TO: Regent Cowell  
Facilities and Land Management Committee Chair  

THROUGH: Kit Duke  
AVP Facilities and Land Management  

THROUGH: Michael Ciri  
Interim Vice Chancellor  

THROUGH: Keith Gerken  
Director Facilities Services  

FROM: Ke Mell  
Project Manager  

DATE: April 18, 2014  

SUBJECT: Project Type: R&R  
Project Name: UAS Technical Education Center Renewal, Phase I  
Project No.: 2013-02  

Cc: John Pugh  
Richard Caufield  

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Total Project Cost $1,500,000  
Approval Level: FLMC Chair  

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SCHEMATIC DESIGN APPROVAL REQUEST
SCHEMATIC DESIGN APPROVAL

Name of Project: UAS Technical Education Center Renewal, Phase I
Project Type: Renewal and Replacement
Location of Project: UAS, Juneau Campus, Technical Education Center and Welding Lab, Juneau
Project Number: 2013-02
Date of Request: April 15, 2014

| Total Project Cost: | $4,620,000          | $1,500,000 (This Phase) |
| Approval Required: | FLMC Chair          |
| Prior Approvals:   | Preliminary Administrative Approval June 2012
                   | Formal Project Approval December 12, 2013 |

A Schematic Design Approval (SDA) is required for all Capital Projects with a Total Project Cost in excess of $250,000.

SDA represents approval of the location of the facility, its relationship to other facilities, the functional relationship of interior areas, the basic design including construction materials, mechanical, electrical, technology infrastructure and telecommunications systems, and any other changes to the project since formal project approval. Unless otherwise designated by the approval authority or a material change in the project is subsequently identified, SDA also represents approval of the proposed cost of the next phases of the project and authorization to complete the design development process, to bid and award a contract within the approved budget, and to proceed to completion of project construction. Provided however, if a material change in the project is subsequently identified, such change will be subject to the approval process.

**Action Requested**
The Chair of the Facilities and Land Management Committee approves the Schematic Design Approval request for the University of Alaska Southeast Technical Education Center Renewal, Phase I as presented in compliance with the campus master plan, and authorizes the university administration to complete construction bid documents to bid and award a contract within the approved budget, and to proceed to completion of project construction not to exceed a Total Project Cost of $1,500,000.

**Project Abstract**
The Technical Education Center Renewal, Phase I, is the first year of a multi-year project of building upgrades to the Technical Education Center and the Welding Lab. Academic programs and curriculum have changed significantly since the Technical Education Center and Welding Lab were put into service in 1984 and 1981 respectively. As a consequence, current programs are not well supported. The Technical Education Center received additions in 1985 and 1992, but neither building has had a major remodel since then. Mechanical and electrical systems in both buildings are largely original. This project began as an expansion of the current diesel technology lab and the project scope has expanded based on the conceptual planning process over the last year.
RATIONALE AND REASONING

Background
The project is phased: 1) to fit within available funds and 2) so that the work can be done during the summer break as the programs have no alternative locations to teach in during the academic year.

Programmatic Need
The Power Technology Program has had a waiting list for many years. Program capacity is limited by the available lab space. Phase I will improve and expand lab space to accommodate 50% more students, removing that constraint on program capacity. Some wood shop equipment used by the Construction Technology Program is unnecessary and can be removed. Reducing the area occupied by wood shop equipment will free up space for classrooms needed in tandem with lab space in accordance with current teaching practices.

Project Scope
In Phase I, the Power Technology Program will receive upgraded space, configured to meet current program requirements. The Center for Mine Training will receive an exhaust system so that generators can be run with the overhead door closed. Failing building equipment and up to 10 existing overhead doors with poor thermal properties will be replaced. Construction Technology Program equipment will be relocated. Phase I prepares for but does not require future phases.

Future phases include replacement of additional building equipment systems and components that are nearing the end of their service lives, upgrading building common areas, and upgrading additional program spaces.

Based on the current level of funding and the current construction cost estimate, the scope for this phase would be the base bid plus additive alternate #1. See plan A004.

Project Impacts
Conceptual and schematic design for all phases is complete. Project phasing is tailored to minimize impacts on academic programs. All programs will remain in TEC at full capacity throughout the project. Each phase will be self-contained, though building on previous phases.

Variances
None.

Total Project Cost and Funding Sources

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<tr>
<th>Funding Title</th>
<th>Fund Account</th>
<th>Amount</th>
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<tbody>
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<td>Phase I Funding</td>
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<td>2013 R&amp;R capital</td>
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<tr>
<td>Phase 1 Project Cost</td>
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Annual Program and Facility Cost Projections

Program Costs
Salaries and benefits for new program Staff and Faculty unchanged
Program Operational Costs unchanged

Total Annual Program Cost Increase unchanged

Facilities Costs:
Maintenance & Repair unchanged
Operations unchanged
Annual O&M Cost will be reduced
Total Annual Cost Projections will be reduced

Project Schedule – Phase 1

DESIGN
  Conceptual Design September, 2013
  Formal Project Approval December, 2013
  Schematic Design, Phase I February, 2014
  Schematic Design Approval, Phase I April, 2014
  Construction Documents, Phase I May, 2014

BID & AWARD - Phase 1
  Advertise and Bid May, 2014
  Construction Contract Award May, 2014

CONSTRUCTION
  Start of Construction June, 2014
  Construction Complete August, 2014
  Date of Beneficial Occupancy August, 2014
  Warranty Period One year

Project Delivery Method
Design-Bid-Build

Supporting Documents
  One-page Project Budget
  Design Narrative Document
  Drawings
    Floor Plans

Affirmation
This project complies with Regents Policy, the campus master plan, and the Project Agreement.
Approvals
The level of approval required for SDA shall be based upon the estimated TPC as follows:

- TPC > $4.0 million will require approval by the board based on the recommendations of the Facilities and Land Management Committee (FLMC).
- TPC > $2.0 million but not more than $4.0 million will require approval by the FLMC.
- TPC > $1.0 million but not more than $2.0 million will require approval by the Chair of the FLMC.
- TPC ≤ $1.0 million will require approval by the AVP of Facilities and Land Management.

Recommends Approval:

[Signature]

Kit Duke, AVP F&LM

Date: 4.23.14

Schematic Design Approval is hereby granted:

[Signature]

Fuller A. Cowell, Chair FLMC

Date: May 4, 2014

This Approval is subject to the following provisions:
### UNIVERSITY OF ALASKA

#### Project Name: Technical Education Center Renewal

**MAU:** UAS  
**Building:** Technical Education Center  
**Project #:** 2013-02  
**Acct #:** 563138  
**Date:** 4/14/2014  
**Prepared by:** Ke Mell  
**Total GSF Affected by Project, Phase I:** 7,296

### PROJECT BUDGET

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<th><strong>FPA Budget</strong></th>
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<td><strong>Consult: Extra Services, Energy Analysis, All Phases</strong></td>
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<td><strong>Site Survey</strong></td>
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<td><strong>Other: Pdf scans of original building drawings</strong></td>
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| **Construction Cost per GSF** | 163 | 141 |

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<th><strong>C. Building Completion Activity</strong></th>
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<td><strong>Move-Out Costs</strong></td>
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<td><strong>Move-In Costs</strong></td>
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<tr>
<td><strong>Art</strong></td>
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<td><strong>Other (Interim Space Needs or Temp Reloc. Costs)</strong></td>
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<td><strong>OIT Support</strong></td>
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<td><strong>Maintenance Operation Support</strong></td>
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<th><strong>FPA Budget</strong></th>
<th><strong>SDA Budget</strong></th>
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<tbody>
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<td><strong>Project Pnng, Staff Support</strong></td>
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<td><strong>Project Management</strong></td>
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<th><strong>FPA Budget</strong></th>
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<td><strong>Total Appropriation(s)</strong></td>
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UAS
Technical Education Center Renewal
Design Development Narrative

Jensen Yorba Lott, Inc.

March 24, 2014
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## NARRATIVE

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<tbody>
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<td>Architectural</td>
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<tr>
<td>Mechanical</td>
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<tr>
<td>Electrical</td>
<td>14</td>
</tr>
<tr>
<td>Mechanical Calculations</td>
<td>18</td>
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</table>
GENERAL PROJECT DESCRIPTION:
The UAS Technical Education Center is comprised of two existing facilities in downtown Juneau, the Technical Center and the Welding Lab. Both are slated to undergo renovation over the span of several years, pending funding. The buildings serve the vocational education program for UAS consisting of Power Diesel Mechanic Training, Mine Training, Welding, Construction Technology and Marine Highway Education. The facility is also used by local mine companies for safety training and refresher courses. The Technical Center is a two story structure of 27,637 gsf on the first floor and 8,861 gsf on the second floor for a total building area of 36,498gsf. The Welding lab is a two story structure with 5,163 gsf on the first floor and 727 gsf on the second floor for a total building area of 5,890 gsf.

PHASING & SCHEDULE
The project has been divided into 4 phases.
This Design Development submittal addresses only phase 1 work. Phase 1 is scheduled to start construction May 2014 with completion by the end of August 2014. Certain designated portions of work may be allowed to be completed after the August deadline.

BUDGET
Funding available for phase one construction is approximately $1,000,000.
The scope of the base bid work is estimated to cost $740,000. Four bid alternates have been identified to enable maximum award for the funds available.
Alternate 1: Construction Technology Shop renovation and adjacent Power Technology Class are slated for construction including relocation and installation of existing shop equipment.
Alternate 2: Replacement of the facility motor control center and fan motors.
Alternate 3: Replacement of exterior overhead doors.
Alternate 4: Installation of an exhaust fan to exhaust fumes from operation of the generator sets used for teaching in the power technology program.
Phase one base bid and alternates are identified graphically on sheet A03 which shows existing areas impacted and A04 which shows the new configuration.

COMPLIANCE CRITERIA:
Code Data 2009 IBC:
The Technology Center occupancy classification is E & S1.
We have assumed an E occupancy because the building is used by the high school. If the facility was used only by the University it could be classed as a B occupancy. Because the building has an automatic sprinkler system there is little impact to areas or fire separation if classed as an E rather than a B.
Construction type V B full automatic sprinkler system.
The buildings are being designed under section 508.3 non separated uses which allows no separation between E and S1 occupancy.
Table 508.3
Technical Education Center
Allowable area S1/VB 9,000 sf per floor one story 40’ (Most restrictive) Design is based on this use.
Allowable area E/VB 9,500 sf per floor one story 40’
Allowable area increase 504.2 Automatic Sprinkler system 2 stories 60’
Allowable are increase 506.2 Frontage W=30’ minimum F=P If=.75
Allowable area increase 506.3 Is=2 Automatic Sprinkler System
Allowable area Aa= 35,625 gsf

Actual area 27,637 sf
Actual Height 2 stories 38’-6”

Technical Education Center
Table 601 Fire resistant rating requirements for building elements: 0 hours for all components except exterior non bearing walls.
1 hour 5’-10’
0 hour >10’
There is no exterior wall closer than 5’ to the property line.

Table 508.2.5 Incidental accessory occupancies
Furnace Room equipment >400,000 BTU/hour: Sprinkler & smoke partition 508.2.5.2
Paint shop( not in scope of phase 1): 1 hour and sprinkler
Vocational Shops (in E occupancy): Sprinkler & smoke partition 508.2.5.2

The following describes specific components of the project by discipline:

ARCHITECTURAL
See key notes, finish schedule and floor plans for description of work. Products listed are “Basis of Design” and are not intended to indicate proprietary specification.

TECHNICAL EDUCATION CENTER

EXTERIOR CONSTRUCTION

Exterior walls: Existing exterior walls will remain. Where one exterior door is slated to be removed, metal insulated metal siding will be installed to match existing. Existing walls are constructed of 2” insulated metal siding fastened to 9/16” hat channels which are attached to 3 5/8” metal studs. The metal studs are attached to steel roof beams and wall girts.

Exterior Wall Openings:
Existing windows and doors are slated to remain except the over head doors. The doors vary in size and will be included in the project as a bid alternate to be bid as a unit price per door. Three unit prices are required for the three different size doors to be replaced.

Overhead Doors: Existing overhead doors will be replaced with insulated doors, Overhead Door Thermacore thermal break R 26 insulated exterior sectional door.
• Phase 1 alternate 3: Install new door and frame for Mining Entry.
Roof:
No roof work will occur in phase 1.

Floor Construction:
The existing first floor is constructed of 5” concrete slab on grade. The pit area in the high bay will be filled and a concrete slab placed level with the existing floor. Concrete floors will require patching where piping and other items that penetrate the floor are removed. All slabs slated to be left exposed will receive concrete sealer.

INTERIOR CONSTRUCTION
Flooring: In the phase one areas there is no existing finish flooring. All areas impacted are exposed concrete. New walls are slated to receive base.

Floor Base: Rubber floor base with standard toe. Roppe

Partitions: Interior partitions will be constructed of metal studs with batt insulation and 5/8” type x gypsum drywall each side. Partitions will extend from floor to underside of floor/roof deck with perimeter and all penetrations sealed where smoke rated construction is required. Partitions will receive semi gloss paint.

Wainscot: Wainscots for vocational classrooms will consist of ½” plywood extending 8’ up the wall. The plywood will be “A” faced and stained. Joints will be butted.

Ceilings: New ceilings where they occur (hall 121) will be suspended acoustical ceiling. All other ceilings will match existing ceilings. In the high bay area under the mechanical room an existing perforated metal panel ceiling in a 2’x4’ grid will be matched. Other areas have 2” thick 4’x4’ acoustical ceilings fastened to the roof deck. These ceilings will be cut and patched to match where new walls occur.

Cabinets & Counters: Cabinets will be plastic laminate faced plywood with premium grade plastic laminate on exposed surfaces and melamine interiors. Counters will be plastic laminate on plywood.

Interior Doors: Interior doors will have painted hollow metal frames. Doors will be painted hollow metal doors. Ceco Door

Signage: Rooms signs will be provided at each door with room numbers, room name and both raised text and braille. Signs will be fabricated of moisture resistant photopolymer.

Toilet Compartments: None.
Toilet Accessories: None.

Appliances: None

Specialties: Visual display boards will be provided for each classroom. Claridge Series 5

Equipment: Heavy duty steel shelving will be installed in the high bay area.

LANDSCAPE
None.

CIVIL
None.
STRUCTURAL
None.

MECHANICAL

DIVISION 22 & 23 - MECHANICAL SYSTEMS
Work will consist of renovating the mechanical systems of the UAS Technical Education Center for phase 1 of a multi-phase renovation (phase 1-4). The mechanical design narrative is organized according to base bid work and four alternates as selected by the Owner. Select mechanical system upgrades are slated to be completed under each portion of work described. See end of report for summary of existing systems.

The BASE BID scope of work consists of: reconfiguration of supply and return air ductwork and compressed air piping in the new 110-Power Tech Lab layout; installation of new return air and motor fume exhaust ductwork for 110-Power Tech Lab; removal of abandoned exhaust air ductwork routed through the 110-Power Tech Lab area connected to EF-2A; removal of exhaust air ductwork from the 109D-Auto Service Area; installation of new general duty exhaust fan EF-5 and ductwork and a self-contained eyewash station in 116-High Bay area; installation of new motor fume exhaust fan MFEF-3 in 200U1-Mechanical room and ductwork in 116-High Bay; reconfiguration of SF-2 return air duct in mechanical room and cleaning of all related SF-2 supply and return air duct systems; installation of new and relocated compressed air hose reels in 116-High Bay; and removal of exhaust fan EF-2B and all connected ductwork from existing 133-Battery room.

The ALTERNATE 1 scope of work consists of: reconfiguration of the saw dust collection system ductwork in the new 120-Construction Tech and 121-Hall Areas; and reconfiguration of the supply and return air ductwork in new 119-Power Tech Class area.

The ALTERNATE 2 scope of work consists of: replacement of fan motors SF-1, RF-1, SF-2, RF-2A, RF-2B, RF-2C with premium efficiency motors; installation of new fan motor fume exhaust fan MFEF-3; and replacement of fan MFEF-2B with MFEF-5 in 200U1-Mechanical room.

The ALTERNATE 3 scope of work is part of architectural. No mechanical work.

The ALTERNATE 4 scope of work consists of the installation of a generator motor fume exhaust fan MFE-4 in the new 130-Heavy Equipment Simulator room.

DESIGN CRITERIA
The mechanical systems will be designed and constructed in accordance with the following codes:

- 2009 International Building Code
- 2009 International Mechanical Code
- 2009 Uniform Plumbing Code
- 2009 International Fire Code
- National Fire Protection Association
- ASHRAE – American Society of Heating, Refrigeration, and Air-conditioning Engineers
- City and Borough of Juneau Code Modifications
- ACGIH (IV) – American Conference of Governmental Industrial Hygienists; 2010.
Ductwork:
Ventilation ductwork shall be designed and constructed to SMACNA HVAC Duct Construction Standards. Ductwork shall be galvanized steel duct ASTM A525 and ASTM A527 having G60 zinc coating in conformance with ASTM A90. All joints will be sealed with water based mastic type duct joint sealers. Ductwork from exterior penetration to 10 feet from exterior shall be insulated with 1-1/2 inch mineral fiber insulation duct insulation with vapor barrier. All supply ductwork is to be insulated.

Vehicle exhaust ductwork shall be designed and constructed to SMACNA HVAC Duct Construction Standards. Ductwork shall be steel duct ASTM ASTM A527 having G60 zinc coating in conformance with ASTM A90. Temperature rating is 500° F with no breakdown of zinc - Zinc melting point is 740° F. All joints will be sealed with UL listed vinyl acrylic or copolymer based type duct sealers.

Sawdust collection ductwork shall be designed and constructed to SMACNA HVAC Duct Construction Standards and designed for use with a sawdust collection system. Ductwork shall be galvanized steel duct ASTM A525 and ASTM A527 having G60 zinc coating in conformance with ASTM A90. Duct joints shall be a flanged, tool-free, clamp-together type system similar to Nordfab. Each equipment drop is to have its own blast gate shut-off.

Sprinkler Piping:
Sprinkler piping material shall be Steel Pipe ASTM a795 Schedule 10 or ASMT A53 Schedule 40 black. Fittings ASME B16.9, wrought steel butt welded or ASME B16.11, forged steel socket welded and threaded.

SCOPE OF MECHANICAL WORK

PHASE 1 – BASE BID – DEMOLITION:
VENTILATION – SUPPLY/RETURN SYSTEMS:
- Remove EF-2A ductwork: Remove approximately 160-feet of abandoned 14-inch EA ductwork located in the 1st floor ceiling space as part of the EF-2A exhaust fan system that once served the Engine Cleaning 112 area.
- Remove SF-2 ductwork: Remove approximately 20-feet of 12x12 SA ductwork serving the Diesel & Marine Electrical 114 area. Remove approximately 20-feet of 10x10 RA ductwork serving the Diesel & Marine Electrical 114 and Future Control 115 areas. Remove (2) SA grilles and (3) RA grilles. Remove approximately 50-feet of 48x30 RA ductwork and RAD-2A serving the SF-2 fan system in the mechanical room and cap remaining ductwork ends (SF-2 duct system to be revised to full-outside-air system per IMC 2009 403.2.1.3 requirements prohibiting recirculation of air in a garage repair area).
- Remove SF-3 ductwork: Remove approximately 100-feet of 10x10 SA ductwork and (4) supply grilles. Remove approximately 50-feet of 34x18 EA ductwork with (2) return air grilles all serving the existing Marine Carpentry & Wood Shop 120 area.

VENTILATION – EXHAUST SYSTEMS:
PLUMBING – SPECIAL PIPING:
- Relocate hose reels and remove air piping: Remove approximately (50) feet of ³⁄₄-inch air piping and remove and store (5) hose reels and associated branch piping located in the Diesel & Marine Electrical 114 area. Store hose reels for reinstallation.

PLUMBING – SPRINKLER PIPING:
- Modify sprinkler system: Sprinkler heads and branch piping will need to be renovated to match the new layout. Minor modifications to existing system will be required to ensure coverage of the remodeled areas.

PHASE 1 – BASE BID – NEW WORK:
VENTILATION – SUPPLY/RETURN SYSTEMS:
- Install SF-2 ductwork: Install approximately 90-feet of 12x12 SA ductwork with (2) supply grilles. Install approximately 70-feet of 14x12 EA ductwork with (2) exhaust grilles all to serve new Power Tech Lab 110 layout as shown on architectural. See schedule on mechanical drawings for grille sizes.
- Install SF-3 ductwork: Install approximately 60-feet of 12x12 SA ductwork with (4) supply grilles serving the Power Tech Classroom 119 area. Install approximately 120-feet of 18x18 RA ductwork with (2) exhaust grilles serving new Power Tech Classroom 119. Install approximately 100-feet of 18x18 RA ductwork with (2) exhaust grilles serving the new layout adjacent to both the new Hall 121 and existing Heavy Equipment Simulator 130 areas as shown on architectural. See schedule on mechanical drawings for grille sizes.
- Install EF-5 fan and ductwork: Install new general duty exhaust fan EF-5 on exterior West wall of new Paint Spray Booth 118. Install approximately 120-feet of 12-inch diameter EA ductwork with (2) EA grilles in the ceiling space to serve general use for High Bay Workspace/Storage 116. Fan to be controlled by wall switch.
- Install MFEF-3 fan and ductwork: Install new motor fume exhaust fan MFEF-3 in Mechanical Room 219. Install approximately 80-feet of 6-inch diameter EA ductwork along with (4) equipment drops with 15-feet of 4-inch retractable flexible duct for each drop. New exhaust system is to serve the new High Bay 116 area.
- Duct cleaning: Clean interior of all supply/return ducts, and all diffusers/grilles in project area only for the first floor. Clean interior of SF-2 fan system and interior of all SF-2 related supply/return ducts in the mechanical room.

PLUMBING – DOMESTIC PLUMBING:
- Install emergency eyewash station: Install new self-contained, wall mounted, emergency eye wash station in new 116-High Bay.

PLUMBING – SPRINKLER PIPING:
- Revise sprinkler piping: Sprinkler designer is to verify that all areas are up to current code and configuration. Assume adding (5) sprinkler heads along moved wall to connecting branch piping for this new work in the 116-High Bay and replacing approximately (45) sprinkler heads throughout the renovated area with upright pendent type, glass bulb type, sprinkler heads in existing sprinkler piping.
**CONTROLS:**

- **Install DDC controls:** Upgrade respective fan system controls and room thermostats.

**PHASE 1 BASE BID FAN SCHEDULE**

1. EF-5 2800 cfm 1 hp/480V/1 ph
2. MFEF-3 1600 cfm 5 hp/480V/3ph, Explosion Proof
3. MFEF-5 1200 cfm 5 hp/480V/3ph, Explosion Proof

**PHASE 1 – ALTERNATE 1 – DEMOLITION:**

- **VENTILATION – EXHAUST SYSTEMS:**
  - Remove EF-3 fan: Remove utility exhaust fan EF-3 located in Mechanical Room 219. Remove approximately 50-feet of existing EA and (2) EA grilles located in Plastics Shop 122.
  - Remove dust collector ductwork: Remove approximately 250-feet of EA ductwork and drops for (8) pieces of equipment located in the Carpentry/Wood Shop 125 area.

- **PLUMBING – SPRINKLER PIPING:**
  - Modify sprinkler system: Sprinkler heads and branch piping will need to be renovated to match the new layout. Minor modifications to existing system will be required to ensure coverage of the remodeled areas.

**PHASE 1 – ALTERNATE 1 – NEW WORK:**

- **VENTILATION – SUPPLY/RETURN SYSTEMS:**
  - Revise dust collector ductwork: Revise EA ductwork for (10) pieces of equipment located in the new Construction Tech 120 area. Install approximately 230-feet of new EA ductwork in ceiling space with (11) equipment drops for each equipment station and (2) drops for floor sweeps. Provide flexible connections approximately 8-feet for piece of equipment. Average of 4-inches for each drop.
  - **Fan and duct cleaning:** Clean interior of all fans, all exhaust ducts, and all diffusers/grilles in project area only.

- **PLUMBING – SPRINKLER PIPING:**
  - Revise sprinkler piping: Sprinkler designer is to verify that all areas are up to current code and configuration. Replace approximately (40) sprinkler heads throughout the renovated area with upright pendent type, glass bulb type, sprinkler heads in existing sprinkler piping.

**PHASE 1 – ALTERNATE 2 – DEMOLITION:**

- **VENTILATION – SUPPLY/RETURN SYSTEMS:**
  - Remove SF-1, RF-1 fan motors: Remove supply fan SF-1 and return fan RF-1 motors in Mechanical Room 219. Ventilation system has (7) dual plenum heating zones to remain existing in this phase.
• Remove dampers and actuators: Remove (18) control dampers and actuators: The majority of the ductwork is to remain unmodified.

- Remove SF-3, RF-3A, RF-3B fan motors: Remove supply fan SF-3 and return fan RF3A & RF-3B motors in Mechanical Room 219. Ventilation system has (2) dual plenum heating zones. The ductwork routing is to remain unmodified.
- Remove dampers and actuators: Remove (4) control dampers and actuators.
- Refurbish air handling unit: Refurbishment to include the following: Replace air handling unit bearings (acceptable bearing manufacturers Timken, Fafnir, SKF); replace air handling unit fan /motor sheaves (acceptable sheave manufacturers Browning, Woods, Maurey ); replace fan belts; clean all dirt from individual fan blades; clean all dirt and grease from fan housing and interior of AHU plenum; clean interior of ductwork; clean diffusers.
- Duct cleaning: Clean interior of all supply/return ducts, and all diffusers/grilles in project area only.

VENTILATION – EXHAUST SYSTEMS:
- Remove EF-2A ductwork: Disconnect 14-inch diameter EA ductwork connected to exhaust fan EF-2A located in Mechanical Room 219. Remove approximately 30-feet of EA ductwork serving Engine Cleaning 112.
- Remove MFEF-2B fan: Remove motor fume exhaust fan MFEF-2B. Existing ductwork is to remain at the Diesel & Marine Electrical 114 area. Disconnect and abandon 7-inch diameter ductwork connected to MFEF-2B in Mechanical Room 219 and serving Small Engines 133.

PLUMBING – SPRINKLER PIPING:
- Modify sprinkler system: Sprinkler heads and branch piping will need to be renovated to match the new layout. Minor modifications to existing system will be required to ensure coverage of the new areas.

PHASE 1 – ALTERNATE 2 – NEW WORK:
VENTILATION – SUPPLY/RETURN SYSTEMS:
- Install SF-1, RF-1 fan motors: Replace supply fan SF-1 and return fan RF-1 motors in Mechanical Room 219 with premium efficiency motors. See schedule below for all fan specifications.
  - Replace dampers and actuators: Replace (18) control dampers and actuators.
- Replace SF-3, RF-3A, RF-3B fan motors: Replace supply fan SF-3 and return fan RF3A & RF-3B motors in Mechanical Room 219 with premium efficiency motors.
  - Replace dampers and actuators: Replace (4) control dampers and actuators.
- Refurbish air handling unit: Refurbishment to include the following: Replace air handling unit bearings (acceptable bearing manufacturers Timken, Fafnir, SKF); replace air handling unit fan /motor sheaves (acceptable sheave manufacturers Browning, Woods, Maurey ); replace fan belts; clean all dirt from individual fan scroll blades; clean all dirt and grease from fan housing and interior of AHU plenum; clean interior of ductwork; clean diffusers.
- Duct cleaning: Clean interior of all supply/return ducts, and all diffusers/grilles in project area.
**VENTILATION – EXHAUST SYSTEMS:**
- Install RF-2D return fan and ductwork: Install new return fan RF-2D in Mechanical Room 219 and connected SF-2 RA ductwork with approximately 20-feet of 18x12 duct. Reroute ductwork to serve new Power Tech Lab 110 with a new 18x18 RA grille.
- Install MFEF-4 fan, ductwork, and equipment drops: Install new motor fume exhaust fan MFEF-4 in Mechanical Room 219. Install approximately 80-feet of 7-inch diameter EA ductwork as part of the exhaust system. Install (3) new equipment drops with approximately 15-feet of retractable 4-inch flexible duct each in the new Power Tech Lab 110.
- Install MFEF-5 fan: Install new motor fume exhaust fan MFEF-5 in Mechanical Room 219 to replace existing fan MFEF-2B. Connect to existing ductwork.
- **Fan and duct cleaning:** Clean interior of all fans, all exhaust ducts, and all diffusers/grilles.

**PLUMBING – DUCT:**
- Install sprinkler piping: Sprinkler designer is to verify that all areas are up to current code and configuration. Replace approximately (22) sprinkler heads throughout the renovated area with upright pendent type, glass bulb type, sprinkler heads in existing sprinkler piping.

**PLUMBING – SPECIAL PIPING:**
- Install compressed air hose reels: Add (3) air hose reels to High Bay area. Connect to existing air piping.

**PHASE 1 ALTERNATE 2 MOTOR REPLACEMENT SCHEDULE**

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>SF-1</td>
<td>5225 cfm 3 hp/480V/3ph</td>
</tr>
<tr>
<td>2.</td>
<td>RF-1</td>
<td>4250 cfm 1.5 hp/480V/3 ph</td>
</tr>
<tr>
<td>3.</td>
<td>SF-2</td>
<td>12600 cfm 7.5 hp/480V/3ph</td>
</tr>
<tr>
<td>4.</td>
<td>RF-2A</td>
<td>7500 cfm 3 hp/480V/3ph</td>
</tr>
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<td>5.</td>
<td>RF-2B</td>
<td>2200 cfm ¼ hp/480V/3ph</td>
</tr>
<tr>
<td>6.</td>
<td>RF-2C</td>
<td>1000 cfm ¼ hp/120V/1ph</td>
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<tr>
<td>7.</td>
<td>RF-2D</td>
<td>1000 cfm ½ hp/120V/1ph</td>
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<tr>
<td>8.</td>
<td>SF-3</td>
<td>8250 cfm 5 hp/480V/3ph</td>
</tr>
<tr>
<td>9.</td>
<td>RF-3A</td>
<td>5500 cfm 1.5 hp/480V/3ph</td>
</tr>
<tr>
<td>10.</td>
<td>RF-3B</td>
<td>2200 cfm ¾ hp/480V/3ph</td>
</tr>
<tr>
<td>11.</td>
<td>EF-2A</td>
<td>1380 cfm ½ hp/120V/1ph</td>
</tr>
<tr>
<td>12.</td>
<td>EF-2B</td>
<td>150 cfm ¼ hp/120V/1ph, Explosion Proof</td>
</tr>
</tbody>
</table>

*Note: Replacement motors listed above are to be premium efficiency type.*

**PHASE 1 – ALTERNATE 4 – DEMOLITION:**

**VENTILATION – SUPPLY/RETURN SYSTEMS:**
- **Duct cleaning:** Clean all diffusers/grilles in project area.

**PHASE 1 – ALTERNATE 4 – NEW WORK:**

**VENTILATION – EXHAUST SYSTEMS:**
- Install MFEF-4 fan and ductwork: Install new motor fume exhaust fan MFEF-4 in new Heavy Equipment/Simulator 130 ceiling space. Install approximately 20-feet of 8-inch diameter EA
ductwork, (3) equipment drops, and approximately 15-feet of retractable 4-inch flexible duct each. Install new 24x24 exhaust grille on exterior West wall of Room 130.

PHASE 1 ALTERNATE 4 EQUIPMENT SCHEDULE
1. MEFE-4 1200 cfm 1 hp/480V/3ph, Explosion Proof

SUMMARY OF EXISTING SYSTEMS (for reference only)
The UAS Marine Technical Center Building is currently ventilated by (3) supply fans and (3) return fan units serve the different use areas of the building. A sawdust collection system serves the equipment and floor sweeps in the wood shop construction tech area. Three different exhaust fans serve the vehicle exhaust, and small engine parts are in the Automotive Shop. Toilet rooms are exhausted from central exhaust fan systems. An air compressor in the fan room serves compressed air to outlets throughout the automotive shop.

VENTILATION – SUPPLY/RETURN/EXHAUST FAN SYSTEMS:
- SF-1 supply fan is utility type fan located in Mechanical Room 219, and configured as a dual plenum (hot deck/mixed Air) ventilation system with (7) zones and serves the second floor ventilation and heating needs. Zone (1) serves the outside offices of the second floor. Zone (1) also has perimeter supplemental convector heating.
- SF-2 supply fan is a cabinet fan located in Mechanical Room 219 and supplies ventilation and heating air to the east half of the first floor areas. SF-2 is configured as a dual plenum (hot deck/mixed air) ventilation system with (9) zones. The zones are controlled by room thermostats modulating duct zone dampers. The SF-2 area is also served by (3) return fans, (2) exhaust fans, and (2) motor vehicle exhaust fans. The three return fans serve areas only within the proposed project upgrade areas.
- SF-3 supply fan is a cabinet fan located in the Mechanical Room 219, and supplies ventilation and heating air to the existing Wood Storage 117, Project Storage 118, Carpentry/Wood Shop 120, Plastics Shop 122, and is configured as a dual plenum (hot deck/mixed air) ventilation system with (2) zones. SF-3 ventilation system serves the area located in the midst of the proposed remodel areas. The zones are controlled by room thermostats modulating duct zone dampers. The SF-3 areas are served by (2) return fan systems, RF-3A and RF-3B, and are both utility sets located in Mechanical Room 219. Both return air fan systems are filtered and can continue to serve the remodel areas.
- RF-1 return fan is a utility type fan located in Mechanical Room 219 and serves the second floor spaces.
- RF-2A return fan located in Mechanical Room 219 serves the first floor offices, Small Engines 133, Loading 126, and Diesel & Marine Electrical 114 rooms.
- RF-2B return fan located in Mechanical Room 219 serves the Machine Shop 138.
- RF-2C return fan located in Mechanical Room 219 serves Loading 126.
- RF-3A return fan located in Mechanical Room 219 serves Wood Storage 117, Project Storage 118, Bulk Storage 119, and Marine Carpentry/Wood Shop 120.
- RF-3B return fan located in Mechanical Room 219 serves Plastics Shop 122.
- EF-1 exhaust fan serves exhaust needs for second floor janitor closet, storage, and toilet rooms. The exhaust ductwork and grilles will require complete replacement to match the proposed second floor remodel.
EF-2B exhaust fan serves the Battery Room 113.
EF-3 serves a small amount of exhaust air as part of the SF-3 system area in the Plastic Shop 122.
EF-4 serves to exhaust air from Mechanical Room 219.

MFEF-2A Motor Fume Exhaust Fan, located in Mechanical 219, serves motor fume exhaust ports in Tune-Up 107 and Service Stalls 111.
MFEF-2B Motor Fume Exhaust Fan, located in Mechanical 219, serves motor fume exhaust ports in Diesel & Marine Electrical 1114 and Small Engines 133.

EXISTING SUPPLY/RETURN/EXHAUST FAN SCHEDULE
1. SF-1 5225 cfm 3 hp/480V/3ph
2. SF-2 12600 cfm 7.5 hp/480V/3ph
3. SF-3 8250 cfm 5 hp/480V/3 ph
4. RF-1 4250 cfm 1.5 hp/480V/3 ph
5. RF-2A 7500 cfm 3 hp/480V/3ph
6. RF-2B 2200 cfm ¾ hp/408V/3ph
7. RF-2C 1000 cfm ¼ hp/120V/1ph
8. RF-3A 5500 cfm 1.5 hp/480V/3ph
9. RF-3B 2200 cfm ¾ hp/480V/3ph
10. EF-1 300 cfm ½ hp/120V/1ph
11. EF-2A 1380 cfm ½ hp/120V/1ph
12. EF-2B 150 cfm ¼ hp/120V/1ph, Explosion Proof
13. EF-3 300 cfm ¼ hp/120V/1ph
14. EF-4 1000 cfm ¼ hp/120V/1ph
15. MFEF-2A 1400 cfm 2 hp/480V/3ph, Explosion Proof
16. MFEF-2B 1100 cfm 1 hp/480V/3ph, Explosion Proof

VENTILATION – DUST COLLECTION SYSTEM:
The existing sawdust collection system is in fair condition.

Schedule of existing equipment is as follows:
1. Sawdust Collector Fan 11,000 cfm 40 HP/460V/3PH
2. Sawdust Collector Shaker ¾ HP/208V/1ph

PLUMBING – SPRINKLER PIPING:
Sprinkler protection for the first floor and second floors of the building are being provided by a wet sprinkler system for the interior of building in accordance with NFPA 13.

TEC AIR COMPRESSOR:
The original air compressor, located in Mechanical Room 219, is used extensively throughout the facility. Air compressor is in fair condition.

An additional air compressor, located in Battery Room 113, is used by the Service Stalls 111 area. Air compressor is in fair condition.

EXISTING COMPRESSED AIR EQUIPMENT SCHEDULE
TEC BUILDING CONTROLS:
The building control system was originally pneumatically controlled. In the 1990’s a partial upgrade to DDC was done that replaced room thermostats with DDC type and installed controllers for operation of systems. Much of the sensors and all valve and damper actuators were not replaced and are still pneumatic.

ELECTRICAL

Existing Systems
Utility Services and Distribution Equipment
Utility power for the Technology Center and Welding Lab originates at a pole on Egan Drive. The primary feeder is routed through a vault in the road to the Welding Lab pad mounted transformer. The Welding Lab pad mounted transformer loop feeds the Technology Center transformer. The primary feeders are in good condition. The pad mounted transformers have some surface rust on the enclosures but otherwise are in good condition.

The Technology Center pad mounted utility transformer is located on the north side of the building. The pad mounted transformer feeds a main switchboard in Electrical 108. The switchboard is rated 1000 amperes, 277/480 volt, 3-phase, 4-wire. The switchboard main circuit breaker has a 900 ampere trip rating. The switchboard feeds panelboards, a motor control center, the elevator, emergency lighting inverters, and the sawdust collector. The panelboards are typically grouped with a 277/480 volt section, dry-type transformer, and 120/208 volt section placed in the same location. Some of the transformers were remote mounted due to space limitations. All of the service and distribution equipment is from the original construction and due for replacement.

Lighting Systems
Lighting in the Technology Center consists mostly of low-bay metal halide fixtures and fluorescent fixtures in various configurations. The fluorescent fixtures utilize T12 lamps, except in the construction technology area and the power technology lab where fixtures with T8 lamps have been installed. The lighting is controlled by low voltage switches wired through relays mounted in enclosures near the panelboards. Emergency power for egress lighting is provided by a central inverter system. The lighting branch circuits are configured 277 volt.

The illumination levels in many areas are inadequate. The metal halide fixtures are failing and provide undesirable color rendering characteristics. The fluorescent fixtures are inefficient. The low voltage control system is failing. The central inverter systems appear to be operational, but the egress lighting system does not comply with current codes. Overall, the lighting systems are in poor condition and no longer maintainable.

Communications
A 50-pair outside plant telephone cable enters the Technology Center in Communications 107A. The space also houses the primary protection, termination, and cross-connect blocks. A 25-pair telephone trunk cable is routed in a 4-inch underground conduit from the Technology Center to the

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<table>
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<tr>
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<tbody>
<tr>
<td>1. AC-1</td>
<td>200 gal.</td>
<td>50HP/480V/3PH</td>
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<td>2. Air Dryer</td>
<td>1/5 HP/120V/1PH</td>
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</tr>
<tr>
<td>3. Sprinkler Compressor</td>
<td>1.5HP/460V/3PH</td>
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</table>

UAS Technical Education Center Renewal
Jensen Yorba Lott, Inc.
Welding Lab. An open data rack, located in a closet on the second floor of the Technology Center, supports data patch panels, network switches, and auxiliary components. The Technology Center was retrofitted with a voice-over-IP telephone system, likely in the last 10-years. The Technology Center lacks a reliable data infrastructure required to support current administrative and teaching technologies.

Fire Alarm
The Technology Center fire alarm system was replaced in 2011 and is in excellent condition.

Security
The main exterior doors of the Technology Center are secured with an electronic access system using proximity cards. The interior side of the doors has a push-to-exit button with an infrared sensor to automatically un-latch the door. The control panel and power supply are located in Electrical 108. The system is in working order and appears to be in good condition. We do not anticipate any work with the security system, unless system enhancements are desired by the Owner.

Electrical Improvements
Base Bid
Utility Services and Distribution Equipment
- Demolish panels H1D and L1D. Demolish associated feeders and dry-type transformer.
- Provide new panels H1D and L1D in new location as indicated.
- Provide new 150/3 circuit breaker in existing main switchboard for panel H1D feeder.

Branch Circuits
- Provide new branch circuits for all new devices and lighting. Reconnect existing loads to new panelboards as indicated.

Mechanical Equipment
- Fans RF-2B and RF-2C shall be replaced by the mechanical contractor. Coordinate reconnection to existing branch circuits.
- Provide new connections and controls for fans EF-5 and MFEF-3.

Lighting Systems
- Provide new light fixtures in Power Tech Lab 110 and High Bay Workspace 116.
- Provide low voltage control panel LCP D.

Wiring Devices
- Provide new wiring devices in Power Tech Lab 110 and High Bay Workspace 116.

Communications
- Provide new data rack with patch panel in Communications 107A. Provide backbone cable from Communications 107A to the existing second floor data rack for connection to existing network.
• Provide new data outlets as indicated. Provide 1” conduit from each data drop to Communications 107A for routing cables.

Fire Alarm
• Relocate existing initiating and notification devices to coordinate with the new space configurations. Re-connect system devices to the existing fire alarm control panel. Provide new cabling as required.

Alternate 1
Utility Services and Distribution Equipment
• Replace the main switchboard.
• Replace panels H1A, H1B, H1C, H1E, H1F, H2A, H1X, L1A, L1B, L1C, L1E, and L1F. Replace feeders and dry-type transformers.

Branch Circuits
• Provide new branch circuits for all new devices and lighting.

Mechanical Equipment
• Fan RF-3A shall be replaced by the mechanical contractor. Coordinate reconnection to existing branch circuits.
• Revise connections and control system for dust collector.

Lighting Systems
• Provide new light fixtures in Power Tech Classroom 119, Construction Tech 120, Wood Storage 125A, and Storage 129.
• Provide low voltage lighting control panel LCP E.

Wiring Devices
• Provide new wiring devices in Power Tech Classroom 119, Construction Tech 120, Wood Storage 125A, and Storage 129.
• Provide new wiring devices on the east wall of Mining Training Classroom 123.
• Re-circuit existing devices in Mining Training 123, and Heavy Equipment Simulator 130 to Panelboard L1F.

Communications
• Provide new data outlets in Power Tech Classroom 119 and Construction Tech 120. Horizontal cables shall terminate in Communications 107A.

Fire Alarm
• Relocate existing initiating and notification devices to coordinate with the new space configurations. Re-connect system devices to the existing fire alarm control panel. Provide new cabling as required.
Alternate 2

**Utility Services and Distribution Equipment**
- Replace the motor control center in Mechanical 200U1. Replace panelboard L2B and transformer L2B.

**Mechanical Equipment**
- Fan SF-1, SF-2, SF-3, RF-1, and RF-2A shall be replaced by the mechanical contractor. Coordinate reconnection to existing branch circuits.

Alternate 3

**Branch Circuits**
- The exterior overhead doors shall be replaced by the general contractor. Connect new doors to existing branch circuits. Provide connection to new control stations.

Alternate 4

**Mechanical Equipment**
- Fan RF-3B shall be replaced by the mechanical contractor. Coordinate reconnection to existing branch circuits.
- Provide new connection and controls for fans MFEF-4 and MFEF-5.

END OF NARRATIVE
### Ventilation Calculations

University of Alaska Southeast Marine Technical Education Center Renovation  
Murray & Associates, P.C.  
Robyn Robinson  
3/21/2014

**Heating Factor**  
20 [Btu/hr/ft²] estimate  
**ΔT**  
30 [°F]

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<th>NAME</th>
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<th>[Btu/hr]</th>
<th>MIN SA [cfm]</th>
<th>EXISTING SA [cfm]</th>
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Existing SA volumes exceed minimum required for heating  
All existing systems reconfigured for renovation

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<th>NAME</th>
<th>AREA [ft²]</th>
<th>EA [cfm]</th>
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<tbody>
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<td>116-HIGH BAY</td>
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IMC 403.2.1 paragraph 3 requires all air from repair garages to be exhausted and not recirculated.  
Repair Garages = 0.75 cfm/ft² per IMC 2009

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<td>MFEF-4 (130-SIMULATOR)</td>
<td>400</td>
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<td>MFEF-5 (110-POWER TECH)</td>
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