# SECTION 105626 – MOBILE STORAGE SHELVING

## PART 1 – GENERAL

### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

### 1.2 SUMMARY

A. Section Includes:

1. Mechanically assisted, carriage-mounted, high density mobile storage systems, including support rails, fabrication including leveling of support rails.

B. Related Requirements:

1. Section 033000 - "Cast-In-Place Concrete".

a. Base floor capable of withstanding line load weight distribution created by load transfers from weight of system, storage housing, media and occupants.

b. Finished floor material and installation within system footprint.

2. Sections in Division 9 – Finishes, relating to finish floor and base materials.

C. Related Work, Not Furnished:

1. Finish floor covering materials and installation on concrete with recessed rail installation.

### 1.3 REFERENCES

A. American National Standards Institute (ANSI) Standards:

1. Applicable standards for fasteners used for assembly.

B. America Society of Testing and Materials (ASTM) Standards:

1. Applicable standards for steel materials used for fabrication.

C. American Institute of Steel Construction (AISC) Standards:

1. Applicable standards for steel materials used for fabrication.

1.4 SYSTEMS DESCRIPTION

A. General: The high-density mobile storage system consists of manufactured storage units mounted on manufacturer's track-guided carriages to form a compact storage system. System design permits access to any single aisle by manually moving units until the desired aisle is opened. 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 welded carriage system with 3/4-inch recess consists of a formed structural steel frame with machined and balanced wheels riding on steel rails recessed 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. Bolted carriages are unacceptable.

C. Movement Controls: Triple arm operating wheels with rotating hand knobs shall be provided on the accessible (drive) ends of shelf units, centered on the end panel, located 40-inches from the base of each unit to permit units to be moved to create a single aisle opening. Turning the handle transmits power through chain drive to drive wheels on each carriage.

D. Drive System: The system shall be designed with a positive type mechanically assisted drive which minimizes end play, ensures there is no play in the drive handle and that carriages will stop without drifting.

1. System shall include a chain sprocket drive system for each movable carriage to ensure that carriages move uniformly along the total length of travel, even with unbalanced loads. All system components shall be selected to ensure a smooth, even movement along the entire carriage length. Drive system gearing shall be designed to permit 1 lb. of force applied to the drive-handle to move a minimum of 4,000 lbs. of load.
2. A chain tensioning device shall be provided on each chain drive with provision for adjusting tension without removing end panels.
3. All bearings used in the drive mechanism shall be permanently shielded and lubricated.

E. Safety Features:

1. Color-coded visual indicators shall provide verification that carriages are in a locked or unlocked mode.
2. A single safety lock button, mounted on each operating wheel hub, will permit moving a carriage in either direction to create a new access aisle when pulled out (unlocked), or locking the carriage when pushed in.
3. Mechanical Sweep and Safety Stop (Non-Powered): Every potential aisle shall be protected with a 3-inch high extruded aluminum safety sweep, hinged from the

carriage using spring steel leaf springs, with the base edge maximum 3/4-inch from the floor. The carriage(s) shall stop when depressed at any location along the leading edge of the sweep surface. Activated safety sweep shall engage an impact-absorbing friction disk brake to protect occupants, stored media and the carriage system itself via a sheathed cable system comprised of aircraft-grade 3/64-inch stainless-steel core cables housed inside lined conduit. Safety sweep shall have bright, red and white safety identification tape applied full length marking its location. Safety sweep shall run full length of both sides of each moveable carriage for full aisle coverage.

4. Mechanical safety sweep shall automatically reset to enable mobile system users to freely and safely back carriages away from aisle obstructions simply by reversing the direction of the rotating handle.
5. Safety sweep shall be operational when the carriages are not moving. Should a sweep be activated in an open aisle, the carriage with the activated sweep will not close on that aisle. Safety sweep shall automatically reset if activated and then released when the carriages are not moving.
6. Safety sweeps shall require no electrical power or batteries to operate.

F. Finishes:

1. Fabricated Metal Components and Assembles: Manufacturer's standard powder coat paint finish.
2. End Panels, Accessible Ends: Plastic laminate, manufacturer's standard textures and patterns.

## 1.5 PERFORMANCE REQUIREMENTS

A. Seismic Performance:

1. Mobile shelving systems shall withstand the effects of earthquake motions determined according to ASCE/SEI7.
2. Structural Performance:

a. Load per Linear Foot of Carriage and Rail: 1000 lb./ft.
b. Rail Deflection: Maximum not to exceed L/480.

B. Ease of Movement:

1. For manually operated systems, maximum 1 lbf. required to move 1000 lbs.

C. Design Requirements:

1. Limit overall height to 97-inches.
2. Limit overall length to 218-inches.

## 1.6 COORDINATION

A. Recessed Tracks: Coordinate size and location of recesses in concrete with installation of recessed tracks.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for mobile shelving systems and accessories. This all must be verified prior to the installation of the concrete floor slab.

1.7 ACTION SUBMITTALS

A. Shop Drawings:

1. Include plans, elevations, sections, and details.
2. Show shelving layout.
3. Show location and extent of rail system.
4. Show clear-aisle widths from face of carriages.
5. Detail fabrication and installation of mobile shelving systems including methods of anchoring shelves and rails to building structure as required for seismic restraint.

B. Samples:

1. For each exposed product and for each color and texture specified, 6-inches in site.

C. Samples for Initial Selections:

1. For units with factory-applied finishes, 6-inches in size.

1.8 INFORMATIONAL SUBMITTALS:

A. Qualification Data:

1. For Installer.

B. Sample Warranty:

1. For manufacture's special warranty.

1.9 CLOSEOUT SUBMITTALS

A. Maintenance Data: For mobile shelving systems to include in maintenance manuals.

1.10 MAINTENANCE MATERIALS SUBMITTALS

A. Furnish extra materials that match products installed and that are packages with protective covering for storage and identified with labels describing contents.

1. Shelf Units: Five (5) of each size and type indicated.

1.11 QUALITY ASSURANCE

A. Installer Qualifications:

1. Installer Qualifications: An entity that employs and supervisors who are trained and approved by manufacturer. Engage an experienced installer who is authorized by the manufacturer to install a high-density mobile system of this magnitude and has a minimum of 1 year experience doing so.

B. Manufacturer Qualifications:

1. Engage an experienced manufacturer who has been continuously manufacturing this type of product without interruption for a minimum of 20 years ad can supply a list of references upon request.

a. Manufacturer must have a minimum of ten (10)-years' experience in the manufacture of mechanically operated mobile storage systems.

1.12 FIELD 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.

1.13 SEQUENCING AND SCHEDULING

A. Coordinate the recessed steel rail locations, dimensions and details for the mobile storage units prior to the installation of the concrete floor slab in this area.

B. Sequence high-density mobile storage system with adjoining work to minimize possibility of damage and soiling during entire construction period.

C. Schedule installation of specified high-density mobile system after finishing operations, including painting have been completed.

D. Delivery, Storage, and Handling:

1. Comply with all instructions and recommendations made by manufacturer or manufacturer's representative for delivery, storage and handling requirements.

E. Pre-installation Conference: Schedule and conduct conference on project site to review methods, procedures, and logistic details for coordination of installation of high-density mobile system.

1. Recommend attendees:

a. Owner's representative.
b. Construction Manager or representatives.
c. Architect, engineer or person responsible for the layout design.
d. Manufacturer's representative
e. Subcontractors or installers whose work may affect or be affected by the installation of this system.

1.14 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of mobile shelving systems that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to the following:

a. Deterioration of metals, metal finishes, and other materials beyond normal wear.
b. Structural failures including, but not limited to, excessive deflection.
c. Failure of operating components to function properly.

2. Warranty Period: Five (5) years from date of Substantial Completion.

a. A minimum of one preventative maintenance inspection must take place each year during warranty.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product:

1. Subject to compliance with requirements provide "Wheelhouse Series" mobile storage shelving system as manufactured by Spacesaver Corporation. or comparable products meeting the specification requirements by one of the following:

a. Datum Filing Systems, Inc.
b. Montel Inc.

c. Richard-Wilcox, Inc.

B. Source Limitations: Obtain mobile storage systems including shelving from single manufacturer.

2.2 BASIC MATERIALS

A. General: Provide materials and quality of workmanship which meet or exceed established industry standards for products specified. Material thickness/gages are manufacturer's option unless indicated otherwise. Fabricated units from ASTM Class 1, cold-rolled commercial grade sheet or coil steel with all bends and radiuses consistent and true.

B. Plastic Laminates: NEMA LD-3, GP-28, Vertical Grade.

2.3 GROUT

A. General:

1. Shall be ready-mixed high strength; controlled expansive grout with superior dynamic load stability, which when mixed with water shall harden rapidly to produce a permanent foundation for the mobile storage system. Grout shall be non-corrosive, non-metallic a non-shrink. The grout after curing shall have a minimum strength of 8000 pounds per square inch.

2.4 SYSTEMS AND COMPONENTS

A. System Description: The system consists of manufactured 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 shall prevent 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. General: Provide manufacturer's standard mobile shelving systems and components. Where components are not otherwise indicated, provide manufacturer's standard components as required for a complete system.

C. Rail:

1. Rail shall be ASTM/AISI Type 1045 or 1035 steel of manufacturer's selection designed and manufactured to carry a load of 1,000 pounds per lineal foot of carriage length.
2. Minimum Contact Surface: 5/8-inch wide.
3. Provide rail sections in minimum 6-ft. lengths.

4. Rail configuration shall permit attachment to top of structural floor system with provision for leveling rails to compensate for variations in floor surface level.
5. Provide rail connections designed to provide horizontal and vertical continuity between rail sections, to gradually transfer for concentrated wheel point load to and from adjoining rail sections. Butt joints are not permitted.
6. Rail Form Covers: Manufacturer shall provide for protection if required to prevent damage to rails during concrete back pours.
7. Barrier free design.

D. Carriages:

1. Provide manufacturer's design movable carriages fabricated of welded or bolted steel construction. Galvanized structural components and/or riveted carriages are unacceptable.
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 weigh load distribution.
4. Carriage shall be designed for a capacity of 1000 lbs. per linear floor.
5. Design carriages to allow the shelving uprights to recess and interlock into the carriages a minimum of 3/4-inch. Top mount carriages are unacceptable.
6. Provide each carriage with two wheels per rail.

E. Wheels:

1. Capacity: Minimum load capacity per wheel: 3,200 lbs.
2. Size: Minimum 5-inches outside diameter drive wheels.
3. Guides: Determined by manufacturer, minimum two (2) locations.

F. Drive/Guide System:

1. Guide Design: Provide drive system which prevents carriage whipping, binding and excessive wheel/rail wear under normal operation.

    a. 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 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.

G. End/Face Panels:

1. Materials: Plastic laminate clad particle board with plastic edging on vertical edges.
2. Finishes: Selected from manufacturer's standard available colors and patterns.

H. Operation:

1. Hand push.
2. Mechanical assist handles.

I. Accessories:

1. Optional Waist High Carriage Security Locks: Provide manufacturer's standard.

2.5 HIGH-DENSITY MOBILE STORAGE UNIT SHELVING

A. Shelving Units: FIXED

1. Type: Fixed Unit.
2. Configuration: Single-faced units with full shelving back panels.
3. Width: Refer to drawings.
4. Height: Refer to drawings.
5. Shelf Depth: Refer to drawings.
6. Shelf Styles: Provide the following styles and numbers of adjustable shelves:

a. Bottom fixed with adjustable intermediate shelves, refer to drawings for number and location.

7 Carriage Heights: 5 15/16-inches.

B. Mobile Shelving Units: MOBILE

1. Type: Mobile unit.
2. Configuration: Double-faced units with full shelving back panels.
3. Width: Refer to drawings.
4. Height: Refer to drawings.
5. Shelf Depth: Refer to drawings.
6. Shelf Styles: Provided the following styles and numbers of adjustable shelves:

a. Bottom fixed with adjustable intermediate shelves, refer to drawings for number and location.

7. Carriage Heights: 5 15/16-inches.

2.6 FABRICATION

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

B. Wheels: Provide precision machined and balanced units with permanently shielded and lubricated bearings.

C. Carriages: Fabricate to ensure no more than 1/4-inch 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.

2.7 FINISHES

A. Colors: Selected from manufacturer's standard available colors.

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.

PART 3 - EXECUTION

3.1 EXAMINATION:

A. Examine areas, with Installer Present, for compliance with requirements for installation tolerances, location of framing and reinforcements and other conditions affecting performance of mobile shelving systems.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. Ensure that recesses for rails in floors are at proper spacing and depths, with allowance for grouting.

D. 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.

3.2 INSTALLTION:

A. Rails:

1. Lay out rails using full length units to the maximum extent possible. Use cut lengths only at the 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 above finished floor surfaces.

2. Verify level, allowing for a minimum 1/4-inch 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.
    b. Maximum Variation Between Adjacent (Parallel) Rails: 1/16-inch, perpendicular to rail direction.
    c. Maximum Variation in Height: 1/32-inch, measured along any 10 ft. rail length.

B. 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.

C. Carriages:

1. 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 moveable base where4 require.
2. Position fixed carriage units to align with moveable units.

D. Shelving Units:

1. Permanently fasten shelving units to fixed and movable carriages with vibration-proof fasteners.
2. Stabilize shelving units following manufacturer's written instructions. Reinforce shelving units to withstand the stress of movement where required and specified.
3. Level and plumb shelving units to a tolerance of 1/8-inch in 96-inches.
4. Starter/Adder Units: Connect groups together with standard fasteners according to manufacturer's written instructions, using concealed fasteners where possible.
5. Install shelves in shelving units at locations indicated on Drawings and according to manufacturer's written instructions.
6. Shelving Enclosure Panels: Install end panels and canopy tops with concealed fasteners

## 3.3 FIELD QUALITY CONTROL

A. Verify shelving unit alignment and plumb after installation. Correct if required following manufacturer's instructions.

C. Remove components which are chipped, scratched, or otherwise damaged and which do not match adjoining work. Replace with new matching units, installed as specified and in manner to eliminate evidence of replacement.

3.4 CLEANING AND PROTECTING

A. Repair or remove and replace defective work as described on completion of installation.

B. Clean finished surfaces, touch up as required, and remove or refinish damaged or soiled areas to match original finish, as approved by Architect.

C. Protect installed products from damage during remainder of the construction period.

3.5 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain mobile storage shelving.

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.

3.6 PROTECTION

A. Protect system against damage during the remainder of construction period. Advise Owner of additional protection needed to ensure that system will be without damage or deterioration at time of substantial completion.

END OF SECTION 105626