

PROVISIONAL PATENT APPLICATION

Convertible Seating Unit with Repositionable Backrest for Sleeping Surface Formation

TECHNICAL DRAWINGS

The following technical drawings illustrate various aspects of the invention:

- Figure 1: Standard pew mode showing normal seating configuration
- Figure 2: Extended backrest configuration showing oversized backrest dimensions
- Figure 3: Backrest converted to cot panel showing horizontal sleeping surface
- Figure 4: Bottom view of cot mode showing backrest deployment and support structure

CLAIMS

Primary Claim: A convertible seating unit comprising a seat platform, structural support members, and a repositionable backrest element that can be moved from a generally vertical seating position to a generally horizontal position to form a sleeping surface, wherein various embodiments may incorporate different repositioning mechanisms, dimensions, materials, and operational features as described herein.

FIELD OF THE INVENTION

This invention relates to convertible furniture systems, and more particularly to seating units having repositionable backrest elements that can form sleeping surfaces for emergency shelter or multi-use applications.

BACKGROUND OF THE INVENTION

Emergency shelters, churches, schools, auditoriums, and other institutional facilities face significant challenges when needing to provide both seating and sleeping accommodations. Traditional approaches require storing and deploying separate cots or sleeping equipment, creating logistical burdens including storage space requirements, setup time, labor costs, and sanitation complexity.

Existing convertible furniture solutions are typically complex, expensive, or fail to maintain the aesthetic requirements of institutional settings. There remains a need for seating that can rapidly convert to sleeping surfaces without separate equipment storage or complex mechanisms.

SUMMARY OF THE INVENTION

The present invention provides a seating unit having an oversized backrest element that serves dual functions: normal backrest support during seating use, and a sleeping surface platform when repositioned horizontally. The conversion eliminates the need for separate sleeping equipment while maintaining traditional seating aesthetics.

In the primary embodiment, the backrest is completely removable, sliding out of retention features and repositioning manually onto the seat platform to form a sleeping surface. Alternative embodiments employ various hinge, pivot, slide, or other positioning mechanisms.

DETAILED DESCRIPTION

Primary Embodiment - Removable Backrest System with Magnetic Security

The seating unit comprises a seat platform supported by end structural members, with an oversized backrest panel that can be completely removed and repositioned. The primary embodiment incorporates a magnetic security system to prevent unauthorized access while allowing rapid professional deployment.

Seat Platform Structure: The seat platform may be approximately 17-18 inches above floor level in some embodiments, though other heights may be used. The platform may be 18-20 inches deep in some embodiments, or other depths as appropriate. Traditional pew seats are typically angled rather than horizontal, creating a sloped surface. The platform provides a stable base for both seating and the repositioned backrest panel.

End Support Members: End support members provide structural support and may take various forms including decorative end panels, simple legs, framework structures, or other configurations. In some embodiments, end support members may include hollow sections for storage. In other embodiments, they may be solid. Heights may vary to accommodate different backrest sizes.

Removable Backrest Panel with Leveling Ribs: In the primary embodiment, the backrest panel is completely detachable from the seating unit. The panel may be approximately 30 inches in height in some embodiments, providing adequate width when repositioned horizontally for sleeping. In other embodiments, heights may be 24 inches, 28 inches, 32 inches, 36 inches, or other dimensions as appropriate.

The backrest length may span the full seating unit width, which may be 72 inches, 75 inches, 84 inches, or other lengths in various embodiments. Panel thickness may range from ½ inch to 2 inches or more.

Critical Innovation - Angle Compensation Ribs: The backrest panel incorporates built-in ribs, contours, or structural elements on one surface designed to compensate for the angled seat platform when the panel is repositioned horizontally. These ribs may be:

- Tapered wooden strips running lengthwise
- Molded contours in composite panels
- Adjustable leveling elements
- Foam or padding shaped to create level surface
- Metal ribs or framework
- Combinations of leveling methods

When the backrest panel is placed horizontally on the angled seat, these ribs create a level sleeping surface suitable for standard mattresses. The ribs eliminate the need for custom-shaped mattresses and allow use of ordinary bedding.

Magnetic Security System: The primary embodiment employs a magnetic locking system to prevent unauthorized manipulation while allowing rapid professional deployment:

Magnetic Latch Configuration:

- Strong permanent magnets (rare earth magnets in some embodiments) embedded in backrest panel
- Corresponding magnetic plates or ferrous metal targets in end support members
- Magnetic strength sufficient to resist casual manipulation (50-200 pounds pull force in various embodiments)
- Multiple magnetic contact points for redundant security

Security Release Mechanism:

- Specific release magnet required for disengagement
- Release magnet must be positioned at specific location(s)
- Specific gesture or motion sequence required (lift, twist, pull combination in some embodiments)
- System designed so casual contact will not trigger release
- Prevents children, teenagers, or unauthorized persons from manipulating during normal use

Professional Deployment Tools:

- Release magnet may be handheld device, integrated tool, or key-like implement
- May incorporate safety features like tethers or lanyards
- Multiple identical tools may be provided for emergency teams
- Tools may be stored in designated locations or with facility management

Bedding Storage and Integration: The system may incorporate bedding storage in various configurations:

Under-Seat Storage:

- Lightweight mattresses stored beneath seat platform
- Cargo strap attachment system (similar to sleeping bag rolls)
- Straps may be adjustable webbing, elastic, or fixed length
- Access may be through hinged panels, removable covers, or open storage
- Bedding remains attached to seating unit but easily deployable

Separate Storage:

- In alternative embodiments, bedding may be stored separately
- Boxed mattresses or bedding bundles stored in facility storage areas
- Standard ordinary mattresses of appropriate dimensions
- No special shaped or custom bedding required due to leveling rib system

Storage Integration Features:

- Storage compartments may be ventilated to prevent moisture accumulation
- Antimicrobial treatments may be applied to storage areas
- Quick-access latches or openings for rapid bedding deployment
- Storage areas designed to accommodate folded or rolled bedding configurations

Personal Storage Integration: The latch mechanism area or end support members may incorporate personal storage features:

- Small compartments for keys, personal items, medications
- Located adjacent to sleeping position for easy access
- May be integral to handle mechanism or separate compartments
- Secure closure methods (magnetic, mechanical, or combination)
- Sized for typical personal items (phone, wallet, glasses, etc.)

Alternative Embodiments - Connected Systems

Hinged Embodiments: In alternative embodiments, the backrest may remain connected to the seating unit through hinge mechanisms. Hinges may include piano hinges, barrel hinges, or other hinge types positioned at various locations including the base of the backrest, along seat edges, or at end support members.

Sliding Embodiments:

Some embodiments may employ sliding mechanisms where the backrest moves along tracks, channels, or guides before pivoting or dropping into horizontal position. Movement may be linear, curved, or combination motions.

Pivoting Embodiments: Various pivot mechanisms may be employed where the backrest rotates around fixed or movable pivot points to achieve horizontal positioning.

Quick-Release Systems: Some embodiments may use pin systems, lever releases, or other quick-disconnect mechanisms that allow rapid conversion while maintaining some connection to prevent loss of components.

Dimensional Considerations and Capacity Planning

Sleeping Surface Dimensions: When converted to sleeping configuration, various embodiments may provide surfaces of different sizes:

- Width: 24", 28", 30", 32", 36" or other dimensions
- Length: 60", 72", 75", 78", 84" or other dimensions
- These dimensions may accommodate adult sleeping in some embodiments, child sleeping in others, or multiple occupants in still other embodiments

Seating Unit Length and Capacity Configurations: Different embodiments may be configured with various overall lengths to accommodate different sleeping arrangements and facility capacity requirements:

Seating Unit Length	Usable Sleeping Length*	Sleeping Configuration Examples	Seating Capacity**	Sleeping Capacity	Conversion Ratio
6 feet (72")	62"	Child bed (60")	3 people	1 child	33%
7 feet (84")	74"	Adult bed (72")	4 people	1 adult	25%
8 feet (96")	86"	Adult bed (75") or Two child beds	5 people	1 adult or 2 children	20% or 40%
9 feet (108")	98"	Adult bed (78") + storage or Adult + child beds	6 people	1 adult or 1 adult + 1 child	17% or 33%
10 feet (120")	110"	Adult (75") + Child (60") beds	6 people	1 adult + 1 child	33%
12 feet (144")	134"	Two adult beds (75" each)	8 people	2 adults	25%
14 feet (168")	158"	Two adult beds (78" each)	9 people	2 adults	22%
16 feet (192")	182"	Two adult beds + central storage	10 people	2 adults	20%

*Usable length assumes 5" per end for structural support
**Based on 18" per seated person + end allowances

Facility-Wide Capacity Planning: In various embodiments, facility-wide conversion ratios may vary based on seating unit configurations:

- Traditional short pews (6-7 feet): 25-35% conversion ratio
- Medium pews (8-10 feet): 20-35% conversion ratio
- Long pews (12+ feet): 20-25% conversion ratio
- Mixed configurations: 20-40% overall conversion ratio

Example Facility Conversions:

- 400-seat sanctuary with mixed pew lengths: 80-160 sleeping capacity
- 200-seat chapel with uniform 8-foot pews: 40-80 sleeping capacity
- 600-seat auditorium with long pews: 120-150 sleeping capacity

Spacing and Walkway Requirements

Seating Configuration Spacing: Various embodiments may be designed to work with different spacing requirements during normal seating use versus emergency sleeping deployment:

Traditional Seating Spacing in Various Embodiments: In some embodiments, seating units may be designed for facilities using:

- Row spacing of 34-42 inches back-to-back, with 36-42 inches being common in recent construction
- In other embodiments, spacing may be 40 inches or more for enhanced comfort
- Some embodiments may accommodate seating allocation of 18-24 inches per person depending on local requirements
- Various embodiments may work with different preferred spacing ranging from minimum code requirements to generous spacing

Isle Width Compatibility in Different Embodiments: Some embodiments may be designed for facilities with:

- Center aisles of 4-6 feet or other widths as appropriate

- Side aisles of 30-42 inches or other dimensions as required
- In other embodiments, aisle widths may be designed for specific ceremonial requirements
- Various embodiments may accommodate different accessible route requirements

ADA Accessibility in Various Embodiments: Some embodiments may be designed to meet or exceed accessibility requirements including:

- Accessible routes of 36 inches minimum width achievable with standard institutional spacing
- In other embodiments, clear space for wheelchair transfer may be provided adjacent to sleeping surfaces
- Some embodiments may include accessible sleeping surface heights of 17-19 inches above floor
- Various embodiments may accommodate different accessibility standards as appropriate for the region or application

Emergency Sleeping Walkway Spacing: When converted to sleeping mode, different embodiments may provide various walkway dimensions:

Walkway Space Calculations in Different Embodiments: In embodiments where seating units are spaced at standard institutional distances, the conversion may result in:

- Net space between pew backs: 35-41 inches in some embodiments
- Other embodiments may provide 33-39 inches of walkway space
- Some embodiments may achieve 37-38 inches of typical walkway width
- Various embodiments may provide different walkway dimensions based on backrest panel thickness

ADA Accessibility in Various Embodiments: Some embodiments may be designed to meet or exceed accessibility requirements including:++

- Accessible routes of 36 inches minimum width or greater
- In other embodiments, clear space for wheelchair transfer may be provided
- Some embodiments may include accessible sleeping surface heights of 17-19 inches above floor
- Various embodiments may accommodate different accessibility standards as appropriate for the region or application

Spacing Analysis for Different Applications:

Walkway Adequacy in Various Embodiments: Different embodiments may provide varying levels of walkway functionality:

Embodiment Type	Typical Walkway Width	Potential Applications	Accessibility
Minimum spacing embodiments	33-35 inches	Basic emergency shelter	Meets ADA minimum
Standard spacing embodiments	36-38 inches	General emergency use	Exceeds ADA requirements
Comfortable spacing embodiments	39-41 inches	Extended shelter use	Enhanced accessibility
Generous spacing embodiments	42+ inches	Long-term applications	Superior accessibility

Emergency Egress in Different Embodiments: Various embodiments may accommodate different emergency egress requirements:

- Some embodiments may provide walkways suitable for single-file emergency egress
- Other embodiments may allow two-way traffic during emergency situations
- Various embodiments may accommodate stretcher access or emergency equipment movement
- Different embodiments may be designed for specific local fire code or emergency management requirements

Design Solutions for Spacing Challenges:

Alternating Deployment Patterns: Various embodiments may employ different deployment strategies to maintain adequate walkways:

- Alternating row conversion: Convert every other pew row to maintain walking spaces
- Sectional conversion: Convert designated sections while maintaining access aisles
- Phased deployment: Gradual conversion allowing maintained egress routes
- Modified spacing: Custom pew spacing designed for dual-function use

Walkway Preservation Methods: Different embodiments may incorporate various approaches to maintain emergency egress:

- Designated walkway preservation during conversion
- Temporary walkway marking systems
- Modular walkway components that deploy during conversion
- Emergency lighting integrated into walkway systems
- Clear marking of accessible routes during sleeping configuration

Compliance Strategies for Various Embodiments:

New Construction Approach:

- Pew spacing designed for 42+ inches back-to-back
- Wider aisles than minimum code requirements
- Integration with building emergency egress planning
- Coordination with fire marshal and building official review

Retrofit Installation Considerations:

- Assessment of existing spacing limitations
- Selective conversion strategies to maintain code compliance
- Alternative deployment patterns for constrained spaces
- Coordination with facility management and emergency response agencies

Accessibility Integration:

- Designated accessible sleeping areas dispersed throughout shelter
- Maintained accessible routes to all facility areas
- Transfer space provision at accessible sleeping locations
- Integration with existing facility accessibility features

Regional and Local Code Variations: Different embodiments may need to accommodate various regional requirements:

- State fire code variations affecting aisle width requirements
- Local building official interpretations of emergency shelter standards
- Regional emergency management agency guidelines
- Facility-specific requirements based on occupancy classification
- Insurance carrier requirements for liability coverage

This spacing analysis ensures various embodiments can be designed to meet applicable codes while providing functional emergency shelter capability.

Load Capacity: Different embodiments may be designed for various load requirements:

- Static loads of 200, 250, 300, 350 pounds or other capacities
- Dynamic loads may be different from static loads
- Safety factors may be incorporated as appropriate for intended use
- Load distribution may be achieved through seat platform design, support ribs, center supports, or other structural elements

Materials and Construction

Backrest Panel Construction: The backrest may be constructed from various materials in different embodiments including:

- Wood products (plywood, solid wood, engineered lumber)
- Metal materials (steel, aluminum, composites)
- Synthetic materials (high-density plastics, fiberglass)
- Layered or laminated constructions
- Combinations of materials

Surface Treatments: Various embodiments may incorporate different surface treatments:

- Fire retardant coatings for institutional applications
- Antimicrobial treatments for hygiene requirements
- Durability finishes for high-use environments
- Decorative finishes for aesthetic requirements
- Untreated surfaces in basic embodiments

Fastening and Hardware: Connection methods may vary among embodiments:

- Mechanical fasteners (screws, bolts, clips)
- Magnetic systems for tool-free operation
- Friction-based retention
- Interference fits
- Quick-release mechanisms
- Combinations of methods

Conversion Process

Professional Deployment Protocol: The primary embodiment is designed for deployment by trained facility personnel (typically two workers for safety and efficiency):

Seating to Sleeping Conversion:

1. *Security Release:* Authorized personnel use specific release magnet at designated contact points

2. *Gesture Sequence:* Perform required motion (lift, twist, pull combination) to disengage magnetic locks
3. *Panel Removal:* Two workers lift backrest panel from vertical position (panel may weigh 20-50 pounds depending on construction)
4. *Horizontal Positioning:* Panel repositioned horizontally on seat platform with leveling ribs facing up
5. *Alignment:* Panel positioned to ensure ribs properly compensate for seat angle, creating level surface
6. *Bedding Deployment:* If stored under seat, release cargo straps and unfold mattresses onto level surface
7. *Final Securing:* Mattresses positioned and secured by friction, body weight, or optional attachment points

Conversion time may be 30-90 seconds per unit with trained personnel in various embodiments.

Quality Control During Deployment:

- Visual inspection that leveling ribs create proper horizontal surface
- Check that bedding lies flat without gaps or raised areas
- Verify personal storage compartments are accessible
- Confirm all magnetic release tools are secured/tethered

Sleeping to Seating Conversion: The reverse process returns the unit to seating configuration:

1. *Bedding Removal:* Fold and secure mattresses to under-seat storage or remove to separate storage
2. *Panel Repositioning:* Lift backrest panel and return to vertical position in end supports
3. *Magnetic Re-engagement:* Panel automatically locks when properly positioned (magnets self-engage)
4. *Security Verification:* Test that panel is securely locked and cannot be casually removed
5. *Storage Securing:* Ensure bedding is properly secured in storage configuration

Safety Protocols:

- Two-person teams prevent injury from panel weight or awkward positioning
- Clear communication between workers during panel movement
- Designated tool custody and accountability
- Emergency stop procedures if conversion must be interrupted

Applications and Use Cases

Institutional Applications: Various embodiments may be configured for different institutional uses:

- Religious facilities (church pews, chapel seating)
- Educational institutions (auditorium seating, classroom benches)
- Civic buildings (courthouse seating, municipal facilities)
- Community centers (multi-purpose rooms, meeting spaces)
- Corporate facilities (conference rooms, training areas)

Emergency Applications: Different embodiments may serve various emergency functions:

- Natural disaster shelters
- Temporary housing facilities
- Emergency evacuation centers
- Community emergency preparedness
- Mobile or portable shelter applications

Residential Applications: Some embodiments may be adapted for residential use:

- Guest seating with sleeping capability
- Small space living solutions
- Recreational vehicle applications
- Temporary accommodation needs

Standards Compliance

Different embodiments may be configured to meet various standards:

- American building codes and safety requirements
- European safety and accessibility standards
- International emergency shelter guidelines
- Regional fire safety requirements
- Institutional accessibility standards (ADA or equivalent)
- Load capacity standards for emergency equipment

Manufacturing Flexibility

Production Methods: Various embodiments may be manufactured using different methods:

- Traditional woodworking for wood-based versions

- Metal fabrication for steel or aluminum versions
- Injection molding for plastic components
- Composite construction techniques
- Hybrid manufacturing approaches

Assembly Options: Some embodiments may be:

- Fully assembled units
- Partially assembled requiring minimal setup
- Knock-down designs for shipping efficiency
- Modular systems allowing customization

Tooling Requirements: Manufacturing may be accomplished using:

- Standard woodworking equipment
- Conventional metalworking tools
- No specialized tooling in basic embodiments
- Custom tooling for high-volume production in other embodiments

Installation and Deployment Methods

New Construction Integration: Various embodiments may be designed for installation during facility construction:

- Coordination with architectural plans and structural engineering
- Integration with building electrical, HVAC, and fire safety systems
- Floor anchoring systems using concrete anchors, embedded plates, or structural attachment
- Spacing requirements coordinated with egress planning and building codes
- Pre-installation staging and storage considerations
- Sequencing with other construction trades

Retrofit Installation Methods: Embodiments designed for existing facility upgrades may employ:

- Assessment of existing floor conditions and load capacity
- Removal of existing seating with minimal facility disruption
- Retrofitted anchoring systems compatible with existing floor structures
- Electrical integration for optional lighting or power features
- Phased installation allowing continued facility use during conversion
- Template-based positioning for consistent alignment and spacing

Portable and Temporary Deployment: Some embodiments may be configured for mobile or temporary use:

- Self-contained units requiring no permanent installation
- Interlocking systems for rapid setup and consistent spacing
- Transport-friendly designs for truck or trailer delivery
- Quick-assembly systems requiring minimal tools or expertise
- Weather protection for outdoor or semi-permanent deployment
- Storage and transport containers integrated with deployment systems

Anchoring and Foundation Systems: Various foundation approaches may be employed in different embodiments:

- Concrete floor anchoring using expansion anchors, wedge anchors, or epoxy anchors
- Elevated floor mounting using structural screws or bolts
- Ballast-based systems for non-penetrating installation
- Rail or track systems allowing repositioning while maintaining security
- Seismic anchoring systems for earthquake-prone regions
- Load distribution plates for point-load sensitive floors

Spacing and Layout Considerations: Installation planning may incorporate various spacing requirements:

- ADA compliance spacing for wheelchair accessibility
- Emergency egress requirements and aisle width maintenance
- Sight line considerations for worship or presentation viewing
- HVAC airflow considerations for proper ventilation
- Lighting coordination for both seating and sleeping configurations
- Sound system integration for optimal acoustics

Installation Tools and Equipment: Different embodiments may require various installation equipment:

- Hand tools: drills, wrenches, levels, measuring devices
- Power tools: hammer drills, impact drivers, circular saws
- Lifting equipment: dollies, lifts, or cranes for heavy units

- Alignment tools: laser levels, string lines, templates
- Safety equipment: fall protection, hearing protection, eye protection
- Testing equipment: torque wrenches, pull-test gauges, load verification tools

Operational Considerations

User Training and Procedures: Different embodiments may require various levels of user instruction and training:

Basic User Training:

- Recognition of convertible seating units vs. standard seating
- Understanding of security systems and authorized access protocols
- Emergency conversion procedures for facility staff
- Safety protocols during panel removal and repositioning
- Proper bedding deployment and securing techniques
- Personal item storage and security during sleeping use

Facility Management Training:

- Regular inspection schedules for mechanical components
- Magnetic system testing and verification procedures
- Hardware maintenance including torque checking and lubrication
- Bedding storage management and rotation protocols
- Emergency deployment team coordination and communication
- Documentation and reporting of system usage and maintenance

Emergency Response Integration:

- Coordination with local emergency management agencies
- Integration with facility emergency response plans
- Training for rapid large-scale deployment during emergencies
- Communication systems for coordinating conversion activities
- Supplies management for bedding, personal items, and support equipment
- Post-emergency conversion back to seating configuration

Maintenance Protocols: Various embodiments may have different maintenance requirements and schedules:

Daily or Weekly Inspections:

- Visual inspection of magnetic retention systems
- Check for loose hardware or damaged components
- Bedding storage area inspection for cleanliness and organization
- Personal storage compartment cleaning and functionality testing
- General cleanliness and appearance maintenance
- Documentation of any issues or concerns

Monthly or Quarterly Maintenance:

- Detailed inspection of all moving parts and mechanisms
- Lubrication of hinges, slides, or other moving components where applicable
- Torque verification of critical fasteners
- Magnetic system strength testing using pull gauges
- Load testing of sleeping surface configurations
- Refinishing or touch-up of surfaces as needed

Annual or Periodic Overhauls:

- Complete disassembly and inspection of conversion mechanisms
- Replacement of wear items such as gaskets, springs, or soft goods
- Recalibration of magnetic systems or adjustment mechanisms
- Structural inspection for fatigue, cracking, or degradation
- Refinishing of all surfaces including sanding and recoating
- Documentation update and maintenance history review

Safety Protocols and Procedures: Safety considerations may vary among different embodiments:

Personnel Safety:

- Two-person teams for panel handling to prevent injury
- Proper lifting techniques for heavy components
- Clear communication protocols during conversion activities
- Personal protective equipment requirements (gloves, safety glasses)
- Emergency stop procedures if conversion must be interrupted
- First aid protocols for handling-related injuries

Facility Safety:

- Egress route maintenance during conversion activities
- Fire safety system integration and emergency procedures
- Electrical safety for units with integrated power or lighting
- Fall protection for elevated or difficult access installations
- Crowd control during emergency deployment situations
- Security protocols for valuable equipment and personal belongings

System Safety:

- Load limit enforcement and monitoring
- Structural integrity verification before each use period
- Proper securing of all components during conversion
- Verification of stable configuration before occupancy
- Emergency release procedures for trapped or stuck components
- Backup systems or manual overrides for critical functions

Enhanced Features and Options

Storage Integration Systems: Various embodiments may incorporate different storage solutions to enhance functionality:

Under-Seat Storage:

- Bedding compartments with compression systems for mattresses and pillows
- Personal item storage with individual locking mechanisms
- Emergency supply storage for flashlights, first aid supplies, or communication devices
- Ventilated storage areas to prevent moisture accumulation and odors
- Quick-access panels or doors for rapid deployment
- Modular storage inserts allowing customization for different items

End Panel Storage:

- Hollow end support members containing additional storage volumes
- Sliding or hinged access panels integrated into decorative end designs
- Tool storage for conversion equipment and maintenance supplies
- Document storage for emergency procedures or facility information
- Charging stations for electronic devices with integrated power systems
- Security storage with locking mechanisms for valuable items

Integrated Storage Features:

- Hidden compartments within seat platforms or backrest panels
- Storage systems that deploy automatically during conversion
- Modular storage components that can be added or removed as needed
- Weather-resistant storage for outdoor or semi-permanent installations
- Climate-controlled storage for sensitive items or medical supplies
- Inventory management systems with tracking and monitoring capabilities

Comfort Enhancement Options: Different embodiments may incorporate various comfort features:

Padding and Cushioning Systems:

- Integrated foam padding within backrest panels for improved sleeping comfort
- Removable cushioning systems allowing cleaning and replacement
- Memory foam or gel-filled options for enhanced comfort
- Contoured surfaces designed for ergonomic support during both seating and sleeping
- Temperature-regulating materials for climate comfort
- Antimicrobial treatments for hygiene and health considerations

Adjustability Features:

- Height-adjustable components for accommodating different user sizes
- Angle adjustment for backrest positioning during seating use
- Firmness adjustment for sleeping surface customization
- Modular padding systems allowing personalization
- Removable components for cleaning or replacement
- Quick-adjustment mechanisms for rapid customization

Privacy and Division Options: Various embodiments may include features for creating individual spaces:

Privacy Screen Systems:

- Deployable fabric screens that extend from end panels or storage areas

- Rigid panel systems that unfold or slide into position
- Modular screen components allowing flexible space division
- Sound-dampening materials integrated into privacy screens
- Visual privacy combined with airflow maintenance
- Easy setup and takedown for rapid reconfiguration

Space Division Methods:

- Retractable dividers stored within seating units
- Snap-together panel systems for creating individual sleeping areas
- Hanging systems suspended from ceiling attachment points
- Floor-standing dividers with weighted or anchored bases
- Integrated lighting within divider systems
- Communication systems allowing coordination between divided spaces

Personal Space Definition:

- Individual storage areas adjacent to each sleeping position
- Personal lighting controls for reading or personal tasks
- Individual climate control options where building systems permit
- Personal security features for belongings during sleep periods
- Customizable space marking or identification systems
- Emergency communication devices within each personal area

Technology Integration Options: Some embodiments may incorporate various technological enhancements:

Power and Lighting:

- Individual LED reading lights for each seating or sleeping position
- USB charging ports for electronic devices
- Emergency lighting systems with battery backup
- Motion-activated lighting for nighttime navigation
- Dimming controls for ambient lighting during sleep periods
- Integration with building power and emergency power systems

Communication Systems:

- Intercom systems for facility-wide communication
- Emergency call buttons for medical or security assistance
- Public address system integration for announcements
- Wi-Fi access points integrated into seating systems
- Emergency broadcasting capability for crisis communications
- Integration with building security and monitoring systems

Best Mode Disclosure

The preferred embodiment employs a removable backrest system with integrated security and leveling features specifically designed for institutional emergency shelter applications.

Preferred Construction:

- Backrest panel: ¾-inch hardwood plywood, 30 inches high by 75 inches long
- Leveling ribs: Three tapered hardwood strips (1" x 2" tapering to 1" x ½") running lengthwise, spaced 24 inches apart
- Rib placement compensates for typical 3-5 degree pew seat angle
- Panel edges rounded to ¼-inch radius for safety
- Natural wood finish with optional fire-retardant treatment

Preferred Magnetic Security System:

- Four rare earth neodymium magnets (N42 grade, 1-inch diameter, ½-inch thick) embedded in backrest panel
- 150-pound pull force per magnet when properly engaged
- Magnets positioned 6 inches from each end, 12 inches from top and bottom edges
- Corresponding steel plates (¼-inch thick, 2-inch diameter) recessed into end support members
- Release tool: Handheld electromagnet or opposing permanent magnet on telescoping handle

Preferred Release Protocol:

- Release magnet must contact two diagonal magnetic points simultaneously
- Lift motion combined with 15-degree twist motion required for disengagement
- Specific sequence prevents accidental release while allowing rapid professional deployment
- Visual indicators (small colored dots) mark proper release contact points

Preferred Bedding Integration:

- Standard twin-size mattresses (75" x 36" x 4-6" thick)
- Stored folded under seat platform in compression straps
- Cargo-style webbing with quick-release buckles
- Mattresses compress to approximately 12-inch thickness for storage
- No custom bedding required due to leveling rib system creating flat surface

Preferred Personal Storage:

- Small sliding drawer (6" x 4" x 2" deep) integrated into end support near magnetic release point
- Magnetic closure matching main locking system
- Lined with felt or similar soft material
- Positioned for easy access from sleeping position

This configuration provides optimal balance of security (preventing unauthorized access), rapid deployment (90-second conversion), traditional aesthetics (standard pew appearance), and cost-effectiveness (standard materials and mattresses).

CONCLUSION

This invention encompasses various embodiments of convertible seating units that provide both seating and sleeping functionality through repositionable backrest elements. The primary removable embodiment offers simplicity and reliability, while alternative connected embodiments provide different operational characteristics. All embodiments eliminate the need for separate sleeping equipment storage while maintaining appropriate aesthetic and functional characteristics for institutional applications.

The invention can be adapted to various dimensional requirements, load capacities, materials, and regional standards while preserving the core functionality of dual-purpose seating and sleeping accommodation through backrest repositioning.
