

# BID DOCUMENTS

Including Specifications  
for the construction of:

## The COUNTY OF MENDOCINO

### Bower Park Restoration and Improvement Project Rebid

38040 Old Stage Road  
Gualala, CA 95445



Prepared by:  
Executive Office  
FACILITIES & FLEET DIVISION  
851 LOW GAP ROAD  
UKIAH, CA 95482

**BID# 025-25**

Date of Issue:  
July 17, 2025

SECTION 005000 - AGREEMENT FOR LUMP SUM BID

THIS CONTRACT, made effective on the date it becomes fully executed by all parties, is between the County of Mendocino, hereinafter called COUNTY, and Miguel Angel Rodriguez Zepeda, DBA MARZ Engineering, hereinafter called CONTRACTOR.

WHEREAS, COUNTY first issued a request for bids for the **Bower Park Improvement and Restoration Project** (the "Project") on May 9, 2025, received one bid which was rejected by COUNTY for exceeding the construction budget; and

WHEREAS, pursuant to Public Contract Code ("PCC") section 22038, subdivision (a), COUNTY rejected the bid and directed COUNTY staff to modify the scope of the Project and re-issue plans for bidding; and

WHEREAS, a request for bids for a reduced scope Project (the "**Bower Park Improvement and Restoration Project Rebid**" or "Project Rebid") was issued on July 17, 2025, and COUNTY received no bids; and

WHEREAS, pursuant to PCC section 22038, subdivision (c), if no bids are received through the formal procedure, the COUNTY may either perform the project by its own employees "or negotiated contract without further complying with this article"; and

WHEREAS, COUNTY and CONTRACTOR entered into negotiations regarding CONTRACTOR's ability to perform the Project Rebid pursuant to PCC section 22038; and

WHEREAS, COUNTY and CONTRACTOR have negotiated this Agreement under which the Project Rebid is being awarded to CONTRACTOR but will be performed in two separate phases, with work as specified herein, with certain work being excluded entirely as unnecessary due to certain bid alternates not being awarded.

COUNTY and CONTRACTOR, for the consideration described below, named, agree as follows:

FIRST: THE CONTRACTOR shall furnish all labor, materials, equipment, mechanical workmanship, transportation, and services for the installation and completion of the Bower Park Improvement and Restoration Project Rebid, in accordance with the contract documents, including the Addenda thereto, all as adopted by the COUNTY.

SECOND: The work under this contract for Phase 1 described below shall be completed within one hundred eighty (180) calendar days from the date of the "Phase 1 Notice to Proceed". The work under this contract for Phase 2 described below shall be completed within one hundred eighty (180) days from the date of the "Phase 2 Notice to Proceed".

THIRD: The Contract consists of the following documents, all of which are fully a part hereof as if herein set out in full, whether or not hereto attached:

1. This Agreement for Lump Sum Bid
2. Invitation to Bid
3. Instructions to Bidders
4. Bidding Documents
5. Supplementary General Conditions
6. General Conditions

County of Mendocino Bower Park Restoration and Improvement Project

7. Unforeseen Physical Conditions
8. Summary of Work
9. Temporary Facilities and Building Services
10. Project Plans and Drawings
11. Technical Specifications
12. Addendum to the Bid

While this Contract has been negotiated with the CONTRACTOR, requirements stated in the Notice Inviting Bids, Instructions to Bidders, and Bidding Documents shall apply to CONTRACTOR as if CONTRACTOR was the winning bidder for the Project Rebid, unless the pages or requirements have been struck through or otherwise superseded by this Section 00500, including the following:

- A. **TIME FOR COMPLETION.** CONTRACTOR agrees to commence work for each Phase on or before a date to be specified in a written "Phase 1 Notice to Proceed" and "Phase 2 Notice to Proceed" from COUNTY and to fully complete each phase within one hundred eighty (180) days from the date of the applicable written notice to proceed. This paragraph does not require that Phase 1 work be completed before a "Phase 2 Notice to Proceed" can be issued.
- B. **BONDS.** CONTRACTOR shall be required to furnish a Labor and Material Bond and a Performance Bond each in the amount equal to one hundred percent (100%) of the prices stated herein for Phase 1 and Phase 2, as further provided for in the FOURTH paragraph below. Said Bonds shall be obtained from a surety company satisfactory to COUNTY.

FOURTH: The Work under this Contract shall be done in two phases, Phase 1 and Phase 2, as follows:

- A. Phase 1 shall include the work described, for the amount stated, in paragraph FIFTH below.
- B. Phase 2 shall include the work described, for the amount stated, in paragraph SIXTH below.
- C. COUNTY shall directly procure the materials to be installed as part of Phase 2 as stated in paragraph SEVENTH.
- D. The items of work specified in paragraph EIGHTH are hereby excluded from this Contract.
- E. The provisions of this Contract shall apply independently to each Phase of this Contract. In the event any additional coordination or information is needed by CONTRACTOR or COUNTY, the parties shall comply with Section 01310 – Project Management and Coordination.
- F. COUNTY shall issue a written "Phase 1 Notice to Proceed" following the execution of this Contract by COUNTY. CONTRACTOR shall proceed only with the Phase 1 work.
- G. Contractor and County shall confirm the scope and cost of Phase 2 work prior to (i) the parties executing any necessary contract amendment for Phase 2, (ii) the CONTRACTOR securing a Labor and Material Bond and a Performance Bond for Phase 2, and (iii) COUNTY issuing the Phase 2 Notice to Proceed.
- H. CONTRACTOR shall not commence any Phase 2 work or procure any materials for Phase 2 until receiving a written "Phase 2 Notice to Proceed" from COUNTY. COUNTY shall not issue a written "Phase 2 Notice to Proceed" until CONTRACTOR has procured and provided to COUNTY the Labor and Material Bond and Performance Bond for all work required as part of Phase 2.
- I. Notwithstanding any other provision of this Contract, prior to issuance of the Phase 2 Notice to Proceed, COUNTY may at its discretion determine not to proceed with Phase 2 and terminate the Contract as to Phase 2. Further, County may withhold issuance of a

County of Mendocino Bower Park Restoration and Improvement Project

written "Phase 2 Notice to Proceed" or determine not to proceed with Phase 2 under this Contract in the event of any CONTRACTOR noncompliance with the provisions of this Contract during Phase 1, including but not limited to the following:

- i. If any payments have been withheld as provided in paragraph 27 of the General Conditions.
- ii. If any faulty work or materials have not been remedied pursuant to paragraph 28 of the General Conditions as stated therein.
- iii. If any materials and labor for Phase 1 not meeting the standards stated in paragraph 42 of the General Conditions have not been removed and replaced as stated therein.
- iv. If the County has had to make a claim under either the Labor and Materials Bond or the Performance Bond provided by CONTRACTOR for the Phase 1 work.
- v. If the County has taken action to terminate this Contract pursuant to paragraph 21 of the General Conditions.

**FIFTH: Phase 1 – Demolition and Site Development**

COUNTY shall pay to CONTRACTOR, as full consideration for the faithful performance of the Contract for Phase 1, the sum of: One million seventy-four thousand, two hundred seventy-five dollars and zero cents **(\$1,074,275.00)**

The work of Phase 1 - Demolition and Site Development shall consist of the following portions of the project scope:

Specification Division 1 General Requirements, including: 010100 Summary of Work, 012100 Allowances – Not Applicable, 012300 Alternates – Not Applicable, 012500 Substitution Procedures – Not Applicable, 013100 Project Management and Coordination, 013200 Construction Progress Documentation, 013300 Submittal Procedures, 014100 Testing and Laboratory Services, 014115 Requirements for Off Road Diesel Fleets, 015000 Temporary Facilities and Building Services, 015050 Erosion Control and 015723 Storm Water Pollution Control

All project plan sheets applicable to the scope defined below including L0.0 Cover Sheet, all plan notes, sheet notes, materials schedules, legends descriptions, layout dimensions, details, civil notes, drawings, details, and specifications, Erosion and Sediment Control Plans, structural notes and specifications, structural plans and details, electrical legends, plans, details and schedules whether or not specifically noted below.

**A. Protection and Demolition**

- 1) Furnish and Install all protection and demolition work shown or noted on protection and demolition sheets L1.0, L1.1, L1.2, L1.3, L1.4, L1.5, C5, C7 and E106.
- 2) Section 024119 Selective Demolition

**B. Site Clearing, Earth Moving, Grading, Drainage, Water System and Utility Work**

- 1) Furnish and Install all site clearing, earth moving, grading and utility work shown or noted on grading and utility plan sheets C1, C2, C3, C4, C5 and Civil Details on sheet C8
- 2) Furnish and Install all site clearing, earth moving, grading, drainage and utility work included above in compliance with Specifications:
  - i. Section 311000 Site Clearing
  - ii. Section 312000 Earth Moving
  - iii. Section 312100 Utility Trenching and Backfill
  - iv. Section 331000 Water Systems

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- v. Section 334100 Storm Utility Drainage Piping
- vi. Section 334600 Subdrainage
- vii. Section 337173 Electric Utility Services

C. Asphalt and Concrete

- 1) Furnish and Install all asphalt and concrete paving, asphalt or concrete curbs, ramps and courts shown or noted on:
  - i. Grading and utility plan sheets C1, C2, C3, C4, C5 and Civil Details on sheet C8.
  - ii. Site Plan Sheets L2.0, L2.1, L2.2, L2.3, L2.4, L2.5 Materials Notes: 1, 3, 3A, Accessibility plans and notes on L3.0 and construction details on sheets L4.0 and L4.5.
  - iii. Structural plans and details on sheets S1, S2, S3, S4
- 2) Furnish and Install all structural concrete retaining walls, deck foundations and weir decking and concrete shown or noted on Structural sheets S1, S5 and S6.
- 3) Furnish and Install all asphalt and concrete paving, asphalt or concrete curbs, ramps and courts included above in compliance with Specifications:
  - i. Section 031000 Concrete Forming and Accessories
  - ii. Section 032000 Concrete Reinforcing
  - iii. Section 033000 Cast in Place Concrete
  - iv. Section 051100 Structural & Miscellaneous Steel
  - v. Section 053000 Metal Decking
  - vi. Section 321100 Pavement Base Course
  - vii. Section 321216 Asphalt Paving
  - viii. Section 321313 Concrete Pavement
  - ix. Section 321318 Cement and Concrete for Exterior Improvements
  - x. Section 321373 Concrete Paving Joint Sealants
  - xi. Section 321375 Concrete Curbs and Gutters

D. Site improvements, decking and surfacing materials

- 1) Furnish and Install all finish grading, surfacing materials, wood retaining wall and decking shown or noted on:
  - i. Sheet L2.0, L2.1, L2.2, L2.3, L2.4, L2.5 – Material Schedule Notes: 2 Infield – Warning Track Material, 5 Stabilized Decomposed Granite, 6 Crushed Stone, 6A Cobble, 7 Recycled Plastic Decking, and 8 Walk-on Mulch and L4.3.
  - ii. Sheet S6 – Bathroom Deck Retrofit A
- 2) Furnish and Install all site improvements, decking and surfacing materials included above in compliance with Specifications:
  - i. Section 061000 Rough Carpentry
  - ii. Section 061533 Wood Patio Decking

SIXTH: **Phase 2 – Park Amenities and Improvements**

COUNTY shall pay to CONTRACTOR, as full consideration for the faithful performance of the Contract for Phase, a sum not to exceed: Three hundred twenty-five thousand dollars and zero cents **(\$325,000.00)**

## County of Mendocino Bower Park Restoration and Improvement Project

The work of Phase 2 - Amenities and Improvements shall consist of the following portions of the project scope:

Specification Division 1 General Requirements, including: 010100 Summary of Work, 012100 Allowances – Not Applicable, 012300 Alternates – Not Applicable, 012500 Substitution Procedures – Not Applicable, 013100 Project Management and Coordination, 013200 Construction Progress Documentation, 013300 Submittal Procedures, 014100 Testing and Laboratory Services, 014115 Requirements for Off Road Diesel Fleets, 015000 Temporary Facilities and Building Services, 015050 Erosion Control and 015723 Storm Water Pollution Control

All project plan sheets applicable to the scope defined below including L0.0 Cover Sheet, all plan notes, sheet notes, materials schedules, legends descriptions, layout dimensions, details, civil notes, drawings, details, and specifications, Erosion and Sediment Control Plans, structural notes and specifications, structural plans and details, electrical legends, plans, details and schedules whether or not specifically noted below.

### A. Playground and Recreational Equipment and Amenities

- 1) Install County furnished playground and recreational equipment and amenities show or noted on sheets – L2.1, L2.2, L2.3 L2.4, L2.5, L4.1, 4.2, L4.3, L4.4, L4.5, L4.6, and L4.7 including Amenities: A1 & A2 Picnic Tables, B Pet Waste Stations, C1 & C2 Benches, D Drinking Fountains, E Trash Receptacles, F Barbeque Pits, G1 – G5 Signage, I Bleachers, K Charcoal Bin, L Baseball Backstop, M Baseball Bases, N & O Tennis & Pickleball Net Assemblies, P Basketball Goal Assemblies, R Bicycle Rack and Playground Equipment on L4.7.
- 2) Install all playground and recreational equipment and amenities included above in compliance with Specifications:
  - i. Section 116800 Playground Equipment and Structures
  - ii. Section 323300 Site Furnishings

### B. Steel Railings, Fencing work

- 1) Furnish and install all steel railings, bollard and fencing, work shown or noted on sheets L2.0, L2.1, L2.2, L2.3, L2.4, L2.5 fencing legend and Amenity Q removable bollards, L4.0, L4.2, L4.5, S4 and S5.
- 2) Furnish and install all steel railings, bollard and fencing included above in compliance with Specifications:
  - i. Section 323113 Chain Link Fence and Gate
  - ii. Section 051100 Structural and Miscellaneous Steel
  - iii. Section 055213 Pipe and Tube Railing
  - iv. Section 323300 Site Furnishings (for bollards)

### C. Electrical Work

- 1) Furnish and install all electrical work shown or noted on sheets E001 through E701
- 2) Furnish all electrical work included above in compliance with Specifications:
  - i. Division 26 – Electrical all sections

### D. Landscape and Irrigation Work

- 1) Furnish and install all landscaping and irrigation work shown or noted on Irrigation and Landscaping plan and detail sheets L5.0, L5.1, L5.2, L5.3, L5.4, L5.5, L5.6, L5.7, L6.0, L6.1, L6.2, L6.3, L6.4, L6.5, and L6.6.
- 2) Furnish all landscape and irrigation work included above in compliance with Specifications:
  - i. 312100 Utility Trench and Backfill
  - ii. 328400 Planting Irrigation
  - iii. 329113 Soil Preparation
  - iv. 329200 Turf and Grasses
  - v. 329300 Plants

County of Mendocino Bower Park Restoration and Improvement Project

E. Finish Surfaces and Materials

- 1) Furnish and install all finish surfaces and materials work shown or noted on site or Civil plan and detail sheets L2.2 Material Schedule item 4 Engineer Wood Fiber, L4.5, L4.6, L4.7, L2.1, L2.5, C1, C5 and C8
- 2) Furnish all finish surfaces and materials work included above in compliance with Specifications:
  - i. Section 321713 Parking Bumpers
  - ii. Section 321723 Pavement Markings
  - iii. Section 321726 Tactile Warning Surfacing
  - iv. Section 321816 Playground Protective Surfacing

**SEVENTH: County Furnished Equipment and Amenities**

In coordination with the Contractor, the County shall furnish to the Contractor the following recreational equipment and park amenities show or noted on sheets – L2.1, L2.2, L2.3 L2.4, L2.5, L4.1, 4.2, L4.3, L4.4, L4.5, L4.6, and L4.7 including Amenities: A1 & A2 Picnic Tables, B Pet Waste Stations, C1 & C2 Benches, D Drinking Fountains, E Trash Receptacles, F Barbeque Pits, G1 – G5 Signage, I Bleachers, K Charcoal Bin, L Baseball Backstop, M Baseball Bases, N & O Tennis & Pickleball Net Assemblies, P Basketball Goal Assemblies, R Bicycle Rack and Playground Equipment on L4.7.

Supply of playground and recreational equipment and amenities included above shall be as identified in Specifications:

- i. Section 116800 Playground Equipment and Structures
- ii. Section 323300 Site Furnishings

The estimated cost of County furnished equipment and amenities is \$250,000

**EIGHTH: The following items of work are excluded from this agreement and the project as not required.**

Section 012300 Alternates

- 1) Alternate NO. 1 Group Picnic Area Including Grading, Paving, and Amenities
  - I. Sheet L2.0 – ADD/ALT 1
- 2) Alternate NO. 2 Fitness Stations Including AC Pads
  - I. Sheets L2.0 – ADD/ALT 2
  - II. Sheets L2.1– L2.5 – Amenities schedule J1 through J6
- 3) Alternate NO. 3 Security Lighting and Wiring
  - I. Sheet L2.0 – ADD/ALT 3
  - II. Sheets E100, E102 and E103 (Add Alternate 6) noted items.

Payment shall be made each month to CONTRACTOR in accordance with and subject to the provisions embodied in the Documents made a part of this Contract.

County of Mendocino Bower Park Restoration and Improvement Project

IN WITNESS WHEREOF

DEPARTMENT FISCAL REVIEW:

Darcie Antle  
DEPARTMENT HEAD DATE

Budgeted:  Yes  No 09/17/2025

Budget Unit: 1710

Line Item: 864360 CI079

Grant:  Yes  No

Grant No.: SR18-23-012 / SRSG-23-001 2024

CONTRACTOR/COMPANY NAME

By: Miguel Rodriguez

Date: 09/17/25

NAME AND ADDRESS OF CONTRACTOR:

Miguel Angel Rodreguez Zepeda, DBA, MARZ Engineering

9741 Laughlin Way

Redwood Valley, CA 95470

COUNTY OF MENDOCINO

By: John Haschak  
JOHN HASCHAK, Chair  
BOARD OF SUPERVISORS

Date: 09/23/2025

By signing the above, the signatory warrants and represents that he/she executed this Agreement in his/her authorized capacity and that by his/her signature on this Agreement, he/she or the entity upon behalf of which he/she acted, executed this Agreement.

ATTEST:

DARCIE ANTLE, Clerk of said Board

By: Amy  
Deputy 09/23/2025

I hereby certify that, according to the provisions of Government Code section 25103, delivery of this document has been made.

DARCIE ANTLE, Clerk of said Board

By: Amy  
Deputy 09/23/2025

COUNTY COUNSEL REVIEW:

APPROVED AS TO FORM:

By: Man Kier  
COUNTY COUNSEL

Date: 09/17/2025

INSURANCE REVIEW:

By: Darcie Antle  
Risk Management

Date: 09/17/2025

EXECUTIVE OFFICE/FISCAL REVIEW:

By: [Signature]  
Deputy CEO or Designee

Date: 09/17/2025

Signatory Authority: \$0-25,000 Department; \$25,001- 50,000 Purchasing Agent; \$50,001+ Board of Supervisors

Exception to Bid Process Required/Completed

Mendocino County Business License: Valid

Exempt Pursuant to MCC Section: \_\_\_\_\_



**COUNTY OF MENDOCINO**  
**Executive Office**  
**Facilities & Fleet Division**

**DARCIE ANTLE**  
 Chief Executive Officer  
 Clerk of the Board  
 Purchasing Agent

851 Low Gap Road  
 Ukiah, CA 95482

Email: facilities@mendocinocounty.gov

Office: (707) 234-6068

**COUNTY OF MENDOCINO ♦ BID ADDENDUM**

**Bid No. 025-25**

**Bower Park Improvement and Restoration Project Rebid**

Addendum No.	<b>01</b>
Addendum Issue Date:	<b>August 11, 2025</b>
Bid Issue Date:	<b>July 17, 2025</b>
Bid Opening Date:	<b>August 14, 2025</b>

**INQUIRIES AND CLARIFICATIONS TO PROJECT PLANS AND SPECIFICATIONS**

*The additions, omissions, clarifications, and/or corrections herein shall be made part of the Contract plans and specifications. They shall be included in the Scope of Work and proposals to be submitted. This Addendum modifies the original plans and specifications as described below.*

1. **Bidder Question:** Please confirm that there is no specific coating required for the tennis/pickleball courts?

**County Response:** The tennis/pickleball court finish consist of plain asphalt with white striping, as depicted in the plans. Refer to Section 321216 – Asphalt Paving and Section 321723 – Pavement Markings.

2. **Bidder Question:** Landscape drawing amenity type L calls for the baseball backstop to be LA Steelcraft LA-1244T or equal and references detail 3/L4.4. The overall backstop height between these details is in conflict. Is the backstop 22'6" per detail 3/L4.4 or 19'6" per the LA Steelcraft website.

**County Response:** Change the backstop height measurement in detail 3/L4.4 to 19'6".

3. **Bidder Question:** Fence details on sheet L4.2 refer to structural drawings for post footing details. The only fence detail appearing on the structural drawings is 5/S5 and reference the weir curb. Please clarify the footing depths for each post detail.

**County Response:** Detail 5/S5 applies only at the weir curb locations. Provide new fence post footings per the following sechedule:

<u>Type</u>	<u>Depth</u>	<u>Diameter</u>
<b>4' Line</b>	<b>18"</b>	<b>12"</b>
<b>4' gate/corner</b>	<b>36"</b>	<b>12"</b>
<b>6' line</b>	<b>36"</b>	<b>12"</b>
<b>6' gate/corner</b>	<b>36"</b>	<b>16"</b>

4. **Bidder Question:** The specification documents 323113 specify 360-degree hinges; however, the drawing appears to show a 180-degree hinge. Please clarify the correct hinge type.

**County Response:** Change specification section 303113 Part 2, paragraph 2.5.D.1 to read "Hinges: 180-degree inward and outward swing."

5. **Bidder Question:** Landscape drawing amenity type P calls for the basketball goal assembly to be LA Steelcraft LA-12C34 or equal and references detail 4/L4.3 Specification Section 323300 calls for an aluminum backboard, model LA-11, while Detail 4/L4.3 specifies a steel model LA-01. Which model should be used?
- County Response:** Correct call-out 1 on detail 4/L4.3 to identify LA Steelcraft model LA-011.
6. **Bidder Question:** Detail 4/L4.3 indicates 6-foot-deep by 18" footings for the basketball post assembly LA-12C34, but the manufacturer specifies a 42" deep by 32" footing. Which installation detail should be followed?
- County Response:** Install basketball posts as drawn in detail 4/L4.3.
7. **Bidder Question:** Detail 3/L4.3 shows the tennis/pickleball footing as a tapered 3'6" deep footing that is wider at the bottom and narrower at the top than the manufacturer specifies. Which installation detail should be followed.
- County Response:** Install tennis/pickleball posts as shown in detail 3/L4.3.
8. **Bidder Question:** Is the Bower Park improvement and restoration project governed by a Project Labor Agreement (PLA)?
- County Response:** Please refer to specification section 000200 Notice inviting Bids, and general conditions for prevailing wage and certified payroll and related labor compliance and reporting requirements. The project is not subject to a Project Labor Agreement.
9. **Bidder Question:** Is prequalification necessary to submit a bid for this project?
- County Response:** No, specification section 001000 Instruction to Bidders provides the specific bidding and qualification requirements for this project.

#### ADDITIONAL INFORMATION

Sheet L4.7 issued with the drawings lacked sufficient resolution to read the notes and details. Attached sheet L4.7 is provided with better resolution.

All other specifications remain in full force and effect.

Bidders are reminded that they shall complete the Addenda Acknowledgement on the Bid Form. Failure to do so may result in the disqualification of the submitted bid.

Any questions or concerns regarding this matter should be directed to Kirk Viera, Facilities Project Specialist, at [Vierak@mendocinocounty.gov](mailto:Vierak@mendocinocounty.gov) or (707) 380-3223

County of Mendocino Bower Park Restoration and Improvement Project

SECTION 000020 - PROJECT DIRECTORY

PROJECT: Bower Park Restoration and Improvement Project Rebid  
38040 Old Stage Road  
Gualala, CA 95445

OWNER: County of Mendocino  
501 Low Gap Road  
Ukiah, CA 95482  
(707) 234-6050

AGENT: County of Mendocino  
Executive Offices  
Facilities and Fleet Division  
841 Low Gap Road  
Ukiah, CA 95482  
Office:(707) 234-6058  
Mobile:(707) 380-3223  
[vierak@mendocinocounty.gov](mailto:vierak@mendocinocounty.gov)  
Kirk Viera, Facility Project Specialist I

ARCHITECT: Integra Planning + Landscape Architecture, Inc.  
1506 4th Street  
Santa Rosa, California 95404  
(707) 852-0500  
[mike@integrapla.com](mailto:mike@integrapla.com)  
Michael Cook, PLA, ASLA, CLIA, CPSI  
[www.integrapla.com](http://www.integrapla.com)

# County of Mendocino Bower Park Restoration and Improvement Project

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032000	Concrete Reinforcing
033000	Cast-in-place Concrete

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# County of Mendocino Bower Park Restoration and Improvement Project

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## DIVISION 33 - UTILITIES

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337173 Electric Utility Services

END OF SECTION

## County of Mendocino Bower Park Restoration and Improvement Project

### SECTION 000200 - NOTICE INVITING BIDS

Notice is hereby given that sealed bids will be received at the Mendocino County Facilities Conference Room located at 841 Low Gap Road, Ukiah, California 95482 until the hour of 2:00 p.m., as determined by the clock on the wall in the Conference Room, **on Thursday August 14, 2025**, and then publicly opened and read aloud in the Conference Room, 841 Low Gap Road, Ukiah, California for the following project:

#### **Bower Park Restoration and Improvement Project Rebid (BID 025-25)**

Electronic Plans and Documents may be seen or downloaded from the Mendocino County Web Page for Open RFP, Quotes & Bids: <https://www.mendocinocounty.org/departments/general-services/central-services/open-rfp-quotes-bids>. Additionally, plans and documents have been distributed to builders' exchange plan rooms throughout Northern California.

Bids shall be made on the form provided in this Manual and accompanied by a form of bid security as provided in Section 001000 Instructions to Bidders.

The successful Bidder will be required to furnish a Labor and Material Bond and a Performance Bond as required in Section 001000 Instructions to Bidders.

Bidders' attention is called to the Instruction to Bidders and other related documents in this Manual for complete directions and information as to bidding and other requirements.

#### NON-MANDATORY PRE-BID CONFERENCE

A non-mandatory pre-bid conference and site inspection will be held on:

**Wednesday, July 30, 2025 @ 10:30 AM at the 38040 Old Stage Road, Gualala, CA 95445**

#### PAYMENT OF PREVAILING WAGES

Pursuant to the provisions of the Labor Code of the State of California, the Department of Industrial Relations has made a determination of the rate of per diem wages to be paid on the prevailing rate of pay for regular, holiday and overtime work in the locality in which the public work is to be performed, for each craft, classification, or type of workman needed to execute the contract. All County of Mendocino projects greater than \$1,000 require that contractors adhere to Prevailing Wage requirements (California Labor Code, Sections 1770 through 1775). The rates can be found online here: <https://www.dir.ca.gov/OPRL/DPreWageDetermination.htm>.

#### CONTRACTOR REGISTRATION

Per Labor Code Section 1771.1(a) A contractor or subcontractor shall not be qualified to bid on, be listed in a bid proposal, subject to the requirements of Section 4104 of the Public Contract Code or engage in the performance of any contract for public work, as defined in this chapter, unless currently registered and qualified to perform public work pursuant to Section 1725.5. It is not a violation of this section for an unregistered contractor to submit a bid that is authorized by Section 7029.1 of the Business and Professions Code or by Section 10164 or 20103.5 of the Public Contract Code, provided the contractor is registered to perform public work pursuant to Section 1725.5 at the time the contract is awarded.

#### CERTIFIED PAYROLL RECORDS

Per Labor Code Section 1776 each contractor and subcontractor shall keep accurate payroll records. A certified copy of all payroll records for work performed under this contract shall be furnished upon request to a representative of the awarding body. Per SB 854 contractors and subcontractors are required to furnish certified payroll reports directly to the Department of Industrial Relations.

#### EMPLOYMENT OF APPRENTICES

Each contractor and subcontractor performing work in an apprenticeable craft or trade shall comply with Section 1777.5 relating to Apprentices on public works projects.

NOTICE INVITING BIDS

000200-1

## County of Mendocino Bower Park Restoration and Improvement Project

### MENDOCINO COUNTY BUSINESS LICENSE

Pursuant to Mendocino County Code Chapter 6.04 – Business Licenses, at the time of contract award, the contractor shall supply a copy of their current County of Mendocino business license.

### LAWS AND GOVERNANCES

In the performance of the work contemplated by this contract, the contractor shall conform to and abide by all labor requirements and provisions of State and Federal Laws and City and County Ordinances and Regulations which may in any manner affect those engaged or employed on the work project, including but not limited to the overtime provisions of the Labor Code section 1813 and 1815 of the State of California.

Federal Laws, including The Davis-Bacon Act and The Americans with Disabilities Act of 1990, are applicable to the project.

END OF SECTION

SECTION 001000 - INSTRUCTIONS TO BIDDERS

PART 1 – GENERAL

1.1 BIDS RECEIVED

- A. Sealed bids for the **Bower Park Restoration and Improvement Project Rebid (BID 025-25)** will be received at the Mendocino County Facilities Conference Room located at 841 Low Gap Road, Ukiah, California, until 2:00 p.m. as determined by the clock on the wall of the Conference Room, on **Thursday August 14, 2025**, and then publicly opened and read aloud in the Conference Room, 841 Low Gap Road, Ukiah, California.
- B. Late bids will not be accepted. It is Bidder's responsibility to ensure that its bid is delivered and received at the location noted above or before the date and hour set for the bid opening.

1.2 LICENSE REQUIREMENT

The license required for this Project is a General A Engineering Contractor.

1.3 BIDS AND BID SECURITY

Bids, to be considered, must be in accordance with the following instructions:

- A. Bids must be submitted on the bid form provided in this Manual, properly and completely filled out with numbers stated both in writing and in figures, and with signatures of all persons signing in longhand/cursive.
- B. The completed form shall be without erasures or interlineation and shall not contain recapitulations of the work to be done.
- C. A Bidder's Bond, Certified Check or Cashier's Check made payable to the County of Mendocino for an amount equal to at least ten percent (10%) of the bid amount shall accompany each bid. The above-mentioned bid security shall be given as a guarantee that the Bidder shall execute the contract if it be awarded to it in conformity with the contract documents and shall provide the surety bond or bonds required, sign the contract and commence work as set forth in the contract documents. Such guaranty to be forfeited should the Bidder to whom the contract is awarded fail to enter into the contract.
- D. Responsive Bids shall include completed and executed copies of the following sections if included in the project Manual:
  - a. 001200 Qualification Application
  - b. 003070 Non-Collusion Affidavit
  - c. 003100 Bid Form
  - d. 00 03 50 Diesel Fleet Certification
  - e. 004300 Subcontractor Listing Form

1.4 SUBCONTRACTORS LISTED

- A. In accordance with California Public Contract Code Sections 4100 et seq., inclusive, each bidder shall provide a list of subcontractors (Section 004300), giving the name and location of place of business and contractor's license number of each subcontractor who will perform a portion of the contract work in an amount in excess of one-half of one percent (0.5%) of the total contract price. In each instance, the nature and portion of the work to be subcontracted shall be described.
- B. Failure of Bidder to specify a subcontractor for any portion of the work in an amount in excess of one-half of one percent (0.5%) of the total contract price constitutes an agreement for Bidder to perform that portion of the work itself. After bids are opened, no subcontractor may be designated or substituted except as provided for in Sections 4107 et seq. of the Public Contract Code.
- C. All Bidders must supply their Bids with the required information on all subcontractors who will perform any portion of the work including labor, rendering of service or specially fabricating and installing a portion of the Work or improvement according to detailed drawings contained in the plans and specifications, in excess of one-half of one percent (0.5%) of total bid. Violation of this requirement may result in the Bid being deemed non-responsive and not being considered.

1.5 AWARD OR REJECTION OF BIDS

The contract shall be awarded to the lowest responsible bidder complying with these instructions, provided the bid is deemed reasonable and in the best interest of the County of Mendocino. The County reserves the right to reject any and all bids, and to waive any informality on bids received whenever the rejection or waiver is in the best interest of the County. The competency and dependability of the bidders will be considered when making the award.

- A. Additive and Deductive Items: Method of Determining Lowest Bid. Pursuant to Public Contract Code section 20103.8, if this bid solicitation includes additive and/or deductive items, the checked [X] method shall be used to determine the lowest bid: [check one].
  - 1. The lowest bid shall be the lowest bid price on the base bid contract without consideration of the prices on allowance, additive or deductive items.
  - 2. The lowest bid shall be the lowest total of the bid prices on the base contract and those additive or deductive items that were specifically identified in the bid solicitation or Bid Form as being used for the purpose of determining the lowest bid price.
  - 3. The lowest bid shall be the lowest total of the bid prices on the base contract and those additive or deductive items taken in order from a specifically identified list of those items that, when in the solicitation, and added to, or subtracted from, the base contract, are less than, or equal to, a funding amount publicly disclosed by the County before the first bid is opened.
  - 4. The lowest bid shall be determined in a manner that prevents any information that would identify any of the bidders or the proposed Subcontractors or suppliers from being revealed to the public entity before the ranking of all bidders from lowest to highest has been determined.

If no method is checked, sub-paragraph 1. shall be used to determine the lowest bid.

- B. Notwithstanding the method used by the County to determine the lowest responsible bidder, the County retains the right to add to or deduct from the contract any of the additive or deductive items included in the bid solicitation.
- C. The award of the contract, if awarded, is expected to be made within thirty (30) days and in no event later than eighty (80) days after the bid opening. After award, County shall notify the successful Bidder in writing, and forward with the notification original contracts for Bidder's execution. Within eight (8) working days after such notification, the successful Bidder shall return the signed contracts to County, accompanied by all required Surety Bonds, insurance policies and endorsements.

#### 1.6 TIME OF COMPLETION

Bidder agrees to commence work on or before a date to be specified in the written "Notice to Proceed" from County and to fully complete the project within one hundred eighty (180) calendar days from date of the written "Notice to Proceed".

#### 1.7 ADDENDUM

Any addendum issued during the time of bidding and before bid opening shall be included in the bid. The addendum issued by County shall become part of the agreement. Questions to be considered for inclusion in an addendum must be in writing and in the hands of County not less than seven (7) days prior to bid opening date.

#### 1.8 INTERPRETATION OF DRAWINGS AND DOCUMENTS

Should a Bidder find discrepancies in, or omissions from, the drawings or documents, or should it be in doubt as to their intent, it should at once notify County, which will then send responsive written instructions in the form of addenda to all Bidders. County will not be responsible for any oral instructions. Any verbal conversations with County during the bidding period are not to be construed as instructions. Any changes in the Contract documents will be issued by written addendum only.

#### 1.9 WITHDRAWAL OF BID

Bids may be withdrawn prior to, but not later than, the time of bid opening.

#### 1.10 BONDS

Successful Bidder is required to furnish a Labor and Material Payment Bond and a Performance Bond each in the amount equal to one hundred percent (100%) of the contract price. Said Bonds shall be obtained from a surety company satisfactory to County.

#### 1.11 SUBSTITUTIONS

Any substitution shall be made in accordance with instructions contained in Section 007000 – General Conditions included herein. Questions concerning substitutions will not be entertained during the bidding period.

1.12 SUBSTITUTION OF SECURITY

Pursuant to California Public Contract Code Section 22300, the Contractor may substitute securities for retention money withheld by the County to insure performance under the Contract. Said securities shall be in a form and of a type acceptable to the County.

1.13 LIQUIDATED DAMAGES

In case of failure on the part of Contractor to complete the work within the time stipulated plus any duly authorized extension of time granted in writing by County, Contractor shall pay to County the sum of \$500.00 per calendar day for each day's delay beyond the time prescribed as liquidated damages, but not as a penalty. The language in the paragraph of the General Conditions entitled "Time of Completion and Liquidated Damages" is incorporated herein.

1.14 BIDDER'S QUALIFICATIONS

- A. All Bidders, Contractors and Subcontractors bidding under joint venture agreements shall be duly licensed as provided for under Sections 7000 et seq. of the Business and Professions Code.
- B. A corporation which is awarded the Contract will be required to furnish certification attesting to its corporate existence, as well as evidence that the Officer signing the contract is duly authorized to do so.
- C. Bidders and their subcontractors may be required to furnish evidence satisfactory to County that they have sufficient means and have had experience in the class of work called for to enable them to complete the contract in a satisfactory manner.
- D. No person, firm or corporation shall make or file or be interested in more than one bid for the same work, except insofar as alternate bids may be called for. No person, firm or corporation shall submit a collusive or sham bid or seek directly or indirectly to induce any other bidder to submit a collusive or sham bid or to refrain from submitting a bid or to seek in any way to control or fix the price of the bid or any portion of the bid price in order to secure an advantage against County or any other person interested in the proposed contract. However, a person, firm or corporation submitting a sub-proposal to a bidder or quoting prices on materials to a bidder is not hereby disqualified from submitting sub-proposals or quoting prices to other bidders.
- E. A licensed contractor shall not submit a bid to a public agency unless (1) its contractor's license number appears clearly on the bid, (2) the license expiration date is stated, and (3) the bid contains a statement that the representations made therein are made under penalty of perjury. Any bid not containing this information, or a bid containing information which has subsequently proven false, shall be considered non-responsive and shall be rejected by County.

- F. The California Air Resources Board (“CARB”) implemented amendments to the In-Use Off-Road Diesel-Fueled Fleets Regulations (“Regulation”), which are effective on January 1, 2024, and apply broadly to all self-propelled off-road diesel vehicles 25 horsepower or greater and other forms of equipment used in California. A copy of the Regulation is available at <https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2022/off-road-diesel/appa-1.pdf>. Bidders are required to comply with all CARB and Regulation requirements, including, without limitation, all applicable sections of the Regulation, as codified in Title 13 of the California Code of Regulations section 2449 *et seq.* throughout the duration of the Project. **Bidders must provide, with their Bid, Section 00 03 50 Diesel Fleet Certification fully executed. All Certificates of Reported Compliance (CRC) or exemption documents issued by CARB required in the Certification must be provided to the County within 24 hours of the deadline for submitting bids. Failure to provide valid CRCs as required herein may render the Bid non-responsive.**
- G. The work to be performed under this contract is of a very specialized nature. It is the desire of County to secure the best work attainable and to maintain a very critical and condensed schedule. Bidders considered for award will be limited to those firms who can show to the satisfaction of County that they have the facilities and experience necessary to perform the required construction in accordance with specifications proposed for this project. The terms under which bidders will be evaluated and the rules that will be applied are attached to this Manual as section 001200 Qualification Application.

#### 1.15 EXAMINATION OF SITE AND DOCUMENTS

By submitting a bid, Bidder agrees and warrants that (1) it has examined the site and all documents, drawings and specifications; (2) it is satisfied that the same are adequate to produce the required results; and (3) its bid covers the cost of all items required in the agreement. The work to be performed includes all of the items mentioned in these specifications and/or as shown on the plans and other documents included as a part of the project.

#### 1.16 ENVIRONMENTAL AND PLANNING CONDITIONS OF APPROVAL

Bidder agrees to perform its work in conformance with all environmental and planning conditions of approval applicable to the project. Bidders’ attention is directed to specification section 008010 Supplementary General Conditions and the source documents for specific conditions of approval.

#### 1.17 AGREEMENT

Contract documents include the Agreement which the successful Bidder, as Contractor, will be required to execute.

#### 1.18 PRE-CONSTRUCTION CONFERENCE

The successful bidder shall be available for a pre-construction conference with County at a mutually convenient time.

END OF SECTION

County of Mendocino Bower Park Restoration and Improvement Project

SECTION 001200 - QUALIFICATION APPLICATION

QUALIFICATION APPLICATION

The information contained in this Application is confidential and is for the sole use of the County in evaluating the qualifications of the Bidder. Only the information below ("Contact Information") is considered public information.

CONTACT INFORMATION

Firm Name (as it appears on license): MARZ Engineering

Check one:  Corporation  Partnership  Sole Proprietor

Contact Person: Ruth Rodriguez

Address: 9741 Laughlin Way, Redwood Valley, CA 95470

Phone: (707)856-3007 Fax: N/A

If the firm is a sole proprietor or partnership:

Owner(s) of Company: Miguel Rodriguez

Contractor's License Number(s):

<u>License No.</u>	<u>Classifications</u>	<u>Expiration</u>	<u>Qualifying Individual</u>
1084927	Class A	12/31/2025	Miguel Rodriguez

DIR Registration Number: 2000000561

Mendocino County Business License No: 135563

County of Mendocino Bower Park Restoration and Improvement Project

PART I. ESSENTIAL REQUIREMENTS FOR QUALIFICATION

**The Contractor will be immediately disqualified if the answer to any of questions 1 through 3 is “no”.**

**The Contractor will be immediately disqualified if the answer to any of questions 4 through 7 is “yes”<sup>1</sup>.**

1. Contractor possesses a valid and current California Contractor's license for the project or projects for which it intends to submit a bid.  
 Yes       No
2. Contractor has a liability insurance policy with a policy limit of at least one million dollars (\$1,000,000) per occurrence and two million dollars (\$2,000,000) aggregate.  
 Yes       No
3. Contractor has a current workers' compensation insurance policy as required by the Labor Code or is legally self-insured pursuant to Labor Code Section 3700 *et seq.*  
 Yes       No       Contractor is exempt from this requirement because it has no employees
4. Has Contractor's license been revoked at any time in the last five (5) years?  
 Yes       No
5. Has a surety firm completed a contract on Contractor's behalf, or paid for completion because Contractor's firm was default terminated by the project owner within the last five (5) years?  
 Yes       No
6. At the time of submitting this qualification form, is Contractor's firm ineligible to bid on or be awarded a public works contract, or perform as a subcontractor on a public works contract, pursuant to either Labor Code Section 1777.1 or Labor Code Section 1777.7?  
 Yes       No

If the answer is “yes”, state the beginning and ending dates of the period of debarment:

7. At any time during the last five (5) years, has Contractor's firm, or any of its owners or officers, been convicted of a crime involving the awarding of a contract of a government construction project, or the bidding or performance of a government contract?  
 Yes       No

PART II. ORGANIZATION, HISTORY, ORGANIZATIONAL PERFORMANCE, COMPLIANCE WITH CIVIL AND CRIMINAL LAWS

A. Current Organization and Structure of the Business

*For firms that are corporations:*

- 1a. Date incorporated: \_\_\_\_\_
- 1b. Under the laws of the State of: \_\_\_\_\_

<sup>1</sup> A contractor disqualified solely because of a “yes” answer given to questions 4,5, or 7 may appeal the disqualification and provide an explanation of the relevant circumstances during the appeal procedure.

County of Mendocino Bower Park Restoration and Improvement Project

1c. Provide all the following information for each person who is either (a) an officer of the corporation (president, vice president, secretary, treasurer), or (b) the owner of at least ten percent (10%) of the corporation's stock:

Name	Position	Years with Co.	% Ownership	Social Security #

*For firms that are partnerships:*

- 1a. Date of formation: \_\_\_\_\_
- 1b. Under the laws of the State of: \_\_\_\_\_
- 1c. Provide all of the following information for each partner who owns ten percent (10%) or more of the firm:

Name	Position	Years with Co.	% Ownership	Social Security #

*For firms that are sole proprietorships:*

- 1a. Date of commencement of business: \_\_\_\_\_
- 1b. Social security number of company owner: \_\_\_\_\_

**B. History of the Business and Organizational Performance**

2. Has there been any change in ownership of the firm at any time during the last three (3) years?

**NOTE: A corporation whose shares are publicly traded is not required to answer this question.**

- Yes       No

If "yes", explain on a separate signed page.

3. Is the firm a subsidiary, parent, holding company, or affiliate of another construction firm?

**NOTE: Include information about other firms if one firm owns fifty percent (50%) or more of another, or if an owner, partner, or officer of Contractor's firm holds a similar position in another firm.**

- Yes       No

If "yes", explain on a separate signed page.

4. Are any corporate officers, partners, or owners connected to any other construction firms?

County of Mendocino Bower Park Restoration and Improvement Project

**NOTE: Include information about other firms if an owner, partner, or officer of Contractor's firm holds a similar position in another firm.**

Yes       No

If "yes", explain on a separate signed page.

5. Financial Statements: Does the Contractor have reviewed or audited financial statements for each of the last three years?

Yes       No

6. State Contractor's firm's gross revenues for each of the last three (3) years:

Year	Gross Revenue

7. How many years has Contractor's organization been in business in California as a contractor under its present business name and license number? \_\_\_\_\_ years.

8. Is Contractor's firm currently the debtor in a bankruptcy case?

Yes       No

If "yes", please attach a copy of the bankruptcy petition, showing the case number, and the date on which the petition was filed.

Disputes

9. At any time in the last five (5) years, has Contractor's firm been assessed and paid liquidated damages after completion of a project under a construction contract with either a public or private owner?

Yes       No

If "yes", explain on a separate signed page, identifying all such projects by owner, owner's address, the date of completion of the project, amount of liquidated damages assessed, and all other information necessary to fully explain the assessment of liquidated damages.

10. In the last five (5) years, has Contractor's firm, or any firm with which any of Contractor's company's owners, officers or partners was associated, been debarred, disqualified, removed or otherwise prevented from bidding on, or completing, any government agency or public works project for any reason?

**NOTE: "Associated with" refers to another construction firm in which an owner, partner or officer of Contractor's firm held a similar position.**

Yes       No

If "yes", explain on a separate signed page. State whether the firm involved was the firm applying for qualification here or another firm. Identify by name of the company, the name of the person within Contractor's firm who was associated with that company, the year of the event, the owner of the project, the project, and the basis for the action.

11. In the last five (5) years, has Contractor's firm been denied an award of a public works contract based on a finding by a public agency that Contractor's company was not a responsible bidder?

Yes       No

County of Mendocino Bower Park Restoration and Improvement Project

If "yes", explain on a separate signed page. Identify the year of the event, the owner, the project, and the basis for the finding by the public agency.

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**NOTE: The following two questions refer only to disputes between Contractor's firm and the owner of a project. Contractor need not include information about disputes between its firm and a supplier, another contractor, or subcontractor. Contractor need not include information about "pass-through" disputes in which the actual dispute is between a subcontractor and a project owner. Also, Contractor may omit reference to all disputes about amounts less than \$50,000.**

12. In the last five (5) years, has any claim *against* Contractor's firm concerning the firm's work on a construction project been *filed in court or arbitration*?
- Yes       No

If "yes", on separate signed sheets of paper identify the claim(s) by providing the project name, date of the claim, name of the claimant, a brief description of the nature of the claim, the court in which the case was filed, and a brief description of the status of the claim (pending or, if resolved, a brief description of the resolution).

13. In the last five (5) years, has Contractor's firm made any claim against a project owner concerning work on a project or payment for a contract and *filed that claim in court or arbitration*?
- Yes       No

If "yes", on separate signed sheets of paper identify the claim by providing the project name, date of the claim, name of the entity (or entities) against whom the claim was filed, a brief description of the nature of the claim, the court in which the case was filed, and a brief description of the status of the claim (pending or, if resolved, a brief description of the resolution).

Criminal Matters and Related Civil Suits

14. Has Contractor's firm or any of its owners, officers or partners ever been found liable in a civil suit or found guilty in a criminal action for making any false claim or material misrepresentation to any public agency or entity?
- Yes       No

If "yes", explain on a separate signed page, including who was involved, the name of the public agency, the date of the investigation and the grounds for the finding.

15. Has Contractor's firm or any of its owners, officers or partners ever been convicted of a crime involving federal, state, or local law related to construction?
- Yes       No

If "yes", explain on a separate signed page, including who was involved, the name of the public agency, the date of the conviction and the grounds for the conviction.

16. Has Contractor's firm or any of its owners, officers or partners ever been convicted of a federal or state crime of fraud, theft, or any other act of dishonesty?
- Yes       No

If "yes", identify on a separate signed page the person(s) convicted, the court (the county if a state court, the district or location if a federal court), the year, and the criminal conduct.

County of Mendocino Bower Park Restoration and Improvement Project

Bonding

17. If Issued a Notice of Award, can the contractor secure payment and performance bonds within ten (10) calendar days?

Yes  No

Name of Bonding Company:

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Name, Address, Telephone# for Surety Agent:

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- C. Compliance with Occupational Safety and Health Laws and with Other Labor Legislation Safety

18. Has Cal-OSHA cited and assessed penalties against Contractor's firm for any "serious", "willful", or "repeat" violations of its safety or health regulations in the last five (5) years?  
**NOTE: If Contractor has filed an appeal of a citation, and the Occupational Safety and Health Appeals Board has not yet ruled on your appeal, Contractor need not include information about it.**

Yes  No

If "yes", attach a separate signed page describing the citations, including information about the dates of the citations, the nature of the violation, the project on which the citation(s) was/were issued, and the amount of the penalty paid (if any). If the citation was appealed to the Occupational Safety and Health Appeals Board and a decision has been issued, state the case number and the date of the decision.

19. Has the Federal Occupational Safety and Health Administration cited and assessed penalties against Contractor's firm in the last five (5) years?  
**NOTE: If Contractor has filed an appeal of a citation and the Appeals Board has not yet ruled on the appeal, or if there is a court appeal pending, Contractor need not include information about the citation.**

Yes  No

If "yes", attach a separate signed page describing each citation.

20. Has the EPA or any Air Quality Management District or any Regional Water Quality Control Board cited and assessed penalties against either Contractor's firm or the owner of a project contracted to Contractor in the last five (5) years?  
**NOTE: If Contractor has filed an appeal of a citation and the Appeals Board has not yet ruled on the appeal, or if there is a court appeal pending, Contractor need not include information about the citation.**

Yes  No

If "yes", attach a separate signed page describing each citation.

21. How often does Contractor require documented safety meetings to be held for construction employees and field supervisors during the course of a project?

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22. List Contractor's Experience Modification Rate (EMR) (California's Workers' Compensation insurance) for each of the past three (3) premium years:  
**NOTE: An Experience Modification Rate is issued to Contractor annually by its workers' compensation insurance carrier.**

Current year: \_\_\_\_\_

Previous year: \_\_\_\_\_

Year previous to previous year: \_\_\_\_\_

If Contractor's EMR for any of these three (3) years is or was 1.20 or higher, Contractor may, at its discretion, attach a letter of explanation.

Prevailing Wage and Apprenticeship Compliance Record

23. Provide the name, address and telephone number of the apprenticeship program (approved by the California Apprenticeship Council) from whom Contractor intends to request the dispatch of apprentices to Contractor for use on any public work project for which it is awarded a contract by the County of Mendocino:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

SECTION 002600 - PROCUREMENT SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for substitutions prior to receipt of bids.
- B. Related Sections:
  - 1. Section 012100 "Allowances" for products selected under an allowance.
  - 2. Section 012500 "Substitution Procedures" for products selected under substitution.
  - 3. Section 116800 "Playground Equipment and Structures"

1.3 DEFINITIONS

- A. Procurement Substitution Requests: Requests for changes in products, materials, equipment, and methods of construction from those indicated in the Technical Specifications of this Manual prior to the opening of Bids.
- B. Substitution Requests: Requests for changes in products, materials, equipment, and methods of construction from those indicated in the Contract Documents, submitted following Contract award. See Section 012500 "Substitution Procedures" for conditions under which Substitution requests will be considered following Contract award.

1.4 QUALITY ASSURANCE

- A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials.

1.5 PROCUREMENT SUBSTITUTIONS

- A. Procurement Substitutions prior to bid shall only be considered for Playground and Fitness Equipment specified under section 116800 Playground Equipment and Structures. By submitting a bid, the Bidder represents that its bid is based on materials and equipment described in the Contract Documents, including Addenda. Bidders are required to request approval of qualifying substitute manufacturer of playground and or fitness equipment when those Specifications Sections list materials and equipment by product or manufacturer name prior to bid submittal. See specification section 01 25 00 Substitution Procedures for substitution of any other products or materials.

## County of Mendocino Bower Park Restoration and Improvement Project

- B. Procurement Substitution Requests will be received and considered by Owner when the following conditions are satisfied, as determined by County; otherwise, requests will be returned without action:
1. Extensive revisions to the Contract Documents are not required.
  2. Proposed changes are in keeping with the general intent of the Contract Documents, including the level of quality of the Work represented by the requirements therein.
  3. The request is fully documented and properly submitted.

### 1.6 SUBMITTALS

- A. Procurement Substitution Request: Submit to County. Procurement Substitution Request must be made in writing by prime contractor in compliance with the following requirements:
1. Requests for substitution of materials and equipment will be considered if received no later than fourteen (14) days prior to date of bid opening.
  2. Submittal Format: Submit electronic copies of each written Procurement Substitution Request, using contractor forms.
    - a. Identify the product or the fabrication or installation method to be replaced in each request. Include related Specifications Sections and drawing numbers.
    - b. Provide complete documentation on both the product specified and the proposed substitute, including the following information as appropriate:
      - 1) Point-by-point comparison of specified and proposed substitute product data, fabrication drawings, and installation procedures.
      - 2) Samples where applicable or when requested by County.
      - 3) Detailed comparison of significant qualities of the proposed substitute with those of the Work specified. Significant qualities may include attributes such as performance, weight, color, size, durability, visual effect, sustainable design characteristics, warranties, fasteners and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
      - 4) Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
      - 5) Research reports, where applicable, evidencing compliance with building code in effect for Project, from ICC-ES or applicable code.
      - 6) Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors, which will become necessary to accommodate the proposed substitute.
    - c. Provide certification by manufacturer that the substitute proposed is equal to or superior to that required by the Procurement and Contracting Documents, and that its in-place performance will be equal to or superior to the product or equipment specified in the application indicated.
    - d. Bidder, in submitting the Procurement Substitution Request, waives the right to additional payment or an extension of Contract Time because of the failure of the substitute to perform as represented in the Procurement Substitution Request.

County of Mendocino Bower Park Restoration and Improvement Project

B. County's Action:

1. County may request additional information or documentation necessary for evaluation of the Procurement Substitution Request. County will notify all bidders of acceptance of the proposed substitute by means of an Addendum to the Procurement and Contracting Documents.

- C. County's approval of a substitute during bidding does not relieve Contractor of the responsibility to submit required shop drawings and to comply with all other requirements of the Contract Documents.

END OF DOCUMENT 002600

**SECTION 00 30 50 – DIESEL FLEET COMPLIANCE CERTIFICATION**

Pursuant to California Code of Regulations Title 13 Section 2449, the Contractor hereby certifies the following:

I am aware of and will comply with the provisions of Section 2449 of Title 13 of the California Code of Regulations which requires contractors in California entering contracts for projects involving the operation of vehicles subject to the regulations to obtain and retain Certificates of Reported Compliance from the operators of any In-Use Off-Road Diesel Fueled Fleets used on such projects and related requirements to submit the Certificates to the Public Agency awarding any such project and other reporting and disclosure requirements.

I hereby certify that that the declaration selected below applies to this project:

- The project **does not** involve operation of vehicles subject to the California Code of Regulations Title 13 Section 2449.
  
- The project **does** involve operation of vehicles subject to the California Code of Regulations Title 13 Section 2449, or such vehicles are exempt and, as a condition of award, I will submit Certificates of Reported Compliance or exemption from the contractor's and all listed subcontractor's fleets of In-Use Off-Road Diesel Fueled vehicles intended for use on the project within 24 hours of the deadline for submitting bids.

Dated 9/16/25

  
Contractor Signature

**END OF SECTION 00 30 50**

SECTION 003060 - ANTITRUST CLAIM ASSIGNMENT

Pursuant to California Labor Code Section 7103.5, the following certification is hereby set forth and made a part of these specifications:

In entering into a public works contract or a subcontract to supply goods, services, or materials pursuant to a public works contract, the contractor or subcontractor offers and agrees to assign to the awarding body all rights, title, and interest in and to all causes of action it may have under Section 4 of the Clayton Act (15 U.S.C. Sec. 15) or under the Cartwright Act (Chapter 2 (commencing with Section 16700) of Part 2 of Division 7 of the Business and Professions Code), arising from purchases of goods, services, or materials pursuant to the public works contract or the subcontract. This assignment shall be made and become effective at the time the awarding body tenders final payment to the contractor, without further acknowledgment by the parties.

SECTION 003070 - NON-COLLUSION AFFIDAVIT

In accordance with California Public Contract Code Section 7106, the following affidavit must be completed by the Bidder:

Non-Collusion Affidavit to be executed by Bidder  
and submitted with the bid

State of California  
County of Mendocino

Miguel Rodriguez \_\_\_\_\_, being first duly sworn, deposes  
and says that he or she is owner of  
MARZ Engineering \_\_\_\_\_ the party making the foregoing bid that the bid is not  
made in the interest of, or on behalf of, any undisclosed person, partnership, company,  
association, organization, or corporation; that the bid is genuine and not collusive or sham; that  
the bidder has not directly or indirectly induced or solicited any other bidder to put in a false or  
sham bid, and has not directly or indirectly colluded, conspired, connived, or agreed with any  
bidder or anyone else to put in a sham bid, or that anyone shall refrain from bidding; that the  
bidder has not in any manner, directly or indirectly, sought by agreement, communication, or  
conference with anyone to fix the bid price of the bidder or any other bidder, or to fix any  
overhead, profit, or cost element of the bid price, or of that of any other bidder, or to secure any  
advantage against the public body awarding the contract of anyone interested in the proposed  
contract; that all statements contained in the bid are true; and, further, that the bidder has not,  
directly or indirectly, submitted his or her bid price or any breakdown thereof, or the contents  
thereof, or divulged information or data relative thereto, or paid, and will not pay, any fee to any  
corporation, partnership, company association, organization, bid depository, or to any member or  
agent thereof to effectuate a collusive or sham bid.

  
\_\_\_\_\_  
Signature

County of Mendocino Bower Park Restoration and Improvement Project

SECTION 003100 – BID FORM

**Bower Park Restoration and Improvement Project Rebid**

FOR MENDOCINO COUNTY

TO: Honorable Board of Supervisors

It is understood that this bid is based upon completion of the work within the time of completion requirements contained in the Instructions to Bidders.

It is agreed that this bid may not be withdrawn for a period of eighty (80) days from the opening hereof.

The undersigned has carefully checked all its figures and understands that the County will not be responsible for any error or omissions on the part of the undersigned in making up this bid.

If awarded the Contract, the undersigned agrees to complete the Work, one hundred eighty (180) calendar days from the date of Notice to Proceed.

The undersigned, having become completely familiar with all conditions affecting the cost of the work at the place where the work is to be done, and with the drawings, specifications and other contract documents prepared and issued thereof and currently posted to, hereby proposes and agrees to perform everything required to be performed, and to provide and furnish any and all required labor, materials, equipment, transportation and services necessary to erect and complete in the best workmanlike manner, all as shown and specified.

The following bid amounts are as defined and clarified in the Bids Required portion of these specifications:



BASE BID:

\_\_\_\_\_ Dollars (\$ \_\_\_\_\_)

Allowance No.1 Unforeseen Physical Conditions Allowance:

Twenty Thousand \_\_\_\_\_ Dollars (\$ 20,000.00)

**Additive Alternate Bid Items:**

Alternate #1: Group Picnic Area Including Amenities and Grading

ADD \_\_\_\_\_ Dollars (\$ \_\_\_\_\_)

Alternate #2: Fitness Stations Including AC Pads

ADD \_\_\_\_\_ Dollars (\$ \_\_\_\_\_)

Name of Organization \_\_\_\_\_

County of Mendocino Bower Park Restoration and Improvement Project

Alternate #3: Security Lighting and Wiring (see electrical plans)

ADD \_\_\_\_\_ Dollars (\$ \_\_\_\_\_)

SALES TAX

All bids shall include required California State Sales Tax, cost of all bonds and insurance as required, and all other items of expense incidental to the contract. The County of Mendocino is exempt from Federal Excise Tax.

A licensed Contractor shall not submit a bid to a public agency unless its Contractor's License number appears clearly on the bid, the license expiration date is stated, and the bid contains a statement that the representations made therein are made under penalty of perjury. Any bid not containing this information, or a bid containing information that is subsequently proven false, shall be considered nonresponsive and shall be rejected by the public agency.

Name of Organization \_\_\_\_\_

Type of Organization \_\_\_\_\_  
(Corporation, Partnership, etc.)

Address \_\_\_\_\_

Name of the State where incorporated \_\_\_\_\_

CONTRACTORS LICENSE NO. \_\_\_\_\_ EXPIRATION DATE \_\_\_\_\_

Contractor has registered with the State of California's DIR (Department of Industrial Relations) website.

DIR Registration #: \_\_\_\_\_

Contractor is currently licensed to do business in the County of Mendocino. Mendocino County Business License #: \_\_\_\_\_

ADDENDA: CONTRACTOR TO ACKNOWLEDGE RECEIPT

I have received the following Addenda pertaining to this project and they have been included as part of my bid.

Numbers: \_\_\_\_\_

The undersigned hereby certifies under penalty of perjury that this bid is genuine and not collusive, that all the information is correct and that he/she has carefully checked all of the above figures and understands that the County will not be responsible for any errors or omissions on the part of the undersigned on making up this bid.

Signature \_\_\_\_\_



County of Mendocino Bower Park Restoration and Improvement Project

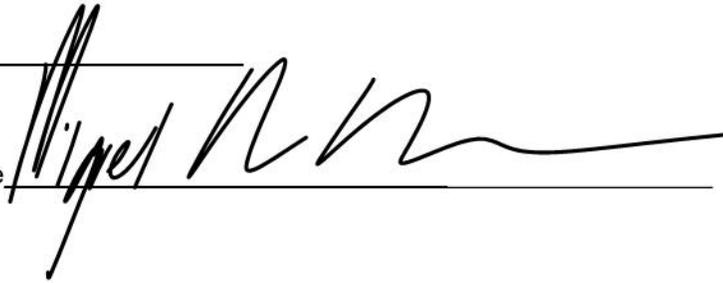
SECTION 005010 - WORKERS' COMPENSATION CERTIFICATION

Pursuant to California Labor Code Section 1861, the Contractor hereby certifies the following:

I am aware of the provisions of Section 3700 of the Labor Code which require every employer to be insured against liability for workers' compensation or to undertake self-insurance in accordance with the provisions of that code, and I will comply with such provisions before commencing the performance of the work of this contract.

Dated: 9/16/25

Contractor Signature

A handwritten signature in black ink, written over a horizontal line. The signature is stylized and appears to be "Nigel R. N." followed by a long horizontal stroke.

SECTION 005100 - CONTRACTOR GUARANTEE

**Bower Park Restoration and Improvement Project Rebid**

Contractor hereby guarantees that the labor and material furnished for this project is in accordance with the drawings, specifications, and applicable building codes. Contractor agrees to repair or replace any or all of the work, together with any other adjacent work which may be displaced in so doing, that may prove to be defective in its workmanship or material within a period of ONE (1) YEAR from date of acceptance of the above-named project by County without any expense whatsoever to County, ordinary wear and tear and unusual abuse or neglect excepted.

In the event of Contractor's failure to comply with the above-mentioned conditions within fifteen (15) calendar days after being notified in writing by County, Contractor authorizes County to proceed to have said defects repaired and made good at Contractor's expense. Contractor shall honor and pay the costs and charges therefore upon demand.

SIGNED \_\_\_\_\_

COUNTERSIGNED \_\_\_\_\_

CONTRACTOR \_\_\_\_\_

DATED \_\_\_\_\_

DATE OF BUILDING ACCEPTANCE \_\_\_\_\_

# County of Mendocino Bower Park Restoration and Improvement Project

## SECTION 007000 - GENERAL CONDITIONS

### 1. DEFINITIONS

Whenever in the Specifications and other Contract Documents the following abbreviations and terms are used, the intent and meaning shall be interpreted as follows:

- A. "Owner" - Board of Supervisors, County of Mendocino, or its authorized agents or assignees.
- B. "Agent" - The Agent acting for the County, which shall be either the County General Services Agency Director or his/her designee, or the County Executive Officer or his/her designee.
- C. "Contractor" - The person or persons, partnership, corporation, or combination thereof, private or municipal, who have entered into a contract with the County, as party or parties of the second part or his/her or their legal representatives.
- D. "Specifications" - The directions, provisions and requirements contained in these Specifications as supplemented by the Supplementary Conditions. Whenever the term "These Specifications" is used in this book, it means the provisions as set forth in this book.
- E. "Paragraph" - The particular section of subdivision herein designated by a number.
- F. "Laboratory" - The designated laboratory authorized by the County to test materials and work involved in the Contract.
- G. In the case of conflict between the Standard Specification and these Specifications, these Specifications shall take precedence over and be used in lieu of such conflicting portions:
  - A.W.S. American Welding Society
  - A.S.T.M. American Society for Testing Materials
  - A.S.A. American Standard Association
  - N.B.F.U. National Board of Fire Underwriters
  - N.B.S. National Bureau of Standards
  - A.S.M.E. American Society of Mechanical Engineers
  - A.R.I. American Refrigeration Institute
  - N.E.M.A. National Electrical Manufacturers Association
  - U.L. Underwriter's Laboratories
  - E.T.L. Electrical Testing Laboratories
  - A.C.I. American Concrete Institute
  - F.A. Federal Specifications
  - A.I.S.C. American Institute of Steel Construction
- H. The County and the Contractor are those named as such in the Agreement. They are treated throughout the Contract Documents as if each were of the singular number and the masculine gender.

## County of Mendocino Bower Park Restoration and Improvement Project

- I. When the words "Approved", "Satisfactory", or "Equal", "As Directed", etc. are used, approval by the County is understood.
- J. All Federal, State laws and local laws shall govern the construction of the Contract and all rules, ordinances and requirements of authorized officials shall be complied with.
- K. It is understood that any reference to the Specifications or designation of the American Society for Testing Materials, Federal Specifications or other standard, code, or order, refers to the most recent or latest amended specification or designation.

### 2. EXAMINATION OF PLANS AND SPECIFICATIONS

The Bidder shall examine carefully the site of the work contemplated and the proposal, plans, specifications, and Contract forms thereof. It will be assumed that the Bidder has investigated and is satisfied as to the conditions to be encountered, as to the character, quality, and quantities of work to be performed and material to be furnished, and as to the requirements of these Specifications.

### 3. DRAWINGS AND SPECIFICATIONS

- A. Figured dimensions on the drawings shall govern but work not dimensioned shall be as directed. Work indicated but not particularly detailed or specified shall be equal to similar parts that are detailed or specified, or as directed. Full-size detailed shall take precedence over scale drawings as to shape and details of construction. It is intended that scale drawings, full-size details and specifications should agree but should any discrepancy or apparent error occur in plans and specifications or should any work of others affect this work, the Contractor shall notify the County at once; if the Contractor proceeds with the work affected without instruction from the County he shall make good any resultant damage or defect.
- B. All misunderstandings of drawings or specifications shall be clarified by the County, whose decision shall be final.
- C. Any work called for by the drawings and not mentioned in the Specifications, or vice versa, is to be furnished as though fully set forth by both. Where not specifically stated otherwise, all work and materials necessary for each unit of construction, including special construction for any specific brand or shape of material called for even though only briefly mentioned or indicated, shall be furnished and installed fully and completely as a part of the Contract.
- D. Lists, rules and regulations referred to are recognized printed standard and shall be considered as one and a part of these Specifications within the limits specified.
- E. "General Conditions" apply with equal force to all of the work, including extra work authorized.

## County of Mendocino Bower Park Restoration and Improvement Project

- F. For convenience, the Technical Specifications are arranged in Divisions and further divided into various sections. It is to be understood; this separation is for convenience of all parties involved and is not to be considered as the limits of the work required of any separate trade. The terms and conditions of such limitations are wholly between the County and the Contractors during bidding and construction phases, i.e., all work shown, as well as for the proper completion of the project as a whole, shall be coordinated by the Contractor and his Subcontractors during bidding and construction and shall be provided in this Contract.

### 4. CONDUCT OF WORK

- A. The County reserves the right to do other work in connection with the project by contract or otherwise. Contractor shall at all times conduct his work so as to impose no hardship on the County or others engaged in the work. Contractor shall adjust, correct, and coordinate his work with the work of others so that no discrepancies shall result in the whole work.
- B. The Contractor shall provide at his own cost and risk all labor, material, water, power tools, machinery, scaffolding, and framework for the execution of the work. Equipment shall be adequate and as approved.

The Contractor shall obtain all necessary measurements from the work and shall check dimensions, levels, and construction and layout and supervise the construction, for correctness of all of which he shall be responsible.

- C. Where work of one trade joins or is on other work, there shall be no discrepancy when same is completed. In engaging work with other materials, marring or damaging same shall not be permitted. Should improper work of any trade be covered by another which results in damage or defects, the whole work affected shall be made good without expense to the County.
- D. The Contractor must anticipate relation of all parts of the work and at the proper time furnish and set anchorage, blocking or bonding as required. Anchorage and blocking necessary for each trade shall be a part of same, except where stated otherwise.
- E. Assistance required by the County in obtaining measurements or information on the work shall be furnished accurately and fully without cost to the County.

### 5. OWNERSHIP OF DRAWINGS

All plans and specifications shall remain the property of the County and shall be returned to the office of the County Facilities and Fleet Division Manager or shall be accounted for by the Contractor before the final certificate is issued.

### 6. PUBLIC AND COUNTY CONVENIENCE AND SAFETY

The Contractor shall furnish, erect, and maintain such fences, barriers, lights and signs as are necessary to give adequate warning to the public at all times and of any dangerous conditions until final acceptance of the work by the County.

## County of Mendocino Bower Park Restoration and Improvement Project

### 7. ACCIDENT PREVENTION

- A. It shall be the Contractor's responsibility to keep himself fully informed of all existing and future safety regulations, Codes, OSHA requirements, and other laws and regulations governing the work which may in any manner affect anyone in and around the project or engaged or employed in the work, or materials, equipment, etc. used in the work or which in any way affect the conduct of the work.
- B. The Contractor shall appoint a Safety Officer for the project and submit his name to the County.
- C. The Contractor shall supply the County with a Material Safety Data Sheet (MSDS) on each hazardous substance to be used by the Contractor on the project.
- D. The Contractor and his Safety Officer shall be solely responsible for ensuring compliance with those Codes, regulations, OSHA requirements, and for discovering and correcting any code violations or unsafe conditions.
- E. Reports of all lost-time accidents shall be promptly submitted to the Owner, giving all pertinent information.

### 8. RESPONSIBILITY FOR DAMAGE

The County shall not be answerable or accountable in any manner for: (1) any loss or damage that may happen to the work or any part thereof, for any loss or damage to any of the materials or other things used or employed in performing the work; (2) injury to or death of any person or persons, either workers or the public; (3) damage to property from any cause which might have been prevented by the Contractor or his workers or anyone employed by him. The Contractor shall be responsible for any liability imposed by law for injuries to or death of any person including, but not limited to, workers and the public or damage to property resulting from defects or obstructions or from any cause whatsoever during the progress of the work or at any time before its completion and final acceptance. The Contractor shall indemnify, save harmless and defend the County of Mendocino, its elected or appointed officers, agents, employees or volunteers connected with the work, from all claims or actions for injuries or death of any person, or damage to property, resulting from the Contractor's performance of the Contract. With respect to third party claims against the Contractor, the Contractor waives any and all rights to any type of express or implied indemnity against the County of Mendocino, its elected or appointed officers, agents, employees or volunteers.

In addition to any remedy authorized by law, so much of the money due the Contractor under and by virtue of the Contract as shall be considered necessary by the County may be retained by the County until disposition has been made of such suits or claims for damages as aforesaid.

### 9. LAWS TO BE OBSERVED

The Contractor shall keep himself fully informed of all existing and future State, Federal and local laws, codes and regulations which in any manner affect those engaged or employed in the work, or the materials used in the work, or which in any way affect the conduct of the work, and of all such orders and decrees of bodies and tribunals having any jurisdiction or authority over the same and shall be solely responsible for insuring compliance with those laws, codes and regulations.

## County of Mendocino Bower Park Restoration and Improvement Project

A partial, though not necessarily complete listing of laws to be observed by the Contractor is as follows:

- A. Federal Americans with Disabilities Act of 1990.
- B. Federal Labor Standards Act.
- C. The Anti Kick-Back regulations found in 29 CFR Part 3.
- D. All contract clauses required by 29 CFR 5.5 (a) and (c), 20 U.S.C. 1232b ; 40 U.S. C. 276a, 276c, 327-332; 29 CFR Parts, (926).
- E. Nondiscrimination clause and Certification of Non-Segregated Facilities prescribed by Executive Order No. 11246, September 24, 1965 as amended by Executive Order 11375.
- F. Executive Order No. 11288 of July 7, 1966 (31 FR 9261) "Prevention, Control and Abatement of Water Pollution".
- G. Executive Order 11988, relating to evaluation of flood hazards.
- H. Compliance with all Federal, State and local requirements for handicapped access, fire safety and seismic resistance.

### 10. BONDS REQUIRED

The successful bidder shall furnish bonds as required in the document entitled "Instructions to Bidders" which is part of these Contract documents.

### 11. INSURANCE

The Contractor, at his expense, shall secure and maintain at all times during the entire period of performance under this Contract, insurance as set forth below with insurance companies acceptable to the County of Mendocino.

The Contractor shall provide to the County of Mendocino certificates of insurance with endorsements properly executed by an officer or authorized agent of the issuing insurance company evidencing coverage and provisions as stated below:

#### A. INSURED

Name the County of Mendocino, its elected or appointed officials, employees, agents and volunteers as additional insured with regard to damages and defense of claims arising from: (a) activities performed by or on behalf of the Named Insured, (b) products and completed operations of the Named Insured, (c) Premises owned, leased or used by the Named Insured, or (d) Ownership, operation, maintenance, use, loading or unloading of any vehicle owned, leased, hired or borrowed by the Named Insured, regardless of whether liability is attributable to the Named Insured or a combination of the Named Insured and the County of Mendocino, its elected or appointed officials, employees, agents and volunteers.

## County of Mendocino Bower Park Restoration and Improvement Project

### B. SEVERABILITY OF INTEREST

Provide that the inclusion of more than one named insured shall not operate to impair the rights of one insured against another insured, and the coverages afforded shall apply as though separate policies had been issued to each insured.

### C. CONTRIBUTION NOT REQUIRED

Provide that as respects: (a) work performed by the Named Insured on behalf of the County of Mendocino; or (b) products sold by the Named Insured to the County of Mendocino; or (c) premises leased by the Named Insured from the County of Mendocino; or (d) ownership, operation, maintenance, use, loading or unloading of any vehicle owned, leased, hired or borrowed by the Named Insured, the insurance afforded by this policy shall be primary insurance as respects the County of Mendocino, its elected or appointed officials, employees, agents and volunteers; or stand in an unbroken chain of coverage excess of the Named Insured's scheduled underlying primary coverage. In either event, any other insurance maintained by the County of Mendocino, its elected or appointed officials, employees, agents and volunteers shall be excess of this insurance and shall not contribute with it.

### D. COVERAGE BELOW MINIMUM REQUIRED NOTICE

Provide that the limits of insurance afforded by this policy shall not fall below the minimum requirements of the County of Mendocino without notice to the County of Mendocino by certified mail return receipt requested. Such notice shall be addressed to: County of Mendocino, 501 Low Gap Road, Ukiah, Calif. 95482, Attn: Risk Management.

### E. CANCELLATION NOTICE

Provide that the insurance afforded by this policy shall not be suspended, voided, canceled, non-renewed or reduced in coverage or in limits except after thirty (30) day's prior written notice, delivered in person or by First Class U.S. Mail, has been given to the County of Mendocino. Such notice shall be addressed to: County of Mendocino, 841 Low Gap Road, Ukiah, Calif. 95482, Attn: Risk Management.

Contractor shall furnish the County of Mendocino certificate(s) of insurance evidencing Workers Compensation Insurance coverage to cover its employees. The Contractor shall require all subcontractors similarly to provide Workers Compensation Insurance as required by the Labor Code of the State of California for all of the Contractor's and subcontractors' employees.

The Contractor shall not commence work, nor shall he allow his employees or subcontractors or anyone to commence work until all insurance required and provisions contained herein have been submitted to and accepted by the County of Mendocino. Failure to submit proof of insurance as required herein may result in awarding said Contract to another bidder. Failure to comply with the insurance requirements set forth herein shall constitute a material breach of contract and, at County of Mendocino's option, shall subject this Contract to termination.

## County of Mendocino Bower Park Restoration and Improvement Project

Insurance coverage in the minimum amounts set forth herein shall not be construed to relieve the Contractor for liability in excess of such coverage, nor shall it preclude the County of Mendocino from taking such other action as is available to it under any other provisions of this Contract or otherwise in law.

### SCOPE OF LIABILITY COVERAGES

Contractor shall furnish to the County of Mendocino certificates of insurance evidencing at the minimum the following:

1. Public Liability-Bodily Injury (not auto) \$500,000 each person; \$1,000,000 each accident,  
and  
Public Liability-Property Damage (not auto) \$500,000 each occurrence; \$1,000,000 aggregate.

---or---

Combined Single Limit Bodily Injury Liability and Property Damage Liability (not auto) \$1,000,000 each occurrence.

2. Vehicle-Bodily Injury \$500,000 each person, \$1,000,000 each occurrence,  
and  
Vehicle-Property Damage \$1,000,000 each occurrence.

---or---

Combined Single Limit Vehicle Bodily Injury and Property Damage Liability \$1,000,000 each occurrence.

### 12. WORKERS COMPENSATION CERTIFICATION

Contractor certifies as follows:

"I am aware of the provisions of Section 3700 of the Labor Code which require every employer to be insured against liability for Workers Compensation or to undertake self-insurance in accordance with the provisions of that Code, and I will comply with such provisions before commencing the performance of the work of this Contract". (Labor Code Section 1861)

### 13. CONTRACTOR'S RESPONSIBILITY FOR WORK

Until the formal acceptance of the work by the County, the Contractor shall have the charge and care thereof and shall bear the risk of injury or damage to any part thereof or to materials or thing employed in doing the work or stored on the site by the action of the elements or from any other cause, whether arising from the execution or from the non-execution of the work. The Contractor shall rebuild, repair, restore, replace, and make good all injuries or damages to any portion of the work occasioned by any of the above caused before final acceptance and shall bear the expense thereof, except such injuries or damages occasioned by acts of the Federal Government or the public enemy. The Contractor's responsibility also extends to adjoining property as related to the construction operation.

### 14. RESPONSIBILITY OF COUNTY

The County shall not be held responsible for the care or protection of any material or parts of the work prior to final acceptance, except as expressly provided in these Specifications.

15. COOPERATION BETWEEN CONTRACTORS

Where two or more contractors are employed on related or adjacent work, each shall conduct his operations in such a manner as not to cause any unnecessary delay or hindrance to the other. Each contractor shall be responsible to the other for all damage to work, to person or property, or for loss caused by failure to furnish the work within the time specified for completion.

Should the Contractor, through acts of neglect on the part of any Contractor, suffer loss or damage to the Work, the Contractor agrees to settle with such other Contractor by agreement. If such other Contractor should file claim against the County on account of alleged damages to be sustained, the County shall notify the Contractor who shall, at his expense, indemnify and save harmless the County against any such claim.

16. SUBCONTRACTING AND ASSIGNMENT

The Contractor shall give his personal attention to the fulfillment of the Contract and shall keep the work under his control. Should the Contractor subcontract any part of his Contract, the Contractor shall be fully responsible to the County for the acts and omissions of his subcontractor and of the persons either directly or indirectly employed by the subcontractor as he is for the acts and omissions of persons directly employed by himself.

No subcontractor will be recognized as such, and all persons engaged in the work on construction shall be considered as employees of the Contractor.

17. PERMITS AND LICENSES

The Contractor shall procure all permits and licenses, pay all charges and fees, and file all notices necessary and incidental to the due and lawful prosecution of the work.

18. PATENTS

The Contractor shall assume all responsibilities arising from the use of patented materials, equipment, devices or processes used on or incorporated in the work.

19. LIENS

Liens shall be enforced as provided by California State Law pertaining to Public Works.

20. CHANGES IN THE WORK

A. The County may order changes in the work, in which event the Contract sum shall be adjusted by one or more, or a combination of, the following methods:

1. Unit bid prices previously approved or as may be agreed upon.
2. An agreed lump sum substantiated by Contractor, itemizing labor, material, equipment, overhead, profit, bond, etc.

## County of Mendocino Bower Park Restoration and Improvement Project

3. By ordering Contractor to proceed with work and keep correct account with vouchers the actual cost of:
  - a. Labor, including foreman;
  - b. Materials entering permanently into the work;
  - c. The ownership or rental cost of construction plant and equipment during the time of use on the extra work;
  - d. Power and consumable supplies for the operation of power equipment;
  - e. Insurance;
  - f. Social Security and old age and employment contribution.
- B. To the cost under (2) and (3), there may be added a fixed fee to be agreed upon but not to exceed fifteen percent (15%) for the estimated cost of the work. The fee shall be compensation to cover the cost of administrative overhead, and profit.
- C. On changes which involve a credit to the County, no allowances for overhead need be figured.
- D. All such change orders and adjustments shall be in writing. Claims by Contractor for extra cost shall be made in writing before executing the work involved.
- E. All change orders shall be reviewed and approved by the County.

### 21. COUNTY'S RIGHT TO TERMINATE CONTRACT

If the Contractor should refuse or neglect to properly perform or prosecute the work or if he should substantially violate any provision of the Contract, then the County may, without prejudice to any other right or remedy upon seven (7) days written notice to the Contractor, terminate the services of the Contractor and take possession of the premises, and all materials, tools, and equipment thereon and complete the work. The expense thereof shall be deducted from the balance otherwise due the Contractor. If such expense should exceed such unpaid balance, then the Contractor shall pay the difference to the County.

### 22. CONTRACTOR'S RIGHT TO STOP WORK OR TERMINATE CONTRACT

If the work is stopped for a period of thirty (30) days under an order of any court or other public authority having jurisdiction, or as a result of an act of government, such as a declaration of a national emergency making materials unavailable, through no act or fault of the Contractor or a Subcontractor or their agents or employees or any other persons performing any of the work under a contract with the Contractor, or if the work should be stopped for a period of thirty (30) days by the Contractor because no certificate for payment has issued as provided in Paragraph 25 or because the County has not made payment thereon as provided in Paragraph 25, then the Contractor may, upon seven (7) additional days' written notice to the County, terminate the Contract and recover from the County payment for all work executed and for any proven loss sustained upon any materials, equipment, tools, construction equipment and machinery, including reasonable profit and damages.

23. TIME OF COMPLETION AND LIQUIDATED DAMAGES

- A. In case all the work called for under the Contract is not completed before or upon the expiration of the time limit as set forth in these specifications, damage will be sustained by the County, and it is impracticable to determine the actual damage which the County will sustain in the event of and by reason of such delay. It is therefore agreed that the Contractor will pay to the County the sum of money per calendar day for each day's delay beyond the time prescribed as required in the document entitled "Instructions to Bidders", which is a part of these Contract Documents. The Contractor agrees to pay such liquidated damages as herein provided, and in case the same are not paid, agrees that the County may deduct the amount thereof from any money due or that may become due the Contractor under the Contract.
- B. In case the work called for under the Contract is not finished and completed in all parts and requirements within the time specified, the County shall have the right to extend the time for completion or not, as may best serve the interest of the County. If the County decides to extend the time limit for the completion of the Contract, the County shall further have the right to charge the Contractor, his heirs, assigns or sureties, and to deduct from the final payment for the work, all or any part, as it may deem proper, of the actual cost of County, including inspections, superintendence, and other overhead expenses directly chargeable to the Contract, and which accrue during the period of such extension. The cost of final inspections shall not be included in such charges.
- C. The Contractor shall not be assessed with liquidated damages nor the cost of County's services and inspection during any delay in the completion of the work caused by acts of God or the public enemy, acts of the County, fire, flood, earthquake, epidemics, quarantine restrictions, strikes, freight embargoes, shortages of materials, labor, fixtures or equipment (provided the Contractor furnishes satisfactory and acceptable proof that he has made diligent attempts to obtain same) and unusually severe weather or delays of subcontractors due to such causes, provided the Contractor shall within ten (10) days from the beginning of such delay notify the County in writing of the delay. County's findings of fact thereon shall be final and conclusive.
- D. The County agrees that changes in work ordered pursuant to Paragraph 20 and extensions of completion time made necessary by reasons thereof, shall in no way release any guarantee given by the Contractor or the Contract let hereunder, nor shall such changes in the work relieve or release the sureties on bonds executed pursuant to these specifications. Sureties shall be deemed to have expressly agreed to any change in the work and to any extension of time made by reason thereof.

24. ACCEPTANCE

- A. The Contract will be accepted as completed only when the whole and entire Contract shall have been completed satisfactorily to the County. In judging the work, no allowance for deviations from the original plans and specifications will be made unless already approved in writing at proper times and in a manner as called for herein.
- B. Should it become necessary to occupy a portion of the work before the Contract is fully completed, such occupancy shall not constitute acceptance.

## County of Mendocino Bower Park Restoration and Improvement Project

### 25. PARTIAL PAYMENTS

Prior to submitting and as a condition of approval of the first progress payment application, the Contractor shall submit a schedule of values acceptable to the County providing a breakdown of the contract value by trade division such that the County can accurately assess the percentage completion of the project.

On the twenty-fifth (25th) day of each month, the Contractor shall submit to the County an application for payment, on a form acceptable to the County, showing an itemized statement for work that has been performed on a percent complete basis based on the previously approved schedule of values. The County within thirty (30) days of receipt of application that meets the County's approval shall issue to the Contractor a certificate for ninety percent (95%) of the amount the County finds due for work that has been performed.

Contractor shall submit certified copy of payroll showing payment of Davis-Bacon Act wages with each request for payment submitted.

### 26. FINAL PAYMENT

Upon completion of the Contract, the County will cause to be made a final estimate of the amount of work done, and the value of such work. After approval by the County representative, the County shall pay the remainder due on the contract (with the exception of retainage) after deducting there from, all previous payments. All amounts retained (retainage) under the provisions of the Contract shall be due and payable 30 days from the date of acceptance in writing of the completion of Contract and / or Notice of Completion issued by the County representative. All prior partial estimates and payments shall be subject to correction in the final estimate and payments. Payment and the final estimate is due within thirty-five (35) days from the recorded date of the Notice of Completion, provided all as-built drawings, equipment manuals, instructions to the owner and guarantees have been received and accepted by the County.

### 27. PAYMENT WITHHELD

The County may withhold or, on account of subsequently discovered evidence, may nullify the whole or part of any certificates to such extent as may be necessary to protect the County from (1) defective work not remedied, (2) asserted claims against Contractor, (3) failure of the Contractor to make payments properly to employees or for material or labor, (4) any reasonable doubt that the Contract work can be completed for the balance then unpaid, or (5) damage to another contractor.

### 28. FAULTY WORK AND MATERIALS

The Contractor shall promptly remove from the premises all materials condemned by the County as failing to conform to the Contract, whether incorporated in the work or not. The Contractor shall promptly replace and re-execute his own work in accordance with the Contract and without expense to the County. The Contractor shall bear the expense of making good all work of other contractors destroyed or damaged by such removal.

If the Contractor does not remove such condemned work and materials within reasonable time, fixed by written notice, the County may remove them and may store the materials at the expense of the Contractor. If the Contractor does not pay the expenses of such removal within ten (10) days thereafter, the County may upon ten (10) days written notice, sell such materials at auction or at private sales and shall account for the net proceeds thereof after deducting all costs and expenses that should have been borne by the Contractor.

## County of Mendocino Bower Park Restoration and Improvement Project

### 29. TEMPORARY SUSPENSION OF WORK

The County shall have the authority to suspend the work wholly or in part, for such period as it may deem necessary, due to unsuitable weather or to such other conditions as are considered unfavorable for the suitable progression of the work, or for such time as it may deem necessary due to the failure of the Contractor to carry out orders given by County, or to perform any provision of the Contract. The Contractor shall immediately obey such order of the County and shall not resume work until ordered in writing by the County.

### 30. SAMPLES

When requested, the Contractor shall submit for the County's review samples of the various materials, together with the finish thereof, as specified for and intended for use in the work. Samples of bulk materials shall be selected by the lab. All materials and workmanship shall in all respects be equal to the samples so submitted and reviewed. Samples shall be sent or delivered to the County, samples and delivery charges paid by Contractor. Samples will be returned to the Contractor if requested, shipping or delivery charges collect.

### 31. CLEANING AND REMOVAL OF DEBRIS

The Contractor shall, as directed by the County during the progress of the work or as indicated elsewhere in these documents, remove and properly dispose of dirt and debris and shall keep the premises reasonably clean. Upon completion of the work, the Contractor shall remove all of his equipment and unused materials provided for the work and shall put the building and appurtenances in a neat and clean condition and shall do all cleaning and washing required by the specifications.

### 32. OBSTRUCTIONS

The Contractor may be required to work around public utility facilities and other improvements which are to remain in place within the construction area. The Contractor shall be held liable to the owners of such facilities and improvements for any damage or interference with service resulting from the Contractor's operation.

The exact location of underground facilities and improvements within the construction area, whether shown on the drawings or not, shall be ascertained by the Contractor before using equipment that may damage such facilities or interfere with their service.

### 33. SUPERINTENDENT IN CHARGE

The Contractor shall keep on the work at all times and until the acceptance certificate is issued a competent superintendent or foreman for the purpose of receiving and executing without delay any orders from County in keeping with the terms of the Contract. This foreman shall have charge of the plans and specifications kept on the job. He shall be instructed to familiarize himself closely with all provisions of the plans and specifications and to follow the same accurately.

### 34. STORAGE OF MATERIALS AND EQUIPMENT

Materials and equipment shall not be stockpiled or placed outside of the site property lines unless written permission is obtained by the appropriate owner or political subdivision having jurisdiction over the adjacent property, roads, streets, etc.

## County of Mendocino Bower Park Restoration and Improvement Project

### 35. GENERAL GUARANTY

Neither the final payment nor any partial payment, nor partial or entire use of the premises by occupancy by the County shall constitute an acceptance of the work not completed in accordance with the Contract. Final Payment or partial payment or partial or entire use of the premises by occupancy shall not relieve the Contractor of liability with respect to any warranties or responsibilities for faulty materials or workmanship. The Contractor shall remedy any defect in the work and pay for any damage to other work resulting therefrom which shall appear within a period of one (1) year from the date of final acceptance of the work, unless a longer period is specified elsewhere in these specifications. The County shall notify the Contractor of observed defects with reasonable promptness.

### 36. MATERIALS SUBMITTALS AND SUBSTITUTIONS

Materials and substitutions shall be governed by the relevant sections elsewhere in these documents. If not specified, the following shall govern.

- A. Specific reference to materials, appliances, fixtures and equipment by trade name is intended to be used as standard, but this implies no right on the part of the Contractor to use other materials, fixtures, appliances, equipment, until reviewed by the County.
- B. The County alone shall determine what will be considered as equal, but the burden of proof as to quality, utility and function, etc. shall be upon the Contractor.

If the Contractor desires to substitute any item, he shall in writing state the cost of such item and the original item named in the specifications if requested and shall submit a substitution warranty in the format shown in the specifications.

- C. As soon as practicable and within twenty (20) days after official award of Contract and before any fixtures, materials or equipment are purchased, the Contractor shall submit to the County a complete list of materials, fixtures and equipment giving the manufacturers' names, catalog numbers, etc., and, when requested, the original and substitute item of each article which he proposes to install as a substitution.
- D. Requests for substitution will not be considered after the above period of time unless the item specified is not obtainable or, in the opinion of the County, such substitution would serve the County's interest.

### 37. CONSTRUCTION, MATERIAL AND LABOR COST SCHEDULES

- A. The successful Contractor shall submit the following schedules to the County within ten (10) days after commencing the work:
  - 1. A construction schedule indicating the start and finish of each phase of the work.
  - 2. A detailed statement of the cost of material and labor included in the original estimate for each phase of the work so arranged that the value of the work as it progresses may be readily determined.

### 38. CONFERENCES

At any time during the progress of the work, the County may request the Contractor to attend a conference of any or all of the Contractors engaged on the work, and any notice of such conference shall be duly observed and complied with by the Contractor.

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### 39. INSPECTION AND PAYMENTS - NOT ACCEPTABLE

The fact that the work and materials have been inspected by the County of Mendocino and payments on account have been made does not relieve the Contractor from the responsibility of replacing and making good any defective work or materials that may be discovered within one (1) year from the date of the completion of the work by the Contractor and its acceptance by the County. [Five (5) years for roof.]

### 40. RETURN OF DRAWINGS AND SPECIFICATIONS

All plans and specifications shall be returned to the Office of the County Director of General Services or shall be accounted for by the Contractor before the final certificate will be issued.

### 41. ARRANGEMENT OF SPECIFICATION SECTION

- A. For convenience, these specifications are arranged in several sections, but such separation shall not be considered as limiting any work required to a particular trade. The Contractor shall in cooperation with other contractors establish responsibility for any work required by the plans and specifications which may be improperly arranged or not included in the appropriate section.
- B. In areas where one trade meets another for joining, the Contractor is responsible to be certain that all work shown is included in his bid.

### 42. QUALITY OF MATERIALS AND LABOR

All materials used on this Contract shall be new and the best market quality, unless specified or shown otherwise. All labor used on this Contract shall be competent and skilled for the work. All work executed under this Contract shall be done in the best, most thorough, substantial and workmanlike manner.

All material and labor not meeting these standards shall be removed. The County may refuse to issue any certificate of payment until all defective materials or work have been removed, and other material of proper quality substituted therefor.

### 43. INCOMPETENT WORKERS

If at any time any foreman or worker who shall be employed by the Contractor shall be declared by the County to be incompetent or unfaithful in executing the work, the Contractor, on receiving written notice, shall forthwith initiate appropriate action to dismiss such person from the work.

### 44. COUNTY TO DECIDE

All matters of color, texture, design, interpretation of plans and specifications shall be referred by the Contractor to County, whose decision thereon shall be final.

### 45. CODES

All work and materials shall be in full accordance with the latest rules and regulations of the State Fire Marshal; the Safety Orders of the Division of Industrial Safety; the California Electric Code; the California Building Code; California Mechanical Code; the California Fire and Plumbing Codes; OSHA and other applicable State and local codes and laws. Nothing in these plans or specifications is to be construed to permit work not conforming to these Codes.

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46. PAYMENT OF FEDERAL, STATE OR LOCAL TAXES

Any Federal, State or Local tax payable on articles furnished by the Contractor under the Contract shall be included in the Contract price and paid by the Contractor.

47. LIMITATIONS OF HOURS OF WORK

Eight (8) hours labor constitutes a legal day's work. The Contractor shall forfeit as a penalty \$25.00 for each worker employed in the execution of the Contract by the Contractor for each calendar day which such worker is required or permitted to work more than eight (8) hours in one (1) calendar day and forty (40) hours in any one (1) calendar week in violation of the provisions of the California Labor Code, and in particular Sections 1810 and 1816. Work performed by employees of Contractors in excess of eight (8) hours per day and forty (40) hours during anyone (1) week, shall be permitted upon compensation for all hours worked in excess of eight (8) hours per day at not less than one and one-half (1 & 1/2) times the basic rate of pay, as provided in Section 1815.]

48. PAYMENT OF NOT LESS THAN THE GENERAL PREVAILING RATE OF PER DIEM WAGES

A. The Contractor shall pay his workers on all work included in this Contract not less than the general prevailing rate of per diem wages for legal holiday and overtime work in said locality. Such per diem wages shall not be less than the stipulated rates contained in a schedule thereof which has been ascertained and determined by the State Director of Industrial Relations to be the general prevailing rate of per diem wages for each craft or type of worker needed to execute this Contract.

B. The Contractor shall comply with Labor Code Section 1775. In accordance with Section 1775, the Contractor shall forfeit as a penalty twenty-five dollars (\$25.00) for each calendar day or portion thereof, for each worker paid less than the stipulated prevailing rates for such work or craft in which such worker is employed for any work done under the Contract in violation of the provisions of the Labor Code in particular Labor Code Sections 1770 and 1780. In addition to said penalty, and pursuant to Section 1775, the difference between such stipulated prevailing wage rates and the amount paid to each worker for each calendar day or portion thereof for which each worker was paid less than the stipulated prevailing wage rate shall be paid to each worker by the Contractor.

49. LABOR CODE CLARIFICATION

It is to be understood that references to the California Labor Code shall mean the current Code or as may be amended during the period of the Contract.

50. NOTIFICATION OF READINESS FOR REQUIRED TESTS AND INSPECTIONS

The Contractor shall be responsible to notify all inspectors, testing agencies, and County representatives a minimum of seventy-two (72) hours before required tests and/or inspections.

51. RESPONSIBILITY FOR PROJECT SAFETY AND CONSTRUCTION TECHNIQUES

Specifically omitted from the services of the County are all design and construction review services relating to the Contractor's safety precautions or to means, methods, techniques, sequences, or procedures required for the Contractor to perform his work.

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Omitted services include, but are not limited to, shoring, scaffolding, underpinning, temporary retainment of excavations and any erection methods and bracing.

52. RECORD DRAWINGS

- A. The Contractor shall furnish one complete set of clean "Record" drawings to the County prior to project acceptance, showing clearly any changes made during construction. Record drawings shall be in accordance with Section 017839 Project Record Documents.
- B. In addition to any changes, all mechanical, electrical and plumbing items concealed in the building and underground, actually installed and routed. Depth below surface to top of underground item shall be indicated.
- C. All underground items shall be dimensioned from permanent reference points in a manner that they can be easily found in the field at a later time.
- D. Each sheet of the "Record" drawings shall be identified with the following label to be signed by the Contractor:

These are record drawings which have been prepared or supervised by the undersigned.

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Contractor	Date
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- E. The Contractor is solely responsible for the preparation, completeness, and accuracy of the "Record" drawings. The County and its representatives are not responsible to review the "Record" drawings.

53. OCCUPANCY OR USE BEFORE ACCEPTANCE OF COMPLETION

The County may occupy any building or portion thereof or use any improvement contemplated by the Contract prior to the completion of the entire work. A list of work to be completed and corrected by the Contractor, if any, shall be prepared and agreed to between the County and the Contractor before occupancy or use. Such occupancy or use shall not operate as an acceptance of any part of the work but shall start the guaranty-warranty period on the structure or portion thereof so occupied or improvement of equipment so used, provided, however, that such occupancy shall not start the guaranty-warranty period as to items appearing on the list of work to be completed and corrected. No such occupancy or use shall be deemed to have occurred unless and until the County has given the Contractor formal written notice of intention to so occupy or use, specifying the portion or portions of the structure, improvement or equipment which will be deemed so occupied or used.

54. COMPLIANCE WITH HANDICAPPED ACCESS LAWS

- A. It is the County's intent for all features on these plans and specifications to conform to applicable regulations for the accommodations of physically handicapped persons in buildings and facilities used by the public, whether or not said plans and specifications so conform.
- B. It shall be the responsibility of the manufacturers, suppliers and distributors to ensure that all manufactured and fabricated products, devices and items they supply for this project conform to applicable regulations of Title 24 of the California Code of Regulations.

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- C. When shop drawings and/or manufacturers' product literature, and other matters subject to handicapped regulations are submitted to County, the following shall be provided:
  - 1. Statement that the item shown complies with the handicapped regulations of Title 24 of the California Code of Regulations.
  - 2. Show all required dimensions, heights, clearances, and locations that must be followed when items are installed on project.

55. CONTRACT AMBIGUITY

This Contract shall be deemed to have been prepared jointly by the parties signing the Contract and if any inconsistencies or ambiguities exist, they shall not be interpreted or construed against any of the parties as the drafter.

56. FAIR EMPLOYMENT PRACTICES/NONDISCRIMINATION

The Contractor shall comply with Federal and State Fair Employment Practices provisions.

The Contractor, in connection with performance of work under this agreement, agrees to comply with the rules and regulations which deal with or relate to nondiscrimination set forth as follows:

- A. During the performance of this Contract, the Contractor and its subcontractors shall not deny the Contract's benefits to any person on the basis of race, religious creed, color, national origin, ancestry, physical disability, mental disability, medical condition, marital status, sex or age, nor shall they discriminate unlawfully against any employee or applicant for employment because of race, religious creed, color, national origin, ancestry, physical disability, mental disability, medical condition, marital status, age, or sex. Contractor shall ensure that the evaluation and treatment of employees and applicants for employment are free of such discrimination.
- B. The Contractor shall comply with the provisions of the California Fair Employment and Housing Act (Gov. Code, sections 12900 *et seq.*), the regulations promulgated thereunder (2 Cal. Code of Regulations sections 7285.0 *et seq.*), and Government Code Sections 11135 - 11139.5).
- C. The Contractor shall permit access by representatives of the Department of Fair Employment and Housing and the County upon reasonable notice at any time during the normal business hours, but in no case less than 24 hours' notice, to view such of its books, records, accounts, other sources of information and its facilities as said Department or County shall require to ascertain compliance with this clause.
- D. The Contractor and its subcontractors shall give written notice of their obligations under this clause to labor organizations with which they have a collective bargaining or other agreement.
- E. The Contractor shall include the above nondiscrimination and compliance provisions in above subparagraphs A and B in all subcontracts to perform work under the Contract.

END OF SECTION

GENERAL CONDITIONS

007000-17

County of Mendocino Bower Park Restoration and Improvement Project

SECTION 008010 - SUPPLEMENTARY GENERAL CONDITIONS

PART 1 – GENERAL

The General Conditions (hereinafter referred to as “General Conditions”) shall apply to all of the work of this contract, except to the extent that they are amended or modified by these Supplementary Conditions.

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

- 1.1 The Coastal Development Use Permit U\_2025-0002 and CEQA Notice of Determination SCH # 2024120844 for this project are incorporated herein by this reference. Copies of both documents and additional information can be found at:  
<https://ceqanet.opr.ca.gov/2024120844/3> for the CEQA Documents and  
<https://www.mendocinocounty.gov/departments/planning-building-services/boards-and-commissions/public-hearing-bodies/planning-commission> for the Coastal Development Permit Documents.
- 1.2 The resolution approving Coastal Development Use Permit U\_2025-0002 and the California Environmental Quality Act (CEQA) – Initial Study – Mitigated Negative Declaration adopted for it is attached at the end of this Section 008010. The resolution and its attachments include specific conditions of approval required for the development project and specific mitigation measures that must be adhered to during the development and construction of the project. Selected specific requirements of this permit along with some of the general obligations included in the mitigation measures are noted below clarifying responsible parties, however compliance with all Conditions of Approval and Mitigation Measures is required for project acceptance. The contractor shall become familiar with all conditions of approval and mitigation measures in the resolution and its attachments, provide access and cooperate with the biologists and other County representatives involved in compliance activities, and conduct the work in a manner that avoids violation of said permit.
- 1.3 CONDITIONS OF APPROVAL AND MITIGATION MEASURES OF NOTE
  - A. This permit shall be subject to revocation or modification upon a finding of any one or more of the following: One or more of the conditions upon which the permit was granted have been violated.
  - B. **\*\*BIO-1: Special-Status Plants.** The County will perform early season floristic plant surveys according to current USFWS, CDFW, and CNPS protocols prior to construction to identify any additional special-status plants. Surveys shall be conducted throughout all suitable habitat within the Project footprint and a 50- foot buffer to address potential direct and indirect impacts of the Project. Surveys shall be conducted by a qualified biologist and timed according to the appropriate phenological stage for identifying target species. Known reference populations shall be visited and/or local herbaria records shall be reviewed, if available, prior to surveys to confirm the phenological stage of the target species.

To protect swamp harebell, coast lily, and other rare or endangered plants identified within 50 feet of the Project impact area, the Contractor shall implement the following

## County of Mendocino Bower Park Restoration and Improvement Project

measures:

- ∞ If avoidance is feasible, establish and clearly demarcate avoidance zones for rare or endangered plant occurrences prior to construction and maintain until the completion of construction. Avoidance zones shall include the extent of the plant occurrences plus a 50-foot buffer, unless otherwise determined by a qualified biologist. No ground- or vegetation-disturbing activities shall occur within avoidance zones unless work is monitored by a qualified biologist/biological monitor to ensure the plants are not impacted by the work.
  - ∞ If avoidance of rare or endangered plants is not feasible, mitigation measures shall be developed in consultation with the CDFW and/or the USFWS. Mitigation measures may include restoration or permanent preservation of an equivalent acreage of onsite or offsite habitat for the impacted species and/or translocation of plants or seeds from impacted areas to unaffected habitats.
  - ∞ During construction, the Contractor will develop and implement a plan to ensure that clothing, vehicles, and equipment (including shoes, equipment undercarriage and tires/tracks) are cleaned prior to entering the Project Area, and materials used for the Project, such as fill dirt or erosion control materials, are from weed-free locations or certified weed free to avoid the introduction and spread of non-native invasive plant species.
  - ∞ Areas containing special-status plants shall be protected by the Contractor during Project operations by installation of constructed (e.g., fencing) permanent barriers, and/or installation of appropriate signs alerting the public that foot traffic is prohibited in the sensitive habitat.
  - ∞ Landscape maintenance activities including mowing or application of herbicides shall be prohibited in the area of the special-status plant occurrences or shall be conducted under the supervision of a qualified biologist.
- C **\*\*BIO-3: Special-Status Amphibians and Reptiles.** A qualified biologist employed by the County shall perform a preconstruction survey within 24 hours prior to the initiation of construction to confirm the site is clear of California giant salamander, California Red legged Frog (CRLF), and Northwest Pond Turtle (NWPT), and shall be on-site during initial vegetation removal and ground-disturbance to monitor special-status amphibians and reptiles. Should California giant salamander be detected, a CDFW-approved biologist shall relocate individuals to suitable nearby habitat that won't be disturbed by Project construction. If CRLF or NWPT are discovered onsite, they may be allowed to leave the area of their own volition but may not be moved or herded from the area. In the event that CRLF or NWPT is observed, work shall stop and applicant shall contact the USFWS for technical guidance regarding ESA consultation requirements and appropriate avoidance and minimization measures.
- ∞ If feasible, construction activities will occur during the non-breeding season for CRLF (June – October).
  - ∞ A USFWS approved biologist employed by the County shall conduct training session(s) for all construction and park personnel involved in construction of the Proposed Project. At a minimum, the training shall include a description of California giant salamander, CRLF and NWPT, their habitats, the status of the species, the general measures being implemented to conserve the species as they relate to the Project, and the physical boundaries within which the Project may be accomplished. The training session will include instruction in the

## County of Mendocino Bower Park Restoration and Improvement Project

appropriate protocol to follow in the event that one of these species is observed on site. Informational handouts with species photos will be provided to construction personnel. Stumps, rocks, logs, or other habitat features moved during the Proposed Project construction will be done so very carefully, under the observance of the approved biologist(s) and will be replaced in adjacent suitable habitat or stored for re-use in the revegetation phase.

- D **\*\*BIO-4: Nesting Bird Surveys.** The County shall conduct a preconstruction nesting bird survey within 14 days prior to the commencement of Project-related activities during the active nesting season (February 1 through September 15), including tree/shrub removal, to identify active nests that could be impacted by construction. The preconstruction nesting bird survey shall include accessible areas within 100 feet of proposed construction areas. If active nests are found, a no-disturbance buffer shall be established around the nest by a qualified biologist, in consultation with the USFWS and/or the CDFW. The buffer shall be maintained until the nestlings fledge or the nest is otherwise no longer occupied, to be determined by a qualified biologist. No further measures are necessary once the young are independent of the nest.
- E **\*\*BIO-6: Wetlands.** To avoid and minimize significant impacts to aquatic resources, the following mitigation measures are recommended:
- ∞ Aquatic resources located within 50 feet of the Project footprint shall be clearly demarcated with orange construction fencing or other visible barrier, and no Project-related activities shall be permitted within the delineated area.
  - ∞ To minimize potential indirect effects, the applicant shall prepare and implement an Erosion and Sediment Control Plan to avoid and minimize erosion and runoff to wetlands and other waters that are to remain within or adjacent to the Project Area.
  - ∞ If the Project will disturb at least 1 acre of land, the Project applicant shall obtain coverage under the General Construction Storm Water Permit from the RWQCB by preparing an SWPPP and implementing best management practices to reduce water quality effects during construction.
  - ∞ If alteration of the bed, channel, or bank of an ephemeral drainage or the onsite pond is proposed, or if the Project will impact associated aquatic or riparian vegetation, the applicant shall notify the CDFW of the Proposed Project activities and obtain a Lake or Streambed Alteration Agreement prior to Project implementation.
  - ∞ A Coastal Development Permit would be required for any activity impacting wetlands subject to the jurisdiction of the California Coastal Commission (CCC). Various alternatives exist for mitigating the adverse effects of wetland development projects on CCC wetlands including in-kind compensatory wetland mitigation (i.e., creation, restoration, or enhancement of wetland habitat) and out-of-kind mitigation where impacts to one habitat type are mitigated through the creation, restoration, or enhancement of another habitat type. Mitigation for impacts to CCC wetlands will be vetted through the Coastal Development Permit process.
- F **\*\*CUL-1: Unanticipated Discoveries.** If subsurface deposits believed to be cultural or human in origin are discovered during construction, the Project shall adhere to the Mendocino County Archaeological Ordinance, Chapter 22.12. This ordinance dictates

## County of Mendocino Bower Park Restoration and Improvement Project

that all work must halt within a 100-foot radius of the discovery and the contractors shall make notification of the discovery to the Director of Planning and Building Services (Director). A qualified professional archaeologist, meeting the Secretary of the Interior's Professional Qualification Standards for prehistoric and historic archaeology, shall be retained by the County to evaluate the significance of the find, and shall have the authority to modify the no-work radius as appropriate, using professional judgment. The following notifications shall apply, depending on the nature of the find:

- ∞ If the professional archaeologist determines that the find does not represent a cultural resource, work may resume immediately and no agency notifications are required.
  - ∞ If the professional archaeologist determines that the find does represent a cultural resource from any time period or cultural affiliation, the archaeologist shall immediately notify the lead agencies who shall consult on the appropriate responses.
  - ∞ It shall be unlawful, prohibited, and a misdemeanor for any person knowingly to disturb, or cause to be disturbed, in any fashion whatsoever, or to excavate, or cause to be excavated, to any extent whatsoever, an archaeological site without complying with the provisions of this section.
  - ∞ It shall be unlawful, prohibited and a misdemeanor for any person knowingly to disturb, or cause to be disturbed, in any fashion whatsoever, or to excavate, or cause to be excavated, to any extent whatsoever, any archaeological site (1) in violation of any order to cease and desist issued pursuant to this section; or (2) during the seventy-two (72) hour period commencing from the time of the required notification of discovery.
- G \*\*GEO-1: Unanticipated Discovery of Paleontological Resources. If paleontological or other geologically sensitive resources are identified during any phase of project development, the construction manager shall cease operation at the site of the discovery and immediately notify the County. Mendocino County shall retain a qualified paleontologist to provide an evaluation of the find and to prescribe mitigation measures to reduce impacts to a less-than-significant level. In considering any suggested mitigation proposed by the consulting paleontologist, Mendocino County shall determine whether avoidance is necessary and feasible in light of factors such as the nature of the find, project design, costs, land use assumptions, and other considerations. If avoidance is unnecessary or infeasible, other appropriate measures (e.g., data recovery) shall be instituted. Work may proceed on other parts of the Project Site while mitigation for paleontological resources is carried out.
- H The Contractor shall cooperate with the biologists and other consultant and coordinate the completion of the work in accordance with the various requirements noted above. Should the surveys result in requirements that impact areas of work or a temporary work stoppage, the County and Contractor will evaluate the impacts on the work and make adjustments to the contract price and time in accordance with General Conditions paragraph 20 Changes in the Work.

END OF SECTION

**USE PERMIT U\_2025\_0002**

Resolution Number \_\_\_\_\_

County of Mendocino  
Ukiah, California

MAY 1, 2025

U\_2025-0002 COUNTY OF MENDOCINO

RESOLUTION OF THE PLANNING COMMISSION, COUNTY OF MENDOCINO, STATE OF CALIFORNIA, ADOPTING A MITIGATED NEGATIVE DECLARATION (SCH 2024120844) AND GRANTING A COASTAL DEVELOPMENT USE PERMIT FOR THE BOWER PARK RESTORATION AND IMPROVEMENT GRANT PROJECT TO IMPROVE RECREATIONAL FACILITIES AND PROVIDE IMPROVED ACCESSIBILITY TO THESE FEATURES WITHIN THE PARK. THE PROJECT INCLUDES VARIOUS UPGRADES AND REPAIRS TO EXISTING AMENITIES AS WELL AS THE ADDITION OF A FEW NEW AMENITIES.

WHEREAS, the applicant, County of Mendocino, filed an application for Coastal Development Use Permit with the Mendocino County Department of Planning and Building Services for the Bower Park Restoration and Improvement Grant Project to improve recreational facilities and provide improved accessibility to these features within the park. The project includes various upgrades and repairs to existing amenities as well as the addition of a few new amenities. The site of the project is located in the Coastal Zone, approximately 1.75 miles northeast of the Gualala town center, lying on the west side of Old Stage Road (CR 502), approximately 0.75 miles north of its intersection with Pacific Woods Drive (CR 524), at 38100 and 38040 Old Stage Road, Gualala; APNs 144-256-12 and 144-233-12; General Plan Open Space (OS); Zoning Open Space (OS); Supervisorial District 5; (the "Project"); and

WHEREAS, a Mitigated Negative Declaration (SCH 2024120844) was prepared for the Project and noticed and made available for agency and public review from December 18, 2024 to January 16, 2025 in accordance with the California Environmental Quality Act (CEQA) and the State and County CEQA Guidelines; and

WHEREAS, comments were received on the Mitigated Negative Declaration which required revisions to Mitigation Measure BIO-1 consistent with CEQA Guidelines section 15074.1, as well as other minor clarifications and insignificant modifications. Recirculation of the Mitigated Negative Declaration is not required pursuant to CEQA Guidelines sections 15073.5(c)(1) and (4); and

WHEREAS, in accordance with applicable provisions of law, the Planning Commission held a public hearing on May 1, 2025, at which time the Planning Commission heard and received all relevant testimony and evidence presented orally or in writing regarding the Mitigated Negative Declaration (SCH 2024120844) and the Project. All interested persons were given an opportunity to hear and be heard regarding the Mitigated Negative Declaration (SCH 2024120844) and the Project; and

WHEREAS, the Planning Commission has had an opportunity to review this Resolution and finds that it accurately sets forth the intentions of the Planning Commission regarding the Mitigated Negative Declaration (SCH 2024120844) and the Project.

NOW, THEREFORE, BE IT RESOLVED, that the Planning Commission, based upon the evidence in the record before it, makes the following findings;

1. Pursuant to MCC Section 20.532.095(A)(1), the proposed development to improve recreational facilities and provide improved accessibility to these features within Bower Park including various

upgrades and repairs to existing amenities as well as the addition of a few new amenities is in conformity with the certified local coastal program. The project has been determined to be consistent with the applicable intent of the zoning district and land use classification, does not involve substantial grading, is compliant with ESHA criteria, is not located in a hazard area, is consistent with visual resource requirements, and would not increase the demand of water, septic, or highway capacity; and

2. Pursuant to MCC Section 20.532.095(A)(2), the proposed development to improve recreational facilities and provide improved accessibility to these features within Bower Park including various upgrades and repairs to existing amenities as well as the addition of a few new amenities will be provided with adequate utilities, access roads, drainage, and other necessary facilities. The property is served by existing water service from North Gualala Water Company and by an on-site septic system and is adequate to serve the proposed development. Access to the property is via existing encroachment off Old Stage Road and is adequate to serve the existing and proposed development; and
3. Pursuant to MCC Section 20.532.095(A)(3), the proposed development to improve recreational facilities and provide improved accessibility to these features within Bower Park including various upgrades and repairs to existing amenities as well as the addition of a few new amenities is consistent with the purpose and intent of the Open Space zoning district, as well as the provisions of this Division and preserve the integrity of the zoning district. The purpose of the project is to improve access to Bower Park for the enjoyment and benefit of the community and visitors to the area; and
4. Pursuant to MCC Section 20.532.095(A)(4), the proposed development, will not have any significant adverse impacts on the environment within the meaning of the California Environmental Quality Act. An Initial Study has been prepared which identified potentially significant impacts, which can be reduced to less than significant levels with the incorporation of several mitigation measures. Consistent with CEQA Guidelines section 15074.1, the modification to Mitigation Measure BIO-1 is equivalent or more effective in mitigating potential impacts to rare plant resources and will not create a significant impact on the environment as the modification ensures that any protective barriers installed will not suppress or out-compete the rare plants. The remaining protective barrier requirements in BIO-1 provide for more effective mitigation of potential impacts to rare plant resources. Mitigation measures BIO-1 (as revised) through BIO-6, CUL-1 and GEO-1, ensure that all potentially significant impacts will be reduced to less than significant levels; and
5. Pursuant to MCC Section 20.532.095(A)(5), the proposed development to improve recreational facilities and provide improved accessibility to these features within Bower Park including various upgrades and repairs to existing amenities as well as the addition of a few new amenities will not have any adverse impacts on any known archaeological or paleontological resource. A Cultural Resources Inventory Report for the Bower Park Restoration Project was prepared by ECORP Consulting, Inc. in August 2024. The Report did not identify any archaeological or architectural historic resources on the property. The Report also identified that no cultural resources were present and that the likelihood of encountering undiscovered, intact, and *in-situ* pre-contact cultural resources is considered low given the projects location. With the implementation of mitigation measures CUL-1 and GEO-1, as outlined in the Initial Study/Mitigated Negative Declaration, impacts are less than significant; and
6. Pursuant to MCC Section 20.532.095(A)(6), other public services, including but not limited to, solid waste and public roadway capacity have been considered and are adequate to serve the proposed development to improve recreational facilities and provide improved accessibility to these features within Bower Park including various upgrades and repairs to existing amenities as well as the addition of a few new amenities. The project is not expected to generate any additional solid waste beyond what already exists from the site. The site will still remain a public park and the proposed improvements will not increase the average number of visitors per day significantly at the project location. Therefore, no impacts on public roadway capacity would occur.
7. Pursuant to MCC Section 20.532.100(A)(1), the ESHA resources identified on the property will not be

USE PERMIT U\_2025\_0002

significantly degraded by the proposed development. There is no feasible less environmentally damaging alternative as the site is already the location of a public park that has highly disturbed ESHA due to the public use of the property. All feasible mitigation measures capable of reducing or eliminating project related impacts are recommended for adoption. Mitigation measures BIO-1 through BIO-6, CUL-1 and GEO-1, ensure that all potentially significant impacts will be reduced to less than significant levels.

BE IT FURTHER RESOLVED that the Planning Commission hereby adopts the Mitigated Negative Declaration (SCH 2024120844) and the Mitigation Monitoring and Reporting Program set forth in Exhibit "B", attached hereto. The Planning Commission certifies that the Mitigated Negative Declaration (SCH 2024120844) has been completed, reviewed, and considered, together with the comments received during the public review process, in compliance with CEQA and State and County CEQA Guidelines, and finds that the Mitigated Negative Declaration (SCH 2024120844) reflects the independent judgment and analysis of the Planning Commission.

BE IT FURTHER RESOLVED that the Planning Commission hereby grants the requested Coastal Development Use Permit, subject to the Conditions of Approval in Exhibit "A" and Mitigation Monitoring and Reporting Program in Exhibit "B", attached hereto.

BE IT FURTHER RESOLVED that the Planning Commission designates the Secretary as the custodian of the document and other material which constitutes the record of proceedings upon which the Planning Commission decision herein is based. These documents may be found at the office of the County of Mendocino Planning and Building Services, 860 North Bush Street, Ukiah, CA 95482.

BE IT FURTHER RESOLVED that the Planning Commission's action shall be final on the 11<sup>th</sup> day after the date of the Resolution unless an appeal is filed pursuant to Section 20.544.015 of the Mendocino County Code. The permit shall become effective after the ten working day appeal period to the Coastal Commission has expired and no appeal has been filed with the Coastal Commission.

*I hereby certify that according to the Provisions of Government Code Section 25103 delivery of this document has been made.*

ATTEST: JOCELYN GONZALEZ-THIES  
Secretary to the Planning Commission

By: \_\_\_\_\_

BY: JULIA KROG  
Director

ELORA BABBINI, Chair  
Mendocino County Planning Commission

\_\_\_\_\_

\_\_\_\_\_

EXHIBIT A

CONDITIONS OF APPROVAL AND MITIGATION MEASURES

MAY 1, 2025

U\_2025-0002 – COUNTY OF MENDOCINO

Coastal Development Use Permit for the Bower Park Restoration and Improvement Grant Project to improve recreational facilities and provide improved accessibility to these features within the park. The project includes various upgrades and repairs to existing amenities as well as the addition of a few new amenities.

**APPROVED PROJECT DESCRIPTION:** Coastal Development Use Permit for the Bower Park Restoration and Improvement Grant Project to improve recreational facilities and provide improved accessibility to these features within the park. The project includes various upgrades and repairs to existing amenities as well as the addition of a few new amenities. Upgrades to existing amenities include expanded and newly paved parking facilities, fence replacement, boardwalk replacement, renovation of picnic areas, repair and renovation of existing structures, expanded basketball court, and walking paths. New amenities include outdoor fitness equipment, pond viewing area, new picnic areas, dog park area, security lighting, and new water and electricity infrastructure.

**CONDITIONS OF APPROVAL AND MITIGATION MEASURES (as indicated by “\*\*\*”):**

1. This action shall become final on the 11th day following the decision unless an appeal is filed pursuant to Section 20.544.015 of the Mendocino County Code. The permit shall become effective after the ten (10) working day appeal period to the Coastal Commission has expired and no appeal has been filed with the Coastal Commission. The permit shall expire and become null and void at the expiration of two years after the effective date except where construction and/or use of the property in reliance on such permit has been initiated prior to its expiration. Such permit vesting shall include approved permits associated with this project (i.e. building permits, septic permits, well permits, etc.) and physical construction in reliance of such permits, or a business license demonstrating establishment of a use proposed under this project.
2. The use and occupancy of the premises shall be established and maintained in conformance with the provisions of Division II of Title 20 of the Mendocino County Code.
3. To remain valid, progress towards completion of the project must be continuous. The Applicants have sole responsibility for renewing this application before the expiration date. The County will not provide a notice prior to the expiration date.
4. The application, along with supplemental exhibits and related material, shall be considered elements of this permit, and that compliance therewith is mandatory, unless an amendment has been approved by the Planning Commission.
5. This permit shall be subject to the securing of all necessary permits for the proposed development from County, State and Federal agencies having jurisdiction.
6. This permit shall be subject to revocation or modification upon a finding of any one or more of the following:
  - a. The permit was obtained or extended by fraud.
  - b. One or more of the conditions upon which the permit was granted have been violated.

## USE PERMIT U\_2025\_0002

- c. The use for which the permit was granted is conducted so as to be detrimental to the public health, welfare or safety, or to be a nuisance.
  - d. A final judgment of a court of competent jurisdiction has declared one or more conditions to be void or ineffective or has enjoined or otherwise prohibited the enforcement or operation of one or more such conditions.
7. This permit is issued without a legal determination having been made upon the number, size or shape of parcels encompassed within the permit described boundaries. Should, at any time, a legal determination be made that the number, size or shape of parcels within the permit described boundaries are different than that which is legally required by this permit, this permit shall become null and void.
  8. This entitlement does not become effective or operative and no work shall be commenced under this entitlement until the California Department of Fish and Wildlife filing fees required or authorized by Section 711.4 of the Fish and Game Code are submitted to the Mendocino County Department of Planning and Building Services. Said fee of \$3,018.75 shall be made payable to the Mendocino County Clerk and submitted to the Department of Planning and Building Services within 5 working days of the approval of the project. Any waiver of the fee shall be on a form issued by the Department of Fish and Wildlife upon their finding that the project has “no effect” on the environment. If the project is appealed, the payment will be held by the Department of Planning and Building Services until the appeal is decided. Depending on the outcome of the appeal, the payment will either be filed with the County Clerk (if the project is approved) or returned to the payer (if the project is denied). Failure to pay this fee by the specified deadline shall result in the entitlement becoming null and void. **The applicant has the sole responsibility to ensure timely compliance with this condition.**
  9. **\*\*BIO-1:** Special-Status Plants. Perform early season floristic plant surveys according to current USFWS, CDFW, and CNPS protocols prior to construction to identify any additional special-status plants. Surveys shall be conducted throughout all suitable habitat within the Project footprint and a 50-foot buffer to address potential direct and indirect impacts of the Project. Surveys shall be conducted by a qualified biologist and timed according to the appropriate phenological stage for identifying target species. Known reference populations shall be visited and/or local herbaria records shall be reviewed, if available, prior to surveys to confirm the phenological stage of the target species.

To protect swamp harebell, coast lily, and other rare or endangered plants identified within 50 feet of the Project impact area, implement the following measures:

- If avoidance is feasible, establish and clearly demarcate avoidance zones for rare or endangered plant occurrences prior to construction and maintain until the completion of construction. Avoidance zones shall include the extent of the plant occurrences plus a 50-foot buffer, unless otherwise determined by a qualified biologist. No ground- or vegetation-disturbing activities shall occur within avoidance zones unless work is monitored by a qualified biologist/biological monitor to ensure the plants are not impacted by the work.
- If avoidance of rare or endangered plants is not feasible, mitigation measures shall be developed in consultation with the CDFW and/or the USFWS. Mitigation measures may include restoration or permanent preservation of an equivalent acreage of onsite or offsite habitat for the impacted species and/or translocation of plants or seeds from impacted areas to unaffected habitats.
- Prior to issuance of any building permits in reliance of this Coastal Development Permit, an active management plan shall be developed for the Bishop pine forest in order to provide for the long term health of the forest habitat. The active management plan shall be prepared by a qualified ecologist and may include things such as: invasive species removal; an understory management regimen to facilitate the growth of new recruits; and identification, removal, and prevention of pathogens killing Bishop pine trees and other native flora.
- During construction, clothing, vehicles, and equipment (including shoes, equipment undercarriage and tires/tracks) should be cleaned prior to entering the Project Area, and materials used for the

## USE PERMIT U\_2025\_0002

- Project, such as fill dirt or erosion control materials, should be from weed-free locations or certified weed free to avoid the introduction and spread of non-native invasive plant species.
- Areas containing special-status plants shall be protected during Project operations by installation of constructed (e.g., fencing) permanent barriers, and/or installation of appropriate signs alerting the public that foot traffic is prohibited in the sensitive habitat.
  - Landscape maintenance activities including mowing or application of herbicides shall be prohibited in the area of the special-status plant occurrences or shall be conducted under the supervision of a qualified biologist.
10. **\*\*BIO-2:** Special-Status Invertebrates. If tree removal would occur during the winter months (November through February) when there is potential for Monarchs to be utilizing roost trees within the BSA, a survey shall be conducted to ensure no monarchs are utilizing the tree. If monarchs are observed, tree removal shall not occur until the end of the winter season and all monarchs have moved from the tree.
11. **\*\*BIO-3:** Special-Status Amphibians and Reptiles. A qualified biologist shall perform a preconstruction survey within 24 hours prior to the initiation of construction to confirm the site is clear of California giant salamander, CRLF, and NWPT, and shall be on-site during initial vegetation removal and ground-disturbance to monitor special-status amphibians and reptiles. Should California giant salamander be detected, a CDFW-approved biologist shall relocate individuals to suitable nearby habitat that won't be disturbed by Project construction. If CRLF or NWPT are discovered onsite, they may be allowed to leave the area of their own volition but may not be moved or herded from the area. In the event that CRLF or NWPT is observed, work shall stop and applicant shall contact the USFWS for technical guidance regarding ESA consultation requirements and appropriate avoidance and minimization measures.
- If feasible, construction activities will occur during the non-breeding season for CRLF (June – October).
  - A USFWS approved biologist(s) shall conduct training session(s) for all construction and park personnel involved in construction of the Proposed Project. At a minimum, the training shall include a description of California giant salamander, CRLF and NWPT, their habitats, the status of the species, the general measures being implemented to conserve the species as they relate to the Project, and the physical boundaries within which the Project may be accomplished. The training session will include instruction in the appropriate protocol to follow in the event that one of these species is observed on site. Informational handouts with species photos will be provided to construction personnel.
  - Stumps, rocks, logs, or other habitat features moved during the Proposed Project construction will be done so very carefully, under the observance of the approved biologist(s) and will be replaced in adjacent suitable habitat or stored for re-use in the revegetation phase.
12. **\*\*BIO-4:** Nesting Bird Surveys. A preconstruction nesting bird survey shall be conducted within 14 days prior to the commencement of Project-related activities during the active nesting season (February 1 through September 15), including tree/shrub removal, to identify active nests that could be impacted by construction. The preconstruction nesting bird survey shall include accessible areas within 100 feet of proposed construction areas. If active nests are found, a no-disturbance buffer shall be established around the nest by a qualified biologist, in consultation with the USFWS and/or the CDFW. The buffer shall be maintained until the nestlings fledge or the nest is otherwise no longer occupied, to be determined by a qualified biologist. No further measures are necessary once the young are independent of the nest.
13. **\*\*BIO-5:** Special-Status Bats. To avoid and minimize significant impacts to special-status bats or roosting colonies, the following mitigation measures are recommended:

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- If trees within the Project Area need to be removed, a qualified bat biologist shall conduct a bat habitat assessment to determine if potential roosting habitat is present.
  - If suitable habitat features, roosting bats, bat sign, or evidence of previous occupation by bats is found during the bat habitat assessment, an acoustic and/or emergence survey will be conducted to determine if bats are actively using the tree. If no sign of bat use is found, no further measures are necessary. If bats are found roosting in trees that cannot be avoided, the trees will be protected until the end of the maternity roosting season (April 15 to September 1). Trees with roosting bats may be removed during the bat active period outside of maternity season and prior to or after the hibernation season (October 16 to February 28) following the two-step tree removal process under the direction of a qualified bat biologist.
  - As much as feasible, vegetation and trees within the area that are not suitable for roosting bats will be removed first to provide a disturbance that might reduce the likelihood of bats using the habitat.
  - Two-step tree removal will occur over two consecutive days under the supervision of a qualified bat biologist. On Day 1, small branches and small limbs containing no cavity, crevice, or exfoliating bark habitat on habitat trees, as identified by a qualified bat biologist, shall be removed first using chainsaws only (i.e., no dozers, backhoes). The following day (Day 2), the remainder of the tree is to be felled/removed.
14. **\*\*BIO-6:** Wetlands. To avoid and minimize significant impacts to aquatic resources, the following mitigation measures are recommended:
- Aquatic resources located within 50 feet of the Project footprint shall be clearly demarcated with orange construction fencing or other visible barrier, and no Project-related activities shall be permitted within the delineated area.
  - To minimize potential indirect effects, the applicant shall prepare and implement an Erosion and Sediment Control Plan to avoid and minimize erosion and runoff to wetlands and other waters that are to remain within or adjacent to the Project Area.
  - If the Project will disturb at least 1 acre of land, the Project applicant shall obtain coverage under the General Construction Storm Water Permit from the RWQCB by preparing an SWPPP and implementing best management practices to reduce water quality effects during construction.
  - Authorization under the Section 404 of the federal Clean Water Act must be obtained from the U.S. Army Corps of Engineers (USACE) prior to discharging any dredged or fill materials into any features determined to be Waters of the U.S. Mitigation measures will be developed as part of the Section 404 Permit process to ensure no net loss of wetland function and values. Mitigation for permanent impacts to Waters of the U.S. is typically required at a minimum 1:1 ratio; however, final mitigation requirements will be developed in consultation with the USACE.
  - If temporary impacts to Waters of the U.S. or State will occur, the applicant shall prepare a site restoration plan describing the methods that will be used to restore impacted aquatic features to pre-Project conditions. The restoration plan will include, at a minimum, the proposed methods for stabilizing and revegetating the site, any maintenance requirements (e.g., watering and invasive species control), the expected timeframe for restoration.
  - If discharges will occur to Waters of the U.S., Section 401 Water Quality Certification must be obtained from the RWQCB before a 404 Permit can be issued. An application for a 401 Water Quality Certification will be prepared and submitted to the RWQCB in accordance with the State Water Resources Control Board's *State Wetland Definition and Procedures for the Discharge of Dredged or Fill Material to Waters of the State* (April 2021).
  - If discharges to Waters of the State will occur, the applicant shall obtain waste discharge requirements or a waiver of waste discharge requirements from the RWQCB as required pursuant to the Porter-Cologne Water Quality Control Act.
  - If alteration of the bed, channel, or bank of an ephemeral drainage or the onsite pond is proposed, or if the Project will impact associated aquatic or riparian vegetation, the applicant shall

notify the CDFW of the Proposed Project activities and obtain a Lake or Streambed Alteration Agreement prior to Project implementation.

- A Coastal Development Permit would be required for any activity impacting wetlands subject to the jurisdiction of the CCC. Various alternatives exist for mitigating the adverse effects of wetland development projects on CCC wetlands including in-kind compensatory wetland mitigation (i.e., creation, restoration, or enhancement of wetland habitat) and out-of-kind mitigation where impacts to one habitat type are mitigated through the creation, restoration, or enhancement of another habitat type. Mitigation for impacts to CCC wetlands will be vetted through the Coastal Development Permit process.

15. **\*\*CUL-1:** Unanticipated Discoveries. If subsurface deposits believed to be cultural or human in origin are discovered during construction, the Project shall adhere to the Mendocino County Archaeological Ordinance, Chapter 22.12. This ordinance dictates that all work must halt within a 100 foot radius of the discovery and the contractors shall make notification of the discovery to the Director of Planning and Building Services (Director). A qualified professional archaeologist, meeting the Secretary of the Interior's Professional Qualification Standards for prehistoric and historic archaeology, shall be retained to evaluate the significance of the find, and shall have the authority to modify the no-work radius as appropriate, using professional judgment. The following notifications shall apply, depending on the nature of the find:

- If the professional archaeologist determines that the find does not represent a cultural resource, work may resume immediately and no agency notifications are required.
- If the professional archaeologist determines that the find does represent a cultural resource from any time period or cultural affiliation, the archaeologist shall immediately notify the lead agencies. The agencies shall consult on a finding of eligibility and implement appropriate treatment measures, if the find is determined to be a Historical Resource under CEQA, as defined by CEQA or a historic property under Section 106 NHPA, if applicable. Work may not resume within the no-work radius until the lead agencies, through consultation as appropriate, determine that the site either: 1) is not a Historical Resource under CEQA or a Historic Property under Section 106; or 2) that the treatment measures have been completed to their satisfaction.
- If the find includes human remains, or remains that are potentially human, they shall ensure reasonable protection measures are taken to protect the discovery from disturbance (AB 2641). The archaeologist shall notify the Mendocino County Coroner (per § 7050.5 of the Health and Safety Code). The provisions of § 7050.5 of the California Health and Safety Code, § 5097.98 of the California PRC, and AB 2641 will be implemented. If the coroner determines the remains are Native American and not the result of a crime scene, the coroner will notify the NAHC, which then will designate a Native American Most Likely Descendant (MLD) for the Project (§ 5097.98 of the PRC). The designated MLD will have 48 hours from the time access to the property is granted to make recommendations concerning treatment of the remains. If the landowner does not agree with the recommendations of the MLD, the NAHC can mediate (§ 5097.94 of the PRC). If no agreement is reached, the landowner must rebury the remains where they will not be further disturbed (§ 5097.98 of the PRC). This will also include either recording the site with the NAHC or the appropriate Information Center; using an open space or conservation zoning designation or easement; or recording a reinternment document with the county in which the property is located (AB 2641). Work may not resume within the no-work radius until the lead agencies, through consultation as appropriate, determine that the treatment measures have been completed to their satisfaction:
- The Director may arrange for an on-site inspection of the area of discovery by one or more of his/her representatives within seventy-two (72) hours of the time of such notification. The Director shall give notice of the time of the on-site inspection to the owner, or other person who made notification of the discovery, who shall be entitled to accompany the Director's representatives at all times on the property in question. The purpose of the inspection shall be to determine whether the site is one of archaeological significance. In the event that such inspection does not take place within such seventy-two (72) hour period and the Director has not, within such time, issued an order to cease and desist for a longer period of time, the excavation and disturbance of the site may resume.

- If the Commission determines that the site of the discovery is one of archaeological significance, it shall, within seventy-two (72) hours of being notified of the discovery, notify the person making the discovery of (1) such determination, (2) the apparent boundaries of the site, and (3) its specific recommendations for the conservation of the site. The Commission may then also issue an order to cease and desist from all further excavation or disturbance of the site for a specific period of time not to exceed thirty (30) days; provided, however, that the period may be extended up to forty-five (45) additional days by minute order of the Board of Supervisors. In issuing such a cease and desist order, the Commission shall take into account both the need for conserving the site and the need for avoiding unnecessary financial hardships to any person engaged in construction work on the site. The cease and desist order shall be subject to whatever conditions the Commission determines will promote the purposes of this Chapter. During the period such cease and desist order is in effect, the site shall be open to physical inspection, photographing, supervised excavation, study and all other reasonable related activities by any person duly authorized by the Commission. The land owner, or the person making the original notification of discovery, shall be kept advised of the times at which any such duly authorized person is on the site and shall be given the opportunity to accompany such person while on the site.
  - The Commission may, for the purpose of giving or receiving notifications under this Chapter, designate as its representatives one or more professional archaeologists.
  - It shall be unlawful, prohibited, and a misdemeanor for any person knowingly to disturb, or cause to be disturbed, in any fashion whatsoever, or to excavate, or cause to be excavated, to any extent whatsoever, an archaeological site without complying with the provisions of this section.
  - It shall be unlawful, prohibited and a misdemeanor for any person knowingly to disturb, or cause to be disturbed, in any fashion whatsoever, or to excavate, or cause to be excavated, to any extent whatsoever, any archaeological site (1) in violation of any order to cease and desist issued pursuant to this section; or (2) during the seventy-two (72) hour period commencing from the time of the required notification of discovery.
16. **\*\*GEO-1: Unanticipated Discovery of Paleontological Resources.** If paleontological or other geologically sensitive resources are identified during any phase of project development, the construction manager shall cease operation at the site of the discovery and immediately notify the County. Mendocino County shall retain a qualified paleontologist to provide an evaluation of the find and to prescribe mitigation measures to reduce impacts to a less-than-significant level. In considering any suggested mitigation proposed by the consulting paleontologist, Mendocino County shall determine whether avoidance is necessary and feasible in light of factors such as the nature of the find, project design, costs, land use assumptions, and other considerations. If avoidance is unnecessary or infeasible, other appropriate measures (e.g., data recovery) shall be instituted. Work may proceed on other parts of the Project Site while mitigation for paleontological resources is carried out.
17. Prior to final inspection of any building permits in reliance of this Coastal Development Use Permit, a revegetation plan shall be provided to mitigate impacts to the Bishop Pine alliance. The revegetation plan shall include a palette comprised of the shrub and tree species (in addition to Bishop pine) that comprise the specific Bishop pine alliance's association. The revegetation plan shall be submitted to both the County and CDFW for review and approval.
18. If the applicant installs fencing to protect plant resources, the fencing shall be wildlife-friendly, low in height, and installed as far as possible from the plant populations to provide an adequate buffer.
19. The planting of "relatively impenetrable vegetation" as a protective barrier for rare plant resources is specifically prohibited.
20. The applicant shall obtain an encroachment permit from the Mendocino County Department of Transportation for any work within the County right-of-way.
21. Security lighting shall be downcast and shielded or motion-sensor activated.

**EXHIBIT "B"**

**County of Mendocino- Bower Park Restoration Grant Project Mitigation Monitoring and Reporting Program**

	<b>Implementation Actions and Timing</b>	<b>Implementati on Responsibility</b>	<b>Responsibility for Oversight of Compliance/ Verification</b>	<b>Agency Coordination</b>	<b>Comments</b>
<b>Biological Resources</b>					
<p><b>BIO-1: Special-Status Plants.</b> Perform early season floristic plant surveys according to current USFWS, CDFW, and CNPS protocols prior to construction to identify any additional special-status plants. Surveys shall be conducted throughout all suitable habitat within the Project footprint and a 50-foot buffer to address potential direct and indirect impacts of the Project. Surveys shall be conducted by a qualified biologist and timed according to the appropriate phenological stage for identifying target species. Known reference populations shall be visited and/or local herbaria records shall be reviewed, if available, prior to surveys to confirm the phenological stage of the target species.</p> <p>To protect swamp harebell, coast lily, and other rare or endangered plants identified</p>	<p><b>Action:</b> During spring survey window (typically late March-May).</p> <p><b>Timing:</b> Prior to construction.</p>	<p>Construction Manager</p> <hr/> <p>Initials</p> <hr/> <p>Date</p>	<p>Construction Manager / County</p> <hr/> <p>Initials</p> <hr/> <p>Date</p>		

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	<b>Implementation Actions and Timing</b>	<b>Implementati on Responsibility</b>	<b>Responsibility for Oversight of Compliance/ Verification</b>	<b>Agency Coordination</b>	<b>Comments</b>
<p>within 50 feet of the Project impact area, implement the following measures:</p> <ul style="list-style-type: none"> <li>▪ If avoidance is feasible, establish and clearly demarcate avoidance zones for rare or endangered plant occurrences prior to construction and maintain until the completion of construction. Avoidance zones shall include the extent of the plant occurrences plus a 50-foot buffer, unless otherwise determined by a qualified biologist. No ground- or vegetation-disturbing activities shall occur within avoidance zones unless work is monitored by a qualified biologist/biological monitor to ensure the plants are not impacted by the work.</li> <li>▪ If avoidance of rare or endangered plants is not feasible, mitigation measures shall be developed in consultation with the CDFW and/or the USFWS. Mitigation measures may include restoration or permanent preservation of an</li> </ul>					

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<p>equivalent acreage of onsite or offsite habitat for the impacted species and/or translocation of plants or seeds from impacted areas to unaffected habitats.</p> <ul style="list-style-type: none"> <li>▪ Prior to issuance of any building permits in reliance of this Coastal Development Permit, an active management plan shall be developed for the Bishop pine forest in order to provide for the long term health of the forest habitat. The active management plan shall be prepared by a qualified ecologist and may include things such as: invasive species removal; an understory management regimen to facilitate the growth of new recruits; and identification, removal, and prevention of pathogens killing Bishop pine trees and other native flora.</li> <li>▪ During construction, clothing, vehicles, and equipment (including</li> </ul>					

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	Implementation Actions and Timing	Implementation on Responsibility	Responsibility for Oversight of Compliance/ Verification	Agency Coordination	Comments
<p>shoes, equipment undercarriage and tires/tracks) should be cleaned prior to entering the Project Area, and materials used for the Project, such as fill dirt or erosion control materials, should be from weed-free locations or certified weed free to avoid the introduction and spread of non-native invasive plant species.</p> <ul style="list-style-type: none"> <li>▪ Areas containing special-status plants shall be protected during Project operations by installation of constructed (e.g., fencing) permanent barriers, and/or installation of appropriate signs alerting the public that foot traffic is prohibited in the sensitive habitat.</li> <li>▪ Landscape maintenance activities including mowing or application of herbicides shall be prohibited in the area of the special-status plant occurrences or shall be conducted</li> </ul>					

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	under the supervision of a qualified biologist.				
<b>BIO-2: Special-Status Invertebrates.</b> If tree removal would occur during the winter months (November through February) when there is potential for Monarchs to be utilizing roost trees within the BSA, a survey shall be conducted to ensure no monarchs are utilizing the tree. If monarchs are observed, tree removal shall not occur until the end of the winter season and all monarchs have moved from the tree.	<p><b>Action:</b> During winter months (typically November through February).</p> <p><b>Timing:</b> Prior to tree removal during winter months</p>	<p>Construction Manager</p> <hr/> <p>Initials</p> <hr/> <p>Date</p>	<p>Construction Manager / County</p> <hr/> <p>Initials</p> <hr/> <p>Date</p>		
<b>BIO-3: Special-Status Amphibians and Reptiles.</b> A qualified biologist shall perform a preconstruction survey within 24 hours prior to the initiation of construction to confirm the site is clear of California giant salamander, CRLF, and NWPT, and shall be on-site during initial vegetation removal and ground-disturbance to monitor special-status amphibians and reptiles. Should California giant salamander be	<p><b>Action:</b> Preconstruction survey</p> <p><b>Timing:</b> 24 hours prior to the start of construction</p>	<p>Construction Manager/ Biologist</p> <hr/> <p>Initials</p> <hr/> <p>Date</p>	<p>Construction Manager / County</p> <hr/> <p>Initials</p> <hr/> <p>Date</p>		

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<p>detected, a CDFW-approved biologist shall relocate individuals to suitable nearby habitat that won't be disturbed by Project construction. If CRLF or NWPT are discovered onsite, they may be allowed to leave the area of their own volition but may not be moved or herded from the area. In the event that CRLF or NWPT is observed, work shall stop and applicant shall contact the USFWS for technical guidance regarding ESA consultation requirements and appropriate avoidance and minimization measures.</p> <ul style="list-style-type: none"> <li>▪ If feasible, construction activities will occur during the non-breeding season for CRLF (June – October).</li> <li>▪ A USFWS approved biologist(s) shall conduct training session(s) for all construction and park personnel involved in construction of the Proposed Project. At a minimum, the training shall include a</li> </ul>					

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<p>description of California giant salamander, CRLF and NWPT, their habitats, the status of the species, the general measures being implemented to conserve the species as they relate to the Project, and the physical boundaries within which the Project may be accomplished. The training session will include instruction in the appropriate protocol to follow in the event that one of these species is observed on site. Informational handouts with species photos will be provided to. construction personnel.</p> <ul style="list-style-type: none"> <li>▪ Stumps, rocks, logs, or other habitat features moved during the Proposed Project construction will be done so very carefully, under the observance of the approved biologist(s) and will be replaced in adjacent</li> </ul>					



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further measures are necessary once the young are independent of the nest.					
<p><b>BIO-5: Special-Status Bats.</b> To avoid and minimize significant impacts to special-status bats or roosting colonies, the following mitigation measures are recommended:</p> <ul style="list-style-type: none"> <li>▪ If trees within the Project Area need to be removed, a qualified bat biologist shall conduct a bat habitat assessment to determine if potential roosting habitat is present.</li> <li>▪ If suitable habitat features, roosting bats, bat sign, or evidence of previous occupation by bats is found during the bat habitat assessment, an acoustic and/or emergence survey will be conducted to determine if bats are actively using the tree. If no sign of bat use is found, no further measures are necessary. If bats are found roosting in</li> </ul>	<p><b>Action:</b> Preconstruction bat survey</p> <p><b>Timing:</b> Prior to the start of construction</p>	<p>Construction Manager / Biologist</p> <hr/> <p>Initials</p> <p>Date</p>	<p>Construction Manager / County</p> <hr/> <p>Initials</p> <p>Date</p>		

	<b>Implementation Actions and Timing</b>	<b>Implementation on Responsibility</b>	<b>Responsibility for Oversight of Compliance/ Verification</b>	<b>Agency Coordination</b>	<b>Comments</b>
<p>trees that cannot be avoided, the trees will be protected until the end of the maternity roosting season (April 15 to September 1). Trees with roosting bats may be removed during the bat active period outside of maternity season and prior to or after the hibernation season (October 16 to February 28) following the two-step tree removal process under the direction of a qualified bat biologist.</p> <ul style="list-style-type: none"> <li>▪ As much as feasible, vegetation and trees within the area that are not suitable for roosting bats will be removed first to provide a disturbance that might reduce the likelihood of bats using the habitat.</li> <li>▪ Two-step tree removal will occur over two consecutive days under the supervision of a qualified bat biologist. On Day 1, small branches and small limbs</li> </ul>					

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<p>containing no cavity, crevice, or exfoliating bark habitat on habitat trees, as identified by a qualified bat biologist, shall be removed first using chainsaws only (i.e., no dozers, backhoes). The following day (Day 2), the remainder of the tree is to be felled/removed.</p>					
<p><b>BIO-6: Wetlands.</b> To avoid and minimize significant impacts to aquatic resources, the following mitigation measures are recommended:</p> <ul style="list-style-type: none"> <li>▪ Aquatic resources located within 50 feet of the Project footprint shall be clearly demarcated with orange construction fencing or other visible barrier, and no Project-related activities shall be permitted within the delineated area.</li> </ul>	<p><b>Action:</b> Wetland fencing</p> <p><b>Timing:</b> Prior to the start of construction</p>	<p>Construction Manager / Biologist</p> <hr/> <p>Initials</p> <p>Date</p>	<p>Construction Manager / County</p> <hr/> <p>Initials</p> <p>Date</p>		

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<ul style="list-style-type: none"> <li>▪ To minimize potential indirect effects, the applicant shall prepare and implement an Erosion and Sediment Control Plan to avoid and minimize erosion and runoff to wetlands and other waters that are to remain within or adjacent to the Project Area.</li> <li>▪ If the Project will disturb at least 1 acre of land, the Project applicant shall obtain coverage under the General Construction Storm Water Permit from the RWQCB by preparing an SWPPP and implementing best management practices to reduce water quality effects during construction.</li> </ul>					

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<ul style="list-style-type: none"> <li>▪ Authorization under the Section 404 of the federal Clean Water Act must be obtained from the U.S. Army Corps of Engineers (USACE) prior to discharging any dredged or fill materials into any features determined to be Waters of the U.S. Mitigation measures will be developed as part of the Section 404 Permit process to ensure no net loss of wetland function and values. Mitigation for permanent impacts to Waters of the U.S. is typically required at a minimum 1:1 ratio; however, final mitigation requirements will be developed in consultation with the USACE.</li> </ul>					

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<ul style="list-style-type: none"> <li>▪ If temporary impacts to Waters of the U.S. or State will occur, the applicant shall prepare a site restoration plan describing the methods that will be used to restore impacted aquatic features to pre-Project conditions. The restoration plan will include, at a minimum, the proposed methods for stabilizing and revegetating the site, any maintenance requirements (e.g., watering and invasive species control), the expected timeframe for restoration.</li> <li>▪ If discharges will occur to Waters of the U.S., Section 401 Water Quality Certification must be obtained from the RWQCB before a 404 Permit can</li> </ul>					

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	Implementation Actions and Timing	Implementation on Responsibility	Responsibility for Oversight of Compliance/ Verification	Agency Coordination	Comments
<p>be issued. An application for a 401 Water Quality Certification will be prepared and submitted to the RWQCB in accordance with the State Water Resources Control Board's <i>State Wetland Definition and Procedures for the Discharge of Dredged or Fill Material to Waters of the State</i> (April 2021).</p> <ul style="list-style-type: none"> <li>▪ If discharges to Waters of the State will occur, the applicant shall obtain waste discharge requirements or a waiver of waste discharge requirements from the RWQCB as required pursuant to the Porter-Cologne Water Quality Control Act.</li> </ul>					

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<ul style="list-style-type: none"> <li>▪ If alteration of the bed, channel, or bank of an ephemeral drainage or the onsite pond is proposed, or if the Project will impact associated aquatic or riparian vegetation, the applicant shall notify the CDFW of the Proposed Project activities and obtain a Lake or Streambed Alteration Agreement prior to Project implementation.</li> </ul> <p>A Coastal Development Permit would be required for any activity impacting wetlands subject to the jurisdiction of the CCC. Various alternatives exist for mitigating the adverse effects of wetland development projects on CCC wetlands including in-kind compensatory wetland mitigation (i.e., creation, restoration, or enhancement of wetland habitat) and out-of-kind mitigation where impacts to one</p>					

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<p>habitat type are mitigated through the creation, restoration, or enhancement of another habitat type. Mitigation for impacts to CCC wetlands will be vetted through the Coastal Development Permit process.</p>					
<p><b>Cultural Resources</b></p>					
<p><b>CUL-1</b>      <b>Unanticipated Discoveries.</b> If subsurface deposits believed to be cultural or human in origin are discovered during construction, the Project shall adhere to the Mendocino County Archaeological Ordinance, Chapter 22.12. This ordinance dictates that all work must halt within a 100-foot radius of the discovery and the contractors shall make notification of the discovery to the Director of Planning and Building Services (Director). A qualified professional archaeologist, meeting the Secretary of the Interior's</p>	<p><b>Action:</b> Work halt if subsurface cultural or human deposits are found</p> <p><b>Timing:</b> Ongoing and as needed during construction activities.</p>	<p>Construction Manager/Qualified professional archaeologist if resources are found</p> <hr/> <p>Initials</p> <hr/> <p>Date</p>	<p>Construction Manager / City of Piedmont</p> <hr/> <p>Initials</p> <hr/> <p>Date</p>		

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<p>Professional Qualification Standards for prehistoric and historic archaeology, shall be retained to evaluate the significance of the find, and shall have the authority to modify the no-work radius as appropriate, using professional judgment. The following notifications shall apply, depending on the nature of the find:</p> <ul style="list-style-type: none"> <li>▪ If the professional archaeologist determines that the find does not represent a cultural resource, work may resume immediately and no agency notifications are required.</li> <li>▪ If the professional archaeologist determines that the find does represent a cultural resource from any time period or cultural affiliation, the archaeologist shall immediately notify the</li> </ul>					

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<p>lead agencies. The agencies shall consult on a finding of eligibility and implement appropriate treatment measures, if the find is determined to be a Historical Resource under CEQA, as defined by CEQA or a historic property under Section 106 NHPA, if applicable. Work may not resume within the no-work radius until the lead agencies, through consultation as appropriate, determine that the site either: 1) is not a Historical Resource under CEQA or a Historic Property under Section 106; or 2) that the treatment measures have been completed to their satisfaction.</p> <ul style="list-style-type: none"> <li>▪ If the find includes human remains, or remains that</li> </ul>					

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<p>are potentially human, they shall ensure reasonable protection measures are taken to protect the discovery from disturbance (AB 2641). The archaeologist shall notify the Mendocino County Coroner (per § 7050.5 of the Health and Safety Code). The provisions of § 7050.5 of the California Health and Safety Code, § 5097.98 of the California PRC, and AB 2641 will be implemented. If the coroner determines the remains are Native American and not the result of a crime scene, the coroner will notify the NAHC, which then will designate a Native American Most Likely Descendant (MLD) for the</p>					

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<p>Project (§ 5097.98 of the PRC). The designated MLD will have 48 hours from the time access to the property is granted to make recommendations concerning treatment of the remains. If the landowner does not agree with the recommendations of the MLD, the NAHC can mediate (§ 5097.94 of the PRC). If no agreement is reached, the landowner must rebury the remains where they will not be further disturbed (§ 5097.98 of the PRC). This will also include either recording the site with the NAHC or the appropriate Information Center; using an open space or conservation zoning designation or easement; or recording a</p>					

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<p>reinternment document with the county in which the property is located (AB 2641). Work may not resume within the no-work radius until the lead agencies, through consultation as appropriate, determine that the treatment measures have been completed to their satisfaction:</p> <ul style="list-style-type: none"> <li>▪ The Director may arrange for an on-site inspection of the area of discovery by one or more of his/her representatives within seventy-two (72) hours of the time of such notification. The Director shall give notice of the time of the on-site inspection to the owner, or other person who made notification of the discovery, who shall be</li> </ul>					

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<p>entitled to accompany the Director's representatives at all times on the property in question. The purpose of the inspection shall be to determine whether the site is one of archaeological significance. In the event that such inspection does not take place within such seventy-two (72) hour period and the Director has not, within such time, issued an order to cease and desist for a longer period of time, the excavation and disturbance of the site may resume.</p> <ul style="list-style-type: none"> <li>▪ If the Commission determines that the site of the discovery is one of archaeological significance, it shall, within seventy-two (72) hours of being notified of the discovery, notify the</li> </ul>					

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<p>person making the discovery of (1) such determination, (2) the apparent boundaries of the site, and (3) its specific recommendations for the conservation of the site. The Commission may then also issue an order to cease and desist from all further excavation or disturbance of the site for a specific period of time not to exceed thirty (30) days; provided, however, that the period may be extended up to forty-five (45) additional days by minute order of the Board of Supervisors. In issuing such a cease and desist order, the Commission shall take into account both the need for conserving the site and the need for avoiding</p>					

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<p>unnecessary financial hardships to any person engaged in construction work on the site. The cease and desist order shall be subject to whatever conditions the Commission determines will promote the purposes of this Chapter. During the period such cease and desist order is in effect, the site shall be open to physical inspection, photographing, supervised excavation, study and all other reasonable related activities by any person duly authorized by the Commission. The land owner, or the person making the original notification of discovery, shall be kept advised of the times at which any such duly authorized person is</p>					

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<p>on the site and shall be given the opportunity to accompany such person while on the site.</p> <ul style="list-style-type: none"> <li>▪ The Commission may, for the purpose of giving or receiving notifications under this Chapter, designate as its representatives one or more professional archaeologists.</li> <li>▪ It shall be unlawful, prohibited, and a misdemeanor for any person knowingly to disturb, or cause to be disturbed, in any fashion whatsoever, or to excavate, or cause to be excavated, to any extent whatsoever, an archaeological site without complying with the provisions of this section.</li> </ul>					

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	Implementation Actions and Timing	Implementation on Responsibility	Responsibility for Oversight of Compliance/ Verification	Agency Coordination	Comments
<p>It shall be unlawful, prohibited and a misdemeanor for any person knowingly to disturb, or cause to be disturbed, in any fashion whatsoever, or to excavate, or cause to be excavated, to any extent whatsoever, any archaeological site (1) in violation of any order to cease and desist issued pursuant to this section; or (2) during the seventy-two (72) hour period commencing from the time of the required notification of discovery</p>					
<p><b>Paleontological Resources</b></p>					
<p><b>GEO-1: Unanticipated Discovery of Paleontological Resources.</b> If paleontological or other geologically sensitive resources are identified during any phase of project development, the construction manager shall cease operation at the site of the discovery and immediately notify the County. Mendocino County shall retain a qualified paleontologist to provide an evaluation of the find and to prescribe mitigation measures to reduce impacts to a less-than-significant level. In considering any suggested mitigation proposed by the consulting paleontologist, Mendocino County shall determine whether avoidance is necessary and</p>	<p><b>Action:</b> Notify the County in the event of a discovery. Implement appropriate treatment of found materials.</p> <p><b>Timing:</b> Ongoing and as needed during construction activities.</p>	<p>County/ Construction Manager</p> <hr/> <p>Initials</p> <hr/> <p>Date</p>	<p>County</p> <hr/> <p>Initials</p> <hr/> <p>Date</p>		

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feasible in light of factors such as the nature of the find, project design, costs, land use assumptions, and other considerations. If avoidance is unnecessary or infeasible, other appropriate measures (e.g., data recovery) shall be instituted. Work may proceed on other parts of the Project Site while mitigation for paleontological resources is carried out.					

To be signed when all mitigation measures have been completed:

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Mendocino County

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Signature

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Printed Name

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Date

SECTION 008110 - UNFORESEEN PHYSICAL CONDITIONS

PART 1 - GENERAL

1.1 SUMMARY

This Section includes special requirements for unforeseen hidden conditions, differing site conditions and underground facilities as required for California Public Works Contracts.

1.2 UNFORESEEN SITE CONDITIONS

- A. Pursuant to Section 7104 of the California Public Contract Code, if any of the following conditions, hereinafter called hidden conditions, are encountered at the site, then Contractor shall promptly, before such conditions are disturbed and in no event later than three (3) days after discovery, notify County in writing using the "Hidden Conditions Report" attached to this Document:
1. Material that Contractor believes may be hazardous waste material, as defined in Section 25117 of the Health and Safety Code, that is required to be removed to a Class I, Class II, or a Class III disposal site in accordance with provisions of existing law.
  2. Subsurface or latent physical conditions at the site or in the building differing materially from those represented in the Contract Documents.
  3. Unknown physical conditions at the site of any unusual nature, different materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents or conditions that could be observed by examination of the site and the Reference Documents.
- B. Conditions that are not unforeseen, hidden, unknown or differing site and building conditions include but are not limited to the following.
1. All that is indicated in or reasonably interpreted from the Contract Documents.
  2. All that is indicated in or reasonably interpreted from the Reference Documents specified in Section 01010, "Summary of Work".
  3. All that could be seen on site and that could be observed.
  4. Conditions that are materially similar or characteristically the same.
  5. Conditions where the location of the building component is in proximity where indicated in or reasonably interpreted from the Contract Documents or Reference Documents.
- C. County will promptly investigate the conditions reported which appear to be unforeseen conditions.

## County of Mendocino Bower Park Restoration and Improvement Project

1. If County determines that the reported conditions are inherent in work of the character provided for in the Contract Documents or observed by examination of the site and Reference Documents, or that the condition is not hidden, unforeseen or materially different, Contractor shall execute the Work at no additional cost to County.
    2. If County determines that the conditions are hidden or differing conditions and that they will materially cause a decrease or increase in Contractor's cost of any portion of the work, Contract Modification will be issued for compensation of such portion of the work as provided in the General Conditions.
    3. If County determines that the conditions are hidden or differing conditions and that they will materially affect the performance time, Contractor, upon submitting a written request, will be granted an extension of time subject to the provisions of the General Conditions.
      - a. Time extensions or contract costs will not be granted for delays that could be or could have been avoided by Contractor redirecting his forces and equipment to perform other work on the Contract.
  - D. Should Contractor disagree with County's determination, Contractor shall submit a Request for Change (RFC) to County that the condition is not indicated in or reasonably interpreted from the Contract Documents, and that the condition is not similar in character to the material that could have been observed by examination of the site and Reference Drawings, but that the condition is materially different and the condition is unforeseen and unknown.
    1. Contractor shall submit proof with written explanation, drawings, photographs, material and labor cost breakdowns, and other relevant data to show the condition.
    2. County will review Contractor's submission and make a determination. Contractor shall not file for claim or RFC before County makes the determination.
    3. In the event of continued disagreement, Contractor shall not be excused from any scheduled completion date provided for by the Contract but shall proceed with all work to be performed under the Contract.
    4. Contractor shall retain any and all rights provided either by the Contract or by law which pertain to the resolution of RFC and protests between the contracting parties.
- 1.3 REMOVAL, RELOCATION, OR PROTECTION OF EXISTING UTILITIES
- A. In accordance with the provisions of Section 4215 of the California Government Code, County will assume the responsibility for the removal, relocation, or protection of existing main or trunk-line utilities located on the site of the Contract work, if such utilities are not identified in the Contract Documents.
  - B. Contractor shall immediately notify County and the public utility in writing of such utility facilities it discovers while performing the work which are not identified in the Contract Documents.
    1. Contractor shall negotiate with the owner of the utility, who shall have the sole discretion to perform repairs or relocation work or permit Contractor to do such repairs or relocation work at a reasonable price.

County of Mendocino Bower Park Restoration and Improvement Project

- C. Contractor shall not be assessed liquidated damages for delay in Substantial Completion if the delay was caused by such existing utilities in direct conflict with the work and not shown on the Drawings.
- D. Contractor will be compensated under the provisions of Article 7 for extra work involving existing utilities not shown on the Drawings or included in the Specifications but in direct physical conflict with Contractor's operations.
  - 1. This extra work shall include the following costs:
    - a. Locating, supporting, working around, and protecting or repairing damage not due to the failure of Contractor to exercise reasonable care.
    - b. Removing and relocating, as directed by County, existing main or trunk line utility facilities located on site but not indicated on the Drawings and Specifications with reasonable accuracy.
    - c. Equipment on the project necessarily idled during such work.
- E. Contractor shall not be entitled to any adjustment in the Contract Sum or Time if the existence of such condition:
  - 1. Could have been reasonably discovered or revealed as a result of any examination, investigation, exploration, test or study of the site and contiguous areas required by the Contract Documents to be conducted by or for Contractor prior to commencing such work, or
  - 2. Could have been inferred from the presence of other visible facilities, such as buildings, meter and junction boxes, on or adjacent to the work site.

PART 2 - PRODUCTS  
NOT USED

PART 3 - EXECUTION  
NOT USED

**HIDDEN CONDITIONS REPORT (HCR)**

**Pre-Trial Release Program Facility** HCR No. \_\_\_\_\_

Submitted By: \_\_\_\_\_ Date: \_\_\_\_\_

	Ctr to PM	PM to Arch	Arch to PM	PM to Ctr
Date Sent:	_____	_____	_____	_____
Date Received:	_____	_____	_____	_____

Type of Conditions Reported:

- |                                    |  |  |                                |
|------------------------------------|--|--|--------------------------------|
| <input type="checkbox"/> Site Work | <input type="checkbox"/> Structural      | <input type="checkbox"/> Architectural | <input type="checkbox"/> HVAC  |
| <input type="checkbox"/> Plumbing  | <input type="checkbox"/> Fire Protection | <input type="checkbox"/> Electrical    | <input type="checkbox"/> Other |

Location and Reference to Drawing: \_\_\_\_\_

Conditions Reported: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Investigated By: \_\_\_\_\_ Firm: \_\_\_\_\_ Date: \_\_\_\_\_

Check this box if the hidden condition reported is not hidden. Reply with location(s) where the information can be obtained.

Reply of Findings: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

By: \_\_\_\_\_ Firm: \_\_\_\_\_ Date: \_\_\_\_\_

The reply is a finding from the investigation. No change in the Contract Sum or Time is authorized. See Specifications Document 00811 for the timeliness of investigation.

END OF SECTION

County of Mendocino Bower Park Restoration and Improvement Project

SECTION 008510 - DRAWINGS INDEX

Title: Bower Park Restoration and Improvement Project

By Integra Planning + Landscape Architecture

Issue Date: July 10, 2025 – Issue for Rebid Revision

**LANDSCAPE**

L0.0	COVER SHEET
L1.0	OVERALL DEMOLITION PLAN
L1.1	DEMOLITION PLAN
L1.2	DEMOLITION PLAN
L1.3	DEMOLITION PLAN
L1.4	DEMOLITION PLAN
L1.5	DEMOLITION PLAN
L2.0	OVERALL SITE PLAN
L2.1	SITE PLAN
L2.2	SITE PLAN
L2.3	SITE PLAN
L2.4	SITE PLAN
L2.5	SITE PLAN
L3.0	OVERALL LAYOUT PLAN
L3.1	LAYOUT PLAN
L3.2	LAYOUT PLAN
L3.3	LAYOUT PLAN
L3.4	LAYOUT PLAN
L3.5	LAYOUT PLAN
L4.0	CONSTRUCTION DETAILING
L4.1	CONSTRUCTION DETAILING
L4.2	CONSTRUCTION DETAILING
L4.3	CONSTRUCTION DETAILING
L4.4	CONSTRUCTION DETAILING
L4.5	CONSTRUCTION DETAILING
L4.6	CONSTRUCTION DETAILING
L4.7	CONSTRUCTION DETAILING
L5.0	MAINLINE IRRIGATION PLAN
L5.1	IRRIGATION PLAN
L5.2	IRRIGATION PLAN
L5.3	IRRIGATION PLAN
L5.4	IRRIGATION PLAN
L5.5	IRRIGATION PLAN
L5.6	IRRIGATION DETAILS
L5.7	IRRIGATION DETAILS

County of Mendocino Bower Park Restoration and Improvement Project

L6.0	TREE PLANTING PLAN
L6.1	PLANTING PLAN
L6.2	PLANTING PLAN
L6.3	PLANTING PLAN
L6.4	PLANTING PLAN
L6.5	PLANTING PLAN
L6.6	PLANTING DETAILS

**CIVIL**

C0	GENERAL NOTES LEGENDS AND ABBREVIATIONS
C1	GRADING AND UTILITY PLAN
C2	GRADING AND UTILITY PLAN
C3	GRADING AND UTILITY PLAN
C4	GRADING AND UTILITY PLAN
C5	GRADING AND UTILITY PLAN
C6	EROSION AND SEDIMENT CONTROL PLAN
C7	EROSION AND SEDIMENT CONTROL PLAN
C8	CIVIL DETAILS

**STRUCTURAL**

S1	GENERAL NOTES AND SPECIFICATIONS
S2	TYPICAL CONCRETE DETAILS
S3	BOWER PARK SITE PLAN
S4	BASEBALL FIELD AREA RETROFITS
S5	WEIR RETROFIT
S6	BATHROOM DECK RETROFIT
S7	RETAINING WALL DETAILS

**ELECTRICAL**

E001	ELECTRICAL LEGEND AND ABBREVIATIONS
E100	ELECTRICAL SITE PLAN
E101	ELECTRICAL SITE PLAN
E102	ELECTRICAL SITE PLAN
E103	ELECTRICAL SITE PLAN
E104	ELECTRICAL SITE PLAN
E501	ELECTRICAL DETAILS
E701	ELECTRICAL SCHEDULES

END OF SECTION

SECTION 010100 - SUMMARY OF WORK

PART 1 - GENERAL

1.1 SUMMARY

- A. General Conditions and Division 1 - General Requirements apply to the Work of all Sections.
- B. Contractor is hereby specifically directed to notify and apprise all subcontractors and other parties engaged in the Work as to the Contents of the General Conditions and Division 1 - General Requirements.

1.2 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work shall be performed at a Project site located in Mendocino County at 38040 Old Stage Road, Gualala, County of Mendocino.
- B. The Work of this Contract comprises major improvements and restoration to Bower Park per the plans and specifications.

Scope of Work shall include but not be limited to:

1. Provide all labor, materials, and equipment for the restoration and improvement project and all related work.
2. The contractor shall provide a proposed work schedule within two (2) weeks of receipt of the fully executed contract and no later than two (2) weeks prior to the proposed start of the work.
3. Work shall be completed no more than one hundred and eighty (180) calendar days after the Notice to Proceed date.
4. Provide all labor, material, and equipment to complete work as depicted in the drawings, as described in the project manual or as necessary for a complete and proper installation. The extent of the work as indicated on the Drawings and as described in the Specifications shall include all that may be reasonably inferred to be required for proper execution or installation of work. Present to the County, at the close of project, signed copies of all required permits indicating successful completion of all permit requirements.
5. Should the General Conditions or Contract Documents contradict themselves, Contractor shall provide the more stringent or higher quality or quantity unless otherwise approved by County. The Drawings shall be recognized as diagrammatic in nature and not completely descriptive of all requirements for construction. Whatever work may be specified, and not drawn, or drawn and not specified, is to be executed as fully as if described in both these ways; and should any workmanship or material be necessary which is not either directly or indirectly noted in these specifications, or shown on the Drawings, but is nevertheless necessary for the purpose of properly carrying out the obvious intention thereof, Contractor is to understand the same to be implied, and is to provide for the same in its bid, as fully as if it were particularly described or delineated.

1.3 TYPE OF CONTRACT

- A. Contractor shall construct the Work under a single fixed-price Contract.
  - 1. Where the term "Contractor" is used in the Specification, the General Contractor is referred to.
  - 2. Where the terms "Plumbing Contractor," "Electrical Contractor," etc., are used, it has been for convenience only and in no way affects the overall responsibility of the General Contractor.

1.4 PRECEDENCE OF DOCUMENTS

- A. In the case of discrepancy or ambiguity in the Contract Documents the following order of precedence shall prevail:
  - 1. Modifications in inverse chronological order and in alphanumeric order.
  - 2. Signed Agreement and terms and conditions referenced in the Signed Agreement.
  - 3. Supplemental Conditions.
  - 4. General Conditions.
  - 5. Division 00 through 01 specifications.
  - 6. Drawings and Division 02 through 36 specifications.
  - 7. Written numbers and figures, unless obviously incorrect.
  - 8. Figured dimensions over scaled dimensions.
  - 9. Large format drawings over small-scale drawings.
- B. Any conflict between the Drawings and Division 02 through 36 specifications will be resolved in favor of the document of the latest date (i.e., the most recent document), and if the dates are not the same or are not determinable, then in favor of the specifications.
- C. Any conflict between a bill or list of materials shown in the Contract Documents and the actual quantities required to complete the Work required, then the actual quantity shall take precedence.

1.5 USE OF PREMISES

- A. General: Comply with requirements in 007000 General Conditions and Section 015000 Temporary Facilities and Building Systems.
- B. Area available for Contractor's use for work and storage, if any, is limited to the area designated by the County.
- C. Work to be performed is within a temporarily closed county-owned public park. Contractor should ensure that no members of the public are within the park prior to commencing each day and throughout the day.

- D. Fire Department Access: Contractor's use of premises shall not limit required Fire Department access.

1.6 EXAMINATION

- A. General: As stipulated in Document 001000 Instructions to Bidders, Contractor is responsible for inspection of the existing site conditions and bidding documents prior to bidding and shall include in their bid any modifications of the Contract Documents required as a result of Contractor's inspection.
- B. Persons performing work shall examine conditions that affect their work and shall report in writing to Contractor, with a copy to County, conditions detrimental to work.
  - 1. Failure to examine and report makes the person responsible, at no increase in the Contract Sum, for corrections necessary for the proper installation of their work.
  - 2. Commencement of Work constitutes acceptance of existing condition.
- C. Field Verification: Contractor shall verify all existing conditions in the field prior to commencing the Work.

1.7 PERMITS FOR WORK

The Contractor is responsible for fulfilling all permit requirements for the completion of the work.

1.8 LISTING OF RELATED WORK

Listings of related work or sections in the various Sections are not necessarily complete listings. They are provided for information and convenience only and are intended to highlight related or similar work which is specified in other Sections. Related work listings and omissions from such listings are not intended to control Contractor in dividing the work among subcontractors or in establishing the extent of the work to be performed by any trade.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

# County of Mendocino Bower Park Restoration and Improvement Project

## SECTION 012100 - ALLOWANCES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section includes administrative and procedural requirements governing allowances.
  - 1. Certain items are specified in the Contract Documents by allowances. Allowances have been established in lieu of additional requirements to permit evaluation of existing conditions before defining the required scope for each allowance item and final direction that will be provided to Contractor. If necessary, additional requirements will be issued by Change Order.
- B. Types of allowances include the following:
  - 1. Lump-sum allowances.
  - 2. Force account allowances.
- C. Related Requirements:
  - 1. Section 00700 "General Conditions" for Changes in Work
  - 2. Section 00811 "Unforeseen Physical Conditions" for definition of hidden conditions.

#### 1.3 SURVEY AND ASSESSMENT

- A. Base bid includes all labor, materials, and equipment for the Bower Park improvements and restoration project indicated on plans and required to complete the work. Prior to and during improvement and restoration work, the Contractor shall coordinate observation of the condition of the site and any unforeseen conditions of the Bower Park improvements and restoration project.
- B. In consultation with the Contractor and the Architect, the County will determine the extent of unforeseen conditions and the work needed to be completed to address them and provide direction to the contractor. Should additional work be required, the County will provide the Contractor with a Request for Proposal. The Contractor shall promptly provide a Lump Sum or Unit Cost Proposal in accordance with Section 00700 General Conditions, Chapter 20 – Changes in the Work.
- C. In the event that a proposal is not authorized by the County, the County may direct the contractor to proceed with the authorized work by Force Account in accordance with Section 00700 – General Conditions, Chapter 20.
- D. In the event other unforeseen conditions are encountered, the Contractor shall promptly notify the County and Architect and proceed according to paragraph 1.3B. above.

## County of Mendocino Bower Park Restoration and Improvement Project

### 1.4 ACTION SUBMITTALS

- A. Submit proposals for the work noted above.
- B. Upon completion of identified repairs, submit revised Schedule of Values noting allowance amounts used.

### 1.5 INFORMATIONAL SUBMITTALS

- A. Submit timecards, invoices or delivery slips to show actual labor time and quantities of materials delivered to the site for use in completing allowance work authorized under force account.
- B. Coordinate and process submittals for allowance work items in same manner as for other portions of the Work.

### 1.6 COORDINATION

- A. Coordinate allowance items with other portions of the Work.

### 1.7 ALLOWANCE ITEMS

- A. Provide for each allowance item on the schedule of Values.
- B. Use the allowances only as directed by the County for labor, materials, and equipment to resolve unforeseen conditions, by unit cost, lump sum price or force account authorized in writing by the owner.
- C. At Project closeout, credit unused amounts remaining in the contingency allowance to Owner by Change Order.

### 1.8 ADJUSTMENT OF ALLOWANCES

- A. Allowance Adjustment: To adjust allowance amounts, prepare a Change Order proposal based on the difference between the authorized cost of all repairs completed and the allowance amount.
  - 1. If requested, include cost of lump sum proposals for the work performed.
  - 2. Submit substantiation of any force account work related to allowance work authorized in advance by the owner.
- B. Submit Contract Change Order to refund the balance of the Allowance to the County or claims for increased costs for work performed on authorized work items that exceed the allowance amount included in the Contract Documents.

County of Mendocino Bower Park Restoration and Improvement Project

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine existing conditions at the time work is to be performed to verify that the conditions are suitable for the work under the allowances. Immediately report all unsatisfactory conditions to the County.

3.2 PREPARATION

- A. Submit and secure approval of all labor, materials, and equipment for the restoration and improvement project prior to beginning work.

3.3 SCHEDULE OF ALLOWANCES

- A. Allowance No.1: Unforeseen Conditions: Include the sum of \$20,000 for labor, materials, and equipment to resolve unforeseen conditions encountered during the project on the bid form.
  - 1. This allowance includes labor, material, equipment costs and Contractor overhead and profit documented for either lump sum or force account work to complete authorized additional improvements and restoration, or to address other unforeseen conditions.

END OF SECTION

County of Mendocino Bower Park Restoration and Improvement Project

SECTION 012300 - ALTERNATES

PART 1 GENERAL

1. SECTION INCLUDES

1. Submission procedures.
2. Documentation of changes to the Contract Sum and Contract Time.

2. RELATED DOCUMENTS

1. Section 00.21.13 – Instructions to Bidders.
2. Proposal Form.
3. Contract for Construction; Incorporating monetary value of accepted Alternates.
4. Overall Site Plan L2.0

3. REQUIREMENTS

1. Alternates quoted on Bid Forms will be reviewed and accepted or rejected at the County's option. Accepted Alternates will be identified in the Owner-Contractor Agreement.
2. Coordinate related work and modify surrounding work to integrate the Work of each Alternate.
3. In the absence of accepted alternates, base construction shall be executed in strict accordance with construction drawings, details, and all associated scope of work necessary to achieve full completion. Walkways shall remain continuous and undisturbed. All edge details shall be properly installed. The completed work shall present a finished appearance and fully comply with all applicable county standards.

4. SELECTION AND AWARD OF ALTERNATIVES

1. Bid award will be based on the Total Lump Sum Base Bid, which does not include consideration of the alternates. Alternates will be selected from bid form of the awarded contractor.

5. SCHEDULE OF ALTERNATES

Amenity Additions

ALTERNATE NO. 1 **Group Picnic Area Including Grading, Paving, and Amenities:**

1. Base Bid: Provide asphalt or concrete path to the playground area, match adjacent grades, planting, and ground cover at the alternate picnic area shown.
2. Alternate 1: Provide Grading and Paving shown for the Group Picnic area and install the alternate amenities, including picnic tables, trash receptacles, barbecue pits, charcoal bin, and GFCI receptacles, and all related work shown as Alternate one on sheets L2.0, L2.2, and E100 and related details and specifications.

County of Mendocino Bower Park Restoration and Improvement Project

**ALTERNATE NO. 2 Fitness Stations Including AC Pads:**

1. Base Bid: Provide continuous asphalt and gravel circuit path around pond, match adjacent grades, planting, and ground cover at alternate fitness stations shown.
2. Alternate 2: Provide grading and paving shown at 6 fitness stations and provide fitness stations J1 through J6 and all related work as shown on sheets L2.0, L2.2, L2.3, L2.4, and L2.5 and related details and specifications.

**ALTERNATE NO. 3 Security Lighting and Wiring:**

1. Base Bid: Provide and install empty conduits and pull boxes with pull strings shown as base bid on Sheets E100, E102, and E104.
1. Alternate 5: Provide and install security lighting and wiring shown as Alternate 6 on Sheets L2.0, E100, E102, E104, and related details and specifications.

PART 2 PRODUCT

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 012500 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for substitutions.
- B. Related Requirements:
  - 1. Document 002600 "Procurement Substitution Procedures" for requirements for substitution requests prior to award of Contract for Playground Equipment.

1.3 DEFINITIONS

- A. Substitutions: Changes in manufacturers, products, materials, equipment, and methods of construction from those required by the Contract Documents.
  - 1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
  - 2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required to meet other Project requirements but may offer advantage to Contractor or Owner.

1.4 ACTION SUBMITTALS

- A. Substitution Requests: Submit documentation identifying product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
  - 1. Substitution Request Form: Use form acceptable to County.
  - 2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
    - a. Statement indicating why specified product or fabrication or installation method cannot be provided, if applicable.

## County of Mendocino Bower Park Restoration and Improvement Project

- b. Coordination of information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.
  - c. Detailed comparison of significant qualities of proposed substitutions with those of the Work specified. Include annotated copy of the applicable Specification Section. Significant qualities may include attributes, such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
  - d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
  - e. Samples, where applicable or requested.
  - f. Certificates and qualification data, where applicable or requested.
  - g. List of similar installations for completed projects, with project names and addresses as well as names and addresses of Landscape Architects and owners.
  - h. Material test reports from a qualified testing agency, indicating and interpreting test results for compliance with requirements indicated.
  - i. Research reports evidencing compliance with building code in effect for Project, from ICC-ES and other applicable codes.
  - j. Detailed comparison of Contractor's construction schedule using proposed substitutions with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
  - k. Cost information, including a proposal of change, if any, in the Contract Sum.
  - l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents, except as indicated in substitution request, is compatible with related materials and is appropriate for applications indicated.
  - m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
3. County's Action: If necessary, County will request additional information or documentation for evaluation within five days of receipt of a request for substitution. County will notify Contractor of acceptance or rejection of proposed substitution within 8 days of receipt of request, or 3 days of receipt of additional information or documentation, whichever is later.
- a. Forms of Acceptance: Change Order, Construction Change Directive, or County's Supplemental Instructions for minor changes in the Work.
  - b. Use product specified if County does not issue a decision on use of a proposed substitution within time allocated.

## County of Mendocino Bower Park Restoration and Improvement Project

### 1.5 QUALITY ASSURANCE

- A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

### 1.6 PROCEDURES

- A. Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.

### 1.7 SUBSTITUTIONS

- A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 14 days prior to time required for preparation and review of related submittals.

- 1. Conditions: County will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, County will return requests without action, except to record noncompliance with these requirements:

- a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
- b. Substitution request is fully documented and properly submitted.
- c. Requested substitution will not adversely affect Contractor's construction schedule.
- d. Requested substitution has received necessary approvals of authorities having jurisdiction.
- e. Requested substitution is compatible with other portions of the Work.
- f. Requested substitution has been coordinated with other portions of the Work.
- g. Requested substitution provides specified warranty.
- h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

- B. Substitutions for Convenience: County will consider requests for substitution if received within 21 days after commencement of the Work. Requests received after that time may be considered or rejected at discretion of County.

- 1. Conditions: County will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, County will return requests without action, except to record noncompliance with these requirements:

- a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.

County of Mendocino Bower Park Restoration and Improvement Project

- b. Requested substitution does not require extensive revisions to the Contract Documents.
- c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
- d. Substitution request is fully documented and properly submitted.
- e. Requested substitution will not adversely affect Contractor's construction schedule.
- f. Requested substitution has received necessary approvals of authorities having jurisdiction.
- g. Requested substitution is compatible with other portions of the Work.
- h. Requested substitution has been coordinated with other portions of the Work.
- i. Requested substitution provides specified warranty.
- j. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012500

## **SECTION 01310 - PROJECT MANAGEMENT AND COORDINATION**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section includes administrative provisions for coordinating construction operations on Project, including, but not limited to, the following:
  - 1. General coordination procedures.
  - 2. RFIs.
  - 3. Project meetings.
- B. Related Requirements:
  - 1. Section 013200 "Construction Progress Documentation" for preparing and submitting Contractor's construction schedule.
  - 2. Section 017300 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
  - 3. Section 017700 "Closeout Procedures" for coordinating closeout of the Contract.

#### **1.2 DEFINITIONS**

- A. RFI: Request for Information. Request from Owner, Construction Manager, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

#### **1.3 INFORMATIONAL SUBMITTALS**

- A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
  - 1. Name, address, telephone number, and email address of entity performing subcontract or supplying products.
  - 2. Number and title of related Specification Section(s) covered by subcontract.
  - 3. Drawing number and detail references, as appropriate, covered by subcontract.
- B. Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses, cellular telephone numbers, and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.

#### **1.4 GENERAL COORDINATION PROCEDURES**

- A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations included in different Sections that depend on each other for proper installation, connection, and operation.

## County of Mendocino Bower Park Restoration and Improvement Project

1. Schedule construction operations in sequence required to obtain the best results, where installation of one part of the Work depends on installation of other components, before or after its own installation.
  2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
  3. Make adequate provisions to accommodate items scheduled for later installation.
- B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

### 1.5 REQUEST FOR INFORMATION (RFI)

- A. General: Immediately on discovery of the need for additional information, clarification, or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
1. Architect will return without response those RFIs submitted to Architect by other entities controlled by Contractor.
  2. Coordinate and submit RFIs in a prompt manner to avoid delays in Contractor's work or work of subcontractors.
- B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
1. Project name.
  2. Owner name.
  3. Owner's Project number.
  4. Name of Architect and Construction Manager.
  5. Architect's Project number.
  6. Date.
  7. Name of Contractor.
  8. RFI number, numbered sequentially.
  9. RFI subject.
  10. Specification Section number and title and related paragraphs, as appropriate.
  11. Drawing number and detail references, as appropriate.
  12. Field dimensions and conditions, as appropriate.
  13. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
  14. Contractor's signature.
  15. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
    - a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.
- C. RFI Forms: AIA Document G716.
1. Attachments shall be electronic files in PDF format.

- D. Architect's and Construction Manager's Action: Architect and Construction Manager will review each RFI, determine action required, and respond. Allow seven days for Architect's response for each RFI. RFIs received by Architect or Construction Manager after 1:00 p.m. will be considered as received the following working day.
1. The following Contractor-generated RFIs will be returned without action:
    - a. Requests for approval of submittals.
    - b. Requests for approval of substitutions.
    - c. Requests for approval of Contractor's means and methods.
    - d. Requests for coordination information already indicated in the Contract Documents.
    - e. Requests for adjustments in the Contract Time or the Contract Sum.
    - f. Requests for interpretation of Architect's actions on submittals.
    - g. Incomplete RFIs or inaccurately prepared RFIs.
  2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt by Architect or Construction Manager of additional information.
    - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect and Construction Manager in writing within 5 days of receipt of the RFI response.
- E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly. Include the following:
1. Project name.
  2. Name and address of Contractor.
  3. Name and address of Architect and Construction Manager.
  4. RFI number, including RFIs that were returned without action or withdrawn.
  5. RFI description.
  6. Date the RFI was submitted.
  7. Date Architect's and Construction Manager's response was received.
  8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
  9. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.
- F. On receipt of Architect's and Construction Manager's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect and Construction Manager within three days if Contractor disagrees with response.

## 1.6 PROJECT MEETINGS

- A. General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated.
1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times a minimum of seven days prior to meeting.
  2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
  3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner, Construction Manager, and Architect, within three days of the meeting.

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- B. Preconstruction Conference: Schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement.
1. Attendees: Authorized representatives of Owner , Construction Manager, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
  2. Agenda: Discuss items of significance that could affect progress, including the following:
    - a. Responsibilities and personnel assignments.
    - b. Tentative construction schedule.
    - c. Phasing.
    - d. Critical work sequencing and long lead items.
    - e. Designation of key personnel and their duties.
    - f. Lines of communications.
    - g. Use of web-based Project software.
    - h. Procedures for processing field decisions and Change Orders.
    - i. Procedures for RFIs.
    - j. Procedures for testing and inspecting.
    - k. Procedures for processing Applications for Payment.
    - l. Distribution of the Contract Documents.
    - m. Submittal procedures.
    - n. Preparation of Record Documents.
    - o. Use of the premises and existing building.
    - p. Work restrictions.
    - q. Working hours.
    - r. Owner's occupancy requirements.
    - s. Responsibility for temporary facilities and controls.
    - t. Procedures for disruptions and shutdowns.
    - u. Construction waste management and recycling.
    - v. Parking availability.
    - w. Office, work, and storage areas.
    - x. Equipment deliveries and priorities.
    - y. First aid.
    - z. Security.
    - aa. Progress cleaning.
  3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.
- C. Project Closeout Conference: Schedule and conduct a project closeout conference, at a time convenient to Owner and Architect, but no later than 90 days prior to the scheduled date of Substantial Completion.
1. Conduct the conference to review requirements and responsibilities related to Project closeout.
  2. Attendees: Authorized representatives of Owner, Construction Manager, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.

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3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:
    - a. Preparation of Record Documents.
    - b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
    - c. Submittal of written warranties.
    - d. Requirements for preparing operations and maintenance data.
    - e. Requirements for demonstration and training.
    - f. Preparation of Contractor's punch list.
    - g. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
    - h. Submittal procedures.
    - i. Owner's partial occupancy requirements.
    - j. Installation of Owner's furniture, fixtures, and equipment.
    - k. Responsibility for removing temporary facilities and controls.
  4. Minutes: Entity conducting meeting will record and distribute meeting minutes.
- D. Progress Meetings: Conduct progress meetings at weekly intervals.
1. Coordinate dates of meetings with preparation of payment requests.
  2. Attendees: In addition to representatives of Owner , Construction Manager, and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
  3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
    - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
      - 1) Review schedule for next period.
    - b. Review present and future needs of each entity present, including the following:
      - 1) Interface requirements.
      - 2) Sequence of operations.
      - 3) Status of submittals.
      - 4) Deliveries.
      - 5) Off-site fabrication.
      - 6) Access.
      - 7) Site use.
      - 8) Temporary facilities and controls.
      - 9) Progress cleaning.
      - 10) Quality and work standards.
      - 11) Status of correction of deficient items.

- 12) Field observations.
  - 13) Status of RFIs.
  - 14) Status of Proposal Requests.
  - 15) Pending changes.
  - 16) Status of Change Orders.
  - 17) Pending claims and disputes.
  - 18) Documentation of information for payment requests.
4. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.
- a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting, where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

PART 2 - PRODUCTS (Not Used)  
PART 3 - EXECUTION (Not Used)

END OF SECTION 013100

SECTION 01320 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:

- 1.Startup construction schedule.
- 2.Contractor's Construction Schedule.
- 3.Construction schedule updating reports.
- 4.Material location reports.
- 5.Site condition reports.
- 6.Unusual event reports.

1.2 DEFINITIONS

- A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction Project. Activities included in a construction schedule consume time and resources.

- 1.Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
- 2.Predecessor Activity: An activity that precedes another activity in the network.
- 3.Successor Activity: An activity that follows another activity in the network.

- B. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.

- C. Event: The starting or ending point of an activity.

1.3 INFORMATIONAL SUBMITTALS

- A. Format for Submittals: Submit required submittals in the following format:

- 1.PDF file.

- B. Startup construction schedule.

- C. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.

- D. Construction Schedule Updating Reports: Submit with Applications for Payment.

- E. Material Location Reports: Submit at weekly intervals.

- F. Site Condition Reports: Submit at time of discovery of differing conditions.

- G. Unusual Event Reports: Submit at time of unusual event.

H. Qualification Data: For scheduling consultant.

#### 1.4 QUALITY ASSURANCE

A. Prescheduling Conference: Conduct conference at Project site to comply with requirements in Section 01310 "Project Management and Coordination." Review methods and procedures related to the preliminary construction schedule and Contractor's Construction Schedule, including, but not limited to, the following:

1. Review software limitations and content and format for reports.
2. Verify availability of qualified personnel is needed to develop and update schedule.
3. Discuss constraints, including phasing, work stages, and partial Owner occupancy.
4. Review submittal requirements and procedures.
5. Review time required for review of submittals and resubmittals.
6. Review requirements for tests and inspections by independent testing and inspecting agencies.
7. Review time required for Project closeout and Owner startup procedures, including commissioning activities.
8. Review and finalize list of construction activities to be included in schedule.
9. Review procedures for updating schedule.

#### 1.5 COORDINATION

A. Coordinate Contractor's Construction Schedule with the schedule of values, list of subcontracts, submittal schedule, progress reports, payment requests, and other required schedules and reports.

1. Secure time commitments for performing critical elements of the Work from entities involved.
2. Specifically identify activities requiring coordination with county staff and or operations; ensure proper notice is provided prior to work affecting county operations.
3. Coordinate each construction activity in the network with other activities, and schedule them in proper sequence.

#### 1.6 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.

B. Time Frame: Extend schedule from date established for commencement of the Work to date of Substantial Completion.

1. Contract completion date shall not be changed by submission of a schedule that shows a revised completion date unless specifically authorized by Change Order.

C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule and show how the sequence of the Work is affected.

1. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
2. Work Restrictions: Show the effect of the following items on the schedule:
  - a. Coordination with existing construction.
  - b. Limitations of continued occupancies.

- c. Uninterruptible services.
- d. Partial occupancy before Substantial Completion.
- e. Use-of-premises restrictions.

3. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:

- a. Subcontract awards.
- b. Submittals.
- c. Purchases.
- d. Fabrication.
- e. Sample testing.
- f. Deliveries.
- g. Installation.
- h. Tests and inspections.
- i. Adjusting.
- j. Curing.
- k. Startup and placement into final use and operation.

4. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:

- a. Completion of Structural pads and underground work.
- b. Completion of pre-engineered concrete building.
- c. Completion of new electrical service.
- d. Completion of emergency generator.
- e. Substantial Completion.

D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and Final Completion.

- 1. Delivery of building structure.
- 2. Delivery of electrical switch gear.
- 3. Delivery of emergency generator.
- 4. Completion of electrical service change.
- 5. Completion of emergency generator changover.

E. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:

- 1. Unresolved issues.
- 2. Unanswered Requests for Information.
- 3. Rejected or unreturned submittals.
- 4. Notations on returned submittals.
- 5. Pending modifications affecting the Work and the Contract Time.

F. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.

- 1. Provide material location report update at each regular project meeting for all outstanding material and equipment deliveries.

2. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
3. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
4. As the Work progresses, indicate Final Completion percentage for each activity.

G. Recovery Schedule: When periodic update indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, equipment required to achieve compliance, and date by which recovery will be accomplished.

H. Distribution: Distribute copies of approved schedule to Architect, Construction Manager, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.

1. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

#### 1.7 STARTUP CONSTRUCTION SCHEDULE

- A. Gantt-Chart Schedule: Submit startup, horizontal, Gantt-chart-type construction schedule within ten days of date established for the Notice to Proceed.
- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line. Outline significant construction activities for first 90 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

#### 1.8 GANTT-CHART SCHEDULE REQUIREMENTS

- A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal, Gantt-chart-type, Contractor's Construction Schedule within 30 days of date established for the Notice to Proceed.
  1. Base schedule on the startup construction schedule and additional information received since the start of Project.
- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.
  1. For construction activities that require three months or longer to complete indicate an estimated completion percentage in 10 percent increments within time bar.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01320

## SECTION 01330 - SUBMITTAL PROCEDURES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Submittal schedule requirements.
  - 2. Administrative and procedural requirements for submittals.

#### 1.2 DEFINITIONS

- A. Action Submittals: Written and graphic information and physical samples that require Architect's and Construction Manager's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."
- B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's and Construction Manager's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."

#### 1.3 SUBMITTAL SCHEDULE

- A. Submittal Schedule: Submit, as an action submittal, a list of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and Construction Manager and additional time for handling and reviewing submittals required by those corrections.
  - 1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
  - 2. Initial Submittal Schedule: Submit concurrently with startup construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
  - 3. Final Submittal Schedule: Submit concurrently with the first complete submittal of Contractor's construction schedule.
    - a. Submit revised submittal schedule as required to reflect changes in current status and timing for submittals.
  - 4. Format: Arrange the following information in a tabular format:
    - a. Scheduled date for first submittal.
    - b. Specification Section number and title.
    - c. Submittal Category: Action; informational.
    - d. Name of subcontractor.
    - e. Description of the Work covered.

- f. Scheduled date for Architect's and Construction Manager's final release or approval.
- g. Scheduled dates for purchasing.
- h. Scheduled date of fabrication.
- i. Scheduled dates for installation.
- j. Activity or event number.

#### 1.4 SUBMITTAL FORMATS

- A. Submittal Information: Include the following information in each submittal:
  - 1. Project name.
  - 2. Date.
  - 3. Name of Architect.
  - 4. Name of Construction Manager.
  - 5. Name of Contractor.
  - 6. Name of firm or entity that prepared submittal.
  - 7. Names of subcontractor, manufacturer, and supplier.
  - 8. Unique submittal number, including revision identifier. Include Specification Section number with sequential alphanumeric identifier and alphanumeric suffix for resubmittals.
  - 9. Category and type of submittal.
  - 10. Submittal purpose and description.
  - 11. Number and title of Specification Section, with paragraph number and generic name for each of multiple items.
  - 12. Drawing number and detail references, as appropriate.
  - 13. Indication of full or partial submittal.
  - 14. Location(s) where product is to be installed, as appropriate.
  - 15. Other necessary identification.
  - 16. Remarks.
  - 17. Signature of transmitter.
- B. Options: Identify options requiring selection by Architect.
- C. Deviations and Additional Information: On each submittal, clearly indicate deviations from requirements in the Contract Documents, including minor variations and limitations; include relevant additional information and revisions, other than those requested by Architect and Construction Manager on previous submittals. Indicate by highlighting on each submittal or noting on attached separate sheet.
- D. Electronic Submittals: Prepare submittals as PDF package, incorporating complete information into each PDF file. Name PDF file with submittal number.

#### 1.5 SUBMITTAL PROCEDURES

- A. Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
  - 1. Email: Prepare submittals as PDF package and transmit to Architect by sending via email. Include PDF transmittal form. Include information in email subject line as requested by Architect.
    - a. Architect, through Construction Manager, will return annotated file. Annotate and retain one copy of file as a digital Project Record Document file.

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2. Paper: Prepare submittals in paper form and deliver to Architect.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
  2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
  3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
  4. Coordinate transmittal of submittals for related parts of the Work specified in different Sections, so processing will not be delayed because of need to review submittals concurrently for coordination.
    - a. Architect and Construction Manager reserve the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
  2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
  3. Resubmittal Review: Allow 15 days for review of each resubmittal.
  4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 21 days for initial review of each submittal.
  5. Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Architect and to Architect's consultants, allow 15 days for review of each submittal. Submittal will be returned to Architect before being returned to Contractor.
- D. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
1. Note date and content of previous submittal.
  2. Note date and content of revision in label or title block, and clearly indicate extent of revision.
  3. Resubmit submittals until they are marked with approval notation from Architect's and Construction Manager's action stamp.
- E. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- F. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's and Construction Manager's action stamp.

1.6 SUBMITTAL REQUIREMENTS

- A. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
  - 1. If information must be specially prepared for submittal because standard published data are unsuitable for use, submit as Shop Drawings, not as Product Data.
  - 2. Mark each copy of each submittal to show which products and options are applicable.
  - 3. Include the following information, as applicable:
    - a. Manufacturer's catalog cuts.
    - b. Manufacturer's product specifications.
    - c. Standard color charts.
    - d. Statement of compliance with specified referenced standards.
    - e. Testing by recognized testing agency.
    - f. Application of testing agency labels and seals.
    - g. Notation of coordination requirements.
    - h. Availability and delivery time information.
  - 4. For equipment, include the following in addition to the above, as applicable:
    - a. Wiring diagrams that show factory-installed wiring.
    - b. Printed performance curves.
    - c. Operational range diagrams.
    - d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
  - 5. Submit Product Data before Shop Drawings, and before or concurrently with Samples.
- B. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data unless submittal based on Architect's digital data drawing files is otherwise permitted.
  - 1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
    - a. Identification of products.
    - b. Schedules.
    - c. Compliance with specified standards.
    - d. Notation of coordination requirements.
    - e. Notation of dimensions established by field measurement.
    - f. Relationship and attachment to adjoining construction clearly indicated.
    - g. Seal and signature of professional engineer if specified.
- C. Samples: Submit Samples for review of type, color, pattern, and texture for a check of these characteristics with other materials.
  - 1. Transmit Samples that contain multiple, related components, such as accessories together in one submittal package.
  - 2. Identification: Permanently attach label on unexposed side of Samples that includes the following:
    - a. Project name and submittal number.
    - b. Generic description of Sample.
    - c. Product name and name of manufacturer.

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- d. Sample source.
  - e. Number and title of applicable Specification Section.
  - f. Specification paragraph number and generic name of each item.
3. Email Transmittal: Provide PDF transmittal. Include digital image file illustrating Sample characteristics and identification information for record.
- D. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
  2. Manufacturer and product name, and model number if applicable.
  3. Number and name of room or space.
  4. Location within room or space.
- E. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.
- F. Design Data: Prepare and submit written and graphic information indicating compliance with indicated performance and design criteria in individual Specification Sections. Include list of assumptions and summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Number each page of submittal.
- G. Certificates:
1. Certificates and Certifications Submittals: Submit a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity. Provide a notarized signature where indicated.
  2. Installer Certificates: Submit written statements on manufacturer's letterhead, certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
  3. Manufacturer Certificates: Submit written statements on manufacturer's letterhead, certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
  4. Material Certificates: Submit written statements on manufacturer's letterhead, certifying that material complies with requirements in the Contract Documents.
  5. Product Certificates: Submit written statements on manufacturer's letterhead, certifying that product complies with requirements in the Contract Documents.
  6. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of AWS B2.1/B2.1M on AWS forms. Include names of firms and personnel certified.
- H. Test and Research Reports:
1. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for substrate preparation and primers required.
  2. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.

3. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
4. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
5. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
6. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
  - a. Name of evaluation organization.
  - b. Date of evaluation.
  - c. Time period when report is in effect.
  - d. Product and manufacturers' names.
  - e. Description of product.
  - f. Test procedures and results.
  - g. Limitations of use.

#### 1.7 DELEGATED DESIGN SERVICES

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
  1. If criteria indicated are insufficient to perform services or certification required, submit a written request for additional information to Architect.
- B. Delegated Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF file, and, three paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
  1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

#### 1.8 CONTRACTOR'S REVIEW

- A. Action Submittals and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect and Construction Manager.
- B. Contractor's Approval: Indicate Contractor's approval for each submittal with a uniform approval stamp. Include name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

1. Architect and Construction Manager will not review submittals received from Contractor that do not have Contractor's review and approval.

1.9 ARCHITECT'S AND CONSTRUCTION MANAGER'S REVIEW

- A. Action Submittals: Architect and Construction Manager will review each submittal, indicate corrections or revisions required, and return.
  1. PDF Submittals: Architect and Construction Manager will indicate, via markup on each submittal, the appropriate action.
- B. Informational Submittals: Architect and Construction Manager will review each submittal and will not return it or will return it if it does not comply with requirements. Architect and Construction Manager will forward each submittal to appropriate party.
- C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect and Construction Manager.
- D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.
- E. Architect and Construction Manager will discard submittals received from sources other than Contractor.
- F. Submittals not required by the Contract Documents will be returned by Architect without action.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013300

SECTION 01410- TESTING AND LABORATORY SERVICES

PART 1 - GENERAL

- 1.1 THIS SECTION includes all testing and inspecting, complete, as described in this Section and elsewhere in the Contract Documents, and as needed for a complete and proper installation.
- 1.2 QUALITY ASSURANCE:
  - A. Provide access and cooperation to the soil engineer, construction inspectors and a testing laboratory hired by the Owner to perform inspections services during the construction.
  - B. Coordinate the work of all required inspectors to provide access to the inspectors at the appropriate times to perform required inspections.
  - C. Upon completion of each test and/or inspection, promptly obtain and distribute copies of test or inspection reports to the Architect, to governmental agencies requiring submission of such reports, and to such other persons as directed by the Architect.

PART 2 - PRODUCTS

- 2.1 PAYMENT FOR TESTING
  - A. All initial testing and inspecting required under this Section of these Specifications shall be paid for by the Owner under separate contract with the inspection agencies. Include within the Contract Sum an amount sufficient to cover all coordination of inspection services and cooperation with inspection procedures. Contractor shall include within the Contract Sum an amount sufficient to cover all job costs associated with testing and inspecting required by governmental agencies having jurisdiction.
  - B. When initial tests indicate non-compliance with the Contract Documents subsequent retesting occasioned by the non-compliance shall be performed by the same testing laboratory and the costs thereof shall be paid by the Contractor.
- 2.2 SPECIFIC TESTS AND INSPECTIONS
  - A. Provide all tests and inspections required by governmental agencies having jurisdiction, required by provisions of the Contract Documents, and such other tests and inspections as are directed by the Architect.
  - B. Tests include, but are not necessarily limited to, those described in detail in Part 3 of this Section.

PART 3 - EXECUTION

- 3.1 TAKING SPECIMENS: Except as may be specifically otherwise approved by the Architect, have the testing laboratory secure and handle all samples and specimens for testing.

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- 3.2 COOPERATION WITH TESTING LABORATORY: Provide access to the Work at all times and at all locations where the Work is in progress. Provide facilities for such access to enable the laboratory to perform its functions properly.
- 3.3 SOIL INSPECTING AND TESTING: Make required inspections and tests including, but not necessarily limited to:
- A. Visually inspect on-site and imported fill and backfill, making such tests and retests as are necessary to determine compliance with the Contract requirements and suitability for the proposed purpose.
  - B. Make field density tests on samples from in-place material as required.
  - C. As pertinent, inspect and test the scarifying and recompacting of cleaned subgrade inspect the progress of excavating, filling, and grading; make 90% density tests at fills and backfills; and verify compliance with provisions of the Contract Documents and governmental agencies having jurisdiction.
  - D. Make and distribute necessary reports and certificates.
- 3.4 CONCRETE INSPECTING AND TESTING
- A. Portland cement:
    - 1. Secure from the cement manufacturer Certificates of Compliance delivered directly to the concrete producer for further delivery directly to the testing laboratory.
    - 2. Require the Certificates of Compliance to positively identify the cement as to production lot, bin or silo number, dating and routing of shipment, and compliance with the specified standards.
    - 3. If so required by the Architect, promptly provide such other specific physical and chemical data as requested.
  - B. Aggregate:
    - 1. Provide one test unless character of material changes, material is substituted, or additional test is requested by the Architect.
    - 2. Sample from conveyor belts or batching gates at the ready-mix plant:
      - a. Sieve analysis to determine compliance with specified standards and grading.
      - b. Specific gravity test for compliance with specified standards.
  - C. Laboratory design mix:
    - 1. After approval of aggregate, and whenever character or source of materials is changed, provide mix design in accordance with ACI 613.
    - 2. Provide designs for all mixes prepared by a licensed civil engineer.

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### D. Molded concrete cylinders:

1. Provide three test cylinders for each 150 cu yds, or fraction thereof, of each class of concrete of each day's placement.
2. Test one cylinder at seven days, one at 28 days, and one when so directed.
3. Report the mix, slump, gage, location of concrete in the structure, and test results.
4. Take specimens and make tests in accordance with the applicable ASTM standard specifications.

### E. Core tests:

1. Provide only when specifically, so directed by the Engineer because of low cylinder test results.
2. Cut from locations directed by the Architect, securing in accordance with ASTM C42, and prepare and test in accordance with ASTM C39.

### F. Placement inspections:

1. On concrete over 2000 psi, provide continuous or other inspection as required by governmental agencies having jurisdiction.
2. Throughout progress of concrete placement, make slump tests to verify conformance with specified slump.
3. Using all required personnel and equipment, throughout progress of concrete placement verify that finished concrete surfaces will have the level or slope that is required by the Contract Documents.

## 3.5 CONCRETE REINFORCEMENT INSPECTING AND TESTING

### A. Prior to use, test all reinforcement steel bars for compliance with the specified standards.

1. Material identified by mill test reports, and certified by the testing laboratory, does not require additional testing. Require the supplier to furnish mill test reports to the testing laboratory for certification.
2. Tag identified steel at the supplier's shop. When steel arrives at the job site without such tags, test it as unidentified steel.

### B. Unidentified steel:

1. Have the testing laboratory select samples consisting of two pieces, each 18" long, of each size.
2. Have the testing laboratory make one tensile test and one bend test for each 2-1/2 tons or fraction thereof of each size of unidentified steel.

### C. Provide continuous inspection for all welding of reinforcement steel.

## 3.6 STRUCTURAL STEEL INSPECTING AND TESTING

### A. Prior to use, test all structural steel for compliance with the specified standards.

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1. Material identified by mill test reports, and certified by the testing laboratory, does not require additional testing. Require the supplier to furnish mill test reports to the laboratory for certification.
  2. Tag identified steel at the supplier's shop. When steel arrives at the job site without such tags, test it as unidentified steel.
- B. Unidentified steel: Have testing laboratory make one tensile test and one bend test for each five tons or fraction thereof of each shape and size of unidentified structural steel.
- C. Shop welding:
1. Provide qualified testing laboratory inspector.
  2. On single pass welds, inspect after completion of welding and prior to painting.
  3. On multiple pass welds, and on butt welds with cover pass on the backside, provide continuous inspection.
- D. Field welding: Provide continuous inspection by a qualified testing laboratory inspector.
- 3.7 WAIVER OF INSPECTION AND/OR TESTS: Specified inspections and/or tests may be waived only by the specific approval of the Architect, and such waivers will be expected to result in credit to the Owner equal to normal cost of such inspection and/or test.

**SECTION 014115 – REQUIREMENTS FOR OFF ROAD DIESEL FLEETS**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Submittal and award requirements for public projects with off road diesel fleets as defined in the California Code of Regulations Title 13 Section 2449.

**1.2 RELATED SECTIONS**

- A. Section 00 01 00: Instructions to Bidders
- B. Section 01 41 00: Regulatory Requirements
- C. Applicable codes and regulations

**1.3 APPLICABLE CODES**

- A. California Code of Regulations (CCR) Title 13 Section 2449 – General Requirements for In-Use Off-Road Diesel-Fueled Fleets

**1.4 SUBMITTALS/TIME**

- A. Copies of valid Certificates of Reported Compliance (CRC) for In-Use Off-Road Diesel Fueled Fleets issued by the California Environmental Protection Agency, Air Resources Board from the Prime Contractor and all Subcontractors using vehicles subject to this regulation
- B. To be considered for award, bidders must submit all required CRC to the Mendocino County General Services Agency, Facilities and Fleet Division office as specified in the Instructions to Bidders.

**PART 2 PRODUCTS**

NOT USED

**PART 3 EXECUTION**

**3.1 AWARDING BODY REQUIREMENTS**

- A. Beginning January 1, 2024, any public agency in the state of California that awards contracts for projects involving the operation of vehicles subject to the regulations referenced in this section must:
  - 1. Obtain copies of valid CRC for the fleets of the awarded prime contractor and listed subcontractors operating vehicles subject to the regulations referenced prior to entering into a new or renewed contract with that contractor.
  - 2. Not enter into a new or renewed contract with a contractor without valid CRC for the contractor's and any listed subcontractor's fleets.
  - 3. Retain all submitted CRC for at least 3 years after project completion and provide such records upon request to the California Air Resources Board (CARB) within 5 business days.

3.2 PRIME CONTRACTOR REQUIREMENTS

- A. Beginning January 1, 2024, any Contractor in California entering contracts for projects involving the operation of vehicles subject to the regulations referenced in this section will be required to provide copies of CRC upon request. Failure to provide valid CRCs as required herein may render the Bid non-responsive.
  
- B. The contractor is referred to the applicable codes for the specific requirements and obligations of this section.

[California Air Resources Board - In-Use Off-Road Diesel-Fueled Fleets Regulations](#)

**END OF SECTION 014115**

# County of Mendocino Bower Park Restoration and Improvement Project

## SECTION 015000 - TEMPORARY FACILITIES & BUILDING SERVICES

### PART 1 - GENERAL

#### 1.1 DESCRIPTION

- A. Work included: Provide temporary facilities and controls needed for the Work included, but not necessarily limited to:
  - 1. Temporary utilities such as water, electricity, lighting and telephone.
  - 2. Temporary building services such as electricity, gas, heating and cooling or telephone and data when interruption in services is required to complete the work.
  - 3. Sanitary facilities.
  - 4. Enclosures and temporary protection such as fencing, tarpaulins, barricades and canopies.
- B. Related work:
  - 1. Documents affecting the work of this Section include, but are not necessarily limited to, Project Plans, General Conditions, Supplementary conditions, and Sections in Division 1 of these Specifications.

#### 1.2 JOB SAFETY

- A. Comply with all applicable laws and regulations pertaining to job safety, and be solely responsible for construction means, methods, techniques, sequences procedures and safety precautions and programs in connection with the Work. Owner or Architect will not be responsible for Contractor's failure to employ proper safety procedures.
- B. All work, including the temporary construction, shall be in full accord with the latest orders, rules and regulations of the State of California Division of Industrial Safety and the California Occupational Safety and Health Act (CAL-OSHA).
- C. The Contractor shall at all times so conduct his work as to cause the least possible obstruction and inconvenience and insure the protection of persons and property in the vicinity of the Work.

### PART 2 - PRODUCTS

#### 2.1 MISCELLANEOUS FACILITIES

- A. Construction Aids: Hoists, ramps and ladders, enclosures, pumps, barriers, fences, barricades necessary to adequately move materials and equipment and to protect workmen and public.
- B. All temporary construction and protection to comply with requirements of state and local authorities.
- C. Sanitary Facilities
  - 1. Provide and pay for temporary sanitary facilities in quantity required for use by all personnel
  - 2. Shall be maintained in a sanitary condition at all times.
  - 3. Facility shall remain locked when Contractor is off-site.

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### PART 3 – EXECUTION

#### 3.1 EXISTING BUILDING SERVICES

- A. Utilities: Coordinate the temporary shut off of any utilities including water, electricity, gas, and sanitary sewer with the County. No utility will be made unavailable without written approval from the County.
- B. Provide a minimum of 48 hours' written notice to the County prior to any activities that may result in loss of water, firewater, sewer, gas, electrical or data connectivity. Coordinate all change over activities closely with County.
- C. Work in the County public park:
  - 1. Provide a minimum of 14-day notice before beginning work within the park.
  - 2. Provide clear delineation and appropriate barriers and signage to protect the public and county employees for the entirety of the project.
  - 3. Do not leave materials, tools, equipment or debris unattended in any areas that are accessible to the public or county employees.
  - 4. Remove all equipment, temporary facilities, debris and thoroughly clean all affected surfaces before removing barriers.

#### 3.2 SECURITY

- A. Contractor shall be responsible for securing the project Site and work areas within the park including:
  - 1. Secure and maintain access points to the Work
  - 2. Secure all stored materials and hardware
  - 3. Secure equipment and temporary facilities until time of acceptance.
  - 4. Security and protection may be by any legal method, or methods, acceptable to the County.

#### 3.3 MAINTENANCE AND REMOVAL

- A. Maintain tree protection, erosion and sediment control measures, temporary facilities and controls as long as needed for safe and proper completion of the Work. Contractor shall be responsible for ensuring the effectiveness of erosion and sediment control devices, repairing, or replacing as necessary for the duration of the project.
- B. Remove such temporary facilities and controls as rapidly as progress of the Work will permit or as directed by the County.

END OF SECTION

SECTION 015050 - EROSION CONTROL

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. The Contractor shall provide all materials, labor and equipment necessary to complete all work as specified herein, including but not limited to the following:
  - 1. Apply specified treatments to all cuts and fill slopes, soil stockpiles, and all disturbed areas.
  - 2. Install all temporary erosion control devices per Plans and Specifications.
- B. All other labor and materials reasonably incidental to the satisfactory completion of the work, including cleanup of the site.

1.2 RELATED SECTIONS

- A. Section 01 10 00, Supplemental General Requirements

1.3 RELATED DOCUMENTS

- A. Caltrans Standard Specifications, 2022
  - 1. Section 21, Erosion Control
- B. Association of Official Seed Analysts Procedures
- C. California State Seed Law of the Department of Food and Agriculture

1.4 CONTRACTOR SUBMITTALS

- A. The Contractor shall submit, in accordance with Section 01 10 00, Supplemental General Requirements, manufacturer's letters of compliance and manufacturer's literature for the following items:
  - 1. Seed Mixes (or individual items)
  - 2. Mulches
  - 3. Binders/Tackifiers
  - 4. Fertilizer
  - 5. Humate
  - 6. Soil inoculates
  - 7. Straw (Weight receipts from scales shall be required)
  - 8. Erosion Control Blanket

## County of Mendocino Bower Park Restoration and Improvement Project

### 1.5 SITE CONDITION

- A. It is the responsibility of the Contractor to visit the site to determine existing conditions including access to the site, the nature and extent of existing improvements upon adjacent public and private property, the nature of materials to be encountered, and other factors that may affect the work of this section.
- B. It is the responsibility of the Contractor to have finished the grading of the slopes, including track walking the areas to be treated with erosion control treatments.

### 1.6 WORK SCHEDULE

- A. The work shall progress as soon as the site becomes available consistent with normal seasonal limitations.

### 1.7 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. All products shall be delivered to the site in manufacturer's unopened standard containers bearing original labels showing quantity, analysis and name of manufacturer.
- B. All materials shall be stored in designated areas and in such a manner as to protect them from weather or other conditions that might damage or impair the effectiveness of the product.

### 1.8 ANALYSIS OF SAMPLES AND TESTS

- A. Samples: The Owner reserves the right to take and analyze samples of materials for conformity to the Specifications at any time. On request, seed shall be delivered to Owner's Representative 30 days prior to seeding so seed can be tested. Seed samples shall be drawn in accordance with procedures outlined in Association of Official Seed Analysts.
- B. Rejected material: Rejected materials shall be removed immediately from the site at Contractor's expense. Contractor shall pay the cost of testing replacement materials.

## PART 2 - PRODUCTS

### 2.1 GENERAL

- A. All products shall be in conformance with the Specifications listed below. Any changes to products to be used shall be approved, in writing, by the Owner or Owner's representative prior to job site delivery.

### 2.2 SEED MIX [SEED MIX NEEDS TO BE PROVIDED BY LANDSCAPE CONSULTANT OR SEED COMPANY FOR THE PROJECT AREA]

- A. Seed shall conform to the provisions in Section 21-2.02F, "Seed," of the Standard Specifications. Individual seed species shall be measured and mixed in the presence of the Owner's Representative.

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B. Seed shall be delivered to the project site in unopened separate containers with the seed tag attached. Containers without a seed tag attached will not be accepted.

C. Composition:

Species	Common Name	PLS lbs. /acre
<i>Gazania</i>	<i>Trailing Gazania</i>	4 lbs. /acre

NON-LEGUME SEED

Botanical Name (Common Name)	Percent Germination (Minimum)	Kilograms Pure Live Seed Per Hectare (Slope Measurement)
Baccharis pilularis var. pilularis (Coyote Bush)	20	0.05
Artemisia californica (California Sagebrush)	25	0.5
Mimulus aurantiacus. (Sticky Monkeyflower)	25	.1
Elymus glaucus (Blue Wildrye)	40	9
Festuca idahoensis (Idaho Festuca)	35	4
Hordium brachyantherum californicum (Meadow Barley)	40	8
Regreen	60	45.0

D. Quality

1. All seed shall be in conformance with the California State Seed Law of the Department of Food and Agriculture. Each seed bag shall be delivered to the site sealed and clearly marked as to species, purity, percent germination, dealer's guarantee, and dates of test. In addition, the container shall be labeled to clearly reflect the amount of Pure Live Seed (PLS) contained.
2. Prior to seeding at the request of the Owner, the Contractor shall provide a letter of certification, original Association of Official Seed Analysts (AOSA) seed test results, and calculations of PLS.
3. All legume seed shall be pellet-inoculated. Inoculant sources shall be species specific and shall be applied at a rate of 2 pounds of inoculant per one hundred pounds of seed.

2.3 MULCH

A. Mulch shall be 100% wood hydroseed and shall be composed of wood fiber derived from whole wood chips with no growth or germination inhibiting substances and shall be manufactured in such a manner that when thoroughly mixed with seed, fertilizer, organic stabilizer, and water, in the proportions specified, will form a homogeneous slurry which is capable of being sprayed to form a porous mat.

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- B. The fibrous mulch in its air-dry state shall contain no more than 15% by weight of water. The fiber shall have a temporary green dye and shall be accompanied by a certificate of compliance stating that the fiber conforms to these Specifications.

2.4 ORGANIC STABILIZER/TACKIFIER

- A. Stabilizer and tackifier shall be an organic substance supplied in powder form and shall be psyllium-based and packed in clearly marked bags stating the contents of each package. The California Department of Food and Agriculture shall certify the material as an Auxiliary Soil Chemical.

2.5 FERTILIZER

- A. Fertilizer shall be of commercial quality, conform to the requirements of the California Department of Food and Agriculture Code, and shall have a guaranteed analysis for nitrogen, phosphorus and potassium of 7-2-3. Products specified as slow release shall have been tested and demonstrate a nearly linear release curve.

2.6 HUMATE

- A. Humate shall be OMRI listed and contain at least 40 % Humic acid. It shall be a natural granular humic acid-based material that functions as an organic chelator and microbial stimulator. Humate shall not burn plant material and shall be non-toxic and non-staining.

- B. Humate Soil Conditioner

Humic Acids (from Leonardite)	40 .00 %
Organic matter	40 .00 % - 50.00%
Carbon	50.00 % - 60.00%
Nitrogen	0.05 % - 1%
Phosphoric Acid	0.07 %
Potash	0.13 %
Sulfur	0.21 %
Magnesium	0.18 %
Calcium	0.32 %
pH	4.0
Soluble Salts	1.8

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### 2.7 MYCORRHIZAL INOCULUM

- A. Endo (arbuscular) mycorrhizal inoculum shall be registered by the California Department of Food and Agriculture and consist of spores, mycelium and mycorrhizal root fragments in a solid carrier suitable for handling by hydro-seeding. The carrier shall be the material in which the inoculum was originally produced, and may include organic materials, vermiculite, perlite, calcined clay, or other approved materials consistent with mechanical application and with good plant growth.
- B. Each endomycorrhizal inoculum shall carry a supplier's guarantee of 80,000 propagules minimum per kilogram. The minimum propagule count shall be shown on each label provided. If more than one fungal species is claimed by the supplier, the label shall include a guarantee for each species of mycorrhizal fungus claimed.
- C. Endomycorrhizal fungal species shall be suitable for the pH of the soil at the planting site. If the inoculum consists of a mixture of species, no more than 20% of the claimed propagule count shall consist of fungal species known to be unsuitable for the pH of the soil at the planting site.
- D. A sample of approximately 28 grams (one ounce) of inoculum will be taken from each inoculum container by the Owner's Representative. The number of propagules will be determined by laboratory testing. Propagules shall include live spores, mycelial fragments and viable mycorrhizal root fragments.
- E. Endomycorrhizal inoculum shall be stored, transported and applied at temperatures of less than 32° C (90° F).

### 2.8 STRAW

- A. Shall be derived from irrigated rice or clean cereal grain straw.
- B. The Contractor shall furnish evidence that clearance has been obtained from the County Agricultural Commissioner, as required by law, before straw from outside the County in which it is to be used is delivered to the site of the work.
- C. Straw that has been used for bedding is prohibited.

### 2.9 EQUIPMENT

- A. Equipment used for application of slurry shall be a commercial-type Hydro-Seeder and have a built-in agitation system with an operation capacity sufficient to agitate, suspend and homogeneously mix slurry.
- B. Tank capacity shall be a minimum of 1,500 gallons and shall be mounted on a truck to allow access to the site.
- C. Pump shall be able to generate 150 psi at the nozzle.

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- D. Straw blowers: Equipment shall be specifically designed and manufactured for the application of straw and shall be of sufficient horsepower to break up and distribute straw at the specified application rate.

2.10 WATER

- A. Water shall be furnished by Owner and shall be made readily available at the sites indicated on the project map. Water shall be of potable quality.
- B. Contractor shall add 4-6 lbs. of Vulpia Microstachys or 20 lbs. of Regreen per acre if hydroseeding occurs in the fall or winter months.
- C. Hydroseed mix can be obtained from:
  1. University of California Cooperative Extension – Mendocino County – Erosion Control Suppliers (<https://my.ucanr.edu/sites/Mendocino/files/17264.pdf>)
  2. Pacific Coast Seed, Inc., (925) 373-4417

2.11 EROSION CONTROL BLANKETS

- A. Erosion control must be Erosion Control Technology Council (ECTC) Type 2D and made of processed natural fibers that are mechanically, structurally, or chemically bound together to form a continuous matrix that is surrounded by 2 natural nets. Erosion control blanket must comply with the requirements shown in the following table:

Erosion Control Blanket				
Quality characteristic	Test method	Requirement		
		Type A	Type B	Type C
Roll width (min, inches)	--	72		
Matrix (%)				
Straw/coconut		70/30	--	--
Woven coir (coconut fiber)	--	--	100	--
Wood excelsior (6 inches or longer)		--	--	80
USLE C-Factor for a 1:1 (H:V) unvegetated slope	--	≤ 0.20		
Shear stress (max, psf)	ASTM D6460	1.75		
Tensile strength (min, psf)	ASTM D5035	75		
Functional longevity (months)	--	12		

PART 3 - EXECUTION

3.1 SOIL PREPARATION

- A. No soil amendments shall be required except as noted on the Plans.

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### B. Verification: Contractor shall verify:

1. That all areas to receive erosion control treatments are free of vegetation and other objectionable material.
2. That grades are final for permanently treated areas and within reasonable standard for temporary treatments.
3. That all sloped areas are uniformly compacted: wherever possible, the surface compaction of the top 1 foot shall be 85% or less.

### 3.2 EROSION CONTROL BLANKET INSTALLATION

- A. Before placing the erosion control blankets, Contractor shall ensure the subgrade has been graded smooth and has no depressed voids. The subgrade must be free from obstructions, such as tree roots, projecting stones, or foreign matter greater than 1 inch in diameter. Overlap the end of the erosion control blanket by 24 inches. Use 18-inch staples staked at maximum of 4 feet on center in staggered pattern. Do not drive vehicles on the erosion control blanket.

### 3.3 HYDROSEEDING AREA

- A. Areas to receive erosion control treatments include all graded areas as shown on the site plan and other areas as determined by the Owner.
- B. Perform erosion control treatments on a section-by-section basis. On approval of the Owner, and as soon as possible after grading, complete treatments in the following order of priority: stream zones, graded slopes, non-trafficked road and parking areas, building pads and other flat areas.
- C. Contractor shall be available to re-treat areas disturbed by on-going activities.
- D. Preparation: All slurry preparation to be conducted at the job site.
1. Water, mulch, fertilizer, compost, binder and other ingredients shall be added to the tank simultaneously so that the finished load is a homogenous mix of the specified ingredients.
  2. Seed shall be added last and shall be discharged within 2 hours. Loads held over 2 hours will be recharged with ½ the seed rate before application.
  3. Once fully loaded, the complete slurry shall be agitated for 3-5 minutes to allow for uniform mixing.
- E. Application: Apply specified slurry in a sweeping motion to form a uniform application.
1. Step One - with hydroseeder apply:

a. Seed Mix Total	4 lbs./acre
b. 100% Cellulose Fiber Mulch	500 lbs./acre
c. Biosol 7-2-3 (Organic Fertilizer)	1,600 lbs./acre
d. AM120 (Mycorrhizal Inoculant)	60 lbs./acre

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2. Step Two - with straw blower apply:
  - a. Rice or Clean Cereal Grain Straw 4,000 lbs./acre
3. Step Three - with hydroseeder apply:
  - a. 100% Cellulose Fiber Mulch 500 lbs./acre
  - b. M-Binder 100 lbs./acre
4. Under suitable conditions straw shall be uniformly spread at the specified rates. The straw may be pneumatically applied as long as the resulting straw is predominately 3 to 6 inches in length. The straw shall be treated with mulch and tackifier before it can blow off the site but in no case shall straw be left untreated for more than 24 hours. The Contractor will clean up areas of straw which are blown from the site, and the areas shall be retreated at no additional expense to the Owner.

- F. Protection: Contractor is to stay off treated areas.
- G. Unused Loads: If mixture remains in tank for more than 8 hours it shall be removed from the job site at Contractor's expense.
- H. Preliminary Inspection: Notify the Owner's Representative 48 hours in advance of all seeding. Inspection and favorable review of completed work shall begin the plant establishment period.

### 3.4 PLANT ESTABLISHMENT MAINTENANCE

- A. General plant maintenance shall immediately follow seeding and continue for 90 days.
- B. Protect areas against all damage, including erosion and trespass, and provide proper safeguards. Maintain and keep in good repair all temporary barriers erected to prevent trespassing. Check all barrier and temporary fencing daily, and make immediate repairs or replacements
- C. Repair all damage to seeded areas.
- D. Maintain constant moisture depth in soil to ensure vigorous growth.

### 3.5 FINAL INSPECTION AND ACCEPTANCE:

- A. Final inspection will be conducted upon completion of maintenance, replacements and corrective work. Five (5) days' notice shall be given. If project improvements, corrective work, and maintenance have not been performed as specified and to the satisfaction of the Owner's Representative, maintenance shall continue at Contractor's expense until such time as work has been successfully completed.

3.6 GUARANTEE AND REPLACEMENT

- A. Guarantee all planting to be in a healthy, thriving condition until the end of the maintenance period or beyond that time until active growth is evident and for one year from date of acceptance.
- B. Replace all seeded areas not in vigorous condition as soon as directed by Owner's Representative. Seed mixture used for replacement must be of the same kind and quantity as specified in this section.

3.7 CLEAN-UP

- A. Erosion control work areas shall be maintained in a neat and orderly condition. Keep paved area free of erosion treatment, soil, and other debris.
- B. Overspray: Installing Contractor is responsible for washing or otherwise cleaning excess material off all areas not intended to receive treatment.
- C. Debris: Clean up and remove erosion control associated materials and debris from project site before Final Acceptance.

END OF SECTION 015050

SECTION 015723 - STORM WATER POLLUTION CONTROL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. State Water Resources Control Board Construction General Permit for Storm Water Discharges associated with construction and land disturbance activities, adopted 2022-0057-DWQ.

1.2 RELATED SECTIONS

- A. Section 01 10 00 Supplemental General Requirements

1.3 SUMMARY

- A. All construction or demolition activity, including, but not limited to, clearing, grubbing, grading, or excavation, or any other activity that results in a land disturbance shall be subject to the State Water Resources Control Board Construction General Permit Order No. 2022-0057-DWQ.
- B. In compliance with the State and Federal regulations on construction storm water management and urban runoff pollution control, no pollutants will be allowed to enter the storm drainage system.
- C. The Contractor shall coordinate with the Owner to ensure the delivery of all engineering, material, labor and equipment for planning, documenting, submitting, monitoring, testing, installing, implementation and maintenance of all surface-water pollution prevention and erosion control measures. This work includes but is not necessarily limited to:
  - 1. Providing a Qualified SWPPP Developer (QSD) for documentation and planning.
  - 2. Providing a Qualified SWPPP Practitioner (QSP) for monitoring and implementation.
  - 3. Preparing and implementing the site-specific Storm Water Pollution Prevention Plan (SWPPP).
  - 4. Submitting to and paying fees to the State Water Resources Control Board on behalf of the Owner.
  - 5. Furnishing, placing, and installing effective measures for preventing runoff of soil, silts, gravel, hazardous chemicals or other materials prohibited by the Regional Water Quality Control Board (RWQCB) from entering the storm water drainage system.
  - 6. Management of on-site construction materials in such a manner as to prevent said materials from contacting storm water or wash water and running off into the storm drain system.
  - 7. Complying with applicable standards and regulations specified herein.
  - 8. Maintaining the most current revised SWPPP plan at the Contractor's work site.
  - 9. Reviewing any changes in the SWPPP plan at the weekly progress meetings. The Contractor shall submit a numbered checklist of the current status of each prevention measure on the job site.

10. Filing reports as required by the Permit.
  11. Filing the Notice of Termination (NOT) in a timely manner upon completion.
- D. In this section, the term “storm drain system” shall include: storm water conduits; storm drain inlets; and other storm drain structures, street gutters, channels, and ditches.
- E. Contractor shall have storm water pollution prevention measures in place and conduct inspections daily or as required by RWQCB requirements. Contractor’s QSP shall develop a Rain Event Action Plan as required by the requirements, and Contractor shall bear the costs of all Likely Precipitation Events, and all Qualifying Rain Events. It is the responsibility of the Contractor to be prepared for a rain event in the non-rainy and rainy season, and to be aware of weather predictions. The Owner is not responsible for informing the Contractor of rain predictions.

#### 1.4 DEFINITIONS

- A. LRP: Legally Responsible Party, the owner of the property, the Owner. As the LRP, it is the intention of the Owner to ensure through this Contract that the Contractor shall properly follow, implement, and execute all provisions of the State Water Resources Control Board Construction General Permit for Storm Water Discharges on behalf of the Owner, and that the Contractor shall include all such costs within their bid. The Owner will review and approve documents as submitted by the Contractor in the SMARTS system, for review by the SWRCB.
- B. Data Submitter. Data Submitter is any individual authorized by the LRP or an Approved Signatory to enter data on behalf of the LRP. The Owner will authorize and link the Contractor as a Data Submitter, to allow Contractor to upload and submit the required documents to the SMARTS system.
- C. PRD: Permit Registration Documents, which consist of the Notice of Intent, Risk Assessment, Post-Construction Calculations, a Site Map, the SWPPP, a signed certification statement by the LRP, and the annual fee.
- D. QSD: Qualified SWPPP Developer, a certified person responsible for preparing, amending and certifying the project SWPPP.
- E. QSP: Qualified SWPPP Practitioner, a certified person responsible for non-storm water and storm water visual observations, sampling and analysis, and for ensuring full compliance with the General Permit and implementation of all elements of the SWPPP.
- F. RWQCB: Regional Water Quality Control Board, one of nine Regional Boards of the SWRCB.
- G. SMARTS: Storm Water Multiple Application and Report Tracking System. <https://smarts.waterboards.ca.gov/smarts/faces/SwSmartsLogin.jsp>
- H. SWRCB: State Water Resources Control Board is the State of California’s State Water Board, responsible for overseeing the permitting process for the SWPPP.
- I. SWPPP: Storm Water Pollution Prevention Plan, to be developed and certified by a QSD and to be implemented by a QSP. QSP shall direct Contractor on all aspects of the SWPPP.

1.5 SUBMITTALS AND RESPONSIBILITIES

- A. Follow submittal procedure outlined in Section 01 10 00, Supplemental General Requirements.
- B. The Contractor shall ensure that a QSD prepares a site-specific State of California Storm Water Pollution Prevention Plan (SWPPP) in PDF format and uploads it to the State Water Resources Control Board's SMARTS system. The Owner will review the submittal and approve it in the SMARTS system, for review by the SWRCB.
- C. The preparation of the SWPPP shall be in accordance with the State Regional Water Quality Control Board General Permit Order No. 2022-0057-DWQ.
- D. Permit Registration Documents (PRDs) as defined in Attachment B of the Construction General Permit include the Notice of Intent, Risk Assessment, Post-Construction Calculations, a Site Map, the SWPPP, a signed certification statement by the LRP, and the first annual fee. The Contractor shall ensure the preparation of PRDs on behalf of the Owner and that the Owner supplies the signed LRP certification statement. The Owner will electronically review and approve the PRDs to the State Water Resources Board via the SMARTS system, after they have been uploaded to the SMARTS system.
- E. The Contractor shall ensure that electronic PDF files of the project PRDs have been submitted to the SMARTS system on behalf of the Owner within fifteen (15) calendar days after Notice of Award. No construction work shall begin until the Contractor receives written notification from the Owner that the Permit Registration Documents components have been deemed complete by the SMARTS system and a Waste Discharge Identification (WDID) number has been emailed to the Owner by the system.
- F. The Contractor shall ensure that the project SWPPP is prepared and certified by a Qualified SWPPP Developer (QSD). The Contractor shall ensure that all elements of the project SWPPP will be implemented by a Qualified SWPPP Practitioner (QSP). Both the QSD and QSP must meet the Construction General Permit certification requirements.
- G. The Contractor shall implement, maintain and be responsible for collection and input of data and for the effectiveness of the SWPPP measures in accordance with the Risk Level as determined by the Risk Assessment procedure as described in the General Permit Appendix 1. It is the responsibility of the Contractor's QSD to determine the Risk Level per the General Permit requirements.
- H. The Contractor shall maintain a rain gauge at the site and record daily (Monday through Friday) rainfall amounts until the project is complete.
- I. The project SWPPP, at a minimum, shall be prepared to address the following:
  - 1. All known/potential pollutants and their sources associated with construction activities.
  - 2. All non-storm water discharges are identified and either eliminated, controlled, or treated.
  - 3. Best Management Practices (BMPs) are effective and result in the reduction or elimination of pollutants in storm water discharges and authorized non-storm water discharges during construction.
  - 4. Stabilization BMPs installed to reduce or eliminate pollutants after construction are completed, effective, and maintained.

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- J. The project SWPPP shall be made available at the construction job site during working hours while construction is occurring and shall be made available upon request by the Owner or State Inspector.
- K. The Contractor shall notify the Owner if either the QSD or QSP is no longer associated with the work. The Owner shall be notified, and a qualified replacement shall be named within twenty-four (24) hours.
- L. The Contractor shall ensure that SWPPP Amendment documents, if required, are submitted to the State SMARTS system on behalf of the Owner. Inform the Owner after documents are uploaded to the system so the Owner may process them in the system as required. SWPPP Amendments shall be provided at a minimum of once every three (3) months, if required. If a SWPPP Amendment is not needed, the QSD and QSP shall send notification to the Owner stating "Amendment is not necessary" for the period of construction.
- M. The Contractor shall ensure that all documentation required for Annual Reporting and the Notice of Termination are submitted to the SMARTS system in PDF format in a timely manner as required by the SWRCB. Inform the Owner when documents are ready for Owner certification in the SMARTS system.

### 1.6 PERMIT VIOLATIONS

- A. If there is a Permit violation, the Contractor shall notify the Owner immediately and corrections shall be made as necessary to comply with the General Permit.
- B. The Contractor is responsible for any fines, and additional sampling, testing and monitoring that result from their negligence to comply with the General Permit requirements without any compensation from the Owner. If the Owner is forced to pay any fines or fees to the SWRCB due to the negligence of the Contractor to comply with the General Permit requirements, the costs shall be deducted from the Contractor's contract value.
- C. If the Regional Water Quality Board or Owner Representative is at the site, the Contractor shall notify the Owner within twenty-four (24) hours and shall provide a written notice of any deficiencies noted and/or changes requested by the inspector.
- D. Violation of the General Permit may cause the Owner to issue a stop-work notice and take necessary actions to require the Contractor to correct and comply with the Permit requirements and regulations. All costs related to the stop-work action and corrective work to comply with the General Permit shall be at the sole expense of the Contractor.

## PART 2 - PRODUCTS

### 2.1 PRODUCTS AND MATERIALS

- A. Products and materials used in the implementation of this work shall be as identified by the approved SWPPP plan and determined by the QSD.

### PART 3 - EXECUTION

#### 3.1 SUMMARY

- A. All construction or demolition activity, including, but not limited to, clearing, grubbing, grading, or excavation, or any other activity that results in a land disturbance shall be subject to the State Water Resources Control Board Construction General Permit Order No. 2022-0057-DWQ.
- B. In compliance with the State and Federal regulations on construction storm water management and urban runoff pollution control, no pollutants will be allowed to enter the storm drainage system.
- C. The Contractor shall coordinate with the Owner to ensure the delivery of all engineering, material, labor and equipment for planning, documenting, submitting, monitoring, testing, installing, implementation and maintenance of all surface-water pollution prevention and erosion control measures. This work includes but is not necessarily limited to:
  - 1. Providing a Qualified SWPPP Practitioner (QSP) for monitoring and implementation.
  - 2. Implementing the site-specific Storm Water Pollution Prevention Plan (SWPPP).
  - 3. Furnishing, placing, and installing effective measures for preventing runoff of soil, silts, gravel, hazardous chemicals or other materials prohibited by the Regional Water Quality Control Board (RWQCB) from entering the storm water drainage system.
  - 4. Management of on-site construction materials in such a manner as to prevent said materials from contacting storm water or wash water and running off into the storm drain system.
  - 5. Complying with applicable standards and regulations specified herein.
  - 6. Maintaining the most current revised SWPPP plan at the Contractor's work site.
  - 7. Reviewing any changes in the SWPPP plan at the weekly progress meetings. The Contractor shall submit a numbered checklist of the current status of each prevention measure on the job site.
- D. In this section, the term "storm drain system" shall include: storm water conduits; storm drain inlets; and other storm drain structures, street gutters, channels, and ditches.
- E. Contractor shall have storm water pollution prevention measures in place and conduct inspections daily or as required by RWQCB requirements. Contractor's QSP shall develop a Rain Event Action Plan as required by the requirements, and Contractor shall bear the costs of all Likely Precipitation Events, and all Qualifying Rain Events. It is the responsibility of the Contractor to be prepared for a rain event in the non-rainy and rainy season, and to be aware of weather predictions. The Owner is not responsible for informing the Contractor of rain predictions.

#### 3.2 PERMIT VIOLATIONS

- A. If there is a Permit violation, the Contractor shall notify the Owner immediately and corrections shall be made as necessary to comply with the General Permit.

- B. The Contractor is responsible for any fines, and additional sampling, testing and monitoring that result from their negligence to comply with the General Permit requirements without any compensation from the Owner. If the Owner is forced to pay any fines or fees to the SWRCB due to the negligence of the Contractor to comply with the General Permit requirements, the costs shall be deducted from the Contractor's contract value.
- C. If the Regional Water Quality Board or City inspector is at the site, the Contractor shall notify the Owner within twenty-four (24) hours and shall provide a written notice of any deficiencies noted and/or changes requested by the inspector.
- D. Violation of the General Permit may cause the Owner to issue a stop-work notice and take necessary actions to require the Contractor to correct and comply with the Permit requirements and regulations. All costs related to the stop-work action and corrective work to come into compliance with the General Permit shall be at the sole expense of the Contractor.

END OF SECTION 015723

SECTION 024119 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. The Work of this Section Includes:

1. Demolition and removal of selected building or structure and site elements.
2. Removal and salvage of existing items for delivery to Owner and removal of existing items for reinstallation.

B. Related Requirements:

1. Section 011000 "Summary" for restrictions on use of the premises, Owner-occupancy requirements, and phasing requirements.
2. Section 015639 "Temporary Tree and Plant Protection" for temporary protection of existing trees and plants that are affected by selective demolition.
3. Section 260500 "Common Work Results for Electrical".
4. Section 311000 "Site Clearing" for site clearing and removal of above and below grade improvements not part of selective demolition.

1.2 DEFINITIONS

- A. Remove: Detach items from existing construction and legally dispose of off-site unless indicated to be removed and salvaged or removed and reinstalled.
- B. Remove and Salvage: Detach items from existing construction, in a manner to prevent damage, and deliver to Owner as indicated.
- C. Remove and Reinstall: Detach items from existing construction, in a manner to prevent damage; prepare for reuse; and reinstall where indicated.
- D. Existing to Remain: Existing items of construction that are not to be removed.

1.3 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition waste becomes property of Contractor.
- B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.
  1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.4 PREINSTALLATION MEETINGS

- A. Predemolition Conference: Conduct conference at Project Site.
  - 1. Inspect and discuss condition of construction to be selectively demolished.
  - 2. Review structural load limitations of existing structure.
  - 3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
  - 4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
  - 5. Review areas where existing construction is to remain and requires protection.

1.5 INFORMATIONAL SUBMITTALS

- A. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property for dust control and for noise control. Indicate proposed locations and construction of barriers.
- B. Schedule of Selective Demolition Activities: Indicate the following:
  - 1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity.
  - 2. Interruption of utility services. Indicate how long utility services will be interrupted.
  - 3. Coordination for shutoff, capping, and continuation of utility services.
- C. Predemolition Photographs or Video: Show existing conditions of adjoining construction, including finish surfaces, that might be misconstrued as damage caused by salvage and demolition operations. Comply with Section 013233 "Photographic Documentation." Submit before Work begins.
- D. Warranties: Documentation indicating that existing warranties are still in effect after completion of selective demolition.

1.6 CLOSEOUT SUBMITTALS

- A. Inventory: Submit a list of items that have been removed and salvaged.

1.7 FIELD CONDITIONS

- A. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- B. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

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- C. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
  - 1. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.
- D. Storage or sale of removed items or materials on-site is not permitted.
- E. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

### 1.8 COORDINATION

- A. Arrange selective demolition schedule so as not to interfere with Owner's operations.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Standards: Comply with ANSI/ASSP A10.6 and NFPA 241.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting selective demolition operations.
- B. Review Project Record Documents of existing construction or other existing condition and hazardous material information provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.
- C. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs or video.
  - 1. Inventory and record the condition of items to be removed and salvaged.

### 3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.

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- B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off utility services and mechanical/electrical systems serving areas to be selectively demolished.
  - 1. Arrange to shut off utilities with utility companies.
  - 2. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of site.

### 3.3 PROTECTION

- A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
  - 1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of site.
  - 2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
- B. Remove temporary barricades and protections where hazards no longer exist.

### 3.4 SELECTIVE DEMOLITION, GENERAL

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
  - 1. Proceed with selective demolition systematically.
  - 2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
  - 3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
  - 4. Do not use cutting torches until work area is cleared of flammable materials. Maintain portable fire-suppression devices during flame-cutting operations.
  - 5. Maintain fire watch during and for at least four hours after flame-cutting operations.
  - 6. Maintain adequate ventilation when using cutting torches.
  - 7. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
  - 8. Dispose of demolished items and materials promptly.
- B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
- C. Removed and Reinstalled Items:
  - 1. Clean and repair items to functional condition adequate for intended reuse.
  - 2. Pack or crate items after cleaning and repairing. Identify contents of containers.

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3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make items functional for use indicated.

- D. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and reinstalled in their original locations after selective demolition operations are complete.

### 3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

- A. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw and then remove concrete between saw cuts.
- B. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, and then remove masonry between saw cuts.
- C. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished and then break up and remove.

### 3.6 DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove demolition waste materials from Project site and recycle or dispose of them according to Section 017419 "Construction Waste Management and Disposal"
- B. Do not allow demolished materials to accumulate on-site.
  1. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- C. Burning: Do not burn demolished materials.

### 3.7 CLEANING

- A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 024119

SECTION 031000 - CONCRETE FORMING AND ACCESSORIES

PART 1 – GENERAL

1.1 SUMMARY

- A. Section Includes: All labor, materials and equipment and all operations required to complete all formwork as indicated on the drawings; to produce shapes and configurations as shown, as required; and as specified herein, including:
  - 1. Forms, shores, bracing, removal and other operations as necessary for all cast-in-place concrete and masonry placed.
  - 2. Setting and securing anchor bolts and other metal items embedded in concrete into formwork, using materials and layouts furnished and delivered to jobsite as specified under other sections.
- B. Related Sections:
  - 1. Pertinent Sections of Division 03 specifying concrete construction.
  - 2. Pertinent Sections of other Divisions specifying work to be embedded in concrete or work penetrating concrete foundations and formwork.

1.2 REFERENCES

- A. California Code of Regulations, Title 24, latest adopted edition (herein noted as CBC): Chapter 19 Concrete.
- B. American Concrete Institute (ACI) PRC-347 "Guide to Formwork for Concrete".
- C. American Plywood Association (APA) "Concrete Forming Guide".
- D. West Coast Lumberman Inspection Bureau (WCLIB) "Standard Grading Rules for West Coast Lumber".
- E. ACI MNL-066 "ACI Detailing Manual".
- F. ACI SPEC-301 "Specifications for Concrete Construction".
- G. Concrete Reinforcing Steel Institute (CRSI) "Manual of Standard Practice".

1.3 DESIGN REQUIREMENTS

- A. Design, engineer, and construct formwork, shoring and bracing to conform to design and code requirements, resist imposed loads; resultant concrete to conform to required shape, line and dimension.

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### 1.4 SUBMITTALS

- A. Limitation of review: Structural Engineer's review will be required only where specifically requested for general architectural applications and features only. Contractor is responsible for structural stability, load-resisting characteristics and sufficiency of form work design.

### 1.5 QUALITY ASSURANCE

- A. General: All form materials shall be new at start of work. Produce high quality concrete construction. Minimize defects due to joints, deflection of forms, roughness of forms, nonconforming materials, concrete or workmanship.
- B. Reuse of Forms: Plywood forms may be reused, if thoroughly cleaned of all dirt, mortar, and foreign materials, and undamaged at edges and contact face. Reuse shall be subject to permission from the Landscape Architect without exception and issued in writing. Reuse of any panel which will produce a blemish on exposed concrete will not be permitted.

## PART 2 – PRODUCTS

### 2.1 MATERIALS

- A. Form Materials:
  - 1. Non-Exposed Surface Formwork Facing: Forms for concrete, which is not exposed to view, may be of plywood as specified for exposed surfaces, or square edge 1x nominal Douglas Fir, Construction Grade, S4S.
  - 2. Exposed Surface Formwork Facing:
    - a. Forms for all exterior and interior concrete flat surfaces unless otherwise specified as board formed shall be new Douglas Fir Plywood (APA) ply, 5/8-inch, B-B Plyform, Class 1, Exterior Type, oiled and edged and edge-sealed conforming to U.S. Product Standard PS 1 in large sheet sizes to achieve joint patterns shown.
    - b. All exposed concrete edges shall be chamfered 3/4" minimum or as noted on the drawings.
  - 3. Exposed Surface Formwork - Special Pattern Form Liner:
    - a. Forms for all exterior and interior concrete flat surfaces indicated shall be as designated by Landscape Architect.
- B. Earth Forms: Allowed, subject to soil standing in excavations without ravel or caving.
- C. Form Release Agent: Spray-on compound, not affecting color, bond or subsequent treatment of concrete surfaces. Maximum VOC content shall comply with local requirements and California Green Building Code.

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- D. Accessories: Types recommended by manufacturers or referenced standards to suit conditions indicated;
  - 1. Anchors, spacers, void in-fill materials: sized to resist imposed loads.
  - 2. Form Ties: Prefabricated rod, flat band, or wire snap ties with 1" break-back or threaded internal disconnecting type with external holding devices of adequate bearing area. Ties shall permit tightening and spreading of forms and leave no metal closer than 1" to surface.
- E. Corner Chamfers and Rustications: Filleted, wood strip or foam type; sizes and shapes as detailed, or 3/4 x 3/4-inch size minimum if not detailed; maximum possible lengths.
- F. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Sized as required, of sufficient strength and character to maintain formwork in place while placing concrete.
- G. Foam Block Formwork: For use only where specified on drawings to create void space under or within concrete. ASTM D6817.

Use Case	InsulFoam Geofoam (or equivalent)	Maximum Density (pcf)	Compressive Resistance at 1% Deformation (psi)	Compressive Resistance at 5% Deformation (psi)	Compressive Resistance at 10% Deformation (psi)
1) Void formwork	EPS-15	0.90	3.6	8.0	10.2
2) Planters	EPS-19	1.14	5.8	13.1	16.0
3) Pedestrian Loads (<=100psf)	EPS-22	1.35	7.3	16.7	19.6
4) Vehicular Loads and Sidewalks (<= 250psf)	EPS-39	2.40	15.0	35.0	40.0

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Inspect the substrate and the conditions under which concrete formwork is to be performed. Correct conditions are detrimental to timely and proper completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected. Commencement of work indicates acceptance of substrates and conditions.
- B. Verify lines, levels and centers before proceeding with formwork. Ensure that dimensions agree with drawings.

### 3.2 EARTH FORMS

- A. If natural soil or compacted fill can be accurately cut and maintained, foundations and grade beams may be poured against earth without forming. Provide positive protection of trench top corners.
- B. Maintain earth forms free of water and foreign materials.

### 3.3 ERECTION – FORMWORK

- A. General: Construct formwork in accordance with calculations, and recommendations of ACI PRC-347. Construct forms to the sizes, shapes, lines and dimensions shown, and as required to obtain accurate alignment, location, grades, level and plumb work in finished structure. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required. Use selected materials to obtain required finishes.
  - 1. Construct cambers specified in concrete members and slabs in the formwork.
  - 2. Schedule the work and notify other trades in ample time so that provisions for their work in the formwork can be made without delaying progress of the project. Install all sleeves, pipes, etc. for building services systems, or other work. Secure information about and provide for all openings, offsets, recessed nailing blocks, channel chases, anchors, ties, inserts, etc. in the formwork before concrete placement.
  - 3. Deflection: Formwork and concrete with excessive deflection after concrete placement will be rejected. Excessive deflection is that which will produce visible and noticeable waves in the finished concrete.
  - 4. Measure formwork for elevated structural slabs, columns, wall elevations points of maximum camber and submit in writing to the Engineer prior to placing concrete.
- B. Formwork Construction: Erect formwork, shoring and bracing to achieve design requirements, in accordance with requirements of ACI SPEC-301. Uniform, substantial and sufficiently tight to prevent leakage of concrete paste, readily removable without impact, shock or damage to cast-in-place concrete surfaces and adjacent materials. Tie, brace, shore, and support to insure stability against pressures from any source, without failure of any component part and without excessive deflection. Solidly butt joints and provide backup material at joints as required to prevent leakage and fins.
- C. Provide all openings, offsets, inserts, anchorages, blocking, and other features of the work as shown or required. See INSERTS, EMBEDDED PARTS, AND OPENINGS for detailed requirements.
- D. Warped, checked, or scuffed forms will be rejected.
- E. Maintain membranes, reinforcing and other work free of damage; protect with plywood runway boards or other positive, durable means.
- F. Align joints and make watertight. Keep form joints to a minimum.

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- G. Provide fillet and chamfer strips on external corners of exposed locations and as indicated to form patterns in finished work. Extend patterns around corners and into alcoves, on backs of columns and similar locations not otherwise shown.
  - 1. Produce beveled, smooth, solid, unbroken lines, except as otherwise indicated to conform to patterns.
  - 2. Form corners and chamfers with 3/4-inch x 3/4-inch strips, unless otherwise indicated, accurately formed and surfaced to produce uniformly straight lines and tight edge joints. Extend terminal edges to required limit and miter chamfer at changes in direction.
- H. Unexposed corners may be formed either square or chamfered.
- I. Ties and Spreaders: Arrange in a pattern acceptable to the Landscape Architect when exposed. Snap-ties may be used except at joints between pours where threaded internal disconnecting type shall be used.
- J. Coordinate this section with other sections of work that require attachment of components to formwork.
- K. Reglets and Rebates: Accurately locate, size, and form all reglets and rebates required to receive work of other trades, including flashing, frames, and equipment.

### 3.4 APPLICATION - FORM RELEASE AGENT

- A. Apply form release agent on formwork in accordance with manufacturer's recommendations.
- B. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.
- C. Do not allow excess form coating material to accumulate in the forms or to come into contact with reinforcement or surfaces which will be bonded to fresh concrete.
- D. Coat steel forms with a non-staining, rust-preventative form oil or otherwise protect against rusting. Rust-stained steel formwork will be rejected.
- E. Leave no residue or stain on the face of the concrete, nor affect bonding of subsequent finishes or work specified in other sections.

### 3.5 INSERTS, EMBEDDED PARTS, AND OPENINGS

- A. Provide formed openings where required for items to be embedded in passing through concrete work.
  - 1. Provide openings in concrete formwork to accommodate work of other sections including those under separate contracts (if any). Size and location of openings, recesses and chases shall be in accordance with the section requiring such items. Accurately place and securely support items to be built into forms.
- B. Construction Joints: Construct and locate generally as indicated on Drawings and only at locations approved by Structural Engineer, so as not to impair the strength of the structure. Form keys in all cold joints shown or required.

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- C. Locate and set in place items that will be cast directly into concrete.
- D. Rough Hardware and Miscellaneous Metal: Set inserts, sleeves, bolts, anchors, angles, and other items to be embedded in concrete. Set embedded bolts and sleeves for equipment to template and approved shop drawings prepared by trades supplying equipment.
- E. Coordinate with work of other sections in forming and placing openings, slots, reglets, recesses, sleeves, bolts, anchors, other inserts, and components of other work.
- F. Wood Inserts and Nailers: Provide approved preservative-treated lumber. Set all required nailing blocks, grounds, and other inserts as required to produce results shown. Wood plugs shall not be used.
- G. Install accessories in accordance with manufacturer's instructions, so they are straight, level, and plumb. Ensure items are not disturbed during concrete placement.
- H. Piping: Do not embed piping in structural concrete unless locations are specifically approved by Structural Engineer.
- I. Conduit: Place conduit below slabs-on-grade and only as specifically detailed on structural drawings. Minimum clear distance between conduits shall be 3 diameters. Location shall be subject to Engineer's written approval and shall not impair the strength of the structure.
- J. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain.
  - 1. Provide openings for the introduction of vibrators at intervals necessary for proper placement.
  - 2. Close temporary openings with tight fitting panels, flush with inside face of forms, and neatly fitted so joints will not be apparent in exposed concrete surfaces.
- K. Install Form Liner inserts in accordance with manufacturer's recommendations, to produce patterns and textures indicated.
- L. Install waterstops in accordance with manufacturer's recommendations to provide continuous waterproof barrier.

### 3.6 FORM CLEANING

- A. Clean forms as erection proceeds, remove foreign matter within forms.
- B. Clean formed cavities of debris prior to placing concrete.
  - 1. Remove all dirt, chips, sawdust, rubbish, water and foreign materials detrimental to concrete.
  - 2. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.

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### 3.7 FOOTINGS

- A. Verify elevations and provide final excavation required for footings prior to placing of concrete.

### 3.8 EQUIPMENT BASES

- A. Form concrete bases for all mechanical and electrical equipment in accordance with approved shop details furnished by other sections.
- B. Sizes and locations as indicated and as required to produce results shown.
- C. Provide coved base for all equipment bases placed on concrete slabs.

### 3.9 FORMWORK TOLERANCES

- A. Construct formwork to maintain tolerances required by ACI SPEC-301.

### 3.10 FOAM BLOCK FORMWORK

- A. Blocks shall be placed on prepared leveling course for level bearing. Place adjacent blocks in tight contact together. Where placed in multiple layers, orient long axis of upper layer at 90° to lower layer, and so forth for subsequent layers. Anchor blocks as required to prevent movement prior to and during concrete placement. Do not expose to hydrocarbons, solvents, or coal tar.

### 3.11 FIELD QUALITY CONTROL

- A. Inspect erected formwork, shoring, and bracing to ensure that work is in accordance with formwork design, and to verify that supports, fastenings, wedges, ties, and items are secure.
- B. Do not reuse wood formwork more than 2 times for concrete surfaces to be exposed to view. Do not patch formwork.
- C. Clean and repair surfaces to be re-used in the work. Split, frayed, delaminated or otherwise damaged form facing material will not be acceptable. Apply new form coating compound material to concrete contact surfaces as specified for new formwork.
- D. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close all joints. Align and secure joints to avoid offsets.

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### 3.12 FORM REMOVAL

- A. Do not loosen or remove forms before minimum curing period has elapsed without employment of appropriate alternate curing methods, approved by the Landscape Architect in writing.
- B. Remove forms without damage to the concrete using means to ensure complete safety of the structure and without damage to exposed beams, columns, wall edges, chamfers and inserts. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.
- C. Do not remove forms until the concrete has hardened sufficiently to permit safe removal and the concrete has attained sufficient strength to safely support imposed loads. The minimum elapsed time for removal of forms after concrete has been placed shall be as follows:
  - 1. Columns and Walls: 7 days, provided members are not subjected to overhead loads.
  - 2. Retaining Walls: 21 days minimum.
  - 3. Footings: 7 days minimum. If backfilled immediately, side forms may be removed 24 hours after concrete is placed.
  - 4. Beams, elevated slab, and similar overhead conditions: 28 days unless adequate shoring is provided.
- D. Durations listed above are minimums and are subject to extension at the sole judgment of the Engineer.
- E. Reshoring: Reshore members where and if required by Formwork Design Engineer.
- F. Do not subject concrete to superimposed loads (structure or construction) until it has attained full specified design strength, nor for a period of at least 14 days after placing.
- G. Store removed forms to prevent damage to form materials or to fresh concrete. Discard damaged forms.

### 3.13 CLEANING

- A. Remove excess material and debris associated with this work from the job site.

END OF SECTION

SECTION 032000 - CONCRETE REINFORCING

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes:

1. Reinforcing steel work for all concrete and masonry work as indicated on the drawings and specified herein.
2. Coordinate this work with other work affected by these operations, such as forms, electrical work, mechanical work, structural steel, masonry and concrete.

B. Related Sections:

1. Pertinent Sections of Division 01 specifying Quality Control and Testing Laboratory services.
2. Pertinent Sections of Divisions 03 specifying concrete construction.
3. Pertinent Sections of Divisions 04 specifying masonry construction.
4. Pertinent Sections of other Divisions specifying work to be embedded in concrete or work penetrating concrete work.

1.2 REFERENCE STANDARDS

- A. California Code of Regulations, Title 24, latest adopted edition (herein noted as CBC) Chapter 19 Concrete.
- B. American Concrete Institute (ACI) SPEC-301 "Specifications for Concrete Construction".
- C. ACI CODE-318 "Building Code Requirements for Structural Concrete and Commentary".
- D. ACI MNL-066 "ACI Detailing Manual".
- E. ASTM International (ASTM) A1064 "Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete".
- F. ASTM A615 "Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement".
- G. ASTM A706 "Standard Specification for Deformed and Plain Low-Alloy Steel Bars for Concrete Reinforcement".
- H. American Welding Society (AWS) D1.4 – "Structural Welding Code - Steel Reinforcing Bars".
- I. Concrete Reinforcing Steel Institute (CRSI) - "Manual of Standard Practice".
- J. CRSI - "Placing Reinforcing Bars".

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### 1.3 SUBMITTALS

- A. Submit in accordance with pertinent sections of Division 01 specifying submittal procedures. Submit for review prior to fabrication.
- B. Limitation of Review: Structural Engineer's review will be for general conformance with design intent as indicated in the Contract Documents and does not relieve Contractor of full responsibility for conformance with the Contract Documents. The General Contractor shall review and approve shop drawings prior to submittal to the Engineer.
- C. Shop Drawings: Show complete fabrication and placing details of all reinforcing steel. Comply with requirements of ACI MNL-66. Include:
  - 1. Bar sizes and schedules;
  - 2. Shapes of bent bars, layout and spacing of bars, location of splices.
  - 3. Stirrup spacing, arrangements and assemblies,
  - 4. References to Contract Document detail numbers and designations.
  - 5. Wall elevations corresponding to elevations shown in Contract Documents.
- D. Product Data: Submit manufacturer's product data, specifications, location and installation instructions for proprietary materials and reinforcement accessories. Provide samples of these items upon request.
- E. Certificates: Submit all certifications of physical and chemical properties of steel for each heat number as manufactured, including location of material in structure as specified below in Article titled QUALITY ASSURANCE. All materials supplied shall be tagged with heat numbers matching submitted Mill Test Report analyses.
- F. Samples: Provide to the Owner's Testing laboratory as specified in Article SOURCE QUALITY CONTROL.

### 1.4 QUALITY ASSURANCE

- A. Perform work of this Section in accordance with the CRSI "Manual of Standard Practice", CRSI "Placing Reinforcing Bars", ACI SPEC-301, and ACI CODE-318.
- B. Requirements of Regulatory Agencies, refer to pertinent Sections of Division 01 and CBC.
- C. Certification and Identification of Materials and Uses: Provide Owner's Testing Agency with access to fabrication plant to facilitate inspection of reinforcement. Provide notification of commencement and duration of shop fabrication in sufficient time to allow inspection and all material identification/test information listed below.
  - 1. Provide manufacturer's Mill Test Reports for all materials. Include chemical and physical properties of the material for each heat number manufactured. Tag all fabricated materials with heat number.
  - 2. Provide letter certifying all materials supplied are from heat numbers covered by supplied mill certificates. Include in letter the physical location of each grade of reinforcing and/or heat number in the project (i.e. foundations, walls, etc.).

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3. Unidentified Material Tests: Where identification of materials by heat number to mill tests cannot be made, Owner's Testing Agency shall test unidentified materials as described below.
- D. Testing and Inspection: Tests and Inspections required by Independent Testing Agency are specified below in Articles SOURCE QUALITY CONTROL and FIELD QUALITY CONTROL. Duties and limitations of Independent Testing Agency, test costs and test reports in conformance with pertinent Sections of Division 01.

### 1.5 DELIVERY, STORAGE AND HANDLING

- A. Comply with pertinent requirements of Division 01.
- B. Deliver reinforcement to project site in bundles marked with durable tags indicating heat number, mill, bar size and length, proposed location in the structure and other information corresponding with markings shown on placement diagrams.
- C. Handle and store materials above ground to prevent damage, contamination or accumulation of dirt or rust.

## PART 2 – PRODUCTS

### 2.1 MATERIALS

- A. Reinforcing Steel: Deformed billet steel bars, ASTM A706 Grade 60 or ASTM A615 Grade 60.
  1. Welded reinforcement shall be ASTM A706, or A615 meeting carbon requirements of AWS D1.4. Welding shall conform with AWS D1.4.
  2. All reinforcement to be unfinished.
  3. ASTM A615 reinforcement at special structural concrete walls, concrete coupling beams, and special concrete moment frames shall have maximum yield stress of 78,000 psi and the tensile strength shall be greater than 125% of the actual yield strength. Test ASTM A615 reinforcement for conformance to these criteria prior to fabrication and/or installation.
- B. Welded Wire Reinforcement: ASTM A1064.
- C. Tie Wire: No. 16 AWG or heavier, black annealed.
- D. Concrete Blocks: On-grade conditions only, as required to support reinforcing bars in position.
- E. Reinforcing Supports: Plastic or galvanized steel chairs, bolsters, bar supports, or spacers sized and shaped for adequate support of reinforcement and construction loads imposed during concrete placement, meeting ACI and CRSI standards.
  1. For use over formwork: Galvanized wire bar type supports complying with CRSI recommendations. Provide plastic tips where exposed to view or weather after removal of formwork. Do not use wood, brick, or other unacceptable materials.

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- F. Reinforcement Splice Couplers: For use only where specified on drawings. Submit other locations proposed for use to Engineer for review. "L-Series Bar Lock" Coupler Systems for Splicing Reinforcement Bars, UES ER-0319, by Dayton-Superior Corporation.

### 2.2 FABRICATION

- A. Fabricate concrete reinforcing in accordance with CRSI (DA4), unless specifically shown otherwise. Details not specifically shown or indicated shall conform to SP-066 and specified codes and standards.
  - 1. Accurately shop-fabricate to shapes, bends, sizes, gauges and lengths indicated or otherwise required.
  - 2. Bend bars once only. Discard bars improperly bent due to fabricating or other errors and provide new material; do not re-bend or straighten unless specifically indicated. Rebending of reinforcement in the field is not allowed.
  - 3. Do not bend reinforcement in a manner that will injure or weaken the material or the embedding concrete.
  - 4. Do not heat reinforcement for bending. Heat-bent materials will be rejected.
- B. Unacceptable materials: Reinforcement with any of the following defects will not be permitted in the work.
  - 1. Bar lengths, depths and bends exceeding specified fabrication tolerances.
  - 2. Bends or kinks not indicated on Drawings or final shop drawings.
  - 3. Bars with reduced cross-section due to rusting or other cause.
- C. Tag reinforcement with durable identification to facilitate sorting and placing.
- D. Shop Fusion Welded Stirrup/Tie/Spiral Cages
  - 1. Shop fusion welding of stirrup/tie/spiral cages is permitted to aid in fabrication and handling. The following requirements shall be met.
  - 2. All reinforcing bars receiving weld shall be ASTM A706.
  - 3. Longitudinal holding wires shall be ASTM A1064.
  - 4. Shop welding shall be performed by machines under a continuous, controlled process.
  - 5. Quality control tests shall be performed on shop-welded specimens and the test results shall be available, upon request, to the Engineer.
  - 6. Tack welding of reinforcing steel is not permitted.
  - 7. Welding of any type shall not occur at 90°, 135°, or 180° bends. Circular ties and spirals may be shop fusion welded outside of areas with 90°, 135°, or 180° hook bends.
  - 8. Longitudinal bars shall not be welded to stirrups/ties/spirals.

### 2.3 SOURCE QUALITY CONTROL

- A. The Testing Agency, as specified in the Article QUALITY ASSURANCE, will perform the following:
  - 1. Material Testing:
    - a. Identified Steel: When samples are taken from bundled steel identified by heat number, matched with accompanying mill analyses as delivered from the mill, supplemental testing of reinforcing steel is not required.

- b. Unidentified Steel: When identification of materials by heat number matched to accompanying mill analyses cannot be made, perform one tensile test and one bend test per each two and one-half tons or fraction thereof for each required size of reinforcing steel. Tests of unidentified steel shall be performed by the Owner's Testing Agency and costs for these tests shall be paid by the Contractor by deductive change order.

### PART 3 – EXECUTION

#### 3.1 EXAMINATION

- A. Inspect the conditions under which concrete reinforcement is to be placed. Do not proceed with the work until unsatisfactory conditions have been corrected.
- B. Coordinate with work of other sections to avoid conflicts or interference. Bring conflicts between reinforcement and other elements to Landscape Architect's attention. Resolve conflicts before concrete is placed.
- C. Notify Structural Engineer, and Authority Having Jurisdiction for review of steel placement not less than 48 hours before placing concrete.

#### 3.2 PLACEMENT

- A. General: Comply with the specified codes and standards, and Concrete Reinforcing Steel Institute recommended practice for "Placing Reinforcing Bars", for details and methods of reinforcement placement and supports, and as herein specified.
- B. Clean bars free of substances which are detrimental to bonding. Maintain reinforcement clean until embedded in concrete.
- C. Place reinforcement to obtain the minimum coverages for concrete protection. Do not deviate from required position. Maintain required distance, spacing and clearance between bars, forms, and ground.
- D. Location and Support: Provide metal chairs, runners, bolsters, spacers and hangers, as required.
- E. Provide additional steel reinforcement as necessary or as directed, to act as spreaders or separators to maintain proper positioning.
- F. Tying and Attachment: Securely tie at all intersections and supports with wire. Prevent dislocation or movement during placement of concrete. Direct twisted ends of wire ties away from exposed concrete surfaces.
- G. Separate reinforcing from pipes or conduits with approved non-metallic separators. Do not use wood or steel form stakes or reinforcement used as stakes as support for reinforcement.
- H. Accommodate placement of formed openings required by other sections.

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- I. Obstructions:
  - 1. Where obstructions, block-outs, or penetrations (conduits, raceways, ductwork) prevent continuous placement of reinforcement as indicated, provide additional reinforcing as detailed and as directed by the Structural Engineer to supplement the indicated reinforcement around the obstruction.
  - 2. Place additional trim bars, ties, stirrups, or other elements as detailed and as directed at all opening, sleeves, pipes or other penetrations through structural elements.
  
- J. Welded Wire Reinforcement: Reinforce slabs with 6"x 6"-W1.4 x W1.4 welded wire reinforcement reinforcing, unless otherwise noted on drawings.
  - 1. Provide flat sheets only, no rolls. Straighten, cut to required size, and lay out flat in place.
  - 2. Securely wire-tie reinforcement to other reinforcement at frequent intervals.
  - 3. Extend reinforcement over supporting beams and walls, and to within 1 inch of edge of slabs, construction joints, and expansion joints.
  - 4. Support reinforcement in mid-depth of slab.
  - 5. Lift reinforcement at intervals as slab concrete is placed, ensure proper embedment.

### 3.3 REINFORCING SPACING AND COVERAGE

- A. Spacing: Do not space bars closer than four (4) diameters of the largest of two adjacent bars, except at bar laps, which shall be placed such that a minimum of 2 bar diameters is clear between bars.
  
- B. Where reinforcing in members is placed in two layers, the distance between layers shall not be less than four bar diameters of the largest bar and the bars in the upper layers shall be placed directly above those in the bottom layer, unless otherwise detailed or dimensioned.
  
- C. Coverage of bars (including stirrups and columns ties) shall be as follows, unless otherwise shown:
  - 1. Concrete cast against earth or grade: 3 inches.
  - 2. Concrete exposed to weather or formed and exposed to earth:
    - a. #5 & smaller: 1-1/2 inches.
    - b. #6 & larger: 2 inches.
  - 3. Concrete not exposed to earth or weather:
    - a. #5 & smaller: 1 inch.
    - b. #6 & larger: 1-1/2 inches.

### 3.4 DOWELS, SPLICES, OFFSETS AND BENDS

- A. Provide standard reinforcement splices at splices, corners, and intersections by lapping ends, placing bars in contact, and tightly tying with wire at each end. Comply with details shown on structural drawings and requirements of ACI CODE-318.
  
- B. Provide minimum 1-1/2-inch clearance between sets of splices. Stagger splices in horizontal bars so that adjacent splices will be 4 feet apart.

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- C. Laps of welded wire reinforcement shall be at least two times the spacing of the members in the direction lapped but not less than twelve inches.
- D. Splices of reinforcement shall not be made at points of maximum stress. Provide splice lengths as noted on the structural drawings, with sufficient lap to transfer the stress between bars by bond and shear.
- E. Spacing:
  - 1. Space bars minimum distance specified and all lapped bars 2 bar diameters (minimum) clear of the next bar.
  - 2. Stagger splices of adjacent bars where possible and where required to maintain bar clearance.
  - 3. Beam or slab top bars shall be spliced mid-span of column support and bottom bars spliced at column supports.
  - 4. Request Engineer review prior to placement for all splices not shown on the drawings.
- F. Reinforcement Couplers: Install at all locations indicated. Install couplers in accordance with manufacturer's recommendations.

### 3.5 WELDING

- A. No reinforcing shall be welded unless specifically indicated. No reinforcing shall be welded without prior approval of the Structural Engineer and the Authority Having Jurisdiction.
- B. Only when so approved for use as noted above, all welding shall conform to AWS D1.4, ACI CODE-318, and the following;
  - 1. All welding performed by certified welders.
  - 2. All reinforcement requires preheat prior to welding. All preheat and welding shall be continuously inspected by the Testing Agency.

### 3.6 MISPLACED REINFORCEMENT

- A. Notify Engineer immediately if reinforcing bars are known to be misplaced after concrete has been placed.
- B. Perform no correction or cutting without specific direction. Do not bend or kink misplaced bars.
- C. Correct misplaced reinforcing only as directed in writing by the Engineer. Bear all costs of redesign, new, or additional reinforcing required because of misplaced bars at Contractor's expense.

### 3.7 FIELD QUALITY CONTROL

- A. The Testing Agency as specified in the Article QUALITY ASSURANCE, will inspect the work for conformance to contract documents before concrete placement.

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1. Inspection: Provide inspection and verification of installed reinforcement. Confirm that the surface of the rebar is free of form release oil or other coatings.
2. Inspect all preheat and welding activities for steel reinforcement, when these occur.
3. Exception: Shallow foundations & non-structural slabs-on-grade supporting buildings of no greater than three stories and either of concrete design strength 2500psi (or greater) or supporting light-frame construction do not require special inspection. Non-structural patios, driveways, and sidewalks do not require special inspection.

### 3.8 CLEANING

- A. Remove excess material and debris associated with this work from the job site.

END OF SECTION

SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 – GENERAL

1.1 SUMMARY

- A. Section Includes: Provide all labor, materials, equipment and services to complete all concrete work required, including, but not limited to, the following:
  - 1. Foundations, beams, columns, elevated slabs, slabs-on-ground, walls, and retaining walls.
  - 2. Installation of all bolts, inserts, sleeves, connections, etc. in the concrete.
  - 3. Joint devices associated with concrete work.
  - 4. Miscellaneous concrete elements, including, but not limited to equipment pads, light pole bases, flagpole bases, thrust blocks, and manholes.
  - 5. Concrete curing.
  - 6. Coordination with other sections:
    - a. Make all preparations and do all work necessary to receive or adjoin other work. Install all bolts and anchors, including those furnished by other sections, into formwork and provide all required blocking.
    - b. Install all accessories embedded in the concrete and provide all holes, blockouts and similar provisions necessary for the work of other sections. Provide all patching or cutting made necessary by failure or delay in complying with this requirement at the Contractor's expense.
    - c. Coordinate with other sections for the accurate location of embedded accessories.
  
- B. Related Sections:
  - 1. Pertinent Sections of Division 01 specifying Quality Control and Testing Laboratory services.
  - 2. Pertinent Sections of Division 03 specifying concrete construction.
  - 3. Pertinent Sections of other Divisions specifying work to be embedded in concrete or work penetrating concrete.
  - 4. Pertinent sections of other Divisions specifying floor finishes and sealants applied to concrete substrates.

1.2 REFERENCES

- A. California Code of Regulations, Title 24, latest adopted edition (herein noted as CBC) Chapter 19 Concrete.
- B. American Concrete Institute (ACI) PRC-211.1 "Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete"
- C. ACI PRC-213 "Guide for Structural Lightweight-Aggregate Concrete".
- D. ACI SPEC-301 "Specifications for Concrete Construction".

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- E. ACI PRC-302.1 "Guide for Concrete Floor and Slab Construction".
- F. ACI PRC-304 "Guide for Measuring, Mixing, Transporting, and Placing Concrete".
- G. ACI SPEC-305.1 "Specification for Hot Weather Concreting".
- H. ACI SPEC-306.1 "Standard Specification for Cold Weather Concreting".
- I. ACI SPEC-308.1 "Specification for Curing Concrete".
- J. ACI CODE-318 "Building Code Requirements for Structural Concrete and Commentary".

### 1.3 SUBMITTALS

- A. Submit in accordance with pertinent sections of Division 01 specifying submittal procedures. The General Contractor shall review and approve shop drawings prior to submittal to the Engineer. Submittals that do not meet these requirements will be returned for correction without review. Submit for review prior to fabrication.
- B. Limitation of Review: Structural Engineer's review will be for general conformance with design intent as indicated in the Contract Documents and does not relieve Contractor of full responsibility for conformance with the Contract Documents.
- C. Product Data: Submit manufacturers' data on manufactured products and other concrete related materials such as bond breakers, cure/sealer, admixtures, etc. Demonstrate compliance with specified characteristics. Provide samples of items upon request.
- D. Mix Designs: Submit Mix Designs for each structural concrete type required for work per requirements of articles CONCRETE MIXES and QUALITY ASSURANCE. Resubmit revised designs for review if original designs are adjusted or changed for any reason. Non-Structural mixes need not be submitted for review by Structural Engineer.
- E. Shop Drawings: Proposed location of construction and cold joints. Proposed location of all slab construction/dowel joints, control joints, and blockouts.
- F. Manufacturer's Installation Instructions: Indicate installation procedures and interface required with adjacent construction for concrete accessories.
- G. Batch Plant Ticket: Include with delivery of each load of concrete. Provide ticket to the Testing Agency and the Engineer as separate submittals. Concrete delivered to the site without such ticket shall be rejected and returned to the plant. Each ticket shall include all information specified in Article SOURCE QUALITY CONTROL below.
- H. Engineering Analysis: Prepared by a California-licensed Civil or Structural Engineer, justifying construction-imposed loads on slabs, beams, and walls which exceed those allowed by CBC for the specified use.
  - 1. 2000 lbs maximum allowable construction load without analysis.
  - 2. 10,000 lbs maximum allowable construction load with analysis.
- I. Project Record Documents: Accurately record actual locations of embedded utilities and components that will be concealed from view upon completion of concrete work.

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### 1.4 QUALITY ASSURANCE

- A. Perform work of this section in accordance with ACI SPEC-301 and ACI CODE-318.
- B. Concrete construction verification and inspection to conform to CBC 1705.3.
- C. Common Sourcing: Provide each of the following materials from consistent sources for entire project.
  - 1. Cement.
  - 2. Fly ash.
  - 3. Aggregate.
  - 4. Slag Cement.
- D. Follow requirements of ACI SPEC-305.1 when concreting during hot weather. Follow requirements of ACI SPEC-306.1 when concreting during cold weather.
- E. Services by the Independent Testing Agency (includes "Special" Inspections) as specified in this Section and as follows:
  - 1. Perform tests and inspections specified below in articles SOURCE QUALITY CONTROL and FIELD QUALITY CONTROL. Duties and limitations of Independent Testing Agency, test costs and reports to be in conformance with pertinent Sections of Division 01.
- F. Contractor shall bear the entire cost of remediation, removal, and/or replacement of concrete determined defective or non-conforming, including Engineer fees for redesign.

### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Materials specified by brand name shall be delivered in unbroken packages bearing manufacturer's label and shall be brand specified or an approved equal.
- B. Delivery, Handling and Storage of other materials shall conform to the applicable sections of the current editions of the various reference standards listed in this Section.
- C. Protect materials from weather or other damage. Sort to prevent inclusion of foreign materials.
- D. Specific Requirements:
  - 1. Cement: Protect against dampness, contamination, and warehouse set. Store in weather tight enclosures.
  - 2. Aggregates: Prevent excessive segregation, or contamination with other materials or other sizes of aggregates. Use only one supply source for each aggregate stockpile.
  - 3. Admixtures:
    - a. Store to prevent contamination, evaporation, or damage.
    - b. Protect liquid admixtures from freezing and extreme temperature ranges.
    - c. Agitate emulsions prior to use.

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### 1.6 ENVIRONMENTAL REQUIREMENTS

- A. Cold Weather (Freezing or near-freezing temperatures) per ACI SPEC-306.1:
  - 1. Heat concrete materials before mixing, as necessary to deposit concrete at a temperature of at least 50°F but not more than 90°F.
  - 2. Do not place concrete during freezing, near-freezing weather, snow, rain or sleet unless protection from moisture and/or cold is provided.
  - 3. Protect from freezing and maintain at a temperature of at least 50°F for not less than seven days after placing. Take special precautions to protect transit-mixed concrete.
  - 4. No salts, chemical protection or admixture are permitted without written approval of Engineer.
  - 5. Contractor shall maintain an air temperature log for the first 7 days after placement with entry intervals not to exceed 8 hours.
  
- B. Hot Weather per ACI SPEC-305.1:
  - 1. Cool concrete materials before mixing, or add ice in lieu of mix water as necessary to deposit concrete at a temperature below 85°F.
  - 2. Do not place concrete in hot/windy weather without Engineer review of procedures.
  - 3. Provide sunshades and/or wind breakers to protect concrete during finishing and immediate curing operations. Do not place slab concrete at air temperature exceeding 90°F.
  - 4. Provide modified mix designs, adding retarders to improve initial set times and applying evaporation reducers during hot/windy weather for review by Independent Testing Agency prior to use.

### 1.7 SCHEDULING AND SEQUENCING

- A. Organize the work and employ shop and field crew(s) of sufficient size to minimize inspections by the Testing Agency.
  
- B. Provide schedule and sequence information to Testing Agency in writing upon request. Update information as work progresses.

## PART 2 – PRODUCTS

### 2.1 FORMWORK

- A. Comply with requirements of Section 03 1000.

### 2.2 REINFORCEMENT

- A. Comply with requirements of Section 03 2000.

2.3 MATERIALS

- A. General Requirements: All materials shall be new and best of their class or kind. All materials found defective, unsuitable, or not as specified, will be condemned and promptly removed from the premises.
- B. Cementitious Materials:
  - 1. Portland Cement: ASTM C150, Type II, low alkali conforming to CBC 1903.1.
  - 2. Fly Ash (Pozzolan): ASTM C618, Class F.
  - 3. Slag Cement: ASTM C989, Grade 100 or 120.
- C. Concrete Aggregates:
  - 1. Coarse and Fine Aggregates: ASTM C33; Stone aggregate and sand. Specific source aggregate and/or sand or shrinkage characteristics as required for class of concrete specified.
  - 2. Lightweight aggregate: ASTM C330 and C332.
  - 3. Source shall remain constant throughout the duration of the job. The exact portions of the fine aggregates and coarse aggregates to be used in the mix shall be determined by the mix design.
  - 4. Recycled concrete products: Returned plastic concrete may not be used in a mix. Recycled Concrete Aggregate (RCA) is not permitted. Reclaimed coarse aggregate is permitted and shall comply with ASTM C33. Reclaimed fine aggregate is not permitted.
- D. Water: ASTM C1602. Potable, clean, from domestic source.
- E. Admixtures: All admixtures shall be used in strict accordance with the manufacturer's recommendations. Admixtures containing calcium chlorides or other accelerators shall not be used without the approval of the Engineer and the Owner's Testing Laboratory.
  - 1. Normal or Mid Range Water Reducing Admixtures: ASTM C494 Type A, "MasterPozzolith" series or "MasterPolyheed" series by Master Builders Solutions, "WRDA" series by W.R. Grace, or equal.
  - 2. Water Reducing Admixture and Retarder: ASTM C494 Type B or D, "MasterSet R" series or "MasterSet DELVO" series by Master Builders Solutions, "Plastiflow-R" by Nox-crete, or equal.
  - 3. High Range Water-Reducing Admixtures: ASTM C494 Type F, "MasterRheoBuild 1000" or "MasterGlenium" series by Master Builders Solutions or equal.
  - 4. Air Entraining Admixtures: ASTM C260, "MasterAir" series by Master Builders Solutions or equal.
  - 5. Viscosity Modifiers: ASTM C494 Type S, "MasterMatrix VMA" series by Master Builders Solutions or equal..
- F. Slurry: Same proportion of cement to fine aggregates used in the regular concrete mix (i.e. only coarse aggregate omitted); well mixed with water to produce a thick consistency.
- G. High Strength Grout: See section 05 1200 or 05 1100 for requirements.

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- H. Dry Pack: Dry pack (used only for cosmetic concrete repairs) shall consist of:
1. One part cement to 2-1/2 parts fine aggregate (screen out all materials retained on No.4 sieve), mixed with a minimum amount of water, added in small amounts.
  2. Mix to consistency such that a ball of the mixture compressed in the hand will retain its shape, showing finger marks, but without showing any surface water.

### 2.4 ACCESSORIES

- A. Bonding Agent: ASTM C881, Type II Grade 2 Class B or C. Do not allow epoxy to set before placing fresh concrete.
1. "MasterEmaco ADH 326" by Master Builders Solutions;
  2. "Rezi-Weld 1000" by W.R. Meadows.
- B. Chemical Hardener: Fluorosilicate solution designed for densification of cured concrete slabs. "MasterKure HD 300 WB" by Master Builders Solutions, "LIQUI-HARD" W.R. Meadows Co, or equal.
- C. Moisture-Retaining Cover: ASTM C171, type 1, one of the following:
1. Regular Curing Paper, Type I, reinforced waterproof: Fortifiber Corporation "Orange Label Sisalkraft", "Pabcotite" paper, or equal.
  2. Polyethylene Film: ASTM D 2103, 4 mil thick, clear or white color.
  3. White-burlap-polyethylene sheet, weighing not less than 10 oz/per linear yd.
- D. Liquid Curing Compound: ASTM C 309, Type 1, Class B, clear or translucent, 25% minimum solids, water base acrylic cure/sealer which will not discolor concrete and compatible with bonding of finishes specified in related sections. W.R. Meadows Co. "Vocomp 25" or equal. Maximum VOC content shall comply with local requirements and California Green Building Code.
- E. Under Slab Water Vapor Retarder: Vapor retarder sheet to be ASTM E1745 Class A; 15 mil, single ply extruded polyolefin; permeance no greater than 0.01 U.S. Perms per ASTM E154, ASTM E96 procedure B or ASTM F1249.
1. "Stego Wrap Vapor Barrier (15mil)" by Stego Industries LLC.
  2. "Vaporguard" by Reef Industries.
  3. Approved Equal.
- F. Evaporation Reducer: "MasterKure ER 50", by Master Builders Solutions.
- G. Permeability Reducer: Use only where specifically referred to.
1. ASTM C494 Type S.
  2. Admixture Type: Xypex Chemical Corporation "XYPEX Admix C-500", Master Builders Solutions "MasterLife 300" series. Dosage: per manufacturer.
  3. Surface-Applied Type: Xypex Chemical Corporation "XYPEX Concentrate. Brush application: 1.25-1.50lb/sq. yd., 5 parts powder to 2 parts water. Master Builders Solutions "MasterSeal 500". Slurry coat: one part water to 2.25-2.5 parts powder by volume.
  4. Approved equal.

## 2.5 JOINT DEVICES AND MATERIALS

- A. Waterstops: Resilient type, meeting Corps of Engineers CRD-C 572. Consult manufacturer for appropriate product for specific use. Submit for review. Install per manufacturers recommendation. Provide W. R. Meadows "Seal Tight" PVC waterstop, Sika "Greenstreak" PVC waterstop, or approved equal.
- B. Expansion Joint Filler: ASTM D1751, Nonextruding, resilient asphalt impregnated fiberboard or felt, 3/8-inch thick and 4-inches deep; tongue and groove profile.
  - 1. Products: "Serviced Products", W.R. Meadows, Inc., "National Expansion Joint Company", "Celotex Corporation", or equal.
- C. Joint Filler: ASTM D944, Compressible asphalt mastic with felt facers, 1/4-inch thick and 4-inches deep.
- D. Sealant and Primer: As specified in Section 07 9000.
- E. Slab Joint Sealant: Compatible with floor finishes specified in related sections.

## 2.6 CONCRETE MIXES

- A. General requirements for mix design and submittal of structural class concrete:
  - 1. Provide Contractor submittals to Engineer not less than 15 days before placing concrete.
  - 2. Contractor shall review mix designs and proposed placing requirements prior to submittal for compatibility to ensure that the concrete as designed can be placed in accordance with the drawings and specifications.
  - 3. Changes or revisions require re-submittal: All variations to approved mix designs, including changing type and/or quantity of admixtures shall be resubmitted to the Engineer for review prior to use.
  - 4. Mix design(s) for all structural classes of concrete to be prepared by qualified person experienced in mix design. Allow for time necessary to do trial batch testing when required.
  - 5. Preparer to provide backup data and certify in writing that mix design meets:
    - a. Requirements of the specifications for concrete durability and quality;
    - b. Requirements of the California Building Code and ACI CODE-318, including break histories, trial batching test results, and/or a mix designed by a California Registered Civil Engineer per ACI CODE-318 and bearing the Engineer's seal & signature.
  - 6. Clearly note on mix designs with specified maximum W/CM if design permits addition of water on site or clearly identify in the mix design that no water is to be added on site.
  - 7. Deviations: Clearly indicate proposed deviations and provide written explanation explaining how the deviating mix design(s) will provide equivalent or better concrete product(s) than those specified.
  - 8. Include adjustments to reviewed mix designs to account for weather conditions and similar factors.

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- B. Proportioning - General: The following provisions apply to all mix designs:
1. Proportion concrete mixes to produce concrete of required average strength (as defined by ACI CODE-318). Select slump, aggregate sizes, shrinkage, and consistency that will allow thorough compaction without excessive puddling, spading, or vibration, and without permitting the materials to segregate, or allow free water to collect on the surface.
  2. Select aggregate size and type to produce dense, uniform concrete with low to moderate shrinkage, free from rock pockets, honeycomb and other irregularities.
  3. Mix designs may include water reducing and retarding admixtures to meet or exceed minimum set times (time required to place and finish) and to minimize Water-Cementitious Materials (W/CM). Minimum and maximum criteria presented in this section are guidelines and do not represent a specific mix design.
  4. Cement Content: Minimum cement content indicates minimum sacks of cementitious material. Increasing cement content to increase early strengths or to achieve specified W/CM while maintaining water content is discouraged in order to minimize effects of shrinkage.
    - a. Substitution of fly ash for Portland cement on an equivalent weight basis up to 25% replacement is permitted, except at high early strength concrete. Replacement in excess of 25% is not permitted unless part of a specified mix design that has been submitted for review.
    - b. Substitution of slag cement for Portland cement on an equivalent weight basis up to 45% replacement is permitted, except at high early strength concrete. Replacement in excess of 45% is not permitted unless part of a specified mix design that has been submitted for review.
    - c. Such substitution requests may be denied by the Engineer.
  5. Water Content: Mix designs with a specified maximum W/CM may be designed with a lower WCR than specified in order to allow addition of water at the site.
  6. Concrete Strength: Establish required average strength for each type of concrete on the basis of field experience or trial mixtures, as specified in ACI SPEC-301 and this section.
    - a. For trial mixtures method, employ independent testing agency acceptable to Engineer for preparing and reporting proposed mix designs.
  7. Placement Options: Mix designs may, at the Contractor's option, be designed for either pump or conventional placement with aggregate size, slumps, etc. to be maintained as specified in this section.
- C. Proportioning Normal Weight Concrete: Comply with ACI PRC-211.1 recommendations and this section.
- D. Proportioning Structural Light Weight Concrete: Comply with ACI PRC-213 recommendations and this section. Maximum cured weight of light weight concrete shall be 120 pounds per cubic feet. General Contractor is responsible for coordinating and providing light weight concrete density to meet the required fire assembly rating of the Construction Documents at the concrete depths provided in the structural drawings. General Contractor to notify the Structural Engineer for review if light weight concrete of the required density for the specified fire assembly rating cannot be sourced.

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### Mix Design Minimum Requirements:

Concrete Class	Coarse Aggregate Size (Inches) & Fine Aggregate <sup>3</sup>	Maximum W/CM or Maximum Nominal Slump & Tolerance (Inches) <sup>1,2</sup>	Minimum 28-Day Design Strength	Minimum Cement Sacks/per yd <sup>4</sup>
<b>NON-STRUCTURAL</b>				
1) Lean Concrete (use only where specified)	---	---	---	3.0
2) Exterior Slab on Ground (Walkways & Patios)	1" x #4	W/CM = .55	2,500	4.5
<b>STRUCTURAL</b>				
3) Foundation (including continuous footings, pad footings, stem walls)	1" x #4	W/CM = .53	3,000	5.0
4) Cast Slab Above Grade on Metal Deck	3/4" x #4	W/CM = .46	4,000	6.0
5) Retaining Walls	1" x #4	W/CM = .46	4,000	6.0

1. The tolerance is the maximum deviation allowable without rejection. The mix design shall be based on the nominal value specified and is without water reducing mixtures. Slump to be measured at the end of the hose.
2. The maximum W/CM is limited at time of placement as noted. No water is to be added on site such that the specified W/CM or maximum slump is exceeded without approval of the testing laboratory and the Engineer. Workability is to be achieved utilizing an acceptable mid-range to high range water reducing admixture.
3. Gradation of aggregate is per ACI CODE-318 and ASTM C33.
4. Minimum cement content includes all cementitious materials.
5. See Article 2.6E for additional requirements at interior slabs on ground.
6. See article 2.6F for additional requirements at high volume fly ash concrete.

### 2.7 MIXING CONCRETE

- A. Batch final proportions in accordance with approved mix designs. All adjustments to approved proportions, for whatever reason, shall be reviewed by the Engineer prior to use.
- B. Batch and mix concrete in accordance with ASTM C94, at an established plant. Site mixed concrete will be rejected.
- C. Provide batch and transit equipment adequate for the work. Operate as necessary to provide concrete complying with specified requirements.
- D. Place mixed concrete in forms within 1-1/2 hours from the time of introduction of cement and water into mixer or 300 revolutions of the drum whichever comes first. Use of, re-mixing, and/or tempering mixed concrete older than 1 hour will not be permitted.

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- E. Do not add water at the site to concrete mixes with a maximum specified W/CM unless the water content at batch time provides for a W/CM less than specified and this provision, including the quantity of water which may be added at the site, is specifically noted on the mix design and certification by the mix preparer. See ASTM C94 for additional requirements.

### 2.8 SOURCE QUALITY CONTROL

- A. Services by independent Testing Agency:
  - 1. Batch Plant Certificates: Obtain the weighmaster's Batch Plant Certificate at arrival of truck at the site. If no batch plant certificate is provided, recommend to the General Contractor that the truckload of concrete be rejected. So note in daily log, along with the location of the load of concrete in the structure if the load is not rejected.
    - a. Laboratory's inspector shall obtain for each transit mixer Batch Plant Certificates to verify mix design quantities and condition upon delivery to the site.
    - b. Certificates include: Date, time, ingredient quantities, water added at plant and on job, total mixer revolutions at time of placement, and time of departure.
    - c. Concrete with specified water cement ratio: Add no water on site unless mix design and batch records each show additional water may be added. See ASTM C94 for additional requirements.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify lines, levels, and dimensions before proceeding with work of this section.
- B. Verify work of other sections is complete and tested as required before proceeding.

### 3.2 PREPARATION

- A. Observation, Inspection and Testing:
  - 1. Engineer: Notify not less than 2 working days before each concrete placement, for observation and review of reinforcing, forms, and other work prior to placement of concrete.
  - 2. Testing Agency: Notify not less than 24-hours before each placement for inspection and testing.
- B. Placement Records: Contractor shall maintain records of time, temperature and date of concrete placement including mix design and location in the structure. Retain records until completion of the contract. Make available for review by Testing Agency and Engineer.

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- C. Coordinate placement of joint devices with erection of concrete formwork and placement of form accessories.
- D. Verify location, position and inclusion of all embedded and concealed items.
- E. Verify installation of vapor retarder under interior slabs on ground, as specified in related section, is complete.
- F. Cleaning and Preparation:
  - 1. Remove loose dirt, mud, standing water, and foreign matter from excavations and cavities.
  - 2. Close cleanout and inspection ports securely.
  - 3. Thoroughly clean reinforcement and other embedded items free from loose rust and foreign matter. Maintain reinforcing securely in place. Do not place concrete on hot reinforcing.
  - 4. At cold joints, remove laitance from previously placed concrete surface.
  - 5. Dampen form materials and substrates on which concrete is to be placed at least 1 hour in advance of placing concrete; repeat wetting as necessary to keep surfaces damp. Do not saturate. Do not place concrete on saturated material.
    - a. Thoroughly wet wood forms (except coated plywood), bottom and sides of trenches, adjacent concrete or masonry and reinforcement.
    - b. Concrete slabs on base rock, dampen rock.
    - c. Concrete slabs on vapor retarder, do not wet vapor retarder.
  - 6. Verify that metal forms are clean and free of rust before applying release agent.
  - 7. Thoroughly clean metal decking. Do not place concrete on wet deck surface.
  - 8. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent in accordance with manufacturer's instructions.
- G. Drill holes in existing concrete at locations where new concrete is doweled to existing work. Insert steel dowels and prepare connections as detailed.
- H. Do not overcut at existing concrete work to remain. Contractor is responsible for repair/replacement of overcut concrete to the Owner's satisfaction.

### 3.3 PIPES AND CONDUITS IN CONCRETE

- A. Slabs-on-Ground:
  - 1. No pipe or conduit exceeding 1-inch outside diameter shall be embedded within the specified slab thickness except as specifically detailed.
  - 2. Do not stack or abut pipes, maintain 3-inches minimum clearance.
- B. Sleeving and Wrapping:
  - 1. Foundations: Sleeve or wrap all individual pipe penetrations, minimum 1-1/2-inches clear to reinforcing all around.
    - a. Sleeves: PVC. Provide 1 inch minimum clear all around O.D. pipe to I.D sleeve, UNO at ends, fill void space with mastic or plastic bituminous cement.
    - b. Wrapped Vertical Pipes: Provide 1/8-inch nominal sheet foam with three wraps minimum, UNO.

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- c. Wrapped Horizontal Pipes: Provide 1/8-inch nominal sheet foam with eight wraps minimum, UNO.
    - d. Underground Fire Lines 4" and Larger: At sleeves provide 2-inch minimum clear all around O.D. pipe to I.D sleeve. At wrapped pipes, provide 1/8-inch nominal sheet foam with sixteen wraps minimum.
  2. Slabs or Curbs: Wrap pipes as described above.
- C. Space groups of pipes/conduits at least 3 sleeve diameters apart, do not interrupt specified concrete and reinforcement.
  1. Provide block-outs as detailed when grouping of pipes/conduits in foundation or other structural member prevents spacing as described. Notify Engineer for review of any conditions not conforming to details.
  2. Center pipe/conduit penetrations in the depth and/or thickness of foundations.
  3. Maximum size of pipe/conduit penetrations shall not exceed the least dimension of concrete divided by 3.
- D. Do not embed pipes/conduits in concrete slabs on metal deck.
- E. Provide the following at pipes/conduits detailed to be embedded in a concrete beam, wall or column:
  1. Place as near as possible to center of member with reinforcing as specified on each side.
  2. Where reinforcing is located near or at center of member, place pipe or conduit 1 inch minimum clear from reinforcing and provide #3 at 12-inches on center perpendicular to the pipe/conduit. Reinforcing to extend 12-inches minimum past pipe/conduit each side.
  3. Maintain 3/4-inch clear minimum from added reinforcing to face of concrete where not exposed to weather and 1-1/2-inches clear where exposed to weather.
  4. Space embedded items (groups of pipe/conduit, junction boxes or other elements) minimum 3 inches apart.
  5. Provide reinforcing in walls, beams, columns as detailed for groups of pipe/conduit. Provide minimum replacement reinforcement of same size and number for interrupted or displaced reinforcement for the full height, length, width of the wall, beam, and/or column on each side of the "effective opening."

### 3.4 CONCRETE PLACEMENT

- A. Transporting:
  1. Provide clean, well-maintained equipment of sufficient quantity and capacity to execute the work and produce concrete of quality specified.
  2. Handle and transport concrete from mixer to final deposit location as rapidly as practicable. Prevent separation or loss of ingredients.
- B. Perform concrete placement by methods which will not puncture, damage or disturb vapor retarder membrane. Repair all damage to vapor retarder membrane before covering.

- C. Placement - General: Placement, once started, shall be carried on as a continuous operation until section of approved size and shape is completed. Provide construction joints as detailed on the drawings. Engineer's written approval required for all deviations.
1. Deposition:
    - a. Deposit concrete to maintain an approximately horizontal plastic surface until the completion of the unit placement.
    - b. Deposit as neatly as practicable in final position, minimize re-handling or flow.
    - c. Do not drop concrete freely where reinforcing bars, embeds, or obstructions occur that may cause segregation. Provide spouts, elephant trunks, or other means to prevent segregation during placement.
  2. Depth: Layered placement in columns and walls shall not exceed ten feet vertical depth.
    - a. Place concrete in minimum 32-inch horizontal lifts.
    - b. Schedule placement to ensure that concrete will not take initial set before placement of next lift.
    - c. No horizontal cold joints are allowed in columns or walls.
  3. Progress Cleaning: Remove all concrete spilled on forms or reinforcing steel in portions of structure not immediately concreted. Remove completely before concrete sets.
  4. Interruptions: Shut down placement operations and dispose of all remaining mixed concrete and concrete in hoppers or mixers following all interruption in placement longer than 60 minutes.
    - a. If such interruption occurs, provide new or relocate existing construction joints as directed by Engineer.
    - b. Cut concrete back to the designated line, cleaning forms and reinforcing as herein specified.
    - c. Prepare for resumption of placement as for new unit when reason for interruption is resolved.
- D. Placement - Elevated Structural Systems: Place as noted for "General" above and as follows:
1. Metal Decking and Structural Steel Beam Systems that are not to be shored: Locate screed lines on primary structural members. Review proposed screed line locations and expected structural deflections with the Engineer prior to placement of concrete.
  2. Place screed lines to match camber of primary girders made of material other than concrete. Locate screeds to provide the minimum specified thickness of concrete at all locations.
  3. Compensate for deflection of intermediate structural members and decking by placement of additional concrete.
  4. Adjust embedded items to compensate for camber and deflection. Maintain locations within specified tolerances.
- E. Consolidation:
1. Consolidate all concrete thoroughly during placement with high-speed mechanical vibrators and other suitable tools. Perform manual spading and tamping to work around reinforcement, embedded fixtures, and into corners of formwork as required to obtain thorough compaction.
    - a. Provide vibrators with sufficient amplitude for adequate consolidation.

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- b. Use mechanical vibrators at each point of concrete placement.
    - c. Keep additional spare vibrators, in addition to those required for use, at the site for standby service in case of equipment failure.
  2. Consolidate each layer of concrete as placed.
    - a. Insert vibrators vertically at points 18 to 30 inches apart; work into top area of previously placed layer to reconsolidate, slowly withdraw vibrator to surface.
    - b. Avoid contact of vibrator heads with formwork surfaces.
    - c. Systematically double back and reconsolidate wherever possible. Consolidate as required to provide concrete of maximum density with minimized honeycomb.
- F. Unacceptable Materials:
  1. Do not place concrete that has started to set or stiffen. Dispose of these materials.
  2. Do not add water on site to concrete except as specified in the approved mix design, see PART 2 above.
- G. Protection of installed work:
  1. Do not introduce any foreign material into any specified drainage, piping or duct systems.
  2. Contractor shall bear all costs of work required to repair or clean affected work as a result of failure to comply with this requirement.

### 3.5 CONCRETE JOINTS

- A. Structural Joints (Construction/Cold Joints):
  1. Locate joints only where shown, or as approved.
  2. Review Required: Joints not indicated on the plans shall be located to meet the minimum requirements below, shall not impair the strength of the structure and shall be submitted to Engineer for review prior to placement of concrete.
    - a. Indicate proposed location(s) of construction/cold/expansion joints on shop drawing submittals for review prior to placing concrete.
  3. Clean and roughen all surfaces of previously placed concrete at construction joints by washing and sandblasting to expose aggregate to 1/4-inch amplitude.
  4. Slabs-On-Ground: Maximum Length of continuous placement shall not exceed 60 feet without special review by the Engineer. Alternate or stagger placement sections.
  5. Foundations, Beams, Elevated Slabs and Joists: Maximum Length of continuous placement shall not exceed 200-foot increments. Provide "keyed" shut-off locations made up with form boards. Extend reinforcing one lap length or more through shut off.
    - a. All reinforcement shall be continuous through construction/cold joint, lapping to adjacent reinforcing in future placement.
    - b. Construction Joints in Elevated Slabs: Review all proposed locations with Engineer.
    - c. Construction Joints in Slabs on Metal Decking: Review all proposed locations with Engineer. Do not locate closer than 48-inches of centerline of beam.

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6. Retaining and Basement Walls: Maximum Length of continuous placement shall not exceed 100-foot increments. Provide “keyed” shut-off locations made up with form boards to limit the length of continuous placement and at abrupt changes in wall thickness. Extend reinforcing one lap length or more through shut-off.
    - a. Review all proposed locations with Engineer
    - b. Horizontal construction joints are not allowed unless approved by the Engineer
  7. Horizontal Construction Joints: Place 2-inch slurry (specified concrete mix less coarse aggregate) at beginning of pour at the bottom of walls unless a prior review of a mock-up section demonstrates that segregation of aggregate will not occur.
- B. Expansion/Construction Joints (Dowel Joints and Control Joints):
1. Interior and Exterior Slabs-on-Ground:
    - a. Expansion/Construction Joints: Provide dowel joints or control joints at a maximum dimension (in feet) of three times the slab thickness (in inches) in each direction unless noted otherwise (15'-0" maximum). Install joints to match slab level and in straight lines. Locate joints at all reentrant corners including blockouts.
    - b. Proportions: Install joints to divide slab into rectangular areas with long dimensions less than 1.5 times short dimension.
  2. Exterior Concrete Slabs-on-Ground (walkways, patios):
    - a. Expansion/ construction joints: Provide a 2-inch-deep troweled groove or asphalt impregnated joint material embedded 50 percent of the slab depth at 12-feet on center, maximum.
    - b. Proportions: Place no section with a length larger than two times width. Additionally, place joints at all inside corners and at all intersections with other work.
  3. Elevated Structural Slabs: Locate construction joints as specifically indicated on the drawings. All additional proposed locations shall be reviewed by the Engineer prior to placement.
  4. Retaining and Basement Walls:
    - a. Contraction Joints: Provide ¾-inch wide beveled wood strips attached to inside face of formwork on each side of the wall. Wood strips shall extend 1/8 times the wall thickness into the wall. Cut 50% of the horizontal reinforcing bars at contraction joint locations
    - b. Proportions: Place joints at 2 times the height of the wall on center max, but not less than 10'-0". Joints shall not exceed 25'-0" on center.
    - c. Review all proposed locations with Engineer
- C. Joint Types:
1. Dowel Joint: A keyed joint with smooth dowels passing through to allow unrestricted movement due to contraction and expansion. Joints are as specified on the drawings.
  2. Control Joint(s): Shrinkage crack control joints may be of the following types when shown on the drawings. Install joints in a straight line between end points with edges finished appropriate to type. Depth shall be 25% of the slab thickness, unless noted otherwise. Fill joints with sealant as shown on the drawings or as required by related sections.
    - a. 1/4-inch-wide troweled joint.
    - b. Keyed joint: Only at locations where concealed by other finishes.

- c. Masonite Strip, 1/8 inch: Only at locations where concealed by other finishes.
- d. Saw Cut, 1/8 inch: Must be performed within eight hours of completion of finishing. Do not make saw cuts if aggregate separates from cement paste during cutting operation. Prevent marring of surface finish. Fill with flexible sealant.

### 3.6 FLATWORK

- A. General Requirements for All Concrete Formed & Finished Flat:
  - 1. Edge Forms and Screeds: Set accurately to produce indicated design elevations and contours in the finished surface, edge forms sufficiently strong to support screed type proposed.
  - 2. Jointing: Located and detailed as indicated.
  - 3. Consolidation: Concrete in slabs shall be thoroughly consolidated.
- B. Flatwork Schedule:
  - 1. Exterior Slabs-On- Ground: Place concrete directly over sub-base as indicated.
    - a. Sub-Base: Clean free-draining, crushed base rock, 4-inch minimum thickness, thoroughly compacted.
  - 2. Interior Concrete Slabs-On- Ground:
    - a. Sub-Base: Clean free-draining, crushed base rock, 4-inch minimum thickness, thoroughly compacted.
    - b. Vapor Retarder: Install over sub-base.

### 3.7 FORMED SURFACES

- A. Form all concrete members level and plumb, except as specifically indicated. Comply with tolerances specified in ACI CODE-318, ACI SPEC-301, and this specification, except that maximum permissible deviation is 1/4 inch end-to-end for any single member.
- B. Cambers: Provide all cambers indicated in the formwork construction. Set screeds to produce specified cambers in the finished concrete.

### 3.8 CONCRETE FINISHES

- A. Flatwork Finishing:
  - 1. Perform with experienced operators.
  - 2. Finish surfaces monolithically. Establish uniform slopes or level grades as indicated. Maintain full design thickness.
  - 3. In areas with floor drains, maintain design floor elevation at walls; slope surfaces uniformly to drains as indicated on drawings.
  - 4. Flatwork Finish Types:
    - a. Wood Float Finish: Surfaces to receive quarry tile, ceramic tile, or cementitious terrazzo with full bed setting system, or wood frame for raised finished floors.

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- b. Steel Trowel Finish: Surfaces to receive carpeting, resilient flooring, seamless flooring, thin set terrazzo, thin set tile or similar finishes specified in related sections. Trowel twice, minimum.
  - c. Broom Texture Finish: Exterior surfaces as indicated or for which no other finish is indicated. Finish as for steel trowel finish, except immediately following first troweling, (depending on conditions of concrete and nature of finish required) provide uniform surfaces texture using a medium or coarse fiber broom.
- B. Other Concrete: Provide as required to achieve appearance indicated on structural and related sections.
- 1. Repair surface defects, including tie holes, immediately after removing formwork.
  - 2. Unexposed Form Finish: Rub down or chip off fins or other raised areas ¼-inch or more in height.
  - 3. Exposed Form Finish: Finish concrete to match forms. Rub down or chip off and smooth fins or other raised areas ¼-inch or more in height. Provide finish as follows:
    - a. Smooth Rubbed Finish: Wet concrete and rub with carborundum brick or other abrasive, not more than 24-hours after form removal.
    - b. Grout Cleaned Finish: Wet areas to be cleaned and apply grout mixture by brush or spray; scrub immediately to remove excess grout. After drying, rub vigorously with clean burlap, and keep moist for 36 hours.
    - c. Cork Floated Finish: Immediately after form removal, apply grout with trowel or firm rubber float; compress grout with low-speed grinder, and apply final texture with cork float.
  - 4. Intermediate joint and score marks and edges: Tool smooth and flush unless otherwise indicated.
  - 5. Use steel tools of standard patterns and as required to achieve details shown or specified. All exposed corners not specified to be chamfered shall have radiused edges.

### 3.9 TOLERANCES

- A. Minimum Flatwork Tolerances: Measure flatness of slabs within 48-hours after slab installation in accordance with ACI PRC-302.1 and ASTM E1155 and to achieve the following FF and FL tolerances:
- 1. Exterior surfaces: 1/8-inch minimum per foot where sloped to drain. Level otherwise. FF20 and FL15.
  - 2. Interior surfaces not otherwise shown or required: Level throughout. FF25 and FL20
  - 3. Interior surfaces required to be sloped for drainage: 1/8-inch in 10 ft.
  - 4. Finish concrete to achieve the following tolerances:
    - a. Under Glazed Tile on Setting Bed: FF30 and FL20.
    - b. Under Resilient Finishes: FF35 and FL25.
    - c. Flooring manufacturer and pertinent section of Division 9.

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- B. Formed Surface Tolerances:
  - 1. Permanently Exposed Joints and Surfaces: Provide maximum differential height within two feet of, and across construction joints of 1/16-inch.
  - 2. Vertical Elevations: Elevation of surfaces shall be as shown or approved

### 3.10 CONCRETE CURING

- A. Curing - General: Cure in accordance with ACI SPEC-308.1. Maintain concrete water content for proper hydration and minimize temperature variations. Begin curing immediately following finishing.
- B. Protection During Curing: Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury. The General Contractor is responsible for the protection of the finished slab from damage.
  - 1. Avoid foot traffic on concrete for minimum of 24-hours after placement.
  - 2. Protect concrete from sun and rain.
  - 3. Maintain concrete temperature at or above 50 degrees F. during the first 7 days after placement. See Article ENVIRONMENTAL REQUIREMENTS.
  - 4. Do not subject concrete to design loads until concrete is completely cured, and until concrete has attained its full specified 28-day compressive strength or until 21 days after placement, whichever is longer.
  - 5. Protect concrete during and after curing from damage during subsequent building construction operations. See Article PROTECTION.
- C. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
  - 1. Normal concrete: Not less than 7 days.
  - 2. High early strength concrete: Not less than 4 days.
- D. Begin curing immediately following finishing.
- E. Surfaces Not in Contact with Forms:
  - 1. Start initial curing as soon as free water has disappeared and before surface is dry. Keep continuously moist for not less than 3 days by water ponding, water-saturated sand, water-fog spray, or saturated burlap.
  - 2. Begin final curing after initial curing but before surface is dry.
    - a. Moisture-retaining cover: Seal in place with waterproof tape or adhesive.
    - b. Curing compound: Apply in two coats at right angles, using application rate recommended by manufacturer.
  - 3. In addition, see specific conditions noted below.
- F. Slabs on Ground: Cure by one of the following methods:
  - 1. Water Cure (Ponding): Maintain 100 percent coverage of water over floor slab areas, continuously for minimum 7 calendar days.
  - 2. Spraying: Spray water over floor slab areas and maintain wet for 7 days.
  - 3. Moisture-Retaining Film or Paper: Lap strips not less than 6 inches and seal with waterproof tape or adhesive; extend beyond slab or paving perimeters minimum 6 inches and secure at edges; maintain in place for minimum 7 days.

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4. Absorptive Moisture-Retaining Covering: Saturate burlap-polyethylene and place burlap-side down over floor slab areas, lapping ends and sides and extend beyond slab or paving perimeters 6 inches minimum; maintain in place for minimum 7 days.
  5. Liquid Membrane-forming Curing Compound: Provide only when subsequent concrete treatments or finish flooring specified in related sections will not be affected by cure/sealer. Apply curing compound in accordance with manufacturer's instructions at the maximum recommended application rate in two coats, with second coat applied at right angles to first.
- G. Concrete on Metal Decking: Moisture-Retaining Sheet method as specified above.
- H. Formed Concrete Members: Cure by moist curing with forms in place for full curing period.
1. Protect free-standing elements from temperature extremes.
  2. Maintain forms tight for minimum 7 days. Maintain exposed surfaces continuously damp and completely covered by sheet materials thereafter.
  3. Maintain all shoring in place. Refer to related sections specifying formwork.
  4. Membrane Curing Compound: Apply compound in accordance with manufacturer's instructions in one coat.
- I. Foundations: Apply curing compound immediately after floating.

### 3.11 CONCRETE HARDENER

- A. Apply hardener to all floor slabs not receiving other finishes after 30 days minimum curing. Clean slabs of non-compatible cure/sealers or other foreign material(s) and apply in strict accordance with the manufacturer's directions.

### 3.12 GROUTING AND DRY PACK

- A. Set steel plates on concrete or masonry with high strength grout bed, completely fill all voids; thoroughly compact in place. See Section 05 1200 or 05 1100.
- B. Bolts or inserts dry packed or grouted in place shall cure for minimum 7 days before tensioning.

### 3.13 FIELD QUALITY CONTROL

- A. Testing and Inspections by Independent Testing Agency: Provided verification and inspection of concrete per CBC Table 1705.3. Provide written reports for to Engineer, Contractor and Building Official for the following tests and inspections:
- B. Testing & Inspection: Provide periodic inspection of reinforcing steel. Provide continuous inspection during placement of structural class concrete, 3000 psi or more. Non-structural class concrete with a design strength of 2500 psi or less to have periodic inspection on a 150 cubic yard basis as required to assure conformance.

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1. Provide periodic inspection of bolts in concrete prior to and during placement where so noted on the construction documents.
2. Structural Concrete Cylinder Tests: Form in accordance with ASTM C31.
  - a. Take four standard 6-inch x 12-inch (or five 4-inch x 8 inch) cylinder specimens on the site, of each class of concrete as specified in PART 2, not less than once a day or for each 150 cubic yards or 5000 sq ft or fraction thereof placed each day.
  - b. Record the location of each concrete batch in the building in a log and also note on each specimen.
  - c. Perform standard compression test of cylinders in accordance with ASTM C39, one at 7 days and two (three for 4x8 cylinders) at 28 days.
  - d. Hold fourth (fifth) cylinder untested until specified concrete strengths are attained.
3. Structural Concrete Slump Test and Air Tests: Perform slump in accordance with ASTM C143 and air content in accordance with C231 or C173 at the time of taking test cylinders, and/or at one-hour intervals during concrete placing.
4. Measure and record concrete temperature in accordance with ASTM C1064 upon arrival of transit mixers and when taking specimens. Note weather conditions and temperature.
5. Determine concrete density in accordance with ASTM C138 at the time of forming test cylinders.
6. Propose adjustments to reviewed mix designs for Engineer review to account for variations in site or weather conditions, or other factors as appropriate.
7. Water Vapor Transmission Tests: Floors receiving floor finishes specified in related sections will be tested prior to installation of flooring systems. Refer to sections specifying floor finishes for related requirements.

### C. Services by Contractor:

1. Rejection of Concrete Materials: Do not use the following without prior written approval of the Engineer.
  - a. Materials without batch plant certificates.
  - b. Materials not conforming to the requirements of these specifications.

### 3.14 ADJUSTING

- A. Inspect all concrete surfaces immediately upon formwork removal. Notify Engineer of identified minor defects. Repair all minor defects as directed.
- B. Surface and Finish Defects: Repair as directed by the Engineer, at no added expense to the Owner. Repairs include all necessary materials; reinforcement grouts, dry pack, admixtures, epoxy and aggregates to perform required repair.
  1. Repair minor defective surface defects by use of drypack and surface grinding. Specific written approval of Engineer is required. Submit proposed patching mixture and methods for approval prior to commencing work.
  2. Slabs-on- Ground, Elevated Slabs and on Slabs on Metal Deck: Review for "curled" slab edges and shrinkage cracks prior to installation of other floor finishes. Grind curled edges flush, fill cracks of 1/16-inch and greater with cementitious grout.

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3. Grind high spots, fins or protrusions caused by formwork; Fill-in pour joints, voids, rock pockets, tie holes and other void not impairing structural strength. Provide surfaces flush with surrounding concrete.

### 3.15 DEFECTIVE CONCRETE

- A. Defective Concrete: Concrete not conforming to required compressive strength, lines, details, dimensions, tolerances, finishes or specified requirements; as determined by the Engineer.
- B. Repair or replacement of defective concrete will be determined by the Engineer who may order additional testing and inspection at his option. The cost of additional testing shall be borne by Contractor when defective concrete is identified.
- C. Specific Defects:
  1. "Low-Strength"; Concrete Not Meeting Specified Compressive Strength after 28 days:
    - a. Concrete with less than 25% Fly Ash or 35% Slag as cementitious material: Test remaining cylinder(s) at 56 days. If strength requirements are met, concrete strength is acceptable.
    - b. Concrete with 25% or more Fly Ash or 35% or more Slag as cementitious material: Test remaining cylinder(s) at 70 days. If strength requirements are met, concrete strength is acceptable.
  2. Excessive Shrinkage, Cracking, Cracking or Curling; Defective Finish: Remove and replace if repair to acceptable condition is not feasible.
  3. Lines, Details, Dimensions, Tolerances: Remove and replace if repair to acceptable condition is not feasible.
  4. Slab sections not meeting specified tolerances for trueness/flatness or lines/levels: Remove and replace unless otherwise directed by the Engineer. Minimum area for removal: Fifteen square feet area unless directed otherwise by the Engineer.
  5. Defective work affecting the strength of the structure or the appearance: Complete removal and replacement of defective concrete, as directed by the Engineer.

### 3.16 CLEANING

- A. Maintain site free of debris and rubbish. Remove all materials and apparatus from the premises and streets at completion of work. Remove all drippings; leave the entire work clean and free of debris.
- B. Slabs to Receive Floor Finishes Specified in other sections: Remove non-compatible cure/sealers or other foreign material(s) which may affect bonding of subsequent finishes. Leave in condition to receive work of related sections.

### 3.17 PROTECTION

- A. Protect completed work from damage until project is complete and accepted by Owner.

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- B. Construction Loads: Submit engineering analysis for equipment loads (including all carried loads) specified in article submittals.
- C. Keep finished areas free from all equipment traffic for a minimum of 4 additional days following attainment of design strength and completion of curing.
- D. Protection of Drainage Systems:
  - 1. Care shall be taken not to introduce any foreign material into any specified drainage, piping or duct system.
  - 2. Cost of work to repair or clean drainage system as a result of failure to comply with this requirement will be back charged to the contractor.
- E. Cover traffic areas with plywood sheets or other protective devices; maintain protection in place and in good repair for as long as necessary to protect against damage by subsequent construction operations.

END OF SECTION

051100 - STRUCTURAL AND MISCELLANEOUS STEEL

PART 1 – GENERAL

1.1 SUMMARY

- A. Section Includes: All labor, materials, equipment and operations required to complete structural and miscellaneous metals in shapes and configurations indicated; including:
  - 1. Structural steel columns, beams, bracing, base plates, bolts, joist hangers, and stud bolts welded to structural steel.
  - 2. Miscellaneous structural steel and connections; fabricated connectors and hangers installed by related sections.
  - 3. Anchor bolts and steel inserts embedded in concrete or masonry, installed by related sections.
  - 4. Fabricated steel items embedded in concrete or masonry installed by related sections.
  - 5. Supervision of anchor bolt setting, leveling and elevations to ensure required fit of steel work.
  - 6. Shop priming and field touch-up, galvanizing.
  - 7. Bracing, Shoring, Fabrication and Erection.
  
- B. Related Sections:
  - 1. Pertinent sections of Division 01 specifying Quality Control and Testing Agency services.
  - 2. Pertinent Sections of other Divisions specifying concrete reinforcement, formwork, concrete, structural and miscellaneous metal fabrications, steel joists, metal decking, cold-formed metal framing, rough carpentry.

1.2 REFERENCES

- A. California Code of Regulations, Title 24, latest adopted edition (herein noted as CBC): Chapter 22 Steel.
- B. American Institute of Steel Construction (AISC) 303 "Code of Standard Practice for Steel Buildings and Bridges".
- C. AISC 360 "Specification for Structural Steel Buildings".
- D. American Welding Society (AWS) D1.1 "Structural Welding Code - Steel".
- E. Underwriters Laboratories (UL) FRD "Fire Resistance Directory".

### 1.3 SUBMITTALS

- A. Submit in accordance with pertinent sections of Division 01 specifying submittal procedures. The General Contractor shall review and approve shop drawings prior to submittal to the Engineer. Submittals that do not meet these requirements will be returned for correction without review.
- B. Limitation of Review: Structural Engineer's review will be for general conformance with design intent as indicated in the Contract Documents and does not relieve Contractor of full responsibility for conformance with the Contract Documents.
- C. Product Data: Submit manufacturer's product data, specifications, location and installation instructions for proprietary materials and reinforcement accessories. Provide samples of these items upon request.
- D. Shop drawings: Submit each building as a complete unit. Do not mix components from multiple buildings or units of work in a submittal. Include all of the following.
  - 1. Profiles, sizes, spacing, locations of structural members, openings, attachments, and fasteners.
  - 2. Fabrication tolerances for all steel.
  - 3. Connections: All, including type and location of shop and field connections.
  - 4. Indicate welded connections with AWS A2.4 welding symbols. Indicate net weld lengths, type, size, and sequence. Designate demand critical welds.
  - 5. Cross-reference all shop drawing detail references to contract document detail references.
  - 6. Secure all field measurements as necessary to complete this work prior to submitting shop drawings for review.
  - 7. Provide holes, welded studs, etc. as necessary to secure work of other sections.
  - 8. Provide the following as separate submittals for each building or unit of work:
    - a. Bolt and anchor setting plans.
    - b. Layout, fabrication and erection drawings.
- E. Certifications:
  - 1. Steel Materials: Submit the following for identified materials.
    - a. Manufacturer's Mill Certificate: Certify that products meet or exceed specified requirements.
    - b. Mill Test Reports: Indicate structural strength, destructive test analysis, and non-destructive test analysis.
    - c. Contractor's affidavit certifying that all identified steel materials provided are of the grades specified and match the certificates supplied.
  - 2. Welders Certificates: Certify welders employed on the Work, verifying AWS qualification per AWS D1.1.
- F. Samples: Provide samples to the Testing Agency as specified in Article SOURCE QUALITY CONTROL, at no additional costs.

#### 1.4 QUALITY ASSURANCE

- A. Requirements of Regulatory Agencies, refer to pertinent sections of Division 01 and CBC Chapter 17.
- B. All tests shall be performed by a recognized testing agency as specified in pertinent sections of Division 01.
- C. Certification and Identification of Materials and Uses: Provide Testing Agency with access to fabrication plant to facilitate inspection of steel. Provide notification of commencement and duration of shop fabrication in sufficient time to allow inspection and all material identification/test information listed below.
  - 1. Test all steel as required by ASTM A6.
  - 2. Provide manufacturer's Mill Test Reports for all materials. Include chemical and physical properties of the material for each heat number manufactured. Tag all fabricated materials with heat number.
  - 3. Provide letter certifying all materials supplied are from heat numbers covered by supplied mill certificates. Include in letter the physical location of each material type and/or heat number in the project (i.e. walls, braced frames etc.).
  - 4. Unidentified Material Tests: Where identification of materials by heat number or mill tests cannot be made, Owner's Testing Agency shall test unidentified materials.
  - 5. Provide all certification, verifications, and other test data required to substantiate specified material properties at no additional cost to the Owner.
- D. Testing and Inspection: Tests and Inspections performed by Independent Testing Agency are specified below in Articles SOURCE QUALITY CONTROL and FIELD QUALITY CONTROL. Duties and limitations of Independent Testing Agency, test costs and test reports in conformance with pertinent sections of Division 01.
- E. The following standards are the minimum level of quality required. Provide higher quality work as specifically indicated in the Contract Documents.
  - 1. Workmanship and details of structural steel work shall conform to the CBC and AISC 360.
  - 2. The quality of materials and the fabrication of all welded connections shall conform to AWS D1.1.
  - 3. Comply with Section 10 of AISC 303 for architecturally exposed structural steel.
- F. The Testing Agency will review all submittals and testing of materials.
- G. All re-inspections made necessary by non-conforming work shall be at the Contractor's expense.

#### 1.5 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to project site in bundles marked with durable tags indicating heat number, mill, member size and length, proposed location in the structure and other information corresponding with markings shown on placement diagrams.

- B. Handle and store materials above ground to prevent damage, contamination or accumulation of dirt or rust.

#### 1.6 SCHEDULING AND SEQUENCING

- A. Organize the work and employ shop and field crew(s) of sufficient size to minimize inspections by the Testing Agency.
- B. Provide schedule and sequence information to Testing Agency in writing upon request. Update information as work progresses.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. Structural Steel Plates: ASTM A36 or ASTM A572 Gr. 50 or ASTM A529 Gr. 50
- B. Structural Steel, Angles: ASTM A36 or ASTM A572 Gr. 50.
- C. Pipe: ASTM A53, Grade B.
- D. Bolts, Nuts, and Washers: ASTM A307 Grade A machine bolts with ASTM A563 Grade A nuts and ASTM F844 washers to match. See FINISHES section for galvanization, where required.
- E. Anchor Bolts/Rods, Nuts, and Washers: ASTM F1554 Gr. 36 or 55 with ASTM A563 Grade A nuts and ASTM F436 Type 1 washers. Grade DH nuts where Grade 105 rod is specified. No upset thread allowed.
- F. Arc-Welding Electrodes: AWS Standards E70 or equivalent, except no E70T-4 allowed.
- G. Other Welding Materials: AWS D1.1; type required for materials being welded.
- H. Welded Headed/Threaded Studs: AWS D1.1 Type B.
- I. Deformed Bar Anchors: ASTM A1064.

#### 2.2 ACCESSORIES

- A. High Strength Grout: ASTM C1107, non-shrink, premixed compound consisting of aggregate, cement, and water reducing plasticizing agents. Minimum compressive strength  $f'_c = 7000$  psi at 28 days, placed in a "fluid" state. Non-metallic where exposed to view. BASF "MasterFlow 928" or equivalent.

- B. Building Structural Steel Primers: Comply with local VOC limitations of authorities having jurisdiction and the California Green Building Code. Verify compatibility with finish coats specified in other sections. Follow manufacturers printed instructions. Apply one coat unless otherwise directed.
  - 1. Type A: Self-Crosslinking Hydrophobic Acrylic passing 2000 hours ASTM D4585 and 7000 hours ASTM D5894. "Series 115 Uni-Bond DF" by Tnemec (2.0 to 4.0 mils DFT).
  - 2. Type B: Organic Zinc-Rich Urethane passing 50,000 hours ASTM B117 and 15000 hours ASTM G85. "Series 90-97 Tneme-Zinc" by Tnemec (2.5 to 3.5 mils DFT) or "Series 94-H20 Hydro-Zinc" by Tnemec (2.5 to 3.5 mils DFT).
  - 3. Type C: MIO-Zinc Filled Urethane passing 10,000 hours ASTM B117 and 5000 hours ASTM D4585. "Series 394 PerimePrime" by Tnemec (2.5 to 3.5 mils DFT).
- C. Galvanizing: ASTM A153 and A123.
- D. Touch-Up Primer for Galvanized Surfaces: Type B primer.

### 2.3 FABRICATION

- A. Shop fabricates to greatest extent possible.
- B. Continuously seal built up members by continuous welds where exposed to weather.
- C. Fabricate connections for bolt, nut, and washer connectors.
- D. Protect all materials, before and after fabrication, from rust, corrosion, dirt, grease, and other foreign matter.
- E. Fabricate framing members free from twists or bends. Form holes, cut and sheared edges neatly without kinks, burrs, or warped edges.
- F. Exposed Steel: Straight, smooth, free of nicks, scars or dents.
- G. Gas Cutting: Gas cutting of holes in a member shall not be permitted.
- H. Splicing of members: Members requiring splicing due to length requirements may be spliced using full penetration butt welds when such welds and procedures are inspected and certified by the Testing Agency, in conformance with AWS and AISC standards. The location of splices shall be approved by the Engineer in writing prior to fabrication.
- I. Welding: Welding of structural steel connections shall be performed by qualified welders in accordance with AWS Standards. All weld sizes shall match those shown on the drawings.
  - 1. Preparation: Clean all surfaces free of rust, paint and all foreign matter. Remove paint or scale by brushing, chipping or hammering as required. Chip clean and wire brush burned or flame cut edges before welding. Space and alternate welds, clamping as necessary to prevent warp or misalignment.

2. Sequence Welding: When welds enclose, or partially enclose, the perimeter or portion of the surface of a member, make weld bead in sequence, or staggered. Minimize internal stresses. Weld groups of members occurring in a single line in staggered sequence to minimize distortion of the structural frame.
  3. Faulty and Defective Welding: Welds failing to meet AWS standards and the Contract Documents shall be rejected and remade at Contractor expense. All welds showing cracks, slag inclusion, lack of fusion, bad undercut or other defects, ascertained by visual or other means of inspection shall be removed and replaced with conforming work.
  4. Minimum Weld Strengths: All welds shall match the minimum weld sizes recommended by AISC. Details of fabrication not specifically shown shall match similar details which are specifically shown. All bevel and groove welds shall be full penetration unless size is noted otherwise.
  5. Threaded studs, headed studs, and deformed bar anchors shall be full-fusion welded conforming to ASW D1.1.
- J. Camber: Fabricate all beams cambered as indicated on the drawings.
1. Fabricate beams without camber for installation with any "natural" crown up.
  2. Exception: Fabricate cantilever beams with "crown" down.
- K. Grinding: Grind smooth the following structural steel and connections.
1. Exposed cut ends of structural and fabricated shapes.
  2. All welds are exposed to view.
  3. Mitered and fit-up corners and intersections.
- L. Back-Up Bars: Required for all complete penetration welds.
- M. Bolt Holes: Edge, end distances and spacing shall conform to dimensions shown on the drawings, and as follows;
1. Round: Size indicated and 1/16-inch maximum oversize, except 1 inch and larger bolts may have 1/8-inch maximum oversize.
  2. Slotted: At locations specifically noted on the drawings, provide size indicated and 1/16 inch by 1/4-inch oversize slotted in direction perpendicular to applied loads.
  3. Holes in base plates for anchor bolts may be 1/8-inch oversize.
- N. Comply with Section 10 of AISC 303 for architecturally exposed structural steel (AESS). See architectural & structural drawings for locations of AESS.

## 2.4 FINISHES

- A. Steel exposed to inclement atmospheric conditions or weather (such as coastal moisture or seasonal rain) shall be sufficiently primed or otherwise protected against corrosion. If condition of steel is suspect due to weathering/corrosion, Contractor shall bear cost of inspection to determine if excessive corrosion is present and if steel member(s) requires repair or replacement. Contractor shall bear cost of repair or replacement.

- B. Prepare and finish structural and miscellaneous steel component surfaces as follows, unless a higher standard-of-care is determined necessary per item A:
1. Unpainted, interior, dry exposure surfaces need not be primed.
  2. Finished painted, interior, dry exposure surfaces:
    - a. Surface Preparation: SSPC-SP2 Hand-Tool and/or SP3 Power-Tool Cleaning. Apply Primer Type A. Field touchup with same primer.
    - b. Where jobsite exposure is expected to exceed 6 months, SSPC-SP6 / NACE No. 3 Commercial Blast-Cleaning is required. Apply Primer Type B or C. Field touchup with same primer.
  3. Finish painted surfaces with exterior exposure, interior exposure subject to wet conditions or fumes, or surfaces to receive high performance finish coatings (for example epoxy or urethane coatings).
    - a. Surface Preparation: SSPC-SP6 / NACE No. 3 Commercial Blast-Cleaning to create a dense, uniform angular surface profile of 2.0 mils minimum. For severe (immersion) exposure, SSPC-SP10 / NACE No. 2 Near-White Blast-Cleaning is required.
    - b. Apply Primer Type B. Field touchup with same primer.
  4. Surfaces to be fireproofed need not be primed unless required by the fireproofing manufacturer or if jobsite exposure is expected to be inclement per item A. Where unprimed steel is to receive fireproofing, prepare steel surface as required by fireproofing manufacturer. If fireproofed surfaces are to be primed, provide primer as follows:
    - a. Surface Preparation: SSPC-SP3 Power-Tool Cleaning.
    - b. Apply Primer Type C. Field touchup with same primer.
  5. Exterior exposed (unpainted) surfaces and as otherwise indicated to receive galvanizing:
    - a. Galvanize per ASTM A123 Class 55 minimum. Passivation agents are not permitted on galvanized metal that is to be painted. Provide vent holes per ASTM A385 at closed sections (such as HSS). Submit proposed location of vent holes for review by Engineer.
    - b. Connection hardware shall be hot-dip galvanized per ASTM A153 or F2329. Mating bolts and nuts shall receive the same zinc-coating process.
    - c. Repair all uncoated, damaged, or altered galvanized surfaces per ASTM A780.
- C. Do not prime the following surfaces unless otherwise indicated:
1. Connections to be field welded.
  2. Steel in contact with concrete.
  3. Surfaces to receive welded metal decking.
- D. Do not cover up work with finish materials until inspection is complete and work is approved by the Testing Agency.

## 2.5 SOURCE QUALITY CONTROL

- A. An independent Testing Agency will perform source quality control tests and submit reports, as specified in pertinent sections of Division 01.

- B. Steel Materials Testing:
  - 1. No testing is required for materials identified in accordance with CBC 2202.1 (heat number, grade stencil, etc.).
  - 2. Unidentified steel- General: Test all structural shapes. In addition, test to verify  $F_y$  and  $F_u$  values when engineering requirements exceed  $F_y = 25$  ksi for design.
- C. Shop Welding Inspection:
  - 1. Testing Agency shall inspect and certify all structural welds, unless the fabricating shop has been accredited in conformance with CBC requirements. Submit certification to the Engineer for review and the Building Official for approval.
  - 2. Welder Qualifications: Welding inspector shall verify that all the welders are properly qualified prior to steel fabrication and state the qualifications of each welder in the welding inspection report.
  - 3. Welding Inspection: Continuous inspection required unless otherwise noted below. Comply with requirements of AWS D1.1.
    - a. Welding Inspector shall check all welds, materials, equipment and procedures.
    - b. Welding Inspector shall provide reports certifying the welding is as required and has been done in conformity with the plans, specifications and codes.
    - c. Welding Inspector shall use radiographic, ultrasonic, magnetic particle, or any other necessary aid to visual inspection to ensure adequacy of welds.
  - 4. Periodic Inspection Acceptable:
    - a. Single pass fillet welds not exceeding 5/16 inch.
- D. Bolts, Nuts, and Washers: Provide samples to Testing Agency for required testing, at no additional cost.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Verify that conditions are appropriate for erection of structural steel and that the work may properly proceed.

#### 3.2 ERECTION

- A. Erect structural steel in compliance with AISC 303.
- B. Framing:
  - 1. Erect all structural steel true and plumb.
  - 2. Verify proper final alignment prior to making final connections.

- C. Field Connections:
1. Workmanship of field bolted and welded connections shall conform in all respects to methods and tolerances specified for fabrication.
  2. Field weld components indicated on shop drawings. Sequence field welds to minimize built-up stress and distortion of the structural frame. Verify sequence with Engineer. Coordinate field welding schedule with Testing Laboratory.
  3. Welded Studs: Install in accordance with manufacturer's instructions and structural welding code AWS D1.1.
- D. Templates: Provide bolt setting templates for all anchor bolts. Provide instructions for the setting of anchors and bearing plates, verify these items are set correctly as work progresses.
- E. Column base plates: Set level to correct elevations, support temporarily on steel wedges, shims, or leveling nuts where shown, until the supported members are plumbed and base plate is grouted.
1. Grout solid the full bearing area under base plates prior to installation of floor and/or roof decks.
  2. Comply with manufacturer's instructions for high strength grout. Trowel grouted surfaces smooth, splaying neatly to 45 degrees, or form edges vertical 1in-2in away from base plate edges. Top of grout outside of base plate footprint shall not extend higher than bottom of base plate.
- F. Bolting:
1. Inspect mating surfaces to ensure that bolt head and nut will have full bearing and that metal plies will mate flush between bolts.
  2. Install bolts in matching holes. Do not distort metal or enlarge holes by drifting during assembly. Remake mismatched components to achieve tolerances indicated.
  3. Holes mismatched in excess of 1/8 inch will be rejected.
  4. Holes mismatched less than 1/8 inch may be reamed to the next larger size bolt.
  5. Do not enlarge holes by flame cutting or air/arc ("plasma") cutting.
  6. Provide flat washer(s) at over-size holes.
  7. Provide washer at bolt head and nut where connected part is less than ¼ inch thick.
  8. Provide ASTM F436 beveled washers when the slope of the surfaces of parts in contact with the bolt head or nut is greater than 1:20.
  9. Do not install bolts with damaged threads.
  10. Threads shall commence outside of the shear plane.
  11. Machine Bolts (MB): Install and tighten to a snug condition (ST) such that laminated surfaces bear fully on one another, using an impact wrench or "full effort" of an installer using a standard spud wrench.

- G. Supports, Shoring and Bracing: Allow for erection loads and provide sufficient temporary bracing to maintain structure in safe condition, plumb, and in true alignment until completion of erection and installation of permanent bracing. Conform to requirements of all applicable laws and governing safety regulations. Resist imposed loads, including those of stored materials and equipment.
  - 1. Provide all temporary supports, shoring and bracing necessary to achieve work of tolerances indicated.
  - 2. Provide all necessary temporary flooring, planking and scaffolding required for erection of steel, and support of erection machinery.
  - 3. Construction Loading: Do not overload the structure or temporary supports with stored materials, equipment or other loads.
  - 4. Maintain temporary bracing and shoring until work is complete, and longer as required to ensure stability and safety of structure.
- H. Do not make final connections until structure is aligned to meet specified tolerances.

### 3.3 ERECTION TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch.

### 3.4 FIELD QUALITY CONTROL

- A. The independent Testing Agency will perform field quality control tests, as specified in pertinent sections of Division 01.
- B. Field Welding Inspection: Conform to all requirements of section SOURCE QUALITY CONTROL.
  - 1. Inspect mating surfaces.
  - 2. Test all materials prior to use. Use only materials meeting specified requirements.

### 3.5 ADJUSTING

- A. Touch-up damaged finishes with compatible specified primer.
- B. Replace defective or damaged work with conforming work. Replace all defective work at Contractor's expense.
- C. Straighten materials by means that will not injure the materials.
- D. Replace defective or damaged work which cannot be corrected in the field with new work or return defective items to the shop for repair.

- E. Engineer shall review all proposals for the repair or replacement of damaged, defective, or missing work.
- F. Pay expenses incurred by Owner for Engineer's costs for (re-)design and obtaining approvals of Authorities Having Jurisdiction (AHJ) necessitated by incomplete, inefficiently scheduled, improperly performed, defective or nonconforming work, as specified in pertinent sections of Division 01.
- G. Pay expenses due to re-testing and re-inspection necessitated by incomplete, inefficiently scheduled, improperly performed, defective or nonconforming work, as specified in pertinent sections of Division 01.

3.6 CLEANING AND PROTECTION

- A. Clean all surfaces upon completion of erection; leave free of grime and dirt. Remove unused materials, tools, equipment and debris from the premises and leave surfaces broomed clean.
- B. Protect work from damage by subsequent operations.

END OF SECTION

SECTION 053000 - METAL DECKING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: All material, labor, equipment and services necessary for the fabrication, erection, and completion of all metal decking as noted on drawings, including all supports for erection. The work shall include, but not necessarily be limited to the following:
  - 1. Furnish metal decking, supports at structural steel, closures, flashing, weld plates, and necessary accessories, complete and ready to receive concrete or roofing.
  - 2. Install metal decking including cutting, fitting, and welding.
  - 3. All cutting and reinforcing of openings as required, and as laid out by other trades.
  
- B. Related Sections:
  - 1. Pertinent Sections of Division 01 Specifying Quality Control and Testing Agency Services
  - 2. Pertinent Sections of Division 03 Specifying Concrete Construction
  - 3. Pertinent Sections of Division 05 Specifying Structural Steel

1.2 REFERENCES

- A. California Code of Regulations, Title 24, latest adopted edition (herein noted as CBC): Chapter 19 Concrete, Chapter 22 Steel.
  
- B. American Iron and Steel Institute (AISI) S100 "North American Specification for the Design of Cold-Formed Steel Structural Members".
  
- C. Steel Deck Institute (SDI) "Design Manual for Composite Decks, Form Decks and Roof Decks".
  
- D. International Code Council (ICC) "Acceptance Criteria (AC) 43 – Steel Deck Roof and Floor Systems".
  
- E. American Society for Testing and Materials (ASTM):
  - 1. ASTM A653 "Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dipped Process".
  - 2. ASTM A780 "Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings".
  - 3. ASTM A1003 "Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members".
  - 4. ASTM A1008 "Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened and Bake Hardenable".
  - 5. ASTM C1513 "Standard Specification for Steel Tapping Screws for Cold-Formed Steel Framing Connections".

- F. American Welding Society (AWS) "D1.3 Structural Welding Code – Sheet Steel".

### 1.3 SUBMITTALS

- A. Shop drawings shall indicate all details of layout, fabrication and installation, location and dimension of openings, reinforcing and accessories, metal closures and flashing and type, size and location of all welds, and electromagnetically welded studs. Submit shop drawings before the start of fabrication. All details must reference detailed callouts on the construction documents. Submittals that do not meet these requirements will be returned for correction without review.
- B. Current ICC reports indicating design values.
- C. Obtain reviewed structural steel shop drawings and verify all conditions before preparing shop drawings for metal decking; show all members required for support of metal decking on shop drawings for metal decking.
- D. The Contractor shall review and approve shop drawings prior to submittal. The Landscape Architect's review is of a general nature only and all responsibility for conformance with drawings and specifications and for dimensions shall remain with the Contractor.

### 1.4 QUALITY ASSURANCE

- A. All work under this section shall be fabricated and installed in strict accordance with the incorporated documents. Refer to pertinent sections of Division 05, Structural Steel.
- B. Decking shall be installed in the field by an approved steel deck applicator with at least five years demonstrated successful experience in this type work.
- C. All installation and welding shall be done by qualified, experienced workers skilled in their trade, in conformance with established standards of good practice and the manufacturer's recommendations. All welders shall be AWS certified.

### 1.5 DELIVERY, STORAGE AND HANDLING

- A. Protection: Steel decking sheets shall be covered and protected from weather during transit and during storage at the job site. Sheets shall not be in contact with the ground and are to have waterproof covering.

### 1.6 JOB CONDITIONS

- A. Coordination: The Contractor shall secure all field measurements necessary for the completion of this work. The Contractor shall be responsible for all errors of detailing and fabrication and for the correct fitting of all metal decking to each other and to their supports. Provide holes and reinforcement for mechanical and electrical penetrations.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Deck shall be of type and by manufacturer as specified on the drawings or approved equal. All equals must meet or exceed ICC approved design values of specified decking.
- B. Steel decking and flashing shall be formed from steel sheets conforming to ASTM A653, A1003, or A1008 with a minimum yield strength of 40,000 psi. Before forming, the steel shall receive a protective metal coating of zinc conforming to ASTM A653 G60 wiped coating.
- C. Deck Sections
  - 1. Deck units shall be supplied in lengths to span over at least 3 supports where layout permits. All single span units shall have temporary mid-span shoring.
  - 2. All deck units shall be provided with either an interlocking side lap or a lapping type side lap.
  - 3. Venting Devices: Provide only for decks with vermiculite-based insulating concrete topping. Vent using individual separating clips of type, style and spacing recommended by deck manufacturer (space no more than 48" o.c. or a two per deck span) or built-in venting-slot formed as an integral part of deck profile. Venting slots are required only in non-cellular deck. Tabs shall be turned up into deck so that they cannot be used for hangers. Provide three rows of slots at 2'-0" on centers in three-foot-wide deck sections.
  - 4. Flashing and Closure Plates: Provide 16-gauge zinc coated continuous flashing for deck units as detailed, or as required, at ends and sides, at openings and at deck perimeter to contain fill. Flashing shall be detailed and installed to prevent concrete leakage.
  - 5. Reinforcing at openings and penetrations: Provide reinforcing at all openings and penetrations per PART 3.
  - 6. Galvanization Coating Repair: Zinc dust-zinc oxide primer, ASTM A780.
- D. Painted Finish: Where painted finish is specified it shall be Manufacturer's standard; baked on, rust inhibitive, applied to chemically cleaned surface.
- E. Welding Electrodes: AWS Standard E60 or equivalent or E70 or equivalent, or as specified by AWS D1.3 and Manufacturer's recommendation.

### 2.2 FABRICATION

- A. All fabrication bevel cuts, etc. shall be done in the shop, and shall be equal to a high standard of workmanship. All deck units shall be shipped to the field in standard widths and in precut lengths so that end joints occur over supporting members.
- B. Deck section shall be cut to fit all openings, which are required. Dimensions of openings and holes required for the work of other trades will be provided by respective trades for cutting of deck.
- C. Misalignment of deck sections and cuts, short lengths, and poor workmanship shall be cause for rejection. All rejected work shall be replaced at the Contractor's expense.

2.3 SOURCE QUALITY CONTROL

- A. An independent testing agency will perform source quality control tests and submit reports as specified in pertinent sections of Division 01.
- B. Steel Materials Testing:
  - 1. No Testing Required for Materials as follows:
    - a. Materials identified in accordance with CBC 2202.1 and ASTM A6. (heat number, grade stencil, etc.)
    - b. Materials accompanied by certified mill test reports for all members, and Contractor's affidavit confirming that all materials used in the fabrication and shipped to the job are from the grades specified and match the certificates supplied.
  - 2. Unidentified steel: Where identification of materials by heat number or mill reports cannot be made, testing agency shall test unidentified deck.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. The steel deck units shall be placed on the supporting framework, aligned, and adjusted to final position before being permanently fastened. Each unit shall be brought to proper bearing on the supporting beams. If the supporting beams are not properly aligned or sufficiently level to permit proper bearing of the steel units, the Contractor shall notify the Landscape Architect prior to taking corrective action to ensure properly aligned work.
- B. Deck units shall be placed in straight alignment for the entire length of run with close registration of the cells of one unit with those of abutting and adjoining units. Provide a minimum of 2-inch end bearing at abutting deck units. Continuous deck units shall be provided with a minimum of 3" bearing, all butt joints shall be "tight" (no gap).
- C. Deck units shall not be placed on supporting members until all structural steel is completely installed, plumbed, and connections are completed.
- D. Welding:
  - 1. Steel deck units shall be fastened to the steel framework by the arc welding process. Welds shall be free of sharp points or edges.
  - 2. All welding shall be done by competent experienced welders, thoroughly familiar with the metal to be welded, and certified for welding of light gauge metal.
  - 3. Deck sheets shall be welded to the supporting member and to each other with welds as listed below unless otherwise noted on the drawings.
    - a. End and intermediate support perpendicular to deck flutes: 3/4" diameter spot weld at each flute.
    - b. Side joints between individual deck units with side interlock joint: 1-1/2" top or side seam weld at 12" on center. Button punch at 36" on center before welding to draw units together.

- c. Side joints between individual deck units where concrete is placed on the metal deck is to be button punched at 36" on center.
  - d. Boundary deck units to parallel supports and interior deck units to parallel framing supports 3/4" diameter spot weld or 3/8" x 1-1/4" arc seam weld at 12" on center.
- 4. Weld all closure angles and plates with 3/4" diameter spot weld or 3/8"x 1-1/4" arc seam welds at 18" apart.
- 5. Headed welded studs and deformed bar anchors: See section 05 1200 or 05 1100.
  
- E. Screw Attachment: When called for on the drawings, painted roof deck is to be attached with galvanized #12 hex head metal screws with neoprene washers at flutes and at 24" on center at side laps and at 12" on center at perimeter side laps. Screws and metal washers shall be painted to match deck color where decking is a painted finish surface.
  
- F. Decking shall be installed in a continuous operation to avoid delays in the construction.
  
- G. Opening reinforcement shall be as detailed on the drawings. Cutting of holes other than those detailed on the drawings shall be done only as specifically approved by the Landscape Architect. Holes not shown on structural drawings shall be cut and reinforced in accordance with details on drawings. In general, reinforcing is not required for holes less than 4" in diameter. Holes at column penetrations shall be reinforced as any other hole. See details on drawings for other requirements.
  
- H. Leave slag in place at welds to be covered by concrete. Elsewhere, remove slag to bright metal and touch up all welds and field cut edges with galvanization repair primer.
  
- I. Field Finishing:
  - 1. Permanently exposed galvanized surfaces requiring welding shall be thoroughly cleaned by wire brushing after welding and then touched up with galvanization repair primer.
  - 2. After erection all damaged surfaces shall be primed.
  - 3. Painted deck shall be touched up with primer and matching paint.

### 3.2 FIELD QUALITY CONTROL

- A. Welding Inspection:
  - 1. Testing Agency shall inspect and certify all structural welds. Submit certification to the Engineer for review and the Building Official for approval.
  - 2. Welder Qualifications: Welding inspector shall verify that all the welders are properly qualified prior to steel fabrication and state the qualifications of each welder in the welding inspection report.
  - 3. Welding Inspection:
    - a. Welding Inspector shall check all welds, materials, equipment and procedures.
    - b. Welding Inspector shall provide reports certifying the welding is as required and has been done in conformity with the plans, specifications and codes.
    - c. Periodic inspection per CBC is acceptable.

3.3 DEFECTIVE WORK

- A. All work not in conformance with these specifications and/or generally accepted standards of the trade, will be deemed defective by the Landscape Architect and will be rejected. All work that is defective shall be corrected or replaced as directed by the Landscape Architect. Corrections redesign, and replacement of defective work shall be at Contractor's expense.

3.4 CLEANING

- A. After erection, all surfaces shall be cleaned and left free of all grime and dirt. Decking shall be cleaned with solvents, if necessary to provide a surface, which will readily bond with concrete fill and direct-to-steel fireproofing. Remove unused materials, tools, scaffolding and debris from the premises and leave the area broom clean.

END OF SECTION

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## SECTION 055213 - PIPE AND TUBE RAILINGS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Steel railings.

#### 1.2 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

#### 1.3 ACTION SUBMITTALS

- A. Product Data:
  - 1. Shop primer.
  - 2. Nonshrink, nonmetallic grout.
  - 3. Anchoring cement.
  - 4. Metal finishes.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
- C. Samples for Verification: For each type of exposed finish required.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For delegated design professional engineer.
- B. Welding certificates.

#### 1.5 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel in accordance with the following:
  - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."

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### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect mechanical finishes on exposed surfaces of railings from damage by applying a strippable, temporary protective covering before shipping.

### 1.7 FIELD CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with railings by field measurements before fabrication.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Railings, including attachment to building construction, withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
  - 1. Handrails and Top Rails of Guards:
    - a. Uniform load of 50 lbf/ ft. applied in any direction.
    - b. Concentrated load of 200 lbf applied in any direction.
    - c. Uniform and concentrated loads need not be assumed to act concurrently.
  - 2. Infill of Guards:
    - a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft.
    - b. Infill load and other loads need not be assumed to act concurrently.
- B. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
  - 1. Temperature Change: 120 deg F , ambient; 180 deg F, material surfaces.

### 2.2 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.

### 2.3 STEEL RAILINGS

- A. Source Limitations: Obtain each type of railing from single source from single manufacturer.
- B. Tubing: ASTM A500/A500M (cold formed) or ASTM A513/A513M, Type 5.
- C. Pipe: ASTM A53/A53M, Type F or Type S, Grade A, Standard Weight (Schedule 40), unless another grade and weight are required by structural loads.
  - 1. Provide galvanized finish for exterior installations and where indicated.

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- D. Plates, Shapes, and Bars: ASTM A36/A36M.

### 2.4 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select in accordance with AWS specifications for metal alloy welded.
  - 1. For aluminum and stainless-steel railings, provide type and alloy as recommended by producers of metal to be welded and as required for color match, strength, and compatibility in fabricated items.
- B. Etching Cleaner for Galvanized Metal: Complying with MPI#25.
- C. Galvanizing Repair Paint: High-zinc-dust-content paint, complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- D. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout, complying with ASTM C1107/C1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- E. Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound.
  - 1. Water-Resistant Product: At exterior locations, provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended by manufacturer for exterior use.

### 2.5 FABRICATION

- A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.
- B. Shop assemble railings to the greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations.
  - 1. Clearly mark units for reassembly and coordinated installation.
  - 2. Use connections that maintain structural value of joined pieces.
- C. Cut, drill, and punch metals cleanly and accurately.
  - 1. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated.
  - 2. Remove sharp or rough areas on exposed surfaces.
- D. Form work true to line and level with accurate angles and surfaces.
- E. Fabricate connections that are exposed to weather in a manner that excludes water.
  - 1. Provide weep holes where water may accumulate.
  - 2. Locate weep holes in inconspicuous locations.

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- F. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.
- G. Connections: Fabricate railings with welded connections unless otherwise indicated.
- H. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
  - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  - 2. Obtain fusion without undercut or overlap.
  - 3. Remove flux immediately.
  - 4. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Finish #2 welds; good appearance, completely sanded joint, some undercutting and pinholes okay.
- I. Welded Connections for Aluminum Pipe: Fabricate railings to interconnect members with concealed internal welds that eliminate surface grinding, using manufacturer's standard system of sleeve and socket fittings.
- J. Form changes in direction are as follows:
  - 1. By bending to smallest radius that will not result in distortion of railing member.
- K. Bend members in jigs to produce uniform curvature for each configuration required. Maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.
- L. Close exposed ends of hollow railing members with prefabricated cap and end fittings of same metal and finish as railings.
- M. For railing posts set in concrete, provide stainless steel sleeves not less than 6 inches long with inside dimensions not less than 1/2 inch greater than outside dimensions of post, with metal plate forming bottom closure.
- N. For removable railing posts, fabricate slip-fit sockets from stainless steel tube or pipe whose ID is sized for a close fit with posts; limit movement of post without lateral load, measured at top, to not more than one-fortieth of post height.
  - 1. Provide socket covers designed and fabricated to resist being dislodged.
  - 2. Provide chain with eye, snap hook, and staple across gaps formed by removable railing sections at locations indicated. Fabricate from same metal as railings.

### 2.6 STEEL AND IRON FINISHES

- A. Galvanized Railings:
  - 1. Hot-dipped galvanize steel railings, including hardware, after fabrication.
  - 2. Comply with ASTM A123/A123M for hot-dipped galvanized railings.
  - 3. Comply with ASTM A153/A153M for hot-dipped galvanized hardware.
  - 4. Do not quench or apply post-galvanizing treatments that might interfere with paint adhesion.
  - 5. Fill vent and drain holes that are exposed in the finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.

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- B. For galvanized railings, provide hot-dipped galvanized fittings, brackets, fasteners, sleeves, and other ferrous components.
- C. Preparing Galvanized Railings for Shop Priming: After galvanizing, thoroughly clean railings of grease, dirt, oil, flux, and other foreign matter, and treat with etching cleaner and as follows.
  - 1. Comply with SSPC-SP 16.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION, GENERAL

- A. Perform cutting, drilling, and fitting required for installing railings.
  - 1. Fit exposed connections together to form tight, hairline joints.
  - 2. Install railings level, plumb, square, true to line, without distortion, warp, or rack.
  - 3. Set railings accurately in location, alignment, and elevation; measured from established lines and levels.
  - 4. Do not weld, cut, or abrade surfaces of railing components that are coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
  - 5. Set posts plumb within a tolerance of 1/16 inch in 3 feet.
  - 6. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.
- B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.
  - 1. Coat concealed surfaces of aluminum that will be in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.
- C. Adjust railings before anchoring to ensure matching alignment at abutting joints.
- D. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

#### 3.2 RAILING CONNECTIONS

- A. Nonwelded Connections: Use mechanical or adhesive joints for permanently connecting railing components. Use wood blocks and padding to prevent damage to railing members and fittings. Seal recessed holes of exposed locking screws, using plastic cement filler colored to match finish of railings.
- B. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article, whether welding is performed in the shop or in the field.
- C. Expansion Joints: Install expansion joints at locations indicated but not farther apart than required to accommodate thermal movement. Provide slip-joint internal sleeve, extending 2 inches beyond joint on either side; fasten internal sleeve securely to one side; and locate joint within 6 inches of post.

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### 3.3 ANCHORING POSTS

- A. Use stainless steel pipe sleeves preset and anchored into concrete for installing posts. After posts are inserted into sleeves, fill annular space between post and sleeve with anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions.
- B. Cover anchorage joint with flange of same metal as post, attached to post with setscrews.
- C. Anchor posts to metal surfaces with flanges, angle type, or floor type, as required by conditions, connected to posts and to metal supporting members as follows:
  - 1. For steel railings, weld flanges to post and bolt to metal supporting surfaces.
  - 2. For aluminum railings, attach posts as indicated, using fittings designed and engineered for this purpose.
  - 3. For stainless steel railings, weld flanges to post and bolt to supporting surfaces.
- D. Install removable railing sections, where indicated, in slip-fit stainless-steel sockets cast in concrete.

### 3.4 CLEANING

- A. Clean aluminum and stainless steel by washing thoroughly with clean water and soap and rinsing with clean water.
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas, and repair galvanizing to comply with ASTM A780/A780M.

### 3.5 PROTECTION

- A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.
- B. Restore finishes damaged during installation and construction period, so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit or provide new units.

END OF SECTION 055213

SECTION 061000 - ROUGH CARPENTRY

PART 1 – GENERAL

1.1 SUMMARY

- A. Section Includes: All labor, materials and equipment and all operations required to complete all rough carpentry and structural framing as indicated on the drawings; to produce shapes and configurations as shown, as required; and as specified herein, including:
  - 1. Structural floor framing.
  - 2. Floor sheathing.
  - 3. Rough hardware, framing connectors and fasteners.
  - 4. Treatment of wood.
  - 5. Concealed wood blocking for work requires supporting blocking.
  - 6. Miscellaneous wood nailers and furring strips for wood framing, furring, shims or blocking as required to complete the work.
  
- B. Related Sections:
  - 1. Pertinent sections of Division 01 specifying Quality Control and Testing Agency services.
  - 2. Pertinent sections of Division 01 specifying Structural Product Requirements: Structural Product Options, Substitution procedures and limitations, transportation, handling and storage.
  - 3. Pertinent sections of Division 03 specifying wood formwork construction and/or setting anchors in concrete.
  - 4. Pertinent section of Division 06 specifying wood construction and materials.
  - 5. Pertinent sections of other divisions specifying steel or concrete construction.

1.2 REFERENCES

- A. California Code of Regulations, Title 24, latest adopted edition (herein noted as CBC): Chapter 23 Wood.
  
- B. American National Standards Institute (ANSI) / American Wood Council (AWC) "NDS - National Design Specification for Wood Construction".
  
- C. National Institute of Standards and Technology (NIST) / Engineered Wood Association (APA) "PS 1 - Voluntary Product Standard for Structural Plywood".
  
- D. NIST / APA "PS 2 - Performance Standard for Wood-Based Structural-Use Panels".
  
- E. NIST "PS 20 - American Softwood Lumber Standard".
  
- F. Redwood Inspection Bureau (RIS) "Standard Specifications for Grades of California Redwood Lumber".

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- G. West Coast Lumber Inspection Bureau (WCLIB) "Standard Grading Rules for West Coast Lumber No. 17".
- H. Western Wood Products Association (WWPA) "Western Lumber Grading Rules".
- I. American Wood Preservers Association (AWPA) "Book of Standards".

### 1.3 SUBMITTALS

- A. Submit in accordance with pertinent sections of Division 01 specifying submittal procedures. Submit for review prior to fabrication. Submittals that do not meet these requirements will be returned for correction without review.
  - 1. Substitutions for products specified require conformance to substitution requirements in Division 01.
  - 2. Review of materials and hardware for substitution to products specified is at the additional expense of the Contractor.
- B. Limitation of Review: Structural Engineer's review will be for general conformance with design intent as indicated in the Contract Documents and does not relieve Contractor of full responsibility for conformance with the Contract Documents. The General Contractor shall review and approve shop drawings prior to submittal to the Engineer.
- C. Product Data:
  - 1. Submit manufacturer's product data, specifications, and installation instructions for & location of framing connectors, wood preservative materials, application instructions, and fasteners. Include complete, accurate equivalence data when submitting alternate products to those specified. Provide samples of these items upon request.
  - 2. Submit product data and current ICC-ES report for machine-driven nails, fasteners, and equipment, including dimensions of all fasteners, including head, shank diameter and length.

### 1.4 QUALITY ASSURANCE

- A. Requirements of Regulatory Agencies, refer to pertinent sections of Division 01 and CBC Chapter 17.
- B. All tests shall be performed by a recognized testing agency as specified in pertinent sections of Division 01.
- C. Inspection of fabricators is required per CBC 1704.2.5 unless fabricator is registered and approved by the building official. Wood product quality standards:
  - 1. All wood products to comply with article REFERENCES.
  - 2. Factory-mark each piece of lumber and sheathing with type, grade, mill, and grading agency, except omit marking from surfaces to be exposed with transparent finish or without finish.
  - 3. Sheathing panels to be marked by APA (The Engineered Wood Association).

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- D. End-Jointed lumber shall not be used.
- E. Hardware and engineered wood products shall have current ICC ES Evaluation/research reports that are equivalent to products specified.
- F. Employ competent workers experienced in work of the types specified and required.

### 1.5 DELIVERY, STORAGE AND HANDLING

- A. Comply with pertinent requirements of Division 01.
- B. Delivery: Time delivery and installation of carpentry products to avoid delaying other trades whose work is dependent on or affected by this section and to comply with moisture content, protection and storage requirements.
- C. Keep materials dry at all times. Protect against exposure to weather and contact with damp or wet surfaces. Stack lumber and sheathing panels to prevent deformation and provide air circulation within stacks.
  - 1. Store materials for which a maximum moisture content is specified only in areas where relative humidity has been reduced to a level where specified moisture content can be maintained.
  - 2. Handle and store materials above ground to prevent damage, contamination, or accumulation of dirt or foreign materials.
  - 3. Provide special protection for horizontal sheathing panels. Deformation of panels due to moisture is not acceptable.

### 1.6 PROJECT/SITE CONDITIONS

- A. Verify all conditions at project site affecting the work; work to field dimensions as required. Coordinate carpentry installation with size, location, and installation of service utilities.
- B. Sequence rough carpentry installation activities to allow sufficient time for:
  - 1. Review of all submittals.
  - 2. Indicate submittal review, procurement, and testing activities in the project schedule prior to the start of installation. Installation durations shall be based on hand-nailed installation methods specified.
  - 3. Attainment of specified maximum lumber moisture content.

## PART 2 – PRODUCTS

### 2.1 DIMENSIONED LUMBER

- A. General
  - 1. Size per industry standards for nominal sizes shown; S4S (sanded four sides).
  - 2. Warped/twisted and excessively checked members shall not be used regardless of grade marks.

3. At the Contractor's option, engineered lumber of equivalent size and material properties may be substituted for solid sawn lumber where material is difficult to source due to length, availability, etc. Submit proposed substitution to Engineer for review prior to purchasing materials.
- B. Moisture content of framing:
1. All lumber to be maximum 19% at time of fastener installation. All lumber to be maximum 19% at time of close-in, unless noted otherwise.
  2. The Owner's Testing Laboratory will test for moisture content prior to commencement of close-in.
  3. The Contractor shall recognize that excessive shrinkage of lumber results from excess moisture content at the time of installation. The Contractor will compensate for use of such lumber by waiting for acceptable moisture content before close in and/or by replacing/repairing lumber that has sagged, twisted, or warped prior to close in.
  4. Deviation from this specification would require structural redesign of connections and fasteners.
- C. Exterior structural framing (exposed to weather) shall be redwood select structural grade or pressure treated D.F. No. 1, unless noted otherwise.
- D. Structural decking shall be D.F. select decking or White Pine select where not exposed to moisture. Where directly exposed to moisture or high humidity for prolonged periods of time, decking shall be Alaskan Yellow Cedar or Port Orford Cedar. Moisture content at time of installation to be less than 12%.
- E. Framing not otherwise shown or specified: Douglas Fir construction grade per WCLIB paragraphs applicable to uses and sizes required.

## 2.2 STRUCTURAL SHEATHING PANELS

- A. Plywood: Structural sheathing shall conform to product standard PS-1 or PS-2. All panels shall have a minimum bond classification of "Exposure 1" and bear the trademark of the Engineered Wood Association (APA) or other qualified agency. Grades shall be "Rated Sheathing" or "Structural 1" as required on the drawings.
- B. Oriented Strand Board (OSB): All structural OSB shall be grade marked by a qualified agency for conformance with Product Standard PS-2 and shall be fabricated with exterior glue. Grades shall be as required on the drawings.

## 2.3 TREATED WOOD:

- A. Treated Lumber and Plywood: Comply with requirements of AWWA Standard U1. See Standard U1 for "Use Category" designations. Do not provide higher Use Category lumber than that specified. Maximum moisture content shall be the same as required for "dimensioned lumber" as specified above.

B. Preservative Treated Lumber

1. General

- a. Preservatives shall be waterborne. Preservative retention rate shall be as required per AWPA Standards U1 & T1. Lumber shall be Douglas Fir No. 2 (or better). Cut faces of treated wood shall be brush treated (two complete applications) prior to installation.
  - b. Lumber less than 8 inches above grade and lumber less than 6 inches above exterior hard-surface flatwork shall be treated.
  - c. Each piece of wood shall be stamped by the wood preservative applicator to identify its treatment and preservative retention.
2. Lumber at interior, non-weather exposed locations installed adjacent to concrete or masonry shall be Use Category UC2. Examples include sill plates & ledgers and lumber in contact with roofing, flashing, or water proofing. Borate treated lumber meeting AWPA UC2 is acceptable in this application.
  3. Lumber at exterior locations, not in contact with soil/ground, shall be Use Category UC3B. Examples include Douglas Fir decking and deck framing.
  4. Lumber in contact with soil/ground shall be Use Category UC4A. Examples include timber retaining walls.
  5. Poles, posts, and sheathing panels shall be treated as recommended by AWPA Standard U1 per use and exposure.
  6. Maximum Volatile Organic Compound (VOC) content of field-applied preservative shall meet local air quality standards and the California Green Building Code. Provide either of the following:
    - a. Copper Azole (CA-B) per ICC-ES AC326.
    - b. Alkaline/Copper/Quaternary (ACQ).

C. Fire Retardant Treatment: Product and application process must be recommended by manufacturer of treatment as being suitable for painting. Application shall be by a California State Fire Marshal approved licensed contractor.

1. Exterior Type: Use Category UCFB, chemically treated, and pressure impregnated; capable of providing a maximum flame spread rating of 25 when tested in accordance with ASTM E84, with no evidence of significant combustion when test is extended for an additional 20 minutes both before and after accelerated weathering test performed in accordance with ASTM D2898.
  - a. Treat exposed exterior rough carpentry items, including stairways, balconies, and covered walkways.
  - b. Do not use treated wood in direct contact with the ground.
2. Interior Type: Use Category UCFA, low temperature (low hygroscopic) type, chemically treated, and pressure impregnated; capable of providing a maximum flame spread rating of 25 when tested in accordance with ASTM E84, with no evidence of significant combustion when test is extended for an additional 20 minutes.
  - a. Treat rough carpentry items as indicated.
  - b. Do not use treated wood in applications exposed to weather or where the wood may become wet.

## 2.4 FASTENERS AND ACCESSORIES

### A. General requirements for fasteners:

1. Fasteners shall be of adequate size, spacing, and number to resist design loads under intended use, and types shall be appropriate for the materials or conditions for which used.
2. Provide washers, pre-drilling, etc. as required for proper installation and to prevent damage to framing.
3. Fasteners shall be hot-dipped galvanized (ASTM A153), mechanically galvanized (ASTM B695 class 55 minimum), stainless steel (type 303, 304, 305, or 316), silicon bronze, or copper by approved methods for the following applications:
  - a. Exterior, exposed use.
  - b. In contact with preservative or fire-retardant treated wood.
  - c. Nails in contact with preservative treated wood containing ammonia shall be stainless steel.
4. Fasteners in moist corrosive atmosphere to be of stainless steel (type 303, 304, 305, or 316).
5. Where the retention level of ACQ or MCQ preservative is greater than 0.40 pcf, CBA-A preservative is greater than 0.41 pcf, or CA-B preservative is greater than 0.21 pcf, provide stainless steel fasteners (type 303, 304, 305, or 316).
6. All fasteners specified by manufacturer shall be installed in framing hardware, unless noted otherwise.
7. At borate treated lumber a clear zinc coating per ASTM F1941 is acceptable.

### B. Nails and nailing not otherwise shown or specified:

1. Comply with requirements of governing building code.
2. For securing materials to hardened concrete or masonry provide hardened steel masonry nails or Simpson Strong-Tie "Titen" screws.
3. For framing and general woodwork: Common bright wire nails (not box nails) with centered full-round heads per ASTM F1667 including Supplement S1. 16d cement coated sinker nails may be used in lieu of common nails for framing, where noted on the drawings. Unless otherwise noted on drawings, nail sizes shall be as follows
  - a. 8d Common: 0.131"Ø x 2-1/2" long with 0.281"Ø head.
  - b. 10d Common: 0.148"Ø x 3" long with 0.312"Ø head.
  - c. 16d Common: 0.162"Ø x 3-1/2" long with 0.344"Ø head.
4. Nails for sheathing panels shall be of common wire with full round heads and shall be of sufficient length to fully develop the nails.
5. Machine-driven nails of all types must comply with the requirements of this section. All proposed nails shall match diameter and penetration of specified nails.
6. Staples shall conform to length and gauges specified and shall be installed to match specified patterns and spacing.
7. Power-Actuated Fasteners (PAF): Use only as approved by the Engineer; operators shall be qualified.

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- C. Bolts: Malleable iron washers or steel plate washers, unless otherwise shown, shall be provided under all bolt heads and nuts.
  - 1. Machine Bolts: ASTM A307 and ANSI/ASME B18.2.1, standard semi-finished machine bolts as shown or required. Nuts shall be standard size unless noted otherwise and shall be per ASTM A563.
  - 2. Anchor bolts or threaded rod anchors shall conform to ASTM F1554, ASTM A307, or ASTM A36. Anchor bolts shall be headed or end in two nuts tightened against one another, unless noted otherwise. Provide embedded plate washer as indicated on drawings. No upset threads allowed. No L or J bolts allowed.
- D. Lag screws: Standard hex lag screws per ANSI/ASME B18.2.1.
- E. Wood screws: Standard wood screws per ANSI/ASME B18.6.1.
- F. Power Actuated Fasteners (PAF): Hilti X-CP72, ICC ESR-2379; Simpson PDPAWL-300 MG, ICC ESR-2138.
- G. Framing hardware: Fabricated sheet metal timber framing connectors shall be manufactured from painted or galvanized G90 steel by Simpson Strong-Tie (connectors specified on drawings are per Simpson Strong Tie, or approved equivalent. Connectors shall be at least 16-gauge material, (1/8-inch plate materials where welded), unless otherwise noted, punched for nailing. All heavy hardware to be fabricated from A36 steel per Division 05, Metals. All hardware intended for exterior exposed use shall be galvanized per G185 ASTM A653 or stainless steel.
  - 1. For contact with preservative or fire-retardant treated wood, provide minimum G185 galvanizing per ASTM A653.
  - 2. Nails and nailing shall conform to the manufacturer's instructions with a nail provided for each punched hole. Nails to be used with framing accessories are subject to the requirements specified in this Section for fasteners and anchors.
- H. Subfloor Glue: Waterproof, water base, air cure type, cartridge dispensed conforming to APA Standard AFG-01 or ASTM D3498. Maximum Volatile Organic Compound (VOC) shall meet local air quality standards and the California Green Building Code.

### 2.5 SOURCE QUALITY CONTROL

- A. The Testing Agency, as specified in the Article QUALITY ASSURANCE, will perform testing for moisture content of all lumber at time of fastener installation.
- B. The Testing Agency will submit reports as specified in Division 01.

## PART 3 – EXECUTION

### 3.1 REQUIREMENTS FOR STRUCTURAL FRAMING

- A. General
  - 1. Refer to drawings for layouts, notes and details, provide framing as required; comply with governing building code requirements.

2. Provide framing to achieve true alignments as surfaces receiving finish materials.
3. It shall be the responsibility of the Contractor to provide and install all wood blocking, furring strips, or grounds detailed or required to provide anchorage for all finishes, accessories, fixtures, etc. as required to complete all work. All blocking and/or backing shall be securely bolted or otherwise anchored in place.
4. Contractor shall be responsible for layout of anchor bolts, and other hardware embedded in concrete when placed by other trades.
5. Provide and install all structural framing, blocking, fasteners, brackets, clips, etc. as required to complete work specified in the Construction Documents.

B. Framing

1. Floor, Roof and Ceiling Framing
  - a. Joists and beams shall be accurately aligned and the position and spacing of all joists and beams shall be as shown and be coordinated with other framing and to other trades prior to actual construction.
  - b. Place all joists and beams with crown up. Cantilevered joists and beams shall be placed with the crown down.
  - c. Cutting of wood girders, beams or joists for electrical and mechanical lines shall be limited to cuts and bored holes not deeper than 1/5 of the beam depth from the top and located not farther from the support than three times the beam depth and not less than the beam depth. Cuts in excess of this, or single bored holes with a diameter of more than 1" are not permitted without special provisions for framing the beams. Location of all cuts in framing shall receive the prior review of the Engineer.

3.2 STRUCTURAL SHEATHING

A. General

1. Sheathing nailing shall be as required on the drawings. Do not overdrive (Do not break skin of sheathing face sheet). Over driving will be cause for rejection.
2. Form sheathing may be re-used for concealed sheathing provided the lumber at the time of re-use is approved by the Landscape Architect, meets the framing grade requirements specified herein, is in good condition, and is thoroughly cleaned with all nails removed.
3. Pneumatic nailing devices shall be adjustable so that nail heads do not penetrate skin of sheathing. Contractor shall submit equipment and nails for review prior to use. Refer to PART 2 for other nailing requirements.

- B. Floor Sheathing: Except "Panelized Roofs", lay with face grain perpendicular to roof rafters, roof trusses or floor joists. Stagger sheets. Block all unsupported sheet edges with 2x material unless noted otherwise.

3.3 ROUGH HARDWARE

- A. General: Nails, spikes, screws, fabricated sheet metal anchors, ties, hangers and any other materials shown or required for the attachment of wood to concrete and wood to steel and wood to wood shall be furnished and installed as part of this work.

- B. Framing Nailing: All framing nailing shall conform to minimum requirements of the Building Code, and with details shown on the drawing.
- C. Bolts, Lag Screws and Washers:
  - 1. Bolts in wood shall be machine bolts unless otherwise noted and shall be of such length that the bearing length of the threads does not exceed  $\frac{1}{4}$  of the full bearing length in the member holding the threads. Bolt holes in wood shall be  $\frac{1}{32}$ " oversized. Bolt holes for sill plates may be  $\frac{1}{16}$ " maximum oversize. Holes in steel shall be  $\frac{1}{16}$ " oversize. See Section 3.1 for anchor bolts at sill plates and ledgers.
  - 2. Provide square plate or malleable iron washer and nut at head where bearing is against wood; cut washer under nut where it is against steel. Washer will not be required under head of carriage bolts. Provide malleable iron washers where exposed.
  - 3. All nuts shall be tightened when placed and retightened at completion of the job or immediately before closing with final construction.
  - 4. Lag screws shall be screwed (not driven) into place. Drill pilot hole to 70% of shank diameter. Drill clearance hole to full shank diameter and depth of unthreaded screw length.
- D. Wood Screws: Minimum penetration is 10 diameters unless noted otherwise. Where fastening hardwood timber species or where wood tends to split, provide pilot hole 70% of screw shank diameter.
- E. Proprietary Fasteners and Hardware: Install per manufacturer's published installation instructions (MPII) and code approval report (e.g. ICC ESR, IAPMO ER, etc). Provide MAX quantity, size, and length of fastener at hardware (i.e. joist hangers, framing, clips, etc) unless otherwise noted per plan.

#### 3.4 INSTALLATION OF ACCESSORIES AND MISCELLANEOUS WOOD

- A. Coordinate installation of wood decking, metal-web wood joists, glued-laminated wood construction, shop-fabricated wood trusses, and wood I- joists.
- B. Curb roof openings except where prefabricated curbs are provided. Form corners by alternating lapping side members. Fasten curbs corner-to-corner and to rafters with framing connectors configured for this application.
- C. Blocking:
  - 1. Provide fire blocking at locations and spacing's as required by CBC Chapter 7. Locate other blocking, supplementary framing, backing plates and bracing to facilitate installation of finish materials, fixtures, equipment, services, accessories, and trim requiring attachment and support.
  - 2. Solid block joists and rafters over all supports with blocking of the same size and material as the joist or rafter.

- D. Furring:
  - 1. Nominal 1 inch x 3 inch minimum, continuous and spaced at 16 inches on center, maximum.
  - 2. Install plumb, rigid, and level. Shim where necessary to provide a true, even plane suitable to receive the finish required.
  - 3. Attach to concrete and masonry as shown in the contract drawings.
- E. Stair Framing: Provide with 3 stair stringers for each set of stairs, unless otherwise shown. Cut notches to receive exact size of treads and risers (if any) shown, with no change in dimensions between landings. Provide stringers of size shown, or if not shown, of a size to allow not less than 3-1/2 inch of effective depth, measured perpendicular to the rake of the stringer, after notching.
- F. Install miscellaneous metal angles, bolts, and other items, secure into formwork where embedded in concrete.
- G. Install accessory items not otherwise set under other sections; after completion of painting and other finishing work; in locations shown or directed by the Landscape Architect. Set items plumb, level, and secure using appropriate fastening as applicable.

### 3.5 FIELD APPLIED WOOD TREATMENT

- A. Field treat all end cuts and holes in preservative treated materials per PART 2.
- B. Apply two brush coats; or full-immersion dip not less than 15 minutes; or as required to thoroughly saturate all surfaces after cutting.
- C. Air dry 2 hours minimum before installation.

### 3.6 TOLERANCES

- A. Framing Members: 1/4 inch from true position, maximum.
- B. Surface Flatness of Floor: 1/8 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum.
- C. Variation from Plane (Other than Floors): 1/8 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum. Provide framed substrates meeting requirements for application of finishes specified in other sections.
- D. Exposed surfaces shall be free from dents and tool marks, unsanded rough or torn faces and corners, and other defects.

### 3.7 FIELD QUALITY CONTROL

- A. The Testing Agency, as specified in the Article QUALITY ASSURANCE, will perform the following tests and submit reports as specified in Division 01:
  - 1. Moisture content of all lumber at time of close-in.
  - 2. Periodic special inspection of nailing, bolting, and other fastening within the seismic-force-resisting system including shear walls, wood diaphragms, etc. per

CBC Section 1705.13.2, excluding systems with sheathing nailing spacing greater than 4" on center.

3. Special inspection of high load diaphragms per CBC Section 1705.5.1 where designated on documents.

### 3.8 ADJUSTING

- A. Replace all defective work at Contractor's expense.
- B. Replace defective or damaged work with conforming work.
- C. Correct defects using means that will not injure the materials.
- D. Replace defective or damaged work which cannot be corrected in the field with new work, or return defective items to the shop for repair.
- E. Repair or replace framing lumber sagged, twisted or warped due to shrinkage from excessive moisture content at time of installation, or from other causes.
- F. Adjust to meet specified tolerances.
- G. Engineer shall review all proposals for the repair or replacement of damaged, defective, or missing work.
- H. Pay expenses incurred by Owner for Architect/Engineer's costs for (re-)design and obtaining approvals of Authorities Having Jurisdiction (AHJ) necessitated by incomplete, inefficiently scheduled, improperly performed, defective or nonconforming work.
- I. Pay expenses due to re-testing and re-inspection necessitated by incomplete, inefficiently scheduled, improperly performed, defective or nonconforming work.

### 3.9 CLEANING AND PROTECTION

- A. Clean all surfaces upon completion of erection, leave free of grime and dirt. Remove unused materials, tools, equipment, and debris from the premises and leave surfaces broomed clean.
- B. Waste Disposal: Comply with the requirements of pertinent sections of Division 01 specifying cleaning and disposal.
  1. Comply with applicable regulations.
  2. Do not burn scrap on project site.
  3. Do not burn scraps that have been pressure treated.
  4. Do not send materials treated with pentachlorophenol, CCA, or ACA to co-generation facilities or "waste-to-energy" facilities.
- C. Do not leave any wood, shavings, sawdust, etc. on the ground or buried in fill.
- D. Prevent sawdust and wood shavings from entering the storm drainage system.
- E. Protect work from damage by subsequent operations.

END OF SECTION

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## SECTION 061533 - WOOD PATIO DECKING

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Wood railings.
  - 2. Plastic decking.

#### 1.2 DEFINITIONS

- A. Boards: Lumber of less than 2 inches nominal in thickness and 2 inches nominal or greater in width.
- B. Dimensional Lumber: Lumber of 2 inches nominal or greater but less than 5 inches nominal in least dimension.
- C. Timber: Lumber of 5 inches nominal or greater in least dimension.
- D. Lumber grading agencies, and the abbreviations used to reference them, include the following:
  - 1. NeLMA: Northeastern Lumber Manufacturers' Association.
  - 2. NLGA: National Lumber Grades Authority.
  - 3. RIS: Redwood Inspection Service.
  - 4. SPIB: The Southern Pine Inspection Bureau.
  - 5. WCLIB: West Coast Lumber Inspection Bureau.
  - 6. WWPA: Western Wood Products Association.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For preservative-treated wood products, plastic decking and metal framing anchors.
  - 1. For preservative-treated wood products. Include chemical treatment manufacturer's written instructions for handling, storing, installing, and finishing treated material.
  - 2. For plastic decking and metal framing anchors. Include installation instructions.
- B. Samples: For plastic decking, not less than 24 inches long, showing the range of variation to be expected in appearance of decking, including surface texture.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Material Certificates:
  - 1. For lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by ALSC's Board of Review.

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2. For preservative-treated wood products. Indicate type of preservative used and net amount of preservative retained. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
- B. Certificates of Inspection: Issued by lumber grading agency for exposed wood products not marked with grade stamp.
  - C. Evaluation Reports: For the following, from ICC-ES:
    1. Preservative-treated wood products.
    2. Plastic decking.
    3. Expansion anchors.
    4. Metal framing anchors.
    5. Decking fasteners.
- 1.5 DELIVERY, STORAGE, AND HANDLING
- A. Store materials under cover and protected from weather and contact with damp or wet surfaces. Stack lumber flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.
  - B. Handle and store plastic lumber to comply with manufacturer's written instructions.

## PART 2 - PRODUCTS

### 2.1 LUMBER, GENERAL

- A. Comply with DOC PS 20 and with grading rules of lumber grading agencies certified by ALSC's Board of Review as applicable. If no grading agency is indicated, comply with the applicable rules of any rules-writing agency certified by ALSC's Board of Review.
  1. Factory mark each item with grade stamp of grading agency.
  2. For items that are exposed to view in the completed Work, omit grade stamp and provide certificates of grade compliance issued by grading agency.
  3. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry wood products.
  4. Provide dressed lumber, S4S, unless otherwise indicated.
- B. Maximum Moisture Content:
  1. Boards: 19 percent.
  2. Dimension Lumber: 15 percent for 2-inch nominal thickness.
  3. Timber: 19 percent.

### 2.2 WOOD STAIR TREADS

- A. Hand select wood for freedom from characteristics, on exposed surfaces and edges, that would impair finish appearance, including decay, honeycomb, knot holes, shake, splits, torn grain, and wane.

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### 2.3 PRESERVATIVE-TREATED LUMBER

- A. Pressure treated boards and dimension lumber with waterborne preservative in accordance with AWPA U1; Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground.
- B. Preservative Chemicals: Acceptable to authorities having jurisdiction.
  - 1. Do not use chemicals containing arsenic or chromium.
- C. Use process for boards and dimension lumber that includes water-repellent treatment.
- D. After treatment, redry dimension lumber to 19 percent maximum moisture content.
- E. Mark treated wood with treatment quality mark of an inspection agency approved by ALSC's Board of Review.
  - 1. For items indicated to receive a stained or natural finish omit marking and provide certificates of treatment compliance issued by inspection agency.
- F. Application: Treat all wood unless otherwise indicated.
  - 1. Stair treads.

### 2.4 PLASTIC DECKING

- A. Plastic Lumber, General: Products acceptable to authorities having jurisdiction with current model code evaluation reports that show compliance with building code in effect for Project for indicated type of construction.
  - 1. Allowable loads and spans, as documented in evaluation reports or in information referenced in evaluation reports, are not to be less than design loads and spans indicated.
- B. Composite Plastic Lumber: Solid shapes made from a mixture of cellulose fiber and polyethylene or polypropylene.
  - 1. Decking Standard: ICC-ES AC109 or ICC-ES AC174.
  - 2. Decking Size: 2 by 6 nominal, 1-1/2 by 5-1/2 inches actual.
  - 3. Surface Texture: Manufacturer's standard.
  - 4. Color: As selected by Architect from manufacturer's standard product range.

### 2.5 FASTENERS

- A. General: Provide fasteners of size and type indicated, acceptable to authorities having jurisdiction, and that comply with requirements specified in this article for material and manufacture. Provide nails or screws, in sufficient length, to penetrate not less than 1-1/2 inches into wood substrate.
  - 1. Use fasteners with hot-dip zinc coating complying with ASTM A153/A153M or ASTM F2329 unless otherwise indicated.
  - 2. For pressure-preservative-treated wood, use stainless steel fasteners.
  - 3. For plastic decking, use stainless steel fasteners where fasteners are exposed to view.

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4. For redwood, use stainless steel or hot-dip galvanized-steel fasteners.
- B. Nails: ASTM F1667.
- C. Power-Driven Fasteners: ICC-ES AC70.
- D. Wood Screws and Lag Screws: ASME B18.2.1, ASME B18.6.1, or ICC-ES AC233.
- E. Carbon-Steel Bolts: ASTM A307 with ASTM A563 hex nuts and, where indicated, flat washers all hot-dip zinc coated.
- F. Stainless Steel Bolts: ASTM F593, Alloy Group 1 or with ASTM F594, Alloy Group 1 or 2 hex nuts and, where indicated, flat washers.
- G. Post installed Anchors: Stainless steel, torque-controlled expansion anchors with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing in accordance with ASTM E488 conducted by a qualified independent testing and inspecting agency.
  1. Stainless steel bolts and nuts complying with ASTM F593 and ASTM F594, Alloy Group 1 or 2.

### 2.6 METAL FRAMING ANCHORS

- A. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those indicated on Drawings. Manufacturer's published values are to be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.
- B. Joist Hangers: U-shaped, with 2-inch- long seat and 1-1/4-inch- wide nailing flanges at least 85 percent of joist depth.
  1. Thickness: 0.062 inch.
- C. Top Flange Hangers: U-shaped joist hangers, full depth of joist, formed from metal strap with tabs bent to extend over and be fastened to supporting member.
  1. Strap Width: 2 inches.
  2. Thickness: 0.062 inch.
- D. Post Bases: Adjustable-socket type for bolting in place with standoff plate to raise post 1 inch above base and with 2-inch- minimum side cover, socket 0.062 inch thick, and standoff and adjustment plates 0.108 inch thick.
- E. Joist Ties: Flat straps, with holes for fasteners, for tying joists together over supports.
  1. Width: 1-1/4 inches.
  2. Thickness: 0.062 inch.
  3. Length: As indicated.

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### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 PREPARATION

- A. Clean substrates of projections and substances detrimental to application.
- B. Stain wood indicated to be stained, including both faces and edges. Cut to required lengths and stain ends. Comply with requirements in Section 099300 "Staining and Transparent Finishing."

#### 3.3 INSTALLATION, GENERAL

- A. Set work to required levels and lines, with members plumb, true to line, cut, and fitted. Fit work to other construction; scribe and cope as needed for accurate fit.
- B. Framing Standard: Comply with AF&PA WCD1 unless otherwise indicated.
- C. Install plastic lumber to comply with manufacturer's written instructions.
- D. Secure decking to framing with deck clips or screws.
- E. Install metal framing anchors to comply with manufacturer's written instructions.
- F. Do not splice structural members between supports unless otherwise indicated.
- G. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
- H. Sort and select lumber so that natural characteristics do not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of members or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- I. Apply copper naphthenate field treatment to comply with AWPA M4, to cut surfaces of preservative-treated lumber.
- J. Securely attach exterior rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
  - 1. ICC-ES AC70 for power-driven fasteners.
  - 2. "Fastening Schedule" in ICC's International Building Code.
  - 3. "Fastener Schedule for Structural Members" and "Alternate Attachments" in ICC's International Residential Code for One- and Two-Family Dwellings.
- K. Use common wire nails unless otherwise indicated. Select fasteners of size that do not fully penetrate members where opposite side is exposed to view. Make tight connections between

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members. Install fasteners without splitting wood; do not countersink nail heads unless otherwise indicated.

- L. For exposed work, arrange fasteners in straight rows parallel with edges of members, with fasteners evenly spaced and with adjacent rows staggered.

### 3.4 INSTALLATION OF ELEVATED DECK JOIST FRAMING

- A. General: Install joists with crown edge up and support ends of each member with not less than 1-1/2 inches of bearing on wood or metal, or 3 inches on masonry. Attach floor joists where framed into wood supporting members by using wood ledgers as indicated or, if not indicated, by using metal joist hangers. Do not notch joists.
- B. Frame openings with headers and trimmers supported by metal joist hangers; double headers and trimmers where span of header exceeds 48 inches.
- C. Lap members framing from opposite sides of beams or girders not less than 4 inches or securely tie opposing members together. Provide solid blocking of 2-inch nominal thickness by depth of joist over supports.
- D. Provide solid blocking of 2-inch nominal thickness by depth of joist at intervals of 96 inches o.c., between joists.

### 3.5 INSTALLATION OF RAILINGS

- A. Balusters: Fit to railings, glue, and screw in place. Countersink fastener heads, fill flush, and sand filler.
- B. Newel Posts: Secure to stringers and risers with lag screws.
- C. Railings: Secure wall rails with metal brackets. Fasten freestanding railings to newel posts and to trim at walls with countersunk-head wood screws or rail bolts and glue.

END OF SECTION 061533

# County of Mendocino Bower Park Restoration and Improvement Project

## SECTION 099300 – STAINING AND TRANSPARENT FINISHING

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Transparent finishes.

#### 1.2 ACTION SUBMITTALS

- A. Product Data:
  - 1. For each type of product.
  - 2. Include preparation requirements and application instructions.
  - 3. Indicate VOC content.
- B. Samples for Initial Selection: Manufacturer's standard color sheets, showing full range of available colors for each type of exposed finish.
- C. Samples for Verification: Sample for each type of finish system and in each color and gloss of finish required on representative samples of actual wood substrates.
  - 1. Size: Minimum 6 inches square or 6 inches long.
- D. Product List: Cross-reference to finish system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.

#### 1.3 MAINTENANCE MATERIAL SUBMITTALS

- A. Extra Stock Material: Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Stains and Transparent Finishes: 5 percent, but not less than 1 gal. of each material and color applied.

#### 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
  - 1. Maintain containers in clean condition, free of foreign materials and residue.
  - 2. Remove rags and waste from storage areas daily.

#### 1.5 FIELD CONDITIONS

- A. Apply finishes only when temperature of surfaces to be finished and ambient air temperatures are between 50 and 95 deg F.

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- B. Do not apply finishes when relative humidity exceeds 85 percent, at temperatures of less than 5 deg F above the dew point, or to damp or wet surfaces.
- C. Do not apply exterior finishes in snow, rain, fog, or mist.

### PART 2 - PRODUCTS

#### 2.1 SOURCE LIMITATIONS

- A. Source Limitations: Obtain each coating product from single source from single manufacturer.

#### 2.2 MATERIALS, GENERAL

- A. Material Compatibility:
  - 1. Provide materials for use within each coating system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
- B. Stain Colors: As selected by Architect from manufacturer's full range.

#### 2.3 TRANSPARENT FINISHES

- A. Varnish with UV Inhibitor, Exterior, Semigloss: Solvent-based, alkyd-type, clear semigloss varnish stabilized against UV deterioration for exterior wood surfaces.
  - 1. Gloss Level: Manufacturer's standard semigloss finish.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Exterior Wood Substrates: 15 percent, when measured with an electronic moisture meter.
- C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- D. Proceed with finish application only after unsatisfactory conditions have been corrected.
  - 1. Beginning finish application constitutes Contractor's acceptance of substrates and conditions.

#### 3.2 PREPARATION

- A. Remove hardware, covers, plates, and similar items already in place that are removable. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and finishing.

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1. After completing finishing operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- B. Clean and prepare surfaces to be finished according to manufacturer's written instructions for each substrate condition and as specified.
  1. Remove dust, dirt, oil, and grease by washing with a detergent solution; rinse thoroughly with clean water and allow to dry. Remove grade stamps and pencil marks by sanding lightly. Remove loose wood fibers by brushing.
  2. Remove mildew by scrubbing with a commercial wash formulated for mildew removal and as recommended by stain manufacturer.
- C. Exterior Wood Substrates:
  1. Scrape and clean knots and apply coat of knot sealer before applying primer.
  2. Prime edges, ends, faces, undersides, and backsides of wood.
    - a. For solid hide-stained wood, stain edges and ends after priming.
    - b. For varnish-coated stained wood, stain edges and ends and prime with varnish. Prime undersides and backsides with varnish.
  3. Countersink steel nails, if used, and fill with putty or plastic wood filler tinted to final color. Sand smooth when dried.

### 3.3 APPLICATION

- A. Apply finishes according to manufacturer's written instructions.
  1. Use applicators and techniques suited for finish and substrate indicated.
  2. Finish surfaces behind movable equipment and furniture same as similar exposed surfaces.
  3. Do not apply finishes over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
- B. Apply finishes to produce surface films without cloudiness, holidays, lap marks, brush marks, runs, ropiness, or other surface imperfections.

### 3.4 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing finish application, clean spattered surfaces. Remove spattered materials by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from finish application. Correct damage by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced finished wood surfaces.

END OF SECTION 099300

# County of Mendocino Bower Park Restoration and Improvement Project

## SECTION 11 6800 – PLAYGROUND EQUIPMENT AND STRUCTURES

### 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 playground equipment as follows:
  - 1. Freestanding playground equipment (2-5).
  - 2. Composite playground equipment (2-5).
  - 3. Freestanding playground equipment (5-12).
  - 4. Composite playground equipment (5-12).
  - 5. Outdoor fitness equipment.
  
- B. Related Sections:
  - 1. Section 002600 Procurement Substitution Procedures
  - 2. Section 321816.13 Playground Protective Surfacing

#### 1.3 DEFINITIONS

- A. Definitions in ASTM F1487 apply to Work of this Section.
- B. IPEMA: International Play Equipment Manufacturers Association.

#### 1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

#### 1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For each type of playground equipment.
  - 1. Include plans, elevations, sections, and attachment details.
  - 2. Include fall heights and use zones for playground equipment, coordinated with the critical-height values of protective surfacing specified in Section 32 1816.13 "Playground Protective Surfacing."
- C. Samples for Initial Selection: For each type of exposed finish.

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1. Manufacturer's color charts.
2. Include Samples of accessories involving color selection.

D. Samples for Verification: For each type of exposed finish on the following products:

1. Include Samples of accessories to verify color and finish selection.
2. Posts and Rails: Minimum 6 inches long.
3. Platforms: Minimum 6 inches square.
4. Molded Plastic: Minimum 3 inches square.

### 1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer, manufacturer, and testing agency.
- B. Product Certificates: For each type of playground equipment.
- C. Material Certificates: For the following items:
  1. Shop finishes.
  2. Wood-Preservative Treatment: Include certification by treating plant that states type of preservative solution and pressure process used, net amount of preservative retained, and compliance with applicable standards.
- D. Field quality-control reports.
- E. Sample Warranty: For manufacturer's special warranties.

### 1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For playground equipment and finishes to include in maintenance manuals.

### 1.8 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A firm whose playground equipment components have been certified by IPEMA's third-party product certification service.
- B. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by the manufacturer.

### 1.9 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of playground equipment that fail in materials or workmanship within specified warranty period.
  1. Failures include, but are not limited to, the following:
    - a. Structural failures.
    - b. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.

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2. Warranty Period: Five years from date of Substantial Completion.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Source Limitations: Obtain playground equipment from single source from single manufacturer.
- B. Specified products and manufacturers identified in this section are Basis of Design product specifications. Substitution of these products and manufacturers will only be considered prior to bid and only if requests for substitution are received by the County in accordance with specification section 00 26 00 Procurement Substitution Procedures. Substitution requests for Playground or Fitness equipment will not be accepted after award of contract.**
- C. Playground equipment and components shall have the IPEMA Certification Seal.

#### 2.2 PERFORMANCE REQUIREMENTS

- A. Safety Standard:
  1. Provide playground equipment according to ASTM F1487 and CPSC standards.
  2. Playground equipment shall comply with CBC 11B-1008.4, 11B-1008.3.1.3 & 11-B1008.3.2.
- B. Powder-coat performance Standards:
  1. Hardness (ASTM D3363) min. rating: 2H
  2. Flexibility (ASTM D522) pass 1/8" mandrel
  3. Impact (ASTM D2794) rating: minimum 80 inch-pounds
  4. Salt Fog Resistance (ASTM B117, ASTM D1654): 4,000 hours and rating 6 or greater
  5. UV Exposure (ASTM G154): 3,000 hours, rating delta E of 2, and 90 percent gloss retention.
  6. Adhesion (ASTM D3359) min. rating: 5B

#### 2.3 FREESTANDING PLAYGROUND EQUIPMENT (2-5)

- A. Landscape Structures' Swing Set, see sheet L4.5:
  1. Single post swing (177332)
  2. Two (2) Full bucket seats with ProGuard chains (176038)
  3. Colors to be from the manufacturer's full color range.
  4. Min. 5" diameter hot-dip galvanized steel frame manufactured per ASTM A123.
  5. Aluminum posts, beams and clamps according to ASTM B-221
  6. Swing chains coated with zinc alloy thermal-diffusion coating in accordance with ASTM A1059.
  7. All metal components shall be cleaned and pre-treated, and powder-coated with a min. of 0.002" epoxy primer, and a min. of 0.004" layer of TGIC polyester powder.
  8. Bucket seats shall be made from low-density polyethylene per ASTM D638 with UV-stabilizing additives.

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9. All fasteners to be stainless steel and tamper-resistant per ASTM F879. All primary fasteners to include a IFI-125 torque requirement compliant locking patch material.
  10. Include all necessary special tools for tamper-proof fasteners.
- B. Landscape Structures' Double Bobble Spring Rider (164075), see sheet L4.5:
1. Colors to be from the manufacturer's full color range.
  2. All metal components shall be cleaned and pre-treated, and powder-coated with a min. of 0.002" epoxy primer, and a min. of 0.004" layer of TGIC polyester powder.
  3. Seats shall be made from low-density polyethylene per ASTM D638 with UV-stabilizing additives.
  4. All fasteners to be stainless steel and tamper-resistant per ASTM F879. All primary fasteners to include a IFI-125 torque requirement compliant locking patch material.
  5. Include all necessary special tools for tamper-proof fasteners.
- C. Landscape Structures' Log Crawl Tunnel (173594), see sheet L4.5:
1. Colors to be from the manufacturer's full color range.
  2. Glass fiber reinforced concrete products to meet ASTM C947 standards. GFRC to utilize alkali resistant glass fibers.
  3. Exterior-application latex paint finish.
- D. Landscape Structures' Peak Natural Climber (160418), see sheet L4.5:
1. Colors to be from the manufacturer's full color range.
  2. Glass fiber reinforced concrete products to meet ASTM C947 standards. GFRC to utilize alkali resistant glass fibers.
  3. Exterior-application latex paint finish.
- E. Landscape Structures' Wee Planet Climber (200677), see sheet L4.5:
1. Panels to be 3/4" high-density polyethylene, UV stable. Density of 0.960 G/cc or higher, per ASTM D1505. Tensile strength of 2400 PSI per ASTM D638.
  2. Three-layer polyethylene system with two colored exterior layers over recycled black interior core.
  3. All metal components shall be cleaned and pre-treated, and powder-coated with a min. of 0.002" epoxy primer, and a min. of 0.004" layer of TGIC polyester powder.
  4. All fasteners to be stainless steel and tamper-resistant per ASTM F879. All primary fasteners to include a IFI-125 torque requirement compliant locking patch material.
  5. Colors to be from manufacturers full color range.
- F. Landscape Structures' Log Steppers, see sheet L4.5:
1. Three (3) 8" Log Stepper (173907)
  2. 18" Log Stepper (173908)
  3. Glass fiber reinforced concrete products to meet ASTM C947 standards. GFRC to utilize alkali resistant glass fibers.
  4. Exterior-application latex paint finish.
  5. Colors to be from manufacturers full color range.
- G. Landscape Structures' Mushroom Climbers, see sheet L4.5:
1. Two (2) 10" Mushroom Climber (171569)

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2. Two (2) 16" Mushroom Climber (171570)
3. Glass fiber reinforced concrete products to meet ASTM C947 standards. GFRC to utilize alkali resistant glass fibers.
4. Exterior-application latex paint finish.
5. Colors to be from manufacturers full color range.

### H. Landscape Structures' Log Balance Beam (173596), see sheet L4.5:

1. Glass fiber reinforced concrete products to meet ASTM C947 standards. GFRC to utilize alkali resistant glass fibers.
2. Exterior-application latex paint finish.
3. Colors to be from manufacturers full color range.

### I. Landscape Structures' Welcome sign 2-5 years (182503), see sheet L4.5:

1. Colors to be from manufacturers full color range.

## 2.4 COMPOSITE PLAYGROUND EQUIPMENT (2-5).

### A. Landscape Structures' Custom composite structure (CP023654): see sheet L4.5:

1. Double Swirl Slide
2. Ring-A-Bell Hole Panel
3. Optigear Panel
4. Belt Climber
5. Belt Hangout
6. Transfer Point
7. Wood Board Climber
8. Net Climber
9. O-Zone Climber
10. Marble Panel
11. Colors to be from manufacturers full color range.

## 2.5 FREESTANDING PLAYGROUND EQUIPMENT (5-12).

### A. Landscape Structures' Swing Set, see sheet L4.6:

1. Single Post Swing (177332)
2. Two (2) Belt seats with ProGuard chains (174018)
3. Min. 5" diameter hot-dip galvanized steel frame manufactured per ASTM A123.
4. Aluminum posts, beams and clamps according to ASTM B-221
5. Swing chains coated with zinc alloy thermal-diffusion coating in accordance with ASTM A1059.
6. All metal components shall be cleaned and pre-treated, and powder-coated with a min. of 0.002" epoxy primer, and a min. of 0.004" layer of TGIC polyester powder.
7. Bucket seats shall be made from low-density polyethylene per ASTM D638 with UV-stabilizing additives.
8. All fasteners to be stainless steel and tamper-resistant per ASTM F879. All primary fasteners to include a IFI-125 torque requirement compliant locking patch material.
9. Include all necessary special tools for tamper-proof fasteners.
10. Colors to be from the manufacturer's full color range.

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- B. Landscape Structures' Topsyturny Spinner (205800), see sheet L4.6.
1. All metal components shall be cleaned and pre-treated, and powder-coated with a min. of 0.002" epoxy primer, and a min. of 0.004" layer of TGIC polyester powder.
  2. Floor/standing surface shall be made from low-density polyethylene per ASTM D638 with UV-stabilizing additives.
  3. All fasteners to be stainless steel and tamper-resistant per ASTM F879. All primary fasteners to include a IFI-125 torque requirement compliant locking patch material.
  4. Cables: Tightly woven polyester-wrapped, six-stranded galvanized steel cable with either a polypropylene or steel core, min. 20mm in diameter.
  5. Colors to be from manufacturers full color range.
- C. Landscape Structures' Cascade Climber (150977) see sheet L4.6.
1. Panels to be 3/4" high-density polyethylene, UV stable. Density of 0.960 G/cc or higher, per ASTM D1505. Tensile strength of 2400 PSI per ASTM D638.
  2. Three-layer polyethylene system with two colored exterior layers over recycled black interior core.
  3. All metal components shall be cleaned and pre-treated, and powder-coated with a min. of 0.002" epoxy primer, and a min. of 0.004" layer of TGIC polyester powder.
  4. All fasteners to be stainless steel and tamper-resistant per ASTM F879. All primary fasteners to include a IFI-125 torque requirement compliant locking patch material.
  5. Colors to be from manufacturers full color range.
- D. Landscape Structures' Three (3) Facet Balance Beam (237934) see sheet L4.6.
1. Glass fiber reinforced concrete products to meet ASTM C947 standards. GFRC to utilize alkali resistant glass fibers.
  2. Exterior-application latex paint finish.
  3. Colors to be from manufacturers full color range.
- E. Landscape Structures' Six (6) Facet Stepper 14" (237103) see sheet L4.6.
1. Glass fiber reinforced concrete products to meet ASTM C947 standards. GFRC to utilize alkali resistant glass fibers.
  2. Exterior-application latex paint finish.
  3. Colors to be from manufacturers full color range.
- F. Landscape Structures' Three (3) Pod Climber 10" (158997) see sheet L4.6.
1. Durable and UV-stable rotationally molded resin with prime natural linear low-density polyethylene with tensile strength of 2400 PSI per ASTM D638. Resin to contain color and UV-stabilizing additives with a nominal wall thickness 1/4".
  2. All metal components shall be cleaned and pre-treated, and powder-coated with a min. of 0.002" epoxy primer, and a min. of 0.004" layer of TGIC polyester powder.
  3. All fasteners to be stainless steel and tamper-resistant per ASTM F879. All primary fasteners to include a IFI-125 torque requirement compliant locking patch material.
  4. Colors to be from manufacturers full color range.
- G. Landscape Structures' Two (2) Pod Climber 16" (120711) see sheet L4.6.

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1. Durable and UV-stable rotationally molded resin with prime natural linear low-density polyethylene with tensile strength of 2400 PSI per ASTM D638. Resin to contain color and UV-stabilizing additives with a nominal wall thickness 1/4".
2. All metal components shall be cleaned and pre-treated, and powder-coated with a min. of 0.002" epoxy primer, and a min. of 0.004" layer of TGIC polyester powder.
3. All fasteners to be stainless steel and tamper-resistant per ASTM F879. All primary fasteners to include a IFI-125 torque requirement compliant locking patch material.
4. Colors to be from manufacturers full color range.

### H. Landscape Structures' Five (5) Pod Climber 20" (158998) see sheet L4.6.

1. Durable and UV-stable rotationally molded resin with prime natural linear low-density polyethylene with tensile strength of 2400 PSI per ASTM D638. Resin to contain color and UV-stabilizing additives with a nominal wall thickness 1/4".
2. All metal components shall be cleaned and pre-treated, and powder-coated with a min. of 0.002" epoxy primer, and a min. of 0.004" layer of TGIC polyester powder.
3. All fasteners to be stainless steel and tamper-resistant per ASTM F879. All primary fasteners to include a IFI-125 torque requirement compliant locking patch material.
4. Colors to be from manufacturers full color range.

### I. Landscape Structures' Two (2) Pod Climber 30" (120713) see sheet L4.6.

1. Durable and UV-stable rotationally molded resin with prime natural linear low-density polyethylene with tensile strength of 2400 PSI per ASTM D638. Resin to contain color and UV-stabilizing additives with a nominal wall thickness 1/4".
2. All metal components shall be cleaned and pre-treated, and powder-coated with a min. of 0.002" epoxy primer, and a min. of 0.004" layer of TGIC polyester powder.
3. All fasteners to be stainless steel and tamper-resistant per ASTM F879. All primary fasteners to include a IFI-125 torque requirement compliant locking patch material.
4. Colors to be from manufacturers full color range.

### J. Landscape Structures' Four (4) Starburst Climber (158426) see sheet L4.6.

1. All metal components shall be cleaned and pre-treated, and powder-coated with a min. of 0.002" epoxy primer, and a min. of 0.004" layer of TGIC polyester powder.
2. All fasteners to be stainless steel and tamper-resistant per ASTM F879. All primary fasteners to include a IFI-125 torque requirement compliant locking patch material.
3. Colors to be from manufacturers full color range.

## 2.6 COMPOSITE PLAYGROUND EQUIPMENT (5-12).

### A. Landscape Structures' Composite structure: see sheet L4.6:

1. 3-Step deck link barrier (CP039102)
2. Chimney Climber (229829)
3. Jigjag Climber Barrier (201887)
4. Crest climber (202625)
5. Colors to be from manufacturers full color range.

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### 2.7 FITNESS EQUIPMENT

- A. Greenfields Outdoor Fitness – 2-Person Static Combo #SHP507 or approved equal.
1. Finish/Color: To be from the Manufacturer's full color range.
  2. Frame: Mild steel (ASTM A36) or stainless steel (ASTM A240) with a minimum yield strength of 36,000 psi.
  3. Frame finish: Steel components must be galvanized (ASTM A123) or powder-coated (ASTM D3359) for UV, corrosion, and weather resistance. Polyester or epoxy powder coating (ASTM D7032) with a min. thickness of 0.006".
  4. All frame and joints welded per AWS D1.1. Welds smooth, continuous, and free of gaps, pinholes, spatter, or burrs.
  5. Fasteners: stainless steel or zinc-coated steel, tamper-resistant.
  6. Installation Method: Direct embedment mount.
- B. Greenfields Outdoor Fitness – S-Shape Ladder #SHP509S or approved equal.
1. Finish/Color: To be from the Manufacturer's full color range.
  2. Frame: Mild steel (ASTM A36) or stainless steel (ASTM A240) with a minimum yield strength of 36,000 psi.
  3. Frame finish: Steel components must be galvanized (ASTM A123) or powder-coated (ASTM D3359) for UV, corrosion, and weather resistance. Polyester or epoxy powder coating (ASTM D7032) with a min. thickness of 0.006".
  4. All frame and joints welded per AWS D1.1. Welds smooth, continuous, and free of gaps, pinholes, spatter, or burrs.
  5. Fasteners: stainless steel or zinc-coated steel, tamper-resistant.
  6. Installation Method: Direct embedment mount.
- C. Greenfields Outdoor Fitness – Push-Up Bar #SGR003 or approved equal.
1. Finish/Color: To be from the Manufacturer's full color range.
  2. Frame: Mild steel (ASTM A36) or stainless steel (ASTM A240) with a minimum yield strength of 36,000 psi.
  3. Frame finish: Steel components must be galvanized (ASTM A123) or powder-coated (ASTM D3359) for UV, corrosion, and weather resistance. Polyester or epoxy powder coating (ASTM D7032) with a min. thickness of 0.006".
  4. All frame and joints welded per AWS D1.1. Welds smooth, continuous, and free of gaps, pinholes, spatter, or burrs.
  5. Fasteners: stainless steel or zinc-coated steel, tamper-resistant.
  6. Installation Method: Direct embedment mount.
- D. Greenfields Outdoor Fitness – Balance Beam #SHP731 or approved equal.
1. Finish/Color: To be from the Manufacturer's full color range.
  2. Frame: Mild steel (ASTM A36) or stainless steel (ASTM A240) with a minimum yield strength of 36,000 psi.
  3. Frame finish: Steel components must be galvanized (ASTM A123) or powder-coated (ASTM D3359) for UV, corrosion, and weather resistance. Polyester or epoxy powder coating (ASTM D7032) with a min. thickness of 0.006".
  4. All frame and joints welded per AWS D1.1. Welds smooth, continuous, and free of gaps, pinholes, spatter, or burrs.
  5. Fasteners: stainless steel or zinc-coated steel, tamper-resistant.

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6. Installation Method: Direct embedment mount.
- E. Greenfields Outdoor Fitness – 2-Person Push-Up and Dip Station #SGR015 or approved equal.
1. Finish/Color: To be from the Manufacturer's full color range.
  2. Frame: Mild steel (ASTM A36) or stainless steel (ASTM A240) with a minimum yield strength of 36,000 psi.
  3. Frame finish: Steel components must be galvanized (ASTM A123) or powder-coated (ASTM D3359) for UV, corrosion, and weather resistance. Polyester or epoxy powder coating (ASTM D7032) with a min. thickness of 0.006".
  4. All frame and joints welded per AWS D1.1. Welds smooth, continuous, and free of gaps, pinholes, spatter, or burrs.
  5. Fasteners: stainless steel or zinc-coated steel, tamper-resistant.
  6. Installation Method: Direct embedment mount.
- F. Greenfields Outdoor Fitness – 3 Beam Jump Bars #SHP720 or approved equal.
1. Finish/Color: To be from the Manufacturer's full color range.
  2. Frame: Mild steel (ASTM A36) or stainless steel (ASTM A240) with a minimum yield strength of 36,000 psi.
  3. Frame finish: Steel components must be galvanized (ASTM A123) or powder-coated (ASTM D3359) for UV, corrosion, and weather resistance. Polyester or epoxy powder coating (ASTM D7032) with a min. thickness of 0.006".
  4. All frame and joints welded per AWS D1.1. Welds smooth, continuous, and free of gaps, pinholes, spatter, or burrs.
  5. Fasteners: stainless steel or zinc-coated steel, tamper-resistant.
  6. Installation Method: Direct embedment mount.
- G. Greenfields Outdoor Fitness – 2-Person Static Combo #SHP507 or approved equal.
1. Finish/Color: To be from the Manufacturer's full color range.
  2. Frame: Mild steel (ASTM A36) or stainless steel (ASTM A240) with a minimum yield strength of 36,000 psi.
  3. Frame finish: Steel components must be galvanized (ASTM A123) or powder-coated (ASTM D3359) for UV, corrosion, and weather resistance. Polyester or epoxy powder coating (ASTM D7032) with a min. thickness of 0.006".
  4. All frame and joints welded per AWS D1.1. Welds smooth, continuous, and free of gaps, pinholes, spatter, or burrs.
  5. Fasteners: stainless steel or zinc-coated steel, tamper-resistant.
  6. Installation Method: Direct embedment mount.

### 2.8 FABRICATION

- A. Provide sizes, strengths, thicknesses, wall thickness, and weights of components as required to comply with requirements in ASTM F1487. Factory drill components for field assembly. Unnecessary holes in components, not required for field assembly, are not permitted. Provide complete play structures, including supporting members and connections, means of access and egress, designated play surfaces, barriers, guardrails, handrails, handholds, and other components indicated or required for equipment indicated.
- B. Metal Frame: Fabricate main-frame upright support posts from metal pipe or tubing with cross-section profile and dimensions as required. Unless otherwise indicated, provide each pipe or tubing main-frame member with manufacturer's standard drainable bottom plate or support

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flange. Fabricate secondary frame members, bracing, and connections from either steel or aluminum.

- C. Composite Frame: Fabricate main-frame upright support posts from metal and plastic. Fabricate secondary frame members, bracing, and connections from either steel or aluminum.
- D. Play Surfaces: Manufacturer's standard elevated drainable decks, platforms, landings, walkways, ramps, and similar transitional play surfaces, designed to withstand loads; fabricated from perforated steel made into floor units with slip-resistant finish. Fabricate units in modular sizes and shapes to form assembled play surfaces indicated.
- E. Protective Barriers: Fabricate according to ASTM F1487. Extend barriers to height above the protected elevated surface according to requirements for use by age group indicated. Fabricate from the following:
  - 1. Welded-metal pipe or tubing with vertical bars.
  - 2. Steel sheet with openings for vision and ventilation.
  - 3. Metal-pipe or metal-tubing frame with wire-mesh infill panels.
  - 4. Plastic panels with openings.
- F. Guardrails: Provide guardrails configured to completely surround the protected area, except for access openings. Fabricate from metal pipe or tubing. Extend guardrails according to requirements for use by age group indicated.
- G. Handrails: Welded metal pipe or tubing, maximum OD between 0.95 and 1.55 inches of 0.125 inch.
  - 1. Provide handrails at heights to comply with requirements for use by age group indicated according to ASTM F1487.
- H. Roofs and Canopies: Designed to discourage and minimize climbing by users.
  - 1. Fabricated from metal-pipe and polyethylene with strong, double-wall construction.
- I. Signs: Manufacturer's standard sign panels, fabricated from plastic with graphics molded in, freestanding, on upright support posts or attached directly to playground equipment.
  - 1. Text: Minimum informational content according to ASTM F1487.
  - 2. Colors: From manufacturer's full color range.

### 2.9 MATERIALS

- A. Aluminum: Material, alloy, and temper recommended by manufacturer for type of use and finish indicated.
- B. Steel: Material types, alloys, and forms recommended by manufacturer for type of use and finish indicated.
- C. Stainless-Steel Sheet: Type 304; finished on exposed faces with No. 2B finish.
- D. Opaque Plastics: Color impregnated, UV stabilized, and mold resistant.

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- E. Iron Castings and Hangers: Malleable iron, ASTM A47/A47M, Grade 32510, hot-dip galvanized.
- F. Post Caps: Cast aluminum or galvanized steel, color-impregnated, UV-stabilized, mold-resistant polyethylene; color to match posts.
- G. Platform Clamps and Hangers: zinc-plated steel, not less than 0.105-inch-nominal thickness.
- H. Hardware: Manufacturer's standard; commercial-quality; corrosion-resistant; hot-dip galvanized steel and iron, stainless steel, or aluminum; of a vandal-resistant design.
- I. Fasteners: Manufacturer's standard; corrosion-resistant; hot-dip galvanized or zinc-plated steel and iron, or stainless steel; permanently capped; and theft resistant.

### 2.10 CAST-IN-PLACE CONCRETE

- A. Concrete Materials and Properties: Comply with requirements in Section 03 3000 "Cast-in-Place Concrete" for normal-weight concrete with minimum 28-day compressive strength of 3000 psi, 3-inch slump, and 1-inch-maximum-size aggregate.
- B. Concrete Materials and Properties: Dry-packaged concrete mix complying with ASTM C387/C387M and mixed at site with potable water, according to manufacturer's written instructions, for normal-weight concrete with minimum 28-day compressive strength of 3000 psi, 3-inch slump, and 1-inch-maximum-size aggregate.

### 2.11 ALUMINUM FINISHES

- A. Powder-Coat Finish: Minimum dry film thickness of 1.5 mils, medium gloss. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

### 2.12 IRON AND STEEL FINISHES

- A. Powder-Coat Finish: After cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat to a minimum dry film thickness of 2 mils. Comply with coating manufacturer's written instructions for pretreatment, applying, and baking.

### 2.13 STAINLESS-STEEL FINISHES

- A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
- B. Bright, Cold-Rolled, Unpolished Finish: No. 2B.

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## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for earthwork, subgrade elevations, surface and subgrade drainage, and other conditions affecting performance of the Work.
  - 1. Do not begin installation before final grading required for placing playground equipment and protective surfacing is completed.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. Comply with manufacturer's written installation instructions for each equipment type unless more stringent requirements are indicated. Anchor playground equipment securely, positioned at locations and elevations indicated.
  - 1. Maximum Equipment Height: Coordinate installed fall heights of equipment with finished elevations and critical-height values of protective surfacing. Set equipment so fall heights and elevation requirements for age group use and accessibility are within required limits. Verify that playground equipment elevations comply with requirements for each type and component of equipment.
- B. Post and Footing Excavation: Excavate holes for posts and footings as indicated in firm, undisturbed or compacted subgrade soil.
- C. Post Set on Subgrade: Level bearing surfaces with drainage fill to required elevation.
- D. Post Set with Concrete Footing: Comply with Section 03 3000 "Cast-in-Place Concrete" for measuring, batching, mixing, transporting, forming, and placing concrete.
  - 1. Set equipment posts in concrete footing. Protect portion of posts above footing from concrete splatter. Verify that posts are set plumb or at the correct angle, alignment, height, and spacing.
  - 2. Place concrete around posts and vibrate or tamp for consolidation. Hold posts in position during placement and finishing operations until concrete is sufficiently cured.
  - 3. Embedded Items: Follow equipment manufacturer's written instructions and drawings to ensure correct installation of anchorages for equipment.
  - 4. Finishing Footings: Smooth top, and shape to shed water.

### 3.3 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Perform the following tests and inspections with the assistance of a factory-authorized service representative.
  - 1. Perform inspection and testing for each type of installed playground equipment according to ASTM F1487.

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- C. Playground equipment items will be considered defective if they do not pass tests and inspections.
- D. Prepare test and inspection reports.
- E. Notify Owner 48 hours in advance of date(s) and time(s) of testing and inspection.

END OF SECTION 11 6800

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## SECTION 260500 - COMMON WORK RESULTS FOR ELECTRICAL

### PART 1 - GENERAL

#### 1.1 SCOPE OF WORK

- A. Work included in this Section: "Provide" indicates all materials, labor, equipment, services, and incidentals necessary to install the Electrical Work indicated on the contract drawings and these specifications. Work includes, but is not limited to the following:
  - 1. Electrical and telephone services stub-outs and coordination.
  - 2. Distribution feeders, branch circuit wiring, wiring devices and connections to all equipment requiring electrical service.
  - 3. Interior and exterior building lighting fixtures, controls and connections complete.
  - 4. Coordination with Vendor's associated with the construction of the project.
  - 5. All necessary incidental work not specifically mentioned herein or shown on the drawings shall be provided for complete and functioning systems.
  
- B. Work specified in Division 26, 27, 28:
  - 1. Section 260519: Low-Voltage Electrical Power Conductors and Cables
  - 2. Section 260526: Grounding and Bonding for Electrical Systems
  - 3. Section 260529: Hangers and Supports for Electrical Systems
  - 4. Section 260533: Raceway and Boxes for Electrical Systems
  - 5. Section 260553: Identification for Electrical Systems
  - 6. Section 262416: 600-Volt Rated Panelboards & CBs'
  - 7. Section 265619 - LED Exterior Lighting
  - 8. Section 262726: Wiring Devices
  - 9. Section 337173: Electrical Utility Services

#### 1.2 INCORPORATED DOCUMENTS

- A. Requirements of the General Conditions, Supplementary Conditions, and Division 1 Sections apply to all work in this Section, unless modified herein.
  
- B. Provide equipment and materials which conform to, and perform the installation thereof in accordance with the following codes and industry standards. The applicable version of each shall be that in effect as of the date of the Contract:
  - 1. California Electrical Code, latest edition (CEC).
  - 2. California Building Code, latest edition (CBC)
  - 3. Underwriters' Laboratories, Inc. (UL).
  - 4. NFPA 101, Life Safety Code.
  - 5. Titles 8, 19 and 24 of the California Code of Regulations (CCR).
  - 6. American National Standards Institute (ANSI).
  - 7. California State Fire Marshal (CSFM).
  - 8. National Electrical Manufacturers' Association (NEMA).

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9. Institute of Electrical and Electronics Engineers (IEEE).
  - a. National Electrical Safety Code (NESC).
    - i. Electrical Safety Orders.
    - ii. Other applicable local codes and ordinances.

10. All local, State and Municipal Codes and Ordinances.

- C. Where the authority-having-jurisdiction makes an interpretation or decision, as is their prerogative in accordance with the Code, such direction shall be considered a part of these Contract Documents as if contained herein. With respect to completing the intent of the Contract Documents, comply with any and all requirements of the authority-having-jurisdiction and utility company field inspectors, at no additional cost.
- D. The above referenced codes and standards are considered to be absolute minimum requirements. The Drawings and Specifications shall take precedence over the above referenced codes and standards where materials or workmanship of higher quality or larger size is indicated. Nothing in these Drawings or Specifications shall be construed to allow work not conforming to the applicable codes and standards

### 1.3 REVIEW OF CONTRACT DOCUMENTS

- A. Examine all relevant Contract Documents including Drawings, Specifications, and Shop Drawings in order to become acquainted with the Work of other installers whose activities will adjoin or be affected by the Electrical Work.

### 1.4 PERMITS, LICENSES, AND FEES

- A. Procure and pay for all permits, licenses and fees that are required to carry out and complete the Electrical Work.
- B. Pay for building department imposed inspection fees.
- C. Pay utility company charges for normal or after hours shutdowns, service calls, repairs, and cable locating that are directly related to the installation of the Electrical Work.

### 1.5 SITE VERIFICATION OF INFORMATION

- A. Visit the project site prior to submitting a bid and verify the condition, location and dimensions of buildings, equipment, and facilities. The act of submitting a bid shall indicate the Contractor to have familiarized themselves with all discernible conditions and has no exceptions to the existing conditions. There shall be no extra payment approved for work required due to existing conditions, whether specifically mentioned or not.
- B. Verify at the project site, the accuracy of information shown on the Drawings regarding existing equipment, materials, and facilities. This includes but is not limited to: size, type, rating, quality, age, and serviceability. No allowance will be made on behalf of the Contractor for extra expenses resulting from the failure to discover conditions affecting the Work.

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- C. Lines of other services that are damaged as a result of this work shall promptly be repaired complete to the satisfaction of the Owner at no additional expense to the contract.

### 1.6 WORKING SPACE

- A. Maintain adequate work space around, and access to, electrical and mechanical equipment in strict accordance with the applicable Codes. Verify during the course of construction that sufficient space will be available for the installation equipment, fixtures, etc.

### 1.7 QUALITY ASSURANCE

#### A. Conformance:

1. The Contractor shall notify the Owner's Representative, prior to submission of bid, about any part of the design which fails to comply with abovementioned requirements.
2. If after contract is awarded, minor changes and additions are required by aforementioned authorities, even though such work is not shown on drawings or covered in the specifications, they shall be included at Contractor's expense.

#### B. Coordination:

1. The Contractor shall become familiar with the conditions at the job site, contract drawings and specifications and plan the installation of the electrical work to conform with the existing conditions and that shown and specified so as to provide the best possible assembly of the combined work of all trades.
2. The Contractor shall work out in advance all "tight" conditions, involving all trades and if found necessary, supplementary drawings shall be prepared by this Contractor, for the Owner's Representative approval before work proceeds in these areas. No additional costs will be considered for work which must be relocated due to conflicts with the work of other trades.

### 1.8 MATERIALS AND SUBSTITUTIONS

- A. Materials shall be new, high quality, free from defects, of standard make, and of the brand or grade as shown on the Drawings or specified herein. Specific trade names are used in the Drawings and Specifications in order to establish the standard grade and characteristics of said items. This does not imply the right upon the part of the Contractor to use other materials or methods without the approval of the Owner's Representative.
- B. Electrical materials and equipment shall bear the label of, or be listed by, the Underwriters' Laboratories (UL) wherever standards have been established and label service is regularly furnished by that agency. Comply with the installation and application requirements of UL as documented in their published directories.
- C. Unless specifically noted, equipment and systems shall be the product of a manufacturer who has been in the manufacture of, and has nationally distributed catalogs covering the ratings and specifications of, said equipment or systems, for a period of not less than five (5) years.
- D. Maintain uniformity throughout the Project by making use of only one make or brand of material for each material used.

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- E. Substitutions of materials or methods will only be allowed if such items are approved in writing by the Owner's Representative as equal in quality and utility to the specified items. Submit a list of proposed substitutions within thirty (30) days of the award of the Contract. Include on the list the original manufacturer's name and model number, the proposed manufacturer's name and model number, catalog cut sheets, ratings, sizes, performance curves, shop drawings, and other data as may be required to demonstrate equality to the specified item.
- F. The approval of a substitution does not authorize any deviation from the utility, size, function, or durability of the specified item unless specifically pointed out and requested in the proposed substitution list, and said deviation is approved in writing by the Owner's Representative. Responsibility of the Contractor for dimensional considerations or space conflicts is not relieved by the approval of a substitution.
- G. If requested by the Owner's Representative, submit samples of materials and equipment for approval prior to installation.
- H. Any and all additional costs incurred by the substitution of electrical material or equipment, or installation thereof, whether Owner's Representative, structural, plumbing, mechanical or electrical, shall be borne by the Contractor under this Section.
- I. Burden of proof of equality of any substitution for a specified product is the responsibility of this Contractor.
- J. Where required by Owner's Representative to ascertain equality of substitute product, Contractor may be requested to provide the specified item and the submitted substitution for comparison, at no additional cost to the Owner.

### 1.9 ELECTRICAL SUBMITTALS

- A. See the General Conditions for conditions of submittal approval and general requirements for submission of shop drawings.
- B. Submit electrical shop drawings and manufacturer's cut sheets for equipment and materials as noted in each Division 26 specification section. Bind the submittals as complete volumes according to classification of equipment such as power, lighting, etc. When possible, make all electrical submittals at the same time.
- C. Submit shop drawings and supporting data as instruments of the Contractor. Stamp each item in the submittal documents with the Contractor's stamp, thereby stating that the equipment meets all requirements and conditions of the Drawings and Specifications. In particular, certify that the items shown on the shop drawings conform to the dimensional, environmental, and space restrictions as pertains to all work under this Contract and the work of other parties in conjunction with this Project.
- D. Provide a blank space on the title page of each submittal classification for the Owner's Representative's or Engineers approval stamp and comment field. The minimum size of such space shall be eight inches wide by five inches high.
- E. Arrange panelboard submittals to show bussing, circuit numbering, and branch circuit protective devices similar the schedules on the Drawings. Show elevations of switchboards, motor control centers, and distribution centers indicating the layout of devices, meters, handles, etc. Provide device ratings, circuit numbers, and nameplate descriptions in table form. Include terminal strip mounting arrangements on elevations for terminal cabinets.

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### 1.10 DRAWINGS AND SPECIFICATIONS

- A. The data and information contained on the Drawings is as accurate as was reasonably possible at the time they were produced, but absolute accuracy is not guaranteed. Exact locations, distances, elevations, etc., will be dictated by the actual building and the conditions at the site.
- B. The layout of electrical equipment, wiring, and accessories is shown in a diagrammatic fashion (not pictorially) in order to achieve clarity and legibility. Although the size and location of electrical equipment is drawn to scale wherever possible, refer to all data in the Contract Documents and field verify this information as the project progresses. Examine Owner's Representative, structural, mechanical, and other drawings to determine the exact location of conduits, outlets, fixtures, and equipment and to note any conditions which may affect the electrical work.
- C. The Drawings and Specifications may be superseded by later detail drawings and specifications prepared by the Owner's Representative. Conform to such detail drawings, specifications, addenda, change orders, other reasonable changes as if they are contained herein. See the General Conditions for change order cost considerations.
- D. Because the Electrical Drawings may be distorted for clarity of representation, it may be necessary to field verify the exact location of electrical outlets, lights, switches, etc. in order to conform to the architectural elements. The Owner's Representative reserves the right to make minor changes to the locations of equipment, devices, and wiring shown on the Drawings, at no additional cost, providing the changes are ordered before the rough-in of conduit, boxes, or related items is completed, and no extra material are required.
- E. For dimensional and locational purposes, the Architectural Drawings take precedence over the Electrical Drawings. Determine the appropriate location of lighting fixtures, outlets, wall-mounted devices, etc. by studying the reflected ceiling plans, building sections, and interior elevations. Report conflicting conditions to the Owner's Representative before rough-in for adjustments to the locations.
- F. Conduit quantities, sizes, termination points, and wiring are depicted on the Electrical Drawings. However, not all conduit bends or routing details are necessarily shown. Route conduit so as to conform to the structural conditions, avoid obstructing other trades, maintain space restrictions and keep circulation areas and access openings clear.
- G. Thoroughly examine the Contract Documents prior to submitting a bid in order to determine electrical requirements which are not necessarily indicated on the Electrical Drawings. Include sufficient allowance in the bid sum to cover the costs of these other requirements.
- H. Should the Contractor perceive that the Drawings and Specifications do not sufficiently define the intent of electrical work, contact the Owner's Representative for clarification or additional information. The absence of such contact will be considered as evidence of understanding, on the part of the Contractor, of the intended Electrical Work and the required installation thereof.

### 1.11 WORKMANSHIP

- A. Constantly supervise the work personally or through an authorized and competent representative. Keep the same foreman or supervisor on the project from commencement through completion.

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- B. Perform the Electrical work using the highest caliber craftsman available. Workmanship shall be first class and of the best quality available to insure a long and trouble free service life. Allow only experienced and competent workmen on the job.

### 1.12 COOPERATION AND COORDINATION

- A. Consult with the other installers and trades in coordinating the Work so as to avoid conflicts, omissions and delays. Cooperate with other contractors, third parties, and the Owner in order to expedite the project and provide for the proper execution of the building as a whole. Work performed without regard to other trades or the overall project scheme, may necessarily be required to be moved at the Contractor's expense.

### 1.13 MANUFACTURER'S DIRECTIONS

- A. Adhere to the manufacturer's directions regarding the proper installation and configuration of electrical equipment where those directions cover points not included in these Drawings and Specifications.

### 1.14 PROTECTION AND STORAGE

- A. Use all means necessary to protect the materials of this Division before, during, and after installation and to protect the work and materials of all trades.
- B. Deliver electrical materials to the site new, and in unbroken packages. Provide for the temporary storage of such materials, equipment, and construction tools in accordance with the General Conditions and in strict accordance with approved manufacturers' recommendations. Protect electrical equipment and materials during transit, storage and handling to prevent damage, soiling and deterioration.
- C. During shipping storage and handling protect electrical materials from damage of any type including dust, water, over-spray, and temperature.
- D. Avoid damage during construction to the work and materials of other trades as well as the electrical work and material. Repair or replace, at the Contractor's expense, defective or damaged items such that the entire Work is completed in a condition satisfactory to the Owner's Representative.
- E. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Owner's Representative and at no additional cost to the Owner.
- F. This Contractor shall personally, or through an authorized representative, check all materials upon receipt at jobsite for conformance with approved shop drawings and/or plans and specifications.

### 1.15 EXCAVATION, CUTTING, PATCHING, AND REPAIR

- A. Perform excavation and backfill required for the installation of electrical sub-structures. Restore grounds, walkways, roadways, curbs, walls, and other existing underground facilities to their original condition.

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- B. Conform to the applicable requirements of Division 2, Earthwork for Utilities, in the selection, placement, and compaction of backfill material and finished surfaces.
- C. Cut, core-drill, and demolish existing walls, floors, ceilings and other building surfaces as required for the installation of Electrical Work. Obtain the approval of the Owner's Representative prior to performing any operation which may affect any structural elements of the building.
- D. Patch and repair wood, plaster, tile, or concrete surfaces which have been damaged by the installation of the Electrical Work so that the finished surface matches the surrounding conditions.

### 1.16 FLASHING, WATERPROOFING AND SEALING

- A. In general, install in an approved watertight manner, Electrical Work which pierces exterior walls or waterproofing membranes. Flash and counter-flash roof and wall penetrations in a manner described in other applicable sections of this Specification and as approved by the Owner's Representative.
- B. Fit conduits passing through finished walls with steel escutcheon plates of brass, chrome, or painted finish as directed by the Owner's Representative. Grout penetrations of floor slabs, concrete or masonry walls with an approved grout or silicone elastomeric caulk.

### 1.17 CLEANING, ADJUSTING, AND TOUCH-UP

- A. Remove on a daily basis electrical debris, scraps, packaging material and other rubbish. Dispose of such items off-site in an approved manner and debris. Maintain the site free from physical hazards at all times. See the General Conditions for additional requirements.
- B. After installation, completely clean electrical equipment, fixtures, and materials of excess paint, over-spray, plaster, cement, insulating products, and other foreign matter. Leave the Electrical Work in a clean, finished, dry, level, like new condition.
- C. Touch-up paint scratches and scuffs on electrical equipment and lighting fixtures with paint recommended by the manufacturer and matching the original item finish.
- D. Make setting, adjustments, and programming in accordance with the manufactures' operating and installation instructions. Settings and program variables will be issued by the Owner's Representative prior to commissioning of the electrical system.

### 1.18 AS-BUILT DRAWINGS

- A. Throughout the project, maintain accurate and current record documents. Show on the record drawings deviations from the Electrical Drawings, locations of underground conduits and pull-boxes, and concealed equipment which is not readily apparent. Dimension the record drawings using permanent, readily identified benchmarks such as column or wall lines.
- B. At the completion of the project, present one clearly legible set of the record drawings to the Owner's Representative.

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### 1.19 SCHEDULING/SEQUENCING

- A. Place orders for all equipment in time to prevent any delay in construction schedule or completion of project. If any materials or equipment are not ordered in time, additional charges made by equipment manufacturers to complete their equipment in time to meet the construction schedule, together with any special handling charges, shall be borne by this Contractor.
- B. The Contractor shall coordinate production and delivery schedule for all Owner-supplied equipment with the equipment suppliers to ensure that all Owner-supplied equipment is delivered to site in coordination with the construction schedule and in such a manner as to cause no delays in completion of the Contract as scheduled.

### 1.20 INSPECTIONS AND TESTING

- A. Arrange for the inspection of the Work at various stages of completion by the Authority Having Jurisdiction, utility company representatives, and the Owner's Representative. Comply with all directions and remedial measures issued thereby. Any objections to these orders on the part of the Contractor must be presented to the Owner's Representative in writing within forty eight (48) hours of the inspection report.
- B. Coordinate the installation of the Work so that observation of all rough-in, concealed, or underground Work can take place by the Owner's Representative. Provide a minimum of seventy two (72) hours' notice to the Owner's Representative prior to covering up the work. Uncover Work that has not been properly observed and make repairs to restore the Work and adjoining surfaces to their proper condition at no additional cost.
- C. Perform tests of the electrical system during the course of the project and at project completion to ensure safe and proper function in accordance with the Contract Documents, manufacturers' recommendations, and applicable codes. Provide complete documentation of all test results to the Owner's Representative prior to project completion. Testing shall include, but not necessarily be limited to, the following:
  - 1. Test for short circuits, open circuits, neutral leakage, and improper grounds on feeders and branch circuits. Perform this test with mains in disconnect from feeders, branch circuits closed, fixtures and devices permanently connected, lamps removed from sockets and wall switches closed.
  - 2. Provide insulation resistance tests of all phase and neutral circuit conductors using a 500 Volt Megger for circuits of 240 Volt rating and below, and a 1000 Volt Megger for circuits of 277 volts and above. Minimum acceptable insulation resistance is one (1) megohm.
  - 3. Perform a ground resistance test of each main grounding electrode system, ground rod, and supplemental grounding electrode. Utilize a calibrated, direct reading, earth ground test set and make the tests using the "Three-terminal, Fall-of-Potential" method. The maximum allowable earth ground resistance is 25 ohms.
  - 4. Test for proper phase-to-phase and phase-to-neutral operating voltage on the main service and on each separately derived system. Perform this test at full load and at no load. With all circuits at full operating conditions, test the phase and neutral load currents using a clamp-on ammeter.
  - 5. When series rated circuit breakers are used, provide a letter from the manufacturer of the equipment confirming that U.L. series rating exists for all protective devices. State the available fault current from the Utility Company and indicate that the overcurrent devices exceed the available fault current at the respective point of protection.

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6. Tests as required by other sections of these Specifications.
  7. Tests as prescribed by individual equipment manufacturers whether or not described in these Specifications.
- D. At project completion, demonstrate to the Owner's Representative that the entire installation is complete, in proper operation condition and that the Contract has been properly and fully executed. Activate all circuits, lights, devices, and controls under full load and normal operating conditions. Identify faulty items and immediately replace or repair defective equipment, workmanship, and materials to like new condition and retest in the presence of the Owner's Representative.
- E. At the completion of the Project, demonstrate to the Owner's Representative that the entire electrical system is free from short circuits and improper grounds, or upon request of the Owner's Representative anytime, make necessary tests under the observation of the Owner's Representative which will ensure that electrical equipment, materials and installation methods are as specified.

### 1.21 IDENTIFICATION

- A. Each branch circuit of panelboards to have a permanently fixed number with one word directory, mounted under celluloid on inside of cabinet door, showing circuit numbers and typewritten description of equipment supplied by breakers, including location.
1. All existing panelboards touched shall be updated with new panel schedules.
  2. All existing equipment on existing panel schedules shall be transferred to new panel schedules.
- B. Provide label on all motors: "*Caution. Automatic equipment .May start at any time.*"
- C. Provide identification of all pull boxes, junction boxes, and conduit stub-ups on the project as outlined below:
1. For Power Feeders:
    - a. Stencil cover with identifying circuit number.
    - b. Lettering 1" high.
    - c. Color of lettering black.
    - d. Place lettering on cover in neat manner; run parallel to long sides of box.
  2. For branch circuits, grounding, communication, signal, and control systems boxes and blank conduit stub-outs. Paint inside back of each j-box, front of each cover, and ends of each blank conduit stub-out with identifying system color as listed below:

<u>System</u>	<u>Color</u>
277/480 volt	Orange
120/208 volt	Blue
Telephone/Data	Grey
Ground system	Green
Clock	Brown
Fire Alarm	Red
Audio/Visual	Yellow
Security	White
Low voltage lighting control	Orange/White

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### 1.22 GUARANTEE

- A. In accordance with Division 1 requirements.

### 1.23 PERMITS AND INSPECTIONS

- A. This Contractor shall obtain and pay for all required permits and arrange for all inspections required.
- B. Do not allow or cause any of the work to be covered or enclosed until it has been tested and/or inspected.

### 1.24 WARRANTIES, CERTIFICATES, AND OPERATING MANUALS

- A. Properly fill out and deliver to the Owner, all warranties, guarantees, certificates, etc. for equipment and materials that are furnished and installed under this Section of the Work. The effective date on each item shall be the date of acceptance of the work by the Owner.
- B. Deliver to the Owner, a minimum of two (2) copies of the manufacturers' operating and maintenance manuals for major items of equipment.

END OF SECTION 260500

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## SECTION 260519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This Section includes the following:
  - 1. Building wires and cables rated 600 V and less.
  - 2. Connectors, splices, and terminations rated 600 V and less.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Field quality-control test reports.

#### 1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in CEC, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with CEC.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Wire and Cable (600V)
    - a. American Wire Company
    - b. Belden
    - c. General Wire and Cable Corporation
    - d. Okonite Company
    - e. Rome Cable Corporation
    - f. Cerrowire
    - g. American Insulated Wire
    - h. AFC Cable Systems
    - i. Essex
    - j. Simplex Wire and Cable Company

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### 2. Solderless Lugs and Grounding Connections

- a. Burndy Engineering Company, Inc.
- b. O.Z. Gedney Company, Inc.
- c. Penn Union Electric Corporation
- d. Thomas and Betts Company, Inc.

### 2.2 CONDUCTORS AND CABLES

- A. Copper Conductors: Comply with NEMA WC 70.
- B. Conductor Insulation: Comply with NEMA WC 70 for Types THHN-THWN and XHHW.

### 2.3 CONNECTORS AND SPLICES

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  1. AFC Cable Systems, Inc.
  2. Hubbell Power Systems, Inc.
  3. O-Z/Gedney; EGS Electrical Group LLC.
  4. 3M; Electrical Products Division.
  5. Tyco Electronics Corp.
- B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

## PART 3 - EXECUTION

### 3.1 CONDUCTOR MATERIAL APPLICATIONS

- A. Feeders: Copper Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
- B. Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
- C. 600-volt class, insulation color coded, minimum No. 12 AWG for branch circuits, No. 14 AWG for control circuits.

### 3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

- A. All branch circuits for equipment electrical power, receptacles and lighting shall be concealed spaces where possible. Wiring method shall be MC Cable (copper) with home runs routed in EMT conduit.
- B. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-THWN, single conductors in raceway.

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- C. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-THWN, single conductors in raceway.
- D. Class 1 Control Circuits: Type THHN-THWN, in raceway.
- E. Class 2 Control Circuits: Type THHN-THWN, in raceway.
- F. Insulation type:
  - 1. Standard locations: #12 to #1 AWG: THWN for wet locations and THHN for dry locations. #1/0 through #4/0 AWG: XHHW (55 Mils). 250MCM and larger: XHHW (65 Mils). All wire sizes used shall be based on a 75-degree insulation rating, unless specifically used with 90 degree rated breakers and devices.
  - 2. High temperature and non-standard locations: Provide wire type and insulation category suitable for area of use as defined in CEC table 310-13.

### 3.3 INSTALLATION OF CONDUCTORS AND CABLES

- A. Conceal cables in finished walls, ceilings, and floors, unless otherwise indicated.
- B. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- C. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
- D. Support cables according to Division 26 Sections "Hangers and Supports for Electrical Systems."
- E. 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 and UL 486B.
- F. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
- G. Install all wiring (low voltage and line voltage) in conduit unless noted otherwise in the drawings, but do not pull into conduit until plastering and taping have been completed, and conduits and outlets have been thoroughly cleaned and swabbed as necessary to remove water and debris.
- H. Approximately balance branch circuits about the neutral conductors in panels.
- I. Connections to devices from "thru-feed" branch circuit conductors to be made with pigtails, with no interruption of the branch circuit conductors.
- J. Neutral conductor identified by white outer braid, with different tracers of "EZ" numbering tags used where more than one neutral conductor is contained in a single raceway.
- K. Neatly arrange and "marlin" wires in panels and distribution panelboards with "T and B Ty-rap" or approved equal plastic type strapping.
- L. All wire and cable shall bear the Underwriters' Label, brought to the job in unbroken packages; wire color-coded as follows:

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Voltage	Phasing	A	B	C	N
120/208	3PH-4W	Black	Red	Blue	White
208	3PH-3W	Black	Red	Blue	--
277/480	3PH-4W	Brown	Orange	Yellow	White
480	3PH-3W	Brown	Orange	Yellow	--
120/240	3PH-4W	Black	Red	Blue	White
240	3PH-3W	Black	Red	Blue	--

- M. The equipment grounding conductor shall be insulated copper; where it is insulated, the insulation shall be colored green.
- N. Label each wire of each electrical system in each pull box, junction box, outlet box, terminal cabinet, and panelboard in which it appears with "EZ" numbering tags indicating the connected circuit numbers.
- O. Properly identify the "high leg" of 4-wire delta connected systems (in each accessible location) as required by CEC 215-8 and 230-56.

### 3.4 INSTALLATION OF DISCONNECTS, CONNECTORS, AND LUGS

- A. Equipment Disconnects: All disconnects shall be located to allow proper code required clearance in each area. Locations shown on drawings are diagrammatic only. The contractor shall coordinate exact locations in the field (with other trades) prior to rough-in to insure proper clearances.
  - 1. Motor Disconnect Switches and Safety Switches: General Electric Company Heavy Duty Type "THD", cover interlocked with operating handle so that cover cannot be opened with switch in closed position and switch cannot be closed with cover in open position. 240V or 480V rating, single or multi-pole as required or as noted on drawings, in Nema 1 enclosure indoors or Nema 3R enclosure outdoors unless otherwise noted. Provide dual element motor circuit fuses sized as recommended by equipment manufacturer (for final equipment actually installed).
  - 2. Code required disconnects: Provide a local disconnect in addition to the branch circuit protection device for all equipment as required by code (whether shown or not). Disconnects shall consist of a motor rated switch (or disconnect) for all motor loads less than 3/4HP or other suitable disconnect sized to match branch circuit conductors and load current of equipment, with number of poles as required.
- B. Lugs and Connectors: Thomas and Betts "lock-tite", for No. 4 and larger wire; "Scotchlock" fixed spring type with insulator for No. 6 and smaller wire.
  - 1. All splices made up with wire nut connectors shall be solidly twisted together with electricians pliers before connector is installed to ensure a proper connection in the event of wire nut failure. No exceptions.
  - 2. Connectors listed or labeled for "no wire twisting required" are not an acceptable substitute for actual wire twisting.
  - 3. Utilize porcelain type connectors in all high temperature environments (above 105 degrees Celsius).

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- C. Splice Insulation: "Scotch" electrical tape with vinyl plastic backing or rubber tape with protective friction tape for interior work.

- 1. Provide watertight cast splices for all conductors in site pull boxes or wet locations.

### 3.5 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 Division 26 Section "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

### 3.6 FIRESTOPPING

- A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Division 07 Section "Penetration Firestopping."

- B. Fire stopping: 3M Fire Protection Products or equal.

- 1. Fire-rated and smoke barrier construction: Maintain barrier and structural floor fire and smoke resistance ratings including resistance to cold smoke at all penetrations, connections with other surfaces or types of construction, at separations required to permit building movement and sound vibration absorption, and at other construction gaps.
  - 2. Systems or devices listed in the UL Fire Resistance Directory under categories XHCR and XHEZ may be used, providing that it conforms to the construction type, penetration type, annular space requirements and fire rating involved in each separate instance, and that the system be symmetrical for wall penetrations. Systems or devices must be asbestos free.

### 3.7 FIELD QUALITY CONTROL

- A. Perform tests and inspections and prepare test reports.

- B. Tests and Inspections:

- 1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors for compliance with requirements.
  - 2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
  - 3. 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.
    - a. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each splice 11 months after date of Substantial Completion.
    - b. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.

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- c. 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.
- C. Test Reports: Prepare a written report to record the following:
  - 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.
- D. Remove and replace malfunctioning units and retest as specified above.

END OF SECTION 260519

# County of Mendocino Bower Park Restoration and Improvement Project

## SECTION 260526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes: Grounding systems and equipment.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

#### 1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in CEC, by a qualified testing agency, and marked for intended location and application.
- B. Comply with UL 467 for grounding and bonding materials and equipment.

### PART 2 - PRODUCTS

#### 2.1 CONDUCTORS

- A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.
- B. Bare Copper Conductors:
  - 1. Solid Conductors: ASTM B 3.
  - 2. Stranded Conductors: ASTM B 8.
  - 3. Tinned Conductors: ASTM B 33.
  - 4. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch in diameter.
  - 5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
  - 6. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.
  - 7. Tinned Bonding Jumper: Tinned-copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16-inch thick.

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### 2.2 CONNECTORS

- A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.
- B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy, pressure type with at least two bolts.
  - 1. Pipe Connectors: Clamp type, sized for pipe.
- C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

### 2.3 GROUND RODS

- A. Copper clad steel size 5/8 inch in diameter and 96 inches in length.

### 2.4 Test Wells

- A. Provide handholes "Christy G5" or equal, with cast iron traffic lid and hold down screws.

## PART 3 - EXECUTION

### 3.1 APPLICATIONS

- A. Conductors: Install a solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.
- B. Underground Grounding Conductors: Install bare copper conductor, No. 4/0 AWG minimum. Bury at least 24 inches below grade.
- C. Conductor Terminations and Connections:
  - 1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
  - 2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
  - 3. Connections to Ground Rods at Test Wells: Bolted connectors.
  - 4. Connections to Structural Steel: Welded connectors.

### 3.2 EQUIPMENT GROUNDING

- A. Install insulated equipment grounding conductors with the following items, in addition to those required by CEC:
  - 1. Feeders and branch circuits.
  - 2. Lighting circuits.
  - 3. Receptacle circuits.
  - 4. Single-phase motor and appliance branch circuits.

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5. Three-phase motor and appliance branch circuits.
  6. Flexible raceway runs.
  7. Computer and Rack-Mounted Electronic Equipment Circuits: Install insulated equipment grounding conductor in branch-circuit runs from equipment-area power panels and power-distribution units.
- B. Signal and Communication Equipment: In addition to grounding and bonding required by CEC, provide a separate grounding system complying with requirements in TIA/ATIS J-STD-607-A.
1. For telephone, alarm, voice and data, and other communication equipment, provide No. 4 AWG minimum insulated grounding conductor in raceway from grounding electrode system to each service location, terminal cabinet, wiring closet, and central equipment location.
  2. Service and Central Equipment Locations and Wiring Closets: Terminate grounding conductor on a 1/4-by-4-by-12-inch grounding bus.
  3. Terminal Cabinets: Terminate grounding conductor on cabinet grounding terminal.

### 3.3 INSTALLATION

- A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
- B. Install ground wires in rigid conduit.
- C. All grounding electrode conductor connections "thermite" or "cad-weld" welded.
- D. Use approved pressure type solderless connector or use fusion welding for all connections to and bonding of grounding electrode system. All connections shall be visible, readily accessible for testing purposes. Grounding electrode conductor between the grounding electrode and service equipment.
- E. Terminate grounding conduits at equipment with ground bushing, with ground wire connected through bushing.
- F. Other than for isolated ground receptacles, provide No. 12 stranded (green) THHN conductor from outlet box to ground screw of every receptacle.
- G. Ground all isolated sections of metallic raceways.
- H. Provide #12 minimum stranded (green) THHN conductor sized per CEC, or as noted, connected continuously throughout branch circuit for all circuits, bonded to panel ground bus, and to all electrical devices and equipment enclosures
- I. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.
1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
  2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.
  3. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.

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### 3.4 LABELING

- A. Comply with requirements in Division 26 Section "Requirements for Electrical Installations" The label or its text shall be green.
- B. Install labels at the telecommunications bonding conductor and grounding equalizer and at the grounding electrode conductor where exposed.
  - 1. Label Text: "If this connector or cable is loose or if it must be removed for any reason, notify the facility manager."

### 3.5 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections and prepare test reports:
  - 1. After installing grounding system, before permanent electrical circuits have been energized, test for compliance with requirements.
  - 2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
  - 3. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, and at ground test wells. Make tests at ground rods before any conductors are connected.
  - 4. Test system using the three-point fall of potential method only. Record results and submit to Owner's Representative for approval.
- B. Report measured ground resistances that exceed the following values:
  - 1. Power and Lighting Equipment or System with Capacity of 500 kVA and Less: 10 ohms.
  - 2. Power Distribution Units or Panelboards Serving Electronic Equipment: 3ohm(s).
- C. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Owner's Representative promptly and include recommendations to reduce ground resistance.

END OF SECTION 260526

# County of Mendocino Bower Park Restoration and Improvement Project

## SECTION 260529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes:
  - 1. Hangers and supports for electrical equipment and systems.

#### 1.2 PERFORMANCE REQUIREMENTS

- A. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.
- B. Rated Strength: Adequate in tension, shear, and pullout force to resist maximum loads calculated or imposed for this Project, with a minimum structural safety factor of five times the applied force.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For steel slotted support systems.
- B. Shop Drawings: Show fabrication and installation details and include calculations for the following:
  - 1. Trapeze hangers. Include Product Data for components.
  - 2. Steel slotted channel systems. Include Product Data for components.
  - 3. Equipment supports.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Welding certificates.

#### 1.5 QUALITY ASSURANCE

- A. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- B. Comply with CEC.

PART 2 - PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.
  - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Allied Tube & Conduit.
    - b. Cooper B-Line, Inc.; a division of Cooper Industries.
    - c. ERICO International Corporation.
    - d. GS Metals Corp.
    - e. Thomas & Betts Corporation.
    - f. Unistrut; Tyco International, Ltd.
    - g. Wesanco, Inc.
    - h. General Electric Company
    - i. Republic Steel Corporation
  - 2. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
  - 3. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
  - 4. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
  - 5. Channel Dimensions: Selected for applicable load criteria.
- B. Raceway and Cable Supports: As described in NECA 1 and NECA 101.
- C. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.
- D. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be malleable iron.
- E. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
- F. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
  - 1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.

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- a. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1) Hilti Inc.
  - 2) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
  - 3) MKT Fastening, LLC.
  - 4) Simpson Strong-Tie Co., Inc.; Masterset Fastening Systems Unit.
2. Mechanical-Expansion Anchors: Insert-wedge-type, stainless steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.
  - a. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - 1) Cooper B-Line, Inc.; a division of Cooper Industries.
    - 2) Empire Tool and Manufacturing Co., Inc.
    - 3) Hilti Inc.
    - 4) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
    - 5) MKT Fastening, LLC.
  3. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
  4. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
  5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
  6. Toggle Bolts: All-steel springhead type.
  7. Hanger Rods: Threaded steel.

### 2.2 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

- A. Description: Welded or bolted, structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.
- B. Materials: Comply with requirements in Division 05 Section "Metal Fabrications" for steel shapes and plates.

## PART 3 - EXECUTION

### 3.1 APPLICATION

- A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.
- B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as required by CEC. Minimum rod size shall be ¼-inch in diameter.

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- C. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.
  - 1. Secure raceways and cables to these supports with two-bolt conduit clamps.
- D. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch and smaller raceways serving branch circuits and communication systems above suspended ceilings and for fastening raceways to trapeze supports.

### 3.2 SUPPORT INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.
- B. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.
- C. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
  - 1. To Wood: Fasten with lag screws or through bolts.
  - 2. To New Concrete: Bolt to concrete inserts.
  - 3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
  - 4. To Existing Concrete: Expansion anchor fasteners.
  - 5. To Steel: Welded threaded studs complying with AWS D1.1/D1.1M, with lock washers and nuts
  - 6. To Light Steel: Sheet metal screws.
  - 7. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate by means that meet seismic-restraint strength and anchorage requirements.
- D. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

### 3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

- A. Comply with installation requirements in Division 05 Section "Metal Fabrications" for site-fabricated metal supports.
- B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.
- C. Field Welding: Comply with AWS D1.1/D1.1M.

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### 3.4 PAINTING

- A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
  - 1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils.
- B. Touchup: Comply with requirements in Division 09 Section "Exterior Paints" for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.
- C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 260529

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## SECTION 260533 - RACEWAYS AND BOXES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. All branch circuits for electrical equipment, receptacles and lighting shall be copper wiring routed in EMT conduit home runs. MC cable may only be used within 6 feet of light fixture.

#### 1.2 RELATED SECTIONS

- A. Section 260500: Common Work Results for Electrical
- B. Section 260519: 600-Volt Power Conductors and Cables
- C. Section 260526: Grounding and Bonding for Electrical Systems
- D. Section 260553: Identification for Electrical Systems

#### 1.3 REFERENCES - CODES AND STANDARDS

- A. ANSI C80.1 Rigid Steel Conduit, Zinc Coated.
- B. ANSI C80.3 Electrical Metallic Tubing, Zinc Coated.
- C. ANSI C80.6 American National Standard for Electrical Intermediate Metal Conduit.
- D. ASTM A 48 Standard Specification for Grey Iron Castings.
- E. NECA (National Electrical Contractor's Association) – "Standard of Installation."
- F. NEMA FB 1 (National Electrical Manufacturers Association) – Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.
- G. NEMA OS 1 (National Electrical Manufacturers Association) – Sheet-steel Outlet Boxes, Device Boxes, Covers, and Box Supports.
- H. NEMA OS 2 (National Electrical Manufacturers Association) – Nonmetallic Outlet Boxes, Device Boxes, Covers and Box Supports.
- I. NEMA RN 1 (National Electrical Manufacturers Association) – Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit.
- J. NEMA TC 2 – Electrical Polyvinyl Chloride (PVC) Conduit.
- K. NEMA TC 3 (National Electrical Manufacturers Association) – PVC Fittings for Use with Rigid PVC Conduit and Tubing.
- L. NEMA TC 6 - Non-Metallic Conduit.

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- M. NEMA 250 (National Electrical Manufacturers Association) – Enclosures for Electrical Equipment (1,000 Volts Maximum).
- N. CEC California Electrical Code (CEC). Latest approved edition
- O. UL 1 Flexible Metal Conduit
- P. UL 6 Rigid Metal Conduit
- Q. UL 514B Conduit, Tubing and Cable Fittings.
- R. UL 651 Rigid Non-Metallic Conduit
- S. UL 797 Electrical Metallic Tubing
- T. UL 1242 Intermediate Metal Conduit

### 1.4 SYSTEM DESCRIPTION

- A. Raceway, boxes and manholes located as indicated on drawings and at other locations required for splices, taps, wire pulling, equipment connections, and compliance with regulatory requirements. Raceway, boxes and manholes are shown in approximate locations unless dimensioned. Provide raceway for complete wiring system.
- B. All branch circuits for equipment electrical power, receptacles and lighting shall be concealed spaces where possible. Wiring method shall be EMT conduit.
- C. In or Under Slab: Provide Schedule 40 non-metallic conduit.
- D. Underground more than 5 feet (1,500 mm) outside foundation wall: Provide Schedule 40 non-metallic conduit.
- E. Underground within 5 feet from foundation wall: Provide rigid steel or Schedule 80 non-metallic conduit.
- F. Provide Schedule 80 or Galvanized Steel with tape wrap rigid steel factory bends greater than 22.5 degrees and for stub-ups through concrete slabs.
- G. Outdoor Locations, Above Grade: Provide EMT conduit painted to match surface(s). Provide cast metal gasketed outlet, pull, and junction boxes.
- H. Concealed Dry Locations: Provide electrical metallic tubing for sizes less than 2-inches. Provide galvanized rigid steel or intermediate steel conduit in sizes 2-inches or larger. Provide cast or sheet metal boxes.

### 1.5 DESIGN REQUIREMENTS

- A. Minimum Raceway Size: 3/4 inch (19 mm) unless otherwise specified.

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### 1.6 SUBMITTALS

- A. Manufacturer's Installation Instructions: Submit application conditions and limitations of use stipulated by product testing agency having jurisdiction. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- B. Submit detailed conduit routing plan, for review and approval, prior to installation as follows:
  - 1. Exposed and/or concealed in building walls for conduits larger than 2-inch outside diameter.
  - 2. All underground conduits (3/4-inch and larger) in duct bank; concealed in floor slabs, equipment pads and concrete slabs.
- C. Product Data: Submit for the following:
  - 1. Rigid Steel Conduit.
  - 2. Electrical Metallic Tubing (EMT).
  - 3. Liquid tight flexible metal conduit.
  - 4. Nonmetallic conduit.
  - 5. Raceway fittings.
  - 6. Conduit bodies.
  - 7. Surface raceway.
  - 8. Pull boxes, junction boxes.
- D. Manufacturer's Installation Instructions:
  - 1. Submit application conditions and limitations of use stipulated by product testing agency specified under Regulatory Requirements.
  - 2. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

### 1.7 CLOSEOUT SUBMITTALS

- A. Project Record Documents:
  - 1. Record actual routing of conduits. Provide record (as-built) drawings marked in red to show actual routing of the underground raceway and cable when different from the original contract drawings. Prepare on new, clean set of contract drawings.
  - 2. Record actual locations and mounting heights of outlet, pull boxes, junction boxes and manholes.

### 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.
- B. Protect PVC and PVC-coated metallic conduit from sunlight.

PART 2 - PRODUCTS

2.1 CONDUIT

- A. Galvanized Rigid Steel Conduit (GRSC or RGS), couplings and elbows shall be hot-dip galvanized, rigid mild steel in accordance with ANSI C80.1 and UL 6. The conduit interior and exterior surfaces shall have a continuous zinc coating with a transparent overcoat of enamel, lacquer, or zinc chromate. Conduit shall be formed with continuous welded seams with a uniform wall thickness, in minimum 10-foot lengths, with threaded ends.
- B. Electrical Metallic Tubing (EMT). Electrical metallic tubing, including elbows and bends, shall be zinc coated, mild steel in accordance with the requirements of ANSI C80.3 and UL 797. The interior and exterior surfaces of the tubing shall have a continuous zinc coating. Conduit shall be formed with a continuous welded seam, with a uniform wall thickness, in minimum 10-foot lengths.
- C. Liquid-Tight Flexible Metal Conduit shall be plastic-jacketed, galvanized steel, "Sealtite" Type EF for general service areas or Type HC for high-temperature when used under raised floor or in air plenums. Conduit shall be UL listed.
- D. Non-Metallic Conduit shall be as follows:
  - 1. Schedule 40: Conduit shall be 90-degree Celsius, polyvinyl chloride in conformance with NEMA TC-2 and UL 651 requirements.
  - 2. Spacers used in duct bank installations shall be high impact plastic, interlocking bases, and intermediate type spacers. Place spacers between 6 and 10 feet apart.

2.2 RACEWAY FITTINGS

- A. Couplings and Thread Protectors. Each length of threaded conduit shall be provided complete from the manufacturer with a coupling on one end and a thread protector on the other. The thread protector shall have sufficient mechanical strength to protect the threads during normal handling and storage.
- B. Metal Conduit Fittings shall conform to the requirements of UL 514B where this standard applies. Galvanized steel fittings shall be used with steel conduit. Threaded fittings shall engage a minimum of five threads made up wrench-tight and be compatible with conduit. EMT fittings shall be compression type, UL approved for rain tight applications.
- C. Liquid-Tight Flexible Conduit Fittings shall be galvanized steel, T&B 53XX series insulated throat, and shall bear the UL label. Die-cast malleable fittings are not acceptable.
- D. Non-Metallic Conduit Fittings shall be of same material and strength characteristics as the conduit and shall be solvent welded as recommended by manufacturer. End bells shall be plastic, high impact, tapered to fit. Where conduit transition from non-metallic to metallic is required, provide non-metallic female "terminal" adapter. Non-metallic "male" adapters are not acceptable.
- E. Bushings shall be provided for the termination of all conduits not terminated in hubs, couplings or insulated throat connectors. Grounding type insulated bushings with insulating inserts in metal housings shall be provided for conduit 1-1/4 inches and larger. Standard bushings shall be galvanized steel or malleable iron in all sizes.

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- F. Locknuts. One interior and one exterior locknut shall be provided for all conduit terminations not provided with threaded hubs and couplings. Locknuts shall be designed to securely bond with the conduit to the box when tightened. Locknuts shall be so constructed that they will not be loosened by vibration.

### 2.3 CONDUIT BODIES

- A. Malleable iron conduit bodies shall be cast malleable iron with tensile strength meeting ASTM A 48, Class 30A requirements. Malleable conduit bodies shall be finished with an epoxy powder coating. Cover shall be malleable iron with captive screws.
- B. All conduit bodies' entrances shall be machined NPT threads with a smooth, rounded, internal conduit stop bushing.
- C. All conduit bodies shall be equipped with a sealed and gasketed cover. Cover shall be secured using stainless steel machine screws.
- D. Conduit bodies shall be manufactured by Crouse-Hinds, Appleton, or approved equal.

### 2.4 CONDUIT SUPPORTS

- A. Conduit supports shall be furnished and installed in accordance with other section of these specifications. Conduits shall be supported so that fittings are accessible. Support systems shall be limited to electrical conduits only.
- B. Hanger rods shall be 3/8-inch diameter galvanized threaded steel rods, minimum. Conduit racks over 18-inch wide, over one level, or supporting 2-inch RSC or larger, shall be 1/2-inch diameter rod minimum.
- C. Conduit Clamps. Conduits in single runs or groups of two shall be supported by steel clamps and clamp backs. They shall be galvanized malleable iron or approved equal cast ferrous metal for steel conduit or tubing.
- D. Support Channels. Supports for banks of three or more conduits shall be constructed of formed steel support channels (Unistrut, Kindorf, Superstrut, B-Line or approved equal) with associated conduit or tubing clips. Support channels shall be steel, hot-dip galvanized after fabrication with galvanized steel clips for steel conduit or tubing.
- E. Wall Penetrations. All conduits, raceways, cables and sleeve penetrations through fire rated and hazardous location walls, shafts, floor, ceilings, etc., shall be sealed with a UL-approved fire stopping system, in accordance with specification Section 16060 – Basic Electrical Materials and Methods.

### 2.5 OUTLET BOXES AND SWITCH BOXES

- A. Manufacturers: Firms regularly engaged in the manufacturing of electrical raceways of the types and capacities required, whose products have been in satisfactory use in similar service for not less than 3 years.
- B. Sheet Metal Outlet Boxes: ANSI/NEMA OS 1, galvanized flat rolled sheet steel outlet wiring boxes of types, shapes and sizes, including box depths, to suit each respective location and

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installation; construct with stamped knockouts in back and sides, and with threaded screw holes with corrosion-resistant screws for securing box covers and wiring devices.

- C. Outlet boxes used in wet outdoor locations, surface mounted shall be cast metal (FS or FD type) with mounting lugs and gasketed covers.
- D. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported, per CEC requirements.
- E. Outlet Box Accessories: Provide outlet box accessories as required for each installation, including mounting brackets, wallboard hangers, extension rings, fixture studs, cable clamps and metal straps for supporting outlet boxes, which are compatible with outlet boxes being used and meeting requirements of individual wiring situations.

### 2.6 PULL BOXES, JUNCTION BOXES, HANDHOLES AND MANHOLES

- A. Sheet Metal Boxes shall be NEMA OS 1, NEMA rating as indicated on drawings. Minimum 16-gauge galvanized steel construction with stainless steel hinged cover and neoprene gasket. Cover shall be secured to the body with a continuous, full length, piano type hinge and stainless-steel pin on one side and captive screw on the other side. Door shall be equipped with padlock hasp with sealing hole provisions.
  - 1. Provide #10-32 tapped hole provisions for optional ground lug kit.
  - 2. Provide 0.375-16 collar studs for mounting optional panel.
  - 3. Provide external mounting feet for secure wall mounting.
  - 4. Finish: Wash and phosphate undercoat with ANSI 61 gray polyester power finish.
- B. Surface-Mounted Cast Metal Box: NEMA 250, NEMA Type 3R or 4 as indicated, flat-flanged, surface-mounted junction box:
  - 1. Material: Cast Iron.
  - 2. Cover: Furnish with ground flange, neoprene gasket, and stainless-steel cover screws.

### 2.7 CLOSURE FOAM

- A. All conduit, raceways, cables and sleeves penetrations through fire rated and hazardous location walls, shafts, floor, ceilings, etc., shall be sealed by closure foam as in Dow Corning #3-6548 silicone RTV, GE RTV 850 silicone foam, or approved equal.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify outlet locations and routing and termination locations of raceway prior to rough in.

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### 3.2 INSTALLATION OF RACEWAYS

#### A. Routing

1. Install raceway and boxes in accordance with NECA "Standard of Installation."
2. Conduit routing shown on drawings is diagrammatic only. Contractor shall field route conduit and raceways between equipment and devices as required to obtain a complete wiring system.
3. Conduit shall not be exposed unless specifically mentioned on the drawings or accepted by the architect.
4. All exposed conduits shall be installed parallel or perpendicular to dominant surfaces with right-angle turns made of symmetrical bends or fittings.
5. Conduit shall not be installed on the outside face of exposed columns but shall be routed on the web or on the inside of a flange of the column.
6. Except where prevented by the location of other work, a single conduit or a conduit group shall be centered on structural members.
7. Conduit shall be located at least 6 inches from hot water or steam pipes and from other hot surfaces

#### B. Moisture Pockets

1. Moisture pockets shall be eliminated from conduits. If water cannot drain to the natural opening in the conduit system, a hole shall be drilled in the bottom of a pull box or a "C-type" conduit fitting provided in the low point of the conduit run.

#### C. Couplings and Unions

1. Metal conduit shall be joined by threaded conduit couplings, with the conduit ends butted.
2. The use of running threads, Erickson type couplings, split couplings or similar unions are not permitted.

#### D. Conduit Bodies

1. Conduit bends shall meet the requirements of CEC, minimum bend radius of the cable installed or as indicated on the drawings, whichever is greater.
2. Conduits or tubing deformed or crushed in any way shall be removed from the job site.

#### E. Bends and Offsets

1. Changes in direction of conduits shall be made with fittings or bends.
2. Conduit bends shall meet the requirements of CEC, minimum bend radius of the cable installed or as indicated on the drawings, whichever is greater.
3. Bends shall be made using appropriate tools or mechanical equipment. The use of a pipe tee or vise for bending conduit or tubing will not be permitted.
4. For non-metallic conduit or plastic-coated steel, approved factory bends and offsets shall be used.
5. Conduits or tubing deformed or crushed in any way shall be removed from the job site.
6. Install no more than the equivalent of three 90-degree bends between boxes or outlets

#### F. Cutting and Threading

1. The plane of all conduit ends shall be square with the centerline.
2. Where threads are required, they shall be cut and cleaned prior to conduit reaming.
3. The ends of all conduit and tubing shall be reamed to remove all rough edges and burrs.
4. Cutting oil shall be used in threading operations; the dies shall be kept sharp, and provisions shall be made for chip clearance.

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5. Threads on conduits and fittings shall be lubricated with conducting and sealing compound.
  6. All steel conduits shall be coated after threading with cold-galvanized zinc coating. The Contractor shall supply this protective material and shall apply it in the field prior to installing conduit or fittings.
- G. All steel conduit, exposed to weather or in contact with earth, shall be re-galvanized after threading with "Galvanizing Powder M-321" as manufactured by the American Solder and Flux Company of Philadelphia, Pennsylvania; "Zincilate 810" as manufactured by Industrial Metal Protectives, Inc., of Dayton, Ohio; "Zinc Rich" coating as manufactured by ZRC Chemical Products Company, Quincy, Massachusetts; or approved equal. The Contractor shall supply this protective material and shall apply it in the field.
- H. Connections to Boxes and Cabinets
1. Conduit shall be securely fastened to all boxes and cabinets.
  2. Threads on metallic conduit shall project through the wall of the box to allow the bushing to butt against the end of the conduit.
  3. The locknuts, both inside and outside, shall then be tightened sufficiently to bond the conduit securely to the box.
  4. Locknuts on connectors shall be tightened securely to bond the connectors.
- I. All conduits entering enclosures outdoors or in wet areas shall enter through Meyer's hubs, or approved equal, or threaded openings.
- J. Cleaning
1. Precautions shall be taken to prevent the accumulation of water, dirt, or concrete in the conduit.
  2. Conduit in which water or other foreign materials have been permitted to accumulate shall be thoroughly cleaned or, where such accumulation cannot be removed by methods acceptable to the Owner /Engineer, the conduit shall be replaced.
  3. For conduits sizes 3 inches and larger, draw a flexible testing mandrel approximately 12 inches long with a diameter less than the inside diameter of the conduit through the conduit. After which, draw a stiff bristle brush through until conduit is clear of particles of foreign materials. For conduits less than 3 inches, draw a stiff bristle brush through until conduit is clear of particles and foreign material.
- K. Empty Conduit
1. All conduits installed for future use shall have a polypropylene pull line with a minimum tensile strength of 200 lbs., Jet Line, Cat. No. 232, polyolefin, or approved equal. Pull line shall be secured at both ends to ensure future accessibility.
- L. Rooftop Conduits
1. Provide redwood sleepers on waterproof mastic base for all conduit runs exposed on roofs.
- M. Identification
1. All conduits shall be identified in accordance with other section of these specifications.

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### N. Grounding

1. All conduits shall be grounded in accordance with specification Section 16050 – Basic Electrical Materials and Methods.
2. A solid or stranded bare copper or green insulated copper solid or stranded ground wire shall be provided in all conduits and raceways.

### O. Galvanized Rigid Steel Conduit

1. Galvanized rigid steel conduit shall be installed in areas exposed to weather, vehicle traffic, in hazardous classified areas, for penetrations through foundations, and 10 feet before transition from below grade to 8 feet above grade, unless otherwise noted on the drawings.
2. Steel conduit in contact with earth shall be protected by "Scotchwrap" 10 mil tape applied in double thickness using 50 percent lap turns to 6 inches above grade and 6 inches beyond transition.
3. Expansion joints shall be used where required.

### P. Polyvinyl Chloride (PVC) Coated Galvanized Rigid Steel Conduits and Intermediate Steel Conduit

1. PVC -coated, steel conduit and fittings shall be installed where highly corrosive conditions exist, indoors or outdoors.
2. The Contractor shall patch any damaged coating according to the manufacturer's instructions.

### Q. Electrical Metallic Tubing

1. Electrical metallic tubing shall be installed for all circuits, indoors above concrete slab, where not subject to conditions outlined for rigid galvanized steel conduits.

### R. Liquid-Tight Flexible Metal Conduit

1. Liquid-tight flexible metal conduit shall be used in place of regular flexible conduit for connections to motors and transformers, in areas exposed to weather, moisture or oil, and under raised floors.
2. Liquid-tight flexible metal conduit may be used in place of flexible metal conduit where not otherwise required.

### S. Non-Metallic Conduit

1. Schedule 40 shall be used for all power, signal feeders and branch circuits, in earth or enclosed in concrete, unless otherwise noted on the drawings. Conduits must be buried in earth in accordance with the CEC.

### T. Conduit Support

1. Fasten conduit supports to building structures and surfaces in accordance with Section 16050 – Basic Electrical Materials and Methods.
2. Support raceway using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.
3. Do not use wire, ceiling support wires or perforated pipe straps to support conduit. Remove any temporary installation support wire.

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### U. Spacing of Supports

1. All conduit runs shall be rigidly supported, except where buried in concrete.
2. Each conduit shall be supported within one (1) foot of junction boxes and fittings.
3. Spacers used in duct bank installations shall be placed no more than 6 to 10 feet apart.
4. Support spacing along conduit runs shall be as follows.

Conduit Size	Maximum Distance Between Supports
½ inch through 1-1/4 inch	5 feet
1-1/2 inch and larger	8 feet

- V. Ground and bond raceway and boxes in accordance with Section 16050 – Basic Electrical Materials and Methods.

### 3.3 CABINET AND BOX INSTALLATION

- A. Install electrical boxes as shown on drawings, and as required for splices, taps, wire pulling, equipment connections and compliance with regulatory requirements.
- B. Locate boxes and conduit bodies so as to ensure ready accessibility of electrical wiring, maintain headroom and to present neat mechanical appearance.
- C. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only. In inaccessible ceiling areas, install outlet and junction boxes no more than 6 inches from ceiling access panel or from removable recessed luminaire.
- D. Align adjacent wall mounted outlet boxes for switches, thermostats, and similar devices with each other.
- E. Use flush mounting outlet boxes in finished areas.
1. Do not install flush mounting boxes back-to-back in walls.
  2. Provide minimum 6-inch separation between adjacent boxes.
  3. Provide minimum 24-inch separation in acoustic rated walls.
  4. Use stamped steel bridges to fasten flush mounting outlet box between studs.
  5. Secure flush mounting box to interior wall and partition studs.
  6. Accurately position to allow for surface finish thickness.
  7. Install flush mounting box without damaging wall insulation or reducing its effectiveness.
  8. Use adjustable steel channel fasteners for hung ceiling outlet box.
- F. Support boxes independently of conduits.
- G. Use code sized gang box where more than one device is mounted together. Do not use sectional box. Use code sized gang box with plaster ring for single device outlets.
- H. Use cast outlet box in exterior locations where exposed to the weather and wet locations (interior or exterior).
- I. Coordinate installation of electrical boxes and fittings with cable and raceway installation work. Provide knockout closures to cap unused knockout holes where blanks have been removed.

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- J. Avoid using round boxes where conduit must enter box through side of box, which would result in difficult and insecure connections where fastened with a locknut or bushing on rounded surface.
- K. Fasten boxes rigidly to substrate or structural surfaces to which they are being mounted, or solidly embed electrical boxes in concrete or masonry as appropriate.
- L. Except as prevented by the location of other work, all junction boxes and outlet boxes shall be centered on structures.
- M. Conduit openings in boxes shall be made with a hole saw or shall be punched.
- N. Cabinets and boxes shall be rigidly mounted.
  - 1. Mounting on concrete shall be secured by self-drilling anchors.
  - 2. Mounting on steel shall be by drilled and tapped screw holes, or by special support channels welded to the steel, or by both.
  - 3. Cabinets shall be leveled and fastened to the mounting surface with not less than ¼-inch air space between the enclosure and mounting surface.
  - 4. All mounting holes in the enclosure shall be used.
- O. Large Pull Boxes - Boxes larger than 100 cubic inches in volume or 12 inches in any dimension.
  - 1. Interior Dry Locations - Use hinged enclosure.
  - 2. Other Locations - Use surface mounted box of appropriate location classification.

### 3.4 ANCHORS

- A. Where supports for raceways, boxes, and cabinets are mounted on concrete surfaces, they shall be fastened with self-drilling tubular expansion shell anchors with externally split expansion shells, single-cone expanders, and annular break-off grooved chucking cones. Anchors shall be Phillips "Red Head" or approved equal.

### 3.5 ADJUSTING

- A. Install knockout closures in unused openings in boxes.

### 3.6 CLEANING

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

END OF SECTION 260533

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## SECTION 260553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. The extent of the electrical systems and equipment requiring identification is shown on the drawings, and the extent of identification required is specified herein and in individual sections of work requiring identification. The types of electrical identification specified in this section include the following:

1. Exposed conduit color banding.
2. Cable/conductor identification.
3. Operational instructions and warnings.
4. Equipment/system identification signs.

#### 1.2 REFERENCES - CODES AND STANDARDS

- A. ANSI Z535.1 - Safety Color Code
- B. APWA ULCC - Uniform Color Code for Buried Utilities.
- C. CEC California Electrical Code (CEC). Latest approved edition.

#### 1.3 SYSTEM DESCRIPTION

- A. Label the following electrical equipment with nameplates which clearly identify each item, the function or use of the item, and the circuit identification of the feed to the item:
1. All transformers shall be identified by 1-inch-high block letters cut in stencil and applied with yellow paint on a flat-black background. The transformer number, primary and secondary voltages, and the kVA shall be shown.
  2. All Distribution Panelboards, Power and Lighting Panels, Local Control Panels, Terminal Cabinets and all electrical equipment enclosure shall be identified using laminated plastic nameplates. The equipment number, voltage rating, current rating, number of phases, connection type, short circuit interrupting rating, and circuit number shall be shown
  3. All motors, starters, disconnect switches, Time Switches, Special Function Pushbuttons and Switches, and miscellaneous control devices shall be identified by function and circuit number, with 1/4-inch-high black characters on a 1/2-inch wide white stick-on tape where installed indoors and engraved plastic nameplates where installed outdoors.
  4. All underground raceway or cable shall be marked with buried warning tape along its entire length.
  5. All exposed raceway longer than 10 feet in length shall be identified.
  6. Panelboard Directories: Furnish all panelboards with a complete typewritten directory mounted in the inner door under a clear plastic cover set in a metal frame.
- B. Branch circuits and devices:
1. Label all individual receptacle outlets and light switches at their faceplate to indicate the panelboard of origin and branch circuit number, as shown on drawings. Labels shall be

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self-adhesive, thermal machine printed type such as Brothers, Panduit, or T&B and shall be clear plastic with black lettering.

2. All branch circuits in outlet boxes shall be identified with circuit number using wrap-around labels (T&B, BRADY or 3M).
3. As an alternative to separate nameplates, device plates may be engraved directly with lettering filled with black enamel.

### 1.4 SUBMITTALS

- A. Catalog data for nameplates, labels, and markers.
- B. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency specified under regulatory requirements. Include instructions for storage, handling, protection, examination, preparation and installation of product.

### 1.5 REGULATORY REQUIREMENTS

- A. Conform to requirements of CEC – California Electrical Code.
- B. Furnish products listed and classified by Underwriters' Laboratories, Inc. (UL), Electrical Testing Laboratories, Inc. (ETL), or other recognized, approved testing and listing agencies as suitable for the purpose specified and shown.

## PART 2 - PRODUCTS

### 2.1 NAMEPLATES AND LABELS

- A. Nameplates
  1. Engraved three-layer laminated plastic, white letters on black background for normal power and white letters on red background for emergency power. Communications and control cabinets shall be labeled with white letters on green background.
  2. Locations
    - a. Each electrical distribution board, panelboard and control equipment enclosure.
    - b. Communication cabinets.
  3. Letter Size
    - a. Use 1/8-inch letters for identifying individual equipment and loads.
    - b. Use 1/4-inch letters for identifying grouped equipment, loads, panelboards, and transfer switches.
    - c. Use 1/2-inch letters for identifying the main switchboard, motor control centers, transformers and large distribution switchboards.
- B. Labels
  1. Embossed adhesive tape, with 3/16-inch white letters on colored background to match color scheme of plastic laminate labels in 2.1.1. Use only for identification of individual wall switches and receptacles, control device stations, and multi-outlet devices.
  2. Thickness

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- a. 1/16-inch for units up to 20 square inches or 8-inch length; 1/8-inch for larger units.

### 2.2 WIRE MARKERS

#### A. Manufacturers

1. Brady
2. Thomas & Betts
3. 3-M Co.

#### B. Description: Cloth, tape, split sleeve, or tubing type wire markers, self-adhesive.

#### C. Locations: Each conductor at panelboard gutters, pull boxes, outlet and junction boxes, control panels, motor controllers and starters, and each load connection.

#### D. Legend

1. Power and Lighting Circuits: Branch circuit or feeder feed from.
2. Control Circuits: Control wire number indicated on shop drawings.
3. Neutral Conductors: Clearly indicate the branch circuit or feeder number the neutral serves. In multi-wire circuits where the neutral is shared, mark the neutral with the circuit number of the "A" phase.

### 2.3 CONDUIT MARKERS

#### A. Provide manufacturer's standard preprinted, flexible or semi-rigid, permanent, plastic-sheet conduit markers, minimum of 3 mils thick and 1-1/2-inch wide extending 360 degrees around conduits; designed for self-adhesive attachment to conduit. Except as otherwise indicated, provide lettering that indicates the voltage of the conductor(s) in the conduit. Provide 8-inch minimum length for 2-inch and smaller conduit, 12-inch minimum length for larger conduit.

#### B. Location: Furnish markers for each conduit longer than 10 feet.

#### C. Spacing: 20 feet on center.

#### D. Color: Unless otherwise indicated or required by governing regulation, provide orange markers with black letters.

1. Fire Alarm System: Red w/black letters.
2. Telephone System: Green w/yellow letters.
3. Data/Communication. System: White w/black letters.
4. Emergency System: Orange w/black letters.

#### E. Legend:

1. 208 Volt System: Normal 208/120-volts.
2. Fire Alarm System: Fire alarm.
3. Telephone System: Telephone.
4. Data/Communication System: Data/communications.

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### 2.4 FASTENERS

- A. Secure all labels and nameplates with self-tapping stainless-steel screws. Use contact type permanent adhesive where screws cannot or should not penetrate the substrate.

### 2.5 LETTERING AND GRAPHICS

- A. Coordinate names, abbreviations and other designations used in the electrical identification work, with the corresponding designations shown, specified or scheduled. Provide numbers, lettering and wording as indicated or, if not otherwise indicated, as recommended by manufacturers or as required for proper identification and operation/maintenance of the electrical systems and equipment.

### 2.6 UNDERGROUND WARNING TAPE

- A. Three-inch minimum width, 5 mil thickness, foil bonded polyethylene tape, detectable type, with suitable continuous warning legend describing buried electrical lines. Tape color shall conform to APWA uniform color code using ANSI Z535.1 safety colors. Text shall be black, 2-inch minimum letters.
- B. Identify underground conduits using underground warning tape. Install one tape per trench at 3 inches below finished grade.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Degrease and clean surfaces to receive nameplates and labels.
- B. Coordination: Where identification is to be applied to surfaces that require finish, install identification after completion of painting.
- C. Regulations: Comply with governing regulations and the requests of governing authorities for the identification of electrical work.

### 3.2 APPLICATION

- A. Install nameplate and label parallel to equipment lines.
- B. Secure nameplate to equipment front using screws, rivets, or adhesive.
- C. Secure nameplate to outside moveable surface of door on panelboard.
- D. Conduit Identification:
  - 1. Where electrical conduit is exposed in spaces with exposed mechanical piping, which is identified by a color-coded method, apply color-coded identification on the electrical conduit in a manner similar to the piping identification. Except as otherwise indicated, use orange as the coded color for conduit.

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2. Paint red band or provide red tape on each fire alarm conduit longer than 10 feet, minimum 20 feet on center.
- E. Cable/Conductor Identification:
1. Apply cable/conductor identification on each cable and conductor in each box/enclosure/cabinet where the wires of more than one circuit or communication/signal system are present, except where another form of identification (such as color-coded conductors) is provided.
  2. Match identification with marking system used in panelboards, shop drawings, contract documents, and similar previously established identification for project electrical work.
- F. Operational Identification and Warnings
1. Wherever reasonably required to ensure safe and efficient operation and maintenance of the electrical systems and electrically connected mechanical systems and general systems and equipment, including the prevention of misuse of electrical facilities by unauthorized personnel, install self-adhesive plastic signs or similar equivalent identification, instruction or warnings on switches, outlets and other controls, devices and covers of electrical enclosures. Where detailed instructions or explanations are needed, provide plasticized tags with clearly written messages adequate for the intended purposes.

END OF SECTION 260553

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## SECTION 262416 - 600-VOLT RATED PANELBOARDS & CIRCUIT BREAKERS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes distribution and branch circuit panelboards and circuit breakers.

#### 1.2 RELATED SECTIONS

- A. Section 260500: Common Work Results for Electrical
- B. Section 260526: Grounding and Bonding for Electrical Systems
- C. Section 260553: Identification for Electrical Systems

#### 1.3 REFERENCES - CODES AND STANDARDS

- A. ANSI C2 National Electrical Safety Code.
- B. NECA Standard of Installation
- C. NEMA AB 1 Molded Case Circuit Breakers.
- D. NEMA ICS 6 Enclosures
- E. NEMA PB 1 Panelboards.
- F. NEMA PB 1.1 Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less.
- G. NETA ATS (National Electrical Testing Association) - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems
- H. NFPA 70 National Electrical Code

#### 1.4 SUBMITTALS

- A. Shop Drawings: Indicate outline and support point dimensions, voltage, main bus ampacity, integrated short circuit ampere rating, circuit breaker and fusible switch arrangement and sizes.
- B. Product Data: Submit catalog data showing specified features of standard products.

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### C. Test Report:

#### 1. Factory Tests:

- a. Certified factory test reports shall be submitted for manufacturer performed routine factory tests, including tests required by standards listed in paragraph "References". Results of factory tests performed shall be certified by the manufacturer, or an approved testing laboratory, and submitted within 7 days following successful completion of the tests. The manufacturer's pass-fail criteria for tests specified in paragraph "Field Testing" shall be included.

### 1.5 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record actual locations of panelboards and record actual circuiting arrangements.
- B. Operation and Maintenance Data: Submit spare parts listing; source and current prices of replacement parts and supplies; and recommended maintenance procedures and intervals.

### 1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum five (5) years' experience.

### 1.7 MAINTENANCE MATERIALS

- A. Furnish two (2) of each panel board key. Panelboards keyed alike to Owner's current keying system.

## PART 2 - PRODUCTS

### 2.1 DISTRIBUTION AND BRANCH CIRCUIT PANELBOARDS

#### A. Manufacturers:

1. Allen Bradley
2. Cutler Hammer
3. General Electric Co.
4. Siemens.
5. Square D Co.
6. Or Approved Equal.

#### B. Product Description

1. NEMA PB 1, circuit breaker type distribution, lighting and appliance branch circuit panelboard.

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### C. Service Conditions:

1. Temperature: 104 degrees F (40 degrees C) ambient
2. Altitude: 100 feet (35 m) above sea level.

### D. Panelboard Bus

1. Silver plated copper current carrying components, ratings as indicated on drawings.
2. Main bus ampacity shall be equal to the main circuit breaker frame size rating.
3. Furnish copper ground bus in each panelboard.

### E. Minimum integrated short circuit rating

1. Panelboards rated 240-Volts - 10,000 amperes RMS symmetrical
2. Panelboards rated 480-Volts - 42,000 amperes RMS symmetrical
3. Circuit Breaker rating shall match or exceed the panel interrupting rating
4. Series rated circuit breakers are not acceptable

### F. Enclosure:

#### 1. Indoor Installation:

- a. NEMA PB 1, Type 1, gasketed, steel construction, minimum 6 inches (153 mm) deep, 20 (503 mm) inches wide suitable for flush or surface mounting as indicated on drawings.
- b. Flush or surface cabinet front with concealed trim clamps, concealed hinge, metal directory frame, and flush lock keyed alike. Finish in manufacturer's standard gray enamel.
- c. Fully hinged door with flush lock and metal directory frame.
- d. Finished in manufacturer's standard gray enamel (ANSI 61).

#### 2. Outdoor Installation:

- a. Panel shall be housed inside an outer weatherproof, corrosion resistant, NEMA 4X, 316 stainless steel enclosure constructed as follows:
- b. Steel support frame with body stiffeners for added strength and minimum 12 gauge 316 stainless steel panels all around.
- c. Steel panels shall have seams that are continuously welded and ground smooth with no holes or knockouts.
- d. The outer door shall provide two-door protection, isolation of electrical equipment and easy access to the interior section doors and devices.
- e. Provide rolled lip around three sides of each outer door and along the top of enclosure opening to channel away liquids and contaminants.
- f. Provide oil-resistant door gasket attached with oil resistant adhesive and held in place with steel retaining strips.
- g. Provide heavy gauge steel continuous piano hinged, 3-point latch, hasp and staple for padlocking.
- h. Provide continuous external support channels for floor mounting, leveling and anchoring the assembly.
- i. Provide heavy duty removable lifting angles and/or lugs.

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- j. Provide suitable grounding stud on door and body.
- k. Provide adequate cable entry space and conduit fittings approved for NEMA Type 4X enclosure for top or bottom conduit entry as indicated on the drawings.
- l. Provide space heaters with thermostat control in each section to prevent condensation.

### 2.2 MOLDED CASE CIRCUIT BREAKERS

- A. NEMA AB 1, bolt-on type thermal magnetic and instantaneous magnetic trip circuit breaker. Circuit breaker thermal elements shall be of the bimetallic type and shall be capable of withstanding sustained overload and short-circuit currents without injury and without affecting the calibration of the bimetallic element. The thermal element shall have inverse time characteristics. The instantaneous elements shall trip the circuit breaker at the minimum standard trip setting.
- B. Provide common trip handle for multiple pole circuit breakers.
- C. Provide type SWD for lighting circuits and type HACR circuit breakers for air conditioning equipment circuits.
- D. Provide Class A ground fault interrupter circuit breakers as indicated on drawings.
- E. Trip rating shall be as indicated on drawings.
- F. Minimum integrated short circuit rating
  - 1. Circuit Breakers rated 240-Volts - 10,000 amperes RMS symmetrical
  - 2. Circuit Breakers rated 480-Volts - 42,000 amperes RMS symmetrical
  - 3. Circuit Breaker rating shall match or exceed the panel interrupting rating
  - 4. Series rated breakers are not acceptable

## PART 3 - EXECUTION

### 3.1 EXISTING WORK

- A. Disconnect and remove abandoned panelboards. Verify all branch circuits are no longer in use before disconnecting.
- B. Maintain access to existing panelboard that remain active and require access. Modify installation or provide access panel.
- C. Clean and repair existing panelboards to remain or to be reinstalled.

### 3.2 INSTALLATION

- A. Install panelboards in accordance with NEMA PB 1.1 and NECA "Standard of Installation", NFPA 70 and IEEE C2.
- B. Install panelboards plumb.

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- C. Install recessed panelboards flush with wall finishes.
- D. Mounting height: 6 feet (1,800 mm) to top of panelboard. Install panelboards taller than 6 feet (1,800 mm) with bottom no more than 4 inches (100 mm) above floor.
- E. Install filler plates for unused spaces in panelboards.
- F. Provide typed circuit directory for each panelboard. Revise directory to reflect circuiting changes to balance phase loads.
- G. Install engraved plastic nameplates in accordance with Section 260553.
- H. Ground and bond panelboard enclosure according to Section 260526. Connect equipment ground bars of panels in accordance with NEC.

### 3.3 FIELD QUALITY CONTROL

- A. Field Inspect and testing shall be in performer under the provisions of NETA ATS 7.6 (1) (1) – Circuit Breaker, Low Voltage, Insulated Case/Molded Case, as outlined below:
  - 1. Visual and Mechanical Inspection:
    - a. Compare equipment nameplate data with drawings and specifications.
    - b. Inspect physical and mechanical condition.
    - c. Inspect circuit breaker for correct mounting.
    - d. Operate circuit breaker to ensure smooth operation.
    - e. Inspect case for cracks or other defects.
    - f. Verify appropriate anchorage, required area clearances, physical damage, and correct alignment.
    - g. Inspect all doors, panels, and sections for corrosion, dents, scratches, fit, and missing hardware.
    - h. Verify that fuse and/or circuit breaker sizes and types correspond to drawings.
    - i. Perform circuit breaker inspections and operation test.

### 3.4 ADJUSTING

- A. Rearrange circuits in panelboard to balance phase loads to within 20 percent of each other.
- B. Maintain proper phasing for multi-wire branch circuits.

END OF SECTION 262416

SECTION 262726 - WIRING DEVICES

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Wiring devices are defined as single discrete units of electrical distribution systems that are intended to carry but not utilize electric energy. The types of general-purpose wiring devices required for the project include, but are not limited to the following line voltage devices:
  - 1. Connectors
  - 2. Plugs
  - 3. Receptacles
  - 4. Wall plates

1.2 RELATED SECTIONS

- A. Section 260500: Common Work Results for Electrical
- B. Section 260519: 600-Volt Power Conductors and Cables
- C. Section 260526: Grounding and Bonding
- D. Section 260553: Identification for Electrical Systems

1.3 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

- A. IEC 529 Degrees of Protection provided by Enclosures.
- B. NEMA WD 1 General Purpose Wiring Devices
- C. NEMA WD 6 Wiring Device Configurations.

1.4 CONTRACTOR SUBMITTALS

- A. Product Information:
  - 1. Catalog cut of each device showing Manufacturer name, catalog number, voltage and current rating and dimensions.

1.5 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum five (5) years' experience.

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- B. Installer: A firm with at least five (5) years of successful installation experience on projects with electrical installation work similar to that required for the project.

### 1.6 REGULATORY REQUIREMENTS

- A. Furnish products listed and classified by Underwriters Laboratories, Inc. (UL), Electrical Testing Laboratories, Inc. (ETL), or other recognized, acceptable testing and listing agencies as suitable for the purpose specified and shown.

## PART 2 - PRODUCTS

### 2.1 GENERAL

- A. Provide factory fabricated wiring devices in the type, color, electrical rating for service indicated, and/or as shown on the drawings.

### 2.2 MANUFACTURERS

- A. Provide products produced by one of the following, or acceptable alternate:

1. Appleton
2. Arrow-Hart, Inc.
3. Bryant Electric Co.
4. Crouse-Hinds Co.
5. General Electric Co.
6. Hubbell Wiring Device Division
7. Leviton
8. Pass & Seymour
9. Pyle National
10. Russell & Stoll
11. Slater
12. Wiremold (multi-outlet assemblies)

### 2.3 RECEPTACLES

- A. Provide specification grade, grounding type, heavy-duty receptacles with ivory plastic body, green hexagonal equipment ground screw terminal and grounding poles internally connected to mounting yoke; metal plaster ears; side wiring NEMA WD-6 as follows:

1. Duplex Receptacle: Two pole, 3 wire, 20-ampere, 125-volt duplex receptacle, NEMA configuration 5-20R unless otherwise indicated.
2. GFCI Receptacle: Two pole, 3 wire, 20-ampere, 125-volt duplex receptacle with integral ground fault circuit interrupter to meet regulatory requirements.
3. Special Purpose: Two pole, 3 wire, 20-ampere, 125-volt single receptacle, twist-lock, NEMA configuration L5-20R as indicated.
4. Two pole, 3 wire, 20-ampere, 250-volt single receptacle, twist-lock, NEMA configuration L6-20R as indicated.

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5. Two pole, 3 wire, 20-ampere, 277-volt single receptacle, twist-lock, NEMA configuration L7-20R as indicated.
6. Two pole, 3 wire, 30-ampere, 125-volt single receptacle, twist-lock, NEMA configuration L5-30R as indicated.
7. Two pole, 3 wire, 30-ampere, 250-volt single receptacle, twist-lock, NEMA configuration L6-30R as indicated.
8. Two pole, 3 wire, 30-ampere, 277-volt single receptacle, twist-lock, NEMA configuration L7-30R as indicated.
9. Three phase, 4 wire, 20-ampere, 125/250-volt single receptacle, twist-lock, NEMA configuration L14-20R as indicated.
10. Three phase, 4 wire, 20-ampere, 250-volt single receptacle, twist-lock, NEMA configuration L15-20R as indicated.
11. Three phase, 4 wire, 20-ampere, 480-volt single receptacle, twist-lock, NEMA configuration L16-20R as indicated.
12. Three pole, 4 wire, 30-ampere, 125/250-volt single receptacle, twist-lock, NEMA configuration L14-30R as indicated.
13. Three pole, 4 wire, 30-ampere, 250-volt single receptacle, twist-lock, NEMA configuration L15-30R as indicated.
14. Special Purpose Receptacle: Type as required meeting the requirements of this Section and the equipment shown on the drawings and elsewhere specified.

### 2.4 PLUGS AND CONNECTORS

- A. Comply with NEMA Standards Publication No. WD-1. Provide 20 ampere, 125-volts, bakelite body connectors, 3-wire grounding, parallel blades, double wipe contact, with cord clamp.
- B. Matching Insulgrip, corrosion resistant nylon plugs, IP20, shall be provided for each twist-lock type receptacles unless indicated otherwise.

### 2.5 WALL PLATES

- A. Stainless steel cover plate.
- B. For areas where two separate power sources are provided, each power source receptacle shall have a different color cover plate such as black, gray, or brown. Emergency power source receptacles shall have a red cover plate.
- C. Weatherproof Cover Plate: Gasketed cast metal with hinged gasketed device cover. Cover for duplex devices shall be designed such that each device is independently covered.

### 2.6 MULTI-OUTLET ASSEMBLIES

- A. Provide fixed multi-outlet assemblies consisting of #5362 grounding type, 20 ampere, 125-volt, two poles, three wire receptacles as an integral part, on 12-inch centers, unless otherwise noted.
- B. Where more than one circuit is indicated, do not connect adjacent receptacles to the same circuit. Include raceway snap-on covers with punched holes to accurately align receptacles.

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### 2.7 HAZARDOUS RATED AREAS

- A. Switches, receptacles and other devices installed in hazardous areas shall be explosion-proof type in accordance with NFPA 70 and as shown on drawings.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify outlet boxes are installed at proper height.
- B. Verify wall openings are neatly cut and will be completely covered by wall plates.
- C. Verify branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.
- D. Inspect each item of materials or equipment immediately prior to installation and reject damaged and defective items.

### 3.2 PREPARATION

- A. Provide extension rings to bring outlet boxes flush with finished surface, if necessary.
- B. Clean debris from all boxes.

### 3.3 INSTALLATION

- A. Install wiring devices where indicated, in accordance with the manufacturer's written instructions, the applicable requirements of the NEC and the NECA "Standard of Installation", and in accordance with recognized industry practices to ensure that products serve the intended function.
- B. Comply with the manufacturer's applicable instructions and recommendations for installation, to whatever extent these are more explicit or more stringent than applicable requirements indicated in the contract documents.
  - 1. Install devices plumb and level. Install switches with OFF position down
  - 2. Install vertically oriented grounded receptacles with grounding pole on top
  - 3. Connect wiring device grounding terminal to equipment grounding conductor.
  - 4. Connect isolated ground (IG) receptacle equipment (yoke) grounding terminal only at metallic box with bonding jumper
  - 5. Install decorative plates on switch, receptacle, and blank outlets in finished areas
  - 6. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface mounted outlets in utility areas. (Does not include multi-outlet assemblies, other similar locations.).
  - 7. Identify wiring devices as specified in Section 260553 – Electric Equipment Identification.
  - 8. If single outlet in a duplex assembly is switched, that outlet shall be upside down in order for owners to easily identify.

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### 3.4 INTERFACE WITH OTHER PRODUCTS

- A. Coordinate locations of outlet boxes to obtain mounting heights compliant with ADA.
- B. Install wall switch at 42 inches to top of the maximum reach above finished floor for forward reach applications, 48 inches to top of reach for side reach applications. The lower reach shall be at or above 18 inches for forward reach and for side reach, unless otherwise noted.
- C. Install convenience receptacle 18 inches to center above finished floor, unless otherwise noted.
- D. Install convenience receptacle 6 inches to center above backsplash of counter, unless otherwise noted.
- E. Install dimmer 42 inches to center above finished floor, unless otherwise noted.
- F. Install telephone and/or data jacks 18 inches to center above finished floor, unless otherwise noted.
- G. Install telephone jack for wall telephone 42 inches to top of reach above finished floor for forward reach applications, and 48 inches above finished floor to top of reach for side reach applications to comply with the ADA. Receiver hook shall not be above 54 inches to its highest point above finished floor.
- H. Provide GFCI receptacles at all locations within 6 feet of a sink.

### 3.5 FIELD QUALITY CONTROL

- A. Inspect each wiring device for defects.
- B. Operate each wall switch with circuit energized and verify proper operation.
- C. Verify that each receptacle device is energized.
- D. Test each receptacle device for proper polarity.
- E. Test each GFCI receptacle device for proper operation.
- F. Verify that each telephone and data jack is properly connected and circuit is operational.

### 3.6 CLEANING

- A. Clean all material per specification Section 260500 Common Work Results for Electrical and General Conditions requirements.

### 3.7 ADJUSTING

- A. Adjust devices and wall plates to be flush, plumb and level.

END OF SECTION 262726

SECTION 265619 - LED EXTERIOR LIGHTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Luminaire-mounted photoelectric relays.
2. Luminaire types.
3. Materials.
4. Finishes.
5. Luminaire support components.

B. Related Requirements:

1. Section 260923 "Lighting Control Devices" for automatic control of lighting, including time switches, photoelectric relays, occupancy sensors, and multipole lighting relays and contactors.

1.2 DEFINITIONS

- A. CCT: Correlated color temperature.
- B. CRI: Color rendering index.
- C. Fixture: See "Luminaire."
- D. Lumen: Measured output of lamp and luminaire, or both.
- E. Luminaire: Complete lighting unit, including lamp, reflector, and housing.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of luminaire.

1. Arrange in order of luminaire designation.
2. Include data on features, accessories, and finishes.
3. Include physical description and dimensions of luminaire.
4. Lamps include life, output (lumens, CCT, and CRI), and energy-efficiency data.
5. Photometric data and adjustment factors based on laboratory tests, complying with IES Lighting Measurements Testing and Calculation Guides, of each luminaire type. The adjustment factors shall be for lamps and accessories identical to those indicated for the luminaire as applied in this Project.

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- a. Manufacturer's Certified Data: Photometric data certified by manufacturer's laboratory with a current accreditation under the NVLAP for Energy Efficient Lighting Products.
  - b. Testing Agency Certified Data: For indicated luminaires, photometric data certified by a qualified independent testing agency. Photometric data for remaining luminaires shall be certified by manufacturer.
6. Wiring diagrams for power, control, and signal wiring.
  7. Photoelectric relays.
  8. Means of attaching luminaires to supports and indication that the attachment is suitable for components involved.
- B. Shop Drawings: For nonstandard or custom luminaires.
1. Include plans, elevations, sections, and mounting and attachment details.
  2. Include details of luminaire assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
  3. Include diagrams for power, signal, and control wiring.
- C. Product Schedule: For luminaires and lamps. Use same designations indicated on Drawings.

### 1.4 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For luminaires to include in operation and maintenance manuals.
1. Provide a list of all lamp types used on Project. Use ANSI and manufacturers' codes.
  2. Provide a list of all photoelectric relay types used on Project; use manufacturers' codes.

### 1.5 QUALITY ASSURANCE

- A. Provide luminaires from a single manufacturer for each luminaire type.
- B. Each luminaire type shall be binned within a three-step MacAdam Ellipse to ensure color consistency among luminaires.
- C. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect finishes of exposed surfaces by applying a strippable, temporary protective covering prior to shipping.

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### 1.7 FIELD CONDITIONS

- A. Verify existing and proposed utility structures prior to the start of work associated with luminaire installation.
- B. Mark locations of exterior luminaires for approval by Architect prior to the start of luminaire installation.

### 1.8 WARRANTY

- A. Warranty: Manufacturer and Installer agree to repair or replace components of luminaires that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Structural failures, including luminaire support components.
    - b. Faulty operation of luminaires and accessories.
    - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
  - 2. Warranty Period: 1 year(s) from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Seismic Performance:
  - 1. Luminaires shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
  - 2. Luminaires and lamps shall be labeled vibration and shock resistant.
  - 3. The term "withstand" means "the luminaire will remain in place without separation of any parts when subjected to the seismic forces specified and the luminaire will be fully operational during and after the seismic event."

### 2.2 LUMINAIRE REQUIREMENTS

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. NRTL Compliance: Luminaires shall be listed and labeled for indicated class and division of hazard by an NRTL.
- C. UL Compliance: Comply with UL 1598 and listed for wet location.

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- D. Lamp base complying with ANSI C81.61.
- E. Bulb shape complying with ANSI C79.1.
- F. CRI of 80 minimum. CCT of [2700 K] [3000 K] [4100 K].
- G. L70 lamp life of 50,000 hours.
- H. Lamps dimmable from 100 percent to 10 percent of maximum light output.
- I. Internal driver.
- J. Source Limitations:
  - 1. For luminaires, obtain each color, grade, finish, type, and variety of luminaire from single source with resources to provide products of consistent quality in appearance and physical properties.

### 2.3 LUMINAIRE TYPES

- A. Provide luminaires as scheduled on the Drawings in Lighting Fixture Schedule:
  - 1. Area and Site.
  - 2. Bollards
  - 3. Canopy
  - 4. Decorative Post Top
  - 5. Roadway
  - 6. Building mounted

### 2.4 MATERIALS

- A. Metal Parts: Free of burrs and sharp corners and edges.
- B. Sheet Metal Components: Form and support to prevent warping and sagging.
- C. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position. Doors shall be removable for cleaning or replacing lenses.
- D. Diffusers and Globes:
  - 1. Acrylic Diffusers: 100 percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
  - 2. Glass: Annealed crystal glass unless otherwise indicated.
  - 3. Lens Thickness: At least 0.125 inch minimum unless otherwise indicated.

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- E. Lens and Refractor Gaskets: Use heat- and aging-resistant resilient gaskets to seal and cushion lenses and refractors in luminaire doors.
- F. Reflecting surfaces shall have minimum reflectance as follows unless otherwise indicated:
  - 1. White Surfaces: 85 percent.
  - 2. Specular Surfaces: 83 percent.
  - 3. Diffusing Specular Surfaces: 75 percent.
- G. Housings:
  - 1. Rigidly formed, weather- and light-tight enclosure that will not warp, sag, or deform in use.
  - 2. Provide filter/breather for enclosed luminaires.
- H. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps. Labels shall be located where they will be readily visible to service personnel but not seen from normal viewing angles when lamps are in place.
  - 1. Label shall include the following lamp characteristics:
    - a. "USE ONLY" and include specific lamp type.
    - b. Lamp diameter, shape, size, wattage and coating.
    - c. CCT and CRI for all luminaires.

### 2.5 FINISHES

- A. Variations in Finishes: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- B. Luminaire Finish: Manufacturer's standard paint applied to factory-assembled and -tested luminaire before shipping. Where indicated, match finish process and color of pole or support materials.
- C. Factory-Applied Finish for Aluminum Luminaires: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
  - 1. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- D. Factory-Applied Finish for Steel Luminaires: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
  - 1. Surface Preparation: Clean surfaces to comply with SSPC-SP 1, to remove dirt, oil, grease, and other contaminants that could impair paint bond. Grind welds and polish surfaces to a smooth, even finish. Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1 or SSPC-SP 8.

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2. Exterior Surfaces: Manufacturer's standard finish consisting of one or more coats of primer and two finish coats of high-gloss, high-build polyurethane enamel.
  - a. Color:
    - 1) As selected from manufacturer's standard catalog of colors.

### 2.6 LUMINAIRE SUPPORT COMPONENTS

- A. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for channel and angle iron supports and nonmetallic channel and angle supports.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for luminaire electrical conduit to verify actual locations of conduit connections before luminaire installation.
- C. Examine walls, roofs, canopy ceilings, and overhang ceilings for suitable conditions where luminaires will be installed.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 GENERAL INSTALLATION REQUIREMENTS

- A. Comply with NECA 1.
- B. Use fastening methods and materials selected to resist seismic forces defined for the application and approved by manufacturer.
- C. Install lamps in each luminaire.
- D. Fasten luminaire to structural support.
- E. Supports:
  1. Sized and rated for luminaire weight.
  2. Able to maintain luminaire position after cleaning and relamping.
  3. Support luminaires without causing deflection of finished surface.
  4. Luminaire-mounting devices shall be capable of supporting a horizontal force of 100 percent of luminaire weight and a vertical force of 400 percent of luminaire weight.

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- F. Wall-Mounted Luminaire Support:
  - 1. Attached to structural members in walls or Attached to a minimum 1/8-inch backing plate attached to wall structural members.
- G. Wiring Method: Install cables in raceways. Conceal raceways and cables.
- H. Install luminaires level, plumb, and square with finished grade unless otherwise indicated. Install luminaires at height and aiming angle as indicated on Drawings.
- I. Coordinate layout and installation of luminaires with other construction.
- J. Adjust luminaires that require field adjustment or aiming.
- K. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables" and Section 260533 "Raceways and Boxes" for wiring connections and wiring methods.

### 3.3 INSTALLATION OF BOLLARD LUMINAIRES

- A. Align units for optimum directional alignment of light distribution.
  - 1. Install on concrete base with top minimum 2 inches above finished grade or surface at luminaire location. Cast conduit into base, and shape base to match shape of bollard base. Finish by troweling and rubbing smooth.

### 3.4 INSTALLATION OF INDIVIDUAL GROUND-MOUNTED LUMINAIRES

- A. Aim as indicated on Drawings.
- B. Install on concrete base with top minimum 2 inches above finished grade or surface at luminaire location. Cast conduit into base, and finish by troweling and rubbing smooth.

### 3.5 CORROSION PREVENTION

- A. Aluminum: Do not use in contact with earth or concrete. When in direct contact with a dissimilar metal, protect aluminum by insulating fittings or treatment.
- B. Steel Conduits: Comply with Section 260533 "Raceways and Boxes." In concrete foundations, wrap conduit with 0.010-inch-thick, pipe-wrapping plastic tape applied with a 50 percent overlap.

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### 3.6 IDENTIFICATION

- A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

### 3.7 FIELD QUALITY CONTROL

- A. Inspect each installed luminaire for damage. Replace damaged luminaires and components.
- B. Perform the following tests and inspections:
  - 1. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.
  - 2. Photoelectric Control Operation: Verify operation of photoelectric controls.
- C. Luminaire will be considered defective if it does not pass tests and inspections.
- D. Prepare a written report of tests, inspections, observations, and verifications indicating and interpreting results. If adjustments are made to lighting system, retest to demonstrate compliance with standards.

### 3.8 DEMONSTRATION

- A. Train Owner's maintenance personnel to adjust, operate, and maintain luminaires and photocell relays.

### 3.9 ADJUSTING

- A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting the direction of aim of luminaires to suit occupied conditions. Make up to two visits to Project during other-than-normal hours for this purpose. Some of this work may be required during hours of darkness.
  - 1. During adjustment visits, inspect all luminaires. Replace lamps or luminaires that are defective.
  - 2. Parts and supplies shall be manufacturers' authorized replacement parts and supplies.
  - 3. Adjust the aim of luminaires in the presence of Architect.

END OF SECTION 265619

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## SECTION 311000 - SITE CLEARING

### 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. Protecting existing vegetation to remain.
  - 2. Removing existing vegetation.
  - 3. Clearing and grubbing.
  - 4. Stripping and stockpiling topsoil.
  - 5. Stripping and stockpiling rock.
  - 6. Removing above- and below-grade site improvements.
  - 7. Disconnecting, capping or sealing, and removing site utilities.
  - 8. Temporary erosion and sedimentation control.

#### 1.3 DEFINITIONS

- A. Subsoil: Soil beneath the level of subgrade; soil beneath the topsoil layers of a naturally occurring soil profile, typified by less than 1 percent organic matter and few soil organisms.
- B. Surface Soil: Soil that is present at the top layer of the existing soil profile. In undisturbed areas, surface soil is typically called "topsoil," but in disturbed areas such as urban environments, the surface soil can be subsoil.
- C. Topsoil: Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil; the zone where plant roots grow.
- D. Topsoil: Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil; the zone where plant roots grow. Its appearance is generally friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects larger than 2 inches in diameter; and free of weeds, roots, toxic materials, or other nonsoil materials.
- E. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction and indicated on Drawings.
- F. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction and as indicated according to requirements in Section 015639 "Temporary Tree and Plant Protection.
- G. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

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### 1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

### 1.5 MATERIAL OWNERSHIP

- A. Except for materials indicated to be stockpiled or otherwise remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

### 1.6 INFORMATIONAL SUBMITTALS

- A. Existing Conditions: Documentation of existing trees and plantings, adjoining construction, and site improvements that establishes preconstruction conditions that might be misconstrued as damage caused by site clearing.
  - 1. Use sufficiently detailed photographs or video recordings.
  - 2. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plant designated to remain.
- B. Topsoil stripping and stockpiling program.
- C. Rock stockpiling program.
- D. Record Drawings: Identifying and accurately showing locations of capped utilities and other subsurface structural, electrical, and mechanical conditions.

### 1.7 QUALITY ASSURANCE

- A. Topsoil Stripping and Stockpiling Program: Prepare a written program to systematically demonstrate the ability of personnel to properly follow procedures and handle materials and equipment during the Work. Include dimensioned diagrams for placement and protection of stockpiles.
- B. Rock Stockpiling Program: Prepare a written program to systematically demonstrate the ability of personnel to properly follow procedures and handle materials and equipment during the Work. Include dimensioned diagrams for placement and protection of stockpiles.

### 1.8 FIELD CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
  - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
  - 2. Provide alternate routes around closed or obstructed trafficways if required by Owner or authorities having jurisdiction.

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- B. Utility Locator Service: Notify Call Before You Dig for area where Project is located before site clearing.
- C. Do not commence site clearing operations until plant-protection measures are in place.
- D. Tree and Plant-Protection Zones: Protect according to requirements in Section 015639 "Temporary Tree and Plant Protection."
- E. Soil Stripping, Handling, and Stockpiling: Perform only when the soil is dry or slightly moist.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. Satisfactory Soil Material: Requirements for satisfactory soil material are specified in Section 312000 "Earth Moving."
  - 1. Obtain approved borrow soil material off-site when satisfactory soil material is not available on-site.

### PART 3 - EXECUTION

#### 3.1 PREPARATION

- A. Protect and maintain benchmarks and survey control points from disturbance during construction.
- B. Verify that trees, shrubs, and other vegetation to remain or to be relocated have been flagged and that protection zones have been identified and enclosed according to requirements in Section 015639 "Temporary Tree and Plant Protection."
- C. Protect existing site improvements to remain from damage during construction.
  - 1. Restore damaged improvements to their original condition, as acceptable to Owner.

#### 3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- A. Provide temporary erosion- and sedimentation-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings and requirements of authorities having jurisdiction.
- B. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.
- C. Inspect, maintain, and repair erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
- D. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

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### 3.3 TREE AND PLANT PROTECTION

- A. Protect trees and plants remaining on-site according to requirements in Section 015639 "Temporary Tree and Plant Protection."
- B. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations according to requirements in Section 015639 "Temporary Tree and Plant Protection."

### 3.4 EXISTING UTILITIES

- A. Locate, identify, disconnect, and seal or cap utilities indicated to be removed.
  - 1. Arrange with utility companies to shut off indicated utilities.
- B. Locate, identify, and disconnect utilities indicated to be abandoned in place.
- C. Interrupting Existing Utilities: Do not interrupt utilities serving facilities occupied by 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 not less County than two days in advance of proposed utility interruptions.
  - 2. Do not proceed with utility interruptions without Architect's written permission.
- D. Excavate for and remove underground utilities indicated to be removed.
- E. Removal of underground utilities is included in earthwork sections; in applicable fire suppression, plumbing, HVAC, electrical, communications, electronic safety and security, and utilities sections; and in Section 024119 "Selective Demolition."

### 3.5 CLEARING AND GRUBBING

- A. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction.
  - 1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
  - 2. Grind down stumps and remove roots larger than 3 inches in diameter, obstructions, and debris to a depth of 18 inches below exposed subgrade.
  - 3. Use only hand methods or air spade for grubbing within protection zones.
  - 4. Chip removed tree branches and dispose of off-site
- B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.
  - 1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches and compact each layer to a density equal to adjacent original ground.

3.6 TOPSOIL STRIPPING

- A. Remove sod and grass before stripping topsoil.
- B. Strip topsoil to depth of 6 inches in a manner to prevent intermingling with underlying subsoil or other waste materials.
  - 1. Remove subsoil and nonsoil materials from topsoil, including clay lumps, gravel, and other objects larger than 2 inches in diameter; trash, debris, weeds, roots, and other waste materials.
- C. Stockpile topsoil away from edge of excavations without intermixing with subsoil or other materials. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust and erosion by water.
  - 1. Limit height of topsoil stockpiles to 72 inches.
  - 2. Do not stockpile topsoil within protection zones.
  - 3. Stockpile surplus topsoil to allow for respreading deeper topsoil.

3.7 SITE IMPROVEMENTS

- A. Remove existing above- and below-grade improvements as indicated and necessary to facilitate new construction.
- B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.
  - 1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut along line of existing pavement to remain before removing adjacent existing pavement. Saw-cut faces vertically.
  - 2. Paint cut ends of steel reinforcement in concrete to remain with two coats of antirust coating, following coating manufacturer's written instructions. Keep paint off surfaces that will remain exposed.

3.8 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.
- B. Separate recyclable materials produced during site clearing from other nonrecyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities. Do not interfere with other Project work.

END OF SECTION 311000

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## SECTION 312000 - EARTH MOVING

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Excavation and/or embankment from existing ground to subgrade, including soil sterilant, for roadways, driveways, parking areas, building pads, walks, paths, or trails and any other site improvements called for on the Plans.

#### 1.2 SECTION EXCLUDES

- A. Earthwork related to underground utility installation shall be performed in accordance with Sections 312100, Utility Trenching and Backfill.

#### 1.3 RELATED SECTIONS

- A. Section 011000, Supplemental General Requirements
- B. Section 015050, Erosion Control
- C. Section 311000, Site Clearing
- D. Section 334600, Subdrainage

#### 1.4 RELATED DOCUMENTS

- A. Geotechnical Report: Geotechnical Study Report – Bower Park Restoration and Improvements, Project Number 4541.005.PW.1, prepared by RGH Consultants, dated November 12, 2024.
- B. ASTM
  - 1. D1557, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort
  - 2. D1586, Method for Penetration Tests and Split-Barrel Sampling of Soils
  - 3. D2487, Classification of Soils for Engineering Purposes
  - 4. D3740, Practice for Evaluation of Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.
  - 5. D4318. Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils
  - 6. E329, Specification for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction
  - 7. E548, Guide for General Criteria Used for Evaluating Laboratory Competence
- C. California Building Code, California Code of Regulations, Title 24, Part 2, Chapter 18, Soils and Foundations, and Chapter 33, Safeguards During Construction

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- D. Caltrans Standard Specifications, 2022
  - 1. Section 17, General
  - 2. Section 19, Earthwork

- E. CAL/OSHA, Title 8.

### 1.5 DEFINITIONS

- A. Borrow: Approved soil material imported from off-site for use as Structural Fill or Backfill.
- B. Excavation: Removal of material encountered above subgrade elevations.
  - 1. Authorized Over-Excavation: Excavation below subgrade elevations or beyond indicated horizontal dimensions as shown on plans or authorized by the Geotechnical Engineer.
  - 2. Unauthorized Over-Excavation: Excavation below subgrade elevations or beyond indicated horizontal dimensions without authorization by the Geotechnical Engineer. Unauthorized excavation shall be without additional compensation.
- C. Geotechnical Testing Agency: An independent testing agency qualified according to ASTM E329 to conduct soil materials and rock definition testing, as documented according to ASTM D3740 and ASTM E548.
- D. Structural Backfill: Soil materials approved by the Geotechnical Engineer and used to fill excavations resulting from removal of existing below grade facilities, including trees.
- E. Structural Fill: Soil materials approved by the Geotechnical Engineer and used to raise existing grades.
- F. Rock: Rock material in beds, ledges, unstratified masses, and conglomerate deposits and boulders of rock material  $\frac{3}{4}$  cubic yards or more in volume that when tested by an independent geotechnical testing agency, according to ASTM D1586, exceeds a standard penetration resistance of 100 blows/2 inches.
- G. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below grade.
- H. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, base or topsoil materials.
- I. Topsoil: Natural or cultivated surface-soil layer containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2 inches in diameter; and free of weeds, roots, and other deleterious materials.

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- J. Unsuitable Material: Any soil material that is not suitable for a specific use on the Project. The Geotechnical Engineer will determine if a soil material is unsuitable.
- K. Relative Compaction: In-place dry density of soil expressed as percentage of maximum dry density of same materials, as determined by laboratory test procedure ASTM D1557.
- L. Utilities: onsite underground pipes, conduits, ducts and cables.

### 1.6 SUBMITTALS

- A. Follow submittal procedure outlined in Section 011000, Supplemental General Requirements.
- B. Samples:
  - 1. If required by the Geotechnical Engineer, provide 20-pound samples, sealed in airtight containers, tagged with source locations and suppliers of each proposed soil material from on-site or borrow sources, 72 hours prior to use. Do not import materials to the Project without written approval of the Geotechnical Engineer.
  - 2. Provide materials from same source throughout work. Change of source requires approval of the Geotechnical Engineer.
- C. Material Test Reports: Provide, from a qualified testing agency, the following test results showing compliance with the project requirements:
- D. Classification according to ASTM D2487 of each onsite or borrow soil material proposed for fill and backfill.
  - 1. Laboratory compaction curve in conformance with ASTM D1557 for each onsite or borrow soil material proposed for fill and backfill.

### 1.7 QUALITY ASSURANCE

- A. Provide an independent testing agency qualified according to ASTM E329 to conduct soil materials and rock definition testing, as documented according to ASTM D3740 and ASTM E548.
- B. Conform all work and materials to the recommendations or requirements of the Geotechnical Report and meet the approval of the Geotechnical Engineer.
- C. Conform all work in accordance with Caltrans Standard Specification Section 17, General and Section 19, Earthwork.
- D. Percentage of compaction specified shall be the minimum acceptable. The percentage represents the ratio of the dry density of the compacted material to the maximum dry density of the material as determined by the procedure set forth in ASTM D1557.

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- E. Perform excavation, filling, compaction and related earthwork under the observation of the Geotechnical Engineer. Materials placed without approval of the Geotechnical Engineer will be presumed to be defective and, at the discretion of the Geotechnical Engineer, shall be removed and replaced at no cost to the Owner. Notify the Geotechnical Engineer at least 24 hours prior to commencement of earthwork and at least 48 hours prior to testing.
- F. The Geotechnical Engineer will perform observations and tests required to enable him to form an opinion of the acceptability of the Project earthwork. Correct earthwork that, in the opinion of the Geotechnical Engineer, does not meet the requirements of these Technical Specifications and the Geotechnical Report.
- G. Upon completion of the construction work, certify that all compacted fills and foundations are in place at the correct locations, and have been constructed in accordance with sound construction practice. In addition, certify that the materials used are of the types, quality and quantity required by these Technical Specifications and the Geotechnical Report. The Contractor shall be responsible for the stability of all fills and backfills constructed by his forces and shall replace portions that in the opinion of the Geotechnical Engineer have been displaced or are otherwise unsatisfactory due to the Contractor's operations.
- H. Finish subgrade tolerance at completion of grading:
  - 1. Building and paved areas:  $\pm 0.05$  feet
  - 2. Other areas:  $\pm 0.10$  feet

### 1.8 PROJECT CONDITIONS

- A. Promptly notify the Owner's Representative of surface or subsurface conditions differing from those disclosed in the Geotechnical Report. First notify the Owner's Representative verbally to permit verification and extent of condition and then in writing. No claim for conditions differing from those anticipated in the Contract Documents and disclosed in the Geotechnical Report will be allowed unless the Contractor has notified the Owner's Representative in writing of differing conditions prior to the Contractor starting work on affected items.
- B. Protect open excavations, trenches, and the like with fences, covers and railings to maintain safe pedestrian and vehicular traffic passage.
- C. Prevent erosion of freshly-graded areas during construction and until such time as permanent drainage and erosion control measures have been installed in accordance with Section 015050, Erosion Control.
- D. Temporarily stock-pile fill material in an orderly and safe manner and in a location approved by the Owner's Representative.
- E. Environmental Requirements: When unfavorable weather conditions necessitate interrupting earthwork operation, areas shall be prepared by compaction of surface and grading to avoid collection of water. Provide adequate temporary drainage to prevent erosion. After interruption, compaction specified in last layer shall be re-established before resuming work.

## PART 2 - PRODUCTS

### 2.1 SOIL MATERIALS

- A. General: On-site soils are considered suitable for use as fill provided the materials are placed in accordance with Geotechnical Recommendations. Highly expansive soils shall not be used as select structural fill, or used as backfill for trenches located within hardscape areas.
- B. Imported fill soils, if required, should be predominantly granular in nature, and should be free of organics, debris, or rocks over 3 inches in size, and shall be approved by the Geotechnical Engineer before importing to the site. Imported non-expansive soils shall have a Plasticity Index less than 15 as determined by ASTM D4318, an R-value of at least 20, and fines content between 15 and 65 percent. Import fill shall be considered non-hazardous per Department of Toxic Substances Control guidelines (DTSC, 2017) and non-corrosive per Caltrans Corrosion Guidelines (Caltrans, 2015).

### 2.2 SOIL STERILANT

- A. Commercial chemical for weed control, registered by EPA. Provide granular, liquid or wet-able powder form.

## PART 3 - EXECUTION

### 3.1 GENERAL

- A. Perform work in accordance with Caltrans Standard Specification Section 19, Earthwork, as modified by the Contract Documents.
- B. Placement and compaction of material by flooding, ponding, or jetting will not be permitted.
- C. The use of explosives will not be permitted.
- D. Grading and earthwork operations shall be observed and tested by a representative of the Geotechnical Engineer for conformance with the project plans/specifications and the geotechnical recommendations. This work includes site preparation, selection of satisfactory materials, placement and compaction of the subgrades and fills. Sufficient notification prior to commencement of earthwork is essential to make certain that the work will be properly observed.

### 3.2 CONTROL OF WATER AND DEWATERING

- A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding the site and surrounding area. Provide dewatering equipment necessary to drain and keep excavations and site free from water.
- B. Dewater during backfilling operation so that groundwater is maintained a least 1 foot below level of compaction effort.

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- C. Obtain the approval from the County and the Geotechnical Engineer for proposed control of water and dewatering methods.
- D. Protect subgrades from softening, undermining, washout and damage by rain or water accumulation.
- E. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations.
- F. Maintain dewatering system in place until dewatering is no longer required.

### 3.3 WET WEATHER CONDITIONS

- A. Do not prepare subgrade, place or compact soil materials if subgrade or materials are above optimum moisture content.
- B. If the Geotechnical Engineer allows work to continue during wet weather conditions, conform to supplemental recommendations provided by the Geotechnical Engineer.

### 3.4 BRACING AND SHORING

- A. Conform to California and Federal OSHA requirements.
- B. Place and maintain such bracing and shoring as may be required to support the sides of the excavations for the proper protection of workmen; to facilitate the work; to prevent damage to the facility being constructed; and to prevent damage to adjacent structures or facilities. Remove all bracing and shoring upon completion of the work.
- C. Be solely responsible for all bracing and shoring and, if requested by the Owner's Representative, submit details and calculations to the Owner's Representative. The Owner's Representative may forward the submittal to the Geotechnical Engineer, the Consulting Engineer and/or the California Division of Industrial Safety for their review. The Contractor's submittal shall include the basic design, assumed soils conditions and estimation of forces to be resisted, together with plans and specifications of the materials and methods to be used, and shall be prepared by a civil engineer or structural engineer registered in California. No excavations related to the proposed facility shall precede a response to the submittal by the Owner's Representative.
- D. Be solely responsible for installing and extracting the sheathing in a manner which will not disturb the position or operation of the facility being constructed or adjacent utilities and facilities.

### 3.5 TOPSOIL STRIPPING

- A. Remove topsoil in accordance with Section 311000, Site Clearing.

3.6 EXCAVATION

- A. Excavate earth and rock to lines and grades shown on plans and to the neat dimensions indicated on the plans, required herein or as required to satisfactorily compact backfill.
- B. Remove and dispose of large rocks, pieces of concrete and other obstructions encountered during excavation.
- C. Excavation through buried concrete and other unknown obstructions will require specialized techniques for demolition and removal.
- D. Where forming is required, excavate only as much material as necessary to permit placing and removing forms.
- E. Provide supports, shoring and sheet piles required to support the sides of excavations or for protection of adjacent existing improvements.

3.7 GRADING

- A. Uniformly grade the Project to the elevations shown on plans
- B. Finish ditches, gutters and swales to the sections, lines and grades indicated and to permit proper surface drainage.
- C. Round tops and bottoms of slopes as indicated or to blend with existing contours.

3.8 SUBGRADE PREPARATION

- A. Subgrade Preparation: Prior to backfilling depressions created by the removal of old foundations and utility lines, scarify the bottom of the excavation to an approximate depth of 8 inches and uniformly moisture condition the scarified surfaces to a moisture content that is at least 2 percent over optimum. Compact the scarified surfaces to a minimum of 90 percent relative compaction at above optimum moisture content.
- B. Over-excavate any remaining soft (pumping) areas down to firm soil and backfill the area.
- C. Subgrade shall be maintained in a moist, but not wet, condition by periodically sprinkling water prior to the placement of additional fill or installation of roads. Subgrade that has been permitted to dry out and loosen or develop desiccation cracking should be scarified, moisture conditioned, and re-compacted as recommended above.
- D. Install underground utilities and service connections prior to final preparation of subgrade and placement of base materials for final surface facilities. Extend services so that final surface facilities are not disturbed when service connections are made.

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- E. Prepare subgrades under the structural section of paved areas, curbs, gutters, walks, structures, other surface facilities and areas to receive structural fill.
- F. Protect utilities from damage during compaction of subgrades and until placement of final pavements or other surface facilities.
- G. Obtain the Geotechnical Engineer's approval of subgrades prior to placing pavement structural section.

### 3.9 KEYWAYS AND BENCHES

- A. Provide keyways as indicated for fill slopes steeper than 6 horizontal to 1 vertical. Extend keyway 5 feet minimum into competent, undisturbed soil or 3 feet minimum into competent, undisturbed rock as directed by the Geotechnical Engineer.
- B. Place subsurface drains in bottom of keyway in accordance with Section 334600, Subdrainage.
- C. Bench subgrade as indicated above toe of fill.
- D. Place subsurface drains at benches every 20 vertical feet or as directed by the Geotechnical Engineer.

### 3.10 LOT FINISH GRADING

- A. Blade finish lots to lines and grades indicated.

### 3.11 FILL PLACEMENT AND COMPACTION

- A. Place fill in uniformly moisture conditioned and compacted lifts not exceeding 8 inches in loose thickness. Each lift should be thoroughly moisture conditioned and compacted to 90 percent before successive fill layers are placed.
- B. In order to achieve satisfactory compaction in the subgrade and fill soils, it may be necessary to adjust the soil moisture content at the time of soil compaction per geotechnical recommendations. This may require that water be added and thoroughly mixed into any soils which are too dry or that scarification and aeration be performed in any soils which are too wet.
- C. Obtain the Geotechnical Engineer's approval of surface to receive structural fill prior to placement of structural fill material.
- D. Place structural fill on prepared subgrade.
- E. Do not drop fill on structures. Do not backfill around, against or upon concrete or masonry structures until structure has attained sufficient strength to withstand loads imposed and the horizontal structural system has been installed.

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- F. Do not compact by ponding, flooding or jetting.
- G. Perform compaction using rollers, pneumatic or vibratory compactors or other equipment and mechanical methods approved by the Geotechnical Engineer.
- H. Compaction requirements (unless specified otherwise by the Geotechnical Engineer):
  - 1. Compact structural fills less than 5 feet thick to 90 percent compaction.
  - 2. Compact structural fill 5 feet thick or greater to 95 percent compaction.
  - 3. Compact the upper 6 inches of subgrade soils beneath pavements, curbs and gutters to 95 percent compaction. Extend compaction 5 feet beyond pavement edges unless specified otherwise by the Geotechnical Engineer.
  - 4. Compact the upper 6 inches of subgrade soils under walks, structures and areas to receive structural fill to 90 percent compaction.

### 3.12 SOIL STERILIZATION

- A. Apply soil sterilant to areas indicated, such as beneath asphalt concrete pavement, brick pavement, concrete pavement and at grade concrete slabs, including sidewalks, curbs and gutters. Also, where indicated apply soil sterilant below expansion and control joints and at areas where pipes, ducts or other features penetrate slabs.
- B. Apply soil sterilant uniformly and at the rates recommended by the manufacturer.
- C. Apply soil sterilant to prepared subgrade, or after installation of aggregate base as recommended by the manufacturer.

### 3.13 DISPOSAL

- A. Lawfully dispose of all unsuitable and excess or surplus material off-site at no cost to the Owner.

END OF SECTION 3212000

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## SECTION 312100 - UTILITY TRENCHING AND BACKFILL

### PART 1 - GENERAL

#### 1.01 SECTION INCLUDES

- A. Excavation, bedding, and backfill for underground storm drain, sanitary sewer, and water piping, underground HVAC piping, electrical conduit, telephone conduit, gas piping, cable TV conduit, etc., and associated structures.
- B. Provide labor, material, equipment, and services necessary to complete the backfilling and compacting as necessary for this project. Section includes, but is not limited to:
  - 1. Select Backfill Material
  - 2. Aggregate Base
  - 3. Detectable Tape
  - 4. Trench Excavation
  - 5. Pipe Bedding
  - 6. Trench Backfill
  - 7. Trench Surfacing
- C. This section excludes drainage fill material and placement around subdrains. See Section 334600 – Subdrainage.

#### 1.02 RELATED SECTIONS

- A. Section 311000 – Site Clearing
- B. Section 312000 – Earthwork Moving
- C. Section 331000 – Water System
- D. Section 333000 – Sanitary Sewer System
- E. Section 334100 – Storm Utility Drainage Piping
- F. Section 334600 – Subdrainage

#### 1.03 RELATED DOCUMENTS

- A. Geotechnical Report: Geotechnical Study Report, Project Number: 4541.005.PW.1, prepared by RGH Consultants and dated November 12, 2024
- B. ASTM
  - 1. D1557, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort.
  - 2. D2321, Standard Practice for Underground Installation of Thermoplastic Pipe for Sewer and Other Gravity-Flow Applications.

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- C. California Administrative Code, Title 24, Part 2 - Basic Building Regulations, Chapter 24, Excavations, Foundations, and Retaining Walls.
- D. Caltrans Standard Specifications, 2015
  - 1. Section 19, Earthwork
  - 2. Section 26, Aggregate Bases
  - 3. Section 68, Subsurface Drains
  - 4. Section 96, Geosynthetics
- E. CAL/OSHA, Title 8

### I.04 DEFINITIONS

- A. AC: Asphalt Concrete
- B. ASTM: American Society for Testing and Materials
- C. Base: The layer placed between the subgrade and surface pavement in a paving system.
- D. Bedding: Material from bottom of trench to bottom of pipe
- E. CDF: Controlled Density Fill
- F. DIP: Ductile Iron Pipe
- G. Engineered Fill:
  - 1. Soil or soil-rock material approved by the Owner and transported to the site by the Contractor in order to raise grades or to backfill excavations.
  - 2. Contractor shall provide sufficient tests, and a written statement that all materials brought onto the project site comply with specification requirements.
- H. Excavation: Consists of the removal of material encountered to subgrade elevations
- I. Initial Backfill: Material from bottom of pipe to 12 inches above top of pipe
- J. PCC: Portland Cement Concrete
- K. RCP: Reinforced Concrete Pipe
- L. Relative Compaction: In-place dry density of soil expressed as percentage of maximum dry density of same materials, as determined by laboratory test procedure ASTM D1557.
- M. Springline of Pipe: Imaginary line on surface of pipe at a vertical distance of  $\frac{1}{2}$  the outside diameter measured from the top or bottom of the pipe.
- N. Subgrade: The uppermost surface of an excavation or the top surface of a fill or backfill immediately below base.
- O. Subsequent Backfill: Material from 12 inches above top of pipe to subgrade of surface material or subgrade of surface facility or to finish grade.

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- P. Trench Excavation: Removal of material encountered above subgrade elevations and within horizontal trench dimensions.
  - 1. Authorized Trench Over-Excavation: Excavation below trench subgrade elevations or beyond indicated horizontal trench dimensions as shown on plans or authorized by the Geotechnical Engineer.
  - 2. Unauthorized Trench Over-Excavation: Excavation below trench subgrade elevations or beyond indicated horizontal trench dimensions without authorization by the Geotechnical Engineer. Unauthorized excavation shall be without additional compensation.
- Q. Utility Structures:
  - 1. Storm drainage manholes, catch basins, drop inlets, curb inlets, vaults, etc.
  - 2. Sanitary sewer manholes, vaults, etc.
  - 3. Water vaults, etc.

### 1.05 SUBMITTALS

- A. Follow submittal procedures outlined in Section 011000 – Supplemental General Requirements.
- B. Test Reports: Submit the following report for import material directly to the Owner from the Contractor's testing services:
  - 1. Compaction test reports for aggregate base.
- C. Samples:
  - 1. If required by the Geotechnical Engineer, provide 20-pound samples of all imported trench bedding and backfill material sealed in airtight containers, tagged with source locations and suppliers of each proposed material. Do not import materials to Project without written approval of the Geotechnical Engineer and the Owner.
  - 2. Provide materials from same source throughout work. Change of source requires approval of the Geotechnical Engineer and the Owner.

### 1.06 QUALITY ASSURANCE

- A. Conform all work and materials to the recommendations or requirements of the Geotechnical Report and meet the approval of the Geotechnical Engineer.
- B. Conform all work to the appropriate portion(s) of the Caltrans Standard Specifications, Section 19, Earthwork.
- C. Percentage of compaction specified shall be the minimum acceptable. The percentage represents the ratio of the dry density of the compacted material to the maximum dry density of the material as determined by the procedure set forth in ASTM D 1557.
- D. The Geotechnical Engineer will perform observations and tests required to enable him to form an opinion of the acceptability of the trench backfill. Correct the trench backfill that, in the opinion of the Geotechnical Engineer, does not meet the requirements of these Technical Specifications and the Geotechnical Report.

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- E. Soil Testing:
  - 1. Contractor to engage a geotechnical testing agency, to include compaction testing and for quality control testing during fill operations.
  - 2. Test results will be submitted to the Owner.

### 1.07 PROJECT CONDITIONS

- A. Promptly notify the Owner of surface or subsurface conditions differing from those disclosed in the Geotechnical Report. First notify the Owner verbally to permit verification and extent of condition and then in writing. No claim for conditions differing from those anticipated in the Contract Documents and disclosed in the Geotechnical Report will be allowed unless Contractor has notified the Owner in writing of differing conditions prior to contractor starting work on affected items.
- B. Barricade open excavations and post with warning lights.
  - 1. Operate warning lights and barricades as required.
  - 2. Protect structures, utilities, sidewalks, pavements, and other facilities immediately adjacent to excavations, from damages caused by settlement, lateral movement, undermining, washout, and other hazards.
  - 3. Protect open, trenches, and utility structure excavations with fences, covers and railings to maintain safe pedestrian and vehicular traffic passage.
- C. Stockpile on-site and imported backfill material temporarily in an orderly and safe manner.
- D. Provide dust and noise control in conformance with Section 011000 Supplemental General Requirements.
- E. Environmental Requirements:
  - 1. Protect existing storm drainage system from silt and debris resulting from construction activities. If contamination occurs, remove contamination at no cost to the District.
  - 2. Protect existing streams, ditches and storm drain inlets during work on this project.
- F. Protection of Subgrade: Do not allow equipment to pump or rut subgrade, stripped areas, footing excavations, or other areas prepared for project.
- G. Transport all excess soils materials by legally approved methods to disposal areas.
  - 1. Coordinate with the Engineer.
  - 2. Any additional fill requirements shall be the responsibility of the Contractor.

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## 1.08 EXISTING UTILITIES

- A. Locate existing underground utilities in the areas of work. For utilities that are to remain in place, provide adequate means of protection during excavation operations.
  - 1. Locating of existing underground utilities shall include but not be limited to potholing prior to the start of construction.
- B. Should uncharted or incorrectly charted piping or other utilities be encountered during excavation, consult Owner and/or utility agency immediately for directions.
  - 1. Cooperate with the Owner and public and private utility companies in keeping their respective services and facilities in operation.
  - 2. Repair damaged utilities to the satisfaction of the agency with jurisdiction.
- C. Do not interrupt existing utilities serving facilities occupied and used by the Owner or others, except when permitted in writing by the Owner and then only after acceptable temporary utility services have been provided.

## PART 2 - PRODUCTS

### 2.01 GENERAL

- A. Import materials will be subject to approval of the Geotechnical Engineer.
- B. For approval of imported fill material, notify the Owner at least 7 days in advance of intention to import material.

### 2.02 PIPE BEDDING AND INITIAL BACKFILL

- A. ASTM D2321, Class IA, IB or II.
  - 1. Clean and free of clay, silt or organic matter.
- B. Permeable Material: In accordance with Section 68-2.02F of Caltrans Standard Specifications, Class 1, Type A or Class 2.
- C. Class 2 Aggregate Base: In accordance with Section 26 of Caltrans Standard Specifications,  $\frac{3}{4}$ -inch maximum.
- D. Sand: In accordance with Section 19-3.02F of Caltrans Standard Specifications.

### 2.03 SELECT BACKFILL

- A. Select backfill material shall be gravel, free of clay or organic matter and shall conform to the following gradation:

Sieve Size	Percentage Passing
1 inch	100
$\frac{3}{4}$ inch	90 – 100
No. 4	35 – 60
No. 200	2 - 9

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- B. For gas pipe and fuel piping select backfill shall be clean, graded building sand conforming to the following gradation:

Sieve Size	Percentage Passing
No. 4	100
No. 200	0 -5

### 2.04 WARNING TAPE

- A. Polyethylene plastic and metallic core or metallic-faced, acid- and alkali-resistant, polyethylene plastic warning tape manufactured specifically for warning and identification of buried utility lines. Provide tape on rolls, 3-inch minimum width, color coded as specified below for the intended utility with warning and identification imprinted in bold black letters continuously over the entire tape length. Warning and identification to read, "CAUTION, BURIED (intended service) LINE BELOW" or similar wording. Color and printing shall be permanent, unaffected by moisture or soil.

1. Warning Tape Color Codes
  - a. Red: Electric
  - b. Yellow: Gas, Oil; Dangerous Materials
  - c. Orange: Telephone and Other Communications
  - d. Blue: Water Systems
  - e. Green: Sewer Systems
  - f. White: Steam Systems
  - g. Gray: Compressed Air
2. Warning Tape for Metallic Piping: Acid and alkali-resistant polyethylene plastic tape conforming to the width, color, and printing requirements specified above. Minimum thickness of tape shall be 0.003 inch. Tape shall have a minimum strength of 1500 psi lengthwise, and 1250 psi crosswise, with a maximum 350 percent elongation.
3. Detectable Warning Tape for Non-Metallic Piping: Polyethylene plastic tape conforming to the width, color, and printing requirements specified above. Minimum thickness of the tape shall be 0.004-inch. Tape shall have a minimum strength of 1500 psi lengthwise and 1250 psi crosswise. Tape shall be manufactured with integral wires, foil backing, or other means of enabling detection by a metal detector when tape is buried up to 3 feet deep. Encase metallic element of the tape in a protective jacket or provide with other means of corrosion protection.

### 2.05 DETECTION WIRE FOR NON-METALLIC PIPING

- A. Detection wire shall be insulated single strand, solid copper with a minimum of 12 AWG.

2.06 SUBSEQUENT BACKFILL

- A. Conform to on-site or imported structural backfill in Section 312000, Earth Moving.

2.07 CONTROLLED DENSITY FILL (CDF) (IN TRENCHES)

- A. Provide non-structural CDF, from bottom of trench to finish subgrade of subbase or base material, that can be excavated by hand and produce unconfined compressive 28-day strengths from 50-psi to a maximum of 150-psi. Provide aggregate no larger than 3/8-inch top size. The 3/8-inch aggregate shall not comprise more than 30% of the total aggregate content.
- B. Cement: Conform to the standards as set forth in ASTM C150, Type II Cement.
- C. Fly Ash: Conform to the standards as set forth in ASTM C618, for Class F pozzolan. Do not inhibit the entrainment of air with the fly ash.
- D. Air Entraining Agent: Conform to the standards as set forth in ASTM C260.
- E. Aggregates need not meet the standards as set forth in ASTM C33. Any aggregate, producing performances characteristics described herein will be accepted for consideration. The amount of material passing a #200 sieve shall not exceed 12% and no plastic fines shall be present.
- F. Provide CDF that is a mixture of cement, Class F pozzolan, aggregate, air entraining agent and water. CDF shall be batched by a ready mixed concrete plant and delivered to the job site by means of transit mixing trucks.
- G. The Contractor shall determine the actual mix proportions of the controlled density fill to meet job site conditions, minimum and maximum strengths, and unit weight. Entrained air content shall be a minimum of 4.0%. The actual entrained air content shall be established for each job with the materials and aggregates to be used to meet the placing and unit weight requirements. Entrained air content may be as high as 20% for fluidity requirements.
- H. Mix design shall meet the Geotechnical Engineer's approval.

2.08 CONCRETE STRUCTURE BEDDING AND BACKFILL

- A. Precast Structures: Same materials to the same heights as specified for pipe bedding and backfill, or other material approved by the Geotechnical Engineer.
- B. Poured-in-Place Structures:
  - 1. Bedding: Bedding shall meet with the approval of the Geotechnical Engineer. In general, bedding is not required, pour bases against undisturbed native earth in cut areas and against engineered fill compacted to 90% relative compaction in embankment areas.
  - 2. Side Backfill: On-site or imported structural fill meeting the requirements given in Section 312000, Earth Moving.

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### 2.09 GEOSYNTHETICS

- A. Filter Fabric:
  - 1. Filter Fabric: Section 96-1.02 of Caltrans Standard Specifications.
  - 2. Mirafi 140N, Mirafi Inc., or approved equal.

### PART 3 - EXECUTION

#### 3.01 GENERAL

- A. Comply with the recommendations of the Geotechnical Engineer.
- B. Protect existing trees to remain. No grading is permitted under the drip line of protected trees.
- C. Excavations for appurtenant structures, such as, but not limited to, manholes, transition structures, junction structure, vaults, valve boxes, catch basins, thrust blocks, and boring pits, shall be deemed to be in the category of trench excavation.
- D. Unless otherwise indicated in the Plans, all excavation for pipelines shall be open cut.
- E. Prior to commencement of work, become thoroughly familiar with site conditions.
- F. In the event discrepancies are found, immediately notify the Owner in writing, indicating the nature and extent of differing conditions.
- G. Backfill excavations as promptly as work permits.
- H. Do not place engineered fill or backfill until rubbish and deleterious materials have been removed and areas have been approved by the Owner.
- I. Place acceptable soil material in layers to required subgrade elevations, for each area classification listed below.
- J. In excavations, use satisfactory excavated or borrow material.
- K. Under grassed areas, use satisfactory excavated or borrow material.

#### 3.02 SITE PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities, which are to remain, from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
- B. Protect existing storm drainage system from silt and debris resulting from construction activities. If contamination occurs, remove contamination at no cost to the Owner.

### 3.03 EXISTING UTILITIES

- A. Identify the location of existing utilities.
  - 1. Prior to trenching, the Contractor shall excavate at locations specifically indicated on the Plans, if any, and where new lines cross other utilities of uncertain depth and determine the elevation of the utility in question to ensure that the new line will clear the potential obstruction.
  - 2. The Contractor shall contact Underground Service Alert (USA) at 1-800-227-2600 for assistance in locating existing utilities.
  - 3. If, after the excavation, a crossing utility does present an obstruction, then the line and grade of the new line will be adjusted as directed by the Owner to clear the utility.
- B. Protect all existing utilities to remain in operation.
- C. Movement of construction machinery and equipment over existing pipes and utilities during construction shall be at Contractor's risk.
- D. Excavation made with power-driven equipment is not permitted within 2 feet of any known utility or subsurface structure.
  - 1. Use hand or light equipment for excavating immediately adjacent to known utilities or for excavations exposing a utility or buried structure.
  - 2. Start hand or light equipment excavation on each side of the indicated obstruction and continue until the obstruction is uncovered or until clearance for the new grade is assured.
  - 3. Support uncovered lines or other existing work affected by excavation until approval for backfill is obtained.
  - 4. Report damage of utility line or subsurface structures immediately to the Owner.
- E. Backfill trenches resulting from utility removal in lifts of 8 inches maximum.

### 3.04 TRENCH EXCAVATION

- A. General
  - 1. Excavation shall include removal of all water and materials that interfere with construction. The Contractor shall remove any water which may be encountered in the trench by pumping or other methods during the pipe laying, bedding and backfill operations. Material shall be sufficiently dry to permit approved jointing.
  - 2. Excavation shall include the construction and maintenance of bridges required for vehicular and pedestrian traffic, support for adjoining utilities.
  - 3. The Contractor shall be responsible to safely direct vehicular and pedestrian traffic through or around his/her work area at all times.

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4. The Contractor shall relocate, reconstruct, replace or repair, at his/her own expense, all improvements which are in the line of construction or which may be damaged, removed, disrupted or otherwise disturbed by the Contractor.
- B. Existing Paving and Concrete:**
1. Existing pavement over trench shall be sawcut, removed, and hauled away from the job. Existing pavement shall be neatly sawcut along the limits of excavations.
  2. Existing concrete over the trench shall be sawcut to a full depth in straight lines, at a minimum distance of 12 inches beyond the edge of the trench, either parallel to the curb or a right angles to the alignment of the sidewalk.
  3. Boards or other suitable material shall be placed under equipment outrigging to prevent damage to paved surfaces.
- C. Trench Width:**
1. The maximum allowable trench widths at the top of the all pipe materials outside diameter of barrel pipe plus 18 inches. shall be as follows:
    - a. The maximum trench width shall be inclusive of all shoring.
    - b. If the maximum trench width is exceeded, the State's representative may direct the Contractor to encase or cradle the pipe in concrete at no additional charge.
  2. For pipes 3-inch diameter and larger, the free working space on each side of the pipe barrel shall not be less than 6 inches.
- D. Excavation Width at Springline of Pipe:**
1. Up to a nominal pipe diameter of 24 inches: Minimum of twice the outside pipe diameter, or as otherwise allowed or required by the Geotechnical Engineer.
  2. Nominal pipe diameter of 30 inches through 36 inches: Minimum of the outside pipe diameter plus 2 feet, or as otherwise allowed or required by the Geotechnical Engineer.
  3. Nominal pipe diameter of 42 inches through 60 inches: Minimum of the outside pipe diameter plus 3 feet, or as otherwise allowed or required by the Geotechnical Engineer.
- E. Open Trench:**
1. The maximum length of open trench shall be 300 feet or the distance necessary to accommodate the amount of pipe installed in a single day, whichever is greater. No trench shall be left open at the end of the day.
  2. Provisions for trench crossings and free access shall be made at all street crossings, driveways, water gate valves, and fire hydrants.

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3. Excavate by hand or machine. For gravity systems begin excavation at the outlet end and proceed upstream. Excavate sides of the trench parallel and equal distant from the centerline of the pipe. Hand trim excavation. Remove loose matter.
4. Excavation Depth for Bedding: Minimum of 6 inches below bottom of pipe or as otherwise allowed or required by the Geotechnical Engineer, except that bedding is not required for nominal pipe diameters of 2 inches or less.
5. Over-Excavations: Backfill trenches that have been excavated below bedding design subgrade, with approved bedding material.
6. Where forming is required, excavate only as much material as necessary to permit placing and removal of forms.
7. Grade bottom of trench to provide uniform thickness of bedding material and to provide uniform bearing and support for pipe along entire length. Remove stones to avoid point bearing.

### F. Excavated Material:

1. All excavated material not required for backfill shall be immediately removed and properly disposed of in a legal manner by the Contractor.
2. Material excavated in streets and roadways shall be laid alongside the trench no closer than 2 feet from the trench edge and kept trimmed to minimize inconvenience to public traffic.
3. Provisions shall be made whereby all storm and wastewater can flow uninterrupted in gutters or drainage channels.

## 3.05 CONTROL OF WATER AND DEWATERING

- A. Contractor's attention is directed to Section 312319, Dewatering.
- B. Be solely responsible for dewatering trenches and excavations and subsequent control of ground and surface water. Provide and maintain such pumps or other equipment as may be necessary to control ground water and seepage to the satisfaction of the Geotechnical Engineer and the Owner until backfilling is completed.
- C. Dewater during backfilling operation so that groundwater is maintained a least one foot below level of compaction effort.
- D. Obtain the Geotechnical Engineer's approval for proposed control of water and dewatering methods.
- E. Reroute surface water runoff away from open trenches and excavations. Do not allow water to accumulate in trenches and excavations.
- F. Maintain dewatering system in place until dewatering is no longer required.

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### 3.06 BRACING AND SHORING

- A. Conform to California and Federal OSHA requirements.
- B. Place and maintain such bracing and shoring as may be required to support the sides of the excavations for the proper protection of workmen; to facilitate the work; to prevent damage to the pipes and appurtenances being constructed; and to prevent damage to adjacent structures or facilities. Remove all bracing and shoring upon completion of the work.
- C. Be solely responsible for all bracing and shoring and, if requested by the Owner, submit details and calculations to the Owner. The Owner may forward the submittal to the Geotechnical Engineer, the Consulting Engineer and/or the California Division of Industrial Safety for their review. The Contractor's submittal shall include the basic design, assumed soils conditions and estimation of forces to be resisted, together with plans and specifications of the materials and methods to be used, and shall be prepared by a civil engineer or structural engineer registered in California. No excavations in trench section or around structures shall precede a response to the submittal by the Owner.
- D. Be solely responsible for installing and extracting the sheathing in a manner which will not disturb the line, grade, or backfill compaction or operation of the utility being installed or adjacent utilities and facilities.

### 3.07 PIPE BEDDING

- A. Obtain approval of bedding material from the Geotechnical Engineer.
- B. Accurately shape bedding material to the line and grade called for on the Plans. Carefully place and compact bedding material to the elevation of the bottom of the pipe in layers not exceeding 8 inches in loose thickness. Compact bedding material at optimum water content to 90% relative compaction unless specified otherwise on the Plans or by the Geotechnical Engineer. Compact by pneumatic tampers or other mechanical means approved by the Geotechnical Engineer. Jetting or ponding of bedding material will not be permitted.
- C. Stabilization of Trench Bottom: When the trench bottom is unstable due to wet or spongy foundation, trench bottom shall be stabilized with gravel or crushed rock. The State's inspector will determine the suitability of the trench bottom and the amount of gravel or crushed rock needed to stabilize a soft foundation. Soft material shall be removed and replaced with gravel or crushed rock as necessary.
- D. Placement of Bedding Material: The trench bottom shall be cleaned to remove all loose native material prior to placing select backfill material. Sufficient select backfill material shall be placed in trench and tamped to bring trench bottom up to grade of the bottom of pipe. The relative compaction of tamped material shall be not less than 90 percent. It is the intention of these requirements to provide uniform bearing under the full length of pipe to a minimum width of 60 percent of the external diameter.

### 3.08 BACKFILLING

#### A. Initial Backfill:

1. Obtain approval of backfill material from Geotechnical Engineer.
2. Bring initial backfill up simultaneously on both sides of the pipe, so as to prevent any displacement of the pipe from its true alignment. Carefully place and compact initial backfill material to an elevation of 12 inches above the top of the pipe in layers not exceeding 8 inches in loose thickness. Compact bedding material at optimum water content to 90% relative compaction unless specified otherwise on the Plans or by the Geotechnical Engineer. Compact by pneumatic tampers or other mechanical means approved by the Geotechnical Engineer. Jetting or ponding of initial backfill material will not be permitted.

#### B. Pipe Detection: In trenches containing pressurized plastic pipes, tracer wire shall be placed directly above the pipe and shall be connected to all valves, existing exposed tracer wires, and other appurtenances as appropriate.

#### C. Installation of Tracer Wire:

1. Install a continuous length of tracer wire for the full length of each run of nonmetallic pipe.
2. Attach wire to top of pipe in such manner that it will not be displaced during construction operations.
3. Form a mechanically and electrically continuous line throughout the pipeline, extending to the nearest valve or other pipeline appurtenance. Extend the wire up the outside of the valve box/riser and cut a hole that is 8 inches from the top, extend a 12-inch wire lead to the inside of the box. At other pipeline appurtenances, terminate the 12-inch wire lead inside the enclosure.
4. Splice wire with a splicing device consisting of and electro-tin plated seamless copper sleeve conductor. Install as recommended by the manufacturer. Wrap splices and damaged insulation with electrician's tape.

#### D. Installation of Warning Tape

1. Install tape approximately 1 foot above and along the centerline of the pipe.
2. Where tape is not continuous lap tape ends a minimum of 2 feet.

#### E. Subsequent Backfill:

1. Above the level of initial backfill, the trench shall be backfilled with non-expansive native material from trench excavation or with imported select backfill material (Contractor's option). Subsequent backfill shall be free of vegetable matter, stones or lumps exceeding 3 inches in greatest dimension, and other unsatisfactory material.

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2. Bring subsequent backfill to subgrade or finish grade as indicated. Carefully place and compact subsequent backfill material to the proper elevation in layers not exceeding 8 inches in loose thickness. Compact bedding material at optimum water content to 90% relative compaction, except that the upper 36 inches in areas subject to vehicular traffic shall be compacted to at least 95% relative compaction, unless specified otherwise on the Plans or by the Geotechnical Engineer. Compact by pneumatic tampers or other mechanical means approved by the Geotechnical Engineer. Jetting or ponding of subsequent backfill material will not be permitted.
- F. Do not use compaction equipment or methods that produce horizontal or vertical earth pressures that may cause excessive pipe displacement or damage the pipe. Jetting of trench backfill is not permitted.
  - G. Utility backfill shall be inspected and tested by the Geotechnical Engineer during placement. Cooperate with the Geotechnical Engineer and provide working space for such tests in operations. Backfill not compacted in accordance with these specifications shall be re-compacted or removed as necessary and replaced to meet the specified requirements, to the satisfaction of the Geotechnical Engineer and the Owner prior to proceeding with the Project.
  - H. Compaction testing shall be in accordance with California Test Method ASTM D1556 or D1557.

### 3.09 CLEANUP

- A. Upon completion of utility earthwork all lines, manholes catch basins, inlets, water meter boxes and other structures shall be thoroughly cleaned of dirt, rubbish, debris and obstructions of any kind to the satisfaction of the Owner.

END OF SECTION 312100

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## SECTION 321100 - PAVEMENT BASE COURSE

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Aggregate subbase
- B. Aggregate base
- C. Cement treated base
- D. Lime stabilization

#### 1.2 RELATED SECTIONS

- A. Section 011000, Supplemental General Requirements
- B. Section 015050, Erosion Control
- C. Section 312000, Earth Moving

#### 1.3 RELATED DOCUMENTS

- A. Geotechnical Report: Geotechnical Study Report, Project Number: 4541.005.PW.1, prepared by RGH Consultants and dated November 12, 2024
- B. ASTM:
  - 1. D1557, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort
  - 2. D3740, Practice for Evaluation of Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction
  - 3. E329, Specification for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction
  - 4. E548, Guide for General Criteria Used for Evaluating Laboratory Competence
- C. Caltrans Standard Specifications, 2022
  - 1. Section 24, Stabilized Soils
  - 2. Section 25, Aggregate Subbases
  - 3. Section 26, Aggregate Bases
  - 4. Section 27, Cement Treated Bases

#### 1.4 DEFINITIONS

- A. Geotechnical Testing Agency: An independent testing agency qualified according to ASTM E329 to conduct soil materials and rock definition testing, as documented according to ASTM D3740 and ASTM E548.

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- B. Rock: Rock material in beds, ledges, unstratified masses, and conglomerate deposits and boulders of rock material  $\frac{3}{4}$  cubic yards or more in volume that when tested by an independent geotechnical testing agency, according to ASTM D1586, exceeds a standard penetration resistance of 100 blows/2 inches.
- C. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below grade.
- D. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, base or topsoil materials. Perform work in accordance with Section 312000, Earth Moving.

### 1.5 SUBMITTALS

- A. Follow submittal procedure outlined in Section 011000, Supplemental General Requirements.
- B. Submit material certificates signed by the material producer and the Contractor, certifying that that each material item complies with, or exceeds the specified requirements.

### 1.6 QUALITY ASSURANCE

- A. Conform all work and materials to the recommendations or requirements of the Geotechnical Report and meet the approval of the Geotechnical Engineer.
- B. Percentage of compaction specified shall be the minimum acceptable. The percentage represents the ratio of the dry density of the compacted material to the maximum dry density of the material as determined by the procedure set forth in ASTM D1557.
- C. Perform installation of base materials under the observation of the Geotechnical Engineer. Materials placed without approval of the Geotechnical Engineer will be presumed to be defective and, at the discretion of the Geotechnical Engineer, shall be removed and replaced at no cost to the Owner. Notify the Geotechnical Engineer at least 24 hours prior to commencement of base material installation and at least 48 hours prior to testing.
- D. Do not mix or place cement treated base when the temperature is below 36 degrees F or when the ground is frozen.
- E. Finish surface of material to be stabilized prior to lime treatment shall be in accordance with Caltrans Standard Specification Section 24, Stabilized Soils.
- F. Finish surface of the stabilized material after lime treatment shall be in accordance with Caltrans Standard Specifications Section 24, Stabilized Soils.
- G. Finish surface of cement treated base shall be in accordance with Caltrans Standard Specification Section 27, Cement Treated Bases.

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- H. Do not project the finish surface of aggregate subbase above the design subgrade.
- I. Finish grade tolerance at completion of base installation: +0.05 feet

### 1.7 PROJECT CONDITIONS

- A. Protect open excavations, trenches, and the like with fences, covers and railings to maintain safe pedestrian and vehicular traffic passage.
- B. Temporarily stockpile material in an orderly and safe manner and in a location approved by the Owner.
- C. Provide dust and noise control in accordance with Section 011000, Supplemental General Requirements.

## PART 2 - PRODUCTS

### 2.1 AGGREGATE SUBBASE

- A. Material: Refer to the Geotechnical Report.
- B. Class, 2 in accordance with Caltrans Standard Specification Section 25, Aggregate Subbases.

### 2.2 AGGREGATE BASE

- A. Material: Class 2, 1-½-inch maximum or ¾-inch maximum in accordance with Caltrans Standard Specification Section 26, Aggregate Bases.

### 2.3 CEMENT TREATED BASE

- A. Material: Class A or B maximum in accordance with Caltrans Standard Specification Section 27, Cement Treated Bases.

### 2.4 LIME STABILIZED SOILS

- A. Material: In accordance with Caltrans Standard Specification Section 24-2, Lime Stabilized Soil.

## PART 3 - EXECUTION

### 3.1 GENERAL

- A. Placement and compaction of material by flooding, ponding, or jetting will not be permitted.

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### 3.2 WET WEATHER CONDITIONS

- A. Do not place or compact subgrade if above optimum moisture content.
- B. If the Geotechnical Engineer allows work to continue during wet weather conditions, conform to supplemental recommendations provided by the Geotechnical Engineer.

### 3.3 AGGREGATE SUBBASE

- A. Spreading and Compacting: In accordance with Caltrans Standard Specification Section 25-1.03D, Spreading and 25-1.03E, Compacting.

### 3.4 AGGREGATE BASE

- A. Watering, Spreading and Compacting: In accordance with Caltrans Standard Specification Section 26-1.03D, Spreading and 26-1.03E, Compacting.

### 3.5 CEMENT TREATED BASE

- A. Proportioning and Mixing Plant-Mixed: In accordance with Caltrans Standard Specification Section 27-1.03D.

### 3.6 LIME STABILIZATION

- A. Lime stabilization shall conform to Caltrans Standard Specification Section 24, Stabilized Soils, and the following:
  - 1. Add lime in the amount specified by the Geotechnical Engineer.
  - 2. Lime treat subgrade soils from back of curb to back of curb to a depth specified by the Geotechnical Engineer.
  - 3. Mix in two mixing periods, both with the tines lowered to the same depth. Both mixing periods shall be monitored and verified by the Geotechnical Engineer. The second mixing shall occur at about 24 hours after the initial mixing.
  - 4. Compact and grade the lime mixed subgrade immediately after the second mixing.
  - 5. Compact the lime treated subgrade to 93 percent as determined by ASTM D1557.
  - 6. After application of the curing seal, do not allow traffic on the lime treated material for a period of 7 days in lieu of the 3 days specified in Caltrans Standard Specifications, Section 24.
  - 7. Proof-roll the stabilized subgrade after compacting to confirm that a non-yielding surface has been achieved. Yielding areas, if any, shall be mitigated. Mitigation could consist of over-excavation, utilization of stabilization fabric, or chemical treatment. Each case shall be addressed individually in the field by the Geotechnical Engineer.

### 3.7 DISPOSAL

- A. Lawfully dispose of all unsuitable and excess or surplus material off-site at no cost to the Owner.

END OF SECTION 321100

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## SECTION 321216 - ASPHALT PAVING

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Hot Mix Asphalt
- B. Tack coat
- C. Hot Mix Asphalt paving
- D. Hot Mix Asphalt overlay
- E. Speed bumps
- F. Asphalt curbs
- G. Pavement grinding
- H. Adjusting manholes, valves, monument covers and other structures to grade

#### 1.2 RELATED SECTIONS

- A. Section 011000, Supplemental General Requirements
- B. Section 312000, Earth Moving
- C. Section 321100, Pavement Base Course

#### 1.3 RELATED DOCUMENTS

- A. Geotechnical Report: Geotechnical Study Report, Project Number: 4541.005.PW.1, prepared by RGH Consultants and dated November 12, 2024
- B. ASTM
  - 1. D979: Standard Practice for Sampling Bituminous Paving Mixtures
  - 2. D1188: Standard Test Method for Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Coated Samples
  - 3. D2041: Standard Test Method for Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures
  - 4. D2726: Standard Test Method for Bulk Specific Gravity and Density of Non-Absorptive Compacted Bituminous Mixtures
  - 5. D2950: Standard Test Method for Density of Bituminous Concrete in Place by Nuclear Methods
  - 6. D3549: Standard Test Method for Thickness or Height of Compacted Bituminous Paving Mixture Specimens.

- C. Caltrans Standard Specifications, 2022
  - 1. Section 20: Landscape
  - 2. Section 39: Asphalt Concrete
  - 3. Section 88: Engineering Fabrics
  - 4. Section 92: Asphalt Binder
  - 5. Section 94: Asphaltic Emulsions
  - 6. Section 96: Geosynthetics

#### 1.4 DEFINITIONS

- A. ASTM: American Society for Testing Materials.
- B. Caltrans: State of California, Department of Transportation

#### 1.5 QUALITY ASSURANCE

- A. Testing Agency: Owner's Representative will engage a qualified independent testing agency to perform field inspections and tests and to prepare test reports.
  - 1. Testing agency will conduct and interpret tests and state in each report whether tested work complies with or deviates from specified requirements.
- B. Additional testing, at Contractor's expense, will be performed to determine compliance of corrected Work with specified requirements.
- C. Thickness of hot mix asphalt: In-place compacted thickness of asphalt courses will be determined according to ASTM D3549.
- D. Surface Smoothness: Finished surface of each asphalt course will be tested for compliance with smoothness tolerances.
- E. In-Place Density: Samples of uncompacted paving mixtures and compacted pavement will be secured by testing agency according to ASTM D979.
  - 1. Reference maximum theoretical density will be determined by averaging results from 4 samples of hot-mix asphalt-paving mixture delivered daily to site, prepared according to ASTM D2041, and compacted according to job-mix specifications.
  - 2. In-place density of compacted pavement may be determined by testing core samples according to ASTM D1188 or ASTM D2726.
    - a. One core sample may be taken for every 1000 square yard or less of installed pavement, but in no case will fewer than 3 cores be taken.
    - b. Field density of in-place compacted pavement may also be determined by nuclear method according to ASTM D2950 and correlated with ASTM D1188 or ASTM D2726.

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### 1.6 SUBMITTALS

- A. Follow submittal procedure outlined in Section 011000, Supplemental General Requirements.
- B. Job-Mix Designs: Certificates signed by manufacturers certifying that each hot mix asphalt mix complies with requirements.
- C. Material Certificates: Certificates signed by manufacturers certifying that each material complies with requirements.

### 1.7 PROJECT CONDITIONS

- A. Environmental Limitations:
  - 1. Tack Coat: Minimum surface temperature of 60 F at application.
  - 2. Asphalt Base Course: Minimum surface temperature of 40 F and rising at application.
  - 3. Asphalt Surface Course: Minimum surface temperature of 60 F at application.
  - 4. Reinforcing Fabric: Air temperature is 50 F and rising and pavement temperature is 40 F and rising.

## PART 2 - PRODUCTS

### 2.1 HOT MIX ASPHALT

- A. Type A In accordance with Caltrans Standard Specifications Section 39-2, Hot Mix Asphalt.
- B. Hot Mix Asphalt Materials:
  - 1. Asphalt Binder: Grade PG 64-10 in accordance with Caltrans Standard Specification Section 92, Asphalt Binders.
  - 2. Tack Coat: Grade SS1 in accordance with Caltrans Standard Specification Section 94, Asphaltic Emulsions.
- C. Aggregates: 1-inch max gradation for virgin aggregate and recycled asphalt pavement (RAP) in accordance with to Caltrans Standard Specification Section 39-2.02, Type A Hot Mix Asphalt.
- D. Geosynthetic Pavement Interlayer: Paving Fabric in accordance with Caltrans Standard Specification Section 96, Geosynthetics.
- E. Soil Sterilant: In accordance with Caltrans Standard Specifications Section 20-5.03, Inert Ground Covers and Mulches.

**PART 3 - EXECUTION**

**3.1 GENERAL**

- A. The Geotechnical Report shall take precedence where in conflict with this Section.

**3.2 EXAMINATION**

- A. Verify that subgrade is dry and in suitable condition to support paving and imposed loads.
- B. Proof-roll subbase using heavy, pneumatic-tired rollers to locate areas that are unstable or that require further compaction.
- C. If necessary, perform subgrade preparation or remediation in accordance with Section 312000, Earth Moving.
- D. Notify Owner in writing of any unsatisfactory conditions. Do not begin paving until these conditions have been satisfactorily corrected.

**3.3 PAVEMENT GRINDING**

- A. Clean existing paving surface of loose or deleterious material immediately before pavement grinding.
- B. Grind conforms as indicated.

**3.4 SOIL STERILANT**

- A. Furnish and apply to areas per manufacturer's specifications.

**3.5 SURFACE PREPARATION FOR AGGREGATE BASE MATERIALS**

- A. General: Immediately before placing asphalt materials remove loose and deleterious material from substrate surfaces and ensure that prepared subgrade is ready to receive paving in accordance with Caltrans Standard Specification Section 39-2.01C(3)(b) and in accordance with Section 321100, Pavement Base Course.
- B. Tack Coat: Apply uniformly and at specified rates between HMA layers, to vertical surfaces of curbs, gutters and construction joints, and to existing pavement, including planned surfaces, in accordance with Caltrans Standard Specification Section 39-2.01C(3)(f).
  - 1. Allow tack coat to cure undisturbed before paving.
  - 2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

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### 3.6 SURFACE PREPARATION FOR PAVEMENT AT HOT MIX ASPHALT OVERLAYS

- A. Pavement Irregularities: Level with hot mix asphalt, Type A, ½ inch max aggregate.
- B. Pavement Cracks:
  - 1. Less than ¼ inch wide: Clean of all dirt by compressed air jet, spray and seal with RS-1 asphaltic emulsion.
  - 2. Wider than ¼ inch: Clean of all dirt by compressed air jet, spray and seal with RS-1 asphaltic emulsion and skin patch.
- C. Clean surface of all material, such as leaves, dirt, sand, gravel, water and vegetation prior to applying binder of paving asphalt to existing surface.

### 3.7 GEOSYNTHETIC PAVEMENT INTERLAYER

- A. Place geosynthetic pavement interlayer in accordance with Caltrans Standard Specification Section 39-2.01C(3)g.

### 3.8 HOT MIX ASPHALT SPREADING AND COMPACTING EQUIPMENT

- A. Provide spreading and compacting equipment in accordance with Caltrans Standard Specification Section 39-2.01C(2).

### 3.9 HOT MIX ASPHALT PLACEMENT

- A. Place, spread and compact hot mix asphalt to required grade, cross section, and thickness in accordance with Caltrans Standard Specification Sections 39-2.01C(2), 39-2.01C(3), and 39-2.01C(8).
- B. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

### 3.10 JOINTS

- A. Construct joints to ensure continuous bond between adjoining paving sections in accordance with Caltrans Standard Specification Sections 39-2.01C(4)
  - 1. Construct joints free of depressions with same texture and smoothness as other sections of asphalt course.
  - 2. Clean contact surfaces and apply tack coat.
  - 3. Offset longitudinal joints in successive courses a minimum of 6 inches.
  - 4. Offset transverse joints in successive courses a minimum of 24 inches.
  - 5. Compact joints as soon as hot mix asphalt will bear roller weight without excessive displacement.

**3.11 COMPACTION**

- A. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact in accordance with the Geotechnical Report and Caltrans Standard Specification Sections 39-2.01C(2).
- B. Compaction Requirements: Average Density to be 92 percent of reference maximum theoretical density according to ASTM D2041, but not less than 90 percent nor greater than 96 percent.
- C. Finish Rolling: Finish roll paved surfaces to remove roller marks while asphalt is still warm.
- D. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while still hot, with back of rake or smooth iron. Compact thoroughly using tamper or other satisfactory method.
- E. Repairs: Remove paved areas that are defective or contaminated with foreign materials and replace with fresh asphalt. Compact by rolling to specified density and surface smoothness.
- F. Protection: After the final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

**3.12 HOT MIX ASPHALT CURBS AND DIKES**

- A. Construction: Place over compacted surfaces in accordance with Caltrans Standard Specification Section 39-2.01C(9). Apply a light tack coat prior to construction, unless pavement surface is still tacky and free of dust.
- B. Shape: Place hot mix asphalt to curb cross section indicated.

**3.13 SPEED BUMPS**

- A. Construct speed bumps over compacted pavement surfaces in accordance with Caltrans Standard Specification Section 39-2. Apply a light tack coat prior to construction, unless pavement surface is still tacky and free of dust.
- B. Place asphalt concrete by hand using a template/screed designed to result in speed bump cross-section indicated after compaction.
- C. Compact speed bumps with 8-ton static roller.

**3.14 ADJUSTING MANHOLES, VALVES, MONUMENT COVERS AND OTHER STRUCTURES TO GRADE**

- A.** Remove pavement, using vertical cuts, as needed to remove frame and provide for concrete collar. Do not damage adjacent pavement.
  - 1. Circular Covers: Cut circle with radius 6 inches larger than cover and concentric with cover.
  - 2. Rectangular Covers: Cut rectangle 6 inches larger than cover on all sides.
- B.** Install grade rings or blocking as needed to raise cover to finish grade.
- C.** Pour concrete collar:
  - 1. Bottom of Collar: Top of existing collar or 6 inches below top of proposed collar, whichever is at a higher elevation.
  - 2. Top of Collar: Bottom of existing asphalt pavement.
  - 3. Apply tack coat to all exposed surfaces.
  - 4. Fill excavation with hot mix asphalt and, while still hot, compact flush with adjacent surface.

**3.15 INSTALLATION TOLERANCES**

- A.** Hot Mix Asphalt Pavement:
  - 1. Course thickness and surface smoothness shall be in accordance with Caltrans Standard Specification Section 39-2.01A(4)(i)(iii)
  - 2. Total Thickness: Not less than indicated.
- B.** Trench Patch:
  - 1. Compacted surface: Within 0.01 foot of adjacent pavement.
  - 2. Do not create ponding.
- C.** Adjust Covers:
  - 1. Compacted surface: Up to 0.01 foot higher, and no lower than adjacent pavement.
  - 2. Do not create ponding.

END OF SECTION 321216

SECTION 321313 - CONCRETE PAVEMENT

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Furnishing, placing, spreading, compacting and shaping portland cement concrete pavement with undoweled transverse weakened plane joints, for vehicular traffic.
- B. Form construction and use in placing portland cement concrete pavement.
- C. Joints for portland cement concrete pavement.
- D. Finishing portland cement concrete pavement.
- E. Curing and protecting portland cement concrete pavement.

1.2 RELATED SECTIONS

- A. Section 011000, Supplemental General Requirements
- B. Section 312000, Earth Moving
- C. Section 321100, Pavement Base Course
- D. Section 321318, Cement and Concrete for Exterior Improvements

1.3 RELATED DOCUMENTS

- A. Geotechnical Report: Geotechnical Report: Geotechnical Study Report, Project Number: 4541.005.PW.1, prepared by RGH Consultants and dated November 12, 2024.
- B. AASHTO Standard Specifications
  - 1. T132: Standard Method of Test for Tensile Strength of Hydraulic Cement Mortars
- C. ASTM Standards
  - 1. D36: Standard Test Method for Softening Point of Bitumen (Ring-and-Ball Apparatus)
  - 2. A615: Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
  - 3. A706: Standard Specification for Deformed and Plain Low-Alloy Steel Bars for Concrete Reinforcement.
  - 4. A775: Standard Specification for Epoxy Coated Steel Reinforcing Bars.
  - 5. A934: Standard Specification for Epoxy-Coated Prefabricated Steel Reinforcing Bars.
  - 6. A996: Standard Specification for Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement

7. C94: Standard Specification for Ready-Mixed Concrete
  8. C603: Standard Test Method for Extrusion Rate and Application Life of Elastomeric Sealants
  9. C639: Standard Test Method for Rheological (Flow) Properties of Elastomeric Sealants
  10. C661: Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer
  11. C679: ASTM C679-15 Standard Test Method for Tack-Free Time of Elastomeric Sealants
  12. C719: Standard Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement (Hockman Cycle)
  13. C793: Standard Test Method for Effects of Laboratory Accelerated Weathering on Elastomeric Joint Sealants
  14. C881: Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete.
  15. D412: Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension
  16. D1640: Standard Test Methods for Drying, Curing, or Film Formation of Organic Coatings
  17. D2628: Standard Specification for Preformed Polychloroprene Elastomeric Joint Seals for Concrete Pavements.
  18. D2835: Standard Specification for Lubricant for Installation of Preformed Compression Seals in Concrete Pavements.
  19. D3963: Standard Specification for Fabrication and Jobsite Handling of Epoxy-Coated Steel Reinforcing Bars.
  20. D6690: Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements.
- D. Caltrans Standard Specifications, 2022
1. Section 10, General
  2. Section 40, Concrete Pavement
  3. Section 52, Reinforcement
  4. Section 95, Epoxy
- E. Caltrans Standard Plans:
1. Plan P1: Jointed Plan Concrete Pavement – New Construction
  2. Plan P10: Concrete Pavement Dowel Bar Details

#### 1.4 DEFINITIONS

- A. AASHTO: American Association of State Highway and Transportation Officials
- B. ASTM: American Society for Testing and Materials
- C. Caltrans: State of California, Department of Transportation

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### 1.5 QUALITY ASSURANCE

- A. Testing Agency: Owner's Representative will engage a qualified independent testing agency to perform field inspections and tests and to prepare test reports.
  - 1. Testing agency will conduct and interpret tests and state in each report whether tested work complies with or deviates from specified requirements.
- B. Additional testing, at Contractor's expense, will be performed to determine compliance of corrected Work with specified requirements.
- C. Manufacturer Qualifications: Manufacturer of ready-mixed concrete products complying with ASTM C94 requirements for production facilities and equipment.
- D. Installer Qualification: An experienced installer who has completed pavement work similar in material, design and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- E. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant and each aggregate from one source.

### 1.6 SUBMITTALS

- A. Follow submittal procedure outlined in Section 011000, Supplemental General Requirements.
- B. Design Mixes: For each concrete pavement mix. Include alternate mix designs when characteristics of materials, project conditions, weather, test results or other circumstances warrant adjustments.
- C. Material Certificates: Signed by manufacturers certifying that each of the following materials complies with requirements.
  - 1. Cementitious materials and aggregates
  - 2. Steel reinforcement and reinforcement accessories
  - 3. Admixtures
  - 4. Curing compound
  - 5. Applied finish material
  - 6. Bonding agent or adhesive
  - 7. Joint filler
  - 8. Joint Sealant
  - 9. Tie Bars
  - 10. Epoxy
  - 11. Backer Rods

**PART 2 - PRODUCTS**

**2.1 PORTLAND CEMENT CONCRETE**

- A. In accordance with Section 321318, Cement and Concrete for Exterior Improvements.

**2.2 BASE MATERIAL**

- A. In accordance with Section 321100, Pavement Base Course.

**2.3 TIE BARS**

- A. Deformed reinforcing steel bars conforming to the requirements of ASTM Designation A615, Grade 40 or 60
- B. Epoxy-coat in accordance with Caltrans Standard Specification Section 52-2.02, Epoxy-Coated Reinforcement, except bars must comply with ASTM A706; ASTM A996; or ASTM A615, Grade 40 or 60.
- C. Do not bend tie bars.

**2.4 EPOXY**

- A. Bond tie bars to existing concrete with epoxy resin in accordance with Caltrans Standard Specification Section 95-1.02D, Epoxy Adhesive for Bonding Freshly Mixed Concrete to Hardened Concrete.

**2.5 SILICONE JOINT SEALANT**

- A. Furnish low modulus silicone joint sealant in a one-part silicone formulation. Do not use acid cure sealants. Compound to be compatible with the surface to which it is applied and conform to the following requirements:

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Specification	Test Method	Requirement
Tensile stress, 150% elongation, 7-day cure at 77°± 1°F and 45% to 55% Relative Humidity	ASTM D412 (Die C)	45 psi max.
Flow at 77° ± 1°F	ASTM C639 <sup>a</sup>	Shall not flow from channel
Extrusion Rate at 77° ± 1°F	ASTM C603 <sup>b</sup>	75-250 g per min.
Specific Gravity	ASTM D792 Method A	1.01 to 1.51
Durometer Hardness, at 0°F, Shore A, cured 7 days at 77° ± 1°F	ASTM C661	10 to 25
Ozone and Ultraviolet Resistance, after 5000 hours	ASTM C793	No chalking, cracking or bond loss
Tack free at 77° ± 1°F and 45% to 55% Relative Humidity	ASTM C679	Less than 75 minutes
Elongation, 7 day cure at 77° ± 1°F and 45% to 55% Relative Humidity	ASTM D412 (Die C)	500 percent min.
Set to Touch, at 77° ± 1°F and 45% to 55% Relative Humidity	ASTM D1640	Less than 75 minutes
Shelf Life, from date of shipment	—	6 months min.
Bond, to concrete mortar-concrete briquets, air cured 7 days at 77° ± 1°F	AASHTO T132 <sup>c</sup>	50 psi min.
Movement Capability and Adhesion, 100% extension at 0°F after air cured 7 days at 77° ± 1°F, and followed by 7 days in water at 77° ± 1°F	ASTM C719 <sup>d</sup>	No adhesive or cohesive failure after 5 cycles

Notes:

- a. ASTM Designation: C639 Modified (15 percent slope channel A).
- b. ASTM Designation: C603, through 1/8 inches opening at 50 psi.
- c. Mold briquets in conformance with the requirements in AASHTO Designation: T132, sawed in half and bonded with a 1/16 inches maximum thickness of sealant and tested in conformance with the requirements in AASHTO Designation: T132. Briquets shall be dried to constant mass at 212 ± 10°F.
- d. Movement Capability and Adhesion: Prepare 12-inch x 1 inch x 3-inch concrete blocks in conformance with the requirements in ASTM Designation: C719. A sawed face shall be used for bond surface. Seal 2 inch of block leaving 1/2 inches on each end of specimen unsealed. The depth of sealant shall be 3/8 inches and the width 1/2 inches.

- B. Formulate the silicon joint sealant to cure rapidly enough to prevent flow after application on grades of up to 15 percent.
- C. Furnish to the Owner's Representative with a Certificate of Compliance. Accompany certificate with a certified test report of the results of the required tests performed on the sealant material within the previous 12 months prior to proposed use. Provide the certificate and accompanying test report for each lot of silicone joint sealant prior to use on the project.

2.6 ASPHALT RUBBER JOINT SEALANT

- A. Conform to the requirements of ASTM Designation: D6690 as modified herein or to the following:
  - 1. Provide a mixture of paving asphalt and ground rubber. Ground rubber to be vulcanized or a combination of vulcanized and de-vulcanized materials ground so that 100 percent will pass a No. 08 sieve and contain not less than 22 percent ground rubber, by mass. Modifiers may be used to facilitate blending.
  - 2. The Ring and Ball softening point shall be 135°F minimum, when tested in conformance with the requirements in ASTM D36.
  - 3. Provide asphalt rubber sealant material capable of being melted and applied to cracks and joints at temperatures below 400°F.
- B. The penetration requirements of Section 4.2 of ASTM Designation: D6690 do not apply. The required penetration at 77°F, 5 oz, 5s, shall not exceed 120.
- C. The resilience requirements of Section 4.5 of ASTM Designation: D6690 do not apply. The required resilience, when tested at 77°F, shall have a minimum of 50 percent recovery.
- D. Accompany each lot of asphalt rubber joint sealant shipped to the job site, whether as specified herein or conforming to the requirements of ASTM Designation D6690, as modified herein, by a Certificate of Compliance, storage and heating instructions and precautionary instructions for use.
- E. Heat and place in conformance with the manufacturer's written instructions and the details shown on the Plans. Provide manufacturer's instructions to the Owner's Representative. Do not place when the pavement surface temperature is below 50 °F.

2.7 PREFORMED COMPRESSION JOINT SEALANT

- A. Material: ASTM Designation: D2628.
  - 1. Number of cells: 5 or 6.
  - 2. Lubricant Adhesive: ASTM Designation D2835.
  - 3. Install compression seals along with lubricant adhesive according to the manufacturer's recommendations. Submit manufacturer's recommendations to the Owner's Representative`.
- B. Accompany each lot of compression seal and lubricant adhesive by a Certificate of Compliance, storage instructions and precautionary instructions for use. Also submit the manufacturer's data sheet with installation instructions and recommended model or type of preformed compression seal for the joint size and depth as shown on the Plans. Show evidence that the selected seal is being compressed at level between 20 and 50 percent at all times for the joint width and depth shown on the Plans.

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### 2.8 BACKER RODS

- A. Provide backer rods that have a diameter prior to placement at least 25 percent greater than the width of the saw cut after sawing and are expanded, crosslinked, closed-cell polyethylene foam that is compatible with the joint sealant so that no bond, adverse reaction occurs between the rod and sealant. In no case use a hot pour sealant that will melt the backer rod. Submit a manufacturer's data sheet verifying that the backer rod is compatible with the sealant to be used.

### 2.9 SLIP RESISTIVE AGGREGATE FINISH

- A. Factory-graded, packaged, rustproof, nonglazing, abrasive aggregate of fused aluminum-oxide granules or crushed emery aggregate containing not less than 50 percent aluminum oxide and not less than 20 percent ferric oxide; unaffected by freezing, moisture, and cleaning materials.

## PART 3 - EXECUTION

### 3.1 WATER SUPPLY

- A. Provide water supply in accordance with Caltrans Standard Specification Section 10-6, Watering.

### 3.2 SUBGRADE

- A. Prepare subgrade in accordance with Caltrans Standard Specification Section 40-1.03F, Placing Concrete.

### 3.3 SOIL STERILANT

- A. Furnish and apply to areas indicated in accordance with Section 312000, Earth Moving.

### 3.4 PLACING

- A. Prepare concrete in accordance with Caltrans Standard Specification Section 40-1.03F, Placing Concrete.

### 3.5 SPREADING COMPACTING AND SHAPING

- A. Conform to the following:
  - 1. Stationary Side Form Construction: In accordance with Caltrans Standard Specification Section 40-1.03F(4), Stationary Side-Form Construction.
  - 2. Slip Form Construction: In accordance with Caltrans Standard Specification Section 40-1.03F(4), Slip Form Construction.

3.6 INSTALLING TIE BARS

A. Install at longitudinal contact joints, longitudinal weakened plane joints, and transverse contact joints as shown on the Plans. In no case, shall any consecutive width of new portland cement concrete pavement tied together with tie bars exceed 50 feet. In no case shall tie bars be used at a joint where portland cement concrete and asphalt concrete pavements abut.

B. Tie bars shall be installed at longitudinal joints by one of the 3 following methods:

1. Drilling and bonding in conformance with the details shown on the Plans. Provide a two-component, epoxy-resin, conforming to the requirements of ASTM Designation: C881, Type V. Grade 3 (Non-Sagging), Class shall be as follows:

<u>Temperature of Concrete</u>	<u>Required Class of Epoxy Resin</u>
Lower than 40° F	A
40° F through 60° F	B
Above 60° F	C

2. Provide, at least 7 days prior to start of work, a Certificate of compliance and a copy of the manufacturer's recommended installation procedure. The drilled holes shall be cleaned in accordance with the epoxy manufacturer's instructions and shall be dry at the time of placing the epoxy and tie bars. Immediately after inserting the tie bars into the epoxy, the tie bars shall be supported as necessary to prevent movement during the curing and shall remain undisturbed until the epoxy has cured a minimum time as specified by the manufacturer. Tie bars that are improperly bonded, as determined by the Owner's Representative, will be rejected. If rejected, adjacent new holes shall be drilled, as directed by the Owner's Representative, and new tie bars shall be placed and securely bonded to the concrete. All work necessary to correct improperly bonded tie bars shall be performed at the Contractor's expense.
3. Insert the tie bars into the plastic slip-formed concrete before finishing the concrete. Inserted tie bars shall have full contact between the bar and the concrete. When tie bars are inserted through the pavement surface, the concrete over the tie bars shall be reworked and refinished to such an extent that there is no evidence on the surface of the completed pavement that there has been any insertion performed. Any loose tie bars shall be replaced by drilling and grouting into place with epoxy as described in method 1 above at the Contractor's expense.
4. By using threaded dowel splice couplers fabricated from deformed bar reinforcement material, free of external welding or machining. Threaded dowel splice couplers shall be accompanied by a Certificate of Compliance and installation instructions. Installation of threaded dowel splice couplers shall conform to the requirements of the manufacturer's recommendations.

### 3.7 JOINTS

- A. Construct joints in accordance with Caltrans Standard Specification Section 40-1.03B, Joints, except that tie bars shall be as specified under Part 1, Materials.
  - 1. Construction Joints: In accordance with Caltrans Standard Specification Section 40-1.03B(2), Construction Joints.
    - a. Construct a construction joint at the end of each day's work, or where concrete placement is interrupted for more than 30 minutes, to coincide with the next weakened plane joint location.
    - b. If sufficient concrete has not been mixed to form a slab to match the next contraction joint, when an interruption occurs, the excess concrete shall be removed and disposed of back to the last preceding joint. The cost of removing and disposing of any excess concrete shall be at the Contractor's expense. Any excess material shall become the property of the Contractor and shall be properly disposed of.
    - c. A metal or wooden bulkhead (header) shall be used to form the joint. The bulkhead shall be designed to accommodate the installation of tie bars.
  - 2. Contraction Joints: In accordance with Caltrans Standard Specification Section 40-1.03B (3), Contraction Joints, except that the insert method of forming joints in pavement shall not be used.

### 3.8 FINISHING

- A. Finish concrete in accordance with Caltrans Standard Specification Section 40-1.03H, Finishing.
- B. Slip-Resistive Aggregate Finish: Before final floating, spread slip-resistive aggregate finish on paving surface according to manufacturer's written instructions and as follows:
  - 1. Uniformly spread of dampened, slip-resistive aggregate over paving surface in two applications. Tamp aggregate flush with surface using a steel trowel, but do not force below surface.
  - 2. Uniformly distribute approximately two-thirds of slip-resistive aggregate over paving surface with mechanical spreader, allow to absorb moisture, and embed by power floating. Follow power floating with a second slip-resistive aggregate application, uniformly distributing remainder of material at right angles to first application to ensure uniform coverage and embed by power floating.

### 3.9 CURING

- A. Cure concrete in accordance with Caltrans Standard Specification Section 40-1.03I, Curing.

### 3.10 SEALING JOINTS

- A. Liquid Joint Sealant Installation.
1. The joint sealant detail for transverse and longitudinal joints, as shown on the Plans, shall apply only to weakened plane joints. Construct weakened plane joints by the sawing method. Should grinding or grooving be required over or adjacent to any joint after sealant has been placed, completely remove the joint material and disposed of, and replace at the Contractor's expense. Recess sealant below the final finished surface as shown on the Plans.
  2. At the Contractor's option, transverse weakened plane joints shall be either Type DSC or Type SSC as shown on the Plans. Longitudinal weakened plane joints shall be Type SSC only as shown on the Plans.
  3. Seven days after the concrete pavement placement and not more than 4 hours before placing backer rods and joint sealant materials, clean the joint walls by the dry sand blast method and other means as necessary to completely remove from the joint all objectionable material such as soil, asphalt, curing compound, paint and rust. After cleaning the joint, remove all traces of sand, dust and loose material from and near the joint for a distance along the pavement surfaces of at least 2-inch on each side of the joint by the use of a vacuum device. Remove surface moisture at the joints by means of compressed air or moderate hot compressed air or other means approved means. Do not use drying procedures that leave a residue or film on the joint wall. Sandblasting equipment shall have a maximum nozzle diameter size of  $1/4 \pm 1/32$  inches and a minimum pressure of 90-psi.
  4. Install backer rod as shown on the Plans. Provide an expanded, closed-cell polyethylene foam backer rod that is compatible with the joint sealant so that no bond or adverse reaction occurs between the rod and sealant. Install backer rod when the temperature of the portland cement concrete pavement is above the dew point of the air and when the air temperature is 40°F or above. Install backer rod when the joints to be sealed have been properly patched, cleaned and dried. Do not use a method of placing backer rod that leave a residue or film on the joint walls.
  5. Immediately after placement of the backer rod, place the joint sealant in the clean, dry, prepared joints as shown on the Plans. Apply the joint sealant by a mechanical device with a nozzle shaped to fit inside the joint to introduce the sealant from inside the joint. Apply adequate pressure to the sealant to ensure that the sealant material is extruded evenly and that full continuous contact is made with the joint walls. After application of the sealant recess the surface of the sealant as shown on the Plans.
  6. Any failure of the joint material in either adhesion or cohesion of the material will be cause for rejection of the joint. Conform the finished surface of joint sealant to the dimensions and allowable tolerances shown on the Plans. Rejected joint materials or joint material whose finished surface does not conform to the dimensions shown on the Plans shall be repaired or replaced, at the Contractor's expense, with joint material that conforms to the requirements.
  7. After each joint is sealed, remove all surplus joint sealer on the pavement surface. Traffic shall not be permitted over the sealed joints until the sealant is tack free and set sufficiently to prevent embedment of roadway debris into the sealant.

- B. Preformed Compression Joint Seal Installation
1. The compression seal alternative joint detail for transverse and longitudinal joints, as shown on the Plans, shall apply only to weakened plane joints. Construct weakened plane joints by the sawing method. Should grinding or grooving be required over or adjacent to any joint after the compression seal has been placed, completely remove the joint materials and disposed of, and replace at the Contractor's expense. Compression seal shall be recessed below the final finished surface as shown on the Plans.
  2. At the Contractor's option, transverse weakened plane joints shall be either Type DSC or Type SSC as shown on the Plans. Longitudinal weakened plane joints shall be Type SSC only as shown on the Plans.
  3. Seven days after the concrete pavement placement and not more than 4 hours before placing preformed compression joint seals, clean the joint walls by the dry sand blast method and other means as necessary to completely remove from the joint all objectionable material such as soil, asphalt, curing compound, paint and rust. After cleaning the joint, remove all traces of sand, dust and loose material from and near the joint for a distance along the pavement surfaces of at least 50 mm on each side of the joint by the use of a vacuum device. Remove surface moisture at the joints by means of compressed air or moderate hot compressed air or other means. Do not use drying procedures that leave a residue or film on the joint wall. Sandblasting equipment shall have a maximum nozzle diameter size of  $1/4 \pm 1/32$  inches and a minimum pressure of 90 psi.

### 3.11 PROTECTING CONCRETE PAVEMENT

- A. Protect pavement in accordance with Caltrans Standard Specification Section 40-1.03J Protecting Concrete Pavement.

END OF SECTION 321313

SECTION 321318 - CEMENT AND CONCRETE FOR EXTERIOR IMPROVEMENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Materials for portland cement concrete
- B. Aggregate and aggregate grading for portland cement concrete
- C. Water for portland cement concrete
- D. Admixtures for portland cement concrete
- E. Proportioning for portland cement concrete
- F. Mixing and transporting portland cement concrete
- G. Formwork for cast in place portland cement concrete
- H. Embedded materials for portland cement concrete
- I. Steel reinforcement for portland cement concrete
- J. Placing and finishing portland cement concrete
- K. Curing portland cement concrete
- L. Protecting portland cement concrete

1.2 RELATED SECTIONS

- A. Section 321216, Asphalt Paving
- B. Section 321313, Concrete Pavement

1.3 RELATED DOCUMENTS

- A. ASTM Standards
  - 1. A615, Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
  - 2. A1064, Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
  - 3. C94, Standard Specification for Ready-mixed Concrete
  - 4. C150, Standard Specification for Portland Cement
  - 5. C260, Standard Specification for Air-Entraining Admixtures for Concrete
  - 6. C309, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete

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7. C494, Standard Specification for Chemical Admixtures for Concrete.
  8. C618, Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for use in Portland Cement
  9. C1017, Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete
  10. D1557, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort
  11. D1751, Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
- B. Caltrans Standard Specifications, 2018
1. Section 51: Concrete Structures
  2. Section 73: Concrete Curbs and Sidewalks
  3. Section 90: Concrete

### 1.4 DEFINITIONS

- A. ASTM: American Society for Testing and Materials

### 1.5 SUBMITTALS

- A. Concrete Mix Design: Have all concrete mixes designed by a testing laboratory and approved by the Consulting Engineer. Conform all mixes to the applicable building code requirement, regardless of other minimum requirements listed herein or on the Plans. Submit mix designs for review before use. Show proportions and specific gravities of cement, fine and coarse aggregate, and water and gradation of combined aggregates.
- B. Reinforcing Steel Shop-Drawings

### 1.6 QUALITY ASSURANCE

- A. Concrete shall be subject to quality assurance in accordance with Section 90 of the Caltrans Standard Specifications.
1. Slump tests: Have available, at job site, equipment required to perform slump tests. Make one slump test for each cylinder sample, from same concrete batch. Allowable maximum slump shall be 4 inches for walls and 3 inches for slabs on grade and other work.
- B. Certifications:
1. Provide Owner's Representative at the time of delivery with certificates of compliance signed by both Contractor and Supplier containing the following statements:
    - a. Materials contained comply with the requirements of the Contract Documents in all respects.

- b. Proportions and mixing comply with the design mix approved by the Consulting Engineer. Design mix shall have been field tested in accordance with the herein requirements of the Caltrans Standard Specifications and produces the required compressive strength under like conditions.
  - c. Statement of type and amount of any admixtures.
2. Provide Owner's Representative, at time of delivery, with certified delivery ticket stating volume of concrete delivered and time of mixing, or time of load-out in case of transit mixers.

## 1.7 DESIGNATION

- A. General: Whenever the 28-day compressive strength is designated herein or on the Plans is 3,600 psi or greater, the concrete shall be considered to be designated by compressive strength. The 28-day compressive strength shown herein or on the plans which are less than 3,600 psi are shown for design information only and are not considered a requirement for acceptance of the concrete. Whenever the concrete is designated by class or as minor concrete herein or on the Plans, the concrete shall contain the cement per cubic yard shown in Section 90-2 of the Caltrans Standard Specifications.
- B. Unless specified otherwise herein or on the Plans, portland cement concrete for curbs, gutters, sidewalks and their appurtenances such as island paving, curb ramps and driveways, shall be minor concrete as specified in Section 90-2 of the Caltrans Standard Specifications.

## PART 2 - PRODUCTS

### 2.1 PORTLAND CEMENT

- A. General: Type II or Type V cement conforming to the requirements of ASTM C150. Contractor may substitute pozzolan for portland cement in amounts up to 15% of the required mix unless high early strength concrete is specified. Pozzolan shall consist of Class F Fly Ash meeting the requirements of ASTM C618.
- B. Color: Provide a coloring equivalent to ¼ pound of lampblack per cubic yard. Add to the concrete at the central mixing plant.

### 2.2 AGGREGATE AND AGGREGATE GRADATION

- A. General: Fine and coarse aggregates shall be ¾ inch maximum size; clean and crushed aggregate free of materials which may cause staining. Aggregates shall conform to the requirements of section 90-1.02C of the Caltrans Standard Specifications.
- B. Aggregate Size and Gradation: Conform to the requirements of section 90-1.02C(4)(d) of the Caltrans Standard Specifications for 1-inch maximum combined aggregate.

### 2.3 WATER

- A. General: Water shall be clean, free from injurious amounts of oil, alkali, organic matter, or other deleterious material, and not detrimental to concrete per ASTM C94. Water shall conform to the requirements of section 90-1.02D of the Caltrans Standard Specifications, for mixing and curing portland cement concrete and for washing aggregates.

### 2.4 CHEMICAL ADMIXTURES

- A. Provide admixtures certified by manufacturer to be compatible with other admixtures and to contain no more than 0.1 percent water-soluble chloride ions by mass of cementitious material. Admixtures shall conform to the requirements of section 90-1.02E of the Caltrans Standard Specifications and as noted herein or on the Plans.
1. Air-Entraining Admixture: ASTM C260/C260M
  2. Water-Reducing Admixture: ASTM C494/C494M, Type A
  3. Retarding Admixture: ASTM C494/C494M, Type B
  4. Water-Reducing and Retarding Admixture: ASTM C494/C494M, Type D
  5. High-Range, Water-Reducing Admixture: ASTM C494/C494M, Type F
  6. High-Range, Water-Reducing and Retarding Admixture: ASTM C494/C494M, Type G
  7. Plasticizing and Retarding Admixture: ASTM C1017/C1017M, Type II

### 2.5 CLASSIFICATION OF PORTLAND CEMENT CONCRETE

- A. Unless specified otherwise herein or on the Plans, portland cement concrete for the following items shall be designated as follows:
1. Curbs, Gutters, and Sidewalks: Minor concrete.
  2. Cast in Place Concrete Pipe: The concrete shall consist of a minimum of 564 pounds of portland cement per cubic yard of concrete.
  3. Thrust Blocks: The concrete shall have a minimum compressive strength of 3,000 psi.
  4. Sign and Fence Footings: The concrete shall consist of a minimum of 376 pounds of portland cement per cubic yard of concrete.
  5. Water, Storm, and Sanitary Structures: The concrete shall consist of a minimum of 564 pounds of portland cement per cubic yard of concrete.

### 2.6 EXPANSION JOINT MATERIAL

- A. Material for expansion joints in portland cement concrete improvements shall be premolded expansion joint fillers conforming to the requirements of ASTM D1751. Expansion joint material shall be shaped to fit the cross section of the concrete prior to being placed. Suppliers certificates showing conformance with this specification shall be delivered with each shipment of materials delivered to the job site. Unless specified otherwise herein or on the Plans, expansion joint thickness shall be as follows:
1. Concrete Slope Protection, Gutter Lining, Ditch Lining and Channel Lining: ½ inch
  2. Structures: As indicated

## 2.7 REINFORCEMENT AND DOWELS

- A. Bar reinforcement for concrete improvements shall be deformed steel bars of the size or sizes called for on the plans conforming to the requirements of ASTM A615 for Grade 60 bars. Size and shape for bar reinforcement shall conform to the details shown or called for on the Plans. Substitution of wire mesh reinforcement for reinforcing bars will not be allowed.
- B. Slip dowels, where noted or called for on the Plans or detail drawings shall be smooth billet-steel bars as designated and conforming to the requirements of ASTM A615 for Grade 60 bars. Ends of bars inserted in new work shall be covered with a cardboard tube sealed with cork; no grease or oil shall be used.
- C. Mesh for reinforcement for concrete improvements shall be cold drawn steel wire mesh of the size and spacing called for on the plans conforming to the requirements of ASTM A1064. Size and extent of mesh reinforcement shall conform to the details shown or called for on the plans.
- D. Tie wire for reinforcement shall be eighteen (18) gauge or heavier, black, annealed conforming to the requirements of ASTM A1064.
- E. Suppliers certificates showing conformance with this specification shall be delivered with each shipment of materials delivered to the job site.

## 2.8 COLOR AND PATTERN FOR DECORATIVE SURFACES

- A. Colors for decorative surfacing shall be CHROMIX admixtures as manufactured by the L. M. Scofield Company, Schedule A-312.05 or approved equal. The specific color shall be as designated or called for on the Plans.
- B. Patterns for decorative surfacing shall be standard "Bomanite" patterns as copyrighted by the Bomanite Corporation of Palo Alto, California or equal. The specific pattern shall be as designated or called for on the Plans.

## 2.9 CURING AND SEALING MATERIALS

- A. Curing Compounds:
  - 1. Concrete surface repellent-vertical and/or flatwork: Repello surface treatment, invisible chemical treatment barrier system.
  - 2. Curing and sealing-exterior: Colorcure concrete cureseal manufactured by L.M. Scofield Company or approved equal. Color-matched, water-based curing and sealing compound that complies with ASTM C309.
  - 3. Color Conditioned Decorative Portland Cement Concrete: LITHOCHROME colorwax manufactured by L.M. Scofield Company or approved equal. Color-matched, water-based curing and sealing compound that complies with ASTM C309.

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### 2.10 FORMS

- A. Conform to the requirements of Section 73-1.03C and Section 90-1.03B(5) of the Caltrans Standard Specifications.
- B. Tolerance: Not to deviate more than ¼ inch in 10 feet in grade and alignment.

### 2.11 PRECAST CONCRETE STRUCTURES

- A. Conform to the following Sections of Caltrans Standard Specifications:
  - 1. 51-7, Minor Structures
  - 2. 70-5.02, Flared End Sections

### 2.12 CONCRETE VEHICULAR PAVEMENT

- A. General: See Section 321313, Concrete Pavement.

## PART 3 - EXECUTION

### 3.1 STRUCTURAL EXCAVATION

- A. Structural excavation may be either by hand, or by machine and shall be neat to the line and dimension shown or called for on the plans. Excavation shall be sufficient width to provide adequate space for working therein and comply with CAL-OSHA requirements.
- B. Where an excavation has been constructed below the design grade, refill the excavation to the bottom of the excavation grade with approved material and compact in place to 95% of the maximum dry density as determined by ASTM D1557.
- C. Remove surplus excavation material remaining upon completion of the work from the job site, or condition it to optimum moisture content and compact it as fill or backfill on the site.

### 3.2 BRACING AND SHORING

- A. Conform to California and Federal OSHA requirements.
- B. Place and maintain such bracing and shoring as may be required to support the sides of the excavations for the proper protection of workmen; to facilitate the work; to prevent damage to the facility being constructed; and to prevent damage to adjacent structures or facilities. Remove all bracing and shoring upon completion of the work.

- C. Be solely responsible for all bracing and shoring and, if requested by the Owner's Representative, submit details and calculations to the Owner's Representative. The Owner's Representative may forward the submittal to the Consulting Engineer for their review. The Contractor's submittal shall include the basic design, assumed soils conditions and estimation of forces to be resisted, together with plans and specifications of the materials and methods to be used, and shall be prepared by a civil engineer or structural engineer registered in California. No excavations related to the proposed facility shall precede a response to the submittal by the Owner's Representative.
- D. Be solely responsible for installing and extracting the sheathing in a manner which will not disturb the position or operation of the facility being constructed or adjacent utilities and facilities.

### 3.3 PLACING CONCRETE FORMS

- A. Form concrete improvements with a smooth and true upper edge. Side of the form with a smooth finish shall be placed next to concrete. Construct forms rigid enough to withstand the pressure of the fresh concrete to be placed without any distortion.
- B. Thoroughly clean all forms prior to placement and coat forms with an approved form oil in sufficient quantity to prevent adherence of concrete prior to placing concrete.
- C. Carefully set forms to the alignment and grade established and conform to the required dimensions. Rigidly hold forms in place by stakes set at satisfactory intervals. Provide sufficient clamps, spreaders and braces to ensure the rigidity of the forms.
- D. Provide forms for back and face of curbs, lip of gutters and edge of walks, valley gutters or other surface slabs that are equal to the full depth of the concrete as shown, noted or called for on the Plans. On curves and curb returns provide composite forms made from benders or thin planks of sufficient ply to ensure rigidity of the form.

### 3.4 PLACING STEEL REINFORCEMENT

- A. Bars shall be free of mortar, oil, dirt, excessive mill scale and scabby rust and other coatings of any character that would destroy or reduce the bond. All bending shall be done cold, to the shapes shown on the plans. The length of lapped splices shall be as follows:
  - 1. Reinforcing bars No. 8, or smaller, shall be lapped at least 45 bar diameters of the smaller bar joined, and reinforced bars Nos. 9, 10, and 11 shall be lapped at least 60 bar diameters of the smaller bars joined, except when otherwise shown on the plans.
  - 2. Splice locations shall be made as indicated on the plans.

- B. Accurately place reinforcement as shown on the plans and hold firmly and securely in position by wiring at intersections and splices, and by providing precast mortar blocks or ferrous metal chairs, spacers, metal hangers, supporting wires, and other approved devices of sufficient strength to resist crushing under applied loads. Provide supports and ties of such strength and density to permit walking on reinforcing without undue displacement.
- C. Place reinforcing to provide the following minimum concrete cover:
  - 1. Surfaces exposed to water: 4 inches.
  - 2. Surfaces poured against earth: 3 inches.
  - 3. Formed surfaces exposed to earth or weather: 2 inches.
  - 4. Slabs, walls, not exposed to weather or earth: 1-inch.
- D. Minimum spacing, center of parallel bars shall be two and one half (2-½) times the diameter of the larger sized bar. Accurately tie reinforcing securely in place prior to pouring concrete. Placing of dowels or other reinforcing in the wet concrete is not permitted.

### 3.5 MIXING AND TRANSPORTING PORTLAND CEMENT CONCRETE

- A. Transit mix concrete in accordance with the requirements of ASTM Designation C94. Transit mix for not less than ten (10) minutes total, not less than three (3) minutes of which shall be on the site just prior to pouring. Mix continuous with no interruptions from the time the truck is filled until the time it is emptied. Place concrete within one hour of the time water is first added unless authorized otherwise by the Owner's Representative.
- B. Do not hand mix concrete for use in concrete structures.

### 3.6 PLACING PORTLAND CEMENT CONCRETE

- A. Thoroughly wet subgrade when concrete is placed directly on soil. Remove all standing water prior to placing concrete.
- B. Do not place concrete until the subgrade and the forms have been approved.
- C. Convey concrete from mixer to final location as rapidly as possible by methods that prevent separation of the ingredients. Deposit concrete as nearly as possible in final position to avoid re-handling.
- D. Place and solidify concrete in forms without segregation by means of mechanical vibration or by other means as approved by the Owner's Representative. Continue vibration until the material is sufficiently consolidated and absent of all voids without causing segregation of material. The use of vibrators for extensive shifting of fresh concrete will not be permitted.
- E. Concrete in certain locations may be pumped into place upon prior approval by the Owner's Representative. When this procedure requires redesign of the mix, such redesign shall be submitted for approval in the same manner as herein specified for approval of design mixes.

**3.7 PLACING ACCESSORY MATERIALS**

- A. Place water stops and other items required to be embedded in of portland cement concrete structures at locations shown or required in accordance with Section 51-2.04 of the Caltrans Standard Specifications unless otherwise specifically noted or called for on the Plans.
- B. Curing Compounds:
  - 1. Regular Portland Cement Concrete: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
  - 2. Color Conditioned Decorative Portland Cement Concrete: Apply in accordance with the manufacturer's written instructions.

**3.8 FORM REMOVAL**

- A. Remove forms without damage to the concrete. Remove all shores and braces below the ground surface, before backfilling.
- B. Do not backfill against concrete until the concrete has developed sufficient strength to prevent damage.
- C. Leave forms for cast-in-place walls in place at least 72 hours after pouring.
- D. Leave edge forms in place at least 24 hours after pouring.

**3.9 DECORATIVE SURFACING CONSTRUCTION**

- A. Decorative surfacing concrete walks, concrete median islands or other installations shall be formed and placed as a concrete slab conforming to the details shown or noted on the Plans.

**3.10 FIELD QUALITY CONTROL**

- A. Finish subgrade for concrete improvements shall be subject to approval prior to placement of forms.
- B. No concrete shall be placed prior to approval of forms.
- C. Concrete improvements constructed shall not contain "bird baths" or pond water and shall be smooth and ridge free.
- D. Conform the finish grade and cross section of concrete improvements to the design grades and cross sections.

- E. Variation of concrete improvements from design grade and cross section as shown or called for on the plans shall not exceed the tolerances ACI 117 and as follows:
1. Elevation:  $\frac{1}{4}$ -inch.
  2. Thickness: Plus  $\frac{3}{8}$ -inch, minus  $\frac{1}{4}$ -inch.
  3. Surface: Gap below 10 foot long, unlevelled straightedge not to exceed  $\frac{1}{4}$ -inch.
  4. Lateral Alignment and Spacing of Tie Bars and Dowels: 1-inch.
  5. Vertical Alignment of Tie Bars and Dowels:  $\frac{1}{4}$ -inch.
  6. Alignment of Tie-Bar End Relative to Line Perpendicular to Pavement Edge:  $\frac{1}{2}$ -inch.
  7. Alignment of Dowel-Bar End Relative to Line Perpendicular to Pavement Edge: Length of dowel  $\frac{1}{4}$ -inch per 12 inches.
  8. Joint Spacing: 3 inches, unless otherwise indicated.
  9. Contraction Joint Depth: Plus  $\frac{1}{4}$ -inch, no minus.
  10. Joint Width: Plus  $\frac{1}{8}$ -inch, no minus.

### 3.11 RESTORATION OF EXISTING IMPROVEMENTS

- A. Replace in kind all pavement or other improvements removed or damaged due to the installation of concrete improvements.
- B. Remove, landscaping or plantings damaged or disturbed due to the installation of concrete improvements. Replace in kind.

END OF SECTION 321318

SECTION 321373 - CONCRETE PAVING JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
  - 1. Cold-applied joint sealants.
  - 2. Joint-sealant backer materials.

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

- A. Product Data:
  - 1. Concrete pavement joint sealants.
  - 2. Joint-sealant backer materials.
- B. Samples for Initial Selection: Manufacturer's standard color sheets showing full range of available colors for each type of joint sealant.
- C. Samples for Verification: Actual sample of finished products for each kind and color of joint sealant required.
  - 1. Size: Joint sealants in 1/2-inch-wide joints formed between two 6-inch-long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
- D. Paving-Joint-Sealant Schedule: Include the following information:
  - 1. Joint-sealant application, joint location, and designation.
  - 2. Joint-sealant manufacturer and product name.
  - 3. Joint-sealant formulation.
  - 4. Joint-sealant color.

1.4 QUALITY ASSURANCE

- A. Qualifications:
  - 1. Installers: Entity that employs installers and supervisors who are trained and approved by manufacturer.

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### 1.5 PRECONSTRUCTION TESTING

- A. Preconstruction Testing: Performed by a qualified testing agency.

### 1.6 FIELD CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
  1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer[ or are below 40 deg F.
  2. When joint substrates are wet.
  3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
  4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

## PART 2 - PRODUCTS

### 2.1 SOURCE LIMITATIONS

- A. Obtain joint sealants from single manufacturer for each sealant type.

### 2.2 JOINT SEALANTS, GENERAL

- A. Compatibility: Provide joint sealants, backer materials, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

### 2.3 COLD-APPLIED JOINT SEALANTS

- A. Single-Component, Nonsag, Silicone Joint Sealant: ASTM D5893/D5893M, Type NS.
- B. Single-Component, Self-Leveling, Silicone Joint Sealant: ASTM D5893/D5893M, Type SL.
- C. Multicomponent, Nonsag, Urethane, Elastomeric Joint Sealant: ASTM C920, Type M, Grade NS, Class 25, for Use T.
- D. Single Component, Pourable, Urethane, Elastomeric Joint Sealant: ASTM C920, Type S, Grade P, Class 25, for Use T.
- E. Multicomponent, Pourable, Urethane, Elastomeric Joint Sealant: ASTM C920, Type M, Grade P, Class 25, for Use T.

2.4 JOINT-SEALANT BACKER MATERIALS

- A. Joint-Sealant Backer Materials: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by joint-sealant manufacturer, based on field experience and laboratory testing.
- B. Round Backer Rods for Cold- and Hot-Applied Joint Sealants: ASTM D5249, Type 1, of diameter and density required to control sealant depth and prevent bottom-side adhesion of sealant.
- C. Round Backer Rods for Cold-Applied Joint Sealants: ASTM D5249, Type 3, of diameter and density required to control joint-sealant depth and prevent bottom-side adhesion of sealant.
- D. acker Strips for Cold- and Hot-Applied Joint Sealants: ASTM D5249; Type 2; of thickness and width required to control joint-sealant depth, prevent bottom-side adhesion of sealant, and fill remainder of joint opening under sealant.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine joints to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning of Joints: Before installing joint sealants, clean out joints immediately to comply with joint-sealant manufacturer's written instructions.
  - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
- B. Joint Priming: Prime joint substrates where indicated or where recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

### 3.3 INSTALLATION OF JOINT SEALANTS

- A. Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated unless more stringent requirements apply.
- B. Joint-Sealant Installation Standard: Comply with recommendations in ASTM C1193 for use of joint sealants as applicable to materials, applications, and conditions.
- C. Install joint-sealant backers to support joint sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
  - 1. Do not leave gaps between ends of joint-sealant backer materials.
  - 2. Do not stretch, twist, puncture, or tear joint-sealant backer materials.
  - 3. Remove absorbent joint-sealant backer materials that have become wet before sealant application and replace them with dry materials.
- D. Install joint sealants immediately following backer material installation, using proven techniques that comply with the following:
  - 1. Place joint sealants so they fully contact joint substrates.
  - 2. Completely fill recesses in each joint configuration.
  - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- E. Tooling of Nonsag Joint Sealants: Immediately after joint-sealant application and before skinning or curing begins, tool sealants in accordance with the following requirements to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint:
  - 1. Remove excess joint sealant from surfaces adjacent to joints.
  - 2. Use tooling agents that are approved in writing by joint-sealant manufacturer and that do not discolor sealants or adjacent surfaces.
- F. Provide joint configuration to comply with joint-sealant manufacturer's written instructions unless otherwise indicated.

3.4 CLEANING AND PROTECTION

- A. Clean off excess joint sealant as the Work progresses, by methods and with cleaning materials approved in writing by joint-sealant manufacturers.
- B. Protect joint sealants, during and after curing period, from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately and replace with joint sealant so installations in repaired areas are indistinguishable from the original work.

3.5 PAVING-JOINT-SEALANT SCHEDULE

- A. Joints within concrete paving:
  - 1. Joint Location:
    - a. Expansion and isolation joints in concrete paving.
    - b. Contraction joints in concrete paving.
    - c. Other joints as indicated.
  - 2. Joint Sealant: Single component, nonsag, silicone joint sealant.
  - 3. Joint-Sealant Color: Manufacturer's standard.

END OF SECTION 321373

# County of Mendocino Bower Park Restoration and Improvement Project

## SECTION 321375 - CONCRETE CURBS AND GUTTERS

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Portland cement concrete curbs and gutters, sidewalk, curb ramps and driveways.

#### 1.2 RELATED SECTIONS

- A. Section 312000, Earth Moving
- B. Section 321100, Pavement Base Course
- C. Section 321313, Concrete Pavement
- D. Section 321318, Cement and Concrete for Exterior Improvements

#### 1.3 RELATED DOCUMENTS

- A. Geotechnical Report: Geotechnical Study Report – Bower Park Restoration and Improvements, Project Number 4541.005.PW.1, prepared by RGH Consultants, dated November 12, 2024.
- B. American society for Testing and Materials (ASTM)
  - 1. A1064 – Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
  - 2. D1751 – Standard Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types)
- C. Caltrans Standard Specifications, 2015
  - 1. Section 51: Concrete Structures
  - 2. Section 72: Slope Protection
  - 3. Section 73: Concrete Curbs and Sidewalks
  - 4. Section 90: Concrete

#### 1.4 DEFINITIONS

- A. ASTM: American Society for Testing Materials
- B. ACI: American Concrete Institute

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### 1.5 SUBMITTALS

- A. Submittal procedures shall be as outlined in Section 01 10 00 – Supplemental General Requirements.
- B. Concrete Mix Design: Have all concrete mixes designed by a testing laboratory and approved by the Owner. Conform all mixes to the applicable building code requirement, regardless of other minimum requirements listed herein or on the drawings. Submit mix designs for review before use. Show proportions and specific gravities of cement, fine and coarse aggregate, and water and gradation of combined aggregates.

### 1.6 QUALITY ASSURANCE

- A. Concrete shall be subject to quality assurance in accordance with Section 90 of the Caltrans Standard Specifications.
- B. Certifications:
  - 1. Provide Owner at the time of delivery with certificates of compliance signed by both Contractor and Supplier containing the following statements:
    - a. Materials contained comply with the requirements of the Contract Documents in all respects.
    - b. Proportions and mixing comply with the design mix approved by the Consulting Engineer. Design mix shall have been field tested in accordance with the herein requirements of the Caltrans Standard Specifications and produces the required compressive strength under like conditions.
  - 2. Settlement of type and amount of any admixtures.
  - 3. Provide Owner, at time of delivery, with certified delivery ticket stating volume of concrete delivered and time of mixing, or time of load-out in case of transit mixers.
- C. Conform to the applicable provisions of Sections 51, 73 and 90 of the Caltrans Standard Specification and these Technical Specifications.
  - 1. Conform construction of portland cement concrete surface improvements (including curbs, gutters, medians, valley gutters, walks) to the requirements of Section 73 of the Caltrans Standard Specifications unless otherwise required in these Technical Specifications or shown on the Plans.
  - 2. Construct "V" ditches in accordance with Section 72-5 of the Caltrans Standard Specifications; except that finishing shall be in accordance with Standard Specification Section 73, or as otherwise required in these Technical Specifications or shown on the Plans.

1.7 DESIGNATION

- A. General: Whenever the 28-day compressive strength is designated herein or on the Plans is 3,600 psi or greater, the concrete shall be considered to be designated by compressive strength. The 28-day compressive strength shown herein or on the plans which are less than 3,600 psi are shown for design information only and are not considered a requirement for acceptance of the concrete. Whenever the concrete is designated by class or as minor concrete herein or on the Plans, the concrete shall contain the cement per cubic yard shown in Section 90-2 of the Caltrans Standard Specifications.
- B. Unless specified otherwise herein or on the Plans, portland cement concrete for curbs, gutters, sidewalks and their appurtenances such as island paving, curb ramps and driveways, shall be minor concrete as specified in Section 90-2 of the Caltrans Standard Specifications.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Comply with requirements of Section 32 13 18, Cement and Concrete for Exterior Improvements.

2.2 PORTLAND CEMENT CONCRETE

- A. Unless specified otherwise herein or on the Plans, portland cement concrete for items in this section shall be Minor Concrete as specified in Section 90-2 of the Caltrans Standard Specifications.
- B. Design mix to produce normal-weight concrete consisting of portland cement, aggregate, water-reducing or high-range water-reducing admixture (superplasticizer), air-entraining admixture, and water to produce the following properties:
  - 1. Compressive Strength:
    - a. Typical: 3000 psi, minimum at 28 days, unless otherwise indicated.
    - b. Curbs & Gutters: 3500 psi, minimum at 28 days.
  - 2. Slump Limit: 8 inches minimum for concrete containing high-range water-reducing admixture (superplasticizer, limited to flatwork only); 4 inches for other concrete.
  - 3. Water/Cement Ratio: 0.5

2.3 CURBS AND GUTTERS FORMS

- A. Use flexible spring-steel forms or laminated boards to form radius bends. Tolerance: Not to deviate more than 1/4 inch in 10 feet in grade and alignment.

2.4 EXPANSION JOINT MATERIAL

- A. Material for expansion joints in portland cement concrete improvements shall be premolded expansion joint fillers conforming to the requirements of ASTM Designation D1751. Expansion joint material shall be shaped to fit the cross section of the concrete prior to being placed. Suppliers' certificates showing conformance with this specification shall be delivered with each shipment of materials delivered to the job site.
- B. Unless noted otherwise herein or on the Plans expansion joint thickness shall be as follows:
  - 1. Curbs, Curb Ramps, Island Paving, Driveways and Gutter Depressions: ¼ inch

2.5 REINFORCEMENT AND DOWELS

- A. Comply with requirements of Section 321318, Cement and Concrete for Exterior Improvements.

PART 3 - EXECUTION

3.1 GENERAL

- A. Comply with requirements of Section 321318, Cement and Concrete for Exterior Improvements.
- B. Form, place and finish concrete curbs, gutters, walkways, island paving, valley gutters and driveway approaches in conformance with the applicable requirements of Section 73 of the Caltrans Standard Specifications as modified herein.
- C. Construct new concrete curb, curb and gutter and valley gutters against existing asphalt concrete by removing a minimum of 12 inches of the asphalt concrete to allow placement of curb or gutter forms. Patch pavement with a 6-inch-deep lift of asphalt concrete after gutter form is removed.

3.2 SUBGRADE

- A. Conform to Section 73-1.03B of Caltrans Standard Specifications.

3.3 SOIL STERILANT

- A. Furnish and apply an oxidation granular preemergent soil sterilant to prepared subgrade or after installation of rock or aggregate base uniformly at the rate recommended by the manufacturer.

### 3.4 PLACING CONCRETE FORMS

- A. Form concrete improvements with a smooth and true upper edge. Side of the form with a smooth finish shall be placed next to concrete. Construct forms rigid enough to withstand the pressure of the fresh concrete to be placed without any distortion.
- B. Thoroughly clean all forms prior to placement and coat forms with an approved form oil in sufficient quantity to prevent adherence of concrete prior to placing concrete.
- C. Carefully set forms to the alignment and grade established and conform to the required dimensions. Rigidly hold forms in place by stakes set at satisfactory intervals. Provide sufficient clamps, spreaders and braces to ensure the rigidity of the forms.
- D. Provide forms for back and face of curbs, lip of gutters and edge of walks, valley gutters or other surface slabs that are equal to the full depth of the concrete as shown, noted or called for on the Plans. On curves and curb returns provide composite forms made from benders or thin planks of sufficient ply to ensure rigidity of the form.

### 3.5 PLACING STEEL REINFORCEMENT

- A. Bars shall be free of mortar, oil, dirt, excessive mill scale and scabby rust and other coatings of any character that would destroy or reduce the bond. All bending shall be done cold, to the shapes shown on the plans. The length of lapped splices shall be as follows:
  - 1. Reinforcing bars No. 8, or smaller, shall be lapped at least 45 bar diameters of the smaller bar joined, and reinforced bars Nos. 9, 10, and 11 shall be lapped at least 60 bar diameters of the smaller bars joined, except when otherwise shown on the plans.
  - 2. Splice locations shall be made as indicated on the plans.
- B. Accurately place reinforcement as shown on the plans and hold firmly and securely in position by wiring at intersections and splices, and by providing precast mortar blocks or ferrous metal chairs, spacers, metal hangers, supporting wires, and other approved devices of sufficient strength to resist crushing under applied loads. Provide supports and ties of such strength and density to permit walking on reinforcing without undue displacement.
- C. Place reinforcing to provide the following minimum concrete cover:
  - 1. Surfaces exposed to water: 4 inches
  - 2. Surfaces poured against earth: 3 inches
  - 3. Formed surfaces exposed to earth or weather: 2 inches
  - 4. Slabs, walls, not exposed to weather or earth: 1-inch
- D. Minimum spacing, center of parallel bars shall be two and one half (2-½) times the diameter of the larger sized bar. Accurately tie reinforcing securely in place prior to pouring concrete. Placing of dowels or other reinforcing in the wet concrete is not permitted.

3.6 PLACING PORTLAND CEMENT CONCRETE

- A. Thoroughly wet subgrade when concrete is placed directly on soil. Remove all standing water prior to placing concrete.
- B. Do not place concrete until the subgrade and the forms have been approved.
- C. Convey concrete from mixer to final location as rapidly as possible by methods that prevent separation of the ingredients. Deposit concrete as nearly as possible in final position to avoid re-handling.
- D. Place and solidify concrete in forms without segregation by means of mechanical vibration or by other means as approved by the Owner. Continue vibration until the material is sufficiently consolidated and absent of all voids without causing segregation of material. The use of vibrators for extensive shifting of fresh concrete will not be permitted.
- E. Concrete in certain locations may be pumped into place upon prior approval by the Owner. When this procedure requires redesign of the mix, such redesign shall be submitted for approval in the same manner as herein specified for approval of design mixes.

3.7 EXPANSION JOINTS

- A. Construct expansion joints incorporating premolded joint fillers at twenty (20) foot intervals in all concrete curbs, gutters, median/island paving, valley gutters, driveway approaches and at the ends of all returns. At each expansion joint install 1/2-inch by 12-inch smooth slip dowels in the positions shown or noted on the detail drawings.
- B. Orient slip dowels at right angles to the expansion joint and hold firmly in place during the construction process by means of appropriate chairs.

3.8 WEAKENED PLANE JOINTS

- A. Construct weakened plane joints in concrete curbs, gutters, median/island paving and valley gutters between expansion joints at ten (10) foot intervals throughout, or as otherwise indicated. Depth of joint score depth to be one-fourth (25%) the thickness of the concrete.
- B. Orient slip dowels at right angles to the expansion joint and hold firmly in place during the construction process by means of appropriate chairs.
- C. Grooved Joints: Form weakened plane joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8-inch. Repeat grooving of weakened plane joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.

**3.9 FINISHING CONCRETE**

- A. Finish curb and gutter in conformance with the applicable requirements of Section 73 of the Caltrans Standard Specifications as modified herein.
- B. Where monolithic curb, gutter and sidewalk are specified, separate concrete pours will not be allowed.
- C. Provide a broom finish to all horizontal surfaces perpendicular to the path of travel on surfaces used by pedestrians:
  - 1. Sloped Less than 6%: Provide a medium salt (medium broom) finish by drawing a soft bristle broom across concrete surface, perpendicular to line of traffic, to provide a uniform fine line texture.
  - 2. Surfaces Sloped Greater than 6%: Provide a slip resistant (heavy broom finish) by striating surface 1/16-inch to 1/8-inch deep with a stiff-bristled broom, perpendicular to line of traffic.

**3.10 FORM REMOVAL**

- A. Remove forms without damage to the concrete. Remove all shores and braces below the ground surface, before backfilling.
- B. Do not backfill against concrete until the concrete has developed sufficient strength to prevent damage.
- C. Leave edge forms in place at least 24 hours after pouring.

**3.11 CONNECTING TO EXISTING CONCRETE IMPROVEMENTS**

- A. New curb or gutter is to connect to existing improvements to remain by saw cutting to existing sound concrete at the nearest score line, expansion joint or control joint. Drill and insert ½ inch diameter by 12-inch-long dowels at 24 inches on center into existing improvements. Install pre-molded expansion joint filler at the matching joint.
- B. A cold joint to the existing curb is not acceptable.

**3.12 FIELD QUALITY CONTROL**

- A. Conform the finish grade at top of curb, flow line of gutter, and the finish cross section of concrete improvements to the design grades and cross sections.
- B. Variation of concrete improvements from design grade and cross section as shown or called for on the plans shall not exceed the tolerances established in Section 73 of the Caltrans Standard Specifications.

**3.13 RESTORATION OF EXISTING IMPROVEMENTS**

- A. Replace in kind all pavement or other improvements removed or damaged due to the installation of concrete improvements.
- B. Remove, landscaping or plantings damaged or disturbed due to the installation of concrete improvements. Replace in kind.

END OF SECTION 321375

# County of Mendocino Bower Park Restoration and Improvement Project

## SECTION 321713 - PARKING BUMPERS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes concrete precast wheel stops.

#### 1.2 RELATED SECTIONS

- A. Section 010000, Supplemental General Requirements

#### 1.3 SUBMITTALS

- A. Follow submittal procedure outlined in accordance with Section 011000, Supplemental General Requirements.
- B. Submit product data for each type of product.

### PART 2 - PRODUCTS

#### 2.1 PARKING BUMPERS

- A. Concrete Wheel Stops: Precast, steel-reinforced, air-entrained concrete, 2500 psi minimum compressive strength, 5½ inches high by 7½ inches wide by 48 inches long (or length as shown on plans). Provide chamfered corners, transverse drainage slots on underside, and a minimum of two factory-formed vertical holes through wheel stop for anchoring to substrate.
  - 1. Surface Appearance: Free of pockets, sand streaks, honeycombs, and other obvious defects. Corners shall be uniform, straight, and sharp.
  - 2. Mounting Hardware: Galvanized-steel dowel, 1/2-inch diameter, 24-inch minimum length.

#### 2.2 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Project include, but are not limited to, the following:
  - 1. Oldcastle Precast
  - 2. Bertelson Precast
  - 3. Barco Products, or approved equal

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. Verify that pavement is in suitable condition to begin installation according to manufacturer's written instructions.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

**3.2 INSTALLATION**

- A. General: Install wheel stops according to manufacturer's written instructions unless otherwise indicated.
- B. Install wheel stops in bed of adhesive before anchoring.
- C. Securely anchor wheel stops to pavement with hardware in each preformed vertical hole in wheel stop as recommended in writing by manufacturer. Recess head of hardware beneath top of wheel stop.

END OF SECTION 321713

# County of Mendocino Bower Park Restoration and Improvement Project

## SECTION 321723 - PAVEMENT MARKINGS

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Removal of existing traffic stripes and pavement markers
- B. Removal of existing signs
- C. Cleaning and sweeping of streets before application of traffic stripes and pavement markings
- D. Materials and application for traffic stripes and pavement markings
- E. Materials and application for pavement markers
- F. Traffic control signs and street name signs
- G. Object markers
- H. Survey monuments

#### 1.2 RELATED SECTIONS

- A. Section 011000, Supplemental General Requirements
- B. Section 321318, Cement and Concrete for Exterior Improvements

#### 1.3 RELATED DOCUMENTS

- A. Caltrans Standard Specifications, 2015
  - 1. Section 78, Incidental Construction
  - 2. Section 81, Miscellaneous Traffic Control Devices
  - 3. Section 82, Signs and Markers
  - 4. Section 84, Markings
- B. Caltrans Standard Plans, 2015
  - 1. Plan A20A through A20D: Pavement Markers and Traffic Lines, Typical Details
  - 2. Plan A24A and A24B: Pavement Markings Arrows
  - 3. Plan A24C: Pavement Markings, Symbols and Numerals
  - 4. Plan A24D: Pavement Markings, Words
  - 5. Plan A24E: Pavement Markings, Words, Limit and Yield Lines
  - 6. Plan A24F: Pavement Markings, Crosswalks
  - 7. Plan A73A: Object Markers
  - 8. Plan A73B: Markers
  - 9. Plan A73C: Delineators, Channelizers and Barricades
  - 10. Plan A74: Survey Monuments
  - 11. Plan RS1: Roadside Sign, Typical Installation Details No. 1
  - 12. Plan RS2: Roadside Sign, Wood Post - Typical Installation Details No. 2
  - 13. Plan RS3: Roadside Sign, Laminated Wood Box Post - Typical Installation Details No. 3
  - 14. Plan RS4: Roadside Sign, Typical Installation Details No. 4

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- C. The State of California Traffic Manual, 2014
- D. The regulations, standards, and tests of the State of California Department of Transportation Materials and Research Division, edition in effect at time of date on Plans.
- E. Professional Land Surveyor's Act, Business and Professions Code §§ 8700 – 8805

### 1.4 SUBMITTALS

- A. Submit product data for each of the following in accordance with Section 011000, Supplemental General Requirements:
  - 1. Traffic paint
  - 2. Pavement markers and adhesives
  - 3. Reflectorized markers and posts

### 1.5 QUALITY ASSURANCE

- A. Deliver certificates showing conformance with this specification to the Owners Representative with each shipment of materials and equipment to the Project site.
- B. Provide proper facilities for handling and storage of products to prevent damage. Where necessary, stack products off ground on level platform, fully protected from weather.

### 1.6 PROJECT CONDITIONS

- A. Do not apply traffic striping or pavement markings to the pavement until after approval to proceed has been given by the Owners Representative.
- B. Thoroughly cure new asphalt concrete and portland cement concrete before application of stripes, markings or markers.

## PART 2 - PRODUCTS

### 2.1 THERMOPLASTIC STRIPES AND MARKING

- A. Thermoplastic striping and marking materials shall be in accordance with Caltrans Standard Specifications Sections 84-2.02 and 84-2.02B, unless noted otherwise herein or on the Plans.
- B. Glass Beads shall be in accordance with Caltrans Standard Specification Section 84-2.02D, Glass Beads, unless noted otherwise herein or on the Plans.
- C. Thermoplastic stripes and markings shall have a minimum skid friction value of BPN 35.

### 2.2 PAINTED STRIPES AND MARKINGS

- A. Painted striping and marking materials shall be in accordance with Caltrans Standard Specifications Sections 84-2.02 and 84-2.02C, unless noted otherwise herein or on the Plans.
- B. Glass Beads shall be in accordance with Caltrans Standard Specification Section 84-2.02D, Glass Beads, unless noted otherwise herein or on the Plans.

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### 2.3 PAVEMENT MARKERS

- A. Pavement Markers shall be in accordance with Caltrans Standard Specification Section 81-3, Pavement Markers, and as indicated on the Plans.
- B. Material
  - 1. Non-reflective Material shall be in accordance with Caltrans Standard Specification Section 81-3.02B, Non-Reflective Pavement Markers.
  - 2. Retroreflective Material shall be in accordance with Caltrans Standard Specification Section 81-3.02C, Retroreflective Pavement Markers.
- C. Adhesive:
  - 1. Adhesive Material shall be in accordance with Caltrans Standard Specification Section 81-3.02D, Hot Melt Bituminous Adhesive.

### 2.4 TRAFFIC CONTROL SIGNS

- A. General: Traffic control signs shall be in accordance with Caltrans Standard Specification Section 82-1, Signs and Markers.
- B. Sign Panels shall be in accordance with Caltrans Standard Specification Section 82-2, Sign Panels. Conform type (regulatory or warning), size, shape and pattern to the State of California, Department of Transportation, Traffic Manual, edition in effect at the date of the Plans.
- C. Posts:
  - 1. Metal Posts shall be in accordance with Caltrans Standard Specification Section 82-3.02B, Metal Posts.
  - 2. Wood Posts shall be in accordance with Caltrans Standard Specification Section 82-3.02C, Wood Posts.
- D. Mounting Hardware shall be in accordance with Caltrans Standard Specification 82-3.02E, Sign Panel Fastening and Mounting Hardware, unless otherwise specified.
- E. Post Foundations: Conform to Caltrans Standard Plans.

### 2.5 STREET NAME SIGNS

- A. Conform to manufacturer, style, size, and shape shown on the Plans.
- B. Posts: 2 inch inside diameter steel pipe unless noted otherwise on the Plans. Posts shall be in accordance with Caltrans Standard Specification Section 82-3.02B, Metal Posts.
- C. Post Foundations: Portland cement concrete in accordance with Section 32 13 18, Cement and Concrete for Exterior Improvements.

### 2.6 REFLECTORIZED OBJECT MARKERS

- A. ReflectORIZED Metal Object Markers: In accordance with Caltrans Standard Specification Section 82-5, Markers, for target plates and reflectors, and Caltrans Standard Plans A73A through A73C. Marker type shall be as shown on Plans.
- B. Posts: Metal posts shall be in accordance with Caltrans Standard Specification Section 82-5.02C, Metal Posts, and Caltrans Standard Plan A73B.

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- C. Mounting Hardware: In accordance with Caltrans Standard Specification Section 82-5.02G, Hardware.

### 2.7 STREET SURVEY MONUMENTS

- A. General: In accordance with Caltrans Standard Specification Section 78-2, Survey Monuments, except that the marker disk will not be furnished. Marker disk shall be 2-inch diameter solid brass with a 2-<sup>3</sup>/<sub>4</sub>-inch shaft, "Lietz No. 525" or approved equal.
  - 1. Portland Cement Concrete: In accordance with Section 321318, Cement and Concrete for Exterior Improvements.

## PART 3 - EXECUTION

### 3.1 REMOVAL OF TRAFFIC STRIPES, PAVEMENT MARKINGS AND PAVEMENT MARKERS

- A. Where blast cleaning is used for the removal of painted traffic stripes and pavement markings, or for removal of objectionable material, remove the residue, including dust and water, immediately after contact with the surface being treated. Remove by a vacuum attachment operating concurrently with the blast cleaning operation.
- B. Where grinding is used for the removal of thermoplastic traffic stripes and pavement markings, remove the residue by means of a vacuum attachment to the grinding machine. Do not allow the residue to flow across or be left on the pavement.
- C. Where markings are to be removed by blast cleaning or by grinding, the removed area shall be approximately rectangular so that no imprint of the removed marking remains on the pavement.
- D. Waste from removal of yellow painted traffic stripe may contain lead chromate. Residue produced when yellow paint is removed may contain heavy metals in concentrations that exceed thresholds established by the California Health and Safety Code and may produce toxic fumes when heated. As such, when grinding or other methods approved by the Owner's Representative are used to remove yellow painted traffic stripes, the removed residue, including dust, shall be collected and contained immediately. The Contractor shall submit a written work plan for the removal, storage, and disposal of yellow painted traffic stripe to the Owner's Representative for approval not less than fifteen (15) days prior to the start of the removal operations. Removal operations shall not be started until the Owner's Representative has approved of the work plan.
- E. Contractor will be responsible for repairing any damage to the pavement during removal of pavement markers. Damage to the pavement, resulting from removal of pavement markers, shall be considered as any depression more than 1/4-inch deep.

### 3.2 TEMPORARY PAVEMENT MARKERS

- A. If permanent pavement markers cannot be installed immediately, and the street or road is to be placed in service, install short term, temporary pavement markers on the new pavement prior to opening the street or road to traffic.
- B. Place markers, at a minimum, of 24 feet on centers, or as required by the governmental agency having jurisdiction, in the appropriate colors to delineate centerlines and travel lanes on multi-lane roadways.

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### 3.3 THERMOPLASTIC TRAFFIC STRIPES AND PAVEMENT MARKINGS

- A. Apply in conformance with the manufacturer's instructions and the applicable requirements Caltrans Standard Specification Section 84-2.03, Construction, and Caltrans Standard Plans A20A through A20D, and A24A through A24E.

### 3.4 PAINTED TRAFFIC STRIPES AND PAVEMENT MARKINGS

- A. Apply in conformance with the manufacturer's instructions and the applicable requirements of Caltrans Standard Specification Section 84-3.03, 3.04 and 3.05 and Caltrans Standard Plans A20A through A20D, and A24A through A24F.

### 3.5 PAVEMENT MARKERS

- A. Place in accordance with Caltrans Standard Specification Section 81-3.03, Construction.
- B. Pavement recesses are not required. Markers shall be installed accurately to the line established by the Owner's Representative. No markers shall be installed until the surface has been approved by the Owner's Representative.

### 3.6 TRAFFIC CONTROL SIGNS

- A. Install in accordance with Caltrans Standard Specification Sections 82-2.03 and 82-3.03, Caltrans Standard Plan RS1, the applicable requirements of the State of California Department of Transportation Maintenance Manual and the details shown on the Plans. The horizontal locations shown on Caltrans Standard Plan RS1 shall not be applicable, the horizontal location shall be as shown on the Plans.
- B. Portland cement concrete for post foundations shall be of the configuration shown on the Plans.
- C. After erection, damage to traffic sign faces shall be touched up or the sign replaced.

### 3.7 STREET NAME SIGNS

- A. Install in accordance with the manufacturer's instructions and as shown on the Plans.
- B. Horizontal location shall be as shown on the Plans.
- C. Portland cement concrete for post foundations shall be of the configuration shown on the Plans.

### 3.8 REFLECTORIZED OBJECT MARKERS.

- A. Install in accordance with Caltrans Standard Specification Section 82-5.03, Construction, except that the metal marker posts shall not be driven in place without prior approval of the Owner's Representative.
- B. Install at locations shown on the Plans.

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### 3.9 STREET SURVEY MONUMENTS

- A. Install Survey Monuments in accordance with Caltrans Standard Specification Section 78-2.03, Construction and Caltrans Standard Plan A74, except that the marker disk will not be furnished. Exact point in marker to be determined by an accurate survey and placed by a California Licensed Land Surveyors in accordance with the Professional Land Surveyors' Act.

### 3.10 PROTECTION

- A. Protect the newly installed traffic stripes and pavement markings from damage until the material has cured.
- B. Replace any traffic stripes or pavement markings or markers that are broken, misaligned or otherwise disturbed prior to opening roadway to traffic.

### 3.11 RESTORATION OF EXISTING IMPROVEMENTS

- A. Existing signs striping or other markings removed or damaged due to the installation of new facilities shall be replaced in kind.
- B. Existing landscaping or planting removed, damaged or disturbed due to the installation of traffic control signs or street name signs shall be replaced in kind.

END OF SECTION 321723

# County of Mendocino Bower Park Restoration and Improvement Project

## SECTION 321726 - TACTILE WARNING SURFACING

### 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. Cast-in-place detectable warning tiles.
  - 2. Surface-applied detectable warning tiles.
  - 3. Detectable warning mats.
  - 4. Detectable warning unit pavers.
- B. Related Requirements:
  - 1. Section 321313 "Concrete Pavement" for concrete walkways serving as substrates for tactile warning surfacing.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples for Initial Selection: For each type of exposed finish requiring color selection.
- C. Samples for Verification: For each type of tactile warning surface, in manufacturer's standard sizes unless otherwise indicated, showing edge condition, truncated-dome pattern, texture, color, and cross section; with fasteners and anchors.

#### 1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For tactile warning surfacing, to include in maintenance manuals.

#### 1.5 QUALITY ASSURANCE

- A. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
  - 1. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

#### 1.6 PROJECT CONDITIONS

- A. Cold-Weather Protection: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen subgrade or setting beds. Remove and replace unit paver work damaged by frost or freezing.
- B. Weather Limitations for Adhesive Application:
  - 1. Apply adhesive only when ambient temperature is above 50 deg F (10 deg C) and when temperature has not been below 35 deg F (2 deg C) for 12 hours immediately before application. Do not apply when substrate is wet or contains excess moisture.

- C. Weather Limitations for Mortar and Grout:
  - 1. Cold-Weather Requirements: Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.
  - 2. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602. Provide artificial shade and windbreaks, and use cooled materials as required. Do not apply mortar to substrates with temperatures of 100 deg F (38 deg C) and higher.
    - a. When ambient temperature exceeds 100 deg F (38 deg C), or when wind velocity exceeds 8 mph (13 km/h) and ambient temperature exceeds 90 deg F (32 deg C), set unit pavers within 1 minute of spreading setting-bed mortar.

## 1.7 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of tactile warning surfaces that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Deterioration of finishes beyond normal weathering and wear.
    - b. Separation or delamination of materials and components.
  - 2. Warranty Period: Five years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 TACTILE WARNING SURFACING, GENERAL

- A. Accessibility Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities and ICC A117.1 for tactile warning surfaces.
  - 1. For tactile warning surfaces composed of multiple units, provide units that when installed provide consistent side-to-side and end-to-end dome spacing that complies with requirements.
- B. Source Limitations: Obtain each type of tactile warning surfacing, joint material, setting material, anchor, and fastener from single source with resources to provide materials and products of consistent quality in appearance and physical properties.

### 2.2 DETECTABLE WARNING TILES

- A. Cast-in-Place Detectable Warning Tiles: Accessible truncated-dome detectable warning tiles configured for setting flush in new concrete walkway surfaces, with slip-resistant surface treatment on domes and field of tile.
  - 1. ADA Solutions cast-in-place or approved equal
  - 2. Material: Cast-fiber-reinforced polymer concrete tile.
  - 3. Color: Safety yellow
  - 4. Shapes and Sizes:
    - a. See plans.
  - 5. Dome Spacing and Configuration: per the California Building Code.

6. Mounting:
  - a. Permanently embedded detectable warning tile wet-set into freshly poured concrete.
  - b. Detectable warning tile set into formed recess in concrete and adhered with mortar or adhesive.
  - c. Replaceable detectable warning tile wet-set into freshly poured concrete and surface-fastened to permanently embedded anchors.

### 2.3 ACCESSORIES

- A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of tactile warning surfaces, noncorrosive and compatible with each material joined, and complying with the following:
  1. Furnish Type 304 stainless-steel fasteners for exterior use.
  2. Fastener Heads: For nonstructural connections, use flathead or oval countersunk screws and bolts with tamper-resistant heads, colored to match tile.
- B. Adhesive: As recommended by manufacturer for adhering tactile warning surfacing unit to pavement.
- C. Sealant: As recommended by manufacturer for sealing perimeter of tactile warning surfacing unit.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify that pavement is in suitable condition to begin installation according to manufacturer's written instructions. Verify that installation of tactile warning surfacing will comply with accessibility requirements upon completion.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION OF TACTILE WARNING SURFACING

- A. General: Prepare substrate and install tactile warning surfacing according to manufacturer's written instructions unless otherwise indicated.
- B. Place tactile warning surfacing units in dimensions and orientation indicated. Comply with location requirements of AASHTO MP 12.

**3.3 INSTALLATION OF DETECTABLE WARNING TILES**

- A. Cast-in-Place Detectable Warning Tiles:
  - 1. Concrete Paving Installation: Comply with installation requirements in Section 321313 "Concrete Paving." Mix, place, and finish concrete to conditions complying with detectable warning tile manufacturer's written requirements for satisfactory embedment of tile.
  - 2. Set each detectable warning tile accurately and firmly in place and completely seat tile back and embedment's in wet concrete by tamping or vibrating. If necessary, temporarily apply weight to tiles to ensure full contact with concrete.
  - 3. Set surface of tile flush with surrounding concrete and adjacent tiles, with variations between tiles and between concrete and tiles not exceeding plus or minus 1/8-inch (3 mm) from flush.
  - 4. Protect exposed surfaces of installed tiles from contact with wet concrete. Complete finishing of concrete paving surrounding tiles. Remove concrete from tile surfaces.
  - 5. Clean tiles using methods recommended in writing by manufacturer.

**3.4 CLEANING AND PROTECTION**

- A. Remove and replace tactile warning surfacing that is broken or damaged or does not comply with requirements in this Section. Remove in complete sections from joint to joint unless otherwise approved by Architect. Replace using tactile warning surfacing installation methods acceptable to Architect.
- B. Protect tactile warning surfacing from damage and maintain free of stains, discoloration, dirt, and other foreign material.

END OF SECTION 321726

# County of Mendocino Bower Park Restoration and Improvement Project

## SECTION 321816.13 - PLAYGROUND PROTECTIVE SURFACING

### 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. Organic loose-fill surfacing.

#### 1.3 DEFINITIONS

- A. Definitions in ASTM F2223 apply to the work of this Section.
- B. Critical Height: Standard measure of shock attenuation according to ASTM F2223; same as "critical fall height" in ASTM F1292. According to ASTM F1292, this approximates "the maximum fall height from which a life-threatening head injury would not be expected to occur."

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples for Verification: For each type of protective surfacing and exposed finish.
  - 1. Loose-Fill Surfacing: Minimum 1 quart.
  - 2. Drainage/Separation Geotextile: Minimum 12 by 12 inches.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and testing agency.
- B. Material Certificates: For each type of loose-fill surfacing.
- C. Field quality-control reports.
- D. Sample Warranty: For manufacturer's special warranty.

#### 1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For playground protective surfacing to include in maintenance manuals.

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### 1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Loose Fill: Amount equal to 1 percent of amount installed, but no fewer than 3 units

### 1.8 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

### 1.9 WARRANTY

- A. Special Warranty: Manufacturer and Installer agree to repair or replace components of protective surfacing that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Reduction in impact attenuation as measured by reduction of critical fall height.
    - b. Deterioration of protective surfacing and other materials beyond normal weathering.
  - 2. Warranty Period: 180 days from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Source Limitations: Obtain protective surfacing materials, including loose-fill accessories, from single source from single manufacturer.

### 2.2 PERFORMANCE REQUIREMENTS

- A. Play Area Standard: Shall comply with CBC 11B-1008.2.6 Ground Surfaces.
- B. Accessibility Standard: Minimum surfacing performance according to ASTM F1951.
- C. Impact Attenuation: Critical fall height tested according to ASTM F1292.

### 2.3 ORGANIC LOOSE-FILL SURFACING

- A. Engineered Wood Fiber: ASTM F2075; containing no bark, leaves, twigs, or foreign or toxic materials; tested for accessibility according to ASTM F1951.
  - 1. Critical Height: As indicated on Drawings.
  - 2. Uncompressed Material Depth: Not less than as required for critical height indicated.

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### 2.4 GEOSYNTHETIC ACCESSORIES

- A. Drainage/Separation Geotextile: Nonwoven, needle-punched geotextile, manufactured for drainage applications and made from polyolefins or polyesters; with the following minimum properties:
  - 1. Weight: 4 oz./sq. yd.; ASTM D5261.
  - 2. Water Flow Rate: 100 gpm/sq. ft. according to ASTM D4491.

### 2.5 GEOSYNTHETIC ACCESSORIES

- A. Drainage/Separation Geotextile: Nonwoven, needle-punched geotextile, manufactured for drainage applications and made from polyolefins or polyesters; with the following minimum properties:
  - 1. Weight: 4 oz./sq. yd.; ASTM D5261.
  - 2. Water Flow Rate: 100 gpm/sq. ft. according to ASTM D4491.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for subgrade elevations, slope, and drainage and for other conditions affecting performance of the Work.
  - 1. Verify that substrates are sound and without high spots, ridges, holes, and depressions.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Prepare substrates to receive surfacing products according to protective surfacing manufacturer's written instructions.

### 3.3 INSTALLATION OF GEOSYNTHETIC ACCESSORIES

- A. Install geosynthetic accessories before edging and according to playground surface system manufacturer's and geosynthetic manufacturer's written instructions and in a manner that cannot become a tripping hazard.
  - 1. Drainage/Separation Geotextile: Completely cover area beneath protective surfacing, overlapping geotextile sides and edges a minimum of 8 inches with overlapping loosely laid seams.

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### 3.4 INSTALLATION OF LOOSE-FILL SURFACING

- A. Apply components of loose-fill surfacing according to manufacturer's written instructions to produce a uniform surface.
- B. Loose Fill: Place loose-fill materials to required depth after installation of playground equipment support posts and foundations. Include manufacturer's recommended amount of additional material to offset mechanical compaction.
- C. Grading: Uniformly grade loose-fill to an even surface free from irregularities.
- D. Compaction: After initial grading, mechanically compact loose fill in two (2) lifts before finish grading.
- E. Finish Grading: Hand rake to a uniformly smooth finished surface and to required elevations.

### 3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests.
- B. Perform the following tests with the assistance of a factory-authorized service representative:
  - 1. Perform "Installed Surface Performance Test" according to ASTM F1292 for each protective surfacing type and thickness in each playground area.
  - 2. Perform installed-surface-performance tests at no less than one series of tests for each 500 sq. ft. of each type and thickness of in-place protective surfacing or part thereof.
- C. Playground protective surfacing will be considered defective if it does not pass tests.
- D. Prepare test reports.

END OF SECTION 32 1816.13

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## SECTION 323113 - CHAIN LINK FENCES AND GATES

### 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. Chain-link fences.
- 2. Swing gates.

- B. Related Requirements:

- 1. Section 033000 "Cast-in-Place Concrete" for cast-in-place concrete post footings.

#### 1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

- 1. Inspect and discuss electrical roughing-in, equipment bases, and other preparatory work specified elsewhere.
- 2. Review sequence of operation for each type of gate operator.
- 3. Review coordination of interlocked equipment specified in this Section and elsewhere.
- 4. Review required testing, inspecting, and certifying procedures.

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.

- 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for the following:
  - a. Fence and gate posts, rails, and fittings.
  - b. Chain-link fabric, reinforcements, and attachments.
  - c. Gates and hardware.

- B. Shop Drawings: For each type of fence and gate assembly.

- 1. Include plans, elevations, sections, details, and attachments to other work.
- 2. Include accessories, hardware, gate operation, and operational clearances.

- C. Samples for Initial Selection: For each type of factory-applied finish.

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- D. Samples for Verification: For each type of component with factory-applied finish, prepared on Samples of size indicated below:
  - 1. Polymer-Coated Components: In 6-inch lengths for components and on full-sized units for accessories.

### 1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For factory-authorized service representative.
- B. Product Certificates: For each type of chain-link fence and gate.
- C. Product Test Reports: For framework strength according to ASTM F1043, for tests performed by manufacturer and witnessed by a qualified testing agency.
- D. Field quality-control reports.
- E. Sample Warranty: For special warranty.

### 1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For gate operators to include in emergency, operation, and maintenance manuals.

### 1.7 QUALITY ASSURANCE

- A. Testing Agency Qualifications: For testing fence grounding; member company of NETA or an NRTL.
  - 1. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

### 1.8 FIELD CONDITIONS

- A. Field Measurements: Verify layout information for chain-link fences and gates shown on Drawings in relation to property survey and existing structures. Verify dimensions by field measurements.

### 1.9 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of chain-link fences and gates that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Failure to comply with performance requirements.
    - b. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
  - 2. Warranty Period: 15 years from date of Substantial Completion.

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## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Chain-link fence and gate frameworks shall withstand the design wind loads and stresses for fence height(s) and under exposure conditions indicated according to ASCE/SEI 7.
- B. Lightning Protection System: Maximum resistance-to-ground value of 25 ohms at each grounding location along fence under normal dry conditions.

### 2.2 CHAIN-LINK FENCE FABRIC

- A. General: Provide fabric in one-piece heights measured between top and bottom of outer edge of selvage knuckle or twist according to "CLFMI Product Manual" and requirements indicated below:
  - 1. Fabric Height: As indicated on Drawings.
  - 2. Steel Wire for Fabric: Wire diameter of 9 gauge.
    - a. Mesh Size: 2 inches.
    - b. Zinc-Coated Fabric: ASTM A392, Type II, Class 2, 2.0 oz./sq. ft. with zinc coating applied after weaving.
    - c. Coat selvage ends of metallic-coated fabric before the weaving process with manufacturer's standard clear protective coating.
  - 3. Selvage: Knuckled at both selvages.

### 2.3 FENCE FRAMEWORK

- A. Posts and Rails: ASTM F1043 for framework, including rails, braces, and line; terminal; and corner posts. Provide members with minimum dimensions and wall thickness according to ASTM F1043 or ASTM F1083 based on the following:
  - 1. Fence Height: As indicated on Drawings.
  - 2. Light-Industrial-Strength Material: Group IC-L, round steel pipe, electric-resistance-welded pipe.
    - a. Line Post: 2.5 inches in diameter.
    - b. End, Corner, and Pull Posts: 4.0 inches in diameter.
  - 3. Horizontal Framework Members: Intermediate, top and bottom rails according to ASTM F1043.
    - a. Top and Bottom Rail: 1.625 inches in diameter.
  - 4. Brace Rails: ASTM F1043.

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### 2.4 TENSION WIRE

- A. Metallic-Coated Steel Wire: 0.177-inch- diameter, marcelled tension wire according to ASTM A817 or ASTM A824, with the following metallic coating:
  - 1. Type II: Zinc coated (galvanized) by hot-dip process, with the following minimum coating weight:
    - a. Class 3: Not less than 0.8 oz./sq. ft. of uncoated wire surface.
    - b. Class 4: Not less than 1.2 oz./sq. ft. of uncoated wire surface.
    - c. Class 5: Not less than 2 oz./sq. ft. of uncoated wire surface.
    - d. Matching chain-link fabric coating weight.

### 2.5 SWING GATES

- A. General: ASTM F900 for gate posts and single and double swing gate types.
  - 1. Gate Leaf Width: As indicated.
  - 2. Framework Member Sizes and Strength: Based on gate fabric height as indicated.
- B. Pipe and Tubing:
  - 1. Zinc-Coated Steel: ASTM F1043 and ASTM F1083; protective coating and finish to match fence framework.
  - 2. Gate Posts: Round tubular steel.
  - 3. Gate Frames and Bracing: Round tubular steel.
- C. Frame Corner Construction: Welded or assembled with corner fittings.
- D. Hardware:
  - 1. Hinges: 360-degree inward and outward swing.
  - 2. Latch: Permitting operation from both sides of gate with provision for padlocking accessible from both sides of gate.
  - 3. Lock: Manufacturer's standard.
  - 4. Padlock and Chain: Owner Supplied.
  - 5. Closer: Manufacturer's standard

### 2.6 FITTINGS

- A. Provide fittings according to ASTM F626.
- B. Post Caps: Provide for each post.
  - 1. Provide line post caps with loop to receive tension wire or top rail.
- C. Rail and Brace Ends: For each gate, corner, pull, and end post.
- D. Rail Fittings: Provide the following:
  - 1. Top Rail Sleeves: Pressed-steel or round-steel tubing not less than 6 inches long.
  - 2. Rail Clamps: Line and corner boulevard clamps for connecting intermediate and bottom rails to posts.

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- E. Tension and Brace Bands: Pressed steel.
- F. Tension Bars: Steel, length not less than 2 inches (50 mm) shorter than full height of chain-link fabric. Provide one bar for each gate and end post, and two for each corner and pull post, unless fabric is integrally woven into post.
- G. Truss Rod Assemblies: Steel, hot-dip galvanized after threading rod and turnbuckle or other means of adjustment.
- H. Tie Wires, Clips, and Fasteners: According to ASTM F626.
  - 1. Standard Round Wire Ties: For attaching chain-link fabric to posts, rails, and frames, according to the following:
    - a. Hot-Dip Galvanized Steel: 0.148-inch diameter wire; galvanized coating thickness matching coating thickness of chain-link fence fabric.
- I. Finish:
  - 1. Metallic Coating for Pressed Steel or Cast Iron: Not less than 1.2 oz./sq. ft. of zinc.
    - a. Polymer coating over metallic coating.

### 2.7 GROUT AND ANCHORING CEMENT

- A. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M. Provide grout, recommended in writing by manufacturer, for exterior applications.
- B. Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound. Provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating, and that is recommended in writing by manufacturer for exterior applications.

### 2.8 GROUNDING MATERIALS

- A. Comply with requirements in Section 260526 "Grounding and Bonding for Electrical Systems."
- B. Connectors and Grounding Rods: Listed and labeled for complying with UL 467.
  - 1. Connectors for Below-Grade Use: Exothermic welded type.
  - 2. Grounding Rods: Copper-clad steel, 5/8 by 96 inches.

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## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for a certified survey of property lines and legal boundaries, site clearing, earthwork, pavement work, and other conditions affecting performance of the Work.
  - 1. Do not begin installation before final grading is completed unless otherwise permitted by Architect.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Stake locations of fence lines, gates, and terminal posts. Do not exceed intervals of 500 feet or line of sight between stakes. Indicate locations of utilities, lawn sprinkler system, underground structures, benchmarks, and property monuments.

### 3.3 CHAIN-LINK FENCE INSTALLATION

- A. Install chain-link fencing according to ASTM F567 and more stringent requirements specified.
  - 1. Install fencing on established boundary lines inside property line.
- B. Post Excavation: Drill or hand-excavate holes for posts to diameters and spacings indicated, in firm, undisturbed soil.
- C. Post Setting: Set posts in concrete at indicated spacing into firm, undisturbed soil.
  - 1. Verify that posts are set plumb, aligned, and at correct height and spacing, and hold in position during setting with concrete or mechanical devices.
  - 2. Concrete Fill: Place concrete around posts to dimensions indicated and vibrate or tamp for consolidation. Protect aboveground portion of posts from concrete splatter.
    - a. Exposed Concrete: Extend 2 inches above grade; shape and smooth to shed water.
    - b. Concealed Concrete: Place top of concrete as indicated on Drawings to allow covering with surface material.
    - c. Posts Set into Sleeves in Concrete: Use steel pipe sleeves preset and anchored into concrete for installing posts. After posts are inserted into sleeves, fill annular space between post and sleeve with nonshrink, nonmetallic grout or anchoring cement, mixed and placed according to anchoring material manufacturer's written instructions. Finish anchorage joint to slope away from post to drain water.
    - d. Posts Set into Holes in Concrete: Form or core drill holes not less than 5 inches deep and 3/4 inch larger than OD of post. Clean holes of loose material, insert posts, and fill annular space between post and concrete with nonshrink, nonmetallic grout or anchoring cement, mixed and placed according to anchoring material manufacturer's written instructions. Finish anchorage joint to slope away from post to drain water.

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- D. Terminal Posts: Install terminal end, corner, and gate posts according to ASTM F567 and terminal pull posts at changes in horizontal or vertical alignment of 15 degrees or more. For runs exceeding 500 feet, space pull posts an equal distance between corner or end posts.
- E. Line Posts: Space line posts uniformly at 10 feet o.c.
- F. Post Bracing and Intermediate Rails: Install according to ASTM F567, maintaining plumb position and alignment of fence posts. Diagonally brace terminal posts to adjacent line posts with truss rods and turnbuckles. Install braces at end and gate posts and at both sides of corner and pull posts.
  - 1. Locate horizontal braces at midheight of fabric 72 inches or higher, on fences with top rail, and at two-third fabric height on fences without top rail. Install so posts are plumb when diagonal rod is under proper tension.
- G. Tension Wire: Install according to ASTM F567, maintaining plumb position and alignment of fence posts. Pull wire taut, without sags. Fasten fabric to tension wire with 0.120-inch- diameter hog rings of same material and finish as fabric wire, spaced a maximum of 24 inches o.c. Install tension wire in locations indicated before stretching fabric. Provide horizontal tension wire at the following locations:
  - 1. Extended along top and bottom of fence fabric. Install top tension wire through post cap loops. Install bottom tension wire within 6 inches of bottom of fabric and tie to each post with not less than same diameter and type of wire.
- H. Top Rail: Install according to ASTM F567, maintaining plumb position and alignment of fence posts. Run rail continuously through line post caps, bending to radius for curved runs and terminating into rail end attached to posts or post caps fabricated to receive rail at terminal posts. Provide expansion couplings as recommended in writing by fencing manufacturer.
- I. Intermediate and Bottom Rails: Secure to posts with fittings.
- J. Chain-Link Fabric: Apply fabric to outside of enclosing framework. Leave 2-inch bottom clearance between finish grade or surface and bottom selvage unless otherwise indicated. Pull fabric taut and tie to posts, rails, and tension wires. Anchor to framework so fabric remains under tension after pulling force is released.
- K. Tension or Stretcher Bars: Thread through fabric and secure to end, corner, pull, and gate posts, with tension bands spaced not more than 15 inches o.c.
- L. Tie Wires: Use wire of proper length to firmly secure fabric to line posts and rails. Attach wire at one end to chain-link fabric, wrap wire around post a minimum of 180 degrees, and attach other end to chain-link fabric according to ASTM F626. Bend ends of wire to minimize hazard to individuals and clothing.
  - 1. Maximum Spacing: Tie fabric to line posts at 12 inches o.c. and to braces at 24 inches o.c.
- M. Fasteners: Install nuts for tension bands and carriage bolts on the side of fence opposite the fabric side. Peen ends of bolts or score threads to prevent removal of nuts.

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### 3.4 GATE INSTALLATION

- A. Install gates according to manufacturer's written instructions, level, plumb, and secure for full opening without interference. Attach fabric as for fencing. Attach hardware using tamper-resistant or concealed means. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation.

### 3.5 GROUNDING AND BONDING

- A. Fence and Gate Grounding:
  - 1. Ground for fence and fence posts shall be a separate system from ground for gate and gate posts.
  - 2. Install ground rods and connections at maximum intervals of 1500 feet.
  - 3. Fences within 100 Feet of Buildings, Structures, Walkways, and Roadways: Ground at maximum intervals of 750 feet.
  - 4. Ground fence on each side of gates and other fence openings.
    - a. Bond metal gates to gate posts.
    - b. Bond across openings, with and without gates, except openings indicated as intentional fence discontinuities. Use No. 2 AWG wire and bury it at least 18 inches below finished grade.
- B. Protection at Crossings of Overhead Electrical Power Lines: Ground fence at location of crossing and at a ground rod located a maximum distance of 150 feet on each side of crossing.
- C. Grounding Method: At each grounding location, drive a grounding rod vertically until the top is 6 inches below finished grade. Connect rod to fence with No. 6 AWG conductor. Connect conductor to each fence component at grounding location.
  - 1. Make grounding connections to each barbed wire strand with wire-to-wire connectors designed for this purpose.
  - 2. Make grounding connections to each barbed tape coil with connectors designed for this purpose.
- D. Connections:
  - 1. Make connections with clean, bare metal at points of contact.
  - 2. Make aluminum-to-steel connections with stainless-steel separators and mechanical clamps.
  - 3. Make aluminum-to-galvanized-steel connections with tin-plated copper jumpers and mechanical clamps.
  - 4. Make above-grade ground connections with mechanical fasteners.
  - 5. Make below-grade ground connections with exothermic welds.
  - 6. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.
- E. Bonding to Lightning Protection System: Ground fence and bond fence grounding conductor to lightning protection down conductor or lightning protection grounding conductor according to NFPA 780.

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### 3.6 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests.
- B. Prepare test reports.

### 3.7 ADJUSTING

- A. Gates: Adjust gates to operate smoothly, easily, and quietly, free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.
- B. Lubricate hardware and other moving parts.

### 3.8 DEMONSTRATION

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

END OF SECTION 323113

# County of Mendocino Bower Park Restoration and Improvement Project

## SECTION 323300 - SITE FURNISHINGS

### 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. Drinking Fountain.
2. Benches.
3. Trash receptacles.
4. Bicycle racks.
5. Picnic tables.
6. Barbecue equipment.
7. Sports equipment.
8. Bollards.

- B. Related Requirements:

1. Section 033000 "Cast-in-Place Concrete" for installing pipe sleeves cast, installing anchor bolts cast and formed voids in concrete footings.
2. Section 312000 "Earth Moving" for excavation for installing concrete footings.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples for Verification: For each type of exposed finish, not less than 6-inch-long linear components and 4-inch- square sheet components.
- C. Product Schedule: For site furnishings, See Sheet L1.0 to L1.3.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For site furnishings manufactured with preservative-treated wood.
  1. Indicate type of preservative used and net amount of preservative retained.

#### 1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For site furnishings to be included in maintenance manuals.

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## PART 2 - PRODUCTS

### 2.1 DRINKING FOUNTAIN

- A. Most Dependable Fountains - 10135SM or approved equal.
  - 1. Finish/Color: Factory powder-coated 'Blue' color.
  - 2. Installation Method: Internal surface mount.
  - 3. Pedestal to be one piece weld construction with 3/16" wall thickness.
  - 4. Bowl to be 18-gauge electro-polished stainless steel.
  - 5. Push bar to be 304 stainless-steel.
  - 6. Water supply line to be braid-reinforced PVC, supplied with a stainless-steel strainer
  - 7. Water filter included.

### 2.2 BENCH SEATING

- A. Belson Boulevard 5ft. backless wood bench #BB-5-W or approved equal.
  - 1. Finish/Color: See Drawings.
  - 2. Wood slats to be white oak with UV-resistant and sealing clear low-gloss finish.
  - 3. Frame to be 2" x 2" sq. tube steel with .095 wall thickness and powder-coated finish.
  - 4. Installation Method: Secured to sidewalk or concrete footing.
- B. Belson Capitol style wood bench #CGLF-80-W or approved equal.
  - 1. Finish/Color: See Drawings.
  - 2. Wood slats to be white oak with UV-resistant and sealing clear low-gloss finish.
  - 3. Frame to be 1-1/2" dia. tube steel with .095 wall thickness and powder-coated finish.
  - 4. Installation Method: Secured to sidewalk or concrete footing.

### 2.3 TRASH RECEPTACLES (TO BE PAIRED WITH TRASH & RECYCLING RECEPTACLES)

- A. Belson Township trash 32-gallon trash receptacle #TTR-DT-W with dome top lid or approved equal.
  - 1. Finish/Color: See Drawings.
  - 2. Wood slats to be white oak with UV-resistant and sealing clear low-gloss finish.
  - 3. Frame to be powder-coated aluminum.
  - 4. Installation Method: Surface mount.

### 2.4 PICNIC TABLES

- A. Belson Park Master picnic table #PMB-6WA or approved equal.
  - 1. Finish/Color: See Drawings.
  - 2. Frame: legs to be fully welded 2-3/8" O.D. 13-ga. galvanized steel tubing, with 1-1/4" O.D. 14-ga. brace tubing, powder-coat finish.
  - 3. Top angles: 1/10" thick (12 ga.) galvanized steel plate.
  - 4. Seat brackets: 1/10" thick (12 ga.) galvanized steel plate.

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5. Wood planks to be pressure treated southern yellow pine or redwood, treated with copper-based preservative.
6. All hardware to be zinc plated.
7. Installation Method: Surface mount.

### B. Belson Park Master universal access ADA picnic table #PMB-HWA or approved equal.

1. Finish/Color: See Drawings.
2. Frame: legs to be fully welded 2-3/8" O.D. 13-ga. galvanized steel tubing, with 1-1/4" O.D. 14-ga. brace tubing, powder-coat finish.
3. Top angles: 1/10" thick (12 ga.) galvanized steel plate.
4. Seat brackets: 1/10" thick (12 ga.) galvanized steel plate.
5. Wood planks to be pressure treated southern yellow pine or redwood, treated with copper-based preservative.
6. All hardware to be zinc plated.
7. Installation Method: Surface mount.

## 2.5 BARBECUE EQUIPMENT

### A. Pilot Rock – Group barbecue grill #Q3-2460 B16 or approved equal.

1. Color/finish: High heat black enamel.
2. Installation Method: Direct embedment mount.
3. Hot-dip galvanized finish shall conform to ASTM A123 specification, with an average coating of 2.0 oz. per square foot.
4. Firebox to be constructed of 3/16" rib reinforced steel plate.
5. Cooking grate to be 5/8" perimeter bars with 1/2" diameter grate bars, welded on both sides, with supporting steel brace along the front edge of the grate.
6. Base post to be 6" outside diameter steel pipe.

### B. Pilot Rock – Hot coal bin #HCB/B-1 or approved equal.

1. Finish/Color: High heat black enamel.
2. Installation method: Surface mount.
3. Heavy-duty 14-gauge die-formed steel panels per ASTM A569 and ASTM A36 standards.
4. Grate shall be constructed with min. 1/2 " diameter steel rods per ASTM A569.
5. Finish to be heat-resistant, scratch-resistant and non-toxic silicone-based enamel paint. Paint to conform to ASTM D3359 adhesion standard, ASTM D523 gloss standards, and ASTM D2485 in resistance to high temperatures.
6. Liner to be hot-dip galvanized steel can.

## 2.6 SPORTS EQUIPMENT

### A. Baseball equipment.

1. LA Steelcraft – Backstop #LA-1244T or approved equal.
  - a. All pipe and fittings galvanized steel. All posts to be capped with zinc-plated end caps.
  - b. Posts and rails pipe sizes (outside diameter):

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- 1) Vertical posts: 2-7/8"
      - 2) Horizontal rails: 1-5/8"
      - 3) Top hood rails: 1-7/8"
      - 4) Hood angle posts: 2-3/8"
    - c. Installation method: Per Drawings.
  2. LA Steelcraft – Major league baseball home plate with anchor #LA-310-SHP or approved equal.
    - a. Hard molded vulcanized rubber with black beveled edges, UV-resistant and weatherproof, with solid wood inner core.
    - b. Installation method: Per Manufacturer's installation guide.
  3. LA Steelcraft – Plugs for ground anchors #LA-230-SP or approved equal.
    - a. Molded plastic 1" plugs with domed caps.
    - b. Installation method: Per Manufacturer's installation guide.
  4. LA Steelcraft – Major league baseball set of 3 bases #LA-175-MLB or approved equal.
    - a. Heavy gauge UV-resistant and weatherproof polyurethane or PVC rubber cover with high-density polyurethane foam interior and all welded stainless steel stanchion pan. Rubber surface with texture added for grip and traction.
    - b. Installation method: Per Manufacturer's installation guide.
  5. LA Steelcraft – Major league baseball 4-way pitching rubber #LA-450-C1 or approved equal.
    - a. Dense vulcanized rubber UV-resistant and weatherproof, with solid wood or composite inner core. Rubber surface with texture added for grip and traction.
    - b. Installation method: Per Manufacturer's installation guide.
- B. Tennis/Pickleball equipment.
1. LA Steelcraft Tennis Assembly #LA-CTR-3 Post and #LA-53LS Net or approved equal.
    - a. Post to be two (2) 3" O.D. round steel tubing 58" long posts with cap. Each post to be equipped with steel, vinyl coated lacing rods for net lacing. Posts to be coated inside and out with a tough backed-on vinyl finish. Net tightener to be internal, heavy duty, no-coil self-locking steel worm gear mechanism completely enclosed within the post and concealed by the cap. Post cap to be heavy duty cast aluminum finished with same vinyl coating as posts. Handle to be removable, 4-1/2" long brass with 7/16" square shaft, secured with a stainless-steel screw. Center tie-down anchor to be 1-1/2" O.D. tube x 8" long with 3/16" welded cross pin. The anchor to be set in concrete, flush with court.
    - b. Tennis net to be 42' long x 42" high, heavy duty braided black poly cord with a breaking strength more than 200 lbs. and a mesh size of 1-3/4". Top binding to be heavy 42 oz. white Naugahyde. End and bottom to be 18 oz. vinyl-coated nylon, Dowels to be included. Top cable to be coated 5/32" diameter and 47' long.
    - c. Installation method: Direct embedment mount.

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2. First Team – Sentry Tennis/Pickleball post system #A60-648 or approved equal.
  - a. Posts to be two (2) Sch.40 Aluminum posts 3-1/2" O.D., min. 1/4" thickness, with 3.6" inside dia. 36" long PVC sleeves to fit. Posts capped with 2" zinc-plated pully for net cable. Adjustable post collar for net height adjustment to 36" and 42". Cable vinyl-coated, post to be powder-coated.
  - b. Pickleball/Tennis to be 42" long x 21'6 high" heavy duty black polypropylene 3-mm woven with 32oz. headband with vinyl side and bottom tapes.
  - c. Installation method: Direct embedment mount.

### C. Basketball equipment.

1. LA Steelcraft – Basketball goal assembly #LA-12C34 or approved equal.
  - a. Post to be 3-1/2" O.D. galvanized steel, with diagonal 1" O.D. galvanized steel braces mounted between post and backboard. All welds to be ground smooth and treated with cold-galvanizing compound.
  - b. Installation method: Per Drawings.
2. LA Steelcraft – Basketball backboard #LA-11
  - a. One-piece cast aluminum alloy min. 3/16" thick with perimeter flange and reinforcing ribs. Edges smooth and rounded. Powder-coated semi-gloss or gloss finish.
  - b. Installation method: Per Manufacturer's installation guide.

## 2.7 BOLLARDS

- A. Post Guard – Removable bollard #RMB436SS RMB4x12 or approved equal.
  1. 4-1/2" O.D. #304 Schedule 40 stainless steel bollard, with dome top and embedment sleeve with hinged lid.
  2. Installation method: Direct embedment mount.

## 2.8 MATERIALS

- A. Aluminum: Alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated; free of surface blemishes and complying with the following:
  1. Rolled or Cold-Finished Bars, Rods, and Wire: ASTM B211 (ASTM B211M).
  2. Extruded Bars, Rods, Wire, Profiles, and Tubes: ASTM B221 (ASTM B221M).
  3. Structural Pipe and Tube: ASTM B429/B429M.
  4. Sheet and Plate: ASTM B209 (ASTM B209M).
  5. Castings: ASTM B26/B26M.
- B. Steel and Iron: Free of surface blemishes and complying with the following:
  1. Plates, Shapes, and Bars: ASTM A36/A36M.

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2. Steel Pipe: Standard-weight steel pipe complying with ASTM A53/A53M, or electric-resistance-welded pipe complying with ASTM A135/A135M.
  3. Tubing: Cold-formed steel tubing complying with ASTM A500/A500M.
  4. Mechanical Tubing: Cold-rolled, electric-resistance-welded carbon or alloy steel tubing complying with ASTM A513/A513M, or steel tubing fabricated from steel complying with ASTM A1011/A1011M and complying with dimensional tolerances in ASTM A500/A500M; zinc coated internally and externally.
  5. Sheet: Commercial steel sheet complying with ASTM A1011/A1011M.
  6. Perforated Metal: From steel sheet not less than 0.120-inch nominal thickness; manufacturer's standard perforation pattern.
  7. Expanded Metal: Carbon-steel sheets deburred after expansion, and complying with ASTM F1267.
  8. Malleable-Iron Castings: ASTM A47/A47M, grade as recommended by fabricator for type of use intended.
  9. Gray-Iron Castings: ASTM A48/A48M, Class 200.
- C. Stainless Steel: Free of surface blemishes and complying with the following:
1. Sheet, Strip, Plate, and Flat Bars: ASTM A240/A240M or ASTM A666.
  2. Pipe: Schedule 40 steel pipe complying with ASTM A312/A312M.
  3. Tubing: ASTM A554.
- D. Wood: Surfaced smooth on four sides with eased edges; kiln dried, free of knots, solid stock of species indicated.
- E. Fiberglass: Multiple laminations of glass-fiber-reinforced polyester resin with UV-light stable, colorfast, nonfading, weather- and stain-resistant, colored polyester gel coat, and with manufacturer's standard finish.
- F. Plastic: Color impregnated, color and UV-light stabilized, and mold resistant.
- G. Anchors, Fasteners, Fittings, and Hardware: City approved anchors
- H. Nonshrink, Nonmetallic Grout: Premixed, factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M; recommended in writing by manufacturer, for exterior applications.
- I. Erosion-Resistant Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with potable water at Project site to create pourable anchoring, patching, and grouting compound; resistant to erosion from water exposure without needing protection by a sealer or waterproof coating; recommended in writing by manufacturer, for exterior applications.
- J. Galvanizing: Where indicated for steel and iron components, provide the following protective zinc coating applied to components after fabrication:
1. Zinc-Coated Tubing: External, zinc with organic overcoat, consisting of a minimum of 0.9 oz./sq. ft. of zinc after welding, a chromate conversion coating, and a clear, polymer film. Internal, same as external or consisting of 81 percent zinc pigmented coating, not less than 0.3 mil thick.
  2. Hot-Dip Galvanizing: According to ASTM A123/A123M, ASTM A153/A153M, or ASTM A924/A924M.

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### 2.9 WOOD-PRESERVATIVE-TREATED MATERIALS

- A. Preservative Treatment: Pressure-treat wood according to AWPA U1, Use Category UC3b, and the following:
  - 1. Use preservative chemicals acceptable to authorities having jurisdiction and containing no arsenic or chromium. Use chemical formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants to distinguish treated materials from untreated materials.
  - 2. Kiln-dry lumber and plywood after treatment to a maximum moisture content, respectively, of 19 and 15 percent. Do not use materials that are warped or do not comply with requirements for untreated materials.

### 2.10 FABRICATION

- A. Metal Components: Form to required shapes and sizes with true, consistent curves, lines, and angles. Separate metals from dissimilar materials to prevent electrolytic action.
- B. Welded Connections: Weld connections continuously. Weld solid members with full-length, full-penetration welds and hollow members with full-circumference welds. At exposed connections, finish surfaces smooth and blended, so no roughness or unevenness shows after finishing and welded surface matches contours of adjoining surfaces.
- C. Pipes and Tubes: Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain cylindrical cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of handrail and railing components.
- D. Preservative-Treated Wood Components: Complete fabrication of treated items before treatment if possible. If cut after treatment, apply field treatment complying with AWPA M4 to cut surfaces.
- E. Exposed Surfaces: Polished, sanded, or otherwise finished; all surfaces smooth, free of burrs, barbs, splinters, and sharpness; all edges and ends rolled, rounded, or capped.
- F. Factory Assembly: Factory assemble components to greatest extent possible to minimize field assembly. Clearly mark units for assembly in the field.

### 2.11 GENERAL FINISH REQUIREMENTS

- A. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

### 2.12 ALUMINUM FINISHES

- A. Powder-Coat Finish: Manufacturer's standard polyester powder-coat finish complying with finish manufacturer's written instructions for surface preparation, including pretreatment, application, baking, and minimum dry film thickness.

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### 2.13 STEEL AND GALVANIZED-STEEL FINISHES

- A. Powder-Coat Finish: Manufacturer's standard polyester, powder-coat finish complying with finish manufacturer's written instructions for surface preparation, including pretreatment, application, baking, and minimum dry film thickness.
- B. PVC Finish: Manufacturer's standard, UV-light stabilized, mold-resistant, slip-resistant, matte-textured, dipped or sprayed-on, PVC-plastisol finish, with flame retardant added; complying with coating manufacturer's written instructions for pretreatment, application, and minimum dry film thickness.

### 2.14 IRON FINISHES

- A. Powder-Coat Finish: Manufacturer's standard polyester powder-coat finish complying with finish manufacturer's written instructions for surface preparation, including pretreatment, application, baking, and minimum dry film thickness.

### 2.15 STAINLESS STEEL FINISHES

- A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
- B. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.
  - 1. Run directional finishes with long dimension of each piece.
  - 2. Directional Satin Finish: ASTM A480/A480M, No 4.
  - 3. Dull Satin Finish: ASTM A480/A480M, No. 6.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for correct and level finished grade, mounting surfaces, installation tolerances, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. Comply with manufacturer's written installation instructions unless more stringent requirements are indicated. Complete field assembly of site furnishings where required.
- B. Unless otherwise indicated, install site furnishings after landscaping and paving have been completed.
- C. Install site furnishings level, plumb, true, and securely anchored at locations indicated on Drawings.

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- D. Post Setting: Set cast-in support posts in concrete footing with smooth top, shaped to shed water. Protect portion of posts above footing from concrete splatter. Verify that posts are set plumb or at correct angle and are aligned and at correct height and spacing. Hold posts in position during placement and finishing operations until concrete is sufficiently cured.
- E. Posts Set into Voids in Concrete: Form or core-drill holes for installing posts in concrete to depth recommended in writing by manufacturer of site furnishings and 3/4 inch larger than OD of post. Clean holes of loose material, insert posts, and fill annular space between post and concrete with nonshrink, nonmetallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions, with top smoothed and shaped to shed water.
- F. Pipe Sleeves: Use steel pipe sleeves preset and anchored into concrete for installing posts. After posts have been inserted into sleeves, fill annular space between post and sleeve with nonshrink, nonmetallic grout or [anchoring cement], mixed and placed to comply with anchoring material manufacturer's written instructions, with top smoothed and shaped to shed water.

END OF SECTION 323300

SECTION 328400 – PLANTING IRRIGATION

PART 1 - PLANTING IRRIGATION

1.1 SUMMARY

A. Section Includes:

1. Pipes, tubes, and fittings.
2. Manual valves.
3. Automatic control valves.
4. Transition fittings.
5. Miscellaneous piping specialties.
6. Quick couplers.
7. Drip irrigation specialties.
8. Controllers.
9. Boxes for automatic control valves.

1.2 DEFINITIONS

- A. Circuit Piping: Downstream from control valves to sprinklers, specialties, and drain valves. Piping is under pressure during flow.
- B. Drain Piping: Downstream from circuit-piping drain valves. Piping is not under pressure.
- C. ET Controllers: EvapoTranspiration Controllers. Irrigation controllers, which use some method of weather-based adjustment of irrigation. These adjusting methods include use of historical monthly averages of ET, broadcasting of ET measurements, or use of on-site sensors to track ET.
- D. Main Piping: Downstream from point of connection to water distribution piping to, and including, control valves. Piping is under water-distribution-system pressure.
- E. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control, signaling power-limited circuits.

1.3 ACTION SUBMITTALS

A. Product Data:

1. Pipes, tubes, and fittings.
2. Manual valves.
3. Automatic control valves.
4. Transition fittings.
5. Miscellaneous piping specialties.
6. Quick couplers.
7. Drip irrigation specialties.
8. Controllers.
9. Boxes for automatic control valves.
10. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

- B. Wiring Diagrams: For power, signal, and control wiring.

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### 1.4 INFORMATIONAL SUBMITTALS

- A. Zoning Chart: Indicate each irrigation zone and its control valve.
- B. Controller Timing Schedule: Indicate timing settings for each automatic controller zone.
- C. Field Quality-Control Submittals:
- D. Field quality-control reports.
- E. Qualification Statements: For Installer.
- F. Delegated design engineer qualifications.

### 1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For sprinklers, controllers and automatic control valves to include in operation and maintenance manuals.

### 1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Extra Stock Material: Furnish extra materials to Owner that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Drip-Tube System Tubing: Equal to 5 percent of total length installed for each type and size indicated, but not less than 100 ft.
- B. Schedule of maintenance material items.

### 1.7 QUALITY ASSURANCE

- A. Qualifications:
  - 1. Installers: Entity that employs a Certified Irrigation Designer - Landscape qualified by the Irrigation Association.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

### 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver piping with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe-end damage and entrance of dirt, debris, and moisture.
- B. Store plastic piping protected from direct sunlight. Support piping to prevent sagging and bending.

### 1.9 FIELD CONDITIONS

- A. Interruption of Existing Water Service: Do not interrupt water service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water service according to requirements indicated:
  - 1. Notify Owner no fewer than two days in advance of proposed interruption of water service.
  - 2. Do not proceed with interruption of water service without Owner's written permission.

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## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Irrigation Zone Control: Automatic operation with controller and automatic control valves.
- B. Location of Sprinklers and Specialties: Design location is approximate. Make minor adjustments necessary to avoid plantings and obstructions, such as signs and light standards. Maintain 100 percent irrigation coverage of areas indicated.
- C. Minimum Working Pressures: The following are minimum pressure requirements for piping, valves, and specialties unless otherwise indicated:
  - 1. Irrigation Main Piping: 200 psig.
  - 2. Circuit Piping: 150 psig.

### 2.2 PIPES, TUBES, AND FITTINGS

- A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, and fitting materials, and for joining methods for specific services, service locations, and pipe sizes.
- B. PVC Pipe: ASTM D1785, PVC 1120 compound, Schedules 40 and 80.
  - 1. PVC Socket Fittings: ASTM D2466, Schedules 40 and 80.
  - 2. PVC Threaded Fittings: ASTM D2464, Schedule 80.
  - 3. PVC Socket Unions: Construction similar to that of MSS SP-107, except both headpiece and tailpiece shall be PVC with socket ends.
- C. PVC Pipe, Pressure Rated: ASTM D2241, PVC 1120 compound, SDR 21 and SDR 26.
  - 1. PVC Socket Fittings: ASTM D2467, Schedule 80.
  - 2. PVC Socket Unions: Construction similar to that of MSS SP-107, except both headpiece and tailpiece shall be PVC with socket or threaded ends.

### 2.3 PIPING JOINING MATERIALS

- A. Solvent Cements for Joining PVC Piping: ASTM D2564. Include primer in accordance with ASTM F656.
- B. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer unless otherwise indicated.

### 2.4 MANUAL VALVES

- A. Brass Ball Valves:
  - 1. Description:
    - a. Standard: MSS SP-110.
    - b. SWP Rating: 150 psig.
    - c. CWP Rating: 600 psig.
    - d. Body Design: Two piece.
    - e. Body Material: Forged brass.
    - f. Ends: Threaded or solder joint if indicated.
    - g. Seats: PTFE or TFE.

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- h. Stem: Brass.
- i. Ball: Chrome-plated brass.
- j. Port: Full or regular but not reduced.

### B. Bronze Gate Valves:

#### 1. Description:

- a. Standard: MSS SP-80, Type 2.
- b. Class: 125.
- c. CWP Rating: 200 psig.
- d. Body Material: ASTM B62 bronze with integral seat and screw-in bonnet.
- e. Ends: Threaded or solder joint.
- f. Stem: Bronze, nonrising.
- g. Disc: Solid wedge; bronze.
- h. Packing: Asbestos free.
- i. Handwheel: Malleable iron, bronze, or aluminum.

## 2.5 PRESSURE-REDUCING VALVES

### A. Water Regulators:

#### 1. Description:

- a. Standard: ASSE 1003.
- b. Body Material: Bronze for NPS 2 and smaller; cast iron with interior lining complying with AWWA C550 or that is FDA approved for NPS 2-1/2 and NPS 3.
- c. Pressure Rating: Initial pressure of 150 psig.
- d. End Connections: Threaded for NPS 2 and smaller; flanged for NPS 2-1/2 and NPS 3.

## 2.6 AUTOMATIC CONTROL VALVES

### A. Brass, Automatic Control Valves:

- 1. Description: Cast-bronze body, normally closed, diaphragm type with manual-flow adjustment, and operated by 24 V ac solenoid.

### B. Plastic, Automatic Control Valves:

- 1. Description: Molded-plastic body, normally closed, diaphragm type with manual-flow adjustment, and operated by 24 V ac solenoid.

## 2.7 AUTOMATIC DRAIN VALVES

- A. Description: Spring-loaded-ball type of corrosion-resistant construction and designed to open for drainage if line pressure drops below 2-1/2 to 3 psig.

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### 2.8 TRANSITION FITTINGS

- A. General Requirements: Same size as, and with pressure rating at least equal to and with ends compatible with, piping to be joined.
- B. Transition Couplings:
  - 1. Description: AWWA C219, metal sleeve-type coupling for underground pressure piping.
- C. Plastic-to-Metal Transition Fittings:
  - 1. Description: PVC one-piece fitting with manufacturer's Schedule 80 equivalent dimensions; one end with threaded brass insert and one solvent-cement-socket or threaded end.
- D. Plastic-to-Metal Transition Unions:
  - 1. Description: MSS SP-107, PVC four-part union. Include one brass or stainless-steel threaded end, one solvent-cement-joint or threaded plastic end, rubber O-ring, and union nut.

### 2.9 MISCELLANEOUS PIPING SPECIALTIES

- A. Water Hammer Arresters: ASSE 1010 or PDI WH 201, with bellows or piston-type pressurized cushioning chamber and in sizes complying with PDI WH 201, Sizes A to F.

### 2.10 QUICK COUPLERS

- A. Description: Factory-fabricated, bronze or brass, two-piece assembly. Include coupler water-seal valve; removable upper body with spring-loaded or weighted, rubber-covered cap; hose swivel with ASME B1.20.7, 3/4-11.5NH threads for garden hose on outlet; and operating key.
  - 1. Locking-Top Option: Vandal-resistant locking feature. Include two matching key(s).

### 2.11 DRIP IRRIGATION SPECIALTIES

- A. Drip Tubes with Direct-Attached Emitters:
  - 1. Tubing: Flexible PE or PVC with plugged end.
  - 2. Emitters: Devices to deliver water at approximately 20 psig.
    - a. Body Material: PE or vinyl, with flow control.
    - b. Mounting: Inserted into tubing at set intervals.
- B. Application Pressure Regulators: Brass housing, NPS 3/4, with corrosion-resistant internal parts; capable of controlling outlet pressure to approximately 20 psig.
- C. Filter Units: Brass or plastic housing, with corrosion-resistant internal parts; of size and capacity required for devices downstream from unit.
- D. Air Relief Valves: Brass or plastic housing, with corrosion-resistant internal parts.
- E. Vacuum Relief Valves: Brass or plastic housing, with corrosion-resistant internal parts.

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### 2.12 CONTROLLERS

#### A. Description:

1. Controller Stations for Automatic Control Valves: Each station is variable from approximately 5 to 60 minutes. Include switch for manual or automatic operation of each station.
2. Exterior Control Enclosures: NEMA 250, Type 4, weatherproof, with locking cover and two matching keys; include provision for grounding.
  - a. Body Material: Stainless steel sheet metal.
  - b. Mounting: Surface type for wall.
3. Control Transformer: 24 V secondary, with primary fuse.
4. Timing Device: Adjustable, 24-hour, 14-day clock, with automatic operations to skip operation any day in timer period, to operate every other day, or to operate two or more times daily.
  - a. Manual or Semiautomatic Operation: Allows this mode without disturbing preset automatic operation.
  - b. Nickel-Cadmium Battery and Trickle Charger: Automatically powers timing device during power outages.
  - c. Surge Protection: Metal-oxide-varistor type on each station and primary power.
5. Moisture Sensor: Adjustable from one to seven days, to shut off water flow during rain.
6. Smart Controllers: Use ET, tested in accordance with IA SWAT Climatological Based Controllers 8th Draft Testing Protocol and compliant with ASHRAE 189.1.
7. Wiring: UL 493, Type UF multiconductor, with solid-copper conductors; insulated cable; suitable for direct burial.
  - a. Feeder-Circuit Cables: No. 12 AWG minimum, between building and controllers.
  - b. Low-Voltage, Branch-Circuit Cables: No. 14 AWG minimum, between controllers and automatic control valves; color-coded different from feeder-circuit-cable jacket color; with jackets of different colors for multiple-cable installation in same trench.
  - c. Splicing Materials: Manufacturer's packaged kit consisting of insulating, spring-type connector or crimped joint and epoxy resin moisture seal; suitable for direct burial.

### 2.13 BOXES FOR AUTOMATIC CONTROL VALVES

#### A. Plastic Boxes:

1. Description: Box and cover, with open bottom and openings for piping; designed for installing flush with grade.
  - a. Size: As required for valves and service.
  - b. Shape: Round, Square or Rectangular.
  - c. Sidewall Material: PE, ABS, or FRP.
  - d. Cover Material: PE, ABS, or FRP.
    - 1) Lettering: "VALVE BOX (VB) and VALVE NUMBER, GATE VALVE (GV), and QUICK COUPER (QC)."

- #### B. Drainage Backfill: Cleaned gravel or crushed stone, graded from 3/4 inch minimum to 3 inches maximum.

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## PART 3 - EXECUTION

### 3.1 EARTHWORK

- A. Excavating, trenching, and backfilling are specified in Section 31 2000 "Earth Moving."
- B. Install warning tape directly above pressure piping, 12 inches below finished grades, except 6 inches below subgrade under pavement and slabs.
- C. Drain Pockets: Excavate to sizes indicated. Backfill with cleaned gravel or crushed stone, graded from 3/4 to 3 inches to 12 inches below grade. Cover gravel or crushed stone with sheet of asphalt-saturated felt and backfill remainder with excavated material.
- D. Provide minimum cover over top of underground piping according to the following:
  - 1. Irrigation Main Piping: Minimum depth of 18 inches below finished grade, or not less than 18 inches below average local frost depth, whichever is deeper.
  - 2. Circuit Piping: 18 inches.
  - 3. Drain Piping: 12 inches.
  - 4. Sleeves: Minimum 18 inches under hardscape.

### 3.2 PREPARATION

- A. Set stakes to identify locations of proposed irrigation system. Obtain Architect's approval before excavation.

### 3.3 INSTALLATION OF PIPING

- A. Location and Arrangement: Drawings indicate location and arrangement of piping systems. Install piping as indicated unless deviations are approved on Coordination Drawings.
- B. Install piping at minimum uniform slope of 0.5 percent down toward drain valves.
- C. Install piping free of sags and bends.
- D. Install groups of pipes parallel to each other, spaced to permit valve servicing.
- E. Install fittings for changes in direction and branch connections.
- F. Install unions adjacent to valves and to final connections to other components with NPS 2 or smaller pipe connection.
- G. Install flanges adjacent to valves and to final connections to other components with NPS 2-1/2 or larger pipe connection.
- H. Install expansion loops in control-valve boxes for plastic piping.
- I. Lay piping on solid subbase, uniformly sloped without humps or depressions.
- J. Install PVC piping in dry weather when temperature is above 40 deg F. Allow joints to cure at least 24 hours at temperatures above 40 deg F before testing.
- K. Install water regulators with shutoff valve and strainer on inlet and pressure gage on outlet. Install shutoff valve on outlet. Install aboveground or in control-valve boxes.
- L. Water Hammer Arresters: Install between connection to building main and circuit valves aboveground or in control-valve boxes.
- M. Install piping in sleeves under parking lots, roadways, and sidewalks.
- N. Install sleeves made of Schedule 40, PVC pipe and socket fittings, and solvent-cemented joints.
- O. Install transition fittings for plastic-to-metal pipe connections according to the following:

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1. Underground Piping:
  - a. NPS 1-1/2 and Smaller: Plastic-to-metal transition fittings.
  - b. NPS 2 and Larger: AWWA transition couplings.
2. Aboveground Piping:
  - a. NPS 2 and Smaller: Plastic-to-metal transition fittings and unions.
  - b. NPS 2 and Larger: Use dielectric flange kits with one plastic flange.

### 3.4 JOINT CONSTRUCTION

- A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- C. Threaded Joints: Thread pipe with tapered pipe threads in accordance with ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
  1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
  2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
- D. PVC Piping Solvent-Cemented Joints: Clean and dry joining surfaces. Join pipe and fittings in accordance with the following:
  1. Comply with ASTM F402 for safe-handling practice of cleaners, primers, and solvent cements.
  2. PVC Pressure Piping: Join schedule number, ASTM D1785, PVC pipe and PVC socket fittings in accordance with ASTM D2672. Join other-than-schedule-number PVC pipe and socket fittings in accordance with ASTM D2855.
  3. PVC Nonpressure Piping: Join in accordance with ASTM D2855.

### 3.5 INSTALLATION OF VALVES

- A. Underground Curb Valves: Install in curb-valve casings with tops flush with grade.
- B. Underground Iron Gate Valves, Resilient Seat: Comply with AWWA C600 and AWWA M44. Install in valve casing with top flush with grade.
  1. Install valves and PVC pipe with restrained, gasketed joints.
- C. Aboveground Valves: Install as components of connected piping system.
- D. Pressure-Reducing Valves: Install in boxes for automatic control valves or aboveground between shutoff valves.
- E. Throttling Valves: Install in underground piping in boxes for automatic control valves.
- F. Drain Valves: Install in underground piping in boxes for automatic control valves.

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### 3.6 INSTALLATION OF DRIP IRRIGATION SPECIALTIES

- A. Install freestanding emitters on pipe riser to mounting height indicated.
- B. Install manifold emitter systems with tubing to emitters. Plug unused manifold outlets. Install emitters on off-ground supports at height indicated.
- C. Install multiple-outlet emitter systems with tubing to outlets. Plug unused emitter outlets. Install outlets on off-ground supports at height indicated.
- D. Install drip tubes with direct-attached emitters on ground.
- E. Install drip tubes with remote discharge on ground with outlets on off-ground supports at height indicated.
- F. Install off-ground supports of length required for indicated mounted height of device.
- G. Install pressure regulators in piping near device being protected, and in control-valve boxes.
- H. Install air relief valves and vacuum relief valves in piping, and in control-valve boxes.

### 3.7 INSTALLATION OF AUTOMATIC IRRIGATION CONTROL SYSTEM

- A. Equipment Mounting, Exterior: Install controllers on exterior wall.
  - 1. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
  - 2. Install anchor bolts to elevations required for proper attachment to supported equipment.
- B. Install control cable in same trench as irrigation piping and at least 2 inches below or beside piping. Provide conductors of size not smaller than recommended by controller manufacturer. Install cable in separate sleeve under paved areas.

### 3.8 CONNECTIONS

- A. Install piping adjacent to equipment, valves, and devices to allow service and maintenance.
- B. Connect wiring between controllers and automatic control valves.

### 3.9 IDENTIFICATION

- A. Equipment Nameplates and Signs: Install engraved plastic-laminate equipment nameplates and signs on each automatic controller.
  - 1. Text: In addition to identifying unit, distinguish between multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations.
- B. Warning Tapes: Arrange for installation of continuous, underground, detectable warning tapes over underground piping during backfilling of trenches. See Section 31 2000 "Earth Moving" for warning tapes.

### 3.10 FIELD QUALITY CONTROL

- A. Perform tests and inspections.

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1. Manufacturer's Field Service with Test Assistance: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

### B. Tests and Inspections:

1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
2. Operational Test: After electrical circuitry has been energized, operate controllers and automatic control valves to confirm proper system operation.
3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
4. Irrigation system will be considered defective if it does not pass tests and inspections.

### C. Prepare test and inspection reports.

## 3.11 STARTUP SERVICE

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

1. Complete installation and startup checks in accordance with manufacturer's written instructions.
2. Verify that controllers are installed and connected in accordance with the Contract Documents.
3. Verify that electrical wiring installation complies with manufacturer's submittal.

## 3.12 ADJUSTING

- A. Adjust settings of controllers.
- B. Adjust automatic control valves to provide flow rate at rated operating pressure required for each sprinkler circuit.
- C. Adjust sprinklers and devices, except those intended to be mounted aboveground, so they will be flush with, or not more than 1/2 inch above, finish grade.

## 3.13 CLEANING

- A. Flush dirt and debris from piping before installing sprinklers and other devices.

## 3.14 DEMONSTRATION

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

## 3.15 PIPING SCHEDULE

- A. Install components having pressure rating equal to or greater than system operating pressure.
- B. Piping in control-valve boxes and aboveground may be joined with flanges or unions instead of joints indicated.
- C. Underground Irrigation Main Piping:

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1. NPS 4 and Smaller:
  - a. Schedule 40, PVC pipe and socket fittings, and solvent-cemented joints.
  - b. Schedule 40, PVC pipe; Schedule 40, threaded PVC fittings; and threaded joints.
  - c. SDR 21, PVC, pressure-rated pipe; Schedule 40, PVC socket fittings; and solvent-cemented joints.

### 3.16 VALVE SCHEDULE

- A. Underground, Shutoff-Duty Valves: Use the following:
  1. NPS 2 and Smaller: Curb valve, curb-valve casing, and shutoff rod.
- B. Aboveground, Shutoff-Duty Valves:
  1. NPS 2 and Smaller:
    - a. Bronze gate valve.

END OF SECTION 32 8400

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## SECTION 329115 - SOIL PREPARATION (PERFORMANCE SPECIFICATION)

### PART 1 - GENERAL

#### 1.01 RELATED DOCUMENTS

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

#### 1.02 SUMMARY

- A. Section includes planting soils specified according to performance requirements of the mixes.
- B. Related Requirements:
  - 1. Section 311000 "Site Clearing" for top-soil stripping and stockpiling.
  - 2. Section 329200 "Turf and Grasses" for placing planting soil for turf and grasses.
  - 3. Section 329300 "Plants" for placing planting soil for plantings.

#### 1.03 ALLOWANCES

- A. Preconstruction and field quality-control testing are part of testing and inspecting allowance.

#### 1.04 DEFINITIONS

- A. AAPFCO: Association of American Plant Food Control Officials.
- B. Backfill: The earth used to replace or the act of replacing earth in an excavation. This can be amended or unamended soil as indicated.
- C. CEC: Cation exchange capacity.
- D. Compost: The product resulting from the controlled biological decomposition of organic material that has been sanitized through the generation of heat and stabilized to the point that it is beneficial to plant growth.
- E. Duff Layer: A surface layer of soil, typical of forested areas, that is composed of mostly decayed leaves, twigs, and detritus.
- F. Imported Soil: Soil that is transported to Project site for use.
- G. Layered Soil Assembly: A designed series of planting soils, layered on each other, that together produce an environment for plant growth.
- H. Manufactured Soil: Soil produced by blending soils, sand, stabilized organic soil amendments, and other materials to produce planting soil.
- I. NAPT: North American Proficiency Testing Program. An SSSA program to assist soil-, plant-, and water-testing laboratories through interlaboratory sample exchanges and statistical evaluation of analytical data.
- J. Organic Matter: The total of organic materials in soil exclusive of undecayed plant and animal tissues, their partial decomposition products, and the soil biomass; also called "humus" or "soil organic matter."
- K. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified as specified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.

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- L. RCRA Metals: Hazardous metals identified by the EPA under the Resource Conservation and Recovery Act.
- M. SSSA: Soil Science Society of America.
- N. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.
- O. Subsoil: Soil beneath the level of subgrade; soil beneath the topsoil layers of a naturally occurring soil profile, typified by less than 1 percent organic matter and few soil organisms.
- P. Surface Soil: Soil that is present at the top layer of the existing soil profile. In undisturbed areas, surface soil is typically called "topsoil"; but in disturbed areas such as urban environments, the surface soil can be subsoil.
- Q. USCC: U.S. Composting Council.

### 1.05 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

### 1.06 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include recommendations for application and use.
  - 2. Include test data substantiating that products comply with requirements.
  - 3. Include sieve analyses for aggregate materials.
- B. Material Certificates: For each type of imported soil and soil amendment and fertilizer before delivery to the site, according to the following:
  - 1. Manufacturer's qualified testing agency's certified analysis of standard products.
  - 2. Analysis of fertilizers, by a qualified testing agency, made according to AAPFCO methods for testing and labeling and according to AAPFCO's SUIP #25.
  - 3. Analysis of nonstandard materials, by a qualified testing agency, made according to SSSA methods, where applicable.
- C. Samples: For each bulk-supplied material, 1-quart volume of each in sealed containers labeled with content, source, and date obtained. Each Sample shall be typical of the lot of material to be furnished; provide an accurate representation of composition, color, and texture.

### 1.07 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For each testing agency.
- B. Preconstruction Test Reports: For preconstruction soil analyses specified in "Preconstruction Testing" Article.
- C. Field quality-control reports.

### 1.08 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent, state-operated, or university-operated laboratory; experienced in soil science, soil testing, and plant nutrition; with the experience and capability to conduct the testing indicated; and that specializes in types of tests to be performed.

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1. Laboratories: Subject to compliance with requirements, provide testing by the following:
  - a. Waypoint Analytical, 1101 S Winchester Blvd, San Jose, CA 95128, (408) 727-0330.

### 1.09 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction soil analyses on existing, on-site soil.
  1. Notify Architect seven days in advance of the dates and times when laboratory samples will be taken.
- B. Preconstruction Soil Analyses: For each unamended soil type, perform testing on soil samples and furnish soil analysis and a written report containing soil-amendment and fertilizer recommendations by a qualified testing agency performing the testing according to "Soil-Sampling Requirements" and "Testing Requirements" articles.
  1. Have testing agency identify and label samples and test reports according to sample collection and labeling requirements.

### 1.10 SOIL-SAMPLING REQUIREMENTS

- A. General: Extract soil samples according to requirements in this article.
- B. Sample Collection and Labeling: Have samples taken and labeled by soil state-certified, -licensed, or -registered soil scientist under the direction of the testing agency.
  1. Number and Location of Samples: Minimum of three representative soil samples from varied locations for each soil to be used or amended for landscaping purposes.
  2. Procedures and Depth of Samples: According to USDA-NRCS's "Field Book for Describing and Sampling Soils."
  3. Division of Samples: Split each sample into two equal parts. Send half to the testing agency and half to Owner for its records.
  4. Labeling: Label each sample with the date, location keyed to a site plan or other location system, visible soil condition, and sampling depth.

### 1.11 TESTING REQUIREMENTS

- A. General: Perform tests on soil samples according to requirements in this article.
- B. Physical Testing:
  1. Soil Texture: Soil-particle, size-distribution analysis by one of the following methods according to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods":
  2. Sieving Method: Report sand-gradation percentages for very coarse, coarse, medium, fine, and very fine sand; and fragment-gradation (gravel) percentages for fine, medium, and coarse fragments; according to USDA sand and fragment sizes.
  3. Hydrometer Method: Report percentages of sand, silt, and clay.
  4. Bulk Density: Analysis according to core method and clod method of SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods."

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5. Total Porosity: Calculate using particle density and bulk density according to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods."
  6. Water Retention: According to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods."
  7. Saturated Hydraulic Conductivity: According to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods"; at 85 percent compaction according to ASTM D698 (Standard Proctor).Chemical Testing:
  8. CEC: Analysis by sodium saturation at pH 7 according to SSSA's "Methods of Soil Analysis - Part 3- Chemical Methods."
  9. Clay Mineralogy: Analysis and estimated percentage of expandable clay minerals using CEC by ammonium saturation at pH 7 according to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods."
  10. Metals Hazardous to Human Health: Test for presence and quantities of RCRA metals including aluminum, arsenic, barium, copper, cadmium, chromium, cobalt, lead, lithium, and vanadium. If RCRA metals are present, include recommendations for corrective action.
  11. Phytotoxicity: Test for plant-available concentrations of phytotoxic minerals including aluminum, arsenic, barium, cadmium, chlorides, chromium, cobalt, copper, lead, lithium, mercury, nickel, selenium, silver, sodium, strontium, tin, titanium, vanadium, and zinc.
- C. Fertility Testing: Soil fertility analysis according to standard laboratory protocol of SSSA NAPT WERA-103, including the following:
1. Percentage of organic matter.
  2. CEC, calcium percent of CEC, and magnesium percent of CEC.
  3. Soil reaction (acidity/alkalinity pH value).
  4. Buffered acidity or alkalinity.
  5. Nitrogen ppm.
  6. Phosphorous ppm.
  7. Potassium ppm.
  8. Manganese ppm.
  9. Manganese-availability ppm.
  10. Zinc ppm.
  11. Zinc availability ppm.
  12. Copper ppm.
  13. Sodium ppm and sodium absorption ratio.
  14. Soluble-salts ppm.
  15. Presence and quantities of problem materials including salts and metals cited in the Standard protocol. If such problem materials are present, provide additional recommendations for corrective action.
  16. Other deleterious materials, including their characteristics and content of each.
  17. Organic-Matter Content: Analysis using loss-by-ignition method according to SSSA's "Methods of Soil Analysis - Part 3-Chemical Methods."
- D. Recommendations: Based on the test results, state recommendations for soil treatments and soil amendments to be incorporated to produce satisfactory planting soil suitable for healthy, viable plants indicated. Include, at a minimum, recommendations for nitrogen, phosphorous, and potassium fertilization, and for micronutrients.
1. Fertilizers and Soil Amendment Rates: State recommendations in weight per 1000 sq. ft. for 8-inch depth of soil.
  2. Soil Reaction: State the recommended liming rates for raising pH or sulfur for lowering pH according to the buffered acidity or buffered alkalinity in weight per 1000 sq. ft. for 8-inch depth of soil.

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### 1.12 DELIVERY, STORAGE, AND HANDLING

- A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and compliance with state and Federal laws if applicable.
- B. Bulk Materials:
  - 1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
  - 2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
  - 3. Do not move or handle materials when they are wet or frozen.
  - 4. Accompany each delivery of bulk fertilizers and soil amendments with appropriate certificates.

## PART 2 - PRODUCTS

### 2.01 PLANTING SOILS SPECIFIED ACCORDING TO PERFORMANCE REQUIREMENTS

- A. Planting-Soil Type: Existing, on-site surface soil, with the duff layer, if any, retained; and stockpiled on-site; modified to produce viable planting soil. Using pre-construction soil analyses and materials specified in other articles of this Section, amend existing, on-site surface soil to become planting soil complying with the following requirements:
  - 1. Particle Size Distribution by USDA Textures: Classified as soil according to USDA textures.
  - 2. Percentage of Organic Matter: Minimum 10 percent by volume.
  - 3. Soil Reaction: pH of 6 to 7.
  - 4. CEC of Total Soil: Minimum 15 meq/100 mL at pH of 7.0.
  - 5. CEC of Clay Fraction: Maximum 15 meq/100 mL at pH of 7.0.
  - 6. Soluble-Salt Content: 5 to 10 dS/m measured by electrical conductivity.
  - 7. Bulk Density: 1.0 g/cu. cm to 1.1 g/cu. cm at 85 percent compaction.
  - 8. Total Porosity: Minimum 50 percent at 85 percent compaction.
  - 9. Macro Porosity: Minimum 10 percent at 85 percent compaction.
  - 10. RCRA Metals: Below maximum limits established by the EPA.
  - 11. Phytotoxicity: Below phytotoxicity limits established by SSSA.
- B. Planting-Soil Type: Imported, naturally formed soil from off-site sources and consisting of loam soil according to USDA textures; and modified to produce viable planting soil. Amend imported soil with materials specified in other articles of this Section to become planting soil complying with the following requirements:
  - 1. Sources: Take imported, unamended soil from sources that are naturally well-drained sites where topsoil occurs at least 4 inches deep, not from agricultural land, bogs, or marshes; and that do not contain undesirable organisms; disease-causing plant pathogens; or obnoxious weeds and invasive plants including, but not limited to, quack grass, Johnsongrass, poison ivy, nutsedge, nimblewill, Canada thistle, bindweed, bent grass, wild garlic, ground ivy, perennial sorrel, and brome grass.
  - 2. Additional Properties of Imported Soil before Amending: Minimum of 8 percent organic-matter content, friable, and with sufficient structure to give good tilth and aeration. Clean soil to be of the following:

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- a. Unacceptable Materials: Concrete slurry, concrete layers or chunks, cement, plaster, building debris, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, acid, and other extraneous materials that are harmful to plant growth.
  - b. Unsuitable Materials: Stones, roots, plants, sod, clay lumps, and pockets of coarse sand that exceed a combined maximum of 2 percent by dry weight of the imported soil.
  - c. Large Materials: Stones, clods, roots, clay lumps, and pockets of coarse sand exceeding 2 inches in any dimension.
3. Percentage of Organic Matter: Minimum 10 percent by volume.
  4. Soil Reaction: pH of 6 to 7.
  5. CEC of Total Soil: Minimum 10 meq/100 mL at pH of 7.0.
  6. CEC of Clay Fraction: Maximum 15 meq/100 mL at pH of 7.0.
  7. Soluble-Salt Content: 5 to 10 dS/m measured by electrical conductivity.
  8. Bulk Density: 1.0 g/cu. cm to 1.1 g/cu. cm at 85 percent compaction.
  9. Total Porosity: Minimum 50 percent at 85 percent compaction.
  10. Macro Porosity: Minimum 10 percent at 85 percent compaction.
  11. RCRA Metals: Below maximum limits established by the EPA.
  12. Phytotoxicity: Below phytotoxicity limits established by SSSA.

### 2.02 INORGANIC SOIL AMENDMENTS

- A. Lime: ASTM C602, agricultural liming material containing a minimum of 80 percent calcium carbonate equivalent and as follows:
  1. Class: T, with a minimum of 99 percent passing through a No. 8 sieve and a minimum of 75 percent passing through a No. 60 sieve.
  2. Class: O, with a minimum of 95 percent passing through No. 8 sieve and a minimum of 55 percent passing through a No. 60 sieve.
  3. Form: Provide lime in form of ground dolomitic limestone.
- B. Sulfur: Granular, biodegradable, and containing a minimum of 90 percent elemental sulfur, with a minimum of 99 percent passing through a No. 6 sieve and a maximum of 10 percent passing through a No. 40 sieve.
- C. Iron Sulfate: Granulated ferrous sulfate containing a minimum of 20 percent iron and 10 percent sulfur.
- D. Agricultural Gypsum: Minimum 90 percent calcium sulfate, finely ground with 90 percent passing through a No. 50 sieve.
- E. Sand: Clean, washed, natural or manufactured, free of toxic materials, and according to ASTM C33/C33M.

### 2.03 ORGANIC SOIL AMENDMENTS

- A. Compost: Well-composted, stable, and weed-free organic matter produced by composting feedstock, and bearing USCC's "Seal of Testing Assurance," and as follows:
  1. Feedstock: Limited to leaves.
  2. Reaction: pH of 5.5 to 8.
  3. Soluble-Salt Concentration: Less than 4 dS/m.
  4. Moisture Content: 35 to 55 percent by weight.

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5. Organic-Matter Content: 50 to 60 percent of dry weight.
  6. Particle Size: Minimum of 98 percent passing through a 2-inch sieve.
- B. Wood Derivatives: Shredded and composted, nitrogen-treated sawdust, ground bark, or wood waste; of uniform texture and free of chips, stones, sticks, soil, or toxic materials.
1. Partially Decomposed Wood Derivatives: In lieu of shredded and composted wood derivatives, mix shredded and partially decomposed wood derivatives with ammonium nitrate at a minimum rate of 0.15 lb/cu. ft. of loose sawdust or ground bark, or with ammonium sulfate at a minimum rate of 0.25 lb/cu. ft. of loose sawdust or ground bark.
- C. Manure: Well-rotted, unleached, stable or cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding materials; free of toxic substances, stones, sticks, soil, weed seed, debris, and material harmful to plant growth.

### 2.04 FERTILIZERS

- A. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:
1. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified testing agency.
- B. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:
1. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified testing agency.
- C. Chelated Iron: Commercial-grade FeEDDHA for dicots and woody plants, and commercial-grade FeDTPA for ornamental grasses and monocots.

## PART 3 - EXECUTION

### 3.01 GENERAL

- A. Place planting soil and fertilizers according to requirements in other Specification Sections.
- B. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in planting soil.
- C. Proceed with placement only after unsatisfactory conditions have been corrected.

### 3.02 PREPARATION OF UNAMENDED, ON-SITE SOIL BEFORE AMENDING

- A. Excavation: Excavate soil from designated area(s) to a depth of 6 inches and stockpile until amended.
- B. Unacceptable Materials: Clean soil of concrete slurry, concrete layers or chunks, cement, plaster, building debris, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, acid, and other extraneous materials that are harmful to plant growth.

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- C. Unsuitable Materials: Clean soil to contain a combined maximum of 8 percent by dry weight of stones, roots, plants, sod, clay lumps, and pockets of coarse sand.
- D. Screening: Pass unamended soil through a 2-inch sieve to remove large materials.

### 3.03 PLACING AND MIXING PLANTING SOIL OVER EXPOSED SUBGRADE

- A. General: Apply and mix unamended soil with amendments on-site to produce required planting soil. Do not apply materials or till if existing soil or subgrade is frozen, muddy, or excessively wet.
- B. Subgrade Preparation: Till subgrade to a minimum depth of 8 inches to 12 inches. Remove stones larger than 1-1/2 inches in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.
  - 1. Apply, add soil amendments, and mix approximately half the thickness of unamended soil over prepared, loosened subgrade according to "Mixing" Paragraph below. Mix thoroughly into top 4 inches of subgrade. Spread remainder of planting soil.
- C. Mixing: Spread unamended soil to total depth of 8 inches to 12 inches, but not less than required to meet finish grades after mixing with amendments and natural settlement. Do not spread if soil or subgrade is frozen, muddy, or excessively wet.
  - 1. Amendments: Apply soil amendments, except compost, and fertilizer, if required, evenly on surface, and thoroughly blend them with unamended soil to produce planting soil.
    - a. Mix lime and sulfur with dry soil before mixing fertilizer.
    - b. Mix fertilizer with planting soil no more than seven days before planting.
  - 2. Lifts: Apply and mix unamended soil and amendments in lifts not exceeding 4 inches in loose depth for material compacted by compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.
- D. Compaction: Compact each blended lift of planting soil to 75 to 82 percent of maximum Standard Proctor density according to ASTM D698.
- E. Finish Grading: Grade planting soil to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

### 3.04 PLACING MANUFACTURED PLANTING SOIL OVER EXPOSED SUBGRADE

- A. General: Apply manufactured soil on-site in its final, blended condition. Do not apply materials or till if existing soil or subgrade is frozen, muddy, or excessively wet.
- B. Subgrade Preparation: Till subgrade to a minimum depth of 8 inches to 12 inches. Remove stones larger than 1-1/2 inches in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.
  - 1. Apply approximately half the thickness of planting soil over prepared, loosened subgrade. Mix thoroughly into top 4 inches of subgrade. Spread remainder of planting soil.

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- C. Application: Spread planting soil to total depth of 8 inches to 12 inches, but not less than required to meet finish grades after natural settlement. Do not spread if soil or subgrade is frozen, muddy, or excessively wet.
  - 1. Lifts: Apply planting soil in lifts not exceeding 4 inches in loose depth for material compacted by compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.
- D. Finish Grading: Grade planting soil to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

### 3.05 APPLYING COMPOST TO SURFACE OF PLANTING SOIL

- A. Application: Apply compost component of planting-soil mix to surface of in-place planting soil. Do not apply materials or till if existing soil or subgrade is frozen, muddy, or excessively wet.
- B. Finish Grading: Grade surface to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

### 3.06 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Perform the following tests and inspections:
  - 1. Compaction: Test planting-soil compaction after placing each lift and at completion using a densitometer or soil-compaction meter calibrated to a reference test value based on laboratory testing according to ASTM D698. Space tests at no less than one for each 500 sq. ft. of in-place soil or part thereof.
  - 2. Performance Testing: For each amended planting-soil type, demonstrating compliance with specified performance requirements. Perform testing according to "Soil-Sampling Requirements" and "Testing Requirements" articles.
- C. Soil will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.
- E. Label each sample and test report with the date, location keyed to a site plan or other location system, visible conditions when and where sample was taken, and sampling depth.

### 3.07 PROTECTION

- A. Protection Zone: Identify protection zones according to Section 01 5639 "Temporary Tree and Plant Protection."
- B. Protect areas of in-place soil from additional compaction, disturbance, and contamination. Prohibit the following practices within these areas except as required to perform planting operations:
  - 1. Storage of construction materials, debris, or excavated material.
  - 2. Parking vehicles or equipment.
  - 3. Vehicle traffic.
  - 4. Foot traffic.
  - 5. Erection of sheds or structures.
  - 6. Impoundment of water.

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- C. Excavation or other digging unless otherwise indicated.
- D. If planting soil or subgrade is overcompacted, disturbed, or contaminated by foreign or deleterious materials or liquids, remove the planting soil and contamination; restore the subgrade as directed by Architect and replace contaminated planting soil with new planting soil.

### 3.08 CLEANING

- A. Protect areas adjacent to planting-soil preparation and placement areas from contamination. Keep adjacent paving and construction clean and work area in an orderly condition.
- B. Remove surplus soil and waste material including excess subsoil, unsuitable materials, trash, and debris and legally dispose of them off Owner's property unless otherwise indicated.
  - 1. Dispose of excess subsoil and unsuitable materials on-site where directed by Owner.

END OF SECTION 32 9115

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## SECTION 329200 – TURF AND GRASSES

### 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. Seeding
- 2. Hydroseeding.

- B. Related Requirements:

- 1. Section 329300 "Plants" for trees, shrubs, ground covers, and other plants as well as border edgings and mow strips.

#### 1.3 DEFINITIONS

- A. Finish Grade: Elevation of finished surface of planting soil.
- B. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. Pesticides include insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. They also include substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.
- C. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. Pests include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.
- D. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth. See Section 329115 "Soil Preparation (Performance Specification)" and drawing designations for planting soils.
- E. Subgrade: The surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

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### 1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

### 1.5 INFORMATIONAL SUBMITTALS

- A. Certification of Seed Mixture: From seed vendor for each grass-seed monostand or mixture, stating the botanical and common name, percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.
- B. Product Certificates: For fertilizers, from manufacturer.
- C. Pesticides and Herbicides: Product label and manufacturer's application instructions specific to Project.

### 1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: Recommended procedures to be established by Owner for maintenance of wildflower non-irrigated hydroseeding during a calendar year. Submit before expiration of required maintenance periods.

### 1.7 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful wildflower non-irrigated hydroseed establishment.
  - 1. Professional Membership: Installer shall be a member in good standing of either the California Landscape Contractors Association or the American Nursery and Landscape Association.
  - 2. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
  - 3. Pesticide Applicator: State licensed, commercial.

### 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of compliance with state and Federal laws, as applicable.
- B. Bulk Materials:
  - 1. Do not dump or store bulk materials near structures, utilities, walkways, and pavements, or on existing turf areas or plants.
  - 2. Provide erosion-control measures to prevent erosion or displacement of bulk materials; discharge of soil-bearing water runoff; and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
  - 3. Accompany each delivery of bulk materials with appropriate certificates.

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### 1.9 FIELD CONDITIONS

- A. Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with initial maintenance periods to provide required maintenance from date of Substantial Completion.
  - 1. Fall Planting.
- B. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions.

## PART 2 - PRODUCTS

### 2.1 SEED MIXES

- A. Turf Seed: Fresh, clean, and dry new seed, of mixed species as follows:
  - 1. Turf Mix (See Planting Plans) from Pacific Coast Seed – (925) 373-4417 or approved equal.
- B. Bioretention Seed: Fresh, clean, and dry new seed, of mixed species as follows:
  - 1. Bio-Swale Mix (See Planting Plan) from Pacific Coast Seed – (925) 373-4417 or approved equal.
- C. Seed Carrier: 100 Is Mbinder from Pacific Coast Seed – (925) 737-4417 or approved equal.

### 2.2 FERTILIZERS

- A. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:
  - 1. Composition:
    - a. 1 lb./1000 sq. ft. of actual nitrogen, 4 percent phosphorous, and 2 percent potassium, by weight.

### 2.3 MULCHES

- A. Fiber Mulch: 2000 lbs./acre of biodegradable, dyed-wood, cellulose-fiber mulch; nontoxic and free of plant-growth or germination inhibitors; with a maximum moisture content of 15 percent and a pH range of 4.5 to 6.5.

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### 2.4 PESTICIDES

- A. General: Pesticide, registered and approved by the EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.
- B. Pre-Emergent Herbicide (Selective and Nonselective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.
- C. Post-Emergent Herbicide (Selective and Nonselective): Effective for controlling weed growth that has already germinated.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas to be planted for compliance with requirements and other conditions affecting installation and performance of the Work.
  - 1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
  - 2. Suspend planting operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
  - 3. Uniformly moisten excessively dry soil that is not workable, or which is dusty.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Architect and replace with new planting soil.

### 3.2 PREPARATION

- A. Protect structures; utilities; sidewalks; pavements; and other facilities, trees, shrubs, and plantings from damage caused by planting operations.
  - 1. Protect adjacent and adjoining areas from hydro-seeding and hydromulching overspray.
  - 2. Protect grade stakes set by others until directed to remove them.
- B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

### 3.3 HYDROSEEDING

- A. Hydroseeding: Mix specified seed, commercial fertilizer, binder, and fiber mulch in water, using equipment specifically designed for hydroseed application. Continue mixing until uniformly blended into homogeneous slurry suitable for hydraulic application.
  - 1. Spray-apply slurry uniformly to all areas to be seeded in a one-step process. Apply slurry at a rate so that mulch component is deposited at not less than 20-lb/acre dry weight, and seed component is deposited at not less than the specified seed-sowing rate.

### 3.4 WILDFLOWER MAINTENANCE

- A. Maintain and establish wildflowers by watering, weeding, mowing, trimming, replanting, and performing other operations as required to establish a healthy, viable wildflower planting. Roll, regrade, and replant bare or eroded areas and remulch. Provide materials and installation the same as those used in the original installation.
  - 1. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace materials and wildflower damaged or lost in areas of subsidence.
  - 2. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.
  - 3. Apply treatments as required to keep wildflowers and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards.
- B. Watering: Use sports field quick coupler equipment to convey water from sources and to keep wildflowers uniformly moist.
  - 1. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Temporary watering system is to avoid walking over muddy or newly planted areas.
  - 2. Water wildflowers with fine spray at a minimum rate of ½-inch per week for eight weeks after planting unless rainfall precipitation is adequate.

### 3.5 PESTICIDE APPLICATION

- A. Apply pesticides and other chemical products and biological control agents according to requirements of authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.
- B. Post-Emergent Herbicides (Selective and Nonselective): Apply only as necessary to treat already-germinated weeds and according to manufacturer's written recommendations.

3.6 CLEANUP AND PROTECTION

- A. Promptly remove soil and debris created by turf work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.
- B. Remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of them off Owner's property.
- C. Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from traffic. Maintain fencing and barricades throughout initial maintenance period and remove after plantings are established.

3.7 MAINTENANCE SERVICE

- A. Wildflower Maintenance Service: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in "Wildflower Maintenance" Article. Begin maintenance immediately after each area is planted and continue until acceptable wildflower planting is established, but for not less than maintenance period below.
  - 1. Maintenance Period: 60 days from date of acceptance.

END OF SECTION 329200

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## SECTION 329300 – PLANTS

### PART 1 - GENERAL

#### 1.1 SUMMARY

##### A. Section Includes:

1. Plant materials.
2. Fertilizers.
3. Mulches.
4. Herbicides and pesticides.
5. Tree-stabilization materials.
6. Landscape edgings.

##### B. Related Requirements:

1. Section 328400 "Planting Irrigation" for complete irrigation systems.

#### 1.2 ALLOWANCES

- ##### A. See Section 012100 "Allowances" for description of allowances affecting items specified in this Section.

#### 1.3 UNIT PRICES

- ##### A. See Section 012200 "Unit Prices" for description of unit prices affecting items specified in this Section.

#### 1.4 PREINSTALLATION MEETINGS

- ##### A. Preinstallation Conference: Conduct conference at Project site.

#### 1.5 ACTION SUBMITTALS

##### A. Product Data:

1. Plant materials.
2. Fertilizers.
3. Mulches.
4. Herbicides and pesticides.
5. Tree-stabilization materials.
6. Landscape edgings.
7. Tree-watering devices.

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- B. Product Data Submittals: For each product.
  - 1. Plant Materials: Include quantities, sizes, quality, and verified sources for plant materials.
- C. Samples for Verification: Actual sample of finished products for each of the following:
  - 1. Mulch: 1-quart volume of each organic mulch required; typical of the lot of material to be furnished, in sealed plastic bags labeled with composition of materials by percentage of weight and source of mulch. Provide an accurate representation of color, texture, and organic makeup.
  - 2. Edging Materials and Accessories: Manufacturer's standard size, to verify color selected.
  - 3. Root Barrier: Width of panel by 12-inch.

### 1.6 INFORMATIONAL SUBMITTALS

- A. Field Quality-Control Reports: Percolation tests for tree pits. Include the following:
  - 1. Tree identification number matching the plans.
  - 2. Date of test.
  - 3. Time when water was added to tree pit to start percolation test.
  - 4. Time with photo documentation showing increments of testing with water level in tree pit.
  - 5. Identification of tester.
- B. Qualification Statements: For landscape Installer. Include list of similar projects completed by Installer demonstrating Installer's capabilities and experience. Include project names, addresses, and year completed, and include names and addresses of owners' contact persons.
- C. Product Certificates: For each type of manufactured product, from manufacturer, and complying with manufacturer's certified analysis of standard products.
- D. Pesticides and Herbicides: Product label and manufacturer's written application instructions specific to Project.
- E. Sample Warranty: For special warranty.

### 1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: Recommended procedures to be established by Owner for maintenance of plants during a calendar year. Submit before expiration of required maintenance periods.

### 1.8 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful establishment of plants.
  - 1. Experience: Five years' experience in landscape installation in addition to requirements in Section 014000 "Quality Requirements."
  - 2. Installer's Field Supervision: Maintain an experienced full-time supervisor on Project site when work is in progress.
  - 3. Pesticide Applicator: State licensed, commercial.

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- B. Provide quality, size, genus, species, and variety of plants indicated, complying with applicable requirements in ANSI Z60.1.
- C. Measurements: Measure in accordance with ANSI Z60.1. Do not prune to obtain required sizes.
  - 1. Trees and Shrubs: Measure with branches and trunks or canes in their normal position. Take height measurements from or near the top of the root flare for field-grown stock and container-grown stock. Measure main body of tree or shrub for height and spread; do not measure branches or roots tip to tip. Take caliper measurements 6-inch above the root flare for trees up to 4-inch caliper size, and 12-inch above the root flare for larger sizes.
  - 2. Other Plants: Measure with stems, petioles, and foliage in their normal position.
- D. Plant Material Observation: Architect may observe plant material either at place of growth or at site before planting for compliance with requirements for genus, species, variety, cultivar, size, and quality. Architect may also observe trees and shrubs further for size and condition of balls and root systems, pests, disease symptoms, injuries, and latent defects and may reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees or shrubs immediately from Project site.
  - 1. Notify Architect of sources of planting materials seven days in advance of delivery to site.

### 1.9 DELIVERY, STORAGE, AND HANDLING

- A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of compliance with state and Federal laws if applicable.
- B. Bulk Materials:
  - 1. Do not dump or store bulk materials near structures, utilities, or walkways and pavements, or on existing turf areas or plants.
  - 2. Provide erosion-control measures to prevent erosion or displacement of bulk materials; discharge of soil-bearing water runoff; and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
  - 3. Accompany each delivery of bulk materials with appropriate certificates.
- C. Do not prune trees and shrubs before delivery. Protect bark, branches, and root systems from sun scald, drying, wind burn, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of plants during shipping and delivery. Do not drop plants during delivery and handling.
- D. Handle planting stock by root ball.
- E. Store bulbs, corms, and tubers in a dry place at 60 to 65 deg F until planting.
- F. Apply antidesiccant to trees and shrubs using power spray to provide an adequate film over trunks (before wrapping), branches, stems, twigs, and foliage to protect during digging, handling, and transportation.
  - 1. If deciduous trees or shrubs are moved in full leaf, spray with antidesiccant at nursery before moving and again two weeks after planting.

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- G. Deliver plants after preparations for planting have been completed, and install immediately. If planting is delayed more than six hours after delivery, set plants and trees in their appropriate aspect (sun, filtered sun, or shade), protect from weather and mechanical damage, and keep roots moist.
1. Heel-in bare-root stock. Soak roots that are in less than moist condition in water for two hours. Reject plants with dry roots.
  2. Set balled stock on ground and cover ball with soil, peat moss, sawdust, or other acceptable material.
  3. Do not remove container-grown stock from containers before time of planting.
  4. Water root systems of plants stored on-site deeply and thoroughly with a fine-mist spray. Water as often as necessary to maintain root systems in a moist, but not overly wet condition.

### 1.10 FIELD CONDITIONS

- A. Field Measurements: Verify actual grade elevations, service and utility locations, irrigation system components, and dimensions of plantings and construction contiguous with new plantings by field measurements before proceeding with planting work.
- B. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions in accordance with manufacturer's written instructions and warranty requirements.

### 1.11 WARRANTY

- A. Special Warranty: Installer agrees to repair or replace plantings and accessories that fail in materials, workmanship, or growth within specified warranty period.
1. Failures include, but are not limited to, the following:
    - a. Death and unsatisfactory growth, except for defects resulting from abuse, lack of adequate maintenance, or neglect by Owner.
    - b. Structural failures, including plantings falling or blowing over.
    - c. Faulty performance of tree stabilization and edgings.
    - d. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
  2. Warranty Periods: From date of Substantial Completion.
    - a. Trees, Shrubs, Vines, and Ornamental Grasses: 12 months.
    - b. Ground Covers, Biennials, Perennials, and Other Plants: 12 months.
    - c. Annuals: Three months.
  3. Include the following remedial actions as a minimum:
    - a. Immediately remove dead plants and replace unless required to plant in the succeeding planting season.
    - b. Replace plants that are more than 25 percent dead or in unhealthy condition at end of warranty period.

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- c. A limit of one replacement of each plant is required except for losses or replacements due to failure to comply with requirements.
- d. Provide extended warranty for period equal to original warranty period, for replaced plant material.

### PART 2 - PRODUCTS

#### 2.1 PLANT MATERIALS

- A. General: Furnish nursery-grown plants true to genus, species, variety, cultivar, stem form, shearing, and other features indicated in Plant List, Plant Schedule, or Plant Legend indicated on Drawings and complying with ANSI Z60.1; and with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock, densely foliated when in leaf and free of disease, pests, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.
  1. Trees with damaged, crooked, or multiple leaders; with tight vertical branches where bark is squeezed between two branches or between branch and trunk ("included bark"); with crossing trunks; with cut-off limbs more than 3/4 inch in diameter; or with stem girdling roots are unacceptable.
  2. Collected Stock: Do not use plants harvested from the wild, from native stands, from an established landscape planting, or not grown in a nursery unless otherwise indicated.
- B. Provide plants of sizes, grades, and ball or container sizes complying with ANSI Z60.1 for types and form of plants required. Plants of a larger size may be used if acceptable to Architect, with a proportionate increase in size of roots or balls.
- C. Root-Ball Depth: Furnish trees and shrubs with root balls measured from top of root ball, which begins at root flare in accordance with ANSI Z60.1.
- D. Labeling: Label each plant of each variety, size, and caliper with a securely attached, waterproof tag bearing legible designation of common name and full scientific name, including genus and species. Include nomenclature for hybrid, variety, or cultivar, if applicable for plant.
- E. If formal arrangements or consecutive order of plants are indicated on Drawings, select stock for uniform height and spread, and number the labels to ensure symmetry in planting.
- F. Annuals and Biennials: Provide healthy, disease-free plants of species and variety shown or listed, with well-established root systems reaching to sides of the container to maintain a firm ball, but not with excessive root growth encircling the container. Provide only plants that are acclimated to outdoor conditions before delivery and that are in bud but are not yet in bloom.

#### 2.2 FERTILIZERS

- A. Granular Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:

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1. Composition:
  - a. 3 percent of actual nitrogen, 4 percent phosphorous, and 3 percent potassium, by weight.
  - b. Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.
2. Mycorrhizal Fungi: Dry, granular inoculant containing at least 5300 spores per lb of vesicular-arbuscular mycorrhizal fungi and 95 million spores per lb of ectomycorrhizal fungi, 33 percent hydrogel, and maximum of 5.5 percent inert material.

### 2.3 MULCHES

- A. Organic Mulch: Free from deleterious materials and suitable as a top dressing of trees and shrubs, consisting of one of the following:
  1. Type: Redwood chips.
  2. Size Range: ½-inch minimum.
  3. Color: Natural.
- B. Compost Mulch: Well-composted, stable, and weed-free organic matter, pH of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through a 1-inch sieve; soluble-salt content of 2 to 5 dS/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:
  1. Organic Matter Content: 60 percent of dry weight.
  2. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.
- C. Walk-On Mulch: Shredded wood mulch or engineered wood fiber suitable for pedestrian use.
  1. Shredded hardwood mulch (aged, double-shredded).
  2. Size: 1/2" to 2".
  3. Free of: nails, wire, plastics, and other toxic and mechanical contaminants.
  4. Moisture Content: 25%–35% at installation.
  5. Color: Natural.

### 2.4 HERBICIDES AND PESTICIDES

- A. Pre-Emergent Herbicide (Selective and Nonselective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.
- B. Pesticides: Registered and approved by the EPA, acceptable to authorities having jurisdiction, and of type recommended in writing by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

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### 2.5 TREE-STABILIZATION MATERIALS

- A. Trunk-Stabilization Materials:
  - 1. Upright and Guy Stakes: Rough-sawn, sound, new hardwood, free of knots, holes, cross grain, and other defects, 2-by-2-inch nominal by length indicated, pointed at one end.
  - 2. Flexible Ties: Wide rubber or elastic bands or straps of length required to reach stakes or turnbuckles.

### 2.6 MISCELLANEOUS PRODUCTS

- A. Root Barrier: Black, molded, modular panels 24-inch high (deep), 85 mils thick, and with vertical root deflecting ribs protruding  $\frac{3}{4}$ -inch out from panel surface; manufactured with minimum 50 percent recycled polyethylene plastic with UV inhibitors.
- B. Antidesiccant: Water-insoluble emulsion, permeable moisture retarder, film forming, for trees and shrubs. Deliver in original, sealed, and fully labeled containers and mix in accordance with manufacturer's written instructions.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas to receive plants, with Installer present, for compliance with requirements and conditions affecting installation and performance of the Work.
  - 1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
  - 2. Verify that plants and vehicles loaded with plants can travel to planting locations with adequate overhead clearance.
  - 3. Suspend planting operations during periods of excessive soil moisture until moisture content reaches acceptable levels to attain required results.
  - 4. Uniformly moisten excessively dry soil that is not workable or which is dusty.
- B. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove soil and contamination as directed by Architect and replace with new planting soil.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities and turf areas and existing plants from damage caused by planting operations.
- B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

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- C. Lay out individual tree and shrub locations and areas for multiple plantings. Stake locations, outline areas, adjust locations when requested, and obtain Architect's acceptance of layout before excavating or planting. Make minor adjustments as required.
- D. For walk-on mulch, grade and compact subgrade to uniform surface free of debris and standing water.

### 3.3 PLANTING AREA ESTABLISHMENT

- A. General: Prepare planting area for soil placement and mix planting soil in accordance with Section 32 9115 "Soil Preparation (Performance Specification)."
- B. Placing Planting Soil: Place and mix planting soil in-place over exposed subgrade.
- C. Before planting, obtain Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.
- D. Application of Mycorrhizal Fungi: At time directed by Architect, broadcast dry product uniformly over prepared soil at application rate in accordance with manufacturer's written instructions.

### 3.4 EXCAVATION FOR TREES AND SHRUBS

- A. Planting Pits and Trenches: Excavate circular planting pits.
  - 1. Excavate planting pits with sides sloping inward at a 45-degree angle. Excavations with vertical sides are unacceptable. Trim perimeter of bottom leaving center area of bottom raised slightly to support root ball and assist in drainage away from center. Do not further disturb base. Ensure that root ball will sit on undisturbed base soil to prevent settling. Scarify sides of planting pit smeared or smoothed during excavation.
  - 2. Excavate approximately two times as wide as ball diameter for container-grown stock.
  - 3. Do not excavate deeper than depth of root ball, measured from the root flare to the bottom of root ball.
  - 4. If area under the plant was initially dug too deep, add soil to raise it to correct level and thoroughly tamp the added soil to prevent settling.
  - 5. Maintain angles of repose of adjacent materials to ensure stability. Do not excavate subgrades of adjacent paving, structures, hardscapes, or other new or existing improvements.
  - 6. Maintain supervision of excavations during working hours.
  - 7. Keep excavations covered or otherwise protected overnight, after working hours and when unattended by Installer's personnel.
  - 8. If drain tile is indicated on Drawings or required under planting areas, excavate to top of porous backfill over tile.
- B. Backfill Soil: Subsoil and topsoil removed from excavations may not be used as backfill soil unless otherwise indicated.
- C. Obstructions: Notify Architect if unexpected rock or obstructions detrimental to trees or shrubs are encountered in excavations.
  - 1. Hardpan Layer: Drill 6-inch-diameter holes, 24-inch apart, into free-draining strata or to depth of 10 ft., whichever is less, and backfill with free-draining material.

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- D. Drainage: Notify Architect if subsoil conditions evidence unexpected water seepage or retention in tree or shrub planting pits.
- E. Fill excavations with water and allow them to percolate away before positioning trees and shrubs.

### 3.5 TREE, SHRUB, AND VINE PLANTING

- A. Inspection: At time of planting, verify that root flare is visible at top of root ball in accordance with ANSI Z60.1. If root flare is not visible, remove soil in a level manner from root ball to where the top-most root emerges from the trunk. After soil removal to expose root flare, verify that root ball still meets size requirements.
- B. Roots: Remove stem girdling roots and kinked roots. Remove injured roots by cutting cleanly; do not break.
- C. Slopes: When planting on slopes, set the plant so the root flare on the uphill side is flush with the surrounding soil on the slope; the edge of root ball on the downhill side will be above the surrounding soil. Apply enough soil to cover the downhill side of root ball.

### 3.6 TREE, SHRUB, AND VINE PRUNING

- A. Remove only dead, dying, or broken branches. Do not prune for shape.
- B. Prune, thin, and shape trees, shrubs, and vines as directed by Architect.
- C. Prune, thin, and shape trees, shrubs, and vines in accordance with standard professional horticultural and arboricultural practices. Unless otherwise indicated by Architect, do not cut tree leaders; remove only injured, dying, or dead branches from trees and shrubs; and prune to retain natural character.
- D. Do not apply pruning paint to wounds.

### 3.7 INSTALLATION OF TREE-STABILIZATION MATERIALS

- A. Trunk Stabilization by Upright Staking and Tying: Install trunk stabilization as follows unless otherwise indicated:
  - 1. Upright Staking and Tying:
    - a. Stake trees of 2-inch through 5-inch caliper. Stake trees of less than 2-inch caliper only as required to prevent wind tip out. Use a minimum of two stakes of length required to penetrate at least 18-inch below bottom of backfilled excavation and to extend at least 72-inch above grade. Set vertical stakes and space to avoid penetrating root balls or root masses.
    - b. Stake trees with two stakes for trees up to 12 ft. high and 2-1/2-inch or less in caliper; three stakes for trees less than 14 ft. high and up to 4-inch in caliper. Space stakes equally around trees.
  - 2. Support trees with bands of flexible ties at contact points with tree trunk. Allow enough slack to avoid rigid restraint of tree.

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3. Support trees with two strands of tie wire, connected to the brass grommets of tree-tie webbing at contact points with tree trunk. Allow enough slack to avoid rigid restraint of tree.

### 3.8 INSTALLATION OF ROOT BARRIER

- A. Install root barrier where trees are planted within 96-inch of paving or other hardscape elements, such as walls, curbs, and walkways, unless otherwise indicated on Drawings.
- B. Align root barrier vertically and run it linearly along and adjacent to paving or other hardscape elements to be protected from invasive roots.
- C. Install root barrier continuously for distance of 60-inch in each direction from tree trunk, for total distance of 8 ft. per tree. If trees are spaced closer, use single continuous piece of root barrier.
  1. Position top of root barrier in accordance with manufacturer's written instructions.
  2. Overlap root barrier minimum of 12-inch at joints.
  3. Do not distort or bend root barrier during construction activities.
  4. Do not install root barrier surrounding the root ball of tree.

### 3.9 GROUND COVER AND PLANT PLANTING

- A. Set out and space ground cover and plants other than trees, shrubs, and vines as indicated on Drawings in even rows with triangular spacing.
- B. Use planting soil for backfill.
- C. Dig holes large enough to allow spreading of roots.
- D. For rooted cutting plants supplied in flats, plant each in a manner that minimally disturbs the root system but to depth not less than two nodes.
- E. Work soil around roots to eliminate air pockets and leave slight saucer indentation around plants to hold water.
- F. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.
- G. Protect plants from hot sun and wind; remove protection if plants show evidence of recovery from transplanting shock.

### 3.10 INSTALLATION OF MULCHES

- A. Mulch backfilled surfaces of planting areas and other areas indicated.
  1. Organic mulch in planting areas:
    - a. Apply 3-inch average thickness of organic mulch over whole surface of planting area, and finish level with adjacent finish grades.
    - b. Do not place mulch within 3-inch trunks or stems.

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2. Walk-on mulch on pathways:
  - a. Spread mulch to uniform loose depth of 3-inch unless otherwise noted.
  - b. Rake smooth and ensure even coverage without bald spots.
  - c. Compact lightly if necessary to provide a stable walking surface.

### 3.11 INSTALLATION OF LANDSCAPE EDGINGS

- A. Steel Edging: Install steel edging where indicated in accordance with manufacturer's written instructions. Anchor with steel stakes spaced approximately 30-inch apart, driven below top elevation of edging.

### 3.12 APPLICATION OF HERBICIDES AND PESTICIDES

- A. Pre-Emergent Herbicides (Selective and Nonselective): Apply to tree, shrub, and ground-cover areas in accordance with manufacturer's written instructions. Do not apply to seeded areas.
- B. Post-Emergent Herbicides (Selective and Nonselective): Apply only as necessary to treat already-germinated weeds and in accordance with manufacturer's written instructions.
- C. Apply pesticides and other chemical products and biological control agents according to authorities having jurisdiction and in accordance with manufacturer's written instructions. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.

### 3.13 PLANT MAINTENANCE

- A. Maintain plantings by pruning, cultivating, watering, weeding, fertilizing, mulching, restoring planting saucers, adjusting and repairing tree-stabilization devices, resetting to proper grades or vertical position, and performing other operations as required to establish healthy, viable plantings.
- B. Fill in, as necessary, soil subsidence that may occur because of settling or other processes. Replace mulch materials damaged or lost in areas of subsidence.
- C. Apply treatments as required to keep plant materials, planted areas, and soils free of pests and pathogens or disease. Use integrated pest management practices when possible to minimize use of pesticides and reduce hazards. Treatments include physical controls such as hosing off foliage, mechanical controls such as traps, and biological control agents.

### 3.14 FIELD QUALITY CONTROL

- A. Tests and Inspections:
  1. Perform tree pit percolation tests.
  2. Tree pit construction will be considered defective if it does not pass percolation tests and inspections.
  3. Do not proceed with planting in tree pits until satisfactory percolation is demonstrated.

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- B. Prepare test and inspection reports.

### 3.15 REPAIR AND REPLACEMENT

- A. Repair or replace existing or new trees and other plants that are damaged by construction operations, in a manner approved by Architect.
  - 1. Submit details of proposed pruning and repairs.
  - 2. Perform repairs of damaged trunks, branches, and roots within 24 hours, if approved.
  - 3. Replace trees and other plants that cannot be repaired and restored to full-growth status, as determined by Architect.
- B. Remove and replace trees that are more than 25 percent dead or in unhealthy condition before end of corrections period or are damaged during construction operations that Architect determines are incapable of restoring to normal growth pattern.

### 3.16 CLEANING AND PROTECTION

- A. During planting, keep adjacent paving and construction clean and work area in an orderly condition. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.
- B. Remove surplus soil and waste material including excess subsoil, unsuitable soil, trash, and debris and legally dispose of them off Owner's property.
- C. Protect plants from damage due to landscape operations and operations of other contractors and trades. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged plantings.
- D. After installation and before Substantial Completion, remove nursery tags, nursery stakes, tie tape, labels, wire, burlap, and other debris from plant material, planting areas, and Project site.

END OF SECTION 32 93 00

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## SECTION 331000 - WATER SYSTEM

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Site water distribution system for domestic and fire protection services up to 5 feet of any on-site building being served.
- B. Domestic water and fire protection water transmission or distribution system within a roadway or street right-of-way.

#### 1.2 RELATED SECTIONS

- A. Section 31 21 00, Utility Trenching and Backfill

#### 1.3 RELATED DOCUMENTS

##### A. ASME

- 1. ASME A112.1.2: Air Gaps in Plumbing Systems (for Plumbing Fixtures and Water Connect Receptors)
- 2. ASME B1.20.1: Pipe Threads, General Purpose, Inch
- 3. ASME B16.1: Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250
- 4. ASME B16.18: Cast Copper Alloy Solder Joint Pressure Fittings
- 5. ASME B16.22: Wrought Copper and Copper Alloy Solder – Joint Pressure fittings
- 6. ASME B16.26: Cast Copper Alloy Fittings for Flared Copper Tubes

##### B. ASTM

- 1. ASTM A536: Standard Specification for Ductile Iron Castings
- 2. ASTM A674: Standard Practice for Polyethylene Encasement for Ductile Iron Pipe for Water or Other Liquids
- 3. ASTM B61: Standard Specification for Steam or Valve Bronze Castings
- 4. ASTM B62: Standard Specification for Composition Bronze or Ounce Metal Castings
- 5. ASTM B88: Standard Specification for Seamless Copper Water Tube
- 6. ASTM C94: Standard Specification for Ready-Mixed Concrete
- 7. ASTM D1785: Standard Specification for Poly Vinyl Chloride (PVC) Plastic Pipe, Schedules 40, 80, and 120
- 8. ASTM D2564: Standard Specification for Solvent Cements for Poly Vinyl Chloride (PVC) Plastic Piping Systems
- 9. ASTM F1056: Standard Specification for Socket Fusion Tools for Use in Socket Fusion Joining Polyethylene Pipe or Tubing and Fittings

##### C. AWWA

- 1. C104: Cement-Mortar Lining for Ductile-Iron Pipe and Fittings
- 2. C105: Polyethylene Encasement for Ductile-Iron Pipe Systems
- 3. C110: Ductile-Iron and Gray-Iron Fittings
- 4. C111: Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
- 5. C115: Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges
- 6. C116: Protective Fusion-Bonded Epoxy Coatings for the Interior & Exterior Surfaces for Ductile-Iron and Gray-Iron Fittings

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7. C150: Thickness Design of Ductile-Iron Pipe
  8. C151: Ductile-Iron Pipe, Centrifugally Cast
  9. C153: Ductile-Iron Compact Fittings
  10. C200: Steel Water Pipe 6-inch and larger
  11. C203: Coal-Tar Protective Coatings and Linings for Steel Water Pipe
  12. C205: Cement-Mortar Protective Lining and Coating for Steel Water Pipe – 4-inch and Larger-Shop Applied
  13. C207: Steel Pipe Flanges for Waterworks Service-Sizes 4-inch through 144-inch
  14. C208: Dimensions for Fabricated Steel Water Pipe Fittings
  15. C209: Cold Applied Tape Coatings for Steel Water Pipe, Special Sections, Connections, and Fittings
  16. C210: Liquid-Epoxy Coatings and Linings for Steel Water Pipe and Fittings
  17. C213: Fusion-Bonded Epoxy Coatings and Linings for Steel Water Pipe and Fittings
  18. C214: Tape Coatings for Steel Water Pipelines
  19. C218: Liquid Coatings for Aboveground Steel Water Pipe and Fittings
  20. C219: Bolted, Sleeve-type Couplings for Plain-End Pipe
  21. C500: Metal-Seated Gate Valves for Water Supply Service
  22. C502: Dry-Barrel Fire Hydrants
  23. C503: Wet Barrel Fire Hydrants
  24. C504: Rubber Seated Butterfly Valves.
  25. C507: Ball Valves, 6-inch through 60-inch.
  26. C508: Swing-check Valves for Waterworks Service, 2-inch through 48-inch NPS.
  27. C509: Resilient-Seated Gate Valves for Water Supply Service
  28. C510: Double Check Valve Backflow Prevention Assembly
  29. C511: Reduced-Pressure Principle Backflow Prevention Assembly
  30. C512: Air-Release, Air/Vacuum, and Combination Air Valves for Water and Wastewater Service
  31. C550: Protective Interior Coatings for Valves and Hydrants
  32. C600: Installation of Ductile-Iron Water Mains and Their Appurtenances
  33. C606: Grooved and Shouldered Joints
  34. C651: Disinfecting Water Mains
  35. C800: Underground Service Line Valves and Fittings
  36. C900: Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4-inch through 60-inch for Water Transmission and Distribution
  37. C901: Polyethylene (PE) Pressure Pipe and Tubing, ½-inch through 3-inch for Water Service
  38. C905: Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 14-inch through 48-inch for Water Transmission and Distribution
  39. C906: Polyethylene (PE) Pressure Pipe and Fittings, 4-inch through 65-inch, for Waterworks
  40. M11: Steel Pipe - A Guide for Design and Installation
  41. M23: PVC Pipe – Design and Installation
  42. M41: Ductile-Iron Pipe and Fittings
- D. Factory Mutual Insurance Company (FM)
1. FM 1530: Fire Department Connections
- E. National Fire Protection Association (NFPA)
1. NFPA 24: Installation of Private Fire Service Mains and Their Appurtenances
  2. NFPA 70: National Electric Code
  3. NFPA 1963: Fire Hose Connection

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- F. National Sanitation Foundation (NSF)
  - 1. NSF 61: Drinking Water System Components-Health Effects
- G. Underwriters Laboratory(UL)
  - 1. UL 262: Safety Gate Valves for Fire-Protection Service
  - 2. UL 405: Safety Fire Department Connection Devices
  - 3. UL 789: Indicator Posts for Fire-Protection Service

### 1.4 DEFINITIONS

- A. AASHTO: American Association of State Highway and Transportation Officials
- B. ASTM: American Society for Testing Materials
- C. AWWA: American Waterworks Association
- D. DI: Ductile iron
- E. DIP: Ductile iron pipe
- F. FM: Factory Mutual
- G. NFPA: National Fire Protection Association
- H. NSF: National Sanitation Foundation
- I. PCC: Portland cement concrete
- J. PE: Polyethylene
- K. PVC: Polyvinyl Chloride
- L. UL: Underwriters Laboratory

### 1.5 SYSTEM PERFORMANCE REQUIREMENTS

- A. Minimum Working Internal Pressures: As indicated on Plans.
- B. External Load: Earth load indicated by depth of cover plus AASHTO H20 live load unless indicated otherwise.

### 1.6 SUBMITTALS

- A. Follow submittal procedure outlined in Section 01 10 00, Supplemental General Requirements.
- B. Product Data: Manufacturer's literature and data, including, where applicable, sizes, pressure rating, rated capacity, listing/approval stamps, labels, or other marking on equipment made to the specified standards for materials, and settings of selected models, for the following:
  - 1. Piping materials and fittings
  - 2. Gaskets, couplings, sleeves, and assembly bolts and nuts
  - 3. Flexible pipe fittings
  - 4. Restrained pipe fittings

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5. Flexible Connectors
  6. Expansion joints
  7. Flexible expansion joints
  8. High deflection fittings/ball joints
  9. Gate valves
  10. Butterfly valves
  11. Check valves
  12. Ball valves
  13. Air release, air/ vacuum and combination air valves
  14. Blow-off valves
  15. Pressure reducing valves
  16. Flow Regulating valves
  17. Service connections and water meters
  18. Valve boxes, meter boxes, frames and covers
  19. Backflow preventers
  20. Fire hydrants
  21. Post indicator valves
  22. Fire department connections
  23. Thrust block concrete mix
  24. Tapping sleeves and tapping valves
  25. Service saddles and corporation stops
  26. Identification materials and devices
- C. Shop Plans and Calculations: Where an on-site fire water system is required, Contractor shall provide shop plans for Engineer and agency approval prior to construction. Coordinate with the Plans and identify any proposed modifications or deviations. Shop Plans and Calculations shall be stamped and signed by a registered Fire Protection Engineer licensed by the State of California as required.
1. Include the following information:
    - a. Design assumptions
    - b. Thrust block sizing and calculations
    - c. Materials to be used
    - d. Available water pressure
    - e. Required water pressure
  2. The review of fire system components constitutes only a portion of the review and approval required. A copy of the fire system component submittal package shall be forwarded to the local fire marshal for further review and approval.
- D. Field test reports: Indicate and interpret test results for compliance with the Project requirements.

### 1.7 QUALITY ASSURANCE

- A. Comply with requirements of utility supplying water. Do not operate existing valves or tap existing piping without written permission and/or presence of utility company representative.
- B. Comply with the following requirements and standards:
1. NSF 61: "Drinking Water System Components-Health Effects" for materials for potable water.
  2. NFPA 24: "Installation of Private Fire Service Mains and Their Appurtenances" for materials, installations, tests, flushing, and valve and hydrant supervision.
  3. NFPA 70: "National Electric Code" for electrical connections between wiring and electrically operated devices.

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- C. Provide listing/approval stamp, label, or other marking on piping and specialties made to a specified standard.

### 1.8 MATERIAL DELIVERY, STORAGE AND HANDLING

- A. Preparation for Transport: Prepare valves, including fire hydrants, according to the following:
  - 1. Ensure that valves are dry and internally protected against rust and corrosion.
  - 2. Protect valves against damage to threaded ends and flange faces.
  - 3. Set valves in best position for handling. Set valves closed to prevent rattling.
- B. Deliver piping with factory-applied endcaps. Maintain endcaps through shipping, storage and handling to prevent pipe end damage and to prevent entrance of dirt, debris and moisture.
- C. Handling: Use slings to handle valves and fire hydrants whose size requires handling by crane or lift. Rig valves to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.
- D. During Storage: Use precautions for valves, including fire hydrants according to the following.
  - 1. Do not remove end protectors, unless necessary for inspection, then reinstall them for storage.
  - 2. Protection from Weather: Store indoors and maintain temperature higher than ambient dew-point temperature. Store indoors and maintain temperature higher than ambient dew point temperature. Support off the ground or pavement in watertight enclosures when outdoor storage is necessary.
- E. Do not store plastic pipe and fittings in direct sunlight.
- F. Protect pipe, fittings, flanges, seals and specialties from moisture, dirt and damage.
- G. Protect linings and coatings from damage.
- H. Handle precast boxes, vaults and other precast structures according to manufacturer's written instructions.
- I. Protect imported bedding and backfill material from contamination by other materials.

### 1.9 COORDINATION

- A. Coordinate connection to existing water mains with water utility supplying water.
- B. Coordinate piping materials, sizes, entry locations, and pressure requirements with building domestic water distribution piping and fire protection piping.

## PART 2 - PRODUCTS

### 2.1 PE PLASTIC PIPE: SIZES ½-INCH THROUGH 3-INCH

- A. Pipe and Fittings: Provide PE3408, Pressure Class 200, DR 9 conforming to AWWA C901. PWPIPE or approved equal.
- B. Cast Copper Fittings shall conform to ASME B16.18.

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- C. Cast Copper Compression Fittings and connections shall be Mueller 110, Ford or approved equal.
- D. Joints: Restrain with clamps or heat-fusion.

### 2.2 PVC PIPE: SIZES 1/8-INCH THROUGH 3-INCH

- A. Pipe and Fittings: ASTM D1785, Schedule 40. [Schedule 80 and 120 are also available. Pressure ratings up to 260 psi are achievable with schedule 40]
- B. Joints: Restrain with solvent cement. Do not use threaded pipe.
- C. Solvent Cement: ASTM D2564.

### 2.3 DIP: SIZES 4-INCH THROUGH 48-INCH

- A. Pipe: Pressure Class pipe conforming to AWWA C151, AWWA Manual M41 and standard thickness per AWWA C150. U.S. Pipe, American Cast Iron Pipe Company, or approved equal.
- B. Fittings: Provide fittings with pressure rating greater than or equal to that of the adjoining pipe.
- C. Pipe and Fitting Lining: Cement Mortar, AWWA C104.
- D. Pipe and Fitting Coating: Asphaltic, AWWA C151 or C115.
- E. Fittings
  1. Standard: AWWA C110, sizes 4-inch through 48-inch.
  2. Compact: AWWA C153, sizes 4-inch through 24-inch.
  3. All fittings shall be fusion epoxy coated per AWWA C116.
- F. Exterior Soil Corrosion Protection for Pipe and Fittings: Polyethylene encasement, AWWA C105.
- G. Unrestrained Joints (Rubber Gasket Joints):
  1. Push-On Bell and Spigot Joint: Provide shape of pipe ends and fitting ends, gaskets, and lubricant for joint assembly conforming to AWWA C111.
  2. Mechanical Joint: Dimensional and material requirements for pipe ends, glands, bolts and nuts, and gaskets shall conform to AWWA C111.
- H. Restrained Joints:
  1. Flanged Joint: Provide bolts, nuts, and gaskets in conformance with AWWA C115. Gaskets shall conform to the requirements specified in AWWA C111. Unless otherwise required, above ground flange assembly bolts shall be standard hex-head, cadmium plated machine bolts with American Standard Heavy, hot-pressed, cadmium plated hexagonal nuts. Buried flange nuts and bolts shall be as above except they shall be of Type 304 stainless steel.
  2. Push-On Bell and Spigot Joint: Provide shape of pipe ends and fitting ends, gaskets, and lubricant for joint assembly conforming to AWWA C111 with "Field Lok Gasket," sizes 4-inch through 24-inch, "TR Flex," sizes 4-inch through 64-inch; both by U. S. Pipe, or approved equal. "Megalug" restraint harness, EBAA Iron, or approved equal.

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3. Mechanical Joint: Dimensional and material requirements for pipe ends, glands, bolts and nuts, and gaskets shall conform to AWWA C111 with "Megalug," sizes 3-inch through 48-inch, EBAA Iron, or approved equal.
  4. Grooved and Shouldered Joints: AWWA C150, AWWA C151 and AWWA C606. 24-inch maximum size.
- I. Insulating Joints:
1. Provide a rubber-gasketed or other suitable approved type of insulating joint or dielectric coupling which will effectively prevent metal-to-metal contact at the joint between adjacent sections of dissimilar metals.
  2. Provide joint of the flanged type with insulating gasket, insulating bolt sleeves, and insulating washers.
  3. Provide gasket of the dielectric type, full face, as recommended in AWWA C115.
  4. Provide bolts and nuts as recommended in AWWA C115.
- J. Couplings: [check with manufacturer for sizes and pressure rating available]
1. Plain End Pipe to Plain End Pipe: Ductile iron or steel bolted couplings, manufacturer's shop coating with low alloy steel bolts and nuts. Steel couplings to conform to AWWA C219. Smith-Blair, Inc., Dresser, or approved equal.
  2. Plain End Pipe to Flanged Pipe: 1) Ductile iron or steel bolted flanged coupling adapters, manufacturer's shop coating with low alloy steel bolts and nuts. Steel flanged couplings to conform to AWWA C219. Smith-Blair, Inc., Dresser, or approved equal.; or 2) restrained flange adapter, "Megaflange," sizes 3-inch through 48-inch, EBAA Iron, or approved equal.

### 2.4 PE PIPE: SIZES 4 INCH THROUGH 64 INCH

- A. Pipe and Fittings: AWWA C906
- B. Joints:
1. Thermal Butt Fusion: AWWA C906 and pipe manufacturer's recommendations
  2. Flanged joints: AWWA C906 and pipe manufacturer's recommendations

### 2.5 PVC PIPE: SIZES 4-INCH THROUGH 48-INCH

- A. Pipe: Pressure Class 200, DR 14, spigot and gasket bell end, conforming to AWWA C900 (4-inch through 12-inch and AWWA C905 (14-inch through 48-inch)
- B. Fittings: Ductile iron fittings
1. Standard: AWWA C110, sizes 4-inch through 48-inch
  2. Compact: AWWA C153, sizes 4-inch through 24-inch
  3. All fittings shall be fusion epoxy coated per AWWA C116
- C. Unrestrained Joints: Push-On Bell and Spigot Joint: AWWA C900
- D. Restrained Joints:
1. Push-On Bell and Spigot Joint: Harness assembly as manufactured by EBAA Iron or approved equal.
  2. Plain End PVC to Ductile Iron Mechanical Joint: EBAA Iron or approved equal.
- E. Steel or Ductile Iron Couplings: [check with manufacturer for sizes and pressure rating available]
1. Plain End Pipe to Plain End Pipe: Ductile iron or steel bolted couplings, manufacturer's shop coating with low alloy steel bolts and nuts. Steel couplings to conform to AWWA C219. Smith-Blair, Inc., Dresser, or approved equal.

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Plain End Pipe to Ductile Iron or Steel Flanged Pipe: Ductile iron or steel bolted flanged coupling adapters, manufacturer's shop coating with low alloy steel bolts and nuts. Steel flanged couplings to conform to AWWA C219. Smith-Blair, Inc, Dresser or approved equal.

- F. PVC Couplings: [check with manufacturer for sizes and pressure rating available]
  - 1. Unrestrained Plain End to Plain End Pipe: AWWA C900, as manufactured by North American Piper approved equal. Restrained Plain End to Plain End Pipe: AWWA C900, "Fluid-Tite" as manufactured by North American Pipe, or approved equal.

### 2.6 FLEXIBLE CONNECTORS

- A. Flanged Coupling Adapters for plain end pipe at fittings, valves and equipment shall be Dresser Style 127 or 128, similar models by ITT; Baker Coupling Company or approved equal. Nuts, bolts and other hardware shall be Type 304 stainless steel.
- B. Mechanical Couplings shall be rated for a minimum working pressure of 150 psi. The barrel shall be a minimum 10 inches long. Couplings shall be cleaned and shop primed with manufacturer's standard rust inhibitive primer. Mechanical couplings shall be Smith-Blair, Romac, JCM, Apac or approved equal, with stainless steel nuts, bolts, and threaded rods.
- C. Flexible Coupling for Steel Pipe shall be Dresser Coupling Style 38 with EPDM gaskets or approved equal.

### 2.7 EXPANSION JOINT

- A. An expansion joint shall be installed at location indicated on the Plans and shall be manufactured of ductile iron conforming to the material properties of AWWA C153.
- B. Separation beyond the maximum extension of the expansion joint shall be prevented without the use of external tie rods.
- C. The expansion joint shall be pressure tested against its own restraint to a minimum of 250 psi.
- D. All pressure containing parts shall be lined with a minimum of 15 mils of fusion bonded epoxy, conforming to the applicable requirements of AWWA C213, and shall be tested with a 1500-volt spark test conforming to stated specification.
- E. Mechanical or Flanged Joint: The expansion joint shall be Model Ex-Tend 200, 4-inch through 36-inch, as manufactured by EBAA Iron, Inc., or approved equal.
- F. TR Flex Joints: TR Flex Telescoping Sleeve, 4-inch through 64-inch, U. S. Pipe.

### 2.8 FLEXIBLE EXPANSION JOINTS

- A. Flexible expansion joints shall be installed at locations indicated on the Plans and shall be manufactured of ductile iron conforming to the material requirements of ASTM A536 and AWWA C153.

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- B. Each flexible expansion joint shall be pressure tested prior to shipment against its own restraint to a minimum of 250 psi. A minimum 2:1 safety factor, determined from the published pressure rating, shall apply.
- C. Each flexible expansion joint shall consist of an expansion joint designed and cast as an integral part of a ball and socket type flexible joint, having a minimum per ball deflection of 15°, and 6 inches minimum expansion. The flexible expansion fitting shall not expand or exert an axial imparting thrust under internal water pressure. The flexible expansion fitting shall not increase or decrease the internal water volume as the unit expands or contracts.
- D. All internal surfaces (wetted parts) shall be lined with a minimum of 15 mils of fusion bonded epoxy conforming to the applicable requirements of AWWA C213. Sealing gaskets shall be constructed of EPDM. The coating and gaskets shall meet ANSI/NSF-61.
- E. Exterior surfaces shall be coated with a minimum of 6 mils of fusion bonded epoxy conforming to the applicable requirements of AWWA C116
- F. Polyethylene sleeves, meeting AWWA C105, shall be included for direct buried applications.
- G. Flanged or mechanical Joint: Flexible expansion joint shall be Force Balanced FLEX-TEND, sizes 3 inch through 48 inch, as manufactured by EBAA Iron, or approved equal.
- H. Flanged Joint: Starflex, Series 5000, Star Pipe Products, or approved equal.
- I. Plain End to Plain End Pipe: "Xtra Flex," sizes 4 inch through 24-inch, U. S. Pipe, or approved equal.

### 2.9 HIGH DEFLECTION FITTINGS/BALL JOINTS

- A. Plain End Pipe: Xtra Flex Restrained Joint High Deflection Fittings, 4 inch through 24-inch, U. S. Pipe, or approved equal.
- B. Mechanical or Flanged Joint: Flex 900, 4 inch through 12 inch, EBAA Iron, or approved equal.

### 2.10 GATE VALVES

- A. Provide valves conforming to AWWA C500 or AWWA C509
- B. Valves shall be resilient-seated, with non-rising stem, gray or ductile-iron body and bonnet, with bronze or gray or ductile-iron gate, bronze stem and square stem operating nut unless noted otherwise.
- C. [Metal seated, AWWA C500, and rubber seated, AWWA C504, are also available.]
- D. All bolts, nuts and washers, except operating nut, shall be stainless steel.
- E. Stem operating nut to be 2 inches square and open counterclockwise.

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- F. Stem extensions shall be installed to bring the stem operating nut to within 2-feet of finish grade where the depth from finish grade to the stem operating nut exceeds 4-feet.
- G. Equip valves in pump stations and other interior or vault installations with hand-wheels.
- H. Provide protective epoxy interior and exterior coating according to AWWA C550 and manufacturer's recommendations.
- I. For the domestic water system, valves shall also conform to NSF 61.
- J. Service valve Valves and fittings, 2-inch and smaller shall be in accordance with AWWA C800
- K. Where a post indicator is shown, provide valve with an indicator post flange.
- L. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the project include, but are not limited to, the following:
  - 1. Mueller Company
  - 2. M&H Valve Company
  - 3. Crane Company, or approved equal

### 2.11 SWING CHECK VALVES

- A. Provide swing-check type valves conforming to AWWA C508.
- B. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Project include, but are not limited to, the following:
  - 1. Mueller Company
  - 2. M&H Valve Company
  - 3. DeZurik/APCO
  - 4. Watts, or approved equal

### 2.12 BALL VALVES

- A. Provide ball valves (6 inch through 48-inch) per AWWA C507 as manufactured by Crane Company or approved equal.
- B. Provide ball valves (2 inches and smaller) conforming to AWWA C800 as manufactured by Mueller 300 Series, Ford, or approved equal.
- C. Valves shall open by counterclockwise rotation of the valve stem.
- D. Provide valves with ends as appropriate for the adjoining pipe.
- E. Provide valve with lockable operating nut or handle as shown on the Plans.

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### 2.13 AIR RELEASE, AIR/VACUUM AND COMBINATION AIR VALVES

- A. Air release and vacuum valves: Provide valve and service size as shown on the Plans. Valve shall have cast-iron single valve body and shall conform to AWWA C512. A compound lever system shall have a maximum operating pressure of 300 psi. Provide a protective cap for the outlet of the valve. Provide universal air-vacuum type valves, Crispin, DeZurik/APCO or approved equal.
- B. Combination air valves: Provide valve and service size as shown on the Plans. Valve shall have cast-iron single valve or double valve body and shall conform to AWWA C512. A simple or compound lever system shall have a maximum operating pressure of 300 psi. Provide a protective cap for the outlet of the valve.
- C. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the project include, but are not limited to, the following:
  - 1. Crispin
  - 2. DeZurik/APCO, or approved equal

### 2.14 BLOW-OFF VALVES

- A. Provide valve and service size as shown in the Plans. Provide 2-inch valves at low points of the piping system, and 4-inch valves at dead-ends of the piping system, unless otherwise directed by the Engineer.
- B. 2-inch blow-off shall have a 2-inch vertical female iron pipe (FIP) inlet and a 2-inch normal pressure and temperature (NPT) nozzle outlet with cap. Valve shall open by counterclockwise rotation of a top-mounted 9/16-inch square operating nut. All working parts shall be serviceable without excavation. Kupferle/Truflo Model TF550 or approved equal.
- C. 4-inch blow-off shall have all brass principal working parts, 4-inch inlet and outlet and is self-draining and non-freezing. Valve shall open by counterclockwise rotation of a top-mounted 2 inch square operating nut. All working parts shall be serviceable without excavation.
- D. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Project include, but are not limited to, the following:
- E. Kupferle/ MainGuard #7600, or approved equal

### 2.15 PRESSURE-REDUCING VALVES

- A. Valve: Automatic, pilot-operated, cast-iron body with interior coating according to AWWA C550. 250 psi working-pressure, bronze pressure-reducing pilot valve and tubing, and means for discharge pressure adjustment.
- B. Valves shall have flanged ends. Valves sized 3 inches or smaller may have screwed ends.

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- C. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Project include, but are not limited to, the following:
  1. Cla-Val Company
  2. Bermad
  3. Ames Company, or approved equal

### 2.16 FLOW-REGULATING VALVES

- A. Valve: Automatic, pilot-operated, cast-iron body with interior coating according to AWWA C550. 250 psi working-pressure, bronze pressure-reducing pilot valve and tubing, and means for flow adjustment. Details as indicated.
- B. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Project include, but are not limited to, the following:
  1. Cla-Val Company
  2. Bermad
  3. Ames Company, or approved equal

### 2.17 SERVICE CONNECTIONS AND WATER METERS

- A. Service connections and water meter details and boxes as indicated.

### 2.18 VALVE BOXES, METER BOXES, FRAMES AND COVERS

- A. Water Valve Box: Provide pre-cast concrete valve box for each buried valve. Provide box with steel or cast-iron traffic cover marked "WATER". Christy Model G5 with G5C cover or approved equal.
- B. Valve or Meter Boxes: Contractor shall verify box size required for water system appurtenances as shown in the Construction Documents. Provide a precast concrete utility box for each buried appurtenance. Provide a traffic-rated lid for H20 loading. A non-traffic rated lid may be used for boxes located in landscape areas. Christy, or approved equal.

### 2.19 BACKFLOW PREVENTER - REDUCED PRESSURE PRINCIPLE ASSEMBLIES (RPPA)

- A. Provide RPPA consisting of two independently operating check valves with a pressure differential relief valve located between the two check valves, two shut-off valves and four test cocks. RPPA shall be tamper-proof and conform to AWWA C511. Valve shall have an outside screw (OS) gate valve on inlet and outlet, and strainer on inlet. Include test cocks and pressure-differential relief valve with ASME A112.1.2 air gap fitting located between 2 positive-seating check valves for continuous-pressure application.
- B. Body:
  1. 2 inch and Smaller: Bronze with threaded ends
  2. 2 ½ inch and Larger: Bronze, cast iron steel, or stainless steel with flanged ends
- C. Interior Lining: AWWA C550, epoxy coating for cast iron or steel bodies
- D. Interior Components: Corrosion-resistant materials

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- E. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Project include, but are not limited to, the following:
1. Cla-Val Company
  2. Ames Company
  3. Febco, CMB Industries, Inc.
  4. Hersey Products, Inc.
  5. Watts
  6. Zurn/Wilkins, or approved equal

### 2.20 BACKFLOW PREVENTER - DOUBLE CHECK DETECTOR ASSEMBLY (DCDA)

- A. Provide a cast-iron body DCDA consisting of mainline double check assemblies in parallel with a bypass double check and meter assembly, two shut-off valves and four test cocks. DCDA shall be tamper-proof and conform to AWWA C510. FM approved or UL listed, with outside screw and yoke (OS&Y) gate valve on inlet and outlet, and strainer on inlet. Include two positive-seating check valves and test cocks, and bypass with displacement-type water meter, valves, and double-check backflow preventer, for continuous pressure application.
- B. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Project include, but are not limited to, the following:
1. Cla-Val Company
  2. Ames Company
  3. Febco, CMB Industries, Inc.
  4. Hersey Products, Inc.
  5. Zurn/Wilkins, or approved equal

### 2.21 POST INDICATOR VALVE

- A. General: UL 789, FM approved, vertical-type, cast-iron body with operating wrench extension rod, and adjustable cast-iron barrel of length required for depth of bury of valve. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Project include, but are not limited to, the following:
1. Mueller Company
  2. Clow Corporation
  3. American Cast Iron Company

### 2.22 FIRE DEPARTMENT CONNECTION

- A. Exposed, sidewalk or Freestanding Type Fire Department Connection: UL 405, cast brass body with threaded inlets according to NFPA 1963 and matching local fire department hose threads and threaded bottom outlet. Include lugged caps, gaskets and chains; lugged swivel connections and drop clapper for each hose-connection inlet; 18-inch-high brass sleeve; and round escutcheon plate. Number of inlets shall be as shown on the Plans. Clapper and spring check inlets shall each have a minimum capacity of 250 gpm and be furnished with a cap and chain. Outlet shall be sized for simultaneous use of all inlets. Connection shall be branded "Building XX".
1. 2-Way FDC: Connection shall conform to UL 405 or FM 1530. Elkhart, Croker, or approved equal.
  2. 3-Way FDC: Connection shall be subject to approval by the local water department or fire marshal. Elkhart, Croker, Potter-Roemer or approved equal.

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3. 4-Way FDC: Connection shall conform to UL 405. Potter-Roemer, Croker, or approved equal.
4. 6-Way FDC: Connection shall be subject to approval by the local water department or fire marshal. Croker, Potter-Roemer or approved equal.

### 2.23 FIRE HYDRANTS

- A. Provide two 2-1/2-inch and one 4-1/2-inch outlets, with a 6-inch nominal inside diameter inlet and break-away type bolts. Hydrant shall have a working pressure of 250 psi and shall conform to AWWA C502 or C503, and be UL listed and FM approved. Provide hydrants of one manufacturer. Clow model 960 series or approved equivalent, subject to approval of the Owner and fire marshal.

### 2.24 THRUST BLOCKS

- A. Use concrete conforming to ASTM C94 having a minimum compressive strength of 2,500 psi at 28 days; or use concrete of a mix not leaner than one part cement, 2 1/2 parts sand, and 5 parts gravel, having the same minimum compressive strength.
- B. Provide thrust blocks or mechanical pipe restraints at all fittings and changes in angle, alignment or elevation.
- C. Where depth or location of existing structures prohibit the use of standard thrust blocks, gravity blocks may be used.

### 2.25 TAPPING SLEEVES AND TAPPING VALVES

- A. Tapping sleeves shall be epoxy coated and furnished with stainless steel washers, nuts and bolts. Mueller H-615 and H-619, Ford, or approved equal.
- B. Tapping valves shall have flanged inlet, Class 125, conforming to ASME B16.1 and furnished with stainless steel washers, nuts and bolts. Tapping valves shall be constructed with a mechanical joint outlet. Mueller T-687, T-642, T-681, or approved equal.

### 2.26 SERVICE SADDLES AND CORPORATION STOPS

- A. Service Saddles: Saddles shall conform to AWWA C800 and NSF 61.
  1. For DIP: Provide bronze or stainless-steel body, double strap type with a 200 psi, maximum working pressure. Mueller BR2 Series, Ford, or approved equal.
  2. For PVC: Provide bronze body, wide strap type. Mueller H-13000 Series, Ford, or approved equal.
  3. For PE: Per manufacturer's recommendations.
- B. Corporation Stops: Provide ground key type; bronze conforming to ASTM B61 or ASTM B62, for a working pressure of 100 psi and suitable for the working pressure of the system.
  1. Ends shall be suitable for adjoining pipe and connections, solder-joint, or flared tube compression type joint.
  2. Threaded ends shall conform to AWWA C800.
  3. Coupling nut for connection to flared copper tubing shall conform to ASME B16.26.
  4. Mueller H-15000 Series with "CC" threads and a copper flare straight connection outlet, Ford, or approved equal.

## 2.27 IDENTIFICATION MATERIALS AND DEVICES

- A. Warning Tape: Provide warning tape consisting of metallic foil bonded to solid blue plastic film not less than 3 inches wide. Film shall be inert polyethylene plastic. Film and foil shall each not be less than 1 mil thick. The tape continuously shall have printed black letter, not less than 3/4 inch high, message reading "CAUTION: WATER MAIN BELOW".
- B. Tracer Wire for Nonmetallic Piping: Provide 12 guage, coated copper or aluminum wire not less than 0.10 inch in diameter, with blue THW, THWN, or THHN rated insulation, in sufficient length to be continuous over each separate run of nonmetallic pipe. Wire shall be tied in at all valves.

## PART 3 - EXECUTION

### 3.1 PIPE INSTALLATION

- A. Pipe Depth and Trench Configuration: Conform to elevations, profiles and typical trench section(s) shown on the Plans.
- B. Excavation, Bedding, Backfill, and Compaction: Section 31 21 00 – Utility Trenching and Backfill.
- C. Handling: Carefully handle during loading, hauling, unloading and placing operations to avoid breakage or damage. Use strap type slings for lifting and placing; no chains or hooks will be permitted. Comply with manufacturer's recommendations.
- D. Pipe laying and jointing:
  - 1. Provide proper facilities for lowering sections of pipe into trenches.
  - 2. Do not drop or dump pipe, fittings, valves, or any other water line material into trenches.
  - 3. Cut pipe accurately to length established at the site and work into place without springing or forcing. Replace any pipe or fitting that does not allow sufficient space for proper installation of jointing material.
  - 4. Blocking or wedging between bells and spigots will not be permitted. Lay bell-and-spigot pipe with the bell end pointing in the direction of laying.
  - 5. Grade the pipeline in straight lines; avoid the formation of dips and low points.
  - 6. Support pipe at proper elevation and grade.
  - 7. Provide secure firm, uniform support. Wood support blocking will not be permitted.
  - 8. Lay pipe so that the full length of each section of pipe and each fitting rests solidly on the pipe bedding; excavate recesses to accommodate bells, joints, and couplings.
  - 9. Provide anchors and supports where indicated and where necessary for fastening work into place.
  - 10. Make proper provision for expansion and contraction of pipelines.
  - 11. Keep trenches free of water until joints have been properly made.
  - 12. Do not lay pipe when conditions of trench or weather prevent proper installation.
  - 13. All fittings shall be blocked with appropriately sized thrust blocks as shown on the Plans.

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- E. Installation of Tracer Wire:
  - 1. Install a continuous length of tracer wire for the full length of each run of nonmetallic pipe.
  - 2. Attach wire to top of pipe in such manner that it will not be displaced during construction operations.
  - 3. Form a mechanically and electrically continuous line throughout the pipeline, extending to the nearest valve or other pipeline appurtenance. Extend the wire up the outside of the valve box/riser and cut a hole that is 8 inches from the top, extend a 12-inch wire lead to the inside of the box. At other pipeline appurtenances, terminate the 12-inch wire lead inside the enclosure.
  - 4. Splice wire with a splicing device consisting of an electro-tin plated seamless copper sleeve conductor. Install as recommended by the manufacturer. Wrap splices and damaged insulation with electrician's tape.
- F. Installation of Warning Tape
  - 1. Install tape approximately 1 foot above and along the centerline of the pipe.
  - 2. Where tape is not continuous, lap tape ends a minimum of 2 feet.
- G. Curved Alignment: When necessary to conform to the alignment specifically indicated, lay pipe on a curved alignment by means of asymmetrical closure of joints or bending of the pipe barrel. If necessary, use shorter than the standard lengths of pipe to achieve curvature specified. Do not exceed the recommendations of the pipe manufacture for deflections at the joints or pipe bending.
- H. Connections to Existing Lines:
  - 1. Make connections to existing water lines after approval is obtained and with a minimum interruption of service on the existing line.
  - 2. Make connections to existing lines under pressure in accordance with the recommended procedures of a manufacturer of pipe of which the line being tapped is made.
- I. Closure: Close open ends of pipes and appurtenance openings at the end of each day's work or when work is not in progress.

### 3.2 INSTALLATION OF DUCTILE-IRON PIPING

- A. Install pipe and fittings in accordance with requirements of AWWA C600 for pipe installation, joint assembly, valve-and-fitting installation, and thrust restraint.
- B. Jointing:
  - 1. Provide push-on joints with the gaskets and lubricant specified for this type joint; assemble in accordance with the applicable requirements of AWWA C600 for joint assembly.
  - 2. Provide mechanical joints with the gaskets, glands, bolts, and nuts specified for this type joint; assemble in accordance with the applicable requirements of AWWA C600 for joint assembly and with the recommendations of AWWA C111.
  - 3. Provide flanged joints with the gaskets, bolts, and nuts specified for this type joint.
  - 4. Install flanged joints up tight; avoid undue strain on flanges, fittings, valves, and other equipment and accessories.
  - 5. Align bolt holes for each flanged joint.

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6. Use full size bolts for the bolt holes; use of undersized bolts to make up for misalignment of bolt holes or for any other purpose will not be permitted.
  7. Do not allow adjoining flange faces to be out of parallel to such degree that the flanged joint cannot be made watertight without over straining the flange.
  8. Where flanged pipe and fitting have dimensions that do not allow the installation of a proper flanged joint as specified, replace it by one of proper dimensions.
  9. Use set screwed flanges to make flanged joints where conditions prevent the use of full-length flanged pipe. Assemble in accordance with the recommendations of the set screwed flange manufacturer.
  10. Provide insulating joints with the gaskets, sleeves, washers, bolts, and nuts previously specified for this type joint. Assemble insulating joints as specified for flanged joints. Bolts for insulating sleeves shall be full size for the bolt holes.
  11. Ensure that there is no metal-to-metal contact between dissimilar metals after the joint has been assembled.
- C. Exterior Protection: Completely encase buried ductile iron pipelines and underground appurtenances with polyethylene wrap. Install 8 mil linear low-density polyethylene (LLD) film or 4 mil high-density cross-laminated (HDCL) film per manufacturer's recommendations and in accordance with AWWA/ANSI C105/A21.5 and ASTM A674.
- D. Pipe Anchorage: Provide concrete thrust blocks or restrained joints for pipe anchorage, except where metal harness is indicated on the Plans.

### 3.3 INSTALLATION OF POLYVINYL CHLORIDE PIPING

- A. Comply with the recommendations for pipe installation, joint assembly and appurtenance installation in AWWA Manual M23.
- B. Comply with the applicable requirements of AWWA C600 for joint assembly, and with the recommendations of Appendix A to AWWA C111.
- C. Jointing:
1. Provide push-on joints with the elastomeric gaskets specified for this type joint, using either elastomeric-gasket bell-end pipe or elastomeric-gasket couplings.
  2. For pipe-to-pipe push-on joint connections, use only pipe with push-on joint ends having factory-made bevel.
  3. For push-on joint connections to metal fittings, valves, and other accessories, cut spigot end of pipe off square and re-bevel pipe end to a bevel approximately the same as that on ductile-iron pipe used for the same type of joint.
  4. Use an approved lubricant recommended by the pipe manufacturer for push-on joints.
  5. Assemble push-on joints for connection to fittings, valves, and other accessories in accordance with the applicable requirements of AWWA C600 for joint assembly.
  6. Make compression-type joints/mechanical-joints with the gaskets, glands, bolts, nuts, and internal stiffeners previously specified for this type joint. Cut off spigot end of pipe for compression-type joint or mechanical-joint connections and do not re-bevel.
  7. Assemble joints made with sleeve-type mechanical couplings in accordance with the recommendations of the coupling manufacturer using internal stiffeners as previously specified for compression-type joints.

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- D. Pipe Anchorage:
  - 1. Provide concrete thrust blocks or restrained joints for pipe anchorage, except where metal harness is indicated on the Plans.

### 3.4 INSTALLATION OF POLYETHYLENE PIPING

- A. Install pipe, fittings, and appurtenances in accordance with manufacturer's recommendations.
- B. Jointing:
  - 1. Provide mechanical joints, compression fittings, or flanges as recommended by the manufacturer.
  - 2. Jointing shall be performed using proper equipment and machinery by trained and certified personnel.
  - 3. Joints, fittings and tools shall be clean and free of burrs, oil, and dirt.
  - 4. Butt fusion:
    - a. Pipe ends shall be faced to establish clean, parallel mating surfaces.
    - b. Align and securely fasten the components to be joined squarely between the jaws of the joining machine.
    - c. Heat the ends of the pipe to the pipe manufacturer's recommended temperature interface pressure and time duration. A pyrometer or other surface temperature measuring device should be used to ensure proper temperature of the heating tool. Temperature indicating crayons shall not be used on a surface which will come into contact with the pipe or fitting.
    - d. Prevent molten plastic from sticking to the heater faces. Molten plastic on the heater faces shall be removed immediately according to the tool manufacturer's instructions.
    - e. Bring the molten ends together with sufficient pressure to properly mix the pipe materials and form a homogeneous joint. Hold the molten joint under pressure until cooled adequately to develop strength. Refer to the manufacturer's recommendations for temperature, pressure, holding, and cooling times.
    - f. Remove the inside bead from the fusion process using Manufacturer's recommended procedure.
  - 5. Socket fusion:
    - a. Mixing manufacturers' heating tools and depth gauges will not be allowed unless the tools conform to ASTM F1056.
    - b. Pipe ends shall be faced square to establish clean, parallel mating surfaces.
    - c. Clamp the cold ring on the pipe at the proper position using a depth gauge.
    - d. Heat the tool to the pipe manufacturer's recommended temperature. A pyrometer or other surface temperature measuring device should be used to ensure proper temperature. Temperature indicating crayons shall not be used on a surface which will come into contact with the pipe or fitting.
    - e. Follow manufacturer's recommendations for bringing the hot tool faces into contact with the outside surface of the end of the pipe and the inside surface of the socket fitting.
    - f. Simultaneously remove the pipe and fitting from the tool.

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- g. Inspect the melt pattern for uniformity and immediately insert the pipe squarely and fully into the socket of the fitting until the fitting contacts the cold ring. Do not twist the pipe or fitting during or after the insertion.
- h. Hold or block the pipe in place during cooling.
- 6. Electrofusion:
  - a. Unless the operation is for a saddle-type electrofusion joint, pipe ends shall be faced square to establish clean, parallel mating surfaces.
  - b. Clamp the pipe and fitting at the proper position in the fixture.
  - c. Connect the electrofusion control box to the fitting and to the power source. Apply the electric current using manufacturer's instructions.
  - d. Allow the joint to cool before removing the clamping fixtures.

### 3.5 INSTALLATION OF VALVES

- A. Gate Valves
  - 1. Install gate valves conforming to AWWA C500 and UL 262 in accordance with the requirements of AWWA C600 for valve-and-fitting installation and with the recommendations of the Appendix (Installation, operation, and Maintenance of Gate Valves) to AWWA C509.
  - 2. Install gate valves conforming to AWWA C509 in accordance with the requirements of AWWA C600 for valve-and-fitting installation and with the recommendations of the Appendix (Installation, Operation, and Maintenance of Gate Valves) to AWWA C509.
  - 3. Install gate valves on PVC water mains in addition in accordance with the recommendations for appurtenance installation in AWWA Manual M23.
- B. Butterfly Valves: Install butterfly valves in accordance with the applicable requirements of Appendix A of AWWA C504.
- C. Check Valves: Install check valves in accordance with the applicable requirements of AWWA C600 for valve-and-fitting installation, except as otherwise indicated.
- D. Joints:
  - 1. Valves on DI, PE and PVC Pipe: Mechanical joint valves for buried locations. Flanged-end valves for installation in vaults/pits.
  - 2. Valves on Steel Pipe: As indicated for buried locations. Flanged-end valves for installation in vaults/pits.

### 3.6 INSTALLATION OF VALVE AND METER BOXES

- A. Boxes shall be centered over the appurtenance so as not to transmit shock or stress. Covers shall be set flush with the surface of the finished pavement, or as shown on the Plans. Backfill shall be placed around the boxes and compacted to the specified level in a manner that will not damage or displace the box from proper alignment or grade. Misaligned boxes shall be excavated, plumbed, and backfilled at no additional cost to the Owner.

### 3.7 INSTALLATION OF FIRE HYDRANTS

- A. Install fire hydrants, except for metal harness, plumbed vertical, in accordance with AWWA C600 for hydrant installation and as indicated.

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- B. Provide and assemble joints as specified for making and assembling the same type joints between pipe and fittings. Hydrants shall be set so that mounting bolts clear the top of finished grade by three inches so bolts may be easily replaced if needed.
- C. Provide metal harness as specified under pipe anchorage requirements for the respective pipeline material to which hydrant is attached.

### 3.8 SERVICE LINE CONNECTIONS TO WATER MAINS

- A. Connect service lines of size shown on plans to the main with a rigid connection or a corporation stop and gooseneck. Install a gate valve on the service line.
- B. Connect service lines to ductile-iron water mains in accordance with AWWA C600 for service taps.
- C. Connect service lines to PVC plastic water mains in accordance with the recommendations of AWWA Manual M23.

### 3.9 INSTALLATION OF BACKFLOW PREVENTERS

- A. Backflow devices shall be installed horizontal and level, with three feet minimum clearances from obstructions.

### 3.10 ANCHORAGE INSTALLATION

- A. Mechanically Restrained Joints: Install where indicated for lengths indicated in accordance with manufacturer's instructions.
- B. PCC Thrust Blocks: Install where required and as indicated. Bearing area indicated is to be against undisturbed earth. Allow a minimum of 24 hours curing time before introducing water into the pipeline and allow a minimum of 7 days curing time before pressure testing.

### 3.11 CONNECTION TO EXISTING

- A. Contractor shall submit a work plan delineating the work sequence and duration of each task.
- B. The Contractor to submit a contingency plan in case work extends beyond the allowable shutdown duration
- C. Contractor to notify Owner 48 hours prior to shut down.
- D. Prior to shut down the Contractor shall have the following:
  - 1. Approved submittals for the work to be done
  - 2. Approved work plan
  - 3. Approved contingency plan
  - 4. The material, tools and equipment necessary to do the work, including pumps, generator, lighting, etc.
- E. No work shall be done within two weeks from a wet weather event.
- F. Contractor to check the weather (NOAA website) and plan work during dry weather period.

### 3.12 HYDROSTATIC PRESSURE AND LEAKAGE TEST

#### A. General:

1. Provide all necessary materials and equipment, including water.
2. Backfill all trenches sufficient to hold pipe firmly in position.
3. Allow time for thrust blocks to cure prior to testing.
4. Flush all pipes prior to testing to remove all foreign material.
5. Perform pressure and leakage test concurrently.
6. Apply test pressure by means of a pump connected to the pipe.
7. Base test pressure on the elevation of the lowest point in the line.
8. Fill each closed valve section or bulk-headed section slowly. Expel air from section being tested by means of permanent air vents installed at high points or by means of temporary corporation cocks installed at such points. Remove and plug the temporary corporation cocks at the conclusion of the test.
9. Ensure the release of air from the line during filling and prevent collapse due to vacuum when dewatering the line.
10. The pressure test on mortar-lined pipe shall not begin until the pipe has been filled with water for at least 24 hours to allow for absorption in the cement mortar lining.
11. Allow the system to stabilize at the test pressure before conducting the leakage test.
12. Do not operate valves in either the opening or closing direction at differential pressures above the valves rated pressure.
13. Maintain test pressure as specified for type of pipe being tested.
14. Pressure Test: Examine any exposed pipe, fittings, valves, hydrants and joints during the test, if no leaks are observed the section of line has passed the pressure test. If leaks are observed, repair any damaged or defective pipe, fittings, valves, or hydrants, and repeat the pressure test.
15. Leakage Test: Perform as specified hereafter for the type of pipe being installed.

#### B. Preparation for Test

1. Vents shall be provided at the high points of the system and drains provided where means of venting or draining do not exist.
2. Remove or block off, all relief valves, rupture discs, alarms, control instruments, etc. that shall not be subjected to the test pressure.
3. All discs, balls, or pistons from check valves shall be removed if they interfere with filling of the system. Open all valves between inlet and outlet of the section to be tested.
4. Connect pump and provide temporary closures for all of the external openings in the system. Use caution to ensure that the closures are properly designed and strong enough to withstand the test pressure.
5. A joint previously tested in accordance with this specification may be covered or insulated.
6. Expansion joints shall be provided with temporary restraint for additional pressure under test or shall be isolated from the test.
7. Flanged joints, where blanks are inserted to isolate equipment during the test, need not be tested.

#### C. DIP Leakage Test: Perform in accordance with AWWA C600. Selected requirements of AWWA C600 are repeated as follows:

1. The pipe shall be subjected to a hydrostatic pressure of 50 percent above the normal operating pressure, or 150 psi, whichever is greater. In no case shall the pressure be allowed to exceed the design pressure for pipe, appurtenances, or thrust restraints.

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2. Maintain the test pressure, +/- 5 psi, for a minimum of four hours.
3. No piping will be accepted if the leakage is greater than that determined by the following formula:

$$L = (S \times D \times P^{1/2})/133,200$$

L = Allowable leakage, gallons per hour.

S = Length of pipe tested, feet.

D = Nominal diameter of pipe, inches.

P = Average test pressure during the leakage test, pounds per square inch (gauge).

D. PE Pipe Leakage Test:

1. The pipe shall be subjected to a hydrostatic pressure of 50 percent above the normal operating pressure, or 150 psi, whichever is greater. In no case shall the pressure be allowed to exceed the design pressure for pipe, appurtenances, or thrust restraints.
2. Apply the test pressure and allow the pipe to stand, without makeup pressure, for sufficient time to allow for diametric expansion or pipe stretching to stabilize, approximately two to three hours.
3. After the above stabilization has occurred, return the section being tested to the test pressure. Hold the test pressure for four hours. If the pressure in the test section drops, and it is determined the drop may be the result of expansion resulting from increasing temperature, a limited amount of additional water may be added to bring the pressure back to the test pressure. Allowable amounts of make-up water, to compensate for expansion due to increasing temperature, are as shown in the following table. Make-up water is only allowed during this final test period and not during the initial stabilization described in the previous paragraph. If the additional water added is less than the allowable shown in the table and there are no visual leaks or significant pressure drops, the tested section passes the test.

Nominal Pipe Size (in.)	Allowance for Expansion (U.S. Gals./100 Feet of Pipe)		
	1-Hour Test	2-Hour Test	3-Hour Test
3	0.10	0.15	0.25
4	0.13	0.25	0.40
6	0.30	0.60	0.90
8	0.50	1.0	1.50
10	0.75	1.3	2.1
11	1.0	2.0	3.0
12	1.1	2.3	3.4
14	1.4	2.8	4.2
16	1.7	3.3	5.0
18	2.2	4.3	6.5
20	2.8	5.5	8.0
22	3.5	7.0	10.5
24	4.5	8.9	13.3
28	5.5	11.1	16.8
32	7.0	14.3	21.5
36	9.0	18.0	27.0
40	11.0	22.0	33.0
48	15.0	27.0	43.0

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- E. PVC Pipe Leakage Test: Perform in accordance with AWWA M23. Selected requirements of AWWA M23 are repeated as follows:

1. The pipe shall be subjected to a hydrostatic pressure of 50 percent above the normal operating pressure, or 150 psi, whichever is greater. In no case shall the pressure be allowed to exceed the design pressure for pipe, appurtenances, or thrust restraints.
2. Maintain the test pressure, +/- 5 psi, for a minimum of four hours.
3. No piping will be accepted if the leakage is greater than that determined by the following formula:

$$L = (N \times D \times P^{1/2}) / 7,400$$

L = Allowable leakage, gallons per hour.

N = Number of joints in the length of the pipeline tested.

D = Nominal diameter of pipe, inches.

P = Average test pressure during the leakage test, pounds per square inch (gauge).

- F. Cement Mortar Lined and Coated Steel Pipe Leakage Test: Perform in accordance with AWWA M11. Selected requirements of AWWA M11 are repeated as follows:

1. All pipelines shall be tested by subjecting each section to a pressure, measured at the lowest end of the section, of at least 150 percent of the class rating or design pressure of the pipe under test. In no case shall the pipe be tested at less than 150 psi, nor shall the pressure be allowed to exceed the design pressure for pipe, appurtenances, or thrust restraints.
2. Maintain the test pressure, +/- 5 psi, for a minimum of four hours.
3. There shall be no significant leakage for pipe with welded joints or mechanical couplings.
4. For pipe joined with O-ring rubber gaskets, a leakage of 25 gallons per inch of diameter per mile per 24 hours is allowed.

### 3.13 CLEANING

- A. At the conclusion of the work, thoroughly clean all pipelines by flushing with water or other means to remove all dirt, stones, pieces of wood, or other material which may have entered the pipes during the construction period. Debris cleaned from the lines shall be removed from the low end of the pipeline. If after this cleaning, obstructions remain, they shall be removed. After the pipelines are cleaned and if the groundwater level is above the pipe or following a heavy rain, the Owner will examine the pipes for leaks. If any further defective pipes or joints are discovered, the Contractor shall repair them. Finished paving shall not be installed prior to completion of all cleaning and testing.

### 3.14 DISINFECTION OF PIPELINES

- A. After completion of the hydrostatic test, the mains shall be thoroughly flushed with a minimum pipe velocity of 2.5 fps and chlorinated in accordance with the latest revision of AWWA 651, Standards of Disinfecting Water Mains. Any one of the methods therein described may be used, with the additional requirement of 50 ppm chlorination minimum initial application. At the end of the contact period, the mains shall again be flushed, and bacteriological samples taken.

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- B. If necessary, the Contractor shall provide, at his expense, outlets from which to take the samples. The location of the chlorination and sampling points will be determined by the Owner in the field. Taps for chlorination and sampling shall be installed. The Contractor shall uncover and backfill the taps as required.
- C. Disinfection of tie-ins shall be performed by the Contractor by swabbing with chlorine or by other approved methods. Following a tie-in, the area affected by the tie-in shall be thoroughly flushed and bacteriological samples will be taken as deemed necessary.
- D. All treated water flushed from the lines shall be dechlorinated and disposed of by discharging to the locations identified in the Plans, or by other approved means. No discharge of chlorinated water to any storm sewer or natural water course will be allowed, unless properly dechlorinated.
- E. The Contractor shall rechlorinate and retest any lines that do not meet the requirements of the above testing. The line shall not be placed in service until the requirements of the State Public Health Department are met.

### 3.15 BACTERIOLOGICAL TESTING

- A. Samples shall be gathered and tests conducted at the expense of the Contractor by a laboratory approved by the Owner.
- B. Water samples are to be taken at representative points no less than one test per 500 feet of pipe, plus one test at each end of the pipe: or as required by the Owner.
- C. After the samples have passed the bacteriological testing, the Contractor will be notified and arrangements can be made to make tie-ins and connections to house services.
- D. Each water sample will have passed the bacteria tests if they show zero total coliform per 100 ml and not more than 50 non-sheen bacteria per 100 ml, and when the turbidity is no greater than the source water.
- E. Samples shall be taken no sooner than 24 hours after final flushing.
- F. Jumpers and/or plates shall be pulled within 14 days of the notification of a successful test, or new bacteria samples will have to be taken.
- G. Follow-up bacteriological testing shall take place after tie-ins have been made and shall meet the same passing requirements as the initial tests.

END OF SECTION 331000

SECTION 334100 - STORM UTILITY DRAINAGE PIPING

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Roadway and/or site storm drainage system up to five feet of any on-site building

1.2 RELATED SECTIONS

- A. Section 31 21 00, Utility Trenching and Backfill
- B. Section 32 13 18, Cement and Concrete for Exterior Improvements

1.3 RELATED DOCUMENTS

A. AASHTO

- 1. M199: Precast Reinforced Concrete Manhole Sections
- 2. M252: Corrugated Polyethylene Drainage Pipe
- 3. M294: Corrugated Polyethylene Pipe, 12-to-604-inch Diameter

B. ASTM

- 1. A74: Cast Iron Soil Pipe and Fittings
- 2. A615: Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
- 3. C143: Standard Test Method for Slump of Hydraulic-Cement Concrete
- 4. C443: Joints for Concrete Pipe and Manholes, Using Rubber Gaskets
- 5. C478: Circular Precast Reinforced Concrete Manhole Sections
- 6. C564: Rubber Gaskets for Cast Iron Soil Pipe and Fittings
- 7. C923: Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes, and Laterals
- 8. C1173: Flexible Transition Couplings for Underground Piping Systems
- 9. D1785: Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120
- 10. D2321: Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity Flow Applications
- 11. D2564: Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems
- 12. D3034: Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings
- 13. D4101: Propylene Injection and Extrusion Materials
- 14. F477: Elastomeric Seals (Gaskets) for Joining Plastic Pipe
- 15. F656: Primers for Use in Solvent Cement Joints of Poly(Vinyl Chloride) (PVC) Plastic Pipe and Fittings
- 16. F679: Poly(Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings
- 17. F1336: Poly(Vinyl Chloride) (PVC) Gasket Sewer Fittings

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- C. AWWA
  - 1. C104: Cement-Mortar Lining for Ductile-Iron Pipe and Fittings
  - 2. C105: Polyethylene Encasement for Ductile-Iron Pipe Systems
  - 3. C110: Ductile-Iron and Gray-Iron Fittings, 3 In. Through 48 In. for Water
  - 4. C111: Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
  - 5. C115: Flanged Ductile-Iron Pipe With Ductile-Iron or Gray-Iron Threaded Flanges
  - 6. C116: Protective Fusion-Bonded Coatings for the Interior and Exterior Surfaces of Ductile-Iron and Gray-Iron Fittings
  - 7. C150: Thickness design of Ductile Iron Pipe
  - 8. C151: Ductile-Iron Pipe, Centrifugally Cast
  - 9. C153: Ductile-Iron Compact Fittings
  - 10. C219: Bolted, Sleeve-type Couplings for Plain-End Pipe
  - 11. M41: Ductile Iron Pipe and Fittings
  
- D. Caltrans Standard Specifications, 2015
  - 1. Section 51, Concrete Structures
  - 2. Section 52, Reinforcement
  - 3. Section 65, Concrete Pipe
  - 4. Section 66, Corrugated Metal Pipe
  - 5. Section 70, Miscellaneous Drainage Facilities
  - 6. Section 72, Slope Protection
  - 7. Section 75, Miscellaneous Metal
  - 8. Section 90, Concrete
  
- E. Caltrans Standard Plans, 2015
  - 1. Plan D94A: Metal and Plastic Flared End Sections
  - 2. Plan D94B: Concrete Flared End Sections
  - 3. Plan D97A: Corrugated Metal Pipe Coupling Details No. 1, Annular Coupling Band Bar and Strap and Angle Connection
  - 4. Plan D97C: Corrugated Metal Pipe Coupling Details No. 3, Helical and Universal Couplers
  - 5. Plan D97D: Corrugated Metal Pipe Coupling Details No. 4, Hugger Coupling Bands
  - 6. Plan D97E: Corrugated Metal Pipe Coupling Details No. 5, Standard Joint
  - 7. Plan D97F: Corrugated Metal Pipe Coupling Details No. 6, Positive Joint
  - 8. Plan D97G: Corrugated Metal Pipe Coupling Details No. 7, Downdrain
  - 9. Plan D98A: Slotted Corrugated Steel Pipe Drain Details
  - 10. Plan D98B: Slotted Corrugated Steel Pipe Drain Details

1.4 DEFINITIONS

- A. AASHTO: American Association of State Highway and Transportation Officials
- B. ASTM: American Society for Testing Materials
- C. AWWA: American Water Works Association
- D. CMP: Corrugated metal pipe
- E. DIP: Ductile iron pipe
- F. HDPE: High-density polyethylene
- G. NPS: Nominal pipe size
- H. PE: Polyethylene
- I. PVC: Polyvinyl Chloride
- J. RCP: Reinforced concrete pipe

1.5 SUBMITTALS

- A. Follow submittal procedure outlined in Section 01 10 00, Supplemental General Requirements.
- B. Product data for the following:
  - 1. Piping materials and fittings
  - 2. Special pipe couplings
  - 3. Polymer-concrete, channel drainage systems (trench drains)
  - 4. Joint sealants
  - 5. Plastic area drains
  - 6. Cleanout plugs or caps
  - 7. Precast concrete catch basins, inlets, curb inlets, junction structures and area drains, including frames and grates
  - 8. Precast clean out boxes and box covers
  - 9. Concrete, metal and plastic flared end sections
- C. Shop drawings: Include plans, elevations, details and attachments for the following:
  - 1. Precast concrete manholes, frames and covers
- D. Design Mix Reports and Calculations: For each class of cast in place concrete
- E. Field Test Reports: Indicate and interpret test results for compliance with performance.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Delivery and Storage
  - 1. Piping: Inspect materials delivered to site for damage; store with minimum of handling. Store materials on site in enclosures or under protective coverings. Store plastic piping and jointing materials and rubber gaskets under cover out of direct sunlight. Do not store materials directly on the ground. Keep inside of pipes and fittings free of dirt and debris.
  - 2. Metal Items: Check upon arrival; identify and segregate as to types, functions, and sizes. Store off the ground in a manner affording easy accessibility and not causing excessive rusting or coating with grease or other objectionable materials.
- B. Handling
  - 1. Handle pipe, fittings, and other accessories in such manner as to ensure delivery to the trench in sound undamaged condition. When handling lined pipe, take special care not to damage linings of pipe and fittings; if lining is damaged, make satisfactory repairs. Carry do not drag, pipe to trench.
  - 2. Handle precast concrete pipe, manholes and other precast structures according to manufacturer's written instructions.
  - 3. Protect imported bedding and backfill material from contamination by other materials.

PART 2 - PRODUCTS

2.1 CAST IRON PIPE AND FITTINGS: 2 INCH THROUGH 15 INCH

- A. Hub and spigot, ASTM A74, service class
- B. Gaskets: ASTM C564, rubber, compression type, thickness to match class of pipe
- C. Special Pipe Coupling: ASTM C1173. Rubber or elastomeric sleeve and band assembly fabricated to match outside diameters of pipes to be joined

2.2 CORRUGATED METAL PIPE AND FITTINGS:

- A. CMP pipe shall be in accordance to Caltrans Standard Specification Section 66
- B. Bituminous Coating: Caltrans Standard Specification Section 66-1.02C
- C. Bituminous Lining: Caltrans Standard Specification Section 66-1.02C
- D. Bituminous Paving: Caltrans Standard Specification Section 66-1.02C
- E. Corrugated Aluminum Pipe: Caltrans Standard Specification Section 66-1.02F
- F. Corrugated Steel Pipe: Caltrans Standard Specification Section 66-1.02E
- G. Slotted Corrugated Steel Pipe: Caltrans Standard Specification Section 66-2

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- H. Details: Caltrans Standard Plans D97A, D97C, D97D, D97E, D97F, D97G, D98A and D98B

2.3 DIP: SIZES 4 INCH THROUGH 48 INCH

- A. Pipe conforming to AWWA C151 and C150
- B. Pipe: Pressure Class Pressure Class: Minimum pressure class for size indicated [Check loading and determine wall thickness if pipe is deep or shallow with AASHTO H20 loading]
- C. Pipe and Fitting Lining: Cement Mortar, AWWA C104
- D. Pipe and Fitting Coating: Asphaltic, AWWA C151 or C115
- E. Fittings
  1. Standard: AWWA C110, sizes 4 inch through 48 inch
  2. Compact: AWWA C153, sizes 4 inch through 24 inch
  3. All fittings shall be fusion epoxy coated per AWWA C116
- F. Exterior Soil Corrosion Protection for Pipe and Fittings: Polyethylene encasement, AWWA C105
- G. Unrestrained Joints (Rubber Gasket Joints):
  1. Push-On Bell and Spigot Joint: Provide shape of pipe ends and fitting ends, gaskets, and lubricant for joint assembly conforming to AWWA C111.
  2. Mechanical Joint: Dimensional and material requirements for pipe ends, glands, bolts and nuts, and gaskets shall conform to AWWA C111.
- H. Insulating Flanged Joints:
  1. Provide a rubber-gasketed or other suitable approved type of insulating joint or dielectric coupling which will effectively prevent metal-to-metal contact at the joint between adjacent sections of dissimilar metals.
  2. Provide joint of the flanged type with insulating gasket, insulating bolt sleeves, and insulating washers.
  3. Provide gasket of the dielectric type, full face, as recommended in AWWA C115.
  4. Provide bolts and nuts as recommended in AWWA C115.
- I. Couplings:
  1. Plain End Pipe to Plain End Pipe: Ductile iron or steel bolted couplings, manufacturer's shop coating with low alloy steel bolts and nuts. Steel couplings to conform to AWWA C219. Smith-Blair, Inc., Dresser, or approved equal.
  2. Plain End Pipe to Flanged Pipe: 1) Ductile iron or steel bolted flanged coupling adapters, manufacturer's shop coating with low alloy steel bolts and nuts. Steel flanged couplings to conform to AWWA C219. Smith-Blair, Inc., Dresser, or approved equal.

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### 2.4 PE PIPE AND FITTINGS (HDPE): 4 INCH THROUGH 10 INCH

- A. Pipe shall be in accordance with AASHTO M252 Type S, smooth interior and corrugated exterior
- B. Bell and spigot joints
- C. Bell and Spigot Joint Gasket: Elastomeric seal, ASTM F477
- D. Couplings: AASHTO M252, corrugated band type, engage a minimum of 4 corrugations, 2 on each side of pipe joint

### 2.5 PE PIPE AND FITTINGS (HDPE): 12 INCH THROUGH 48 INCH

- A. Pipe shall be in accordance to AASHTO M294. Type S, smooth interior and corrugated exterior.
- B. Bell and spigot joints
- C. Bell and Spigot Joint Gasket: Elastomeric seal, ASTM F477
- D. Couplings: AASHTO M252, corrugated band type, engage a minimum of 4 corrugations, 2 on each side of pipe joint

### 2.6 PVC PIPE AND FITTINGS-SMALLER THAN 4 INCH

- A. Pipe shall be in accordance to ASTM D1785, Schedule 40. [Check external load and laying condition, schedule 80 and 120 are also available if stronger pipe is required.]
- B. Joints: Solvent Cement, ASTM D2564
- C. Include primer according to ASTM F656
- D. Special Pipe Coupling: ASTM C1173. Rubber or elastomeric sleeve and band assembly fabricated to match outside diameters of pipes to be joined.

### 2.7 PVC PIPE, 4 INCH AND LARGER

- A. Pipe
  - 1. 4 inch through 15 inch: ASTM D3034, SDR 35
  - 2. 18 inch through 36 inch: ASTM F679, T-1 wall
- B. Bell and spigot joints
- C. Fittings:
  - 1. 4 inch through 27 inch: ASTM F1336
  - 2. 30 inch through 36 inch: ASTM D3034, SDR 35
- D. Joint Gasket: Elastomeric seal, ASTM F477
- E. Special Pipe Coupling: ASTM C 1173. Rubber or elastomeric sleeve and band assembly fabricated to match outside diameters of pipes to be joined

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### 2.8 REINFORCED CONCRETE PIPE

- A. Designated by Class, rubber gasketed joints, Type II or V cement
  1. Circular Reinforced Concrete Pipe: Caltrans Standard Specification Section 65-2.02C(2). Class III
  2. Oval shaped (Elliptical) Reinforced Concrete Pipe: Caltrans Standard Specification Section 65-2.02D. Class HE-III and VE-III
- B. Rubber Gasketed Joints: Caltrans Standard Specification Section 65-2.02F
- C. Special Pipe Couplings: Portland cement collar as indicated

### 2.9 PIPE ANCHORS

- A. General: Location, configuration bearing area, etc. as indicated
- B. Portland Cement Concrete: Section 32 13 18, Cement and Concrete for Exterior Improvements

### 2.10 PIPE CLEANOUTS

- A. Piping: Same as storm drain line if possible
- B. Top Plug or Cap: Same material as piping if possible. Plug or cap to be secure but removable, threaded or non-threaded.
- C. Box Size: As required to provide access and allow easy removal and reinstallation of cap
- D. Box Types
  1. Non-Traffic Areas: Portland cement concrete box and box cover, light duty
  2. Traffic Areas: Portland cement concrete box and box cover or steel or cast-iron cover, heavy duty, both box and cover to be rated for AASHTO H20 loading
- E. Box Cover Markings: "S.D.," unless otherwise specified
- F. Available Manufacturers: Subject to compliance with requirements, box manufacturers offering products that may be incorporated into the Project include, but are not limited to the following:
  1. Associated Concrete Products, Inc.
  2. Brooks Products Inc.
  3. OldCastle Precast/Christy Concrete Products, Inc.

### 2.11 AREA DRAINS

- A. Grate and Riser: Area drain shall be as manufactured by Nyloplast or approved equal. Riser shall be constructed of 6-inch PVC SDR 35 piping per paragraph 2.1(A) of this section and connected to area drain by a gasket joint. Riser shall be vertical except as otherwise noted in the plans. Riser may include a reducer if necessary to make connection to the storm drain line.

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- B. Elevation and Grading: Area Drain rim elevation shall be set and area around area drain shall be graded to drain away from any adjacent structures, walks, or roadways and towards area drain.

### 2.12 CURB INLETS, CATCH BASINS, DROP INLETS, JUNCTION STRUCTURES, AREA DRAINS, ETC.

- A. General: Size, shape, configuration, depth, etc. of structure and frame, grate, or cover shall be as indicated.
- B. Portland Cement Concrete and Reinforcing: Section 32 13 18, Cement and Concrete for Exterior Improvements.
- C. Precast Structure: Rate for AASHTO H20 loading in traffic areas.
- D. Steps: ASTM C 478 or AASHTO M199. Manufacture from deformed, ½ inch steel reinforcement rod complying with ASTM A615 and encased in polypropylene complying with ASTM D4101. Include pattern designed to prevent lateral slippage off step. Acceptable manufacturer is Hanson Concrete Products, (Milpitas, CA) (Tel 408-262-1091).
- E. Frames, Grates and Covers: Caltrans Standard Specification Section 75-1.02, 75-1.02.B and 75-2
  1. Galvanize steel frames, grates and covers
  2. Grates and covers shall be non-rocking
  3. Rate for AASHTO H20 loading in traffic areas

### 2.13 MANHOLES

- A. Manholes shall be pre-cast concrete of the size and shape shown on the Plans and shall conform to ASTM C478. Equivalent poured-in-place structures may be used at the Contractor's option. Concrete shall consist of Caltrans Type I/II cement. Rate for AASHTO H20 loading in traffic areas.
- B. All interior concrete surfaces shall be coated with "Xypex Crystalline" or approved equivalent. Use of a water-resistant admix is acceptable, at Contractor option.
- C. Frames and Covers: As indicated and in accordance with Caltrans Standard Specification Section 75-2.02B. Manhole covers shall have the words "STORM DRAIN" in letters not less than 2 inches cast into the cover. The clear opening for all manhole covers shall be 24 inches.
- D. Frames and lids for manholes shall be match-marked in pairs before delivery to the job site. The lids shall fit into their frames without rocking.
- E. Reinforcing Bars: Reinforcing bars shall be of intermediate grade billet steel conforming to ASTM A615 and shall be of the size shown on the Standard Details or in the Plans. Bars shall be of the round deformed type, free from injurious seams, flaws, or cracks, and shall be cleaned of all rust, dirt, grease and loose scales.

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- F. Portland Cement Concrete: Concrete for manhole bases, inlets, and other concrete structures shall conform to the requirements of Caltrans Standard Specifications Section 90 and as herein specified. The concrete shall be Class "A" containing six (6) sacks of portland cement per cubic yard of concrete. The grading of the combined aggregate shall conform with the CDT requirements of the three-quarter inch maximum. The consistency of the fresh aggregate shall be such that the slump does not exceed four inches, as determined by ASTM C143. The concrete shall have a minimum design compressive strength of 3,000 psi after 28 days.
- G. Steps: ASTM C478 or AASHTO M199. Manufacture from deformed, ½ inch steel reinforcement rod complying with ASTM A615 and encased in polypropylene complying with ASTM D4101. Include pattern designed to prevent lateral slippage off step. Acceptable manufacturer is Hanson Concrete Products or approved equal.

### 2.14 JOINT SEALANT FOR PRECAST STRUCTURES AND MANHOLES

- A. Mortar: Caltrans Standard Specification Section 51-1.02F
  - 1. Use to seal around pipes at connections to structures and manholes. Also use to seal joints between precast sections of structures and manholes.
- B. Gaskets: Preformed flexible rubber or plastic gasket
  - 1. Rubber Gaskets: ASTM C443
  - 2. Plastic Gaskets: Federal Specification SS-S-00210 (GSA-FSS), Type I, Rope Form; or alternate standard which may exist. Acceptable material is "Ram-Nek," as manufactured by Henry Company, or approved equal.

### 2.15 PIPE TO STRUCTURE CONNECTOR/SEAL

- A. A flexible pipe to manhole connector shall be used for all pipe penetrations to pre-cast and/or cast-in-place concrete structures.
  - 1. The seal shall provide a flexible, positive, watertight connection between pipe and concrete wastewater structures. The connector shall ensure that a seal is made between (1) the connector and the structure wall, and (2) between the connector and the pipe. The seal between the connector and the manhole wall shall be made by casting the connector integrally with the structure wall during the manufacturing process in such a manner that it will not pull-out during coupling. The seal between connector and pipe will be made by way of a stainless steel take down band compressing the gasket against the outside diameter of the pipe.
  - 2. The connector shall be molded from materials whose physical/chemical properties meet or exceed the physical/chemical resistant properties outlined in ASTM C923. The connector and stainless-steel hardware shall meet or exceed the performance requirements proscribed in ASTM C923.
  - 3. The connector shall be of size specifically designed for the pipe material being used and shall be installed in accordance with recommendations of the manufacturer.
  - 4. Connectors shall be Z-LOK or G3 connectors manufactured by A-LOK Products Inc. or approved equivalent.

### 2.16 POLYMER-CONCRETE TRENCH DRAINS

- A. General: Modular system of precast, polymer-concrete channel sections, grates, and appurtenances; designed so grates fit into channel recesses without rocking or rattling. Include number of units required to form total length required.
- B. Include the following components:

STORM UTILITY DRAINAGE PIPING

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1. Channel Sections: Interlocking-joint, precast modular units with end caps. Inside width as indicated with deep, rounded bottom, with built in slope or flat invert as indicated and outlets in number, sizes, and locations indicated. Include extension sections necessary for required depth.
  2. Frame and Grate: Gray iron, ductile iron or galvanized steel as indicated. Where drain is located in traffic areas, rate for AASHTO H20 loading.
- C. Locking Mechanism: Manufacturer's standard device for securing grates to channel sections.
- D. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Project include, but are not limited to, the following:
1. "Polydrain" by ABT Inc.
  2. "ACO Drain" by ACO Polymer Products Inc. , or approved equal

### 2.17 METAL, CONCRETE OR PLASTIC FLARED END SECTIONS

- A. General: Caltrans Standard Specification Section 70-5.02 and Caltrans Standard Plan D94A and D94B

### 2.18 SLOPE PROTECTION

- A. Rock Slope Protection: Caltrans Standard Specification Section 72-2.02B
1. Fabric: Caltrans Standard Specification Section 72-2.02C
- B. Concrete/Shotcrete Slope Protection: Caltrans Standard Specification Section 72-5
1. Bar Reinforcement: Caltrans Standard Specification Section 52-1.02B, minimum Grade 40
  2. Welded Wire Fabric: Caltrans Standard Specification Section 52-1.02C. Use 6 x 6-W1.4 x W1.4 unless otherwise indicated.
- C. Concreted-Rock Slope Protection: Caltrans Standard Specification Section 72-3
- D. Sacked Concrete Slope Protection
1. Concrete: Section 32 13 18 Cement and Concrete for Exterior Improvements
  2. Sacks: 10-ounce burlap measuring approximately 19.5 inches by 36 inches when empty and laid flat

### 2.19 CONCRETE/SHOTCRETE DITCH LINING

- A. General: Caltrans Standard Specification Section 72-5.02
1. Bar Reinforcement: Caltrans Standard Specification Section 52-1.02B, minimum Grade 40
  2. Welded Wire Fabric: Caltrans Standard Specification Section 52-1.02C. Use 6 x 6-W1.4 x W1.4 unless otherwise indicated.

## PART 3 - EXECUTION

### 3.1 PIPE INSTALLATION

- A. General: Install pipe, fittings, and appurtenances utilizing best practices, manufacturer's instructions, and in accordance with Section 6 and 7 of ASTM D 2321 for plastic pipe, Caltrans Standard Specification Section 65-2.03 for reinforced

concrete pipe, Caltrans Standard Specification Section 66-1.03 for corrugated metal pipe, and chapter 11.3.3 of AWWA M41 for cast iron and ductile iron pipe.

- B. Pipe Depth and Trench Configuration: Conform to typical trench section(s) indicated.
- C. Excavation, Bedding, Backfill, and Compaction: Section 31 21 00, Utility Trenching and Backfill
- D. Handling: Carefully handle during loading, hauling, unloading and placing operations to avoid breakage or damage. Use strap type slings for lifting and placing; no chains or hooks will be permitted. Comply with the manufacturer's recommendations.
- E. Laying: Before lowering pipe into the trench, remove all stakes, debris, loose rock and other hard materials from the bottom of the trench. Lay accurately in conformance with lines and grades indicated. Start laying the pipeline at the low end and proceed upstream. Lay bell and spigot pipe with the bell end facing upstream. Lay pipe on a bed prepared by handwork, dug true to grade. Furnish firm bearing for pipe throughout its entire length with bell holes provided at the ends of each pipe length of sufficient size to permit making up the particular type of joint being used. Adjust pipe to line and grade by scraping away or filling and tamping material under the body of the pipe for the entire pipe length and not by blocking or wedging. After final positioning, hold pipe in place in trench with backfill material placed equally on both sides of the pipe at as many locations as required to hold the pipe section in place.
- F. Curved Alignment: When necessary to conform to the alignment specifically indicated, lay pipe on a curved alignment by means of asymmetrical closure of joints or bending of the pipe barrel. Use shorter lengths of pipe than the standard length if necessary to achieve curvature specified. Do not exceed the recommendations of the pipe manufacture for deflections at the joints or pipe bending.
- G. Closure: Close open ends of pipes and appurtenance at the end of each day's work or when work is not in progress.

### 3.2 SPECIAL PIPE COUPLINGS

- A. General: Use where required to join piping and no other appropriate method is specified. Do not use instead of specified joining methods.
- B. Installation: Manufacturers' instructions

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### 3.3 INSTALLATION OF CURB INLETS, CATCH BASINS, DROP INLETS, JUNCTION STRUCTURES, AREA DRAINS, ETC. AND MANHOLES

- A. Excavation, Bedding, Backfill, and Compaction: Section 31 21 00, Utility Trenching and Backfill
- B. Poured in Place Structures: Install as indicated and Caltrans Standard Specification Section 51.
  - 1. Shape bottoms to convey flows as indicated.
- C. Precast Structures: Install as indicated.
  - 1. Seal all joints and pipe entrances and exits.
  - 2. Place concrete in bottom and shape to convey flows as indicated.

### 3.4 POLYMER-CONCRETE TRENCH DRAIN INSTALLATION

- A. Excavation, Bedding, Backfill, and Compaction: Section 31 21 00, Utility Trenching and Backfill
- B. Install: As indicated and in accordance with the manufacturer's instructions.

### 3.5 SLOPE PROTECTION PLACEMENT

- A. Rock Slope Protection: Caltrans Standard Specification Section 72-2.03 and as indicated.
  - 1. Use Method B Placement unless otherwise indicated.
- B. Concrete/Shotcrete Slope Protection: Caltrans Standard Specification Section 72-5.03
- C. Concreted-Rock Slope Protection: Caltrans Standard Specification Section 72-3.03
  - 1. Use Method B Placement unless otherwise indicated.
- D. Sacked Concrete Slope Protection
  - 1. Detailed configuration: As indicated
  - 2. Use one cubic foot of concrete per sack.
  - 3. Locate headers and stretchers as indicated.
  - 4. Headers: Folded end to bank
  - 5. Stretchers: Folded ends are not to be adjacent.
  - 6. Place no more than four vertical courses until initial set has taken place in first course.

### 3.6 CONCRETE/SHOTCRETE DITCH LINING PLACEMENT

- A. Concrete/Shotcrete Slope Protection: Caltrans Standard Specification Section 72-5.03

### 3.7 POURED-IN-PLACE CONCRETE

- A. Concrete shall be mixed in accordance with applicable provisions of Section 90 of Caltrans Standard Specifications.

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- B. Construction of concrete structures shall conform to applicable provisions of Section 51 of the Caltrans Standards Specifications. Unless otherwise noted herein or in the Plans, exposed surfaces of structures shall be Class 1 surface finish.
- C. Curing shall conform to applicable portions in Section 90 of Caltrans Standard Specifications. No pigment shall be used in curing compounds. All work shall be subject to inspection. No concrete shall be placed until the Project Manager has approved the forms and reinforcement.
- D. Concrete shall not be dropped freely where reinforcing bars will cause segregation, nor shall it be dropped freely more than six feet. Spouts, elephant trunks, or other approved means shall be used to prevent segregation.

### 3.8 PIPELINE FLUSHING

- A. Newly constructed storm drainpipes shall be flushed with water to clean. A metal screen shall be used to collect and remove any rock, silt and other debris that is flushed out during cleaning.

### 3.9 DEFLECTION TESTING

- A. Upon completion of work, perform a deflection test on entire length of installed plastic pipeline. Completed work includes superimposed loads adjacent to and over the pipeline, such as compacted backfill and earthwork, and does not include paving, concrete curbs and gutters, sidewalks, walkways, and landscaping.
- B. Under external loads, deflection of pipe in the installed pipeline shall not exceed 4.5 percent of the average inside diameter of pipe.
- C. Determine whether the allowable deflection has been exceeded by use of a pull-through device or a deflection-measuring device.
- D. Pull-Through Device:
  - 1. Provide a spherical, spheroidal, or elliptical ball, a cylinder, or circular sections fused to a common shaft.
    - a. Circular sections shall be so spaced on the shaft that distance from external faces of front and back sections will equal or exceed diameter of the circular section.
    - b. Pull-through device may also be of a design approved by the Uni-Bell Plastic Pipe Association, provided that the device meets the applicable requirements specified in this paragraph, including those for diameter of the device.
  - 2. Ball, cylinder, or circular sections shall conform to the following:
    - a. A diameter, or minor diameter as applicable, of 95 percent of the average inside diameter of the pipe; tolerance of plus 0.5 percent will be permitted.
    - b. A homogeneous material throughout, with a density greater than 1.0 as related to water at 39.2 degrees F, and a surface Brinell hardness of not less than 150.

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- c. Center bored and through bolted with a ¼ inch minimum diameter steel shaft having a yield strength of not less than 70,000 pounds per square inch, with eyes or loops at each end for attaching pulling cables.
    - d. Each eye or loop shall be suitably backed with a flange or heavy washer such that a pull exerted on opposite end of shaft will produce compression throughout remote end.
  - 3. Pull-Through Device:
    - a. Pass the pull-through device through each run of pipe, either by pulling it through or flushing it through with water.
    - b. If the device fails to pass freely through a pipe run, replace pipe which has the excessive deflection and completely retest in same manner and under same conditions as specified.
- E. Deflection measuring Device:
  - 1. Sensitive to 1.0 percent of the diameter of the pipe being tested and accurate to 1.0 percent of the indicated dimension.
  - 2. Obtain approval of deflection measuring device prior to use.
- F. Deflection Measuring Device Procedure:
  - 1. Measure deflections through each run of installed pipe.
  - 2. If deflection readings in excess of 4.5 percent of average inside diameter of pipe are obtained, retest pipe by a run from the opposite direction.
  - 3. If retest continues to show a deflection in excess of 4.5 percent of average inside diameter of pipe, remove pipe which has excessive deflections, replace with new pipe, and completely retest in same manner and under same conditions.
- G. Warranty Period Test: Pipe found to have a deflection of greater than 5 percent of average inside diameter when deflection test is performed just prior to end of 1 year warranty period shall be replaced with new pipe and tested as specified for leakage and deflection.

### 3.10 CLEANING

- A. Thoroughly clean storm drain lines, manholes, catch basins, field inlets, culverts, and similar structures, of dirt, debris, and obstructions of any kind.

END OF SECTION 334100

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## SECTION 334600 - SUBDRAINAGE

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Subdrains in trenches and subdrains or prefabricated composite drainage panels at walls or foundations
- B. Bioretention and biofiltration areas for storm water treatment

#### 1.2 RELATED SECTIONS

- A. Section 31 23 33, Utility Trenching and Backfill
- B. Section 33 41 00, Storm Utility Drainage Piping

#### 1.3 RELATED DOCUMENTS

- A. Geotechnical Report: Geotechnical Study Report, Project Number: 4541.005.PW.1, prepared by RGH Consultants and dated November 12, 2024.
- B. AASHTO
  - 1. M288: Standard Specification for Geotextiles Used for Subsurface Drainage Purposes
- C. ASTM
  - 1. C1173: Standard Specification for Flexible Transition Couplings for Underground Piping Systems
  - 2. D448: Standard Classification for Sizes of Aggregate for Road and Bridge Construction
  - 3. D1621: Standard Test Method for Compressive Properties of Rigid Cellular Plastics
  - 4. D1785: Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120
  - 5. D2321: Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications
  - 6. D2564: Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems
  - 7. D2729: Standard Specification for Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings
  - 8. D3034: Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings
  - 9. D4716: Standard Test Method for Determining the (In-Plane) Flow Rate per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head
  - 10. F477: Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe
  - 11. F656: Standard Specification for Primers for Use in Solvent Cement Joints of Poly(Vinyl Chloride) (PVC) Plastic Pipe and Fittings
  - 12. F1336: Standard Specification for Poly(Vinyl Chloride) (PVC) Gasket Sewer Fittings

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- D. Caltrans Standard Specifications, 2022
  - 1. Section 68-Subsurface Drains
  - 2. Section 96-Geosynthetics

### 1.4 DEFINITIONS

- A. AASHTO: American Association of State Highway and Transportation Officials
- B. ASTM: American Society for Testing and Materials
- C. PVC: Polyvinyl Chloride

### 1.5 SUBMITTALS

- A. Follow submittal procedure in accordance with Section 01 10 00, Supplemental General Requirements.
- B. Product data for the following:
  - 1. Perforated pipe and fittings
  - 2. Solid pipe and fittings
  - 3. Geotextile fabrics
  - 4. Cleanout plugs or caps
  - 5. Precast clean out boxes and box covers
  - 6. Drainage bubblers
  - 7. Bioretention soil material

### 1.6 DELIVERY, STORAGE AND HANDLING

- A. Do not store plastic structures, pipe, and fittings in direct sunlight.
- B. Protect pipe, pipefittings, and seals from dirt and damage.
- C. Protect permeable material from contamination by other materials.

## PART 2 - PRODUCTS

### 2.1 PERFORATED WALL AND SOLID WALL PIPE

- A. PVC pipe and Fittings Smaller than 4-inch:
  - 1. Pipe: ASTM D1785, Schedule 40. Solvent cement joints
  - 2. Solvent Cement: ASTM D2564. Include primer according to ASTM F656.
  - 3. Perforation Size, Location, and Spacing: ASTM D2729
- B. PVC Pipe and Fittings 4-inch through 15-inch:
  - 1. Pipe: ASTMD3034, SDR 26. Bell and spigot joints
  - 2. Perforation Size, Location, and Spacing: ASTM D2729
  - 3. Fittings: ASTM F1336
  - 4. Joint Gasket: Elastomeric seal, ASTM F477

### 2.2 SPECIAL PIPE COUPLINGS

- A. Description: ASTM C1173. Rubber or elastomeric sleeve and stainless-steel band assembly fabricated to match outside diameters of pipes to be joined.

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### 2.3 CLEANOUTS

- A. Piping: Same as subdrain pipe without perforations.
- B. Top Plug or Cap: Same material as piping if possible. Plug or cap to be secure but removable, threaded or non-threaded.
  - 1. Size box to provide access and allow easy removal and reinstallation of plug or cap.
  - 2. Types:
    - a. Non-Traffic Areas: Portland cement concrete box and box cover, light duty.
    - b. Traffic Areas: Portland cement concrete box and box cover or steel or cast-iron cover, heavy duty, both box and cover to be rated for AASHTO H20 loading.
- C. Cover Markings: "STORM DRAIN" unless otherwise specified.
  - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Project include, but are not limited to, the following:
    - a. Associated Concrete Products, Inc.,
    - b. Brooks Products Inc.,
    - c. Christy Concrete Products, Inc., or approved equal

### 2.4 BIORETENTION OR BIOFILTRATION TREATMENT SOIL

- A. Soil specification shall meet requirements of local agency having authority or sustainability requirements for projects achieving environmental goals.
  - 1. For projects located within jurisdictions following the Santa Rosa Low Impact Development Technical Design Manual, the Contractor shall provide submittal information verifying conformance to BMP requirements.

### 2.5 DRAINAGE FILL MATERIAL

- A. Permeable Material: Conform to Section 68-2.02F(3) of Caltrans Standard Specifications, Class 2.
- B. Washed, evenly graded mixture of crushed stone, or crushed or uncrushed gravel, ASTM D 448, coarse aggregate, Sieve No. 57, with 100 percent passing 1-1/2-inch sieve and not more than 5 percent passing No. 8 sieve

### 2.6 GEOSYNTHETICS

- A. When required, use filter fabric for encasing permeable material around subdrains.
  - 1. Caltrans Filter Fabric: Section 96-1.02B of Caltrans Standard Specifications,
  - 2. Mirafi 140N (by Tencate Geosynthetics/Mirafi Inc.) or approved equal.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine surfaces and areas for suitable conditions where subdrainage systems are to be installed.
- B. Install only after unsatisfactory conditions have been corrected.

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### 3.2 PIPING APPLICATIONS

- A. Refer to Plans for location, size, and material designation for individual subdrains.

### 3.3 INSTALLATION OF PERFORATED PORTIONS OF SUBDRAINS

- A. Excavation: Section 6 of ASTM D2321 and as indicated.
- B. Subdrain Bedding: Place supporting layer of drainage fill over compacted subgrade to compacted depth indicated. If drainage fill requires encasement in filter fabric, lay filter fabric in trench and overlap trench sides before installing drainage fill.
- C. Piping Installation: Install pipe in accordance with Section 7 of ASTM D2321. Install piping beginning at low point of system, true to grades and alignment indicated, with unbroken continuity of invert. Excavate recesses for bottoms of bell ends of pipe. Lay pipe with bells facing upslope and with spigot end centered fully into adjacent bell. Bed piping with full pipe bearing in drainage fill material. Lay perforated pipe with perforations down. Install gaskets, seals, sleeves, and couplings in accordance with manufacturers' written instructions. Use increasers, reducers, and couplings made for different sizes of materials of pipes and fittings being connected. Reduction of pipe size in direction of flow is prohibited.
- D. Initial Subdrain Backfill: After installing drainage piping, add drainage fill up to top of pipe to perform tests.
- E. Testing Subdrain: After installing drainage fill to top of pipe, test drain piping with water to ensure free flow before backfilling with drainage fill. Remove obstructions, replace damaged components, and repeat test until results are satisfactory.
- F. Subsequent Subdrain Backfill: After satisfactory testing, cover piping with drainage fill to width and height indicated. Place drainage fill in layers not exceeding 3 inches in loose depth; compact each layer placed. If filter fabric is required complete the filter fabric encasement by bringing fabric to top and closing the encasement.
- G. Fill to Grade: Place native fill material over compacted drainage fill to thickness indicated. Place material in loose-depth layers not exceeding 6 inches. Thoroughly compact each layer. Fill to finish elevations.

### 3.4 INSTALLATION OF NON-PERFORATED PORTIONS OF SUBDRAINS

- A. Conform to Sections 31 23 33, Utility Trenching and Backfill and 33 41 00, Storm Utility Drainage Pipe.

### 3.5 INSTALLATION OF RAIN GARDENS, BIORETENTION OR BIOFILTRATION TREATMENT AREAS

- A. The Contractor shall excavate rain gardens / treatment areas to the elevations and dimensions specified on the plans. Level surface of area of top of treatment soil shown on the plans shall govern actual length and width dimensions if shown on the plans. In-situ soils shall not be further compacted.
- B. Direct the use of heavy equipment and construction traffic around rain gardens so as to avoid compaction, to the extent possible.

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- C. After initial site grading, the Contractor shall provide temporary protection from curb cuts and other potential inflow entrances so that runoff drainage does not enter the rain gardens during construction and installation.
  - 1. Treatment areas / rain gardens may be used as sediment settling facilities during mass excavation and commensurate construction activities.
  - 2. Prior to commencing work in rain gardens, the Contractor shall remove and properly dispose of all accumulated sediments.
- D. Excavated soils shall be placed with stockpiled fill and properly disposed and stabilized by the Contractor.
- E. Subdrain installation:
  - 1. Subdrain shall be installed as indicated on the plans at an elevation within the drain rock layer shown on the construction details and connected to the overflow or outfall structure at the invert elevation shown on the plans.
  - 2. For connections of the perforated drainpipes to storm drainage structures, appropriately sized holes shall be cut in the structures at the correct inverted elevation specified by the Project Designer or authorized representative. The connections shall be sealed sediment-tight and secured in place with mortar or other approved joint sealant compatible with subdrain pipe materials.
  - 3. Drain rock layer shall be approved Class II Permeable Material. Crushed rock or aggregate base cannot be used within the treatment area, in, around or under the drain rock layer.
  - 4. Care shall be exercised to prevent natural or fill soils from intermixing with the drain rock surrounding the underdrain. All contaminated drain rock shall be removed and replaced with uncontaminated Class II permeable material.
  - 5. Attach subdrain piping to overflow structure.
  - 6. Install cleanouts at the ends of the subdrains. Install screw-on end caps set flush with the finished top of treatment soil.
- F. Overflow drain structure:
  - 1. Install overflow structure at the elevation and location specified on the plans. Attach subdrain piping to overflow structure. Attach solid pipe from overflow structure outfall storm drain system at elevation and slope indicated on the plans.
  - 2. Rim elevation of overflow structure must be set above the elevation of the top of treatment soil by the amount indicated on the plans, typically 6 inches. Contractor shall verify that the rim elevation of the overflow structure is also a minimum of 2 inches below the lowest elevation of the treatment area perimeter so that storm flows will reach the overflow rim before the top of the treatment area perimeter.
  - 3. The overflow structure shall have an open bottom filled with drain rock if indicated on the plans. This should be installed where the overflow structure has a sump condition (subdrains lower than the outfall invert elevation). The overflow structure shall be installed such that the bottom of the structure is set a minimum of 6-inches below the undisturbed bottom of the treatment area. Drain rock in the overflow sump shall be installed up to the invert of the lowest pipe connected to the structure.

- G. Filter media soil backfill
  - 1. Filter soil of the approved specification shall be installed to the elevation indicated on the plans. Care should be taken to ensure that the soil is not compacted, and that no equipment is driven on the backfill. Walking on the backfill should be limited to what is absolutely necessary.
- H. Planting soil, plantings, and mulch shall be installed per the plans. Non-floating bark / mulch shall be used, if indicated, to prevent removal of material and clogging of the overflow.
- I. Testing of the treatment area should be conducted once the filter media is installed, and all storm drain piping is connected. The area should allow an infiltration rate well above 5 inches/ hour to ensure that the treatment area will continue to function at 5 inches/ hour over the lifetime of the treatment area.

### 3.6 PREFABRICATED COMPOSITE DRAINAGE PANELS

- A. Coordinate placement with other drainage materials.
- B. Install prefabricated drainage panels in accordance with manufacturer's instructions.
- C. Place perforated drainage pipe at base of footing and attach to composite drainage panels in accordance with the manufacturer's instructions.

### 3.7 JOINING PIPE

- A. Join PVC pipe and fittings with elastomeric seals according to ASTM D2321 or solvent cement.
- B. Special pipe couplings: Join piping made of different materials and dimensions with special couplings made for this application. Use couplings that are compatible with and that fit both pipe materials and dimensions.

### 3.8 CLEANOUT INSTALLATION

- A. Cleanout piping to be the same size as the subdrain piping to which it is attached.
- B. Install cleanouts from subdrainage piping to grade. Locate cleanouts at beginning of piping run, at changes in direction, and other locations indicated.
- C. Do not allow clean out box to bear on clean out riser.

### 3.9 CLEANING

- A. Clear interior of installed piping and structures of dirt and other superfluous material as work progresses. Maintain swab or drag in piping and pull past each joint as it is completed. Place plugs in ends of uncompleted pipe at end of each day or when work stops.

3.10 RETAINING WALL DRAINAGE

- A. Unless otherwise specified, drain system should consist of a minimum of 12 inches thick free-draining granular materials containing less than five percent fines passing a No. 200 sieve placed adjacent to the wall. Free-draining granular material should be graded to prevent the intrusion of fines or encapsulated in a suitable filter fabric. As an alternative, a prefabricated drainage structure, such as geo-composite, or approved equivalent, may be used as a substitute for the granular backfill adjacent to the wall.
  
- B. Drainage system consisting of either weep holes or perforated drain lines (minimum 4-inch diameter placed near the base of the wall) should be used to intercept and discharge water which would tend to saturate the backfill. Where used, drain lines should be embedded in uniformly graded filter material and provided with adequate clean-outs for periodic maintenance.
  
- C. An impervious soil should be used in the upper one-foot layer of backfill to reduce the potential for water infiltration.

END OF SECTION 334600

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SECTION 337173 - ELECTRIC UTILITY SERVICES

PART 1 - GENERAL

1.1 SUMMARY

- A. Arrange and coordinate with Utility Company for permanent electric service, service provisions and utility metering equipment.

1.2 RELATED SECTIONS

- A. Section 260500: Common Work Results for Electrical
- B. Section 260519: 600-Volt Power Conductors and Cables
- C. Section 260526: Grounding and Bonding for Electrical Systems
- D. Section 260533: Raceway and Boxes for Electrical Systems
- E. Section 260553: Identification for Electrical Systems
- F. Section 262416: 600-Volt Rated Panelboards & CB

1.3 SUBMITTALS

- A. In accordance with Division 1 requirements.
- B. Submit copy of switchboard, / switchgear Service entrance Compartment to Utility Company for their review and approval prior to fabrication of the equipment.

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with Utility Company written requirements.
- B. Maintain one copy of each document on site.

1.5 FIELD MEASUREMENTS

- A. Verify field measurements are as indicated.

1.6 COORDINATION

- A. Coordinate relocation of any overhead or underground lines interfering with the construction with utility company.

PART 2 - PRODUCTS

2.1 SERVICE DESCRIPTION

- A. Utility Company name and contact person or representative are indicated on the drawings.
- B. Electrical Service System Characteristics: 1600 Amp, 208Y/120 Volt, 3-phase, 4-wire.
- C. Service Entrance:
  - 1. Underground service entrance to switchboard service termination section.

2.2 UTILITY METERS

- A. Utility revenue meter will be furnished and installed by Utility Company.

2.3 UTILITY METER BASE

- A. Utility revenue meter base rated for the service size requested. Coordinate with Utility Co. prior to release of Switchboard procurement order.

2.4 ACCEPTABLE MANUFACTURERS

- A. Refer to Section 260500, Part 2 - Products
- B. List of Equipment Manufacturers:
  - 1. Main Switchboard
    - a. Westinghouse/Cutler Hammer
    - b. General Electric
    - c. Industrial Electric Manufacturing
    - d. Electrical Power Products
    - e. Square D
  - 2. Panelboards
    - a. Shall match manufacturer of main switchboard

2.5 MATERIALS

- A. Provide and install conduits for primary cables by utility company, concrete pad and grounding for utility company transformer, and conduit for secondary service to main switchboard. Comply with all Utility Co. requirements.
- B. Furnish and install telephone and cable television service conduits and pullboxes; install conduits to main backboard as shown. All work shall conform to utility company requirements and to Section 260500.

C. Grounding:

1. Provide and install grounding system as noted on the Drawings.
2. Grounding electrode conductor: bare stranded copper type, #4/0 minimum.
3. Install ground wires in rigid conduit.
4. All grounding electrode conductor connections "thermite" or "cad-weld" welded.
5. Use approved pressure type solderless connector or use fusion welding for all connections to and bonding of grounding electrode system. All connections shall be visible, readily accessible for testing purposes. Grounding electrode conductor between the grounding electrode and service equipment: Minimum #4/0.
6. Furnish and install solid copper 3/4" x 10'-0" ground rod(s). Where multiple ground rods are shown, install a minimum of 20'-0" apart. Install ground rods in accessible boxes with covers. Furnish and install 2-#4/0 bare copper cables between multiple ground rods and main switchboard ground bus.
7. Terminate grounding conduits at equipment with ground bushing, with ground wire connected through bushing.
8. Provide No. 12 stranded (green) THHN conductor from outlet box to ground screw of every receptacle.
9. Ground all isolated sections of metallic raceways.
10. Provide #12 minimum stranded (green) THHN conductor sized per NEC, or as noted, connected continuously throughout branch circuit for all circuits, bonded to panel ground bus, and to all electrical devices and equipment enclosures
11. Use approved pressure type solderless connector or use fusion welding for all connections to grounding electrode. Connection visible, readily accessible for testing purposes. Grounding electrode conductor between the grounding electrode and service equipment: Minimum #4/0.
12. Connect grounding electrode system to metallic water service entry metallic cold-water pipe (if available) with nonferrous clamp and bare copper cable (sized as required) in conduit. Connection shall be accessible for inspection.
13. Connect grounding electrode system to building steel as noted on Drawings. Use exothermic weld, connection shall be accessible for inspection.
14. After installation, test system using the three-point fall of potential method only. Record results and submit to Architect for approval. If resistance to ground exceeds three (3) ohms, install additional ground rods, bonded and interconnected to grounding electrode system. Provide additional grounding until resistance is less than three (3) ohms.

2.6 MAIN SWITCHBOARD

- A. General: Switchboard shall be distribution panel type, Nema 3R metal enclosure with ground bus and insulated full capacity neutral bus.
- B. The switchboard shall be braced for a short circuit current shown on drawings. Bracing shall be per NEMA and UL standards.
- C. The switchboard shall comply with all the requirements of the Utility Company.
- D. The switchboard shall be pad-mounted, self-supporting, dead-front and rear, front-operated, front-connected, distribution type. The enclosure shall be 90 inches high, made of cold rolled steel on a structural shape, or formed, steel frame and shall be mounted on two 3-inch, 5-pound continuous channel iron sills, which shall be closed at the ends between the two channels.
- E. This contractor is responsible for the complete installation of the new switchboard within the space provided (both vertical and horizontal) and shall verify and/or coordinate all dimensions prior to ordering equipment. Proper allowances should be included to allow complete installation and erection.

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- F. The switchboard shall be a minimum of 20 inches deep and shall be constructed of National Electrical Code (NEC) gauge steel.
- G. The switchboard shall be provided with a cable pull section at the top of the switchboard. Provide a minimum of 12 inches of vertical clearance between the cable terminal lugs bolted to the switchboard busses and the top and bottom of the switchboard enclosure. Horizontal pull sections and gutters shall be kept free and clear of busses. Where busses cross vertical pull sections, the busses shall be insulated.
- H. All connections between bus bars shall be of a bolted type using Belleville washers. Clamps will not be accepted. All bus bars shall be accurately formed, and all holes shall be made in a manner which will permit bus bars and connections to be fitted into place without being forced.
- I. The design of all current-carrying devices or parts of the switchboard shall conform to the standard specified in the related sections of Underwriters' Laboratories, Inc. (UL) No. UL-891 and National Electric Manufacturer's Association (NEMA) Standard PB-2, except as these characteristics may be modified herein.
- J. Bus bars, connection bars and wiring on the back of the switchboard shall be arranged so that maximum accessibility is provided for cable connections from the front.
- K. Ampere ratings for rectangular bus bars shall be in accordance with the temperature rise standard of National Electric Manufacturer's Association (NEMA) and the Underwriters' Laboratories, Inc. (UL).
- L. The enclosure shall be chemically cleaned by Parkerizing, Bonderizing or Phosphorizing as a unit after all welding has been completed. The enclosure shall then be painted with a rust-resisting primer coat of paint and shall be finished with a coat of light gray, baked enamel.
- M. Each section shall be bussed for the full connected load of that section. Extend bussing to spare circuit breaker "Spaces." Drill busses for future circuit breakers and provide breaker connector hardware as required.
- N. Provide copper bus bars and connections with silver-plated contact surfaces.
- O. The contact surfaces and studs of all devices to which bus connections are made shall also have silver-plated surfaces.
- P. Locate ground bus, with a cross-section equal to at least 25 percent of the capacity of the main bus rating, in the back of the switchboard and extend bus throughout the length of the switchboard assembly. Ground each housing of the assembly directly to this bus.
- Q. Rigidly support all bus and connection bars and current transformers.
- R. Fit all nuts and connections with locking devices to prevent loosening.
- S. Provide load connections with solderless lugs. Factory-install all devices shown on Drawings as specified herein.
- T. Properly identify the "high leg" of 4-wire delta connected systems as required by NEC 384-3(e).
- U. Provide half-inch copper braid pigtail at side of switchboard enclosure for termination of signal system ground cables. Pigtail to be located on side of distribution section.

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- V. Provide ground fault protection when indicated on the single line diagram or where otherwise noted on the plans. Protection shall consist of a current sensor, relaying device, and the appropriately sized main overcurrent protection device.
- W. Provide a bonding strap from the equipment ground bus to the neutral bus.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. In accordance with Division 1 requirements.
- B. Verify that service equipment is ready to be connected and energized.

#### 3.2 INSTALLATION

- A. Install service entrance conduits from pull box to building service entrance equipment. Utility Company will provide service entrance conductors.
- B. Electric Service: Coordinate with Pacific Gas & Electric and district for electric service. Furnish and install all materials and labor necessary for complete installation as noted on drawings. Submit shop drawings and obtain approval from the Utility Co. prior to fabrication.
- C. Excavate and trench as necessary for the electrical installation, and when the work has been installed, inspected and approved, backfill all excavations with clean earth from excavation, or imported sandy soil in maximum 8" (eight-inch) layers, moisten and machine tamp to 95% compaction, and restore the ground and/or paving or floor surfaces to their original condition.

END OF SECTION 337173