Desktop Reconnaissance Procedure
for
Observing System Installation Planning

Procedure Number: SOP # 3.1.1.6
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1. **Title:** Desktop Reconnaissance Procedure for Observing System Installation Planning.

2. **Purpose**:

The purpose of this SOP is to provide procedural guidance for completing desktop reconnaissance, a prerequisite step in planning the successful installation of metocean observing systems. This document details the required components of a desktop reconnaissance and the roles of involved parties. The workflow described results in the creation of a desktop reconnaissance report outlining project functional requirements, constraints and design recommendations. The summary should include information which aids in the development of design alternatives prior to field reconnaissance or detailed design activities.

3. **Background/History**:

CO-OPS frequently upgrades, relocates, rebuilds and installs new stations to maintain metocean observing systems operated under various programs. Thorough planning and coordination are critical to station installation project success. A desktop reconnaissance prior to the site visit will determine the environmental conditions in which the proposed system must operate. This will be used to determine which particular site is best suited to fulfill project requirements and identify specific additional information to be collected during field reconnaissance. The desktop recon may also uncover sufficient details such that a field visit may be unnecessary.

4. **Scope/Applicability**:

This SOP is primarily applicable to DDET personnel responsible for compiling the desktop reconnaissance information, and those contributing to the preliminary design. Engineers, field party chiefs, project managers and planners may find this SOP useful for understanding how the feasibility and scope of installation of oceanographic instrumentation is determined.

5. Main Processes:

1. Convene initial reconnaissance and design planning meeting.
2. Create a project design folder.
3. Compile existing or historic station information and photographs.
4. Collect available information about the area.
5. Define probable design conditions and develop engineering requirements.
6. Summarize desktop reconnaissance results.
7. If applicable, seek waiver approval and document any non-standard system configuration or sensor.
8. Brief on desktop reconnaissance results and assess need for site visit.

6. Detailed Sub-Processes/Checklists:

The following roles, responsibilities and workflows provide detailed guidance for accomplishing the tasks illustrated in the orange box of the Station Design WorkFlow found in Appendix A. DDET has the responsibility of collecting the information detailed in the following sections.

6.1 Convene the Initial Recon and Design Planning Meeting

The Observing System Manager (OSM) and Project Lead (PL) (if applicable) shall hold a meeting with the assigned Design and Development Engineering Team (DDET) member, appropriate Program Management Team (PMT) member, assigned Field Operations Division (FOD) Field Team Lead (FTL), FOD Crew Chief (FCC) and other relevant personnel to understand and document the scope and requirements of the proposed installation. During this meeting, those attending shall exchange initial thoughts on the project scope, schedule, stakeholder requirements, and potential location(s) already identified. All applicable project documents shall be referenced to determine the scope and requirements of the proposed installation.

This meeting should be held at least 6 months prior to the procurement deadline relevant to the project. Often the timeline for installation is affected by circumstances beyond the project team's control; if the timeline for installation is shorter than 6 months the meeting should be held as soon as possible.

If contact information is known for property owners of the location(s), the FTL and/or FCC should contact the facility representative (FR) to set up a meeting with the project team to discuss the viability of sitting a station on the facility.

6.2 Create Project Design Folder

A project folder should be created by DDET that includes all the information collected in the above sections. The folder shall reside in the FERS project directory on \\esp-s-

nas01\co-ops_shared_data\CO-OPS_Common\Engineering Review Board\Field Engineering Review Subcommittee\Submitted Plans\<PROJECT NAME>\Recon, where <PROJECT NAME> is the name of the project. Any project documents created should be saved to the folder. Since the folder resides on Common Drive, all employees including the planning team members have permissions to read and write to that folder.

6.3 Review and Compile Historic Station Information

A records search in the vicinity should be performed by DDET (or if the group agrees at the initial meeting to another member conducting this work) for current or historic CO-OPS, partner, or peer (other government agencies or universities) sensor installation locations. Information on past or current cGNSS installations are particularly important to find.

After determining if there is a current or historic station in the area, cross reference the station identification number and collect the information listed in the Station Information Package (490 folders), the CO-OPS website and the CO-OPS databases. Store information gathered in the project design folder.

Information from the above sources to collect may include:

- Photos
- Tidal Datums
- Extreme Water Levels (If possible note source and direction: storm surge, extreme tides, stormwater runoff)
- eSite Documentation
- Station ‘To-Reach’ Statements
- Bench Mark Descriptions and Elevations
- Sensor Elevation Diagrams
- Facility Infrastructure
- Local Contacts
- Property Use Agreement

Review the CO-OPS environmental compliance checklist for any station installation, particularly if any oceanographic sensors are to be installed below the water surface or diving is required.

CO-OPS EC Checklist
Environmental Compliance Checklist Guide

Review and document any historic and existing “To-Reach” statements and bench marks. For existing stations review the eSite report for future work and determine if it will pose a potential obstruction or interference to the oceanographic sensors to be installed. Additionally compile historic photos that give a sense of the layout and orientation of the existing station. For new stations, identify bench marks in the vicinity of the proposed site. Bench mark information can be found on CO-OPS, NGS, and NGL websites:

CO-OPS
http://tidesandcurrents.noaa.gov/stations.html?type=Bench+Mark+Data+Sheets

NGS
https://www.ngs.noaa.gov/CORS/

NGL (CO-OPS has reserved the block of N station IDs from N001 to N999 on this site)
http://geodesy.unr.edu/index.php

For new stations, identify bench marks in the vicinity of the proposed site. Investigate bench mark possibilities from the NGS website. The datasheet by point radius website is http://www.ngs.noaa.gov/cgi-bin/ds_radius.prl. Use the project latitude/longitude as the center point coordinates. Search for bench marks within a 1 mile radius. Datasheets retrieved from the NGS allow the CO-OPS Recon Team to find nearby bench marks which are essential for replacing destroyed historic marks and for providing a connection to the North American Vertical Datum of 1988 (NAVD88).

Use GIS software (e.g., Google Earth, ArcGIS, Nobel Tec) to plot stations and bench marks from any existing or historic stations. The feasibility of reoccupying an historic station location should be assessed and documented in the recon report, if applicable. If possible use to evaluate line of sight to GOES.

Determine if a Property Use Agreement exists for the station and determine if it needs to be updated or one needs to be obtained in order to head off any permitting issues with the property owner. FOD is responsible for drafting such agreements and opening dialogue with their local contacts if needed.

6.4 Collect Available Information about the Area

Reference the Coast Pilot (http://www.nauticalcharts.noaa.gov/nsd/cpdownload.htm) for important information about the area such as channel descriptions, anchorages, bridge and cable clearances, currents, tide and water levels, prominent geographic and geologic features, pilotage, towage, weather, ice conditions, wharf descriptions, dangers, routes, traffic separation schemes, small-craft facilities, and Federal regulations applicable to navigation. Document relevant information found in the Coast Pilot.

Research any extreme water level data for the area. Where possible determine the highest and lowest minimum observed, and 1% exceedance water at the location. CO-OPS data can be found at http://www.tidesandcurrents.noaa.gov/stations.html?type=Water+Levels. In addition to the observed values, statistical and modeled extreme values are also available at https://www.tidesandcurrents.noaa.gov/est/. FEMA publishes flood maps which document projected storm surge elevation for the area. Those elevations can be found by referencing Flood Information Rate Maps of the area at https://msc.fema.gov/portal/search. Another viable source for storm surge elevations is

the National Hurricane Center's Sea, Lake and Overland Surges from Hurricanes (SLOSH) Model. SLOSH model heights are available through the Oceanographic Division's Applications and Analysis Team. Additional guidance on information gathering methods is detailed in SOP 'Inundation Model Usage in Station Design'.

Search the National Geodetic Survey Continuously Operating Reference Station (CORS), research institutions and state and local governments. Collect as much of the information listed above for nearby peer installations. Store search results in the project design folder.

For stations that are slated for cGNSS antenna installation, at a minimum locate the closest 5 NGS CORS stations for relative position solutions. For each of the 5 CORS stations list their; lat/lon position, straight line distance from the prospective CO-OPS cGNSS station location, owner/operator, station overview photos, antenna mounting photos, and create an annotated map graphic showing all surrounding CORS and their distance to the prospective location of cGNSS station.

Determine the cellular signal strength at the site (Verizon, AT&T), the signal strength may determine if the test kit modem antenna should be placed outside or if a directional antenna is needed.

OSTEP
https://sites.google.com/a/noaa.gov/co-ops-ostep/home/currentprojects/gnss

- Satellite Imagery
- Nautical Charts
- USACE Surveys
- FEMA Flood Maps

Store all results in the project design folder.

6.5 Define Probable Design Conditions

The probable design conditions matrix should include all information collected by DDET through the historic station information search and information on the location that could inform the design of the station. Some important information to consider is:

- General site information which constrains design options
- Geologic features
- Salinity and/or density of water
- Wave and current conditions
- Dominant wind direction
- Superstructure ice accumulation
- Extreme Water Levels and Water Level Datums
- Wind speed from ASCE 7 Hazard Tool website

- SLOSH model water level heights and FEMA flood elevations
- Communication methods (GOES and IP availability)
- Availability of AC power

Store all results in the project design folder.

DDET shall consult with the project team, gather and document any known requirements of the facility. Consult FCC and determine if utilities (phone and power) are available and what service providers will need to be contacted. Consult with the instrument lab for GOES, cellular coverage and document the findings in the desktop reconnaissance summary.

Evaluate the information collected in sections 6.1-6.4 and provide the project team with engineering requirements. Document engineering requirements and provide a recommendation as part of the desktop reconnaissance summary.

6.6 Summarize Desktop Reconnaissance Results

A brief (4-6 paragraphs) draft summary report detailing the desktop reconnaissance should be developed by DDET. The draft should be circulated to the project team for review. The summary report should include:

- An introduction to the station location, scope of the project and contacts/shareholders or user requests
- Historical station and location information
- Cell coverage map
- Bench marks diagram
- CORS map of the area, with key information listed for the nearby stations
- Datum analysis
- Probable design conditions
- Engineering requirements
- Any additional engineering or site specific considerations
- Photos of the existing station or site, including satellite imagery
- At a minimum 2 recommended recon locations, preferably 3+; see SOP 3.1.1.7 for field recon requirements

The draft summary report will include information to aid the development of design alternatives and installation options prior to initiating a site reconnaissance or design development effort.

6.7 Brief Project Team on Desktop Reconnaissance Results and Assess Need for Site Visit

Review the summary with the project team and discuss the recommendations. Feasibility of the recommendations with respect to the engineering requirements should be documented during this meeting. After the review, discuss and develop potential design alternatives with the project team as needed.

Work with the FCC to provide a recommendation to the DDETL and FTL on the need for a site visit. The appropriate FTL and DDETL will review the findings and the recommendation to determine if a site visit is required for a successful design effort. After consensus is reached on the desktop recon recommendations, share the summary report with EDB and AOB/POB Branch Chiefs. They will decide the need for the site visit considering the recommendation and if the site visit is needed then notify CO-OPS Deputy Director and ED and FOD Division Chiefs.

For guidance on conducting a site reconnaissance, see SOP 3.1.1.7 'Field Reconnaissance Procedure for Observing System Installation Planning'.

6.8 Seek Waiver Approval and Document any Non-Standard System Configurations

CO-OPS has standardized the electronics, systems and configurations in an effort to increase corporate efficiency. However, occasionally a project requires a non-standard sensor or sensor configuration (e.g. rain gauge or dual MWWL) due to site limitations, health and environmental concerns, or partner request. When a circumstance or request requires a non-standard configuration, the PL for CRR projects or the FTL for CRR-OPS or other in-house projects must complete the first half of the CO-OPS Waiver Request for Nonstandard Systems Configuration form (Appendix B) and submit the form to the Observing Systems Manager (OSM). The OSM will circulate the request to the Chief Scientist (CS). The CS adds comments and approves, denies, or sends the waiver back requesting more information. If CS approves, OSM submits to the ED Division Chief. The ED Chief reviews the request, adds comments and approves, denies, or sends the waiver back requesting more information. Upon approval the ED chief notifies the ELT. The OSM stores the approved form in the project folder and on paper in the 490 folder.

Part of the engineering requirement is that all new installs of oceanographic sensors or stations meet the risk based NWLON requirements for survivability. Briefly, this requirement states that the station shall be designed, installed and maintained to survive during extreme events which have a minimum mean recurrence interval of 300 years (i.e. 300 year storms). For a station to survive it must continuously collect, store, transmit and disseminate near real-time data, including during extreme events (as defined above). Every effort to try and meet this criteria shall be made, unless meeting them incurs an undue burden on CO-OPS. For stations that will not be able to meet this requirement a waiver shall be submitted to document the reasons behind the inability to meet this criteria.

7. <u>Quality Assurance/Control</u>:

The PL and FCC should contact the FR to obtain the latest plans for the facility including future improvements and construction schedules. Understanding the facility's plans for the site will ensure CO-OPS invests resources in the most responsible and sustainable way possible. The details provided by the FR should be included in the desktop reconnaissance. The facility's plans or requirements may disqualify the location or add additional restriction or risk to potential design alternatives, impacting the installation. The PL will ensure CO-OPS resource managers have resourced task assistance in current resource tracking tool, and continue project oversight.

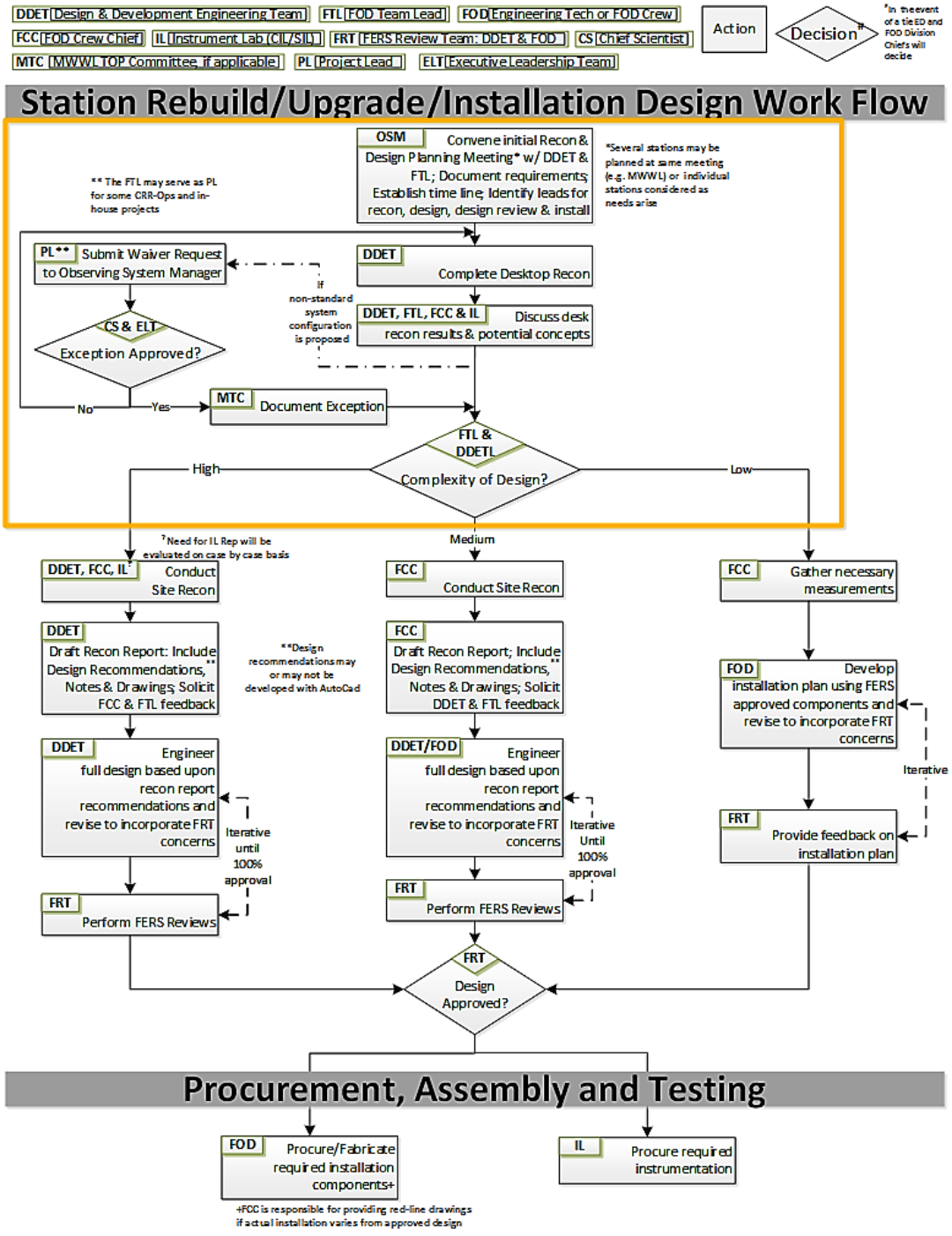
8. Management/Responsibility:

DDET coordinates desktop reconnaissance plans with the PMT, OD, FCC, FOD team leads, OSM, and Instrument Lab and works with the project team to identify recon locations. The DDETL oversees that the tasks are being accomplished in a reasonable time and communicates/resolves concerns first with the other Division's appropriate Team Leads and if needed, next with the BC for EDB. The responsibility for maintaining this SOP resides with DDETL.

9. Change History:

September 01, 2020: Added additional reconnaissance information for cGNSS system reconnaissance. Revised text to eliminate jargon and update to current practices.

Appendix A: Station Design Work Flow Diagram



Appendix B: CO-OPS Waiver Request for Nonstandard Systems Configuration

CO-OPS Waiver Request For Nonstandard Systems Configuration

Instructions: Complete the information above the double line and submit to CO-OPS Observing System Manager (OSM) for approval from the Chief Scientist and Engineering Division Chief.

Requestor's Name: _____

Email: _____

Station ID #: _____

☐ New Station
or
☐ Existing Station

Station Name: _____

Proposed Nonstandard Configuration :

Reason for Request:

1) _____ _____
OSM Receipt Signature **Date**

Chief Scientist Comments

2) _____
Chief Scientist Signature

☐ Approved ☐ Not Approved ☐ Resubmit after addressing concerns noted

ED Chief Discussion Date & Comments

3) _____
ED Chief Signature

☐ Approved ☐ Not Approved ☐ Resubmit after addressing concerns noted