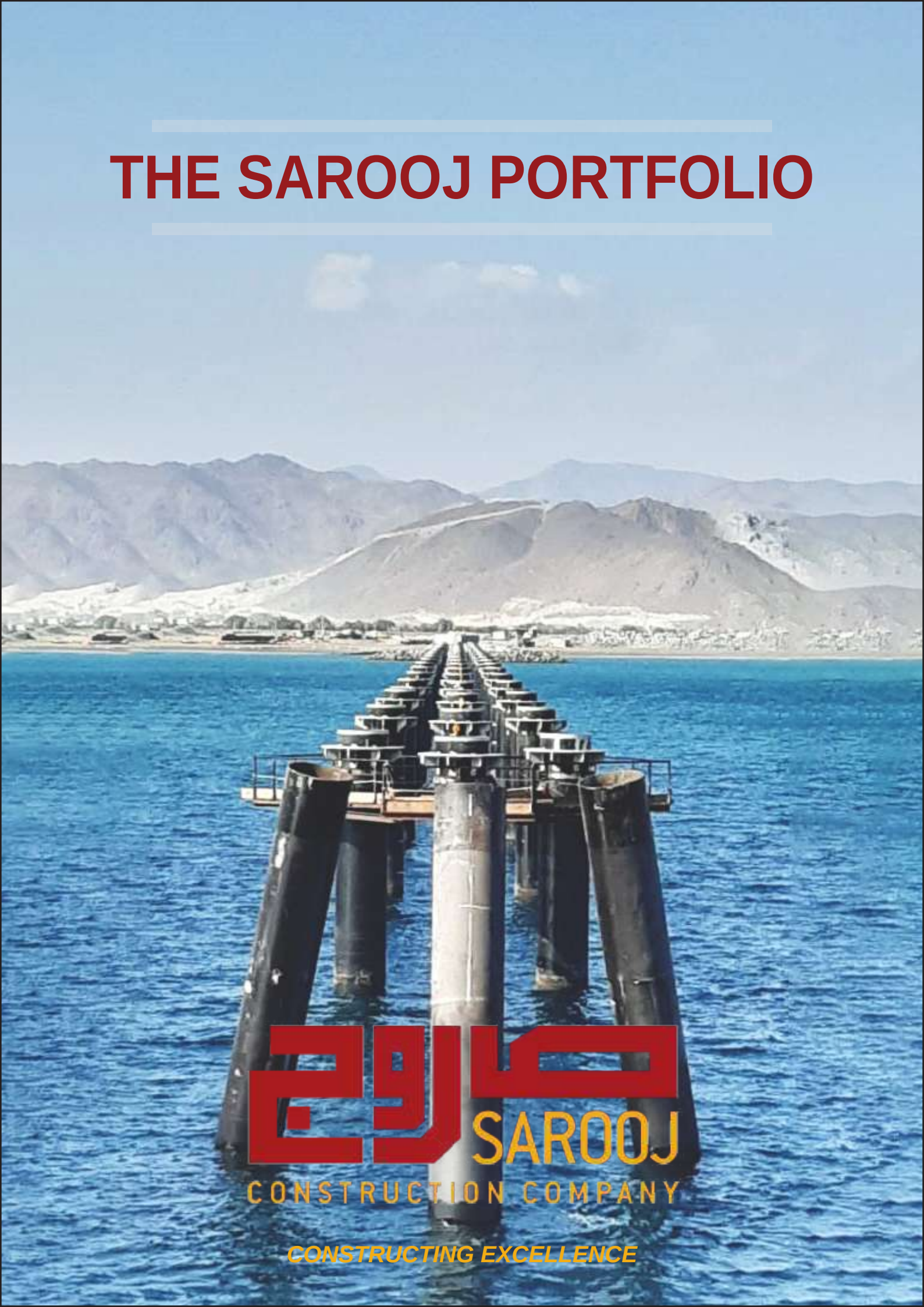
THE SAROOJ PORTFOLIO



صاروج
SAROOJ
CONSTRUCTION COMPANY

CONSTRUCTING EXCELLENCE

INSIDE THIS ISSUE

To our clients, colleagues, partners, bankers, suppliers, sub-contractors, sister companies, and friends:

As regional countries started feeling the pinch of the Pandemic, Sarooj Construction Company confidently cruised along to reach new heights, primarily through what it does best: delivering projects safely, on time, as per contract specifications and within budget.
We achieved this performance during these difficult times with the support of our partners, suppliers, sub-contractors, bankers and our experienced management team that has a long service tenure with the Company. Furthermore, the heavy reliance on the ingenuity of our engineers, value engineering their way through our projects, large and small, with the help of nearly 3000 dedicated people working on our sites and in our offices has also played an essential role in this performance.
Our aspiration to become the most trusted partner in the provision of construction services on the oilfields, in major infrastructure projects and marine works in the GCC continues to drive our success amid ever-changing economic, legislative, and social conditions.

THE SCC REPORT

We have successfully leveraged customer relationships, built over the span of 47 years via our solid execution in the construction works to win several key contracts.
By having these strong relationships, as well as being located within close proximity of the project sites, Sarooj is able to remain competitive. We are able to bid for a vast number of contracts.
Our chances of success are increased by being able to provide complete or partial maintenance or construction teams and all the required machinery, specialist equipment, facilities and plant.
We maintain our competitive edge by leveraging our ability to provide a comprehensive solution to our clients by carrying out our Core Capabilities whilst relying solely on our in-house resources.

Proof of our success has been highlighted by the fact that we have been entrusted with a number of fast-track contracts by our key clients.

We have successfully constructed and completed the first ever Gas Well Pad at Petroleum Development Oman (PDO) Saih Rawl area where all construction equipment utilized were fuelled by Biodiesel.
We are the first construction company in the MENA region to utilize the first Omani-produced Biodiesel. We are very proud to be part of this collaboration with PDO and Synergy Biofuels to deliver this project while reducing CO2 emissions.
Sarooj is committed to invest in transformative solutions to reduce emissions and greenhouse gases and this project is one step in that direction.

Ghazi Helou
Managing Director

Simon Karam
Chairman of the Board

Anthony Helou
Chief Executive Officer

Fawzi Mouchantaf
Deputy Chief Executive Officer

Ali El Zein
Deputy Chief Executive Officer

Issa Al Bahlani
HR, Admin & ICV Manager

Hilal Al Rawahi
Legal Advisor

Salim Al Maamari
Business Development Manager

Fatma Hattali
HR & ICV Admin

Wafa Al Maamari
Government Relations Manager

Khoula Al Hajri
HR Officer

Ahmed Al Shukaili
Personnel Manager

Amer Al Kindi
Senior Consultant

Bhawani Shankar
Quality Manager

Chady Assaf
Plant Manager

Fadi Zakhem
Proposals Manager

Hanna Obeid
Facilities Manager

Monib Traboulsi
Corporate HSE Manager

Omar Bou Maroun
Financial Controller

Rana Assaad
Communication Lead

Roderick Blair
Commercial Manager

Santosh Shetty
Finance Manager

Wissam Kashmar
Procurement Manager

SAROOJ AT A GLANCE

SCC STORY

FOUNDATION

Established in 1976, restructured in 2006.

PERFORMANCE

Annual Turnover of 131 Million USD.

SCALE

Employs 2,750 personnel.

RANKING

Classified as Excellent, with the Tender Board.

LOCATION

All Oman Governorates.

PERFORMANCE	2019	2020	2021	2022
Turnover (in Millions)	USD 157	USD 117	USD 97	USD 131
SCALE				
Total Employees	3,200	2,700	2,400	2,750

SCC OPERATIONS

EPC
MARINE
OIL & GAS
AIRPORT & ROADS
CIVIL INFRASTRUCTURE
MEP

OUR MISSION

At Sarooj, our mission is to create superior value for all our stakeholders through combining experience, passion and innovation to deliver on commitments and create long-term relationships with a unique continuous focus on projects, value, and business sustainability.

صاروج
SAROOJ
CONSTRUCTION COMPANY

OUR VISION

DELIVERING SUPERIOR VALUE AND CREATING SUSTAINABLE FUTURES FOR ALL OUR STAKEHOLDERS

OUR VALUES

PROFITABILITY
BUSINESS SUSTAINABILITY
SUPERIOR PERFORMANCE
PROJECT & CUSTOMER FOCUS
TEAMWORK

COMMITMENT TO HSE, QUALITY, INTEGRITY, INCOUNTRY VALUE AND HUMAN DEVELOPMENT.

Since its inception, SCC has held on to five core principles that serve as the foundation for our modus operandi:

- Health Safety Environment (HSE)
- Quality
- Human Development
- Integrity
- Corporate Social Responsibility (CSR)

We continuously strive to achieve Goal Zero when it comes to incidents and accidents. This means we never fall short on providing all the necessary resources that help achieve this Goal.
We strongly believe every accident / incident is preventable; and with this mentality and drive, SCC remains an industry leader in work-site safety.

Quality is one of the fundamental core values at SCC, where we are committed to maximizing customer satisfaction and striving for excellence through continuous improvement.
SCC's management has integrated the requirements of the quality management system into core business processes and continues to invest in the system to ensure that required resources are allocated to achieve its intended outcome.

At SCC, integrity transcends well beyond compliance with the local laws. Every constituent of the SCC family is expected to maintain the highest ethical standards. Our values demand that our business conduct is proper, fair, impartial, and ethical.
In summary, we are off to a very solid future. We have won some new landmark projects and have reached new heights financially.
Whether on or off the oilfields, onshore or offshore, we continue to deliver our projects safely, on time, as per contract specifications, with no impact to the environment, all the while adding value to our stakeholders, customers, employees and the community at large.

At SCC, the standard for excellence is measured against specific key success factors:

- Profitability for our shareholders
- Stable employment to SCC's team members
- Unwavering commitment to HSE and QA/QC.

SCC's overriding method of accomplishing excellence has been to focus on construction management techniques of the highest professional standards to perform our services to the benefit of our clients.
Since 2015, SCC uses the ERP-SAP system to monitor and control its activities in a totally integrated manner.
Furthermore, the company has an extensive well maintained equipment asset portfolio ranging from specific construction machinery to earth moving and Marine Equipment.
SCC has added lands to its portfolio in Bid Bid and Duqm port area and built several new camps for its workforce in many regions of Oman.

A recurring theme in SCC's journey spilled over from year to year; and that is a "challenge". Sarooj has a long, prestigious continuously improving safety record and has been at the forefront of safety accreditations in the Omani construction industry.

Our Oil & Gas Division continues to be very successful on the oilfields and was merited several safety awards and many shields. Occidental Oman recognized our achievement of working five years in Mukhaiznah without LTI. Equally in PDO we have worked six years without LTI on our long-term contract making it one of the best performances ever achieved.

The challenge for our Oil & Gas Division and indeed for the whole company is therefore to maintain this international level in project execution. The Division has added Dubai Petroleum Establishment (DPE) and Arawak to the list of valued clients in the upstream Oil & Gas Industry.

- Petroleum Development Oman (PDO)
- Oman Oil Company Exploration and Production (OOCEP)
- Occidental Oman (OXY)
- BP Exploration (Epsilon) Ltd.
- Dubai Petroleum
- Majid Al Futtaim
- Royal Court Affairs
- Ministry of Transport, Communications and Information Technology
- Ministry Of Defence
- Oman Gas Company
- Sidem Veolia
- Sepco3
- Haya Water
- Al Mouj Muscat
- Ministry of Agriculture, Fisheries Wealth, and Water Resources
- Saipem
- Tecnicas Reunidas
- GS
- Doosan
- Wärtsilä
- Orpic
- Chicago Bridge & Iron
- Hyundai Engineering
- Worley
- Daewoo E&C
- Duqm Refinery
- OQ
- Jacobs
- Muscat Municipality
- Oman LNG

The work awarded to our Civil & Infrastructure Division are characterized by their remoteness and difficult accessibility such as sand dunes in the Empty Quarter.

Our team had to innovate and value engineer every step of the way.

Finding water sources or borrow pits or quarries for producing aggregates, establishing thus an efficient supply chain with necessary logistical support became absolutely vital.

Sarooj has been awarded several projects during the last two years.

A very challenging one consists of constructing a border security fence and patrol road across the Dhofar mountainous areas.

Petroleum Development Oman has entrusted us to build rig locations and access roads for a long-term contract.














- OIL & GAS
- MARINE
- MECHANICAL & ELECTRICAL
- AIRPORTS & ROADS
- CIVIL
- BUILDINGS
- OFFICES

OIL & GAS

NICOLAS SAWAYA
Contract Manager

The oil and gas industry in Oman, in both upstream and downstream operations, remained very active during the past period. Intensive upstream drilling programs continued very actively. Some mega petrochemical downstream were commissioned and others close to completion.

With projects like the Duqm Refinery and the Liwa Plastic project commissioned a step change took place in the industry. The Ras Markaz Crude Oil storage facility is well under way to supply the new refinery with raw materials. The Yibal Khuff mega project went online during the period.

Petroleum Development Oman (PDO), Occidental, CCED, Petrotel, Maha Energy, Ara Petroleum, Shell continue their exploration programs. Several blocks were awarded to local, regional and international companies. OQ became more and more active upstream and downstream.


GAS

OIL & GAS

LOCATION

Most of the locations are located on producing oilfield and, therefore, they present rather permanent characteristics such as concrete pads. Construction water comes from wells drilled into deep aquifers in the vicinity.

RIG MATS

The client PDO is always open to innovative ideas that generate savings in time and in resources. Here we see very strong mats that replace concrete and could be reused several times.

FILLING IN LAYERS

Locations must be raised above surrounding ground to improve soil characteristics and also to avoid flooding during heavy rains and storms. The selected materials are laid and compacted in layers.

ASPHALT ROAD

When the traffic on a road becomes intensive, particularly on producing fields, the client may decide to upgrade that track road into a paved one.
This activity is part of our scope.

PETROLEUM DEVELOPMENT OMAN EARTHWORK CONTRACT - QARN ALAM

Upstream operators in Oman have extensive drilling programs whether for exploration, production, or EOR (Enhanced Oil Recovery) purposes.
Depending on the type of rig, there are various configurations for the locations. The requirements also depend on the expected depth of each well. Furthermore, drilling programs may vary within short times. Therefore, it is advisable to construct some locations ahead of rig moves (buffer).
Sarooj have got the call-off contract to build locations and access roads with Petroleum Development Oman.
Depending on the objectives (oil or gas) the requirements are affected. Sarooj typically build access roads, platforms, cellars, stove pipes, pits, fences and flares.
Sometimes we build camp sites and several miscellaneous civil and building works. Restoration works may also be required on abandoned wells. Special care is given to industrial wastes and cuttings.

HSE CELEBRATION

Considering the importance of working safely, i.e. in a manner that does not cause undue negative impact on the people, their health or the environment, HSE good performances are frequently celebrated and best achievers rewarded in the presence of high management officials from client, contractor and sub-contractor. Five years without LTI.

OIL & GAS

PIPE RACKS

On similar facilities, pipe racks and their foundations represent a tangible part of the works. Here the foundations are of isolated type and are cast in-situ. The racks are made of structural steel.
They could have been also made from precast concrete frames.

OFF-LOADING LARGE VESSELS

Considering the high risks inherent to this operation, a lifting plan is prepared in advance and HSE controls are put in place.

GRP PIPES

A critical operation in GRP pipework is the lamination and pre-forming of fittings such as bends and tees.
This work is done in a covered workshop.

ISOLATED FOOTINGS

Isolated reinforced concrete footings are aligned to carry piperack supports.

Holding down bolts are positioned and stud columns cast in order to embed and cover the bolts.

CAREFUL CONCRETING

It is of prime importance that the anchor bolts do not move during concreting and are well covered with concrete.

Extra care and continuous monitoring should be exercised during the placing of the wet mix.

NGL EXTRACTION UNIT - FAHUD

The Oman Oil Company, one of the government's major investments and development arm decided to build the Liwa Plastic project in Sohar Industrial Port.

Four packages were awarded. GS Engineering and Construction were given the NGL extraction Unit in Fahud.

Sarooj were entrusted with the enabling works in terms of on-plot cut and fill, perimeter road and security fence. Our scope consists of the foundation works and underground pipework.

About half a million cubic meters of various borrow and excavated materials were moved.

Twenty thousand cubic meters of reinforced concrete have been poured in piperack supports, machine foundations, retaining walls, pits and manholes.

GRP pipes were laminated in an enclosed shed before they were laid in trenches. An internal asphalt road network serves the various plant areas.

It is to be noted that Sarooj were ahead of programme in the delivery of their SOW (Scope of Work).

GLOBAL WATER AWARDS

The Nimr Water Treatment Plant project was internationally recognized and the team received the 'Global Water Award' for treatment of industrial water in Berlin.
The trophy was presented by HE Late Kofi Anan to the team.

TURN-OVER POINT

The produced water reaches the plant and is metered. It goes into cylindrical reservoirs where a large part of the oil is separated by cyclonic effect. The water then goes and rests in a long buffer pond where more oil is skimmed from the surface. The oil returns to PDO production station.

BIODIVERSITY

The Nimr Water Treatment Plant has become a hub for research and development. To make smarter use of the clean water several pilot projects were undertaken to identify what plants, shrubs and trees can tolerate this water. This photograph shows cotton production.

NEW HABITAT

This man-made oasis with green plants thriving in the wetland and with shining water bodies in the evaporation ponds, became a new ecosystem, a new habitat for new resident birds and a stopping station for migratory ones. The project now has about 135 species living on it. Furthermore, several fish species enjoy life in the evaporation ponds.

NIMR WATER TREATMENT PLANT

In many cases, when oil is extracted from its reservoir it is accompanied by water known as produced water. Traditionally, this was re-injected into deep layers of the ground. PDO commissioned Bauer GmbH of Germany to Build, Own, and Operate (BOO) a reed bed to biologically treat this water and clear it from its hydrocarbon content. Sarooj was appointed to build the Nimr Water Treatment Plant in its three phases using indigenous plant; a bacterium grows at its roots and breaks down the oil molecule. Before entering the wetland, the bulk of the oil is separated by cyclonic effects and later collected by surface skimmers in the buffer pond. The clear water is guided to evaporation ponds. The wetlands are now the permanent habitat for several kinds of birds and the stopover for many who migrate. Research is being carried out at present to diversify the plantation from monoculture and investigate other ways than evaporation to optimize the uses of the treated water: production of salt, desalination, production of steam, and water injection as part of EOR techniques.

NURSERY

As the project developed, advanced nurseries were built near the project so that the seedlings get acquainted to the environment: mangrove, jojoba, kuwaiti tree, algae, cotton, reeds… take birth in this dedicated nursery for the project. Irrigation water comes from an RO plant at the initial stages.

▲ **MAN-MADE FOREST**

This spectacular photo is not taken in some sugar cane plantation or in equatorial flora haven, it is taken in the Nimr Water Treatment Plant.
Some of the reeds reached 4 to 5 meters height. The cells need to be harvested, the substrate re-conditioned and re-planted.

▲ **STOPOVER**

Several migratory birds rest for several months in this oasis. The reed beds have become a popular stopover for these great travellers.
Many of them now hatch in the wetlands, which has created a new micro ecosystem in this arid area.

◀ **SEEDLINGS**

Seedlings are arranged in portable boxes and prepared in sufficient numbers to cover, when planted, an area of 9 hectares in one delivery.
Careful preparation is needed to face this logistical challenge.

SEEN FROM SPACE

The wetland in Nimr sprawls over a vast area. The plot size is 36 million m². the wetland area in use now is close to 11 million m². The project could be seen from space.

It may extend in the future to be able to cope with 250,000 m³ per day, as compared to 150,000 m³ being presently treated every day.

NIMR WATER TREATMENT PLANT (Cont'd)

This successful project continues inspiring upstream operators, environmentalists, and scientists. With a daily inflow of 150,000 m³ of water, the reeds are thriving and several species become residents in this new habitat in the middle of the desert. Meanwhile, Bauer Nimr Oman LLC continues delivering several hundred barrels of recovered crude oil back to the Nimr production station through a dedicated flowline. The treated clean water is now being used more and more to irrigate new plantations such as mangrove, cotton, jojoba, and medicinal algae. Experiments are taking place presently to establish the impact that polymers used in the oil extraction process may have on the reeds. The project has also opened opportunities for the re-use of treated water on the oilfields and it is better still to desalinate some of it using solar energy. The reed beds have become a living laboratory for experimentation and innovation. Another prospect for the future is the possibility of growing plants whose seeds give castor oil. An agreement is in place between a factory in Duqm (Sebacic) and BNO to buy all the harvest.

PLANTING

The plantation cells are 300mx300m i.e. 90,000 m² to the planted in one day because the water will cover the cell in one day which makes it impossible to work within it thereafter. An army of farmers and workers plant the cell in one day.

The cell is flooded immediately after planting.

RIG IN OPERATION

Looking from a distance at a rig location, one hardly sees movement or change.
The area is so flat. It is not until a drilling rig sits above the cellar that one locates clearly the well. Support equipment, pipes and materials are mobilized with it.

CONCRETE PILES

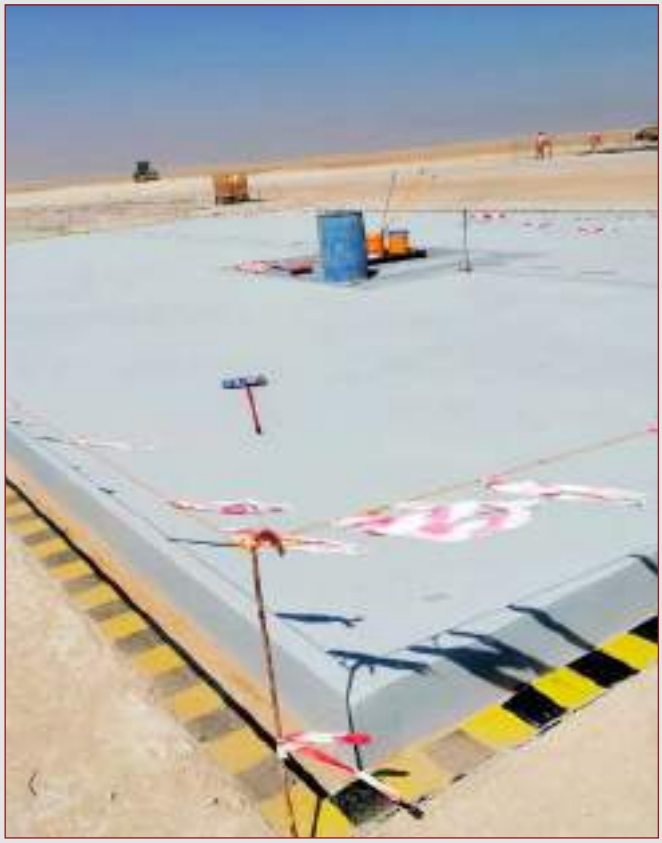
Many rig locations in Khazzan fall on Sabkha, a soil with very poor geotechnical characteristics. Considering the heavy static and dynamic loads that go under the rig, it became necessary to improve the bearing capacity by drilling concrete piles.

PILE CAP

Here is a hydraulic tool that can embrace the top part of the piles that protrude from the ground and break the unnecessary concrete. The pile steel reinforcement becomes exposed. It is thereafter bent and overlapped with the reinforcing bars of the apron slab that carries the drilling rig.

CONCRETE PADS

Concrete pads are provided under the rig's footprint and under heavy loads. Any settlement in the ground would jeopardize the safety of the rig. Rig mats are also provided; surface drains help keep good housekeeping and clean worksite. The stove pipe can be seen protruding from the cellar.



BP KHAZZAN OILFIELD DEVELOPMENT

BP exploration are developing the Khazzan Tight Gas Field within block 61 in central part of Oman. The block covers 2,800 km².

The works are now completed on Phase one and Phase two and the field is yielding about 50smtd.

The start-up was mid 2017 with a 30-year operating period with possible time extension. Further development is scheduled for the future. The project includes a central processing facility (CPF) and gathering stations receiving gas from nearly 100 wells through an extensive network of flowlines (about 400km). Associated infrastructure to support the project includes residential quarters, contractors base camps, desalination plant, sewage treatment plant (STP), and waste handling facility. Our worksites were remote and scattered on a vast area. Therefore, each site required independent welfare arrangements and stand-by ambulance. Our scope consisted of building access roads and locations with all their components: mud pits, water pits, cellars, fences, stove pipes and flare pits.

KITCHEN

The people's welfare and safety are of paramount importance for both BP and SCC. The picture shows the inside of the camp base kitchen.

Hygiene, proper lighting, cleanliness, are essential to ensure delivery of good food to the workforce.

THE PLANT

Raw water comes from wells drilled deep in the ground.
This water contains a high PPM of salts and the plant is precisely designed to separate the salts.
The produced water is exported to the oilfields for rock fracking and the brine disposed of in the evaporation ponds.

TANK FOUNDATION

Considering the circular shape of the tank foundations, blockwork was built as sacrificial formwork.
This permitted, however, easier application of external concrete protection.

PRE-CAST ELEMENTS

When many identical concrete elements are needed they are pre-cast in a separate yard, transported and installed in their final positions.
Pipe rack supports are seen in this picture.

EVAPORATION POND

Large ponds are created by building up bunds around them, levelling the internal area, laying a sand bed and installing an HDPE membrane welded and tucked into the earth bund.

BP KHAZZAN RO PLANT

For its operations to develop Block 61, British Petroleum (BP) would require a large quantity of pure water to be used in the fracking process aimed at extracting tight gas. BP commissioned Veolia as the EPC contractor to design, procure, and construct a Reverse Osmosis Plant that could produce up to 8000 m^3 of water per day. Veolia, upon BP's recommendation assigned the civil works to SCC. The works comprised of a vast geotechnical campaign that led to soil replacement under all structures; also concrete foundations, tank foundations, pits and chambers, ramps, buildings and sheds, access roads, street lighting, and fencing. A major part of the civil works consisted of the construction of vast evaporation ponds lined with HDPE membrane laid on sand bed. Many concrete elements were pre-casted outside the site, transported and placed in their final locations. Starting the works at such an early stage of the oilfield development represented a challenge, particularly arranging decent accommodation for the work force until such time that a proper camp base was built.

RAFT FOUNDATION

Large raft foundations had to be cast.
This represented a real challenge in terms of supplying ready mix concrete in such large volumes in the middle of the desert and under harsh climatic conditions.

▲ CONCRETING OF PAD

Once the cellar is concreted in and backfilled several areas on the platform have also to be concreted to take the loads that they will be subjected to.
One important area is the footprint of the rig itself because it has to take intensive loads during operations.

▲ EARTH PITS

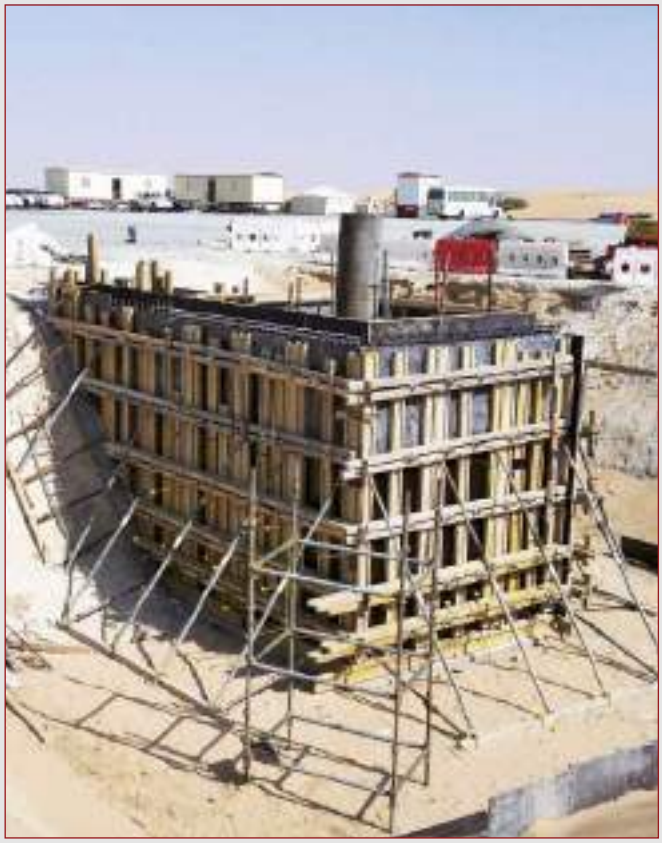
This is our Atlas Copco Rig drilling holes for earthing rods.
These holes are deep enough to achieve the required electrical resistivity.
Several earth pits are required to protect the installations and the power generating equipment.

◀ CONDUCTOR PIPE

When working on such dunes, the conductor pipe has to go down to firm ground and be anchored in it.
The pipe should be perfectly vertical and positioned exactly in the well location.

THE CELLAR

This is the cave built exactly under the rig.
It holds the conductor pipe that is extremely useful at the onset of the drilling operations.
The cellar captures any drilling mud falling around it before it is pumped out into the mud pit.



RIG LOCATIONS FOR DPE

Dubai Petroleum Establishment (DPE) launched an exploration campaign on its concession.
They decided in a first phase to drill three wells.
Typically, prior to the rig's arrival to site, preparation works comprising of access roads, camp site, rig working platform, mud pit, water pit, and flare pit have to be constructed.
These early works include ancillary works such as fencing, earthing, and foul water disposal.
Furthermore, a critical part is the cellar and the conductor pipe that would be inserted in the ground in the exact location of the well.
Three locations were selected: Khubai, Jabal Ali, and North Rimah.
Other satisfied clients for whom our company had carried out similar works recommended Sarooj to DPE. Khubai falls on sand dunes.
Its access road had to have a thick enough sub-base layer of granular materials to take the big load on certain axles.
In Jabal Ali, ground water was encountered and dewatering was necessary in order to build the cellar under dry conditions.

HDPE LINING

HDPE is a versatile material that is used widely across many applications. One of the primary uses of HDPE is as a liner at the base of landfills, where its chemical resistance is put to use. HDPE applications also include pond linings and water containment projects.

THE SITE

The site shows the land encroached on the mountains and the part reclaimed on the sea. Whilst the seawater intake is placed low on the coast (+7.5 m), the main area is at a higher level (+15 m), the flare is installed high on a ledge (+50 m). The temporary jetty limits the site.

SUPERSTRUCTURE

To ensure quality and time saving, a shuttering system was used (PERI) to form the various elements of the superstructures. Columns formwork elements are lifted into position with cranes.

SECANT WALL

To enable the construction of the seawater intake basin, in dry conditions, the construction of closed secant wall was necessary.
Inside the cofferdam well point dewatering system was used to complete water tightness.

PIPE RACKS

These structures constitute an important part of the civil works.

They carry pipes over the whole site to reach the various product destinations.

long lines of foundations bases and stud columns have to be accurately cast in-situ.

▼

MUSANDAM GAS PROCESSING PLANT

The Northern Province of Musandam in the Sultanate of Oman consists mainly of rugged mountains touching the sea and leaving no space between them and the waters. In order to build the Musandam Gas Processing Plant (MGP), which treats gas extracted from offshore fields, a vast area had to be prepared to take the various installations and facilities. Sarooj proposed to cut into the mountains and reclaim land in the sea, in a manner that would not require neither import of fill materials nor cart away surplus excavated rock. This was achieved by crushing the yielded rock into various sizes. The scope of works (SOW) included the casting of various concrete foundations, tank farm, pits and manholes, revetment, sheds, substations, administration building, roads, security fencing, trenches and slope protection. A milestone was the completion of the main seawater intake basin constructed below sea level. This allowed the completion of subsea pipelines. The upgrading and commissioning of the existing jetty together with the construction of a quay wall allowed marine vessels, barges, and tug boats to service and support the marine works, particularly the laying of pipes and the installation of the Single Point Mooring (SPM) anchors.

SEAWATER INTAKE BASIN ▶

The intake basin is below sea level and the coastal formation is rocky.

Secant wall was built all around the structure and inside the cofferdam, a well point dewatering system was put in place to allow working in dry conditions.

Sealing around the intake pipelines was particularly challenging.

▲ **OILFIELD (MUKHAIZNA)**

It is in this congested environment that Sarooj had to move its heavy machineries to build access roads and rig locations.

Managing interface through Permit to Work (PTW) was essential.

▲ **CUSTOMIZED OIL DRILLING RIGS**

Special oil drilling rigs of high efficiency and mobility were procured to be able to cope on time with the intensive drilling program.

◀ **FILL MATERIAL**

In the approved borrow pits, the naturally occurring fill materials are screened to fit within the gradation curve, then moistened, tested, and transported to the final destination.

SCHRAMM DRILLING RIG

In order to avoid risks of delays due to the critical operation of installing conductor pipes at the exact oil well location, Sarooj procured a highly reliable Schramm rig from the USA.

▼

OCCIDENTAL OMAN - RIG LOCATION AND ACCESS ROADS SERVICE CONTRACT

Heavy oil extraction is a difficult process and requires EOR techniques. On their concession in Mukhaizna (Block 53) Occidental Oman opted for steam injection. They developed an intensive program to drill injector and producer wells. The rhythm is approximately one well a day. They have procured special drilling rigs that can move fast from a location to another. In this congested environment with flow lines, well-heads, stations, facilities, electrical lines, and other services, Sarooj were commissioned to build rig locations, cellars, conductor pipes, water pits and mud pits, access roads, as well as their maintenance. They too had to follow the same rhythm that is practically one well per day. Eight earthwork teams were permanently working to deliver the locations. A limiting factor was the drilling and installation of conductor pipe 12 m into the ground and then grouted in. To cope with such a challenging requirement, Sarooj procured a Schramm drilling rig from the USA supported by a smaller DrillTech rig on standby. Fencing works, HDPE lining for pits, and installation of cellars are carried out by civil works crews. Four years have passed without LTI (Lost Time Injury).

RIG LOCATION ▶

The location is now ready for use. The cellar is covered with metal grating and the conductor pipe is seen protruding from the cellar.

▲ ASPHALT PLANT

The ‘Marini’ hot mix asphalt plant was mobilized to the vicinity of the road to ensure constant delivery at designed temperatures. Environmental permit was obtained prior to the installation of the plant.

▲ PROTECTION SLAB

Considering that the road is built on an oilfield, it is crossed by many flowlines, buried pipelines and cables. To protect these installations, protection slabs had to be cast over them.

◀ TAR DISTRIBUTION

In order to seal the surface of the aggregate base course layer, a hot bitumen cutback 60/70 is spread under pressure on the clean surface. A thin film of water is spread prior to bitumen coat to keep the dust down.

ASPHALT LAYING

The hot asphalt is laid on the primed and dry surface using modern asphalt finishers equipped with advanced sensors to ensure levels and slopes. A train of rubber tyred rollers as well as steel rollers follows to ensure compaction of the wearing course and smoothness of its surface.

OQ - 40KMS ASPHALT ROAD ABU TABUL - BISAT

In many cases in the Sultanate, the oil and gas are discovered in the Empty Quarter. Consequently, most of the roads and rig locations fall on sand dunes.

These roads are generally kept as track roads during the exploration phase to minimize initial expenditure.

However, as soon as a field is developed and extended on its concession, the movements of vehicles, trucks, rigs, and other equipment become intense on some sections of these roads. Consequently, the cost of maintenance increases excessively while the quality of the service decreases. Upstream operators identify these main arteries on the fields and may decide to pave them with asphalt.

This is how the national oil company OQ decided to pave the road linking Abu Tubul to Bisat in their block.

The road extends over nearly 30 km crossing dunes and sabkha deposits.

The contract was awarded to Sarooj through competitive e-tendering.

SAND DUNES

The road is built on the dunes of the Empty Quarter in its majority length. It also crosses treacherous grounds known locally as Sabkha: a mixer of sand, silt, clay, salt and water, creating unstable foundation for the road. Improvement techniques are used.

MARINE

DHANARAJ JANAKIRAMAN
Project Director

Projects involving marine works are increasing in numbers and complexity. The Ministry of Agriculture, Fisheries, Wealth & Water Resources have an ambitious program to build larger fishery harbors that can accommodate canning industries, cold stores, bunkering facilities and workshops. More water desalination plants are being constructed along the coast and require intake and outfall structures. New Jetties for the purpose of exporting Gabbro stones and sand are planned to be built in Khatmat Milaha, Sur, and Shwaymia Several sea front resorts are approved and construction started such as Yitti Resort. Furthermore, there is an in increasing demand for maintenance works on marine structures and dredging of silted critical areas. Our marine department was very active during the period in following these projects and participating to several of them. A major acquisition in our group was the purchase of dredger CERES, a medium size cutter/sucker dredger adequate for the majority of marine work cases in Omani waters.

HYDRAULIC HAMMER

Considering the soil investigation report which indicates the presence of a hard layer of sand stone encountered frequently along the Batinah coast, adequate hydraulic and vibro hammers had to be mobilized. This 42 T hydraulic hammer is equipped with very precise controls to ensure exact positioning of the piles.

TUG BOAT

This vessel is vital to ensure successful logistical support in towing Kumzar barge loaded with plant equipment, materials and tools.

STEEL PILES

The berthing facility consists of a set of three piles to be connected together.

The distance between the piles takes into account the size and shape of ships that will be mooring against them.

PILE DRIVING

The hydraulic hammer is driving-in the piles.
The efficiency and productivity improved as the work progressed.
Three piles were driven in final position in a time lapse of 24 hours.

▼

JETTY-BERTH C1A & C1B

The new Liwa Plastic project will generate products that have to be exported on vessels from a jetty berthing facility in the port of Sohar. The consortium of CB&I – CTCI are carrying out package 1 which covers the steam cracker unit and their scope includes extension alterations and renovation of existing jetty. The marine works were entrusted to Sarooj. Although the volume of the work is not large, adequate marine equipment had to be mobilized to cope with the challenging requirement. 36 m long pipe, 1500 mm diameter were imported from China and the protection works were done in Sohar. Special hydraulic vibro hammers were mobilized. To minimize the work in-situ, pile caps were welded onto their support outside the water. Existing bollards are to be replaced by new ones. Considering that the existing jetty is still in operation a strict time frame had to be designed to minimize inconvenience of vessel movements. 7-day slots followed by 7-day waiting time were given to us to work day and night on marine works. Preparation works continued offshore during the idle period.

CAPS ▶

Every three piles were to be capped and held together firmly.
Much of the controlled welding was done outside the water and the structure lifted in position so that final welding can be done in-situ.

▲ **EXCAVATION**

SCC's CAT 385 is seen on the 'Limassol' excavating trench for the pipeline.

Only a machine of that size could reach the required depth and yet still have enough power to dig out hard formations.

The excavated materials, when suitable would be used to backfill the trenches.

▲ **INTERFACE**

At the interface of offshore/onshore, it is necessary to shore the trench with sheet piles. The dredging works are carried out by an excavator travelling on top of the sheet piles. Once the trench is dug out to levels, the pipe is floated and sunk in the same manner as offshore.

◀ **LAUNCHING PAD**

A launching pad was built on the side of the temporary jetty. It is fitted with rails, rollers, and steel guides to keep the pipe on track and ease the pulling effort.

Lubricants are used on the rails to minimize friction.

LAUNCHING

Once the pipe is seated on the bottom part of concrete collars and the top half is installed and bolted, the length of 250 m is pulled to make it slide on the rails and rollers. The pipe floats before it is sunk and joined to the previous sections. The total weight of one section is almost 750 T.

HAYA SEA OUTFALL PIPES

Haya is the authority in Oman that manages sewage water from collection to treatment to disposal. They have built one large sewage treatment plant in Darsait and upgraded another one in Athaiba. SCC formed a joint venture with Tecnicas Reunidas from Spain to lay 1600 mm diameter HDPE pipeline 3 km long into the sea in each location. These pipes would operate in case of emergency should any breakdown occur in the treatment plants. They would diffuse the foul water into the sea until treatment resumes. An onshore section is also part of the works before the final connection is made to the treatment plant. The technique used is to float sections of the pipeline and sink them under the sea. Several challenges had to be addressed. The pipeline route in Dar Seit goes through a wadi that ends in the sea. Dewatering was necessary as well as extensive trench shoring. In the interface section between land and sea, the trench was demarcated and protected with sheet piles. Special care had to be taken in order not to cause undue inconvenience for the local fishermen.

KUMZAR

SCC's large Kumzar, carrying the 270 T Somitomo crane assisted considerably the operations, whether for lifting or anchoring, pulling or sinking.

Keeping the right inclination on the pipe whilst sinking the pipeline is vital to avoid damage to the joints or to the concrete collars.

▲ **RECLAMATION**

The materials yielded from the enabling works on site were used to reclaim an area badly needed by ROP near the border post in Tibet.
The check point buildings can be seen on the extreme left of the picture.

▲ **UNDERLAYER**

Excavator CAT 385 seen dressing the underlayer on the face of the protection revetment.

◀ **ROCK TRAY**

Rock is being placed on the toe using a rock tray.
These rocks would be tipped directly on the dredged area.
The floating silt curtain can be seen in the horizon to stop migration of fines that may hurt nearby corals.

BIRD'S EYE VIEW

This is an overview of the project. It shows in the background the new Power Station's allocated area, the ROP helipad which was right on the beach and is now about 100 m away from the water.

▼

MIPP POWER PLANT (EPC)

The Rural Electrification Company (RAECO) in Oman, a subsidiary from PAEW, the public authority that regulates power and water, signed a contract with Messrs Wärtsilä of Finland to build and commission a 120 MW power plant in Musandam. Wörtsilä awarded Sarooj the enabling works contract. About 2.5 million cubic meters of rock and aggregate materials had to be removed and used for reclaiming a vast area that now belongs to the Royal Oman Police (ROP). Environmental Permit (EP) was put in place and measures were taken to mitigate the migration of fines towards coral areas by using silt curtains. Sarooj appointed AECOM to design the revetment and protection works, obviously using armour stones. The works also included tying-in new revetment with existing jetty to form a monolithic structure. Careful sorting out of various sizes of rock allowed a successful operation. The final layers on the reclaimed areas consisted of produced aggregate sub-base materials. In Musandam where available land is scarce, gaining around 100,000 m² of land came as a blessing.

GEOTEXTILE MEMBRANE ▶

To avoid material migration between the quarry run part and the underlayer, a geotextile membrane is placed.
It allows water to pass through it but not solids.

BALUSTRADE

The carbon steel pipes are connected with stainless steel elements. A nice cap covers the piles' tops. A navigational aid is fixed on the last pile to guide boats away from the balustrade. Sacrificial anodes are fixed to the pipes to ensure cathodic protection and to mitigate corrosion.

RIG AFLOAT

The steel casings are placed in position guided and held by a metal frame.
The temporary access ramp is installed with the rig sitting on it.
The permanent pile is inserted and held in final position before grouting takes place.

TEMPORARY RAMP

A 150 T crane is lifting elements of the steel temporary access ramp on which the drilling rig would position itself in order to carry out its activities.

WORKING IN TANDEM

A rig and a crane are seen working in tandem; the rig carries out the pre-drilling through the bedrock and the crane follows with the temporary casing and the permanent pile. Grouting of the pile follows on. A similar team worked in parallel on the other beach barrier in order to complete the project on time.

BEACH BARRIERS

The Royal Court Affairs (RCA) launched a tender for the construction of two beach barriers in order to restrict access of intruders onto a private beach in Salalah, together with a removable onshore pre-cast concrete ramp to be used by coastguards.

The design called for driving carbon steel pipes straight into the ground.

However, two test piles proved that, despite the “shoe” and the use of a large vibro hammer, the bedrock resisted and the piles buckled.

Sarooj suggested to pre-drill, insert a sleeve, and then fix the pipe in position and grout it in whilst removing the temporary casing.

The method succeeded.

Stainless steel pipes were used as horizontal elements.

The ramp had to rest on steel piles connected with capping beams and completed with removable pre-cast concrete slabs.

A cathodic protection system was provided and controlled from a panel board fixed in a discrete electrical room.

STEEL PILING

A drilling rig is driving steel piles into the ground using a vibro hammer.

These piles will carry the pre-cast concrete elements that form the removable ramp.

KHASSAB PORT

The seabed in Khassab is rocky.

Pre-drilling was used before the piles could be positioned and concreted in.

The pipes were filled with concrete to increase their moment of inertia and resistance to shocks.

MAIDEN JOURNEY

The fast ferry is seen entering the port of Shinas on its maiden journey.

The main breakwater has been extended by 110 m and the lee breakwater shortened by 100 m.

STEEL PILES

Steel piles 1100 mm in diameter were driven in the seabed to absorb the energy of the vessel when approaching the steel floating deck.

They are ready to receive the proper permanent fenders.

EMBARKING AND DISEMBARKING

The fast ferry has arrived to Khassab.
Passengers leave the vessel and others go aboard. Cars are driven out and others are driven in.
Many curious residents come to admire the wonderful vessel.

SHINAS AND KHASSAB PORTS

The government of Oman decided to link major provinces by sea transport, particularly the Musandam Province with mainland.
For this purpose, they purchased ultra-modern fast ferries which operate from the Sultan Qaboos Port in Muttrah and also from Port Shinas and Khassab.
Sarooj secured the contract to make modification and upgrading works to Port Shinas and Khassab to accommodate the operations and maneuvering of the new vessels.
The works included dredging the entrance channel and mooring basin.
They also included the extension to main and lee breakwaters, skiff beach and ramp for the fishermen boats, and several onshore amenities to service the vessels: fuel supply, potable water supply, power supply, collection of sewage water and rubbish, an immigration hall and car parks.
The port now harbours the fishermen boats, the Royal Oman Police (ROP) vessels, and the fast ferries.

ONSHORE WORKS

New facilities were provided in Shinas: Car park, passengers' hall, immigration building and utilities.
A main asphalt access road was built to reach the new compound. A fuel tank and fuel transfer pipeline to the jetty were installed.

▲ **AL MOUJ, MUSCAT AERIAL PHOTOGRAPH**

This project aerial photograph shows the marina harbour, the quay walls, the reef breakwater (2 km long), the reclaimed land, the new township, and some beach groynes.

▲ **QUAY WALL AND CAPPING BEAM**

The nearly 3 km long quay wall and capping beam were built to demarcate the marina and provide mooring facilities.
Stainless steel access ladders can be seen.

◀ **QUAY WALL UNITS INSTALLATION**

Sarooj's crawler crane assisting in the installation of quay wall units and casting of capping beam. The crane is parked in a convenient location to launch the HDPE intake pipeline that feeds the ponds and lakes with seawater.

CORE-LOCK PROTECTION

A view of the reef breakwater crown.
It shows the final layer of pre-cast concrete units called ‘Core-Lock’. The system is patented and the units are interlocked with each other and act as a mat. Raising one of them upwards lifts all the neighbouring ones at the same time.

AL MOUJ, MUSCAT

Al Mouj, Muscat resort is developed along a 7 km beach plot, close to the Airport. A major feature of the project are the marine works.
Sarooj executed these marine works in a joint venture with SNE of Lebanon.
To supply the millions of tons of rock needed, a quarry of crystallized limestone was opened and operated 40 km away from site.
The scope included the construction of main and lee breakwaters, quay wall, reef breakwater, reclamation of land using dredged material, and groynes along the beach to stabilize the sand and avoid its migration.
Furthermore, revetment works were also executed to protect parts of the golf grounds.
A hydraulic model was run by Sogreah of France to check the integrity under different simulated conditions.
It is interesting to note that we had to build a temporary harbour to moor our equipment and also to load materials on vessels serving the reef breakwater construction.
The temporary harbour was demolished and removed after completion of the project.

MARINA BASIN ▶

The marina basin can be seen practically complete.
Breakwaters, quay walls, and reclaimed areas.
One could also see a section of the HDPE pipeline floating ready to be towed and sunk in its final position.

▲
REVETMENT

In this magnificent setting, the revetment blended nicely and tidily.
Fort Jalali, a Portuguese fort could be seen in the background.

▲
DREDGER AT WORK

Dredger 'Ave Caesar' was mobilized to carry out the excavation works underwater.
It is seen here removing debris of previous revetment damaged by Cyclone Gonu.

◀ **TRANSPORTATION OF ACCROPODES**

The transportation of Accropodes across the city incited curiosity and offered Sarooj a free publicity. Most of the units, however, were transported at night not only to avoid traffic jams, but also to limit inconvenience and hazard to public.

40 T ACCROPODES

40 T concrete units called ‘Accropodes’ were pre-cast in special patented steel moulds on a site close to a concrete batching plant.

These were cured and stored before transporting them to site. Each unit is marked and numbered for quality control purposes.

▼

FORT JALALI REVETMENT (EPC)

Following Cyclone Gonu that hit the Omani coasts, causing havoc and considerable damage, marine engineers had to change their design parameters to account for lessons learnt.

One area that was particularly affected was Fort Jalali, built by the Portuguese to control Muscat’s natural harbour entrance.

Sarooj were commissioned by the Royal Court Affairs (RCA) to design and build an adequate revetment that could withstand sea action.

After conceptual design, hydraulic modelling was carried out in the UK and the final features were established. The crown had to be raised +12.5 meters above mean sea level, huge Accropodes had to be placed, and massive concrete blocks (80 T each) formed the toe.

Rock armour ensured resistance to scouring effects. Dredging was carried out by ‘Ave Caesar’ mobilized especially for this work.

The access to site and the confined space allocated for the works represented a difficult challenge. The finished product integrated nicely with its surrounding.

CROWN BEAM ▶

The crown beam was cast in-situ at 12.5 meters above sea level to cater for 9 m high wave and an extra 3.5 meters splash zone.

From land side, local rocks were used to complete the structure and present a neat and tidy face.

▲ **REVETMENT FOR HOSN HOTEL**

Six-star hotel 'Al Hosn' overlooking the turtle beach area.

The revetment protects the weathered and weak rocky cliffs but leaves access to a sandy area for green turtles to come and hatch on the beach.

▲ **MARINA MAIN BREAKWATER**

The team are seen working on the main marina breakwater.

A special silt curtain was installed to protect the corals during the works.

◀ **BREAKWATER ROUNDHEAD**

A crawler crane working on placing 'Core-Lock' concrete pre-cast units on the breakwater's roundhead.

A navigational aid would eventually be installed at this roundhead, indicating the marina's entrance.

MARINA AREA

An overview of the marina area showing the breakwater, quay wall, as well as the reclaimed zone to accommodate new residential leisure activities.

The quay wall is to allow the boats to park for refuelling and taking potable water on board.

▼

FLOATING PONTOONS ▶

After the marina was commissioned, boats and yachts started mooring at the floating pontoons, protected by a breakwater.

BARR AL JISSAH RESORT AND SPA (SHANGRI-LA)

Built on a pristine site, the Barr Al Jissah Resort (Shangri-La) is well integrated in the nature as the developers were committed to cause minimum adverse impact on the environment.

A contract to develop, upgrade, and extend the marine facilities was awarded to Sarooj who had to operate without disturbing the guests.

The works comprised of breakwaters, revetments, skiff beach, diving club, reclamation works, quay walls for refuelling the boats, marina floating pontoons, beach restoration, reserved turtle area, and internal roads and car parks.

Considering the project's location, the logistical support for the supply of rock and Core-Lock units was done from the sea using landing crafts, barges, and tug boats.

Two finger jetties were built at each side of the sandy bay in front of the resort and clean white sand was imported to replenish some barren areas. Rock protection was also provided for the intake and brine pipes connected to the Reverse Osmosis (RO) plant.

STEEL PILES

The picture shows the steel piles that would carry the structure, the conveyor belt and the products.
In the horizon one could see the quarry at the initial stages of its development.
Some piles are vertical others are raked.

FRAME

In order to keep the piles in their right position particularly during the driving-in process, a steel frame was built to hold them together and provide a working platform for workers and supervisors.

CONCRETE CAPS

Once the piles are in place, the next operation is to install on them precast capping elements that would form the support to the steel gallery along which the loading belt would move. The concrete elements were cast on site and thoroughly checked for dimensions and quality.

THE TUG BOAT

Various marine equipment such as dumb barges require means of propulsion. For this Sarooj uses tug boats of various capacities. Here is Sarooj 1 tug boat working on this challenging project. It is capable of towing Kumzar Barge with the 270 Ton crane mounted on it.

AL SARH OFFSHORE CAUSEWAY - KHATMAT MILAHA

The overall purpose of the project is to develop and operate a Gabbro quarry at Khatmat Milaha in the Northern Batinah Governorate. The yield is aimed at export, particularly to the State of Qatar. The aggregates and sand are produced at the quarry site, sorted and stored in a vast designated area ready to be loaded on ships and vessels. The materials will eventually be transferred by conveyor belt from the storage area to the loading platform out in the sea. This conveyor belt goes overhead on land and rests on a rock jetty followed by elevated pier jetty, in the sea.

Our specific scope is to build the jetties, install the structural steel joists and beams that span across the piers, and cast the deck. A pre-casting yard was built to fabricate the concrete caps that top the piles. The structural steel beams are assembled on the temporary jetty to be lifted at a later stage. These beams span and bridge the space between the piers. Eventually, they would carry the conveyor belt. Sacrificial anodes protect cathodically the steel piles. The ultimate aim of the project is to export around five million tons of stones every year.

CERES DREDGER

The group acquired CERES, a cutter/sucker dredger to extend and complete its range of operations. Many marine construction works require dredging, which falls sometimes in hard ground.

CERES is equipped to do that and has all the necessary tools to dispose of the cuttings and the dredged materials on shore.

THE RESORT

The picture shows the six-star Al Hosn hotel.

At its feet lay the turtle beach protected by the core-lock revetment.

The beach has been restored by pumping back the migrated sand from the sea.

SETTLING POND

The pumped materials are conveyed to the shore through a floating pipeline. A temporary settling pond is constructed. The dark outflow from the pipe indicates the sand content accompanying the water.

SAND PUMP

The photo shows a powerful pump that will be immersed in the sea to suck water and sand that are delivered to a settling pond.

The water returns to the sea and the sand is collected and stockpiled to be later spread on the beach.

GHUMAYS

The barge Ghumays is seen carrying the crane that would move the sucking pump from location to location.

It also moves the floating pipe into new positions. Ghumays is a self-propelled vessel that can take up to 500 Tons of materials.

▼

SHANGRI-LA - REPAIRING OF THE MARINE STRUCTURES

It is now an established fact that tropical storms and cyclones may occur more frequently due to global warming, as believed by many scientists.

High waves are generated by these storms causing the migration of large quantities of beach sand and exposing the bedrock underneath.

Beach tourist resorts are impacted and their beaches require frequent replenishing.

This is what took place on the two main beaches in the Barr Al Jissah resort.

Furthermore, the revetment protecting the turtle beach area was also affected.

Sarooj were commissioned to reinforce the revetment, pump back to the beach the displaced sand and provide geotubes to retain the sand and stop the its migration.

Sarooj had also to import by land beach sand to compensate for the sand losses.

Since then, another storm took place and the sand remained in place due to the sea bund created by the geotubes.

GEOTUBES ▶

The plastic geotubes which are basically cylindrical shape when full are seen floating on the surface ready to be sunk to the sea bottom.

They are then filled-up with sand using the same sucking pump.

They will form an underwater dam to hold the sand from migrating.

THE OLD AND NEW

The picture shows the present small harbor congested with dhows, fishing boats, passenger ferries, old buildings and car parks. It also shows the beginning of the new breakwater that will extend far beyond the existing one to encompass all the new facilities.

CORE-LOCK UNITS

Precast core-lock concrete units have proven to be an advanced technology to resist and absorb the pounding energy of big waves. This is a patented product and we have to work closely with the intellectual proprietor.

CONCRETING

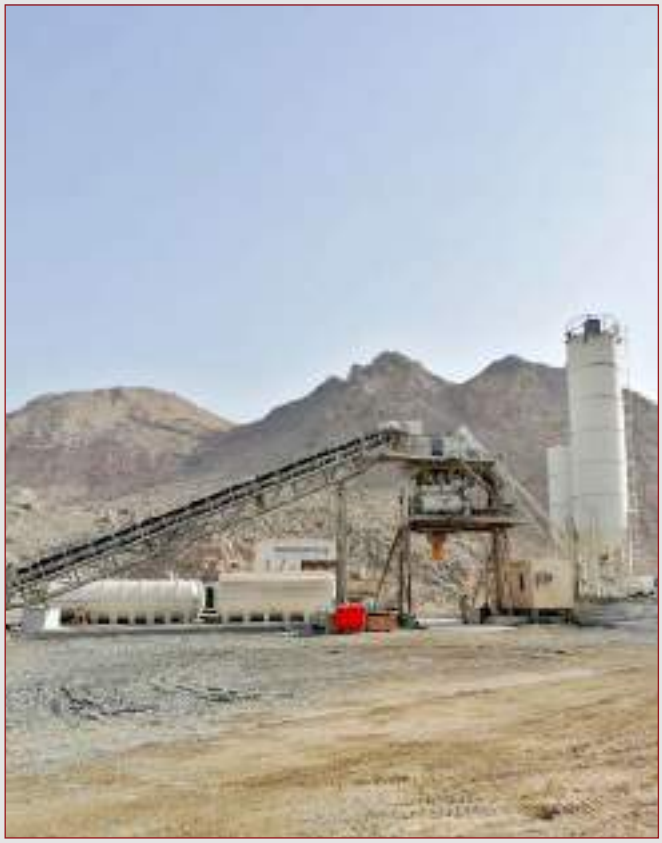
The size of quay wall blocks require sometimes a large quantity of fresh concrete to be poured non-stop in the shortest possible times to avoid cold joints.

Two concrete pumps are used simultaneously for that purpose.

BATCHING PLANT

Diba falls at the border with UAE and is confined to a small area between the sea and the mountains.

The local resources are limited. For a project of this size the JV had to count primarily on their own resources. This is the case for our concrete batching plant.



DIBA FISHERY HARBOUR

The Ministry of Fisheries has built over the years many fishery harbors all along the coast from Dhofar to Musandam.

These harbors have helped local fishermen develop and improve their traditional activities. There are presently about 22,000 small fishing boats that sail on the Omani waters.

However, with the new government vision 2040 and the aim to diversify the national economy, and the priority given to fisheries, it became necessary to build large industrial harbors with on-land facilities such as canning, provision of cold stores and boat repair shops.

The first one of these harbors was built and recently commissioned in the Special Economic Zone in Al Duqm (SEZAD).

The next one was awarded to a JV between Doha marine and Sarooj and led by the latter.

The third one is planned to be built in Shuwaymiah.

The Diba harbor will also accommodate ROP coast guard, general cargo and tourist zone.

PRECAST YARD

Considering the large number of quay wall blocks, their weight and their storage and curing requirements, it was essential to design and build a precast yard large enough to accommodate all these activities.

Large cranes are used to handle the blocks.

▲ **CERES CUTTER SUCTION DREDGER**

The group cutter suction dredger is shown above between the breakwaters excavating the trench for the pipe installation.

Dredging and offshore excavations are key element of the marine works projects.

▲ **BREAWATERS & JETTY**

To enable the marine barges and tugs that will be used for the offshore installation of the pipes, a temporary jetty and 2 breakwaters were constructed in a record time of less than 3 months.

◀ **SHEET PILES & GRP PILES**

Sheet Piling were used on the shore end to limit the extent of the excavation and protect the existing drainage channel. The depth of the excavation onshore was 8m.

OFFSHORE GRP PIPE INSTALLATION USING SEAHORSE

A Seahorse holding 2 jointed pipes 12m each with bottom leveling jacks was used to install the pipes in position with a team of surface air supplied divers. Each 24m segment was joined with another segment by couplers and secured in position with gravel. Final backfilling of the trench with dredged sand was done by pumping.

▼

BARKA DESALINATION PLANT

The Project consists of installing GRP pipes 1.6km into the sea to a maximum depth of 14m below sea water level.

These pipes will allow the seawater to enter the pumping station for the desalination process, and will return the processed water back into the sea.

Sheet Piling was used on the shore end to limit the extent of the excavation and protect the existing drainage channel. The depth of the excavation onshore was 8m.

2 Intake pipes 1.4m diameter and 2 outfall pipes 1.2m diameter are used as supplied by the Client: GS Inima (Barka) LLC, with all associated couplers, bends and connections.

Other major scope of work include: Construction and Installation of 2 Intake Towers 9m high; and the installation of 2 Chloroniation pipes 1.6km long.

INTAKE TOWER SECTION UNDER CONSTRUCTION ▶

Two Intake Towers, 9m tall, will be installed in the sea at the end of the GRP Intake Pipes. These towers will allow the seawater to enter the pipes without harming the marine environment as they are equipped with GRP gratings and chlorination pipes that will prevent small fish and sea frogs from being sucked into the pipes.

MARINE

DREDGING OF AL HARATHY CHANNEL

The overall scope of the Project is Dredging of Channel, Shore protection using Armor Rock & Natural Rock, Ancillary Buildings, Icemaking machine & Surface Drainage works including demolition of existing culverts, Construction of New Culverts,Asphalt Road & Excvation of Water Channels at Yenkit & Al-Harathy Village.

EDGE PROTECTION

Shore protection by Installation of Natural Armor Rocks 25 Kg - 40 Kg around 2000 m3 underneath filter fabric. The main aim of this work is to further protect against further serious erosion by dissipating the effect of wave energy.

STORAGE & NET REPAIR SHEDS

Construction of Auxillary buildings to accomodate Fishermen Requirements & Materials inrelation Fishing items, Plant, Storage & Repair.

GSB LAYER

The Earth works actitivity consists of removal of exisiting Pavement, Clearing, Grubbing, Subgrade & Sub-Base preparation. All the materials were screened to achieve required grade. Followed, all the materials were dumped & Compacted well with Steel rollers through Layer by Layer, FDT Test & Quality Control.

CONSTRUCTION OF TEMPORARY ACCESS ROAD TO YITI PROJECT SITE

The overall purpose of the project is to construct Temporary Asphalt road to Yiti Project Site from nearby Roundabout including Mountain cutting/ shapping, Riprap Works, Traffic Signs, Road Markings, Relocation of existing Utilities,Road Crossing Culvert & Wadi Croosing works.

All the Existing Pavements, Reinforced Concrete Box, Removal of Curbs, Pipe Culverts & Drainage Protection works were removed. This road plays vital role for the access for MegaYiti Projects to be constructed.

CANAL ACCESS ROAD

Armor Rock Layers & Subsequentlly Place were across the Proposed Channel.Culvert Piping inserted on top of Screened material to allow channel flow.The Main challenge is laying Pipes in exact position & alingment above the back waters without disturbing the flow.This Access road is plays a imporant role in Yiti Area since it reduces the distance & time to reach parallel side of the development area.

MECHANICA

&

E

HANNA OBEID
Facilities Manager

The department consolidated its position as the prime provider of mechanical, electrical, plumbing and air conditioning works for Sarooj projects.

The recruitment of specialized engineers and technicians has continued.

The vital relationships with local authorities to obtain permits and shutdowns have strengthened.

The department took upon itself to install Reverse Osmosis desalination plants (RO), sewage treatment plants, gas lines and gas stations.

They are presently moving towards hybrid solutions (solar and diesel) for economic and environmental reasons.

The department will be looking at carrying out work for third parties in the market.


AL
ELECTRICAL

MECHANICAL & ELECTRICAL

33 kV ARMOURED CABLE

5x33 kV armoured cable powerline running for about one kilometre were laid to replace existing ones.

A timely shutdown was organized for each one of them to be commissioned.

DOMESTIC MEP

The semi-permanent site offices were provided with adequate lighting, power supply, telecommunication connections and air conditioning.

STREET LIGHTING

Street lighting system was provided on bridges and slip roads, in a manner to match existing one along the southern expressway and the Baushar dual carriageway.

DUCT BANKS

Kilometres of duct banks were provided to protect telecommunications cables as well as power cables.

MALL OF OMAN - MEP WORKS

This new mall is being built on a plot in a congested area with traffic above ground and utilities underground.

Our MEP department was involved in obtaining permits from various authorities to identify the exact location of existing services, propose and agree protection, and for diversion works as well as installation of new utilities.

They would prepare shop drawings, carry out the works, schedule shut-downs and commission the lines.

The electrical works included dismantling of 11 kV overhead lines, supplying and laying in a confined corridor 5x33 kV armoured power cables, relocating substations, installation of street lighting, fixing traffic light signals, fixing light fixtures on the soffit of bridges and underpasses.

Other works included cathodic protection wells and anodes to protect oil and gas steel pipelines, surface drainage pipelines, duct banks and telecommunication cables.

The team also carried out all MEP and HVAC works on the large site offices that house client's staff as well as all contractors' and consultants' personnel.

PLUMBING

High quality toilets and restrooms were provided in the site offices at several locations in the large building.

ELECTRICAL CABLES

A complex electrical supply network had to be installed to provide the various parts of the plant with power.
Large trenches had to be dug in the chalky ground to make room for all the armoured cables.

VESSELS

A sophisticated pipework was designed to connect the numerous vessels, filters and tanks.
Sometimes congestion of services in confined spaces created a challenge.

EXPORT PIPELINE

Technicians are seen installing a water pipeline on its pre-cast concrete foundations.
Many a time the works had to be suspended due to inclement weather and sandstorms that take place frequently in that area.

PIPES ON RACKS

Once the pre-cast concrete pads were positioned and stabilized cross-beams were fixed onto them to carry several lines of steel pipes.
Steel cross-over was provided to facilitate safe movement of personnel.

▼

VEOLIA RO PLANT

On this project, several mechanical and electrical works had to be executed.
French companies consider the erection of steel structures also a part of mechanical works.
Kilometres of electrical armoured cables went into trenches and ducts.
The electrical room housed the switchgears and panel boards.
Generators supplied power until the RO Plant was connected to the power main coming from the national grid.
Street lighting was also provided.
Several types of pipe materials were used, particularly GRP, GRE, carbon steel, stainless steel, HDPE, and UPVC, depending on the anticipated pressure in the pipe and the nature of the fluid that the pipeline had to carry.
Fiber optic cable ensured the transfer of information from the various instruments to the control station.
A fire fighting system and earthing arrangement ensured safety controls and recovery measures.

PIPE WORK ▶

Raw water arriving to plant, treated water conducted to the produced water tanks, outfall pipes taking the brine to the evaporation ponds: a complex network had to be built to service the plant.

UTILITIES

Power cables are seen laid in trench.
They would be bedded in sand.
Similar underground network was built for water supply, sewage collection system, and street lighting.

WATER PUMPS

A pump room houses four pumps, skid-mounted, to serve the various camp sections. One pump is always on stand-by mode.

WATER TANKS

Potable water storage tanks are connected by two parallel pipes that feed the water pumps.
The pipe material is high pressure PVC.

RO PLANT

To cater for domestic use, a reverse osmosis plant (RO) was installed.

It produces 15,000 gls /day. A post treatment softener, and a multimedia filter were also provided.

The RO cylindrical membrane is seen in the picture.

1000 - MAN CAMP (EPC)

Sarooj signed two contracts on the Khazzan oilfield operated by BP (Block 61):

- One to build rig locations and access roads,
- and one to carry out various civil and MEP works for RO Plant (Reverse Osmosis).

To accommodate the workforce, we had to build a base camp for 1000 people.

The MEP department took upon themselves the task of providing all utilities, HVAC, kitchen equipment, RO plant, and sewage treatment plant.

The specifications for this semi-temporary camp were not any different from the specifications for permanent works and as such the project was controlled and monitored by Jacobs and BP under the same procedures in force for permanent works, whether for HSE or for quality assurance.

Potable water came from Awaifi until the Veolia plant became operational.

Foul water was collected in holding tanks and transported by septic tankers to municipality treatment plant.

Electricity was provided by generators.

GENERATORS

Five 810 kVA generators were installed complete with their switchgear, distribution boards, earthing, and fuel tanks.

Sarooj opted for Caterpillar generators at this occasion.

MV SWITCHGEAR

This is the medium voltage switchgear assembled and supplied locally by Al Hassan. This decision was made to enhance In-Country Value especially that the manufacturer's performance records is quite satisfactory. This switchgear feeds the new cranes with power.

CONDUITS AND DUCTS

The project includes the construction of several small amenity buildings such as help desks, security booths, gate houses, toilets, as well as a new substation building. The MEP works are all carried out directly by Sarooj's team.

CABLE CONNECTORS

Special Euromould cable connectors were procured from Nexams in France.

The cable being 3-phase required three connectors per crane.

Therefore, twelve connectors were provided to cater for all the new cranes.

ARMOURED CABLE

11 kV armoured cable drum is being installed in duct banks accessible through draw pits to give power to the new four cantilever cranes. This raises the number of similar cranes to 8 in Sohar Industrial Port.

OICT TERMINAL C

Oman International Container Company is a locally established Hong Kong Company that operates the container terminals in the industrial port of Sohar and is known as OICT. Since all Cargo handling operations were moved from Port Sultan Qaboos in Muttrah to Sohar Port, yard extension became urgently required.

Sarooj won the contract to extend the terminal and provide the new premises and equipment with their needed power.

The works comprised of installing new medium voltage (MV) switchgear in existing substation to feed four new cranes.

11 kV cables were laid from the main substation to the auxiliary one that feeds the crane through also 11 kV cables laid in duct banks.

Domestic plumbing, drainage, HVAC, for all ancillary buildings were part of the scope.

An external firefighting system is also provided.

External lighting fixtures are installed on high masts.

For refrigerated containers power is provided at reefer gantries.

REEFER GANTRY

Electricians are seen working at height on a Reefer Gantry fixing cable trays and laying cables.

These gantries are also provided with distribution boards (DBs) and power sockets to supply freezer containers.

Eventually Terminal C would accommodate about eight hundred extra freezers.

AGL LIGHTING

The runway edge lights are on. They consist of elevated lights sitting on deep bases.
The photo was taken during commissioning and handing over of project.

TRENCHING

All along the runway on both sides and closing the loop, a trench was excavated to accommodate a cable duct which would eventually house the electric cable.

EARTHING

Once the trench was partially backfilled a 1 Core x 16 mm copper cable was laid bare and in direct contact with soil to ensure proper earthing of the installations.

FOC TERMINATIONS

Fibre optic cables (FOC) were used to transmit instructions and ensure data circulation.
In the picture we can see the deep base unit procured from Belgium and the kit which came from the USA.
The supplier was also ADB to achieve integration, and avoid interfacing problems.

HAIMA AIRSTIP MEP WORKS

SCC were awarded a contract to build a new runway in Haima.
The works also included the construction of taxiway and hard-standings.
The client decided that the airstrip should offer the possibility of night service.
A comprehensive AGL (airstrip ground lighting) system was designed.
Our electro-mechanical division took upon themselves the execution of this important part of the works: power supply, earthing, elevated lights, and regulators.
The successful commissioning of the system was celebrated throughout the company.
The event gave the team further confidence in their skills and competencies.
Furthermore, Sarooj had another project in the vicinity for the same client, which consisted of a firing range.
The MEP works were carried out simultaneously with the airstrip MEP works.

REGULATORS

An important element of the system were the constant current regulators (CCR) - These were supplied by ADB and housed in the substation building.
CCR feed and control the airstrip light fittings.

▲ **INSIDE THE PUMPHOUSE**

Inside the pump house that drives the water towards the service reservoir.
The whole system operates automatically using SCADA.

▲ **AT WORK**

Skilled workers tighten the bolts on a flanged adaptor under the specialist's supervision.

◀ **PIPELINES CORRIDOR**

Above ground pipeline.
The pipe's route follows a corridor and goes into the ground and over bridges to avoid congested areas.

DUCTILE IRON PIPE

A 500 mm diameter ductile iron transmission main conveys water from the Reverse Osmosis Desalination plant to the PAEW service reservoir.

PAEW are the Public Authority for Electricity and Water.

PORT OF SOHAR MEP WORKS

The Port of Sohar houses a myriad of heavy industries:

Refinery, methanol plant, steel smelters, fabrication yards, polypropylene plant, power and desalination plants, and others.

These industries require utilities and services.

Apart from power, water, and sewage mains, they need seawater for cooling, telecommunication networks, natural gas pipelines, industrial waste systems, and irrigation schemes.

Majis Industrial Services Company (MAJIS), a government body, was formed to manage these services and coordinate among the various agencies that produce or consume such products and use such services.

Sarooj takes pride in being the contractor that MAJIS entrusted to carry out utility extensions, diversions, and improvements.

This mechanical work requires proper planning in terms of protecting existing services and procuring the right materials on time.

Sarooj is delighted to state that it worked for almost four years with MAJIS without any lost time injury (LTI).

DEWATERING

Intensive dewatering in some areas generated a flow of water that was poured into the canal. The canal circulates seawater for cooling purposes needed by the various industrial complexes.

▲ **SUBSTATION BATTERY ROOMS**

Battery rooms are considered classified for the presence of Hydrogen.
Therefore, all equipment inside the battery rooms are Explosion proof rated (min. Exd IIC-T3).

▲ **CABLE CELLARS**

There are several power and control cables entering and exiting the substations. Therefore, in cable cellars, cable ladders and trays are carefully constructed in accordance with the equipment layout, gving appropriate access to all of these cables and their connections.

◀ **ELECTRICAL POWER TRANSFORMERS**

Substations are the heart of the Electrical supply for any industrial project. Transformers are the main Electrical equipment allowing to convert the high voltage coming from the transmission lines to low voltage which can be used by the consumers.

FIRE SUPPRESSION SYSTEM (INERGEN)

The INERGEN Fire Suppression System protects enclosed areas where conventional fire protection systems such as water cannot be used. Upon discharge, INERGEN agent fills the room, mixing with the air to suppress fires quickly and effectively.

SUBSTATION & BUILDINGS - MEP WORKS

The first part of the scope was to perform detailed engineering for the various utilities and services to be made available in the buildings. This exercise required intricate interfacing to agree on design parameters and to obtain approvals from both the EPC contractor (Saipem) and the Client (Duqm Refinery). The next step which is connected to the first was to identify suppliers who could meet the specifications, the delivery times, and the budget. This required detailed planning and constant follow up, particularly for long lead imported products. Meanwhile the actual construction of the buildings was ongoing on site. The scope covered the domestic lighting and the provision of small power together with lighting fixtures of internal and external types. It covered also the Extra Low Voltage (ELV) needed for data processing and CCTV. A fire suppression system is provided in addition to the usual smoke detectors and sprinklers arrangements. This necessitates the supply of water to the various outlets. A comprehensive HVAC package including chillers, air handling units and Close Control Units (CCU). In some substation buildings where hazardous areas are identified such as in battery rooms, the space was made explosion proof.

HVAC EQUIPMENT & EXTERNAL DUCTING WORKS

HVAC and its ductwork are required to keep the interior temperature and relative humidity at design levels, especially inside substations where sensitive electrical and instrumentation equipment needs careful control to function properly.

AIRPORTS

With the main infrastructure projects in terms of airports and roads being completed, the market for this activity has slowed down considerably.

However, the need to link important highways with each other, the necessary widening and upgrading of existing roads, the construction of fuel stations, malls and other commercial complexes, the scarcity of car parking, the extension of internal roads in new urban areas, the development of free zones, offer opportunities to make this activity sustainable.

Maintenance and repair works for damages caused by frequent tropical storms and cyclones have unfortunately become common.

Sarooj has recently secured several projects consisting of circa 400 kms of national roads in various Governorates of Oman.


&
ROADS

▲ CONTROL BUILDING

The building is constructed on a rocky plateau.
The architecture is inspired from the crenelated traditional mud old Omani houses.
The arches and porch echo the same spirit.

▲ HAIRPIN CURVE

Considering the big differences in levels along the route, hair pin curves are provided at various locations to ease the steep gradients.

◀ UP & DOWN

Having to remain as close as possible to the border line, the road went up and down crossing the rolling hills and mountain cliffs.

FENCE

A high anti-climb fence is fixed to posts anchored in solid reinforced concrete foundations.
Concertina coils unfold at the crown.

ENGINEER 3 - SECTOR 3 & 4 (EPC)

The project falls in a rugged mountainous area in the Dhofar Province.
Consisting of undulating hills, elevated plateaus, sharp cliffs and deep wadis and ravines.
A major challenge for our design team was the client's desire to keep the road as close as possible to the fence line.
To achieve this goal and keep the balance with other constraints, it was necessary to cut and fill millions of cubic meters of rock and introduce several hairpins to ease the slope.
Special care is given to wadi crossings and the risks it involves.
Arrangements made had to be tight enough to deter intruders and large enough to allow the water to flow through the fence.
Several specialized buildings were erected along the project whilst one integration centre connected the various parts.
The project extends slightly into the sea to demarcate the border line for boat users.

CHALKY LIMESTONE

About ten million cubic meters had to be cut into the rock to create space for the road and the fence.
Tons of explosives were consumed to that effect.

AIRSTRIP

The airstrip is adequate to receive jet planes, even at night.

It is marked and delimited as per specifications.

It is cambered at the centre to clear any rainwater.

Taxiways and apron slabs also received adequate marking.

APRON

A large concrete hardstanding was cast in-situ in alternate strips and bays. The concrete was produced by a batching plant, transported in concrete transit mixer trucks, and placed by concrete pump.

SURFACE DRAINAGE

A drainage channel was built all along the runway.

It was lined with mortared riprap stones.

Pipe culverts under the runway were provided to transfer the water from side to side towards natural drains.

ASPHALT WORKS

A hot mix asphalt plant, semi-mobile was installed in the site vicinity in order to produce the required bituminous materials.
Gabbro stones came from quarries near Nizwa. Gabbro stones are preferred for their high characteristics and performance.

HAIMA AIRSTRIP - CIVILS

The site falls on an area of poor ground.
The presence of gypsum in high proportions commanded the removal of about one meter of unsuitable materials.
Actually, the excavation continued until the rock was exposed. Borrow materials replaced the unsuitable existing layers.
The airstrip and the taxiways received sub-base and aggregate base course layers before they were primed and paved.
A large hardstanding (apron) concrete area was also provided as parking space for the aircrafts. The aircraft ground lighting (AGL) was carried out directly by our MEP department.
This was done to allow the use of the airstrip at night.
An adequate surface drainage system was also provided.
The project was completed on time together with the adjacent firing range.
Sarooj , who are keen on developing small and medium size enterprises (SMEs) assisted several local companies benefit from the project by giving them an opportunity to grow.

EARTHWORKS

The site required extensive earthworks to remove the unsuitable materials, to break the rock outcrop, and produce suitable materials for sub-base and base layers.
Stones for riprap came from distant quarries closer to the mountains.

▲ **LANDSCAPE**

A combination of flat areas and staggered sand dunes marked the landscape.
Not only the permanent asphalt road had to be built but also a temporary service road to be used by trucks and vehicles during construction.

▲ **ASPHALT**

A hot mix asphalt plant was installed to provide materials for the bituminous layer.
Aggregates were produced locally by crushing stones collected from existing small hills.

◀ **FENCE**

A security fence was provided all along the project.
The posts were anchored in pre-cast concrete foundation units that would interlock with each other to improve stability.

STRAIGHT LINE

The road had to follow a straight line along the fence regardless of topography and contours; at the same time the slopes along the road profile had to fall within the acceptable range.

▼

ENGINEER 3 - SECTOR 1 & 2 (EPC)

In order to control the borderline, the Sultanate of Oman decided to build a security fence, a metal barrier, and a proper asphalt road along a distance exceeding 300 km.

The topography of the region varies from sand dunes to flat arid areas to green rolling hills.

A particularly challenging section occurred on the sand dunes of the 'Empty Quarter'.

Finding good materials was a daunting task.

Finding water was even more difficult.

A security fence was built all along the borderline.

It is protected by a sophisticated system of electronic devices to observe every part in order to intervene rapidly whenever and wherever necessary.

Surveillance centres along the border monitor suspicious movements.

The information is transferred in real time by fibre optic cable (FOC) to control centres built in the proximity.

Even before completion, the number of smugglers and intruders dropped drastically.

DUNES ▶

Millions of cubic meters of sand had to be pushed away to create the body of the embankment.

Twenty bulldozers worked in tandem continuously for months to achieve the desired dimensions and slopes on the road.

WEARING COURSE

The hot bituminous mix is produced in SCC plant, transported and laid by an asphalt finisher equipped with electronic sensors to control the finished levels and thickness above the base course layer.

STREETS

New streets are created, changing thus the urban infrastructure and leading to raising the quality of life for Maabella residents.

KERBSTONES

Pre-cast concrete kerbstones are laid to demarcate the asphalt road but more importantly to protect its edges.

BUILDINGS

The area is partially built and several buildings are occupied whilst others are still under construction.

Public safety and traffic management represented a constant concern.

MAABELLA INTERNAL ROADS (EPC)

The capital Muscat has not stopped its spectacular growth since the beginning of the Renaissance in the seventies.

New residential areas are constantly being developed to satisfy the needs of the increasing population.

Hence, Muscat is sprawling over new areas all the time.

One of these areas is Maabella which is very popular and public demand for moving to Maabella is pressing.

Sarooj signed a contract with Muscat Municipality to extend the existing road network by fifteen kilometres together with kerbstones, car parking, street lighting, and road signs.

Special care was given to safety in this area of occupied houses and flats.

Granular materials were borrowed from local quarries rich with alluvial deposits.

Hot mix asphalt was produced in our Marini asphalt plant in Farfarah.

Due to the project's proximity, all activities were managed from our main base in Ghala.

COMPACTION

Once the hot mix layer is applied, proper compaction using adequate rollers has to take place at the proper timing.

Whilst rubber-tyred heavy rollers act in depth, tandem steel rollers treat the wearing course surface.

UNSUITABLE MATERIALS

The unsuitable materials occurring under the new runway had to be removed under dry conditions before they were replaced by dry sand of controlled gradation.

CONSOLIDATION

To ensure proper consolidation of bottom layers, the runway was laden by overburden materials seen being levelled by Caterpillar D8R bulldozers.

STONE COLUMN

The funnel that receives the crushed aggregates is being replenished.

These stones would be vibrated and pressed into the ground forming thus a stone column.

RIGS AT WORK

Twelve rigs worked simultaneously on the activity of forming stone columns.
Enough stock of crushed aggregates was continuously built up and replenished to ensure continuity of progress and minimal downtime.

▼

GEOTEXTILE MEMBRANE ▶

A geotextile membrane receives a layer of crushed Gabbro stones that offer high performing and special characteristics.
The membrane stops the migration of fines into upper layers.

MUSCAT INTERNATIONAL AIRPORT. GROUND IMPROVEMENT UNDER RUNWAY

The new runway at the new Muscat International Airport rests partially on a marshland (Sabkha). Intensive ground improvement works had to be undertaken before the body of the runway could be constructed. Sarooj jointly with Soletanche-Bachy of France were awarded the contract. Basically, the weak ground was removed under dry conditions using well points and deep well techniques for dewatering. The soil was replaced by dry sand of approved gradation. A thick layer of stones was laid on geotextile membrane provided to halt any migration of fine particles into upper layers. One hundred thousand stone columns were driven into the ground. Approved fill materials, stored on site were used to build the embankment.
2,000,000 T overburden of materials were loaded on the embankment to ensure consolidation and settlement of the ground. The excavated materials were deposited on site either for removal or to be reused at a later stage. Laboratory technicians ensured proper quality control and quality records archiving.

▲
CUT & FILL

The first operation consists of removing unsuitable top soil, preparing the existing ground to receive fill, and to cut high points to achieve the designed profile.

▲
RUMBLING STRIPS

Yellow stripes force the fast drivers to reduce speed as they approach a T-junction on the road, without causing any damage to vehicles.

◀ **SLOPES**

The slopes of the finished road section are trimmed to merge progressively with the natural ground to avoid possible rollovers and accumulation of sand.

HOT MIX PLANT

Marini semi-mobile 120 T per hour hot mix asphalt plant was mobilized to site to produce the required quantity of asphalt.

Bitumen 60/70 was used as prime coat to seal the aggregate base course layer.

ROAD ON BLOCK 6 (PDO) - (EPC)

Petroleum Development Oman (PDO) awarded a 20-year contract to build, operate, and own (BOO) the Nimr Water Treatment Plant to Bauer Nimr.

The Plant is about 23 km away from the central processing facility in Nimr.

Considering the longevity of the project and the frequent commuting between the plant and Nimr, it was decided by PDO to build an asphalt road to minimize travelling time, road traffic hazards, and vehicle maintenance.

Sarooj produced locally the aggregate base course materials.

A brand new Marini semi-mobile asphalt plant of 120 T per hour capacity was mobilized to site.

The project design was carried out in-house and verified by a third party.

Being present in the area, Sarooj extended its services to other contractors requiring asphalt works to be done on their contracts.

They worked particularly on asphalting roundabouts, road junctions, deceleration and acceleration lanes.

HAND MARKING

Where marking machine cannot be used, skilled labour complete the work by hand using the same thermoplastic hot paint.

Pre-marking is defined by land surveyors, as per drawings.

▲ CONCRETING

Concrete delivered by transit mixers from a stationary batching plant and placed using a concrete pump.
System shuttering has been used as falsework.
Multiple cells concrete culverts were built under the carriage way.

▲ THE LANDSCAPE

Similar pictures of the completed road do not show the complexity and the volume of the works.

◀ WING WALLS

Wing walls are cast at inlet and outlet of culverts to hold the embankment as well as easing the collection and dispersion of water.
The area around them would be protected by riprap stones on the slopes and gabion mattresses at aprons.

BARRIERS

The route of the road meandered between the mountains.
Safety barriers were provided where necessary. In some critical places, permanent concrete barriers were installed.

MADHA ROAD

The Northern enclave of Madha is surrounded by Fujairah territory within an inner circle belonging to Sharjah, forming thus a “doughnut”. In order for Omani citizens to communicate with each other, without having to cross through Emirati Territory, a road had to be built through rugged mountains that characterize the area. The Ministry of Transport and Communications awarded Sarooj the challenging contract through competitive tendering.
Sarooj had to obtain so many permits to cross the borders, to get road passes for the workforce, to produce evidence of fuel needs, to avoid smuggling the commodity between countries driven by price differences, and escorting convoys carrying explosives through various Emirates.
Another challenge was to dispose of about 6,000,000 m^3 of surplus materials. Flash floods were a constant threat during the works causing damage and rock-falls which would fill the narrow gorge blocking thus access through it. Despite these challenges, the team has successfully completed the project.

EARTHWORKS

Twelve self-propelled rigs worked simultaneously on blasting and pre-splitting the rock.
Dumpers of 35-40 m^3 capacity cart away the surplus materials to an approved dumping area.
6 million cubic meters of rock had to be cart away.

▲ **OPENING CEREMONY**

This is the eve of the project official opening ceremony:
The tent will shade dignitaries and official government representatives.

▲ **WEARING COURSE**

The wearing course laying train:
Asphalt finisher, Pneumatic Tyred Roller (PTR), and steel roller.
The black carpet is laid on a sealed surface with MC 60/70.

◀ **QUALITY CONTROL**

In-situ compaction test is being carried out on a compacted embankment layer under the Consultant's close eyes.

PAVED ROAD

This is a life changer for people.
As soon as the road was built and paved, all services follow:
Power, water and telecommunication towers in particular.

HAIL MAJAZ-HOQAIN ROAD (EPC)

The Batinah coastal road runs parallel to the sea on one side and to the Hajar range on the other.
Rainwater and floods have carved many wadis and watercourses through the alluvial plane.
People living at the toe of the mountain, such as those in Rustaq have to drive to the coastal road and then back to the mountains if they had to visit another town in the vicinity.
Sarooj won through competitive tendering from the Ministry of Transport and Communications a contract to design and build 32 km of national road between Hail Majaz and Hoqain.
In minor wadis Irish crossings were built with the carriageway made of reinforced concrete pavement.
In larger wadis, box culverts with multi-cell units were provided.
Upstream and downstream anti-scouring riprap protection were provided in both cases.
This road facilitated commuting between villages and settlements along the mountain range.

CATERPILLAR

One of the popular machines on Sarooj sites is the bulldozer D8R.
Apart from the fact that Oasis Trading, the local agency is an associate company, the performance of this machine and its dependability is remarkable.

▲ **NEW INTERCHANGE**

The tower cranes are working at the Mall's building site in the background.

The new 42m span pre-stressed bridge is nearly completed and in the forefront the approach road to a new bridge is in progress.

▲ **DECORATIVE PATTERN**

Muscat Municipality specified the pattern to be repeated on retaining walls.

This choice is in harmony with other models used on the Southern Expressway.

◀ **ROAD WORKS**

Sub base materials, aggregate base course were produced and placed on site using modern aggregate spreaders.

Bituminous courses were carried out by Rawasi, our specialist sister Company.

SCAFFOLDING AND SHUTTERING

A system shuttering (PERI) was used as falsework.

It was designed as a standalone structure accessible to workers, shaped like the bridge and capable of carrying safely the loads.

MALL OF OMAN - ENABLING AND HIGHWAY WORKS

The client for the Mall of Oman is Majid Al Futtaim (MAF).

It has been their policy to ease vehicular access to their malls and to provide sufficient parking space for customer vehicles, particularly in the case of this prestigious project, the Mall of Oman.

The works covered the construction of underpasses, bridges and flyovers with all related works such as retaining walls, guard rails, surface water drainage system, concrete barriers and pedestrian walkways.

They also covered street lighting, road signs (portal and cantilevered), road marking, rumbling strips and road stud reflectors.

The approach roads to bridges are retained by mechanically stabilized precast elements and reinforced soil.

Another part of the SOW was the provision/ protection of utilities. Widening of intersection and improvement of traffic light are also included. Furthermore, a dedicated cyclist lane is provided for the lone customer.

RETAINING WALLS

The presence of sand dunes in the vicinity necessitated the construction of in situ reinforced concrete walls to retain the sand.

A decorative pattern was adopted to break the monotony of the plain surface.

▲ SCHOOL JUNCTION

Design and construction of road junctions forms an integral part of traffic management. Incoming and outgoing traffic must be carefully studied to ensure smooth flow of traffic.

▲ BACKFILLING

Layer by layer backfilling of the potable water pipe road crossing.

◀ PT ROLLER

Pneumatic tyre rollers used in the final stages of asphalt compaction to ensure the required density and smoothness is achieved.

ROCK EXCAVATION

Rock excavation of potable water line right of way via excavator fitter with a rock breaker.

ROAD TO ABA

The American British Academy are a prime international school operating in Oman. Originally, it was established as a community school for expatriate students, particularly for American and British citizens living in Oman, before it was opened to Omani children as well. The premises were built on a plot belonging to an Omani landlord. A long lease agreement governed the relationship between ABA and the landlord. As part of the Muscat town planning and to help international schools (ABA, French School, British School and American School TAISM) improve their facilities on a land that they would own, the Omani government donated land in Irfan area.

The ABA neighborhood on their new plot are ICEM college, Muscat University and others. The area has become an educational hub. Sarooj were commissioned to build an access road for the new compound. The scope included the construction of a main function with the existing service road, the drainage structures, the relocation of existing services and the street lighting.

SERVICE ROAD

Widening of service road to accommodate the median and acceleration/ deceleration lanes of the school junction.

▲ **ASPHALT ROAD**

Completed asphalt road ready to receive the road marking and traffic sign posts.

▲ **ASPHALT TESTING**

Collection of asphalt sample for laboratory testing and quality compliance.

◀ **ROAD MARKING**

Carrying out of road marking activity of the road carriageway centerline.

TEMPORARY ROADS

Temporary graded road to facilitate earth moving activities.

ROAD TO YITI RESORT

Yiti is a charming fishing village located on a pristine site where sea, mountain, creek, wadi and beach interact with each other in harmony. A large development project was started few years back and was frozen until recently. YTDC, a company owned by government and private investor Diamond decided to resume the works on a revised master plan. The enabling works, consisting of moving fishermen houses from wadi sides and coastal areas to new houses on top of surrounding mountains was successfully completed. The revetment works along the wadi/creek were completed and a small harbor/marina was constructed. As the works resumed on the project, paved permanent access road had to be built. Sarooj were the preferred bidder for this project. The road starts at the roundabout leading to Yiti village and beyond to Sifa Resorts and ends at present by the sea. An interesting part of the scope was to cross one creek. This was achieved by installing pipes under the embankment to allow seawater to flow from one side to the other, depending on the tide. This road will become the main traffic artery to access the various parts of the resort.

PROJECT ENTRANCE

Secured project access control via double vehicle swing gate and a security personnel.

▲ **BOULEVARD ROAD ASPHALT COMPACTION**

The infrastructure of this plot which will house the sales offices, a network of roads consisting of the main dual carriage, service perimeter roads that give access to this compound are built. The roadworks also include kerbstones, pedestrian walkways and surface drainage arrangements.

▲ **TEMPORARY ACCESS ROAD**

As the excavated materials generated good limestone rock, a mobile crusher and mechanical screen were mobilized to site to produce materials for sub-grade, sub-base and backfilling materials in the trenches.

◀ **MC 60/70 PRIME COAT**

The base course surface was impregnated with prime coat of bitumen 60/70 and hot mix asphalt bituminous base course layer and wearing course were laid. Road markings were applied by a specialist company team using hot thermoplastic paint.

MANHOLE CONSTRUCTION

All utilities must be installed in that plot taking into account the connections to the mains on the one hand and the future extensions on the other hand. This is a real opportunity to execute an integral service which avoids having to carry out new excavations or road crossings, and mainly to avoid accidents that lead to damaging the existing utilities.

ROAD TO CENTREVILLE

Majid Al Futtaim (MAF) is a prime real estate developer in the region and in the Arab world in general. In Oman, the chains of City Centers and Carrefour are growing in number. MAF are about to complete the 'Mall of Oman' at a time where 'The Mouj' continues to be one of the most successful waterfront residential and commercial projects in the Sultanate. In continuation of its series of successful investments, MAF signed a massive contract to develop millions of square meters on the hills surrounding the 'Convention Center' in what is known now, as Irfan City. One of MAF's marketing strategies is to build a model, a prototype, a sales office where the potential customer can live for a while the 'MAF Experience' as they call it. As this compound will eventually be integrated in the neighborhood, a contract was signed with Sarooj to start the project by building the complete infrastructure surrounding the plot. The works comprise of all utilities: power, communications, sewage, potable water, irrigation network with handholes and manholes. Furthermore, they include the construction of a section of a main dual carriageway leading to the new area. Fixing kerbstones and laying pedestrian walkways were also part of the scope.

FORMATION PREPARATION & BACKFILLING

Backfilling around the experience center was part of the scope of work which served as a milestone in the project, was a predecessor for the construction of the Experience center, where SCC used approved crushed materials and placed it into layers while using graders and rollers for leveling and compaction respectively.

▲ FORMING CORRIDOR

At 3 locations, project road passing through sand dunes (Ch, 9+980 to 10+360, 15+040 to 16+260 & 25+400 to 26+660). Heavy machineries such as Dozer (13) dumpers (4) and shovels (5) excavators (6) and tipper trucks (25) were mobilized to execute the removal of dune sands of 287,000 m3.

▲ SCREENING PLANT

142,000 m3 of Sub-base material produced in line with the specification requirements from approved four borrow pits. 3 nos Power screen mobilized to produce material within the specification limits.

◀ ASPHALT LAYING

SCC has mobilized two asphalt paving team in order to achieve the target within the 3 months period. Each team consists of 1 paver, 2 pneumatic tyre rollers and 1 tandom roller. Asphalt layer consist of two layers, 60mm thick Bituminous Base Course and 40mm Bituminous Wearing Course.

MANAGEMENT VISIT

Director Mr. Simon Karam visit to Abu Tubul and briefed about the challenges and the importance of Safety Performance to the working team in order to complete the project with Zero LTI.

OQ BLACKTOP ROAD PROJECT

In many cases in the Sultanate, the oil and gas are discovered in the Empty Quarter. Consequently, most of the roads and rig locations fall on sand dunes.

These roads are generally kept as track roads during the exploration phase to minimize initial expenditure.

However as soon as a field is developed and extended on its concession, the movements of vehicles, trucks, rigs, and other equipment become intense on some sections.

The cost of maintenance becomes excessive and the quality of the service is affected. Upstream operators identify these main arteries on the fields and may decide to pave them with asphalt.

This is how the national oil company OQ decided to pave the road linking Abu Tubul to Bisat.

The road extends over nearly 30 km crossing dunes and sabkha deposits.

The contract was awarded to Sarooj.

ASPHALT PLANT

In order to produce 65,000 tons of asphalt and to complete the project on time, SCC decided to install the Marini asphalt plant (120 tons/ hour) at the project location.

SCC received special approval from OQ to operate the asphalt plant during extended working hours.

▲ **WADI HAWASNAH**

Construction of Box Culvert, 6 cells of 4.0m x 3.0m.

▲ **WADI HEIBI**

Construction of Realignment # 5, Excavation on the mountain.

◀ **WADI QANOT**

Bituminous Wearing Course, Rolling and Compaction by Pneumatic tyre rollers.

WADI HAWASNAH

Road Opened at 10 locations out of 20 locations on 17th Nov 2022 i.e., prior to Oman National Day Celebration. This is one of the milestone achievement, which was committed to the Client by Sarooj management.

REINSTATEMENT OF DAMAGE REPAIR WORK OF ROAD PROJECT

Ministry of Transport, Communication and Information Technology (MTCIT) has awarded the project of ''Reinstatement of damaged roads due to Tropical Weather Condition (Shaheen), (Wadi Al-Hawasnah, Wadi Heibi & Wadi Al-Qanot)'' to Sarooj Construction Company in October 2021.

These roads are situated in three Wadis, i.e Wadi Hawsnah, Wadi Qanot and Wadi Heibi. The roads are passing through several Wadis on the mountainous terrain. The major scope of work for each Wadi are as follows:

- Wadi Hawasnah {Reconstruction of five Irish crossing - Reconstruction of two major culverts - Reinstatement works of damaged roads, Irish crossing & Box culvert on the Ghuzayn Village and Miskin}
- Wadi Qanot {Construction of 7.5 kms road along the mountain and Wadi}
- Wadi Heibi {Construction of realignment 1, to improve the geometric of the existing curve - Construction of realignment 2, approx. 3.80 kms which will bypass the Al Shubaybat village - Construction of realignment 3 & 4, for the improvement of existing Irish crossing to Box Culvert, considering the road type is all weather road in order to allow the traffic movement during the flood - Construction of realignment 5, approx. 4.5 kms which will bypass the Al Ghadifa village}.

WADI HEIBI

Construction of 1.5m / 2.0m Paved Shoulder on Both Sides of existing Sohar to Heibi Road (27.0 Kms).

CIVIL

THAMEEM ANSAR
Project Manager

This represents a core activity of SCC. SCC has the resources and the experience to tender for a variety of civil works and are now recognized on the market for being a reliable strategic partner to the international EPC contractors. This is how SCC has secured works on the new refinery project being built in the Duqm Economic Zone known as SEZAD, in the field of earthworks, concrete foundation works, and underground piping. SCC has secured, a long-term service contract for construction of rig locations with Petroleum Development Oman (PDO) and Phase III on the Nimr Water Treatment Plant where reed bed technology is applied. Sarooj has also identified a niche market in offering civil and electrical services for solar plants to be built in Oman. The first of these being the 100 MW solar plant in Amal.

LIGHTING AND VENTILATION

The underpass is lit with high quality lighting fixtures.
A system of ventilators ensures proper circulation of fresh air and clearing of gas emissions.
Emergency stand-by power supply was also provided to ensure full time operation.

EXISTING SERVICES

Several existing services had to be protected during the works and restored to their initial state after completion. Temporary supports like cables and steel beams were provided to hold these services.

SEGMENTS

The underpass was built in alternate segments and completed in intermediate ones. Each segment's walls and roof took about 300 m^3 of ready-mixed concrete.
A PVC waterstop ensured the construction joints were tightly waterproof.

COLLAPSIBLE SHUTTERING

Considering the short execution time allowed for the project, a collapsible and mobile shuttering had to be designed and fabricated. Six modules were made in Germany for this purpose.

▼

UNDERPASS

The number of vehicles on the roads in the Sultanate of Oman has been increasing at the phenomenal rate of 10 to 11 percent per annum reaching a number approaching 1.6 million vehicles for an Omani population of 2.7 million. This has generated incredible pressure on the road network especially in the capital Muscat. Authorities had to find solutions in terms of building flyover bridges, underpasses, widening of roads, cancelling roundabouts and building new expressways. Sarooj were entrusted to build the longest underpass in the country together with its approach roads, service gallery, surface drainage arrangements, ventilation, fire fighting, and lighting. The works included the crossing of one main national highway. This was done in open excavation and by providing temporary road diversions. The excavation had to be kept free from water by continuous dewatering; several services had to be crossed or diverted and substantial landscaping works were undertaken. The whole site had to be restored to its original state and replanting of the magnificent palm trees into their original positions was done successfully.

MICRO-TUNNELING ▶

The 2 m diameter GRP sewer pipe had to be diverted to make room for the underpass.
The new route goes under a highway.
Micro-tunnelling technique was used to carry out these works without causing any inconvenience to roads users.

DRILLING RIG

Several alterations to the Atlas Copco drilling rig were made before it could be sent to site.
The main jib had to be shortened to reduce its footprint when drilling horizontally, in order to ensure traffic flow on slip roads along the bridges.

DRILLING

The jib must be perfectly horizontal before any drilling is carried out so that the target point is reached on the other side of the bridge approach road.
Constant monitory was maintained and fine adjustments were made using hydraulic jacks.

BLOCKING THE SLEEVES

Once the sleeves were placed using the rig, their ends were temporarily covered to avoid any debris going into them.
This debris would have hindered the pulling of steel tendons through them before they were stretched, and post-tensioned.

FINISHED PRODUCT

The new retaining wall received the same finish as the original one in order to keep the same concept in harmony with all other flyovers in Muscat.

Pedestrian walkways were restored and GRC plugs covered the recesses at tendon locations.

BRIDGE REPAIR AND UPGRADING

The GCC summit which took place in 1985 gave an opportunity to build flyovers and bridges to ease a rapidly growing traffic. These projects were executed in record times which may have caused some of their elements to age quickly. Some of the mechanically stabilized earth (MSE) walls retaining the approach roads deteriorated and became a serious concern for safety and inconvenience. Sarooj undertook the difficult task of improvising tools and devices to carry out the works. Despite its modest value compared to large contracts, this project required proper engineering and satisfactory innovative solutions. The new monolithic retaining walls on both sides of approach roads were tied together with steel tendons using pre and post tensioning techniques. Located in the heart of the town, in a busy and congested area, most of the work on these bridges was carried out at night. Special permit to work (PTW) was obtained from the Royal Oman Police (ROP) at every construction stage. Sarooj takes pride in the fact that the project was delivered without LTI or RTA.

SACRIFICIAL FORMWORK

Pre-cast elements presenting the same patterns as the existing ones were used as sacrificial formwork for the monolithic retaining wall, achieving thus two goals: formwork and finish.

Steel reinforcing bars together with spacers can be seen in the retaining wall before concrete is cast.

EMBANKMENT LAYERS

Each horizontal layer making the dam is composed of various materials: fill, filter, rock, and gabions.
Special attention was given to the impervious core layer that ensured sealing the dam and holding water behind it.

WORK PROTECTION

Whilst building the dam, it is important to protect the works from occasional floods.
This is ensured by leaving part of the dam free until the spillway could take over the task.

GABION PROTECTION

Gabions are provided downstream on the spillway.
A pipe culvert crosses the dam at a low level to allow controlled flow. A penstock valve is provided on the upstream side for this purpose.
An automatic recorder registers the valuable data.

FUNCTIONING DAM

This photo was taken after heavy rainfall.
It demonstrates the purpose of the dam.
It is hoped that this captured water has the time to percolate into the ground thus recharging the aquifer.

WADI SAHNA DAM

Oman is blessed by its mountains and wadis. However, the lack of vegetation allows rainwater to rush to the sea.
Across many wadis the Ministry of Regional Municipalities and Water Resources decided to build aquifer recharge dams to give water a chance to percolate into the alluvial deposits.
One of these wadis is Sahna in the Madha enclave. The dam also provides flood protection and control through a spillway and a culvert across the dam.
It is an earth and rock dam with a central impervious core consisting of clayey materials.
Blocking the wadi by the dam, exposed the existing road and some neighbouring lands to floods.
A saddle dam had to be built and the road diverted onto its crest.
After the rain, more and more tourists are attracted to the site to enjoy the scene.
When dry the dam's reservoir has to be cleared from mud and fine particles carried by water and deposited in the basin, in order to facilitate seepage into the aquifer.

SPILLWAY

The spillway is seen with rock protection upstream and downstream and concrete slab on its crown.
Two concrete retaining walls contain the spillage section of the dam.

TOWER LINES

Routes for tower lines are pushed towards the mountains, away from settlements, clearing thus further areas to be used for land development. This rule applies to new lines as well as to relocated ones.

FOUNDATIONS

The stub columns are fixed exactly in their designated locations and are secured to avoid their displacement during concreting.

LATTICE TOWER

The lattice tower is ready to receive isolators before the cable stringing process can start.

The tower elements are painted as per the client's colour code.

TOWER ASSEMBLY

The labelled tower elements are imported in containers and assembled on site.
Large sections of towers are joined on the ground and then lifted onto final position with cranes.

▼

WORKING AT HEIGHT ►

During isolator installation and cable stringing, technicians work at height.
They should be well harnessed and firmly anchored.

132 kV - OVERHEAD LINES

With the development and progress, power supply and demand grow at the high rate of 11-12 percent annually in the Sultanate of Oman. This represents a challenge on both power generation and power transmission. A national grid already covers and connects main metropoles. Frequently, the grid has to be pushed away from settlements to find that the only possible routes are the mountains. Sarooj built the foundations for nearly 1000 km of 132 kV lines and 220 kV lines. In this project, access roads and logistical support represented the main difficulties. Rock anchoring and grouting techniques were used to secure the foundations in rocky areas. In loose or soft ground, we reverted to the more conventional method known as ‘pad and chimney’ type foundation. In each location the ground electrical resistivity was measured for the purpose of providing an adequate earthing system for towers and lines. Shut down for final connections were coordinated closely with the client. They were done systematically during the winter season when the power demand was low. Temporary roads were maintained to give access to the towers.

CONNECTIONS

Pipes are connected through pre-cast manholes installed along the pipeline.

These manholes are tailor-made to suit each configuration.

They are prepared and numbered in the factory before they are moved to site.

LIFTING STATION

The pipe is a gravity line and therefore may reach unwanted depths. Lifting stations are built to raise the water into shallower manholes and then forwarded to the sewage treatment plant by gravity again.

DUCTILE IRON PIPES

Ductile iron pipes were used to deliver the flow to the Sewage Treatment Plant (STP).

Air valve chambers are provided.

EXCAVATION WORKS

Long reach boom excavators were used to dig and backfill trenches and to form larger pits to accommodate big manholes.

SEWAGE MAINS

Haya is the government organization that regulates, builds, and operates the effluent waste water system in Muscat and was lately mandated to extend its activities to the whole country. A large sewage treatment plant was built in the densely populated areas of Seeb, Maabella, and Al Khod. Sarooj was commissioned to build the sewage main that brings collected waste water into the plant. The pipeline route was carefully examined and was eventually approved by concerned authorities. The GRP pipes were manufactured in Oman as well as the manholes which were designed and tailored for the project. Deep excavations were carried out in two tiers for safety reasons in order to mitigate the risks of material collapsing into the trench. The excavated materials are composed of alluvial deposits which were screened on site to produce bedding and fill materials. Micro-tunnelling was used to cross a dual carriageway in the vicinity. The site was cleared and restored to its original state. Sarooj carried out the construction of smaller diameter sewage mains and house connections.

CONCRETE SURROUND

In Wadi areas, the pipeline had to be encased in concrete before final backfill.
In some cases, gabion mattresses were used to avoid surface scouring of the pipeline.

▲ **CONCRETING**

Concrete bucket trailing from a helicopter cable delivers concrete to these brave Sarooj workers.

The concrete mixing takes place on a barge's deck stationed in the vicinity.

▲ **HELICOPTER**

Helicopters are allowed to fly up to five hours per day.

This helicopter was based in Salalah making the real productive time very limited. Proper planning was essential.

◀ **DGPS**

In plain areas the DGPS sites are fenced and provided with an air-conditioned equipment room.

This is a requirement to prevent exposing electronic devices to extremely high temperatures.

LIGHTHOUSE

A completed lighthouse standing on this mountain peak of an isolated isle.
It is powered by solar energy.
The solar panel could be seen fixed on the tower side.

LIGHTHOUSES & DGPS INSTALLATION

The port of Duqm is now fully operational, particularly the dry docking activity. The number of vessels approaching the port is increasing by the day.
The Ministry of Transport and Communications has decided to install three lighthouses and three Differential Global Positioning System Stations (DGPS). The lighthouses are typically located on isolated islands and high peaks.
Sarooj takes pride in executing these challenging contracts requiring land, sea, and air logistical support. Helicopter services were obviously required. DGPS sites are generally on plain ground and therefore, their sites had to be fenced and secured.
An air-conditioned room housing the equipment was provided on each site. The distances that separated the stations from the main SCC bases and from each other represented the main difficulty in ensuring adequate logistical support. The team had a full time landing craft and passenger speed boats for water and food supply but also to be used in case of emergencies.

REINFORCEMENT

Last touches before the concreting starts.
Towers holding down bolts are kept in position by a circular template so that they are not displaced when pouring of concrete takes place.
The foundation is provided with heavy reinforcing bars.

▲ **MONUMENT SETTING**

It is in this spectacular setting that the concrete monuments were placed.
The workforce took lots of pride in their achievements.
The project was completed without any lost time injury (LTI).
SCC cherish that result.

▲ **VERIFICATION AND CHECKING**

Verifying and checking the final survey, the position of the copper stud position was vital to stay within the tolerances specified. These studs were embedded in the concrete fulcrum.

◀ **HELICOPTER**

Workers wait for the helicopter to bring them down from this acute ridge.
In many instances, the weather conditions changed rapidly and did not permit the helicopter to hover and pick them up.
They had to wait for hours in some cases.

MONUMENT

A border monument carrying stainless steel indicator plates demonstrates the borderline and shows on which side each territory is.

OMAN - UAE BORDER DEMARCATION

We have been commissioned by both Oman and the UAE governments to demarcate and install permanent monuments along the border between the two countries. Sarooj did value engineering and changed the monuments' design from cast in-situ monuments to pre-cast units that would be grouted together with epoxy material. This proved salutary for saving time, ensuring high quality, and improving safety. Units would be cast in a yard, transported by land to the vicinity of the borderline and then lifted and installed by helicopter. Sarooj entrusted Fugro to produce the required maps of the corridor along the border. Wherever possible, roads were built to provide permanent access to locations. In plain and inhabited areas, a stainless steel guard rail was provided to protect the monument. On the sand dunes, larger foundations were needed and were cast in-situ. As-built drawings and maps covering the border corridor were delivered to the client both in electronic and hard copies. This project supervised by teams from the UAE and Oman, opened many doors for Sarooj to operate in the Emirates.

BULLDOZER

Wherever possible and reachable, bulldozers (CAT D8R) were used to provide a permanent access and a small working area around the monuments.
However, servicing these machines in such places was a real challenge and limited their production.

THE RANGE

The firing range sprawls over a large area.

At every shooting distance a shed is erected for rest and ammunition supply.

Red flags demarcate the various ranges.

GRAND STAND

A grand stand was raised on an earth mound to enable officers and guests to watch the competitions. Cars are parked behind the stand.

BARRIERS

Considering the risks inherent to the operations, the various areas are demarcated with steel pipes embedded in concrete foundations and painted in vivid colours.

TARGETS

Collapsible targets were manufactured and fixed in their final positions.
Ten soldiers can compete or train at the same time.

FIRING RANGE

When you have big clients such as the Ministry of Defence (MOD), you undertake the construction of large projects but you may also be faced with smaller projects that involve different resources and technologies.
Sarooj signed a contract to build a firing range for a variety of weapons and from specified distances.
The project also included the construction of a grand stand and various sheds used for observation and rest.
The main firing range houses at its back a facility building that comprises of stores, toilets, and repair shops.
The targets were manufactured in SCC workshops. The whole area was supplied with power mains.
Car parking areas were also provided to cater for a large number of cars that may come there during important events.
Accumulation of sand because of the proximity of sand dunes, remains a concern.
This contract was executed in parallel with the one related to the close-by runway.

PISTOLS

A smaller firing range was built for pistols and revolvers.
Soldiers can fire from various distances well demarcated on the field.

THE SITE

A bird's eye view shows the site.
In the background is the Musandam Gas Plant (MGP).
In the foreground is an overall view of the plot that was levelled to build upon the new powerhouse and its facilities.

TIERS

Starting from the highest point and working their way down, excavators loaded blasted materials on dumpers leaving behind them tiers to designed slopes.

MANLIFT

Housed in a basket, trained labour would be lifted to their work area by mobile cranes that were regularly maintained and checked for reliability and good performance, to cater for the risk taken.

EXCAVATION

Footprints of buildings and civil structures were marked and the formation excavated to accommodate the foundations.

Civil works progressed with enabling works to gain time.

MUSANDAM IPP (CIVILS)

The same strategy of cutting the mountain side and reclaiming land on sea, a technique used on a previous contiguous site was also used on this project that consists of building a new 120 MW power station.

The scope is basically enabling works, slope stabilization, gabion retaining walls, surface drainage, perimeter road, and security fencing.

The materials generated through excavation were dumped in the sea and a revetment was built to protect the reclaimed areas.

Explosives were used to break the rock and large stones were sorted and placed as rock armour.

The last two meters of fill consisted of carefully selected materials screened and wetted on site.

As the works progressed and the rock face examined, the designers recommended that rock anchors be used in certain weak areas where shotcrete treatment was insufficient.

The presence of so many faults is this formation and the inconsistency of the stratas made the task of stabilizing the slopes very challenging.

SHOTCRETE

The geology of the site varied from solid to weathered rock and sometimes loose formation.

Shotcrete techniques were used to stabilize these vulnerable slopes.

CONTAINER YARD

The new yard is delivered to client by sections (milestones). The first section was handed over just on time to receive the new fleet of gantry cranes.
Single size clean aggregates fill the space between the sleeper beams.

CBM

Where the ground is subjected to heavy weights, a layer of cement bound materials (CBM) is applied by means of aggregate spreader and well compacted with rubber-tyred rollers. Materials are pre-mixed in a special mixing plant off-site.

GANTRY CRANE

A typical gantry crane moves on wheels and rubber tyres on a reinforced concrete track.
Trailers circulate on asphalted access roads.

REEFER GANTRY

Refrigerated containers need to be stored near a power source.

Special gantries called Reefer Gantries are provided and can supply power to several containers stacked at different heights.

CONCRETE TRACKS

Concrete beams are cast across the yard to take the containers.

Longitudinal concrete beams constitute the tracks on which gantry cranes will travel.

Both types of beams rest on a raft of aggregate base course.

CONTAINER TERMINAL IN SOHAR PORT

Since the shutting down of commercial shipping activities in the Port of Sultan Qaboos in Muttrah and the diversion of these activities to the Sohar Industrial Port, large container handling areas became a necessity.

OICT (Oman International Container Terminal) awarded Sarooj through tendering a contract to build an extension to the existing container yard and a new gate to control access to the area. The works include soil improvement by replacement, sleeper reinforced concrete beams to take the container loads, asphalted circulation areas, reefer gantries for refrigerated containers, several substations, external lighting, fencing and aggregate spreading.

The travelling overhead cranes on wheels move on special reinforced concrete tracks.

Under the gate shed guard houses are provided and electronic equipment for ocular characterization and identification.

Several areas received cement bound materials (CBM) before they were paved.

A special mixing plant produces the CBM wet materials that would be laid and compacted.

DMPF-FILTERS

The reverse osmosis plant building is complete.
The vessels are water filters (DMPF), the external GRP pipes are connected.
The plant is almost ready to be pre-commissioned.

DAF BUILDING

This is a fully reinforced concrete structure operating like a water reservoir. It has several internal compartments. PERI shuttering system was used for falsework. Waterproofing of the whole structure was essential.

ELECTRICAL PITS

Adjacent to the electrical building several concrete pits were built to ensure proper housing of electrical cables and adequate power distribution to the various parts of the plant.

STRUCTURAL STEEL

Several sheds were erected on site, particularly the reverse osmosis (RO) plant building.
The materials were imported from GCC countries and erected on site.

SUR RO PLANT - SIDEM

This is an extension to the existing reverse osmosis (RO) Plant in Sur-Sharqiah Province.
The enhanced capacity of the plant is around 11,000m³/day.
Sarooj signed with the EPC contractor Sidem a contract for carrying out the civil, electrical, HVAC, and pipework. Veolia are the developer.
The scope comprised of enabling works and earthworks, the construction of several buildings, some having concrete frames other structural metal frames, the erection of steel tanks, the seawater intake, the GRP external pipeworks, the electrical works and HVAC.
External works such as asphalt roads, kerbstones, car parking, and fencing are also included in the scope.
The contract was completed on time and the plant started producing water since July 2016.
The ultimate client is OPWP, the state company, that purchases products from private developers.
The Sultanate of Oman is a pioneer in the privatization of the production of water and power. Their first initiative began in 1982.

PERMEATE TANK

Several steel tanks had to be erected on site. Steel plates were pre-formed in the factory.
The tanks were sand blasted, painted and tested. Safety of workers was given great care and attention.

HYDROCRACKER UNIT - UNIT 120

Main Pipe Rack PR-120-001 Execution with 09 modules & 11 Secondary Piperacks contain 3200m3 Concrete & Connected with Hot dipped Galvanized steel Anchorbolts. Several parameters were compiled during execution & Concretes were successfully poured under several inspection & observations.

FURNACE - UNIT 160

160F-001 Reactor Feed Furnace Foundation Execution contain 622 m3 Concrete Connected with Hot dipped Galvanized steel Anchorbolts & all the reinforcement bars were Epoxy Coated. Special Scaffolding systems was used.

UNDERGROUND AOC/OWS/ FWS/DWS SYSTEM

Manhole installation & underground pipe GRP with silica sand, chemical joints.The pipes are cut, laminated and prepared for stringing out in a covered space, well aerated for safety reasons but also hermetic to dust and sand. Also, the installation area is more Congested & Confined. 18,000 LM of Pipes & 322 No's of Manholes were successfuly installed.

UNIT 160 - DIESEL HYDRODESULPHURISATION UNIT (DHT)

160-PR-001 Main Pipe Rack foundation works with Epoxy Coated Reinforcement steel and C40 Concrete (899 m3) Connected with Hot dipped Galvanized steel Anchorbolts. Several parameters were complied during execution & Concretes were successfully poured under several inspection & observations.

120 C - 003 FRACTIONATOR

Octagonal shaped Vertical Equipment foundation execution containn 400 m3 of Concrete. Owing to Complexity of the Structure, special tailormade scaffolding were used under special supervison. Any minor error may led to devastating result, hence proper field setting inspection & observations were carried out. Structure was successfully casted with zero errors & perfect quality.

DUQM REFINERY - CIVIL WORKS

Three packages have been awarded to international EPC contractors. Sarooj signed a contract with the joint venture of Tecnicas Reunidas and Daewoo (TRD) to carry out the construction of civil works and underground pipework. The scope, therefore, covers excavation works in various types of grounds, transporting and disposing of unsuitable excavated materials, and backfilling with approved imported materials; the design and execution of reliable formwork that can deliver the sizes of elements and quality of their finish; the preparation of bar bending schedules, cutting, shaping, labelling and fixing the epoxy coated reinforcement. The procurement and accurate fixing of anchor bolts represent a critical operation. The fresh ready mix concrete is produced in a concrete batching plant and delivered to site in transit mixers and placed in their final destination with concrete pumps and compacted with vibrators. Careful curing arrangements are made before the concrete surface is prepared to receive bituminous protection coating. The GRP pipes are prepared and laminated indoor in a workshop before they are transported to site. All pipes are hydro-tested before final backfill takes place.

DRILLING RIG SETUP

The Khazzan tight gas reserves lie at depths of up to five kilometres in narrow bands of extremely hard, dense rock. These complex and challenging conditions require specialized drilling equipment, precise drilling of both vertical and horizontal wells, and well stimulation to free the gas.

KRC FACILITY

Located within the vicinity of the Central Processing Facility in the southern half of Block 61, the Khazzan Residential Complex accommodates BP's operation team of up to 450 personnel at any given time.

PILING RIG

Reinforced concrete pile construction on well pads located in the Salina (Sabkha) ground conditions.

RAFT FOUNDATION

The raft foundation is a reinforced concrete structure around the cellar pit measuring approximately 30m in length and 15 m in width. It serves as a platform for the rigs during the drilling operations.

BP KHAZZAN CONCESSION

The greater project is the development of a gas field in the northern part of Oman within the large Block 6. The project includes drilling of production wells, gathering the gas and treating it in a Central Unit and exporting it through existing conveyance pipelines and storage tanks.

Phase One was commissioned and started production in 2019 increasing thus the national production by nearly 30%.

Sarooj mobilized a first class camp base and adequate industrial yard. They built access roads and rig locations as per BP's drilling schedule.

Phase two extended into different terrains presenting thus new challenges such as locations falling on sand dunes and Sabkha. SCC scope included the design and execution of concrete piles to support the reinforced concrete raft that carries the rig and its accessories.

Similarly access roads built on dunes or Sabkha had to be designed differently to take into account the ground low bearing capacity.

SAROOJ KHAZZAN WORKSHOP

With a fleet of over 350 number equipment operating at the Khazzan project. A fully established workshop was vital in order to ensure preventative and routine maintenance are conducted in a timely manner for optimum and efficient plant production.

▲ **SOLAR PANEL TABLE**

30,000 post and 200,000 solar panels were installed within a time period of 6 months.

▲ **AERIAL VIEW**

An aerial view of the substation, transformer station and pump station.

◀ **RAMMING MACHINE**

Rigmen aliging the post before ramming activities specially designed machine imported from Turkey (Mazaka) and Pauselli (Italy).

TRANSFORMER STATION

Produced energy transmitting to PDO grid.

105 MW AMEEN SOLAR POWER PLANT

This is the first large scale Solar Power Plant with 105 MW capacity.

PDO the prime upstream operator in the country, decided to have this plant built in Ameen, in the center of a busy and active area in exploration, development and production, the Nimr Area.

The works include the enabling works, access track roads, pre-drilling and ramming about 30,000 posts, the tables, the construction of the main control building, the construction of sheds and installation of inverter transformers, the excavation and backfill of project plot, 100 km of trenches to take the electrical and communication cables, a fire fighting system with steel sectional water tanks.

The works also include the construction of a double security fence complying with Royal Oman Police regulations applicable to security on the oilfield.

A fine mesh is fixed on the external fence to minimize dust and sand ingress into the Plant.

INSTALLATION OF SOLAR PANELS

The installation of panels is very critical due to the delicacy.

a crew member of 6 people were installing 300 panels per day.

MECHANICAL INSTALLATION

Installation, testing and commissioning of 2 P 112 Modules per tables trackers, related (alignments & torqueing of structure, motor and drive system installation, Controller and weather stations) all as per manufacture recommendation.

PV MODULES INSTALLATION

Installation, testing, commissioning of Jinko Tiger Plus 525/520 WP PV Modules as per manufacture recommendation.

PREDRILLING

Drilling a hole with 23Cm drill average of 2 meters' depth based on approved drawing.

SITE PREPARATION

Site Grading to achieve the uniform gradient convenient for the installation of the solar trucker.

SUR SDC 17.17 MW SOLAR PROJECT

This project is the second solar project that SCC acquires in the vision of protecting the environment and going green. The works consisted of predrilling, ramming, mechanical installation services, and civil works for 17 mwp pv system at Sur desalination plant, Oman.

The works include enabling works, access track roads, pre-drilling and ramming, mechanical installation and panel installation.

Ground Leveling Work: Site grading to achieve the uniform gradient convenient for the installation of the solar tracker the work is include some and fill on area plot 203500 m².

Pre-drilling: Drilling 2720 holes of 23 cam drill average of 2 meters' depth

Ramming of trucker posts: ramming of 2720 trackers posts around 4 meters' length using ramming machine and rotated laser to maintain the level.

Mechanical Installation: installation of 293 tracker system 2P tracker 112 modules and 56 modules for table.

Panel Installation: installation of 32760 Jinko Tiger plus 525/520W PV modules, this will be including the testing and commissioning.

RAMMING

Ramming of tracker posts around 4 meters' length using ramming machine directly into predrilling boreholes after filling the hole with concrete mixed as per the specification

BUILDIN

RAFIC MUSHANTAF
MEP Department

This department, like the MEP department, has grown and outperformed other activities.

We continue to build semi-permanent camps and site facilities, sub-stations accommodation blocks, multi-storeyed residential buildings, control rooms, administration buildings, sheds and warehouses, and commercial buildings. Usually, these projects include utilities and external works which are also carried out by Sarooj and their sister companies.

Several of our building projects are in remote places and therefore, require strong logistical support to avoid delays in the completion dates.


GS

▲ **OASIS**

These buildings and their compounds are like oases standing in the middle of arid areas.
The comfort they offer to their occupants is vital under these harsh living conditions.

▲ **SURVEILLANCE CENTERS**

These stand-alone compounds are essential to relay information to the command centre.
Reinforced concrete boundary walls add to their security.

◀ **HVAC**

Corridors link the residential part in the building to the command and control rooms.
HVAC ducts run along the corridors of these multipurpose buildings.

SUB-COMMAND

Some buildings are located in very remote areas in the empty desert.
Making them self-sufficient and fully equipped is necessary and vital for operators and technicians.

ENGINEER 3 - SECTION 1 & 2 BUILDINGS

Many surveillance centres were built along the border.
These buildings house electronic devices and data collection equipment.
The compound is enclosed within a reinforced concrete boundary wall and accommodates generators, fuel tanks, and elevated towers.
The sub-command buildings have control rooms as well as accommodation for technicians and operators.
A fibre optic cable links all these buildings together creating thus an integrated system of surveillance for easy intervention.
These buildings are generally equipped with a central air-conditioning system and kitchen equipment and facilities.
Geotechnical studies preceded the actual construction knowing that the ground conditions varied considerably from location to location along this lengthy project.
The ground slab is raised about 600 mm above the surrounding areas to minimize sand accumulation at doorways.

COLORS

The paint colours were selected carefully to integrate the buildings in their environment.
An effort was made to keep the local Omani architectural features.

SNCO ACCOMODATION

Typical architecture for military accommodation with a touch of Omani flavour in terms of arches and crenellations on its parapet.

JUNIOR ZONE

A more private accommodation and recreation centre is reserved for junior staff.

The colour scheme is selected to integrate the structure into its environment.

HEADQUARTERS

The main artery in the base leads from the main gate directly to the headquarters or the main administration building.

MOSQUE

The mosque stands close-by for worshippers to say their prayers.
The minaret is modest and elegant as per the Omani old mosques.

▼

ARMY CANTONMENT

Sarooj signed a contract with the Ministry of Defence to build an army base in the border town of Mazyounah.
The plot allocated for the project measures 500 m by 500 m of undulating mounds and hills.
The scope included tangible excavation and filling works, road works, external services, and many functional buildings.
A parade ground, recreation areas, landscaping, and a boundary wall also form part of the scope.
Four 1000 kVA generators can supply the base with power in case of mains failure.
Mazyounah is growing at an incredible pace since the border between Oman and Yemen became better controlled.
It is attracting many investors and is becoming a trading hub between the two countries.
This new cantonment comes at the right time in the right place.
Sarooj is developing several SMEs in the area by giving them direct contracts and technical support.

STAIRS ▶

Enough natural daylight reaches the stairs through a large window.

RESIDENTIAL COMPOUND

The photo shows the compound at the final stages of its construction.
The sober external elevation contrasts the luxurious atmosphere inside the building.
An advantage of this closed architecture is that minimum heat from the sun enters the building.

ROOF SLAB

Casting of roof slab is underway.
The concrete pump is about to start delivering ready-mix concrete produced in SCC's batching plant on site.

TOILETS

Vanity type wash-hand basins with marble top and side cladding give the feeling of being in a modern hotel.

DINING HALL

The dining hall is spacious, very well lit, and furnished with simple practical easy to clean tables and chairs.
Food remains one of the few pleasures in this remote area.

PERMANENT ACCOMMODATION

The project's management team and eventually the plant operators and staff require quality accommodation that is not readily available on the local market in the province of Musandam. Therefore, it was decided to build a residential compound for the staff with messing and kitchen facilities, recreation rooms, clinic, and laundry; a self-sufficient compound.
Considering that food is one of the rare pleasures the personnel enjoy in this remote place, special attention is given to the kitchen, food stores, and to the dining halls.
The rooms' finishes are of top quality.
The ventilation and HVAC works are highly reliable and the safety aspects have been very well studied particularly earthing and fire fighting arrangements.
The compound is connected to power and water mains.
Sewage water is collected in a holding tank before it is transferred to a municipal sewage treatment plant in Bukha; the compound is now occupied and fully functional.

KITCHEN

A modern kitchen using hygienic appliances, fixtures, and surfaces.
Anti-slippery and anti-acid tiles are used to cover the floor.
It has been designed and supplied by a specialist manufacturer of kitchen equipment.

SITE OFFICE

Pre-engineered metal building system is selected to construct this 5000m² temporary site office.

The primary framing structure is an assembly of I-beams, where all secondary frames and wall panels are made of Cold-formed steel frames.

PARKING AREA

To accommodate all of the cars, a parking area was designed in front of the site office,, with access control and barriers installed. Material and color were carefully considered when installing car parking shades.

TOILETS

Restrooms were made to the highest level using the best material as per MAF specifications.

OPEN SPACE OFFICES

Working in an open environment makes it easier for employees to communicate with each other and share ideas.

MALL OF OMAN OFFICES

Majid al Futtaim (MAF) are a large developer and operator of malls and hypermarkets.
They also are real estate developer on a big scale.
For the construction of the Mall of Oman, they commissioned Sarooj, as part of a single contract to carry out enabling works and road alterations, to build 5000 m² of site offices and other temporary facilities.
The main building is pre-engineered one, fabricated in Sharjah-UAE.
The whole contract period was three months for this office building.
The furniture was also part of the contract. Sarooj also we commissioned to operate and maintain the premises for one year.
Asphalt access road, covered car parks and safety hoarding were also provided.

INTERIOR FINISHES

Marble stairs, carpet tiles, and stainless steel handrails were carefully chosen after client approval in addition to a wide range of interior finishing items.

ACCOMODATION

Overview of the camp's facilities, which are located in Ras Markaz (Sub-Package C). The camp has a total capacity of -/+135 individuals, as well as recreational areas and multipurpose sports courts.

WAREHOUSE

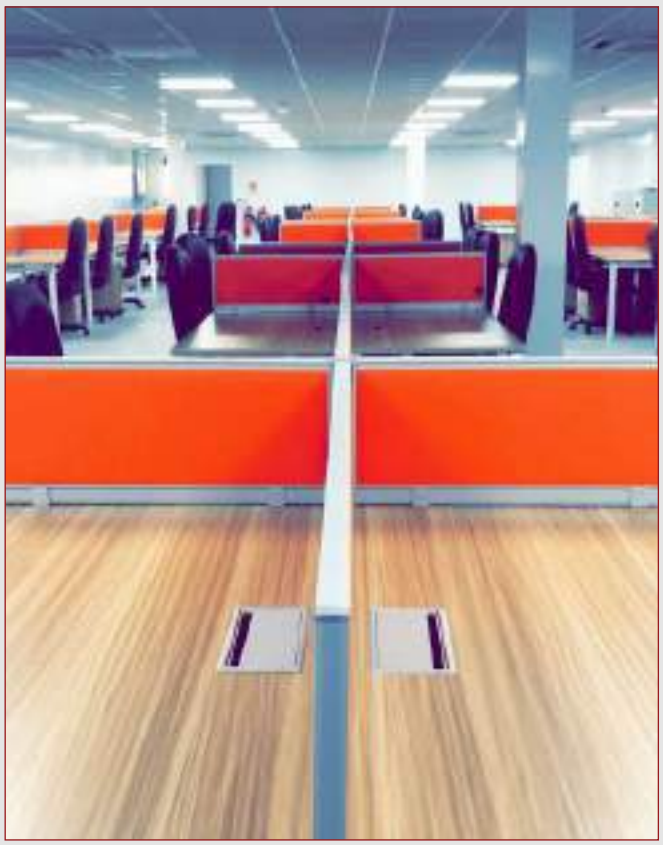
Inside the laydown area, a warehouse was built to store project materials. PU sandwich panels were used as insulation, and racking system was added to maximize the storing capacity.

RECREATIONAL FACILITIES

In addition to the indoor recreational facilities, outdoor Multi-purpose sports court and Football pitch are erected to stay fit and de-stress.

OFFICES

More than 5000 square meters of office space were built and outfitted with the necessary office furnishings.



SAIPEM TEMPORARY FACILITIES

Our client, Saipem S.p.A, were awarded Package 3 on the 'Duqm Refinery' mega-project. Packages 1 and 2 that deal with the process and the off-plot facilities were awarded to other EPC contractors, namely Petrofac, TR, Daewoo and Samsung.

Saipem's scope include the construction of crude oil storage tanks and facilities in Ras Markaz, some 70 km south of Duqm. Package 3 also includes the construction of a crude oil pipeline that links Ras Markaz to the refinery site. Considering the traveling distance, and the inherent HSE hazards and to save time, Saipem decided to build a fully equipped camp for their staff at Ras Markaz.

This project was assigned to Sarooj on EPC and finance basis. The scope covers also managing the facilities and providing accommodation and catering in particular, for the duration of their contract. Medical, recreational and sports activities are also part of the scope. Reverse Osmosis (RO) plant, Sewage Treatment Plant (STP) and power generators were also provided.

KITCHEN

A fully functional kitchen was installed in the camp to accommodate everyone living there and to provide meals during business hours inside the office areas.

ADMINISTRATION & CONTROL BUILDING

Designed to be the main building in the plant where all the offices and main control room are located. The Administration & Control building overlooks the complete plant.

CONCRETE STRUCTURE

At the very first stages of the buildings construction, when concrete floor slabs, columns, and beams were being constructed.

BLAST PROOF WALLS

In Transformer Bays, blast proof walls are essential in protecting lives, properties and infrastructure when there is a risk from transformer failures.

ARCHITECTURAL FINISHES

The installation of windows, doors, and painting works received extra consideration in order to have the highest architectural finishes.

ROOF WATERPROOFING

On the roof of the buildings, an EPDM membrane waterproofing system was installed to protect against any weather-related damage. Finishing included thermal insulation and concrete tiles. Concrete pedestals were carefully designed to support the roof mounted HVAC equipment and ducting works.

DUQM REFINERY - OFFSITE FACILITIES

A project of the size of Duqm Refinery with a capacity of about 220,000 barrels a day, sprawls over a large area and the elements of the plant require a lot of electrical energy, as per the design. Eventually, the energy would come from one or more power stations presently under construction. Considering the long distances between the source and the consumers' locations, the transport of electrical energy has to be carried out at high voltage to minimize the drop and the losses. This necessitates the construction of substations in locations that would optimize the distribution. The substation buildings form the core of Sarooj scope. Furthermore, the contract covers two sites (i) one on the refinery site itself in Duqm and (ii) one in Ras Markaz where crude oil facilities are being built. The contract also covers the construction of an administration building which incorporates under its roof, a control room where the operations of the system are managed. A major and essential part of the works is the MEP part which includes HVAC, fire suppression, fire detection, domestic power supply and lighting. Finishing materials comply with heavy duty industrial specifications.

HEALTH
SAFETY
ENVIRONMENT
HSE

MESSAGE FROM THE DIRECTOR

Incidents are sad events as they bring harm to people, their health, their assets, or the environment they live in. Actually, the sad effects of these incidents generally extends to their families, their friends, and their loved ones. This fact, however, should not deter us from persisting in our endeavours to eliminate incidents and mitigate their negative consequences by insisting on implementing comprehensive HSE system and plans. This is an absolute priority for all and it remains everybody's responsibility. It is not a pleasant activity to investigate them nor are the findings as they usually highlight failures somewhere. Nevertheless, we have to keep doing them in order to acquire further knowledge and improve accordingly. That may be the sad side of the coin. Fortunately, there is some joy as well in this exercise. When we think that all these efforts and controls may have saved a worker's fingers or even his life, then we are happy and feel well rewarded. It is our duty to continue caring about people, their health, and the environment in the workplace and outside it. We would be driven by the real opportunity of joy and satisfaction when we mitigate them and not be complacent when they do not occur.

MONIB TRABOULSI
Corporate HSE Manager

Sarooj does not believe that HSE is only documentation, it is a culture emanating from strong beliefs and values. Sarooj aspires to conduct its business without causing any harm to people nor undue negative impact on the environment. We also believe that all incidents are avoidable. In recent years, we have reaped the benefits of such a culture and celebrated many million safe man-hours and kilometres driven without lost time injuries (LTI) in our workplace. The HSE department is managed by highly competent professionals and a team of dedicated staff, particularly Omani nationals. We have also taken numerous initiatives towards improving our own HSE performance and have acquired prestigious internationally recognized certification such as ISO 14001:2015 Environmental Management, and ISO 45001:2018 Occupational Health & Safety. Our goal is to ensure that all our employees always return to their families safe and in good health.

SAROOJ HAS A LONG, PRESTIGIOUS CONTINUOUSLY IMPROVING SAFETY RECORD

Sarooj has been at the forefront of safety accreditations in the Omani construction industry. Sarooj is ISO 9001, 14001 and ISO 45001 accredited.

ISO 9001:2015 ISO 14001:2015 ISO 45001:2018

HSE ON SITE

KEY HSE STATISTICS

	2018	2019	2020	2021	2022Q3
Employee Total	3,200	3,500	2,700	2,400	2,750
Man-hour Total	11,291,585	12,653,243	9,733,990	6,926,441	5,922,596
Fatal Accidents	0	0	0	0	0
Lost Time Incidents	0	0	0	0	0
Recordable Incidents	6	4	3	2	4
Kilometers Driven	20,510,490	22,593,442	25,601,467	17,990,309	12,650,773
Vehicle Incidents	21	12	9	5	5

IN COUNTRY VALUE **ICV**

ISSA AL BAHLANI
HR, Admin & ICV Manager

For every hundred Rials Omani paid by government, oil companies, or even private sector to contractors, vendors, or service providers, how many of these Rials remain in the country? How many of them are used to develop local knowledge, local entrepreneurs, and start-ups to diversify their economy and make it more sustainable? These questions are omnipresent in Sarooj's culture and commitment to augment the In-Country-Value (ICV). Our projects are spread all over the country from Musandam to Salalah. In every area we have developed and mentored new entrepreneurs. In Musandam and Madha we supported three SMEs that are now growing on their own. On the border project we provided a local aggregate producer with finance, technical support, and contract so that he may grow his business. He has now four crushers, a fleet of dumping trailers, and produces ready mix concrete. PDO has awarded Sarooj with Raoul Restucci In-Country Value Award for the Best Contractor in ICV Delivery Category – 2021. We believe that our culture and commitment to enhance ICV contributes to making the economy and ourselves stronger through the fostering of these local enterprises. Furthermore, our strategy of bringing to Oman industries, technologies, and actually building factories remains high on our priorities in business development.

CORPORATE SOCIAL RESPONSABILITY **CSR**

ISSA AL BAHLANI
HR, Admin & ICV Manager

It is generally accepted today that any company that wishes to sustain its activities in a certain social environment must interact with its neighbours and other stakeholders.

Sarooj, who was born in the Oman environment does this in a natural manner. They would like to remain a force for the good in their society.

They have a generous yearly budget to offer scholarships. Sarooj are a strategic partner to Dar Al Atta, one of the more successful charity non-government organizations (NGOs). Where Sarooj is building roads, they always extend the paved areas to a school or to a hospital.

In Musandam alone SCC gave back to the local community added value worth 2 million dollars in contracts, rentals, training, sponsorships and many other positive initiatives.

In Meetan, this figure reached 7 million dollars.

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