UNITED STATES NAVAL ACADEMY

# DIVISION OF PROFESSIONAL DEVELOPMENT

DEPARTMENT OF SEAMANSHIP AND NAVIGATION

NAMES\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

SECTION\_\_\_\_\_\_\_INSTRUCTOR\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

NN220 – FUNDAMENTALS OF NAVIGATION

NAVIGATION PROJECT ASSIGNMENT

# I. Materials Required

# Chart #18773 San Diego Bay

Navigation Kit

Chart Preparation Checklist

Chart One (provided electronically)

Coast Pilots (provided electronically)

Sailing Directions (provided electronically)

Light List (provided electronically)

List of Lights (provided electronically)

Pub. 151 World Port Index (provided electronically)

Pub. 150 Distance Between Ports (provided electronically)

Atlas of Pilot Charts (provided electronically)

Advance and Transfer Table (provided electronically)

Navigation Brief Checklist (provided electronically)

**II. Situation**

You are the Navigation team onboard USS RUSSELL (DDG 59) scheduled to depart Naval Station San Diego on 100800UAPR23 to execute a 7th Fleet deployment with the Bunker Hill Surface Action Group. You are scheduled to arrive and anchor at Naval Station Pearl Harbor on 171200WAPR23 for a Port Visit before you proceed to the 7th Fleet Area of Operation. Complete the following items:

1. Prepare the outbound San Diego chart per the checklist attached, use the gazetteer to identify your navigation aids, and lay down your track according to the waypoint information provided. You will select a MINIMUM of 10 Visual Aids and 5 RADAR Aids and you will choose the appropriate NAVAIDs for all turn bearings and turn ranges. Be sure to complete the track data sheet by filling in all pertinent track and turn bearing information. The chart is worth 40 points total.
2. From the **LAST** waypoint of your track plotted on the chart, complete a trans-oceanic voyage plan in VMS. You will prepare a composite route and calculate your Speed of Advance to match the arrival time given above. Fuel efficiency is 16 knots and you should avoid any speeds that exceed this for extended periods of time. Additionally, you need to account for approximately 6 hours of time in the vicinity of 28° 05’ 37” N 139° 30’ 44” W to UNREP with the USNS RAPPAHANNOCK to refuel. Place a Critical Point in the area of the rendezvous point. A NAVAID layer for inbound Pearl Harbor will be created and inserted into the voyage plan with a minimum of 5 visual and 5 RADAR NAVAIDs. The final waypoint of your track (provided below) is your anchorage point. Include a relevant head bearing, drop bearing and drop range and ensure these are described in the Navigation Brief. All DNC’s used for the trans-oceanic and inbound voyage will be inserted into the Voyage Plan. You will send the .NAVPLAN file of your track to your instructor for review. The voyage plan is worth 40 points total.
3. Complete a Navigation Brief and present to the class. You should follow the Navigation Brief checklist located in the References Tab on Blackboard. Be prepared to present your completed chart and provide screenshots of your VMS route in the brief. You will send the .PPT file of the brief to your instructor for review. The Navigation Brief is worth 40 points total.
4. Complete the following worksheet with information gathered from your research and preparation of the voyage plan. The worksheet is worth 40 points.
5. Complete a Peer Review grade sheet for each of your group partners. You will assess each of your partners based on participation, communication, and overall commitment to the project. You will assign a grade from 0-40 points for each team member. This will factor into the overall 40 points total for the Peer Review score.

**III. Instructions**

* Follow the chart preparation checklist as it pertains to the steps involved in correcting the chart
* Completely fill out Track Data Sheet
* Complete a Composite Route VMS Voyage Plan
* Complete a Navigation Brief
* Answer all questions in the worksheet
* Complete a Peer Review for all group members

**IV.** **Amplifying Data:** USS RUSSELL

* SOA is dependent on the ETA and ETD.
* Overall Length: 505ft
* Mast height: 160ft
* Height of Eye: 56ft
* Length from Hawse pipe to center line Pelorus: 160ft
* **Navigational Draft: 36ft**
* Draft: 32ft
* Fuel Efficiency is 16 knots.
* Utilize NOAA and NGA to apply the three most recent LNM and NTM to your chart.

**Gazetteer**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Desig** | **Type** | **Name** | **Lat/Long** | |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

**OUTBOUND TRACK DATA TABLE**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **WP#** | **LAT/LONG** | **LEG** | **TRUE** | **MAG** | **DIST**  **(yds)** | **SPD** | **TB**  **(Tº/Rº)** | | | **TR**  **(yds)** | | **DEG** | **RDR** | **ADV/ XFER** |
| **1** | 32°40′40"N 117°08′00"W |  |  |  |  |  |  | | |  | |  |  |  |
| **1** |  |  |  | **10** |
| **2** | 32°41′30"N 117°09′16"W | **V(\_)-** |  | | **R(\_)-** |  |  | **STD** |  |
| **2** |  |  |  | **10** |  | | |  | |  |
| **3** | 32°42′06"N 117°10′00"W | **V(\_)-** | |  | **R(\_)-** |  |  | **STD** |  |
| **3** |  |  |  | **10** |  | | |  | |  |
| **4** | 32°42′34"N 117°10’42"W | **V(\_)-** | |  | **R(\_)-** |  |  | **STD** |  |
| **4** |  |  |  | **10** |  | | |  | |  |
| **5** | 32°43′05"N 117°11’25"W | **V(\_)-** | | | **R(\_)-** | |  | **STD** |  |
| **5** |  |  |  | **10** |  |
| **6** | 32°43′05"N 117°12′21"W | **V(\_)-** |  | | **R(\_)-** |  |  | **STD** |  |
| **6** |  |  |  | **10** |  | | |  | |  |
| **7** | 32°42′50"N 117°13′04"W | **V(\_)-** |  | | **R(\_)-** |  |  | **STD** |  |
| **7** |  |  |  | **10** |  | | |  | |  |
| **8** | 32°42′18"N 117°13′43"W | **V(\_)-** | |  | **R(\_)-** |  |  | **STD** |  |
| **8** |  |  |  | **10** |  | | |  | |  |
| **9** | 32°41′44"N 117°13’56"W | **V(\_)-** | |  | **R(\_)-** |  |  | **STD** |  |
| **9** |  |  |  | **10** |  | | |  | |  |
| **10** | 32°39′01”N 117°13′32"W |  | | |  | |  |  |  |
|  |  |  |  |  |  |

**V. Questions**

Complete the remainder of the track proceeding into Naval Station Pearl Harbor using Voyage Management System (VMS). The route should follow a Great Circle and converted into a Composite Route.

Use this position as the final waypoint (Pearl Harbor) in your Voyage Plan as well as your anchorage point: 21° 22’ 24” N 157° 57’ 44” W

Your UNREP rendezvous will be in this position: 28° 05’ 37” N 139° 30’ 44” W

Be sure to match your ETA/ETD with the timelines given in the introduction. You will need to generate a necessary SOA to ensure you can reach your destination on time!

Use screenshots from your VMS route in your Navigation Brief.

Export the .NAVPLAN file and send to your instructor for review.

1. What is the distance between San Diego, CA and Pearl Harbor, HI? (2 pt)
2. What publication did reference for question 1? (2 pt)
3. From September to April in San Diego, visibility can be reduced approximately 3-7 days per month due to radiation fog. What can you expect visibility in these conditions? (1 pt)
4. Winds are strongest during which months? What can you expect in terms of speed and what percentage of the time? (2 pt)
5. What is the vertical clearance of the San Diego-Coronado Bay Bridge between Piers 18 and 19? (1 pt)
6. What publication could you find the answers to questions 3, 4 and 5? (2 pt)
7. For question 6, what publication edition and chapter number? (2 pt)
8. What are the light characteristics of Point Loma Light? (2 pt)
9. What is the color of the structure of Point Loma Light? (1 pt)
10. Point Loma Light has a horn that can be activated remotely. How do you activate it? (1 pt)
11. What publications would you find the answers to questions 8, 9 and 10? (2 pt)
12. Is a commissioned U.S. Naval vessel required to take a pilot when entering Pearl Harbor? (1 pt)
13. Where would you pick up the pilot (name and location)? (1 pt)
14. What VHF channels does Pearl Harbor Control monitor and when should you contact them? (2 pt)
15. What publication and on what page did you find the answers to questions 12, 13 and 14? (2 pt)
16. What is the Port No. for Honolulu, HI? (1 pt)
17. List the 4 DNCs needed for Pearl Harbor. (2 pt)
18. Does Honolulu provide garbage disposal? (1 pt)
19. Which publication provided the answers to questions 16, 17 and 18? (2 pt)
20. What is the light characteristic of the West Loch Junction Light W? (1 pt)
21. What is the structure of the West Loch Junction Light W? (2 pt)
22. What is the identifying no. for the West Loch Junction Light W? (1 pt)
23. What Publication would you find the answers to questions 20, 21 and 22? (2 pt)
24. What DNC region(s) would you need to cover your entire journey? (2 pt)
25. What direction (Ex. NW, SE, SSW, etc) should the prevailing current direction be as you make your trans-pacific voyage per the Atlas of Pilot Charts during the month of April? (2 pt)

**CHART PREPARATION CHECKLIST**

|  |  |  |
| --- | --- | --- |
|  | Action | Initials |
| 1 | Chart number \_\_\_\_\_\_\_\_\_\_\_ |  |
| 2 | Identify chart for use and ensure chart is the latest edition using the Hydro Product Catalog, Notice to Mariners and Local Notice to Mariners. |  |
| 3 | Locate Notice to Mariners updates via the internet:  <http://www.nauticalcharts.noaa.gov/mcd/updates/LNM_NM.html>  (Use chart corrections found below) |  |
| 4 | Make all corrections on chart with corrections carefully annotated in the correction tree located in left margin of chart. The correction tree will have three columns: NTM number, date and printed initials of person responsible for making correction to chart. If corrections are temporary in nature annotate with pencil; otherwise, all corrections will be made with black ink |  |
| 5 | Highlight Geodetic Datum and Variation in yellow. |  |
| 6 | Highlight chart sounding datum (feet, fathom or meters) in yellow. Outline all shoal water on chart with a blue Sharpie Permanent Marker, Ultra-Fine Point. **(A fine point is preferred over a wide tip in order not to cover important chart information.)** |  |
| 7 | Create the track using a **Pencil**. Once done, trace with a **Black, Ballpoint Pen**.  **ERASE CROSS HAIRS AT THE WAYPOINTS BEFORE YOU INK THE TRACK!** |  |
| 8 | All tracks clearly labeled with True and Magnetic Headings, Speed of Advance (SOA), and Distance in Yards. Track data boxes will be placed along the track for all legs; they will be parallel to the track and not to interfere with charted information. Trace all data boxes with a **Black, Ballpoint Pen**. |  |
| 9 | Use NAVAID Gazetteer to identify both Visual and Radar Navigation Aids.  Visual aids will be outlined by a **Circle** using a **Black, Ballpoint Pen**; the Staedtler Professional General Purpose Template 5/8” will be used. Fill in each circle using a **Yellow Highlighter.** Label the NAVAID with the two-letter identifier as indicated on the gazetteer. Visuals will start with a “V,” for example “VA”.  Radar aids will be outlined by a **Triangle** using a **Black, Ballpoint Pen**; the Staedtler Professional General Purpose Template 5/8” will be used. Fill in each triangle using a **Blue Highlighter.** Label NAVAID with two-letter identifier as per gazetteer. Radar aids are identified by the letter “R,” for example “RA” |  |

|  |  |  |
| --- | --- | --- |
| 10 | Plot Advance and Transfer for each turn. Create the slide bar at your turn point using a **Green Marker**. Remember, the slide bar is used to determine a new turn bearing when a vessel is either left or right of track.  **ERASE YOUR ADVANCE AND TRANSFER CALCULATION LINES BEFORE YOU INK!**  From each turn bearing, at 100-yard increments, mark distance to turn out to 1000 yards. At 1000-yards, mark distance to turn out at 500-yard increments.  **Black, Ballpoint Pen** |  |
| 11 | Connect turn bearing to turn point with dotted line and labeled along length of dotted line. Turn bearings are labeled with a two-letter designator off NAVAID; for example, **“TB “VA” 123T/245R”.** Turn bearings are labeled in True and Relative bearings. Turn bearings are traced in **Black, Ballpoint Pen.**  Connect turn range to turn point with dotted arc and labeled along length of dotted arc. Turn ranges are labeled with a two-letter designator off NAVAID; for example, **“TR “RA” 500 yards”.** Turn ranges are traced in **Black, Ballpoint Pen.** |  |
| 12 | Create Command Review Box using a **Black, Ballpoint Pen**, using the following format:  Prepared by: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ LASTNAME, MIDN 3/C, USN DDMMMYY  Reviewed by: \_\_\_\_\_\_\_\_\_\_\_\_\_\_ LASTNAME, MIDN 3/C, USN DDMMMYY  Approved by: \_\_\_\_\_\_\_\_\_\_\_\_\_\_ LASTNAME, LT, USN DDMMMYY  Sign your name on the “Prepared by” line when checklist is complete. Print your name, rank, service and the date after your signature. |  |
| 13 | Fold and label the chart. With the chart face up oriented north away from you, fold right to left and then bottom to top so that a single crease is formed on the edge of the folded chart nearest the bottom of the chart table. Label in legible 1” print letters on the bottom right hand corner of the folded chart, the chart name and number. If you have other charts, immediately above the label, write the number of the previous chart on the track and immediately below the label, write the next chart number on the track. The numbers of the previous and next charts should be 1/2” lettering.  For example:  Chart: 13224  Chart: 13223 Narragansett Bay Including Newport Harbor  Chart: 13218  Trace the Chart Label using a **Black, Ballpoint Pen**. |  |

|  |  |  |
| --- | --- | --- |
| 14 | Identify and mark anchorage point.  Remember, when identifying an anchorage the following are taken into consideration: Depth of water, Shelter from seas, Characteristics of the haven bottom (mud, sand, etc), Charted obstructions (wrecks, buoys, shoal water, etc), and other vessels at anchor, prominent navigational aids to include a “Head Mark” and a “Letting Go Bearing,” and identifiable NAVAIDS for day and night in order to fix ship’s position. | N/A |
| 15 | Determine total amount of anchor chain needed considering the type of bottom, the expected wind and current.  **Usually 5-7 time the water depth** | N/A |
| 16 | Layout Approach Track.  Identify the Head Mark NAVAID, and lay out your approach track (normally no shorter than 1000 yds) based on the Head Mark. Label course 1-2 inches above track, course should be in true and magnetic (omit SOA).  From your Head Mark, draw a dashed line to the center of your anchorage, and label Head Mark along dashed line; for example, “HB VC 090 T/093 M”.  **Black, Ballpoint Pen** | N/A |
| 17 | Layout Letting Go Circle. Using a **Black, Ballpoint Pen,** draw circle around the center of the anchorage with a radius equal to the distance from the ships hawspipe (where the anchor chain runs out of the ship) to the pelorus (where the bearing is shot from the pilot house or bridge wing.) Label the circle “LGC”. | N/A |
| 18 | Layout the “Letting Go Bearing”.  Identify LGB NAVAID, this NAVAID is as close to 90 degrees off the approach track. Using a **Black, Ballpoint Pen,** draw a dashed line tangent from your LGC to your LGB NAVAID. Above the dashed line label LGB; for example, “LGB VD 270T/200R”. Remember, LGB will have a true and relative bearing. | N/A |
| 19 | Layout Range Arcs. Draw range arcs in 100 yds increments across the track using a **Black, Ballpoint Pen,** measured outward from the Letting Go Circle to 1000 yds. Draw range arcs across track outward from the Letting Go circle at 1200 yds. Draw range arcs across track outward from the Letting Go circle at 1500 yds. Draw range arcs across track outward from the Letting Go circle at 2000 yds. Label each range arc with its appropriate distance to the anchorage. | N/A |
| 20 | Anchoring Computations, DO NOT DRAW ON CHART:  Compute Swing Circle: Radius equal to length of chain + overall length of ship.  Compute Drag Circle: Radius equal to the length of chain + distance from hawspipe to the centerline pelorus.’ | N/A |

**Notice to Mariner Updates**

Correct your chart through the most recent NTM. I recommend you start with the most recent and work backwards until your chart has been fully updated.

https://msi.nga.mil/NTM

**Chart Grading Criteria**

|  |  |  |
| --- | --- | --- |
| **ITEM** | **Points** | **Comments** |
| **General** |  |  |
| Overall Neatness | 5 |  |
| Filled-out Checklist, Data Sheet, Gazetteer | 2 |  |
| Correctly highlighted all specified information | 2 |  |
| NTM completed correctly | 2 |  |
| Correction tree present and correct | 2 |  |
| Shoal water marked correctly | 5 |  |
| NAVAIDS correctly drawn (size/color) | 2 |  |
| Correct placement of NAVAIDS | 2 |  |
| Track Data Boxes present and correct | 5 |  |
| Command Review Box present and correct | 2 |  |
| Chart labeled correctly on outside | 2 |  |
| Plot track correctly and safely | 5 |  |
| Advance and Transfer correctly plotted | 2 |  |
| Turn Bearing and Turn Range correctly plotted | 2 |  |
| **Total (40 points)** |  |  |

**VMS Voyage Plan Criteria**

|  |  |  |
| --- | --- | --- |
| **ITEM** | **Points** | **Comments** |
| **General** |  |  |
| .NAVPLAN file sent to instructor | 5 |  |
| All DNCs correctly listed in voyage plan | 1 |  |
| NAVAID layer listed in voyage plan. | 1 |  |
| Composite route listed in voyage plan. | 1 |  |
| A minimum of 5 visual and 5 RADAR aids used in NAVAID layer. | 3 |  |
| Turn Bearings and Turn Ranges correctly used | 2 |  |
| Loiter time accounted for UNREP and CP created along route | 2 |  |
| SOA is no greater than 16 knots | 5 |  |
| Track does not cross any shoal or significant hazards to navigation. | 5 |  |
| ETD and ETA match the given times | 5 |  |
| Track utilizes great circle path | 5 |  |
| Track does not violate international law by crossing into territorial waters of any nation. | 5 |  |
| **Total (40 points)** |  |  |

**Navigation Brief Criteria**

|  |  |  |
| --- | --- | --- |
| **ITEM** | **Points** | **Comments** |
| **General** |  |  |
| Mission stated | 2 |  |
| SOE listed and explained. | 4 |  |
| Tides/Currents for departure and arrival port listed. | 4 |  |
| Operational requirements noted. | 2 |  |
| Weather for departure and arrival port listed. | 4 |  |
| Astronomical data for departure and arrival port listed | 4 |  |
| All nautical charts (electronic and standard) listed | 2 |  |
| Buoyage systems noted | 2 |  |
| Track data listed and briefed | 4 |  |
| VTSS and Lines of Demarcation briefed | 2 |  |
| Anchorage is included with all relevant information | 2 |  |
| Communication Plan noted | 2 |  |
| Material condition listed | 2 |  |
| Emergencies listed and briefed | 2 |  |
| ORM listed and briefed | 2 |  |
| **Total (40 points)** |  |  |

**Peer Review Grading Criteria**

|  |  |  |
| --- | --- | --- |
| **ITEM** | **Point Value** | **Points Awarded** |
| **Name:** |  |  |
| Participation in project activities | 0-10 |  |
| Fulfillment of his/her duties | 0-10 |  |
| Quality of work | 0-10 |  |
| Leadership provided to group | 0-10 |  |
| **Total (40 points)** |  |  |

**ADDITIONAL COMMENTS:**