

# From Ballistics to Cyber Commandos: An Insider Look at NFSU Ahmedabad

A recent visit to the National Forensic Sciences University (NFSU) headquarters at the prestigious Ahmedabad campus in Gandhinagar, Gujarat, revealed the epicentre of India's forensic revolution—a global pioneer recognised as the world's first university dedicated exclusively to forensic sciences and an Institution of National Importance since the 2020 Act.

As the team was escorted through the sprawling facilities, a comprehensive presentation unveiled the campus's evolution from its 2007 precursors, spotlighting nine Centres of Excellence in narcotics, ballistics, cybersecurity, and forensic psychology, where state-of-the-art labs hummed with activity, training thousands of professionals who fortify the nation's criminal justice and security apparatus. Under the visionary leadership of Vice-Chancellor Dr. J.M. Vyas, a Padma Shri awardee, the campus exudes innovation, from advanced explosive residue analyzers to cyber simulation suites that impress by their precision and scale.

What stands out during the tour is the Ahmedabad campus's mastery in specialized training, forged through robust collaborations with DRDO and CRPF, as detailed in the presentation on ballistic R&D and next-generation protective gear like bullet-proof helmets and jackets, drawing real-world lessons from events such as the 2008 Mumbai attacks.

Guides walk visitors through hands-on sessions simulating post-blast scenarios, showcasing 72 specialized programs that



have enrolled over 10,000 students and fueled hundreds of research projects in forensic biotechnology and digital evidence—figures that underscore NFSU's dominance in equipping investigators for IED threats and cyber intrusions. The Ballistics Research and Testing Centre, with its high-velocity testing ranges and residue labs, feels like a step into the future of justice, where every tool is calibrated for actionable insights. A highlight of the present-

ation is NFSU's trailblazing Cyber Commandos programme, run in tandem with the Ministry of Home Affairs and the Indian Cyber Crime Coordination Centre, where cohorts of elite trainees master cyber forensics, threat hunting, and incident response on the Ahmedabad campus. With a significant share of candidates drawn directly from national security agencies and an ambitious goal of creating a cadre of highly skilled cyber specialists, these op-

eratives are now shielding digital networks across the country, bolstered by international collaborations through training programmes with dozens of partner nations. Watching recruits in action during mock cyber drills reinforces how the campus is not just teaching theory; it is actively building a digital shield for India.

Equally impressive are the Mobile Forensic Vans, showcased as a campus-led triumph: high-tech units designed for

on-site DNA collection, explosive tracing and crime scene mapping, with several already handed over to Jammu & Kashmir to address difficult terrain and fast-moving threats.

A tour of a fully equipped van reveals compact spectrometers, integrated documentation tools, and space for drone-based evidence gathering—over a hundred such units have been rolled out nationwide, but the allocation to J&K stands out for its impact in shortening the time between crime and preliminary forensic analysis. These vans embody NFSU's commitment to field-ready innovation, translating laboratory excellence into real-world capability.

Guided by Prof. (Dr.) Astha Pandey, Dean of the School of Forensic Science, whose expertise in toxicology and explosives is reflected in the depth of ongoing projects, the visit underscores the Ahmedabad campus's unique synergy of scholarship and security. From student innovators demonstrating new analytical tools to senior officers acknowledging how NFSU's diplomas are reshaping investigations on the ground, it becomes clear that this campus anchors much of India's forensic training ecosystem.

As the tour concludes, one impression remains unmistakable: National Forensic Sciences University is far more than an academic institution—it is a critical pillar of the country's justice and security architecture, where rigorous science is continuously converted into practical tools to safeguard the nation.

## Unlocking Lothal: 4,500 Years of Seafaring Glory and Rise of a World-Class Museum

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Lothal, cradled in the arid expanse of Gujarat's Bhal region along the ancient Bhogavo River, stands as a testament to the ingenuity of the Harappan civilization, whose maritime prowess around 2500 BCE reshaped our understanding of ancient global trade.

Excavated primarily between 1955 and 1960 by archaeologist S.R. Rao of the Archaeological Survey of India, this modest mound unveiled a meticulously planned port city spanning seven hectares, divided into an elevated citadel for elites and a bustling lower town teeming with commerce. At its core lay the world's earliest known tidal dockyard—a trapezoidal marvel measuring 219 meters by 36 meters, constructed with kiln-fired bricks and lime mortar, complete with inlet channels and a sluice gate that harnessed the Gulf of Khambhat's extreme tidal range. Stone anchors, terracotta models of boats, and foraminifera fossils in the basin confirm that ships of 10 to 20 meters draft docked here during high tide, facilitating the loading and unloading of cargo in an era predating written sea charts by millennia.

Recent paleo environmental studies have mapped a 30-kilometer river extension that once linked Lothal directly to the Arabian Sea, dispelling earlier doubts about its maritime functionality amid modern silting and floods, while ongoing excavations as of 2026 continue to uncover fresh layers of workshop debris and structural remnants, breathing new life into our comprehension of this ancient hub.

This dockyard was no isolated engineering feat; it pulsed as the nerve center of Lothal's economy, where small factories and artisan quarters hummed with production tailored for export. Workshops clustered near the marketplace and warehouse revealed specialized industries: a bead factory with 11 rooms, kilns, and cinder heaps where lapidaries etched carnelian, jasper, and steatite into micro-beads as fine as 0.25 millimeters, strung with gold wires—a technique echoing in modern Khambhat craftsmanship. Shell-working dominated, drawing chank from the Gulf of Kutch for bangles, ladles, inlays, and even musical plectrums; ivory carvers fashioned scales with decimal precision (1.70 mm graduations), while coppersmiths employed lost-wax casting in multi-piece molds to forge celts, hooks, and spears from arsenic-free ingots likely sourced from Arabia.

Five furnaces and sinks in one metallurgical unit suggest organized team labor, yielding gold pendants, cogwheels, and heart-shaped ornaments that spoke of prosperity. The warehouse, elevated on 64 cubical podiums measuring 3.6 meters per side, stored these goods under elite supervision, with ramps leading straight to the dock for efficient shipping.

Residential blocks housed these artisans—20 to 30 homes per cluster, equipped with baths, latrines, and drains that channeled waste into the river, a sanitation system resilient against recur-



rent floods. Diets reflected trade's bounty: rice (South Asia's earliest evidence), ragi, lentils, and bones from wild and domesticated bovines. Cultural artifacts painted a vibrant society: terracotta gamesmen resembling chess precursors, wall paintings depicting fables akin to the Panchatantra's fox-and-crow tale, and a compass-like shell disc hinting at navigational prowess. Fire altars evoked Vedic rituals like the Gavamayana sacrifice, while a sea goddess figurine linked to contemporary Vanuvati Sikotirimata worship. Standardized weights in a 16:2:1 ratio and the site's third-largest collection of IVC seals—featuring bulls, tigers, and unicorns—stamped goods for mass export, ensuring trust across distant markets.

Lothal's trade networks extended far beyond the subcontinent, cementing its role as a Harappan maritime pioneer. Carnelian beads matching Lothal styles have surfaced at Mesopotamian sites like Ur and Kish, alongside Persian Gulf seals from Bahrain attesting to direct Gulf routes. Exports included faience jewelry, ivory weights and combs, cotton textiles, shells, gems, and rice, bartered for copper, chert from Larkana, and chalcidony.

While direct evidence to Egypt remains indirect—Harappan beads and ivory in the Nile Valley likely via intermediaries like Mesopotamia—Lothal supplied the standardized goods that fueled these exchanges. Climate shifts around 1900 BCE brought catastrophe: weakened monsoons, salinity, and floods silted the dock and ruined soils, prompting hasty rebuilds with soakage jars.

Late Harappans lingered until 1600 BCE with simplified pottery and blades, but de-urbanization set in, marking Lothal's gradual fade even as it outlasted Mohenjo-daro. Current excavations, actively progressing in 2026 under ASI supervision, are peeling back these late layers to reveal



more about the site's prolonged resilience and final phases.

Rediscovery came post-1947 Partition, when ASI surveys in Kutch and Saurashtra identified over 50 Harappan sites. Rao's trenches from 1955 to 1960, extended in 1961, exposed the mound's layers, dock, township, and a treasure trove now housed in the on-site ASI museum. Challenges persist—salinity erodes bricks, moss from monsoons clings stubbornly—yet these contemporary digs, including peripheral trenches and nullah ex-

plorations, affirm Lothal's industrial scale and promise further revelations. Its inclusion on UNESCO's tentative World Heritage list since 2014 underscores its unmatched port primacy, a beacon of Harappan resilience amplified by today's ongoing archaeological efforts.



In a bold revival, the present Indian government under Prime Minister Narendra Modi has greenlit the National Maritime Heritage Complex (NMHC) at Lothal, an ambitious ₹3,500 to 4,500 crore project under the Sagarmala initiative, transforming 400 acres of Gujarat-donated land into one of the world's largest maritime museums by 2028. Foundation laid in March 2019 by the Prime Minister himself, the complex—designed by Hafeez Contractor and executed by Tata Projects—integrates Lothal's ancient ruins with a futur-

istic narrative of India's 5,000-year seafaring saga, coinciding seamlessly with the live excavations that continue to enrich its interpretive galleries. Gujarat's ₹150 crore infrastructure infusion (roads, water, power) and ₹209 crore from major ports seeded its launch, with PM reviews in 2022 and 2024 accelerating momentum amid minor delays.

Phase 1A, budgeted at ₹1,200 crore across 35 acres and targeting August 2025 completion, kicks off with six immersive galleries: oceanic mythology featuring Varuna, Harappan maritime pioneers, post-Harappan climate disruptions, Greco-Roman interconnections, and evolutions of the Indian Navy and Coast Guard. Highlights include a Lothal Jetty Walkway for tactile history, a 5D theater plunging visitors into ancient voyages, and VR simulations of dock operations informed by the latest excavation data. Phase 1B escalates with the world's tallest lighthouse museum, completing the 14 galleries that trace from Harappan sails to INS Vikrant's triumphs. Phase 2 unleashes spectacle: state pavilions for coastal regions and union territories, a Maritime and Naval Theme Park, Monuments and Memorial Park, Climate Change Park warning of ancient floods' modern parallels, and an Adventure-Amusement Park with ship rides and recreations of Lothal and Dholavira cities.

The scale dazzles—theme parks blending education and thrill, eco-resorts and a Museotel for immersive stays, a maritime research institute with hostels fostering global scholarship, and coastal pavilions evoking Chola navies and Portuguese caravans. A Netherlands partnership infuses Indo-European perspectives, while AR tech revives Harappan life in vivid detail, drawing directly from artifacts emerging from the current digs. Economically, NMHC promises 15,000 direct jobs and thousands more in tourism, revitalizing the Bhal region's subsistence farming into a heritage-driven economy, much like Dholavira's recent surge. Gujarat Chief Minister Bhupendra Patel has hailed it as the "greatest maritime complex," poised to attract FDI and millions of visitors, rivaling Singapore's Maritime Gallery or Lisbon's naval museums but rooted uniquely in Harappan soil.

This initiative bridges epochs, safeguarding Lothal from environmental foes like its ancient nemesis—salinity—with cutting-edge preservation, even as ongoing excavations provide real-time insights for exhibit curation. Galleries will showcase ASI-held seals, weights, and anchors, narrated through interactive exhibits that honor ancestors who conquered seas sans compasses. In the Sagarmala era of 800-plus port projects and blue economy ambitions, NMHC positions India as a maritime superpower, echoing Harappan innovation. As Phase 1A nears fruition in 2026 alongside active digs that keep unveiling the past, Lothal evolves from buried mound to global icon, its 2500 BCE dock whispering lessons of resilience to a world facing rising tides. This isn't merely a museum; it's India's seafaring renaissance, a monumental tribute to the traders who first strung beads for Babylon and sailed horizons unknown.