ATTACHMENT 7

SLOPE STABILITY ANALYSIS OF EXISTING PLACEMENT AREAS

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Houston Ship Channel DMMP
Mid Bay Placement Area, Sta 15+00, EL +35
Exterior Slope - Short Term Condition
MidBay.EL35.80Step.4H1V.WL33.Geo.EOC1
5/19/2016

Name: Firm SA Lean CLAY (Dike)
Unit Weight: 120 pcf
Cohesion': 600 psf
Phi': 0 °

Name: Firm Elastic SILT w/SA (Dike)
Unit Weight: 120 pcf
Cohesion': 500 psf
Phi': 0 °

Name: Hyd Fill 1
Unit Weight: 100 pcf
Cohesion': 150 psf
Phi': 0 °

Name: Hyd Fill 2
Unit Weight: 100 pcf
Cohesion': 250 psf
Phi': 0 °

Name: Hyd Fill 3
Unit Weight: 100 pcf
Cohesion': 600 psf
Phi': 0 °

Name: Hyd Fill 4
Unit Weight: 100 pcf
Cohesion': 800 psf
Phi': 0 °

Name: Soft SA Lean CLAY
Unit Weight: 120 pcf
Cohesion': 300 psf
Phi': 0 °

Name: Soft SA Lean CLAY (2)
Unit Weight: 120 pcf
Cohesion': 350 psf
Phi': 0 °

Name: Loose SI SAND
Unit Weight: 115 pcf
Cohesion': 0 psf
Phi': 30 °

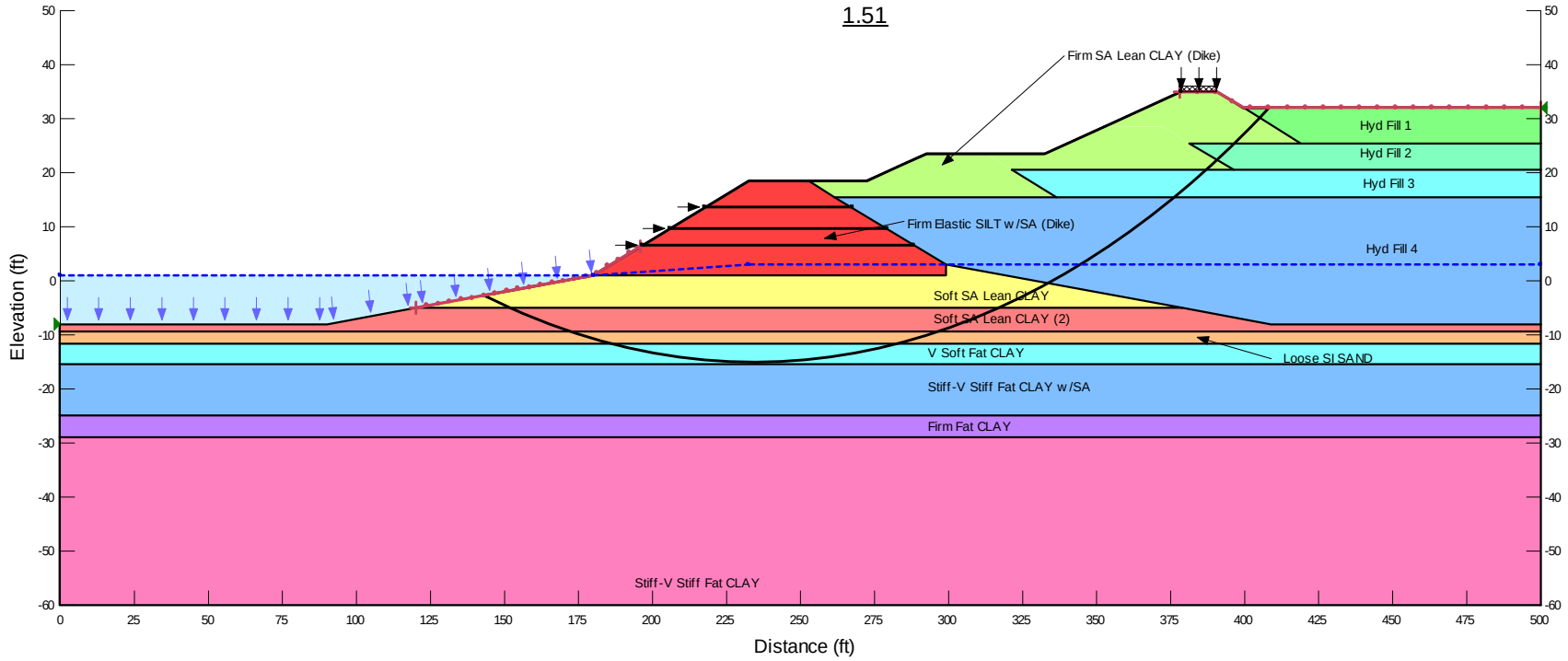
Name: V Soft Fat CLAY
Unit Weight: 120 pcf
Cohesion': 250 psf
Phi': 0 °

Name: Stiff-V Stiff Fat CLAY w/SA
Unit Weight: 125 pcf
Cohesion': 1,500 psf
Phi': 0 °

Name: Firm Fat CLAY
Unit Weight: 125 pcf
Cohesion': 600 psf
Phi': 0 °

Name: Stiff-V Stiff Fat CLAY
Unit Weight: 130 pcf
Cohesion': 1,500 psf
Phi': 0 °

Geotextile Dike Reinforcement
Tensile Capacity: 2,400 lbs
Interface Adhesion: 240 psf
Interface Shear Angle: 11 °



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GALVESTON, TEXAS

DATE: 19 MAY 2016	APPROVED BY:	PREPARED BY: DBB

HOUSTON SHIP CHANNEL, TEXAS
DREDGED MATERIAL MANAGEMENT PLAN
SLOPE STABILITY ANALYSIS – SHORT TERM
MID BAY PA CONTAINMENT DIKE STA. 15+00, EL +35

FILE NO:	PLATE NO: STAB-01

Houston Ship Channel DMMP
Mid Bay Placement Area, Sta 15+00, EL +35
Exterior Slope - Long Term Condition
MidBay.EL35.80Step.4H1V.WL33.Geo.LT1
5/19/2016

Name: Firm SA Lean CLAY (Dike)
Unit Weight: 120 pcf
Cohesion': 120 psf
Phi': 20 °

Name: Firm Elastic SILT w/SA (Dike)
Unit Weight: 120 pcf
Cohesion': 80 psf
Phi': 14 °

Name: Hyd Fill 1
Unit Weight: 100 pcf
Cohesion': 0 psf
Phi': 14 °

Name: Hyd Fill 2
Unit Weight: 100 pcf
Cohesion': 50 psf
Phi': 14 °

Name: Hyd Fill 3
Unit Weight: 100 pcf
Cohesion': 100 psf
Phi': 18 °

Name: Hyd Fill 4
Unit Weight: 100 pcf
Cohesion': 130 psf
Phi': 18 °

Name: Soft SA Lean CLAY
Unit Weight: 120 pcf
Cohesion': 60 psf
Phi': 16 °

Name: Soft SA Lean CLAY (2)
Unit Weight: 120 pcf
Cohesion': 80 psf
Phi': 18 °

Name: Loose SI SAND
Unit Weight: 115 pcf
Cohesion': 0 psf
Phi': 30 °

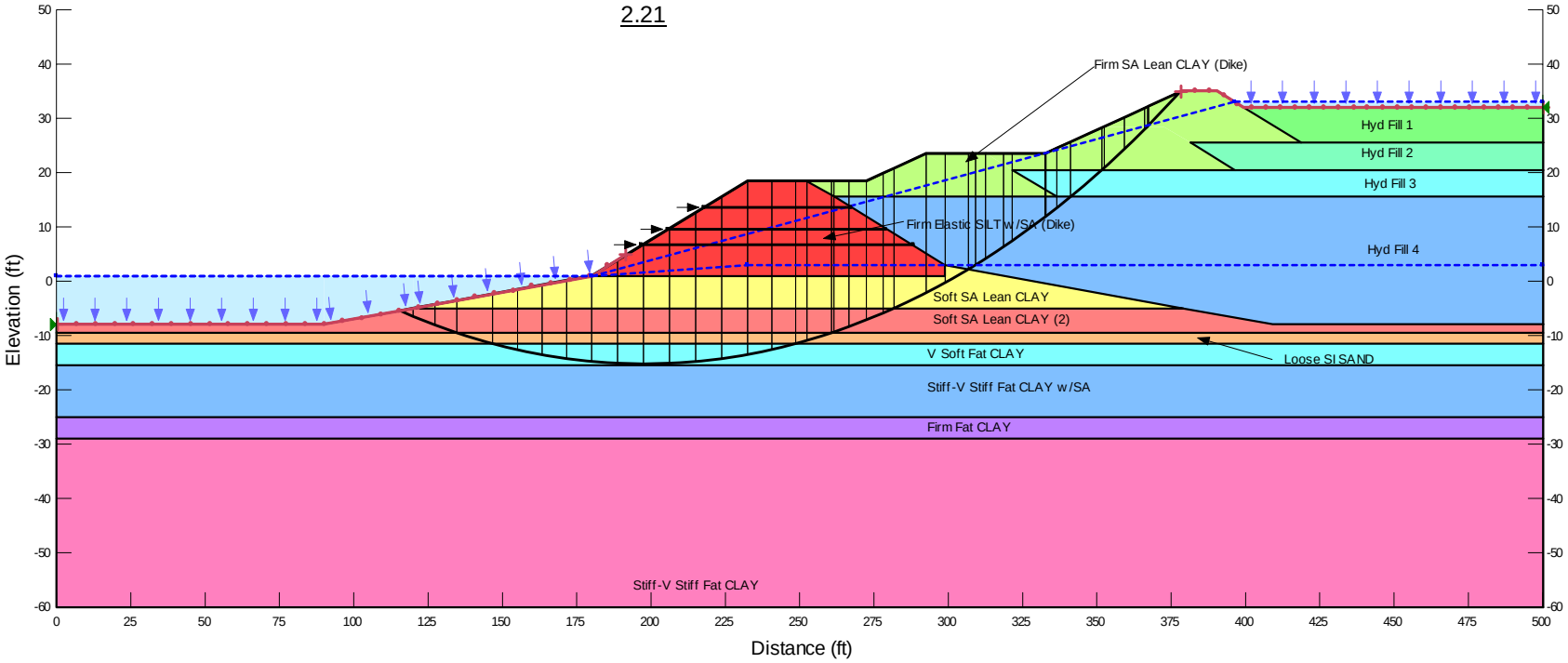
Name: V Soft Fat CLAY
Unit Weight: 120 pcf
Cohesion': 60 psf
Phi': 18 °

Name: Stiff-V Stiff Fat CLAY w/SA
Unit Weight: 125 pcf
Cohesion': 200 psf
Phi': 22 °

Name: Firm Fat CLAY
Unit Weight: 125 pcf
Cohesion': 150 psf
Phi': 18 °

Name: Stiff-V Stiff Fat CLAY
Unit Weight: 130 pcf
Cohesion': 200 psf
Phi': 22 °

Geotextile Dike Reinforcement
Tensile Capacity: 2,400 lbs
Interface Adhesion: 240 psf
Interface Shear Angle: 11 °



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HOUSTON SHIP CHANNEL, TEXAS
DREDGED MATERIAL MANAGEMENT PLAN
SLOPE STABILITY ANALYSIS – LONG TERM
MID BAY PA CONTAINMENT DIKE STA. 15+00, EL +35

FILE NO:	PLATE NO: STAB-02

Houston Ship Channel DPR
PA14, Sta 46+50, EL +50
Exterior Slope - Short Term Condition
PA14.Step80.EL50.WL3.MP.EOC1
5/19/2016

Name: Firm SA Lean CLAY (Dike)
Unit Weight: 120 pcf
Cohesion': 600 psf
Phi': 0 °

Name: Hydraulic Berm
Unit Weight: 100 pcf
Cohesion': 600 psf
Phi': 0 °

Name: Hyd Fill 1
Unit Weight: 100 pcf
Cohesion': 150 psf
Phi': 0 °

Name: Hyd Fill 2
Unit Weight: 100 pcf
Cohesion': 250 psf
Phi': 0 °

Name: Hyd Fill 3
Unit Weight: 100 pcf
Cohesion': 600 psf
Phi': 0 °

Name: Hyd Fill 4
Unit Weight: 100 pcf
Cohesion': 800 psf
Phi': 0 °

Name: Me Dense Si SAND (Dike)
Unit Weight: 115 pcf
Cohesion': 0 psf
Phi': 32 °

Name: Stiff-V Stiff Fat CLAY w/SA (Dike)
Unit Weight: 130 pcf
Cohesion': 1,500 psf
Phi': 0 °

Name: Soft Fat CLAY w/SA (Dike)
Unit Weight: 120 pcf
Cohesion': 400 psf
Phi': 0 °

Name: Firm Fat CLAY w/SA (Dike)
Unit Weight: 120 pcf
Cohesion': 800 psf
Phi': 0 °

Name: Me Dense SILT w/SA
Unit Weight: 115 pcf
Cohesion': 0 psf
Phi': 28 °

Name: V Soft Fat CLAY w/SA & SI
Unit Weight: 120 pcf
Cohesion': 300 psf
Phi': 0 °

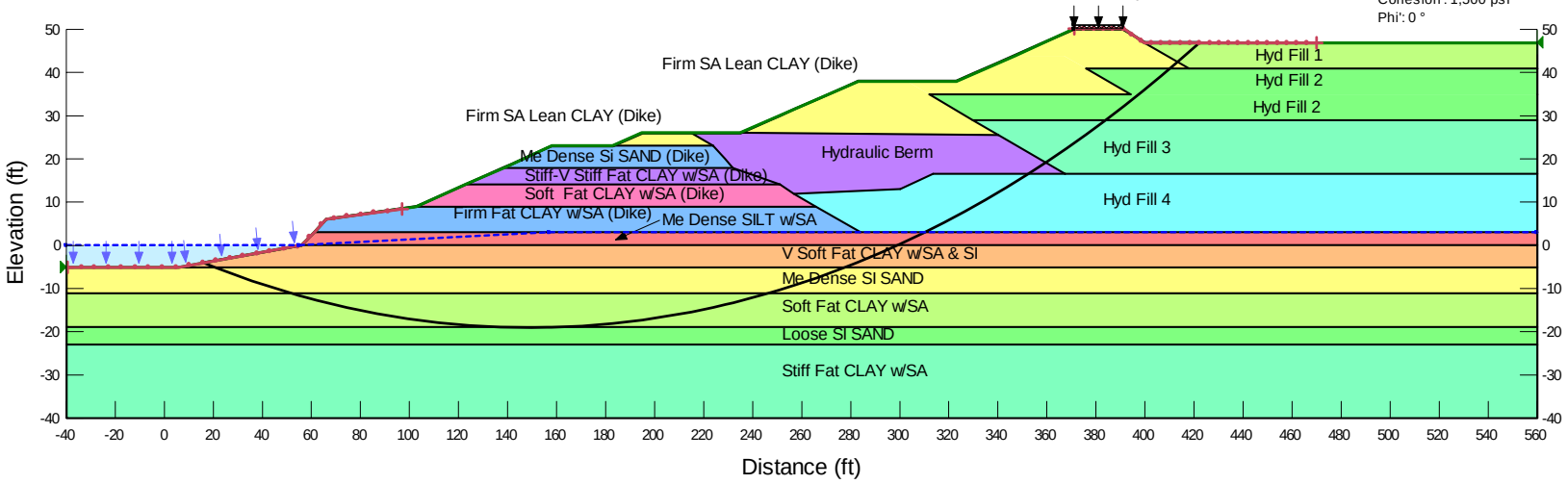
Name: Me Dense SI SAND
Unit Weight: 115 pcf
Cohesion': 0 psf
Phi': 32 °

Name: Soft Fat CLAY w/SA
Unit Weight: 120 pcf
Cohesion': 400 psf
Phi': 0 °

Name: Loose SI SAND
Unit Weight: 115 pcf
Cohesion': 0 psf
Phi': 30 °

Name: Stiff Fat CLAY w/SA
Unit Weight: 120 pcf
Cohesion': 1,500 psf
Phi': 0 °

1.54



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HOUSTON SHIP CHANNEL, TEXAS
DREDGED MATERIAL MANAGEMENT PLAN
SLOPE STABILITY ANALYSIS – SHORT TERM
PA 14 CONTAINMENT DIKE STA. 46+50, EL +50

FILE NO:	PLATE NO: STAB-03

Houston Ship Channel DPR
PA14, Sta 46+50, EL +50
Exterior Slope - Long Term Condition
PA14.Step60.EL50.WL47.MP.LT1
5/19/2016

Name: Firm SA Lean CLAY (Dike) LT
Unit Weight: 120 pcf
Cohesion': 120 psf
Phi': 20 °

Name: Hydraulic Berm LT
Unit Weight: 100 pcf
Cohesion': 100 psf
Phi': 17 °

Name: Hyd Fill 1 LT
Unit Weight: 100 pcf
Cohesion': 0 psf
Phi': 14 °

Name: Hyd Fill 2 LT
Unit Weight: 100 pcf
Cohesion': 50 psf
Phi': 14 °

Name: Hyd Fill 3 LT
Unit Weight: 100 pcf
Cohesion': 100 psf
Phi': 18 °

Name: Hyd Fill 4 LT
Unit Weight: 100 pcf
Cohesion': 130 psf
Phi': 18 °

Name: Me Dense Si SAND (Dike) LT
Unit Weight: 115 pcf
Cohesion': 0 psf
Phi': 32 °

Name: Stiff-V Stiff Fat CLAY w/SA (Dike) LT
Unit Weight: 130 pcf
Cohesion': 140 psf
Phi': 20 °

Name: Soft Fat CLAY w/SA (Dike) LT
Unit Weight: 120 pcf
Cohesion': 100 psf
Phi': 16 °

Name: Firm Fat CLAY w/SA (Dike) LT
Unit Weight: 120 pcf
Cohesion': 120 psf
Phi': 18 °

Name: Me Dense SILT w/SA LT
Unit Weight: 115 pcf
Cohesion': 0 psf
Phi': 28 °

Name: V Soft Fat CLAY w/SA & SI LT
Unit Weight: 120 pcf
Cohesion': 80 psf
Phi': 15 °

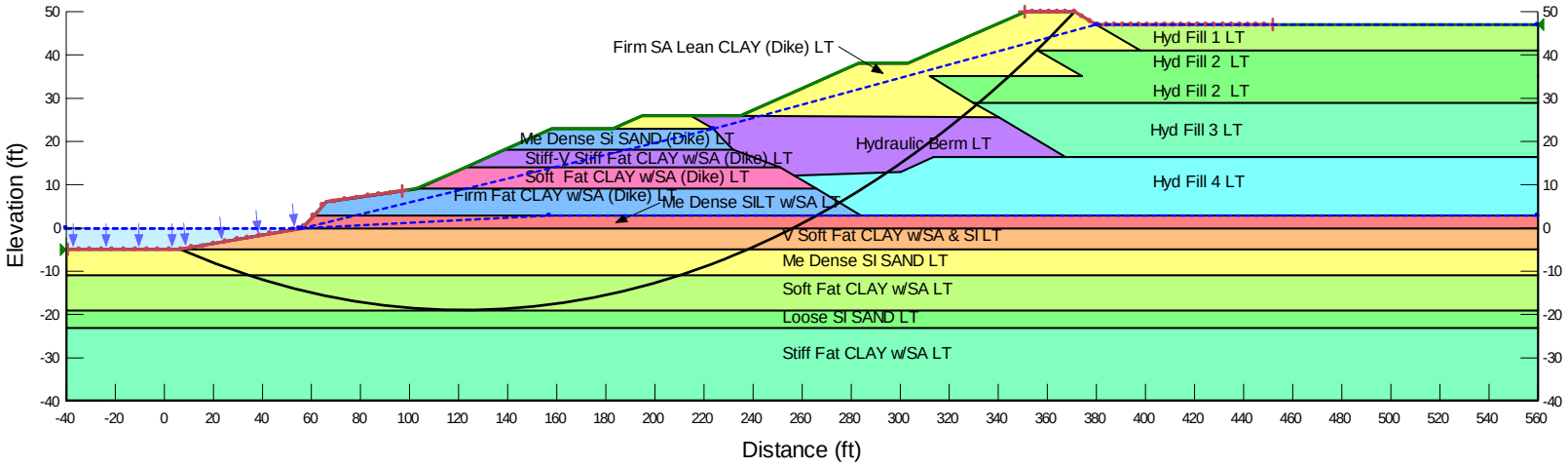
Name: Me Dense SI SAND LT
Unit Weight: 115 pcf
Cohesion': 0 psf
Phi': 32 °

Name: Soft Fat CLAY w/SA LT
Unit Weight: 120 pcf
Cohesion': 80 psf
Phi': 16 °

Name: Loose SI SAND LT
Unit Weight: 115 pcf
Cohesion': 0 psf
Phi': 30 °

Name: Stiff Fat CLAY w/SA LT
Unit Weight: 120 pcf
Cohesion': 150 psf
Phi': 22 °

2.10



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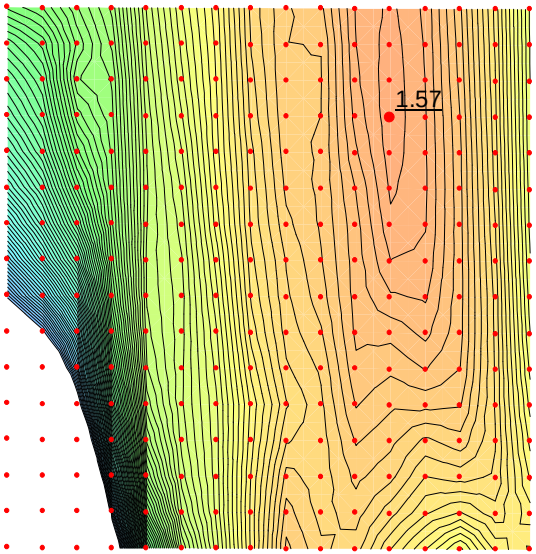
HOUSTON SHIP CHANNEL, TEXAS
DREDGED MATERIAL MANAGEMENT PLAN
SLOPE STABILITY ANALYSIS – LONG TERM
PA 14 CONTAINMENT DIKE STA. 46+50, EL +50

FILE NO:	PLATE NO: STAB-04

Houston Ship Channel DMMP
PA 15, Sta 150+00, EL +50
Exterior Slope - Short Term Condition
PA15.EL50Step.150+00.WL+3.EOC
1/19/2016



Name: Firm SA LN CLAY (Dike)
Unit Weight: 120 pcf
Cohesion': 600 psf
Phi': 0 °

Name: Hydraulic Fill 1
Unit Weight: 100 pcf
Cohesion': 150 psf
Phi': 0 °

Name: Hydraulic Fill 2
Unit Weight: 100 pcf
Cohesion': 250 psf
Phi': 0 °

Name: Hydraulic Fill 3
Unit Weight: 100 pcf
Cohesion': 600 psf
Phi': 0 °

Name: Firm to Stiff SA LN CLAY
Unit Weight: 125 pcf
Cohesion': 800 psf
Phi': 0 °

Name: Me. Dense CL SAND
Unit Weight: 115 pcf
Cohesion': 0 psf
Phi': 30 °

Name: Stiff Ln CLAY w/SA
Unit Weight: 125 pcf
Cohesion': 1,000 psf
Phi': 0 °

Name: Soft LN CLAY w/SA
Unit Weight: 120 pcf
Cohesion': 400 psf
Phi': 0 °

Name: Stiff SA Ln CLAY
Unit Weight: 125 pcf
Cohesion': 1,000 psf
Phi': 0 °

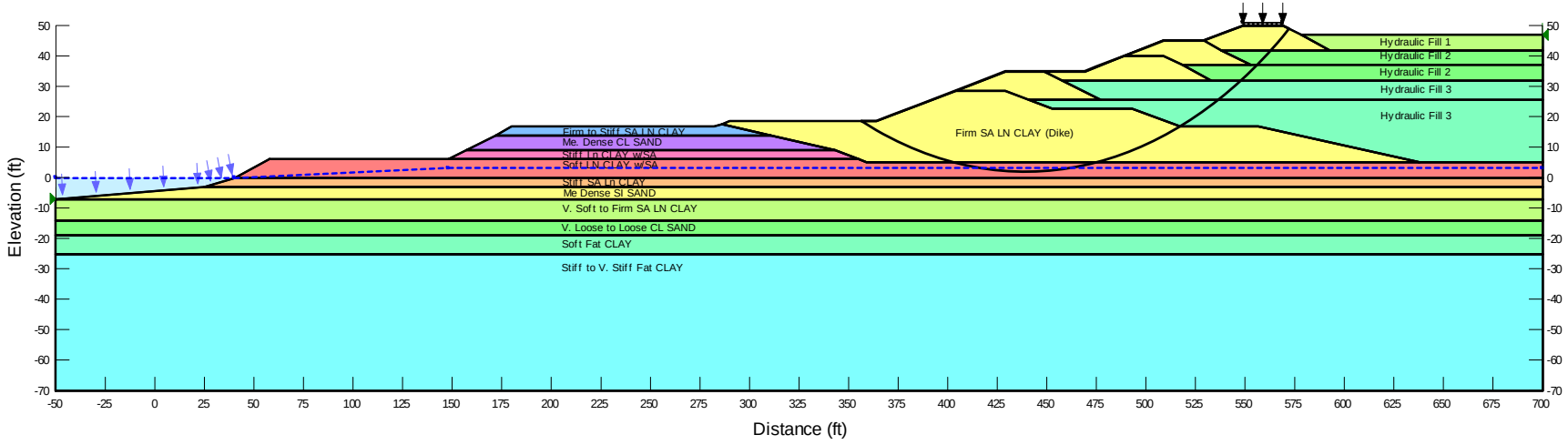
Name: Me Dense SI SAND
Unit Weight: 115 pcf
Cohesion': 0 psf
Phi': 30 °

Name: V. Soft to Firm SA LN CLAY
Unit Weight: 120 pcf
Cohesion Spatial Fn: 350-500
Phi': 0 °

Name: V. Loose to Loose CL SAND
Unit Weight: 115 pcf
Cohesion': 0 psf
Phi': 28 °

Name: Soft Fat CLAY
Unit Weight: 120 pcf
Cohesion': 400 psf
Phi': 0 °

Name: Stiff to V. Stiff Fat CLAY
Unit Weight: 125 pcf
Cohesion': 1,500 psf
Phi': 0 °



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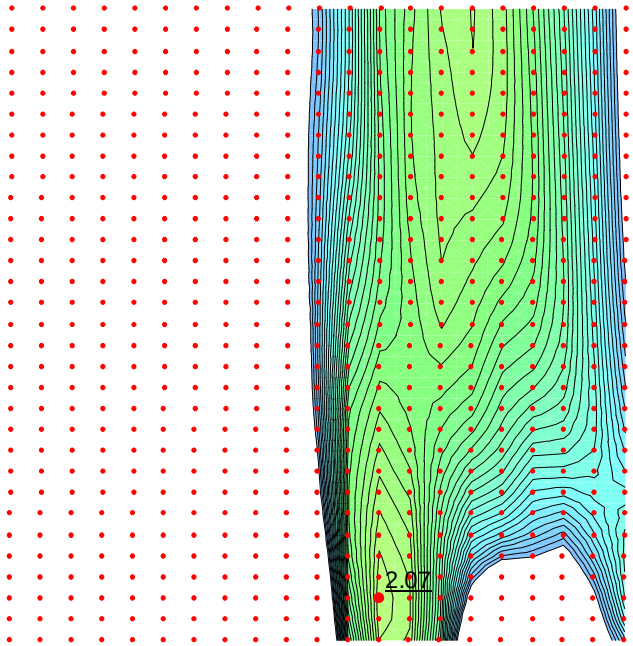
HOUSTON SHIP CHANNEL, TEXAS
DREDGED MATERIAL MANAGEMENT PLAN
SLOPE STABILITY ANALYSIS – SHORT TERM
PA 15 CONTAINMENT DIKE STA. 150+00, EL +50

FILE NO:	PLATE NO:
	STAB-05

Houston Ship Channel DMMP
PA 15, Sta 150+00, EL +50
Exterior Slope - Long Term Condition
PA15.EL50Step.150+00.WL+3.LT
5/19/2016



Name: Firm SA LN CLAY (Dike) LT
Unit Weight: 120 pcf
Cohesion': 120 psf
Phi': 20 °

Name: Soft LN CLAY w/SA LT
Unit Weight: 120 pcf
Cohesion': 100 psf
Phi': 18 °

Name: Hydraulic Fill 1 LT
Unit Weight: 100 pcf
Cohesion': 0 psf
Phi': 14 °

Name: Stiff SA Ln CLAY LT
Unit Weight: 125 pcf
Cohesion': 130 psf
Phi': 22 °

Name: Hydraulic Fill 2 LT
Unit Weight: 100 pcf
Cohesion': 50 psf
Phi': 14 °

Name: Me Dense SI SAND LT
Unit Weight: 115 pcf
Cohesion': 0 psf
Phi': 30 °

Name: Hydraulic Fill 3 LT
Unit Weight: 100 pcf
Cohesion': 100 psf
Phi': 18 °

Name: V. Soft to Firm SA LN CLAY LT
Unit Weight: 120 pcf
Cohesion': 100 psf
Phi': 18 °

Name: Firm to Stiff SA LN CLAY LT
Unit Weight: 125 pcf
Cohesion': 130 psf
Phi': 18 °

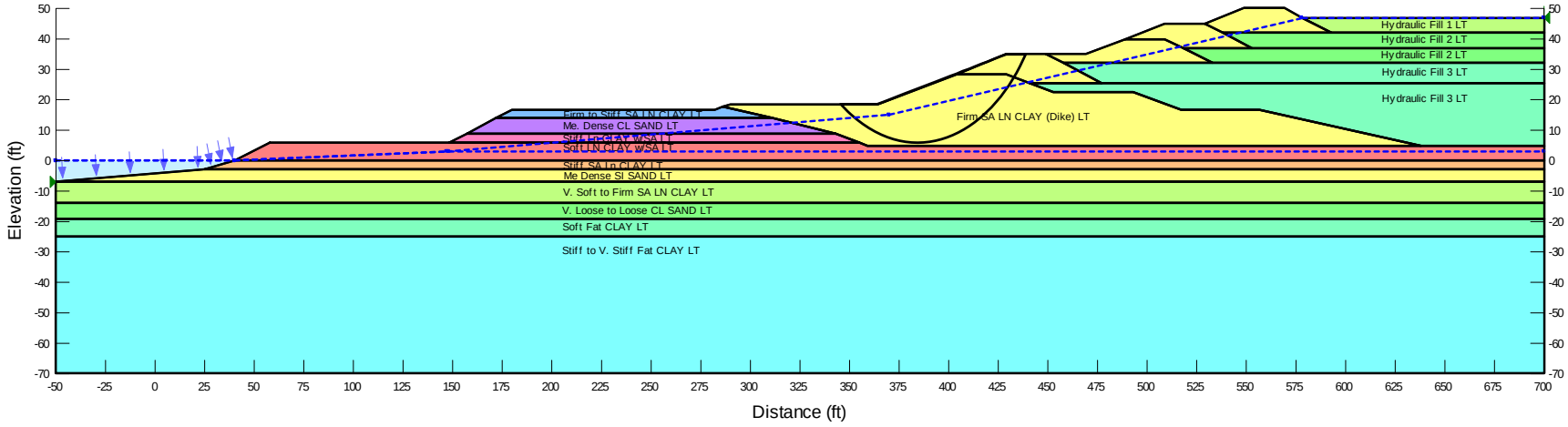
Name: V. Loose to Loose CL SAND LT
Unit Weight: 115 pcf
Cohesion': 0 psf
Phi': 28 °

Name: Me. Dense CL SAND LT
Unit Weight: 115 pcf
Cohesion': 0 psf
Phi': 30 °

Name: Soft Fat CLAY LT
Unit Weight: 120 pcf
Cohesion': 100 psf
Phi': 18 °

Name: Stiff Ln CLAY w/SA LT
Unit Weight: 125 pcf
Cohesion': 130 psf
Phi': 22 °

Name: Stiff to V. Stiff Fat CLAY LT
Unit Weight: 125 pcf
Cohesion': 150 psf
Phi': 20 °



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GALVESTON, TEXAS

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HOUSTON SHIP CHANNEL, TEXAS
DREDGED MATERIAL MANAGEMENT PLAN
SLOPE STABILITY ANALYSIS – LONG TERM
PA 15 CONTAINMENT DIKE STA. 150+00, EL +50

FILE NO:	PLATE NO:
	STAB-06

Houston Ship Channel DMMP
Spilman Is PA, Sta 133+00, EL +45
Exterior Slope - Short Term Condition
SpilmanIs.133+00.EL45.Channel.EOC1.1
5/19/2016

Name: Firm SA Lean CLAY (Dike)
Unit Weight: 120 pcf
Cohesion': 600 psf
Phi': 0 °

Name: Firm Fat CLAY w/SA
Unit Weight: 125 pcf
Cohesion': 600 psf
Phi': 0 °

Name: Hydraulic Fill 1
Unit Weight: 100 pcf
Cohesion': 150 psf
Phi': 0 °

Name: Soft Fat CLAY w/SA
Unit Weight: 125 pcf
Cohesion': 450 psf
Phi': 0 °

Name: Hydraulic Fill 2
Unit Weight: 100 pcf
Cohesion': 250 psf
Phi': 0 °

Name: V Soft Fat CLAY w/SA
Unit Weight: 120 pcf
Cohesion': 350 psf
Phi': 0 °

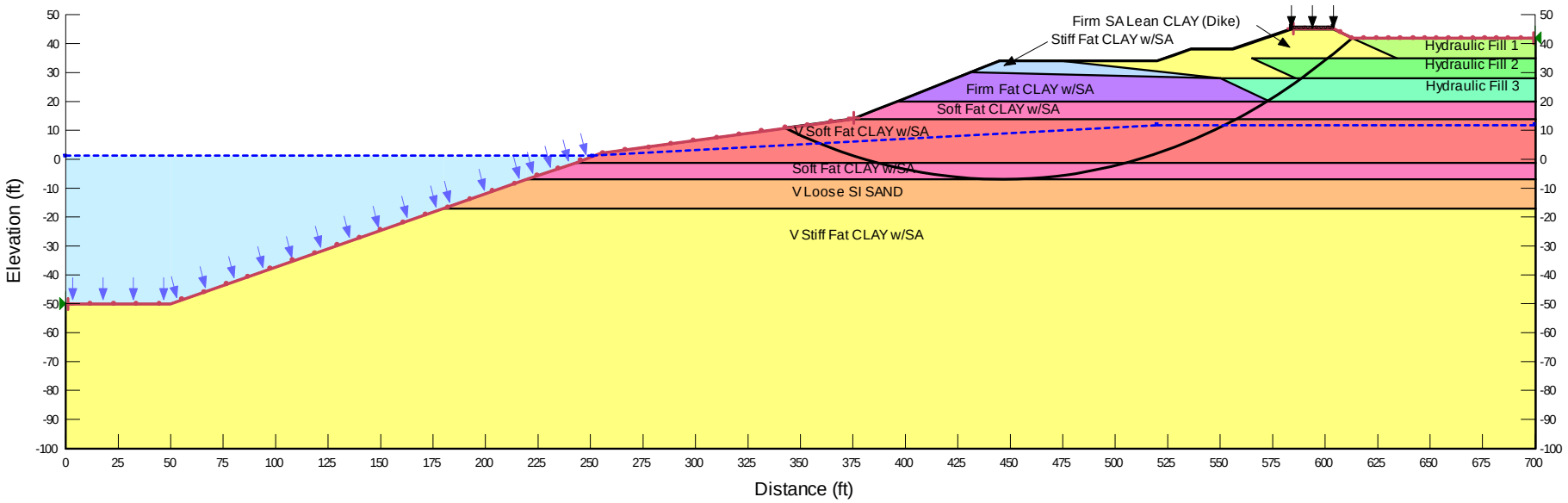
Name: Hydraulic Fill 3
Unit Weight: 100 pcf
Cohesion': 600 psf
Phi': 0 °

Name: V Loose SI SAND
Unit Weight: 115 pcf
Cohesion': 0 psf
Phi': 28 °

Name: Stiff Fat CLAY w/SA
Unit Weight: 125 pcf
Cohesion': 1,200 psf
Phi': 0 °

Name: V Stiff Fat CLAY w/SA
Unit Weight: 125 pcf
Cohesion': 1,500 psf
Phi': 0 °

1.25



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GALVESTON, TEXAS

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HOUSTON SHIP CHANNEL, TEXAS
DREDGED MATERIAL MANAGEMENT PLAN
SLOPE STABILITY ANALYSIS – SHORT TERM
SPILMAN IS. PA CONTAINMENT DIKE STA. 133+00, EL +45

FILE NO:	PLATE NO:
	STAB-07

Houston Ship Channel DMMP
Spilman Is PA, Sta 133+00, EL +45
Exterior Slope - Long Term Condition
SpilmanIs.133+00.EL45.Channel.LT1
5/19/2016

Name: Firm SA Lean CLAY (Dike)
Unit Weight: 120 pcf
Cohesion': 120 psf
Phi': 20 °

Name: Hydraulic Fill 1
Unit Weight: 100 pcf
Cohesion': 0 psf
Phi': 14 °

Name: Hydraulic Fill 2
Unit Weight: 100 pcf
Cohesion': 50 psf
Phi': 14 °

Name: Hydraulic Fill 3
Unit Weight: 100 pcf
Cohesion': 100 psf
Phi': 18 °

Name: Stiff Fat CLAY w/SA
Unit Weight: 125 pcf
Cohesion': 140 psf
Phi': 20 °

Name: Firm Fat CLAY w/SA
Unit Weight: 125 pcf
Cohesion': 120 psf
Phi': 20 °

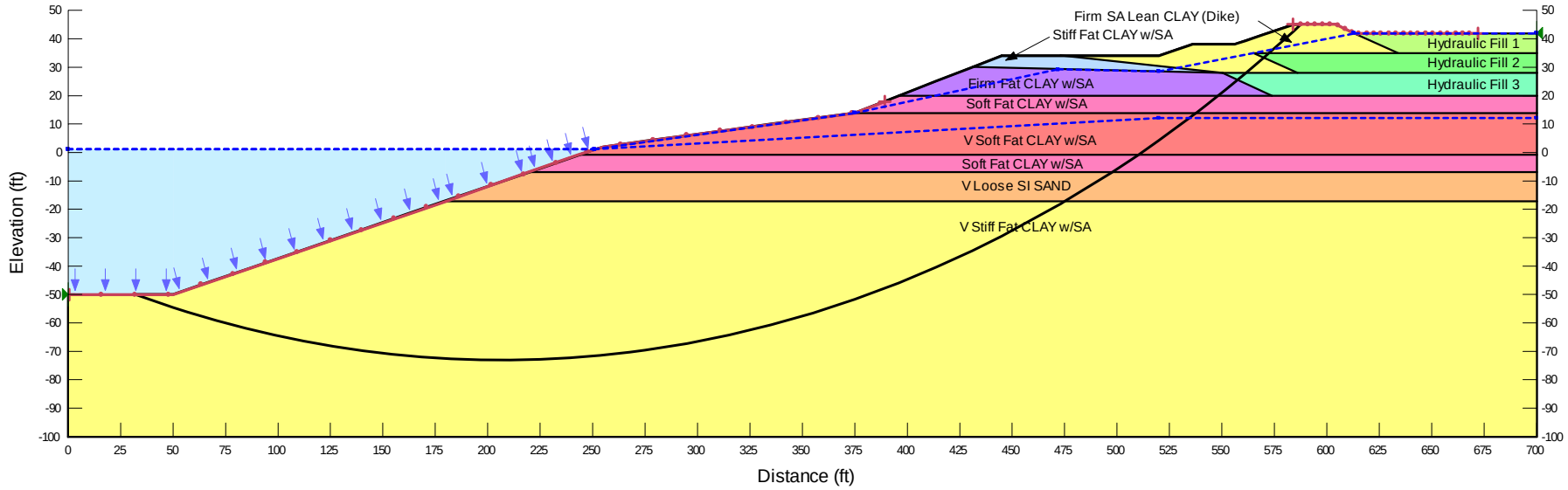
Name: Soft Fat CLAY w/SA
Unit Weight: 125 pcf
Cohesion': 100 psf
Phi': 18 °

Name: V Soft Fat CLAY w/SA
Unit Weight: 120 pcf
Cohesion': 80 psf
Phi': 18 °

Name: V Loose SI SAND
Unit Weight: 115 pcf
Cohesion': 0 psf
Phi': 28 °

Name: V Stiff Fat CLAY w/SA
Unit Weight: 125 pcf
Cohesion': 150 psf
Phi': 20 °

1.98



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HOUSTON SHIP CHANNEL, TEXAS
DREDGED MATERIAL MANAGEMENT PLAN
SLOPE STABILITY ANALYSIS – LONG TERM
SPILMAN IS. PA CONTAINMENT DIKE STA. 133+00, EL +45

FILE NO:	PLATE NO:
	STAB-08

Houston Ship Channel DMMP
Alexander Island PA, Sta 35+50, EL +45
Exterior Slope - Short Term Condition
Name: AlexanderIs.EL45.Step90.35+50new.EOC1
Date: 5/19/2016

Name: Firm SA Lean CLAY (Dike)
Unit Weight: 120 pcf
Cohesion': 600 psf
Phi': 0 °

Name: Hydraulic Fill 1
Unit Weight: 100 pcf
Cohesion': 150 psf
Phi': 0 °

Name: Hydraulic Fill 2
Unit Weight: 100 pcf
Cohesion': 250 psf
Phi': 0 °

Name: Hydraulic Fill 3
Unit Weight: 100 pcf
Cohesion': 600 psf
Phi': 0 °

Name: Hydraulic Fill 4
Unit Weight: 100 pcf
Cohesion': 800 psf
Phi': 0 °

Name: Loose-Me Dense SI SAND (Dike)
Unit Weight: 110 pcf
Cohesion': 0 psf
Phi': 28 °

Name: Soft to Firm Lean CLAY w/SA (Dike)
Unit Weight: 130 pcf
Cohesion': 450 psf
Phi': 0 °

Name: Soft SA SI CLAY
Unit Weight: 120 pcf
Cohesion': 400 psf
Phi': 0 °

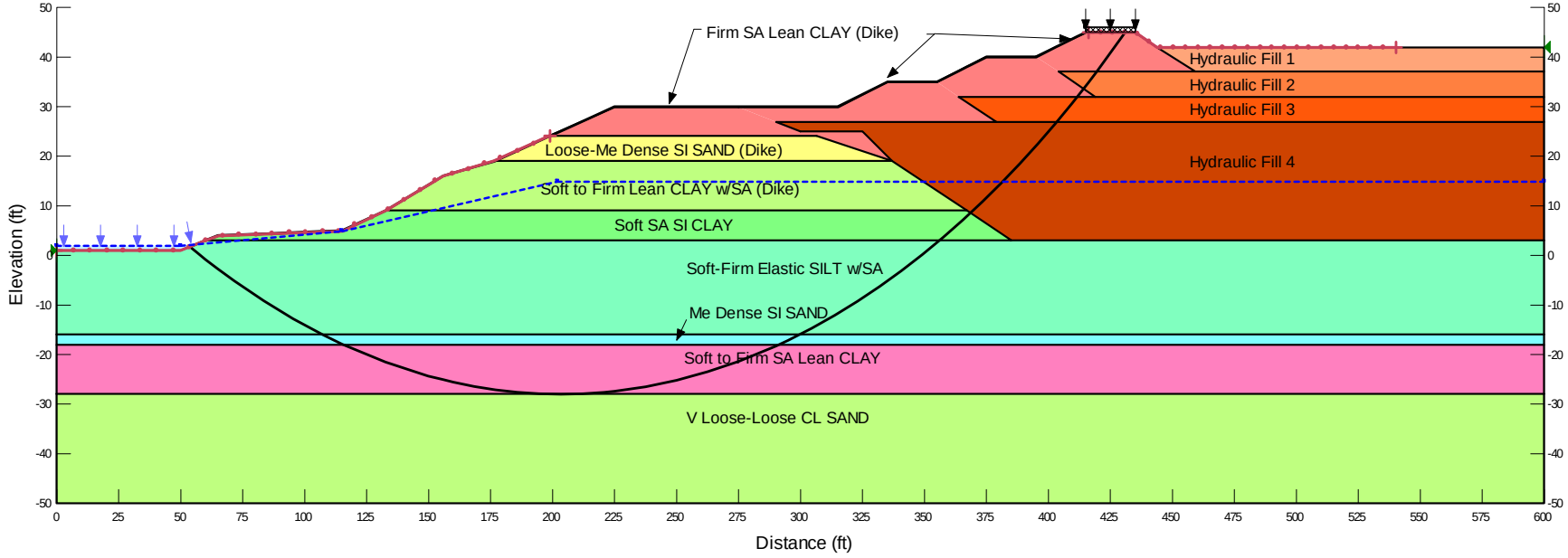
Name: Soft-Firm Elastic SILT w/SA
Unit Weight: 110 pcf
Cohesion Spatial Fn: 350 - 500 psf
Phi': 0 °

Name: Me Dense SI SAND
Unit Weight: 115 pcf
Cohesion': 0 psf
Phi': 32 °

Name: Soft to Firm SA Lean CLAY
Unit Weight: 130 pcf
Cohesion': 500 psf
Phi': 0 °

Name: V Loose-Loose CL SAND
Unit Weight: 115 pcf
Cohesion': 0 psf
Phi': 28 °

1.35



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GALVESTON, TEXAS

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HOUSTON SHIP CHANNEL, TEXAS
DREDGED MATERIAL MANAGEMENT PLAN
SLOPE STABILITY ANALYSIS – SHORT TERM
ALEXANDER IS. PA CONTAINMENT DIKE STA. 35+50, EL +45

FILE NO:	PLATE NO: STAB-09

Houston Ship Channel DMMP
Alexander Island PA, Sta 35+50, EL +45
Exterior Slope - Long Term Condition
Name: AlexanderIs.EL45.Step90.35+50new.LT1
Date: 5/19/2016

Name: Firm SA Lean CLAY (Dike) LT
Unit Weight: 120 pcf
Cohesion': 120 psf
Phi': 20 °

Name: Hydraulic Fill 1 LT
Unit Weight: 100 pcf
Cohesion': 0 psf
Phi': 14 °

Name: Hydraulic Fill 2 LT
Unit Weight: 100 pcf
Cohesion': 50 psf
Phi': 14 °

Name: Hydraulic Fill 3 LT
Unit Weight: 100 pcf
Cohesion': 100 psf
Phi': 18 °

Name: Hydraulic Fill 4 LT
Unit Weight: 100 pcf
Cohesion': 130 psf
Phi': 18 °

Name: Loose-Me Dense SI SAND (Dike) LT
Unit Weight: 110 pcf
Cohesion': 0 psf
Phi': 28 °

Name: Soft to Firm Lean CLAY w/SA (Dike) l
Unit Weight: 130 pcf
Cohesion': 120 psf
Phi': 18 °

Name: Soft SA SI CLAY LT
Unit Weight: 110 pcf
Cohesion': 100 psf
Phi': 18 °

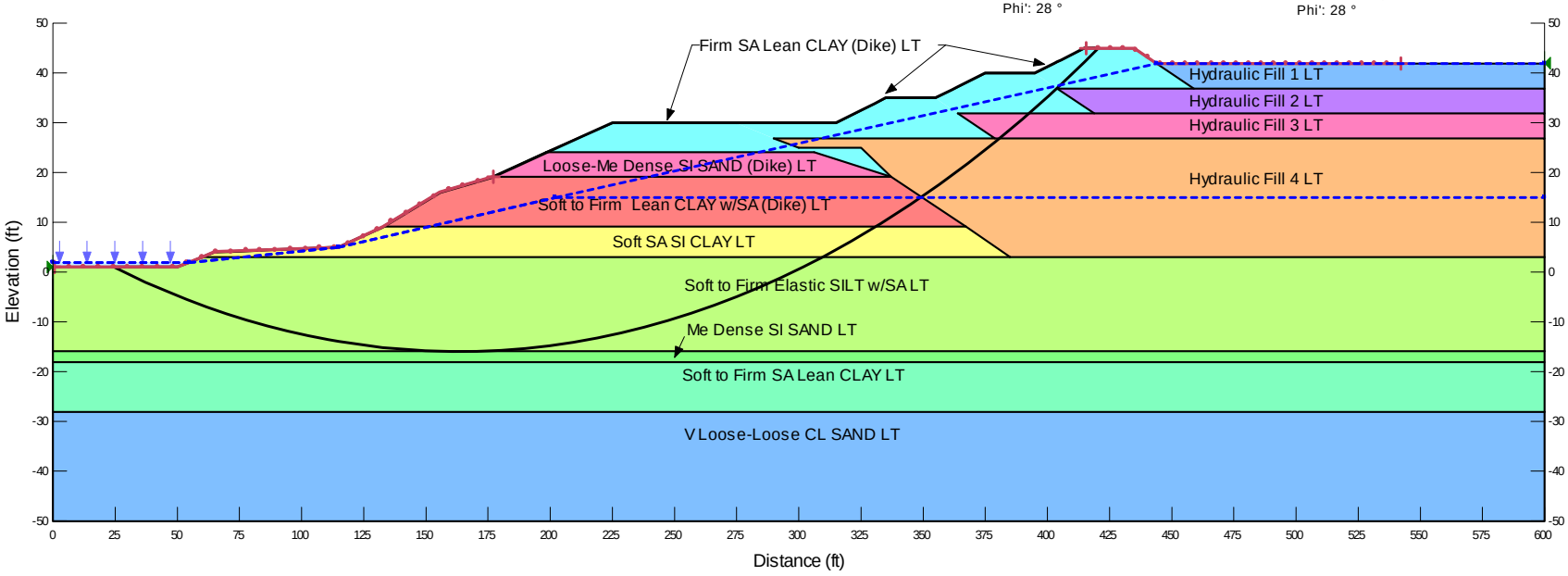
Name: Soft to Firm Elastic SILT w/SA LT
Unit Weight: 110 pcf
Cohesion': 80 psf
Phi': 18 °

Name: Me Dense SI SAND LT
Unit Weight: 115 pcf
Cohesion': 0 psf
Phi': 32 °

Name: Soft to Firm SA Lean CLAY LT
Unit Weight: 130 pcf
Cohesion': 120 psf
Phi': 22 °

Name: V Loose-Loose CL SAND LT
Unit Weight: 115 pcf
Cohesion': 0 psf
Phi': 28 °

2.12



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HOUSTON SHIP CHANNEL, TEXAS
DREDGED MATERIAL MANAGEMENT PLAN
SLOPE STABILITY ANALYSIS – LONG TERM
ALEXANDER IS. PA CONTAINMENT DIKE STA. 35+50, EL +45

FILE NO:	PLATE NO:
	STAB-10

Houston Ship Channel DMMP
Peggy Lake PA, Sta 130+00, EL +35
Exterior Slope - Short Term Condition
PeggyLake.EL35.130+00New.Step.EOC
5/19/2016

Name: Firm SA Lean CLAY (Dike)
Unit Weight: 120 pcf
Cohesion': 600 psf
Phi': 0 °

Name: Hydraulic Fill 1
Unit Weight: 100 pcf
Cohesion': 150 psf
Phi': 0 °

Name: Hydraulic Fill 2
Unit Weight: 100 pcf
Cohesion': 250 psf
Phi': 0 °

Name: Hydraulic Fill 3
Unit Weight: 100 pcf
Cohesion': 600 psf
Phi': 0 °

Name: Stiff - V. Stiff Fat CLAY w/SA
Unit Weight: 130 pcf
Cohesion': 1,500 psf
Phi': 0 °

Name: Soft SA Lean CLAY (Berm)
Unit Weight: 120 pcf
Cohesion': 400 psf
Phi': 0 °

Name: Me. Dense to V. Dense SI SAND w/CL
Unit Weight: 115 pcf
Cohesion': 0 psf
Phi': 32 °

Name: Stiff Ln CLAY w/SA
Unit Weight: 120 pcf
Cohesion': 1,000 psf
Phi': 0 °

Name: Me. Dense SI SAND
Unit Weight: 115 pcf
Cohesion': 0 psf
Phi': 32 °

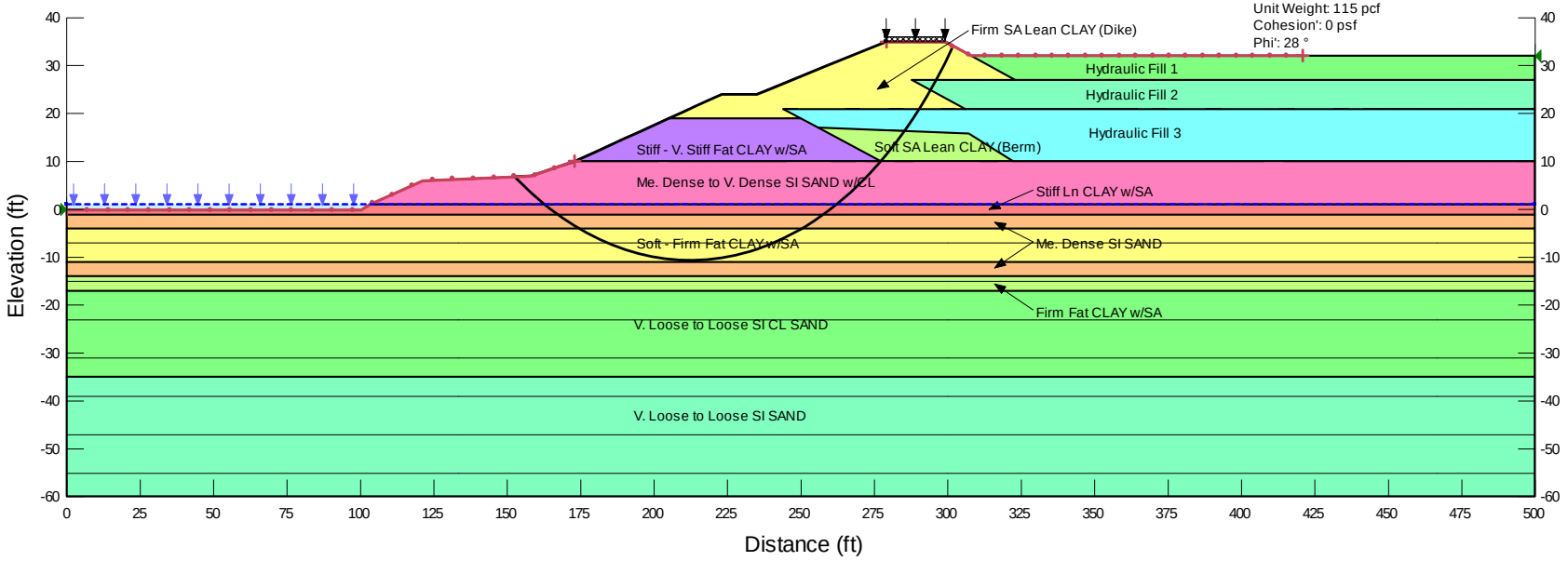
Name: Soft - Firm Fat CLAY w/SA
Unit Weight: 120 pcf
Cohesion Spatial Fn: 350-500 psf
Phi': 0 °

Name: Firm Fat CLAY w/SA
Unit Weight: 120 pcf
Cohesion': 600 psf
Phi': 0 °

Name: V. Loose to Loose SI CL SAND
Unit Weight: 115 pcf
Cohesion': 0 psf
Phi': 23 °

Name: V. Loose to Loose SI SAND
Unit Weight: 115 pcf
Cohesion': 0 psf
Phi': 28 °

1.62



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HOUSTON SHIP CHANNEL, TEXAS
DREDGED MATERIAL MANAGEMENT PLAN
SLOPE STABILITY ANALYSIS – SHORT TERM
PEGGY LAKE PA CONTAINMENT DIKE STA. 130+00, EL +35

FILE NO:	PLATE NO:
	STAB-11

Houston Ship Channel DMMP
Peggy Lake PA, Sta 130+00, EL +35
Exterior Slope - Long Term Condition
PeggyLake.EL35.130+00New.Step.LT
5/19/2016

Name: Firm SA Lean CLAY (Dike) LT
Unit Weight: 120 pcf
Cohesion': 120 psf
Phi': 20 °

Name: Hydraulic Fill 1 LT
Unit Weight: 100 pcf
Cohesion': 0 psf
Phi': 14 °

Name: Hydraulic Fill 2 LT
Unit Weight: 100 pcf
Cohesion': 50 psf
Phi': 14 °

Name: Hydraulic Fill 3 LT
Unit Weight: 100 pcf
Cohesion': 100 psf
Phi': 18 °

Name: Stiff - V. Stiff Fat CLAY w/SA LT
Unit Weight: 130 pcf
Cohesion': 140 psf
Phi': 18 °

Name: Soft SA Lean CLAY (Berm) LT
Unit Weight: 120 pcf
Cohesion': 100 psf
Phi': 20 °

Name: Me. Dense to V. Dense SI SAND w/CL LT
Unit Weight: 115 pcf
Cohesion': 0 psf
Phi': 32 °

Name: Stiff Ln CLAY w/SA LT
Unit Weight: 120 pcf
Cohesion': 130 psf
Phi': 18 °

Name: Me. Dense SI SAND LT
Unit Weight: 115 pcf
Cohesion': 0 psf
Phi': 32 °

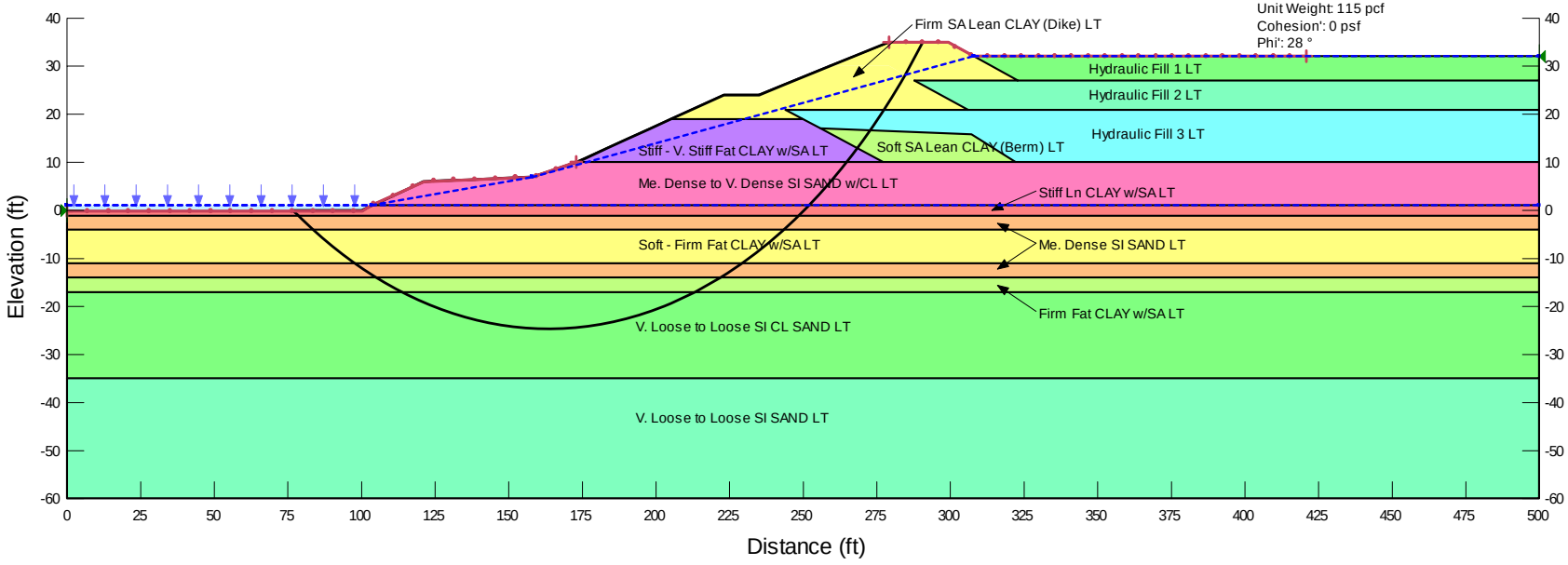
Name: Soft - Firm Fat CLAY w/SA LT
Unit Weight: 120 pcf
Cohesion': 100 psf
Phi': 18 °

Name: Firm Fat CLAY w/SA LT
Unit Weight: 120 pcf
Cohesion': 120 psf
Phi': 18 °

Name: V. Loose to Loose SI CL SAND LT
Unit Weight: 115 pcf
Cohesion': 0 psf
Phi': 23 °

Name: V. Loose to Loose SI SAND LT
Unit Weight: 115 pcf
Cohesion': 0 psf
Phi': 28 °

2.10



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HOUSTON SHIP CHANNEL, TEXAS
DREDGED MATERIAL MANAGEMENT PLAN
SLOPE STABILITY ANALYSIS – LONG TERM
PEGGY LAKE PA CONTAINMENT DIKE STA. 130+00, EL +35

FILE NO:	PLATE NO:
	STAB-12

Houston Ship Channel DMMP
Lost Lake PA, Sta 167+00, EL +38.6
Exterior Slope - Short Term Condition
LostLake.EL38.5.4H1V.Stable2.1.EOC1
5/19/2016

Name: Firm SA Lean CLAY (Dike)
Unit Weight: 120 pcf
Cohesion': 600 psf
Phi': 0 °

Name: Hyd Fill 1
Unit Weight: 110 pcf
Cohesion': 150 psf
Phi': 0 °

Name: Hyd Fill 2
Unit Weight: 100 pcf
Cohesion': 250 psf
Phi': 0 °

Name: Hyd Fill 3
Unit Weight: 100 pcf
Cohesion': 600 psf
Phi': 0 °

Name: Stiff SA Lean CLAY
Unit Weight: 125 pcf
Cohesion': 1,000 psf
Phi': 0 °

Name: Deep Soil Mixing Panels
Unit Weight: 115 pcf
Cohesion': 900 psf
Phi': 0 °

Name: Soft-Firm SA Fat CLAY
Unit Weight: 125 pcf
Cohesion Spatial Fn: 350-500
Phi': 0 °

Name: Loose SI CL SAND
Unit Weight: 120 pcf
Cohesion': 0 psf
Phi': 28 °

Name: Soft Fat CLAY w/SA
Unit Weight: 125 pcf
Cohesion': 400 psf
Phi': 0 °

Name: Firm Fat CLAY w/SA
Unit Weight: 125 pcf
Cohesion': 800 psf
Phi': 0 °

Name: Soft-Firm Lean CLAY w/SA
Unit Weight: 125 pcf
Cohesion Spatial Fn: 350-500
Phi': 0 °

Name: V Soft-Soft Lean CLAY w/SA
Unit Weight: 125 pcf
Cohesion Spatial Fn: 300-400
Phi': 0 °

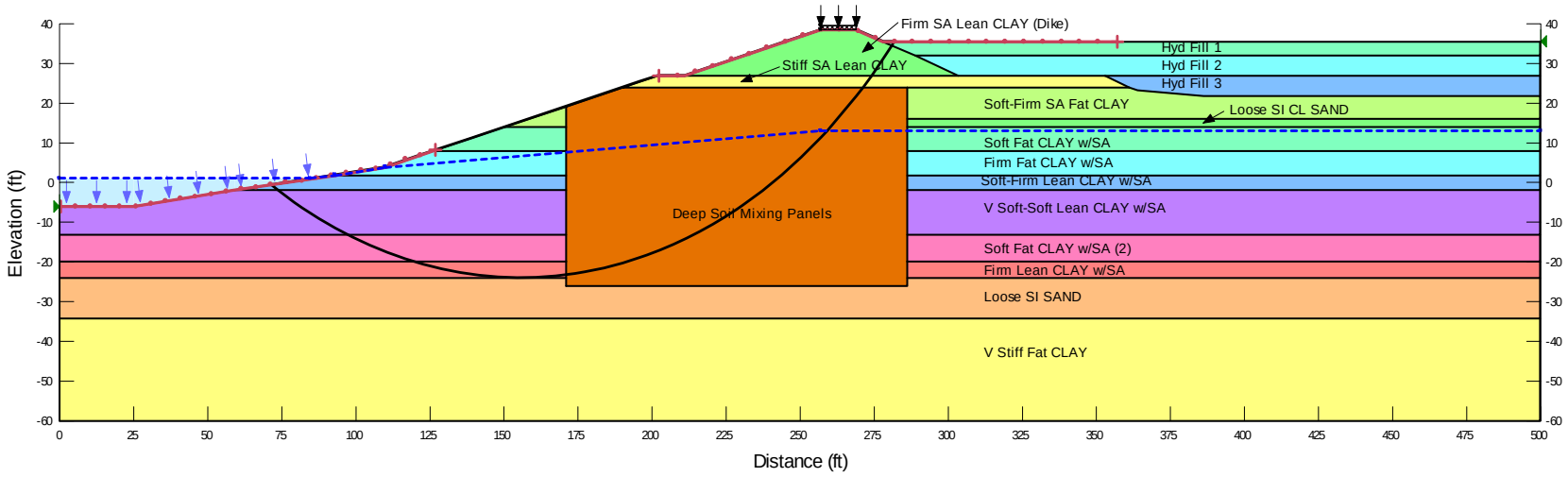
Name: Soft Fat CLAY w/SA (2)
Unit Weight: 125 pcf
Cohesion': 450 psf
Phi': 0 °

Name: Firm Lean CLAY w/SA
Unit Weight: 125 pcf
Cohesion': 600 psf
Phi': 0 °

Name: Loose SI SAND
Unit Weight: 115 pcf
Cohesion': 0 psf
Phi': 30 °

Name: V Stiff Fat CLAY
Unit Weight: 125 pcf
Cohesion': 1,500 psf
Phi': 0 °

1.32



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HOUSTON SHIP CHANNEL, TEXAS
DREDGED MATERIAL MANAGEMENT PLAN
SLOPE STABILITY ANALYSIS – SHORT TERM
LOST LAKE PA CONTAINMENT DIKE STA. 167+00, EL +38.5

FILE NO:	PLATE NO:
	STAB-13

Houston Ship Channel DMMP
Lost Lake PA, Sta 167+00, EL +38.6
Exterior Slope - Long Term Condition
LostLake.EL38.5.4H1V.Stable2.1.LT1.1
5/19/2016

Name: Firm SA Lean CLAY (Dike) LT
Unit Weight: 120 pcf
Cohesion': 120 psf
Phi': 20 °

Name: Hyd Fill 1 LT
Unit Weight: 110 pcf
Cohesion': 0 psf
Phi': 14 °

Name: Hyd Fill 2 LT
Unit Weight: 115 pcf
Cohesion': 50 psf
Phi': 14 °

Name: Hyd Fill 3 LT
Unit Weight: 115 pcf
Cohesion': 100 psf
Phi': 18 °

Name: Stiff SA Lean CLAY LT
Unit Weight: 125 pcf
Cohesion': 130 psf
Phi': 20 °

Name: Deep Soil Mixing Panels LT
Unit Weight: 115 pcf
Cohesion': 150 psf
Phi': 22 °

Name: Soft-Firm SA Fat CLAY LT
Unit Weight: 125 pcf
Cohesion': 100 psf
Phi': 18 °

Name: Loose SI CL SAND LT
Unit Weight: 120 pcf
Cohesion': 0 psf
Phi': 28 °

Name: Soft Fat CLAY w/SA LT
Unit Weight: 125 pcf
Cohesion': 100 psf
Phi': 18 °

Name: Firm Fat CLAY w/SA LT
Unit Weight: 125 pcf
Cohesion': 120 psf
Phi': 20 °

Name: Soft-Firm Lean CLAY w/SA LT
Unit Weight: 125 pcf
Cohesion': 120 psf
Phi': 18 °

Name: V Soft-Soft Lean CLAY w/SA LT
Unit Weight: 125 pcf
Cohesion': 80 psf
Phi': 18 °

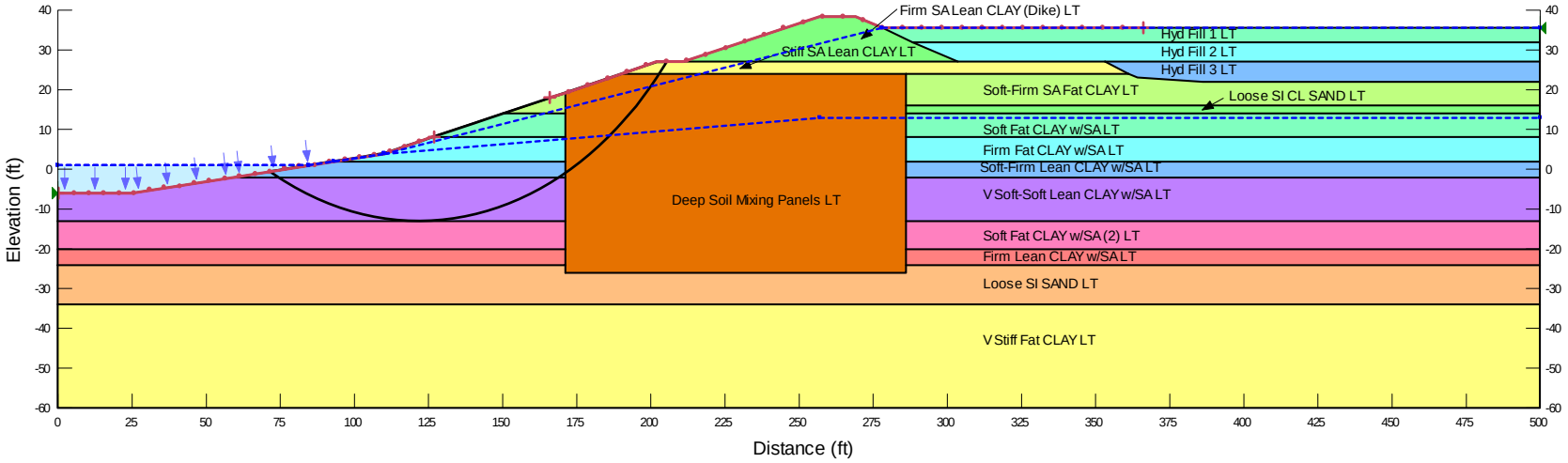
Name: Soft Fat CLAY w/SA (2) LT
Unit Weight: 125 pcf
Cohesion': 100 psf
Phi': 18 °

Name: Firm Lean CLAY w/SA LT
Unit Weight: 125 pcf
Cohesion': 120 psf
Phi': 20 °

Name: Loose SI SAND LT
Unit Weight: 115 pcf
Cohesion': 0 psf
Phi': 30 °

Name: V Stiff Fat CLAY LT
Unit Weight: 125 pcf
Cohesion': 150 psf
Phi': 22 °

1.57



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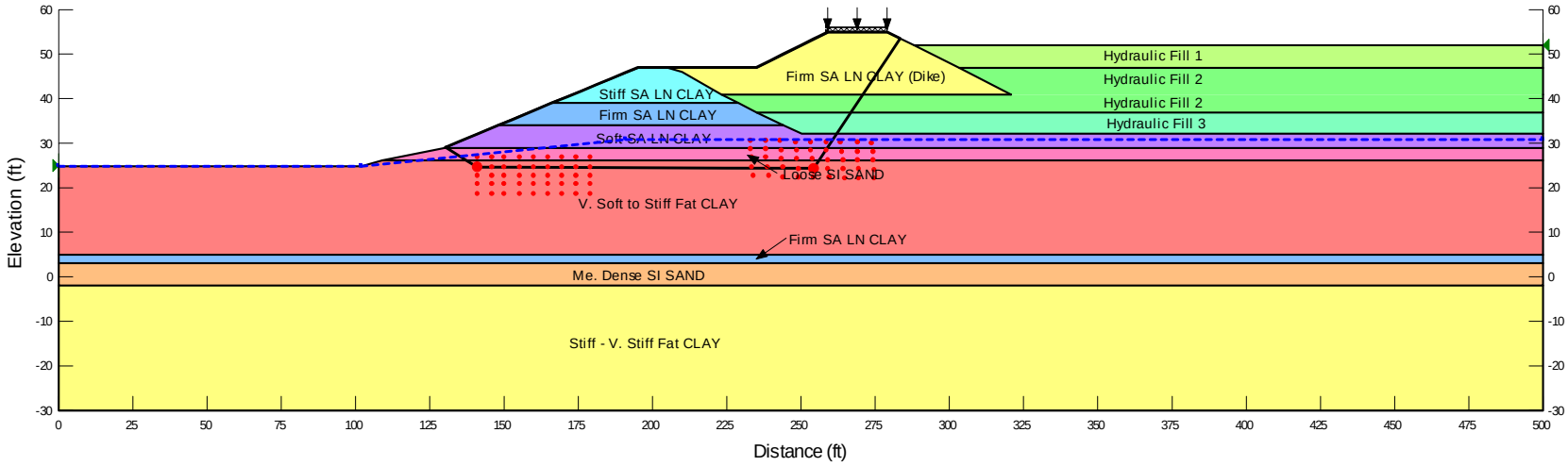
HOUSTON SHIP CHANNEL, TEXAS
DREDGED MATERIAL MANAGEMENT PLAN
SLOPE STABILITY ANALYSIS – LONG TERM
LOST LAKE PA CONTAINMENT DIKE STA. 167+00, EL +38.5

FILE NO:	PLATE NO:
	STAB-14

Houston Ship Channel DMMP
Rosa Allen PA, Sta 19+00, EL +55
Exterior Slope - Short Term Conditions
RosaAllen.EL55.Sta19+00Step40.WL31.EOC
5/19/2016

Name: Firm SA LN CLAY (Dike)
Unit Weight: 120 pcf
Cohesion': 600 psf
Phi': 0 °
Name: Hydraulic Fill 1
Unit Weight: 100 pcf
Cohesion': 150 psf
Phi': 0 °
Name: Hydraulic Fill 2
Unit Weight: 100 pcf
Cohesion': 250 psf
Phi': 0 °
Name: Hydraulic Fill 3
Unit Weight: 100 pcf
Cohesion': 600 psf
Phi': 0 °
Name: Stiff SA LN CLAY
Unit Weight: 120 pcf
Cohesion': 1,000 psf
Phi': 0 °
Name: Firm SA LN CLAY
Unit Weight: 125 pcf
Cohesion': 600 psf
Phi': 0 °
Name: Soft SA LN CLAY
Unit Weight: 120 pcf
Cohesion': 400 psf
Phi': 0 °
Name: Loose SI SAND
Unit Weight: 110 pcf
Cohesion': 0 psf
Phi': 28 °
Name: V. Soft to Stiff Fat CLA
Unit Weight: 125 pcf
Cohesion Spatial Fn: 250-120
Phi': 0 °
Name: Me. Dense SI SAND
Unit Weight: 115 pcf
Cohesion': 0 psf
Phi': 32 °
Name: Stiff - V. Stiff Fat CLAY
Unit Weight: 130 pcf
Cohesion': 1,500 psf
Phi': 0 °

1.42



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HOUSTON SHIP CHANNEL, TEXAS
DREDGED MATERIAL MANAGEMENT PLAN
SLOPE STABILITY ANALYSIS – SHORT TERM
ROSA ALLEN PA CONTAINMENT DIKE STA. 19+00, EL +55

FILE NO:	PLATE NO:
	STAB-15

Houston Ship Channel DMMP
Rosa Allen PA, Sta 19+00, EL +55
Exterior Slope - Long Term Conditions
RosaAllen.EL55.Sta19+00Step40.WL31.LT
5/19/2016

Name: Firm SA LN CLAY (Dike) LT
Unit Weight: 120 pcf
Cohesion': 120 psf
Phi': 20 °

Name: Hydraulic Fill 1 LT
Unit Weight: 100 pcf
Cohesion': 0 psf
Phi': 14 °

Name: Hydraulic Fill 2 LT
Unit Weight: 100 pcf
Cohesion': 50 psf
Phi': 14 °

Name: Hydraulic Fill 3 LT
Unit Weight: 100 pcf
Cohesion': 100 psf
Phi': 18 °

Name: Stiff SA LN CLAY LT
Unit Weight: 120 pcf
Cohesion': 130 psf
Phi': 20 °

Name: Firm SA LN CLAY LT
Unit Weight: 125 pcf
Cohesion': 120 psf
Phi': 20 °

Name: Soft SA LN CLAY LT
Unit Weight: 120 pcf
Cohesion': 110 psf
Phi': 18 °

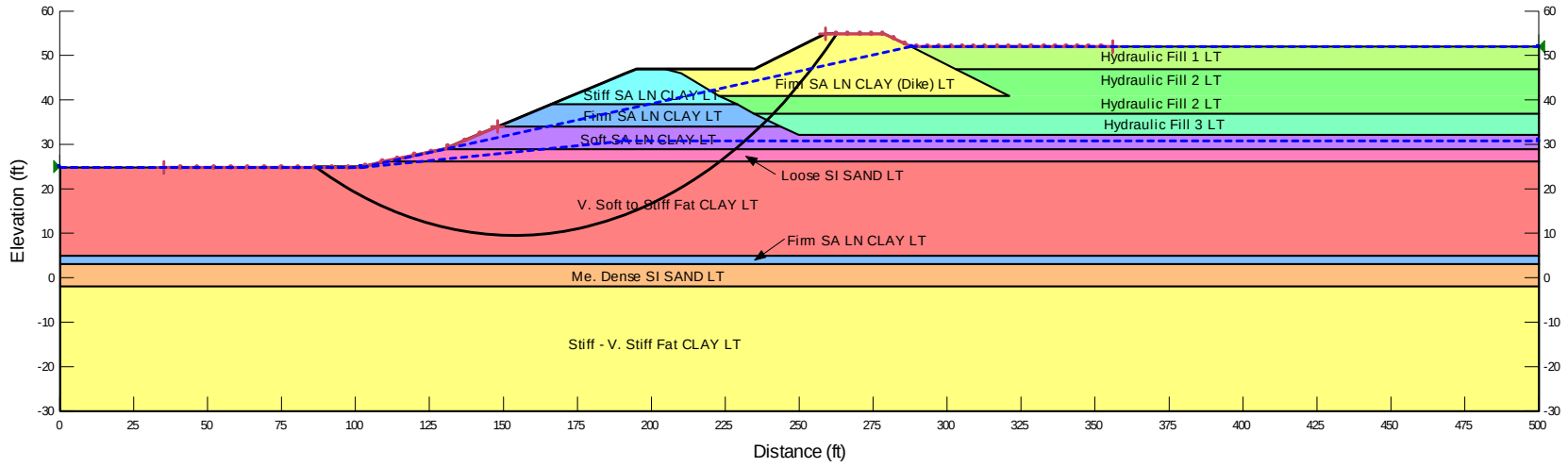
Name: Loose SI SAND LT
Unit Weight: 110 pcf
Cohesion': 0 psf
Phi': 28 °

Name: V. Soft to Stiff Fat CLAY L
Unit Weight: 125 pcf
Cohesion Spatial Fn: 80-200
Phi': 18 °

Name: Me. Dense SI SAND LT
Unit Weight: 115 pcf
Cohesion': 0 psf
Phi': 32 °

Name: Stiff - V. Stiff Fat CLAY LT
Unit Weight: 130 pcf
Cohesion': 220 psf
Phi': 18 °

1.89



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GALVESTON, TEXAS

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HOUSTON SHIP CHANNEL, TEXAS
DREDGED MATERIAL MANAGEMENT PLAN
SLOPE STABILITY ANALYSIS – LONG TERM
ROSA ALLEN PA CONTAINMENT DIKE STA. 19+00, EL +55

FILE NO:	PLATE NO:
	STAB-16

Houston Ship Channel DMMP
Clinton PA, East Cell, Sta 38+00, EL +60
Exterior Slope - Short Term Condition
ClintonEast.EL60Step40.38+00.WL32.EOC
5/19/2016

Name: Firm SA LN CLAY (Dike)
Unit Weight: 120 pcf
Cohesion': 600 psf
Phi': 0 °

Name: Hydraulic Fill 1
Unit Weight: 100 pcf
Cohesion': 150 psf
Phi': 0 °

Name: Hydraulic Fill 2
Unit Weight: 100 pcf
Cohesion': 250 psf
Phi': 0 °

Name: Hydraulic Fill 3
Unit Weight: 100 pcf
Cohesion': 600 psf
Phi': 0 °

Name: Stiff SA LN CLAY
Unit Weight: 120 pcf
Cohesion': 1,000 psf
Phi': 0 °

Name: V. Stiff SA LN CLAY
Unit Weight: 130 pcf
Cohesion': 1,500 psf
Phi': 0 °

Name: Firm Fat CLAY w/SA
Unit Weight: 120 pcf
Cohesion': 800 psf
Phi': 0 °

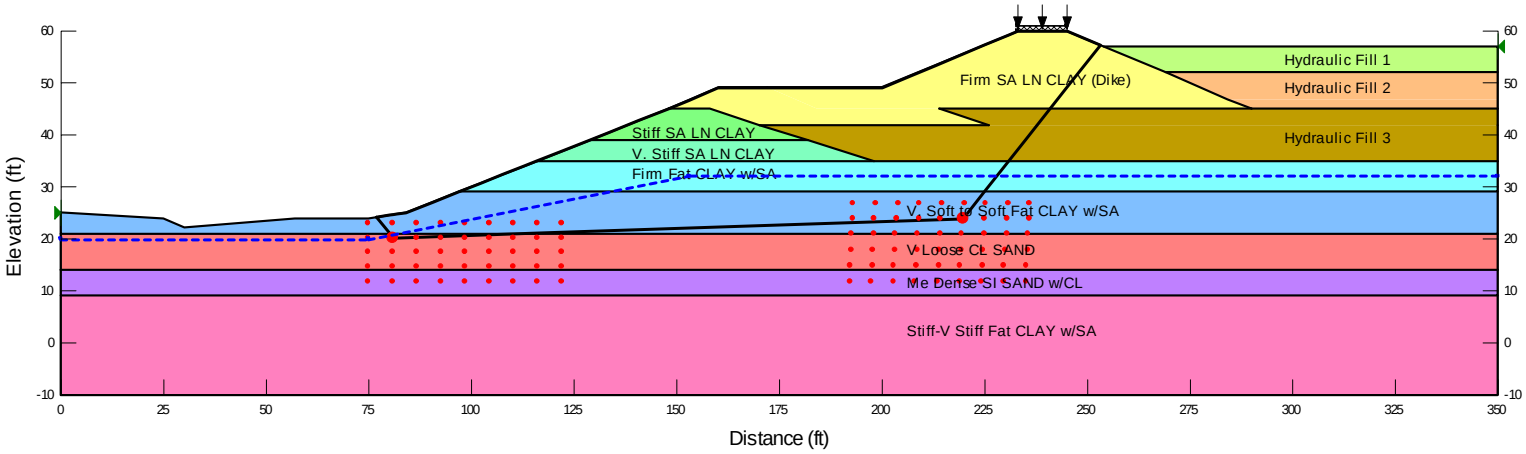
Name: V. Soft to Soft Fat CLAY w/SA
Unit Weight: 125 pcf
Cohesion': 500 psf
Phi': 0 °

Name: V Loose CL SAND
Unit Weight: 115 pcf
Cohesion': 0 psf
Phi': 28 °

Name: Me Dense SI SAND w/CL
Unit Weight: 115 pcf
Cohesion': 0 psf
Phi': 30 °

Name: Stiff-V Stiff Fat CLAY w/SA
Unit Weight: 130 pcf
Cohesion': 1,500 psf
Phi': 0 °

1.52



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GALVESTON, TEXAS

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HOUSTON SHIP CHANNEL, TEXAS
DREDGED MATERIAL MANAGEMENT PLAN
SLOPE STABILITY ANALYSIS – SHORT TERM
CLINTON PA EAST CELL CONTAINMENT DIKE STA. 38+00, EL +60

FILE NO:	PLATE NO:
	STAB-17

Houston Ship Channel DMMP
Clinton PA, East Cell, Sta 38+00, EL +60
Exterior Slope - Long Term Condition
ClintonEast.EL60Step40.38+00.WL57.LT
5/19/2016

Name: Firm SA LN CLAY (Dike) LT
Unit Weight: 120 pcf
Cohesion': 120 psf
Phi': 20 °

Name: Hydraulic Fill 1 LT
Unit Weight: 100 pcf
Cohesion': 0 psf
Phi': 14 °

Name: Hydraulic Fill 2 LT
Unit Weight: 100 pcf
Cohesion': 50 psf
Phi': 14 °

Name: Hydraulic Fill 3 LT
Unit Weight: 100 pcf
Cohesion': 100 psf
Phi': 18 °

Name: Stiff SA LN CLAY LT
Unit Weight: 120 pcf
Cohesion': 130 psf
Phi': 20 °

Name: V. Stiff SA LN CLAY LT
Unit Weight: 130 pcf
Cohesion': 200 psf
Phi': 20 °

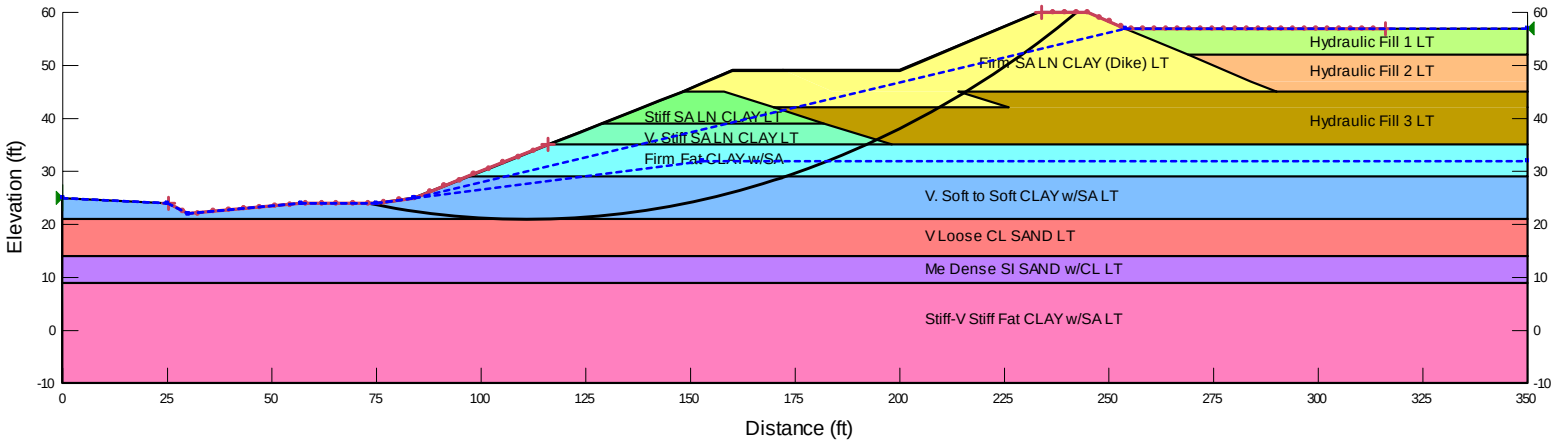
Name: Firm Fat CLAY w/SA
Unit Weight: 120 pcf
Cohesion': 120 psf
Phi': 18 °

Name: V. Soft to Soft CLAY w/SA LT
Unit Weight: 125 pcf
Cohesion': 100 psf
Phi': 18 °

Name: Me Dense SI SAND w/CL LT
Unit Weight: 115 pcf
Cohesion': 0 psf
Phi': 30 °

Name: Stiff-V Stiff Fat CLAY w/SA LT
Unit Weight: 130 pcf
Cohesion': 200 psf
Phi': 20 °

1.78



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HOUSTON SHIP CHANNEL, TEXAS
DREDGED MATERIAL MANAGEMENT PLAN
SLOPE STABILITY ANALYSIS – LONG TERM
CLINTON PA EAST CELL CONTAINMENT DIKE STA. 38+00, EL +60

FILE NO:	PLATE NO:
	STAB-18

Houston Ship Channel DMMP
Clinton PA, West Cell, Sta 102+00, EL +60
Exterior Slope - Short Term Condition
ClintonWest.EL60Step40.102+00.EOC1.2
5/19/2016

Name: Hydraulic Fill 2
Unit Weight: 100 pcf
Cohesion': 250 psf
Phi': 0 °

Name: Hydraulic Fill 3
Unit Weight: 100 pcf
Cohesion': 600 psf
Phi': 0 °

Name: Loose-Me Dense SI SAND
Unit Weight: 115 pcf
Cohesion': 0 psf
Phi': 30 °

Name: Firm-Stiff Fat CLAY w/Sa
Unit Weight: 120 pcf
Cohesion': 800 psf
Phi': 0 °

Name: Soft-Firm Fat CLAY w/Sa
Unit Weight: 120 pcf
Cohesion': 400 psf
Phi': 0 °

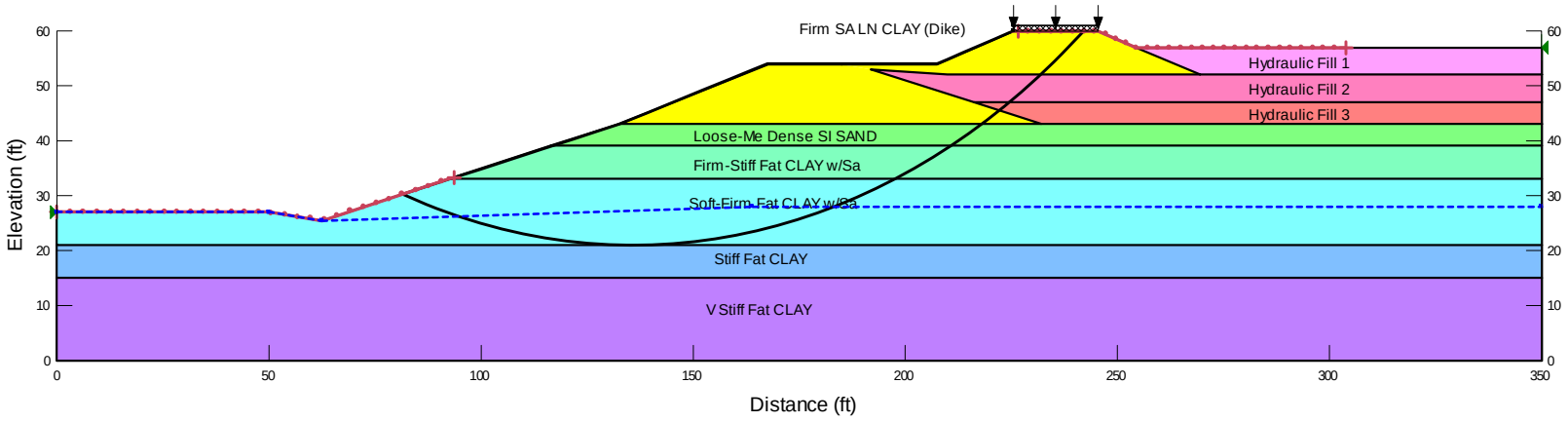
Name: Firm SA LN CLAY (Dike)
Unit Weight: 120 pcf
Cohesion': 600 psf
Phi': 0 °

Name: Stiff Fat CLAY
Unit Weight: 130 pcf
Cohesion': 1,200 psf
Phi': 0 °

Name: Hydraulic Fill 1
Unit Weight: 100 pcf
Cohesion': 150 psf
Phi': 0 °

Name: V Stiff Fat CLAY
Unit Weight: 130 pcf
Cohesion': 1,500 psf
Phi': 0 °

1.39



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GALVESTON, TEXAS

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HOUSTON SHIP CHANNEL, TEXAS
DREDGED MATERIAL MANAGEMENT PLAN
SLOPE STABILITY ANALYSIS – SHORT TERM
CLINTON PA WEST CELL CONTAINMENT DIKE STA. 102+00, EL +60

FILE NO:	PLATE NO:
	STAB-19

Houston Ship Channel DMMP
Clinton PA, West Cell, Sta 102+00, EL +60
Exterior Slope - Long Term Condition
ClintonWest.EL60Step40.102+00.LT1.1
5/19/2016

Name: Hydraulic Fill 2 LT
Unit Weight: 100 pcf
Cohesion': 50 psf
Phi': 14 °

Name: Hydraulic Fill 3 LT
Unit Weight: 100 pcf
Cohesion': 100 psf
Phi': 18 °

Name: Loose-Me Dense SI SAND LT
Unit Weight: 115 pcf
Cohesion': 0 psf
Phi': 30 °

Name: Firm-Stiff Fat CLAY w/Sa LT
Unit Weight: 120 pcf
Cohesion': 120 psf
Phi': 20 °

Name: Soft-Firm Fat CLAY w/Sa LT
Unit Weight: 120 pcf
Cohesion': 100 psf
Phi': 20 °

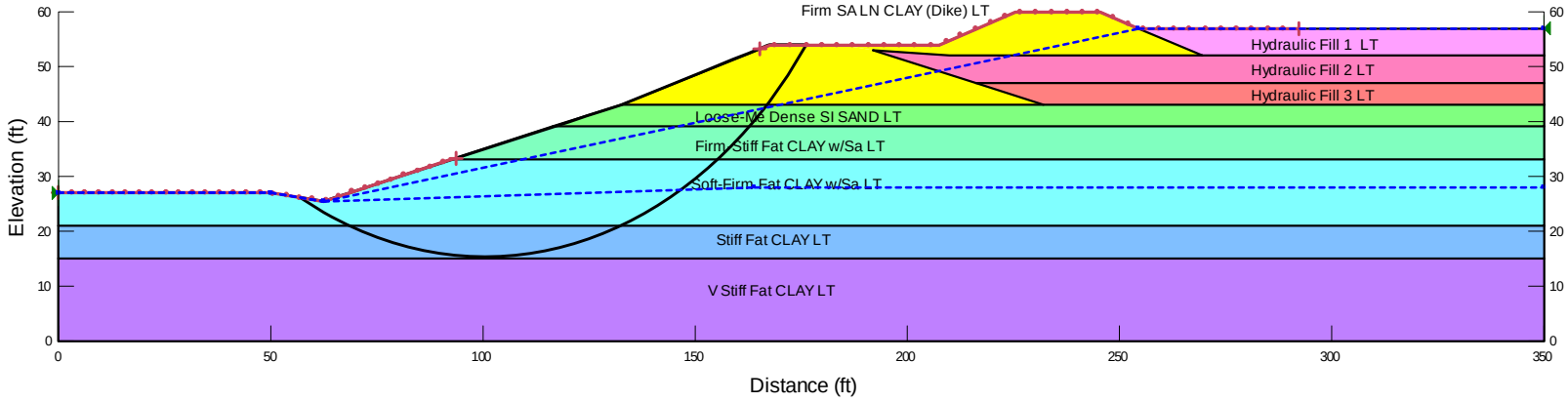
Name: Firm SA LN CLAY (Dike) LT
Unit Weight: 120 pcf
Cohesion': 120 psf
Phi': 20 °

Name: Stiff Fat CLAY LT
Unit Weight: 130 pcf
Cohesion': 150 psf
Phi': 18 °

Name: Hydraulic Fill 1 LT
Unit Weight: 100 pcf
Cohesion': 0 psf
Phi': 14 °

Name: V Stiff Fat CLAY LT
Unit Weight: 130 pcf
Cohesion': 220 psf
Phi': 18 °

1.68



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HOUSTON SHIP CHANNEL, TEXAS
DREDGED MATERIAL MANAGEMENT PLAN
SLOPE STABILITY ANALYSIS – LONG TERM
CLINTON PA WEST CELL CONTAINMENT DIKE STA. 102+00, EL +60

FILE NO:	PLATE NO:
	STAB-20

Houston Ship Channel DMMP
House Tract PA, Sta 163+00, EL +66
Exterior Slope - Short Term Condition
Housetract.Sta163+00.EL66 Step 40.WL22.EOC
5/19/2016

Name: Firm SA LN CLAY (Dike)
Unit Weight: 120 pcf
Cohesion': 600 psf
Phi': 0 °

Name: Hydraulic Fill 1
Unit Weight: 100 pcf
Cohesion': 150 psf
Phi': 0 °

Name: Hydraulic Fill 2
Unit Weight: 100 pcf
Cohesion': 250 psf
Phi': 0 °

Name: Hydraulic Fill 3
Unit Weight: 100 pcf
Cohesion': 600 psf
Phi': 0 °

Name: Stiff-V Stiff Fat CLAY w/Sa
Unit Weight: 125 pcf
Cohesion': 1,200 psf
Phi': 0 °

Name: Firm Fat CLAY w/Sa
Unit Weight: 120 pcf
Cohesion': 600 psf
Phi': 0 °

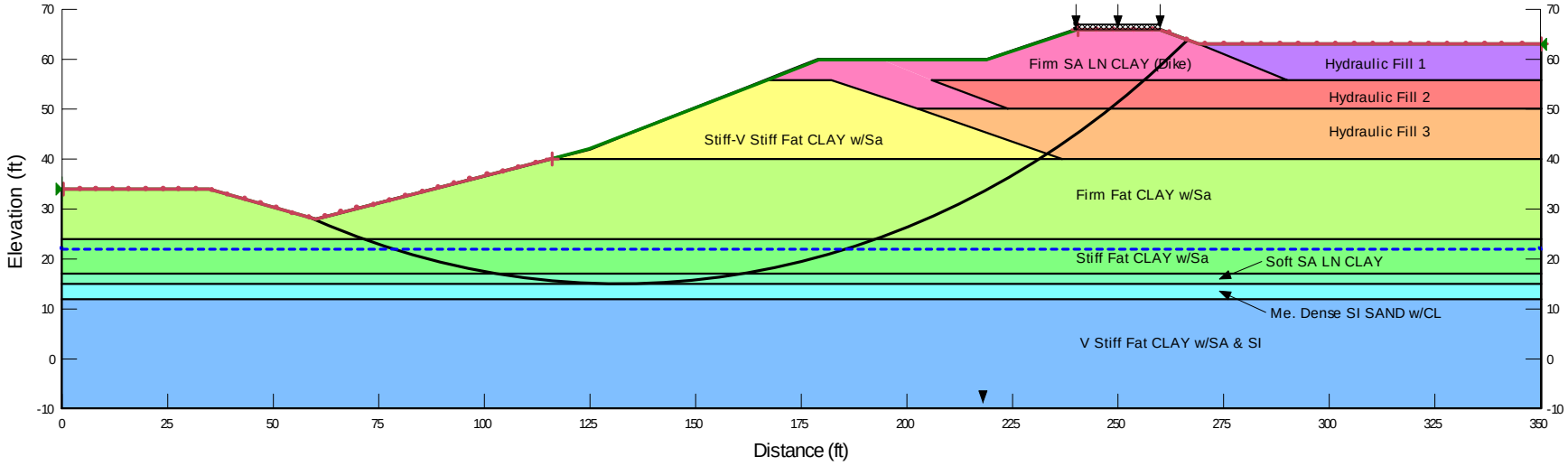
Name: Stiff Fat CLAY w/Sa
Unit Weight: 125 pcf
Cohesion': 1,200 psf
Phi': 0 °

Name: Soft SA LN CLAY
Unit Weight: 125 pcf
Cohesion': 300 psf
Phi': 0 °

Name: Me. Dense SI SAND w/CL
Unit Weight: 115 pcf
Cohesion': 0 psf
Phi': 30 °

Name: V Stiff Fat CLAY w/SA & S
Unit Weight: 125 pcf
Cohesion': 1,500 psf
Phi': 0 °

1.47



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HOUSTON SHIP CHANNEL, TEXAS
DREDGED MATERIAL MANAGEMENT PLAN
SLOPE STABILITY ANALYSIS – SHORT TERM
HOUSE TRACT PA CONTAINMENT DIKE STA. 163+00, EL +66

FILE NO:	PLATE NO:
	STAB-21

Houston Ship Channel DMMP
House Tract PA, Sta 163+00, EL +66
Exterior Slope - Long Term Condition
Housetract.Sta163+00.EL66 Step 40.WL63.LT
5/19/2016

Name: Firm SA LN CLAY (Dike) LT
Unit Weight: 120 pcf
Cohesion': 120 psf
Phi': 20 °

Name: Hydraulic Fill 1 LT
Unit Weight: 100 pcf
Cohesion': 0 psf
Phi': 14 °

Name: Hydraulic Fill 2 LT
Unit Weight: 100 pcf
Cohesion': 50 psf
Phi': 14 °

Name: Hydraulic Fill 3 LT
Unit Weight: 100 pcf
Cohesion': 100 psf
Phi': 18 °

Name: Stiff-V Stiff Fat CLAY w/Sa L
Unit Weight: 125 pcf
Cohesion': 150 psf
Phi': 20 °

Name: Firm Fat CLAY w/Sa LT
Unit Weight: 120 pcf
Cohesion': 120 psf
Phi': 20 °

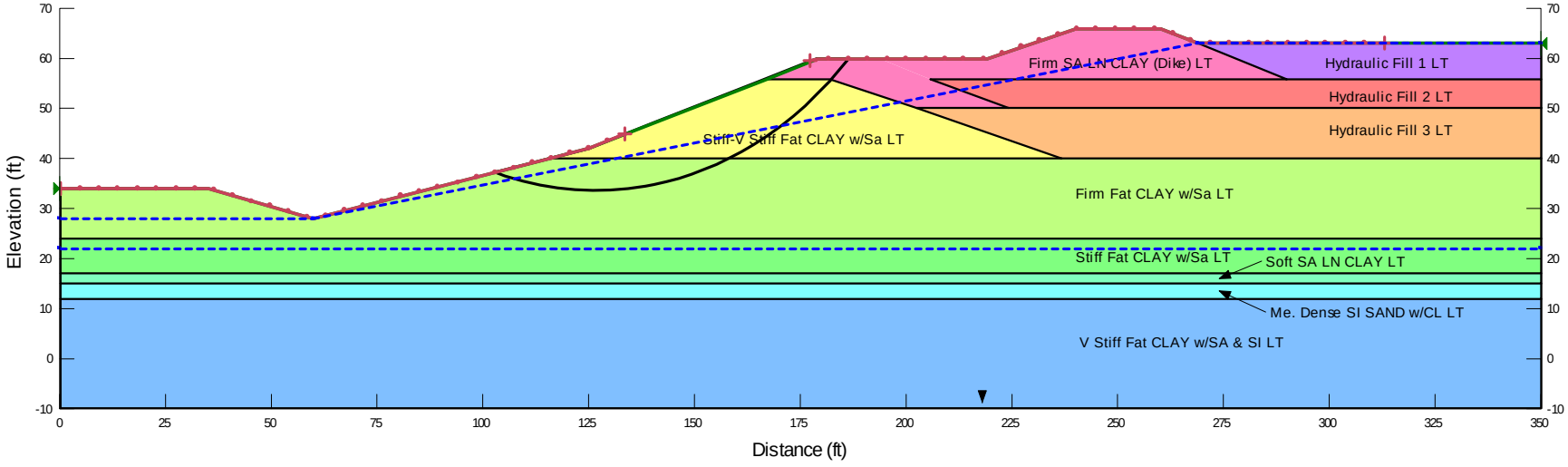
Name: Stiff Fat CLAY w/Sa LT
Unit Weight: 125 pcf
Cohesion': 150 psf
Phi': 20 °

Name: Soft SA LN CLAY LT
Unit Weight: 125 pcf
Cohesion': 80 psf
Phi': 20 °

Name: Me. Dense SI SAND w/CL LT
Unit Weight: 115 pcf
Cohesion': 0 psf
Phi': 30 °

Name: V Stiff Fat CLAY w/SA & SI L
Unit Weight: 125 pcf
Cohesion': 200 psf
Phi': 20 °

1.84



U.S. ARMY ENGINEER DISTRICT, GALVESTON
CORPS OF ENGINEERS
GALVESTON, TEXAS

DATE:	APPROVED BY:	PREPARED BY:
22 JAN 2016		DBB

HOUSTON SHIP CHANNEL, TEXAS
DREDGED MATERIAL MANAGEMENT PLAN
SLOPE STABILITY ANALYSIS – LONG TERM
HOUSE TRACT PA CONTAINMENT DIKE STA. 163+00, EL +66

FILE NO:

PLATE NO: STAB-22

Houston Ship Channel DMMP
Glendale PA, Sta 120+00, EL +60
Exterior Slope - Short Term Condition
HSC DMMP Glendale 3.5:1 Slope EL60 Step 20' WL24 EOC
5/19/2016

Name: Firm Sa Lean CLAY (Dike)
Unit Weight: 120 pcf
Cohesion': 600 psf
Phi': 0 °

Name: Hydraulic Fill 1
Unit Weight: 100 pcf
Cohesion': 150 psf
Phi': 0 °

Name: Hydraulic Fill 2
Unit Weight: 100 pcf
Cohesion': 250 psf
Phi': 0 °

Name: Hydraulic Fill 4
Unit Weight: 100 pcf
Cohesion': 800 psf
Phi': 0 °

Name: Firm SA Lean CLAY
Unit Weight: 120 pcf
Cohesion': 600 psf
Phi': 0 °

Name: Stiff-V Stiff SA Lean CLAY
Unit Weight: 125 pcf
Cohesion': 1,500 psf
Phi': 0 °

Name: Stiff SI CLAY
Unit Weight: 120 pcf
Cohesion': 1,000 psf
Phi': 0 °

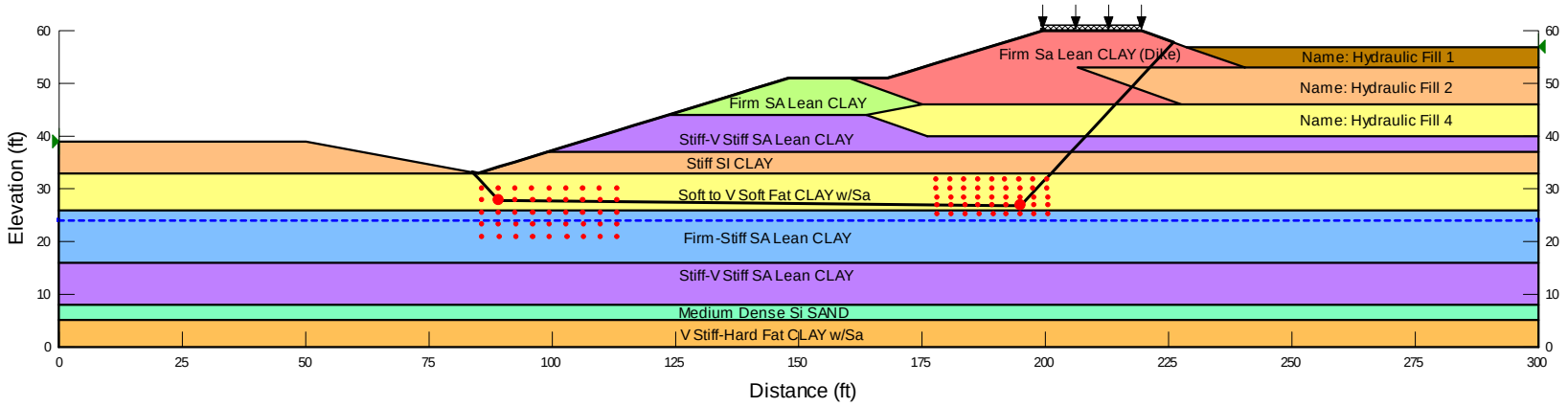
Name: Soft to V Soft Fat CLAY w/Sa
Unit Weight: 125 pcf
Cohesion': 300 psf
Phi': 0 °

Name: Firm-Stiff SA Lean CLAY
Unit Weight: 125 pcf
Cohesion': 800 psf
Phi': 0 °

Name: Medium Dense Si SAND
Unit Weight: 115 pcf
Cohesion': 0 psf
Phi': 30 °

Name: V Stiff-Hard Fat CLAY w/Sa
Unit Weight: 130 pcf
Cohesion': 2,000 psf
Phi': 0 °

1.34



U.S. ARMY ENGINEER DISTRICT, GALVESTON
CORPS OF ENGINEERS
GALVESTON, TEXAS

DATE: 19 May 2016	APPROVED BY:	PREPARED BY: DBB

HOUSTON SHIP CHANNEL, TEXAS
DREDGED MATERIAL MANAGEMENT PLAN
SLOPE STABILITY ANALYSIS – SHORT TERM
GLENDALE PA CONTAINMENT DIKE STA. 120+00, EL +60

FILE NO:	PLATE NO: STAB-23

Houston Ship Channel DMMP
Glendale PA, Sta 120+00, EL +60
Exterior Slope - Long Term Condition
HSC DMMP Glendale 3.5:1 Slope EL60 Step 20' WL57 LT
5/19/2016

Name: Firm Sa Lean CLAY (Dike) LT
Unit Weight: 120 pcf
Cohesion': 120 psf
Phi': 20 °

Name: Hydraulic Fill 1 LT
Unit Weight: 100 pcf
Cohesion': 0 psf
Phi': 14 °

Name: Hydraulic Fill 2 LT
Unit Weight: 100 pcf
Cohesion': 50 psf
Phi': 14 °

Name: Hydraulic Fill 4 LT
Unit Weight: 100 pcf
Cohesion': 130 psf
Phi': 18 °

Name: Firm SA Lean CLAY LT
Unit Weight: 120 pcf
Cohesion': 120 psf
Phi': 20 °

Name: Stiff-V Stiff SA Lean CLAY LT
Unit Weight: 125 pcf
Cohesion': 220 psf
Phi': 20 °

Name: Stiff SI CLAY LT
Unit Weight: 120 pcf
Cohesion': 150 psf
Phi': 18 °

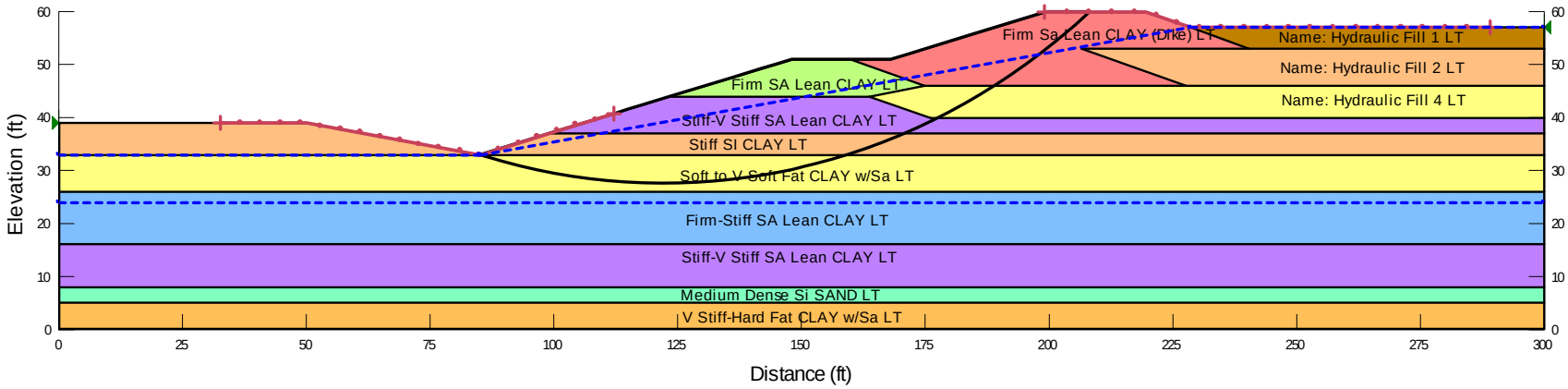
Name: Soft to V Soft Fat CLAY w/Sa L
Unit Weight: 125 pcf
Cohesion': 80 psf
Phi': 18 °

Name: Firm-Stiff SA Lean CLAY LT
Unit Weight: 125 pcf
Cohesion': 140 psf
Phi': 20 °

Name: Medium Dense Si SAND LT
Unit Weight: 115 pcf
Cohesion': 0 psf
Phi': 30 °

Name: V Stiff-Hard Fat CLAY w/Sa LT
Unit Weight: 130 pcf
Cohesion': 250 psf
Phi': 20 °

2.11



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CORPS OF ENGINEERS
GALVESTON, TEXAS

DATE:	APPROVED BY:	PREPARED BY:
19 May 2016		DBB

HOUSTON SHIP CHANNEL, TEXAS
DREDGED MATERIAL MANAGEMENT PLAN
SLOPE STABILITY ANALYSIS – LONG TERM
GLENDALE PA CONTAINMENT DIKE STA. 120+00, EL +60

FILE NO:	PLATE NO:
	STAB-24

Houston Ship Channel DMMP
Filterbed PA, Sta 62+50, EL +60
Exterior Slope - Short Term Condition
Filterbed.62+50.EL60 Step20 WL24 EOC
5/19/2016

Name: Firm SA LN CLAY (Dike)
Unit Weight: 120 pcf
Cohesion': 600 psf
Phi': 0 °

Name: Hydraulic Fill 1
Unit Weight: 100 pcf
Cohesion': 150 psf
Phi': 0 °

Name: Hydraulic Fill 4
Unit Weight: 100 pcf
Cohesion': 800 psf
Phi': 0 °

Name: V. Stiff-Hard Fat CLAY w/SA
Unit Weight: 120 pcf
Cohesion': 1,500 psf
Phi': 0 °

Name: Loose SI CL SAND
Unit Weight: 110 pcf
Cohesion': 0 psf
Phi': 28 °

Name: Firm-Stiff Fat CLAY
Unit Weight: 120 pcf
Cohesion': 800 psf
Phi': 0 °

Name: Soft-Firm Fat CLAY w/SA
Unit Weight: 120 pcf
Cohesion': 500 psf
Phi': 0 °

Name: Stiff Fat CLAY w/SA
Unit Weight: 125 pcf
Cohesion': 1,200 psf
Phi': 0 °

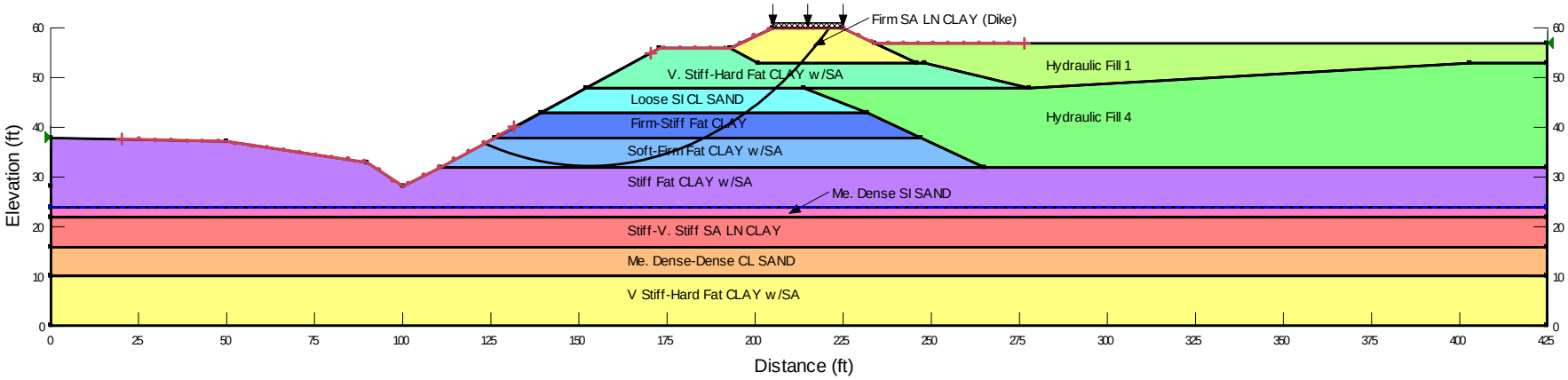
Name: Me. Dense SI SAND
Unit Weight: 115 pcf
Cohesion': 0 psf
Phi': 32 °

Name: Stiff-V. Stiff SA LN CLAY
Unit Weight: 125 pcf
Cohesion': 1,500 psf
Phi': 0 °

Name: Me. Dense-Dense CL SAND
Unit Weight: 115 pcf
Cohesion': 0 psf
Phi': 30 °

Name: V Stiff-Hard Fat CLAY w/SA
Unit Weight: 125 pcf
Cohesion': 2,000 psf
Phi': 0 °

2.07



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GALVESTON, TEXAS

DATE:	APPROVED BY:	PREPARED BY:
19 May 2016		DBB

HOUSTON SHIP CHANNEL, TEXAS
DREDGED MATERIAL MANAGEMENT PLAN
SLOPE STABILITY ANALYSIS – SHORT TERM
FILTERBED PA CONTAINMENT DIKE STA. 62+50, EL +60

FILE NO:	PLATE NO:
	STAB-25

Houston Ship Channel DMMP
Filterbed PA, Sta 62+50, EL +60
Exterior Slope - Long Term Condition
Filterbed.62+50.EL60 Step20 WL24 LT
5/19/2016

Name: Firm SA LN CLAY (Dike) LT
Unit Weight: 120 pcf
Cohesion': 120 psf
Phi': 20 °

Name: Hydraulic Fill 1 LT
Unit Weight: 100 pcf
Cohesion': 0 psf
Phi': 14 °

Name: Hydraulic Fill 4 LT
Unit Weight: 100 pcf
Cohesion': 130 psf
Phi': 18 °

Name: V. Stiff-Hard Fat CLAY w/SA LT
Unit Weight: 120 pcf
Cohesion': 220 psf
Phi': 18 °

Name: Loose SI CL SAND LT
Unit Weight: 110 pcf
Cohesion': 0 psf
Phi': 28 °

Name: Firm-Stiff Fat CLAY LT
Unit Weight: 120 pcf
Cohesion': 140 psf
Phi': 18 °

Name: Soft-Firm Fat CLAY w/SA LT
Unit Weight: 120 pcf
Cohesion': 100 psf
Phi': 18 °

Name: Stiff Fat CLAY w/SA LT
Unit Weight: 125 pcf
Cohesion': 180 psf
Phi': 20 °

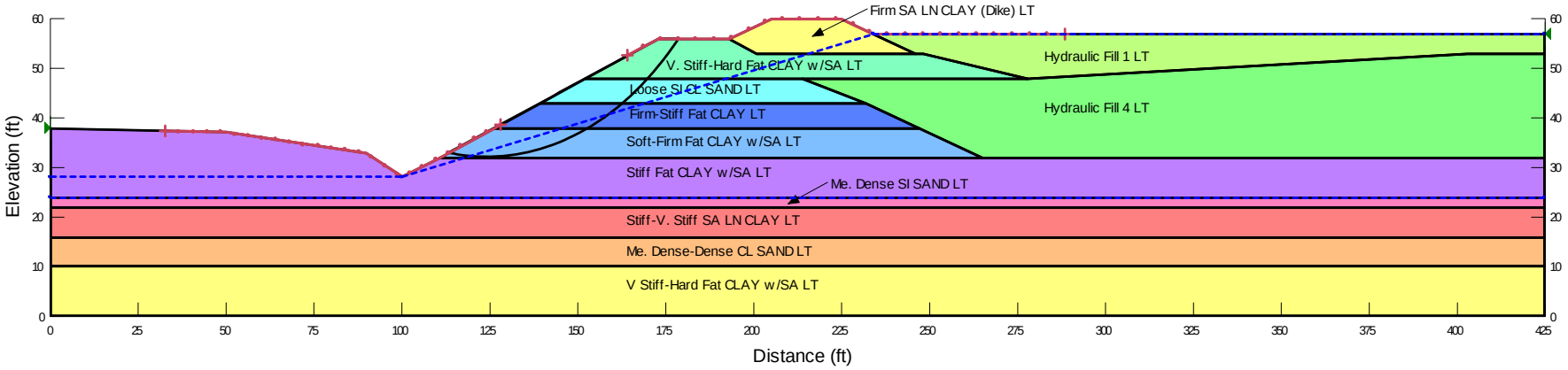
Name: Me. Dense SI SAND LT
Unit Weight: 115 pcf
Cohesion': 0 psf
Phi': 32 °

Name: Stiff-V. Stiff SA LN CLAY LT
Unit Weight: 125 pcf
Cohesion': 220 psf
Phi': 20 °

Name: Me. Dense-Dense CL SAND LT
Unit Weight: 115 pcf
Cohesion': 0 psf
Phi': 30 °

Name: V Stiff-Hard Fat CLAY w/SA LT
Unit Weight: 125 pcf
Cohesion': 250 psf
Phi': 20 °

1.52



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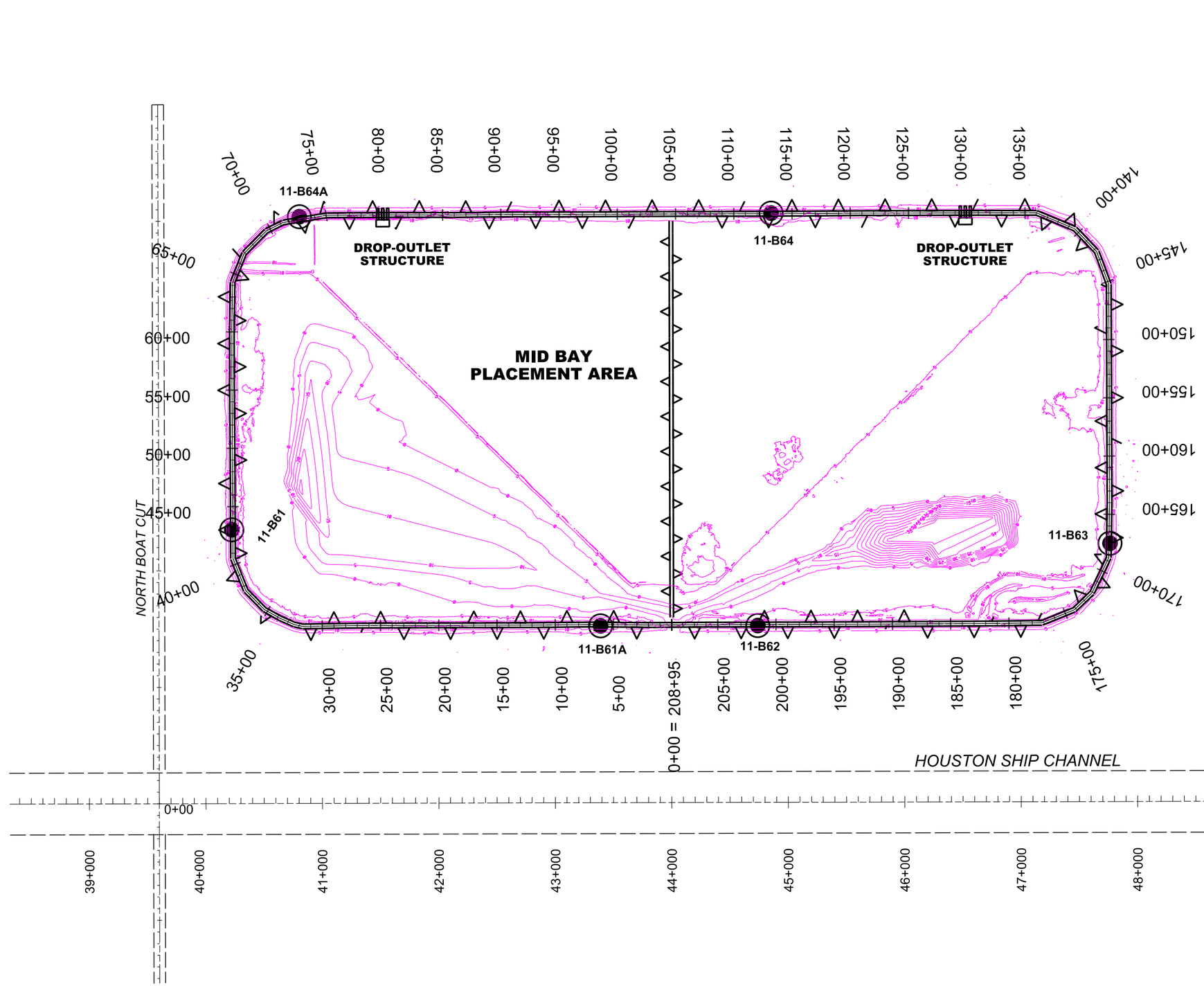
CORPS OF ENGINEERS
GALVESTON, TEXAS

DATE:	APPROVED BY:	PREPARED BY:
19 May 2016		DBB

HOUSTON SHIP CHANNEL, TEXAS
DREDGED MATERIAL MANAGEMENT PLAN
SLOPE STABILITY ANALYSIS – LONG TERM
FILTERBED PA CONTAINMENT DIKE STA. 62+50, EL +60

FILE NO:	PLATE NO:
	STAB-26



LEGEND

EXISTING DIKE

DROP-OUTLET STRUCTURE

SOIL BORING LOCATION AND NUMBER ●11-BXX

PLAN

SCALE IN FEET

500 0 500 1000

U.S. Army Corps of Engineers
Galveston District

No.	Date	By	Description

Drawn by:	DBB	Date: July 2016
Designed by:	DBB	Scale: AS SHOWN
Checked by:	DBB	Approval Recommended:
Submitted by: LORI K. HODGES, P.E. Chief, Geotech/Structure Section		JOSEPH L. KING, P.A. Chief, Engineering Branch
Approved by: TERRY F. BAUTISTA, P.E. Chief, Engineering and Construction Division		

U.S. ARMY ENGINEER DISTRICT, GALVESTON
CORPS OF ENGINEERS
GALVESTON, TEXAS

PREPARED UNDER THE DIRECTION OF
RICHARD P. PANNELL, COL, C.E.,
DISTRICT COMMANDER

HOUSTON SHIP CHANNEL, TEXAS
DREDGED MATERIAL MANAGEMENT PLAN

PLAN VIEW
MID BAY PLACEMENT AREA

Drawing No.:
B-01

Sheet 1 of 30

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Model Name: Default
By: M3ECEDBB Date: 5/16/2016 Time: 10:16:46 AM

CELL M10
305 ACRES

PLACEMENT AREA NO. 14

DROP-OUTLET STRUCTURES

EXISTING WELL

EXISTING ROCK DIKE +6.6 NAVD88

11-B57 11-B58 11-B59 11-B60

W-RANGE-LT W-RANGE-LT V-RANGE-LT

R-LT-78 R-LT-76 G-LT-6P JUNC G-LT-75 G-LT-3 G-LT-2

POES Sta 241+69.320

530' 518'

0+00 10+00 20+00 210+00 220+00 230+00

21+000 22+000 23+000 24+000 25+000 26+000 27+000 28+000 29+000

PLAN
SCALE IN FEET
500 0 500 1000

LEGEND

EXISTING DIKE

DROP-OUTLET STRUCTURE

SOIL BORING LOCATION AND NUMBER 11-BXX

U.S. Army Corps of Engineers
Galveston District

By	Date	Description	Rev.

Drawn by:	DBB
Designed by:	DBB
Checked by:	DBB
Submitted by:	LORI K. HODGES, P.E. Chief, Geotech/Structure Section
Date:	July 2016
Scale:	AS SHOWN
Approval Recommended:	JOSEPH L. KING, P.A. Chief, Engineering Branch
Approved by:	TERRY F. BAUTISTA, P.E. Chief, Engineering and Construction Division

U.S. ARMY ENGINEER DISTRICT, GALVESTON
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GALVESTON, TEXAS

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RICHARD P. PANNELL, COL, C.E.,
DISTRICT COMMANDER

HOUSTON SHIP CHANNEL, TEXAS
DREDGED MATERIAL MANAGEMENT PLAN

PLAN VIEW
PLACEMENT AREA NO. 14

Drawing No.:
B-02

Sheet 2 of 30

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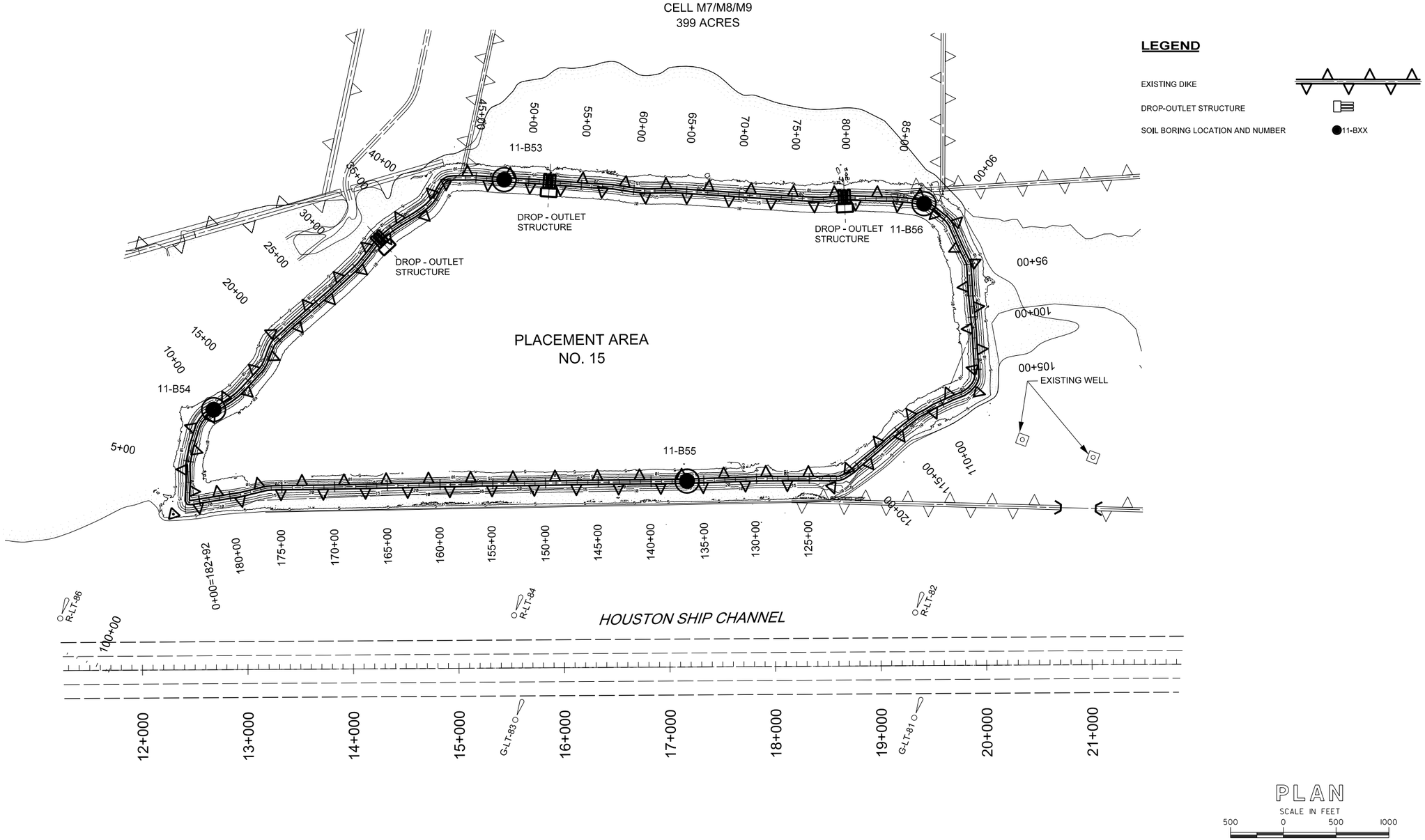

LEGEND

EXISTING DIKE

DROP-OUTLET STRUCTURE

SOIL BORING LOCATION AND NUMBER ●11-BXX

PLAN
SCALE IN FEET
500 0 500 1000

U.S. Army Corps of Engineers
Galveston District

By:	Date:	Description	Rev.

Drawn by:	DBB	Date:	July 2016
Designed by:	DBB	Scale:	AS SHOWN
Checked by:	DBB	Approval Recommended:	
Submitted by:	LORI K. HODGES, P.E. Chief, Geotech/Structure Section	JOSEPH L. KING, P.A. Chief, Engineering Branch	
Approved by:	TERRY F. BAUTISTA, P.E. Chief, Engineering and Construction Division		

U.S. ARMY ENGINEER DISTRICT, GALVESTON
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GALVESTON, TEXAS

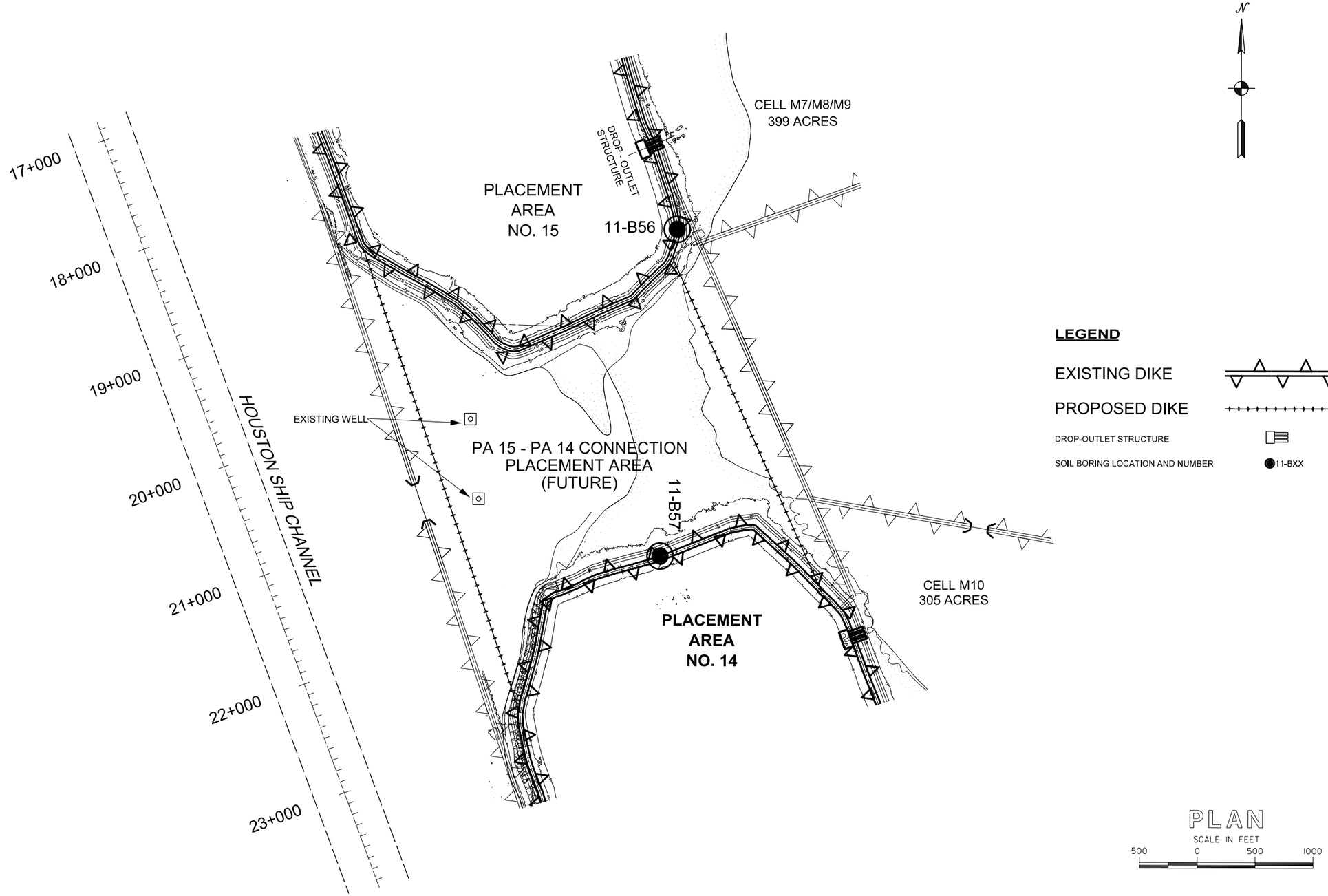
PREPARED UNDER THE DIRECTION OF
RICHARD P. PANNELL, COL, C.E.,
DISTRICT COMMANDER

HOUSTON SHIP CHANNEL, TEXAS
DREDGED MATERIAL MANAGEMENT PLAN

PLAN VIEW
PLACEMENT AREA NO. 15

Drawing No.:
B-03

Sheet 3 of 30



N

LEGEND

EXISTING DIKE

PROPOSED DIKE

DROP-OUTLET STRUCTURE

SOIL BORING LOCATION AND NUMBER 11-BXX

PLAN
SCALE IN FEET
500 0 500 1000

U.S. Army Corps of Engineers
Galveston District

No.	Description	Date	By

Drawn by: DBB
Designed by: DBB
Checked by: DBB
Submitted by: LORI K. HODGES, P.E.
Chief, Geotech/Structure Section
Approved by: TERRY F. BAUTISTA, P.E.
Chief, Engineering and Construction Division
Date: July 2016
Scale: AS SHOWN
Approval Recommended: JOSEPH I. KING, P.A.
Chief, Engineering Branch
Rev:

U.S. ARMY ENGINEER DISTRICT, GALVESTON
CORPS OF ENGINEERS
GALVESTON, TEXAS

PREPARED UNDER THE DIRECTION OF
RICHARD P. PANNELL, COL., C.E.,
DISTRICT COMMANDER

HOUSTON SHIP CHANNEL, TEXAS
DREDGED MATERIAL MANAGEMENT PLAN

PLAN VIEW
PA 14/15 CONNECTION
PLACEMENT AREA

Drawing No.:
B-04
Sheet 4 of 30

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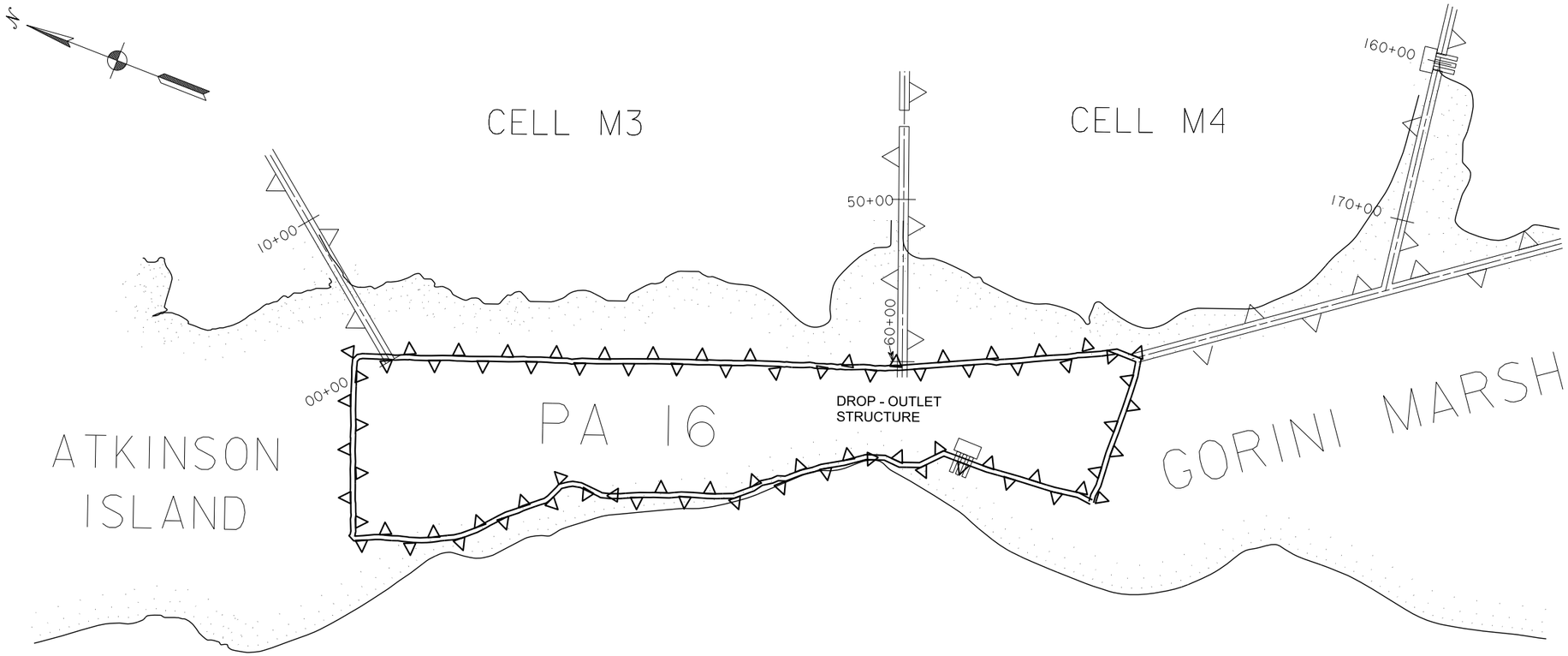
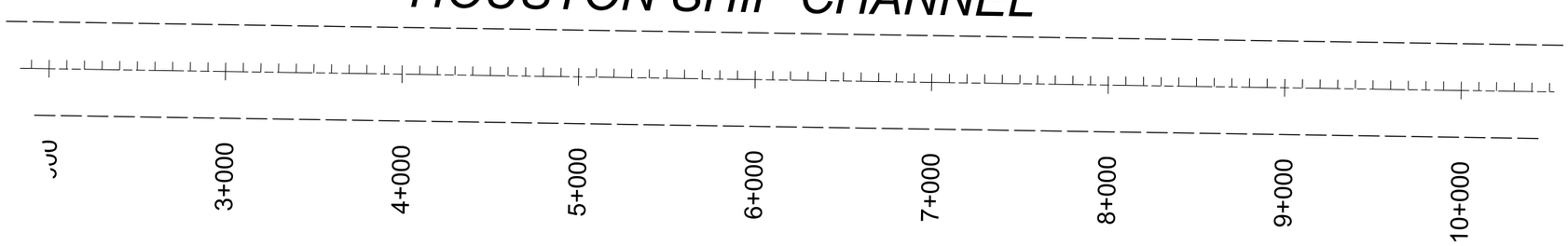


HOUSTON SHIP CHANNEL



PLAN

SCALE IN FEET

1000 0 1000 2000

LEGEND

EXISTING DIKE

DROP-OUTLET STRUCTURE

SOIL BORING LOCATION AND NUMBER 11-BXX

U.S. Army Corps of Engineers
Galveston District

No.	Description	Date	By

Drawn by:	DBB	Date:	Rev.
Designed by:	DBB	July 2016	
Checked by:	DBB	Scale: AS SHOWN	
Submitted by:		Approval Recommended:	
LORI K. HODGES, P.E. Chief, Geotech/Structure Section		JOSEPH L. KING, P.A. Chief, Engineering Branch	
Approved by:		TERRY F. BAUTISTA, P.E. Chief, Engineering and Construction Division	

U.S. ARMY ENGINEER DISTRICT, GALVESTON
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GALVESTON, TEXAS

PREPARED UNDER THE DIRECTION OF
RICHARD P. PANNELL, COL., C.E.,
DISTRICT COMMANDER

HOUSTON SHIP CHANNEL, TEXAS
DREDGED MATERIAL MANAGEMENT PLAN

PLAN VIEW
PLACEMENT AREA NO. 16

Drawing No.:
B-05

Sheet 5 of 30

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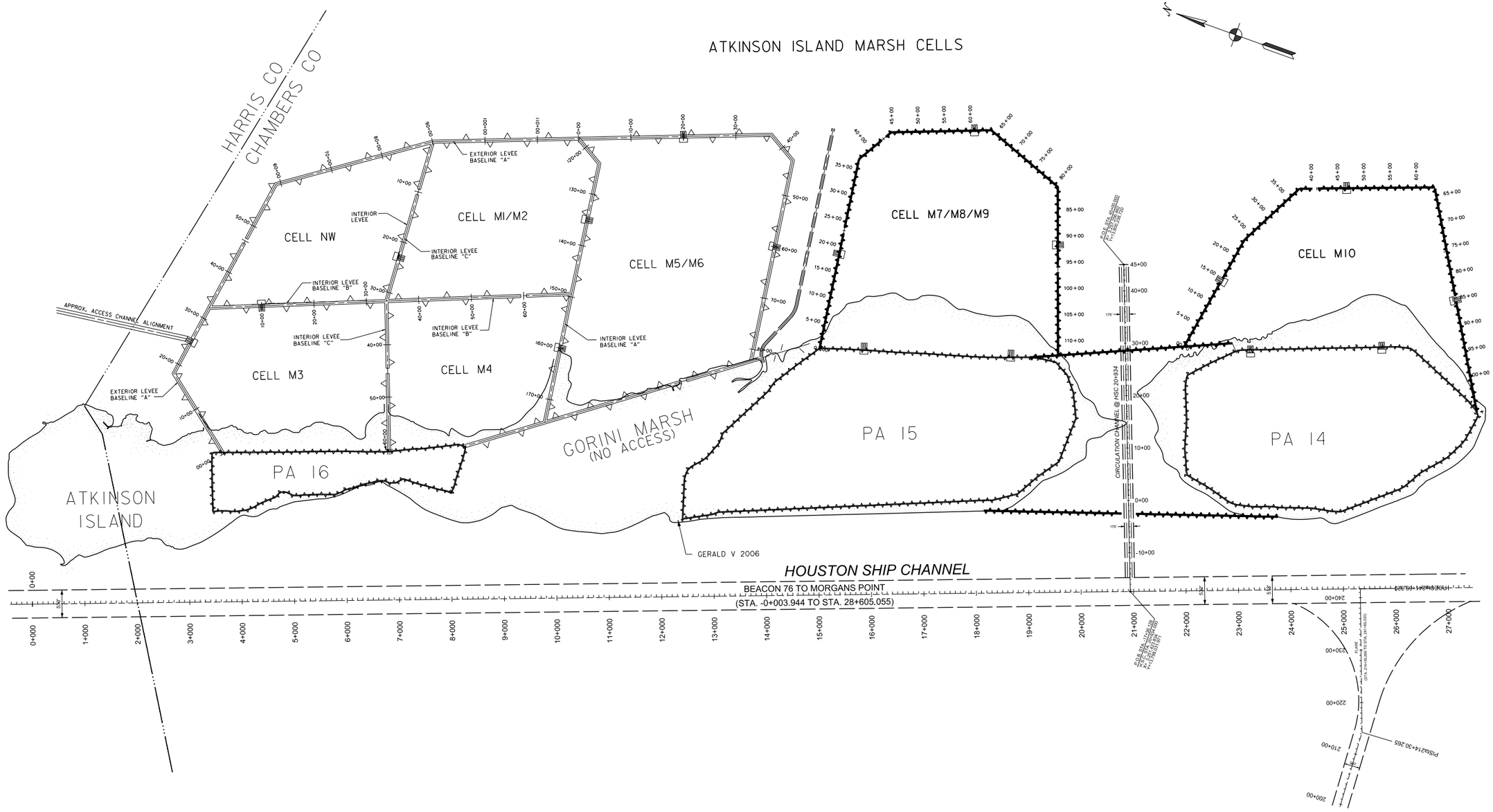
ATKINSON ISLAND MARSH CELLS



LEGEND

EXISTING DIKE

DROP-OUTLET STRUCTURE

U.S. Army Corps of Engineers
Galveston District

No.	Description	Date	By

Drawn by:	DBB	Date: July 2016
Designed by:	DBB	Scale: AS SHOWN
Checked by:	DBB	Approval Recommended:
Submitted by:		
LORI K. HODGES, P.E. Chief, Geotech/Structure Section		JOSEPH L. KING, P.A. Chief, Engineering Branch
Approved by:		TERRY F. BAUTISTA, P.E. Chief, Engineering and Construction Division

U.S. ARMY ENGINEER DISTRICT, GALVESTON
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GALVESTON, TEXAS

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DISTRICT COMMANDER

HOUSTON SHIP CHANNEL, TEXAS
DREDGED MATERIAL MANAGEMENT PLAN

PLAN VIEW
ATKINSON ISLAND MARSH

Drawing No.:
B-06
Sheet 6 of 30

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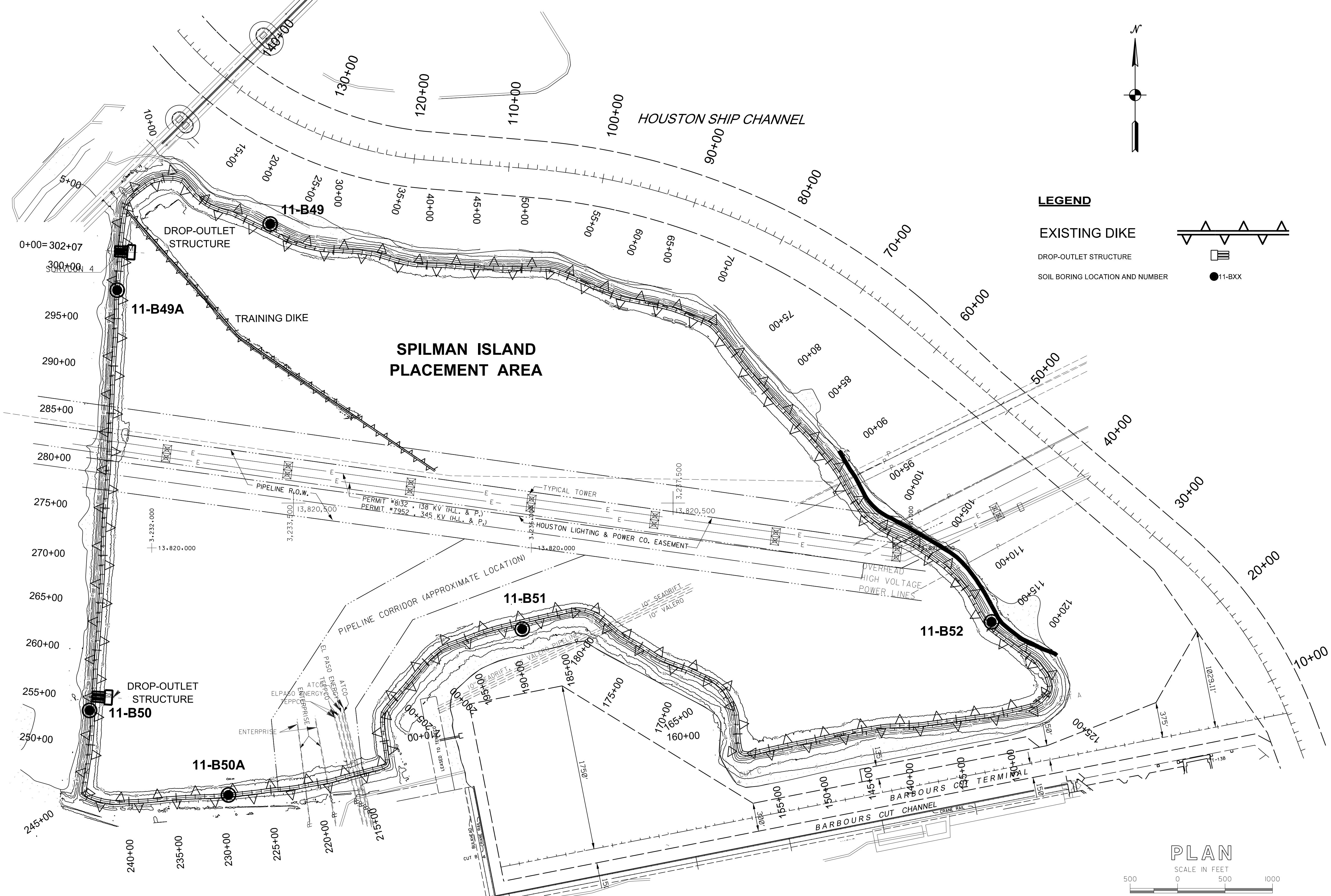

U.S. Army Corps of Engineers
Galveston District

Rev.	Description	Date	By

Drawn by: DBB	Date: July 2016
Designed by: DBB	Scale: AS SHOWN
Checked by: DBB	Approval Recommended:
Submitted by: LORI K. HODGES, P.E. Chief, Geotech/Structure Section	JOSEPH L. KING, P.E. Chief, Engineering Branch
Approved by: TERRY F. BAUTISTA, P.E. Chief, Engineering and Construction Division	

U.S. ARMY ENGINEER DISTRICT, GALVESTON
CORPS OF ENGINEERS
GALVESTON, TEXAS

PREPARED UNDER THE DIRECTION OF
RICHARD P. PANNELL, COL., C.E.,
DISTRICT COMMANDER

HOUSTON SHIP CHANNEL, TEXAS
DREDGED MATERIAL MANAGEMENT PLAN

PLAN VIEW
SPILMAN ISLAND PLACEMENT AREA

Drawing No.:
B-07

Sheet 7 of 30

File: C:\Users\M3ECEDBB\Documents\Projects\Houston Ship Channel\HSC DMMP\DMMP Engr Appendix\Geotechnical Plates\B-07-Plan Spilman PA.dgn
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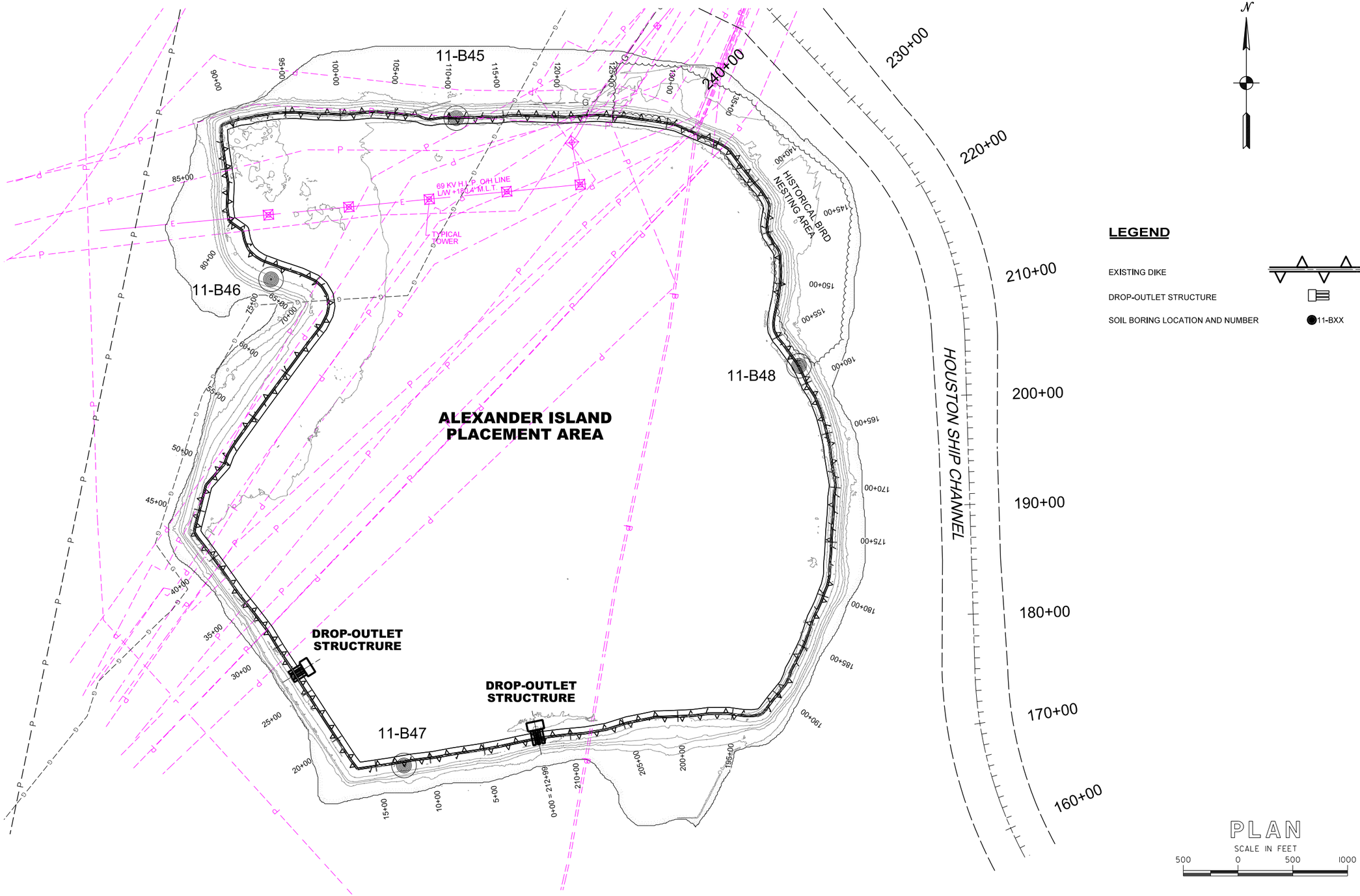

LEGEND

EXISTING DIKE

DROP-OUTLET STRUCTURE

SOIL BORING LOCATION AND NUMBER 11-BXX

PLAN
SCALE IN FEET
500 0 500 1000

U.S. Army Corps of Engineers
Galveston District

No.	Description	Date	By

Drawn by:	DBB	Date:	Rev:
Designed by:	DBB	July 2016	
Checked by:	DBB	Scale: AS SHOWN	
Submitted by:		Approval Recommended:	
USA K. HODGES, P.E.		JOSEPH L. KING, P.A.	
Chief, Geotech/Structure Section		Chief, Engineering Branch	
Approved by:		TERRY F. BAUTISTA, P.E.	
Chief, Engineering and Construction Division			

U.S. ARMY ENGINEER DISTRICT, GALVESTON
CORPS OF ENGINEERS
GALVESTON, TEXAS

PREPARED UNDER THE DIRECTION OF
RICHARD P. PANNELL, COL., C.E.,
DISTRICT COMMANDER

HOUSTON SHIP CHANNEL, TEXAS
DREDGED MATERIAL MANAGEMENT PLAN

PLAN VIEW
ALEXANDER ISLAND
PLACEMENT AREA

Drawing No.:
B-08

Sheet 8 of 30

File: C:\Users\M3ECEDBB\Documents\Projects\Houston Ship Channel\HSC DMMP\DMMP Engr Appendix\Geotechnical Plates\B-08-Plan Alexander.dgn
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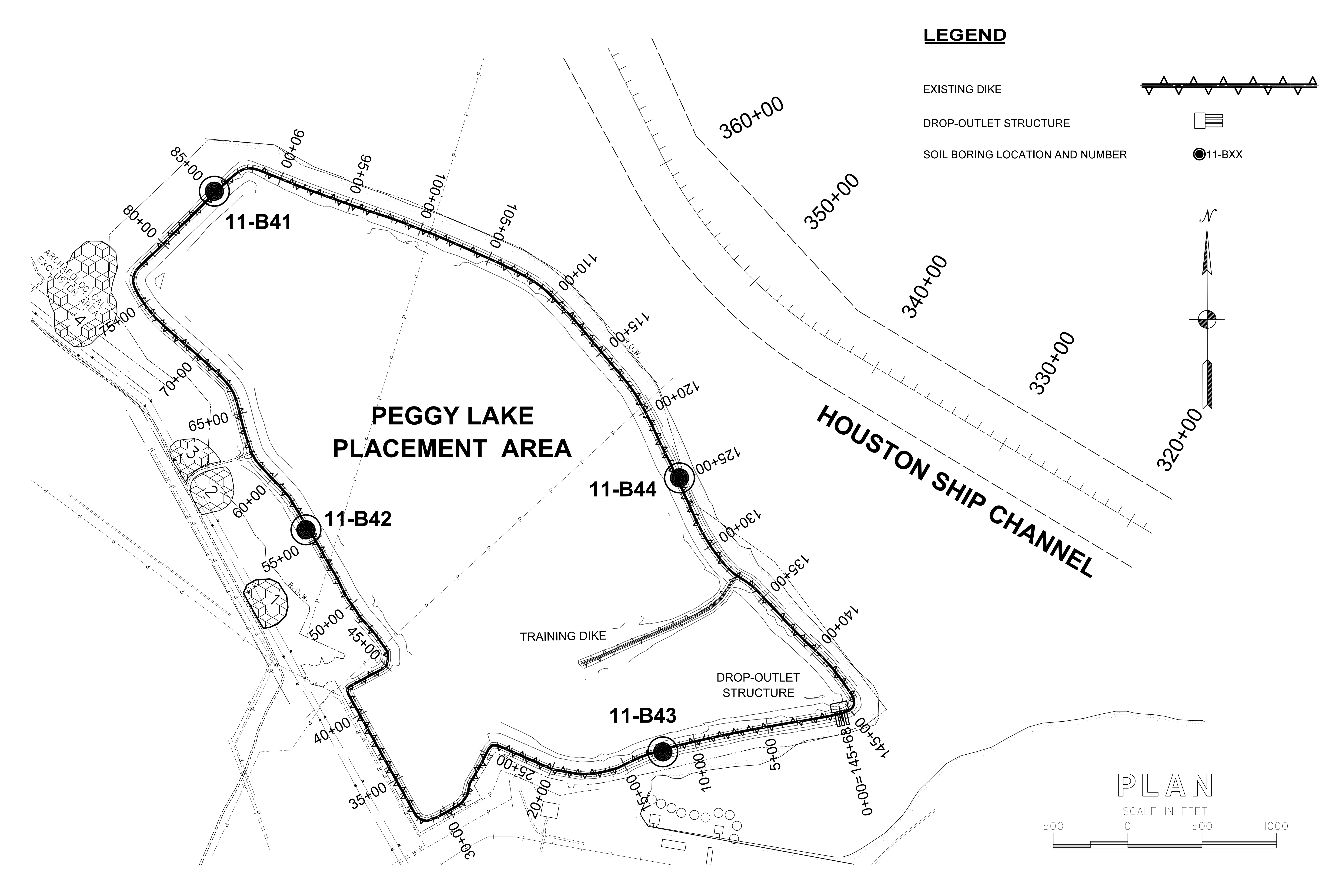

U.S. Army Corps of Engineers
Galveston District

Rev.	Description	Date	By

Drawn by: DBB	Date: July 2016	Rev.
Designed by: DBB		
Checked by: DBB	Scale: AS SHOWN	
Submitted by: LORI K. HODGES, P.E. Chief, Geotech/Structure Section	Approval Recommended: JOSEPH L. KING, R.A. Chief, Engineering Branch	
Approved by: TERRY F. BAUTISTA, P.E. Chief, Engineering and Construction Division		

U.S. ARMY ENGINEER DISTRICT, GALVESTON
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GALVESTON, TEXAS

PREPARED UNDER THE DIRECTION OF
RICHARD P. PANNELL, COL., C.E.,
DISTRICT COMMANDER

HOUSTON SHIP CHANNEL, TEXAS
DREDGED MATERIAL MANAGEMENT PLAN

PLAN VIEW
PEGGY LAKE PLACEMENT AREA

Drawing No.:
B-09

Sheet 9 of 30

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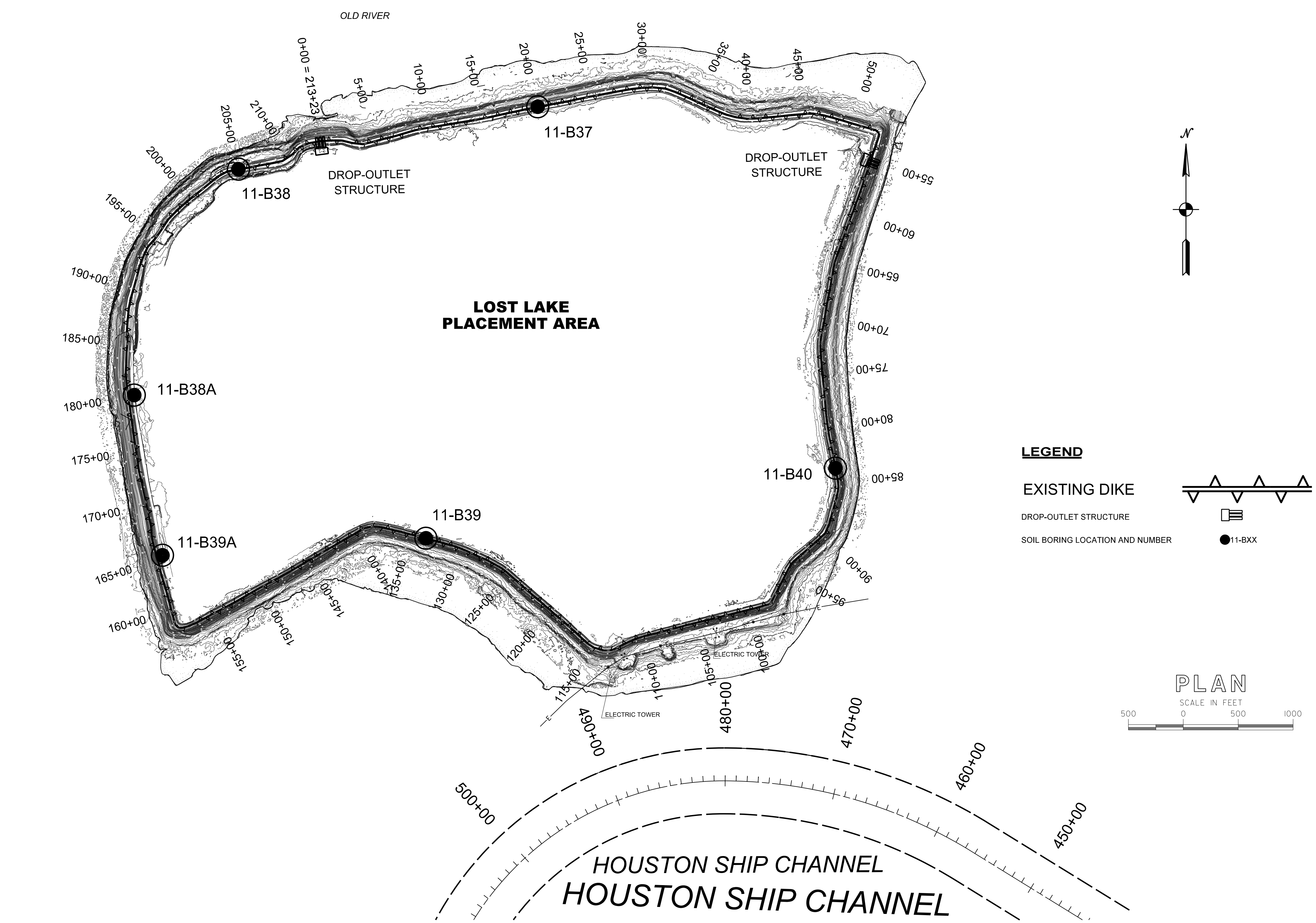

LEGEND

EXISTING DIKE

DROP-OUTLET STRUCTURE

SOIL BORING LOCATION AND NUMBER 11-BXX

U.S. Army Corps of Engineers
Galveston District

U.S. ARMY ENGINEER DISTRICT, GALVESTON
CORPS OF ENGINEERS
GALVESTON, TEXAS

PREPARED UNDER THE DIRECTION OF
RICHARD P. PANNELL, COL., C.E.,
DISTRICT COMMANDER

Drawn by: DBB
Designed by: DBB
Checked by: DBB
Submitted by: LORI K. HODGES, P.E. Chief, Geotech/Structure Section
Date: July 2016
Rev.
Scale: AS SHOWN
Approval Recommended: JOSEPH L. KING, R.A. Chief, Engineering Branch
Approved by: TERRY F. BAUTISTA, P.E. Chief, Engineering and Construction Division

HOUSTON SHIP CHANNEL, TEXAS
DREDGED MATERIAL MANAGEMENT PLAN

PLAN VIEW
LOST LAKE PLACEMENT AREA

Drawing No.: B-10

Sheet 10 of 30

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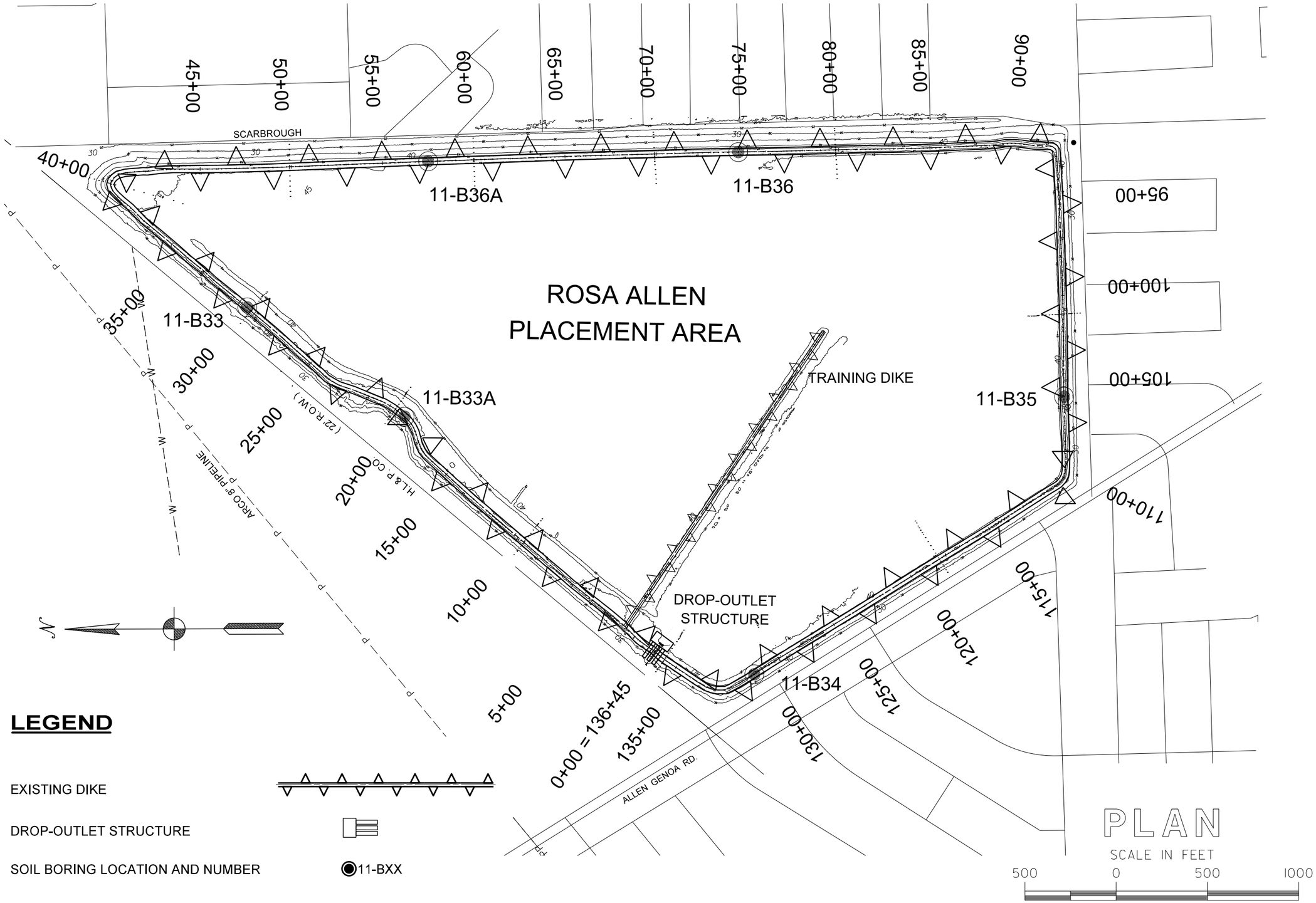

LEGEND

EXISTING DIKE

DROP-OUTLET STRUCTURE

SOIL BORING LOCATION AND NUMBER ◉11-BXX

U.S. Army Corps of Engineers
Galveston District

Rev.	Description	Date	By

		Date:	July 2016	Rev.
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Designed by:	DBB	Approval Recommended:		
Checked by:	DBB	JOSEPH L. KING, P.A.		
Submitted by:	LORI K. HODGES, P.E.	Chief, Engineering Branch		
Chief, Geotech/Structure Section		Approved by:	TERRY F. BAUTISTA, P.E.	
		Chief, Engineering and Construction Division		

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GALVESTON, TEXAS

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DISTRICT COMMANDER

HOUSTON SHIP CHANNEL, TEXAS
DREDGED MATERIAL MANAGEMENT PLAN

PLAN VIEW
ROSA ALLEN PLACEMENT AREA

Drawing No.:
B-11

Sheet 11 of 30

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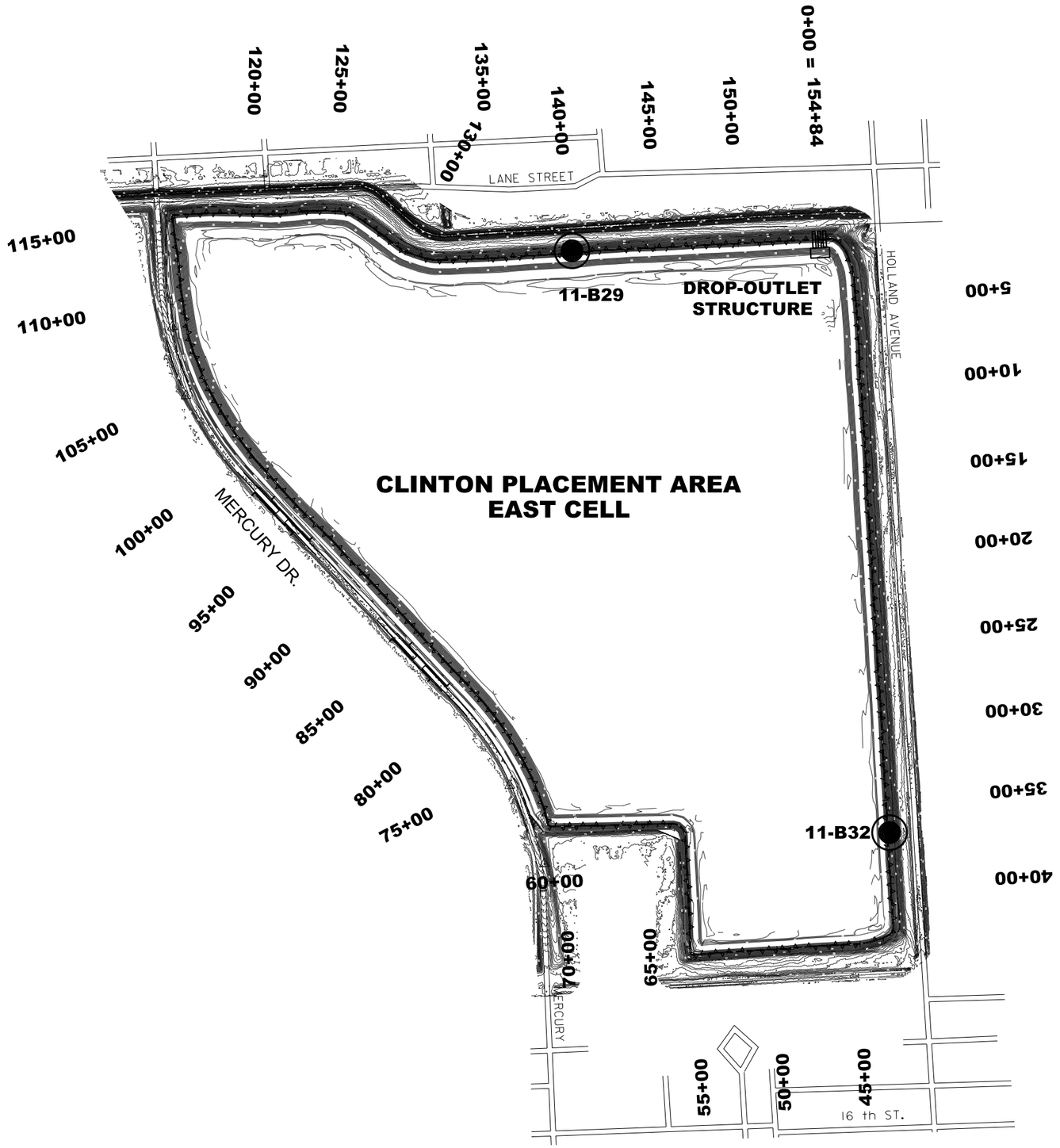

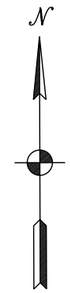

LEGEND

EXISTING DIKE

DROP-OUTLET STRUCTURE

SOIL BORING LOCATION AND NUMBER 11-BXX

PLAN
SCALE IN FEET
500 0 500 1000

U.S. Army Corps of Engineers
Galveston District

No.	Description	Date	By

Drawn by:	DBB	Date:	July 2016
Designed by:	DBB	Scale:	AS SHOWN
Checked by:	DBB	Approval Recommended:	
Submitted by:	LORI K. HODGES, P.E.		JOSEPH L. KING, P.A.
Chief, Geotech/Structure Section		Chief, Engineering Branch	
Approved by:	TERRY F. BAUTISTA, P.E.		
Chief, Engineering and Construction Division			

U.S. ARMY ENGINEER DISTRICT, GALVESTON
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HOUSTON SHIP CHANNEL, TEXAS
DREDGED MATERIAL MANAGEMENT PLAN

PLAN VIEW
CLINTON PLACEMENT AREA
EAST CELL

Drawing No.:
B-12
Sheet 12 of 30

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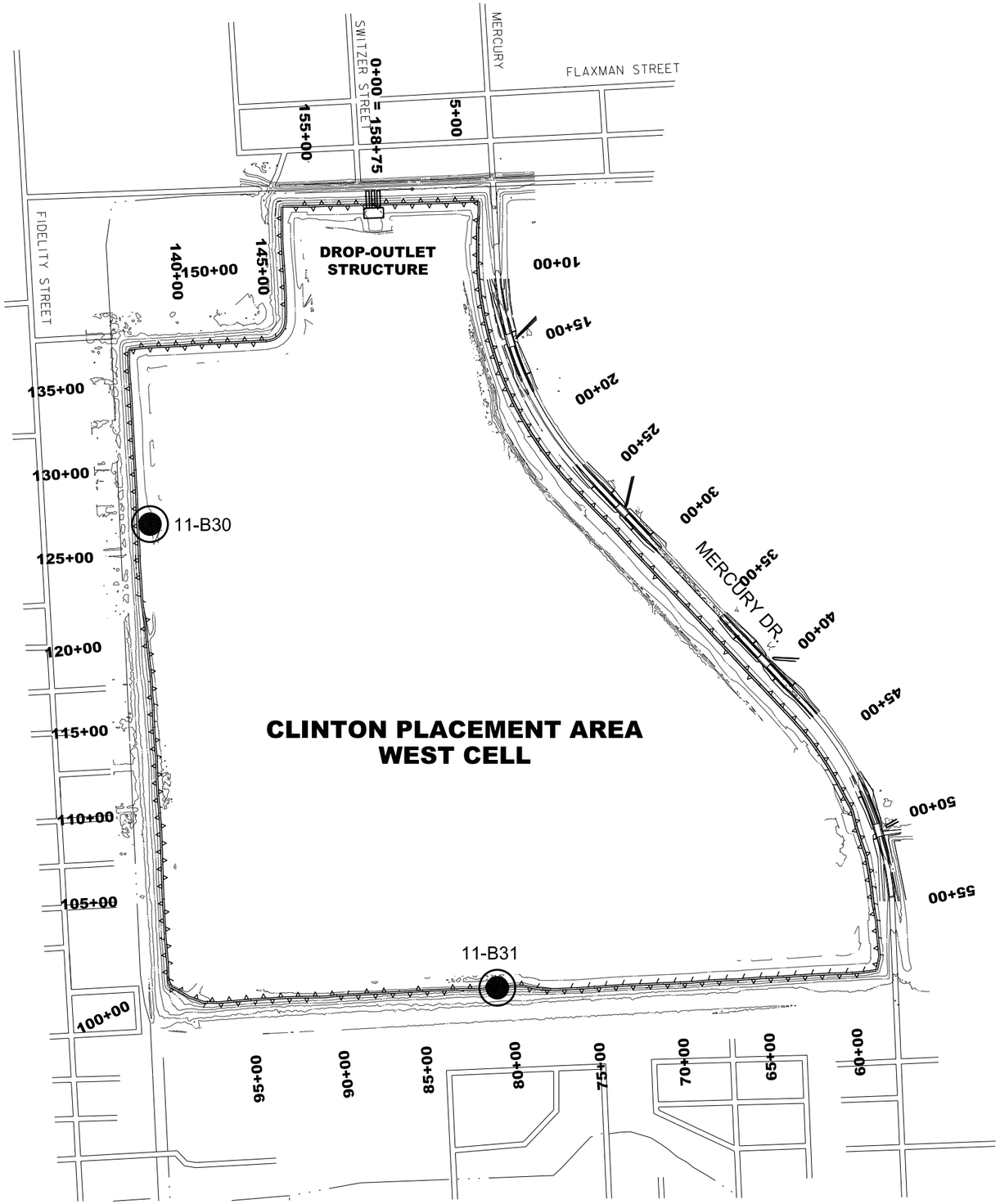

N

LEGEND

EXISTING DIKE

DROP-OUTLET STRUCTURE

SOIL BORING LOCATION AND NUMBER 11-BXX

PLAN

SCALE IN FEET

500 0 500 1000

U.S. Army Corps of Engineers
Galveston District

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Designed by:	DBB	July 2016	
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LORI K. HODGES, P.E. Chief, Geotech/Structure Section		JOSEPH I. KING, P.A. Chief, Engineering Branch	
Approved by:		TERRY F. BAUTISTA, P.E. Chief, Engineering and Construction Division	

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HOUSTON SHIP CHANNEL, TEXAS
DREDGED MATERIAL MANAGEMENT PLAN

PLAN VIEW
CLINTON PLACEMENT AREA
WEST CELL

Drawing No.:
B-13

Sheet 13 of 30

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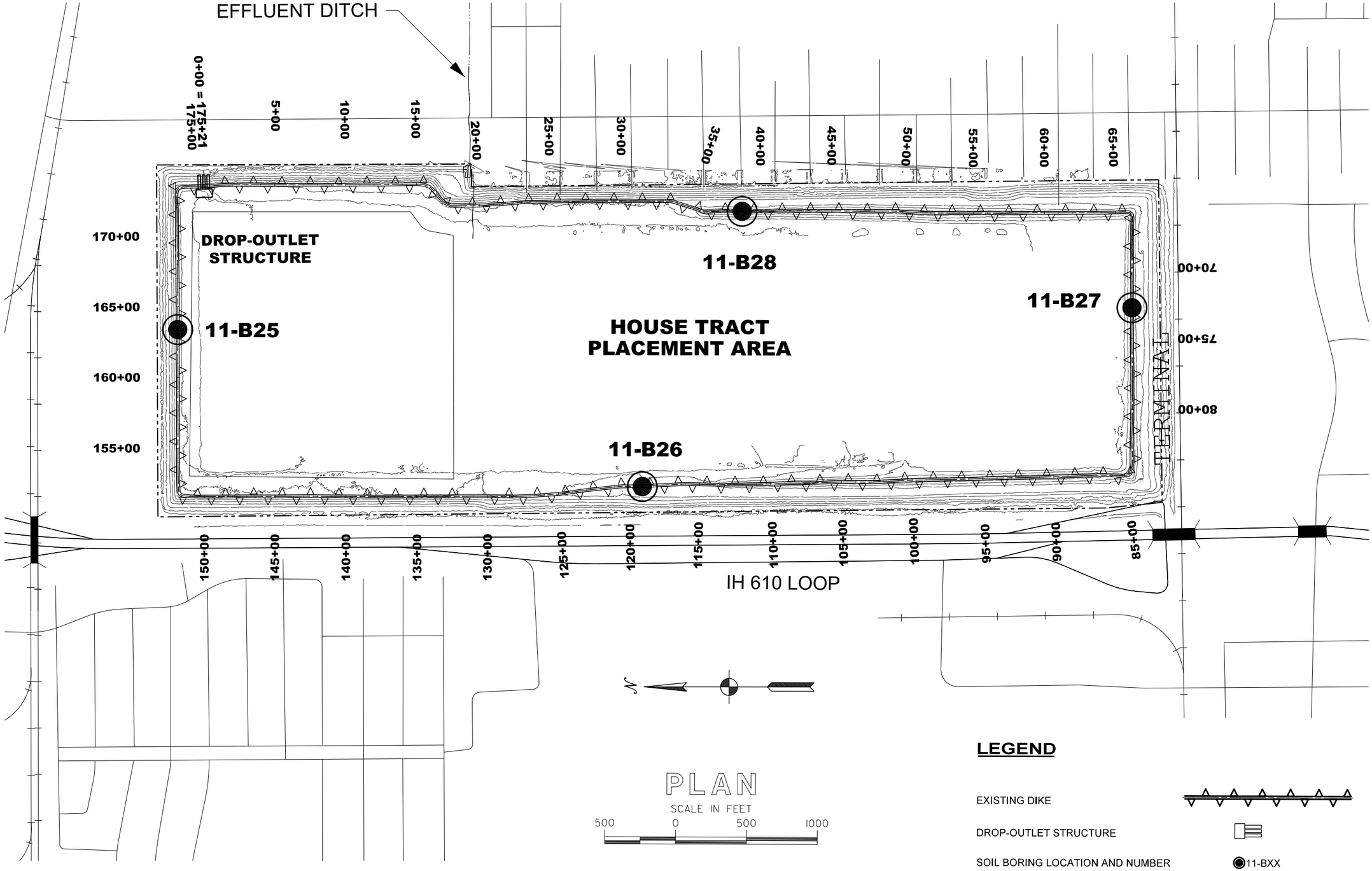

PLAN

SCALE IN FEET

500 0 500 1000

LEGEND

EXISTING DIKE

DROP-OUTLET STRUCTURE

SOIL BORING LOCATION AND NUMBER 11-BXX

U.S. Army Corps of Engineers
Galveston District

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Chief, Geotech/Structure Section		Chief, Engineering Branch	
		Approved by: TERRY F. BAUTISTA, P.E.	
		Chief, Engineering and Construction Division	

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HOUSTON SHIP CHANNEL, TEXAS
DREDGED MATERIAL MANAGEMENT PLAN

PLAN VIEW
HOUSE TRACT PLACEMENT AREA

Drawing No.:
B-14
Sheet 14 of 30

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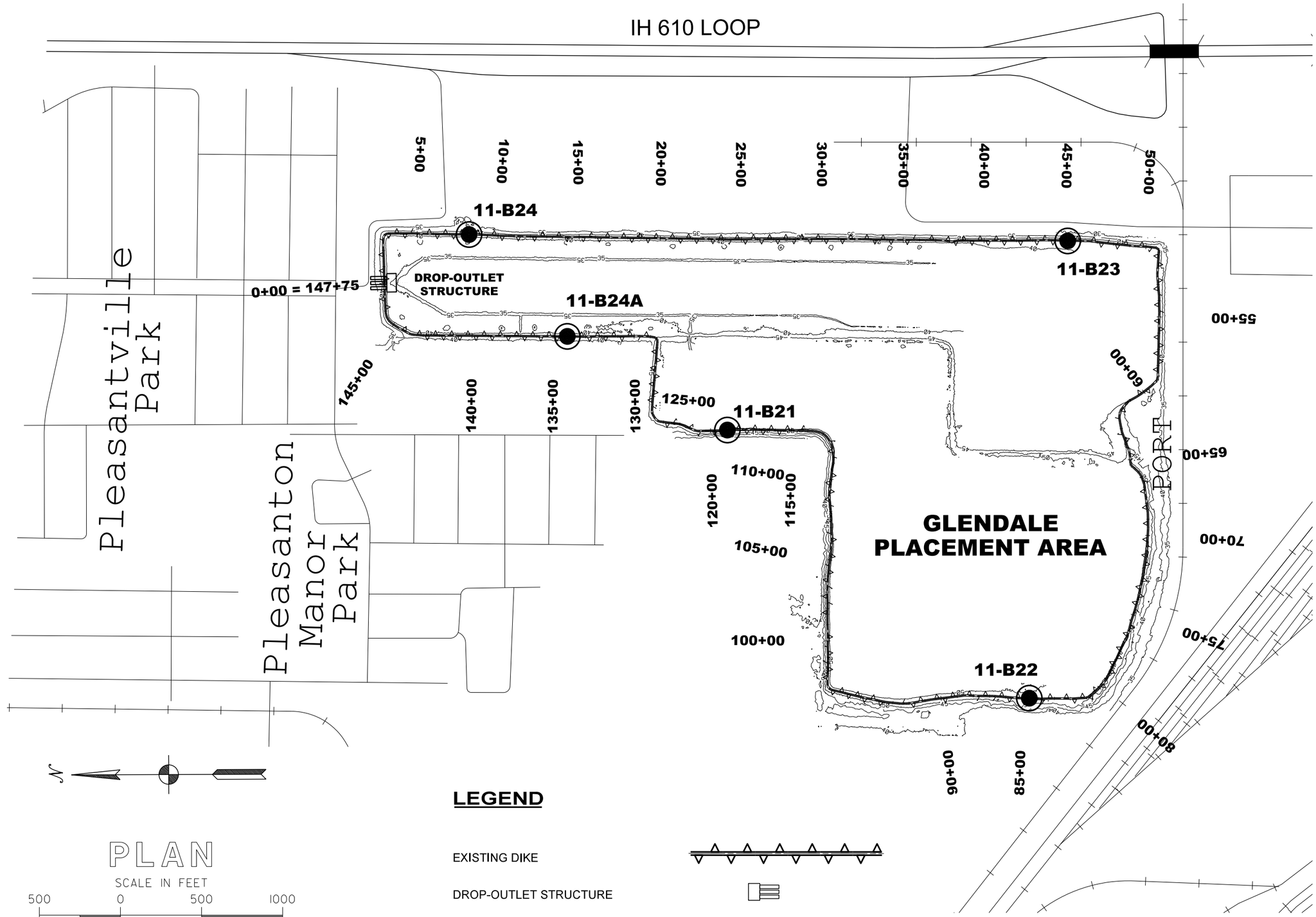

LEGEND

EXISTING DIKE

DROP-OUTLET STRUCTURE

SOIL BORING LOCATION AND NUMBER 11-BXX

U.S. Army Corps of Engineers
Galveston District

Rev.	Description	Date	By

Drawn by: DBB
Designed by: DBB
Checked by: DBB
Submitted by:
LORI K. HODGES, P.E.
Chief, Geotech/Structure Section

Date: July 2016
Scale: AS SHOWN
Approval Recommended:
JOSEPH I. KING, P.A.
Chief, Engineering Branch

Approved by:
TERRY F. BAUTISTA, P.E.
Chief, Engineering and Construction Division

U.S. ARMY ENGINEER DISTRICT, GALVESTON
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GALVESTON, TEXAS

PREPARED UNDER THE DIRECTION OF
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HOUSTON SHIP CHANNEL, TEXAS
DREDGED MATERIAL MANAGEMENT PLAN

PLAN VIEW
GLENDALE PLACEMENT AREA

Drawing No.:
B-15

Sheet 15 of 30

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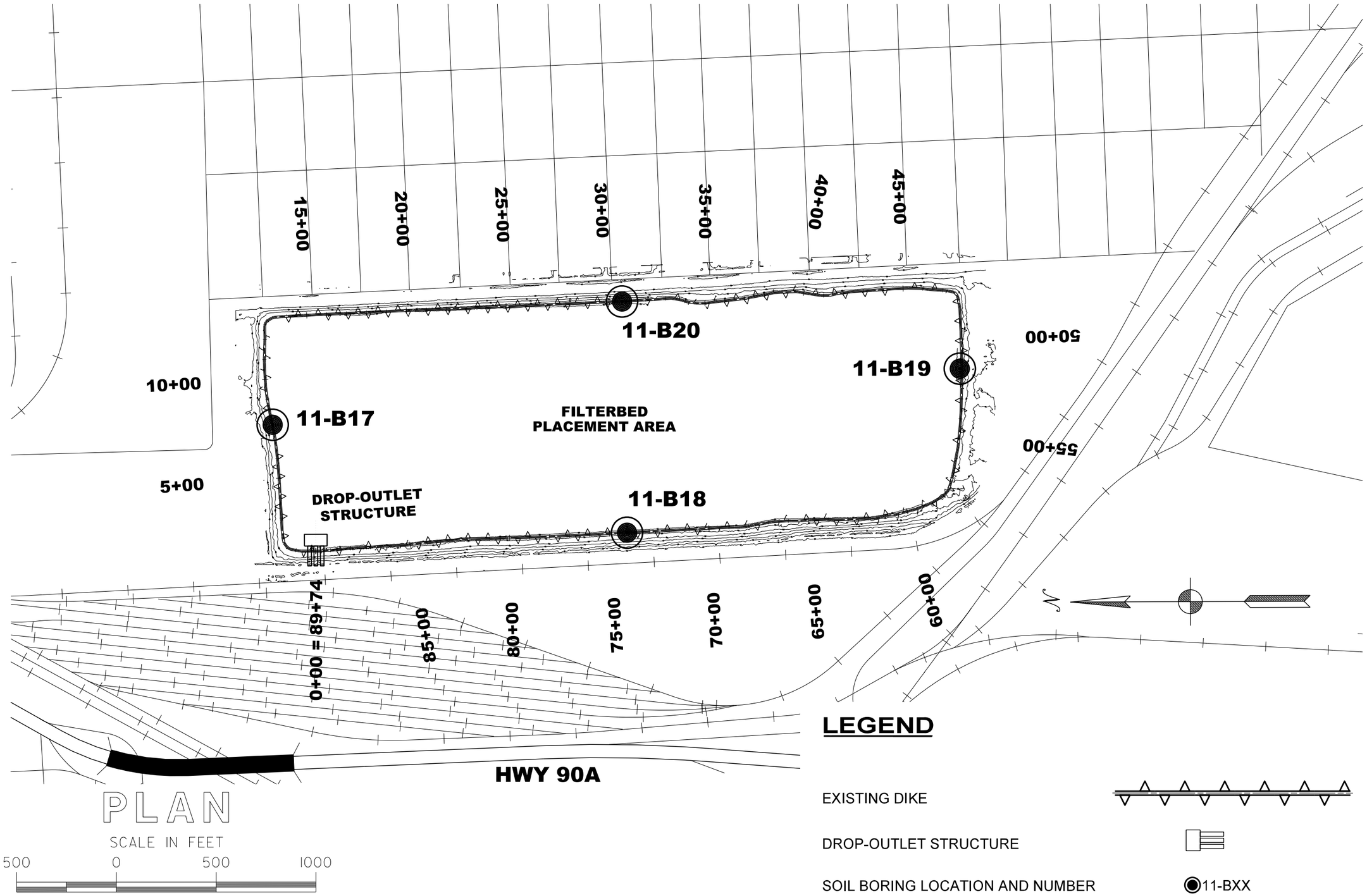

PLAN

SCALE IN FEET

500 0 500 1000

LEGEND

EXISTING DIKE

DROP-OUTLET STRUCTURE

SOIL BORING LOCATION AND NUMBER 11-BXX

U.S. Army Corps of Engineers
Galveston District

Rev.	Description	Date	By

Drawn by: DBB
Designed by: DBB
Checked by: DBB
Submitted by: LOR K. HODGES, P.E.
Chief, Geotech/Structure Section
Approved by: TERRY F. BAUTISTA, P.E.
Chief, Engineering and Construction Division

Date: July 2016
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Approval Recommended: JOSEPH I. KING, P.A.
Chief, Engineering Branch

U.S. ARMY ENGINEER DISTRICT, GALVESTON
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GALVESTON, TEXAS

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HOUSTON SHIP CHANNEL, TEXAS
DREDGED MATERIAL MANAGEMENT PLAN

PLAN VIEW
FILTERBED PLACEMENT AREA

Drawing No.:
B-16

Sheet 16 of 30

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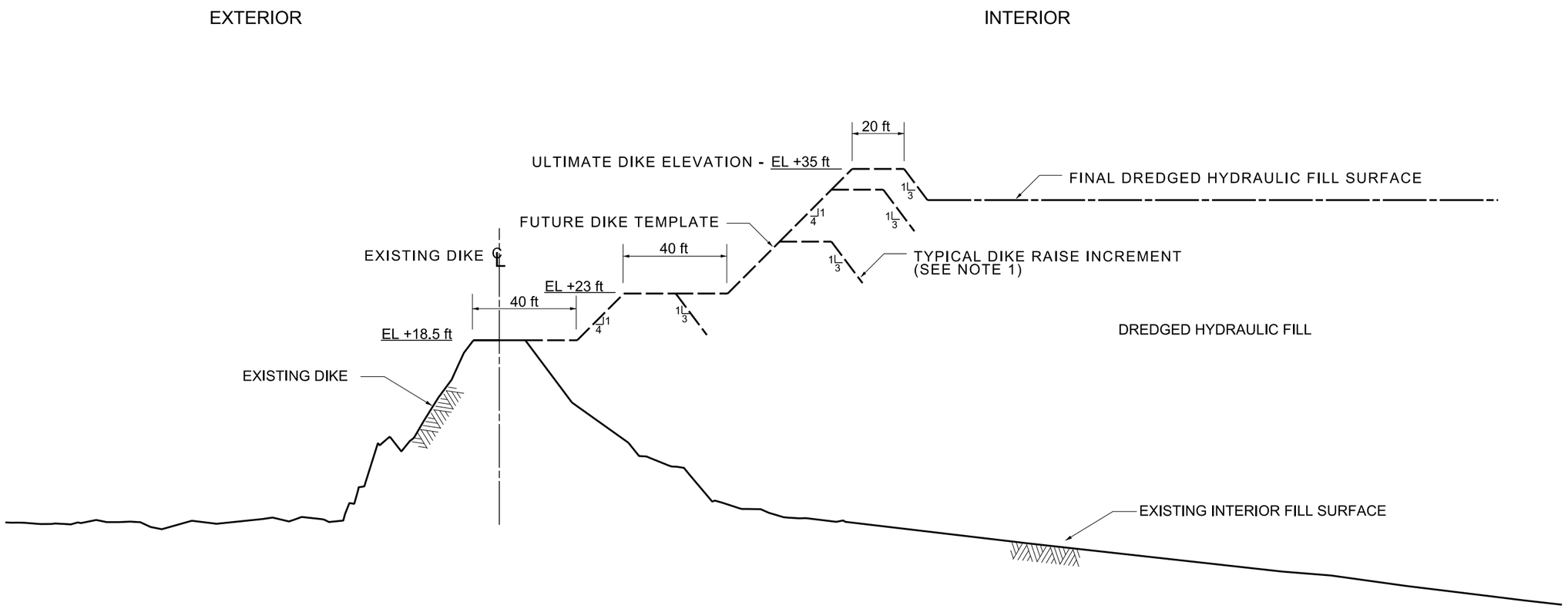

NOTES:
1. TYPICAL DIKE RAISE INCREMENT IS ASSUMED TO BE 5 FT.
2. FUTURE DIKE CONSTRUCTION TO BE PERFORMED USING SEMI-COMPACTED SELECT DIKE FILL.
3. ELEVATIONS REFERENCED TO NAVD88 DATUM.

LEGEND

EXISTING DIKE TEMPLATE ——————

FUTURE DIKE TEMPLATE — — — — — —

FINAL HYDRAULIC FILL SURFACE ——— - ——— - ———

TYPICAL SECTION (FUTURE)
CONTAINMENT DIKE
MID BAY PLACEMENT AREA
N.T.S.

U.S. Army Corps of Engineers
Galveston District

No.	Description	Date	By

Drawn by: DBB
Designed by: DBB
Checked by: DBB
Submitted by: LORI K. HODGES, P.E.
Chief, Geotech/Structure Section
Approved by: TERRY F. BAUTISTA, P.E.
Chief, Engineering and Construction Division
Date: July 2016
Scale: AS SHOWN
Rev:
Approval Recommended:
JOSEPH L. KING, P.A.
Chief, Engineering Branch

U.S. ARMY ENGINEER DISTRICT, GALVESTON
CORPS OF ENGINEERS
GALVESTON, TEXAS

PREPARED UNDER THE DIRECTION OF
RICHARD P. PANNELL, COL., C.E.,
DISTRICT COMMANDER

HOUSTON SHIP CHANNEL, TEXAS
DREDGED MATERIAL MANAGEMENT PLAN

FUTURE CROSS SECTION
CONTAINMENT DIKE
MID BAY PLACEMENT AREA

Drawing No.:
B-17
Sheet 17 of 30

File: C:\Users\M3ECEDBB\Documents\Projects\Houston Ship Channel\HSC DMMP\DMMP Engr Appendix\Geotechnical Plates\B-17-xSEC Mid Bay PA.dgn
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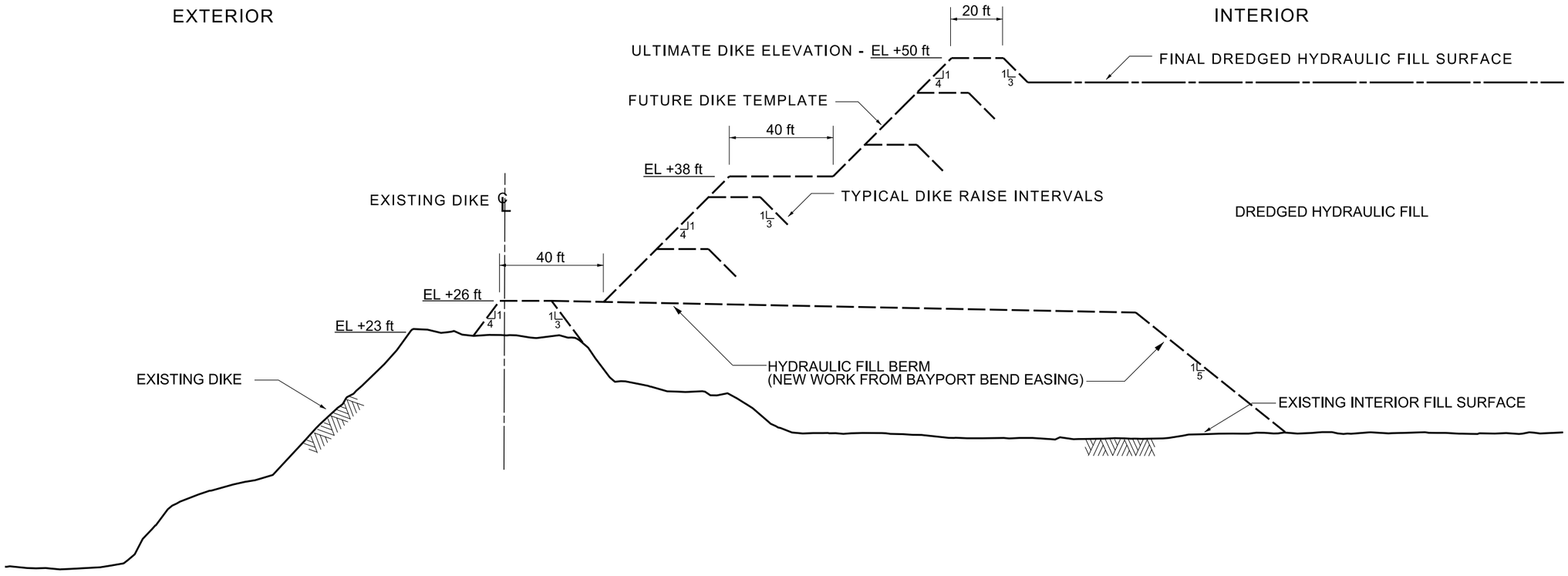

NOTES:
1. TYPICAL DIKE RAISE INCREMENT IS ASSUMED TO BE 5 FT.
2. FUTURE DIKE CONSTRUCTION TO BE PERFORMED USING SEMI-COMPACTED SELECT DIKE FILL.
3. ELEVATIONS REFERENCED TO NAVD88 DATUM.
4. CONFIGURATION SHOWN ASSUMES NEW WORK FROM THE BAYPORT BEND EASING PROJECT IS PLACED AND USED IN PA 14.

LEGEND

EXISTING DIKE TEMPLATE ————————

FUTURE DIKE TEMPLATE — — — — — — —

FINAL HYDRAULIC FILL SURFACE ——— - ——— - ———

TYPICAL SECTION (FUTURE) CONTAINMENT DIKE PLACEMENT AREA 14

N.T.S.

U.S. Army Corps of Engineers
Galveston District

No.	Description	Date	By

Drawn by: DBB
Designed by: DBB
Checked by: DBB
Submitted by: LORI K. HODGES, P.E. Chief, Geotech/Structure Section
Approved by: TERRY F. BAUTISTA, P.E. Chief, Engineering and Construction Division
Date: July 2016
Scale: AS SHOWN
Rev:
Approval Recommended: JOSEPH L. KING, P.A. Chief, Engineering Branch

U.S. ARMY ENGINEER DISTRICT, GALVESTON
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GALVESTON, TEXAS

PREPARED UNDER THE DIRECTION OF
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HOUSTON SHIP CHANNEL, TEXAS
DREDGED MATERIAL MANAGEMENT PLAN

FUTURE CROSS SECTION
CONTAINMENT DIKE
PLACEMENT AREA 14

Drawing No.:
B-18

Sheet 18 of 30

File: C:\Users\M3ECEDBB\Documents\Projects\Houston Ship Channel\HSC DMMP\DMMP Engr Appendix\Geotechnical Plates\B-18-xSEC PA 14.dgn
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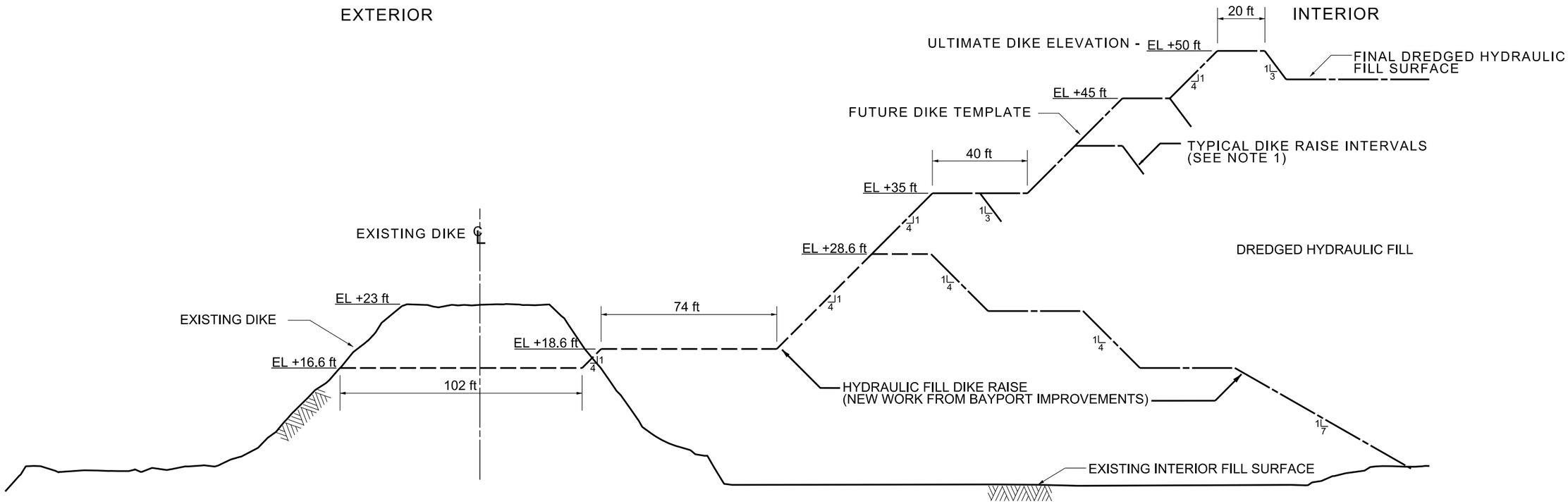

NOTES:
1. TYPICAL DIKE RAISE INCREMENT IS ASSUMED TO BE 5 FT.
2. FUTURE DIKE CONSTRUCTION TO BE PERFORMED USING SEMI-COMPACTED SELECT DIKE FILL.
3. ELEVATIONS REFERENCED TO NAVD88 DATUM.
4. CONFIGURATION SHOWN INCLUDES NEW WORK FROM THE BAYPORT IMPROVEMENT PROJECT USED TO CONSTRUCT HYDRAULIC DIKE RAISE IN PA 15.

LEGEND

EXISTING DIKE TEMPLATE

FUTURE DIKE TEMPLATE

FINAL HYDRAULIC FILL SURFACE

TYPICAL SECTION (FUTURE) CONTAINMENT DIKE PLACEMENT AREA 15

N.T.S.

U.S. Army Corps of Engineers
Galveston District

Rev.	Description	Date	By

Drawn by: DBB
Designed by: DBB
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Submitted by: LORI K. HODGES, P.E. Chief, Geotech/Structure Section
Approved by: TERRY F. BAUTISTA, P.E. Chief, Engineering and Construction Division
Date: July 2016
Scale: AS SHOWN
Approval Recommended: JOSEPH I. KING, P.A. Chief, Engineering Branch

U.S. ARMY ENGINEER DISTRICT, GALVESTON
CORPS OF ENGINEERS
GALVESTON, TEXAS

PREPARED UNDER THE DIRECTION OF
RICHARD P. PANNELL, COL., C.E.,
DISTRICT COMMANDER

HOUSTON SHIP CHANNEL, TEXAS
DREDGED MATERIAL MANAGEMENT PLAN

FUTURE CROSS SECTION
CONTAINMENT DIKE
PLACEMENT AREA 15

Drawing No.:
B-19
Sheet 19 of 30

File: C:\Users\M3ECEDBB\Documents\Projects\Houston Ship Channel\HSC DMMP\DMMP Engr Appendix\Geotechnical Plates\B-19-xSEC PA 15.dgn
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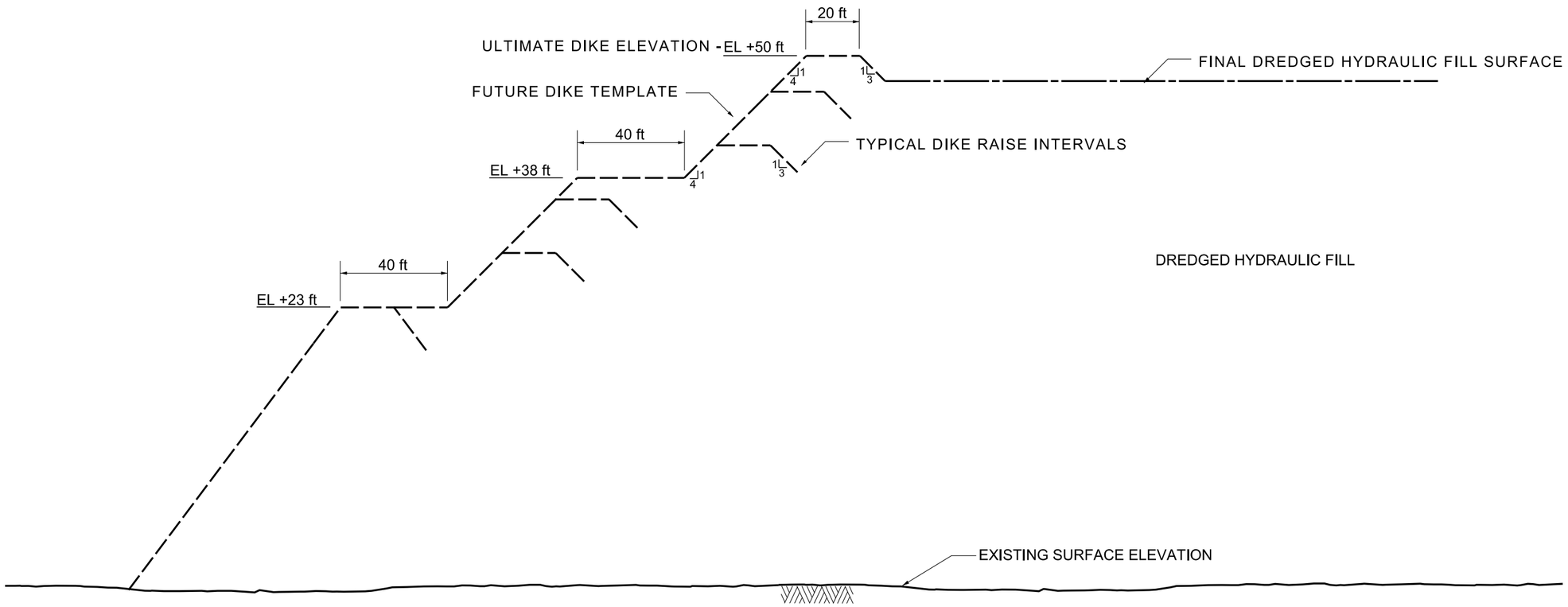

NOTES:
1. TYPICAL DIKE RAISE INCREMENT IS ASSUMED TO BE 5 FT.
2. FUTURE DIKE CONSTRUCTION TO BE PERFORMED USING SEMI-COMPACTED SELECT DIKE FILL.
3. ELEVATIONS REFERENCED TO NAVD88 DATUM.

LEGEND

EXISTING SURFACE ELEVATION ——————

FUTURE DIKE TEMPLATE — — — — — — —

FINAL HYDRAULIC FILL SURFACE ——— - ——— - ———

TYPICAL SECTION (FUTURE)
CONTAINMENT DIKE
PA 14/15 CONNECTION PLACEMENT AREA
N.T.S.

U.S. Army Corps of Engineers
Galveston District

No.	Description	Date	By

Drawn by:	DBB	Date:	July 2016
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Approved by:	TERRY F. BAUTISTA, P.E. Chief, Engineering and Construction Division		

U.S. ARMY ENGINEER DISTRICT, GALVESTON
CORPS OF ENGINEERS
GALVESTON, TEXAS

PREPARED UNDER THE DIRECTION OF
RICHARD P. PANNELL, COL., C.E.,
DISTRICT COMMANDER

HOUSTON SHIP CHANNEL, TEXAS
DREDGED MATERIAL MANAGEMENT PLAN

FUTURE CROSS SECTION
CONTAINMENT DIKE
PA 14/15 CONNECTION
PLACEMENT AREA

Drawing No.:
B-20
Sheet 20 of 30

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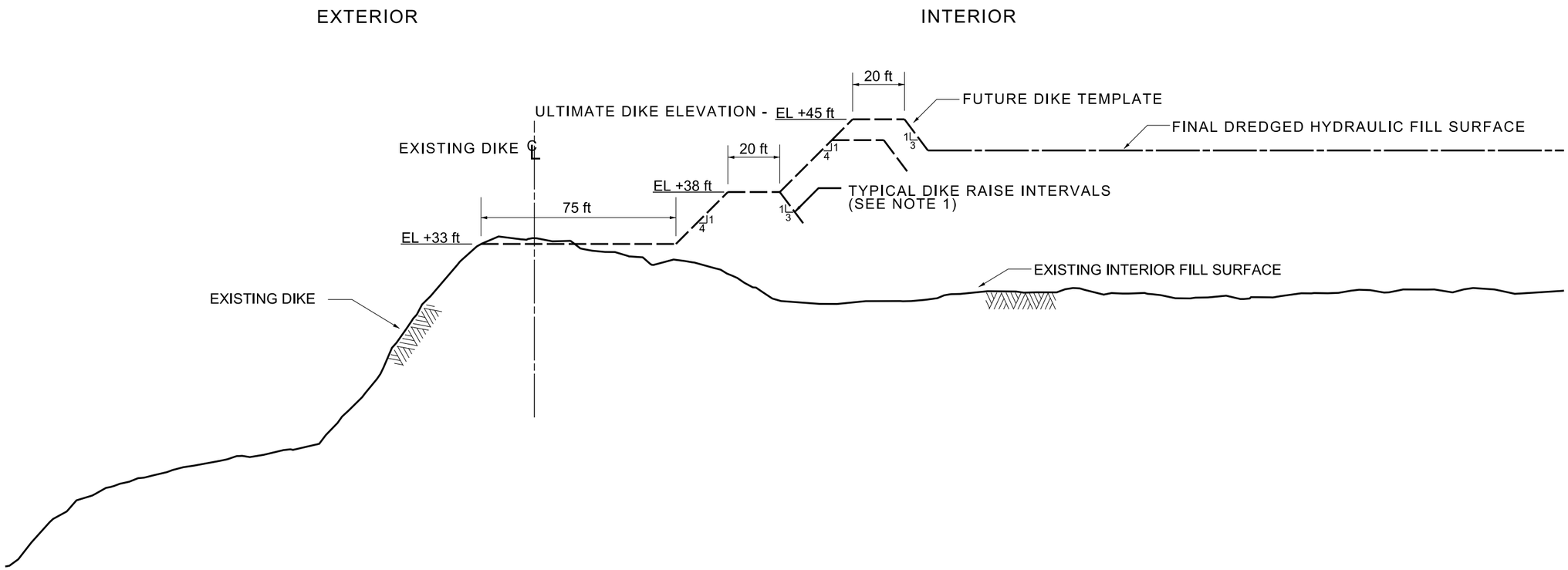

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LEGEND

EXISTING DIKE TEMPLATE ————————

FUTURE DIKE TEMPLATE — — — — — —

FINAL HYDRAULIC FILL SURFACE ——-——-——

TYPICAL SECTION (FUTURE)
CONTAINMENT DIKE
SPILMAN ISLAND PLACEMENT AREA
N.T.S.

U.S. Army Corps of Engineers
Galveston District

No.	Description	Date	By

Drawn by: DBB
Designed by: DBB
Checked by: DBB
Submitted by: LORI K. HODGES, P.E. Chief, Geotech/Structure Section
Approved by: TERRY F. BAUTISTA, P.E. Chief, Engineering and Construction Division
Date: July 2016
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Approval Recommended: JOSEPH I. KING, P.A. Chief, Engineering Branch

U.S. ARMY ENGINEER DISTRICT, GALVESTON
CORPS OF ENGINEERS
GALVESTON, TEXAS

PREPARED UNDER THE DIRECTION OF
RICHARD P. PANNELL, COL., C.E.,
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HOUSTON SHIP CHANNEL, TEXAS
DREDGED MATERIAL MANAGEMENT PLAN

FUTURE CROSS SECTION
CONTAINMENT DIKE
SPILMAN ISLAND PLACEMENT AREA

Drawing No.:
B-21

Sheet 21 of 30

File: C:\Users\M3ECEDBB\Documents\Projects\Houston Ship Channel\HSC DMMP\DMMP Engr Appendix\Geotechnical Plates\B-21-xSEC Spilman PA.dgn
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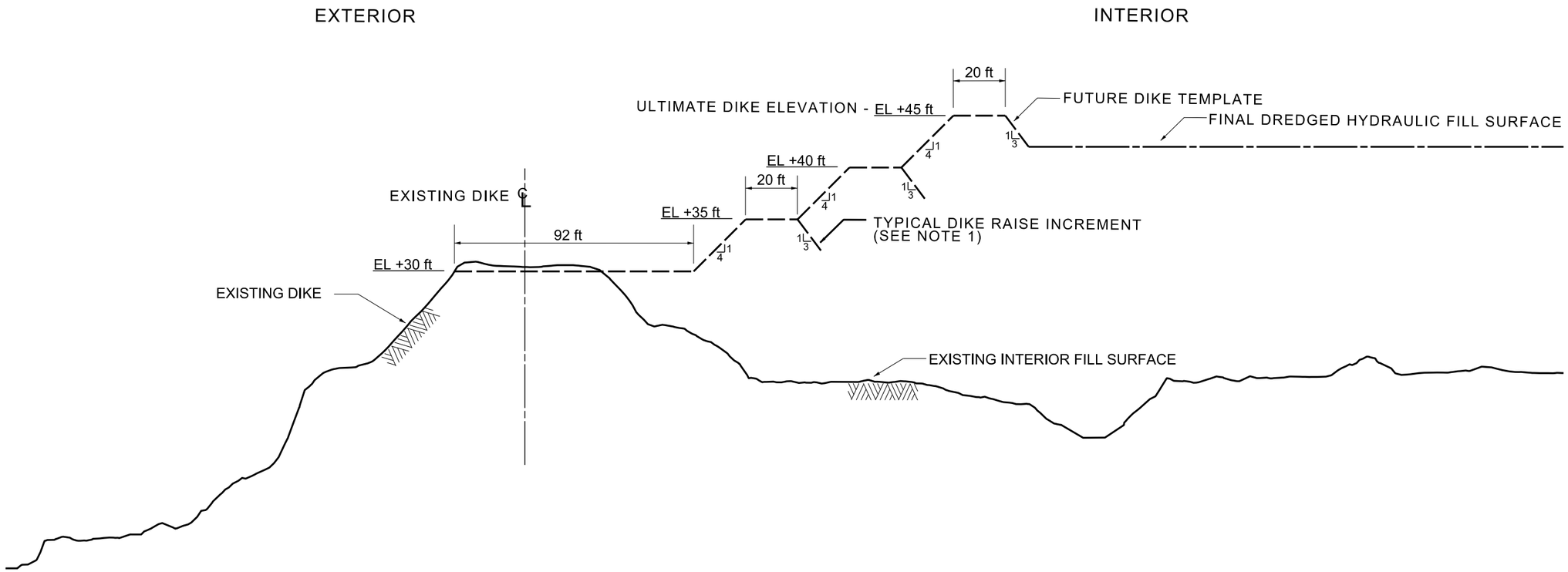

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3. ELEVATIONS REFERENCED TO NAVD88 DATUM.

LEGEND

EXISTING DIKE TEMPLATE ————————

FUTURE DIKE TEMPLATE — — — — — — —

FINAL HYDRAULIC FILL SURFACE ——-——-——

TYPICAL SECTION (FUTURE)
CONTAINMENT DIKE
ALEXANDER ISLAND PLACEMENT AREA
N.T.S.

U.S. Army Corps of Engineers
Galveston District

Rev.	Description	Date	By

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Checked by:	DBB	Approval Recommended:	
Submitted by:		JOSEPH L. KING, P.A.	
LORI K. HODGES, P.E.		Chief, Engineering Branch	
Chief, Geotech/Structure Section			
Approved by:		TERRY F. BAUTISTA, P.E.	
Chief, Engineering and Construction Division			

U.S. ARMY ENGINEER DISTRICT, GALVESTON
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GALVESTON, TEXAS

PREPARED UNDER THE DIRECTION OF
RICHARD P. PANNELL, COL., C.E.,
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HOUSTON SHIP CHANNEL, TEXAS
DREDGED MATERIAL MANAGEMENT PLAN

FUTURE CROSS SECTION
CONTAINMENT DIKE
ALEXANDER ISLAND PLACEMENT AREA

Drawing No.:
B-22
Sheet 22 of 30

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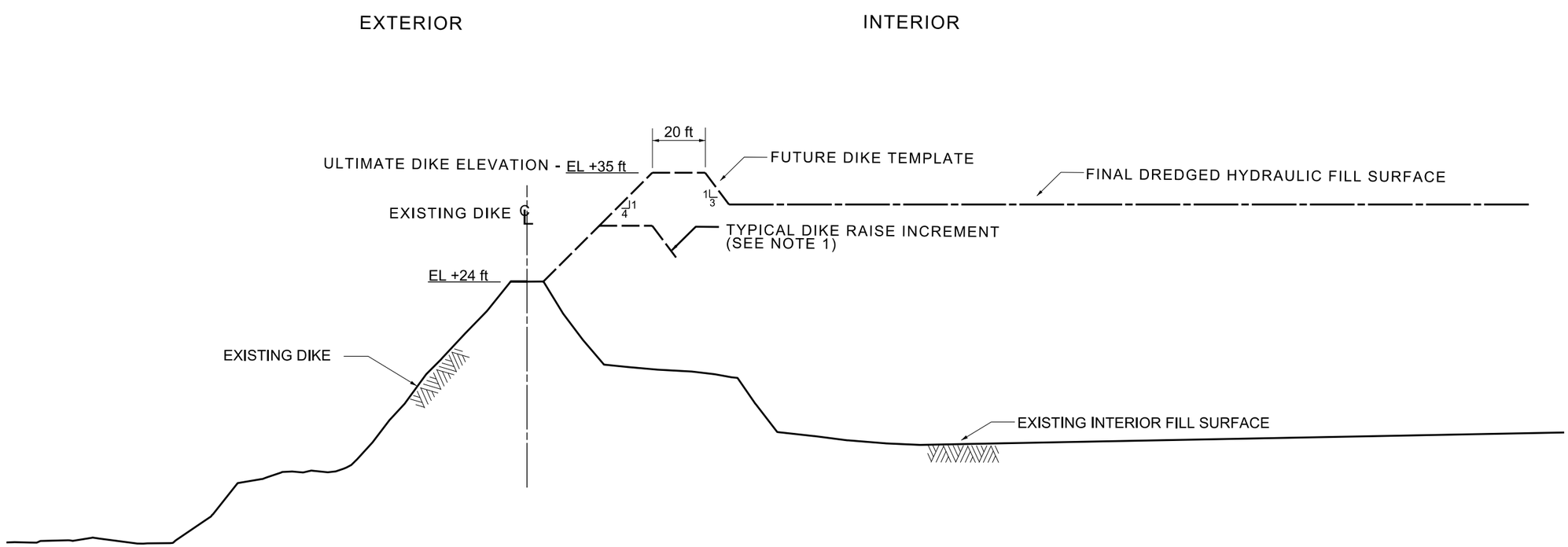

NOTES:
1. TYPICAL DIKE RAISE INCREMENT IS ASSUMED TO BE 5 FT.
2. FUTURE DIKE CONSTRUCTION TO BE PERFORMED USING SEMI-COMPACTED SELECT DIKE FILL.
3. ELEVATIONS REFERENCED TO NAVD88 DATUM.

LEGEND

EXISTING DIKE TEMPLATE ————————

FUTURE DIKE TEMPLATE — — — — — — —

FINAL HYDRAULIC FILL SURFACE ——-——-——

TYPICAL SECTION (FUTURE)
CONTAINMENT DIKE
PEGGY LAKE PLACEMENT AREA

N.T.S.

U.S. Army Corps of Engineers
Galveston District

No.	Description	Date	By

Drawn by: DBB
Designed by: DBB
Checked by: DBB
Submitted by: LORI K. HODGES, P.E. Chief, Geotech/Structure Section
Approved by: TERRY F. BAUTISTA, P.E. Chief, Engineering and Construction Division
Date: July 2016
Scale: AS SHOWN
Rev.
Approval Recommended: JOSEPH L. KING, P.A. Chief, Engineering Branch

U.S. ARMY ENGINEER DISTRICT, GALVESTON
CORPS OF ENGINEERS
GALVESTON, TEXAS

PREPARED UNDER THE DIRECTION OF
RICHARD P. PANNELL, COL., C.E.,
DISTRICT COMMANDER

HOUSTON SHIP CHANNEL, TEXAS
DREDGED MATERIAL MANAGEMENT PLAN

FUTURE CROSS SECTION
CONTAINMENT DIKE
PEGGY LAKE PLACEMENT AREA

Drawing No.:
B-23

Sheet 23 of 30

File: C:\Users\M3ECEDBB\Documents\Projects\Houston Ship Channel\HSC DMMP\DMMP Engr Appendix\Geotechnical Plates\B-23-xSEC Peggy Lake PA.dgn
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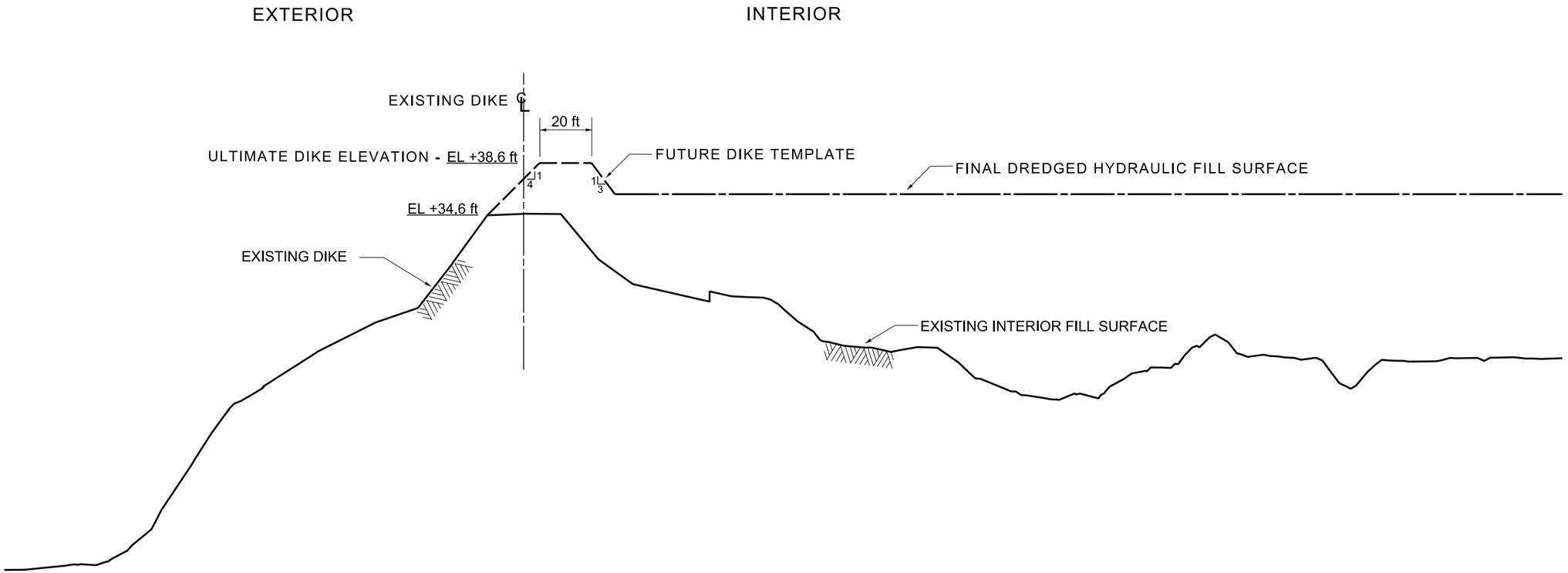

NOTES:
1. TYPICAL DIKE RAISE INCREMENT IS ASSUMED TO BE 5 FT.
2. FUTURE DIKE CONSTRUCTION TO BE PERFORMED USING SEMI-COMPACTED SELECT DIKE FILL.
3. ELEVATIONS REFERENCED TO NAVD88 DATUM.

LEGEND

EXISTING DIKE TEMPLATE ——————

FUTURE DIKE TEMPLATE — — — — — — —

FINAL HYDRAULIC FILL SURFACE ——·——·——

TYPICAL SECTION (FUTURE)
CONTAINMENT DIKE
LOST LAKE PLACEMENT AREA

N.T.S.

U.S. Army Corps of Engineers
Galveston District

No.	Description	Date	By

Drawn by: DBB
Designed by: DBB
Checked by: DBB
Submitted by: LORI K. HODGES, P.E. Chief, Geotech/Structure Section
Approved by: TERRY F. BAUTISTA, P.E. Chief, Engineering and Construction Division
Date: July 2016
Scale: AS SHOWN
Approval Recommended: JOSEPH I. KING, P.A. Chief, Engineering Branch

U.S. ARMY ENGINEER DISTRICT, GALVESTON
CORPS OF ENGINEERS
GALVESTON, TEXAS

PREPARED UNDER THE DIRECTION OF
RICHARD P. PANNELL, COL., C.E.,
DISTRICT COMMANDER

HOUSTON SHIP CHANNEL, TEXAS
DREDGED MATERIAL MANAGEMENT PLAN

FUTURE CROSS SECTION
CONTAINMENT DIKE
LOST LAKE PLACEMENT AREA

Drawing No.:
B-24

Sheet 24 of 30

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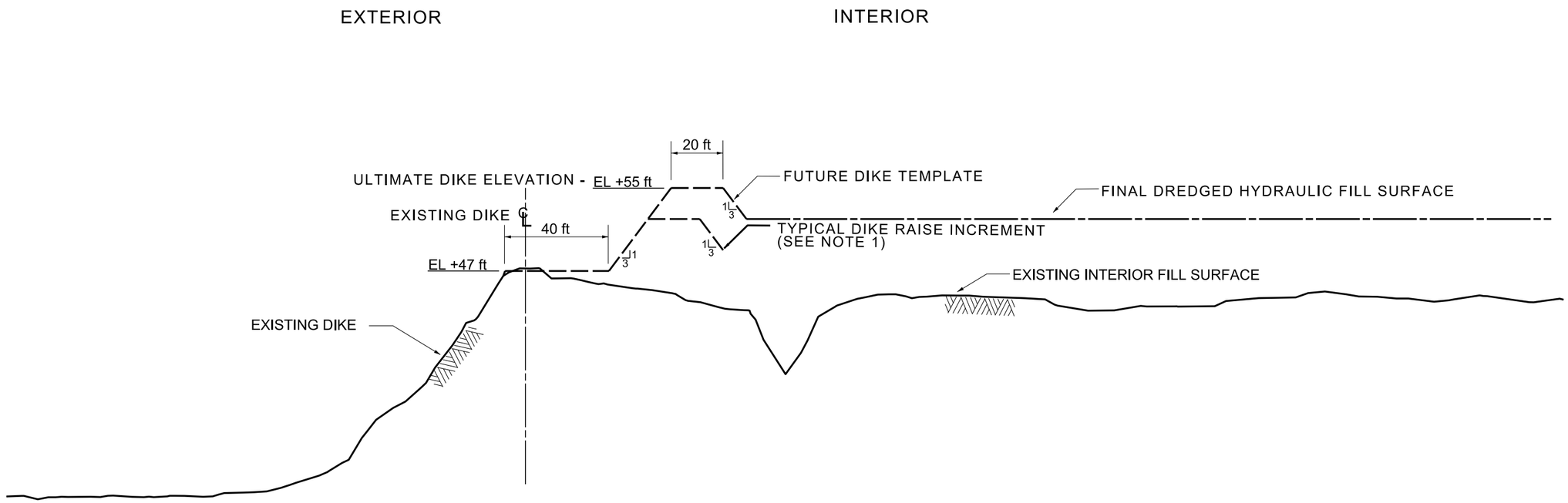

NOTES:
1. TYPICAL DIKE RAISE INCREMENT IS ASSUMED TO BE 5 FT.
2. FUTURE DIKE CONSTRUCTION TO BE PERFORMED USING SEMI-COMPACTED SELECT DIKE FILL.
3. ELEVATIONS REFERENCED TO NAVD88 DATUM.

LEGEND

EXISTING DIKE TEMPLATE ————————

FUTURE DIKE TEMPLATE — — — — — — —

FINAL HYDRAULIC FILL SURFACE ——— - ——— - ———

TYPICAL SECTION (FUTURE)
CONTAINMENT DIKE
ROSA ALLEN PLACEMENT AREA

N.T.S.

U.S. Army Corps of Engineers
Galveston District

By:	Date:	Description	Rev.

Drawn by: DBB
Designed by: DBB
Checked by: DBB
Submitted by: LORI K. HODGES, P.E. Chief, Geotech/Structure Section
Approved by: TERRY F. BAUTISTA, P.E. Chief, Engineering and Construction Division
Date: July 2016
Scale: AS SHOWN
Approval Recommended: JOSEPH I. KING, P.A. Chief, Engineering Branch

U.S. ARMY ENGINEER DISTRICT, GALVESTON
CORPS OF ENGINEERS
GALVESTON, TEXAS

PREPARED UNDER THE DIRECTION OF
RICHARD P. PANNELL, COL., C.E.,
DISTRICT COMMANDER

HOUSTON SHIP CHANNEL, TEXAS
DREDGED MATERIAL MANAGEMENT PLAN

FUTURE CROSS SECTION
CONTAINMENT DIKE
ROSA ALLEN PLACEMENT AREA

Drawing No.:
B-25

Sheet 25 of 30

File: C:\Users\M3ECEDBB\Documents\Projects\Houston Ship Channel\HSC DMMP\DMMP Engr Appendix\Geotechnical Plates\B-25-xSEC Rosa Allen PA.dgn
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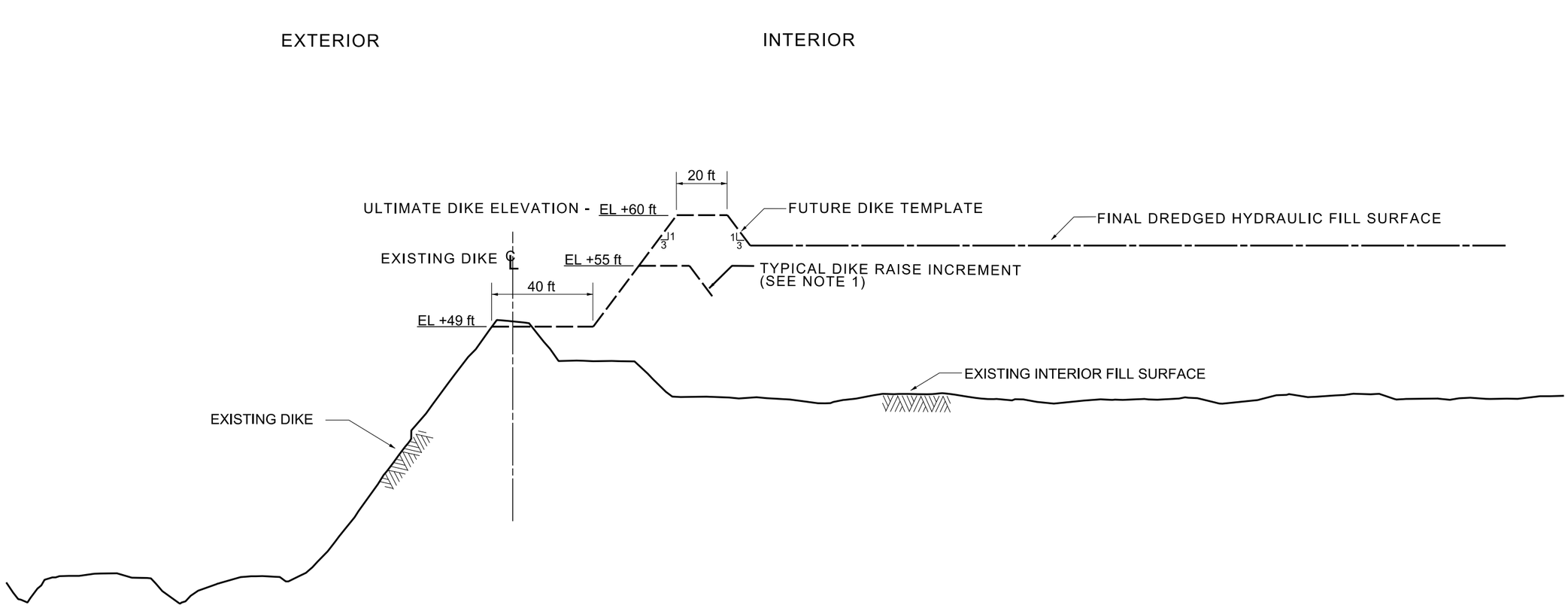

NOTES:
1. TYPICAL DIKE RAISE INCREMENT IS ASSUMED TO BE 5 FT.
2. FUTURE DIKE CONSTRUCTION TO BE PERFORMED USING SEMI-COMPACTED SELECT DIKE FILL.
3. ELEVATIONS REFERENCED TO NAVD88 DATUM.

LEGEND

EXISTING DIKE TEMPLATE ————————

FUTURE DIKE TEMPLATE — — — — — — —

FINAL HYDRAULIC FILL SURFACE ——-———-——

TYPICAL SECTION (FUTURE)
CONTAINMENT DIKE
CLINTON PLACEMENT AREA EAST CELL
N.T.S.

U.S. Army Corps of Engineers
Galveston District

No.	Description	Date	By

Drawn by:	DBB	Date:	July 2016
Designed by:	DBB	Scale:	AS SHOWN
Checked by:	DBB	Rev:	
Submitted by: LORI K. HODGES, P.E. Chief, Geotech/Structure Section		Approval Recommended: JOSEPH I. KING, P.A. Chief, Engineering Branch	
Approved by: TERRY F. BAUTISTA, P.E. Chief, Engineering and Construction Division			

U.S. ARMY ENGINEER DISTRICT, GALVESTON
CORPS OF ENGINEERS
GALVESTON, TEXAS

PREPARED UNDER THE DIRECTION OF
RICHARD P. PANNELL, COL., C.E.,
DISTRICT COMMANDER

HOUSTON SHIP CHANNEL, TEXAS
DREDGED MATERIAL MANAGEMENT PLAN

FUTURE CROSS SECTION
CONTAINMENT DIKE
CLINTON PA EAST CELL

Drawing No.:
B-26

Sheet 26 of 30

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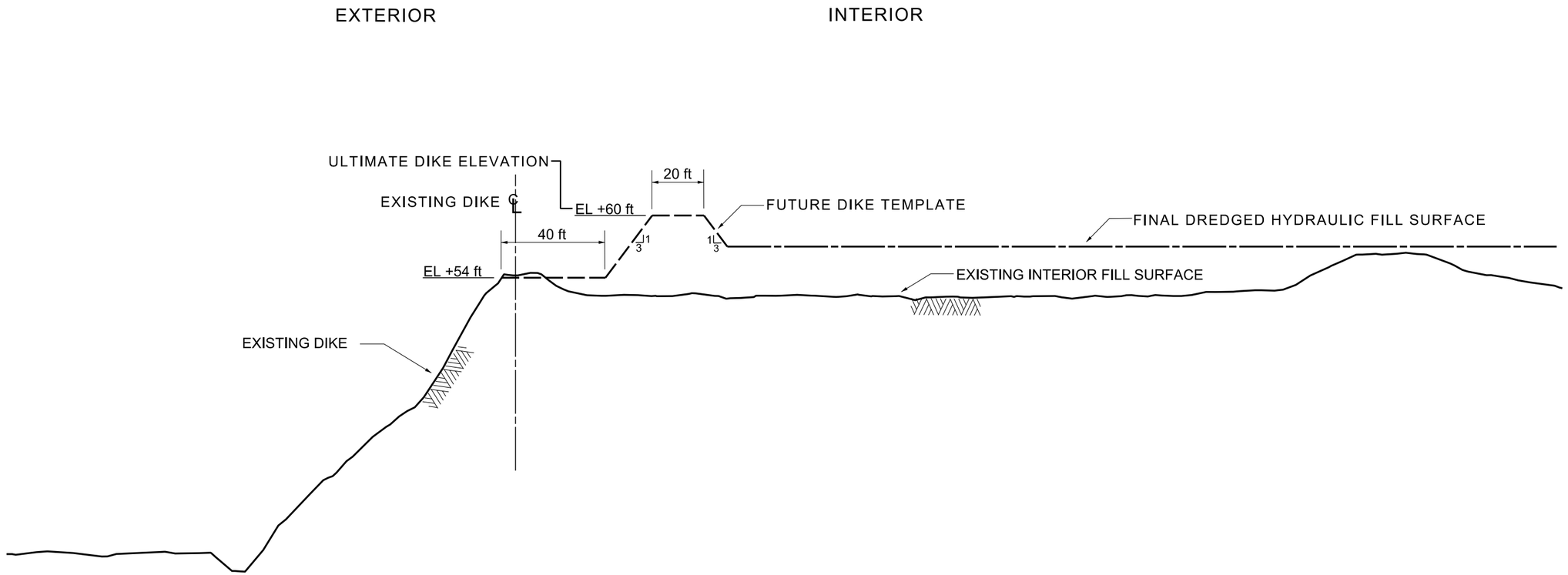

NOTES:
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2. FUTURE DIKE CONSTRUCTION TO BE PERFORMED USING SEMI-COMPACTED SELECT DIKE FILL.
3. ELEVATIONS REFERENCED TO NAVD88 DATUM.

LEGEND

EXISTING DIKE TEMPLATE ————————

FUTURE DIKE TEMPLATE — — — — — — —

FINAL HYDRAULIC FILL SURFACE ——— - ——— - ———

TYPICAL SECTION (FUTURE)
CONTAINMENT DIKE
CLINTON PLACEMENT AREA WEST CELL
N.T.S.

U.S. Army Corps of Engineers
Galveston District

No.	Description	Date	By

Drawn by: DBB
Designed by: DBB
Checked by: DBB
Submitted by: LORI K. HODGES, P.E. Chief, Geotech/Structure Section
Approved by: TERRY F. BAUTISTA, P.E. Chief, Engineering and Construction Division
Date: July 2016
Scale: AS SHOWN
Rev.
Approval Recommended: JOSEPH L. KING, P.A. Chief, Engineering Branch

U.S. ARMY ENGINEER DISTRICT, GALVESTON
CORPS OF ENGINEERS
GALVESTON, TEXAS

PREPARED UNDER THE DIRECTION OF
RICHARD P. PANNELL, COL., C.E.,
DISTRICT COMMANDER

HOUSTON SHIP CHANNEL, TEXAS
DREDGED MATERIAL MANAGEMENT PLAN

FUTURE CROSS SECTION
CONTAINMENT DIKE
CLINTON PA WEST CELL

Drawing No.:
B-27
Sheet 27 of 30

File: C:\Users\M3ECEDBB\Documents\Projects\Houston Ship Channel\HSC DMMP\DMMP Engr Appendix\Geotechnical Plates\B-27-xSEC Clinton West PA.dgn
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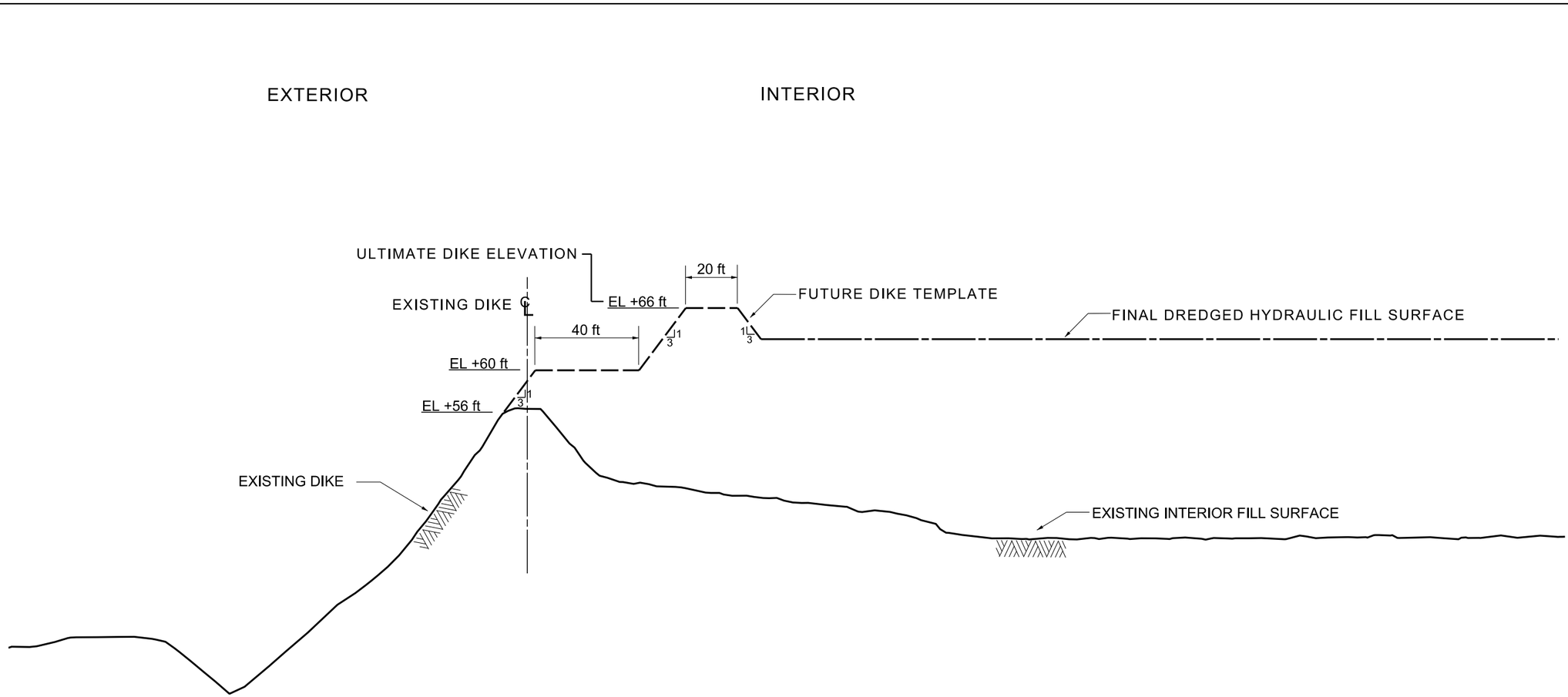

NOTES:
1. TYPICAL DIKE RAISE INCREMENT IS ASSUMED TO BE 5 FT.
2. FUTURE DIKE CONSTRUCTION TO BE PERFORMED USING SEMI-COMPACTED SELECT DIKE FILL.
3. ELEVATIONS REFERENCED TO NAVD88 DATUM.

LEGEND

EXISTING DIKE TEMPLATE

FUTURE DIKE TEMPLATE

FINAL HYDRAULIC FILL SURFACE

TYPICAL SECTION (FUTURE)
CONTAINMENT DIKE
HOUSE TRACT PLACEMENT AREA

N.T.S.

File: C:\Users\M3ECEDBB\Documents\Projects\Houston Ship Channel\HSC DMMP\DMMP Engr Appendix\Geotechnical Plates\B-28-xSEC House Tract PA.dgn
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By: M3ECEDBB Date: 5/16/2016 Time: 4:05:50 PM

U.S. Army Corps of Engineers
Galveston District

Rev.	Description	Date	By

Drawn by: DBB
Designed by: DBB
Checked by: DBB
Submitted by: LORI K. HODGES, P.E. Chief, Geotech/Structure Section
Approved by: TERRY F. BAUTISTA, P.E. Chief, Engineering and Construction Division
Date: July 2016
Scale: AS SHOWN
Approval Recommended: JOSEPH L. KING, P.A. Chief, Engineering Branch

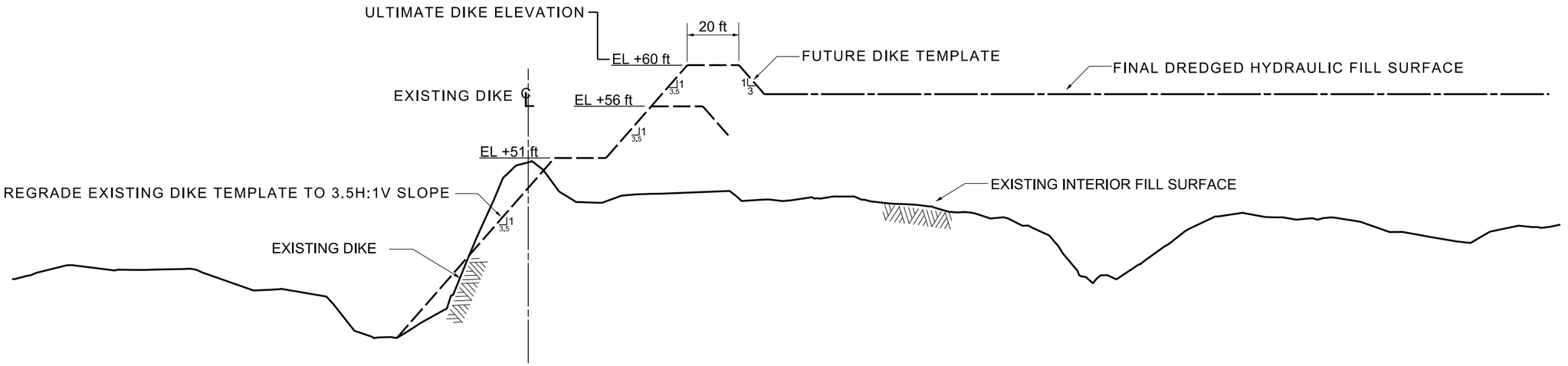
U.S. ARMY ENGINEER DISTRICT, GALVESTON
CORPS OF ENGINEERS
GALVESTON, TEXAS

PREPARED UNDER THE DIRECTION OF
RICHARD P. PANNELL, COL., C.E.,
DISTRICT COMMANDER

HOUSTON SHIP CHANNEL, TEXAS
DREDGED MATERIAL MANAGEMENT PLAN

FUTURE CROSS SECTION
CONTAINMENT DIKE
HOUSE TRACT PLACEMENT AREA

Drawing No.:
B-28



NOTES:
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2. FUTURE DIKE CONSTRUCTION TO BE PERFORMED USING SEMI-COMPACTED SELECT DIKE FILL.
3. ELEVATIONS REFERENCED TO NAVD88 DATUM.

LEGEND

EXISTING DIKE TEMPLATE ————————

FUTURE DIKE TEMPLATE — — — — — — —

FINAL HYDRAULIC FILL SURFACE ——-——-——

TYPICAL SECTION (FUTURE) CONTAINMENT DIKE GLENDALE PLACEMENT AREA

N.T.S.

U.S. Army Corps of Engineers
Galveston District

No.	Description	Date	By

Drawn by: DBB
Designed by: DBB
Checked by: DBB
Submitted by: JOSEPH L. KING, P.A.
Chief, Engineering and Construction Division
Approved by: TERRY F. BAUTISTA, P.E.
Chief, Engineering and Construction Division
Date: July 2016
Scale: AS SHOWN
Rev:

U.S. ARMY ENGINEER DISTRICT, GALVESTON
CORPS OF ENGINEERS
GALVESTON, TEXAS

PREPARED UNDER THE DIRECTION OF
RICHARD P. PANNELL, COL., C.E.,
DISTRICT COMMANDER

HOUSTON SHIP CHANNEL, TEXAS
DREDGED MATERIAL MANAGEMENT PLAN

FUTURE CROSS SECTION
CONTAINMENT DIKE
GLENDALE PLACEMENT AREA

Drawing No.:
B-29
Sheet 29 of 30

File: C:\Users\M3ECEDBB\Documents\Projects\Houston Ship Channel\HSC DMMP\DMMP Engr Appendix\Geotechnical Plates\B-29-xSEC Glendale PA.dgn
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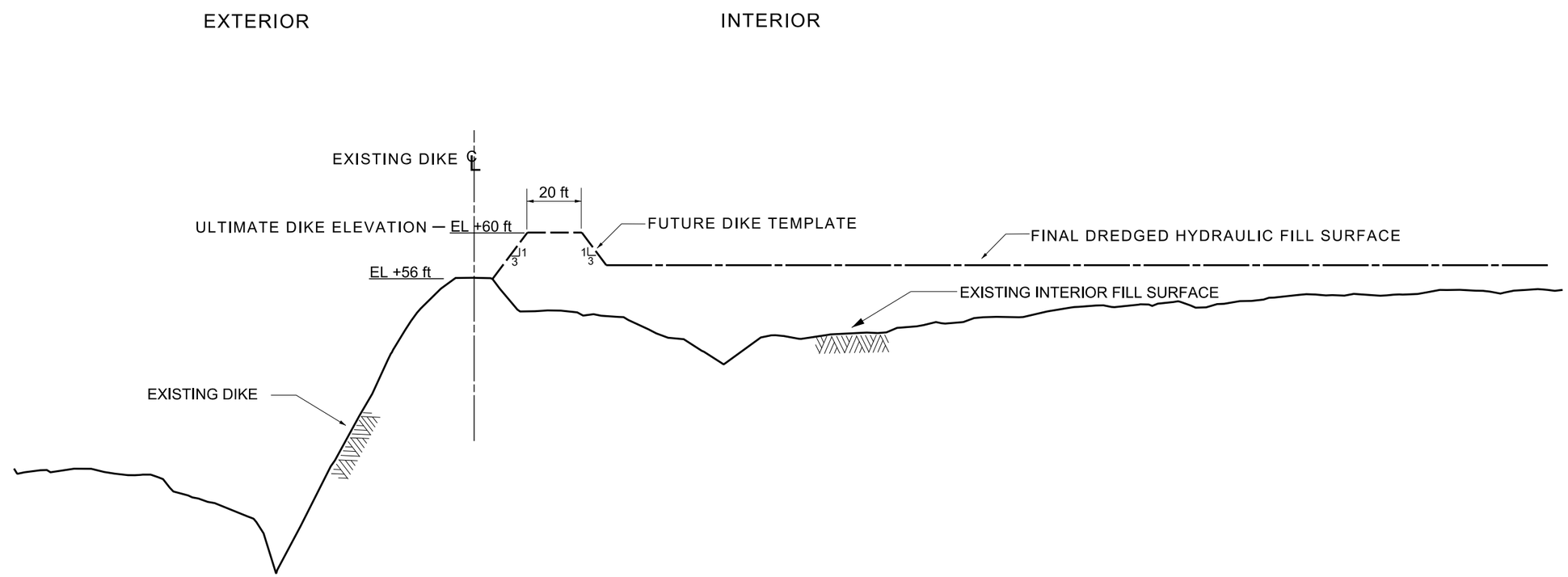
By: M3ECEDBB Date: 5/16/2016 Time: 4:09:29 PM



NOTES:
1. TYPICAL DIKE RAISE INCREMENT IS ASSUMED TO BE 5 FT.
2. FUTURE DIKE CONSTRUCTION TO BE PERFORMED USING SEMI-COMPACTED SELECT DIKE FILL.
3. ELEVATIONS REFERENCED TO NAVD88 DATUM.

LEGEND

EXISTING DIKE TEMPLATE ————————

FUTURE DIKE TEMPLATE — — — — — — —

FINAL HYDRAULIC FILL SURFACE ——-——-——

TYPICAL SECTION (FUTURE) CONTAINMENT DIKE FILTERBED PLACEMENT AREA

N.T.S.

U.S. Army Corps of Engineers
Galveston District

No.	Description	Date	By

Drawn by: DBB
Designed by: DBB
Checked by: DBB
Submitted by: LORI K. HODGES, P.E. Chief, Geotech/Structure Section
Approved by: TERRY F. BAUTISTA, P.E. Chief, Engineering and Construction Division
Date: July 2016
Scale: AS SHOWN
Approval Recommended: JOSEPH L. KING, P.A. Chief, Engineering Branch
Rev.

U.S. ARMY ENGINEER DISTRICT, GALVESTON
CORPS OF ENGINEERS
GALVESTON, TEXAS

PREPARED UNDER THE DIRECTION OF
RICHARD P. PANNELL, COL., C.E.,
DISTRICT COMMANDER

HOUSTON SHIP CHANNEL, TEXAS
DREDGED MATERIAL MANAGEMENT PLAN

FUTURE CROSS SECTION
CONTAINMENT DIKE
FILTERBED PLACEMENT AREA

Drawing No.:
B-30
Sheet 30 of 30

File: C:\Users\M3ECEDBB\Documents\Projects\Houston Ship Channel\HSC DMMP\DMMP Engr Appendix\Geotechnical Plates\B-30-xSEC Filterbed PA.dgn
Model Name: Default
By: M3ECEDBB Date: 5/16/2016 Time: 4:10:27 PM

Hole No. 11-B17

BORING LOG	DISTRICT: Galveston	INSTALLATION: Filterbed	SHEET 1 OF 2 SHEETS
1. PROJECT: HSCDMMP		7. ELEVATION OF HOLE: 54.26 ft	
2. LOCATION (Coordinates or Station): Filterbed, N=13844407.59 E=3145592.29		8. DATUM FOR ELEVATION:	
3. DRILLING AGENCY: Kenall Inc.		9. ELEVATION OF GROUNDWATER: ▽ TOD: 30.96 ft ▼ 24-HR:	
4. LABORATORY TESTING AGENCY: Kenall Inc.		10. DRILLING DATE and TIME: STARTED: 9/9/11 COMPLETED: 9/9/11	
5. DEPTH OF WATER: ▽ TOD: 23.3 ft ▼ 24-HR:		11. CLASSIFICATION REFERENCE:	
6. DEPTH OF HOLE: 60 ft		12. ENGINEER: Vivek Chikyala	

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
			FAT CLAY(CH), very stiff, dark brown with ferrous nodules		1			4.5		16.0				
					2			4.5	105	17.0	89	27	62	
5					3			4.5		21.0				
					4			4.5		23.0				
					5			2.25	90	29.0	85	31	54	
10			-soft to sfiff, dark gray below 10'		6			1.25		36.0				
					7			0.75	79	36.0				
			-traces of organics and strong hydrocarbons odour below 13' to 22'		8			1.5		22.0				
15					9			0.25	75	46.0				
					10			0.5		48.0				
20	34.3													
	32.3		**SANDY LEAN CLAY(CL)**, soft, dark brown		11			0.5		17.0	43	14	29	
	▽		**FAT CLAY(CH)**, stiff, light gray with sand pockets		12			0.75		21.0				
25					13			1.75		18.0				
					14			1.75	105	21.0				
					15			1.75		21.0				
30	23.8													
	22.3		**SILTY SAND(SM)**, medium dense, brown		16		18			24.0				48
			SANDY LEAN CLAY(CL), very stiff, brown and light gray with sand seams		17			4.0	111	16.0	47	20	27	

SWG 1836 BOR FILTERBED.GPJ TOLUNAY-WONG ENGINEERS.GDT 1/4/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B17

BORING LOG	DISTRICT: Galveston	INSTALLATION: Filterbed	SHEET 2 OF 2 SHEETS

1. PROJECT: HSCDMMP	7. ELEVATION OF HOLE: 54.26 ft
2. LOCATION (Coordinates or Station): Filterbed, N=13844407.59 E=3145592.29	8. DATUM FOR ELEVATION:
3. DRILLING AGENCY: Kenall Inc.	9. ELEVATION OF GROUNDWATER: ▽ TOD: 30.96 ft ▼ 24-HR:
4. LABORATORY TESTING AGENCY: Kenall Inc.	10. DRILLING DATE and TIME: STARTED: 9/9/11 COMPLETED: 9/9/11
5. DEPTH OF WATER: ▽ TOD: 23.3 ft ▼ 24-HR:	11. CLASSIFICATION REFERENCE:
6. DEPTH OF HOLE: 60 ft	12. ENGINEER: Vivek Chikyala

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
					18			2.75		28.0				
					19			3.75		15.0				
	16.3		**SILTY SAND(SM)**, loose to very dense, brown, light gray with clay pockets											
					20		38			7.0				
40					21		10			27.0				
					22		24			24.0				
45					23		40			23.0				
					24		40			25.0				
					25		41			29.0				
50	3.3													
	2.3		**FAT CLAY(CH)**, very stiff, reddish brown		26			4.0	100	15.0				
			SILTY SAND(SM), medium dense to very dense, reddish brown with clay pockets		27					22.0				
55					28		27			30.0				
					29		28			24.0				
	-5.7				30		27			19.0				
60														
65														

SWG 1836 BOR FILTERBED.GPJ TOLUNAY-WONG ENGINEERS.GDT 1/4/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B18

BORING LOG	DISTRICT: Galveston	INSTALLATION: Filterbed	SHEET 1 OF 2 SHEETS
1. PROJECT: HSCDMMP		7. ELEVATION OF HOLE: +55.86 ft	
2. LOCATION (Coordinates or Station): Filterbed, N=13842631.67 E=3145054.27		8. DATUM FOR ELEVATION:	
3. DRILLING AGENCY: Kenall Inc.		9. ELEVATION OF GROUNDWATER: ▽ TOD: 23.36 ft ▼ 24-HR:	
4. LABORATORY TESTING AGENCY: Kenall Inc.		10. DRILLING DATE and TIME: STARTED: 9/9/11 COMPLETED: 9/9/11	
5. DEPTH OF WATER: ▽ TOD: 32.5 ft ▼ 24-HR:		11. CLASSIFICATION REFERENCE:	
6. DEPTH OF HOLE: 60 ft		12. ENGINEER: Vivek Chikyala	

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
			SANDY LEAN CLAY(CL), very stiff, brown		1			4.5		14.0				
	51.9				2			4.5	103	17.0	45	18	27	
5			**FAT CLAY(CH)**, very stiff, brown with sand seams		3			4.5		22.0				
	47.9				4			4.0		31.0				
			SILTY SAND(SM), loose,brown, with clay pockets with hyrdocarbon odours		5				98	25.0				
10					6		9			32.0				
	42.9				7			1.25		20.0				
			FAT CLAY(CH), soft to stiff, dark gray with hydrocarbon odours		8		14			23.0				
15					9		8			27.0				
			-sand pockets below 19'		10			0.5	79	42.0				
20			-calcareous nodules below 21'		11			1.25		24.0				
					12			1.0		24.0				
25			-light gray and reddish brown below 25'		13			2.0		16.0	69	24	45	
					14			2.25		27.0				
					15			2.75		24.0				
30					16			3.0		25.0				
	23.9													
	▽ 21.9		**SILTY SAND(SM)**, medium dense, brown		17		20			15.0				53
			SANDY LEAN CLAY(CL), stiff to very stiff,											

SWG 1836 BOR FILTERBED.GPJ TOLUNAY-WONG ENGINEERS.GDT 1/4/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B18

BORING LOG	DISTRICT: Galveston	INSTALLATION: Filterbed	SHEET 2 OF 2 SHEETS

1. PROJECT: HSCDMMP	7. ELEVATION OF HOLE: +55.86 ft
2. LOCATION (Coordinates or Station): Filterbed, N=13842631.67 E=3145054.27	8. DATUM FOR ELEVATION:
3. DRILLING AGENCY: Kenall Inc.	9. ELEVATION OF GROUNDWATER: ▽ TOD: 23.36 ft ▼ 24-HR:
4. LABORATORY TESTING AGENCY: Kenall Inc.	10. DRILLING DATE and TIME: STARTED: 9/9/11 COMPLETED: 9/9/11
5. DEPTH OF WATER: ▽ TOD: 32.5 ft ▼ 24-HR:	11. CLASSIFICATION REFERENCE:
6. DEPTH OF HOLE: 60 ft	12. ENGINEER: Vivek Chikyala

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
			reddish brown and light gray with gravel and sand seams		18			1.75	118	16.0	34	12	22	
					19			2.5		15.0				
					20			4.5		14.0				
40	15.9		**CLAYEY SAND(SM)**, medium dense to very dense, reddish brown light gray with clay pockets		21		30			20.0				
					22		65			23.0				
45	9.9				23		63			20.0				
			FAT CLAY(CH), very stiff, reddish brown and light gray with sand seams		24			3.0	117	16.0				
					25			4.5						
50					26			4.0		15.0				
					27			4.5		12.0				
55					28			4.5	97	19.0				
					29			3.75		20.0				
					30			4.5		19.0				
60	-4.1													
65														

SWG 1836 BOR FILTERBED.GPJ TOLUNAY-WONG ENGINEERS.GDT 1/4/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B19

BORING LOG	DISTRICT: Galveston	INSTALLATION: Filterbed	SHEET 1 OF 2 SHEETS

1. PROJECT: HSCDMMP	7. ELEVATION OF HOLE: +55.90 ft
2. LOCATION (Coordinates or Station): Filterbed, N=13840966.04 E=3145878.72	8. DATUM FOR ELEVATION:
3. DRILLING AGENCY: Kenall Inc.	9. ELEVATION OF GROUNDWATER: ▽ TOD: 39.8 ft ▼ 24-HR:
4. LABORATORY TESTING AGENCY: Kenall Inc.	10. DRILLING DATE and TIME: STARTED: 9/8/11 COMPLETED: 9/8/11
5. DEPTH OF WATER: ▽ TOD: 16.1 ft ▼ 24-HR:	11. CLASSIFICATION REFERENCE:
6. DEPTH OF HOLE: 60 ft	12. ENGINEER: Vivek Chikyala

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
	55.4		6" Top soil											
			SILTY SAND(SM), loose to medium dense, brown and light gray, with gravel		1		20			4.0				
					2		26			4.0				27
5					3		18			3.0				
					4		9		95	7.0				
					5					8.0				
10			-with clay pockets below 10'		6		10			15.0				
					7			1.25	95	30.0	71	25	46	
	41.9		**CLAYEY SAND(SC)**, loose to medium dense, light gray with hyrdo carbons odours		8					23.0				
15	▽		-too soft from 14' to 16'		9		7		79	21.0				
					10		13			22.0				
20					11					20.0				
	32.9		**FAT CLAY(CH)**, very stiff, dark gray with ferrous stains and calcareous nodules		12			0.25		20.0	56	22	34	
25					13			2.25		20.0				
					14			2.25		21.0				
30			-light gray with gravel seams from 31' to 32'		15			2.25		29.0				
					16			3.75	104	22.0				
					17			3.75		21.0				

SWG 1836 BOR FILTERBED.GPJ TOLUNAY-WONG ENGINEERS.GDT 1/4/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B19

BORING LOG	DISTRICT: Galveston	INSTALLATION: Filterbed	SHEET 2 OF 2 SHEETS

1. PROJECT: HSCDMMP	7. ELEVATION OF HOLE: +55.90 ft
2. LOCATION (Coordinates or Station): Filterbed, N=13840966.04 E=3145878.72	8. DATUM FOR ELEVATION:
3. DRILLING AGENCY: Kenall Inc.	9. ELEVATION OF GROUNDWATER: ▽ TOD: 39.8 ft ▼ 24-HR:
4. LABORATORY TESTING AGENCY: Kenall Inc.	10. DRILLING DATE and TIME: STARTED: 9/8/11 COMPLETED: 9/8/11
5. DEPTH OF WATER: ▽ TOD: 16.1 ft ▼ 24-HR:	11. CLASSIFICATION REFERENCE:
6. DEPTH OF HOLE: 60 ft	12. ENGINEER: Vivek Chikyala

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
			-with sand seams from 37' to 44'		18			4.5	113	19.0				
					19			4.5		21.0				
40					20		24			19.0				
					21			3.75	106	24.0	73	23	50	
	11.9				22			1.25		16.0				
45			**SANDY LEAN CLAY(CL)**, stiff to very stiff, light gray and reddish brown with silt seams		23			2.25		15.0				
					24			3.0	111	17.0				
	5.9				25			3.0		20.0				
50			**FAT CLAY(CH)**, very stiff, reddish brown and light gray		26		25			28.0				
					27			4.5	97	19.0				
55					28			3.5		15.0				
					29			3.75		14.0				
	-4.1				30			3.75		16.0				
60														
65														

SWG 1836 BOR FILTERBED.GPJ TOLUNAY-WONG ENGINEERS.GDT 1/4/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B20

BORING LOG	DISTRICT: Galveston	INSTALLATION: Filterbed	SHEET 1 OF 2 SHEETS

1. PROJECT: HSCDMMP	7. ELEVATION OF HOLE: +55.45 ft
2. LOCATION (Coordinates or Station): Filterbed, N=138426658.35 E=3146212.68	8. DATUM FOR ELEVATION:
3. DRILLING AGENCY: Kenall Inc.	9. ELEVATION OF GROUNDWATER: ▽ TOD: 32.15 ft ▼ 24-HR:
4. LABORATORY TESTING AGENCY: Kenall Inc.	10. DRILLING DATE and TIME: STARTED: 9/8/11 COMPLETED: 9/8/11
5. DEPTH OF WATER: ▽ TOD: 23.3 ft ▼ 24-HR:	11. CLASSIFICATION REFERENCE:
6. DEPTH OF HOLE: 60 ft	12. ENGINEER: Vivek Chikyala

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
	55.0		6" top soil											
			FAT CLAY(CH), very stiff, dark brown with sand seams		1			4.5		17.0				
					2			4.5	100	22.0				
5					3			4.5		20.0				
					4			2.25		23.0				
					5			2.0		18.0				
10					6			2.0	110	18.0	59	18	41	
	43.5		**SILTY SAND(SM)**, loose, brown sand with clay pockets		7					11.0				
15					8		6			27.0				
	39.5		-no recovery		9									
	36.5													
20			**FAT CLAY(CH)**, soft to very stiff, dark gray with organics and hydrocarbon odours		10		2			27.0				
					11			2.25	61	59.0	97	31	66	
	32.5		**FAT CLAY(CH)**, stiff to very stiff, light gray with sand seams		12			2.0		18.0				
25					13			1.5	108	20.0				82
					14			2.5		22.0				
30					15			2.25		18.0				
	24.5		**SANDY LEAN CLAY(CI)**, very stiff, reddish brown, light gray with sand seams and calcareous deposits		16			4.5	118	15.0				
					17			4.5		23.0				

SWG 1836 BOR FILTERBED.GPJ TOLUNAY-WONG ENGINEERS.GDT 1/4/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B20

BORING LOG	DISTRICT Galveston	INSTALLATION Filterbed	SHEET 2 OF 2 SHEETS

1. PROJECT HSCDMMP	7. ELEVATION OF HOLE +55.45 ft
2. LOCATION (Coordinates or Station) Filterbed, N=138426658.35 E=3146212.68	8. DATUM FOR ELEVATION
3. DRILLING AGENCY Kenall Inc.	9. ELEVATION OF GROUNDWATER ▽ TOD: 32.15 ft ▼ 24-HR:
4. LABORATORY TESTING AGENCY Kenall Inc.	10. DRILLING DATE and TIME STARTED: 9/8/11 COMPLETED: 9/8/11
5. DEPTH OF WATER ▽ TOD: 23.3 ft ▼ 24-HR:	11. CLASSIFICATION REFERENCE
6. DEPTH OF HOLE 60 ft	12. ENGINEER Vivek Chikyala

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
	18.5				18			4.5		16.0				
			FAT CLAY(CH), very stiff, reddish brown, light gray with calcareous nodules		19			3.25		30.0				
	16.5													
40			**SANDY LEAN CLAY(CI)**, very stiff, reddish brown, light gray with lots of silt pockets		20			3.0	110	19.0	32	19	13	
					21			4.5		25.0				
	11.5													
			FAT CLAY(CH), very stiff, reddish brown, light gray with calcareous nodules		22		21			24.0				
45					23			3.75		22.0				
					24			3.5		16.0	53	16	37	
50					25			4.0	115	16.0				
					26			4.0		14.0				
					27			4.25		18.0				
55					28			4.5		15.0				
					29			4.5		15.0				
					30			4.5						
60	-4.6													
65														

SWG 1836 BOR FILTERBED.GPJ TOLUNAY-WONG ENGINEERS.GDT 1/4/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B24A

BORING LOG	DISTRICT: Galveston	INSTALLATION: Glendale	SHEET 1 OF 2 SHEETS
1. PROJECT: HSCDMMP		7. ELEVATION OF HOLE: +44.03 ft	
2. LOCATION (Coordinates or Station): Glendale N=13841395.75 E=3151548.93		8. DATUM FOR ELEVATION:	
3. DRILLING AGENCY: Kenall Inc.		9. ELEVATION OF GROUNDWATER: ▽ TOD: 18.03 ft ▼ 24-HR:	
4. LABORATORY TESTING AGENCY: Kenall Inc.		10. DRILLING DATE and TIME: STARTED: 12/15/11 COMPLETED: 12/15/11	
5. DEPTH OF WATER: ▽ TOD: 26.0 ft ▼ 24-HR:		11. CLASSIFICATION REFERENCE:	
6. DEPTH OF HOLE: 60 ft		12. ENGINEER: Vivek Chikyala	

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	TORVANE (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
			SANDY LEAN CLAY(CL), very stiff, reddish brown and light gray with lot of sand seams		1			3.75			17.0				
	40.5		- dark gray		2			3.25		102	17.0				
5			**SILT(ML)**, light gray with clay pockets												
	38.0				3		11				22.0				92
			FAT CLAY(CH), very stiff, reddish brown and dark gray with sand pockets and seams		4			2.5		93	28.0	80	30	50	99
	36.0				5			2.75			18.0				
10			**FAT CLAY WITH SAND(CH)**, stiff to very stiff, light gray, light brown and dark gray with calcareous nodules and ferrous stains		6			1.0		107	20.0	61	20	41	81
					7			1.0			27.0				
			- gray		8			1.0		93	29.0				
15					9			1.75			22.0				
					10			1.25			14.0				
	24.0														
20			**FAT CLAY(CH)**, very stiff, light gray, light brown and reddish brown with calcareous nodules and ferrous stains		11			2.25				50	21	29	86
			- with sand pockets		12			2.75			19.0				
	20.0														
25			**SANDY LEAN CLAY(CL)**, stiff to very stiff, light brown and light gray with silty sand at bottom		13			1.75			25.0				
	▽		- ferrous stains		14			3.75			16.0				
					15			1.5			12.0				
30					16			1.5			18.0				
			- reddish brown with calcareous nodules		17			2.0			20.0				

SWG 1836 BOR GLENDALE.GPJ TOLUNAY-WONG ENGINEERS.GDT 3/6/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B24A

BORING LOG	DISTRICT: Galveston	INSTALLATION: Glendale	SHEET 2 OF 2 SHEETS
1. PROJECT: HSCDMMP		7. ELEVATION OF HOLE: +44.03 ft	
2. LOCATION (Coordinates or Station): Glendale N=13841395.75 E=3151548.93		8. DATUM FOR ELEVATION:	
3. DRILLING AGENCY: Kenall Inc.		9. ELEVATION OF GROUNDWATER: ▽ TOD: 18.03 ft ▼ 24-HR:	
4. LABORATORY TESTING AGENCY: Kenall Inc.		10. DRILLING DATE and TIME: STARTED: 12/15/11 COMPLETED: 12/15/11	
5. DEPTH OF WATER: ▽ TOD: 26.0 ft ▼ 24-HR:		11. CLASSIFICATION REFERENCE:	
6. DEPTH OF HOLE: 60 ft		12. ENGINEER: Vivek Chikyala	

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	TORVANE (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
	8.0				18			3.5			15.0				
			FAT CLAY WITH SAND(CH), very stiff, reddish brown and light gray		19			3.5			22.0				
			- calcareous nodules		20			3.0			23.0				
40			- with sand seams, calcareous nodules and ferrous stains		21			3.75			13.0				
	1.0				22			3.75			29.0				
			SANDY LEAN CLAY(CL), very stiff, light gray with calcareous nodules and ferrous stains		23			4.0			17.0				
45			- light brown		24			4.0			19.0				
					25			4.5			15.0				
50					26			3.5			16.0				
	-9.0														
			SILTY SAND(SM), very dense, light gray with clay pockets		27		70								
55	-12.0				28		50				16.0				
			SANDY LEAN CLAY(CL), light gray and reddish brown		29		36								
			- light brown		30										
	-16.0														
60															
65															

SWG 1836 BOR GLENDALE.GPJ TOLUNAY-WONG ENGINEERS.GDT 3/6/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B21

BORING LOG	DISTRICT: Galveston	INSTALLATION: Glendale	SHEET 1 OF 2 SHEETS
1. PROJECT: HSCDMMP		7. ELEVATION OF HOLE: +50.97 ft	
2. LOCATION (Coordinates or Station): Glendale, N=13840375.80 E=3151031.44		8. DATUM FOR ELEVATION:	
3. DRILLING AGENCY: Kenall Inc.		9. ELEVATION OF GROUNDWATER: ▽ TOD: ▼ 24-HR:	
4. LABORATORY TESTING AGENCY: Kenall Inc.		10. DRILLING DATE and TIME: STARTED: 9/12/11 COMPLETED: 9/12/11	
5. DEPTH OF WATER: ▽ TOD: 30'2" ft ▼ 24-HR:		11. CLASSIFICATION REFERENCE:	
6. DEPTH OF HOLE: 60 ft		12. ENGINEER: Vivek Chikyala	

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
			SANDY LEAN CLAY(CL), firm to stiff, brown with clay pockets		1		7			8.0				
					2		7			9.0				
5					3		9			8.0				
	43.0				4		8			5.0				
			FAT CLAY(CH), very stiff to hard, dark brown with sand seams		5			3.0		24.0				
10					6			4.5	116	20.0	60	22	38	
	37.0				7			4.5		21.0				
15			**SILTY CLAY(CL-ML)**, stiff, brown with clay pockets		8		10			24.0				87
	33.0		- light gray		9					14.0				
			FAT CLAY(CH), soft, dark gray with sand pockets, trace of organics and apparent hydro carbon		10			0.25	66	54.0	105	34	71	99
20					11			0.5		23.0				
	28.0				12			0.5	107	18.0				
			SANDY LEAN CLAY(CL), stiff to hard, dark gray		13			2.75		19.0				
25			- light gray and yellowish brown with calcareous nodules		14			1.0	102	21.0	46	19	27	81
					15			2.25		11.0				
30			- reddish brown and light gray with calcareous granules		16			1.0	114	16.0				
			- reddish brown and light gray with clay pockets		17			1.0		13.0	47	27	20	57
			- calcareous granules											

SWG 1836 BOR GLENDALE.GPJ TOLUNAY-WONG ENGINEERS.GDT 1/6/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B21

BORING LOG	DISTRICT: Galveston	INSTALLATION: Glendale	SHEET 2 OF 2 SHEETS
1. PROJECT: HSCDMMP		7. ELEVATION OF HOLE: +50.97 ft	
2. LOCATION (Coordinates or Station): Glendale, N=13840375.80 E=3151031.44		8. DATUM FOR ELEVATION:	
3. DRILLING AGENCY: Kenall Inc.		9. ELEVATION OF GROUNDWATER: ▽ TOD: ▼ 24-HR:	
4. LABORATORY TESTING AGENCY: Kenall Inc.		10. DRILLING DATE and TIME: STARTED: 9/12/11 COMPLETED: 9/12/11	
5. DEPTH OF WATER: ▽ TOD: 30'2" ft ▼ 24-HR:		11. CLASSIFICATION REFERENCE:	
6. DEPTH OF HOLE: 60 ft		12. ENGINEER: Vivek Chikyala	

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
					18			0.5		14.0				
					19			3.5		14.0				
					20			2.0	113	17.0				
40														
	10.0				21			4.25		18.0				
			FAT CLAY(CH), very stiff, reddish brown and light gray with calcareous nodules											
	7.5				22			4.0		24.0				
			SILTY SAND(SM), medium dense, light gray											
45														
	5.0				23		21			24.0				
			FAT CLAY(CH), very stiff to hard, light gray with sand seams		24			4.0		34.0				
					25			4.5		23.0				
50														
					26			3.25	115	16.0				
	-1.0													
			SANDY LEAN CLAY(CL), very stiff to hard, yellowish brown		27			2.75		15.0				
					28			3.25		16.0				
55			- ferrous nodules											
					29			4.5		14.0				
					30			4.5		15.0				
	-9.0													
60														
65														

SWG 1836 BOR GLENDALE.GPJ TOLUNAY-WONG ENGINEERS.GDT 1/6/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B22

BORING LOG	DISTRICT Galveston	INSTALLATION Glendale	SHEET 1 OF 2 SHEETS
1. PROJECT HSCDMMP		7. ELEVATION OF HOLE +55.33 ft	
2. LOCATION (Coordinates or Station) Glendale, N=13838418.18 E=3149492.17		8. DATUM FOR ELEVATION	
3. DRILLING AGENCY Kenall Inc.		9. ELEVATION OF GROUNDWATER ▽ TOD: ▼ 24-HR:	
4. LABORATORY TESTING AGENCY Kenall Inc.		10. DRILLING DATE and TIME STARTED: 9/12/11 COMPLETED: 9/12/11	
5. DEPTH OF WATER ▽ TOD: 21'6" ft ▼ 24-HR:		11. CLASSIFICATION REFERENCE	
6. DEPTH OF HOLE 60 ft		12. ENGINEER Vivek Chikyala	

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
			SANDY LEAN CLAY(CL), very stiff, brown with clay pockets		1					2.0	23	21	2	
					2		20			5.0				
5					3		21		105	3.0				
					4		18			4.0				
	47.3													
			FAT CLAY(CH), hard, dark brown with gray sand seams		5			4.5		16.0				
10					6			4.5	108	12.0				
	43.3													
			SILTY SAND(SM), loose to medium dense, brown with reddish brown clay pockets		7					6.0				
15					8		16			5.0				85
					9		13			9.0				
			- light gray		10		11							
20					11		5			22.0				10
			- trace of organics and apparent hydro carbon odour		12		4			36.0				
	31.3													
25			**SANDY LEAN CLAY(CL)**, firm to hard, brown and light gray with sand pockets		13			3.75		17.0				
			- light gray		14			3.0	116	15.0	45	27	18	83
			- firm to hard, reddish brown and light gray with calcareous deposits and gravel		15			2.75		18.0				
30					16			2.0	110	16.0				
					17			4.0	121	11.0				
			- silt seams											

SWG 1836 BOR GLENDALE.GPJ TOLUNAY-WONG ENGINEERS.GDT 1/6/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B22

BORING LOG	DISTRICT: Galveston	INSTALLATION: Glendale	SHEET 2 OF 2 SHEETS
1. PROJECT: HSCDMMP		7. ELEVATION OF HOLE: +55.33 ft	
2. LOCATION (Coordinates or Station): Glendale, N=13838418.18 E=3149492.17		8. DATUM FOR ELEVATION:	
3. DRILLING AGENCY: Kenall Inc.		9. ELEVATION OF GROUNDWATER: ▽ TOD: ▼ 24-HR:	
4. LABORATORY TESTING AGENCY: Kenall Inc.		10. DRILLING DATE and TIME: STARTED: 9/12/11 COMPLETED: 9/12/11	
5. DEPTH OF WATER: ▽ TOD: 21'6" ft ▼ 24-HR:		11. CLASSIFICATION REFERENCE:	
6. DEPTH OF HOLE: 60 ft		12. ENGINEER: Vivek Chikyala	

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
	19.3				18			3.5		17.0				
			SILTY SAND(SM), medium dense, light gray with reddish brown clay pockets		19		20		122	13.0				
	16.3				20			3.25		14.0				
40			**SANDY LEAN CLAY(CL)**, very stiff to hard, yellowish brown with clay pockets and ferrous nodules		21			4.5		10.0	38	23	15	62
					22			4.5		22.0				
45					23			4.5		17.0				
					24			3.75		19.0				
			- reddish brown		25			4.5		15.0				
50			- yellowish brown		26			4.0		15.0				
					27			4.5		16.0				
			- sand seams from 54 - 55 feet		28			4.5		20.0				
55					29			4.5		18.0				
					30			4.5		18.0				
60	-4.7													
65														

SWG 1836 BOR GLENDALE.GPJ TOLUNAY-WONG ENGINEERS.GDT 1/6/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B23

BORING LOG	DISTRICT: Galveston	INSTALLATION: Glendale	SHEET 1 OF 2 SHEETS
1. PROJECT: HSCDMMP		7. ELEVATION OF HOLE: +43.33 ft	
2. LOCATION (Coordinates or Station): Glendale, N=13838350.12 E=3152321.04		8. DATUM FOR ELEVATION:	
3. DRILLING AGENCY: Kenall Inc.		9. ELEVATION OF GROUNDWATER: ▽ TOD: ▼ 24-HR:	
4. LABORATORY TESTING AGENCY: Kenall Inc.		10. DRILLING DATE and TIME: STARTED: 9/13/11 COMPLETED: 9/13/11	
5. DEPTH OF WATER: ▽ TOD: 23'5" ft ▼ 24-HR:		11. CLASSIFICATION REFERENCE:	
6. DEPTH OF HOLE: 60 ft		12. ENGINEER: Vivek Chikyala	

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
			SANDY LEAN CLAY(CL), soft to hard, dark brown with gravel and calcareous deposits		1			4.5	113	12.0	42	18	24	75
					2		12			11.0				
5			- light gray and yellowish brown with sand pockets		3		11			14.0				
			- brown and gray with sand pockets, gravel and calcareous granules		4			4.5	115	15.0				
					5			1.5	112	17.0				
10					6			1.25		22.0				
			- dark gray with sand pockets and trace of organics		7			0.25	104	21.0				
			- dark gray		8			1.25		24.0				
15					9			0.75		21.0				
			- light gray		10			1.25	103	20.0	41	24	17	0.5
20	23.3		- reddish brown and light gray with sand and calcareous deposits											
			SILTY CLAY(CL-ML), stiff, reddish brown with clay pockets		11					16.0				
					12					16.0				90
25					13		24			20.0				
	15.3				14		29			18.0				
			SANDY LEAN CLAY(CL), stiff to hard, reddish brown and light gray with calcareous granules		15			2.25	109	17.0				
30			- yellowish brown with ferrous nodules		16			3,25		25.0				
					17			1.5	113	18.0	26	11	15	74

SWG 1836 BOR GLENDALE.GPJ TOLUNAY-WONG ENGINEERS.GDT 1/6/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B23

BORING LOG	DISTRICT: Galveston	INSTALLATION: Glendale	SHEET 2 OF 2 SHEETS
1. PROJECT: HSCDMMP		7. ELEVATION OF HOLE: +43.33 ft	
2. LOCATION (Coordinates or Station): Glendale, N=13838350.12 E=3152321.04		8. DATUM FOR ELEVATION:	
3. DRILLING AGENCY: Kenall Inc.		9. ELEVATION OF GROUNDWATER: ▽ TOD: ▼ 24-HR:	
4. LABORATORY TESTING AGENCY: Kenall Inc.		10. DRILLING DATE and TIME: STARTED: 9/13/11 COMPLETED: 9/13/11	
5. DEPTH OF WATER: ▽ TOD: 23'5" ft ▼ 24-HR:		11. CLASSIFICATION REFERENCE:	
6. DEPTH OF HOLE: 60 ft		12. ENGINEER: Vivek Chikyala	

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
					18			4.0		15.0				
			- increase of calcareous granules		19			3.75		16.0				
					20			4.0		13.0				
40			- light gray and yellowish brown with calcareous nodules and ferrous nodules		21			3.25		18.0				
					22			3.75		22.0				
45					23			3.5	102	24.0				
					24			4.5		16.0				
			- gravel		25			4.5		17.0				
50			- reddish brown with sand sand pockets and gravel		26			4.5		18.0				
					27			4.5						
55					28			4.5		17.0				
					29			4.5						
	-14.7		- silty sand seams											
	-16.7		**SILTY SAND(SM)**, very dense, reddish brown and light gray		30		51			21.0				
60														
65														

SWG 1836 BOR GLENDALE.GPJ TOLUNAY-WONG ENGINEERS.GDT 1/6/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B24

BORING LOG	DISTRICT: Galveston	INSTALLATION: Glendale	SHEET 1 OF 2 SHEETS
1. PROJECT: HSCDMMP		7. ELEVATION OF HOLE: +42.93 ft	
2. LOCATION (Coordinates or Station): Glendale, N=13842038.30 E=3152139.53		8. DATUM FOR ELEVATION:	
3. DRILLING AGENCY: Kenall Inc.		9. ELEVATION OF GROUNDWATER: ▽ TOD: ▼ 24-HR:	
4. LABORATORY TESTING AGENCY: Kenall Inc.		10. DRILLING DATE and TIME: STARTED: 9/13/11 COMPLETED: 9/13/11	
5. DEPTH OF WATER: ▽ TOD: 22'8" ft ▼ 24-HR:		11. CLASSIFICATION REFERENCE:	
6. DEPTH OF HOLE: 60 ft		12. ENGINEER: Vivek Chikyala	

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
			SANDY LEAN CLAY(CL), firm to very stiff, dark brown and gray with gravel and sand pockets		1		22			10.0				
					2			4.5	124	11.0				
5					3			4.5	122	13.0	49	37	12	77
			- calcareous granules		4			3.5		18.0				
			- dark gray and yellowish brown with sand pockets		5			1.75	106	23.0				
10					6			1.25		19.0				
	29.9				7			1.5		23.0				
			FAT CLAY(CH), stiff, dark gray to light gray and yellowish brown clay with sand pockets		8			1.5	108	16.0	66	43	23	
15					9			1.5	106	23.0				
	23.9				10			1.0		20.0				
			SANDY LEAN CLAY(CL), stiff to very stiff, yellowish brown, bottom sand											
20	21.9				11			1.0	98	21.0	34	17	17	3
			SILTY CLAY(CL-ML), very stiff, with clay pockets											
	18.9				12		21			24.0				78
			SANDY LEAN CLAY(CL), firm to hard, yellowish brown		13			1.0		16.0				
25					14			1.5		16.0				
	13.9		- gravel and calcareous granules		15			1.5		20.0				
			FAT CLAY(CH), stiff to hard, reddish brown and light gray with gravel and calcareous granules											
30					16			4.5	101	24.0				
					17			4.5		16.0				
	7.9													

SWG 1836 BOR GLENDALE.GPJ TOLUNAY-WONG ENGINEERS.GDT 1/6/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B24

BORING LOG	DISTRICT: Galveston	INSTALLATION: Glendale	SHEET 2 OF 2 SHEETS
1. PROJECT: HSCDMMP		7. ELEVATION OF HOLE: +42.93 ft	
2. LOCATION (Coordinates or Station): Glendale, N=13842038.30 E=3152139.53		8. DATUM FOR ELEVATION:	
3. DRILLING AGENCY: Kenall Inc.		9. ELEVATION OF GROUNDWATER: ▽ TOD: ▼ 24-HR:	
4. LABORATORY TESTING AGENCY: Kenall Inc.		10. DRILLING DATE and TIME: STARTED: 9/13/11 COMPLETED: 9/13/11	
5. DEPTH OF WATER: ▽ TOD: 22'8" ft ▼ 24-HR:		11. CLASSIFICATION REFERENCE:	
6. DEPTH OF HOLE: 60 ft		12. ENGINEER: Vivek Chikyala	

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
	6.9		**SILTY SAND(SM)**, medium dense, with clay pockets		18			4.0		14.0				
			FAT CLAY(CH), very stiff to hard, reddish brown and light gray with gravel and calcareous granules, sand seams from 36 to 40 feet		19		22			21.0				
					20			4.5		18.0				
40					21			4.5		14.0	52	38	14	
					22			4.5		15.0				
	-1.1													
45			**SANDY LEAN CLAY(CL)**, very stiff to hard, yellowish brown		23			4.5		11.0				
					24			4.5	121	13.0				
	-5.1													
			SILTY SAND(SM), dense, brown and light gray with gravel		25					15.0				
50					26		34			25.0				
					27		35			23.0				
55					28		31			24.0				11
					29		31			24.0				
	-17.1				30		32			24.0				
60														
65														

SWG 1836 BOR GLENDALE.GPJ TOLUNAY-WONG ENGINEERS.GDT 1/6/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B25

BORING LOG	DISTRICT: Galveston	INSTALLATION: Housetract	SHEET 1 OF 2 SHEETS

1. PROJECT: HSCDMMP	7. ELEVATION OF HOLE: +56.30 ft
2. LOCATION (Coordinates or Station): Housetract, N=13844852.79 E=3154649.81	8. DATUM FOR ELEVATION:
3. DRILLING AGENCY: Kenall Inc.	9. ELEVATION OF GROUNDWATER: ▽ TOD: 16.3 ft ▼ 24-HR:
4. LABORATORY TESTING AGENCY: Kenall Inc.	10. DRILLING DATE and TIME: STARTED: 9/14/11 COMPLETED: 9/14/11
5. DEPTH OF WATER: ▽ TOD: 40.0 ft ▼ 24-HR:	11. CLASSIFICATION REFERENCE:
6. DEPTH OF HOLE: 60 ft	12. ENGINEER: Vivek Chikyala

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
			FAT CLAY(CH), stiff to hard, dark gray and reddish brown clay with brown sand seams and slicken sided		1			4.5		14.0				
					2			4.5	117	12.0				
5					3			4.5		10.0				
					4			4.0		15.0				
					5			3.0	108	19.0	64	14	50	78
10			- light gray		6			3.0		26.0				
			- gravel and sand pockets		7			2.25	104	22.0				
15					8			3.5		22.0				
			- gravel, calcareous nodules and sand pockets		9			1.25	103	23.0	65	50	15	89
					10			1.5		23.0				
20					11			3.5		22.0				
					12			1.5		32.0				
25					13			1.25	88	32.0				
	29.3				14			1.25		30.0				
			FAT CLAY(CH), stiff, light gray with sand pockets		15			1.25		28.0				
30			- yellowish brown		16			1.5	94	28.0				
			- calcareous nodules		17			1.5		25.0				
			- reddish brown and light gray with sand pockets											

SWG 1836 BOR HOUSE TRACT.GPJ TOLUNAY-WONG ENGINEERS.GDT 1/13/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B25

BORING LOG	DISTRICT: Galveston	INSTALLATION: Housetract	SHEET 2 OF 2 SHEETS

1. PROJECT: HSCDMMP	7. ELEVATION OF HOLE: +56.30 ft
2. LOCATION (Coordinates or Station): Housetract, N=13844852.79 E=3154649.81	8. DATUM FOR ELEVATION:
3. DRILLING AGENCY: Kenall Inc.	9. ELEVATION OF GROUNDWATER: ▽ TOD: 16.3 ft ▼ 24-HR:
4. LABORATORY TESTING AGENCY: Kenall Inc.	10. DRILLING DATE and TIME: STARTED: 9/14/11 COMPLETED: 9/14/11
5. DEPTH OF WATER: ▽ TOD: 40.0 ft ▼ 24-HR:	11. CLASSIFICATION REFERENCE:
6. DEPTH OF HOLE: 60 ft	12. ENGINEER: Vivek Chikyala

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
					18			1.5		22.0				
					19			3.25		23.0				
	17.3				20			0.5		19.0				
40	15.3		**SANDY LEAN CLAY(CL)**, soft, reddish brown and light gray		21			3.5	115	17.0	24	15	9	86
	12.3		**SILTY SAND(SM)**, light gray and yellowish brown with clay seams		22					19.0				
	11.3		**SILTY CLAY(CL-ML)**, very stiff, light gray and yellowish brown											
45					23		28			14.0				
			FAT CLAY(CH), very stiff to hard, yellowish brown and light gray with gravel and sand pockets - silty sand seam - calcareous nodules		24			4.5		15.0				
					25			3.75		25.0				
50			- Gravel seams at 51'-52'		26			4.0		21.0				
	4.3		**SANDY SILTY CLAY(CL-ML)**, very stiff, reddish brown clay seams		27			3.0		18.0				
55	-0.2				28			3.0	108	15.0	26	20	6	76
			FAT CLAY(CH), hard, light gray and reddish brown with silt seams		29			4.5		19.0				
	-3.7				30			4.5						
60														
65														

SWG 1836 BOR HOUSE TRACT.GPJ TOLUNAY-WONG ENGINEERS.GDT 1/13/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B26

BORING LOG	DISTRICT: Galveston	INSTALLATION: Housetract	SHEET 1 OF 2 SHEETS
1. PROJECT: HSCDMMP		7. ELEVATION OF HOLE: +58.58 ft	
2. LOCATION (Coordinates or Station): Housetract, N=13841527.12 E=3153693.11		8. DATUM FOR ELEVATION:	
3. DRILLING AGENCY: Kenall Inc.		9. ELEVATION OF GROUNDWATER: ▽ TOD: 48.08 ft ▼ 24-HR:	
4. LABORATORY TESTING AGENCY: Kenall Inc.		10. DRILLING DATE and TIME: STARTED: 9/15/11 COMPLETED: 9/15/11	
5. DEPTH OF WATER: ▽ TOD: 10.5 ft ▼ 24-HR:		11. CLASSIFICATION REFERENCE:	
6. DEPTH OF HOLE: 60 ft		12. ENGINEER: Vivek Chikyala	

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
			SILTY SAND(SM), loose to medium dense, brown, with gravel and clay pockets		1					1.0				
					2		21			9.0				
5					3		10			8.0				39
			- light gray		4		10			17.0				
					5		4			22.0				
10	▽		- strong chemical odour		6		15			19.0				
	46.6		**FAT CLAY(CH)**, stiff, reddish brown and light gray with sand pockets		7		5			38.0				
15					8			1.25	85	37.0	81	54	27	95
			- ferrous nodules		9			1.5		38.0				
			- brown sand with clay pockets		10			0.75		30.0				
20			- soft, dark gray with hydro carbon odour		11			0.75	85	35.0				
					12			0.25	75	45.0	82	54	28	100
25					13			0.25	0.75	31.0				
					14			0.75	97	29.0				
	30.6		**FAT CLAY(CH)**, soft to hard, dark gray with silt pockets		15			0.25	105	20.0	51	23	28	85
30					16			1.5		24.0				
					17			1.0		17.0				
			- yellowish brown clay with gravel, calcareous											

SWG 1836 BOR HOUSE TRACT.GPJ TOLUNAY-WONG ENGINEERS.GDT 1/13/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B26

BORING LOG	DISTRICT: Galveston	INSTALLATION: Housetract	SHEET 2 OF 2 SHEETS

1. PROJECT: HSCDMMP	7. ELEVATION OF HOLE: +58.58 ft
2. LOCATION (Coordinates or Station): Housetract, N=13841527.12 E=3153693.11	8. DATUM FOR ELEVATION:
3. DRILLING AGENCY: Kenall Inc.	9. ELEVATION OF GROUNDWATER: ▽ TOD: 48.08 ft ▼ 24-HR:
4. LABORATORY TESTING AGENCY: Kenall Inc.	10. DRILLING DATE and TIME: STARTED: 9/15/11 COMPLETED: 9/15/11
5. DEPTH OF WATER: ▽ TOD: 10.5 ft ▼ 24-HR:	11. CLASSIFICATION REFERENCE:
6. DEPTH OF HOLE: 60 ft	12. ENGINEER: Vivek Chikyala

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
			nodules and ferrous nodules		18			2.0	111	20.0				
					19			2.0		23.0				
					20			4.5	113	17.0				
40														
	17.6				21			4.5		17.0				
			LEAN CLAY(CL), very stiff, yellowish brown and light gray with calcareous granules and sand pockets		22			2.75		15.0				
			- ferrous nodules		23			3.75		20.0				
45	12.6													
			FAT CLAY(CH), very stiff to hard, reddish brown and light gray with sand pockets		24			3.5		18.0				
			- yellowish brown		25			4.5	115	16.0	58	21	37	92
50					26			4.5		23.0				
			- reddish brown		27			4.0		24.0				
					28			4.5		20.0				
55	2.6													
			SANDY LEAN CLAY(CL), hard, reddish brown with calcareous and ferrous nodules		29			4.25		15.0				
					30			4.5		16.0				
60	-1.4													
65														

SWG 1836 BOR HOUSE TRACT.GPJ TOLUNAY-WONG ENGINEERS.GDT 1/13/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B27

BORING LOG	DISTRICT: Galveston	INSTALLATION: Housetract	SHEET 1 OF 2 SHEETS

1. PROJECT: HSCDMMP	7. ELEVATION OF HOLE: +70.34 ft
2. LOCATION (Coordinates or Station): Housetract, N=13838133.15 E=3155112.37	8. DATUM FOR ELEVATION:
3. DRILLING AGENCY: Kenall Inc.	9. ELEVATION OF GROUNDWATER: ▽ TOD: 48.74 ft ▼ 24-HR:
4. LABORATORY TESTING AGENCY: Kenall Inc.	10. DRILLING DATE and TIME: STARTED: 9/15/11 COMPLETED: 9/15/11
5. DEPTH OF WATER: ▽ TOD: 21.6 ft ▼ 24-HR:	11. CLASSIFICATION REFERENCE:
6. DEPTH OF HOLE: 60 ft	12. ENGINEER: Vivek Chikyala

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
			FAT CLAY(CH), very stiff, reddish brown with gravel, sand seams and calcareous nodules		1					8.0				
	66.8				2			4.5	107	11.0	74	30	44	
			SILTY SAND(SM), medium dense, brown with clay pockets		3		21			18.0				
5	64.8													
			SANDY LEAN CLAY(CL), very stiff, orange brown		4			3.75	110	9.0				
	62.8		**SILTY SAND(SM)**, medium dense to dense, dark gray with clay pockets		5		34			13.0				
10					6					25.0				
			- light gray with apparent hydro carbon odour		7		27			17.0				
15					8		19			15.0	Non Plastic	Non Plastic	NP	48
					9		15			18.0				
			- loose to medium dark gray with apparent hydro carbon odour		10		6			18.0				
20					11		5			21.0				
					12		18			27.0				
25	44.3				13		3			59.0				
			FAT CLAY(CH), soft, brown with hydro carbon odour		14			0.75		37.0				
					15			0.25	77	43.0	53	22	31	98
30					16			0.5	81	36.0				
			- sand pockets at 33.5'		17		4			35.0				

SWG 1836 BOR HOUSE TRACT.GPJ TOLUNAY-WONG ENGINEERS.GDT 1/13/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B27

BORING LOG	DISTRICT Galveston	INSTALLATION Housetract	SHEET 2 OF 2 SHEETS

1. PROJECT HSCDMMP	7. ELEVATION OF HOLE +70.34 ft
2. LOCATION (Coordinates or Station) Housetract, N=13838133.15 E=3155112.37	8. DATUM FOR ELEVATION
3. DRILLING AGENCY Kenall Inc.	9. ELEVATION OF GROUNDWATER ▽ TOD: 48.74 ft ▼ 24-HR:
4. LABORATORY TESTING AGENCY Kenall Inc.	10. DRILLING DATE and TIME STARTED: 9/15/11 COMPLETED: 9/15/11
5. DEPTH OF WATER ▽ TOD: 21.6 ft ▼ 24-HR:	11. CLASSIFICATION REFERENCE
6. DEPTH OF HOLE 60 ft	12. ENGINEER Vivek Chikyala

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
			- trace of organics	X	18		3			26.0				
				■	19			0.25	81	36.0				
				■	20			0.25		26.0				
40	30.3		**SILTY SAND(SM)**, loose to dense, light gray	X	21		9			26.0				
	27.3		**FAT CLAY(CH)**, soft to hard, reddish brown and dark gray	X	22		34							
45			- ferrous nodules	■	23			0.75	84	38.0				
				■	24			1.5		28.0				
				■	25			1.5	100	24.0	72	18	54	92
50				■	26			1.75		27.0				
			- calcareous nodules	■	27			2.0		25.0				
55				■	28			4.5	117	19.0				
	13.3		- calcareous nodules and gravel seams	■	29			4.5		20.0				
	12.3		**SILTY SAND(SM)**, reddish brown and light gray											
	10.3		**FAT CLAY(CH)**, very stiff, reddish brown and light gray with calcareous nodules and silt	■	30			3.0		14.0				
60														
65														

SWG 1836 BOR HOUSE TRACT.GPJ TOLUNAY-WONG ENGINEERS.GDT 1/13/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B28

BORING LOG	DISTRICT Galveston	INSTALLATION Housetract	SHEET 1 OF 2 SHEETS
1. PROJECT HSCDMMP		7. ELEVATION OF HOLE +70.01 ft	
2. LOCATION (Coordinates or Station) Housetract, N=13840912.36 E=3155665.97		8. DATUM FOR ELEVATION	
3. DRILLING AGENCY Kenall Inc.		9. ELEVATION OF GROUNDWATER ▽ TOD: 37.51 ft ▼ 24-HR:	
4. LABORATORY TESTING AGENCY Kenall Inc.		10. DRILLING DATE and TIME STARTED: 9/14/11 COMPLETED: 9/15/11	
5. DEPTH OF WATER ▽ TOD: 32.5 ft ▼ 24-HR:		11. CLASSIFICATION REFERENCE	
6. DEPTH OF HOLE 60 ft		12. ENGINEER Vivek Chikyala	

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
			SANDY LEAN CLAY(CL), stiff, brown with clay pockets		1			4.5		2.0				
					2		9			8.0				
5					3		12			13.0	35	21	14	87
					4		7			14.0				
					5		16			12.0				
10			- dark gray with apparent hydro carbon odour		6		16			17.0				
					7					18.0				
15					8					16.0				
			- ferrous nodules		9		11			15.0				
					10			1.25	105	17.0				
20					11					17.0				
					12		8			30.0				
25					13			1.25	103	22.0	45	24	21	88
					14			1.0		39.0				
	41.0				15			0.25	85	35.0				
30	40.0		**FAT CLAY(CH)**, soft, dark gray with hydro carbon odour											
			SANDY LEAN CLAY to CLAYEY SAND, soft, gray with hydro carbon odour		16			0.25		17.0				
	▽													
	36.0				17		3			33.0				
			FAT CLAY(CH), soft, dark gray with hydro											

SWG 1836 BOR HOUSE TRACT.GPJ TOLUNAY-WONG ENGINEERS.GDT 1/13/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B28

BORING LOG	DISTRICT: Galveston	INSTALLATION: Housetract	SHEET 2 OF 2 SHEETS

1. PROJECT: HSCDMMP	7. ELEVATION OF HOLE: +70.01 ft
2. LOCATION (Coordinates or Station): Housetract, N=13840912.36 E=3155665.97	8. DATUM FOR ELEVATION:
3. DRILLING AGENCY: Kenall Inc.	9. ELEVATION OF GROUNDWATER: ▽ TOD: 37.51 ft ▼ 24-HR:
4. LABORATORY TESTING AGENCY: Kenall Inc.	10. DRILLING DATE and TIME: STARTED: 9/14/11 COMPLETED: 9/15/11
5. DEPTH OF WATER: ▽ TOD: 32.5 ft ▼ 24-HR:	11. CLASSIFICATION REFERENCE:
6. DEPTH OF HOLE: 60 ft	12. ENGINEER: Vivek Chikyala

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
			carbon odour		18			0.25		63.0				
					19			0.25	85	36.0	76	28	48	96
					20			0.25		47.0				
40					21			0.25	76	43.0				
	26.5				22			0.25		23.0				
			FAT CLAY(CH), stiff to very stiff, light gray and yellowish brown with ferrous nodules		23			1.5		26.0				
45					24			1.25	99	26.0	88	25	63	91
					25			2.25		24.0				
50					26			3.75	108	21.0				
			- calcareous, ferrous nodules and gravel seams		27			3.5		22.0				
	16.0													
55			**SANDY LEAN CLAY(CL)**, stiff to very stiff, yellowish brown and light gray with ferrous nodules		28			3.25		19.0				
					29			1.25		15.0				
					30			4.5						
	10.0													
60														
65														

SWG 1836 BOR HOUSE TRACT.GPJ TOLUNAY-WONG ENGINEERS.GDT 1/13/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B29

BORING LOG	DISTRICT Galveston	INSTALLATION Clinton	SHEET 1 OF 2 SHEETS

1. PROJECT HSCDMMP	7. ELEVATION OF HOLE 44.68 ft
2. LOCATION (Coordinates or Station) Clinton N=13842586.26 E=3161470.84	8. DATUM FOR ELEVATION
3. DRILLING AGENCY Kenall Inc.	9. ELEVATION OF GROUNDWATER ▽ TOD: ▼ 24-HR:
4. LABORATORY TESTING AGENCY Kenall Inc.	10. DRILLING DATE and TIME STARTED: 9/23/11 COMPLETED: 9/23/11
5. DEPTH OF WATER ▽ TOD: 38'3" ft ▼ 24-HR:	11. CLASSIFICATION REFERENCE
6. DEPTH OF HOLE 60 ft	12. ENGINEER Vivek Chikyala

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
			LEAN CLAY WITH SAND(CL), very stiff to hard, brown and reddish brown with sand, gravel and rock pieces		1			4.5		11.0				
					2			4.5		7.0				
5			- yellowish brown and light gray with sand pockets and calcareous nodules		3			4.5	109	12.0				
					4			3.75	119	13.0	47	16	31	82
			- calcareous and ferrous nodules		5			3.5		15.0				
10	34.7		- reddish brown and gray **FAT CLAY(CH)**, soft to firm to stiff, yellowish brown and gray with sand pockets and calcareous nodules		6			0.5	104	20.0	55	24	31	80
			- trace of gravel		7			0.75	94	30.0				
15			- ferrous nodules		8			0.5		36.0				
			- reddish brown		9			1		41.0				
					10			0.75	77	42.0	85	33	52	100
20			- dark gray with sand pockets		11			3.25		18.0				
					12			0.75	77	65.0				
25			- light gray with ferrous and calcareous nodules		13			0.25		26.0				
			- yellowish brown and light gray with sand pockets and calcareous deposits		14			2.5		24.0				
			- slickensided		15			2.25		26.0				
30					16			3	105	23.0				
			- stiff to very stiff, yellowish brown, reddish brown and light gray with sand seams, gravel		17			1.5		18.0				

SWG 1836 BOR CLINTON.GPJ TOLUNAY-WONG ENGINEERS.GDT 2/3/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B29

BORING LOG	DISTRICT: Galveston	INSTALLATION: Clinton	SHEET 2 OF 2 SHEETS

1. PROJECT: HSCDMMP	7. ELEVATION OF HOLE: 44.68 ft
2. LOCATION (Coordinates or Station): Clinton N=13842586.26 E=3161470.84	8. DATUM FOR ELEVATION:
3. DRILLING AGENCY: Kenall Inc.	9. ELEVATION OF GROUNDWATER: ▽ TOD: ▼ 24-HR:
4. LABORATORY TESTING AGENCY: Kenall Inc.	10. DRILLING DATE and TIME: STARTED: 9/23/11 COMPLETED: 9/23/11
5. DEPTH OF WATER: ▽ TOD: 38'3" ft ▼ 24-HR:	11. CLASSIFICATION REFERENCE:
6. DEPTH OF HOLE: 60 ft	12. ENGINEER: Vivek Chikyala

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
			deposits and calcium deposits		18			1.25	111	18.0				
			- slickensided		19			2.75	107	18.0	56	24	32	72
					20			4.5		22.0				
40					21			3.75		20.0				
			- gravel seams 42'-43'		22			3.5		16.0				
45			- ferrous nodules		23			2.75	106	15.0				
			- calcareous nodules		24			2.75		15.0				
					25			4.5		15.0				
50	-5.3		**CLAYEY SAND(SC)**, light gray and yellowish brown		26			4.5		15.0				
	-7.3		**SILTY SAND(SM)**, very dense, yellowish brown with clay pockets		27		66			22.0				
55	-11.3				28		70			23.0				
			FAT CLAY(CH), very stiff, reddish brown and light gray with slickensided		29		27			23.0				
	-15.3				30			2.5		25.0				
60														
65														

SWG 1836 BOR CLINTON.GPJ TOLUNAY-WONG ENGINEERS.GDT 2/3/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B30

BORING LOG	DISTRICT Galveston	INSTALLATION Clinton	SHEET 1 OF 2 SHEETS
1. PROJECT HSCDMMP		7. ELEVATION OF HOLE 48.68 ft	
2. LOCATION (Coordinates or Station) Clinton N=13840915.23 E=3156989.87		8. DATUM FOR ELEVATION	
3. DRILLING AGENCY Kenall Inc.		9. ELEVATION OF GROUNDWATER ▽ TOD: ▼ 24-HR:	
4. LABORATORY TESTING AGENCY Kenall Inc.		10. DRILLING DATE and TIME STARTED: 9/21/11 COMPLETED: 9/21/11	
5. DEPTH OF WATER ▽ TOD: 22'2" ft ▼ 24-HR:		11. CLASSIFICATION REFERENCE	
6. DEPTH OF HOLE 60 ft		12. ENGINEER Vivek Chikyala	

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
			SANDY LEAN CLAY(CL), stiff, brown with roots		1		9			13.0				
			- trace of gravel		2		11			7.0				
5	43.7		**SILTY SAND(SM)**, loose to medium dense, brown with clay pockets		3		15			8.0				
					4		5			10.0				36
	38.7		- light gray		5		11			12.0				
10			**FAT CLAY(CH)**, soft to very stiff, dark gray with sand seams and apparent hydrocarbon odour		6		1			27.0				
					7		6			42.0				
15			- ferrous nodules		8			0.25	87	31.0	89	33	56	98
			- light gray and brown sand seams		9			0.25		31.0				
			- light reddish brown with ferrous nodules		10			0.5		34.0				
20					11			1	95	28.0				
			- gray with sand pockets and ferrous stains		12			1.25		28.0				
25					13			1		34.0				
			- yellowish brown and light gray		14			1	93	28.0	72	25	47	91
			- gravel pockets		15			2.5		24.0				
30					16			3.75		23.0				
	15.2		- reddish brown and light gray with ferrous nodules, gravel, sand pockets and calcareous deposits		17			2.25	117	15.0				
			SANDY LEAN CLAY(CL), stiff, yellowish brown and light gray with roots											

SWG 1836 BOR CLINTON.GPJ TOLUNAY-WONG ENGINEERS.GDT 2/3/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B30

BORING LOG	DISTRICT Galveston	INSTALLATION Clinton	SHEET 2 OF 2 SHEETS

1. PROJECT HSCDMMP	7. ELEVATION OF HOLE 48.68 ft
2. LOCATION (Coordinates or Station) Clinton N=13840915.23 E=3156989.87	8. DATUM FOR ELEVATION
3. DRILLING AGENCY Kenall Inc.	9. ELEVATION OF GROUNDWATER ▽ TOD: ▼ 24-HR:
4. LABORATORY TESTING AGENCY Kenall Inc.	10. DRILLING DATE and TIME STARTED: 9/21/11 COMPLETED: 9/21/11
5. DEPTH OF WATER ▽ TOD: 22'2" ft ▼ 24-HR:	11. CLASSIFICATION REFERENCE
6. DEPTH OF HOLE 60 ft	12. ENGINEER Vivek Chikyala

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
					18			4	120	13.0				
					19			4		12.0				
	10.7													
			FAT CLAY(CH), stiff to very stiff, reddish brown and light gray with gravel seams and calcium deposits		20			3.75	111	18.0				
40					21			4.5		21.0				
					22			4.5		26.0				
			- calcareous nodules and slickensided from 43 ft to 60 feet											
45					23			4		26.0				
					24			3.25	99	28.0	72	27	45	
					25			3		28.0				
50			- sand seams below 50'		26			1.5		24.0				
					27			4.25		29.0				
55					28			4	100	25.0				
					29			3.25		32.0				
					30			3.25		31.0				
60	-11.3													
65														

SWG 1836 BOR CLINTON.GPJ TOLUNAY-WONG ENGINEERS.GDT 2/3/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B31

BORING LOG	DISTRICT: Galveston	INSTALLATION: Clinton	SHEET 1 OF 2 SHEETS
1. PROJECT: HSCDMMP		7. ELEVATION OF HOLE: 53.28 ft	
2. LOCATION (Coordinates or Station): Clinton N=13838221.69 E=3159007.06		8. DATUM FOR ELEVATION:	
3. DRILLING AGENCY: Kenall Inc.		9. ELEVATION OF GROUNDWATER: ▽ TOD: ▼ 24-HR:	
4. LABORATORY TESTING AGENCY: Kenall Inc.		10. DRILLING DATE and TIME: STARTED: 9/21/11 COMPLETED: 9/21/11	
5. DEPTH OF WATER: ▽ TOD: 24'8" ft ▼ 24-HR:		11. CLASSIFICATION REFERENCE:	
6. DEPTH OF HOLE: 60 ft		12. ENGINEER: Vivek Chikyala	

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
			SILTY SAND(SM), loose, brown with clay pockets		1					8.0				
					2		8			8.0				69
5					3		8			6.0				
					4		6			7.0				
					5		7			6.0				
10	42.3				6		10			19.0				
	39.3		**SANDY LEAN CLAY(CL)**, stiff, brown and dark gray with light gray sand seams and ferrous stains		7		7			9.0	43	22	21	66
15			**FAT CLAY(CH)**, stiff to very stiff, dark gray with light gray sand seams - hydrcarbon odour		8			0.25		25.0				
					9		6			45.0				
					10			0.5		20.0				
20					11			0.5		26.0				
	29.3				12			1	96	24.0	53	21	32	60
25	27.3		**SILTY SAND(SM)**, loose, reddish brown and light gray with clay pockets - 1" gravel seams		13					31.0				79
			SANDY LEAN CLAY(CL), stiff, gray with sand seams, pockets and ferrous stains		14			1.75	102	23.0				
					15			2.75	112	18.0				
30					16			3.5		16.0				
			- light gray and yellowish brown with sand pockets and ferrous stains		17			2	114	17.0	40	19	21	74

SWG 1836 BOR CLINTON.GPJ TOLUNAY-WONG ENGINEERS.GDT 2/3/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B31

BORING LOG	DISTRICT: Galveston	INSTALLATION: Clinton	SHEET 2 OF 2 SHEETS

1. PROJECT: HSCDMMP	7. ELEVATION OF HOLE: 53.28 ft
2. LOCATION (Coordinates or Station): Clinton N=13838221.69 E=3159007.06	8. DATUM FOR ELEVATION:
3. DRILLING AGENCY: Kenall Inc.	9. ELEVATION OF GROUNDWATER: ▽ TOD: ▼ 24-HR:
4. LABORATORY TESTING AGENCY: Kenall Inc.	10. DRILLING DATE and TIME: STARTED: 9/21/11 COMPLETED: 9/21/11
5. DEPTH OF WATER: ▽ TOD: 24'8" ft ▼ 24-HR:	11. CLASSIFICATION REFERENCE:
6. DEPTH OF HOLE: 60 ft	12. ENGINEER: Vivek Chikyala

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
	17.3				18			3.25	111	19.0				
	15.8		**CLAYEY SAND(SC)**, soft, light gray and yellowish brown		19			0.75		20.0				
			SILTY SAND(SM), medium dense, yellowish brown with clay pockets		20		13			25.0				
40					21	239	20			22.0				
					22		19			24.0				
45					23		18			31.0				
			- brown with clay pockets		24		19			26.0				
					25		23			27.0				
50					26		20			24.0				
					27		19			24.0				
55			- dense below 55'		28		40			25.0				
					29		45			21.0				
			- brown and light gray		30		77			23.0				
60	-6.7													
65														

SWG 1836 BOR CLINTON.GPJ TOLUNAY-WONG ENGINEERS.GDT 2/3/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B32

BORING LOG	DISTRICT: Galveston	INSTALLATION: Clinton	SHEET 1 OF 2 SHEETS
1. PROJECT: HSCDMMP		7. ELEVATION OF HOLE: 44.97 ft	
2. LOCATION (Coordinates or Station): Clinton N=13839099.37 E=3163374.11		8. DATUM FOR ELEVATION:	
3. DRILLING AGENCY: Kenall Inc.		9. ELEVATION OF GROUNDWATER: ▽ TOD: ▼ 24-HR:	
4. LABORATORY TESTING AGENCY: Kenall Inc.		10. DRILLING DATE and TIME: STARTED: 9/26/11 COMPLETED: 9/26/11	
5. DEPTH OF WATER: ▽ TOD: 12'8" ft ▼ 24-HR:		11. CLASSIFICATION REFERENCE:	
6. DEPTH OF HOLE: 60 ft		12. ENGINEER: Vivek Chikyala	

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
			SANDY LEAN CLAY(CL), firm to very stiff, dark brown and gray with gravel and sand pockets		1		13			7.0				
					2		10			6.0	42	20	22	35
5			- calcareous granules		3		15			13.0				
			- dark gray and yellowish brown with sand pockets and gravel		4			4.5		7.0				
					5			4.5		18.0				
10	35.0		**FAT CLAY(CH)**, very soft to stiff, dark gray to light gray and yellowish brown clay with sand pockets		6			1.25	97	27.0				
					7			1	83	44.0				
15					8			1.25		26.0				
					9			0.25		14.0				
	26.0				10			0.25	86	26.0	112	38	74	91
20			**SANDY LEAN CLAY(CL)**, very soft, yellowish brown, bottom sand		11			0.25		25.0				
	23.0				12					13.0				66
25			**CLAYEY SAND(SC-SM)**, very loose to loose, brown and dark gray, with clay pcokets and hydrocarbon odour		13		2			31.0				
					14		2			21.0				
					15		4			25.0				
30	14.0				16		15			21.0				
			SILTY SAND(SM), medium dense, light gray and yellowish brown, with clay pockets		17		19			26.0				

SWG 1836 BOR CLINTON.GPJ TOLUNAY-WONG ENGINEERS.GDT 2/3/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B32

BORING LOG	DISTRICT Galveston	INSTALLATION Clinton	SHEET 2 OF 2 SHEETS

1. PROJECT HSCDMMP	7. ELEVATION OF HOLE 44.97 ft
2. LOCATION (Coordinates or Station) Clinton N=13839099.37 E=3163374.11	8. DATUM FOR ELEVATION
3. DRILLING AGENCY Kenall Inc.	9. ELEVATION OF GROUNDWATER ▽ TOD: ▼ 24-HR:
4. LABORATORY TESTING AGENCY Kenall Inc.	10. DRILLING DATE and TIME STARTED: 9/26/11 COMPLETED: 9/26/11
5. DEPTH OF WATER ▽ TOD: 12'8" ft ▼ 24-HR:	11. CLASSIFICATION REFERENCE
6. DEPTH OF HOLE 60 ft	12. ENGINEER Vivek Chikyala

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
	9.5				18					10.0				
			FAT CLAY(CH), very stiff, reddish brown to light gray, with gravel, calcareous nodules and sand pockets, slicken sided		19			2.75	113	19.0				
	6.0				20			2.5		19.0				
40			**LEAN CLAY WITH SAND(CL)**, stiff, light gray to yellowish brown, with sand pockets, ferrous nodules		21				114	19.0	24	15	9	81
					22			1.5		18.0				
45					23			2.5		19.0				
					24			4		16.0				
					25			4.25	118	15.0				
50					26			4.5		15.0				
					27			4.5		15.0				
55			- calcareous nodules		28			3.75		16.0				
	-11.0													
			SANDY LEAN CLAY(CL), very stiff, light gray to reddish brown		29			3						
					30			3.75		18.0				
	-15.0													
60														
65														

SWG 1836 BOR CLINTON.GPJ TOLUNAY-WONG ENGINEERS.GDT 2/3/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B33

BORING LOG	DISTRICT: Galveston	INSTALLATION: Rosa Allen	SHEET 1 OF 2 SHEETS
1. PROJECT: HSCDMMP		7. ELEVATION OF HOLE: 47.24 ft	
2. LOCATION (Coordinates or Station): Rosa Allen N=13822489.37 E=3164743.85		8. DATUM FOR ELEVATION:	
3. DRILLING AGENCY: Kenall Inc.		9. ELEVATION OF GROUNDWATER: ▽ TOD: ▼ 24-HR:	
4. LABORATORY TESTING AGENCY: Kenall Inc.		10. DRILLING DATE and TIME: STARTED: 9/26/11 COMPLETED: 9/26/11	
5. DEPTH OF WATER: ▽ TOD: 16'5" ft ▼ 24-HR:		11. CLASSIFICATION REFERENCE:	
6. DEPTH OF HOLE: 60 ft		12. ENGINEER: Vivek Chikyala	

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
			SANDY LEAN CLAY(CL), firm to stiff, brown with gravel		1		11			22.0				
			- reddish brown											
			- brown with trace of gravel		2		12			14.0				
			- reddish brown clay seams											
5					3		15			20.0				
			- reddish brown with sand seams											
			- brown silty sand		4					26.0				
			- brown silty sand seams		5		4			22.0				
10														
			- reddish brown and ligth gray with brown sand seams		6			1.25	101	22.0				
			- firm to stiff, reddish brown with brown sand seams		7			1.0	108	19.0				
15					8			0.5	92	30.0	41	20	21	99
					9					27.0				
	29.2		**SILTY SAND(SM)**, very loose to loose, brown and dark gray with sand seams and apparent hydrocarbon odour		10		5			22.0				32
20	26.2		**FAT CLAY(CH)**, soft to firm to stiff, dark gray and gray with sand seams and apparent hydrcarbon odour		11		2			28.0				
					12		1			33.0				
25					13		2			34.0				
			- gray with sand pockets and ferrous nodules		14			0.75	80	42.0				
					15			1.0	82	38.0	93	38	55	98
30					16			2.0		31.0				
			- yellowsh brown with sand pockets, trace of gravel and ferrous nodules											
			- reddish brown and light gray with sand pockets from 32' to 42'		17			2.0	98	28.0				

SWG 1836 BOR ROSA ALLEN.GPJ TOLUNAY-WONG ENGINEERS.GDT 2/3/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B33

BORING LOG	DISTRICT Galveston	INSTALLATION Rosa Allen	SHEET 2 OF 2 SHEETS

1. PROJECT HSCDMMP	7. ELEVATION OF HOLE 47.24 ft
2. LOCATION (Coordinates or Station) Rosa Allen N=13822489.37 E=3164743.85	8. DATUM FOR ELEVATION
3. DRILLING AGENCY Kenall Inc.	9. ELEVATION OF GROUNDWATER ▽ TOD: ▼ 24-HR:
4. LABORATORY TESTING AGENCY Kenall Inc.	10. DRILLING DATE and TIME STARTED: 9/26/11 COMPLETED: 9/26/11
5. DEPTH OF WATER ▽ TOD: 16'5" ft ▼ 24-HR:	11. CLASSIFICATION REFERENCE
6. DEPTH OF HOLE 60 ft	12. ENGINEER Vivek Chikyala

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
					18			1.5		34.0				
					19			2.5		25.0				
					20			1.75		30.0				
40			- ferrous nodules - calcareous nodules		21			2.0		29.0				
	5.2		**SANDY LEAN CLAY(CL)**, firm, reddish brown with gravel deposits		22			0.75	106	22.0	43	20	23	93
	3.2		**SILTY SAND(SM)**, medium dense, reddish brown and reddish brown clay seams		23			2.5		25.0				
45					24		19			26.0				
	-1.8		**FAT CLAY(CH)**, very stiff to hard, reddish brown with trace of calcareous nodules - reddish brown and light gray with ferrous nodules and slickensided from 49.5' to 60 '		25			2.25		29.0				
50					26			4.25		29.0				
					27			4.25		31.0				
55					28			3.5		33.0				
					29			4.25		31.0				
					30			2.75		35.0				
60	-12.8													
65														

SWG 1836 BOR ROSA ALLEN.GPJ TOLUNAY-WONG ENGINEERS.GDT 2/3/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B34

BORING LOG	DISTRICT: Galveston	INSTALLATION: Rosa Allen	SHEET 1 OF 2 SHEETS
1. PROJECT: HSCDMMP		7. ELEVATION OF HOLE: 45.14 ft	
2. LOCATION (Coordinates or Station): Rosa Allen N=13819680.87 E=3162775.75		8. DATUM FOR ELEVATION:	
3. DRILLING AGENCY: Kenall Inc.		9. ELEVATION OF GROUNDWATER: ▽ TOD: ▼ 24-HR:	
4. LABORATORY TESTING AGENCY: Kenall Inc.		10. DRILLING DATE and TIME: STARTED: 9/27/11 COMPLETED: 9/27/11	
5. DEPTH OF WATER: ▽ TOD: 37'4" ft ▼ 24-HR:		11. CLASSIFICATION REFERENCE:	
6. DEPTH OF HOLE: 60 ft		12. ENGINEER: Vivek Chikyala	

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
			FAT CLAY(CH), firm to stiff to very stiff to hard, reddish brown with sand and slickensided		1			4.5		20.0				
					2			4.5	101	20.0	89	25	64	100
5					3			4.5		12.0				
			- with sand pockets and calcareous nodules		4			4.5		17.0				
					5			3.25	103	23.0	68	22	46	84
10					6			0.75		29.0				
			- light gray with sand and gravel		7			1.5	97	30.0				
	31.1		- brown sand seams											
15			**SANDY LEAN CLAY(CL)**, brown with silt and sand pockets		8					23.0				91
	29.1		**FAT CLAY(CH)**, very soft to stiff to very stiff, dark gray with sand and apparent hydrocarbon odour		9			0.25						
			- gray with sand and ferrous nodules		10			0.25	78	37.0	88	28	60	97
20					11			0.25		33.0				
			- light gray with ferrous nodules		12			0.25		37.0				
25					13			1.0	97	28.0				
			- yellowish brown and light gray with sand and ferrous nodules		14			1.5		31.0				
			- yellowish brown and light gray with sand pockets, calcareous nodules and ferrous nodules		15			3.0		22.0				
30					16			4.5	110	20.0				
			- reddish brown and light gray with sand pockets and calcareous nodules		17			3.0		16.0				

SWG 1836 BOR ROSA ALLEN.GPJ TOLUNAY-WONG ENGINEERS.GDT 2/3/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B34

BORING LOG	DISTRICT: Galveston	INSTALLATION: Rosa Allen	SHEET 2 OF 2 SHEETS

1. PROJECT: HSCDMMP	7. ELEVATION OF HOLE: 45.14 ft
2. LOCATION (Coordinates or Station): Rosa Allen N=13819680.87 E=3162775.75	8. DATUM FOR ELEVATION:
3. DRILLING AGENCY: Kenall Inc.	9. ELEVATION OF GROUNDWATER: ▽ TOD: ▼ 24-HR:
4. LABORATORY TESTING AGENCY: Kenall Inc.	10. DRILLING DATE and TIME: STARTED: 9/27/11 COMPLETED: 9/27/11
5. DEPTH OF WATER: ▽ TOD: 37'4" ft ▼ 24-HR:	11. CLASSIFICATION REFERENCE:
6. DEPTH OF HOLE: 60 ft	12. ENGINEER: Vivek Chikyala

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
					18			2.5		24.0				
			- ferrous nodules		19			2.0		21.0				
					20			2.5		29.0				
40					21			2.5	108	20.0				
					22			2.25		30.0				
45			- reddish brown and light gray with sand and trace of gravel		23			2.5		22.0				
					24			3.0		22.0				
	-2.9		**SILTY CLAY(CL-ML)**, very stiff, reddish brown with reddish brown clay seams		25				103	23.0				
50														
	-6.4				26			2.5		22.0				
			FAT CLAY(CH), very stiff, reddish brown with sand - silty sand seams - with sand and trace of calcareous nodules - with ferrous nodules and slickensided		27			3.5		19.0				
55					28			3.5		26.0				
					29			3.0		27.0				
					30			3.0		26.0				
	-14.9		- brown sand seams - 3 " sand seam											
60														
65														

SWG 1836 BOR ROSA ALLEN.GPJ TOLUNAY-WONG ENGINEERS.GDT 2/3/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B35

BORING LOG	DISTRICT: Galveston	INSTALLATION: Rosa Allen	SHEET 1 OF 2 SHEETS
1. PROJECT: HSCDMMP		7. ELEVATION OF HOLE: 46.00 ft	
2. LOCATION (Coordinates or Station): Rosa Allen N=13818006.87 E=3164322.72		8. DATUM FOR ELEVATION:	
3. DRILLING AGENCY: Kenall Inc.		9. ELEVATION OF GROUNDWATER: ▽ TOD: ▼ 24-HR:	
4. LABORATORY TESTING AGENCY: Kenall Inc.		10. DRILLING DATE and TIME: STARTED: 9/27/11 COMPLETED: 9/27/11	
5. DEPTH OF WATER: ▽ TOD: 38'4" ft ▼ 24-HR:		11. CLASSIFICATION REFERENCE:	
6. DEPTH OF HOLE: 60 ft		12. ENGINEER: Vivek Chikyala	

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
			FAT CLAY(CH), very soft to soft to firm to stiff to very stiff to hard, reddish brown and dark gray with sand seams and slickensided		1			4.5		17.0				
					2			4.5		22.0				
5					3			4.5	108	22.0	94	28	66	
					4			3.25		19.0				
					5			1.0		20.0				
10					6			1.0	88	33.0				85
			- sand pockets		7			0.75		36.0				
			- yellowish brown and gray with brown sand seams		8			0.25		30.0				
15			- dark gray with light gray sand seams and apparent hydrocarbon odour		9			0.75		25.0				
			- reddish brown		10			0.25	74	42.0	93	27	66	99
			- brown sand		11			0.25		23.0				
20			- dark gray with apparent hydrocarbon odour		12			0.5		35.0				
			- gray with sand and ferrous nodules		13			1.25	92	32.0				
					14			1.0		21.0				
25					15			1.75		31.0				
			- light gray and yellowish brown with ferrous nodules		16			1.75		34.0				
					17			1.75	93	29.0	98	29	69	96
30			- reddish brown and light gray with calcareous nodules and trace of gravel											

SWG 1836 BOR ROSA ALLEN.GPJ TOLUNAY-WONG ENGINEERS.GDT 2/3/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B35

BORING LOG	DISTRICT: Galveston	INSTALLATION: Rosa Allen	SHEET 2 OF 2 SHEETS

1. PROJECT: HSCDMMP	7. ELEVATION OF HOLE: 46.00 ft
2. LOCATION (Coordinates or Station): Rosa Allen N=13818006.87 E=3164322.72	8. DATUM FOR ELEVATION:
3. DRILLING AGENCY: Kenall Inc.	9. ELEVATION OF GROUNDWATER: ▽ TOD: ▼ 24-HR:
4. LABORATORY TESTING AGENCY: Kenall Inc.	10. DRILLING DATE and TIME: STARTED: 9/27/11 COMPLETED: 9/27/11
5. DEPTH OF WATER: ▽ TOD: 38'4" ft ▼ 24-HR:	11. CLASSIFICATION REFERENCE:
6. DEPTH OF HOLE: 60 ft	12. ENGINEER: Vivek Chikyala

DEPTH (ft)	ELEVATION (ft)	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
				18			1.75		29.0				
				19			1.5	101	26.0				
		- yellowish brown and light gray											
	7.0			20			2.0		23.0				
	6.0	**SILTY SAND(SM)**, reddish brown and light gray with clay pockets											
40													
	4.5	**SANDY LEAN CLAY(CL)**, very stiff, ligth gray and yellowish brown		21			3.0		13.0				
		FAT CLAY(CH), very stiff, reddish brown and light gray with sand and slickensided and calcareous nodules		22			3.0		20.0				
	2.0												
45		- gravel seam		23					22.0				90
	0.0	**SANDY SILT(ML)**, brown and light gray with clay seams											
		FAT CLAY(CH), stiff to very stiff, reddish brown and light gray with trace of gravel		24		18			22.0				
				25			3.5	110	22.0				
50													
	-5.5			26			2.5		17.0				
	-6.5	**SILTY SAND(SM)**, medium dense, reddish brown											
	-7.5	**FAT CLAY(CH)**, very stiff, reddish brown		27			2.5		21.0				
		SILTY SAND(SM), medium dense, reddish brown											
55	-9.5			28			4.0		12.0				
		FAT CLAY(CH), very stiff, reddish brown with slickensided		29		26			30.0				
				30			3.25		20.0				
	-14.0	- reddish brown and light gray											
60													
65													

SWG 1836 BOR ROSA ALLEN.GPJ TOLUNAY-WONG ENGINEERS.GDT 2/3/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B36

BORING LOG	DISTRICT: Galveston	INSTALLATION: Rosa Allen	SHEET 1 OF 2 SHEETS
1. PROJECT: HSCDMMP		7. ELEVATION OF HOLE: 48.17 ft	
2. LOCATION (Coordinates or Station): Rosa Allen N=13819812.41 E=3165636.16		8. DATUM FOR ELEVATION:	
3. DRILLING AGENCY: Kenall Inc.		9. ELEVATION OF GROUNDWATER: ▽ TOD: ▼ 24-HR:	
4. LABORATORY TESTING AGENCY: Kenall Inc.		10. DRILLING DATE and TIME: STARTED: 9/28/11 COMPLETED: 9/28/11	
5. DEPTH OF WATER: ▽ TOD: 30' ft ▼ 24-HR:		11. CLASSIFICATION REFERENCE:	
6. DEPTH OF HOLE: 60 ft		12. ENGINEER: Vivek Chikyala	

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
			ELASTIC SILT WITH SAND(MH), stiff to very stiff to hard, reddish brown and dark gray with gravel with brown sand seams		1			4.5		10.0				
					2		12			13.0				
5					3			4.5	101	15.0	55	33	22	79
					4		11			17.0				
					5			3.25		18.0				
10			- light gray		6		8			21.0				
	36.2		**FAT CLAY(CH)**, soft to stiff, reddish brown and dark gray with apparent hydrocarbon odour and sand seams		7			1.0		41.0				
15					8			0.25	89	29.0	60	40	20	100
					9			0.25		28.0				
	30.2		**ELASTIC SILT(MH)**, very soft, dark gray with apparent hydrocarbon odour		10			0.25		31.0				
20			- gray with sand pockets		11			0.25		29.0				
					12			0.25	81	33.0	83	54	29	99
25					13			0.25	85	33.0				98
					14			0.25		39.0				
					15			0.25		29.0				
30					16			0.25	86	32.0				
					17			0.25		29.0				

SWG 1836 BOR ROSA ALLEN.GPJ TOLUNAY-WONG ENGINEERS.GDT 2/3/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B36

BORING LOG	DISTRICT: Galveston	INSTALLATION: Rosa Allen	SHEET 2 OF 2 SHEETS

1. PROJECT: HSCDMMP	7. ELEVATION OF HOLE: 48.17 ft
2. LOCATION (Coordinates or Station): Rosa Allen N=13819812.41 E=3165636.16	8. DATUM FOR ELEVATION:
3. DRILLING AGENCY: Kenall Inc.	9. ELEVATION OF GROUNDWATER: ▽ TOD: ▼ 24-HR:
4. LABORATORY TESTING AGENCY: Kenall Inc.	10. DRILLING DATE and TIME: STARTED: 9/28/11 COMPLETED: 9/28/11
5. DEPTH OF WATER: ▽ TOD: 30' ft ▼ 24-HR:	11. CLASSIFICATION REFERENCE:
6. DEPTH OF HOLE: 60 ft	12. ENGINEER: Vivek Chikyala

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
	12.7				18			0.25		23.0				
			FAT CLAY(CH), firm to very stiff, gray with sand pockets and ferrous nodules		19			0.75	93	30.0				
			- light gray and yellowish brown with sand and ferrous nodules											
	8.7		- trace of calcareous deposits		20			2.25		23.0				
40			- trace of gravel											
	7.2		**SILTY SAND(SM)**, medium dense, light gray and yellowish brown with clay pockets		21		16			24.0				
	5.2		**SANDY LEAN CLAY(CL)**, very stiff, light gray and yellowish brown with sand, ferrous nodules and trace of gravel		22			2.0		20.0				
45			**FAT CLAY(CH)**, very stiff, reddish brown and ligth gray with sand, ferrous nodules and trace of gravel		23			2.25		17.0				
					24			2.25		22.0				
					25			2.25	100	25.0				
50			- reddish brown with sand and trace of gravel		26			2.25		27.0				
					27			2.0		22.0				
55					28			2.75		23.0				
					29			3.25		22.0				
					30			2.0						
60	-11.8													
65														

SWG 1836 BOR ROSA ALLEN.GPJ TOLUNAY-WONG ENGINEERS.GDT 2/3/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B33A

BORING LOG	DISTRICT: Galveston	INSTALLATION: Rosa Allen	SHEET 1 OF 2 SHEETS

1. PROJECT: HSCDMMP	7. ELEVATION OF HOLE: 47.17 ft
2. LOCATION (Coordinates or Station): Rosa Allen N=13821618.48 E=3164158.23	8. DATUM FOR ELEVATION:
3. DRILLING AGENCY: Kenall Inc.	9. ELEVATION OF GROUNDWATER: ▽ TOD: ▼ 24-HR:
4. LABORATORY TESTING AGENCY: Kenall Inc.	10. DRILLING DATE and TIME: STARTED: 12/10/11 COMPLETED: 12/10/11
5. DEPTH OF WATER: ▽ TOD: NA ft ▼ 24-HR:	11. CLASSIFICATION REFERENCE:
6. DEPTH OF HOLE: 60 ft	12. ENGINEER: Vivek Chikyala

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	TORVANE (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
	45.2		**SANDY LEAN CLAY(CL)**, hard, light brown with roots and light gray silty sand at 1.5 feet		1			4.5+			7.0				
	42.7		**SILTY SAND(SM)**, medium dense, light brown and light gray		2		18				6.0				47
5			**FAT CLAY(CH)**, soft to firm to stiff to very stiff, reddish brown with sand pockets and sand seams		3		21				15.0				
					4			3.5		117	13.0	63	32	31	99
			- light gray and light brown with ferrous stains		5			2.75		97	19.0				
10					6			1.5			22.0				
			- with silt and calcareous nodules		7			0.75		106	21.0	50	24	26	87
			- with sand		8			0.25	0.187		27.0				
15	30.9		**SILT(ML)**, soft to firm, gray, black and reddish brown with sand pockets		9			0.25	0.125		26.0				
					10			0.75				38	26	12	93
20					11			1.0			12.0				
	25.2		**FAT CLAY(CH)**, stiff to very stiff to hard, black and gray with sand		12			2.0		91	30.0				
			- reddish brown and light gray with calcareous nodules and ferrous stains		13			1.0			32.0				
25					14			1.0		89	35.0				
			- gray and light brown		15			1.5			32.0				
30					16			1.5			28.0				
					17			2.75			22.0				

SWG 1836 BOR ROSA ALLEN.GPJ TOLUNAY-WONG ENGINEERS.GDT 3/7/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B33A

BORING LOG	DISTRICT: Galveston	INSTALLATION: Rosa Allen	SHEET 2 OF 2 SHEETS

1. PROJECT: HSCDMMP	7. ELEVATION OF HOLE: 47.17 ft
2. LOCATION (Coordinates or Station): Rosa Allen N=13821618.48 E=3164158.23	8. DATUM FOR ELEVATION:
3. DRILLING AGENCY: Kenall Inc.	9. ELEVATION OF GROUNDWATER: ▽ TOD: ▼ 24-HR:
4. LABORATORY TESTING AGENCY: Kenall Inc.	10. DRILLING DATE and TIME: STARTED: 12/10/11 COMPLETED: 12/10/11
5. DEPTH OF WATER: ▽ TOD: NA ft ▼ 24-HR:	11. CLASSIFICATION REFERENCE:
6. DEPTH OF HOLE: 60 ft	12. ENGINEER: Vivek Chikyala

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	TORVANE (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
					18			2.5			23.0				
					19			3.25			17.0				
					20			3.25			21.0				
40					21			3.75			22.0				
					22			4.25			24.0				
	2.2				23			1.75			16.0				
45			**SILTY SAND(SM)**, dense, light brown and light gray												
	0.2														
			SANDY LEAN CLAY(CL), stiff to hard, reddish brown and light gray with gravel		24		35				26.0				
					25			1.75			23.0				
50			- ferrous stains		26			4.5			26.0				
	-4.8														
			SILTY SAND(SM), dense, reddish brown		27		41				21.0				
	-6.8														
55			**FAT CLAY(CH)**, hard, reddish brown with large sand pockets and calcareous nodules		28			4.0			17.0				
	-8.8														
			SANDY LEAN CLAY(CL), hard, light brown		29			4.5+			17.0				
	-10.8														
			SILTY SAND(SM), dense, light brown - reddish brown clay		30		31								
	-12.8														
60															
65															

SWG 1836 BOR ROSA ALLEN.GPJ TOLUNAY-WONG ENGINEERS.GDT 3/7/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B36A

BORING LOG	DISTRICT Galveston	INSTALLATION Rosa Allen	SHEET 1 OF 2 SHEETS

1. PROJECT HSCDMMP	7. ELEVATION OF HOLE 48.49 ft
2. LOCATION (Coordinates or Station) Rosa Allen N=13821510.70 E=3165560.10	8. DATUM FOR ELEVATION
3. DRILLING AGENCY Kenall Inc.	9. ELEVATION OF GROUNDWATER ▽ TOD: ▼ 24-HR:
4. LABORATORY TESTING AGENCY Kenall Inc.	10. DRILLING DATE and TIME STARTED: 12/12/11 COMPLETED: 12/12/11
5. DEPTH OF WATER ▽ TOD: NA ft ▼ 24-HR:	11. CLASSIFICATION REFERENCE
6. DEPTH OF HOLE 60 ft	12. ENGINEER Vivek Chikyala

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	TORVANE (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
	46.5		**SANDY LEAN CLAY(CL)**, hard, reddish brown with silt pockets		1			4.5+		100	18.0				
			FAT CLAY(CH), hard, reddish brown and dark gray with sand pockets and sand seams		2			4.5+		108	18.0				72
5	42.5				3			4.5+		103	20.0				
			SILTY SAND(SM), loose, light brown and light gray with clay pcokets		4						16.0				
					5		11				9.0				40
10					6		5				18.0				
	34.5				7		4				21.0				
15			**LEAN CLAY WITH SAND(CL)**, black with hydrocarbon odour		8		4				25.0	26	18	8	83
	30.5				9		4				30.0				
			SANDY LEAN CLAY(CL), black with hydrocarbon odour		10		3				35.0				
20					11		2				31.0				
	24.5				12		3				37.0				
			FAT CLAY(CH), stiff to very stiff, light brown and gray with ferrous stains		13			0.75		79	42.0	89	41	48	100
					14			1.0			20.0				
					15			1.25			17.0				
30			- reddish brown		16			1.25		89	35.0	99	38	61	
			- reddish brown and light gray		17			1.25			31.0				

SWG 1836 BOR ROSA ALLEN.GPJ TOLUNAY-WONG ENGINEERS.GDT 3/7/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B36A

BORING LOG	DISTRICT: Galveston	INSTALLATION: Rosa Allen	SHEET 2 OF 2 SHEETS

1. PROJECT: HSCDMMP	7. ELEVATION OF HOLE: 48.49 ft
2. LOCATION (Coordinates or Station): Rosa Allen N=13821510.70 E=3165560.10	8. DATUM FOR ELEVATION:
3. DRILLING AGENCY: Kenall Inc.	9. ELEVATION OF GROUNDWATER: ▽ TOD: ▼ 24-HR:
4. LABORATORY TESTING AGENCY: Kenall Inc.	10. DRILLING DATE and TIME: STARTED: 12/12/11 COMPLETED: 12/12/11
5. DEPTH OF WATER: ▽ TOD: NA ft ▼ 24-HR:	11. CLASSIFICATION REFERENCE:
6. DEPTH OF HOLE: 60 ft	12. ENGINEER: Vivek Chikyala

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	TORVANE (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
					18			1.75			32.0				
					19			2.25			30.0				
					20			3.0			29.0				
40					21			2.75			28.0				
					22			3.0			24.0				
45					23			2.5			22.0				
	1.5				24			2.5			34.0				
			SANDY LEAN CLAY(CL), very stiff, reddish brown and light gray												
	-0.5				25			3.0			19.0				
50			**SILTY SAND(SM)**, dense to very dense, reddish brown and light gray with sandy clay												
					26		39				19.0				
					27		40				18.0				
55					28		62				21.0				
					29		59				21.0				
	-11.5				30		61				25.0				
60															
65															

SWG 1836 BOR ROSA ALLEN.GPJ TOLUNAY-WONG ENGINEERS.GDT 3/7/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B37

BORING LOG	DISTRICT: Galveston	INSTALLATION: Lost Lake	SHEET 1 OF 2 SHEETS

1. PROJECT: HSCDMMP	7. ELEVATION OF HOLE: 33.84 ft
2. LOCATION (Coordinates or Station): Lost Lake N=13852198.66 E=3209358.32	8. DATUM FOR ELEVATION:
3. DRILLING AGENCY: Kenall Inc.	9. ELEVATION OF GROUNDWATER: ▽ TOD: 13.84 ft ▼ 24-HR:
4. LABORATORY TESTING AGENCY: Kenall Inc.	10. DRILLING DATE and TIME: STARTED: 1/19/12 COMPLETED: 1/19/12
5. DEPTH OF WATER: ▽ TOD: 20.0 ft ▼ 24-HR:	11. CLASSIFICATION REFERENCE:
6. DEPTH OF HOLE: 60 ft	12. ENGINEER: Vivek Chikyala

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
			FAT CLAY(CH), stiff to very stiff, tan and yellowish brown with sand		1			1.5		21.0				
					2			2.5	111	18.0	53	16	37	
5			- light gray		3			3.5		18.0				
					4			2.5	106	21.0				
	25.8		**CLAYEY SAND(SC)**, tan and reddish brown with clay pockets		5			1.0	118	14.0	25	11	14	32
10					6			1.5		14.0				
	19.8				7			1.5	118	8.0				
			SILTY SAND(SM), very loose to medium dense, gray and dark gray		8		2			19.0				25
15					9		19			15.0				
	15.8		**CLAYEY SAND(SC)**, dark gray with clay pockets		10			0.0		17.0				23
20	▽13.8		**SILTY SAND(SM)**, medium dense, gray and dark gray with clay pockets		11		14			21.0				
	9.8				12		12			28.0				
			SANDY LEAN CLAY(CL), very soft to soft, tan and reddish brown with ferrous nodules		13			1.0		22.0	46	15	31	50
					14			0.5		19.0				
					15			0.0	92	28.0				
30			- tan and black		16			0.5		58.0				
			- brown and black		17			0.0		58.0				

SWG 1836 BOR LOST LAKE.GPJ TOLUNAY-WONG ENGINEERS.GDT 2/17/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B37

BORING LOG	DISTRICT: Galveston	INSTALLATION: Lost Lake	SHEET 2 OF 2 SHEETS

1. PROJECT: HSCDMMP	7. ELEVATION OF HOLE: 33.84 ft
2. LOCATION (Coordinates or Station): Lost Lake N=13852198.66 E=3209358.32	8. DATUM FOR ELEVATION:
3. DRILLING AGENCY: Kenall Inc.	9. ELEVATION OF GROUNDWATER: ▽ TOD: 13.84 ft ▼ 24-HR:
4. LABORATORY TESTING AGENCY: Kenall Inc.	10. DRILLING DATE and TIME: STARTED: 1/19/12 COMPLETED: 1/19/12
5. DEPTH OF WATER: ▽ TOD: 20.0 ft ▼ 24-HR:	11. CLASSIFICATION REFERENCE:
6. DEPTH OF HOLE: 60 ft	12. ENGINEER: Vivek Chikyala

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
			- brown with roots and hydrocarbon odour		18			0.0	61	59.0				
					19			0.0		55.0				
			- dark gray		20			0.0		38.0				
40														
	-8.2				21		20			41.0				
			SILTY SAND(SM), medium dense to dense, dark gray and light gray with clay pockets		22		31			24.0				
45					23		37			24.0				
					24		25			32.0				
					25		24			23.0				
50	-16.2													
	-18.2		**SANDY LEAN CLAY(CL)**, brown and reddish brown with sand and hydrocarbon odour		26		23			32.0				
			SILTY SAND(SM), medium dense, dark gray and light gray with clay pockets		27		22			27.0				
55					28		23			20.0				
	-22.2		**CLAYEY SAND(SC)**, medium dense, black with organics and hydrocarbon odour		29		17			41.0				
	-24.2		**SANDY LEAN CLAY(CL)**, brown hydrocarbon odour		30		19			33.0				
60	-26.2													
65														

SWG 1836 BOR LOST LAKE.GPJ TOLUNAY-WONG ENGINEERS.GDT 2/17/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B38

BORING LOG	DISTRICT: Galveston	INSTALLATION: Lost Lake	SHEET 1 OF 2 SHEETS
1. PROJECT: HSCDMMP		7. ELEVATION OF HOLE: 34.29 ft	
2. LOCATION (Coordinates or Station): Lost Lake N=13851630.30 E=3206632.14		8. DATUM FOR ELEVATION:	
3. DRILLING AGENCY: Kenall Inc.		9. ELEVATION OF GROUNDWATER: ▽ TOD: 15.29 ft ▼ 24-HR:	
4. LABORATORY TESTING AGENCY: Kenall Inc.		10. DRILLING DATE and TIME: STARTED: 1/18/12 COMPLETED: 1/18/12	
5. DEPTH OF WATER: ▽ TOD: 19.0 ft ▼ 24-HR:		11. CLASSIFICATION REFERENCE:	
6. DEPTH OF HOLE: 60 ft		12. ENGINEER: Vivek Chikyala	

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
			FAT CLAY WITH SAND(CH), stiff to very stiff to hard, tan and yellowish brown with sand seams and pockets		1			4.0		20.0				
			- calcareous nodules		2			3.0	107	20.0				
5			- tan and brown		3			4.5		27.0				
			- ferrous nodules		4			3.0	100	25.0				
					5			3.0		17.0				
10			- reddish brown with sand seams and ferrous nodules		6			1.5	106	20.0	50	17	33	74
	22.3		**SILTY SAND(SM)**, medium dense, brown with clay pockets		7		25			7.0				
15					8		30			9.0				
			- gray		9		11			13.0				
	16.3		**CLAYEY SAND(SC)**, medium dense, gray with clay pockets		10		16			14.0				
	▽ 14.3		**SILTY SAND(SM)**, loose to medium dense to dense, dark gray and gray with clay pockets		11		8			23.0				33
20					12		35			21.0				
25					13		29			23.0				21
	6.3		- hydrocarbon odour		14		7			20.0				
	4.3		**CLAYEY SAND(SC)**, loose, dark gray with clay pockets		15		5			21.0				
30			**FAT CLAY(CH)**, very soft to soft to firm, dark gray with silt and sand pockets		16			0.5			67	33	34	97
			- with sand seams and hydrocarbon odour		17			0.5	63	65.0				

SWG 1836 BOR LOST LAKE.GPJ TOLUNAY-WONG ENGINEERS.GDT 2/17/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B38

BORING LOG	DISTRICT: Galveston	INSTALLATION: Lost Lake	SHEET 2 OF 2 SHEETS

1. PROJECT: HSCDMMP	7. ELEVATION OF HOLE: 34.29 ft
2. LOCATION (Coordinates or Station): Lost Lake N=13851630.30 E=3206632.14	8. DATUM FOR ELEVATION:
3. DRILLING AGENCY: Kenall Inc.	9. ELEVATION OF GROUNDWATER: ▽ TOD: 15.29 ft ▼ 24-HR:
4. LABORATORY TESTING AGENCY: Kenall Inc.	10. DRILLING DATE and TIME: STARTED: 1/18/12 COMPLETED: 1/18/12
5. DEPTH OF WATER: ▽ TOD: 19.0 ft ▼ 24-HR:	11. CLASSIFICATION REFERENCE:
6. DEPTH OF HOLE: 60 ft	12. ENGINEER: Vivek Chikyala

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
					18			0.5		56.0				
					19			0.5		71.0				
					20			0.5		36.0				
40	-5.7													
			SILTY SAND(SM), medium dense, dark gray with clay pockets		21			1.0		21.0				
	-9.7				22		26			22.0				
45	-11.7		**CLAYEY SAND(SC)**, medium dense, brown and dark gray with organics		23		29			39.0				
			SILTY SAND(SM), dense, gray and dark gray with clay pockets		24		34			22.0				
	-15.7				25		31			31.0				
50	-17.7		**CLAYEY SAND(SC)**, medium dense, dark gray		26		21			29.0				
			SILTY SAND(SM), medium dense, gray and dark gray with clay pockets - gravel		27		20			20.0				
55					28		22			18.0				
	-23.7				29		22			19.0				
	-25.7		**SANDY LEAN CLAY(CL)**, gray with sand pockets		30		37			23.0				
60														
65														

SWG 1836 BOR LOST LAKE.GPJ TOLUNAY-WONG ENGINEERS.GDT 2/17/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B38A

BORING LOG	DISTRICT: Galveston	INSTALLATION: Lost Lake	SHEET 1 OF 2 SHEETS

1. PROJECT: HSCDMMP	7. ELEVATION OF HOLE: 30.94 ft
2. LOCATION (Coordinates or Station): Lost Lake N=13849572.85 E=3205682.90	8. DATUM FOR ELEVATION:
3. DRILLING AGENCY: Kenall Inc.	9. ELEVATION OF GROUNDWATER: ▽ TOD: 13.94 ft ▼ 24-HR:
4. LABORATORY TESTING AGENCY: Kenall Inc.	10. DRILLING DATE and TIME: STARTED: 1/17/12 COMPLETED: 1/17/12
5. DEPTH OF WATER: ▽ TOD: 17.0 ft ▼ 24-HR:	11. CLASSIFICATION REFERENCE:
6. DEPTH OF HOLE: 60 ft	12. ENGINEER: Vivek Chikyala

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
			LEAN CLAY WITH SAND(CL), soft to stiff to very hard, tan and brown with gravel		1			1.5		31.0				
			- brown and reddish brown with gravel and calcareous nodules		2			0.5	101	24.0				
5			- with sand seams and ferrous nodules		3			1.0	97	26.0	44	14	30	78
			- yellowish brown with roots, sand seams and ferrous nodules		4			4.0		21.0				
			- calcareous nodules		5			3.5	107	21.0				
10			- reddish brown		6			4.5		18.0				
			- sand seams, gravel, calcareous and ferrous nodules		7			4.5	119	11.0				
			- brown with sand pockets		8			1.5	112	17.0				
15	▽13.9		- brown and dark gray with sand seams		9			0.5		19.0				
			CLAYEY SAND(SC), reddish brown with lot of clay pockets, wood, burnt wood (debris) and with hydrocarbon odour		10			0.0		21.0	47	16	31	44
20			- with clay pockets		11			0.5		14.0	22	13	9	34
	8.9		**SANDY LEAN CLAY(CL)**, very soft, gray, reddish brown and dark gray with lots of sand pockets and shell		12		5			20.0				
25					13			0.5		9.0				
					14			0.5	107	16.0	24	16	8	16
			- brown with gravel and shell		15		4			28.0				
30	0.9		**FAT CLAY(CH)**, brown and dark gray with organics		16		3			66.0				
					17		2			64.0				

SWG 1836 BOR LOST LAKE.GPJ TOLUNAY-WONG ENGINEERS.GDT 2/17/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B38A

BORING LOG	DISTRICT: Galveston	INSTALLATION: Lost Lake	SHEET 2 OF 2 SHEETS

1. PROJECT: HSCDMMP	7. ELEVATION OF HOLE: 30.94 ft
2. LOCATION (Coordinates or Station): Lost Lake N=13849572.85 E=3205682.90	8. DATUM FOR ELEVATION:
3. DRILLING AGENCY: Kenall Inc.	9. ELEVATION OF GROUNDWATER: ▽ TOD: 13.94 ft ▼ 24-HR:
4. LABORATORY TESTING AGENCY: Kenall Inc.	10. DRILLING DATE and TIME: STARTED: 1/17/12 COMPLETED: 1/17/12
5. DEPTH OF WATER: ▽ TOD: 17.0 ft ▼ 24-HR:	11. CLASSIFICATION REFERENCE:
6. DEPTH OF HOLE: 60 ft	12. ENGINEER: Vivek Chikyala

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
				X	18		3			67.0				
				X	19		2			56.0				
				X	20		2			57.0				
40				X	21		4			68.0				
				X	22		2			74.0				
			- black and brown	■	23			0.0		87.0				
45				■	24			0.0		43.0				
				X	25		3			61.0				
50				X	26		3			68.0				
			- with lots of sand pockets and seams	■	27			0.5		22.0				
	-23.1													
55			**SANDY LEAN CLAY(CL)**, soft, tan and reddish brown with sand pockets and calcareous nodules	■	28			3.5		22.0				
				■	29			4.0		27.0				
				■	30			4.0		29.0				
	-29.1													
60														
65														

SWG 1836 BOR LOST LAKE.GPJ TOLUNAY-WONG ENGINEERS.GDT 2/17/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B39

BORING LOG	DISTRICT Galveston	INSTALLATION Lost Lake	SHEET 1 OF 2 SHEETS

1. PROJECT HSCDMMP	7. ELEVATION OF HOLE 34.14 ft
2. LOCATION (Coordinates or Station) Lost Lake N=13848269.02 E=3208339.81	8. DATUM FOR ELEVATION
3. DRILLING AGENCY Kenall Inc.	9. ELEVATION OF GROUNDWATER ▽ TOD: 12.14 ft ▼ 24-HR:
4. LABORATORY TESTING AGENCY Kenall Inc.	10. DRILLING DATE and TIME STARTED: 1/18/12 COMPLETED: 1/18/12
5. DEPTH OF WATER ▽ TOD: 22.0 ft ▼ 24-HR:	11. CLASSIFICATION REFERENCE
6. DEPTH OF HOLE 60 ft	12. ENGINEER Vivek Chikyala

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
			FAT CLAY WITH SAND(CH), firm to very stiff to hard, reddish brown and dark gray with sand pockets		1			4.5	113	16.0				
			- calcareous nodules		2			3.0		7.0				
			- brown and gray with calcareous nodules		3			3.0		12.0				
5			- dark gray with many sand pockets		4			0.5	69	53.0	97	31	66	76
					5			0.5		15.0				
10			- brown, dark gray with sand seams and pockets		6			2.5	97	27.0				
			- reddish brown		7			1.0	98	28.0				
15			- dark gray		8			2.5		16.0				
			- with shell		9			2.0	111	17.0				
	16.1		**SANDY LEAN CLAY(CL)**, very soft to soft to firm, tan and gray with sand pockets		10			1.0		21.0				59
20			- dark gray with many sand pockets		11			0.5	92	18.0	39	16	23	62
	▽													
					12		2			34.0				
			- brown, dark gray											
25					13		3			25.0				
					14			0.5		16.0				
	6.1		**CLAYEY SAND(SM)**, gray with clay pockets		15			0.0		30.0				29
30	4.1		**FAT CLAY WITH SAND(CH)**, soft to firm to very stiff, dark gray with sand pockets		16			0.5	79	35.0				
			- gray with sand pockets and shell		17			1.0		43.0				
			- dark gray, reddish brown and tan with sand											

SWG 1836 BOR LOST LAKE.GPJ TOLUNAY-WONG ENGINEERS.GDT 2/17/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B39

BORING LOG	DISTRICT: Galveston	INSTALLATION: Lost Lake	SHEET 2 OF 2 SHEETS

1. PROJECT: HSCDMMP	7. ELEVATION OF HOLE: 34.14 ft
2. LOCATION (Coordinates or Station): Lost Lake N=13848269.02 E=3208339.81	8. DATUM FOR ELEVATION:
3. DRILLING AGENCY: Kenall Inc.	9. ELEVATION OF GROUNDWATER: ▽ TOD: 12.14 ft ▼ 24-HR:
4. LABORATORY TESTING AGENCY: Kenall Inc.	10. DRILLING DATE and TIME: STARTED: 1/18/12 COMPLETED: 1/18/12
5. DEPTH OF WATER: ▽ TOD: 22.0 ft ▼ 24-HR:	11. CLASSIFICATION REFERENCE:
6. DEPTH OF HOLE: 60 ft	12. ENGINEER: Vivek Chikyala

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
			seams and gravel		18			0.5		21.0				
			- shell		19		2			37.0				
			- black and dark gray with silt pockets		20			1.0		17.0				
40			- dark gray with shell		21			2.5		25.0				
			- gray sand - dark gray and brown with shell		22		26			41.0				
	-9.9		**SILTY SAND(SM)**, medium dense to dense, gray with silt and clay pockets		23		22			24.0				64
45					24		24			26.0				
					25		26			24.0				
50			- dark gray		26		38			20.0				
					27		35			37.0				
55					28		13			20.0				
	-21.9		**SANDY LEAN CLAY(CL)**, brown and dark gray with shell and gravel		29		7			25.0				
	-23.9		**SILTY SAND(SM)**, medium dense, dark gray with clay pockets		30		30			19.0				
60	-25.9													
65														

SWG 1836 BOR LOST LAKE.GPJ TOLUNAY-WONG ENGINEERS.GDT 2/17/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B39A

BORING LOG	DISTRICT Galveston	INSTALLATION Lost Lake	SHEET 1 OF 2 SHEETS
1. PROJECT HSCDMMP		7. ELEVATION OF HOLE 34.59 ft	
2. LOCATION (Coordinates or Station) Lost Lake N=13848114.07 E=3205940.23		8. DATUM FOR ELEVATION	
3. DRILLING AGENCY Kenall Inc.		9. ELEVATION OF GROUNDWATER ▽ TOD: 11.59 ft ▼ 24-HR:	
4. LABORATORY TESTING AGENCY Kenall Inc.		10. DRILLING DATE and TIME STARTED: 1/17/12 COMPLETED: 1/17/12	
5. DEPTH OF WATER ▽ TOD: 23.0 ft ▼ 24-HR:		11. CLASSIFICATION REFERENCE	
6. DEPTH OF HOLE 60 ft		12. ENGINEER Vivek Chikyala	

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
			SANDY LEAN CLAY(CL), stiff to hard, reddish brown and yellowish brown with gravel and shell		1			1.0		20.0				
			- with sand seams		2			1.0	99	24.0	40	15	25	54
5			- with sand pockets		3			1.5		15.0				
			- calcareous nodules		4			2.0	107	23.0				
			- brown with sand pockets		5			4.5		16.0				
10	24.6		**SANDY FAT CLAY(CH)**, soft, reddish brown and brown with many sand pockets and gravel		6			1.0	106	19.0	65	18	47	66
			- brown and gray sand with clay and gravel		7			0.5		14.0				
15					8			0.5		28.0				
	18.6		**FAT CLAY WITH SAND(CH)**, soft, reddish brown with sand seams and calcareous nodules		9			0.5		30.0	54	20	34	79
	16.6		**SILTY, CLAYEY SAND(SC-SM)**, brown with silt and clay pockets		10			0.5		20.0	22	16	6	23
20	14.6		**FAT CLAY(CH)**, soft to stiff, reddish brown and gray with sand pockets		11			0.5	88	35.0				
	▽		- brown with ferrous nodules		12			0.5	93	38.0				
25					13			0.5		35.0				
			- sand seams, shell and gravel		14			1.5	90	35.0				
			- yellowish brown		15			1.5		34.0				
30					16			1.5		26.0				
	2.6		**LEAN CLAY WITH SAND(CL)**, very soft to soft to stiff, gray and black with sand and organics		17			0.0	95	29.0	36	17	19	75

SWG 1836 BOR LOST LAKE.GPJ TOLUNAY-WONG ENGINEERS.GDT 2/17/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B39A

BORING LOG	DISTRICT: Galveston	INSTALLATION: Lost Lake	SHEET 2 OF 2 SHEETS
1. PROJECT: HSCDMMP		7. ELEVATION OF HOLE: 34.59 ft	
2. LOCATION (Coordinates or Station): Lost Lake N=13848114.07 E=3205940.23		8. DATUM FOR ELEVATION:	
3. DRILLING AGENCY: Kenall Inc.		9. ELEVATION OF GROUNDWATER: ▽ TOD: 11.59 ft ▼ 24-HR:	
4. LABORATORY TESTING AGENCY: Kenall Inc.		10. DRILLING DATE and TIME: STARTED: 1/17/12 COMPLETED: 1/17/12	
5. DEPTH OF WATER: ▽ TOD: 23.0 ft ▼ 24-HR:		11. CLASSIFICATION REFERENCE:	
6. DEPTH OF HOLE: 60 ft		12. ENGINEER: Vivek Chikyala	

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
					18			0.0		26.0				
			- dark gray and brown with sand pockets		19			0.5		31.0				
					20			1.0	98	29.0				
40			- hydrocarbon odour		21			0.5	77	40.0				
					22		3			40.0				
			- brown and gray with sand		23		3			26.0				
45					24		2			48.0				
					25		3			60.0				
50			- dark gray with shell		26			0.5		72.0				
			- gray with sand		27		7			76.0				
55					28		5			63.0				
			- dark gray with many sand pockets		29			1.0		56.0				
	-23.4													
	-25.4		**SILTY SAND(SM)**, dark gray with many clay pockets		30			1.0		43.0				
60														
65														

SWG 1836 BOR LOST LAKE.GPJ TOLUNAY-WONG ENGINEERS.GDT 2/17/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B40

BORING LOG	DISTRICT Galveston	INSTALLATION Lost Lake	SHEET 1 OF 2 SHEETS
1. PROJECT HSCDMMP		7. ELEVATION OF HOLE 34.33 ft	
2. LOCATION (Coordinates or Station) Lost Lake N=13848907.66 E=3212070.13		8. DATUM FOR ELEVATION	
3. DRILLING AGENCY Kenall Inc.		9. ELEVATION OF GROUNDWATER ▽ TOD: 15.33 ft ▼ 24-HR:	
4. LABORATORY TESTING AGENCY Kenall Inc.		10. DRILLING DATE and TIME STARTED: 1/19/12 COMPLETED: 1/19/12	
5. DEPTH OF WATER ▽ TOD: 19.0 ft ▼ 24-HR:		11. CLASSIFICATION REFERENCE	
6. DEPTH OF HOLE 60 ft		12. ENGINEER Vivek Chikyala	

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
			SANDY LEAN CLAY(CL), hard, brown and gray with sand pockets		1			4.5		17.0				
			- reddish brown		2			4.5	117	15.0	37	13	24	
5					3			4.0		17.0				
	28.3		**SILTY SAND(SM)**, loose to medium dense, gray with clay pockets		4		9			15.0				50
					5		12			23.0				
10	24.3		**SANDY LEAN CLAY(CL)**, firm to stiff to very stiff, brown, yellowish brown and gray with sand pockets, shell and gravel		6			1.0	116	15.0	31	14	17	50
					7			1.0		13.0				
15					8			1.5	107	22.0				
			- tan and yellowish brown		9			3.0		17.0				
	▽		- gray		10			3.0		19.0				
20					11			0.5	83	18.0	41	13	28	50
			- dark gray		12			1.0		21.0				
25			- with shell		13			1.0	100	21.0				
			- gray with sand											
	6.3				14		3			28.0				
			SILTY SAND(SM), very loose to loose, gray with clay pockets and shell		15		2			24.0				
30					16		7			31.0				
	2.3													
			FAT CLAY(CH), very soft to soft to firm, black and gray with sand pockets		17		2			34.0				
			- dark gray with gravel											

SWG 1836 BOR LOST LAKE.GPJ TOLUNAY-WONG ENGINEERS.GDT 2/17/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B40

BORING LOG	DISTRICT: Galveston	INSTALLATION: Lost Lake	SHEET 2 OF 2 SHEETS

1. PROJECT: HSCDMMP	7. ELEVATION OF HOLE: 34.33 ft
2. LOCATION (Coordinates or Station): Lost Lake N=13848907.66 E=3212070.13	8. DATUM FOR ELEVATION:
3. DRILLING AGENCY: Kenall Inc.	9. ELEVATION OF GROUNDWATER: ▽ TOD: 15.33 ft ▼ 24-HR:
4. LABORATORY TESTING AGENCY: Kenall Inc.	10. DRILLING DATE and TIME: STARTED: 1/19/12 COMPLETED: 1/19/12
5. DEPTH OF WATER: ▽ TOD: 19.0 ft ▼ 24-HR:	11. CLASSIFICATION REFERENCE:
6. DEPTH OF HOLE: 60 ft	12. ENGINEER: Vivek Chikyala

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
				■	18			0.5	61	65.0				
				■	19			1.0		60.0				
				■	20			1.0		59.0				
40				■	21			0.0	65	38.0				
	-7.7		**SILTY SAND(SM)**, dense to very dense, gray with organics	⊠	22		53			22.0				
45				⊠	23		44			23.0				
				○	24									
				⊠	25		42			28.0				
50	-17.7		- gray and black with clay pockets and shell	⊠	26		23			28.0				
			SANDY LEAN CLAY(CL), very stiff, gray and black with gravel	⊠	27		23			35.0				
55				⊠	28		19			35.0				
			- light gray and reddish brown with sand pockets	■	29			4.0		20.0				
			- yellowish brown and gray with some sand	■	30			4.0		17.0				
60	-25.7													
65														

SWG 1836 BOR LOST LAKE.GPJ TOLUNAY-WONG ENGINEERS.GDT 2/17/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B41

BORING LOG	DISTRICT: Galveston	INSTALLATION: Peggy Lake	SHEET 1 OF 2 SHEETS

1. PROJECT: HSCDMMP	7. ELEVATION OF HOLE: +19.10 ft
2. LOCATION (Coordinates or Station): Peggy Lake N=13837588.30 E=3215723.56	8. DATUM FOR ELEVATION:
3. DRILLING AGENCY: Kenall Inc.	9. ELEVATION OF GROUNDWATER: ▽ TOD: 8.02 ft ▼ 24-HR:
4. LABORATORY TESTING AGENCY: Kenall Inc.	10. DRILLING DATE and TIME: STARTED: 10/5/11 COMPLETED: 10/5/11
5. DEPTH OF WATER: ▽ TOD: 11.08 ft ▼ 24-HR:	11. CLASSIFICATION REFERENCE:
6. DEPTH OF HOLE: 60 ft	12. ENGINEER: Vivek Chikyala

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
			FAT CLAY WITH SAND(CH), firm to stiff to very stiff, dark gray and light gray with sand and gravel		1			1.75		18.0				
			- yellowish brown and gray		2			2.5	95	29.0				
5					3			2.75	95	28.0				
			- reddish brown and light gray		4			3.25		22.0				
			- gray and light gray		5			0.75	91	28.0	74	19	55	73
10	9.1		- sand seam											
	▽		**SILTY SAND(SM)**, loose to medium dense, gray with shell		6					16.0				
					7		11			16.0				
15	4.1				8		8			20.0				66
			FAT CLAY(CH), very soft to soft to firm to stiff to very stiff, reddish brown and light gray with sand seams		9			0.75	77	41.0	111	12	99	88
			- light gray and yellowish brown with sand and gravel		10			1.0		28.0				
20			- dark gray with sand seams - yellowish brown and light gray with sand		11			0.5	105	20.0				
					12			0.625		43.0				
			- gray with sand seams and a trace of organics		13			0.687		35.0				
25			- dark gray with debris and trace of organics		14			0.437			53	14	39	44
			- gray and brown with sand seams		15			1.75		14.0				
			- gray sand with shell											
30			- gray with sand seams		16		5			34.0				
	-12.9													
			SILTY SAND(SM), very loose to loose, gray with clay seams		17		8			23.0				

SWG 1836 BOR PEGGY LAKE.GPJ TOLUNAY-WONG ENGINEERS.GDT 2/13/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B41

BORING LOG	DISTRICT: Galveston	INSTALLATION: Peggy Lake	SHEET 2 OF 2 SHEETS

1. PROJECT: HSCDMMP	7. ELEVATION OF HOLE: +19.10 ft
2. LOCATION (Coordinates or Station): Peggy Lake N=13837588.30 E=3215723.56	8. DATUM FOR ELEVATION:
3. DRILLING AGENCY: Kenall Inc.	9. ELEVATION OF GROUNDWATER: ▽ TOD: 8.02 ft ▼ 24-HR:
4. LABORATORY TESTING AGENCY: Kenall Inc.	10. DRILLING DATE and TIME: STARTED: 10/5/11 COMPLETED: 10/5/11
5. DEPTH OF WATER: ▽ TOD: 11.08 ft ▼ 24-HR:	11. CLASSIFICATION REFERENCE:
6. DEPTH OF HOLE: 60 ft	12. ENGINEER: Vivek Chikyala

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
				X	18		7			25.0				
				X	19		6			25.0				
				X	20		3			23.0				
40				X	21		3			22.0				
				X	22		5			24.0				
45				X	23		3							
				X	24		3			28.0				
				X	25		1			23.0				
50				X	26		0			26.0				
				X	27		2			23.0				
55				X	28		4			23.0				
				X	29		0							
	-40.9			X	30		0			23.0				
60														
65														

SWG 1836 BOR PEGGY LAKE.GPJ TOLUNAY-WONG ENGINEERS.GDT 2/13/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B42

BORING LOG	DISTRICT: Galveston	INSTALLATION: Peggy Lake	SHEET 1 OF 2 SHEETS

1. PROJECT: HSCDMMP	7. ELEVATION OF HOLE: +18.23 ft
2. LOCATION (Coordinates or Station): Peggy Lake N=13835312.73 E=3216338.98	8. DATUM FOR ELEVATION:
3. DRILLING AGENCY: Kenall Inc.	9. ELEVATION OF GROUNDWATER: ▽ TOD: 2.73 ft ▼ 24-HR:
4. LABORATORY TESTING AGENCY: Kenall Inc.	10. DRILLING DATE and TIME: STARTED: 10/4/11 COMPLETED: 10/5/11
5. DEPTH OF WATER: ▽ TOD: 15.5 ft ▼ 24-HR:	11. CLASSIFICATION REFERENCE:
6. DEPTH OF HOLE: 60 ft	12. ENGINEER: Vivek Chikyala

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
			FAT CLAY(CH), very stiff to hard, dark gray with sand and gravel		1			4.5		10.0				
			- reddish brown and dark gray with sand and gravel and plastic		2			4.5	111	10.0				
5			- dark gray and light gray with sand and gravel		3			4	90	52.0				
			- dark gray and yellowish brown		4			3.75		15.0				
			- dark gray and light gray											
			- dark gray and yellowish brown		5			2		23.0				
10	8.2		**SILTY SAND(SM)**, very loose to medium dense to dense, yellowish brown and light gray with shell		6					9.0				
					7		16			6.0				
15	▽		- gray with clay pockets		8		35			12.0				
					9		16			16.0				69
					10		22			17.0				
20					11		2			24.0				
	-3.8		**FAT CLAY(CH)**, very soft to stiff, dark gray with apparent hydrocarbon odour		12		3			85.0				
25					13			0.125			116	35	81	99
					14			0.125	50	87.0				
					15			0.125		71.0				
30			- gray - light gray and yellowish brown with sand and a trace of gravel		16			1.75	93	27.0	86	24	62	94
					17			1.75		31.0				

SWG 1836 BOR PEGGY LAKE.GPJ TOLUNAY-WONG ENGINEERS.GDT 2/13/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B42

BORING LOG	DISTRICT: Galveston	INSTALLATION: Peggy Lake	SHEET 2 OF 2 SHEETS

1. PROJECT: HSCDMMP	7. ELEVATION OF HOLE: +18.23 ft
2. LOCATION (Coordinates or Station): Peggy Lake N=13835312.73 E=3216338.98	8. DATUM FOR ELEVATION:
3. DRILLING AGENCY: Kenall Inc.	9. ELEVATION OF GROUNDWATER: ▽ TOD: 2.73 ft ▼ 24-HR:
4. LABORATORY TESTING AGENCY: Kenall Inc.	10. DRILLING DATE and TIME: STARTED: 10/4/11 COMPLETED: 10/5/11
5. DEPTH OF WATER: ▽ TOD: 15.5 ft ▼ 24-HR:	11. CLASSIFICATION REFERENCE:
6. DEPTH OF HOLE: 60 ft	12. ENGINEER: Vivek Chikyala

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
					18			1.5		34.0				
					19			1.25	96	25.0				
					20			1.0		30.0				
40	-22.8				21			1.0		16.0				
			LEAN CLAY(CL), firm to stiff, light gray with sand		22			0.5		19.0				
			- light gray and yellowish brown with sand and ferrous nodules		23			1.75	113	15.0	26	16	10	92
45	-29.8				24			2.0		17.0				
			FAT CLAY(CH), very stiff to hard, light gray and yellowish brown with sand		25			4.0		32.0				
50					26			3.0						
					27			4.25		15.0				
55			- with sand, gravel and calcareous deposits		28			4.5		18.0				
			- gravel and calcareous nodules		29			2.75		19.0				
	-41.8				30			3.5		22.0				
60														
65														

SWG 1836 BOR PEGGY LAKE.GPJ TOLUNAY-WONG ENGINEERS.GDT 2/13/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B43

BORING LOG	DISTRICT: Galveston	INSTALLATION: Peggy Lake	SHEET 1 OF 2 SHEETS
1. PROJECT: HSCDMMP		7. ELEVATION OF HOLE: +19.19 ft	
2. LOCATION (Coordinates or Station): Peggy Lake N=13833820.72 E=3218736.79		8. DATUM FOR ELEVATION:	
3. DRILLING AGENCY: Kenall Inc.		9. ELEVATION OF GROUNDWATER: ▽ TOD: 6.19 ft ▼ 24-HR:	
4. LABORATORY TESTING AGENCY: Kenall Inc.		10. DRILLING DATE and TIME: STARTED: 10/7/11 COMPLETED: 10/7/11	
5. DEPTH OF WATER: ▽ TOD: 13.0 ft ▼ 24-HR:		11. CLASSIFICATION REFERENCE:	
6. DEPTH OF HOLE: 60 ft		12. ENGINEER: Vivek Chikyala	

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
			SILTY SAND(SM), loose, light gray and brown with shell and clay pockets		1			0.75		8.0				
			- yellowish and light gray clay with sand upto 1'		2					8.0				
5					3		7			18.0				79
			- light gray with dark gray clay pockets and trace of tree roots		4		6			18.0				
	11.2		**CLAYEY SAND(SC)**, reddish brown and gray with brown and dark gray sand seams and shell		5			1.0	116	8.0	59	11	48	45
10	9.2		**SILTY SAND(SM)**, loose, light gray and brown with sand pockets		6					13.0				
	▽		- gray - brown		7		9			19.0				
15	4.2		- gray and dark gray		8		7			35.0				
			FAT CLAY(CH), firm to stiff, yellowish brown, reddish brown and gray with sand and gravel		9			1.5	94	29.0				
					10			1.25		21.0				
20					11			0.75			68	20	48	88
					12			0.75		29.0				
25					13			1.0	96	30.0				
			- dark gray with sand and ferrous nodules		14			1.75		24.0				
	-8.8		- dark gray and yellowish brown with sand											
			SILTY SAND(SM), very loose, light gray with shell and reddish brown clay pockets		15					19.0				
30			- gray											
	-12.3				16		2			51.0				
			FAT CLAY(CH), very soft, dark gray											
	-14.3		- gray with trace of organics		17			0.187		19.0				
	-15.8		**CLAYEY SAND(SC)**, light gray											

SWG 1836 BOR PEGGY LAKE.GPJ TOLUNAY-WONG ENGINEERS.GDT 2/13/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B43

BORING LOG	DISTRICT Galveston	INSTALLATION Peggy Lake	SHEET 2 OF 2 SHEETS

1. PROJECT HSCDMMP	7. ELEVATION OF HOLE +19.19 ft
2. LOCATION (Coordinates or Station) Peggy Lake N=13833820.72 E=3218736.79	8. DATUM FOR ELEVATION
3. DRILLING AGENCY Kenall Inc.	9. ELEVATION OF GROUNDWATER ▽ TOD: 6.19 ft ▼ 24-HR:
4. LABORATORY TESTING AGENCY Kenall Inc.	10. DRILLING DATE and TIME STARTED: 10/7/11 COMPLETED: 10/7/11
5. DEPTH OF WATER ▽ TOD: 13.0 ft ▼ 24-HR:	11. CLASSIFICATION REFERENCE
6. DEPTH OF HOLE 60 ft	12. ENGINEER Vivek Chikyala

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
			FAT CLAY(CH), stiff to very stiff to hard, light gray and reddish brown with sand and slickensided		18			2.25		28.0				
					19			2.25	93	29.0	63	23	40	95
			- light gray and yellowish brown with sand seams											
			- with sand and gravel		20			1.25		24.0				
40			- yellowish brown and light gray with vertical sand seams		21			2.25		14.0				
					22			2.25	116	15.0				
45			- with ferrous nodules and sand seams		23			4.0		17.0				
					24			2.5		13.0				
			- sand pockets		25			4.5		19.0				
50					26			3.25						
	-34.3				27			2.75		22.0				
			SILTY CLAY(CL-ML), very stiff, reddish brown and light gray with clay pockets											
55	-36.3				28		32			22.0				
			FAT CLAY(CH), very stiff to hard, reddish brown and light gray with gravel and slickensided		29			4.5	102	22.0				
			- with sand and slickensided											
			- with rock and slickensided		30			3.75		24.0				
60	-40.8													
65														

SWG 1836 BOR PEGGY LAKE.GPJ TOLUNAY-WONG ENGINEERS.GDT 2/13/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B44

BORING LOG	DISTRICT Galveston	INSTALLATION Peggy Lake	SHEET 1 OF 2 SHEETS
1. PROJECT HSCDMMP		7. ELEVATION OF HOLE +19.08 ft	
2. LOCATION (Coordinates or Station) Peggy Lake N=13835661.76 E=3218848.69		8. DATUM FOR ELEVATION	
3. DRILLING AGENCY Kenall Inc.		9. ELEVATION OF GROUNDWATER ▽ TOD: 1.08 ft ▼ 24-HR:	
4. LABORATORY TESTING AGENCY Kenall Inc.		10. DRILLING DATE and TIME STARTED: 10/11/11 COMPLETED: 10/11/11	
5. DEPTH OF WATER ▽ TOD: 18.0 ft ▼ 24-HR:		11. CLASSIFICATION REFERENCE	
6. DEPTH OF HOLE 60 ft		12. ENGINEER Vivek Chikyala	

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
			FAT CLAY(CH), firm to stiff to very stiff to hard, dark gray with sand and gravel		1			4.5	120	13.0				
			- yellowish brown, gray		2			2.75		32.0				
5					3			1.5	102	23.0				
					4			1.5	107	20.0	72	22	50	96
	10.1		- gray with vertical sand seams		5			0.75		20.0				
10			**SILTY SAND(SM)**, medium dense to very dense, light gray											
			- with sand pockets		6		24			9.0				
			- with reddish brown clay seams		7		80			18.0				
15					8					14.0				
	1.1		- light gray and dark gray		9		16			19.0				
	-0.4		**LEAN CLAY WITH SAND(CL)**, stiff, dark brown with trace of roots		10			1.0	108	12.0	42	17	25	83
20			**SILTY SAND(SM)**, loose to medium dense, light gray with shell		11		14			24.0				
	-3.9		**FAT CLAY(CH)**, very soft, dark gray with yellowish brown clay pockets		12		4			65.0				97
25	-6.4				13			0.25	66	55.0				
	-7.9		**CLAYEY SAND(SC)**, very loose, dark gray		14		3			25.0				
	-9.9		**FAT CLAY(CH)**, dark gray		15					45.0				
	-10.9		**CLAYEY SAND(SC)**, dark gray											
30			**SILTY SAND(SM)**, loose to medium dense, light gray		16		18			23.0				
	-13.9		**FAT CLAY(CH)**, very soft, dark gray with sand seams		17		7			27.0				

SWG 1836 BOR PEGGY LAKE.GPJ TOLUNAY-WONG ENGINEERS.GDT 2/13/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B44

BORING LOG	DISTRICT: Galveston	INSTALLATION: Peggy Lake	SHEET 2 OF 2 SHEETS

1. PROJECT: HSCDMMP	7. ELEVATION OF HOLE: +19.08 ft
2. LOCATION (Coordinates or Station): Peggy Lake N=13835661.76 E=3218848.69	8. DATUM FOR ELEVATION:
3. DRILLING AGENCY: Kenall Inc.	9. ELEVATION OF GROUNDWATER: ▽ TOD: 1.08 ft ▼ 24-HR:
4. LABORATORY TESTING AGENCY: Kenall Inc.	10. DRILLING DATE and TIME: STARTED: 10/11/11 COMPLETED: 10/11/11
5. DEPTH OF WATER: ▽ TOD: 18.0 ft ▼ 24-HR:	11. CLASSIFICATION REFERENCE:
6. DEPTH OF HOLE: 60 ft	12. ENGINEER: Vivek Chikyala

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
	-16.9			■	18			0.25	79	37.0				
			SANDY SILTY CLAY(CL-ML), very soft, gray	⊠	19					33.0	32	18	14	49
				⊠	20		0			26.0				
40				⊠	21		0			32.0				
				⊠	22		0			30.0				
45				⊠	23		4			36.0				
				■	24			0.125		26.0				
				⊠	25					47.0				
50				⊠	26		4			21.0				
	-34.9			⊠	27		2			24.0				
			SILTY SAND(SM), very loose to loose, gray	⊠	28		5			24.0				
55				⊠	29		3			26.0				
	-40.9			⊠	30		6			26.0				
60														
65														

SWG 1836 BOR PEGGY LAKE.GPJ TOLUNAY-WONG ENGINEERS.GDT 2/13/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B45

BORING LOG	DISTRICT Galveston	INSTALLATION Alexander	SHEET 1 OF 2 SHEETS

1. PROJECT HSCDMMP	7. ELEVATION OF HOLE +28.73 ft
2. LOCATION (Coordinates or Station) Alexander Island N=13832862.32 E=3226633.57	8. DATUM FOR ELEVATION
3. DRILLING AGENCY Kenall Inc.	9. ELEVATION OF GROUNDWATER ▽ TOD: 14.07 ft ▼ 24-HR:
4. LABORATORY TESTING AGENCY Kenall Inc.	10. DRILLING DATE and TIME STARTED: 11/9/11 COMPLETED: 11/9/11
5. DEPTH OF WATER ▽ TOD: 14.66 ft ▼ 24-HR:	11. CLASSIFICATION REFERENCE
6. DEPTH OF HOLE 60 ft	12. ENGINEER Vivek Chikyala

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
			SILTY SAND(SM), loose to medium dense, gray and tan		1		16			13.0				
	24.7				2		5			18.0				
5			**LEAN CLAY WITH SAND(CL)**, soft, light gray and yellowish brown with sand seams and organics		3					22.0				84
					4			0.5		14.0				
			- sand pockets		5			0.375	110	17.0	31	17	14	73
10					6			0.312	104	19.0				
					7			0.312		17.0				
	▽13.7				8			0.375		19.0				
15			**FAT CLAY(CH)**, soft, reddish brown and light gray with light gray sand seams and shells		9			0.375	100	29.0	56	22	34	
					10			0.375		27.0				
	8.7													
20			**SILTY SAND(SM)**, medium dense, gray and dark gray with clay pockets, organics and hydrocarbon odour		11		26			19.0				
	6.7		**FAT CLAY(CH)**, very soft to soft, dark gray with sand seams, trace of organics and apparent hydrocarbon odour		12		4			34.0				
25					13			0.375	61	69.0				
					14			0.375		54.0	126	41	85	69
					15			0.375		63.0				
30					16			0.5	77	44.0				
	-4.8				17			0.315	81	40.0				
			SILTY SAND(SM), medium dense to very dense, light gray with dark gray clay seams											

SWG 1836 BOR ALEXANDER.GPJ TOLUNAY-WONG ENGINEERS.GDT 2/9/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B45

BORING LOG	DISTRICT: Galveston	INSTALLATION: Alexander	SHEET 2 OF 2 SHEETS

1. PROJECT: HSCDMMP	7. ELEVATION OF HOLE: +28.73 ft
2. LOCATION (Coordinates or Station): Alexander Island N=13832862.32 E=3226633.57	8. DATUM FOR ELEVATION:
3. DRILLING AGENCY: Kenall Inc.	9. ELEVATION OF GROUNDWATER: ▽ TOD: 14.07 ft ▼ 24-HR:
4. LABORATORY TESTING AGENCY: Kenall Inc.	10. DRILLING DATE and TIME: STARTED: 11/9/11 COMPLETED: 11/9/11
5. DEPTH OF WATER: ▽ TOD: 14.66 ft ▼ 24-HR:	11. CLASSIFICATION REFERENCE:
6. DEPTH OF HOLE: 60 ft	12. ENGINEER: Vivek Chikyala

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
				X	18		14			37.0				
			- light gray with clay pockets	X	19		77			17.0				22
				X	20		18			21.0				
40	-12.3			X	21		10			50.0				
			FAT CLAY(CH), very soft, dark gray with organics and sand seams	■	22			0.187		36.0				
45	-17.3			■	23			0.315		38.0				
			CLAYEY SAND(SC), very loose to loose, gray with clay pockets	X	24					26.0				
				X	25		4			19.0				
50				X	26		2			22.0				
				X	27		4			21.0				
55				X	28		4			27.0				
				X	29		9			24.0				
	-31.3			X	30		4			24.0				
60														
65														

SWG 1836 BOR ALEXANDER.GPJ TOLUNAY-WONG ENGINEERS.GDT 2/9/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B46

BORING LOG	DISTRICT: Galveston	INSTALLATION: Alexander	SHEET 1 OF 2 SHEETS

1. PROJECT: HSCDMMP	7. ELEVATION OF HOLE: +24.24 ft
2. LOCATION (Coordinates or Station): Alexander Island N=13831380.02 E=3224944.38	8. DATUM FOR ELEVATION:
3. DRILLING AGENCY: Kenall Inc.	9. ELEVATION OF GROUNDWATER: ▽ TOD: 12.84 ft ▼ 24-HR:
4. LABORATORY TESTING AGENCY: Kenall Inc.	10. DRILLING DATE and TIME: STARTED: 11/8/11 COMPLETED: 11/8/11
5. DEPTH OF WATER: ▽ TOD: 11.4 ft ▼ 24-HR:	11. CLASSIFICATION REFERENCE:
6. DEPTH OF HOLE: 60 ft	12. ENGINEER: Vivek Chikyala

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
			SILTY SAND(SM), loose to medium dense, light gray with shell and gravel		1		23			15.0				
					2		20			9.0				18
5	19.2		**LEAN CLAY(CL)**, very soft to stiff, light gray and yellowish brown with sand seams and trace of organics		3		6			22.0				
					4			0.315		22.0				
			- redddish brown and light gray with gravel		5			1.5	111	17.0	46	16	30	73
10			- yellowish brown and gray with sand pockets and ferrous nodules		6			0.375		18.0				
	▽				7			0.315	111	17.0				
15	9.2		**SILTY SAND(SM)**, loose, light gray with shell and clay pockets		8			0.55		17.0				
					9					20.0				65
					10		4			21.0				
20	3.2		**ELASTIC SILT(MH)**, very soft, dark gray with sand pockets and ferrous nodules		11		4			49.0				
					12			0.315	76	46.0	79	44	35	
25			- dark gray with shell		13			0.315		51.0				
					14			0.25		51.0				
			- dark gray with apparent hydrocarbon odour		15			0.125			95	42	53	98
30					16			0.125		43.0				
					17			0.125	71	48.0				

SWG 1836 BOR ALEXANDER.GPJ TOLUNAY-WONG ENGINEERS.GDT 2/9/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B46

BORING LOG	DISTRICT: Galveston	INSTALLATION: Alexander	SHEET 2 OF 2 SHEETS

1. PROJECT: HSCDMMP	7. ELEVATION OF HOLE: +24.24 ft
2. LOCATION (Coordinates or Station): Alexander Island N=13831380.02 E=3224944.38	8. DATUM FOR ELEVATION:
3. DRILLING AGENCY: Kenall Inc.	9. ELEVATION OF GROUNDWATER: ▽ TOD: 12.84 ft ▼ 24-HR:
4. LABORATORY TESTING AGENCY: Kenall Inc.	10. DRILLING DATE and TIME: STARTED: 11/8/11 COMPLETED: 11/8/11
5. DEPTH OF WATER: ▽ TOD: 11.4 ft ▼ 24-HR:	11. CLASSIFICATION REFERENCE:
6. DEPTH OF HOLE: 60 ft	12. ENGINEER: Vivek Chikyala

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
					18			0.187		61.0				
					19			0.25		54.0				
					20			0.437		67.0				
40	-15.8		- gray with sand seams											
	-17.8		**SILTY SAND(SM)**, medium dense, light gray		21		18			28.0				
			SANDY LEAN CLAY(CL), very soft, gray with sand seams and apparent hydrocarbon odour		22		6		97	35.0				
45					23					32.0				
					24		5			42.0				
					25			0.375		46.0				
50					26			0.375		34.0				
	-27.8		**FAT CLAY(CH)**, firm, gray with light gray sand seams		27			1		36.0				
55					28		6			32.0				
					29		2							
			- with shell											
	-35.8				30		2			34.0				
60														
65														

SWG 1836 BOR ALEXANDER.GPJ TOLUNAY-WONG ENGINEERS.GDT 2/9/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B47

BORING LOG	DISTRICT: Galveston	INSTALLATION: Alexander	SHEET 1 OF 2 SHEETS

1. PROJECT: HSCDMMP	7. ELEVATION OF HOLE: +24.5 ft
2. LOCATION (Coordinates or Station): Alexander Island N=13826950.56 E=3226155.67	8. DATUM FOR ELEVATION:
3. DRILLING AGENCY: Kenall Inc.	9. ELEVATION OF GROUNDWATER: ▽ TOD: 14.34 ft ▼ 24-HR:
4. LABORATORY TESTING AGENCY: Kenall Inc.	10. DRILLING DATE and TIME: STARTED: 11/7/11 COMPLETED: 11/7/11
5. DEPTH OF WATER: ▽ TOD: 10.16 ft ▼ 24-HR:	11. CLASSIFICATION REFERENCE:
6. DEPTH OF HOLE: 60 ft	12. ENGINEER: Vivek Chikyala

DEPTH (ft)	ELEVATION (ft)	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
		SILTY SAND(SM), light gray with shell		1			4.5		6.0				
		- brown sandy clay		2					5.0				
	20.5												
5		**LEAN CLAY(CL)**, very soft to stiff to very stiff, light gray and yellowish brown with sand and ferrous nodules		3			2.5	112	20.0	49	24	25	
		- brown sand seams		4			0.56		23.0				
				5			1.5	99	32.0				
10 ▽		- reddish brown with gravel		6			1.5	99	28.0				
				7			0.5	111	18.0	46	21	25	78
15				8			0.187		22.0				
	8.5	- reddish brown and light gray with brown sand seams and shells											
		SILTY CLAY(CL-ML), very soft, gray with apparaent hydrocarbon odour		9					28.0				84
	5.0	- sand		10			0.25		58.0				
20		**ELASTIC SILT(MH)**, very soft, dark gray		11			0.25	66	48.0				
				12			0.25		23.0				
25				13			0.25			107	54	53	100
				14			0.25		31.0				
	-3.5	- light gray sand seams											
		FAT CLAY(CH), stiff to very stiff, reddish brown and light gray with brown and light gray sand seams		15			2.5		14.0				
30				16			1.75	107	18.0				
				17			1.25		21.0				
	-9.5												
		SILTY SAND(SM), gray with clay pockets											

SWG 1836 BOR ALEXANDER.GPJ TOLUNAY-WONG ENGINEERS.GDT 2/9/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B47

BORING LOG	DISTRICT: Galveston	INSTALLATION: Alexander	SHEET 2 OF 2 SHEETS

1. PROJECT: HSCDMMP	7. ELEVATION OF HOLE: +24.5 ft
2. LOCATION (Coordinates or Station): Alexander Island N=13826950.56 E=3226155.67	8. DATUM FOR ELEVATION:
3. DRILLING AGENCY: Kenall Inc.	9. ELEVATION OF GROUNDWATER: ▽ TOD: 14.34 ft ▼ 24-HR:
4. LABORATORY TESTING AGENCY: Kenall Inc.	10. DRILLING DATE and TIME: STARTED: 11/7/11 COMPLETED: 11/7/11
5. DEPTH OF WATER: ▽ TOD: 10.16 ft ▼ 24-HR:	11. CLASSIFICATION REFERENCE:
6. DEPTH OF HOLE: 60 ft	12. ENGINEER: Vivek Chikyala

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
			and shell	■	18					22.0				32
	-13.5			⊠	19		9			16.0				
			CLAYEY SAND(SC), very loose to loose, gray with clay pockets and shell	⊠	20		5			22.0				
40				⊠	21		3			18.0				
				⊠	22		5			18.0				
45				⊠	23		5			17.0				
				⊠	24					19.0				
				⊠	25		6			20.0				
50				⊠	26		3			16.0				
				⊠	27		1			20.0				
55				⊠	28		2							
				⊠	29		4			26.0				
	-35.5			⊠	30		2			23.0				
60														
65														

SWG 1836 BOR ALEXANDER.GPJ TOLUNAY-WONG ENGINEERS.GDT 2/9/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B48

BORING LOG	DISTRICT: Galveston	INSTALLATION: Alexander	SHEET 1 OF 2 SHEETS

1. PROJECT: HSCDMMP	7. ELEVATION OF HOLE: +29.92 ft
2. LOCATION (Coordinates or Station): Alexander Island N=13830591.44 E=3229758.91	8. DATUM FOR ELEVATION:
3. DRILLING AGENCY: Kenall Inc.	9. ELEVATION OF GROUNDWATER: ▽ TOD: 16.76 ft ▼ 24-HR:
4. LABORATORY TESTING AGENCY: Kenall Inc.	10. DRILLING DATE and TIME: STARTED: 11/9/11 COMPLETED: 11/9/11
5. DEPTH OF WATER: ▽ TOD: 13.16 ft ▼ 24-HR:	11. CLASSIFICATION REFERENCE:
6. DEPTH OF HOLE: 60 ft	12. ENGINEER: Vivek Chikyala

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
			SILTY SAND(SM), loose to medium dense, tan and light gray		1		27			13.0				
					2		15			12.0				33
5	24.9		**FAT CLAY(CH)**, firm, yellowish brown and light gray with sand		3		7			38.0				
					4			0.75		20.0				
	21.9		- gray sand seams below 7.5'											
			SILTY SAND(SM), gray		5					12.0				
10	19.9		**SANDY LEAN CLAY(CL)**, very soft, yellowish brown, bottom sand		6			0.437	109	18.0	39	16	23	73
	▽				7			0.375		18.0				
15					8					22.0				
	13.4		**SILTY SAND(SM)**, loose to medium dense, light gray with shell, clay pockets and hydrocarbon odour		9		10			38.0				
					10		14			27.0				71
20	8.4				11		4			23.0				
			FAT CLAY(CH), very soft to soft to firm, light gray with light gray sand seams		12			0.5	97	18.0				
25					13			0.375		24.0				
					14			0.5		25.0				
					15			0.375	84	28.0				
30			- dark gray with light gray sand seams		16		3			45.0				
					17			1	78	37.0	112	42	70	99

SWG 1836 BOR ALEXANDER.GPJ TOLUNAY-WONG ENGINEERS.GDT 2/9/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B48

BORING LOG	DISTRICT: Galveston	INSTALLATION: Alexander	SHEET 2 OF 2 SHEETS

1. PROJECT: HSCDMMP	7. ELEVATION OF HOLE: +29.92 ft
2. LOCATION (Coordinates or Station): Alexander Island N=13830591.44 E=3229758.91	8. DATUM FOR ELEVATION:
3. DRILLING AGENCY: Kenall Inc.	9. ELEVATION OF GROUNDWATER: ▽ TOD: 16.76 ft ▼ 24-HR:
4. LABORATORY TESTING AGENCY: Kenall Inc.	10. DRILLING DATE and TIME: STARTED: 11/9/11 COMPLETED: 11/9/11
5. DEPTH OF WATER: ▽ TOD: 13.16 ft ▼ 24-HR:	11. CLASSIFICATION REFERENCE:
6. DEPTH OF HOLE: 60 ft	12. ENGINEER: Vivek Chikyala

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
					18			0.5		51.0				
			- light gray sand		19			0.25		55.0				
					20		2			57.0				
40			- dark gray with organics and sand seams		21			0.25	91	29.0				
					22			0.25		33.0				
	-14.1													
45			**SILTY SAND(SM)**, medium dense, light gray with sand pockets and apparent hydrocarbon odour		23		24			35.0				
	-18.1				24		19			25.0				
			CLAYEY SAND(SC), very loose to loose to medium dense, light gray with clay pockets and apparent hydrocarbon odour		25		2			20.0				
50					26		10			22.0				
					27		14			24.0				
55					28		3			21.0				
					29		4			25.0				
	-30.1				30		4							
60														
65														

SWG 1836 BOR ALEXANDER.GPJ TOLUNAY-WONG ENGINEERS.GDT 2/9/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B49

BORING LOG	DISTRICT Galveston	INSTALLATION Spillman Island	SHEET 1 OF 2 SHEETS
1. PROJECT HSCDMMP		7. ELEVATION OF HOLE +33.7 ft	
2. LOCATION (Coordinates or Station) Spillman Island N=13823353.81 E=3233248.72		8. DATUM FOR ELEVATION	
3. DRILLING AGENCY Kenall Inc.		9. ELEVATION OF GROUNDWATER ▽ TOD: 3.54 ft ▼ 24-HR:	
4. LABORATORY TESTING AGENCY Kenall Inc.		10. DRILLING DATE and TIME STARTED: 9/29/11 COMPLETED: 9/30/11	
5. DEPTH OF WATER ▽ TOD: 30.16 ft ▼ 24-HR:		11. CLASSIFICATION REFERENCE	
6. DEPTH OF HOLE 60 ft		12. ENGINEER Vivek Chikyala	

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
			FAT CLAY WITH SAND(CH), very soft to firm to very stiff, reddish brown and light gray with brown sand deposits		1			0.75		18.0				
					2			3.75	110	13.0				
5					3			0.25	104	23.0	60	28	32	77
					4			0.25		20.0				
			- with shell											
	24.7				5			0.25		16.0				
10			**SILTY SAND(SM)**, loose, light gray with shell											
	22.7				6		8			19.0				
			FAT CLAY(CH), very soft to soft to firm to stiff to very stiff, yellowish brown and light gray with sand seams		7			2.5	111	17.0				
15			- with trace of gravel		8			0.75		24.0				
					9			0.25	75	45.0	85	37	48	
					10			0.75		21.0				
20					11			0.75		24.0	50	20	30	94
					12			0.5		22.0				
			- dark gray											
25					13			1.75	71	39.0				
					14			0.25		13.0				
	5.7		- gray with sand seams											
			SILTY SAND(SM), loose to medium dense, gray with shell		15					15.0				
30	▽													
					16		9			33.0				23
					17		20			35.0				

SWG 1836 BOR SPILLMAN.GPJ TOLUNAY-WONG ENGINEERS.GDT 2/10/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B49

BORING LOG	DISTRICT: Galveston	INSTALLATION: Spillman Island	SHEET 2 OF 2 SHEETS

1. PROJECT: HSCDMMP	7. ELEVATION OF HOLE: +33.7 ft
2. LOCATION (Coordinates or Station): Spillman Island N=13823353.81 E=3233248.72	8. DATUM FOR ELEVATION:
3. DRILLING AGENCY: Kenall Inc.	9. ELEVATION OF GROUNDWATER: ▽ TOD: 3.54 ft ▼ 24-HR:
4. LABORATORY TESTING AGENCY: Kenall Inc.	10. DRILLING DATE and TIME: STARTED: 9/29/11 COMPLETED: 9/30/11
5. DEPTH OF WATER: ▽ TOD: 30.16 ft ▼ 24-HR:	11. CLASSIFICATION REFERENCE:
6. DEPTH OF HOLE: 60 ft	12. ENGINEER: Vivek Chikyala

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
			- light and yellowish brown clay at 35'-35.5'	X	18		13			22.0				
				X	19		15			49.0				
	-5.8			X	20		12			58.0				
40			**FAT CLAY(CH)**, very soft, gray and dark gray with sand pockets	■	21			0.25		47.0				
	-7.8		**SILTY SAND(SM)**, very loose to loose to medium dense, gray with shell	X	22		4			25.0				
45				X	23		8			23.0				24
				X	24		3			25.0				
				X	25		15			22.0				
50				X	26		4							
				X	27		5			21.0				
55				X	28		3							
				X	29		14			20.0				
	-26.3			X	30		18			21.0				
60														
65														

SWG 1836 BOR SPILLMAN.GPJ TOLUNAY-WONG ENGINEERS.GDT 2/10/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B50

BORING LOG	DISTRICT: Galveston	INSTALLATION: Spillman Island	SHEET 1 OF 2 SHEETS
1. PROJECT: HSCDMMP		7. ELEVATION OF HOLE: +33.6 ft	
2. LOCATION (Coordinates or Station): Spillman Island N=13819835.66 E=3231476.32		8. DATUM FOR ELEVATION:	
3. DRILLING AGENCY: Kenall Inc.		9. ELEVATION OF GROUNDWATER: ▽ TOD: 17.6 ft ▼ 24-HR:	
4. LABORATORY TESTING AGENCY: Kenall Inc.		10. DRILLING DATE and TIME: STARTED: 9/29/11 COMPLETED: 9/29/11	
5. DEPTH OF WATER: ▽ TOD: 16.0 ft ▼ 24-HR:		11. CLASSIFICATION REFERENCE:	
6. DEPTH OF HOLE: 60 ft		12. ENGINEER: Vivek Chikyala	

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
			FAT CLAY(CH), firm to stiff to very stiff, reddish brown and light gray with sand and gravel		1			2.25	105	23.0				
			- yellowish brown with brown sand seams		2			1		15.0				
			- reddish brown and dark gray with brown sand seams		3			0.75		7.0				
5	28.6		- with sand and shell											
			SILTY SAND(SM), medium dense, light gray with shell		4		23			5.0				
					5		22			4.0				52
10					6		14			8.0				
	21.6		**FAT CLAY(CH)**, very soft to soft, light gray and yellowish brown with sand		7			0.5	104	22.0	52	22	30	82
			- sand seams		8			0.5		26.0				
15			- light gray sand with shell at 15'-16'		9			0.25		24.0				
					10			0.25	99	27.0				
20			- brown sand seams		11			0.25		23.0				
			- with trace of gravel and organics		12			0.5	101	23.0				
			- with shell											
25			- yellowish brown and dark gray with shell		13			0.5		31.0				
			- with trace of gravel and ferrous nodules		14			0.5	107	20.0				
					15			0.5		21.0				
30			- sand seam		16			0.25		19.0				
			- dark gray with apparent hydrocarbon odour		17			0.25			109	35	74	99

SWG 1836 BOR SPILLMAN.GPJ TOLUNAY-WONG ENGINEERS.GDT 2/10/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B50

BORING LOG	DISTRICT: Galveston	INSTALLATION: Spillman Island	SHEET 2 OF 2 SHEETS

1. PROJECT: HSCDMMP	7. ELEVATION OF HOLE: +33.6 ft
2. LOCATION (Coordinates or Station): Spillman Island N=13819835.66 E=3231476.32	8. DATUM FOR ELEVATION:
3. DRILLING AGENCY: Kenall Inc.	9. ELEVATION OF GROUNDWATER: ▽ TOD: 17.6 ft ▼ 24-HR:
4. LABORATORY TESTING AGENCY: Kenall Inc.	10. DRILLING DATE and TIME: STARTED: 9/29/11 COMPLETED: 9/29/11
5. DEPTH OF WATER: ▽ TOD: 16.0 ft ▼ 24-HR:	11. CLASSIFICATION REFERENCE:
6. DEPTH OF HOLE: 60 ft	12. ENGINEER: Vivek Chikyala

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
					18			0.25		41.0				
	-3.4				19			0.25		55.0				
			SILTY SAND(SM), very loose to medium dense, light gray											
					20		21			19.0				
40														
	-8.4		- dark gray clayey sand with apparent hydrocarbon odour		21		2			54.0				
			SANDY LEAN CLAY(CL), dark gray		22		2			64.0				
			(Marsh material)											
45					23		0		57	80.0	38	18	20	86
					24		0			36.0				
					25		2			28.0				
50	-17.4		- gray											
			FAT CLAY(CH), very stiff, light gray and yellowish brown with sand and slickensided		26		7			32.0				
					27			2.0		28.0				
			- reddish brown and light gray with ferrous nodules and a trace of gravel											
55			- slickensided		28			2.75		32.0				
					29			3.0						
					30			2.25		32.0				
60	-26.4		- 1/4 inch sand seam											
65														

SWG 1836 BOR SPILLMAN.GPJ TOLUNAY-WONG ENGINEERS.GDT 2/10/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B51

BORING LOG	DISTRICT: Galveston	INSTALLATION: Spillman Island	SHEET 1 OF 2 SHEETS

1. PROJECT: HSCDMMP	7. ELEVATION OF HOLE: +33.91 ft
2. LOCATION (Coordinates or Station): Spillman Island N=13819226.09 E=3235903.79	8. DATUM FOR ELEVATION:
3. DRILLING AGENCY: Kenall Inc.	9. ELEVATION OF GROUNDWATER: ▽ TOD: 12.66 ft ▼ 24-HR:
4. LABORATORY TESTING AGENCY: Kenall Inc.	10. DRILLING DATE and TIME: STARTED: 10/3/11 COMPLETED: 10/3/11
5. DEPTH OF WATER: ▽ TOD: 21.25 ft ▼ 24-HR:	11. CLASSIFICATION REFERENCE:
6. DEPTH OF HOLE: 60 ft	12. ENGINEER: Vivek Chikyala

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
			FAT CLAY(CH), very soft to soft to firm to very stiff, yellowish brown and light gray with sand and trace of gravel		1			4	111	14.0				
					2			3.75		17.0				
5			- dark gray with sand seams		3			0.25	83	29.0	72	30	42	97
			- yellowish brown and light gray with sand and trace of gravel		4			0.75	97	27.0				
					5			0.5		28.0				
10					6			0.5	99	24.0				
					7			1.25		24.0				
			- light gray sand seams											
15			- yellowish brown and light gray with sand and ferrous nodules		8			0.5	99	24.0				
					9			0.5		28.0				
					10			0.5	99	25.0	67	26	41	90
20	▽				11			0.25		25.0				
			- dark gray		12			0.25			68	22	46	88
25					13		0			56.0				
					14			0.25	88	31.0				
			- dark gray with brown sand seams											
			- dark gray with sand		15		0			43.0				
30					16		3			53.0				
					17		2			59.0				

SWG 1836 BOR SPILLMAN.GPJ TOLUNAY-WONG ENGINEERS.GDT 2/10/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B51

BORING LOG	DISTRICT: Galveston	INSTALLATION: Spillman Island	SHEET 2 OF 2 SHEETS

1. PROJECT: HSCDMMP	7. ELEVATION OF HOLE: +33.91 ft
2. LOCATION (Coordinates or Station): Spillman Island N=13819226.09 E=3235903.79	8. DATUM FOR ELEVATION:
3. DRILLING AGENCY: Kenall Inc.	9. ELEVATION OF GROUNDWATER: ▽ TOD: 12.66 ft ▼ 24-HR:
4. LABORATORY TESTING AGENCY: Kenall Inc.	10. DRILLING DATE and TIME: STARTED: 10/3/11 COMPLETED: 10/3/11
5. DEPTH OF WATER: ▽ TOD: 21.25 ft ▼ 24-HR:	11. CLASSIFICATION REFERENCE:
6. DEPTH OF HOLE: 60 ft	12. ENGINEER: Vivek Chikyala

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
				X	18		3			54.0				
				X	19		3			56.0				
				X	20		5			64.0	110	37	73	100
40	-7.1			X	21		16			36.0				
			SILTY SAND(SM), very loose to loose to medium dense, gray	X	22		4			30.0				
45			- with shell	X	23		2			29.0				
				X	24		2			25.0				
				X	25		0			25.0				
50	-17.1			X	26		10			28.0				84
			FAT CLAY(CH), very stiff, yellowish brown and light gray with sand and gravel	■	27			3.75		16.0				
			- reddish brown and light gray with sand seams and calcareous nodules	■	28			3.5		13.0				
55				■	29			2.75	102	24.0				
				■	30			3.25		21.0				
60	-26.1		- light gray with sand pockets											
65														

SWG 1836 BOR SPILLMAN.GPJ TOLUNAY-WONG ENGINEERS.GDT 2/10/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B52

BORING LOG	DISTRICT: Galveston	INSTALLATION: Spillman Island	SHEET 1 OF 2 SHEETS
1. PROJECT: HSCDMMP		7. ELEVATION OF HOLE: +34.25 ft	
2. LOCATION (Coordinates or Station): Spillman Island N=13819143.97 E=3240849.66		8. DATUM FOR ELEVATION:	
3. DRILLING AGENCY: Kenall Inc.		9. ELEVATION OF GROUNDWATER: ▽ TOD: 12.25 ft ▼ 24-HR:	
4. LABORATORY TESTING AGENCY: Kenall Inc.		10. DRILLING DATE and TIME: STARTED: 11/9/11 COMPLETED: 11/9/11	
5. DEPTH OF WATER: ▽ TOD: 22.0 ft ▼ 24-HR:		11. CLASSIFICATION REFERENCE:	
6. DEPTH OF HOLE: 60 ft		12. ENGINEER: Vivek Chikyala	

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
			SANDY FAT CLAY(CH), stiff to hard, reddish brown and light gray with brown sand seams and shell		1			1.75		5.0				
					2			4.5	116	10.0	50	14	36	61
	29.3				3			4.5		13.0				
5			**SILTY SAND(SM)**, loose to medium dense, light gray with shell and clay seams		4					8.0				52
					5		24			9.0				
10			- gray with shell		6		8			30.0				
			- dark gray with shell											
	21.3				7		7			27.0				
			FAT CLAY(CH), firm to stiff, yellowish brown and light gray with shell		8			1.5	108	20.0	62	18	44	81
15			- with sand and gravel		9			0.5		20.0				
					10			0.5	94	30.0				
20					11			0.5		18.0				
	▽12.3													
			SILTY SAND(SM), gray		12					21.0				
	10.3													
25			**FAT CLAY(CH)**, soft, yellowish brown and light gray with sand		13			0.25	96	28.0				
					14			0.5	96	27.0	50	16	34	85
	4.3				15		0			38.0				
30			**SILTY SAND(SM)**, loose to medium dense, gray		16		8			25.0				
	0.8				17		15			25.0				
	-0.8		**FAT CLAY(CH)**, dark gray											

SWG 1836 BOR SPILLMAN.GPJ TOLUNAY-WONG ENGINEERS.GDT 2/10/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B52

BORING LOG	DISTRICT: Galveston	INSTALLATION: Spillman Island	SHEET 2 OF 2 SHEETS

1. PROJECT: HSCDMMP	7. ELEVATION OF HOLE: +34.25 ft
2. LOCATION (Coordinates or Station): Spillman Island N=13819143.97 E=3240849.66	8. DATUM FOR ELEVATION:
3. DRILLING AGENCY: Kenall Inc.	9. ELEVATION OF GROUNDWATER: ▽ TOD: 12.25 ft ▼ 24-HR:
4. LABORATORY TESTING AGENCY: Kenall Inc.	10. DRILLING DATE and TIME: STARTED: 11/9/11 COMPLETED: 11/9/11
5. DEPTH OF WATER: ▽ TOD: 22.0 ft ▼ 24-HR:	11. CLASSIFICATION REFERENCE:
6. DEPTH OF HOLE: 60 ft	12. ENGINEER: Vivek Chikyala

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
			SILTY SAND(SM), very loose to loose to medium dense, gray		18		9			37.0				
			- dark gray clay at 37'-38'		19		9			42.0				
40					20		10			26.0				
					21		20			28.0				
					22		3			31.0				
45					23		7			30.0				
					24		3			25.0				
					25		0			30.0				
50	-16.8				26		8			30.0				
			FAT CLAY(CH), stiff to very stiff, light gray and yellowish brown with sand, gravel and ferrous nodules		27			1	90	33.0				
55					28			1.75		33.0				
			- sand pockets		29			2.75		28.0				
					30			2.25		24.0				
60	-25.8													
65														

SWG 1836 BOR SPILLMAN.GPJ TOLUNAY-WONG ENGINEERS.GDT 2/10/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B49A

BORING LOG	DISTRICT Galveston	INSTALLATION Spillman Island	SHEET 1 OF 2 SHEETS
1. PROJECT HSCDMMP		7. ELEVATION OF HOLE +33.14 ft	
2. LOCATION (Coordinates or Station) Spillman Island N=13822714.72 E=3231635.39		8. DATUM FOR ELEVATION	
3. DRILLING AGENCY Kenall Inc.		9. ELEVATION OF GROUNDWATER ▽ TOD: 17.14 ft ▼ 24-HR:	
4. LABORATORY TESTING AGENCY Kenall Inc.		10. DRILLING DATE and TIME STARTED: 12/14/11 COMPLETED: 12/14/11	
5. DEPTH OF WATER ▽ TOD: 16.0 ft ▼ 24-HR:		11. CLASSIFICATION REFERENCE	
6. DEPTH OF HOLE 60 ft		12. ENGINEER Vivek Chikyala	

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	TORVANE (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
			SANDY LEAN CLAY(CL), soft to stiff, reddish brown with calcareous nodules		1			2.0		112	18.0				
			- with large sand pockets		2			0.5			23.0				
	29.1														
	28.1		**SILTY CLAY(CL-ML)**, stiff, reddish brown with calcareous nodules		3			1.75			28.0				
5			**FAT CLAY(CH)**, soft to firm to stiff, light brown, light gray and reddish brown with calcareous nodules		4			0.75		102	23.0	59	20	39	92
			- ferrous stains		5			1.25			24.0				
10					6			0.75		100	24.0				
					7			1.25			23.0				
15					8			0.5			22.0				
	▽				9			0.25	0.125		24.0				
			- with sand seams		10			0.5			24.0				
20					11			0.25	0.187		31.0	66	27	39	86
					12			0.5			33.0				
25					13			0.75		98	29.0	52	22	30	84
					14			0.5			28.0				
					15			0.5		97	28.0				
30					16			0.75			26.0				
					17			0.75			22.0				

SWG 1836 BOR SPILLMAN.GPJ TOLUNAY-WONG ENGINEERS.GDT 3/6/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B49A

BORING LOG	DISTRICT: Galveston	INSTALLATION: Spillman Island	SHEET 2 OF 2 SHEETS

1. PROJECT: HSCDMMP	7. ELEVATION OF HOLE: +33.14 ft
2. LOCATION (Coordinates or Station): Spillman Island N=13822714.72 E=3231635.39	8. DATUM FOR ELEVATION:
3. DRILLING AGENCY: Kenall Inc.	9. ELEVATION OF GROUNDWATER: ▽ TOD: 17.14 ft ▼ 24-HR:
4. LABORATORY TESTING AGENCY: Kenall Inc.	10. DRILLING DATE and TIME: STARTED: 12/14/11 COMPLETED: 12/14/11
5. DEPTH OF WATER: ▽ TOD: 16.0 ft ▼ 24-HR:	11. CLASSIFICATION REFERENCE:
6. DEPTH OF HOLE: 60 ft	12. ENGINEER: Vivek Chikyala

DEPTH (ft)	ELEVATION (ft)	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	TORVANE (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
	-2.9			18			0.75		97	25.0				
		SANDY LEAN CLAY(CL), soft, black, light gray and light brown with sand seams and with hydrocarbon odour		19			0.5			49.0				
		- 4 inch silty sand with shell		20			0.25	0.25		29.0				
40	-6.9	**FAT CLAY(CH)**, dark gray with hydrocarbon odour		21		8				50.0				
	-9.9			22			0.5			24.0				
		SILTY SAND(SM), loose, dark gray with shell and hydrocarbon odour		23		5				25.0				
45		- with clay seams		24		5				20.0				
	-15.4			25		7				29.0				
		SANDY LEAN CLAY(CL), soft, dark gray with sand seams		26			0.5			20.0				
50		- with sand pockets and shell		27		6				32.0				
55				28		8				31.0				
				29		6				29.0				
	-26.9			30		14				34.0				
60														
65														

SWG 1836 BOR SPILLMAN.GPJ TOLUNAY-WONG ENGINEERS.GDT 3/6/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B50A

BORING LOG	DISTRICT Galveston	INSTALLATION Spillman Island	SHEET 1 OF 2 SHEETS
1. PROJECT HSCDMMP		7. ELEVATION OF HOLE +33.54 ft	
2. LOCATION (Coordinates or Station) Spillman Island N=13817396.43 E=3232808.41		8. DATUM FOR ELEVATION	
3. DRILLING AGENCY Kenall Inc.		9. ELEVATION OF GROUNDWATER ▽ TOD: 8.54 ft ▼ 24-HR:	
4. LABORATORY TESTING AGENCY Kenall Inc.		10. DRILLING DATE and TIME STARTED: 12/14/11 COMPLETED: 12/14/11	
5. DEPTH OF WATER ▽ TOD: 25.0 ft ▼ 24-HR:		11. CLASSIFICATION REFERENCE	
6. DEPTH OF HOLE 60 ft		12. ENGINEER Vivek Chikyala	

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	TORVANE (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
	31.5		**SANDY LEAN CLAY(CL)**, stiff, light brown and light gray with sand seams		1			2.0		98	24.0				
			FAT CLAY(CH), soft to firm to stiff to very stiff, light brown and light gray with sand and ferrous nodules and large rocks		2			1.75		94	29.0	60	23	37	92
5			- reddish brown with calcareous nodules		3			2.25			26.0				
			- with sand pockets		4			1.75		100	25.0	58	27	31	91
					5			0.5		104	18.0				
10			- light gray silty sand												
			- dark gray		6		7				31.0				
					7			1.25			35.0				
15			- with ferrous stains and sand pockets		8			1.75		104	21.0				
					9			0.5			26.0				
					10			1.5			30.0	68	27	41	96
20					11			0.75			29.0				
					12			1.25			27.0				
25	▽		- reddish brown and dark gray with sand and shell seam		13			1.5			17.0				
			- with calcareous nodules		14			1.25			26.0				
					15			0.75			25.0				
30			- reddish brown with sand pockets and calcareous nodules		16			0.5			23.0				
					17			0.75			24.0				

SWG 1836 BOR SPILLMAN.GPJ TOLUNAY-WONG ENGINEERS.GDT 3/6/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B50A

BORING LOG	DISTRICT: Galveston	INSTALLATION: Spillman Island	SHEET 2 OF 2 SHEETS
1. PROJECT: HSCDMMP		7. ELEVATION OF HOLE: +33.54 ft	
2. LOCATION (Coordinates or Station): Spillman Island N=13817396.43 E=3232808.41		8. DATUM FOR ELEVATION:	
3. DRILLING AGENCY: Kenall Inc.		9. ELEVATION OF GROUNDWATER: ▽ TOD: 8.54 ft ▼ 24-HR:	
4. LABORATORY TESTING AGENCY: Kenall Inc.		10. DRILLING DATE and TIME: STARTED: 12/14/11 COMPLETED: 12/14/11	
5. DEPTH OF WATER: ▽ TOD: 25.0 ft ▼ 24-HR:		11. CLASSIFICATION REFERENCE:	
6. DEPTH OF HOLE: 60 ft		12. ENGINEER: Vivek Chikyala	

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	TORVANE (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
					18			0.75			27.0				
					19			0.5			27.0				
			- black with calcareous nodules and ferrous stains		20			0.25	0.125		40.0				
40			- black with sand seams		21			0.5			40.0				
	-8.5		**SANDY LEAN CLAY(CL)**, stiff to very stiff to hard, light brown and light gray with calcareous nodules and ferrous stains		22			2.0			17.0				
45					23			4.25			13.0				
			- reddish brown		24			2.0			17.0				
					25			1.75			14.0				
50			- silty sand												
					26		49				22.0				
					27			4.5+			25.0				
	-20.5		**FAT CLAY(CH)**, very stiff to hard, reddish brown and light gray with calcareous nodules and ferrous stains												
55					28		37				18.0				
					29			3.5			21.0				
					30			4.25			13.0				
60	-26.5														
65															

SWG 1836 BOR SPILLMAN.GPJ TOLUNAY-WONG ENGINEERS.GDT 3/6/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B53

BORING LOG	DISTRICT Galveston	INSTALLATION PA 15	SHEET 1 OF 2 SHEETS

1. PROJECT HSCDMMP	7. ELEVATION OF HOLE +22.78 ft
2. LOCATION (Coordinates or Station) PA 15 N=13804775.31 E=3253870.95	8. DATUM FOR ELEVATION
3. DRILLING AGENCY Kenall Inc.	9. ELEVATION OF GROUNDWATER ▽ TOD: 4.95 ft ▼ 24-HR:
4. LABORATORY TESTING AGENCY Kenall Inc.	10. DRILLING DATE and TIME STARTED: 11/21/11 COMPLETED: 11/21/11
5. DEPTH OF WATER ▽ TOD: 17.83 ft ▼ 24-HR:	11. CLASSIFICATION REFERENCE
6. DEPTH OF HOLE 60 ft	12. ENGINEER Vivek Chikyala

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
			SILTY SAND(SM), medium dense, brown with brown and light gray clay seams		1			1.5		19.0				
					2					6.0				
5					3		18			11.0				35
	15.8		**LEAN CLAY WITH SAND(CL)**, soft to firm to very stiff, gray with sand		4		26			22.0				
					5		15			25.0				
10					6			2.5	107	20.0	38	15	23	
			- with sand pockets and shell		7			0.75	97	27.0	41	24	17	73
15			- brown		8			0.5		22.0				
			- gray and brown with sand and shell											
			- yellowish brown with sand pockets		9			<0.25	115	16.0				
	3.8		- brown and gray with sand pockets		10			<0.25		41.0				
20			**SILTY SAND(SM)**, medium dense to dense, gray with shell		11		37			20.0				22
	-1.2				12		23			21.0				
25			**FAT CLAY(CH)**, soft, gray with sand and trace of organic roots		13		2			69.0				
					14			<0.25	65	58.0				
	-5.2		- brown silty clay											
			SILTY SAND(SM), very loose, brown		15					25.0				33
30					16		3			58.0				
	-9.2													
	-10.2		**SILTY CLAY(CL-ML)**, brown											
			FAT CLAY(CH), very soft, reddish brown		17		7			52.0				

SWG 1836 BOR PA 15.GPJ TOLUNAY-WONG ENGINEERS.GDT 2/16/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B53

BORING LOG	DISTRICT: Galveston	INSTALLATION: PA 15	SHEET 2 OF 2 SHEETS

1. PROJECT: HSCDMMP	7. ELEVATION OF HOLE: +22.78 ft
2. LOCATION (Coordinates or Station): PA 15 N=13804775.31 E=3253870.95	8. DATUM FOR ELEVATION:
3. DRILLING AGENCY: Kenall Inc.	9. ELEVATION OF GROUNDWATER: ▽ TOD: 4.95 ft ▼ 24-HR:
4. LABORATORY TESTING AGENCY: Kenall Inc.	10. DRILLING DATE and TIME: STARTED: 11/21/11 COMPLETED: 11/21/11
5. DEPTH OF WATER: ▽ TOD: 17.83 ft ▼ 24-HR:	11. CLASSIFICATION REFERENCE:
6. DEPTH OF HOLE: 60 ft	12. ENGINEER: Vivek Chikyala

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
	-12.7		- gray with sand		18			<0.25	86	31.0				
			CLAYEY SAND(SC), very loose to loose, gray with shell		19		4			25.0				
					20		7			24.0				
40					21		5			26.0				
					22		7			26.0				
45					23		1							
					24		9			27.0				
					25		7			28.0				
50					26		7			40.0				
	-29.2		**SANDY LEAN CLAY(CL)**, soft, gray with sand		27			<0.25	103	25.0	39	16	23	63
55					28			<0.25		25.0				
					29			<0.25	102	24.0				
					30			<0.25						
60	-37.2													
65														

SWG 1836 BOR PA 15.GPJ TOLUNAY-WONG ENGINEERS.GDT 2/16/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B54

BORING LOG	DISTRICT: Galveston	INSTALLATION: PA 15	SHEET 1 OF 2 SHEETS

1. PROJECT: HSCDMMP	7. ELEVATION OF HOLE: +22.85 ft
2. LOCATION (Coordinates or Station): PA 15 N=13806621.52 E=3250883.25	8. DATUM FOR ELEVATION:
3. DRILLING AGENCY: Kenall Inc.	9. ELEVATION OF GROUNDWATER: ▽ TOD: 7.85 ft ▼ 24-HR:
4. LABORATORY TESTING AGENCY: Kenall Inc.	10. DRILLING DATE and TIME: STARTED: 11/23/11 COMPLETED: 11/23/11
5. DEPTH OF WATER: ▽ TOD: 15.0 ft ▼ 24-HR:	11. CLASSIFICATION REFERENCE:
6. DEPTH OF HOLE: 60 ft	12. ENGINEER: Vivek Chikyala

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
			SILTY SAND(SM), medium dense, brown with clay pockets		1		15			10.0				
					2		11			18.0				
5	17.9		**CLAYEY SAND(SC)**, medium dense, gray		3		29			12.0				
	15.4		**SILTY SAND(SM)**, medium dense to dense, gray with clay pockets		4		20				N/P	N/P	NP	38
					5					12.0				
10					6		41			13.0				
					7		35			13.0				
15 ▽	6.9		- brown		8		15			20.0				
			SANDY LEAN CLAY(CL), very soft to soft, yellowish brown and light gray with sand pockets, roots and shell		9			<0.25	106	24.0	43	15	28	66
					10			<0.25		28.0				
20	1.9		**SANDY SILT(ML)**, loose to medium dense, gray with clay seams		11		16			29.0				
					12		5			26.0				62
25	-3.2		- with clay pockets - gray clayey sand to sandy clay		13		4			33.0				
			FAT CLAY(CH), stiff, dark gray with sand		14			1.0	90	35.0				
			- reddish brown with sand pockets and shell		15			2.0			65	24	41	86
30	-8.7				16		11			24.0				
			SILTY SAND(SM), loose to medium dense, gray with shell		17		6			47.0				
	-11.2		**SILTY CLAY(CL-ML)**, gray with sand											

SWG 1836 BOR PA 15.GPJ TOLUNAY-WONG ENGINEERS.GDT 2/16/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B54

BORING LOG	DISTRICT: Galveston	INSTALLATION: PA 15	SHEET 2 OF 2 SHEETS

1. PROJECT: HSCDMMP	7. ELEVATION OF HOLE: +22.85 ft
2. LOCATION (Coordinates or Station): PA 15 N=13806621.52 E=3250883.25	8. DATUM FOR ELEVATION:
3. DRILLING AGENCY: Kenall Inc.	9. ELEVATION OF GROUNDWATER: ▽ TOD: 7.85 ft ▼ 24-HR:
4. LABORATORY TESTING AGENCY: Kenall Inc.	10. DRILLING DATE and TIME: STARTED: 11/23/11 COMPLETED: 11/23/11
5. DEPTH OF WATER: ▽ TOD: 15.0 ft ▼ 24-HR:	11. CLASSIFICATION REFERENCE:
6. DEPTH OF HOLE: 60 ft	12. ENGINEER: Vivek Chikyala

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
	-13.2			X	18		7			41.0				
			CLAYEY SAND(SC), gray with shell	■	19					23.0				18
	-15.2		**SILTY SAND(SM)**, very loose to loose, gray with shell	X	20		3			30.0				
40				X	21		2			27.0				
				X	22		2			24.0				
45				X	23		2			25.0				
				X	24		5			24.0				
	-25.2		**CLAYEY SAND(SC)**, loose, gray with shell	X	25		5							
50				■	26			<0.25		19.0				
			- very soft, gray clayey sand to sandy clay with shell	X	27		4			22.0				
55				X	28		5							
				X	29		5			24.0				
	-37.2			X	30		4							
60														
65														

SWG 1836 BOR PA 15.GPJ TOLUNAY-WONG ENGINEERS.GDT 2/16/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B55

BORING LOG	DISTRICT: Galveston	INSTALLATION: PA 15	SHEET 1 OF 2 SHEETS
1. PROJECT: HSCDMMP		7. ELEVATION OF HOLE: +23.35 ft	
2. LOCATION (Coordinates or Station): PA 15 N=13802172.29 E=3251775.14		8. DATUM FOR ELEVATION:	
3. DRILLING AGENCY: Kenall Inc.		9. ELEVATION OF GROUNDWATER: ▽ TOD: 1.35 ft ▼ 24-HR:	
4. LABORATORY TESTING AGENCY: Kenall Inc.		10. DRILLING DATE and TIME: STARTED: 11/23/11 COMPLETED: 11/23/11	
5. DEPTH OF WATER: ▽ TOD: 22.0 ft ▼ 24-HR:		11. CLASSIFICATION REFERENCE:	
6. DEPTH OF HOLE: 60 ft		12. ENGINEER: Vivek Chikyala	

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
			SANDY LEAN CLAY(CL), soft to stiff to very stiff, brown with sand seams		1		21			27.0				
			- with organics and sand pockets		2			2.5	119	14.0				58
5					3		7			13.0				
			- shale - brown and gray with sand pockets and a trace of gravel		4			1.5		12.0				
					5			<0.25	106	28.0				
10	13.4		**CLAYEY SAND(SC)**, medium dense, tan and brown with clay pockets and trace of organics		6			<0.25	110	20.0	34	13	21	32
	9.4				7		18			17.0				
15			**LEAN CLAY(CL)**, soft to stiff to very stiff, light gray and brown with sand pockets and gravel		8			2.75		20.0				
			- light gray and reddish brown with sand seams and gravel		9			1.0	107	24.0				
					10			<0.25		27.0				
20	3.4		**CLAYEY SAND(SC)**, light gray and brown with clay pockets		11				112	20.0				
	▽ 1.4		**SANDY LEAN CLAY(CL)**, gray with sand		12		8			23.0				
			- light gray sand seam		13		20			29.0				
25	-2.7		**SILTY SAND(SM)**, medium dense, gray with clay pockets and shell - gravel seam		14		16			21.0				
	-6.7				15		10			14.0				21
30			**SANDY LEAN CLAY(CL)**, very soft, gray with sand seams and shell		16		6			38.0				
					17			<0.25		25.0	32	17	15	50

SWG 1836 BOR PA 15.GPJ TOLUNAY-WONG ENGINEERS.GDT 2/16/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B55

BORING LOG	DISTRICT Galveston	INSTALLATION PA 15	SHEET 2 OF 2 SHEETS

1. PROJECT HSCDMMP	7. ELEVATION OF HOLE +23.35 ft
2. LOCATION (Coordinates or Station) PA 15 N=13802172.29 E=3251775.14	8. DATUM FOR ELEVATION
3. DRILLING AGENCY Kenall Inc.	9. ELEVATION OF GROUNDWATER ▽ TOD: 1.35 ft ▼ 24-HR:
4. LABORATORY TESTING AGENCY Kenall Inc.	10. DRILLING DATE and TIME STARTED: 11/23/11 COMPLETED: 11/23/11
5. DEPTH OF WATER ▽ TOD: 22.0 ft ▼ 24-HR:	11. CLASSIFICATION REFERENCE
6. DEPTH OF HOLE 60 ft	12. ENGINEER Vivek Chikyala

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
				X	18		4			33.0				
	-13.7			■	19			<0.25	107	21.0				
			CLAYEY SAND(SC), very loose to loose, gray with shell	X	20		5			28.0				
40	-18.7			X	21		3			27.0				
			FAT CLAY(CH), soft to stiff to very stiff, gray and reddish brown with sand and sand pockets	X	22		8			37.0				
45				■	23			<0.25	79	44.0				
				■	24			<0.25		40.0				
				■	25			1.75		27.0				
50			- light gray with ferrous nodules	■	26			1.75	95	30.0	81	23	58	
			- light gray with calcareous nodules and shell	■	27			3.25		21.0				
55				■	28			2.5		28.0				
				■	29			3.0		22.0				
	-36.7			■	30			3.75		19.0				
60														
65														

SWG 1836 BOR PA 15.GPJ TOLUNAY-WONG ENGINEERS.GDT 2/16/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B56

BORING LOG	DISTRICT: Galveston	INSTALLATION: PA 15	SHEET 1 OF 2 SHEETS
1. PROJECT: HSCDMMP		7. ELEVATION OF HOLE: +22.96 ft	
2. LOCATION (Coordinates or Station): PA 15 N=13800957.00 E=3255012.54		8. DATUM FOR ELEVATION:	
3. DRILLING AGENCY: Kenall Inc.		9. ELEVATION OF GROUNDWATER: ▽ TOD: -0.04 ft ▼ 24-HR:	
4. LABORATORY TESTING AGENCY: Kenall Inc.		10. DRILLING DATE and TIME: STARTED: 11/18/11 COMPLETED: 11/18/11	
5. DEPTH OF WATER: ▽ TOD: 23 ft ▼ 24-HR:		11. CLASSIFICATION REFERENCE:	
6. DEPTH OF HOLE: 60 ft		12. ENGINEER: Vivek Chikyala	

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
			SILTY SAND(SM), medium dense to dense, gray and brown with clay pockets		1		30			13.0				
					2					10.0				
5					3		43			13.0				30
					4		14			16.0				
	15.0		**CLAYEY SAND(SC)**, loose, gray and brown with clay pockets		5		9			15.0				
10					6		10			18.0				
	11.0		**SANDY FAT CLAY(CH)**, soft to stiff, gray with sand pockets		7		4			47.0				
15					8			<0.25	89	33.0				
			- yellowish brown and light gray with sand pockets and shell		9			1.75	105	26.0				
			- sand seams		10			0.5			50	19	31	63
20					11			<0.25		20.0				
	1.0		- brown sand seam											
	▽		**FAT CLAY(CH)**, soft, gray with sand		12		2			52.0				
25			- gray with sand seams and pockets		13			<0.25	77	41.0				91
	-3.0		**CLAYEY SAND(SC)**, gray with clay pockets and shell		14					28.0				
	-5.0		**SANDY SILT(ML)**, brown with clay pockets		15		15			29.0				
30	-7.0		**SILTY CLAY(CL-ML)**, very soft, brown with clay pockets		16		2			24.0				
			- gray clay with sand		17		4			35.0				
			- gray and brown with sand pockets and											

SWG 1836 BOR PA 15.GPJ TOLUNAY-WONG ENGINEERS.GDT 2/16/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B56

BORING LOG	DISTRICT: Galveston	INSTALLATION: PA 15	SHEET 2 OF 2 SHEETS

1. PROJECT: HSCDMMP	7. ELEVATION OF HOLE: +22.96 ft
2. LOCATION (Coordinates or Station): PA 15 N=13800957.00 E=3255012.54	8. DATUM FOR ELEVATION:
3. DRILLING AGENCY: Kenall Inc.	9. ELEVATION OF GROUNDWATER: ▽ TOD: -0.04 ft ▼ 24-HR:
4. LABORATORY TESTING AGENCY: Kenall Inc.	10. DRILLING DATE and TIME: STARTED: 11/18/11 COMPLETED: 11/18/11
5. DEPTH OF WATER: ▽ TOD: 23 ft ▼ 24-HR:	11. CLASSIFICATION REFERENCE:
6. DEPTH OF HOLE: 60 ft	12. ENGINEER: Vivek Chikyala

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
	-13.0		seams		18			<0.25	69	62.0	29	22	7	
			CLAYEY SAND(SC), very loose, gray with clay pockets and shell		19		2			27.0				
					20		2			28.0				
40					21		3			28.0				
					22			<0.25	101	27.0				
	-22.0				23			<0.25		35.0				
45			**FAT CLAY(CH)**, firm to stiff to very stiff, light gray and yellowish brown with sand pockets and gravel		24					35.0				
			- ferrous nodules		25			1.25	104	23.0	51	17	34	
50					26			0.75		25.0				
			- sand seams											
			- reddish brown		27			2.75		25.0				
55			- with slickensided		28			3.75		31.0				
			- yellowish brown and light gray with sand pockets		29			3.0		27.0				
					30			3.25		19.0				
	-37.0													
60														
65														

SWG 1836 BOR PA 15.GPJ TOLUNAY-WONG ENGINEERS.GDT 2/16/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B57

BORING LOG	DISTRICT Galveston	INSTALLATION PA 14	SHEET 1 OF 2 SHEETS
1. PROJECT HSCDMMP		7. ELEVATION OF HOLE +22.88 ft	
2. LOCATION (Coordinates or Station) PA 14 N=13798136.94 E=3254863.99		8. DATUM FOR ELEVATION	
3. DRILLING AGENCY Kenall Inc.		9. ELEVATION OF GROUNDWATER ▽ TOD: N/A ft ▼ 24-HR:	
4. LABORATORY TESTING AGENCY Kenall Inc.		10. DRILLING DATE and TIME STARTED: 11/16/11 COMPLETED: 11/16/11	
5. DEPTH OF WATER ▽ TOD: N/A ft ▼ 24-HR:		11. CLASSIFICATION REFERENCE	
6. DEPTH OF HOLE 60 ft		12. ENGINEER Vivek Chikyala	

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
			SANDY LEAN CLAY(CL), very stiff, reddish brown with brown sand seams		1			2.75		11.0				50
	19.4				2		10			14.0				
5			**FAT CLAY(CH)**, very soft to soft, reddish brown with sand and shell - gray		3			0.25	105	20.0	52	19	33	
			- gray sand seam		4			0.1875		19.0				
			- gray with sand seams and shell		5			0.1875		24.0				
10	12.4		- sand pockets		6			0.1875		27.0	45	18	27	84
			LEAN CLAY WITH SAND(CL), very soft to soft, yellowish brown and light gray with sand pockets		7			0.25		41.0				
15			- shell		8			0.25	94	25.0				
			- silty sand seams and roots		9			0.25		15.0				
	2.9		- gray with shell and silty sand seams		10		3			32.0				
20			**FAT CLAY(CH)**, very soft, reddish brown with sand seams		11			0.25	91	29.0	66	25	41	80
					12			0.25		40.0				
25			- sand pockets, seams and shell		13			0.25	90	34.0				
					14			0.25		38.0				
					15			0.25	88	36.0				
30					16			0.75		35.0				
			- roots		17			0.25		27.0				

SWG 1836 BOR PA 14.GPJ TOLUNAY-WONG ENGINEERS.GDT 2/15/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B57

BORING LOG	DISTRICT: Galveston	INSTALLATION: PA 14	SHEET 2 OF 2 SHEETS

1. PROJECT: HSCDMMP	7. ELEVATION OF HOLE: +22.88 ft
2. LOCATION (Coordinates or Station): PA 14 N=13798136.94 E=3254863.99	8. DATUM FOR ELEVATION:
3. DRILLING AGENCY: Kenall Inc.	9. ELEVATION OF GROUNDWATER: ▽ TOD: N/A ft ▼ 24-HR:
4. LABORATORY TESTING AGENCY: Kenall Inc.	10. DRILLING DATE and TIME: STARTED: 11/16/11 COMPLETED: 11/16/11
5. DEPTH OF WATER: ▽ TOD: N/A ft ▼ 24-HR:	11. CLASSIFICATION REFERENCE:
6. DEPTH OF HOLE: 60 ft	12. ENGINEER: Vivek Chikyala

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
	-13.1		- gray with sand seams		18			0.25		54.0				
			CLAYEY SAND(SC), very loose, gray with shell and clay seams		19		2			29.0				71
	-17.1				20		3			38.0				
40			**FAT CLAY(CH)**, firm to stiff to very stiff, light gray and reddish brown with sand pockets and ferrous nodules		21			2.25	94	29.0				
			- with sand		22			2.75		27.0				
45					23			1.75		27.0				
			- trace of shell		24			3.0		27.0				
	-27.1		- with sand and silt pockets and shell		25			0.5		20.0				
50			**SILTY CLAY(CL-ML)**, soft, yellowish brown and light gray		26			0.5		16.0				
	-29.1		**SILTY SAND(SM)**, dense to very dense, yellowish brown and light gray with clay pockets		27					21.0				
55					28		46							
					29		69			22.0				
	-37.1				30		71							
60														
65														

SWG 1836 BOR PA 14.GPJ TOLUNAY-WONG ENGINEERS.GDT 2/15/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B58

BORING LOG	DISTRICT: Galveston	INSTALLATION: PA 14	SHEET 1 OF 2 SHEETS

1. PROJECT: HSCDMMP	7. ELEVATION OF HOLE: +23.28 ft
2. LOCATION (Coordinates or Station): PA 14 N=13795466.53 E=3254039.05	8. DATUM FOR ELEVATION:
3. DRILLING AGENCY: Kenall Inc.	9. ELEVATION OF GROUNDWATER: ▽ TOD: 2.28 ft ▼ 24-HR:
4. LABORATORY TESTING AGENCY: Kenall Inc.	10. DRILLING DATE and TIME: STARTED: 11/16/11 COMPLETED: 11/16/11
5. DEPTH OF WATER: ▽ TOD: 21.0 ft ▼ 24-HR:	11. CLASSIFICATION REFERENCE:
6. DEPTH OF HOLE: 60 ft	12. ENGINEER: Vivek Chikyala

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
			FAT CLAY(CH), soft to stiff to hard, reddish brown clay with trace of sand and gravel		1			4.25	103	27.0				
					2			1.25	96	27.0	67	22	45	89
5					3			1.0		31.0				
			- with sand and shell		4			0.25	85	38.0				
					5			0.3125		40.0				
10					6			0.25		34.0				
			- with trace of organics - gray with sand and shell		7			0.25	74	48.0	92	30	62	88
15					8			0.25		30.0				
					9			0.25	95	27.0				
					10			1.25	79	41.0	102	32	70	94
20	▽ 2.3				11			0.25		27.0				
			SILTY SAND(SM), loose, gray with clay pockets		12					38.0				45
25	-2.2				13		8			32.0				
	-2.7		**FAT CLAY(CH)**, reddish brown											
			SILTY SAND(SM), loose, gray with clay pockets		14					17.0				
					15		5			29.0				
30					16		6			24.0				
	-10.7				17		6			30.0				
			FAT CLAY(CH), soft, gray with sand seams											

SWG 1836 BOR PA 14.GPJ TOLUNAY-WONG ENGINEERS.GDT 2/15/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B58

BORING LOG	DISTRICT Galveston	INSTALLATION PA 14	SHEET 2 OF 2 SHEETS

1. PROJECT HSCDMMP	7. ELEVATION OF HOLE +23.28 ft
2. LOCATION (Coordinates or Station) PA 14 N=13795466.53 E=3254039.05	8. DATUM FOR ELEVATION
3. DRILLING AGENCY Kenall Inc.	9. ELEVATION OF GROUNDWATER ▽ TOD: 2.28 ft ▼ 24-HR:
4. LABORATORY TESTING AGENCY Kenall Inc.	10. DRILLING DATE and TIME STARTED: 11/16/11 COMPLETED: 11/16/11
5. DEPTH OF WATER ▽ TOD: 21.0 ft ▼ 24-HR:	11. CLASSIFICATION REFERENCE
6. DEPTH OF HOLE 60 ft	12. ENGINEER Vivek Chikyala

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
	-12.7				18			0.25		34.0				
			CLAYEY SAND(CH), very loose to loose, gray with clay seams		19					29.0				50
					20					26.0				
40					21		3			26.0				
					22		5			25.0				
			- with silt seams											
45			- gray with silt		23			0.25		24.0				
					24					26.0				
			- clay pockets											
	-25.7		- yellowish brown and gray sand with clay pockets		25		12			33.0				
50			**FAT CLAY(CH)**, stiff to very stiff, reddish brown and gray with sand and silt seams		26			1.0		44.0				
					27			1.75		30.0				
55					28			3.25		33.0				
					29			2.5		34.0				
					30			2.75		34.0				
60	-36.7													
65														

SWG 1836 BOR PA 14.GPJ TOLUNAY-WONG ENGINEERS.GDT 2/15/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B59

BORING LOG	DISTRICT Galveston	INSTALLATION PA 14	SHEET 1 OF 2 SHEETS
1. PROJECT HSCDMMP		7. ELEVATION OF HOLE +22.19 ft	
2. LOCATION (Coordinates or Station) PA 14 N=13792975.00 E=3256498.92		8. DATUM FOR ELEVATION	
3. DRILLING AGENCY Kenall Inc.		9. ELEVATION OF GROUNDWATER ▽ TOD: N/A ft ▼ 24-HR:	
4. LABORATORY TESTING AGENCY Kenall Inc.		10. DRILLING DATE and TIME STARTED: 11/10/11 COMPLETED: 11/14/11	
5. DEPTH OF WATER ▽ TOD: N/A ft ▼ 24-HR:		11. CLASSIFICATION REFERENCE	
6. DEPTH OF HOLE 60 ft		12. ENGINEER Vivek Chikyala	

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
			SILTY SAND(SM), medium dense, tan and brown with shell		1		16			9.0				
					2		13			17.0				29
5	16.7				3			1.25		18.0				
			FAT CLAY(CH), very soft to firm to stiff, gray with sand and trace of gravel and sand seams		4			1.75	110	18.0				53
			- with organics		5			0.125		13.0				
10			- with sand pockets, gravel and shell		6			0.75	103	24.0				
			- organics		7			0.25		18.0				
15					8			0.25	108	34.0				
					9			0.25	93	20.0	50	23	27	
	3.2				10			0.125		24.0				
20			**SILT WITH SAND(ML)**, loose to medium dense, reddish brown with clay pockets		11		25			22.0				71
	-0.8				12		6			33.0				
			SILTY CLAY(CL-ML), very soft, gray with sand pockets		13			0.1875		26.0				
25	-3.3		**FAT CLAY(CH)**, very soft, dark gray with sand and shell		14			0.125		25.0				
	-5.3		**SILTY SAND(SM)**, medium dense, brown and gray		15		13			29.0				
30					16		16			41.0				
	-11.3				17		17			47.0				
			FAT CLAY(CH), very soft, gray with sand and sand pockets											

SWG 1836 BOR PA 14.GPJ TOLUNAY-WONG ENGINEERS.GDT 2/15/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B59

BORING LOG	DISTRICT: Galveston	INSTALLATION: PA 14	SHEET 2 OF 2 SHEETS
1. PROJECT: HSCDMMP		7. ELEVATION OF HOLE: +22.19 ft	
2. LOCATION (Coordinates or Station): PA 14 N=13792975.00 E=3256498.92		8. DATUM FOR ELEVATION:	
3. DRILLING AGENCY: Kenall Inc.		9. ELEVATION OF GROUNDWATER: ▽ TOD: N/A ft ▼ 24-HR:	
4. LABORATORY TESTING AGENCY: Kenall Inc.		10. DRILLING DATE and TIME: STARTED: 11/10/11 COMPLETED: 11/14/11	
5. DEPTH OF WATER: ▽ TOD: N/A ft ▼ 24-HR:		11. CLASSIFICATION REFERENCE:	
6. DEPTH OF HOLE: 60 ft		12. ENGINEER: Vivek Chikyala	

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
					18			0.25		48.0	86	30	56	98
	-14.8				19			0.1875		39.0				
			SANDY LEAN CLAY(CL), very soft, gray with sand pockets		20			0.1875	96	24.0				
40	-18.8				21			0.125		18.0				
			SILTY SAND(SM), loose to medium dense, gray with shell		22		5			26.0				
	-22.8				23		14			31.0				
45			**FAT CLAY(CH)**, firm to stiff to very stiff, reddish brown with sand and silt pockets		24			2.5	95	29.0	62	26	36	100
					25			2.5		12.0				
50			- sand seams		26			2.5		32.0				
			- calcareous nodules		27			0.5		29.0				
			- sand seams											
55			- with sand		28			2.0		29.0				
			- with sand, slickensided and calcareous nodules		29			1.75		29.0				
					30			2.75		19.0				
60	-37.8													
65														

SWG 1836 BOR PA 14.GPJ TOLUNAY-WONG ENGINEERS.GDT 2/15/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B60

BORING LOG	DISTRICT Galveston	INSTALLATION PA 14	SHEET 1 OF 2 SHEETS
1. PROJECT HSCDMMP		7. ELEVATION OF HOLE +23.41 ft	
2. LOCATION (Coordinates or Station) PA 14 N=13796409.93 E=3256931.27		8. DATUM FOR ELEVATION	
3. DRILLING AGENCY Kenall Inc.		9. ELEVATION OF GROUNDWATER ▽ TOD: 4.41 ft ▼ 24-HR:	
4. LABORATORY TESTING AGENCY Kenall Inc.		10. DRILLING DATE and TIME STARTED: 11/14/11 COMPLETED: 11/14/11	
5. DEPTH OF WATER ▽ TOD: 19.0 ft ▼ 24-HR:		11. CLASSIFICATION REFERENCE	
6. DEPTH OF HOLE 60 ft		12. ENGINEER Vivek Chikyala	

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
			FAT CLAY(CH), firm to stiff to very stiff to hard, dark brown and reddish brown with ferrous nodules and gravel		1			4.5		14.0				
			- with sand and gravel		2			2.75	106	21.0				
5			- sand pockets - gray and reddish brown		3			4.5		15.0				
			- gray, light gray and brown with sand and shell - sand seam		4			0.75	103	23.0	62	22	40	66
			- reddish brown		5			1.75	109	16.0				
10	13.4		**SILT WITH SAND(ML)**, loose to medium dense, tan and reddish brown		6					10.0				
					7		18			20.0				73
15	8.4		**SANDY LEAN CLAY(CL)**, very soft to soft to firm, light gray and reddish brown with sand pockets and shell		8		9			26.0				
					9			1.0	94	30.0	47	21	26	61
	▽				10			1.0		24.0				
20					11			0.25	86	36.0				
	0.4		- with sand seams		12			0.5		39.0				
	-1.6		**SILTY SAND(SM)**, loose, gray and brown with shell and clay pockets											
25			**FAT CLAY(CH)**, very soft, dark gray with sand pockets and seams		13		4			26.0				
	-3.6		- Marsh material		14			0.25		41.0				
	-4.6		**SILTY SAND(SM)**, brown											
			FAT CLAY(CH), soft to firm, reddish brown with silty sand seams and sand pockets		15			0.5		38.0	67	29	38	87
30					16			0.75	88	37.0				
			- slickensided		17			1.0		37.0				
	-10.6		**CLAYEY SAND(CL)**, loose, gray											

SWG 1836 BOR PA 14.GPJ TOLUNAY-WONG ENGINEERS.GDT 2/15/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B60

BORING LOG	DISTRICT Galveston	INSTALLATION PA 14	SHEET 2 OF 2 SHEETS

1. PROJECT HSCDMMP	7. ELEVATION OF HOLE +23.41 ft
2. LOCATION (Coordinates or Station) PA 14 N=13796409.93 E=3256931.27	8. DATUM FOR ELEVATION
3. DRILLING AGENCY Kenall Inc.	9. ELEVATION OF GROUNDWATER ▽ TOD: 4.41 ft ▼ 24-HR:
4. LABORATORY TESTING AGENCY Kenall Inc.	10. DRILLING DATE and TIME STARTED: 11/14/11 COMPLETED: 11/14/11
5. DEPTH OF WATER ▽ TOD: 19.0 ft ▼ 24-HR:	11. CLASSIFICATION REFERENCE
6. DEPTH OF HOLE 60 ft	12. ENGINEER Vivek Chikyala

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
					18					21.0				
					19					27.0				
					20					28.0				
40														
					21		6			29.0				
	-19.6													
			FAT CLAY(CH), stiff to very stiff, yellowish brown and light gray with slickensided and		22		7			33.0				
45			sand pockets		23			2.25	94	27.0				
			- with sand seams and gravel pockets		24			2.25		23.0				
			- reddish brown with sand pockets and silt seams		25			1.5		22.0				
50					26			1.0		29.0				
					27			1.0		31.0				
55			- with sand		28			3.0		31.0				
					29			3.0		31.0				
					30			2.5		32.0				
60	-36.6													
65														

SWG 1836 BOR PA 14.GPJ TOLUNAY-WONG ENGINEERS.GDT 2/15/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B61

BORING LOG	DISTRICT: Galveston	INSTALLATION: Mid Bay Marsh	SHEET 1 OF 2 SHEETS
1. PROJECT: HSCDMMP		7. ELEVATION OF HOLE: 18.38 ft	
2. LOCATION (Coordinates or Station): Mid Bay Marsh N=13782790.23 E=3262798.84		8. DATUM FOR ELEVATION:	
3. DRILLING AGENCY: Kenall Inc.		9. ELEVATION OF GROUNDWATER: ▽ TOD: 6.38 ft ▼ 24-HR:	
4. LABORATORY TESTING AGENCY: Kenall Inc.		10. DRILLING DATE and TIME: STARTED: 1/24/12 COMPLETED: 1/24/12	
5. DEPTH OF WATER: ▽ TOD: 12.0 ft ▼ 24-HR:		11. CLASSIFICATION REFERENCE:	
6. DEPTH OF HOLE: 60 ft		12. ENGINEER: Vivek Chikyala	

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	TORVANE (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
	16.4		**SILTY SAND(SM)**, gray with brown clay pockets and clay seams		1			0.0	0.0625		13.0				
			FAT CLAY WITH SAND(CH), very soft to stiff, gray and brown with sand seams and pockets		2			1.5		91	28.0	55	24	31	78
5	12.4		- ferrous nodules		3			1.5		80	41.0				
			SILTY SAND(SM), light gray, brown and gray, medium dense to dense		4		19				6.0				
			- with clay pockets		5		29				19.0				34
10					6		24				18.0				20
	▽				7		44				23.0				
15	2.4				8		35				23.0				23
	0.4		**SILTY CLAY(CL-ML)**, gray,		9		2				28.0				97
	-1.6		**SANDY LEAN CLAY(CL)**, gray		10		3				30.0				
20			**FAT CLAY(CH)**, very soft to stiff to very stiff, reddish brown and dark gray with sand pockets		11			1.0		86	37.0	54	26	28	94
			- hydrocarbon odour		12			0.5			39.0	50	26	24	
			- tan and gray		13		2				37.0				
25			- reddish brown with sand pockets and shell		14			0.5		85	32.0				
					15			1.0		88	37.0	67	33	34	
30					16			0.5			43.0				
			- brown and tan with shell		17			0.0	0.125	89	35.0				
			- reddish brown and dark gray with sand												

SWG 1836 BOR MID BAY MARSH.GPJ TOLUNAY-WONG ENGINEERS.GDT 3/5/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B61

BORING LOG	DISTRICT: Galveston	INSTALLATION: Mid Bay Marsh	SHEET 2 OF 2 SHEETS

1. PROJECT: HSCDMMP	7. ELEVATION OF HOLE: 18.38 ft
2. LOCATION (Coordinates or Station): Mid Bay Marsh N=13782790.23 E=3262798.84	8. DATUM FOR ELEVATION:
3. DRILLING AGENCY: Kenall Inc.	9. ELEVATION OF GROUNDWATER: ▽ TOD: 6.38 ft ▼ 24-HR:
4. LABORATORY TESTING AGENCY: Kenall Inc.	10. DRILLING DATE and TIME: STARTED: 1/24/12 COMPLETED: 1/24/12
5. DEPTH OF WATER: ▽ TOD: 12.0 ft ▼ 24-HR:	11. CLASSIFICATION REFERENCE:
6. DEPTH OF HOLE: 60 ft	12. ENGINEER: Vivek Chikyala

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	TORVANE (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
			pockets and shell		18			1.0			32.0				
					19			2.5		97	27.0				
					20			2.5			29.0				
40					21			2.0		110	29.0				
					22			1.5			24.0				
45			- tan and reddish brown with lots of sand pockets		23			1.5		104	24.0				
					24			1.0			27.0				
			- ferrous stains and sand pockets		25		22				30.0				
50					26			1.5			25.0				
					27		25				34.0				
55					28		20				32.0				
					29			3.0			34.0				
					30			3.0			32.0				
60	-41.6														
65															

SWG 1836 BOR MID BAY MARSH.GPJ TOLUNAY-WONG ENGINEERS.GDT 3/5/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B61A

BORING LOG	DISTRICT: Galveston	INSTALLATION: Mid Bay Marsh	SHEET 1 OF 2 SHEETS

1. PROJECT: HSCDMMP	7. ELEVATION OF HOLE: 18.48 ft
2. LOCATION (Coordinates or Station): Mid Bay Marsh N=13779778.67 E=3263975.60	8. DATUM FOR ELEVATION:
3. DRILLING AGENCY: Kenall Inc.	9. ELEVATION OF GROUNDWATER: ▽ TOD: 18.48 ft ▼ 24-HR:
4. LABORATORY TESTING AGENCY: Kenall Inc.	10. DRILLING DATE and TIME: STARTED: 2/8/12 COMPLETED: 2/8/12
5. DEPTH OF WATER: ▽ TOD: N/A ft ▼ 24-HR:	11. CLASSIFICATION REFERENCE:
6. DEPTH OF HOLE: 60 ft	12. ENGINEER: Vivek Chikyala

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	TORVANE (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
			ELASTIC SILT(MH), very soft to soft to firm, reddish brown with sand and calcareous nodules		1			1.0			32.0				
					2			0.75		92	31.0				
5					3			0.25	0.125	88	35.0	64	33	31	89
					4			0.25	0.1875	86	36.0				
					5			0.0	0.125		34.0	66	34	32	94
10					6			0.75		86	36.0				
					7			1.0			34.0	60	31	29	88
	4.5														
15			**SILTY SAND(SM)**, dense, light gray		8		44				21.0				49
	2.5														
			SANDY LEAN CLAY(CL), stiff, light gray and light brown		9			1.0		100	26.0				
					10			1.25			24.0				
20	-1.5														
			FAT CLAY(CH), soft to firm to stiff, reddish brown and light gray with large sand pockets and shell		11			0.5		90	35.0	50	28	22	
					12			0.5			36.0				
25					13			1.0		92	31.0				
	-8.5														
	-9.5		**SANDY LEAN CLAY(CL)**, very soft, gray and brown		14			0.25	0.125		36.0				99
			SILTY SAND(SM), dark gray with shell		15						21.0				26
30	-11.5														
			FAT CLAY(CH), dark gray		16		2				33.0				
					17		2				39.0				
	-15.5														
			SANDY LEAN CLAY(CL), very stiff, light												

SWG 1836 BOR MID BAY MARSH.GPJ TOLUNAY-WONG ENGINEERS.GDT 3/5/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B61A

BORING LOG	DISTRICT: Galveston	INSTALLATION: Mid Bay Marsh	SHEET 2 OF 2 SHEETS

1. PROJECT: HSCDMMP	7. ELEVATION OF HOLE: 18.48 ft
2. LOCATION (Coordinates or Station): Mid Bay Marsh N=13779778.67 E=3263975.60	8. DATUM FOR ELEVATION:
3. DRILLING AGENCY: Kenall Inc.	9. ELEVATION OF GROUNDWATER: ▽ TOD: 18.48 ft ▼ 24-HR:
4. LABORATORY TESTING AGENCY: Kenall Inc.	10. DRILLING DATE and TIME: STARTED: 2/8/12 COMPLETED: 2/8/12
5. DEPTH OF WATER: ▽ TOD: N/A ft ▼ 24-HR:	11. CLASSIFICATION REFERENCE:
6. DEPTH OF HOLE: 60 ft	12. ENGINEER: Vivek Chikyala

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	TORVANE (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
	-17.5		brown and gray		18			3.0		96	27.0				
			FAT CLAY(CH), stiff to very stiff to hard, light brown and light gray with ferrous stains		19			4.0		100	25.0				
					20			4.0			22.0				
40					21			3.0			23.0				
			- calcareous nodules		22			3.75			21.0				
45					23			1.25			22.0				
					24			1.0			20.0				
			- reddish brown with ferrous stains		25			4.25			23.0				
50			- with calcareous nodules		26			3.75			24.0				
	-34.5				27			2.75			26.0				
	-36.5		**SANDY LEAN CLAY(CL)**, very stiff, reddish brown		28			3.5			30.0				
55			**FAT CLAY(CH)**, very stiff, reddish brown		29			3.0			33.0				
	-40.5				30			2.75			33.0				
	-41.5		**SILTY SAND(SM)**, reddish brown												
60															
65															

SWG 1836 BOR MID BAY MARSH.GPJ TOLUNAY-WONG ENGINEERS.GDT 3/5/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B62

BORING LOG	DISTRICT: Galveston	INSTALLATION: Mid Bay Marsh	SHEET 1 OF 2 SHEETS

1. PROJECT: HSCDMMP	7. ELEVATION OF HOLE: 18.72 ft
2. LOCATION (Coordinates or Station): Mid Bay Marsh N=13778656.34 E=3264786.27	8. DATUM FOR ELEVATION:
3. DRILLING AGENCY: Kenall Inc.	9. ELEVATION OF GROUNDWATER: ▽ TOD: -1.28 ft ▼ 24-HR:
4. LABORATORY TESTING AGENCY: Kenall Inc.	10. DRILLING DATE and TIME: STARTED: 12/3/11 COMPLETED: 2/7/12
5. DEPTH OF WATER: ▽ TOD: 20.0 ft ▼ 24-HR:	11. CLASSIFICATION REFERENCE:
6. DEPTH OF HOLE: 60 ft	12. ENGINEER: Vivek Chikyala

DEPTH (ft)	ELEVATION (ft)	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	TORVANE (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
0		**FAT CLAY(CH)**, very soft tostiff, reddish brown with silt pockets and trace of gravel		1			1.25		102	23.0	64	21	43	94
		- with sand		2			0.25	0.125		25.0				
		- gray		3			<0.25	0.1875	100	26.0				
5		- reddish brown with sand and gray silt seams		4			<0.25	0.0625	82	41.0	73	26	47	
				5			<0.25	0.25		38.0				
10				6			<0.25	0.125			72	33	39	93
		- with sand pockets and seams		7			<0.25	0.125		37.0				
15	3.2			8			<0.25	0.25	89	33.0				
		SILTY CLAY WITH SAND(CL-ML), gray and brown with reddish brown clay seam		9		9				33.0				77
	0.7	**SILTY SAND(SM)**, loose, gray with clay pockets		10		7				35.0				
20	▽			11		6				29.0				
	-3.3	**FAT CLAY WITH SAND(CH)**, reddish brown with gray sand seams		12		5			87	33.0				84
	-6.3			13			1.5			31.0				
25		**SILTY SAND(SM)**, very loose to loose, gray with clay pockets and shell		14		6				34.0				17
				15		5				23.0				
30	-12.8			16		3				53.0				
		FAT CLAY(CH), very loose to stiff to very stiff to hard, gray with sand and shell		17		4				37.0				

SWG 1836 BOR MID BAY MARSH.GPJ TOLUNAY-WONG ENGINEERS.GDT 3/5/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B62

BORING LOG	DISTRICT: Galveston	INSTALLATION: Mid Bay Marsh	SHEET 2 OF 2 SHEETS

1. PROJECT: HSCDMMP	7. ELEVATION OF HOLE: 18.72 ft
2. LOCATION (Coordinates or Station): Mid Bay Marsh N=13778656.34 E=3264786.27	8. DATUM FOR ELEVATION:
3. DRILLING AGENCY: Kenall Inc.	9. ELEVATION OF GROUNDWATER: ▽ TOD: -1.28 ft ▼ 24-HR:
4. LABORATORY TESTING AGENCY: Kenall Inc.	10. DRILLING DATE and TIME: STARTED: 12/3/11 COMPLETED: 2/7/12
5. DEPTH OF WATER: ▽ TOD: 20.0 ft ▼ 24-HR:	11. CLASSIFICATION REFERENCE:
6. DEPTH OF HOLE: 60 ft	12. ENGINEER: Vivek Chikyala

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	TORVANE (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
					18			<0.25	0.125	92	32.0				
			- light brown and light gray with with ferrous stains		19			4.25			47.0				
					20			2.5		108	21.0				
40			- with calcareous nodules and ferrous stains		21			3.75			30.0				
					22			4.0		110	19.0				
45					23			2.0			23.0				
					24			1.5			21.0				
			- reddish brown with ferrous stains and calcareous nodules		25			4.5+			24.0				
50					26			3.0			31.0				
	-34.3				27			0.25			24.0				
			SILTY CLAY(CL-ML), soft, reddish brown												
55	-37.3				28		16				26.0				
			FAT CLAY(CH), reddish brown with gray sand seams		29			2.0			30.0				
					30			2.75			38.0				
60	-41.3														
65															

SWG 1836 BOR MID BAY MARSH.GPJ TOLUNAY-WONG ENGINEERS.GDT 3/5/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B63

BORING LOG	DISTRICT Galveston	INSTALLATION Mid Bay Marsh	SHEET 1 OF 2 SHEETS
1. PROJECT HSCDMMP		7. ELEVATION OF HOLE 17.92 ft	
2. LOCATION (Coordinates or Station) Mid Bay Marsh N=13776620.24 E=3267114.15		8. DATUM FOR ELEVATION	
3. DRILLING AGENCY Kenall Inc.		9. ELEVATION OF GROUNDWATER ▽ TOD: -0.08 ft ▼ 24-HR:	
4. LABORATORY TESTING AGENCY Kenall Inc.		10. DRILLING DATE and TIME STARTED: 12/2/11 COMPLETED: 12/2/11	
5. DEPTH OF WATER ▽ TOD: 18.0 ft ▼ 24-HR:		11. CLASSIFICATION REFERENCE	
6. DEPTH OF HOLE 60 ft		12. ENGINEER Vivek Chikyala	

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	TORVANE (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
			FAT CLAY(CH), very soft to soft to stiff, reddish brown with calcareous nodules		1			2.0		109	19.0	54	25	29	
			- with silty sand seams		2			<0.25	0.125	98	25.0				
5					3			0.5		95	28.0	52	21	31	83
			- with silty sand pockets		4			<0.25	0.125		30.0				
			- with silt		5			<0.25	0.0625	83	37.0				96
10					6			<0.25	0.125		36.0				
					7			<0.25	0.125		34.0				
	3.9		- with silty sand seams												
15			**SANDY SILT(ML)**, reddish brown with clay pockets		8						22.0				
					9						23.0				75
	▽ -1.1														
			FAT CLAY WITH SAND(CH), very soft to soft to firm to stiff, gray with sand seams		10						32.0				
20					11			0.75		89	33.0	81	26	55	79
					12			0.5			25.0				
25					13			1.0		88	34.0				
					14			1.0		90	35.0				
			- reddish brown and gray with sand seams		15			1.25		92	33.0				
30					16			<0.25	0.25		31.0				
					17			0.5			31.0				
			- gray with sand seams and shell												

SWG 1836 BOR MID BAY MARSH.GPJ TOLUNAY-WONG ENGINEERS.GDT 3/5/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B63

BORING LOG	DISTRICT Galveston	INSTALLATION Mid Bay Marsh	SHEET 2 OF 2 SHEETS

1. PROJECT HSCDMMP	7. ELEVATION OF HOLE 17.92 ft
2. LOCATION (Coordinates or Station) Mid Bay Marsh N=13776620.24 E=3267114.15	8. DATUM FOR ELEVATION
3. DRILLING AGENCY Kenall Inc.	9. ELEVATION OF GROUNDWATER ▽ TOD: -0.08 ft ▼ 24-HR:
4. LABORATORY TESTING AGENCY Kenall Inc.	10. DRILLING DATE and TIME STARTED: 12/2/11 COMPLETED: 12/2/11
5. DEPTH OF WATER ▽ TOD: 18.0 ft ▼ 24-HR:	11. CLASSIFICATION REFERENCE
6. DEPTH OF HOLE 60 ft	12. ENGINEER Vivek Chikyala

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	TORVANE (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
					18			0.5		94	30.0				
					19			<0.25	0.1875		17.0				
					20			<0.25	0.125		15.0				
40					21			1.5		109	16.0				
	-25.1				22			<0.25	0.25		10.0				
			SILTY SAND(SM), dense, gray with brown seams												
45					23		34				24.0				
					24		36				28.0				
					25		36				36.0				
50					26		37				27.0				
					27		38				24.0				
55					28		35				21.0				
					29		30				35.0				
	-42.1				30		36				32.0				
60															
65															

SWG 1836 BOR MID BAY MARSH.GPJ TOLUNAY-WONG ENGINEERS.GDT 3/5/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B64

BORING LOG	DISTRICT Galveston	INSTALLATION Mid Bay Marsh	SHEET 1 OF 2 SHEETS

1. PROJECT HSCDMMP	7. ELEVATION OF HOLE 19.07 ft
2. LOCATION (Coordinates or Station) Mid Bay Marsh N=13780633.60 E=3267708.41	8. DATUM FOR ELEVATION
3. DRILLING AGENCY Kenall Inc.	9. ELEVATION OF GROUNDWATER ▽ TOD: 7.07 ft ▼ 24-HR:
4. LABORATORY TESTING AGENCY Kenall Inc.	10. DRILLING DATE and TIME STARTED: 11/30/11 COMPLETED: 12/2/11
5. DEPTH OF WATER ▽ TOD: 12.0 ft ▼ 24-HR:	11. CLASSIFICATION REFERENCE
6. DEPTH OF HOLE 60 ft	12. ENGINEER Vivek Chikyala

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	TORVANE (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
			FAT CLAY(CH), very soft to soft to stiff to very stiff to hard, reddish brown and dark gray with sand		1			4.25			21.0				85
			- gray silty sand - light gray with sand pockets		2			2.0		102	21.0	61	20	41	83
5					3			0.5			39.0				
					4			0.5		81	45.0	70	29	41	94
			- gray		5			<0.25	0.0625	80	42.0				
10			- with sand and gravel		6			<0.25	0.0625	82	40.0				
	▽				7			<0.25	0.125		36.0				
			- brown sand with clay pockets - reddish brown with brown sand seams												
15					8		7				33.0				
					9		5				40.0				
			- gray with sand pockets		10			<0.25	0.0625			53	27	26	90
20			- shell seams		11			0.5		84	39.0				
			- gray and reddish brown with with sand pockets, seams and shell		12		4				39.0				
25					13			<0.25	0.125		33.0				
					14			<0.25	0.25	98	26.0				
					15			<0.25	0.1875		34.0				
30			- light gray - reddish brown and light gray with sand pockets, seams and shell		16			0.5		93	34.0				
					17			0.25	0.125		34.0				

SWG 1836 BOR MID BAY MARSH.GPJ TOLUNAY-WONG ENGINEERS.GDT 3/5/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B64

BORING LOG	DISTRICT Galveston	INSTALLATION Mid Bay Marsh	SHEET 2 OF 2 SHEETS

1. PROJECT HSCDMMP	7. ELEVATION OF HOLE 19.07 ft
2. LOCATION (Coordinates or Station) Mid Bay Marsh N=13780633.60 E=3267708.41	8. DATUM FOR ELEVATION
3. DRILLING AGENCY Kenall Inc.	9. ELEVATION OF GROUNDWATER ▽ TOD: 7.07 ft ▼ 24-HR:
4. LABORATORY TESTING AGENCY Kenall Inc.	10. DRILLING DATE and TIME STARTED: 11/30/11 COMPLETED: 12/2/11
5. DEPTH OF WATER ▽ TOD: 12.0 ft ▼ 24-HR:	11. CLASSIFICATION REFERENCE
6. DEPTH OF HOLE 60 ft	12. ENGINEER Vivek Chikyala

DEPTH (ft)	ELEVATION (ft)	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	TORVANE (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
				18			0.25	0.1875		30.0				
		- light gray and yellowish brown wih sand pockets and trace of calcareous noduels		19			1.5			31.0				
				20			2.0			23.0				
40				21			2.25		115	17.0				
		- light gray with sand seams		22			2.0			14.0				
45				23			1.5			20.0				
		- with calcareous nodules		24			2.0			22.0				
	-27.9	**SILTY CLAY(CL-ML)**, reddish brown with sand												
				25		23				24.0				
50				26		22				23.0				
	-32.9	**FAT CLAY WITH SAND(CH)**, stiff to very stiff, reddish brown with calcareous nodules and slicken sided		27			2.75			33.0				
55				28			1.5			30.0				
				29			2.5			19.0				
				30			2.75			29.0				
60	-40.9													
65														

SWG 1836 BOR MID BAY MARSH.GPJ TOLUNAY-WONG ENGINEERS.GDT 3/5/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B64A

BORING LOG	DISTRICT Galveston	INSTALLATION Mid Bay Marsh	SHEET 1 OF 2 SHEETS

1. PROJECT HSCDMMP	7. ELEVATION OF HOLE 18.67 ft
2. LOCATION (Coordinates or Station) Mid Bay Marsh N=13783980.66 E=3265204.98	8. DATUM FOR ELEVATION
3. DRILLING AGENCY Kenall Inc.	9. ELEVATION OF GROUNDWATER ▽ TOD: 6.59 ft ▼ 24-HR:
4. LABORATORY TESTING AGENCY Kenall Inc.	10. DRILLING DATE and TIME STARTED: 2/9/12 COMPLETED: 2/9/12
5. DEPTH OF WATER ▽ TOD: 12.08 ft ▼ 24-HR:	11. CLASSIFICATION REFERENCE
6. DEPTH OF HOLE 60 ft	12. ENGINEER Vivek Chikyala

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	TORVANE (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
			FAT CLAY(CH), stiff, dark brown with sand pockets		1			1.5		94	28.0	62	27	35	
			- reddish brown and gray with sand pockets and seams		2			1.75		90	31.0				88
5					3			1.5			37.0				
					4			1.0		87	37.0				
	10.7		**FAT CLAY WITH SAND(CH)**, firm, reddish brown and gray with sand pockets		5			0.75			28.0	74	33	41	71
10	7.7		**SILTY SAND(SM)**, medium dense, light gray		6			0.5		102	23.0				
	▽				7		26				21.0				
15					8		30				18.0				23
					9		14				24.0				
					10		17				18.0				
20	-1.3		**FAT CLAY(CH)**, soft to stiff to very stiff, reddish brown and dark brown with large sand pockets		11			1.0		81	40.0				
					12			0.5		93	33.0	60	27	33	
25			- light gray		13			1.5			36.0				85
			- gray		14			1.0		90	33.0	71	30	41	97
					15			1.75		93	33.0				
30					16			0.75			36.0				
					17			0.5		95	29.0				96
			- with sand pockets and shell												

SWG 1836 BOR MID BAY MARSH.GPJ TOLUNAY-WONG ENGINEERS.GDT 3/5/12

ENG FORM: SWG 1836 BOR

Hole No. 11-B64A

BORING LOG	DISTRICT: Galveston	INSTALLATION: Mid Bay Marsh	SHEET 2 OF 2 SHEETS

1. PROJECT: HSCDMMP	7. ELEVATION OF HOLE: 18.67 ft
2. LOCATION (Coordinates or Station): Mid Bay Marsh N=13783980.66 E=3265204.98	8. DATUM FOR ELEVATION:
3. DRILLING AGENCY: Kenall Inc.	9. ELEVATION OF GROUNDWATER: ▽ TOD: 6.59 ft ▼ 24-HR:
4. LABORATORY TESTING AGENCY: Kenall Inc.	10. DRILLING DATE and TIME: STARTED: 2/9/12 COMPLETED: 2/9/12
5. DEPTH OF WATER: ▽ TOD: 12.08 ft ▼ 24-HR:	11. CLASSIFICATION REFERENCE:
6. DEPTH OF HOLE: 60 ft	12. ENGINEER: Vivek Chikyala

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	TORVANE (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
					18			0.25	0.25		36.0	73	27	46	89
			- dark gray and light brown		19			2.25		86	37.0				
			- light brown and light gray		20			2.25			28.0				
40					21			2.75			31.0				
			- reddish brown		22			2.25		88	35.0				
			- with ferrous stains		23			2.75			30.0				
45			- with calcareous nodules		24			3.5			29.0				
					25			3.25			30.0				
					26			3.75			26.0				
50					27			1.75			29.0				
	-36.3														
55			**SILTY SAND(SM)**, medium dense, reddish brown		28		15				28.0				
	-38.3				29			2.5			29.0				
			FAT CLAY(CH), very stiff, reddish brown												
					30			3.5			31.0				
60	-41.3														
65															

SWG 1836 BOR MID BAY MARSH.GPJ TOLUNAY-WONG ENGINEERS.GDT 3/5/12

ENG FORM: SWG 1836 BOR