

DIVISION 10 - SPECIALTIES

SECTION 105626.23 – MOTORIZED MOBILE STORAGE SHELVING (SPACESAVER “ECLIPSE POWERED SYSTEM®”)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Electric, carriage mounted high-density mobile storage units, support rails, fabrication, and installation including leveling of support rails.
- B. Related Work, Not Furnished:
 - 1. Structural floor system capable of supporting live and dead loads required by prevailing building codes, including loads of storage units to be installed. Provide a maximum allowable sub floor deflection of [L/480] [L/360 with Automatic Brake] under specified mobile storage loads.
 - 2. Finish floor covering and edging materials and installation on raised floors and ramps, or when on concrete with recessed rail installation.
 - 3. Power wiring to units from adequate power supply. Final connections to units shall be provided by [installer] [electrician].
 - 4. Fire suppression system is by others.
- C. Related Sections:
 - 1. [Section 033000 – Concrete Work]
 - 2. [Sections in Division 9 – Finishes, relating to finish floor and base materials.]
 - 3. [Division 26 Specification Sections power wiring devices, conductors and circuit protection.]
- D. Allowances:
- E. Alternates:

1.3 REFERENCES

- A. American Library Association (when applicable)
 - 1. Cantilever Bracket Type Metal Library Bookstacks; Library Technology Reports.
- B. American National Standards Institute (ANSI) Standards:
 - 1. Applicable standards for fasteners used for assembly.
- C. American Society for Testing and Materials (ASTM) Standards:

DIVISION 10 - SPECIALTIES

1. Applicable standards for steel sheet materials used for fabrication.
- D. American Institute of Steel Construction (AISC) Standards:
1. Applicable standards for steel materials used for fabrication.
- E. Underwriters' Laboratories (C-UL US):
1. Listings for electrical equipment and devices described in this specification.

1.4 SYSTEM DESCRIPTION

- A. General: The system consists of [manufactured] [Owner furnished] storage units mounted on manufacturer's track-guided carriages to form a compact storage system. System design permits access to any single aisle by moving units until the desired aisle is opened. The manufacturer's proprietary unit interlock system prevents units from being moved while the open aisle is occupied. The carriage/rail system provides uniform carriage movement along the total length of travel, even with unbalanced loads.
- B. Carriage System Design and Features: The carriage system consists of a formed structural steel frame with [hardened steel] [ductile iron] wheels riding on steel rails [recessed] [surface] mounted to the floor. Rails shall be types selected by the manufacturer to ensure smooth operation and self-centering of mobile storage units during travel without end play or binding. Rail types, quantities and spacing shall be selected by the manufacturer to suit installation conditions and requirements. All bearings used in the drive mechanism shall be permanently shielded and lubricated.
- C. Movement Controls: Provide a carriage control panel on the accessible (open) end of each moveable carriage, located 44 inches (1118 MM) above the base, centered on the face panel. Minimum controls shall include directional control buttons/icons, STOP/RESET push-button/icon and a red reset light/icon.
1. System controls shall start motors on each movable carriage ["sequentially" to minimize power demands] ["block" to start all at once] and shall provide dynamic braking to provide smooth operation. No additional hardware shall be required to change between "sequential" and "block" movement. Maximum running speed shall be limited to 3.3 inches (84 mm) per second.
 2. Provide solid state controls and indicator lights/icons for a visual indication of safety system operation. Provide each aisle with a programmable distance sensor to ensure proper timing for start/stop operation.
 3. Pushing the directional control button/icon on any moveable carriage adjacent to the desired aisle location in the direction away from the desired aisle location opens the system at the desired aisle. The selected aisle shall open automatically regardless of the position of the carriages. [Manual Reset: The carriage control head will display a flashing red reset light/icon at the newly opened aisle indicating that the aisle is locked open and requires resetting before another aisle can be opened. Provide for automatic lockout and manual reset of controls if selected aisle is not moved within a preset period of time.] [(Optional) Automatic Reset: The carriage control heads will display a constant green light, or green arrow icon, at all carriages indicating that the system is ready for the next aisle access. Provide for automatic reset if system is equipped with optional Zero Force Sensor (ZFS) system safety feature, or other redundant safeties.]
 4. Controls shall feature safety activated message and direction indicator designating which aisle safety was activated or back lit message indicating which aisle is in use (i.e. "Right Aisle in use" or "Left Aisle in use").

DIVISION 10 - SPECIALTIES

5. [(Optional) Infrared Capable Controls and Infrared Remote Control Keys: Provide infrared capable control panel at end of each motorized carriage and [one] [two] [additional] hand held infrared remote control user key(s).] (In lieu of standard control moveable on carriage.)
- D. Drive System: The system shall be designed with a positive type motorized drive which minimizes end play and that carriages will stop without drifting. All system components shall be selected to ensure a smooth, even movement along the entire carriage length.
1. Each electric carriage shall be provided with a current limited fractional horsepower gear motor, connected to drive wheel assembly with a roller chain.
 2. System shall include a chain sprocket drive system to ensure that carriages move uniformly along the total length of travel, even with unbalanced loads.
 3. A tensioning device shall be provided on each chain drive (when applicable).
 4. All bearings used in the drive mechanism shall be permanently shielded and lubricated.
 5. System shall operate on 115 V.A.C. 50/60 hertz, 20 amp dedicated circuit provided by others, one per module.
 6. Overhead mounted power pantograph distribution system shall conceal all interconnecting wiring.
- E. Safety Features:
1. Visual indicators/icons shall provide verification that carriages are in the locked or unlocked mode.
 2. One safety sweep shall be provided in each aisle. A full-length infrared photoelectric safety sweep shall be provided to stop carriage movement if the sweep contacts an obstruction while in motion. Sweep must be equipped with OSHA approved safety demarcation tape.
 3. Entire system shall be C-UL US system listed.
 4. [(Optional) Mechanical safety sweep strip shall be provided to stop carriage movement if the system detects objects or persons in the aisle while the carriage is in motion. Sweep must be equipped with OSHA approved safety demarcation tape.] (In lieu of infrared photoelectric safety sweep.)
 5. [(Optional) Infrared photoelectric aisle entry sensor system shall be provided to stop carriage movement if the system detects persons entering a closing aisle.
 6. [(Optional) Zero Force Sensor (ZFS) system and electric braking devices shall be provided to prevent new carriage movement if the system detects objects or persons in the open aisle when an attempt is made to open another aisle.]
 7. [(Optional) An Automatic Battery Backup shall be provided for emergency operations in case of primary power failure.]
 8. [(Optional) A handheld rechargeable power pack shall be provided for emergency operations in case of primary power failure.]
- F. Finishes:
1. Fabricated Metal Components And Assemblies: Manufacturer's standard powder coat paint finish.
 2. End Panels, Accessible Ends: [Plastic laminate, manufacturer's standard available textures and patterns.] [Manufacturer's standard powder coat paint finish in standard available colors.]

DIVISION 10 - SPECIALTIES

1.5 PERFORMANCE REQUIREMENTS

- A. Design Requirements:
 - 1. Limit overall height to [____] inches [____] MM.
 - 2. Limit overall length to [____] inches [____] MM.
- B. [Seismic Performance: Provide mobile storage units capable of withstanding the effects of earthquake movement when required by applicable building codes.]

1.6 SUBMITTALS

- A. Product Data: Submit manufacturer's product literature and installation instructions for each type of shelving, track and installation accessory required. Include data substantiating that products to be furnished comply with requirements of the contract documents.
- B. Shop Drawings: Show fabrication, assembly, and installation details including descriptions of procedures and diagrams. Show complete extent of installation layout including clearances, spacings, and relation to adjacent construction in plan, elevation, and sections. Indicate clear exit and access aisle widths; access to concealed components; assemblies, connections, attachments, reinforcement, and anchorage; and deck details, edge conditions, and extent of finish flooring within area where units are to be installed.
 - 1. Show installation details at non-standard conditions. Furnish floor layouts, technical and installation manuals for every unit shipment with necessary dimensions for rail layout and system configuration at the project site. Include installed weight, load criteria, furnished specialties, and accessories.
 - 2. Provide layout, dimensions, and identification of each unit corresponding to sequence of installation and erection procedures. Specifically include the following:
 - a. Location, position and configuration of tracks on all floors.
 - b. Plan layouts of positions of carriages, including all required clearances.
 - c. Details of shelving, indicating method and configuration of installation in carriages.
 - 3. Provide location and details of anchorage devices to be embedded in or fastened to other construction.
 - 4. Provide installation schedule and complete erection procedures to ensure proper installation.
 - 5. Show locations of wiring and disconnects required for operating movable carriage units.
- C. Samples: Provide minimum 3 inch (76MM) square example of each color and texture on actual substrate for each component to remain exposed after installation.
- D. Selection Samples: For initial selection of colors and textures, submit manufacturer's color charts consisting of actual product pieces, showing full range of colors and textures available.
- E. Warranty: Submit draft copy of proposed warranty for review by the [Architect] [Architect/Engineer] [Engineer] [Designer].
- F. [Reference List: Provide a list of recently installed mobile storage systems (5 minimum) to be visited by owner, architect, and contractor. Intent of list is to aid in verifying the suitability of manufacturer's products and comparison with materials and product specified in this section.]

DIVISION 10 - SPECIALTIES

1.7 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Engage an experienced manufacturer who is ISO 9001 certified for the design, production, installation and service of motorized, carriage mounted high-density mobile storage units and support rails. Furnish manufacturer's ISO 9001 quality system registration certificate.
- B. Installer Qualifications: Engage an experienced installer who is a manufacturer's authorized representative for the specified products for installing carriages and anchoring shelving units to carriages.
 - 1. Minimum Qualifications: 1-year experience installing systems of comparable size and complexity to specified project requirements.
 - 2. Guaranteed 24 hour minimum response time to service call.

1.8 DELIVERY, STORAGE AND HANDLING

- A. Follow manufacturer's instructions and recommendations for delivery, storage and handling requirements.

1.9 PROJECT CONDITIONS

- A. Field Measurements: Verify dimensions before fabrication. Indicate verified measurements on Shop Drawings. Coordinate fabrication and delivery to ensure no delay in progress of the Work.
- B. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating mobile storage units without field measurements. Coordinate construction to ensure actual dimensions correspond to established dimensions.

1.10 SEQUENCING AND SCHEDULING

- A. Sequence storage shelving system installation with other work to minimize possibility of damage and soiling during remainder of construction period.
- B. Schedule installation of specified products and accessories after finishing operations, including painting have been completed.
- C. Provide components, which must be built in at a time which causes no delays general progress of the Work.
- D. Pre-installation Conference: Schedule and conduct conference on project site to review methods and procedures for installing mobile storage units including, but not limited to, the following:
 - 1. Review project conditions and levelness of flooring and other preparatory work performed under other contracts.
 - 2. Review and verify structural loading limitations.
 - 3. Recommended attendees include:
 - a. Owner's Representative.
 - b. Prime Contractor or representative.

DIVISION 10 - SPECIALTIES

- c. The [Architect] [Architect/Engineer] [Engineer/Architect] [Engineer] [Designer].
- d. Manufacturer's representative.
- e. Subcontractors or installers whose work may affect, or be affected by, the work of this section.

1.11 WARRANTY

- A. Provide a written warranty, executed by Contractor, Installer, and Manufacturer, agreeing to repair or replace units which fail in materials or workmanship within the established warranty period. This warranty shall be in addition to, and not a limitation of, other rights the Owner may have under General Conditions provisions of the Contract Documents.
- B. Warrant the entire movable compact shelving installation against defects in materials and workmanship for a period of five years from date of acceptance by the Owner.

1.12 [MAINTENANCE]

- A. [Provide manufacturer's extended maintenance agreement for [] [years] [months], commencing on the day the standard maintenance warranty ends.]

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. General: Products are based upon mobile shelving system products manufactured by Spacesaver Corporation. Spacesaver or equal as determined by owner/architect.

Contact: sales@bradfordsystems.com or by phone: 800-696-3453

2.2 BASIC MATERIALS

- A. General: Provide materials and quality of workmanship which meet or exceed established industry standards for products specified. Use furniture grade sheet metal for component fabrication unless indicated otherwise. Material thickness/gauges are manufacturer's option unless indicated otherwise.
- B. Plastic Laminates: NEMA LD-3, GP-28, Vertical Grade.
- C. Electrical Devices and Controls: C-UL US System Listed for type of application and service.
- D. [Other]

2.3 GROUT

- A. General: Provide non-shrink, non-staining hydraulic cement compound conforming to the following requirements, based on the performance of the test specimens at room temperature and in laboratory air, as stated by the grout manufacturer.
 - 1. Linear Movement: No shrinkage while setting; maximum expansion limited to .002 inches per linear inch.

DIVISION 10 - SPECIALTIES

2. Compressive Strength: Based on two inch cubes made following ASTM standards, tested on a Balding-Southward machine of 60,000 pounds capacity, meet or exceed the following:
 - a. Age: 1 hour ---- 4,500 psi
7 days ---- 8,000 psi

2.4 MANUFACTURED COMPONENTS

A. Rails:

1. General: Provide manufacturer's proprietary design units with the following properties:
2. Material: ASTM/AISI Type 1035 or 1045 steel, manufacturer's selection.
3. Capacity: 1,000 pounds per lineal foot (1385kg/M) of carriage.
4. Minimum Contact Surface: 5/8 inch (16MM) wide.
5. Provide rail sections in minimum 6 foot (1.83M) lengths.
6. Rail configuration shall permit attachment to top of structural floor system with provision for leveling rails to compensate for variations in floor surface level.
7. Provide rail connections designed to provide horizontal and vertical continuity between rail sections, to gradually transfer the concentrated wheel point load to and from adjoining rail sections. Butt joints without connections are not permitted.
8. [Anti-Tip Rail Form Covers: Manufacturer shall provide for protection if required [to prevent damage to rails during concrete back pours.] [when anti-tip devices are installed.]
9. Once rails are leveled, they shall be supported the full length with the specified grout.

B. Floor / Ramp:

1. Floor/Ramp Sheathing: [Minimum 3/4 inch (19MM), 7-ply underlayment grade plywood. Particleboard sheathing materials are not permitted.] [Provide low volatile organic compound (VOC)-emitting material for floor/ramp sheathing.]
2. Provide fire retardant treated floor/ramp materials when required by code.
3. Finished flooring materials shall be provided by [the Owner] [others].
4. Ramps at entrances to system. Full floor between all rails.

C. Carriages:

1. Provide manufacturer's design movable carriages fabricated of welded steel construction. Galvanized structural components and/or riveted carriages are unacceptable. 1,000 pound per foot (1385kg/M) minimum capacity.
2. Provide fixed carriages of same construction and height as the movable carriages, anchored to rails. Setting fixed shelving directly on floors is not permitted.
3. When required, provide bolted carriage splices designed to maintain proper unit alignment and weight load distribution.
4. Design carriages to allow the shelving uprights to recess and interlock into the carriages a minimum of 3/4 inch (19MM). Top mount carriages are unacceptable.
5. Provide each carriage with two wheels per rail.

D. Drive / Guide System:

DIVISION 10 - SPECIALTIES

1. Design: Provide drive system which prevents carriage whipping, binding and excessive wheel/rail wear under normal operation.
 - a. If line shafts are used, all wheels on one side of carriage shall drive.
 - b. If synchronized drives are used, a minimum of one wheel assembly driving both sides of carriage at center location required. Drive shaft shall exhibit no play or looseness over the entire length of that assembly.
2. Shafts: Solid steel rod or tube.
3. Shaft Connections: Secured couplings.
4. Bearing Surfaces: Provide rotating load bearing members with ball or roller bearings. Provide shafts with pillow block or flanged self-aligning type bearings.

E. Wheels:

1. Materials: Type [1045 solid steel] [ASTM A 536 specification 65/45/12 machined ductile iron]. Minimum load capacity per wheel: 3200 lbs. (1455kg).
2. Size: Minimum [5 inches (127MM)] [3 inches (76 MM)], outside diameter drive wheels.
3. Guides: Determined by manufacturer; minimum 2 locations.

F. Motors:

1. Type: 90VDC

G. Face Panels:

1. Materials: [Plastic laminate clad particleboard with plastic edging on vertical edges.] [Steel.]
2. Finishes: [Selected from manufacturer's standard available colors and patterns.] [(Optional) Selected by the [Architect] [Architect/Engineer] [Engineer] [Designer].]
3. End panels must cover the full height and width of shelving.

H. Shelving: (Choose from Cantilever, Four Post, Case-Type, or Wire)

I. Storage Panels and Cabinets: (Choose from Framed Art Storage Panels, File Cabinets, Laboratory Cabinets, Museum Cabinets, or Weapons Cabinets)

2.5 ACCESSORIES (CONSULT WITH YOUR STORAGE SPECIALIST.)

- A. [Touch Technology Control: Provide a touchscreen control head on every carriage that has standard system start/stop/reset controls, Infrared Capable Controls and Infrared Remote Controls, and Touch Technology Aisle Access Controls. (as described below) Depending on access rights user can perform the following system controls at each control head: Access aisle left or right of Touchscreen, Toggle stationary locally, Toggle power for the system, Toggle the auxiliary relay output, Tutorials for basic system and safety operation, Administrative functions]
- B. [Touch Technology Aisle Access Control: Provide a numeric touchscreen keypad at each carriage. 3 – 15 digit Pin-code access can be programmed and reprogrammed by the user, as needs dictate.]
- C. [Touch Technology Aisle Access Control with Pin-code and Card: Provide a numeric touchscreen keypad at each carriage. 3 – 15 digit Pin-code access. Provide a Card access at one or more carriage location(s). Both Pin and Card access can be programmed and reprogrammed by the user, as needs dictate.]

DIVISION 10 - SPECIALTIES

- D. [Touch Technology Control Audio: Provide audible, volume controlled, voice prompts and tone activation upon pressing icon controls.]
- E. [Touch Technology Control Tutorials: Provide audio/visual system use tutorials on touchscreen control head.]
- F. [Infrared Capable Controls and Infrared Remote Controls: Provide infrared capable control panel at end of each motorized carriage and [one] [two] [additional] handheld infrared remote control user key(s).] (In lieu of standard or touchpad controls.)
- G. [Individual Touchpad Aisle Access Controls: Provide a 10-digit push button keypad at each secured carriage. 4-digit PIN access code can be programmed and reprogrammed by the user, as needs dictate.] (In lieu of standard or infrared capable controls.)
- H. [Touchpad System Access Control: Provide one 10-digit push button keypad for each motorized system module. Touchpad control will be used to activate or deactivate system operation.] (In addition to standard or infrared capable controls.)
- I. [Dual Controls: Provide additional control panel at end of each motorized carriage.]
- J. [Programmable Aisle: Provide the ability to create more than one aisle per mobile storage module.]
- K. [System controls shall start motors on each movable carriage [“sequentially” to minimize power demands] [“block” to start all at once] and shall provide dynamic braking to provide smooth operation.] (No additional hardware shall be required to change between “sequential” and “block” movement.)
- L. [Automatic Battery Backup: Provide an integrated uninterruptible power supply for emergency operations in case of primary power failure.] (Includes the Plug-In-The-Wall Power option.)
- M. [Power Pack Override: Provide [one] [two] [additional] handheld rechargeable battery pack units to operate modules in case of main power failure.]
- N. [Plug-In-The-Wall Power: Provide a plug-in-the-wall power option, if permitted by local building code.] (In lieu of permanent power connection.)
- O. [Automatic Aisle Lighting: Provide top-mounted fluorescent light fixtures.]
- P. [Stationary aisle lock: Provide key switch to make a movable carriage into a stationary carriage.]
- Q. [Automatic Brake: Provide an automatic security brake on each motorized carriage.]
- R. [Auto Move Interface: Provide the capability for the motorized mobile storage shelving system to move automatically depending upon the Owner’s requirements. Select [System Auto Cycle] [System Priority Aisle] [System Closed Park] [System Ventilation Park]].
- S. [Building Management Interface: Provide the capability for the motorized mobile storage shelving system to interface with the building’s fire alarm system or building management system for fire protection [System Fire Park] and security [System Closed Park].]

2.6 FABRICATION

- A. General: Coordinate fabrication and delivery to ensure no delay in progress of the Work.

DIVISION 10 - SPECIALTIES

- B. Wheels: Provide precision ground and balanced units with permanently shielded and lubricated bearings.
- C. Carriages: Fabricate to ensure no more than 1/4 inch (6MM) maximum deviation from a true straight line. Splice and weld to ensure no permanent set or slippage in any spliced or welded joint when exposed to forces encountered in normal operating circumstances.
- D. Shelving, Supports and Accessories: See individual descriptions in "Shelving" paragraphs.

2.7 FINISHES

- A. Colors: [Selected from manufacturer's standard available colors.] [Provide in custom colors as selected by [Architect] [Architect/Engineer] [Engineer.]
- B. Paint Finish: Provide factory applied electrostatic powder coat paint. Meet or exceed specifications of the American Library Association.
- C. Laminate Finish: Provide factory applied laminate panels at locations indicated on approved shop drawings.
- D. Edgings: Provide preformed edging, color-matched to unit colors selected.
- E. [(Optional) (Describe finish materials)]

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine floor surfaces with Installer present for compliance with requirements for installation tolerances and other conditions affecting performance of mobile storage units.
- B. Verify that building structural system is adequate for installing mobile storage units at locations indicated on approved shop drawings.
 - 1. [In new construction, ensure that recesses for rails in floors are at proper spacing and depths, with allowance for grouting.]
 - 2. [For installations on existing floors, ensure that rail spacings indicated on shop drawings are in proper locations so existing load-bearing structural members are not over stressed.]
- C. Verify that intended installation locations of mobile storage units will not interfere with, nor block established required exit paths or similar means of egress once units are installed.
- D. Verify that adequate capacity permanent power sources have been installed at locations indicated on approved shop drawings.
- E. Prepare written report, endorsed by Installer, listing conditions detrimental to proper performance of mobile storage units, once installed.
- F. Proceed with installation only after unsatisfactory conditions have been corrected.

DIVISION 10 - SPECIALTIES

3.2 INSTALLATION

A. Rails:

1. Lay out rails using full-length units to the maximum extent possible. Use cut lengths only at ends to attain total length required. Locate and position properly, following dimensions indicated on approved shop drawings. Verify thickness of finished floor materials to be installed (by others) and install level 1/16 inch (1.6MM) above finished floor surfaces.
2. Verify level, allowing for a minimum 1/4 inch (6MM) of grout under high points. Position and support rails so that no movement occurs during grouting.
3. Set rails in full grout bed, completely filling any voids entire length of all rails including rail connectors. Trim up sides flush with rails to ensure proper load transfer from rail to supporting floor. Using shims in lieu of full grouting is not permitted.
4. Installation Tolerances: Do not exceed levelness of installed rails listed below:
 - a. Maximum Variation From True Level Within Any Module: 3/32 inch (2.4MM).
 - b. Maximum Variation Between Adjacent (Parallel) Rails: 1/16 inch (1.6MM), perpendicular to rail direction.
 - c. Maximum Variation In Height: 1/32 inch (.8MM), measured along any 10 foot (3.05M) rail length.
5. Verify rail position and level; anchor to structural floor system with anchor type and spacings indicated on approved shop drawings.

B. Floors/Ramps:

1. General: Finished elevation shall be 1/16 inch (1.6MM) below top of rails.
2. Place floors and ramps to the extent indicated on approved shop drawings. Extend ramps under all movable and stationary ranges. Do not extend ramps beyond the ends of carriages.
3. Construct floors and ramps to prevent warping or deformation of floor panels in a normal operating environment. Support panels on levelers at maximum 16 inches (406MM) on center.
4. Ramp Slope: Do not exceed the following:
 - a. ADA Accessible Ramps: Maximum 1:12 slope (4.76 degrees).
 - b. Other Ramps: Maximum 9 degree slope (1.9:12).
 - c. Vertical Transition, Ramp edge to floor: Maximum 1/8 inch (3MM).

C. Shelving Units Installation:

1. General: Follow layout and details shown on approved shop drawings and manufacturer's printed installation instructions. Position units level, plumb; at proper location relative to adjoining units and related work.
2. Carriages:
 - a. Place movable carriages on rails. Ensure that all wheels track properly and centering wheels are properly seated on centering rails. Fasten multiple carriage units together to form single movable base where required.
 - b. Position fixed carriage units to align with movable units; make final leveling adjustments with leveling screws.
3. Shelving Units:

DIVISION 10 - SPECIALTIES

- a. Permanently fasten shelving units to fixed and movable carriages with vibration-proof fasteners.
 - b. Stabilize shelving units following manufacturer's written instructions. Reinforce shelving units to withstand the stress of movement where required and specified.
4. Wiring:
- a. Make final control wiring connections between modules under single control.
 - b. Test wiring for continuity and proper connections with regulated field power supply before making final power connections.
 - c. Make final wiring connections to permanent power source. Connection to power source by others.
 - d. Test system operation by cycling all units through complete operations sequences.

3.3 FIELD QUALITY CONTROL

- A. Verify shelving unit alignment and plumb after installation. Correct if required following manufacturer's instructions.
- B. Remove components which are chipped, scratched, or otherwise damaged and which do not match adjoining work. Replace with new, undamaged, matching units.

3.4 ADJUSTING

- A. Adjust components and accessories to provide smoothly operating, visually acceptable installation.

3.5 CLEANING

- A. Immediately upon completion of mobile shelving installation, clear components and surfaces. Remove surplus materials, rubbish and debris resulting from mobile shelving installation upon completion of work and leave areas of installation in neat, clean condition.

3.6 DEMONSTRATION/TRAINING

- A. Schedule and conduct demonstration of installed equipment and features with Owner's personnel.
- B. Schedule and conduct maintenance training with Owner's maintenance personnel. Training session should include lecture and demonstration of all maintenance and repair procedures that end user personnel would normally perform.

3.7 PROTECTION

- A. Advise Owner of additional protection needed to ensure that system will be without damage or deterioration at time of substantial completion.

3.8 SCHEDULES

- A. Equipment Schedules, See next page.

DIVISION 10 - SPECIALTIES
END OF SECTION