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Iwakuni Runway Relocation Project

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MCAS Iwakuni
2000/2010 – A Reality

2000

2010

Background

- US & Japan signed MOU Jul 1992
  - 3 spheres of communication/oversight: Politicians, Regional & Senior Managers, & lastly, the project team
- Primary reasons for project
  - Reduce noise in City of Iwakuni
  - Improve flight safety of Airfield
- (Unstated) impact ….Commercial Use possibility
- Explosives Safety SEC CERT approved current plan in Mar 2000 – revisions being reviewed
- GOJ project cost estimate $2.4B
- Project in year 9 of 13
  - Phase I reclamation complete
  - Phase II reclamation in progress
  - Port Area to complete in June 2005; Fuel Wharf in July 2005
  - $1.852B spent or authorized through JFY2005; $2.082B projected after JFY2006
- Detailed Criteria Package conveying US military expectations

Project Background/Requirements (Continued)

- 8000' Class B runway (with 1,000 foot overruns)
  - Hot-pit refueling
  - Simultaneous CALA and Red Label area operations
  - State-of-the-art aviation navigational aids
  - 1,000 foot overruns; US MCON must fund hardened overrun
  - Concrete pavement required due to heat signature of US military aircraft
    - F/A-18, AV-8B,

- Port Facilities
  - 360 Meter General Purpose Wharf - minimum 42' draft, 80T rail crane
  - 142 Meter North Breakwater Wharf - minimum 60' draft, 100,000 lbs NEW
  - T-1 capable Fuel Wharf
  - New staging/container lay-down areas and warehouses.

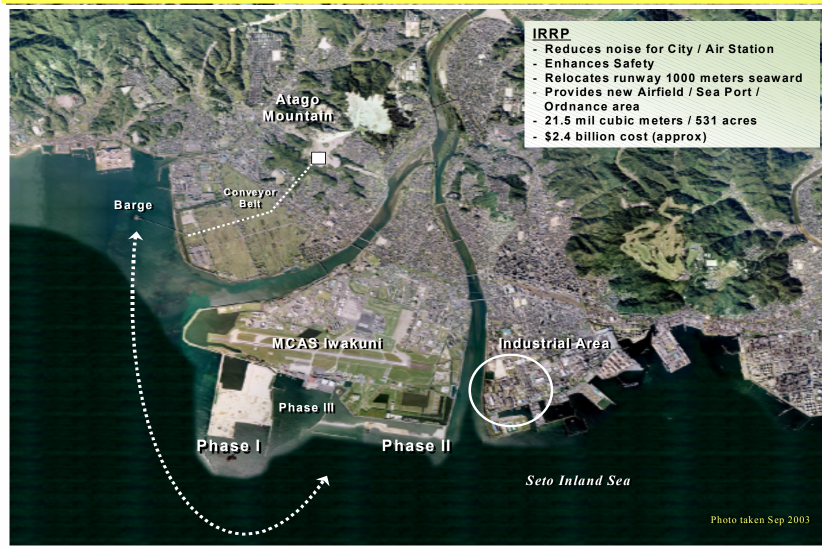
- New Ordnance Storage Area eliminates explosives safety waivers

Reclaimed Land: Sand Piles & Sand Drains Construction

Crushed Rock Conveyed from Atago Mountain by Barge

Sand Piles: Liquefaction Prevention from Tight Consolidation
Sand Drains: Uniform, Loose Consolidation

SAND COMPACTION PILE AUGERS

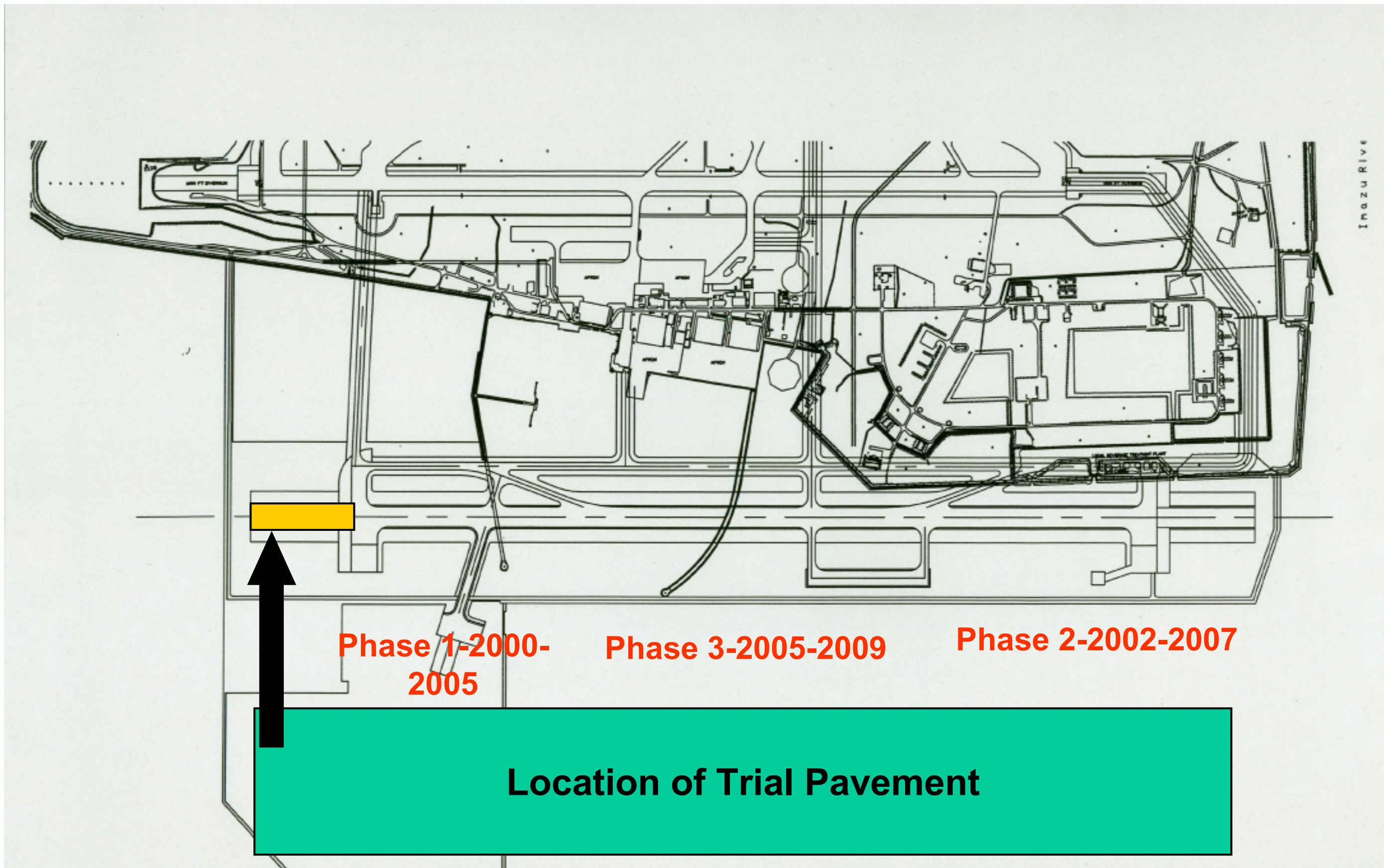


Construction Progress Photos

Civil Engineering Features for Runway Construction

- **Flat Surface Criteria**: This construction requires a smooth pavement for the runway on the reclamation area anticipating a consolidation settlement which will occur over many years.
- **Settlement:** Uneven (differential) Settlement Amount: about 6cm at 50m intervals
  - Sand Piles/Sand Drains
  - 3 phases of consolidation
- **Unpredictable Soil Behavior**: The result of how the concrete pavement, compacted sub grade, and sand piles/sand drains will perform due to uneven residual settlement at reclamation area is not known at this time.
- **Material Parameters**: Type of concrete pavement (CRC, reinforced concrete or NC, non-reinforced concrete) and base course and the final design thick nesses of concrete slab will be determined based on demonstration section results
- **Design Procedure Parameters:**
  - GOJ developing their own design procedures; US to review using our tools. We need to verify what happens to the concrete slab during the test period
  - Current concept of design cannot be verified until the testing of actual conditions occurs.
  - Ground Settlement must be better understood by analyzed data gathered during test period for final pavement design

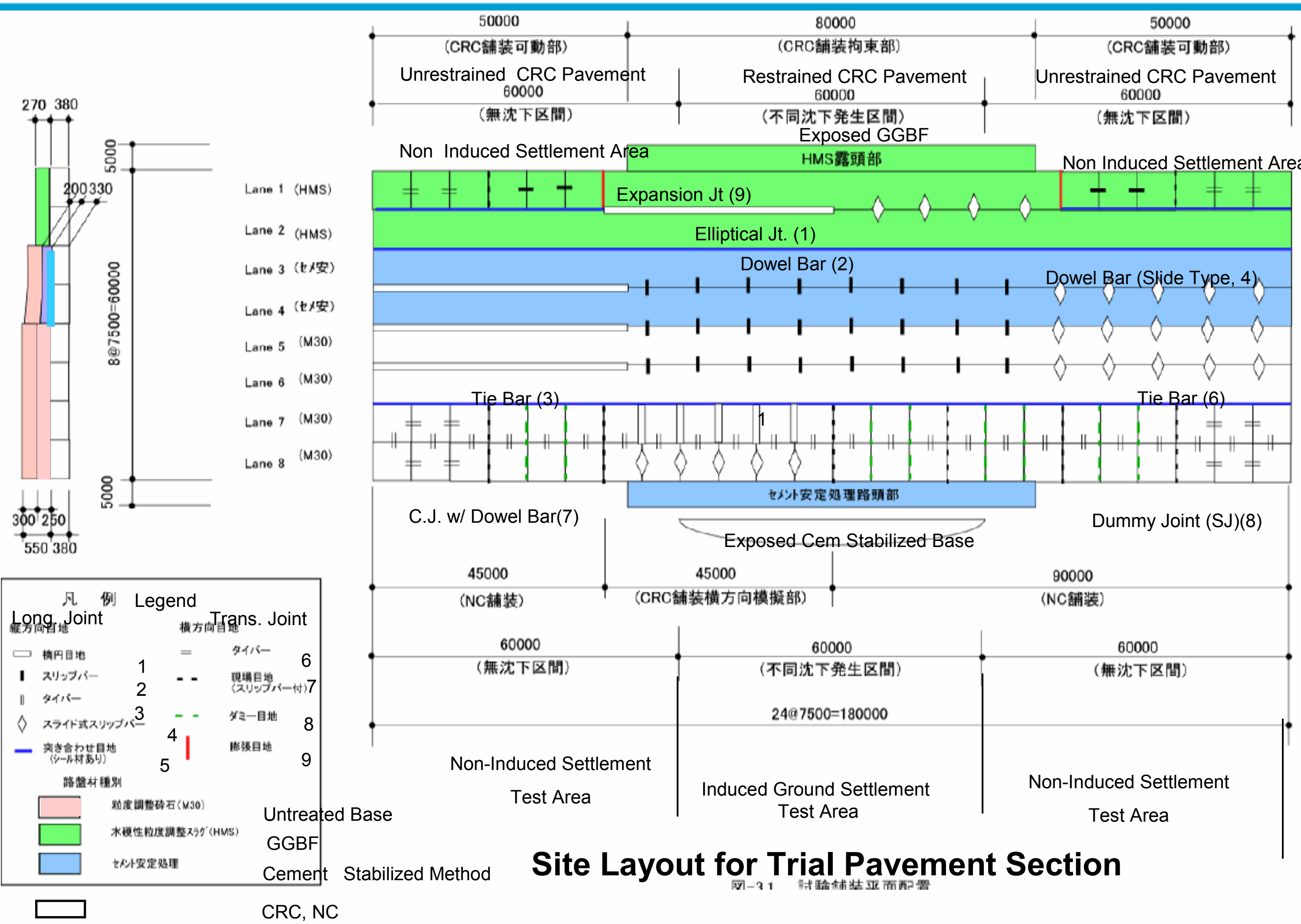
Test Section



Trial Pavement Section Budget Cost: $10 Million Funded by GOJ

The rough estimated cost of the runway is $200 million

Test Section



Site Layout for Trial Pavement Section

Pavement Type	Lane
Normal PCC	Lane 8
CRC	Lane 1--7

Pavement Joints Types:

Longitudinal
- Elliptical 1
- Dowel Bar 2
- Tie-Bar 3
- Dowel Bar (Slide Type) 4
- Butt Joint w/seal 5

Transverse
- Tie-Bar 6
- C.J. w/ Dowel Bar 7
- Dummy Joint (SJ) 8
- Expansion Jt 9

TEST SECTION

Steel Grillage for Introducing Differential Settlement

Platform for placement of Pavement structure

TEST SECTION

Test Section Objectives

- Purpose: The demo section will be used to determine the effects of artificially induced differential settlement and to understand concrete pavement behavior by applying repetitive loadings and other thermal, drying stresses.
- Pavement Loading
  - 747 Wheel cart
  - Number of repetitions
- Slab Instrumentation for load, thermal, & shrinkage stresses
- Test Section Cost: $10 million
- GOJ/US Government to Use Demo results To Get Final Design Pavement Thickness Right!


Trial Section with Reinforcing set prior to paving

PAVEMENT SENSITIVITY ANALYSIS

PAVEMENT PROFILE CONDITION	LOADING CONDITION	NAVY PAVEMENT COMPUTED THICKNESS (Inches)	PCASE PROGRAM COMPUTED THICKNESS (Inches)
FLEX 650,SG 100	NAVY	15.0	15.7
FLEX 650,SG 200	NAVY	13.8	14.5
FLEX 650,SG 300	NAVY	13.2	13.2
FLEX 650,SG 500	NAVY	13.0	11.2
FLEX 650,SG 100	AIR FORCE	27.2	20.3
FLEX 650,SG 200	AIR FORCE	25.6	16.8
FLEX 650,SG 300	AIR FORCE	24.7	13.8
FLEX 650,SG 500	AIR FORCE	24.6	11.8
FLEX 726,SG 100	NAVY	14.1	14.8
FLEX 726,SG 200	NAVY	12.8	12.5
FLEX 726,SG 300	NAVY	12.3	10.6
FLEX 726,SG 500	NAVY	12.2	10.7
FLEX 726,SG 100	AIR FORCE	25.6	19.0
FLEX 726,SG 200	AIR FORCE	24.1	15.6
FLEX 726,SG 300	AIR FORCE	23.3	12.9
FLEX 726,SG 500	AIR FORCE	23.1	11.1

Pavement Structure

Item	Sub Item	Test Condition		Remarks
Classification of Pavement		NC,CRCNC Pavement, CRC Pavement		
Concrete	Design Basis Flexural Strength	$5 N/mm^2$		
	Elastic Coefficient	$2.75 \times 10^5 N/mm^2$		
	Poisson's Ratio	0.15		
NC Pavement	Slab Thickness	38□□		C-141 Objective Aircraft
CRC Pavement	Slab Thickness	33cm w/ Cement Treated Base	38cm	C-141 Objective Aircraft
	Amount of Rebar for Longitudinal Direction	D19ctc13cm	D19ctc11.5cm (D22ctc15.5cm)	
	Amount of Rebar for Lateral Direction	D13ctc37cm	D13ctc32cm	
	Depth of Rebar for Longitudinal Direction	11cm 11cm from Top Surface	12.5cm 12.5cm from Top Surface	

Pavement Structure

Base Course Materials	Granular Material Untreated Base	Cement Stabilization	HMS Hydraulic Mechanical Stabilized Slag (GGBF)
Select Materials	□Granular Material I CBR Modified CBR□80% □ Granular Material II CBR Modified CBR<80%	Cement Stabilization $E=5{,}000 N/mm^2$	HMS $E=750 N/mm^2$
Coefficient of Bearing Factor for Design Sub grade	$K_{75}=$ 24 (MN/m^3)		
Coefficient of Bearing Factor for Base Course	$K_{75}=$ 70	150	70
Coefficient of Bearing Factor for Design Base	$K_{75}=$ 56	120	56

Questions?