Los Angeles Port Police
Sonar Underwater Program

Situation
The Los Angeles Port Police Department's underwater dive/sonar program provides quick access to underwater imagery and data that can be viewed in real time. This modern and evolving technology strengthens the Port Police Department's efforts to monitor and protect the Port of Los Angeles' supply chain and transportation infrastructure.

Mission
The continuous development of a robust underwater program dedicated to protecting the Port of Los Angeles' supply chain, transportation infrastructure, stakeholders, and community while simultaneously building on synergetic partnerships, information sharing and domain awareness with other public safety entities.

Execution
The underwater program is managed by the Los Angeles Port Police Dive Team and consists of certified personnel, approved equipment, consistent training and thorough documentation. The program will enhance existing security efforts of the Port of Los Angeles and neighboring partners by providing: real-time situational awareness, imagery of subsurface conditions, and identification of maritime threats to navigation and commerce.

Administration
Administration will adhere to the guidelines established by the United States Navy for underwater mine counter measures, Incident Command System (ICS), Field Operations Guide (FOG), Supervisor's Operations Guide (SOG), Emergency Operations Guide (EOG), dive guidelines established within the Port Police dive manual, and the Los Angeles Port Police Department policies and procedures.

Coordination
As each incident/event develops, notifications will be made to appropriate entities including the Los Angeles Port Police Watch Commander, United States Coast Guard (USCG), Maritime Coordination Center (MCC) and other jurisdictional agencies within the respective area of responsibility.

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Overview

The Los Angeles Port Police Department has sought out innovative underwater technologies to protect and secure its waterways. The Department's pursuit of synergetic partnerships and information sharing with civilian, law enforcement agencies, and our Nation's military forces have aided in the development of a robust underwater program. The dive team's mission to protect the Port of Los Angeles' supply chain and transportation infrastructure is complimented by the Agency's ability to integrate technology into its underwater Port resiliency and mitigation plan.

The Department's strategy is to proactively use technology, education, training, and agency partnering and community involvement to promote safety, security, and emergency management. The team's goal is to optimize underwater maritime awareness through skilled divers, sonar operators, underwater robotics, and the continued introduction of cost effective undersea surveillance and inspection based technology.

Our layered underwater strategy utilizes technology to monitor the Port's seabed, technology enhanced searches using remotely operated vehicles, side scan sonar imagery and underwater pre-emptive searches of the Port of Los Angeles' critical infrastructures and vessels of high interest. The dive team's synergism with local and federal entities has assisted with the development of information networking and partnerships in the team's effort to defend the Port's waterways. The team's sonar data is shared with the Port of Los Angeles' surveying engineers and the Naval Oceanographic Office annually. The team's ability to successfully integrate military and scientific technologies into the Port Police underwater program has enhanced the Agency's maritime awareness.

If not for the collaboration and guidance of the Johns Hopkins University Applied Physics Laboratory, the United States Navy, Klein Marine Systems, the Port of Los Angeles Engineering Surveyors, and the Port of Los Angeles Harbor Department commissioners, the team's sonar program would not have been possible. In August of 2008, the Los Angeles Port Police sonar program launched. The program has been an instrumental tool in underwater operations and will continue to advance operationally with experienced operators and innovative technology.

Concept of Operation

Sonar/ROV systems are used to assist the Los Angeles Port Police in enhancing public safety, transportation infrastructure protection, and search and rescue (SAR) operations by providing a visual assessment (underwater imagery) throughout all phases of the emergency. This program also enhances critical infrastructure protection of the Port of Los Angeles' supply chain and transportation modes. The team's sonar utilizes high frequency sonar imagery to provide real-time situational awareness and evidence collection. This ability to obtain a view of the seafloor in adverse conditions without jeopardizing human life is truly unprecedented. Having the capability to launch these systems quickly assists command staff and other involved parties in building an appropriate incident management structure.

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Sonar operations/surveys will be conducted routinely to maintain current imagery and awareness of the Port's seafloor. The Los Angeles Port Police Department's sonar operations may be conducted on multiple platforms available within the department's fleet. However, the team's primary sonar platform is DiveBoat1, a 69ft aluminum All American Marine catamaran designed specifically for sonar operations, various underwater mechanical apparatus operations, and dive operations. The team's back-up vessel is a 31ft SafeBoat. The SafeBoat is scheduled for replacement during the 2019/2020 fiscal budget. A 12M Metal Craft vessel will replace the SafeBoat.

Sonar operations should be staffed with a minimum of five Port Police Divers. Three crew members must be prepared to dive at all times. In addition to the Klein 5000V2 and/or Klein 4900/3900 side scan sonar, the Kongsberg Mesotech, Teledyne SeaBotix vLBV300 w/multi-beam, ArtemisPro diver handheld sonar, scuba equipment and other underwater equipment shall be onboard during operations.

If an anomaly is discovered, the team will deploy the following tactics to identify the object: side by side comparison using previous route survey data, review previously identified anomalies, and visually confirm/identify the anomaly by a diver or an ROV deployed from the vessel.

Sonar/ROV Requests
Requests to deploy sonar/ROV systems shall be approved by the Maritime Operations Division's executive officer or his designee. When an incident occurs that may require sonar/ROV deployment the executive officer or his designee shall be notified by Port Police communications dispatch or Watch Commander.

The commanding officer or executive officer will give the approval for all team deployments. The team supervisor or designee will notify the appropriate team members regarding the team's activation and response.

Sonar /ROV Deployment
Prior to all deployments, an operational threat assessment should be completed to determine the appropriate response and resources necessary. This assessment should consider the team's capabilities and limitations and should be reviewed periodically.

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The following is a list of missions sonar is utilized for:

1. Critical infrastructure searches and inspections
2. Evidence documentation and recovery
3. High Asset Vessel Escorts and/or inspections
4. Port reconstitution and resiliency
5. Dignitary protection
6. HAZMAT response
7. Search and rescue of human life
8. Over watch for high risk incidents
9. Disaster response
10. Special Events

Scope of Operation:
The dive team has identified and divided the Port of Los Angeles into eight geographic areas: Main Channel, Glenn Anderson Shipping Channel, Turning Basin, West Basin, Pier 300 Shipping Channel, East Basin, Outer Harbor and West Channel. A priority list, terminology, defined boundaries for each area, and a timeline to complete each route survey has also been established.

The priority and request for service shall dictate the route survey area and frequency of surveys. A Klein Marine Systems' side scan sonar will be used to complete route surveys. Surveys will be conducted in high resolution 50/75 meters with 50 meters spacing for programmed routes and grids. An estimated time to completely survey the Port of Los Angeles has been established by the dive team. The estimated time is consistent with the calculations made by George Pollitt (Johns Hopkins University Applied Physics Laboratory, Mine Warfare Analyst) from his Maritime 911 Study and the National Defense Industrial Association (NDIA) Study on Mines and Underwater IEDs in US Ports. The side scan sonar should not be towed faster than 6mph or slower than 4 mph. An altitude of 10 meters +/- 3 meters (25ft to 30ft) should be maintained during the route survey. Route surveys are recorded in sdf format. A baseline survey of each geographical area shall remain on dedicated sonar imaging desktops and laptops. Information will be downloaded onto a portable storage device and shared with NAVOCEANO and designated recipients annually.

Preventative

a. The team practices a layered strategy utilizing towed side scan sonar, tri-pod mounted sector scanning sonar, multi-beam sonar attached to remotely operated vehicles (ROV) and diver held multi-beam sonar to monitor the Port's seabed, technology enhanced searches using ROVs, and underwater pre-emptive searches of its critical infrastructures and vessels of high interest to secure the Ports maritime environment. Sonar operators/divers train regularly in the recognition and placement of commercial and improvised explosive devices, the documentation and basic rendering safe of waterborne devices. The team's synergism with local and federal entities has assisted with the development of information networking and partnerships in our effort to protect our waterways.

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Incident Response

a. The dive team has 24 hour, 7 days a week responsibility for responding to radio or suspicious actions/activities from the waterline or subsurface. Team members are prepared to dive, board vessels, escort ships, conduct and record sonar images within the Port's region in minutes of being notified. Once a threat or area of interest is identified, divers will be notified and given a location to respond. When on scene, the dive supervisor will do a risk/benefit evaluation of the site and determine the appropriate response. The threat or perceived threat will be mitigated using technology and/or diver related search techniques.

Post Incident

a. The dive team currently has the capability to sustain operations independent of city provided power or resources for several days. In addition to dive operations, the team has the capability to conduct route surveys of the Port shipping channels and berths. These surveys will provide immediate seabed images; offering clear and affective safe transit routes for vessels, enabling the Port of Los Angeles to resume its business operations by supplying and maintaining a safe marine environment.

Crew Assignments and Responsibilities

a. Vessel captain – piloting vessel and maintain vessel tracking
b. Forward observer – monitor data and target anomalies observed in the water column via laptop (slave mode) and assist vessel operator with vessel navigation
c. Main observer – monitor data and target anomalies observed in the water column via desk tower/laptop (master mode), responsible for data adjustments and management of towfish altitude and setup
d. Deckhands – towfish deployment, cable/umbilical management, and assist with vessel start up, lock out and general maintenance

Operational Considerations

1. PROTECTION OF THE NON-PARTICIPATING PUBLIC. All operations should occur within a secured perimeter, with controlled access in and out of the area, when feasible. Every attempt shall be made to offset operations from the nearest vessel.

Pre-flight and Procedures

1. Pre-op Procedure
    a. Pre-op procedures will be conducted prior to each sonar/ROV op and will be done in accordance with the checklist prepared by the Los Angeles Port Police dive team and will adhere to the manufacture's recommendations. Any issues found during the pre-op procedures will be noted. It will be the responsibility of the dive supervisor to determine if the issue will alter the safe operation of the equipment.
2. Pre-op public notification

a. Except in instances where officer safety could be jeopardized, time is of the essence, or impractical due to the operation's location, officers shall utilize the appropriate navigational day shapes/lights, the VHF marine radio, the vessel's PA system, or request the USCG to broadcast alerts to people in the area of the sonar/ROV operation. To aid in public safety, alerts shall notify the public that sonar will be used and they should avoid the designated area.

Collisions

1. If a collision occurs during the operation of a sonar or ROV system and results in serious injury to any person, any loss of consciousness, or any property damage (other than the system) notification shall be made to the Maritime Operations Division's (MOD) executive officer and the Los Angeles Port Police watch commander. An appropriate report for the incident shall be completed.
2. If a collision occurs during the operation of a sonar or ROV and results in no serious injury to any person, no loss of consciousness, or property damage (other than the system), documentation should be noted in the post dive report at the discretion of the dive supervisor.
3. In either case, the supervisor shall conduct a review of the collision and determine if the collision could have been prevented through maintenance, training, etc., and ensure all necessary paperwork has been submitted.

System Requirements/Maintenance

1. System Requirements
   a. Sonar systems are purchased and maintained by the Los Angeles Port Police dive team.
   b. Only sonar systems and underwater equipment authorized by the Los Angeles Port Police can be deployed unless approved by the MOD executive officer and/or dive team supervisor.
2. Maintenance
   a. Sonar systems shall be maintained regularly per the user manual and company's recommendations. Only properly trained officers shall complete any repairs or perform maintenance on the sonar systems.
   b. The Port of Los Angeles' Harbor Department Construction and Maintenance Division (C&M) service the team's vessels and mechanical apparatus. The C&M Division has tradesmen in HVAC systems, mechanist for vessel power plants, welding, and heavy equipment. Additionally, the C&M yard contains the equipment and supplies necessary to maintain, repair and/or replace the team's equipment.
3. System Storage
   Unless directed by the Office of the Chief of Police, all sonar/ROV systems and dive equipment shall be stored at 954 S. Seaside Ave, Terminal Island 90731. Regardless of ownership, all underwater systems, shall confirm to the standards set forth by Los Angeles Port Police within these guidelines.

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Training

1. All team members engaged as a vessel captain or sonar operator, shall be trained and maintain proficiency in their operator abilities. Each member shall be certified as an operator in accordance with current Port Police policies, USCG, and manufacturer requirements and standards. The team operators will stay proficient in the job function by participating in monthly operations and training sessions. Vessel captains must possess a minimum of a USCG license of 50GT and successfully completed manufacturer training for deployed sonar systems.
2. Qualification courses include skills, obstacles, and utilizing the sonar/ROV and/or dive equipment in a manner consistent with the manufacture's guidelines. A captain or operator who does not have any documented missions or training within a span of 90 days (due to vacation, court appearance, etc.) will have to show proficiency prior to any deployment and the dive supervisor may suspend his/her duties until the officer has had updated training and completed a qualification course.

Image Retention

1. With the exception of training and demonstration purposes, all missions where sonar/digital recording devices are utilized for criminal investigations or evidentiary value should be recorded. When recorded, data should be down loaded under the related incident number and retained in accordance with the Los Angeles Port Police Policy Manual Section 450.7, Retention of Recordings the Records.
2. Audio and/or images captured by a sonar/digital recording devices should be retained by following the procedures stated in Section 450.7.1 of the Los Angeles Port Police Policy Manual, Retention Requirements

Documentation

1. All operations shall be documented by an involved officer, on a dive report. The documentation should, at minimum, include:
   a. All sonar survey/dive operation times and locations.
   b. Reason for the sonar/dive operation.
   c. Name of approving supervisor.
   d. Any additional relevant information to the mission.

Equipment

1. All sonar systems, control stations, accessories and supporting equipment used by the Los Angeles Port Police dive team, regardless of ownership, shall conform to the standards set forth by the equipment manufacturer, manufacture operational guidelines and the Los Angeles Port Police sonar/dive program policy manual. If not addressed by these guidelines, equipment shall be approved by the MOD executive officer and/or team supervisor.

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2. Vessels assigned to the dive team
    a. DiveBoat1 – All American Marine aluminum catamaran equipped with:
        i. Construction standard USCG, Subchapter T
        ii. Length: 69'; beam: 24'; draft: 6'7"
            1. Useable aft deck space 24' wide X 17' long (transom to cabin)
            2. Cabin dimensions 18' wide X 30' long
        iii. Cummings Engines
            1. (2) 705 bhp
            2. Maximum speed approx 25kn @ 100% rated power
            3. Cruise speed approx 20kn (200rpm below max
            4. Minimum speed .75 knots
            5. Fuel capacity 1300 gallons minimum
            6. Waste capacity 100 gallons minimum
            7. Fresh water capacity 100 gallons minimum
            8. Passengers 28 minimum
        iv. (3) control stations
        v. Navigation packages in the wheelhouse and flybridge
        vi. Wifi & mirroring capabilities for briefs and document review
        vii. Hydraulic crane (14ft boom)
        viii. A-frame for sonar ops
        ix. Rehab area w/(3) HVAC systems for climate control, (8) bunks, galley, dinette area, (2) freshwater hot/cold showers & full bathroom
        x. Dry/wet work lab & charging station w/large monitors for data viewing and briefs
        xi. Yamaha 1200 PWC
        xii. Zodiac FN530
        xiii. Bauer BP12H breathing air compressor w/(2) AMSE storage bottles (oxygen clean)
        xiv. 21.5 kW Onan Genset generator
            1. Voltage 120/240v AC
            2. 12/24 DC
    b. Boat23 – SafeBoat 31ft equipped w/3000kW mobile generator
3. Sonar Systems
    a. (1) Klein Marine Systems 5000V2 side scan sonar
    b. (1) Klein Marine Systems 5000 side scan sonar
    c. (1) Klein Marine 4900 side scan sonar
    d. (1) Klein Marine 3900 side scan sonar
    e. (2) Kongsberg MS1000 Mesotech single beam sector scanning sonar
    f. (1) ArtemisPro diver held sonar w/Oculus multi-beam sonar
    g. (1) Shark Navigator diver held sonar w/BlueView multi-beam sonar
    h. (1) Teledyne Seabotix vLBV300 ROV w/ Tritech Gemini multi-beam sonar

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4. Remotely Operated Vehicles (ROVs)
   a. (1) Teledyne Seabotix vLBV300 w/integrated navigation console, Tritech Gemini multi-beam sonar, 250 meter cable, grabber accessories & tracked crawler
   b. (1) Teledyne Seabotix LBV150-SE5 w/integrated navigation console, 250 meter cable, grabber accessories & crawler
   c. (1) Teledyne Seabotix LBV200 w/250 meter cable & grabber accessories
5. Dive Equipment
   a. Open Circuit
      i. Interspiro MKII Divator full face mask w/OTS MAG 1004HS underwater communication
      ii. Wetsuit or dry suit
      iii. Air or enriched air
   b. Surfaced Supplied Diving
      i. Kirby Morgan Air Control System 5
      ii. Kirby Morgan Helmets
         1. 27B Superlight
         2. 37SS
6. Unmanned Aircraft System
   a. (2) DJI Matrice 210
      i. 30X optical zoom HD gimbal camera
      ii. 4X thermal imaging gimbal camera
   b. (2) DJI Inspire2
      i. 4X optical zoom HD gimbal camera
      ii. 4X thermal imaging gimbal camera
   c. (2) DJI Phantom4
      i. 4K gimbal camera
   d. (1) DJI Mavic
      1080HD camera

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ROUTE SURVEY PRIORITY LIST

Location		ETA to Survey Areas
1. Main Channel		4 HRS
2. Glenn Anderson Shipping Channel		4 HRS
3. Turning Basin		4 HRS
4. West Basin		2 HRS
5. Pier 300 Shipping Channel		3 HRS
6. East Basin		2 HRS
7. Outer Harbor	3 HRS	
8. West Channel		2 HR
Port of Los Angeles Complex (1) Vessel		24 HRS

Location

1. Main Channel (red outline – Reservation Point to Vincent Thomas Bridge)
    a. Multiple critical infrastructure sites
    b. Commercial and recreational tenants
    c. Economic impact if the Port were closed for an extended period of time
    d. Vessel traffic restricted if not disabled with a threat or perceived threat
2. Glenn Anderson Shipping Channel (grid surveys: Glenn Anderson #1, Glenn Anderson #2 & Glenn Anderson #3, pink outline – Outer Harbor to 3 mile past the break wall between lighted buoys)
    a. Only access for large vessels to enter the Port of Los Angeles
    b. Economic impact if the Port were closed for an extended period of time
    c. Vessel traffic restricted if not disabled with any threat or perceived threat to Angel's Gate
3. Turning Basin (grid surveys: Turning Basin #1 & Turning Basin #2, blue outline – Vincent Thomas Bridge between Berth 96 to Berth 224)
    a. Economic impact if the Port were closed for an extended period of time
    b. Vessel traffic restricted if not disabled with a threat or perceived threat
4. West Basin (grid surveys: West Basin #1, West Basin #2, West Basin #3 & West Basin #4, light green outline – Berth 118 to Berth 147)
    a. Economic impact if the Port were closed for an extended period of time
    b. Vessel traffic restricted if not disabled with a threat or perceived threat

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5. Pier 300 Shipping Channel (grid surveys: Pier 300 #1, Pier 300 #2 & Pier 300 #3, purple outline – Fish Harbor and Berth 300 to Berth 406)
    a. Economic impact if the Port were closed for an extended period of time
    b. Commercial and recreational tenants
    c. Vessel traffic restricted if not disabled with a threat or perceived threat
6. East Basin (grid surveys: Slip No.1, East Basin #1, East Basin #2 & East Basin #3, green outline – Berth 177 to Berth 214)
    a. Marinas
    b. Mostly residential and vessel storage in consolidated marinas
    c. Henry Ford and Badger Bridge (Alameda Corridor, connects land masses for train and vehicle traffic and divides the Port of Los Angeles from the Port of Long Beach waterways)
    d. Economic impact if the Port were closed for an extended period of time
7. Outer Harbor (yellow outline – Light House, Cabrillo Beach, and Berth 44 to Berth 60)
    a. Recreational boating and overnight anchorage
    b. Minimal impact to the Port's economic trade
    c. Deep draft lay berth
8. West Channel (light yellow outline, Berth 30 to Berth 43)
    a. Recreational boating and sports fishing
    b. Minimal impact to the Port's economic trade
    c. Marinas

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