


ADDENDUM TO RFP DOCUMENTS

	ADDENDUM #01
	Project: Solano Community College District Vallejo Center HVAC Upgrade Project Project #17-009
	Date: March 30, 2017

Addendum # 01 – The following clarifications are provided based on questions received and must be added/considered when completing your submittal: Acknowledgement of receipt of this **ADDENDUM** is required in the proposal's cover letter of introduction. Please clearly note the addendum date and number.

ITEM:

ITEM NO. 1 – SECTION 00 01 15 – List of Drawings and Tables

Replace 'Section 00 01 15 – List of Drawings and Tables' with the attached. Note that Architectural Drawings have been added to the list and are attached herein.

ITEM NO. 2 – SECTION 00 73 13 – Special Conditions

Replace 'Sheet 00 73 13-7' with the attached. Revisions include the following:

- Item 9. Revise Project Manager from Karim M. Nassab to Jason Yi.
- Item 10; Bullet 1. Delete "As there is no Architect associated with the project,".
- Item 10; Bullet 6. Add "In the event of Contractor-incurred damage, Contractor will be responsible for all restoration and repairs at Contractor's sole cost."

ITEM NO. 3 – ARCHITECTURAL PLANS

See the attached Architectural plans. Additionally, see Item 1 of this addendum.

ITEM NO. 4 – PLAN SHEET M0.01 – Mechanical Schedules, Notes and Legend

Replace 'Plan Sheet M0.01' with attached revised 'Addendum – 1 Plan Sheet M0.01'. Revisions include the following:

- Added note to 'Mechanical Scope of Work' section regarding mechanical controls.

ITEM NO. 5 – MECHANICAL SPECIFICATIONS

See the attached Mechanical Specifications, including the following Sections:

- Section 230593 – Testing, Adjusting and Balancing for HVAC
- Section 230800 – Commissioning of HVAC
- Section 232300 – Refrigerant Piping
- Section 235233 – Water-Tube Boilers
- Section 238119 – Self-Contained Air-Conditioners

ITEM NO. 5 – MECHANICAL SPECIFICATIONS (con't)

- Section 238126 – Split-System Air-Conditioners
- Section 238216.11 – Hydronic Air Coils

ITEM NO. 6 – ANSWERS TO SUBMITTED QUESTIONS

QUESTION -At the SCC Vallejo Center there is an existing BACnet Building Automation System that is controlling a Cooling Tower, Boiler +HW Pumps, Lighting, Efs, Water Source Heat Pumps, CRAC Units and Split Systems. In the HVAC Upgrade they are removing all of the Water Source Heat Pumps and the Cooling Tower and installing Package DX/Hydronic Rooftop Units and Splits Systems and totally removing the Cooling Tower and Condenser Water System. We need Building Automation Control Drawings, Points Lists, and Sequence of Operation to provide a functional Building Automation System for the HVAC Upgrade Project. Also request direction be provided to the Mechanical Contractors to include a Delta Controls Building Automation System on the new HVAC equipment they are installing. If you would like the Delta Controls Contractor to perform this project as a Design Build Controls project where the controls contractor provide the Controls Drawings, Points List, and Sequence of Operation please instruct us to do this.

ANSWER - The Mechanical Scope of Work on the Mechanical Title sheet has been modified to "ALL MECHANICAL CONTROLS SHALL BE BY DELTA AND SHALL BE FULLY INTERFACED WITH THE DISTRICT'S EXISTING BMS SYSTEM AND MATCH ALL CURRENT DISTRICT GRAPHIC TEMPLATES. CONTRACTOR IS NOT REMOVE ANY CONTROLS WIRING AND/OR CONDUIT UNLESS DIRECTED TO BY DESIGN-BUILD CONTROLS CONTRACTOR. "

LIST OF DRAWINGS AND TABLES

<u>SHEET NUMBER</u>	<u>DESCRIPTION</u>
S1.1	GENERAL NOTES AND ABBREVIATIONS
S2.1	VALLEJO EDUCATION CENTER EAST ROOF FRAMING PLAN
S2.2	VALLEJO EDUCATION CENTER WEST ROOF FRAMING PLAN
S8.1	TYPICAL WOOD DETAILS
E0.01	ELECTRICAL TITLE SHEET
E0.02	EQUIPMENT CONNECTION SCHEDULE
E1.10	FIRST FLOOR EAST ELECTRICAL DEMOLITION PLAN
E1.12	SECOND FLOOR ELECTRICAL DEMOLITION PLAN
E1.13	ROOF EAST ELECTRICAL DEMOLITION PLAN
E1.14	ROOF WEST ELECTRICAL DEMOLITION PLAN
E2.10	FIRST FLOOR EAST ELECTRICAL PLAN
E2.12	SECOND FLOOR ELECTRICAL PLAN
E2.13	ROOF EAST ELECTRICAL PLAN
E2.14	ROOF WEST ELECTRICAL PLAN
E10.01	ELECTRICAL PANEL SCHEDULE
E10.02	ELECTRICAL PANEL SCHEDULE
M0.01	MECHANICAL SCHEDULES, NOTES AND LEGEND
M0.02	MECHANICAL DETAILS
M1.10	FIRST FLOOR EAST MECHANICAL DEMOLITION PLAN
M1.11	FIRST FLOOR WEST MECHANICAL DEMOLITION PLAN
M1.12	SECOND FLOOR MECHANICAL DEMOLITION PLAN
M1.13	ROOF EAST MECHANICAL DEMOLITION PLAN
M1.14	ROOF WEST MECHANICAL DEMOLITION PLAN
M2.10	FIRST FLOOR EAST MECHANICAL DUCTWORK PLAN
M2.11	FIRST FLOOR WEST MECHANICAL DUCTWORK PLAN
M2.12	SECOND FLOOR MECHANICAL DUCTWORK PLAN
M2.13	ROOF EAST MECHANICAL PROPOSED PLAN
M2.14	ROOF WEST MECHANICAL PROPOSED PLAN
M3.10	FIRST FLOOR EAST MECHANICAL HYDRONIC PLAN
M3.11	FIRST FLOOR WEST MECHANICAL HYDRONIC PLAN
M3.12	SECOND FLOOR MECHANICAL HYDRONIC PLAN
A0.1	GENERAL NOTES AND PROJECT DIRECTORY
A0.2	DRAWING INDEX
A0.3	DRAFTING SYMBOLS AND MAT INDICATORS
A0.4	ARCHITECTURAL DRAWING ABBREVIATIONS
A1.1	OVERALL SITE PLAN
A3.1	DEMO 1 ST FLOOR RCP PLAN EAST

A3.2	PROPOSED 1 ST FLOOR RCP PLAN EAST
A3.3	DEMO 1 ST FLOOR RCP PLAN WEST
A3.4	PROPOSED 1 ST FLOOR RCP PLAN WEST
A3.5	DEMO 2 ND FLOOR RCP PLAN EAST
A3.6	PROPOSED 2 ND FLOOR RCP PLAN EAST
A4.1	DEMO/EXISTING ROOF PLAN EAST
A4.2	DEMO/EXISTING ROOF PLAN WEST
7.1	ROOF DETAILS

END OF DOCUMENT

SPECIAL CONDITIONS

LIST OF SPECIAL CONDITION PROVISIONS

1. Mitigation Measures
2. Modernization projects
3. Substitution for Specified Items
4. Weather Days
5. Insurance Policy Limits
6. Permits, Certificates, Licenses, Fees, Approval
7. As-Builts and Record Drawings
8. Construction Manager
9. Program Manager
10. General Notes

SPECIAL CONDITIONS

1. Mitigation Measures

Contractor shall comply with all applicable mitigation measures, if any, adopted by any public agency with respect to this Project pursuant to the California Environmental Quality Act. (Public Resources Code section 21000 et seq.)

2. Modernization Projects

2.1. Access. Access to the school buildings and entry to buildings, classrooms, restrooms, mechanical rooms, electrical rooms, or other rooms, for construction purposes, must be coordinated with District' CM and onsite District personnel "CM" before Work is to start. Unless agreed to otherwise in writing, only a school custodian will be allowed to unlock and lock doors in existing building(s). The custodian will be available only while school is in session. If a custodian is required to arrive before 7:00 a.m. or leave after 3:30 p.m. to accommodate Contractor's Work, the overtime wages for the custodian will be paid by the Contractor, unless at the discretion of the District, other arrangements are made in advance.

2.2. Master Key. Upon request, the District may, at its own discretion, provide a master key to the school site for the convenience of the Contractor. The Contractor agrees to pay all expenses to re-key the entire school site and all other affected District buildings if the master key is lost or stolen or if any unauthorized party obtains a copy of the key or access to the school.

2.3. Maintaining Services. The Contractor is advised that Work is to be performed in spaces regularly scheduled for instruction. Interruption and/or periods of shutdown of public access, electrical service, water service, lighting, or other utilities shall be only as arranged in advance with the District. Contractor shall provide temporary services to all facilities interrupted by Contractor's Work.

2.4. Maintaining Utilities. The Contractor shall maintain in operation during duration of Contract, drainage lines, storm drains, sewers, water, gas, electrical, steam, and other utility service lines within working area.

2.5. Confidentiality. Contractor shall maintain the confidentiality of all information, documents, programs, procedures and all other items that Contractor encounters while performing the Work. This requirement shall be ongoing and shall survive the expiration or termination of this Contract and specifically includes, without limitation, all student, parent, and employee disciplinary information and health information.

2.6. Work during Instructional Time. By submitting its bid, Contractor affirms that Work may be performed during ongoing instruction in existing facilities. If so, Contractor agrees to cooperate to the best of its ability to minimize any disruption to the school up to, and including, rescheduling specific work activities, at no additional cost to District.

2.7. No Work during Student Testing. Contractor shall, at no additional cost to the District and at the District's request, coordinate its Work to not disturb District

students including, without limitation, not performing any Work when students at the Site are taking State-required tests.

3. Substitution for Specified Items

3.1. Whenever in the Specifications any materials, process, or article is indicated or specified by grade, patent, or proprietary name, or by name of manufacturer, that Specification shall be deemed to be followed by the words "or equal." Contractor may, unless otherwise stated, offer any material, process, or article that shall be substantially equal or better in every respect to that so indicated or specified.

3.1.1. If the material, process, or article offered by Contractor is not, in the opinion of the District, substantially equal or better in every respect to that specified, then Contractor shall furnish the material, process, or article specified in the Specifications without any additional compensation or change order.

3.1.2. This provision shall not be applicable with respect to any material, product, thing or service for which District made findings and gave notice in accordance with Public Contract Code section 3400(c); therefore, Contractor shall not be entitled to request a substitution with respect to those materials, products or services.

3.2. A request for a substitution shall be submitted as follows:

3.2.1. Contractor shall notify the District in writing of any request for a substitution at least ten (10) days prior to bid opening as indicated in the Instructions to Bidders.

3.2.2. Requests for Substitutions after award of the Contract shall be submitted within five (5) days of the date of the Notice of Award.

3.3. Within 5 days after the date of the Notice of Award, Contractor shall provide data substantiating a request for substitution of "an equal" item, including but not limited to the following:

3.3.1. All variations of the proposed substitute from the material specified including, but not limited to, principles of operation, materials, or construction finish, thickness or gauge of materials, dimensions, weight, and tolerances;

3.3.2. Available maintenance, repair or replacement services;

3.3.3. Increases or decreases in operating, maintenance, repair, replacement, and spare parts costs;

3.3.4. Whether or not acceptance of the substitute will require other changes in the Work (or in work performed by the District or others under Contract with the District); and

3.3.5. The time impact on any part of the Work resulting directly or indirectly from acceptance of the proposed substitute.

3.4. No substitutions shall be made until approved, in writing, by the District. The burden of proof as to equality of any material, process, or article shall rest with Contractor. The Contractor warrants that if substitutes are approved:

3.4.1. The proposed substitute is equal or superior in all respects to that specified, and that such proposed substitute is suitable and fit for the intended purpose and will perform adequately the function and achieve the results called for by the general design and the Contract Documents;

3.4.2. The Contractor provides the same warranties and guarantees for the substitute that would be provided for that specified;

3.4.3. The Contractor shall be fully responsible for the installation of the substitute and any changes in the Work required, either directly or indirectly, because of the acceptance of such substitute, with no increase in Contract Price or Contract Time. Incidental changes or extra component parts required to accommodate the substitute will be made by the Contractor without a change in the Contract Price or Contract Time;

3.4.4. The Contractor shall be responsible for any re-design costs occasioned by District's acceptance and/or approval of any substitute; and

3.4.5. The Contractor shall, in the event that a substitute is less costly than that specified, credit the District with one hundred percent (100%) of the net difference between the substitute and the originally specified material. In this event, the Contractor agrees to execute a deductive Change Order to reflect that credit.

3.5. In the event Contractor furnishes a material, process, or article more expensive than that specified, the difference in the cost of that material, process, or article so furnished shall be borne by Contractor.

3.6. In no event shall the District be liable for any increase in Contract Price or Contract Time due to any claimed delay in the evaluation of any proposed substitute or in the acceptance or rejection of any proposed substitute.

4. **Weather Days**

Delays due to Adverse Weather conditions will only be permitted in compliance with the provisions in the General Conditions and only if the number of days of Adverse Weather exceeds the following parameters and Contractor can verify that the excess days of Adverse Weather caused delays:

January	<u>11</u>	July	<u>0</u>
February	<u>10</u>	August	<u>0</u>
March	<u>10</u>	September	<u>1</u>
April	<u>6</u>	October	<u>4</u>
May	<u>3</u>	November	<u>7</u>
June	<u>1</u>	December	<u>10</u>

5. **Insurance Policy Limits**

All of Contractor's insurance shall be with insurance companies with an A.M. Best rating. The Contractor shall maintain at all times it performs any portion of the Service the following insurance with minimum limits equal to the amounts indicated below:

Commercial General Liability	Product Liability and Completed Operations, Fire Damage Liability – Split Limit	2,000,000 per occurrence; \$4,000,000 General Aggregate
Automobile Liability – Any Auto	Combined Single Limit	\$1,000,000 General Aggregate: \$2,000,000
Pollution Liability		\$1,000,000 Per claim; \$2,000,000 Aggregate
Workers Compensation		Statutory limits pursuant to State law
Employers' Liability		\$1,000,000
Builders Risk (Course of Construction)		Issued for the value and scope of work indicated herein.

6. Permits, Certificates, Licenses, Fees, Approval

6.1. Payment of Fees for Permits, Certificates, Licenses, and Registrations.

As required in the General Conditions, the Contractor shall secure and pay for all permits, licenses, registrations, and certificates necessary for the prosecution of the Work with the exception of the following:

With respect to the above listed items, Contractor shall be responsible for securing such items.

6.2. General Permit For Storm Water Discharges Associated With Construction and Land Disturbance Activities

6.2.1. Contractor acknowledges that all California community college districts are obligated to develop and implement the following requirements for the discharge of storm water to surface waters from its construction and land disturbance activities (storm water requirements), without limitation:

6.2.1.1. Municipal Separate Storm Sewer System (MS4) is a system of conveyances used to collect and/or convey storm water, including, without limitation, catch basins, curbs, gutters, ditches, man-made channels, and storm drains.

6.2.1.2. Storm Water Pollution Prevention Plan (SWPPP) contains specific best management practices (BMPs) and establishes numeric effluent limitations at:

6.2.1.2.1. Sites where the District engages in maintenance (e.g., fueling, cleaning, repairing) for transportation activities.

6.2.1.2.2. Construction sites where:

6.2.1.2.2.1. One (1) or more acres of soil will be disturbed, or

6.2.1.2.2.2. The project is part of a larger common plan of development that disturbs more than one (1) acre of soil.

6.2.2. Contractor shall comply with any District storm water requirements that are approved by the District and applicable to the Project, at no additional cost to the District.

6.2.3. At no additional cost to the District, Contractor shall provide a Qualified Storm Water Practitioner who shall be onsite and implement and monitor any and all SWPPP requirements applicable to the Project, including but not limited to:

6.2.3.1. At least forty eight (48) hours prior to a forecasted rain event, implementing the Rain Event Action Plan (REAP) for any rain event requiring implementation of the REAP, including any erosion and sediment control measures needed to protect all exposed portions of the site; and

6.2.3.2. Monitoring any Numeric Action Levels (NALs), if applicable.

7. As-Builts and Record Drawings

7.1. Contractor shall submit Record Drawings pursuant to the Contract Documents on one set of computer-aided design and drafting ("CADD") files in the editable and PDF format.

8. Construction Manager

The District will use a Construction Manager on the Project that is the subject of this Contract. Scott Glover of Swinerton Management and Consulting is the Construction Manager for this Project.

9. Program Manager

Kitchell CEM is the Program Manager designated for the Project that is the subject of this Contract. Jason Yi is the Project Manager for this Project.

10. General Notes

- Please substitute any references to the "Architect" with "Engineer of Record".
- This project is a DSA Project.
- Contractor must include janitorial service in their contract for deep cleaning upon completion of project.
- Removed ceiling material must be replaced with the same material.
- Replacement Suspending Ceiling Product Specification:
CertainTeed 1220-IOF-1
(Mineral CEILING SYMPHONY 2x4x3/4" OVERSTONE FINISH)
- All existing surfaces and finishes must be protected from potential damage during construction activities. In the event of contractor damage, Contractor will be responsible for all restoration and repairs at their sole cost.
- Building will be accessible for contractor's mobilization and construction activities as of May 30, 2017.
- Contractor must complete the entire project including punch list, test, air balance, demobilization no later than August 4, 2017.
- This contractor will be responsible for moving, relocation and protection of all classrooms and office furniture's as required during construction period.

- Moving Electronic equipment such as copier, computer and printers will be by District's IT staff with 48 hours of notice to CM.

END OF DOCUMENT

SECTION 230593 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Balancing Air Systems:
 - a. Constant-volume air systems.
 - 2. Balancing Hydronic Piping Systems:
 - a. Variable-flow hydronic systems.

1.2 DEFINITIONS

- A. AABC: Associated Air Balance Council.
- B. NEBB: National Environmental Balancing Bureau.
- C. TAB: Testing, adjusting, and balancing.
- D. TABB: Testing, Adjusting, and Balancing Bureau.
- E. TAB Specialist: An entity engaged to perform TAB Work.

1.3 ACTION SUBMITTALS

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: Within 30 days of Contractor's Notice to Proceed, submit documentation that the TAB contractor and this Project's TAB team members meet the qualifications specified in "Quality Assurance" Article.
- B. Contract Documents Examination Report: Within 30 days of Contractor's Notice to Proceed, submit the Contract Documents review report as specified in Part 3.
- C. Strategies and Procedures Plan: Within 30 days of Contractor's Notice to Proceed, submit TAB strategies and step-by-step procedures as specified in "Preparation" Article.
- D. Certified TAB reports.
- E. Sample report forms.
- F. Instrument calibration reports, to include the following:

1. Instrument type and make.
2. Serial number.
3. Application.
4. Dates of use.
5. Dates of calibration.

1.5 QUALITY ASSURANCE

- A. TAB Contractor Qualifications: Engage a TAB entity certified by AABC NEBB or TABB.
 1. TAB Field Supervisor: Employee of the TAB contractor and certified by AABC NEBB or TABB.
 2. TAB Technician: Employee of the TAB contractor and who is certified by AABC NEBB or TABB as a TAB technician.
- B. TAB Conference: Meet with Construction Manager and Commissioning Authority on approval of the TAB strategies and procedures plan to develop a mutual understanding of the details. Require the participation of the TAB field supervisor and technicians. Provide 10 days' advance notice of scheduled meeting time and location.
 1. Agenda Items:
 - a. The Contract Documents examination report.
 - b. The TAB plan.
 - c. Coordination and cooperation of trades and subcontractors.
 - d. Coordination of documentation and communication flow.
- C. Certify TAB field data reports and perform the following:
 1. Review field data reports to validate accuracy of data and to prepare certified TAB reports.
 2. Certify that the TAB team complied with the approved TAB plan and the procedures specified and referenced in this Specification.
- D. TAB Report Forms: Use standard TAB contractor's forms approved by Construction Manager and Commissioning Authority.
- E. Instrumentation Type, Quantity, Accuracy, and Calibration: As described in ASHRAE 111, Section 5, "Instrumentation."

1.6 COORDINATION

- A. Notice: Provide 10 days' advance notice for each test. Include scheduled test dates and times.
- B. Perform TAB after leakage and pressure tests on air and water distribution systems have been satisfactorily completed.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems' designs that may preclude proper TAB of systems and equipment.
- B. Examine the drawings and systems for new and existing installed balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers. Verify that locations of these balancing devices are accessible.
- C. Examine the approved submittals for HVAC systems and equipment.
- D. Examine system and equipment installations and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.
- E. Examine test reports specified in individual system and equipment Sections.
- F. Examine HVAC equipment and filters and verify that bearings are greased, belts are aligned and tight, and equipment with functioning controls is ready for operation.
- G. Examine strainers. Verify that startup screens are replaced by permanent screens with indicated perforations.
- H. Examine three-way valves for proper installation for their intended function of diverting or mixing fluid flows.
- I. Examine heat-transfer coils for correct piping connections and for clean and straight fins.
- J. Examine system pumps to ensure absence of entrained air in the suction piping.
- K. Examine operating safety interlocks and controls on HVAC equipment.
- L. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

3.2 PREPARATION

- A. Prepare a TAB plan that includes strategies and step-by-step procedures.
- B. Complete system-readiness checks and prepare reports. Verify the following:
 - 1. Permanent electrical-power wiring is complete.
 - 2. Hydronic systems are filled, clean, and free of air.
 - 3. Automatic temperature-control systems are operational.
 - 4. Equipment and duct access doors are securely closed.

5. Balance, smoke, and fire dampers are open.
6. Isolating and balancing valves are open and control valves are operational.
7. Ceilings are installed and access to balancing devices is provided.
8. Windows and doors can be closed so indicated conditions for system operations can be met.

3.3 GENERAL PROCEDURES FOR TESTING AND BALANCING

- A. Perform testing and balancing procedures on each system according to the procedures contained in SMACNA's "HVAC Systems - Testing, Adjusting, and Balancing" and in this Section.
- B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary for TAB procedures.
 1. After testing and balancing, patch probe holes in ducts with same material and thickness as used to construct ducts.
 2. Install and join new insulation that matches removed materials. Restore insulation, coverings, vapor barrier, and finish .
- C. Mark equipment and balancing devices, including damper-control positions, valve position indicators, and similar controls and devices, with paint or other suitable, permanent identification material to show final settings.
- D. Take and report testing and balancing measurements in inch-pound (IP) units.

3.4 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

- A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Crosscheck the summation of required outlet volumes with required fan volumes.
- B. Prepare schematic diagrams of systems' "as-built" duct layouts.
- C. Determine the best locations in main and branch ducts for accurate duct-airflow measurements.
- D. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.
- E. Verify that motor starters are equipped with properly sized thermal protection.
- F. Check dampers for proper position to achieve desired airflow path.
- G. Check for airflow blockages.
- H. Check condensate drains for proper connections and functioning.
- I. Check for proper sealing of air-handling-unit components.

3.5 PROCEDURES FOR CONSTANT-VOLUME AIR SYSTEMS

- A. Adjust fans to deliver total indicated airflows within the maximum allowable fan speed listed by fan manufacturer.
 - 1. Measure total airflow.
 - a. Where sufficient space in ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow.
 - 2. Measure fan static pressures as follows to determine actual static pressure:
 - a. Measure outlet static pressure as far downstream from the fan as practical and upstream from restrictions in ducts such as elbows and transitions.
 - b. Measure static pressure directly at the fan outlet or through the flexible connection.
 - c. Measure inlet static pressure in the inlet duct as near the fan as possible, upstream from the flexible connection, and downstream from duct restrictions.
 - 3. Measure static pressure across each component that makes up an air-handling unit, rooftop unit, and other air-handling and -treating equipment.
 - a. Report the cleanliness status of filters and the time static pressures are measured.
 - 4. Review Record Documents to determine variations in design static pressures versus actual static pressures. Calculate actual system-effect factors. Recommend adjustments to accommodate actual conditions.
 - 5. Obtain approval from Construction Manager for adjustment of fan speed higher or lower than indicated speed. Comply with requirements in HVAC Sections for air-handling units for adjustment of fans, belts, and pulley sizes to achieve indicated air-handling-unit performance.
 - 6. Do not make fan-speed adjustments that result in motor overload. Consult equipment manufacturers about fan-speed safety factors. Modulate dampers and measure fan-motor amperage to ensure that no overload will occur. Measure amperage in full-cooling, full-heating, economizer, and any other operating mode to determine the maximum required brake horsepower.
- B. Adjust volume dampers for main duct, submain ducts, and major branch ducts to indicated airflows within specified tolerances.
 - 1. Measure airflow of submain and branch ducts.
 - a. Where sufficient space in submain and branch ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow for that zone.
 - 2. Measure static pressure at a point downstream from the balancing damper, and adjust volume dampers until the proper static pressure is achieved.
 - 3. Remeasure each submain and branch duct after all have been adjusted. Continue to adjust submain and branch ducts to indicated airflows within specified tolerances.
- C. Measure air outlets and inlets without making adjustments.

1. Measure terminal outlets using a direct-reading hood or outlet manufacturer's written instructions and calculating factors.
- D. Adjust air outlets and inlets for each space to indicated airflows within specified tolerances of indicated values. Make adjustments using branch volume dampers rather than extractors and the dampers at air terminals.
 1. Adjust each outlet in same room or space to within specified tolerances of indicated quantities without generating noise levels above the limitations prescribed by the Contract Documents.
 2. Adjust patterns of adjustable outlets for proper distribution without drafts.

3.6 GENERAL PROCEDURES FOR HYDRONIC SYSTEMS

- A. Prepare test reports with pertinent design data, and number in sequence starting at pump to end of system. Check the sum of branch-circuit flows against the approved pump flow rate. Correct variations that exceed plus or minus 5 percent.
- B. Prepare schematic diagrams of systems' "as-built" piping layouts.
- C. Prepare hydronic systems for testing and balancing according to the following, in addition to the general preparation procedures specified above:
 1. Open all manual valves for maximum flow.
 2. Check liquid level in expansion tank.
 3. Check makeup water-station pressure gage for adequate pressure for highest vent.
 4. Check flow-control valves for specified sequence of operation, and set at indicated flow.
 5. Set differential-pressure control valves at the specified differential pressure. Do not set at fully closed position when pump is positive-displacement type unless several terminal valves are kept open.
 6. Set system controls so automatic valves are wide open to heat exchangers.
 7. Check pump-motor load. If motor is overloaded, throttle main flow-balancing device so motor nameplate rating is not exceeded.
 8. Check air vents for a forceful liquid flow exiting from vents when manually operated.

3.7 PROCEDURES FOR VARIABLE-FLOW HYDRONIC SYSTEMS

- A. Balance systems with automatic two- and three-way control valves by setting systems at maximum flow through heat-exchange terminals and proceed as specified above for hydronic systems.

3.8 PROCEDURES FOR BOILERS

- A. Hydronic Boilers: Measure and record entering- and leaving-water temperatures and water flow.

3.9 PROCEDURES FOR TESTING, ADJUSTING, AND BALANCING EXISTING LAB EXHAUST SYSTEMS

- A. Perform a preconstruction inspection of existing equipment that is to remain and be reused.
 - 1. Measure and record the operating speed, airflow, and static pressure of each fan.
 - 2. Measure motor voltage and amperage. Compare the values to motor nameplate information.
 - 3. Check bearings and other lubricated parts for proper lubrication.
 - 4. Report on the operating condition of the equipment and the results of the measurements taken. Report deficiencies.
- B. Before performing testing and balancing of existing systems, inspect existing equipment that is to remain and be reused to verify that existing equipment has been cleaned and refurbished. Verify the following:
 - 1. Fans are clean.
 - 2. Bearings and other parts are properly lubricated.
 - 3. Deficiencies noted in the preconstruction report are corrected.
- C. Perform testing and balancing of existing systems to the extent that existing systems are affected by the renovation work.
 - 1. Compare the indicated airflow of the renovated work to the measured fan airflows, and determine the new fan speed.
 - 2. If calculations increase or decrease the air flow rates by more than 5 percent, make equipment adjustments to achieve the calculated rates. If increase or decrease is 5 percent or less, equipment adjustments are not required.
 - 3. Balance each air inlet.

3.10 TOLERANCES

- A. Set HVAC system's air flow rates and water flow rates within the following tolerances:
 - 1. Supply, Return, and Exhaust Fans and Equipment with Fans: Plus or minus 10 percent.
 - 2. Air Outlets and Inlets: Plus or minus 10 percent.
 - 3. Heating-Water Flow Rate: Plus or minus 10 percent.

3.11 REPORTING

- A. Initial Construction-Phase Report: Based on examination of the Contract Documents as specified in "Examination" Article, prepare a report on the adequacy of design for systems' balancing devices. Recommend changes and additions to systems' balancing devices to facilitate proper performance measuring and balancing. Recommend changes and additions to HVAC systems and general construction to allow access for performance measuring and balancing devices.

3.12 FINAL REPORT

- A. General: Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems.
 - 1. Include a certification sheet at the front of the report's binder, signed and sealed by the certified testing and balancing engineer.
 - 2. Include a list of instruments used for procedures, along with proof of calibration.
- B. Final Report Contents: In addition to certified field-report data, include the following:
 - 1. Pump curves.
 - 2. Fan curves.
 - 3. Manufacturers' test data.
 - 4. Field test reports prepared by system and equipment installers.
 - 5. Other information relative to equipment performance; do not include Shop Drawings and product data.
- C. General Report Data: In addition to form titles and entries, include the following data:
 - 1. Title page.
 - 2. Name and address of the TAB contractor.
 - 3. Project name.
 - 4. Project location.
 - 5. Architect's name and address.
 - 6. Engineer's name and address.
 - 7. Contractor's name and address.
 - 8. Report date.
 - 9. Signature of TAB supervisor who certifies the report.
 - 10. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
 - 11. Summary of contents including the following:
 - a. Indicated versus final performance.
 - b. Notable characteristics of systems.
 - c. Description of system operation sequence if it varies from the Contract Documents.
 - 12. Nomenclature sheets for each item of equipment.
 - 13. Notes to explain why certain final data in the body of reports vary from indicated values.
 - 14. Test conditions for fans and pump performance forms including the following:
 - a. Settings for outdoor-, return-, and exhaust-air dampers.
 - b. Conditions of filters.
 - c. Cooling coil, wet- and dry-bulb conditions.
 - d. Fan drive settings including settings and percentage of maximum pitch diameter.
 - e. Other system operating conditions that affect performance.
- D. System Diagrams: Include schematic layouts of air and hydronic distribution systems. Present each system with single-line diagram and include the following:

1. Quantities of outdoor, supply, return, and exhaust airflows.
2. Water and flow rates.
3. Duct, outlet, and inlet sizes.
4. Pipe and valve sizes and locations.
5. Balancing stations.
6. Position of balancing devices.

E. Air-Handling-Unit Test Reports: For air-handling units with coils, include the following:

1. Unit Data:
 - a. Unit identification.
 - b. Location.
 - c. Make and type.
 - d. Model number and unit size.
 - e. Manufacturer's serial number.
 - f. Unit arrangement and class.
 - g. Discharge arrangement.
 - h. Sheave make, size in inches, and bore.
 - i. Center-to-center dimensions of sheave, and amount of adjustments in inches.
 - j. Number, make, and size of belts.
 - k. Number, type, and size of filters.
2. Motor Data:
 - a. Motor make, and frame type and size.
 - b. Horsepower and rpm.
 - c. Volts, phase, and hertz.
 - d. Full-load amperage and service factor.
 - e. Sheave make, size in inches, and bore.
 - f. Center-to-center dimensions of sheave, and amount of adjustments in inches.
3. Test Data (Indicated and Actual Values):
 - a. Total air flow rate in cfm.
 - b. Total system static pressure in inches wg.
 - c. Fan rpm.
 - d. Discharge static pressure in inches wg.
 - e. Filter static-pressure differential in inches wg.
 - f. Outdoor airflow in cfm.
 - g. Return airflow in cfm.
 - h. Outdoor-air damper position.
 - i. Return-air damper position.

F. Apparatus-Coil Test Reports:

1. Coil Data:
 - a. System identification.
 - b. Location.
 - c. Coil type.

- d. Number of rows.
 - e. Fin spacing in fins per inch o.c.
 - f. Make and model number.
 - g. Face area in sq. ft..
 - h. Tube size in NPS.
 - i. Tube and fin materials.
 - j. Circuiting arrangement.
2. Test Data (Indicated and Actual Values):
- a. Air flow rate in cfm.
 - b. Average face velocity in fpm.
 - c. Air pressure drop in inches wg.
 - d. Water flow rate in gpm.
 - e. Water pressure differential in feet of head or psig.
 - f. Entering-water temperature in deg F.
 - g. Leaving-water temperature in deg F.
- G. Fan Test Reports: For existing lab exhaust fans, include the following:
1. Fan Data:
- a. System identification.
 - b. Location.
 - c. Make and type.
 - d. Model number and size.
 - e. Manufacturer's serial number.
 - f. Arrangement and class.
 - g. Sheave make, size in inches, and bore.
 - h. Center-to-center dimensions of sheave, and amount of adjustments in inches.
2. Motor Data:
- a. Motor make, and frame type and size.
 - b. Horsepower and rpm.
 - c. Volts, phase, and hertz.
 - d. Full-load amperage and service factor.
 - e. Sheave make, size in inches, and bore.
 - f. Center-to-center dimensions of sheave, and amount of adjustments in inches.
 - g. Number, make, and size of belts.
3. Test Data (Indicated and Actual Values):
- a. Total airflow rate in cfm.
 - b. Total system static pressure in inches wg.
 - c. Fan rpm.
 - d. Discharge static pressure in inches wg.
 - e. Suction static pressure in inches wg.
- H. Round, and Rectangular Duct Traverse Reports: Include a diagram with a grid representing the duct cross-section and record the following:

1. Report Data:
 - a. System and air-handling-unit number.
 - b. Location and zone.
 - c. Traverse air temperature in deg F.
 - d. Duct static pressure in inches wg.
 - e. Duct size in inches.
 - f. Duct area in sq. ft..
 - g. Indicated air flow rate in cfm.
 - h. Indicated velocity in fpm.
 - i. Actual air flow rate in cfm.
 - j. Actual average velocity in fpm.
 - k. Barometric pressure in psig.
- I. Pump Test Reports: Calculate impeller size by plotting the shutoff head on pump curves and include the following:
 1. Unit Data:
 - a. Unit identification.
 - b. Location.
 - c. Service.
 - d. Make and size.
 - e. Model number and serial number.
 - f. Water flow rate in gpm.
 - g. Water pressure differential in feet of head or psig.
 - h. Required net positive suction head in feet of head or psig.
 - i. Pump rpm.
 - j. Impeller diameter in inches.
 - k. Motor make and frame size.
 - l. Motor horsepower and rpm.
 - m. Voltage at each connection.
 - n. Amperage for each phase.
 - o. Full-load amperage and service factor.
 - p. Seal type.
 2. Test Data (Indicated and Actual Values):
 - a. Static head in feet of head or psig.
 - b. Pump shutoff pressure in feet of head or psig.
 - c. Actual impeller size in inches.
 - d. Full-open flow rate in gpm.
 - e. Full-open pressure in feet of head or psig.
 - f. Final discharge pressure in feet of head or psig.
 - g. Final suction pressure in feet of head or psig.
 - h. Final total pressure in feet of head or psig.
 - i. Final water flow rate in gpm.
 - j. Voltage at each connection.
 - k. Amperage for each phase.
- J. Instrument Calibration Reports:

1. Report Data:
 - a. Instrument type and make.
 - b. Serial number.
 - c. Application.
 - d. Dates of use.
 - e. Dates of calibration.

3.13 INSPECTIONS

A. Initial Inspection:

1. After testing and balancing are complete, operate each system and randomly check measurements to verify that the system is operating according to the final test and balance readings documented in the final report.
2. Check the following for each system:
 - a. Measure airflow of at least 10 percent of air outlets.
 - b. Measure water flow of at least 5 Insert number percent of coils.
 - c. Measure room temperature at each thermostat/temperature sensor. Compare the reading to the set point.
 - d. Verify that balancing devices are marked with final balance position.
 - e. Note deviations from the Contract Documents in the final report.

B. Final Inspection:

1. After initial inspection is complete and documentation by random checks verifies that testing and balancing are complete and accurately documented in the final report, request that a final inspection be made by Commissioning Authority.
2. The TAB contractor's test and balance engineer shall conduct the inspection in the presence of Commissioning Authority.
3. Commissioning Authority shall randomly select measurements, documented in the final report, to be rechecked. Rechecking shall be limited to either 10 percent of the total measurements recorded or the extent of measurements that can be accomplished in a normal 8-hour business day.
4. If rechecks yield measurements that differ from the measurements documented in the final report by more than the tolerances allowed, the measurements shall be noted as "FAILED."
5. If the number of "FAILED" measurements is greater than 10 percent of the total measurements checked during the final inspection, the testing and balancing shall be considered incomplete and shall be rejected.

C. TAB Work will be considered defective if it does not pass final inspections. If TAB Work fails, proceed as follows:

1. Recheck all measurements and make adjustments. Revise the final report and balancing device settings to include all changes; resubmit the final report and request a second final inspection.

2. If the second final inspection also fails, Owner may contract the services of another TAB contractor to complete TAB Work according to the Contract Documents and deduct the cost of the services from the original TAB contractor's final payment.

- D. Prepare test and inspection reports.

3.14 ADDITIONAL TESTS

- A. Within 90 days of completing TAB, perform additional TAB to verify that balanced conditions are being maintained throughout and to correct unusual conditions.
- B. Seasonal Periods: If initial TAB procedures were not performed during near-peak summer and winter conditions, perform additional TAB during near-peak summer and winter conditions.

END OF SECTION 230593

SECTION 230800 - COMMISSIONING OF HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes commissioning process requirements for HVAC&R systems, assemblies, and equipment.

1.3 DEFINITIONS

- A. Commissioning Plan: A document that outlines the organization, schedule, allocation of resources, and documentation requirements of the commissioning process.
- B. CxA: Commissioning Authority.
- C. HVAC&R: Heating, Ventilating, Air Conditioning, and Refrigeration.
- D. Systems, Subsystems, Equipment, and Components: Where these terms are used together or separately, they shall mean "as-built" systems, subsystems, equipment, and components.

1.4 INFORMATIONAL SUBMITTALS

- A. Certificates of readiness.
- B. Certificates of completion of installation, prestart, and startup activities.

1.5 CONTRACTOR'S RESPONSIBILITIES

- A. Perform commissioning tests at the direction of the CxA.
- B. Attend construction phase controls coordination meeting.
- C. Attend testing, adjusting, and balancing review and coordination meeting.
- D. Participate in HVAC&R systems, assemblies, equipment, and component maintenance orientation and inspection as directed by the CxA.
- E. Provide information requested by the CxA for final commissioning documentation.

- F. Provide measuring instruments and logging devices to record test data, and provide data acquisition equipment to record data for the complete range of testing for the required test period.

1.6 CxA'S RESPONSIBILITIES

- A. Provide Project-specific construction checklists and commissioning process test procedures for actual HVAC&R systems, assemblies, equipment, and components to be furnished and installed as part of the construction contract.
- B. Direct commissioning testing.
- C. Verify testing, adjusting, and balancing of Work are complete.
- D. Provide test data, inspection reports, and certificates in Systems Manual.

1.7 COMMISSIONING DOCUMENTATION

- A. Provide the following information to the CxA for inclusion in the commissioning plan:
 - 1. Plan for delivery and review of submittals, systems manuals, and other documents and reports.
 - 2. Identification of installed systems, assemblies, equipment, and components including design changes that occurred during the construction phase.
 - 3. Process and schedule for completing construction checklists and manufacturer's prestart and startup checklists for HVAC&R systems, assemblies, equipment, and components to be verified and tested.
 - 4. Certificate of completion certifying that installation, prestart checks, and startup procedures have been completed.
 - 5. Certificate of readiness certifying that HVAC&R systems, subsystems, equipment, and associated controls are ready for testing.
 - 6. Test and inspection reports and certificates.
 - 7. Corrective action documents.
 - 8. Verification of testing, adjusting, and balancing reports.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TESTING PREPARATION

- A. Certify that HVAC&R systems, subsystems, and equipment have been installed, calibrated, and started and are operating according to the Contract Documents.
- B. Certify that HVAC&R instrumentation and control systems have been completed and calibrated, that they are operating according to the Contract Documents, and that pretest set points have been recorded.

- C. Certify that testing, adjusting, and balancing procedures have been completed and that testing, adjusting, and balancing reports have been submitted, discrepancies corrected, and corrective work approved.
- D. Set systems, subsystems, and equipment into operating mode to be tested (e.g., normal shutdown, normal auto position, normal manual position, unoccupied cycle, emergency power, and alarm conditions).
- E. Inspect and verify the position of each device and interlock identified on checklists.
- F. Check safety cutouts, alarms, and interlocks with smoke control and life-safety systems during each mode of operation.
- G. Testing Instrumentation: Install measuring instruments and logging devices to record test data as directed by the CxA.

3.2 Testing AND BALANCING VERIFICATION

- A. Prior to performance of testing and balancing Work, provide copies of reports, sample forms, checklists, and certificates to the CxA.
- B. Notify the CxA at least 10 days in advance of testing and balancing Work, and provide access for the CxA to witness testing and balancing Work.
- C. Provide technicians, instrumentation, and tools to verify testing and balancing of HVAC&R systems at the direction of the CxA.
 - 1. The CxA will notify testing and balancing Contractor 10 days in advance of the date of field verification. Notice will not include data points to be verified.
 - 2. The testing and balancing Contractor shall use the same instruments (by model and serial number) that were used when original data were collected.
 - 3. Failure of an item includes, other than sound, a deviation of more than 10 percent. Failure of more than 10 percent of selected items shall result in rejection of final testing, adjusting, and balancing report. For sound pressure readings, a deviation of 3 dB shall result in rejection of final testing. Variations in background noise must be considered.
 - 4. Remedy the deficiency and notify the CxA so verification of failed portions can be performed.

3.3 GENERAL TESTING REQUIREMENTS

- A. Provide technicians, instrumentation, and tools to perform commissioning test at the direction of the CxA.
- B. Scope of HVAC&R testing shall include entire HVAC&R installation, from central equipment for heat generation and refrigeration through distribution systems to each conditioned space. Testing shall include measuring capacities and effectiveness of operational and control functions.

- C. Test all operating modes, interlocks, control responses, and responses to abnormal or emergency conditions, and verify proper response of building automation system controllers and sensors.
- D. The CxA along with the HVAC&R Contractor, testing and balancing Contractor, and HVAC&R Instrumentation and Control Contractor shall prepare detailed testing plans, procedures, and checklists for HVAC&R systems, subsystems, and equipment.
- E. Tests will be performed using design conditions whenever possible.
- F. Simulated conditions may need to be imposed using an artificial load when it is not practical to test under design conditions. Before simulating conditions, calibrate testing instruments. Provide equipment to simulate loads. Set simulated conditions as directed by the CxA and document simulated conditions and methods of simulation. After tests, return settings to normal operating conditions.
- G. The CxA may direct that set points be altered when simulating conditions is not practical.
- H. The CxA may direct that sensor values be altered with a signal generator when design or simulating conditions and altering set points are not practical.
- I. If tests cannot be completed because of a deficiency outside the scope of the HVAC&R system, document the deficiency and report it to the Owner. After deficiencies are resolved, reschedule tests.
- J. If the testing plan indicates specific seasonal testing, complete appropriate initial performance tests and documentation and schedule seasonal tests.

3.4 HVAC&R systems, subsystems, and equipment Testing Procedures

- A. Boiler Testing and Acceptance Procedures: Testing requirements are specified in HVAC boiler Sections. Provide submittals, test data, inspector record, and boiler certification to the CxA.
- B. HVAC&R Instrumentation and Controls Testing Procedures:
 - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and installations, including connections.
 - 2. Perform the following tests and inspections:
 - a. Perform each visual and mechanical inspection.
 - b. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 - 3. Testing:
 - a. Final Testing.
 - b. Record test results and submit copy of test results for Project record.
 - 4. DDC SYSTEM I/O CHECKOUT PROCEDURES
 - a. Check installed products before continuity tests, leak tests and calibration.
 - b. Check instruments for proper location and accessibility.
 - c. Check instruments for proper installation on direction of flow, elevation, orientation, insertion depth, or other applicable considerations that will impact performance.

- C. HVAC units: Testing requirements are specified in SELF-CONTAINED AIR-CONDITIONERS and SPLIT-SYSTEM AIR-CONDITIONERS.
- D. Pipe system cleaning, flushing, hydrostatic tests, and chemical treatment requirements are specified in HVAC piping Sections. HVAC&R Contractor shall prepare a pipe system cleaning, flushing, and hydrostatic testing plan. Provide cleaning, flushing, testing, and treating plan and final reports to the CxA. Plan shall include the following:
 - 1. Sequence of testing and testing procedures for each section of pipe to be tested, identified by pipe zone or sector identification marker. Markers shall be keyed to Drawings for each pipe sector, showing the physical location of each designated pipe test section. Drawings keyed to pipe zones or sectors shall be formatted to allow each section of piping to be physically located and identified when referred to in pipe system cleaning, flushing, hydrostatic testing, and chemical treatment plan.
 - 2. Description of equipment for flushing operations.
 - 3. Minimum flushing water velocity.
 - 4. Tracking checklist for managing and ensuring that all pipe sections have been cleaned, flushed, hydrostatically tested, and chemically treated.
- E. HVAC&R Distribution System Testing: Provide technicians, instrumentation, tools, and equipment to test performance of air and hydronic distribution systems; special exhaust; and other distribution systems, including HVAC&R split and unitary equipment.
- F. Vibration and Sound Tests: Provide technicians, instrumentation, tools, and equipment to test performance of vibration isolation and seismic controls.

END OF SECTION 230800

SECTION 232300 - REFRIGERANT PIPING

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. This Section includes refrigerant piping used for air-conditioning applications.

1.3 PERFORMANCE REQUIREMENTS

- A. Line Test Pressure for Refrigerant R-410A:
 - 1. Suction Lines for Air-Conditioning Applications: 300 psig.
 - 2. Suction Lines for Heat-Pump Applications: 535 psig.
 - 3. Hot-Gas and Liquid Lines: 535 psig.

1.4 INFORMATIONAL SUBMITTALS

- A. Welding certificates.
- B. Field quality-control test reports.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For refrigerant valves and piping specialties to include in maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Welding: Qualify procedures and personnel according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."
- B. Comply with ASHRAE 15, "Safety Code for Refrigeration Systems."
- C. Comply with ASME B31.5, "Refrigeration Piping and Heat Transfer Components."

1.7 PRODUCT STORAGE AND HANDLING

- A. Store piping in a clean and protected area with end caps in place to ensure that piping interior and exterior are clean when installed.

PART 2 - PRODUCTS

2.1 COPPER TUBE AND FITTINGS

- A. Copper Tube: ASTM B 88, Type K or L.
- B. Wrought-Copper Fittings: ASME B16.22.
- C. Wrought-Copper Unions: ASME B16.22.
- D. Solder Filler Metals: ASTM B 32. Use 95-5 tin antimony or alloy HB solder to join copper socket fittings on copper pipe.
- E. Brazing Filler Metals: AWS A5.8.
- F. Flexible Connectors:
 - 1. Body: Tin-bronze bellows with woven, flexible, tinned-bronze-wire-reinforced protective jacket.
 - 2. End Connections: Socket ends.
 - 3. Offset Performance: Capable of minimum 3/4-inch misalignment in minimum 7-inch-long assembly.
 - 4. Pressure Rating: Factory test at minimum 500 psig.
 - 5. Maximum Operating Temperature: 250 deg F.

2.2 REFRIGERANTS

- A. ASHRAE 34, R-410A: Pentafluoroethane/Difluoromethane.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Install piping as indicated unless deviations to layout are approved on Shop Drawings.
- B. Install refrigerant piping according to ASHRAE 15 and according to equipment manufacturer's instruction. Include all accessories, appurtances and devices according to equipment manufacturer's installation instructions.
- C. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

- D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- E. Install piping adjacent to machines to allow service and maintenance.
- F. Install piping free of sags and bends.
- G. Install fittings for changes in direction and branch connections.
- H. Install piping as short and direct as possible, with a minimum number of joints, elbows, and fittings.
- I. Arrange piping to allow inspection and service of refrigeration equipment. Install valves and specialties in accessible locations to allow for service and inspection. Install access doors or panels as necessary if valves or equipment requiring maintenance is concealed behind finished surfaces.
- J. When brazing or soldering, remove solenoid-valve coils and sight glasses; also remove valve stems, seats, and packing, and accessible internal parts of refrigerant specialties. Do not apply heat near expansion-valve bulb.
- K. Install piping with adequate clearance between pipe and adjacent walls and hangers or between pipes for insulation installation.
- L. Identify refrigerant piping and valves according to Section 230553 "Identification for HVAC Piping and Equipment."
- M. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 230517 "Sleeves and Sleeve Seals for HVAC Piping."
- N. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 230517 "Sleeves and Sleeve Seals for HVAC Piping."
- O. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 230518 "Escutcheons for HVAC Piping."
- P. Provide insulation on all refrigerant piping to comply with all applicable codes and Title 24 requirements.

3.2 PIPE JOINT CONSTRUCTION

- A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- C. Soldered Joints: Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook."
- D. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," Chapter "Pipe and Tube."

1. Use Type BcuP, copper-phosphorus alloy for joining copper socket fittings with copper pipe.
2. Use Type BAg, cadmium-free silver alloy for joining copper with bronze or steel.

3.3 HANGERS AND SUPPORTS

A. Install the following pipe attachments:

1. Adjustable steel clevis hangers for individual horizontal runs less than 20 feet long.
2. Roller hangers and spring hangers for individual horizontal runs 20 feet or longer.
3. Pipe Roller: MSS SP-58, Type 44 for multiple horizontal piping 20 feet or longer, supported on a trapeze.
4. Spring hangers to support vertical runs.
5. Copper-clad hangers and supports for hangers and supports in direct contact with copper pipe.

B. Install hangers for copper tubing with the following maximum spacing and minimum rod sizes:

1. NPS 1/2: Maximum span, 60 inches; minimum rod size, 1/4 inch.
2. NPS 5/8: Maximum span, 60 inches; minimum rod size, 1/4 inch.
3. NPS 1: Maximum span, 72 inches; minimum rod size, 1/4 inch.
4. NPS 1-1/4: Maximum span, 96 inches; minimum rod size, 3/8 inch.
5. NPS 1-1/2: Maximum span, 96 inches; minimum rod size, 3/8 inch.
6. NPS 2: Maximum span, 96 inches; minimum rod size, 3/8 inch.
7. NPS 2-1/2: Maximum span, 108 inches; minimum rod size, 3/8 inch.
8. NPS 3: Maximum span, 10 feet; minimum rod size, 3/8 inch.
9. NPS 4: Maximum span, 12 feet; minimum rod size, 1/2 inch.

C. Support multifloor vertical runs at least at each floor.

3.4 FIELD QUALITY CONTROL

A. Perform tests and inspections and prepare test reports.

B. Tests and Inspections:

1. Comply with ASME B31.5, Chapter VI.
2. Test refrigerant piping, specialties, and receivers. Isolate compressor, condenser, evaporator, and safety devices from test pressure if they are not rated above the test pressure.
3. Test high- and low-pressure side piping of each system separately at not less than the pressures indicated in Part 1 "Performance Requirements" Article.
 - a. Fill system with nitrogen to the required test pressure.
 - b. System shall maintain test pressure at the manifold gage throughout duration of test.
 - c. Test joints and fittings with electronic leak detector or by brushing a small amount of soap and glycerin solution over joints.

- d. Remake leaking joints using new materials, and retest until satisfactory results are achieved.

3.5 SYSTEM CHARGING

- A. Charge system using the following procedures:
 1. Install core in filter dryers after leak test but before evacuation.
 2. Evacuate entire refrigerant system with a vacuum pump to 500 micrometers. If vacuum holds for 12 hours, system is ready for charging.
 3. Break vacuum with refrigerant gas, allowing pressure to build up to 2 psig.
 4. Charge system with a new filter-dryer core in charging line.

3.6 ADJUSTING

- A. Adjust thermostatic expansion valve to obtain proper evaporator superheat.
- B. Adjust high- and low-pressure switch settings to avoid short cycling in response to fluctuating suction pressure.
- C. Adjust set-point temperature of air-conditioning controllers to the system design temperature.
- D. Perform the following adjustments before operating the refrigeration system, according to manufacturer's written instructions:
 1. Open shutoff valves in condenser water circuit.
 2. Verify that compressor oil level is correct.
 3. Open compressor suction and discharge valves.
 4. Open refrigerant valves except bypass valves that are used for other purposes.
 5. Check open compressor-motor alignment and verify lubrication for motors and bearings.
- E. Replace core of replaceable filter dryer after system has been adjusted and after design flow rates and pressures are established.

END OF SECTION 232300

SECTION 235233 - WATER-TUBE BOILERS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes packaged, factory-fabricated and -assembled, gas-fired, finned water-tube boilers, trim, and accessories for generating hot water.
- B. This Section includes packaged, water-tube boilers, trim, and accessories for generating hot water .
 - 1. Factory assembled.

1.2 ACTION SUBMITTALS

- A. Product Data: Include performance data, operating characteristics, furnished specialties, and accessories.

1.3 INFORMATIONAL SUBMITTALS

- A. Source quality-control test reports.
- B. Warranty: Special warranty specified in this Section.
- C. Other Informational Submittals:
 - 1. Startup service reports.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For boilers, components, and accessories to include in emergency, operation, and maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. ASME Compliance: Fabricate and label boilers to comply with ASME Boiler and Pressure Vessel Code.
- C. I=B=R Compliance: Boilers shall be tested and rated according to HI's "Rating Procedure for Heating Boilers" and "Testing Standard for Commercial Boilers," with I=B=R emblem on a nameplate affixed to boiler.

1.6 COORDINATION

- A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified with concrete.

1.7 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace heat exchangers damaged by thermal shock and vent dampers of boilers that fail in materials or workmanship within specified warranty period.

PART 2 - PRODUCTS

2.1 FINNED WATER-TUBE BOILERS

- A. Description: Factory-fabricated, -assembled, and -tested boiler. The model shown on the schedule in the drawings is the basis of design. Provide including insulated jacket, flue-gas vent, combustion-air intake connections, water supply and return connections, boiler circulation pump, and controls.
- B. Trim:
 - 1. Aquastat Controllers: Operating, 2 stage firing rate, and high limit.
 - 2. Safety Relief Valve: ASME rated.
 - 3. Pressure and Temperature Gage: Minimum 3-1/2-inch-diameter, combination water-pressure and -temperature gage. Gages shall have operating-pressure and -temperature ranges so normal operating range is about 50 percent of full range.
 - 4. Boiler Air Vent: Automatic.
 - 5. Drain Valve: Minimum NPS 3/4 hose-end gate valve.
 - 6. Circulation Pump: Non-overloading, in-line pump with split-capacitor motor having thermal-overload protection and lubricated bearings; designed to operate at specified boiler pressures and temperatures.
- C. Controls:
 - 1. Boiler operating controls shall include the following devices and features:
 - a. Control transformer.
 - b. Motorized Vent Damper: Interlocked with burner to open before burner starts. If damper fails to open, stop burner operation.
 - c. Set-Point Adjust: Set points shall be adjustable.
 - d. Sequence of Operation: Electric, factory-fabricated and field-installed panel to control burner firing rate to reset supply-water temperature inversely with outside-air temperature. At 30 deg F outside-air temperature, set supply-water temperature at 180; at 60 deg F outside-air temperature, set supply-water temperature at 140 deg F.
 - e. Include automatic, alternating-firing sequence for multiple boilers to ensure maximum system efficiency throughout the load range and to provide equal runtime for boilers.

2. Burner Operating Controls: To maintain safe operating conditions, burner safety controls limit burner operation.
 - a. High Cutoff: Manual reset stops burner if operating conditions rise above maximum boiler design temperature.
 - b. Water Flow Switch: Automatic-reset paddle-switch shall prevent burner operation on low water flow.
 - c. Audible Alarm: Factory mounted on control panel with silence switch; shall sound alarm for above conditions.
3. Building Automation System Interface: Factory install hardware and software to enable building automation system to monitor, control, and display boiler status and alarms.
 - a. Monitoring: On/off status, common trouble alarm.
 - b. Control: On/off operation, hot water supply temperature set-point adjustment.
 - c. A communication interface with building automation system shall enable building automation system operator to remotely control and monitor the boiler from an operator workstation. Control features available, and monitoring points displayed, locally at boiler control panel shall be available through building automation system.

2.2 ELECTRICAL POWER

- A. Controllers, Electrical Devices, and Wiring: Electrical devices and connections are specified in electrical Sections.
- B. Single-Point Field Power Connection: Factory-installed and -wired switches, motor controllers, transformers, and other electrical devices necessary shall provide a single-point field power connection to boiler.
 1. House in NEMA 250, Type 1 enclosure.
 2. Wiring shall be numbered and color-coded to match wiring diagram.
 3. Install factory wiring outside of an enclosure in a metal raceway.
 4. Provide each motor with overcurrent protection.

2.3 VENTING KITS

- A. Vent Damper: Motorized, UL listed for use on atmospheric burner boiler equipped with draft hood; motor to open and close damper; stainless-steel vent coupling and damper blade; keyed wiring harness connector plug; and dual-position switches to permit burner operation.
- B. Combustion-Air Intake: Stainless steel, pipe, vent terminal with screen, inlet air coupling, and sealant.

2.4 CAPACITIES AND CHARACTERISTICS

- A. Refer to schedule on drawings.

2.5 SOURCE QUALITY CONTROL

- A. Test and inspect factory-assembled boilers, before shipping, according to ASME Boiler and Pressure Vessel Code.
- B. Burner and Hydrostatic Test: Factory adjust burner to eliminate excess oxygen, carbon dioxide, oxides of nitrogen emissions, and carbon monoxide in flue gas and to achieve combustion efficiency; perform hydrostatic test.
- C. Allow Owner access to source quality-control testing of boilers. Notify Architect 14 days in advance of testing.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Before boiler installation, examine roughing-in for concrete equipment bases, anchor-bolt sizes and locations, and piping and electrical connections to verify actual locations, sizes, and other conditions affecting boiler performance, maintenance, and operations.
 - 1. Final boiler locations indicated on Drawings are approximate. Determine exact locations before roughing-in for piping and electrical connections.
- B. Examine mechanical spaces for suitable conditions where boilers will be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 BOILER INSTALLATION

- A. Install per manufacturer's installation instructions.
- B. Equipment Mounting:
 - 1. Install boilers on cast-in-place concrete equipment base(s).
- C. Install gas-fired boilers according to NFPA 54.
- D. Install electrical devices furnished with boiler but not specified to be factory mounted.
- E. Install control wiring to field-mounted electrical devices.

3.3 CONNECTIONS

- A. Piping installation requirements are specified in other Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to boiler to allow service and maintenance.

- C. Connect gas piping to boiler gas-train inlet with union. Piping shall be at least full size of gas train connection. Provide a reducer if required.
- D. Connect hot-water piping to supply- and return-boiler tapings with shutoff valve and union or flange at each connection.
- E. Install piping from safety relief valves to nearest floor drain.
- F. Install piping from safety valves to nearest floor drain.
- G. Install piping from equipment drain connection to nearest floor drain. Piping shall be at least full size of connection. Provide an isolation valve if required.
- H. Boiler Flue Venting:
 - 1. Install venting kit and combustion-air intake.
- I. Connect breeching to full size of boiler outlet.
- J. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."
- K. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

3.4 FIELD QUALITY CONTROL

- A. Perform tests and inspections and prepare test reports.
 - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- B. Tests and Inspections:
 - 1. Perform installation and startup checks according to manufacturer's written instructions.
 - 2. Leak Test: Hydrostatic test. Repair leaks and retest until no leaks exist.
 - 3. Operational Test: Start units to confirm proper motor rotation and unit operation. Adjust air-fuel ratio and combustion.
 - 4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 - a. Burner Test: Adjust burner to eliminate excess oxygen, carbon dioxide, oxides of nitrogen emissions, and carbon monoxide in flue gas and to achieve combustion efficiency.
 - b. Check and adjust initial operating set points and high- and low-limit safety set points of fuel supply, water level, and water temperature.
 - c. Set field-adjustable switches and circuit-breaker trip ranges as indicated.
- C. Remove and replace malfunctioning units and retest as specified above.

- D. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other than normal occupancy hours for this purpose.
- E. Performance Tests:
 - 1. Engage a factory-authorized service representative to inspect component assemblies and equipment installations, including connections, and to conduct performance testing.
 - 2. Boilers shall comply with performance requirements indicated, as determined by field performance tests. Adjust, modify, or replace equipment in order to comply.
 - 3. Perform field performance tests to determine the capacity and efficiency of the boilers.
 - a. Test for full capacity.
 - 4. Repeat tests until results comply with requirements indicated.
 - 5. Provide analysis equipment required to determine performance.
 - 6. Provide temporary equipment and system modifications necessary to dissipate the heat produced during tests if building systems are not adequate.
 - 7. Notify Architect in advance of test dates.
 - 8. Document test results in a report and submit to Architect.

3.5 DEMONSTRATION

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

END OF SECTION 235233

SECTION 238119 - SELF-CONTAINED AIR-CONDITIONERS

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 packaged, air-cooled air-conditioning units with refrigerant compressors and controls intended for indoor installations.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and furnished specialties and accessories.

1.4 INFORMATIONAL SUBMITTALS

- A. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For self-contained air conditioners to include in emergency, operation, and maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Filters: One set(s) of filters for each unit.
 - 2. Fan Belts: One set(s) of belts for each unit.
 - 3. Fuses: One set(s) for each air-handling unit.

1.7 QUALITY ASSURANCE

- A. 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.
- B. ARI Compliance:

1. Cooling capacity less than 65,000 BTUH: Applicable requirements in ARI 210/240.
2. Cooling capacity greater than 65,000 BTUH and less than 250,000 BTUH: Applicable requirements in ARI 340/360.

C. ASHRAE Compliance:

1. Fabricate and label refrigeration system to comply with ASHRAE 15, "Safety Standard for Refrigeration Systems."

1.8 COORDINATION

- A. Coordinate sizes and locations of roof curbs with actual equipment provided.

1.9 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of self-contained air conditioners that fail in materials or workmanship within specified warranty period.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings (basis of design) or comparable product:

2.2 PACKAGED UNITS

- A. Description: Factory assembled, wired, and tested; and fully charged with refrigerant and oil.
- B. Configuration: Vertical, roof mounted; vertical and horizontal discharge.
- C. Disconnect Switch: Factory mounted on cabinet.

2.3 Cabinet

- A. Frame and Panels: Structural-steel frame with galvanized-steel panels and access doors or panels.
- B. Insulation: 1-inch-thick, glass-fiber duct liner complying with ASTM C 1091 and having a microbial coating on cabinet interior and control panel. 1/2-inch-thick liner is acceptable for units smaller than 15 tons.
- C. Corrosion-Resistant Treatment: Phenolic coating on unit interior and exterior.

2.4 Supply-air Fan

- A. Fan Material: Galvanized steel.
- B. Configuration: Double-width, double-inlet, forward-curved centrifugal fan; statically and dynamically balanced.
- C. Drive: Belt, with fan mounted on permanently lubricated bearings.
- D. Fan Sheaves: Variable pitch, dynamically balanced, bored to fit shafts, and keyed for initial startup.
- E. Motor Sheave: Variable and adjustable pitch, dynamically balanced, and selected to achieve specified rpm when set at midposition.
- F. Belt Rating: As recommended by manufacturer or a minimum of one and one-half times nameplate rating of motor.
- G. Outdoor-Air-Intake Accessories:
 - 1. Air-Side Economizer: Damper assembly allowing induction of up to 100 percent outdoor air to maintain a selected mixed-air temperature; and exhaust damper and spring-return, low-voltage, modulating damper motor with minimum position adjustment.

2.5 REFRIGERATION SYSTEM

- A. Compressor: Scroll type, hermetically sealed, 3600 rpm maximum, and resiliently mounted with positive lubrication and internal motor protection.
- B. Refrigerant Coils (Indoor and Outdoor for Air-Cooled Units): Seamless copper tubes expanded into aluminum fins.
 - 1. Corrosion-Resistant Treatment: Phenolic coating applied with multiple dips and baked.
 - 2. Refrigerant: R-410A.
 - 3. Refrigerant dryer.
 - 4. High-pressure switch.
 - 5. Low-pressure switch.
 - 6. Thermostat for coil freeze-up protection during low ambient temperature operation or loss of air.
 - 7. Low ambient temperature switch.
 - 8. Brass service valves installed in discharge and liquid lines.

2.6 Heating Coil

- A. Water Coil: Copper tube, with mechanically bonded aluminum fins spaced no closer than 0.1 inch; leak tested to 300 psig underwater; and having a two-position control valve.

2.7 CONTROLS

- A. Control Package: Factory wired, including contactor, high- and low-pressure cutouts, internal-winding thermostat for compressor, control-circuit transformer, and noncycling reset relay.
- B. Time-Delay Relay: Five-minute delay to prevent compressor cycling.
- C. System Selector Switch: Off-heat-auto-cool.
- D. Fan Control Switch: Auto-on.
- E. Microprocessor Control Panel: Controls unit functions as standalone or network operation, including refrigeration and safety controls, with unit-mounted display, and the following:
 - 1. Supply fan.
 - 2. Supply-fan motor speed.
 - 3. Compressors.
 - 4. Air-cooled condenser.
 - 5. Modulating, hot-water coil valve.
 - 6. Night-heat, morning warm-up cycle.
 - 7. Economizer control.
 - 8. Panel-mounted control switch to operate unit in remote or local control mode or to stop or reset.
 - 9. Panel-mounted indication of the following:
 - a. Operating status.
 - b. System diagnostics and safety alarms.
 - c. Supply-air temperature set point.
 - d. Zone heating-temperature set point.
 - e. Supply-air pressure set point.
 - f. Economizer minimum position set point.
 - g. Supply-air-pressure, high-limit set point.

2.8 Capacities and Characteristics: refer to schedule on drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install units level and plumb and according to manufacturer's installation recommendations/requirements.
- B. Anchor units to roof curb.

3.2 CONNECTIONS

- A. Piping installation requirements are specified in other Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

1. Water Coil Connections: Connect to supply and return coil with shutoff-duty valve and union or flange on the supply connection and with throttling-duty valve and union or flange on the return connection.
- B. Where installing piping adjacent to equipment, allow space for service and maintenance of equipment.
- C. Duct Connections: Drawings indicate the general arrangement of ducts. Connect supply and return ducts to self-contained air conditioners with flexible duct connectors.

3.3 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.
- B. Perform tests and inspections.
 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- C. Tests and Inspections:
 1. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation, and inspect for refrigerant leaks.
 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Units will be considered defective if they do not pass tests and inspections.
- E. Prepare test and inspection reports.

3.4 STARTUP SERVICE

- A. Engage a factory-authorized service representative to perform startup service.

END OF SECTION 238119

SECTION 238126 - SPLIT-SYSTEM AIR-CONDITIONERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes split-system air-conditioning units consisting of separate evaporator-fan and compressor-condenser components.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and furnished specialties and accessories. Include performance data in terms of capacities, outlet velocities, static pressures, sound power characteristics, motor requirements, and electrical characteristics.

1.3 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.
- B. Warranty: Sample of special warranty.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For split-system air-conditioning units to include in emergency, operation, and maintenance manuals.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Filters: One set(s) for each air-handling unit.
 - 2. Fan Belts: One set(s) for each air-handling unit fan.

1.6 QUALITY ASSURANCE

- A. 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.
- B. ASHRAE Compliance:
 - 1. Fabricate and label refrigeration system to comply with ASHRAE 15, "Safety Standard for Refrigeration Systems."

1.7 COORDINATION

- A. Coordinate sizes and locations of roof curbs, equipment supports, and roof penetrations with actual equipment provided.

1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of split-system air-conditioning units that fail in materials or workmanship within specified warranty period.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. **Basis-of-Design Product:** Subject to compliance with requirements, provide product indicated on Drawings (basis of design) or comparable products:

2.2 INDOOR UNITS (5 TONS OR LESS)

- A. Concealed Evaporator-Fan Components:

1. Chassis: Galvanized steel with flanged edges, removable panels for servicing, and insulation on back of panel.
2. Insulation: Faced, glass-fiber duct liner.
3. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins and thermal-expansion valve. Comply with ARI 206/110.
4. Water Coil: Copper tube, with mechanically bonded aluminum fins spaced no closer than 0.1 inch; leak tested to 300 psig underwater; with a two-position control valve.
5. Fan: Forward-curved, double-width wheel of galvanized steel; directly connected to motor.
6. Fan Motors:
 - a. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements .
 - b. Wiring Terminations: Connect motor to chassis wiring with plug connection.
7. Filters: Permanent, cleanable.
8. Condensate Drain Pans:
 - a. Fabricated with one percent slope in at least two planes to collect condensate from cooling coils (including coil piping connections, coil headers, and return bends) and humidifiers, and to direct water toward drain connection.
 - b. Single-wall, galvanized-steel sheet.
 - c. Drain Connection: Located at lowest point of pan and sized to prevent overflow. Terminate with threaded nipple on one end of pan.
 - d. Pan-Top Surface Coating: Asphaltic waterproofing compound.

- e. Units with stacked coils shall have an intermediate drain pan to collect condensate from top coil.

2.3 OUTDOOR UNITS (5 TONS OR LESS)

A. Air-Cooled, Compressor-Condenser Components:

1. Casing: Steel, finished with baked enamel in color selected by Architect, with removable panels for access to controls, weep holes for water drainage, and mounting holes in base. Provide brass service valves, fittings, and gage ports on exterior of casing.
2. Compressor: Hermetically sealed with crankcase heater and mounted on vibration isolation device. Compressor motor shall have thermal- and current-sensitive overload devices, start capacitor, relay, and contactor.
 - a. Compressor Type: Scroll.
 - b. Two-speed compressor motor with manual-reset high-pressure switch and automatic-reset low-pressure switch.
 - c. Refrigerant Charge: R-410A.
 - d. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins and liquid subcooler. Comply with ARI 206/110.
3. Fan: Aluminum-propeller type, directly connected to motor.
4. Motor: Permanently lubricated, with integral thermal-overload protection.
5. Low Ambient Kit: Permits operation down to 45 deg F.

2.4 ACCESSORIES

- A. Automatic-reset timer to prevent rapid cycling of compressor.
- B. Refrigerant Line Kits: Soft-annealed copper suction and liquid lines factory cleaned, dried, pressurized, and sealed; factory-insulated suction line with flared fittings at both ends.

2.5 CAPACITIES AND CHARACTERISTICS

- A. Refer to schedule on drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install units level and plumb and according to manufacturer's installation recommendations/requirements.
- B. Install evaporator-fan components using manufacturer's standard mounting devices securely fastened to building structure.
- C. Install and connect precharged refrigerant tubing to component's quick-connect fittings. Install tubing to allow access to unit.

3.2 CONNECTIONS

- A. Piping installation requirements are specified in other Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
 - 1. Water Coil Connections: Comply with requirements specified in Section 232113 "Hydronic Piping" and Section 232116 Hydronic Piping Specialties." Connect hydronic piping to supply and return coil connections with shutoff-duty valve and union or flange on the supply connection and with throttling-duty valve and union or flange on the return connection.
- B. Where piping is installed adjacent to unit, allow space for service and maintenance of unit.
- C. Duct Connections: Connect supply and return ducts to split-system air-conditioning units with flexible duct connectors.

3.3 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.
- B. Perform tests and inspections.
 - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- C. Tests and Inspections:
 - 1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
 - 2. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
 - 3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Remove and replace malfunctioning units and retest as specified above.
- E. Prepare test and inspection reports.

3.4 STARTUP SERVICE

- A. Engage a factory-authorized service representative to perform startup service.
 - 1. Complete installation and startup checks according to manufacturer's written instructions.

END OF SECTION 238126

SECTION 238216.11 - HYDRONIC AIR COILS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes hydronic heating air coils.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each air coil.
 - 2. Include rated capacities, operating characteristics, and pressure drops for each air coil.

1.3 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For air coils to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 DESCRIPTION

- A. Heating hot water coils are to be provided with each package and split system heating and air conditioning unit.

2.2 COILS

- A. **Basis**-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings (basis of design) or comparable product:
- B. Performance Ratings: Tested and rated according to AHRI 410 and ASHRAE 33.
- C. Minimum Working-Pressure/Temperature Ratings: 200 psig, 325 deg F.
- D. Source Quality Control: Factory tested to 300 psig.
- E. Hot-Water Coil Capacities and Characteristics: refer to schedules on drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine ducts, plenums, and casings to receive air coils for compliance with requirements for installation tolerances and other conditions affecting coil performance.
- B. Examine roughing-in for piping systems to verify actual locations of piping connections before coil installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install coils level and plumb.
- B. Straighten bent fins on air coils.
- C. Clean coils using materials and methods recommended in writing by manufacturers, and clean inside of casings and enclosures to remove dust and debris.

3.3 CONNECTIONS

- A. Piping installation requirements are specified in other Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to coils to allow service and maintenance.
- C. Connect water piping with unions and shutoff valves to allow coils to be disconnected without draining piping.

END OF SECTION 238216.11

PACKAGE DX/HYDRONIC HEATING ROOF TOP UNITS																					
SYMBOL	MANUF/ MODEL	MIN/MAX OSA (CFM)	COOLING			HEATING COIL							FAN			ELECTRIC				WEIGHT (LBS)	NOTES
			TOTAL (W/BH)	SENSIBLE (M/BH)	SEER/EER	M/BH	GPM	EAT	LAT	EWT	LWT	FLUID PD (FT)	SUPPLY CFM/ESP	EXHAUST FAN (KW)	HP	VOLTS	PHASE	WGA	MOCP		
RTU-1	TRANE THC036	90/170	36.7	33.2	15	35.1	2.3	53	80	180	150	0.43	1200	0.65	0.75	460	3	11	15	780	1
RTU-2	TRANE THC036	150/460	36.7	33.2	15	35.1	2.3	53	80	180	150	0.43	1200	0.65	0.75	460	3	11	15	780	1
RTU-3	TRANE THC036	155/500	36.7	33.2	15	35.1	2.3	53	80	180	150	0.43	1200	0.65	0.75	460	3	11	15	780	1
RTU-4	TRANE THC036	150/470	36.7	33.2	15	35.1	2.3	53	80	180	150	0.43	1200	0.65	0.75	460	3	11	15	780	1
RTU-5	TRANE THC036	150/490	36.7	33.2	15	35.1	2.3	53	80	180	150	0.43	1200	0.65	0.75	460	3	11	15	780	1
RTU-6	TRANE THC036	210/300	36.7	33.2	15	35.1	2.3	53	80	180	150	0.43	1200	0.65	0.75	460	3	11	15	780	1
RTU-7	TRANE THC036	230/510	36.7	33.2	15	35.1	2.3	53	80	180	150	0.43	1200	0.65	0.75	460	3	11	15	780	1
RTU-8	TRANE THC092	420/1050	88.3	76.5	/12.6	87.8	5.8	53	80	180	150	2.7	3000	0.65	1.5	460	3	19.9	25	1230	1, 3
RTU-9	TRANE THC102	280/3752	95.2	86.2	/12.5	99.6	6.6	53	80	180	150	3.4	3400	0.65	2	460	3	21.6	25	1230	1, 3
RTU-10	TRANE THC102	280/3752	95.2	86.2	/12.5	99.6	6.6	53	80	180	150	3.4	3400	0.65	2	460	3	21.6	25	1230	1, 3
RTU-11	TRANE THC102	360	95.2	86.2	/12.5	99.6	6.6	53	80	180	150	3.4	3400	0.65	2	460	3	21.6	25	1230	1, 3
RTU-12	TRANE THC048	1500	53.4	46.3	15	98.9	6.6	28	85	180	150	4.8	1600	0.65	0.75	460	3	12.8	15	910	1, 2
RTU-13	TRANE THC060	1800	64.7	58.15	15	101.9	6.8	28	75	180	150	9	2000	0.65	1	460	3	13.8	20	960	1, 2
RTU-14	TRANE THC048	1500	53.4	46.3	15	98.9	6.6	28	85	180	150	4.8	1600	0.65	0.75	460	3	12.8	15	910	1, 2
NOTES:																					
1. BELT DRIVE, PROVIDE WITH 1" THROWAWAY FILTERS (MERV , CONVENIENCE OUTLET, NON-FUSED DISCONNECT, THRU THE BASE ELECTRICAL CONNECTION) ECONOMIZER SECTIONS AND DEMAND CONTROL VENTILATION CONTROLS.																					
2. PROVIDE WITH FROSTAT AND CRANKCASE HEATERS (UNITS PROVIDING 100% OUTSIDE AIR).																					
3. PROVIDE WITH DUCT SMOKE DETECTOR IN THE SUPPLY DUCT FOR THE UNIT.																					

INDOOR DX/HYDRONIC HEATING HORIZONTAL UNITS																				
SYMBOL	MANUF/ MODEL	OUTDOOR UNIT	MIN OSA (CFM)	SENSIBLE COOLING (MBH)	HEATING COIL							FAN			ELECTRIC			WEIGHT (LBS)	NOTES	
					MBH	GPM	EAT	LAT	EWIT	LVT	FLUID PD (FT)	CFM	ESP	HP	VOLTS	PHASE	MCA			MOCp
FCU-1	TRANE GAM5A0A18	CU-1	80	5.6	28.8	3	70	120	180	150	0.4	600	0.5	1/3	208	1	4	15	150	
FCU-2	TRANE GAM5A0A18	CU-2	50	8.4	28.8	3	70	120	180	150	0.4	600	0.5	1/3	208	1	4	15	150	
FCU-3	TRANE GAM5A0A30	CU-3	470	18	35.4	3	70	114	180	150	0.5	1000	0.5	1/3	208	1	4	15	150	
FCU-4	TRANE GAM5A0A36	CU-4	610	25	37.4	3	70	111	180	150	0.5	1200	0.5	1/2	208	1	5	15	170	
FCU-5	TRANE GAM5A0A36	CU-5	550	21.5	37.4	3	70	111	180	150	0.5	1200	0.5	1/2	208	1	5	15	170	
FCU-6	TRANE GAM5A0A60	CU-6	1200	49.1	49.9	3	70	99	180	150	0.5	1600	0.5	1	208	1	10	15	190	
FCU-7	TRANE GAM5A0A30	CU-7	1200	18	35.4	3	70	114	180	150	0.5	1000	0.5	1/3	208	1	4	15	150	
FCU-8	TRANE GAM5A0A36	CU-8	430	25.4	37.4	3	70	111	180	150	0.5	1200	0.5	1/2	208	1	5	15	170	
FCU-9	TRANE GAM5A0A18	CU-9	30	10	28.8	3	70	120	180	150	0.4	600	0.5	1/3	208	1	4	15	150	
FCU-10	TRANE GAM5A0A48	CU-10	450	34.8	49.9	3	70	99	180	150	0.5	1600	0.5	/3/4	208	1	8	15	190	
FCU-11	TRANE GAM5A0A18	CU-11	40	11.4	28.8	3	70	120	180	150	0.4	600	0.5	1/3	208	1	4	15	150	
FCU-12	TRANE GAM5A0A18	CU-12	40	11.5	28.8	3	70	120	180	150	0.4	600	0.5	1/3	208	1	4	15	150	
FCU-13	TRANE GAM5A0A18	CU-13	90	9.4	28.8	3	70	120	180	150	0.4	600	0.5	1/3	208	1	4	15	150	
FCU-14	TRANE GAM5A0A18	CU-14	80	7.7	28.8	3	70	120	180	150	0.4	600	0.5	1/3	208	1	4	15	150	
NOTES:																				
1. PROVIDE WITH CONDENSATE PUMP, FILTER RACK, 1" THROWAWAY FILTERS (MERV 8), PROGRAMABLE THERMOSTAT AND DRAIN PAN. SET FAN SPEED TO ACHIEVE AIR VOLUME STATED ABOVE.																				

CONDENSING UNITS												
SYMBOL	MANUFACTURER /MODEL	INDOOR UNIT	REFRIG TYPE	OSA TEMP (F)	COOLING		ELECTRIC				WEIGHT (LBS)	NOTES
					TOTAL (MBH)	SEER	VOLTS	PHASE	MCA	MOCP		
CU-1	TRANE 4TTR4018L	FCU-1	410A	95	8.1	15.5	208	1	12	20	150	
CU-2	TRANE 4TTR4018L	FCU-2	410A	95	9.3	15.5	208	1	12	20	150	
CU-3	TRANE 4TTR4030L	FCU-3	410A	95	27.8	15.5	208	1	17	25	180	
CU-4	TRANE 4TTR4036L	FCU-4	410A	95	34.8	15.5	208	1	18	30	180	
CU-5	TRANE 4TTR4036L	FCU-5	410A	95	30.8	15.5	208	1	18	30	180	
CU-6	TRANE 4TTR4060L	FCU-6	410A	95	73.4	14	208	1	31	50	230	
CU-7	TRANE 4TTR4030L	FCU-7	410A	95	27.8	15.5	208	1	17	25	180	
CU-8	TRANE 4TTR4036L	FCU-8	410A	95	33.6	15.5	208	1	18	30	180	
CU-9	TRANE 4TTR4018L	FCU-9	410A	95	12	15.5	208	1	12	20	150	
CU-10	TRANE 4TTR4048L	FCU-10	410A	95	44.4	15.5	208	1	24	40	200	
CU-11	TRANE 4TTR4018L	FCU-11	410A	95	12	15.5	208	1	12	20	150	
CU-12	TRANE 4TTR4018L	FCU-12	410A	95	11.8	15.5	208	1	12	20	150	
CU-13	TRANE 4TTR4018L	FCU-13	410A	95	11.1	15.5	208	1	12	20	150	
CU-14	TRANE 4TTR4018L	FCU-14	410A	95	10.5	15.5	208	1	12	20	150	

GENERAL MECHANICAL NOTES

3. ALL WORK SHALL COMPLY WITH THE REQUIREMENTS OF TITLE 24 OF THE CALIFORNIA CODE OF REGULATIONS (C.C.R.), 2013 CMC.
2. ALL SYSTEMS SHALL BE INSTALLED IN STRICT ACCORDANCE WITH ALL APPLICABLE CITY, COUNTY, FEDERAL AND STATE CODES AND ORDINANCES, AND SHALL MEET ALL REQUIREMENTS OF ALL AUTHORITIES HAVING JURISDICTION.
3. SYSTEM LAYOUTS AS INDICATED ON DRAWINGS ARE GENERALLY DIAGRAMMATIC BUT SHALL BE FOLLOWED AS CLOSELY AS ACTUAL CONSTRUCTION WILL PERMIT.
4. PRIOR TO SUBMISSION OF BID, REVIEW FULL SET OF NEW CONSTRUCTION DRAWINGS (INCLUDING ALL OTHER TRADES), INCLUDE ANY ADDITIONAL PIPE OR DUCT OFF-SETS THAT ARE NOT CURRENTLY SHOWN ON DRAWINGS BUT MAY BE REQUIRED TO CLEAR STRUCTURE, FINISHES OR WORK OF OTHER TRADES. NO EXTRA PAYMENT WILL BE ALLOWED FOR WORK RESULTING FROM LACK OF PROPER INITIAL APPRAISAL OF ENTIRE SCOPE OF WORK. SUBMIT REQUESTS FOR INFORMATION (RFIs) AS REQUIRED TO ANSWER ANY QUESTIONS THAT MAY ARISE DURING BIDDING PHASE. CLEARLY INDICATE SCOPE INCLUSION AND EXCLUSION IN BID.
5. FURNISH ALL LABOR, MATERIALS, TRANSPORTATION, AND PERFORM ALL REQUIRED OPERATIONS TO PROVIDE COMPLETE AND OPERABLE MECHANICAL SYSTEM, IN ACCORDANCE WITH THE FULL INTENT AND MEANING OF THE DRAWINGS AND SPECIFICATIONS AND PER STANDARD TRADE PRACTICES.
6. WORKSMANSHIP SHALL BE FIRST CLASS THROUGHOUT AND PERFORMED ONLY BY COMPETENT AND EXPERIENCED WORKMEN IN A MANNER SATISFACTORY TO THE OWNER AND ARCHITECT.
7. ALL EQUIPMENT SHALL BE INSTALLED WITH SUFFICIENT ACCESS TO CONTROLS, FILTERS, ELECTRIC MOTORS, ETC. CONTRACTOR SHALL PROVIDE ACCESS PANELS WHERE REQUIRED.
8. COORDINATE ACCESS TO ALL DAMPERS, VALVES, AND OTHER SERVICEABLE EQUIPMENT.
9. PROVIDE BIRD SCREENS AT ALL INTAKE AND EXHAUST OPENINGS.
10. FLASH AND COUNTER FLASH ALL ROOF PENETRATIONS AS REQUIRED TO SEAL WEATHER TIGHT. (SEE ARCHITECTURAL ROOFING DETAILS AND SPECIFICATIONS)
11. PROVIDE UL-LISTED/APPROVED THROUGH PENETRATION FIRE-STOPPING AT ALL DUCT, PIPE AND CONDUIT PENETRATIONS OF FIRE-RATED WALLS, FLOORS, CEILING/FLOOR OR CEILING/ROOF ASSEMBLIES AND SHAFTS COMPLIANT WITH CHAPTER 7 OF THE 2013 CALIFORNIA BUILDING CODE.
12. LIMITING TRANSMISSION OF NOISE AND VIBRATIONS IS EXTREMELY IMPORTANT. CONTRACTOR TO PAY PARTICULAR ATTENTION THAT PIPING, EQUIPMENT, AND DUCTWORK ARE INSTALLED SO AS NOT TO CHATTER OR RUB AGAINST OTHER MATERIALS, EQUIPMENT OR BUILDING STRUCTURE. PROVIDE ISOMODE PADS, INSULATION OR OTHER SUITABLE MATERIALS TO AVOID DIRECT CONTACT AND NOISY CONDITIONS. SUFFICIENT CLEARANCES OF PIPING AND ITS ASSOCIATED COMPONENTS SHALL BE PROVIDED FROM ADJACENT JOIST, STUDS, BEAMS, COLUMNS DRYWALL, ETC. TO ALLOW FOR PIPE MOVEMENT DUE TO THERMAL EXPANSION AND STILL NOT COME IN CONTACT WITH STRUCTURE. INSULATION SHALL BE CONTINUOUS THROUGH PIPE HANGERS (PROVIDE SHEET METAL INSULATION SHIELD AT EACH HANGER).
13. WHERE JOIST, STUD OR BEAM PENETRATIONS ARE REQUIRED, SIZE TO PROVIDE ADEQUATE CLEARANCE FROM PIPE BUT DO NOT SIZE FOR INSULATION. PROVIDE "ACCOUSTO-PLUMB" ISOLATORS AT EACH SUCH PIPE PENETRATION AND BUTT ENDS OF INSULATION TIGHT AGAINST FRAMING TO ELIMINATE ANY CONNECTIVE HEAT LOSS. REVIEW ALL SUCH PENETRATIONS WITH ARCHITECT AND GENERAL CONTRACTOR BEFORE DRILLING OR NOTCHING. SEE STRUCTURAL DRAWINGS FOR CRITERIA ON JOIST PENETRATIONS - VERIFY WITH GENERAL CONTRACTOR.
14. PROVIDE DIELECTRIC INSULATING CONNECTIONS BETWEEN ALL DISSIMILAR METALS.
15. NOTIFY OWNER AND GENERAL CONTRACTOR 48 HOURS IN ADVANCE BEFORE ANY TESTING.
16. PROVIDE DUCT AND PIPE INSULATION AND THERMOSTATS PER TITLE 24 REQUIREMENTS AND SPECIFICATIONS.
17. PER CALIFORNIA GREEN BUILDING STANDARDS CODE (PART 11 OF TITLE 24, CALIFORNIA CODE OF REGULATIONS), PROTECT DUCT OPENINGS AND MECHANICAL EQUIPMENT DURING CONSTRUCTION. LIMIT USE OF PERMANENT HVAC DURING CONSTRUCTION TO CONDITIONING NECESSARY FOR MATERIAL AND EQUIPMENT INSTALLATION. IF PERMANENT HVAC IS USED DURING CONSTRUCTION, INSTALL MERV-8 FILTERS ON RETURNS, AND REPLACE ALL FILTERS IMMEDIATELY PRIOR TO OCCUPANCY. OR, IF THE BUILDING IS OCCUPIED DURING ALTERATION, AT THE CONCLUSION OF CONSTRUCTION.
18. PER CALIFORNIA GREEN BUILDING STANDARDS CODE (PART 11 OF TITLE 24, CALIFORNIA CODE OF REGULATIONS), PROVIDE AT LEAST MERV-8 FILTERS IN REGULARLY OCCUPIED SPACES OF MECHANICALLY VENTILATED BUILDINGS.
19. PER CALIFORNIA GREEN BUILDING STANDARDS CODE (PART 11 OF TITLE 24, CALIFORNIA CODE OF REGULATIONS), DO NOT INSTALL EQUIPMENT THAT CONTAINS CFCS OR HALONS.
20. THE FIRST 10 FEET OF SUPPLY AND RETURN DUCTS CONNECTED TO THE ROOFTOP AND FAN COIL UNITS SHALL BE LINED WITH MINIMUM 1" SOUND ABSORBING LINING. DUCT DIMENSIONS SHOWN ARE CLEAR INSIDE DIMENSIONS. INSTALL PER MANUFACTURERS INSTRUCTIONS.

MEP COMPONENT ANCHORAGE NOTES

- ALL MECHANICAL, PLUMBING, AND ELECTRICAL COMPONENTS SHALL BE ANCHORED AND INSTALLED PER THE DETAILS ON THE DSA APPROVED CONSTRUCTION DOCUMENTS, WHERE NO DETAIL IS INDICATED. THE FOLLOWING COMPONENTS SHALL BE ANCHORED OR BORED TO MEET THE FORCE AND DISPLACEMENT REQUIREMENTS PRESCRIBED IN THE 2013 CBC, SECTIONS 1616.1.18 THROUGH 1616.1.26 AND ASCE 7-10 CHAPTER 13, 29 AND 31.
- 1. ALL PERMANENT EQUIPMENT AND COMPONENTS.
 - 2. TEMPORARY OR MOVABLE EQUIPMENT THAT IS PERMANENTLY ATTACHED (E.G. HARD WIRED) TO THE BUILDING UTILITY SERVICE SUCH AS ELECTRICAL, GAS OR WATER.
 - 3. MOVABLE EQUIPMENT THAT IS PERMANENTLY PLACED FOR MORE THAN 48 HOURS AND HEAVIER THAN 400 POUNDS OR MORE THAN 125 POUNDS ARE REQUIRED TO BE ANCHORED.
 - 4. THE FOLLOWING MECHANICAL AND ELECTRICAL COMPONENT S SHALL BE POSITIVELY ATTACHED TO THE STRUCTURE, BUT NEED NOT BE DETAILED ON THE PLANS. THESE COMPONENTS SHALL HAVE FLEXIBLE CONNECTIONS PROVIDED BETWEEN THE COMPONENT AND ASSOCIATED DUCTWORK, PIPING, AND CONDUIT.
- 1. COMPONENTS WEIGHING LESS THAN 400 POUNDS AND HAVE A CENTER OF MASS LOCATED 4 FEET OR LESS ABOVE THE ADJACENT FLOOR OR ROOF LEVEL THAT DIRECTLY SUPPORT THE COMPONENT.
 - 2. COMPONENTS WEIGHING LESS THAN 200 POUNDS, OR IN THE CASE OF DISTRIBUTED SYSTEMS, LESS THAN 5 POUNDS PER FOOT, WHICH ARE SUSPENDED FROM A ROOF OR FLOOR OR HUNG FROM A WALL.
- FOR THE ELEMENTS THAT DO NOT REQUIRE DETAILS ON THE APPROVED DRAWINGS, THE INSTALLATION SHALL BE SUBJECT TO THE APPROVAL OF THE STRUCTURAL ENGINEER OF RECORD AND THE DSA DISTRICT STRUCTURAL ENGINEER. THE PROJECT INSPECTOR WILL VERIFY THAT ALL COMPONENTS AND EQUIPMENT HAVE BEEN ANCHORED IN ACCORDANCE WITH ABOVE REQUIREMENTS.

LOW NOX GAS FIRED BOILER SCHEDULE

SYMBOL	MANUFACTURER /MODEL	LOCATION	NATURAL GAS			WATER DATA					ELECTRIC				WEIGHT (LBS)	NOTES	
			INPUT (MBH)	OUTPUT (MBH)	AFUE	EWI	LWT	GPM	VOLUME (GAL)	DROP (FT WATER)	FLUE (IN)	VOLTS	PHASE	FLA			MOCp
B-1	LAARS PENNANT PNCH1000	MECH ROOM	999	849	85%	150	180	57	---	---	10	120	1	12	15	700	1
B-2	LAARS PENNANT PNCH1000	MECH ROOM	999	849	85%	150	180	57	---	---	10	120	1	12	15	700	1

NOTES:

1. PROVIDE FACTORY-MOUNTED CIRCULATION PUMP.

PUMP SCHEDULE

SYMBOL	MANUFACTURER /MODEL	LOCATION	SYSTEM	TYPE	FLOW (GPM)	HEAD (FT OF WATER)	RPM	ELECTRICAL				WEIGHT (LBS)	NOTES
								VOLT	PHASE	HP	BHP		
HHWP-1	BELL & GOSSETT SERIES E-801.5x1.5x7C	MECH ROOM	HEATING HOT WATER	IN-LINE	90	35	---	460	3	1	---	200	1
HHWP-2	BELL & GOSSETT SERIES E-801.5x1.5x7C	MECH ROOM	HEATING HOT WATER	IN-LINE	90	35	---	460	3	1	---	200	1

NOTES

1. PROVIDE WITH VFD.

DIFFUSER, GRILLE AND REGISTER SCHEDULE

SYMBOL	MANUFACTURER	AREA SERVED	FACE SIZE	TYPE	MOUNT	NOTES
A	TITUS PCS	VARIOUS	SEE PLANS	SUPPLY GRILLE	T-BAR CEILING	ALUMINUM PERFORATED FACE DIFFUSER WITH STEEL, ADJUSTABLE, CURVED NECK MOUNTED DEFLECTOR BLADES.
B	TITUS PAR	VARIOUS	SEE PLANS	RETURN GRILLE	T-BAR CEILING	STEEL PERFORATED FACE RETURN.

SYMBOLS

NOTE: NOT ALL SYMBOLS APPLY

SYMBOL	ABBR	DESCRIPTION
	DETAIL NUMBER DRAWING NUMBER	
	SECTION NUMBER DRAWING NUMBER	
	EQUIPMENT TYPE UNIT NUMBER	
	SYMBOL AIR QUANTITY NECK SIZE	(4-WAY UON)
	CEILING SUPPLY DIFFUSER/REGISTER	
	CEILING RETURN GRILLE/REGISTER	
	CEILING EXHAUST GRILLE/REGISTER	
	CEILING TRANSFER DIFFUSER/GRILLE	
	CEILING OUTSIDE AIR GRILLE/REGISTER	
	SLOT DIFFUSER WITH AIR DUCT	
	WALL SUPPLY GRILLE/REGISTER	
	WALL RETURN OR EXHAUST GRILLE/REGISTER	
	SUPPLY AIR DUCT RISER/DROP	
	RETURN AIR DUCT RISER/DROP	
	EXHAUST AIR DUCT RISER/DROP	
	OUTSIDE AIR DUCT RISER/DROP	
	R or D SLOPED DUCT (RISE OR DROP)	
	L ACOUSTICAL LINING (1" FIBERGLASS U.O.N.)	
	TV TURNING VANES	
	FD FIRE DAMPER	
	FS FIRE-SMOKE DAMPER	
	VD VOLUME DAMPER	
	BDD BACK DRAFT DAMPER	
	FLEXIBLE DUCT	
	SQUARE TO ROUND DUCT	
	DUCT CONTINUATION	
	RL REFRIGERANT LIQUID	
	RS REFRIGERANT SUCTION	
	T-STAT THERMOSTAT (MOUNT AT 48" AFF)	
	TEMPERATURE SENSOR (MOUNT AT 48" AFF)	
	REFERENCE NOTE	
	CO2 SENSOR	
	HHWS HEATING HOT WATER SUPPLY	
	HHWR HEATING HOT WATER RETURN	
	DIRECTION OF SLOPE	
	DIRECTION OF FLOW	
	BALL VALVE	
	P&TRV RELIEF VALVE, P&T RELIEF VALVE	
	BUTTERFLY VALVE	
	GATE VALVE	
	CHECK VALVE	
	2-WAY CONTROL VALVE	
	3-WAY CONTROL VALVE	
	STRAINER	
	STRAINER WITH BLOW OFF	
	PRESSURE GAGE	
	PRESSURE GAUGE WITH COCK	
	THERMOMETER	
	PUMP	
	TEST TAP (PETE'S PLUG)	
	MV MANUAL AIR VENT	
	AAV AUTOMATIC AIR VENT	
	PIPE GUIDE	
	EXPANSION JOINT	
	FLEXIBLE CONNECTOR	
	UNION	
	CAPPED OR PLUGGED TEE	
	EXPANSION LOOP	
	PIPE UP	
	PIPE DOWN	
	TOP CONNECTION - BRANCH LINE	
	BOTTOM CONNECTION - BRANCH LINE	
	PIPE ANCHOR	
	TEE UP	
	TEE DOWN	
	CIRCUIT SETTER	

ABBREVIATIONS

NOTE: NOT ALL ABBREVIATIONS APPLY

AC	DIAMETER	LWT	LEAVING WATER TEMPERATURE
ACC	AIR CONDITIONING	MA	MIXED AIR
AFF	ABOVE FINISHED FLOOR	MAX	MAXIMUM
AMP	AMPERE	MBH	THOUSAND BTU PER HOUR
ARCH	ARCHITECTURAL	MECH	MECHANICAL
BDD	BACKDRAFT DAMPERS	MIN	MINIMUM
BHP	BRAKE HORSEPOWER	(N)	NEW
BLDG	BUILDING	N/A	NOT APPLICABLE
BDO	BOTTOM OF DUCT	NC	NORMALLY CLOSED
BTU	BRITISH THERMAL UNIT	NC	NOT IN CONTRACT
BTUH	BRITISH THERMAL UNIT PER HOUR	NO	NUMBER OR NORMALLY OPEN
CFM	CUBIC FEET PER MINUTE	NTS	NOT TO SCALE
CL	CENTER LINE	OAT	OUTSIDE AIR TEMPERATURE
CLG	CEILING	OBD	OPOSED BLADE DAMPER
DBT	DRY BULB TEMPERATURE	OC	ON CENTER
DN	DOWN	OD	OUTSIDE DIMENSION
DSO	DUCT MOUNTED SMOKE DETECTOR	OSA	OUTSIDE AIR
(E)	EXISTING	PD	PRESSURE DROP
EA	EXHAUST AIR	PH	PHASE
EAT	ENTERING AIR TEMPERATURE	PLBG	PLUMBING
EER	ENERGY EFFICIENCY RATIO	POC	POINT OF CONNECTION
ELEC	ELECTRICAL	POD	POINT OF DEMOLITION
ESP	EXTERNAL STATIC PRESSURE (IN WG)	RA	RETURN AIR
EW	ENTERING WATER TEMPERATURE	REQ	REQUIRED
F	FAHRENHEIT	REV	REVISION
FA	FACE AREA	RPM	REVOLUTIONS PER MINUTE
FLA	FULLLOAD AMPS	SA	SUPPLY AIR
FD	FIRE DAMPER	SD	SMOKE DAMPER
FPM	FEET PER MINUTE	SEER	SEASONAL ENERGY EFFICIENCY RATIO
FSD	FIRE/SMOKE DAMPER	SP	STATIC PRESSURE
FT	FEET	SQ FT.	SQUARE FEET
GA	GAUGE	STRUCT	STRUCTURAL
GAL	GALLONS	TA	TRANSFER AIR
GALV	GALVANIZED	TCP	TEMPERATURE CONTROL PANEL
GPM	GALLONS PER MINUTE	TEMP	TEMPERATURE
HD	HEAD	TOD	TOP OF DUCT
HP	HORSEPOWER	TYP	TYPICAL
HVAC	HEATING VENTILATING AND AC	UC	UNDERCUT
HZ	HERTZ	UG	UNDERGROUND
ID	INSIDE DIAMETER	UON	UNLESS OTHERWISE NOTED
IN.	INCH	VAV	VARIABLE AIR VOLUME
IN. WG.	INCHES WATER GAGE (PRESSURE)	VEL	VELOCITY
IN.	INCH	VFO	VARIABLE FREQUENCY DRIVE
LA	LEAVING AIR TEMPERATURE	WGL	WATER GAGE
LBS	POUNDS	WT	WEIGHT
LF	LINEAR FEET		

APPLICABLE CODES

1. 2013 BUILDING STANDARD ADMINISTRATIVE CODE, PART 1, TITLE 24 C.C.R.
2. 2013 CALIFORNIA BUILDING CODE (CBC), PART 2, TITLE 24 C.C.R.;
3. 2013 CALIFORNIA ELECTRICAL CODE (CEC), PART 3, TITLE 24 C.C.R.;
4. 2013 CALIFORNIA MECHANICAL CODE (CMC), PART 4, TITLE 24 C.C.R.;
5. 2013 CALIFORNIA PLUMBING CODE (CPC), PART 5, TITLE 24 C.C.R.;
6. 2013 CALIFORNIA ENERGY CODE (CEC), PART 6, TITLE 24 C.C.R.;
7. 2013 CALIFORNIA FIRE CODE (CFC), PART 9, TITLE 24 C.C.R.;
8. 2013 CALIFORNIA "GREEN" BUILDING REQUIREMENTS, PART 11, TITLE 24 C.C.R.
9. 2013 CALIFORNIA EXISTING BUILDING CODE, PART 10, TITLE 24 C.C.R.
10. 2013 CALIFORNIA REFERENCED STANDARDS CODE, PART 12, TITLE 24 C.C.R.
11. TITLE 19, CCR, PUBLIC SAFETY, STATE FIRE MARSHAL REGULATIONS

REFERENCE CODE SECTION FOR NFPA STANDARDS - CBC(SFM) 3504.1
TITLE 24 C.C.R. ACCESSIBILITY STANDARDS
AMERICAN WITH DISABILITIES ACT (A.D.A., ADAAG) FEDERAL ACCESSIBILITY STANDARDS

MECHANICAL SCOPE OF WORK

1. REPLACE EXISTING WATER SOURCE HEAT PUMP UNITS WITH DX COOLING/HYDRONIC HEATING UNITS. MODIFY DUCTS, DIFFUSERS AND PIPING AS NECESSARY.
2. REMOVE EXISTING COOLING TOWER AND BOILER.
3. PROVIDE 2 NEW BOILERS AND HEATING HOT WATER PUMPS.
4. MODIFY EXISTING CONDENSER WATER PIPING SYSTEM FOR USE AS HEATING HOT WATER SYSTEM.
5. PROVIDE (N) IN-LINE EXHAUST FANS AND ASSOCIATED DUCTWORK FOR TWO JANITOR CLOSETS.
6. MODIFY RETURN GRILLES/DUCTS AS SHOWN.
7. RELOCATE THERMOSTATS AS SHOWN.
8. ALL MECHANICAL CONTROLS SHALL BE BY DELTA AND SHALL BE FULLY INTERFACED WITH THE DISTRICT EXISTING CONTROL SYSTEM AND MATCH ALL CURRENT DISTRICT GRAPHIC TEMPLATES. CONTRACTOR IS NOT REMOVE ANY CONTROLS WIRING AND/OR CONDUIT UNLESS DIRECTED TO BY DESIGN-BUILD CONTROLS CONTRACTOR.

SHEET INDEX

M0.01	MECHANICAL TIME SHEET
M0.02	MECHANICAL DETAILS
M1.10	FIRST FLOOR EAST MECHANICAL DEMOLITION PLAN
M1.11	FIRST FLOOR WEST MECHANICAL DEMOLITION PLAN
M1.12	SECOND FLOOR MECHANICAL DEMOLITION PLAN
M1.13	ROOF EAST MECHANICAL DEMOLITION PLAN
M1.14	ROOF WEST MECHANICAL DEMOLITION PLAN
M2.10	FIRST FLOOR EAST MECHANICAL DUCTWORK PLAN
M2.11	FIRST FLOOR WEST MECHANICAL DUCTWORK PLAN
M2.12	SECOND FLOOR MECHANICAL DUCTWORK PLAN
M2.13	ROOF EAST MECHANICAL PROPOSED PLAN
M2.14	ROOF WEST MECHANICAL PROPOSED PLAN
M3.10	FIRST FLOOR EAST MECHANICAL HYDRONIC PLAN
M3.11	FIRST FLOOR WEST MECHANICAL HYDRONIC PLAN
M3.12	SECOND FLOOR MECHANICAL HYDRONIC PLAN

ISSUES	
▲	BID RFI#1 3/30/2017
 <p>582 MARKET STREET, SUITE 400 SAN FRANCISCO, CA 94104 (415) 963-4303</p> <p>212 9TH STREET, SUITE 203 OAKLAND, CA 94612</p> <p>Seal & Signature:</p> 	
<p style="text-align: center;">SOLANO COMMUNITY COLLEGE DISTRICT VALLEJO CENTER MECHANICAL EQUIPMENT REPLACEMENT</p>	
<p style="text-align: center;">MECHANICAL SCHEDULES, NOTES AND LEGEND</p>	
Date:	12/29/2016
Scale:	1/8"=1'-0"
Drawn:	-
Job:	16SCC01
Sheet	M0.01
Of	

SOLANO COMMUNITY COLLEGE VALLEJO CENTER

SOLANO COMMUNITY DISTRICT

545 COLUMBUS PKWY

VALLEJO, CA 94591

GENERAL NOTES

1. THESE DRAWINGS DO NOT CONTAIN THE NECESSARY COMPONENTS FOR CONSTRUCTION SAFETY.

2. LOCATIONS OF ALL UTILITIES SHOWN ARE APPROXIMATE AND CONTRACTOR SHALL EXERCISE EXTREME CAUTION IN EXCAVATING AND TRENCHING ON THIS SITE TO AVOID INTERCEPTING EXISTING PIPING OR CONDUITS. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO LOCATE ALL EXISTING UTILITIES WHETHER SHOWN HEREON OR NOT AND TO PROTECT THEM FROM DAMAGE. THE ARCHITECT IS NOT RESPONSIBLE FOR THE LOCATION OF UNDERGROUND UTILITIES OR STRUCTURES WHETHER OR NOT SHOWN OR DETAILED AND INSTALLED BY ANY OTHER CONTRACT. THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ARCHITECT SHOULD ANY UNIDENTIFIED CONDITIONS BE DISCOVERED. THE CONTRACTOR SHALL BEAR ALL EXPENSE OF REPAIR OR REPLACEMENT OF UTILITIES OR OTHER PROPERTY DAMAGED BY OPERATIONS IN CONJUNCTION WITH THE EXECUTION OF THIS WORK.

3. THESE DOCUMENTS AND THE IDEAS AND DESIGNS INCORPORATED HEREIN AS AN INSTRUMENT OF PROFESSIONAL SERVICE, ARE THE PROPERTY OF WLC ARCHITECTS, INC., AND ARE NOT TO BE USED, IN WHOLE OR IN PART, FOR ANY OTHER PROJECT WITHOUT THE WRITTEN AUTHORIZATION OF WLC ARCHITECTS, INC.

4. THE WORK SHOWN ON THESE DRAWINGS AS EXISTING CONDITIONS WAS PREPARED FROM INFORMATION FURNISHED BY THE OWNER. WHILE THIS INFORMATION IS BELIEVED TO BE RELIABLE, WLC ARCHITECTS, INC. IS NOT RESPONSIBLE FOR THE ACCURACY OR ADEQUACY OF ANY WORK SHOWN AS EXISTING NOR IS WLC ARCHITECTS, INC. RESPONSIBLE FOR ANY ERRORS OR OMISSIONS WHICH MAY HAVE BEEN INCORPORATED INTO THESE DRAWINGS AS A RESULT.

5. EACH BIDDER SHALL POSSESS AT THE TIME OF BID A CLASS B OR THE APPROPRIATE CLASS C CONTRACTOR'S LICENSE PURSUANT TO PUBLIC CONTRACT CODE SECTION 3300 AND BUSINESS AND PROFESSIONS CODE SECTION 7028.15. THE SUCCESSFUL BIDDER MUST MAINTAIN THE LICENSE THROUGHOUT THE DURATION OF THIS CONTRACT.

6. PENETRATIONS TO FIRE RATED MATERIALS OR ASSEMBLIES SHALL BE RESTORED TO EQUAL RATING. FIRE STOP SYSTEMS AS LISTED BY UNDERWRITERS LABORATORIES SHALL BE INSTALLED PER FIRE RESISTANCE DIRECTORY. FIRE STOP SYSTEMS SHALL BE AS SPECIFIED.

7. NONRESIDENTIAL ENERGY STANDARDS COMPLIANCE STATEMENT (TITLE 24, PART 6):

THE DESIGN INDICATED HEREIN COMPLIES WITH THE REQUIREMENTS OF THE ENERGY CONSERVATION STANDARDS OF TITLE 24, PART 6, CALIFORNIA CODE OF REGULATIONS. THE PROPOSED BUILDING(S) WILL BE IN COMPLIANCE WITH THE ENERGY CONSERVATION STANDARDS PROVIDED IT (THEY) IS (ARE) BUILT ACCORDING TO THESE DRAWINGS AND SPECIFICATIONS AND PROVIDED ANY FUTURE IMPROVEMENTS ARE COMPLETED ACCORDING TO THE REQUIREMENTS OF TITLE 24, PART 6, CALIFORNIA CODE OF REGULATIONS. THESE PLANS AND SPECIFICATIONS HAVE BEEN PREPARED TO INCLUDE ALL SIGNIFICANT ENERGY CONSERVATION FEATURES REQUIRED FOR COMPLIANCE WITH THE STANDARDS. BUILDING AREAS THAT ARE UNCONDITIONED AND/OR NOT SUBJECT TO THE STANDARDS ARE INDICATED ON THE PLANS.

A. INSTALLED INSULATING MATERIALS SHALL HAVE BEEN CERTIFIED BY THE MANUFACTURER TO COMPLY WITH THE CALIFORNIA QUALITY STANDARDS FOR INSULATING MATERIAL.

B. ALL INSULATING MATERIALS SHALL BE INSTALLED IN COMPLIANCE WITH THE FLAME SPREAD RATING AND SMOKE DENSITY REQUIREMENTS OF TITLE 24, PART 2, CALIFORNIA CODE OF REGULATIONS, SECTIONS 720 AND 2603.

C. ALL EXTERIOR JOINTS AND OPENINGS IN THE BUILDING ENVELOPE THAT ARE POTENTIAL AND OBSERVABLE SOURCES OF AIR LEAKAGE SHALL BE CAULKED, GASKETED, WEATHERSTRIPPED OR OTHERWISE SEALED.

D. SITE CONSTRUCTED DOORS, WINDOWS, AND SKYLIGHTS SHALL BE CAULKED BETWEEN THE UNIT AND THE BUILDING, AND SHALL BE WEATHERSTRIPPED (EXCEPT FOR UNFRAMED GLASS DOORS AND FIRE DOORS).
- E. MANUFACTURED DOORS AND WINDOWS INSTALLED SHALL HAVE AIR INFILTRATION RATES CERTIFIED BY THE MANUFACTURER IN ACCORDANCE WITH TITLE 24, PART 6, CALIFORNIA CODE OF REGULATIONS, SECTION 110.6.

F. MANUFACTURED FENESTRATION PRODUCTS IN THE ENVELOPE OF THE BUILDING, INCLUDING, BUT NOT LIMITED TO, WINDOWS, SLIDING GLASS DOORS, FRENCH DOORS, SKYLIGHTS, CURTAIN WALLS, AND GARDEN WINDOWS MUST BE LABELED FOR U-VALUE IN ACCORDANCE WITH THE (NFRC) NATIONAL FENESTRATION RATING COUNCIL'S INTERIM U-VALUE RATING PROCEDURE.

G. DEMISING WALL INSULATION SHALL BE INSTALLED IN ALL OPAQUE PORTIONS OF FRAMED WALLS (EXCEPT DOORS).
12. INSPECTOR OF RECORD REQUIREMENTS

A. ONE OR MORE INSPECTORS EMPLOYED BY THE OWNER IN ACCORDANCE WITH THE REQUIREMENTS OF TITLE 24 OF THE CALIFORNIA CODE OF REGULATIONS WILL BE ASSIGNED TO THE WORK. THE INSPECTORS DUTIES ARE SPECIFICALLY DEFINED IN SECTION 4-342 OF SAID TITLE 24, PART 1 AND IN ADDITION SHALL BE AS STIPULATED IN INTERPRETATION OF REGULATION DOCUMENT IR A-8.

B. INSPECTOR SHALL BE CERTIFIED AS A CLASS [1] [2] [3] [4] INSPECTOR THROUGH THE DIVISION OF THE STATE ARCHITECT INSPECTOR EXAMINATION PROGRAM. INSPECTOR SHALL ALSO BE SPECIFICALLY APPROVED BY THE DIVISION OF THE STATE ARCHITECT FOR THIS PROJECT AT LEAST 10 DAYS PRIOR TO THE START OF ANY WORK FOR THIS PROJECT.
13. ALL WORK SHOWN ON THESE DRAWINGS SHALL COMPLY WITH THE REQUIREMENTS OF TITLE 24, CALIFORNIA CODE OF REGULATIONS (CCR).

14. CHANGES TO THE APPROVED DRAWINGS AND SPECIFICATIONS SHALL BE MADE BY AN ADDENDUM OR A CONSTRUCTION CHANGE DOCUMENT APPROVED BY THE DIVISION OF THE STATE ARCHITECT, AS REQUIRED BY TITLE 24, CCR, PART 1, SECTION 4-338.

15. GRADING PLANS, DRAINAGE IMPROVEMENTS, ROAD AND ACCESS REQUIREMENTS AND ENVIROMENTAL HEALTH CONCDERATIONS SHALL COMPLY WITH ALL LOCAL ORDINANCES.

16. DRINKING WATER SHALL COMPLY WITH ALL LOCAL HEALTH DEPARTMENT REQUIREMENTS.

17. FOOD HANDLING FACILITIES SHALL COMPLY WITH ALL LOCAL HEALTH REQUIREMENTS AND THE CALIFORNIA RETAIL FOOD FACILITIES LAW.

18. SWIMMING POOL SHALL COMPLY WITH ALL LOCAL HEALTH DEPARTMENT REQUIREMENTS.

19. THE INTENT OF THESE DRAWINGS AND SPECIFICATIONS IS THAT THE WORK OF THE ADDITION, ALTERATION OR RECONSTRUCTION IS IN COMPLIANCE WITH THE REQUIREMENTS OF TITLE 24, CALIFORNIA CODE OF REGULATIONS. SHOULD ANY CONDITIONS SUCH AS DETERIORATION OR NON-COMPLYING CONSTRUCTION BE DISCOVERED WHICH IS NOT IDENTIFIED BY THE CONTRACT DOCUMENTS WHEREIN THE FINAL WORK WOULD NOT COMPLY WITH THE REQUIREMENTS OF TITLE 24, CALIFORNIA CODE OF REGULATIONS, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE OWNER AND THE ARCHITECT OF THE CONDITION IN WRITING. NECESSARY INFORMATION REQUIRED TO CORRECT THE CONDITIONS ENCOUNTERED WILL BE ISSUED BY THE ARCHITECT. A CHANGE ORDER MAY BE ISSUED TO ADJUST THE CONTRACT SUM OR TIME COMMENSURATE WITH THE AMOUNT OF ADDITIONAL WORK REQUIRED IF ANY. A CONSTRUCTION CHANGE DOCUMENT SHALL BE APPROVED BY THE DIVISION OF THE STATE ARCHITECT PRIOR TO PROCEEDING WITH THE WORK REQUIRED BY THE CHANGE ORDER.

GOVERNING CODE

2013 CALIFORNIA BUILDING STANDARDS ADMINISTRATIVE CODE
CALIFORNIA CODE OF REGULATIONS (CCR) TITLE 24, PART 1

2013 CALIFORNIA BUILDING CODE (CBC)
CALIFORNIA CODE OF REGULATIONS (CCR) TITLE 24, PART 2

2013 CALIFORNIA ELECTRICAL CODE (CEC)
CALIFORNIA CODE OF REGULATIONS (CCR) TITLE 24, PART 3

2013 CALIFORNIA MECHANICAL CODE (CMC)
CALIFORNIA CODE OF REGULATIONS (CCR) TITLE 24, PART 4

2013 CALIFORNIA PLUMBING CODE (CPC)
CALIFORNIA CODE OF REGULATIONS (CCR) TITLE 24, PART 5

2013 CALIFORNIA ENERGY CODE
CALIFORNIA CODE OF REGULATIONS (CCR) TITLE 24, PART 6

2013 CALIFORNIA HISTORICAL BUILDING CODE
CALIFORNIA CODE OF REGULATIONS (CCR) TITLE 24, PART 8

2013 CALIFORNIA FIRE CODE (CFC)
CALIFORNIA CODE OF REGULATIONS (CCR) TITLE 24, PART 9

2013 CALIFORNIA EXISTING BUILDING CODE
CALIFORNIA CODE OF REGULATION (CCR) TITLE 24, PART 10

2013 CALIFORNIA GREEN BUILDING REGULATIONS
STANDARDS CODE (CGBSC)

2013 CALIFORNIA REFERENCED STANDARDS CODE
CALIFORNIA CODE OF REGULATIONS (CCR) TITLE 24, PART 12

AMERICANS WITH DISABILITIES ACT (ADA), 2013 ADA STANDARDS FOR ACCESSIBLE DESIGN

APPLICABLE NFPA STANDARDS

NFPA 13 - AUTOMATIC SPRINKLER SYSTEMS, 2010 EDITION

NFPA 14 - STANDPIPE SYSTEMS, 2007 EDITION

NFPA 17 - DRY CHEMICAL EXTINGUISHING SYSTEMS, 2002 EDITION

NFPA 17A - WET CHEMICAL SYSTEMS, 2002 EDITION

NFPA 20 - STATIONARY PUMPS, 2007 EDITION

NFPA 24 - PRIVATE FIRE MAINS, 2010 EDITION

NFPA 72 - NATIONAL FIRE ALARM CODE, 2010 EDITION

NFPA 253 - CRITICAL RADIANT FLUX OF FLOOR COVERING SYSTEMS, 2006 EDITION

NFPA 2001 - CLEAN AGENT FIRE EXTINGUISHING SYSTEMS, 2008 EDITION

NOTE: ALL NFPA STANDARDS AS LISTED ARE TO CONFORM TO THE EDITION AS LISTED WITH THE LATEST CALIFORNIA AMENDMENTS. REFERENCE CBC TITLE 24 , PART 2 - CHAPTER 35 FOR ADDITIONAL APPLICABLE NFPA STANDARDS.

ALL FOOD SERVICE EQUIPMENT SHALL MEET AND BE INSTALLED PER THE REQUIREMENT OF CALIFORNIA HEALTH AND SAFETY CODE DIVISION 22 AND ALL LOCAL CODES AND ORDINANCES

TITLE 8 CCR CHAPTER 4 SUBCHAPTER 6 ELEVATOR SAFETY ORDERS

ASME A18.1-2003 SAFETY STANDARD FOR PLATFORM LIFTS

PROJECT TEAM

PROJECT ADDRESS

SOLANO COMMUNITY COLLEGE VACAVILLE CENTER

2001 N VILLAGE PKWY

VACAVILLE, CA 95688

PHONE: 707-863-7872

OWNER

SOLANO COMMUNITY COLLEGE VALLEJO CENTER

545 COLIMBUS PKWY

VALLEJO, CA 94591

PHONE: 510-450-1999

ARCHITECT

WLC ARCHITECTS, INC.

2600 TENTH STREET , SUITE 500

BERKELEY, CA 94710

PHONE: 510-450-1999

STRUCTURAL ENGINEER

BASE DESIGN

582 MARKET ST. STE 1402

SAN FRANCISCO, CA 94104

PHONE:415-466-2997

MECHANICAL ENGINEER

EDESIGNC INCORPORATED

582 MARKET STREET, SUITE 400

SAN FRANCISCO, CA 94104

PHONE: 415-963-4303

ELECTRICAL ENGINEER

EDESIGNC INCORPORATED

582 MARKET STREET, SUITE 400

SAN FRANCISCO, CA 94104

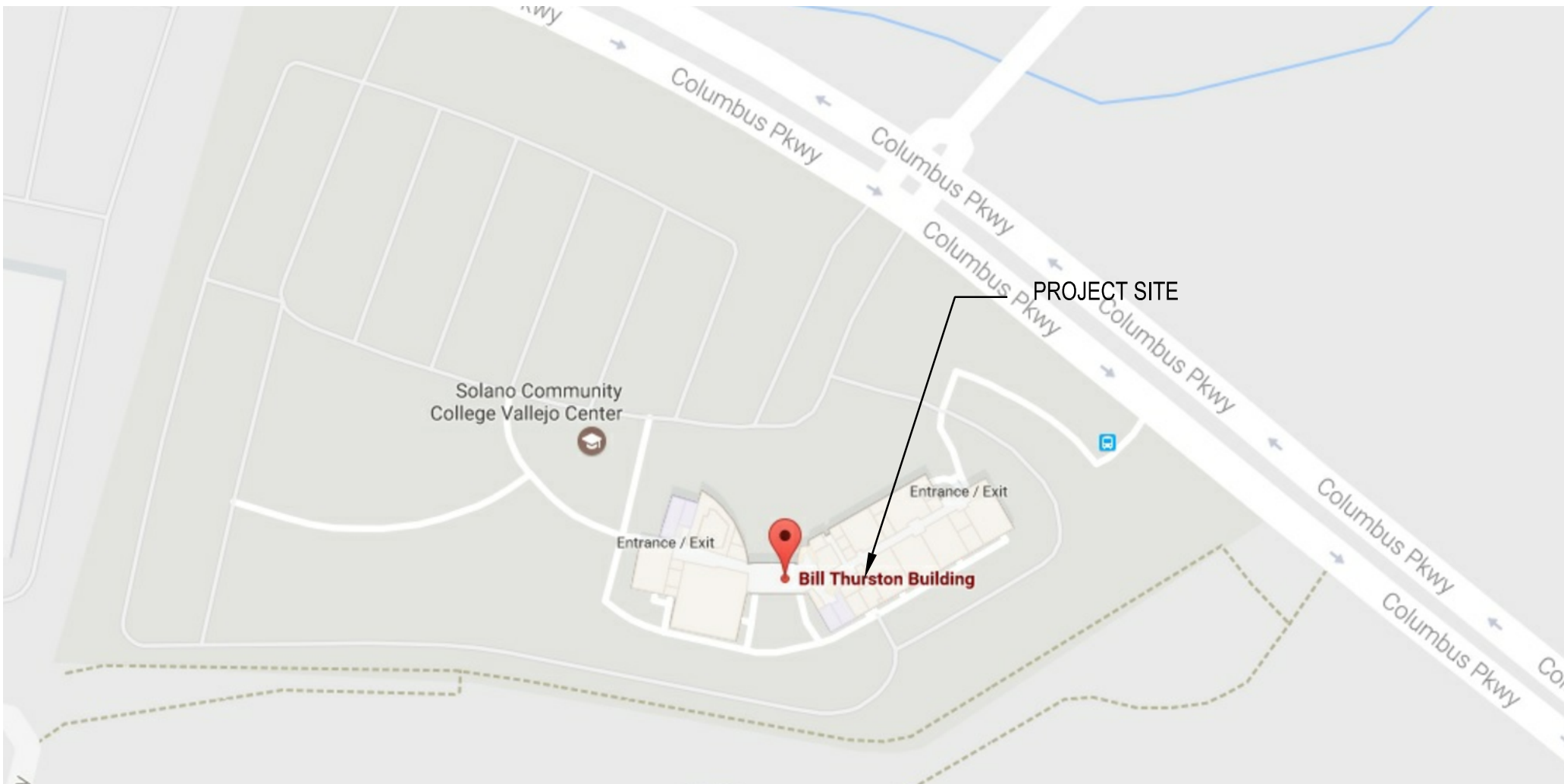
PHONE: 415-963-4303

SCOPE OF WORK DESCRIPTION

THE SCOPE OF THE WORK AS STATED BELOW IS FOR DSA PLAN REVIEW PURPOSES ONLY AND DOES NOT CONSTITUTE A DETAILED AND FULL EXPLANATION OF THE REQUIREMENTS OF THE CONTRACT DOCUMENTS.

ALTERATIONS TO 1-EDUCATION CENTER/HVAC UPGRADE

VICINITY MAP



BAY AREA

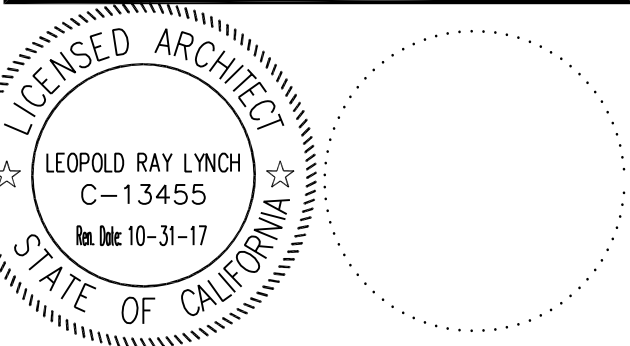
2600 TENTH STREET, SUITE 500
BERKELEY
CALIFORNIA 94710-2597

TEL: 510-450-1999

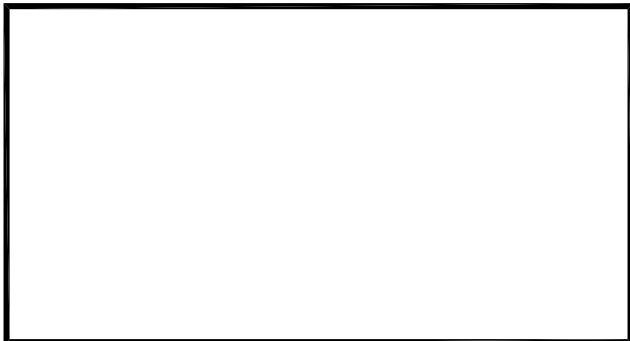
www.wlcarchitects.com

SOLANO COMMUNITY
COLLEGE DISTRICT
VALLEJO CENTER

545 COLUMBUS PARK WAY
VALLEJO, CA 94591



CONSULTANT



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NO	DATE	BY	DESCRIPTION
REVISIONS			

DRAWN: VP CHECKED: EB

DATE: 03/21/2017 SCALE:

PROJECT NUMBER: 1715900

**GENERAL NOTES
& PROJECT
DIRECTORY**

DRAWING
NUMBER: **A0.1**

DRAWING INDEX						DRAWING INDEX CODE
DRAWING REF NO	DESCRIPTION	DRAWING REF NO	DESCRIPTION	DRAWING REF NO	DESCRIPTION	DRAWING DISCIPLINE PREFIX INDEX
	ARCHITECTURAL		STRUCTURAL			A. ARCHITECTURAL C. CIVIL D. INTERIOR DESIGN / FURNITURE E. ELECTRICAL F. FIRE PROTECTION / SPRINKLER SYSTEM G. GRAPHICS H. HAZARDOUS MATERIALS K. DIETARY / FOOD SERVICE L. LANDSCAPING M. MECHANICAL P. PLUMBING S. STRUCTURAL T. TELECOMMUNICATIONS
A0.1	GENERAL NOTES / PROJECT DIRECTORY	S1.1	GENERAL NOTES AND ABBREVIATIONS			
A0.2	DRAWING INDEX	S2.1	VALLEJO EDUCATION EAST ROOF FRAMING PLAN			
A0.3	DRAFTING SYMBOLS AND MATERIAL INDICATIONS	S2.2	VALLEJO EDUCATION WEST ROOF FRAMING PLAN			
A0.4	ARCHITECTURAL DRAWING ABBREVIATIONS	S8.1	TYPICAL WOOD DETAILS			
A1.1	OVERALL SITE PLAN					
A3.1	DEMO 1ST FLOOR RCP PLAN EAST		MECHANICAL			
A3.2	PROPOSED 1ST FLOOR RCP PLAN EAST	M0.01	MECHANICAL SCHEDULES NOTES AND LEGEND			
A3.3	DEMO 1ST FLOOR RCP PLAN WEST	M0.02	MECHANICAL DETAIL NOTES AND LEGEND			
A3.4	PROPOSED 1ST FLOOR RCP PLAN WEST	M1.10	FIRST FLOOR EAST MECHANICAL DEMOLITION PLAN			
A3.5	DEMO 2ND FLOOR RCP PLAN EAST	M1.11	FIRST FLOOR WEST MECHANICAL DEMOLITION PLAN			
A3.6	PROPOSED 2ND FLOOR RCP PLAN EAST	M1.12	SECOND FLOOR MECHANICAL DEMOLITION PLAN			
A4.1	DEMO ROOF PLAN EAST	M1.13	ROOF EAST MECHANICAL DEMOLITION PLAN			
A4.2	NEW ROOF PLAN EAST	M1.14	ROOF WEST MECHANICAL DEMOLITION PLAN			
A4.3	NEW ROOF PLAN WEST	M2.10	FIRST FLOOR EAST MECHANICAL DUCTWORK PLAN			
A7.1	ROOF DETAILS	M2.11	FIRST FLOOR WEST MECHANICAL DUCTWORK PLAN			
		M2.12	SECOND FLOOR MECHANICAL DUCTWORK PLAN			
		M2.13	ROOF EAST MECHANICAL PROPOSED PLAN			
		M2.14	ROOF WEST MECHANICAL PROPOSED PLAN			
		M3.10	FRIST FLOOR EAST MECHANICAL HYDRONIC PLAN			
		M3.11	FIRST FLOOR WEST MECHANICAL DUCTWORK PLAN			
		M3.12	SECOND FLOOR MECHANICAL HYDRONIC PLAN			

ARCHITECTS

WLC

CLIENT FOCUSED • PASSION DRIVEN

BAY AREA

2600 TENTH STREET, SUITE 500
BERKELEY
CALIFORNIA 94710-2597

TEL: 510-450-1999

www.wlcarchitects.com

SOLANO COMMUNITY
COLLEGE DISTRICT
VALLEJO CENTER

545 COLUMBUS PARK WAY
VALLEJO, CA 94591

LICENSED ARCHITECT

LEOPOLD RAY LYNCH
C-13455
Exp. 10-31-17

STATE OF CALIFORNIA

CONSULTANT

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△			
NO	DATE	BY	DESCRIPTION

REVISIONS

DRAWN: WLC

CHECKED: WLC

DATE: 03/21/2017

SCALE: NONE

PROJECT NUMBER: 1715900

DRAWING INDEX

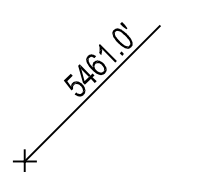
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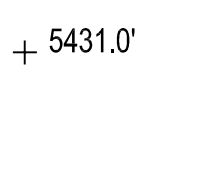
DRAFTING SYMBOL LEGEND

MATERIALS INDICATION LEGEND

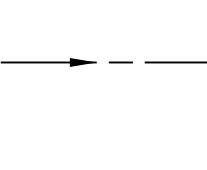
WALL MATERIALS LEGEND



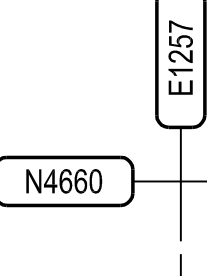
NEW / REQUIRED POINT
ELEVATION (PLAN)



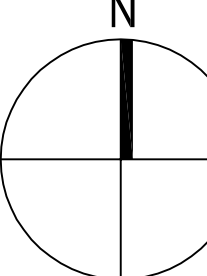
EXISTING POINT ELEVATION
(PLAN)



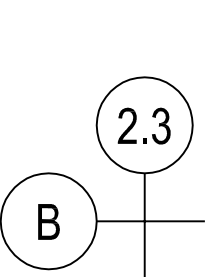
SURFACE DRAINAGE
ARROW INDICATES DIRECTION OF FLOW



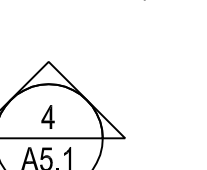
SITE REFERENCE GRID
WORK POINT COORDINATES



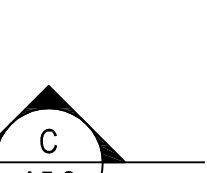
PROJECT NORTH



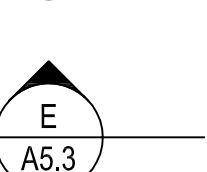
COLUMN REFERENCE GRIDS
B,23 = COLUMN DESIGNATION



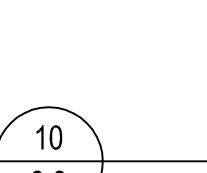
ELEVATION
4 = ELEVATION DESIGNATION
A5.1 = REFERENCE DRAWING NUMBER
ARROW INDICATES DIRECTION OF VIEW



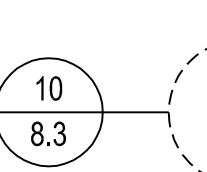
BUILDING SECTION
C = SECTION DESIGNATION
A5.2 = REFERENCE DRAWING NUMBER
ARROW INDICATES DIRECTION OF VIEW



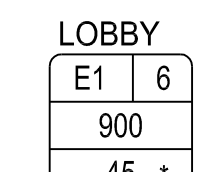
WALL SECTION
E = SECTION DESIGNATION
A5.3 = REFERENCE DRAWING NUMBER
ARROW INDICATES DIRECTION OF VIEW




DETAIL
10 = DETAIL DESIGNATION
8.3 = REFERENCE DRAWING NUMBER



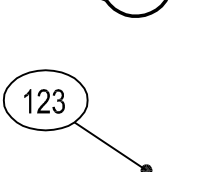
AREA IDENTITY/ CODE ANALYSIS



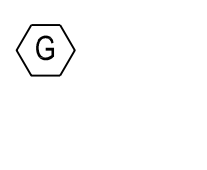
AREA IDENTITY & FINISH
REFERENCE/ PLAN



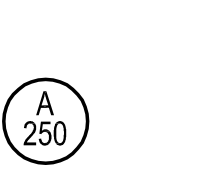
REVISION
3 = REVISION NUMBER



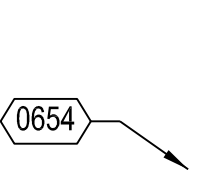
EQUIPMENT IDENTIFICATION
123 = EQUIPMENT NUMBER




GLAZED OPENING OR
WINDOW TYPE
NUMERICAL DESIGNATION = GLAZED OPENING
ALPHABETICAL DESIGNATION = WINDOW TYPE



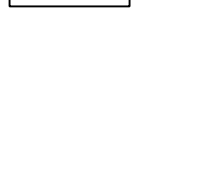
DOOR IDENTIFICATION
A = BUILDING DESIGNATION
2 = FLOOR NUMBER
50 = DOOR NUMBER



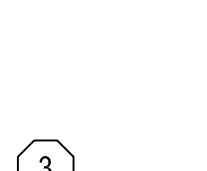
REFERENCE NOTE
IDENTIFICATION
06 = DIVISIONAL PREFIX
54 = NOTE NUMBER




WALL IDENTIFICATION
C = WALL TYPE DESIGNATION -
REF SCHEDULE
4 = NOMINAL STUD OR MASONRY SIZE
2 = FIRE RATING IN HOURS
B = ADDITIONAL REMARKS -
REF SCHEDULE
* = OPTIONAL CHARACTER




TOILET ACCESSORY
IDENTIFICATION
3 = ACCESSORY NUMBER - REF SCHEDULE
A = ACCESSIBLE WHEN NOTED



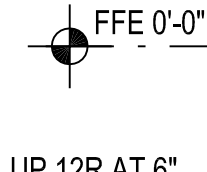
CABINET DESIGNATION
100 = WI CABINET NUMBER
M = MODIFIED AS NOTED
L = LOCK WHEN NOTED




LEVEL LINE, CONTROL POINT
FFE 0'-0" = ELEVATION



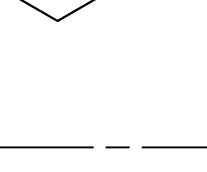
STAIR DIRECTION SYMBOL
NUMBER AND SIZE OF TREADS
AND RISERS IN INCHES



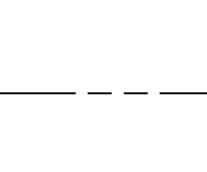
MATCH LINE AND AREA
DESIGNATOR
SHADED PORTION IS THE SIDE CONSIDERED



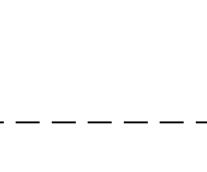
CENTER LINES, FLOOR LINES
AND LEVEL LINES



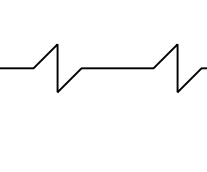
SECTION LINES



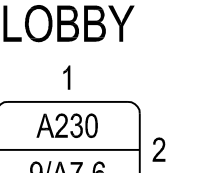
PROPERTY LINES, BOUNDRY
LINES AND MATCH LINES



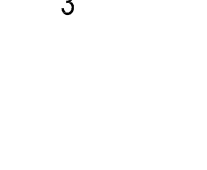
HIDDEN CONSTRUCTION
FEATURE




BREAKS OF BUILDING
COMPONENTS



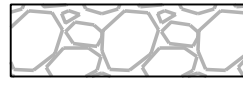
AREA IDENTITY/ PLAN




LOBBY



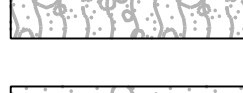
EARTH




POROUS FILL
(STONE, GRAVEL, ETC.)



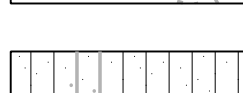
ROCK




ASPHALT PAVING




CAST-IN-PLACE CONCRETE
(OR CONCRETE FILL)




PRECAST CONCRETE
(GLASS FIBER REINFORCED CONCRETE)




CEMENTITIOUS DECKS &
TOPPINGS
(GYPSUM, INSULATING CONCRETE)



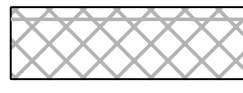
BRICK
(COMMON OR FACE, LARGE SCALE)



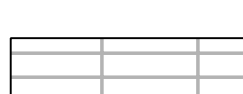
GLAZED BRICK



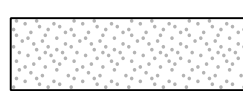
FIRE BRICK




CONCRETE MASONRY UNITS
(CMU, LARGE SCALE CONCRETE BLOCK)




GLAZED CONCRETE MASONRY
UNITS



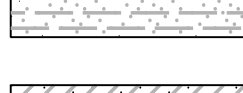
GLASS UNIT MASONRY



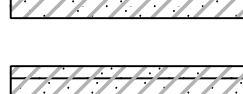
GROUT




CUT STONE
(MARBLE, GRANITE, LIMESTONE)




CAST STONE




SLATE, SOAPSTONE, FLAGGING




STRUCTURAL CLAY TILE



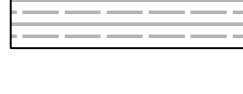
GLAZED STRUCTURAL CLAY TILE



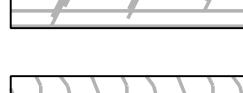
ALUMINUM
(LARGE SCALE)




STEEL
(LARGE SCALE)




ORNAMENTAL METAL
(BRASS, BRONZE)



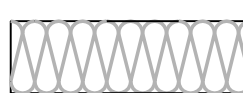
METAL
(SMALL SCALE, STRUCTURAL OR SHEET)



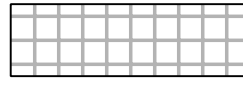
PARTICLE BOARD




PLYWOOD
(LARGE SCALE)




WOOD FINISHED




WOOD ROUGH/CONTINUOUS
(2 X 10 - SIZE NOTED)



WOOD ROUGH/BLOCKING
(2 X 10 - SIZE NOTED)




INSULATION
(LOOSE OR BATT)

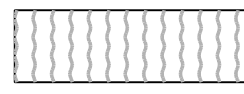


INSULATION
(RIGID)

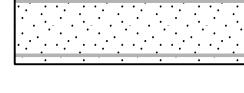
GLASS
(LARGE SCALE)




ACOUSTICAL TILE



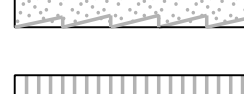
CERAMIC TILE




GYPSUM BOARD



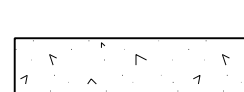
SAND, CEMENT, ETC.




METAL LATH AND PLASTER




RESILIENT FLOORING




CARPET




TERRAZZO




CONCRETE, PLASTER,
GYPSUM BOARD




MARBLE, FIELD STONE



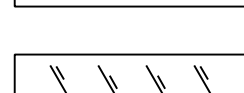
MASONRY
(BRICK OR CMU)




GLAZING
(CLEAR, TEMPERED, ETC.)



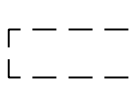
GLAZING
(WIRE, LABELED)



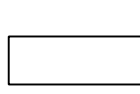
SHEET METAL



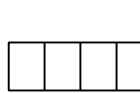
CERAMIC TILE




EXISTING WALL TO BE REMOVED




EXISTING WALL TO REMAIN




STUD WALL - REF SCHEDULE FOR STUD
TYPE, SIZE AND SPACING




BRICK MASONRY WALL - REF SCHEDULE
FOR SIZE




CONCRETE MASONRY WALL (CMU) - REF
SCHEDULE FOR TYPE AND SIZE




COMPOSITE MASONRY WALL - REF
SCHEDULE FOR MASONRY TYPES AND
SIZES




COMPOSITE VENEER WALL - REF
SCHEDULE FOR MASONRY AND STUD
TYPE, SIZE AND SPACING



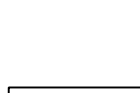
SHAFT WALL - REF SCHEDULE FOR STUD
TYPE, SIZE AND SPACING




SOUND RATED WALL - REF SCHEDULE
FOR WALL MATERIALS



CONCRETE WALL - REF SCHEDULE
FOR SIZE



ONE HOUR FIRE RATED WALL - REF PLAN
AND SCHEDULE FOR WALL MATERIALS
AND CBC/UL/GA LISTING



TWO HOUR FIRE RATED WALL - REF PLAN
AND SCHEDULE FOR WALL MATERIALS
AND CBC/UL/GA LISTING

GENERAL NOTES:

- REFER TO FINISH SCHEDULE FOR WALL FINISHES
- REFER TO WALL TYPE SCHEDULE FOR WALL DETAILS AND MATERIALS OF CONSTRUCTION
- ALL WALL DEFINITIONS MAY NOT BE USED, REFER TO FLOOR PLAN(S) FOR APPLICABLE WALL DEFINITIONS USED.

REFERENCE NOTES

ARCHITECTS

WLC

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BAY AREA

2600 TENTH STREET, SUITE 500
BERKELEY
CALIFORNIA 94710-2597

TEL: 510-450-1999
www.wlcarchitects.com

SOLANO COMMUNITY
COLLEGE DISTRICT
VALLEJO CENTER

545 COLUMBUS PARK WAY
VALLEJO, CA 94591

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LEOPOLD RAY LYNCH
C-13455
Exp. Date: 10-31-17

STATE OF CALIFORNIA

CONSULTANT

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NO	DATE	BY	DESCRIPTION
REVISIONS			

DRAWN: VP	CHECKED: EB
DATE: 03/21/2017	SCALE: AS SHOWN
PROJECT NUMBER: 1715900	

DRAFTING
SYMBOLS AND
MAT INDICTATORS

DRAWING
NUMBER:

A0.3

ARCHITECTURAL DRAWING ABBREVIATIONS

SYMBOLS

AND @ CL Ø (E) (N) d ⊥ PL #	ANGLE AT CENTERLINE CHANNEL DIAMETER OR ROUND EXISTING NEW PENNY (NAILS) PERPENDICULAR PLATE POUND OR NUMBER	COMB COMPT CONC CONF CONN CONSTR CONT CONTR COORD CORR CPR CPRS	COMBINATION COMPARTMENT CONC CONF CONSTR CONSTRUCTION CONTINUOUS (ATION) CONTR COORD CORR COPPER COMPRESS(ED), (ION), (IBLE)	FBRK FCBRK FD FDTN FE FEC FFA FFB FFEL FFL FGL FHC FHMS FHWS	FIRE BRICK FACE BRICK FLOOR DRAIN FOUNDATION FIRE EXTINGUISHER FIRE EXTINGUISHER CABINET FROM FLOOR ABOVE FROM FLOOR BELOW CONTRACT(OR) FINISHED FLOOR ELEVATION FINISHED FLOOR LINE FIBERGLASS FIRE HOSE CABINET FLATHEAD MACHINE SCREW FLATHEAD WOOD SCREW	INT INV IPS	INTERIOR INVERT IRON PIPE SIZE	CONTRACTOR INSTALLED OFFICE OWNER FURNISHED - OWNER INSTALLED OUTSIDE FACE OF STUD OVALHEAD MACHINE SCREW OVALHEAD WOOD SCREW OPPOSITE HAND OPENING OPPOSITE OPAQUE OPERABLE OVERFLOW ROOF DRAIN OVERFLOW OVERHEAD	RFH RH RHMS RHR RHWS RL RLG RM RND RO ROW RS RTF RTU RVL RVS RVT RWD RWL	ROOF HATCH RIGHT HAND ROUND HEAD MACHINE SCREW RIGHT HAND REVERSE ROUND HEAD WOOD SCREW ROOF LEADER RAILING ROOM ROUND ROUGH OPENING RIGHT OF WAY ROUGH SAWN RUBBER TILE FLOORING ROOF TOP UNIT ROOF VENT REVEAL REVERSE (SIDE) RIVET(ED) REDWOOD RAIN WATER LEADER	THRES TKBD TMPD TOB TOC TOF TOFF TOJ TOL TOM TOP TOPV TOS TOSL TOST TOW TPD TPTN TS TWLB TV TYP	THRESHOLD (N/A) TACKBOARD TEMPERED TOP OF BEAM TOP OF CURB TOP OF FOOTING TOP OF FINISH FLOOR TOP OF JOIST TOLERANCE TOP OF MASONRY TOP OF PARAPET TOP OF PAVEMENT TOP OF SHEATHING TOP OF SLAB TOP OF STEEL TOP OF WALL TOILET PAPER DISPENSER TOILET PARTITION TUBE STEEL TOWEL BAR TELEVISION TYPICAL		
A/C A/E AB ABAN ABC ABV AC ACC ACST ACT AD ADDM ADH ADJ ADJC AFF AFG AGGR AHU AL ALT ANC APLD APPRX ARCH ASC ASPH ASSY ASYM AWG	AIR CONDITIONING ARCHITECT/ENGINEER ANCHOR BOLT ABANDON AGGREGATE BASE COURSE ABOVE ASPHALTIC CONCRETE ACCESS(IBLE) ACOUSTICAL ACOUSTICAL CEILING TILE AREA DRAIN ADDENDUM ADHESIVE ADJUSTABLE ADJACENT ABOVE FINISHED FLOOR ABOVE FINISHED GRADE AIR HANDLING UNIT ALUMINUM ALTERNATE ANCHOR, ANCHORAGE APPLIED APPROXIMATE ARCHITECT(URAL) ABOVE SUSPENDED CEILING ASPHALT ASSEMBLY ASYMMETRICAL AMERICAN WIRE GAGE	CPT CRS CS CSG CSK CSMT CSWK CT CTB CTF CTG CTR CUFT CUIN CUST CUYD	CARPET(ED) COLD ROLLED STEEL CAST STONE CASING COUNTERSUNK CASEMENT CASEWORK CERAMIC TILE CERAMIC TILE BASE CERAMIC TILE FLOOR COATING CENTER CUBIC FOOT CUBIC INCH CUSTODIAN CUBIC YARD	FR FIN FJT FLASH FLDG FLG FLR FLUOR FN FOC FOF FOG FOM FOS FPL PRFR FR FRG FRGL FRP FRTD FRTW FRZ FS FSTN FT FTG FURG FUT FWC	FACE BRICK FLOOR DRAIN FOUNDATION FIRE EXTINGUISHER FIRE EXTINGUISHER CABINET FROM FLOOR ABOVE FROM FLOOR BELOW CONTRACT(OR) FINISHED FLOOR ELEVATION FINISHED FLOOR LINE FIBERGLASS FIRE HOSE CABINET FLATHEAD MACHINE SCREW FLATHEAD WOOD SCREW FINISH(ED) CAST STONE FLUSH JOINT FLASH(ING) FOLDING FLOORING FLOOR FLUORESCENT FIELD NAILING FACE OF CONCRETE FACE OF FINISH FACE OF GRID FACE OF MASONRY FACE OF STUDS FIREPLACE FIREPROOF(ING) FRAME(D), (ING) FIBER REINFORCED GYPSUM FIRE RESISTIVE GLAZING FIBERGLASS REINFORCED PLASTIC FIRE RATED FIRE RETARDANT TREATED WOOD FREEZER FAR SIDE FASTEN, FASTENER FOOT OR FEET FOOTING FURRED (ING) FUTURE FABRIC WALL COVERING	JAN JST JT	JANITOR JOIST JOINT	OFS OHMS OHWS OPH OPNG OPP OPQ OPR ORD OVFL OVHD	PAR PAT PB PBD PC PCC PCP PED PERF PERIM PERP PGBD PH PHS PI PIV PL PLAM PLAS PLBG PLYWD PNEU PNL PNT POL POLY PORC PORT PR PRCST PREFAB PREFIN PREFMD PRKG PRML PROJ PROP PSCONC PT PTCONC PTD PTN PTR PVC PVG PVMT	PARALLEL PATTERN PANIC BAR PARTICLE BOARD PORTLAND CEMENT PRECAST CONCRETE PORTLAND CEMENT PLASTER PEDESTAL PERFORATE(D) PERIMETER PERPENDICULAR PEGBOARD PHASE PHILLIPS HEAD SCREW POINT OF INTERSECTION POST INDICATOR VALVE PROPERTY LINE PLASTIC LAMINATE PLASTER PLUMBING PLYWOOD PNEUMATIC PANEL PAINT(ED) POLISHED POLYETHYLENE PORCELAIN PORTABLE PAIR PRECAST PREFABRICATE(D) PREFINISHED PREFORMED PARKING PREMOLDED PROJECT PROPERTY PRESTRESSED CONCRETE POINT POST TENSIONED CONCRETE PAPER TOWEL DISPENSER PARTITION PAPER TOWEL RECEPTOR POLYVINYL CHLORIDE PAVE(D), (ING) PAVEMENT	S S2S S4S SA SALV SAT SB SBSTR SC SCD SCHED SCP SCRN SD SDBL SECT SGL SHR SHT SHTHG SHV SIM SKLT SLD SLDG SLDR SLNT SLV SMACNA SMLS SND SNDINS SNDU SNT SPC SPD SPEC SPRT SQ SSK SST STA STAG STD STG STIF STIR STL STOR STR ST STRCT STU SUSP SV SYMM SYNTH SYS	SOUTH SURFACED TWO SIDES SURFACED FOUR SIDES SUPPLY AIR SALVAGE SUSPENDED ACOUSTICAL TILE SPLASH BLOCK SUBSTRATE SOLID CORE SEAT COVER DISPENSER SCHEDULE SCUPPER SCREEN STORM DRAIN SANDBLAST SECTION SINGLE SHOWER SHEET(ING) SHEATHING SHELVES (ING) SIMILAR SKYLIGHT SEALED SLIDE (ING) SOLDER SEALANT SLEEVE SHEET METAL AND AIR CONDITIONING CONTRACTORS NATIONAL ASSOCIATION SEAMLESS SANITARY NAPKIN DISPENSER SOUND INSULATION SANITARY NAPKIN DISPOSAL UNIT SEALANT SUSPENDED PLASTER CEILING SOAP DISPENSER SPECIFICATION(S) (ED) SUPPORT SQUARE SERVICE SINK STAINLESS STEEL STATION STAGGERED SOUND TRANSMISSION CLASS STANDARD SEATING STIFFENER STIRRUP STEEL STORAGE STRAIGHT STREET STRUCTURAL STRUCT SUSPENDED SHEET VINYL SYMMETRICAL SYNTHETIC SYSTEM	UC UGND UL UNFIN UON UR VAR VB VCT VERT VEST VFAT VJ VNR VR VTR WVC	UNDERCUT UNDERGROUND UNDERWRITERS LABORATORY UNFINISHED UNLESS OTHERWISE NOTED URNAL VARIES VINYL BASE VINYL COMPOSITION TILE VERTICAL VESTIBULE VINYL FACED ACOUSTIC TILE VERIFY IN FIELD V-JOINT(ED) VENEER VAPOR RETARDER VENT THROUGH ROOF VINYL WALL COVERING
BC BD BITUM BLDG BLK BLKG BLW CLG BLW FFLR BLW BM BN BOT BRCG BRDG BRG BRK BRKT BRS BRZ BS BSMT BTWN BUR BW	BACK OF CURB BOARD BITUMINOUS BUILDING BLOCK BLOCKING BELOW CEILING BELOW FINISH FLOOR BELOW BENCH MARK BOUNDARY NAILING BOTTOM BRACING BRIDGING BEARING BRICK BRACKET BRASS BRONZE BOTH SIDES BASEMENT BETWEEN BUILT UP ROOFING BOTH WAYS	DIV DMPF DMT DN DR DRB DRLV DS DSP DT DVTL DW DWG DWL DWR	DRAIN DOUBLEACTING DOUBLE DEMOLISH, DEMOLITION ANCHOR, ANCHORAGE DEPARTMENT DETAIL DRINKING FOUNTAIN DOUBLE HUNG DIAMETER DIAGONAL DIFFUSER DIMENSION DISPENSER DIVISION DAMPPROOFING DEMOUNTABLE DOWN DOOR DRAINBOARD DOOR LOUVER DOWNSPOUT DRY STANDPIPE DRAIN TILE DOVETAIL DISHWASHER DRAWING DOWEL DRAWER	GA GAL GALV GB GFRC GI GL GLU LAM GLZ GLZCMU GND GPC GR LN GR BM GR GRBD GSB GSS GST GT GVL GYP	GAGE GALLON GALVANIZED GRAB BAR GLASS FIBER REINFORCED CONCRETE GALVANIZED IRON GLASS GLUE LAMINATED GLAZING GLAZED CONCRETE MASONRY UNITS GROUND GYPSUM PLASTER CEILING GRADE LINE GRADE BEAM GRADE, (ING) GARBAGE DISPOSER GYPSUM SHEATHING BOARD GALVANIZED STEEL SHEET GLAZED STRUCTURAL TILE GROUT GRAVEL GYPSUM	MANT MAS MATL MAX MB MBR MC MCB MDO MECH MED MEMB MEZZ MFD MFR MH MIN MIRR MISC ML MLDG MLWK MO MOD MR MRB MRD MS MTD MTL	MAINTAIN(ANCE) MASONRY MATERIAL MAXIMUM MACHINE BOLT MEMBER MEDICINE CABINET METAL CORNER BEAD MEDIUM DENSITY OVERLAID MECHANICAL MEDIUM MEMBRANE MEZZANINE METAL FLOOR DECKING MANUFACTURE(ER) MANHOLE MINIMUM MIRROR MISCELLANEOUS METAL LATH MOLDING MILLWORK MASONRY OPENING MODULE (AR) MOISTURE RESISTANT MARBLE METAL ROOF DECKING MACHINE SCREW MOUNTED METAL	PRCST PREFAB PREFIN PREFMD PRKG PRML PROJ PROP PSCONC PT PTCONC PTD PTN PTR PVC PVG PVMT	QUARRY TILE QUARRY TILE BASE QUARRY TILE FLOOR QUARTER QUANTITY	QUARRY TILE RETURN AIR RABBIT RADIUS RESILIENT BASE RUBBER REINFORCED CONCRETE PIPE RECEIVER ROOF DRAIN RIGID INSULATION ROADWAY REINFORCING STEEL BARS RECESSED RETANGULAR REFERENCE REFLECT(ED), (IVE), (OR) REFRIGERATOR REGISTER REINFORCE(D), (ING), (MENT) REMOVE(ABLE) REPAIR REPLACE REQUIRED RESILIENT RETURN REVISION(S), REVISED RESILIENT FLOORING ROOFING	SNT SPC SPD SPEC SPRT SQ SSK SST STA STAG STD STG STIF STIR STL STOR STR ST STRCT STU SUSP SV SYMM SYNTH SYS	SEALANT SUSPENDED PLASTER CEILING SOAP DISPENSER SPECIFICATION(S) (ED) SUPPORT SQUARE SERVICE SINK STAINLESS STEEL STATION STAGGERED SOUND TRANSMISSION CLASS STANDARD SEATING STIFFENER STIRRUP STEEL STORAGE STRAIGHT STREET STRUCTURAL STRUCT SUSPENDED SHEET VINYL SYMMETRICAL SYNTHETIC SYSTEM	W/ WW W/O W WBL WC WD WDP WDW WF WFS WGL WH WI WID WLD WM WP WPT WR WS WSCT WT WWF	WITH WALL TO WALL WITHOUT WEST WOOD BLOCKING WATER CLOSET WOOD WOOD PANELING WINDOW WIDE FLANGE WOOD FURRING STRIP WIRED GLASS WALL HUNG WROUGHT IRON WIDTH, WIDE WELD(ED) WIRE MESH WATERPROOF(ING) WORKING POINT WIRE ROPE WOOD SCREW WAINSCOT WEIGHT WELDED WIRE FABRIC
C&G CAB CAD CB CBB CEM CER CFCI	CURB AND GUTTER CABINET CADMIUM CATCH BASIN CEMENTITIOUS BACKER BOARD CEMENT CERAMIC CONTRACTOR FURNISH CONTRACTOR INSTALLED COUNTERFLASHING CONTRACTOR FURNISH OWNER INSTALLED CORNER GUARD CHALKBOARD CHAMFER CAST IRON CIRCLE CIRCULAR, CIRCUMFERENCE CONSTRUCTION JOINT CHAIN LINK CEILING CONTROL JOINT CONTRACT LIMIT LINE CLOSURE CLEAR(ANCE) CLASSROOM COMPOSITION CONCRETE MASONRY UNIT CONCEALED CORNER	EJ EL ELAST ELEC ELEV EM EMER EN ENCL ENGR ENTR EP EQ EQUIP ESC ESCL ESMT EW EWC EWH EWS EXC EXG EXH EXP EXPN EXS EXT	EXPANSION JOINT ELEVATION ELASTOMERIC ELECTRIC(AL) ELEVATOR EXPANDED METAL EMER EMERGENCY EDGE NAILING ENCLOSE(URE) ENGINEER ENTRANCE ELECTRICAL PANELBOARD EQUAL EQUIPMENT ESCUTCHEON ESCALATOR EASEMENT EACH WAY ELECTRIC WATER COOLER ELECTRICAL WATER HEATER EYE WASH STATION EXCAVATE EXISTING EXHAUST EXPOSED EXPANSION EXTRA STRONG EXTERIOR	HB HC HD HD JT HDAS HDR HDW HDWD HEX HGR HLDN HM HMD HMDF HMF HNDRL HORIZ HPT HR HT HTG HVAC HWH	HOSE BIBB HOLLOW CORE HEAVY DUTY HEAD JOINT HEADED ANCHOR STUD HEADER HARDWARE HARDWOOD HEXAGONAL HANGER HOLD DOWN HOLLOW METAL HOLLOW METAL DOOR HOLLOW METAL DOOR AND FRAME HOLLOW METAL FRAME HANDRAIL HORIZONTAL HIGH POINT HOUR HEIGHT HEATING HEATING/VENTILATING/ AIR CONDITIONING HOT WATER HEATER	O/O OA OBS OC OD	OUT TO OUT OVERALL OBSCURE ON CENTER(S) OUTSIDE DIAMETER							



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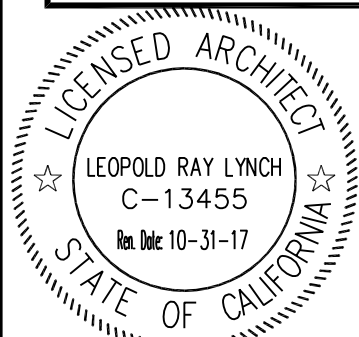
100 TENTH STREET, SUITE 500
BERKELEY
CALIFORNIA 94710-2597

TEL: 510-450-1999

www.wlcarhitects.com

SOLANO COMMUNITY
COLLEGE DISTRICT
VALLEJO CENTER

545 COLUMBUS PARK WAY
VALLEJO CA 94591



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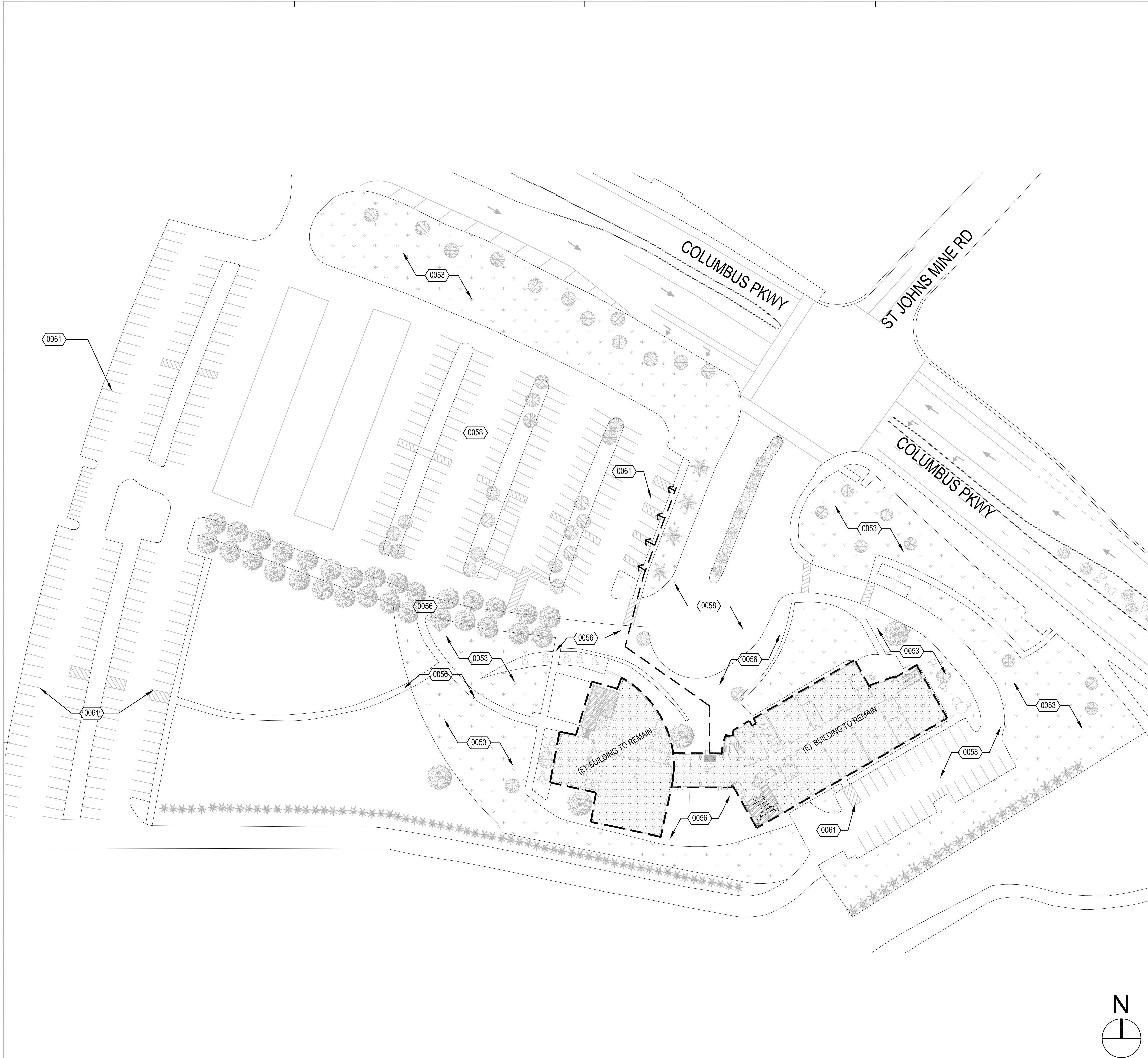
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NO	DATE	BY	DESCRIPTION
REVISIONS			

DRAWN: VP	CHECKED: EB
DATE: 03/21/2017	SCALE:
PROJECT NUMBER: 1715900	

ARCHITECTURAL DRAWING ABBREVIATIONS

DRAWING:
NUMBER:

A0.4



GENERAL NOTES

- 1. BUILDING LOCATIONS ON SITE ARE APPROXIMATE BASED ON DRAWINGS FROM OWNER.
- 2. ACCESSIBLE ROUTE OF TRAVEL AS INDICATED ON PLAN IS A BARRIER FREE ACCESS ROUTE WITHOUT ANY ABRUPT LEVEL CHANGES EXCEEDING 1/2" IF BEVELED AT 1:2 MAX. SLOPE, OR VERTICAL LEVEL CHANGES NOT EXCEEDING 1/4" MAX AND AT LEAST 48" IN WIDTH. SURFACE IS STABLE, FIRM, AND SLIP RESISTANT. CROSS SLOPE DOES NOT EXCEED 2% AND SLOPE IN THE DIRECTION OF TRAVEL IS LESS THAN 5% UNLESS OTHERWISE INDICATED. "PASSING SPACES", AT LEAST 60"x60", ARE TO BE LOCATED NO MORE THAN 200' APART. PARTS OF THE ACCESSIBLE PATH OF TRAVEL WITH A CONTINUOUS GRADIENT WITH A 60' LONG LEVEL AREAS ARE NOT TO BE MORE THAN 400' APART. ACCESSIBLE ROUTE OF TRAVEL SHALL BE MAINTAINED FREE OF OVERHANGING OBSTRUCTIONS TO 80" MINIMUM AND PROTRUDING OBJECTS GREATER THAN 4" PROJECTION FROM WALL AND ABOVE 27" AND LESS THAN 80". ARCHITECT SHALL VERIFY THAT THERE ARE NO BARRIERS IN THE ROUTE OF TRAVEL.
- 3. REPAIR (E) PAVING WHERE REQUIRED TO MEET ACCESSIBILITY REQUIREMENTS IN GENERAL NOTE NUMBER 2.
- 4. FIRE DEPARTMENT ACCESS MUST BE MAINTAINED TO ALL PORTIONS OF THE SITE DURING CONSTRUCTION. ALL SHUTDOWN OF THE EGRESS LANES MUST BE COORDINATED WITH AND APPROVED BY THE ARCHITECT AND OWNER A MINIMUM OF 72 HOURS PRIOR TO CLOSING.
- 5. THE GENERAL CONTRACTOR IS RESPONSIBLE TO PROTECT ALL EXISTING BUILDING AND LANDSCAPE, INCLUDING (BUT NOT LIMITED TO) ROOFS, WALLS, FLOORS, SITE EQUIPMENT, AND SITE SIGNAGE THROUGH THE DURATION OF THE PROJECT.

LEGEND

- ACCESSIBLE PATH OF TRAVEL (P.O.T.)
- (E) BUILDING
- (E) ACCESSIBLE RESTROOM TO REMAIN.

REFERENCE NOTES

- (E) FENCING TO REMAIN
- (E) LANDSCAPING TO REMAIN
- (E) CONCRETE PAVING TO REMAIN
- (E) ASPHALT PAVING TO REMAIN
- (E) FIRE HYDRANT
- (E) PARKING TO REMAIN

ARCHITECTS

WLC

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BAY AREA

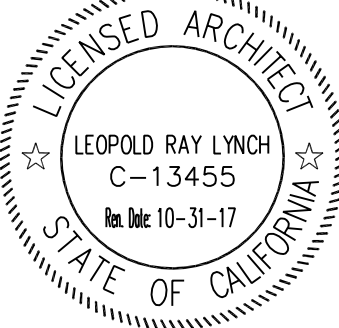
2600 TENTH STREET, SUITE 500
BERKELEY
CALIFORNIA 94710-2597

TEL: 510-450-1999

www.wlcarchitects.com

SOLANO COMMUNITY
COLLEGE DISTRICT
VALLEJO CENTER

545 COLUMBUS PARK WAY
VALLEJO, CA 94591



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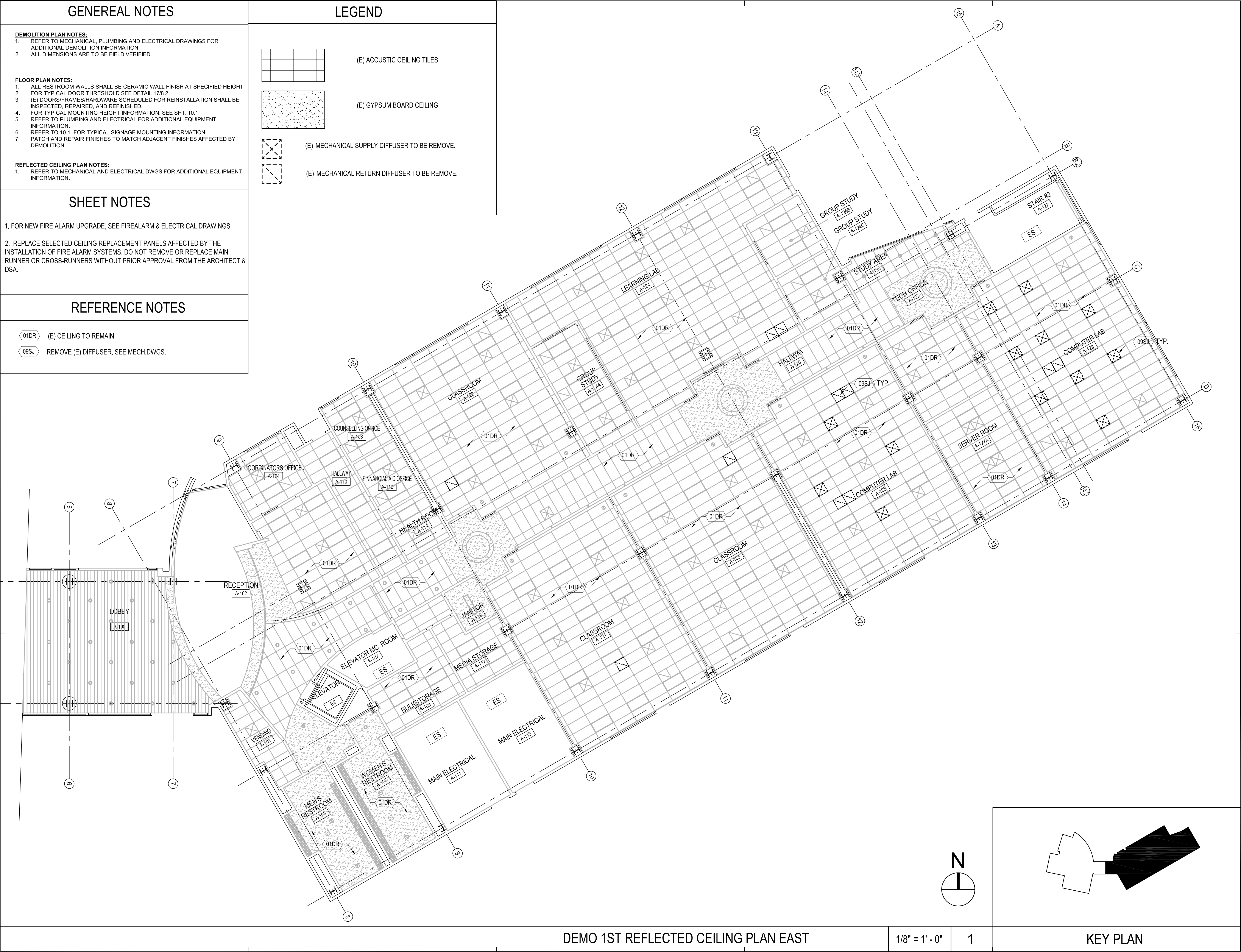
NO	DATE	BY	DESCRIPTION
REVISIONS			

DRAWN: VP	CHECKED: EB
DATE: 03/21/2017	SCALE: AS SHOWN
PROJECT NUMBER:	1715900

OVERALL
SITE PLAN

DRAWING
NUMBER:

A1.1



GENERAL NOTES

DEMOLITION PLAN NOTES:
1. REFER TO MECHANICAL, PLUMBING AND ELECTRICAL DRAWINGS FOR ADDITIONAL DEMOLITION INFORMATION.
2. ALL DIMENSIONS ARE TO BE FIELD VERIFIED.

REFLECTED CEILING PLAN NOTES:
1. REFER TO MECHANICAL AND ELECTRICAL DWGS FOR ADDITIONAL EQUIPMENT INFORMATION.

SHEET NOTES

1. FOR NEW FIRE ALARM UPGRADE, SEE FIREALARM & ELECTRICAL DRAWINGS

REFERENCE NOTES

15EF

(N) EXHAUST FAN, (E) AIR REGISTER TO REMAIN S.M.D. & S.E.D.

16EL

(E) LIGHT FIXTURE TO REMAIN

LEGEND:

(E) ACCUSTIC CEILING TILES

(E) GYPSUM BOARD CEILING

(E) MECHANICAL SUPPLY DIFFUSER TO BE REMOVE.

(E) MECHANICAL RETURN DIFFUSER TO BE REMOVE.

ARCHITECTS

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2600 TENTH STREET, SUITE 500
BERKELEY
CALIFORNIA 94710-2597

TEL: 510-450-1999
www.wlccarchitects.com

SOLANO COMMUNITY
COLLEGE DISTRICT
VALLEJO CENTER

545 COLUMBUS PARK WAY
VALLEJO, CA 94591

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Exp. Date: 10-31-17
STATE OF CALIFORNIA

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NO	DATE	BY	DESCRIPTION
REVISIONS			

DRAWN: VP

CHECKED: EB

DATE: 03/21/2017

SCALE: AS SHOWN

PROJECT NUMBER: 1715900

PROPOSED
1ST FLOOR RCP
PLAN EAST

DRAWING
NUMBER:

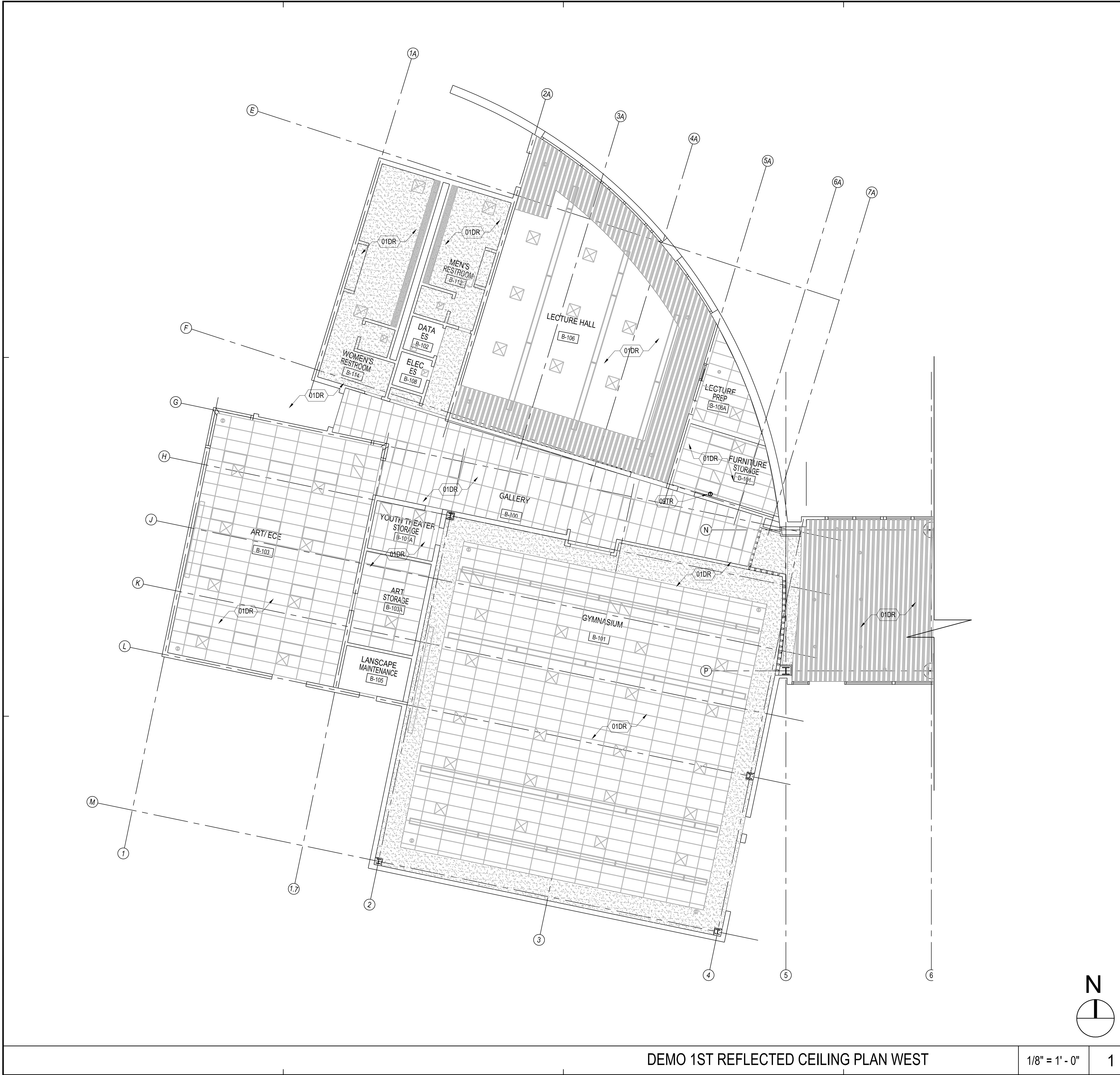
A3.2

PROPOSED 1ST REFLECTED CEILING PLAN EAST

1/8" = 1' - 0"

1

KEY PLAN



GENEREAL NOTES

DEMOLITION PLAN NOTES:

- REFER TO MECHANICAL, PLUMBING AND ELECTRICAL DRAWINGS FOR ADDITIONAL DEMOLITION INFORMATION.
- ALL DIMENSIONS ARE TO BE FIELD VERIFIED.

FLOOR PLAN NOTES:

- ALL RESTROOM WALLS SHALL BE CERAMIC WALL FINISH AT SPECIFIED HEIGHT
- FOR TYPICAL DOOR THRESHOLD SEE DETAIL 17/8.2
- (E) DOORS/FRAMES/HARDWARE SCHEDULED FOR REINSTALLATION SHALL BE INSPECTED, REPAIRED, AND REFINISHED.
- FOR TYPICAL MOUNTING HEIGHT INFORMATION, SEE SHT. 10.1
- REFER TO PLUMBING AND ELECTRICAL FOR ADDITIONAL EQUIPMENT INFORMATION.
- REFER TO 10.1 FOR TYPICAL SIGNAGE MOUNTING INFORMATION.
- PATCH AND REPAIR FINISHES TO MATCH ADJACENT FINISHES AFFECTED BY DEMOLITION.

REFLECTED CEILING PLAN NOTES:

- REFER TO MECHANICAL AND ELECTRICAL DWGS FOR ADDITIONAL EQUIPMENT INFORMATION.

SHEET NOTES

- FOR NEW FIRE ALARM UPGRADE, SEE FIREALARM & ELECTRICAL DRAWINGS
- REPLACE SELECTED CEILING REPLACEMENT PANELS AFFECTED BY THE INSTALLATION OF FIRE ALARM SYSTEMS. DO NOT REMOVE OR REPLACE MAIN RUNNER OR CROSS-RUNNERS WITHOUT PRIOR APPROVAL FROM THE ARCHITECT & DSA.

(E) ACCUSTIC CEILING TILES

(E) GYPSUM BOARD CEILING

(E) MECHANICAL SUPPLY DIFFUSER TO BE REMOVE.

(E) MECHANICAL RETURN DIFFUSER TO BE REMOVE.

(E) THERMOSTAT TO BE REMOVE

REFERENCE NOTES

01DR

(E) CEILING TO REMAIN

09SJ

REMOVE (E) DIFFUSER, SEE MECH.DWGS.

09TR

REMOVE (E) THERMOSTAT, SEE MECH.DWGS.

KEY PLAN

ARCHITECTS

WLC

CLIENT FOCUSED • PASSION DRIVEN

BAY AREA

2600 TENTH STREET, SUITE 500
BERKELEY
CALIFORNIA 94710-2597

TEL: 510-450-1999
www.wlcarchitects.com

SOLANO COMMUNITY
COLLEGE DISTRICT
VALLEJO CENTER

545 COLUMBUS PARK WAY
VALLEJO, CA 94591

LICENSED ARCHITECT
LEOPOLD RAY LYNCH
C-13455
Exp. Date: 10-31-17
STATE OF CALIFORNIA

CONSULTANT

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NO	DATE	BY	DESCRIPTION
REVISIONS			

DRAWN: VP

CHECKED: EB

DATE: 03/21/2017

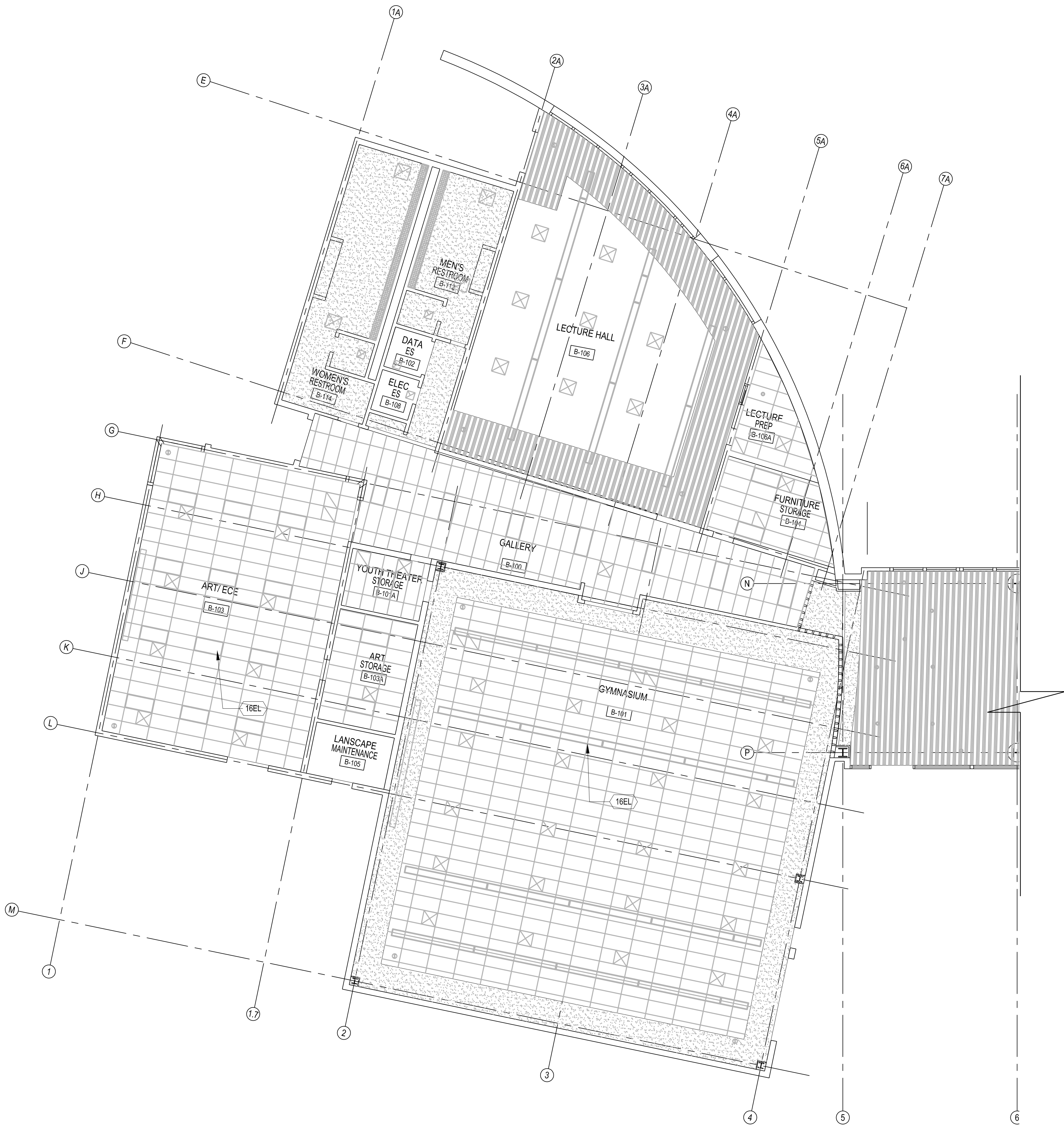
SCALE: AS SHOWN

PROJECT NUMBER: 1715900

DEMO
1ST FLOOR RCP
PLAN WEST

DRAWING
NUMBER:

A3.3



PROPOSED 1ST REFLECTED CEILING PLAN WEST

1/8" = 1' - 0"

1

GENERAL NOTES

- DEMOLITION PLAN NOTES:
1. REFER TO MECHANICAL, PLUMBING AND ELECTRICAL DRAWINGS FOR ADDITIONAL DEMOLITION INFORMATION.
 2. ALL DIMENSIONS ARE TO BE FIELD VERIFIED.
- REFLECTED CEILING PLAN NOTES:
1. REFER TO MECHANICAL AND ELECTRICAL DWGS FOR ADDITIONAL EQUIPMENT INFORMATION.

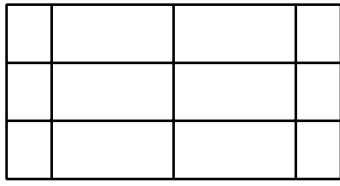
SHEET NOTES

1. FOR NEW FIRE ALARM UPGRADE, SEE FIREALARM & ELECTRICAL DRAWINGS

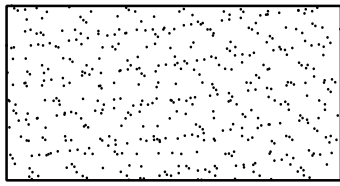
REFERENCE NOTES

- (N) EXHAUST FAN, (E) AIR REGISTER TO REMAIN S.M.D. & S.E.D.
- (E) LIGHT FIXTURE TO REMAIN

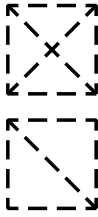
LEGEND:



(E) ACCUSTIC CEILING TILES



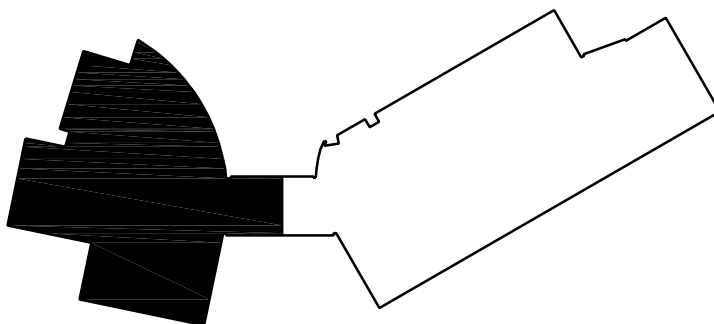
(E) GYPSUM BOARD CEILING



(E) MECHANICAL SUPPLY DIFFUSER TO BE REMOVE.



(E) MECHANICAL RETURN DIFFUSER TO BE REMOVE.



KEY PLAN



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BAY AREA

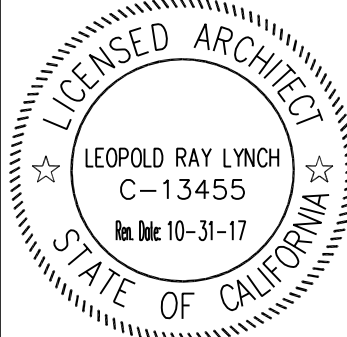
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BERKELEY
CALIFORNIA 94710-2597

TEL: 510-450-1999

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COLLEGE DISTRICT
VALLEJO CENTER

545 COLUMBUS PARK WAY
VALLEJO, CA 94591



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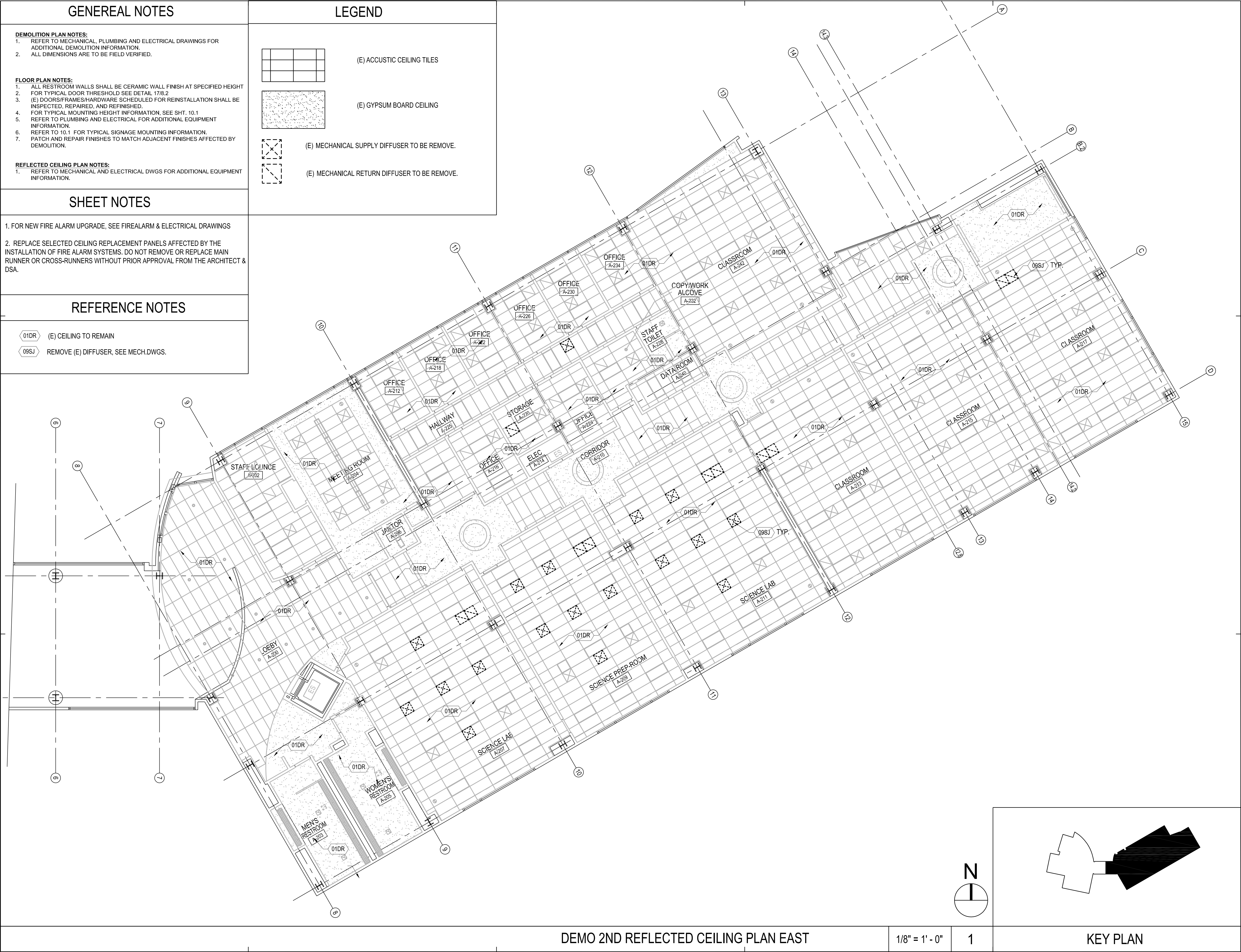
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NO	DATE	BY	DESCRIPTION
REVISIONS			

DRAWN: VP	CHECKED: EB
DATE: 03/21/2017	SCALE: AS SHOWN
PROJECT NUMBER: 1715900	

PROPOSED
1ST FLOOR RCP
PLAN WEST

DRAWING
NUMBER:

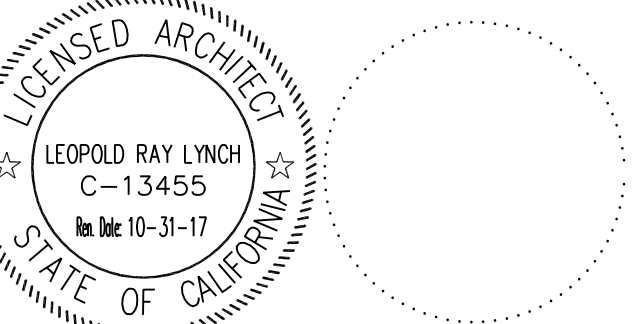
A3.4





BAY AREA
2600 TENTH STREET, SUITE 500
BERKELEY
CALIFORNIA 94710-2597
TEL: 510-450-1999
www.wlcarchitects.com

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COLLEGE DISTRICT
VALLEJO CENTER**
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VALLEJO, CA 94591



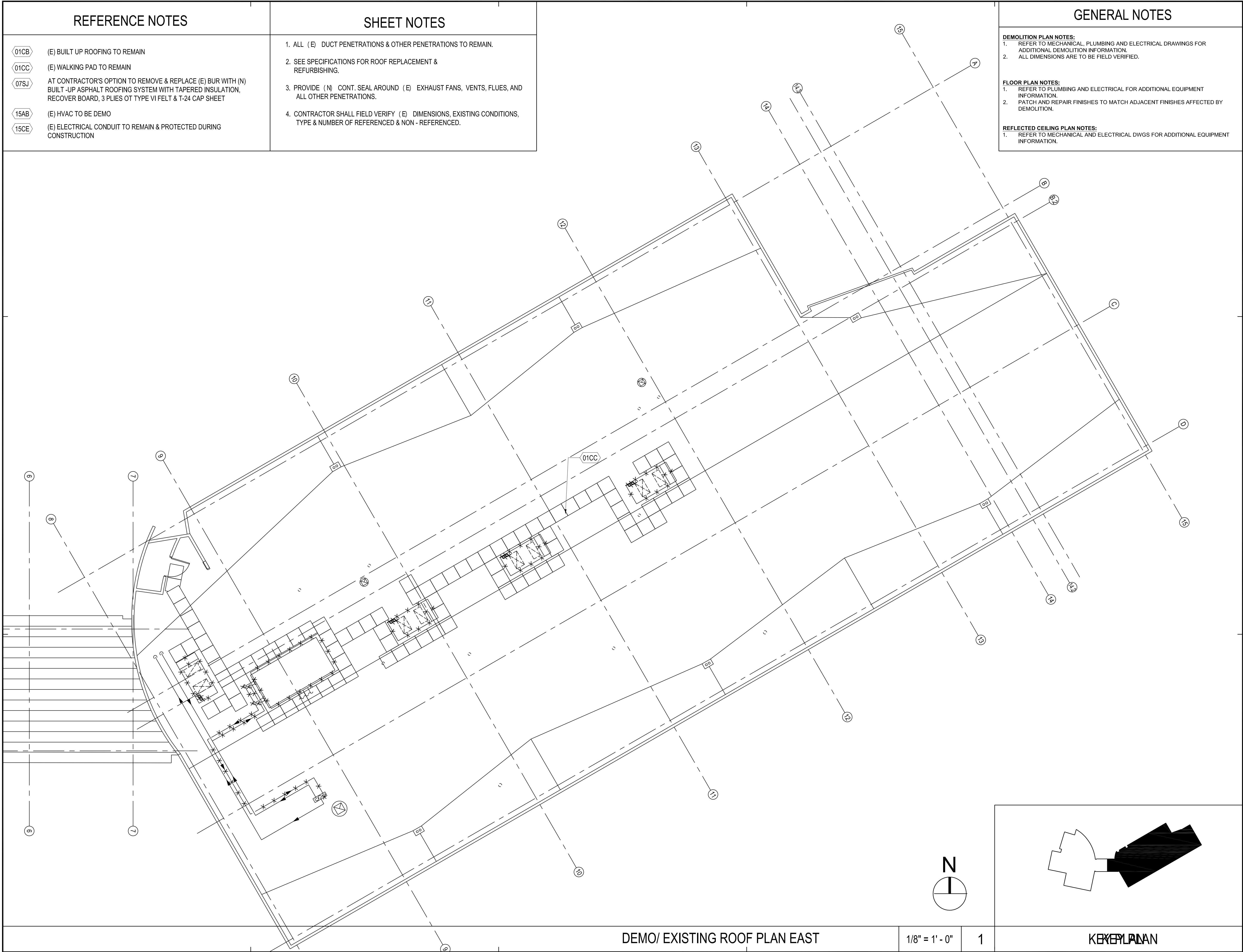
CONSULTANT

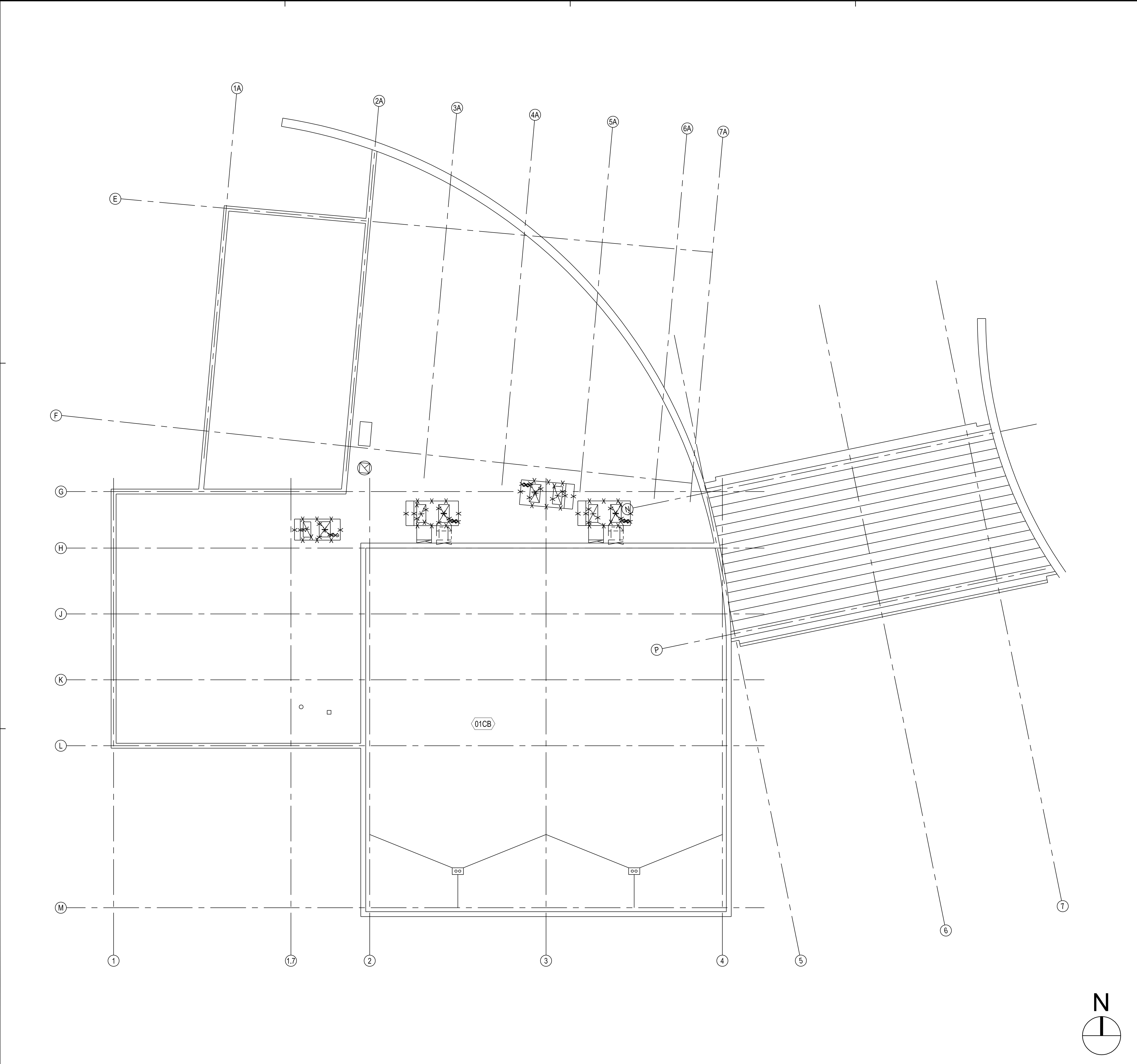
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NO	DATE	BY	DESCRIPTION
REVISIONS			

DRAWN: VP CHECKED: EB
DATE: 03/21/2017 SCALE: AS SHOWN
PROJECT NUMBER: 1715900

**PROPOSED
2ND FLOOR RCP
PLAN EAST**

DRAWING
NUMBER: **A3.6**





DEMO/ EXISTING ROOF PLAN WEST

1/8" = 1' - 0"

GENERAL NOTES

DEMOLITION PLAN NOTES:

- REFER TO MECHANICAL, PLUMBING AND ELECTRICAL DRAWINGS FOR ADDITIONAL DEMOLITION INFORMATION.
- ALL DIMENSIONS ARE TO BE FIELD VERIFIED.

FLOOR PLAN NOTES:

- REFER TO PLUMBING AND ELECTRICAL FOR ADDITIONAL EQUIPMENT INFORMATION.
- PATCH AND REPAIR FINISHES TO MATCH ADJACENT FINISHES AFFECTED BY DEMOLITION.

REFLECTED CEILING PLAN NOTES:

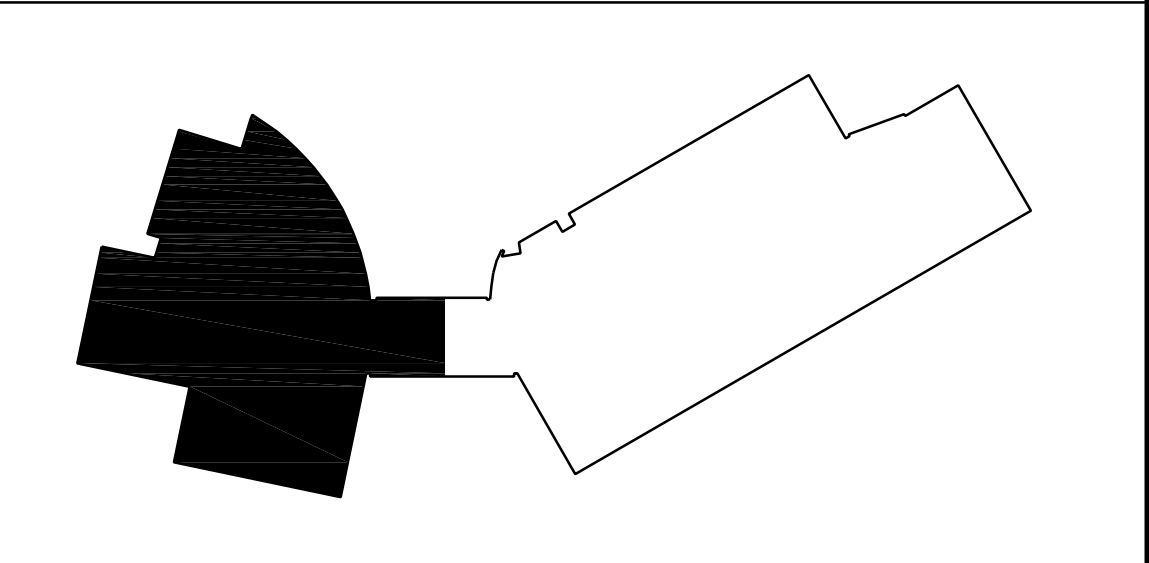
- REFER TO MECHANICAL AND ELECTRICAL DWGS FOR ADDITIONAL EQUIPMENT INFORMATION.

SHEET NOTES

- ALL (E) DUCT PENETRATIONS & OTHER PENETRATIONS TO REMAIN.
- SEE SPECIFICATIONS FOR ROOF REPLACEMENT & REFURBISHING.
- PROVIDE (N) CONT. SEAL AROUND (E) EXHAUST FANS, VENTS, FLUES, AND ALL OTHER PENETRATIONS.
- CONTRACTOR SHALL FIELD VERIFY (E) DIMENSIONS, EXISTING CONDITIONS, TYPE & NUMBER OF REFERENCED & NON - REFERENCED.

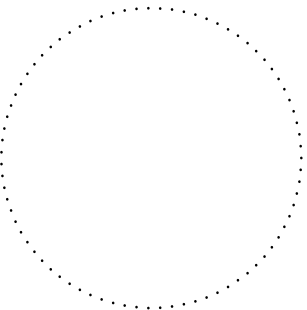
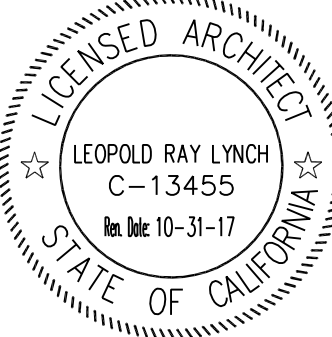
REFERENCE NOTES

01CB (E) BUILT UP ROOFING TO REMAIN



BAY AREA
2600 TENTH STREET, SUITE 500
BERKELEY
CALIFORNIA 94710-2597
TEL: 510-450-1999
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SOLANO COMMUNITY
COLLEGE DISTRICT
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NO	DATE	BY	DESCRIPTION
REVISIONS			

DRAWN: VP	CHECKED: DR
DATE: 03/21/2017	SCALE: AS SHOWN
PROJECT NUMBER: 1715900	

DEMO / EXISTING
ROOF PLAN
WEST

