DIVISION 11-EQUIPMENT

11 00 00 EQUIPMENT

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SECTION 11 12 26.02 – WEB-BASED FACILITY MANAGEMENT SYSTEM PART 1 –

GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Related Sections:

1. 111226.00 Parking Access and Revenue Control System (PARCS)

2. 111226.10 Multi-Space Meter

1.3 WEB-BASED FACILITY MANAGEMENT SYSTEM (FMS):

A. Facility Management System (FMS):

1. The system shall be implemented through a web-based application, hosted by the MSM vendor, and shall be accessible with proper user ID and password at all, designated workstations. System shall use a secure VPN connection and maintain that connection while active, and automatically logoff after programmable period of inactivity.

2. The FMS shall be configured with four subsystems. FMS shall be password protected to restrict access to authorized users only. The subsystems are:

   a. Revenue Reporting
   b. Equipment Functions
   c. Enforcement Software

3. The Revenue Reporting/Control Subsystem shall accomplish the following tasks from any designated workstation with appropriate user name and password:

   a. Remote programming of MSM payment stations.
   b. Uploading and consolidating reports from MSM.
   c. Retrieval and review of individual transactions. Retrieval shall be based upon user defined parameters. Reports shall be displayed on a monitor, printed on a printer, and/or converted to an ASCII file.
   d. Consolidating and retaining data that allow for report generation. The following are the minimum required reports. The reports shall be either viewed on a work station monitor or printed.
1) **Daily Event Log** - A listing of changes to the system and users who made the changes. It shall include print communication messages; equipment alarms and system log on/offs.

2) **Daily Report** - Shall provide a chronological listing of each transaction processed by MSM. This report is used to audit information at the transaction record level.

3) **Daily Summary Report** - Provide a daily summary of all MSM Daily reports including daily grand totals of all information from the MSM reports. This report provides an overview of the day's activity.

4) **Monthly MSM Report** - Shall summarize MSM activity by month including all of the features listed in the Daily Summary Report. This report is used for adding, performance evaluation, auditing, and statistical information.

5) **Ticket Value Report** - Shall provide a stratification based upon the value of transactions processed. Breakdowns shall be provided for each rate structure. This report is used for revenue analysis, rate analysis, management planning, and statistical information.

4. MSM system software shall be capable of generating all reports for individual MSM machines as well as summary reports for all machines.

5. Revenue reports shall include:
   a. Total revenue from all transactions
   b. Revenue from cash purchases of parking time
   c. Revenue from Citation collections
   d. Revenue from credit and debit or smart card sales
   e. Total cash in vaults

6. Activity reports shall include:
   a. Usage by time of day
   b. Usage by space number
   c. Usage by MSM machine number
   d. Length of stay reports

7. Citation reports shall include:
   a. Citation reports by date
   b. Citation reports by attendant
   c. Citation reports by location

8. Cash collection reports shall be printed showing the amount collected in coins with non-resettable coin totals and the date and time of the previous collection.

9. Equipment Monitoring: Subsystem shall have the following characteristics:
   a. Monitor the operational status of all equipment supplied by this contract.
   b. Each of the following alarm conditions shall be immediately signaled showing the time of occurrence and the machine number:
1) Low paper for receipt printer
2) Coin jam
3) Full coin vault
4) Low battery
5) Open door indicating access to coin vaults
6) Loss of communications to any MSM machine
7) Tampering or door forcements

c. A record of alarms shall be kept, including the transmission of repeated messages that may indicate possible problems with the system.
d. Abnormal status conditions shall be flashed on the monitor(s) and accompanied with an audible alarm. The display shall continue to flash until the abnormal condition is corrected. The audible alarm shall continue until it is turned off by a command issued through the monitoring computer(s). Acknowledgement and turning off of any alarm condition shall be able to be performed at any of the designated workstations connected to the FMS. It shall not be necessary to acknowledge the alarm condition at every workstation. The system shall record the abnormal status condition and the acknowledgement of the alarm condition by time, workstation and operator.
e. Monitor frequency of operational error in PARCS components to identify maintenance actions that would prevent later failure of a component.

1.4 SECURITY

A. FMS and all subsystem controllers shall have security protocols, password protection and reports to exception transaction logs that prevent unauthorized access to and manipulation of data and reports, including individual transactions.

B. All databases of transactions, reports, etc shall be secured by means of password from unauthorized entry and tampering from either within or outside FMS.

C. The System must include minimum of 6 levels of access authorization to all operational, administrative and reporting functions and provide the following security features:

1. Define individual user and group based security
2. Ability to assign a unique user ID for each person authorized to use the system
3. Ability to assign a unique password and periodically change that password for each authorized user ID
4. Ability to establish an expiration period for passwords
5. Ability to disable a user ID following successive long-on failures exceeding a specific limit
6. Ability to view and report user and group level security rights
7. Ability to de-activate codes for former users and internal and external customers
8. Available user-defined fields
D. PCI – Data Security Standard

1. Compliance: Compliance programs are offered by the individual financial institutions on the PCI council. The PARCS Vendor shall submit proof of PCI compliance and PABP validation.
   a. Acceptable proof of PCI Compliance and PABP Validation is that the vendor/manufacturer is listed on both Visa and MasterCard web sites as PCI Compliant and having PABP Validation.
   b. It is not acceptable to state that the credit card processor is PCI Compliant or is in the process of becoming compliant and/or receiving validation.

PART 2 - PRODUCTS

2.1 FMS SOFTWARE SYSTEMS

A. Equipment Monitoring System:

1. FMS shall include system administration module that allows remote monitoring, programming and synchronization of all devices from a designated workstation.
2. All field programmable functions of each device shall be reprogrammed from FMS (password protected), and any and all reprogramming changes shall be reported to daily log.
3. FMS shall provide warning alarms to alert parking operator of atypical activity, such as equipment malfunctions or equipment vandalism. These alarms are to be visual and audible on all enforcement handhelds or at each computer workstation designated to monitor alarm function. A daily log report shall be produced which identifies all system alarms as reported to each parking supervisor.
4. Equipment monitoring system shall have the following characteristics:
   a. Monitor operational status of all MSM’s and Vehicle Sensors.
   b. For each MSM, indicate and display:
      1) Door status, open or closed.
      2) Receipt paper supply.
      3) Vault status.
      4) Power Status
   c. Monitor electrical circuits and frequency of operational error in PARCS components to assist operator to identify maintenance actions that would prevent later failure of a component.

B. Ad-Hoc Report Generator:

1. The System shall include a report generation tool for developing additional standard reports, as well as for developing ad hoc reports.
2. Include ability to automatically print reports based on defined event or database trigger.
3. Provide ability to access database and graphic information summary reports by web browser.
4. Capability to be exported to common Microsoft Office latest edition products such as Excel and MS Access.
PART 3 - EXECUTION 3.1

GENERAL

A. Provide Owner with a complete list of initial installation administrator user names and passwords for all authorized users.

END OF SECTION 111226.02

SECTION 11 12 26.10 – MULTI-SPACE METER SYSTEM PART 1 -

GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Related Sections:
1. 111226.00 Parking Access and Revenue Control System (PARCS).
2. 111226.02 Vendor hosted Web-Based Facility Management System (FMS).

1.3 MULTI-SPACE METER SYSTEM (MSM):

A. MSM shall meet the following minimum requirements:

1. Components shall be microprocessor controlled, in on-line, virtual real-time communication with vendor hosted web-based FMS. Transactions occurring at equipment shall be reported to FMS in real time, with communications hierarchy appropriate to need for action or response from another component, feature or subsystem. Components or subsystems shall not experience delays, or functional degradation resulting from data communication between devices over the FMS network. All transaction data shall be available to designated workstations within one minute of completing transaction at any device.
2. MSM shall communicate complete transaction log to FMS. In event of communication failure with FMS, MSM shall continue to operate in off-line mode and shall store a minimum of 1,000 transactions, or have sufficient system redundancy, to insure availability of transaction.
data upon restoration of FMS. In event of failure during communication an error checking
and recovery routine shall be employed to prevent corruption of data files.

3. Each MSM shall monitor critical functions and transmit alarms to FMS and designated
workstations. Functions monitored shall include low paper, low battery, coin jam, coin vault
full, door open, door closed, tampering and door forcements.

4. MSM shall be capable of performing a self-diagnostic routine at programmable times or
intervals. Self-diagnostic routine shall verify that MSM functions are working properly.
Functions to be checked shall include, but not be limited to, accuracy of fee calculation,
clock, and coin recognition. System shall be capable of producing a printout documenting
the results of the diagnostic routine.

5. MSM machine shall have a minimum accuracy of:

   a. Fee calculation accuracy: 99.9%
   b. Data transmission error rates: Less than one message retransmission per hour. Data
      received and accepted by FMS as valid shall have 99.9% accuracy.

6. All field programmable functions of each MSM shall be reprogrammed from the designated
workstation (pass-word protected), and all reprogramming changes shall be reported to the
FMS.

7. MSM shall be capable of multiple rate structures that can easily be changed in a Windows design
format from the vendor hosted web-based FMS or designated workstation.

8. Machine shall contain concise customer instructions for user friendly operation. The machine
shall have an easily readable alpha numeric display to communicate messages to user. The
operating procedure shall generally progress from left to right and top to bottom;
corresponding instructions shall be numbered and shall be pictorially illustrated. Messages
displayed at changeable message indicator shall be instructional phrases such as; Enter
Space Number, Time Bought, Please Take Receipt, Please Wait While Receipt is Printing,
Thank you, etc.

9. Receipt shall be issued upon customer request by pressing receipt button. Information provided
on receipt shall include space number, amount of money deposited, time bought, expiration
time, as well as time and date of transaction. Printer shall dispense a minimum of 4,000
receipts per roll of paper.

10. Machine shall be capable of recognizing user errors, such as invalid space number, and
shall provide guidance to user via display on machine.

11. Machines shall conform to the Americans with Disabilities Act accessibility guidelines for
automated teller machines, August 1992 except that requirements related to persons with
vision impairments need not be met.

12. Cabinets and component brackets shall be fabricated of stainless steel. The mounting holes shall
only be accessible from the inside of the cabinet. All surfaces shall be corrosion resistant and
the exterior of cabinet shall be finished in a color chosen by the University. Cabinet doors
shall be hinged with hinges completely hidden and not exposed.

13. Coin acceptor must be equipped with a stainless steel electronic shutter door to prevent
dirt and debris from entering unit.

14. Piezo keypad made of stainless steel shall be provided.

15. Internal components shall be modular and plugged for easy maintenance and replacement.

16. Corrosion resistant connection boxes shall be provided for all wiring connections.

17. MSM shall accept payment of parking fees by coin. Coins shall be accepted in
quarters, dimes, nickels and Susan B. Anthony dollar denominations (United
States currency only).

18. MSM shall accept payment of parking fees by credit card.

19. MSM shall accept Razorback smart cards for payment.
20. MSM shall be capable of accepting payment for citations issued. System shall be capable of displaying amount due for each citation, collecting payment and issuing a receipt as proof of payment.
21. Customer shall be able to add time to an existing space from any MSM, cell phone or via SMS text message.
22. MSM shall be easily configurable to operate in a network pay per space mode.

23. MSM shall be equipped with a metal coin vault located in a locked compartment that is separate from the transaction compartment. Vault shall be removable and locking, and shall be keyed differently than other machine locks such that access to vault is not available when vaults are removed. Coin vault shall be a minimum of 7 gauge in thickness and shall have a storage capacity of $1,000. Each vault shall have a separate identification number.
24. Capable of changing messages on the ticket including advertisement logos from designated workstations.
25. MSM shall be capable of accommodating advertisement panels.
26. Capable of operating in up to 5 different languages by push of a button.
27. Accommodate “P” or other custom sign on top of the MSM for easy identification of the MSM.

PART 2 - PRODUCTS

A. Multi-Space Meters:

1. Operational Description

   a. Cash Payments: Each MSM machine shall enable patron to key in parking space number by pushing the appropriate keys on the machine. Each machine shall be capable of accepting payment of parking fee for any space within the system. Machine shall accept payment of parking fees by coin. As each coin is inserted into machine, machine shall calculate and display parking time paid. Machine shall issue a receipt for parking fee paid upon pressing of receipt button by patron. Machine shall have a memory system which stores data from each transaction, including space number, amount paid, and time purchased. Patrons can return to any MSM machine and pay for additional time by entering space number from receipt.

   b. Non-Cash Payment Options: The MSM shall accept and process the following non-cash payment options: credit card, debit cards, smart cards and pay by cell phone.

   1) Each MSM shall be equipped with an internal magnetic stripe swipe reader used for processing credit card transactions. Credit card transactions shall accommodate as a minimum:

   a) VISA
   b) Master Card
   c) American Express
   d) Discover
   e) Checking Account Debit Cards
   f) Razorbuck Smart Card

   2) Credit Card Approval System: credit card reader with each MSM shall be connected to a server that is dedicated to credit card approval and payment processing system. Information from each credit card transaction shall be transmitted to
server that shall be in direct communication with authorizing clearinghouse via GSM, GPRS, T1 or DSL connection, to provide on line real-time approvals for each transaction.

3) Authorization for credit card transactions from swipe to authorization shall not be greater than seven seconds. Contractor shall be responsible for confirming record formats required by Owner's financial institution.

4) Smart Cards: Customers using Razorback smart cards will insert their card into the MSM, identify their space number and remove their card. When leaving the customer would insert their smart card in any MSM and their fee would be calculated for the time actually parked.

5) Pay by Cell Phone: Customers, after preregistering with the provider can pay for parking from their cell phone by calling a predetermined number and entering their space number and intended length of stay information at the prompt. This payment information is then sent to the FMS in real time and is used to update the enforcement handheld and MSM on payment status. Once registered, a customer may choose to use a SMS text message to pay for parking by texting a message indicating their parking space number and desired length of stay. A SMS text message will automatically be sent to the customers’ registered phone several minutes prior to the expiration of paid time, and an option is given to extend time parked if not restricted by zone.

B. Enforcement System

1. Enforcement system shall consist of a multi-purpose hand-held mobile device, citation printer, battery pack, software and all peripherals required to operate in the manner described herein.

   a. Enforcement handheld shall communicate wirelessly with FMS and display status of all parking spaces located within the designated zone. Handheld shall display a color coded grid map of the immediate area indicating current status, i.e. Green = Paid, Red = Expired not Paid, Blue = Time Limit Violation and Yellow = Grace Period. Handheld shall communicate on-line in virtual time with FMS.

   b. Enforcement officers will receive a paid space report directly onto their enforcement handheld. With the same handheld, the officer will then have the ability to issue a citation ticket.

   c. Ability for the system to work with a pay by cell phone program. Patrons can pay for their parking and add time by using a cell phone. The enforcement handheld must have the ability to monitor vehicles that have paid by cell phone.

   d. The enforcement handheld shall be capable of taking a photo of the vehicle in dispute and save as a file attachment in the database.

   e. The handheld enforcement ticketing system shall be in real time and once a ticket is issued, the information is sent to the FMS. When a license plate look up is entered on the wireless handheld, the system will check the FMS for history of that vehicle and display it on the handheld in real time.

   f. Hand-held mobile units shall provide the following features:

      1) 128 MB SDRAM/256 MB Flash Memory.
      2) Windows Mobile 6.0 or higher operating system.
3) Numeric and QWERTY keypad.
4) 3.5” LED backlit touch panel QVGA display (320x240) which is highly visible in daylight and darkness.
5) Unit shall be user-friendly and ergonomically correct.
6) Blue tooth Class II, v2.0 Enhanced Data Rate communication.
7) GMS/GPRS EDGE 2.5G Wireless WAN and Data communications.
8) Wireless LAN Voice and Data Communication.
9) MicroSD expansion slot.
10) USB communication interface.
11) 2 Megapixel color camera.
12) Barcode scanner.
13) Speaker, microphone and Bluetooth headset audio.
14) Removable, rechargeable Lithium Ion battery pack with recharging unit.
15) Battery with 12 hours minimum operation between recharging.
16) Less than 1 pound weight, including battery.
17) Able to withstand 4 ft drop onto concrete surface. Meets applicable MIL-STD and IEC specifications for drop, tumble and sealing.

Multi-purpose Mobile/Citation printer shall be:

1) Thermal-line printer.
2) Capable of printing the citation number, location, space number, violation type, amount due, due date and barcode in format coordinated with citation envelope.
3) Print at 2 in. per second.
4) Blue Tooth v2.0 communication.
5) USB 2.0 and RS-232 Serial communication.
6) Memory capacity 4MB Flash, 2MB RAM.
7) It shall be integral to the mobile/citation device or belt carried.
8) If belt carried, it shall meet the following requirements:
   a) Removable, rechargeable Lithium Ion battery pack with recharging unit.
   b) Battery with 12 hours minimum operation between recharging.
   c) Less than 2 pound weight, including battery and paper roll.
   d) Able to withstand a 4 ft drop onto concrete surface.

2. Citation software on hand-held mobile devices shall issue citations in numbered sequence with user definable data entry fields and a review screen that allows the officer to review the citation prior to printing and storing. Software shall allow for the correction of mistakes made during the enforcement process prior to issuance of citation. All data entry information shall be sent to the FMS in real time. Software shall include license plate check against scofflaw list. System shall control and monitor citations voided by officer.

3. Enforcement Management, independently or in concert with FMS shall:
   a. Manage and compile all enforcement data.
   b. Provide controls over citation issuance including numbering system, void tracking, reporting of enforcement tours and productivity of officer.
c. Control payments of citation whether by MSM, mail or at parking office.
d. Provide automatic generation of overdue notices.
e. Provide for an appeals function/process during which further collection action is suspended.
f. Provide a collection function process for monitoring tickets after turned over to collection agencies.
g. Provide for scofflaw list for downloading to hand-held mobile/citation writers.
h. Provide cash management reporting, which is down-loaded to FMS for consolidation with other revenue sources.
i. The enforcement management system software shall be able to communicate in regular intervals with the university’s current financial management system.

2.2 SPARE PARTS
A. Spare Components: Furnish the following spare components, complete and ready to use, prior to commencement of operational testing and maintain inventory of spare components at this level as components are used during warranty period. After expiration of warranty period, University will pay for replacement of parts as used from this inventory.

1. MSM:
   a. One CPU Board
   b. One Thermo receipt printer unit
   c. One card reader head
   d. One Alphanumeric keypad
   e. One Coin Selector

2. Enforcement Handheld
   a. One Replacement Handheld Unit
   b. One Citation Thermo Printer
   c. One Handheld Battery
   d. One Citation Thermo Printer Battery
   e. One Battery Charger

2.3 STOCK ITEMS
A. Stock: Furnish the following operating stock items prior to commencement of operational testing. Contractor shall provide samples for Owner approval prior to final order of any item that is custom printed. Manufacturer shall select actual size of credentials/tickets and Smart Card ID devices. Owner must approve color and artwork of credentials/tickets and Smart Card ID devices. Owner will provide camera-ready artwork for logos.

1. 100 rolls of thermal paper for citation printer
2. 100 rolls of thermal receipt paper for MSM
3. One additional removable locking coin vault for each MSM
4. One spare handheld battery for each handheld purchased
5. One spare printer battery for each printer purchased
PART 3 - EXECUTION

3.1 VERIFICATION TESTS

A. Multi-Space Meter (MSM)

1. Cash Transaction
   a. Insert space number and coins, and confirm that it is displayed on the screen.
   b. Confirm that machine calculates and displays the payment amount.
   c. Confirm that machine displays the parking time.
   d. Confirm that machine displays space number or license plate

2. Credit Card Transaction (Pay by-Space)
   a. Insert and remove credit card from card reader.
   b. Select Parking Space Number
   c. Select Parking Time Desired
   d. Verify credit card transaction is completed in < 7 seconds.
   e. Confirm that a printed receipt is offered.
   f. Accept printed receipt and confirm accuracy of receipt.

3. No Data Communications Payment
   a. Disconnect data communications from machine.
   b. Process several normal transactions as indicated above (only cash).
   c. Verify system works as if it were a normal transaction.
   d. Re-establish communications.
   e. Verify transactions are uploaded to the FMS.

4. Receipt and Coin Vault Removal and Replacement
   a. Verify that coin vault can be easily removed/inserted and posses a locking mechanism.
   b. Verify that receipt read/write device(s) are readily accessible for replacement of roll stock.
   c. Verify that MSM main door properly aligns and locks upon service completion of above units.

END OF SECTION 11 12 26.10

11 12 26.13 Parking Fee Coin Collection Equipment
11 12 33 Parking Gates

11 13 00 Loading Dock Equipment

Consultant Design Guideline

SECTION 111300
LOADING DOCK EQUIPMENT
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. Dock levelers.
   2. Dock bumpers.
   3. Inflatable dock seals.
   4. Transparent-strip door curtains.

B. Related Sections:
   1. Division 03 Section "Cast-in-Place Concrete" for concrete work for recessed loading dock equipment.
   2. Division 05 Section "Metal Fabrications" for curb angles at edges of recessed pits.
   3. Division 08 Section "Sectional Doors" for overhead doors electrically interlocked to dock levelers.
   4. Division 26 Sections for electrical wiring for, and connections to, loading dock equipment.

1.3 DEFINITIONS

A. Operating Range: Maximum amount of travel above and below the loading dock level.

B. Working Range: Recommended amount of travel above and below the loading dock level for which loading and unloading operations can take place.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for loading dock equipment. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Shop Drawings: For loading dock equipment. Include plans, elevations, sections, details, and attachments to other work.
1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

2. Wiring Diagrams: For power, signal, and control wiring.

C. Samples for Selection: For each type of dock-seal fabric and curtain door strip indicated.

D. Qualification Data: For qualified Installer.

E. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency; indicate compliance of dock levelers with requirements in MH 30.1 for determining rated capacity, which is based on comprehensive testing within last two years of current products.

1. Submittal Form: According to MH 30.1, Appendix A.

F. Operation and Maintenance Data: For loading dock equipment to include in operation and maintenance manuals.

G. Warranty: Sample of special warranty.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer’s authorized representative who is trained and approved for installation of units required for this Project.

1. Maintenance Proximity: Not more than four hours' normal travel time from Installer's place of business to Project site.

B. Source Limitations: Obtain dock levelers from single source from single manufacturer.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.6 DELIVERY, STORAGE, AND HANDLING

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify actual dimensions of construction contiguous with loading dock equipment, including recessed pit dimensions slopes of driveways and heights of loading docks, by field measurements before fabrication.
1.8 WARRANTY

A. Special Warranty for Dock Levelers: Manufacturer's standard form in which manufacturer agrees to repair or replace dock-leveler components that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
   a. Structural failures including cracked or broken structural support members, load-bearing welds, and front and rear hinges.
   b. Faulty operation of operators, control system, or hardware.
   c. Deck plate failures including cracked plate or permanent deformation in excess of 1/4 inch between deck supports.
   d. Hydraulic system failures including failure of hydraulic seals and cylinders.

2. Warranty Period for Structural Assembly: 4 years from date of Substantial Completion.
3. Warranty Period for Hydraulic System: 4 years from date of Substantial Completion.
4. Warranty shall be for unlimited usage of leveler for the specified rated capacity over the term of the warranty.

1.9 MAINTENANCE SERVICE

A. Initial Maintenance Service: Beginning at Substantial Completion, provide 12 months' full maintenance by skilled employees of loading dock equipment Installer. Include monthly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper loading dock equipment operation at rated speed and capacity. Provide parts and supplies the same as those used in the manufacture and installation of original equipment.

B. Continuing Maintenance Proposal: From Installer to Owner, in the form of a standard yearly maintenance agreement, starting on date initial maintenance service is concluded. State services, obligations, conditions, and terms for agreement period and for future renewal options.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Steel Plates, Shapes, and Bars: ASTM 36/A 36M.

B. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from steel plate complying with ASTM A 572/A 572M, Grade 55.

C. Steel Tubing: ASTM A 500, cold formed.

D. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy
welded.

E. Wood: DOC PS 20 dimension lumber, select structural grade, kiln dried.

F. Pressure-Treated Wood: DOC PS 20 dimension lumber, select structural grade, kiln dried, and pressure treated with waterborne preservatives to comply with AWPA C2.

2.2 RECESSED DOCK LEVELERS

A. General: Recessed, hinged-lip-type dock levelers designed for permanent installation in concrete pits preformed in the edge of loading platform; of type, function, operation, capacity, size, and construction indicated; and complete with controls, safety devices, and accessories required.

1. Basis-of-Design Product: Subject to compliance with requirements, provide "Autodok H Series" hydraulic dock levelers as manufactured by McGuire, a Division of Systems, Inc., or comparable product by one of the following:

   a. Autoquip Corporation
   b. Beacon Industries, Inc.
   c. Nordock Inc.
   d. Pentalift Equipment Corporation.
   e. Rite-Hite Corporation.
   f. SPX Dock Products - Kelley.

B. Standard: Comply with MH 30.1.

C. Rated Capacity: Capable of supporting total gross load of 45,000 lb. without permanent deflection or distortion.

D. Platform: Not less than 1/4-inch- thick, nonskid steel plate.

   1. Platform Size: 6 feet by 6 feet, as indicated on Drawings.
   2. Frame: Manufacturer's standard.
   3. Toe Guards: Equip open sides of dock leveler over range indicated with metal toe guards.

       a. Toe-Guard Range: Entire upper operating range.

E. Hinged Lip: Not less than 1/2-inch- thick, nonskid steel plate.

   1. Hinge: Full width, piano-type hinge with heavy-wall hinge tube and greased fittings, with gussets on lip and ramp for support.
   2. Safety Barrier Lip: Designed to protect material-handling equipment from an accidental fall from loading platform edge of the dock leveler when the leveler is not in use.

F. Function: Dock levelers shall compensate for differences in height between truck bed and loading platform.

   1. Vertical Travel: Operating range above platform level of sufficient height to enable lip to extend and clear truck bed before contact with the following minimum working range:

2. Automatic Vertical Compensation: Floating travel of ramp with lip extended and resting on truck bed shall compensate automatically for upward or downward movement of truck bed during loading and unloading.

3. Automatic Lateral Compensation: Tilting of ramp with lip extended and resting on truck bed shall compensate automatically for canted truck beds of up to 4 inches over width of ramp.

4. Lip Operation: Manufacturer’s standard mechanism that automatically extends and supports hinged lip on ramp edge with lip resting on truck bed over dock leveler’s working range, allows lip to yield under impact of incoming truck, and automatically retracts lip when truck departs.

a. Length of Lip Extension: 16 inches.

5. Automatic Ramp Return: Automatic return of unloaded ramp, from raised or lowered positions to stored position, level with platform, as truck departs.

6. Interlock: Leveler will not operate while overhead door is in closed position.

G. Hydraulic Operating System: Electric control from a remote-control station; fully hydraulic operation. Electric-powered hydraulic raising and hydraulic lowering of ramp. Equip leveler with a packaged unit including a unitized, totally enclosed, non-ventilated electric motor, pump, manifold reservoir, and valve assembly of proper size, type, and operation for capacity of leveler indicated. Include means for lowering ramp below platform level with lip retracted behind dock bumpers. Provide a hydraulic velocity fuse connected to main hydraulic cylinder to limit loaded ramp’s free fall to not more than 3 inches.

1. Electric Motor: 208V / 3P / 3.6A, 1 HP
2. Remote-Control Station with Emergency Stop: Multi-button control station with an UP button of the constant-pressure type and an emergency STOP button of the momentary-contact type, enclosed in NEMA ICS 6, Type 12 box. Ramp raises by depressing and holding UP button; ramp lowers at a controlled rate by releasing UP button. All ramp movement stops, regardless of position of ramp or lip, by depressing STOP button. Normal operation resumes by engaging a manual reset button or by pulling out STOP button. All control wiring to be 120V.

H. Construction: Fabricate dock-leveler frame, platform supports, and lip supports from structural- or formed-steel shapes. Weld platform and hinged lip to supports. Fabricate entire assembly to withstand deformation during both operating and stored phases of service. Chamfer lip edge to minimize obstructing wheels of material handling vehicles.

1. Cross-Traffic Support: Manufacturer’s standard method of supporting ramp at platform level in stored position with lip retracted. Provide a means to release supports to allow ramp to descend below platform level.
2. Maintenance Strut: Integral strut to positively support ramp in up position during maintenance of dock leveler.

I. Integral Laminated-Tread Dock Bumper: Fabricated from 4-1/2 inch-thick, multiple, uniformly thick plies cut from fabric-reinforced rubber tires. Laminate plies under
pressure on not less than two 3/4-inch- diameter, steel supporting rods that are welded at one end to 1/4-inch- thick, structural-steel end angle and secured with a nut and angle at the other end. Fabricate angles with predrilled anchor holes and sized to provide not less than 1 inch of tread plies extending beyond the face of closure angles.

J. Accessories:

1. Night Locks: Manufacturer’s standard means to prevent extending lip and lowering ramp when overhead doors are locked.

K. Finish: Paint dock levelers after assembly.

1. Toe Guards: Paint yellow to comply with ANSI Z535.1.

2.3 DOCK BUMPERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Beacon Industries, Inc.
2. McGuire, a Division of Systems, Inc.
4. Rite-Hite Corporation.
5. SPX Dock Products - Kelley.

B. Laminated-Tread Dock Bumper: Fabricated from multiple, uniformly thick plies cut from fabric-reinforced rubber tires. Laminate plies under pressure on not less than two 3/4-inch- diameter, steel supporting rods that are welded at one end to 1/4-inch- thick, structural-steel end angle and secured with a nut and angle at the other end. Fabricate angles with predrilled anchor holes and sized to provide not less than 1 inch of tread plies extending beyond the face of closure angles.

1. Thickness: 4-1/2 inches.
2. Horizontal Style: Match bumpers provided with dock levelers (12 inches high by 13 inches long)
3. For dock openings without dock levelers.

C. Anchorage Devices: Hot-dip galvanized-steel anchor bolts, nuts, washers, bolts, sleeves, cast-in-place plates, and other anchorage devices as required to fasten bumpers securely in place and to suit installation type indicated.

2.4 INFLATABLE DOCK SEALS

A. General: Inflatable dock seals consisting of jamb and header seals designed to inflate by motor/blower and compress against truck bodies to form airtight seals at loading dock openings; of type, size, and construction indicated.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Model SI-350 Inflatable Dock Seal as manufactured by SPX Dock Products - Serco or comparable product
by another manufacturer. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

b. Rite-Hite Corporation.
c. SPX Dock Products - Kelley.

B. Door Opening Size: As indicated on Drawings.

C. Construction: Fabricate with 12 inch wide jamb seals over 2 x 8 pressure treated wood backing. Head assembly consists of fiberglass covered wood framework supporting integral torsion spring head bag assembly. Variable head height member adjusts to different trailer heights. Mount seals with hot-dip galvanized-steel mounting hardware. Inflate seals by use of a 115V / 1 P / 1/2-hp motor/blower with automatic thermal overload protection and NEMA 1 on-off switch. Control wiring to be 120V. Blower to be mounted under canopy cover and behind header seal. Provide bottom of header and jamb seals with grommets to allow for release of moisture and excess air.


a. Color: As selected by Architect from manufacturer's full range.

2.5 TRANSPARENT-STRIP DOOR CURTAINS

A. General: Door curtains consisting of overlapping strips suspended from top of opening to form a sealed door curtain. Provide strips of length required to suit opening height and with sufficient number in unit to close opening width with overlap indicated.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Chase Doors.
b. Flexon, Inc.
c. Rotary Products Inc.
d. Vestil Manufacturing Company.

B. Strip Material: Curved, clear, transparent, extruded PVC. Fabricate strips for manufacturer's standard method of attachment to overhead mounting system indicated.

1. Standard Grade: Designed to withstand temperature range of 0 to plus 150 deg F (minus 18 to plus 66 deg C).
2. Strip Width and Thickness: 8 inches (203 mm) wide and 0.080 inch (2 mm) thick.
3. Overlap: One-third.

C. Wall Surface Mounting: Consisting of a steel plate bolted to side of lintel; equip plate with permanently attached, threaded, mounting pins and steel-angle or -plate retaining strip attached to plate with wing nuts.
2.6 GENERAL FINISH REQUIREMENTS

A. Finish loading dock equipment after assembly and testing.

2.7 STEEL FINISHES

A. Galvanizing: Hot-dip galvanize components as indicated to comply with the following:

1. ASTM A 123/A 123M for iron and steel loading dock equipment.
2. ASTM A 153/A 153M or ASTM F 2329 for iron and steel hardware for loading dock equipment.

B. Galvanized-Steel and Steel Finish: Immediately after cleaning and pre-treating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat in manufacturer's standard color.

PART 3 - EXECUTION

3.1 EXAMINATION

3.2 PREPARATION

3.3 INSTALLATION

A. General: Install loading dock equipment, including motors, pumps, control stations, wiring, safety devices, and accessories as required for a complete installation.
3.4 ADJUSTING

3.5 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain loading dock equipment.

END OF SECTION 111300
11 14 43 Pedestrian Detection Equipment
   11 14 43.13 Electronic Detection and Counting Systems
11 14 53 Pedestrian Security Equipment

11 15 00 SECURITY, DETENTION AND BANKING EQUIPMENT
11 16 00 Vault Equipment
   11 16 13 Safe Deposit Boxes
   11 16 16 Safes
   11 16 23 Vault Ventilators

11 17 00 Teller and Service Equipment
   11 17 13 Teller Equipment Systems
   11 17 16 Automatic Banking Systems
   11 17 23 Money Handling Equipment
   11 17 33 Money Cart Pass-Through
   11 17 36 Package Transfer Units

11 18 00 Security
   11 18 13 Deal Drawers
   11 18 16 Gun Ports
   11 18 23 Valuable Material Storage

11 19 00 Detention Equipment
   11 19 13 Detention Pass-Through Doors
   11 19 16 Detention Gun Lockers

11 20 00 COMMERCIAL EQUIPMENT
11 21 00 Mercantile and Service Equipment
   11 21 13 Cash Registers and Checking Equipment
   11 21 23 Vending Equipment
      11 21 23.13 Vending Machines
   11 21 33 Checkroom Equipment
   11 21 43 Weighing and Wrapping Equipment
   11 21 53 Barber and Beauty Shop Equipment

11 22 00 Refrigerated Display Equipment

11 23 00 Commercial Laundry and Dry Cleaning Equipment
   11 23 13 Dry Cleaning Equipment
   11 23 16 Drying and Conditioning Equipment
   11 23 19 Finishing Equipment
   11 23 23 Commercial Ironing Equipment
   11 23 26 Commercial Washers and Extractors
   11 23 33 Coin-Operated Laundry Equipment
   11 23 43 Hanging Garment Conveyors

11 24 00 Maintenance Equipment
   11 24 13 Floor and Wall Cleaning Equipment
11 24 16 Housekeeping Carts
11 24 19 Vacuum Cleaning Systems
11 24 23 Window Washing Systems

11 25 00 Hospitality Equipment
11 25 13 Registration Equipment

11 26 00 Unit Kitchens
11 26 13 Metal Unit Kitchens
11 26 16 Wood Unit Kitchens
11 26 19 Plastic-Laminate-Clad Unit Kitchens

11 27 00 Photographic Processing Equipment
11 27 13 Darkroom Processing Equipment
11 27 16 Film Transfer Cabinets

11 28 00 Office Equipment
11 28 13 Computers
11 28 16 Printers
11 28 19 Self-Contained Facsimile Machines
11 28 23 Copiers

11 29 00 Postal, Packaging, and Shipping Equipment
11 29 23 Packing Equipment
11 29 33 Shipping Equipment
11 29 55 Postal Equipment

11 30 00 RESIDENTIAL EQUIPMENT

11 31 00 Residential Appliances
11 31 13 Residential Kitchen Appliances
11 31 23 Residential Laundry Appliances

11 33 00 Retractable Stairs

11 40 00 FOODSERVICE EQUIPMENT
11 41 00 Food Storage Equipment
11 41 13 Refrigerated Food Storage Cases
11 41 23 Walk-In Coolers
11 41 26 Walk-In Freezers

11 42 00 Food Preparation Equipment

11 43 00 Food Delivery Carts and Conveyors
11 43 13 Food Delivery Carts
11 43 16 Food Delivery Conveyors

11 44 00 Food Cooking Equipment
11 44 13 Commercial Ranges
11 44 16 Commercial Ovens

11 46 00 Food Dispensing Equipment
11 46 13 Bar Equipment
11 46 16 Service Line Equipment
11 46 19 Soda Fountain Equipment

11 47 00 Ice Machines

11 48 00 Cleaning and Disposal Equipment
11 48 13 Commercial Dishwashers

11 50 00 EDUCATIONAL AND SCIENTIFIC EQUIPMENT
11 51 00 Library Equipment
11 51 13 Automated Book Storage and Retrieval Systems
11 51 16 Book Depositories
11 51 19 Book Theft Protection Equipment
11 51 23 Library Stack Systems
11 51 23.13 Metal Library Shelving

11 52 00 Audio-Visual Equipment
11 52 13 Projection Screens
11 52 13.13 Fixed Projection Screens
11 52 13.16 Portable Projection Screens
11 52 13.19 Rear Projection Screens
11 52 16 Projectors
11 52 16.13 Movie Projectors
11 52 16.16 Slide Projectors
11 52 16.19 Overhead Projectors
11 52 16.23 Opaque Projectors
11 52 16.26 Video Projectors
11 52 19 Players and Recorders

11 53 00 Laboratory Equipment
11 53 13 Laboratory Fume Hoods

Consultant Design Guideline

SECTION 11 53 13 - HIGH PERFORMANCE LOW AIRFLOW FUME HOODS

PART 1 GENERAL

1.01 SUMMARY

A. The following performance specification is for new hoods without sash opening restrictions per schedule for low volume/high performance chemical laboratory Fume Hood (herein referred to as FH). The FH must fit through a 34” door opening for delivery to the installation location (field breakdown and re-assembly by manufacturer may be
required). The FH is expected to operate at the highest level of fume containment over a broad range of operation. The building’s exhaust system capacity is limited, therefore individual fume hoods must satisfy this specification with a maximum exhaust of 300 cfm per FH. The FH shall be ergonomically designed for all size workers. The FH shall be specified to:

1. Provide containment of chemical fumes for the safety of personnel working within laboratory areas. Provide both a splash and explosion protection resistant FH as per NFPA 45-2004 8.2.3.
2. Operate at constant volume and pressure with sash closure pressure independent operation. All make up air must come from the laboratory space. At no time can the FH draw make up air from voids above the ceiling.
3. Support OSHA’s required Chemical Hygiene Plan (CHP) via ANSI/ASHRAE 110 Testing 4AM 0.05 and 4AI 0.1 rating that will include a safety factor to achieve added robustness even when operating in less than ideal conditions up to 27-1/2” sash opening. A reduced sash operating hood is not acceptable.
4. Fume hoods will provide 4AI 0.1 at a maximum face velocity at 18” vertical sash opening.
5. The FH performance shall be verified via ASHRAE 110 testing after balancing and exhaust fan portion of work is complete.
6. The fume hoods shall be bid according to the U of A/VWR Primary Supplier Agreement – Contact No. CNR-01163. The primary contact for fume hoods is Charles Bacher, cell: 314-402-8533, fax: 314-846-1944 and e-mail: charles_bacher@vwr.com. The VWR account executive for the U of A is Cassey Cloninger, cellphone: (870) 919-3107.

1.02 FUME HOOD GENERAL DESIGN REQUIREMENTS

A. Fume hoods shall function as ventilated, enclosed workspaces, designed to capture, confine and exhaust fumes, vapors and particulate matter produced or generated within the enclosure.

B. Design fume hoods for consistent and safe air flow through the hood face. Negative variations of face velocity shall not exceed 20% of the average face velocity at any designated measuring point as defined in this section.

C. Average illumination of work area with Polyresin liner: Minimum 80 foot-candles. Work area shall be defined as the area inside the superstructure from side to side and from face of baffle to the inside face of the sash, and from the working surface to a height of 28 inches.

D. Fume hood shall be designed to minimize static pressure loss with adequate slot area and bell shaped exhaust collar configuration. Maximum average static pressure loss readings taken three diameters above the hood outlet from four points, 90 degrees apart, shall not exceed the following maximums with sash in full open position:

Face Velocity Measured S.P.L. (W.G.)

60 F.P.M. .15 inches
100 F.P.M. .30 inches

E. Fume hood shall maintain essentially constant exhaust volume at any sash position for safety. Maximum variation in exhaust CFM, static pressure and average face velocity as a result of sash adjustment shall not exceed 5% for any sash position at the specified exhaust volume.

F. Fume hoods shall be available in standard widths of 4, 5, 6, 7 & 8-feet.

G. Noise Criteria: Test data of octave band analysis verifying hood is capable of a 50 NC value when connected to a 50 NC HVAC source. Reading shall be taken 3’ in front of an open sash, 5’ off the floor at 100 fpm face velocity.

H. Interior and exterior materials of construction and finishes shall meet the usage and these specification requirements.

1.03 LINER SURFACE FINISH PERFORMANCE REQUIREMENTS

A. Test procedure:

1. Test No. 1 – Spills and Splashes:
   a. Suspend in a vertical plane a 42” (horizontal) by 12” (vertical) panel divided into 3/4” wide vertical columns, each column numbered 1 through 49.
   b. Apply five drops of each reagent listed with an eyedropper.
   c. Apply liquid reagents at top of panel and allow to flow down full panel height. (CAUTION! Flush away any reagent drops.)

2. Test No. 2 – Fumes and Gases:
   a. Divide 24” x 12” panel into 2” squares, each square numbered 1 through 49.
   b. Place 25 milliliters of reagent into 100 milliliters beakers and position panel over beaker tops in the proper sequence. Note: Beaker pouring lip permits atmospheric oxygen to enter and participate in the reaction of the reagent fumes.

3. After 24 hours remove panel, flush with water, clean with naphtha and detergent, rinse, wipe dry and evaluate.

B. Evaluation ratings: Change in surface finish and function shall be described by the following ratings:

1. No Effect: No detectable change in surface material.
2. Excellent: Slight detectable change in color or gloss, but no change to the function or life of the work surface material.
3. Good: Clearly discernible change in color or gloss, but no significant impairment of work surface function or life.
4. Fair: Objectionable change in appearance due to surface discoloration or etch, possibly resulting in deterioration of function over an extended period.
5. Failure: Pitting, cratering or erosion of work surface material; obvious and significant deterioration.

C. Test Results: “P” Fume Hood Liner:

<table>
<thead>
<tr>
<th>REAGENT LIST</th>
<th>Test No. 1</th>
<th>Test No. 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concentrations by Weight</td>
<td>Rating Spills</td>
<td>Fumes</td>
</tr>
<tr>
<td>Sodium Hydroxide Flake</td>
<td>---</td>
<td>No Effect</td>
</tr>
<tr>
<td>Sodium Hydroxide, 40%</td>
<td>Excellent</td>
<td>No Effect</td>
</tr>
<tr>
<td>Sodium Hydroxide, 20%</td>
<td>Excellent</td>
<td>No Effect</td>
</tr>
<tr>
<td>Sodium Hydroxide, 10%</td>
<td>Excellent</td>
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</tr>
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<td>Ammonium Hydroxide, 28%</td>
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<tr>
<td>Eldorado - Plus (Solution)</td>
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<td>No Effect</td>
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<tr>
<td>Chloroform</td>
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<tr>
<td>LpH SE (Solution)</td>
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<td>Trichloroethylene</td>
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</tr>
<tr>
<td>Monochlorobenzene</td>
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</tr>
<tr>
<td>Tincture of Iodine</td>
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<td>Excellent</td>
</tr>
<tr>
<td>Methyl Alcohol</td>
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</tr>
<tr>
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<td>No Effect</td>
</tr>
<tr>
<td>Butyl Alcohol</td>
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<tr>
<td>Phenol, 85%</td>
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<td>Cresol</td>
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<td>Sodium Sulfide, Saturated</td>
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<td>Sulfuric Acid, 77%</td>
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</tr>
<tr>
<td>Sulfuric Acid, 93%</td>
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</tr>
</tbody>
</table>
42. Hydrogen Peroxide, 30%  No Effect  No Effect
43. Acid Dichromate  Excellent  No Effect
44. Nitric Acid, 20%  Excellent  No Effect
45. Nitric Acid, 30%  Excellent  No Effect
46. 40 & 47 Equal Parts  Excellent  Good
47. Nitric Acid, 70%  Excellent  Good
48. Hydrochloric Acid, 37%  No Effect  Excellent
49. Hydrofluoric Acid, 48%  No Effect  Failure

1.04 SUBMITTALS

A. Shop Drawings: Indicate equipment locations, large scale plans, elevations, cross sections, rough-in and anchor placement dimensions and tolerances and all required clearances.

B. Product Data: Submit manufacturer's data for each component and item of laboratory equipment specified. Include component dimensions, configurations, construction details, joint details, and attachments, utility and service requirements and locations. Include liner and exterior finish tests by independent third party.

C. Samples: Submit 3 x 6 inch samples of finish for fume hood, work surfaces and for other pre-finished equipment and accessories for selection by Architect or Owner.

D. Test Reports: Submit test reports on each size and type of hood verifying conformance to test performances specified. Test report must accompany each hood as part of installation and usage package. Submit independent test reports as required by specification.

E. Instructions: Submit for review and approval

1. Instructions to be inscribed on instruction plate to be attached to hood, as specified in Part 2 of this Section.
2. Written instructions in booklet form providing additional details on safe and proper operation and maintenance.
3. Professional quality video - minimum 15 minutes in length on proper hood usage.

F. Independent validation: Written verification of compliance to UL-1805 fume hood standard is mandatory.

1.05 QUALITY ASSURANCE

A. Manufacturer's qualifications: Modern plant with proper tools, dies, fixtures and skilled workmen to produce high quality laboratory casework and equipment, and shall meet the following minimum requirements:

1. Five years or more experience in manufacture of laboratory casework and equipment of type specified.
2. Ten installations of equal or larger size and requirements. Provide contact at each.
3. UL 1805 Specification: (Mandatory)
   Fume Hood must be Underwriters Laboratories subject 1805 classified. The
   1805 standard covers electrical and mechanical hazards, investigate the
   flammability of materials and measures the effectiveness of airflow
   characteristics. Proper labeling must be affixed to the face of each fume hood
   indicating classification to the UL 1805 standard for Laboratory Fume Hoods. UL
   listing covering electrical components only or other listings that do not
   encompass all issues covered in UL 1805 is insufficient. All factory testing shall
   be performed in a Nationally Recognized Test Laboratory (NRTL).

4. ASHRAE Standard 110 Testing:
   a. As installed field performance certification: Spillage limit for field tests
      shall be 4.0 AI 0.1 ppm. Any hood not meeting specifications in the As
      Installed (AI) testing shall be brought into conformance or replaced.
      Refer to specification SECTION 230593 TESTING, ADJUSTING AND
      BALANCING FOR HVAC.

B. The system shall be designed, manufactured, tested and installed in compliance with
   the current versions or issuance of:
   1. OSHA 29 CFR Part 1910
   2. ASHRAE 62, 110 and 111
   3. AIHA Z9.5
   4. NFPA 45

C. Installer's qualifications: Factory certified by the manufacturer. Provide outline of
   certification program.

1.06 DELIVERY, STORAGE AND HANDLING

1.07 SCOPE OF WORK

A. Scope of FH work includes:
   1. Complete field installation for all low volume/high performance bench style
      hoods. This includes installation of benches and work surfaces.
   2. Provide factory piping, electrical wiring and controls.
   3. Coordinate with independent testing agency to provide hood balancing.
   4. Provide instrument calibration.
   5. Provide final control commissioning of each fume hood.
   6. Provide ASHRAE 110 testing of each fume hood.

B. Work shall be limited to Fume Hood.

1.08 PROJECT CONDITIONS

PART 2 PRODUCTS

2.01 MANUFACTURER
A. Fume hood by Labconco: Labconco Corporation, 8811 Prospect Avenue, Kansas City, MO 64132.

1. Labconco Protector XStream

2.02 FUME HOOD MATERIALS

A. Steel: High quality, cold rolled, mild steel meeting requirements of ASTM A1008; gauges U.S. Standard and galvanized.

B. Stainless steel: Type 304; gauges U.S. Standard.

C. Ceiling closure panels: Minimum 18 gauge; finish to match hood exterior.

D. Downdraft bypass: Low resistant type, 18 gauge steel chamber, directional louvers – not acceptable. All bypass air shall enter top of bypass chamber and enter hood in a down flow direction. Chamber shall protect user from expelled particulate in the event of an adverse internal reaction.

E. Safety glass: 7/32” thick laminated safety glass or 3/8” thick laminated safety glass viewing panel.

F. Sash chain: ANSI #35 steel, single strand. Average tensile strength of 2,400 pounds; maximum working load of 480 pounds.

G. Sash guides: Extruded PVC.

H. Pulley assembly for sash chain: Finish bored steel drive sprockets and keyed drive, 1/2” diameter front connector shaft. Rear idler sprockets; double sealed ball bearings type, lubricated. All sprockets steel with zinc dichromate finish.

I. Sash pull: Corrosion resistant steel with chemical resistant powder coating. Maximum 1.5” thick.

J. Gaskets: White 70 durometer PVC for interior access panels. Gasket interior access panels to eliminate air leakage and to retain liquids inside hood.

K. Fastenings:

1. Exterior structural members attachments: Sheet metal screws, zinc plated.

2. Interior fastening devices concealed. Exposed screws not acceptable. (Screw head "caps" not acceptable.)

3. Exterior side access panel member fastening devices to be exposed corrosion resistant, non-metallic material, creating a positive mechanical latch. Latch must be flush type. Exposed screws or Velcro type fasteners – not acceptable.

L. Instruction plate: Corrosion resistant or plastic plate attached to the fume hood exterior with condensed information covering recommended locations for apparatus and accessories, baffle settings and use of sash.
2.03 FUME HOOD CONSTRUCTION

A. Superstructure: Rigid, self-supporting assembly of double wall construction, maximum 4-7/8" thick.

1. Wall consists of a sheet steel outer shell with urethane powder finish and a corrosion resistant inner liner, This wall houses and conceals steel framing members, attaching brackets and remote operating service fixture mechanisms and services. Panels must be attached to a full frame construction, minimum 14 gauge galvanized members. Panels and brackets attached to eliminate screw heads and metallic bracket from hood interior.
   
a. Exterior sidewalls and upper front panel to be 304 stainless steel or powder coat steel front panels.

2. Access to fixture valves concealed in wall provided by exterior removable access panels, gasket access panels on the inside liner walls, or through removable front posts.

B. Exhaust outlet: Rectangular with ends radiused, shaped and flanged, 18 gauge steel finished with urethane powder coating, 12.81” diameter, designed to accept 12” nominal ducting.

C. Access opening perimeter: Airfoil or streamlined shape with all right angle corners radiused or angled. Bottom horizontal foil shall provide nominal one-inch bypass when sash is in the closed position. Bottom foil shall not be removable without use of special tools. Bottom foil: Steel with epoxy powder coating to increase acid and abrasion resistance. Airfoil and sill to be low profile design. A secondary containment trough shall be located in front of the work surface and extend below the airfoil sill.

D. Fume hood sash: (Vertical) Full view type with clear, unobstructed, side-to-side view of fume hood interior and service fixture connections. Sash to have a 35-inch sight line and a 28.5” vertical access height.

   Bottom sash rail: 2" maximum, 18-gauge steel with powder coating finish. Provide integral formed, flush pull the full width of bottom rail. Full width extruded dual durometer bottom bumper and airflow control strip. Set safety glass into rails in deep form, extruded poly-vinyl chloride glazing channels available on constant volume and restricted bypass hoods

E. Counter balance system: Single weight, sprocket and chain, counter balance system which prevents sash tilting and permits ease of operation at any point along full width pull. Maximum 7 pounds pull required to raise or lower sash throughout its full 18” height of operating sash opening. Life cycle test sash and weight. Provide independent test data. (See 2.02 F, G and H for material descriptions.) Open and close sash against rubber bumper stops.

F. Airfoil: The airfoil will be low profile, relatively flush to the work surface with
ample room for electrical hospital grade cords to fit beneath the airfoil. This sill to be used on both Sash Types. Sill to be ergonomically radiused on front edge. Sill must pivot forward to provide cord and trough access. Airfoil sills that are not low profile are not acceptable.

G. Fume hood liner: Poly-resin (product number denoted by the suffix "P"): Reinforced polyester panel; smooth finish and white color in final appearance. Flexural strength: 14,000 psi. Flame spread: 17 or less per U.L. 723 and ASTM E84-80. Baffle must be same material as liner. Metallic baffles, brackets or supports on hood interior – not acceptable. Liner and baffle material must meet 1.03-performance test. Independent test validation is mandatory.

H. Baffles: Baffles providing controlled air vectors into and through the fume hood must be fabricated of the same material as the liner. High performance 2-piece baffle will be used. Baffle shall incorporate exhaust slots located to purge the upper and lower area of the hood. Baffle to be non-adjustable. Baffles with manual or automatic adjustment are not acceptable. All baffles, supports, and brackets to be non-metallic.

I. Auto-Sash Stop: Sash shall be designed to promote usage as an upper body and face shield. Face velocities and volumes shall be based on an 18” operating opening. Sash shall have the capability to be raised to full 28.5” vertical opening for loading or unloading of large apparatus. A lock-open shall be provided. Sash shall lower automatically to the operating position or lower when released from any position above 18”. Auto-sash function shall be life cycle tested and not incorporate the need for motor drives. Submit third party validation of life cycle tests.

J. Service fixtures and fittings: Color-coded hose nozzle outlets and valves mounted inside the fume hood and controlled from the exterior with color-coded index handles.

2. Provide piping for all service fixtures from valve to outlet: Galvanized iron or copper for water, air and vacuum and brass for gas services.
3. Fixtures exposed to hood interior: Hose connectors are chemically resistant, glass-filled polypropylene with 6 serrations.
4. Remote control handles: Four-arm handle with nylon color-coded index buttons.
5. Services: As shown or specified.
6. See attachment A for vacuum breaker design.

K. Service fixtures and fittings:

1. Handle and outlet nozzle will be color coded to the media. Other materials may be in contact with media where appropriate.
2. Provide piping for all service fixtures from valve to outlet: Galvanized iron or copper for water, air and vacuum and brass for gas services.
3. No soldering or brazing should be required to complete mechanical
connections.
4. Fixtures exposed to fume hood interior shall have a chemically resistant finish.
5. Fixtures are to be provided with easy-to-mount attachment device for secure mounting in deck or wall mounted applications. System to be installed with simple hand tools.
6. Fittings are to be constructed to operate with the following maximum working pressure without leak or failure.
   • Water Fittings: 145 PSI
   • Non-Burning Gas: 145 PSI
   • Burning Gases: 100 PSI
   • Special Water Fittings: 145 PSI
   • Oxygen Fittings: 145 PSI
7. All outlets shall have detachable serrated nozzles.

L. Hood light fixture: Two lamp, rapid start, UL listed fluorescent light fixture with sound rated ballast installed on exterior of roof. Provide safety glass panel cemented and sealed to the hood roof.
   1. Interior of fixture: White, high reflecting plastic enamel.
   2. Size of fixture: Largest possible up to 48" for hoods with superstructures up to seven feet. Provide two 36" fixtures for hoods with eight-foot superstructures.
   4. Illumination: Per performance values, Part 1 of this Section.
   5. Access to light thru lintel panel – no tools required.

M. Electrical services: Three wire grounding type receptacles rated at 120 V.A.C. at 20 amperes. Provide 250 V.A.C. receptacles where specified. Flush plates: Black acid resistant thermoplastic.

N. Work surfaces: 1-1/4" thick surface, dished a nominal 3/8” to contain spills.
   1. Molded resin work surfaces for hoods with Poly-resin liners.

O. Safety Monitor/Alarm System:
Provide Safety Monitor/Alarm System, which monitors face velocity and provides audible and visual alarm if face velocity drops below safe levels. As the internal fume hood pressure changes as the sash opening is closed and opened, the flow passing over the thermistor is calibrated to a face velocity, which is displayed on the front of the monitor.
   1. Safety monitor: UL listed, tamper proof, with all alarm circuits, electric components, external tubing, and manifolds furnished complete and factory installed.
   2. Calibration is required once the hood is stationed and the hood exhausts and room supply systems are balanced. A secondary calibration has been factory set into the alarm’s memory only to determine that the alarm is functional and ready for shipment. The primary calibration must be completed in the field.
   3. Airflow sensor: Thermally compensated glass-beaded thermistor, factory
connected to a sidewall port on the interior of the fume hood.

   a. Silence pushbutton, which disables the audible alarm, shall be accessible on the front of the safety monitor.
   b. Provide alternate mode in which audible alarm is silenced indefinitely but visual alarm remains activated until the alarm condition is corrected.
   c. When alarm condition is corrected and face velocity and volume return to specified levels, the Safety Monitor will automatically reset and begin routine monitoring.

5. Provide test circuit to verify proper Safety Monitor operation.
6. Interface with BAS via contacts.

P. Linear damper/probe. Provide linear characterized butterfly damper with airflow probe.
   2. Shaft: ½” diameter.
   4. Operation: 1.5 to 1, turndown.
   7. Accuracy: ± 4%.

2.04 BYPASS TYPE FUME HOODS

A. Constant volume type with built-in automatic compensating bypass to maintain constant exhaust volume regardless of sash position.

B. Bypass: Positive in action and controlled by the sash operation.

C. Low resistance opening at top of front lintel panel. Bypass shall provide a smooth down flow effect.

D. As sash is lowered to 6”, bypass design shall limit the increase in face velocity to maximum of three times the average face velocity with the sash full open.

E. Width: As scheduled on drawings.

2.05 METAL FINISH

A. Metal finish:
   1. Preparation: Spray clean metal with a heated cleaner/phosphate solution, pre-treat with iron phosphate spray, water rinse, and neutral final seal. Immediately dry in heated ovens, gradually cooled, prior to application of finish.
   2. Application: Electrostatically apply urethane powder coat of selected color and bake in controlled high temperature oven to assure a smooth, hard satin finish.
Surfaces shall have a chemical resistant, high grade laboratory furniture quality finish of the following thickness: Liquid, dipped, solvent based finishes are not and will not be acceptable.

a. Exterior and interior exposed surfaces: 1.5 mil average and 1.2 mil min.
b. Backs of cabinets and other surfaces not exposed to view: 1.2 mil average.

B. Cabinet Surface Finish Tests:

All casework construction and performance characteristics shall be in full compliance with SEFA 8 standards. At the owner’s request, independent, third party performance testing must be submitted validating compliance and adheres to the finish specifications.

2.06 SOURCE QUALITY CONTROL TESTING OF FUME HOODS

A. Evaluation of manufacturer's standard product shall take place in manufacturer’s own test facility, with testing personnel, samples, apparatus, instruments, and test materials supplied by the manufacturer at no cost to the Owner.

3.01 INSTALLATION

A. Installation:

1. Install fume hoods and equipment in accordance with manufacturer's instructions.
2. Install equipment plumb, square, and straight with no distortion and securely anchored as required.
3. Secure work surfaces to casework and equipment components with material and procedures recommended by the manufacturer.

B. Accessory installation: Install accessories and fittings in accordance with manufacturer's recommendations.

3.02 FIELD QUALITY CONTROL TESTING OF FUME HOODS

A. Field testing requirements:

1. Perform tests in field to verify proper operation of the fume hoods before they are put in use, using only qualified personnel.
2. Perform tests after installation is complete, the building ventilation system has been balanced, all connections have been made, and written verification has been submitted that the above conditions have been met.
3. Verify that the building make-up air system is in operation, the doors and windows are in normal operating position, and that all other hoods and exhaust devices are operating at designed conditions.

4. Correct any unsafe conditions disclosed by these tests before request of test procedures.

3.03 ADJUSTING

3.04 CLEANING

3.05 PROTECTION OF FINISHED WORK

3.06 SCHEDULE

A. Fume Hood Accessory Schedule:  
Provide the following fume hoods and accessories. See drawings for quantities.  
Fume hood manufacturer - Labconco Corporation  
Fume hood model – 9840600 Protector Xstream  
Work surface 4’ x 3’ (sink cut out right rear) - 9849805  
Air flow monitor – 9743211  
Sash stop – 9724501  
Duplex GFCI receptacle kit (2 per hood) – 9851500  
Cold water gooseneck (1 per hood) – 9827900  
Cup sink (1 per hood) – 4005200  
Ceiling enclosure kit – 9852116  
Gas Service Fixture: 9808700

END OF SECTION 11 53 13

11 53 13.13 Recirculating Laboratory Fume Hoods  
11 53 16 Laboratory Incubators  
11 53 19 Laboratory Sterilizers  
11 53 23 Laboratory Refrigerators  
11 53 33 Emergency Safety Appliance  
11 53 43 Service Fittings and Accessories  
11 53 53 Biological Safety Cabinets

11 55 00 Planetarium Equipment
11 55 13 Planetarium Projectors  
11 55 16 Planetarium Pendulums

11 56 00 Observatory Equipment
11 56 13 Telescopes  
11 56 16 Telescope Mounts  
11 56 19 Telescope Drive Mechanisms
11 56 23 Telescope Domes

11 57 00 Vocational Shop Equipment

11 59 00 Exhibit Equipment

11 60 00 ENTERTAINMENT EQUIPMENT

11 61 00 Theater and Stage Equipment
   11 61 13 Acoustical Shells
   11 61 23 Folding and Portable Stages
   11 61 33 Rigging Systems and Controls
   11 61 43 Stage Curtains

11 62 00 Musical Equipment
   11 62 13 Bells
   11 62 16 Carillons
   11 62 19 Organs

11 65 00 ATHLETIC AND RECREATIONAL EQUIPMENT

11 66 00 Athletic Equipment
   11 66 13 Exercise Equipment
   11 66 23 Gymnasium Equipment
      11 66 23.13 Basketball Equipment
      11 66 23.23 Volleyball Equipment
      11 66 23.33 Interior Tennis Equipment
      11 66 23.43 Interior Track and Field Equipment
      11 66 23.53 Wall Padding
      11 66 23.56 Mat Storage
   11 66 43 Interior Scoreboards
   11 66 53 Gymnasium Dividers
      11 66 53.13 Batting/Golf Cages

11 67 00 Recreational Equipment
   11 67 13 Bowling Alley Equipment
   11 67 23 Shooting Range Equipment
   11 67 33 Climbing Walls
   11 67 43 Table Games Equipment
      11 67 43.13 Pool Tables
      11 67 43.23 Ping-Pong Tables
   11 67 53 Game Room Equipment
      11 67 53.13 Video Games
      11 67 53.23 Pinball Machines

11 68 00 Play Field Equipment and Structures
   11 68 13 Playground Equipment
   11 68 16 Play Structures
11 68 23 Exterior Court Athletic Equipment
   11 68 23.13 Exterior Basketball Equipment
   11 68 23.23 Exterior Volleyball Equipment
   11 68.23.33 Tennis Equipment
11 68 33 Athletic Field Equipment
   11 68 33.13 Football Field Equipment
   11 68 33.23 Soccer and Field Hockey Equipment
   11 68 33.33 Baseball Field Equipment
   11 68 33.43 Track and Field Equipment
11 68 43 Exterior Scoreboards

11 70 00 HEALTHCARE EQUIPMENT
11 71 00 Medical Sterilizing Equipment

11 72 00 Examination and Treatment Equipment
11 72 13 Examination Equipment
11 72 53 Treatment Equipment

11 73 00 Patient Care

11 74 00 Dental Equipment

11 75 00 Optical Equipment

11 76 00 Operating Room Equipment

11 77 00 Radiology Equipment

11 78 00 Mortuary Equipment
11 78 13 Mortuary Refrigerators
11 78 16 Crematorium Equipment
11 78 19 Mortuary Lifts

11 79 00 Therapy Equipment

11 80 00 COLLECTION AND DISPOSAL EQUIPMENT

11 82 00 Solid Waste Handling Equipment
11 82 13 Solid Waste Bins
11 82 19 Packaged Incinerators
11 82 23 Recycling Equipment
11 82 26 Waste Compactors and Destructors
11 82 29 Composting Equipment

11 90 00 OTHER EQUIPMENT
11 91 00 Religious Equipment
11 91 13 Baptisteries
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