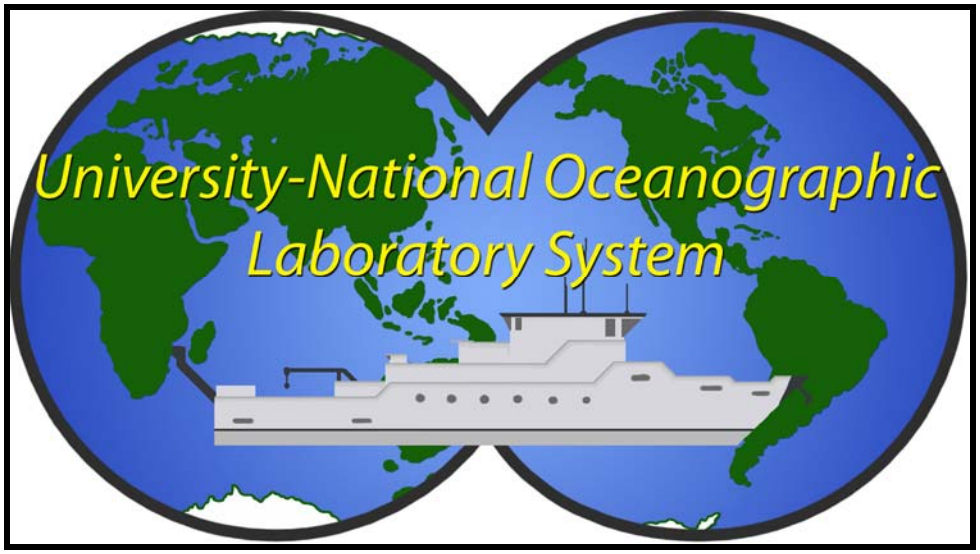
American Disabilities Act (ADA)
Guidelines for UNOLS Vessels



Prepared by the UNOLS
American Disability Act Recommendations Committee

January 7, 2008

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UNOLS
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- David Glover (WHOI)—Scientist, Corresponding Member
- Eric Buck (SIO) - Ship Master
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- NOAA – RADM Behn and Stephan Manzo
- UNOLS – Peter Wiebe and Annette DeSilva

Summary of Recommendations

Summary of ADA Recommendations for Regional Class Vessels:

It is recommended that the following spaces should be considered with respect to ADA accommodations on UNOLS Regional Class vessels. In general, the specified areas are utilized by the science participants in their normal research tasks. Work areas that are not utilized by the science party are not included in these recommendations. Details of the specific requirements are described later in this document and are referenced to specific sections of the ADA Accessibility Guidelines.

Stateroom
- Berthing
- Desks
- Bathroom/Shower

Common Living Areas
- Passageways
- Public Restrooms
- Mess Deck/Lounge

Scientific Work Areas
- Main/Wet/Computer/Electronics Lab
- Scientific Vans

Weather Decks

Summary of ADA Recommendations for Ocean Class Vessels:

It is recommended that the following spaces should be considered with respect to ADA accommodations on UNOLS Ocean Class vessels. In general, the specified areas are utilized by the science participants in their normal research tasks and are living accommodations which may be located on several deck levels that are serviced by a personnel elevator. Work areas that are not utilized by the science party are not included in these recommendations. Details of the specific requirements are described later in this document and are referenced to specific sections of the ADA Accessibility Guidelines.

Stateroom
- Berthing
- Desks
- Bathroom/Shower

Common Living Areas
- Passageways
- Public Restrooms
- Mess Deck
- Lounge/Library

Personnel Elevator
Scientific Laboratories
Main/Wet/Computer/Electronics Lab
Environmental Chamber/Freezer
Scientific Vans
Weather Decks

Summary of ADA Recommendations for Global Class Vessels:

It is recommended that the following spaces should be considered with respect to ADA accommodations on UNOLS Global Class vessels. In general, the specified areas are utilized by the science participants in their normal research tasks and are living accommodations which may be located on several deck levels that are serviced by personnel elevator(s). Work areas that are not utilized by the science party are not included in these recommendations. Details of the specific requirements are described later in this document and are referenced to specific sections of the ADA Accessibility Guidelines.

Stateroom
Berthing
Desks
Bathroom/Shower
Common Living Areas
Passageways
Public Restrooms
Mess Deck
Lounge/Library
Exercise Room/Spa
Laundry Facilities
Personnel Elevator
Scientific Laboratories
Main Lab
Wet Lab
Computer/Electronics Lab
Environmental Chamber/Freezer
Scientific Vans
Weather Decks

Section 1. Introduction and Background

This report has been prepared to provide recommended guidelines for Americans with Disabilities Act (ADA) accommodations for disabled scientists on vessels that are being designed and constructed to operate as research vessels for the University National Oceanographic Laboratory System (UNOLS).

Background:

- NSF has indicated the need for new ship construction and ship conversion efforts to address ADA requirements. Although UNOLS vessels are not passenger vessels and fall under the United States Coast Guard (USCG) Subchapter U Classification, vessels that support Federally funded academic research should be equipped and arranged as feasible to accommodate persons with disabilities.

- In turn, procedural guidelines to carry out shipboard operations by persons with disabilities are needed.

General Description of ADA:

The Americans with Disabilities Act (ADA) recognizes and protects the civil rights of people with disabilities and is modeled after earlier landmark laws prohibiting discrimination on the basis of race and gender. To ensure that buildings and facilities and certain modes of transportation are accessible to and usable by people with disabilities, the ADA establishes accessibility requirements for State and local government facilities, places of public accommodation, and commercial facilities. Under the ADA, the Access Board has developed and continues to maintain accessibility guidelines for new construction and alterations of buildings and facilities; the guidelines are known as the ADA Accessibility Guidelines (ADAAG) and accessibility guidelines for transportation vehicles.

Definition of Scientific Personnel on Research Vessels:

USCG Subchapter U - PART 188--GENERAL PROVISIONS--
Table of Contents Subpart 188.05--Application
Sec. 188.05-33 Scientific personnel--interpretive rulings.
(a) Scientific personnel on oceanographic research vessels are not considered to be seamen or passengers, but are considered as “persons" when requirements are based on total persons on board.
(b) Scientific personnel on such vessels shall not be required to possess seamen's documents nor shall they be required to sign shipping articles.

PART 3--DESIGNATION OF OCEANOGRAPHIC RESEARCH VESSELS--
Table of Contents Subpart 3.05-- Definition of Terms Used in This Part Sec. 3.05-3 Oceanographic research vessel. “An oceanographic research vessel is a vessel which the U.S. Coast Guard finds is employed exclusively in one or more of the following: (a) Oceanographic instruction; (b) Limnologic instruction; (c) Oceanographic research; or, (d) Limnologic research."

Tasks:

- Evaluate existing documentation and activities to determine recommendations that are feasible for the UNOLS fleet. These could include:
  - The draft ADA paper by Terry Whitledge.
  - The draft ADA Guidelines for passenger vessels <http://www.access-board.gov/pvaac/guidelines.htm>.
  - Modifications implemented or included in the designs for the ARRV, *Marcus Langseth*, and *Hugh R. Sharp*

- Provide Recommended Guidelines to NSF.

Section 2. General Recommendations

Conceptual Guidelines to Implement ADA on UNOLS Vessels:

Improvement of access to UNOLS vessels in the spirit of the ADA is focused to the scientific and living spaces in UNOLS vessels. The working decks are included but safety concerns of disabled personnel must be considered carefully.

The desire to improve accessibility of UNOLS vessels with regard to ADA must be considered within the context of the cost of changes for existing vessels and constraints imposed by the existing configurations. For new vessels that are undergoing complete design spirals, the additional costs associated with incorporating ADA accessibility features and the design constraints can be minimal. However, it should be noted that the incorporation of a personnel rated elevator will provide enhanced access to the science berthing and laboratories but there can be substantial initial costs in money and space as well as costs associated with a continued maintenance program. The overall goal of improving accessibility for the disabled is the maintenance of a safe working environment and to provide as much a quality experience as practical within the confines of reasonable cost constraints. Vessel modifications and operational procedures that are implemented to accommodate ADA should be consistent with the UNOLS Research Vessel Safety Standards.

1. **Existing Vessels** – Existing vessels in the UNOLS fleet offer the least opportunity for implementing changes to improve ADA accessibility. In general, the costs of modifications to existing vessels are the least efficient use of funds since many of the existing vessels are scheduled for retirement in the next decade. In a practical sense, there are probably very few structural changes that can be incorporated in the existing local class and regional class vessels but non-structural alterations may significantly improve the vessels for the disabled and should be strongly considered.

2. **Refitting of Vessels –** Refitting of vessels is often much more practical and less expensive than new construction. The options for including ADA design enhancements to existing hulls that are refitted are more numerous and may have smaller incremental costs than modifications to existing UNOLS vessels. However, the extent that ADA modifications are practical will be very dependent on the specific configuration of the vessel.

3. **New Vessels –** New vessel construction offers the most opportunity to design and construct vessels that will provide improved access to the disabled. The general size of the vessel will determine the extent that special ADA design features can be integrated into the vessel. As vessel sizes decrease from Global Class to Ocean Class to Regional Class to Local Class, the smaller dimensions of facilities makes the range of ADA improvements more difficult, if not impossible.

4. **Size Class of Vessels –** The size classification of research vessels will place practical limits on the extent that ADA enhancements can be incorporated into the UNOLS fleet.

5. **Special Purpose Research Vessels –** Special purpose vessels in the UNOLS fleet such as submersibles or aircraft may not be practical for ADA improvements. The addition of ADA features will be very dependent on specific configuration of the vessel.

General Recommendations for Hearing Impaired:

Improvements to UNOLS vessels for those that are hearing impaired are probably the easiest to implement and are the least expensive. The inability to hear a full range of sounds presents a potential safety factor since voice signals and audible communications are often used to alert of danger or unsafe conditions. This is particularly important with regard to ship alarms which are usually bells or claxons that sound emergency signals. Recent technology has created wigglers that are silent alarms that can be actuated from a central location. It may be advisable to recommend that UNOLS research vessels investigate acquiring a wiggler alarm system. In the absence of specific modifications for the hearing impaired, the safety rules aboard all UNOLS vessels should include specific safety precautions for protecting persons who are hearing impaired.
This may be the designation of a "buddy system" and the designation of a specific buddy to make sure any hearing impaired persons are aware of all safety signals. The science spaces and staterooms could also be outfitted with flashing lights that respond to ship alarms. It may also be advisable to designate a special area to muster during an emergency warning.

General Recommendations for Visual Impaired:

Improvements to UNOLS vessels for those that are visually impaired do not require major space alterations so there may not be a large cost associated with these changes. The standards for lighting of laboratories and common living spaces have been recognized as inadequate in many of the older research vessels. Modern standards for suitable lighting should be incorporated in new vessel designs and major refits. Trip hazards are especially critical for the visually impaired so prominent colors and tactile strips should be utilized to enhance their visibility. The inability to clearly see objects presents a potential safety factor since visual signals are often used to alert of danger or unsafe conditions. In the absence of specific modifications for the vision impaired, the safety rules aboard all UNOLS vessels should include specific safety precautions for protecting persons who are visually impaired. This may be the designation of a "buddy system" and the designation of a specific buddy to make sure any visually impaired persons are aware of all safety signals. The science spaces and staterooms are normally outfitted with bells and claxons that signify emergency conditions. It may also be advisable to designate a special area to muster during an emergency warning.

General Recommendations for Mobility Impaired:

Improvements to UNOLS vessels for those that have mobility impairments require the most space alterations so there may be a large cost associated with these changes. The science spaces and at

least one stateroom and bathroom should be outfitted to accommodate wheelchairs and other mobility impairments. Passageways that connect the science and living spaces must be designed to allow wheelchair access and turn-around-space. Wheelchair latchdowns should be installed in areas that can accommodate wheelchairs. The latchdowns, as well as a number of additional improvements can be installed at modest cost. The inability to move freely without assistance presents a potential safety factor since evacuation is often necessary in the case of danger or unsafe conditions. In the absence of specific modifications to improve access for mobility impairments, the safety rules aboard all UNOLS vessels should include specific safety precautions for protecting persons who cannot move freely around the vessel. This may be the designation of a "buddy system" and the designation of a specific buddy to assure that mobility impaired personnel can utilize the safest evacuation routes. It may also be advisable to designate a special area to muster during emergencies.

General Habitability and Safety Considerations for Regional, Ocean and Global Class Vessels

The following is a general listing of considerations that would improve the working and living conditions on scientific research vessels. This list is the product of discussions and a research vessel tour during the UNOLS Workshop to Develop ADA Recommendations held at Woods Hole Oceanographic Institution in September 2006.

Considerations to Improve Working Conditions

- Install ship's equipment to improve limited reach access and for better visibility
- Lab benches, lab sinks and fume hoods should have adjustable heights
- Adjustable chairs in laboratories that are highly stable with locking swivels and hydraulic/electric lifts
- Safety eye wash, shower pulls and pull down alarms should be mounted lower
- Lighting should be improved in laboratory spaces
- Large format data displays should be installed to improve visibility
- Access to shipboard vans should be improved
- Maintain line-of-sight in laboratories to help visually impaired

Considerations to Improve Living Conditions

- Provide adequate lighting in all common living areas and staterooms
- Turning space into staterooms from passageways is needed
- Sliding pocket doors may improve clearance distance in staterooms.
- Provide bunk restraint rails in all staterooms
- Large format signage (may be portable) for thermostat controls in staterooms
- Emergency procedure/manuals should be provided in a format (such as electronic) for visually impaired

Safety Considerations

- Update general communications systems to take advantage of new technology for the benefit of all personnel including the handicapped

- Warning strips - install tactile strips at bottom and top of ladders and weather deck edges
- Handrails – install handrails before the start of ladders and on both sides. Install handrails in all passageways
- Use bright colors to identify trip hazards and the edge of steps on ladders
- Reduce passageway obstacles with recessed fixtures
- Install signage to indicate designated science and living spaces
- Provide a wider range of immersion suits. Consider modifications to immersion suits by adding zippers to allow easier donning by handicapped personnel
- Accommodations should be considered for seeing-eye and hearing aid animals to accompany impaired scientists. However, any international regulatory issues must be addressed prior to the cruise.
- Pre-cruise planning guidelines should be developed to improve communications of captain, crew and marine technicians with disabled personnel. Pre-cruise forms should include this information to allow early notification
- ADA Accessibility and Procedures should be incorporated in the UNOLS Research Vessel Safety Standards
- Develop specific rescue procedures for the disabled that include abandon ship plans, as well as procedures for rescue after departing the vessel. The rescue procedures should be incorporated into the UNOLS Research Vessel Safety Standards.
- Establish a UNOLS pool of ADA equipment (e.g. wheelchairs, portable alarm kits)

Section 3. Guidelines for Regional Class Vessels

Introduction:

This section has been prepared to provide recommended guidelines for Americans with Disabilities Act (ADA) accommodations for disabled scientists on Regional Class vessels that are being designed and constructed to operate as research vessels for the University National Oceanographic Laboratory System (UNOLS).

Summary of ADA Recommendations for Regional Class:

It is recommended that the following spaces should be considered with respect to Americans with Disabilities Act (ADA) accommodations on UNOLS Regional Class vessels. In general, the specified areas are utilized by science participants in their normal research tasks. Work areas that are not utilized by the science party are not included in this recommendation. Details of the specific requirements are described later in this document and are referenced to specific sections of the ADA Accessibility Guidelines.

Stateroom
- Berthing
- Desks
- Bathroom/Shower

Common Living Areas
- Passageways
- Public Restrooms
- Mess Deck
- Lounge/Library
- Personnel Elevator

Scientific Work Spaces
- Main/Wet Lab
- Computer/Electronics Lab
- Environmental Chamber/Freezer
- Scientific Vans

Weather Decks

ADA Recommendations for Regional Class Scientific Vessels

New Regional Class research vessels should include as many of the following accommodations in scientific workspaces and living quarters as possible to conform to ADA while taking into account the size of the vessel and any special circumstances. A list of suggested design features for various scientific workspaces and accommodations is given below but it should not be considered exhaustive. ADA accommodations should be considered during the earliest phases of the ship design process.

A more complete listing with specifications for large commercial cruise ships can be found on the website for ADAAG (http://www.access-board.gov/pvaac/guidelines.htm)

but it should be recognized that many of those recommendations are not practical (and not mandatory) for research vessels.

The following items are recommended for consideration for ADA accommodations on Regional Class UNOLS vessels. Some of the specified items are difficult to accomplish and have large cost factors for this class of vessel, especially the local and smaller regional sizes. It should also be understood that the specific design of the vessel will place constraints on the level of ADA accommodations that can be achieved. The "RV" reference numbers indicate the specific detailed recommendations listed in Section 7.

Stateroom - One designated Stateroom or convertible space for mobility impairments with access to the main deck (preferably located on same level as common living spaces). If feasible, a personnel rated elevator (or person-rated platform lift) may greatly improve access to berthing accommodations. Special considerations should be given for alarms in staterooms to provide alert for emergency situations:

- Staterooms equipped with wiring to accept portable kits to accommodate hearing and vision impairments that go beyond bells and claxons.
    - Wigglers
    - Vibrating Bunks
    - Flashing strobes
- Provide modern lighting with brightness controls
- Berthing (RV806)
    - Provide rail restraints for berths
- Desks (RV902)
- Toilet, Sink and Shower (RV604 to RV610)
- Possibly install pocket doors to improve floor space clearance.
- Install signage for thermostat and other controls

Common Living Areas

- Passageways (RV403)
    - Recessed protrusions
    - Hand rails and grab bars for mobility impaired and wheelchairs
    - Tactile strips installed to alert for obstructions and/or steps
    - Improved lighting in stairwells and ladder areas
    - Door lips that are wheelchair friendly
- Public Restrooms (RV604 toRV606) – One on each accessible deck
- Drinking Fountains (RV602) - If you provide a drinking fountain, one on each accessible deck
- Mess Deck (RV902)
    - One table with clear access and away from heavy traffic patterns
    - Food and beverage service areas should be accessible
- Lounge/Library (RV902)
- Laundry Facilities (RV611) (Operational solution may be needed)

Scientific Work Spaces –

- Reduce reach distances to science equipment controls

- Improved lighting with intensity controls
- Install equipment with high contrast data displays
- Maintain line-of-sight in labs to the extent possible
- Lab bench height in Main/Wet/Computer/Electronics Lab (RV902;RV308)
- Adjustable heights for lab sinks and portable hoods
- Lower safety facilities such as eye wash, shower pulls and alarm pull downs
- Improve access for disabled to science and personnel vans

Weather Decks

- Ladders – handrails should start before first step
- Gangway design should be developed to assure accessibility for both normal and emergency conditions
- Audible signals and induction mechanisms should be installed on hatchways
- Tactile stripping to alert of obstructions or steps
- Paint trip hazards a prominent color such as yellow
- Signage installed to alert of hazards (Refer to RV216)

Vessel Operational Spaces Used by Crew Members (Bridge, Engine Room, Winch Room, etc.) Access of science personnel to operational spaces such as the bridge and engine room are usually restricted due to regulations or the hazardous environment(s). No ADA accommodations are anticipated for vessel spaces that are normally occupied only by crew members.

Note on Accessibility and Emergency Egress

Accessibility to the vessel via the gangway should be reviewed for ease of access and egress of impaired members of the scientific party. Design and deployment of the gangway to avoid steep inclines should be attempted if possible to improve safety for all personnel but especially for vision impaired and mobility limited. For wheelchair access it may be prudent to deploy a personnel cage with the ship's crane (personnel rated) to minimize problems with docking facilities in ports with high tidal ranges and the variety of docking arrangements that are encountered.

Section 4. Guidelines for UNOLS Ocean Class Vessels

Introduction

Although UNOLS vessels are not passenger vessels and fall under USCG Subchapter U Classification, vessels that support Federally funded academic research should be equipped and arranged as feasible to accommodate persons with disabilities. Improvement of access to UNOLS vessels in the spirit of the ADA is focused to the scientific and living spaces in UNOLS vessels, including the working decks. The overall goal of providing accessibility for the disabled is the maintenance of a safe working environment and to provide as much a quality experience as practical within the confines of reasonable cost constraints. ADA accommodations should be considered during the earliest phases of the ship design process.

Summary of ADA Recommendations for Ocean Class Vessels:

It is recommended that the following spaces be considered with respect to ADA accommodations on UNOLS Ocean Class vessels. In general, the science participants in their normal research tasks and living accommodations utilize the specified areas listed below, which may be located on several deck levels that are serviced by a personnel elevator. Work areas that are not utilized by the science party are not included in these recommendations.

- Stateroom
  - Berthing
  - Desks
  - Bathroom/Shower
- Common Living Areas
  - Passageways
  - Public Restrooms
  - Mess Deck
  - Lounge/Library
  - Exercise Room
  - Personnel Elevator
- Scientific Work Spaces
  - Main/Wet Lab
  - Computer/Electronics Lab
  - Environmental Chamber/Freezer
  - Scientific Vans
- Weather Decks

ADA Recommendations for Ocean Class Scientific Vessels

New Ocean Class research vessels should include as many of the following accommodations in scientific workspaces and living quarters as possible to conform to

ADA while taking into account the size of the vessel and any special circumstances. A list of suggested design features for various scientific workspaces and accommodations is given below but it should not be considered exhaustive. A more complete listing with specifications for large cruise vessels can be found on the website for ADAAG (http://www.access-board.gov/pvaac/guidelines.htm) but it should be recognized that many of the recommendations are not practical (and not mandatory) for research vessels.

The following items are recommended for consideration for ADA accommodations on Ocean Class UNOLS vessels. Some of the specified items may be difficult to accomplish and have large cost factors within this class of vessel. It should also be understood that the specific design of the vessel would place constraints on the level of ADA accommodations that can be achieved. The (reference numbers) indicate the specific detailed requirements that are listed in Section 7 of the UNOLS ADA Guidelines for Research Vessels.

Recommended ADA Accommodations:

Stateroom - One designated stateroom for mobility impairments with access to the main deck (located on same level as common living spaces preferred). If feasible, a personnel rated elevator may greatly improve access to berthing accommodations. Special considerations should be given for alarms in staterooms to alert in emergency situations:

- Staterooms equipped with wiring to accept portable kits to accommodate hearing and vision impairments that go beyond bells and claxons.
    - Wigglers
    - Vibrating Bunks
    - Flashing strobes
- Berthing (RV806)
    - Provide rail restraints for berths
- Desks (RV902)
- Toilet, Sink and Shower (RV604 to RV610)
- Provide modern lighting with brightness controls
- Possibly install pocket doors to improve floor space clearance
- Install signage for thermostat and other controls

Common Living Areas

- Passageways (RV403)
    - Recessed protrusions
    - Hand rails and grab bars for mobility impaired and wheelchairs
    - Tactile strips installed to alert for obstructions and/or steps
    - Improved lighting in stairwells and ladder areas
    - Door lips that are wheelchair friendly
- Public Restrooms (RV604 toRV606) – One on each accessible deck
- Drinking Fountains (RV602) - If you provide a drinking fountain, one on each accessible deck
- Mess Deck (RV902)
    - One table with clear access and away from heavy traffic patterns

    - Food and beverage service areas should be accessible
- Lounge/Library (RV902)
- Laundry Facilities (RV611)
- Personnel Elevator or Platform Lift

Scientific Work Spaces

- Reduce reach distances to science equipment controls
- Improved lighting with intensity controls
- Install equipment with high contrast data displays
- Maintain line-of-sight in labs to the extent possible
- Lab bench height in Main/Wet/Computer/Electronics Lab (RV902;RV308)
- Adjustable heights for lab sinks and portable hoods
- Lower safety facilities such as eye wash, shower pulls and alarm pull downs
- Improve access for disabled to science and personnel vans
- Main/Wet Lab (RV902;RV308)
- Computer/Electronics Lab (RV902; RV308)
- Environmental Chamber/Freezer (a portable ramp may be needed for access)

Weather Decks

- Ladders – handrails should start before first step
- Tactile stripping to alert of obstructions or steps
- Paint trip hazards a prominent color such as yellow
- Signage (Refer to RV216)
- Gangway design should be developed to assure accessibility for both normal and emergency conditions
- Audible signals and induction mechanisms should be installed on hatchways

Vessel Operational Spaces Used by Crew Members (Bridge, Engine Room, Winch Room, etc.)

Access of science personnel to operational spaces such as, the bridge and engine room is usually restricted due to regulations or the hazardous environment(s). No ADA accommodations are anticipated for vessel spaces that are normally only occupied by crewmembers.

Note on Accessibility and Emergency Egress

Accessibility to the vessel via the gangway should be reviewed for ease of access and egress of impaired members of the scientific party. Deployment of the gangway to avoid steep inclines should be attempted if possible. For wheelchair access it may be prudent to deploy a personnel cage with the ship's crane (personnel rated) to minimize problems with docking facilities in ports with high tidal ranges and the variety of docking arrangements that are encountered.

Section 5. Guidelines for Global Class Vessels

Introduction

Although UNOLS vessels are not passenger vessels and fall under USCG Subchapter U Classification, vessels that support Federally funded academic research should be equipped and arranged as feasible to accommodate persons with disabilities. Improvement of access to UNOLS vessels in the spirit of the ADA is focused to the scientific and living spaces in UNOLS vessels, including the working decks. The overall goal of providing accessibility for the disabled is the maintenance of a safe working environment and to provide as much a quality experience as practical within the confines of reasonable cost constraints. ADA accommodations should be considered during the earliest phases of the ship design process.

Summary of ADA Recommendations for Global Class Vessels:

It is recommended that the following spaces be considered with respect to ADA accommodations on UNOLS Global Class vessels. In general, the science participants in their normal research tasks and living accommodations utilize the specified areas listed below, which may be located on several deck levels that are serviced by a personnel elevator. Work areas that are not utilized by the science party are not included in these recommendations.

- Stateroom
  - Berthing
  - Desks
  - Bathroom/Shower
- Common Living Areas
  - Passageways
  - Public Restrooms
  - Mess Deck
  - Lounge/Library
  - Exercise Room
  - Personnel Elevator
- Scientific Laboratories
  - Main/Wet Lab
  - Computer/Electronics Lab
  - Environmental Chamber/Freezer
  - Scientific Vans
- Weather Decks

ADA Recommendations for Global Class Scientific Vessels

The following items are recommended for consideration for ADA accommodations on Global Class UNOLS vessels. Some of the specified items may be difficult to accomplish and have large cost factors within this class of vessel. In general, the large size of the Global Class vessels

present the fewest difficulties to accommodate desirable ADA features compared to the smaller size classes. It should also be understood that the specific design of the vessel will place constraints on the level of ADA accommodations that can be achieved. The (reference numbers) indicate the specific detailed requirements that are listed in Section 7.

New research vessels should include as many of the following accommodations in scientific workspaces and living quarters as possible to conform to ADA while taking into account special circumstances. A list of suggested design features for various scientific work spaces and accommodations is given below but it should not be considered exhaustive. A more complete listing with specifications large cruise vessels can be found on the website for ADAAG (http://www.access-board.gov/pvaac/guidelines.htm) but it should be recognized that many of the recommendations are not practical (and not mandatory) for scientific research vessels.

Stateroom - One designated Stateroom for personnel with mobility impairments should be incorporated in all new Global Class research vessel construction. A personnel rated elevator should also be included to allow access to scientific spaces on all decks. Special considerations should be given for alarms in staterooms to provide alert for emergency situations:

- Staterooms equipped with wiring to accept portable kits to accommodate hearing and vision impairments that go beyond bells and claxons.
    - Wigglers
    - Vibrating Bunks
    - Flashing strobes
- Provide modern lighting with brightness controls
- Berthing (RV806)
    - Provide rail restraints for berths
- Desks (RV902)
- Toilet, Sink and Shower (RV604 to RV610)
- Possibly install pocket doors to improve floor space clearance
- Install signage for thermostat and other controls

Common Living Areas

- Passageways (RV403)
    - Recessed protrusions
    - Hand rails and grab bars for mobility impaired and wheelchairs
    - Tactile strips installed to alert for obstructions and/or steps
    - Improved lighting in stairwells and ladder areas
    - Door lips that are wheelchair friendly
- Public Restrooms (RV604 toRV606) – One on each accessible deck and near to main laboratory
- Drinking Fountains (RV602) - If you provide a drinking fountain, one on each accessible deck
- Mess Deck (RV902)
    - One table with clear access and away from heavy traffic patterns
    - Food and beverage service areas should be accessible
- Lounge/Library (RV902)

- Exercise Room/Spa (RV902)
- Laundry Facilities (RV611)
- Personnel Elevator

Scientific Work Spaces –

- Reduce reach distances to science equipment controls
- Improved lighting with intensity controls
- Install equipment with high contrast data displays
- Maintain line-of-sight in labs to the extent possible
- Lab bench height in Main/Wet/Computer/Electronics Lab (RV902;RV308)
- Adjustable heights for lab sinks and portable hoods
- Lower safety facilities such as eye wash, shower pulls and alarm pull downs
- Improve access for disabled to science and personnel vans
- Environmental Chamber/Freezer (a portable ramp may be needed for access)

Weather Decks

- Ladders – handrails should start before first step
- Gangway design should be developed to assure accessibility for both normal and emergency conditions
- Audible signals and induction mechanisms should be installed on hatchways
- Tactile stripping to alert of obstructions or steps
- Paint trip hazards a prominent color such as yellow
- Signage installed to alert of hazards (Refer to RV216)

Vessel Operational Spaces Used by Crew Members (Bridge, Engine Room, Winch Room, etc.)

Access of science personnel to operational spaces such as the bridge and engine room is usually restricted due to regulations or the hazardous environment(s). No ADA accommodations are anticipated for vessel spaces that are normally only occupied by crew members.

Note on Accessibility and Emergency Egress

Accessibility to the vessel via the gangway should be reviewed for ease of access and egress of impaired members of the scientific party. Deployment of the gangway to avoid steep inclines should be attempted if possible. For wheelchair access it may be prudent to deploy a personnel cage with the ship's crane (personnel rated) to minimize problems with docking facilities in ports with high tidal ranges and the variety of docking arrangements that are encountered.

Section 6. Safety Guidelines for Disabled Scientists on UNOLS Vessels

Safety Drills and Oversight
Safety drills should include specific procedures for impaired members of the scientific party that would require personnel to abandon the vessel or muster in safe areas of the ship. Procedures should be discussed and rehearsed for donning survival suits and possible deployment of life rafts.

Overall Safety Considerations for Impaired Scientists
Safety procedures for impaired scientists should be reviewed and discussed prior to embarkation on a scientific cruise. It is generally a good policy for impaired scientists to discuss their disabilities with the captain and other safety officers on the crew in order to fully understand special requirements in work and emergency situations. It may be prudent to assign a "buddy" to the impaired scientist to help with difficult situations or emergencies. The "buddy system" could easily be employed for all scientific cruise participants to increase safety.

Rescue Procedures for Impaired Scientists
Specific rescue procedures for impaired scientists should be in place and should include abandon ship plans, as well as procedures for addressing special needs of the impaired scientist after abandoning ship.

Section 7. Detailed Specifications

Detailed Specifications for ADA Accommodations on UNOLS Vessels

The following specifications were extracted from the "Passenger Vessel Accessibility Guidelines and Supplemental Information" which was prepared by the Passenger Vessel Access Advisory Committee (PVAAC). The "RV" reference numbers indicate that the specifications were deemed appropriate for consideration on research vessels in the UNOLS fleet. The latest version of the guidelines can be found at the website

http://www.access-board.gov/pvaac/guidelines.htm

Stateroom

RV806 Staterooms

Since Regional Class vessels are very unlikely to accommodate a personnel elevator the best choice for an ADA compliant stateroom may be located on the main deck.

RV806.2.1 Living and Dining Areas. Living and dining areas shall be *accessible*.

RV806.2.3 Sleeping Areas. At least one sleeping area shall provide a clear *deck space* complying with RV305 on both sides of a bed. The clear *deck space* shall be positioned for parallel approach to the side of the bed.

RV806.2.4 Toilet and Bathing Facilities. No fewer than one water closet, one lavatory, and one bathtub or shower shall comply with RV603. In addition, required roll-in shower compartments shall comply with RV608.2.2 or RV608.2.3.

RV806.2.6 Turning Space. Turning *space* complying with RV304 shall be provided within the guest room.

RV806.3.1 Alarms. Where emergency warning systems are provided, alarms complying with RV702 shall be provided.

Toilet/Sink/Shower

RV604 Water Closets and Toilet Compartments

RV604.2 Location. The water closet shall be positioned with a wall or partition to the rear and to one side. The centerline of the water closet shall be 16 inches (405 mm) minimum to 18 inches (455 mm) maximum from the side wall or partition, except that the water closet shall be 17 inches (430 mm) minimum and 19 inches (485 mm) maximum from the side wall or partition in the ambulatory *accessible* toilet compartment specified in RV604.8.2. Water closets shall be arranged for a left-hand or right-hand approach.

RV604.3.1 Size. Clearance around a water closet shall be 60 inches (1525 mm) minimum measured perpendicular from the side wall and 56 inches (1420 mm) minimum measured perpendicular from the rear wall.

RV604.3.2 Overlap. The required clearance around the water closet shall be permitted to overlap the water closet, associated grab bars, dispensers, sanitary napkin disposal units, coat hooks, shelves, *accessible* routes, clear *deck space* and clearances required at other fixtures, and the turning *space*. No other fixtures or obstructions shall be located within the required water closet clearance.

RV604.4 Seats. The seat height of a water closet above the finish *deck* surface shall be 17 inches (430 mm) minimum and 19 inches (485 mm) maximum measured to the top of the seat. Seats shall not be sprung to return to a lifted position.
RV604.5 Grab Bars. Grab bars for water closets shall comply with RV609. Grab bars shall be provided on the side wall closest to the water closet and on the rear wall.
RV604.5.1 Side Wall. The side wall grab bar shall be 42 inches (1065 mm) long minimum, located 12 inches (305 mm) maximum from the rear wall and extending 54 inches (1370 mm) minimum from the rear wall.
RV604.5.2 Rear Wall. The rear wall grab bar shall be 36 inches (915 mm) long minimum and extend from the centerline of the water closet 12 inches (305 mm) minimum on one side and 24 inches (610 mm) minimum on the other side.
RV604.6 Flush Controls. Flush controls shall be hand operated or automatic. Hand operated flush controls shall comply with RV309. Flush controls shall be located on the open side of the water closet except in ambulatory *accessible* compartments complying with RV604.8.2.
RV604.7 Dispensers. Toilet paper dispensers shall comply with RV309.4 and shall be 7 inches (180 mm) minimum and 9 inches (230 mm) maximum in front of the water closet measured to the centerline of the dispenser. The outlet of the dispenser shall be 15 inches (380 mm) minimum and 48 inches (1220 mm) maximum above the finish *deck* surface and shall not be located behind grab bars. Dispensers shall not be of a type that controls delivery or that does not allow continuous paper flow.
RV604.8 Toilet Compartments. Wheelchair *accessible* toilet compartments shall meet the requirements of RV604.8.1 and RV604.8.3. Compartments containing more than one plumbing fixture shall comply with RV603. Ambulatory *accessible* compartments shall comply with RV604.8.2 and RV604.8.3.
RV604.8.1.1 Size. Wheelchair *accessible* compartments shall be 60 inches (1525 mm) wide minimum measured perpendicular to the side wall, and 56 inches (1420 mm) deep minimum for wall hung water closets, and 59 inches (1500 mm) deep minimum for *deck* surface mounted water closets measured perpendicular to the rear wall. Wheelchair *accessible* compartments for *children's use* shall be 60 inches (1525 mm) wide minimum measured perpendicular to the side wall, and 59 inches (1500 mm) deep minimum for wall hung and *deck* surface mounted water closets measured perpendicular to the rear wall.

RV606 Lavatories and Sinks
RV606.3 Height. Lavatories and sinks shall be installed with the front of the higher of the rim or counter surface 34 inches (865 mm) maximum above the finish *deck* surface.
RV606.4 Faucets. Controls for faucets shall comply with RV309. Hand-operated, metering faucets shall remain open for 10 seconds minimum.
RV606.5 Exposed Pipes and Surfaces. Water supply and drain pipes under lavatories and sinks shall be insulated or otherwise configured to protect against contact. There shall be no sharp or abrasive surfaces under lavatories and sinks.

RV608 Shower Compartments and Rinsing Showers
RV608.3.2 Standard Roll-In Type Shower Compartments. Where a seat is provided in standard roll-in type shower compartments, grab bars shall be provided on the back

wall and the side wall opposite the seat. Grab bars shall not be provided above the seat. Where a seat is not provided in standard roll-in type shower compartments, grab bars shall be provided on three walls. Grab bars shall be installed 6 inches (150 mm) maximum from adjacent walls.

RV608.3.4.1 Vertical Grab Bar. Where the shower head is mounted on a post, a vertical grab shall be provided under the shower head. The grab bar shall start at a point at or below the minimum grab bar mounting height in RV609 and shall extend to within at least 3 inches (75 mm) of the shower head.

RV608.3.4.2 Circular Grab Bar. Where the shower head is mounted on a post, a circular grab bar that surrounds the usable part of the post shall be provided.

RV608.3.4.3 Horizontal Grab Bar. Where the shower head is mounted on a post or a wall, a horizontal grab bar extending 18 inches (455 mm) minimum in both directions from the center line of the shower head shall be provided.

RV608.5.2 Standard Roll-In Type Shower Compartments. In standard roll-in type shower compartments, the controls, faucets, and shower spray unit shall be located above the grab bar, but no higher than 48 inches (1220 mm) above the shower *deck* surface. Where a seat is provided, the controls, faucets, and shower spray unit shall be installed on the back wall adjacent to the seat wall and shall be located 27 inches (685 mm) maximum from the seat wall.

RV608.6 Shower Spray Unit and Water. A shower spray unit with a hose 59 inches (1500 mm) long minimum that can be used both as a fixed-position shower head and as a hand-held shower shall be provided. The shower spray unit shall have an on/off control with a non-positive shut-off. If an adjustable-height shower head on a vertical bar is used, the bar shall be installed so as not to obstruct the use of grab bars. Shower spray units shall deliver water that is 120°F (49°C) maximum.

RV609 Grab Bars

RV609.2.1 Circular Cross Section. Grab bars with circular cross sections shall have an outside diameter of 1¼ inches (32 mm) minimum and 2 inches (51 mm) maximum.

RV609.3 Spacing. The *space* between the wall and the grab bar shall be 1½ inches (38 mm). At rinsing showers, if grab bars are installed on posts, the *space* between the post and grab bar shall be 1½ inches (38 mm). The *space* between the grab bar and projecting objects below and at the ends shall be 1½ inches (38 mm) minimum. The *space* between the grab bar and projecting objects above shall be 12 inches (305 mm) minimum.

RV609.4 Position of Grab Bars. Grab bars shall be installed in a horizontal position, 33 inches (840 mm) minimum and 36 inches (915 mm) maximum above the finish *deck* surface measured to the top of the gripping surface, except that at water closets for *children's use* complying with RV604.9, grab bars shall be installed in a horizontal position 18 inches (455 mm) minimum and 27 inches (685 mm) maximum above the finish *deck* surface measured to the top of the gripping surface. The height of the lower grab bar on the back wall of a bathtub shall comply with RV607.4.1.1 or RV607.4.2.1.

RV609.8 Structural Strength. Allowable stresses shall not be exceeded for materials used when a vertical or horizontal force of 250 pounds (1112 N) is applied at any point on the grab bar, fastener, mounting device, or supporting structure.

RV610 Seats

RV610.3 Shower Compartment Seats. Where a seat is provided in a standard roll-in shower compartment, it shall be a folding type, shall be installed on the side wall adjacent to the controls, and shall extend from the back wall to a point within 3 inches (75 mm) of the compartment entry. Where a seat is provided in an alternate roll-in type shower compartment, it shall be a folding type, shall be installed on the front wall opposite the back wall, and shall extend from the adjacent side wall to a point within 3 inches (75 mm) of the compartment entry. In transfer type showers, the seat shall extend from the back wall to a point within 3 inches (75 mm) of the compartment entry. The top of the seat shall be 17 inches (430 mm) minimum and 19 inches (485 mm) maximum above the bathroom finish *deck* surface. Seats shall comply with RV610.3.1 or RV610.3.2.

Common Living Areas

Passageways and Doorways

RV403.5.1 Passageway Clear Width. The clear width of walking surfaces shall be 36 inches (915 mm) minimum.

RV307.2 Passageway Protrusion Limits. Objects with leading edges more than 27 inches (685 mm) and not more than 80 inches (2030 mm) above the finish *deck* surface shall protrude 4 inches (100 mm) maximum horizontally into the *circulation path*.

RV404.2.3 Doorway Clear Width. Door openings shall provide a clear width of 32 inches (815 mm) minimum. Clear openings of doorways with swinging doors shall be measured between the face of the door and the stop, with the door open 90 degrees.

Public Restrooms

RV604 Water Closets and Toilet Compartments

RV604.2 Location. The water closet shall be positioned with a wall or partition to the rear and to one side. The centerline of the water closet shall be 16 inches (405 mm) minimum to 18 inches (455 mm) maximum from the side wall or partition, except that the water closet shall be 17 inches (430 mm) minimum and 19 inches (485 mm) maximum from the side wall or partition in the ambulatory *accessible* toilet compartment specified in RV604.8.2. Water closets shall be arranged for a left-hand or right-hand approach.

RV604.3.1 Size. Clearance around a water closet shall be 60 inches (1525 mm) minimum measured perpendicular from the side wall and 56 inches (1420 mm) minimum measured perpendicular from the rear wall.

RV604.3.2 Overlap. The required clearance around the water closet shall be permitted to overlap the water closet, associated grab bars, dispensers, sanitary napkin disposal units, coat hooks, shelves, *accessible* routes, clear *deck space* and clearances required at other fixtures, and the turning *space*. No other fixtures or obstructions shall be located within the required water closet clearance.

RV604.4 Seats. The seat height of a water closet above the finish *deck* surface shall be 17 inches (430 mm) minimum and 19 inches (485 mm) maximum measured to the top of the seat. Seats shall not be sprung to return to a lifted position.

RV604.5 Grab Bars. Grab bars for water closets shall comply with V609. Grab bars shall be provided on the side wall closest to the water closet and on the rear wall.

RV604.5.1 Side Wall. The side wall grab bar shall be 42 inches (1065 mm) long minimum, located 12 inches (305 mm) maximum from the rear wall and extending 54 inches (1370 mm) minimum from the rear wall.
RV604.5.2 Rear Wall. The rear wall grab bar shall be 36 inches (915 mm) long minimum and extend from the centerline of the water closet 12 inches (305 mm) minimum on one side and 24 inches (610 mm) minimum on the other side.
RV604.6 Flush Controls. Flush controls shall be hand operated or automatic. Hand operated flush controls shall comply with RV309. Flush controls shall be located on the open side of the water closet except in ambulatory *accessible* compartments complying with RV604.8.2.
RV604.7 Dispensers. Toilet paper dispensers shall comply with RV309.4 and shall be 7 inches (180 mm) minimum and 9 inches (230 mm) maximum in front of the water closet measured to the centerline of the dispenser. The outlet of the dispenser shall be 15 inches (380 mm) minimum and 48 inches (1220 mm) maximum above the finish *deck* surface and shall not be located behind grab bars. Dispensers shall not be of a type that controls delivery or that does not allow continuous paper flow.
RV604.8 Toilet Compartments. Wheelchair *accessible* toilet compartments shall meet the requirements of RV604.8.1 and RV604.8.3. Compartments containing more than one plumbing fixture shall comply with V603. Ambulatory *accessible* compartments shall comply with RV604.8.2 and RV604.8.3.
RV604.8.1.1 Size. Wheelchair *accessible* compartments shall be 60 inches (1525 mm) wide minimum measured perpendicular to the side wall, and 56 inches (1420 mm) deep minimum for wall hung water closets, and 59 inches (1500 mm) deep minimum for *deck* surface mounted water closets measured perpendicular to the rear wall. Wheelchair *accessible* compartments for *children's use* shall be 60 inches (1525 mm) wide minimum measured perpendicular to the side wall, and 59 inches (1500 mm) deep minimum for wall hung and *deck* surface mounted water closets measured perpendicular to the rear wall.

RV606 Lavatories and Sinks
RV606.3 Height. Lavatories and sinks shall be installed with the front of the higher of the rim or counter surface 34 inches (865 mm) maximum above the finish *deck* surface.
RV606.4 Faucets. Controls for faucets shall comply with RV309. Hand-operated, metering faucets shall remain open for 10 seconds minimum.
RV606.5 Exposed Pipes and Surfaces. Water supply and drain pipes under lavatories and sinks shall be insulated or otherwise configured to protect against contact. There shall be no sharp or abrasive surfaces under lavatories and sinks.

RV605 Urinals
RV605.2 Height and Depth. Urinals shall be the stall-type or the wall-hung type with the rim 17 inches (430 mm) maximum above the finish *deck* surface. Urinals shall be 13½ inches (345 mm) deep minimum measured from the outer face of the urinal rim to the back of the fixture.
RV605.3 Clear Deck Space. A clear *deck space* complying with RV305 positioned for forward approach shall be provided.

RV605.4 Flush Controls. Flush controls shall be hand operated or automatic. Hand operated flush controls shall comply with RV309.

Drinking Fountains

RV602.4 Spout Height. Spout outlets shall be 36 inches (915 mm) maximum above the finish *deck* surface.

RV602.5 Spout Location. The spout shall be located 15 inches (380 mm) minimum from the vertical support and 5 inches (125 mm) maximum from the front edge of the unit, including bumpers.

RV602.6 Water Flow. The spout shall provide a flow of water 4 inches (100 mm) high minimum and shall be located 5 inches (125 mm) maximum from the front of the unit. The angle of the water stream shall be measured horizontally relative to the front face of the unit. Where spouts are located less than 3 inches (75 mm) of the front of the unit, the angle of the water stream shall be 30 degrees maximum. Where spouts are located between 3 inches (75 mm) and 5 inches (125 mm) maximum from the front of the unit, the angle of the water stream shall be 15 degrees maximum.

RV602.7 Drinking Fountains for Standing Persons. Spout outlets of drinking fountains for standing persons shall be 38 inches (965 mm) minimum and 43 inches (1090 mm) maximum above the finish *deck* surface.

Mess Deck/Dining Hall

RV902 Dining Surfaces and Work Surfaces

RV902.3 Height. The tops of dining surfaces and work surfaces shall be 28 inches (710 mm) minimum and 34 inches (865 mm) maximum above the finish *deck* surface.

RV902.4.1 Clear Deck Space. A clear *deck space* complying with RV305 positioned for a forward approach shall be provided. Knee and toe clearance complying with V306 shall be provided, except that knee clearance 24 inches (610 mm) minimum above the finish *deck* surface shall be permitted.

RV902.4.2 Height. The tops of tables and counters shall be 26 inches (660 mm) minimum and 30 inches (760 mm) maximum above the finish *deck* surface.

RV903 Benches

RV903.2 Clear Deck Space. Clear *deck space* complying with RV305 shall be provided and shall be positioned at the end of the bench seat and parallel to the short axis of the bench.

RV903.3 Size. Benches shall have seats that are 42 inches (1065 mm) long minimum and 20 inches (510 mm) deep minimum and 24 inches (610 mm) deep maximum.

RV903.4 Back Support. The bench shall provide for back support or shall be affixed to a wall. Back support shall be 42 inches (1065 mm) long minimum and shall extend from a point 2 inches (51 mm) maximum above the seat surface to a point 18 inches (455 mm) minimum above the seat surface. Back support shall be 2½ inches (64 mm) maximum from the rear edge of the seat measured horizontally.

RV903.5 Height. The top of the bench seat surface shall be 17 inches (430 mm) minimum and 19 inches (485 mm) maximum above the finish *deck* surface.

RV903.6 Structural Strength. Allowable stresses shall not be exceeded for materials used when a vertical or horizontal force of 250 pounds (1112 N) is applied at any point on the seat, fastener, mounting device, or supporting structure.

TV Lounge/Library
Clear space should be available in the TV lounge/library areas that are suitable for wheelchair access and utilization of the facilities. Special sound systems with volume controls should be included for hearing impaired and closed captioning of TV sets should be available.

Personnel Elevator
A personnel elevator may not be practical for small research vessels, however it is included as a desirable option only if it is practical within the weight and space considerations of the vessel design. The inclusion of a personnel elevator would greatly improve access to other deck(s) for the mobility impaired and would make stateroom accommodations easier to include.

Laundry Facilities
RV611 Washing Machines and Clothes Dryers
RV611.4 Height. Top loading machines shall have the door to the laundry compartment located 36 inches (915 mm) maximum above the finish *deck* surface. Front loading machines shall have the bottom of the opening to the laundry compartment located 15 inches (380 mm) minimum and 36 inches (915 mm) maximum above the finish *deck* surface.

Scientific Work Areas

Main Lab/Wet Lab/Electronics Lab/Computer Lab
Laboratory benches should be capable of height adjustments that will accommodate wheelchair heights to provide a convenient work space. Operational controls for laboratory equipment should be mounted to allow full access to controls and gauges that the scientific party normally would be allowed to use.
RV902.1 General. Dining surfaces and work surfaces shall comply with RV902.2 and RV902.3.
RV902.2 Clear Deck Space. A clear *deck space* complying with RV305 positioned for a forward approach shall be provided. Knee and toe clearance complying with RV306 shall be provided.
RV902.3 Height. The tops of dining surfaces and work surfaces shall be 28 inches (710 mm) minimum and 34 inches (865 mm) maximum above the finish *deck* surface.

RV308 Reach Ranges
RV308.1 General. Reach ranges shall comply with RV308.
RV308.2 Forward Reach.
RV308.2.1 Unobstructed. Where a forward reach is unobstructed, the high forward reach shall be 48 inches (1220 mm) maximum and the low forward reach shall be 15 inches (380 mm) minimum above the finish *deck* surface.
RV308.2.2 Obstructed High Reach. Where a high forward reach is over an obstruction, the clear *deck space* shall extend beneath the element for a distance not less than the

required reach depth over the obstruction. The high forward reach shall be 48 inches (1220 mm) maximum where the reach depth is 20 inches (510 mm) maximum. Where the reach depth exceeds 20 inches (510 mm), the high forward reach shall be 44 inches (1120 mm) maximum and the reach depth shall be 25 inches (635 mm) maximum.

RV308.3 Side Reach.

RV308.3.1 Unobstructed. Where a clear *deck space* allows a parallel approach to an *element* and the side reach is unobstructed, the high side reach shall be 48 inches (1220 mm) maximum and the low side reach shall be 15 inches (380 mm) minimum above the finish *deck* surface.

Environmental Chamber/Freezer

If possible environmental chambers and scientific freezers should be accessible to disabled scientists.

Scientific Vans

Scientific vans configured as either laboratory or berthing spaces should be constructed to comply with width and height requirements of their respective interior vessel spaces unless sufficient clearance is not available.

Weather Decks

Portable/dropping door coamings should be provided on an exterior entry door on main deck

Other Spaces

Vessel Operational Spaces Used by Crew Members (Bridge, Engine Room, Winch Room, etc.)

Access of science personnel to operational spaces such as the bridge and engine room are usually restricted due to regulations or the hazardous environment(s). No ADA accommodations are anticipated for vessel spaces that are normally occupied by crew members.

Visual and Audible Alarms/Communications

RV702 Emergency Alarm Systems

RV702.1 General. Emergency alarm systems shall have permanently installed audible and visible alarms complying with NFPA 72 (1999 or 2002 edition) (incorporated by reference, see "Referenced Standards" in Chapter 1), except that the maximum allowable sound level of audible notification appliances complying with section 4-3.2.1 of NFPA 72 (1999 edition) shall have a sound level no more than 110 dB at the minimum hearing distance from the audible appliance. In addition, alarms in guest rooms required to provide communication features shall comply with sections 4-3 and 4-4 of NFPA 72 (1999 edition) or sections 7.4 and 7.5 of NFPA 72 (2002 edition).

RV703 Signs

RV703.1 General. Signs shall comply with RV703. Where both visual and *tactile characters* are required, either one sign with both visual and *tactile characters*, or two separate signs, one with visual, and one with *tactile characters*, shall be provided.

RV703.2 Raised Characters. Raised *characters* shall comply with RV703.2 and shall be duplicated in Braille complying with V703.3. Raised *characters* shall be installed in accordance with RV703.4.
RV703.2.1 Depth. Raised *characters* shall be 1/32 inch (0.8 mm) minimum above their background.
RV703.2.2 Case. *Characters* shall be uppercase.
RV703.2.3 Style. *Characters* shall be sans serif. *Characters* shall not be italic, oblique, script, highly decorative, or of other unusual forms.
RV703.2.4 Character Proportions. *Characters* shall be selected from fonts where the width of the uppercase letter "O" is 55 percent minimum and 110 percent maximum of the height of the uppercase letter "I".
RV703.2.5 Character Height. *Character* height measured vertically from the baseline of the *character* shall be e inch (16 mm) minimum and 2 inches (51 mm) maximum based on the height of the uppercase letter "I".
EXCEPTION: Where separate raised and visual *characters* with the same information are provided, raised *character* height shall be permitted to be ½ inch (13 mm) minimum.
RV703.2.6 Stroke Thickness. Stroke thickness of the uppercase letter "I" shall be 15 percent maximum of the height of the *character*.
RV703.2.7 Character Spacing. *Character* spacing shall be measured between the two closest points of adjacent raised *characters* within a message, excluding word spaces. Where characters have rectangular cross sections, spacing between individual raised *characters* shall be 0.13 inch (3.2 mm) minimum and 4 times the raised character stroke width maximum. Where characters have other cross sections, spacing between individual raised characters shall be 1/16 inch (1.6 mm) minimum and 4 times the raised *character* stroke width maximum at the base of the cross sections, and 0.13 inch (3.2 mm) minimum and 4 times the raised character stroke width maximum at the top of the cross sections. *Characters* shall be separated from raised borders and decorative *elements* 0.37 inch (9.5 mm) minimum.
RV703.2.8 Line Spacing. Spacing between the baselines of separate lines of raised *characters* within a message shall be 135 percent minimum and 170 percent maximum of the raised *character* height.
RV703.3 Braille. Braille shall be contracted (Grade 2) and shall comply with RV703.3 and RV703.4.
RV703.3.1 Dimensions and Capitalization. Braille dots shall have a domed or rounded shape and shall comply with Table RV703.3.1. The indication of an uppercase letter or letters shall only be used before the first word of sentences, proper nouns and names, individual letters of the alphabet, initials, and acronyms.

Table RV703.3.1 Braille Dimensions

Measurement Range	Minimum in Inches Maximum in Inches
Dot base diameter	0.059 (1.5 mm) to 0.063 (1.6 mm)
Distance between two dots in the same cell[1]	0.090 (2.3 mm) to 0.100 (2.5 mm)
Distance between corresponding dots in adjacent cells[1]	0.241 (6.1 mm) to 0.300 (7.6 mm)
Dot height	0.025 (0.6 mm) to 0.037 (0.9 mm)
Distance between corresponding dots from one cell directly below[1]	0.395 (10 mm) to 0.400 (10.2 mm)

1. Measured center-to-center

RV703.3.2 Position. Braille shall be positioned below the corresponding text. If text is multi-lined, Braille shall be placed below the entire text. Braille shall be separated d inch (9.5 mm) minimum from any other *tactile characters* and d inch (9.5 mm) minimum from raised borders and decorative *elements*.

RV703.4.1 Height Above Finish Deck Surface. *Tactile characters* on signs shall be located 48 inches (1220 mm) minimum above the finish *deck* surface, measured from the baseline of the lowest *tactile character* and 60 inches (1525 mm) maximum above the finish *deck* surface, measured from the baseline of the highest *tactile character*.

RV703.4.2 Location. Where a *tactile* sign is provided at a door, the sign shall be located alongside the door at the latch side. Where a *tactile* sign is provided at double doors with one active leaf, the sign shall be located on the inactive leaf. Where a *tactile* sign is provided at double doors with two active leafs, the sign shall be located to the right of the right hand door. Where there is no wall *space* at the latch side of a single door or at the right side of double doors, signs shall be located on the nearest adjacent wall. Signs containing *tactile characters* shall be located so that a clear *deck space* of 18 inches (455 mm) minimum by 18 inches (455 mm) minimum, centered on the *tactile characters*, is provided beyond the arc of any door swing between the closed position and 45 degree open position.

RV703.5 Visual Characters. Visual *characters* shall comply with RV703.5.

RV703.5.1 Finish and Contrast. *Characters* and their background shall have a non-glare finish. *Characters* shall contrast with their background with either light *characters* on a dark background or dark *characters* on a light background.

RV703.5.2 Case. *Characters* shall be uppercase or lowercase or a combination of both.

RV703.5.3 Style. *Characters* shall be conventional in form. *Characters* shall not be italic, oblique, script, highly decorative, or of other unusual forms.

RV703.5.4 Character Proportions. *Characters* shall be selected from fonts where the width of the uppercase letter "O" is 55 percent minimum and 110 percent maximum of the height of the uppercase letter "I".

RV703.5.5 Character Height. Minimum *character* height shall comply with Table RV703.5.5. Viewing distance shall be measured as the horizontal distance between the *character* and an obstruction preventing further approach towards the sign. *Character* height shall be based on the uppercase letter "I".

Table RV703.5.5 Visual Character Height (text version)

Height to Finish Deck Surface From Baseline of Character	Horizontal Viewing Distance	Minimum Character Height
40 inches (1015 mm) to less than or equal to 70 inches (1780 mm)	Less than 72 inches (1830 mm)	e inch (16 mm)
	72 inches (1830 mm) and greater	e inch (16 mm), plus c inch (3.2 mm) per foot (305 mm) of viewing distance above 72 inches (1830 mm)
Greater than 70 inches (1780 mm) to less than or equal to 120 inches (3050 mm)	Less than 180 inches (4570 mm)	2 inches (51 mm)
	180 inches (4570 mm) and greater	2 inches (51 mm), plus c inch (3.2 mm) per foot (305 mm) of viewing distance above 180 inches (4570 mm)
Greater than 120 inches (3050 mm)	Less than 21 feet (6400 mm)	3 inches (75 mm)
	21 feet (6400 mm) and greater	3 inches (75 mm), plus c inch (3.2 mm) per foot (305 mm) of viewing distance above 21 feet (6400 mm)

RV703.5.6 Height From Finish Deck Surface. Visual *characters* shall be 40 inches (1015 mm) minimum above the finish *deck* surface.

2. This requirement does not apply where the *administrative authority* requires signs to be mounted below 40 inches (1015 mm).

RV703.5.7 Stroke Thickness. Stroke thickness of the uppercase letter "I" shall be 10 percent minimum and 30 percent maximum of the height of the *character*.

RV703.5.8 Character Spacing. *Character* spacing shall be measured between the two closest points of adjacent *characters*, excluding word *spaces*. Spacing between individual *characters* shall be 10 percent minimum and 35 percent maximum of *character* height.

RV703.5.9 Line Spacing. Spacing between the baselines of separate lines of *characters* within a message shall be 135 percent minimum and 170 percent maximum of the *character* height.

RV703.6 Pictograms. *Pictograms* shall comply with RV703.6.

RV703.6.1 Pictogram Field. *Pictograms* shall have a field height of 6 inches (150 mm) minimum. *Characters* and Braille shall not be located in the *pictogram* field.

RV703.6.2 Finish and Contrast. *Pictograms* and their field shall have a non-glare finish. *Pictograms* shall contrast with their field with either a light *pictogram* on a dark field or a dark *pictogram* on a light field.

RV703.6.3 Text Descriptors. *Pictograms* shall have text descriptors located directly below the *pictogram* field. Text descriptors shall comply with RV703.2, RV703.3 and RV703.4.

RV703.7 Symbols of Accessibility. Symbols of accessibility shall comply with RV703.7.

RV703.7.1 Finish and Contrast. Symbols of accessibility and their background shall have a non-glare finish. Symbols of accessibility shall contrast with their background with either a light symbol on a dark background or a dark symbol on a light background.

RV703.7.2 Symbols.

RV703.7.2.1 International Symbol of Accessibility. The International Symbol of Accessibility shall comply with Figure RV703.7.2.1.

RV703.7.2.2 Assistive Listening Systems. *Assistive listening systems* shall be identified by the International Symbol of Access for Hearing Loss complying with Figure RV703.7.2.2

Appendix. ADA Examples on Existing or Planned Vessels

A. ADA Facilities Incorporated on R/V Hugh Sharp

(From input received from Matt Hawkins and Dave Chapman)

The Workshop/Storage toilet space compartment was expanded to make it wheelchair accessible and equipped with a shower as shown on the attached sketch. The shower would also provide utility (and possibly enhance safety) for other personnel entering the house. The deck head located in the workshop area was expanded to accommodate a hand-held shower. A deck drain was added and the door was increased to 32". No folding seat – but ADA sink and grab rails.

1. The clear opening width of doors were increased to 32" minimum (presently have 28" doors shown):
    a) Workshop, fr. 11 S
    b) Workshop head
    c) Workshop to Wet Lab, fr. 13.8 S
    d) Workshop to Exterior, fr. 13.8 S
    e) Conference Room, fr. 9.5 S
    f) Mess, fr. 11 P (archway)
    g) Galley, fr. 7 P (archway)
    h) Dry Lab, fr. 14 P
    i) Wet Lab, QAWT door to Wet Lab, fr. 18.5 CL
    j) Wet Lab, fr. 22 (sliding WT door, width not indicated)

3. Instead of increasing the main passageway to 48" (done for tonnage anyway) which would impact the surrounding compartments too significantly, a specialized wheel chair which is narrower and better suited for use at sea will be sought. This would be similar to the special wheel chairs provided by the airline industry.

4. Conference room door will swing into the compartment. Table will be removable for when the compartment is used as berth.

5. To the extent possible, ramps comply with the following slope criteria:
    a. 1:4 if the rise is 3 inches (75 mm) maximum;
    b. 1:6 if the rise is 6 inches (150 mm) maximum;
    c. 1:8 if the rise is 9 inches (230 mm) maximum; or
    d. 1:12 if the rise is greater than 9 inches (230 mm).

    A set of portable ramps with recommended slope criteria as possible will be provided. A water tight door with a swing sill has been installed (approved by ABS) where the sill is 15" high when normally shut at sea, but can be opened for access giving a 2"

sill. Highest sill to get over now is 6" – which can be done with a small ramp and (hopefully) a special motorized marine wheelchair

6. All lab benches are modular – special ADA workbench could be easily installed as needed at the recommended heights of 34" above the finished deck, min. 36" wide, with 27" high, 25" deep knee room.

7. The placement of objects, controls, and operating mechanisms normally accessed by the scientific party was placed (where possible) within the reach ranges recommended.

8. Both visual and audible alarms will be provided.

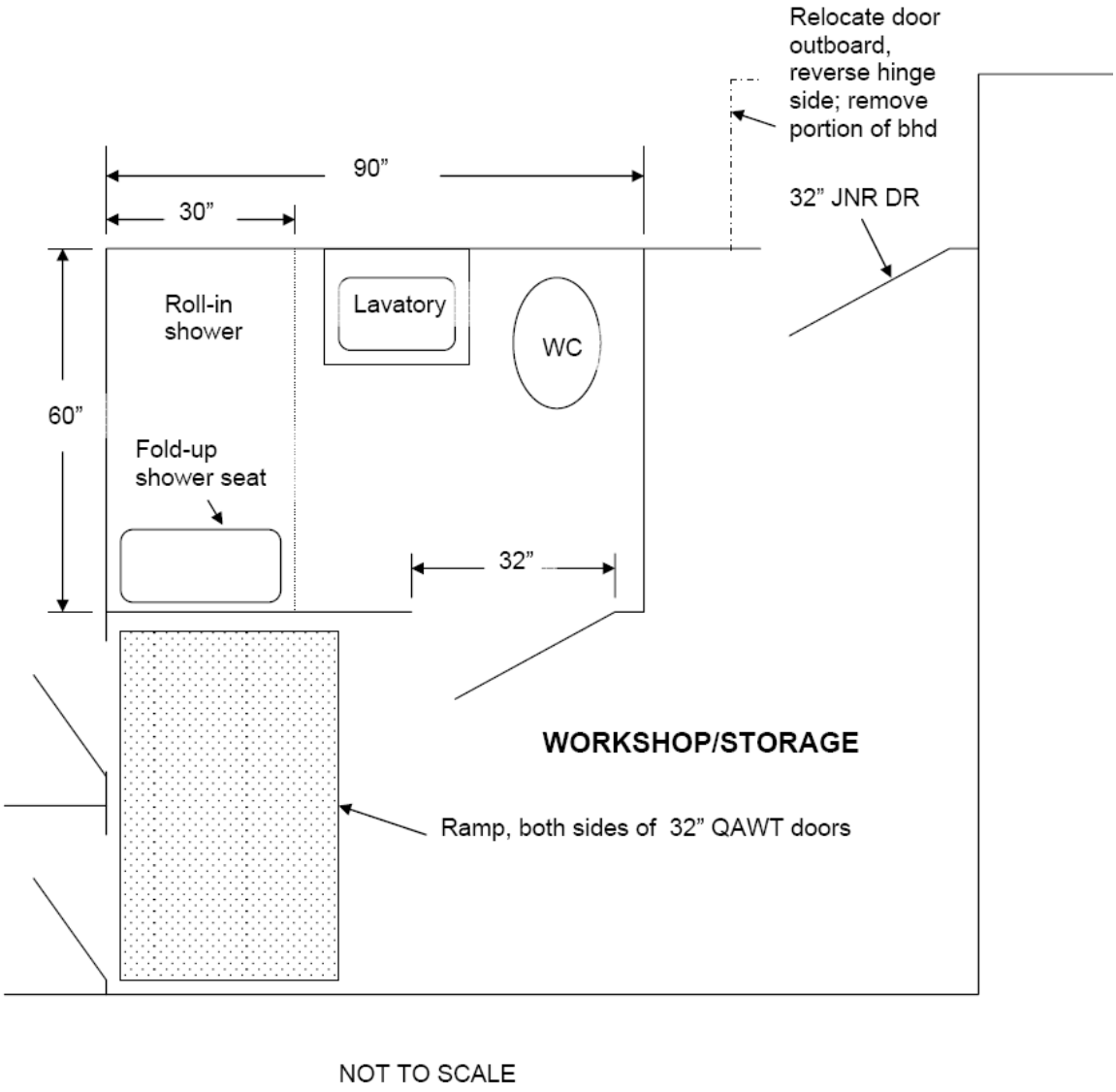
9. Objects normally located in passageways (fire extinguishers, fire stations, emergency equipment) will be mounted in recesses so as not to protrude into accessible routes.

10. The slopes for ladders (stairs) in Sub-Chapter U (Inspected Research Vessels) will be used. Decreasing the slope further may have a significant impact on other compartments.

11. The gangway design is being carefully considered. A full stern loading ramp has been envisioned so that scientific equipment can be easily transported aboard by dolly or forklift. This arrangement would be ideal for making the vessel accessible to the disabled and the general public during open houses. Some changes to the pier itself will be needed.

12. Transitions (deck surface vertical changes) such as door sills were minimized and kept below ¼" where possible. American Bureau of Shipping requires some sill and their purpose is to keep water from going all over.

13. A portable accommodations van will be equipped to expand berthing capacity when needed. These vans come equipped with both a head and shower, and HVAC. Drain and plumbing supply lines will be provided on deck. Guidance given by the ADAAG will be used in designing the accommodations van so that it too is more accessible to the disabled.



Sketch: R/V *Hugh R. Sharp* – Workshop/Storage Arrangement

B. ADA Facilities Planned for ARRV

Current Handicap Access Arrangements on the ARRV Include:

- One handicap stateroom is provided on the 01 deck (see example below)
- A personnel lift, handicap accessible, is provided for access to all deck levels with the exception of the bridge
- All passageways are minimum 4 ft width to accommodate handicap access
- Portable/dropping door coamings will be provided on exterior entry door on main deck
- Laboratories will be designed to conform to requirements for impaired scientists
- Living spaces such as mess deck and lounge will be friendly to disabled persons.
- Open deck access will be provided for the disabled with considerations for their safety.

ADA Stateroom Arrangement For ARRV