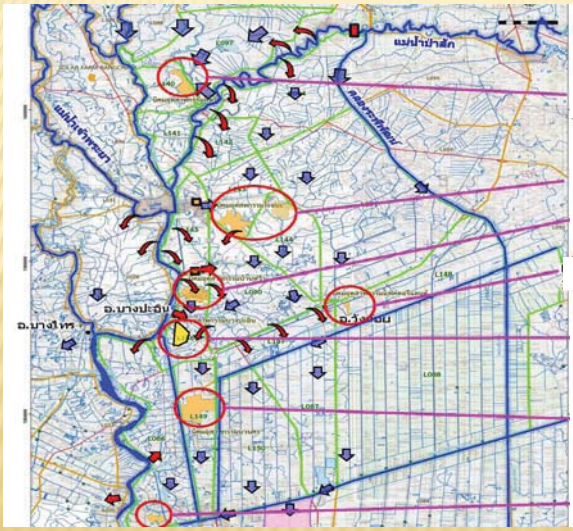
Industrial Estate Authority of Thailand

Flood Prevention Measures of Industrial Estates

25 September 2012

7 Industrial Areas Effected by 2011 Big Flood



- Saharatananakorn IE., Ayutthaya
- Rojana IZ., Ayutthaya
- Hi-Tech IE., Ayutthaya
- Factory Land IZ., Ayutthaya
- Bang Pa-In IE., Ayutthaya
- Navanakorn IZ., Pathum Thani
- Bangkadi IP., Pathum Thani

Key Information of 7 Industrial Areas

No.	Site	Total Area (Rais)	Total Factories	Investment Cost (MB.)	Manpower
1	Saharatananakorn Industrial Estate	1,440	46	10,314	14,696
2	Hi-Tech Industrial Estate	2,446	143	57,034	56,096
3	Bang Pa-In Industrial Estate	1,962	90	67,202	56,887
4	Rojana Industrial Zone	9,100	213	194,504	155,957
5	Factory Land Industrial Zone	170	84	2,360	3,165
6	Navanakorn Industrial Zone	6,500	227	180,000	128,311
7	Bangkadi Industrial Zone	1,222	36	66,000	30,000
	รวม	22,078	839	577,414	445,112

Flooding in 7 Industrial Ares




Flooding in 7 Industrial Ares




Industrial Estate Authority of Thailand (IEAT)

Flooding in 7 Industrial Ares


Industrial Estate Authority of Thailand (IEAT)

Flooding in 7 Industrial Ares

Flooding in 7 Industrial Ares

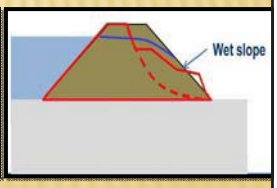
Flooding in 7 Industrial Ares

Flooding in 7 Industrial Ares

Main Causes of Water Attacks

1) **High Water Level & Overflow**

2) **High Water Pressure & Land Slide**



Revision of Design Criteria of Flood Protection and Dewatering for Industrial Areas

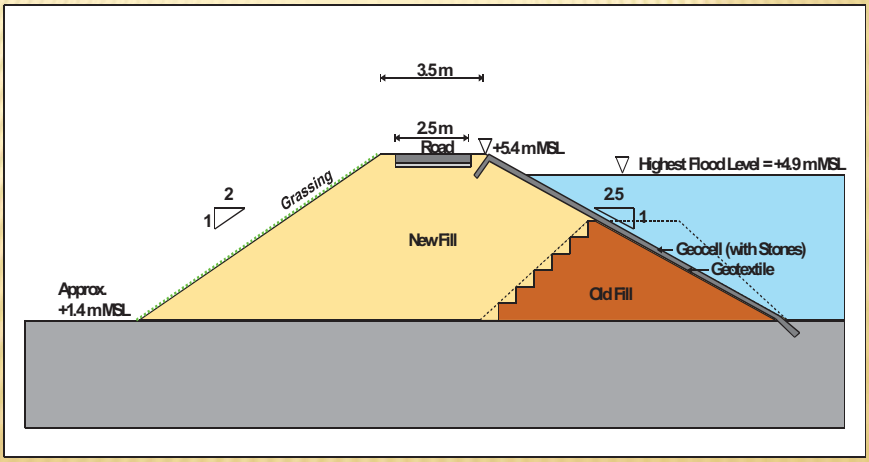
Last Design Criteria	Revised Design Criteria
1. Provide Retention Pond and Dewatering Station for Drainage with Spare Pumps and Serviced Road (Compacted Clay 0.20 m. thickness /2.50 m. width min.) for Maintenance	1. Provide Retention Pond and Dewatering Station for Drainage with Spare Pumps ▪ Within 2 hrs. Drainage Capacity ▪ Capacity and Efficiency of Spare Pumps not less than Working Pumps ▪ Provide Serviced Road surround Retention Pond
2. Flood Protection Dike ▪ Must Higher than 10 Years Period Max. Flood Level (+ 0.50 m. free board) ▪ Width of Road not less than 2.50 m. ▪ Compacted Clay 0.20 m. thickness ▪ Not Disturb Water Way	2. Flood Protection Dike ▪ Must Higher than 70 Years Period Max. Flood Level (+ 0.50 m. free board) ▪ Strong Structure and Resist Hydro-Pressure ▪ Width of Road not less than 2.50 m. ▪ Not Disturb Water Way included Quantity and Direction

Revision of Design Criteria of Flood Protection and Dewatering for Industrial Areas

Last Design Criteria	Revised Design Criteria
3. In case of Fill Earth Cover the Entire Area, Allow 0.50 m. Higher than Max. Flood Level	3. In case of Fill Earth Cover the Entire Area, Allow 0.50 m. Higher than 70 Years Period Max. Flood Level
	4. Designing of Dewatering System must be considered and concerned with the capacity and direction of outer water way
	5. Provide periodic maintenance
	6. Provide Water monitoring system, Early Warning System and Emergency Response Plan for Flood Protection
	7. Annually Inspection and Report

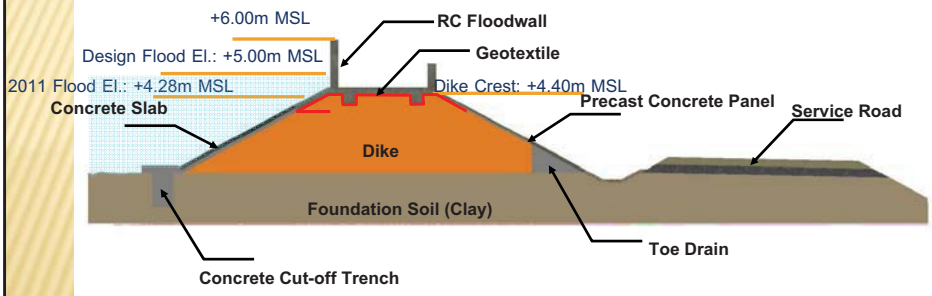
Alternative Design of Flood Protection

TYPE I : EARTH DIKE WITH 2.50 m. ACCESS ROAD



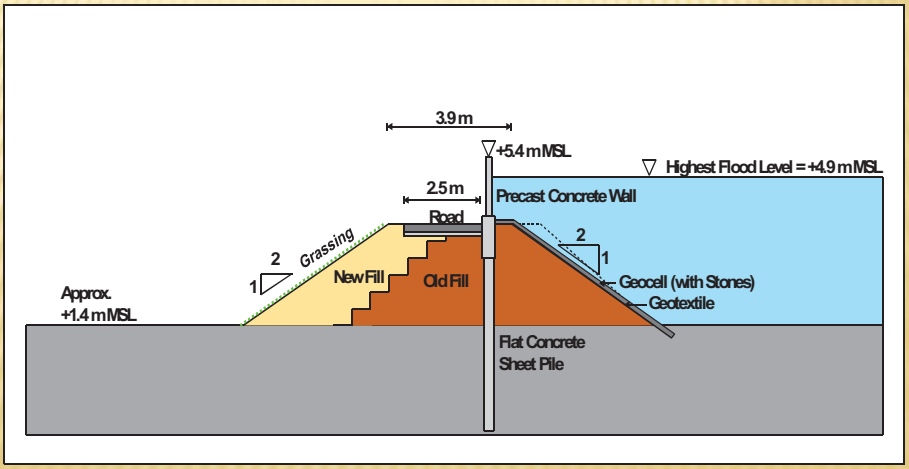
Alternative Design of Flood Protection

TYPE II : EARTH DIKE WITH RC FLOOD WALL



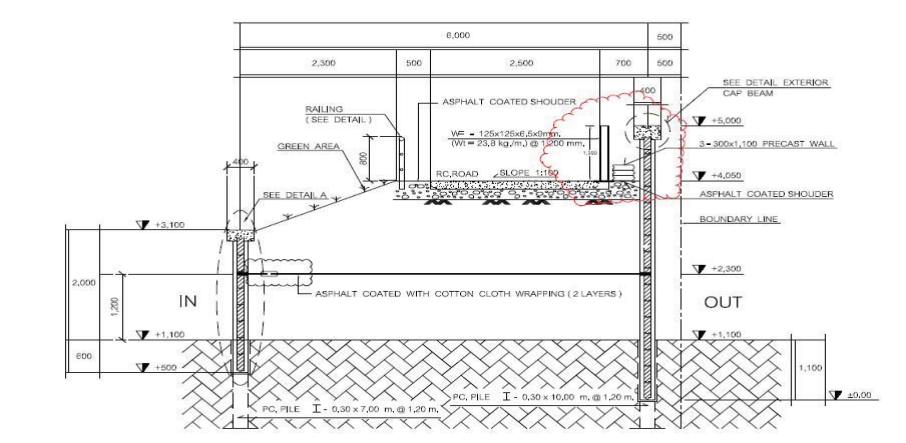
Alternative Design of Flood Protection

TYPE III : EARTH DIKE WITH CONCRETE RETAINING WALL



Alternative Design of Flood Protection

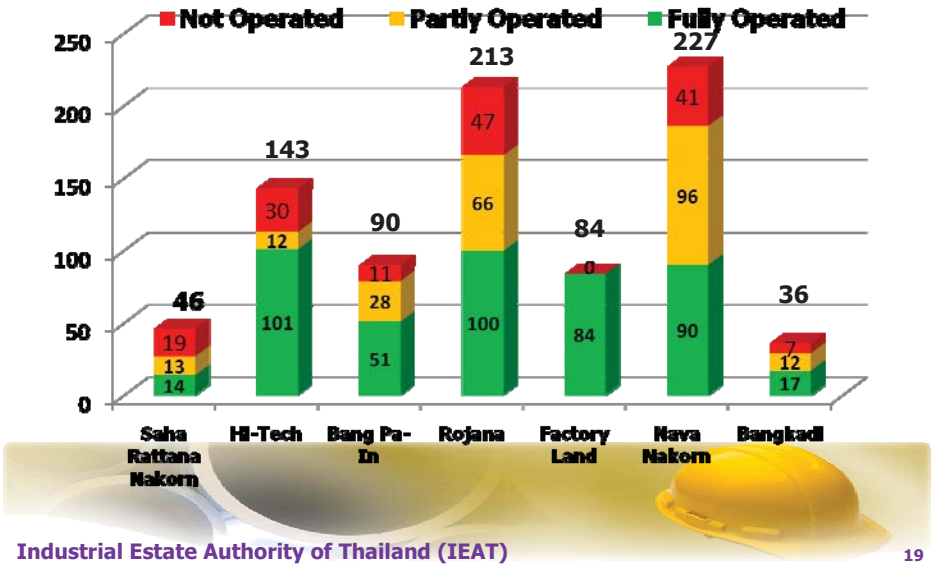
TYPE IV : FLOOD WALL



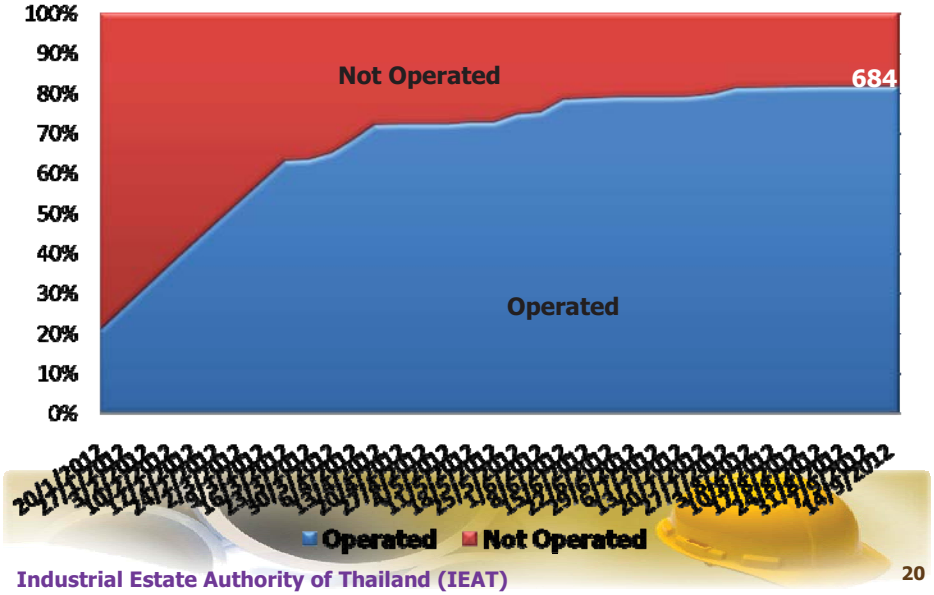
Existing Restoration of Factories in 7 Industrial Areas As 21 September 2012

No.	Site	Total Factories	Operated			
			Fully	Partly	Total	%
1	Saharatananakorn Industrial Estate	46	14	13	27	58.70
2	Hi-Tech Industrial Estate	143	101	12	113	79.02
3	Bang Pa-In Industrial Estate	90	51	28	79	87.78
4	Rojana Industrial Zone	213	100	66	166	77.93
5	Factory Land Industrial Zone	84	84	0	84	100
6	Navanakorn Industrial Zone	227	90	96	186	81.94
7	Bangkadi Industrial Zone	36	17	12	29	80.56
	Total	839	454	230	684	81.53

Existing Restoration of Factories in 7 Industrial Areas As 21 September 2012

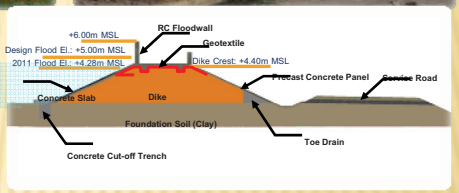


Trend of Factory's Restoration of 7 Industrial Areas As 21 September 2012



Industrial Estate Authority of Thailand

Progress of Flood Protection



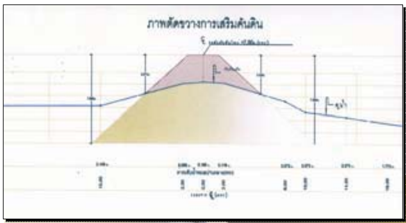
Key Information of Dike's Construction

No.	Site	Cost (M฿)	Started	Planned Finish
1	Saharatananakorn Industrial Estate	535.123	Temporary Dike Construction	
2	Hi-Tech Industrial Estate	558.061	1 Feb. 2012	31 Aug. 2012
3	Bang Pa-In Industrial Estate	704.374	1 Feb. 2012	31 Aug. 2012
4	Rojana Industrial Zone	2,030.000	20 Feb. 2012	31 Aug. 2012
5	Navanakorn Industrial Zone	1,102.100	15 Feb. 2012	31 Aug. 2012
6	Bangkadi Industrial Zone	583.280	2 Mar. 2012	31 Aug. 2012
	Total	5,512.911		

Progression of Saha Rattana Nakorn Industrial Estate

6.500 Km. Length Temporary Dike Construction operated by Thai Army Development Division, 38.809 MB Budget and 60 Days Plan

29.33%



WORK PROGRESS REPORT
Temporary Dike Construction Project
Saha Rattana Nakorn Industrial Estate

Client : Industrial Estste Authority of Thailand(IEAT) and Saha Rattana Nakorn Co.,LTD
Contractor : 1st Development Division, 1st Thai Army Area, Royal Thai Army
Contract Start : 27 Aug 2012 Finish : 25 October 2012 ; 60 Days

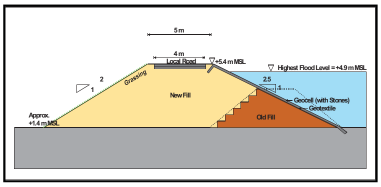
Update to :	19 Sep 12
Report By :	IEAT

Item	Description	Quantity	Working Days	% Weight	Duration – Schedule Start	Schedule Finish	Actual Start	Actual Finished
1	Mobilization & Preparation	L.S.	5	3%	27 Aug 12	31 Aug 12	27 Aug 12	31 Aug 12
2	Surveying & Clearing	48,000 sq.m.	15	10%	1 Sep 12	15 Sep 12	27 Aug 12	
3	Excavation Removed and Compaction Existing Dike	30,375 cu.m.	15	10%	4 Sep 12	18 Sep 12	27 Aug 12	
4	Fill and Compaction Dike Embankment	133,030 cu.m.	40	26%	6 Sep 12	15 Oct 12	9 Sep 12	
5	Big Bag Installtion on Dike	11,116 Pcs	45	29%	9 Sep 12	23 Oct 12	14 Sep 12	
6	Frontage Road Improvement	4,774 cu.m.	20	13%	1 Oct 12	20 Oct 12		
7	Finishing & Modification	5,200 cu.m.	10	6%	11 Oct 12	20 Oct 12		
8	Demobilization & Recovery	L.S.	5	3%	21 Oct 12	25 Oct 12		
9	รวม		155	100%	27 Aug 12	25 Oct 12		

		10	20	30	40	50	60
Planned Progression	Current %	8%	26%	17%	16%	23%	10%
	Accumulate %	8%	34%	51%	67%	90%	100%
Actual Progression	Current %	13.50%	12.37%	3.46%			
	Accumulate %	13.50%	25.87%	29.33%			

Plan	41.00%
Actual	29.33%
Delayed	11.67%

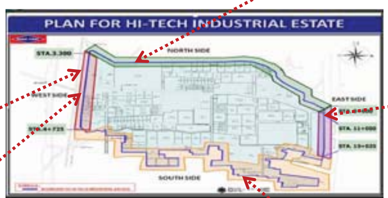
Progression of Hi-Tech Industrial Estate



Fill Embankment & compact El.+4.50 m.

90.19%

Install Geocell



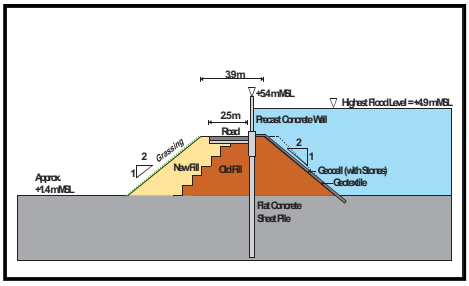
Exit Gate 2

Fill Embankment and compaction El.+4.70 m.

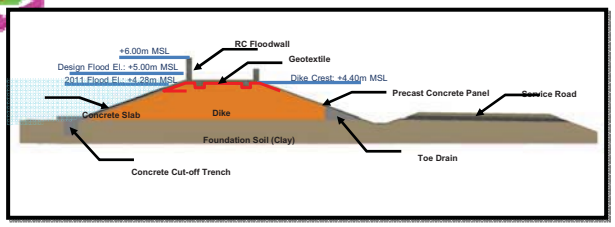
Gabions

Progression of Rojana Industrial Zone

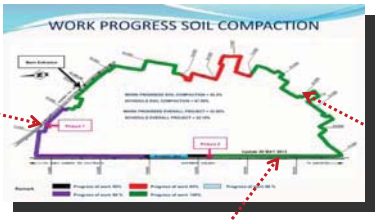
98.00%



Progression of Bang Pa-In Industrial Estate

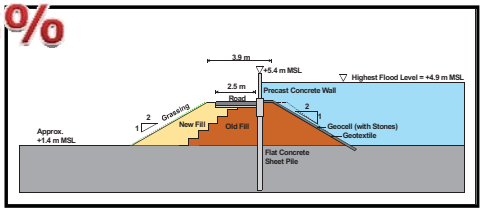


75.00%



Progression of Navanakorn Industrial Zone

97.83%

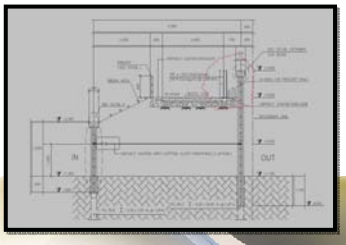







Progression of Bangkadi Industrial Park

84.08%






Progression of Dike's Construction as 21 Sep 2012

No.	Site	Cumulative Planed Progress (%)	Cum. Existing Progress (%) at 17 Sep 2012	Compare to Plan	Cum. Existing Progress (%) at 30 Aug 2012	Compare to Last Update
1	**Saharatananakorn Industrial Estate**	41.00%	29.33%	- 11.67%	3.00%	+26.33%
2	**Hi-Tech Industrial Estate**	94.50%	90.19%	- 4.86%	85.02%	+5.17%
3	**Bang Pa-In Industrial Estate**	66.96%	75.00%	+7.39%	72.00%	+3.00%
4	**Rojana Industrial Zone**	100.00%	98.00%	-3.00%	94.00%	+4.00%
5	**Navanakorn Industrial Zone**	100.00%	97.83%	-3.00%	95.00%	+2.83%
6	**Bangkadi Industrial Zone**	93.97%	84.08%	-3.99%	77.92%	+6.16%

Industrial Estate Authority of Thailand

Thank You
For Your Attention