

# SANWA

# AUGER

## IN THE WORLD



SDA-180KWP on a pontoon in Singapore  
Refer to Page 8.

## SANWA AUGER MODEL D-120H-PY USED FOR BORING OF BOULDER PERMAFROST IN YAKTUK SIBERIA, USSR

SANWA AUGER D-120H-PY was employed for the construction of the BAM Railway across a lot of rivers. Russian's construction of new trans-Siberian railway promises to be one of the biggest construction projects of the century. Extending 3,145 km from Thaisket right through to the Pacific Ocean where the terminal will be Sowentskaja Gowan, the line of route runs parallel to the existing trans-Siberian railway, but between 150 and 800 km farther north.

The railway is named the Baikal-Amur-Magistrale (BAM for short).

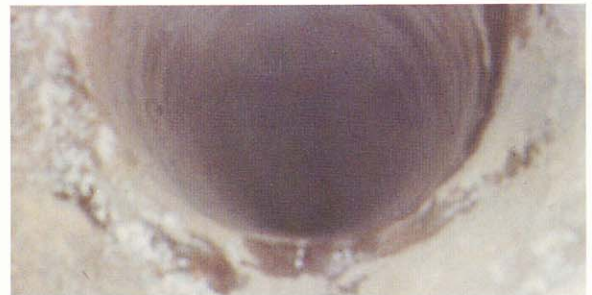
Sanwa Auger D-120H-PY was used for preboring to install concrete pile foundation through permanently frost hardened soil (Permafrost for short) prior to the construction of bridge and railway support structures.

### Soil Conditions to be bored

Permafrost; Uniaxial Compressive Strength more than  $500 \text{ kg/cm}^2$   
 Boulder 500–600 mm dia. (Content ratio: More than 50%)

### Average Performance of boring:

16.8 m/hour (Max. 1.4 m/min., Min. 0.3/min.)

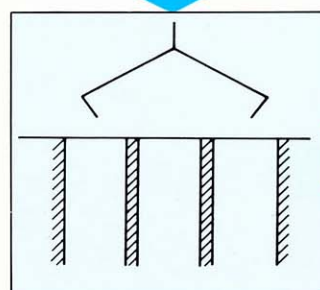
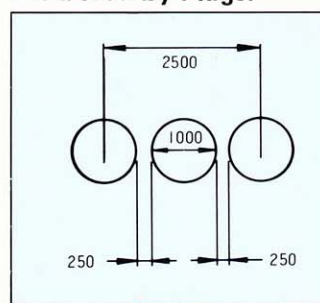


### Guide Hole for Trench Bucket at Hard Layer in Hong Kong

SANWA AUGER MODEL D-120H (200V, 6Pole, 50Hz, 90 Kw) was also used for the construction of diaphragm wall of 1 m wide and 21 m deep in Hong Kong.

The average boring speed against  $500 \text{ kg/cm}^2$  uniaxial compressive strength of decomposed granite was 0.1 m/min.

### Three Holes Pre-bored by Auger



### Excavating by Clam Shell Bucket



Installing Reinforcement Cage



# SANWA DOUGHNUT AUGER MODEL SDA-180P USED FOR DRIVING OF RAKED STEEL PILES INTO HARD SEABED IN BASRAH. IRAQ

In order to pre-bore hard clay, dense sand etc., whose conversion N-value reached 160, SANWA DOUGHNUT AUGER SDA-180P was used at the Gulf in Basrah when Toa Harbor Works, one of leading Japanese general contractors, constructed a jetty there.

Especially, as raked piles should be installed there upto desired depth in hard layer, Doughnut type auger machine was requested strongly.

Inner Auger Drive Unit pre-bored the layer while Outer Auger Drive Unit drove the steel casing simultaneously rotating it in counterclockwise direction. Steel Casing protected auger flight from bending or damage by the force of sea waves, and also it kept augering straightly.

The other barge, equipped with diesel pile hammer, running after pre-bored hole, steel piles were installed and hammered vertically or obliquely until desired bearing capacity.

**Period of Civil Work:**

From December 1976  
to July 1977

**Quantity of Steel Piles:**

approx. 1500  
including raked piles 200

**Boring Holes per Day:**

approx. average 10 holes/day

**Generator Size Used:**

250 KVA x 2 units

**Subsidiary Equipment Used:**

Sanwa Mortar Mixing & Pumping Plant Model PM-15

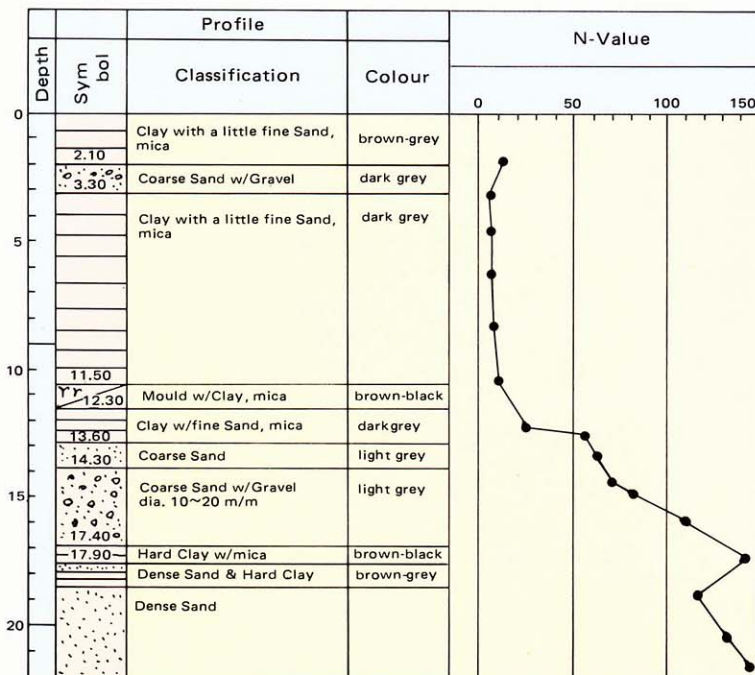


Overall View of the Job Site



Doughnut Auger Model SDA-180P mounted on the barge  
Leader length: 34.5M

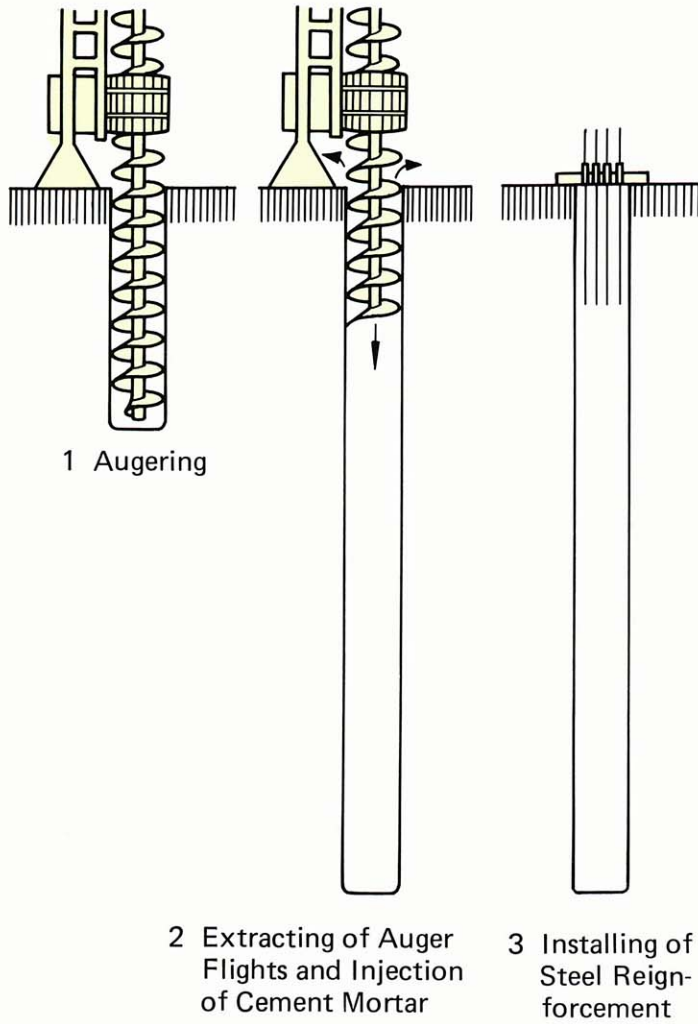
**Boring Log**



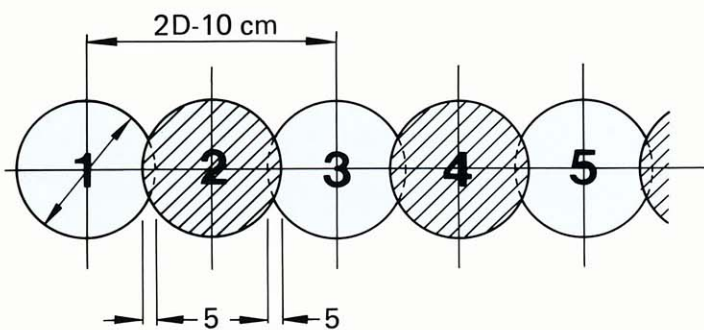


**SANWA AUGER USED FOR P.I.P.(PACKED-IN-PLACE)PILING METHOD(MORTAR GROUTING PILE) IN THE NETHERLANDS.**

**Piling Procedure**



**P.I.P. Diaphragm Wall**



In First day: The piles of odd number  
 In Second day: The piles of even number





## SANWA DOUGHNUT AUGER MODEL SDA-180P USED FOR FOUNDATION WORK OF PIPE LINE AND VEHICULAR BRIDGE SUPPORT CONSTRUCTION IN PRUDOHOE BAY IN ALASKA, U.S.A.

By simultaneously augering and casing against unstable tundra thaw deadline to complete pipe line and vehicular bridge supports across Alaska's Sagvanirktok River.

Contractor for the project is M-O-G, a joint venture of Manson Const. & Engineering Co. and Osberg Const. and Ghemm.

M-O-G used the double augering-casing action of Sanwa Doughnut Auger SDA-180P to install 24 foundations through crumbling permafrost prior to construction of bridge support piling structures. The equipment's heavyduty cutting head cut through river ice and permafrost up to 33 m thick while a rotating caisson simultaneously reamed to 1,219.2 mm (48 inch) and held back saltconcentrate soil layers which threatened to collapse the hole.

Working through temperatures wind-chilled to minus 100°C more than 500 km north from the Arctic Circle.

In spite of bad weather and material's delay, and requirement of precision, M-O-G completed the project nearly one week ahead of May 1st, construction deadline.

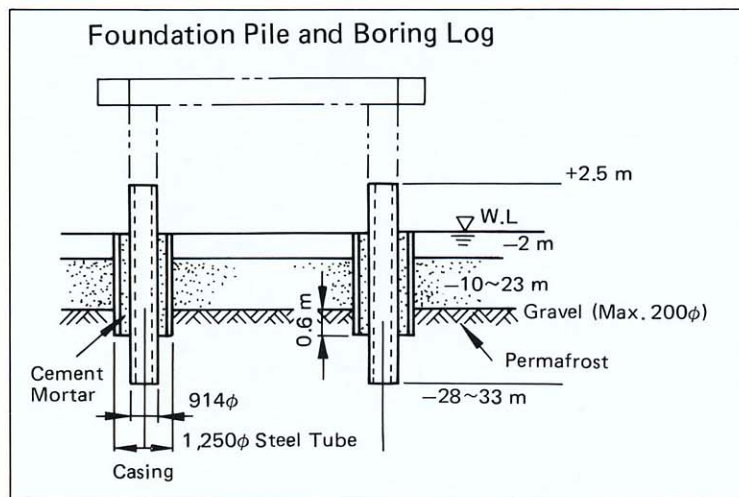
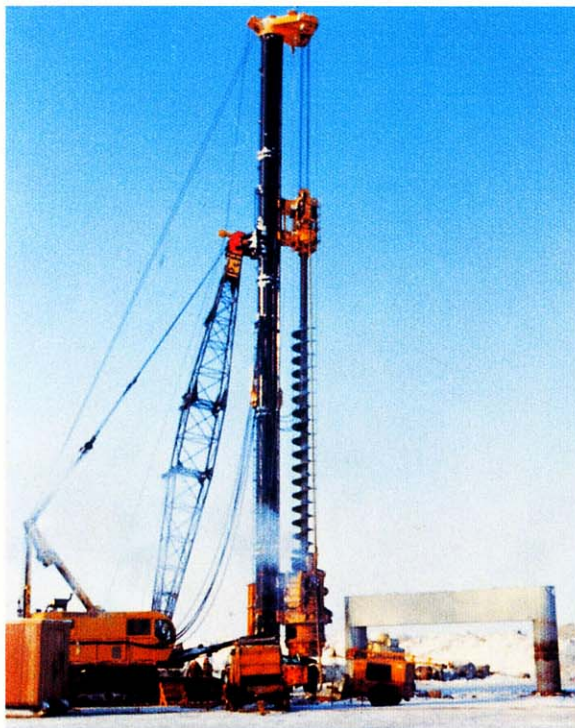
At the 6 m level, the casing was extracted. If the soil boring warranted, M-O-G either welded a 15 m section to the 6 m casing, or substituted a 18 m caisson for the remainder of the augering operation.

M-O-G then centered a 914.4 mm (36 inch) O.D. Steel Pipe pile and a capped bottom into the 1,219.2 mm (48 inch) I.D. casing. Throughout the total length, wall clearance was critical for proper set of Foundue cement to meet skin friction requirement, and for alignment of pile caps.

The 914.4 mm (36 inch) piles were cut approximately 1.5 m above ground level, and welded to pile extractions on the I-shaped Beam caps. Pile sections were then filled with gravel to strengthen the pipe against possible pressure change in the tundra.

Average Augering Speed = 4 m/hour (Max. 6m/hr)

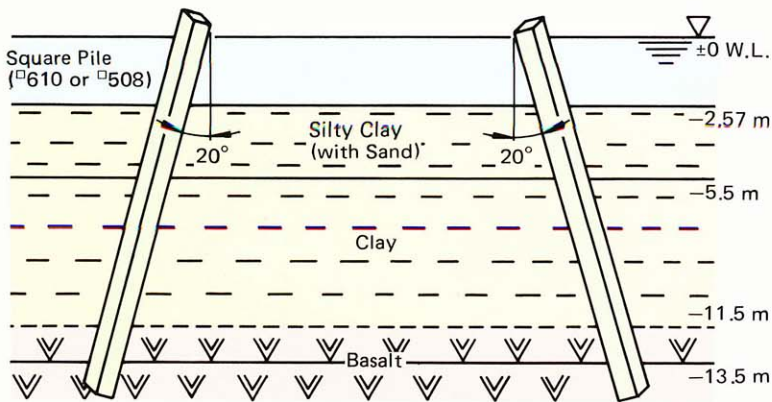
Average Piling Speed = 1 pile/day





# SANWA AUGER MODEL D-120H-PS USED FOR A PILING WORK OF A PIER CONSTRUCTION IN VACAMONTE IN PANAMA.

## Ordinary Boring Log in Vacamonte

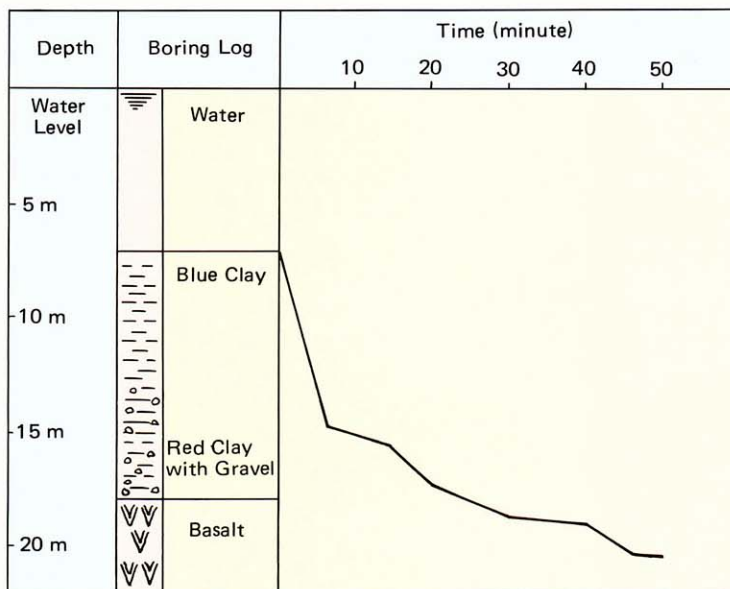


There must be piled to basalt stratum whose uniaxial compressive strength was more than 600 kg/cm<sup>2</sup>.

But it was impossible to pile by diesel hammer and therefore Pre-boring Method by Sanwa Auger Model D-120H-PS was adopted to solve this problem.

By Japanese contractor: Aoki Construction Co., Ltd.

## Augering Time Diagram



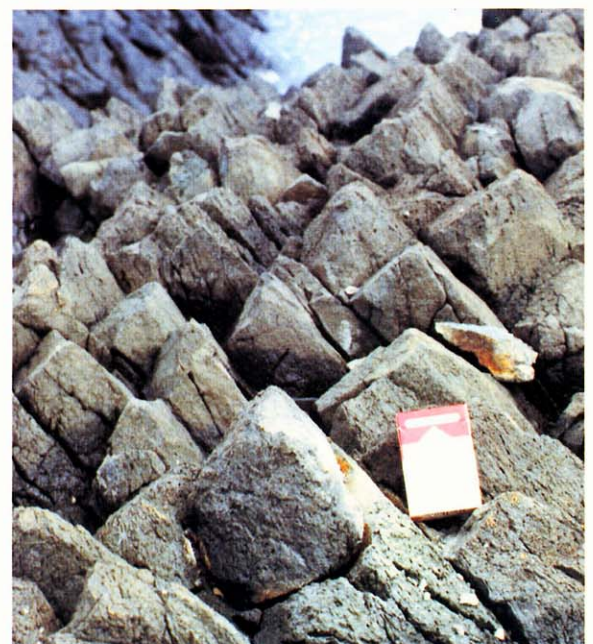
## Result of Augering By Sanwa Auger

### Augering Conditions

- 1) Both swelling and wave of sea are very little.
- 2) Auger Flight = 710φ
- 3) Auger Head = 730φ w/tungsten carbide tipped bit
- 4) Water Injection Capacity = 207 liter/min.



at Vacamonte Fishing Port/May 25, 1977



Sanwa Auger Model D120H-PS



## SANWA AUGER MODEL D-60H USED FOR A SOIL CONSOLIDATION WORK BY INJECTION OF CEMENT MILK IN UMMSAID, QATAR

Two units of Sanwa Auger Model D-60H have completed soil consolidation work for jetty construction in Qatar in a very short period; each completed four soil piles per hour, by Penta-Ocean Construction Co., Ltd., one of leading Japanese general contractors.

When the Sanwa Auger D-60H reached the desired depth – about 17 m below the seabed – a mixture of seawater and cement was injected into the hole through a swivel device, hollow stem of Auger Flights, Agitating Head when Auger Flights were extracted and mixed with soil in order to increase its bearing strength.

As it was important to keep extracting speed and consolidating scope of soil, speed meter and depth measure meter were equipped in operator's room.

### Period of Work:

From December 1976  
to March 1977

### Quantity of Boring:

approx. 5000

### Generator Size Used:

200 KVA

### Subsidiary Equipment Used:

Sanwa Mortar Mixing & Pumping Plant Model PM-15  
Mixing Capacity : 500 liters x 2  
Water Tank : 4,000 liters  
Discharge : 0–281 liters/min  
Discharge Pressure : 0–14 kg/cm<sup>2</sup>



Tested Sample of Consolidation mixed with Cement Milk and Reclaimed Soil



Overall View of D-60H





## SANWA AUGER MODEL D-120H IN THE PHILIPPINES' SUBIC SHIP REPAIR YARD PROJECT.

Sanwa Auger D-120H was used for a foundation work of constructing a ship repair yard in the subic area in the Philippines.

The foundation work was to bore and insert H-box piles or sheet piles to construct water-tight walls. On May, 1980, the work was started by Japanese leading general contractor, Penta-ocean Construction Company.

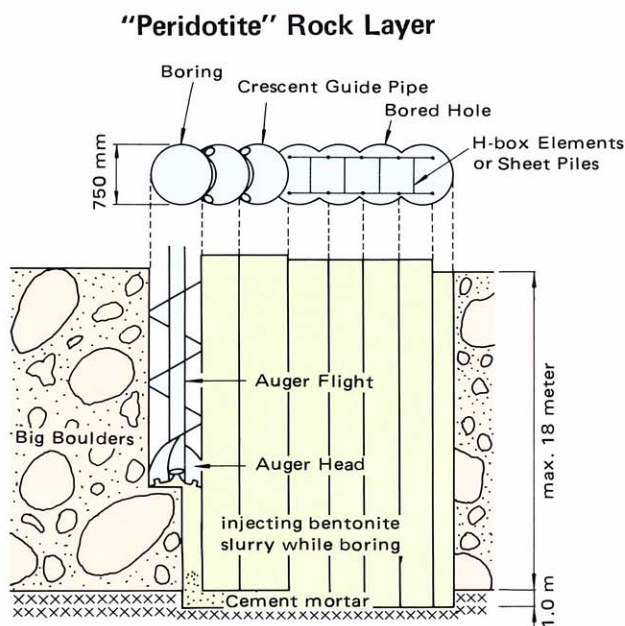
As the soil was composed of big boulders in max. dia meter 2M and very hard peridotite layer lying under the big boulders, the foundation work was very difficult we have never had before. To bore such soils under hard boring conditions and to construct water-tight walls, specially designed equipments were used, i.e.,

1. **Sanwa Auger Model D-120H**  
45KW x 2 Units, 6 Pole  
Rated Torque: 6.32 Ton-m  
Break down Torque: 22.75 Ton-m
2. **Heavy-duty Auger Head**  
Two types of tungsten carbide tipped bits, which were fitted to the point of the Auger Head, were used; one was for boulders and the other for peridotite layer.
3. **Heavy-duty Auger Flight**  
Torque tube and Blade of the Auger Flight were made much larger than the standard.
4. **Heavy-duty Casing Crown Bit (Core Tube)**  
The Crown Bit was used for cutting big boulders and preventing bore hole from deviation. Tungsten carbide tips were fitted at the point of the 8 Meter long Tube.
5. **Crescent Guide Pipe**  
The crescent Guide Pipe were inserted into bore hole and used for conducting Auger Flight along the crescent form, keeping already-bored hole vertically and permitting bored holes to be overlapped.
6. **On-The-Ground Fixing Type Auger Holder**  
The specially designed Auger Holder was tightly fixed on the ground to prevent Auger Flight from swinging when Auger Head hit big boulders. Conventionally Auger Holder is fixed apart from the ground to Leader of Crawler Crane.

Auger D-120H bored a hole down to max. 19.0M depth, while injecting Bentonite Slurry. When extracting Auger Flight began to be extracted, Poor Cement Mortar was grouted to the bottom of the bored hole, and then Auger Flight was wholly extracted. Crescent Guide Pipe was inserted into the bored hole. Auger D-120H began to bore the adjoining soil along the Crescent Guide Pipe. The Crescent Guide Pipe was extracted and then H-box elements or Sheet Piles were inserted into the hole.

### Construction Rate

Four (4) Holes per Eight (8) Working Hours



Bored Hole in the boulder layer



Boring with bentonite solution



## SANWA DOUGHNUT AUGER MODEL SDA-180KWP USED FOR A PILING WORK OF A PIER CONSTRUCTION IN SINGAPORE.

Sanwa Doughnut Auger SDA-180KWP was used for a piling work for a pier construction in the Pulau Hantu Island in Singapore. The Pulau Hantu Island is located between the main island of Singapore and The Sentosa Island.

The piling work was started by McConnell Dowell S.E.A. Pte Ltd, Singapore in June, 1982, on the sea carrying the Auger SDA-180KWP on a pontoon.

As raked piles should be installed upto desired depth in the sea bottom, doughnut type auger equipment was requested strongly.

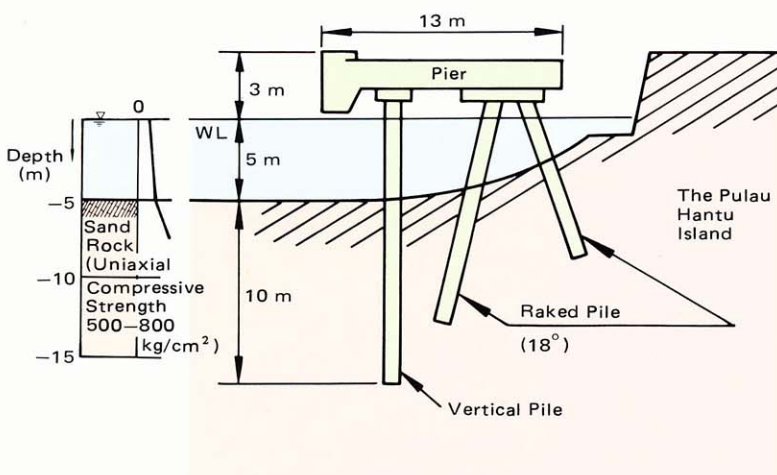
Each Auger Drive Units rotated the Auger Flight and Casing simultaneously in counter direction. After reaching the desired depth, Auger Flight was extracted leaving the Casing. Cement Slurry was grouted at the bottom of the hole for Pile settlement. After Concrete Pile was inserted into the hole, the Casing was extracted.

The Casing protected Auger Flight from bending or breaking by the force of sea waves, and also it kept boring straightly.

After 6 months, 212 pcs of raked piles ( $18^\circ$ ) and 188 pcs of vertical piles were executed.



### LAG TIME





# SANWA AUGER MODEL D-60H FOR P.I.P.(PACKED-IN-PLACE)MORTAR BEARING PILE IN EGYPT

In February, 1980, Sanwa Auger D-60H-4S\* and Sanwa Mortar Mixing & Pumping Plant PM2-15 were used for constructing P.I.P. Bearing Piles for a 30-stories' building in Alexandria in Egypt.

As the job site was situated under a sharp cliff of sandy rock very close to the Mediterranean Sea, and might be collapsed by vibration, P.I.P. (Packed-In-Place) Method was adopted for avoiding vibration by conventional dynamic piling method.

After boring down to the 10.5M depth by the Auger D-60H-4S, Cement Mortar was grouted into the bored hole through the 4-inches diameter hollow stem of Auger Flight by the Grout Pump provided on the PM2-15, while Auger Flight was extracted from the bored hole.

Then, Reinforcing Steel Cage was inserted into the bored hole filled with the Cement Mortar.

\* Former Model of D-60K-4S



Job Site under the sharp cliff of fine sand



Constructed P.I.P. Pile



Reinforcing Steel Cage

Depth	Soil Condition	Compressive Strength	
		60	120
1	Fine Sand		
2	Lack Stickiness		
3	w/Springs		
4			
5			
6			
7			
8			
9			
10			
10.5			



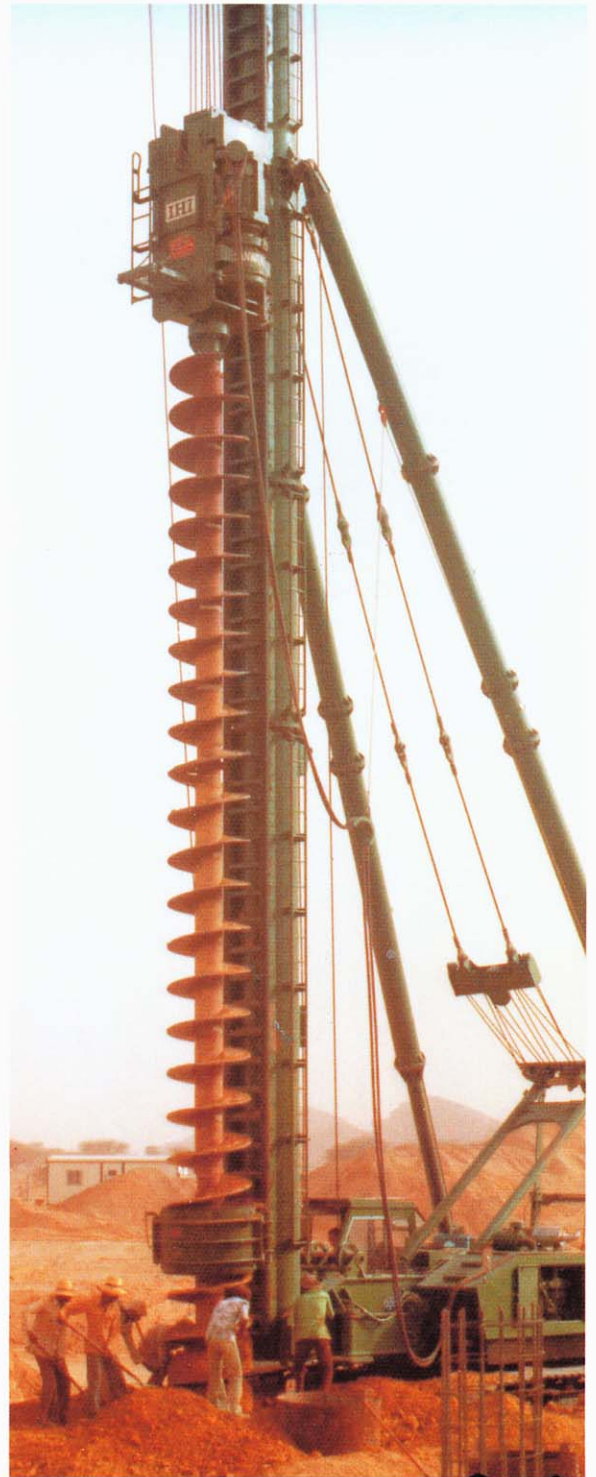
## 1000MM DIAMETERS' POURED CONCRETE PILING WORK USING SANWA AUGER MODEL D-120H IN AL-AIN, UNITED ARAB EMITRIES

Four (4) units of Sanwa Auger D-120H were used for the foundation work of constructing a cement plant in Al-ain in United Arab Emitries.

The foundation work was started in September, 1978 by Japanese leading plant manufacturer, Ishikawajima Harima Heavy Industries (I.H.I.). The layer's uniaxial compressive strength was  $300 \text{ kg/cm}^2$ .

At first, boring down to desired depth of 12 meters by Auger D-120H was done taking only 20 minutes.

Then, slime treatment to remove remained soil at the bottom was executed by Auger Bucket taking 20 minutes. Into the bored hole, Reinforcement Cage was inserted and Concrete was poured. Totally it took approximately 120 minutes to complete one pile.







SANWA AUGER MODEL D-60H FOR  
AUGER-CAISSON PILING METHOD



SANWA DOUGHNUT AUGER  
MODEL SDA-120HW,



SANWA DOUGHNUT AUGER  
MODEL SMD-120H



SANWA PILE CONDESTLER



SANWA HORIZONGER MODEL SH-1030



SANWA MORTAR MIXING &  
PUMPING PLANTS

Sole Distributor

**Sanwa Matoron co.,ltd.**

Manufacturer

**SANWA KIZAI CO., LTD.**

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\*The right is reserved to change the specifications without notice due to continuous improvement.