

## DIVISION 10 - SPECIALTIES

### SECTION 105626.13 –MANUAL 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 1 Specification Sections, apply to this Section.

##### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Mechanically assisted, 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 rolling loads of storage units to be installed.
  - 2. Finish floor covering materials and installation
- C. Allowances:
- D. Alternates:

##### 1.3 REFERENCES

- A. American National Standards Institute (ANSI) Standards:
  - 1. Applicable standards for fasteners used for assembly.
- B. American Society for 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 SYSTEM DESCRIPTION

- A. General: The system consists of four-post or case-type shelving 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 carriage system consists of formed structural steel wheel sections with precision machined wheels riding on steel rails surface mounted to the floor. System should meet ADA slope ratios. Wheel sections shall interlock with steel side profiles and shelving posts to form a rigid carriage structure. Wheel sections shall also be interchangeable to permit carriages to be added onto and reconfigured without

## DIVISION 10 - SPECIALTIES

cutting or welding. 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: Triple or single 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 (1051MM) 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 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.
- 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 textures and patterns.

### 1.5 PERFORMANCE REQUIREMENTS

- A. Design Requirements:
  - 1. **Limit overall height to**
  - 2. **Limit overall length to**
  - 3. **Limit overall width to**
- B. Ease of Movement: Provide mechanically assisted units capable of being moved by exerting a maximum horizontal force of 5 pounds on the operating wheel.

## DIVISION 10 - SPECIALTIES

- C. Seismic Performance: Provide mobile storage units capable of withstanding the effects of earthquake movement when required by applicable building codes. Include anti-tips at all rail locations.

### 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.
- 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.
- F. Maintenance Data: Provide in form suitable for inclusion in maintenance manuals for mobile storage units. Data shall include operating and maintenance instructions, parts inventory listing, purchase source listing, emergency instructions, and related information.
  - 1. Submit manufacturer's instructions for proper maintenance materials and procedures.
  - 2. Submit manufacturer's printed instructions for maintenance of installed work, including methods and frequency recommended for maintaining optimum condition under anticipated use conditions. Include precautions against using materials and methods which may be detrimental to finishes and performance.

## DIVISION 10 - SPECIALTIES

- G. Reference List: Provide a list of recently installed mobile storage units 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.

### 1.7 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Engage an experienced manufacturer who is ISO 9001 certified for the design, production, installation, and service of carriage mounted high-density mobile storage units and support rails. Furnish certificate attesting manufacturer's ISO 9001 quality system registration.
- 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: 2-years experience installing systems of comparable size and complexity to specified project requirements.
  - 2. Guaranteed 24-hour service response time. Provide toll free phone number for service to be available 24/7.

### 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. Coordinate construction to ensure actual dimensions correspond to established dimensions.

### 1.10 SEQUENCING AND SCHEDULING

- A. Sequencing: Coordinate storage shelving system installation with other work to minimize possibility of damage and soiling during remainder of construction period.
- B. Scheduling: Plan installation to commence after finishing operations, including painting have been completed.
- C. Built-In Items: 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.

## DIVISION 10 - SPECIALTIES

2. Review and verify structural loading limitations.
3. Recommended attendees include:
  - a. Owner's Representative.
  - b. Prime Contractor or representative.
  - c. The Architect.
  - 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 for five (5) years and workmanship for a period of one (1) year from date of acceptance by the Owner.

### 1.12 MAINTENANCE

- A. Provide manufacturer's extended maintenance agreement commencing on the day the standard maintenance warranty ends.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. General: Products are based upon the WH Manual Mobile Storage Shelving by Southwest Solutions Group Telephone: 1-800-803-1083. Southwestsolutions.com – POC: Craig Crock
  1. The materials, products and equipment described in the Bidding Documents establish a standard of required function, dimension, appearance, and quality to be met by any proposed substitution.
  2. No substitution will be considered prior to receipt of Bids unless written request for approval has been received by the Architect at least ten days prior to the date for receipt of Bids. Such requests shall include the name of the material or equipment for which it is to be substituted and a complete description of the proposed substitution including drawings, performance and test data, and other information necessary for an evaluation. A statement setting forth changes in other materials, equipment, or other portions of the Work, including changes in the work of other contracts that incorporation of the proposed substitution would require, shall be included. The burden of proof of the merit of the proposed substitution is upon the proposer. The Architect's decision of approval or disapproval of a proposed substitution shall be final.

## DIVISION 10 - SPECIALTIES

3. If the Architect approves a proposed substitution prior to receipt of Bids, such approval will be set forth in an Addendum. Bidders shall not rely upon approvals made in any other manner.
4. No substitutions will be considered after the Contract award unless specifically provided for in the Contract Documents.

### 2.2 BASIC MATERIALS

- A. General: Provide materials and quality of workmanship which meet or exceed established industry standards for products specified. Material thicknesses/gauges are manufacturer's option unless indicated otherwise.
- B. Plastic Laminates: NEMA LD-3, GP-28, Vertical Grade.

### 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.
  1. Linear Movement: No shrinkage while setting; maximum expansion limited to .002 inches per linear inch.
  2. Compressive Strength: Based on two inch cubes made following ASTM standards, tested on a Balding-Southward machine of 60,000 pounds (27,200kg) 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. Material: ASTM/AISI Type 1035 or 1045 steel, or equal, manufacturer's selection.
  2. Capacity: 750 pounds per lineal foot (1116kg/M) of carriage.
  3. Minimum Contact Surface: 5/8 inch (16MM) wide.
  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 the concentrated wheel point load to and from adjoining rail sections. Butt joints are not permitted.
  6. ADA compliant slope on floor system.
- B. Carriages:
  1. Provide manufacturer's design movable carriages fabricated of welded wheel assembly with bolted steel and riveted construction. Galvanized carriage components are unacceptable. The use of cross-bracing is unacceptable.
  2. Design carriages to allow the shelving uprights to recess and interlock into the carriage wheel section a minimum of 2 inches (50MM). Carriage design shall provide a minimum of two shelving retention rivets and two carriage bolts to securely retain each shelving post. Top mounting of shelving onto carriages is unacceptable.

## DIVISION 10 - SPECIALTIES

3. Provide each carriage with two wheels per rail.
- C. Drive / Guide System:
1. Design: Provide drive system which prevents carriage whipping, binding, and excessive wheel/rail wear under normal operation.
    - a. Provide a full-length line drive shaft, whereby, all wheels on one side of carriage shall drive.
  2. Shafts: 1 inch (25MM) steel connecting tube shafts.
  3. Bearing Surfaces: Provide rotating load bearing members with ball or roller bearings. Provide shafts with pillow block or flanged self-aligning type bearings.
- D. Wheel Sections:
1. Low-Profile Wheel Section: Minimum 12 ga. fixture-welded wheel sections to ensure that, once installed; bottom storage shelf is no higher than 4.25 inches (108mm) above top of rail. Locate wheel assemblies under each upright to distribute loads directly to wheels.
  2. Wheel Size: Minimum 3 inches (76MM), outside diameter drive and load wheels.
  3. Guide Wheels: All wheels and all locations.
- E. 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. Selected by the architect
- F. Shelving: Four Post shelving with powder coat paint finish.
- G. Accessories:
1. Anti-Tip Devices: Provide manufacturer's standard fixtures at rail locations
  2. Clutch Brake Assemblies to meet L/480 deflection criteria

## 2.5 FABRICATION

- A. General: Coordinate fabrication and delivery to ensure no delay in progress of the Work.
- B. Wheels: Provide precision machined units with permanently shielded and lubricated bearings.
- C. Carriage Wheel Sections: Fabricate Carriage wheel sections to provide two heavy-duty 7 ga. support plates to support the full weight of shelving posts.
- D. Carriage Side Profiles: Fabricate 14 ga. die-formed carriage side profiles 2-3/4 inches (70mm) tall each with four (4) shelving retention rivets.
- E. Rail Shims: Fabricate galvanized steel shims with interlocking tabs to prevent dislocation; interlocking tabs to interlock with rail and with other shims. For non-grouted systems only.
- F. Shelving Supports and Accessories: See individual descriptions in "Shelving" paragraphs.

## DIVISION 10 - SPECIALTIES

### 2.6 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 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. Prepare written report, endorsed by Installer, listing conditions detrimental to proper performance of mobile storage units, once installed.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

### 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 (0.6MM) above finished floor surfaces.
  - 2. When using grouted rails, 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. When grouting, 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.



## DIVISION 10 - SPECIALTIES

4. Installation Tolerances When Grouting: 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. Installation Tolerances When Shimming: Do not exceed variation from level listed below:
    - a. Maximum Variation Across All Rails (up to 5 rails or 12 feet (3.7M): 3/8 inch (9.5MM).
    - b. Maximum Variation from Rail to Rail: 1/8 inch (3.2MM).
    - c. Maximum Variation in 12 feet (3.7M) of Rail Length, Along Any Rail: ¼ inch (6.3MM) and Maximum Variation in 2 feet (6096MM) of Rail Length (Flatness): 1/8 inch (3.2MM).  $\sim L/600$ .
  6. Verify rail position and level; anchor to structural floor system with anchor type and spacings indicated on approved shop drawings.
- B. Floors/Ramps [when applicable]:
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. Provide ramp at both ends of mobile system if dual control access is required.
  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 on center.
  4. Ramp Slope: Do not exceed the following:
    - a. ADA Accessible Ramps: Maximum 1:12 slope (4.76 degrees). Ramps cannot stick past the face panels on the system.
    - b. 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.
  3. Shelving Units:
    - a. Stabilize shelving units following manufacturer's written instructions. Reinforce shelving units to withstand the stress of movement where required and specified.

## DIVISION 10 - SPECIALTIES

### 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 matching units, installed as specified and in manner to eliminate evidence of replacement.

### 3.4 ADJUSTING

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

### 3.5 CLEANING

- A. Immediately upon completion of installation, clear components, and surfaces. Remove surplus materials, rubbish and debris resulting from 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. Protect system against damage during 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

## DIVISION 10 - SPECIALTIES

### SECTION 105626.23 – MOTORIZED MOBILE STORAGE SHELVING

#### 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/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 electrician.
  - 4. Fire suppression system is by others.
- C. Related Sections:
  - 1. Sections in Division 9 – Finishes, relating to finish floor and base materials.
  - 2. Division 26 Specification Sections power wiring devices, conductors, and circuit protection.
- D. Alternates:

#### 1.3 REFERENCES

- A. American Society for Testing and Materials (ASTM) Standards:
  - 1. Applicable standards for steel sheet materials used for fabrication.
- B. American Institute of Steel Construction (AISC) Standards:
  - 1. Applicable standards for steel materials used for fabrication.
- C. 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 four-post or case-type shelving 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

## DIVISION 10 - SPECIALTIES

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 formed structural steel wheel sections with precision machined wheels riding on steel rails [recessed][surface] mounted to the floor. Wheel sections shall interlock with steel side profiles and shelving posts to form a rigid carriage structure. Wheel sections shall also be interchangeable to permit carriages to be added onto and reconfigured without cutting or welding. 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, STOP/RESET push-button and a red reset light.
1. System controls shall start motors on each movable carriage sequentially to minimize power demands and shall provide dynamic braking to provide smooth operation. Maximum running speed shall be limited to 3.3 inches (84 mm) per second.
  2. Provide solid state controls and indicator lights 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 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 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.
  4. Controls shall feature back lit message indicating which aisle is in use (i.e. "Right Aisle in use" or "Left Aisle in use").
- 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). All bearings used in the drive mechanism shall be permanently shielded and lubricated.
  4. System shall be a plug-in-the-wall system equipped with a 15-amp breaker box, a 10 ft. (3M) cord and a 15-amp hospital-grade plug and operate on 120 VAC, 50/60 hertz, [20] [15] amp dedicated/isolated circuit provided by others, one per module.
  5. Overhead mounted power pantograph distribution system shall conceal all interconnecting wiring.
- E. Safety Features:

## DIVISION 10 - SPECIALTIES

1. Visual indicators 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 red/white stripped safety demarcation tape with text, "PLACE FOOT HERE TO STOP". [(Optional) Two safety sweeps shall be provided per carriage.]
  3. Entire system shall be C-UL US system listed.
  4. Infrared photoelectric aisle entry sensor system shall be provided to stop carriage movement if the system detects persons entering a closing aisle.
  5. 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.

## 1.5 PERFORMANCE REQUIREMENTS

- A. Design Requirements:
1. Limit overall height to ( )
  2. Limit overall length to 16'

## 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.

## DIVISION 10 - SPECIALTIES

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 a sample of each color and texture 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 manufacturer's written warranty.

### 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: 5-years 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.

## DIVISION 10 - SPECIALTIES

- 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.
    - c. Architect
    - d. 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 for five (5) years and workmanship for a period of one (1) year from date of acceptance by the Owner.

### 1.12 [MAINTENANCE]

- A. Provide manufacturer's extended maintenance agreement for 5 years 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 Southwest Solutions Group, Inc.
  - 1. The materials, products and equipment described in the Bidding Documents establish a standard of required function, dimension, appearance, and quality to be met by any proposed substitution.
  - 2. No substitution will be considered prior to receipt of Bids unless written request for approval has been received by the Architect at least ten days prior to the date for receipt

## DIVISION 10 - SPECIALTIES

of Bids. Such requests shall include the name of the material or equipment for which it is to be substituted and a complete description of the proposed substitution including drawings, performance and test data, and other information necessary for an evaluation. A statement setting forth changes in other materials, equipment, or other portions of the Work, including changes in the work of other contracts that incorporation of the proposed substitution would require, shall be included. The burden of proof of the merit of the proposed substitution is upon the proposer. The Architect's decision of approval or disapproval of a proposed substitution shall be final.

3. If the Architect approves a proposed substitution prior to receipt of Bids, such approval will be set forth in an Addendum. Bidders shall not rely upon approvals made in any other manner.
4. No substitutions will be considered after the Contract award unless specifically provided for in the Contract Documents.

### 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.

### 2.3 GROUT [WHEN APPLICABLE]

- 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.
  2. Compressive Strength: Based on two inch cubes made following ASTM standards, tested on a Balding-Southward machine of 60,000 pounds (27,200kg) 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. Material: ASTM/AISI Type 1035 or 1045 steel, or equal, manufacturer's selection.
  2. Capacity: 750 pounds per lineal foot (1116kg/M) of carriage.
  3. Minimum Contact Surface: 5/8 inch (16MM) wide.
  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.



## DIVISION 10 - SPECIALTIES

5. 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.
6. Anti-Tip Rails.

### B. Carriages:

1. Provide manufacturer's design movable carriages fabricated of welded wheel assembly with bolted steel and riveted construction. Galvanized carriage components are unacceptable. The use of cross-bracing is unacceptable.
2. Design carriages to allow the shelving uprights to recess and interlock into the carriage wheel section a minimum of 2 inches (50MM). Carriage design shall provide a minimum of two shelving retention rivets and two carriage bolts to securely retain each shelving post. Top mounting of shelving onto carriages is unacceptable.
3. Provide each carriage with two wheels per rail.

### C. Drive / Guide System:

1. Design: Provide drive system which prevents carriage whipping, binding, and excessive wheel/rail wear under normal operation.
  - a. Provide a full-length line drive shafts, whereby, all wheels on one side of carriage shall drive.
2. Shafts: 1 inch (25MM) steel connecting tube shafts.
3. Bearing Surfaces: Provide rotating load bearing members with ball or roller bearings. Provide shafts with pillow block or flanged self-aligning type bearings.

### D. Wheel Sections:

1. Low-Profile Wheel Section: Minimum 12 ga. fixture-welded wheel sections to ensure that, once installed; bottom storage shelf is no higher than 4.25 inches (108mm) above top of rail. Locate wheel assemblies under each upright to distribute loads directly to wheels.
2. Wheel Size: Minimum 3 inches (76MM), outside diameter drive and load wheels.
3. Guide Wheels: All wheels and all locations.

### E. Motors:

1. Type: 90VDC

### F. Plug-In-The-Wall Power:

1. Provide a 15-amp hospital-grade plug-in-the-wall power, if permitted by local building code. (In lieu of permanent power connection.) Dedicated circuit required.

### G. Face Panels:

1. Materials: Plastic laminate with plastic edging on vertical edges.
2. Finishes: Selected from manufacturer's standard available colors and patterns. Selected by the Gensler
3. End panels must cover the full height and width of shelving.

### H. Shelving: (Choose from Four Post or Case-Type)

## DIVISION 10 - SPECIALTIES

### 2.5 ACCESSORIES (CONSULT WITH YOUR STORAGE SPECIALIST.)

- A. [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.)
- B. [Touchpad Module Security Control on a Stationary Unit: Provide a 10-digit touchpad control with display and audit trail capability to be located on a stationary platform in conjunction with each carriage having a standard control on a mobile system to control all the carriages in the system module with an easy-to-read 2x20 character LCD status display, PIN-code security, an internal real-time clock and a clear record of access. Touchpad shall permit: multiple (up to 512) unique PIN-codes with multiple (up to 256) unique security classes, PIN access to be limited to specific days of the week or time of day, and PIN access to be set to expire at a specific date and time. Touchpad control shall permit the transfer of access data (audit trail) to a touchpad PC interface software program which shall permit an authorized administrator to work with access data in spreadsheet format, to establish security classes, to assign security classes and PIN-codes to users, and to make updates as security requirements change. PC interface software installation and setup and touchpad setup shall be required. The mobile system with a touchpad module control on a stationary unit shall also be equipped with a hardware on/off control to, with PIN-code authorization, permanently shut down or restore power to the system, preventing unintentional power ups.]
- C. System controls shall start motors on each movable carriage “sequentially” to minimize power demands and shall provide dynamic braking to provide smooth operation.
- D. Power Pack Override: Provide one handheld rechargeable battery pack unit to operate modules in case of main power failure.
- E. Automatic Brake: Provide an automatic security brake on each motorized carriage.

### 2.6 FABRICATION

- A. General: Coordinate fabrication and delivery to ensure no delay in progress of the Work.
- B. Wheels: Provide precision ground units with permanently shielded and lubricated bearings.
- C. Carriage Wheel Sections: Fabricate Carriage wheel sections to provide two heavy-duty 7 ga. support plates to support the full weight of shelving posts.
- D. Carriage Side Profiles: Fabricate 14 ga. die-formed carriage side profiles 2-3/4 inches (70mm) tall each with four (4) shelving retention rivets.
- E. Rail Shims: Fabricate galvanized steel shims with interlocking tabs to prevent dislocation; interlocking tabs to interlock with rail and with other shims. For non-grouted systems only.
- F. Shelving Supports and Accessories: See individual descriptions in “Shelving” paragraphs.

### 2.7 FINISHES

- A. Colors: Selected from manufacturer’s standard available colors by Gensler.
- B. Paint Finish: Provide factory applied electrostatic powder coat paint. Meet or exceed specifications of the American Library Association.

## DIVISION 10 - SPECIALTIES

- C. Laminate Finish: Provide factory applied laminate panels at locations indicated on approved shop drawings.
- D. Edgings: Provide preformed edging.

## 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. 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.

### 3.2 INSTALLATION

- A. Rails:
- B. 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 (0.6MM) above finished floor surfaces.
  - 2. When using grouted rails, 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. When grouting, 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 When Grouting: Do not exceed levelness of installed rails listed below:
    - a. Maximum Variation from True Level Within Any Module: 3/32 inch (2.4MM).

## DIVISION 10 - SPECIALTIES

- 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. Installation Tolerances When Shimming: Do not exceed variation from level listed below:
    - a. Maximum Variation Across All Rails (up to 5 rails or 12 feet (3.7M): 3/8 inch (9.5MM).
    - b. Maximum Variation from Rail to Rail: 1/8 inch (3.2MM).
    - c. Maximum Variation in 12 feet (3.7M) of Rail Length, Along Any Rail: ¼ inch (6.3MM) and Maximum Variation in 2 feet (6096MM) of Rail Length (Flatness): 1/8 inch (3.2MM).  $\sim L/600$ .
  6. Verify rail position and level; anchor to structural floor system with anchor type and spacings indicated on approved shop drawings.
- C. Floors/Ramps
1. 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.
- D. 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:
    - a. 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. (In lieu of 15-amp hospital grade plug-in-the-wall power 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.

## DIVISION 10 - SPECIALTIES

### 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.

### 3.9 END OF SECTION