MUSTANG BEACH UNIT II
BULKHEAD INVESTIGATION

Port Aransas, Texas

June, 2011
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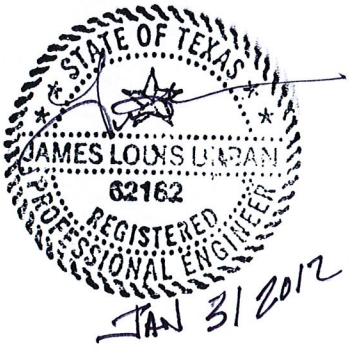
Job No. 42390.00.00



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Bulkhead Investigation

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I. INTRODUCTION

Urban Engineering has been retained by the Mustang Beach Unit II Property Owners Association to perform an investigation and deliver a report of the current condition of the existing bulkhead along the perimeter of their subdivision. The purpose of this investigation is to record the bulkhead condition, establish a basis to maintain and repair the bulkhead, and provide an idea of the probable cost to repair the damaged areas.

II. LIMITATIONS

The survey and analysis of the bulkhead is based on the information collected in the field and the recorded data obtained by Urban Engineering during the course of this investigation. Conclusions regarding the condition of the bulkhead are based on a visual investigation of the surface conditions and interviews with several property owners. It was not within the scope of the project to conduct subsurface investigations including drilling, sampling, excavations, or other similar subsurface activities. This assessment, therefore, makes no conclusions regarding the subsurface conditions at the site that may not have been apparent during this investigation. It is also prudent to state that many of the lots had structures built above or right along the bulkhead line. Consequently, this made it difficult to fully inspect and determine the condition of the bulkhead and the possible extents of any damage associated with it.

III. INVESTIGATION & FINDINGS

The area inspected includes Mustang Beach Unit II located along the East side of Bayside Drive, all of La Costa Cay, and the North side of Margo Lane in Port Aransas, Texas. Approximately 25% of the lots are undeveloped within this subdivision and roughly 50% of the lots require at least some maintenance or repair of the bulkhead structure within their property.

The investigation was conducted on every lot during the month of April 2011 by physically walking and inspecting the bulkheads located at the rear of each property. The bulkhead was visually inspected, photographed, and evaluated on a scale of 1 to 5, 1 being the best and 5 being the worst, and rated on a sub-scale of good to critical for each lot. A complete description of the rating scale utilized can be found in Appendix A at the end of this report.

In general, the structural integrity of the bulkhead throughout the subdivision appears to be sound and performing well for its age and typical use. However, there are areas that have succumbed to the forces of nature and have begun to show degradation. Although no observed areas appeared to be in immediate danger of structural failure, there were some areas of concern that require repair and maintenance. The majority of the damage observed included small to large sink holes, joint material missing or forced out of place, minor to heavy cracks and fractures, deterioration of the bulkhead caps, and the loss of supportive sand

resulting in recessed or collapsing sidewalks or patios. This damage can be attributed to several conditions including the absence, or deterioration of the filter fabric and failing joint sealant material, the amount of excess stress placed on the bulkhead system due to the proximity of structures, and the effects of salt water and wave action impacting the concrete bulkhead.

The filter fabric, an essential component of the bulkhead system, provides a permeable barrier at each joint which allows subsurface water to drain through the joints of the bulkhead sheet panels and relieves the hydrostatic pressures that can build up behind them, but at the same time, prevents sand from eroding away behind the bulkhead panels so it can retain the supporting soils along the bulkhead line. During the investigation, it was apparent in some locations that sand had been washed into the mooring area through these cracks and joints, leaving voids and sink holes behind as evidence.

Another culprit of damage is the corrosive effects of the salt water and punishing nature of wave action. It was very common along the main portion of the channel to see major deterioration of the concrete cap due to the corrosive characteristics of the environment. The caps were typically broken along the outer wall and their reinforcing steel was exposed and corroded. The concrete cap that forms the top portion of the bulkhead structure is responsible for uniting each individual panel together and provides support and continuity for the entire system. It also provides the junction between the tie-back anchors and panels to properly support the structure from overturning. It is critical to the system to maintain the integrity of the cap.

The subdivision has allowed residential structures and retaining walls to be built right up to, and along the bulkhead line. Typically, these structures are prohibited from being built within 15’ from the bulkhead line due to the maintenance required during the bulkhead’s lifetime and to avoid the additional loads and stresses that these structures convey to the bulkhead system, for which it was likely not designed. However, nearly all the instances where I encountered large retaining walls, swimming pools, or homes built along the bulkhead line during the investigation, it did not appear that they were negatively impacting the integrity of the bulkhead system and actually seamed to provide some protection from the elements.

Bulkheads are usually designed to resist earth loads, not residential and ancillary structure loading. Evidence of a horizontal panel crack at approximately the midpoint of the panels was observed in several locations. (Lot 14 Block 3, Lots 2 & 3, Block 2 as well others) The cracks that were observed did not appear to be newly formed and may have occurred before the residential structures were constructed. The existence of such cracks is masked by algae and barnacle growth at the water line and a more complete investigation should be undertaken to determine their extent and severity. None of the observed cracks appeared to represent a significant risk of catastrophic failure.

Representative pictures of the typical damage encountered throughout the investigation and a complete digital copy of the photographs can be found in Appendix B.

IV. RECOMMENDATIONS

A. REPAIRS & MAINTENANCE

Repairs and general maintenance are necessary and are integral for extending the life and improving the quality and integrity of the bulkhead structure. Ignoring maintenance issues may result in further deterioration of the bulkhead and its various components, and could eventually lead to complete failure of the system. Based on the current condition of the bulkhead and the evidence found during the investigation, we recommend the following repairs and maintenance that would address most of the issues found during the investigation.

Those areas that are experiencing sinkholes, voids, and settlement behind the bulkhead should undergo a filter fabric joint repair. This involves, when possible, the excavation and removal of material behind the concrete bulkhead panel joint that is centered, or associated with the void space. The contractor shall replace or install a new filter cloth that encompasses the joint and extends below the mud line elevation, flush against the existing panel. The area shall be carefully backfilled so as not to wrinkle or displace the new filter fabric and any improvements shall be repaired or replaced back to pre-construction conditions.

Damaged cap joints that are missing portions or all of their joint material shall be completely replaced with new joint material in accordance with the details and specifications found in the appendix. Minor cracks, or shrinkage cracks are common to nearly all concrete structures and do not adversely affect the integrity of the structure; however, cracks that create gaps in the concrete or have caused small pieces of the cap or panels to break off, can ultimately cause internal damage to the exiting rebar by allowing salt water and other contaminants to penetrate the concrete and corrode the reinforcing steel. These types of cracks should be repaired and sealed with a high strength epoxy.

Areas that have already experienced a great deal of damage, such as the bulkhead caps along the main channel, should be completely removed and replaced. The steel in these areas have lost their strength and physical properties and should not be repaired with epoxy or any other method that does not completely replace the cap.

Due to the location of some residences and their close proximity to the bulkhead on some of these lots, the recommended repairs, whether minor or major, may not be practically accomplished and will need to be evaluated on a individual bases. It is highly likely that those lots designated 4 and 5, with residential improvements along the bulkhead line will require further subsurface investigation to determine the full extent of any damage, and alternate methods of repair could be considered to accommodate the conditions at these lots.

A summary of the lots and their condition can be found in Appendix C, or a complete record of the investigation can be found in Appendix E.

We recognize that the total cost to repair the entire length of bulkhead is probably greater than the available funds. We have, therefore, developed a repair strategy which minimizes the total cost and addresses the long term goal of improving the overall condition of the subdivision's bulkhead. Below are the basic assumptions describing the priority of repair.

1. Bulkheads which pose a significant danger to the structural integrity of the property owner's house or property shall be considered a high priority for repair.

2. Any bulkhead repair which, if deferred, would result in structural damage to the bulkhead would be considered a high priority.

3. Any repairs to the bulkhead of an undeveloped lot shall be accomplished prior to the construction of any structure on that lot.

4. When repairs to a bulkhead within a lot are approved, the entire length of the bulkhead within the lot shall be repaired to the greatest extent practicable.

B. POLICY CODE

It is unknown if Mustang Beach Unit II has any policy involving the responsible party and procedures for bulkhead repairs. Due to the approved locations of the existing homes, there is very little, to no room for maintenance without affecting the residential structures. Other lesser structures, such as irrigation lines and landscaping, will also be affected, but it is much easier and less costly to repair these types of improvements during bulkhead repairs. The responsible party for the removal and replacement of these structures is not defined and becomes more of a policy issue than a legal one. Ultimately, it will be up to the property owners to determine who should bare the cost of repairs for these types of structures.

V. PROBABLE COSTS

The costs associated with these repairs and maintenance will vary depending on the type of repair needed. Some lots may only need to replace some joint material, while others may need a complete excavation and installation of filter fabric. Repairs to lots with residences will be limited by the improvements existing adjacent to the bulkhead. Sidewalks, decks, grass, trees, or vegetation, and/or retaining walls may need to be removed and replaced or relocated so that they do not hinder any future maintenance efforts or continue to affect the integrity of the bulkhead. The average unimproved lot with a rating of Fair or better should cost approximately $1,000.00, depending on the number of sheet panel joints on each particular lot. Generally, four foot wide concrete sheet panels were used during construction and the average width of each lot is 83 ft. An improved lot may range on the order of $500.00 to $100,000.00 depending on the severity of damage and what improvements need to be removed and replaced. If all repairs are completed, which is unlikely due to the proximity of the residential structures to the bulkhead line, we estimate the total construction cost to be on the order of $715,000.00. A detailed cost estimate, breaking down some of these costs is included in Appendix D.

VI. CONCLUSIONS

The investigation of the Mustang Beach Unit II bulkhead condition has been completed. We have found that approximately 50% of the lots are in need of some repair and maintenance. The undeveloped lots should definitely be repaired prior to any new construction proposed for that lot, and the developed lots should be repaired based on severity. The majority of the repairs and maintenance will consist of repairing minor cracks, installing filter fabric behind the bulkhead, and resealing the failed expansion joint material. There is a good portion of the bulkhead cap that will also need replacement.

The horizontal cracks observed at the midpoint of the concrete panels are not typical. They are symptomatic of flexure cracks caused by excessive loading or and under designed bulkhead panel. The cracks seemed to be greater on the lots with higher unsupported bulkhead face. (The distance from the cap to the mud line) A detailed analysis of the bulkhead panel design would be required to determine the cause of the failures. A summary of each lot condition and recommendation can be found in the Appendix.

VII. APPENDICES

APPENDIX A

CONDITION ASSESSMENT RATINGS
&
ABBREVIATIONS

CONDITION ASSESSMENT RATINGS

RATING	SUB-RATING	DESCRIPTION
1	Good	No visible damage; no maintenance required
2	Satisfactory	Limited minor damage observed; Little or no maintenance required
	Fair	Minor to moderate damage or defects observed; May need maintenance in the future
3	Fair	Moderate damage or small sink holes present; Maintenance recommended
	Poor	Moderate damage or medium to large sink holes present; Repair in the near future
4	Poor	Heavy damage or large sink holes present; Repair is required
	Serious	Heavy damage and/or large sink holes present – May be affecting bulkhead integrity; Repair as soon as possible
5	Critical	Heavy damage and/or very large sink holes – May be affecting integrity of surrounding structures; Repair with the highest priority

ABBREVIATIONS

ABBREVIATION	MEANING
S to L SHs	Small to Large Sink Holes present
M SH	Medium Sink Hole present
Decked over	The bulkhead is covered by a deck
Perp.	Perpendicular
SW	Sidewalk
Sett.	Settlement or Settled
BH	Bulkhead
6/7	near the property line shared by lots 6 & 7
J	Joint
J elev.	Joint elevated or forced out of place
V	Void, generally under the sidewalk
mtrl	material
comp	compressed
Mod	Moderate
Cap	Bulkhead Cap Damage
Min	Minor or Minimum
Sep	Separated or Separation
T&G	Tongue and Groove Connection

APPENDIX B

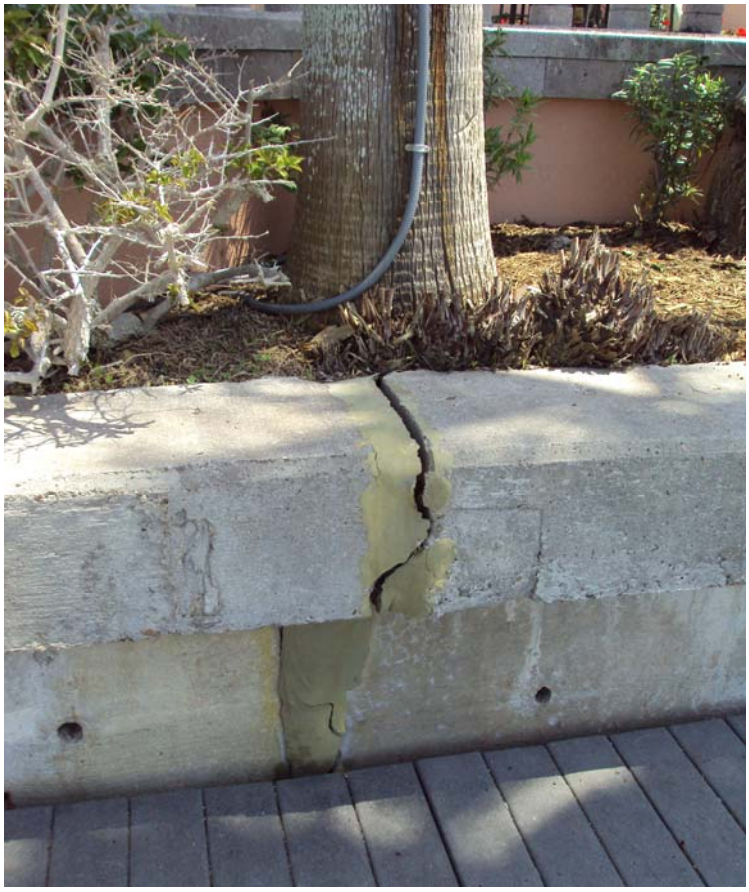
PHOTOGRAPHS
&
CD COPY

1. Lot 20, Block 3 – Rust Stains (1 - Good)

2. Lot 42, Block 3 – Minor/Shrinkage Cracks (1 - Good)

3. Lot 16, Block 3 – Minor Cap Damage (2 - Satisfactory)

4. Lot 27, Block 3 – Panel Shift (2 - Fair)



5. Lot 6, Block 2 – Joint and Panel Damage (3 - poor)

6. Lot 2, Block 1 – Small Sinkhole at Corner (3 - Fair)

7. Lot 4, Block 3 – Major Cap Damage (4 - Poor)

8. Lot 3, Block 3 – Major Cap Damage (4 - Poor)

9. Lot 3, Block 3 – Settlement and Void below Concrete (4 - Poor)

10. Lot 22, Block 3 – Cap Joint Material missing and Large Sinkhole behind Bulkhead (4 - Poor)

11. Lot 14, Block 3 – Foundation Failure and Moderate Cap Damage (5 - Critical)

12. Lot 14, Block 3 – Foundation Failure (5 - Critical)

13. Lot 1, Block 2 – Large Sinkhole (4 - Poor)

14. Lot 2, Block 2 – Cracked Bulkhead Panel (4 - Serious)

APPENDIX C

SUMMARY OF BULKHEAD CONDITION

Mustang Beach Unit II
Summary of Bulkhead Condition

Condition of Lots in Block 1							
5 - Critical	4 - Serious	4 - Poor	3 - Poor	3 - Fair	2 - Fair	2 - Satisfactory	1 - Good
		6		1	3		
				2			
				4			
				5			

Condition of Lots in Block 2							
5 - Critical	4 - Serious	4 - Poor	3 - Poor	3 - Fair	2 - Fair	2 - Satisfactory	1 - Good
	2*	1	4	3*	5	2*	
	3*	9	6		7		
					8		

Condition of Lots in Block 3							
5 - Critical	4 - Serious	4 - Poor	3 - Poor	3 - Fair	2 - Fair	2 - Satisfactory	1 - Good
14		1	6	2	13	7	18
		3	40	9	15	8	19
		4	41	10	27	11	20
		5		12	28	16	42
		22		26	38	17	
				35		21	
				36		23	
				39		24	
						25	
						29	
						30	
						31	
						32	
						33	
						34	
						37	

Condition	Recommendation
5 - Critical	Repair with the highest priority
4 - Serious	Repair ASAP
4 - Poor	Repair is required
3 - Poor	Repair in the near future
3 - Fair	Maintenance recommended
2 - Fair	May need maintenance in the future
2 - Satisfactory	Little or No Maintenance required
1 - Good	No Maintenance required
#	Undeveloped Lots

*	Alternate Rating due to Isolated Condition

APPENDIX D

COST ESTIMATE

PROJECT:	MUSTANG BEACH UNIT II BULKHEAD INVESTIGATION				
UE Job No.	42390.00.00				
	ESTIMATED COST FOR VARIOUS ITEMS OF REPAIR				
	Item Description	**Unit**	**Unit Price**		
1	Remove Concrete Sidewalk/Patio	SF	$6.00		
2	Replace Concrete Sidewalk/Patio	SF	$7.50		
3	Remove & Replace Decking	SF	Varies Depending on Material		
4	Remove & Replace Landscaping	Lot	Varies Depending on Material		
5	Jet Filter Fabric	Joint	$500.00		
6	Cap Joint Repair	EA	$200.00		
7	Remove and Replace Bulkhead Cap	LF	$200.00		
	ESTIMATED AVERAGE COST TO REPAIR TYPICAL LOTS AND ENTIRE SUBDIVISION				
	Item Description	**Qty**	**Unit**	**Unit Price**	**Subtotal**
1	Improved lot with a rating of Serious or Critical	2	Lot	$100,000.00	$200,000.00
2	Improved lot with a rating of Poor	9	Lot	$30,000.00	$270,000.00
3	Improved lot with a rating of Fair	19	Lot	$5,000.00	$95,000.00
4	Improved lot with a rating of Satisfactory	13	Lot	$500.00	$6,500.00
5	Undeveloped lot with a rating of Poor	4	Lot	$10,000.00	$40,000.00
6	Undeveloped lot with a rating of Fair or Better	10	Lot	$1,000.00	$10,000.00
7	15% Contingency	1	LS	$93,225.00	$93,225.00
		57	Lot	Total =	$714,725.00
Note: Item 1 can vary greatly depending on the required repair. Further subsurface investigation is required.					

APPENDIX E

DATA CHARTS

MUSTANG BEACH UNIT II
BULKHEAD INVESTIGATION

UE Job No. 42390.00.00

Lot	Block	Developed	Bulkhead Condition	Picture #	Plat Length @ Bulkhead	Water Depth, in	Mudline Depth, in	Comments
1	1	Y	3 - Fair	7062 - 7072	167.24	36	93	Mod Cap, Panel damage @ Corner of House on top of Cap, Rebar visible, Corners cracked, Min sett.
2	1	Y	3 - Fair	7059 - 7061	90.00			Min Cracks, Cap separation, S-SH @ Stairs
3	1	Y	2 - Fair	7055 - 7058	90.00			Min Cracks, Min sett, no mtrl loss
4	1	Y	3 - Fair	7052 - 7054	90.01			Min Cracks, Panel damage, 1/2" sett, 4" of mtrl loss
5	1	Y	3 - Fair	7049 - 7051	55.00			Min Cracks, Mod Cap, Panel shift, 3/4" sett, S-SH
6	1	Y	4 - Poor	7045 - 7048	114.80			Maj Cap along Bayside St., Storm Sett, 33" deep M-SH, Min Cracks, Panel J caulked except every 4th J - rope
1	2	N	4 - Poor	7038 - 7044	203.01			3 S & 3 M-SH, Min Cracks, Mod Cap & Panel damage
2	2	Y	2 - Satisfactory*	7036 - 7037	90.00			*4 - Serious: Panel cracked Horiz at WL between Lots 2 and 3; Min Cracks, Pool at 1.5' from BH, chipped Cap
3	2	Y	3 - Fair*	7030 - 7035	106.42			*4 - Serious: Panel cracked Horiz at WL between Lots 2 and 3; Corner panel cracks, Pool at BH line
4	2	Y	3 - Poor	7026 - 7029	163.38		100	Min Cracks, L-SH & Cap/Panel separation @ sett in veg, Corner Cap Cracks
5	2	Y	2 - Fair	7022 - 7025	131.25			Cap sett = 1/2", SW cracking, Min Cap/Panel cracks
6	2	Y	3 - Poor	7013 - 7021	160.90			J & Panel Damage, S-SH near Palm, Cap sett = 1/2", Cap cracks, Panel shifts, M-SH @ corner, Cap/Joint separation due to Palm roots?, Panel T&G damage, Maj Cap damage
7	2	N	2 - Fair	7010 - 7012	84.56		83	Min cracks, S-SH due to irrigation lines?, Cap damage
8	2	N			56.70			
9	2	Y	4 - Poor	7008 - 7009	105.98			Maj Cap damage, Maj SW Sett ~3", Storm sett, Min Cap crack & sett ~ 1/2"
1	3	Y	4 - Poor	7003 - 7008	118.88	34	68	Minor SW settlement; Cap Settlement, Maj Cap Damage along Channel
2	3	Y	3 - Fair	7000 - 7002	102.93			SW settlement 1/2" - 1-1/4"; Cap and Panel Cracks
3	3	Y	4 - Poor	6995 - 6999	154.56		34	Maj Cap Damage, SW Sett 1"-2", L-SH @ corner, Sett of Fish Stand - possible M-SH, crack in panel
4	3	Y			117.67			
5	3	Y	4 - Poor	6976 - 6977, 6982 - 6994	169.34		72	Min Cap, Min SW sett @ NE corner, Cap/Panel sep, Maj Cap damage, 1" SW sett, Min shift of Panels
6	3	Y	3 - Poor	6973 - 6975, 6978 - 6981	90.52			Cap cracked @ corner elevation change
7	3	Y	2 - Satisfactory	6971 - 6972	70.00			Min shift in panel alignment
8	3	Y	2 - Satisfactory	6969 - 6970	91.64		51	Min cracks
9	3	Y	3 - Fair	6961 - 6968	149.65			Min cracks, Cap J missing x2, Tree growing between Panel J, S-SH due to irrigation lines
10	3	Y			105.12			
11	3	Y	2 - Satisfactory	6957 - 6960	60.00			Min cracks, Separate Concrete wall has a L-SH, but doesn't appear to be part of the original BH
12	3	Y	3 - Fair	6954 - 6956	60.00			Rust on Cap, Min cracks, Cap & Panel sep, T&G broken
13	3	Y	2 - Fair	6949 - 6953	60.00			Min to Mod Cap cracks and damage, rust apparent
14	3	Y	5 - Critical	6929 - 6948	60.00			Mod Cap cracks & damage due to boat lift loading, Maj Structural damage on Conc walls and foundation
15	3	Y	2 - Fair		60.00			Min cracks, veg within J mtrl
16	3	N	2 - Satisfactory	6926 - 6928	60.00			Min cracks, Min Cap damage
17	3	Y	2 - Satisfactory	6923 - 6925	60.00			Min cracks, Panel 1/2" shift, rust spots, Min Cap damage
18	3	N	1 - Good	6920 - 6922	60.00			Min cracks, No visible damage
19	3	N	1 - Good	6916 - 6919	60.00		63	Min cracks, No visible damage
20	3	N	1 - Good	6913 - 6915	60.00			Little evidence of Rust

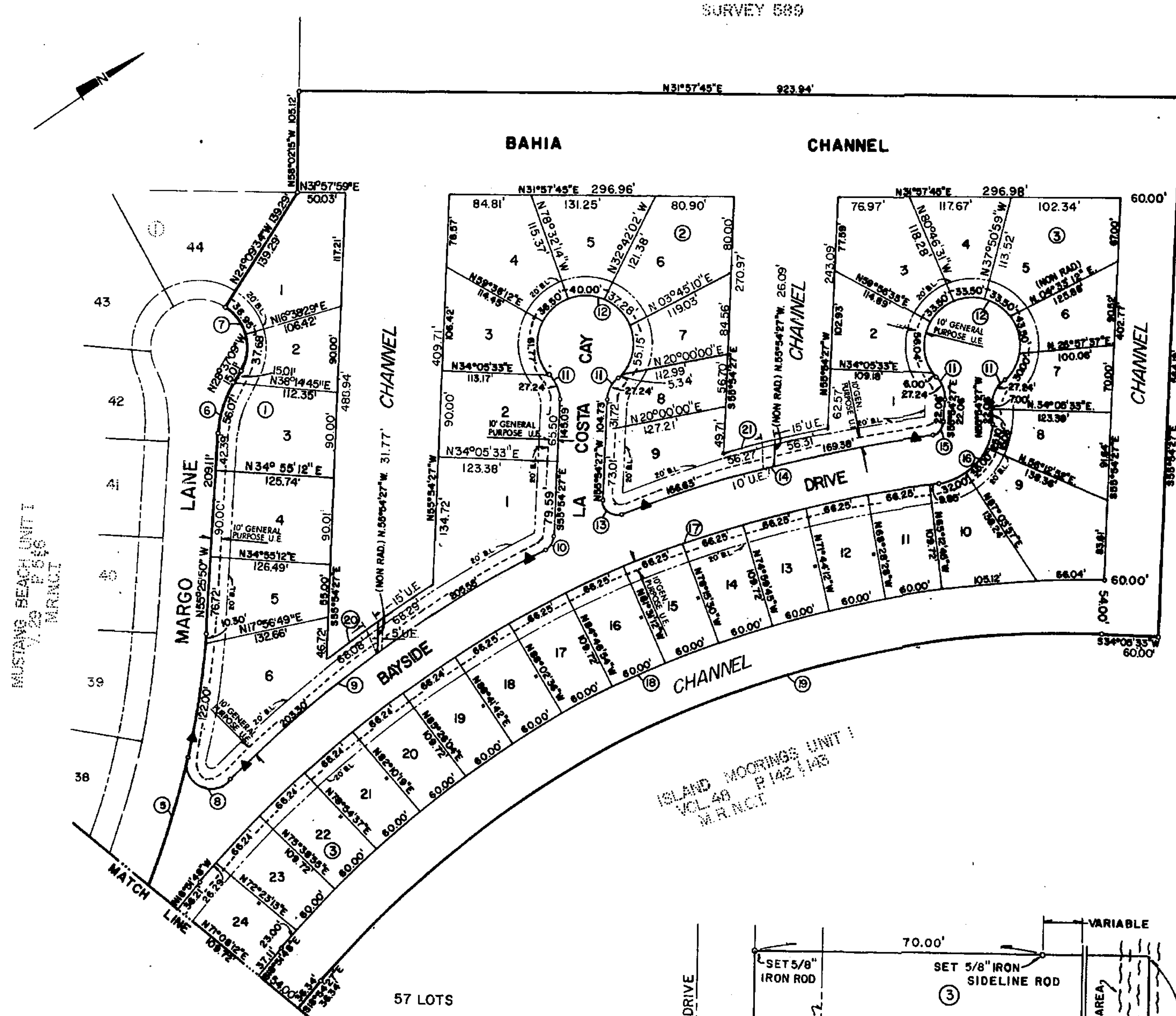
MUSTANG BEACH UNIT II
BULKHEAD INVESTIGATION

UE Job No. 42390.00.00

Lot	Block	Developed	Bulkhead Condition	Picture #	Plat Length @ Bulkhead	Water Depth, in	Mudline Depth, in	Comments
21	3	Y	2 - Satisfactory	6907 - 6912	60.00			Min cracks
22	3	N	4 - Poor	6902 - 6906	60.00		>96	L-SH @ J 10' from corner, M-SH, J mtrl missing, Tie-back
23	3	Y	2 - Satisfactory	6899, 6901	60.00			Min cracks, rust
24	3	N	2 - Satisfactory	6898, 6900	60.11	2	63	Min cracks, Panel 1/2" shift, min J mtrl loss
25	3	Y	2 - Satisfactory	6894 - 6897, 6899	61.00			Min Cracks, Panel 1/2" shift
26	3	Y	3 - Fair	6890 - 6893	61.00		66	Min cracks, Panel 1/2" shift, S-SH @ utility line through BH
27	3	Y	2 - Fair	6888 - 6889	61.00			Min Cracks, Panel shift
28	3	N	2 - Fair	6886 - 6887	61.00			Possible S-SH or plant void, J mtrl missing
29	3	N	2 - Satisfactory	6883 - 6885	61.00			Min cracks, BH not very accessible
30	3	Y	2 - Satisfactory	6882	61.00		63.5	Min Cracks, Panel 1/2" shift, conc or debris on cap
31	3	Y	2 - Satisfactory	6880 - 6881	61.00			Min Cap cracks, covered by deck
32	3	Y	2 - Satisfactory	6876 - 6879	61.00		60	Minor cracks
33	3	Y	2 - Satisfactory	6875	61.00			Min Cap and Panel cracks
34	3	Y			59.90			
35	3	Y	3 - Fair	6869 - 6874	59.95		60	J mtrl missing, Min cracks, Panel 1.25" shift and sep, V @ utility insertion points in foundation
36	3	Y			59.94			
37	3	Y	2 - Satisfactory	6866 - 6868	59.94			Min cracks, Foundation adjacent and above BH
38	3	Y	2 - Fair	6863 - 6865	61.99	0	57	Min cracks, Min Panel shifting, Min Cap damage, Rebar dowels fused into Cap
39	3	Y	3 - Fair	6860 - 6862	62.00			Min cracks, Min Panel shifts, SH may be present beneath
40	3	N	3 - Poor	6858 - 6859	65.00			Mod Cap damage, rust, Pane shift, S-SH
41	3	N	3 - Poor	6856 - 6857	50.79	52.25		2 M-SH covered with conc, Min cracks, rust
42	3	N	1 - Good	6855	15.00	35		Min cracks
					83.56			

APPENDIX F

RECORDED PLATS



CURVE DATA

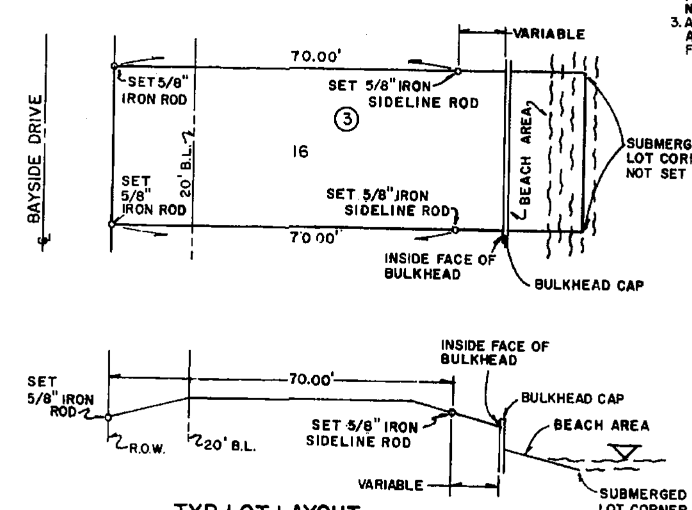
Curve	Δ	R	T	L
5	36°03'23"	828.76'	273.47'	528.29' (T.C.)
6	26°47'14"	119.93'	28.56'	56.07'
7	85°30'58"	50.00'	46.23'	74.63'
8	147°37'03"	25.00'	86.10'	64.41'
9	19°18'07"	1213.72'	206.40'	408.88'
10	61°08'22"	15.00'	8.86'	16.01'
11	45°14'23"	34.50'	14.38'	27.24'
12	270°28'46"	50.00	—	236.04'
13	114°40'53"	15.00'	23.40'	30.02'
14	15°51'43"	1213.72'	169.09'	336.01'
15	81°10'50"	15.00'	12.85'	21.25'
16	81°10'50"	65.00'	55.69'	92.10'
17	44°10'50"	1163.72'	472.31'	897.34'
18	52°57'21"	1054.00'	525.00'	974.16'
19	53°00'00"	1000.00'	498.56'	925.03'
20	06°18'28"	1238.72'	68.25'	136.37'
21	05°12'26"	1238.72'	56.33'	112.58'

SQUARE FOOTAGE OF LOTS

Lot No.	Sq. Ft.	Lot No.	Sq. Ft.
BLOCK 1		BLOCK 3 Cont.	
1	11,846.07	6	6,917.54
2	7,221.56	7	7,151.57
3	11,504.34	8	8,255.87
4	11,350.43	9	12,195.84
5	9,424.65	10	8,311.71
6	18,023.38	11	6,925.65
		12	6,925.67
BLOCK 2		13	6,925.65
		14	6,925.65
1	17,142.58	15	6,925.68
2	11,026.25	16	6,925.68
3	8,359.54	17	6,925.65
4	11,484.53	18	6,925.67
5	9,164.91	19	6,924.80
6	11,593.42	20	6,925.65
7	6,832.07	21	6,925.68
8	6,894.82	22	6,925.68
9	11,779.72	23	6,925.56
		24	6,726.19
BLOCK 3			
1	10,500.84		
2	7,929.81		
3	10,724.05		
4	7,570.95		
5	12,403.32		

100 0 100 200
GRAPHIC SCALE IN FEET

GENERAL NOTES:
1. 5/8" IRON RODS SET AS SHOWN.
2. ▲ - INDICATES REFERENCE POINTS WHICH ARE 5/8" X 24" LONG IRON RODS SET 20' FROM PROPERTY CORNERS AND BURIED 1.0' BELOW NATURAL GROUND.
3. ALL STRUCTURES WILL BE REQUIRED TO HAVE A FLOOD PERMIT FROM NUECES COUNTY. THE FLOOD ELEVATION IS 8.0.



TYP. LOT LAYOUT
N.T.S.

No. 357568
FILED FOR RECORD
AT 1:17 O'CLOCK P.M.
Jan. 20, 1984
MARION UEHLINGER
CLERK COUNTY COURT,
NUECES COUNTY, TEXAS.
BY [signature]
DEPUTY

STATE OF TEXAS
COUNTY OF NUECES

I, NIXON M. WELSH, REGISTERED PUBLIC SURVEYOR OF OGLETREE, GUNN, BYRNE, WELSH & HUBNER, HEREBY CERTIFY THAT THE FOREGOING PLAT WAS PREPARED FROM SURVEYS MADE ON THE GROUND UNDER MY DIRECTION AND IS TRUE AND CORRECT; THAT OGLETREE, GUNN, BYRNE, WELSH & HUBNER HAS BEEN ENGAGED UNDER CONTRACT TO SET ALL CORNERS AS SHOWN AND TO COMPLETE SUCH OPERATIONS WITHOUT DELAY.

THIS THE 9th DAY OF December, 1983.

[signature]
NIXON M. WELSH
TEXAS LICENSE #2211

STATE OF TEXAS
COUNTY OF NUECES

This is to certify that the attached plat and subdivision complies with all rules and regulations of the Commissioner Court of Nueces County, in effect this the 13th day of January, 1984.

[signature]
County Engineer

STATE OF TEXAS
GERALD R. SCALF
19989
REGISTERED PROFESSIONAL ENGINEER

PLAT OF

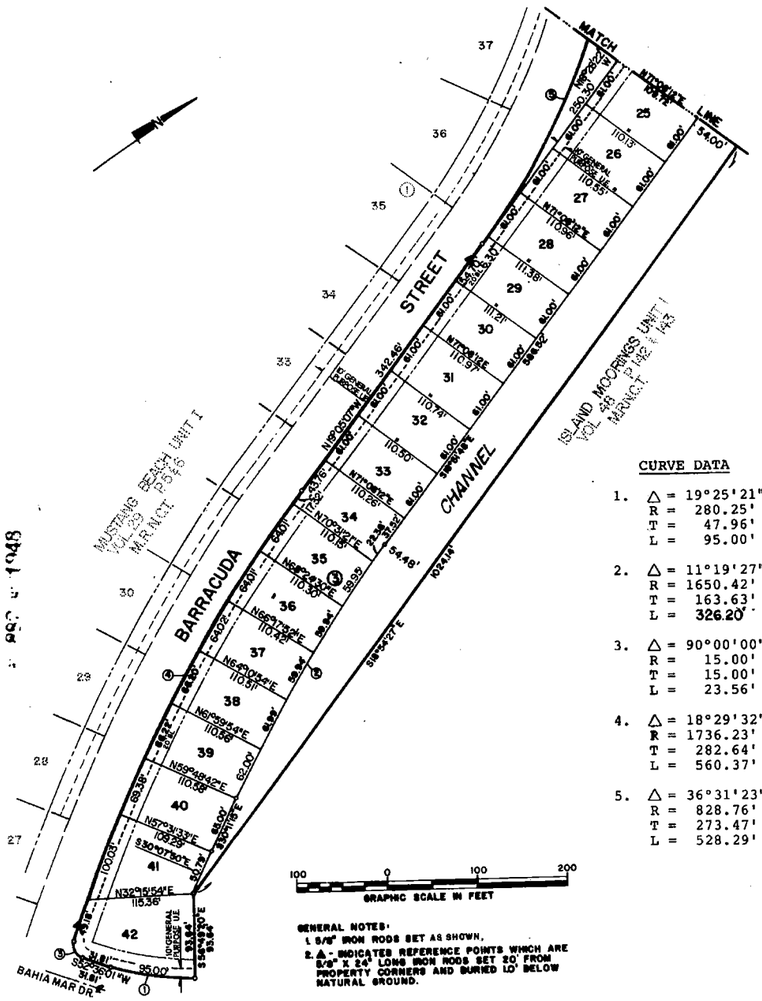
MUSTANG BEACH UNIT II

NUECES COUNTY, TEXAS

OGLETREE, GUNN, BYRNE, WELSH AND HUBNER
ENGINEERS AND PLANNERS
BOX 3551 (512) 883-7244
CORPUS CHRISTI, TEXAS 78404

DATE: 12-9-83
SHEET: 2 OF 2
JOB NO: 89-78050
[initials] 12-9-83

Vol 49 Pg. 89



GENERAL NOTES:
1. 5/8" IRON RODS SET AS SHOWN.
2. ▲ - INDICATES REFERENCE POINTS WHICH ARE 5/8" X 24" LONG IRON RODS SET 10' FROM PROPERTY CORNERS AND BURIED 10' BELOW NATURAL GROUND.

CURVE DATA

1. △ = 19°25'21"
   R = 280.25'
   T = 47.96'
   L = 95.00'
2. △ = 11°19'27"
   R = 1650.42'
   T = 163.63'
   L = 326.20'
3. △ = 90°00'00"
   R = 15.00'
   T = 15.00'
   L = 23.56'
4. △ = 18°29'32"
   R = 1736.23'
   T = 282.64'
   L = 560.37'
5. △ = 36°31'23"
   R = 828.76'
   T = 273.47'
   L = 528.29'

STATE OF TEXAS
COUNTY OF NUECES

I, C.L. CASTOR, JR., GENERAL PARTNER OF MUSTANG BEACH, LTD., A TEXAS LIMITED PARTNERSHIP, HEREBY CERTIFY THAT I AM THE OWNER, SUBJECT TO A LIEN IN FAVOR OF PARKDALE BANK, OF THE LAND EMBRACED WITHIN THE BOUNDARIES OF THE FOREGOING PLAT; THAT I HAVE HAD SAID LAND SURVEYED AND SUBDIVIDED AS SHOWN HEREON; THAT ALL STREETS AS SHOWN ARE HEREBY DEDICATED TO THE PUBLIC USE FOREVER; AND THAT ALL EASEMENTS AS SHOWN ARE HEREBY DEDICATED TO THE PUBLIC USE FOREVER; AND THAT THIS PLAT WAS MADE FOR THE PURPOSE OF DESCRIPTION AND DEDICATION.

THIS THE 15th DAY OF December, 1983.

STATE OF TEXAS
COUNTY OF NUECES

C.L. CASTOR, JR., GENERAL PARTNER

BEFORE ME, THE UNDERSIGNED AUTHORITY, ON THIS DAY, PERSONALLY APPEARED C. L. CASTOR, JR., KNOWN TO ME TO BE THE PERSON WHOSE NAME IS SUBSCRIBED TO THE FOREGOING INSTRUMENT AND ACKNOWLEDGED TO ME THAT HE EXECUTED THE SAME FOR THE PURPOSES AND CONSIDERATIONS THEREIN EXPRESSED AND IN THE CAPACITY STATED.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, THIS THE ____ DAY OF ____, 19__.

NOTARY PUBLIC IN AND FOR
NUECES COUNTY, TEXAS

STATE OF TEXAS
COUNTY OF NUECES

WE, PARKDALE BANK, GEORGE HORNER, JR., VICE PRESIDENT, HEREBY CERTIFY THAT WE ARE THE HOLDERS OF A LIEN ON THE LAND EMBRACED WITHIN THE BOUNDARIES OF THE FOREGOING MAP, OF WHICH C.L. CASTOR, JR., IS THE OWNER, AND THAT WE APPROVED THE SUBDIVISION AND DEDICATION OF SAME FOR THE PURPOSES AND CONSIDERATIONS THEREIN EXPRESSED.

PARKDALE BANK

George Horner Jr.
GEORGE HORNER, JR., VICE PRESIDENT

STATE OF TEXAS
COUNTY OF NUECES

BEFORE ME, THE UNDERSIGNED AUTHORITY, ON THIS DAY, PERSONALLY APPEARED, GEORGE HORNER, JR., VICE PRESIDENT OF PARKDALE BANK, KNOWN TO ME TO BE THE PERSON AND OFFICER WHOSE NAME IS SUBSCRIBED TO THE FOREGOING INSTRUMENT AND ACKNOWLEDGED TO ME THAT THE SAME WAS THE ACT OF THE SAME PARKDALE BANK AND THAT HE EXECUTED THE SAME AS THE ACT OF THE SAME PARKDALE BANK FOR THE PURPOSES AND CONSIDERATIONS THEREIN EXPRESSED AND IN THE CAPACITY STATED.

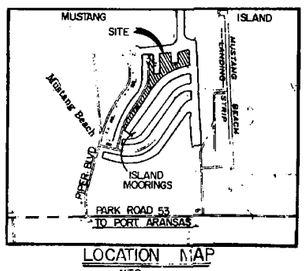
GIVEN UNDER MY HAND AND SEAL OF OFFICE, THIS THE 5 DAY OF January, 1984.

Connie Davila
NOTARY PUBLIC IN AND FOR
NUECES COUNTY, TEXAS

CONNIE DAVILA
Notary Public, State of Texas
My Commission Expires 8-6-85

SQUARE FOOTAGE OF LOTS

LOT NO.	SQ. FT.	LOT NO.	SQ. FT.
BLOCK 3		BLOCK 3 CONT.	
25	6,705.30	34	6,663.90
26	6,730.65	35	6,832.22
27	6,756.01	36	6,839.80
28	6,781.38	37	6,846.34
29	6,790.75	38	7,085.29
30	6,776.55	39	7,089.08
31	6,762.13	40	7,399.92
32	6,747.72	41	8,106.96
33	6,733.30	42	10,476.19



LOCATION MAP
N.T.S

PLAT OF
MUSTANG BEACH UNIT II
NUECES COUNTY, TEXAS

Being 19.795 acres of land, more or less, out of state land survey 587, Mustang Island, Nueces County, Texas.

OGLETREE, GUNN, BYRNE, WELSH AND HUBNER
ENGINEERS AND PLANNERS
BOX 3551 (512) 883-7244
CORPUS CHRISTI, TEXAS 78404

DATE: 12-9-83
SHEET: 1 OF 2
JOB NO: 89-78050

STATE OF TEXAS
COUNTY OF NUECES

I, Marion Uehlinger, Clerk of the Commissioners Court of Nueces County, Texas, hereby certify that the foregoing map was approved and accepted by said Court on the 13th day of JANUARY, 1984, as shown by order of record in the minutes of said court in Volume 43, Page 228.

Witness my hand and seal of said Court at office in Corpus Christi, Texas, this the 16th day of JANUARY, 1984.

Marion Uehlinger
Marion Uehlinger, Clerk of the Commissioners Court, Nueces County, Texas

STATE OF TEXAS
COUNTY OF NUECES

The plat of the herein described property is/~~is not~~ recommended for approval by the undersigned City Engineer.

Date 1-4-84

Robert D. Hutchison
City Engineer
City of Port Aransas, Texas

STATE OF TEXAS
COUNTY OF NUECES

This plat of the herein described property is/is not recommended to the City Council for final approval by the Planning Commission of the City of Port Aransas, Texas.

Date 1484

Chairman
City Planning Commission
City of Port Aransas, Texas

STATE OF TEXAS
COUNTY OF NUECES

This plat of the herein described property is approved for filing for record in Nueces County, Texas, by the City Council of the City of Port Aransas, Texas, in accordance with the Land Subdivision Ordinance of the City of Port Aransas and Article 974a, Vernon's Texas Civil Statutes.

Date 1.4.84

Mayor, City of Port Aransas, Texas

City Secretary

STATE OF TEXAS
COUNTY OF NUECES

I, MARION UEHLINGER, CLERK OF THE COUNTY COURT IN AND FOR SAID COUNTY DO HEREBY CERTIFY THAT THE FOREGOING INSTRUMENT DATED THE 13 DAY OF December, 1983, WITH ITS CERTIFICATE OF AUTHENTICATION, WAS FILLED FOR RECORD IN MY OFFICE THE 20 DAY OF JANUARY, 1984, AT 1:17 O'CLOCK P .M. AND DULY RECORDED THE 20 DAY OF JANUARY, 1984, AT 2:10 O'CLOCK, P .M. IN THE MAP RECORDS OF SAID COUNTY IN VOLUME 49, PAGE(S) 89-90.

WITNESS MY HAND AND SEAL OF THE COUNTY COURT IN AND FOR SAID COUNTY AT OFFICE IN CORPUS CHRISTI, NUECES COUNTY, TEXAS, THE DAY AND YEAR LAST WRITTEN.

BY: LeAnn R McCain
DEPUTY

Marion Uehlinger
MARION UEHLINGER,
CLERK, COUNTY COURT,
NUECES COUNTY, TEXAS

NO. 357568
FILED FOR RECORD

AT 1:17 O'CLOCK P .M.
JANUARY 20, 1984
MARION UEHLINGER, CLERK
COUNTY COURT, NUECES COUNTY, TEXAS

BY: LeAnn R McCain
DEPUTY

Vol 49 Page 88

89

APPENDIX G

SPECIFICATIONS

DIVISION 3 - CONCRETE

SECTION 3C - CAST-IN-PLACE CONCRETE

3C9[1] CAST-IN-PLACE CONCRETE BULKHEAD CAP

3C9.1 SCOPE:
This specification shall govern for work necessary for providing cast-in-place concrete bulkhead cap required to complete the project. This specification is a design specification as defined in Section 1D General Conditions Subsection "Supplemental General Conditions", Art. SC-1 Definitions.

3C9.2 GENERAL:

3C9.2.1 Dimensions:
All caps shall be of the shape, size and section in accordance with the strength requirement as shown on the drawings.

3C9.3 MATERIAL:

3C9.3.1 Concrete:
Concrete shall have a minimum compressive strength of 4000 p.s.i. (unless shown otherwise on the drawings) and shall be in accordance with Section 3C1-"Normal Weight Aggregate Concrete". The concrete shall have low permeability, high durability and have a 0.40 WCR or less. No limestone shall be used.

3C9.3.2 Steel:
All mild steel reinforcement shall meet the requirement specified in Section 3B -"Concrete Reinforcement" and 3.C.9.3.4.

3C9.3.3 Admixtures: Admixtures to be used in concrete shall be subjected to prior approval by the Engineer.

3C9.3.4 DYWIDAG Threadbars:
All reinforcing steel used in the bulkheading and deadmen system, shall be epoxy coated by the electrostatic spray method. Coating shall be applied in strict accordance with ASTM A 775-81, Standard Specification for Epoxy Coated Reinforcing Bars. The coating material shall be Scotchkote Brand Fusion Bonded Epoxy Coating 213, manufactured by 3M, St. Paul, Minnesota. Coating that is damaged after delivery to the site shall be repaired with Scotchkote 213 PC patching material in accordance with the manufacturer’s recommendations. If the coating is damaged during unloading or placing, the Contractor shall make repairs with the patching material. If the possibility of holidays exist, the Engineer may require the Contractor to check the coated rebar with a 97.5 volt D.C. holiday detector and repair any holidays found. The sheared ends of epoxy coated rebar shall be coated after fabrication with epoxy patching compound.

3C9.4 CONSTRUCTION METHOD:

3C9.4.1 Curing:
The concrete bulkhead caps shall be cured in accordance with standard acceptance practice caps shall not be moved or handled prior to a minimum curing period of 14 days or may be moved in 7 days at Contractor's risk.

3C9.4.2 Setting Cap, Deadman, and Tie-Back:
Bulkhead cap shall be formed in place with tie back embedded per the construction drawings. The deadman shall be cast in place or precast per the Contractor's option. Construct concrete deadman anchors as shown on the drawings. Cast side closest to bulkhead and bottom against undisturbed soil. Form backside and top. Backfill and compact as specified. The Contractor shall insure that the tie backs are taut between cap and anchor. The rods shall be encased in 1" inside diameter Polyethylene pipe. Polyethylene pipe must be embedded the full length and must remain undamaged throughout.

3C9.5 HANDLING AND DELIVERY:
The method of handling and delivering of all caps shall be in such a manner that it minimizes the danger of fracture by impact or undue bending stresses. Any broken or cracked caps shall be rejected unless approved by an Engineer. Where site storage is necessary, provide level, sound surface prepared in manner to prevent damage or undue strains to piles.

3C9.6 EPOXY GROUT CONCRETE REPAIR:
Not less than 30 minutes, nor more than 5 hours prior to application of epoxy grout, completely clean surfaces to be repaired. The Contractor shall thoroughly clean all surfaces with methods subject to the approval of the Engineer. Each crack shall be chipped out using a pneumatic air hammer as manufactured by Chicago Pneumatic No. 9310 or approved equal. Cracks shall be chipped out in a V shaped manner, 1" - 1-1/2" maximum. Brush blast spalled or damaged concrete to remove excess flakes and dust. Clean surface by washing with a 10 percent solution of muriatic acid. The surface shall be rinsed with fresh water and allowed to dry thoroughly before applying the epoxy grout. The Contractor shall use one convenient location for storing and mixing of epoxy grout materials, and keep an approved type fire extinguisher available in this area. The Contractor shall protect all areas where epoxy grout material is stored and shall remove oily rags and waste from buildings at close of each day. Epoxy grouting shall not be accomplished when either the surface or ambient temperatures are less than 50 degrees Fahrenheit; or when temperature drop of 20 degrees, or below 50 degrees Fahrenheit is forecast. Epoxy grouting shall not be accomplished during misty or rainy weather, or on surface that have any frost or moisture. Epoxy grout shall be applied by skilled workmen. Material may applied with trowel, putty knife or similar tool to fill cracks and for resurfacing. Application shall be in accordance with manufacturer's recommendations.

3C9.7 EPOXY GROUT MATERIAL:

a. Fill all cracks with Patch All Special as manufactured by Dewey Supply, Inc., Corpus Christi, Texas. Leave "fitting" openings in epoxy grout every 24" o.c. such that "fitting" for injection can be made into the concrete cracks. Openings shall be such that "fitting" is flush and tight.

b. Epo Bond as manufactured by Dewey Supply, Inc. shall be injected into the cracks by use of "fitting" through the openings. Application procedure shall be in strict accordance with manufacturer's design recommendations.

c. If water seepage is present, fill bottom 1/4" V Section with lead wood to prevent seepage, then apply the Patch All Special followed by the Epo Bond injection.

d. or an approved equal.

3C9.8 DRYING TIME:
Allow through drying of each application before succeeding with another. Allow full drying time between applications, as specified by the manufacturer.

3C9.9 COVERAGE: Shall be as recommended by the manufacturer.

3C9.10 DELIVERY OF EPOXY GROUT MATERIAL:
Contractor shall deliver material to the site in original, unbroken, sealed containers, with manufacturer's label attached.

3C9.11 CLEANING:
Upon completion of epoxy grouting operations, the Contractor shall clean off spots, oil and stain from all surfaces and leave entire project in perfect condition as far as epoxy grouting work is concerned. Remove from premises all containers and debris resulting from this operation.

3C9.12 TESTING:

Owner shall require one concrete cylinder test per day unless directed otherwise by the Engineer. Contractor will make appropriate notification to testing laboratory. Cost of such testing shall be borne by the Owner. The cost of all retesting due to failure shall be borne by the Contractor.

DIVISION 3 - CONCRETE

SECTION 3F - EPOXY GROUT

3F1[1] EPOXY GROUT CONCRETE REPAIR

3F1.1 SCOPE:

This section shall govern for all work necessary to accomplish all Epoxy Grout Concrete Repairs to existing concrete structures as directed by the Engineer. This specification is a performance specification as defined in Section 1D General Conditions, Subsection "Supplemental General Conditions", Art. SC-1 Definitions. The Contractor shall include in his bid the cost to repair linear feet of crack.

3F1.2 GENERAL:

3F1.2.1 Workmanship:

All work shall be done using "first class workmanship." The Engineer shall be the sole judge as to what constitutes "first class workmanship" and shall have the right to immediately stop the work covered under this section, if said work is not being done to his satisfaction. The epoxy grout repair operation shall not resume until the methods have been corrected to the Engineer's satisfaction.

3F1.3 PREPARATION OF SURFACE:

Not less than 30 minutes, nor more than 5 hours prior to application of epoxy grout, completely clean surfaces to be repaired. The Contractor shall thoroughly clean all surfaces with methods subject to the approval of the Engineer.

3F1.3.1 Concrete Preparation:

Each crack shall be chipped out using a pneumatic air hammer. Cracks shall be chipped out in a V-shaped manner, 1" to 1-1/2" maximum depth. Brush blast spalled or damaged concrete to remove excess flakes and dust. Clean surface by washing with a 10 percent solution of muriatic acid. The surface shall be rinsed with fresh water and allowed to dry thoroughly before applying the epoxy grout.

3F1.4 STORING AND MIXING OF EPOXY GROUT:

The Contractor shall use one convenient location for storing and mixing of epoxy grout materials, and keep an approved type of fire extinguisher available in this area. The Contractor shall protect all areas where epoxy grout material is stored and shall remove oily rags and waste from buildings each day.

3F1.5 WEATHER AND SITE CONDITIONS:

3F1.5.1 Temperature:

Epoxy grouting shall not be accomplished when either the surface or ambient temperatures are less than 50 degrees Fahrenheit; or when temperature of 20 degrees, or below 50 degrees Fahrenheit is forecast.

3F1.5.2 Humidity:

Epoxy grouting shall not be accomplished during misty or rainy weather, or on surface that have any frost or moisture.

3F1.6 APPLICATION PROCEDURES FOR REPAIR:

3F1.6.1 General:

Epoxy grout shall be applied by skilled workmen. Material may be applied with trowel, putty knife or similar tool to fill cracks and for resurfacing. Application shall be in accordance with manufacturer's recommendations.

3F1.6.2 Material:

a. Fill all cracks with Patch All Special as manufactured by Dewey Supply, Inc., Corpus Christi, Texas, or approved equal. Leave "fitting" for injection can be made into the concrete cracks. Openings shall be such that "fitting" is flush and tight.

b. Epo Bond as manufactured by Dewey Supply, Inc. or approved equal, shall be injected into the cracks by use of "fitting" through the openings. Application procedure shall be in strict accordance with manufacturer's design recommendations.

c. If water seepage is present, fill bottom 1/4" V section with lead wool to prevent seepage, then apply the Patch All Special followed by the Epo Bond injection.

3F1.6.3 Drying Time:
Allow thorough drying of each application before succeeding with another. Allow full drying time between applications, as specified by the manufacturer.

3F1.6.4 Coverage: Shall be as recommended by the manufacturer.

3F1.6.5 Delivery of Epoxy Grout Material:
Contractor shall deliver material to the site in original, unbroken, sealed containers, with manufacturer's label attached.

3F1.7 CLEANING:
Upon completion of epoxy grouting operations, the Contractor shall clean off all spots, oil and stain from all surfaces.

DIVISION 3 - CONCRETE

SECTION 3G - CONCRETE REPAIRS

3G1[2] BULKHEAD CAP AND PANEL JOINT REPAIR

3G1.1 SCOPE:
This specification shall govern for work necessary to accomplish the repair of the cap expansion joint and concrete panel filter fabric.

3G1.2 MATERIAL:

3G1.2.1 Filter Fabric:
Filter fabric shall be a nonwoven polypropylene engineered filtration geotextile fabric, N-series, manufactured by Nicolon Mirafi Group or approved equal.

3G1.2.2 Backer Rod:
Backer rod shall be a continuous length of flexible, round, fabricated open cell polyurethane; Denver Foam manufactured by Backer Rod Manufacturing, Inc., or approved equal.

3G1.2.3 Polyurethane Joint Sealant:
Joint sealant shall be a two-component polyurethane sealant; Chem-Calk 500 Vertical Application, manufactured by Bostik Findley, Inc., or approved equal.

3G1.2.5 Self-Leveling Epoxy Sealant:
The sealant shall be a two-component self-leveling flexible epoxy-polyurethane sealant intended for horizontal concrete joints; EP 280 Control Joint Sealant manufactured by Primeline Products Inc., or approved equal.

3G1.3 CONSTRUCTION METHODS:

3G1.3.1 Cap Joint Repair:
1. Completely remove any existing joint material and debris from cap expansion joint
2. Install 1” Backer Rod around existing rebar dowels as shown in detail
3. Apply Vertical polyurethane sealant against the outer rim of the backer rod creating a complete seal around the joint
4. Use the self-leveling epoxy sealant to fill the remaining cavity to the rim, level with the surrounding bulkhead cap
5. Follow all manufactures’ instruction and recommendations

3G1.3.2 Installation of Filter Fabric:
1. Remove any improvements (i.e. sidewalk, tile, flower beds, etc) obstructing excavation efforts, if necessary; taking cautionary measures to protect the adjacent property and bulkhead.
2. Hand dig approximately 18” to locate and expose the tie backs; continue excavation down to the waterline. In the event that existing, improperly installed filter fabric is encountered above the waterline, the contractor shall cut the portion of filter fabric that is no longer in direct contact with the concrete pilings and cap, and in lieu of Item 3, may install a section of filter fabric centered and extending 24” to either side of the joint and overlapping the existing fabric by at least six (6”) inches. The contractor shall insure that the new section of fabric is adhered with a manufactured approved adhesive or properly secured to the bulkhead in such a way as to not allow the fabric to deform, tear, or crimple during installation or backfilling efforts. The soil shall be excavated not to exceed a 3:1 slope, and shall be braced as required and when excavating deeper than five (5) feet.
3. Install the filter fabric centered and extending 24” to either side of the joint by jetting and/or excavating to four (4) feet below the mud line. The contractor shall secure the fabric in such a way as not to allow the fabric to deform, tear, or crimple during installation or backfill efforts.

4. Backfill the excavated area, by hand when necessary, ensuring the filter fabric retain its shape and orientation. The backfill material shall be GW/GP sand. The excavated material can be used if free from contaminates, foreign objects, and vegetation. Backfill shall be filled and compacted in maximum six (6) inch lifts.
5. Replace the removed improvements in a similar fashion in which they were constructed
6. Repeat this procedure for every joint within the specified lot or area

3G1.4 MEASUREMENT & PAYMENT:

3G1.4.1 Measurement:

1. Cap Joint Repair shall be measured by each joint within the specified area. This will include and consist of all labor and materials needed to complete each cap joint
2. Piling Joint Repair shall be measured by each joint within the specified area. This will include and consist of all labor and materials needed to complete each piling joint
3. Grading and restoration shall be measured by lump sum for the specified area. This shall include all labor and materials to completely restore the area to its original condition.

3G1.4.2 Payment:

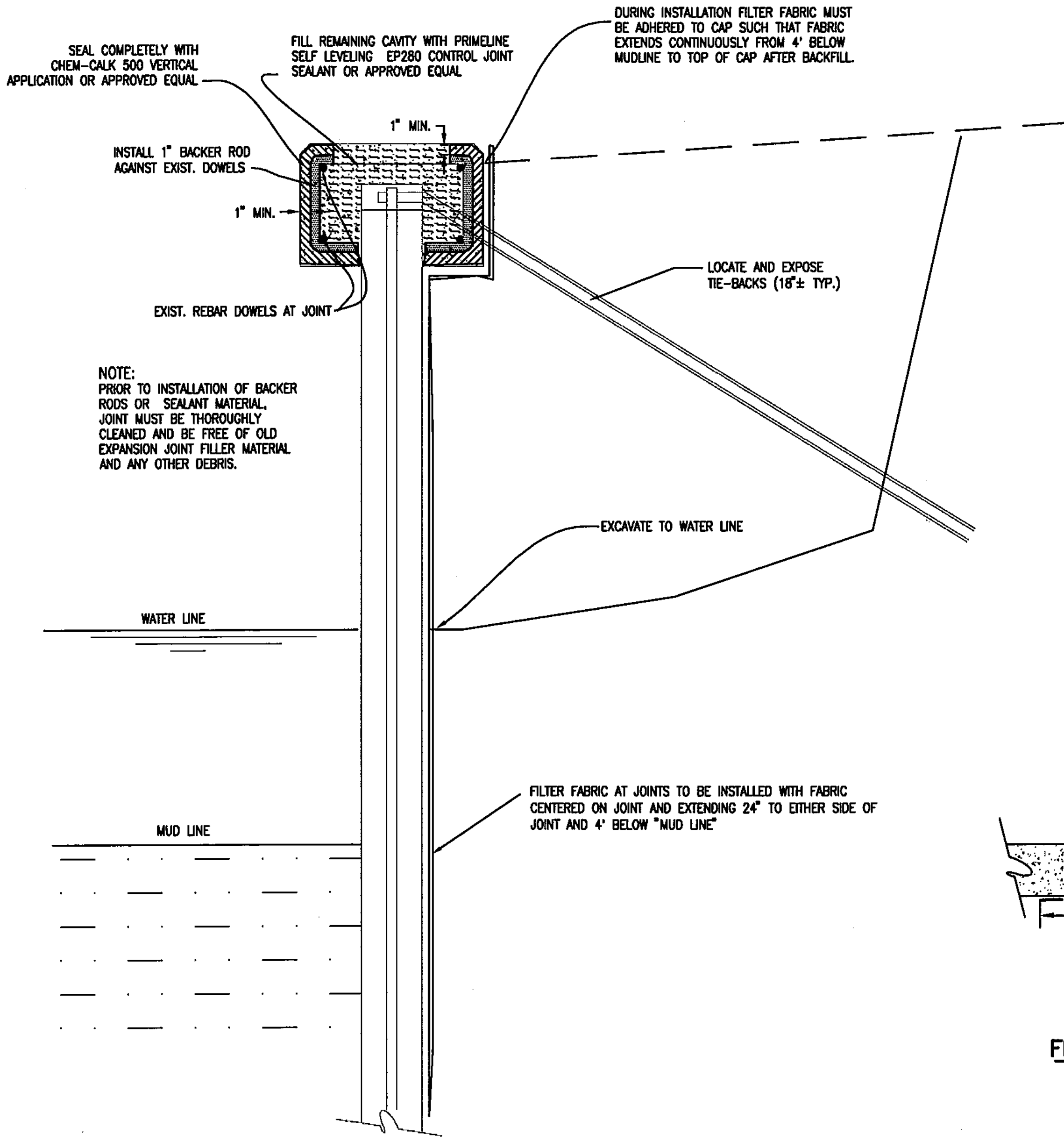
Payment shall be based on each cap and panel joint completed within the specified area. A lump sum shall be considered for the restoration needed at each site.

3G1.5 PROPOSAL

ITEM	QUANTITY	UNIT	UNIT PRICE		TOTAL
Cap Joint Repair		EA	$		$
Piling Joint Repair		EA	$		$
Restoration	1	LS	$		$
				Total:	$

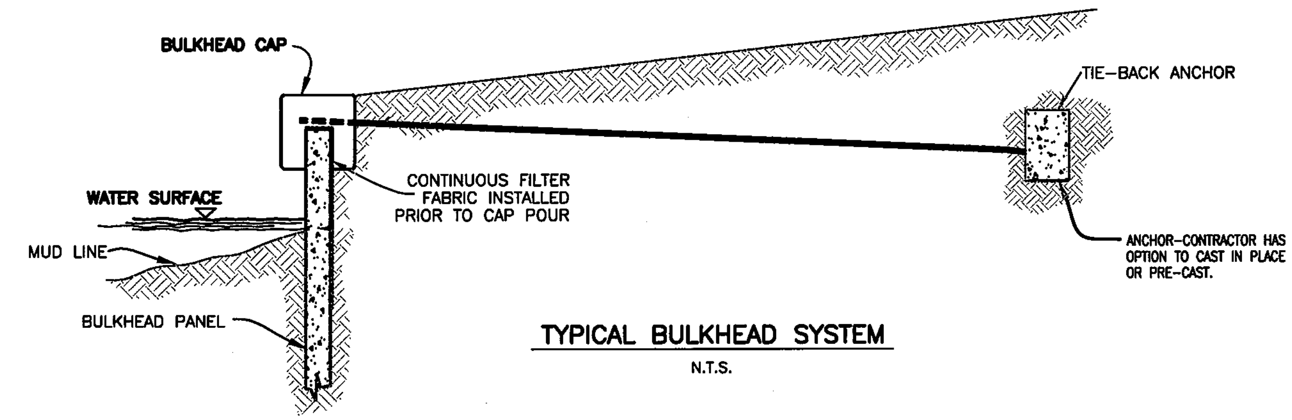
APPENDIX H

DETAILS



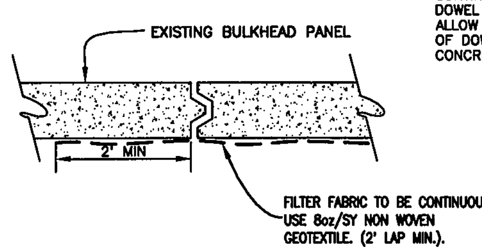
BULKHEAD CAP JOINT & FILTER FABRIC REPAIR DETAIL

N.T.S.



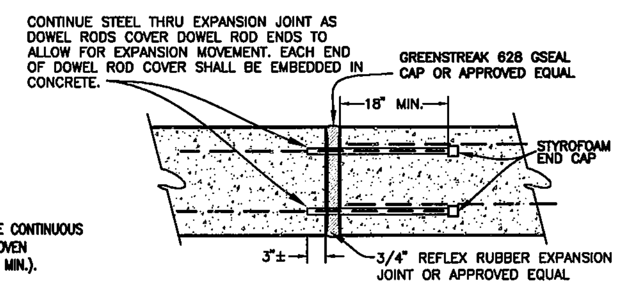
TYPICAL BULKHEAD SYSTEM

N.T.S.



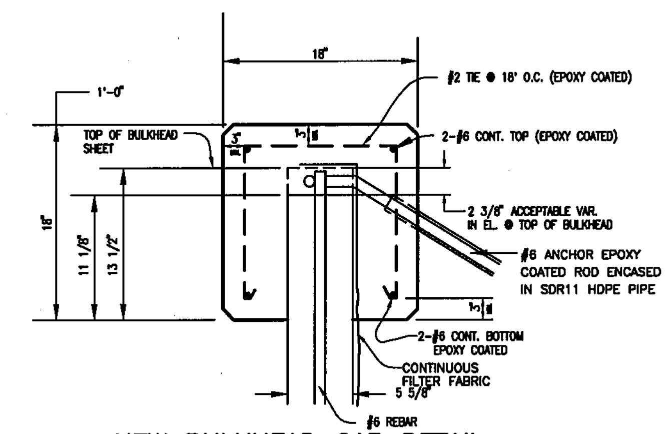
FILTER FABRIC LOCATION DETAIL

N.T.S.



NEW BULKHEAD CAP DOWEL RODS & EXPANSION JOINT DETAIL

N.T.S.



NEW BULKHEAD CAP DETAIL

N.T.S.

TIE ANCHOR ROD TO BULKHEAD THROUGH LIFTING EYE REINFORCEMENT IN ACCORDANCE WITH SPECIFICATION 03200

NOTES:

1. CONCRETE SHALL HAVE A MINIMUM STRENGTH AT TWENTY-EIGHT (28) DAYS OF 4000 P.S.I.
2. EXPANSION JOINT MATERIAL SHALL BE IN ACCORDANCE WITH ASTM. D1751-04 OR D1752-04
3. ALTERNATE METHODS OF FILTER FABRIC REPAIR ARE AVAILABLE WHEN THIS METHOD IS NOT FEASIBLE, BUT SHALL BE SUBJECT TO THE ENGINEERS APPROVAL

NOTE:
CONTRACTOR SHALL BE FULLY AND COMPLETELY LIABLE, AT HIS OWN EXPENSE, FOR DESIGN, CONSTRUCTION, INSTALLATION AND USE, OR NON-USE, OF ALL ITEMS AND METHODS INCIDENT TO PERFORMANCE OF THE CONTRACT, AND FOR LOSS, DAMAGE OR INJURY INCIDENT THERETO, EITHER TO PERSON OR PROPERTY, INCLUDING, WITHOUT LIMITATION, THE ADEQUACY OF ALL TEMPORARY SUPPORTS, SHORING, BRACING, SCAFFOLDING, MACHINERY OR EQUIPMENT, SAFETY PRECAUTION OR DEVICES, AND SIMILAR ITEMS OR DEVICES USED BY HIM DURING CONSTRUCTION.

REV.	BY	DATE	DESCRIPTION	APPROVED BY

SCALE: AS NOTED
DRAWN: JAG
CHECKED: OO
DATE: JULY 2011

THE SEAL APPEARING ON THIS DOCUMENT WAS AUTHORIZED BY ORLANDO ORTIZ, P.E. TX. REG. 98398 (07/06/2011)

BULKHEAD DETAILS

MUSTANG BEACH UNIT I
BULKHEAD INVESTIGATION
PORT ARANSAS, TEXAS

URBAN ENGINEERING
CORPUS CHRISTI, TEXAS
Firm No. 145; 2725 SWANTNER, CORPUS CHRISTI, TX 78404-2832
V:(361)854-3101 F:(361)854-6001 Email@urbaneng.com

SHEET 1 OF 1

JOB NO. 42390.00.00