



MARK PESTRELLA, Director

COUNTY OF LOS ANGELES

DEPARTMENT OF PUBLIC WORKS

"To Enrich Lives Through Effective and Caring Service"

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P.O. BOX 1460
ALHAMBRA, CALIFORNIA 91802-1460

IN REPLY PLEASE

REFER TO FILE:

BRC-2

September 8, 2022

NOTICE TO BIDDERS C HARBOR-UCLA MEDICAL CENTER REPLACEMENT PROGRAM INTERIM HELISTOP PROJECT SPECS. NO: 7821; CP 67965

This Notice to Bidders C clarifies certain Sections of the Project Manual and is hereby made part of the Contract Documents.

PROJECT MANUAL

1. Refer to Section 00 03 00, Form of Bid.

Delete Section in its entirety and replace with the attached revised Section 00 03 00, Form of Bid, which includes receipt of Notices to Bidders (Attachment 1).

2. Delete Sections 260500, 260519, 260526, 260533, 260543, 260553, 262416, 262726, and 262816 and replace with the revised sections attached to this Notice to Bidders C (Attachment 2, Addendum B, dated 09/08/2022).

DRAWINGS

3. Delete Drawing Sheets A010, A110, A211, A212, C010, C020, C030, C201, C301, S201, S401, S501, E101, E221, E222, E301, HH002, T001, T110, T111, T600, T601, SG-02, SG-03, and SG-04, and replace with the revised drawing sheets attached to this Notice to Bidders C (Attachment 3). Changes clouded and tagged BC-2, dated 09/07/2022.
4. Add Drawing Sheets C101 and C151 attached to this Notice to Bidders C (Attachment 4), to the construction documents.

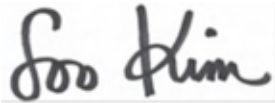
Notice to Bidders C
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Kindly notify your subcontractors of this Notice.

If you have any questions regarding this Notice to Bidders C, you may contact Mr. Simon Lee at (626) 458-2509 or SIMONLEE@dpw.lacounty.gov.

Very truly yours,

MARK PESTRELLA, PE
Director of Public Works

A handwritten signature in black ink, appearing to read "Jose Quevedo", is enclosed in a thin black rectangular border.

for

JOSE QUEVEDO, PE
Assistant Deputy Director
Business Relations and Contracts Division

JQ:syl

Attach.

ATTACHMENT 1

Name of Bidder (Firm Name)

Vendor Identification Number**SECTION 00 03 00****FORM OF BID TO BE USED BY BIDDERS**

The undersigned proposes to furnish all materials, labor, and equipment required for the construction to complete the Harbor-UCLA Medical Center Replacement Program Interim Helistop Project, in accordance with Drawings and Specifications 7821, including addenda thereto, if any, adopted by the Board of Supervisors, and on file in the office of the Board of Supervisors, as follows:

The lowest bid price shall be determined by adding the following items: Lump Sum Bid in Words (1) + [Extended Overhead Daily Rate (2) x Multiplied by 30 days] = Total Lump Sum Bid. Preference as stated in Section 00 01 00, 1.30, will be applied to the Total Lump Sum Bid, if applicable, to determine the final total bid amount.

1. LUMP SUM BID:

The lump sum bid for the work, including Best Management Practices (BMP) and Construction and Demolition Debris Recycling, and Mandatory Jobs Coordinator requirements complete according to the Drawings and Specifications, will be:

(\$ _____) (_____)
Lump sum bid in figures Lump sum bid in words

2. EXTENDED OVERHEAD DAILY RATE:

The daily rate for the sum of the Contractor's field office and home office overhead applicable to this project, for each day of compensable delay will be:

(\$ _____) (_____)
Daily rate in figures Daily rate in words

3. COUNTY PROGRAM PREFERENCE:

The Local Small Business Enterprise Program Preference, Social Enterprise Program Preference, and Disabled Veterans Business Enterprise Program Preference are provided by the County for purposes of bid evaluation only, as specified in Article 1.30 of Section 00 01 00. If Bidder is a qualifying Local Small Business Enterprise, Social Enterprise Preference, and/or Disabled Veterans Business Enterprise check "yes" in the box below. If non-qualifying, check "no" in the appropriate box.

Yes

☐

No

☐

4. RECEIPT OF NOTICE TO BIDDERS:

I hereby certify and declare that I have received, reviewed and incorporated Notice to Bidders C dated September 8, 2022, into my Bid.

Executed this day of _____ (Month and Year)

By: _____

(Authorized Signature of a Principal Owner, Officer, or Manager)

NOTE: Any alteration or addition to the Form of Bid may invalidate same. All blank spaces shall be filled out completely. Line out nonapplicable blanks. An incomplete form may invalidate bid. The County reserves the right to waive any informalities or to reject any or all bids or to accept any alternatives when called for.

ATTACHMENT 1

I (We) certify that on _____, 20____, License No. _____, license classification(s) _____, was issued to me (us), in the name of _____, by the Contractors' State License Board, pursuant to California Statutes of 1929, as amended, and that said license has not been revoked.

Firm Ownership Information
Check where applicable:

If minority-owned, indicate the appropriate category:

1. ☐ Minority-Owned
- ☐ Woman-Owned
- ☐ Disadvantaged-Owned
- ☐ Disabled Veteran-Owned
- ☐ Other

- ☐ African American
- ☐ Hispanic or Latino
- ☐ Asian/Pacific Islander
- ☐ Filipino
- ☐ American Indian/Alaskan Native

2. ☐ An individual
- ☐ A corporation. Name state or territory of Incorporation

If a copartnership or joint venture, list names of individuals comprising same below

- ☐ A copartnership
- ☐ A joint venture

Date signed _____, 20____

Respectfully submitted,

Place _____
City and State

Firm Name (if applicable)

Bidder's address, E-mail address, and telephone:

Number and Street

Signature and Print Name

City and State

Title and E-mail Address

Telephone

Signature and Print Name

Fax

Title and E-mail Address

ATTACHMENT 2

SECTION 260500 - COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1. The general and supplemental requirements applicable to the Work specified in Division 26 and it also includes general administrative and procedural requirements for Division 26 that supplements the requirements specified in Division 01.
- 2. The supplemental requirements, accessories, and detail work necessary for a complete installation of electrical systems whether or not such items are indicated on the Drawings or included in the Specifications. Review all sections of the Specifications for related work and coordinate the work of this Section with all other Sections.
- 3. The specific requirements included are as follows:
 - a. Supporting devices for electrical components
 - b. Concrete equipment bases
 - c. Electrical demolition
 - d. Cutting and patching for electrical construction

B. Related Requirements:

- 1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.
- 2. Specifications as described on plans and/or contract documents.
- ~~3. Division 07 Section "Penetration Firestopping" for firestopping materials and requirements for penetrations through fire and smoke barriers.~~

C. Description of Work:

- 1. The scope of work shall include but not be limited to the following:
 - a. Perform all incidental work required to provide a complete properly operating system. Provide the type and quantity of electrical materials and equipment necessary to complete Work and all systems in operation, tested and ready for use.
 - b. Provide all incidental items that belong to the Work described and which are required for complete systems.
 - c. Provide construction power and lighting.
 - d. Provide power for testing of equipment and systems through final acceptance tests.
 - e. Provide outlet, junction and pull boxes, plaster rings, plates, conduit only and pull lines for communications, security, maintenance signal, intercom, A/V and other systems. (Provide wiring and equipment if shown on drawings.)
 - f. Provide, design, dimension, coordinate and install the following items specified as design build under specified performance criteria:

- 1) Support and anchorage of all equipment, raceways (trays, conduits, ~~and etc.etc.~~) and lighting.
 - 2) Hangers and Supports for Electrical Systems. ~~Refer to Section 260529 as required per code.~~
 - ~~3) Vibration and Seismic Controls. Refer to Section 260548.~~
 - g. Provide testing described in individual sections ~~and Section 260563.~~
2. Construction Documents Drawings and Data:
- a. All drawings and these specifications shall be considered as a whole, and work of this Division shown therein shall be furnished under this Division.
 - b. Drawings indicate general arrangement of all conduits, equipment, devices, light fixtures, and connections. Examine drawings and specifications very carefully and notify the Owner's Representative via RFI (Request for Information) of any discrepancies so these can be rectified at an early date and before any work is performed.
 - c. Drawings are diagrammatic and are a graphic representation of the Contract Requirements, produced according to the best available standards to an optimum scale. Dimensions of work as indicated on plans are not guaranteed to be as-built dimensions. No measurements shall be scaled from the Drawings for use as a definite dimension for layout or fitting work in place. The Contractor is solely responsible for dimensional control and coordination of the work to be installed.
 - d. The layout of equipment, as shown on the plans, shall be checked and exact location determined by dimensions of equipment accepted for installation. Consult the Architectural and Structural Drawings for all dimensions, locations of partitions, sizes of structural members, foundations, etc.
 - e. Should conditions necessitate any rearrangements, the Contractor shall prepare and submit drawings showing the changes before proceeding with the work. If such changes are approved, they shall become a part of this contract after their approval.
 - f. Contractor shall be responsible for the coordination of the mechanical ducting, mechanical and plumbing piping distribution with the fire sprinklers, lighting, conduit, cable tray, structural members, ceiling support and all other trades present within the project.
 - g. Contractor shall also be responsible for the coordination of all existing utilities and existing conditions with existing documents, civil engineer and civil drawings.

1.3 REFERENCES

A. General:

1. Reference to codes, standards, specifications and recommendations of technical societies, trade organizations and governmental agencies shall mean that latest edition of such publications adopted and in effect at the time of proposal or the bid. Such codes or standards shall be considered part of this Specification as though fully repeated herein.
2. When codes, standards, regulations, etc. allow work of lesser quality or extent than is specified under this Division, nothing in said codes shall be construed or inferred authority for reducing the quality, requirements or extent of the Drawings and Specifications. The contract documents address the minimum requirements for construction.
3. Before bidding, be familiar with rulings of the building and inspection departments and comply with such requirements. Rulings and interpretations of authorities shall be considered as part of the regulations.

4. It is not the intent of Drawings and Specifications to repeat requirements of codes except where necessary for completeness or clarity. Nothing in the Drawings or Specifications is to be construed to permit work not conforming to the applicable codes and regulations. Should there be any direct conflict between Contract Documents and applicable codes and regulations the codes and regulations shall govern.
 5. Nothing in the contract documents is to be construed to permit work not conforming to the applicable standards, codes and regulations. Should there be any direct conflict between contract documents and below codes, rules and regulations, the rules shall govern.
 6. Any equipment/device/fixture for which there is an energy efficiency standard established by the authority having jurisdiction shall comply with the applicable standard.
- B. Work shall be performed in accordance with all applicable requirements of the listed edition of all governing codes, rules and regulations including but not limited to the following minimum standards, whether statutory or not:
1. California Code of Regulations Titles 8, 19 and 24 and other applicable laws or regulations, amended by local jurisdiction where applicable. Applicable codes are as follows:
 - a. California Building Code (CBC), 2019 edition
 - b. California Electrical Code (CEC), 2019 edition
 - c. 2019 California Energy Code
 - d. California Mechanical Code (CMC), 2019 edition
 - e. California Plumbing Code (CPC), 2019 edition
 2. California State Fire Marshall and California State Department of Public Health, Titles 17 and 22, amended by the City of Los Angeles. Applicable code is as follows:
 - a. California Fire Code (CFC), 2019 edition
 3. National, State and local codes, standards and other applicable laws or regulations including, but not limited to, the following:
 - a. National Fire Protection Association (NFPA), all applicable sections.
 - b. Safety Orders of the Division of Industrial Industry.
 - c. Americans with Disabilities Act (ADA).
 - d. State of California Construction Safety Orders (CAL-OSHA).
 - e. Codes and regulations noted in other Sections of Division 26.
 4. Code compliance is mandatory. Nothing in these Design Standards implies acceptance of work not conforming to those codes. Items that exceed minimum code requirements shall comply with these Standards.
 5. No work shall be concealed until after inspection and approval by proper authorities. If work is concealed without inspection and approval, the Contractor shall be responsible for all work required to open and restore the concealed areas in addition to all required modifications.
- C. Standards: Equipment and materials specified under this Division shall conform to the following standards where applicable:
1. ACI - American Concrete Institute.
 2. AEIC- Association of Edison Illuminating Companies.
 3. AISI - American Iron and Steel Institute.
 4. ANSI - American National Standards Institute.
 5. ASTM - American Society for Testing Materials.
 6. CBM - Certified Ballast Manufacturers.
 7. ETL - Electrical Testing Laboratories.
 8. FAA - Federal Aviation Administration.

9. FCC - Federal Communications Commission.
10. FM - Factory Mutual.
11. FS - Federal Specification.
12. ICEA - Insulated Cable Engineers Association.
13. IEEE - Institute of Electrical and Electronics Engineers, Inc.
14. IESNA - Illuminating Engineering Society of North America.
15. ISO - International Standardization Organization.
16. NEMA - National Electrical Manufacturer's Association.
17. NETA - InterNational Electrical Testing Association.
18. NFPA - National Fire Protection Association.
19. UL - Underwriters Laboratories

1.4 COORDINATION

- A. The Work to be performed is an existing site that will require close coordination with existing installations and conditions. Contractor should anticipate that many existing pipes, ducts, conduits, structural members, fixtures, equipment, and other features will not be of the sizes, in the locations, or in the orientations indicated on the Drawings.
 1. Examine the site and drawings relating to work of all trades and become fully informed as to the extent and character of work required.
 2. Contractor should anticipate that many new pipes, ducts, conduits, etc. may not fit as indicated on Drawings.
 3. Contractor shall adjust the Work as necessary to resolve such issues, even if such adjustments require more material or labor. Contractor will not be compensated extra money or granted time extensions for such adjustments or relocations.
- B. All work shall be completed in a workmanlike manner and shall conform to best trade practice.
- C. Coordinate chases, slots, inserts, sleeves, and openings with general construction work and arrange in building structure during progress of construction to facilitate the electrical installations that follow.
 1. Set inserts and sleeves in poured-in-place concrete, masonry work, and other structural components as they are constructed.
- D. Where conflict exists between rough-in shown on drawings and that shown or required by equipment to be installed, obtain clarification from the Owner's Representative and provide rough-in as directed.
- E. Sequence, coordinate, and integrate installing electrical materials and equipment for efficient flow of the Work. Coordinate installing large equipment requiring positioning before closing in the building.
- F. Coordinate location of access panels and doors for electrical items that are concealed by finished surfaces. Access doors and panels are specified in Division 08 Section "Access Doors and Frames."
- G. Cooperate with all other Divisions performing work on this project as necessary to achieve a complete neatly fitted installation for each condition. Consult the Drawings and Specifications to determine nature and extent of work specified in other Divisions that adjoins, shares space with, or attaches to the work of this Division.

1. Confer with other Divisions at the site to coordinate this work with theirs in view of job conditions to the end that interferences may be eliminated, and that maximum headroom and clearance may be obtained.
 2. In the event that interferences develop, the Owner's Representative's decision will be final as to which Division shall relocate its work and no additional compensation will be allowed for the moving of piping, ductwork, conduit or equipment to clear such interferences.
- H. Identify congested conditions. Congested areas typically include ductwork, piping, electrical work, ceiling work, etc. Include all mechanical and utility rooms and congested areas in corridors, tunnels and similar spaces. Shop Drawings for Work in "tight" areas shall clearly indicate the solutions to space problems in coordination with Work in other Sections. Identification of space problems without solutions is not acceptable. Solutions to problems may include relocation or rerouting of existing equipment, pullbox, conduit, piping and etc. to allow installation of new work
- I. Coordinate electrical power and line voltage control wiring requirements of ~~mechanical~~ Plumbing equipment and systems with requirements in Division ~~23~~22. Low voltage wiring that is not shown as by electrical contractor shall be the responsibility of the low voltage controls contractor including all conduit if not shown specifically in drawings as by Electrical Contractor.
- J. Coordinate electrical power and line voltage power supply wiring requirements of other low voltage systems (e.g. Divisions 13, 27, and 28) requirements with respective specifications section. Including but not limited to: Low voltage wiring that is not shown as by electrical contractor shall be the responsibility of the low voltage system awarded contractor including all conduit if not shown specifically in the low voltage system drawings as by Electrical Contractor.
- ~~J.~~K. Coordinate the exact Point of Connection (POC) for incoming electrical feeder/circuiting conductors from new 12kV Service Building located to the West of project site.
- ~~K.~~L. Cutting and Patching:
1. The Contractor shall do all cutting of building materials and etc., as required for the installation of work.
 2. No structural members shall be cut without the prior approval of the Owner's Representative. To gain approval to cut concrete, Ferro scan the affected area and submit scan results to Structural Engineer for review. Submit to Owner's Representative, drawings, and details for the support of structure around the opening. If the standard structural details are to be used, then submit a plan that cross-references all penetrations against detail numbers for review. Otherwise, submit drawings, design and calculations stamped by a Registered Professional Structural Engineer in the state of California. Any cutting and remedial support shall be done in a manner satisfactory to the Owner's Representative.
 3. ~~All Cutting-cutting~~ and patching of building structure, walls, floors, etc. during normal work progress shall be in full compliance with the Requirements of Division 01.
 4. All patching of or repair of damage to completed work in place shall be done to meet with the approval of the Owner's Representative.
 5. All patching shall be equal to the condition of the element prior to cutting as defined by the Owner's Representative.
 6. All cutting shall be performed with machine saw. Holes for pipes in concrete walls or floors shall be drilled with core drilling equipment.
 7. Work in place that is subsequently cut is seen as evidence of the contractor's lack of field coordination during the shop drawing production phase. Because field coordination is a requirement of the contract, the contractor must bear all costs of cutting, patching and repair for corrective work.

~~L-M.~~ M. Interruption of Existing Electrical Service(s): Do not interrupt electrical service to facilities occupied by Owner or other Tenants unless permitted under the following conditions:

1. Notify Owner's Representative no fewer than 10 working days in advance of proposed interruption of electrical service.
2. Do not proceed with interruption of electrical service without Owner's written permission.
3. Coordinate interruption with systems impacted by the power outage including, but not limited to, the following:
 - a. Emergency Lighting
 - b. Elevator(s)
 - c. Fire Alarm Systems

~~M-N.~~ N. Arrange to provide temporary electrical power in accordance with requirements specified in Division 01 and Electrical documents.

1.5 SUBMITTALS

A. Submittals for each section shall conform to the general guidelines and procedures of Division 01 and this section.

B. Informational Submittals: At preconstruction meeting, and periodically thereafter as dates change, provide schedule for electrical installation Work to Owner and Architect including, but not limited to, milestone dates for the following activities:

1. Submission of power system studies.
2. Submission of specified coordination drawings.
3. Submission of action submittals specified in Division 26.
4. Utility service outages.
- ~~5. Utility service inspection and activation.~~
- ~~6-5.~~ 5. System startup, testing, and commissioning activities for major electrical equipment.
- ~~7-6.~~ 6. System startup, testing, and commissioning activities for emergency lighting.
- ~~8-7.~~ 7. System startup, testing, and commissioning activities for automation systems (~~SCADA, BMS,~~ lighting, HVAC, fire alarm, fire pump, etc.).
- ~~9-8.~~ 8. Pouring of concrete housekeeping pads for electrical equipment and testing of concrete samples.
- ~~10-9.~~ 9. Requests for inspections by authorities having jurisdiction.

C. Action Submittals: Before beginning work, submit the following to the Engineer for review and approval.

1. Product Data: Submit a list of manufactured units, components and accessories to be provided, along with their manufacturer's product data, specifications, typical installation details and other data necessary to demonstrate compliance with the Contract Documents for each item listed.
 - a. Identify each item by the manufacturer, brand or trade name, model number, size, ratings, and any other data that is necessary to properly identify and check materials and equipment.
 - b. Mark the exact equipment item and data on each sheet. Where multiple product model types are listed on a single sheet, the contractor shall clearly indicate which specific item is submitted. If different model numbers of a single product line are submitted for different uses, this should be clearly annotated, identifying each individual use cross-referenced by the requirement it intends to fulfill. Submittals without annotation will be rejected and returned without review.
 - c. Submittal literature, drawings and wiring diagrams shall be specifically applicable

to this project and shall not contain extraneous material or optional choices.

Clearly mark literature to indicate the proposed item and its relevant features or options. Submittals shall include all those items listed in each individual Section.

- d. As part of the equipment submittals, the manufacturer shall submit documentation to indicate that the entire assembly is suitable and certified to meet all applicable seismic requirements. In addition, the manufacturer shall recommend the method of anchoring the equipment to the mounting surface, including the assembly dimensions, weights, and approximate centers of gravity.

2. Shop Drawings:

- a. Prepare reproducible CAD drawings in AutoCAD and Revit as required.
- b. Provide shop drawings for all systems as required per individual Division 26 specification sections, drawings or Construction Documents.
- c. All equipment shall be shown to scale and shall match the required dimensions from the equipment submittals. All equipment access clearances shall be marked explicitly on the Shop Drawings with manufacturer and code required distances dimensioned and annotated as such.
- d. The drawings shall be minimum 1/4" = 1'-0" scale.
- e. Independent structural support and structural pad drawings shall be submitted for Structural Engineer's review.
- f. All equipment shall be labeled to match the drawings.
- g. The Contractor shall assure that each trade has coordinated work with other trades, prior to submittal. Division 26 shop drawings shall be issued after the coordination drawings are signed off by all other trades. Any conflicts that occur with other trades shall be brought to the attention of the Owner's Representative prior to issuance of the shop drawings.
- h. Provide detailed drawings of all electrical equipment rooms, yards and utility areas. Revised electrical equipment layouts must be reviewed and approved prior to release of order for equipment and prior to installation
- i. Furnish panel and frame elevations indicating materials, construction, finish, anchoring details for each wall condition and accessories.

3. Substitutions:

- a. All requests for substitutions shall conform to the general requirements and procedure outlined in Division 01.
- b. No substitutions shall be made in the materials submitted and approved without a re-submittal and prior approval of the Project Engineer.
- c. Where items are noted as "or equal," a product of equal design, construction and performance will be considered. Contractor must submit all pertinent test data, catalog cuts and product information required substantiating that the product is in fact equal to that specified. Only one substitution will be considered for each product specified.
- d. Manufacturers' names and model numbers used in conjunction with materials, processes or equipment included in the Contract Documents are used to establish standards of quality, utility, and appearance. Materials, processes and/or equipment, which, in the opinion of the Owner's Representative, is equal in quality, utility and appearance, will be approved as substitutions to that specified.
- e. Whenever any material, process or equipment is specified in accordance with a Federal specification, ASTM standard, ANSI specification, UL listing or other association standard, the Contractor shall present an affidavit from the manufacturer certifying that the product complies with the particular standard specification. When requested by the Owner's Representative, support test data to substantiate compliance shall be submitted by the Contractor at no additional cost.
- f. Substitutions shall be equal, in the opinion of the Owner's Representative, to the specified product. The burden of proof of such shall rest with the Contractor. When the Owner's Representative, in writing, accepts a substitution, it is with the

understanding that the Contractor guaranteed the substituted article or material to be equal to the one specified and dimensioned to fit within the construction. Approved substitutions shall not relieve the Contractor of responsibilities for the proper execution of the work, or from any provisions of the Specifications.

- g. The Contractor shall be responsible for all expenses in connection with the substitution materials, processes and equipment, including the effect of his substitution on him, his subcontractor's or other Contractor's work. No substitution of material, processes or equipment shall be permitted without written authorization of the Owner's Representative. Any assumptions on the acceptability of a proposed substitution prior to acceptance by the Owner's Representative are at the sole risk of the Contractor.

4. Resubmittals:

- a. All re-submittals shall include a cover letter that lists the action taken and revisions made to every drawing and equipment data sheet in response to Submittal Review Comments. Re-submittal packages will not be reviewed unless accompanied by this cover letter. Failure to include this cover letter will constitute rejection of the re-submittal package.
- b. Resubmittals shall be complete and shall be explicitly annotated to note all changes. Contractor shall not just include specific responses to review comments, but shall show how the resubmittal data has been corrected and how all consequences of the change have been accommodated.
- c. Changes made in the resubmittal which are not directly a response to an earlier review comment shall be clearly identified on the letter of transmittal provided with the re-submittal and annotated within the body of the submittal. The reason for the change shall be included.
- d. Non-compliant items which were not noticed in an earlier submittal but are noticed in a resubmittal shall be noted as non-compliant and the resubmittal tagged for corrective action. The fact that the Owner's Representative may have overlooked the defect shall not constitute total or partial acceptance of it. The contractor remains responsible for delivering an installation that meets the design intent. All corrective action shall be performed at no additional cost or delay to the project.
- e. One resubmittal will be reviewed. Review time for all second and higher resubmittals will be charged on a time and materials basis to the contractor regardless of the cause of the resubmittal. This will include all submittals to change manufacturer or equipment type after an original submittal was returned with no exceptions taken, unless the change is directly related to a Bulletin.

5. Samples: Submit samples where indicated in each Division 26 Section.

D. Informational Submittals:

1. Installation instructions:

- a. Submit manufacturer-prepared published instructions for the proper installation of each item; include storage, handling, and protection instructions and requirements.
- b. If manufacturer-prepared published installation instructions are either unavailable or do not specifically apply to project conditions, then consult the manufacturer's field representative and obtain manufacturer-prepared, project-specific supplemental instructions in writing. Before beginning work, promptly distribute copies to the Architect; the Architect may provide comments that lead to minor changes in the work.

1.6 QUALITY ASSURANCE

- A. Provide a meaningful Quality Assurance program. To assist the Contractor in this program, the

specifications contained herein are set forth as the minimum acceptable requirements. This does not relieve the Contractor from executing other Quality Assurance measures to obtain a complete operating facility within the scope of this project.

- B. The Contractor shall insure that all workmanship, all materials employed, all required equipment and the manner and method of installation conforms to accepted construction and engineering practices, and that each piece of equipment is in satisfactory working condition to satisfactorily perform its functional operation.
- C. Nothing in these plans or specifications is to be construed to permit work not conforming to the prevailing codes and regulations. Should there be any direct conflict between any referenced standard and the governing code, the mandatory code language shall govern to set only the minimum requirements and the most stringent requirement shall govern. A letter or Request for Information (RFI) shall be generated to highlight the discrepancy.
- D. Factory and Field Testing:
 - 1. Refer to each Section ~~and section 260810~~ for the required testing and procedures.
 - 2. Test reports shall include:
 - a. Description of equipment tested.
 - b. Description of test procedures.
 - c. Test results
 - d. Names and signatures of witnesses of tests.
 - 3. Notify the Owner's Representative 14 days in advance of when tests will be performed.
- E. Electrical Acceptance Testing:
 - 1. Contractor shall engage the services of a qualified third party testing agency for the purpose of performing the specified field tests of installed Work as herein specified and specified in other Sections of Division 26 of these Specifications. ~~Refer to Section 260810 for additional requirements.~~
 - 2. The testing agency shall provide all material, equipment, labor and technical supervision to perform such tests and inspections.
 - 3. All tests shall be performed in compliance with the recommendations and requirements of the NETA and applicable codes and standards.
 - 4. Upon completion of the tests and inspections noted in these specifications, a label shall be attached to all serviced devices. These labels shall indicate date serviced and the service company responsible.
 - 5. The tests and inspections shall determine suitability for continued reliable operation.
 - 6. All tests shall be conducted in the presence of Owner's Representative.
 - 7. Test reports: All test forms, results and reports shall be typed in their final form.
- F. Materials and Standards:
 - 1. The label of listing by UL shall appear on all materials and equipment for which standards have been established by the agency.
 - 2. Where codes listed in Division 01, establish label or approval requirements, furnish all materials and equipment with either the required labels affixed or the necessary written approval.
 - 3. All base material shall be per ASTM and/or ANSI standards.
- G. Materials and Workmanship:

1. All materials shall be new, meet the requirements of the contract document and be identifiable as being specified or substitute products.
2. Materials that do not conform to the requirements of the contract documents, are not equal to approved samples or are unsatisfactory or unsuited to the purpose for which they are intended, will be rejected and shall not be installed.
3. All equipment shall be installed in accordance with the recommendation of the manufacturer.
4. Work performed under this Division shall be installed by craftsmen skilled in the trade involved and apprentices as indicated in General Conditions.
5. Provide all control equipment for electrically operated equipment except when equipment is furnished with control equipment.
6. Provide all electrical Work required for the service and connection of electrically operated and controlled equipment specified in other Divisions of the Specification.
7. All electrical power, signal, alarm and communication systems shall be complete, tested and ready for use.
8. Defective work, whether the result of poor workmanship, use of defective materials, damage through carelessness, or other cause shall be removed within ten (10) days after written notice is given by the Owner's Representative and the work shall be re-executed by the Contractor. The fact that the Owner's Representative may have previously overlooked such defective work shall not constitute total or partial acceptance of it.
9. The Contractor recognizes that the design is based upon the equipment and material specified by name or construction and the Contractor accepts full responsibility for assuring that the quality, utility and performance of a substitution equals or exceeds that of the specified item.
10. In no case shall a Bidder base his bid on a class of material or workmanship less than that required by the contract documents nor the governing codes and ordinances.

H. Checking and Testing Equipment by Contractors and Manufacturer's Representative:

1. All equipment shall be installed per the manufacturer's instructions. During construction request supervisory assistance from equipment manufacturer's representatives so the equipment will be correctly installed. After installation, request the Owner's Representative to inspect and see the equipment is in proper working order.
2. Manufacturer's representative shall review the overall system design relative to the proper application of his equipment in the particular system. He shall note conduit, wiring, control, location and other relevant relationships and furnish appurtenances necessary for satisfactory operation.
3. Before equipment start up, the manufacturer's representative shall submit to the Owner's Representative, a signed statement certifying to their inspection and noting that the equipment is properly installed and ready for operation.

I. Source Limitations: Obtain each type of equipment, device and fixture used and all related accessories from one source from the same manufacturer.

1.7 SEISMIC PROTECTION

- A. Contractor shall be responsible for the design of seismic restraints and anchorage systems for the entire project. Seismic protection system including labor, materials and design shall be included in the Contract Sum.
- B. Provide certified report including seismic calculations for anchorage and support of all electrical system equipment and as described in Division 26 Sections. All Calculations shall be prepared, stamped and signed by a professional Structural/Civil Engineer registered in the state of California. All calculations shall meet the applicable CBC requirements.

- C. Provide seismic calculations and shop drawings for electrical equipment with:
 - 1. An operating weight of over 400lbs or more and mounted directly to the floor.
 - 2. An operating weight of over 20lbs and suspended from the roof, floor, or wall or supported by vibration isolation devices.

1.8 LOCATION AND ROUTING

- A. Drawings are for reference only and indicate diagrammatically the desired location or arrangement of equipment, devices, raceways, outlets, lights, vaults/manholes, pull-boxes, etc. and are to be followed as closely as possible.
 - 1. Judgment must be exercised in executing the Work so as to secure the best possible installation in the available space and to overcome local difficulties due to space limitations or interference with structural and existing conditions.
 - 2. Exact locations necessary to secure proper conditions and results shall be determined at Project Site and shall be approved by the Owner's Representative.
- B. Verify dimensions, correct location and electrical requirements of all equipment specified in other Divisions before proceeding with the roughing-in of connection.
- C. Locations shown on architectural drawings (floor plans, RCPs, sections, elevations and etc.) shall take precedence over electrical drawing locations.
- D. Dimensions, location of doors, partitions and similar physical features shall be taken from architectural Drawings for exact location of outlets to coordinate with Architectural features, panels, etc.
- E. Mounting heights of brackets, outlets, etc., shall be as required to suit equipment served.
- F. All scaled and figured dimensions are approximate of typical equipment of the class indicated. Before proceeding with any Work, carefully check and verify all dimensions, sizes, etc., with the Drawings to see that the equipment being installed will fit into the spaces provided.
- G. The Contractor shall be responsible for verifying that equipment being provided by him will fit dimensionally in locations shown on Drawings.
- H. Lighting fixtures in mechanical spaces and utility rooms are shown in their approximate locations only. Do not install light outlets or fixtures until all raceways, piping and ductwork are installed; then lighting fixtures shall be installed in locations best suited for equipment arrangement and as approved by the Owner's Representative.
- I. Access to Equipment: Locate starters, disconnects, switches, receptacles and pull-boxes to provide easy access for operation, repair and maintenance. All code required clearances shall be maintained for accessing the equipment and its disconnecting means.
- J. Locations of Openings: Locate all chases, shafts and openings required for the installation of the electrical Work during framing of the structure.
 - 1. Do any cutting and patching required due to improperly located or omitted openings with the approval of the Owner's Representative, who must also approve any additional changes resulting from relocation or omission of openings.
 - 2. Cutting or drilling in any structural member is prohibited without prior written approval of the Owner's Representative.

1.9 HANDLING

- A. Packaging Requirements: Each delivery must include with it a copy of the submitted manufacturer-prepared published and supplemental instructions for the proper storage, handling, installation, and protection of each product delivered.
- B. Delivery and Acceptance Requirements:
 - 1. Delivery:
 - a. Deliver items to the project site in conformance with the manufacturer's requirements with factory-fabricated containers and protective means. Maintain containers and protective means through shipping, storage and handling to prevent damage and to prevent exposure to dirt, debris and moisture.
 - 1) Do not deliver materials to the job before they are ready for installation, unless adequate security and safe storage area is provided.
 - 2) Perform all handling and shipping in accordance with manufacturer's instructions.
 - b. Provide adequate dunnage and bracing during transport and delivery. Support items on non-staining, shock-absorbing material.
 - c. During transport and delivery, protect items from (1) exposure to weather; (2) becoming wet; and (3) other sources of damage.
 - 2. Acceptance at the Site:
 - a. Inspect for damage all items delivered to the project site.
 - b. Reject delivery of items that show damage or have damaged containers.
 - c. With a minimum of handling, unload and store only undamaged items, and items that have undamaged containers.
- C. Storage and Handling Requirements:
 - 1. Storage:
 - a. Store in a clean, dry, ventilated space free from temperature extremes. Maintain factory wrapping or provide a heavy canvas/plastic cover to protect equipment from dirt, water, construction debris and traffic.
 - 1) Store items off the floor or ground on pallets
 - 2) Provide adequate dunnage and bracing during storage.
 - 3) Incline stored items to provide maximum drainage of accumulated moisture.
 - 4) Provide spacers to separate stored items and allow air to circulate around all surfaces.
 - 5) Do not leave items uncovered where they may be exposed to rain, mist, high relative humidity, condensation, frost, or other sources of moisture.
 - 2. Handling: Handle in accordance with manufacturer's written instructions. Be careful to prevent internal component damage, breakage, denting and scoring. Damaged units shall not be installed and shall be replaced with new units.
- D. Damaged Item Replacement Requirements: Promptly remove, dispose of, and replace, or arrange and pay costs for the removal, disposal, and replacement of items that become deteriorated, contaminated, or otherwise damaged.
 - 1. Remove and dispose of damaged items at a disposal location away from the project site.
 - 2. Replace removed items with undamaged new items.
- E. Packaging Waste Management: Do not bury any type of construction waste at the project site.

Remove and dispose of construction waste at a disposal location away from the project site.

1.10 CLOSEOUT SUBMITTALS

- A. All "Project Record Documents" and "Operation and Maintenance Data" shall be submitted in accordance with Division 01 and as follows.
- B. Operating and Maintenance Instructions and Manuals:
 - 1. Prior to project closeout, furnish to the Owner's Representative hard back 3-ring binders containing all bulletins, operation and maintenance instructions, parts' lists, service telephone numbers and other pertinent information as noted in each Section for equipment furnished under Division 26. Binders shall be indexed into Division Sections and labeled for easy reference. Bulletins containing more information than the equipment concerned shall be properly stripped and assembled.
 - 2. O&M manuals shall be in both hard copy format and electronic format. Electronic files must have searchable text for ease in locating specific information, i.e. no scanning of paper documents.
 - 3. O&M's shall include the copy of approved submittal information so that the specific details and applications of each device for this project are available.
 - 4. One month prior to request for final inspection, submit Operating and Maintenance manuals or as stated in Division 01.
 - 5. Manuals shall be prepared to include the following:
 - a. Section 1: A comprehensive table of contents and guide to the manual's contents and layout. This section shall enable the reader to comprehend the scope and purpose of the document and to identify readily where specific information can be obtained.
 - b. Section 2: Contractual and Legal records including:
 - 1) Name and Address of the installation.
 - 2) Details of City, County and State approvals.
 - 3) Name and Contact details of the Design Team and Installing Contractors and associated sub-contractors.
 - 4) Dates for Start of Installation, Substantial Completion and Expiry of Warrantee period.
 - 5) Copies of maintenance service contracts and contact details for local service company.
 - 6) Copies of warrantees and bonds.
 - c. Subsequent Sections:
 - 1) Startup and Shutdown Procedures: Provide a step-by-step write-up of all major equipment. When manufacturer's printed start-up, troubleshooting and shut-down procedures are available, they shall be incorporated into the operating manual for reference.
 - 2) Operating Instructions: Written operating instructions shall be included for the efficient and safe operation of all equipment.
 - 3) Service Instructions: Provide the following information for all pieces of equipment:
 - a) Recommended spare parts, including catalog number and the name, manufacturer's name and contact information, address and telephone number of local suppliers of factory representative.
 - b) Maintenance instructions and recommended service maintenance schedule for all equipment. Provide sample maintenance record forms for each equipment type.

- c) Data sheets to show complete internal wiring, mechanical and electrical ratings and characteristics, catalog data on component parts whether furnished by equipment manufacturer or others, names, addresses and telephone numbers of source of supply for parts subject to wear or electrical failure and description of operating, test, adjustment and maintenance procedures.
- d) Where data sheets included in manual cover equipment, options, or other features are not part of the equipment/device actually furnished, line out these references or otherwise clearly mark so remaining text, diagrams, drawings, schedules and similar information shall apply specifically to equipment furnished.
- e) Final submittals for equipment shall have final corrections included in the prints used for the manual.

1.11 RECORD DOCUMENTS

- A. Contractor shall submit in writing PRIOR to installation, any proposed modifications to equipment layouts, device locations, conduit routings, or conductor groupings. Provide as-built drawings at close of project indicating all changes to the documents.
- B. Keep up-to-date during the progress of the job through, one set of drawings indicating the Record installation. In addition to changes made during course of Work, show following by dimension from readily obtained base line reference points:
- C. Underground utility services, both inside and outside of buildings, shall be dimensioned from permanent structures or property line. Utility services outside of buildings shall also show depth of burial with reference to the finished ground floor elevation.
- D. This set of drawings shall be kept on the project site at all times and shall be available for inspection by Owner's Representative or Construction Manager weekly.
- E. Submit completed Drawings to Owner's Representative for approval prior to authorization for final payment. Record drawings shall be certified as to their correctness by the signature of the Contractor and shall be stamped or otherwise identified as record drawings.
- F. At the completion of the project the Contractor shall submit record as-built drawings as specified in Division 01 and their electronic CAD files. Drawings shall incorporate all the Owner's Representative comments and represent completed as-built conditions.

1.12 REGULATIONS, CODES, PERMITS AND FEES

- A. Conform to all rules, regulations, laws and ordinances governing the area in which this construction occurs.
- B. Obtain the required permits from the local authorities for this work and pay for all fees required by the City, County, State and Federal authorities for permits, inspections and review, including special agency construction and operating permits. Make corrections in the work as required by the Owner's Representative or Inspector to pass local regulations.
- C. Provide local authorities with all notices relating to this Division.
- D. Provide Owner's Representative and local Inspectors access to work at all times.

- E. Contractor shall be responsible for all law violations caused by the work under this Division. Notify the Owner's Representative in writing when a discrepancy occurs between code requirements and work shown on drawings and resolve matter before proceeding with work.
- F. Make application and pay for all certificates of inspection, taxes and permits required by Local, State or Federal agencies, public utilities, or other authorities having lawful jurisdiction. Deliver to the Owner's Representative any and all certificates of inspections, permits and approvals that may be required by such authorities.

1.13 TEMPORARY FACILITIES

- A. Temporary Light and Power: Provided under requirements of Division 01.
- B. All temporary facilities shall be removed at completion of project, with permanent facilities returned to proper working order.

1.14 WARRANTY

- A. The Contractor shall issue a certificate of guarantee certifying that all materials and workmanship supplied and/or installed by the Contractor shall be free from defects for a period of not less than one year from the date of substantial completion or beneficial occupancy, whichever occurs first.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one or more of the manufacturers specified.
 - 2. Or Equal: Where products are specified by manufacturers name and accompanied by the term "or equal", comply with provisions in Division 01 Section "Product Requirements", Part 2 "Product Substitutions" Article. Specific procedures must be followed before use of an unnamed product or manufacturer.
- B. Construction of all electrical equipment such as switchgear, switchboards, motor control centers, distribution boards, panelboards, transformers and similar equipment shall meet the current seismic requirements.
- C. All materials and equipment shall be new, shall bear manufacturer's name, and shall conform to the grade, quality and standards specified herein. Type, capacity, and application shall be suitable and capable of satisfactory operation for the purpose intended,

2.2 SUPPORTING DEVICES

- A. Material: Cold-formed steel, with corrosion-resistant coating acceptable to the Owner.
- B. Metal Items for Use Outdoors or in Damp Locations: Hot-dip galvanized or electro-galvanized

steel.

- C. Slotted-Steel Channel Supports: Flange edges turned toward web, and max 1-1/8"-inch-diameter elongated holes at a maximum of 2 inches ~~e-e~~on center, in webs.
- D. Channel Thickness: Selected to suit structural loading.
- E. Fittings and Accessories: Products of the same manufacturer as channel supports.
- F. Raceway and Cable Supports: Manufactured clevis hangers, riser clamps, straps, threaded C-clamps with retainers, ceiling trapeze hangers, wall brackets, and spring-steel clamps or click-type hangers.
- G. Pipe Sleeves. Suitable for installed locations.
- H. Cable Supports for Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug for non-armored electrical cables in riser conduits. Plugs have number and size of conductor gripping holes as required to suit individual risers. Body constructed of malleable-iron casting with hot-dip galvanized finish.
- I. Expansion Anchors: Carbon-steel wedge or sleeve type.
- J. Toggle Bolts: All-steel springhead type.
- K. Powder-Driven Threaded Studs: Heat-treated steel. Not allowed within building with occupants except by prior approval, before installation, with the Owner's Representative. Pins allowed.

2.3 CONCRETE BASES

- A. Construct concrete bases of dimensions not less than 6 inches where front access is required, in both directions, than supported unit unless larger is required to comply with seismic restraint requirements. Follow supported equipment manufacturer's anchorage recommendations and setting templates for anchor-bolt and tie locations.
- B. Concrete Forms and Reinforcement Materials: As specified in Division 03 Section "Cast-in-Place Concrete."
- C. Concrete: Minimum 3000-psi, 28-day compressive strength as specified in Division 03. ~~Section "Cast-in-Place Concrete."~~

2.4 TOUCHUP PAINT

- A. For Equipment: Equipment manufacturer's paint selected to match installed equipment finish.
- B. Galvanized Surfaces: Zinc-rich paint recommended by item manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Before beginning installation, examine project conditions and field-verify measurements affecting the work indicated and/or described in Electrical Documents.
 - 1. Contractor shall thoroughly review the locale, working conditions, conflicting utilities and the conditions in which the electrical work will take place. Verify all existing conditions in the field.
 - 2. No allowances will be made subsequently for any costs that may be incurred because of any error or omission due to failure to examine the site and to notify the Owner's Representative of any discrepancies between Drawings and Specifications and actual site conditions.
 - 3. Examine construction adjacent to areas indicated as receiving access doors and other conditions under which the major electrical equipment is installed.
- B. The location and elevation of the utilities, existing piping, conduit, or equipment is that which can be determined from available information and its accuracy cannot be guaranteed. Exact location and elevation of these items shall be verified by the Contractor prior to excavation, demolition, or installation of any portion of the work indicated. Exercise special care when excavating at or near the general location of underground utilities to avoid damage to the utility services, as well as to ensure worker safety.
- C. Any connections to or relocation of any existing utility line requiring temporary discontinuance of utility services which are in active use shall be scheduled and coordinated with the utility companies and the Owner's Representative. In no case shall the services be left disconnected at the end of a working day or weekend unless authorized by representatives of the utilities and the Owner's Representative. Any existing utility service damaged shall be repaired to the satisfaction of the Owner's Representative. Include 14-day (10 working days) written notice required for all shutdowns. Written approval with date and time shall be provided by the Owner's Representative prior to any shut down.
- D. Examine all Drawings and Specifications to familiarize with the type of construction to be used and the nature and extent of work of other trades.
- E. Observe the conditions under which deliveries of materials and equipment shall be made and under which such materials and equipment can be stored and shall include adequate provision in the bid proposal

3.2 FIELD VERIFICATION

- A. All dimensions, locations of equipment and connections to utilities or pre-existing equipment shall be verified in field prior to construction and installation.
- B. All roughing in construction dimensions shall be made from architectural plans where discrepancies may exist.
- C. Architectural plans will hold precedence over electrical plans as to location of partitions, devices, and light fixtures.
- D. Measurements in existing buildings shall take precedence over all other plans with regards to identifying location of existing installations

3.3 INSTALLATION

- A. Comply with manufacturer's installation instructions for installing Electrical equipment as

described in Division 26 Sections.

- B. Provide a complete properly operating system for each item of equipment called for under this Division. Installation shall be in accordance ~~to~~with equipment manufacturers' instructions, code requirements, the best industry practices and the contract documents.
- C. Make installation in a neat, finished and safe manner, according to the latest published NECA Standard of Installation under competent supervision.
- D. Coordinate electrical systems, equipment and materials installations with other building components.
- E. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.
- F. Install raceways, boxes and lights to allow maximum possible headroom where specific mounting heights are not indicated.
- G. Rough-in locations for fixtures and equipment shall be determined from the unit itself or from the approved shop drawings.
- H. Install equipment with minimum code required clearances to permit easy access for normal maintenance.
- I. Maintain easy access to switches, motors, drives, disconnects, pull-boxes, receptacles, etc.
- J. Notify the Owner's Representative in writing of relocation items which interfere with access or working clearances around the equipment.
- K. Provide all access panels required for the electrical installation. Access panels shall be installed by the framer. Electrical contractor shall coordinate the installation where devices or equipment are concealed behind finished surfaces.
- L. Suspended raceways and equipment shall be installed in accordance with the Applicable local, state and National Building Codes.

3.4 ELECTRICAL EQUIPMENT INSTALLATION

- A. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide the maximum possible headroom.
- B. Materials and Components: Install level, plumb, and parallel and perpendicular to other building systems and components, unless otherwise indicated.
- C. Equipment: Install to facilitate service, maintenance, and repair or replacement of components. Connect for ease of disconnecting, with minimum interference with other installations.
- D. Right of Way: Give to raceways and piping systems installed at a required slope.

3.5 WIRING INSTALLATION

- A. Install splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.

- B. Install wiring at outlets with at least 6 inches of slack conductor at each outlet.
- C. Connect outlet and component connections to wiring systems and to ground. Tighten electrical connectors and terminals, according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A.

3.6 ELECTRICAL SUPPORTING DEVICE APPLICATION

- A. Damp Locations and Outdoors: Hot-dip galvanized or electro-galvanized materials, U-channel system components.
- B. Dry Locations: Steel materials.
- C. Support Clamps for PVC Raceways: Click-type clamp system.
- D. Selection of Supports: Comply with manufacturer's written instructions.

3.7 SUPPORT INSTALLATION

- A. Install support devices to securely and permanently fasten and support electrical components.
- B. Install individual and multiple raceway hangers and riser clamps to support raceways. Provide U-bolts, clamps, attachments, and other hardware necessary for hanger assemblies and for securing hanger rods and conduits.
- C. Support individual horizontal raceways with separate, approved hangers, spring steel fasteners or clamps.
- D. Install 1/4-inch diameter or larger threaded steel hanger rods.
- E. Arrange supports in vertical runs so the weight of raceways and enclosed conductors is carried entirely by raceway supports, with no weight load on raceway terminals.
- F. Simultaneously install vertical conductor supports with conductors.
- G. Separately support cast boxes that are threaded to raceways and used for fixture support. Support sheet-metal boxes directly from the building structure or by bar hangers. If bar hangers are used, attach bar to raceways on opposite sides of the box and support the raceway with an approved fastener per code requirements.
- H. Install metal channel racks for mounting cabinets, panel boards; disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices unless components are mounted directly to structural elements of adequate strength or per Structural Drawings.
- I. Install sleeves for cable penetrations of concrete slabs and walls unless core-drilled holes are used. Install sleeves for cable penetrations of masonry and fire-rated gypsum walls and of all other fire-rated floor and wall assemblies. Install sleeves during erection of concrete and masonry walls.
- J. Securely fasten electrical items and their supports to the building structure, unless otherwise indicated. Perform fastening according to the following unless other fastening methods are indicated:

1. Wood: Fasten with wood screws or screw-type nails.
2. Masonry: Toggle bolts on hollow masonry units and expansion bolts on solid masonry units.
3. New Concrete: Concrete inserts with machine screws and bolts, or other approved methods.
4. Existing Concrete: Expansion bolts or other approved methods.
5. Instead of expansion bolts, threaded studs driven by a powder charge and provided with lock washers may be used in existing concrete when prior approval is received from the Owner's Representative.
6. Steel: Welded threaded studs or spring-tension clamps on steel or other approved methods.
 - a. Field Welding: Comply with AWS D1.1.
7. Welding to steel structure may be used only for threaded studs, not for conduits, pipe straps, or other items.
8. Light Steel: Sheet-metal screws.
9. Fasteners: Select so the load applied to each fastener does not exceed its proof-test load.

3.8 CUTTING AND PATCHING

- A. Cut, channel, chase, and drill floors, walls, partitions, ceilings, and other surfaces required to permit electrical installations. Perform cutting by skilled mechanics of trades involved.
- B. Repair and refinish disturbed finish materials and other surfaces to match adjacent undisturbed surfaces. Install new fireproofing where existing fire stopping has been disturbed. Repair and refinish materials and other surfaces by skilled mechanics of trades involved.

3.9 FIELD QUALITY CONTROL

- A. Inspect installed components for damage and faulty work, including the following:
 1. Supporting devices for electrical components.
 2. Concrete bases.
 3. Electrical demolition.
 4. Cutting and patching for electrical construction.
 5. Touchup painting.

3.10 REFINISHING AND TOUCHUP PAINTING

- A. Refinish and touch up paint. Paint materials and application requirements are specified in Division 09 Section "Interior Painting."
 1. Clean damaged and disturbed areas and apply primer, intermediate, and finish coats to suit the degree of damage at each location.
 2. Follow paint manufacturer's written instructions for surface preparation and for timing and application of successive coats.
 3. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
 4. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

3.11 TOOLS AND EQUIPMENT

- A. Furnish all tools and equipment necessary for the proper installation, protection and upkeep of the work

3.12 EXCAVATION, TRENCHING AND BACKFILL

- A. Do all excavation, trenching and backfill required to install the work in this Division.
- B. Coordinate trenching and backfill required for the installation of this Division as detailed in relevant sections of Division 31. Repair or replace all street, roadway, sidewalk, pavements, gutters, curbs and other work incidental thereto. Dispose of excavation material per Division 31.
- C. Provide barricades, signs, lanterns, shoring, sheeting and pumping as part of Work in this Division as required to insure safe conditions. Comply with OSHA requirements.
- D. Shore all trenches and excavations as necessary to maintain the banks of excavations and to prevent any sloughing, caving-in or damage of any kind.
- E. Trenching: Subject to the requirements of the civil engineer, dig trenches straight, true to line and grade with sides and bottoms smoothed of any rock points. All trenches shall be sloping away from the building. All trenching required for utility company shall comply with individual utility company requirements.
- F. Excavation: All excavations shall be inspected by the Owner's Representative and approved before placing of any conduit or pullbox. Bury conduits outside the building to a depth of not less than code required minimum, below finish grade unless otherwise noted.
- G. Backfilling: Do not backfill until final inspection and approval for the conduit installation by the Owner's Representative. Any imported backfill material required shall be approved by the soils engineer responsible for certification of compaction

3.13 NOISE CONTROL

- A. Perform necessary sound rated wall sealing for the electrical work in compliance with Division 09.
- B. Back to back or straight through boxes are not permitted unless specifically noted on the drawings.
- C. Route raceways along corridors or other noncritical noise space to minimize penetrations through sound rated walls. Seal raceway penetrations through sound rated walls.
- D. Do not install contactors, transformers, starters and similar noise producing devices and equipment on walls common to occupied spaces unless specifically noted on the drawings. Where such devices must be mounted on common walls, install using shock mounted or isolated methods to prevent the transmission of device inherent noise to the occupied space.
- E. Ballasts, drivers, contactors, starters, transformers and like equipment which are found to be noticeably noisier than other similar equipment on the project will be deemed defective and shall be replaced.

3.14 PENETRATIONS

- A. Acoustical: All penetrations through acoustically treated walls shall be sealed with non-hardening resilient acoustic sealant.
- B. Waterproofing:
 - 1. All penetrations through exterior walls and beneath slabs-on-grade shall be sealed with weatherproofing material.
 - 2. All below grade conduit penetrations through the walls shall be individually sealed with Link-Seal or equal.
 - 3. Provide flashings at exterior wall and roof penetrations. Caulk watertight penetrations of above grade walls, roofs and floors

3.15 FIRESTOPPING

- A. Provide sealing or stuffing material or assembly in spaces between and penetrations through building materials to arrest movement of fire, smoke, heat and hot gases through fire rated construction. Perform necessary fire rated sealing for the electrical work in compliance with the applicable codes ~~and requirements of Division 07~~.
- B. Materials and Products: Provide material listed in the UL Fire Resistance Directory for the UL system involved to achieve fire ratings of adjacent construction.
 - 1. Materials shall have been tested to provide fire rating at least equal to that of the construction.
 - 2. All fire-stopping products shall be from a single manufacturer.
- C. Environmental Requirements: Comply with manufacturer's recommendations for temperature and humidity conditions before, during and after installation of fire-stopping.
 - 1. Provide masking and drop cloths to prevent contamination of adjacent surfaces by fire-stopping materials.
 - 2. Provide ventilation in areas to receive solvent cured materials and as required by manufacturer.

3.16 ALIGNMENT

- A. Install panels, cabinets and equipment level and plumb, parallel with structural building lines. Join switchgear, panels and electrical enclosures so that they fit neatly together without gaps, openings or distortion.
- B. Fit surface panels, devices and outlets with neat, appropriate trims, plates or covers, without over-hanging edges, protruding corners or raw edges, to leave a finished appearance

3.17 IDENTIFICATION

- A. The Contractor shall identify all conduit, cabling, devices and equipment in accordance with Section 260553 ~~—~~ "Identification for Electrical Systems".
- B. The Contractor shall submit a schedule for equipment identification nameplates prior to ordering or installing

3.18 CLEANING

A. Cleaning Work:

1. In a manner that does not lead to or result in any specified or other warranty becoming void, clean surfaces exposed to view using cleaning agents, equipment, tools, and procedures supplied, required, recommended, approved, or accepted by the manufacturer.
 - a. Protect other work from staining or damage caused by cleaning operations.
 - b. Do not use cleaning materials or processes that can or may change the appearance of exposed finishes or damage adjacent materials.
2. Replace items that cannot be satisfactorily cleaned, as determined by the manufacturer's field representative and the Architect.

B. Equipment, light fixtures, devices and Other Items with Factory Finish: Remove grease, oil, paint overspray, fireproofing overspray, gypsum board mud splatters and leave surfaces clean

C. Waste Management: After completing the work in each space, leave work areas free from debris, materials, equipment, and related items.

3.19 PROTECTION

A. Fully protect all finished parts of the materials and equipment against physical damage from whatever cause during the progress of the work and until completion.

B. Protect in place the installed equipment from corrosion, deterioration, staining, and other sources of damage until Substantial Completion.

1. Provide protection items supplied, required, recommended, approved, or accepted by the manufacturer.
2. Use protection materials and methods that do not lead to or result in any specified or other warranty becoming void.

C. During construction, cap all conduits so as to prevent the entrance of sand and dirt

D. Do not store anything adjacent to or against installed electrical equipment.

E. Remove protection when it's no longer needed and before Substantial Completion.

3.20 SETTING OF PROTECTIVE DEVICES

A. Prior to final completion of the Project, set all protective device relays and internal settings to provide adjustment between upstream and downstream protective devices. Settings shall be based on the accepted coordination study.

3.21 OPERATIONAL TESTS

A. Before acceptance tests are performed, demonstrate to the Owner's Representative that all systems and components are complete and fully operational.

B. Perform operational tests on all equipment to determine compliance with Specifications.

3.22 COMMISSIONING AND TESTING

- A. Coordinate with the commissioning and testing requirements described elsewhere.
- B. Test electrical systems and show that the equipment installed operates as designed and specified, free of faults and unintentional grounds. The system tests may be set up and done for coordination with construction phasing. Perform testing or system operational functions in the presence of the Owner's Representatives. Schedule work in advance and as directed by the Owner's Representatives.
- C. Provide a minimum of 1 journeyman electrician with required tools during testing or system commissioning work. Provide equipment factory representative for this work when needed.
- D. Provide testing and commissioning work for equipment and systems noted in Division 26 specifications and drawings, including but not limited to:
 - 1. Low voltage distribution system including metering energy monitoring
 - 2. Grounding system
 - 3. Emergency power system, including central inverter and uninterruptible power supply
 - 4. Lighting and Lighting control system

3.23 FINAL INSPECTION

- A. As the work nears completion, review the requirements of the Contract Documents, inspect the work and inform all parties involved in work to be corrected or completed before the project can be deemed substantially complete.
- B. When the project is substantially complete, notify the Owner's Representative in writing of this fact, listing those items of work remaining incomplete, the reason for incompleteness and the anticipated date that all remaining work will be completed. Carry out own final inspection and be satisfied that the work is complete. Final inspection of the project will then be scheduled by the Owner's Representative.
- C. The Owner's Representative reserves the right to cancel and reschedule the inspection in the event ~~considerable~~considerably more work remains to be completed or corrected than indicated in the written request for inspection.
- D. All items not completed or found not complying with drawings or specifications by the Owner's Representative will be identified in an inspection report by Owner's Representative.
- E. Correct all items on inspection report. Make the correction and initial and date each item on the report after corrections have been completed.

3.24 PROJECT CLOSE-OUT

- A. Prior to requesting Owner's Representative's inspection for certification of substantial completion, complete the following and list known exceptions in request:
- B. Obtain final inspections and approvals from all governmental jurisdictions that are required for the project.
- C. Submit record drawings, maintenance manuals, warranties and similar final record information.

- D. Deliver tools, spare parts, extra stocks of materials and similar physical items to the Owner's Representative.
- E. Complete start-up, testing and demonstration of systems to the satisfaction of the Owner's Representative that the entire installation is complete, properly adjusted and is in proper operating condition.
- F. Complete final cleaning requirements

END OF SECTION 260500

SECTION 260519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

1. Building wires and cables and associated connectors, splices, and terminations for wiring systems rated 600 V and less.

- B. Related Requirements

1. Section 260500 "Common Work Results for Electrical" for additional information.
2. Section 260553 ~~—"Identification for Electrical Systems"~~.

1.3 REFERENCES

- A. Comply with the latest edition of the following applicable specifications and standards except as otherwise shown or specified.

1. NFPA 70 - California Electrical Code (CEC)
2. IEEE 82 - Test Procedure for Impulse Voltage Tests on Insulated Conductors
3. NEMA WC70 - Power Cables Rated 2kV or Less for Distribution of Electrical Energy
4. UL 83 - Thermoplastic-Insulated Wires and Cables
5. UL 486A - Wire Connectors and Soldering Lugs for use with Copper Conductors
6. UL 486B - Wire Connectors
7. UL 486C - Splicing Wire Connectors
8. UL 493 - Thermoplastic-Insulated Underground Feeder & Branch Circuit Cables
9. UL 854 - Service Entrance Cables
- ~~10. UL 1569 - Metal-Clad Cables~~
- ~~11.~~ 10. UL 1581 - Reference Standard for Electrical Wires, Cables, and Flexible Cords

1.4 SUBMITTALS

- A. Submit in accordance with the requirements of Division 01 and Section 260500 ~~—"Common Work Results for Electrical"~~, the following items:

1. Product Data: Submit Data/catalog cuts for each product and component specified herein, listing all physical and electrical characteristics and ratings indicating compliance with all listed standards.
 - a. Clearly mark on each data sheet the specific item(s) being submitted and the proposed application.

2. Submit manufacturer's installation instructions.
3. Field quality test reports.

1.5 QUALITY ASSURANCE

- A. All materials, equipment and parts comprising the units specified herein shall be new and unused, and of current manufacturer.
- B. The Contractor shall provide insulation-resistance "Megger" tests per NETA standards and as described in Part 3.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
 1. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.
 2. Or Equal: Where products are specified by manufacturers name and accompanied by the term "or equal", comply with provisions in Division 01 Section "Product Options and Substitutions". Specific procedures must be followed before use of an unnamed product or manufacturer.

2.2 CONDUCTORS AND CABLES

- A. Available Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers listed in the following product categories:
- B. Building Wire and Cable:
 1. American Insulated Wire Corp.
 2. General Cable Corporation
 3. Southwire Company
 4. Encore Wire Corp.
 5. Or equal.
- C. Control Wire and Cable:
 1. Alpha.
 2. Belden.
 3. All Star Cable
 4. Or equal.

~~D. Metal Clad (MC) Cables (Hospital grade and OSHPD approved)~~

- ~~1. AFC Cable Systems.~~
- ~~2. Southwire Company.~~
- ~~3. Or equal.~~

~~E.D.~~ Refer to Part 3 "Conductor and Insulation Applications" Article for insulation type, cable construction, and ratings.

~~F.E.~~ Conductor Material: Copper complying with ICEA S-95-658 / NEMA WC 70 Non-shielded 0-2 kV Cables.

~~G.F.~~ Conductor Insulation Types: Conductor insulation type, size and UL approval shall be printed with permanent white paint on all conductor insulation continually repeating.

1. Provide conductors with Type THHN/THWN, 90°C insulation for indoor applications.
2. Provide conductors with Type THWN-2, THW-2 or XHHW-2, 90°C insulation for exterior, wet or damp locations.
3. Provide conductors with Type RHW-2, 90°C insulation for areas subjected to temperatures exceeding 60°C (140°F)

~~H.~~ ~~Multi-conductor Cable: The MC Cable shall be a flexible metallic conduit (galvanized interlocking steel strip) containing preassembled set of stranded copper conductors with THHN/THWN insulation that are wrapped in polypropylene tape covering.~~

- ~~1. The entire assembly shall be plenum rated and meet CEC 300.22(C).~~
- ~~2. The MC Cable shall contain an insulated grounding conductor as required.~~
- ~~3. The entire assembly shall be UL listed and meet the CEC Article 330 requirements.~~

~~I.G.~~ All conductors shall be new and shall have been manufactured within 12 months of the date of delivery to the site and continuously stored where protected from the heat or weather.

~~J.H.~~ All conductors shall be delivered to the site on their original cable reels or in their original unbroken packages and shall be inspected and approved by the Owner before opening.

2.3 CONNECTORS AND SPLICES

A. Available Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. AFC Cable Systems, Inc.
2. AMP Incorporated/Tyco International
3. Hubbell/Anderson
4. O-Z/Gedney; EGS Electrical Group LLC.
5. 3M Company; Electrical Products Division
6. Arlington Industries, Ideal, NSI, Polaris
7. Or equal.

B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

C. Connectors: All connectors shall be UL listed for 600 volts, UL listed and approved for use with copper conductors:

1. For size #10 and smaller conductors:
 - a. Use cone shaped connectors with expandable coil spring inset and insulated with a nylon shell and two wings placed opposite each other to serve as a "built-in" wrench. The shell shall be molded in one-piece.
 - b. Available Manufacturers: Ideal Industries "Wing-Nut," 3M (Minnesota, Mining and Manufacturing Co.), "Scotchlok," or equal.

2. For size #8 and larger conductors:
 - a. Use connectors with screw pressure lugs made of high strength structural copper alloy.
 - b. Available Manufacturers: "T & B" Locktite, Burndy, or equal.
3. Connections to Fixtures: Make circuit wiring connections to fixture wire with insulated electrical spring connectors. Threaded-type wire nuts, porcelain or Bakelite are not acceptable.

D. Terminations:

1. Provide compression set, bolted, or screw type lug, or direct to bolted or screw type terminal.
2. Connections to Circuit Breakers and Switches:
 - a. No. 12 AWG wire: formed around binding post or screw.
 - b. No. 10 and No. 8 wire AWG: Buchanan "Termend", or equal locking tongue lug.
 - c. No. 6 AWG wire and larger: Burndy Qiklug Type QDA, Penn Union, or equal, round flange solderless lug.

2.4 SLEEVES AND SLEEVE SEALS

A. Available Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Advance Products & Systems, Inc.
2. Calpico, Inc
3. Metraflex Co
4. Pipeline Seal and Insulator, Inc.

B. Sleeve Seals: Modular sealing device, designed for field assembly, to fill annular space between sleeve and cable.

1. Sealing Elements: EPDM interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable.
2. Pressure Plates: Stainless steel. Include two for each sealing element.
3. Connection bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements. Include one for each sealing element.

C. Sleeves for Cables:

1. Steel Pipe Sleeves: Standard, Type E, Grade B, Schedule 40, galvanized steel, plain ends.
2. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe", equivalent to ductile-iron pressure pipe, with plain ends and integral water-stop, unless otherwise indicated.
3. Sleeves for Rectangular Openings: Galvanized sheet steel with minimum 0.052" or 0.138" thickness as required or indicated and of length to suit application.
4. Coordinate sleeve selection and application with selection and application of fire-stopping specified in Section 07 84 13 - Penetration Fire-stopping.

2.5 LUBRICANTS

A. Available Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Polywater J
2. Or Equal

- B. Use approved wire-pulling compounds used as lubricants for pulling conductors. It is not allowed to use oil, grease, graphite, or similar substances for pulling conductors in raceways.
- C. Pulling of size #1/0 or larger conductors shall be done with an approved cable pull machine. Other methods: e.g. using vehicles, and block and tackle to install conductors are not acceptable.

2.6 MISCELLANEOUS

- A. Cable supports: Vertical cable supports shall be manufactured by O.Z. type "M" series, Adalet "SVM" series, or equal.
- B. Insulating Tape: Insulating tapes shall be plastic self-adhering type manufactured by Minnesota Mining and Manufacturing "Scotch" #33 Electrical tape, Manville Bulldog #166, or equal.
- C. Conductor Tags: Tags shall be pre-marked, self-adhesive wrap around type.
- D. Conductor ties: Ties shall be plastic with cinching holders manufactured by T & B "Ty-Rap" series, Panduit "Pan-Rap" series, or equal.
- E. Sealants: Conductor sealant shall be silicone type manufactured by Dow-Corning #795, General Electric #SCS 1000 or equal.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify interior of building has been protected from weather.
- B. Verify mechanical work likely to damage wire and cable has been completed.
- C. Verify raceway installation is complete and supported.

3.2 PREPARATION

- A. Completely and thoroughly swab raceway before installing any wire.
- B. Clean all outlet and J-boxes before installing any wire.
- C. Do not install permanent wiring, without special permission from the Owner, until plastering is done, and dirt removed.

3.3 CONDUCTOR AND INSULATION APPLICATIONS

- A. Service Entrance: Type XHHW-2, single conductors in raceway.
- B. Feeders Concealed in Ceilings, Walls, and Partitions: Type THHN-THWN or XHHW-2, single

conductors in raceway.

C. Feeders Concealed in Concrete, below Slabs-on-Grade, and in Crawlspace: Type THWN-2 or XHHW-2, single conductors in raceway.

D. Exposed Branch Circuits, ~~including in Crawlspace~~indoors: Type THHN-THWN, single conductors in raceway.

E. Branch Circuits Concealed in Concrete and below Slabs-on-Grade, and in Crawlspace: Type ~~THHN-THWN~~ or XHHW, single conductors in raceway.

~~F. Branch Circuits for wet and dry laboratories Concealed in Ceilings, walls and Partitions: Type THHN-THWN, single conductors in raceway. MC cable may be used for the portion of runs in the wall, from wall outlet to ceiling j-box.~~

~~G.F.~~ Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN-THWN, single conductors in raceway. ~~MC cable may be used for the portion of runs in the wall, from wall outlet to ceiling j-box.~~

~~H.G.~~ Lighting Circuits Concealed in Ceiling, Walls, and Partitions: Type THHN-THWN, single conductors in raceway. ~~MC cable may be used for the portion of runs in the ceiling, from fixtures to ceiling j-box located within 6'.~~

~~I.H.~~ Outdoors and below grade: Compression types with heat shrink style watertight splice covers. Raychem CTE series, T&B "shrinkson" series or equal. Cables with multiple conductors shall include a waterproof housing with a non-hardening encapsulating material.

~~J.I.~~ Cord Drops and Portable Appliance Connections: Type SO, hard service cord.

~~K.J.~~ Fire Alarm Circuits: ~~Lightweight steel Metal-clad cable, Type MC with red strip or~~ Type THHN-THWN, in raceway, Power-limited, fire-protective, signaling circuit cable.

~~L.K.~~ Class 1 Control Circuits: Type THHN-THWN, in raceway.

~~M.L.~~ Class 2 Control Circuits: Type THHN-THWN, in raceway.

3.4 INSTALLATION

A. General Requirements:

1. All wires, both low and line voltage, shall be installed in code approved raceways unless exceptions are approved by the Owner's Representative in writing.
2. Do not run conductors with different voltages in the same raceway. Do not run conductors from different panelboards in the same raceway.
3. All systems of wiring shall be so installed that when completed the systems will be free from short circuits and grounds, other than required grounds. Inspect wire and cable for physical damage and proper connection.
4. Branch Circuit conductors for all systems shall be continuous from switch to terminal or farthest outlet. No joint shall be made except in pull, junction, or outlet boxes.
5. Pigtails shall be extended from branch wiring in outlet boxes for attachment to devices. Loops in through wiring will not be acceptable.
6. ~~Fluorescent Light~~ Fixtures shall not be used as a raceway for branch circuit conductors except where installed end-to-end to form a continuous assembly and fixture is UL listed for through-wiring.

7. Arrange wiring in cabinets, [panelboards](#), [switchboards](#), switchgear and electrical equipment neatly cut to proper length, remove surplus wire and braid and secure in an acceptable manner. Wiring within all equipment enclosures shall be neatly grouped and tied together.
 8. Where single conductors and cables in manholes, handholes, vaults, cable trays and other indicated locations are not wrapped together by some means such as arc and fireproofing tapes, bundle throughout their exposed length all conductors entering from each conduit with nylon self-locking releasable cable ties placed at intervals not exceeding 18 inches on center.
- B. Wiring Size and Length Limitations:
1. Branch Circuits: Copper conductors, solid for No. 12 AWG and smaller; stranded for No. 10 AWG and larger.
 2. Minimum conductor sizes shall be as follows:
 - a. No. 12 AWG – branch circuits of any kind.
 - b. No. 14 AWG – Remote control and signal systems, fire alarm systems.
 3. Branch wiring length limitations.
 - a. 208Y/120V circuits over 120' in length: Increase wire size one size for each 60' of length. Increase conduit size as required.
 - b. 480Y/277V circuits over 220' in length: Increase wire size one size for each 140' of length. Increase conduit size as required.
- C. Wire Pulling:
1. Do not exceed cable manufacturer's recommendations for maximum pulling tension and minimum bending radius. Where pulling compound is used, use only UL listed compound compatible with the cable outer jacket and with the raceway involved.
 2. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not use oil, grease, graphite or similar substances. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
 3. Pull conductors into raceway at same time. Use pulling means; including fish tape, cable, rope, and basket-weave wire/cable grips that will not damage cables or raceway. Pulling of large conductors in raceways shall be done with an approved cable pulling machine. Other methods such as block and tackle to install conductors are not acceptable.
 4. Install/pull conductors only after:
 - a. Building interior is enclosed and weather tight
 - b. Any work likely to damage conductors has been completed
 - c. Raceway installation is complete and supported
- D. Sealing:
1. Where conductors in conduit pass through exterior walls, a sealing compound of moisture-resistant material shall be applied in the ends of the conduits to seal around the conductors.
 2. Seal around cables penetrating fire-rated elements according ~~to Division 07 Section "Penetration Fire-stopping."~~[applicable codes and standards](#). Provide separate sleeves and/or fire barriers for cable fire wall penetration, unless cable is UL listed for the application.
- E. Conceal cables in finished walls, ceilings and floors, unless noted otherwise.
- F. Install exposed cables parallel and perpendicular to surfaces of exposed structural members

and follow surface contours where possible. Protect exposed cables from damage.

- G. Support cables above accessible ceiling using plastic cable ties to support cables from structure. Do not rest cable on ceiling panels.
- H. Wiring at outlets: Install conductor at each outlet, with at least 12 inches of slack.
- I. Limit conduit fill to a maximum of 9 conductors (hot/switched, neutrals, and ground). No more than four branch circuits plus associated neutral and ground conductor will be allowed, unless noted otherwise on drawings.
- J. Install stranded conductors where conductors terminate in crimp type lugs. Do not place bare stranded conductors directly under screws.
- K. Cap spare conductors and conductors not terminated with UL listed end caps.
- L. For conductors that will be connected by others, provide at least 6 feet spare conductors in freestanding panels and at least 2 feet spare in other assemblies. Provide more spare conductors in any particular assembly where it is obvious that more conductors will be needed to reach the termination point.
- M. Neatly bundle conductors and cables together for support. Size cable ties sufficiently to accommodate the multiple cables being supported.
- N. For control wiring, conform to the wiring diagrams shown on the mechanical Drawings and the manufacturer's wiring diagrams to control the equipment in the manner specified in Divisions ~~23~~ 22, & 27 and 28 of the Specifications. All control wiring shall be color-coded
- ~~O. Identify and color-code conductors and cables according to Division 26 Section "Common Work Results for Electrical" and "Identification for Electrical Systems." Color-coded conductor sleeves are not permitted.~~
- ~~P. Metal Clad (MC) Cable Installation Requirements:~~
 - ~~1. Securely support all MC cable with cable hangers, individual spring steel support clips, steel trapeze hangers, threaded rods or dedicated No. 12AWG drop wire. Cable supports shall be fastened to concrete slabs, beams, joists or other structural members of the building.~~
 - ~~2. Provide j-box above ceiling before running MC cable down within partitions/walls.~~
 - ~~3. Overhead MC cable runs shall generally follow building lines to provide a neat and workmanlike installation.~~
 - ~~4. MC cable shall be supported per code requirements.~~
 - ~~a. MC cable runs shall not rest on ceiling structures.~~
 - ~~b. Do not support MC cable on hung ceiling or ceiling support wires.~~
 - ~~c. Do not support cables or allow contact with mechanical piping.~~
 - ~~d. The use of cable ties to support MC Cable is not allowed.~~
 - ~~5. Do not exceed code requirements for total current carrying conductors in multiple MC cable runs bundled together into a single MC cable hanger or strap, unless support device is specifically listed for such purpose. Neutrals shall be counted as current carrying conductors.~~
 - ~~6. Provide #10 neutral wire, or one neutral per phase for three-phase, four wire power supply systems to computers, office machines, programmable controls, electronic discharge equipment.~~
 - ~~7. Limit #12 wire homeruns to code voltage drop requirements.~~

- ~~8. Oversize j-box to accommodate MC cable splicing.~~
- ~~9. Use lock or spring nut fittings.~~
- ~~10. When terminating or splicing at a junction, outlet, or switch box, cut the cable such that 6-inches of free conductors remain for connections or splices. Use screw-in or spring lock connector and ensure a proper bonding by firmly tightening the connector to both the box and cable.~~
- ~~11. MC cable shall be cut with an armored cable rotary cutter.~~
- ~~12. Insert an anti-short bushing at cable ends to protect conductors from abrasion or use insulated connectors per connector and code requirements.~~
- ~~13. Bend radius shall be not less than 7 times the external diameter of the cable.~~
- ~~14. MC cables passing through fire-rated walls or electrical /telecommunication room walls shall be provided with a UL listed, fire rated penetration assembly.~~
- ~~15. Maintain a clearance of at least 6 inches from hot water and other high temperature pipes. Maintain at least 12-inches from telecommunication unshielded twisted-pair telecommunication cables.~~
- ~~16. MC Cable shall not be used for Life safety or Critical Branch wiring. Acceptable for normal power and equipment branch wiring only.~~

3.5 CONNECTIONS

- A. Provide steel with insulated throat cable connectors, OZ/Gedney AMC series or equivalent. Die cast or pressure cast fittings are not permitted.
- B. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A.
- C. Make splices and taps that are compatible with conductor material and that possess equivalent mechanical strength and insulation ratings than unspliced conductors.
- D. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches of slack.

3.6 IDENTIFICATION

- A. Identify and color-code conductors and cables according to Section 26-05-53 "Identification for Electrical Systems."
- B. Identify each spare conductor at each end with identity number and location of other end of conductor, and identify as spare conductor.

3.7 FIRESTOPPING

- A. Apply fire-stopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly ~~according to Division 07~~ as required.
- B. Wrap together as a single cable all conductors entering from each conduit.
- C. Follow tape manufacturer's installation instructions. Secure the arc and fireproofing tape at frequent intervals with bands of the specified glass cloth electrical tape.

3.8 FIELD QUALITY CONTROL

- A. Test reports: The contractor shall engage a qualified ~~Independent~~independent testing and inspecting agency to perform field tests/inspections and provide reports for service entrance and feeder conductors for compliance with requirements
1. Test procedures used.
 2. Test results that comply with requirements.
 3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.
- B. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors for compliance with requirements.
- C. Perform each electrical test and visual and mechanical inspection stated in NETA ATS, Sections 7.3. Certify compliance with test parameters.
1. Visual and Mechanical Inspection:
 - a. Verify cable color coding and compare cable data with drawings and specifications.
 - b. Inspect for physical damage and correct connection in accordance with drawings.
 - c. Inspect tightness of all bolted connections by calibrated torque-wrench method. Apply mark indicating that the bolt has been torqued.
- D. Electrical Tests:
1. Perform insulation-resistance (Megger) test on all feeder conductors and conductors for motors over 15 HP. The test values shall meet the recommended minimum insulation resistance values stated in the NETA table 100.1.
 2. Perform insulation-resistance test on each conductor with respect to ground and adjacent conductors. The test values shall meet the recommended minimum insulation resistance values stated in the NETA table 100.1.
 3. Applied voltage shall be 1000VDC for one minute for 600V rated cables.
 4. Tests shall be made prior to final connection of equipment.
- E. Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each splice in cables and conductors No. 3 AWG and larger. Remove box and equipment covers so splices are accessible to portable scanner.
1. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each splice 11 months after date of Substantial Completion.
 2. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
 3. Record of Infrared Scanning: Prepare a certified report that identifies splices checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken and observations after remedial action.
- F. All conductors failing to comply with the ~~above~~-above-mentioned tests shall be removed and replaced at Contractor's expense. All replaced conductors shall be tested as specified above.

END OF SECTION 260519

SECTION 260526 – GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Grounding of electrical systems and equipment. Grounding requirements specified in this Section may be supplemented by special requirements of systems described in other Sections.

B. Related Requirements

1. Section 26-05-00 "Common Work Results for Electrical" for additional information.
2. Section 26-05-43 "Underground Ducts and Raceways for Electrical Systems".

C. Description: The entire electrical installation (non-current carrying metal parts) shall be effectively grounded.

1. The electrical installation, including but not limited to, metallic conduits and raceways, cable trays, junction and pull boxes, enclosures, fixtures, service equipment, distribution boards and panels, transformers, grounding type receptacles, switches, motor frames, cabinets and equipment shall be completely and effectively grounded in accordance with all code requirements, whether or not such connections are specifically shown or specified.
2. Electrical continuity to ground metal raceways and enclosures, isolated from the equipment ground by use of non-metallic conduit or fittings, shall be provided by a green insulated grounding conductor of approved size within each raceway connected to the isolated metallic raceways or enclosures at each end.
3. Ground each separately derived system neutral as described herein except as otherwise shown or specified.
4. Provide telecommunications system grounding as described herein except as otherwise shown or specified.

~~5. Ground HVAC ductwork per Division 23 requirements.~~

~~6.5.~~ Resistance Values:

- a. Resistance from the main switchboard ground bus through the ground electrode to earth shall not exceed 5 OHMS unless otherwise noted.
- b. Resistance from the farthest panelboard, switchboard, and etc. ground bus through the ground electrode to earth shall not exceed 20 OHMS unless otherwise noted

1.3 REFERENCES

- A. Comply with the latest edition of the following applicable specifications and standards except as otherwise shown or specified.
1. IEEE 80 – Guide for Safety in AC Substation Grounding
 2. IEEE 81 – Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System (Parts 1 & 2)
 3. IEEE 141 – Recommended Practice for Electric Power Distribution for Industrial Plants
 4. IEEE 142 – Recommended Practice for Powering and Grounding of Industrial and Commercial Power Systems
 5. IEEE 1100 – Recommended Practice for Powering and Grounding Electronic Equipment
 6. NFPA 70 – California Electrical Code (CEC)
 7. NETA ATS – Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems
 8. UL 467 – Standard for Grounding and Bonding Equipment
 - ~~9. UL 837 – Standard for Qualifying Permanent Connections Used in Substation Grounding~~
 - ~~10.~~9. UL 869 – Standard for Electrical Service Equipment

1.4 SUBMITTALS

- A. Submit in accordance with the requirements of Division 01 and Section 26-05-00 ~~– “Common Work Results for Electrical”~~, the following items:
- B. Product Data: Provide Data/catalog cuts for each product and component specified herein, listing all physical and electrical characteristics and ratings indicating compliance with all listed standards.
1. Clearly mark on each data sheet the specific item(s) being submitted and the proposed application.
- C. Submit manufacturer's installation instructions.
- D. Bill of materials, listing all components.
- E. Field quality test reports.
- F. Qualifications for testing agency and their field supervisor.
- G. Record drawings:
1. Record drawings shall indicate the location of all ground rods and supplementary grounding electrodes connected to the grounding system.
 2. The location of each ground rod, ground-rod assembly, and other grounding electrodes shall be identified by letter in alphabetical order and keyed to the record of ground-resistance tests.
- H. Typewritten records of measured resistance values shall be submitted for review and included with the operation and maintenance manual furnished to the Owner at the time of project closeout.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Testing agency as defined by OSHA in 29 CFR 1910.7 or a member company of the InterNational Electrical Testing Association and that is acceptable to authorities having jurisdiction.
 - 1. Testing Agency's Field Supervisor: Person currently certified by the InterNational Electrical Testing Association to supervise on-site testing specified in Part 3.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in California Electrical Code (CEC) based on National Electrical Code (NFPA 70), Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
 - 1. Comply with UL 467.
- C. Provide grounding materials conforming to requirements of CEC, IEEE 142, and UL labeled.
- D. Comply with the latest edition of CEC as stated in drawings and/or applicable; for medium-voltage underground construction, comply with IEEE C2.

1.6 COORDINATION

- A. Complete grounding and bonding of building reinforcing steel prior concrete placement.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers listed in the following product categories:
- B. Grounding Rods
 - 1. Eritech/Erico
 - 2. Blackburn/Thomas & Betts
 - 3. Galvan Industries
 - 4. Or Equal
- C. Grounding Busbars
 - 1. Eritech / Erico
 - 2. Copperweld
 - 3. Harger
 - 4. Or Equal
- D. Mechanical and Compression Connectors
 - 1. Burndy/FCI
 - 2. Blackburn/Thomas & Betts
 - 3. ERICO
 - 4. Or Equal
- E. Compression Connectors

1. Burndy/FCI
2. Blackburn/Thomas & Betts
3. Or Equal

F. Exothermic Connections

1. Cadweld/Erco
2. Fuseweld/Thomas & Betts
3. Or equal

G. Grounding Wells

1. Jensen, catalog #N9.
2. Quickset, catalog # EC-17.
3. Associated
4. Or Equal

H. Grounding and Bonding Conductors

1. Equipment Grounding Conductor: 600 V, THHN/THWN-2 or THWN-2, **copper** wire, green color, in accordance with Section 26 05 19 "Low-Voltage Electrical Power Conductors and Cables."
2. Isolated Equipment Grounding Conductor: 600 V, THHN/THWN-2 or THWN-2, **copper** wire, green color with yellow stripes, in accordance with Section 26 05 19 "Low-Voltage Electrical Power Conductors and Cables."
3. ASTM - Bare Copper Grounding and Bonding Conductor:
 - a. Soft or Annealed Copper Wire: ASTM B3
 - b. Concentric-Lay Stranded Copper Conductor: ASTM B8.
 - c. Tin-Coated Soft or Annealed Copper Wire: ASTM B33.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Thoroughly examine site conditions for acceptance of grounding system installation to verify conformance with manufacturer and specification tolerances. Do not commence with installation until all conditions are made satisfactory.
- B. Verify final backfill and compaction has been completed before driving rod electrodes.

3.2 PREPARATION

- A. Remove paint, rust and any other surface contaminants at connection points.

3.3 APPLICATION

- A. Use only copper conductors for both insulated and bare grounding conductors in direct contact with earth, concrete, masonry, crushed stone, and similar materials.
- B. Grounding Rods:

1. Driven rods shall be copper clad steel with minimum 10 mil copper bonded coating, minimum of 3/4" in diameter and 10 feet in length.
2. Ground rod clamps shall be cast bronze body providing high pressure contact between rod and ground wire (manufactured by Copperweld Type AB, Burndy GKP or equal).
3. Ground Rod Clamps at Test Wells: Use bolted pressure clamps with at least two bolts.

C. Grounding Busbars:

1. Grounding Bus: Install in electrical and telephone equipment rooms, in rooms housing service equipment, and elsewhere as indicated.
 - a. Use insulated spacer; space 1 inch from wall and support from wall 6 inches above finished floor, unless otherwise indicated.
2. Provide rectangular annealed copper ground bars with pre-punched holes. The spacing and size of ground bar holes shall match the connection holes required for terminal lugs being furnished.
3. The minimum dimension of bars shall be 1/4" T x 4" W x 24" L unless a longer bus is noted on the drawings.
4. Provide mounting kit complete with fasteners, insulators and brackets as required.

D. Mechanical and Compression Connectors:

1. Provide copper alloy connectors, suitable for grounding and bonding applications, in configurations required for particular installation.
2. Ground Rod Clamps: Where required, grounding conductors shall be connected to ground rods or posts using U-bolt clamps.
 - a. For single cable connections use type "GAR" series by Burndy or "GUV" series by Blackburn.
 - b. For two cable connections use type "GD" series by Burndy or equal.
3. Water Pipe Clamps: Where required, grounding conductors shall be connected to water pipe using use type "GAR-BU" series by Burndy, "CWP" series by ERICO, or equal.

E. Compression Connectors:

1. Provide irreversible compression copper connectors with high mechanical strength and electrical integrity.
2. Terminal Lugs: Provide heavy-duty terminal lugs with inspection probe hole, extended barrel and two-hole tang for cable to ground bar terminations. The lugs shall be pre-filled with oxide inhibitor and individually sealed to prevent from moisture and contaminants prior to connection to bus bars. The lugs shall be "Hyground" series, type "YGHA" manufactured by Burndy or equal.
3. Cable to Cable connectors: Provide high strength connectors for cable to cable and cable to ground grid connections. The connectors shall be "Hyground" series products

F. Exothermic-Welded Connections:

1. Use for connections to structural steel, for underground connections and where indicated on drawings, except those at test wells.
 - a. In addition to exothermic welded connections, the use of compression fittings (Burndy Hyground or equal) shall be allowed for underground connections.
2. Connectors shall be exothermic materials using approved accessories and tools for preparing and making permanent field connections between grounding system components as required.

G. Grounding Wells:

1. Ground wells shall be precast concrete boxes equipped with cast iron covers with a cast iron frame cast into the box. The covers shall be checkered and bolt-on type.
2. Box exterior dimensions shall be approximately 14" wide, 19" long and 12" deep, or larger, if necessary to obtain the required clearances for accessing the connectors.

H. Grounding and Bonding Conductors:

1. Use only copper conductors for both insulated and bare grounding conductors in direct contact with earth, concrete, masonry, crushed stone, and similar materials.
2. In raceways, use insulated equipment grounding conductors.
3. Equipment Grounding Conductor Terminations: Use bolted pressure clamps.
4. Underground Grounding Conductors: Use copper conductor, No. 4/0 AWG minimum. Bury at least 24 inches below grade or bury 12 inches above duct bank when installed as part of the duct bank.

3.4 INSTALLATION

~~A. Comply with manufacturer's installation instructions for installing access doors and frames.~~General:

1. The grounding and bonding systems installation shall be in accordance with CEC, IEEE 142 and 1100.
2. Install ground rods at locations as indicated on Drawings or at locations reviewed and approved by the Owner's Representative. Install additional rod electrodes to achieve specified resistance to ground.
3. Provide ground bars in all electrical rooms and telecommunication rooms, sized as required, wall mounted at main and each electrical room, and each telecommunication room with insulated standoffs.
4. Install grounding and bonding conductors concealed from view in public locations.
5. Apply corrosion-resistant finish to field connections, buried metallic grounding and bonding products, and places where factory applied protective coating has been destroyed, which are subjected to corrosive action. This step is not applicable where exothermic welded connections are utilized.
6. Provide a separate grounding bus at panelboards, switchboards, and motor control centers. Connect all metallic enclosed equipment so that with maximum fault current flowing, shall be maintained at not more than 35 volts above ground.
7. Conduit terminating in concentric, eccentric, or oversized knockouts at panelboards, cabinets, gutters, etc. shall have grounding bushings and bonding jumpers installed interconnecting all such conduits.
8. All conduit stub-ups shall be grounded and where multiple stub-ups are made within an equipment enclosure, such as a switchboard, they shall be equipped with grounding bushings and bonded together and to the enclosure and the enclosure ground bus.
9. Provide grounding and bonding conductors with sufficient slack to avoid breaking due to settlement and movement of conductors at attached points.
10. Install grounding well at each rod location.
- ~~A.11.~~ Grounding wells installed outdoors shall be located in the nearest usable planting area, where not otherwise indicated on the Drawings. The wells in planting areas shall be installed 2" above soil. Wells installed in non-planter areas shall be flush with the finished grade.

~~B. Install doors flush with adjacent finish surfaces or recessed to receive finish material.~~Bonding:

1. Bond together metal siding not attached to grounded structure, bond to ground.
2. Bond together reinforcing steel and metal accessories in any water feature (I.e., pool, fountain, etc.) structures, where applicable.
3. Bond metal HVAC air ducts to the equipment grounding conductors at the equipment side, of associated fans, motors & heaters. Provide tinned bonding jumper across flexible duct connections to maintain ground continuity. In the case of solid metallic connection, there is no need for a separate bonding conductor.
4. Provide bonding jumpers across expansion and deflection couplings in conduit runs, piping, pipe connections to water meters, and dielectric couplings in metallic cold water piping system.
5. Bonding pigtails shall be insulated copper conductor, identified green, sized per code and provided with termination screw or lug.
- ~~B.6.~~ Bond to lightning protection system, where applicable.

3.5 FIELD QUALITY CONTROL~~CORRECTION AND REPAIR~~

- A. Field inspection and testing shall be performed under provisions of Section 260500 "Common Work Result for Electrical System" and as stated here.~~Correction and Repair: In a manner that does not lead to or result in any specified or other warranty becoming void,~~

- ~~1. correct deficiencies that do not conform to the Drawings or specified requirements, as determined by the manufacturer's field representative and the Architect; and~~
- ~~2. repair all damaged areas and items.~~

- B. Test reports: The contractor shall engage a qualified Independent testing and inspecting agency to perform field tests/inspections and provide reports for all connections/terminations and protective devices.

- C. Perform inspections and tests listed in NETA ATS, Section 7.13

- D. Perform ground resistance and continuity testing in accordance with IEEE 142.

~~B.E.~~ Submittals~~Testing:~~

1. Provide testing agency with contract documents for their review prior to the commencement of ground testing.~~Document non-conforming, defective, or damaged work along with proposed corrections or repair, and then submit such documentation to the Architect for review. Such defective work submittals must include~~

~~1.2.~~ Visual and mechanical inspection:

- a. The testing agency shall inspect the grounding electrode and connections prior to concrete encasement, burial, or concealment.~~descriptions and locations of defective work;~~
- b. Check tightness and welds of all ground conductor terminations.~~supporting sketches, diagrams, photographs, and other visual depictions of defective work; and~~
- c. Verify installation complies with the intent of the contract documents.~~similar documentation and visual depictions of Contractor proposed corrections and repairs.~~

- ~~2. Do not begin correction or repair of defective work until after the Architect's review of the defective work submittal is complete.~~

3. Electrical Tests: The resistance to ground for all systems shall be measured by the "direct" method or "fall-of-potential" method.~~With respect to the acceptance or rejection of corrected work, the Architect's decision is final. Acceptance by the Architect of corrected~~

~~work is contingent upon~~

- a. Perform "fall-of-potential" test per Institute of Electrical and Electronic Engineers (IEEE) Standard No. 81, Section 9.04 on the main grounding electrode or system.~~corrections and repairs being performed skillfully.~~
- b. Perform the 2 point method test per IEEE No. 81, Section 9.03 to determine the ground resistance between the main grounding system and all major electrical equipment frames, system neutral and derived neutral points.~~corrective or repaired work resulting in sound, permanent construction that is flush and seamless with adjacent surfaces.~~
- c. The earth electrode under test must be far enough away from the water pipe system to be outside its sphere of influence. Rule of thumb: Distance from the earth electrode system to the water pipe system should be about 10 times the radius of the electrode or grid to obtain a measurement within an accuracy of plus or minus 10%.~~colors and textures matching adjoining and adjacent surfaces, without differentiation; and~~

~~d.4.~~ Obtain and record ground resistance measurements both from electrical equipment ground bus to the ground electrode and from the ground electrode to earth.~~no visible evidence of correction or repair, nor any other apparent distinction or seam between original and corrected or repaired work.~~

~~G.F.~~ When improper grounding is found on receptacles, check receptacles in entire project and correct. Perform retest.~~Completion:~~

- ~~1. Upon completion of correction or repair, items must be free from damage, as determined by the manufacturer's field representative and the Architect.~~
- ~~2. Arrange and pay costs for either removing and reinstalling or replacing non-conforming work; or items that are deficient, damaged or that cannot be satisfactorily corrected or repaired in a manner that both matches adjacent undamaged areas and shows no evidence of correction, repair, or refinishing, as determined by the manufacturer's field representative and the Architect.~~

3.6 ADJUSTMENTS~~CLEANING~~

A. Furnish and install additional bonding and add grounding electrodes as required complying with resistance limits specified under this Section of the Specification.~~Cleaning Work:~~

- ~~1. Remove from exposed metal surfaces anything that might interfere with uniform oxidation or weathering~~
- ~~2. In a manner that does not lead to or result in any specified or other warranty becoming void, clean surfaces exposed to view using cleaning agents, equipment, tools, and procedures supplied, required, recommended, approved, or accepted by the manufacturer.~~
 - ~~a. Protect other work from staining or damage caused by cleaning operations.~~
 - ~~b. Do not use cleaning materials or processes that can or may change the appearance of exposed finishes or damage adjacent materials.~~
- ~~3. Replace items that cannot be satisfactorily cleaned, as determined by the manufacturer's field representative and the Architect.~~

~~B. Waste Management: After completing the work of this Section, leave work areas free from debris, materials, equipment, and related items.~~

~~3.7 PROTECTION~~

- ~~A. Protect in place the installed access door assemblies from corrosion, deterioration, staining, and other sources of damage until Substantial Completion.~~
 - ~~1. Provide protection items supplied, required, recommended, approved, or accepted by the manufacturer.~~
 - ~~2. Use protection materials and methods that do not lead to or result in any specified or other warranty becoming void.~~
- ~~B. Do not store anything adjacent to or against installed access door assemblies unless they are adequately protected from damage and staining, as determined by the manufacturer's field representative and the Architect.~~
- ~~C. Do not use access door assembly surfaces as work surfaces.~~
- ~~D. Remove protection when it's no longer needed and before Substantial Completion.~~

END OF SECTION 260526

SECTION 260533 – RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Metal conduits and fittings.
2. Nonmetallic conduits and fittings.
3. Metal wireways and auxiliary gutters.
4. Nonmetal wireways and auxiliary gutters.
5. Boxes, enclosures, and cabinets.
6. Handholes and boxes for exterior underground cabling.

B. Related Requirements:

- ~~1. Section 078413 "Penetration Firestopping" for firestopping at conduit and box entrances.~~
~~2.1. Section 260543 "Underground Ducts and Raceways for Electrical Systems" for exterior ductbanks, manholes, and underground utility construction.~~
~~3. Section 270528 "Pathways for Communications Systems" for conduits, wireways, surface pathways, innerduct, boxes, faceplate adapters, enclosures, cabinets, and handholes serving communications systems.~~

C. Description of Work: Raceway and boxes located as indicated on Drawings, and at other locations required for splices, taps, wire pulling, equipment connections, and compliance with regulatory requirements. Raceway and boxes are shown in approximate locations unless otherwise noted.

1. Outdoor Locations, Above Grade: Provide rigid steel conduit with cast metal outlet, pull, and junction boxes.
2. Wet and Damp Locations: Provide rigid steel conduit with cast metal outlet, junction, and pull boxes. Provide flush mounting outlet boxes in finished areas.
3. Concealed Dry Locations: Provide electrical metallic tubing (EMT) with sheet-metal boxes. Provide flush mounting outlet boxes in finished areas. Provide hinged enclosure for large pull boxes.
4. Exposed Dry Locations: Provide rigid steel conduit when outside. Provide flush mounting outlet boxes in finished areas. Provide hinged enclosure for large pull boxes.
5. Underground: Provide thick wall rigid nonmetallic conduit (PVC Sch. 40).

1.3 ~~DEFINITIONS~~ REFERENCES

- A. Comply with the latest edition of the following applicable specifications and standards except as otherwise shown or specified. ~~ARC: Aluminum rigid conduit.~~
1. ANSI C80.1 - Rigid Steel Conduit, Zinc-Coated
 2. ANSI C80-3 - Electrical Metallic Tubing, Zinc-Coated

3. [ANSI/SCTE 77](#) - [Specifications for Underground Enclosure Integrity](#)
4. [FS WW-C-563A](#) - [Electrical Metallic Tubing](#)
5. [FS WW-C-566](#) - [Specification for Flexible Metal Conduit](#)
6. [FS WW-C-581](#) - [Specification for Galvanized Rigid Conduit](#)
7. [NEMA FB 1](#) - [Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies](#)
8. [NEMA FB 2.10](#) - [Selection & Installation Guidelines for Fittings for Use with Non-Flexible Electrical Metal Conduit or Tubing](#)
9. [NEMA FB 2.20](#) - [Selection & Installation Guidelines for Fittings for Use with Flexible Electrical Conduit and Cable](#)
10. [NEMA RN 1](#) - [Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit & Cable Assemblies](#)
11. [NEMA RV 3](#) - [Application and Installation Guidelines for Flexible and Liquid-tight Flexible Metal and Nonmetallic Conduits](#)
12. [NEMA TC 2](#) - [Electrical Polyvinyl Chloride \(PVC\) Tubing and Conduit](#)
13. [NEMA TC 3](#) - [PVC Fittings for Use with Rigid PVC Conduit and Tubing](#)
14. [NEMA TC 14](#) - [Reinforced Thermosetting Resin Conduit and Fittings Series](#)
15. [NEMA OS-1](#) - [Sheet Steel Outlet Boxes, Device Boxes, Covers, & Box Supports](#)
16. [NEMA OS-2](#) - [Nonmetallic Outlet Boxes, Device Boxes, Covers, & Box Supports](#)
17. [NEMA 250](#) - [Enclosures for Electrical Equipment \(1000V Maximum\)](#)
18. [NFPA 70](#) - [California Electrical Code \(CEC\)](#)
19. [UL 1](#) - [Flexible Metal Conduit](#)
20. [UL 6](#) - [Rigid Metal Conduit](#)
21. [UL 50](#) - [Enclosures for Elec Equipment, Non-Environmental Considerations](#)
22. [UL 183](#) - [Standard for Manufactured Wiring Systems](#)
23. [UL 514A](#) - [Metallic Outlet Boxes](#)
24. [UL 514B](#) - [Conduit, Tubing, and Cable Fittings](#)
25. [UL 514C](#) - [Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers](#)
26. [UL 651](#) - [Rigid Nonmetallic Electrical Conduit](#)
27. [UL 797](#) - [Electrical Metallic Tubing](#)
28. [UL 870](#) - [Standard for Wireways, Auxiliary Gutters, and Associated Fittings](#)
29. [UL 1203](#) - [Explosion-Proof & Dust-Ignition/Proof Electrical Equipment for Use in Hazardous \(Classified\) Locations](#)
30. [UL 1242](#) - [Intermediate Metal Conduit](#)
- ~~B.31. [UL 1773](#) - [Standard for Termination Boxes](#)~~ ~~GRC: Galvanized rigid steel conduit.~~

~~C. IMC: Intermediate metal conduit.~~

1.4 ACTION SUBMITTALS

- A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.
1. [Data/catalog cuts for each product and component specified herein, listing all physical and electrical characteristics and ratings indicating compliance with all listed standards.](#)
 2. [Clearly mark on each data sheet the specific item\(s\) being submitted and the proposed application.](#)
 3. [Submit manufacturer's installation instruction. Provide written instructions for raceway products requiring glues, special tools, or specific installation techniques.](#)
 - ~~A.4.~~ [List of conduit types indicating where each type will be used.](#)
- B. Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections, and attachment details.

1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Conduit routing plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of items involved:
 - 1. Structural members in paths of conduit groups with common supports.
 - 2. HVAC and plumbing items and architectural features in paths of conduit groups with common supports.
- B. Qualification Data: For professional engineer.
- C. Seismic Qualification Data: Certificates, for enclosures, cabinets, and conduit racks and their mounting provisions, including those for internal components, from manufacturer.
 - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 - 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
 - 4. Detailed description of conduit support devices and interconnections on which the certification is based and their installation requirements.
- D. Source quality-control reports.

1.6 QUALITY ASSURANCE

- A. All materials, equipment and parts comprising the units specified herein shall be new.
 - 1. Only products and applications listed in this Section may be used on the project unless otherwise submitted and approved by the Owner's Representative.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, protect, and handle Products to site under provisions of Division 01 and Section 260500 "Common Work Results for Electrical".
- B. Store and handle in strict compliance with manufacturer's written instructions and recommendations.
- ~~D.C.~~ C. Protect from damage due to weather, excessive temperature, and construction operations.

PART 2 - PRODUCTS

2.1 METAL CONDUITS AND FITTINGS

- A. Metal Conduit:
 - 1. Listing and Labeling: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 - 2. RMC (GRC): Rigid Metal Conduit, ~~Comply~~ comply with ANSI C80.1 and UL 6.
 - ~~3. ARC: Comply with ANSI C80.5 and UL 6A.~~

~~4. IMC: Comply with ANSI C80.6 and UL 1242.~~

- ~~5.3.~~ PVC-Coated Steel Conduit: PVC-coated rigid steel conduit.
- a. Comply with NEMA RN 1.
 - b. Coating Thickness: 0.040 inch (1 mm), minimum.

~~6.4.~~ EMT: Electrical Metallic Tubing. ~~Comply comply~~ with ANSI C80.3 and UL 797.

~~7.5.~~ FMC: Flexible Metal Conduit. ~~Comply comply~~ with UL 1; zinc-coated steel or aluminum.

~~8.6.~~ LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.

B. Metal Fittings:

1. Comply with NEMA FB 1 and UL 514B.
2. Listing and Labeling: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
3. Fittings, General: Listed and labeled for type of conduit, location, and use.
4. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 1203 and NFPA 70.
5. Fittings for EMT:
 - a. Material: Steel.
 - b. Type:
 - 1) Conduit 2" and larger: compression.
 - 2) Conduit smaller than 2": Setscrew or compression.
6. Expansion Fittings: PVC or steel to match conduit type, complying with UL 651, rated for environmental conditions where installed, and including flexible external bonding jumper.
7. Coating for Fittings for PVC-Coated Conduit: Minimum thickness of 0.040 inch (1 mm), with overlapping sleeves protecting threaded joints.

- C. Joint Compound for ~~IMC, GRC, or ARC~~: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.2 NONMETALLIC CONDUITS AND FITTINGS

A. Nonmetallic Conduit:

1. Listing and Labeling: Nonmetallic conduit shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- ~~2. Fiberglass:~~
 - ~~a. Comply with NEMA TC 14.~~
 - ~~b. Comply with UL 2515 for aboveground raceways.~~
 - ~~c. Comply with UL 2420 for belowground raceways.~~
- ~~3. ENT: Comply with NEMA TC 13 and UL 1653.~~
- ~~4.2.~~ RNC: Electrical Polyvinyl Chloride (PVC) Conduit, ~~Type type~~ EPC-40-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.
- ~~5. LFNC: Comply with UL 1660.~~
- ~~6. Rigid HDPE: Comply with UL 651A.~~
- ~~7. Continuous HDPE: Comply with UL 651A.~~
- ~~8. Coilable HDPE: Preassembled with conductors or cables and complying with ASTM D 3485.~~
- ~~9. RTRC: Comply with UL 2515A and NEMA TC 14.~~

B. Nonmetallic Fittings:

1. Fittings, General: Listed and labeled for type of conduit, location, and use.
2. Fittings for ~~ENT and~~ RNC: Comply with NEMA TC 3; match to conduit or tubing type and material.
~~a. Fittings for LFNC: Comply with UL 514B.~~
3. Solvents and Adhesives: As recommended by conduit manufacturer.

2.3 METAL WIREWAYS AND AUXILIARY GUTTERS

- A. Description: Sheet metal, complying with UL 870 and NEMA 250, Type 1 unless otherwise indicated, and sized according to NFPA 70.
 1. Metal wireways installed outdoors shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Fittings and Accessories: Include covers, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.
- C. Wireway Covers: Screw-cover type unless otherwise indicated.
- D. Finish: Manufacturer's standard enamel finish.

2.4 NONMETALLIC WIREWAYS AND AUXILIARY GUTTERS

- A. Listing and Labeling: Nonmetallic wireways and auxiliary gutters shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Description: Fiberglass polyester, extruded and fabricated to required size and shape, without holes or knockouts. Cover shall be gasketed with oil-resistant gasket material and fastened with captive screws treated for corrosion resistance. Connections shall be flanged and have stainless-steel screws and oil-resistant gaskets.
- C. Description: PVC, extruded and fabricated to required size and shape, and having snap-on cover, mechanically coupled connections, and plastic fasteners.
- D. Fittings and Accessories: Couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings shall match and mate with wireways as required for complete system.
- E. Solvents and Adhesives: As recommended by conduit manufacturer.

2.5 BOXES, ENCLOSURES, AND CABINETS

- A. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.
- B. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.

- C. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.
- D. Nonmetallic Outlet and Device Boxes: Comply with NEMA OS 2 and UL 514C.
- E. Metal Floor Boxes:
 - 1. Material: Cast metal.
 - 2. Type: Fully adjustable.
 - 3. Shape: Rectangular.
 - 4. Listing and Labeling: Metal floor boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- F. Luminaire Outlet Boxes: Nonadjustable, designed for attachment of luminaire weighing 50 lb (23 kg). Outlet boxes designed for attachment of luminaires weighing more than 50 lb (23 kg) shall be listed and marked for the maximum allowable weight.
- G. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
- H. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, cast ~~aluminum~~-metal with gasketed cover.
- I. Box extensions used to accommodate new building finishes shall be of same material as recessed box.
- J. Device Box Dimensions: 4 inches square by 2-1/8 inches deep (100 mm square by 60 mm deep).
- K. Gang-able boxes are prohibited.
- L. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 1 with continuous-hinge cover with flush latch unless otherwise indicated.
 - 1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
 - 2. Nonmetallic Enclosures: Fiberglass.
 - 3. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.
- M. Cabinets:
 - 1. NEMA 250, Type 1 galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
 - 2. Hinged door in front cover with flush latch and concealed hinge.
 - 3. Key latch to match panelboards.
 - 4. Metal barriers to separate wiring of different systems and voltage.
 - 5. Accessory feet where required for freestanding equipment.
 - 6. Nonmetallic cabinets shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.6 HANDHOLES AND BOXES FOR EXTERIOR UNDERGROUND WIRING

- A. General Requirements for Handholes and Boxes:
 - 1. Boxes and handholes for use in underground systems shall be designed and identified as defined in NFPA 70, for intended location and application.

2. Boxes installed in wet areas shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Polymer-Concrete Handholes and Boxes with Polymer-Concrete Cover: Molded of sand and aggregate, bound together with polymer resin, and reinforced with steel, fiberglass, or a combination of the two.
1. Standard: Comply with SCTE 77.
 2. Configuration: Designed for flush burial with closed bottom unless otherwise indicated.
 3. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure and handhole location.
 4. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
 5. Cover Legend: Molded lettering, "ELECTRIC."
 6. Conduit Entrance Provisions: Conduit-terminating fittings shall mate with entering ducts for secure, fixed installation in enclosure wall.
 7. Handholes 12 Inches Wide by 24 Inches Long (300 mm Wide by 600 mm Long) and Larger: Have inserts for cable racks and pulling-in irons installed before concrete is poured.
- C. Fiberglass Handholes and Boxes: Molded of fiberglass-reinforced polyester resin, with frame and covers of polymer concrete.
1. Standard: Comply with SCTE 77.
 2. Color of Frame and Cover: Gray.
 3. Configuration: Designed for flush burial with closed bottom unless otherwise indicated.
 4. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure and handhole location.
 5. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
 6. Cover Legend: Molded lettering, "ELECTRIC."
 7. Conduit Entrance Provisions: Conduit-terminating fittings shall mate with entering ducts for secure, fixed installation in enclosure wall.
 8. Handholes 12 Inches Wide by 24 Inches Long (300 mm Wide by 600 mm Long) and Larger: Have inserts for cable racks and pulling-in irons installed before concrete is poured.

2.7 SOURCE QUALITY CONTROL FOR UNDERGROUND ENCLOSURES

- A. Handhole and Pull-Box Prototype Test: Test prototypes of handholes and boxes for compliance with SCTE 77. Strength tests shall be for specified tier ratings of products supplied.
1. Tests of materials shall be performed by an independent testing agency.
 2. Strength tests of complete boxes and covers shall be by either an independent testing agency or manufacturer. A qualified registered professional engineer shall certify tests by manufacturer.
 3. Testing machine pressure gages shall have current calibration certification complying with ISO 9000 and ISO 10012 and traceable to NIST standards.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Thoroughly examine site conditions for acceptance of raceways and boxes installation to verify conformance with manufacturer and specification tolerances. Do not commence with installation until all conditions are made satisfactory.

3.2 PREPARATION

- A. Coordinate the routing of all raceways prior to commencing any work.
- B. Coordinate locations of all handholes and underground boxes with existing conditions.

~~3.1~~ 3.3 RACEWAY APPLICATION

- A. Outdoors: Apply raceway products as specified below unless otherwise indicated:
1. Exposed Conduit: ~~RMC~~GRC.
 2. Concealed Conduit, Aboveground: EMT.
 3. Underground Conduit: RNC, Type EPC-40-PVC concrete encased.
 4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
 5. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.
- B. Indoors: Apply raceway products as specified below unless otherwise indicated:
1. Exposed, Not Subject to Physical Damage: EMT.
 2. Exposed, Not Subject to Severe Physical Damage: EMT.
 3. Exposed and Subject to Severe Physical Damage: ~~RMC~~GRC. Raceway locations include the following:
 - a. ~~Loading dock~~Helistop.
 - b. ~~Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.~~
 - c. ~~b. Mechanical rooms~~Areas exposed to traffic.
 - d. ~~Gymnasiums.~~
 4. Concealed in Ceilings and Interior Walls and Partitions: EMT.
 5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
 6. Damp or Wet Locations: ~~RMC~~GRC.
 7. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4 stainless steel in institutional and commercial kitchens and damp or wet locations.
- C. Minimum Raceway Size: 1/2-inch trade size.
- D. Raceway Fittings: Compatible with raceways and suitable for use and location.
1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
 2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with this type of conduit. Patch and seal all joints, nicks, and scrapes in PVC coating after installing

- conduits and fittings. Use sealant recommended by fitting manufacturer and apply in thickness and number of coats recommended by manufacturer.
3. EMT: Use setscrew or compression, steel fittings. Comply with NEMA FB 2.10.
 4. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.
- E. Install nonferrous conduit or tubing for circuits operating above 60 Hz. Where aluminum raceways are installed for such circuits and ~~pass-through~~pass-through concrete, install in nonmetallic sleeve.
- ~~F. Do not install aluminum conduits, boxes, or fittings in contact with concrete or earth.~~
- ~~G.F.~~ Install surface raceways only where indicated on Drawings.
- ~~H.G.~~ Do not install nonmetallic conduit where ambient temperature exceeds 120 deg F.

~~3.2~~3.4 INSTALLATION

- A. Comply with requirements stated in Section ~~260529-260500~~ "~~Hangers and Supports~~Common work Result for Electrical ~~Systems~~" for hangers and supports.
- B. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum conduits. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.
- C. Do not install raceways or electrical items on any "explosion-relief" walls or rotating equipment.
- D. Do not fasten conduits onto the bottom side of a metal deck roof.
- E. Keep raceways at least 6 inches (150 mm) away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
- F. Complete raceway installation before starting conductor installation.
- G. Arrange stub-ups so curved portions of bends are not visible above finished slab.
- H. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches (300 mm) of changes in direction.
- I. Make bends in raceway using large-radius preformed ells. Field bending shall be according to NFPA 70 minimum radii requirements. Use only equipment specifically designed for material and size involved.
- J. Conceal conduit within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.
- K. Support conduit within 12 inches (300 mm) of enclosures to which attached.
- L. Raceways Embedded in Slabs:

1. Run conduit larger than 1-inch (27-mm) trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support. Secure raceways to reinforcement at maximum 10-foot (3-m) intervals.
 2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
 3. Arrange raceways to keep a minimum of 2 inches of concrete cover in all directions.
 4. Do not embed threadless fittings in concrete unless specifically approved by Architect for each specific location.
 5. Change from ENT to RMC ~~GRC~~ before rising above floor.
- M. Stub-Ups to Above Recessed Ceilings:
1. Use EMT, ~~IMC~~, or RMC for raceways.
 2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.
- N. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.
- O. Coat field-cut threads on PVC-coated raceway with a corrosion-preventing conductive compound prior to assembly.
- P. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors including conductors smaller than No. 4 AWG.
- Q. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4-inch (35mm) trade size and insulated throat metal bushings on 1-1/2-inch (41-mm) trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.
- R. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.
- S. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.
- T. Cut conduit perpendicular to the length. For conduits 2-inch (53-mm) trade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the length.
- U. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb (90-kg) tensile strength. Leave at least 12 inches (300 mm) of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.
- V. Surface Raceways:
1. Install surface raceway with a minimum 2-inch (50-mm) radius control at bend points.
 2. Secure surface raceway with screws or other anchor-type devices at intervals not exceeding 48 inches (1200 mm) and with no less than two supports per straight raceway section. Support surface raceway according to manufacturer's written instructions. Tape and glue are not acceptable support methods.
- W. Install raceway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a

blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings according to NFPA 70.

- X. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points:
1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
 2. Where an underground service raceway enters a building or structure.
 3. Conduit extending from interior to exterior of building.
 4. Conduit extending into pressurized duct and equipment.
 5. Conduit extending into pressurized zones that are automatically controlled to maintain different pressure set points.
 6. Where otherwise required by NFPA 70.
- Y. Comply with manufacturer's written instructions for solvent welding RNC and fittings.
- Z. Expansion-Joint Fittings:
1. Install in each run of aboveground RNC that is located where environmental temperature change may exceed 30 deg F (17 deg C) and that has straight-run length that exceeds 25 feet (7.6 m). Install in each run of aboveground RMC and EMT conduit that is located where environmental temperature change may exceed 100 deg F (55 deg C) and that has straight-run length that exceeds 100 feet (30 m).
 2. Install type and quantity of fittings that accommodate temperature change listed for each of the following locations:
 - a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F temperature change.
 - b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F temperature change.
 - c. Indoor Spaces Connected with Outdoors without Physical Separation: 125 deg F temperature change.
 3. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F (0.06 mm per meter of length of straight run per deg C) of temperature change for PVC conduits. Install fitting(s) that provide expansion and contraction for at least 0.000078 inch per foot of length of straight run per deg F (0.0115 mm per meter of length of straight run per deg C) of temperature change for metal conduits.
 4. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
 5. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.
- AA. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of 72 inches (1830 mm) of flexible conduit for recessed and semi recessed luminaires, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.
1. Use LFMC in damp or wet locations subject to severe physical damage.
 2. ~~Use LFMC or LFNC in damp or wet locations not subject to severe physical damage.~~
- BB. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to [center] [top] [bottom] of box unless otherwise indicated.

- CC. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall. Prepare block surfaces to provide a flat surface for a raintight connection between box and cover plate or supported equipment and box.
- DD. Horizontally separate boxes mounted on opposite sides of walls, so they are not in the same vertical channel.
- EE. Locate boxes so that cover or plate will not span different building finishes.
- FF. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.
- GG. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.
- HH. Set metal floor boxes level and flush with finished floor surface.
- II. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.

~~3.3.5~~ 3.3.5 INSTALLATION OF UNDERGROUND CONDUIT

A. Direct-Buried Conduit:

1. Excavate trench bottom to provide firm and uniform support for conduit. ~~Prepare trench bottom as specified in Section 312000 "Earth Moving" for pipe less than 6 inches (150 mm) in nominal diameter.~~
- ~~2. Install backfill as specified in Section 312000 "Earth Moving."~~
- ~~3.2.~~ 3.2. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches (300 mm) of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction as ~~specified in Section 312000 "Earth Moving."~~ required.
- ~~4.3.~~ 4.3. Install manufactured duct elbows for stub-ups at poles and equipment and at building entrances through floor unless otherwise indicated. Encase elbows for stub-up ducts throughout length of elbow.
- ~~5.4.~~ 5.4. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through floor.
 - a. Couple steel conduits to ducts with adapters designed for this purpose and encase coupling with 3 inches (75 mm) of concrete for a minimum of 12 inches (300 mm) on each side of the coupling.
 - b. For stub-ups at equipment mounted on outdoor concrete bases and where conduits penetrate building foundations, extend steel conduit horizontally a minimum of 60 inches (1500 mm) from edge of foundation or equipment base. Install insulated grounding bushings on terminations at equipment.
- ~~6.5.~~ 6.5. Warning Planks: Bury warning planks approximately 12 inches (300 mm) above direct-buried conduits but a minimum of 6 inches (150 mm) below grade. Align planks along centerline of conduit.
- ~~7.6.~~ 7.6. Underground Warning Tape: Comply with requirements in Section 260553 "Identification for Electrical Systems."

~~3.4~~3.6 INSTALLATION OF UNDERGROUND HANDHOLES AND BOXES

- A. Install handholes and boxes level and plumb and with orientation and depth coordinated with connecting conduits to minimize bends and deflections required for proper entrances.
- B. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1/2-inch (12.5-mm) sieve to No. 4 (4.75-mm) sieve and compacted to same density as adjacent undisturbed earth.
- C. Elevation: In paved areas, set so cover surface will be flush with finished grade. Set covers of other enclosures 1 inch (25 mm) above finished grade.
- D. Install removable hardware, including pulling eyes, cable stanchions, cable arms, and insulators, as required for installation and support of cables and conductors and as indicated. Select arm lengths to be long enough to provide spare space for future cables but short enough to preserve adequate working clearances in enclosure.
- E. Field-cut openings for conduits according to enclosure manufacturer's written instructions. Cut wall of enclosure with a tool designed for material to be cut. Size holes for terminating fittings to be used, and seal around penetrations after fittings are installed.

~~3.5~~3.7 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. ~~Comply with requirements in Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."~~

~~3.6~~3.8 FIRESTOPPING

- A. Install firestopping at penetrations of fire-rated floor and wall assemblies. ~~Comply with requirements in Section 078413 "Penetration Firestopping."~~

~~3.7~~3.9 PROTECTION

- A. Protect coatings, finishes, and cabinets from damage and deterioration.
 - 1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
 - 2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

3.10 ADJUSTING

- A. Align adjacent wall/surface mounted outlet boxes for switches, receptacles, and similar devices.
- B. In concrete or drywall construction, set recessed boxes so that the front of the plaster ring or front of the box for those without plaster rings is not more than 1/4" behind the final finished surface.

- C. Set all recessed boxes in other types of construction so that the fronts are flush with the finished surface. Where these settings are not achieved, provide a 24-gauge or heavier galvanized steel liner flush with finished surface.

3.11 CLEANING

- A. Clean interior of boxes to remove dust, debris, and other material.
- ~~2.~~B. Clean exposed surfaces and restore finish.

END OF SECTION 260533

SECTION 260543 UNDERGROUND DUCTS AND RACEWAYS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Ducts in concrete-encased duct banks.
2. Handholes and handhole accessories.
3. Manholes and manhole accessories.

B. Related Sections:

1. Consult all other Sections, determine the extent and character of related work and properly coordinate work specified herein with that specified elsewhere to produce a complete installation.
2. Specific and close coordination is required with the following sections:
 - a. Section 26-05-26 - "Grounding and Bonding for Electrical Systems"
 - b. Section 26-05-33 - "Raceway and boxes for Electrical Systems"

- C. Description of work: Conduit and duct routing, handhole and manhole locations are shown in approximate locations unless dimensions are indicated. Route and locate interconnected system of encased conduits, ducts, handholes and manholes to complete the underground distribution system.

1. Use rigid non-metallic conduits for all underground and concrete encased applications.
2. Use PVC coated metallic conduits for all underground conduit penetrations to the building. All underground conduits entering the building shall transition to PVC coated metallic conduits within 5' of the building.
3. Use rigid steel conduits for all exposed conduits in manholes unless specified otherwise on drawings.

1.3 REFERENCES

- A. Comply with the latest edition of the following applicable specifications and standards except as otherwise shown or specified.

1. ANSI C80.1 - Rigid Steel Conduit, Zinc Coated
2. ASTM A48 - Standard Specification for Gray Iron Castings
3. ASTM C478 - Standard Specification for Precast Reinforced Concrete Manholes
4. ASTM C857 - Standard Practice for Minimum Structural Design Loading for Underground Precast Concrete Utility Structures.
5. ASTM C858 - Standard Specification for Underground Precast Concrete Utility Structures

6. ASTM C891 - Standard Practice for Installation of Underground Precast Concrete Utility Structures
7. ASTM C990 - Standard Specification for Joints for Concrete Pipe, Manholes and Precast Box Sections Using Preformed Flexible Joint Sealants
8. ASTM C1037 - Standard Practice for Inspection of Underground Precast Concrete Utility Structures
9. IEEE C2 - National Electrical Safety Code (NESC) or ANSI C2
10. NEMA RN1 - PVC Externally Coated Galvanized Rigid Steel Conduit
11. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Tubing and Conduit
12. NEMA TC 3 - PVC Fittings for Use with Rigid PVC Conduit and Tubing
13. NEMA TC 9 - Fittings for ABS and PVC Plastic Utilities Duct for UG Installation
14. NFPA 70 - California Electrical Code (CEC)
15. UL 6 - Rigid Metal Conduit
16. UL 514B - Fittings for Conduit

1.4 SUBMITTALS

- A. Submit in accordance with the requirements of Section 26-05-00 - "Common Work Results for Electrical", the following items:
 1. Data/catalog cuts for each product and component specified herein, listing all physical characteristics, and indicating compliance with all listed standards.
 - a. Thickness of all metals
 - b. Reinforcing iron dimensions and placement.
 - c. Concrete dimensions.
 - d. Interior dimensions.
 - e. Method of construction
 2. Clearly mark on each data sheet the specific item(s) being submitted and the proposed application.
 3. Submit manufacturer's installation instructions.
- B. Manufacturer's Instructions: Include instructions for storage, handling, protection, examination, preparation, and installation.
- C. Structural calculations to indicate compliance with H2O truck loading and any seismic risk in conformance with CBC requirements.
- D. Shop Drawings: Show fabrication and installation details for underground ducts and utility structures and include the following:
 1. For manholes:
 - a. Butterfly layout with duct sizes and locations of duct entries.
 - b. Reinforcement details.
 - c. Manhole cover design.
 - d. Step details.
 - e. Grounding details.
 - f. Dimensioned locations of cable rack inserts, pulling-in irons, and sumps.
 2. For precast manholes and hand holes, Shop Drawings shall be signed and sealed by a qualified professional engineer, and shall show the following:
 - a. Construction of individual segments.
 - b. Joint details.
 - c. Design calculations.

- E. Product Certificates: For concrete and steel used in underground precast manholes, according to ASTM C 858.

1.5 QUALITY ASSURANCE

- A. All materials, equipment and parts comprising the units specified herein shall be new.
- B. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum ten years of experience.
- C. Comply with California Electric Code (NFPA 70) and ANSI/IEEE C2.
- D. Electrical Components, Devices, and Accessories Including Ducts for Communications and Telephone Service: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to the Owner's Representative, and marked for intended use.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver items to the project site in conformance with the manufacturer's requirements, recommendations, or instructions for transport and delivery.
 - 1. Inspect for damage all items delivered to the project site.
 - 2. Reject delivery of items that show damage or have damaged containers.
- B. Store items off the floor or ground on pallets, and protect against weather, precipitation, and other forms of moisture with breathable covers.
 - 1. Store nonmetallic ducts with supports to prevent bending, warping, and deforming.
 - 2. Store precast concrete units at Project site as recommended by manufacturer to prevent physical damage. Arrange so identification markings are visible.
- C. Handling: Handle items in a manner that prevents bending, warping, twisting or other damage.
 - 1. Lift and support precast concrete units only at designated lifting or supporting points.

1.7 COORDINATION

- A. Coordinate layout and installation of ducts, manholes, and handholes with final arrangement of other utilities and site grading, as determined in the field.
 - 1. Coordinate with existing underground utilities and structures.
 - 2. Coordinate with work indicated on civil, landscape and other consultants' drawings.
- B. Coordinate elevations of ducts and duct-bank entrances into manholes and handholes with final profiles of conduits as determined by coordination with other utilities and underground obstructions. Revise locations and elevations from those indicated as required to suit field conditions and to ensure duct runs drain to manholes and handholes, and as approved by the Owner's Representative.
- C. Coordinate routing and termination locations of duct bank prior to excavation for rough-in. Duct bank routing is shown on Drawings in approximate locations unless dimensions are indicated. Route as required to complete the duct-bank system.

- D. Coordinate locations of manholes and vaults prior to excavating for installation. Manhole and pullbox locations are shown on Drawings in approximate locations unless dimensions are indicated. Locate as required to complete the duct-bank system.

1.8 PROJECT CONDITIONS

- A. Existing Utilities: Do not interrupt utilities serving facilities occupied the Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated.
 - 1. Notify the Owner's Representative fourteen days in advance of proposed utility interruptions.
 - 2. Do not proceed with utility interruptions without Owner Representative's written permission.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Underground Precast Concrete Utility Structures:
 - a. Carder Concrete Products.
 - b. Christy Concrete Products, Inc.
 - c. Elmhurst-Chicago Stone Co.
 - d. Jensen Precast.
 - e. Utility Vault Co.
 - f. Wausau Concrete Co.
 - g. Oldcastle
 - h. Or equal.
 - 2. Frames and Covers:
 - a. Alhambra Foundry
 - b. Campbell Foundry Co.
 - c. East Jordan Iron Works, Inc.
 - d. McKinley Iron Works, Inc.
 - e. Neenah Foundry Co.
 - f. Or equal.
 - 3. Nonmetallic Ducts and Accessories:
 - a. Arnco Corp.
 - b. Beck Manufacturing Inc.
 - c. Cantex, Inc.
 - d. Certainteed Corp.; Pipe & Plastics Group.
 - e. ElecSys, Inc.
 - f. Electri-Flex Co.
 - g. Lamson & Sessions; Carlon Electrical Products.
 - h. Manhattan/CDT/Cole-Flex.
 - i. Spiraduct/AFC Cable Systems, Inc.
 - j. Prime Conduit
 - k. JM Eagle

I. Or equal.

4. Or Equal: Where products are specified by manufacturers name and accompanied by the term "or equal", comply with provisions in Division 01 Section "Product Options and Substitutions". Specific procedures must be followed before use of an unnamed product or manufacturer.

2.2 DUCTS

- A. For Conduit and fittings' requirements refer to Division 26 Section "Raceways and Boxes for Electrical Systems."

2.3 HAND HOLES

- A. Cast-Metal Boxes: Cast aluminum, with outside flanges and recessed, gasketed cover for flush mounting and with nonskid finish and legend on cover. Unit, when buried, shall be designed to support AASHTO H10 loading for sidewalk and landscaped areas and HS20 for roadways, parking lots and loading docks.
- B. Precast Handholes: Reinforced concrete, monolithically poured walls and bottom, with steel frame and access door assembly as the top of hand hole. Duct entrances and windows shall be located near corners to facilitate racking. Pulling-in irons and other built-in items shall be installed before pouring concrete. Cover shall have nonskid finish and legend. Unit, when buried, shall be designed to support AASHTO H10 loading for sidewalk and landscaped areas and HS20 for roadways, parking lots and loading docks.
- C. Cover Legend: "ELECTRIC."

2.4 PRECAST MANHOLES

- A. Precast Units: ASTM 478, with interlocking mating sections, complete with accessories, hardware, and features as indicated. Include concrete knockout panels for conduit entrance and sleeve for ground rod.
- B. Diameter: 48 inches minimum.
- C. Design and fabricate structure according to ASTM C 858.
- D. Structural Design Loading: ASTM C 857, Class A-16 (AASHTO HS20).
- E. Base section: 6-inch minimum thickness for floor slab and 4-inch minimum thickness for walls and base riser section and having separate base slab or base section with integral floor.
- F. Riser Sections: 4-inch minimum thickness, and lengths to provide required depth Approved by Owner's Representative.
- G. Top Section: Eccentric-cone type unless concentric-cone or flat-slab-top type is indicated. Top of cone of size that matches grade rings.
- H. Steps: ASTM A 615, deformed, 1/2-inch steel reinforcing rods encased in ASTM D 4101, PP, wide enough to allow worker to place both feet on 1 step and designed to prevent lateral

slippage ~~off-of~~ step. Cast or anchor steps into sidewalls at 12- to 16-inch intervals. Omit steps if total depth from floor of manhole to finished grade is less than 36 inches.

- I. Grade Rings: Reinforced-concrete rings, 6- to 9-inch total thickness, to match diameter of manhole frame and cover.
- J. Joint Sealant: ASTM C 990, bitumen, or butyl rubber.
- K. Protective Coating: Plant-applied, coal-tar, epoxy-polyamide paint 15-mil minimum thickness applied to exterior and interior surfaces.
- L. Source Quality Control: Inspect structures according to ASTM C 1037.

2.5 ACCESSORIES

- A. Duct Spacers: Rigid PVC interlocking spacers, selected to provide minimum duct spacing and cover depths indicated while supporting ducts during concreting and backfilling; produced by the same manufacturer as the ducts.
- B. Manhole Frames and Covers: Comply with AASHTO loading specified for manhole; Ferrous frame 36-inch clear ID by 6-inch minimum riser with 4-inch-minimum width flange and 38 -inch-diameter cover.
 - 1. Provide cast covers with cast-in legend:
 - a. "LV-ELECTRIC" for duct systems with power wires and cables for systems operating at 600 V and less.
 - b. "HV-ELECTRIC" for duct systems with medium-voltage cables.
 - c. "COMMUNICATIONS" for communications, data, and telephone duct systems.
 - 2. Cast iron with cast-in legend as indicated above subsection 1. Milled cover-to-frame bearing surfaces.
 - 3. Manhole Frames and Covers: ASTM A 48; Class 30B gray iron, 36-inch size, machine-finished with flat bearing surfaces.
- C. Sump Frame and Grate: ASTM A 48, Class 30B gray cast iron.
- D. Pulling Eyes in Walls: Eyebolt with reinforcing-bar fastening insert 2-inch- diameter eye and 1-by-4-inch bolt.
 - 1. Working Load Embedded in 6-Inch, 4000-psi Concrete: 13,000-lbf minimum tension.
- E. Pulling and Lifting Irons in Floor: 7/8-inch- diameter, hot-dip-galvanized, bent steel rod; stress relieved after forming; and fastened to reinforced rod. Exposed triangular opening.
 - 1. Ultimate Yield Strength: 40,000-lbf shear and 60,000-lbf tension.
- F. Bolting Inserts for Cable Stanchions: Flared, threaded inserts of noncorrosive, chemical-resistant, nonconductive thermoplastic material; 1/2-inch ID by 2-3/4 inches deep, flared to 1-1/4 inches minimum at base.
 - 1. Tested Ultimate Pullout Strength: 12,000 lbf minimum.
- G. Non-hardening, safe for contact with human skin, not deleterious to cable insulation, and workable at temperatures as low as 35°F. Capable of withstanding temperature of 300°F

without slump and of adhering to clean surfaces of plastic ducts, metallic conduits, conduit coatings, concrete, masonry, lead, cable sheaths, cable jackets, insulation materials, and common metals.

1. O-BASF, Masterlife 3000D.
2. Or Equal.

- H. Warning Tape: Underground-line warning tape specified in Division 26 Section "Identification for Electrical Systems."

2.6 CONSTRUCTION MATERIALS

- A. Seal manhole section joints with sealing compound recommended by the manhole manufacturer.
- B. Moisture Sealing Material: Where indicated or required, provide a two-part urethane foam sealant which when mixed will expand approximately 15 times in volume to form a dense, strong tough foam unit with a density of 3 to 4 pounds per cubic foot. Sealant shall reach 60% full strength in 8 to 10 minutes after application.
- C. Corrosion-and moisture resistant add mixture for manholes: Manhole manufacturer shall provide crystalline cementitious material integrated in the manhole concrete mix to reduce the concrete permeability and provide corrosion resistance per the requirements of Division 7. Product to be manufactured by:
- D. Damp proofing: Comply with Division 07 Section "Bituminous Damp proofing."
- E. Mortar: Comply with ASTM C 270, Type M, except for quantities less than 2.0 cu. ft. where packaged mix complying with ASTM C 387, Type M, may be used.
- F. Brick for Manhole Chimney: Sewer and manhole brick, ASTM C 32, Grade MS.
- G. Concrete: Use 3000-psi- minimum, 28-day compressive strength and 1-inch maximum aggregate size. Concrete and reinforcement are specified in Division 03 Section "Cast-in- Place Concrete." Provide red dye added to concrete during batching for medium voltage as follows:
1. 2.0 lbs. of dye per 94 lb. bag of cement.
 - a. Color: Davis Color No. 1117.
- H. Finishes:
1. Uncoated Steel: Provide manufacturer's standard shop-applied phosphate pre-treatment and baked on rust inhibitive primer for field-applied finish.
 2. Stainless Steel:
 - a. Items Indicated to have an Uncoated (Bare) or Natural Finish: Furnish materials having a No. 4 finish.
 - b. Items Indicated to have a Painted Finish: Furnish materials having a No. 2D (matte) finish.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Before beginning installation, examine project conditions and field-verify measurements affecting the work of this specification Section.
 - 1. Thoroughly examine site conditions for the routing and acceptance of ductbanks and handhole/manhole installation to verify conformance with the manufacturers and specification tolerances. Do not commence with installation until all conditions are made satisfactory
 - 2. Verify that work performed as part of the work of other Sections.

3.2 PREPARATION

- A. Contractor shall prepare and be responsible for an excavation in accordance with those shown on pullbox/Manhole shop drawings. Prior to placing the precast substructure into the excavation, the Contractor shall provide base material at the bottom of the excavation. The base material shall be level and compacted to the proper elevation in conjunction with the conduit and the conduit entrance of vault/manhole as designated on the utility plans.
- B. Upon delivery of the product the Contractor shall provide sufficient labor to assist the placement of the precast concrete sections.

3.3 APPLICATION

- A. Use PVC Schedule 40 plastic conduit for power and communication systems concrete encased underground runs, unless otherwise noted. Use PVC Schedule 80 for direct buried runs where allowed.
- B. Use PVC Schedule 40 plastic factory elbows, encased in concrete, for bends in plastic conduit runs. When plastic conduit runs are not encased in concrete, use PVC-coated rigid steel factory elbows for bends in plastic conduit runs longer than 100 feet, or in plastic conduit runs which have more than two bends regardless of length.
- C. Use PVC conduit for stub-ups through slabs when protected by enclosed electrical enclosure or else use PVC-coated rigid steel conduit for stub-ups out in the open.

3.4 INSTALLATION – DUCTBANKS

- A. General:
 - 1. Coordinate installation of underground raceways with other outside and building construction work. Maintain existing outside utilities in operation.
 - 2. Remove entirely and properly reinstall all raceway installations not in compliance with these requirements.
 - 3. Provide a minimum cover of 2 feet over the top of ductbank for low voltage (600V and below) and 3 feet over the top of ductbank for high voltage (above 600V) underground raceways unless otherwise indicated.
 - 4. Do not backfill underground direct burial and concrete-encased raceways until they have been inspected by the Owner.

5. Warning Tapes: Bury warning tapes approximately 18" above all underground conduit runs or duct banks. Align parallel to and within 12" of the centerline of runs.
6. Provide suitable fittings to accommodate expansion and deflection where required.
7. Horizontal and vertical direction changes in all ducts at the couplings shall not exceed 5 degrees.
8. At building entry point provide tags on all conduits clearly stating "CAUTION - HORIZONTAL RUNS EXTERIOR TO BUILDING ARE PLASTIC."

B. Separation and Support:

1. Separate parallel runs of two or more raceways in a single trench with preformed, nonmetallic spacers designed for the purpose. Install spacers at intervals not greater than that specified in the NEC for support of the type of raceways used and in no case greater than 5 feet.
2. Support raceways installed in fill areas to prevent accidental bending until backfilling is complete. Tie raceways to supports and raceways and supports to the ground, so that raceways will not be displaced when concrete encasement or earth backfill is placed.
3. All duct banks containing signaling system cables (including telephone, data, alarm, sound, etc.) shall have a minimum separation of 12" with any lighting or power system duct bank.

C. Arrangement and Routing:

1. Arrange multiple conduit runs substantially in accordance with any details shown on the Drawings. Locate underground conduits where indicated on the Drawings and graded to the elevations shown.
2. Make minor changes in location or cross-section as necessary to avoid obstructions or conflicts. Where raceway runs cannot be installed substantially as shown because of conditions not discoverable prior to digging of trenches, refer the condition to the Engineer for instructions before further work is done.
3. Where other utility piping systems are encountered, maintain a 12-inch minimum vertical separation between raceways and other systems at crossings. Maintain a 12-inch minimum separation between raceways over couplings in other piping systems. Refer conflicts with these requirements to the Engineer for instructions before further work is done.
4. In multiple conduit runs, stagger raceway coupling locations so that couplings in adjacent raceways are not in the same transverse line.

D. Concrete Encasement:

1. Encase underground conduits in 3000 psi concrete, small aggregate. Maintain a minimum 3-inch envelope around all conduits. Backfill from top of concrete encasement to finish grade shall be with 1 sack mix slurry.
2. Maintain a grade of at least 4 inches per 100 feet, either from one manhole or pull box to the next, or from a high point between them, depending on the surface contour.
3. Hold conduits for concrete-encased raceways securely in place by acceptable window type spacer supports. Where, in the opinion of the Engineer, ground conditions are such as to require concrete forms, install forms constructed of materials and in a manner acceptable to the Engineer. No variations greater than 1/2 inch in 50 feet will be permitted from a straight line.
4. Envelopes may be poured directly against the sides of trenches if the cut is clean, even and free of loose material. Remove loose material from trenches before and during pouring of concrete to ensure sound envelopes. Carefully spade slurry during pouring to eliminate all voids under and between raceways and honeycombing of the exterior surface.

5. Do not use power-driven tampers or agitators unless they are specifically designed for the application, in order to ensure that the watertight integrity of the raceways is maintained.
6. Generally, place an entire concrete envelope in one continuous pour. Where more than one pour is necessary, terminate each pour in a sloped plane and insert 3/4-inch reinforcing rod dowels extending into the slurry 18" minimum on each side of the joint. Obtain Engineer's approval for the number and location of dowels.

E. Bends:

1. Install no more than equivalent of four 90-degree bends between pull points except for medium voltage (above 600 volts) feeder conduit runs, where no more than equivalent of four 90-degree bends between pull points shall be installed, or maximum as allowed by CEC.
2. Bends in conduit 2 inches or larger for underground conduit shall have a radius or curvature of the inner edge, equal to not less than 10 times the internal diameter of the conduit unless otherwise indicated on the Drawings. Any deviations from this radius shall be approved by the Owner.
3. Bends for 600-volt cable shall have a radius of not less than five (5) times the diameter of the cable. Shielded cables rated above 600 volts shall have a bending radius of not less than 12 times the cable overall diameter. Nesting of conduits shall be made when two or more conduits are run in parallel.
4. Keep bends and offsets in conduit runs to an absolute minimum.
5. For the serving utility company feeders, make large radius bends to meet their requirements.
6. Apply heat for bends so that conduit does not distort or discolor. Use a spring mandrel to ensure that full inside diameter is maintained at all bends.
7. Changes in direction of runs exceeding a total of 10 degrees, either vertical or horizontal, shall be accomplished by long-sweep bends having a minimum radius of curvature of 25', except that manufactured bends may be used at ends of short runs of 100' or less and then only at or close to the end of run.

F. Cuts and Connections:

1. Cut conduit and duct square using saw or pipe cutter; de-burr cut ends.
2. Insert conduit and duct to shoulder of fittings; fasten securely.
3. Join nonmetallic conduit and duct using adhesive as recommended by manufacturer.
4. Wipe nonmetallic conduit and duct dry and clean before joining. Apply full even coat of adhesive to entire area inserted in fitting. Allow joint to cure for 20 minutes, minimum.

3.5 INSTALLATION - HANDHOLES AND MANHOLES

A. General:

1. Install handholes and manholes in accordance with manufacturer's written instructions, as shown on the drawings and as specified herein. Install and seal precast sections in accordance with ASTM C891.
- ~~1-2.~~ Install handholes and boxes level and plumb and with orientation and depth coordinated with connecting ducts to minimize bends and deflections required for proper entrances. Use box extension if required to match depths of ducts, and seal joint between box and extension as recommended by the manufacturer.
- ~~2-3.~~ Install handholes and manholes plumb and at general locations indicated on drawings, away from any existing or proposed underground utilities.

- ~~3-4.~~ Install manholes and handholes where shown on the drawings. Provide excavation, shoring, bracing, backfilling, grading, etc., in accordance with requirements specified elsewhere in these contract documents.
- ~~4-5.~~ Do not install manholes or handholes until final conduit grading, including field changes necessitated by underground interferences, has been determined. Set frames to final grades as required.
- ~~5-6.~~ Make installation so that raceways enter manholes or handholes at nearly right angles and as near as possible to one end of a wall, unless otherwise indicated.
- ~~6-7.~~ Install two ground rods at opposite corners of the exterior of each manhole and handhole. Connect all non-current-carrying metal parts in the manhole and any metallic raceway grounding bushings to this ground rod with No. 4/0 bare copper ground conductor and approved ground clamp and as required per CEC.
- ~~7.~~ ~~Use precast neck and shaft sections to bring manhole cover to finished elevation where required.~~
8. Install removable hardware, including pulling eyes, cable stanchions, cable arms, and insulators, as required for installation and support of cables and conductors and as indicated. Select arm lengths to be long enough to provide spare space for future cables, but short enough to preserve adequate working clearances in the enclosure.
9. Field-cut openings for ducts and conduits according to enclosure manufacturer's written instructions. Cut wall of enclosure with a tool designed for material to be cut. Size holes for terminating fittings to be used, and seal around penetrations after fittings are installed.
10. For enclosures installed in asphalt paving and concrete and subject to occasional, nondeliberate, heavy vehicle loading, form and pour a concrete ring encircling, and in contact with, enclosure and with top surface screeded to top of box cover frame. Bottom of ring shall rest on compacted earth.
 - a. Concrete: 3000 psi (20 kPa), 28-day strength, complying with Division 03 Concrete Sections with a troweled finish.
 - b. Dimensions: 10 inches wide by 12 inches deep (250 mm wide by 300 mm deep).
- ~~8. Provide concrete sump in base of each manhole.~~
- ~~9. Provide 12" deep gravel base under each manhole.~~
- ~~10. Place duct and conduit entries minimum of 6" above floor of manholes.~~

B. Elevations:

1. Manhole Roof: Install with rooftop at least 18 inches (450 mm) below finished grade.
2. Use precast neck and shaft sections to bring manhole cover to finished elevation where required.
3. Manhole Frame: In paved areas and traffic-ways, set frames flush with finished grade. Set other manhole frames 1 inch (25 mm) above finished grade.
4. Handhole Covers: In paved areas and traffic-ways, set surface flush with finished grade. Set covers of other handholes 1 inch (25 mm) above finished grade.
5. Where indicated, cast handhole cover frame integrally with handhole structure.
6. Place duct and conduit entries minimum of 6" above floor of manholes.

C. Drainage:

1. Install drains in bottom of manholes where indicated. Coordinate with drainage provisions indicated.
2. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1/2-inch (12.7-mm) sieve to No. 4 (4.75-mm) sieve and compacted to same density as adjacent undisturbed earth.
3. Provide 12" deep gravel base under each manhole.

D. Manhole Access: Circular opening in manhole roof; sized to match cover size.

1. Manholes with Fixed Ladders: Offset access opening from manhole centerlines to align with ladder.
2. Install chimney, constructed of precast concrete collars and rings to support frame and cover and to connect cover with manhole roof opening. Provide moisture-tight masonry joints and waterproof grouting for cast-iron frame to chimney.

E. Waterproofing: Apply waterproofing to exterior surfaces of manholes and handholes after concrete has cured at least three days. Waterproofing materials and installation are specified in Division 07 Sections. After ducts have been connected and grouted, and before backfilling, waterproof joints and connections and touch up abrasions and scars. Waterproof exterior of manhole chimneys after mortar has cured at least three days. Joint between manhole and chimney shall be sealed with a flexible epoxy or EPDM rubber seal.

B.F. Preparation for Pulling in Conductors:

1. Do not install crushed or deformed raceways. Avoid traps in raceways where possible. Take care to prevent the lodging of concrete, dirt, or trash in raceways, boxes, fittings and equipment during the course of construction. Make raceways entirely free of obstructions or replace them. Ream all raceways, remove burrs and clean raceway interior before introducing conductors or pull wires.
2. Immediately after installation, plug or cap all raceway ends with water-tight and dust-tight seals until the time for pulling in conductors.
3. For concrete-encased raceways, after the concrete envelope has set, pull a mandrel of a diameter approximately 1/4 inch less than the raceway inside diameter, through each raceway. Then pull a bristle brush through each raceway to remove debris.

G.G. Empty Raceways:

1. Certain raceways will have no conductors pulled in as part of the Contract. Identify with tags at each end and at any intermediate pull point the origin and destination of each such empty raceway.
2. Where a raceway has been identified with a name (number) in the Raceway Schedule, use that name on the tag in lieu of origin and destination. Provide a removable permanent cap over each end of each empty raceway. Provide a 3/8" nylon pull cord in each empty raceway.
3. Provide suitable pull string in each empty duct except sleeves and nipples.
4. For the utility company ductbanks, at the time of inspection by their representative, an appropriate length of fish tape shall be calibrated by utility company representative to attach to the mandrel and pull in the duct. Fish tape will be used by utility company for subsequent cable installation.

D.H. As Built Conduit Drawings:

1. At the completion of Contract, provide as-built conduit Drawings showing location and depth of all conduits. Measure conduit locations from permanently fixed readily discernible landmarks such as building corners, columns, manhole centerline, etc.

3.6 FIELD QUALITY CONTROL

- A. Testing: Demonstrate capability and compliance with requirements on completion of installation of underground ducts and utility structures.

- B. Grounding: Test manhole grounding to ensure electrical continuity of grounding and bonding connections. Measure and report ground resistance as specified in Division 26 Section "Grounding and Bonding for Electrical Systems."
- C. Duct Integrity: Pull aluminum or wood test mandrel through duct to prove joint integrity and test for out-of-round duct. Provide mandrel equal to 80 percent fill of the duct. If obstructions are indicated, remove obstructions and retest.
- D. Correct installations if possible and retest to demonstrate compliance. Remove and replace defective products and retest.

3.7 CLEANING

- A. Pull leather-washer-type duct cleaner, with graduated washer sizes, through full length of ducts. Follow with rubber duct swab for final cleaning and to assist in spreading lubricant throughout ducts.
- B. Clean internal surfaces of manholes, including sump. Remove foreign material.
- C. After the duct line has been completed, a brush with stiff bristles shall be pulled through each duct to make certain that no particles of earth, sand or gravel have been left in the line. (Mandrels not less than 12 inches long, having a diameter approximately 1/4 inch less than inside diameter of the duct, shall be pulled through each duct). Leave a 3/8"-inch minimum polypropylene pull rope in each duct for future use.

END OF SECTION 260543

SECTION 260553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Nameplates
2. Labels
3. Warning and Caution Signs
4. Underground-Line Warning Tape
5. Conductor and Raceway Identification

B. Related Requirements

1. Consult all other Sections, determine the extent and character of related work and properly coordinate work specified herein with that specified elsewhere to produce a complete installation.

C. Description of Work: Clearly and properly identify the complete electrical system to indicate the loads served or the function of each item of equipment connected under this work.

1. Provide conduit and cable identification as required and specified in Divisions 26, 27 and other relevant specifications.

~~2. Provide arc flash warning labels as required per Specification Section 260573 - Overcurrent Protective Device Coordination Study.~~

1.3 REFERENCES

A. Comply with the latest edition of the following applicable specifications and standards except as otherwise shown or specified.

1. ANSI A13.1 - Raceway/Piping Labeling Standard
2. ANSI Z535.4 - Product Safety Signs and Label
3. NFPA 70 - California Electrical Code (CEC), Article 110
4. OSHA 1910.144 - Safety Color Code for Marking Physical Hazards
5. OSHA 1910.145 - Specifications for Accident Prevention Signs and Tags

1.4 SUBMITTALS

- A. Submit in accordance with the requirements of Division 01 and Section 260500 - "Common Work Results for Electrical", the following items:

1. Product Data: Submit Data/catalog cuts for each product and component specified herein.
 - a. Clearly mark on each data sheet the specific item(s) being submitted and the proposed application.
 - b. Preparation instructions and recommendations.
 - c. Storage and handling requirements and recommendations
 - d. Installation instructions.
2. Shop Drawings: Submit electrical nameplate/identification schedule including list of wording, symbols, letter size, color coding, tag number, location, and function for review and approval before the nameplates are ordered and installed.
 - a. Lettering and Graphics: Coordinate names, abbreviations, colors and other designations with corresponding designations specified or indicated on the drawings.
 - b. Provide numbering, lettering, and colors as approved in submittals and as required by Code.
3. Closeout Submittals: Record actual as built locations of tagged devices and update schedules accordingly.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum five years documented experience.

1.6 COORDINATION

- A. Coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual; and with those required by codes and standards.
- B. Use consistent designations throughout Project.
- C. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- D. Coordinate installation of identifying devices with location of access panels and doors.
- E. Install identifying devices before installing acoustical ceilings and similar concealment.

1.7 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Thomas & Betts
 - 2. Brady
 - 3. Kroy
 - 4. Merlin
 - 5. Or Equal
- B. All materials/products shall meet or exceed the component characteristics described in this section.
- C. For each identification type, provide all products from same manufacturer with same text, style, color, shape, and other identification features.

2.2 NAMEPLATES

- A. Provide laminated, engraved plastic nameplates with $\frac{3}{8}$ inch high letters for all switchgear, switchboards, motor control centers, disconnect switches, transfer switches, panelboards, signal system equipment cabinets, and terminal cabinets.
 - 1. Provide similar nameplates with $\frac{3}{8}$ " high letters for transformers, time switches, individually mounted breakers, switches and controls, switchboards, and motor center branch devices.
 - 2. Refer to single line diagrams and schedules for actual designations and circuit numbers that apply to this project.
- B. Size: $\frac{1}{16}$ " minimum thickness for signs up to 20 square inches, or 8" in length; $\frac{1}{8}$ " thick for larger sizes.
- C. Content: The nameplates used for equipment shall provide the minimum information as described below:
 - 1. Line 1: Equipment designation
 - 2. Line 2: Primary voltage, phase, number of wires. In addition, include KVA rating for transformers, kW rating for generators, and amperes for switchgear, Automatic Transfer Switches, and panelboards.
 - 3. Line 3: Source equipment "Fed From". For Transfer Switch, indicate normal and emergency source equipment. For equipment fed from a transformer, indicate the source with transformer name in parenthesis.
 - 4. Line 4: where applicable, indicate priority level for Automatic Transfer Switch.
- D. Color coding: The nameplates for different voltages and systems shall be as follows:
 - 1. 120 through 240V - Black letters on white label
 - 2. 277 through 600V - Brown letters on white label
 - 3. Over 600V - Black letters on orange label
 - 4. Emergency System - White letters on red label
 - 5. Comm./Signal Systems - White letters on black label. Identify system & voltage
 - 6. Build. Control System - White letters on green label
- E. Mounting: The nameplates shall be furnished with pre-punched mechanical fastener mounting holes.

- F. ~~Attach~~ nameplates to equipment with sheet metal screws. Adhesive mounted nameplates are not acceptable.
- G. Mount panelboard nameplates behind panel door in public areas and on panel face in equipment rooms.
 - 1. Attach nameplates to equipment with sheet metal screws. Adhesive mounted nameplates are not acceptable.
 - 2. Mount panelboard nameplates behind panel door in public areas and on panel face in equipment rooms.

2.3 LABELS

- A. Provide label, in addition to UL label, for each switchgear, switchboard, panelboard, transfer switch, and motor control center indicating the short circuit rating of the gear as constructed and the minimum rating of devices allowable.
- B. At all 120V outlet locations, provide labels with panel and circuit information using a P-touch or similar label maker with minimum 1/2" tape. For normal power, label shall be black letters on white tape. For emergency power, label shall be white letters on red tape. All outlets provided as part of furniture systems shall be labeled as well.
- C. At all fusible devices, either individually mounted or part of gear, provide a label (as supplied by fuse manufacturer) or nameplate inside each switch cover, indicating specific type of fuse required for replacement.
- D. At all equipment with dedicated circuits, label with panel circuit (first line) and equipment name (second line).

2.4 WARNING AND CAUTION SIGNS

- A. Conform to the latest edition of the CEC. Provide No. 18 AWG steel, white porcelain enameled signs with 1" high letters to read "DANGER! – HIGH VOLTAGE, AUTHORIZED PERSONNEL ONLY!"
 - 1. Provide similar signs with 1" high black letters in all electrical and signal rooms and closets reading "ELECTRICAL (or SIGNAL) ROOM – NO STORAGE PERMITTED".
 - 2. Post on doors or entries to all rooms or areas containing equipment rated over 600V and on front of such equipment enclosures.

2.5 UNDERGROUND-LINE WARNING TAPE

- A. Provide continuous underground plastic line marker/warning tape for underground raceways and ductbanks.
 - 1. The tape shall be marked "Caution Buried Electric Line" for low voltage and "Danger High Voltage Line" for medium voltage.
 - 2. The tape shall be marked "Caution Buried Signal Line" for signal systems, and "Caution Buried Communication Line" for communication lines.
 - 3. Where multiple lines are installed in a common trench or concrete envelope do not exceed an overall width of 16", install a single line marker.

- B. Provide suitable warning tapes to identify and locate underground electrical and communications utility lines. Provide Non-Detectable warning tape unless noted otherwise in contract documents.
- C. Non-Detectable Underground Warning Tape:
 - 1. Description: Color-coded tape designed to be buried above metallic underground piping or cables to warn of utility lines. Formulated to resist degradation due to acidic or alkaline soils.
 - 2. Dimension: 6-inch wide.
 - 3. Material: 4 mil plastic film with stock and custom legends.
 - 4. -Conforms to the American Public Works Association (APWA) Standards.
- D. Detectable Underground Warning Tape:
 - 1. Description: Detectable warning tape allows for the location of buried, non-metallic pipes. Printed tape is formulated for extended use underground and is resistant to acids, alkalis and other destructive agents found in soil. Imprinted message is "encased" to prevent ink deterioration.
 - 2. Dimension: 6-inch wide.
 - 3. Material: 4 mil foil tape with stock and custom legends

2.6 CONDUCTOR AND RACEWAY IDENTIFICATION

- A. Identify all branch circuit system conductors with pre-marked self-adhesive, wrap around cloth wire markers, indicating circuit number and name of panel, cabinet, etc, or origin, at panelboards, motor control centers, switchboards, isolated power panels, terminal cabinets, wireways, junction boxes and at all outlet boxes containing more than one neutral wire.
- B. Tag feeders at panels, switchboards, pull boxes, manholes and other accessible enclosures, indicating source, voltage, circuit number, and conductor ampere rating. Tags to be readily readable after installation.
 - 1. In exterior or wet locations, and for medium voltage conductors in all locations, provide 1½" diameter brass discs engraved or embossed with 3/16" minimum high letters and tied with No. 16 AWG galvanized wire.
 - 2. In interior dry locations, provide metal or laminated plastic discs as above, attached with nylon cord.
 - 3. Identify medium voltage conductors with phase and circuit number.
- C. Tag exposed ends of conduit stubs indicating system, name of panel, switchboard, etc., of origin and conduit size.
- D. Provide, above underground conduits stubbed for future use, engraved flush bronze marker anchored in 4" square by 12" deep concrete block, flush with grade, indicating system, conduit size and point of origin.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Thoroughly examine site conditions for acceptance of identification device installation to verify conformance with manufacturer and specification tolerances. Do not commence with installation until all conditions are made satisfactory.

3.2 PREPARATION

- A. Apply identification devices to surfaces that require finish after completing finish work.
 - 1. Install identifying devices after completion of coverings and painting.
 - 2. Completely and thoroughly clean surfaces prior to installation.
- B. For labels that are installed using pressure-sensitive adhesives, clean conduit and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, and paints.
- C. For markers that are pre-coiled or strap-on type and do not adhere directly to the conduit, no surface preparation is necessary.

3.3 INSTALLATION

- A. Verify identity of each item before installing identification products.
- B. Secure nameplates to equipment fronts using adhesive. Use weatherproof adhesive for outdoor installation. Do not use tape for nameplates or legend plates.
 - 1. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.
 - 2. Placement: Install nameplates, labels, signs, and etc. parallel to equipment/device lines.
- C. Lettering, Colors, and Graphics: Coordinate names, abbreviations, colors, and other designations with corresponding designations. Use consistent designations throughout project based on the Owner electrical equipment numbering, and identification scheme included in this section.
- D. Color Coded Raceways: Junction Boxes for Fire Alarm System shall be red.
- E. Circuit Identification Labels on all Receptacles:
 - 1. Engraved.
- F. Conduit installed below grade shall have underground warning tape installed at a minimum of 12 inches above the conduit or top layer of conduits in a duct bank.
- G. Color-Coding of Secondary Phase Conductors: Use the following colors for service feeder and branch-circuit phase conductors. Wiring shall be color coded, see Division 26 Section, "Low-Voltage Electrical Power Conductors and Cables". Low voltage wire markers shall be adhering, preprinted, self-laminating vinyl wrap-around strips. Wire shall be marked with circuit numbers. Panel source shall be labelled at junction boxes. Phasing shall be indicated by colored wire or tape.
- H. 208Y/120V System Conductors:
 - 1. Phase A: Black.

2. Phase B: Red.
 3. Phase C: Blue.
 4. Switch Leg: Pink or purple.
 5. Switch Traveler: Same as Hot Leg.
- I. 480Y/277V System Conductors:
1. Phase A: Brown.
 2. Phase B: Orange.
 3. Phase C: Yellow.
 4. Switch Leg: Purple or pink.
 5. Switch Traveler: Same as Hot Leg.
- J. Neutral and Ground Conductors:
1. Neutral: White or gray
 2. Ground: Green.
 3. Isolated Ground: Green with yellow strips
- K. Factory apply color the entire length of conductors, except the following field-applied, color-coding methods may be used instead of factory-coded wire for sizes larger than No. 10 AWG:
1. Colored, pressure-sensitive plastic tape in half-lapped turns for a distance of 6 inches from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Use 1-inch- wide tape in colors specified. Adjust tape bands to avoid obscuring cable identification markings.
 2. Colored cable ties applied in groups of three ties of specified color to each wire at each terminal or splice point starting 3 inches from the terminal and spaced 3 inches apart. Apply with a special tool or pliers, tighten to a snug fit, and cut off excess length.
- L. Apply identification to conductors as follows:
1. Multiple Power or Lighting Circuits in the Same Enclosure: Identify each conductor with circuit number. Use color-coding to identify circuits' voltage and phase.
 2. Multiple Control and Communication Circuits in the Same Enclosure: Identify each conductor by its system and circuit designation. Use a consistent system of tags, color-coding, or cable marking tape.
- M. Apply warning, caution, and instruction signs as follows:
1. Warnings, Cautions, and Instructions: Install to ensure safe operation and maintenance of electrical systems and of items to which they connect. Install engraved plastic-laminated instruction signs with approved legend where instructions are needed for system or equipment operation. Install metal-backed butyrate signs for outdoor items.
 2. Emergency Operation: Install engraved laminated signs with white legend on red background with minimum 3/8-inch- high lettering for emergency instructions on power transfer, load shedding, and other emergency operations.
- N. Equipment Identification Labels: Engraved plastic laminate. Install on each unit of equipment, including central or master unit of each system. This includes power, lighting, communication, signal, and alarm systems, unless units are specified with their own self-explanatory identification. Unless otherwise indicated, provide a single line of text with 1/2-inch- high lettering on 2" high label. Use black lettering on white field. Use white lettering on red field for emergency circuited equipment. -Apply labels for each unit of the following categories of

equipment using mechanical fasteners for outdoor installations ~~or and~~ adhesive type for indoors:

1. Panel boards, electrical cabinets, and enclosures.
- ~~2. Electrical switchgear and switchboards.~~
- ~~3. Electrical substations.~~
- ~~4.2.~~ Disconnect switches.
- ~~5.3.~~ Enclosed circuit breakers.
- ~~6.4.~~ Motor starters.
- ~~7.5.~~ Push-button stations.
- ~~8.6.~~ Power transfer equipment.
- ~~9.7.~~ Contactors.
- ~~10.8.~~ Transformers.
- ~~11.9.~~ Inverters.
- ~~12. Frequency converters.~~
- ~~13.10.~~ Battery racks.
- ~~14. Power-generating units.~~
- ~~15. Clock/program master equipment.~~
- ~~16. Call system master station.~~
- ~~17. TV/audio monitoring master station.~~
- ~~18.11.~~ Fire alarm master station or control panel, devices.
- ~~19.12.~~ Security-monitoring ~~master station or~~ control panel and devices.

~~Q.~~ MV Cable Tags shall be connected to cables by non-ferrous cable ties and include the following minimum information:

- ~~1. Circuit Identification based on the Owner's Numbering Scheme~~
- ~~2. Phase of each conductor by letter (A, B, C)~~
- ~~3. Phase by Color Code~~
 - ~~a. A = Yellow Tape — 1 ring~~
 - ~~b. B = Red Tape — 2 rings~~
 - ~~c. C = Blue Tape — 3 rings~~
- ~~4. Both ends' termination points of cable segment, e.g., East Sub, Cubicle 3 & MH102.~~

~~P.~~ Equipment in manholes, buildings, and substations shall be labeled with engraved nameplates having red background and white letters. The equipment ID plus cable circuit terminations shall be provided. Identify the circuit switching devices and position in addition to cable identification noted above (i.e., SF6-46, way 2; ES-4). Letters shall be ½ inch high minimum on 2 inches by 4 inch plates.

~~Q.O.~~ The numbering scheme provided by the Owner accomplishes the following:

1. Establishes a unique identifier for all system components and eliminates possible duplication.

~~R.P.~~ Low Voltage Identification

1. Equipment nameplates shall be engraved three-layer laminated plastic with white background and black letters for normal power and red background with white letters for emergency. Letters shall be ¼" minimum size. Identifications shall match plan designations and based upon the Owner's numbering scheme.
2. Legend plates for control panels and indicators shall be provided on disconnect and safety switches and indicating lights. The plates shall be die-stamped metal with mounting hole and positioning key.

3. For panel board directories provide the following:
 - a. Provide typewritten directories arranged in numerical order showing number of room in which each device is located.
 - b. Verify room numbers to be used with the Architect or Owner's representative prior to typing, since room numbers will most likely not be those shown on the drawings.
 - c. Mount directories under a clear plastic cover inside each panelboard door.

~~S-Q.~~ Telecommunication, Security, Signaling, Fire Alarm and Control Wiring:

1. Conductors Terminated or spliced shall be labeled at each end with tape markers.

END OF SECTION 260553

SECTION 262416 - PANELBOARDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Lighting and appliance branch-circuit panelboards
2. Distribution panelboards
3. Transient voltage surge suppressor panelboards

B. Related Requirements

1. Consult all other Sections, determine the extent and character of related work and properly coordinate work specified herein with that specified elsewhere to produce a complete installation.
2. Section 260553 "Identification for Electrical Systems".

C. Description of Work:

1. Provide Panelboards complete with all devices and accessories.
2. Dimensions and configurations of panelboards shall conform to the spaces allocated on the Drawings for their installation. The contractor shall include with the submittal a layout of the electrical room if it differs from construction documents for review and approval by the Owner's Representative prior to release of order.

1.3 REFERENCES

- A. Comply with the latest edition of the following applicable specifications and standards except as otherwise shown or specified.

1. FS W-P-115C - Power Distribution Panel
2. NEMA AB1 - Molded Case Circuit Breakers
- ~~3. NEMA ICS 2 - Industrial Control and Systems: Controllers, Contactors, and Overload Relays, Rated Not More Than 2000 Volts AC or 750 Volts DC~~
- ~~4.3. NEMA ICS 5 - Industrial Control and Systems: Control Circuit and Pilot Devices~~ NEMA PB1 - Panelboards
- ~~5.4. NEMA PB 1.1 - General Instructions for Proper Handling, Installation, Operation and Maintenance of Panelboards Rated 600 Volts or less~~
- ~~6.5. NEMA PB 1.2 - Application Guide for Ground-fault Protective Devices for Equipment.~~
- ~~7.6. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems~~
- ~~8.7. NFPA 70 - California Electrical Code (CEC)~~
- ~~9.8. UL 50 - Cabinet and Boxes~~

1.4 SUBMITTALS

- A. Submit in accordance with the requirements of Division 01 and Section 260500 "Common Work Results for Electrical", the following items:
1. Data/catalog cuts for each product and component specified herein, listing all physical and electrical characteristics and ratings indicating compliance with all listed standards.
 - a. Product Data: Include catalog cuts rated nameplate data, capacities, weights, dimensions, minimum clearances, installed devices and features, and performance for each type and size of Panelboard indicated.
 - b. Clearly mark on each data sheet the specific item(s) being submitted and the proposed application.
 2. Shop Drawings: Include all pertinent information as listed below, but not limited to:
 - a. Enclosure types and details for types other than NEMA 250, Type 1.
 - b. Front, plan and side view elevations with overall dimensions.
 - c. Breaker layout drawing with dimensions indicated and nameplate designation
 - d. Conduit entrance/exit locations and requirements
 - e. Bus configuration, and size per phase, neutral, and ground
 - f. Cable terminal sizes
 - g. Connections and support, including weight
 - h. Components list and layout of contactors, relays, time clocks, and etc.
 - i. Nameplate legends
 - j. Features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components
 - k. Electrical characteristics including voltage, frame size and trip rating, and withstand ratings
 3. Wiring Diagrams: Diagram power, signal, and control wiring and differentiate between manufacturer-installed and field-installed wiring.
 4. Submit manufacturer's installation instructions.
 5. Complete Bill of Material listing all components.
 6. Warranty
- B. Manufacturer Seismic Qualification Certification: Submit certification that switchboards, overcurrent protective devices, accessories, and components will withstand seismic forces defined in Division 26 Section "Vibration and Seismic Controls for Electrical Work." Include the following:
1. Basis of Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 2. The term "withstand" means "the unit will remain in place without separation of internal and external parts during a seismic event and the unit will be fully operational after the event."
 3. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 4. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- C. Qualification Data: Submit data for testing agencies indicating that they comply with qualifications specified in "Quality Assurance" Article.
- D. Field Test Reports: Submit written test reports and include the following:
1. Test procedures used.

2. Test results that comply with requirements.
 3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.
- E. Manufacturer's field service report.
- F. Panelboard Schedules: For installation in panelboards. Submit final versions after load balancing.
- G. Operation and Maintenance manuals
1. A detailed explanation of the operation of the system
 2. Instructions for routine maintenance
 3. Pictorial parts list and part numbers
 4. Telephone numbers for the authorized parts and service distributors.
 5. Final testing reports
 6. Include spare parts data listing; source and current prices of replacement parts and supplies; and recommended maintenance procedures and intervals.

1.5 SEISMIC MOUNTING

- A. Install Panelboards in accordance with the seismic requirements of the applicable California Building Code (CBC). Equipment manufacturer shall provide guidelines for the installation consistent with the CBC requirements that are based upon testing of representative equipment.

1.6 QUALITY ASSURANCE

- A. All materials, equipment and parts comprising the units specified herein shall be new.
- B. The manufacturer of the assembly shall be the manufacturer of the major components within the assembly.
- C. Contractor shall pay for the services of a qualified testing agency to perform the specified tests. The Contractor shall notify the Owner at least five (5) working days in advance of performance of work requiring testing.
1. Testing Agency shall have the experience and capability to conduct the testing indicated, that is a member company of the InterNational Electrical Testing Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.~~The testing agency shall be a member of International Electrical Testing Association and specializing in testing products specified in this section with minimum five years of documented experience.~~
 2. Testing Agency's Field Supervisor: Person currently certified by the InterNational Electrical Testing Association or the National Institute for Certification in Engineering Technologies to supervise on-site testing specified in Part 3.
 - ~~2.3.~~ The Contractor shall provide all material required for testing.
- D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in CEC (NFPA 70), Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- E. Comply with NEMA PB 1.

F. ~~OSHPD~~ HCAI Projects:

1. Provide SPDs for all emergency Panelboards for HCAI ~~(OSHPD)~~ projects.
- ~~2. Include line isolation monitoring Panelboards for operating rooms for HCAI (OSHPD) projects where indicated on drawings.~~

1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the products specified in this Section with minimum ten years documented experience.
- B. Seismic qualifications:
 1. The equipment and major components shall be suitable for and certified by actual seismic testing to meet all applicable seismic requirements of the latest applicable California Building Code (CBC) Site Classification "D".
 2. Equipment certification acceptance criteria shall be based upon the ability for the equipment to be returned to service immediately after a seismic event within the above requirements without the need for repairs.
 3. The following minimum mounting and installation guidelines shall be met, unless specifically modified by the above referenced standards:
 - a. The Contractor shall provide equipment anchorage details, coordinated with the equipment mounting provision, prepared and stamped by a licensed structural engineer in the state. Mounting recommendations shall be provided by the manufacturer based upon the above criteria to verify the seismic design of the equipment.
 - b. The equipment manufacturer shall certify that the equipment can withstand, that is, function following the seismic event, including both vertical and lateral required response spectra as specified in above codes.
 - c. The equipment manufacturer shall document the requirements necessary for proper seismic mounting of the equipment. Seismic qualification shall be considered achieved when the capability of the equipment, meets or exceeds the specified response spectra.

1.8 DELIVERY, STORAGE AND HANDLING

- A. Delivery: Equipment shall not be delivered to the site until protected storage space is available. Storage outdoors covered by rainproof material is not acceptable. Equipment damaged during shipment shall be replaced and returned to manufacturer at no additional cost to the Owner.
- B. Storage: Store in a clean, dry, ventilated space free from temperature extremes. Maintain factory wrapping or provide a heavy canvas/plastic cover to protect units from dirt, water, construction debris, and traffic. Provide heat where required to prevent condensation.
- C. Handling: Handle in accordance with NEMA PB 1.1 manufacturers written instructions. Be careful to prevent internal component damage, breakage, denting and scoring. Damaged units shall not be installed. Replace damaged units and return equipment to manufacturer.

1.9 COORDINATION

- A. Coordinate layout and installation of Panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment,

raceways, piping, and encumbrances to workspace clearance requirements.

1.10 EXTRA MATERIALS

- A. Keys: Six spares of each type of panelboard cabinet lock, keyed alike to match the Owner standard key requirements.

1.11 WARRANTY

- A. Equipment and components offered under this Section shall be covered by 1-year parts and labor warranty for malfunctions resulting from defects in materials and workmanship.
- B. Warranty shall begin upon acceptance by the Owner. Refer to Division 01 for the definition of Acceptance

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Panelboards:
 - a. Schneider Electric
 - b. Eaton
 - c. GE
 - d. Or equal.
 - 2. SPDs:
 - a. Current Technology, Inc.
 - b. Or Equal.
- B. Or Equal: Where products are specified by manufacturers name and accompanied by the term "or equal", comply with provisions in Division 01 Section "Product Requirements", Part 2 "Product Substitutions" Article. Specific procedures must be followed before use of an unnamed product or manufacturer.
- C. All Electrical Equipment provided shall be product of single manufacturer.

2.2 GENERAL

- A. Lighting, power and distribution panelboards shall be three phase, four wire, S/N 208Y/120V or 480Y/277V, as indicated on the Drawings.
 - 1. All panelboards shall be equipped with minimum ~~225~~-125 amperes busing and a minimum ~~225A~~-100A frame main circuit breaker or as indicated on drawings.
 - 2. Where indicated on drawings, provide an isolated ground bus bar for 208Y/120V panelboards in addition to regular ground bus bar.
- B. Provide panelboard cabinets flush or surface-mounted as indicated on the Drawings. Minimum

size: 20" wide by 5-3/4" deep unless noted otherwise on the Drawings.

- C. Provide permanent type plastic or metal numbers for each branch breaker on adjacent trim removable only from back of trim, to identify the branch circuit breakers.
- D. Provide panelboards with index/directory card that is fitted in a transparent protective cover, mounted in metal frame, inside panelboard door.
- E. Provide zinc chromate primer factory finish on the exposed trim of all flush mounted panels in corridors, offices and other public spaces.
- F. The main circuit breaker shall be installed vertically on the top or the bottom of panel. Installing the main at branch circuit location is not acceptable.
- G. Where contactors, time switches, metering, and control devices are specified or indicated to be installed within panelboard cabinets, a separate compartment and door shall be provided at the top of the cabinet for such devices. The door shall be sized as required to permit removal of the contactor and other devices intact. Gutters shall be provided to the sides and top of the compartment.

2.3 RATINGS

- A. UL label indicating series-connected rating with integral or remote upstream devices. Include size and type of upstream device allowable, branch devices allowable, and UL series-connected short-circuit rating.
- B. Fully rated to interrupt symmetrical short-circuit current available at terminals.

2.4 CONSTRUCTION

- A. The interiors of all panelboards shall be completely factory assembled. They shall be designed such that switching and protective devices can be replaced without disturbing adjacent units and without removing the main bus connectors.
- B. Trims for branch circuit panelboards shall be supplied with a hinged door over all circuit breaker handles.
 - 1. Distribution panelboard trims shall cover all live parts. Switching device handles shall be accessible.
 - 2. Doors in panelboard trims shall not uncover any live parts. Doors shall have a semi flush cylinder lock and catch assembly.
 - 3. Door-in-door trim shall be provided. Both hinged trim and trim door shall utilize three point latching. No tools shall be required to install or remove trim. Trim shall be equipped with a door-actuated trim locking tab. Equip locking tab with provision for a screw such that removal of trim requires a tool, at the owner's option.
 - 4. Panelboards with a height greater than 3 feet shall have three trim bolts each side.
 - 5. Surface trims shall be same height and width as box. Flush trims shall overlap the box by 3/4 of an inch on all sides.
 - 6. Installation shall be tamper resistant with no exposed hardware on the panelboard trim.
- C. Enclosures: Flush- and surface-mounted cabinets. NEMA PB 1, Type 1, to meet environmental conditions at installed location.

1. Outdoor Locations: NEMA 250, Type 3R.
 2. Kitchen Areas: NEMA 250, Type 4X, stainless steel.
 3. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.
 4. Hazardous Areas Indicated on Drawings: NEMA 250, Type 7C.
- D. Main and Neutral Lugs: Compression type suitable for use with conductor material.
- E. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment ground conductors; bonded to box. When isolated grounds are required, provide ground bus insulated from box.
- F. Future Devices: Mounting brackets, bus connections, and necessary appurtenances required for future installation of devices.
- G. Extra-Capacity Neutral Bus: Neutral bus rated 200 percent of phase bus and UL listed as suitable for nonlinear loads.
- H. Split Bus: Vertical buses divided into individual vertical sections.
- I. Gutter Barrier: Arrange to isolate individual panel sections.
- J. Column-Type Panelboards: Narrow gutter extension, with cover, to overhead junction box equipped with ground and neutral terminal buses.
- K. A directory card (panelboard schedule) with a clear plastic cover shall be supplied and mounted on the inside of each door.
1. The Contractor shall prepare a neatly typewritten schedule with the number or name of the room or area or the machine served by each panel board circuit.
 2. The room numbers or name used shall be determined at the site and shall not necessarily be those used on the Drawings.
 3. The schedule shall also indicate the panel designation, voltage and phase, the building and distribution panel or switchboard from which fed.
- L. All locks shall be keyed alike.

2.5 BUS

- A. Bus bars shall be copper (hard drawn with 98% conductivity) sized in accordance with UL standards to limit temperature rise on any current carrying part to a maximum of 65°C above an ambient of 40°C maximum.
- B. Full-size (100%-rated) insulated neutral bars shall be included for panelboards shown with neutral. Bus bar taps for panels with single-pole branches shall be arranged for sequence phasing of the branch circuit devices.
1. Neutral busing shall have a suitable lug for each outgoing feeder requiring a neutral connection.
 2. 200%-rated neutrals shall be supplied for panels designated on drawings with oversized neutral conductors
- C. A ground bus shall be included in all panels.
- D. All 208Y/120V panelboards serving non-linear loads shall be furnished with isolated ground bus.

2.6 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

- A. Branch Overcurrent Protective Devices: Bolt-on type circuit breakers, replaceable without disturbing adjacent units.
 - 1. Breakers shall be heavy-duty, quick-make, quick-break, single- and multi-pole circuit breakers of the types specified herein.
 - 2. Breakers shall be equipped with toggle handles that indicate when unit has tripped.
- B. Circuit breakers shall be thermal-magnetic type with common type handle for all multiple pole circuit breakers. Circuit breakers shall be minimum 100A frame and through 100A trip sizes shall take up the same pole spacing. Circuit breakers shall be UL listed as type SWD for lighting circuits.
- C. Circuit breaker handle locks shall be provided for all circuits that supply exit signs, emergency lights, electrical discharge lamp, energy management, and control system (EMCS) panels and fire alarm panels.
- D. Circuit breakers serving "Fire Alarm Control Panel(s)" and related equipment shall be red in color.
- E. Doors: Front mounted with concealed hinges; secured with flush latch with tumbler lock; keyed alike.

2.7 DISTRIBUTION PANELBOARDS

- A. Doors: Front mounted, except omit in fused-switch panelboards; secured with vault-type latch with tumbler lock; keyed alike.
- B. Main Overcurrent Protective Devices: Circuit breaker. Where indicated, provide circuit breakers UL listed for application at 100% of their continuous ampere rating in their intended enclosure.
- C. Branch overcurrent protective devices shall be one of the following:
 - 1. For Circuit-Breaker Frame Sizes 125 A and Smaller: Bolt-on circuit breakers with Copper terminals.
 - 2. For Circuit-Breaker Frame Sizes Larger Than 125 A: Bolt-on circuit breakers with Copper terminals; plug-in circuit breakers where individual positive-locking device requires mechanical release for removal.
 - 3. Fused switches.
- D. Provide shunt trips, bell alarms, and auxiliary switches as shown on the contract drawings.

2.8 SPD PANELBOARDS

- A. Doors: Front mounted; secured with vault-type latch with tumbler lock; keyed alike. Manufacturer's standard enamel finish over corrosion-resistant treatment or primer coat.
- B. Main Overcurrent Devices: Thermal-magnetic circuit breaker with Copper terminals.
- C. Branch Overcurrent Protective Devices: Bolt-on circuit breakers with Copper terminals.

- D. Bus: Copper phase and neutral buses; 200% capacity neutral bus.
- E. SPDs shall meet IEEE C62.41, remote mounted, solid-state, parallel-connected, sine-wave tracking suppression and filtering modules Minimum single-impulse current rating shall be as follows:
 - 1. Line to Neutral: 100,000 A
 - 2. Line to Ground: 100,000 A
 - 3. Neutral to Ground: 50,000 A
- F. Protection modes shall be as follows:
 - 1. Line to Neutral
 - 2. Line to Ground
 - 3. Neutral to Ground
- G. EMI/RFI Noise Attenuation Using 50-ohm Insertion Loss Test: 55 dB at 100 kHz.
- H. Category C combination wave clamping voltage shall not exceed 600 V, line to neutral and line to ground on 120/208 V systems and 1000 V, line to neutral and line to ground on 277/480 V systems.
- I. UL 1449 clamping levels shall not exceed 400 V, line to neutral and line to ground on 120/208 V systems and 800 V, line to neutral and line to ground on 277/480 V systems.
- J. Withstand Capabilities: 3000 Category C surges with less than 5% change in clamping.
- K. Accessories shall include the following:
 - 1. Form-C contacts, one normally open and one normally closed, for remote monitoring of system operation.
 - 2. Contacts to reverse position on failure of any surge diversion module.
 - 3. Audible alarm activated on failure of any surge diversion module.
 - 4. Six-digit transient-counter set to totalize transient surges that deviate from the sine-wave envelope by more than 125 V.

2.9 OVERCURRENT PROTECTIVE DEVICES

- A. Molded-Case Circuit Breaker: Comply with UL 489, NEMA AB 1, and NEMA AB 3, fully rated with interrupting capacity to comply with available fault currents.~~NEMA AB 1, with interrupting capacity to meet available fault currents.~~
- ~~A.~~ B. Refer to Section 262816 "Enclosed Switches and Circuit Breakers".
 - ~~1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads, and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 225 A and larger.~~
 - ~~2. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.~~
 - ~~3. Electronic Trip Unit Circuit Breakers: RMS sensing; field-replaceable rating plug; with the following field-adjustable settings:~~
 - ~~a. Instantaneous trip.~~
 - ~~b. Long and short-time pickup levels.~~
 - ~~c. Long and short-time time adjustments.~~

- ~~d. — Ground-fault pickup level, time delay, and I2t response~~
 - ~~4. — Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller; let-through ratings less than NEMA FU 1, RK-5.~~
 - ~~5. — Integrally Fused Circuit Breakers: Thermal-magnetic trip element with integral limiter-style fuse listed for use with circuit breaker; trip activation on fuse opening or on opening of fuse compartment door.~~
 - ~~6. — GFCI Circuit Breakers: Single and two-pole configurations with 5 mA trip sensitivity.~~
 - ~~B. — Molded-Case Circuit-Breaker Features and Accessories: Standard frame sizes, trip ratings, and number of poles.~~
 - ~~1. — Lugs: Compression style, suitable for number, size, trip ratings, and material of conductors.~~
 - ~~2. — Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HACR for heating, air-conditioning, and refrigerating equipment.~~
 - ~~3. — Ground-Fault Protection: Integrally mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator.~~
 - ~~4. — Communication Capability: Circuit-breaker-mounted communication module with functions and features compatible with power monitoring and control system.~~
 - ~~5. — Shunt Trip: 120V trip coil energized from separate circuit, set to trip at 75 percent of rated voltage.~~
 - ~~6. — Undervoltage Trip: Set to operate at 35 to 75 percent of rated voltage without intentional time delay.~~
 - ~~7. — Auxiliary Switch: Two SPDT switches with "a" and "b" contacts; "a" contacts mimic circuit-breaker contacts, "b" contacts operate in reverse of circuit-breaker contacts.~~
 - ~~8. — Key Interlock Kit: Externally mounted to prohibit circuit-breaker operation; key shall be removable only when circuit breaker is in off position.~~
 - ~~9. — Zone-Selective Interlocking: Integral with electronic trip unit; for interlocking ground-fault protection function.~~
 - ~~C. — Fused Switch: NEMA KS 1, Type HD; clips to accommodate specified fuses; lockable handle.~~

2.10 — CONTROLLERS

- ~~A. — Motor Controllers: NEMA ICS 2, Class A combination controller equipped for panelboard mounting and including the following accessories:~~
 - ~~1. — Individual control power transformers.~~
 - ~~2. — Fuses for control power transformers.~~
 - ~~3. — Bimetallic element overload relay.~~
 - ~~4. — Melting-alloy overload relay.~~
 - ~~5. — Indicating lights.~~
 - ~~6. — Seal-in contact.~~
 - ~~7. — 2 convertible auxiliary contacts.~~
 - ~~8. — Push buttons.~~
 - ~~9. — Selector switches.~~
- ~~B. — Contactors: NEMA ICS 2, Class A combination controller equipped for panelboard mounting and including the following accessories:~~
 - ~~1. — Individual control power transformers.~~
 - ~~2. — Fuses for control power transformers.~~
 - ~~3. — Indicating lights.~~

- ~~4. Seal-in contact.~~
- ~~5. 2 convertible auxiliary contacts.~~
- ~~6. Push buttons.~~
- ~~7. Selector switches.~~

~~C. Controller Disconnect Switches: Fused switch and interlocked with controller.~~

- ~~1. Auxiliary Contacts: Integral with disconnect switches to de-energize external control power source.~~

~~D. Contactors in Main Bus: NEMA ICS 2, Class A, mechanically held general-purpose controller.~~

- ~~1. Control Power Source: Control power transformer, with fused primary and secondary terminals, connected to main bus ahead of contactor connection.~~
- ~~2. Control Power Source: 120V branch circuit.~~

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Thoroughly examine site conditions for acceptance of Panelboard installation to verify conformance with manufacturer and specification tolerances. Do not commence with installation until all conditions are made satisfactory.
- B. Examine elements and surfaces to receive Panelboards for compliance with installation tolerances and other conditions affecting performance.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install panelboards in accordance with manufacturer's written instructions, as shown on the drawings and as specified herein.
- B. Panelboards shall be anchored and braced to withstand seismic forces as required per code.
- C. Set panels plumb and symmetrical with building lines in conformance with PB1.1. Furnish and install all construction channel bolts, angles, etc., required to mount the equipment furnished under this Section.
- D. Mounting height shall be 6'-0" to top of panelboard or 6'-6" to the centerline of highest mounted breaker handle.
- E. Mounting: Plumb and rigid without distortion of box. Mount recessed panelboards with fronts uniformly flush with wall finish.
- F. Circuit Directory: Create a directory to indicate installed circuit loads after balancing panelboard loads. Obtain approval before installing. Use a computer or typewriter to create directory; handwritten directories are not acceptable.
- G. Install filler plates in unused spaces.

- H. Provision for Future Circuits at Flush Panelboards: Stub four 1-inch empty conduits from panelboard into accessible ceiling space or space designated to be ceiling space in the future. Stub four 1-inch empty conduits into raised floor space or below slab not on grade.
- I. Panelboards located in mechanical areas shall have weatherproof gaskets on trims and doors.
- J. Panelboards installed in damp locations, on exterior walls of basements or areas exposed to moisture shall be mounted with a minimum 1" of gap between back of the cabinet and the wall or other supports.
- K. Panelboard cabinets shall be rigidly supported in place independent of the conduits with minimum two rows of steel channels.
- L. Check and tighten all bolts and connections with a torque wrench using manufacturer's recommended values.
- M. Wiring in Panelboard Gutters: Arrange conductors into groups and bundle and wrap with wire ties after completing load balancing.
 - 1. "Train" interior wiring; bundle and clamp, using specified plastic wire wraps specified under Section 260519 — "Low Voltage Electrical Power Conductors and Cables".
- N. Provide a neatly typewritten panel schedule as described in Part 2.
- O. Provide mounting hardware brackets, busbar drillings and filler pieces for all unused spaces.
- P. Conduits terminating in concentric, eccentric or oversized knockouts at panelboards shall have ground bushings and bonding jumpers installed interconnecting all such conduits and the panelboard.
- Q. Provide two 1" and two 3/4" spare conduits stubbed-out of flush mounted panelboards to the nearest accessible ceiling space or other accessible location and cap for future use.
- R. Provide close up plugs in all unused openings in the cabinet.
- S. Install nameplates at the front of each panelboard.

3.3 IDENTIFICATION

- A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs as specified in Division 26 Section "Identification for Electrical Systems."
- B. Panelboard Nameplates: Label each panelboard with laminated-plastic nameplate mounted with corrosion-resistant screws.

3.4 CONNECTIONS

- A. Install equipment grounding connections for panelboards with ground continuity to main electrical ground bus.
- B. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A.

3.5 FIELD QUALITY CONTROL

- A. Field inspection and testing shall be performed under provisions of Section 26-05-~~63-00~~ – ~~“Testing of Electrical Systems”~~[Common Work Results for Electrical](#)” and as described here.
- B. Independent Testing: Arrange and pay for the services of an independent testing agency to perform all quality control electrical testing, calibration and inspection required herein. Testing agencies objectives shall be to:
 - 1. Assure panelboard installation conforms to specified requirements and operates within specified tolerances.
 - 2. Field test and inspect to insure operation in accordance with manufacturer's recommendations and specifications.
 - 3. Prepare final test report including results, observations, failures, adjustments and remedies.
 - 4. Apply label on panelboard upon satisfactory completion of tests and results.
 - 5. Verify ratings and settings and make final adjustments to breakers in accordance with Coordination Study.
- C. Supply a suitable and stable source of electrical power to each test site. The testing agency shall specify the specific power requirements.
- D. Testing of overcurrent protective devices shall be done only after all devices are installed and system is energized.
- E. All tests shall be performed in compliance with NETA ATS standard.
- F. Pre-functional Testing:
 - 1. Provide testing agency with contract documents and manufacturer instructions for installation and testing.
 - 2. Visual and mechanical inspection:
 - a. Inspect for physical damage, defects alignment and fit.
 - b. Compare nameplate information and connections to contract documents.
 - c. Check tightness of all control and power connections.
 - 3. Electrical Tests:
 - a. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
 - b. Test continuity of each circuit.
 - c. Test each panel for proper grounding,
 - d. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
- G. In the event that the system fails to function properly during the testing, as a result of inadequate pretesting or preparation, the contractor shall bear all costs incurred by the necessity for retesting including test equipment, transportation, subsistence and the Owner's hourly rate.
- H. Replace at no additional cost to the owner all devices that are found defective or do not operate within factory specified tolerances.
- I. Submit the testing agency's final report for review prior to project closeout and final acceptance by the owner. Test report shall indicate test dates, devices tested, results, observation, deficiencies and remedies. Test report shall be included in the operation and maintenance

manuals.

3.6 FIELD ADJUSTMENTS

- A. Measure steady state load currents at each panelboard feeder; rearrange circuits in panelboard to balance phase loads to within 10% of each other. Maintain proper phasing for multi-wire branch circuits.
- B. Where applicable, the Contractors shall perform field adjustments of the protective devices as required to place the equipment in final operating condition. The settings shall be in accordance with the approved Overcurrent Protective Device Coordination Study. ~~per specification Section 26-05-73.~~
- C. Where applicable, necessary field settings of devices, adjustments and minor modifications to equipment to accomplish conformance with the approved Overcurrent Protective Device Coordination Study ~~per specification Section 26-05-73, shall be carried out by the Contractor at no additional cost to the owner.~~
- D. Visually inspect panelboard for rust and corrosion. If signs of rust and corrosion are present, restore or replace panelboard to new condition.
- E. Replace panel pieces, doors, or trim exhibiting dents, bends, warps or poor fit that may impede ready access, security or integrity.
- F. All surfaces of surface mounting cabinets and fronts shall be given one coat of metal primer and a finish coat of baked on gray enamel.
- ~~G. Apply Arc Flash label as calculated and printed under the Arc Flash analysis study, refer to Section 26-05-73 "Overcurrent Protective Device Coordination Study".~~

3.7 CLEANING

- A. Upon completion of project prior to final acceptance the contractor shall thoroughly clean both the interior and exterior of switchboards per manufacturers approved methods and materials. Remove paint splatters and other spots, dirt, and debris.
- B. Touch-up paint any marks, blemishes, or other finish damage suffered during installation.

3.8 EQUIPMENT ENERGIZING

- A. Clean and test equipment before energizing.
- B. Maintain locked, clean and dust free premise for energized equipment.

3.9 TRAINING

- A. The bid shall include the cost for the services of a factory authorized service representative to train the Owner's maintenance personnel on the procedures and schedules for settings of relays and protection devices, startup, shutdown, trouble shooting, servicing and preventive maintenance of all equipment. Included below:

1. The instruction shall be dedicated and intensive and shall be provided by competent instructors fully familiar with the equipment.
2. Contractor shall coordinate with the Owner and schedule training with a minimum of 14 working days advance notice.
3. The training shall include professional video recording as outlined in the contract and Division 01.
4. The instructions shall be presented in an 8-hour session. The training session for Switchboards, Low-Voltage Transformers, MCCs, Panelboards and Electricity Metering can be combined with the Owner's prior approval to a single session.
5. The Field Service engineer shall provide Instructions on the operation and maintenance of the equipment and auxiliary devices.
6. The Owner shall provide a suitable classroom environment on site for the instruction session.
7. Provide both classroom training and hands-on equipment operation covering the following:
 - a. Safety precautions
 - b. Features and construction of equipment and accessories
 - c. Routine inspection, test and maintenance procedures
 - d. Routine cleaning
 - e. Features, operation and maintenance of protective devices where applicable
 - f. Interpretation of readings of indicating and alarm devices where applicable
 - g. Review operating and maintenance manuals
 - h. Review troubleshooting operations

END OF SECTION 262416

SECTION 262726 - WIRING DEVICES

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 the following:

1. Single and duplex receptacles, ground-fault circuit interrupters, integral surge suppression units, and isolated-ground receptacles.
2. Single- and double-pole snap switches and dimmer switches.
3. Device wall plates.
4. Pin and sleeve connectors and receptacles.
5. Floor service outlets, poke-through assemblies, service poles, and multioutlet assemblies.

B. Related Sections:

1. Consult all other Sections, determine the extent and character of related work and properly coordinate work specified herein with that specified elsewhere to produce a complete installation.
- ~~5-2. Section 260553 "Identification for Electrical Systems".~~

1.3 ~~DEFINITIONS~~ REFERENCES

- A. Comply with the latest edition of the following applicable specifications and standards except as otherwise shown or specified. ~~EMI: Electromagnetic interference.~~

1. NEMA WD 1 - General Purpose Wiring Devices
2. NEMA WD 5 - Specific-Purpose Wiring Devices
3. NEMA WD 6 - Wiring Device Configurations
4. WS-896-E - Federal Specification
5. WC-596-F - Federal Specification
6. UL 498 - Attachment Plugs and Receptacles
7. UL 514A - Metallic Outlet Boxes
8. UL 943 - Ground-Fault Circuit-Interrupters, Safety Standard
9. UL 1449 - Transient Voltage Surge Suppressors

~~A. _____~~

~~B. GFCI: Ground-fault circuit interrupter.~~

~~C. RFI: Radio-frequency interference.~~

~~D. TVSS: Transient-voltage surge suppressor.~~

~~E. UTP: Unshielded twisted pair.~~

1.4 SUBMITTALS

A. Submit in accordance with the requirements of Division 01 and Section 260500 "Common Work Results for Electrical", the following items:~~Product Data: For each type of product indicated.~~

1. Data/catalog cuts for each product and component specified herein, listing all physical and electrical characteristics and ratings indicating compliance with all listed standards
2. Provide list of available color finishes/samples for Owner/Architect to select from.
3. Submit manufacturer's installation instructions.
4. Submit one sample of each type of device and cover plate.
- ~~A.5.~~ Where engraved device coverplates are noted on the drawings or in the specifications, conform to the requirements of Section 260553 "Identification for Electrical Systems".

B. Field quality-control test reports.

1.5 QUALITY ASSURANCE

A. All materials, devices and parts comprising the units specified herein shall be new.

~~A.B.~~ Source Limitations: Obtain each type of wiring device through one source from a single manufacturer.

~~B.C.~~ Electrical Components, Devices, and Accessories: Listed and labeled as defined in CEC (NFPA 70), Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

~~C.D.~~ Comply with CEC (NFPA 70).

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Toggle switches and receptacles shall be of the same manufacturer. Only one manufacturer shall be used in a building. Subject to compliance with requirements, provide products by one of the following:

1. Wiring Devices:

~~a. Bryant Electric, Inc./Hubbell Subsidiary.~~

~~b.a.~~ Hubbell Incorporated; Wiring Device-Kellems.

~~c.b.~~ Leviton Mfg. Company Inc.

~~d.c.~~ Pass & Seymour/Legrand; Wiring Devices Div.

~~e.d.~~ Or equal.

2. Wiring Devices for Hazardous (Classified) Locations:

a. Crouse-Hinds/Cooper Industries, Inc.; Arrow Hart Wiring Devices.

b. EGS/Appleton Electric Company.

c. Killark Electric Manufacturing Co./Hubbell Incorporated.

d. Or equal.

3. Multioutlet Assemblies:

a. Hubbell Incorporated; Wiring Device-Kellems.

- b. Wiremold Company (The).
 - c. Or equal.
4. Poke-Through, Floor Service Outlets and Telephone/Power Poles:
- a. Hubbell Incorporated; Wiring Device-Kellems.
 - b. ~~Pass & Seymour~~/Legrand; Wiring Devices Div.
 - c. Square D/Groupe Schneider NA.
 - d. Thomas & Betts Corporation.
 - e. Wiremold Company (The).
 - f. Or equal.
- B. Or Equal: Where products are specified by manufacturers name and accompanied by the term "or equal", comply with provisions in Division 01 Section "Product Requirements", Part 2 "Product Substitutions" Article. Specific procedures must be followed before use of an unnamed product or manufacturer.

2.2 GENERAL

- A. All devices shall conform to National Electrical Manufacturer's Association (NEMA) standards and shall be Underwriters Laboratories, Inc., (UL) listed and labeled and shall be "Specification Grade" Industrial/heavy-duty type, meeting the requirements of Federal Specification WC-596-F for receptacle, and meeting the requirements of Federal Specification WS-896-E, for switches.
- B. Color:
- 1. Devices on normal power shall be white unless otherwise noted.
 - 2. Devices on emergency power shall be red.

2.2.3 RECEPTACLES

- A. Straight-Blade-Type Receptacles: Comply with NEMA WD 1, NEMA WD 5, NEMA WD 6, DSCC W-C-596G, and UL 498, ~~"Decora or style line" type in white color.~~
- 1. Provide "Style line Decorator" type receptacles in offices and public areas unless a different type of receptacle is specified or indicated on drawings.
 - a. Use Hubbell # HBL2182 series.
 - 2. Provide Hospital Grade Receptacles in ORs, Patient care areas, and for Helistop.
 - a. Use Extra Heavy-Duty Max by Hubbell # HBL8300 series.
 - 3. Provide Hospital Grade Ground Fault Circuit Interrupting (GFCI) Tamper-Resistant and Weather Resistant Receptacles in all areas within 6' of Sinks, exterior locations and as noted or indicated on drawings.
 - a. Patient Care areas: Use Hubbell # GFTWRST83 series.
 - b. Non-Patient Care areas: Use Snap-Connect GFCI LED by Hubbell # GFTWRST83SNAP series.
 - ~~A-c.~~ Helistop: Use Hubbell # GFTWRST83 series.
- B. Provide NEMA 5-20R, specification grade as noted herein, 20 Amp, 125 VAC, 2 pole, 3 wire grounding type receptacles.
- C. General Purpose Duplex Receptacles:
- 1. Receptacles shall be self-grounding, back wired grounding with binding head staked terminal screws.

2. Receptacles shall have a deep treaded brass center rivet to hold cover plates without rotating or stripping.
3. The grounding contact shall be one-piece brass and internally connected to the frame with ground terminal for external ground.

D. Controlled (Switched) Receptacles:

1. The Controlled receptacles shall be in compliance with NEC, permanently marked as "Controlled" and listed for use with automatic control systems.
2. The entire receptacle shall be controlled. Half controlled receptacles are not acceptable.

E. Ground Fault Circuit Interrupting (GFCI) Receptacles:

1. The GFCI receptacles shall be in conformance with UL 943 and equipped with integral solid-state sensing and signaling circuitry capable of detecting and interrupting a maximum 5 milli-amp line-to-ground fault current in approximately 0.025 second.
2. A power denial feature shall be included to disconnect power to the receptacle if critical components are damaged and GFCI protection is lost.
3. The GFCI receptacles shall include a solid green LED to indicate power to the face, a solid red LED for a tripped condition and a flashing red LED to indicate end of life when the unit should be replaced.
4. Device shall provide ground fault indicator, no power to face if reverse wired. Shall be equipped with trip indication, manual reset and test mechanisms.

F. Industrial Heavy-Duty Pin and Sleeve Devices: Comply with IEC 309-1.

~~B.G.~~ Locking Type Receptacles: Heavy-Duty grade.

~~C.~~ Straight-Blade Receptacles:

- ~~1. Hospital grade in patient care areas; elsewhere provide Specification grade/Institutional grade.~~

~~D.H.~~ Special purpose receptacles: Provide specification grade devices with the NEMA configuration, voltage, and current rating, number of poles and ground provisions as noted on the Drawings. ~~GFCI Receptacles: Straight blade, feed-through type, hospital grade / specification grade, with integral NEMA WD-6, Configuration 5-20R duplex receptacle; complying with UL 498 and UL 943. Design units for installation in a 2-3/4-inch deep outlet box without an adaptor.~~

~~E.I.~~ Industrial Heavy-Duty Pin and Sleeve Devices: Comply with IEC 309-1.

~~F.J.~~ Hazardous (Classified) Location Receptacles: Comply with NEMA FB 11.

~~2.3~~ 2.4 SWITCHES

A. Standards: Provide Heavy-Duty 120/277VAC switches that conform to NEMA WD-1 specifications.

1. Provide "Style line Decorator" type Specification Grade switches in offices and public areas, unless a different type of switch is specified or indicated on drawings. ~~Single and Double-Pole Switches: Comply with DSCC W-C-896F and UL 20. "Decora or style line" type in white color.~~
 - a. Use Snap-Connect single-pole Switch, Hubbell # SNAP2121xNA series.
 - b. Use Snap-Connect 3-way Switch, Hubbell # SNAP2123xNA series, as indicated.

2. Provide toggle type switches in utility rooms and back of house areas.
 - a. Use Snap-Connect single-pole Switch, Hubbell # SNAP1221xNA series.
 - ~~A.b.~~ Use Snap-Connect 3-way Switch, Hubbell # SNAP1223xNA series, as indicated.

B. Single- and Double-Pole Switches: Comply with DSCC W-C-896F and UL 20.

~~B.C.~~ Snap Switches: Heavy -Duty grade, quiet type.

~~C.D.~~ Dimmer Switches: Modular, full-wave, solid-state units with integral, quiet on/off switches and audible frequency and EMI/RFI filters.

1. Control: Continuously adjustable slider-; with single-pole or three-way switching to suit connections.
2. Incandescent Lamp Dimmers: Modular, 120 V, 60 Hz with continuously adjustable, or slider; single pole with soft tap or other quiet switch; EMI/RFI filter to eliminate interference; and 5-inch wire connecting leads.
3. Fluorescent Lamp Dimmer Switches: Modular; compatible with dimmer ballasts; trim potentiometer to adjust low-end dimming; dimmer-ballast combination capable of consistent dimming with low end not greater than 10% of full brightness and 1% in areas where projection equipment is utilized.
- ~~3.4.~~ LED Dimmer Switches: Modular; 0 – 10 VDC Dimmer/Sensor compatible with 3rd party LED drivers; dimmer-driver combination capable of consistent dimming with low end not greater than 1% of full brightness, with integral, quiet, continuously adjustable slide-to-off with single-pole or three-way switching. Comply with UL 1472.

2.4.2.5 WALL PLATES

A. Single and combination types to match corresponding wiring devices.

1. Plate-Securing Screws: Metal with head color to match plate finish. Minimum of two screws per outlet box gang section.
2. Provide gang type coverplates where two or more devices are installed at one location. Individual gang-able coverplates are not acceptable.

B. Material for Finished Spaces:

1. All ORs, Imaging and Patient care areas: Use non-magnetic 302/304 type stainless steel cover plate. Hubbell # SSxxx series.
2. All general areas and offices and public areas: Smooth, high-impact thermoplastic shatter resistant plates with curved corners and captive screws. Hubbell # Pxxx series.~~0.035-inch-thick, satin-finished stainless steel. When approved by the University cover plates may be non-metallic, shatter resistant nylon in lieu of stainless steel.~~
- ~~3. Material for Unfinished Spaces: Smooth, high-impact thermoplastic.~~
3. Material for Wet Locations: NEMA 3R weatherproof die-cast aluminum with spring-loaded lift cover, and listed and labeled for use in "wet locations" Hubbell #WP26E series.~~Cast aluminum with spring-loaded lift cover, and listed and labeled for use in "wet locations."~~
4. Wet Locations (While-In-Use): NEMA 3R weatherproof non-metallic high-impact polycarbonate, listed and labeled for While-In-Use applications. Hubbell #RW57300 series.

~~4.C.~~ Provide plates of one design, throughout the project unless otherwise specified.

2.5.2.6 FLOOR SERVICE FITTINGS

- A. Type: Modular, flush mount~~[flush-type] [flap-type] [above-floor]~~, dual-service units suitable for wiring method used.
- B. Compartments: 4-gang, shallow with Barriers to separate power from voice and data communication cabling.
- C. Service Plate: Rectangular, Cast-Iron box with Aluminum top, Hubbell # HBLCFB401CB1 with Black die-cast metal cover and flange assembly, Hubbell #HBLTCGNTBKS~~W. [Rectangular] [Round], [die-cast aluminum] [solid brass] with satin finish.~~

D. Mounting Method: Cast into Concrete.

~~D.~~E. Power Receptacle: NEMA WD 6, Configuration 5-20R, gray finish, unless otherwise indicated.

~~E.~~ Voice and Data Communication Outlet: Comply with IT Requirements (minimum two modular, keyed, color-coded, RJ-45 Category 5 jacks for UTP cable).~~[Blank cover with bushed cable opening] [Two modular, keyed, color-coded, RJ-45 Category 3 jacks for UTP cable] [Two modular, keyed, color-coded, RJ-45 Category 5 jacks for UTP cable].~~

F. Coordinate fittings with floor boxes as described in Section 260533 "Raceways and Boxes for Electrical Systems".

~~F.~~ POKE-THROUGH ASSEMBLIES

~~G.~~ Description: ~~Factory-fabricated and wired assembly of below-floor junction box with multichanneled, through-floor raceway/firestop unit and detachable matching floor service outlet assembly.~~

- ~~1. Service Outlet Assembly: Flush type with two simplex receptacles and space for two RJ-45 jacks, Flush type with four simplex~~
- ~~2. Size: Selected to fit nominal 4-inch receptacles and space for four RJ-45 jacks or as indicated on the drawings. Core holes in floor and match to floor thickness.~~
- ~~3. Fire Rating: Unit is listed and labeled for fire rating of floor-ceiling assembly.~~
- ~~4. Closure Plug: Arranged to close unused 4-inch cored openings and reestablish fire rating of floor.~~
- ~~5. Wiring Raceways and Compartments: For a minimum of four No. 12 AWG conductors; and a minimum of four, 4-pair, Category 5 voice and data communication cables.~~

~~2.6~~2.7 MULTIOUTLET ASSEMBLIES

- A. Components of Assemblies: Products from a single manufacturer designed for use as a complete, matching assembly of raceways and receptacles.
- B. Raceway Material: Base, cover and end plates shall be constructed of extruded aluminum #6063-T5, 0.060-inch minimum wall thickness. Finish shall be clear anodized #AA-C22A31, Class 2.
- C. Wire: No. 12 AWG stranded.

~~2.7~~ FINISHES

~~A.~~ Color:

- ~~1. Wiring Devices Connected to Normal Power System: White or as selected by University's Representative, unless otherwise indicated or required by CEC (NFPA 70).~~
- ~~2. Wiring Devices Connected to Emergency Power System: Red.~~
 - ~~a. Emergency receptacles (critical branch) shall have receptacle and face plate colored red per OSHPD requirements.~~
- ~~3. Coordinate final cover plate style and color with University's Representative. The following is a general guide:~~
 - ~~a. White or almond in office areas~~
 - ~~b. Stainless steel in laboratories, and other high use areas.~~

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Thoroughly examine site conditions for acceptance of wiring device installation to verify conformance with manufacturer and specification tolerances. Do not commence with installation until all conditions are made satisfactory.

3.2 PREPARATION

- A. Coordinate device heights in all areas with Architectural plans, including cabinets, benches, counters, etc.
- B. Coordinate switch mounting location with Architectural details. Unless otherwise noted, locate switches on latch side of door.
- C. Refer to Section 260553 "Identification for Electrical Systems", for labeling requirements of coverplates.

~~3.1~~3.3 INSTALLATION

- A. Install wiring devices in accordance with manufacturer's written instructions, as shown on the drawings and as specified herein.
- ~~A.B. Install devices with the vertical centerline plumb and with all edges of the device flush against the adjacent wall surfaces. Provide hospital-grade receptacles, switches, specialty items, and devices in patient care areas; elsewhere provide Specification-grade/Institutional grade.~~
- ~~B.C.~~ C. Install devices and all assemblies level, plumb, and square with building lines.
- ~~C.D.~~ D. Install wall dimmers to achieve indicated rating after derating for ganging according to manufacturer's written instructions.
- E. Install unshared neutral conductors online and load side of dimmers according to manufacturers' written instructions.
- ~~D.F.~~ F. Ganged switches on 277V circuits shall have a barrier between each switch.
- ~~E.G.~~ G. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical, and with grounding terminal of receptacles on top. Group adjacent switches under single, multi-gang wall plates.

~~F.H.~~ Remove wall plates and protect devices and assemblies during painting.

~~G.I.~~ Coordinate locations of floor service outlets and service poles to suit arrangement of partitions and furnishings.

J. Switches shall be installed in a minimum 4-inch by 4-inch outlet boxes.

~~H.K.~~ California Electrical Code (CEC) sized (#12 minimum) bonding jumper shall connect grounded outlet box to receptacle grounding terminal on all flush mounted units.

~~3.2~~3.4 IDENTIFICATION

A. Comply with ~~Division 26~~ Section 260553 "Identification ~~For~~for Electrical Systems."

1. Receptacles: Identify panelboard and circuit number from which served. Use hot, stamped or engraved machine printing with black/white/red~~black~~ ~~white~~ ~~red~~-filled lettering on face of plate, and durable wire markers or tags inside outlet boxes.
2. Cover plates for receptacles shall be engraved or permanent stenciled on the front side with the device circuit number and panelboard source name. Use of an engraving on the front of the device plate is not required for housing projects.
3. Cover plates for receptacles in locations of public view such as lobbies and atriums shall have the circuit numbers and source feed point stenciled on the back of the plate.

~~3.3~~3.5 CONNECTIONS

- A. Ground equipment according to ~~Division 26~~ Section 260526 "Grounding and Bonding for electrical systems."
- B. Connect wiring according to ~~Division 26~~ Section 260519 "Low-Voltage Electrical Power Conductors and Cables."
- C. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A.

~~3.4~~3.6 FIELD QUALITY CONTROL

A. Perform the following field tests and inspections and prepare test reports:

1. After installing wiring devices and after electrical circuitry has been energized, test for proper polarity, ground continuity, and compliance with requirements.
2. Test GFCI operation with both local and remote fault simulations according to manufacturer's written instructions.

B. Visual and mechanical inspection:

1. Check proper operation of all switches.
2. Visually inspect and replace damaged or defective device.

~~B.C.~~ Remove malfunctioning units, replace with new units, and retest as specified above.

END OF SECTION 262726

SECTION 262816 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS

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 the following individually mounted, enclosed switches and circuit breakers:

1. Fusible and non-fusible switches.
- ~~2. Nonfusible switches.~~
- ~~3-2. Bolted-pressure contact switches.~~
- ~~4. High-pressure, butt-type contact switches.~~
3. Fuses
4. Molded-case circuit breakers (MCCBs).
5. Controllers.
- ~~5-6. Enclosures.~~

- B. Related Sections:

1. Consult all other Sections, determine the extent and character of related work, and properly coordinate work specified herein with that specified elsewhere to produce a complete installation.
- ~~4-2. Section 260553 "Identification for Electrical Systems". Refer to Division 26 Section "Switchboards" for circuit breaker requirements.~~

1.3 ~~DEFINITIONS~~REFERENCES

- A. Comply with the latest edition of the following applicable specifications and standards except as otherwise shown on specified: ~~HD: Heavy duty.~~

1. FS W-F-870 - Fuse-holders (For Plug and Enclosed Cartridge Fuses)
2. FS W-F-865 - Switch, Box, (Enclosed), Surface-Mounted
3. NEMA AB 1 - Molded-Case Breakers, Molded Case Switches & Breaker Enclosures
4. NEMA AB 3 - Molded-Case Circuit Breakers and their Application
5. NEMA FU 1 - Low Voltage Cartridge Fuses
6. NEMA KS 1 - Enclosed & Misc. Distribution Equipment Switches (600V Maximum)
7. NEMA ICS 2 - Industrial Control and Systems: Controllers, Contactors, and Overload Relays, Rated Not More Than 2000 Volts AC or 750 Volts DC
8. NEMA ICS 5 - Industrial Control and Systems: Control Circuit and Pilot Devices
9. NECA 1 - National Electrical Contractors Association's Standard of Installation
10. NETA ATS - Acceptance Testing Specs for Elec Power Dist. Equip. and Systems
11. NFPA 70 - California Electrical Code (CEC)
12. UL 50 - Cabinet and Boxes
13. UL 489 - Molded Case Circuit Breakers

- 14. UL 891 - Breakers for Switchboard Applications
- 15. UL 198C - High-Intensity Capacity Fuses; Current Limiting Types
- ~~A-16.~~ UL 198E - Class R Fuses

1.4 SUBMITTALS

A. Submit in accordance with the requirements of Division 01 and Section 260500 "Common Work Results for Electrical", the following items:

- ~~A-1.~~ Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.
 - a. Clearly mark on each data sheet the specific item(s) being submitted and the proposed application.
- 2. As a minimum the following characteristics shall be indicated:
 - ~~1-a.~~ Enclosure types and details for types other than NEMA 250, Type 1.
 - b. Current and voltage ratings.
 - c. Number of poles.
 - d. Fuse provisions and accessories.
 - ~~2-e.~~ Horsepower rating (where applicable)
 - ~~3-f.~~ Short-circuit current rating.
 - g. Features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
- ~~4.~~ 3. Shop Drawings: Include all pertinent information as required and listed below, but not limited to:
 - a. Front, plan and side view elevations with overall dimensions.
 - b. Breaker layout drawing with dimensions indicated and nameplate designation.
 - c. Conduit entrance/exit locations and requirements.
 - d. Cable terminal sizes
 - e. Connections and support, including weight
 - f. Components list and layout of contactors, relays, time clocks, and etc.
 - g. Nameplate legends
- 4. Wiring Diagrams: ~~Diagram~~ Provide power, signal, and control wiring and differentiate between manufacturer-installed and field-installed wiring.
- 5. Submit manufacturer's installation instructions.
- 6. Complete Bill of Material listing all components.
- ~~B-7.~~ Warranty

~~G-B.~~ Manufacturer Seismic Qualification Certification: Submit certification that enclosed switches and circuit breakers, accessories, and components will withstand seismic forces defined in Division 26 Section "Vibration and Seismic Controls for Electrical Work." Include the following:

- 1. Basis of Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
- ~~a-2.~~ The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."
- ~~2-3.~~ Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
- ~~3-4.~~ Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

~~D.C.~~ Qualification Data: Submit data for testing agencies indicating that they comply with qualifications specified in "Quality Assurance" Article. ~~For testing agency.~~

~~E.D.~~ Field Test Reports: Submit written ~~Field quality-control~~ test reports including the following:

1. Test procedures used.
2. Test results that comply with requirements.
3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.

~~F.E.~~ Manufacturer's field service report.

~~G.F.~~ Operation and Maintenance ~~Data~~ Manuals: ~~For enclosed switches and circuit breakers to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Sections "Closeout Procedures" and "Operation and Maintenance Data," include the following:~~

1. Manufacturer's written instructions for testing and adjusting enclosed switches and circuit breakers.
2. Time-current curves, including selectable ranges for each type of circuit breaker.
3. A detailed explanation of the operation of the system
4. Instructions for routine maintenance
5. Pictorial parts list and part numbers
6. Telephone numbers for the authorized parts and service distributors.
7. Final testing reports
- 2-8. Include spare parts data listing; source and current prices of replacement parts and supplies; and recommended maintenance procedures and intervals.

1.5 SEISMIC MOUNTING

A. Install Disconnects and Switches in accordance with the seismic requirements of the applicable California Building Code (CBC). Equipment manufacturer shall provide guidelines for the installation consistent with the CBC requirements that are based upon testing of representative equipment.

~~4.5~~ 1.6 QUALITY ASSURANCE

A. All materials, equipment and parts comprising the units specified herein shall be new.

B. The manufacturer of the assembly shall be the manufacturer of the major components within the assembly.

C. Contractor shall pay for the services of a qualified ~~Testing Agency Qualifications: An~~ independent testing agency to perform the specified tests. The Contractor shall notify the Owner at least five (5) working days in advance of performance of work requiring testing.

~~A-1.~~ with Testing Agency shall have the experience and capability to conduct the testing indicated, that is a member company of the InterNational Electrical Testing Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.

2. Testing Agency's Field Supervisor: Person currently certified by the InterNational Electrical Testing Association or the National Institute for Certification in Engineering Technologies to supervise on-site testing specified in Part 3.

~~1.3.~~ The Contractor shall provide all material required for testing.

~~B.D.~~ Electrical Components, Devices, and Accessories: Listed and labeled as defined in CEC (NFPA 70), Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

~~G.E.~~ Comply with CEC (NFPA 70).

~~D.F.~~ Product Selection for Restricted Space: Drawings indicate maximum dimensions for enclosed switches and circuit breakers, including clearances between enclosures, and adjacent surfaces and other items. Comply with indicated maximum dimensions.

~~1.6 PROJECT CONDITIONS~~

~~A. Environmental Limitations: Rate equipment for continuous operation under the following conditions, unless otherwise indicated:~~

- ~~1. Ambient Temperature: Not less than minus 22 deg F and not exceeding 104 deg F.~~
- ~~2. Altitude: Not exceeding 6600 feet.~~

1.7 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the products specified in this Section with minimum ten years documented experience.

B. Seismic qualifications:

1. The equipment and major components shall be suitable for and certified by actual seismic testing to meet all applicable seismic requirements of the latest applicable California Building Code (CBC) Site Classification "D".
2. Equipment certification acceptance criteria shall be based upon the ability for the equipment to be returned to service immediately after a seismic event within the above requirements without the need for repairs.
3. The following minimum mounting and installation guidelines shall be met, unless specifically modified by the above referenced standards:
 - a. The Contractor shall provide equipment anchorage details, coordinated with the equipment mounting provision, prepared and stamped by a licensed structural engineer in the state. Mounting recommendations shall be provided by the manufacturer based upon the above criteria to verify the seismic design of the equipment.
 - b. The equipment manufacturer shall certify that the equipment can withstand, that is, function following the seismic event, including both vertical and lateral required response spectra as specified in above codes.
 - c. The equipment manufacturer shall document the requirements necessary for proper seismic mounting of the equipment. Seismic qualification shall be considered achieved when the capability of the equipment, meets or exceeds the specified response spectra.

1.8 DELIVERY, STORAGE AND HANDLING

A. Delivery: Equipment and Devices shall not be delivered to the site until protected storage space is available. Storage outdoors covered by rainproof material is not acceptable. Equipment or

devices damaged during shipment shall be replaced and returned to manufacturer at no additional cost to the Owner.

B. Storage: Store in a clean, dry, ventilated space free from temperature extremes. Maintain factory wrapping or provide a heavy canvas/plastic cover to protect units from dirt, water, construction debris, and traffic. Provide heat where required to prevent condensation.

C. Handling: Handle in accordance with manufacturers written instructions. Be careful to prevent internal component damage, breakage, denting and scoring. Damaged units shall not be installed. Replace damaged units and return equipment to manufacturer.

1.9 COORDINATION

~~B.~~A. Coordinate layout and installation of switches, circuit breakers, and components with other construction, including conduit, piping, equipment, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

~~1.7~~1.10 EXTRA MATERIALS

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

1. Spares: For the following:
 - a. Potential Transformer Fuses: 4.
 - b. Control-Power Fuses: 4.
 - c. Fuses for Fusible Switches: 3.

2. Spare Indicating Lights: 3 of each type installed.

1.11 WARRANTY

A. Equipment and components offered under this Section shall be covered by 1-year parts and labor warranty for malfunctions resulting from defects in materials and workmanship.

~~2.~~B. Warranty shall begin upon acceptance by the Owner. Refer to Division 01 for the definition of Acceptance

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.
2. Or Equal: Where products are specified by manufacturers name and accompanied by the term "or equal", comply with provisions in Division 01 Section "Product Requirements", Part 2 "Product Substitutions" Article. Specific procedures must be followed before use of an unnamed product or manufacturer.

2.2 FUSIBLE AND NONFUSIBLE SWITCHES

A. Manufacturers:

1. Schneider Electric
- ~~1.2. Eaton Corporation; Cutler-Hammer Products.~~
- ~~2.3. General Electric Co.; Electrical Distribution & Control Division.~~
- ~~3. Siemens Energy & Automation, Inc.~~
- ~~4. Square D/Group Schneider.~~
- 5.4. Or equal.

B. Fusible Switch, 600 A and Smaller: NEMA KS 1, Type HD, with clips or bolt pads to accommodate specified fuses, lockable handle with capability to accept two padlocks, and interlocked with cover in closed position.

C. Non-fusible Switch, 600 A and Smaller: NEMA KS 1, Type HD, lockable handle with capability to accept two padlocks, and interlocked with cover in closed position.

D. Accessories:

1. Equipment Ground Kit: Internally mounted and labeled for copper ground conductors.
2. Neutral Kit: Internally mounted; insulated, capable of being grounded, and bonded; and labeled for copper neutral conductors.

2.3 FUSED POWER CIRCUIT DEVICES

A. Bolted-Pressure Contact Switch: UL 977; operating mechanism shall use a rotary-mechanical-bolting action to produce and maintain high-clamping pressure on the switch blade after it engages the stationary contacts.

1. Manufacturers:

- a. Schneider Electric
- ~~a.b. Eaton Corporation; Cutler-Hammer Products.~~
- ~~b.c. Pringle Electrical Mfg. Co. GE~~
- ~~c. Siemens Energy & Automation, Inc.~~
- ~~d. Square D/Group Schneider.~~
- e.d. Or equal.

2.4 FUSES

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Cooper Bussmann, Inc. (Eaton Corp. Electrical Group)
2. Littlefuse
3. Or equal

B. The listing of specific manufacturers above does not imply acceptance of their products that do not meet the specified ratings, features and functions. Manufacturers listed above are not relieved from meeting these specifications in their entirety.

C. Cartridge Fuses and Application:

1. Provide UL listed low-peak, dual-element (time-delay, current limiting) type RK1 fuses for all fused switches, unless otherwise indicated on drawings (for 1/10 - 600A range).
2. Provide UL listed low-peak, current limiting (time-delay, current limiting) Class L fuses for Feeder or Large Motor Circuits 601 - 4000A.
3. Elevator Branch Circuits: Class J, fast acting.
4. Control Circuits: Class CC, time delay, and control transformer duty.
5. All Switches shall be equipped with rejection hardware to prevent installation of all but class "R" fuses.

D. SPARE-FUSE CABINET

1. Characteristics: Wall-mounted steel unit with full-length, recessed piano-hinged door and key-coded cam lock and pull.
 - a. Size of cabinet: Adequate for storage of spare fuses specified with 15% spare capacity minimum.
 - b. Finish: Gray, baked enamel.
 - c. Identification: "SPARE FUSES" in 2-inch, high letters on exterior of door.
 - d. Fuse Pullers: Provide for each size of fuse.
 - e. List of fuse sizes/types provided

2.5 MOLDED CASE CIRCUIT BREAKERS

- A. Molded-Case Circuit Breaker: Comply with UL 489, NEMA AB 1, and NEMA AB 3, fully rated with interrupting capacity to comply with available fault currents.
- B. Circuit breakers 250 Amps and larger shall be rated to carry 100% of their current rating continuously.
- C. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 225 A up to 400 A.
- D. Adjustable, Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
- E. Electronic Trip Circuit Breakers: 400 A and larger. Field-replaceable rating plug, rms sensing, with the following field-adjustable settings:
 1. Instantaneous trip.
 2. Long- and short-time pickup levels.
 - ~~2-3.~~ Long- and short-time time adjustments.
 4. Ground-fault pickup level, time delay, and I₂t response.
- F. Ground-Fault, Circuit-Interrupter (GFCI) Circuit Breakers: Single- and two-pole configurations with Class A ground-fault protection (6-mA trip).
- G. Ground-Fault, Equipment-Protection (GFEP) Circuit Breakers: Single- and two-pole configurations with Class B ground-fault protection (30-mA trip).
- H. Features and Accessories:
 1. Standard frame sizes, trip ratings, and number of poles.
 2. Lugs: Mechanical type, suitable for number, size, trip ratings, and conductor material.

3. Application Listing: Appropriate for application; type SWD for switching fluorescent lighting loads; type HACR for heating, air-conditioning, and refrigerating equipment.
4. Ground-Fault Protection: Comply with UL 1053; integrally mounted, self-powered type with mechanical ground-fault indicator; relay with adjustable pickup and time-delay settings, push-to-test feature, internal memory, and shunt trip unit; and three-phase, zero-sequence current transformer/sensor.
5. Communication Capability: Integral communication module with functions and features compatible with power Monitoring and other systems (e.g. SCADA).
6. Shunt Trip: Trip coil energized from separate circuit, with coil-clearing contact.
7. Undervoltage Trip: Set to operate at 35-75% of rated voltage without intentional time delay.
8. Auxiliary Contacts: Two SPDT switch with "a" and "b" contacts; "a" contacts mimic circuit-breaker contacts, "b" contacts operate in reverse of circuit-breaker contacts.
9. Key Interlock Kit: Externally mounted to prohibit circuit-breaker operation; key shall be removable only when circuit breaker is in off position.
10. Zone-Selective Interlocking: Integral with electronic trip unit; for interlocking ground-fault protection function.
11. Electrical Operator: Provide remote control for on, off, and reset operations.
12. Accessory Control Power Voltage: Integrally mounted, self-powered.

2.6 CONTROLLERS

A. Motor Controllers: NEMA ICS 2, Class A combination controller equipped for panelboard mounting and including the following accessories:

1. Individual control-power transformers.
2. Fuses for control-power transformers.
3. Bimetallic-element overload relay.
4. Melting-alloy overload relay.
5. Indicating lights.
6. Seal-in contact.
7. 2 convertible auxiliary contacts.
8. Push buttons.
9. Selector switches.

B. Contactors: NEMA ICS 2, Class A combination controller equipped for panelboard mounting and including the following accessories:

1. Individual control-power transformers.
2. Fuses for control-power transformers.
3. Indicating lights.
4. Seal-in contact.
5. 2 convertible auxiliary contacts.
6. Push buttons.
7. Selector switches.

C. Controller Disconnect Switches: Fused switch and interlocked with controller.

1. Auxiliary Contacts: Integral with disconnect switches to de-energize external control-power source.

D. Contactors in Main Bus: NEMA ICS 2, Class A, mechanically held general-purpose controller.

1. Control-Power Source: Control-power transformer, with fused primary and secondary terminals, connected to main bus ahead of contactor connection.
2. Control-Power Source: 120V branch circuit.

~~2.4~~2.7 ENCLOSURES

- A. NEMA AB 1 and NEMA KS 1 to meet environmental conditions of installed location.
 1. Outdoor Locations: NEMA 250, Type 3R.
 2. Kitchen Areas: NEMA 250, Type 4X, stainless steel.
 3. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.
 4. Hazardous Areas Indicated on Drawings: NEMA 250, Type 7C.
- B. Fused Switch: NEMA KS 1, Type HD; clips to accommodate specified fuses; lockable handle.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance.
- B. Examine fuses before installation. Reject fuses that are moisture damaged or physically damaged.
- C. Examine holders to receive fuses for compliance with installation tolerances and other conditions affecting performance, such as rejection features.
- ~~A.~~D. Examine utilization equipment nameplates and installation instructions. Install fuses of sizes and with characteristics appropriate for each piece of equipment.
- ~~B.~~E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 CONCRETE BASES

- A. Coordinate size and location of concrete bases. Verify structural requirements with structural engineer.
- B. Concrete base is specified in Division 26 Section "Common Work Results for Electrical," and concrete materials and installation requirements are specified in Division 03.

3.3 INSTALLATION

- A. Comply with applicable portions of NECA 1, ~~NEMA PB 1.1,~~ and NEMA ~~PB 2.1~~AB 3 for installation of enclosed switches and circuit breakers.
- B. Mount individual wall-mounting switches and circuit breakers with tops at uniform height, unless otherwise indicated. Anchor floor-mounting switches to concrete base.

~~C. Comply with mounting and anchoring requirements specified in Division 26 Section "Vibration and Seismic Controls for Electrical Work."~~

C. Install enclosed switches plumb and in accordance with manufacturer's written instructions.

D. Switches shall be mounted to withstand seismic forces as required per code. Securely fasten to structural members or channel support.

E. Provide construction channel and mounting hardware as required to support disconnect switch.

F. Coordinate locations of switches and equipment in the field to provide code required clearances in front of switches and to ensure that switches are insight of the controller as described in CEC Article 430.

G. Install fuses in fusible devices in accordance with Manufacturer's recommendations or equipment nameplates.

H. Install fuses for fusible disconnect switches. Install fuse with label oriented so manufacturer, type, and size are easily read.

I. Apply adhesive tag on inside door of each fused switch indicating NEMA fuse class and size installed.

J. Install spare fuse cabinet at main electrical room or as directed by the Owner's Representative.

~~D.K.~~ Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.

3.4 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs as specified in Division 26 Section "Common Work Results for Electrical" and Identification for Electrical Systems."

B. Enclosure Nameplates: Label each enclosure with engraved metal or laminated-plastic nameplate as specified in Division 26 Section "Common Work Results for Electrical" and Identification for Electrical Systems."

3.5 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect test, and adjust field-assembled components and equipment installation, including connections, and to assist in field testing. Report results in writing.

1. Inspect mechanical and electrical connections.
2. Verify switch and relay type and labeling verification.
3. Verify rating of installed fuses.
4. Inspect proper installation of type, size, quantity, and arrangement of mounting or anchorage devices complying with manufacturer's certification.

B. Acceptance Testing Preparation:

1. Test insulation resistance for each enclosed switch and circuit breaker, component, connecting supply, feeder, and control circuit.
2. Test continuity of each circuit.

~~B.C.~~ Perform the following field tests and inspections and prepare test reports:

1. Test mounting and anchorage devices ~~according to requirements in Division 26 Section "Vibration and Seismic Controls for Electrical Work."~~per local AHJ and code requirements.
2. Perform each electrical test and visual and mechanical inspection stated in NETA ATS, Section 7.5 for switches and Section 7.6 for molded-case circuit breakers. Certify compliance with test parameters.
3. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
4. Infrared Scanning:
 - a. Initial Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each enclosed switch and circuit breaker. Open or remove doors or panels so connections are accessible to portable scanner.
 - b. Follow-Up Infrared Scanning: Perform an additional follow-up infrared scan of each unit 11 months after date of Substantial Completion.
 - c. Instruments, Equipment and Reports:
 - 1) Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
 - 2) Prepare a certified report that identifies enclosed switches and circuit breakers included and describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.6 ADJUSTING

- A. Set field-adjustable switches and circuit-breaker trip ranges. Provide list of "as left" settings and submit to Electric Shop.
- ~~A.B.~~ Adjust moving parts and operable components to function smoothly and lubricate as recommended by manufacturer.

3.7 CLEANING

- A. On completion of installation, vacuum dirt, and debris from interiors; do not use compressed air to assist in cleaning.
- B. Inspect exposed surfaces and repair damaged finishes.

END OF SECTION 262816

ATTACHMENT 3

HARBOR-UCLA MEDICAL CENTER

TASK ORDER 35 PHASE 2F INC1 - INTERIM HELISTOP

1000 West Carson Street, Torrance, CA 90502

RBB#1712035

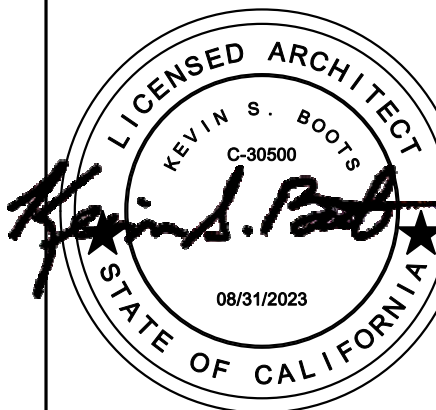


RBB ARCHITECTS INC

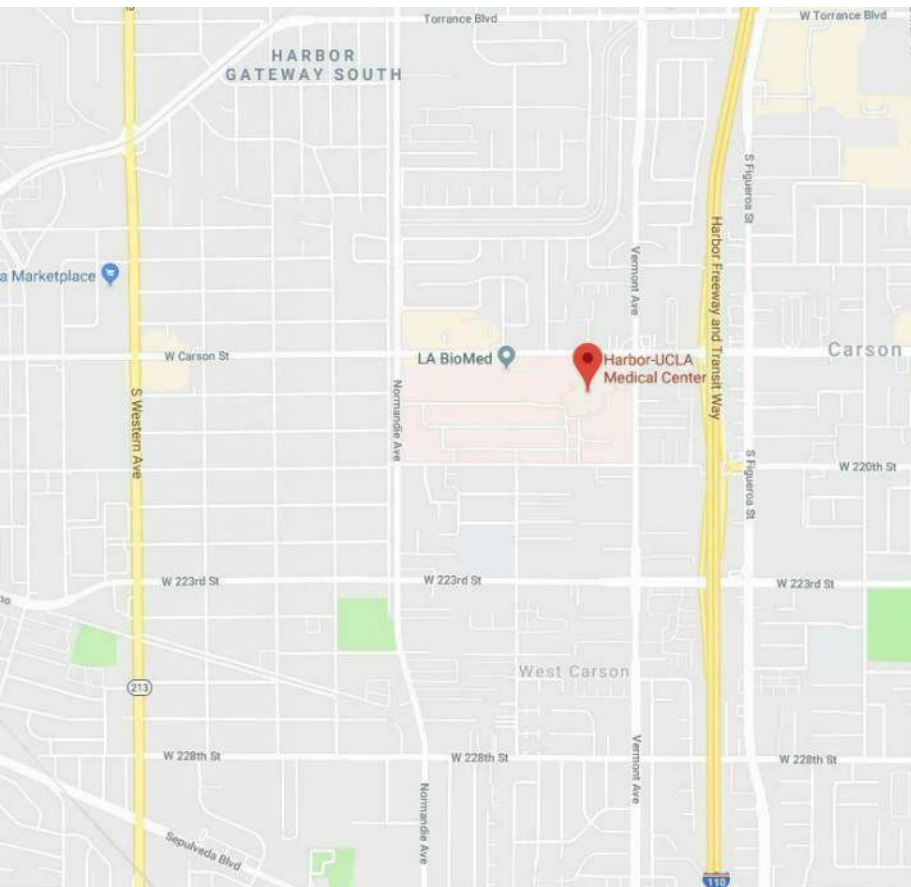
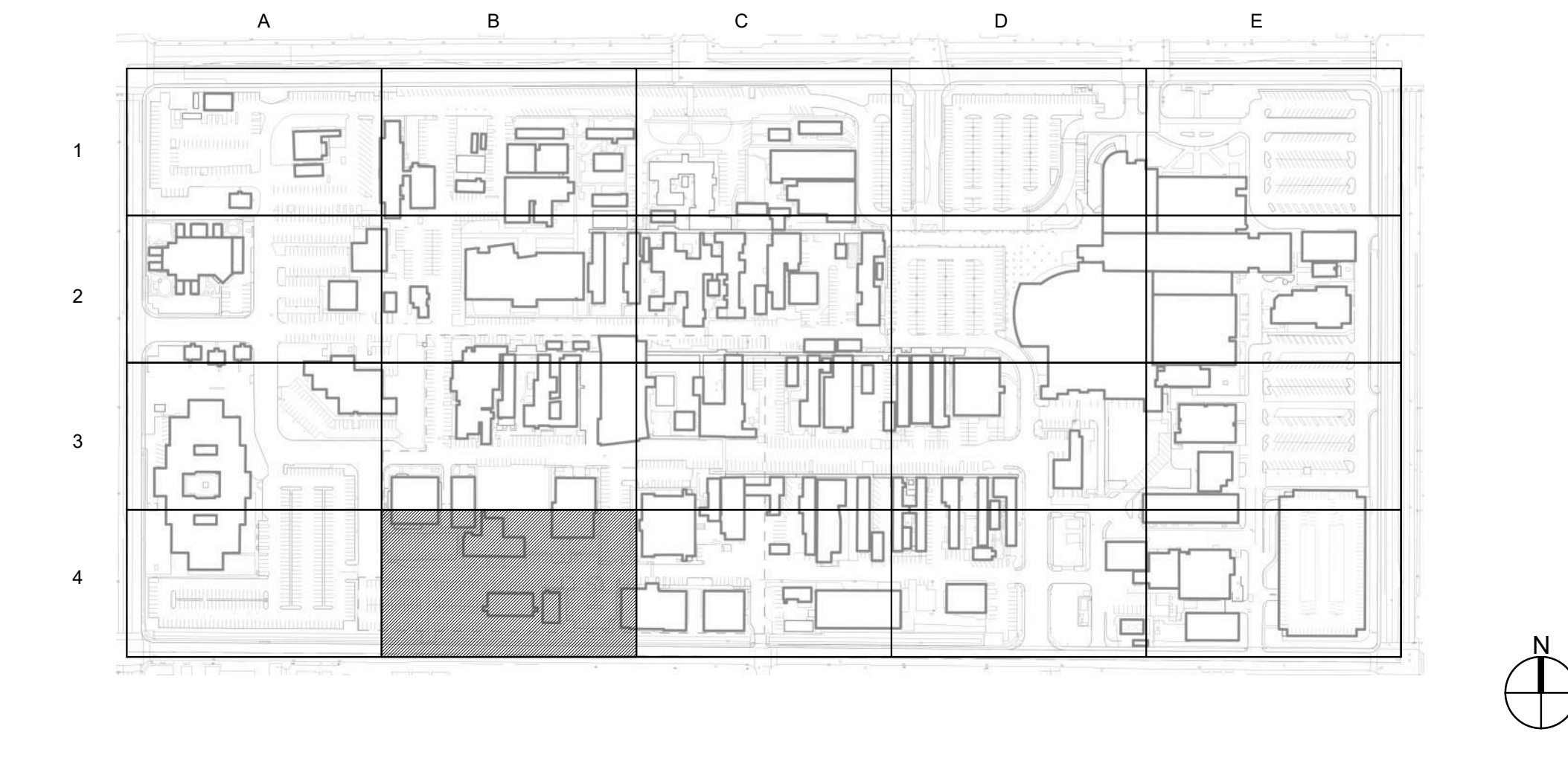
Joseph A. Balbons, AIA
Sylvia Botero, AIA
Kevin S. Boots, AIA

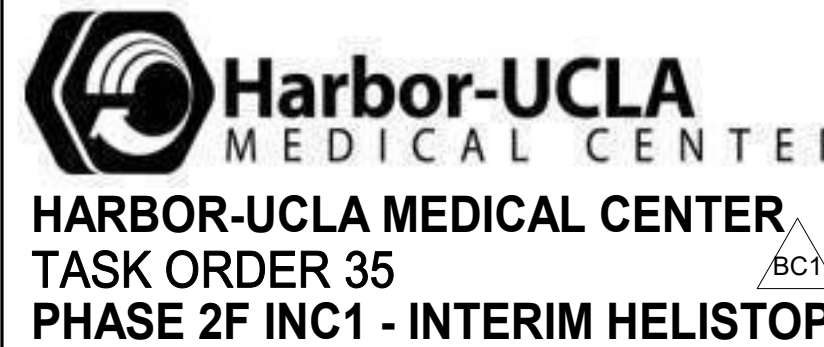
10980 Wilshire Boulevard
Los Angeles, California
90024-3905

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Facsimile 310 473 3555
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AGENCY APPROVALS

PROJECT INFORMATION		CONSULTANTS		SHEET INDEX																																	
<p>ELEVATED INTERIM HELISTOP</p> <p>THE DESIGN IS BASED ON SIKORSKY UH-60 (BLACK HAWK) HELICOPTER WITH FOLLOWING DIMENSIONS:</p> <table><tr><td>TLOF</td><td>65'</td></tr><tr><td>FATO</td><td>109'</td></tr><tr><td>SAFETY NET</td><td>18'</td></tr><tr><td>TOTAL UNOBSTRUCTED WIDTH</td><td>145'</td></tr></table> <p>MAXIMUM GROSS TAKE OFF WEIGHT IS BASED ON SIKORSKY S-92 (MARINE ONE) HELICOPTER:</p> <table><tr><td>DEADLOAD</td><td>27,000 lbs.</td></tr><tr><td>IMPACT LOAD</td><td>40,500 lbs.</td></tr></table> <p>THE FUEL SEPARATORS TANKS ARE DESIGNED BASED ON SIKORSKY S-92 (MARINE ONE) HELICOPTER.</p> <p>FLIGHT PATH SLOPES:</p> <table><tr><td>APPROACH/ DEPARTURE SURFACE</td><td>8:1</td></tr><tr><td>TRANSITIONAL SURFACE</td><td>2:1</td></tr></table>		TLOF	65'	FATO	109'	SAFETY NET	18'	TOTAL UNOBSTRUCTED WIDTH	145'	DEADLOAD	27,000 lbs.	IMPACT LOAD	40,500 lbs.	APPROACH/ DEPARTURE SURFACE	8:1	TRANSITIONAL SURFACE	2:1	<p>OWNER</p> <p>DHS - HARBOR UCLA 1000 W CARSON ST. TORRANCE, CA 90502 T (626) 300-2360</p> <p>OWNER REPRESENTATIVE</p> <p>LOS ANGELES COUNTY DEPT. OF PUBLIC WORKS 900 S FREMONT AVE. 5TH FLOOR ALHAMBRA, CA 91803</p> <p>ARCHITECT</p> <p>RBB ARCHITECTS INC 10980 WILSHIRE BLVD. LOS ANGELES, CA 90024 Kevin Boots kboots@rbbinc.com T (310)) 473-3555</p> <p>AVIATION HELIPLANNERS</p> <p>41689 ENTERPRISE CIR N TEMECULA, CA 92590 Kathryn D. Wright katwright@heliplanners.com T (951) 693-5090</p> <p>FEC HELIPORTS</p> <p>5298 RIVER ROAD CINCINNATI, OH 45233 Jeffrey Stenwerf JeffS@fecheliports.com T (513) 864-8024</p> <p>CIVIL ENGINEER</p> <p>KIMLEY-HORN 660 S FIGUEROA SUITE 2050 LOS ANGELES, CA 90017 Nikki Kerry Nikki.Kerry@kimley-horn.com T (310) 663-3319</p> <p>STRUCTURAL ENGINEER</p> <p>JOHN A MARTIN ASSOCIATES 950 S GRAND AVE 4TH FLOOR LOS ANGELES, CA 90015 Shane Fitzgerald fitzgerald@johnmartin.com T (213) 483-6490 x 161</p> <p>MECHANICAL/PLUMBING ENGINEER/FIRE ALARM/FIRE PROTECTION</p> <p>tk1sc 515 S FIGUEROA SUITE 1105 LOS ANGELES, CA 90071 Louise Belair lbelair@tk1sc.com T (480) 329-0917</p> <p>ELECTRICAL ENGINEER</p> <p>POWER ENGINEERING SERVICES, INC. 2703 SATURN STREET BREA, CA 92821 Doug Effenberger d.effenberger@pespower.com T (714) 524-9100</p> <p>LOW VOLTAGE ENGINEER</p> <p>EXANTE 360 895 DOVE ST 3RD FLOOR NEWPORT BEACH, CA 92660 Craig Durrant cdurrant@exante360.com</p>		<p>A010 SHEET INDEX, BUILDING CRITERIA, PROJECT INFORMATION, CONSULTANTS, DEFERRED APPROVAL</p> <p>A020 ABBREVIATIONS, WALL LEGEND, AND SYMBOLS</p> <p>A030 GENERAL REQUIREMENTS AND NOTES</p> <p>A050 HCAI FIRE & LIFE SAFETY REQUIREMENTS</p> <p>A101 PARTIAL DEMO SITE PLAN</p> <p>A110 PARTIAL SITE PLAN</p> <p>A120 SITE DETAILS</p> <p>A211 GROUND LEVEL PLAN</p> <p>A212 HELISTOP LEVEL PLAN</p> <p>A410 ELEVATIONS</p> <p>B100 SITE LAYOUT, HELIPORT DETAIL, DATA PANEL, ELEVATIONS, LEGEND</p> <p>B101 CAMPUS LAYOUT</p> <p>C010 COVER SHEET</p> <p>C020 LA COUNTY GENERAL NOTES</p> <p>C021 GENERAL NOTES</p> <p>C030 EXISTING SURVEY CONTROL PLAN</p> <p>C031 PARTIAL EXISTING CONDITIONS SURVEY AREA B4</p> <p>C032 PARTIAL EXISTING TOPOGRAPHY SURVEY AREA B4</p> <p>C101 EROSION AND SEDIMENT CONTROL PLAN</p> <p>C151 EROSION CONTROL DETAILS</p> <p>C201 UTILITY PLAN</p> <p>C301 GRADING AND DRAINAGE PLAN</p> <p>C401 DETAILS</p> <p>S001 GENERAL NOTES</p> <p>S002 GENERAL NOTES</p> <p>S003 GENERAL NOTES</p> <p>S101 TYPICAL DETAILS</p> <p>S102 TYPICAL DETAILS</p> <p>S201 HELISTOP FOUNDATION PLAN</p> <p>S202 HELISTOP FRAMING PLAN</p> <p>S301 BRACE FRAME ELEVATIONS</p> <p>S401 COLUMN SCHEDULE AND FOUNDATION DETAILS</p> <p>S501 SECTION AND DETAILS</p> <p>S601 EQUIPMENT ANCHORAGE DETAILS</p> <p>P010 PLUMBING SYMBOLS, ABBREVIATIONS AND GENERAL NOTES</p> <p>P011 PLUMBING SCHEDULES</p> <p>P110 PLUMBING PARTIAL SITE PLAN</p> <p>P211 PLUMBING GROUND LEVEL PLAN</p> <p>P212 PLUMBING INTERIM HELISTOP PLAN</p> <p>P800 PLUMBING DETAILS</p> <p>E010 ELECTRICAL SYMBOLS AND ABBREVIATIONS</p> <p>E101 ELECTRICAL SITE PLAN</p> <p>E211 ELECTRICAL GROUND LEVEL POWER PLAN- INTERIM HELISTOP</p>		<p>E213 ELECTRICAL GROUND LEVEL FLOOR PLAN - 12KV BLDG.</p> <p>E221 LIGHTING GROUND LEVEL FLOOR PLAN- INTERIM HELISTOP</p> <p>E222 LIGHTING LEVEL PLAN- INTERIM HELISTOP</p> <p>E301 ELECTRICAL PANEL SCHEDULES & SINGLE LINE DIAGRAM</p> <p>E701 TITLE 24 COMPLIANCE FORMS</p> <p>E800 ELECTRICAL DETAILS</p> <p>HH000 HELISTOP GENERAL NOTES</p> <p>HH001 HELISTOP FLIGHT PATH ARRANGEMENT</p> <p>HH002 HELISTOP GENERAL ARRANGEMENT</p> <p>HH003 HELISTOP GENERAL ARRANGEMENT BELOW PAD</p> <p>HH004 HELISTOP HANDRAIL ARRANGEMENT</p> <p>HH005 HELISTOP HANDRAIL SECTIONS</p> <p>HH006 HELISTOP HANDRAIL DETAILS</p> <p>HS001 HELISTOP STRUCTURAL ARRANGEMENT</p> <p>HS002 HELISTOP STEEL DETAILS</p> <p>HS003 HELISTOP STAIR DETAILS</p> <p>HS004 HELISTOP ALUMINUM CLAMP ARRANGEMENT</p> <p>HSN001 HELISTOP SAFETY NET GENERAL ARRANGEMENT</p> <p>HSN002 HELISTOP SAFETY NET BRACKET ARRANGEMENT</p> <p>HSN003 HELISTOP SAFETY NET PANELS</p> <p>HSN004 HELISTOP SAFETY NET DETAILS</p> <p>HSN005 HELISTOP SAFETY NET BRACKET DETAILS</p> <p>HSN006 HELISTOP SAFETY CORNER NET BRACKET DETAILS</p> <p>HE001 HELISTOP ELECTRICAL ARRANGEMENT</p> <p>HE002 HELISTOP ELECTRICAL ARRANGEMENT BELOW PAD</p> <p>HE003 HELISTOP ELECTRICAL DETAILS</p> <p>HE004 HELISTOP ELECTRICAL SINGLE LINE DIAGRAMS</p> <p>HP001 HELISTOP PLUMBING ARRANGEMENT</p> <p>HP002 HELISTOP PLUMBING ARRANGEMENT BELOW PAD</p> <p>HP003 HELISTOP FUEL WATER SEPARATOR DETAILS</p> <p>HPA001 HELISTOP PAINT ARRANGEMENT</p> <p>HPA002 HELISTOP PAINT DETAILS</p> <p>T001 TECHNOLOGY GENERAL INFORMATION AND SYMBOL LEGEND</p> <p>T110 TECHNOLOGY PARTIAL SITE PLAN</p> <p>T111 TECHNOLOGY ENLARGED 12KV AUX RM MDF PLAN</p> <p>T600 TECHNOLOGY DETAILS</p> <p>T601 TECHNOLOGY RISER DIAGRAM</p> <p>SG-01 GRAPHIC STANDARDS & SIGN TYPE MENU</p> <p>SG-02 SIGN LOCATION PLAN- HELISTOP LEVEL</p> <p>SG-03 SIGNAGE DETAILS- SIGN TYPE 8, 9, 10</p> <p>SG-04 SIGNAGE DETAILS - SIGN TYPES 11, 84 & 93</p>															
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<p>THE PROPOSED PROJECT WILL INSTALL AN ELEVATED MODULAR INTERIM HELISTOP DECK SURFACE, SAFETY SCREEN, STAIRS & RAMP WITH CHAIN-LINKED FENCE SCREEN AROUND THE PERIMETER</p>																																					
BUILDING CRITERIA																																					
<p>ZONING: N/A EXISTING SITE</p> <p>OCCUPANCY TYPE: S-1</p> <p>OCCUPANCY SEPARATION: None</p> <p>CONSTRUCTION TYPE: TYPE IIB</p> <p>AUTOMATIC SPRINKLER: Non-Sprinklered</p> <p>SEISMIC ZONE: D</p> <p>HEIGHT: 12'</p>																																					
DEFERRED APPROVALS																																					
<p>INSTALLATION OF THE LISTED ITEMS BELOW SHALL NOT COMMENCE UNTIL THE FOLLOWING OCCURS-</p> <p>ALL DETAIL, PLANS SPECIFICATIONS AND ENGINEERING CALCULATIONS HAVE BEEN SIGNED BY THE ARCHITECT OR STRUCTURAL ENGINEER IN GENERAL CHARGE OF DESIGN.</p> <p>ALL DETAILS, PLANS, SPECIFICATIONS AND ENGINEERING CALCULATIONS HAVE BEEN SIGNED BY THE ARCHITECT OR PROFESSIONAL ENGINEER WHO HAS BEEN DELEGATED RESPONSIBLE COVERING THE WORK SHOWN.</p> <p>THE DEFERRED SUBMITTAL ITEMS SHALL NOT BE FABRICATED OR INSTALLED UNTIL THEIR DESIGN AND SUBMITTAL DOCUMENTS HAVE BEEN APPROVED BY HCAI.</p> <p>THE DEFERRED APPROVAL SHALL BE SUBMITTED WITHIN 30 DAYS AFTER NOTICE TO PROCEED HAS BEEN ISSUED.</p> <p>DA-01 MPE SEISMIC BRACING</p>																																					
VICINITY MAP		LEGAL DESCRIPTION		PRIOR TO COMMENCING WORK																																	
		<p>THE LAND REFERRED TO IN THIS COMMITMENT IS SITUATED IN THE UNINCORPORATED AREA OF THE COUNTY OF LOS ANGELES, STATE OF CALIFORNIA, AND IS DESCRIBED AS FOLLOWS:</p> <p>THOSE PORTIONS OF TRACT NO. 3239, IN THE UNINCORPORATED TERRITORY OF THE COUNTY OF LOS ANGELES, CALIFORNIA AS SHOWN ON MAP RECORDED IN BOOK 37, PAGES 27 AND 28, OF MAPS, IN THE OFFICE OF THE COUNTY OF RECORDER OF SAID COUNTY; THOSE PORTIONS OF CARSON STREET, 220TH STREET (FORMERLY AMELIA STREET), MEYLER STREET (NOW VACATED), AS SHOWN ON SAID MAP, AND VERMONT AVENUE, AS SAID STREETS AND AVENUES ARE SHOWN ON SAID MAP; AND THOSE PORTIONS OF THE VICTORIA DOMINGUEZ DE CARSON 2483.79 ACRE ALLOTMENT IN PART OF THE RANCHO SAN PEDRO AS SHOWN ON MAP FILED IN CASE NO. 3284 OF THE SUPERIOR COURT OF THE STATE OF CALIFORNIA, IN AND FOR THE COUNTY OF LOS ANGELES, DESCRIBED AS PARCEL 1, IN DEED RECORDED JUNE 30, 1947 IN BOOK 24786, PAGE 76 OF OFFICIAL RECORDS OF SAID COUNTY.</p> <p>NOTE: THE ABOVE DESCRIPTION IS FOR IDENTIFICATION PURPOSES ONLY AND HAS BEEN PROVIDED FOR THE ACCOMMODATION OF THIS REPORT. SAID DESCRIPTION IS NOT INSURABLE PURSUANT TO THE SUBDIVISION MAP ACT OF THE STATE OF CALIFORNIA AND SHOULD NOT BE RELIED UPON TO CONVEY OR ENCUMBER SAID LAND.</p>		<p>1. SUBMIT UTILITY SHUT DOWN PLAN AND SCHEDULE FOR EACH BUILDING/UTILITY IN THIS PROJECTS SCOPE.</p>																																	
		HUCLA MASTER PLAN PROJECTS		CAMPUS KEY PLAN																																	
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MILESTONE: HCAI SUBMITTAL
MILESTONE DATE: 3/4/2022
RBB PROJECT: 1712035 SCALE:

DESCRIPTION
SHEET INDEX, BUILDING CRITERIA, PROJECT INFORMATION, CONSULTANTS, DEFERRED APPROVAL

A010

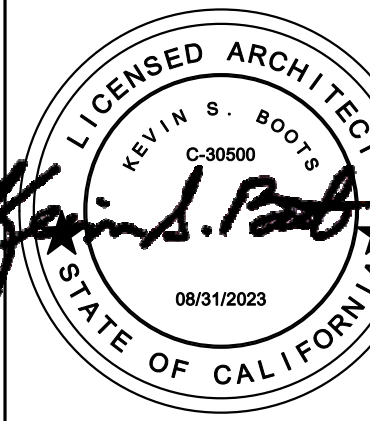


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AGENCY APPROVALS

HCAI # H220345-19-00

CONSULTANT

ISSUE RECORD

9/7/2022	BC2	HCAI SUBMITTAL BC2
7/26/2022		AHJ SUBMITTAL
6/23/2022	BC1	HCAI SUBMITTAL BC1
5/23/2022		AHJ SUBMITTAL
3/4/2022		HCAI SUBMITTAL
DATE	△	DESCRIPTION

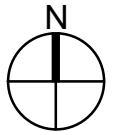
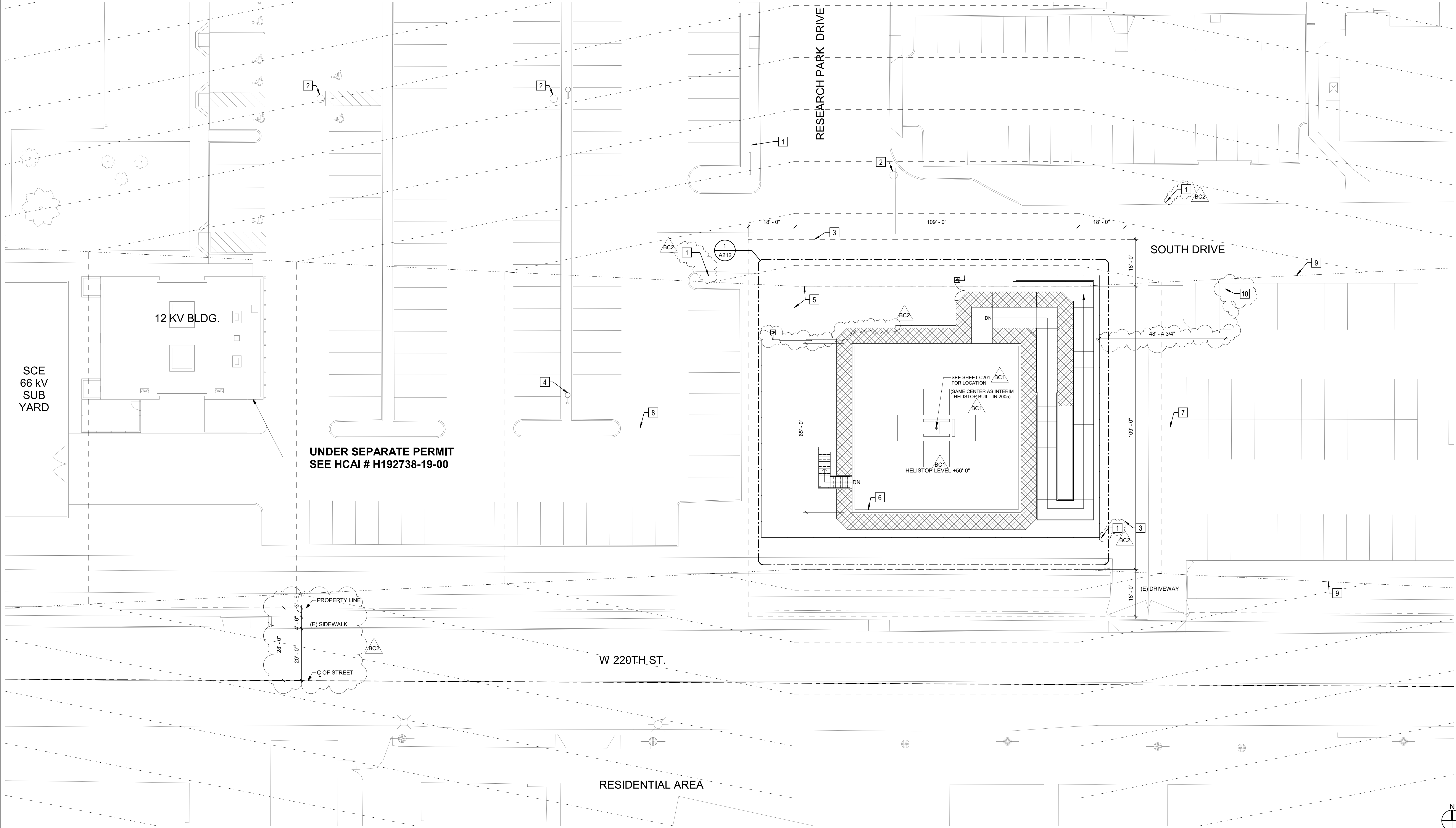
HARBOR-UCLA MEDICAL CENTER
TASK ORDER 35
PHASE 2F INC1 - INTERIM HELISTOP

1000 West Carson Street, Torrance, CA 90502

MILESTONE: HCAI SUBMITTAL
MILESTONE DATE: 3/4/2022
RBB PROJECT: 1712035 SCALE: 1/16" = 1'-0"

DESCRIPTION
PARTIAL SITE PLAN

A110



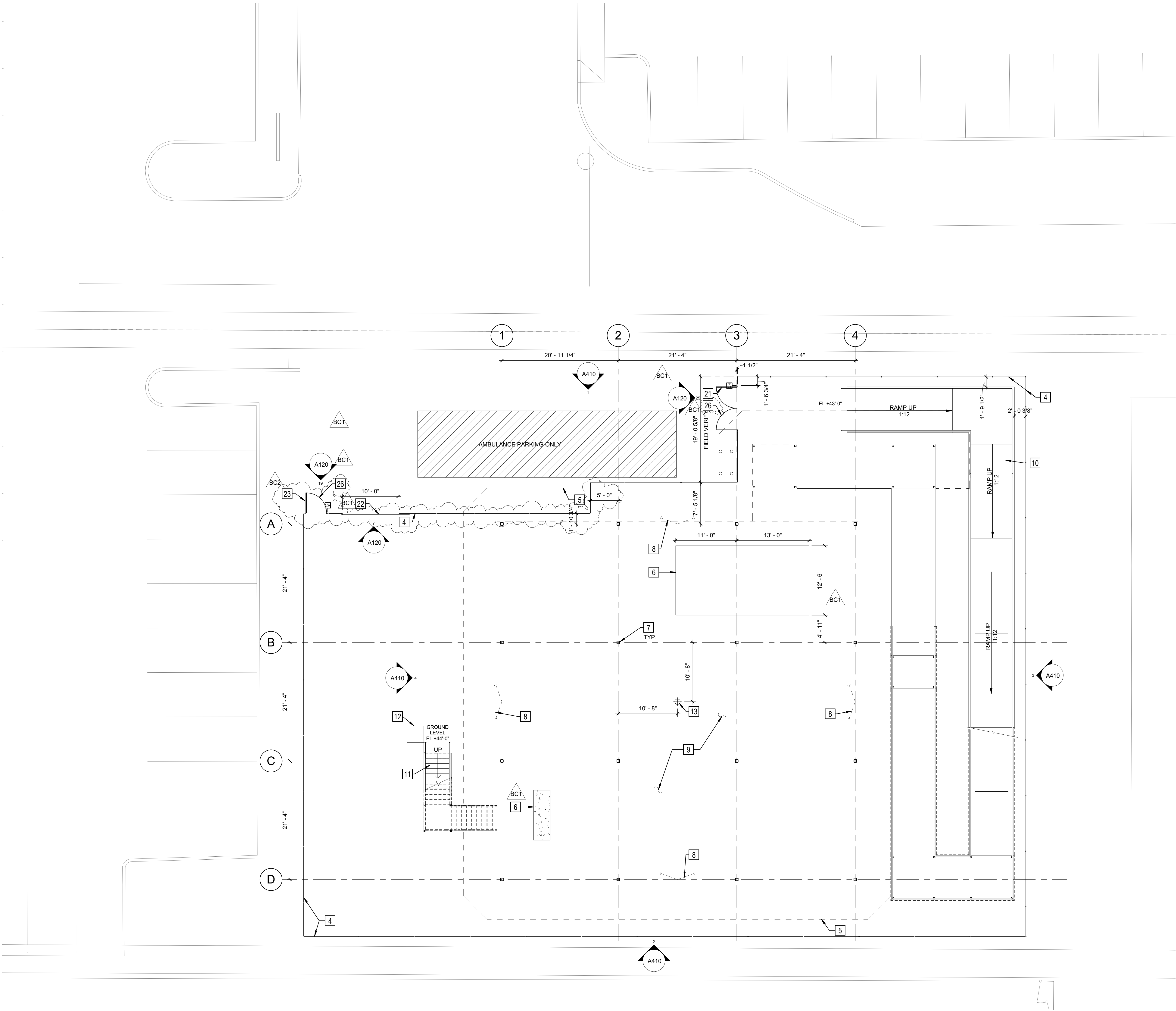
PARTIAL SITE PLAN 1/16" = 1'-0" 1

SITE PLAN KEYNOTES

Number	Description
1	SIGNAGE: LIMIT 10 FEET VEHICLE HEIGHT WITHIN 100 FEET OF THE HELISTOP. CAUTION ROTORWASH FOR OPEN TRUCK BEDS AND UNSECURED MATERIALS. SEE DETAIL 1/SG-04
2	(E) UTILITY MANHOLE
3	SAFETY AREA
4	(N) LOW LIGHT POLE, SEE SHEET E101
5	FATO- FINAL APPROACH & TAKE OFF AREA
6	TLOF- TOUCH DOWN & LIFT OFF
7	PRIMARY APPROACH
8	PRIMARY DEPARTURE
9	APPROACH/DEPARTURE CORRIDOR 8:1 SLOPE; TRANSITIONAL SURFACE 2:1 SLOPE
10	EXISTING FIRE HYDRANT

CAMPUS KEY PLAN





PLAN KEYNOTES

Number	Description
1	6'-0" WIDE GALVANIZED SAFETY NET, REFER TO SHEETS HSN001 TO HSN006
2	8" WIDE GUTTER
3	FIRE EXTINGUISHER CABINET, DESIGNED TO ACCOMMODATE 4A/120BC RATED EXTINGUISHER SEE 3/A120
4	8'-0" HIGH CHAINLINK FENCE, SEE 1/A120. SEE ALTERNATE 4/A120
5	OUTLINE OF SAFETY NET ABOVE
6	6" HIGH CONCRETE CURB
7	STEEL COLUMNS, SEE STRUCTURAL
8	STEEL BRACE FRAME, SEE STRUCTURAL
9	ASPHALT PAVING, SEE C301
10	8'-0" WIDE GURNEY RAMP, GALVANIZED FINISH. SEE HS001
11	4'-6" WIDE EMERGENCY ACCESS STAIR, GALVANIZED FINISH. SEE HS003
12	HALOTRON WHEELED FIRE EXTINGUISHER, SEE SHEET HH002
13	REFERENCE/ CENTER POINT OF INTERIM HELISTOP, SEE CIVIL DRAWINGS
14	18" WIDE YELLOW TOUCHDOWN POSITIONING CIRCLE, SEE SHEET B100
15	LIMITATION MARKING, SEE SHEET B100
16	5'-0" HIGH 'PVT' WHITE BLOCK LETTERS WITH 6" LINEWIDTHS. SEE SHEET B100
17	RED FIELD W/ UV INHIBITORS, SEE B100
18	RED UNDERLINED 'H' ON WHITE CROSS, SEE SHEET B100
19	5'-0" HIGH WHITE 'HUCLA' HOSPITAL IDENTIFICATION, SEE SHEET B100
20	HANDRAIL, SEE SHEETS HH005-HH007
21	PAIR OF 4'-0"W X 8'-0"H STEEL SWING GATE, SEE DTL. 25/A120
22	10'-0"W X 8'-0"H MANUALLY OPERATED SLIDING CHAINLINK GATE WITH PADLOCK, SEE DTL. 7/A120
23	4'-0"W X 8'-0"H STEEL SWING GATE, SEE DTL. 19/A120
24	FUEL SEPARATOR BELL
25	FOR RAMP WIDTH, LENGTH, LANDING SIZES- SEE SHEET HH002.
26	NO SMOKING SIGN

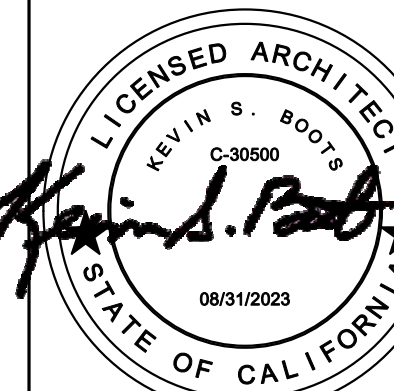


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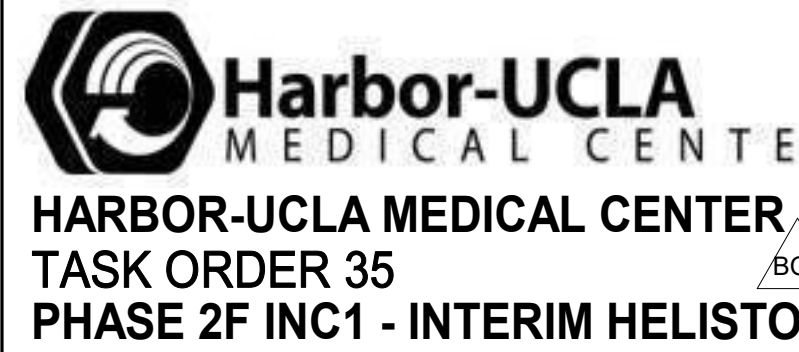
AGENCY APPROVALS

HCAI # H220345-19-00

CONSULTANT

ISSUE RECORD

9/7/2022	BC2	HCAI SUBMITTAL BC2
7/26/2022		AHJ SUBMITTAL
6/23/2022	BC1	HCAI SUBMITTAL BC1
5/23/2022		AHJ SUBMITTAL
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DATE	△	DESCRIPTION



1000 West Carson Street, Torrance, CA 90502

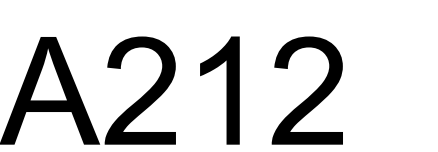
MILESTONE: HCAI SUBMITTAL

MILESTONE DATE: 3/4/2022

RBB PROJECT: 1712035 SCALE: 1/8" = 1'-0"

DESCRIPTION
GROUND LEVEL PLAN

A211

BC20

ON-SITE IMPROVEMENT PLANS

FOR

HARBOR-UCLA MEDICAL CENTER PHASE 2F INC 1 - INTERIM HELISTOP

1000 West Carson Street, Torrance, CA 90502

RBB#1712027

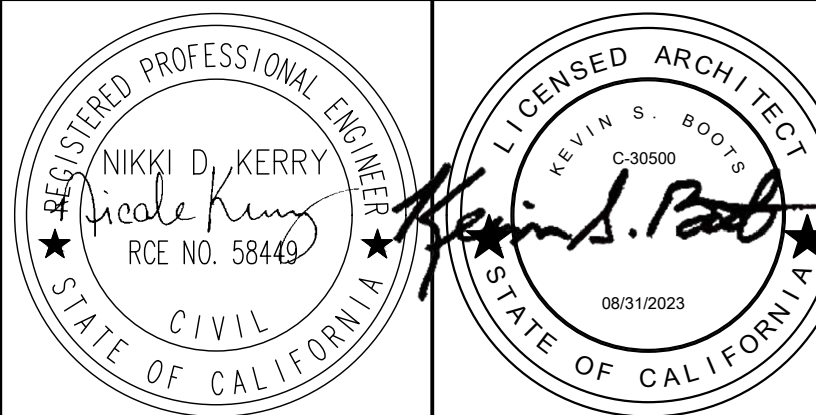


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AGENCY APPROVALS

HCAI #H220345-19-00

CONSULTANT

Kimley»Horn

© 2019 KIMLEY-HORN AND ASSOCIATES, INC.
660 S. FIGUEROA STREET, SUITE 2050
LOS ANGELES, CA 90071
PHONE: 213-261-4040
WWW.KIMLEY-HORN.COM

ISSUE RECORD

9/07/2022	BC2	HCAI SUBMITTAL BC2
8/03/2022	A	ADDENDUM A
7/26/2022	AHJ	SUBMITTAL
6/23/2022	BC1	HCAI SUBMITTAL BC1
5/23/2022	AHJ	SUBMITTAL
3/4/2022	HCAI	SUBMITTAL
DATE	△	DESCRIPTION



**HARBOR-UCLA MEDICAL CENTER
PHASE 2F INC1 - INTERIM HELISTOP**

1000 West Carson Street, Torrance, CA 90502

MILESTONE: HCAI SUBMITTAL

MILESTONE DATE: 03/04/2022

RBB PROJECT: 1712035 SCALE: As indicated

DESCRIPTION

COVER SHEET

C010

UTILITY PURVEYORS	PROJECT TEAM	VICINITY MAP	PROJECT INFORMATION																						
<p>WATER CALIFORNIA WATER SERVICE 2632 W 237TH ST TORRANCE, CA 90505 (310) 257-1427</p> <p>ELECTRICITY SOUTHERN CALIFORNIA EDISON (SCE) 14005 S. BENSON AVE, CHINO, CA 91710 (909) 548-7249</p> <p>GAS SOUTHERN CALIFORNIA GAS COMPANY 9400 OAKDALE AVE CHATSWORTH, CA 91311 (818) 701-3245</p> <p>AT&T 20930 BONITA STREET, SUITE Z CARSON, CA 90746 (310) 485-2041</p> <p>SANITATION LA COUNTY SANITATION DEPARTMENT 920 ALAMEDA ST COMPTON, CA 90221 (310) 638-1161</p> <p>STORM DRAIN LOS ANGELES DEPARTMENT OF PUBLIC WORKS 900 S FREEMONT AVE. ALHAMBRA, CA 90012 (626) 458-1700</p>	<p>OWNER LOS ANGELES COUNTY DEPT. OF PUBLIC WORKS 900 S. FREEMONT AVE., 5TH FLOOR ALHAMBRA, CA 91803-1331</p> <p>ARCHITECT RBB ARCHITECTS INC. MR. KEVIN BOOTS 10980 WILSHIRE BLVD. LOS ANGELES, CA 90024 kboots@rbbinc.com</p> <p>CIVIL ENGINEER KIMLEY-HORN AND ASSOCIATES, INC. MS. NIKKI KERRY, P.E. 660 S. FIGUEROA ST., SUITE 2050 LOS ANGELES, CA 90071 nikki.kerry@kimley-horn.com PHONE: (310) 663-3319</p> <p>STRUCTURAL ENGINEER SHANE FITZGERALD JOHN A. MARTIN ASSOCIATES 950 S. GRAND AVE., 4TH FLOOR LOS ANGELES, CA 90015 fitzgerald@johnamartin.com PHONE: (213) 483-6490 X181</p> <p>MECHANICAL/ELECTRICAL/PLUMBING ENGINEER TK1sc MS. LOUISE BELAIR 515 S. FIGUEROA ST., SUITE 1105 LOS ANGELES, CA 90071 lbelair@tk1sc.com PHONE: (480) 329-0917</p> <p>SURVEYOR GUIDA SURVEYING, INC. 9241 IRVINE BLVD, SUITE 200 IRVINE, CA 92618 PHONE: (949) 777-2023</p> <p>GEOTECHNICAL CONSULTANT C. GARRY LAY, P.E., G.E. AECOM 300 S GRAND AVE STE 900 LOS ANGELES, CA 90017 (213) 593-8100</p> <p>AVIATION HELIPLANNERS 41689 ENTERPRISE CIR N TEMECULA, CA 92590 Kathryn D. Wright katwright@heliplanners.com T (951) 693-5090</p> <p>FEC HELIPORTS 5298 RIVER ROAD CINCINNATI, OH 45233 Jeffrey Stenwerf jstf@fcheliports.com T (513) 864-8024</p> <p>LOW VOLTAGE ENGINEER EXANTE 360 895 DOVE ST 3RD FLOOR NEWPORT BEACH, CA 92660 Craig Durrant cdurrant@exante360.com</p>		<p>GENERAL INFORMATION</p> <p>GRADING PERMIT APPLICATION No. GRAD220523000276</p> <p>EARTHWORK VOLUMES Cut 300 (cy) Fill N/A (cy) Over Excavation Removal & Compaction 41 (cy) Export 300 (cy) , Export Location SHALL BE DETERMINED BY CONTRACTOR</p> <p>TOTAL DISTURBED AREA 0.3 (Acres)</p> <p>TOTAL PROPOSED LANDSCAPE AREA 0 (Square Feet)</p> <p>TOTAL TURF AREA N/A (%) (Percent of Total Proposed Landscaping)*</p> <p>TOTAL DROUGHT TOLERANT LANDSCAPING AREA N/A (%) (Percent of Total Proposed Landscaping)*</p> <p>PRE-DEVELOPMENT IMPERVIOUS AREA 0.3 (Acres)</p> <p>POST-DEVELOPMENT IMPERVIOUS AREA 0.3 (Acres)</p> <p>CONSTRUCTION & DEMOLITION DEBRIS RECYCLING AND REUSE PLAN (RPP ID) OBTAIN FROM EPD</p> <p>PROPERTY INFORMATION</p> <p>PROPERTY ADDRESS 1000 W CARSON ST, TORRANCE, CA 90502</p> <p>PROPERTY OWNER DHS - HARBOR UCLA</p> <p>ASSESSORS ID NUMBER 7344-001-901</p> <p>ZONING AND REGIONAL PLANNING INFORMATION</p> <p>PROPERTY ZONING C-3 (GENERAL COMMERCIAL)</p> <p>INTENDED LAND USE MEDICAL CAMPUS</p> <p>NOTE: CONTRACTOR NOT TO EXCEED 3 DAYS OF 5000 CY OR MORE OF DIRT MOVEMENTS PER DAY WITHOUT A FUGITIVE DUST PERMIT. PLEASE CONTACT SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT AT (909) 396-2000.</p> <p>EARTHWORK QUANTITIES NOTE</p> <p>THE QUANTITIES LISTED BELOW ARE APPROXIMATE AND FOR PERMIT PROCESS ONLY. QUANTITIES HAVE BEEN CALCULATED FROM EXISTING FINISHED GRADES TO PROPOSED SUBGRADE. THE CONTRACTOR SHALL MAKE THEIR OWN DETERMINATION OF THE QUANTITIES INVOLVED AND BASE THEIR BID ON THEIR OWN ESTIMATE.</p>																						
<p>LEGAL DESCRIPTION PER TITLE REPORT</p> <p>THE LAND REFERRED TO IN THIS COMMITMENT IT SITUATED IN THE UNINCORPORATED AREA OF THE COUNTY OF LOS ANGELES, STATE OF CALIFORNIA, AND IS DESCRIBED AS FOLLOWS:</p> <p>THOSE PORTIONS OF TRACT NO. 3239, IN THE UNINCORPORATED TERRITORY OF THE COUNTY OF LOS ANGELES, STATE OF CALIFORNIA, AS SHOWN ON MAP RECORDED IN BOOK 37, PAGES 27 AND 28, OF MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY; THOSE PORTIONS OF CARSON STREET, 220TH STREET (FORMERLY AMELIA STREET), MEYLER STREET (NOW VACATED), AS SHOWN ON SAID MAP, AND VERMONT AVENUE, AS SAID STREETS AND AVENUES ARE SHOWN ON SAID MAP; AND THOSE PORTIONS OF THE VICTORIA DOMINGUEZ DE CARSON 2463.79 ACRE ALLOTMENT IN PART OF THE RANCHO SAN PEDRO AS SHOWN ON MAP FILED IN CASE NO. 3284 OF THE SUPERIOR COURT OF THE STATE OF CALIFORNIA, IN AND FOR THE COUNTY OF LOS ANGELES, DESCRIBED AS PARCEL 1, IN DEED RECORDED JUNE 30, 1947 IN BOOK 24766, PAGE 76 OF OFFICIAL RECORDS OF SAID COUNTY.</p> <p>NOTE: THE ABOVE DESCRIPTION IS FOR IDENTIFICATION PURPOSES ONLY AND HAS BEEN PROVIDED FOR THE ACCOMMODATION OF THIS REPORT. SAID DESCRIPTION IS NOT INSURABLE PURSUANT TO THE SUBDIVISION MAP ACT OF THE STATE OF CALIFORNIA AND SHOULD NOT BE RELIED UPON TO CONVEY OR ENCUMBER SAID LAND.</p>	<p>GEOTECHNICAL REPORT</p> <p>REFERENCE THE "GEOTECHNICAL ENGINEERING INVESTIGATION" PREPARED BY AECOM, DATED JANUARY 20, 2022. ALSO REFERENCE ADDENDUM NO. 1 DATED MAY 17, 2022 PREPARED BY AECOM; ALL GEOTECHNICAL REPORTS AND ADDENDA SHALL BE CONSIDERED PART OF THESE CONSTRUCTION DOCUMENTS.</p>	<p>SHEET INDEX</p> <table><tbody><tr><td>C010</td><td>COVER SHEET</td></tr><tr><td>C020</td><td>LA COUNTY GENERAL NOTES</td></tr><tr><td>C021</td><td>GENERAL NOTES</td></tr><tr><td>C030</td><td>EXISTING SURVEY CONTROL PLAN</td></tr><tr><td>C031</td><td>PARTIAL EXISTING CONDITIONS SURVEY AREA A4</td></tr><tr><td>C032</td><td>PARTIAL EXISTING TOPOGRAPHY SURVEY AREA A4</td></tr><tr><td>C101</td><td>EROSION AND SEDIMENT CONTROL PLAN</td></tr><tr><td>C151</td><td>EROSION CONTROL DETAILS</td></tr><tr><td>C201</td><td>UTILITY PLAN</td></tr><tr><td>C301</td><td>GRADING AND DRAINAGE PLAN</td></tr><tr><td>C401</td><td>DETAILS</td></tr></tbody></table>	C010	COVER SHEET	C020	LA COUNTY GENERAL NOTES	C021	GENERAL NOTES	C030	EXISTING SURVEY CONTROL PLAN	C031	PARTIAL EXISTING CONDITIONS SURVEY AREA A4	C032	PARTIAL EXISTING TOPOGRAPHY SURVEY AREA A4	C101	EROSION AND SEDIMENT CONTROL PLAN	C151	EROSION CONTROL DETAILS	C201	UTILITY PLAN	C301	GRADING AND DRAINAGE PLAN	C401	DETAILS	<p>RECORD DRAWING NOTE</p> <p>THE EXISTING CONDITIONS SURVEY PLAN REFLECTS TO THE EXTENT PRACTICAL EXISTING UTILITIES BASED ON FIELD SURVEY, UNDERGROUND LOCATING SERVICES, VISUAL OBSERVATION AND READILY AVAILABLE RECORD DRAWINGS FROM THE FOLLOWING SOURCES:</p> <ol style="list-style-type: none">1. HARBOR GENERAL HOSPITAL DATED 19532. ACUTE CARE BUILDING DATED 19583. CENTRAL HEATING AND LAUNDRY DATED 19604. DISTRICT 5 INTERCEPTOR TRUNK SEWER DATED 19665. ELECTRICAL DISTRIBUTION DIAGRAM MULTIPLE REVISIONS6. SURGERY EMERGENCY REPLACEMENT TOPO UPDATE DATED 20097. SURGERY EMERGENCY PRIVATE SEWER PLANS RECORD DRAWING DATED 20138. SURGERY EMERGENCY PRIVATE WATER PLANS RECORD DRAWING DATED 20139. FIRE HYDRANT MASTER SITE PLAN DATED 200610. CIVIL (KHA) UTILITY EXHIBIT11. LA BIOMED DRAWINGS DATED 201412. TELEDATA AND FIBER SITE PLAN DATED 201313. SEWER VACINITY MAP DATED 201514. CHILDREN'S INSTITUTE INTERNATIONAL CHILD/FAMILY DEVELOPMENT CENTER AS-BUILT DATED 199215. MFI AS BUILT16. LA BIOMED DRAWINGS DATED 2017 <p>THE ACCURACY AND COMPLETENESS OF THE INFORMATION ON THESE DRAWINGS WAS NOT VERIFIED IN THE FIELD FOR EVERY UTILITY AT EVERY LOCATION. CONTRACTOR SHALL MAKE THEMSELVES FAMILIAR WITH THESE DRAWINGS AND FIELD CONDITIONS AND SHALL MAKE THEIR OWN DETERMINATION AS TO EXISTENCE, TYPE, SIZE, MATERIAL, AND LOCATION OF ALL UNDERGROUND UTILITIES.</p>
C010	COVER SHEET																								
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C201	UTILITY PLAN																								
C301	GRADING AND DRAINAGE PLAN																								
C401	DETAILS																								
<p>BENCHMARK NOTE</p> <p>SEE SHEET C030.</p>	<p>BASIS OF BEARINGS NOTE</p> <p>SEE SHEET C030.</p>	<p>PERMITS</p> <p>GRADING PERMIT GRAD220523000276</p> <p>FOR ALL DRY UTILITIES, REFER TO PES, EXANTE, TK1SC FOR CONSTRUCTION DETAILS. WORK SHOWN HEREON IS FOR REFERENCE ONLY.</p> <p>UTILITY PERMITS</p> <p>ELECTRICAL PERMIT _____</p> <p>LANDSCAPE WATER EFFICIENCY _____</p>	<p>APPLICABLE CODES</p> <ul style="list-style-type: none">• COUNTY OF LOS ANGELES BUILDING CODE (TITLE 26) APPENDIX J GRADING• LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS STANDARD PLAN MANUAL, CURRENT EDITION• STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION, 2019 EDITION• STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION, 2019 EDITION• CALIFORNIA STORMWATER QUALITY ASSOCIATION STORMWATER BEST MANAGEMENT PRACTICE HANDBOOK PORTAL: CONSTRUCTION (CASQA, 2012)• CALIFORNIA GENERAL PERMIT FOR STORMWATER DISCHARGES ASSOCIATED WITH CONSTRUCTION AND LAND DISTURBANCE ACTIVITIES (SWRCB ORDERS NO. 2009-009-DWQ AS AMENDED BY ORDER 2010-0014-DWQ AND ORDER 2012-0006-DWQ)• CALTRANS STANDARD SPECIFICATION, 2018 EDITION																						
<p>BY REFERENCE</p> <p>UTILITIES SUCH AS WATER, ELECTRICAL, PLUMBING, MECHANICAL, AND SEWER SHOWN ON GRADING PLANS MAY REQUIRE A SEPARATE PERMIT.</p>	<p>ENGINEER'S/SURVEYOR'S STATEMENT REGARDING THE PRESENCE OF MONUMENTS WITHIN PROJECT LIMITS</p> <p>I HEREBY ATTEST THAT I HAVE LOCATED AND REFERENCED ON THESE PLANS THE MONUMENTS EXISTING PRIOR TO CONSTRUCTION TO ENSURE PERPETUATION OF THEIR LOCATION IN ACCORDANCE WITH SECTION 8771 OF THE BUSINESS AND PROFESSIONS CODE. I FURTHER ATTEST THAT I HAVE PERFORMED A RECORD SEARCH AND FIELD INSPECTION TO IDENTIFY EXISTING MONUMENTS, SHALL SET SUFFICIENT CONTROLLING, WITNESS, AND PERMANENT MONUMENTS; AND SHALL FILE THE REQUISITE CORNER RECORD OR RECORD OF SURVEY OF THE REFERENCES WITH THE COUNTY SURVEYOR.</p>	<p>AS CIVIL ENGINEER/LAND SURVEYOR OF THIS PROJECT, I HAVE IDENTIFIED THE LOCATION OF ALL EASEMENTS WHICH ARE DEPICTED ON THESE PLANS. I HAVE REVIEWED THE PROPOSED EASEMENT DOCUMENTS AND VERIFIED THE PROPOSED CONSTRUCTION DOES NOT CONFLICT OR INTERFERE WITH THE INTENDED EASEMENT USE.</p>	<p>THIS PLAN HAS BEEN REVIEWED AND CONFORMS TO RECOMMENDATIONS OF THE "GEOTECHNICAL ENGINEERING INVESTIGATION", DATED MAY 15, 2019 FOR OSHPD WORK, DATED MAY 20, 2019 AND NOVEMBER 7, 2019 FOR NON-OSHPD WORK PREPARED BY AECOM, AND ALL ADDENDA SHALL BE CONSIDERED PART OF THESE CONSTRUCTION DOCUMENTS.</p>																						

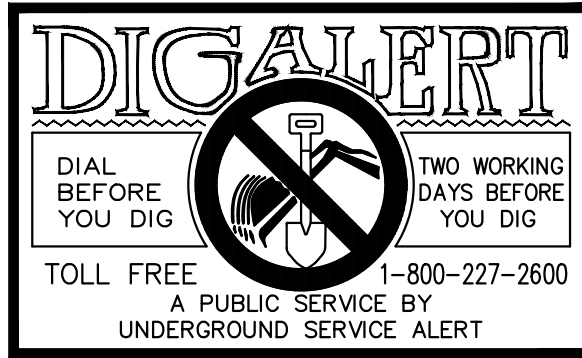


ENGINEER/SURVEYOR (SEAL AND SIGNATURE) 7/26/2022 DATE

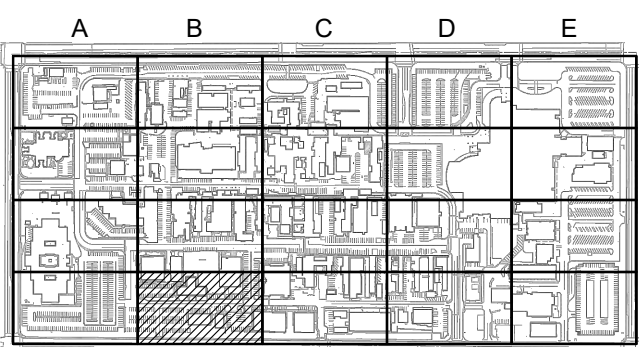


CIVIL ENGINEER/LAND SURVEYOR (STAMP AND SIGNATURE) 7/26/2022 DATE

SIGNATURE DATE



CAMPUS KEY PLAN



GENERAL NOTES:

- ALL GRADING AND CONSTRUCTION SHALL CONFORM TO THE 2017 COUNTY OF LOS ANGELES BUILDING CODES AND THE STATE MODEL WATER EFFICIENCY LANDSCAPE ORDINANCE UNLESS SPECIFICALLY NOTED ON THESE PLANS.
- ANY MODIFICATIONS OF OR CHANGES TO APPROVED GRADING PLANS MUST BE APPROVED BY THE BUILDING OFFICIAL.
- NO GRADING SHALL BE STARTED WITHOUT FIRST NOTIFYING THE BUILDING OFFICIAL. A PRE-GRADING MEETING AT THE SITE IS REQUIRED BEFORE THE START OF THE GRADING WITH THE FOLLOWING PEOPLE PRESENT: OWNER, GRADING CONTRACTOR, DESIGN CIVIL ENGINEER, SOILS ENGINEER, GEOLOGIST, COUNTY GRADING INSPECTOR(S) OR THEIR REPRESENTATIVES, AND WHEN REQUIRED THE ARCHEOLOGIST OR OTHER JURISDICTIONAL AGENCIES. PERMITTEE OR HIS AGENT ARE RESPONSIBLE FOR ARRANGING PRE-GRADE MEETING AND MUST NOTIFY THE BUILDING OFFICIAL AT LEAST TWO BUSINESS DAYS PRIOR TO PROPOSED PRE-GRADE MEETING.
- APPROVAL OF THESE PLANS REFLECT SOLELY THE REVIEW OF PLANS IN ACCORDANCE WITH THE COUNTY OF LOS ANGELES BUILDING CODES AND DOES NOT REFLECT ANY POSITION BY THE COUNTY OF LOS ANGELES OR THE DEPARTMENT OF PUBLIC WORKS REGARDING THE STATUS OF ANY TITLE ISSUES RELATING TO THE LAND ON WHICH THE IMPROVEMENTS MAY BE CONSTRUCTED. ANY DISPUTES RELATING TO TITLE ARE SOLELY A PRIVATE MATTER NOT INVOLVING THE COUNTY OF LOS ANGELES OR THE DEPARTMENT OF PUBLIC WORKS.
- ALL GRADING AND CONSTRUCTION ACTIVITIES SHALL COMPLY WITH COUNTY OF LOS ANGELES CODE, TITLE 12, SECTION 12.12.030 THAT CONTROLS AND RESTRICTS NOISE FROM THE USE OF CONSTRUCTION AND GRADING EQUIPMENT FROM THE HOURS OF 6:00 PM TO 6:30 AM, AND ON SUNDAYS AND HOLIDAYS. (MORE RESTRICTIVE CONSTRUCTION ACTIVITY TIMES MAY GOVERN, AS REQUIRED BY THE DEPARTMENT OF REGIONAL PLANNING AND SHOULD BE SHOWN ON THE GRADING PLANS WHEN APPLICABLE.)
- CALIFORNIA PUBLIC RESOURCES CODE (SECTION 5097.98) AND HEALTH AND SAFETY CODE (SECTION 7050.5) ADDRESS THE DISCOVERY AND DISPOSITION OF HUMAN REMAINS. IN THE EVENT OF DISCOVERY OR RECOGNITION OF ANY HUMAN REMAINS IN ANY LOCATION OTHER THAN A DEDICATED CEMETERY, THE LAW REQUIRES THAT GRADING IMMEDIATELY STOPS AND NO FURTHER EXCAVATION OR DISTURBANCE OF THE SITE, OR ANY NEARBY AREA WHERE HUMAN REMAINS MAY BE LOCATED, OCCUR UNTIL THE FOLLOWING HAS BEEN MEASURES HAVE BEEN TAKEN:
 - THE COUNTY CORONER HAS BEEN INFORMED AND HAS DETERMINED THAT NO INVESTIGATION OF THE CAUSE OF DEATH IS REQUIRED, AND
 - IF THE REMAINS ARE OF NATIVE AMERICAN ORIGIN, THE DESCENDANTS FROM THE DECEASED NATIVE AMERICANS HAVE MADE A RECOMMENDATION FOR THE MEANS OF TREATING OR DISPOSING, WITH APPROPRIATE DIGNITY, OF THE HUMAN REMAINS AND ANY ASSOCIATED GRAVE GOODS
- THE LOCATION AND PROTECTION OF ALL UTILITIES IS THE RESPONSIBILITY OF THE PERMITTEE.
- ALL EXPORT OF MATERIAL FROM THE SITE MUST GO TO A PERMITTED SITE APPROVED BY THE BUILDING OFFICIAL OR A LEGAL DUMPSITE. RECEIPTS FOR ACCEPTANCE OF EXCESS MATERIAL BY A DUMPSITE ARE REQUIRED AND MUST BE PROVIDED TO THE BUILDING OFFICIAL UPON REQUEST.
- A COPY OF THE GRADING PERMIT AND APPROVED GRADING PLANS MUST BE IN THE POSSESSION OF A RESPONSIBLE PERSON AND AVAILABLE AT THE SITE AT ALL TIMES.
- SITE BOUNDARIES, EASEMENTS, DRAINAGE DEVICES, RESTRICTED USE AREAS SHALL BE LOCATED PER CONSTRUCTION STAKING BY FIELD ENGINEER OR LICENSED SURVEYOR PRIOR TO GRADING, AS REQUESTED BY THE BUILDING OFFICIAL, ALL PROPERTY LINES, EASEMENTS, AND RESTRICTED USE AREAS SHALL BE STAKED.
- NO GRADING OR CONSTRUCTION SHALL OCCUR WITHIN THE PROTECTED ZONE OF ANY OAK TREE AS REQUIRED PER TITLE CHAPTER 22.56 OF THE COUNTY OF LOS ANGELES ZONING CODE. THE PROTECTED ZONE SHALL MEAN THAT AREA WITHIN THE DRIP LINE OF AN OAK TREE EXTENDING THERE FROM A POINT AT LEAST FIVE FEET OUTSIDE THE DRIP LINE, OR 15 FEET FROM THE TRUNK(S) OF A TREE, WHICHEVER IS GREATER.
- WHERE A GRADING PERMIT IS ISSUED AND THE BUILDING OFFICIAL DETERMINES THAT THE GRADING WILL NOT BE COMPLETED PRIOR TO NOVEMBER 1, THE OWNER OF THE SITE ON WHICH THE GRADING IS BEING PERFORMED SHALL, ON OR BEFORE OCTOBER 1, FILE OR CAUSE TO BE FILED WITH THE BUILDING OFFICIAL AN ESCP PER SECTION J101.8.3 OF THE COUNTY OF LOS ANGELES BUILDING CODE.
- TRANSFER OF RESPONSIBILITY: IF THE FIELD ENGINEER, THE SOILS ENGINEER, OR THE ENGINEERING GEOLOGIST OF RECORD IS CHANGED DURING GRADING, THE WORK SHALL BE STOPPED UNTIL THE REPLACEMENT HAS AGREED IN WRITING TO ACCEPT THEIR RESPONSIBILITY WITHIN THE AREA OF TECHNICAL COMPETENCE FOR APPROVAL UPON COMPLETION OF THE WORK. IT SHALL BE THE DUTY OF THE PERMITTEE TO NOTIFY THE BUILDING OFFICIAL IN WRITING OF SUCH CHANGE PRIOR TO THE RECOMMENCEMENT OF SUCH GRADING.

INSPECTION NOTES:

- THE PERMITTEE OR HIS AGENT SHALL NOTIFY THE BUILDING OFFICIAL AT LEAST ONE WORKING DAY IN ADVANCE OF REQUIRED INSPECTIONS AT FOLLOWING STAGES OF THE WORK: (SECTION J105.7 OF THE BUILDING CODE.)
 - PRE-GRADE - BEFORE THE START OF ANY EARTH DISTURBING ACTIVITY OR CONSTRUCTION.
 - INITIAL - WHEN THE SITE HAS BEEN CLEARED OF VEGETATION AND UNAPPROVED FILL HAS BEEN SCARIFIED, BENCHED OR OTHERWISE PREPARED FOR FILL. FILL SHALL NOT BE PLACED PRIOR TO THIS INSPECTION. NOTE: PRIOR TO ANY CONSTRUCTION ACTIVITIES, INCLUDING GRADING, ALL STORM WATER POLLUTION PREVENTION MEASURES INCLUDING EROSION CONTROL DEVICES WHICH CONTAIN SEDIMENTS MUST BE INSTALLED.
 - ROUGH - WHEN APPROXIMATE FINAL ELEVATIONS HAVE BEEN ESTABLISHED, DRAINAGE TERRACES, SWALES AND BERMS INSTALLED AT THE TOP OF THE SLOPE, AND THE STATEMENTS REQUIRED IN THIS SECTION HAVE BEEN RECEIVED.
 - FINAL - WHEN GRADING HAS BEEN COMPLETED, ALL DRAINAGE DEVICES INSTALLED, SLOPE PLANTING ESTABLISHED, IRRIGATION SYSTEMS INSTALLED AND THE AS-BUILT PLANS, REQUIRED STATEMENTS, AND REPORTS HAVE BEEN SUBMITTED AND APPROVED.
- IN ADDITION TO THE INSPECTION REQUIRED BY THE BUILDING OFFICIAL FOR GRADING, REPORTS AND STATEMENTS SHALL BE SUBMITTED TO THE BUILDING OFFICIAL IN ACCORDANCE WITH SECTION J105.7 OF THE COUNTY OF LOS ANGELES BUILDING CODE.
- UNLESS OTHERWISE DIRECTED BY THE BUILDING OFFICIAL, THE FIELD ENGINEER FOR ALL ENGINEERED GRADING PROJECTS SHALL PREPARE ROUTINE INSPECTION REPORTS AS REQUIRED UNDER SECTION J105.11 OF THE COUNTY OF LOS ANGELES BUILDING CODE. THESE REPORTS, KNOWN AS "REPORT OF GRADING ACTIVITIES", SHALL BE SUBMITTED TO THE BUILDING OFFICIAL AS FOLLOWS:
 - BI-WEEKLY DURING ALL TIMES WHEN GRADING OF 400 CUBIC YARDS OR MORE PER WEEK IS OCCURRING ON THE SITE;
 - MONTHLY AT ALL OTHER TIMES; AND
 - AT ANY TIME WHEN REQUESTED IN WRITING BY THE BUILDING OFFICIAL. SUCH "REPORT OF GRADING ACTIVITIES" SHALL CERTIFY TO THE BUILDING OFFICIAL THAT THE FIELD ENGINEER HAS INSPECTED THE GRADING SITE AND RELATED ACTIVITIES AND HAS FOUND THEM IN COMPLIANCE WITH THE APPROVED GRADING PLANS AND SPECIFICATIONS, THE BUILDING CODE, ALL GRADING PERMIT CONDITIONS, AND ALL OTHER APPLICABLE ORDINANCES AND REQUIREMENTS. THIS FORM IS AVAILABLE AT THE FOLLOWING WEBSITE: [HTTP://DPW.LACOUNTY.GOV/BS/DG/DEFAULT.ASPX](http://dpw.lacounty.gov/bsd/dg/default.aspx). "REPORT OF GRADING ACTIVITIES" MAY BE SCANNED AND UPLOADED AT THE WEBSITE OR FAXED TO (310) 530-5482. FAILURE TO PROVIDE REQUIRED INSPECTION REPORTS WILL RESULT IN A "STOP" WORK ORDER."19. ALL GRADED SITES MUST HAVE DRAINAGE SWALES, BERMS, AND OTHER DRAINAGE DEVICES INSTALLED PRIOR TO ROUGH GRADING APPROVAL PER SECTION J105.7 OF THE COUNTY OF LOS ANGELES BUILDING CODE.
- ALL GRADED SITES MUST HAVE DRAINAGE SWALES, BERMS, AND OTHER DRAINAGE DEVICES INSTALLED PRIOR TO ROUGH GRADING APPROVAL PER SECTION J105.7 OF THE COUNTY OF LOS ANGELES BUILDING CODE.
- THE GRADING CONTRACTOR SHALL SUBMIT THE STATEMENT TO THE GRADING INSPECTOR AS REQUIRED BY SECTION J105.12 OF THE COUNTY OF LOS ANGELES BUILDING CODE AT THE COMPLETION OF ROUGH GRADING.
- FINAL GRADING MUST BE APPROVED BEFORE OCCUPANCY OF BUILDINGS WILL BE ALLOWED PER SECTION J105 OF THE COUNTY OF LOS ANGELES BUILDING CODE.
- A PROPERTY LINE SURVEY, PREPARED BY A CA LICENSED LAND SURVEYOR OR A CIVIL ENGINEER WITH A LICENSE NUMBER BELOW C33986, MAY BE REQUIRED BY THE BUILDING OFFICIAL BASED UPON SITE CONDITIONS IN ACCORDANCE WITH LACBC SECTION 108.1.

DRAINAGE NOTES:

- ALL STORM DRAIN WORK IS TO BE DONE UNDER CONTINUOUS INSPECTION BY THE FIELD ENGINEER. STATUS REPORTS REQUIRED UNDER NOTE 18 AND SECTION J105.11 OF THE COUNTY OF LOS ANGELES BUILDING CODE SHALL INCLUDE INSPECTION INFORMATION AND REPORTS ON THE STORM DRAIN INSTALLATION.

GENERAL GEOTECHNICAL NOTES:

- ALL WORK MUST BE IN COMPLIANCE WITH THE RECOMMENDATIONS INCLUDED IN THE GEOTECHNICAL CONSULTANT'S REPORT(S) AND THE APPROVED GRADING PLANS AND SPECIFICATIONS.
- GRADING OPERATIONS MUST BE CONDUCTED UNDER PERIODIC INSPECTIONS BY THE GEOTECHNICAL CONSULTANTS WITH MONTHLY INSPECTION REPORTS TO BE SUBMITTED TO THE GEOLOGY AND SOILS SECTION, (900 S. FREMONT, ALHAMBRA CA 91803 - 3RD FLOOR.)
- THE SOIL ENGINEER SHALL PROVIDE SUFFICIENT INSPECTIONS DURING THE PREPARATION OF THE PROPOSED SUBGRADE AND FINISHED GRADE, AND THE PLACEMENT AND COMPACTION OF THE FILL TO BE SATISFIED THAT THE WORK IS BEING PERFORMED IN ACCORDANCE WITH THE PLAN AND APPLICABLE CODE REQUIREMENTS.
- ROUGH GRADING MUST BE APPROVED BY A FINAL ENGINEERING GEOLOGY AND SOILS ENGINEERING REPORT. AN AS-BUILT PLAN TO DOCUMENT GRADING OPERATION MUST BE INCLUDED IN THE FINAL GEOTECHNICAL CONSTRUCTION REPORT. PROVIDE A FINAL REPORT STATEMENT THAT VERIFIES WORK WAS DONE IN ACCORDANCE WITH REPORT RECOMMENDATIONS AND CODE PROVISIONS (SECTION J105.12 OF THE COUNTY OF LOS ANGELES BUILDING CODE). THE FINAL REPORT(S) MUST BE SUBMITTED TO THE GEOTECHNICAL AND MATERIALS ENGINEERING DIVISION FOR REVIEW AND APPROVAL.
- FOUNDATION, WALL AND UTILITY TRENCH EXCAVATIONS MUST BE INSPECTED AND APPROVED BY THE CONSULTING GEOLOGIST AND SOIL ENGINEER, PRIOR TO THE PLACING OF STEEL, CONCRETE OR UTILITY CONDUIT.
- FOR SUBGRADE PREPARATION IN NATIVE SOIL, REFER TO PARAGRAPH 1, PAGE 2 OF AECOM AMENDMENT 1 (DATED 05/17/21)

FILL NOTES:

- ALL FILL SHALL BE COMPACTED TO THE FOLLOWING MINIMUM RELATIVE COMPACTION CRITERIA:
 - 95 PERCENT OF MAXIMUM DRY DENSITY WITHIN 40 FEET BELOW FINISH GRADE.
 - 93 PERCENT OF MAXIMUM DRY DENSITY DEEPER THAN 40 FEET BELOW FINISH GRADE, UNLESS A LOWER RELATIVE COMPACTION (NOT LESS THAN 90 PERCENT OF MAXIMUM DRY DENSITY) IS JUSTIFIED BY THE GEOTECHNICAL ENGINEER.

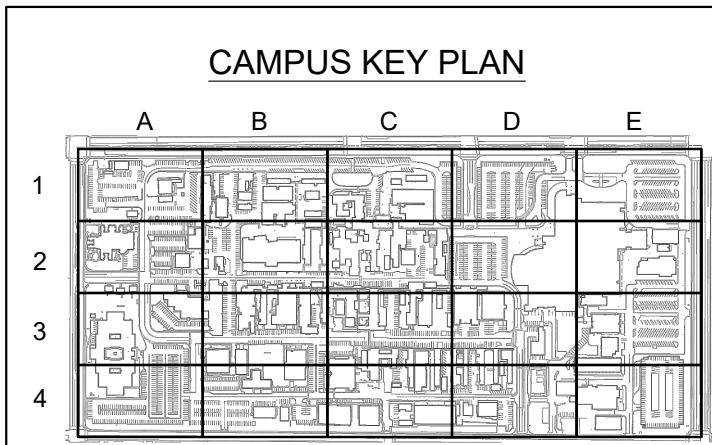
- THE RELATIVE COMPACTION SHALL BE DETERMINED BY A S.T.M. SOIL COMPACTION TEST D1557-91 WHERE APPLICABLE; WHERE NOT APPLICABLE, A TEST ACCEPTABLE TO THE BUILDING OFFICIAL SHALL BE USED. (SECTION J107.5 OF THE COUNTY OF LOS ANGELES BUILDING CODE.)
- 95 PERCENT OF MAXIMUM DRY DENSITY IS REQUIRED FOR ALL FIRE LANES UNLESS OTHERWISE APPROVED BY THE FIRE DEPARTMENT.
 - MINIMUM RELATIVE COMPACTION REQUIREMENT AS SPECIFIED IN THE REFERENCED GEOTECHNICAL REPORT(S).
- FIELD DENSITY SHALL BE DETERMINED BY A METHOD ACCEPTABLE TO THE BUILDING OFFICIAL. (SECTION J107.5 OF THE COUNTY OF LOS ANGELES BUILDING CODE.) HOWEVER, NOT LESS THAN 10% OF THE REQUIRED DENSITY TEST, UNIFORMLY DISTRIBUTED, AND SHALL BE OBTAINED BY THE SAND CONE METHOD.
 - SUFFICIENT TESTS OF THE FILL SOILS SHALL BE MADE TO DETERMINE THE RELATIVE COMPACTION OF THE FILL IN ACCORDANCE WITH THE FOLLOWING MINIMUM GUIDELINES:
 - ONE TEST FOR EACH TWO-FOOT VERTICAL LIFT.
 - ONE TEST FOR EACH 1,000 CUBIC YARDS OF MATERIAL PLACED.
 - ONE TEST AT THE LOCATION OF THE FINAL FILL SLOPE FOR EACH BUILDING SITE (LOT) IN EACH FOUR-FOOT VERTICAL LIFT OR PORTION THEREOF.
 - ONE TEST IN THE VICINITY OF EACH BUILDING PAD FOR EACH FOUR-FOOT VERTICAL LIFT OR PORTION THEREOF.
 - SUFFICIENT TESTS OF FILL SOILS SHALL BE MADE TO VERIFY THAT THE SOIL PROPERTIES COMPLY WITH THE DESIGN REQUIREMENTS, AS DETERMINED BY THE SOIL ENGINEER INCLUDING SOIL TYPES, SHEAR STRENGTHS PARAMETERS AND CORRESPONDING UNIT WEIGHTS IN ACCORDANCE WITH THE FOLLOWING GUIDELINES:
 - PRIOR AND SUBSEQUENT TO PLACEMENT OF THE FILL, SHEAR TESTS SHALL BE TAKEN ON EACH TYPE OF SOIL OR SOIL MIXTURE TO BE USED FOR ALL FILL SLOPES STEEPER THAN THREE (3) HORIZONTAL TO ONE VERTICAL.
 - SHEAR TEST RESULTS FOR THE PROPOSED FILL MATERIAL MUST MEET OR EXCEED THE DESIGN VALUES USED IN THE GEOTECHNICAL REPORT TO DETERMINE SLOPE STABILITY REQUIREMENTS. OTHERWISE, THE SLOPE MUST BE REEVALUATED USING THE ACTUAL SHEAR TEST VALUE OF THE FILL MATERIAL THAT IS IN PLACE.
 - FILL SOILS SHALL BE FREE OF DELETERIOUS MATERIALS.

- FILL SHALL NOT BE PLACED UNTIL STRIPPING OF VEGETATION, REMOVAL OF UNSUITABLE SOILS, AND INSTALLATION OF SUBDRAIN (IF ANY) HAVE BEEN INSPECTED AND APPROVED BY THE SOIL ENGINEER. THE BUILDING OFFICIAL MAY REQUIRE A "STANDARD TEST METHOD FOR MOISTURE, ASH, ORGANIC MATTER, PEAT OR OTHER ORGANIC SOILS" ASTM D-2974-87 ON ANY SUSPECT MATERIAL. DETRIMENTAL AMOUNTS OF ORGANIC MATERIAL SHALL NOT BE PERMITTED IN FILLS. SOIL CONTAINING SMALL AMOUNTS OF ROOTS MAY BE ALLOWED PROVIDED THAT THE ROOTS ARE IN A QUANTITY AND DISTRIBUTED IN A MANNER THAT WILL NOT BE DETRIMENTAL TO THE FUTURE USE OF THE SITE AND THE SOILS ENGINEER APPROVES THE USE OF SUCH MATERIAL.
- ROCK OR SIMILAR MATERIAL GREATER THAN 12 INCHES IN DIAMETER SHALL NOT BE PLACED IN THE FILL UNLESS RECOMMENDATIONS FOR SUCH PLACEMENT HAVE BEEN SUBMITTED BY THE SOIL ENGINEER AND APPROVED IN ADVANCE BY THE BUILDING OFFICIAL. LOCATION, EXTENT, AND ELEVATION OF ROCK DISPOSAL AREAS MUST BE SHOWN ON AN "AS BUILT" GRADING PLAN.
- CONTINUOUS INSPECTION BY THE SOIL ENGINEER, OR A RESPONSIBLE REPRESENTATIVE, SHALL BE PROVIDED DURING ALL FILL PLACEMENT AND COMPACTION OPERATIONS.
- CONTINUOUS INSPECTION BY THE SOIL ENGINEER, OR A RESPONSIBLE REPRESENTATIVE, SHALL BE PROVIDED DURING ALL SUBDRAIN INSTALLATION. (SECTION J107.2 OF THE COUNTY OF LOS ANGELES BUILDING CODE)
- ALL SUBDRAIN OUTLETS ARE TO BE SURVEYED FOR LINE AND ELEVATION. SUBDRAIN INFORMATION MUST BE SHOWN ON AN "AS BUILT" GRADING PLAN.
- FILL SLOPES IN EXCESS OF 2:1 STEEPNESS RATIO ARE TO BE CONSTRUCTED BY THE PLACEMENT OF SOIL AT SUFFICIENT DISTANCE BEYOND THE PROPOSED FINISH SLOPE TO ALLOW COMPACTION EQUIPMENT TO BE OPERATED AT THE OUTER LIMITS OF THE FINAL SLOPE SURFACE. THE EXCESS FILL IS TO BE REMOVED PRIOR TO COMPLETION OF ROUGH GRADING. OTHER CONSTRUCTION PROCEDURES MAY BE USED WHEN IT IS DEMONSTRATED TO THE SATISFACTION OF THE BUILDING OFFICIAL THAT THE ANGLE OF SLOPE, CONSTRUCTION METHOD AND OTHER FACTORS WILL HAVE EQUIVALENT EFFECT. (SECTION J107.5 OF THE COUNTY OF LOS ANGELES BUILDING CODE.)

BEST MANAGEMENT PRACTICE NOTES:

- EVERY EFFORT SHOULD BE MADE TO ELIMINATE THE DISCHARGE OF NON-STORMWATER FROM THE PROJECT SITE AT ALL TIMES.
- ERODED SEDIMENTS AND OTHER POLLUTANTS MUST BE RETAINED ON-SITE AND MAY NOT BE TRANSPORTED FROM THE SITE VIA SHEET FLOW, SWALES, AREA DRAINS, NATURAL DRAINAGE COURSES OR WIND.
- STOCKPILES OF EARTH AND OTHER CONSTRUCTION RELATED MATERIALS MUST BE PROTECTED FROM BEING TRANSPORTED FROM THE SITE BY THE FORCES OF WIND OR WATER.
- FUELS, OILS, SOLVENTS, AND OTHER TOXIC MATERIALS MUST BE STORED IN ACCORDANCE WITH THEIR LISTING AND ARE NOT TO CONTAMINATE THE SOIL AND SURFACE WATERS. ALL APPROVED STORAGE CONTAINERS ARE TO BE PROTECTED FROM THE WEATHER. SPILLS MUST BE CLEANED UP IMMEDIATELY AND DISPOSED OF IN A PROPER MANNER. SPILLS MAY NOT BE WASHED INTO THE DRAINAGE SYSTEM.
- EXCESS OR WASTE CONCRETE MAY NOT BE WASHED INTO THE PUBLIC WAY OR ANY OTHER DRAINAGE SYSTEM. PROVISIONS SHALL BE MADE TO RETAIN CONCRETE WASTES ON-SITE UNTIL THEY CAN BE DISPOSED OF AS SOLID WASTE.
- TRASH AND CONSTRUCTION RELATED SOLID WASTES MUST BE DEPOSITED INTO A COVERED RECEPTACLE TO PREVENT CONTAMINATION OF RAINWATER AND DISPERSAL BY WIND.
- SEDIMENTS AND OTHER MATERIALS MAY NOT BE TRACKED FROM THE SITE BY VEHICLE TRAFFIC. THE CONSTRUCTION ENTRANCE ROADWAYS MUST BE STABILIZED SO AS TO INHIBIT SEDIMENTS FROM BEING DEPOSITED INTO THE PUBLIC WAY. ACCIDENTAL DEPOSITIONS MUST BE SWEEPED UP IMMEDIATELY AND MAY NOT BE WASHED DOWN BY RAIN OR OTHER MEANS.
- ANY SLOPES WITH DISTURBED SOILS OR DENUDED OF VEGETATION MUST BE STABILIZED SO AS TO INHIBIT EROSION BY WIND AND WATER.
- AS THE PROJECT OWNER OR AUTHORIZED AGENT OF THE OWNER, "I CERTIFY THAT THIS DOCUMENT AND ALL ATTACHMENTS WERE PREPARED UNDER MY DIRECTION OR SUPERVISION IN ACCORDANCE WITH THE SYSTEM DESIGNED TO ENSURE THAT A QUALIFIED PERSONNEL PROPERLY GATHER AND EVALUATE THE INFORMATION SUBMITTED, BASED ON MY INQUIRY OF THE PERSON OR PERSONS WHO MANAGE THE SYSTEM OR THOSE DIRECTLY RESPONSIBLE FOR GATHERING THE INFORMATION, TO THE BEST OF MY KNOWLEDGE AND BELIEF. THE INFORMATION SUBMITTED IS TRUE, ACCURATE, AND COMPLETE. I AM AWARE THAT SUBMITTING FALSE AND/OR INACCURATE INFORMATION, FAILING TO UPDATE THE ESCP TO REFLECT CURRENT CONDITIONS, OR FAILING TO PROPERLY AND/OR ADEQUATELY IMPLEMENT THE ESCP MAY RESULT IN REVOCATION OF GRADING AND/OR OTHER PERMITS OR OTHER SANCTIONS PROVIDED BY LAW."

PRINT NAME	SLAVKO VUKIC	
	(OWNER OR AUTHORIZED AGENT OF THE OWNER)	
SIGNATURE		08/08/22
	(OWNER OR AUTHORIZED AGENT OF THE OWNER)	DATE



RBB ARCHITECTS INC

Joseph A. Balbona, AIA

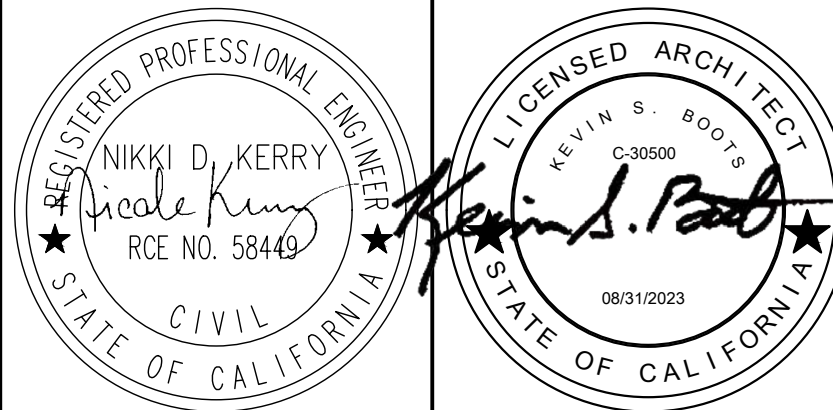
Sylvia Botero, AIA

Kevin S. Boots, AIA

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Los Angeles, California
90024-3905

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Facsimile 310 473 3555

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AGENCY APPROVALS

HCAI #H220345-19-00

CONSULTANT

Kimley»Horn

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LOS ANGELES, CA 90007
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ISSUE RECORD

9/07/2022	BC2	HCAI SUBMITTAL BC2
8/03/2022	A	ADDENDUM A
7/26/2022		AHJ SUBMITTAL
6/23/2022	BC1	HCAI SUBMITTAL BC1
5/23/2022		AHJ SUBMITTAL
3/4/2022		HCAI SUBMITTAL
DATE		DESCRIPTION



HARBOR-UCLA MEDICAL CENTER
PHASE 2F INC1 - INTERIM HELISTOP

1000 West Carson Street, Torrance, CA 90502

MILESTONE: HCAI SUBMITTAL

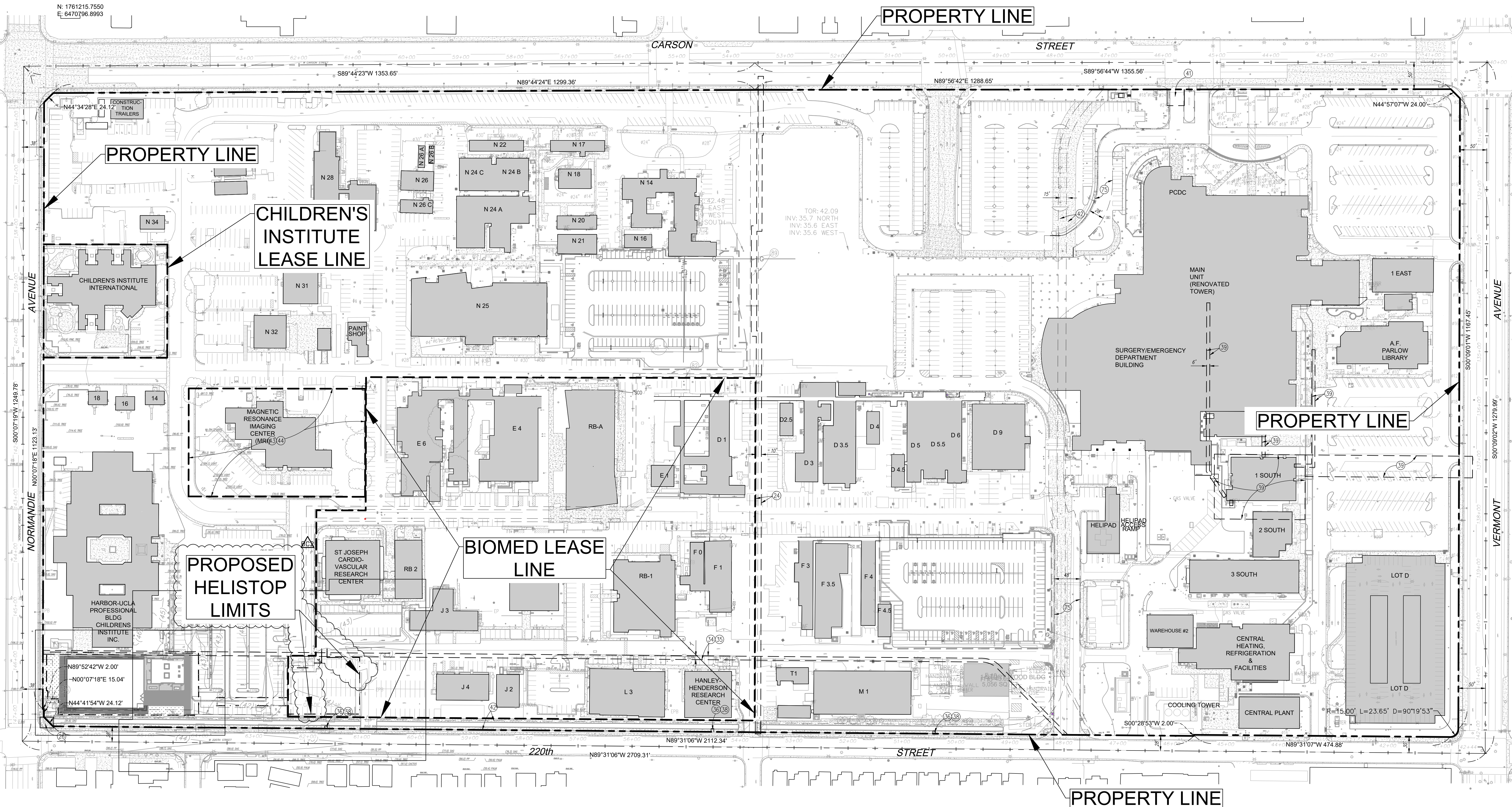
MILESTONE DATE: 03/04/2022

RBB PROJECT: 1712035 SCALE: As indicated

DESCRIPTION
LA COUNTY GENERAL
NOTES

C020

Plotted By: Libo, Michael
Sheet Set: 2F INC 1 Layout: EXIST SURV CONTROL PLAN
September 02, 2022 11:33:31
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N: 1759965.9808

BASIS OF BEARINGS

THE BASIS OF BEARINGS FOR THIS SURVEY IS THE CALIFORNIA COORDINATE SYSTEM 83, ZONE 5, NAD 83 (NSRS2007), EPOCH 2007.00, AS DETERMINED LOCALLY BY A LINE BETWEEN CGPS SITES "CRHS" AND "TORP" BEING SOUTH 62°08'22" WEST AS DERIVED FROM GEODETIC VALUES PUBLISHED BY THE CALIFORNIA SPATIAL REFERENCE CENTER (CSRC) FOR SAID EPOCH, AND MEETS ALL THE REQUIREMENTS OF THE CALIFORNIA PUBLIC RESOURCES CODE.

CRHS

LATITUDE = 33°49'24.600738", LONGITUDE = 118°16'21.907049"

NORTHING = 1758262.1763, EASTING = 6478820.9940

TORP

LATITUDE = 33°47'52.059269", LONGITUDE = 118°19'50.122040"

NORTHING = 1748959.8685, EASTING = 6461222.7208

BASIS OF COORDINATES

GRID COORDINATES SHOWN HEREON ARE SCALED LOCALLY ABOUT "POINT A", WHICH IS THE CALCULATED CENTER OF THE PROJECT, BEING LOCATED AT THE INTERSECTION OF LINES DRAWN BETWEEN PROJECT PAIRS "AT-5 & AT-3" AND "AT-1 & AT-6".

POINT A

NORTHING = 1760597.4594, EASTING = 6472110.1429

THE COMBINED GRID FACTOR AT "POINT A" IS 1.00005388142, USING AN ELEVATION OF 43.24 FEET, NAVD 88. ALL LOCAL COORDINATES ARE SCALED ABOUT "POINT A".

ALL DISTANCES AND DERIVED COORDINATES AS SHOWN ARE GROUND. GRID DISTANCE = GROUND DISTANCE x COMBINED GRID FACTOR.

BENCHMARK

ELEVATIONS SHOWN HEREON ARE BASED UPON LOS ANGELES COUNTY BENCHMARK

"Y 10536".

ELEVATION 47.686 FEET, NAVD 88 (GARDENA QUAD, ADJ. 2005)

NOTE THAT AS PER THE CONTROL SURVEY PROVIDED BY CALVADA SURVEYING, THE CITY OF LOS ANGELES BENCHMARKS IN THE VICINITY DO NOT MATCH TO THIS DATUM. COMPARATIVE ELEVATIONS ARE AS LISTED BELOW:

BM 21-07801 41.48 FEET

BM 21-04542 40.18 FEET

BM 21-04535 44.31 FEET

PLOTTABLE EASEMENTS OF RECORD

(24) EASEMENT FOR PUBLIC UTILITIES TO SOUTHERN CALIFORNIA GAS COMPANY, RECORDED APRIL 3, 1953 BOOK 41389 PAGE 317 OFFICIAL RECORDS (PLOTTED HEREON).

(26) AN EASEMENT FOR UNDERGROUND DRAINAGE RECORDED JULY 17, 1956 BOOK 51761 PAGE 105 OFFICIAL RECORDS (PLOTTED HEREON).

(28) THE TERMS, PROVISIONS AND EASEMENTS RECORDED IN DOCUMENT "CONSENT TO EASEMENT FOR PUBLIC ROAD AND HIGHWAY PURPOSES" RECORDED AUGUST 23, 1961 INSTRUMENT 3629 OFFICIAL RECORDS (PLOTTED HEREON).

(34) AN EASEMENT FOR SEWER PURPOSES RECORDED MARCH 14, 1968 INSTRUMENT 2564 OFFICIAL RECORDS (PLOTTED HEREON).

(36) THE TERMS, PROVISIONS AND EASEMENTS CONTAINED IN DOCUMENT "CONSENT INSTRUMENT" RECORDED JANUARY 15, 1970 INSTRUMENT 3254 OFFICIAL RECORDS (PLOTTED HEREON).

(36) THE TERMS, PROVISIONS AND EASEMENTS CONTAINED IN DOCUMENT "CONSENT INSTRUMENT" RECORDED JANUARY 15, 1970 INSTRUMENT 3255 OFFICIAL RECORDS (PLOTTED HEREON).

(36) THE TERMS, PROVISIONS AND EASEMENTS CONTAINED IN DOCUMENT "RESOLUTION-SETTING ASIDE PORTIONS OF COUNTY-OWNED PROPERTY FOR HIGHWAY AND DRAINAGE PURPOSES-220TH STREET (18-1, 10.1, 10.2 AND 10.3) AND NORMANDIE AVENUE (24-9) IN THE VICINITY OF TORRANCE-SECOND SUPERVISORIAL DISTRICT" RECORDED AUGUST 17, 1970 INSTRUMENT 3378 OFFICIAL RECORDS (PLOTTED HEREON).

(39) THE TERMS AND PROVISIONS CONTAINED IN DOCUMENT "LEASE AND LEASE-BACK PSYCHIATRIC SERVICES BUILDING HARBOR GENERAL HOSPITAL" RECORDED JANUARY 10, 1972 INSTRUMENT 148; MODIFIED MAY 2, 1972 INSTRUMENT 2572; A "QUITCLAIM DEED" RECORDED SEPTEMBER 8, 1997 INSTRUMENT 1385915 ALL OFFICIAL RECORDS (PLOTTED HEREON).

(41) THE TERMS, PROVISIONS AND EASEMENTS CONTAINED IN DOCUMENT "DESCRIPTION OF PARCEL OF LAND TO BE SET ASIDE BY THE COUNTY OF LOS ANGELES FOR PUBLIC ROAD AND HIGHWAY PURPOSES-CARSON STREET" RECORDED MARCH 23, 1982 INSTRUMENT 306431 OFFICIAL RECORDS (PLOTTED HEREON).

(42) AN EASEMENT TO CONSTRUCT, RECONSTRUCT, INSPECT, OPERATE, AND MAINTAIN, REPAIR A CHANNEL RECORDED DECEMBER 19, 1985 INSTRUMENT 85-1498464 OFFICIAL RECORDS (PLOTTED HEREON).

(43) UNRECORDED LEASE RECORDED JANUARY 29, 1988 INSTRUMENT 88-126604 AND JANUARY 29, 1988 INSTRUMENT 88-126606 BOTH OFFICIAL RECORDS (PLOTTED HEREON).

(44) THE TERMS AND PROVISIONS CONTAINED IN DOCUMENT "A LANDLORD'S CONSENT TO LEASE ENCUMBRANCE (HARBOR CENTER)" RECORDED JANUARY 29, 1988 INSTRUMENT No. 88-126607 OFFICIAL RECORDS (PLOTTED HEREON).

(78) AN EASEMENT FOR INGRESS AND EGRESS RECORDED SEPTEMBER 15, 2011 INSTRUMENT 20111256483 OFFICIAL RECORDS (PLOTTED HEREON).

EASEMENTS OF RECORD (CONTINUED)

(81) EASEMENT FOR PUBLIC UTILITIES TO SOUTHERN CALIFORNIA EDISON CO., RECORDED JUNE 21, 2017 AS INST. NO. 20170686706, O.R.

(82) EASEMENT FOR PRIVATE UTILITIES TO "BIOMED", RECORDED DECEMBER 28, 2017 AS INST. NO. 20171513181, O.R.

(86) EASEMENT FOR PUBLIC UTILITIES TO SOUTHERN CALIFORNIA EDISON CO., RECORDED JULY 31, 2019 AS INST. NO. 20190756786, O.R.

(89) EASEMENT FOR PUBLIC UTILITIES TO LOS ANGELES COUNTY SANITATION DISTRICT NO. 2, RECORDED OCTOBER 27, 2016 AS INST. NO. 20161326878, O.R.

MONUMENT NOTES

M1 AT THE INTERSECTION OF NORMANDIE & 220TH, FOUND MAG & FLASHER PER PWFB 0419/1547
NORTHING: 1759965.9808, EASTING: 6470794.2414

M2 AT THE INTERSECTION OF NORMANDIE & CARSON, FOUND LA CO. DPW TAG PER PWFB 0518/1561
NORTHING: 1761215.7550, EASTING: 6470796.8993

M3 AT THE INTERSECTION OF VERMONT & 220TH, FOUND SPK & DPW WSHR PER PWFB 0420/2288

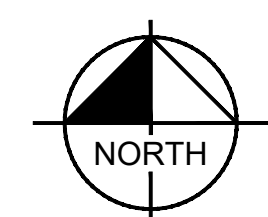
M4 AT THE INTERSECTION OF CARSON & VERMONT, FOUND L&T PER PWFB 0520/1537

SURVEY NOTE

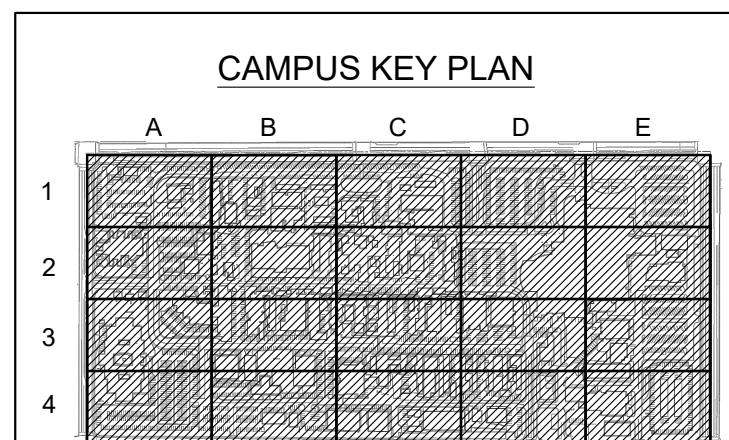
EXISTING BOUNDARY AND TOPOGRAPHICAL INFORMATION AS SHOWN ON THIS PLAN ARE BASED ON SURVEY BY CALVADA SURVEYING, INC. ON 3/16/2016, LAST REVISED 3/27/2019.

LEGEND

- PROPERTY LINE
- RIGHT-OF-WAY LINE
- STREET CENTER LINE
- LUNDQUIST LEASE LINE
- EASEMENT OR SETBACK LINE
- EXISTING BUILDING



GRAPHIC SCALE IN FEET
0 40 80 160

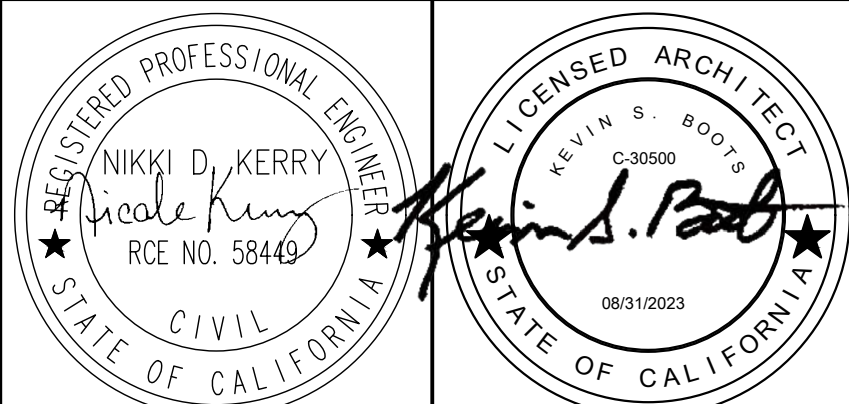


RBB ARCHITECTS INC

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AGENCY APPROVALS

HCAI #H220345-19-00

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ISSUE RECORD

9/07/2022 BC2 HCAI SUBMITTAL BC2
8/03/2022 A ADDENDUM A
7/26/2022 AHJ SUBMITTAL
6/23/2022 BC1 HCAI SUBMITTAL BC1
5/23/2022 AHJ SUBMITTAL
3/4/2022 HCAI SUBMITTAL
DATE DESCRIPTION



HARBOR-UCLA MEDICAL CENTER PHASE 2F INC1 - INTERIM HELISTOP

1000 West Carson Street, Torrance, CA 90502

MILESTONE: HCAI SUBMITTAL

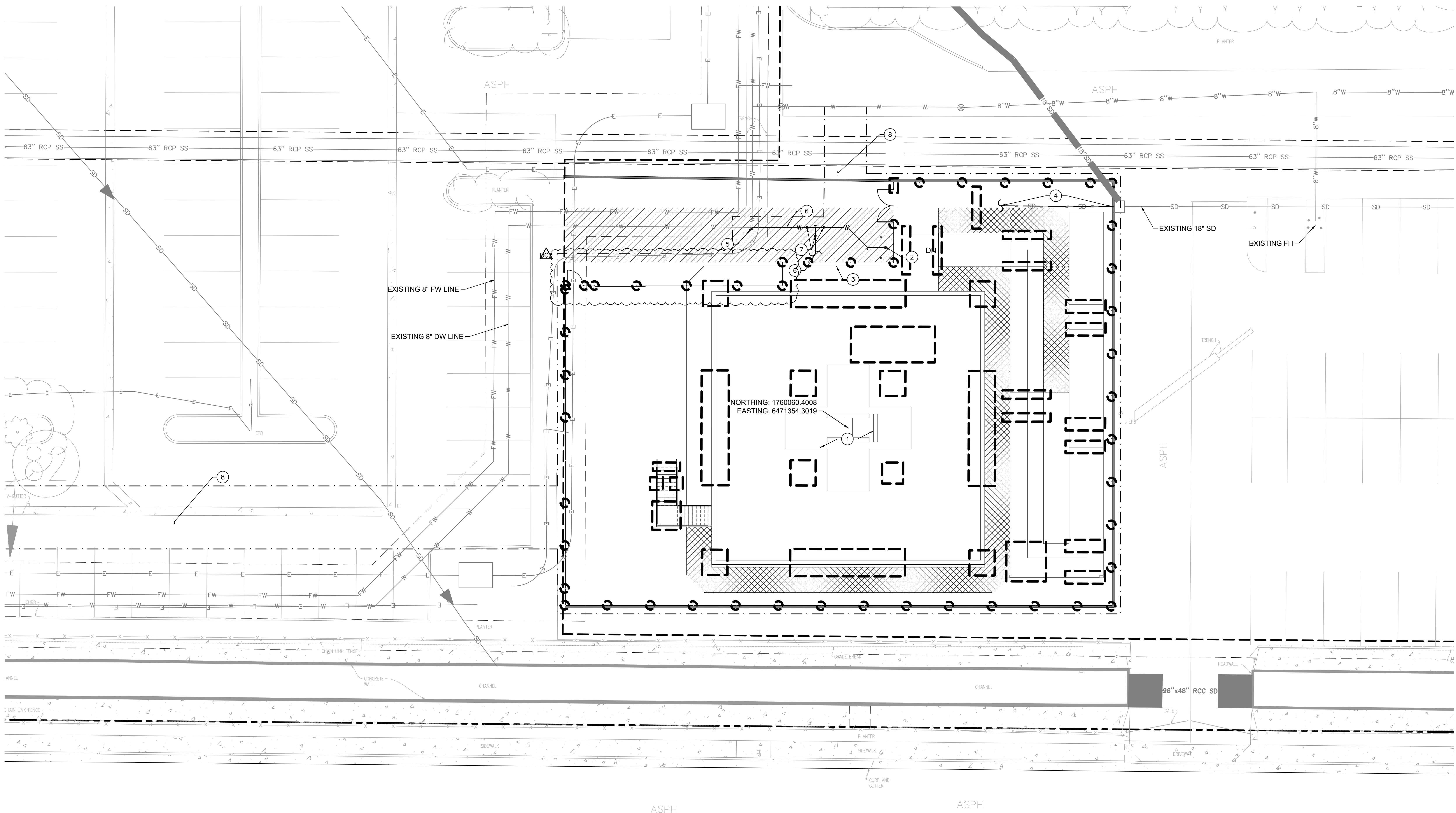
MILESTONE DATE: 03/04/2022

RBB PROJECT: 1712035 SCALE: As indicated

DESCRIPTION
EXISTING SURVEY
CONTROL PLAN

C030

K:\UTL_DEV\090609000 - hca\CAD\035\2F\1\plan sheets\400 UTILITY PLAN.dwg
K:\UTL_DEV\090609000 - hca\CAD\035\2F\1\plan sheets\400 UTILITY PLAN.dwg
Plotted By: Libo, Michael Sheet Set: 2F - INC 1 Layout: UTILITY September 02, 2022 11:36:33am

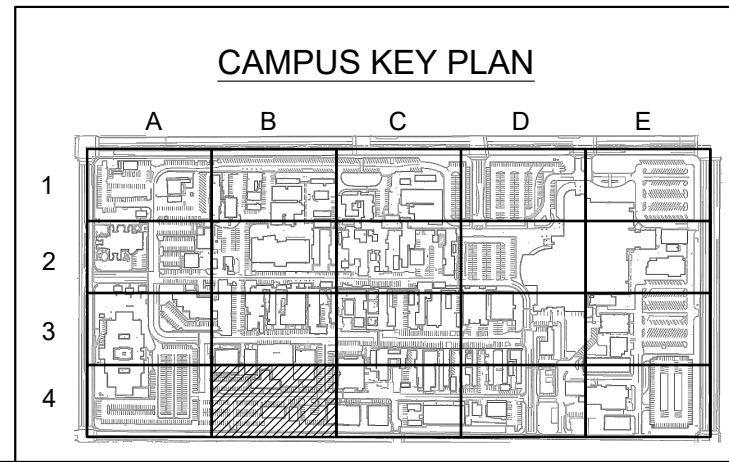
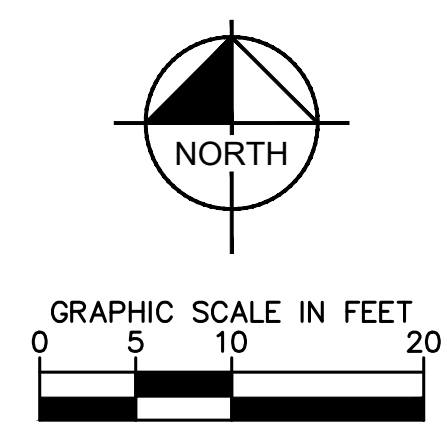


- UTILITY NOTES**
- INTERIM HELIPAD. REFER TO PLANS BY JAMA FOR STRUCTURAL INFORMATION. REFER TO PLANS BY TKISC FOR MEP.
 - CONSTRUCT FLUSHOUT WITH ALL ASSOCIATED VALVES REFER TO SHEET C401 (TYP.), THRUST BLOCKS, & ASSOCIATED APPURTENANCES PER LACWD STD PLAN W-32. INSTALL (4) BOLLARDS PER LACWD STD PLAN W-14.
 - CONTRACTOR TO REFER TO PLANS BY TKISC FOR ABOVE GRADE STORM DRAIN REMOVE EXISTING 18" STORM DRAIN LATERAL. CONTRACTOR SHALL OCTV TO CONFIRM LATERAL DOES NOT SERVE ANYTHING AS SHOWN ON SURVEY. NOTIFY ENGINEER OF ANY DISCREPANCIES.
 - RECONNECT TO EXISTING 8" DOMESTIC WATER LINE WITH NEW 8" X 8" TEE W/ 8"x2" REDUCER AND THRUST BLOCK. THRUST BLOCK AT 45° AND 90° BENDS PER LACWD STD PLAN W-21. CONTRACTOR SHALL COORDINATE TAPPING OF LINE WITH LUNDQUIST INSTITUTE AND LA COUNTY DPW.
 - INSTALL 2" PVC C900 (DR14) PIPE, TRENCH PER DETAIL 1, SHEET C401. REFER TO PLANS BY TKISC FOR CONTINUATION. PIPING INSTALLATION SHALL COMPLY WITH IAPMO IS-8-2006 OF THE CALIFORNIA PLUMBING CODE.
 - GATE VALVE PER DETAIL LACWD STD PLAN W-15.
 - REFER TO ELECTRICAL PLAN, SHEET E101 FOR ELECTRICAL TRENCH.

- EXISTING UTILITY NOTE**
- THE EXISTING UTILITIES SHOWN ON THE PLAN ARE BASED ON AVAILABLE RECORDS. THE CONTRACTOR MUST FIELD DETERMINE THE LOCATION AND DEPTH OF ALL UTILITIES PRIOR TO ANY CONSTRUCTION. REPORT DISCREPANCIES AND POTENTIAL CONFLICTS WITH PROPOSED UTILITIES TO ENGINEER PRIOR TO INSTALLATION OF ANY PIPING.
- LEGEND**
- PROPERTY LINE
 - RIGHT-OF-WAY LINE
 - CENTER LINE
 - LUNDQUIST LEASE LINE
 - EASEMENT LINE
 - CIVIL LIMIT OF WORK LINE
 - DOMESTIC WATER LINE
 - DEMOLISH EXISTING UTILITY
 - THRUST BLOCK
 - GATE VALVE
 - FLUSHOUT

ADDITIONAL UTILITY NOTES

UTILITIES, SUCH AS WATER, ELECTRICAL, PLUMBING, MECHANICAL, AND SEWER SHOWN ON GRADING PLANS, MAY REQUIRE A SEPARATE PERMIT. ADD NOTE ON GRADING PLANS/UTILITY PLANS WHICH LABELS THE UTILITIES ARE PROVIDED FOR REFERENCE ONLY AND SEPARATE PERMITS MAY BE REQUIRED.

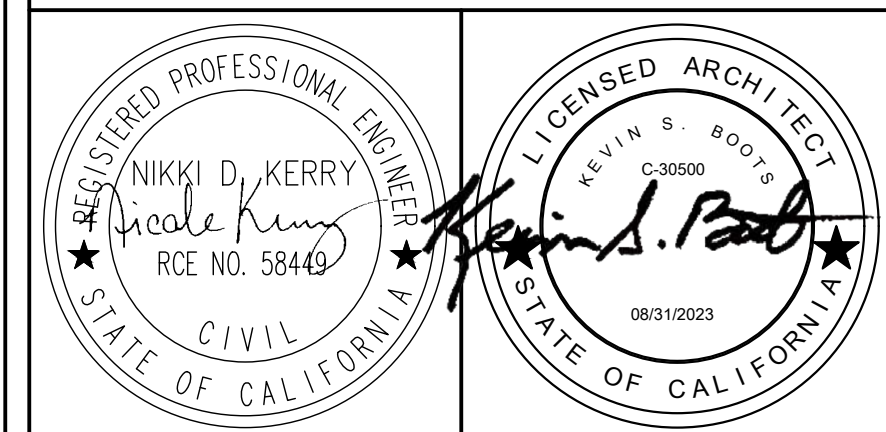


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AGENCY APPROVALS

HCAI #H220345-19-00

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ISSUE RECORD

9/07/2022	BC2	HCAI SUBMITTAL BC2
8/03/2022	A	ADDENDUM A
7/26/2022	AHU	SUBMITTAL
6/23/2022	BC1	HCAI SUBMITTAL BC1
5/23/2022	AHU	SUBMITTAL
3/4/2022		HCAI SUBMITTAL
DATE		DESCRIPTION



**HARBOR-UCLA MEDICAL CENTER
PHASE 2F INC1 - INTERIM HELISTOP**

1000 West Carson Street, Torrance, CA 90502

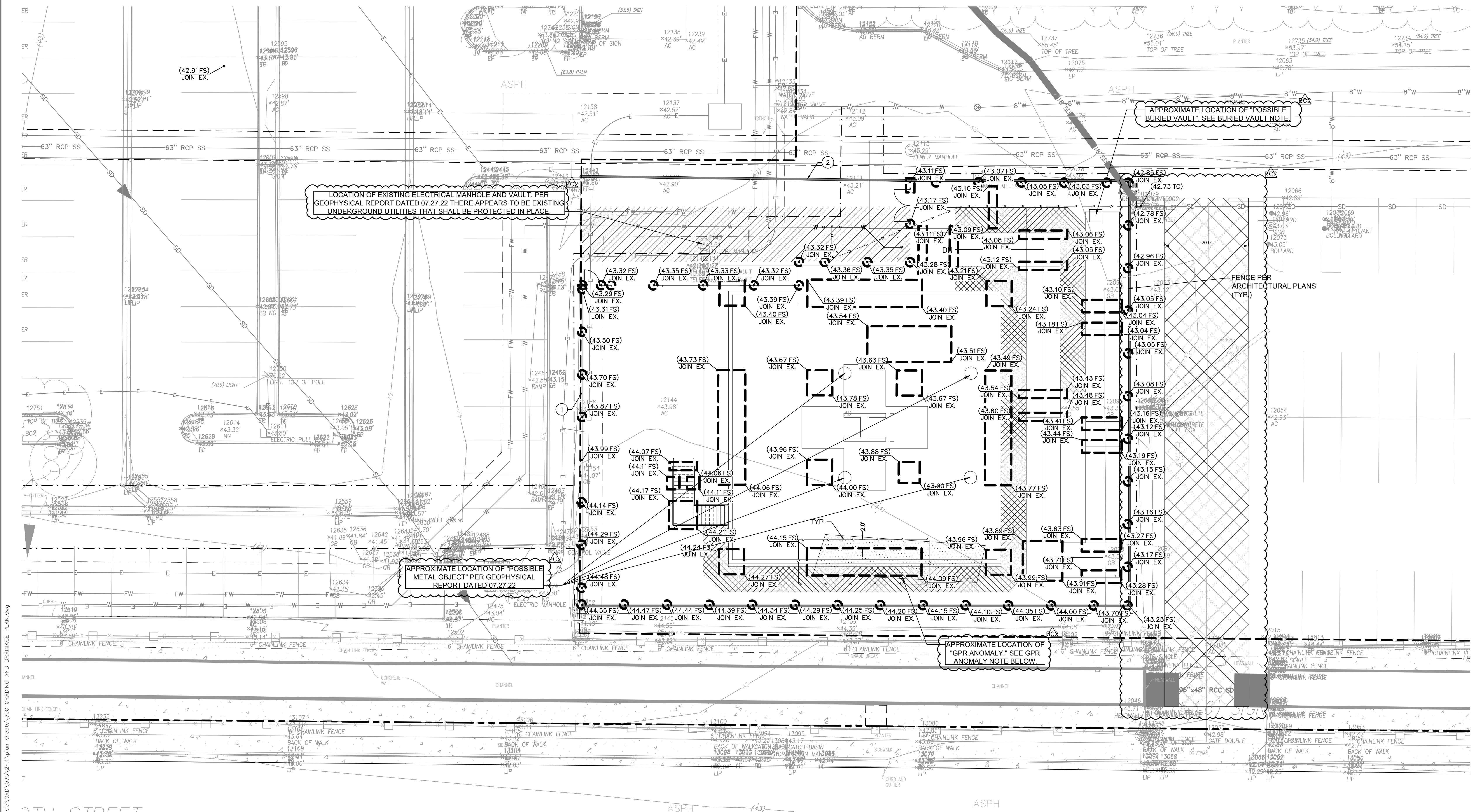
MILESTONE: HCAI SUBMITTAL

MILESTONE DATE: 03/04/2022

RBB PROJECT: 1712035 SCALE: As indicated

**DESCRIPTION
UTILITY PLAN**

C201



RE-ESTABLISHMENT OF EXISTING GRADE

CONTRACTOR SHALL RESTORE PAVEMENT BACK TO EXISTING GRADE FOLLOWING CONSTRUCTION OF HELIPAD FOUNDATIONS. CONTRACTOR SHALL MATCH EXISTING PAVEMENT IN KIND. NOTIFY ENGINEER OF ANY DISCREPANCIES FOUND IN-FIELD.

EXISTING UTILITY NOTE

THE EXISTING UTILITIES SHOWN ON THE PLAN ARE BASED ON AVAILABLE RECORDS. THE CONTRACTOR MUST FIELD DETERMINE THE LOCATION AND DEPTH OF ALL UTILITIES PRIOR TO ANY CONSTRUCTION. REPORT DISCREPANCIES AND POTENTIAL CONFLICTS WITH PROPOSED UTILITIES TO ENGINEER PRIOR TO INSTALLATION OF ANY PIPING.

GPR ANOMALY NOTE

- PER THE "GEOPHYSICAL SURVEY REPORT DATED JULY 27, 2022 PREPARED BY ATLAS TECHNICAL CONSULTANTS LLC", THERE IS AN UNIDENTIFIED OBJECT (APPROXIMATELY 360 SF) UNDERNEATH THE SURFACE.
- PER THE "GEOPHYSICAL SURVEY REPORT DATED JULY 27, 2022 PREPARED BY ATLAS TECHNICAL CONSULTANTS LLC", THE REPORT IS PROVIDED AS A PART OF ADDENDUM "A" PACKAGE. FOR THE OVERLAY.
- FOR QUANTITY ESTIMATE, ASSUME ALL THE ANOMALY TO A MAXIMUM DEPTH OF 4 FEET BELOW THE EXISTING GRADE TO BE REMOVED. FOR ESTIMATING PURPOSE, CONSIDER THE ANOMALY AS COMPACTED AGGREGATE OR 2-SACK CONTROL LOW STRENGTH MATERIAL (CLSM) FOR EXCAVATION EFFORT. ADDITIONAL EXCAVATION WITHIN THE PROPOSED FOOTING FOOTPRINT BELOW THE ANOMALY IS ANTICIPATED TO EL 39 FEET MSL FOR FOUNDATION CONSTRUCTION. FOR BIDDING, ASSUME THE ANOMALY EXCAVATION BEYOND THE PROPOSED FOUNDATION TO BE BACKFILLED WITH COMPACTED FILL TO 90% RELATIVE COMPACTION PER ASTM D1557. THE EXCAVATED ON-SITE SOIL CAN BE REUSED FOR BACKFILL.
- PRIOR TO GRADING OPERATION, CONTRACTOR TO POTHOLE OR EXCAVATE TEST PIT WITHIN THE GPR ANOMALY LIMIT TO CONFIRM THE ACTUAL MATERIAL AND DIMENSIONS. ENGINEER WILL DETERMINE THE FINAL EXCAVATION SCHEME FOR FOUNDATION CONSTRUCTION BASED ON THE FINDINGS.
- IF POTHOLE OR TEST PIT RESULTS MATERIALLY DIFFER FROM THE ESTIMATED EXTENT OR DESCRIPTION OF ANOMALY AS INDICATED IN THE BID DOCUMENT, CONTRACTOR SHALL NOTIFY ENGINEER IMMEDIATELY FOR FURTHER DIRECTION.

BURIED VAULT NOTE

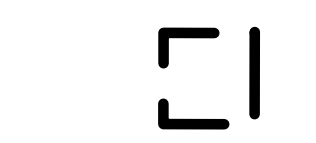
PER THE "GEOPHYSICAL SURVEY REPORT DATED JULY 27, 2022 PREPARED BY ATLAS TECHNICAL CONSULTANTS LLC", THERE IS A POSSIBLE BURIED VAULT THAT HAS NO SCANNED EVIDENCE OF ANY CONNECTING UTILITIES. NO RECORD DRAWINGS ARE AVAILABLE OF THIS VAULT. BEFORE START OF CONSTRUCTION, CONTRACTOR SHALL POTHOLE EXISTING VAULT TO CONFIRM SIZE, DEPTH, AND EXISTENCE OF ANY CONNECTING UTILITIES AND NOTIFY ENGINEER OF ANY DISCREPANCIES. CONTRACTOR SHALL CONFIRM IF THERE IS A CONFLICT TO CONSTRUCT FOOTINGS FOR HELISTOP RAMP, AND NOTIFY ENGINEER ON IF VAULT CAN BE REMOVED OR ABANDONED.

GRADING AND DRAINAGE PLAN NOTES

- AFTER INSTALLATION OF FENCE PER ARCHITECTURAL PLANS, CONTRACTOR TO INSTALL WOOD HEADER PER DETAIL 13, SHEET C401
- CONTRACTOR TO PAINT NEW RED STD. STRIPE PER DETAIL 4, SHEET C401

LEGEND

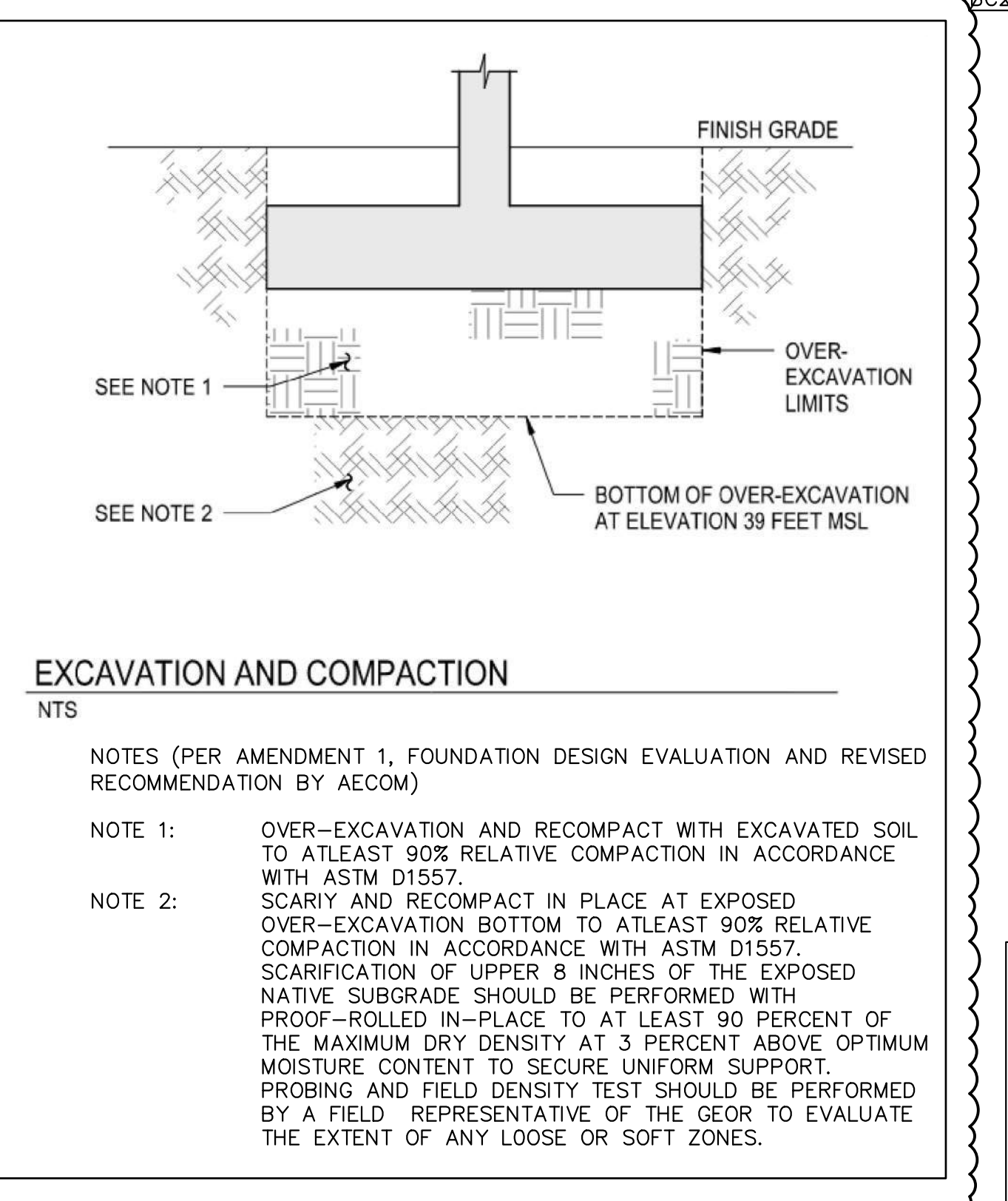
- PROPERTY LINE
- RIGHT-OF-WAY LINE
- CENTER LINE
- EASEMENT LINE
- CIVIL LIMIT OF WORK LINE
- LUNDQUIST LEASE LINE
- SAWOUT PER DETAIL 2, SHEET C401.



STRUCTURAL FOUNDATIONS. REFER TO PLANS BY JAMA. FOR SCARIFY & RECOMPACTION REQUIREMENTS, REFER TO APPROVED GEOTECHNICAL REPORT DATED JANUARY 20, 2022 AND ALL ASSOCIATED ADDENDA INCLUDING MAY 17, 2022 AS SHOWN ON SHEET C401.

(XX.XX FS) MATCH EXISTING GRADE

- AMBULANCE PARKING ONLY STRIPING. REFER TO PLANS BY RBB.
- RED STRIPE. SEE CONSTRUCTION NOTE 2.
- DIRECTION OF FLOW
- FIRE SITE ACCESS
- GPR ANOMALY



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HCAL #H20345-19-00

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ISSUE RECORD	
9/07/2022	BC2 HCAL SUBMITTAL BC2
8/03/2022	A ADDENDUM A
7/26/2022	AHJ SUBMITTAL
6/23/2022	BC1 HCAL SUBMITTAL BC1
5/23/2022	AHJ SUBMITTAL
4/22/2022	HCAL SUBMITTAL
DATE	DESCRIPTION

HARBOR-UCLA MEDICAL CENTER

PHASE 2F INC1 - INTERIM HELISTOP

1000 West Carson Street, Torrance, CA 90502

MILESTONE: HCAL SUBMITTAL

MILESTONE DATE: 03/04/2022

RBB PROJECT: 1712035 SCALE: As indicated

DESCRIPTION

GRADING AND DRAINAGE PLAN

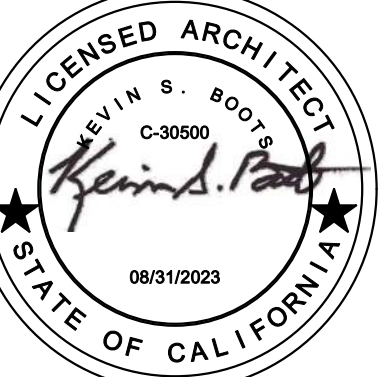
C301

RBB ARCHITECTS INC

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Kevin S. Boots, AIA



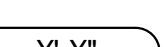

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AGENCY APPROVALS

FOUNDATION NOTES

1. VERIFY ALL DIMENSIONS WITH ARCHITECTURAL DRAWINGS.
2. FOR GENERAL NOTES AND TYPICAL DETAILS, SEE SHEETS S001 THRU S102.
3. FOR NON-FRAME COLUMN SCHEDULE, SEE 1/S401.
4. FOR BRACE FRAME ELEVATIONS SEE S301.
5.  INDICATES SPREAD FOOTING AT NON-FRAME COLUMNS. SEE FOOTING SCHEDULE 11/S401 FOR SIZE AND REINFORCING.
6.  INDICATES CONTINUOUS FOOTINGS. SEE FOOTING SCHEDULE 12/S401 FOR SIZE AND REINFORCING.
7.  INDICATES TOP OF FOOTING ELEVATIONS (FROM TOP OF FINISHED FLOOR).
8.  INDICATES CONCRETE PAD, SEE 17/S101. COORDINATE LOCATION WITH ARCHITECTURAL AND MECHANICAL DRAWINGS.

HCAI # H220345-19-00

CONSULTANT

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& associates
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& ASSOCIATES
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J18006

ISSUE RECORD

9/7/2022	BC2	HCAI SUBMITTAL BC2
7/26/2022		AHJ SUBMITTAL
6/23/2022	BC1	HCAI SUBMITTAL BC1
5/23/2022		AHJ SUBMITTAL
3/4/2022		HCAI SUBMITTAL
DATE	△	DESCRIPTION



HARBOR-UCLA MEDICAL CENTER
TASK ORDER 35
PHASE 2F INC 1 - INTERIM HELISTOP

1000 West Carson Street, Torrance, CA 90502

MILESTONE: HCAI SUBMITTAL

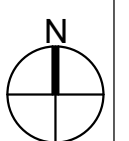
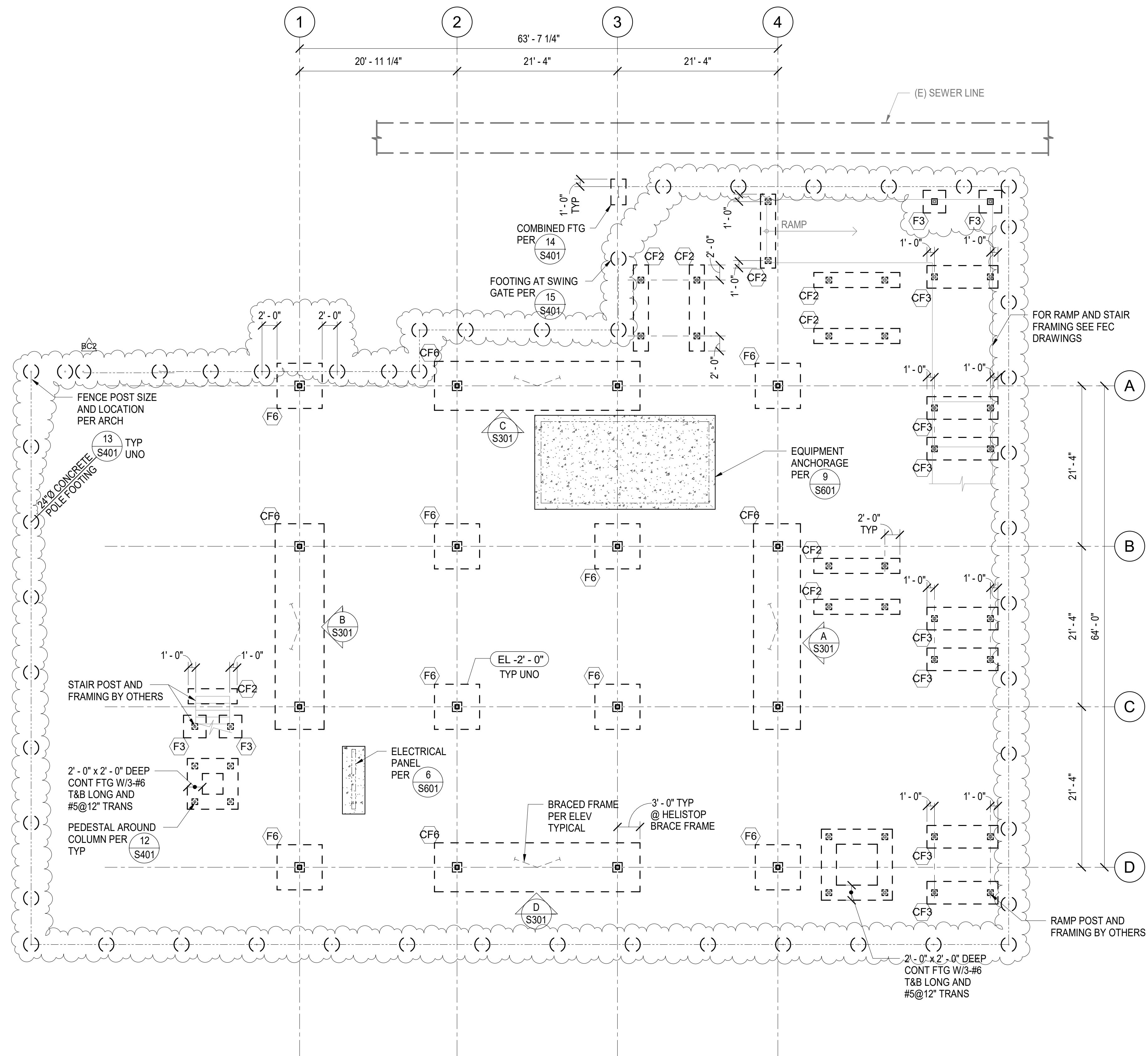
MILESTONE DATE: 03/04/2022

RBB PROJECT: 1712000 SCALE: 1/8" = 1'-0"

DESCRIPTION

HELISTOP FOUNDATION PLAN

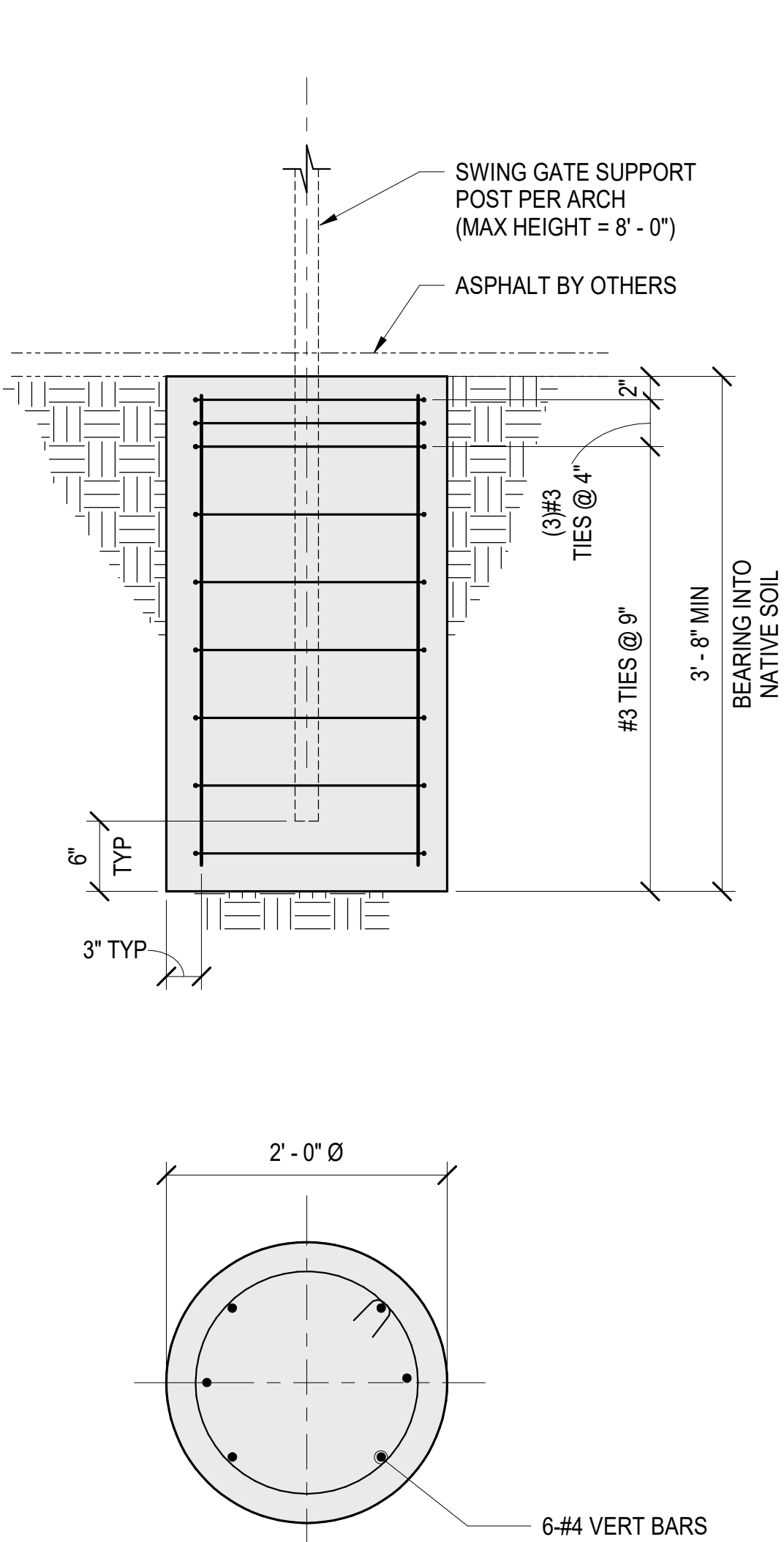
S201



HELISTOP FOUNDATION PLAN

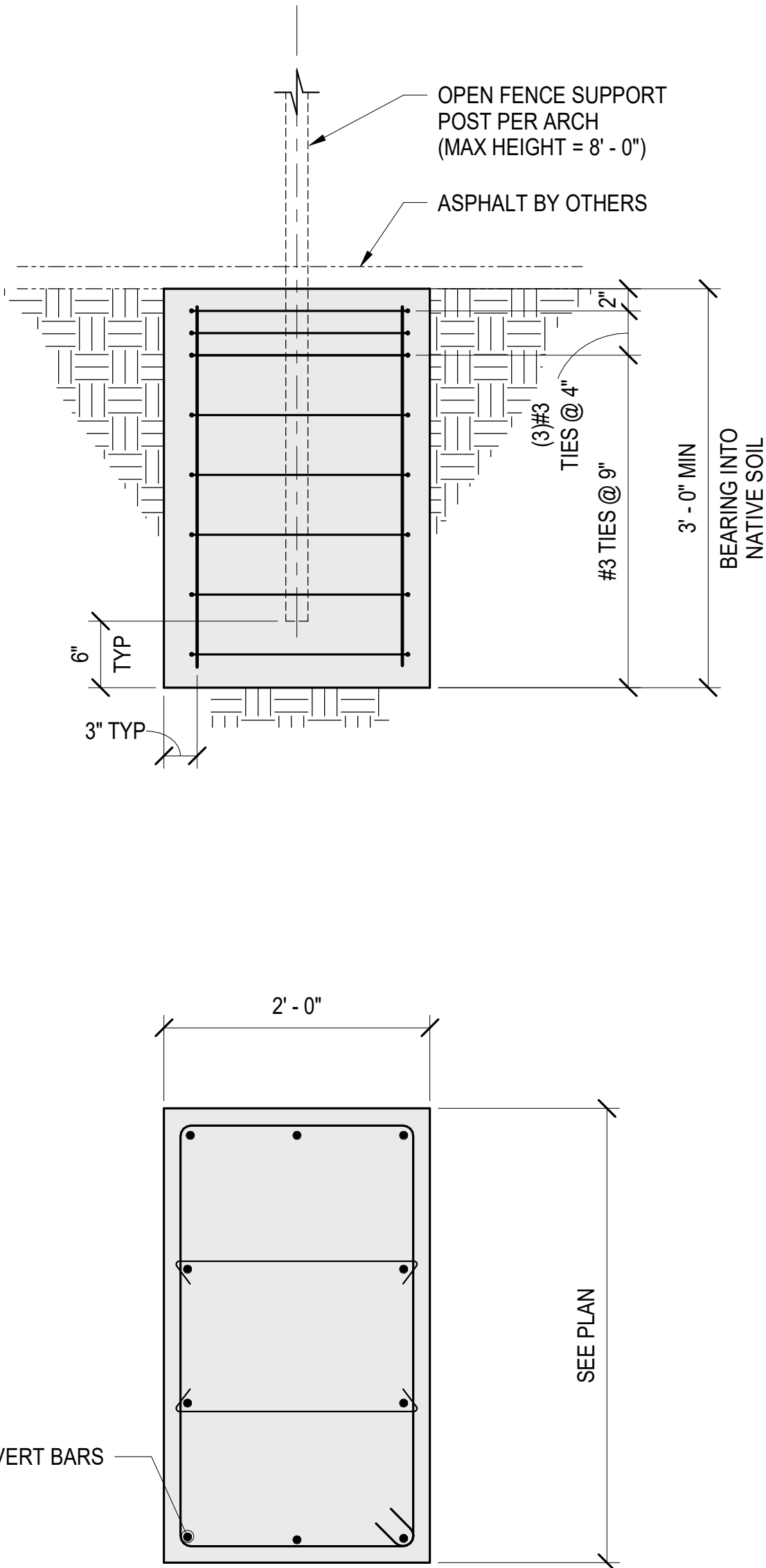
$$1/8" = 1'-0"$$

A



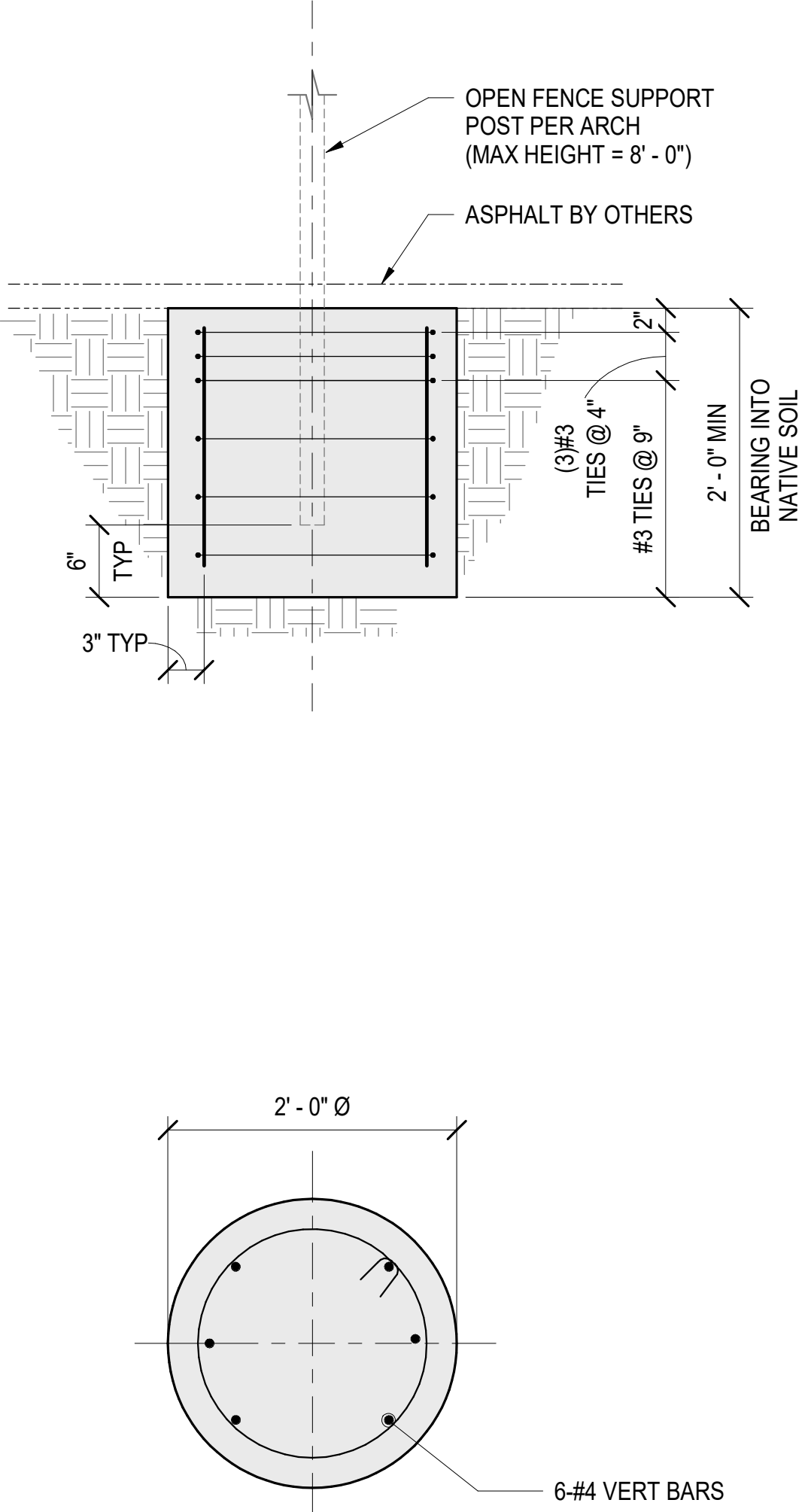
SWING GATE POLE FOOTING DETAIL
1" = 1'-0"

15



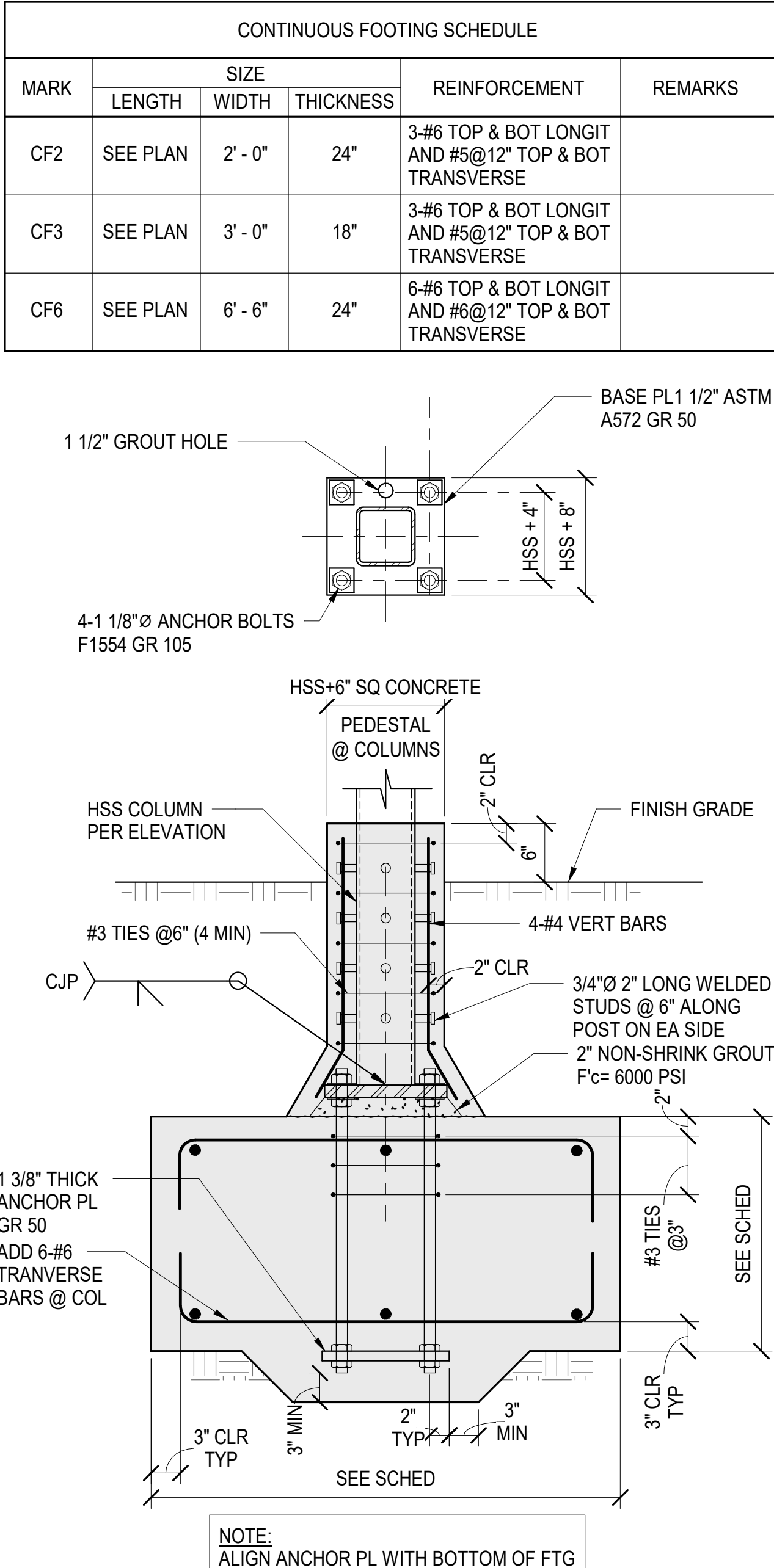
COMBINED POLE FOOTING DETAIL
1" = 1'-0"

14



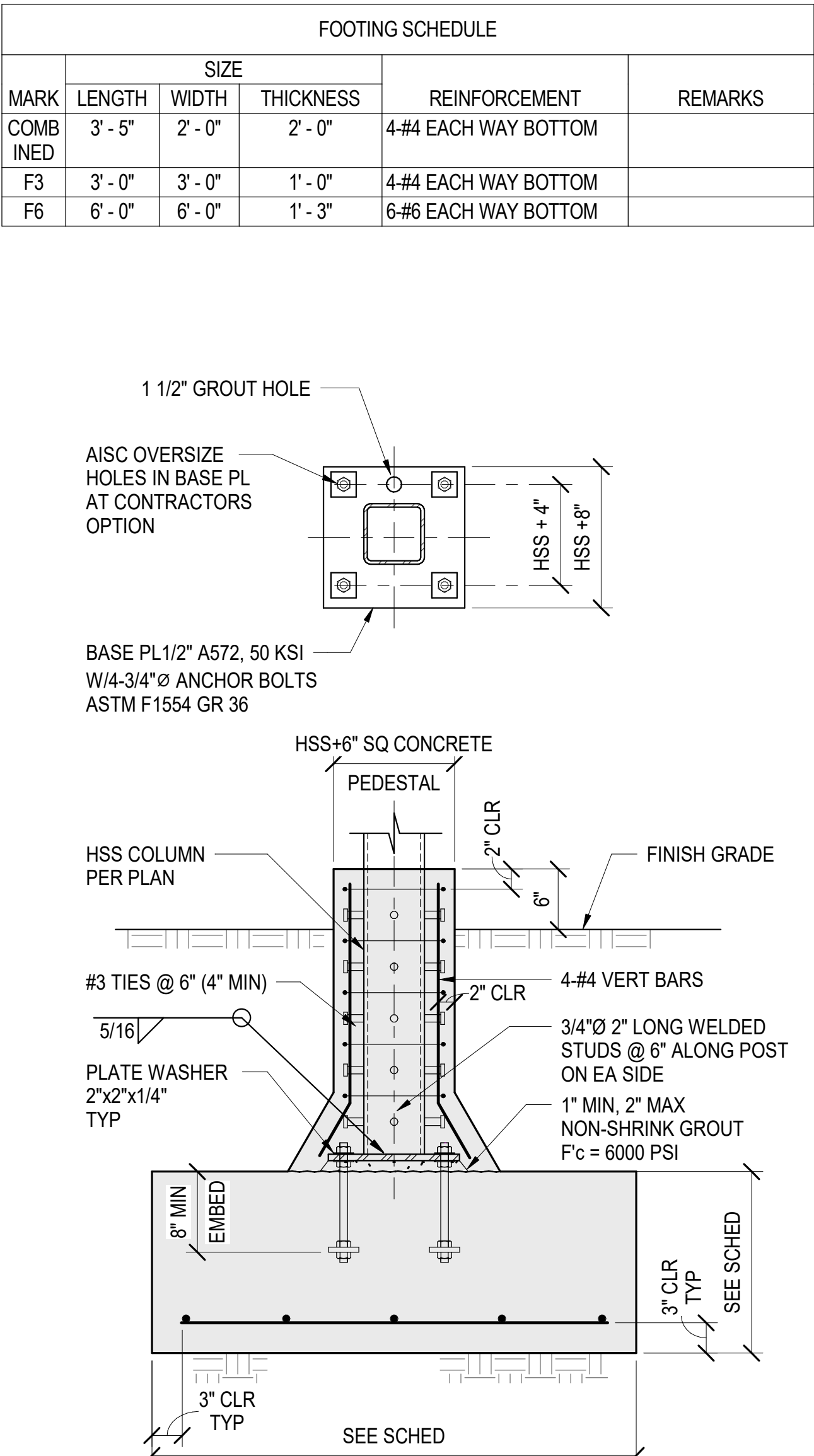
FENCE POST POLE FOOTING DETAIL
1" = 1'-0"

13



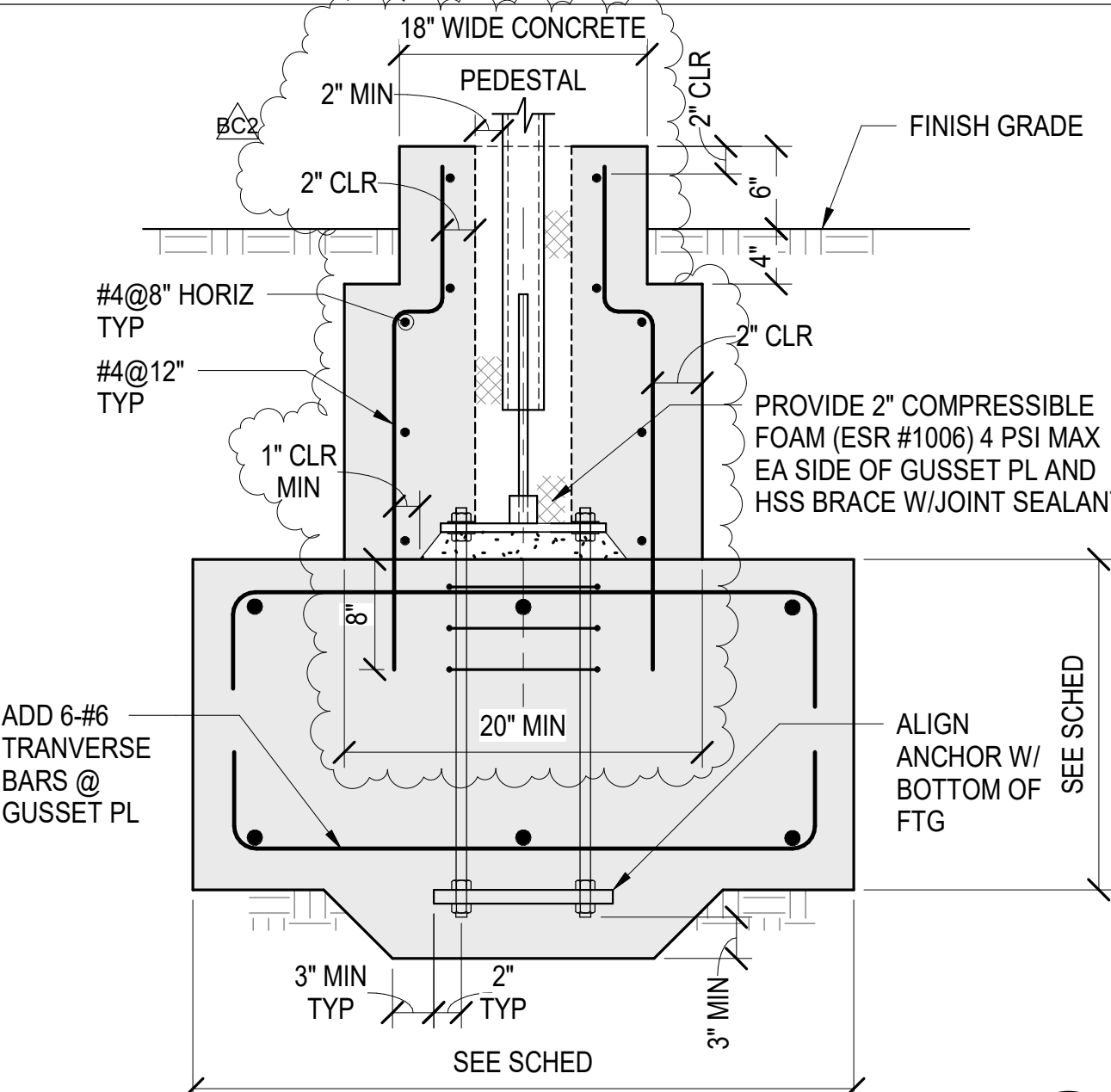
BRACE FRAME FOOTING DETAIL
1" = 1'-0"

12



NON-FRAME SPREAD FOOTING DETAIL
1" = 1'-0"

11



SECTION
1" = 1'-0"

16

INTERIM HELISTOP LEVEL									INTERIM HELISTOP LEVEL
56' - 0"	HSS6x6x1/4	HSS6x6x1/4	HSS6x6x1/4	HSS6x6x1/4	HSS6x6x1/4	HSS6x6x1/4	HSS6x6x1/4	HSS6x6x1/4	56' - 0"
GROUND LEVEL									GROUND LEVEL
44' - 0"									44' - 0"
Column Locations	A-1	A-4	B-2	B-3	C-2	C-3	D-1	D-4	
	1/2"x 14"x 1' - 2"	1/2"x 14"x 1' - 2"	1/2"x 14"x 1' - 2"	1/2"x 14"x 1' - 2"	1/2"x 14"x 1' - 2"	1/2"x 14"x 1' - 2"	1/2"x 14"x 1' - 2"	1/2"x 14"x 1' - 2"	BASE PLATE SIZE (L x B x N) GR 50
	4 - 3/4"Ø	4 - 3/4"Ø	4 - 3/4"Ø	4 - 3/4"Ø	4 - 3/4"Ø	4 - 3/4"Ø	4 - 3/4"Ø	4 - 3/4"Ø	ANCHOR BOLTS NUMBER & SIZE (F1554-55 TYP UNO)
	11 S401	11 S401	11 S401	11 S401	11 S401	11 S401	11 S401	11 S401	COLUMN BASE CONN DETAIL

NON-FRAME STEEL COLUMN SCHEDULE

1

CONTINUOUS FOOTING SCHEDULE					
MARK	SIZE		THICKNESS	REINFORCEMENT	REMARKS
	LENGTH	WIDTH			
CF2	SEE PLAN	2' - 0"	24"	3-#6 TOP & BOT LONGIT AND #5@12" TOP & BOT TRANSVERSE	
CF3	SEE PLAN	3' - 0"	18"	3-#6 TOP & BOT LONGIT AND #5@12" TOP & BOT TRANSVERSE	
CF6	SEE PLAN	6' - 6"	24"	6-#6 TOP & BOT LONGIT AND #6@12" TOP & BOT TRANSVERSE	

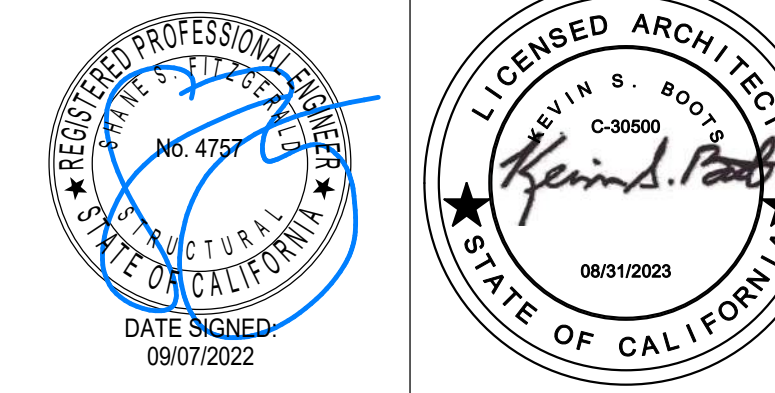


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AGENCY APPROVALS

HCAI # H220345-19-00

CONSULTANT

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JOHN A. MARTIN & ASSOCIATES
Structural Engineers
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J16006

ISSUE RECORD

9/7/2022	BC2	HCAI SUBMITTAL BC2
7/26/2022		AHJ SUBMITTAL
6/23/2022	BC1	HCAI SUBMITTAL BC1
5/23/2022		AHJ SUBMITTAL
3/4/2022		HCAI SUBMITTAL
DATE	△	DESCRIPTION

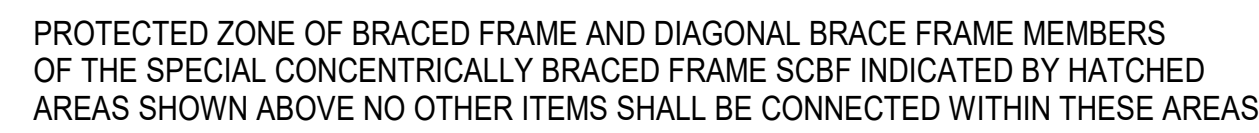
Harbor-UCLA
MEDICAL CENTER
HARBOR-UCLA MEDICAL CENTER
TASK ORDER 35
PHASE 2F INC 1 - INTERIM HELISTOP

1000 West Carson Street, Torrance, CA 90502

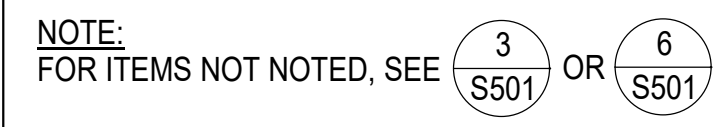
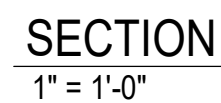
MILESTONE: HCAI SUBMITTAL
MILESTONE DATE: 03/04/2022
RBB PROJECT: 1712000 SCALE: As indicated

DESCRIPTION
COLUMN SCHEDULE AND
FOUNDATION DETAILS

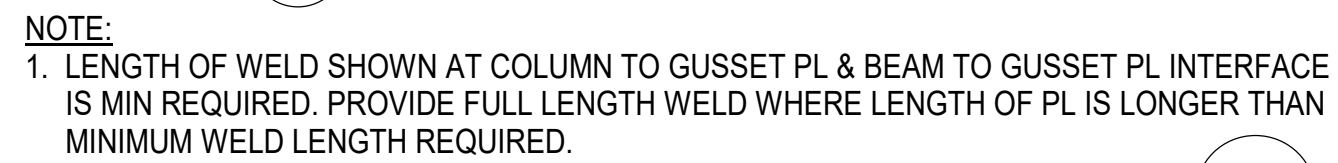
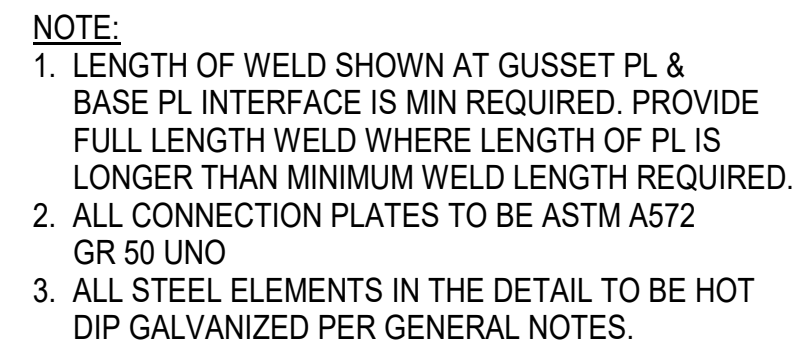
S401



NTS



SECTION
1 1/2" = 1'-0"


$$1'' = 1'-0''$$


6B PLAN
1 1/2" = 1'-0"

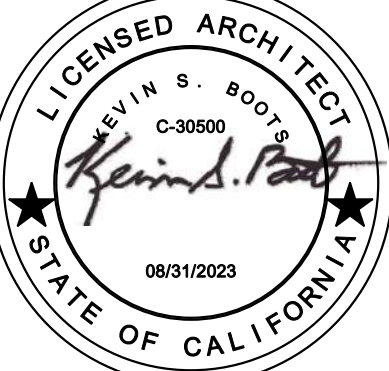


BRACE CONNECTION DETAIL
1 1/2" = 1'-0"

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6/23/2022	BC1	HCAI SUBMITTAL BC1
5/23/2022		AHJ SUBMITTAL
3/4/2022		HCAI SUBMITTAL
DATE	△	DESCRIPTION



HARBOR-UCLA MEDICAL CENTER
TASK ORDER 35
PHASE 2F INC 1 - INTERIM HELISTOP

1000 West Carson Street, Torrance, CA 90502

MILESTONE:	HCAI SUBMITTAL
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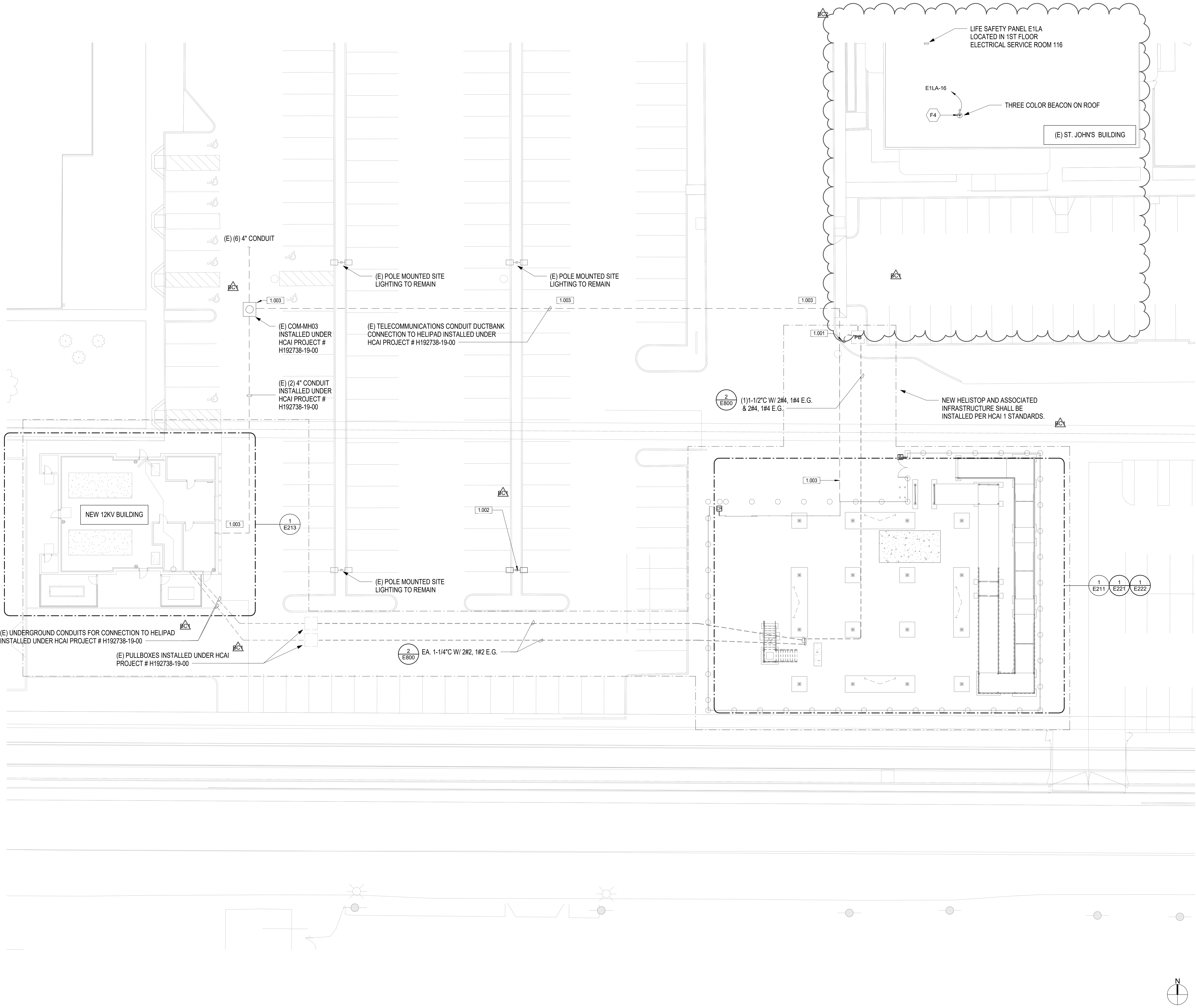
MILESTONE DATE:	03/04/2022
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RBB PROJECT: 1712000 SCALE: As indicated

DESCRIPTION

SECTIONS AND DETAILS

S501



KEYNOTES	
NUMBER	DESCRIPTION
1.001	PROVIDE A HANDHOLE/PULLBOX AS REQUIRED FOR FINAL CONNECTION TO LED INTERNALLY ILLUMINATED WINDCONE ASSEMBLY. COORDINATE HELISTOP CONSULTANT DRAWINGS.
1.002	CONTRACTOR TO REMOVE EXISTING POLE FOR EXISTING SITE LIGHT AND DELIVER TO DESIGNATED LOCATION AT SITE FOR STORAGE AS DIRECTED BY THE OWNER FOR FUTURE REINSTALLATION. PROVIDE NEW POLE SHORTER MATCHING AT A HEIGHT REDUCTION OF 65" TO ACCOMMODATE HELICOPTER PATH OF TRAVEL. REUSE EXISTING FIXTURES ON NEW POLE. MAINTAIN CIRCUITING AND CONTROLS. NO APPLICABLE HCAI REQUIREMENTS IN THIS AREA.
1.003	FUEL MONITORING ALARM BELL FROM THE INTERIM HELISTOP TO BE CONNECTED TO THE 12KV BUILDING GENERATOR ANNUNCIATOR PANEL. PROVIDE 18 GAZ DRY CONTACT WIRING COMPATIBLE TO CONNECT TO EXISTING CONNET ETHERNET CONTACT SERVER TRANSMITTER. LOW VOLTAGE WIRING AND CONDUIT BY OTHERS.

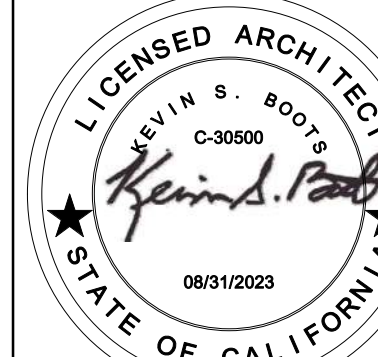


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OSHPD # H220345-19-00

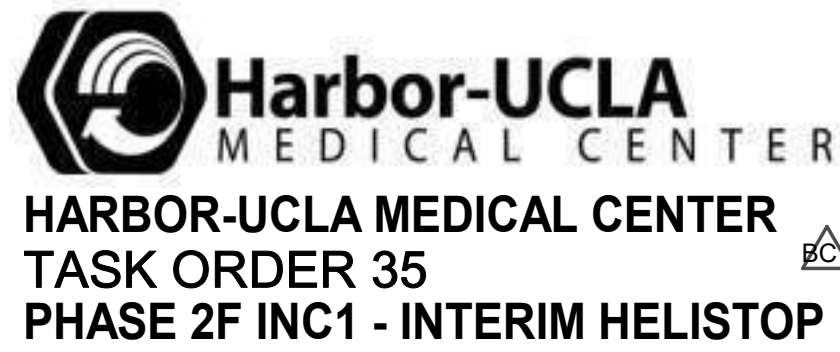
CONSULTANT



515 South Figueroa Street, Suite 1400
Los Angeles, California 90071
213.507.8400 www.tklsc.com
Project Leader - Michael Huynh
Electrical Lead - Vahik Davoudi
tklsc Job #2017-0456-035

ISSUE RECORD

9/7/2022	BC2	HCAI SUBMITTAL BC2
6/23/2022	BC1	HCAI SUBMITTAL BC1
3/4/2022		HCAI SUBMITTAL
DATE	△	DESCRIPTION



1000 West Carson Street, Torrance, CA 90502

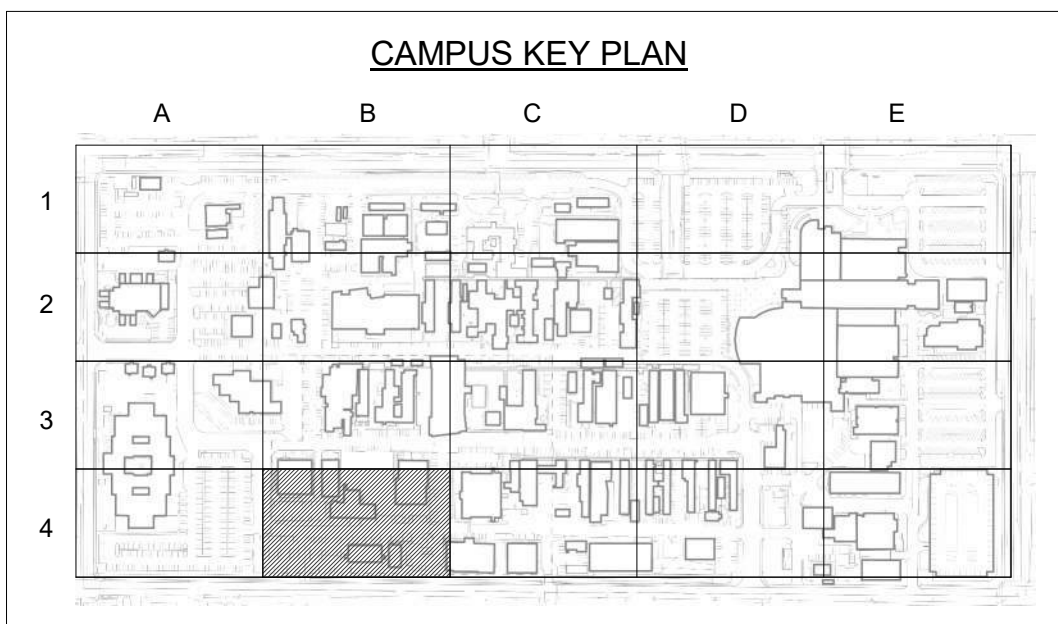
MILESTONE: HCAI SUBMITAL


MILESTONE DATE: 3/4/2022

RBB PROJECT: 1712000 SCALE: 1/16" = 1'-0"

DESCRIPTION
ELECTRICAL SITE PLAN

E101



	F5	LUMINAIRE LED VPT44-23V/3000K-DIM/126-X-X-DIM	120V ONLY	F5	2993	-	-	FIXTURE FOR USE WITH 26W/2903 EUMENANT 3500K DIMMING, 438- INCH W.B.Y. 2.70-INCH H. PROVIDE VANDAL RESISTANT LENS.	-	-
	X1	SURE-LITES APX6-COLOR/3-CI-120-V2	120V ONLY	1.33	-	-	-	SELF ILLUMINATED, DUAL CIRCUIT EXIT SIGN	MOUNT TO HANDRAIL ON EGRESS PATH	-

1

PLAN VIEW GRAPHIC LEGEND

GENERAL NOTES:

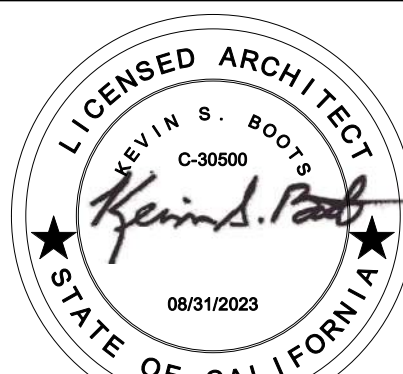
- | KEYNOTES | |
|----------|---|
| NUMBER | DESCRIPTION |
| 3.001 | MAINTENANCE LIGHTING FIXTURES SHALL BE INSTALLED UNDERSIDE OF THE HELISTOP AND SUPPORTED FROM STRUCTURAL ASSEMBLY AS REQUIRED. COORDINATE EXACT LOCATION WITH HELISTOP DRAWINGS AND THE EQUIPMENT TO BE MAINTAINED. |

KEYNOTES	
NUMBER	DESCRIPTION
3.001	MAINTENANCE LIGHTING FIXTURES SHALL BE INSTALLED UNDERSIDE OF THE HELISTOP AND SUPPORTED FROM STRUCTURAL ASSEMBLY AS REQUIRED. COORDINATE EXACT LOCATION WITH HELISTOP DRAWINGS AND THE EQUIPMENT TO BE MAINTAINED.



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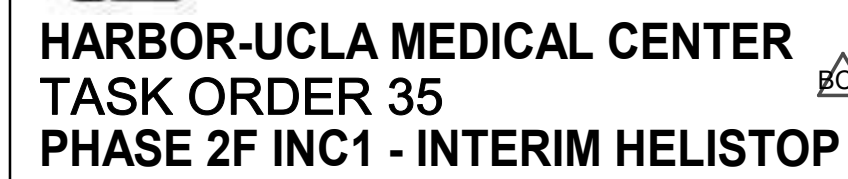
OSHPD # H220345-19-00

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ISSUE RECORD

9/7/2022	BC2	HCAI SUBMITTAL BC2
6/23/2022	BC1	HCAI SUBMITTAL BC1
3/4/2022		HCAI SUBMITAL
DATE		DESCRIPTION



1000 West Carson Street, Torrance, CA 90502

MILESTONE: HCAI SUBMITAL

MILESTONE DATE: 3/4/2022

RBB PROJECT: 1712000 SCALE: As indicated

DESCRIPTION
LIGHTING GROUND LEVEL
FLOOR PLAN - INTERIM
HELISTOP

E221

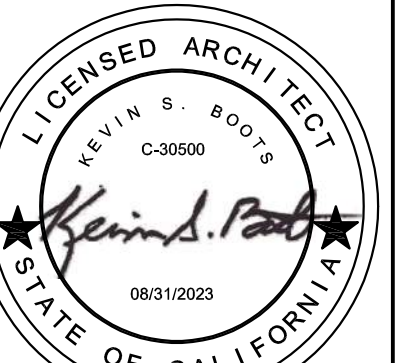


RBB ARCHITECTS INC

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HCAI #1220345-19-00

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ISSUE RECORD

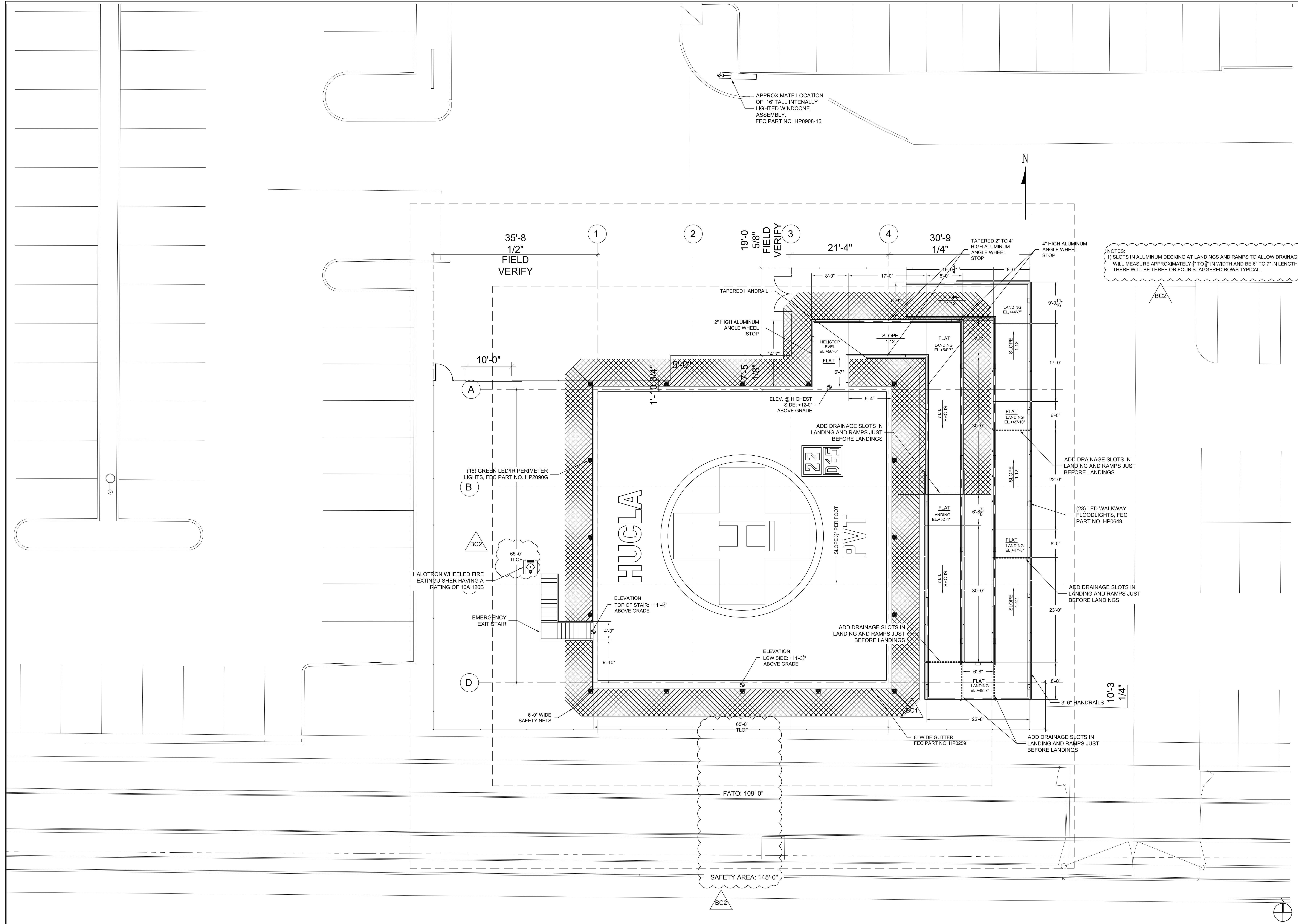
9/7/2022	BC2	HCAI SUBMITTAL BC2
6/23/2022	BC1	HCAI SUBMITTAL BC1
3/4/2022		HCAI SUBMITTAL
DATE	△	DESCRIPTION

Harbor-UCLA MEDICAL CENTER
HARBOR-UCLA MEDICAL CENTER
PHASE 2F INC1 - INTERIM HELISTOP
1000 West Carson Street, Torrance, CA 90502

MILESTONE: HCAI SUBMITTAL
MILESTONE DATE: 3/4/2022
RBB PROJECT: 1712000 SCALE: 1/8" = 1'-0"

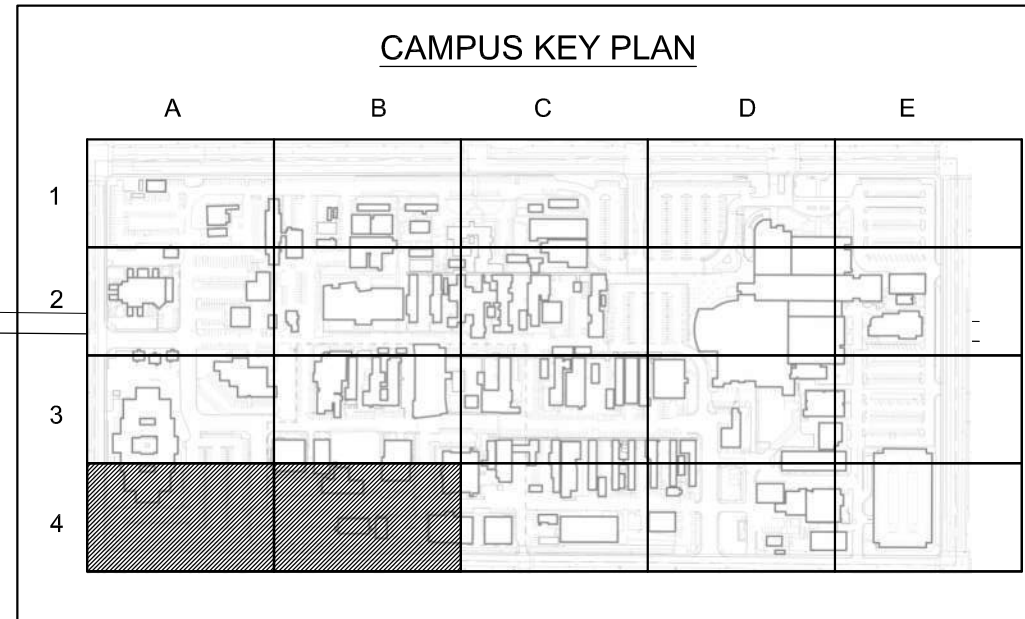
DESCRIPTION
HELISTOP GENERAL
ARRANGEMENT

HH002



NOTES:
1) SLOTS IN ALUMINUM DECKING AT LANDINGS AND RAMPS TO ALLOW DRAINAGE WILL MEASURE APPROXIMATELY 1/2" TO 3/4" IN WIDTH AND BE 6" TO 7" IN LENGTH. THERE WILL BE THREE OR FOUR STAGGERED ROWS TYPICAL.

10'-3 1/4"



INSTALLATION NOTES

OSHPPD NOTES

ABBREVIATIONS

SYMBOL LEGEND

TYPICAL SYMBOLS

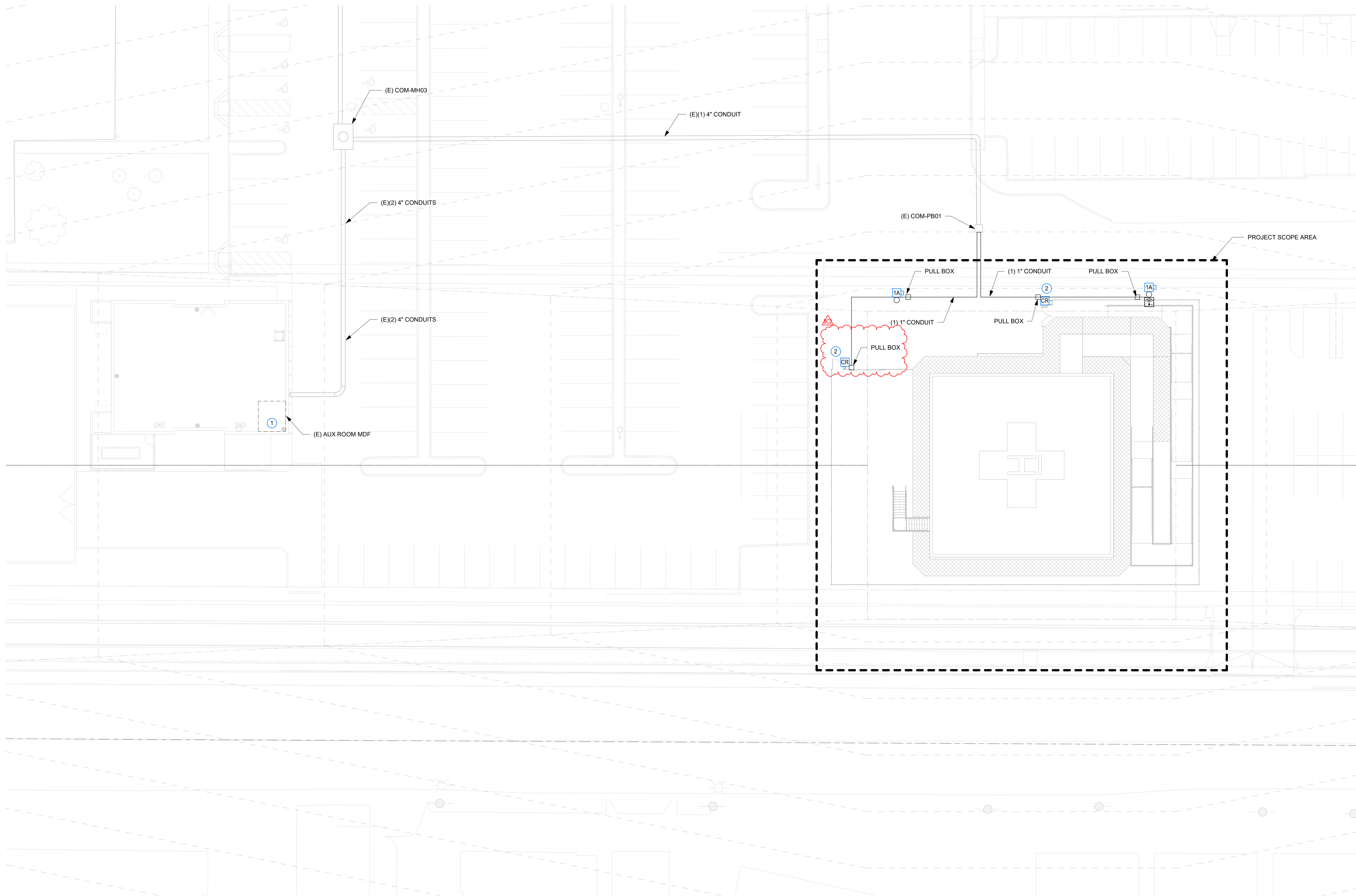
SECURITY DEVICE LEGEND

DATA DEVICE LEGEND

RBB ARCHITECTS INC

T001



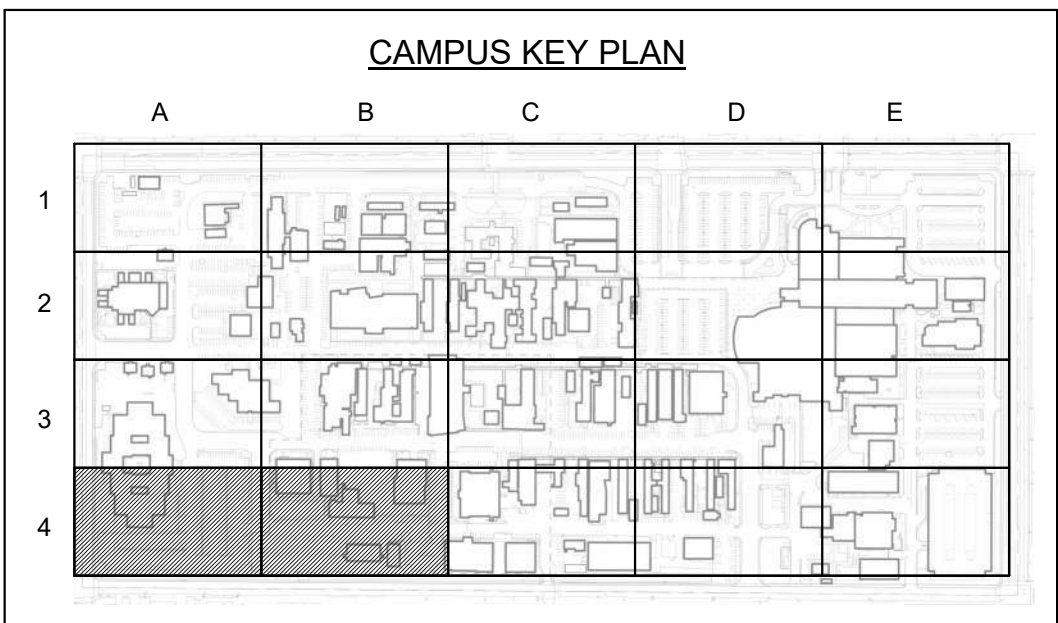


GENERAL NOTES:

- A. ALL NETWORK DEVICES SHALL BE CONNECTED BY DEDICATED 1" PVC FROM (E) COM-PB01.
- B. INSTALL COMPOSITE 2-STRAND SINGLE MODE FIBER WITH 16/2 CONDUCTORS TO EACH DEVICE LOCATION FROM 12KV (E) AUX RM MDF. INSTALL MEDIA CONVERTER AT EACH DEVICE POWERED BY 16/2 CONDUCTORS.
- C. CONDUIT DESIGN IS SHOWN DIAGRAMMATICALLY. COORDINATE EXACT PLACEMENT WITH ALL OTHER TRADES.
- D. PROVIDE 1 OR 2 PORT POE RJ45 TO SINGLE MODE FIBER 56 VOLT MEDIA CONVERTER AT EACH DEVICE LOCATION BASED ON QUANTITY OF DEVICES AT EACH LOCATION. PROVIDE (1) RACK MOUNT 56 VOLT POWER SUPPLY WITHIN IDF TO POWER ALL MEDIA CONVERTERS.
- E. COORDINATE ALL FINAL DEVICE LOCATIONS WITH ARCHITECT AND OTHER TRADES PRIOR TO ROUGH-IN.
- F. PROVIDE CONDUIT FROM CAMERA LOCATIONS TO NEAREST COMMUNICATIONS MANHOLE. PROVIDE PULL BOX FOR EVERY 180 DEGREES OF BENDS. COORDINATE PATHWAY INSTALLATION WITH ELECTRICAL.
- G. UTILIZE CABLE RATED FOR THE ENVIRONMENT.
- H. CAMERAS SHALL UTILIZE FIBER WITH MEDIA CONVERTER (MC). MC SHALL BE POWERED BY LOW VOLTAGE POWER SUPPLY WITHIN 12KV BUILDING AUX RM MDF. CAMERAS SHALL CONNECT TO (E) COPPER NETWORK SWITCH WITHIN RACK.

SHEET NOTES:

- ① PROVIDE AND INSTALL RACK MOUNT MEDIA CONVERTER CHASSIS WITHIN 12KV MDF, IN EXISTING RACK.
- ② (N) CARD READERS SHALL BE HOMERUN TO EXISTING ACP WITHIN 12KV MDF.

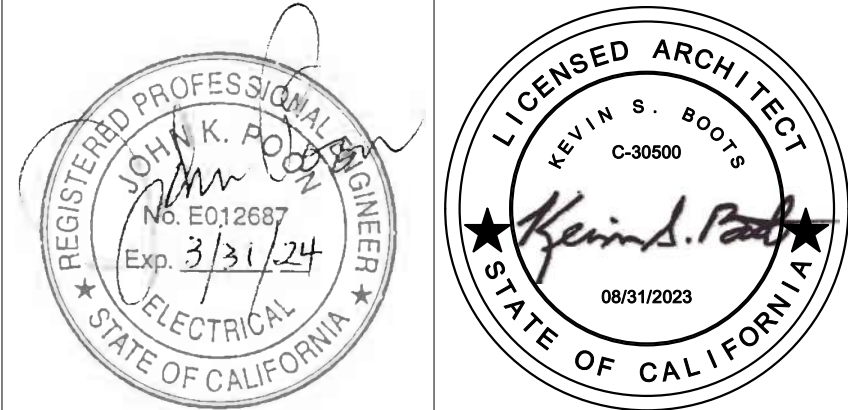


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AGENCY APPROVALS

HCAI# H220345-19-00

CONSULTANT



895 DOVE ST. 3RD FLOOR
NEWPORT BEACH, CA
92660

ISSUE RECORD

DATE	DESCRIPTION
09/07/2022	BC2
03/04/2022	HCAI SUBMITTAL BC2
	HCAI SUBMITTAL



TASK ORDER 35 PHASE 2F INC1 - INTERIM HELISTOP

1000 West Carson Street, Torrance, CA 90509

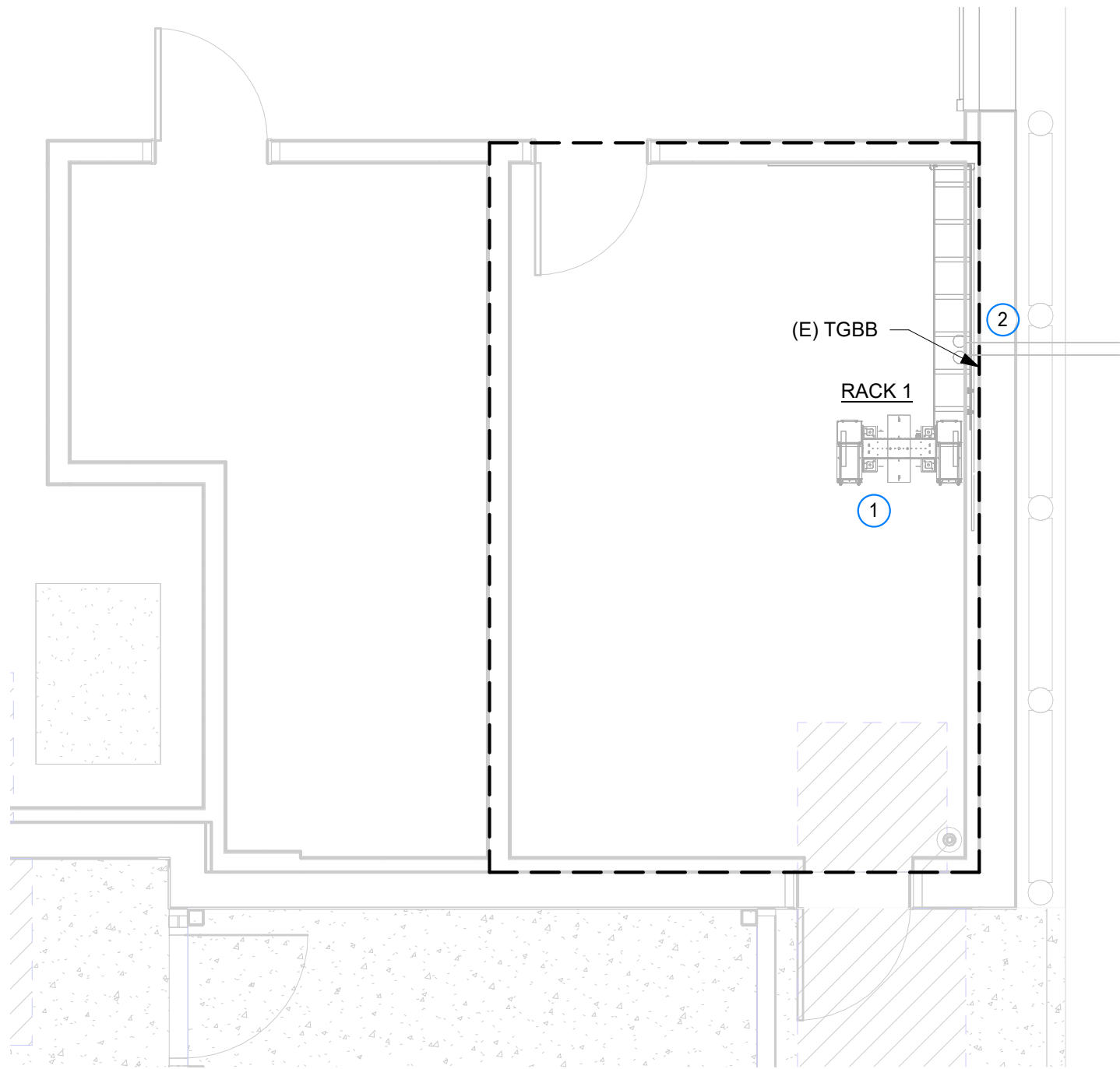
MILESTONE: HCAI SUBMITTAL

MILESTONE DATE: 03/04/2022

RBB PROJECT: 1712000 SCALE: 1/16" = 1'-0"

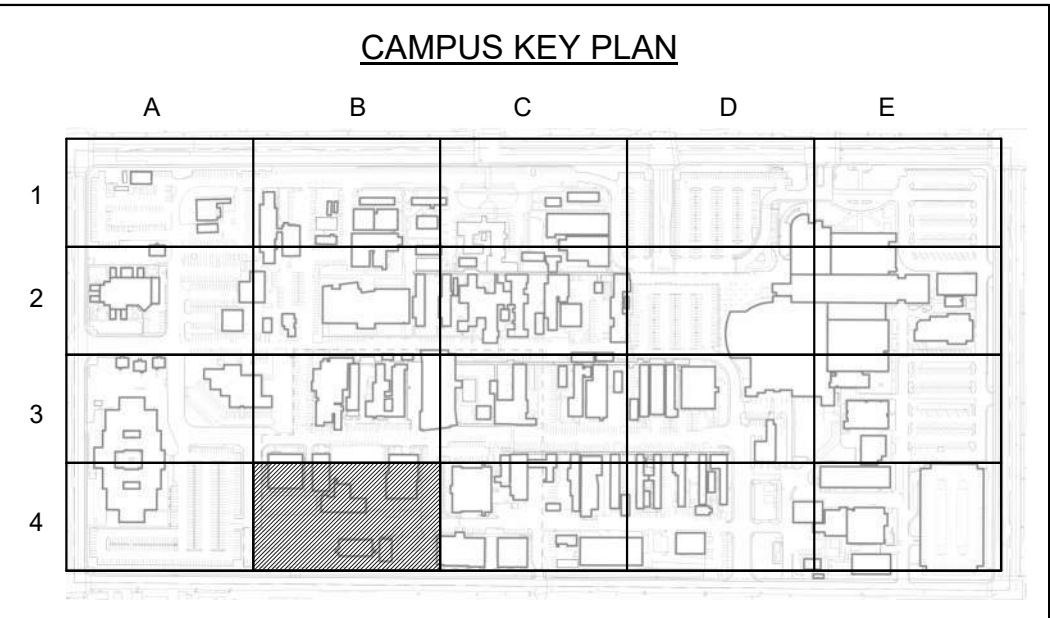
DESCRIPTION
TECHNOLOGY PARTIAL SITE
PLAN

T110



SHEET NOTES:

- ① (N) MEDIA CONVERTER AND POWER SUPPLY SHALL BE INSTALLED IN EXISTING 2-POST RACK. SEE RACK ELEVATION ON 1/7600 FOR MORE INFORMATION. METAL COMPONENTS SHALL BE GROUNDED TO EXISTING TELECOMMUNICATIONS GROUNDING BUS BAR (TGBB) PER CEC 517.124.
- ② EXISTING CONDUIT PATHWAY TO (E) COM-MH03 SHALL BE USED FOR NEW CABLING. REFER TO 2/T601 FOR UNDERGROUND PATHWAY.

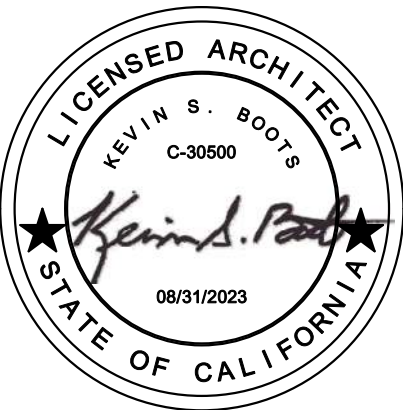


RBB ARCHITECTS INC

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AGENCY APPROVALS

HCAI# H220345-19-00

CONSULTANT



895 DOVE ST. 3RD FLOOR
NEWPORT BEACH, CA
92660

ISSUE RECORD

DATE	DESCRIPTION
09/07/2022	BC2 HCAI SUBMITTAL BC2
03/04/2022	HCAI SUBMITTAL



HARBOR-UCLA MEDICAL CENTER
TASK ORDER 35 PHASE 2F INC1 -
INTERIM HELISTOP

1000 West Carson Street, Torrance, CA 90509

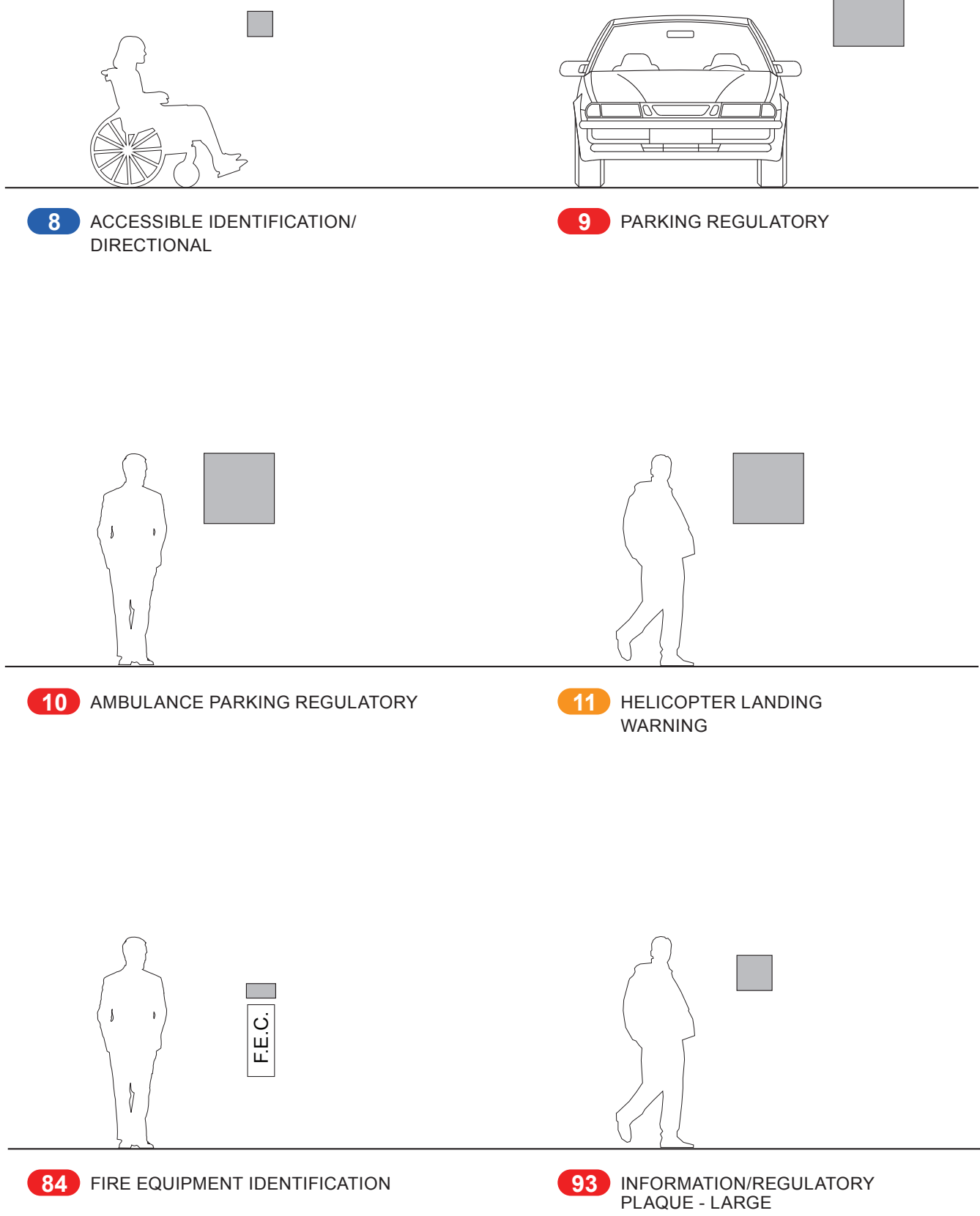
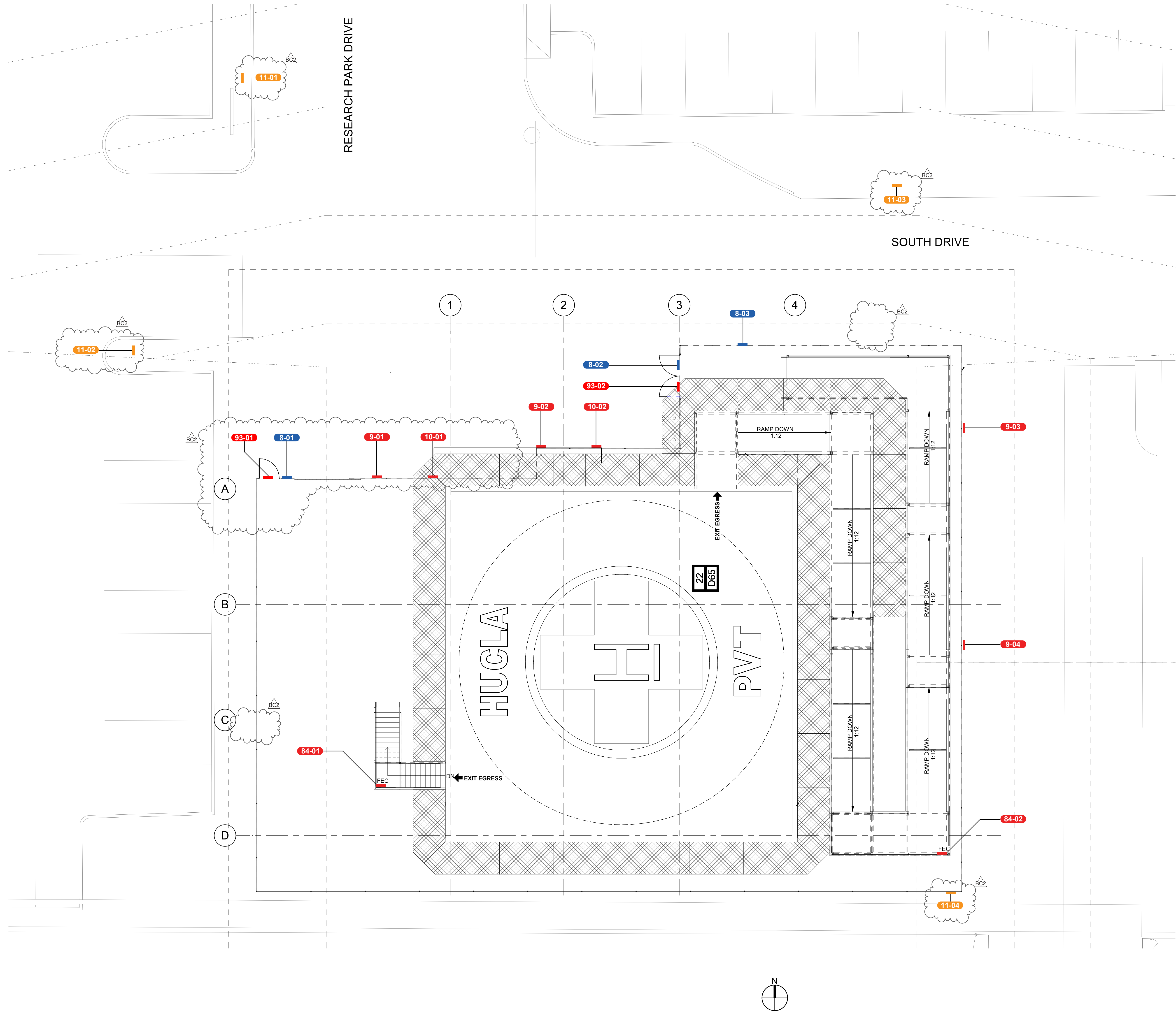
MILESTONE: HCAI SUBMITTAL

MILESTONE DATE: 03/04/2022

RBB PROJECT: 1712000 SCALE: 1/4" = 1'-0"

DESCRIPTION
**TECHNOLOGY ENLARGED 12KV
AUX RM MDF PLAN**

T111

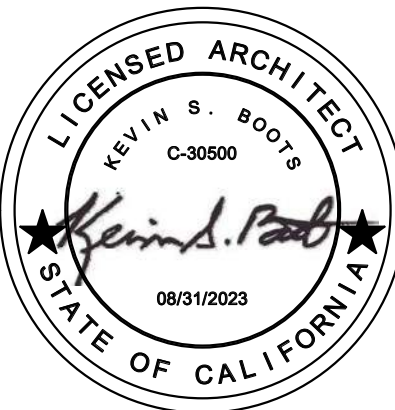


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HCAI # H220345-19-00

CONSULTANT

SKADESIGN

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Pasadena, California 91101-2025
T 626.403.5870
F 626.403.5871
W skadesign.com

ISSUE RECORD

9/7/2022	BC2	HCAI SUBMITTAL BC2
8/3/2022	A	ADDENDUM A
7/26/2022	AHJ	SUBMITTAL
6/23/2022	BC1	HCAI SUBMITTAL BC1
DATE	△	DESCRIPTION



HARBOR-ULA MEDICAL CENTER
TASK ORDER 35
PHASE 2F INC1 - INTERIM HELISTOP

1000 West Carson Street, Torrance, CA 90502

MILESTONE: HCAI SUBMITTAL
MILESTONE DATE: 3/4/2022
RBB PROJECT: 1712035 SCALE: AS NOTED

DESCRIPTION
SIGN LOCATION PLAN -
HELISTOP LEVEL

SG-02



10980 Wilshire Boulevard
Los Angeles, California
90024-3905

HCAI # H220345-19-00

CONSULTANT

472 East Colorado Boulevard
Pasadena, California 91101-2025
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W skadesign.com

ISSUE RECORD



Harbor-UCLA
MEDICAL CENTER

1000 West Carson Street, Torrance, CA 90502

MILESTONE:	HCAI SUBMITTAL
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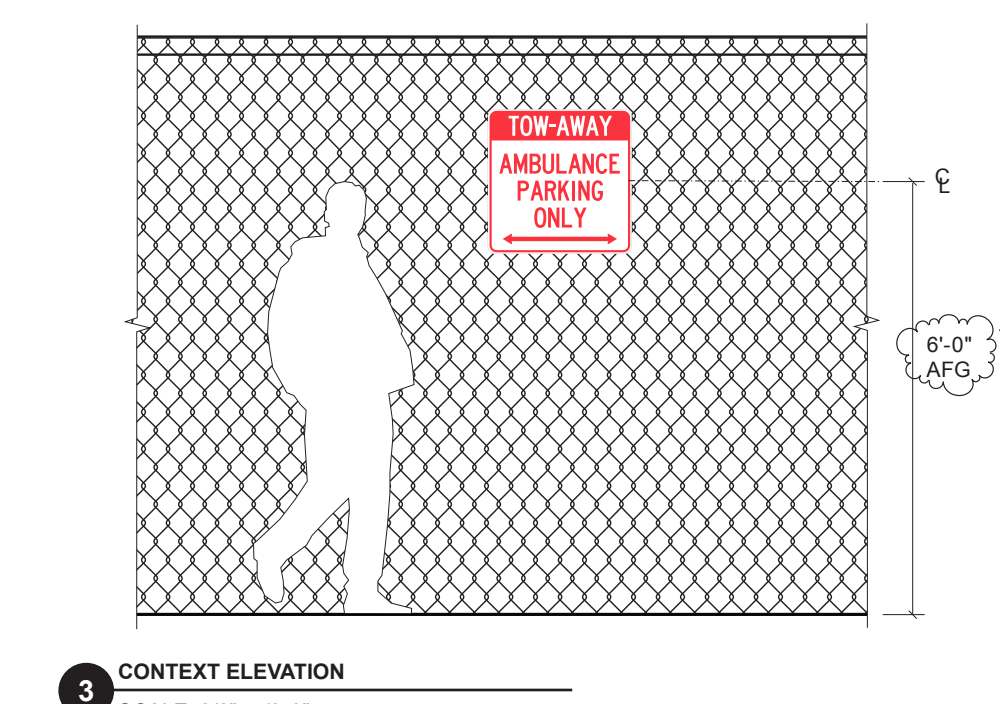
MILESTONE DATE:	3/4/2022
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RBB PROJECT: 1712035 SCALE: AS NOTED

DESCRIPTION

SIGNAGE DETAILS -
SIGN TYPES 8, 9, 10

BC1



SIGN TYPE 10	AMBULANCE PARKING REGULATORY	3
--------------	------------------------------	---

	3
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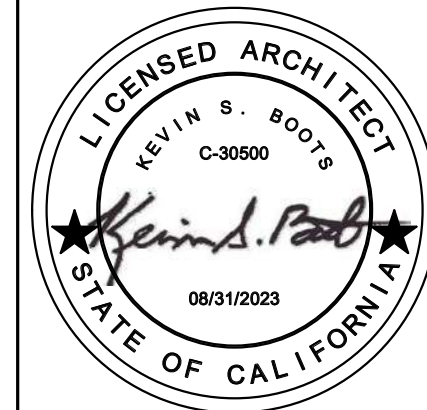


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ISSUE RECORD

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8/3/2022	A	ADDENDUM A
7/26/2022	AHJ	SUBMITTAL
6/23/2022	BC1	HCAI SUBMITTAL BC1
DATE	BC1	DESCRIPTION

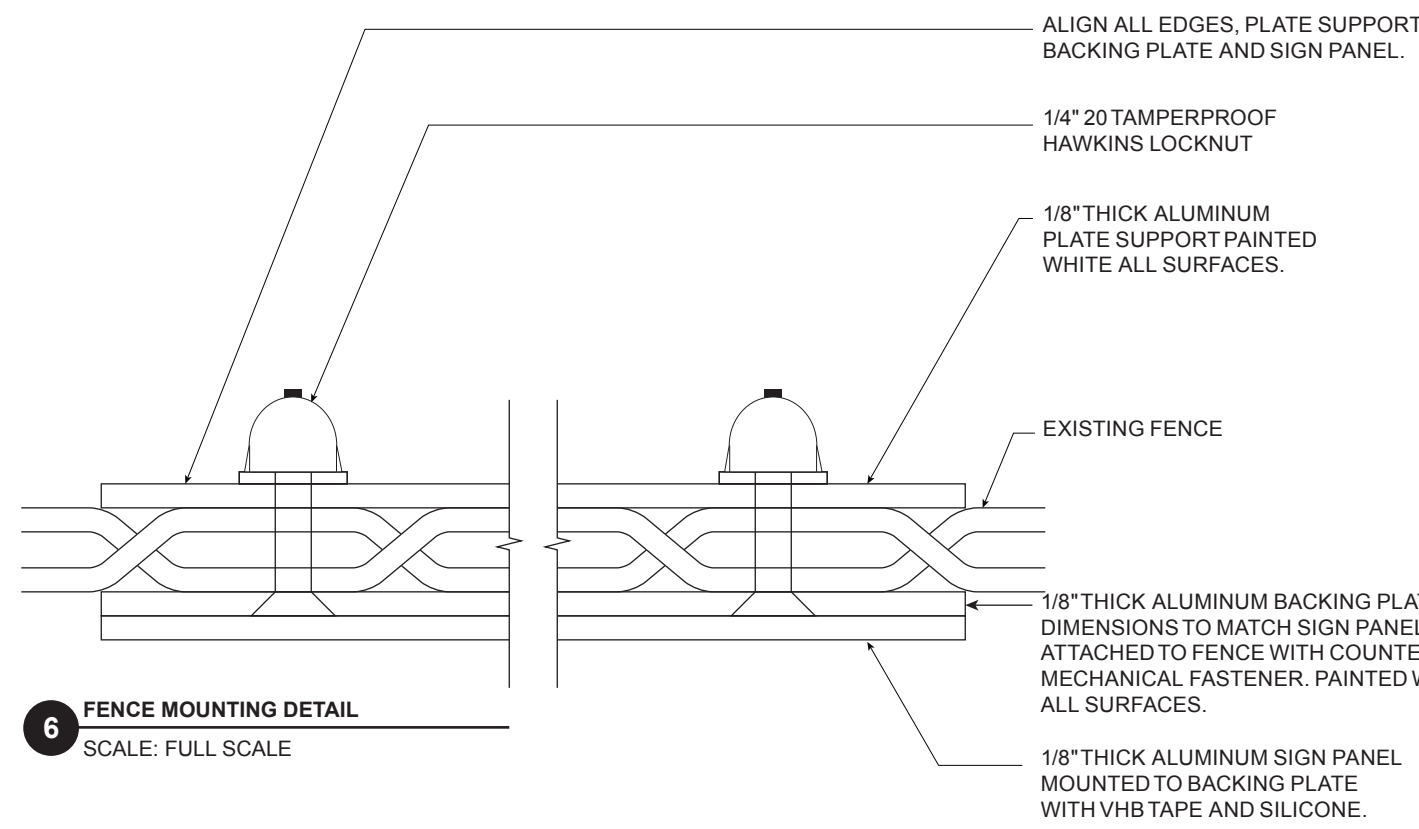
Harbor-UCLA
MEDICAL CENTER
HARBOR-ULA MEDICAL CENTER
TASK ORDER 35
PHASE 2F INC1 - INTERIM HELISTOP

1000 West Carson Street, Torrance, CA 90502

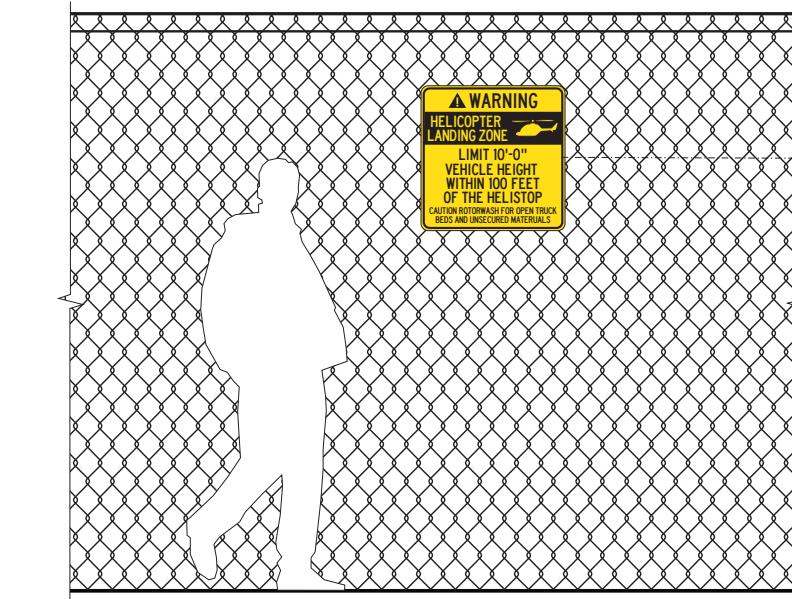
MILESTONE: HCAI SUBMITTAL
MILESTONE DATE: 3/4/2022
RBB PROJECT: 1712035 SCALE: AS NOTED

DESCRIPTION
SIGNAGE DETAILS -
SIGN TYPES 11, 84 & 93

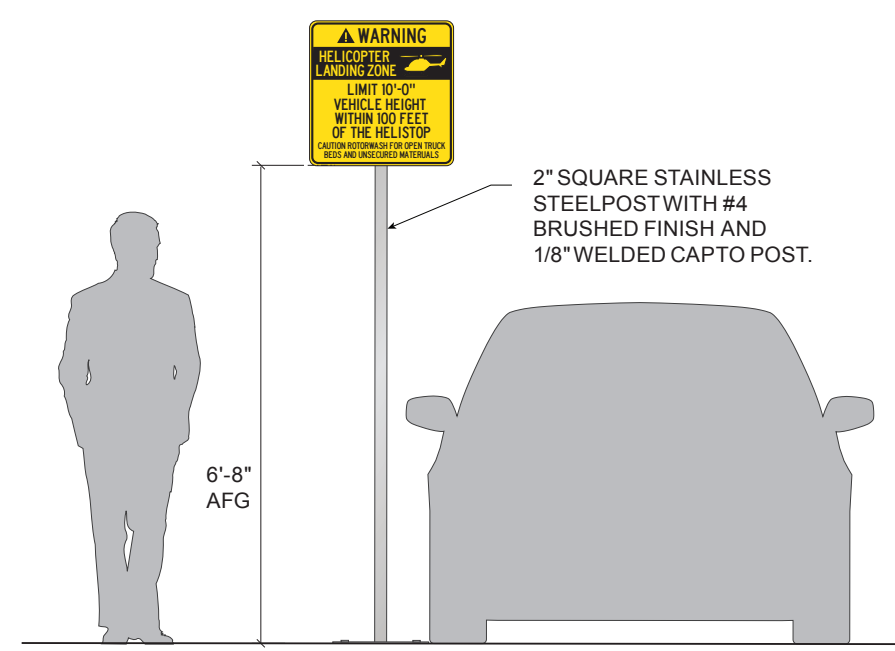
SG-04



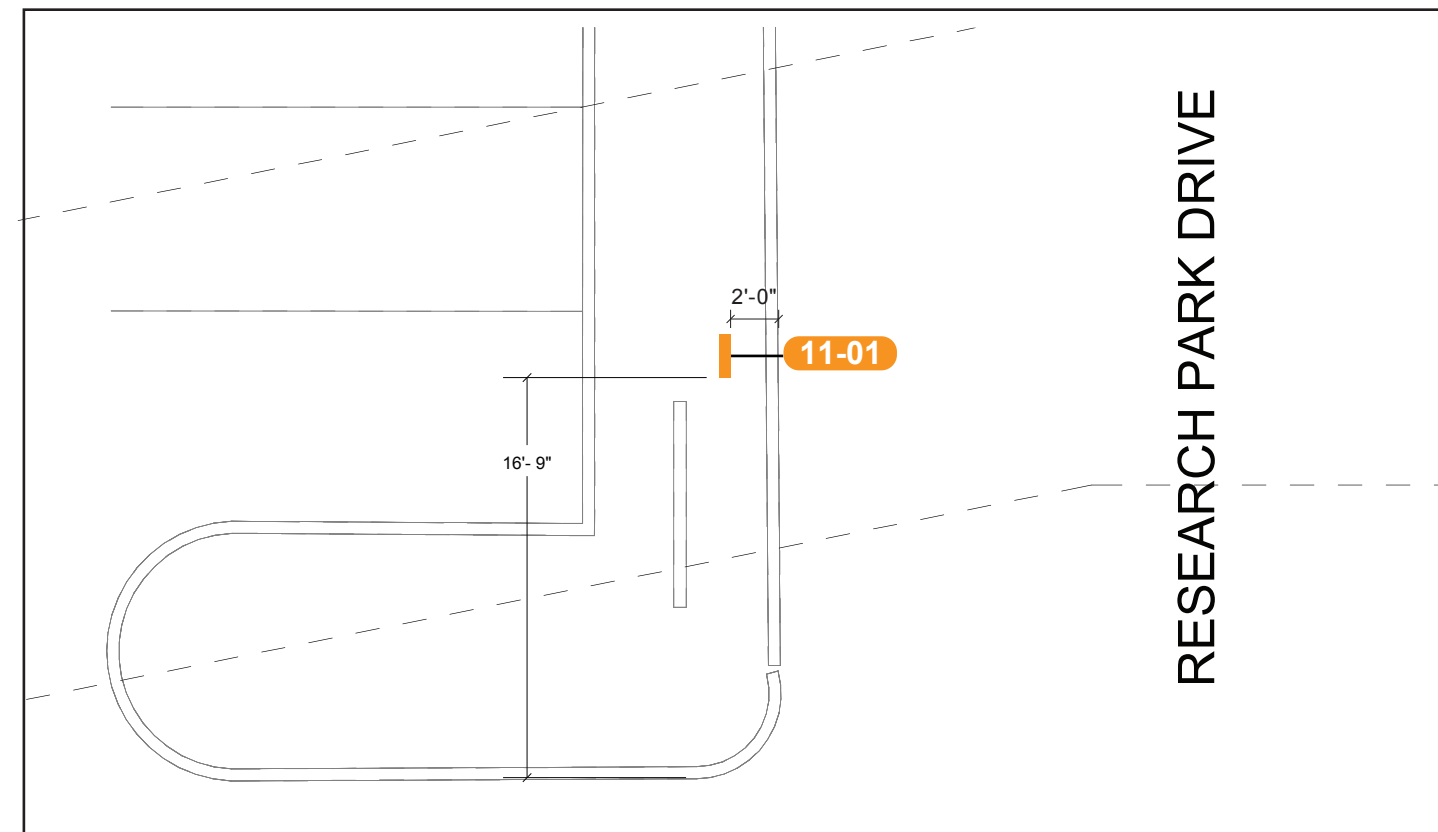
6 FENCE MOUNTING DETAIL
SCALE: FULL SCALE



7 CONTEXT ELEVATION - FENCE MOUNT
SCALE: 3/8" = 1'-0"



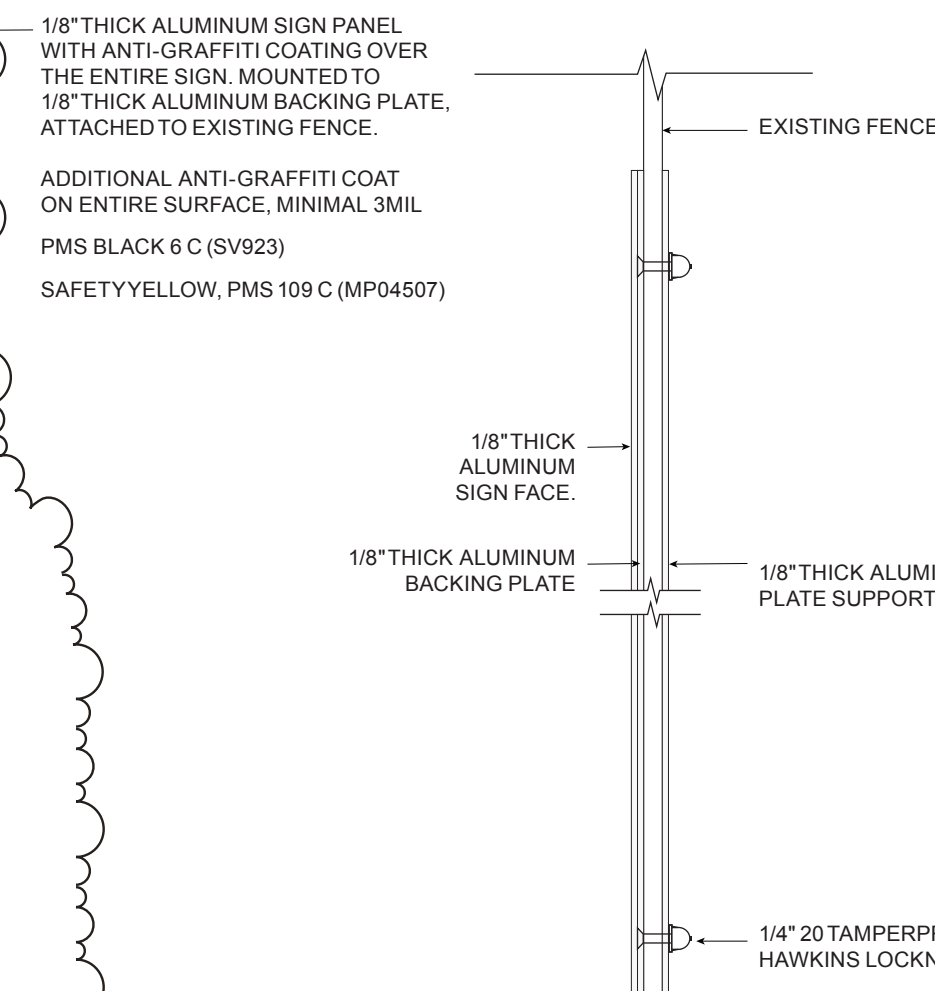
8 CONTEXT ELEVATION - POST MOUNT
SCALE: 3/8" = 1'-0"



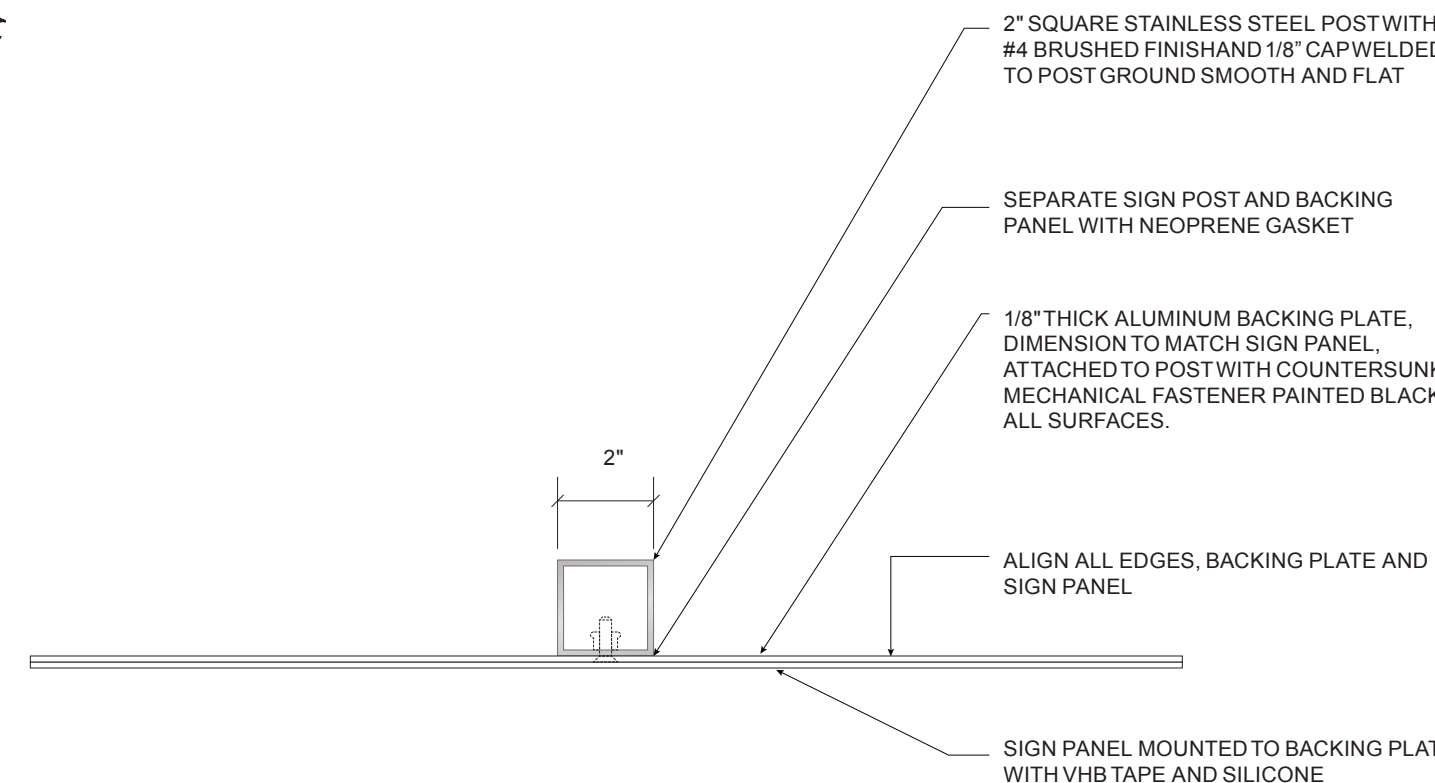
9 SIGN LOCATION DETAIL - ST11-01
SCALE: 1/8" = 1'-0"



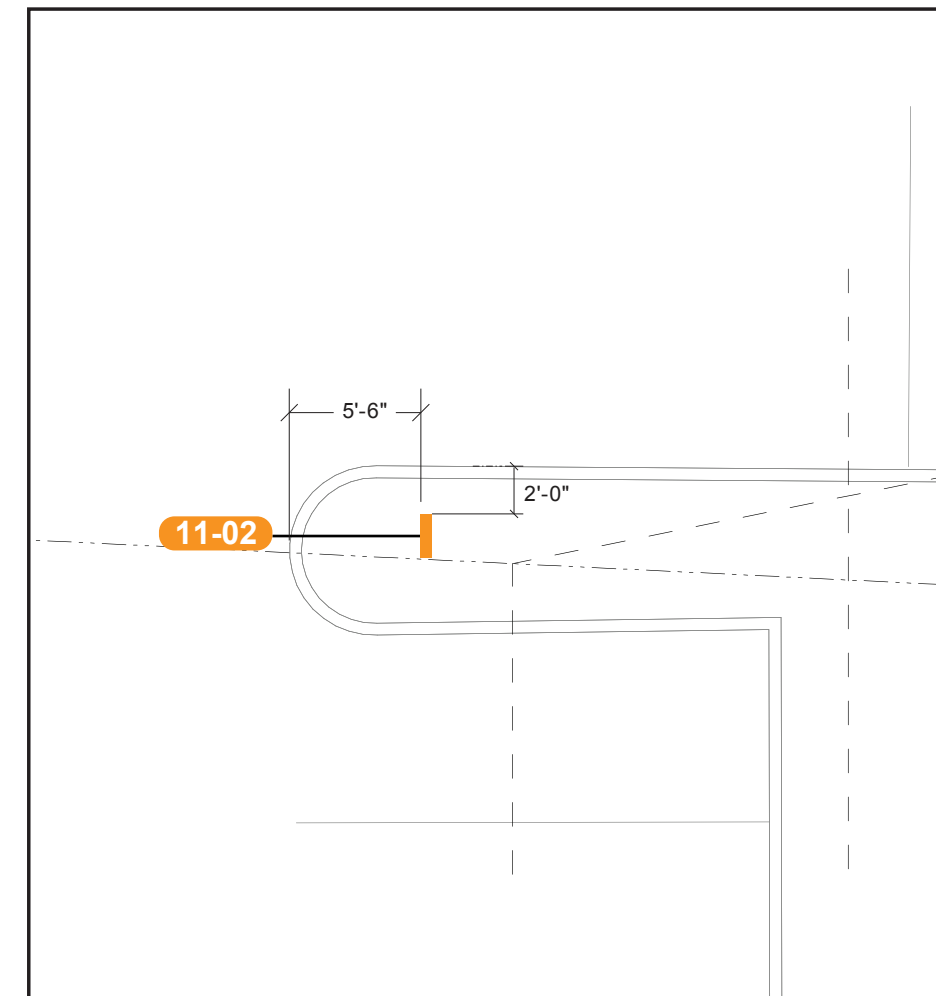
1 HELICOPTER LANDING WARNING
SCALE: 3" = 1'-0"



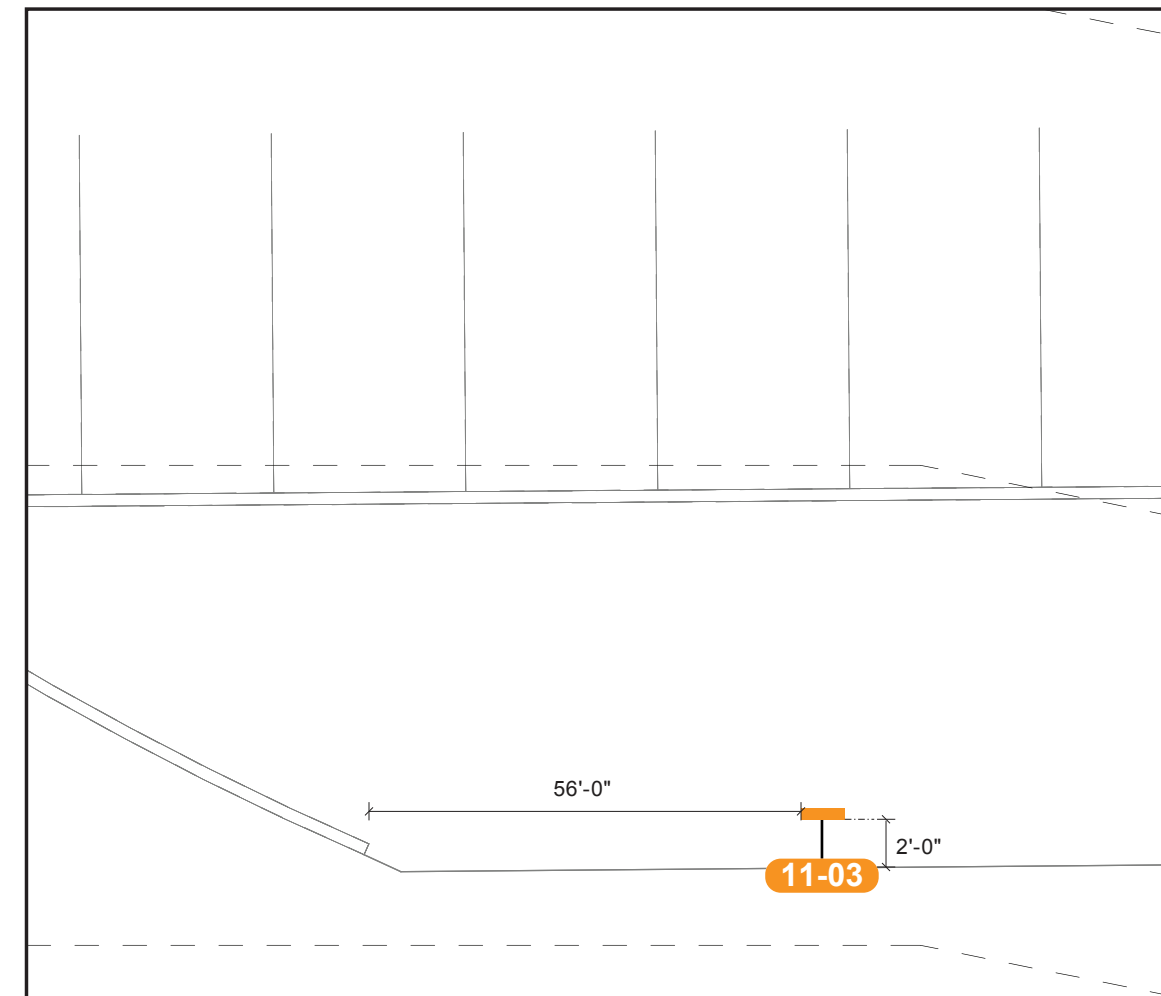
2 SIDE VIEW FENCE MOUNT
SCALE: 6" = 1'-0"



3 MOUNTING DETAIL - POST MOUNT
SCALE: 3" = 1'-0"

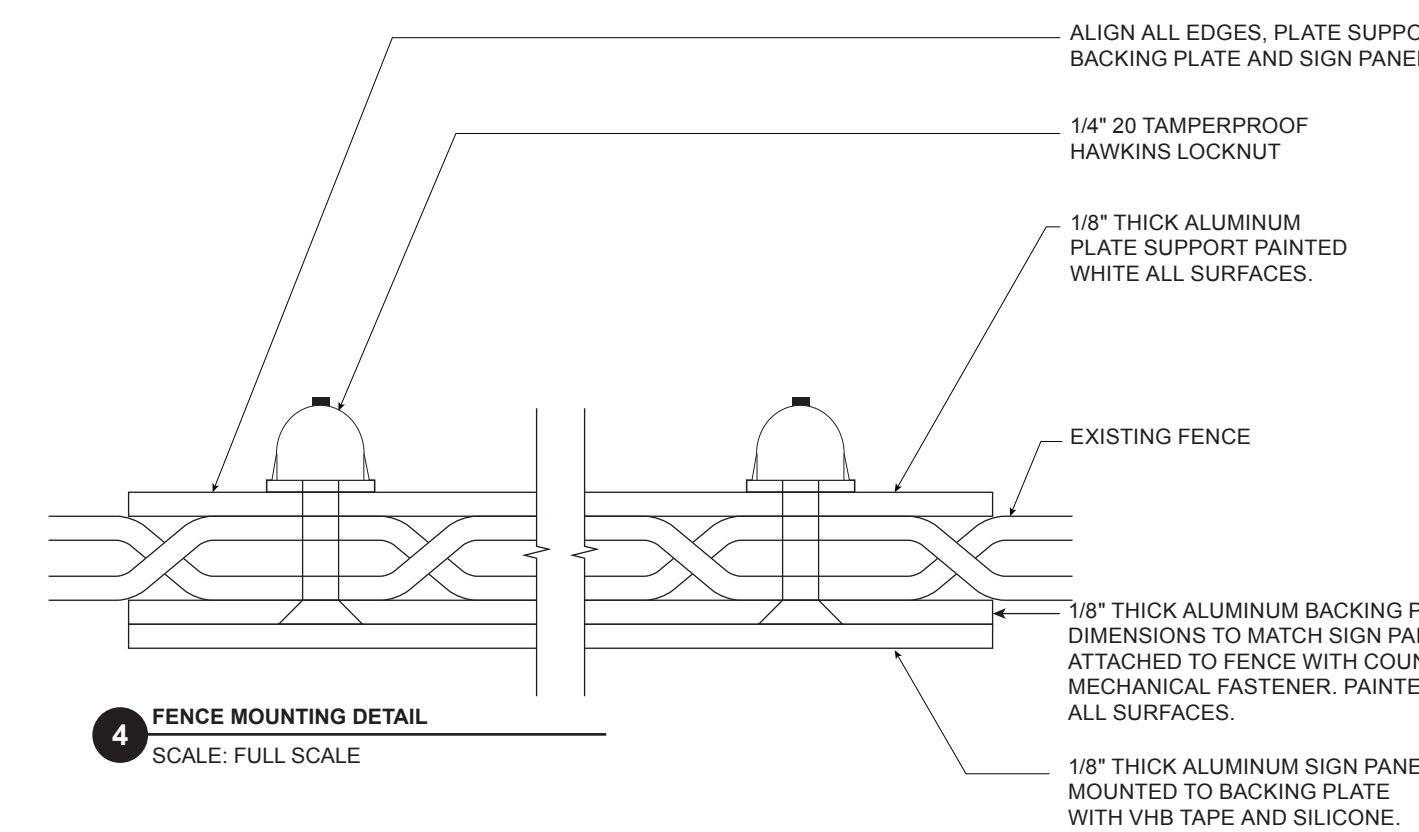


4 SIGN LOCATION DETAIL - ST11-02
SCALE: 1/8" = 1'-0"

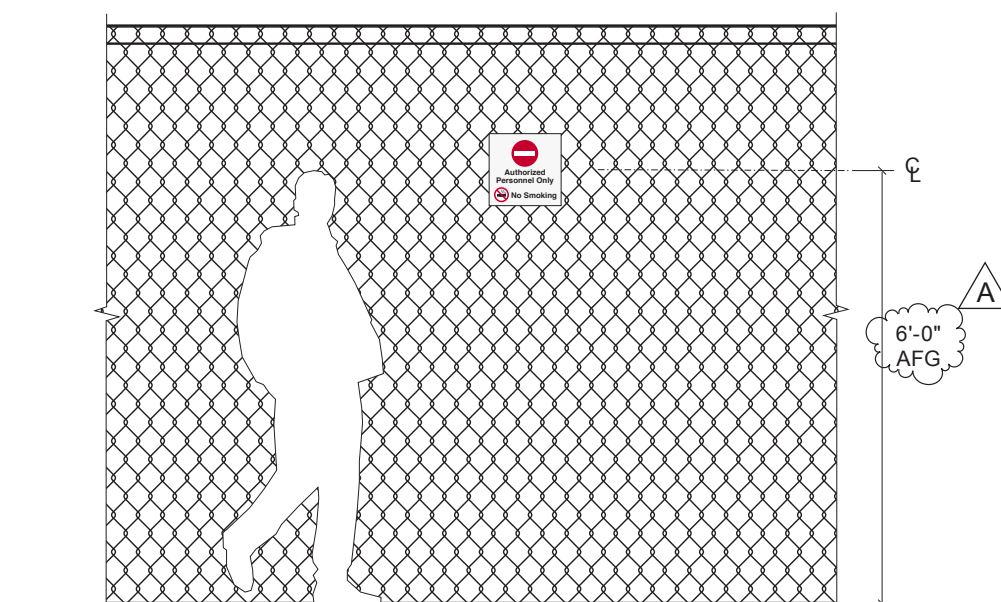


5 SIGN LOCATION DETAIL - ST11-03
SCALE: 1/8" = 1'-0"

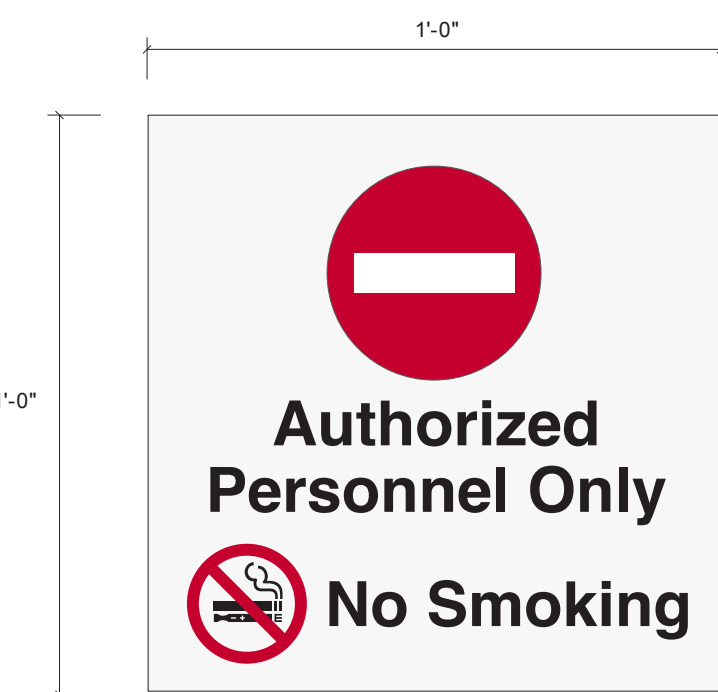
SIGN TYPE 11 HELICOPTER LANDING WARNING 1



4 FENCE MOUNTING DETAIL
SCALE: FULL SCALE

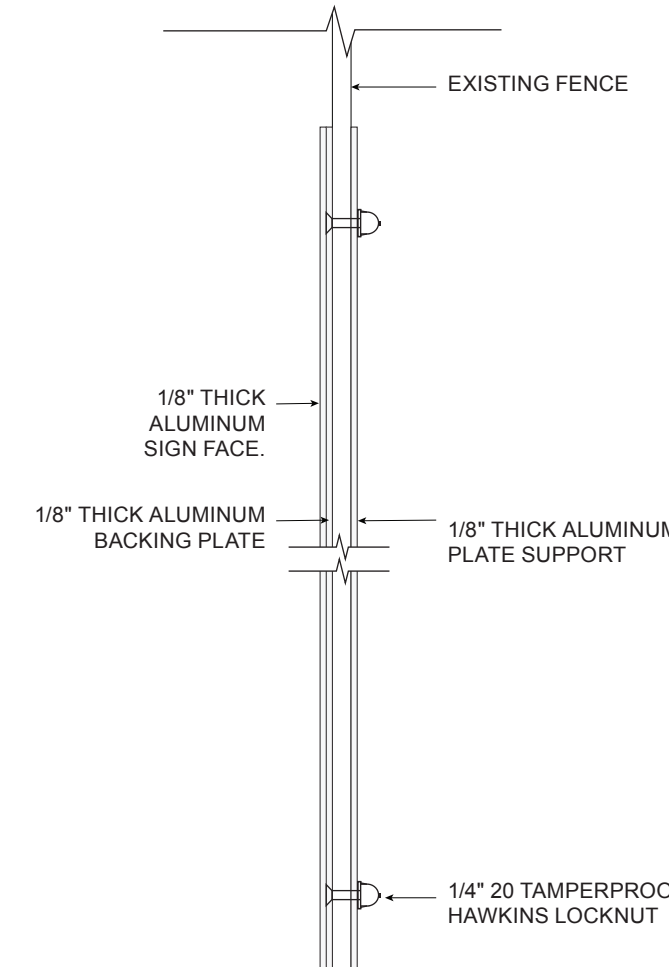


3 CONTEXT ELEVATION
SCALE: 3/8" = 1'-0"



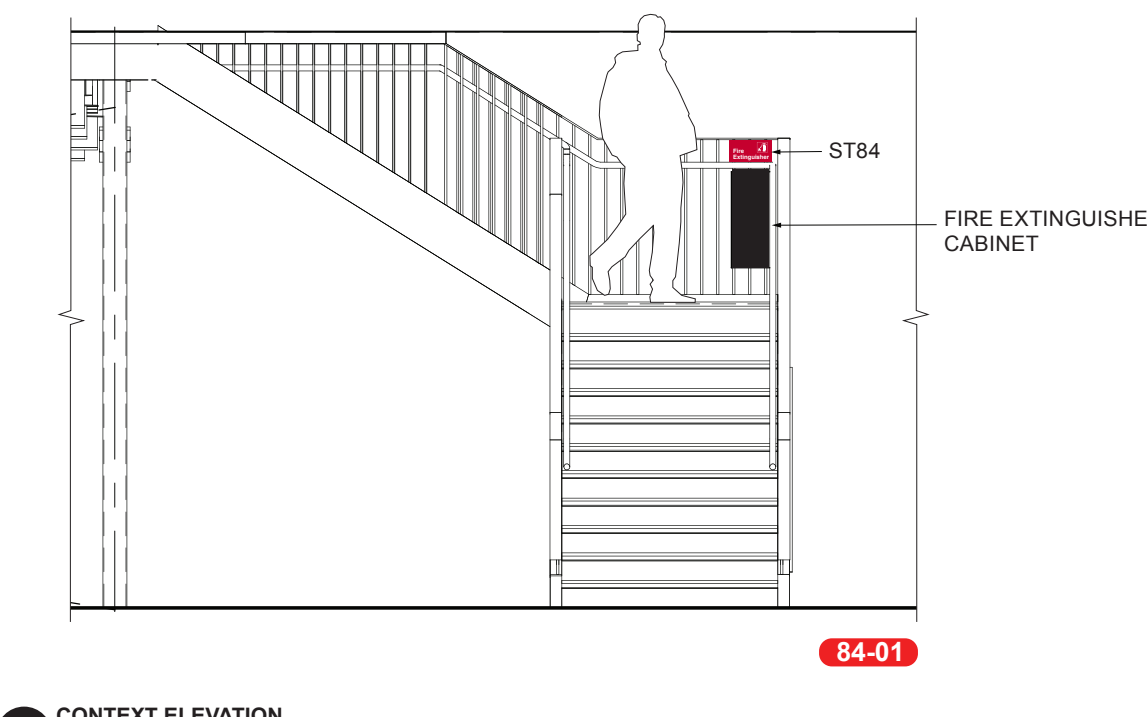
1 INFORMATION/REGULATORY PLAQUE - LARGE
SCALE: 3" = 1'-0"

1/8" THICK ALUMINUM SIGN PANEL WITH ANTI-GRAFFITI COATING OVER THE ENTIRE SIGN, MOUNTED TO 1/8" THICK ALUMINUM BACKING PLATE, ATTACHED TO EXISTING FENCE.
ADDITIONAL ANTI-GRAFFITI COAT ON ENTIRE SURFACE, MINIMAL 3MIL COPY AND SYMBOL: PMS BLACK 6 C (SV023) PMS WHITE C (SV202) RED PMS 200 C (MP00239) PANEL: PMS WHITE C (SV202)

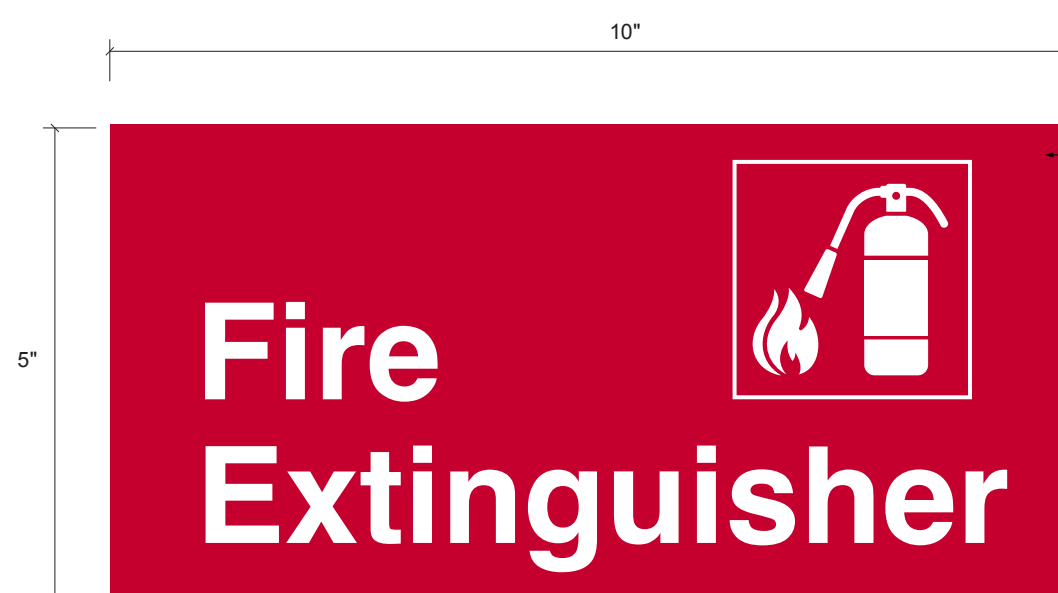


2 SIDE VIEW
SCALE: 6" = 1'-0"

SIGN TYPE 93 INFORMATION / REGULATORY PLAQUE - LARGE 4

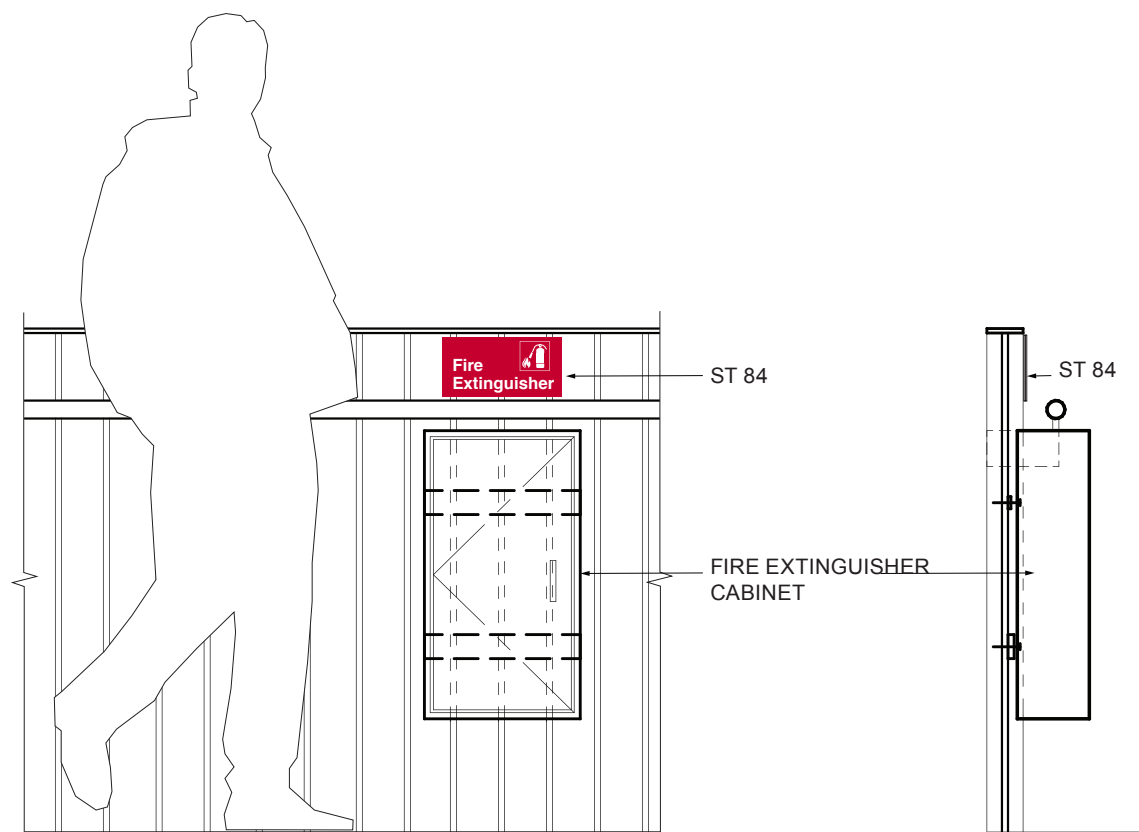


5 CONTEXT ELEVATION
SCALE: 1/4" = 1'-0"

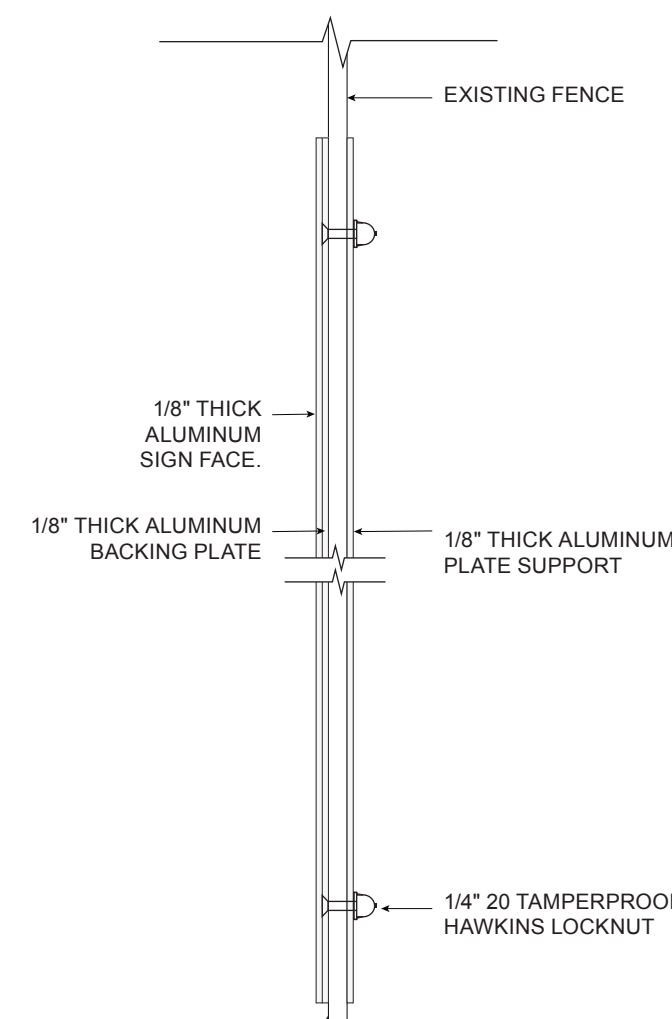


1 FIRE EQUIPMENT IDENTIFICATION
SCALE: 6" = 1'-0"

1/8" THICK SIGN PANEL MOUNTED TO 1/8" THICK ALUMINUM BACKING PLATE DIMENSION TO MATCH SIGN PANEL WITH VHB TAPE AND SILICONE ADHESIVE.
ADDITIONAL ANTI-GRAFFITI COAT ON ENTIRE SURFACE, MINIMAL 3MIL COPY AND SYMBOL: PMS WHITE C (SV202) PANEL: RED PMS 200 C (MP00239)



4 CONTEXT ELEVATION
SCALE: 3/4" = 1'-0"



2 SIDE VIEW
SCALE: 6" = 1'-0"

SIGN TYPE 84 FIRE EQUIPMENT IDENTIFICATION 3

ATTACHMENT 4



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Los Angeles, California
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HCAI #H220345-19-00

CONSULTANT

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ISSUE RECORD

DATE	DESCRIPTION
9/07/2022	BC2 HCAI SUBMITTAL BC2



1000 West Carson Street, Torrance, CA 90502

MILESTONE: HCAI SUBMITTAL

MILESTONE DATE: 03/04/2022

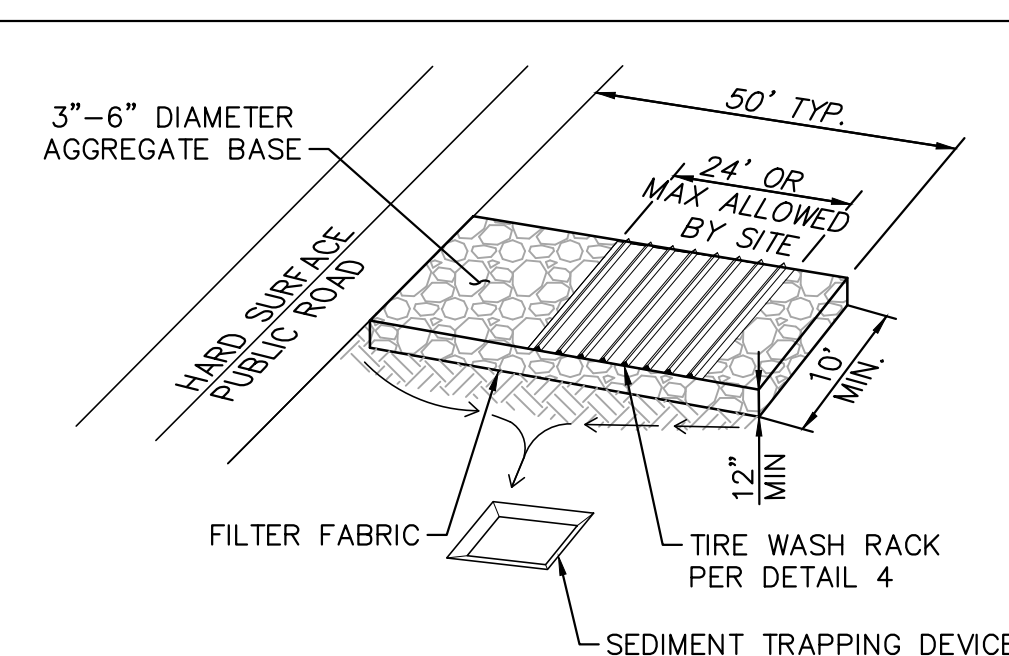
RBB PROJECT: 1712035 SCALE: As indicated

EROSION CONTROL DETAILS

C151



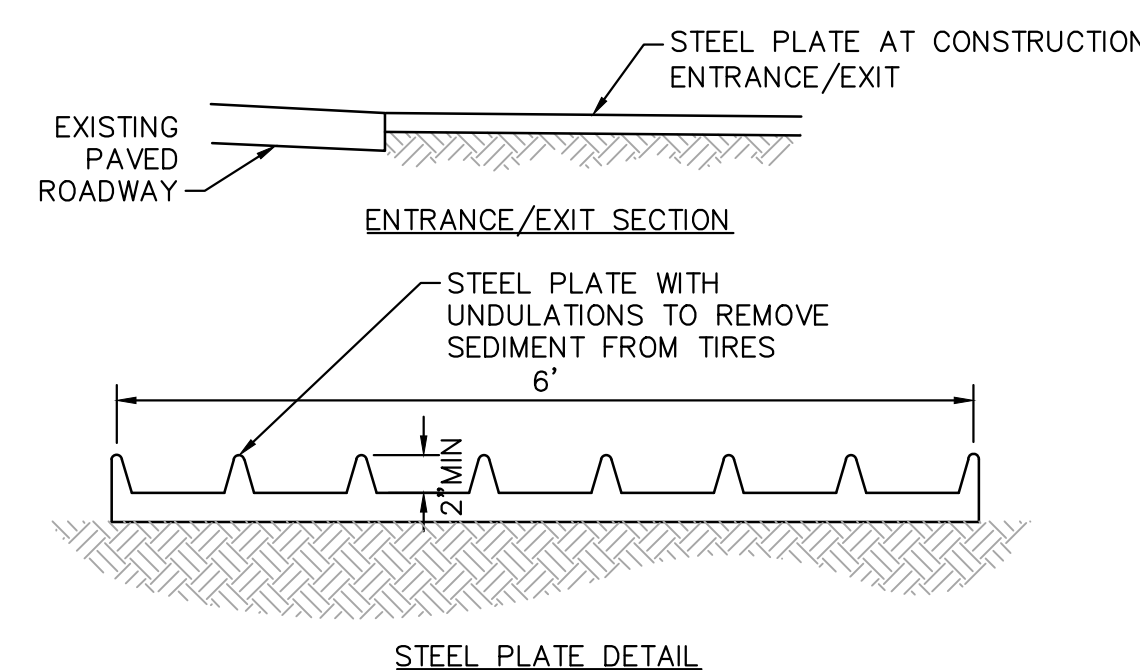
DROP INLET SEDIMENT BARRIER
N.T.S.



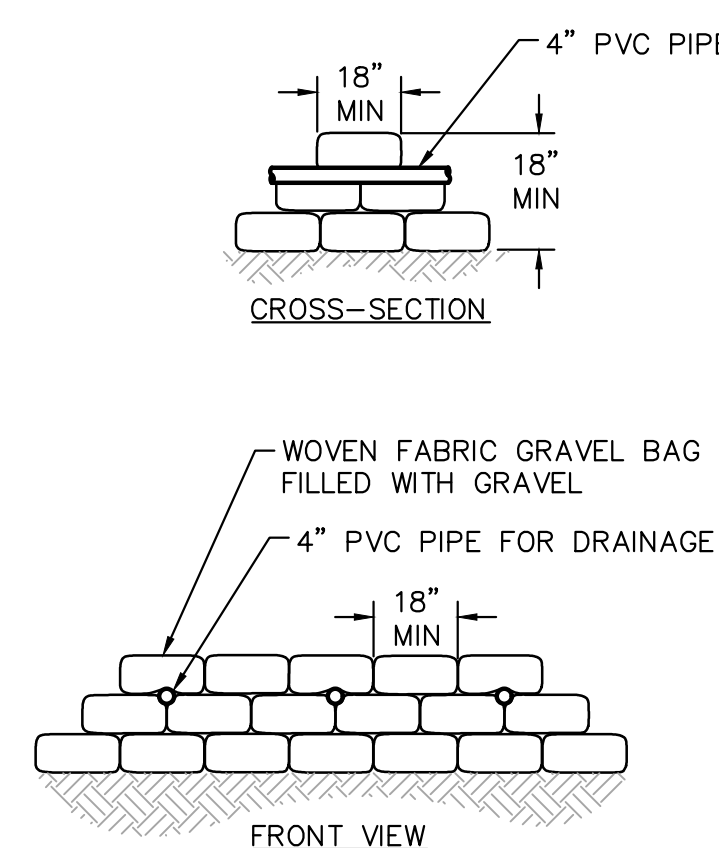
NOTES:

1. THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION THAT WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS-OF-WAY. THIS MAY REQUIRE TOP DRESSING, REPAIR AND/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT.
2. WHEN NECESSARY, WHEELS SHALL BE CLEANED PRIOR TO ENTRANCE ONTO PUBLIC RIGHT-OF-WAY.
3. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH CRUSHED STONE THAT DRAINS INTO AN APPROVED SEDIMENT TRAP OR SEDIMENT BASIN.

STABILIZED CONSTRUCTION ENTRANCE
N.T.S.



TIRE WASH RACK
N T S



RUNOFF OUTLET BARRIER
N.T.S.

