Table 6.4.3-1-3 (3)Required Number of Rubber Tired Gantry (RTG) Type Yard Cranes - 3/4

((6+1)Rows x (4+1)Tier Type)

(Design Data taken from S2 Container Terminal)

2. Required Number of the Cranes - 3/4:

Required number of the Yard Cranes is calculated by adopting the following formula:

(2) Land-side Operation: To/from the railway station and outside of the terminal through the terminal gate. - 2/2

Nyl = (Qy x Rp x Th) / (Py x Ra x Dw x Hw x Rw x Rh)

The results of the calculation are shown on the table below:

Case-2 (3 Berths)

	• • • •					
Marks	Descriptions	Units	2014	2017	2020	Remarks
Qid	Import dry container quantity	boxes/year	124,600	153,800	189,400	
Qir	Import reefer container quantity	boxes/year	2,300	2,800	3,500	
Qie	Import empty container quantity	boxes/year	17,300	21,400	26,300	
Qit	Import transit container quantity	boxes/year	12,800	22,000	38,200	· · ·
Qis	Import tranship container quantity	boxes/year	13,200	22,700	39,300	
Qiy	Total import container quantity	boxes/year	170,200	222,700	296,700	
Rp	Peak ratio	-	1.25	1.25	1,25	
Thi	Average handling times	-	1.8	1.8	1.8	Including container rehandling*
Pya	Yard crane productivity(average)	boxes/hour	32	32	. 32	
Ra	Crane availability ratio	-	1	1	1	
Dw	Working days per year	days/year	345	345	345	Subtracted holidays, maintenance, etc.
Hw	Working hours per days	hours/day	22	22	. 22	
Rw	Crane working hour ratio	-	0.92	0.93	0.95	
Rh	Cargo handling hour ratio	-	0.74	0.76	0.80	· · · · · · · · · · · · · · · · · · ·
Nyli	Number of yard crane for import	units	2.3	2.9	3.6	
Qed	Export dry container quantity	boxes/year	103,300	127,400	157,000	
Qer	Export reefer container quantity	boxes/year	600	700	900	
Qee	Export empty container quantity	boxes/year	40,400	49,800	61,400	
Qet	Export transit container quantity	boxes/year	12,800	22,000	38,200	
Qes	Export tranship container quantity	boxes/year	13,200		39,300	
Qey	Total export container quantity	boxes/year	170,300	222,600	296,800	
Rp	Peak ratio	-	1.25	1.25	1.25	
The	Average handling times	-	1	1	1	Including container rehandling**
Pya	Yard crane productivity(average)	boxes/hour	32	32	32	
Ra	Crane availability ratio	-	1	1	1	· · · · · · · · · · · · · · · · · · ·
Dw	Working days per year	days/year	345	345	345	Subtracted holidays, maintenance, etc.
Hw	Working hours per days	hours/day	22	22	22	
Rw	Crane working hour ratio	-	0.92	0.93	0.95	
Rh	Cargo handling hour ratio	•	0.74	0.76	0.80	
Nyle	Number of yard crane for export	units	1.3	1.6	2.0	
Nyl	Total number of yard crane	units	3.6	4.5	5.6	Including cranes for import & export
	say	units	4	5	6	

Note*: Container stacking height(average): 2.5, first come first serve service

**: Container stacking height(average): 3.0, as per vessel loading plan

Table 6.4.3-1-3 (3) Required Number of Rubber Tired Gantry (RTG) Type Yard Cranes - 4/4

((6+1)Rows x (4+1)Tier Type)

(Design Data taken from S2 Container Terminal)

2. Required Number of the Cranes - 4/4:

Required number of the Yard Cranes is calculated by adopting the following formula:

(3) Total Number of Yard Cranes Required:

Ny = Nys + Nyl

The results of the calculation are shown on the table below:

Case-1 (2 Berths)

Marks	Description	Units	-	2008	2011	Remarks
Nysa	Average sea-side yard cranes	sets	-	3	4	
Nysm	Maximum sea-side yard cranes	sets	-	6	8	
Nyl	Land-side yard cranes	sets	-	3	3	
Nya	Total average yard cranes	sets	-	6	7	Too strict
Nym	Total maximum yard cranes	sets	-	9		Can be decreased
	Recommended number of cranes	sets	-	8	10	By accommodating land-side yard crane

Case-2 (3 Berths)

Marks	Description	Units	2015	2017	2020	Remarks
Nysa	Average sea-side yard cranes	sets	5	6	7	
Nysm	Maximum sea-side yard cranes	sets	10	12	14	
Nyl	Land-side yard cranes	sets	4	5	6	, , , ,
Nya	Total average yard cranes	sets	9	11	13	Too strict
Nym	Total maximum yard cranes	sets	14	17		Can be decreased
-	Recommended number of cranes	sets	12	14	16	By accommodating land-side yard crane

Table 6.4.3-1-3 (4)Required Number of Rail Mounted Gantry (RMG) Type Railway Station Cranes - 1/3(Design Data taken from S2 Container Terminal)

1. Number of Trains to be Accommodated - (20 Wagons/Train)

The number of trains to be accommodated per day is calculated by adopting the following formula:

 $Nt = (Qr \times Rp) / (Dw \times Nw \times Nbw)$

The results of the calculation are shown on the table below:

Case - 1 (2	Berths)
-------------	---------

	T (2 Dennis)					
Marks	Description	Units	-	2008	2011	Remarks
	Outbound dry container q'tity	boxes/year	-	55,700	71,000	
Qrot	Outbound transit container q'tity	boxes/year	-	1,500	2,600	
Qroe	Outbound empty container q'tity	boxes/year		7,700	9,900	
Qro	Total outbound container q'tity	boxes/year	-	64,900	83,500	
Rp	Peak ratio	-	-	1.25	1.25	· · · · ·
Dw	Working days per year	days/year	-	345	345	Subtracted holidays, maintenance, etc.
Nw	Number of wagon per train	wagons/train	-	20	20	
Nbw	Ave. number of box on wagon	boxes/wagon	-	1.67	1.67	1.6TEU/box (20ft: 40%, 40ft: 60%)
Nto	Number of outbound trains per day	trains/day	•	7.0	9.1	
	say:	trains/day	-	7	9	
Qrid	Inbound dry container q'tity	boxes/year	-	46,200	58,800	
Qrit	Inbound transit container q'tity	boxes/year	-	1,500	2,600	
	Inbound empty container q'tity	boxes/year	-	18,000	23,000	
Qri	Total inbound container q'tity	boxes/year	•	65,700	84,400	
Rp	Peak ratio	-	-	1.25	1.25	
Dw	Working days per year	days/year	-	345	345	Subtracted holidays, maintenance, etc.
Nw	Number of wagon per train	wagons/train		20	20	
Nbw	Ave. number of box on wagon	boxes/wagon	-	1.67	1.67	1.6TEU/box (20ft: 40%, 40ft: 60%)
Nti	Number of inbound trains per day	trains/day	-	7.1	9.2	
	say:	trains/day	-	7	9	
Nt	Total number of trains to be accom.	trains/day	-	14	18	
NI	Number of railway lines	lines	-	2	2	

Case - 2 (3 Berths)

Marks	Description	Units	2014	2017	2020	Remarks
	Outbound dry container q'tity	boxes/year	87,300	107,600		
Qrot	Outbound transit container q'tity	boxes/year	4,500	7,700	13,300	
Qroe	Outbound empty container q'tity	boxes/year	9,500	11,700	14,500	
Qro	Total outbound container q'tity	boxes/year	101,300	127,000	160,400	
Rp	Peak ratio	-	1.25	1.25	1.25	
Dw	Working days per year	days/year	345	345	345	Subtracted holidays, maintenance, etc.
Nw	Number of wagon per train	wagons/train	20	20	20	
Nbw	Ave, number of box on wagon	boxes/wagon	1.67	1.67	1.67	1.6TEU/box (20ft: 40%, 40ft: 60%)
Nto	Number of outbound trains per day	trains/day	11.0	13.8		
	say:	trains/day	11	14	18	
Qrid	Inbound dry container q'tity	boxes/year	72,300	89,200	109,900	
Orit	Inbound transit container q'tity	boxes/year	4,500	7,700	13,300	
Orie	Inbound empty container q'tity	boxes/year	28,300	34,900	43,000	
Qri	Total inbound container q'tity	boxes/year	105,100	131,800	166.200	
Rp	Peak ratio	-	1.25	1.25	1.25	
Dw	Working days per year	days/year	345	345	345	Subtracted holidays, maintenance, etc.
	Number of wagon per train	wagons/train	20	20	20	
	Ave. number of box on wagon	boxes/wagon		1.67	1.67	1.6TEU/box (20ft: 40%, 40ft: 60%)
	Number of inbound trains per day	trains/day	11.4		18.0	
	say:	trains/day	Н	14	18	
Nt	Total number of trains to be accom.		22	28	36	······································
	Number of railway lines	lines	2	3	3	
131	riamosi of farmay miles	11103	L			I

Table 6.4.3-1-3 (4)

Required Number of Rail Mounted Gantry (RMG) Type Railway Station Cranes - 2/3

(Design Data taken from S2 Container Terminal)

2. Category of the Crane Operation:

There are two(2) major categories of container handling operation at the Railway Station:

(1) Direct Handling Operation: Between Terminal Trailer and Railway Wagon

(2) Indirect Handling Operation:

Between Terminal Trailer and Buffer Storage / Buffer Storage and Railway Wagon Note: This operation requires double handling for each container, and will require more than double numbers of the crane comparing with the Direct Handling Operation. Therefore, the Indirect Handling Operation is not preferable to this Project.

3. Required Number of the Cranes - (20 Wagons / Train)

Required number of the Cranes is calculated by adopting the following formula:

(1) Crane Speeds: (Hoist: 15/30 m/min, Trolley Traverse: 90 m/min), Average Cycle Time: 75 sec) Nt =[{(Tba x Nw x Nbw x Th) + Ts} x Nt] / (60 x 60 x Rw x Rh x Wh)

The results of the calculation are shown on the table below:

Case	1	(2	Berths)	
Case	L	14	DCIUIS)	

Marks	Descriptions	Units	-	2008	2011	Remarks
		sec/box	-	75	75	
Nw	Number of wagons per train	wagons/train	-	20	20	
	Number of boxes per wagon(averag	boxes/wagor	-	1.67	1.67	
Th	Handling times	-	-	2		Import + Export
Ts		min/train	-	35	35	Before: 15, after:20
		min/train		118.5	118.5	
	Crane working hour ratio	-		0.90	0.90	
Rh	Cargo handling hour ratio	-		0.80	0.80	
Tť'	Required time per train(average)	min/train		164.6	164.6	
Nt	Number of trains per day	trains/day	-	14	18	
Wh	Working hour per day	hours/day	-	22	22	
Nr	Number of RMG cranes	Units	-	1.7	2.2	<u> </u>
	say	Units	-	2	3	l

Case 2 (3 Berths)

Marks	Descriptions	Units	2014	2017	2020	Remarks
Tba	Required time per box(average)	sec/box	75	75	75	
Nw	Number of wagons per train	wagons/train	20	20	20	
Nbw	Number of boxes per wagon(averag	boxes/wagor	1.67	1.67	1.67	
Th	Handling times	•	2	2		Import + Export
Ts	Required time for train shifting	min/train	35			Before: 15, after:20
Tt	Required time per train(average)	min/train	118.5		118.5	
Rw	Crane working hour ratio	-	0.90	0.90	0.90	
Rh	Cargo handling hour ratio	-	0.80	0.80	0.80	
Tt'	Required time per train(average)	min/train	164.6	164.6	164.6	
Nt	Number of trains per day	trains/day	22	28	36	
Wh	Working hour per day	hours/day	22	22	22	
Nr	Number of RMG cranes	Units	2.7	3.5	4.5	
	say	Units	3	4	ว ี	

Table 6.4.3-1-3 (4)

Required Number of Rail Mounted Gantry (RMG) Type Railway Station Cranes - 3/3

(Design Data taken from S2 Container Terminal)

2. Category of the Crane Operation:

There are two(2) major categories of container handling operation at the Railway Station:

(1) Direct Handling Operation: Between Terminal Trailer and Railway Wagon

(2) Indirect Handling Operation:

Between Terminal Trailer and Buffer Storage / Buffer Storage and Railway Wagon Note: This operation requires double handling for each container, and will require more than double numbers of the crane comparing with the Direct Handling Operation. Therefore, the Indirect Handling Operation is not preferable to this Project.

3. Required Number of the Cranes - (20 Wagons / Train)

Required number of the Cranes is calculated by adopting the following formula:

(2) Crane Speeds: (Hoist: 20/40 m/min, Trolley Traverse: 140 m/min), Average Cycle Time: 65 sec Nt =[{(Tba x Nw x Nbw x Th) + Ts} x Nt] / (60 x 60 x Rw x Rh x Wh)

The results of the calculation are shown on the table below:

Case 1 (2 Berths)

Marks	Descriptions	Ünits	-	2008	2011	Remarks
Tba	Required time per box(average)	sec/box	-	65	65	
Nw	Number of wagons per train	wagons/train		20	20	
Nbw	Number of boxes per wagon(averag	boxes/wagor	-	1.67	1.67	
Th	Handling times	-	-	2		Import + Export
Ts	Required time for train shifting	min/train	-	35	· 35	Before: 15, after:20
Tt	Required time per train(average)	min/train	1	107.4	107.4	
Rw	Crane working hour ratio	-		0.90	0.90	•
Rh '	Cargo handling hour ratio	-		0.80	0.80	
Tt'	Required time per train(average)	min/train		149.2	149.2	-
Nt	Number of trains per day	trains/day	+	14	18	
Wh	Working hour per day	hours/day	•	22	22	
Nr	Number of RMG cranes	Units	-	1.6	2.0	
	say	Units	-	2	3	

Case 2 (3 Berths)

Marks	Descriptions	Units	2014	2017	2020	Remarks
Tba	Required time per box(average)	sec/box	65	65	65	
Nw	Number of wagons per train	wagons/train	20	20	20	
Nbw	Number of boxes per wagon(averag	boxes/wagor	1.67	1.67	1.67	
Th	Handling times	-	2	2		Import + Export
		min/train	35	35	35	Before: 15, after:20
Tt	Required time per train(average)	min/train	107.4	107.4	107.4	
Rw	Crane working hour ratio	-	0.90	0.90	0.90	
Rh	Cargo handling hour ratio	1	0.80	0.80	0.80	
Tť	Required time per train(average)	min/train	149.2	149.2	149.2	
Nt	Number of trains per day	trains/day	22	28	36	·····
Wh	Working hour per day	hours/day	22	22	22	
Nr	Number of RMG cranes	Units	2.5	3.2	4.1	
	say	Units	3	4	5	

Table 6.4.3-1-4 (1) Container Ground Slot and Gantry Crane Calculation Sheet : Case 1

Trani Trani <th< th=""><th>Image: bit in the bit bit the bit bit the bit in the bit bit the bit in the bit in the</th><th> </th><th></th><th></th><th></th><th></th><th>nutainet</th><th>iked C</th><th>100</th><th>-</th><th>┞</th><th>L</th><th>L</th><th>L</th><th>Dwelli</th><th>Owelling Time</th><th></th><th>ō</th><th>oundshol</th><th>Groundstot Requirement</th><th>rement</th><th>-</th><th>æ</th><th>Required</th><th></th><th></th><th>Box</th><th></th><th>Mov</th><th>Move Boxes</th><th>_</th><th>-</th><th></th><th>ß</th><th>Ganity Cranes</th><th>Tanes</th><th></th></th<>	Image: bit in the bit bit the bit bit the bit in the bit bit the bit in the bit in the						nutainet	iked C	100	-	┞	L	L	L	Dwelli	Owelling Time		ō	oundshol	Groundstot Requirement	rement	-	æ	Required			Box		Mov	Move Boxes	_	-		ß	Ganity Cranes	Tanes	
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	Pro Pro <td></td> <td></td> <td></td> <td>Trada</td> <td></td> <td>F</td> <td>F</td> <td></td> <td>- SEE</td> <td></td> <td>1 Iota</td> <td>┝_</td> <td>\square</td> <td>Trad</td> <td>ļ</td> <td>Trans</td> <td></td> <td>Trad</td> <td>9</td> <td></td> <td>frans</td> <td></td> <td>of</td> <td>Plan</td> <td></td> <td>latio</td> <td></td> <td>Tie-</td> <td>ade</td> <td></td> <td>Tra</td> <td>_</td> <td></td> <td></td> <td>lan</td> <td></td>				Trada		F	F		- SEE		1 Iota	┝_	\square	Trad	ļ	Trans		Trad	9		frans		of	Plan		latio		Tie-	ade		Tra	_			lan	
			L u		1		÷···			<u> </u>			Ž	8	<u>ă</u>	ģ	S-til	·		>	<u> </u>	-		-		East	4						=		Ne:		
Mar M	Mar M		1	+-	+-	-	-	_	-	-	4	┢		Ld.	ů,	Ë.			• • •	-	-	-	┢╸			-			-			_				_	
m m	m m					100							0 "	Lau Lau		, dav	hab						ten	ane		ana	<u>- z</u>	Box M.	00 10 Box M. 1	00 10 Box M.	00 100 Box M. B	00 100 30x M. B	00 100 Jex M B				
1 1	1 1				+			+	÷	+	+	+		¥ ₽		5 5 7 7	9	-			÷		8	2	÷	8	1 1		2 2	2 2		ΓT	11			+	-
1000 1000												3	-					<u> </u>	ŀ.—			_	21+22	뚌		given					12	101		_			5
111 1111 111 111	111 1111 11111 1111 1111 <	-f	1991				\dagger	╈	+	+			╀	T	-	┞	T	╀	╀						Ħ	Ħ	┢	\parallel					\parallel		ļļ		1 -1
1111 11111 11111 11111	1111 11111 11111 11111 11111	1-	2661					t		╞		ļ		H	$\ $	П		H	H		ļ				H				-		-	-		+		╀	
111 1111 1111 1111 1111 <	111 1111 1111 1111 1111 1111 1111 1111 1111 1111 1111 1111 1111 1111 1111 1111 1111 1111 1111 1111 111111 11111 11111	H	6661					H										-	-	+	1				┥	+		┼		$\frac{1}{1}$	 	 	+	+		+	-
1000000000000000000000000000000000000	11 12 <th< td=""><td>H</td><td>1994</td><td></td><td></td><td></td><td></td><td>╉</td><td></td><td>-</td><td></td><td></td><td>+</td><td>Ţ</td><td>+</td><td>Ţ</td><td></td><td>$\frac{1}{1}$</td><td></td><td>+</td><td></td><td>İ</td><td></td><td></td><td> </td><td></td><td></td><td>$\frac{1}{1}$</td><td></td><td></td><td> </td><td></td><td>+</td><td>+</td><td></td><td>+</td><td>1</td></th<>	H	1994					╉		-			+	Ţ	+	Ţ		$\frac{1}{1}$		+		İ						$\frac{1}{1}$			 		+	+		+	1
1010 1010	1010 1010	Ť	1995	+					╋	-		+-			+			$\frac{1}{1}$	<u> </u> 			i.															• •
10100 10100 <th< td=""><td>101 1</td><td>Ť</td><td>1997</td><td></td><td></td><td></td><td></td><td></td><td>╎</td><td></td><td></td><td></td><td></td><td></td><td></td><td>$\prod_{i=1}^{i}$</td><td></td><td></td><td></td><td></td><td>Į</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>-</td><td>+</td><td></td><td>+</td><td>$\frac{1}{1}$</td><td></td><td></td><td></td><td>-</td></th<>	101 1	Ť	1997						╎							$\prod_{i=1}^{i}$					Į								-	+		+	$\frac{1}{1}$				-
0000 0000 000 <th< td=""><td>0000 00000 0000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 000000 000000 000000 000000000 0000000 000000 00</td><td>Г</td><td>1998</td><td></td><td>Ц</td><td></td><td></td><td></td><td>$\left \right$</td><td></td><td></td><td></td><td></td><td>ļ</td><td></td><td></td><td></td><td></td><td></td><td>+</td><td>Ī</td><td>Ì</td><td>İ</td><td></td><td>\dagger</td><td>+</td><td></td><td>+</td><td></td><td></td><td></td><td></td><td></td><td>+</td><td>1</td><td>+</td><td>т</td></th<>	0000 00000 0000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 000000 000000 000000 000000000 0000000 000000 00	Г	1998		Ц				$\left \right $					ļ						+	Ī	Ì	İ		\dagger	+		+						+	1	+	т
1000 101	1000 100		8661										Year														-						_				
Marry State Marry State	Marc Marc <th< td=""><td>1</td><td></td><td></td><td>1</td><td></td><td></td><td>Π</td><td>$\left \right$</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>ſ</td><td></td><td>4</td><td></td><td>1</td><td>1 ED</td><td>0 10</td><td></td><td>_</td><td></td><td></td><td></td><td></td><td></td><td></td><td>1</td></th<>	1			1			Π	$\left \right $													ſ		4		1	1 ED	0 10		_							1
Mark Mark <thmark< th=""> Mark Mark <thm< td=""><td>Mark Mark <thmark< th=""> Mark Mark <thm< td=""><td>i i</td><td></td><td></td><td>í I</td><td>14.1</td><td>12.9</td><td>0.0</td><td>0.0</td><td></td><td>1</td><td></td><td><u>ە</u> اە</td><td>: : : :</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>₅</td><td>11911</td><td>0.0</td><td></td><td></td><td>1.53</td><td>37.8</td><td></td><td>1</td><td></td><td></td><td>1</td><td></td><td>2</td><td></td><td>-</td></thm<></thmark<></td></thm<></thmark<>	Mark Mark <thmark< th=""> Mark Mark <thm< td=""><td>i i</td><td></td><td></td><td>í I</td><td>14.1</td><td>12.9</td><td>0.0</td><td>0.0</td><td></td><td>1</td><td></td><td><u>ە</u> اە</td><td>: : : :</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>₅</td><td>11911</td><td>0.0</td><td></td><td></td><td>1.53</td><td>37.8</td><td></td><td>1</td><td></td><td></td><td>1</td><td></td><td>2</td><td></td><td>-</td></thm<></thmark<>	i i			í I	14.1	12.9	0.0	0.0		1		<u>ە</u> اە	: : : :								₅	11911	0.0			1.53	37.8		1			1		2		-
7000 7000 <th< td=""><td>1111 11111 11111 11111 11111 111111</td><td>Ť</td><td>1</td><td></td><td></td><td>19</td><td>21.2</td><td>0.0</td><td></td><td>.1</td><td>1</td><td></td><td><u>م</u> ابر</td><td>200</td><td></td><td></td><td>°[°</td><td></td><td></td><td></td><td></td><td>Î</td><td>1328</td><td>7.4</td><td>t</td><td></td><td></td><td>42.1</td><td></td><td></td><td>11.7 9.</td><td></td><td></td><td></td><td>- </td><td></td><td></td></th<>	1111 11111 11111 11111 11111 111111	Ť	1			19	21.2	0.0		.1	1		<u>م</u> ابر	200			°[°					Î	1328	7.4	t			42.1			11.7 9.				- 		
0.11 0.11	1 1	Ť			+		4 . 3		30				20		- 	_	⁹	1		79 296		٥	1500	8.3		╞	Ļ	46.7	ļ.		10.1	f					
1000 100 <td>110 1</td> <td>T</td> <td></td> <td>i.</td> <td></td> <td>1000</td> <td></td> <td>0.0</td> <td>30</td> <td>÷.,</td> <td></td> <td>0.0</td> <td>: • • •</td> <td>0</td> <td>8</td> <td></td> <td>9</td> <td>1</td> <td></td> <td>78 336</td> <td></td> <td>P</td> <td>1677</td> <td>9.3</td> <td>14</td> <td>İ</td> <td>i</td> <td>52.2</td> <td>1</td> <td>1</td> <td></td> <td>1</td> <td></td> <td></td> <td></td> <td>\square</td> <td>)</td>	110 1	T		i.		1000		0.0	30	÷.,		0.0	: • • •	0	8		9	1		78 336		P	1677	9.3	14	İ	i	52.2	1	1		1				\square)
3000 11102 1123 123 253 137 134 123 133 251 134 134 251 134 134 251 134 134 251 134 134 251 134 134 251 134 134 251 134 134 251 134 134 251 134 134 251 134 134 251 134 134 251 134 134 251 134 134 251 134 134 251 134 134 251 134 <	$ \begin{array}{ $	Ť	_			25.6	+	6.9	0.7				9.	5	6	<u>+</u>	9			88 33T		194	1891	10.5			1	58.6	ļ	- i	_					+	-r
(11) (11) (11) (11) (11) (12) <th< td=""><td>Title Title <th< td=""><td></td><td><u> </u></td><td>+</td><td>_</td><td></td><td>┾</td><td>8.6</td><td>0.9</td><td></td><td></td><td></td><td>6.</td><td>e.</td><td>2</td><td>8</td><td></td><td></td><td></td><td></td><td></td><td>166</td><td>1831</td><td><u>-</u></td><td></td><td></td><td></td><td>65.2</td><td>ļ</td><td></td><td>_</td><td>_</td><td>_</td><td></td><td> </td><td></td><td>-</td></th<></td></th<>	Title Title <th< td=""><td></td><td><u> </u></td><td>+</td><td>_</td><td></td><td>┾</td><td>8.6</td><td>0.9</td><td></td><td></td><td></td><td>6.</td><td>e.</td><td>2</td><td>8</td><td></td><td></td><td></td><td></td><td></td><td>166</td><td>1831</td><td><u>-</u></td><td></td><td></td><td></td><td>65.2</td><td>ļ</td><td></td><td>_</td><td>_</td><td>_</td><td></td><td> </td><td></td><td>-</td></th<>		<u> </u>	+	_		┾	8.6	0.9				6.	e.	2	8						166	1831	<u>-</u>				65.2	ļ		_	_	_		 		-
2000 117.0 12.0	2000 111 121	1						10.5					~	5	~	8		1				82	2184	12.1				1.2				4		_	2	+	-1-
2010 141/ 142 <td< td=""><td>2001 141/ 142 143 145 <td< td=""><td></td><td></td><td></td><td></td><td>35.3 2</td><td></td><td>12</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td><u> </u></td><td></td><td>1</td><td></td><td></td><td></td><td>240</td><td>2122</td><td>13.5</td><td>İ</td><td>-</td><td></td><td>1.99</td><td></td><td></td><td></td><td></td><td></td><td>_</td><td></td><td>╞</td><td></td></td<></td></td<>	2001 141/ 142 143 145 <td< td=""><td></td><td></td><td></td><td></td><td>35.3 2</td><td></td><td>12</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td><u> </u></td><td></td><td>1</td><td></td><td></td><td></td><td>240</td><td>2122</td><td>13.5</td><td>İ</td><td>-</td><td></td><td>1.99</td><td></td><td></td><td></td><td></td><td></td><td>_</td><td></td><td>╞</td><td></td></td<>					35.3 2		12								<u> </u>		1				240	2122	13.5	İ	-		1.99						_		╞	
2010 1500 150 <td< td=""><td>2010 1550 156 157 150 <td< td=""><td>-</td><td>,</td><td></td><td></td><td>39.6 3</td><td></td><td>15.4</td><td></td><td></td><td></td><td></td><td></td><td>2 </td><td>2</td><td>-</td><td></td><td></td><td></td><td></td><td></td><td>Pag</td><td>201</td><td>2</td><td>T</td><td>+-</td><td>1</td><td>-</td><td></td><td>1</td><td></td><td></td><td>-</td><td><u> </u></td><td>L</td><td>╞</td><td></td></td<></td></td<>	2010 1550 156 157 150 <td< td=""><td>-</td><td>,</td><td></td><td></td><td>39.6 3</td><td></td><td>15.4</td><td></td><td></td><td></td><td></td><td></td><td>2 </td><td>2</td><td>-</td><td></td><td></td><td></td><td></td><td></td><td>Pag</td><td>201</td><td>2</td><td>T</td><td>+-</td><td>1</td><td>-</td><td></td><td>1</td><td></td><td></td><td>-</td><td><u> </u></td><td>L</td><td>╞</td><td></td></td<>	-	,			39.6 3		15.4						2 	2	-						Pag	201	2	T	+-	1	-		1			-	<u> </u>	L	╞	
2010 (1660) (156) (280 3425 126) (216 126) (216 363 75) (316 126) (217 443 2321) (326 230 547) (317 45) (327 352 231 352 231 352 231 352 231 352 231 352 351 351 351 351 351 351 351 351 351 351	2011 (1650 (156) (156) (156) (156) (156) (156) (156) (157) (•					000														
2011 167.1 168 17.6 7 368 202 20 170 152 7 25 20 20 75 16 75 75 20 20 20 20 20 20 20 20 20 20 20 20 20	2011 11011 11011 11011 11011		2010 156	I	6 128.0	43.6	_	18.4		15.2						9 9	99 4	549	92 11			200	27/22	5.4.5	ž	Ť	Ţ.									╀	.
311 1537 1533 <	3011 1507 250 150 756 661 713 7561 7561 7561 7563 553 573 573 573 573 573 573 573 573 573 573 573 573 573 573 573 573 573 573 573 <		2011 167		1.751 8.	46.7 3		20.3	1.		1		<u> </u>	n (6		1			<u>108 125</u>	_	8 2488	3 1 5 1 5 1 5 1 5 1 5 1 5 1 5 1 5 1 5 1	2933	16.3	Ť	\uparrow	+		1			1		•			П
3711 3717 <th< td=""><td>3011 3017 3017 3016 110</td><td></td><td>2013 193</td><td></td><td>31 158.5</td><td>54.2 4</td><td></td><td>25.7</td><td></td><td></td><td>ł</td><td></td><td> </td><td>3</td><td></td><td></td><td>9</td><td>· · · · ·</td><td>113 13</td><td></td><td>7 2667</td><td>498</td><td>3165</td><td>17.6</td><td>Η</td><td></td><td></td><td>1 1</td><td>12.1</td><td> 1</td><td></td><td></td><td></td><td></td><td><u> </u></td><td></td><td>T</td></th<>	3011 3017 3017 3016 110		2013 193		31 158.5	54.2 4		25.7			ł		 	3			9	· · · · ·	113 13		7 2667	498	3165	17.6	Η			1 1	12.1	1					<u> </u>		T
2011 2227 222 182 62.2 46.3 56.1 3 4 5 6 784 15.6 15.6 15.7	2011 2227 222 812 31 35 94 5 6 734 144 12 140 126 133 1326 133 134 143 136 133 143 126 133 143 126 133 143 126 133 143 126 133 133 133 131 1363 133 143 136 143 146 143 146 143 146 143 146 143 146 143 146 </td <td></td> <td>2014 207</td> <td></td> <td>7 170.5</td> <td>57.7 4</td> <td></td> <td>28.6</td> <td></td> <td></td> <td></td> <td>1</td> <td>2</td> <td>3</td> <td>1</td> <td></td> <td>Ŷ</td> <td>L</td> <td>97 12</td> <td></td> <td>3 2502</td> <td>553</td> <td>3055</td> <td>17.0</td> <td></td> <td>÷</td> <td>-</td> <td></td> <td>13.0 1(</td> <td>1</td> <td>36.11 28</td> <td></td> <td></td> <td></td> <td>-</td> <td>-</td> <td>-17</td>		2014 207		7 170.5	57.7 4		28.6				1	2	3	1		Ŷ	L	97 12		3 2502	553	3055	17.0		÷	-		13.0 1(1	36.11 28				-	-	-17
2016 254.0 55.1 35.3 3.4 3.4	2010 286.2 254 65.3 35.3 35.2 74.2 747.3 757.4 757.4 757.6 753.7<		2015 222	1 4	182.E	62.2 4	1 1	31.5		1			 -	с 	4		9			- 1	5 2686	609	3295	18.3	14	÷	-		1 9 11		10 30.9				7 2 7	2	Т
2011 23-61 260 314 460 317 150 <t< td=""><td>2011 2240 224 264 314 155 41 315 115 116</td><td></td><td></td><td></td><td>198</td><td>66.0 5</td><td>- 1</td><td>35.3</td><td></td><td>- 1</td><td></td><td></td><td></td><td>2 C</td><td>*</td><td></td><td>0 0</td><td><u> </u></td><td></td><td></td><td>1 20Ed</td><td>362</td><td>3856</td><td>21.4</td><td></td><td>\uparrow</td><td></td><td>1</td><td>15.9 1</td><td></td><td>44.2 34</td><td>1</td><td></td><td></td><td>0</td><td>1</td><td>1</td></t<>	2011 2240 224 264 314 155 41 315 115 116				198	66.0 5	- 1	35.3		- 1				2 C	*		0 0	<u> </u>			1 20Ed	362	3856	21.4		\uparrow		1	15.9 1		44.2 34	1			0	1	1
2010 256.7 25.1 25.2 13.1 15.6 13.6	2010 2014 2016 <th< td=""><td></td><td></td><td></td><td></td><td>29.0</td><td>6.8C</td><td>40.3</td><td></td><td></td><td></td><td></td><td></td><td>1</td><td>4</td><td></td><td>9</td><td></td><td></td><td>_</td><td></td><td>886</td><td>4034</td><td>22.4</td><td>Ť</td><td></td><td>÷-</td><td></td><td></td><td></td><td>17.1 37</td><td>1</td><td></td><td>\$</td><td>4</td><td></td><td></td></th<>					29.0	6.8C	40.3						1	4		9			_		886	4034	22.4	Ť		÷-				17.1 37	1		\$	4		
2020 30.6 30.1 246.6 64.1 66.13 58.5 5.9 47.7 16.7 128.7 790.0 189.0 133 547.7 2020 30.0.6 30.1 246.6 64.1 66.13 58.5 5.9 47.7 16.7 128.7 790.0 189.0 133 547.7 2020 200.6 30.1 246.6 5.9 47.7 16.7 128.7 791.0 791.3 547.7 2020 200.6 16.0 16.0 133 453 50.2 133 453.6 141.6 160.7 167.7 154.1 52.5 413.3 134.3 547.7 2020 200.6 16.0 16.0 453 52.6 413.4 154.1 52.5 413.3 134.3 547.7 2030 2030 10.0 160.7 160.7 160.7 160.7 160.7 160.7 160.7 154.1 52.5 413.3 134.3 547.7 2030 10.0 160.7 160.7 160.7 160.7 160.7 160.7 <t< td=""><td>2220 30.6 30.1 246.6 84.1 66.13 58.5 5.9 47.7 16.7 128.7 790.0 189 3 54.7 54.7 52.5 413.3 134.3 547.7 2025 200.6 30.1 246.6 5.9 47.7 16.7 16.7 16.8 154.1 52.5 413.3 134.3 547.7 2025 200.5 5.9 47.7 16.7 16.7 16.9 16.6 16.7 16.7 154.1 52.5 413.3 134.3 547.7 2025 2035 5.9 47.7 16.7 16.9 16.9 16.7 16.7 154.1 52.5 413.3 134.3 547.7 2035 20.9 5.9 47.7 16.7 12.8 7 16.7 16.7 154.1 52.5 413.3 134.3 547.7 2035 2035 10.0 14.0 10.0 10.0 16.7 10.7 10.4</td><td></td><td></td><td></td><td>6 235.0</td><td>79.3 6</td><td>28.5</td><td>51.6</td><td></td><td></td><td></td><td></td><td></td><td></td><td>4</td><td>4</td><td></td><td></td><td></td><td></td><td></td><td>1000</td><td>4329</td><td>24.0</td><td></td><td></td><td>÷</td><td>11</td><td>- 6.11</td><td></td><td>49.6 39</td><td></td><td></td><td></td><td>-</td><td></td><td>T</td></t<>	2220 30.6 30.1 246.6 84.1 66.13 58.5 5.9 47.7 16.7 128.7 790.0 189 3 54.7 54.7 52.5 413.3 134.3 547.7 2025 200.6 30.1 246.6 5.9 47.7 16.7 16.7 16.8 154.1 52.5 413.3 134.3 547.7 2025 200.5 5.9 47.7 16.7 16.7 16.9 16.6 16.7 16.7 154.1 52.5 413.3 134.3 547.7 2025 2035 5.9 47.7 16.7 16.9 16.9 16.7 16.7 154.1 52.5 413.3 134.3 547.7 2035 20.9 5.9 47.7 16.7 12.8 7 16.7 16.7 154.1 52.5 413.3 134.3 547.7 2035 2035 10.0 14.0 10.0 10.0 16.7 10.7 10.4				6 235.0	79.3 6	28.5	51.6							4	4						1000	4329	24.0			÷	11	- 6.11		49.6 39				-		T
2025 2030 1 </td <td>2023 1 1 1 1 2030 2030 1 1 1 2035 1 1 1 1 2035 1 1 1 1 2035 1 1 1 1 2035 1 1 1 1 2035 1 1 1 1 2035 1 1 1 1 2035 1 1 1 1 2036 1 1 1 1 2037 1 1 1 1 2038 1 1 1 1 1 2039 1 1 1 1 1 2039 1 1 1 1 1 Anexage yard utilization: import 60% thus 2.4 high 1 1 1 Anexage yard utilization: import 60% thus 2.4 high 1 1 1 Anexage yard utilization: import 60% thus 2.4 high 1 1 1 Anexage yard utilization: import 60% thus 2.4 high 1 1 1 Anexage yard utilization: import 50% thus 2.0 high 1 1 1 Anexage yard utilization import 50% thus 2.0 high</td> <td></td> <td></td> <td></td> <td></td> <td>84,1 6</td> <td>61.3</td> <td>58.5</td> <td></td> <td></td> <td>16.7 12</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>9</td> <td></td> <td></td> <td></td> <td>3502</td> <td>1133</td> <td>4635</td> <td>25.7</td> <td></td> <td></td> <td><u> </u></td> <td>1</td> <td></td> <td>1</td> <td></td> <td></td> <td>Ŧ</td> <td></td> <td></td> <td>-+</td> <td></td>	2023 1 1 1 1 2030 2030 1 1 1 2035 1 1 1 1 2035 1 1 1 1 2035 1 1 1 1 2035 1 1 1 1 2035 1 1 1 1 2035 1 1 1 1 2035 1 1 1 1 2036 1 1 1 1 2037 1 1 1 1 2038 1 1 1 1 1 2039 1 1 1 1 1 2039 1 1 1 1 1 Anexage yard utilization: import 60% thus 2.4 high 1 1 1 Anexage yard utilization: import 60% thus 2.4 high 1 1 1 Anexage yard utilization: import 60% thus 2.4 high 1 1 1 Anexage yard utilization: import 60% thus 2.4 high 1 1 1 Anexage yard utilization: import 50% thus 2.0 high 1 1 1 Anexage yard utilization import 50% thus 2.0 high					84,1 6	61.3	58.5			16.7 12						9				3502	1133	4635	25.7			<u> </u>	1		1			Ŧ			-+	
2030 2030 Lut: Laden, Ey: Empty Deweiling time is given for each by length of day in the table. Madmum stocking height in the ut (4) Average yard utilization: Import 60% thus 2.4 high Average yard utilization: Transit and Transshipment 60% thus 2.4 high Average yard utilization: Transit and Transshipment 60% thus 2.4 high Average annual working days in 3.55 days	2030	0							Η																†	+	+	╉	T					+	+	+	Т
20035	20035	S.	2030					Ì		-						Ť		+	╉	+	•		\dagger			╞	+	\dagger	+-	╀				+	+-	+	Т
Laden. Ey: Empty Luc: Laden. Ey: Empty Luc: Laden. Ey: Empty Maximum stacking height in hour (4) Maximum stacking height in hour (4) Average yard utilization: Import 60% thus 2.4 high Average yard utilization: Transit and Transshipment 60% thus 2.4 high Average annual working days in 3.55 days	Laden. Ey: Empty Duscillarg fimels given for each by length of day in the table. Duscillarg fimels given for each by length of day in the table. Maximum stacking height in four (4) Average yand utitization: Import 55% into 2.0 high Average yand utitization: Import 75% into 2.0 high Average annual writing days in 355 days An average annual writing days in 355 days Unit lane ground stot : 30 rows x films = 180 stots		2035				Í	+		╉							T					I		ĺ	İ	T		┞		1					Ļ		
Leadon E: FiraTyb Develting firms is given for each by length of day in the table. Maadmunus stackting height in four (4) Average yard utitization: Import 65%, thus 2.4 high Average yard utitization: Transit and Transshipment 60%, thus 2.4 high Average yard utitization: Transit and Transshipment 60%, thus 2.4 high Average arrutal working days in 3.55 days	Li addin. Ex: Errory Develling time is green for each by length of day in the table. Maximum stacking helph in four (4) Maximum stacking neither in the stable. Average yard withzation: Import 5% intrus 2.4 high Average yard withzation: Transit and Transshipment 60% thus 2.4 high Average partual withzation: Transit and Transshipment 60% thus 2.4 high Average annual vision in 2.55 An average annual vision of the second stables = 180 stables Unit lame ground stat : 300 rows x Glines = 180 stable		0402	╢						-							1																		ĺ		1
Maximum stacking height in four (4) Kreage yord uthization: Inport 60%, thus 2.4 high Average yard uthization: Inport 75%, thus 3.0 high Average yard uthization: Transit and Transshipment 60%, thus 2.4 high Peek lactor in 1.25 An average annual working days in 355 days	Maximum stacking height in four (4) Maximum stacking height in four (4) Average yard utitization: Impoin 60%, thus 3.0 high Average yard utitization: Transit and Transshipment 60% thus 2.4 high Average annua vorking days in 355 days Linkt lame ground stot :300 rows x Glines = 180 stots Unit lame ground stot :300 rows x Glines = 180 stots		Ld.: Laden Dewelting (, Ey: En líme is gi	nply iven lor c	ach by lei	ngth of	day in t	he tabla.									L																	٣		
Average yard utitization: Irrport 60% thus 2.4 high Average yard utitization: Irrport 75% thus 3.0 high Average yard utitization: Transit and Transshipment 60% thus 2.4 high Peak lactor in 1.25 An average annual working days in 355 days	Porme Average yard utitization: Import 60% thus 2.0 high Average yard utitization: Import 75% thus 2.0 high Average and tactor in 1.1 Average annual 200 rows x 6lines = 180 stols Unit lane ground stol : 30 rows x 6lines = 180 stols		MaxImum :	stacking	height in	four (4)	,	•									•		1																		
Average yard withzation: Transit and Transshipment 60% thus 2.4 high Peak factor In 1.25 An average annual working days in 355 days	Average yard witization: Transit and Transshipment 60% thus 2.4 high An average annual 2.5 An average annual working days in 355 days Unit lane ground stat :30 rows x Glines = 180 stats		Average y	ard utiliza ard utiliza	ation: In ation: In	port 60% port 75%	thus 2. Thus 3.	A high O high											Ö	Requ	uired Gi	toundsli	왕							:			i				
Peak factor In 1.25 An averege annual working days in 355 days	and factor in 1.125 An average annual working days in 355 days Unit lane ground stot : 30. owr x Gines = 180 stots		Average y	ard utiliza	ation: To	ansit and	Transs	hipmen	1 60% 1	hus 2.4 k	high			•							nlainer	Cargo)	x (Dewl	X (.T girl	(Peak (a	ictor) / ((Annual t) x (Says) x (Average	Slackun	g Height						
An average annual working days in 355 days	An average annual working days in 355 days Until lane ground sidi : 30 rows x 6lines = 180 sidis =		Peak lacto	ır in 1.25	:	•	-													Bant	tihod G	tound 1	2018														
	Unit lane ground stot : 30 rows x 6lines = 180 stots		An averag.	e annua	Working	days in 3.	55 day:														uired Gr	raundsh	ote / I Ini	h around 4	sints ner	lane (1)	80 teus).		F2								

6-71

ream reave in the service days in 355 days
 An excersige annual working days in 355 days
 Unit lame ground stot is 30 rows x (tilmes = 180 stots
 Unit lame ground stot is 30 rows x (tilmes = 180 stots
 Equation in century frain inficients the required facilities to start operation at that year for each Phase 1, 2 and 3 to Figure in century frain in FEUs / Number in Boxes
 Box radio : Number in TEUs / Number in Boxes
 Box radio: Software stote required facilities to start operation at that year for each Phase 1, 2 and 3 to Figure in center in FEUs / Number in Boxes
 Box radio: Software store required facilities to start operation at that year (or each Phase 1, 2 and 3 to Eucle the nanuling rate for the Transiti and Transshipment containers: Truck/rali+canal+versei = 1, 12 + 1x2/3² = 1, 13
 Average annual move box per ganky crane: 75000 strove boxes or 120000 tous

Image: bit is the part of the p	$ = \frac{1}{100} \frac$.Conta	Containetised Cargo	d Cargi						_	Dwel.	Dwelling Time	_	ō	olsbruo.	Groundslot Requirement	rement	Ī	ž	quired			Box	-	ΰ W	Move Boxes				ß	Gantry Cranes	anet
$ \begin{array}{ $	$ \begin{array}{ $				Trak	de				Trans			Tola			Tra		Trans		Trac	fe te		Trans		ol	Plan	<u>а</u> ,	latio		Ĕ.	ade		Tran				5
Mot Lie <thlie< th=""> <thlie< th=""> <thlie< th=""></thlie<></thlie<></thlie<>	$ \begin{array}{ c c c c c c c c c c c c c$							_			<u> </u>	<u> </u>		Note	s Exp.			S-til				S-til	S-B		·	_	ast									West	t East
Prote Prot Prote Prote	No No<		1		-	-	-	÷					-	1	۲ġ.				_		-	_	F		f			F		• •	_	-					
Image Image <th< td=""><td>$\begin{array}{ c c c c c c c c c c c c c c c c c c c$</td><td></td><td>;</td><td></td><td></td><td></td><td></td><td>_</td><td></td><td></td><td></td><td></td><td></td><td>0</td><td></td><td>100</td><td></td><td></td><td><u> </u></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>- 3</td><td>000 1(</td><td>00 10</td><td>00 10</td><td>00 100</td><td>00 100</td><td>001 00</td><td></td><td>1</td><td>_</td></th<>	$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$;					_						0		100			<u> </u>									- 3	000 1(00 10	00 10	00 100	00 100	001 00		1	_
1 1	1991 1991					_	_				_	_	_			13 13		lay 16					≣ ន	1	+		28 28		28	- M		1 32		5 7. 5		5	8
188 1	1991 1991 1991 1991 1991 1991 1992 1993 1993 1994 1994 1994 1993 1994 1994 1994 1994 1994 1994 1993 1994 1994 111129 0.00		<u> </u>									ł		-	<u> </u>							<u> </u>	T	21+22			hen	<u> </u>	-						-		1
With High High	1990 1990 <th< td=""><td>Γ</td><td>1991</td><td>╀</td><td>┞</td><td>┞</td><td></td><td>Ļ</td><td> </td><td></td><td></td><td></td><td>Ļ</td><td></td><td>ļ</td><td>T</td><td>ſ</td><td>T</td><td>╞</td><td>╞</td><td>-</td><td></td><td></td><td></td><td>F</td><td>╞</td><td>╞</td><td>╞</td><td></td><td>L</td><td>-</td><td>-</td><td> </td><td></td><td></td><td></td><td></td></th<>	Γ	1991	╀	┞	┞		Ļ	 				Ļ		ļ	T	ſ	T	╞	╞	-				F	╞	╞	╞		L	-	-					
188 1	1993 1713 1713 <th< td=""><td></td><td>1992</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>H</td><td></td><td></td><td></td><td></td><td>Ц</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>Ц</td></th<>		1992													H					Ц																Ц
1000 1000	1935 1 100	Ţ	1993																+	$\frac{1}{1}$	+	Ì				+	1				-				-		ļ
11100 11100 <th< td=""><td>1399 1399 149 1499 141 172 00</td><td>Ţ</td><td>1005</td><td>╉</td><td>+</td><td>1</td><td></td><td>┦</td><td>+</td><td> </td><td></td><td></td><td>ļ</td><td>+</td><td></td><td></td><td>Ţ</td><td>Ì</td><td></td><td>╀</td><td></td><td>ļ</td><td></td><td></td><td>+</td><td>+</td><td></td><td></td><td>+</td><td>1</td><td>╀</td><td></td><td> </td><td></td><td></td><td></td><td></td></th<>	1399 1399 149 1499 141 172 00	Ţ	1005	╉	+	1		┦	+				ļ	+			Ţ	Ì		╀		ļ			+	+			+	1	╀						
1919 1919 <	1937 1937 1937 1937 1937 1938 1939 100 101 <th< td=""><td>Ţ</td><td>1996</td><td></td><td></td><td></td><td></td><td>1</td><td>1</td><td></td><td>1</td><td></td><td>+</td><td>1</td><td></td><td>$\frac{1}{1}$</td><td>ſ</td><td></td><td>+</td><td>$\frac{1}{1}$</td><td> </td><td>Ţ</td><td>ľ</td><td>-</td><td>┢</td><td>╉</td><td>┢</td><td>╀</td><td>╈</td><td>╞</td><td>+</td><td></td><td>+-</td><td></td><td></td><td></td><td>Ļ</td></th<>	Ţ	1996					1	1		1		+	1		$\frac{1}{1}$	ſ		+	$\frac{1}{1}$		Ţ	ľ	-	┢	╉	┢	╀	╈	╞	+		+-				Ļ
1918 1918 1 </td <td>1399 1399 1399 1399 1399 1399 1399 139 139 139 139 139 139 135 11 135 35 135 11 135 35 135 11 135 35 135</td> <td></td> <td>1997</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>Í</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	1399 1399 1399 1399 1399 1399 1399 139 139 139 139 139 139 135 11 135 35 135 11 135 35 135 11 135 35 135		1997																				Í														
1010 1010 <th< td=""><td>1999 1999 1499 <th< td=""><td></td><td>8661</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></th<></td></th<>	1999 1999 1499 <th< td=""><td></td><td>8661</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></th<>		8661																																		
10000 100000 10000 10000 <t< td=""><td>$\frac{2000}{2000}$ 513 511 1129 00<</td><td></td><td>0000</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>Hase Voor</td><td>_</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>_</td><td></td><td></td><td></td><td></td><td></td><td></td></t<>	$\frac{2000}{2000}$ 513 511 1129 00 <		0000											Hase Voor	_																_						
2000 131 51 61 111 112 111 113 111 113 111 113 111 113 111 113 111 113 111 113 111 113 111 113 111 113 111 113 111 113 111 113	2000 51.3 5.1 $q.2.3$ 14.1 112.9 0.0 0.0 0.0 112.9 1		20002	+	-	+			_	-					Ţ		Ţ		┼	╉		Ţ	T			╉	t	╀	+	+					-		Ļ
2001 1001 100 000 <th< td=""><td>2001 57.3 5.8 7.5 16 1 2.00 16.7 16 12.7 16 10 10 6 225 55 16 10 10 6 225 55 16 17 16 12.7 16 12.7 16 12.7 16 12.7 16 12.7 16 12.7 16 17 16 12.7 16 12.7 16 12.7 16 12.7 16 12.7 16 12.7 16 12.7 17 16 12.7 17 16 12.7 12 12.7 12</td><td>I</td><td></td><td></td><td></td><td></td><td></td><td><u> </u></td><td></td><td></td><td></td><td></td><td>113</td><td>σ</td><td>e.</td><td>ľ</td><td></td><td>ď</td><td>1</td><td></td><td>-</td><td></td><td>0</td><td>1000</td><td>5.6</td><td>┢╍</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>_</td><td></td><td></td><td>Ļ</td></th<>	2001 57.3 5.8 7.5 16 1 2.00 16.7 16 12.7 16 10 10 6 225 55 16 10 10 6 225 55 16 17 16 12.7 16 12.7 16 12.7 16 12.7 16 12.7 16 12.7 16 17 16 12.7 16 12.7 16 12.7 16 12.7 16 12.7 16 12.7 16 12.7 17 16 12.7 17 16 12.7 12 12.7 12	I						<u> </u>					113	σ	e.	ľ		ď	1		-		0	1000	5.6	┢╍								_			Ļ
3000 300 300 100	2000 82.9 6.3 61.3 17.7 136.4 0.0 0.0 0.0 136.4 10 10 6 246 65 2003 85.4 5.5 51.5 17.7 136.4 0.0 0.0 0.0 136.4 5 57.1 139.4 6 57.4 59.5 6 57.7 59.5 6 57.7 59.4 6 57.7 59.4 6 57.7 59.4 6 57.7 59.4 59.5 6 57.7 57.4 57.3 57.7 57.4 57.3 57.4 57.8 57.7 57.4 57.7 57.4 57.7 57.4 57.7 57.4 57.7 57.4 57.7	Ī				75 18		4					197	2	Ĩ									1111	9.9										1		Ļ
2000 660 750	2000 653 65 571 1323 152 00 00 00 00 00 65 <	T.		1		15 - 17	7 136.4	<u>.</u>		1		÷.	138	1.14		Ē	1		1			1296		1296	7.2	:	Ţ	_	τ.								Ļ
2000 7:00 35 6:00 0:00 0:01 0:00 0:01 0:00 0:01 0	2001 74.9 7.5 62.0 20.5 16.6 0.0 0.	Ī		+		7 1 19	3 152.8						0 152.	6					1			3 1430	P	1430	- 6.7		F	<u> </u>						<u>.</u>			-
71 2006 88.1 8.1 7.1 7.0	2001 82.5 6.3 6.7 7.3 7.6 6.7 7.7 6.6 7.7 6 6.1 7.7 6 6.1 7.7 6 6.1 7.7 6 6.1 7.7 6 6.1 7.7 6 6.1 7.7 6 6.1 7.7 6 6.1 7.7 6 6.1 7.7 6 6.1 7.7 6 6.1 7.7 6 6.1 7.7 6 6.1 7.7 6 6.1 7.7 6 6.1 7.7 6 7.7 6 7.7 7 6 7.7 7.7 6 7.7 7.7 7.7 6 7.7 7.7 7.7 6 7.7 <td></td> <td></td> <td>÷.</td> <td>7.5 62</td> <td>2.0 20</td> <td>5 164.8</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>0 164.</td> <td></td> <td>ľ</td> <td>0</td> <td><u> </u></td> <td></td> <td>1.</td> <td></td> <td></td> <td>1 1543</td> <td>ľ</td> <td>1543</td> <td>8.6</td> <td>4</td> <td>┢</td> <td>Ļ</td> <td></td> <td></td> <td></td> <td></td> <td>1</td> <td>1</td> <td></td> <td></td> <td>Ļ</td>			÷.	7.5 62	2.0 20	5 164.8						0 164.		ľ	0	<u> </u>		1.			1 1543	ľ	1543	8.6	4	┢	Ļ					1	1			Ļ
7 1	1 2000 931 633 73 244 153 244 153 244 153 244 153 244 153 244 153 244 153 244 153 244 153 244 153 244 153 244 153 244 153 244 153 244 153 244 153 244 153 244 245 173 64 241 77 6 243 243 243 244 244 245 244 244 245 244				8.3 67	7.4 23	4 181.6	ê,				L	2 196.	8	ŕ	6	L		ł		<u> </u>	1576		11	6.5	╞	-			L.,			L				L
2 2 2000 101 61 62 22 2001 11.3 71 72 360 17.3 75 560 17.3 75 560 17.3 75 560 17.3 75 560 17.3 75 560 17.3 75 560 17.3 75 560 17.3 75 560 17.3 75 560 17.3 75 560 17.3 75 560 17.3 75 560 17.3 75 560 17.3 75 560 17.3 75 560 17.3 75 560 77.3 75 560 77.3 75 560 77.3 75 560 77.3 75 560 77.3 75 560 77.3 75 750 <td>2 2000 1730 937 936 77 96 533 930</td> <td></td> <td></td> <td></td> <td>8.9 75</td> <td>3.3 24</td> <td>8 196.0</td> <td>Te la</td> <td></td> <td></td> <td></td> <td>L</td> <td>9 214.</td> <td>6</td> <td>r</td> <td>-</td> <td>8 8</td> <td></td> <td>1</td> <td></td> <td>1</td> <td>1537</td> <td></td> <td>1703</td> <td>9.5</td> <td> </td> <td>-</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	2 2000 1730 937 936 77 96 533 930				8.9 75	3.3 24	8 196.0	Te la				L	9 214.	6	r	-	8 8		1		1	1537		1703	9.5		-										
3 2000 104 161 232 252 116 115 71	3 2000 114.4 10.4 <				9.7 75	9.8 27	2 214.1	-						2	•	F	8					0 1679		1862	10,5		-										
4 7000 11.0 01.1 03.2 27.0 10.0 13.0 23.1 10.0 23.0 <t< td=""><td>4 2009 114.0 11.4 93.2 250.7 13.4 13.1 33.3 244.6 51.0 3 6 6 6 7 6 401 60 7 7011 1280.1 12.8 103.0 3.55 281.6 203 2.0 17.0 5.3 4.46 366.1 7 6</td><td></td><td></td><td></td><td>10.4 B£</td><td>6.1 28</td><td>7 229.7</td><td></td><td></td><td></td><td></td><td>- 1</td><td></td><td></td><td>0</td><td>i.</td><td><u>~</u>;</td><td>-</td><td></td><td></td><td></td><td></td><td></td><td>1961</td><td>10.3</td><td></td><td>-r </td><td>1</td><td></td><td></td><td>F</td><td></td><td>1</td><td></td><td></td><td></td><td></td></t<>	4 2009 114.0 11.4 93.2 250.7 13.4 13.1 33.3 244.6 51.0 3 6 6 6 7 6 401 60 7 7011 1280.1 12.8 103.0 3.55 281.6 203 2.0 17.0 5.3 4.46 366.1 7 6				10.4 B£	6.1 28	7 229.7					- 1			0	i.	<u>~</u> ;	-						1961	10.3		-r 	1			F		1				
5 2010 1216 122 1000 332 257.5 10.4 16 15.5 5.0 4.0 210.1 211.6 14 6 15.9 75.5 </td <td>5 2010 1216 12.2 1000 33.8 267.5 18.4 18 15.2 5.0 40.5 38.6 7 6 42.8 7 6 42.8 7 6 42.8 7 7 6 42.8 7 7 6 42.8 7 7 6 42.8 7 7 6 42.8 7 7 6 42.8 7 7 6 42.8 7 7 6 42.8 7 7 6 6 6 7<</td> <td></td> <td></td> <td></td> <td>11.4</td> <td>32</td> <td>2 250.7</td> <td>_</td> <td></td> <td></td> <td></td> <td>- I</td> <td>_</td> <td></td> <td>1</td> <td></td> <td></td> <td></td> <td>ļ</td> <td></td> <td></td> <td></td> <td></td> <td>Ì</td> <td><u>,</u></td> <td>╉</td> <td>┤</td> <td></td> <td></td> <td></td> <td></td> <td>_</td> <td></td> <td></td> <td></td> <td></td> <td></td>	5 2010 1216 12.2 1000 33.8 267.5 18.4 18 15.2 5.0 40.5 38.6 7 6 42.8 7 6 42.8 7 6 42.8 7 7 6 42.8 7 7 6 42.8 7 7 6 42.8 7 7 6 42.8 7 7 6 42.8 7 7 6 42.8 7 7 6 42.8 7 7 6 6 6 7<				11.4	32	2 250.7	_				- I	_		1				ļ					Ì	<u>,</u>	╉	┤					_					
5 2010 121.6 12.2 150.0 336 357.5 116.1 14 6 150 321 320.0 321.6 210.0 121.6 22.2 170.0 221.0 <t< td=""><td>5 2010 121.6 12.2 1000 33.8 25.7.5 18.4 1.6 15.2 5.0 40.5 35.6 6 6 430 77 7 2012 133.7 124.1 105.3 35.2 81.6 5.3 44.6 35.1 7 6 <</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>tern d</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>	5 2010 121.6 12.2 1000 33.8 25.7.5 18.4 1.6 15.2 5.0 40.5 35.6 6 6 430 77 7 2012 133.7 124.1 105.3 35.2 81.6 5.3 44.6 35.1 7 6 <													tern d																							
6 2011 (1320) (132) (123) (124) (163) (35, 2811, 203) (20) (12, 30) (31) (36) (35) (32) (31) (36) (35) (32) (31) (36) (35) (32) (32) (32) (32) (32) (32) (32) (32	6 2011 1320 12.3 105.3 35.5 61 6 431 75 8 2012 132.7 14.0 15.3 37.1 237.2 237.7 237.1 237.2 237.7 237.7 237.7 237.7 237.7 237.7 237.7 237.7 237.7 237.4 237.7 237.4 237.7 237.4 237.7 237.4 237.4 237.4 237.7 237.4 <td>ŝ</td> <td>2010</td> <td>121.6</td> <td>12.2 100</td> <td>33.</td> <td>8 267.5</td> <td>18,</td> <td></td> <td>- 1</td> <td></td> <td></td> <td>5 308.</td> <td>0 Stag.</td> <td>_</td> <td>- !</td> <td>2</td> <td></td> <td></td> <td></td> <td></td> <td>1727</td> <td>356</td> <td>2083</td> <td>11.6</td> <td>7</td> <td>┥</td> <td></td> <td></td> <td></td> <td></td> <td>1</td> <td></td> <td></td> <td>1</td> <td></td> <td>~</td>	ŝ	2010	121.6	12.2 100	33.	8 267.5	18,		- 1			5 308.	0 Stag.	_	- !	2					1727	356	2083	11.6	7	┥					1			1		~
7 7	7 2012 73.7 13.4 19.6 37.1 23.6 64 64.1 73 8 2019 14.0 16.4 30.3 25.6 25.7 25.1 25.7 55.7 55 56 55 56 55 56 55 56 55 56 55 56 55 56 55 56 55 56 55 56 55 56 55 56 55 56 55 56 55 56 55 56 55 56 56 55 56 56 </td <td>ဖ</td> <td>2011</td> <td>128.0</td> <td>12.8 105</td> <td>5.3 35.</td> <td>5 281.6</td> <td>20.5</td> <td></td> <td></td> <td></td> <td></td> <td>6 326.</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>1765</td> <td>392</td> <td>2157</td> <td>12.0</td> <td></td> <td>-</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>5 222</td> <td></td> <td></td> <td></td>	ဖ	2011	128.0	12.8 105	5.3 35.	5 281.6	20.5					6 326.									1765	392	2157	12.0		-							5 222			
8 2010 140.3 140.1 140.	8 2014 17.03 17.01 17.0		2012	33.7	13.4 109	37.	1 294.1	22	ļ		1		5 344.	9	0				i			1843	445	228B	12.7					1	. 1			7 236	1]		
1 2016 14/1 <t< td=""><td>1 2019 147.0 16.7 17.10 40.0 323.4 255 51 352.5 51 52.5 51 52.5 51 52.5 51 52.5 51 52.5 51 52.5 51 52.5 51 52.5 51 52.5 51 52.5 51 52.5 51 52.5 51 52.5 51 52.5 51 52.5 51 52.5 51.5 52.5 51.5 52.5 51.5 52.5 51.5 52.5 51.5 52.5 51.5 52.7 50.3 51.5 52.7 50.3 51.5 52.7 50.3 50.3 32.7 4 5 4 5 6 65.5 51 51.5 52.7 13.1 13.6 50.3 31.7 13.6 50.3 31.4 5 4 5 6 65.7 77 14.1 113.6 50.4 5 32.4 5 4 5 6 66.3 86.3 86.3 86.3 87.4 77 14.1 113.6 5 4 5 4</td></t<> <td>5</td> <td></td> <td>140.3</td> <td>14.0 110</td> <td>35 4.35</td> <td>9'RAE 6'</td> <td>2</td> <td>1</td> <td>- 1</td> <td></td> <td></td> <td>365.</td> <td></td> <td>-</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>95.51</td> <td>4515</td> <td>5935</td> <td></td> <td></td> <td></td> <td>_</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>707 1</td> <td></td> <td></td> <td>_</td>	1 2019 147.0 16.7 17.10 40.0 323.4 255 51 352.5 51 52.5 51 52.5 51 52.5 51 52.5 51 52.5 51 52.5 51 52.5 51 52.5 51 52.5 51 52.5 51 52.5 51 52.5 51 52.5 51 52.5 51 52.5 51 52.5 51.5 52.5 51.5 52.5 51.5 52.5 51.5 52.5 51.5 52.5 51.5 52.7 50.3 51.5 52.7 50.3 51.5 52.7 50.3 50.3 32.7 4 5 4 5 6 65.5 51 51.5 52.7 13.1 13.6 50.3 31.7 13.6 50.3 31.4 5 4 5 6 65.7 77 14.1 113.6 50.4 5 32.4 5 4 5 6 66.3 86.3 86.3 86.3 87.4 77 14.1 113.6 5 4 5 4	5		140.3	14.0 110	35 4.35	9'RAE 6'	2	1	- 1			365.		-							95.51	4515	5935				_						707 1			_
11 2010 133 143 1	11 2010 153.4 153.1 153.1 153.4 153.3 153	<u>م</u>	2014	47.0	14.7 121	1.0 40	1 323.4	28.	1	۰.				N	- -	4						5/11	2	0702	R'7	-	÷	-								Į	
12 2011 1733.1 173.4 14.86 8.03 4.03 4.03 4.04 4.04 4.05 16.06 16.06 16.06 16.06 16.06 26.13 233.1 236.13 233.1 236.13 <	12 2017 1733 1	2		5	10.0 120	24	2020 0	2		1			201 2	2	1	7						000		0843	2	=	\dagger				_						1
13 2018 153.0 163.5 50.3 47.5 16.8 37.4 15.4 17.15 37.8 17.6 16.6 16.7 16.6	13 2018 153.0 163.1 55.3 60.3 47.8 75.5 160.5 56.3 47.8 76.3 56.3 76.3 56.3 76.3 56.3 76.3 56.3 76.3 56.3 76.3 56.3 76.3 56.3 76.3 56.3 76.3 56.3 76.3 56.3 76.3 56.3 76.3 56.3 76.3 56.3 76.3 56.3 76.3 56.3 76.3 56.3 76.3	- -	111	3	17 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	A A	8 380.0	200			ſ				T							200R	30	CIBBO	19.0		1	4.		1					1	I	
12 2016 192.6 123.0 126.0 126.0 12.1 12.1 93.6 73.3 24.1 113.5 74.6.3 714.1 113.5 74.7 14.1 113.5 74.7 14.1 113.6 713.5 12.1 93.6 73.8 76.8 714.5 715.5 713.5 713.5 714.7 113.5 74.7 15.7 15.0 128.7 15.0 128.3 15.6 713.3 23.5 15.6 713.3 12.1 12.1 12.1 93.6 73.3 23.5 14.6 71.3 72.1 93.6 716.5 713.3 23.2 19.6 16.0 12.8 10.5 28.2 13.13 35.23 19.6 16.0 16.5	14 2019 1934 (0) 1934 (0) 1934 (0) 1934 (0) 1934 (0) 1934 (0) 1934 (0) 1934 (0) 1934 (0) 1934 (0) 1034	12	2018	10	18.3 150	1.5 50.	9 402.7	45.6			1		7 503	>		1						2133	988	3019	16.8	┢		4	1	1	1		ľ	. i	1		1
16 2020 205.2 20.5 18.3 5.7.4 451.4 5.8.5 5.9 47.7 16.7 128.7 16.0 128.3 12.8 105.2 35.8 282.2 134.3 416.5 202 2023 2030 1.16 1.26 128.3 128.9 16.6 1.60 128.3 128.3 128.3 16.6 16.5<	16 2020 205.2 201.5 163.3 57.4 451.4 58.5 5.9 47.7 16.7 128.7 580.1 58age 3 4 5 4 6 723 96 20 205.2 205.5 205.6 205.5 5.9 47.7 16.7 128.7 58age 3 4 5 4 6 723 96 20 2055 203.6	-	2019	94.0	19.4 159	13 54.	1 426.8	51.6			i –		6 540.			4	5					2260		3260	18.1					1	1		2	_			
10 10000 xxxxx xxxx xxx xxxx xxxx xxxx xxx	20 2005 <] ;			8		A 464.4						69			-		1	1		F	Udee	1.00	1636													
25 2030	26 2030 30 2030 31 2030 32 2030 33 2030 33 2030 34 204 35 204 36 1 37 1 38 204 30 2030 30 2030 30 2030 3 Maximum stacking height of day in the table. 3 Maximum stacking height in four (4) 4 Areage yard utilization. Hopot 60% hus 2.4 hight 5 Areage yard utilization. Fropt 60% hus 2.0 hight	202	2025	1												. 	1	_				0007	2	2	-	+		+									
30 2030 28 2040	30 2030 36 2030 38 2030 38 2040 38 2040 3 2 Develling time is given for each by length of day in the table. 3 Maximum stacking height in four (4) 4 Average yard utilization: import 60% thus 2.4 high 5 Average yard utilization: import 65% thus 2.0 high 6 Average varid utilization: report 65% thus 2.4 high	52	2030		ļ										1							ļļ															1
1 Ld.: Laden. Ey: Erroly 2 Dewelling time is given far each by tength of day in the table. 3 Maximum stacking prime trunt (4) 4 Average yard utilization: froport 60% thus 2.0 high 5 Average yard utilizations: froport 5% thus 3.0 high	 Ld.: Laden, Ey: Errohy Develling time is given for each by length of day in the table. Maximum stacking height in four (4) A verage yand utilitization: import 60% thus 2.4 high E Average yand utilitization: import 75% thus 3.0 high A verage varid utilitization: report 75% thus 3.0 high 	38	2035														Ţ	T				Ţ	+	┿	+-	+	┿	+-	╋		+	+	+				
 Decur Level into U. Sy terrupt of day in the table. Decur Level into Units of year for each by length of day in the table. Asarimum stacking prior into unit (s) A verage yord utilization: import of Six thus 2.0 high A verage yord utilization: import of Six thus 2.0 high 	 Cur, canor, Sy, runt for each by length of day in the table. Dearmurn stacking height in four (4) Average yard utilitation: import 60% thus 2.4 high Average yard utilitation: import 75% thus 3.0 high Average varid utilitation: runton 75% thus 3.0 high Average varid utilitation: runton 75% thus 2.4 high 	1 -		- 10 10																																	
Maximum stacking height in four (4) Average yard utilitzation: Import 60% ithus 2.4 high Average yard utilitzation: Import 75% ithus 3.0 high	Maximum stacking height in four (4) Average yard utilitzation: troport 60% thus 2.4 high Average yard utilitzation: troport 75% thus 3.0 high Average yard utilitzation: Transiti and Transshimment 60% thus 2.4 high	- 0	Dewellir Dewellir	na time i.	s given fai	r each t	w length.	ol day i	n the t	abte.																											
Average yard uliitzation: krptost 60% itsus 2.4 high Average yard uliitzation: krptost 75% itsus 3.0 high	Average yard utilization: trrpont 60% thus 2.4 high Average yard utilization: tripont 75% thus 3.0 high Average vard utilization: Transiti and Transshitment 60% thus 2.4 high		Maximu	'm slacki	ng height	in four	, • 💽	•																													
Average yard ulitization: Import 75% thus 3.0 high	Average yard uliitzation: Inpoot 75%. Ityus 3.0 high Average vard uliitzation: Transit and Transshipment 60%. Ityus 2.4 high		Average	9 yard ul	Kization: L	Import (70% thus	2.4 hig	륲											Fon	muta:																
	Average vard ulitization: Transit and Transshipment 60% thus 2.4 high		Average	a yard ul	tization: L	Import	75% thus	3.0 hlg	두												Requ	tired Gro	pundslp	\$													

Table 6.4 3.1-4 (2) Container Ground Slot and Gantry Crane Calculation Sheet : Case 2

Presk factor in transmost, instantant interscription, over use an instantant of the set factor in 1.25
 Ran servelage annual working days in 355 days
 Ban severage annual working days in 355 days
 Dinll lang ground sol (30 rows x 6lines = 180 stols)
 Dinll lang ground sol (30 rows x 6lines = 180 stols)
 Figure in column Plan indicates the regulated lacitities to start operation at that year for each Phase 1, 2 and 3
 Figure in column Plan indicates the regulated lacitities to start operation at that year for each Phase 1, 2 and 3
 Example an in FELS / Number in Boxes
 Boxeratio : Number in FELS / Number in Boxes
 Doubla handling rate for the Transit and Transshipment containers: Truck/rail+canal+vessal = (1+1*2+1/2)/3= 1,67
 Average annual move box per ganty crane: 75000 move boxes or 120000 teus. 75000 teus

Table 6.4.3-1-4 (3) Container Terminals Construction Schedule

Forecast Case Alc	Quay Alocation	Work Items	'01 '02 '03 Construction Worl	102 103 Uction Wor	3 '04 pri Phase	e 1	90,	20,	80,	60,	'10 ' Phase 2	2	1, 21,	13 11	'14 '15 Phase	'15 '16 Phase 3	9 11	18	61.	'20
+			1		V										K				ſ	
-	West	Quay Gantry Crane Construction Work	Construc	uction Work	m	Cranes				1	4 Cranes				₹	Cranes			1	
		Berth	Construction Worl	tion W	C4	Berths				101	Berths	s			~1	Berths			1	
	- 1999 - 1999	Lane	Construction Work	tion Wo	1 ±v	Lanes					14 Lanes	es			¥ 4	Lanes			1	
	East	Quay Gantry Crane					Const	ruction	Construction Works	Ą	2 Cranes		V			3 Cranes			1	
		Berth					Const	ruction	Construction Works	A	Berths	s			C-IX	Berths			1	
_		Lane					Const	ruction	Construction Works		6 Lanes	0	V		24	Lanes			1	
2	West	Quay Gantry Crane Construction Work	Construc	tion Wo	m	Cranes				A	Cranes				N N	ranes				
		Berth	Construction Work	tion W(N	Berths				~Y	Berths	S			242	Berths				
		Lane	Construction Worl	uction Worl		4 Lanes				1	14 Lanes	es			₹¥	Lanes			1	
	East	Quay Gantry Crane					Const	ruction.	Construction Works	Ą	2 Cranes	10	ľ		44	3 Cranes			Î	
		Berth					Const	ruction	Construction Works	Å	2 Berths	S			H N	2 Berths				
		Lane					Const	ruction	Construction Works	S 6	Lanes	S			6(12)		Lanes		ſ	

(2) Grain Terminal

For the analysis of required cargo handling equipment, following reference data was prepared for review:

Figure 6.4.3-2 Cargo Flow Chart - Grain Terminal (Total Grain Terminals & New Terminal) Table 6.4.3-2-1 Project Scale - Grain Terminal (2,000,000 ton/yr Export) Table 6.4.3-2-2 Cargo Handling Equipment - Grain Terminal (2,000,000 ton/yr Export) Table 6.4.3-2-3 Annual Cargo Handling Capacity Calculation - Grain Terminal

Figure 6.4.3-2 Cargo flow Chart indicates cargo movement flow by volume and direction. Main input data are the traffic forecast data and estimated modal split by commodity. This is basic data to design the cargo handling equipment.

Based on the cargo volume forecast, project scale of the grain terminal was studied as indicated in the Table 6.4.3-2-1.

Table 6.4.3-2-2 shows the contents of major cargo handling equipment for the new grain terminal.

Table 6.4.3-2-3 indicates the annual cargo handling capacity of major cargo handling equipment for new grain terminal.

Two(2) 400 ton/hr pneumatic type unloaders and two(2) 800 ton/hr grain loaders with swing type telescopic chute, will be required up to the year of 2020.

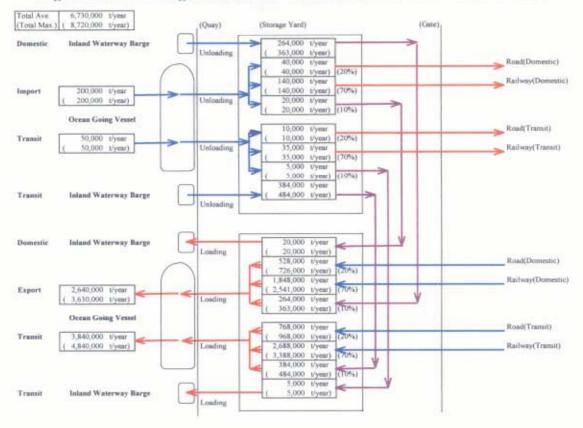


Figure 6.4.3-2-1 Cargo Flow Chart -Total Grain Terminals - Case 1 - 2020



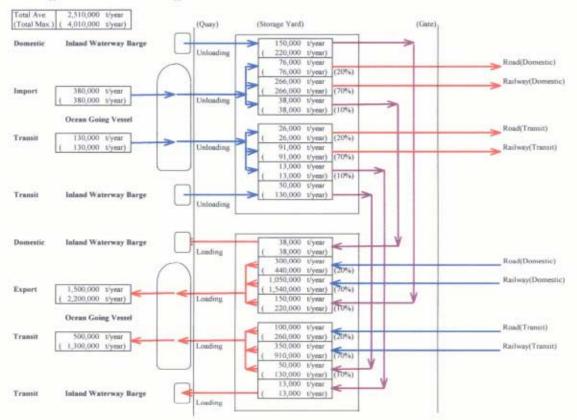


Figure 6.4.3-2-3 Cargo Flow Chart - New Grain Terminal (2.0 Million Tons/Year Export)

Total Export & Transit (Export) Cargo

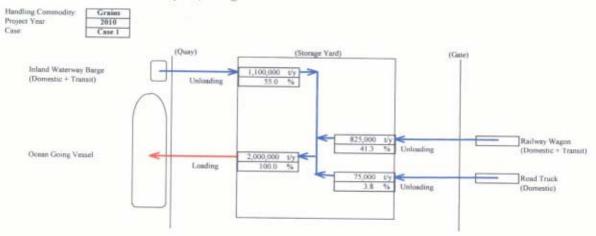
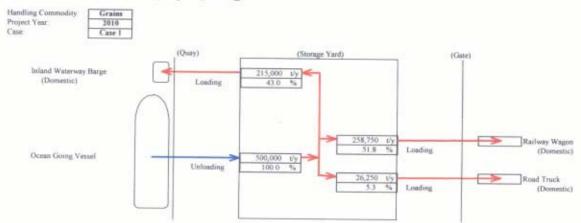


Figure 6.4.3-2-4 Cargo Flow Chart - New Grain Terminal (0.5 Million Tons/Year Import)

Total Import & Transit (Import) Cargo



	(2.0 Million To	ons/Year Export	t / 0.5 Million '	Tons/Year Import)
Destination	Direction	Transportation	Cargo Volume	Handling Equipment
Desimation	Direction	Transportation	(Tons/year)	Handling Equipment
		Barges	1,100,000	2 x 400 t/h Pneumatic Unloader
	Dessiving from	Railway Wagons	825,000	2 x 400 t/h Receiving System
Export	Receiving from:	Road Trucks	75,000	1 x 100 t/h Receiving System
-		Total	2,000,000	~
	Delivery to:	Vessels	2,000,000	2 x 800 t/h Bulk Loader
	Receiving from:	Vessels	500,000	Same Pneumatic Unloader for Export
	· · · · · · · · · · · · · · · · · · ·	Barges	215,000	Same Bulk Loader for Export
Import	Delline	Railway Wagons	258,750	1 x 200 t/h Loading System
-	Delivery to:	Road Trucks	26,250	1 x 100 t/h Loading System
		Total	500,000	

Table 6.4.3-2-1 Project Scale - New Grain Terminal

Table 6.4.3-2-2 Cargo Handling Equipment - Grain Terminal

No.	System	Equip	ment	Capacity	Remarks
01	Barge/Ship Unloading System	Ship Unloader		2 x 400 tons/hour	Pneumatic
		Inter-Systems Handling	g Equipment	2 x 400 tons/hour	
	· •		Conveyors	2 x 400 tons/hour	Chain Conveyor
02	Railway Wagon Receiving System	Receiving Hopper		2 x 400 tons/hour	
·		Inter-Systems Handling	g Equipment	2 x 400 tons/hour	
•••			Bulk Weigher	2 x 400 tons/hour	
			Conveyors	2 x 400 tons/hour	
			Elevators	2 x 400 tons/hour	
03	Truck Receiving System	Tipping Platform		1 x 100 tons	
		Receiving Hopper		1 x 100 tons/hour	
		Buffer Silos	Wet Grain	2 x 500 tons	
			Dry Grain	1 x 500 tons	
	,	Tower Dryer		1 x 100 tons/hour	
		Inter-Systems Handling	g Equipment	I x 100 tons/hour	
			Conveyors	1 x 100 tons/hour	Chain Conveyor
	•		Elevators	1 x 100 tons/hour	
04	Transfer System	Inter-Systems Handlin	g Equipment	2 x 400 tons/hour	
			Elevators	5 x 400 tons/hour	
			Bulk Weigher	2 x 400 tons/hour	
05	Storage System	Main Silos		10 x 10,000 tons	Galvanized Steel Sheets
		Inter-Systems Handlin	g Equipment	2 x 800 tons/hour	Chain Conveyor
06	Transfer System	To Ship Loading Syste		2 x 800 tons/hour	Chain Conveyor
	_	To Railway Wagon Lo	ading System	1 x 200 tons/hour	Chain Conveyor
		ToTruck Loading Syst	em	1 x 100 tons	Chain Conveyor
07	Ship Loading System	Ship Loader		2 x 800 tons/hour	Swing Type Telescopic Chute
08	Railway Wagon Loading System	Loading Chute		1 x 200 tons/hour	
09	Truck Loading System	Loading Chute		1 x 100 tons	

(Basic Model for the Purpose of Estimating Project Scale)

Table 6.4.3-2-3 Annual Cargo Handling Capacity Calculation - Grain Terminal

Annual cargo handling capacity of the terminal is calculated by adopting the following formula:

1. Berth Occupancy Ratio

- $Rbo = Hb / (365 \times 24)$
 - = (Hba + Hbb) / (365 x 24)
 - $= \{(Ha x Nva) + (Hb x Hvb)\} / (365 x 24)$

 - $= [\{(Vsa / Pe) x Nva\} + \{(Vsb / Pe) x Hvb)\}] / (365 x 24)$ $= [\{(Vsa / Pe) x (Q x Vda) / Vsa\} + \{(Vsb / Pe) x (Q x Vdb) / Vsb\}] / (365 x 24)$

where:

Marks		Units	Remarks
	Berth Occupancy Ratio	-	$Rbo = Hb / (365 \times 24)$
	Total Berthing Hours	hours	Hb = (Hba + Hbb)
	Total Berthing Hours by Vessel (A)	hours	Hba = Ha x Nva
Hbb	Total Berthing Hours by Vessel (B)	hours	Hbb = Hb x Nvb
Ha	Working Hours for Vessel (A)	hours	Ha = Vsa / Pe
НЬ	Working Hours for Vessel (B)	hours	Hb = Vsb / Pe
	Cargo Handlig Capacity per Berth per Equip't	tons/year	
Nva	Number of Vessel (A)	number	$Nva = (Q \times Vda) / Vsa$
Nvb	Number of Vessel (B)	number	$Nvb = (Q \times Vdb) / Vsb$
Vsa	Vessel (A) Size	tons	DWT
	Vessel (B) Size	tons	DWT
	Vessel (A) Distribution Ratio	-	
Vdb	Vessel (B) Distribution Ratio	-	

2. Annual Cargo Handling Capacity per 1 Berth, per 1 Equipment

- $Q = (365 \times 24 \times Rw \times Rh \times Rbo \times Pe) / [{(Vsa \times Vda) / Vsa} + {(Vsb \times Vdb / Vsb}]$
 - = $(365 \times 24 \times Rw \times Rh \times Rbo \times Pe) / (Vda + Vdb)$
 - = 365 x 24 x Rw x Rh x Rbo x Pe
- 3. Annual Cargo Handling Capacity of the Terminal

 $Qt = 365 \times 24 \times Rw \times Rh \times Rboa \times Nb \times Pe \times Ne \times Ree \times Ee$

where:

	Description	Units	Remarks
Nb	Number of Berth per Terminal	number	
	Allowable Berth Occupancy Ratio		Nb=1: 0.50, Nb=2: 0.55
Rw	Equipment Working Hour Ratio	· · ·	working hour/berthing hour
Rh	Cargo Handling Hour Ratio	-	handling hour/working hour
	Theoretical Equipment Productivity	tons/hour	
	Number of Equipment per Berth	number	
Ree	Equipment Effectiveness Ratio		Ne=1: 1.0, Ne=2: 0.9, Ne=3 :0.8
Ee	Average Equipment Efficiency	-	
Qt	Annual Cargo Handing Capacity	tons/year	

4. Average Operation Time per Vessel

 $Tr = (Sv \times RI) / (Rw \times Rh \times Pe \times Ne \times Ree \times Ee)$

where:

Marks	Description	Units	Remarks
Sva	Vessel Size, average	DWT	
RI	Loading Ratio to Vessel Size	-	
Tr	Average Operation Time per Vessel	hour	

Table 6.4.3-2-3 Annual Cargo Handling Capacity Calculation - Grain Terminal

Annual cargo handling capacity of the terminal is calculated by adopting the following formula:

Qt = 365 x 24 x Rw x Rh x Rbo x Nb x Pe x Ne x Ree x Ee

The results of the calculation are shown on the table below:

	Description	Units	Study 1	Study 2	Study 3	Remarks
Nb	Number of Berth per Terminal	number	2	2	2	
	Berth Occupancy Ratio	-	0.55	0.55	0.55	Nb=1: <0.50, Nb=2: <0.55
	Equipment Working Hour Ratio	- 1	0.90	0.90	0.90	working hour/berthing hour
Rh	Cargo Handling Hour Ratio	-	0.70	0.70	0.70	handling hour/working hour
Pe	Theoretical Equipment Productivity	tons/hour	300	400	500	
	Number of Equipment per Berth	number	1	1	1	
	Equipment Effectiveness Ratio	-	1.0	1.0	1.0	Ne=1: 1.0, Ne=2: 0.9, Ne=3 :0.8
Ee	Average Equipment Efficiency	-	0.50	0.50	0.50	Pneumatic Unloading Operation
Qt	Annual Cargo Handing Capacity	tons/year	910,602	1,214,136	1,517,670	>Required Unloading Capacity
Sb	Average Bulk Carrier Barge Size	DWT	2,000	2,000	2,000	
Nb	Number of Barges per Conboy	-	5	5	5	
Vc	Cargo Volume (0.90 x DWT)	tons/convoy	9,000	9,000	9,000	
Tr	Required Hours to Unload 1 Convo	hour	95.2	71.4	57.1	
Dr	Required Days to Unload 1 Convoy	Days	4.0	3.0	2.4	
Made	Year	year		2020		l
Note	Required Unloading Capacity	tons/year		1,100,000		

Loader (Number of Berth: 1, Number of Equipment/Berth: 2, BOR: 0.50)

Marks	Description	Units	Study 1	Study 2	Study 3	Remarks
Nb	Number of Berth per Terminal	number	1	1	1	
Rbo	Berth Occupancy Ratio	-	0.50	0.50	0.50	Nb=1: <0.50, Nb=2: <0.55
Rw	Equipment Working Hour Ratio	-	0.90	0.90	0.90	working hour/berthing hour
Rh	Cargo Handling Hour Ratio	-	0.70	0.70	0.70	handling hour/working hour
Pe	Theoretical Equipment Productivity	tons/hour	600	800	1,000	
Ne	Number of Equipment per Berth	number	2	2	2	
Ree	Equipment Effectiveness Ratio	-	0.9	0.9	0.9	Ne=1: 1.0, Ne=2: 0.9, Ne=3 :0.8
Ee	Average Equipment Efficiency	-	0.60	0.60	0.60	Loading Operation
Qt	Annual Cargo Handing Capacity	tons/year	1,788,091	2,384,122	2,980,152	>Required Loading Capacity
Sb	Average Bulk Carrier Vessel Size	DWT	27,500	27,500	27,500	
Vc	Cargo Volume (0.90 x DWT)	tons/vessel	24,750	24,750	24,750	
Tr	Required Hours to Load 1 Vessel	hour	60.6	45.5	36.4	
Dr	Required Days to Load 1 Vessel	Days	2.5	1.9	1.5	
Note	Year	year		2010		
	Required Loading Capacity	tons/year		2,000,000		

(3) Edible Oil Terminal

For the analysis of required cargo handling equipment, following reference data was prepared for review:

Figure 6.4.3-3 Cargo Flow Chart - Edible Oil Terminal Table 6.4.3-3-1 Project Scale - Edible Oil Terminal Table 6.4.3-3-2 Cargo Handling Equipment - Edible Oil Terminal Table 6.4.3-3-3 Annual Cargo Handling Capacity Calculation - Edible Oil Terminal

Figure 6.4.3-3 Cargo flow Chart indicates cargo movement flow by volume and direction. Main input data are the traffic forecast data and estimated modal split by commodity. This is basic data to design the cargo handling equipment.

Based on the cargo volume forecast, project scale of the edible oil terminal was studied as indicated in the Table 6.4.3-3-1.

Table 6.4.3-3-2 shows the contents of major cargo handling equipment for the new edible oil terminal.

Table 6.4.3-3-3 indicates the annual cargo handling capacity of major cargo handling equipment for new edible oil terminal.

Two(2) 100 ton/hr truck receiving systems, two(2) 100 ton/hr railway wagon receiving systems, and two(2) 100 ton/hr barge/ship loading/unloading will be required up to the year of 2020, as well as four(4) 3,000 tons edible oil tanks to handle 250,000 tons/year cargoes.

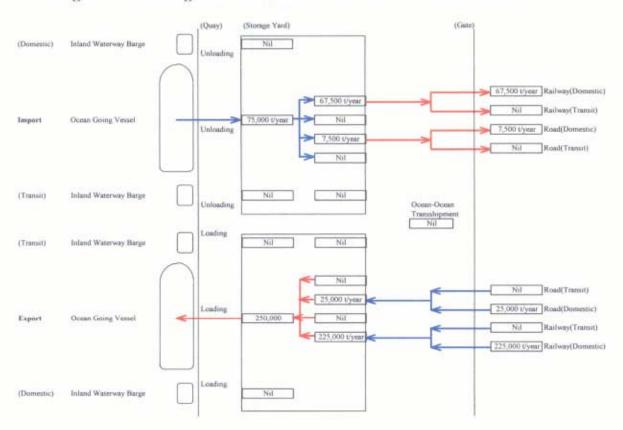


Figure 6.4.3-3 Cargo Flow Chart - Edible Oil Terminal - Case 1 & 2 - 2020

Cargo Volı	ume Forecast	Cargo Volume Forecast (21. Feb. 2001. By Manju)	1. By Manji	(n				•			
			Case 1 &	1 & 2			•			Balance)ce
Onservice			2020	20		Ċ	Uodii	a Conceite.			the Welters
Operation	Category	Average	age	Maximum*	um*	Ca	cargo nangung capacity	ig capacity	Ken	naining ca	Kemaining Cargo Volume
		Volume	unit	Volume	unit	Volume	unit	Equipment	Volume	unit	Required Equipment
	Export	,	int/year	250,000	int/year						
1 000	Transit	1	mt/year	0	mt/year						
FUAUIIE	Domestic	•	mt/year	0	mt/year						2 1004L
	Total	1	int/year	250,000	mt/year	0	mt/year	1	250,000 mt/year		
	Import	ı	mt/year	75,000	mt/year						
Incoding	Transit	•	mt/year	0	mt/year				·		Arms
CIIIUauilig	Domestic	•	mt/year	0	mt/year						
	Total	,	mt/year	75,000	mt/year	0	mt/year	•	75,000	75,000 mt/year	
T	Total	•	mt/year	325,000	mt/year	0	mt/year		325,000	mt/year	-

Table 6.4.3-3-1 Project Scale - Edible Oil Terminal

*: To be considered for Equipment Planning

Table 6.4.3-3-2 Cargo Handling Equipment - Edible Oil Terminal

Equipment
Pipeline
Pipeline
Loading/Unloading Arm
Edible Oil Tank

Table 6.4.3-3-3 (1) Annual Cargo Handling Capacity Calculation - Edible Oil Terminal

Annual cargo handling capacity of the terminal is calculated by adopting the following formula:

1. Berth Occupancy Ratio

- $Rbo = Hb / (365 \times 24)$
 - $= (Hba + Hbb) / (365 \times 24)$
 - $= \{(Ha \times Nva) + (Hb \times Hvb)\} / (365 \times 24)$
 - $= [{(Vsa / Pe) x Nva} + {(Vsb / Pe) x Hvb}]/(365 x 24)$
 - $= [\{(Vsa / Pe) x (Q x Vda) / Vsa\} + \{(Vsb / Pe) x (Q x Vdb) / Vsb\}] / (365 x 24)$

where:

Marks	Description	Units	Remarks
Rbo	Berth Occupancy Ratio	-	$Rbo = Hb / (365 \times 24)$
	Total Berthing Hours	hours	Hb = (Hba + Hbb)
Hba	Total Berthing Hours by Vessel (A)	hours	Hba = Ha x Nva
Hbb	Total Berthing Hours by Vessel (B)	hours	$Hbb = Hb \times Nvb$
	Working Hours for Vessel (A)	hours	Ha = Vsa / Pe
Hb	Working Hours for Vessel (B)	hours	Hb = Vsb / Pe
Q	Cargo Handlig Capacity per Berth per Equip't	tons/year	
Nva	Number of Vessel (A)	number	$Nva = (Q \times Vda) / Vsa$
Nvb	Number of Vessel (B)	number	$Nvb = (Q \times Vdb) / Vsb$
Vsa	Vessel (A) Size	tons	DWT
	Vessel (B) Size	tons	DWT
Vda	Vessel (A) Distribution Ratio	-	
Vdb	Vessel (B) Distribution Ratio	-	

2. Annual Cargo Handling Capacity per 1 Berth, per 1 Equipment

- $Q = (365 \times 24 \times Rw \times Rh \times Rbo \times Pe) / [{(Vsa \times Vda) / Vsa} + {(Vsb \times Vdb / Vsb}]$
 - $= (365 \times 24 \times Rw \times Rh \times Rbo \times Pe) / (Vda + Vdb)$
 - = 365 x 24 x Rw x Rh x Rbo x Pe
- 3. Annual Cargo Handling Capacity of the Terminal Qt = 365 x 24 x Rw x Rh x Rboa x Nb x Pe x Ne x Ree x Ee

where:

Marks	Description	Units	Remarks
	Number of Berth per Terminal	number	
Rboa	Allowable Berth Occupancy Ratio	-	Nb=1: 0.50, Nb=2: 0.55
Rw	Equipment Working Hour Ratio	-	working hour/berthing hour
	Cargo Handling Hour Ratio	-	handling hour/working hour
Pe	Theoretical Equipment Productivity	tons/hour	
	Number of Equipment per Berth	number	
Ree	Equipment Effectiveness Ratio	-	Ne=1: 1.0, Ne=2: 0.9, Ne=3 :0.8
Ee	Average Equipment Efficiency	-	
Qt	Annual Cargo Handing Capacity	tons/year	

4. Average Operation Time per Vessel

 $T_r = (S_V \times R_I) / (R_W \times R_h \times P_e \times N_e \times R_{ee} \times E_e)$

where:

Marks	Description	Units	Remarks
Sva	Vessel Size, average	DWT	
RI	Loading Ratio to Vessel Size	-	
Tr	Average Operation Time per Vessel	hour	

Table 6.4.3-3-3 (2) Annual Cargo Handling Capacity Calculation - Edible Oil Terminal

Annual cargo handling capacity of the terminal is calculated by adopting the following formula:

Qt = 365 x 24 x Rw x Rh x Rbo x Nb x Pe x Ne x Ree x Ee

The result of the calculation are shown on the table below:

Marks	Description	Units	Study 1	Study 2	Study 3	Remarks
Nb	Number of Berth per Terminal	number	1	1	1	
Rbo	Berth Occupancy Ratio	-	0.50	0.50	0.50	Nb=1: <0.50, Nb=2: <0.55
Rw	Equipment Working Hour Ratio	-	0.90	0.90	0.90	working hour/berthing hour
Rh	Cargo Handling Hour Ratio	•	0.70	0.70	0.70	handling hour/working hour
Pe	Theoretical Equipment Productivi	tons/hour	75	100	150	
Ne	Number of Equipment per Berth	number	2	2	2	
	Equipment Effectiveness Ratio	-	0.9	0.9	0.9	Ne=1: 1.0, Ne=2: 0.9, Ne=3 :0.8
Ee	Average Equipment Efficiency	-	0.75	0.75	0.75	Pneumatic Unloading Operation
Qt	Annual Cargo Handing Capacity	tons/year	279,389	372,519	558,779	
St	Average Liquid Bulk Tanker Size	DWT	2,000	2,000	2,000	
Vc	Cargo Volume (0.90 x DWT)	tons/vessel	1.800	1,800	1,800	
	Required Hours to Unload 1 Vess		28.2	21.2	14.1	
Dr	Required Days to Unload 1 Vesse	Days	1.2	0.9	0.6	
Note	Year	year		2020		
NOLE	Cargo Demand Forecast	tons/year		75,000		

Unloading Arm(Number of Berth: 1, Number of Equipment/Berth: 2, BOR: 0.50)

Loading Arm(Number of Berth: 1, Number of Equipment/Berth: 2, BOR: 0.50)

ks
<0.55
ng hour
ng hour
9, Ne=3 :0.8
g Operation

Loading/Unloading Arm(Number of Berth: 1, Number of Equipment/Berth: 2, BOR: 0.50)

Marks	Description	Units	Study 1	Study 2	Study 3	Remarks
Nb	Number of Berth per Terminal	number	1	1	1	
Rbo	Berth Occupancy Ratio	-	0.50	0.50	0.50	Nb=1: <0.50, Nb=2: <0.55
Rw	Equipment Working Hour Ratio	-	0.90	0.90	0.90	working hour/berthing hour
Rh	Cargo Handling Hour Ratio	-	0.70	0.70	0.70	handling hour/working hour
Pe	Theoretical Equipment Productivi	tons/hour	75	100	150	
Ne	Number of Equipment per Berth	number	2	2	2	
Ree	Equipment Effectiveness Ratio	-	0.9	0.9	0.9	Ne=1: 1.0, Ne=2: 0.9, Ne=3 :0.8
Ee	Average Equipment Efficiency	-	0.75	0.75	0.75	Pneumatic Unloading Operation
Qt	Annual Cargo Handing Capacity	tons/year	279,389	372,519	558,779	
St	Average Liquid Bulk Tanker Size	DWT	2,000	2,000	2,000	
Vc	Cargo Volume (0.90 x DWT)	tons/vessel	1,800	1,800	1,800	
Tr	Required Hours to Unload 1 Vess	hour	28.2	21.2	14.1	
Dr	Required Days to Unload 1 Vesse	Days	1.2	0.9	0.6	
Note	Year	year		2020		
Note	Cargo Demand Forecast	tons/year		325,000		

(4) Steel Products Terminal (Multi-Purpose General Cargo Terminal)

Preliminary study for the required major equipment of the integrated steel product terminal has been carried out based on the future demand and present situation of equipment at site. Main target to integrate should be rise of operation efficiency by scale merit. At this moment, operational and institutional consideration has been omitted.

For the analysis of required cargo handling equipment, following reference data was prepared for review:

Table 6.4.3-4 Annual Cargo Handling Capacity Calculation - Steel Products Terminal

Based on the forecast cargo volume, capacities of existing cargo handling equipment are studied.

Table 6.4.3-4 indicates the annual cargo handling capacity of existing cargo handling equipment at the terminal. According to the study results, the existing cargo handling equipment at the terminal has enough capacity for handling forecast cargo volume in 2020.

It is recommended that this terminal is used for multi-purpose general cargo handling, mainly steel products.

• Table 6.4.3-4 (1) Required Number of Quay Cranes for Steel Products Terminal

Plan 1: South Port (Berth 108, 109, 110 & 117 & 118)

Annual cargo handling capacity of the Quay Cranes is calculated by adopting the following formula: Qb = Nq x Pqt x Hw x Dw x Rb x Rw x Rh x Re

The results of the calculation are shown on the table below:

Berth 108, 109 & 110

Marks.		Units	6.3t Crane	20t Crane	Remarks
Nb	Total Number of berth	-	5	5	per Terminal
Nq	Number of quay cranes	sets	4	2	
Lr	Rated Load	tons	6.3	20	
Ĺa	Average Lifting Load	tons	5.0	16.0	Average Lifting Load/Rated Load=0.8
T	Cycle Time	cycles/hour	15	10	
Pqt	Theoret'l ave, productivity of crane	tons/hour	75	160	$Pqt = La \times T$
Hw	Working hours per day	hours/day	· 22	22	
Dw	Working days per year	days/year	355	355	Subtracted holidays
Rb	Berth occupancy ratio	-	0.6	0.6	Nb=1:0.4, Nb=2:0.5,Nb=3:0.55,Nb=>4:0.60
Rw	Crane working hour ratio	-	0.90	0.90	working hour/berthing hour
	Cargo handling hour ratio	-	0.70	0.70	handling hour/working hour
Pqn	Nominal ave. productivity of crane	-	47	101	Pqn = Pqt x Rw x Rh
Re	Crane effectiveness factor	-	0.8	0.8	Nc/Nb=1:1,Nc/Nb=2:0.9, Nc/Nb=3:0.8
Q	Annual cargo handling capacity	tons/year	708,523	755,758	
Qst	Sub-Total	-	1,464	,281	

Berth 117 & 118

Marks	Descriptions	Units	6.3t Crane	20t Crane	Remarks
Nb	Total Number of berth	-	5	5	per Terminal
Nq	Number of quay cranes	sets	4	2	
Ĺr	Rated Load	tons	6.3	20	
La	Average Lifting Load	tons	5.0	16.0	Average Lifting Load/Rated Load=0.8
Ť	Cycle Time	cycles/hour	15	10	
Pqt	Theoret'l ave. productivity of crane	tons/hour	75	160	$Pqt = La \times T$
Hw	Working hours per day	hours/day	22	22	
Dw	Working days per year	days/year	355	355	Subtracted holidays
Rb	Berth occupancy ratio		0.6	0.6	Nb=1:0.4, Nb=2:0.5,Nb=3:0.55,Nb=>4:0.60
Rw	Crane working hour ratio	-	0.90	0.90	working hour/berthing hour
Rh	Cargo handling hour ratio	-	0.70	0.70	handling hour/working hour
	Nominal ave. productivity of crane	-	47	101	Pqn = Pqt x Rw x Rh
Re	Crane effectiveness factor		0.8	0.8	Nc/Nb=1:1,Nc/Nb=2:0.9, Nc/Nb=3:0.8
Q	Annual cargo handling capacity	tons/year	708,523	755,758	
Qst	Sub-Total	-	1,464	.281	

Qt	Total cargo handling capacity	tons/year	2,928,562	Total terminal
Note:	Target Year		2020	
	Cargo Throughput per year	tons/year	2,000,000	0.68

Table 6.4.3-4 (2) Required Number of Quay Cranes for Steel Products Terminal

Plan 2: North Port (Berth 56, 57, 58, 59 & 60)

Annual cargo handling capacity of the Quay Cranes is calculated by adopting the following formula:

Qb = Nq x Pqt x Hw x Dw x Rb x Rw x Rh x Re

The results of the calculation are shown on the table below:

Berth 56

Marks		Units	6.3t Crane	20t Crane	Remarks
	Total Number of berth	-	5	5	per Terminal
Nq	Number of quay cranes	sets	2	l	
	Rated Load	tons	6.3	20	
La	Average Lifting Load	tons	5.0	16.0	Average Lifting Load/Rated Load=0.8
Т	Cycle Time	cycles/hour	15	10	
Pqt	Theoret'l ave. productivity of crane	tons/hour	75	160	$Pqt = La \times T$
Hw	Working hours per day	hours/day	22	22	
Dw	Working days per year	days/year	355		Subtracted holidays
	Berth occupancy ratio	-	0.6		Nb=1:0.4, Nb=2:0.5,Nb=3:0.55,Nb=>4:0.60
Rw	Crane working hour ratio	-	0.90		working hour/berthing hour
Rh	Cargo handling hour ratio	4	0.70		handling hour/working hour
	Nominal ave. productivity of crane	-	47		Pqn = Pqt x Rw x Rh
Re	Crane effectiveness factor	-	0.8	0.8	Nc/Nb=1:1,Nc/Nb=2:0.9, Nc/Nb=3:0.8
Q	Annual cargo handling capacity	tons/year	354,262	377,879	
Qst	Sub-Total	-	732,	141	

Berth 57

Marks	Descriptions	Units	6.3t Crane	20t Crane	Remarks
	Total Number of berth	-	5	5.	per Terminal
Nq	Number of quay cranes	sets	3	0	
	Rated Load	tons	6.3	20	
La	Average Lifting Load	tons	5.0	16.0	Average Lifting Load/Rated Load=0.8
Т	Cycle Time	cycles/hour	15	10	
Pqt	Theoret'l ave. productivity of crane	tons/hour	75	160	$Pqt = La \times T$
Hw [.]	Working hours per day	hours/day	22	22	•
Ďw	Working days per year	days/year	355		Subtracted holidays
Rb	Berth occupancy ratio	-	0.6	0.6	Nb=1:0.4, Nb=2:0.5,Nb=3:0.55,Nb=>4:0.60
Rw	Crane working hour ratio	-	0.90	0.90	working hour/berthing hour
Rh	Cargo handling hour ratio	•	0.70	0.70	handling hour/working hour
Pqn	Nominal ave. productivity of crane	-	47		Pqn = Pqt x Rw x Rh
	Crane effectiveness factor	-	0.8	0.8	Nc/Nb=1:1,Nc/Nb=2:0.9, Nc/Nb=3:0.8
Q	Annual cargo handling capacity	tons/year	531,392	0	
Qst	Sub-Total	-	531,	392	

Berth 58

Marks	the second second second second second second second second second second second second second second second s	Units	6 3t Crane	20t Crane	Remarks
Nb	Total Number of berth	-	5		per Terminal
	Number of quay cranes	sets	2	Ī	
Lr	Rated Load	tons	6.3	20	
La	Average Lifting Load	tons	5.0	16.0	Average Lifting Load/Rated Load=0.8
Т	Cycle Time	cycles/hour	15	10	
Pqt	Theoret'l ave. productivity of crane	tons/hour .	, 75	160	$Pqt = La \times T$
Hw	Working hours per day	hours/day	22	22	
Dw	Working days per year	days/year	355		Subtracted holidays
Rb	Berth occupancy ratio	-	0.6	0.6	Nb=1:0.4, Nb=2:0.5,Nb=3:0.55,Nb=>4:0.60
Rw	Crane working hour ratio	-	0.90	0.90	working hour/berthing hour
Rh	Cargo handling hour ratio	-	0.70		handling hour/working hour
Pqn	Nominal ave. productivity of crane	-	47		Pqn = Pqt x Rw x Rh
Re	Crane effectiveness factor	-	0.8	0.8	Nc/Nb=1:1,Nc/Nb=2:0.9, Nc/Nb=3:0.8
Q	Annual cargo handling capacity	tons/year	354,262	377,879	
Qst	Sub-Total	-	732,	141	

Table 6.4.3-4 (3) Required Number of Quay Cranes for Steel Products Terminal

Berth 59

Marks	Descriptions	Units	6.3t Cran	20t Crane	Remarks
Nb	Total Number of berth	•	5	5	per Terminal
Nq	Number of quay cranes	sets	0	1	
Ĺĩ	Rated Load	tons	6.3		
La	Average Lifting Load	tons	5.0	16.0	Average Lifting Load/Rated Load=0.8
Т	Cycle Time	cycles/hour	15	10	
Pqt	Theoret'l ave. productivity of crane	tons/hour	75	160	$Pqt = La \times T$
Hw	Working hours per day	hours/day	22	22	
Dw	Working days per year	days/year	355		Subtracted holidays
	Berth occupancy ratio	-	0.6		Nb=1:0.4, Nb=2:0.5,Nb=3:0.55,Nb=>4:0.60
	Crane working hour ratio	•	0.90		working hour/berthing hour
	Cargo handling hour ratio	-	0.70		handling hour/working hour
Pqn	Nominal ave. productivity of crane	•	47		Pqn = Pqt x Rw x Rh
	Crane effectiveness factor	-	0		Nc/Nb=1:1,Nc/Nb=2:0.9, Nc/Nb=3:0.8
	Annual cargo handling capacity	tons/year	0	472,349	
Qst	Sub-Total	-	472,	349	

Berth 60

Marks	Descriptions	Units	6.3t Crane	20t Crane	Remarks
Nb	Total Number of berth	-	5	5	per Terminal
Nq	Number of quay cranes	sets	0]	
Lr	Rated Load	tons	6.3	20	
La	Average Lifting Load	tons	5.0	16.0	Average Lifting Load/Rated Load=0.8
Т	Cycle Time	cycles/hour	15	10	
Pqt	Theoret'l ave, productivity of crane	tons/hour	75	160	$Pqt = La \times T$
Hw	Working hours per day	hours/day	22	22	
Dw	Working days per year	days/year	355		Subtracted holidays
	Berth occupancy ratio		0.6		Nb=1:0.4, Nb=2:0.5,Nb=3:0.55,Nb=>4:0.60
Rw -	Crane working hour ratio	-	0.90		working hour/berthing hour
Rh	Cargo handling hour ratio	-	0.70		handling hour/working hour
Рqл	Nominal ave. productivity of crane	-	47	101	Pqn = Pqt x Rw x Rh
Re	Crane effectiveness factor	-	0	1	Nc/Nb=1:1,Nc/Nb=2:0.9, Nc/Nb=3:0.8
Q	Annual cargo handling capacity	tons/year	0	472;349	
Qst	Sub-Total	-	472,	349	

Qt	Total cargo handling capacity	tons/year	2.940,372	Total terminal
Note:	Target Year		2020	
	Cargo Throughput per year	tons/year	2,000,000	0.68

(5) Timber Terminal (Multi-Purpose General Cargo Terminal)

The main aim to this terminal is the same with the steel product terminal. Preliminary study for the required major equipment of the gathering steel product terminal has been carried out based on the estimated future traffic demand and present situation of equipment at site. The main target to this effort should be increase of operation efficiency by scale merit. At this moment, operational and institutional considerations have not been considered.

For the analysis of required cargo handling equipment, following reference data was prepared for review:

Table 6.4.3-5 Annual Cargo Handling Capacity Calculation - Timber Terminal

Based on the forecast cargo volume, capacities of existing cargo handling equipment are studied.

Table 6.4.3-5 indicates the annual cargo handling capacity of existing cargo handling equipment at the terminal. According to the study results, the existing cargo handling equipment at the terminal has enough capacity for handling forecast cargo volume in 2020. Cargo expected in 2020 is not used for the planning since it is less than those in 2010.

It is strongly recommended that this terminal is used for multi-purpose general cargo handling, mainly timbers. Other commodities should be handled also.

Timber cargo is currently for the exports. It is recorded that sharp timber export increase was observed by the end of last century. As shown in Part II Chapter 3, forecasted future timber cargo demands, however, indicates a weak demand. It is estimated that timber export will decrease after the peak volume in 2010.

It is recommended to review the cargo traffic of timber exports before the decision making of investment. It is also recommended to start the construction after the concession contract with private operators are carried out.

Table 6.4.3-5 Required Number of Quay Cranes for Timber Terminal

Annual cargo handling capacity of the Quay Cranes is calculated by adopting the following formula:

Qb = Nq x Pqt x Hw x Dw x Rb x Rw x Rh x Re

The results of the calculation are shown on the table below:

Berth 4	5.46.	47	&	48
---------	-------	----	---	----

Marks	Descriptions	Units	6.3t Crane	20t Crane	Remarks
Nb	Total Number of berth	-	6	6	per Terminal
Ng	Number of quay cranes	sets	7	2	
Lr	Rated Load	tons	6.3	20	· · · · · · · · · · · · · · · · · · ·
La	Average Lifting Load	tons	5.0	16.0	Average Lifting Load/Rated Load=0.8
Т	Cycle Time	cycles/hour	15	10	
Pqt	Theoret'l ave. productivity of crane	tons/hour	75	160	$Pqt = La \times T$
Hw	Working hours per day	hours/day	22	22	
Dw	Working days per year	days/year	355		Subtracted holidays
	Berth occupancy ratio	-	0.6		Nb=1:0.4, Nb=2:0.5,Nb=3:0.55,Nb=>4:0.60
Rw	Crane working hour ratio	-	0.90		working hour/berthing hour
Rh	Cargo handling hour ratio	-	0.70	0.70	handling hour/working hour
	Nominal ave. productivity of crane	-	47		Pan = Pat x Rw x Rh
	Crane effectiveness factor		0.8		Nc/Nb=1:1,Nc/Nb=2:0.9, Nc/Nb=3:0.8
	Annual cargo handling capacity	tons/year	1,239,916	755,758	
Qst	Sub-Total	-	1,995	,674	

Berth 49 & 50

Marks	Descriptions	Units	6.3t Crane	20t Crane	Remarks
Nb	Total Number of berth	-	5	5	per Terminal
Nq	Number of quay cranes	sets	10	1	
Lr	Rated Load	tons	6.3	20	
La	Average Lifting Load	tons	5.0	16.0	Average Lifting Load/Rated Load=0.8
Т	Cycle Time	cycles/hour	15	10	
Pqt	Theoret'l ave. productivity of crant	tons/hour	75	160	$Pqt = La \times T$
Hw	Working hours per day	hours/day	22	22	
Dw	Working days per year	days/year	355		Subtracted holidays
Rb	Berth occupancy ratio	-	0.6		Nb=1:0.4, Nb=2:0.5,Nb=3:0.55,Nb=>4:0.60
Rw	Crane working hour ratio	-	0.90	0.90	working hour/berthing hour
Rh	Cargo handling hour ratio	-	0.70	0.70	handling hour/working hour
Pqn	Nominal ave. productivity of crane	•	47	101	Pqn = Pqt x Rw x Rh
Re	Crane effectiveness factor	-	0.8	0.8	Nc/Nb=1:1,Nc/Nb=2:0.9, Nc/Nb=3:0.8
Q	Annual cargo handling capacity	tons/year	1,771,308	377,879	
Qst	Sub-Total	-	2,149	,187	
					······································
Ot l	Total cargo handling capacity	tons/year	4.144	.861	Total terminal

Qt	Total cargo handling capacity	tons/year	4,144,861	Total terminal
Note:	Target Year	_	2010	
	Cargo Throughput per year	tons/year	1,130,000	0.27

Number of cranes can be reduced.

(6) Barge Terminal

The barge terminal is one of core project among the Master Plan components. However no equipment is considered since this terminal is mainly for the standby and preparation areas for the next trip to up-stream. Even so any equipment is required, it will be provided by the related private sectors, thus no equipment is provided here.

In order to accelerate the utilization of barge terminal, supporting facilities will be provided. Supporting system is the space of offices, car parking area and minimum utilities. Utilities will include the facilities such as water supply system, power supply and lighting system.

Discussion of these will be carried out Part II Chapter 7.