ASSISTANCE WAS EXTENDED OR FOR AS LONG AS THE GRANTEE OWNS IT, WHICHEVER IS LONGER.

GBRA NOTES:

1. PROVIDE DEDICATED EASEMENTS IN THE NAME OF GBRA. EASEMENTS SHALL NOT OVERLAP OR BE WITHIN RESIDENTIAL LOTS.
2. WHERE OUTSIDE OF PUBLIC RIGHT-OF-WAY, PROVIDE DEDICATED EASEMENTS WITH A MINIMUM WIDTH EQUAL TO PIPE OUTSIDE DIAMETER, ROUNDED UP TO THE NEAREST FOOT, PLUS 10 FEET MINIMUM ON EACH SIDE. FOR EASEMENTS WITH MULTIPLE PIPES, PROVIDE 10 FEET MINIMUM HORIZONTAL CLEARANCE BETWEEN PIPES. PROVIDE ADDITIONAL WIDTH FOR EASEMENTS THAT ARE NOT LOCATED ADJACENT TO PUBLIC RIGHT-OF-WAY.
3. THE GUADALUPE-BLANCO RIVER AUTHORITY (GBRA) IS HEREBY DEDICATED THE EASEMENT AND RIGHTS-OF-WAY IN THE AREAS DESIGNATED ON THIS PLAN FOR WASTEWATER FACILITIES FOR THE PURPOSE OF INSTALLING, CONSTRUCTING, RECONSTRUCTING, OPERATING, MAINTAINING, INSPECTING, REPAIRING, REMOVING, AND RELOCATING BURIED AND/OR EXPOSED WASTEWATER FACILITIES AND APPURTENANCES.
4. TOGETHER WITH THE RIGHT OF INGRESS AND EGRESS, GBRA SHALL HAVE THE RIGHT TO REMOVE SAID LANDS OF ALL TREES OR PARTS THEREOF, OR ANY OTHER OBSTRUCTIONS WHICH MAY ENDANGER, OR INTERFERE WITH MAINTENANCE OF THE FACILITIES AND APPURTENANCES.
5. OTHER UTILITIES, STRUCTURES, GRADING, DRAINAGE, DETENTION/RETENTION PONDS, LANDSCAPING, TREES, ROADS, PARKING LOTS, FENCES, WALLS, CONSTRUCTION OF ANY TYPE, OR ANY OTHER IMPROVEMENTS OR OBSTRUCTIONS, ARE NOT ALLOWED WITHIN GBRA EASEMENTS.
6. DESIGNS FOR ANY PROPOSED ALTERATIONS OR CROSSINGS OF GBRA EASEMENTS MUST BE APPROVED IN WRITING BY GBRA AND THE INSTALLATION OF SUCH MUST BE INSPECTED AND APPROVED BY GBRA.
7. MAINTENANCE OF EASEMENTS IS THE RESPONSIBILITY OF THE PROPERTY OWNER.
8. THE PROPERTY OWNER MUST INSTALL 16-FOOT GATES IN ANY FENCES THAT CROSS GBRA UTILITIES; GATES MUST BE CENTERED ACROSS GBRA UTILITIES.
9. CUSTOMER WASTEWATER SERVICES SHALL NOT BE INSTALLED WITHIN FENCED AREAS.

LOT SUMMARY TABLE

	# OF RES. LOTS
PHASE 1 (25.11 AC.)	154
PHASE 2 (25.91 AC.)	80
PHASE 3 (25.79 AC.)	156
PHASE 4 (24.84 AC.)	148
TOTAL RESIDENTIAL LOTS	538
DRAINAGE LOTS (7.789 AC.)	8
OPEN SPACE (1.586 AC.)	5
HOA PARK (3.80 AC.)	1
TOTAL LOTS	12
TOTAL ACREAGE	101.65 AC.

LOT DENSITY (LOTS/AC) = 5.29 UNITS PER ACRE

OWNER:
CB/FOSSIL SPRINGS LTD.
30829 MAN O WAR
FAIR OAKS, TEXAS 78015

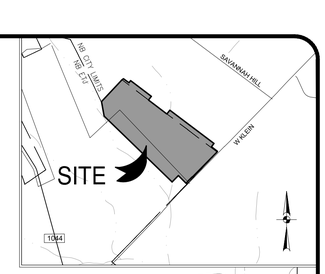
DEVELOPER:
LENNAR HOMES OF TEXAS LAND AND CONSTRUCTION, LTD
100 NE LOOP 410, SUITE 1155
SAN ANTONIO, TEXAS 78216

ENGINEER/SURVEYOR:
HMT ENGINEERING AND SURVEYING
290 S. CASTELL AVE., SUITE 100
NEW BRAUNFELS, TX 78130
PH: (830) 625-8555

LEGEND:

U.E.	= UTILITY EASEMENT
DRNG	= DRAINAGE
R.O.W.	= RIGHT-OF-WAY
M.P.R.C.C.T.	= MAP AND PLAT RECORDS, COMAL COUNTY, TEXAS
O.P.R.C.C.T.	= OFFICIAL PUBLIC RECORDS, COMAL COUNTY, TEXAS
D.R.C.C.T.	= DEED RECORDS, COMAL COUNTY, TEXAS
	= OPEN SPACE/PARKS/ LANDSCAPE AREAS
	= PROPOSED PHASING
	= CITY LIMITS
	= DRAINAGE/DETENTION

SCALE: 1" = 100' HORIZ.



HMT ENGINEERING & SURVEYING
290 S. CASTELL AVE., STE. 100
NEW BRAUNFELS, TX 78130
TBPE FIRM F-10961
TBPLS FIRM 10153600

Attachment C

FEMA Firm Map

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures.** Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Texas State Plane south central zone (FIPSZONE 4204). The **horizontal datum** was NAD83, GRS1980 spheroid. Differences in datum, spheroid, projection or State Plane zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of the FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum.** For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC–3, #9202
1315 East–West Highway
Silver Spring, MD 20910–3282

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713–3242,** or visit its website at http://www.ngs.noaa.gov/.

Base map information shown on this FIRM was provided in digital format by Bexar Metro 911. This information was photogrammetrically compiled at a scale of at least 1:24,000 from aerial photography dated September 2004.

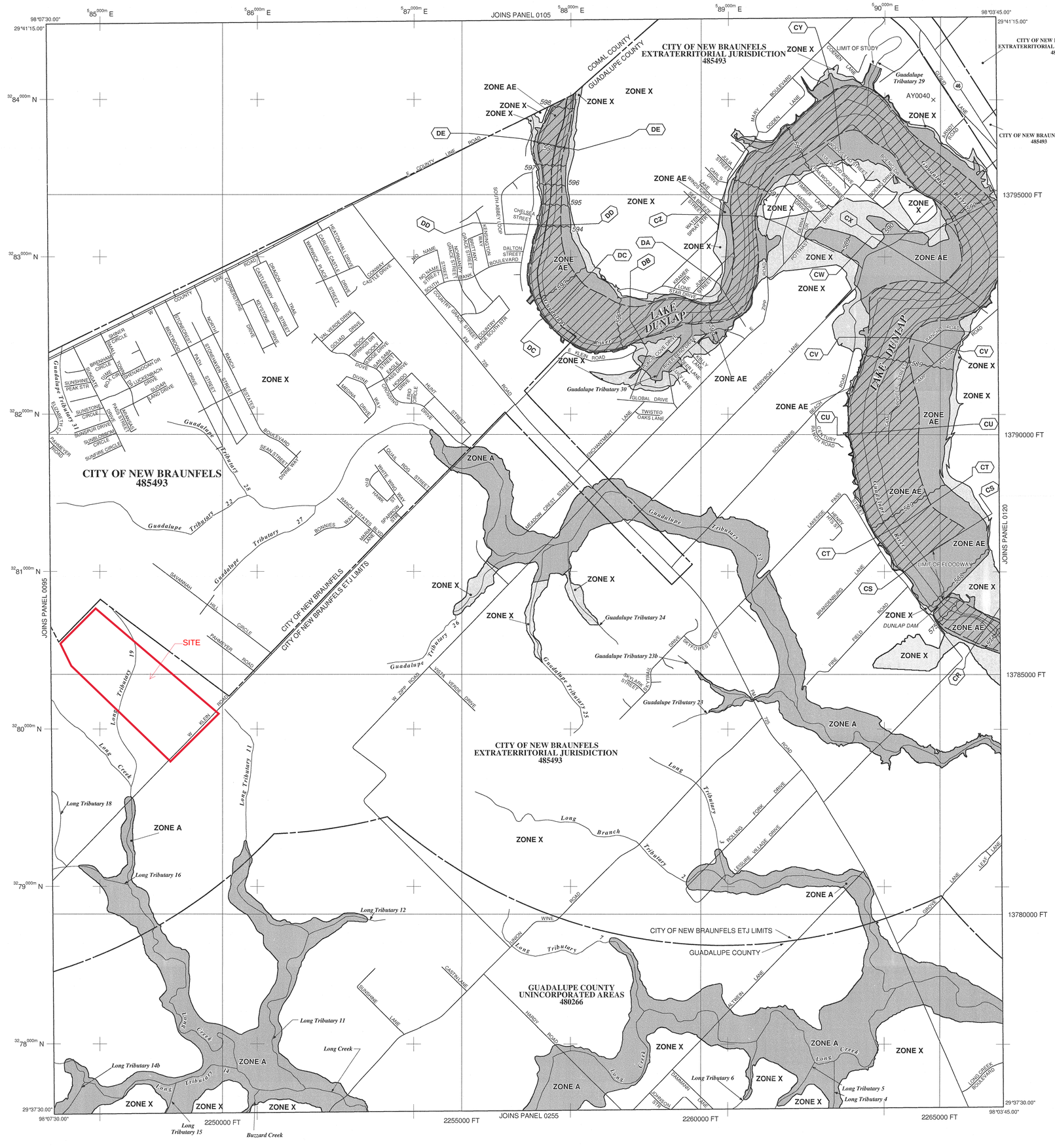
This map reflects more detailed and up–to–date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables *in the Flood Insurance Study report (which contains authoritative hydraulic data)* may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de–annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1–800–358–9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, *a Flood Insurance Study report,* and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1–800–358–9620 and its website at http://www.msc.fema.gov/.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1–877–FEMA MAP** (1–877–336–2627) or visit the FEMA website at http://www.fema.gov/.



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

	Floodplain boundary
	Floodway boundary
	Zone D boundary
	CBRS and OPA boundary
	Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
513	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988 (NAVD 88)

A — A	Cross section line
23 — 23	Transect line
97°07'30", 32°22'30"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
4275000mN	1000-meter Universal Transverse Mercator grid ticks, zone 14
6000000 FT	5000-foot grid values: Texas State Plane coordinate system, south central zone (FIPSZONE 4204), Lambert Conformal Conic
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
M1.5	River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
November 2, 2007
EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1–800–638–6620.

MAP SCALE 1" = 1000'
500 0 1000 2000 FEET
300 0 300 600 METERS

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0115F

FIRM
FLOOD INSURANCE RATE MAP
GUADALUPE COUNTY, TEXAS
AND INCORPORATED AREAS

PANEL 115 OF 480
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
GUADALUPE COUNTY	480266	0115	F
NEW BRAUNFELS, CITY OF	485493	0115	F

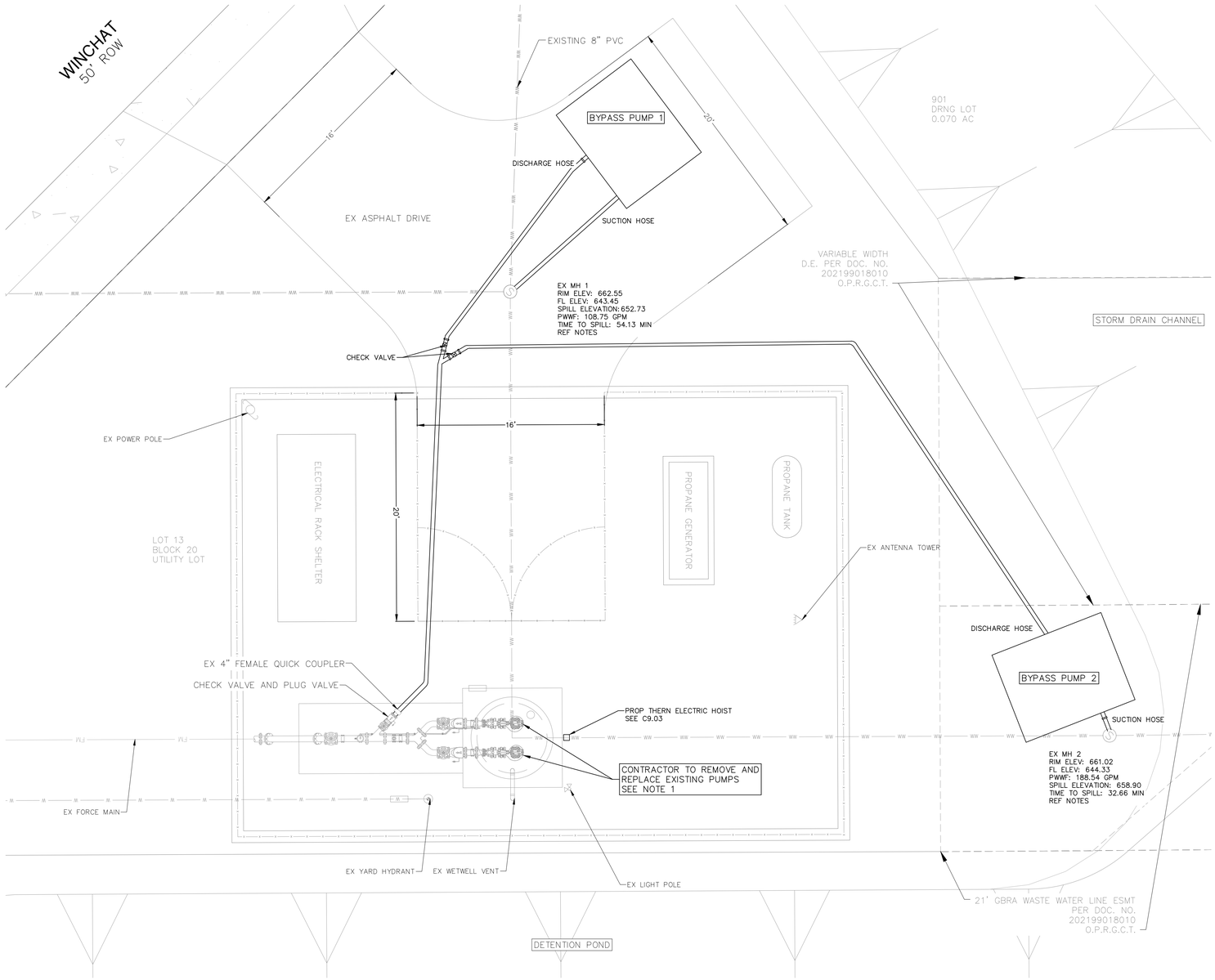
Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
48187C0115F
EFFECTIVE DATE
NOVEMBER 2, 2007

Federal Emergency Management Agency

Attachment D

Sewer Shed Map and Flow and Bypass Calculations



0 2.5 5

SCALE: 1" = 5'

LEGEND

- EXISTING CONTOURS
- PROPOSED CONTOURS
- BUILDING SETBACK LINE
- UTILITY EASEMENT
- DRAINAGE EASEMENT
- EXISTING WATER LINE
- PROPOSED WATER LINE
- PROPOSED WATER SERVICE
- PROPOSED FIRE HYDRANT
- PROPOSED WATER VALVE
- PROPOSED WATER FITTING
- UTILITY CROSSING
- EXISTING SEWER LINE
- PROPOSED SEWER LINE
- PROPOSED SEWER SERVICE
- PROPOSED SEWER MANHOLE
- PROPOSED OVERHEAD ELECTRIC
- PROPOSED UNDERGROUND ELECTRIC
- PROPOSED SWITCHGEAR
- PROPOSED TRANSFORMER
- PROPOSED PEDESTAL
- PROPOSED STREETLIGHT
- EXISTING POWER POLE

NOTES:

1. POSITION OF BYPASS PUMP AND PIPING SHALL BE TO THE DISCRETION OF THE CONTRACTOR. CONTRACTOR TO SUBMIT BYPASS PUMPING PLAN TO ENGINEER AND GBRA FOR REVIEW AND APPROVAL. PUMPS SHALL OPERATE SEPERATELY BASED ON THE WATER SURFACE ELEVATION ON EACH MANHOLE. CONTRACTOR SHALL HAVE 2 SPARE PUMPS ONSITE INCASE OF PUMP OUTAGE

2. THE CONTRACTOR SHALL PROVIDE A BYPASS PUMPING PLAN FOR GBRA AND ENGINEER FOR REVIEW, COMMENT, AND APPROVAL. GBRA AND ENGINEER MAY REQUIRE MINIMUM CAPACITY REQUIREMENTS FOR BYPASS PUMPING SYSTEMS, HOWEVER THE USE OF THIS INFORMATION IS AT THE SOLE RISK OF THE CONTRACTOR. THE CONTRACTOR SHALL FURNISH, INSTALL, OPERATE, AND MAINTAIN ALL NECESSARY BYPASS PUMPING, PLUGS, AND ASSOCIATED APPURTENANCES INCLUDING 24-HOUR ONSITE PUMP WATCH PERSONNEL TO ENSURE THAT NO OVERFLOWS OR SPILLS OCCUR. CONTRACTOR MAY SUBMIT PLAN TO ENGINEER/GBRA DETAILING REMOTE MONITORING SYSTEM IN LIEU OF 24-HOUR ONSITE PUMP WATCH. APPROVAL OF REMOTE MONITORING WILL BE CONTINGENT ON REACTION TIME AND PERSONNEL DISTANCE FROM SITE. PUMPING SYSTEMS MUST BE RATED FOR PEAK FLOW WITH THE LARGEST PUMP OUT OF SERVICE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL NECESSARY CLEANUP AND REPORTING EFFORTS DUE TO FAILURE OF EQUIPMENT OR ACTIVITIES ASSOCIATED WITH THE BYPASS PUMPING OPERATIONS CONTRIBUTING TO EITHER A SURCHARGE OR SANITARY SEWER OVERFLOW (SSO). THE COST OF ANY RELATED FINES, PENALTIES, OR DAMAGES AND THE COST OF ANY EFFORT BY GBRA OR OTHER THIRD PARTIES TO MITIGATE DAMAGES RESULTING FROM ANY SURCHARGING OR SSOS SHALL BE THE DIRECT AND SOLE RESPONSIBILITY OF THE CONTRACTOR. CONTRACTOR TO CONSULT ENGINEER ON BYPASS PUMP SIZING. SYSTEM CURVES WILL BE PROVIDED BY ENGINEER UPON REQUEST.

3. CONTRACTOR TO COORDINATE WITH GBRA ON DISPOSAL OF EXISTING PUMPS

4. CONTRACTOR TO SUBMIT BYPASS PUMPING PLAN TO ENGINEER AND GBRA FOR REVIEW AND APPROVAL. PUMPS SHALL OPERATE SEPERATELY BASED ON THE WATER SURFACE ELEVATION ON EACH MANHOLE

5. REFERENCE REPORT TITLED "KRAFT SUBDIVISION UNIT 3 – LAUBACH LIFT STATION UPGRADES ENGINEERING DESIGN REPORT", DATED APRIL 2024, FOR INFORMATION REGARDING TIME TO SPILL CALCULATIONS

6. CONTRACTOR SHALL COORDINATE WITH GBRA INSPECTOR ON TO ADD SUFFICIENT PROTECTION AGAINST STORM RUNNOFF AND FALLING HAZARDS

REFER TO THE COVER SHEET
FOR BENCHMARK INFORMATION.

THE LOCATION OF ALL EXISTING UNDERGROUND UTILITIES ARE SHOWN IN APPROXIMATE LOCATIONS ONLY. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK. THE CONTRACTOR WILL AGREE TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE INCURRED BY THEIR FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES, STRUCTURES OR FACILITIES. CONTRACTOR SHALL NOTIFY ENGINEER OF ANY DISCREPANCIES 24-HOURS PRIOR TO COMMENCING CONSTRUCTION.

HMT
ENGINEERING & SURVEYING
290 S. CASTELL AVE., STE. 100
NEW BRAUNFELS, TX 78130
TBPE FIRM F-10961
TBPLS FIRM 1053600

STATE OF TEXAS
CHRISTOPHER P. VAN HEERDE
93047
LICENSED
PROFESSIONAL ENGINEER

3/28/2024

LIFT STATION SITE PLAN AND BYPASS PLAN

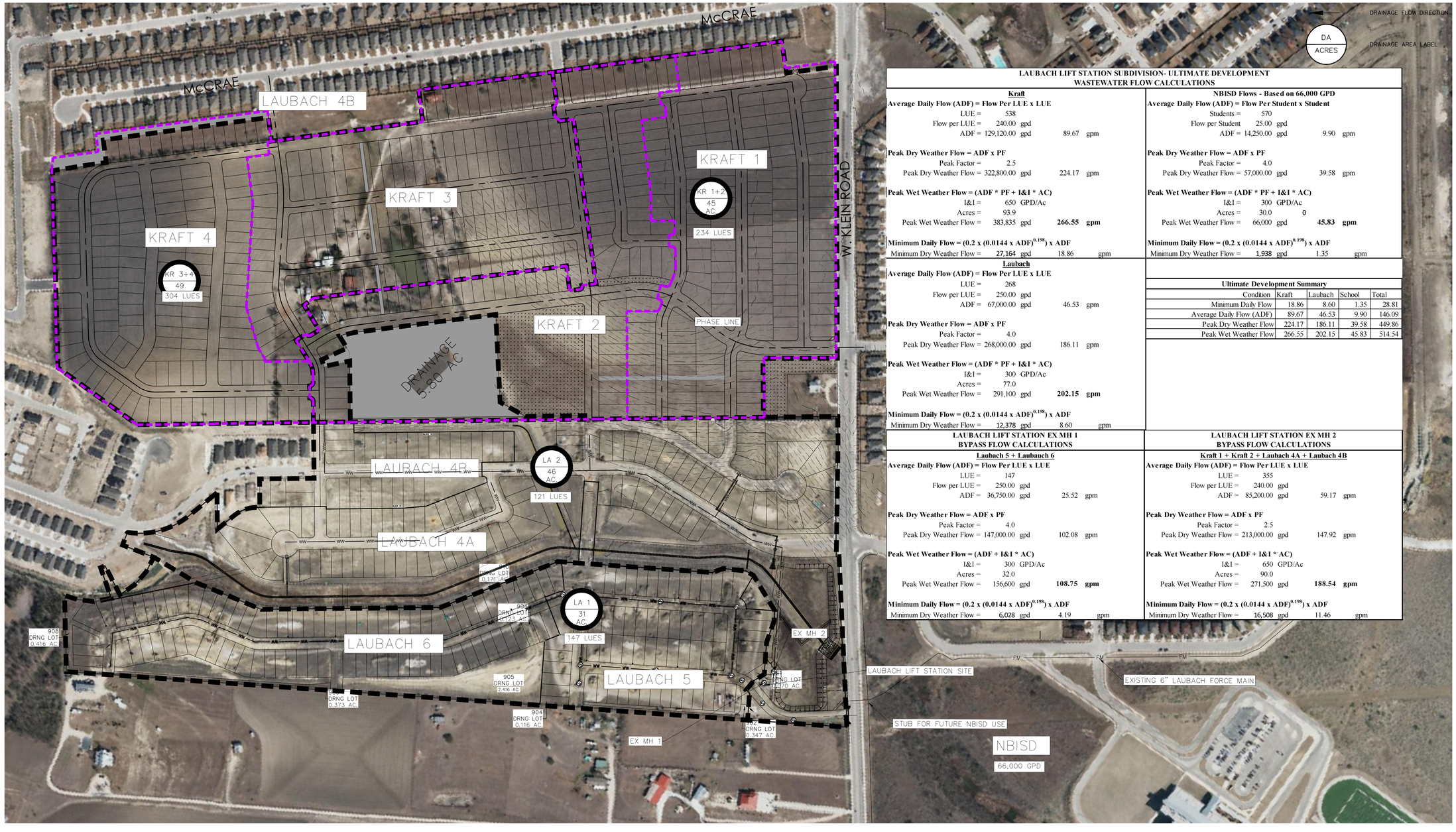
KRAFT SUBDIVISION, UNIT 3
NEW BRAUNFELS, TEXAS

NO.	REVISION DESCRIPTION	REVISION DATE

DATE:	March 2024
DRAWN BY:	KWP
DESIGNED BY:	RDB
REVIEWED BY:	CVH
HMT PROJECT NO.:	337.070

SHEET

C9.02



LEGEND

700	EXISTING CONTOURS
700	PROPOSED CONTOURS
B.L.	BUILDING SETBACK LINE
U.E.	UTILITY EASEMENT
D.E.	DRAINAGE EASEMENT
	DRAINAGE AREA
TC TC	TIME OF CONCENTRATION
A–1	POINT OF CONCENTRATION
	DRAINAGE FLOW DIRECTION
DA / ACRES	DRAINAGE AREA LABEL

0 100 200 400
HORIZONTAL SCALE: 1:200

LAUBACH LIFT STATION SUBDIVISION- ULTIMATE DEVELOPMENT
WASTEWATER FLOW CALCULATIONS

Kraft

Average Daily Flow (ADF) = Flow Per LUE x LUE

LUE =	538			
Flow per LUE =	240.00	gpd		
ADF =	129,120.00	gpd	89.67	gpm

Peak Dry Weather Flow = ADF x PF

Peak Factor =	2.5			
Peak Dry Weather Flow =	322,800.00	gpd	224.17	gpm

Peak Wet Weather Flow = (ADF * PF + I&I * AC)

I&I =	650	GPD/Ac		
Acres =	93.9			
Peak Wet Weather Flow =	383,835	gpd	**266.55**	**gpm**

Minimum Daily Flow = (0.2 x (0.0144 x ADF)$^{0.198}$) x ADF

Minimum Dry Weather Flow =	27,164	gpd	18.86	gpm

Laubach

Average Daily Flow (ADF) = Flow Per LUE x LUE

LUE =	268			
Flow per LUE =	250.00	gpd		
ADF =	67,000.00	gpd	46.53	gpm

Peak Dry Weather Flow = ADF x PF

Peak Factor =	4.0			
Peak Dry Weather Flow =	268,000.00	gpd	186.11	gpm

Peak Wet Weather Flow = (ADF * PF + I&I * AC)

I&I =	300	GPD/Ac		
Acres =	77.0			
Peak Wet Weather Flow =	291,100	gpd	**202.15**	**gpm**

Minimum Daily Flow = (0.2 x (0.0144 x ADF)$^{0.198}$) x ADF

Minimum Dry Weather Flow =	12,378	gpd	8.60	gpm

NBISD Flows - Based on 66,000 GPD

Average Daily Flow (ADF) = Flow Per Student x Student

Students =	570			
Flow per Student	25.00	gpd		
ADF =	14,250.00	gpd	9.90	gpm

Peak Dry Weather Flow = ADF x PF

Peak Factor =	4.0			
Peak Dry Weather Flow =	57,000.00	gpd	39.58	gpm

Peak Wet Weather Flow = (ADF * PF + I&I * AC)

I&I =	300	GPD/Ac		
Acres =	30.0	0		
Peak Wet Weather Flow =	66,000	gpd	**45.83**	**gpm**

Minimum Daily Flow = (0.2 x (0.0144 x ADF)$^{0.198}$) x ADF

Minimum Dry Weather Flow =	1,938	gpd	1.35	gpm

Ultimate Development Summary

Condition	Kraft	Laubach	School	Total
Minimum Daily Flow	18.86	8.60	1.35	28.81
Average Daily Flow (ADF)	89.67	46.53	9.90	146.09
Peak Dry Weather Flow	224.17	186.11	39.58	449.86
Peak Wet Weather Flow	266.55	202.15	45.83	514.54

LAUBACH LIFT STATION EX MH 1
BYPASS FLOW CALCULATIONS

Laubach 5 + Laubach 6

Average Daily Flow (ADF) = Flow Per LUE x LUE

LUE =	147			
Flow per LUE =	250.00	gpd		
ADF =	36,750.00	gpd	25.52	gpm

Peak Dry Weather Flow = ADF x PF

Peak Factor =	4.0			
Peak Dry Weather Flow =	147,000.00	gpd	102.08	gpm

Peak Wet Weather Flow = (ADF + I&I * AC)

I&I =	300	GPD/Ac		
Acres =	32.0			
Peak Wet Weather Flow =	156,600	gpd	**108.75**	**gpm**

Minimum Daily Flow = (0.2 x (0.0144 x ADF)$^{0.198}$) x ADF

Minimum Dry Weather Flow =	6,028	gpd	4.19	gpm

LAUBACH LIFT STATION EX MH 2
BYPASS FLOW CALCULATIONS

Kraft 1 + Kraft 2 + Laubach 4A + Laubach 4B

Average Daily Flow (ADF) = Flow Per LUE x LUE

LUE =	355			
Flow per LUE =	240.00	gpd		
ADF =	85,200.00	gpd	59.17	gpm

Peak Dry Weather Flow = ADF x PF

Peak Factor =	2.5			
Peak Dry Weather Flow =	213,000.00	gpd	147.92	gpm

Peak Wet Weather Flow = (ADF + I&I * AC)

I&I =	650	GPD/Ac		
Acres =	90.0			
Peak Wet Weather Flow =	271,500	gpd	**188.54**	**gpm**

Minimum Daily Flow = (0.2 x (0.0144 x ADF)$^{0.198}$) x ADF

Minimum Dry Weather Flow =	16,508	gpd	11.46	gpm

HMT
ENGINEERING & SURVEYING
290 S. CASTELL AVE., STE. 100
NEW BRAUNFELS, TX 78130
HMTNB.COM
P(830)625-8555*F(830)625-8556
TBPE FIRM F-10961
TBPLS FIRM 1053600

LAUBACH SEWERSHED EXHIBIT

Pump 1 Overflow Exhibit 1 of 2

CONTRACTOR SHALL NOTIFY THE FOLLOWING UTILITY COMPANIES 48 HOURS PRIOR TO EXCAVATION:

GVSUD(Water)	830-914-2331
Time Warner Cable	830-625-3408
Centerpoint Gas	830-643-6434
Robert Sanders	830-643-6903
Damaged Lines	888-876-5786
AT&T Telephone	830-303-1333
GVEC(Electric)	830-223-4832
Guadalupe-Blanco River Authority(Sewer)	830-379-5822
Texas One Call	830-545-6005

C.P.E. LOCATOR

CALL CENTER POINT ENERGY LOCATOR AT 1-800-545-6005, 48HRS BEFORE BEGINNING ANY EXCAVATION. DUE TO FEDERAL REGULATIONS TITLE 49, PART 192.181, CENTER POINT ENERGY MUST MAINTAIN ACCESS TO GAS VALVES AT ALL TIMES. THE CONTRACTOR MUST PROTECT AND WORK AROUND ANY GAS VALVES THAT ARE IN THE PROJECT AREA.

TELEPHONE LOCATOR

THE EXISTENCE AND LOCATION OF UNDERGROUND CABLE INDICATED ON THE PLANS ARE TAKEN FROM THE BEST RECORDS AVAILABLE AND ARE NOT GUARANTEED TO BE ACCURATE. CONTRACTOR TO CONTACT THE TELEPHONE COMPANY CABLE LOCATOR 48HRS PRIOR TO EXCAVATION AT 1-800-545-6005,, CONTRACTOR HAS THE RESPONSIBILITY TO PROTECT AND SUPPORT TELEPHONE COMPANY DURING CONSTRUCTION.

TRENCH EXCAVATION SAFETY PROTECTION

CONTRACTOR AND/OR CONTRACTOR'S INDEPENDENTLY RETAINED EMPLOYEE OR STRUCTURAL DESIGN/GEOTECHNICAL/SAFETY/EQUIPMENT CONSULTANT, IF ANY, SHALL REVIEW THESE PLANS AND AVAILABLE GEOTECHNICAL INFORMATION AND THE ANTICIPATED INSTALLATION SITE(S) WITHIN THE PROJECT WORK AREA IN ORDER TO IMPLEMENT CONTRACTOR'S TRENCH EXCAVATION SAFETY PROTECTION SYSTEMS, PROGRAMS AND/OR PROCEDURES FOR THE PROJECT DESCRIBED IN THE CONTRACT DOCUMENTS. THE CONTRACTORS IMPLEMENTATION OF THESE SYSTEMS, PROGRAMS AND/OR PROCEDURES SHALL PROVIDE FOR ADEQUATE TRENCH EXCAVATION SAFETY PROTECTION THAT COMPLY WITH AS A MINIMUM, OSHA STANDARDS FOR TRENCH EXCAVATIONS. SPECIFICALLY, CONTRACTOR AND/OR CONTRACTOR'S INDEPENDENTLY RETAINED EMPLOYEE OR SAFETY CONSULTANT SHALL IMPLEMENT A TRENCH SAFETY PROGRAM IN ACCORDANCE WITH OSHA STANDARDS GOVERNING THE PRESENCE AND ACTIVITIES OF INDIVIDUALS WORKING IN AND AROUND TRENCH EXCAVATIONS.

UTILITY TRENCH COMPACTION

ALL UTILITY TRENCH COMPACTION TESTS WITHIN THE STREET PAVEMENT SECTION SHALL BE THE RESPONSIBILITY OF THE DEVELOPER'S GEO-TECHNICAL ENGINEER. FILL MATERIAL SHALL BE PLACED IN UNIFORM LAYERS NOT TO EXCEED TWELVE INCHES (12") LOOSE. EACH LAYER OF MATERIAL SHALL BE COMPACTED TO A MINIMUM 95% DENSITY AND TESTED FOR DENSITY AND MOISTURE IN ACCORDANCE WITH TEST METHODS TEX-113-E, TEX-114-E, TEX-115-E. THE NUMBER AND LOCATION OF REQUIRED TESTS SHALL BE DETERMINED BY THE GEOTECHNICAL ENGINEER AND APPROVED BY THE CITY OF NEW BRAUNFELS STREET INSPECTOR. AT A MINIMUM, TESTS SHALL BE TAKEN EVERY 100LF FOR EACH LIFT, UPON COMPLETION OF TESTING THE GEO-TECHNICAL ENGINEER SHALL PROVIDE THE CITY OF NEW BRAUNFELS STREET INSPECTOR WITH ALL TESTING DOCUMENTATION AND A CERTIFICATION STATING THAT THE PLACEMENT OF FILL MATERIAL HAS BEEN COMPLETED IN ACCORDANCE WITH THE PLANS.

DEEP TRENCH COMPACTION TESTING

CITY REQUIREMENTS FOR TESTING SHALL BE ADHERED TO, IN CASES WHERE TRENCH DEPTHS DO NOT ALLOW TECHNICIANS ACCESS, METHODS FOR TESTING SHALL BE PROPOSED AND APPROVED PRIOR TO CONSTRUCTION COMMENCING.

THIS PROJECT INCLUDES UTILITY INSTALLATIONS GREATER THAN 5-FEET IN DEPTH LOCATED IN PUBLIC RIGHT-OF-WAY OR EASEMENTS. DEEP TRENCHES POSE COMPACTION TESTING AND CONSTRUCTION CHALLENGES AND CITY METHODS FOR TESTING AND COMPACTION MAY NOT BE ACHIEVABLE.

A UTILITY COMPACTION PLAN WILL BE REQUIRED AND MUST BE SUBMITTED FRO APPROVAL TO CITY PRIOR TO UTILITY INSTALLATION.

RECORD DRAWING

THIS RECORD DRAWING HAS BEEN PREPARED BASED ON INFORMATION SUBMITTED, IN PART, BY OTHERS. WHILE THIS INFORMATION IS BELIEVED TO BE RELIABLE, THE ENGINEER IS NOT RESPONSIBLE FOR ITS ACCURACY OR FOR ERRORS OR OMISSIONS WHICH MAY HAVE BEEN INCORPORATED INTO THIS DOCUMENT AS A RESULT. THOSE RELYING ON THIS RECORD DOCUMENT ARE ADVISED TO OBTAIN INDEPENDENT VERIFICATION OF ITS ACCURACY BEFORE APPLYING IT FOR ANY PURPOSE.

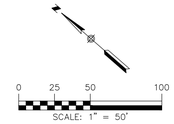
Date: 11/03/2020
By: Tim Gorena, PE
HMT ENGINEERING & SURVEYING
509 W HUISACHE
NEW BRAUNFELS, TEXAS 78130
(830) 625-8555
TBPE FIRM F-10961
TBPLS FIRM 10536000

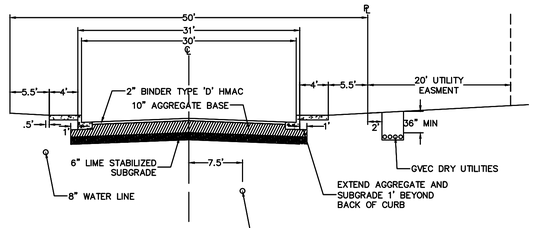
City of New Braunfels: PI2020-0011

UTILITY NOTES:

1. ALL UTILITIES TO BE CONSTRUCTED PRIOR TO THE STREETS.
2. NO VALVES, HYDRANTS, ETC. SHALL BE CONSTRUCTED WITHIN CURBS, SIDEWALKS OR DRIVEWAYS.
3. ALL SEWER PIPE DASTM 3034 (115 PSI) SDR 26 UNLESS CALLED OUT OTHERWISE.
4. REFER TO THE COVER SHEET FOR BENCHMARK INFORMATION.
5. AT WATER CROSSING INCLUDING FIRE HYDRANT LEADS, WHITE COLOR GASKETED ASTM D2241 SDR 26 PIPE AND FITTINGS SHALL BE USED FOR MAINS AND LATERALS.
6. REFER TO ALL GBRA NOTES ON SHEET C0.1.

THE LOCATION OF ALL EXISTING UNDERGROUND UTILITIES ARE SHOWN IN APPROXIMATE LOCATIONS ONLY. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK. THE CONTRACTOR WILL AGREE TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE INCURRED BY THEIR FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES, STRUCTURES OR FACILITIES. CONTRACTOR SHALL NOTIFY ENGINEER OF ANY DISCREPANCIES 24-HOURS PRIOR TO COMMENCING CONSTRUCTION.





LEGEND

700	EXISTING CONTOURS
700	PROPOSED CONTOURS
B.L.	BUILDING SETBACK LINE
U.E.	UTILITY EASEMENT
D.E.	DRAINAGE EASEMENT
	EXISTING WASTEWATER LINE
	PROPOSED WASTEWATER LINE
	PROPOSED WASTEWATER SERVICE
	UTILITY CROSSING
	PROPOSED STREET LIGHT
	PROPOSED TRANSFORMER

Time to Overflow Calculation Pump 1

First point to Overflow: NBISD MH 4

Overflow Elev = 652.73

MHs with FL > 652.73

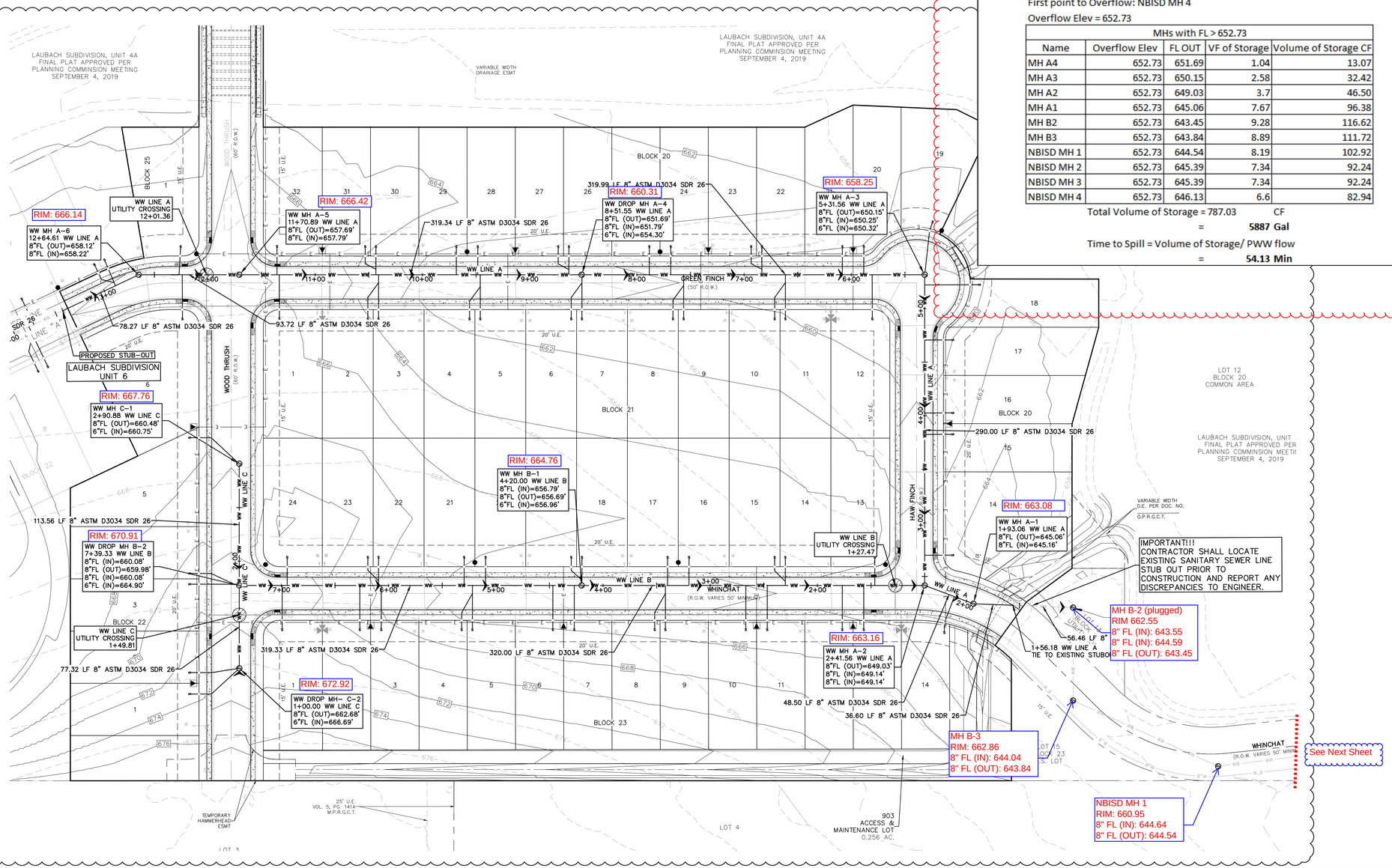
Name	Overflow Elev	FL OUT	VF of Storage	Volume of Storage CF
MH A4	652.73	651.69	1.04	13.07
MH A3	652.73	650.15	2.58	32.42
MH A2	652.73	649.03	3.7	46.50
MH A1	652.73	645.06	7.67	96.38
MH B2	652.73	643.45	9.28	116.62
MH B3	652.73	643.84	8.89	111.72
NBISD MH 1	652.73	644.54	8.19	102.92
NBISD MH 2	652.73	645.39	7.34	92.24
NBISD MH 3	652.73	645.39	7.34	92.24
NBISD MH 4	652.73	646.13	6.6	82.94

Total Volume of Storage = 787.03 CF

= **5887 Gal**

Time to Spill = Volume of Storage/ PWW flow

= **54.13 Min**



290 S. CASTELL AVE., STE. 100
NEW BRAUNFELS, TX 78130
TBPE FIRM F-10961
TBPLS FIRM 10536000

HMT ENGINEERING & SURVEYING

OVERALL WASTEWATER PLAN

LAUBACH SUBDIVISION UNIT 5

NO.	REVISION DESCRIPTION	REVISION DATE
1	WOOD THRUSH VERTICAL CURVE	08-10-2020
2	GBRA & GVEC COMMENTS	08-19-2020

DATE: **JUNE 2020**

DRAWN BY: **AM**

DESIGNED BY: **MTA**

REVIEWED BY: **TAG**

HMT PROJECT NO.: **337.004**

SHEET

C7.0

Drawing Name: M:_projects\337 - tennor homes\004 - laubach unit 5\Cds\337.004_OVERALL WASTEWATER.dwg User: rondyr Aug 19, 2020 - 10:48am

Pump 1 Overflow Exhibit 2 of 2

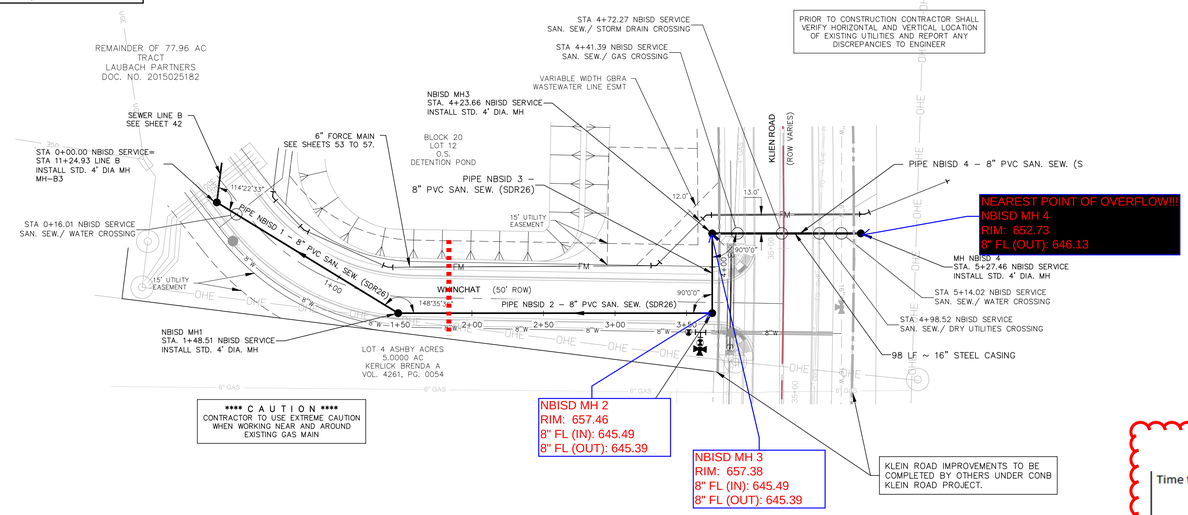
STATE OF TEXAS
TIMOTHY A. GORENA
129271
LICENSED
PROFESSIONAL ENGINEER
01/26/2022

RECORD DRAWING

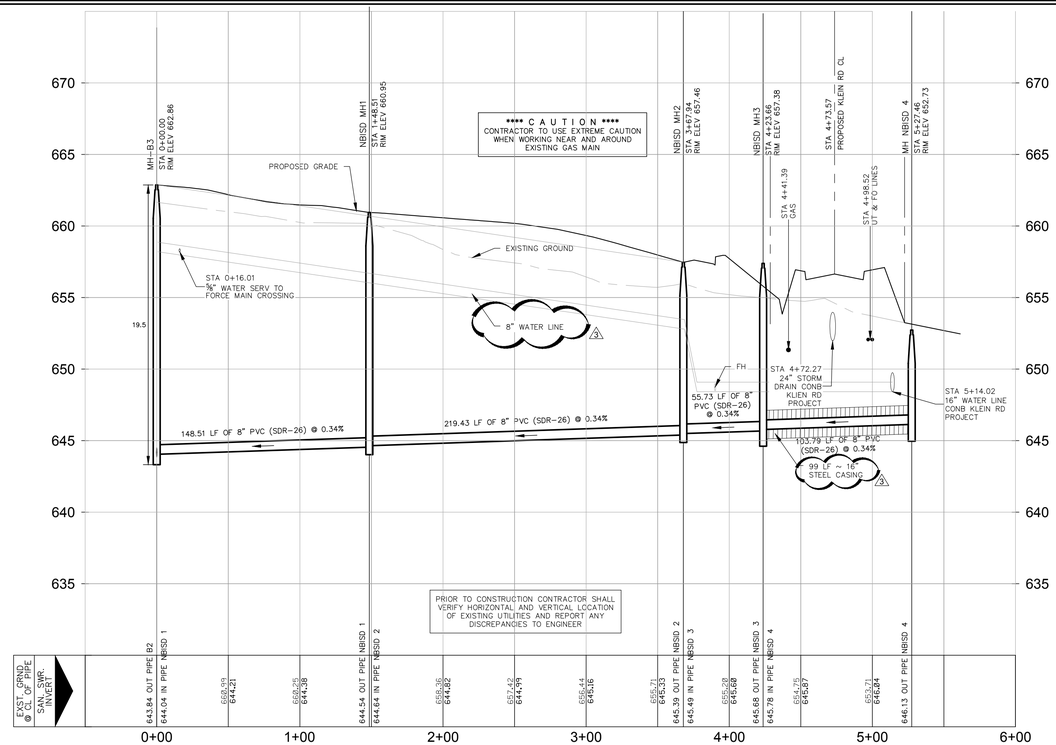
THIS RECORD DRAWING HAS BEEN PREPARED BASED ON INFORMATION SUBMITTED, IN PART, BY OTHERS. WHILE THIS INFORMATION IS BELIEVED TO BE RELIABLE, THE ENGINEER IS NOT RESPONSIBLE FOR ITS ACCURACY OR FOR ERRORS OR OMISSIONS WHICH MAY HAVE BEEN INCORPORATED INTO THIS DOCUMENT AS A RESULT. THOSE RELYING ON THIS RECORD DOCUMENT ARE ADVISED TO OBTAIN INDEPENDENT VERIFICATION OF ITS ACCURACY BEFORE APPLYING IT FOR ANY PURPOSE.

Date: 01/26/2022
By: Tim Gorena, PE

HMT
ENGINEERING & SURVEYING
8200 W IH-10, #810
San Antonio, TX 78230
(830) 625-8555
TBPE-FIRM F-10961
TBPLS FIRM 10153600



NBISD LINE - STA. 0+0.00 TO END



Time to Overflow Calculation Pump 1
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MHs with FL > 652.73

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MH A1	652.73	645.06	7.67	96.38
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NBISD MH 2	652.73	645.39	7.34	92.24
NBISD MH 3	652.73	645.39	7.34	92.24
NBISD MH 4	652.73	646.13	6.6	82.94

Total Volume of Storage = 787.03 CF
= **5887 Gal**
Time to Spill = Volume of Storage/ PWW flow
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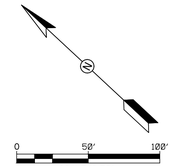

LEGEND

- NEW SANITARY SEWER
- NEW MANHOLE
- NEW DOUBLE VERTICAL STACK SEWER LATERAL
- NEW SEWER LATERAL
- 8"W — NEW 8" WATER MAIN
- 12"W — NEW 8" WATER MAIN
- OHE — OHE — NEW OVERHEAD ELEC.
- NEW DOUBLE METERED DUAL WATER SERVICE
- NEW FIRE HYDRANT

CONSTRUCTION NOTES:

1. WHERE WATER LINES AND NEW SEWER LINES ARE INSTALLED WITH A SEPARATION DISTANCE CLOSER THAN 10FT HORIZONTAL AND 12IN VERTICAL (I.E., WATER LINES CROSSING WASTEWATER LINES, WATER LINES PARALLELING WASTEWATER LINES, OR WATER LINES NEXT TO MANHOLES) THE INSTALLATION MUST MEET THE REQUIREMENTS OF 30 TAC §217.53(D) (PIPE DESIGN) AND 30 TAC §290.44(E) (WATER DISTRIBUTION).

2. WHERE 10FT HORIZONTAL AND 12IN VERTICAL SEPARATION FROM WATER AND SEWER LINES CROSSING CANNOT BE MAINTAINED, THE NEW WATER LINE SHALL BE ABOVE THE SEWER LINE AS SHOWN ON THE WATER/SEWER LINE CROSSING DETAIL. AT NO TIME SHALL A WATER LINE OR WATER SERVICE BE PLACED UNDER A SEWER LINE OR SEWER SERVICE.

3. WHERE A NEW POTABLE WATERLINE CROSSES AN EXISTING, PRESSURE RATED WASTEWATER MAIN OR LATERAL, ONE SEGMENT OF THE WATERLINE PIPE SHALL BE CENTERED OVER THE WASTEWATER MAIN OR LATERAL SUCH THAT THE JOINTS OF THE WATERLINE PIPE ARE EQUIDISTANT AND AT LEAST NINE FEET HORIZONTALLY FROM THE CENTERLINE OF THE WASTEWATER MAIN OR LATERAL. THE POTABLE WATERLINE SHALL BE AT LEAST TWELVE INCHES ABOVE THE WASTEWATER MAIN OR LATERAL. WHENEVER POSSIBLE, THE CROSSING SHALL BE CENTERED BETWEEN THE JOINTS OF THE WASTEWATER MAIN OR LATERAL. IF THE EXISTING WASTEWATER MAIN OR LATERAL SHOWS SIGNS OF LEAKING, IT SHALL BE REPLACED FOR AT LEAST NINE FEET IN BOTH DIRECTIONS (18 FEET TOTAL) WITH AT LEAST 150 PSI PRESSURE RATED PIPE.

4. ALL PRIVATE SERVICE LATERALS MUST BE INSPECTED AND CERTIFIED IN ACCORDANCE WITH 30 TAC §213.5(C)(3)(I). AFTER INSTALLATION OF AND, PRIOR TO COVERING AND CONNECTING A PRIVATE SERVICE LATERAL TO AN EXISTING ORGANIZED SEWAGE COLLECTION SYSTEM, A TEXAS LICENSED PROFESSIONAL ENGINEER, TEXAS REGISTERED SANITARIAN, OR APPROPRIATE CITY INSPECTOR MUST VISUALLY INSPECT THE PRIVATE SERVICE LATERAL AND THE CONNECTION TO THE SEWAGE COLLECTION SYSTEM, AND CERTIFY THAT IT IS CONSTRUCTED IN CONFORMITY WITH THE APPLICABLE PROVISIONS OF THIS SECTION. THE OWNER OF THE COLLECTION SYSTEM MUST MAINTAIN SUCH CERTIFICATIONS FOR FIVE YEARS AND FORWARD COPIES TO THE APPROPRIATE REGIONAL OFFICE UPON REQUEST. CONNECTIONS MAY ONLY BE MADE TO AN APPROVED SEWAGE COLLECTION SYSTEM.

5. FIRE HYDRANTS SHALL NOT BE INSTALLED WITHIN 10FT HORIZONTAL AND 12' VERTICAL OF ANY WASTEWATER MAIN, WASTEWATER LATERAL, OR WASTEWATER SERVICE LINE REGARDLESS OF CONSTRUCTION.

6. METER BOXES MUST BE SET AT PROPOSED FINISHED GRADE. ANY METER BOXES THAT ARE NOT SET AT THE FINAL GRADE WILL BE ADJUSTED BY THE CONTRACTOR AT NO ADDITIONAL COSTS.

7. ALL UTILITIES SHALL BE CONSTRUCTED PRIOR TO STREETS.

8. NO VALVES, FIRE HYDRANTS, ETC. SHALL BE CONSTRUCTED WITHIN CURBS, SIDEWALKS OR DRIVEWAYS.

9. ALL UTILITY TRENCH COMPACTION TESTS WITHIN THE STREET PAVEMENT SECTION SHALL BE THE RESPONSIBILITY OF THE DEVELOPER'S GEO-TECHNICAL ENGINEER. FILL MATERIAL SHALL BE PLACED IN UNIFORM LAYERS NOT TO EXCEED TWELVE INCHES (12") LOOSE. EACH LAYER OF MATERIAL SHALL BE COMPACTED TO A MINIMUM 95% DENSITY AND TESTED FOR DENSITY AND MOISTURE IN ACCORDANCE WITH TEST METHODS TEX-113-E, TEX- 114-E, TEX-115-E. THE NUMBER AND LOCATION OF REQUIRED TESTS SHALL BE DETERMINED BY THE GEO- TECHNICAL ENGINEER AND APPROVED BY THE CITY [illegible] AT A MINIMUM, TESTS SHALL BE TAKEN EVERY [illegible] OF TESTING THE GEO-TECHNICAL ENGINEER [illegible] BRAUNFELS STREET INSPECTOR WITH ALL TESTING [illegible] ING THAT THE PLACEMENT OF FILL MATERIAL [illegible] CE WITH THE PLANS.

[illegible] TY INSTALLATIONS GREATER THAN 5-FEET IN DEPTH [illegible] OR EASEMENTS. DEEP TRENCHES POSE COMPACTION [illegible] LENGES AND CITY METHODS FOR TESTING AND [illegible] SLE. A UTILITY COMPACTION PLAN WILL BE REQUIRED [illegible] OVAL TO CITY PRIOR TO UTILITY INSTALLATION.

SCALE:
HORIZONTAL 1" = 50'
VERTICAL 1" = 5'

CONTRACTOR SHALL NOTIFY THE FOLLOWING UTILITY COMPANIES 48 HOURS PRIOR TO EXCAVATION:

GREEN VALLEY SPECIAL UTILITY DISTRICT (GVSUD) (WATER)	(830) 914-2330
GUADALUPE BLANCO RIVER AUTHORITY (GBRA) (SEWER)	(830) 379-5822
GREEN VALLEY ELECTRIC COOPERATIVE (GVEC) (ELECTRIC)	(830) 379-2114
SPECTRUM CABLE	1-800-892-4357
CENTERPOINT GAS	(800) 427-7142
AT&T	(830) 303-1333
NEW BRAUNFELS UTILITIES	(830)-629-8400
TEXAS ONE CALL SYSTEM	811

C.P.E. LOCATOR

CALL CENTER POINT ENERGY LOCATOR AT 1-800-545-6005, 48HRS BEFORE BEGINNING ANY EXCAVATION. DUE TO FEDERAL REGULATIONS TITLE 49, PART 192.181, CENTER POINT ENERGY MUST MAINTAIN ACCESS TO GAS VALVES AT ALL TIMES. THE CONTRACTOR MUST PROTECT AND WORK AROUND ANY GAS VALVES THAT ARE IN THE PROJECT AREA.

TELEPHONE LOCATOR

THE EXISTENCE AND LOCATION OF UNDERGROUND CABLE INDICATED ON THE PLANS ARE TAKEN FROM THE BEST RECORDS AVAILABLE AND ARE NOT GUARANTEED TO BE ACCURATE. CONTRACTOR TO CONTACT THE TELEPHONE COMPANY CABLE LOCATOR 48HRS PRIOR TO EXCAVATION AT 1-800-545-6005,. CONTRACTOR HAS THE RESPONSIBILITY TO PROTECT AND SUPPORT TELEPHONE COMPANY DURING CONSTRUCTION.

TRENCH EXCAVATION SAFETY PROTECTION

CONTRACTOR AND/OR CONTRACTOR'S INDEPENDENTLY RETAINED EMPLOYEE OR STRUCTURAL DESIGN/GEOTECHNICAL/SAFETY/EQUIPMENT CONSULTANT, IF ANY, SHALL REVIEW THESE PLANS AND AVAILABLE GEOTECHNICAL INFORMATION AND THE ANTICIPATED INSTALLATION SITE(S) WITHIN THE PROJECT WORK AREA IN ORDER TO IMPLEMENT CONTRACTOR'S TRENCH EXCAVATION SAFETY PROTECTION SYSTEMS, PROGRAMS AND/OR PROCEDURES FOR THE PROJECT DESCRIBED IN THE CONTRACT DOCUMENTS. THE CONTRACTORS IMPLEMENTATION OF THESE SYSTEMS, PROGRAMS AND/OR PROCEDURES SHALL PROVIDE FOR ADEQUATE TRENCH EXCAVATION SAFETY PROTECTION THAT COMPLY WITH AS A MINIMUM, OSHA STANDARDS FOR TRENCH EXCAVATIONS. SPECIFICALLY, CONTRACTOR AND/OR CONTRACTOR'S INDEPENDENTLY RETAINED EMPLOYEE OR SAFETY CONSULTANT SHALL IMPLEMENT A TRENCH SAFETY PROGRAM IN ACCORDANCE WITH OSHA STANDARDS GOVERNING THE PRESENCE AND ACTIVITIES OF INDIVIDUALS WORKING IN AND AROUND TRENCH EXCAVATIONS.

THE LOCATION OF ALL EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE LOCATIONS ONLY. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK. THE CONTRACTOR WILL AGREE TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE INCURRED BY THEIR FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES, STRUCTURES OR FACILITIES. CONTRACTOR SHALL NOTIFY ENGINEER OF ANY DISCREPANCIES 24-HOURS PRIOR TO COMMENCING CONSTRUCTION.

811 Know what's below. Call before you dig.

STATE OF TEXAS
JAMES INGALLS
107416
LICENSED
PROFESSIONAL ENGINEER
2-26-19

ISSUES AND REVISIONS

NO	DATE	
1	7/26/2018	REVISED AS PER CONB COMMENTS
2	11/1/2018	REVISED AS PER GBRA COMMENTS
3	02/19/2019	REVISED AS PER GBRA COMMENTS
4	04/02/2019	REVISED AS PER GBRA COMMENTS

MOELLER & ASSOCIATES Engineering Solutions
2021 W SH46, STE 105, NEW BRAUNFELS, TX. 78132
PH: 830-358-7127 www.mg-tx.com
TBPE FIRM F-13351

NBISD SANITARY SEWER

LAUBACH SUBDIVISION UNIT 4A
LAUBACH PARTNERS, LLC
1286 RIVER ROAD
NEW BRAUNFELS, TEXAS 78130

SHEET 46 OF 71

PUMP 2 Overflow Exhibit

STATE OF TEXAS
TIMOTHY A. GORENA
129271
LICENSED
PROFESSIONAL ENGINEER
01/26/2022

RECORD DRAWING

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Date: 01/26/2022
By: Tim Gorena, PE

HMT ENGINEERING & SURVEYING
8200 W IH-10, #810
San Antonio, TX 78230
(830) 625-8555
TBPE-FIRM F-10961
TBPLS FIRM 10153600

INV ELEV: 678.80

INV ELEV: 663.89

INV Elevation: 661.18

MH F1
RIM: 667.18
8" FL (IN): 659.86
8" FL (IN): 659.76
8" FL (OUT): 659.48

MH A10
RIM: 665.36
8" FL (IN): 656.40
8" FL (OUT): 656.30

MH D4
RIM: 671.01
6" FL (IN): 662.65
8" FL (OUT): 661.19

MH D3
RIM: 671.18
8" FL (IN): 660.52
8" FL (OUT): 660.42

MH D2
RIM: 669.26
8" FL (IN): 660.07
8" FL (IN): 660.07
8" FL (OUT): 659.97

MH-J2
RIM: 671.57
6" FL (IN): 659.07
8" FL (OUT): 663.18

MH E1
RIM: 668.53
6" FL (IN): 661.19
8" FL (OUT): 659.62

MH D1
RIM: 663.38
8" FL (IN): 655.42
8" FL (IN): 655.55
8" FL (OUT): 655.32

MH-J1
RIM: 664.49
8" FL (IN): 658.37
8" FL (OUT): 658.27

MH C1
RIM: 663.00
8" FL (IN): 652.50
8" FL (IN): 654.40
8" FL (OUT): 652.40

MH G1
RIM: 668.91
8" FL (IN): 661.06
8" FL (OUT): 660.96

MH C2
RIM: 663.60
8" FL (IN): 656.08
8" FL (OUT): 655.98

MH A8
RIM: 666.94
8" FL (IN): 655.04
8" FL (OUT): 654.94

MH A7
RIM: 663.94
8" FL (IN): 654.40
8" FL (OUT): 654.30

MH C3
RIM: 664.83
6" FL (IN): 659.07
6" FL (IN): 658.87
8" FL (OUT): 657.77

MH A9
RIM: 666.65
8" FL (IN): 655.62
8" FL (IN): 657.52
8" FL (OUT): 655.52

MH G2
RIM: 669.83
6" FL (IN): 663.76
6" FL (IN): 663.27
8" FL (IN): 662.47
8" FL (OUT): 662.37

MH A6
RIM: 662.01
8" FL (IN): 652.98
8" FL (IN): 651.71
8" FL (OUT): 651.61

MH A5
RIM: 661.05
8" FL (IN): 650.86
8" FL (OUT): 650.76

MH A4
RIM: 660.58
8" FL (IN): 649.55
8" FL (OUT): 649.45

MH G3
RIM: 672.28
8" FL (IN): 665.62
8" FL (OUT): 665.52

MH G4
RIM: 672.82
8" FL (IN): 666.38
8" FL (OUT): 666.28

MH G6
RIM: 677.98
6" FL (IN): 670.92
6" FL (IN): 670.82
8" FL (OUT): 670.82

MH-G5
RIM: 679.61
8" FL (IN): 671.78
8" FL (IN): 672.06
8" FL (OUT): 671.68

NEAREST POINT OF OVERFLOW!!!
MH A3
RIM: 658.90
8" FL (IN): 646.57
8" FL (OUT): 646.47

MH A2
RIM: 661.02
8" FL (IN): 644.42
8" FL (OUT): 644.33

96.00 AC LEONARD KRAFT VOL. 373, PG. 254

1.00 AC DEBORAH KRAFT VOL. 2648, PG. 798

77.96 AC PARTNERS 201502518

LINE F CALANDRA LARK (60' R.O.W.) LINE A

WOOD THRUSH (60' R.O.W.)

WOOD WARBLER (50' R.O.W.)

STONECHAT (50' R.O.W.)

SHORE LARK (60' R.O.W.)

REDSTART (50' R.O.W.)

ROSEFINCH (50' R.O.W.)

VIERY (50' R.O.W.)

KLEIN ROAD (60' R.O.W.)

CALANDRA LARK (60' VARIES)

WHINCHAT

BLOCK 8 LOT 94 O.S.

BLOCK 15

BLOCK 17 LOT 1

BLOCK 19

BLOCK 20 LOT 11 HOA PARK

BLOCK 20 LOT 15 O.S.

96 HOA PARK

94 HOA PARK

20' PEDESTRIAN ESMT

VARIABLE WIDTH PEDESTRIAN ESMT

GBRA WASTEWATER LINE ESMT

VARIABLE WIDTH WASTEWATER LINE ESMT

LOT 4 ASHBY ACRES SUBDIVISION VOL 5, PG. 141-A

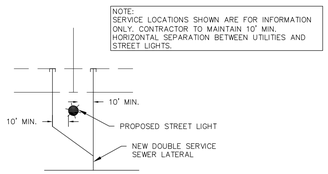
NOTE:
1. SERVICE LOCATIONS SHOWN ARE FOR INFORMATION ONLY. CONTRACTOR TO MAINTAIN 10' MIN. HORIZONTAL SEPARATION BETWEEN ALL UTILITIES.
2. CONTRACTOR TO MAINTAIN 10-FT HORIZONTAL AND 12-IN VERTICAL SEPARATION BETWEEN UTILITIES. REFERENCE GENERAL NOTES AND DETAIL SHEETS FOR ADDITIONAL REQUIREMENTS. (TYPICAL OTHER SHEETS)
3. CONTRACTOR SHALL COORDINATE SERVICES FOR LOTS LISTED BELOW WITH MANHOLE SUPPLIER TO VERIFY PROPER DIRECTION/ORIENTATION OF MANHOLE WALL PENETRATIONS AS REQUIRED TO ACHIEVE THE LAYOUT SHOWN ON THE DOUBLE WASTEWATER LATERAL DETAIL.
   - BLOCK 8: LOT 65, 66, 67, 68, 88, 90
   - BLOCK 19: LOT 19, 20, 21, 22
4. CONTRACTOR SHALL INSTALL SERVICES FOR LOTS LISTED BELOW INTO THE MAIN, NOT INTO THE MANHOLE, AND LAYOUT SHALL BE AS SHOWN ON THE DOUBLE WASTEWATER LATERAL DETAIL.
   - BLOCK 8: LOT 82, 83, 91, 92
   - BLOCK 16: LOT 21, 22

0 100' 200'
SCALE: 1"=100'

LEGEND

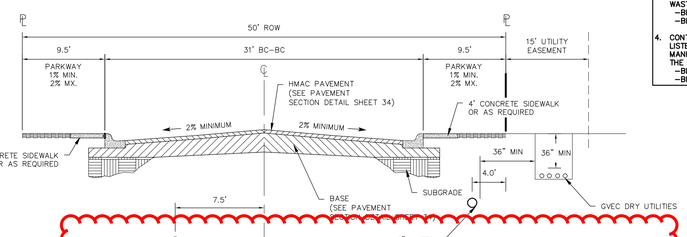
- NEW SANITARY SEWER
- NEW MANHOLE
- NEW SINGLE SERVICE SEWER LATERAL
- NEW DOUBLE SERVICE SEWER LATERAL
- NEW DOUBLE VERTICAL STACK SEWER LATERAL
- NEW WATER SERVICE
- NEW DOUBLE METERED DUAL WATER SERVICE
- NEW FIRE HYDRANT
- EXISTING OVERHEAD ELECTRIC
- EXISTING 8" SANITARY SEWER
- EXISTING 16" WATER LINE
- EXISTING WOOD FENCE
- EXISTING BARBWIRE FENCE
- EXISTING SIGN
- EXISTING SANITARY SEWER MANHOLE
- EXISTING UTILITY POLE
- EXISTING GUY

NOTE:
SERVICE LOCATIONS SHOWN ARE FOR INFORMATION ONLY. CONTRACTOR TO MAINTAIN 10' MIN. HORIZONTAL SEPARATION BETWEEN UTILITIES AND STREET LIGHTS.



STREET LIGHT & SEWER LAT. DETAIL (TYP.)

NTS



LAUBACH SUBDIVISION UNIT 4A	
ITEM	QTY.
SANITARY SEWER MAIN (8" PVC SDR-26)	5815 LF
SANITARY SEWER SERVICE	90 EA.
SANITARY SEWER CLEANOUT	2 EA.
STANDARD MANHOLE	32 EA.

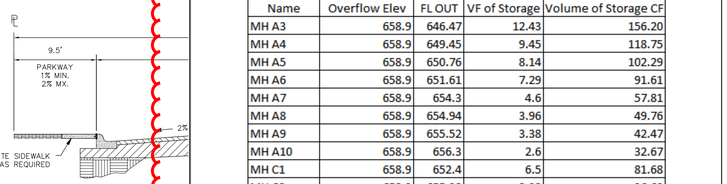
CONSTRUCTION NOTES:
1. ALL PRIVATE SERVICE LATERALS MUST BE INSPECTED AND CERTIFIED IN ACCORDANCE WITH 30 TAC §213.5(C)(3)(I). AFTER INSTALLATION OF AND, PRIOR TO COVERING AND CONNECTING A PRIVATE SERVICE LATERAL TO AN EXISTING ORGANIZED SEWAGE COLLECTION SYSTEM, A TEXAS LICENSED PROFESSIONAL ENGINEER, TEXAS REGISTERED SANITARIAN, OR APPROPRIATE CITY INSPECTOR MUST VISUALLY INSPECT THE PRIVATE SERVICE LATERAL AND THE CONNECTION TO THE SEWAGE COLLECTION SYSTEM, AND CERTIFY THAT IT IS CONSTRUCTED IN CONFORMITY WITH THE APPLICABLE PROVISIONS OF THIS SECTION. THE OWNER OF THE COLLECTION SYSTEM MUST MAINTAIN SUCH CERTIFICATIONS FOR FIVE YEARS AND FORWARD COPIES TO THE APPROPRIATE REGIONAL OFFICE UPON REQUEST. CONNECTIONS MAY ONLY BE MADE TO AN APPROVED SEWAGE COLLECTION SYSTEM.
2. FIRE HYDRANTS SHALL NOT BE INSTALLED WITHIN 10FT HORIZONTAL AND 12' VERTICAL OF ANY WASTEWATER MAIN, WASTEWATER LATERAL, OR WASTEWATER SERVICE LINE REGARDLESS OF CONSTRUCTION.
3. METER BOXES MUST BE SET AT PROPOSED FINISHED GRADE. ANY METER BOXES THAT ARE NOT SET AT THE FINAL GRADE WILL BE ADJUSTED BY THE CONTRACTOR AT NO ADDITIONAL COSTS.
4. ALL UTILITIES SHALL BE CONSTRUCTED PRIOR TO STREETS.
5. NO VALVES, FIRE HYDRANTS, ETC. SHALL BE CONSTRUCTED WITHIN CURBS, SIDEWALKS OR DRIVEWAYS.
6. ALL UTILITY TRENCH COMPACTION TESTS WITHIN THE STREET PAVEMENT SECTION SHALL BE THE RESPONSIBILITY OF THE DEVELOPER'S GEO-TECHNICAL ENGINEER. FILL MATERIAL SHALL BE PLACED IN UNIFORM LAYERS NOT TO EXCEED TWELVE INCHES (12") LOOSE. EACH LAYER OF MATERIAL SHALL BE COMPACTED TO A MINIMUM 95% DENSITY AND TESTED FOR DENSITY AND MOISTURE IN ACCORDANCE WITH TEST METHODS TEX-113-E, TEX- 114-E, TEX-115-E. THE NUMBER AND LOCATION OF REQUIRED TESTS SHALL BE DETERMINED BY THE GEO- TECHNICAL ENGINEER AND APPROVED BY THE CITY OF NEW BRAUNFELS STREET INSPECTOR. AT A MINIMUM, TESTS SHALL BE TAKEN EVERY 100LF FOR EACH LIFT. UPON COMPLETION OF TESTING THE GEO-TECHNICAL ENGINEER SHALL PROVIDE THE CITY OF NEW BRAUNFELS STREET INSPECTOR WITH ALL TESTING DOCUMENTATION AND A CERTIFICATION STATING THAT THE PLACEMENT OF FILL MATERIAL HAS BEEN COMPLETED IN ACCORDANCE WITH THE PLANS.
7. THIS PROJECT INCLUDES UTILITY INSTALLATIONS GREATER THAN 5-FEET IN DEPTH LOCATED IN PUBLIC RIGHT-OF-WAY OR EASEMENTS. DEEP TRENCHES POSE COMPACTION TESTING AND CONSTRUCTION CHALLENGES AND CITY METHODS FOR TESTING AND COMPACTION MAY NOT BE ACHIEVABLE. A UTILITY COMPACTION PLAN WILL BE REQUIRED AND MUST BE SUBMITTED FOR APPROVAL TO CITY PRIOR TO UTILITY INSTALLATION.

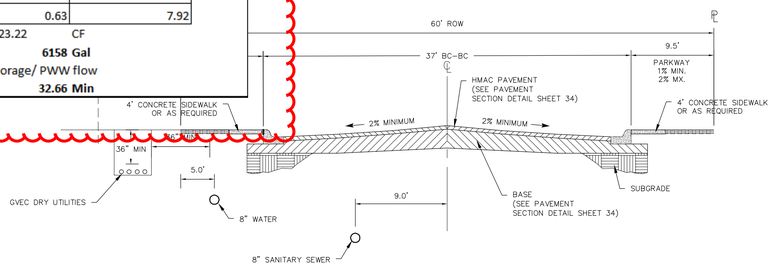
Time to Overflow Calculation Pump 2
First point to Overflow: MH A3
Overflow Elev = 658.90

MHs with FL > 658.90				
Name	Overflow Elev	FL OUT	VF of Storage	Volume of Storage CF
MH A3	658.9	646.47	12.43	156.20
MH A4	658.9	649.45	9.45	118.75
MH A5	658.9	650.76	8.14	102.29
MH A6	658.9	651.61	7.29	91.61
MH A7	658.9	654.3	4.6	57.81
MH A8	658.9	654.94	3.96	49.76
MH A9	658.9	655.52	3.38	42.47
MH A10	658.9	656.3	2.6	32.67
MH C1	658.9	652.4	6.5	81.68
MH C2	658.9	655.98	2.92	36.69
MH C3	658.9	658.87	0.03	0.38
MH D1	658.9	655.32	3.58	44.99
MH J1	658.9	658.27	0.63	7.92

Total Volume of Storage = 823.22 CF
= 6158 Gal
Time to Spill = Volume of Storage/ PWW flow
= 32.66 Min

LOCA





CALANDRA LARK & WOOD THRUSH

COLLECTOR STREET SECTION

CONTRACTOR SHALL NOTIFY THE FOLLOWING UTILITY COMPANIES 48 HOURS PRIOR TO EXCAVATION:

GREEN VALLEY SPECIAL UTILITY DISTRICT (GVSUD) (WATER)	(830) 914-2330
GUADALUPE BLANCO RIVER AUTHORITY (GBRA) (SEWER)	(830) 379-5822
GREEN VALLEY ELECTRIC COOPERATIVE (GVEC) (ELECTRIC)	(830) 379-2114
SPECTRUM CABLE	1-800-892-4357
CENTERPOINT GAS	(800) 427-7142
AT&T	(830) 303-1333
NEW BRAUNFELS UTILITIES	(830)-629-8400
TEXAS ONE CALL SYSTEM	811

C.P.E. LOCATOR

CALL CENTER POINT ENERGY LOCATOR AT 1-800-545-6005, 48HRS BEFORE BEGINNING ANY EXCAVATION. DUE TO FEDERAL REGULATIONS TITLE 49, PART 192.181, CENTER POINT ENERGY MUST MAINTAIN ACCESS TO GAS VALVES AT ALL TIMES. THE CONTRACTOR MUST PROTECT AND WORK AROUND ANY GAS VALVES THAT ARE IN THE PROJECT AREA.

TELEPHONE LOCATOR

THE EXISTENCE AND LOCATION OF UNDERGROUND CABLE INDICATED ON THE PLANS ARE TAKEN FROM THE BEST RECORDS AVAILABLE AND ARE NOT GUARANTEED TO BE ACCURATE. CONTRACTOR TO CONTACT THE TELEPHONE COMPANY CABLE LOCATOR 48HRS PRIOR TO EXCAVATION AT 1-800-545-6005, CONTRACTOR HAS THE RESPONSIBILITY TO PROTECT AND SUPPORT TELEPHONE COMPANY DURING CONSTRUCTION.

TRENCH EXCAVATION SAFETY PROTECTION

CONTRACTOR AND/OR CONTRACTOR'S INDEPENDENTLY RETAINED EMPLOYEE OR STRUCTURAL DESIGN/GEOTECHNICAL/SAFETY/EQUIPMENT CONSULTANT, IF ANY, SHALL REVIEW THESE PLANS AND AVAILABLE GEOTECHNICAL INFORMATION AND THE ANTICIPATED INSTALLATION SITE(S) WITHIN THE PROJECT WORK AREA IN ORDER TO IMPLEMENT CONTRACTOR'S TRENCH EXCAVATION SAFETY PROTECTION SYSTEMS, PROGRAMS AND/OR PROCEDURES FOR THE PROJECT DESCRIBED IN THE CONTRACT DOCUMENTS. THE CONTRACTORS IMPLEMENTATION OF THESE SYSTEMS, PROGRAMS AND/OR PROCEDURES SHALL PROVIDE FOR ADEQUATE TRENCH EXCAVATION SAFETY PROTECTION THAT COMPLY WITH AS A MINIMUM, OSHA STANDARDS FOR TRENCH EXCAVATIONS. SPECIFICALLY, CONTRACTOR AND/OR CONTRACTOR'S INDEPENDENTLY RETAINED EMPLOYEE OR SAFETY CONSULTANT SHALL IMPLEMENT A TRENCH SAFETY PROGRAM IN ACCORDANCE WITH OSHA STANDARDS GOVERNING THE PRESENCE AND ACTIVITIES OF INDIVIDUALS WORKING IN AND AROUND TRENCH EXCAVATIONS.

THE LOCATION OF ALL EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE LOCATIONS ONLY. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK. THE CONTRACTOR WILL AGREE TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE INCURRED BY THEIR FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES, STRUCTURES OR FACILITIES. CONTRACTOR SHALL NOTIFY ENGINEER OF ANY DISCREPANCIES 24-HOURS PRIOR TO COMMENCING CONSTRUCTION.

811 Know what's below. Call before you dig.

STATE OF TEXAS
JAMES INGALLS
107416
LICENSED
PROFESSIONAL ENGINEER
2-8-19

NO	DATE	ISSUES AND REVISIONS
1	7/26/2018	REVISED AS PER CONB COMMENTS
2	11/1/2018	REVISED AS PER GBRA COMMENTS
3	02/19/2019	REVISED AS PER GBRA COMMENTS
4	04/02/2019	REVISED AS PER GBRA COMMENTS
5	05/02/2019	REVISED AS PER GBRA COMMENTS
6	05/08/2019	REVISED AS PER CONB COMMENTS

MOELLER & ASSOCIATES Engineering Solutions
2021 W. SH46, STE. 105, NEW BRAUNFELS, TX. 78132
PH: 830-358-7127 www.mo-tx.com
TBPE FIRM F-13351

OVERALL SANITARY SEWER SYSTEM

LAUBACH SUBDIVISION UNIT 4A
LAUBACH PARTNERS, LLC
1286 RIVER ROAD
NEW BRAUNFELS, TEXAS 78130

SHEET 39 OF 71

Drawing Name: N:\Projects\SEA\CO08 1\06c Laubach Tract\Civil\Construction Drawings\Laubach Unit 4A\39 OVERALL SANITARY SEWER SYSTEM.dwg User: BlancoPalma May 08, 2019 - 6:12pm

Attachment E

Lift Station Calculations

Head Loss Calculations and Pump Selection

The pipe frictions losses were calculated using the Hazen Williams equation. A C value of 100 was used for all ductile iron pipe and a C value of 120 was used for all PVC pipe. K values used for minor losses through fittings and bends come from the *Handbook of PVC Design and Construction.*

Laubach Losses Calculations

Pump Discharge to 4-6" reducer C-100

	Emperical	Units
Diameter =	**4**	inch
C factor =	**100**	Flanged D.I
Length=	**35**	feet

GPM	Pipe Friction [1] Head Loss (ft)	Fittings Head Loss (ft)	Total Minor Head Loss (ft)
320	3.70	1.53	5.23
330	3.91	1.62	5.54
340	4.14	1.72	5.86
350	4.36	1.83	6.19
360	4.60	1.93	6.53
370	4.84	2.04	6.88
380	5.08	2.15	7.24
390	5.33	2.27	7.60
400	5.59	2.39	7.97
410	5.85	2.51	8.36
420	6.12	2.63	8.75
430	6.39	2.76	9.15
440	6.67	2.89	9.55
450	6.95	3.02	9.97
460	7.24	3.16	10.39
470	7.53	3.30	10.83
480	7.83	3.44	11.27
490	8.13	3.58	11.72
500	8.44	3.73	12.17
510	**8.76**	**3.88**	**12.64**
520	**9.08**	**4.03**	**13.11**
530	**9.40**	**4.19**	**13.59**
540	9.74	4.35	14.09
550	10.07	4.51	14.58
560	10.41	4.68	15.09
570	10.76	4.85	15.61
580	11.11	5.02	16.13
590	11.47	5.19	16.66
600	11.83	5.37	17.20
610	12.20	5.55	17.75
620	12.57	5.73	18.30
630	12.95	5.92	18.87
640	13.33	6.11	19.44
650	13.72	6.30	20.02
660	14.11	6.50	20.61
670	14.51	6.70	21.21
680	14.91	6.90	21.81
690	15.32	7.10	22.42
700	15.73	7.31	23.04
710	16.15	7.52	23.67
720	16.58	7.73	24.31
730	17.01	7.95	24.95

	DESIGN FLOW=	**520**	(gpm)
	KINEMATIC VISCOSITY=	**1.06E-05**	1.06E-05 @ 70F
	ROUGHNESS COEFFICIENT=	**0.000005**	(SEE TABLE)
	REYNOLDS NUMBER=	417,731	
	FRICTION FACTOR(f)=	0.011081719	

QUANTITY	VALVES	L/D	K	K, TOTAL
0	GATE VALVES, FULLY OPEN	8	0.09	0.00
0	CHECK VALVES, CONVENTIONAL	100	1.11	0.00
0	BUTTERFLY VALVES, FULLY OPEN	40	0.44	0.00
	FITTINGS			
2	STANDARD 90	30	0.33	0.66
0	STANDARD 45	16	0.18	0.00
0	LONG RADIUS 90	16	0.18	0.00
0	STREET 90	50	0.55	0.00
0	STREET 45	26	0.29	0.00
0	STANDARD 22.5	8	0.09	0.00
0	STANDARD 11.25	4	0.04	0.00
	TEE			
0	STRAIGHT THRU	20	0.22	0.00
0	BRANCH FLOW	60	0.66	0.00
	SUDDEN ENLARGEMENTS			
1	4 TO **6**		0.31	0.31
	SUDDEN CONTRACTIONS			
0	10 **4**		0.42	0.00
	ENTRY/EXIT			
1	**ENTRANCE LOSS**		0.5	0.50
0	**EXIT LOSS**		1	0.00
4			**TOTAL (K) =**	**1.47**

Roughness Coefficient Table	
Type of Pipe	**Absolute Roughness**
drawn tubing-glass, brass, plastic	**0.000005**
commercial steel or wrought iron	0.00015
galvanized iron	0.0005
cast iron, uncoated	0.00085
wood stave	0.0006-0.0003
concrete	0.001-0.01
riveted steel	0.003-0.03

Notes:

1. Calculated pipe friction head loss with the Hazen Williams equation.

Laubach Losses Calculations

From 4"-6" Reducer to End of Ductile Iron Section C-100

	Emperical	Units
Diameter =	**6**	inch
C factor =	**100**	Flanged D.I
Length=	**15**	feet

GPM	Pipe Friction [1] Head Loss (ft)	Fittings Head Loss (ft)	Total Minor Head Loss (ft)
320	0.22	0.64	0.86
330	0.23	0.68	0.91
340	0.25	0.72	0.97
350	0.26	0.76	1.02
360	0.27	0.81	1.08
370	0.29	0.85	1.14
380	0.30	0.90	1.20
390	0.32	0.95	1.26
400	0.33	0.99	1.33
410	0.35	1.05	1.39
420	0.36	1.10	1.46
430	0.38	1.15	1.53
440	0.40	1.20	1.60
450	0.41	1.26	1.67
460	0.43	1.32	1.75
470	0.45	1.37	1.82
480	0.47	1.43	1.90
490	0.48	1.49	1.98
500	0.50	1.55	2.06
510	**0.52**	**1.62**	**2.14**
520	**0.54**	**1.68**	**2.22**
530	**0.56**	**1.75**	**2.31**
540	0.58	1.81	2.39
550	0.60	1.88	2.48
560	0.62	1.95	2.57
570	0.64	2.02	2.66
580	0.66	2.09	2.75
590	0.68	2.16	2.85
600	0.71	2.24	2.94
610	0.73	2.31	3.04
620	0.75	2.39	3.14
630	0.77	2.47	3.24
640	0.79	2.55	3.34
650	0.82	2.63	3.44
660	0.84	2.71	3.55
670	0.86	2.79	3.66
680	0.89	2.88	3.76
690	0.91	2.96	3.87
700	0.94	3.05	3.98
710	0.96	3.13	4.10
720	0.99	3.22	4.21
730	1.01	3.31	4.33

	DESIGN FLOW=	**520**	(gpm)		
	KINEMATIC VISCOSITY=	**1.06E-05**	1.06E-05 @ 70F		
	ROUGHNESS COEFFICIENT=	**0.000005**	(SEE TABLE)		
	REYNOLDS NUMBER=	278,487			
	FRICTION FACTOR(f)=	0.011650145			
QUANTITY	**VALVES**			**K**	**K, TOTAL**
2	GATE VALVES, FULLY OPEN		8	0.09	0.19
1	CHECK VALVES, CONVENTIONAL		100	1.17	1.17
0	BUTTERFLY VALVES, FULLY OPEN		40	0.47	0.00
	FITTINGS				
0	STANDARD 90		30	0.35	0.00
3	STANDARD 45		16	0.19	0.56
0	LONG RADIUS 90		16	0.19	0.00
0	STREET 90		50	0.58	0.00
0	STREET 45		26	0.30	0.00
0	STANDARD 22.5		8	0.09	0.00
0	STANDARD 11.25		4	0.05	0.00
	TEE				
0	STRAIGHT THRU		20	0.23	0.00
1	BRANCH FLOW		60	0.70	0.70
	SUDDEN ENLARGEMENTS				
0	4 TO **6**			0.31	0.00
	SUDDEN CONTRACTIONS				
0	10 **4**			0.42	0.00
	ENTRY/EXIT				
1	**ENTRANCE LOSS**			0.5	0.50
0	**EXIT LOSS**			1	0.00
8				**TOTAL (K) =**	**3.11**

Roughness Coefficient Table	
Type of Pipe	**Absolute Roughness**
drawn tubing-glass, brass, plastic	**0.000005**
commercial steel or wrought iron	0.00015
galvanized iron	0.0005
cast iron, uncoated	0.00085
wood stave	0.0006-0.0003
concrete	0.001-0.01
riveted steel	0.003-0.03

Notes:

1. Calculated pipe friction head loss with the Hazen Williams equation.

Laubach Losses Calculations

C900 Forcemain to Manhole - C=120

	Emperical	Units
Diameter =	**6.09**	inch
C factor =	**120**	PVC
Length=	**3119**	feet

GPM	Pipe Friction [1] Head Loss (ft)	Fittings Head Loss (ft)	Total Minor Head Loss (ft)
320	30.42	0.80	31.22
330	32.20	0.85	33.05
340	34.03	0.90	34.93
350	35.91	0.95	36.86
360	37.83	1.01	38.84
370	39.80	1.06	40.86
380	41.81	1.12	42.93
390	43.87	1.18	45.05
400	45.97	1.24	47.21
410	48.12	1.31	49.43
420	50.31	1.37	51.68
430	52.55	1.44	53.99
440	54.83	1.51	56.34
450	57.16	1.58	58.74
460	59.53	1.65	61.18
470	61.95	1.72	63.67
480	64.41	1.79	66.20
490	66.92	1.87	68.78
500	69.46	1.94	71.41
510	**72.06**	**2.02**	**74.08**
520	**74.69**	**2.10**	**76.79**
530	**77.37**	**2.19**	**79.56**
540	80.09	2.27	82.36
550	82.86	2.35	85.21
560	85.67	2.44	88.11
570	88.52	2.53	91.05
580	91.41	2.62	94.03
590	94.35	2.71	97.06
600	97.33	2.80	100.13
610	100.35	2.89	103.25
620	103.42	2.99	106.41
630	106.52	3.09	109.61
640	109.67	3.19	112.86
650	112.86	3.29	116.15
660	116.10	3.39	119.49
670	119.37	3.49	122.86
680	122.69	3.60	126.29
690	126.05	3.70	129.75
700	129.45	3.81	133.26
710	132.89	3.92	136.81
720	136.37	4.03	140.41
730	139.90	4.15	144.04

	DESIGN FLOW=	**520**	(gpm)
	KINEMATIC VISCOSITY=	**1.06E-05**	1.06E-05 @ 70F
	ROUGHNESS COEFFICIENT=	**0.000005**	(SEE TABLE)
	REYNOLDS NUMBER=	274,371	
	FRICTION FACTOR(f)=	0.011675266	

QUANTITY	VALVES	L/D	K	K, TOTAL
3	GATE VALVES, FULLY OPEN	8	0.09	0.28
0	CHECK VALVES, CONVENTIONAL	100	1.17	0.00
0	BUTTERFLY VALVES, FULLY OPEN	40	0.47	0.00
	FITTINGS			
0	STANDARD 90	30	0.35	0.00
10	STANDARD 45	16	0.19	1.87
0	LONG RADIUS 90	16	0.19	0.00
0	STREET 90	50	0.58	0.00
0	STREET 45	26	0.30	0.00
4	STANDARD 22.5	8	0.09	0.37
13	STANDARD 11.25	4	0.05	0.61
	TEE			
0	STRAIGHT THRU	20	0.23	0.00
0	BRANCH FLOW	60	0.70	0.00
	SUDDEN ENLARGEMENTS			
0	4 TO **6**		0.31	0.00
	SUDDEN CONTRACTIONS			
0	10 **4**		0.42	0.00
	ENTRY/EXIT			
0	**ENTRANCE LOSS**		0.5	0.00
1	**EXIT LOSS**		1	1.00
31			**TOTAL (K) =**	**4.13**

Roughness Coefficient Table	
Type of Pipe	**Absolute Roughness**
drawn tubing-glass, brass, plastic	**0.000005**
commercial steel or wrought iron	0.00015
galvanized iron	0.0005
cast iron, uncoated	0.00085
wood stave	0.0006-0.0003
concrete	0.001-0.01
riveted steel	0.003-0.03

Notes:

1. Calculated pipe friction head loss with the Hazen Williams equation.

Laubach Losses Calculations

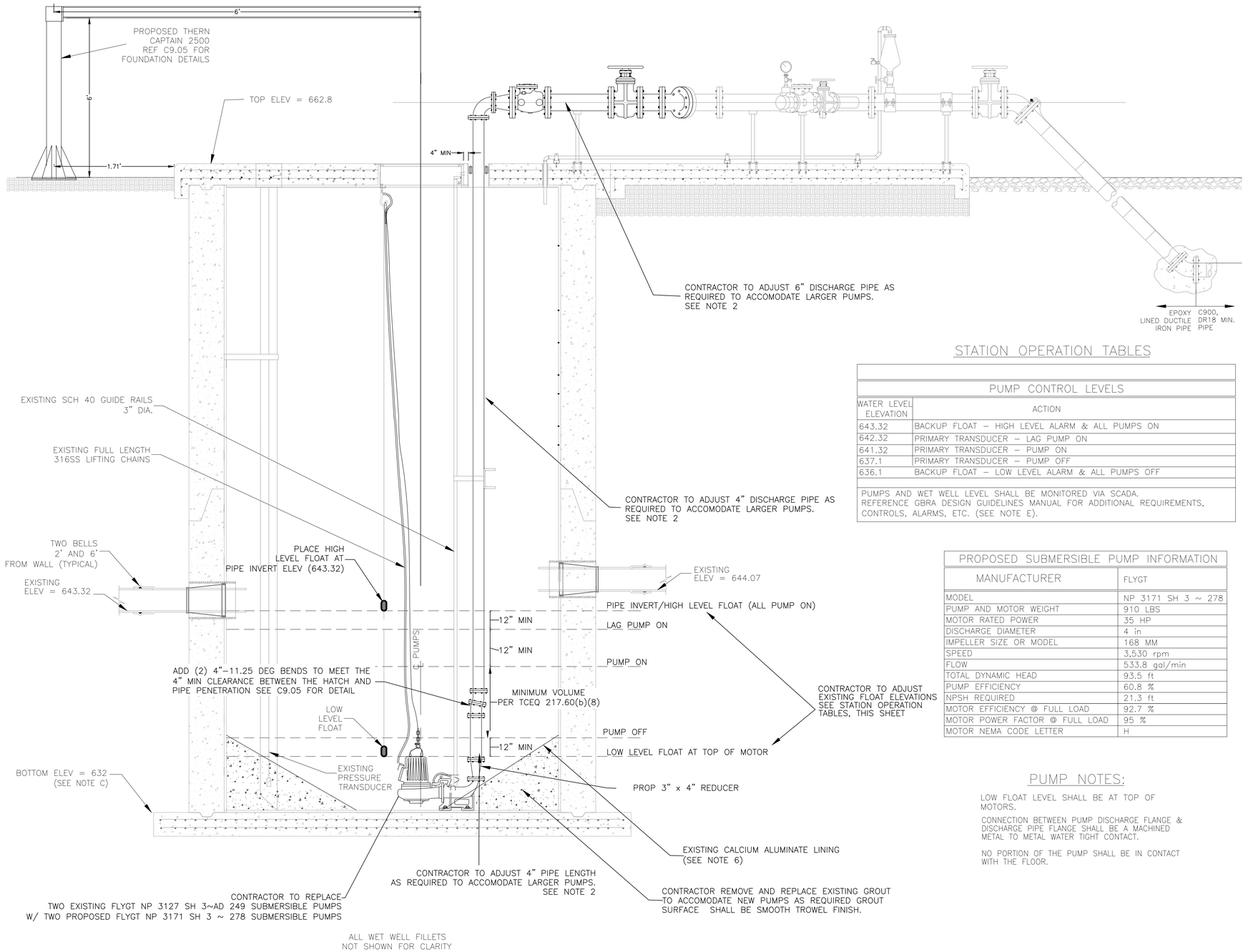
Total Dynamic Head Loss All Pipes Together

Best Case Elevation Head (All Pumps On)		
Discharge Elevation	**637.42**	feet
Suction Elevation	**641.10**	feet
Elevation Head	**-3.68**	**feet**

Worst Case Elevation Head (Pumps Off)		
Discharge Elevation	**637.42**	feet
Suction Elevation	**637.10**	feet
Elevation Head	**0.32**	**feet**

GPM	4" DI Pipe Pipe Friction [1] Head Loss (ft)	4" DI Pipe Fittings Head Loss (ft)	4" DI Pipe Total Minor Head Loss (ft)	6" DI Pipe Pipe Friction [1] Head Loss (ft)	6" DI Pipe Fittings Head Loss (ft)	6" DI Pipe Total Minor Head Loss (ft)	C900 Force Main Pipe Friction [1] Head Loss (ft)	C900 Force Main Fittings Head Loss (ft)	Force Main Total Minor Head Loss (ft)	Total Head Loss (ft) Best Case Elevation	Total Head Loss (ft) Worst Case Elevation	Velocity (ft/s)
320	3.70	1.53	5.23	0.22	0.64	0.86	30.42	0.80	31.22	33.62	37.62	**3.53**
330	3.91	1.62	5.54	0.23	0.68	0.91	32.20	0.85	33.05	35.82	39.82	**3.64**
340	4.14	1.72	5.86	0.25	0.72	0.97	34.03	0.90	34.93	38.08	42.08	**3.75**
350	4.36	1.83	6.19	0.26	0.76	1.02	35.91	0.95	36.86	40.39	44.39	**3.86**
360	4.60	1.93	6.53	0.27	0.81	1.08	37.83	1.01	38.84	42.77	46.77	**3.97**
370	4.84	2.04	6.88	0.29	0.85	1.14	39.80	1.06	40.86	45.20	49.20	**4.08**
380	5.08	2.15	7.24	0.30	0.90	1.20	41.81	1.12	42.93	47.69	51.69	**4.19**
390	5.33	2.27	7.60	0.32	0.95	1.26	43.87	1.18	45.05	50.23	54.23	**4.30**
400	5.59	2.39	7.97	0.33	0.99	1.33	45.97	1.24	47.21	52.84	56.84	**4.41**
410	5.85	2.51	8.36	0.35	1.05	1.39	48.12	1.31	49.43	55.50	59.50	**4.52**
420	6.12	2.63	8.75	0.36	1.10	1.46	50.31	1.37	51.68	58.21	62.21	**4.63**
430	6.39	2.76	9.15	0.38	1.15	1.53	52.55	1.44	53.99	60.99	64.99	**4.74**
440	6.67	2.89	9.55	0.40	1.20	1.60	54.83	1.51	56.34	63.81	67.81	**4.85**
450	6.95	3.02	9.97	0.41	1.26	1.67	57.16	1.58	58.74	66.70	70.70	**4.96**
460	7.24	3.16	10.39	0.43	1.32	1.75	59.53	1.65	61.18	69.64	73.64	**5.07**
470	7.53	3.30	10.83	0.45	1.37	1.82	61.95	1.72	63.67	72.64	76.64	**5.18**
480	7.83	3.44	11.27	0.47	1.43	1.90	64.41	1.79	66.20	75.69	79.69	**5.29**
490	8.13	3.58	11.72	0.48	1.49	1.98	66.92	1.87	68.78	78.80	82.80	**5.40**
500	8.44	3.73	12.17	0.50	1.55	2.06	69.46	1.94	71.41	81.96	85.96	**5.51**
510	**8.76**	**3.88**	**12.64**	**0.52**	**1.62**	**2.14**	**72.06**	**2.02**	**74.08**	**85.18**	**89.18**	**5.62**
520	**9.08**	**4.03**	**13.11**	**0.54**	**1.68**	**2.22**	**74.69**	**2.10**	**76.79**	**88.45**	**92.45**	**5.73**
530	**9.40**	**4.19**	**13.59**	**0.56**	**1.75**	**2.31**	**77.37**	**2.19**	**79.56**	**91.78**	**95.78**	**5.84**
540	9.74	4.35	14.09	0.58	1.81	2.39	80.09	2.27	82.36	95.16	99.16	**5.95**
550	10.07	4.51	14.58	0.60	1.88	2.48	82.86	2.35	85.21	98.60	102.60	**6.06**
560	10.41	4.68	15.09	0.62	1.95	2.57	85.67	2.44	88.11	102.09	106.09	**6.17**
570	10.76	4.85	15.61	0.64	2.02	2.66	88.52	2.53	91.05	105.63	109.63	**6.28**
580	11.11	5.02	16.13	0.66	2.09	2.75	91.41	2.62	94.03	109.23	113.23	**6.39**
590	11.47	5.19	16.66	0.68	2.16	2.85	94.35	2.71	97.06	112.89	116.89	**6.50**
600	11.83	5.37	17.20	0.71	2.24	2.94	97.33	2.80	100.13	116.59	120.59	**6.61**
610	12.20	5.55	17.75	0.73	2.31	3.04	100.35	2.89	103.25	120.36	124.36	**6.72**
620	12.57	5.73	18.30	0.75	2.39	3.14	103.42	2.99	106.41	124.17	128.17	**6.83**
630	12.95	5.92	18.87	0.77	2.47	3.24	106.52	3.09	109.61	128.04	132.04	**6.94**
640	13.33	6.11	19.44	0.79	2.55	3.34	109.67	3.19	112.86	131.96	135.96	**7.05**
650	13.72	6.30	20.02	0.82	2.63	3.44	112.86	3.29	116.15	135.94	139.94	**7.16**
660	14.11	6.50	20.61	0.84	2.71	3.55	116.10	3.39	119.49	139.96	143.96	**7.27**
670	14.51	6.70	21.21	0.86	2.79	3.66	119.37	3.49	122.86	144.05	148.05	**7.38**
680	14.91	6.90	21.81	0.89	2.88	3.76	122.69	3.60	126.29	148.18	152.18	**7.49**
690	15.32	7.10	22.42	0.91	2.96	3.87	126.05	3.70	129.75	152.37	156.37	**7.60**
700	15.73	7.31	23.04	0.94	3.05	3.98	129.45	3.81	133.26	156.61	160.61	**7.71**
710	16.15	7.52	23.67	0.96	3.13	4.10	132.89	3.92	136.81	160.90	164.90	**7.82**
720	16.58	7.73	24.31	0.99	3.22	4.21	136.37	4.03	140.41	165.25	169.25	**7.93**
730	17.01	7.95	24.95	1.01	3.31	4.33	139.90	4.15	144.04	169.64	173.64	**8.04**

Pump Selection



STATION OPERATION TABLES

PUMP CONTROL LEVELS	
WATER LEVEL ELEVATION	ACTION
643.32	BACKUP FLOAT – HIGH LEVEL ALARM & ALL PUMPS ON
642.32	PRIMARY TRANSDUCER – LAG PUMP ON
641.32	PRIMARY TRANSDUCER – PUMP ON
637.1	PRIMARY TRANSDUCER – PUMP OFF
636.1	BACKUP FLOAT – LOW LEVEL ALARM & ALL PUMPS OFF

PUMPS AND WET WELL LEVEL SHALL BE MONITORED VIA SCADA. REFERENCE GBRA DESIGN GUIDELINES MANUAL FOR ADDITIONAL REQUIREMENTS, CONTROLS, ALARMS, ETC. (SEE NOTE E).

PROPOSED SUBMERSIBLE PUMP INFORMATION	
MANUFACTURER	FLYGT
MODEL	NP 3171 SH 3 ~ 278
PUMP AND MOTOR WEIGHT	910 LBS
MOTOR RATED POWER	35 HP
DISCHARGE DIAMETER	4 in
IMPELLER SIZE OR MODEL	168 MM
SPEED	3,530 rpm
FLOW	533.8 gal/min
TOTAL DYNAMIC HEAD	93.5 ft
PUMP EFFICIENCY	60.8 %
NPSH REQUIRED	21.3 ft
MOTOR EFFICIENCY @ FULL LOAD	92.7 %
MOTOR POWER FACTOR @ FULL LOAD	95 %
MOTOR NEMA CODE LETTER	H

PUMP NOTES:

LOW FLOAT LEVEL SHALL BE AT TOP OF MOTORS.

CONNECTION BETWEEN PUMP DISCHARGE FLANGE & DISCHARGE PIPE FLANGE SHALL BE A MACHINED METAL TO METAL WATER TIGHT CONTACT.

NO PORTION OF THE PUMP SHALL BE IN CONTACT WITH THE FLOOR.

STATIONARY CRANE NOTES:

1. CONTRACTOR TO COORDINATE WITH GBRA ON DISPOSAL OF EXISTING CRANE
2. PROPOSED CRANE SHALL BE AN ELECTRIC MOTOR THERN CAPTAIN 2500 OR EQUIVELANT WITH EPOXY FINISH, 316SS HARDWARE AND FASTENERS, 316SS WIRE ROPE AND CHAIN GRIP EYE. SEE APPROVED ASSEMBLY BELOW:
   a. CRANE ITEM NO. 5FT25X-M2X
   b. ELECTRIC WINCH ITEM NO. ED400-DW09
   c. WIRE ROPE ASSEMBLY ITEM NO. WSS19-36NS

NOTES:

1. CONTRACTOR SHALL REPLACE EXISTING PUMPS
2. ALL PUMP DISCHARGE PIPE AND FITTINGS WITHIN WET WELL SHALL BE FLANGED AND SHALL RECEIVE AFTER INSTALLATION A COAL TAR EPOXY COATING SYSTEM IN ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS.
3. ALL PUMP DISCHARGE PIPE, VALVES AND FITTINGS OUTSIDE THE WET WELL, EXCEPT 316SS AND PVC, SHALL RECEIVE AFTER INSTALLATION A WHITE COLOR HIGH BUILD EPOXY COATING SYSTEM WITH A GREY PANTONE #431-U COLOR TOP COAT OF POLYURETHANE IN ACCORDANCE WITH MANUFACTURER INSTRUCTIONS.
4. ALL FASTENERS AND ANCHOR BOLTS SHALL BE 316SS WITH FIELD APPLIED ANTI-SIEZE COMPOUND. ANCHOR BOLTS INSIDE WET WELL SHALL BE EPOXY TYPE. DO NOT PAINT NUTS AND BOLTS.
5. CONTRACTOR TO VERIFY THE SIZE AND LOCATION OF THE WET WELL HATCHES ACCORDING TO THE SELECTED PUMP AND HATCH MANUFACTURERS' REQUIREMENTS (36'X48' MIN.).
6. IF DEMO OF GROUT IS REQUIRED TO PLACE PUMP. SAND BLAST AND LINE INTERIOR OF WET WELL WITH SERPERCOAT, REFRATTA HAC 100, OR APPROVED EQUAL MINIMUM 1" THICKNESS. SMOOTH TROWEL FINISH. SPRAY CURING COMPOUND

SUBMERSIBLE LIFT STATION CONFIGURATION PROFILE VIEW

REVISION JAN 2018

OPERATIONS & MAINTENANCE ENGINEERING

PROPERTY OF
GUADALUPE-BLANCO RIVER AUTHORITY
SEGUIN, TEXAS

LS-02

HMT ENGINEERING & SURVEYING
290 S. CASTELL AVE., STE. 100
NEW BRAUNFELS, TX 78130
TBPE FIRM F-10961
TBPLS FIRM 1053600

STATE OF TEXAS
CHRISTOPHER P. VAN HEERDE
93047
LICENSED
PROFESSIONAL ENGINEER

3/28/2024

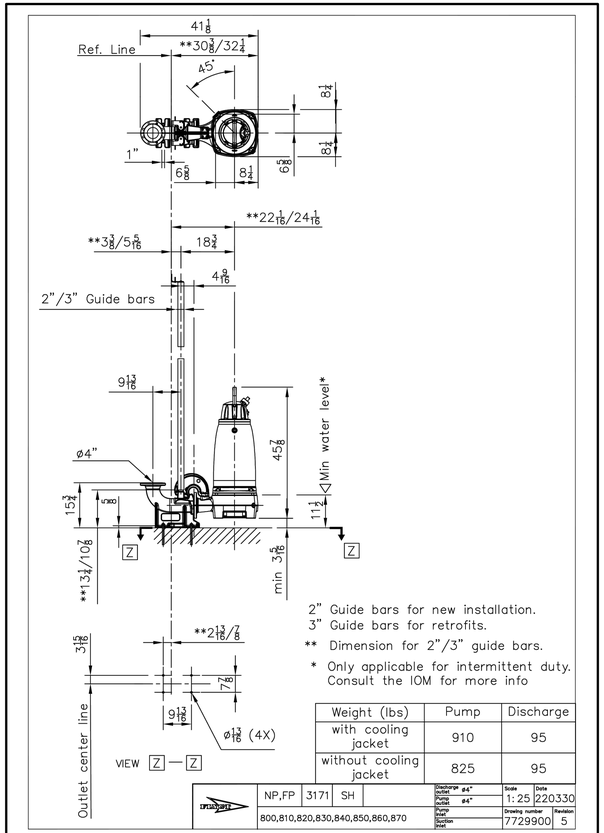
LIFT STATION EXISTING WETWELL

KRAFT SUBDIVISION, UNIT 3
NEW BRAUNFELS, TEXAS

NO.	REVISION DESCRIPTION	REVISION DATE

DATE: March 2024
DRAWN BY: KWP
DESIGNED BY: RDB
REVIEWED BY: CVH
HMT PROJECT NO.: 337.070

SHEET
C9.03



Weight (lbs)	Pump	Discharge
with cooling jacket	910	95
without cooling jacket	825	95

FLYGT a xylem brand	NP,FP	3171	SH		Discharge Flange Rotation Outlet	ø4" ø4"
	800,810,820,830,840,850,860,870				Pump Shaft Rotation	

Scale	Date
1:25	220330
Drawing number	Revision
7729900	5

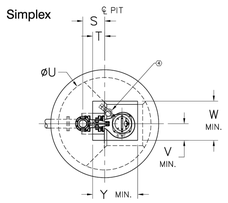
FLYGT a xylem brand

Issued: 11/11 Supersedes: 2/09

FP/NP-3171

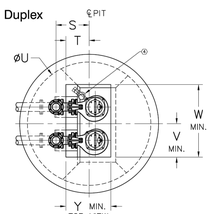
NOTES:
1. CONFIGURATION AND DIMS. SHOWN ARE SUGGESTED REQUIREMENTS ONLY. ALL DETAILS, INCLUDING SIZING OF PIT, TYPE, LOCATION AND ARRANGEMENT OF VALVES AND PIPING, ETC. ARE TO BE SPECIFIED BY THE CONSULTING ENGINEER AND ARE SUBJECT TO THEIR APPROVAL.
2. REFERENCE GENERIC DUPLEX LIFT STATION LAYOUT FOR ELEVATION VIEW.
3. LOCATE ANCHOR BOLTS USING INSIDE EDGE OF CLEAR OPENING AND PUMP CENTERLINE AS REFERENCE POINT. BOLT LOCATIONS MUST BE HELD TO MAINTAIN EXACT POSITION OF PUMP TO CLEAR OPENING.
4. FLYGT MIX–FLUSH VALVE.

Simplex

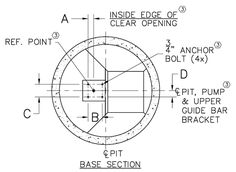


TOP VIEW

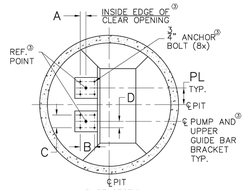
Duplex



TOP VIEW



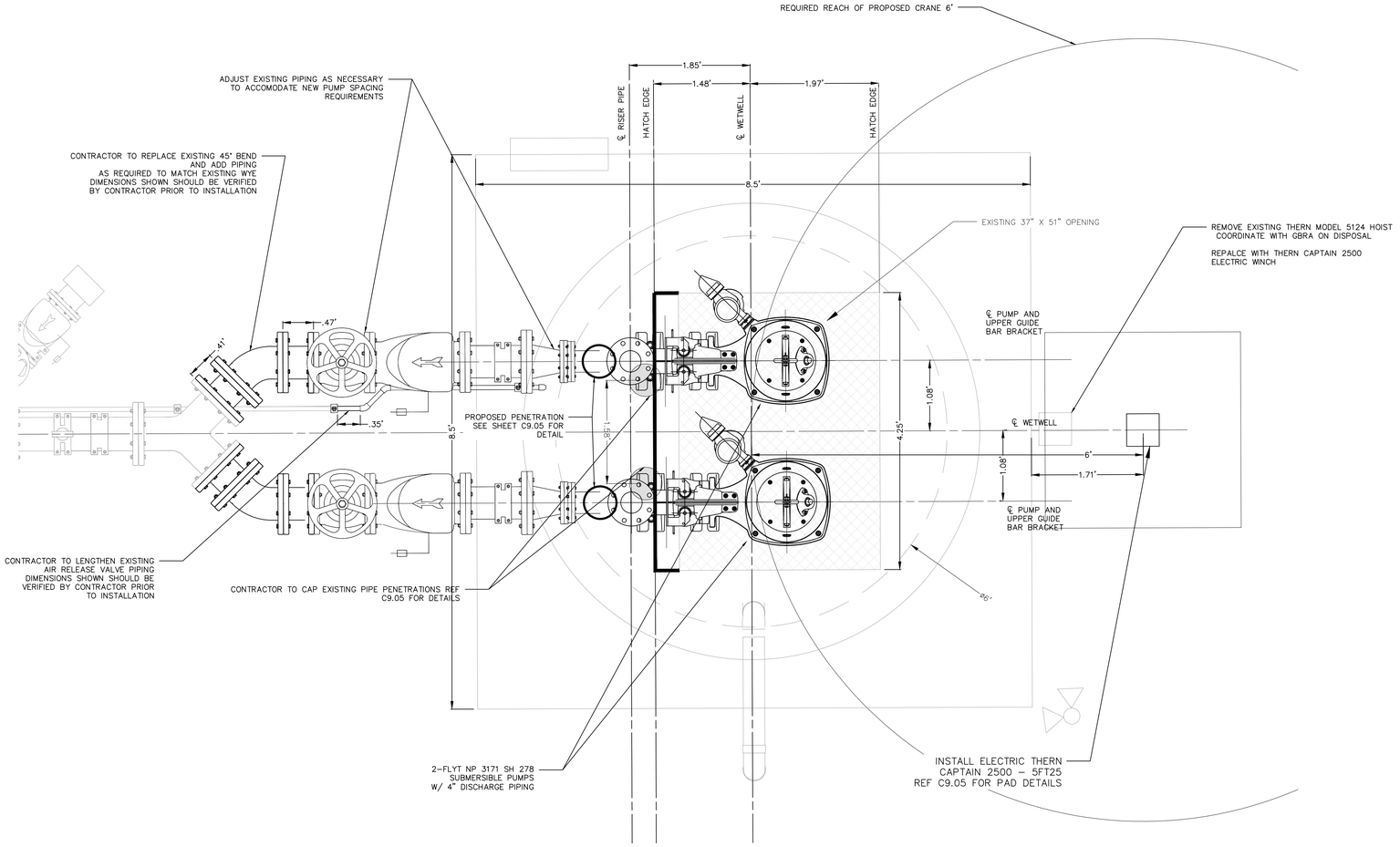
BASE SECTION



BASE SECTION

ALL DIMENSIONS ARE IN INCHES

MODEL	NOM. SIZE	VERSION	GUIDE BAR SIZE	A	B	C	D	SIMPLEX S	T	U	V	W	Y	DUPLEX S	T	U	PL	V	W	Y
NP	4"	SH	2"	23	9½	8	4	19½	13½	72	9½	27½	32	22½	15½	84	13	22½	53½	32
NP	4"	SH	3"	23	9½	8	4	19½	15½	72	9½	27½	34	22½	17½	84	13	23½	53½	34
FP/NP	4"	HT	2"	23	9½	8	4	19½	13½	72	12	29½	33	22½	15½	84	13	25	55½	33
FP/NP	4"	HT	3"	23	9½	8	4	19½	15½	72	12	29½	35	22½	17½	84	13	25	55½	35
FP/NP	6"	MT	2"	28	11	10	5	17	9½	72	13	30½	35	27½	18½	96	13	26	56½	35
FP/NP	6"	MT	3"	28	11	10	5	17	11½	72	13	30½	37	27½	20½	96	13	26	56½	37
NP	10"	LT	2"	16½	19½	10	5	23½	13	96	17½	37	43	28½	17½	120	22	39½	81	43
NP	10"	LT	3"	16½	19½	10	5	23½	14½	96	17½	37	45	28½	19½	120	22	39½	81	45



SCALE
1"=1'

REFER TO THE COVER SHEET FOR BENCHMARK INFORMATION.

THE LOCATION OF ALL EXISTING UNDERGROUND UTILITIES ARE SHOWN IN APPROXIMATE LOCATIONS ONLY. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK. THE CONTRACTOR WILL AGREE TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE INCURRED BY THEIR FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES, STRUCTURES OR FACILITIES. CONTRACTOR SHALL NOTIFY ENGINEER OF ANY DISCREPANCIES 24–HOURS PRIOR TO COMMENCING CONSTRUCTION.

HMT ENGINEERING & SURVEYING
290 S. CASTELL AVE., STE. 100
NEW BRAUNFELS, TX 78130
TBPE FIRM F-10961
TBPLS FIRM 1053600

STATE OF TEXAS
CHRISTOPHER P. VAN HEERDE
93047
LICENSED
PROFESSIONAL ENGINEER

3/28/2024

WETWELL PLAN VIEW

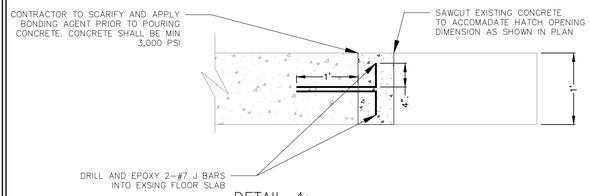
KRAFT SUBDIVISION, UNIT 3
NEW BRAUNFELS, TEXAS

NO.	REVISION DESCRIPTION	REVISION DATE

DATE:	March 2024
DRAWN BY:	KWP
DESIGNED BY:	RDB
REVIEWED BY:	CVH
HMT PROJECT NO.:	337.070

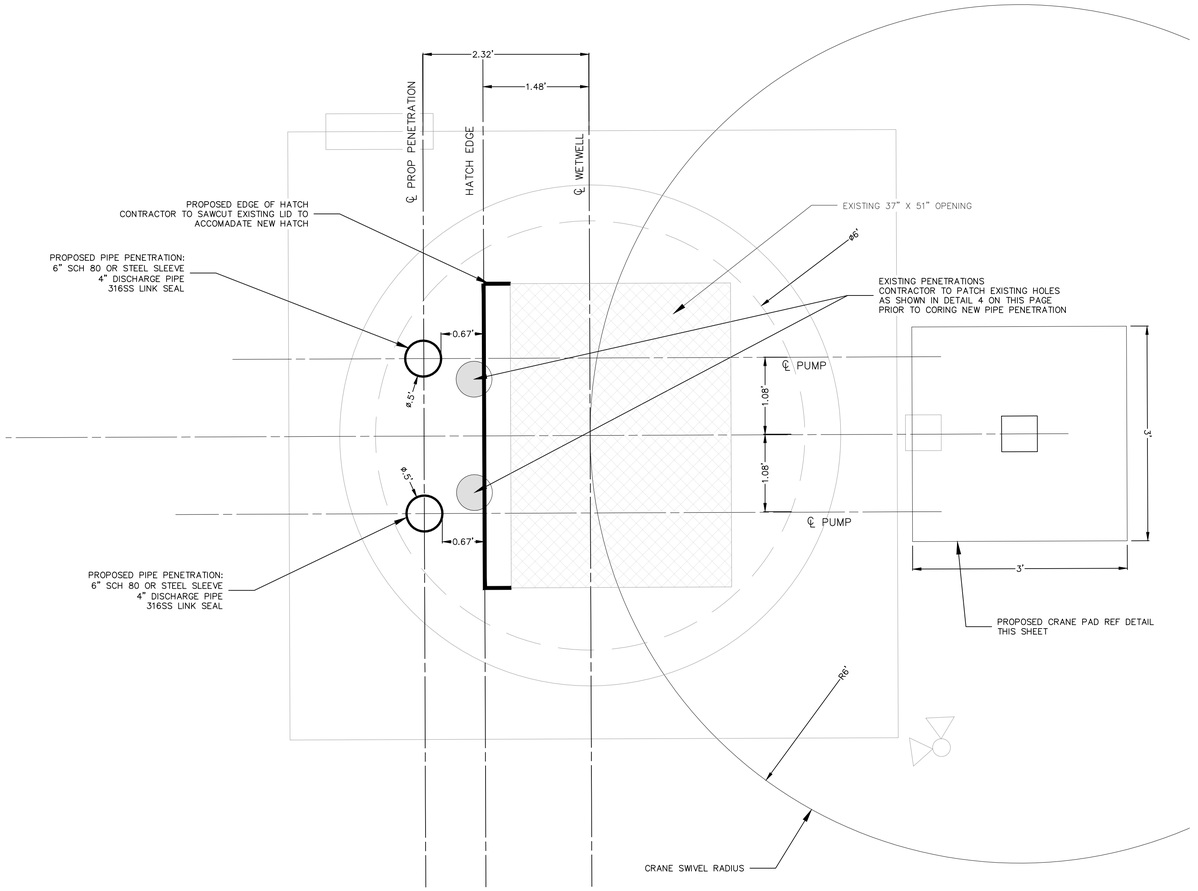
SHEET
C9.04

Drawing Name: N:_Projects\337 - Lennar\070 - Kraft Unit 3\Civil\Lift Station\337.070_LIFT STATION UPGRADES.dwg User: joshuck Apr 22, 2024 - 3:11pm

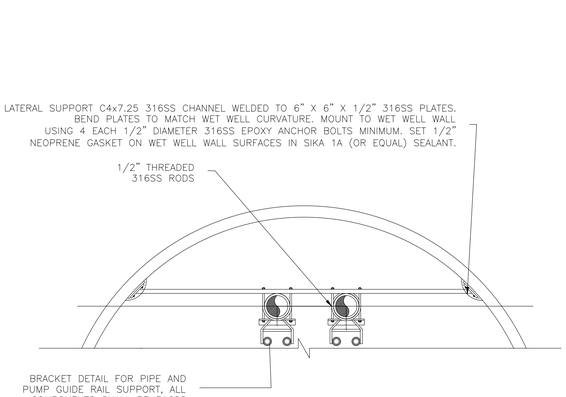


DETAIL 4:
PATCHING OF EXISTING PIPE PENETRATIONS

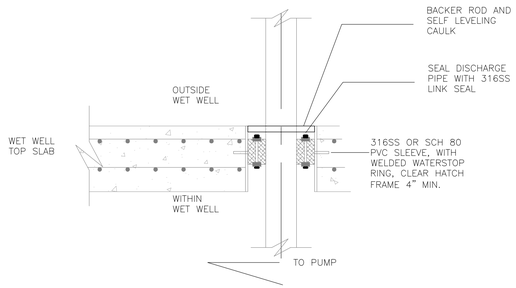
NOTE: CONTRACTOR MAY CHOOSE TO SUBMIT ALTERNATE PLAN FOR THE PATCHING OF EXISTING PIPE PENETRATIONS FOR REVIEW/APPROVAL BY THE ENGINEER AND GBRA.



SCALE
1"=1'



NOTE: ALL MATERIAL SHALL BE 316SS, ALL NUTS SHALL BE LOCK NUTS, INSTALL FLAT WASHERS FOR ALL BOLTS AND NUTS



DETAIL 3:
TYPICAL PIPE PENETRATION DETAIL

REFER TO THE COVER SHEET FOR BENCHMARK INFORMATION.

THE LOCATION OF ALL EXISTING UNDERGROUND UTILITIES ARE SHOWN IN APPROXIMATE LOCATIONS ONLY. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK. THE CONTRACTOR WILL AGREE TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE INCURRED BY THEIR FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES, STRUCTURES OR FACILITIES. CONTRACTOR SHALL NOTIFY ENGINEER OF ANY DISCREPANCIES 24-HOURS PRIOR TO COMMENCING CONSTRUCTION.

6/13/2024 3:28:09 PM

Keynotes

2.3 24" diameter shaft reinforcing shall be 8- #6 vertical bars continuous. Extend vertical bars from 3" from the bottom of the shaft to 3" from the top of the shaft. Wrap vertical reinforcing with 3/8" diameter spiral at 6" pitch for the full length of the pier extending from 12" from the bottom of the shaft to 3" from the top of the shaft. Wrap spiral 2 additional turns at top and bottom.

2.5 Provide 3 precast concrete seat blocks at bottom and 3 precast concrete spacer blocks at mid depth of pier shaft such that steel cage will be held centered in shaft.

3.4 3'-0" x 3'-0" square pier cap shall be cast monolithically with the pier shaft and reinforced with #6 bars spaced at 8" on center each way at top and bottom of pier cap with standard 90 degree bends at each end.

3.6 Anchor baseplate to foundation with 4- 3/4" diameter HILTI HAS-R 316 SS threaded rods x 16" long with 12" minimum embedment. Epoxy with HILTI HIT-RE 500 V3 adhesive. Install per manufacturer recommendations. Hole cleaning procedure shall be 2x2x2 procedure as specified in HILTI technical literature.

9.1 Captain 2500 series stationary davit crane by others. Maximum load shall be 2500 lb in boom position 1.

9.2 Crane base plate by others. Anchorage to foundation shall be per keynote 3.6.

A Crane Foundation
1/2" = 1'-0"

STATE OF TEXAS
MIKE BRATTEN
121512
LICENSED
PROFESSIONAL ENGINEER
4/19/24

THE DETAILS AND DIMENSIONS REPRESENT THE STANDARD OF CARE FOR THIS PROJECT IDENTIFIED WITHIN THESE DRAWINGS AND SPECIFICATIONS. ALL REQUIREMENTS WILL BE EXPRESSED BY COMBINING ALL DOCUMENTS INTO THE STRUCTURAL DOCUMENTS. THE CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS BEFORE ANY CONSTRUCTION, AND SHALL BE RESPONSIBLE FOR THE SAME. THE CONTRACTOR SHALL NOTIFY THE ENGINEER OF ANY DISCREPANCIES BEFORE PROCEEDING WITH THE CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROPER EXECUTION AND COORDINATION OF ALL CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES AND PROCEDURES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL JOB SITE SAFETY PRECAUTIONS AND PROGRAMS IN CONNECTION WITH THE WORK. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL DAMAGE OR INJURY TO PERSONS OR PROPERTY OCCURRING AS A RESULT OF FAULT OR NEGLIGENCE IN CONNECTION WITH THE PERFORMANCE OF THE WORK ON THE PROJECT OR THE PERFORMANCE OF ANY CORRECTIVE WORK REQUIRED. THE CONTRACTOR MAY BE REQUIRED TO CARRY LIABILITY INSURANCE IN AN AMOUNT TO BE SET BY THE OWNER TO PROTECT HIMSELF AND THE OWNER FROM ANY AND ALL DAMAGES. CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES AND PROCEDURES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL DAMAGE OR INJURY TO PERSONS OR PROPERTY OCCURRING AS A RESULT OF FAULT OR NEGLIGENCE IN CONNECTION WITH THE PERFORMANCE OF THE WORK ON THE PROJECT OR THE PERFORMANCE OF ANY CORRECTIVE WORK REQUIRED. THE CONTRACTOR MAY BE REQUIRED TO CARRY LIABILITY INSURANCE IN AN AMOUNT TO BE SET BY THE OWNER TO PROTECT HIMSELF AND THE OWNER FROM ANY AND ALL DAMAGES. CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES AND PROCEDURES.

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5343 CENTRAL PARKWAY N., SUITE 101
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AXISSTRUCTURAL.COM

HMT Engineering & Surveying
290 S. Castell Avenue, Ste 100
New Braunfels, Texas 78130

CRANE FOUNDATION SECTIONS AND DETAILS
Laubach Lift Station - Crane Foundation
New Braunfels, Texas

SCALE: AS INDICATED
PROJECT NO: 24227-0
DATE: April 12, 2024
SHEET NO: S-2.1

HMT
ENGINEERING & SURVEYING
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NEW BRAUNFELS, TX 78130
TBPE FIRM F-10961
TBPLS FIRM 1053600

STATE OF TEXAS
CHRISTOPHER P. VAN HEERDE
93047
LICENSED
PROFESSIONAL ENGINEER

3/28/2024

LIFT STATION DETAILS

KRAFT SUBDIVISION, UNIT 3
NEW BRAUNFELS, TEXAS

NO.	REVISION DESCRIPTION	REVISION DATE

DATE: March 2024
DRAWN BY: KWP
DESIGNED BY: RDB
REVIEWED BY: CVH
HMT PROJECT NO.: 337.070

SHEET
C9.05

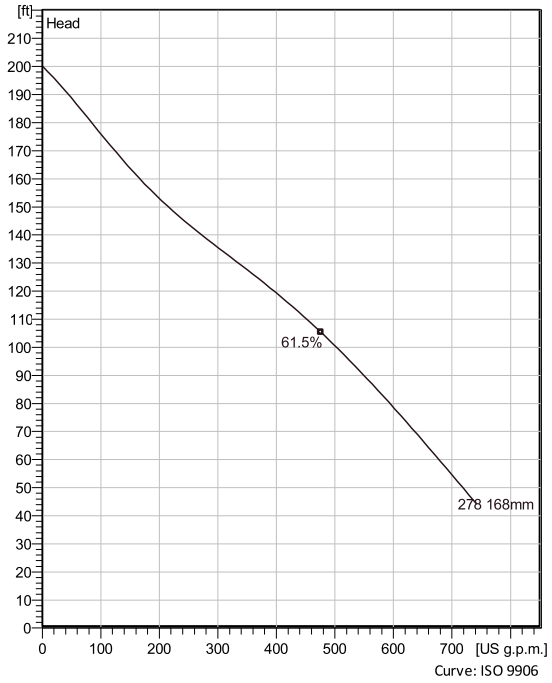
Drawing Name: N:_Projects\337 - Lennar\070 - Kraft Unit 3\03a\Lift Station\337.070_LIFT STATION UPGRADES.dwg User: jshook Apr 22, 2024 - 3:11pm

NP 3171 SH 3~ 278

Patented self cleaning semi-open channel impeller, ideal for pumping in waste water applications. Modular based design with high adaptation grade.

Technical specification

Curves according to: Water, pure Water, pure [100%],39.2 °F,62.42 lb/ft³,1.6891E-5 ft²/s



Curve: ISO 9906

Nominal (mean) data shown. Under- and over-performance from this data should be expected due to standard manufacturing tolerances.
Please consult your local Flygt representative for performance guarantees.

Configuration

Motor number
N3171.830 25-31-2IE-W IE3 35hp

Installation type
P - Semi permanent, Wet

Impeller diameter
168 mm

Discharge diameter
4 inch

Pump information

Impeller diameter
168 mm

Discharge diameter
4 inch

Inlet diameter
150 mm

Maximum operating speed
3530 rpm

Number of blades
2

Max. fluid temperature
40 °C

Material

Impeller
Hard-Iron ™

Project	Laubach LS Upgrades	**Created by**	Barrie Hamm		
Block	0	**Created on**	11/27/2023	**Last update**	11/27/2023

NP 3171 SH 3~ 278

Technical specification

Motor - General

Motor number N3171.830 25-31-2IE-W IE3 35hp	**Phases** 3~	**Rated speed** 3530 rpm	**Rated power** 35 hp
ATEX approved FM	**Number of poles** 2	**Rated current** 37 A	**Stator variant** 9
Frequency 60 Hz	**Rated voltage** 460 V	**Insulation class** H	**Type of Duty** S1
Version code 830			

Motor - Technical

Power factor - 1/1 Load 0.95	**Motor efficiency - 1/1 Load** 92.7 %	**Total moment of inertia** 2.53 lb ft²	**Starts per hour max.** 30
Power factor - 3/4 Load 0.94	**Motor efficiency - 3/4 Load** 93.6 %	**Starting current, direct starting** 291 A	
Power factor - 1/2 Load 0.90	**Motor efficiency - 1/2 Load** 93.8 %	**Starting current, star-delta** 96.9 A	

Locked rotor code
H

Project	Laubach LS Upgrades	**Created by**	Barrie Hamm		
Block	0	**Created on**	11/27/2023	**Last update**	11/27/2023

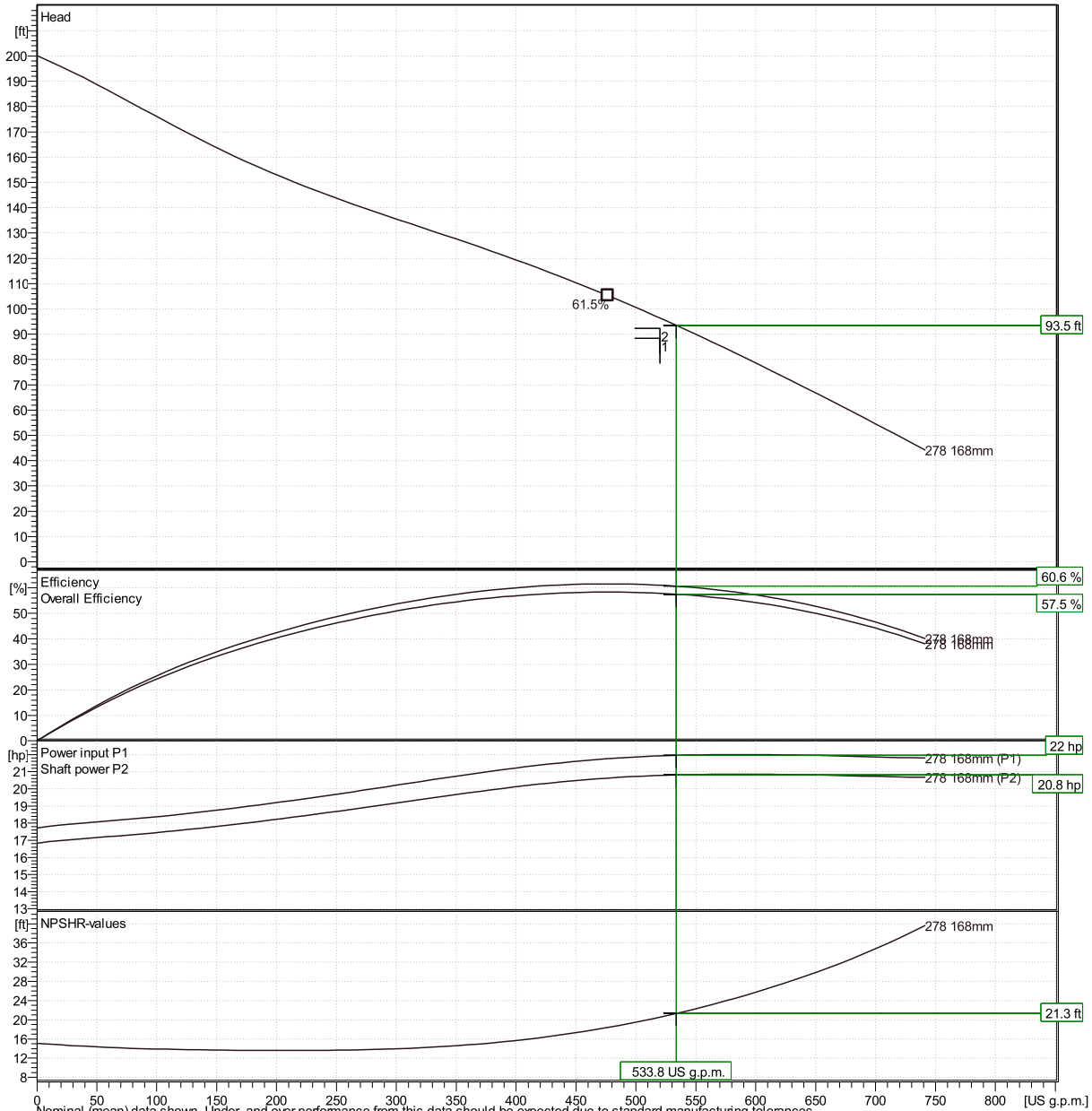
NP 3171 SH 3~ 278

Performance curve

Duty point

Flow	Head
534 US g.p.m.	93.5 ft

Curves according to: Water, pure Water, pure [100%],39.2 °F,62.42 lb/ft³,1.6891E-5 ft²/s



Nominal (mean) data shown. Under- and over-performance from this data should be expected due to standard manufacturing tolerances.
Please consult your local Flygt representative for performance guarantees.

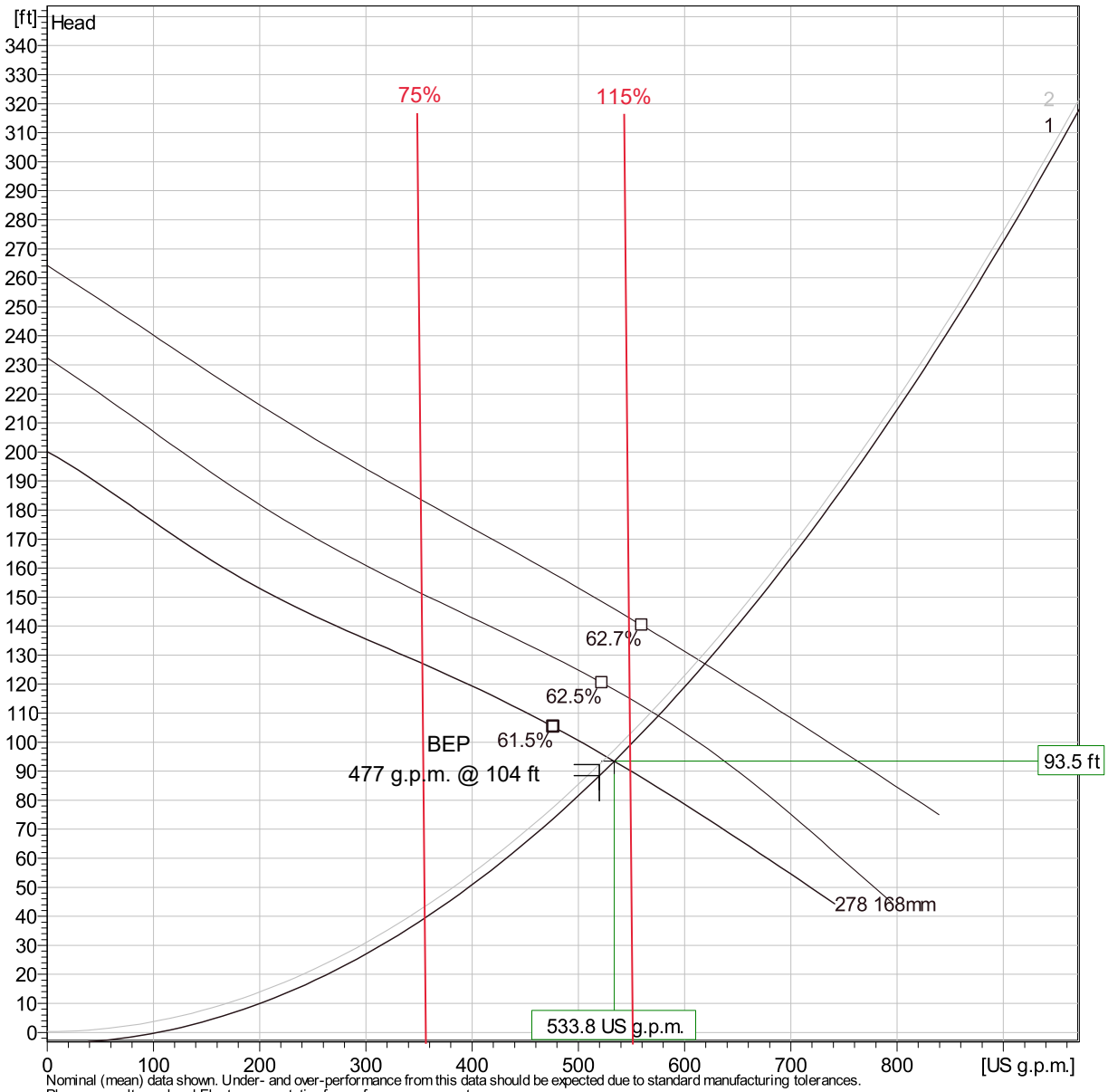
Curve: ISO 9906

Laubach LS Upgrades			Barrie Hamm		
0		**Created on**	11/27/2023	**Last update**	11/27/2023

NP 3171 SH 3~ 278

Duty Analysis

Curves according to: Water, pure [100%] ; 39.2°F; 62.42lb/ft³; 1.6891E-5ft²/s

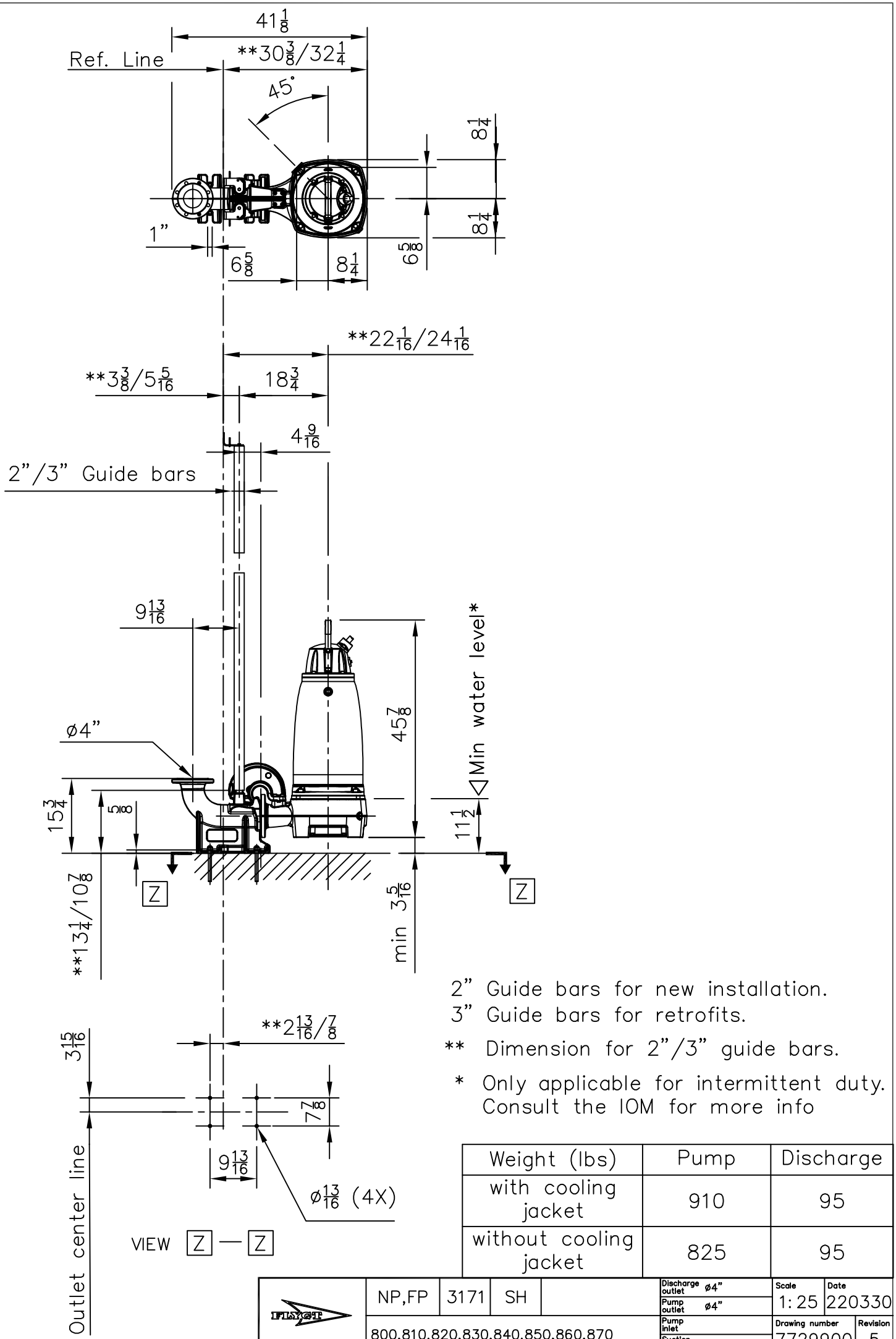


Nominal (mean) data shown. Under- and over-performance from this data should be expected due to standard manufacturing tolerances.
Please consult your local Flygt representative for performance guarantees.

Operating characteristics

Pumps / Systems	Flow	Head	Shaft power	Flow	Head	Shaft power	Hydr.eff.	Spec. Energy	NPSHre
	US g.p.m.	ft	hp	US g.p.m.	ft	hp		kWh/US MG	ft
2	527	94.9	20.8	527	94.9	20.8	60.8 %	517	20.9
1	534	93.5	20.8	534	93.5	20.8	60.6 %	511	21.3

Project		**Created by**	Barrie Hamm		
Block	Laubach LS Upgrades	**Created on**	11/27/2023	**Last update**	11/27/2023



2" Guide bars for new installation.
3" Guide bars for retrofits.

** Dimension for 2"/3" guide bars.

* Only applicable for intermittent duty. Consult the IOM for more info

Weight (lbs)	Pump	Discharge
with cooling jacket	910	95
without cooling jacket	825	95

FLYGT	NP,FP	3171	SH		Discharge outlet ø4" / Pump outlet ø4"	Scale 1:25 / Date 220330
	800,810,820,830,840,850,860,870				Pump inlet / Suction inlet	Drawing number 7729900 / Revision 5

FLYGT
a xylem brand

Issued: 11/11 Supersedes: 2/09

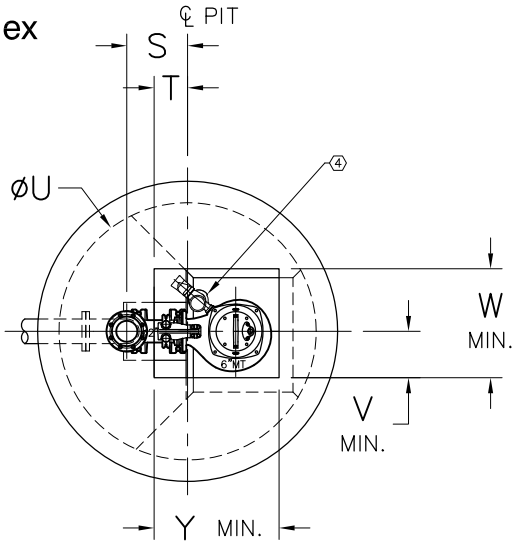
682022C

FP/NP-3171

NOTES:

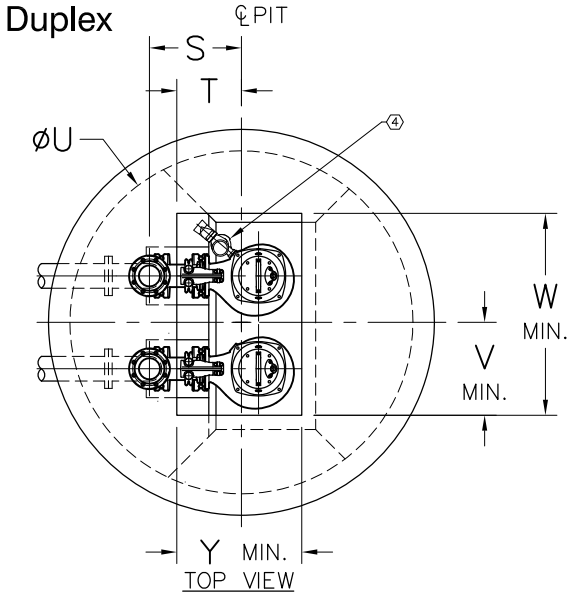
1. CONFIGURATION AND DIMS. SHOWN ARE SUGGESTED REQUIREMENTS ONLY. ALL DETAILS, INCLUDING SIZING OF PIT, TYPE, LOCATION AND ARRANGEMENT OF VALVES AND PIPING, ETC. ARE TO BE SPECIFIED BY THE CONSULTING ENGINEER AND ARE SUBJECT TO THEIR APPROVAL.
2. REFERENCE GENERIC DUPLEX LIFT STATION LAYOUT FOR ELEVATION VIEW.
3. LOCATE ANCHOR BOLTS USING INSIDE EDGE OF CLEAR OPENING AND PUMP CENTERLINE AS REFERENCE POINT. BOLT LOCATIONS MUST BE HELD TO MAINTAIN EXACT POSITION OF PUMP TO CLEAR OPENING.
4. FLYGT MIX–FLUSH VALVE.

Simplex

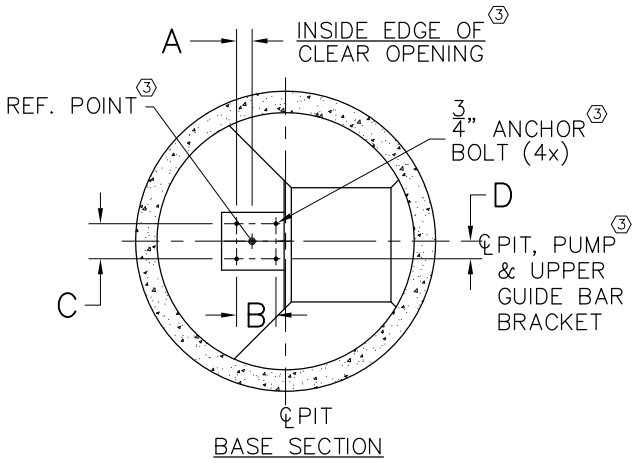


TOP VIEW

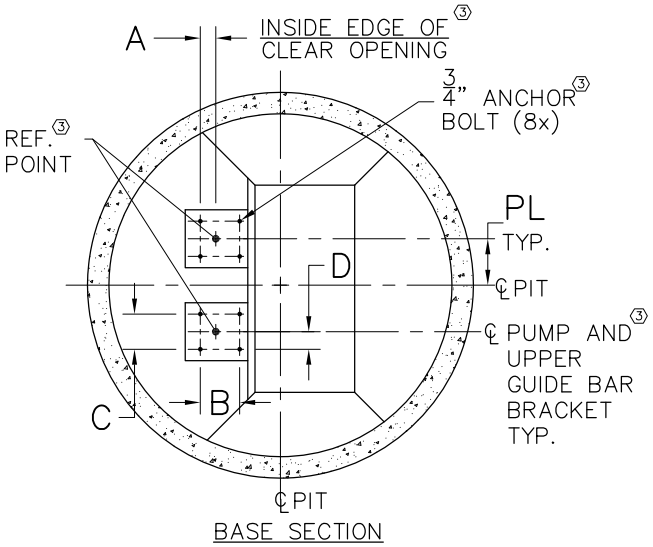
Duplex



TOP VIEW



BASE SECTION



BASE SECTION

ALL DIMENSIONS ARE IN INCHES

MODEL	NOM. SIZE	VERSION	GUIDE BAR SIZE	A	B	C	D	SIMPLEX S	T	U	V	W	Y	DUPLEX S	T	U	PL	V	W	Y
NP	4"	SH	2"	2¾	9⅞	8	4	19¾	13¼	72	9½	27½	32	22¼	15¾	84	13	22½	53½	32
NP	4"	SH	3"	⅞	9⅞	8	4	19¾	15¼	72	9½	27½	34	22¼	17¾	84	13	22½	53½	34
FP/NP	4"	HT	2"	2¾	9⅞	8	4	19¾	13¼	72	12	29½	33	22¼	15¾	84	13	25	55½	33
FP/NP	4"	HT	3"	⅞	9⅞	8	4	19¾	15¼	72	12	29½	35	22¼	17¾	84	13	25	55½	35
FP/NP	6"	MT	2"	4⅜	11	10	5	17	9⅜	72	13	30½	35	25¾	18⅛	96	13	26	56½	35
FP/NP	6"	MT	3"	2⅜	11	10	5	17	11⅜	72	13	30½	37	25¾	20⅛	96	13	26	56½	37
NP	10"	LT	2"	16⅛	19¾	10	5	23¾	13	96	17½	37	43	28⅜	17⅝	120	22	39½	81	43
NP	10"	LT	3"	14⅛	19¾	10	5	23¾	14⅞	96	17½	37	45	28⅜	19½	120	22	39½	81	45

Wet well Calculations Ultimate

LAUBACH WETWELL CALCULATIONS FULL BUILD OUT

	Residential		School			Total	
	(gpd)	(gpm)	(gpd)	(gpm)		(gpd)	(gpm)
Peak Wet Weather Flow	674,928.50	468.70	66,000.00	45.83		740,929	**514.53**
Peak Dry Weather Flow	322,800.00	224.17	57,000.00	39.58		379,800	**263.75**
Average Dry Weather Flow	129,120.00	89.67	14,250.00	9.90		143,370	**99.56**
Minimum Dry Weather Flow	27,164.41	18.86	1,937.76	1.35		29,102	**20.21**

For 2 to 50 Hp motors: minimum cycle time (t_c) = **6** minutes TCEQ 217.C.60.b.7

Pump Capacity (q) = **533.8** gpm

Volume (V) between "Pump On" and "Pump Off" Elevation =

V = (t_c/4) * q = **800.7** gal TCEQ 217.C.60.b.8

Volume/VF = 26.79 ft^3/ VF

Diameter of Wet Well = **5.84** ft = **200.36** gal/VF

TCEQ min vol Elevation between "Pump On" and "Pump Off" needed = **4.00** ft USE **4** FT

Wet Well Volume = **801.45** GAL

Proposed Grade	**662.8**			
Pump Staging Sequence		Space Between Stages		
Inlet Invert	**643.32**			
High Level Alarm	642.32	1		
Pump ON Elevation	641.32	1		
Pump Off	637.1	4.22	depth on-off	
Low Level	636.10	1		
Finished Floor	**632.00**	4.10	30.80 ft	Total Depth

Wet Well Detention Time:

Peak Wet Weather (t_d)

t_f = Time to Fill the Wet Well	1.56	minutes
t_e = Time to Empty the Wet Well	41.60	minutes
t_d = Detention Time	43.16	minutes

$$t_d = t_f + t_e$$

$$t_f = \frac{V}{\mathrm{i}}$$

$$t_e = \frac{V}{q - \mathrm{i}}$$

Peak Dry Weather (t_d)

t_f = Time to Fill the Wet Well	3.04	minutes
t_e = Time to Empty the Wet Well	2.97	minutes
t_d = Detention Time	6.01	minutes

V = volume of wet well between "pump on" and "pump off" elevations in gallons

q = pump capacity in gpm

i = corresponding flow into station

Average Dry Weather (t_d)

t_f = Time to Fill the Wet Well	8.05	minutes
t_e = Time to Empty the Wet Well	1.85	minutes
t_d = Detention Time	9.90	minutes

Minimum Dry Weather Flow

t_f = Time to Fill the Wet Well	39.66	minutes
t_e = Time to Empty the Wet Well	1.56	minutes
t_d = Detention Time	41.22	minutes

Wet well Calculations Temporary
(Kraft 1-2 + Laubach)

LAUBACH LIFT STATION SUBDIVISION-TEMPORARY CONDITIONS (KRAFT 1-2 + LAUBACH)
WASTEWATER FLOW CALCULATIONS

Kraft

Average Daily Flow (ADF) = Flow Per LUE x LUE

LUE =	231			
Flow per LUE =	240.00	gpd		
ADF =	55,440.00	gpd	38.50	gpm

Peak Dry Weather Flow = ADF x PF

Peak Factor =	2.5			
Peak Dry Weather Flow =	138,600.00	gpd	96.25	gpm

Peak Wet Weather Flow = (ADF + I&I * AC)

I&I =	650	GPD/Ac		
Acres =	46.4			
Peak Wet Weather Flow =	168,760	gpd	**117.19**	**gpm**

Minimum Daily Flow = (0.2 x (0.0144 x ADF)$^{0.198}$) x ADF

Minimum Dry Weather Flow =	9,866	gpd	6.85	gpm

Laubach

Average Daily Flow (ADF) = Flow Per LUE x LUE

LUE =	268			
Flow per LUE =	250.00	gpd		
ADF =	67,000.00	gpd	46.53	gpm

Peak Dry Weather Flow = ADF x PF

Peak Factor =	4.0			
Peak Dry Weather Flow =	268,000.00	gpd	186.11	gpm

Peak Wet Weather Flow = (ADF + I&I * AC)

I&I =	300	GPD/Ac		
Acres =	77.0			
Peak Wet Weather Flow =	291,100	gpd	**202.15**	**gpm**

Minimum Daily Flow = (0.2 x (0.0144 x ADF)$^{0.198}$) x ADF

Minimum Dry Weather Flow =	12,378	gpd	8.60	gpm

NBISD Flows - Based on 66,000 GPD

Average Daily Flow (ADF) = Flow Per Student x Student

Students =	0	570%		
Flow per Student	25.00	gpd		
ADF =	0.00	gpd	0.00	gpm

Peak Dry Weather Flow = ADF x PF

Peak Factor =	4.0			
Peak Dry Weather Flow =	0.00	gpd	0.00	gpm

Peak Wet Weather Flow = (ADF + I&I * AC)

I&I =	300	GPD/Ac		
Acres =	0.0	30		
Peak Wet Weather Flow =	0	gpd	**0.00**	**gpm**

Minimum Daily Flow = (0.2 x (0.0144 x ADF)$^{0.198}$) x ADF

Minimum Dry Weather Flow =	-	gpd	0.00	gpm

Ultimate Development Summary

Condition	Kraft	Laubach	School	Total
Minimum Daily Flow	6.85	8.60	0.00	15.45
Average Daily Flow (ADF)	38.50	46.53	0.00	85.03
Peak Dry Weather Flow	96.25	186.11	0.00	282.36
Peak Wet Weather Flow	117.19	202.15	0.00	319.35

Force Main Calculations

Force Main Velocity

Largest Pump Capacity	=	533.8	GPM
	=	1.19	CFS
Inner Diameter	=	6.09	in
Pipe Area	=	0.20	ft^2
Velocity	=	**5.88**	ft/s

Force Main Flush Time

$$T_{flush} = (t_f + t_e) * \frac{Force\ main\ length}{\left(\frac{t_c}{2}\right) * v_{fm} * 60}$$

i = average dry weather flow (gpm) =	99.56
t_f = V/I = time to fill wet well (min) =	8.05
t_e = V/(q-i) = time to empty wet well (min) =	1.85
t_c = pump cycle time (min) =	9.90
v_{fm} * = flow velocity in the force main (feet per second) =	5.88
**Force Main Length (ft)	3119
T_{flush} =	17.7

Water Hammer

$$p = \frac{a * v}{2.31 * g} + \text{operating pressure}$$

$$a = \frac{12}{\{\left(\frac{w}{g}\right) * [\left(\frac{1}{k}\right) + \left(\frac{d}{E * t}\right)]\}^{0.5}}$$

where:

p = water hammer pressure (psi)
a = pressure wave velocity (fps)
w = specific weight of water (62.4 lb/ft^3)
g = acceleration of gravity (32.2 ft/s^2)
k = bulk modulus of water (300,000 psi)
d = inside diameter of pipe (in)
E = Young's modulus of pipe (psi)
t = pipe wall thickness (in)
v = flow velocity in pipe (fps)
L = length of force main (ft)

For Class C900 (235 psi)

E=	400000	psi
t=	0.383	in
d=	6.09	in

a=	1313.265	fps
operating pressure(93.5' Head) =	40.47619	psi
p=	144.2884	psi

Attachment F

GBRA Adjusted Design Criteria &
NBISD Site Flow

GBRA Design Criteria

Josh Kelsey

From: Amy Uniacke <auniacke@gbra.org>
Sent: Tuesday, December 7, 2021 5:04 PM
To: Bill Ball; Chris Crim; Max Zekos
Cc: Alvin Schuerg; Travis Basham; Stephen Hanz; Darrell Nichols
Subject: RE: Kraft Tract
Attachments: 2021-07-21_Kraft LUE through Laubach Calcs - 430 LUEs Acceptable.pdf

Bill,

Per our call this afternoon, in keeping with the standard set forth by the TCEQ for collection system design (217.53), gravity pipe capacity shall be determined using Manning's formula with a minimum n value of 0.013. Please see GBRA comments to your Kraft calculations attached. As shown, using Manning's with n = 0.013, Kraft can be allowed 430 LUEs through the Laubach sewer system, contingent upon an approved GBRA plan for upgrading the Laubach lift station capacity.

During the call HMT proposed using Manning's coefficient of n = 0.011. GBRA's position is that the minimum TCEQ n value allowed for sewer design is 0.013, as TCEQ has increased the "new" PVC n value of .011 to .013 to account for an aged pipe. Please reference 217.53(l)(2)(A)(i) and (ii):

(i) The minimum acceptable "n" value for design of minimum pipe slope is 0.013.

(ii) The "n" value must take into consideration the slime, grit, and grease layers that will affect hydraulics or hinder flow as a pipe ages.

Though TCEQ references minimum pipe slope, it reasons that the actual pipe slope dictates full pipe capacity and the same n value that TCEQ requires for minimum pipe slopes shall be used to determine system capacity. Because HMT disagrees with that reasoning, HMT may request a variance from the TCEQ in accordance with 217.4 to utilize n = .011 for system capacity design at pipe full flow. GBRA will take into consideration any TCEQ approved variance.

Regarding your question of what formula to use for collection system design, GBRA will update our design guidelines to clarify that the Hazen-Williams formula shall be used for calculating friction loss in pressurized systems, and that Manning's formula with a minimum n value of 0.013 shall be used for calculating gravity sewer capacity.

Thanks,
Amy

Amy Uniacke
Treatment Design Director
O (830) 379-5822 ext. 505
C (830) 557-7168

GUADALUPE-BLANCO RIVER AUTHORITY
933 E. Court St.
Seguin, TX 78155

From: Bill Ball <billb@hmtnb.com>
Sent: Tuesday, November 16, 2021 3:08 PM
To: Chris Crim <chrisc@hmtnb.com>; Amy Uniacke <auniacke@gbra.org>; Max Zekos <maxz@hmtnb.com>
Cc: Alvin Schuerg <aschuerg@gbra.org>; Travis Basham <tbasham@gbra.org>; Stephen Hanz <stephenh@hmtnb.com>;

Darrell Nichols <dnichols@gbra.org>
Subject: RE: Kraft Tract

Amy,
I think we left off where we were going to meet to discuss this further. Please let me know when you are available.
Thanks,

William B. Ball, P.E.
Senior Project Manager
TEL: (830) 625-8555
Email: billb@hmtnb.com Website:www.hmtnb.com

HMT
ENGINEERING & SURVEYING
290 S. Castell Avenue, Ste 100
New Braunfels, TX 78130
TBPE FIRM F-10961
TBPLS FIRM 10153600

HMT offices are open and continue to operate at maximum capacity. We are following the guidance of the CDC and have implemented infection prevention measures and routine cleaning/sanitation of the workspaces, meeting rooms, and offices. We sincerely appreciate your patience and understanding as we continue to work through the impact of COVID-19 as a community.

From: Chris Crim
Sent: Thursday, September 2, 2021 5:00 PM
To: Amy Uniacke <auniacke@gbra.org>
Cc: Alvin Schuerg <aschuerg@gbra.org>; Travis Basham <tbasham@gbra.org>; Stephen Hanz <stephenh@hmtnb.com>; Bill Ball <billb@hmtnb.com>; Darrell Nichols <dnichols@gbra.org>
Subject: RE: Kraft Tract

Amy,

Thanks for the follow up and with working on us with the design criteria! Attached are the revised sewer calculations using the numbers below in an excel format. Based on this, it appears that the 8" sewer line through Laubach should have enough capacity for Kraft. Additionally, the existing 6" force main should also have enough capacity for the additional demand without exceeding 6 ft/s. It does appear that the lift station would need some upgrades for the extra demand. If you have them, would you be able to send us the lift station design report? This will help us in identifying any possible improvements. Let us know if you have any questions or comments on these calculations.

Thank you!

Chris Crim, P.E.
Senior Project Manager

Office: (210) 562-3844
Cell: (210) 413-1433
Website: www.hmtnb.com

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ENGINEERING & SURVEYING
8300 W IH-10, #810
San Antonio, Tx 78230
TBPE FIRM F-10961
TBPLS FIRM 10153600

From: Amy Uniacke <auniacke@gbra.org>
Sent: Wednesday, September 1, 2021 10:14 AM
To: Chris Crim <chrisc@hmtnb.com>
Cc: Alvin Schuerg <aschuerg@gbra.org>; Travis Basham <tbasham@gbra.org>; Stephen Hanz <stephenh@hmtnb.com>; Bill Ball <billb@hmtnb.com>; Darrell Nichols <dnichols@gbra.org>
Subject: RE: Kraft Tract

Chris,

For the Kraft tract only, GBRA can accept a design criteria of 240 gpd/LUE with 2.5 peaking factor plus 650 gpd/acre I&I. To determine available capacity in proposed or existing systems to serve Kraft, a design criteria of 250 gpd/LUE x 4 peaking factor must be used for any other tracts whether upstream or downstream of Kraft.

Please revise and resubmit the calculations for your proposal for GBRA review. Submit all calculations in an excel format with formulas embedded.

Thanks,
Amy

Amy Uniacke
Engineer
O (830) 379-5822 ext. 505
C (830) 557-7168

GUADALUPE-BLANCO RIVER AUTHORITY
933 E. Court St.
Seguin, TX 78155

From: Chris Crim <chrisc@hmtnb.com>
Sent: Thursday, August 26, 2021 4:32 PM
To: Darrell Nichols <dnichols@gbra.org>
Cc: Alvin Schuerg <aschuerg@gbra.org>; Amy Uniacke <auniacke@gbra.org>; Travis Basham <tbasham@gbra.org>; Stephen Hanz <stephenh@hmtnb.com>; Bill Ball <billb@hmtnb.com>
Subject: RE: Kraft Tract

Darrell,

Thanks for the update!

Thank you!

Chris Crim, P.E.
Senior Project Manager

Office: (210) 562-3844
Cell: (210) 413-1433
Website: www.hmtnb.com

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TBPE FIRM F-10961
TBPLS FIRM 10153600

From: Darrell Nichols <dnichols@gbra.org>
Sent: Thursday, August 26, 2021 4:26 PM
To: Chris Crim <chrisc@hmtnb.com>
Cc: Alvin Schuerg <aschuerg@gbra.org>; Amy Uniacke <auniacke@gbra.org>; Travis Basham <tbasham@gbra.org>; Stephen Hanz <stephenh@hmtnb.com>; Bill Ball <billb@hmtnb.com>
Subject: RE: Kraft Tract

Good Afternoon, Chris. I should be getting an update from GBRA's engineering staff by early next week. I will follow up with you after that update.

Darrell Nichols
Senior Deputy General Manager
O (830) 379-5822 ext. 314

GUADALUPE-BLANCO RIVER AUTHORITY
933 E. Court St.
Seguin, TX 78155

From: Chris Crim <chrisc@hmtnb.com>
Sent: Wednesday, August 25, 2021 11:58 AM
To: Darrell Nichols <dnichols@gbra.org>
Cc: Alvin Schuerg <aschuerg@gbra.org>; Amy Uniacke <auniacke@gbra.org>; Travis Basham <tbasham@gbra.org>; Stephen Hanz <stephenh@hmtnb.com>; Bill Ball <billb@hmtnb.com>
Subject: RE: Kraft Tract

Darrell,

Hope you're week has been going great so far. We just wanted to follow up with you to see if you had a chance to look into the sewer service for the Kraft Tract. Feel free to let us know if you need any additional information or have any questions.

Thank you!

Chris Crim, P.E.
Senior Project Manager

Office: (210) 562-3844
Cell: (210) 413-1433
Website: www.hmtnb.com

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San Antonio, Tx 78230
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TBPLS FIRM 10153600

From: Chris Crim
Sent: Wednesday, August 18, 2021 3:37 PM
To: Darrell Nichols <dnichols@gbra.org>

Cc: Alvin Schuerg <aschuerg@gbra.org>; Amy Uniacke <auniacke@gbra.org>; Travis Basham <tbasham@gbra.org>; Stephen Hanz <stephenh@hmtnb.com>; Bill Ball <billb@hmtnb.com>
Subject: RE: Kraft Tract

Darrell,

Thanks again for your time last Friday to meet on the Kraft Tract regarding sewer service. As discussed, below are some of the preliminary calculations we are seeing regarding the downstream capacity through the Laubach's recently constructed 8" sewer lines, lift station, and force main. Sorry for the lengthy calculations, but just wanted to make sure there isn't any improper assumptions.

Capacity of Gravity Sewer Main

- Critical Line is Pipe A5 in Laubach Unit 4A which is an 8" line at a 0.4%.
  - Capacity of Line with a Hazen-Williams Coefficient of 120 per item 4 of the GBRA design guidelines and 7.75" I.D. is roughly 374 GPM (see attached).
- Proposed Average Flow to Pipe A5
  - Kraft Tract = 530 LUEs x 300 GPD (per item 3 of the GBRA design guidelines)/1,440 = 110.4 GPM
  - Laubach 4A and 4B = 121 LUEs x 300 GPD (per item 3 of the GBRA design guidelines)/1,440 = 25.2 GPM
  - Total = 135.6 GPM
- Inflow and Infiltration
  - Kraft Tract = 97-acres x 300 GPD/Acre (per item 3 of the GBRA design guidelines)/1,440 = 20.2 GPM
  - Laubach 4A and 4B = 46-acres x 300 GPD/Acre (per item 3 of the GBRA design guidelines)/1,440 = 9.6 GPM
  - Total = 29.8 GPM
- Maximum Peaking Factor
  - 374 GPM – 29.8 PGM / 135.6 GPM = **2.54 Peaking Factor**
  - We would like to request a design peaking factor of 2.5 which is in line with SAWS USR 11.3.1(4) and SARA USR 4.12.

Capacity of Lift Station

- Maximum Pump Flow (per Sheet 61 of Moeller Plans for Laubach 4A) = 320 GPM
- Proposed Average Flow to Lift Station
  - Kraft Tract = 530 LUEs x 300 GPD (per item 3 of the GBRA design guidelines)/1,440 = 110.4 GPM
  - Laubach 4A, 4B, 5 and 6 = 268 LUEs x 300 GPD (per item 3 of the GBRA design guidelines)/1,440 = 55.8 GPM
  - Total = 166.2 GPM
- Inflow and Infiltration
  - Kraft Tract = 97-acres x 300 GPD/Acre (per item 3 of the GBRA design guidelines)/1,440 = 20.2 GPM
  - Laubach 4A, 4B, 5, and 6 = 77-acres x 300 GPD/Acre (per item 3 of the GBRA design guidelines)/1,440 = 16.0 GPM
  - Total = 36.2 GPM
- Maximum Peaking Factor
  - 320 GPM – 36.2 PGM / 166.2 GPM = 1.7 Peaking Factor
  - **Pump Size Upgrade with 2.5 Peaking Factor = 166.2 GPM x 2.5 + 36.2 GPM = 452 GPM**
  - We would like to request a design peaking factor of 2.5 which is in line with SAWS USR 11.3.1(4) and SARA USR 4.12 and upgrade the pumps at the Laubach Lift Station.
  - Sizing of the exact pump flow, confirmation of wet well size, and pump switch elevations might also need to be adjusted based on final design flow.

Capacity of 6" Force Main

- Maximum Velocity in Force Main without surge pressure analysis = 6 ft/s
- Maximum Capacity in 6" Force Main (assumed I.D. of 6" C900 DR 18 Green Pipe = 6.134") = 552 GPM

- **Velocity of Force Main Based on Above Pump Size of 452 GPM = 4.9 ft/s**

Based on this, we think the existing GBRA sewer infrastructure can work with the additional 530 lots for the Kraft Tract assuming we have can design to a peaking factor of 2.5 which appears to be in line with other major utilizes such at SAWS and SARA. We will need to run our final calculations to confirm all this, but hopes this helps start the conversation. Please let us know if you have any questions or need any additional information.

Thank you!

Chris Crim, P.E.
Senior Project Manager

Office: (210) 562-3844
Cell: (210) 413-1433
Website: www.hmtnb.com

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TBPE Firm F-
TBPLS Firm

-----Original Appointment-----
From: Darrell Nichols [mailto:dnichols@gbra.org]
Sent: Thursday, August 5, 2021 5:27 PM
To: Darrell Nichols; Alvin Schuerg; Amy Uniacke; Travis Basham; Chris Crim; Thor Thornhill; Stephen Hanz; 'Fred Heimer (fred.heimer@sv-re.com)'; 'Kyle Setliff (kylesetliff@stictx.com)'
Subject: Kraft Tract
When: Friday, August 13, 2021 10:30 AM-11:30 AM (UTC-06:00) Central Time (US & Canada).
Where: GBRA Offices - Seguin

Checked by GBRA

Kraft Peak Wet Demand			Acceptable to GBRA		
Average Daily Demand =	240	gpd	240	gpd	
Peaking Factor =	2.5		2.5		
Inflow and Infiltration =	650	gpd/acre	650	gpd/acre	
Proposed LUEs =	530	LUEs	430	LUEs	
Acreage =	97	Acres	97	Acres	
Peak Wet Demand =	264.6	gpm	223.0	gpm	
Laubach 4A&4B Peak Wet Demand					
Average Daily Demand =	250	gpd	250	gpd	
Peaking Factor =	4		4		
Inflow and Infiltration =	300	gpd/acre	300	gpd/acre	
Proposed LUEs =	121	LUEs	121	LUEs	
Acreage =	46	Acres	46	Acres	
Peak Wet Demand =	93.6	gpm	93.6	gpm	
Laubach 4C Peak Wet Demand					
Average Daily Demand =	250	gpd	250	gpd	
Peaking Factor =	4		4		
Inflow and Infiltration =	300	gpd/acre	300	gpd/acre	
Proposed LUEs =	147	LUEs	147	LUEs	
Acreage =	31	Acres	31	Acres	
Peak Wet Demand =	108.5	gpm	108.5	gpm	
Capacity of Pipe A5 in Laubach 4A					
Hazen-Williams Formula	Use Mannings with pipe flowing full per TCEQ 217.53				
Inside Diameter =	7.75	inches	7.754	in	
Slope =	0.4	%	0.4	%	
Roughness Coefficient =	120		0.013	n factor	
Full Flow Capacity =	374.36	gpm	317	gpm	
Demand to Pipe A5 =	358.2	gpm	317	gpm	(Kraft and Laubach 4A and 4B.
Is Demand <= Capacity	**YES**		**YES**		4C does not drain to this pipe.)
Capacity of Lift Station					
Pump Capacity =	320	gpm	320	gpm	
Demand to Lift Station	466.8	gpm	425.1	gpm	(Kraft and Laubach 4A, 4B, 4C)
Is Demand Less Than Capacity	**NO**		**NO**		Plan for Lift Station upgrade to be submitted to GBRA. LS plan to account for future NBISD committed capacity
Capacity of Force Main					
Pipe Diameter =	6.134	inches			
Peak Wet Flow =	466.8	gpm			
Velocity =	5.07	ft/s			
Is Force Main Less Than 6 ft/s	**YES**				

NBISD Flow

Josh Kelsey

From: Bill Ball
Sent: Monday, May 22, 2023 5:26 PM
To: Drew Burnett; Josh Kelsey; Stephen Hanz
Cc: Richard Mott; Derrick Stavinoha
Subject: FW: Laubach Subdivision LS

All,
I spoke with Nathan and he said the original 112,000 gpd flow was based off the majority of the site flowing to the Laubach lift station. They acknowledge this is not the plan, so they reduced the flow to account for the potential development of the area fronting Klein. They based the 66,000 gpd on an existing elementary school site. Nathan said they want to reserve capacity in the 15" line for future upstream development.

I would say let's proceed with the 66,000 gpd peak flow unless anyone has any objections.

Thanks,

William B. Ball, P.E.
Senior Project Manager
TEL: (830) 625-8555
Email: billb@hmtnb.com Website:www.hmtnb.com

From: Nathan Virdell, P.E. <nvirdell@gbra.org>
Sent: Monday, May 22, 2023 1:47 PM
To: Bill Ball <billb@hmtnb.com>
Cc: Richard Kortz <richardk@hmtnb.com>; Travis Basham <tbasham@gbra.org>; Alvin Schuerg <aschuerg@gbra.org>; Amy Uniacke <auniacke@gbra.org>
Subject: RE: Laubach Subdivision LS

Bill,

Thanks for speaking with me on the phone this afternoon regarding this subject. As discussed, we have further evaluated the necessary peak flow demand needing to be reserved in Laubach Lift Station for NBISD and determined it to be 66,000 GPD.

Let me know if you have any questions or need additional information.

Respectfully,

Nathan Virdell, P.E.
Project Engineer
o (830) 560-3961
c (512) 720-1505

2225 E. Common Street
New Braunfels TX 78130

From: Amy Uniacke
Sent: Thursday, March 10, 2022 2:06 PM
To: Bill Ball <billb@hmtnb.com>
Cc: Richard Kortz <richardk@hmtnb.com>; Travis Basham <tbasham@gbra.org>; Nathan Virdell, P.E. <nvirdell@gbra.org>; Alvin Schuerg <aschuerg@gbra.org>
Subject: RE: Laubach Subdivision LS

Bill,

Please see attached the requested Laubach lift station EDR. I assume you have the as-built LS plans?

You will need to save 112,000 GPD peak flow demand coming from the NBISD tract to the Laubach Lift Station.

Thanks,
Amy

From: Bill Ball <billb@hmtnb.com>
Sent: Thursday, February 24, 2022 5:11 PM
To: Amy Uniacke <auniacke@gbra.org>
Cc: Richard Kortz <richardk@hmtnb.com>; Travis Basham <tbasham@gbra.org>
Subject: RE: Laubach Subdivision LS

Amy,
I would like to see the wet well and pump calculations at a minimum. But the design report would be great in case I'm missing something.
Thanks,

William B. Ball, P.E.
Senior Project Manager
TEL: (830) 625-8555
Email: billb@hmtnb.com Website:www.hmtnb.com

HMT
ENGINEERING & SURVEYING
200 S. Castell Avenue, Ste 200
New Braunfels, TX 78130
TBPE FIRM F-10951
TBPLS FIRM 10153800

From: Amy Uniacke [mailto:auniacke@gbra.org]
Sent: Thursday, February 24, 2022 12:58 PM
To: Bill Ball <billb@hmtnb.com>
Cc: Richard Kortz <richardk@hmtnb.com>; Travis Basham <tbasham@gbra.org>
Subject: RE: Laubach Subdivision LS

Hey Bill,

What specific information are you looking to find in the design report?

Also, our team is finalizing the capacity that needs to be reserved for the NBISD tract out of the LS. Should be getting that to you next week.

Thanks,
Amy

Amy Uniacke
Treatment Design Director
O (830) 379-5822 ext. 505
C (830) 557-7168

GUADALUPE-BLANCO RIVER AUTHORITY
933 E. Court St.
Seguin, TX 78155

From: Bill Ball <billb@hmtnb.com>
Sent: Thursday, February 24, 2022 8:10 AM
To: Amy Uniacke <auniacke@gbra.org>
Cc: Richard Kortz <richardk@hmtnb.com>; Travis Basham <tbasham@gbra.org>
Subject: RE: Laubach Subdivision LS

Amy,
Have you had a chance to find this yet?
Thanks,

William B. Ball, P.E.
Senior Project Manager
TEL: (830) 625-8555
Email: billb@hmtnb.com Website:www.hmtnb.com

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200 S. Castell Avenue, Ste 300
New Braunfels, TX 78130
TBPE FIRM F-10981
TBPLS FIRM 10153900

HMT offices are open and continue to operate at maximum capacity. We are following the guidance of the CDC and have implemented infection prevention measures and routine cleaning/sanitation of the workspaces, meeting rooms, and offices. We sincerely appreciate your patience and understanding as we continue to work through the impact of COVID-19 as a community.

From: Bill Ball
Sent: Wednesday, February 2, 2022 4:53 PM
To: Amy Uniacke <auniacke@gbra.org>
Cc: Richard Kortz <richardk@hmtnb.com>; Travis Basham (tbasham@gbra.org) <tbasham@gbra.org>
Subject: Laubach Subdivision LS

Amy,
We are looking through our files to start the lift station evaluation. One thing we do not have is the lift station design report. Can you please provide us with a copy? Once we dive into

that a little bit, I think it might be a good idea to have a predesign meeting, preferably at the lift station site, to make sure we don't head down a road GBRA does not want us to. Your thoughts?
Thanks,

William B. Ball, P.E.
Senior Project Manager
TEL: (830) 625-8555
Email: billb@hmtnb.com Website:www.hmtnb.com

HMT offices are open and continue to operate at maximum capacity. We are following the guidance of the CDC and have implemented infection prevention measures and routine cleaning/sanitation of the workspaces, meeting rooms, and offices. We sincerely appreciate your patience and understanding as we continue to work through the impact of COVID-19 as a community.

Attachment G

Mueller Lift Station Engineering Design Report

MOELLER & ASSOCIATES
Engineering Solutions

2019

Laubach Subdivision
Lift Station Design Report

Moeller & Associates
2021 W State Hwy 46, Suite 105
New Braunfels, TX 781332
TBPE Firm # F-13351

Prepared for :

Laubach Partners, LLC

c/o Richard Beach

2/26/2019

Contents

PROJECT DESCRIPTION

Laubach Subdivision ï Units 4A, 4B, 5, and 6 is a 77 acre development on the northwest side of Kleid Rd approximately 1 mile north of FM 1044 and 2 miles south of FM 725 (See Location Map). The proposed site consists of 267 residential lots, with the addition of 8 LUE from the service to the NBISD tract. The site is currently undeveloped. A small portion of the property lies within the 100-year flood plain, according to FEMA Map Numbers 48187C0115F and 48187C0095F dated November 2, 2007 (Reference Attachment C).

City of New Braunfels requires 10yr storm event flows to be contained within the street curb and gutter, and the 100 year flows to be contained within the street right of way and all Lift Station improvements will be outside of the street right of way. This satisfies the TCEQ conditions stating the finished slab of the lift station be above the 100-year floodplain, and the access road must be above the 25-floodplain.

DESIGN ASSUMPTIONS

Design Flow

The current proposed development is Unit 4A and 4B of four planned units. The lift station will pump the wastewater generated by this subdivision to the Legends Pond lift station. In meetings with GBRA staff, we have been directed to design and construct the lift station and force main to get the flow to the Legends Pond lift station, and any improvements needed to the Legends Pond Lift Station would be handled (design and construction) by GBRA through the use of impact fees.

Lift Station Design

The proposed lift station and force main were designed to perform with peak wet weather flow conditions of 353,100 gpd (245 gpm). The lift station was designed to have a firm pumping capacity (pumping capacity with the largest pump out of service) of 320 gpm.

The proposed lift station consists of two 12-horsepower submersible pumps (see Attachment G). The power supply required to operate the lift station is 480/V three phase electric service. The lift station package system contains an automatic transfer switch and propane powered generator that powers a backup pump in the event of a loss of electrical power.

Force Main Design

The proposed force main is proposed to be ductile iron within the lift station and PVC outside the lift station. In order to keep the velocity within the TCEQ requirements, the proposed force

main diameter is 6ò. Under the ultimate design flow conditions, with one pump operating, the velocity is 3.53 fps.

ATTACHMENT A LOCATION MAP


PROJECT SITE
W. Klein Rd
Pahmeyer Rd
Max Berges Rd
Birdie's Golf Center
1044
368
LAUBACH SOUTH SUBDIVISION
LOCATION MAP
New Braunfels
PROJECT SITE
1 inch = 500 feet
Legend
Cadastre
Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China
MOELLER & ASSOCIATES
Engineering Solutions
bing
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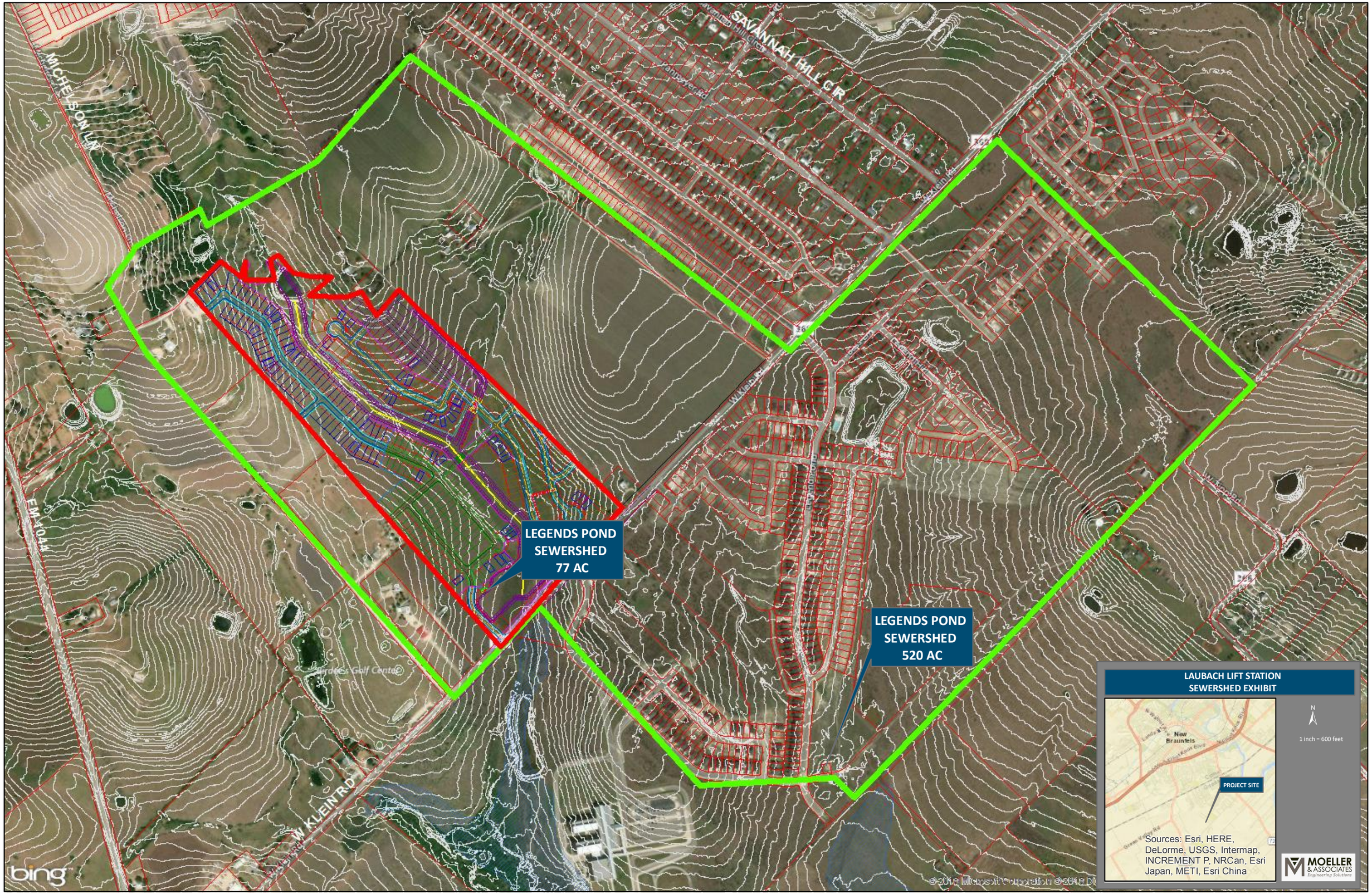
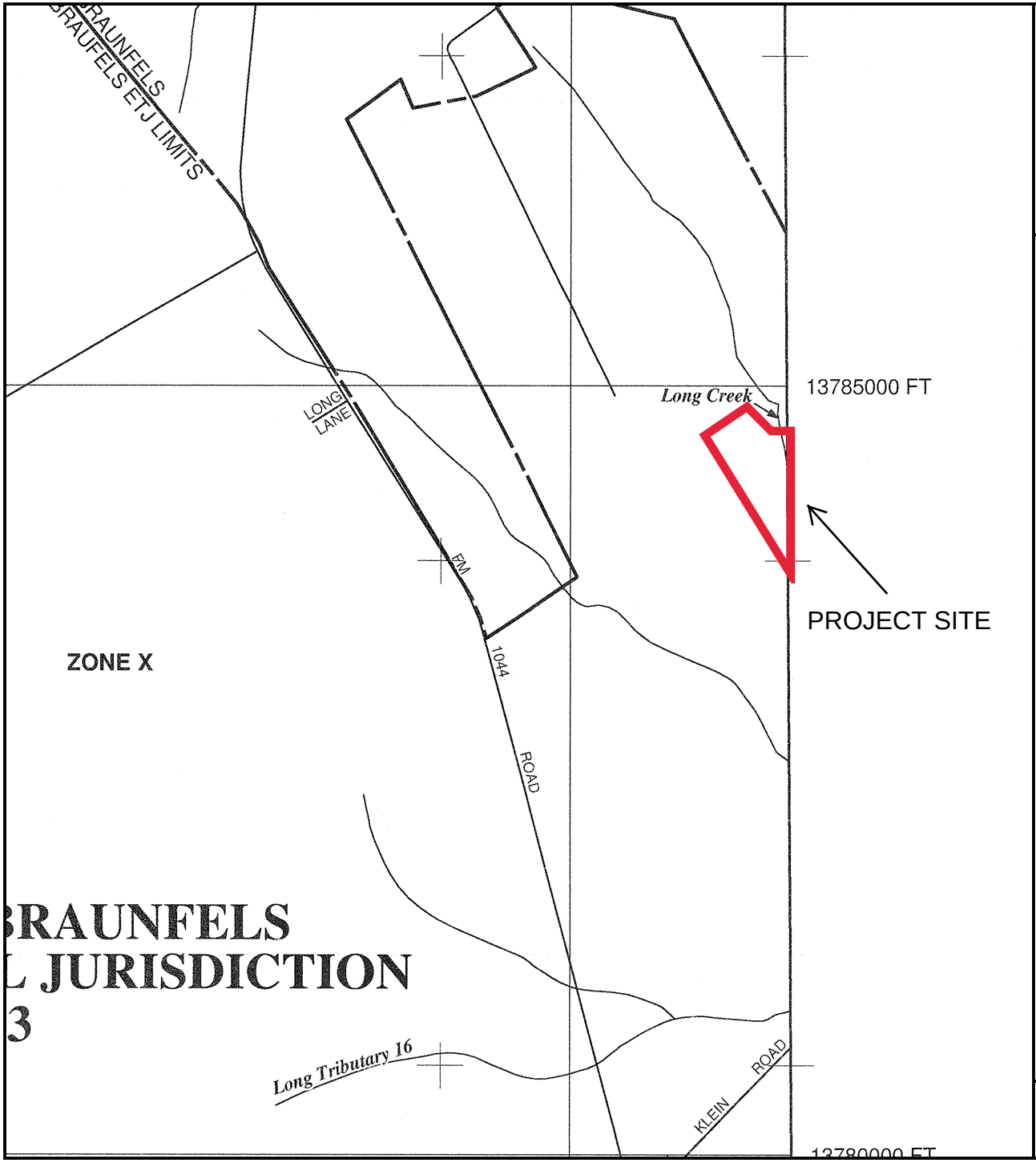
ATTACHMENT B OVERLL SEWER SHED MAP


SAVANNAH HILL CIR
MICHELSON LN
W KLEIN RD
LEGENDS POND
SEWERSHED
77 AC
LEGENDS POND
SEWERSHED
520 AC
LAUBACH LIFT STATION
SEWERSHED EXHIBIT
New Braunfels
PROJECT SITE
1 inch = 600 feet
Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China
MOELLER & ASSOCIATES
Engineering Solutions
bing

ATTACHMENT C FEMA FIRM MAP



MAP SCALE 1" = 1000'

500 0 1000 2000 FEET

PANEL 0095F

FIRM

FLOOD INSURANCE RATE MAP

GUADALUPE COUNTY, TEXAS

AND INCORPORATED AREAS

PANEL 95 OF 480

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

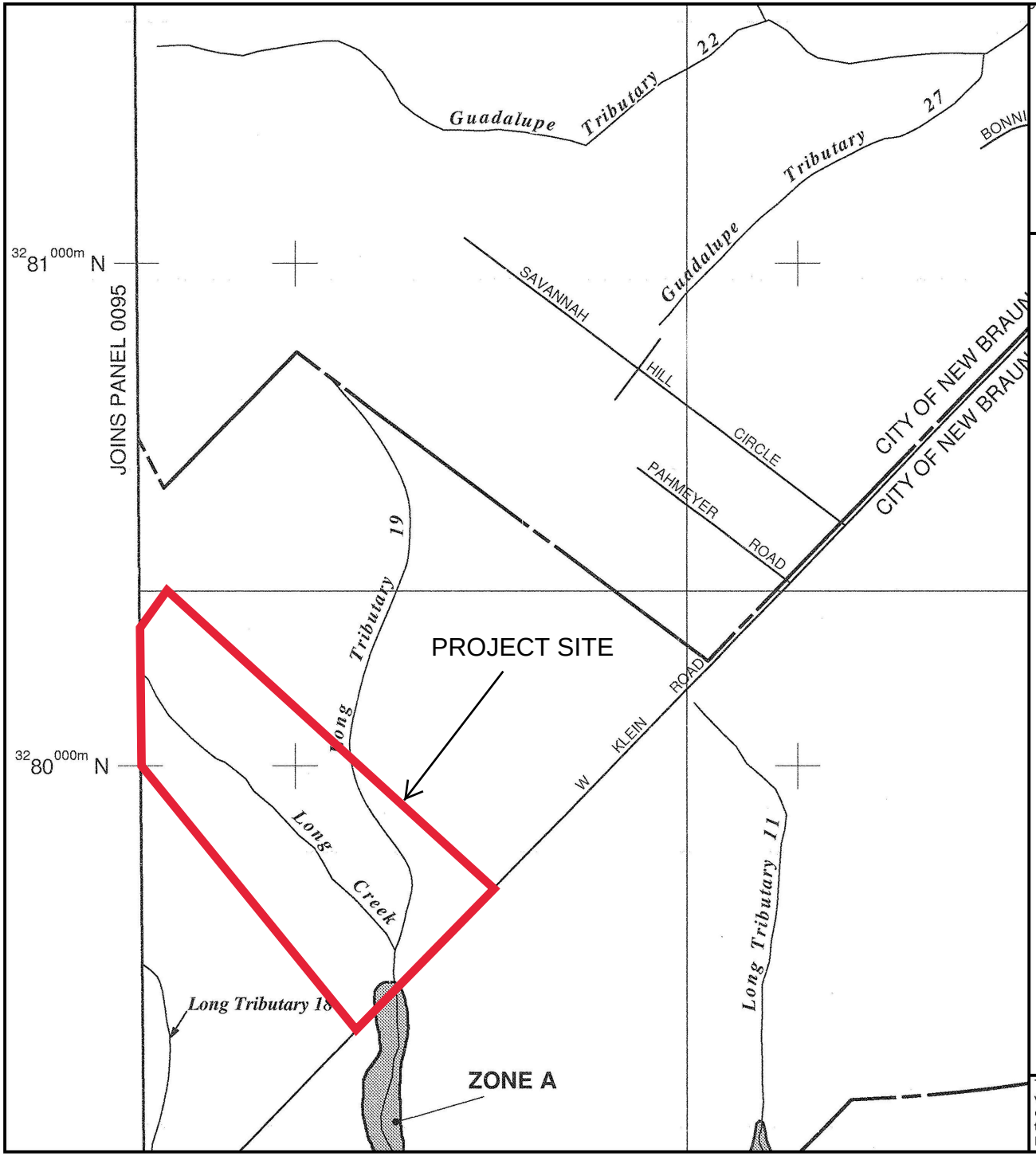
COMMUNITY	NUMBER	PANEL	SUFFIX
GUADALUPE COUNTY	480266	0095	F
NEW BRAUNFELS, CITY OF	485493	0095	F
SANTA CLARA, CITY OF	480013	0095	F

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
48187C0095F

EFFECTIVE DATE
NOVEMBER 2, 2007

Federal Emergency Management Agency



MAP SCALE 1" = 1000'

500 0 1000 2000 FEET

PANEL 0115F

FIRM

FLOOD INSURANCE RATE MAP

GUADALUPE COUNTY, TEXAS

AND INCORPORATED AREAS

PANEL 115 OF 480

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
GUADALUPE COUNTY	480266	0115	F
NEW BRAUNFELS, CITY OF	485493	0115	F

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
48187C0115F

EFFECTIVE DATE
NOVEMBER 2, 2007

Federal Emergency Management Agency

ATTACHMENT D DESIGN FLOW CALCULATIONS

Lift Station
Design Calculations

Project: Laubach Subdivision
Project No: BEAC008
Date: 02/26/19

Design Flow Calculations

Input Variables			
Service Area	77	acre	
Total LUE's Served	275	connections	267 + 8 for NBISD
Average Dry Flow ($ADF_{1\ LUE}$)	300	gpd per LUE	
Inflow & Infiltration Rate (I&I)	300	gpd per acre	

Population = 825 people (assume 3.0 people per LUE)

Average Dry Flow(ADF) = $ADF_{1\ LUE}$ * Total LUE Served

ADF_{DESIGN} = 82,500 gpd

57 gpm (1 gpm = 1440 gpd)

Peaking Factor = 4.00

TCEQ requires min of 4 for minor lines

Peak Dry Flow(PDF) = ADF_{DESIGN} * Peak Factor

PDF_{DESIGN} = 330,000 gpd

229 gpm

Inflow & Infiltration Rate(I&I) = 300 gpd/ac * Service Area (ac)

$I\&I_{DESIGN}$ = 23,100 gpd

16 gpm

Peak Wet Flow (PWF) = PDF_{DESIGN} + $I\&I_{DESIGN}$

PWF_{DESIGN} = 353,100 gpd **Design Flow**

245 gpm

Minimum Daily Flow (MDF) = $(0.2 * (0.0144 * ADF_{DESIGN})^{0.198}) * ADF_{DESIGN}$

MDF_{DESIGN} = 67,034 gpd

47 gpm

Pump Flow (Q_{PUMP}) = 320 gpm

ATTACHMENT E LIFT STATION DESIGN CALCULATIONS

Wet Well Design

Detention Time and Pump Cycles

Water Hammer

Pipe Design Life Calculations

Lift Station
Design Calculations

Wet Well Design Calculations

ADF_{DESIGN}	=	57.3 gpm	(From Design Flow Calcs)
PWF_{DESIGN}	=	245.2 gpm	
Q_{PUMP}	=	320 gpm	
Number of Pumps	=	2	
Minimum Cycle Time (T_c)	=	10 min	

Motor HP	Min. Cycle Time (min)
2 to 50	10
51 to 75	15
76 to 250	30
251 to 1500	45

Minimum Working Volume (V) = $(T_C/4) * Q_{PUMP}$ Assumes one pump operation

$V_{WORKING}$ = 800 gal

Wet Well Hydraulics

Net Outflow Scenarios		
Peak Wet Flow	$Q_{NETOUT(PWF)}$ =	Q_{PUMP} - PWF_{DESIGN}
	$Q_{NETOUT(PWF)}$ =	74.8 gpm
Avg Dry Flow	$Q_{NETOUT(ADF)}$ =	Q_{PUMP} - ADF_{DESIGN}
	$Q_{NETOUT(ADF)}$ =	262.7 gpm

Wet Well Diameter ($D_{WETWELL}$) = 5.84 ft (6ft dia) 200.36 gal per foot

		Time to Pump Down		Time to Fill Wet Well		Cycle Time	
Pump off - Pump On (depth ft)	Working Volume (gal)	ADF (minutes)	PWF (minutes)	ADF (minutes)	PWF (minutes)	ADF (minutes)	PWF (minutes)
1.5	300.5	1.1	4.0	5.2	1.2	6.4	5.2
2	400.7	1.5	5.4	7.0	1.6	8.5	7.0
2.5	500.9	1.9	6.7	8.7	2.0	10.6	8.7
3	601.1	2.3	8.0	10.5	2.5	12.8	10.5
3.5	701.3	2.7	9.4	12.2	2.9	14.9	12.2
4	801.5	3.1	10.7	14.0	3.3	17.0	14.0
5	1001.8	3.8	13.4	17.5	4.1	21.3	17.5
6	1202.2	4.6	16.1	21.0	4.9	25.6	21.0
7	1402.5	5.3	18.8	24.5	5.7	29.8	24.5

MOELLER & ASSOCIATES Engineering Solutions

Lift Station
Design Calculations

Wet Well Detention Time and Pump Cycle Times

$V_{WORKING}$ =	801.5	gal
Working Volume Depth =	4	ft
$D_{WETWELL}$ =	5.84	ft
MDF_{DESIGN} =	46.55	gpm
ADF_{DESIGN} =	57.29	gpm
PWF_{DESIGN} =	245.21	gpm
Q_{PUMP} =	320	gpm

Average Detention Time

T_{fill}	14.0	min	$T_{fill} = V_{working} / ADF_{DESIGN}$
T_{empty}	3.1	min	$T_{empty} = V_{working} / (Q_{PUMP} - ADF_{DESIGN})$
$T_{detention}$	17.0	min	$T_{detention} = T_{fill} + T_{empty}$
Daily Cyles	85	cycles/day	

Minimum Detention Time

T_{fill}	3.3	min	$T_{fill} = V_{working} / PWF_{DESIGN}$
T_{empty}	10.7	min	$T_{empty} = V_{working} / (Q_{PUMP} - PWF_{DESIGN})$
$T_{detention}$	14.0	min	$T_{detention} = T_{fill} + T_{empty}$

Maximum Detention Time

T_{fill}	17.2	min	$T_{fill} = V_{working} / MDF_{DESIGN}$
T_{empty}	2.9	min	$T_{empty} = V_{working} / (Q_{PUMP} - MDF_{DESIGN})$
$T_{detention}$	20.1	min	$T_{detention} = T_{fill} + T_{empty}$

Minimum Time Between Pump Starts (results when inflow = 50% Q_{PUMP})

T_{fill}	5.0	min	$T_{fill} = V_{working} / 0.5*Q_{PUMP}$
T_{empty}	5.0	min	$T_{empty} = V_{working} / (Q_{PUMP} - 0.5*Q_{PUMP})$
$T_{detention}$	10.0	min	$T_{detention} = T_{fill} + T_{empty}$ **Minimum Cycle Time OK**
Daily Cycles	144	cycles/day	

Odor Control Not Req'd

Total Dynamic Head Calculations

Total Dynamic Head = $H_{static} + H_{friction} + H_{minor}$

Static Head, H_{static}

Top of Motor	635	ft above mean sea level
Discharge Elevation	678	ft above mean sea level
	43	

Friction Head, $H_{friction}$

$$H_{friction} = \frac{10.44 * L * Q_{pump}^{1.85}}{C^{1.85} * d^{4.8655}}$$

L = Length of pipe (ft)

Q_{pump} = Pump Flow Rate (gpm)

C = Hazen Williams Coeffient

d = Pipe diamer (in)

Discharge Piping

L	35	ft	actual length
Q_{pump}	320	gpm	
d	3.99	in	GBRA minimum is 4"
C	100		GBRA requires flanged ductile iron

$H_{friction}$ = **1.77 ft**

Force Main Piping

L	3198	ft	actual length
Q_{pump}	320	gpm	
d	6.09	in	GBRA minimum is 4"
C	120		PVC C900 DR18

$H_{friction}$ = **19.64 ft**

Minor Losses, H_{minor}

$$H_{minor} = \frac{K * V^2}{2 * g}$$

K = Minor Loss Coefficient

V = Velocity in Pipe

g = Gravitational Acceleration (32.2 ft/s^2)

$$V = \frac{Q_{pump}}{A_{suction\ pipe}} = \frac{0.71\ cfs}{0.20\ ft^2}$$

V = 3.53 fps

Dischare Piping and Force Main Piping

Fittings	Qty.	K Value	Total
45º Bends	34	0.2	6.8
90º Bends	1	0.3	0.3
Check Valve	1	2.5	2.5
Plug Valve	1	1.3	1.3
Air Release Valve	2	0.2	0.4
Tee, Thru	1	0.1	0.1
Entrance	1	0.5	0.5
Exit	1	1	1
Total			12.9

H_{minor} = **2.50 ft**

Total Dynamic Head = $H_{static} + H_{friction} + H_{minor}$ **66.91 ft**

Emergency Storage Provisions

$D_{WETWELL}$ =	6	ft	
MDF_{DESIGN} =	46.55	gpm	
ADF_{DESIGN} =	57.29	gpm	
PWF_{DESIGN} =	245.21	gpm	
Q_{PUMP} =	320.00	gpm	
Max Allowable $Elev_{Emergency}$ =	0.00	ft	
Pump On Elev =	0.00	ft	
$Depth_{Emergency}$ =	0.00	ft	
VF of MH's =	0.00	ft	Vertical feet of manholes below Max Allowable Elev
$V_{Emerg\ MH}$ =	0.00	gal	Emergency Volume in Manholes
LF of Pipe $_{8in}$ =	0.00	ft	Vertical feet of manholes below Max Allowable Elev
$V_{8in\ Pipe}$ =	0.00	gal	Emergency Volume in pipe
$V_{Emergency}$ =	0.00	gal	Total Emergency Volume

Emergency Storage $Duration_{ADF}$ =	0	min	0.0 hr
Emergency Storage $Duration_{PWF}$ =	0	min	0.0 hr

Emergency Provisions prodived by backup generator

Force Main Flushing

$$T_{force\ main\ flush} = \frac{V_{Force\ Main} * T_{C\ (ADF)}}{V_{Wet\ Well\ Working}}$$

$V_{Force\ Main}$ = $L * A_{force\ main}$ L = 3198 ft

$A_{force\ main}$ = 0.20 ft^2

$V_{Force\ Main}$ = 4838.85 gal

$T_{force\ main\ flush}$ = 25.72 min **Odor Control Not Req'd**

Water Hammer Calculations

Ductile Iron Pipe

$$p_{Water\ Hammer} = \frac{a * V}{2.31 * g} + p_{Operating}$$

$$a = \frac{12}{[(\gamma_{water}/g)*(1/k + d/Et)]^{0.5}}$$ pressure wave velocity (fps)

γ_{water} =	62.4	lb/ft^3	specific weight of water (lbs/ft^3)
g =	32.2	ft/s^2	gravitational acceleration (ft/s^2)
k =	300,000	psi	bulk modulus of water (psi)
d =	6.09	in	pipe diameter (in)
E =	24,000,000	psi	Young's modulus of pipe (psi)
t =	0.405	in	pipe wall thickness (in)
V =	3.53	ft/s	Velocity of flow in pipe (fps)

a = 4331.88 fps

$p_{Operating}$ = 40.7 psi

$p_{Water\ Hammer}$ = 246.35 psi

For Ductile Iron Pipe, rate working stress + 100 psi surge pressure = 450 psi **OK**

PVC Pipe

$$p_{Water\ Hammer} = \frac{a * V}{2.31 * g} + p_{Operating}$$

$$a = \frac{4660}{[1 + (k*d/E*t)]^{0.5}}$$ pressure wave velocity (fps)

g =	32.2	ft/s^2	gravitational acceleration (ft/s^2)
k =	300,000	psi	bulk modulus of water (psi)
d =	6.09	in	pipe diameter (in)
E =	400,000	psi	Young's modulus of pipe (psi)
t =	0.405	in	pipe wall thickness (in)
V =	3.53	ft/s	Velocity of flow in pipe (fps)

a = 1329.92 fps

$p_{Operating}$ = 40.7 psi

$p_{Water\ Hammer}$ = 103.83 psi

For C-900 DR 18 PVC Pipe, rate working stress + 35 psi surge pressure = 235 psi **OK**

Buoyancy Calculations

Wet Well

Top Slab	Outer $D_{wet\ well}$ =	7.29	ft
	$A_{Top\ Slab}$ =	41.76	ft^2
	$thickness_{Top\ Slab}$ =	0.5	ft
	$V_{top\ slab}$ =	20.88	ft^3
Bottom Slab	Outer $D_{wet\ well}$ =	9.29	ft
	$A_{Bottom\ Slab}$ =	67.81	ft^2
	thickness =	1	ft
	$V_{bottom\ slab}$ =	67.81	ft^3
Access Hatch	Width	3	ft
	Length	3	ft
	$thickness_{Top\ Slab}$ =	0.5	ft
	$V_{access\ hatch}$ =	4.50	ft^3

Inner Diameter (ft)	Wall Thickness (in)	Outer Diameter (ft)	Wet Well Weight Per VF (lbs)
5	6	6.00	1295.91
6	7.75	7.29	2022.60
7	8.75	8.46	2655.83
8	9.75	9.63	3374.14
9	10	10.67	3861.54
10	11.75	11.96	5066.02
11	12	13.00	5654.87
12	13	14.17	6679.16

Per ASTM C-478 for Precast Reinforced Concrete Manholes

Wet Well	Outer $D_{wet\ well}$ =	7.29	ft	
	$A_{Wet\ Well\ (rim)}$ =	41.76	ft^2	
	Inner $D_{wet\ well}$ =	6	ft	
	$A_{Wet\ Well\ (rim)}$ =	28.27	ft^2	
	$Depth_{wet\ well}$ =	30.8	ft	(into soil)
	$V_{wet\ well}$=	415.31	ft^3	

$W_{lift\ station}$ Lift Station Weight (lbs)

$V_{top\ slab}$ =	20.88	ft^3	
$V_{bottom\ slab}$ =	67.81	ft^3	
$V_{access\ hatch}$ =	-4.50	ft^3	
$V_{wet\ well}$=	415.31	ft^3	
$V_{soil\ above\ lug}$=	802.31	ft^3	
V_{total} =	1301.81	ft^3	
$W_{lift\ station}$ =	**195,270.78**	lbs	Unit Weight of Conc. and soil 150 lb/ft^3

Buoyancy Force, $F_{buoyancy}$ $F_{buoyancy}$ (lbs) = $V_{displaced}$ (ft^3)* W_{water} (lb/ft^3)

$V_{top\ slab}$ =	20.88	ft^3
$V_{bottom\ slab}$ =	67.81	ft^3
$V_{wet\ well}$ =	1286.16	ft^3
$V_{displaced}$ =	1,374.84	ft^3
$F_{buoyancy}$ =	**85,790.28**	**lbs** **OK**

Pipe Design Life Calculations

Number of Pumps in Operation	1	
Number of Cycles per day	96	
Operating Pressure ($P_{operating}$)	22.8	psi
Maximum Velocity	3.53	ft/s
Max pressure during start-up/shut-down operation	109	psi
Min pressure during start-up/shut-down operation	0	psi
Selected Dimension Ratio (DR)	18	
DR - Related Pressure Surge (P_{surge})	14.7	psi
DR - Related Short Term Pressure Rating (STR)	215	psi

$$P_{max} = P_{operating} + (V_{max} * P_{surge})$$

P_{max} = 74.71 psi **OK**

$$\sigma_{avg} = (P_{max} - P_{min})(DR-1)/4$$

σ_{avg} = 463.25 psi

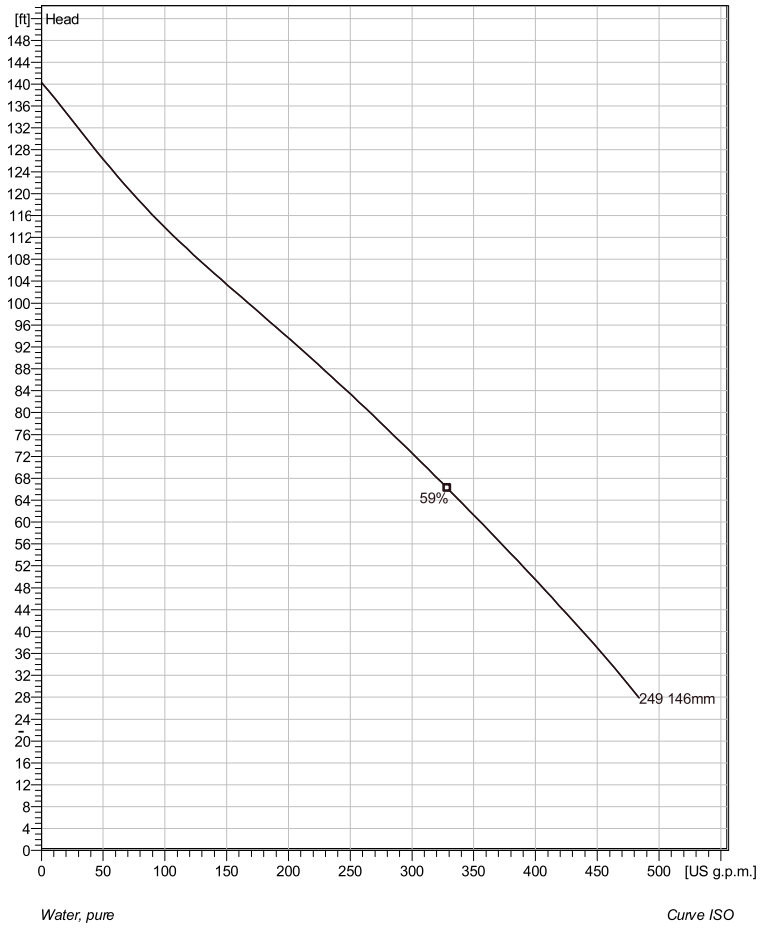
Approximate Cycles to Failure = 20,000,000 UniBell Figure 5.7

System Cycles in 50 yrs = 1,748,827 **OK**

ATTACHMENT F PERFORMANCE CURVES

NP 3127 SH 3~ Adaptive 249

Technical specification



Note: Picture might not correspond to the current configuration

Patented self cleaning semi-open channel impeller, ideal for pumping in waste water applications. Possible to be upgraded with Guide-pin® for even better clogging resistance. Modular based design with high adaptation grade.

General

Impeller

Impeller material	Hard-Iron ™
Discharge Flange Diameter	3 1/8 inch
Suction Flange Diameter	80 mm
Impeller diameter	146 mm
Number of blades	2

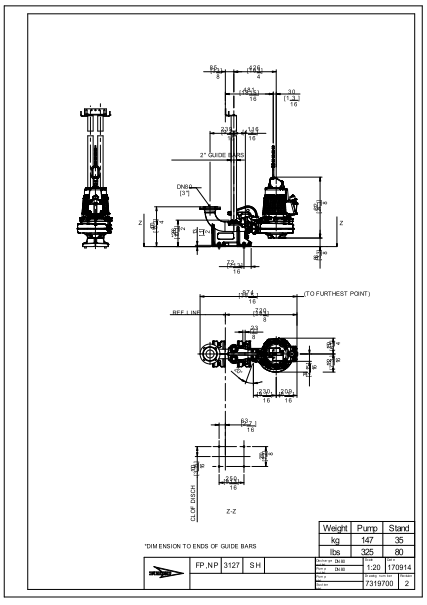
Motor

Motor #	N3127.930 21-11-2AS-W IE3 12hp
Stator variant	60
Frequency	60 Hz
Rated voltage	460 V
Number of poles	2
Phases	3~
Rated power	12 hp
Rated current	14 A
Starting current	120 A
Rated speed	3600 rpm
Power factor	
1/1 Load	0.91
3/4 Load	0.90
1/2 Load	0.86
Pump Efficiency	
1/1 Load	91.4 %
3/4 Load	91.2 %
1/2 Load	89.3 %

IE3 Rating is based on Y connection

Configuration

Installation: P - Semi permanent, Wet



Project	Project ID	Created by	Created on	Last update
	Laubach LS - GBRA	**Barrie Hamm**	**11/19/2018**	**2/27/2019**

NP 3127 SH 3~ Adaptive 249

Performance curve

Pump

Discharge Flange Diameter	3 1/8 inch
Suction Flange Diameter	80 mm
Impeller diameter	$5^{3}/_{4}$"
Number of blades	2

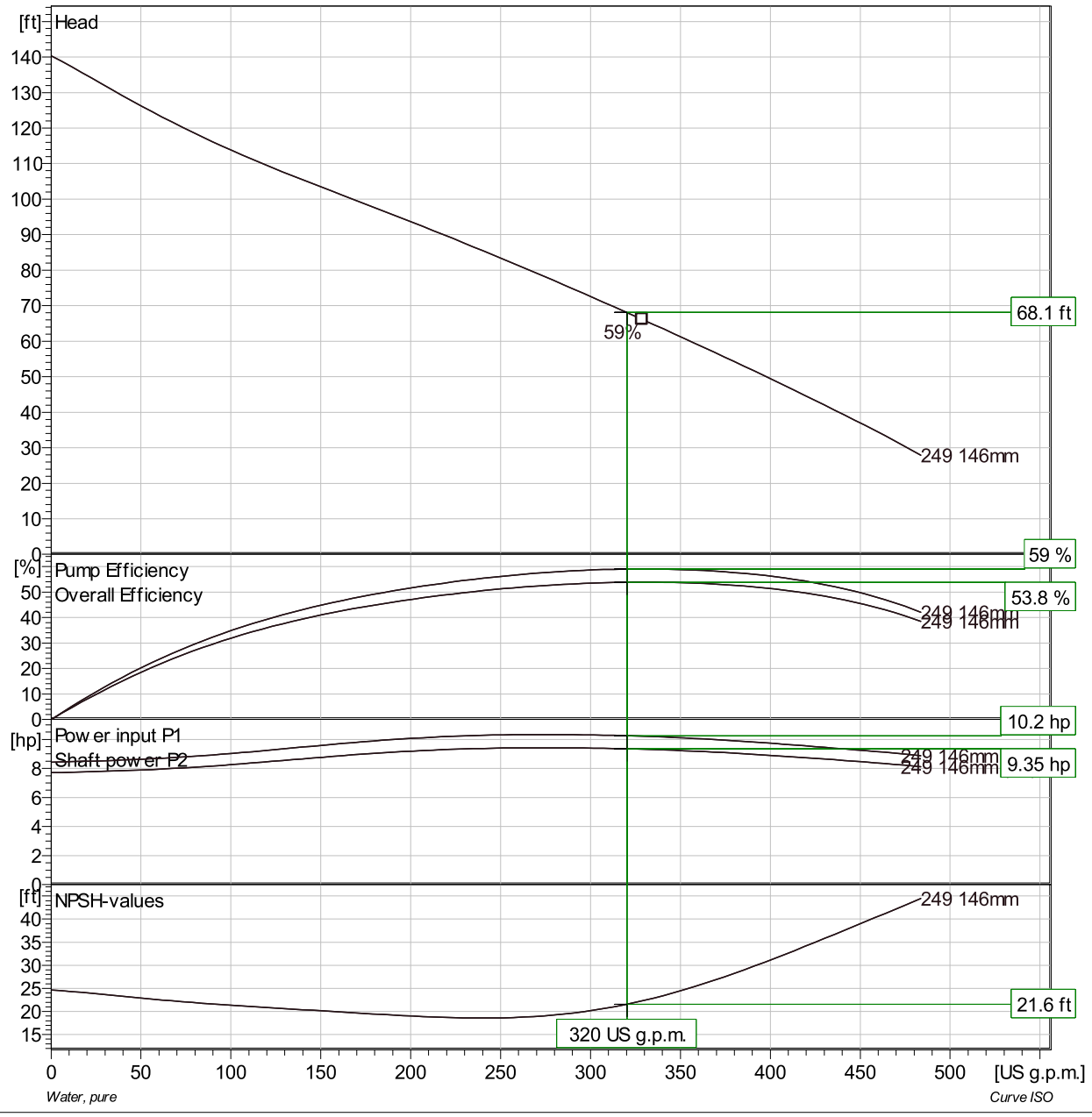
Motor

Motor #	N3127.930 21-11-2AS-W IE3 12hp
Stator variant	60
Frequency	60 Hz
Rated voltage	460 V
Number of poles	2
Phases	3~
Rated power	12 hp
Rated current	14 A
Starting current	120 A
Rated speed	3600 rpm

IE3 Rating is based on Y connection

Power factor	
1/1 Load	0.91
3/4 Load	0.90
1/2 Load	0.86

Pump Efficiency	
1/1 Load	91.4 %
3/4 Load	91.2 %
1/2 Load	89.3 %

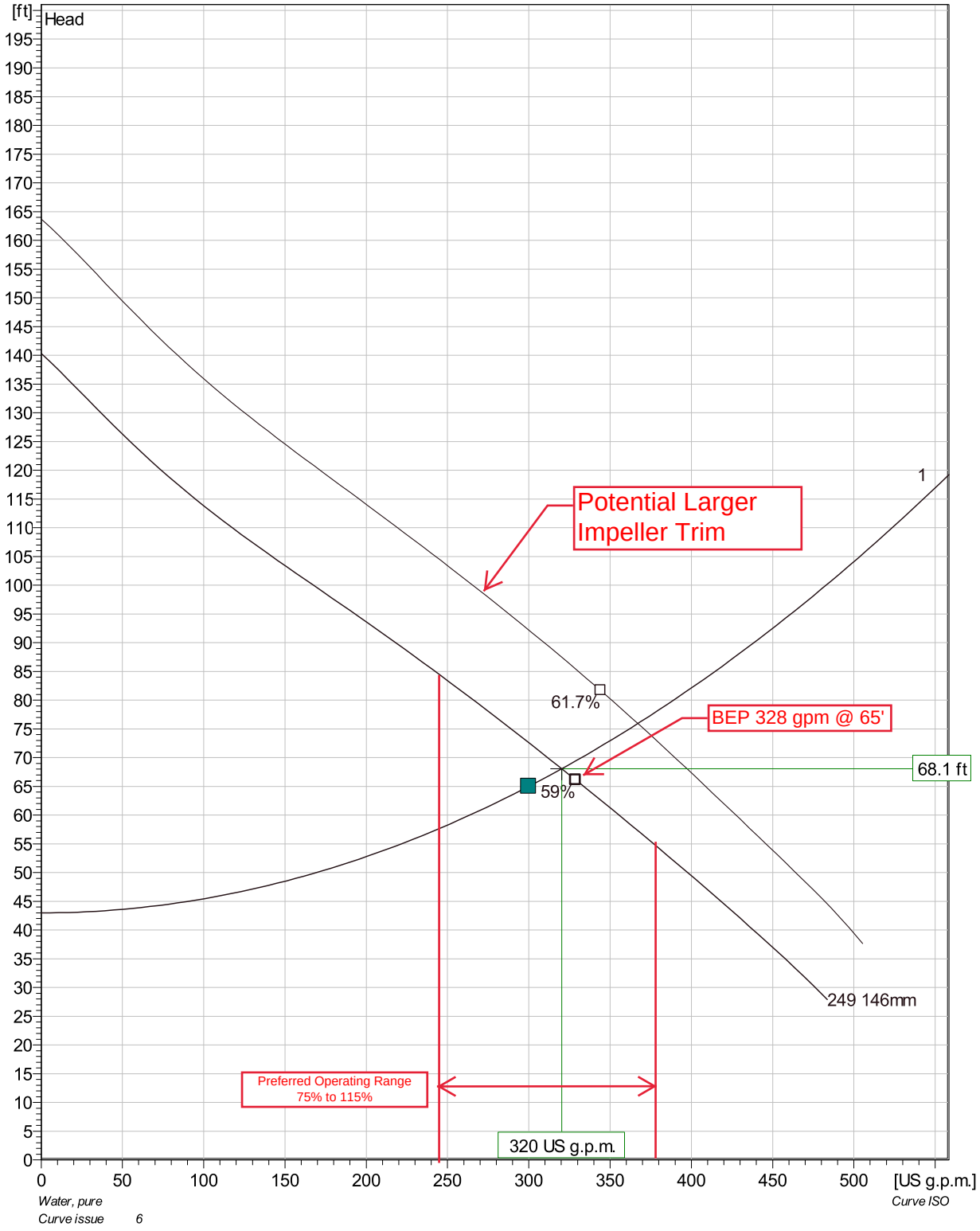


Duty point		Guarantee
Flow	Head	
300 US g.p.m.	65 ft	No

Project	Project ID	Created by	Created on	Last update
	Laubach LS - GBRA	**Barrie Hamm**	**11/19/2018**	**2/27/2019**

NP 3127 SH 3~ Adaptive 249

Duty Analysis

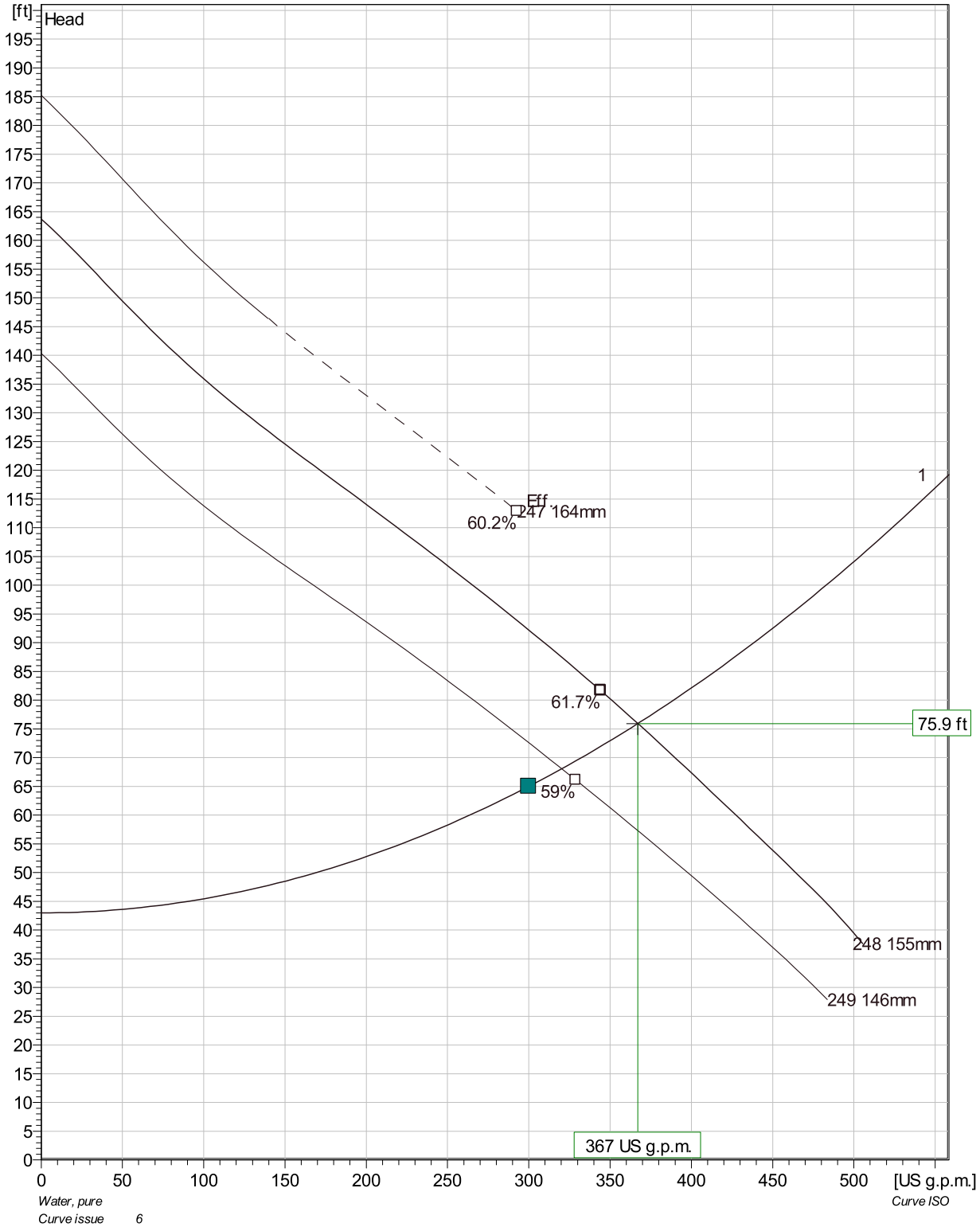


Pumps running /System	Individual pump			Total					
	Flow	Head	Shaft power	Flow	Head	Shaft power	Pump eff.	Specific energy	NPSHre
1	320 US g.p.m.	68.1 ft	9.35 hp	320 US g.p.m.	68.1 ft	9.35 hp	59 %25	398 kWh/US MG	21.6 ft

Project	Project ID	Created by	Created on	Last update
	Laubach LS - GBRA	Barrie Hamm	11/19/2018	2/27/2019

NP 3127 SH 3~ Adaptive 248

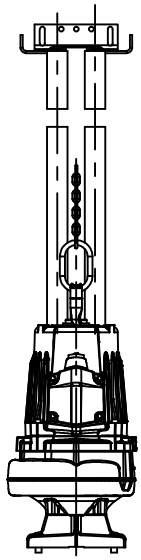
Duty Analysis

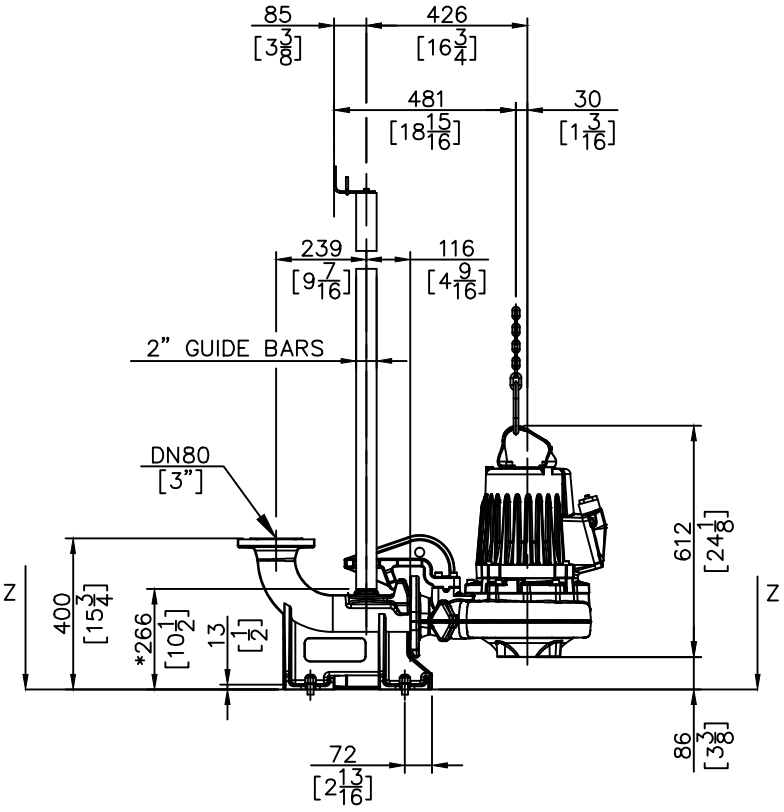


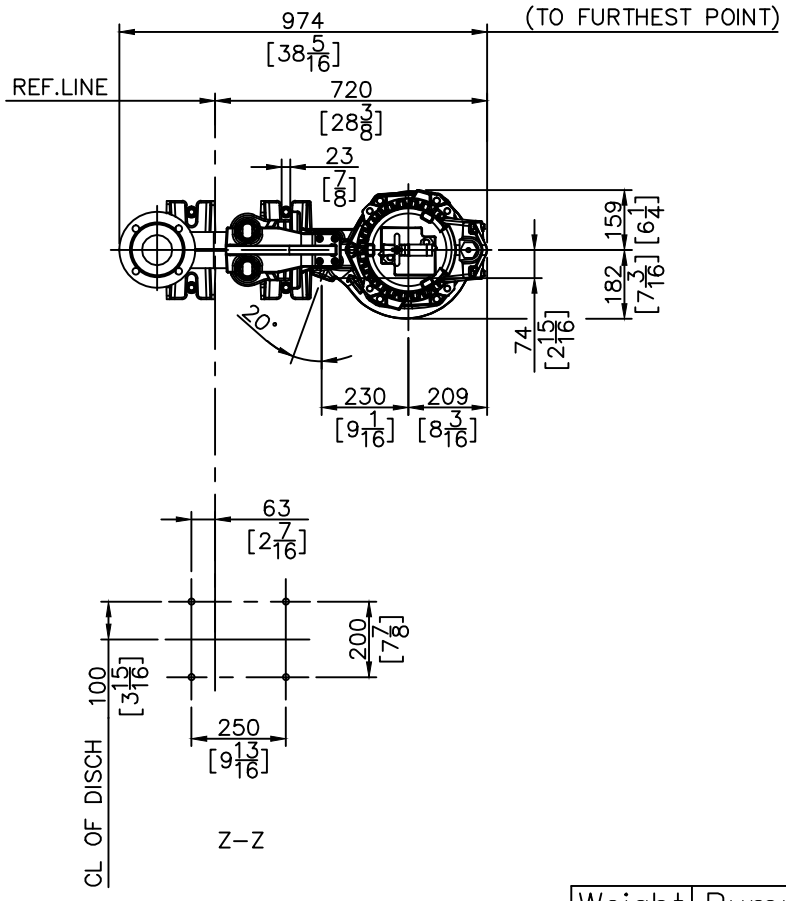
Pumps running /System	Individual pump			Total					
	Flow	Head	Shaft power	Flow	Head	Shaft power	Pump eff.	Specific energy	NPSHre
1	367 US g.p.m.	75.9 ft	11.5 hp	367 US g.p.m.	75.9 ft	11.5 hp	61.5 %25	426 kWh/US MG	26.5 ft

Project	Project ID	Created by	Created on	Last update
	Laubach LS - GBRA	Barrie Hamm	11/19/2018	4/6/2019

ATTACHMENT G PUMP MANUFACTURER INFORMATION







*DIMENSION TO ENDS OF GUIDE BARS

Weight	Pump	Stand
kg	147	35
lbs	325	80

FLYGT	FP,NP	3127	SH		Discharge outlet DN 80 Pump outlet DN 80 Pump inlet Suction inlet	Scale 1:20	Date 170914
						Drawing number 7319700	Revision 2

FLYGT
a xylem brand

Issued: 11/11 Supersedes: 1/11

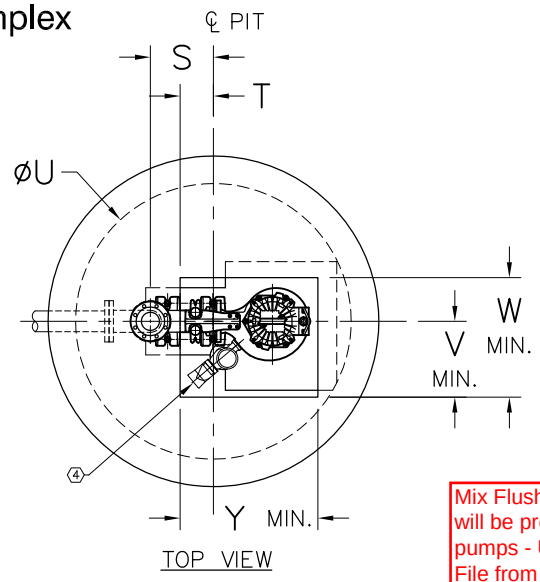
6820180

CP/DP/FP/NP-3127

NOTES:

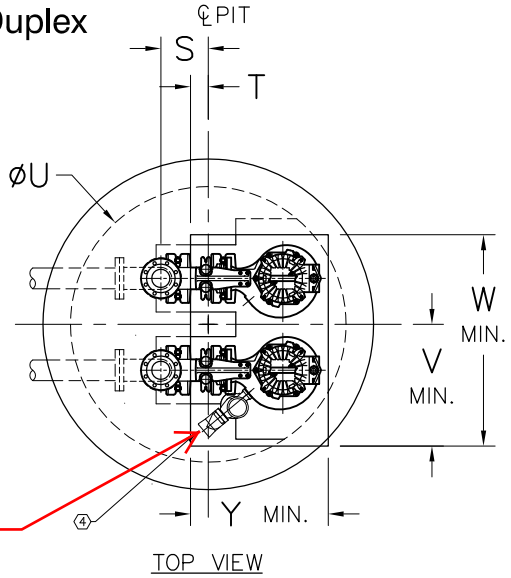
1. CONFIGURATION AND DIMS. SHOWN ARE SUGGESTED REQUIREMENTS ONLY. ALL DETAILS, INCLUDING SIZING OF PIT, TYPE, LOCATION AND ARRANGEMENT OF VALVES AND PIPING, ETC. ARE TO BE SPECIFIED BY THE CONSULTING ENGINEER AND ARE SUBJECT TO THEIR APPROVAL.
2. REFERENCE GENERIC DUPLEX LIFT STATION LAYOUT FOR ELEVATION VIEW.
3. LOCATE ANCHOR BOLTS USING INSIDE EDGE OF CLEAR OPENING AND PUMP CENTERLINE AS REFERENCE POINT. BOLT LOCATIONS MUST BE HELD TO MAINTAIN EXACT POSITION OF PUMP TO CLEAR OPENING.
4. FLYGT MIX–FLUSH VALVE.

Simplex



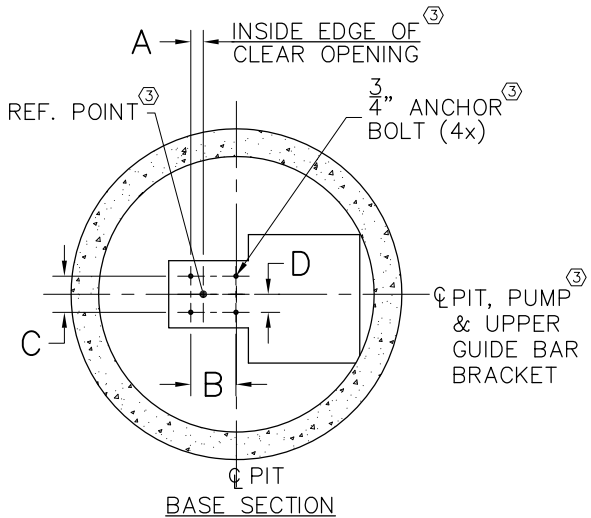
TOP VIEW

Duplex

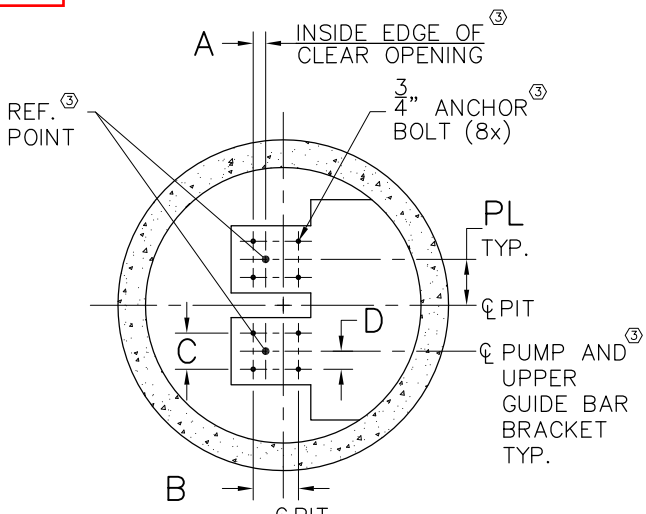


TOP VIEW

Mix Flush Valve will be provided for both pumps - Updated Cad File from Flygt can be found on the next sheet



BASE SECTION



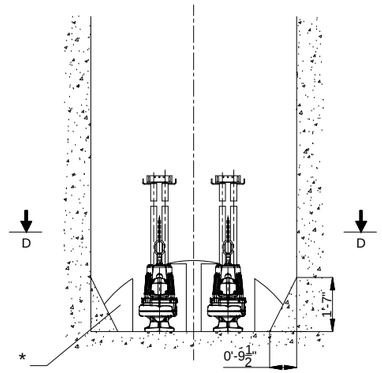
BASE SECTION

ALL DIMENSIONS ARE IN INCHES

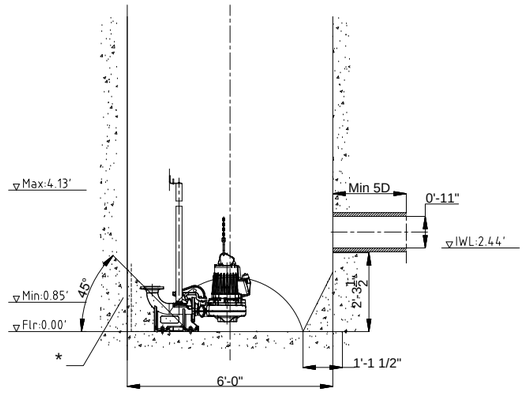
	MODEL	NOM. SIZE	VERSION	A	B	C	D	SIMPLEX S	T	U	V	W	Y	DUPLEX S	T	U	PL	V	W	Y
	FP/NP	3"	SH	2 3/8	9 7/8	8	4	15 1/4	9 1/4	60	17 1/2	26	30	19 3/8	13 3/8	72	8 1/2	26	43	30
***	CP	4"	HT	2 3/4	9 7/8	8	4	13 3/4	7 1/4	60	18 1/2	28	30	17	10 1/2	72	10	28 1/2	48	30
****	CP/NP	4"	HT	2 3/4	9 7/8	8	4	13 3/4	7 1/4	60	18 1/2	28	30	17	10 1/2	72	10	28 1/2	48	30
	DP	4"	MT	2 3/4	9 7/8	8	4	13 3/4	7 1/4	60	10 1/4	29	29	17	10 1/2	72	10	20 1/4	49	29
	CP/NP	4"	MT	2 3/4	9 7/8	8	4	13 3/4	7 1/4	60	16 1/2	26	30	17	10 1/2	72	10	28 1/2	46	30
*	CP/NP	6"	MT	4 3/8	11	10	5	11	3 3/8	60	16 1/4	26	30	13 1/4	5 5/8	72	11	28 1/2	48	30
**	CP/NP	6"	MT	4 3/8	11	10	5	11	3 3/8	60	17 1/2	26 1/2	30	13 1/2	5 7/8	72	11	28 1/2	48 1/2	30
	CP/NP	6"	LT	5 1/2	11	10	5	16	8 3/8	72	11 1/2	26 1/2	32	15 1/4	8 1/4	72	11	22 1/2	48 1/2	32
	CP/NP	8"	MT	5 1/2	11	10	5	14 3/8	5 1/2	72	17 1/2	26 1/2	30	10 1/4	1 3/8	72	11	28 1/2	48 1/2	30
	CP/NP	8"	LT	5 1/2	11	10	5	14 3/8	5 1/2	72	11 1/2	27 1/2	32	10 1/4	1 3/8	72	11	22 1/2	49 1/2	32

* WITH 4" VOLUTE OUTLET
** WITH 6" VOLUTE OUTLET
*** WITH 462 OR 463 IMPELLER
**** WITH 481, 483–485, 487–489 IMPELLER

A-A

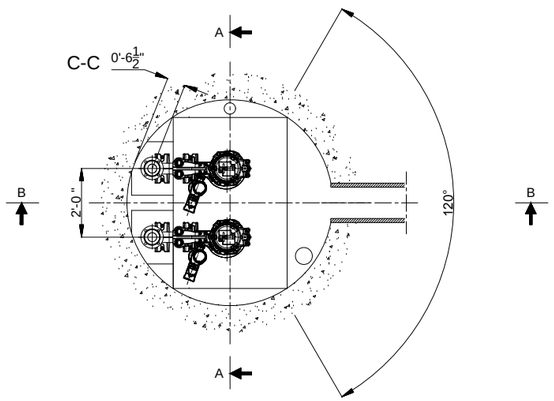


B-B



* If any pump in the sump are to be equipped with a flush valve this benching may need to be modified.
Please contact Flygt for detailed advice.

C-C



Autosump Midrange	
Number of pumps	2
Pump	NP 3127 SH DN 80
Max. flow pump [USgpm]	800
Configuration	Circular sump

Designed by	EA approved by	Draft	Weight	A-class	M-class
Checked by	Date 4/5/2019	Denomination Conceptual drawing		Material	
Drawn/Redrawn by				Blank	
Applicable to				Treatment	
xylem Let's Solve Water				Scale 1/2"=1'	
	Approval	Drawing No Autosump Midrange[2]		Rev	

A1

SECAD™ 5.2.6.5 (5.2) Standard

ATTACHMENT H GRAVITY LINE RATING TABLE

Worksheet for 8" Sewer Main

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.34000	%
Diameter	8.00	in
Discharge	245.00	gal/min

Results

Normal Depth	5.29	in
Flow Area	0.24	ft²
Wetted Perimeter	1.27	ft
Hydraulic Radius	2.32	in
Top Width	0.63	ft
Critical Depth	0.35	ft
Percent Full	66.1	%
Critical Slope	0.00714	ft/ft
Velocity	2.23	ft/s
Velocity Head	0.08	ft
Specific Energy	0.52	ft
Froude Number	0.63	
Maximum Discharge	0.76	ft³/s
Discharge Full	0.70	ft³/s
Slope Full	0.00204	ft/ft
Flow Type	SubCritical	

At the minimum slope of 0.34%, the flow within the pipe is 245 gpm under the PWF condition. The velocity is 2.23 fps and exceeds the minimum velocity required.

GVF Input Data

Downstream Depth	0.00	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	66.12	%
Downstream Velocity	Infinity	ft/s

Worksheet for 8" Sewer Main

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	5.29	in
Critical Depth	0.35	ft
Channel Slope	0.34000	%
Critical Slope	0.00714	ft/ft

Rating Table for 8" Sewer Main

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.013	
Channel Slope	3.50000	%
Normal Depth	8.00	in
Diameter	8.00	in

Channel Slope (%)	Discharge (ft³/s)	Velocity (ft/s)	Flow Area (ft²)	Wetted Perimeter (ft)	Top Width (ft)
0.34000	0.70	2.02	0.35	2.09	0.00
0.39000	0.75	2.16	0.35	2.09	0.00
0.44000	0.80	2.30	0.35	2.09	0.00
0.49000	0.85	2.42	0.35	2.09	0.00
0.54000	0.89	2.54	0.35	2.09	0.00
0.59000	0.93	2.66	0.35	2.09	0.00
0.64000	0.97	2.77	0.35	2.09	0.00
0.69000	1.00	2.88	0.35	2.09	0.00
0.74000	1.04	2.98	0.35	2.09	0.00
0.79000	1.07	3.08	0.35	2.09	0.00
0.84000	1.11	3.17	0.35	2.09	0.00
0.89000	1.14	3.27	0.35	2.09	0.00
0.94000	1.17	3.36	0.35	2.09	0.00
0.99000	1.20	3.44	0.35	2.09	0.00
1.04000	1.23	3.53	0.35	2.09	0.00
1.09000	1.26	3.61	0.35	2.09	0.00
1.14000	1.29	3.70	0.35	2.09	0.00
1.19000	1.32	3.78	0.35	2.09	0.00
1.24000	1.35	3.85	0.35	2.09	0.00
1.29000	1.37	3.93	0.35	2.09	0.00
1.34000	1.40	4.01	0.35	2.09	0.00
1.39000	1.42	4.08	0.35	2.09	0.00
1.44000	1.45	4.15	0.35	2.09	0.00
1.49000	1.47	4.23	0.35	2.09	0.00
1.54000	1.50	4.30	0.35	2.09	0.00

Rating Table for 8" Sewer Main

Input Data

Channel Slope (%)	Discharge (ft³/s)	Velocity (ft/s)	Flow Area (ft²)	Wetted Perimeter (ft)	Top Width (ft)
1.59000	1.52	4.36	0.35	2.09	0.00
1.64000	1.55	4.43	0.35	2.09	0.00
1.69000	1.57	4.50	0.35	2.09	0.00
1.74000	1.59	4.57	0.35	2.09	0.00
1.79000	1.62	4.63	0.35	2.09	0.00
1.84000	1.64	4.70	0.35	2.09	0.00
1.89000	1.66	4.76	0.35	2.09	0.00
1.94000	1.68	4.82	0.35	2.09	0.00
1.99000	1.70	4.88	0.35	2.09	0.00
2.04000	1.73	4.94	0.35	2.09	0.00
2.09000	1.75	5.00	0.35	2.09	0.00
2.14000	1.77	5.06	0.35	2.09	0.00
2.19000	1.79	5.12	0.35	2.09	0.00
2.24000	1.81	5.18	0.35	2.09	0.00
2.29000	1.83	5.24	0.35	2.09	0.00
2.34000	1.85	5.30	0.35	2.09	0.00
2.39000	1.87	5.35	0.35	2.09	0.00
2.44000	1.89	5.41	0.35	2.09	0.00
2.49000	1.91	5.46	0.35	2.09	0.00
2.54000	1.93	5.52	0.35	2.09	0.00
2.59000	1.94	5.57	0.35	2.09	0.00
2.64000	1.96	5.62	0.35	2.09	0.00
2.69000	1.98	5.68	0.35	2.09	0.00
2.74000	2.00	5.73	0.35	2.09	0.00
2.79000	2.02	5.78	0.35	2.09	0.00
2.84000	2.04	5.83	0.35	2.09	0.00
2.89000	2.05	5.88	0.35	2.09	0.00
2.94000	2.07	5.94	0.35	2.09	0.00
2.99000	2.09	5.99	0.35	2.09	0.00
3.04000	2.11	6.04	0.35	2.09	0.00
3.09000	2.12	6.09	0.35	2.09	0.00
3.14000	2.14	6.13	0.35	2.09	0.00
3.19000	2.16	6.18	0.35	2.09	0.00
3.24000	2.18	6.23	0.35	2.09	0.00
3.29000	2.19	6.28	0.35	2.09	0.00
3.34000	2.21	6.33	0.35	2.09	0.00
3.39000	2.22	6.37	0.35	2.09	0.00

Rating Table for 8" Sewer Main

Input Data

Channel Slope (%)	Discharge (ft³/s)	Velocity (ft/s)	Flow Area (ft²)	Wetted Perimeter (ft)	Top Width (ft)
3.44000	2.24	6.42	0.35	2.09	0.00
3.49000	2.26	6.47	0.35	2.09	0.00