

DALLAS FLOODWAY PFM #7

(19)

PFM #7 - BACKWARD EROSION SAND

NODE 4 - ROOF FORMS - COMPARE TO PFM #8

MORE LIKELY

LESS LIKELY

• SHORTER DISTANCE
FOR ROOF FORMATION

USE NUMBERS FROM PFM #8

RAIIONALE: NUMBERS ALREADY HIGH
AND SHORTER DISTANCE ~~IS~~ IS STILL FAIRLY
LONG PATH.

NODE 5 - HEROIC INTERVENTION

MORE LIKELY

LESS LIKELY

- ACCESS BETTER THAN ~~220E~~
- ~~WOULD~~ ^{MIGHT} BE POSSIBLE TO
TREAT ON ~~THIS~~ ^{RIVER} SIDE - BY
DUMPING MATERIAL INTO
HAMPTON OUTFALL

USE SAME NUMBERS AS PFM #8,
ALTHOUGH IT IS RECOGNIZED THEY COULD
BE SLIGHTLY LOWER HERE.

DALLAS FLOODWAY PFM #7

BACKWARD EROSION OF SAND

DE 1 - REPEACH - COMPARE TO STA 220E

(20)

15%	0.05	0.1	0.15
50%	0.005	0.04	0.05

DALLAS FLOODWAY PFM #7
 BACKWARD EROSION OF SAND LAYER

COMPARE TO STA 220 E
 NODE 3 - UNSUCCESSFUL EARLY INTERVENTION
 MORE LIKELY

(17)
 18

• ABOVE SUMP WATER
 LEVEL - NO BACK
 PRESSURE UNLESS
 SUMP POND LEVEL RAISED

LESS LIKELY

• THIS AREA NEAR PUMP
 STATION - MORE LIKELY TO
 OBSERVE
 • GOOD ACCESS ON LAND SIDE
 • WOULD OCCUR IN SIDE
 SLOPE OF SUMP - MORE
 OBSERVABLE - ABOVE
 SUMP WATER LEVEL

TREATMENT WOULD BE SEEPAGE BERM
 OVER SIDE SLOPE - SIMILAR DIFFICULTY
 EASE FOR

USE NUMBERS FROM PFM #8

RATIONALE: SIMILAR ISSUES AND
 EASE OF TREATMENT

DALLAS FLOODWAY PFM #7

(17)

BACKWARD EROSION SAND LAYER

NIDE 2-SUFFICIENT GRADIENT TO ERODE SAND

COMPARE TO STA 220 E

MORE LIKELY

LESS LIKELY

GRADIENT IS HIGHER
0.12 PER ANALYSIS

SAND LAYER IS
LIKELY COARSER

• TERRACE DEPOSIT
COULD RESULT IN
FINER SANDS ON TOP
OF LAYER

CRITICAL GRADIENT
~ 0.6 SIMILAR TO 220 E
BASED ON C_u

ESTIMATES: 100% HT 0.1, 0.05, 0.3, 0.2, 0.2, 0.15
0.4, 0.4, 0.35, 0.2, 0.1, 0.1, 0.2

75% HT 0.05, 0.05, 0.1, 0.1, 0.05, 0.1, 0.1, 0.1, 0.15, 0.1
0.05, 0.05, 0.1

50% HT 0.01, 0.05, 0.005, 0.01, 0.01, 0.05, 0.05, 0.05, 0.05,
0.05, 0.005, 0.005, 0.01

	LOW	MED	HIGH
100%	0.05	0.2	0.4
75%	0.05	0.1	0.15
50%	0.005	0.01	0.05

DALLAS FLOODWAY PFM #7

(18)

ORIGINAL TREATMENT
OF RIVER CROSSINGS /
PITS UNCLEAR

FREQUENTLY - NO
OBSERVED SEEPAGE
WOULD EXPECT TO SEE
IT w/ CONTINUOUS SAND

DALLAS FLOODWAY PFM 7

NODE 1 - CONTINUOUS CLEAN SAND

(14)

MORE LIKELY

- EROSION AT OUTFALL
COULD EXPOSE MORE SAND
DURING LARGE EVENT PUMPING

ESTIMATES: 0.3, 0.25,
0.6, 0.4, 0.2, 0.1, 0.2,
0.1, 0.25, 0.1, 0.2,
0.5, 0.2, 0.6

LOW	MEDIAN	HIGH
0.1	0.23	0.6

CAUTION: LARGEST
UNCERTAINTY IN THIS
CASE IS WHETHER SAND
IS CLEAN

LESS LIKELY

- BORING LOGS INDICATE
VARIABLE MATERIALS
FOR SAND LAYER
INCL. GRAVELS AND CLAYS

- PIEZOMETERS STA 302
SHOW NO RESPONSE TO
RIVER

- SANDS NOT OBSERVED
ON PROTECTED SIDE

- ORIGINAL DESIGNERS
(1979 EIR) HAD

CONSIDERED w/ BUILT
RIVER CROSSINGS

DALLAS FLOODWAY PFM # 7 (15)

BACKWARD EROSION OF SAND LAYER

STATION 311 E CRITICAL LOCATION

DIFFERENCES w/ PFM # 8

NODE 1 - CONTINUOUS CLEAN SAND LAYER
RIVER TO SUMP

MORE LIKELY

- SEEPAGE PATH SHORTER
~ 300 FT, LESS CONTINUITY
NEEDED

- GRAVEL PITS IN AREA
INDICATE CONTINUOUS
SAND / GRAVEL DEPOSITS

- ORIGINAL TREATMENT
OF RIVER CROSSINGS /
PITS UNCLEAR

LESS LIKELY

- COULD NOT SEE A
CLEAN SAND IN OLD
HAMPTON OUTFALL

- OUTFALL AT LOWER
ELEVATION AND IS
EXPOSED MORE

FREQUENTLY - NO
OBSERVED SEEPAGE -
WOULD EXPECT TO SEE
IT w/ CONTINUOUS SAND

DALLAS FLOODWAY PFM 7

NODE 1 - CONTINUOUS CLEAN SAND

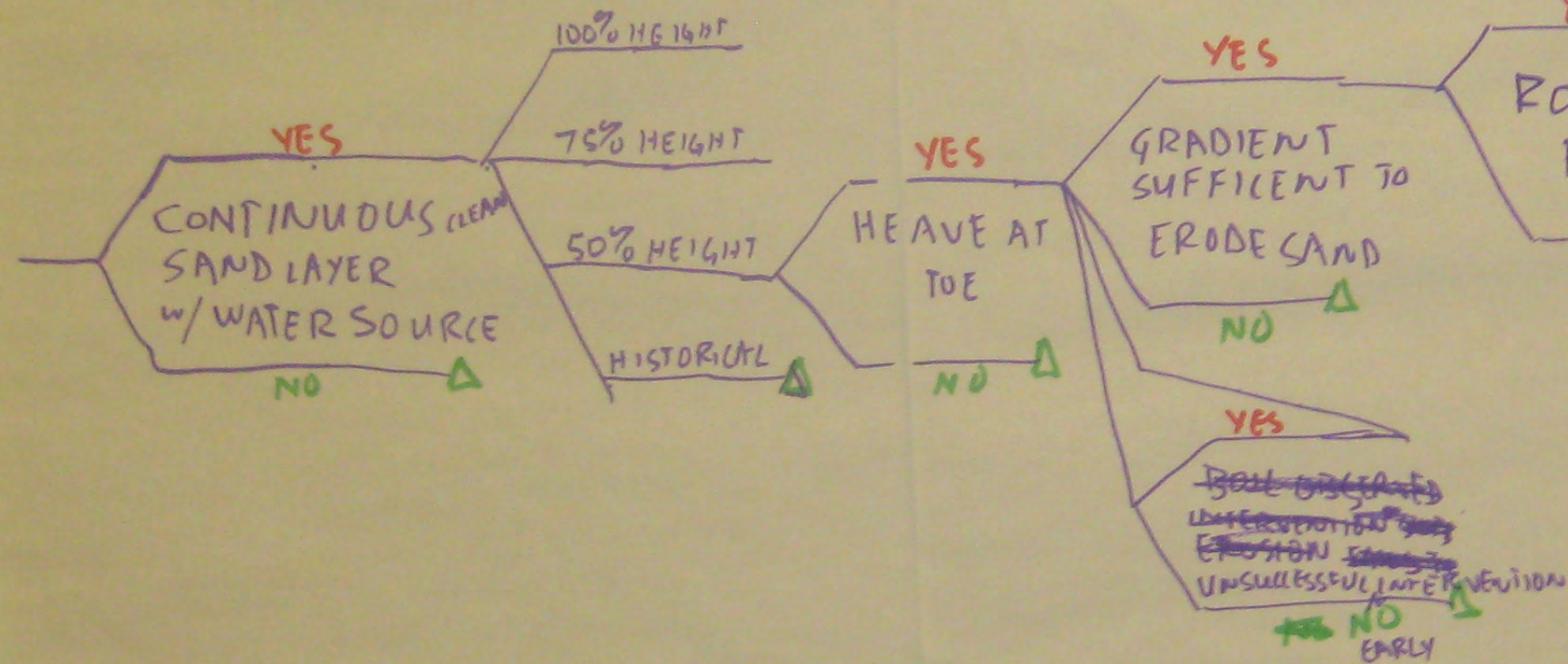
MORE LIKELY

LESS LIKELY

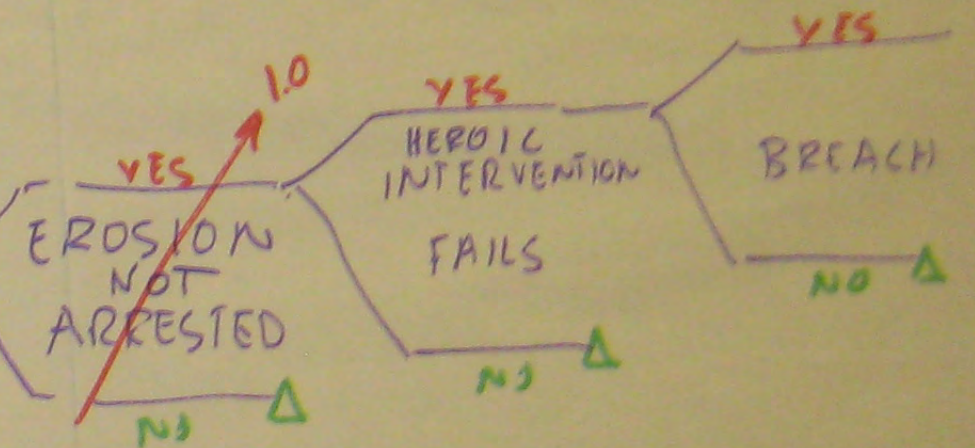
- EROSION AT OUTFALL

- BORING LOGS INDICATE

POTENTIAL FAILURE MODE #8 - HEAVE



DALLAS FLOODWAY



CREST OF LEVEE @
50% HT

DALLAS FLOODWAY PFM 8 - HEAVE

(14)

NODE 7 - BREACH

MORE LIKELY

LESS LIKELY

SAND LAYER
RELATIVELY THIN -
MAY LIMIT ~~THE~~ AMOUNT
OF FLOW/EROSIVE POWER
AND SIZE OF "PIPE"

ESTIMATES

100% HT

0.9, 0.5, 0.1, 0.7, 0.7, 0.5, 0.9, 0.9, 0.8
0.7, 0.65, 0.6, 0.7, 0.6

75% HT

0.01, 0.4, 0.5, 0.3, 0.8, 0.1, 0.5
0.6, 0.3, 0.4, 0.35, 0.3, 0.5, 0.5

50% HT

0.001, 0.01, 0.3, 0.1, 0.3, 0.05, 0.1
0.9, 0.1, 0.15, 0.1, 0.1, 0.3, 0.2

RATIONALE: AT 50% SIGNIFICANT HT OF
LEVEE NEEDS TO BE LOST AND LIMITED TIME -
AT 100%, SMALL LOSS OF CREST LEADS TO BREACH

DALLAS FLOODWAY PFM #18

(13)

NODE 7 - BREACH

	LOW	MEDIAN	HIGH
100% HT	0.1	0.7	0.9
75% HT	0.01	0.4	0.8
50% HT	0.001	0.1	0.4

MORE LIKELY

LESS LIKELY

DESICCATED CLAY
WOULD ERODE MORE
QUICKLY

• LEVEE LOADED FOR
SHORT DURATION -
A FEW DAYS ABOVE TOE
OF LEVEE FOR LARGE
LOCAL STORMS DIS OF DAMS

• CLAY ERODES SLOWLY

• MAY NOT BREACH
CREST OF LEVEE @
50% HT

(14)

DALLAS FLOODWAY PFM 8 - HEAVE

NODE 7 - BREACH

MORE LIKELY

LESS LIKELY

WITH WATER
FLOW/EROSIVE

ALLAS FLOODWAY PFM #8 HEAVE (12)

MODE 6 - HEROIC INTERVENTION FAILS

MORE LIKELY LESS LIKELY

• MAY TAKE TIME TO INTERVENE

• PROBLEM OBVIOUS AT THIS POINT

ESTIMATES

• STA 220 E ~~IS~~ HAS GOOD ACCESS, CAN ~~BE~~ WORK QUICKLY

100% HT 0.5, 0.3, 0.9, 0.1, 0.5, 0.4, 0.5, 0.6
0.5, 0.5, 0.5, 0.5, 0.5, 0.1

75% HT 0.1, 0.1, 0.3, 0.1, 0.5, 0.05, 0.3
0.25, 0.4, 0.5, 0.1, 0.2, 0.3, 0.2

50% HT 0.1, 0.1, 0.1, 0.05, 0.05, 0.3
0.1, 0.1, 0.05, 0.1, 0.05, 0.1, 0.1, 0.05

RATIONALE: CITY HAS ABILITY TO DEAL WITH MAJOR ISSUES - BUT AT VERY HIGH FLOOD LEVELS IT BECOMES UNCERTAIN WHETHER IT CAN BE IMPLEMENTED

DALLAS FLOODWAY PFM #8 HEAVE

NODE 6 - HEROIC INTERVENTION FAILS

(11)

	LOW	MEDIAN	HIGH
100% HT	0.1	0.5	0.9
75% HT	0.05	0.25	0.5
50% HT	0.05	0.1	0.3

MORE LIKELY

LESS LIKELY

NO ACCESS TO ENTRANCE
OR SEEPAGE

CAN DUMP MATERIAL
& BUILD SEEPAGE BERM
IN SUMP AREA

CITY HAS MATERIAL,
EQUIPMENT, STAFF
TO "GO TO WAR"

COULD FILL SUMP
WITH WATER. REDUCE
FLOW/EROSIVE POWER

DALLAS FLOODWAY PFM #8 HEAVE

(12)

DALLAS FLOODWAY PFM #8 HEAVE
NODE 5 - ROOF FORMS

(10)

LOW	~~THE~~ BEST	HIGH
0.75	0.9	0.99

MORE LIKELY

LESS LIKELY

- EMBANKMENT IS CLAY (CH / CL) - WILL LIKELY SUPPORT A ROOF
- IN GENERAL, CLAYS OVERLIE SAND BASED ON BORINGS ~20'

- MATERIALS OVERLYING SAND BEYOND LEVEE ON RIVER SIDE MAY NOT ALL BE CLAY.

~~ROOF MUST STAY OPEN FOR LONG DISTANCE~~

- IF ROOF COLLAPSES ON RIVER SIDE - COULD FORM AN OPEN PATH TO SAND

~~ROOF MUST STAY~~

ESTIMATES: 0.99, 0.9
0.9, 0.8, 0.99, 0.9, 0.85,
0.9, 0.9, 0.75, 0.9, 0.9,
0.8,

RATIONALE - CLAYS
OVERLIE SAND - CLAYS
TYPICALLY CAPABLE OF
ROOF FORMATION

$C_u > 3$ (MOSTLY 10-20)
 $\Rightarrow$ CRITICAL GRADIENT ~ 0.6
 • LAKE SHALLOW AND
 SILTED IN

DALLAS FLOODWAY PFM #8

⑨

NODE 4 - GRADIENT SUFFICIENT TO MOVE
 CLEAN SAND

MORE LIKELY

LESS LIKELY

COULD BE SHORTER
 SEEPAGE PATH ALONG A
 BRIDGE PIER

• MOST SAND — #40
 FINE SAND MORE
 ERODIBLE

• NEED TO MOVE A
 LOT OF SAND TO
 CONNECT TO ~~THE~~ RIVER

• GRADIENT HIS HEEL TO
 DISTOE: $40/400 \sim 0.1$

ESTIMATES 100% HT

.05, .01, .01, 0.2, 0.25

0.1, 0.2, 0.1, 0.01, 0.1, 0.15

0.05, 0.05, 0.01

75% HT

0.05, 0.05, 0.01, 0.1, 0.15, 0.01,

0.05, 0.1, 0.05, 0.1, 0.1, 0.005

50% HT

0.007, 0.01

.05, .05, .01, .01, .01, .05, .005

0.001, .05, .001, .001, .005, .001

.01

RATIONAL: LOW

AWY GRADIENTS &

HIGH $C_u \Rightarrow$ LOW PROB.

UNCERTAINTY WITH

FINE SANDS AT HIGHER
 HEADS AND POSSIBLE
 MOVEMENT

DALLAS FLOODWAY PFM #8 HEAVE

(8)

NODE 4 - GRADIENT SUFFICIENT TO MOVE CLEAN SAND

	LOW	BEST	HIGH
100% HT	0.01	0.1	0.25
75% HT	0.005	0.05	0.15
50% HT	0.001	0.01	0.05

MORE LIKELY

LESS LIKELY

• LAKE ON RIVERSIDE

- LESS PERVIOUS STRATA BELOW SAND LAYER - LESS CHANCE FOR LARGE FLOW & VELOCITY
- GRADIENT 40 / 1400' ~ 0.03 FULL HEIGHT
- GRADATIONS STOW $C_u > 3$ (MOSTLY 10-20) $\Rightarrow$ CRITICAL GRDIENT ~ 0.6
- LAKES SHALLOW AND SILTED IN

(9)

DALLAS FLOODWAY PFM #8

NODE 4 - GRADIENT SUFFICIENT TO MOVE CLEAN SAND

LESS LIKELY

DALLAS FLOODWAY PFM #8 (UNT.)

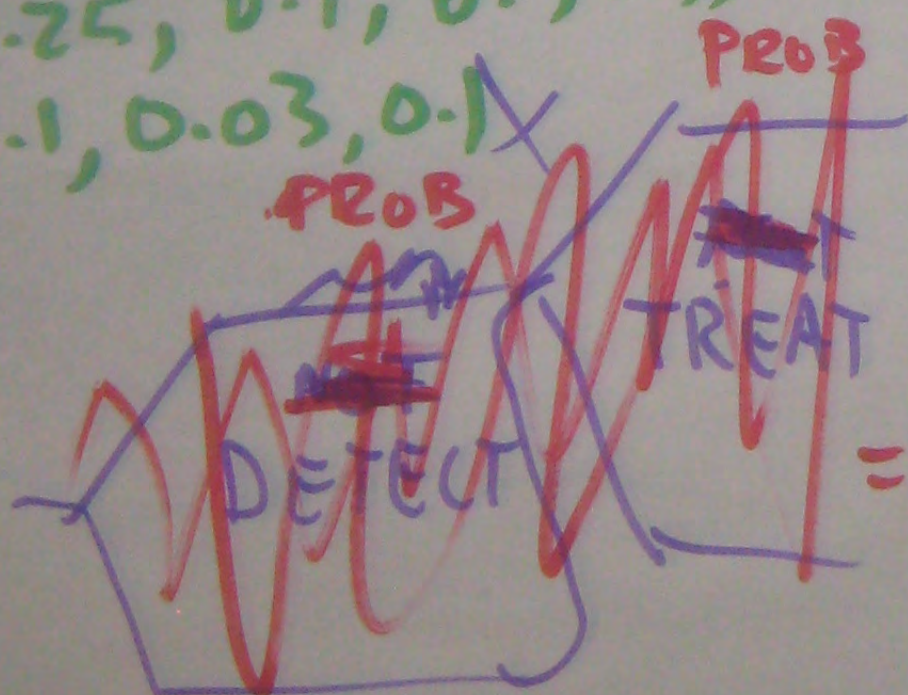
(7)

NODE 3 - UNSUCCESSFUL EARLY INTERVENTION

MORE LIKELY

- TREATING A BOIL IN ONE AREA COULD CREATE ONE IN ANOTHER AREA.

ESTIMATES - 0.1, 0.01, 0.1,
100% HT 0.1, 0.25, 0.45
0.25, 0.1, 0.1, 0.3, 0.2
0.1, 0.03, 0.1



= PROB SUCCESS 1 - : PROB UNSUCCESS

LESS LIKELY

- ROTATING STAFF ON CALL FOR FLOOD FIGHTING
- BOILS SHOULD BE PRETTY OBVIOUS IF LOOKING FOR THEM
- HEADS NOT LARGE, OPPORTUNITY TO EQUALIZE
- FLOOD PEAK DURATIONS ARE SHORT

RATIONALE FOR LOW

ESTIMATES - GOOD MONITOR AND ABILITIES, HISTORICALLY THESE TYPES OF SITUATIONS HAVE BEEN SUCCESSFULLY DEALT WITH

75% HT 0.1, 0.03, 0.05,
0.06, 0.1, 0.1, 0.1, 0.05, 0.45
0.1, 0.1, 0.05, 0.005, 0.05
50% HT
0.01, 0.1, 0.03, 0.01, 0.01, 0.01
0.05, 0.05, 0.01, 0.25, 0.02, 0.05, 0.01, 0.001

• VISI
• BEG
• BEG
• EME
• OF S
• BAG

• VISIBI
NIGH
• WATER
SUMPS

DALLAS FLOODWAY PFM #8 CON, (6)

NODE 3 - UNSUCCESSFUL EARLY INTERVENT

~~100%~~ 1	LOW	BEST	HIGH
100% HT	0.01	~~0.1~~	0.45
75% HT	0.005	0.08	0.45
50% HT	0.001	0.01	0.25

FAVORABLE
MORE LIKELY

UNFAVORABLE
LESS LIKELY

• VISUAL OBSERVATIONS
BEGIN ONCE PUMPING
BEGINS

• EMERGENCY STOCKPILES
OF SAND AND ~400S AND
BAGS

• VISIBILITY LESS AT
NIGHT
• WATER/VEGETATION IN
SUMPS COULD OBSCURE BOILS

• AT STA 220 E ACCESS
IS EXCELLENT

• MOWING OPERATIONS HAVE
IMPROVED VISIBILITY

• TRACKED EQUIPMENT

• ~~VISIBILITY LESS AT~~

~~NIGHT~~

• GENERALLY HAS BEEN A
HIGH SUCCESS RATE IN
FLOOD FIGHTING BOILS