January 13, 2025

4801 Southwest Parkway,
Parkway 1, Suite 185
Austin TX 78735
T +1 512.579.3315

Vahab Haghighatian, P.E., P.G., Project Manager
Industrial and Hazardous Waste Permit Section
Waste Permits Division MC-126
Texas Commission on Environmental Quality
P.O. Box 13087
Austin, Texas 78711-3087

Re: Class 3 Permit Modification Technical Notice of Deficiency Letter Response
Shell USA, Inc. – Deer Park, Harris County
Hazardous Waste Permit No. 50099
Industrial Solid Waste Registration No. 30007
EPA Identification No. TXD067285973
Tracking No. 29917021; RN100211879/CN601542012

Dear Mr. Haghighatian:

On behalf of Shell USA, Inc, this letter is to provide responses to the referenced Technical NOD in your letter dated November 14, 2024. Specific to each NOD, our responses are as follows:

NOD T1 – Table III.D.
Response: Waste liquid level, dike, and sign inspection for the East SET Basin has been added to Table III.D and is attached.

NOD T2 – Table IV.B.
Response: Waste No. 6 has been added to Table IV.B and is attached.

NOD T3 – Class 1-1 Permit Modification
Response: A Class 1-1 permit modification request to authorize installation of geotechnical boreholes through the existing cap as part of the of the West ESP Basin has been submitted under West SET cap modification project. The document is dated January 9, 2025 and hard copy of the application was received at the TCEQ on January 10, 2025.

NOD T4 – Section V

T4.1 Provide a stability analysis showing the final cover system for the West SET Basin, as modified, will accommodate settling and subsidence due to the overburden loads so that the cover's integrity is maintained.

Response: The stability analysis is attached and will be incorporated into the revised Section V, 2025 cap modification plan (under revision) and Section VII revised closure plan (under construction).

T4.2 Provide information showing how the stormwater from at least a 25-year, 24-hour rainfall event is collected and removed from the closed West SET Basin.

Response: The proposed stormwater drainage plan with calculations is attached and will be incorporated into the revised Section V, 2025 cap modification plan and Section VII (as appropriate).

T4.3 Each engineering drawing and calculation sheet must be sealed, signed, and dated separately by a Texas licensed Professional Engineer (P.E.) and must also contain the engineering firm registration number (if applicable), as required by the Texas P.E. Board.

Response: The revised drawings are attached and will be incorporated into the revised Section V, 2025 cap modification plan (under revision) and Section VII revised closure plan (under construction).

T4.4 The cover page of the engineering report must be sealed, signed, and dated by a Texas licensed P.E. and must also contain the engineering firm registration number (if applicable), as required by the Texas P.E. Board.

Response: A *Closure Design Certification Statement* signed and sealed by the appropriate Texas Professional Engineer is attached and will be incorporated into the revised Section V, 2025 cap modification plan (under revision) and Section VII revised closure plan (under construction).

T4.5 Per the TCEQ Regional Office NOV, revise the status of East SET Basin.

Response: Table V.D.1.-Surface Impoundments has been revised to change the East Basin unit status from Inactive to Active. This table is also attached.

NODT5 – Section VII Tables VII.B., VII.D., VII.E.1., VII.E.2., and CP Table XI.E.3.

T5.1 Revise the closure plan for the West SET Basin to clearly describe the changes in the existing final cover system resulted from the proposed expansion (i.e., bentonite clay sealing layers, engineered fill, and any other overlying layers supporting the tanks, piping, equipment, etc.). Note these proposed overlying layers are considered a part of the final cover system and must be included in the final cover construction certification, to be sealed, signed, and dated by a Texas licensed P.E., upon construction and after the issuance of the Class 3 permit modification application.

Response: A Closure Plan detailing the 2025 modification with estimated costs is attached. A larger holistic, closure plan which combines the 2025 planned work project work the 2016 closure is under construction. It is understood that a final cover construction certification will be required upon construction and after the issuance of the Class 3 permit modification.

T5.2 Revise the closure plan for the West SET Basin to provide the design drawings (plan and cross-sectional views) for the final cover system that is sealed, signed, and dated by a Texas licensed P.E. as well as the engineering firm registration number (if applicable) required by the Texas P.E. board.

Response: The revised drawings are attached and will be incorporated into the revised Section V, 2025 cap modification plan (under revision) and Section VII revised closure plan (under construction).

T5.3. Revise the closure plan for the West SET Basin to describe procedures for plugging and/or sealing the holes for installation of the piling system.

Response: The requested procedures are attached and can be found within the April 19, 2024 Helical Pile Design and Installation letter from TorcSill. The original design drawing has been sealed by a Texas Professional Engineer and is also attached. The analysis from TorcSill was initially submitted in July 2024 as part of Section V and will also be incorporated into the Section VII 2025 revised closure plan which is currently under construction.

T5.4 Add the additional closure costs for the West SET Basin (labor, material, testing, etc.), based on 2023 dollars, to construct the final cover system, including the subgrade, bentonite, engineered fill, concrete layer, plugging/sealing holes, and QA/QC sampling and analysis, if applicable.

T5.5. In addition to adding the additional closure cost for the West EST Basin, adjust the facility total closure, post-closure, and corrective action financial assurance costs in the current permit from 2021 to 2023 dollars.

Response T5.4 and T5.5 Revised Tables VII.B., VII.D., VII.E.1., VII.E.2., and CP Table XI.E.3 with updated costs are attached. Table VII.1 is footnoted to indicate the original estimated costs for closing the West SET (originally certified as closed on February 13, 2018).

Revised Tables VII.B., VII.D., VII.E.1., VII.E.2., and CP Table XI.E.3 are attached.

NOD T6 – Section VIII Tables VII.B., VII.D., VII.E.1., and VIII.B.

1. Based on the increased closure, post-closure, and corrective action costs, the TCEQ Financial Assurance Section will notify Shell USA, Inc. to update its financial assurance (FA) bond within 60 days of the issuance of the initial draft Class 3 permit modification. IHW Permits Section plans to issue the final draft Class 3 permit modification within 30 days of the initial draft permit modification issuance, therefore, we request that the FA bond be updated within 30 days of the issuance of the initial draft.

2. Provide the Estimated Capital Costs for the proposed expansion project within and over the West SET Basin.
3. In accordance with 30 TAC 305.50(a)(4), the estimated Capital Costs, and the attached guidance, provide Financial Capability information which demonstrates that Shell USA, Inc. has sufficient financial resources to complete the proposed expansion.
4. For additional financial assurance and financial capability requirements, please contact Mr. Mark Stoebner of the TCEQ Financial Assurance Section at [redacted]

Response: Tables VII.B., VII.D., VII.E.1. are attached. Table VIII.B is being addressed separately as per your email of November 6, 2024 directing Shell to work with Mr. Mark Stoebner, TCEQ Financial Assurance Section.

Mr. Vahab Haghighatian
January 13, 2025

If you have any questions regarding this matter, please contact me at the phone number below or Mr. Javier Garza, Shell Chemical LP, 346-518-6304.

Yours sincerely,
for RPS/Tetra Tech

Byron Ellington, CPG, PG (TX, UT)
Principal
[redacted]
D 512.579.3315

Attachments

cc: Javier Garza - [redacted]

Table ID T1

Table III.D.

Table III.D. - Inspection Schedule

acility Unit(s) and Basic Elements	Possible Error, Malfunction, or Deterioration	Frequency of Inspection
Permit Unit 02 - East SET Basin		
Groundwater Monitoring Wells	Visual observation of integrity, missing locks or locking devices, damage to surface casing and/or concrete pad	During sampling (semiannually)
Liquid waste level/Freeboard	Overfilling	1/week and after storms
Dikes/containment devices	Erosion, deterioration or failure	1/week and after storms
Signs	Missing/damaged	1/week and after storms
Permit Unit 03 - Middle SET Basin		
Clay Cap and Crushed Rock	Cap erosion, evidence of cap failure	Every 6 months and after storms
Surveyed Benchmarks	Check benchmarks	Annual
Groundwater Monitoring Wells	Visual observation of integrity	During sampling (semiannually)
Permit Unit 04 - West SET Basin		
Clay Cap and Crushed Rock	Cap erosion, evidence of cap failure	Every 6 months and after storms
Surveyed Benchmarks	Check benchmarks	Annual
Groundwater Monitoring Wells	Visual observation of integrity	During sampling (semiannually)

Table III.D. - Inspection Schedule

Facility Unit(s) and Basic Elements	Possible Error, Malfunction, or Deterioration	Frequency of Inspection
ermit Unit 08 - Phenol 3 Boiler[1]		
Combustion Chamber Temperatures[1]	Not functioning	Daily
Waste Feed Rates[1]	Not functioning	Daily
Intake Air Flow[1]	Not functioning	Daily
Recirculation Gas Flow[1]	Not functioning	Daily
Percent Oxygen[1]	Not functioning	Daily
CO Concentration[1]	Not functioning	Daily
Emergency Waste Feed Cutoff System[1]	Not functioning	Monthly
Process, Transfer and Feed Equipment[1]	Leaks, spills, fugitive emissions, tampering	Daily
Alarm Systems	Not functioning, inadequate volume	Weekly
Intercom/Radio	Not functioning, inadequate volume	Weekly
Emergency Shower/Eyewash	Water flow rate below minimum, poor spray pattern, dirt	Monthly
Fire Extinguishers	Inadequate pressure poor condition	Monthly
Fire Monitors	Water flow inadequate	Quarterly
CO and O2 CEMS Calibration[1]	Not functioning	Daily

[1] The Phenol 3 Boiler is currently inactive. Inspection schedule for this element will be commenced when the unit is reactivated.

Table ID T2

Table IV.B.

Table IV.B. - Wastes Managed In Permitted Units

No.	Waste	EPA Hazardous Waste Numbers	TCEQ Waste Form Codes and Classification Codes
11,	Biosolids	Kl74	0316607H
2'	SET Biosolids	K017,K019,K020,Kl74	0320607H
6	Wastewater, nonhazardous, (from chemical production and amine/water mixture) managed in Permit Unit 02 East SET Basin	N/A	80041021, 80111021
31,	Rock Box Wastewater	K017, K019, K020	8022102H
4,	SET Primary Solids	K017,K019,K020,Kl74	8048503H
5	Phenol Heavy Ends	K022, D001	1702208H

* These wastes were previously managed in permitted units but are no longer managed in them.

Table ID T4

Section V

Table ID T4.1

Section V - Stability Analysis

FUGRO
Fugro USA Land, Inc.
13501 Katy Freeway, Suite 1050
Houston, Texas 77079

Worley
13501 Bay Area Blvd
Pasadena, Texas 77507

January 13, 2025

Fugro Project No.: 04.00261851

Subject: Shell SET Front Ends Project – West Basin & Offsite Areas
Preliminary Settlement Estimate

Mr. Patrick Langley

As per an email by Mr. Langley on December 16, 2024, Fugro was requested to provide preliminary settlement stability estimates of the west basin at the Shell Deer Park site, based on past Fugro projects and experience within the site vicinity. Note that Fugro will be conducting field exploration activities as a part of this current project and will be providing settlement analysis based on actual soil properties encountered. The aim of this document is to provide a broad understanding of the West Basin's clay cover settling concerns and its overall integrity.

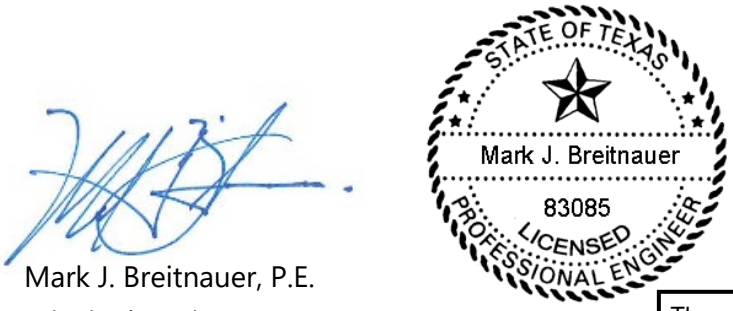
As per Fugro Project No. 04.10120070, there are three process wastewater aeration basins that were covered. Adjacent to the west basin, there exists a middle aeration basin which consists of an open concrete tank structure. It was analyzed that the proposed tank, 300 ft long, 200 ft wide and 25 ft tall, will lead to a total settlement of 8 to 12 inches.

Fugro was also provided with a document 'Shell Deer Park Aeration Tank Monitoring dated June 12, 2021', which contains a survey conducted by Intertek Surveying Services. It provides elevations of various points within the middle basin from the year 2016 and 2021. We utilized this survey data to account for actual total settlements for the initial 5 years and back-calculated the approximate soil properties. Following are the material layers (top to bottom) based on our understanding:

1) Protective Cover Material
2) Low Permeability Clay Cap
3) Structural Fill
4) Stabilized Sludge

Assuming the soil properties remain similar for the west basin, we interpolated the analysis for estimating the settlements for the west basin. We analyzed square mats 2 ft in depth with sizes varying from 6 ft X 6 ft to 30 ft X 30 ft. The total settlements (for the entire lifetime of the structures) for these foundations on the west basin range from 1-inch to 2.5-inches. Based on this preliminary settlement study, we do not anticipate failure of the cover system at the west basin. We strongly recommend referring to our final settlement study which will be conducted post completion of our field exploration program, which is currently scheduled for the week of January 20, 2025.

Regards,



Mark J. Breitnauer, P.E.
Principal Engineer
915-490-5020 | [redacted]

Fugro USA Land, Inc.
Texas Engineering Firm F-299

The seal appearing on this document was authorized by Mark J. Breitnauer, P.E. on 1/13/2025.

Table ID T4.2

Section V - Stormwater Analysis

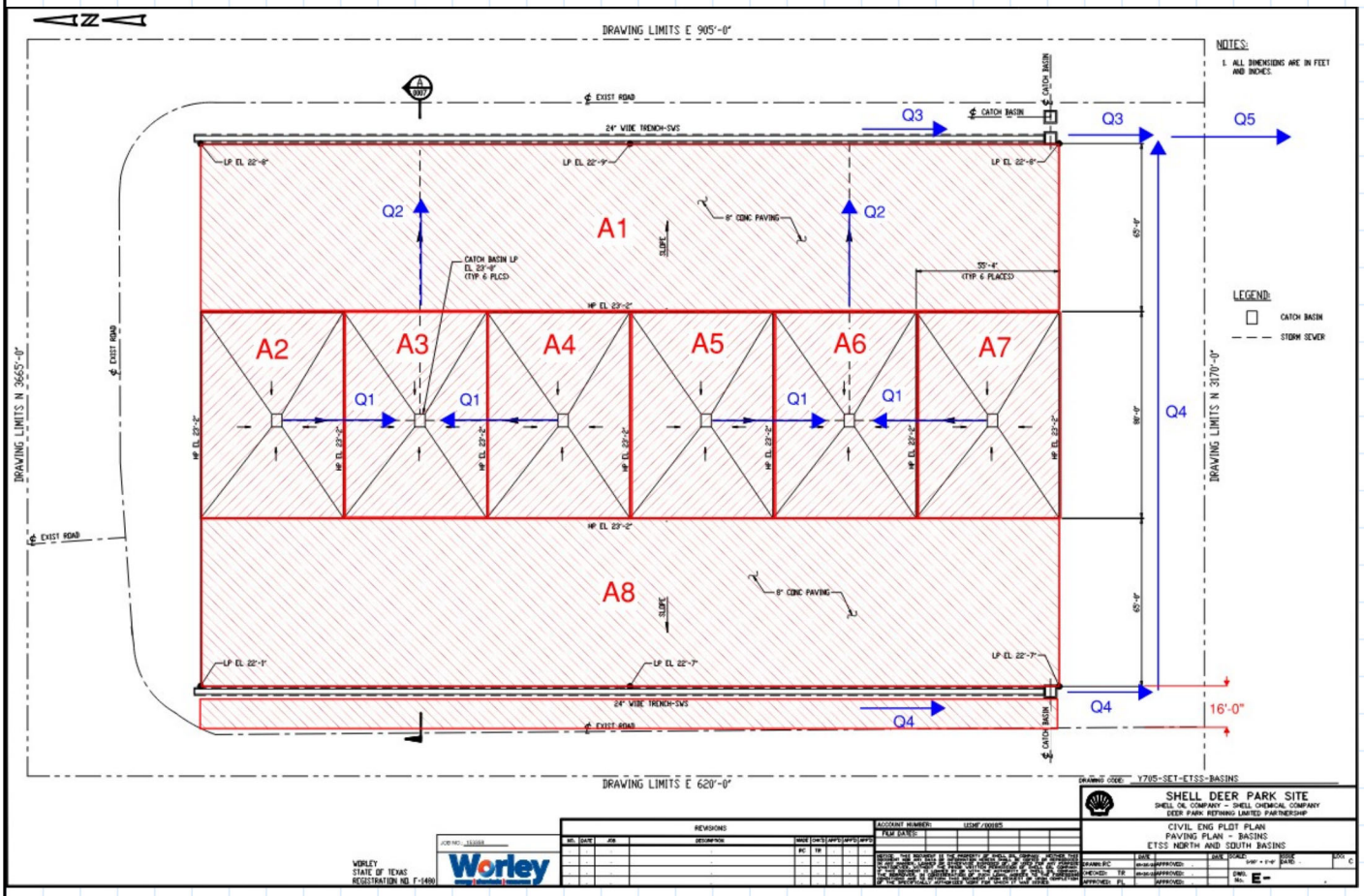
CLIENT NAME: SHELL
PROJECT NAME: SET FRONT END
SUBJECT: SURFACE DRAINAGE DESIGN
REVISION: A
ORIGINATOR: TRAHAN

JOB NO: 153358
CALC. NO: SH-ST-CAL-XXX-XXXX
SHEET {n} of {nn}
DATE: 1/9/25

PRELIMINARY DEFINE PHASE

CALCULATION SHEET

Drainage Area: For 25 Year / 1 Hour Rainfall Event



$$A1 := 65\ ft \cdot (55.333\ ft \cdot 6) = 21579.87\ ft^2$$

$$A2 := 80\ ft \cdot 55.333\ ft = 4426.64\ ft^2$$

$$A3 := 80\ ft \cdot 55.333\ ft = 4426.64\ ft^2$$

$$A4 := 80\ ft \cdot 55.333\ ft = 4426.64\ ft^2$$

$$A5 := 80\ ft \cdot 55.333\ ft = 4426.64\ ft^2$$

$$A6 := 80\ ft \cdot 55.333\ ft = 4426.64\ ft^2$$

$$A7 := 80\ ft \cdot 55.333\ ft = 4426.64\ ft^2$$

$$A8 := (65 + 16)\ ft \cdot (55.333\ ft \cdot 6) = 26891.838\ ft^2$$

STATE OF TEXAS
STANLEY VU NGUYEN
118549
LICENSED PROFESSIONAL ENGINEER
01/13/25

From Shell DEPS:

Q=CiA *Equation 1*

where:

C is a runoff coefficient,

i is the rainfall intensity, and

A is the subcatchment area.

$C := .9$ from TxDOT Hydraulic Design Manual

$i := 4.08 \ \frac{in}{hr}$ from NOAA Atlas 14 Point Precipitation Frequency Estimate 25 yr/60-min intensity for Deer Park, TX, USA

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.498 (0.377-0.658)	0.594 (0.452-0.773)	0.747 (0.568-0.980)	0.878 (0.659-1.17)	1.06 (0.773-1.46)	1.21 (0.856-1.71)	1.36 (0.938-1.97)	1.52 (1.02-2.26)	1.74 (1.13-2.69)	1.92 (1.22-3.03)
10-min	0.788 (0.596-1.04)	0.942 (0.716-1.22)	1.19 (0.903-1.56)	1.40 (1.05-1.86)	1.69 (1.23-2.33)	1.93 (1.37-2.73)	2.17 (1.50-3.15)	2.42 (1.62-3.60)	2.74 (1.78-4.22)	2.99 (1.89-4.73)
15-min	1.01 (0.762-1.33)	1.20 (0.910-1.56)	1.50 (1.14-1.97)	1.76 (1.32-2.34)	2.12 (1.54-2.91)	2.41 (1.70-3.40)	2.70 (1.86-3.92)	3.02 (2.03-4.49)	3.46 (2.24-5.32)	3.80 (2.40-6.00)
30-min	1.45 (1.10-1.92)	1.72 (1.30-2.23)	2.14 (1.62-2.80)	2.49 (1.87-3.32)	2.99 (2.17-4.10)	3.38 (2.39-4.76)	3.79 (2.62-5.50)	4.25 (2.86-6.33)	4.91 (3.19-7.57)	5.45 (3.45-8.61)
60-min	1.91 (1.45-2.52)	2.28 (1.73-2.96)	2.87 (2.18-3.76)	3.37 (2.53-4.49)	4.08 (2.96-5.58)	4.62 (3.27-6.52)	5.22 (3.60-7.57)	5.90 (3.97-8.80)	6.92 (4.50-10.7)	7.77 (4.92-12.3)
2-hr	2.30 (1.75-3.02)	2.86 (2.16-3.64)	3.70 (2.82-4.82)	4.47 (3.37-5.93)	5.60 (4.10-7.68)	6.54 (4.66-9.22)	7.60 (5.26-11.0)	8.79 (5.92-13.0)	10.5 (6.87-16.2)	12.0 (7.64-18.9)
3-hr	2.50 (1.91-3.29)	3.22 (2.40-4.03)	4.24 (3.23-5.49)	5.20 (3.93-6.89)	6.67 (4.90-9.15)	7.94 (5.68-11.2)	9.38 (6.51-13.5)	11.0 (7.42-16.2)	13.4 (8.72-20.5)	15.3 (9.77-24.1)
6-hr	2.88 (2.21-3.77)	3.85 (2.86-4.74)	5.20 (3.97-6.69)	6.52 (4.94-8.59)	8.55 (6.32-11.7)	10.3 (7.44-14.6)	12.4 (8.65-17.8)	14.8 (9.98-21.7)	18.2 (11.9-27.8)	21.1 (13.5-33.0)
12-hr	3.34 (2.57-4.35)	4.54 (3.39-5.56)	6.23 (4.78-7.98)	7.86 (5.99-10.3)	10.4 (7.69-14.1)	12.6 (9.06-17.6)	15.1 (10.6-21.6)	18.1 (12.3-26.6)	22.7 (14.9-34.5)	26.6 (17.0-41.4)
24-hr	3.85 (2.97-4.99)	5.29 (3.96-6.45)	7.34 (5.66-9.36)	9.30 (7.11-12.2)	12.3 (9.14-16.7)	14.9 (10.8-20.8)	18.0 (12.6-25.6)	21.5 (14.7-31.5)	27.0 (17.8-41.0)	31.8 (20.4-49.3)

Surface Runoff Flow Rates:

$Q_{A1} := C \cdot i \cdot A1 = 1.834 \ \frac{ft^3}{s}$

$Q_{A2} := C \cdot i \cdot A2 = 0.376 \ \frac{ft^3}{s}$

$Q_{A3} := C \cdot i \cdot A3 = 0.376 \ \frac{ft^3}{s}$

$Q_{A4} := C \cdot i \cdot A4 = 0.376 \ \frac{ft^3}{s}$

$Q_{A5} := C \cdot i \cdot A5 = 0.376 \ \frac{ft^3}{s}$

$Q_{A6} := C \cdot i \cdot A6 = 0.376 \ \frac{ft^3}{s}$

$Q_{A7} := C \cdot i \cdot A7 = 0.376 \ \frac{ft^3}{s}$

$Q_{A8} := C \cdot i \cdot A8 = 2.286 \ \frac{ft^3}{s}$

Required Pipe Flow Rates:

$$Q1 := Q_{A2} = 0.376 \ \frac{ft^3}{s}$$

$$Q2 := Q1 + Q1 + Q_{A3} = 1.129 \ \frac{ft^3}{s}$$

$$Q3 := Q2 + Q2 + Q_{A1} = 4.092 \ \frac{ft^3}{s}$$

$$Q4 := Q_{A8} = 2.286 \ \frac{ft^3}{s}$$

$$Q5 := Q3 + Q4 = 6.378 \ \frac{ft^3}{s}$$

Stormwater Pipe Design:

From Shell DEPS:

3.5 FLOW VELOCITIES

1. The underground gravity flow drainage piping shall meet the following velocity ranges for the combined total of the rainfall and the continuous dry weather flow:
   a. For AC, CC and ODD piping:
      i. Vmax ≤ 0.9 m/s (3 ft/s) – for design load case Q1 and Q3 (3.2.1);
      ii. Vmin > 0.4 m/s (1.3 ft/s) – for design load case Q1 (3.2.1).
   b. For CR piping – for design load case Q1 (3.2.1)
      i. Vmax ≤ 4 m/s (13 ft/s);
      ii. Vmin > 0.7 m/s (2.3 ft/s).
   c. For DS piping - All load cases
      i. Vmax ≤ 2 m/s (6.56 ft/s);
      ii. Vmin > 0.45 m/s (1.5 ft/s).

From PIP CVC01015:

1. Minimum earth cover shall be at least 1 ft (300 mm) below frost line and not less than the smaller of 3 ft (900 mm) or one nominal pipe diameter below finished grade.

4.10.2.4 Piping design flow depth shall not exceed 2/3 of pipe diameter.

CALCULATION SHEET

Follow File Path to see complete set of Pipe Size and Slope Calculations:

"\\WORLEY.com\US\USSWO\PROJECTS\LAP\Shell\150000-Shell-Alliance\153358-SET Front End\CS\Ethan\Manning-Pipe-Flow Simple Calculation.xlsx"

NOTE: Pipe Sizes are based on 2/3 Full Flow

Pipe Size and Slope Results:

For Q1 Pipes use 6" HDPE pipe at 1% slope

For Q2 Pipes use 10" HDPE Pipe at 1% slope

For Q3 Pipes use 16" HDPE Pipe at 1% slope

For Q4 Pipes use 12" HDPE Pipe at 1% slope

For Q5 Pipes use 20" HDPE Pipe at 0.6% slope

Stormwater Trench Design:

From Shell DEPS:

6.2 CHANNELS AND TRENCHES

1. The cross sectional flow area of channels and trenches shall be determined by hydraulic calculations for the applicable design condition as per the following:
   a. To support maintenance tasks the minimum width of a trench with rectangular cross-section and bottom of a trapezoidal cross section channel shall be at least 300 mm (12 in);
   b. For constructability and maintainability the minimum depth for trenches shall be 150 mm (6 in);
   c. The design at full flow for a trench shall be designed with freeboard of at least 75 mm (3 in) to account for debris in the flow stream;
   d. For constructability the minimal longitudinal slope for trenches and the paved bottom channels shall be 1:300.

CALCULATION SHEET

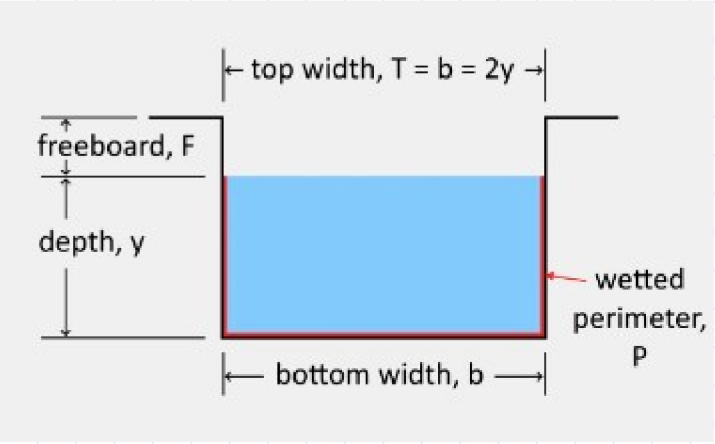
Manning Equation for Open Channel Flow:

General case

$$Q = \frac{\phi}{n} A R_h^{2/3} S_f^{1/2}$$

ϕ = ~~1 (metric)~~ or 1.486 ~~(English)~~

Rectangular Channel:



East Trench Design:

$b := 18\ in$ $F := 3\ in$ $n := .015 \cdot \frac{s}{ft^{\frac{1}{3}}}$ Manning's Roughness coefficient for Concrete-wooden forms

$Depth_{Total} := 18\ in$

$S_f := \frac{1}{300}\ \frac{ft}{ft}$

$y := Depth_{Total} - F = 15\ in$

$A := b \cdot y = 1.875\ ft^2$ $P := b + 2 \cdot y = 4\ ft$

$R_h := \frac{A}{P} = 0.469\ ft$

$$R_h := \frac{A}{P} = 0.469\ ft$$

$$Q_{trench} := \left(\frac{1.486}{n}\right) \cdot A \cdot \left(R_h\right)^{\frac{2}{3}} \cdot \left(S_f\right)^{\frac{1}{2}} = 6.471\ \frac{ft^3}{s}$$

$$V_{trench} := \frac{Q_{trench}}{A} = 3.451\ \frac{ft}{s}$$

$$\begin{aligned} &\text{if } Q_{trench} > Q4 \\ &\quad \| \text{“OK”} \\ &\text{else if } Q_{trench} < Q4 \\ &\quad \| \text{“N.G.”} \end{aligned} \Bigg| = \text{“OK”}$$

$$\begin{aligned} &\text{if } 3\ \frac{ft}{s} < V_{trench} < 13\ \frac{ft}{s} \\ &\quad \| \text{“OK”} \\ &\text{else if } 3\ \frac{ft}{s} > V_{trench} > 13\ \frac{ft}{s} \\ &\quad \| \text{“N.G.”} \end{aligned} \Bigg| = \text{“OK”}$$

Trench Design Results:

Use a Rectangular Concrete Trench with a bottom width of 18" and a 18" MINIMUM Total Depth at downstream exit of channel.

Use a slope of 0.33%

CALCULATION SHEET

$$Q_{trench} := \left(\frac{1.486}{n}\right) \cdot A \cdot (R_h)^{\frac{2}{3}} \cdot (S_f)^{\frac{1}{2}} = 6.471 \ \frac{ft^3}{s}$$

$$V_{trench} := \frac{Q_{trench}}{A} = 3.451 \ \frac{ft}{s}$$

$$\begin{cases} \text{if } Q_{trench} > Q3 \\ \quad \| \text{“OK”} \\ \text{else if } Q_{trench} < Q3 \\ \quad \| \text{“N.G.”} \end{cases} = \text{“OK”}$$

$$\begin{cases} \text{if } 3 \ \frac{ft}{s} < V_{trench} < 13 \ \frac{ft}{s} \\ \quad \| \text{“OK”} \\ \text{else if } 3 \ \frac{ft}{s} > V_{trench} > 13 \ \frac{ft}{s} \\ \quad \| \text{“N.G.”} \end{cases} = \text{“OK”}$$

West Trench Design:

$b := 18 \ in$ $F := 3 \ in$ $n := .015 \cdot \frac{s}{ft^{\frac{1}{3}}}$ Manning's Roughness coefficient for Concrete-wooden forms

$Depth_{Total} := 18 \ in$

$S_f := \frac{1}{300} \ \frac{ft}{ft}$

$y := Depth_{Total} - F = 15 \ in$

$A := b \cdot y = 1.875 \ ft^2$ $P := b + 2 \cdot y = 4 \ ft$

Table ID T4.3

Section V - Engineering Drawings

DRAWING LIMITS N 910'-0"

DRAWING LIMITS N 3635'-0"

DRAWING LIMITS N 3225'-0"

DRAWING LIMITS E 625'-0"

END OF TRENCH N 3600'-6"

TRENCH & CATCH BASIN E 863'-9"

NEW TRENCH DRAIN

℄ EXIST ROAD

℄ CATCH BASIN & MANHOLES E 875'-0"

EDGE OF ROAD

24' WIDE TRENCH-SWS (NOTE 2)

℄ MANHOLE N 3338'-1"

℄ MANHOLE N 3295'-8"

14" HDPE

℄ DRAIN N 3295'-8"

℄ CATCH BASIN N 3269'-6"

℄ MANHOLE N 3239'-1"

℄ DRAIN

M A I N T E N A N C E R O A D

HVAC PLATFORM

SUBSTATION BLDG

8" HDPE

DRAIN E 840'-8"

T-13152 NEUTRALIZER TANK 1

DRAIN N 3248'-9"

24" CISP - CP

P I P E R A C K

CARBON

OLEFINS OIL/WATER API SEPARATOR 1

OLEFINS OIL/WATER API SEPARATOR 2

OLEFINS OIL/WATER API SEPARATOR 3

℄ CATCH BASIN N 3395'-1"

T-13150 OXY PRIMARY CLARIFIER #1

℄ DRAIN E 793'-11"

T-13153 NEUTRALIZER TANK 2

COAGULANT

ANALYZER SHELTER

CATCH BASIN E 779'-3"

8" HDPE

T-13151 OXY PRIMARY CLARIFIER #2

T-13154 NEUTRALIZER TANK 3

CATCH BASIN N 3297'-9"

4" CISP (TYP)

EDGE OF ROAD

℄ EXIST ROAD

8" HDPE

UG PIPE DRAIN LINE (TYP)

E 757'-3"

CATCH BASIN N 3568'-7"

CATCH BASIN N 3517'-2"

CATCH BASIN N 3457'-10"

API SLUDGE PUMPS

CLARIFIER PUMPS

CATCH BASIN N 3335'-1"

℄ MANHOLE E 728'-4"

4" CISP

TRANSFER PUMPS

T-13158 OIL RECOVERY TANK

MOTORS

℄ DRAIN E 706'-9"

4" CISP (TYP)

T-13159 OLEFINS TRANSFER TANK

(E) PREFAB ROAD CROSSING TRENCH

24" CISP

P I P E R A C K

BASIN CONC PAVING ON FILL

BOTTOM OF (E) CONC CONTAINMENT AREA

NEW TRENCH DRAIN (TYP)

T-13163 ACID TANK

T-13162 ACID TANK

PUMPS

PUMPS

T-13161 CAUSTIC TANK

T-13160 CAUSTIC TANK

DRAIN HUB (TYP)

MANHOLE N 3246'-3"

TRENCH, PIPE & CATCH BASIN E 655'-9"

℄ E 660'-2"

8" HDPE

8" HDPE

8" HDPE

12"ø HDPE-CS

12"ø HDPE-CS

CATCH BASIN (TYP)

EDGE OF ROAD

℄ EXIST ROAD

END OF TRENCH N 3600'-6"

℄ CATCH BASIN N 3423'-6"

℄ CATCH BASIN N 3378'-6"

℄ CATCH BASIN N 3333'-6"

A DSK-0003

℄ CATCH BASIN N 3269'-6"

℄ MANHOLE N 3234'-0"

THIS DWG

KEY PLAN

NOTES:

1. (E) DENOTES EXISTING.

REFERENCE DRAWINGS:

SDPMCP-00185-CS-DSK-0002	WEST BASIN PAVING PLAN
SDPMCP-00185-CS-DSK-0003	WEST BASIN CROSS SECTION
SDPMCP-00185-CS-DSK-0004	WEST BASIN PILE CAP FILL DETAILS

LEGEND:

○ PILE

ISSUED FOR DESIGN

DRAWING CODE: Y705-SET-ETSS-BASINS

STATE OF TEXAS
STANLEY VU NGUYEN
118549
LICENSED PROFESSIONAL ENGINEER
01/13/25

WORLEY
STATE OF TEXAS
REGISTRATION NO. F-1480

JOB NO.: 153358

worley
DELIVERING SUSTAINABLE CHANGE

REVISIONS

NO.	DATE	JOB	DESCRIPTION	MADE	CHK'D	APP'D	APP'D	APP'D
A	04/24	00185	ISSUED FOR TCEQ - PERMITTING	RC	TR	PL	.	.
B	01/25	00185	UPDATED FOR TCEQ - PERMITTING	RC	TR	PL	.	.
.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.

ACCOUNT NUMBER: USMF/00185
FILM DATES:

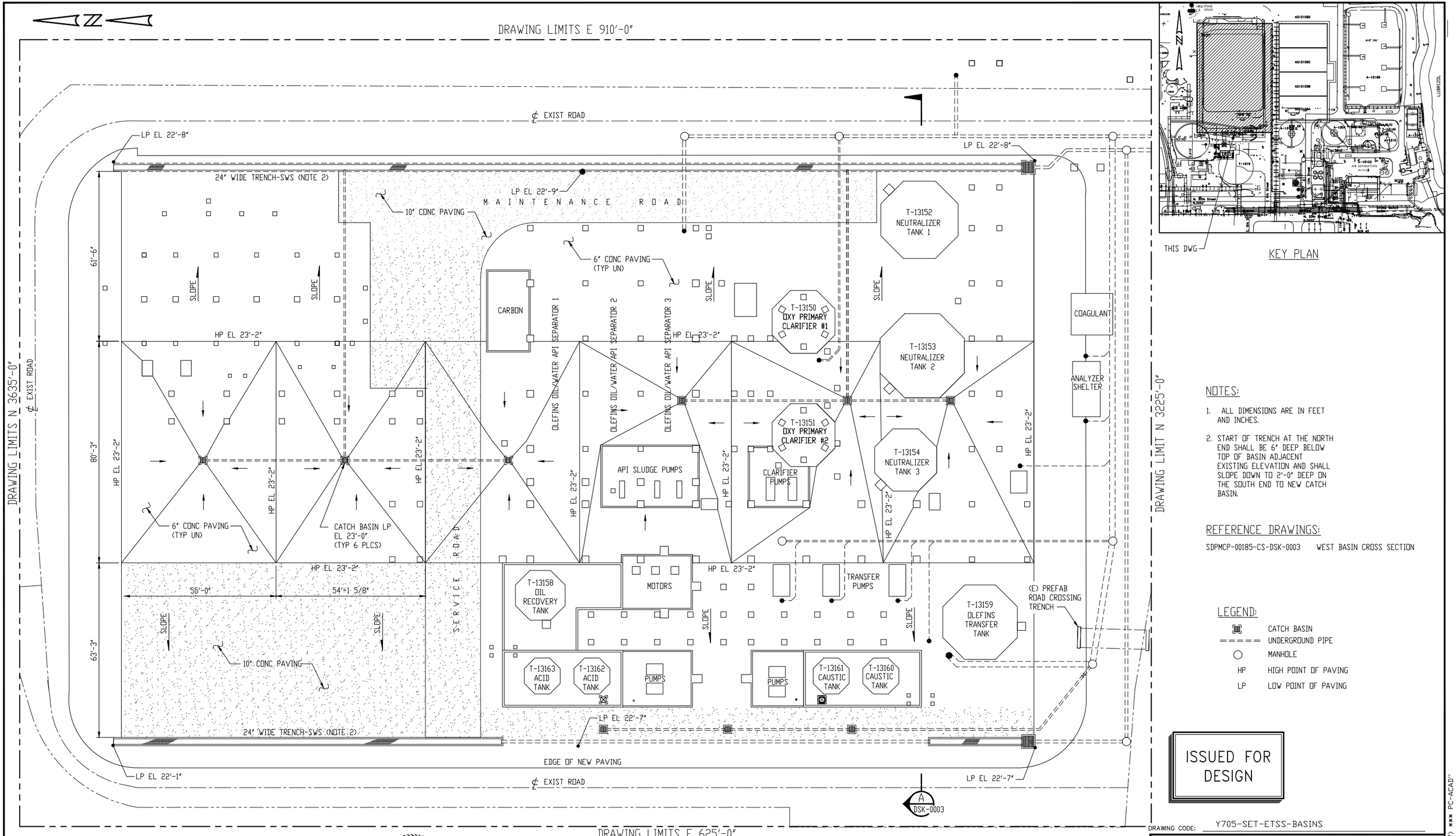
SHELL DEER PARK SITE
SHELL OIL COMPANY – SHELL CHEMICAL COMPANY
DEER PARK REFINING LIMITED PARTNERSHIP

CIVIL ENG PLOT PLAN
WEST BASIN FOUNDATION AND PILE LOCATION PLAN - BASINS
ETSS NORTH AND SOUTH BASINS

		DATE			DATE	SCALE:	ISSUE	LOG:
DRAWN:	RC	03/27/24	APPROVED:	.	.	1/16" = 1'-0"	DATE: .	C
CHECKED:	TR	04/25/24	APPROVED:	.	.	DWG. No. E- .		
APPROVED:	.	.	APPROVED:	.	.			

"11-RACK PRINT (11 x 17) ***** PC-ACAD"

SDPMCP-00185-CS-DSK-0001-B



KEY PLAN

NOTES:

1. ALL DIMENSIONS ARE IN FEET AND INCHES.
2. START OF TRENCH AT THE NORTH END SHALL BE 6' DEEP BELOW TOP OF BASIN ADJACENT EXISTING ELEVATION AND SHALL SLOPE DOWN TO 2'-0" DEEP ON THE SOUTH END TO NEW CATCH BASIN.

REFERENCE DRAWINGS:

SDPMCP-00185-CS-DSK-0003 WEST BASIN CROSS SECTION

LEGEND:

- CATCH BASIN
- UNDERGROUND PIPE
- MANHOLE
- HP HIGH POINT OF PAVING
- LP LOW POINT OF PAVING

ISSUED FOR DESIGN

DRAWING CODE: Y705-SET-ETSS-BASINS

STATE OF TEXAS
STANLEY VU NGUYEN
118549
LICENSED PROFESSIONAL ENGINEER
01/13/25

WORLEY
STATE OF TEXAS
REGISTRATION NO. F-1480

JOB NO.: 153358

worley
DELIVERING SUSTAINABLE CHANGE

REVISIONS								
NO.	DATE	JOB	DESCRIPTION	MADE	CHK'D	APP'D	APP'D	APP'D
A	04/24	00185	ISSUED FOR TCEQ - PERMITTING	RC	TR	PL	.	.
B	01/25	00185	UPDATED FOR TCEQ - PERMITTING	RC	TR	PL	.	.
.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.

ACCOUNT NUMBER: USMF/00185
FILM DATES:

SHELL DEER PARK SITE
SHELL OIL COMPANY – SHELL CHEMICAL COMPANY
DEER PARK REFINING LIMITED PARTNERSHIP

CIVIL ENG PLOT PLAN
WEST BASIN PAVING PLAN - BASINS
ETSS NORTH AND SOUTH BASINS

		DATE			DATE	SCALE:	ISSUE	LOC:
DRAWN:	RC	03/26/24	APPROVED:	.	.	1/16" = 1'-0"	DATE: .	C
CHECKED:	TR	04/05/24	APPROVED:	.	.	DWG. No. E- .		
APPROVED:	.	.	APPROVED:	.	.			

\\1-RACK PRINT (11 x 17) *** PC-ACAD"

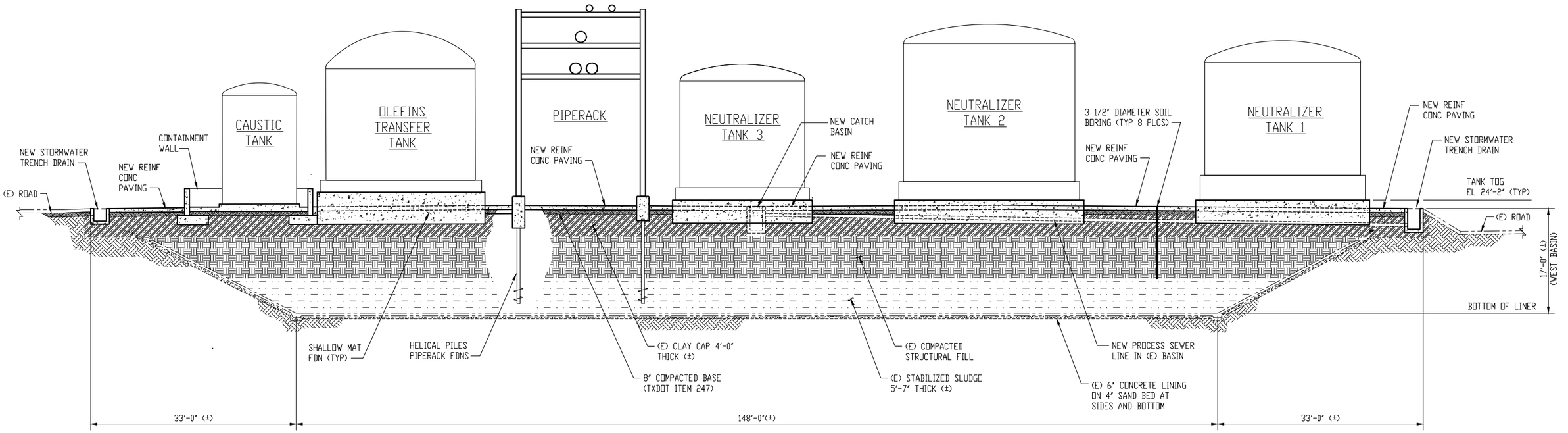
SDPMCP-00185-CS-DSK-0002-B

NOTES:

1. FOR NOTES AND REFERENCE DRAWINGS SEE DRAWING SDPMCP-00185-CS-DSK-0001.
2. (E) DENOTES EXISTING.
3. ALL EQUIPMENT SHOWN IS NEW.

REFERENCE DRAWING:

SDPMCP-00185-CS-DSK-0001	WEST BASIN FOUNDATION AND PILE LOCATION PLAN



CROSS SECTION OF WEST BASIN (A DSK-0001)
(LOOKING NORTH)

ISSUED FOR DESIGN

STATE OF TEXAS
STANLEY VU NGUYEN
118549
LICENSED PROFESSIONAL ENGINEER
01/13/25

WORLEY
STATE OF TEXAS
REGISTRATION NO. F-1480

JOB NO.: 153358

worley
DELIVERING SUSTAINABLE CHANGE

REVISIONS								
NO.	DATE	JOB	DESCRIPTION	MADE	CHK'D	APP'D	APP'D	APP'D
A	04/24	00185	ISSUE FOR TCEQ - PERMITTING	RC	TR	PL	.	.
B	01/25	00185	UPDATED FOR TCEQ - PERMITTING	RC	TR	PL	.	.
.	.	.	.	.	.	.	.	.

ACCOUNT NUMBER: USMF/00185
FILM DATES:

DRAWING CODE: Y705-SET-ETSS-BASINS

SHELL DEER PARK SITE
SHELL OIL COMPANY – SHELL CHEMICAL COMPANY
DEER PARK REFINING LIMITED PARTNERSHIP

CIVIL ENG DETAIL DRAWING
WEST BASIN CROSS SECTION - BASINS
ETSS NORTH AND SOUTH BASINS

		DATE		DATE	SCALE:	ISSUE DATE: .	LOC:
DRAWN: RC		03/28/24	APPROVED: .	.	1/8" = 1'-0"		C
CHECKED: TR		04/04/24	APPROVED: .	.	DWG. No. E-		
APPROVED: PL		.	APPROVED: .				

"I-RACK PRINT (11 x 17) *** PC-ACAD"

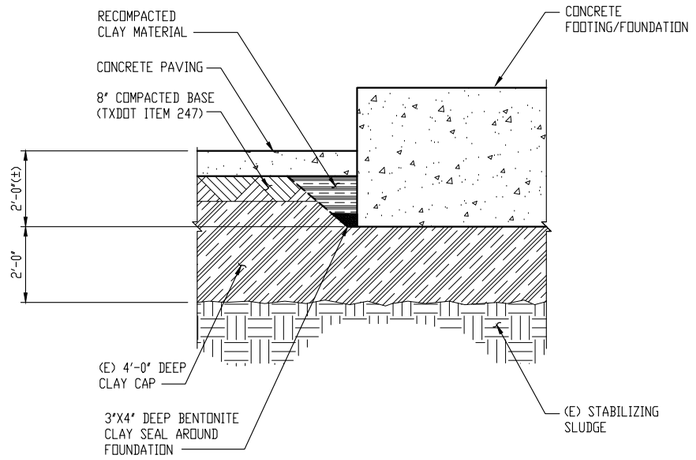
SDPMCP-00185-CS-DSK-0003-B

NOTES:

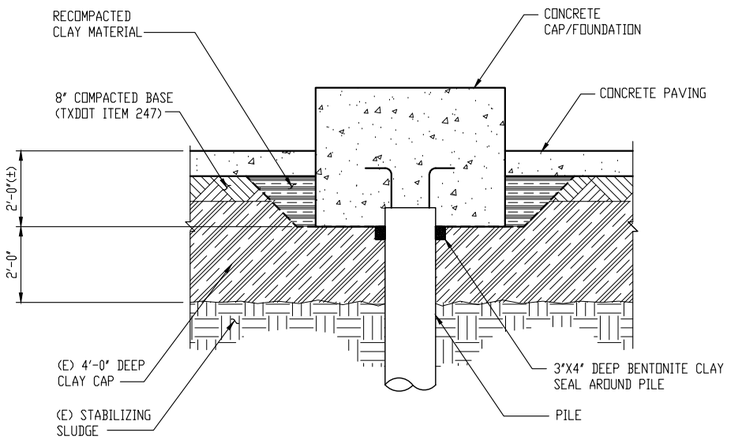
1. FOR NOTES AND REFERENCE DRAWINGS SEE DRAWING SDPMCP-00185-CS-DSK-0001.
2. (E) DENOTES EXISTING.

REFERENCE DRAWING:

SDPMCP-00185-CS-DSK-0001	WEST BASIN FOUNDATION AND PILE LOCATION PLAN



TYPICAL FOUNDATION FILL DETAIL



TYPICAL PILE CAP FILL DETAIL

ISSUED FOR DESIGN

STATE OF TEXAS
STANLEY VU NGUYEN
118549
LICENSED PROFESSIONAL ENGINEER
01/13/25

WORLEY
STATE OF TEXAS
REGISTRATION NO. F-1480

JOB NO.: 153358

worley
DELIVERING SUSTAINABLE CHANGE

REVISIONS								
NO.	DATE	JOB	DESCRIPTION	MADE	CHK'D	APP'D	APP'D	APP'D
A	04/24	00185	ISSUE FOR TCEQ - PERMITTING	RC	TR	PL	.	.
B	01/25	00185	UPDATED FOR TCEQ - PERMITTING	RC	TR	PL	.	.
.	.	.	.	.	.	.	.	.

ACCOUNT NUMBER: USMF/00185
FILM DATES:

DRAWING CODE: Y705-SET-ETSS-BASINS

SHELL DEER PARK SITE
SHELL OIL COMPANY – SHELL CHEMICAL COMPANY
DEER PARK REFINING LIMITED PARTNERSHIP

CIVIL ENG DETAIL DRAWING
WEST BASIN PILE CAP FILL DETAIL - BASINS
ETSS NORTH AND SOUTH BASINS

		DATE		DATE	SCALE:	ISSUE DATE:	LOC:
DRAWN:	RC	04/01/24	APPROVED: .	.	1/2"=1'-0"	.	C
CHECKED:	TR	04/05/24	APPROVED: .	.	DWG. No. E-	.	
APPROVED:		.	APPROVED: .	.			

T-PACK PRINT 03 x 17 ### PC-ACAD"

SDPMCP-00185-CS-DSK-0004-B

Table ID T4.4

Section V - Engineering Certification

Shell/Worley Parsons – West SET Basin Closure Design Certification Statement to TCEQ

Certification Statement

Upon completion of review of the Class 3 Modification Application Permit and Compliance Plan No. 50099, and the *2025 West SET Front End Upgrade Conceptual Cap Modification Plan, West South Effluent Treater (SET) Basin*, dated June 2024; and the associated Conceptual Design documentation, including the foundation plan and foundation design prepared by Worley, with professional engineering recommendations from Fugro USA Land, Inc,, and TorcSill, I, Stanley Nguyen, have affirmed that the preliminary Modification Plan and Design for the Project have been developed to allow for the modification to be completed such that the existing closure cap will maintain its intended design function.

The modification design is such that if constructed in accordance with project and design specifications, the existing cap will: remain intact, be structurally stable, maintain allowable settlements for the equipment and structures planned, maintain appropriate grades. The cap and subgrade will not have detrimental settlement or fail under bearing pressures per geotechnical consultant Fugro; and it's intended original approved design *(Closure Certification Report, West South Effluent Treater Basin, December 2017, approved by TCEQ on February 13, 2019)* will not be compromised and will not allow for additional infiltration or any potential releases of waste due to the modification, above the original approved design. Furthermore, the design will not compromise the integrity of the waste containment as originally designed.

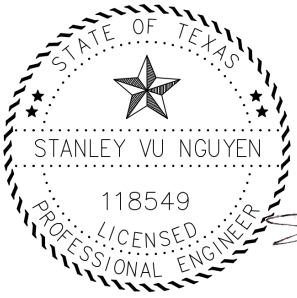
This certification does not attest to the overall integrity of the original West SET Basin waste containment, containment cap, or previous containment or cap construction, which has been evaluated by Others' previously. This statement does not attest to the longevity of the original containment system or closure cap for operation for the life of the facility.

Stanley V. Nguyen P.E.
Principal Civil/Structural Engineer

Texas Registration No. 118549

Texas Firm No. F-1480

Date: 01/13/2025



01/13/25

Table ID T4.5

Section V - Table V.D.1.- Surface Impoundments

Table V.D.1. - Surface Impoundments

Permit Unit No.	Surface Impoundment	N.O.R. No.	Waste Nos.[1]	Rated Capacity	Dimensions[2]	Distance from lowest liner to groundwater	Action Leakage Rate of (if Required)	Unit will manage Ignitable, Reactive, Incompatible, or F20, FO21, FO22, FO23, F026, and F027 Waste (state all that apply)	Unit Status
2	Activated Sludge Biotreater (SET) East Basin[3]	38	4	4.1 MM gals	Length=342' Width=192' Depth=16.5	7'	Not Required	NA	Active
3	Activated Sludge Biotreater (SET)Middle Basin	39	4	4.1 MM gals	Length=342' Width=192' Depth=16.5	7'	Not Required	NA	Closed as Landfill
4	Activated Sludge Biotreater (SET)West Basin	40	4	4.1 MM gals	Length=342' Width=192' Depth=16.5	7'	Not Required	NA	Closed as Landfill

1from Table IV.B, first column

2Dimensions should be provided as average length, width and depth, also include the surface acreage for the unit

3Unit is under delay of closure and currently manages only non-hazardous waste; the unit is subject to closure as a hazardous waste management unit.

Table ID T5

Section VII

Table ID T5.1

Section VII - Revised Closure Plan

Closure Plan for the West SET Basin

The following describes the closure plan for the installation of the new SET facility and to maintain the stability and seal of the SET West Basin:

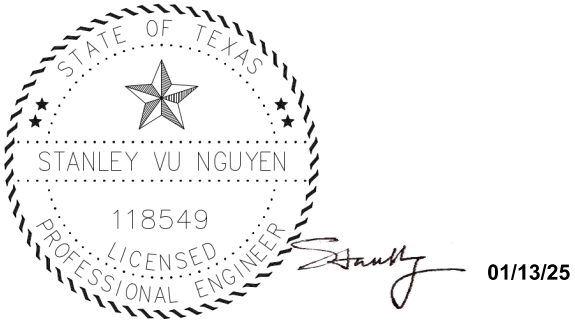
- The existing 6-inch fiber reinforced concrete cover of the West Basin shall be removed and replaced with 8 inches of compacted limestone subbase (TXDOT Item 247) under a reinforced concrete slab varying in thickness from 6 to 10 inches to cap and protect the clay seal layer.
- A new stormwater drainage system shall be installed consisting of catch basins with underground drain lines in the center section of the West Basin and trenches at the edges of the basin to provide conveyance of the surface stormwater runoff from the SET West Basin area into the stormwater system.
- Where foundations are required to support equipment, up to 2 feet of the clay seal will be removed and be replaced with a concrete foundation.
- A bentonite clay seal shall be installed around the perimeter of the foundation to seal the foundation and prevent migration of liquids through the clay seal (see drawing SDPMCP-00185-CS-DSK-0004)
- Where the installation of piles is required to support pipe racks and structures, a helical pile will be installed.
- The depth of the installed helical piles shall be such that they shall not compromise the concrete bottom of the West Basin.
- All installed helical piles shall be encased in a concrete cap (pedestal).
- A bentonite clay seal shall be installed around the perimeter of the top of the pile to seal around the pile preventing migration of liquids through the clay seal (see drawing SDPMCP-00185-CS-DSK-0004).

For details see drawings SDPMCP-00185-CS-DSK-0001 thru 0004

Direct Installation Cost

Remove Existing 6” Fiber Reinforced Slab	$182,500
Concrete Paving and Limestone Subbase	$2,839,000
New Stormwater Drainage System	$277,000
New Concrete Foundations	$2,524,000
Bentonite Clay Seal For Foundations	$40,000
Helical Piles	$714,000
Bentonite Clay Seal For Helical Piles	$4,000
Concrete Caps For Helical Piles	$114,000
Sub Total	**$6,694,500**
Contingency (10%)	**$669,450**
Total	**$7,363,950**

Stanley V. Nguyen P.E.
Principal Civil/Structural Engineer
5995 Rogerdale Road, Houston TX 77072 USA



01/13/25

Table ID T5.2

Section VII - Engineering Drawings

DRAWING LIMITS N 910'-0"

DRAWING LIMITS N 3635'-0"

DRAWING LIMITS N 3225'-0"

DRAWING LIMITS E 625'-0"

END OF TRENCH N 3600'-6"

TRENCH & CATCH BASIN E 863'-9"

NEW TRENCH DRAIN

℄ EXIST ROAD

℄ CATCH BASIN & MANHOLES E 875'-0"

EDGE OF ROAD

24' WIDE TRENCH-SWS (NOTE 2)

℄ MANHOLE N 3338'-1"

℄ MANHOLE N 3295'-8"

14" HDPE

℄ DRAIN N 3295'-8"

℄ CATCH BASIN N 3269'-6"

℄ MANHOLE N 3239'-1"

℄ DRAIN

M A I N T E N A N C E R O A D

HVAC PLATFORM

SUBSTATION BLDG

8" HDPE

DRAIN E 840'-8"

T-13152 NEUTRALIZER TANK 1

DRAIN N 3248'-9"

24" CISP - CP

P I P E R A C K

CARBON

OLEFINS OIL/WATER API SEPARATOR 1

OLEFINS OIL/WATER API SEPARATOR 2

OLEFINS OIL/WATER API SEPARATOR 3

℄ CATCH BASIN N 3395'-1"

T-13150 OXY PRIMARY CLARIFIER #1

℄ DRAIN E 793'-11"

T-13153 NEUTRALIZER TANK 2

COAGULANT

ANALYZER SHELTER

CATCH BASIN E 779'-3"

8" HDPE

T-13151 OXY PRIMARY CLARIFIER #2

T-13154 NEUTRALIZER TANK 3

CATCH BASIN N 3297'-9"

4" CISP (TYP)

EDGE OF ROAD

℄ EXIST ROAD

8" HDPE

UG PIPE DRAIN LINE (TYP)

E 757'-3"

CATCH BASIN N 3568'-7"

CATCH BASIN N 3517'-2"

CATCH BASIN N 3457'-10"

API SLUDGE PUMPS

CLARIFIER PUMPS

CATCH BASIN N 3335'-1"

℄ MANHOLE E 728'-4"

4" CISP

TRANSFER PUMPS

T-13158 OIL RECOVERY TANK

MOTORS

℄ DRAIN E 706'-9"

4" CISP (TYP)

T-13159 OLEFINS TRANSFER TANK

(E) PREFAB ROAD CROSSING TRENCH

24" CISP

P I P E R A C K

BASIN CONC PAVING ON FILL

BOTTOM OF (E) CONC CONTAINMENT AREA

NEW TRENCH DRAIN (TYP)

T-13163 ACID TANK

T-13162 ACID TANK

PUMPS

PUMPS

T-13161 CAUSTIC TANK

T-13160 CAUSTIC TANK

DRAIN HUB (TYP)

MANHOLE N 3246'-3"

TRENCH, PIPE & CATCH BASIN E 655'-9"

℄ E 660'-2"

8" HDPE

8" HDPE

8" HDPE

12"ø HDPE-CS

12"ø HDPE-CS

CATCH BASIN (TYP)

EDGE OF ROAD

℄ EXIST ROAD

END OF TRENCH N 3600'-6"

℄ CATCH BASIN N 3423'-6"

℄ CATCH BASIN N 3378'-6"

℄ CATCH BASIN N 3333'-6"

A DSK-0003

℄ CATCH BASIN N 3269'-6"

℄ MANHOLE N 3234'-0"

THIS DWG

KEY PLAN

NOTES:

1. (E) DENOTES EXISTING.

REFERENCE DRAWINGS:

SDPMCP-00185-CS-DSK-0002	WEST BASIN PAVING PLAN
SDPMCP-00185-CS-DSK-0003	WEST BASIN CROSS SECTION
SDPMCP-00185-CS-DSK-0004	WEST BASIN PILE CAP FILL DETAILS

LEGEND:

○ PILE

ISSUED FOR DESIGN

DRAWING CODE: Y705-SET-ETSS-BASINS

STATE OF TEXAS
STANLEY VU NGUYEN
118549
LICENSED PROFESSIONAL ENGINEER
01/13/25

WORLEY
STATE OF TEXAS
REGISTRATION NO. F-1480

JOB NO.: 153358

worley
DELIVERING SUSTAINABLE CHANGE

REVISIONS

NO.	DATE	JOB	DESCRIPTION	MADE	CHK'D	APP'D	APP'D	APP'D
A	04/24	00185	ISSUED FOR TCEQ - PERMITTING	RC	TR	PL	.	.
B	01/25	00185	UPDATED FOR TCEQ - PERMITTING	RC	TR	PL	.	.
.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.

ACCOUNT NUMBER: USMF/00185
FILM DATES:

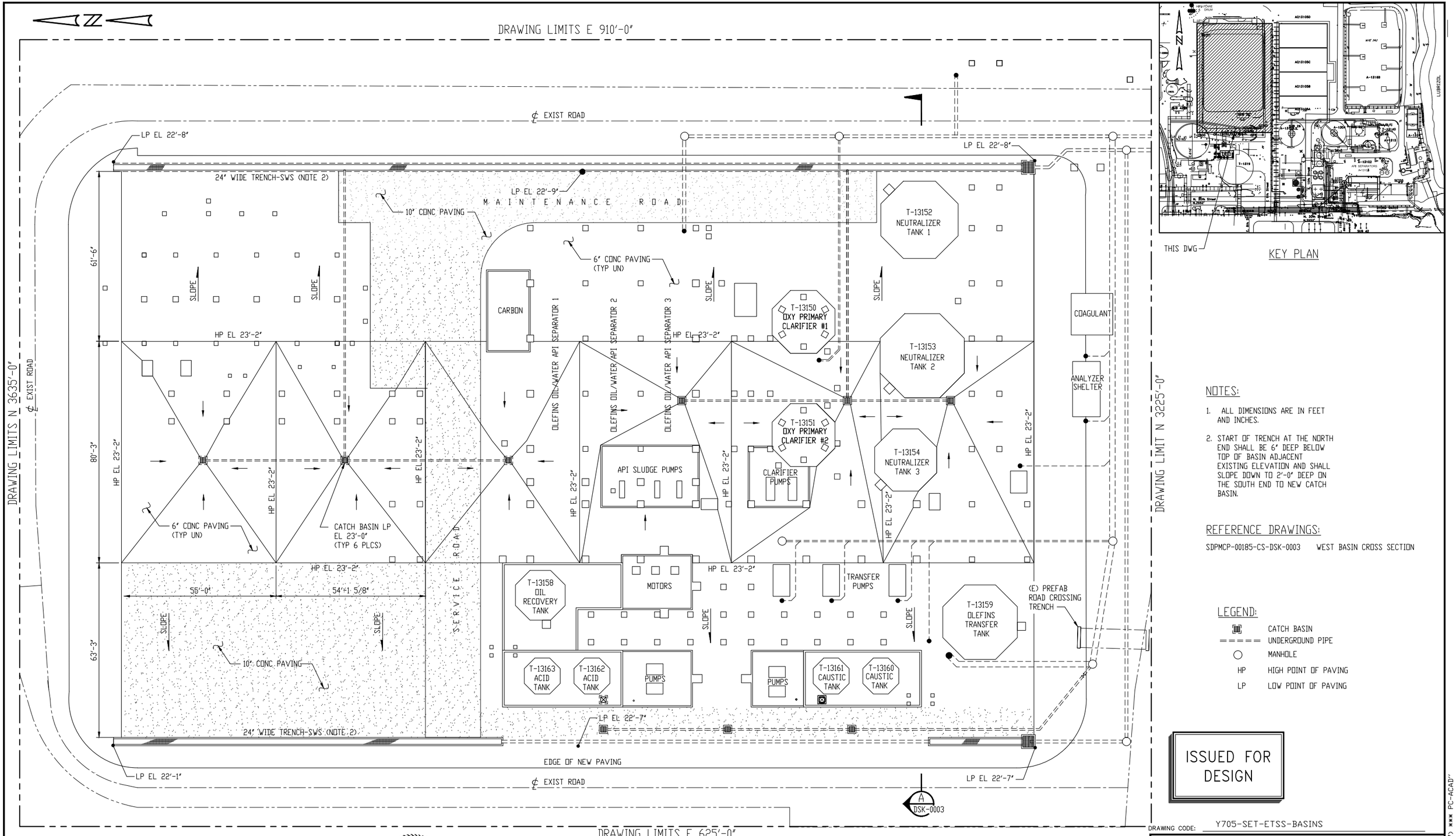
SHELL DEER PARK SITE
SHELL OIL COMPANY – SHELL CHEMICAL COMPANY
DEER PARK REFINING LIMITED PARTNERSHIP

CIVIL ENG PLOT PLAN
WEST BASIN FOUNDATION AND PILE LOCATION PLAN - BASINS
ETSS NORTH AND SOUTH BASINS

		DATE			DATE	SCALE:	ISSUE	LOG:
DRAWN:	RC	03/27/24	APPROVED:	.	.	1/16" = 1'-0"	DATE: .	C
CHECKED:	TR	04/25/24	APPROVED:	.	.	DWG. No. E- .		
APPROVED:	.	.	APPROVED:	.	.			

"11-RACK PRINT (11 x 17) ***** PC-ACAD"

SDPMCP-00185-CS-DSK-0001-B



KEY PLAN

NOTES:

1. ALL DIMENSIONS ARE IN FEET AND INCHES.
2. START OF TRENCH AT THE NORTH END SHALL BE 6' DEEP BELOW TOP OF BASIN ADJACENT EXISTING ELEVATION AND SHALL SLOPE DOWN TO 2'-0" DEEP ON THE SOUTH END TO NEW CATCH BASIN.

REFERENCE DRAWINGS:

SDPMCP-00185-CS-DSK-0003 WEST BASIN CROSS SECTION

LEGEND:

- CATCH BASIN
- UNDERGROUND PIPE
- MANHOLE
- HP HIGH POINT OF PAVING
- LP LOW POINT OF PAVING

ISSUED FOR DESIGN

DRAWING CODE: Y705-SET-ETSS-BASINS

STATE OF TEXAS
STANLEY VU NGUYEN
118549
LICENSED PROFESSIONAL ENGINEER
01/13/25

WORLEY
STATE OF TEXAS
REGISTRATION NO. F-1480

JOB NO.: 153358

worley
DELIVERING SUSTAINABLE CHANGE

REVISIONS								
NO.	DATE	JOB	DESCRIPTION	MADE	CHK'D	APP'D	APP'D	APP'D
A	04/24	00185	ISSUED FOR TCEQ - PERMITTING	RC	TR	PL	.	.
B	01/25	00185	UPDATED FOR TCEQ - PERMITTING	RC	TR	PL	.	.
.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.

ACCOUNT NUMBER: USMF/00185
FILM DATES:

SHELL DEER PARK SITE
SHELL OIL COMPANY – SHELL CHEMICAL COMPANY
DEER PARK REFINING LIMITED PARTNERSHIP

CIVIL ENG PLOT PLAN
WEST BASIN PAVING PLAN - BASINS
ETSS NORTH AND SOUTH BASINS

		DATE			DATE	SCALE:	ISSUE	LOC:
DRAWN:	RC	03/26/24	APPROVED:	.	.	1/16" = 1'-0"	DATE: .	C
CHECKED:	TR	04/05/24	APPROVED:	.	.	DWG. No. E- .		
APPROVED:	.	.	APPROVED:	.	.			

\\1-RACK PRINT (11 x 17) *** PC-ACAD"

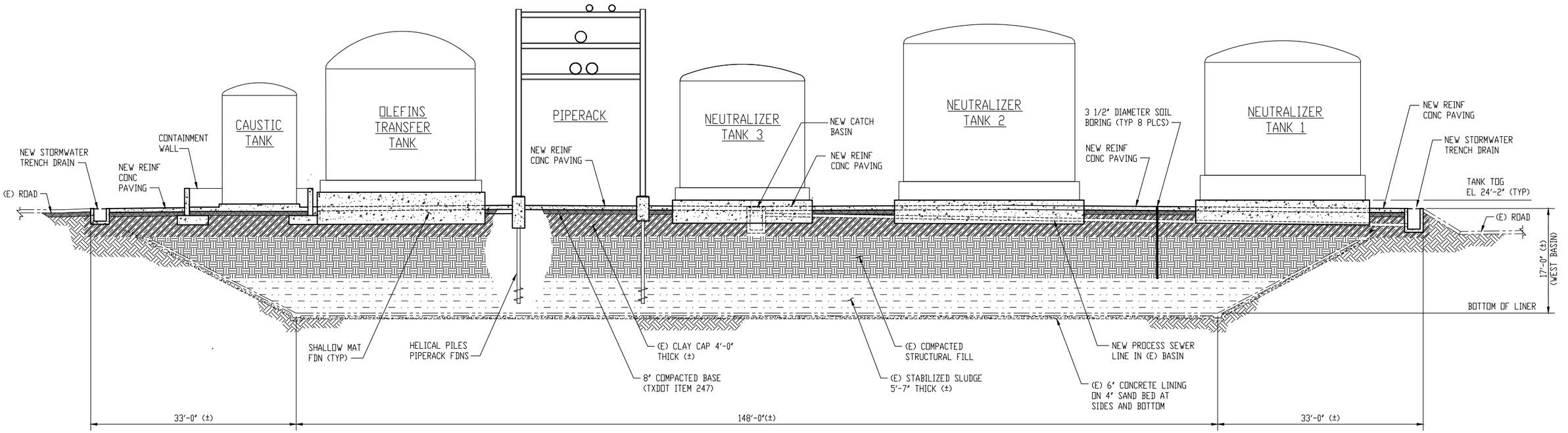
SDPMCP-00185-CS-DSK-0002-B

NOTES:

1. FOR NOTES AND REFERENCE DRAWINGS SEE DRAWING SDPMCP-00185-CS-DSK-0001.
2. (E) DENOTES EXISTING.
3. ALL EQUIPMENT SHOWN IS NEW.

REFERENCE DRAWING:

SDPMCP-00185-CS-DSK-0001	WEST BASIN FOUNDATION AND PILE LOCATION PLAN



CROSS SECTION OF WEST BASIN (A DSK-0001)
(LOOKING NORTH)

ISSUED FOR DESIGN

STATE OF TEXAS
STANLEY VU NGUYEN
118549
LICENSED PROFESSIONAL ENGINEER
01/13/25

WORLEY
STATE OF TEXAS
REGISTRATION NO. F-1480

JOB NO.: 153358

worley
DELIVERING SUSTAINABLE CHANGE

REVISIONS								
NO.	DATE	JOB	DESCRIPTION	MADE	CHK'D	APP'D	APP'D	APP'D
A	04/24	00185	ISSUE FOR TCEQ - PERMITTING	RC	TR	PL	.	.
B	01/25	00185	UPDATED FOR TCEQ - PERMITTING	RC	TR	PL	.	.
.	.	.	.	.	.	.	.	.

ACCOUNT NUMBER: USMF/00185
FILM DATES:

DRAWING CODE: Y705-SET-ETSS-BASINS

SHELL DEER PARK SITE
SHELL OIL COMPANY – SHELL CHEMICAL COMPANY
DEER PARK REFINING LIMITED PARTNERSHIP

CIVIL ENG DETAIL DRAWING
WEST BASIN CROSS SECTION - BASINS
ETSS NORTH AND SOUTH BASINS

		DATE		DATE	SCALE:	ISSUE DATE: .	LOC:
DRAWN: RC		03/28/24	APPROVED: .	.	1/8" = 1'-0"		C
CHECKED: TR		04/04/24	APPROVED: .	.	DWG. No. E-		
APPROVED: PL		.	APPROVED: .				

"I-RACK PRINT (11 x 17) *** PC-ACAD"

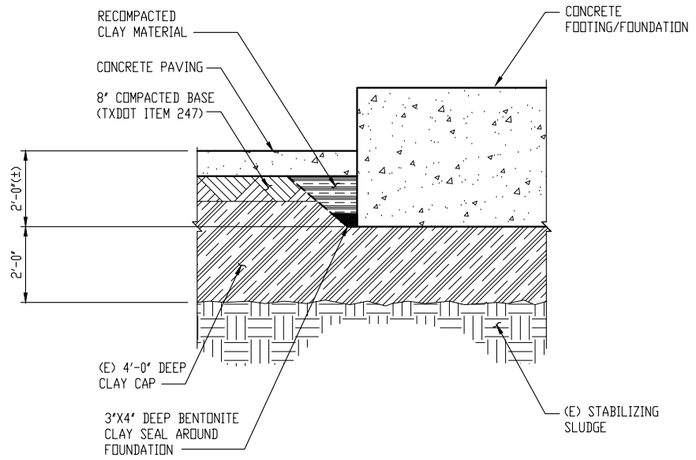
SDPMCP-00185-CS-DSK-0003-B

NOTES:

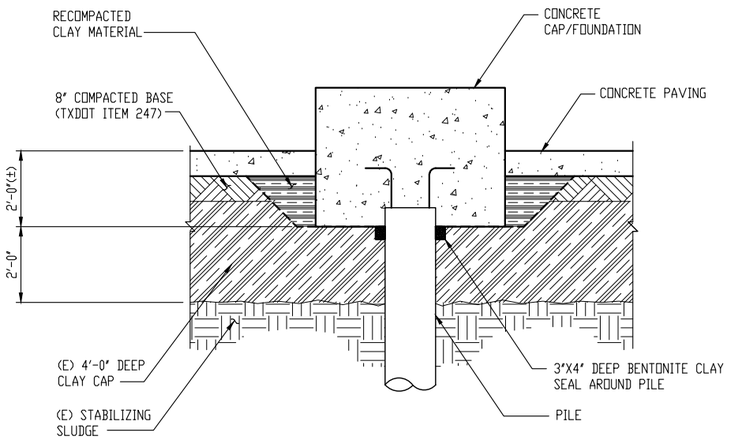
1. FOR NOTES AND REFERENCE DRAWINGS SEE DRAWING SDPMCP-00185-CS-DSK-0001.
2. (E) DENOTES EXISTING.

REFERENCE DRAWING:

SDPMCP-00185-CS-DSK-0001	WEST BASIN FOUNDATION AND PILE LOCATION PLAN



TYPICAL FOUNDATION FILL DETAIL



TYPICAL PILE CAP FILL DETAIL

ISSUED FOR DESIGN

STATE OF TEXAS
STANLEY VU NGUYEN
118549
LICENSED PROFESSIONAL ENGINEER
01/13/25

WORLEY
STATE OF TEXAS
REGISTRATION NO. F-1480

JOB NO.: 153358

worley
DELIVERING SUSTAINABLE CHANGE

REVISIONS								
NO.	DATE	JOB	DESCRIPTION	MADE	CHK'D	APP'D	APP'D	APP'D
A	04/24	00185	ISSUE FOR TCEQ - PERMITTING	RC	TR	PL	.	.
B	01/25	00185	UPDATED FOR TCEQ - PERMITTING	RC	TR	PL	.	.
.	.	.	.	.	.	.	.	.

ACCOUNT NUMBER: USMF/00185
FILM DATES:

DRAWING CODE: Y705-SET-ETSS-BASINS

SHELL DEER PARK SITE
SHELL OIL COMPANY – SHELL CHEMICAL COMPANY
DEER PARK REFINING LIMITED PARTNERSHIP

CIVIL ENG DETAIL DRAWING
WEST BASIN PILE CAP FILL DETAIL - BASINS
ETSS NORTH AND SOUTH BASINS

		DATE		DATE	SCALE:	ISSUE DATE:	LOC:
DRAWN:	RC	04/01/24	APPROVED: .	.	1/2"=1'-0"	.	C
CHECKED:	TR	04/05/24	APPROVED: .	.	DWG. No. E-	.	
APPROVED:		.	APPROVED: .	.			

T-PACK PRINT 03 x 17 ### PC-ACAD"

SDPMCP-00185-CS-DSK-0004-B

Table ID T5.3

Section VII-Procedures for Plugging Sealing Piling System.

Shell
Shell Set Front Ends
Deer Park, TX

April 19, 2024

SUBJECT: Helical Pile Design and Installation
Acknowledgment of Design Requirements

TorcSill Project No: GULF230077

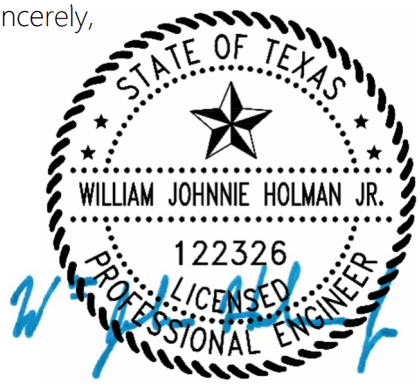
The purpose of this letter is to confirm that the helical piles specified for this project shall be designed in accordance with the information provided in Geotechnical Report 203021-REP1 Version 1 by Fugro dated February 2022. Only end bearing shall be considered in the calculation of axial capacity and shall correspond with the Ultimate axial curves provided in Plates 3 thru 7 (attached).

We understand the lateral loads placed on the helical piles are designed to minimize the lateral motion to prevent side pressures on the top clay and concrete liner of the closed basin. To ensure that water does not vertically make its way into the closed basin by following any annular voids on the edge of the piles, hydrated granular bentonite, followed by compacted clay will be utilized where the concrete and clay cap is penetrated. Lastly, a concrete cap that further restricts surface water from approaching the annular space around each pile will be installed. Please see the attached detail provided to TorcSill for further information.

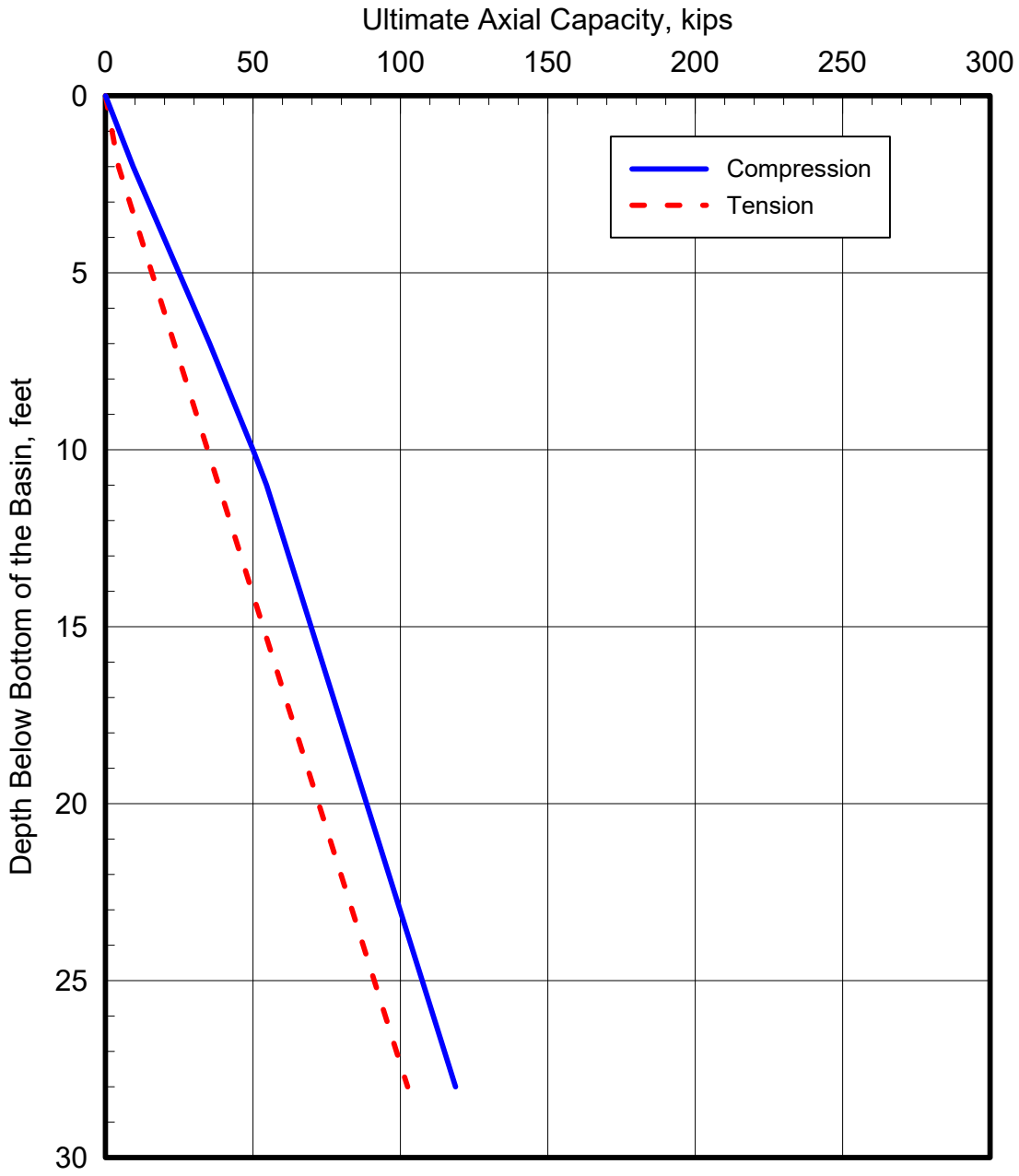
TorcSill's operations and design teams understand that helical piles shall not be permitted to penetrate the concrete bottom of the basin. Helical piles shall not be designed nor installed deeper than 15 ft (or 2 ft above the concrete liner) in the stabilized sludge.

Please do not hesitate to contact us if we can be of further assistance on this project.

Sincerely,



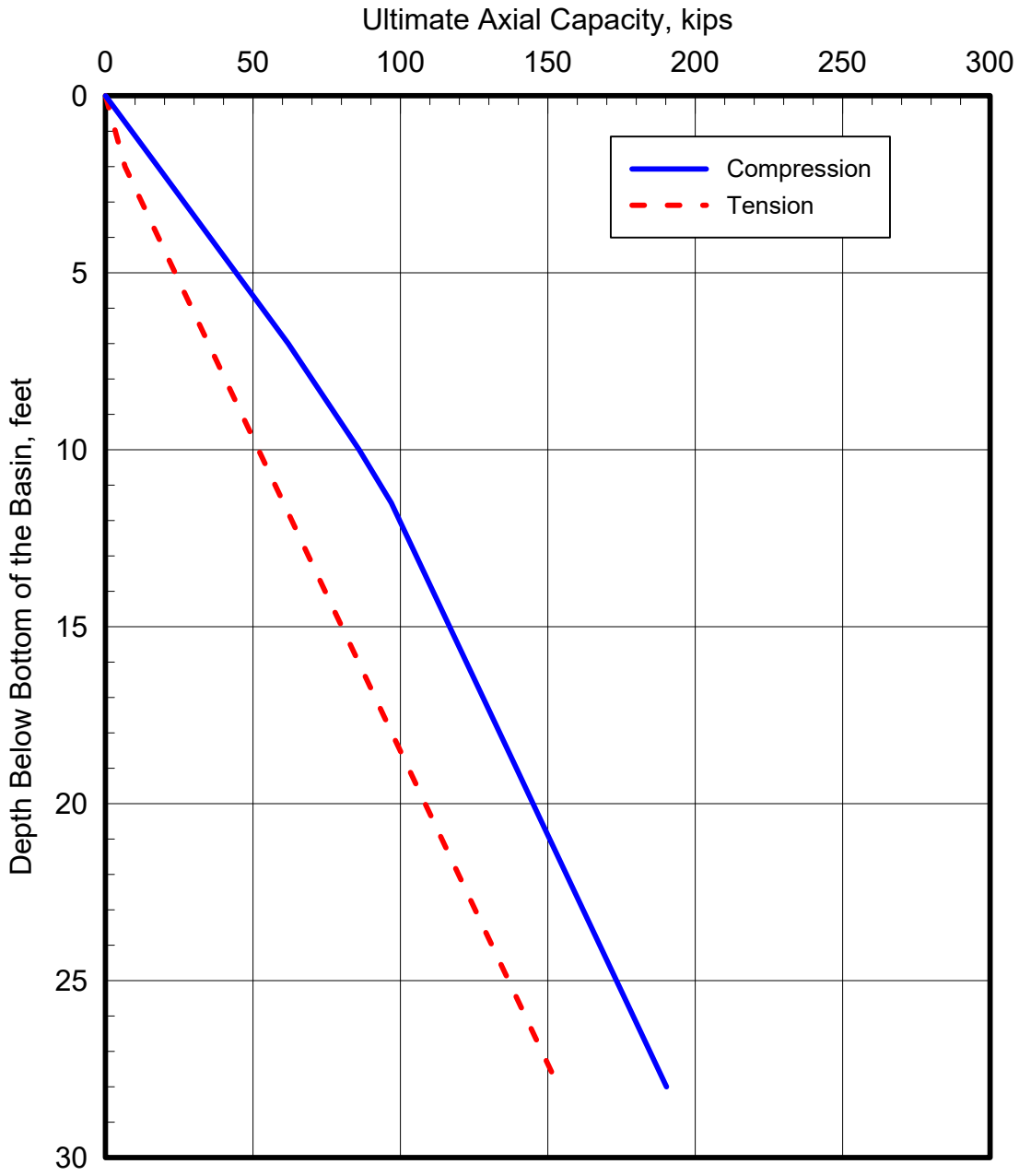
Wm. John Holman Jr., M.S., P.E.
Vice President of Engineering
TorcSill Foundations, LLC



Notes:

1. The bottom of the basin is assumed to be 18 feet below the existing ground surface.
2. The piles are assumed to be permanently cased through the closure material and axial capacity has been neglected in the closure material.
3. These curves represent the ultimate value for compression and tension. Factors of safety for compressive and tensile loading are discussed in the report.
4. The ultimate axial compressive capacity curve includes 50 percent of the end bearing capacity.
5. The capacity curves are for a single isolated pile. Group effects are discussed in the report.
6. See report for additional information when using this capacity curve.

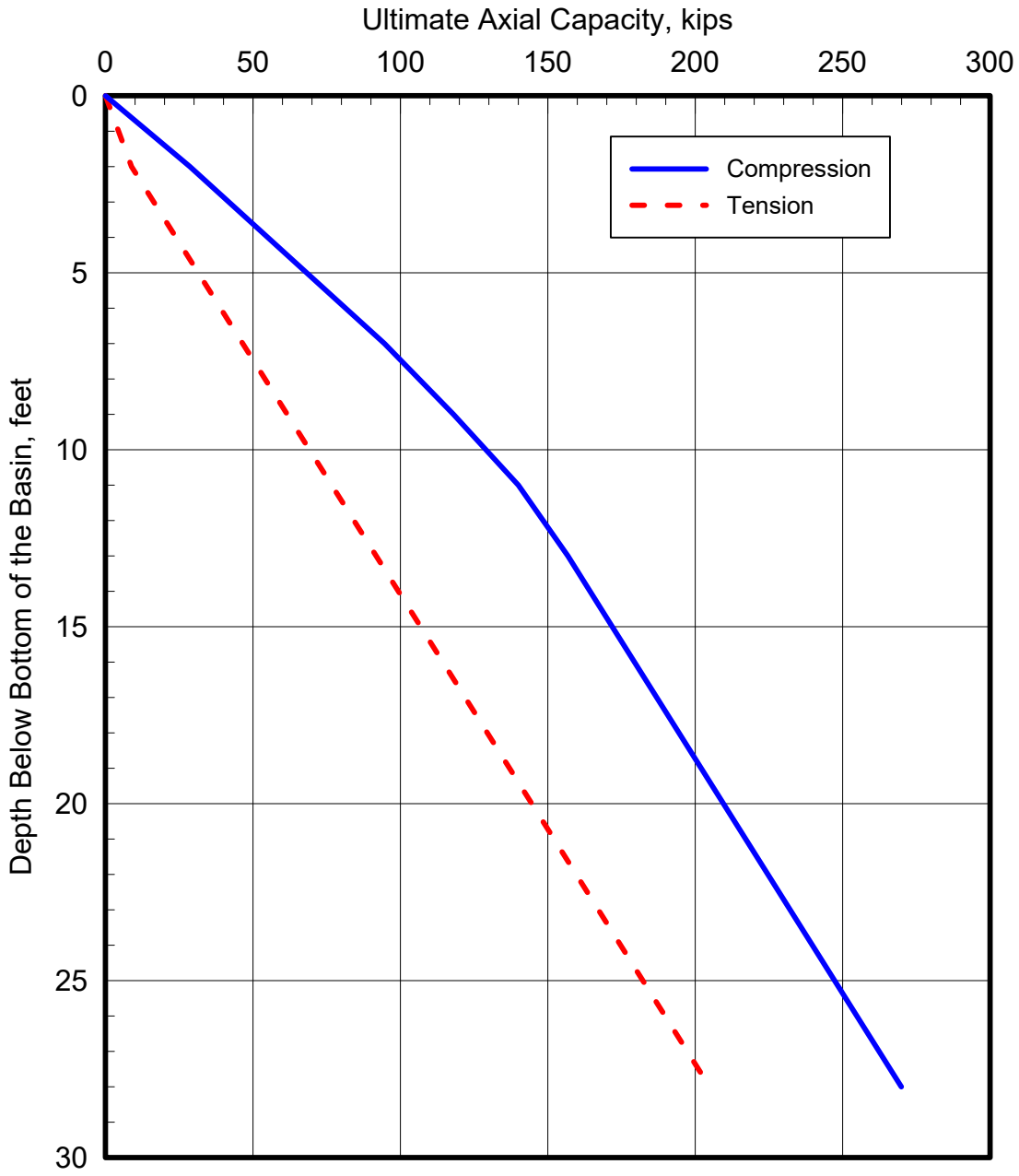
ULTIMATE AXIAL CAPACITY CURVES -- 12-INCH-DIAMETER DRILLED DISPLACEMENT PILE
SET FRONT ENDS UPGRADE PROJECT
SHELL DEER PARK CHEMICAL
DEER PARK, TEXAS



Notes:

1. The bottom of the basin is assumed to be 18 feet below the existing ground surface.
2. The piles are assumed to be permanently cased through the closure material and axial capacity has been neglected in the closure material.
3. These curves represent the ultimate value for compression and tension. Factors of safety for compressive and tensile loading are discussed in the report.
4. The ultimate axial compressive capacity curve includes 50 percent of the end bearing capacity.
5. The capacity curves are for a single isolated pile. Group effects are discussed in the report.
6. See report for additional information when using this capacity curve.

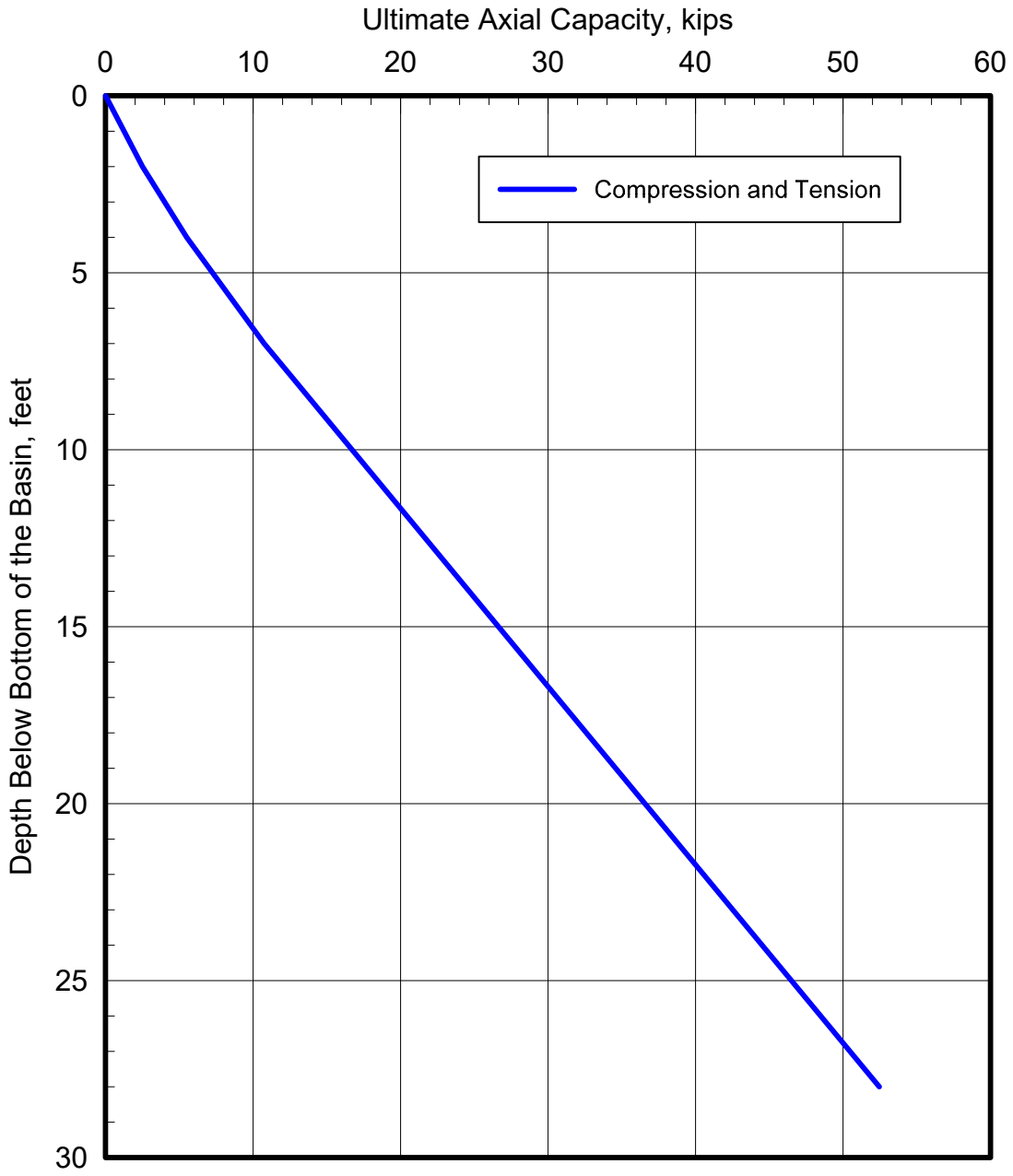
ULTIMATE AXIAL CAPACITY CURVES -- 18-INCH-DIAMETER DRILLED DISPLACEMENT PILE
SET FRONT ENDS UPGRADE PROJECT
SHELL DEER PARK CHEMICAL
DEER PARK, TEXAS



Notes:

1. The bottom of the basin is assumed to be 18 feet below the existing ground surface.
2. The piles are assumed to be permanently cased through the closure material and axial capacity has been neglected in the closure material.
3. These curves represent the ultimate value for compression and tension. Factors of safety for compressive and tensile loading are discussed in the report.
4. The ultimate axial compressive capacity curve includes 50 percent of the end bearing capacity.
5. The capacity curves are for a single isolated pile. Group effects are discussed in the report.
6. See report for additional information when using this capacity curve.

ULTIMATE AXIAL CAPACITY CURVES -- 24-INCH-DIAMETER DRILLED DISPLACEMENT PILE
SET FRONT ENDS UPGRADE PROJECT
SHELL DEER PARK CHEMICAL
DEER PARK, TEXAS



Notes:

1. The bottom of the basin is assumed to be 18 feet below the existing ground surface.
2. The piles are assumed to be permanently cased through the closure material and axial capacity has been neglected in the closure material.
3. This curve represents the ultimate value for compression and tension. Factors of safety for compressive and tensile loading are discussed in the report.
4. The capacity curve is for a single isolated pile. Group effects are discussed in the report.
5. See report for additional information when using this capacity curve.
6. To obtain the ultimate axial capacity for a different diameter pile, the curve should be scaled by a value of d/6, where d is the design diameter, in inches, of the micropile.

ULTIMATE AXIAL CAPACITY CURVES -- 6-INCH-DIAMETER MICROPILE
SET FRONT ENDS UPGRADE PROJECT
SHELL DEER PARK CHEMICAL
DEER PARK, TEXAS

PLATE 6

Recommended Soil Type and Model	Depth		Total Unit Weight,γ	Undrained Shear Strength, Su	Friction Angle, ϕ	Static Stiffness, k	ε 50
	(feet)		(pcf)	(psf)		(psi/in)	(in/in)
Stiff Clay w Free Water (Reese) (Clay Cap)	Top	0.0	126	1000	_	100	0.01
	Bot	4.0	126	1000	_	100	0.01
Stiff Clay w Free Water (Reese) (Structural Fill)	Top	4.0	133	1000	_	100	0.01
	Bot	12.0	133	1000	_	100	0.01
Stiff Clay w Free Water (Reese) (Stabilized Sludge)	Top	12.0	115	1800	_	500	0.007
	Bot	16.0	115	1800	_	500	0.007
Stiff Clay w Free Water (Reese) (Stabilized Sludge)	Top	16.0	110	300	_	30	0.02
	Bot	17.5	110	300	_	30	0.02
Concrete Liner	Top	17.5					
	Bot	18.0					
Stiff Clay w Free Water (Reese)	Top	18.0	125	700	_	100	0.01
	Bot	20.0	125	700	_	100	0.01
Stiff Clay w Free Water (Reese)	Top	20.0	128	1700	_	500	0.007
	Bot	25.0	128	1700	_	500	0.007
Stiff Clay w Free Water (Reese)	Top	25.0	128	2300	_	1000	0.005
	Bot	50.0	128	2300	_	1000	0.005

Notes

1. Depth is referenced from existing grade defined as the top of the clay cap, assumed to be about 4-foot-thick.
2. Soil type corresponds to LPILE soil layer models.
3. Groundwater level is assumed at the ground surface.
4. Static stiffness, "k", values for clay assume static loading conditions. We recommend decreasing static stiffness values, "k", in clay by at least 60 percent for cyclic loading conditions.

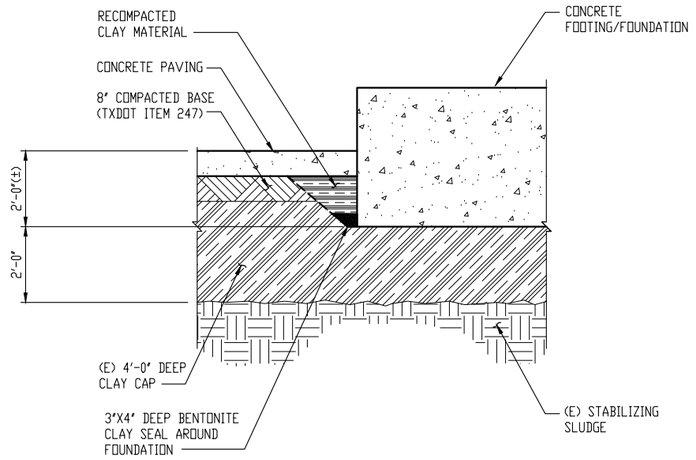
SOIL PARAMETERS FOR PILE LATERAL LOAD ANALYSES
SET FRONT ENDS UPGRADE PROJECT
SHELL DEER PARK CHEMICAL
DEER PARK, TEXAS

NOTES:

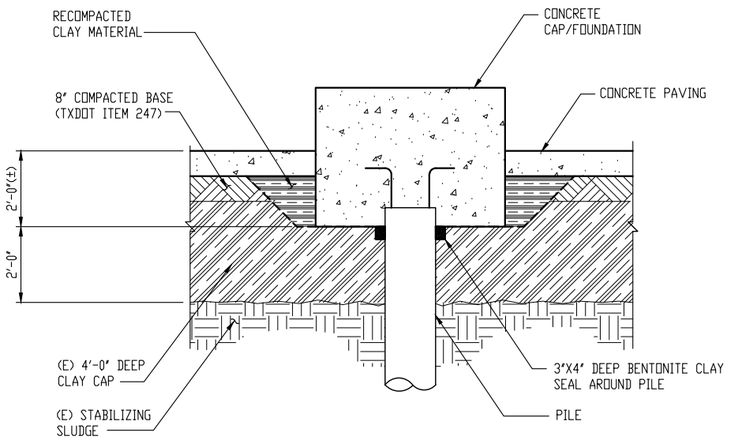
1. FOR NOTES AND REFERENCE DRAWINGS SEE DRAWING SDPMCP-00185-CS-DSK-0001.
2. (E) DENOTES EXISTING.

REFERENCE DRAWING:

SDPMCP-00185-CS-DSK-0001	WEST BASIN FOUNDATION AND PILE LOCATION PLAN



TYPICAL FOUNDATION FILL DETAIL



TYPICAL PILE CAP FILL DETAIL

ISSUED FOR DESIGN

STATE OF TEXAS
STANLEY VU NGUYEN
118549
LICENSED PROFESSIONAL ENGINEER
01/13/25

WORLEY
STATE OF TEXAS
REGISTRATION NO. F-1480

JOB NO.: 153358

worley
DELIVERING SUSTAINABLE CHANGE

REVISIONS								
NO.	DATE	JOB	DESCRIPTION	MADE	CHK'D	APP'D	APP'D	APP'D
A	04/24	00185	ISSUE FOR TCEQ - PERMITTING	RC	TR	PL	.	.
B	01/25	00185	UPDATED FOR TCEQ - PERMITTING	RC	TR	PL	.	.
.	.	.	.	.	.	.	.	.

ACCOUNT NUMBER: USMF/00185
FILM DATES:

DRAWING CODE: Y705-SET-ETSS-BASINS

SHELL DEER PARK SITE
SHELL OIL COMPANY – SHELL CHEMICAL COMPANY
DEER PARK REFINING LIMITED PARTNERSHIP

CIVIL ENG DETAIL DRAWING
WEST BASIN PILE CAP FILL DETAIL - BASINS
ETSS NORTH AND SOUTH BASINS

		DATE		DATE	SCALE:	ISSUE DATE:	LOC:
DRAWN:	RC	04/01/24	APPROVED: .	.	1/2"=1'-0"	.	C
CHECKED:	TR	04/05/24	APPROVED: .	.	DWG. No. E-	.	
APPROVED:		.	APPROVED: .	.			

T-PACK PRINT 03 x 17 ### PC-ACAD"

SDPMCP-00185-CS-DSK-0004-B

Table ID T5.4 and 5.5

Section VII - Updated Costs
Tables VII.B., VII.D.,
VII.E.1., VII.E.2., and
CP Table XI.E.3.

Table VII.B. - Unit Closure Cost Estimate

Task		Cost
(East SET Basin)		
Mobilization, Administration Costs, Demobilization		$329,400.00
Wastewater Removal and Sludge Stabilization		$297,680.00
Demolition and Disposal of Basin and Equipment		$85,400.00
Structural Fill and Compacted Clay Cap Materials/Installation		$1,395,680.00
Stormwater Management		$6,100.00
Closure Management, QA/QC, and Certification (10% of above costs)		$219,600.00
Subtotal		$2,333,860.00
Contingency (10% minimum)		$233,386.00
Total Closure Cost	Year 2023	$2,567,246.00
Task		Cost
(Phenol 3 Boiler)		
Mobilization, Administration Costs, Demobilization		$19,520.00
Disconnect Feed Lines, Install Pump and Recirculation Lines		$9,760.00
8-hour Solvent Rinse, 4-Hour Water/Detergent Rinse, 4-Hour Water Rinse		$13,420.00
Sampling and Analysis, Confirmation Sampling		$2,440.00
Off-Site Rinsate Disposal, Secondary Containment Decontamination		$8,540.00
Closure Management, QA/QC, and Certification		$12,200.00
Subtotal		$65,880.00
Contingency (10% minimum)		$66,880.00
Total Closure Cost	Year 2023	$132,760.00

Task		Cost
Total Closure Cost	Year	$132,760.00
Task		Cost
(West SET Basin-2025 Cap Modification)		
Remove Existing 6” Fiber Reinforced Slab Installation of Concrete Paving and Limestone Subbase		$3,021,500.00
New Stormwater Drainage System		$277,000.00
New Concrete Foundations		$2,524,000.00
Bentonite Clay Seal For Foundations		$40,000.00
Helical Piles, Bentonite Clay Seal For Helical Piles, Concrete Caps For Helical Piles		$832,000.00
Other tasks		
Subtotal		$6,694,500.00
Contingency (10% minimum)		$669,450.00
Total Closure Cost	Year 2025	$7,363,950.00

Table VII.D. - Unit Post-Closure Cost Estimate

Task	Cost
(East, West, and Middle SET Basins)	
Semi-Annual Cover Inspections (30 years x 2/year x $1,000)	$77,400
Replace 1% of Base Material (41 CY/year x $80/CY x 30 years)	$127,710
Annual Allowance for Repairs ($2,500/year x 30 years)	$96,750
Survey Benchmarks ($2,000/5 years x 30 years)	$15,480
Post-Closure Completion Report (Lump Sum)	$12,900
Administration Costs (25% of Above)	$82,560
Subtotal	$412,800
Contingency (10% minimum)	$41,280
Year(s) of Post-Closure	30
Total Unit Closure Cost (Annual Cost X Years of Post-Closure) Year 2023*	$454,080

The estimates listed above were derived from the following sources:
Costs reflect the third party estimates in the 2014 renewal application and subsequent revisions.

The monitoring and maintenance steps reflected in this table for post-closure unit will remain the same aft the West SET cap modification project is complete.

* This table was revised from 2014 dollars to 2023 dollars using the TCEQ inflation factors.

Table VII.E.1. - Permitted Unit Closure Cost Summary

Existing Unit Closure Cost Estimate	
Unit	Cost
East SET Basin 2023 Dollars	$2,567,246.00
Phenol 3 Boiler 2023 Dollars	$132,760.00
West SET Basin 2025 Cap Modification 2025 Dollars	$7,363,950.00
Total Existing Unit Post-Closure Cost Estimate[1]	$10,063,956.00

Proposed Unit Post-Closure Cost Estimate	
Unit	Cost
Total Proposed Unit Post-Closure Cost Estimate	

1. As units are added or deleted from these tables through future permit amendments or modifications, the remaining itemized unit costs should be updated for inflation when re-calculating the revised total cost in current dollars.

* This table was revised from the same table in the 2021 permit and revised to 2023 dollars using the TCEQ inflation factors for the existing units (East SET Basin and Phenol Boiler). In addition:

-2025 estimated Closure Costs were added to capture the post-closure costs of the *2025 Cap Modification Project.*

-The original closure cost estimate of the West SET Basin was estimated at 2,200,000 in 2018 (2,567,246 in 2023 Dollars).

-closure costs for the East, West, and Middle SET Basins are often discussed interchangeably with respect to their closure scopes of work and cost estimates, since they are similar in size, depth, and operations.

Table VII.E.2. - Permitted Unit Post-Closure Cost Summary

Existing Unit Post-Closure Cost Estimate	
Unit	Cost
East, West and Middle SET Basins	**$475,175**
Total Existing Unit Post-Closure Cost Estimate **(2023 Dollars)**	**$475,175**[1]

Proposed Unit Post-Closure Cost Estimate - **N/A***	
Unit	Cost

[1]As units are added or deleted from these tables through future permit amendments or modifications, the remaining itemized unit costs should be updated for inflation when re-calculating the revised total cost in current dollars.

N/A* - No new units are proposed

* This table was revised from the same table in the 2021 permit and revised to 2023 dollars using the TCEQ inflation factors

The monitoring and maintenance steps that this table reflects for post-closure unit will remain the same after the West SET cap modification project is complete.

Table XI.E.3. – Financial Assurance Summary

Task	Cost
Annual Off-Site Liquid Treatment / Disposal Cost	$0.00
Annual On-Site Treatment / Disposal Cost	$22,022
Annual Inspection / Maintenance / Operation Cost For The Corrective Action Program	$100,277
Annual Groundwater Monitoring Cost	$ $54,390
Annual Administrative Cost	$46,203
Annual Inspection And Maintenance Cost For The Groundwater Monitoring Program	$11,551
Annual Sub Total	$234,443
Total Years Used For Calculating Financial Assurance for Corrective Action and/or Compliance Monitoring Program	**30** Years
Remediation Cost (Annual Sub Total x Total Years Used)	$7,033,281
On-Site Waste Water Treatment System Capital Cost Total Well Cost	$0.00
10% Contingency	$703,328
Total Cost	6,697,911
Grand Total Cost (round to nearest $1000) 2023 Dollars*	$7,737,000

* This table was revised from the same table in the 2021 permit and revised to 2023 dollars using the TCEQ inflation factors

Table ID T6

Section VIII Tables VII.B., VII.D., VII.E.1., and VIII.B.

Table III.D. - Inspection Schedule

Facility Unit(s) and Basic Elements	Possible Error, Malfunction, or Deterioration	Frequency of Inspection
Permit Unit 02 - East SET Basin		
Groundwater Monitoring Wells	Visual observation of integrity, missing locks or locking devices, damage to surface casing and/or concrete pad	During sampling (semiannually)
Liquid waste level/Freeboard	Overfilling	1/week and after storms
Dikes/containment devices	Erosion, deterioration or failure	1/week and after storms
Signs	Missing/damaged	1/week and after storms
Permit Unit 03 - Middle SET Basin		
Clay Cap and Crushed Rock	Cap erosion, evidence of cap failure	Every 6 months and after storms
Surveyed Benchmarks	Check benchmarks	Annual
Signs	Missing/damaged	1/week and after storms
Groundwater Monitoring Wells	Visual observation of integrity	During sampling (semiannually)
Permit Unit 04 - West SET Basin		
Concrete Cap	Cap erosion, evidence of cap failure	Every 6 months and after storms
Surveyed Benchmarks	Check benchmarks	Annual
Signs	Missing/damaged	1/week and after storms
Groundwater Monitoring Wells	Visual observation of integrity	During sampling (semiannually)

Table III.D. - Inspection Schedule

Facility Unit(s) and Basic Elements	Possible Error, Malfunction, or Deterioration	Frequency of Inspection
Permit Unit 08 - Phenol 3 Boiler[1]		
Combustion Chamber Temperatures[1]	Not functioning	Daily
Waste Feed Rates[1]	Not functioning	Daily
Intake Air Flow[1]	Not functioning	Daily
Recirculation Gas Flow[1]	Not functioning	Daily
Percent Oxygen[1]	Not functioning	Daily
CO Concentration[1]	Not functioning	Daily
Emergency Waste Feed Cutoff System[1]	Not functioning	Monthly
Process, Transfer and Feed Equipment[1]	Leaks, spills, fugitive emissions, tampering	Daily
Alarm Systems	Not functioning, inadequate volume	Weekly
Intercom/Radio	Not functioning, inadequate volume	Weekly
Emergency Shower/Eyewash	Water flow rate below minimum, poor spray pattern, dirt	Monthly
Fire Extinguishers	Inadequate pressure poor condition	Monthly
Fire Monitors	Water flow inadequate	Quarterly
CO and O2 CEMS Calibration[1]	Not functioning	Daily

[1] The Phenol 3 Boiler is currently inactive. Inspection schedule for this element will be commenced when the unit is reactivated.

Table IV.B. - Wastes Managed In Permitted Units

No.	Waste	EPA Hazardous Waste Numbers	TCEQ Waste Form Codes and Classification Codes
1*	Biosolids	K174	0316607H
2*	SET Biosolids	K017, K019, K020, K174	0320607H
3*	Rock Box Wastewater	K017, K019, K020	8022102H
4*	SET Primary Solids	K017, K019, K020, K174	8048503H
5	Phenol Heavy Ends	K022, D001	1702208H
6	Wastewater, nonhazardous, (from chemical production and amine/water mixture)	N/A	80041021, 80111021

Table V.D.1. - Surface Impoundments

Permit Unit No.	Surface Impoundment	N.O.R. No.	Waste Nos.[1]	Rated Capacity	Dimensions[2]	Distance from lowest liner to groundwater	Action Leakage Rate of (if Required)	Unit will manage Ignitable, Reactive, Incompatible, or F20, FO21, FO22, FO23, F026, and F027 Waste (state all that apply)	Unit Status
2	Activated Sludge Biotreater (SET) East Basin[3]	38	4	4.1 MM gals	Length=342' Width=192' Depth=16.5	7'	Not Required	NA	Active
3	Activated Sludge Biotreater (SET)Middle Basin	39	4	4.1 MM gals	Length=342' Width=192' Depth=16.5	7'	Not Required	NA	Closed as Landfill
4	Activated Sludge Biotreater (SET)West Basin	40	4	4.1 MM gals	Length=342' Width=192' Depth=16.5	7'	Not Required	NA	Closed as Landfill

1from Table IV.B, first column

2Dimensions should be provided as average length, width and depth, also include the surface acreage for the unit

3Unit is under delay of closure and currently manages only non-hazardous waste; the unit is subject to closure as a hazardous waste management unit.

Table VII.E.1. - Permitted Unit Closure Cost Summary

Existing Unit Closure Cost Estimate	
Unit	Cost
East SET Basin 2024 Dollars	$2,678,153.00
Phenol 3 Boiler 2024 Dollars	$90,795.00
West SET Basin Cap Modification 2024 Dollars	$7,363,950.00
Total Existing Unit Post-Closure Cost Estimate[1]	$10,132,898

Proposed Unit Post-Closure Cost Estimate	
Unit	Cost
Total Proposed Unit Post-Closure Cost Estimate	

1. As units are added or deleted from these tables through future permit amendments or modifications, the remaining itemized unit costs should be updated for i inflation when re-calculating the revised total cost in current dollars.

2. Costs for East SET Basis and Phenol 3 Boiler are based on the costs in the Class 3 permit modification issued on August 24, 2023, converted from 2021 dollars to 2024 dollars, Using the TCEQ inflation factors.

Table VII.E.2. - Permitted Unit Post-Closure Cost Summary

Existing Unit Post-Closure Cost Estimate	
Unit	Cost
East, West and Middle SET Basins	**$466,949**
Total Existing Unit Post-Closure Cost Estimate **(2024 Dollars)**	**$466,949** [1]

Proposed Unit Post-Closure Cost Estimate - **N/A***	
Unit	Cost

[1]As units are added or deleted from these tables through future permit amendments or modifications, the remaining itemized unit costs should be updated for inflation when re-calculating the revised total cost in current dollars.

Costs are based on the costs in the Class 3 permit modification issued on August 24, 2023, convered from 2021 dollars to 2024 dollars, using the TCEQ inflation factors.

N/A* - No new units are proposed

Table VIII.B. - Estimated Capital Costs

Task	Cost
Site preparation, fencing, paving, curbing, lighting, roadways	3,700,000
Foundations, buildings, other structures, utilities and connections, drainage system, HVAC system, electrical system, wastewater system	67,800,000
Process and control equipment	4,400,000
Auxiliary equipment, including but not limited to exhaust hoods fans, ducting, pumps, piping, conveyors, stacks, storage tanks, process tanks, waste disposal facilities, pollution control equipment, and fire protection system	
Process integration and instrumentation	
Emergency response equipment	
Transportation equipment	
Office equipment	
Engineering design, supervision, overhead	25,000,000
Construction expenses including permits, insurance, temporary facilities, and clean-up	18,000,000
Contractor's fees and overhead	7,800,000
Contingency	15,600,000
Total Cost	142,300,000

Table XI.E.3. – Financial Assurance Summary

Task	Cost
Annual Off-Site Liquid Treatment / Disposal Cost	$0.00
Annual On-Site Treatment / Disposal Cost	$21,641
Annual Inspection / Maintenance / Operation Cost For The Corrective Action Program	$98,545
Annual Groundwater Monitoring Cost	$ 53,451
Annual Administrative Cost	$45,405
Annual Inspection And Maintenance Cost For The Groundwater Monitoring Program	$11,351
Annual Sub Total	$230,393
Total Years Used For Calculating Financial Assurance for Corrective Action and/or Compliance Monitoring Program	**30** Years
Remediation Cost (Annual Sub Total x Total Years Used)	$6,911,784
On-Site Waste Water Treatment System Capital Cost Total Well Cost	$0.00
10% Contingency	$691,178
Total Cost	7,602,963
Grand Total Cost (round to nearest $1000) 2024 Dollars*	$7,602,963

* Costs are based on the costs from the Class 3 permit modification issued on August 24, 2023, converted from 2021 dollars to 2024 dollars, using the TCEQ inflation factors

Table VII.B. - Unit Closure Cost Estimate

Task		Cost
(East SET Basin)		
Mobilization, Administration Costs, Demobilization		$329,400.00
Wastewater Removal and Sludge Stabilization		$297,680.00
Demolition and Disposal of Basin and Equipment		$85,400.00
Structural Fill and Compacted Clay Cap Materials/Installation		$1,395,680.00
Stormwater Management		$6,100.00
Closure Management, QA/QC, and Certification (10% of above costs)		$219,600.00
Subtotal		$2,333,860.00
Contingency (10% minimum)		$233,386.00
Total Closure Cost	Year 2023	$2,567,246.00
Task		Cost
(Phenol 3 Boiler)		
Mobilization, Administration Costs, Demobilization		$19,520.00
Disconnect Feed Lines, Install Pump and Recirculation Lines		$9,760.00
8-hour Solvent Rinse, 4-Hour Water/Detergent Rinse, 4-Hour Water Rinse		$13,420.00
Sampling and Analysis, Confirmation Sampling		$2,440.00
Off-Site Rinsate Disposal, Secondary Containment Decontamination		$8,540.00
Closure Management, QA/QC, and Certification		$12,200.00
Subtotal		$65,880.00
Contingency (10% minimum)		$66,880.00
Total Closure Cost	Year 2023	$132,760.00

Task		Cost
Total Closure Cost	Year	$132,760.00
Task		Cost
(West SET Basin-2025 Cap Modification)		
Remove Existing 6” Fiber Reinforced Slab Installation of Concrete Paving and Limestone Subbase		$3,021,500.00
New Stormwater Drainage System		$277,000.00
New Concrete Foundations		$2,524,000.00
Bentonite Clay Seal For Foundations		$40,000.00
Helical Piles, Bentonite Clay Seal For Helical Piles, Concrete Caps For Helical Piles		$832,000.00
Other tasks		
Subtotal		$6,694,500.00
Contingency (10% minimum)		$669,450.00
Total Closure Cost	Year 2025	$7,363,950.00

Table VII.D. - Unit Post-Closure Cost Estimate

Task	Cost
(East, West, and Middle SET Basins)	
Semi-Annual Cover Inspections (30 years x 2/year x $1,000)	$77,400
Replace 1% of Base Material (41 CY/year x $80/CY x 30 years)	$127,710
Annual Allowance for Repairs ($2,500/year x 30 years)	$96,750
Survey Benchmarks ($2,000/5 years x 30 years)	$15,480
Post-Closure Completion Report (Lump Sum)	$12,900
Administration Costs (25% of Above)	$82,560
Subtotal	$412,800
Contingency (10% minimum)	$41,280
Year(s) of Post-Closure	30
Total Unit Closure Cost (Annual Cost X Years of Post-Closure) Year 2023*	$454,080

The estimates listed above were derived from the following sources:
Costs reflect the third party estimates in the 2014 renewal application and subsequent revisions.

The monitoring and maintenance steps reflected in this table for post-closure unit will remain the same aft the West SET cap modification project is complete.

* This table was revised from 2014 dollars to 2023 dollars using the TCEQ inflation factors.

Table VII.E.1. - Permitted Unit Closure Cost Summary

Existing Unit Closure Cost Estimate	
Unit	Cost
East SET Basin 2023 Dollars	$2,567,246.00
Phenol 3 Boiler 2023 Dollars	$132,760.00
West SET Basin 2025 Cap Modification 2025 Dollars	$7,363,950.00
Total Existing Unit Post-Closure Cost Estimate[1]	$10,063,956.00

Proposed Unit Post-Closure Cost Estimate	
Unit	Cost
Total Proposed Unit Post-Closure Cost Estimate	

1. As units are added or deleted from these tables through future permit amendments or modifications, the remaining itemized unit costs should be updated for inflation when re-calculating the revised total cost in current dollars.

* This table was revised from the same table in the 2021 permit and revised to 2023 dollars using the TCEQ inflation factors for the existing units (East SET Basin and Phenol Boiler). In addition:

-2025 estimated Closure Costs were added to capture the post-closure costs of the *2025 Cap Modification Project.*

-The original closure cost estimate of the West SET Basin was estimated at 2,200,000 in 2018 (2,567,246 in 2023 Dollars).

-closure costs for the East, West, and Middle SET Basins are often discussed interchangeably with respect to their closure scopes of work and cost estimates, since they are similar in size, depth, and operations.

Part B, Signature Page

An original notarized signature page from the facilities General Manager is included.

Signature Page

I, William Watson, General Manager,

(Operator) *(Title)*

certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signature: W H Watson Date: 3/6/25

- -

To be completed by the Operator if the application is signed by an Authorized Representative for the Operator

I,______________________________, hereby designate ________________________

[Print or Type Name] *[Print or Type Name]*

as my representative and hereby authorize said representative to sign any application, submit additional information as may be requested by the Commission; and/or appear for me at any hearing or before the Texas Commission on Environmental Quality in conjunction with this request for a Texas Water Code or Texas Solid Waste Disposal Act permit. I further understand that I am responsible for the contents of this application, for oral statements given by my authorized representative in support of the application, and for compliance with the terms and conditions of any permit which might be issued based upon this application.

____

Printed or Typed Name of Operator or Principal Executive Officer

____

Signature

- -

SUBSCRIBED AND SWORN to before me by the said William Watson

On this 6th day of March, 2025

My commission expires on the 15th day of August, 2027

Notary Public in and for Harris County, Texas

*[**Note**: Application Must Bear Signature & Seal of Notary Public]*

Geneva Boyett

GENEVA I BOYETT
Notary ID #6574959
My Commission Expires
August 15, 2027

Table III.D. - Inspection Schedule

Facility Unit(s) and Basic Elements	Possible Error, Malfunction, or Deterioration	Frequency of Inspection
Permit Unit 02 - East SET Basin		
Groundwater Monitoring Wells	Visual observation of integrity, missing locks or locking devices, damage to surface casing and/or concrete pad	During sampling (semiannually)
Liquid waste level/Freeboard	Overfilling	1/week and after storms
Dikes/containment devices	Erosion, deterioration or failure	1/week and after storms
Signs	Missing/damaged	1/week and after storms
Permit Unit 03 - Middle SET Basin		
Clay Cap and Crushed Rock	Cap erosion, evidence of cap failure	Every 6 months and after storms
Surveyed Benchmarks	Check benchmarks	Annual
Signs	Missing/damaged	1/week and after storms
Groundwater Monitoring Wells	Visual observation of integrity	During sampling (semiannually)
Permit Unit 04 - West SET Basin		
Concrete Cap	Cap erosion, evidence of cap failure	Every 6 months and after storms
Surveyed Benchmarks	Check benchmarks	Annual
Signs	Missing/damaged	1/week and after storms
Groundwater Monitoring Wells	Visual observation of integrity	During sampling (semiannually)

Table III.D. - Inspection Schedule

Facility Unit(s) and Basic Elements	Possible Error, Malfunction, or Deterioration	Frequency of Inspection
Permit Unit 08 - Phenol 3 Boiler[1]		
Combustion Chamber Temperatures[1]	Not functioning	Daily
Waste Feed Rates[1]	Not functioning	Daily
Intake Air Flow[1]	Not functioning	Daily
Recirculation Gas Flow[1]	Not functioning	Daily
Percent Oxygen[1]	Not functioning	Daily
CO Concentration[1]	Not functioning	Daily
Emergency Waste Feed Cutoff System[1]	Not functioning	Monthly
Process, Transfer and Feed Equipment[1]	Leaks, spills, fugitive emissions, tampering	Daily
Alarm Systems	Not functioning, inadequate volume	Weekly
Intercom/Radio	Not functioning, inadequate volume	Weekly
Emergency Shower/Eyewash	Water flow rate below minimum, poor spray pattern, dirt	Monthly
Fire Extinguishers	Inadequate pressure poor condition	Monthly
Fire Monitors	Water flow inadequate	Quarterly
CO and O2 CEMS Calibration[1]	Not functioning	Daily

[1] The Phenol 3 Boiler is currently inactive. Inspection schedule for this element will be commenced when the unit is reactivated.

Table IV.B. - Wastes Managed In Permitted Units

No.	Waste	EPA Hazardous Waste Numbers	TCEQ Waste Form Codes and Classification Codes
1*	Biosolids	K174	0316607H
2*	SET Biosolids	K017, K019, K020, K174	0320607H
3*	Rock Box Wastewater	K017, K019, K020	8022102H
4*	SET Primary Solids	K017, K019, K020, K174	8048503H
5	Phenol Heavy Ends	K022, D001	1702208H
6	Wastewater, nonhazardous, (from chemical production and amine/water mixture)	N/A	80041021, 80111021

Table V.D.1. - Surface Impoundments

Permit Unit No.	Surface Impoundment	N.O.R. No.	Waste Nos.[1]	Rated Capacity	Dimensions[2]	Distance from lowest liner to groundwater	Action Leakage Rate of (if Required)	Unit will manage Ignitable, Reactive, Incompatible, or F20, FO21, FO22, FO23, F026, and F027 Waste (state all that apply)	Unit Status
2	Activated Sludge Biotreater (SET) East Basin[3]	38	4	4.1 MM gals	Length=342' Width=192' Depth=16.5	7'	Not Required	NA	Active
3	Activated Sludge Biotreater (SET)Middle Basin	39	4	4.1 MM gals	Length=342' Width=192' Depth=16.5	7'	Not Required	NA	Closed as Landfill
4	Activated Sludge Biotreater (SET)West Basin	40	4	4.1 MM gals	Length=342' Width=192' Depth=16.5	7'	Not Required	NA	Closed as Landfill

1from Table IV.B, first column

2Dimensions should be provided as average length, width and depth, also include the surface acreage for the unit

3Unit is under delay of closure and currently manages only non-hazardous waste; the unit is subject to closure as a hazardous waste management unit.

Table VII.E.1. - Permitted Unit Closure Cost Summary

Existing Unit Closure Cost Estimate	
Unit	Cost
East SET Basin 2024 Dollars	$2,678,153.00
Phenol 3 Boiler 2024 Dollars	$90,795.00
West SET Basin Cap Modification 2024 Dollars	$7,363,950.00
Total Existing Unit Post-Closure Cost Estimate[1]	$10,132,898

Proposed Unit Post-Closure Cost Estimate	
Unit	Cost
Total Proposed Unit Post-Closure Cost Estimate	

1. As units are added or deleted from these tables through future permit amendments or modifications, the remaining itemized unit costs should be updated for i inflation when re-calculating the revised total cost in current dollars.

2. Costs for East SET Basis and Phenol 3 Boiler are based on the costs in the Class 3 permit modification issued on August 24, 2023, converted from 2021 dollars to 2024 dollars, Using the TCEQ inflation factors.

Table VII.E.2. - Permitted Unit Post-Closure Cost Summary

Existing Unit Post-Closure Cost Estimate	
Unit	Cost
East, West and Middle SET Basins	**$466,949**
Total Existing Unit Post-Closure Cost Estimate **(2024 Dollars)**	**$466,949** [1]

Proposed Unit Post-Closure Cost Estimate - **N/A***	
Unit	Cost

[1]As units are added or deleted from these tables through future permit amendments or modifications, the remaining itemized unit costs should be updated for inflation when re-calculating the revised total cost in current dollars.

Costs are based on the costs in the Class 3 permit modification issued on August 24, 2023, convered from 2021 dollars to 2024 dollars, using the TCEQ inflation factors.

N/A* - No new units are proposed

Table VIII.B. - Estimated Capital Costs

Task	Cost
Site preparation, fencing, paving, curbing, lighting, roadways	3,700,000
Foundations, buildings, other structures, utilities and connections, drainage system, HVAC system, electrical system, wastewater system	67,800,000
Process and control equipment	4,400,000
Auxiliary equipment, including but not limited to exhaust hoods fans, ducting, pumps, piping, conveyors, stacks, storage tanks, process tanks, waste disposal facilities, pollution control equipment, and fire protection system	
Process integration and instrumentation	
Emergency response equipment	
Transportation equipment	
Office equipment	
Engineering design, supervision, overhead	25,000,000
Construction expenses including permits, insurance, temporary facilities, and clean-up	18,000,000
Contractor's fees and overhead	7,800,000
Contingency	15,600,000
Total Cost	142,300,000

Table XI.E.3. – Financial Assurance Summary

Task	Cost
Annual Off-Site Liquid Treatment / Disposal Cost	$0.00
Annual On-Site Treatment / Disposal Cost	$21,641
Annual Inspection / Maintenance / Operation Cost For The Corrective Action Program	$98,545
Annual Groundwater Monitoring Cost	$ 53,451
Annual Administrative Cost	$45,405
Annual Inspection And Maintenance Cost For The Groundwater Monitoring Program	$11,351
Annual Sub Total	$230,393
Total Years Used For Calculating Financial Assurance for Corrective Action and/or Compliance Monitoring Program	**30** Years
Remediation Cost (Annual Sub Total x Total Years Used)	$6,911,784
On-Site Waste Water Treatment System Capital Cost Total Well Cost	$0.00
10% Contingency	$691,178
Total Cost	7,602,963
Grand Total Cost (round to nearest $1000) 2024 Dollars*	$7,602,963

* Costs are based on the costs from the Class 3 permit modification issued on August 24, 2023, converted from 2021 dollars to 2024 dollars, using the TCEQ inflation factors